US

BÜHLER TECHNOLOGIES

GAS ANALYSIS

COMPONENTS AND SYSTEMS FOR GAS CONDITIONING & PARTICLE MONITORING

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US

V04.19

BÜHLER TECHNOLOGIES

GAS ANALYSIS

COMPONENTS AND SYSTEMS FOR GAS CONDITIONING & PARTICLE MONITORING

GAS ANALYSIS

INNOVATIVE, DIVERSE AND EFFICIENT

In many areas of manufacturing, energy production and environmental protection, continuously monitoring process data, limits and occupational safety are key for efficient and safe equipment operation.

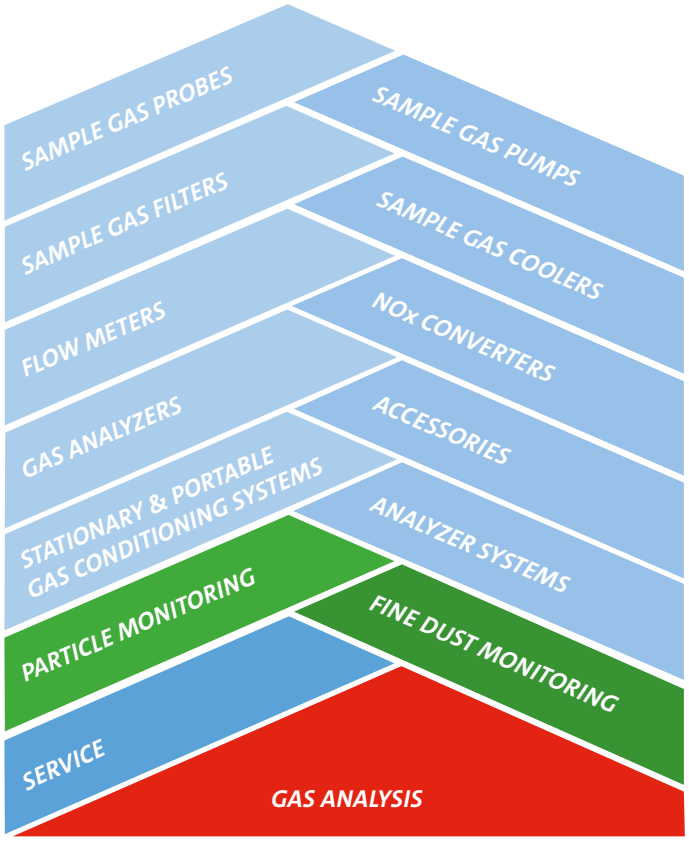
Analyzing the process atmosphere from gas and particle emissions as well as immission affecting the environment are a key task. Many of the analysis methods used in these areas require extracting the sample gas. Process-related contaminants such as particles or moisture are inevitably also extracted. These in turn can impact the readings or damage the measuring cells of the high-quality analyzers. The sample gas therefore needs to be conditioned before it enters the analyzer. Depending on the application, this conditioning uses multiple stages. It starts at the sample gas extraction point and ends with releasing or returning the gas once it has been analyzed. Based on the often toxic and/or corrosive nature of the sample gas, conventional standard components from general measuring and control technology cannot be used.

Reliable analysis systems require devices and components developed specifically for this field of application.

In workplace and environmental monitoring the fine particle concentration is becoming more and more important. Here, network-compatible monitors with a modern digital connection are the first choice.

Filter monitors offer optimal conditions for monitoring particulate emissions in waste gas streams, e.g. of dust filters, to ensure active filter management.

Bühler Technologies has been a world renowned technology driver for this sophisticated equipment for 50 years.



COMPONENTS / ANALYSIS SYSTEMS

SAMPLE GAS PROBES

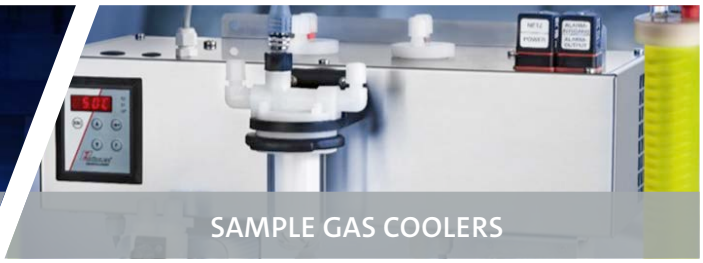
Sample gas probes are a critical point between process and analysis system. They must be able to extract sample gas from the process stream unaltered and supply it for further transport to the analyzer system.

SAMPLE GAS FILTERS

Even if the particulate was already removed at the sampling point using an effective particle filter in the sample gas probe, there's still a risk of fine particles entering the measuring system. Effective analysis filters are therefore required.

SAMPLE GAS PUMPS

If the process pressure is not adequate to safely transport sufficient amounts of the sample gas to the analyzers, reliable and noncorrosive sample gas pumps are needed.

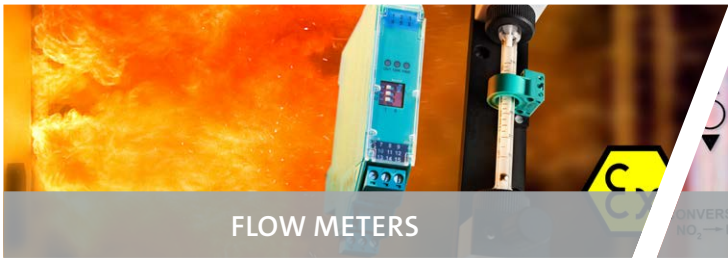


SAMPLE GAS COOLERS

One important element in gas conditioning is removing any moisture from the gas. We offer various gas cooler models for this purpose. Plus the necessary accessories such as condensate removal and moisture detectors. Precoolers and water coolers / gas scrubbers complete the sample gas cooler line.

GAS CONDITIONING

COMPONENTS / ANALYSIS SYSTEMS



FLOW METERS

Reliable analysis results require consistent operating conditions. This also includes setting and monitoring the flow rate precisely. At the same time, flow meters serve as filter monitors.

NOx CONVERTERS

Nitrogen oxide emission need to be reduced and monitored to protect humans and the environment. The BüNOx 2+ converter series converts these to a measurable quantity. Advantages of these devices are high energy efficiency, converter materials with a high conversion rate and optional built-in bypass valves.

ACCESSORIES

A range of useful accessories such as needle valves, ball valves and different screw fittings make it easier for the plant manufacturer to plan and implement systems specifically suited for gas analysis.

GAS ANALYZERS

The selective program based on 50 years of experience includes in situ or “Closed-coupled extractive” analyzers, portable gas analyzers, stationary devices for extractive analyzer systems. Implementable depending on the application: paramagnetic measuring cells, ZrO_2 modules, IR and UV banks, electrochemical cells.

PORTABLE GAS CONDITIONING SYSTEMS

The gas analyzers used to monitor emissions are available as stationary or portable analysis systems.

ANALYZER SYSTEMS

We provide both prefabricated, modular 19” systems for one or multiple gas paths as well as custom analyzer systems.

MONITORING

PARTICLE AND FINE DUST MONITORING

The user-friendly particle monitors in our BDA series are high-quality systems for monitoring fabric filters and other separators.

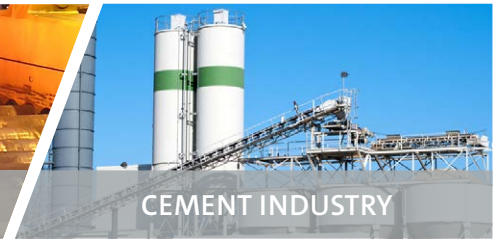
Network-compatible monitors for monitoring the fine dust concentration in buildings and the environment.

SERVICE

HERE FOR YOU AROUND THE CLOCK

Individuality and flexibility are also the focus of our services. Our service team is not only a reliable point of contact for Bühler Technologies products, but also beyond, for products from other manufacturers.

GAS ANALYSIS INDUSTRIES



GAS ANALYSIS

INNOVATIVE, DIVERSE AND EFFICIENT

BUHLER TECHNOLOGIES LLC
1030 West Hamlin Road
Rochester Hills, MI 48309 • United States

P +1 248.652.1546 • F +1 248.652.1598
sales@buhlertech.com
www.buhlertech.com

Your Contact to Buhler Technologies LLC

Gas Analysis

SALES

Division/Product range	Contact person/Adress	Phone & E-Mail
Vice President Sales & Marketing	**Oliver Fries** Buhler Technologies LLC 1030 West Hamlin Road Rochester Hills, MI 48309	Tel: 248.652.1546 Fax: 248.652.1598 Cell: 248.797.2760 E-Mail: oliver@buhlertech.com
Technical Sales Manager East region	**Larry La France** Buhler Technologies LLC 1030 West Hamlin Road Rochester Hills, MI 48309	Cell: 248.792.1147 E-Mail: larry@buhlertech.com
Inside Sales Support Gas Analysis/Fluidcontrol	**Douglas Prange** Buhler Technologies LLC 1030 West Hamlin Road Rochester Hills, MI 48309	Tel: 248.652.1546 Fax: 248.652.1598 E-Mail: douglas@buhlertech.com
CFO North America	**Melissa Cooper** Buhler Technologies LLC 1030 West Hamlin Road Rochester Hills, MI 48309	Tel: 248.652.1546 Fax: 248.652.1598 E-Mail: melissa@buhlertech.com
Administrative Assistant	**Melanie Lefeve** Buhler Technologies LLC 1030 West Hamlin Road Rochester Hills, MI 48309	Tel: 248.652.1546 Fax: 248.652.1598 E-Mail: melanie@buhlertech.com
General Sales Support	**Buhler Technologies LLC** 1030 West Hamlin Road Rochester Hills, MI 48309	Tel: 248.652.1546 Fax: 248.652.1598 E-Mail: sales@buhlertech.com

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Bühler representatives abroad

Your contact in EUROPE

BELGIUM
Ecotechnic
Rue Rodenbach, 69.
B-1160 Bruxelles
Tel. +32 2 672 0752
Fax +32 2 672 6156
sales@ecotechnic.be
www.ecotechnic.be

FRANCE
Bühler Technologies GmbH
Frédéric Chaigne
Tel. +33 631 27 11 92
f.chaigne@buehler-technologies.com
www.buehler-technologies.com

GREAT BRITAIN
DRM Technic Ltd.
Unit 18, Trendham Lakes Technology Park
Longton Road, Trentham
Stoke-on-Trent, ST4 8LJ,
United Kingdom
Tel. +44 1782 326 632
Fax +44 7791 537 235
mail@drmtechnic.com
www.drmtechnic.com

NETHERLANDS
Analytical Solutions and Products B.V.
Distelweg 80M
NL-1031 HH,
Amsterdam
Tel. +31 20 4924 748
Fax +31 20 3372 798
info@asap.nl
www.asap.nl

AUSTRIA
SICOM Prozeß- und Umwelttechnik GmbH
Westbahnstr. 4
A-4470 Enns
Tel. +43 7223 81250
Fax +43 7223 84786
simon@sicom.at
www.sicom.at

POLAND
Merazet S.A.
ul. J. Krauthofera 36
PL-60-203 Poznań
Adrian Zgórz
Tel. +48 61 864 4637
Cell. +48 660 533 397
Fax +48 61 865 1933
adrian.zgorz@merazet.pl
www.merazet.pl

SWITZERLAND
MBE AG
Bolstr. 7
CH-8623 Wetzikon 3
Tel. +41 1 9312 288
Fax +41 1 9312 280
contact@mbe.ch
www.mbe.ch

TURKEY
Alpteknik Kontrol Sistemleri Ltd. Sti.
ISISO Sanayi Sitesi
8.Yol M-Blok No. 9-10
34860 Hadimkoy
Istanbul, Turkey
Tel. +90 212 62323 80
Tel. +90 212 62323 81
Fax +90 212 62323 79
info@alpteknik.com
www.alpteknik.com

Your contact in ASIA

CHINA/HONG KONG, THAILAND, TAIWAN, INDONESIA, PHILIPPINES, VIETNAM
Bühler Technologies GmbH
Asiencenter
Beijing representative office
W 1302, Jia 1,
Mudanyuan Beili, Haidan
100083 Beijing
Liu Huawei
Tel. +86 10 6208-0850
Fax +86 10 6208-0347
liuhuawei@buehler-beijing.com
www.buehler-technologies.com

INDIA
Axis Engineering
Plot # 324, Road No. 5,
G.I.D.C. Kathwada,
ZIP: 382430
Bijal Sanghvi
Tel. +91 79 2290 0861
Fax +91 98 2507 1701
bijal@axisindia.in
www.axisindia.in

SINGAPORE
Brix Engineering Pte.Ltd.
Mr. Bijal Sanghvi
Singapore
sales@brixengg.com
www.brixengg.com

Your contact in AFRICA

EGYPT, TUNESIA, LYBIA
Bühler Technologies Sales Rep.
Gebehardstraße 27d
D-85283 Wolnzach
Ahmed Balti
Tel. +49 8442 962 0221
Cell. +49 171 830 98 73
bair-technology@t-online.de
www.bair-technology.com

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Your contacts in RUSSIA

RUSSIA, CIS
Bühler Technologies Sales Rep.
Chelyabinskaya st. 23/1
105568 Moscow
Mikhail Sulima
Tel. +7 (495) 1200424
Fax +7 (495) 1200424
Cell. +7 (916) 4608907
m.sulima@buehler-technologies.com
www.buehler-technologies.com

Your contact in NORTH AMERICA

USA
Buhler Technologies LLC
1030 West Hamlin Road
Rochester Hills, MI 48309
Tel. +1.248.652.1546
Fax +1.248.652.1598
sales@buhlertech.com
www.buhlertech.com

Your contact in SOUTH AMERICA

ARGENTINA
DASTEC S.r.l
Hipolito Yrigoyen 850
Piso 3° Of.335
C1086AAN- Buenos Aires,
Argentina
Tel. +54 11 4343 6200
Tel. +54 11 4331 2288
Fax +54 11 4334 3120
amarzoratti@dastecsrl.com.ar
www.dastecsrl.com.ar

Your contacts in the MIDDLE EAST

BAHRAIN, IRAQ, KUWAIT
Bühler Technologies Sales Rep.
Gebehardstraße 27d
D-85283 Wolnzach
Ahmed Balti
Tel. +49 8442 962 0221
Cell. +49 171 830 98 73
bair-technology@t-online.de
www.bair-technology.com

IRAN
Zist AP Limited
No 12 Masood, Kazerun Str.
Mirdamad Ave.
P.O.Box 19395-5813
19199 Tehran, IRAN
Tel. +98 21 225 3079
Fax +98 21 225 768
zistap@dpimail.net

QATAR
Ladder Automation Trading LLC
Barwa Commercial Avenue
DOHA, QATAR
Gaurav Saraswat
Tel. +974 4476 9953
Cell. +974 3377 2668
gaurav@ladderautomation.com
www.ladderautomation.com

OMAN
Crystal International
Technology and Trading
PC 133 Al Khuwair
Muscat, Sultanate of Oman
Nikul Desai
Tel. +968-91273186
nikul@crystalot.com

Your contacts in the NEAR EAST

JORDAN
Bühler Technologies Sales Rep.
Gebehardstraße 27d
D-85283 Wolnzach
Ahmed Balti
Tel. +49 8442 962 0221
Cell. +49 171 830 98 73
bair-technology@t-online.de
www.bair-technology.com

Your contact in OCEANIA

AUSTRALIA
ENVISYS
PO Box 1191, Menai NSW
ZIP 2234, Australia
Ben Payami
Tel. +61 2 8502 7825
Fax +61 2 4500 19660
ben@envisys.com.au
www.envisys.com.au

For further countries please contact our export department.

Sample Probes

- DA461000 Sample Gas Probes Series GAS 222
- DA461010 GAS 222.10
- DA461410 GAS 222.10 ANSI
- DA461011 GAS 222.11
- DA461411 GAS 222.11 ANSI CSA
- DA462111 GAS 222.11 Ex2
- DA461015 GAS 222.15
- DA462415 GAS 222.15-MA
- DA461415 GAS 222.15 ANSI CSA
- DA461017 GAS 222.17
- DA461417 GAS 222.17 ANSI CSA
- DA461020 GAS 222.20
- DA461420 GAS 222.20 ANSI CSA
- DA461120 GAS 222.20 Atex
- DA462020 GAS 222.20 Ex1
- DA462120 GAS 222.20 Ex2
- DA461520 GAS 222.20 Amex
- DA461720 GAS 222.20-HT
- DA461920 GAS 222.20 Denox
- DA462220 Denox-MB
- DA461320 GAS 222.20-DH
- DA461620 GAS 222.20-DH ANSI
- DA461021 GAS 222.21
- DA461421 GAS 222.21 ANSI CSA
- DA461121 GAS 222.21 Atex
- DA462021 GAS 222.21 Ex1
- DA462121 GAS 222.21 Ex2
- DA461521 GAS 222.21 Amex
- DA461030 GAS 222.30
- DA461430 GAS 222.30 ANSI CSA
- DA462130 GAS 222.30 Ex2
- DA461031 GAS 222.31
- DA461431 GAS 222.31 ANSI CSA
- DA461131 GAS 222.31 Atex

- DA462031 GAS 222.31 Ex1
- DA462131 GAS 222.31 Ex2
- DA461531 GAS 222.31 Amex
- DA461335 GAS 222.35-U
- DA462235 GAS 222.35U Ex2
- DA461035 GAS 222.35
- DA461635 GAS 222.35-U ANSI CSA
- DA461435 GAS 222.35 ANSI CSA
- DA461135 GAS 222.35 Atex
- DA462035 GAS 222.35 Ex1
- DA462135 GAS 222.35 Ex2
- DA461535 GAS 222.35 Amex
- DA461099 Accessories for Sample Gas Probes GAS 222
- DA460003 ECO
- DA460005 Blowback Controller RSS
- DA460004 APO

Sample Gas Probes - Series GAS 222

Description

The sampling point (measuring point) is the critical interface between the process and the measuring system. Sample gas probes require a special design for the typically rough and challenging process parameters. A tough design and a flexible configuration reduce installation and operating costs.

The GAS 222 series sample gas probes are modular and enable easy alignment with the specific requirements of the respective process.

BASIC CONFIGURATION

- Unheated, heated self-regulating, heated with regulator,
- Probes for use in explosive area ATEX Zone 1, 21 or 2 and AMEX Class I Div 2. Some Atex probes allow sampling from Zone 0 and 20,
- Inlet and/or outlet filter
- Designed for high dust loads

FEATURES

- Easy to use
- Tool-less filter change
- Weather hood opens without tools,
- Special insulation for steady temperatures and protection against contact,
- Highly effective filter cleaning system for greatly reduced maintenance,
- Integrated complete system for fully automated control.

OPTIONS AND ACCESSORIES

- Vast range of inlet and outlet filters in different materials,
- Heated and unheated extensions,
- Different blowback options including blowback control.

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Sample gas probes with outlet filter

This type of gas probes is used for applications with low dust concentrations (up to approx. 2 g/m³).

The filter elements can be changed very quickly without tools.

Sample gas probes with inlet filter

With these sample gas probes, the filter element is located directly inside the process.

Combining this probe with effective blowback yields a very long filter life. This drastically reduces operating and maintenance expenses.

Filter elements are available in different materials and sizes depending on the dust concentration and other application parameters.

The efficient blowback system is based on a compressed air tank directly on the probe. The sequential control of solenoid valves a high, pressurised purging gas volume runs through the filter element in the opposite direction during blowback. If necessary, the purging gas can be heated.

The blowback cycle is either controlled by the system controller or an optional built-in or separate blowback control.

On probe type GAS 222.35, the inlet filter is easy to access for maintenance without tools.

The probe remains installed in the process. This further reduces maintenance costs.

Combination of inlet and outlet filter

Some operators require installing an outlet filter in addition to the inlet filter to serve as “last change filter”. This is also an option. In this case, however, the blowback system will only clean the inlet filter. The outlet filter element is easy to replace without tools.

Heated and unheated sample gas probes

Water or water steam are an inherent part in many processes. Moisture together with dirt particles produce undesirable contamination in the measuring system. The sample gas must therefore remain inside the gas phase during filtration. This is implemented by heating the gas probe and the gas line, however the temperature must remain above the gas dew point.

Depending on the application, the probes can be heated electrically or with steam. The electric heating elements can be self-regulating or regulated by a temperature regulator mounted directly to the probe.

Sample gas probes for Ex zones

For applications in explosive areas we offer ATEX or CSA-C and CSA-US approved sample gas probes. These can be used in zones 1, 21/ category 2 and Zone 2/ category 3 or Class I Div 2, Gps B, C and D. In some cases gas can be sampled from zones 0 and 20. All basic components and the blowback option can be implemented. Furthermore, all unheated and steam heated probes can be used in Ex areas.

Sampling tubes and sampling tube extensions

We offer various heated and unheated sampling tubes and different extensions for these tubes.

A regulator for heated extensions can optionally be integrated in the probe controller.

Options

Vast range of accessories as well as test gas connections, integrated regulator for heated extension, integrated blowback control etc.

Combinations and versions

Please carefully read the specific data sheets to determine the correct probe type.

All properties of the basic types and possible combinations are detailed in the respective data sheets.

Data sheet no. 461099 contains additional important information on accessories.

Please submit your detailed specifications if you are unable to find a product to fit your application.

Data sheets and probe selection

The data sheets describe the specific probe type. In addition to this information, there are charts and drawings. The probe selection chart and the following examples illustrate the possible combinations of gas probes for a custom solution.

Our experts are here to assist you if you have any questions or require support in designing your measuring system.

Probe selection

The chart shows the key selection criteria to determine a gas probe and guide you through our product range. Once you have selected a specific gas probe, please carefully read the data sheet (number specified) to ensure it meets all of your requirements.

Please refer to data sheet no. 461099 for a list of accessories.

	Non-explosive area			Explosive area			
Dust load Filter type	**Heated, self-regulating**	**Heated, with regulator**	**Unheated**	**Heated 1GD/2GD Extraction from zones 0, 20/ use in Zone 1, 21**	**Heated 3G Extraction from / use in zone 2**	**Class I, Div 2**	**Extraction temperature max.**
	max. permissible operating pressure 6 bar (87 psi)/max. permissible probe inlet temperature 200 °C (392 °F)						
up to 2 g/m³ Outlet filter	**GAS 222.15** (461015)	**GAS 222.20** (461020)	**GAS 222.10** (461010)	**GAS 222.20 ATEX *** (461120)	**GAS 222.20 ATEX 2** (461220)	**GAS 222.20 AMEX** (461520)	**1600 °C (2912 °F)**
	GAS 222.15 ANSI/CSA (461415)	**GAS 222.20 ANSI/CSA** (461420)	**GAS 222.10 ANSI** (461410)				
	GAS 222.17 (461017)	**GAS 222.21** (461021)	**GAS 222.11** (461011)	**GAS 222.21 ATEX *** (461121)	**GAS 222.21 ATEX 2** (461221)	**GAS 222.21 AMEX** (461521)	
	GAS 222.17 ANSI/CSA (461417)	**GAS 222.21 ANSI/CSA** (461421)	**GAS 222.11 ANSI/CSA** (461411)				
			Steam heated **GAS 222.20DH** (461320)				
			GAS 222.20DH ANSI/CSA (461620)				
> 2 g/m³ Inlet filter		**GAS 222.31** (461031)	**GAS 222.30** (461030)	**GAS 222.31 ATEX *** (461131)	**GAS 222.31 ATEX 2** (461231)	**GAS 222.31 AMEX** (461531)	**1000 °C (1832 °F)**
		GAS 222.31 ANSI/CSA (461431)	**GAS 222.30 ANSI/CSA** (461430)				
> 2 g/m³ Inlet and outlet filter		**GAS 222.21** (461021)		**GAS 222.21 ATEX *** (461121)	**GAS 222.21 ATEX 2** (461221)	**GAS 222.21 AMEX** (461521)	
		GAS 222.21 ANSI/CSA (461421)					
> 2 g/m³ inlet filter removable without tools		**GAS 222.35** (461035)	**GAS 222.35U** (461335)	**GAS 222.35 ATEX *** (461135)	**GAS 222.35 ATEX 2** (461235)	**GAS 222.35 AMEX** (461535)	**600 °C (1112 °F)**
		GAS 222.35 ANSI/CSA (461435)	**GAS 222.35U ANSI/CSA** (461435)				

*max. gas inlet temperature 135 °C (275 °F)

Ordering instructions

1. Select the base model from the chart.
2. Select the item number of the basic gas probe from the respective data sheet.
3. Select accessories using data sheet no. 461099 to customise the base model to your application and ensure safe operation.

Example 1:

The application has a dust concentration of approx. 89 g/m³ with moisture present, the process temperature is between 500 °C (932 °F) and 600 °C (1112 °F), to be installed in non-Ex area.

The process has no notable aggressive components.

The voltage is 230 VAC and probe blowback is monitored by an existing SPS.

Solution:

Per the probe selection chart, 3 probe models would be suitable, as the process temperature is between 500 °C (932 °F) and 600 °C (1112 °F): GAS 222.31, GAS 222.21 and GAS 222.35

If lower operating costs are more important, probe type GAS 222.35 would be used: The item number for the heated gas probe GAS 222.35 is 4622235.

Use data sheet DE 461099 to complete the gas probe: An inlet filter will be used: Item no.: 46222359.

For effective probe blowback we recommend a blowback vessel, item no.: 46222PAV.

A solenoid valve is required between the blowback vessel and the gas prove to control the probe blowback: Item no.: 46222PAVMV3.

The complete gas probe consists of:

Item no.: 4622235, quantity 1

Item no.: 46222359, quantity 1

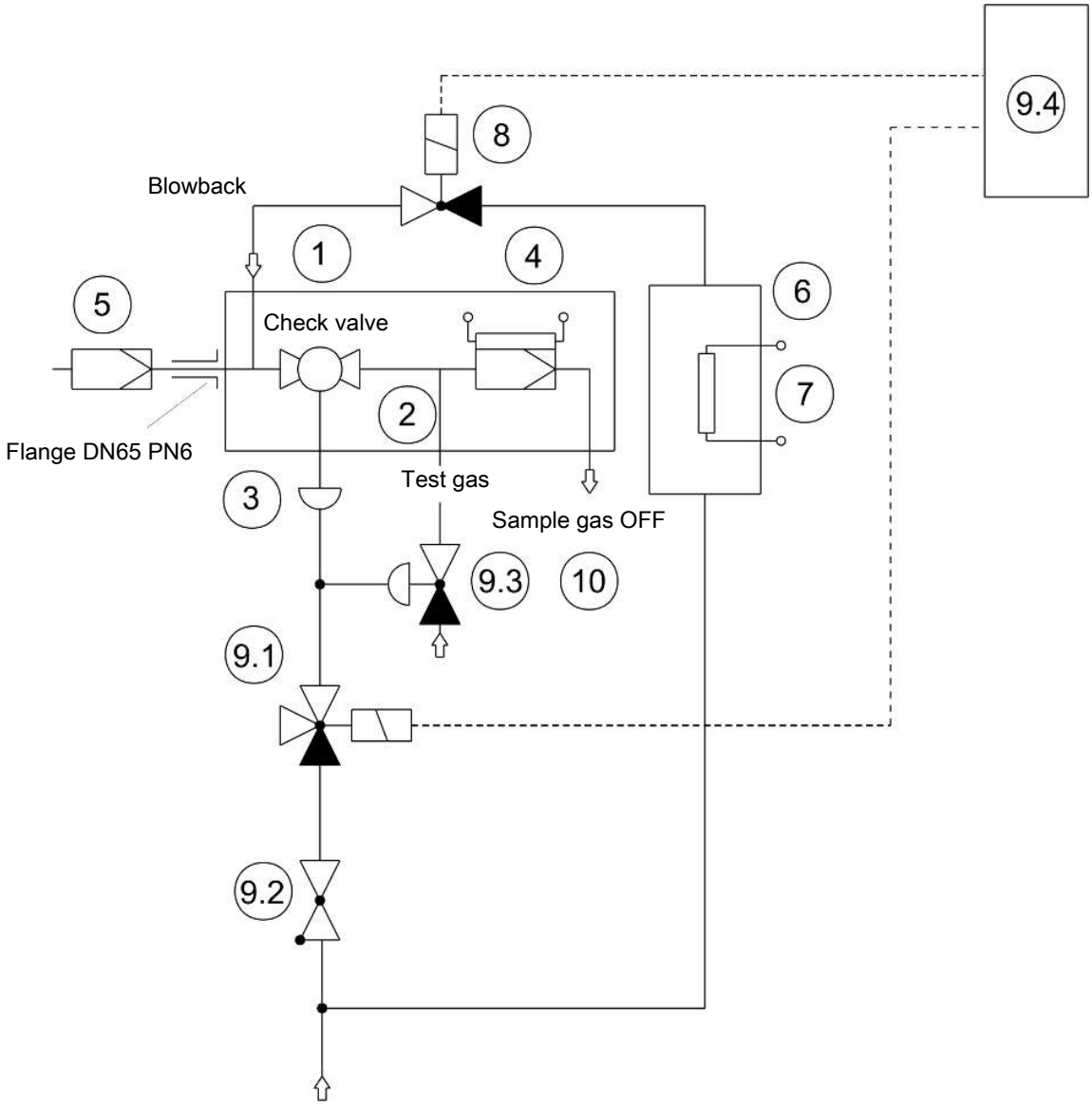
Item no.: 46222PAV, quantity 1

Item no.: 46222PAVMV3, quantity 1*

**Assuming the sample gas path in the measuring system will be shut off during probe blowback.*

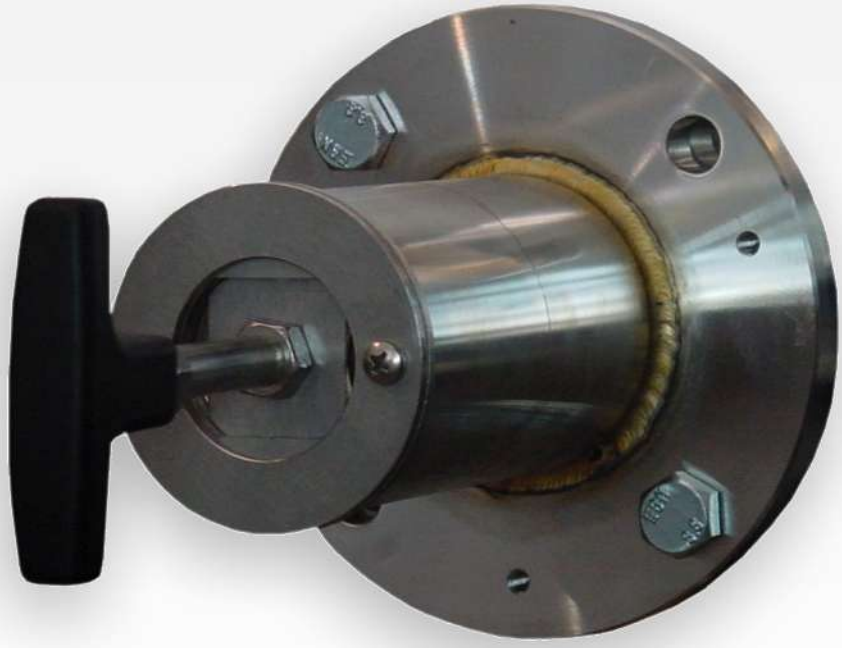
Example 2:

GAS 222.21 with automatic blowback and control unit



Application similar to **Example 1**, extraction temperature approx. 600 °C (1112 °F). The particle concentration is always over 10 g/m³ and inconsistent. Therefore a large filter element should be used and a “Last chance” filter element is recommended. Blowback is controlled by the central SPS.

No.	Description	Data sheet no.	Item no.
1	Probe GAS 222.21	461021	4622221
2	Test gas connection	461099	46222309
3	Pneumatic drive for ball valve	461099	46222008
4	Outlet filter	461099	46222010
5	Inlet filter	461099	46222303
6	Compressed air tank	461099	46222PAV
7	Self-regulating heater	461099	46222PAVHZ1
8	2/2-way solenoid valve for purge air	461099	46222PAVMV3
9	Control unit for blowback-compatible probe consists of: **9.1** 3/2-way solenoid valve for pneumatic drive **9.2** Check valve (upon request) **9.3** Pneumatic valve for test gas **9.4** Terminal box for solenoid valves		upon request
10	Fitting for sample gas connection	461099	9026172



Sample gas probe GAS 222.10

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Unheated probe with downstream filter for indoor installation.

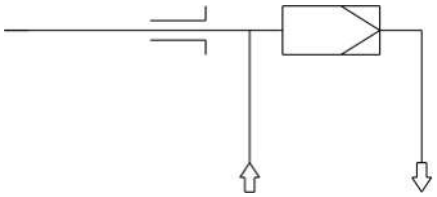
The filter element can easily be removed by turning the handle 90°

For dust loads up to 2 g/m³

The probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

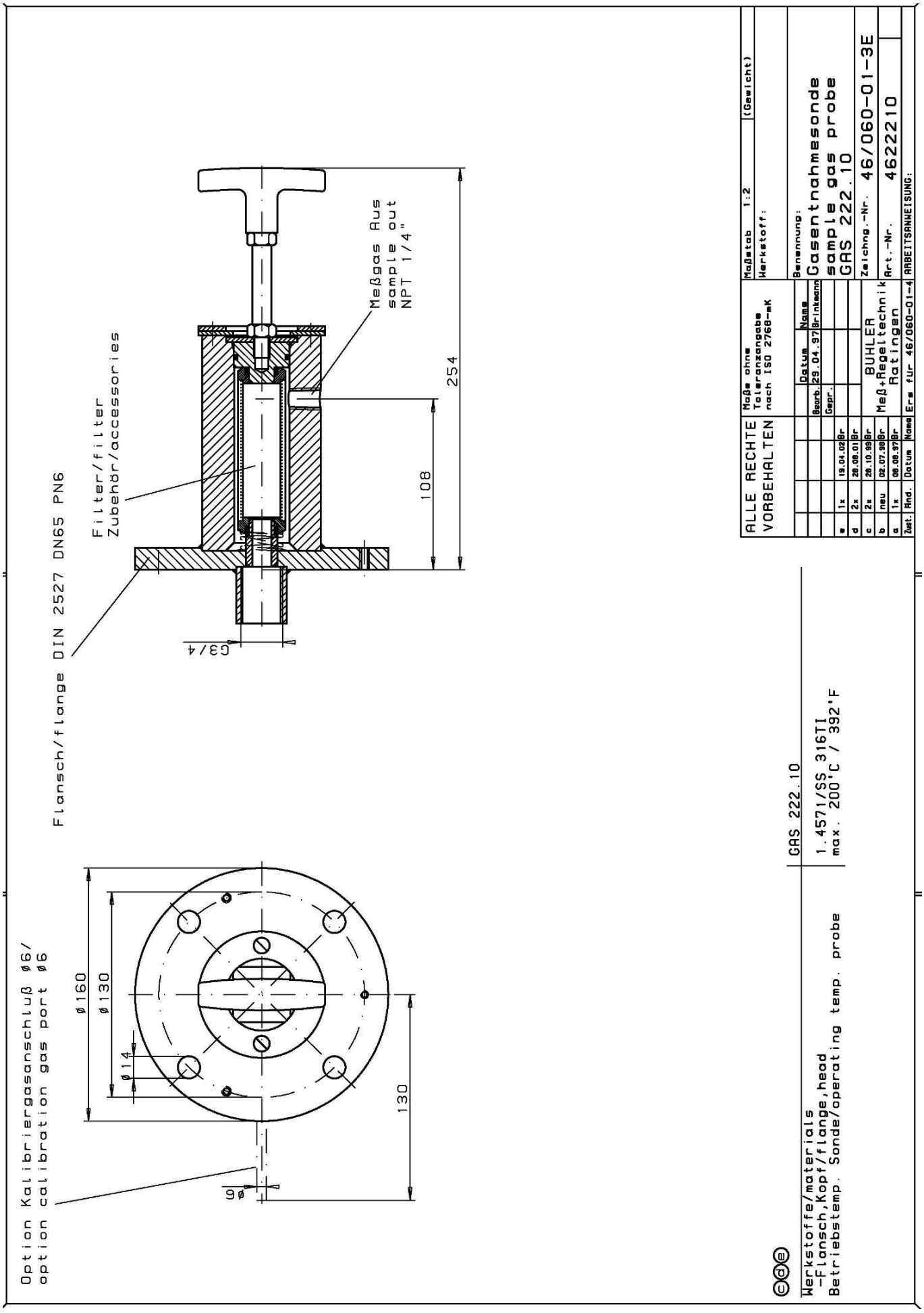
4622210	0	9	9	0	0	X	0	0	9	9	9	9	9	Product Characteristics
														Flange/approval
														DIN DN65 PN6
														Power supply sample probe
														none
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve

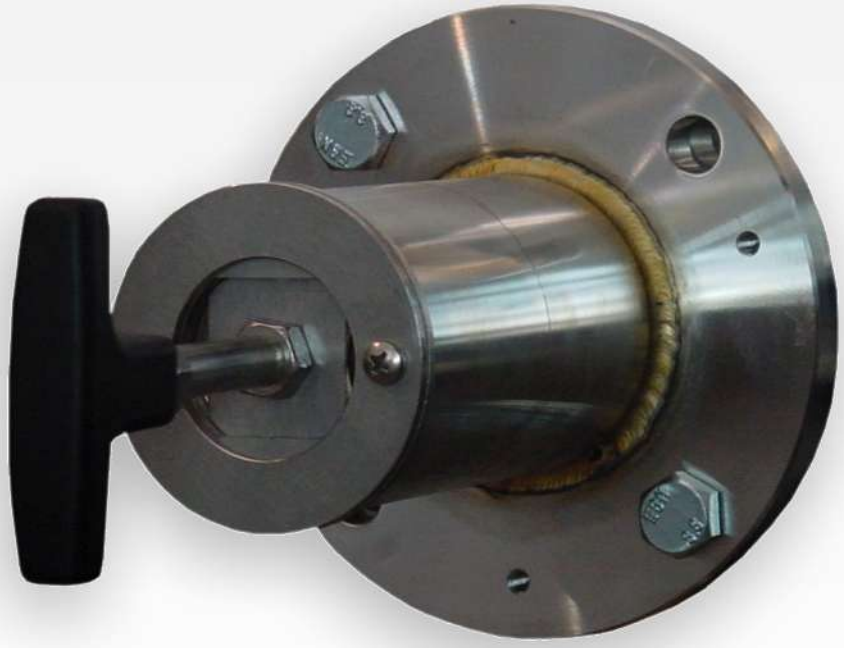
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Meßgas Aus
sample out
NPT 1/4"
254
108
G3/4
Filter/filter
Zubehör/accessories
Flansch/flange DIN 2527 DN65 PN6
Option Kalibriergasanschluß ø6/
option calibration gas port ø6
ø160
ø130
ø14
130
9ø
GAS 222.10
1.4571/SS 316TI
max. 200°C / 392°F
Werkstoffe/materials
-Flansch,Kopf/flange,head
Betriebstemp. Sonde/operating temp. probe
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.10
BUHLER
Meß+Regeltechnik
Ratingen
Zeichng.-Nr. 46/060-01-3E
Art.-Nr. 4622210
Ers. für 46/060-01-4
ARBEITSANWEISUNG:



Sample gas probe GAS 222.10 ANSI

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Unheated probe with downstream filter

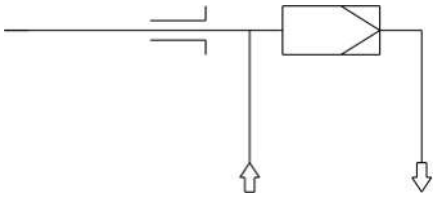
The filter element can easily be removed by turning the handle 90°

For dust loads up to 2 g/m³, non-condensable gases

The probe has no innate ignition source and is therefore suitable for use in Ex areas.

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

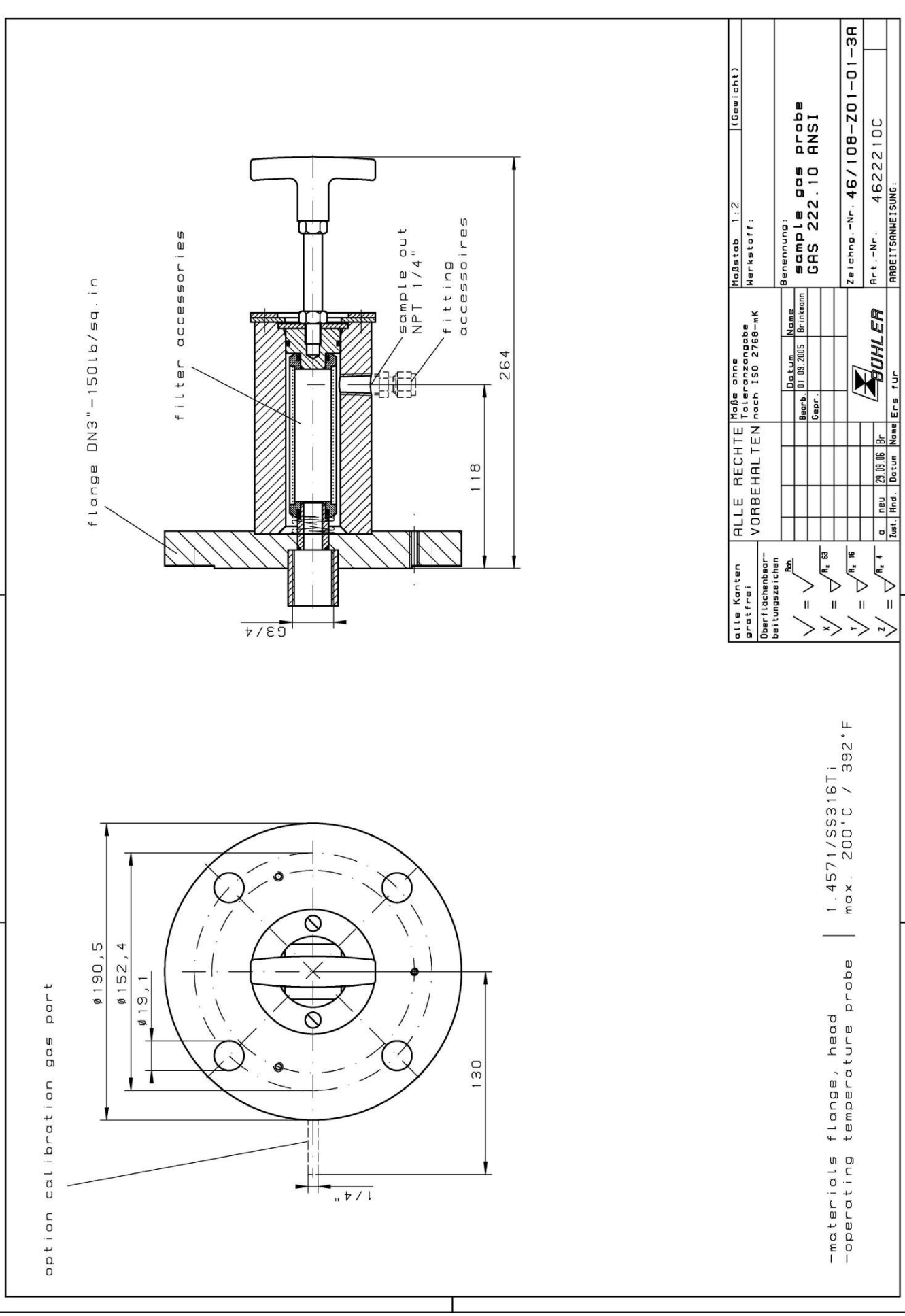
4622210	1	9	9	0	0	X	0	0	9	9	9	9	9	Product Characteristics
														Flange/approval
														ANSI 3"-150 lbs (ANSI CSA)
														Power supply sample probe
														none
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


flange DN3"-150lb/sq.in
filter accessories
sample out NPT 1/4"
fitting accessoires
264
118
G3/4
ø190,5
ø152,4
ø19,1
130
1/4"
option calibration gas port
-materials flange, head 1.4571/SS316Ti
-operating temperature probe max. 200°C / 392°F
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
sample gas probe GAS 222.10 ANSI
Zeichng.-Nr. 46/108-Z01-01-3A
Art.-Nr. 46222100
ARBEITSANWEISUNG:
BÜHLER

Sample gas probe GAS 222.11

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

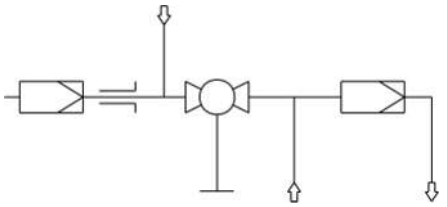
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with shut-off valve and/or upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 2 g/m³, non-condensable gases. Combined with upstream filter up to 10 g/m³ and higher
- The probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Material:	Ball valve 1.4408
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622211	0	9	9	0	0	X	0	0	X	X	X	X	X	X	Product Characteristics
															Flange / approval
															DIN DN65 PN6
															Power supply sample probe
															none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
															No
															Built-in temperature controller for heated extension
															No
															Blowback with air reservoir [1]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Pressure valve/valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
												3			Bi-stable
															Limit switch for pneumatic drive
													1		Yes
													9		No
															Control valve for pneumatic drive
														3	3/2-way valve
														5	5/2 way valve
														9	No control valve

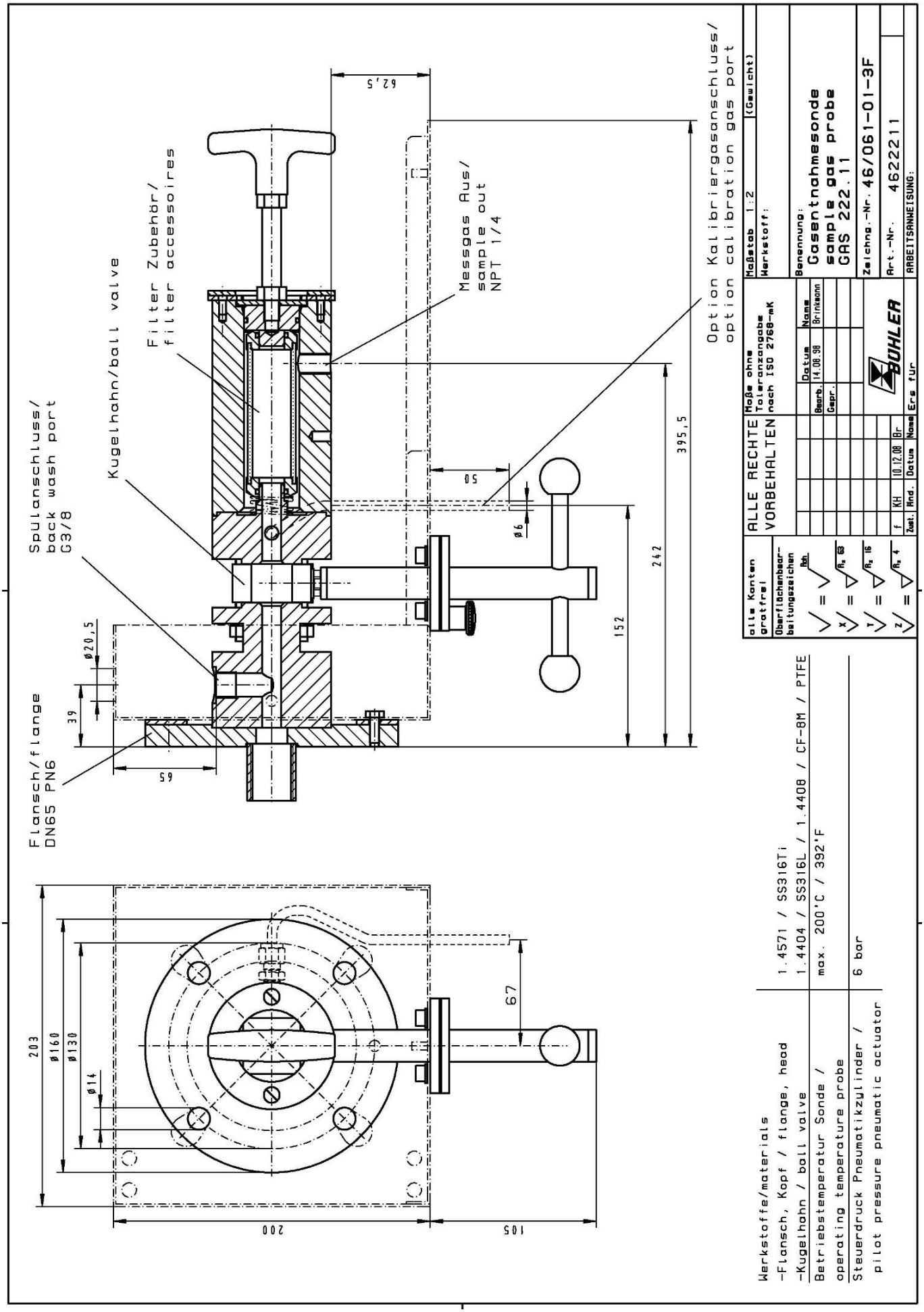
[1] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Spülanschluss/
back wash port
G3/8
Kugelhahn/ball valve
Filter Zubehör/
filter accessoires
Messgas Aus/
sample out
NPT 1/4
Option Kalibriergasanschluss/
option calibration gas port
Flansch/flange
DN65 PN6
62,5
395,5
242
152
50
Ø6
Ø20,5
39
65
203
Ø160
Ø130
Ø14
67
200
105
Werkstoffe/materials
-Flansch, Kopf / flange, head
-Kugelhahn / ball valve
Betriebstemperatur Sonde /
operating temperature probe
Steuerdruck Pneumatikzylinder /
pilot pressure pneumatic actuator
1.4571 / SS316Ti
1.4404 / SS316L / 1.4408 / CF-8M / PTFE
max. 200°C / 392°F
6 bar
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.11
Zeichng.-Nr. 46/061-01-3F
Art.-Nr. 4622211
ARBEITSANWEISUNG:
BÜHLER

Sample gas probe GAS 222.11 ANSI CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with shut-off valve and inlet and/or downstream filter
- The downstream filter can easily be removed by turning the handle 90°
- For dust loads up to 2 g/m³, non-condensable gases. Combined with upstream filter up to 10 g/m³ and higher
- The probe has no innate ignition source and is therefore suitable for use in Ex areas.
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

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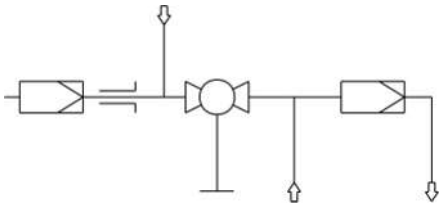
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Material:	Ball valve 1.4408
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622211	1	9	9	0	0	X	0	0	X	X	X	X	9	X	Product Characteristics
															Flange / approval
															ANSI 3"-150 lbs [1]
															Power supply sample probe
															none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
															No
															Built-in temperature controller for heated extension
															No
															Blowback with air reservoir [2]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Pressure valve/valve voltage information
											0				Manual
											1				120 V 60 Hz
											2				240 V 60 Hz
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
												9			N/A
															Limit switch for pneumatic drive
															No
															Control valve for pneumatic drive
														3	3/2-way valve
														9	No control valve

[1] Probes with ANSI flange are CSA and C-US approved

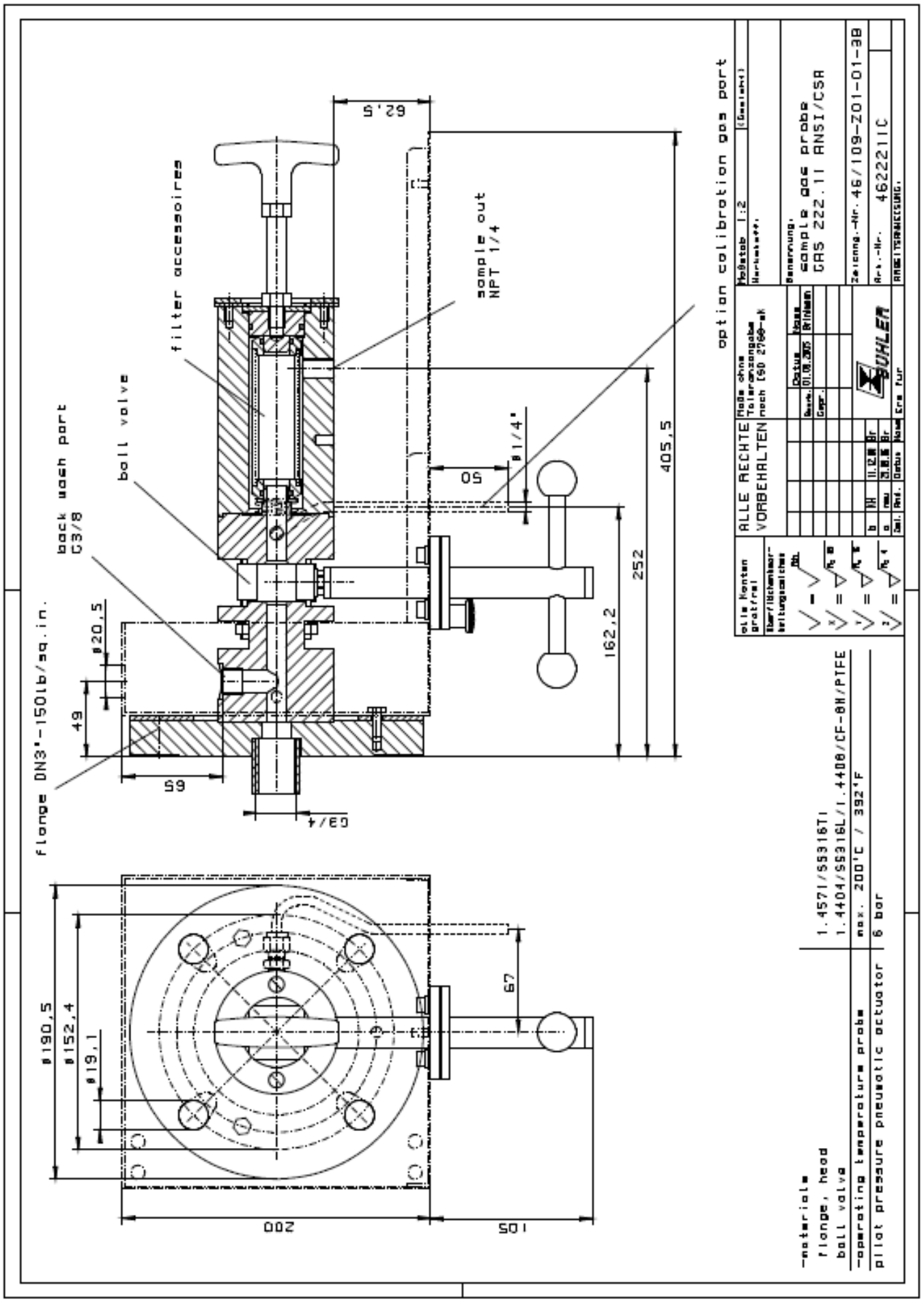
[2] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


option calibration gas port
sample out NPT 1/4
filter accessoires
ball valve
back wash port C3/8
flange DN3"-150lb/sq.in.
405,5
252
162,2
62,5
50
65
49
ø20,5
ø190,5
ø152,4
ø19,1
67
200
105
-materials
flange, head 1.4571/S53161
ball valve 1.4404/S5316L/1.4408/CF-8M/PTFE
-operating temperature probe max. 200°C / 392°F
pilot pressure pneumatic actuator 6 bar
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
Benennung: sample gas probe GAS 222.11 ANSI/CSA
Zeichng.-Nr. 46/109-Z01-01-38
Art.-Nr. 462211C
BÜHLER

Sample gas probe GAS 222.11 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

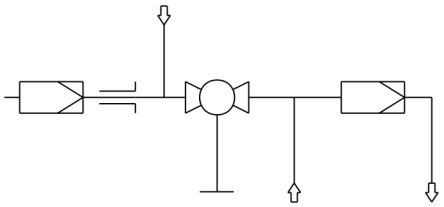
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with shut-off valve and/or inlet filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 2 g/m³, non-condensable gases. Combined with inlet filter up to 10 g/m³ and higher
- The probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Max. operating pressure	85 psia	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec mb IIC T3/T4 Gc IECEx: Ex ec mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622211	X	X	X	X	X	X	0	0	X	X	X	X	X	X	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							0								none
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none
															Pneumatic actuator for internal ball valve
												0			No
												1			Mono stable depressurized open
												2			Mono stable depressurized closed
															Limit switch for pneumatic actuator
													0		No
													1		Yes
															Solenoid valve for pneumatic actuator
														0	No
														1	Yes (marked with "mb")

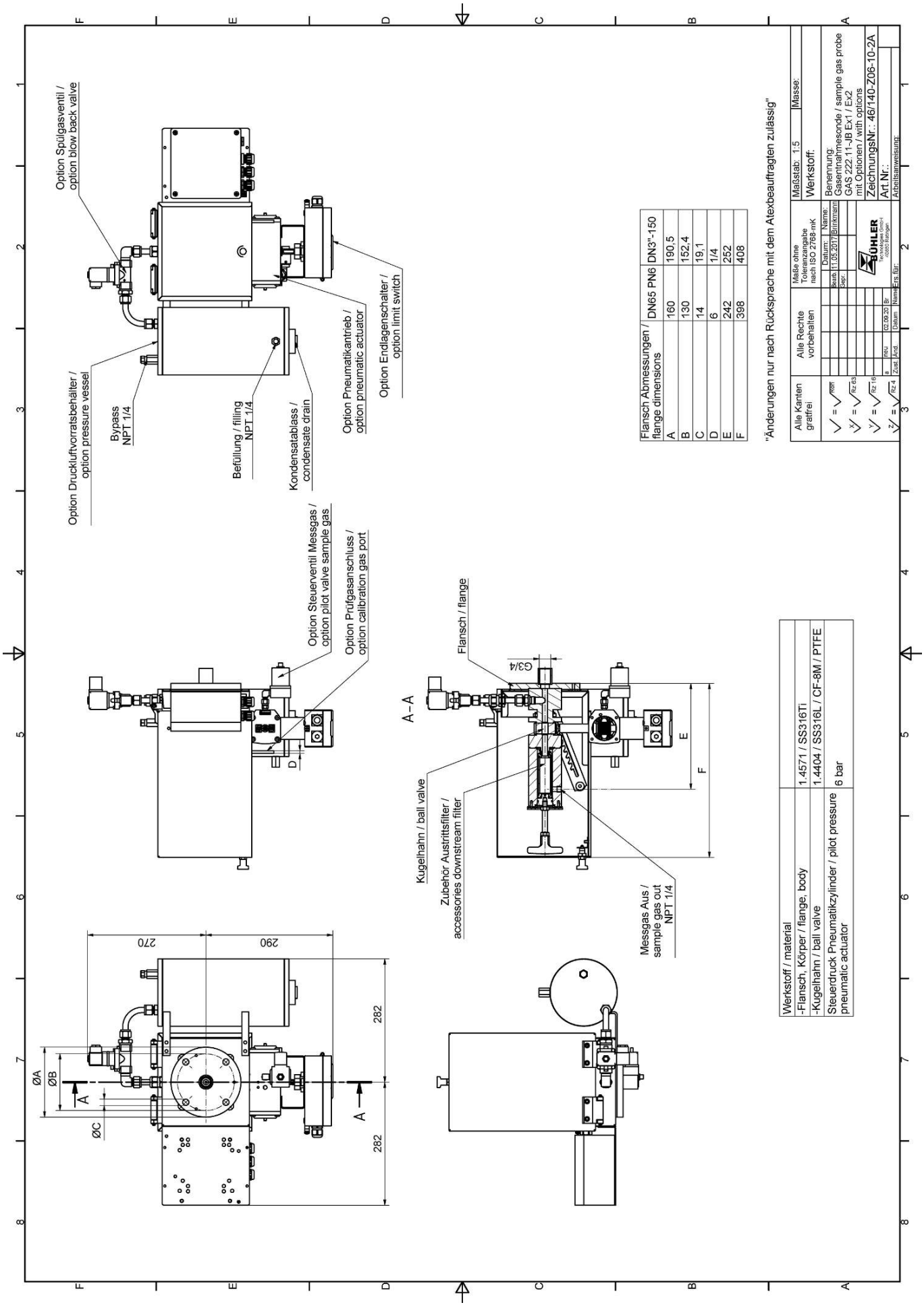
* Blowback of explosive atmosphere prohibited.

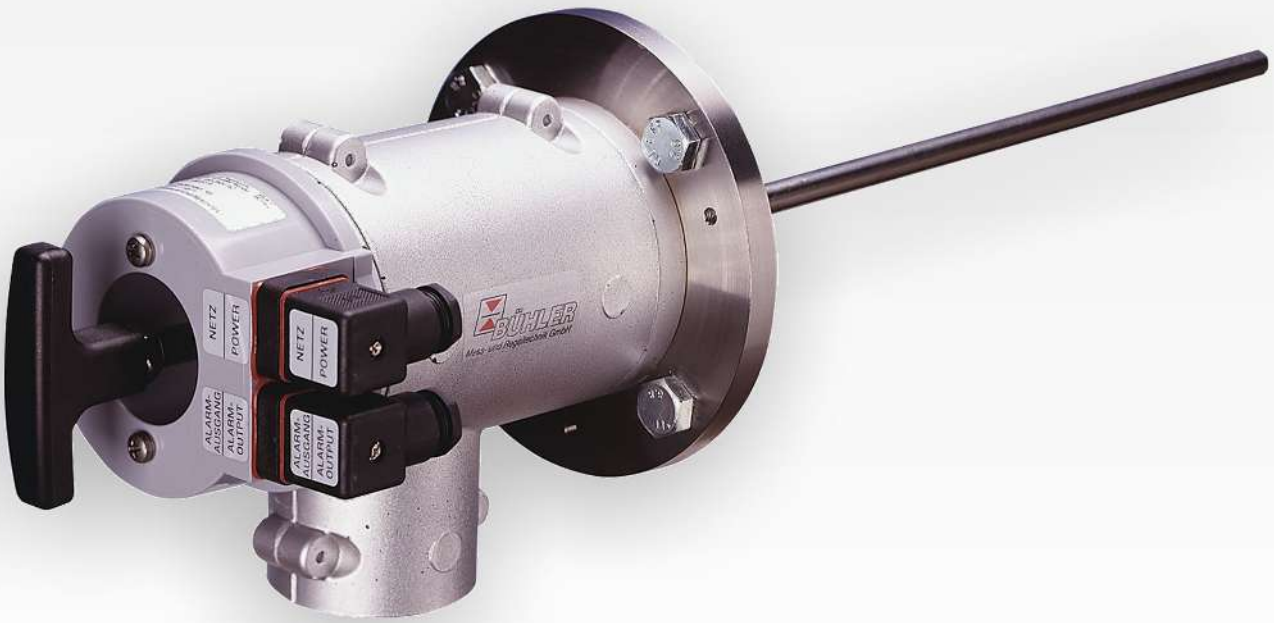
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Option Spülgasventil / option blow back valve
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Option Pneumatikantrieb / option pneumatic actuator
Option Endlagenschalter / option limit switch
Option Steuerventil Messgas / option pilot valve sample gas
Option Prüfgasanschluss / option calibration gas port
Flansch / flange
G3/4
A–A
Kugelhahn / ball valve
Zubehör Austrittsfilter / accessories downstream filter
Messgas Aus / sample gas out NPT 1/4
ØA
ØB
ØC
270
290
282
282
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 242 252
F 398 408
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.11-JB Ex1 / Ex2 mit Optionen / with options
ZeichnungsNr.: 46/140-Z06-10-2A
Art.Nr.:
Arbeitsanweisung:
Werkstoff / material
-Flansch, Körper / flange, body 1.4571 / SS316Ti
-Kugelhahn / ball valve 1.4404 / SS316L / CF-8M / PTFE
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator 6 bar



Sample gas probe GAS 222.15

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

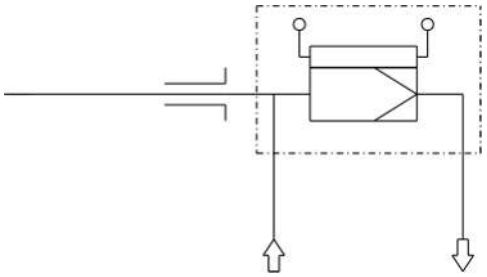
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Self-regulating heater to approx. 356 °F with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 176 °F
Self-regulating heater:	356 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 284 °F, Max. switching current 4 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

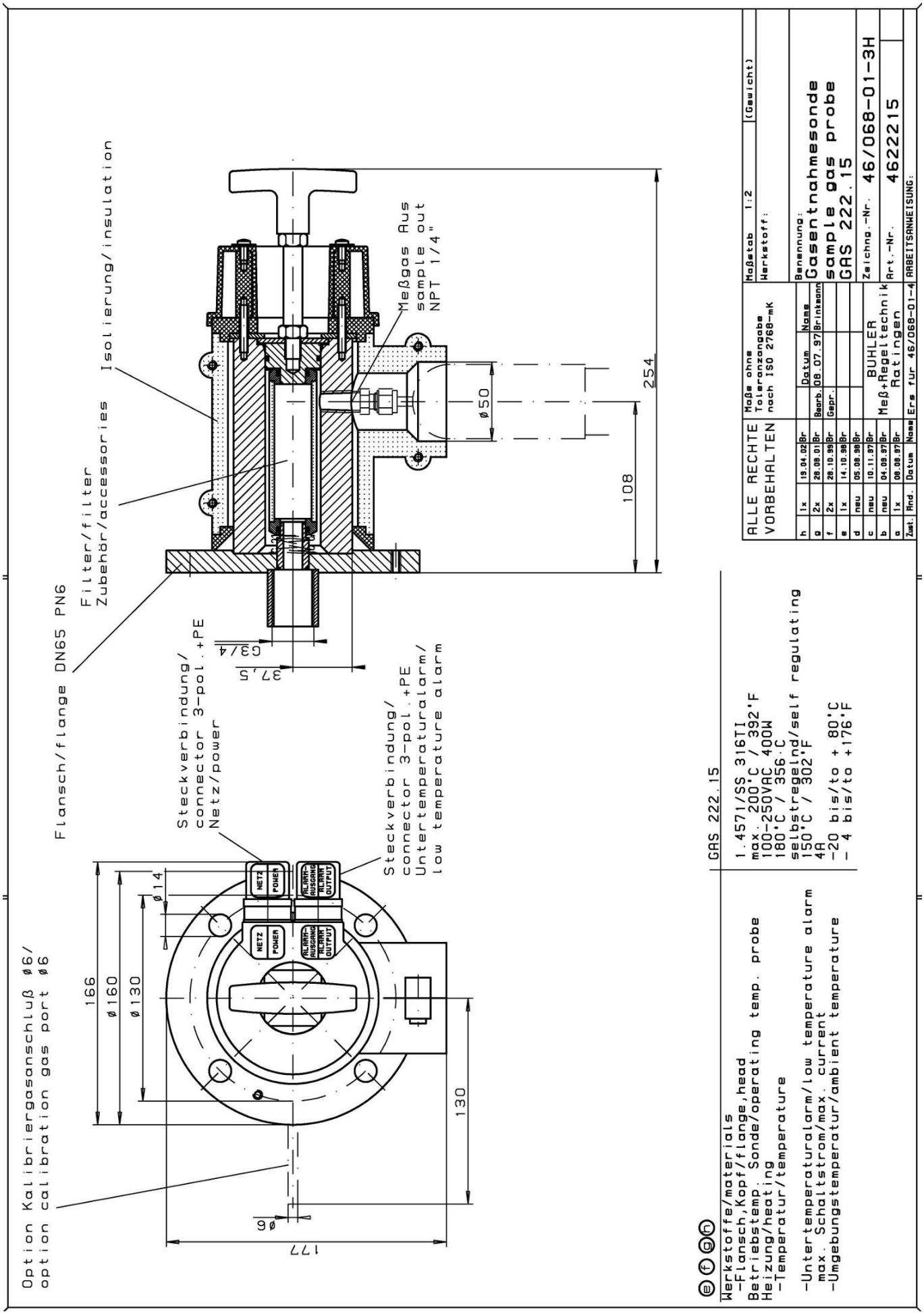
4622215	0	9	9	0	3	X	0	0	9	9	9	9	9	Product Characteristics
														Flange type
														DIN DN65 PN6
														Power supply sample probe
					3									115/230 V
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
Meßgas Aus
sample out
NPT 1/4"
ø50
254
108
G3/4
37,5
Steckverbindung/
connector 3-pol.+PE
Netz/power
Steckverbindung/
connector 3-pol.+PE
Untertemperaturalarm/
low temperature alarm
Option Kalibriergasanschluß ø6/
option calibration gas port ø6
166
ø160
ø130
ø14
130
9ø
177
NETZ
POWER
ALARM
RELAIS
RELAY
OUTPUT
GAS 222.15
1.4571/SS 316TI
max. 200°C / 392°F
100-250VAC 400W
180°C / 356°C
selbstregelnd/self regulating
150°C / 302°F
4A
-20 bis/to + 80°C
- 4 bis/to +176°F
Werkstoffe/materials
-Flansch,Kopf/flange,head
Betriebstemp. Sonde/operating temp. probe
Heizung/heating
-Temperatur/temperatur
-Untertemperaturalarm/low temperature alarm
max. Schaltstrom/max. current
-Umgebungstemperatur/ambient temperature
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.15
Zeichng.-Nr. 46/068-01-3H
Art.-Nr. 4622215
BUHLER
Meß+Regeltechnik
Ratingen
ARBEITSANWEISUNG:
Ers. für 46/068-01-4
Änd. Datum Name
h 1x 19.04.02 Br
g 2x 28.08.01 Br
f 2x 28.10.99 Br
e 1x 14.10.98 Br
d neu 05.08.98 Br
c neu 10.11.97 Br
b neu 04.08.97 Br
a 1x 08.08.97 Br
Datum Name
Baarb. 08.07.97 Brinkmann
Gepr.

Sample gas probe GAS 222.15-MA

The GAS 222.15-MA gas probe was designed specifically for sampling gas in maritime applications. It is certified for operation on ships and offshore units and is type approved by **DNV-GL** and **Lloyd's Register**. The special design features allow the GAS 222.15-MA to also be used in high vibration environments (e.g. on ships) up to an acceleration of 4 g (0.009 lbs).

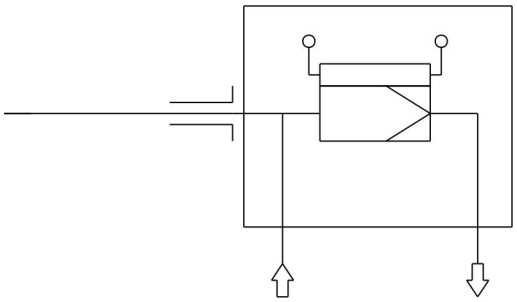
Similar to large combustion plants, gas analysis in maritime applications also serves monitoring pollutant emissions as well as controlling the combustion process. However, maritime applications pose additional requirements with respect to components compared to stationary applications. The gas probe is therefore protected by a special silicone cover (type of protection IP66).

The GAS 222.15-MA probe is equipped with a self-regulating heater for approx. 356 °F including low temperature alarm (284 °F) and can even be operated in severe ambient conditions of -4 °F and 140 °F. Apart from additional requirements for operation on ships, the GAS 222.15-MA gas probe has the tried and tested advantage of toolless filter changes and a very compact size.

- Heated probe with downstream filter
- Type tested for use on ships according to **LR and DNV-GL**
- Product Design Assessment of the American Bureau of Shipping (ABS)
- Certified for high vibration environments up to 4 g (0.009 lbs)
- Safe for use in environments between -4 °F and 140 °F
- Self-regulating heater to approx. 356 °F with low temperature alarm
- Type of protection IP66
- The downstream filter can easily be removed by turning the handle 90°
- For dust loads up to 2 g/m^3

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe

Type tested:	**DNV GL** rules for classification Ships, offshore units, and high speed and light craft Certificate no.: TAA00002FW **Lloyd's Register** Type Approval System, Test Specification Number 1 - March 2019 Certificate no.: LR2008137TA
Product Design Assessment:	ABS
Ambient categories as per DNVGL-CG-0339:	Temperature: D Humidity B Vibration B EMC B Housing: B (IP66)
Environmental categories as per LR:	ENV1, ENV2
Probe gas inlet temperature:	max. 392 °F
Ambient temperature:	-4 to +140 °F
Self-regulating heater:	+356 °C
Low temperature alarm:	Switching current max. 4 A (switch-back point < 284 °F)
Electrical data:	115 V/230 V, 50/60 Hz, 400 W
Weight:	18.7 lb
IP rating:	IP66
Max. operating pressure:	87 psia
Materials in contact with media:	1.4571, graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

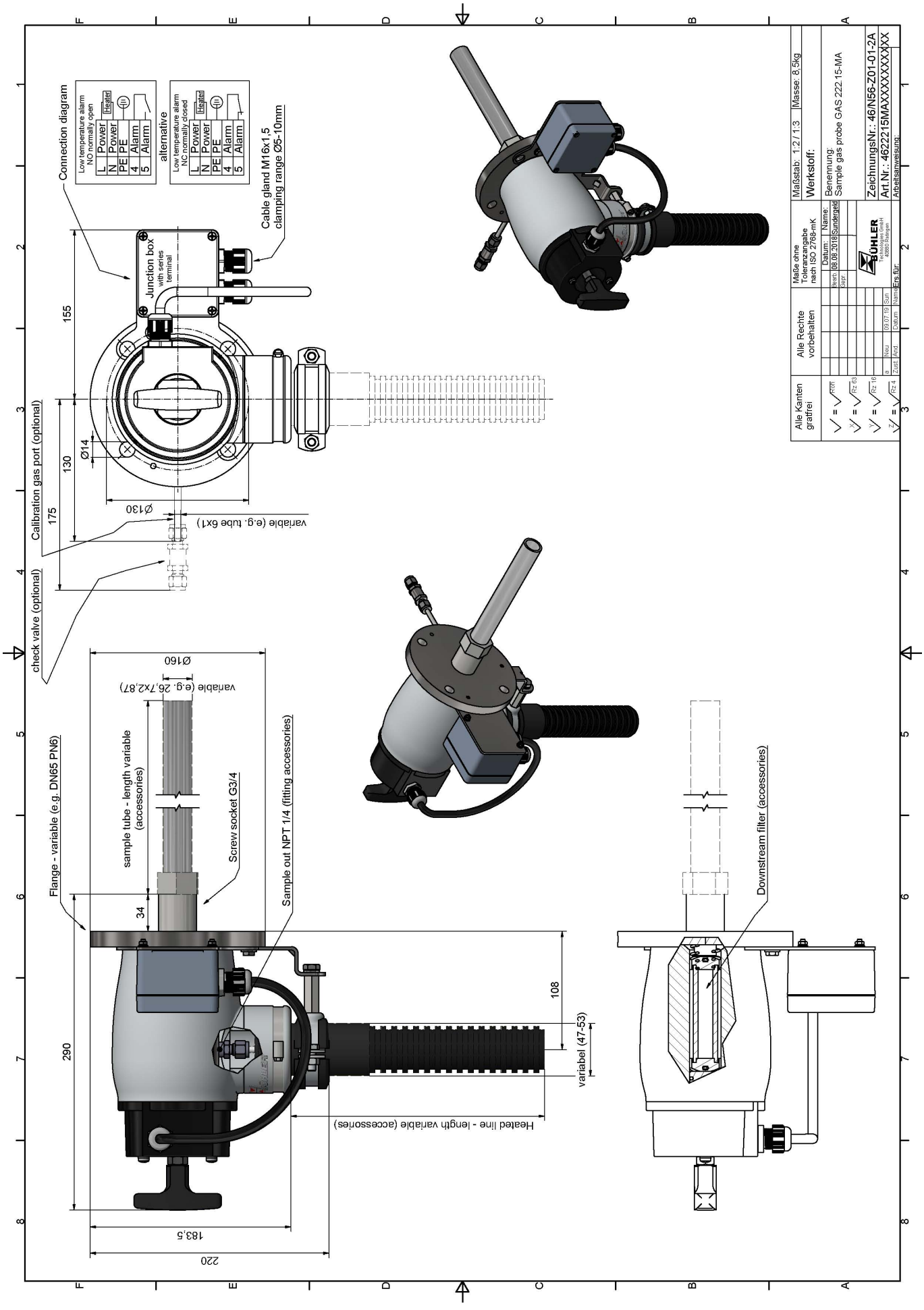
4622215MA	X	9	9	0	3	X	X	0	0	0	Product characteristic
											Flange
	0										DIN DN65 PN6
	1										ANSI 3"- 150 lbs
											Voltage
					3						115/230 V
											Calibration gas connection
						0					without calibration gas connection
						1					6 mm
						2					6 mm with check valve
						3					1/4"
						4					1/4" with check valve
											Low temperature alarm
							1				opening contact (open at operating temperature)
							2				closing contact (closed at operating temperature)

Options

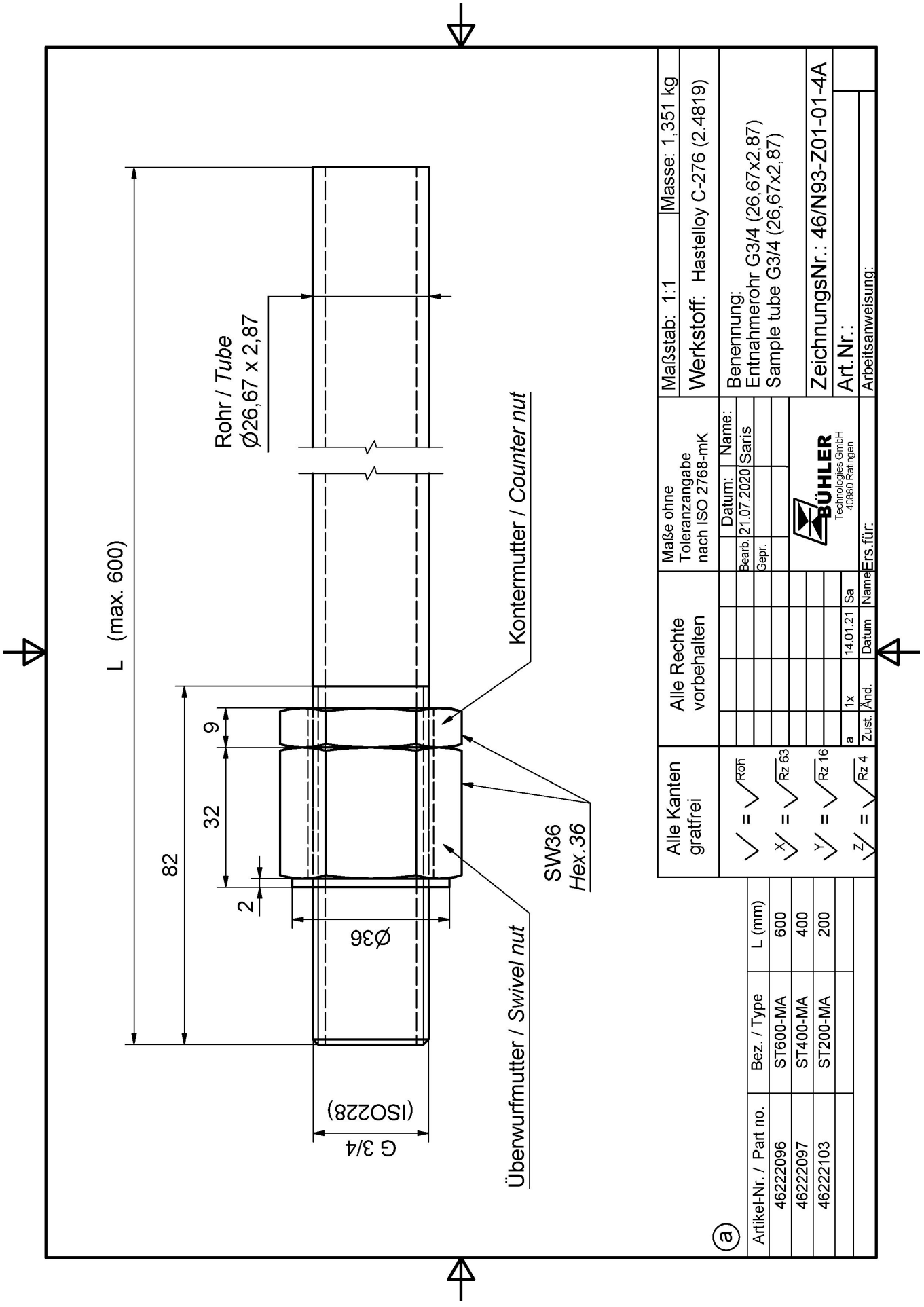
The base unit can optionally be equipped with a sampling tube type ST...-MA. These are type approved by DNV-GL and available in 7.9, 15.7 and 23.6 inch lengths. You will find the dimensions on the last page.

Type designation	ST200-MA	ST400-MA	ST600-MA
Item no.	46222103	46222097	46222096
Length (inch)	7.9	15.7	23.6

Probe dimensions



Sampling tube dimensions



Sample gas probe GAS 222.15 ANSI CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

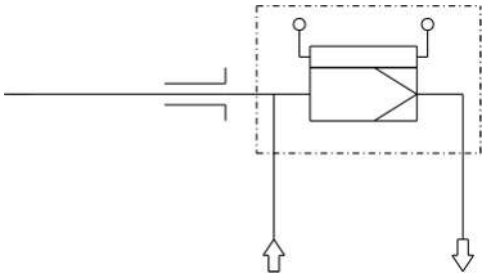
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Self-regulating heater to approx. 356 °F with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 176 °F
Self-regulating heater:	356 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 284 °F, Max. switching current 4 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622215	1	9	9	0	3	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange type
															ANSI 3"-150 lbs [1]
															Power supply sample probe
					3										115/230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

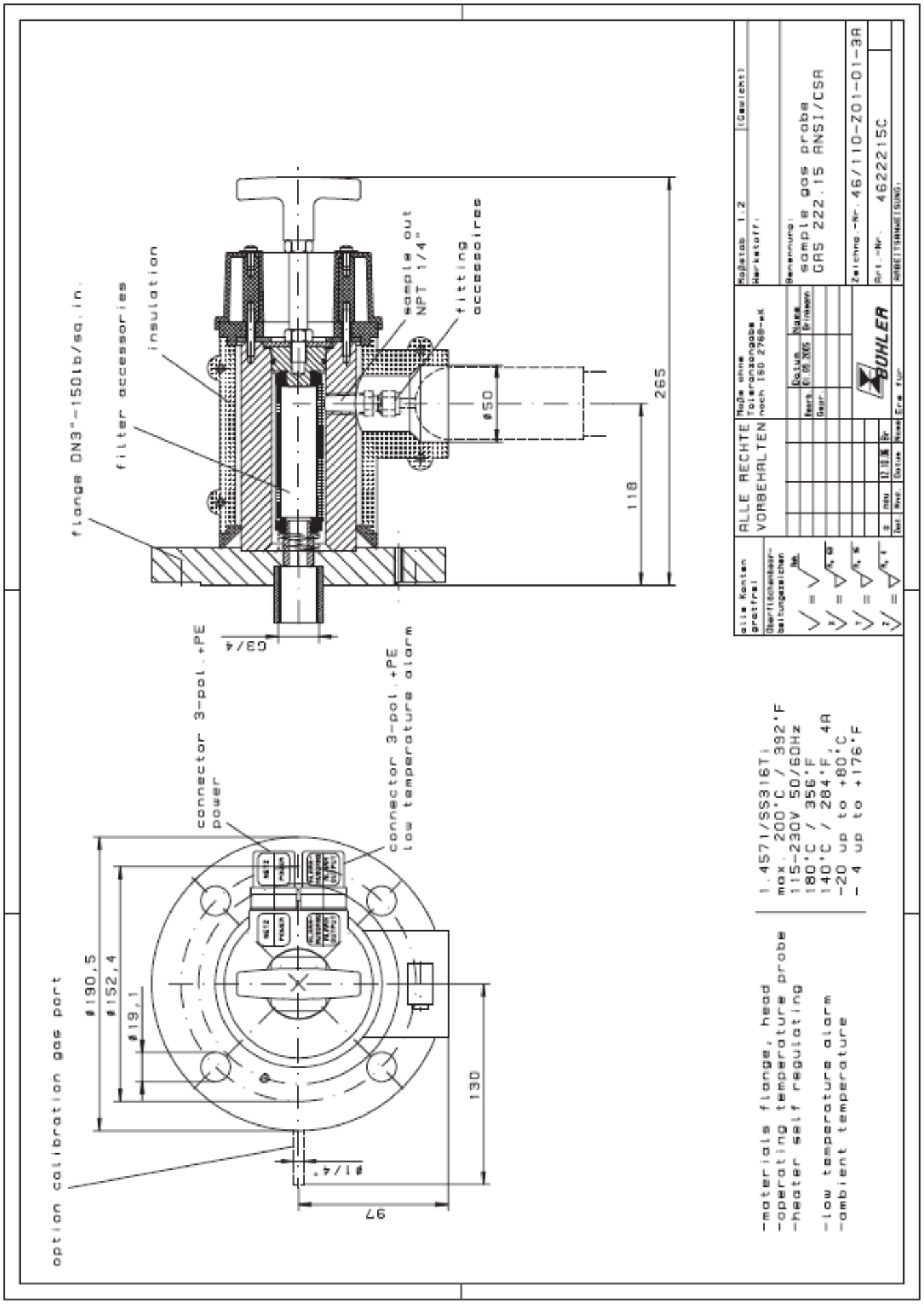
[1] Probes with ANSI flange are CSA and C-US approved

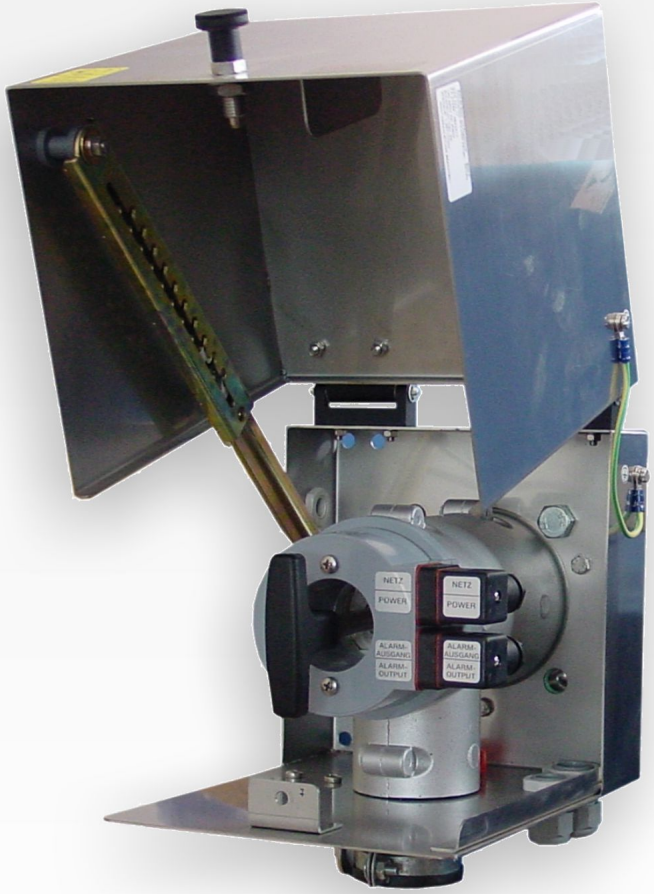
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


flange DN3"-150lb/sq.in.
filter accessories
insulation
sample out NPT 1/4"
fitting accessoires
ø50
265
118
G3/4
connector 3-pol.+PE power
connector 3-pol.+PE low temperature alarm
option calibration gas port
ø190,5
ø152,4
ø19,1
130
97
ø1/4"
-materials flange, head
-operating temperature probe
-heater self regulating
-low temperature alarm
-ambient temperature
1.4571/SS316Ti
max. 200°C / 392°F
115-230V 50/60Hz
180°C / 356°F
140°C / 284°F, 4A
-20 up to +80°C
- 4 up to +176°F
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
sample gas probe
GAS 222.15 ANSI/CSA
Zeichng.-Nr. 46/110-Z01-01-3A
Art.-Nr. 462215C
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
BÜHLER



Sample gas probe GAS 222.17

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

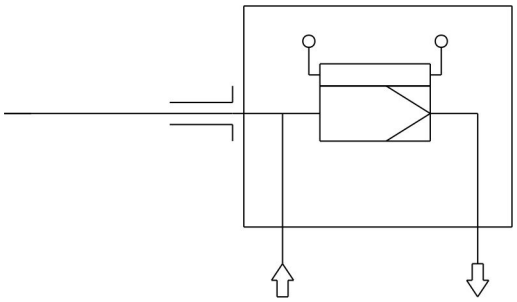
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Self-regulating heater to approx. 356 °F with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 °F to 176 °F
Self-regulating heater:	356 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 284 °F. Max. switching current 4 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
IP rating:	IP54
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

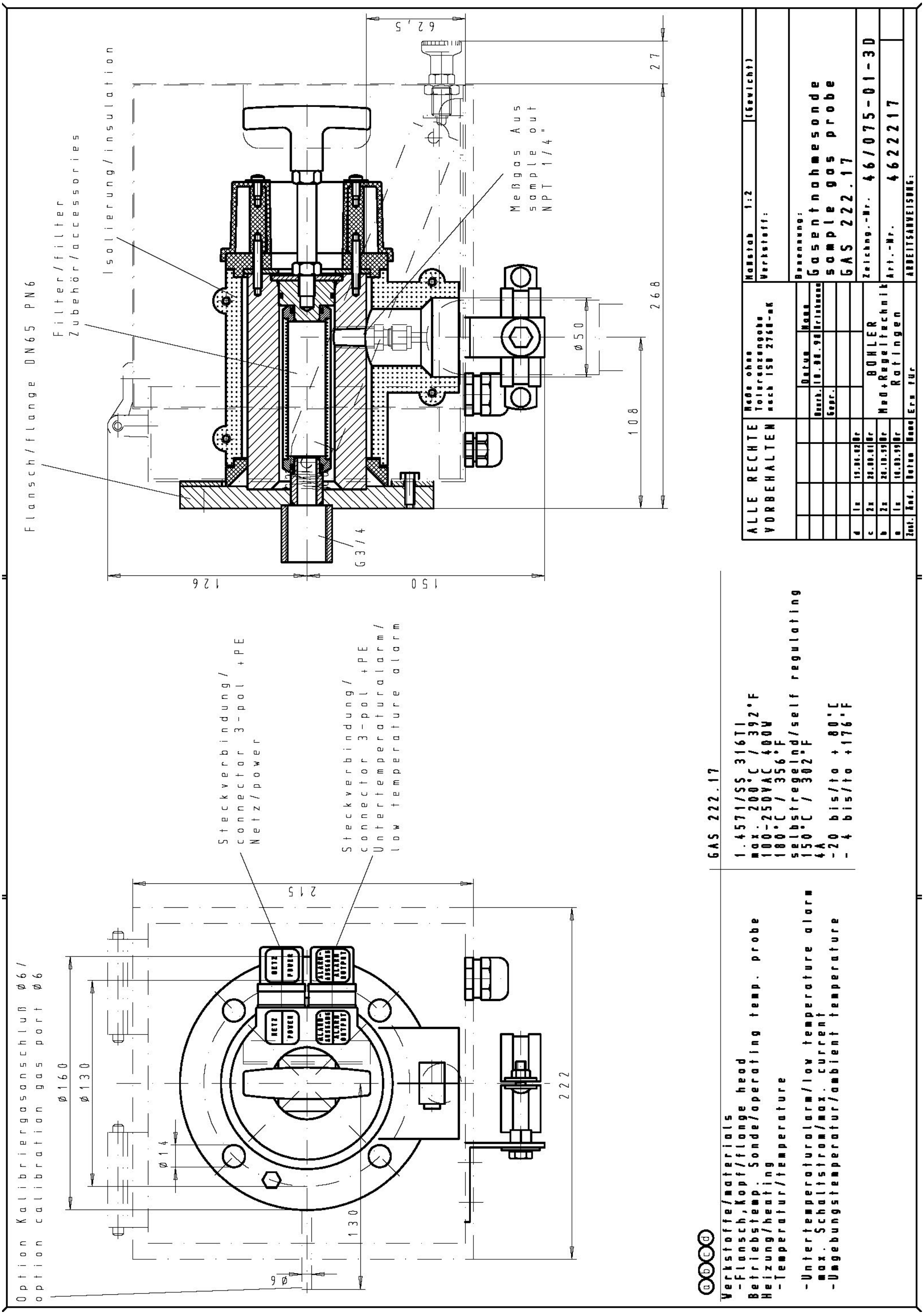
4622217	0	9	9	0	3	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange
															DIN DN65 PN6
															Power supply sample probe
					3										115/230 V
															Calibrating gas connection
							0								no calibrating gas connection
							1								6 mm
							2								6 mm with check valve
							3								1/4"
							4								1/4" with check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
Meßgas Aus
sample out
NPT 1/4"
G3/4
Steckverbindung/
connector 3-pol +PE
Netz/power
Steckverbindung/
connector 3-pol +PE
Untertemperaturalarm/
low temperature alarm
Option Kalibriergasanschluß ø6/
option calibration gas port ø6
GAS 222.17
Werkstoffe/materials
-Flansch,Kopf/flange head
1.4571/SS 316TI
Betriebstemp. Sonde/operating temp. probe
max. 200°C / 392°F
Heizung/heating
100-250VAC 400W
-Temperatur/temperature
180°C / 356°F
selbstgeregelnd/self regulating
150°C / 302°F
-Untertemperaturalarm/low temperature alarm
max. Schaltstrom/max. current
4A
-Umgebungstemperatur/ambient temperature
-20 bis/to +80°C
-4 bis/to +176°F
ALLE RECHTE VORBEHALTEN
Gasentnahmesonde
sample gas probe
GAS 222.17
46/075-01-3D
4622217
BÜHLER
Meß+Regeltechnik
Ratingen

Sample gas probe GAS 222.17 ANSI CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

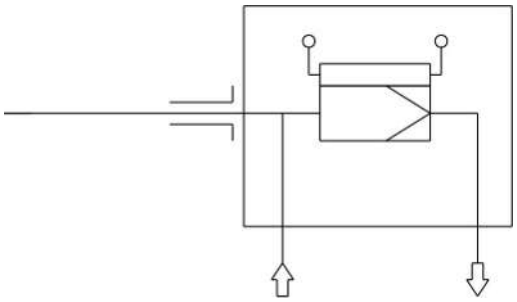
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Self-regulating heater to approx. 356 °F with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 176 °F
Self-regulating heater:	356 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 284 °F, max. switching current 4 A
Electrical data:	115/230 V, 50/60 Hz
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622217	1	9	9	0	3	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange
															ANSI 3"- 150 lbs [1]
															Power supply sample probe
					3										115/230 V
															Calibrating gas connection
							0								no calibrating gas connection
							1								6 mm
							2								6 mm with check valve
							3								1/4"
							4								1/4" with check valve

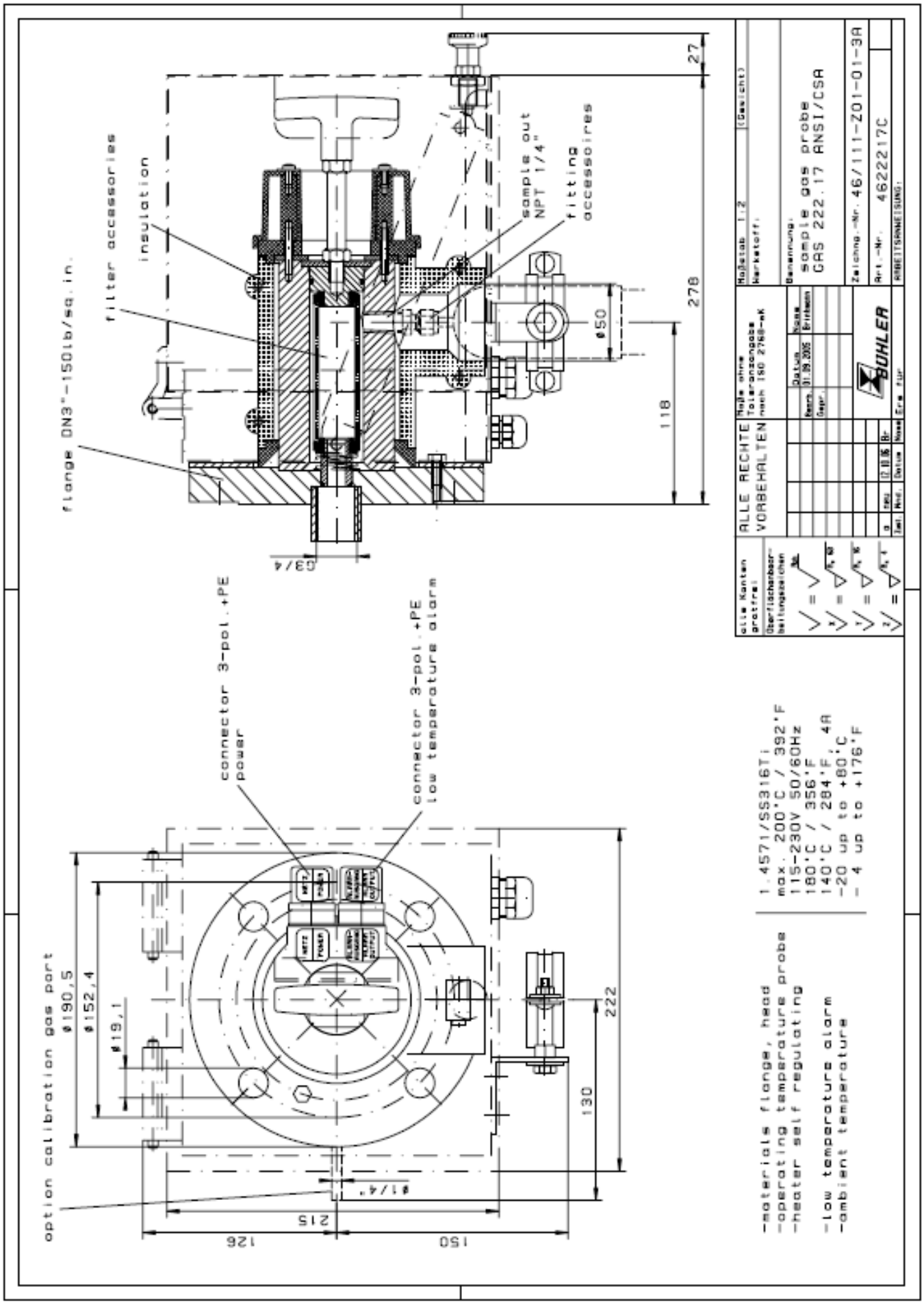
[1] Probes with ANSI: Flanges are CSA and C-US certified.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


flange DN3"-150lb/sq.in.
filter accessories
insulation
sample out NPT 1/4"
fitting accessories
27
278
118
ø50
G3/4
connector 3-pol.+PE power
connector 3-pol.+PE low temperature alarm
option calibration gas port
ø190,5
ø152,4
ø19,1
222
130
215
126
150
ø1/4"
-materials flange, head 1.4571/SS316Ti
-operating temperature probe max. 200°C / 392°F
-heater self regulating 115-230V 50/60Hz
180°C / 356°F
140°C / 284°F, 4A
-low temperature alarm -20 up to +80°C
-ambient temperature - 4 up to +176°F
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
Werkstoff:
Benennung: sample gas probe GAS 222.17 ANSI/CSA
Zeichng.-Nr. 46/111-201-01-3A
Art.-Nr. 46222170
BÜHLER

Sample gas probe GAS 222.20

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

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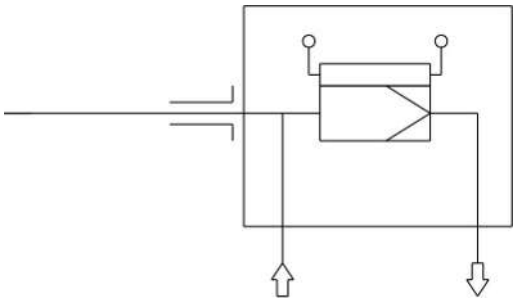
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 158 °F (can be limited by optional add-ons)
Controller temperature range:	122 to 395 °F
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
IP rating:	IP54
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

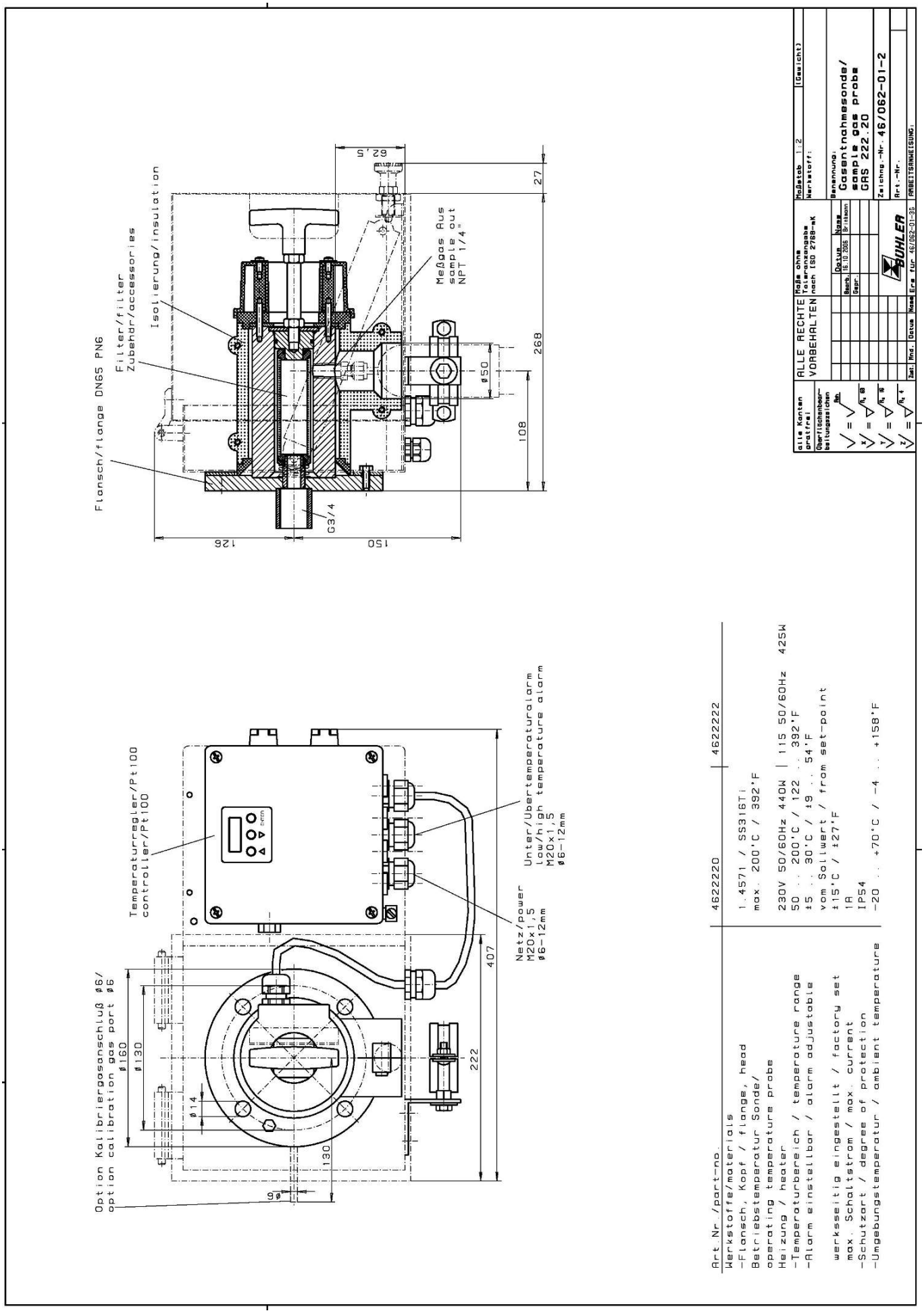
4622220	0	9	9	0	X	X	X	X	9	9	9	9	9	9	Product Characteristics
															Flange
															DIN DN65 PN6
															Power supply sample probe
					1										115 V
					2										230 V
															Calibrating gas connection
						0									no calibrating gas connection
						1									6 mm
						2									6 mm with check valve
						3									1/4"
						4									1/4" with check valve
															Connection, heated line
							0								No
							1								Yes
															Built-in temperature controller for heated extension
								0							No
								1							Yes

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
Meßgas Aus
sample out
NPT 1/4"
62,5
27
268
108
ø50
G3/4
126
150
Temperaturregler/Pt100
controller/Pt100
Option Kalibriergasanschluß ø6/
option calibration gas port ø6
ø160
ø130
ø14
130
9ø
222
407
Netz/power
M20x1,5
ø6–12mm
Unter/Übertemperaturalarm
Low/high temperature alarm
M20x1,5
ø6–12mm
Art Nr./part-no.
4622220
4622222
Werkstoffe/materials
-Flansch, Kopf / flange, head
1.4571 / SS316Ti
Betriebstemperatur Sonde/
operating temperature probe
max. 200°C / 392°F
Heizung / heater
230V 50/60Hz 440W | 115 50/60Hz 425W
-Temperaturbereich / temperature range
50 . . 200°C / 122 . . 392°F
-Alarm einstellbar / alarm adjustable
±5 . . 30°C / ±9 . . 54°F
vom Sollwert / from set-point
werksseitig eingestellt / factory set
±15°C / ±27°F
max. Schaltstrom / max. current
1A
-Schutzart / degree of protection
IP54
-Umgebungstemperatur / ambient temperatur
-20 . . +70°C / -4 . . +158°F
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2
(Gewicht)
Werkstoff:
Bearb. 16.10.2008 Brinkmann
Gepr.
Benennung:
Gasentnahmesonde/
sample gas probe
GAS 222.20
Zeichng.-Nr. 46/062-01-2
Art.-Nr.
BUHLER
Zust. Änd. Datum Name Ers. für 46/062-01-3S
ARBEITSHINWEISUNG:

Sample gas probe GAS 222.20 ANSI CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

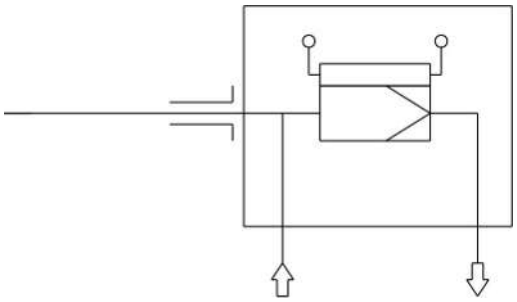
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Controller temperature range:	122 to 395 °F
Ambient temperature:	-4 to 158 °F (can be limited by optional add-ons)
Low/high temperature alarm:	Alarm adjustable ±5...30 K from setpoint, factory preset to 15 K. Max. switching current 1 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter
IP rating:	IP54

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622220	1	9	9	0	X	X	X	X	9	9	9	9	9	9	Product Characteristics
															Flange
															ANSI 3"- 150 lbs [1]
															Power supply sample probe
					1										115 V
					2										230 V
															Calibrating gas connection
						0									no calibrating gas connection
						1									6 mm
						2									6 mm with check valve
						3									1/4"
						4									1/4" with check valve
															Connection, heated line
							0								No
							1								Yes
															Built-in temperature controller for heated extension
								0							No
								1							Yes

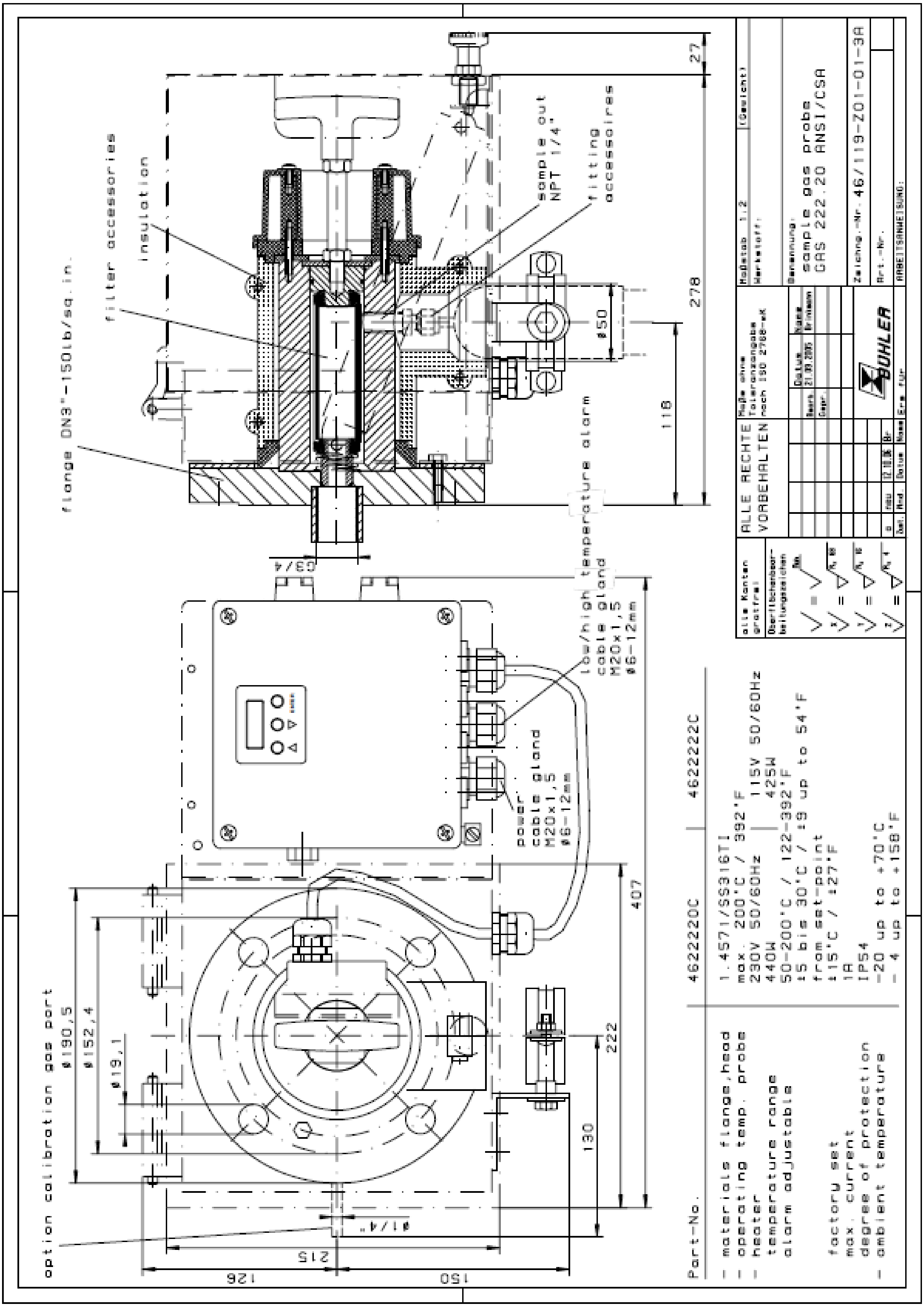
[1] Probes with ANSI: Flanges are CSA and C-US certified.

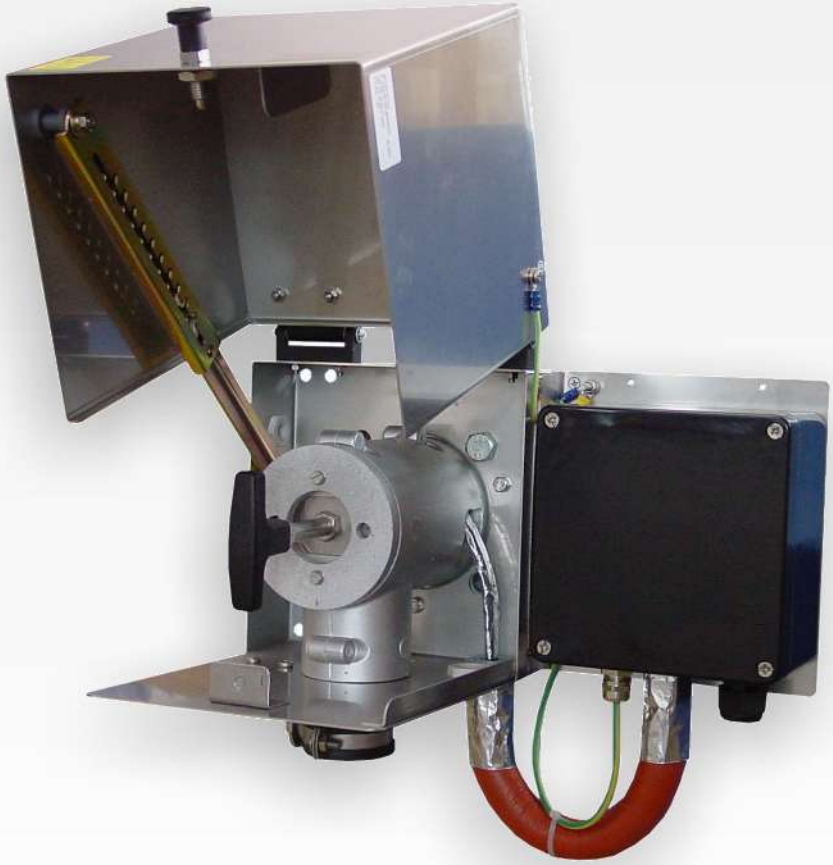
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


flange DN3"-150lb/sq.in.
filter accessories
insulation
sample out NPT 1/4"
fitting accessoires
low/high temperature alarm
cable gland M20x1,5 ø6-12mm
power cable gland M20x1,5 ø6-12mm
option calibration gas port
G3/4
27
278
118
ø50
407
222
130
215
126
150
ø190,5
ø152,4
ø19,1
ø1/4"
Part-No.
4622220C
4622222C
- materials flange, head
- operating temp. probe
- heater
temperature range
alarm adjustable
factory set
max. current
degree of protection
- ambient temperature
1.4571/SS316TI
max. 200°C / 392°F
230V 50/60Hz
440W
115V 50/60Hz
425W
50-200°C / 122-392°F
±5 bis 30°C / ±9 up to 54°F
from set-point
±15°C / ±27°F
1A
IP54
-20 up to +70°C
- 4 up to +158°F
ALLE RECHTE VORBEHALTEN
sample gas probe
GAS 222.20 ANSI/CSA
Zeichng.-Nr. 46/119-Z01-01-3A
BÜHLER



Sample gas probe GAS 222.20 Atex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Versions with Atex approval
Heated probe with downstream filter and weather hood
The downstream filter can easily be removed by turning the handle 90°
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 176 °F
For dust loads up to 2 g/m³
This probe is designed for use in explosive areas (Zone 21, 22 and extracting from Zone 20)

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
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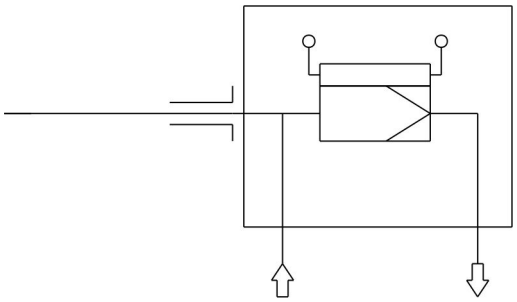
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data		
Ambient temperature:	-4 to 122 °F	
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T3	275 °F
	T4	266 °F
Self-regulating heater:	176 °F	
Electrical data:	Probe: 230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	External circuit breaker type C: 230 V, 2 A, 50/60 Hz 115 V, 3 A, 50/60 Hz
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Marks*:	ATEX: Ex 1GD / 2GD T4 T130 °C	

* Please note, using special accessories may limit the approved applications of the probes.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

46222200	X	X	4	X	X	0	0	9	9	9	9	9	9	Product Characteristics
														Flange
														DIN DN65 PN6
														Explosive outdoor areas
	4													Zone 21
	5													Zone 22
														Explosive indoor areas
		3												Zone 20
		4												Zone 21
		5												Zone 22
														Ex temperature classes
			4											T4
														Probe voltage
				1										115 V
				2										230 V
														Calibrating gas connection
					0									No calibrating gas connection
					1									6 mm
					2									6 mm + check valve
					3									1/4"
					4									1/4" + check valve

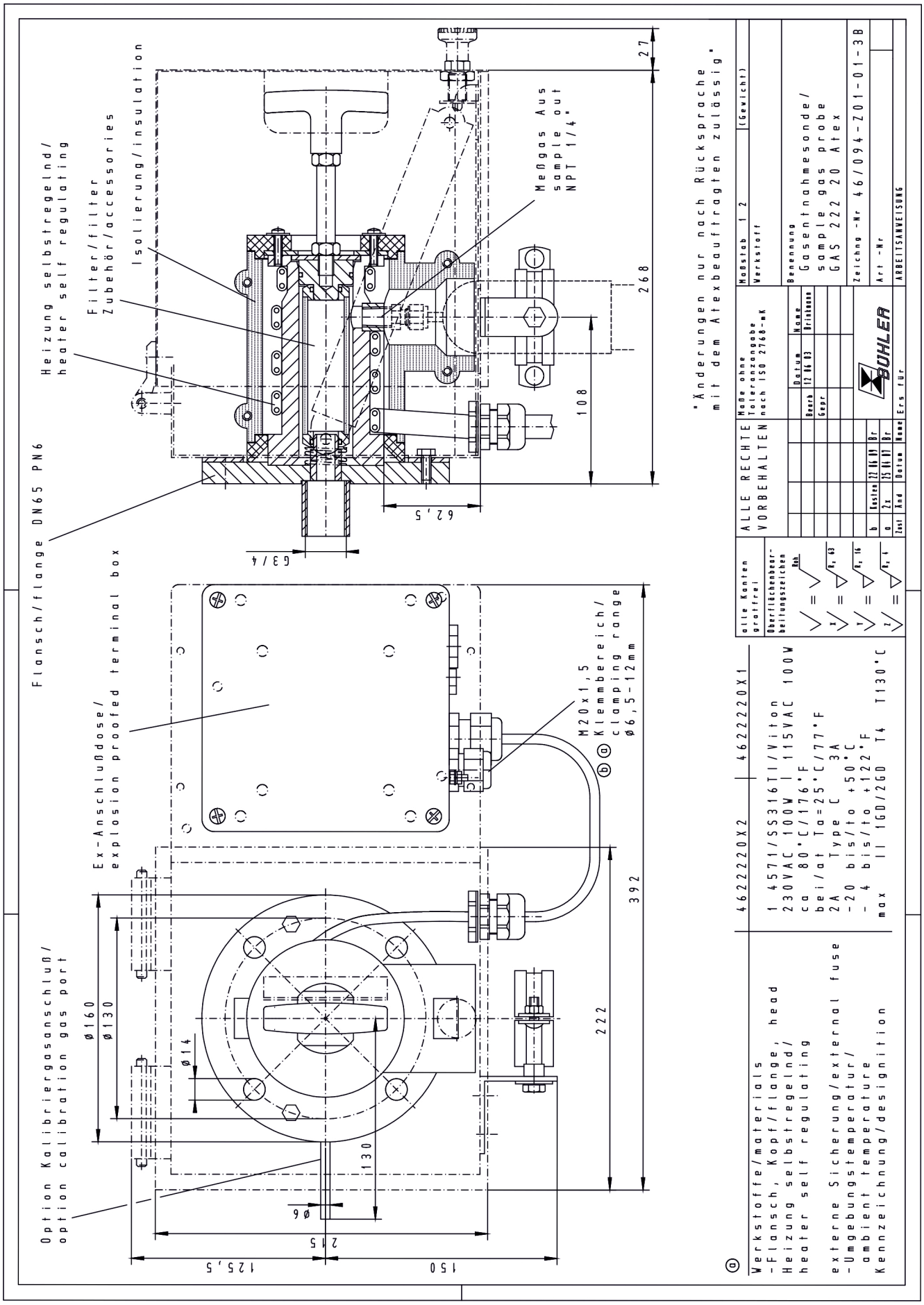
[1] Please note, using certain accessories may limit gas probe use in Ex areas! Observe the respective operating manuals, accessory compatibility charts, and data sheets to ensure proper technical product design!

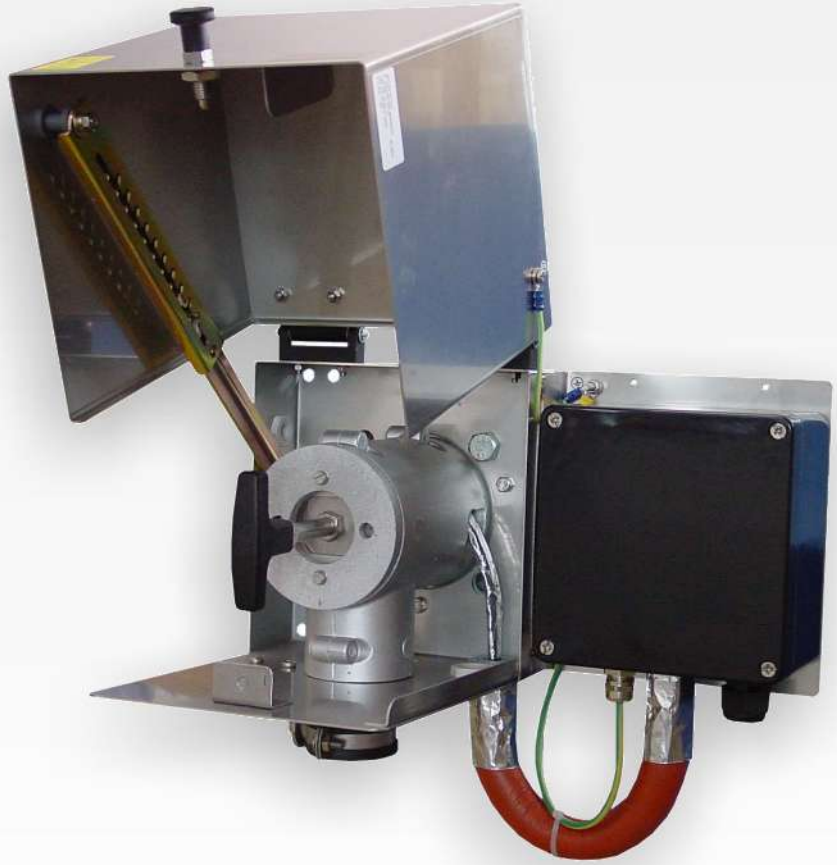
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Heizung selbstregelnd/
heater self regulating
Filter/filter
Zubehör/accessories
Isolierung/insulation
Meßgas Aus
sample out
NPT 1/4"
G 1/4
62,5
108
268
27
Ex-Anschlußdose/
explosion proofed terminal box
M20x1,5
Klemmbereich/
clamping range
Ø6,5-12mm
392
222
150
125,5
215
130
Ø14
Ø160
Ø130
Option Kalibriergasanschluß/
option calibration gas port
"Änderungen nur nach Rücksprache
mit dem Atexbeauftragten zulässig"
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
Maßstab 1 2 (Gewicht)
Werkstoff
Benennung
Gasentnahmesonde/
sample gas probe
GAS 222 20 Atex
Zeichng -Nr 46/094-Z01-01-3B
Art -Nr
ARBEITSANWEISUNG
BÜHLER
4622220X2 4622220X1
1.4571/SS316TI/Viton
230VAC 100W | 115VAC 100W
ca 80°C/176°F
bei/at Ta=25°C/77°F
2A Type C 3A
-20 bis/to +50°C
-4 bis/to +122°F
max II 1GD/2GD T4 T130°C
Werkstoffe/materials
-Flansch, Kopf/flange, head
Heizung selbstregelnd/
heater self regulating
externe Sicherung/external fuse
-Umgebungstemperatur/
ambient temperature
Kennzeichnung/designition



Sample gas probe GAS 222.20 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 176 °F
- For dust loads up to 2 g/m³
- This probe is designed for use in explosive areas (Zone 1 and extracting from Zone 0)

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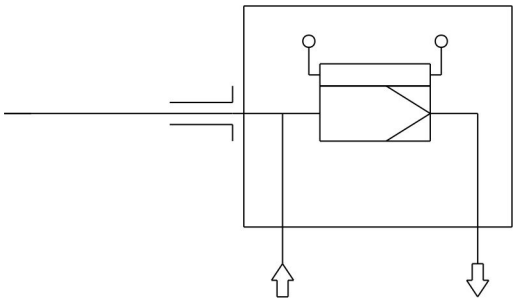
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature:	-40 to 140 °F	
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Self-regulating heater:	176 °F	
Electrical data:	Probe: 230 V, 100 W, 50/60 Hz 115 V, 100 W, 50/60 Hz	External circuit breaker type C: 230 V, 2 A, 50/60 Hz 115 V, 3 A, 50/60 Hz
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db eb mb IIC T6...T2 Gb IECEx: Ex db eb mb IIC T6...T2 Gb	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

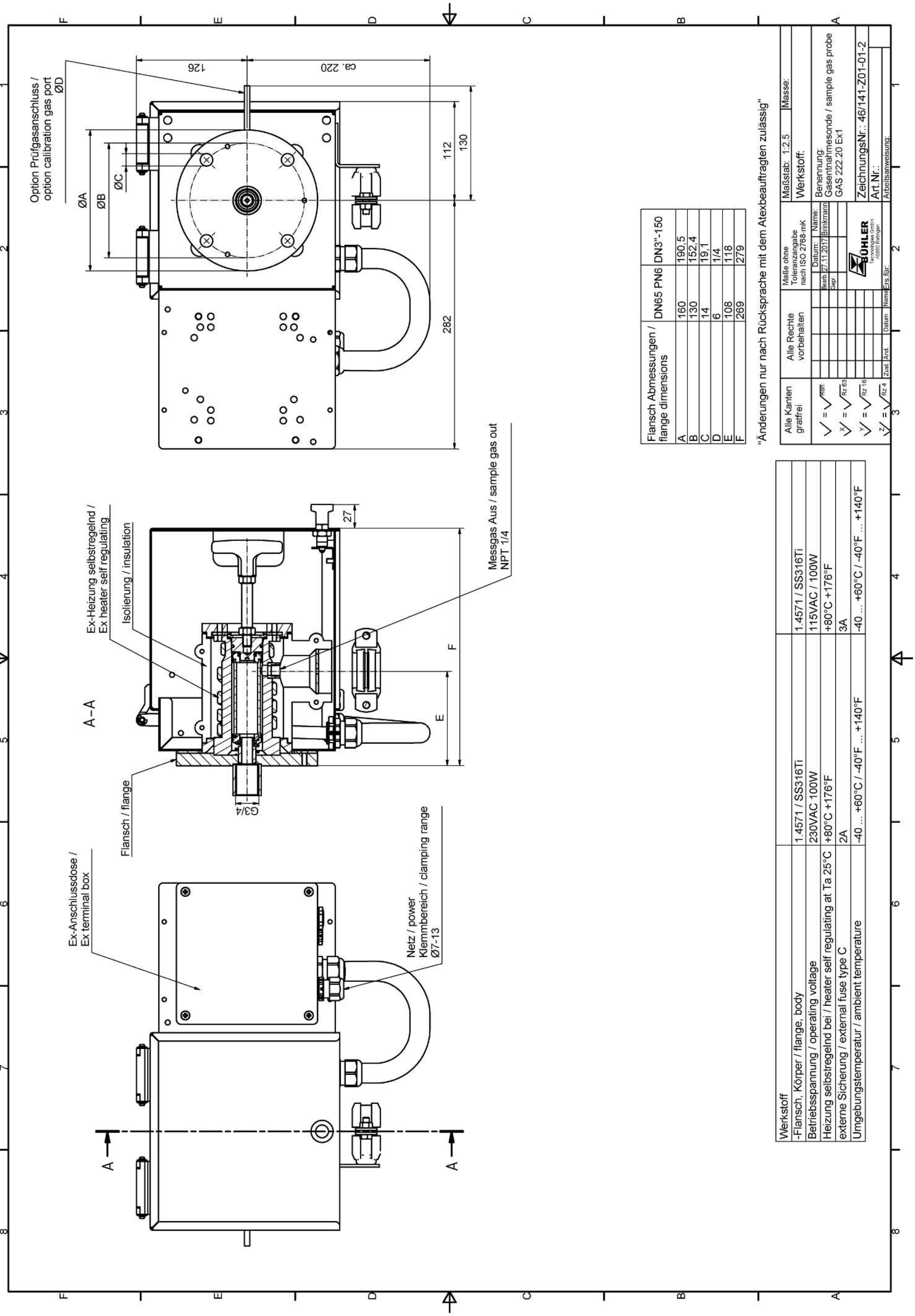
46222201	X	X	X	X	4	X	0	X	0	9	0	0	0	Product Characteristics
														Flange
	0	1												Flange DN65 PN6
	0	2												Flange DN3"-150
	x	x												Other
														Hazardous area outside
			4											Zone 1
			5											Zone 2
			9											none
														Hazardous area inside
				3										Zone 0
				4										Zone 1
				5										Zone 2
				9										none
														Power supply sample probe
						1								115 V
						2								230 V
														Calibration gas port
								0						No
								1						6 mm
								2						6 mm with check valve
								3						1/4"
								4						1/4" with check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

Werkstoff		
-Flansch, Körper / flange, body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	230VAC 100W	115VAC / 100W
Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+80°C +176°F	+80°C +176°F
externe Sicherung / external fuse type C	2A	3A
Umgebungstemperatur / ambient temperature	-40 ... +60°C / -40°F ... +140°F	-40 ... +60°C / -40°F ... +140°F

Sample gas probe GAS 222.20 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with outlet filter and weather hood
- The outlet filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Heater self-regulating to approx. 266 °F (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 2 g/m³
- This probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
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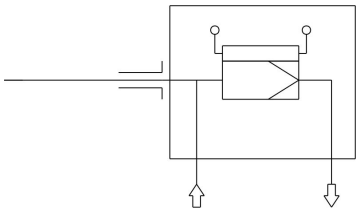
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Self-regulating heater:	266 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure:	85 psia	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: ⟨Ex⟩ II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

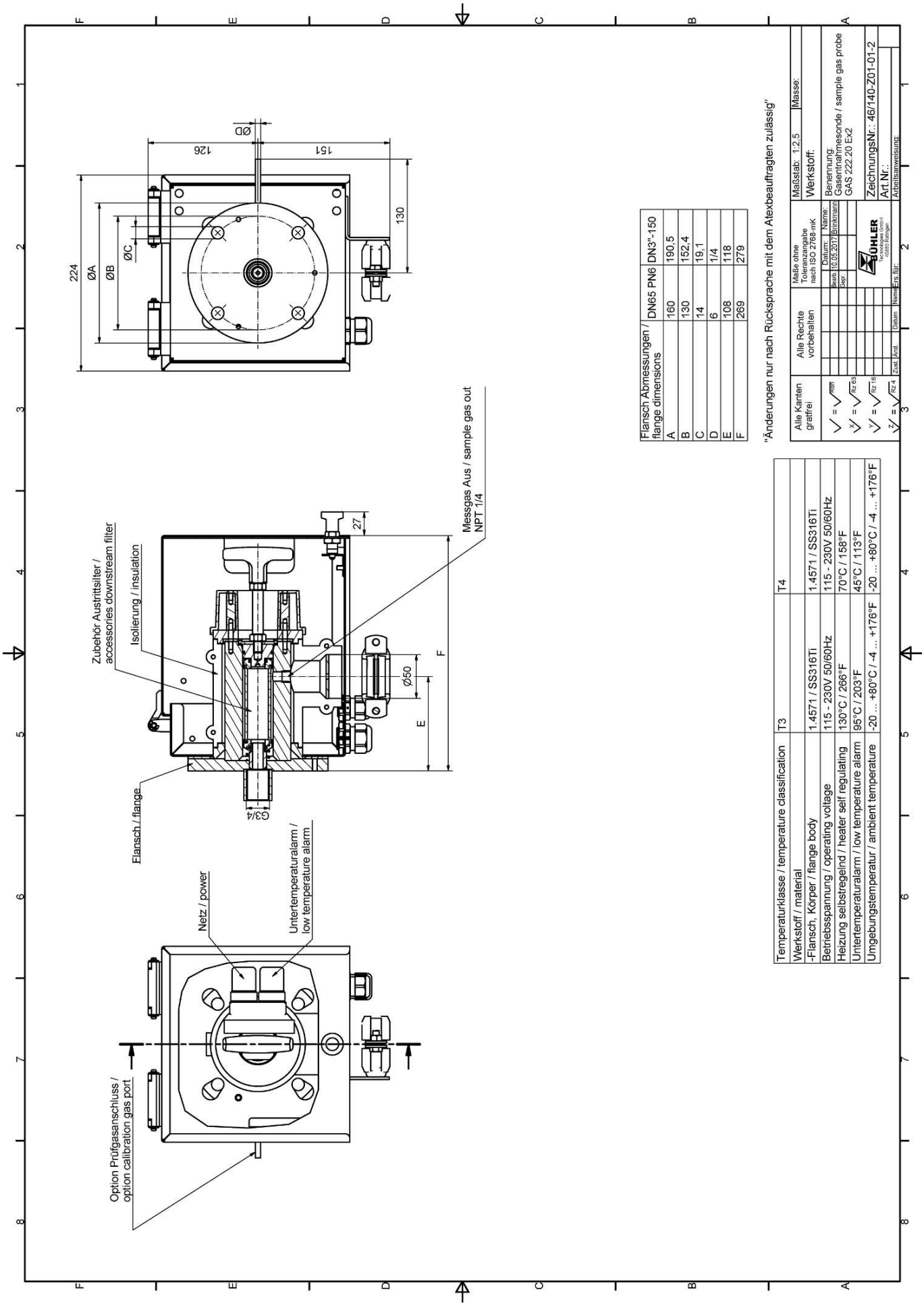
4622220	X	0	X	X	X	X	3	X	X	0	9	0	0	0	Product Characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							3								115/230 V
															Low temperature alarm
								1							Opener (open at operating temperature) (marked with "ic")
								2							Closer (closed at operating temperature) (marked with "ic")
															Calibrating gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	115 - 230V 50/60Hz	115 - 230V 50/60Hz
Heizung selbstregelnd / heater self regulating	130°C / 266°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C / 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

Alle Kanten gratfrei

Alle Rechte vorbehalten

Maße ohne Toleranzangabe nach ISO 2768-mK

Maßstab: 1:2,5

Masse:

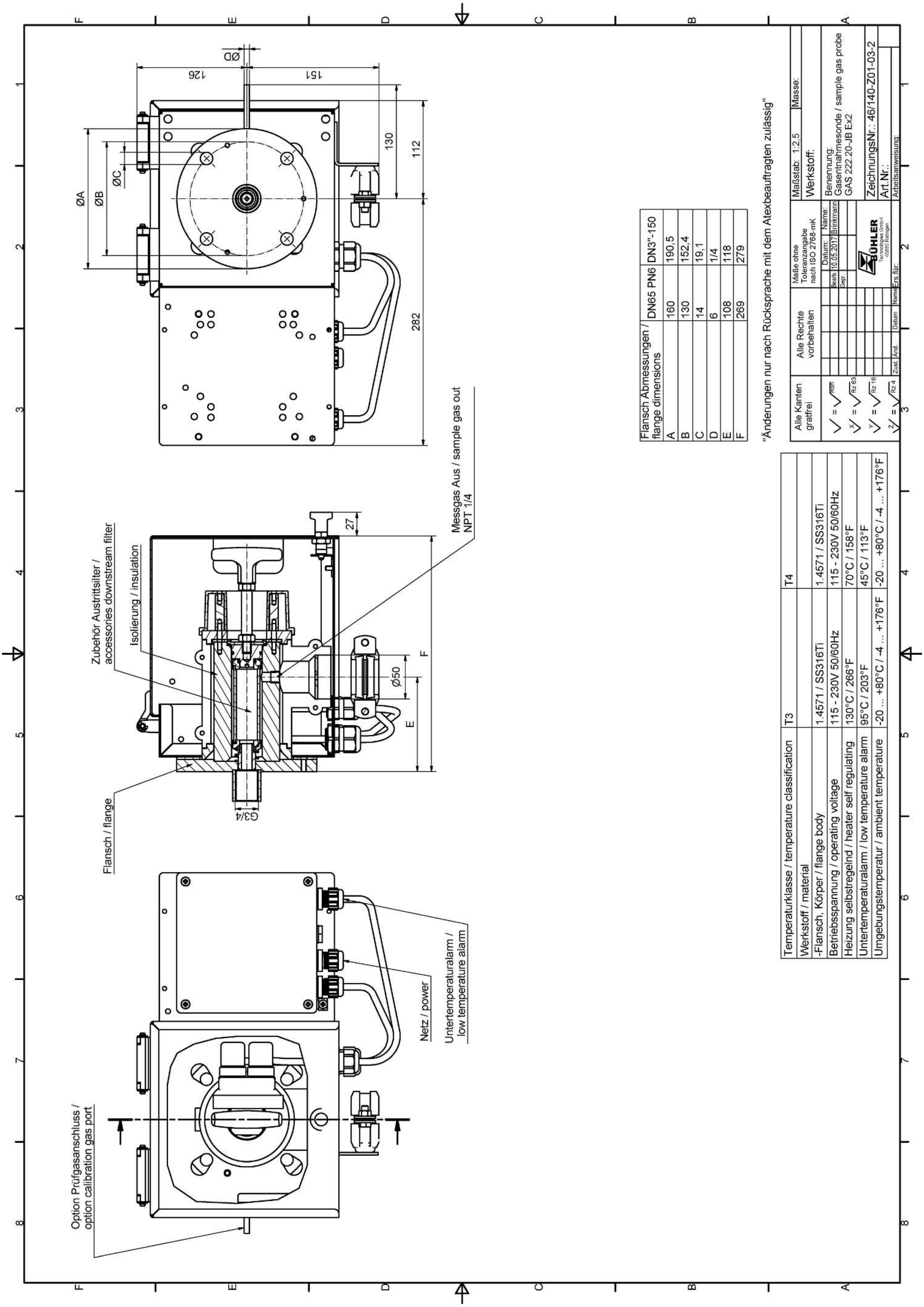
Werkstoff:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.20 Ex2

ZeichnungsNr.: 46/140-Z01-01-2

Art.Nr.:

Arbeitsanweisung:


ØD
126
151
ØA
ØB
ØC
130
112
282
Flansch Abmessungen / flange dimensions
DN65 PN6 | DN3"-150
A 160 | 190,5
B 130 | 152,4
C 14 | 19,1
D 6 | 1/4
E 108 | 118
F 269 | 279
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:2,5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.20-JB Ex2
ZeichnungsNr.: 46/140-Z01-03-2
Art.Nr.:
Arbeitsanweisung:
Bearb. 10.05.2017 Brinkmann
BÜHLER
Zubehör Austrittsfilter / accessories downstream filter
Isolierung / insulation
Messgas Aus / sample gas out NPT 1/4
27
Ø50
E
F
G3/4
Flansch / flange
Temperaturklasse / temperature classification | T3 | T4
Werkstoff / material
-Flansch, Körper / flange body | 1.4571 / SS316Ti | 1.4571 / SS316Ti
Betriebsspannung / operating voltage | 115 - 230V 50/60Hz | 115 - 230V 50/60Hz
Heizung selbstregelnd / heater self regulating | 130°C / 266°F | 70°C / 158°F
Untertemperaturalarm / low temperature alarm | 95°C / 203°F | 45°C / 113°F
Umgebungstemperatur / ambient temperature | -20 ... +80°C / -4 ... +176°F | -20 ... +80°C / -4 ... +176°F
Netz / power
Untertemperaturalarm / low temperature alarm
Option Prüfgasanschluss / option calibration gas port

Sample gas probe GAS 222.20 Amex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Heated prove with downstream filter, weather hood and terminal box
The downstream filter can easily be removed by turning the handle 90°
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 266 °F (T3)/158 °F (T4)
For dust loads up to 2 g/m³
This probe is suitable for use in explosive areas
C-US and CSA approval

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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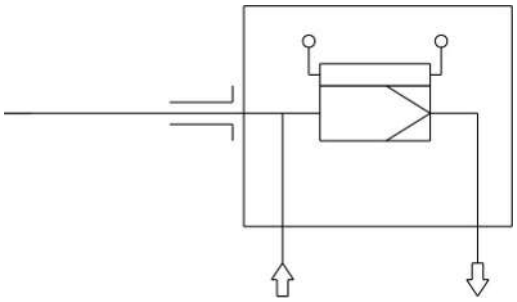
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Self-regulating temperature:	266 °F (T3)/158 °F (T4)
Ambient temperature:	-4 to +176 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 203 °F (T3) resp. < 122 °F (T4); U_{max}=30 VDC, I_{max}=100 mA, Ci/Li~0
Electrical data:	115 V-230 V, 50/60 Hz
Max. operating pressure:	85 psia
Parts in contact with media:	1.4571 Seals: Graphite/1.4404 and see filter
Explosion protection:	Class 1, Div 2, Gps B, C, D, T3 and T4

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

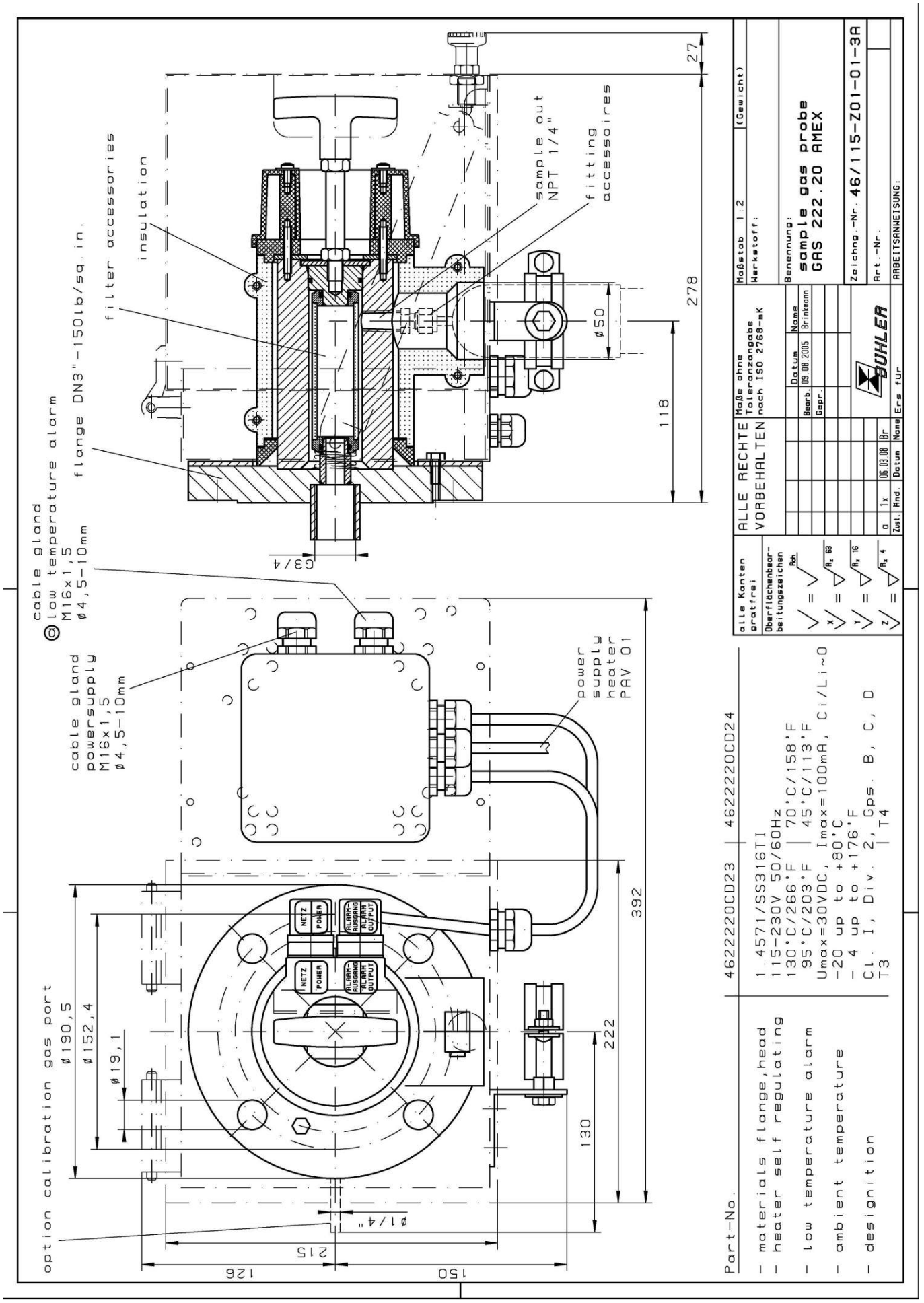
4622220	1	6	6	X	3	X	0	0	9	9	9	9	9	9	Product Characteristics
															Ex temperature classes
				3											T3
				4											T4
															Sample probe power supply
					3										115 / 230 V
															Calibration gas connection
						0									No calibration gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


cable gland
low temperature alarm
M16x1,5
ø4,5–10mm
flange DN3"–150lb/sq.in.
filter accessories
insulation
sample out
NPT 1/4"
fitting
accessoires
27
278
118
ø50
G3/4
cable gland
powersupply
M16x1,5
ø4,5–10mm
power
supply
heater
PAV 01
option calibration gas port
ø190,5
ø152,4
ø19,1
392
222
130
ø1/4"
215
126
150
NETZ
POWER
ALARM-
AUSGANG
ALARM
OUTPUT
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
sample gas probe
GAS 222.20 AMEX
Zeichng.-Nr. 46/115-Z01-01-3A
Art.-Nr.
ARBEITSANWEISUNG:
BÜHLER
Part-No. 4622220CD23 | 4622220CD24
- materials flange,head 1.4571/SS316TI
- heater self regulating 115–230V 50/60Hz
130°C/266°F | 70°C/158°F
95°C/203°F | 45°C/113°F
- low temperature alarm Umax=30VDC, Imax=100mA, Ci/Li~0
- ambient temperature –20 up to +80°C
– 4 up to +176°F
- designition Cl. I, Div. 2, Gps. B, C, D
T3 | T4

Sample gas probe GAS 222.20-HT

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

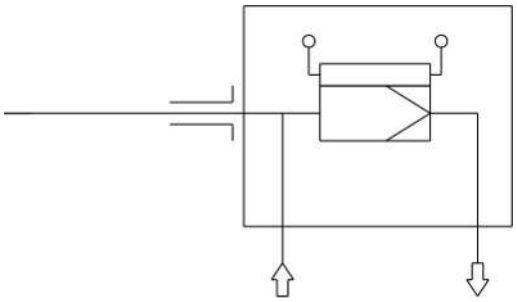
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 536 °F with Pt100, high/low temperature alarm and display
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 536 °F
Controller temperature range:	122 to 536 °F
Ambient temperature:	-4 to 158 °F (can be limited by optional add-ons)
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Switching current max. 1 A
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz
IP rating:	IP54
Max. operating pressure:	87 psia
Material:	1.4571
Parts in contact with media:	Seals: Graphit/1.4404 and see filter

Ordering instructions

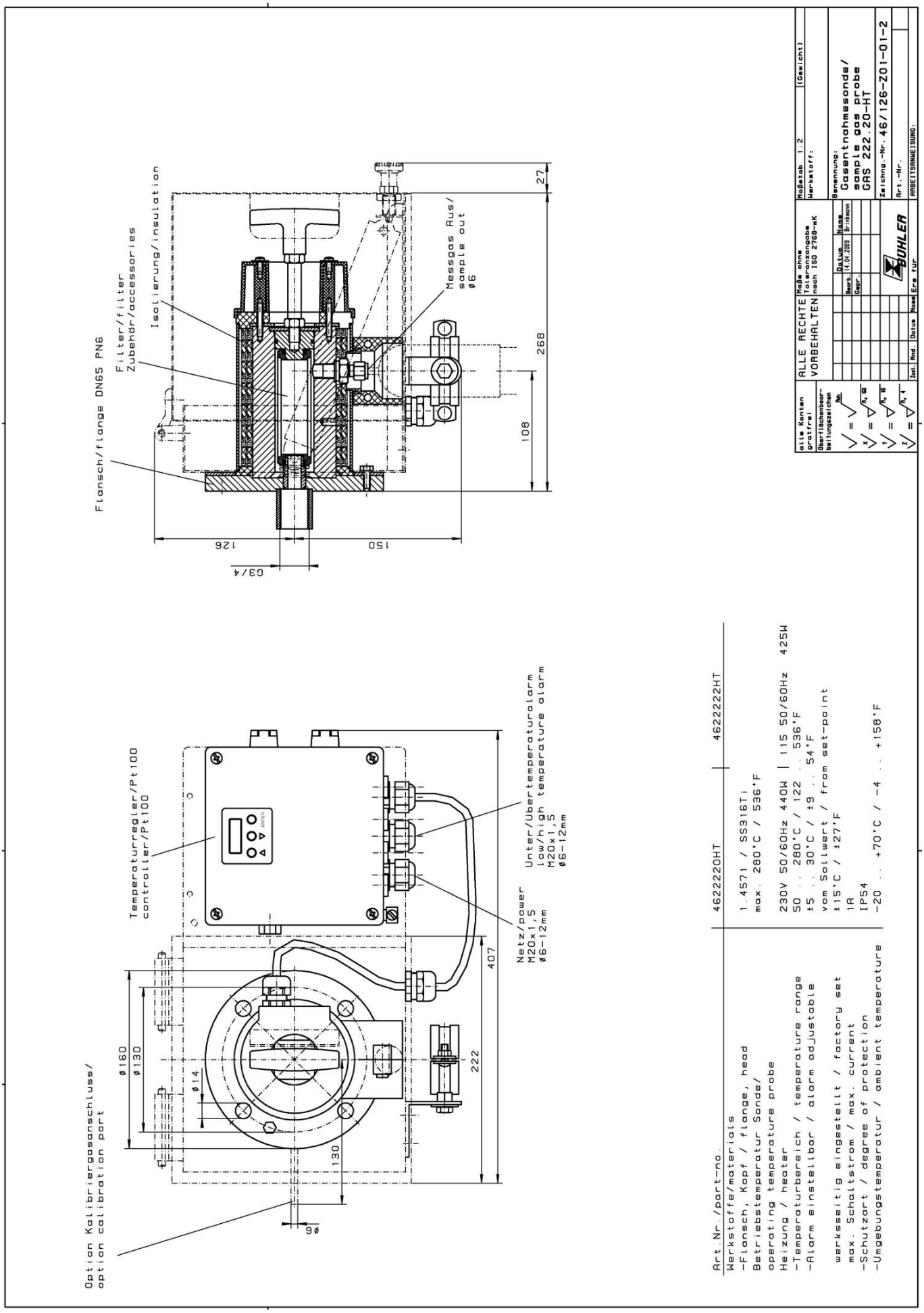
Item no.	Base unit
46 222 20HT	GAS 222.20-HT, 230 V
46 222 22HT	GAS 222.20-HT, 115 V

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Flansch/flange DN65 PN6
Filter/filter
Zubehör/accessories
Isolierung/insulation
Messgas Aus/
sample out
ø6
27
268
108
126
150
G3/4
Temperaturregler/Pt100
controller/Pt100
Unter/Übertemperaturalarm
low/high temperature alarm
M20x1,5
ø6-12mm
Netz/power
M20x1,5
ø6-12mm
407
222
130
ø160
ø130
ø14
9ø
Option Kalibriergasanschluss/
option calibration port
Art.Nr./part-no. 462220HT 462222HT
Werkstoffe/materials
-Flansch, Kopf / flange, head 1.4571 / SS316Ti
Betriebstemperatur Sonde/
operating temperature probe max. 280°C / 536°F
Heizung / heater 230V 50/60Hz 440W | 115 50/60Hz 425W
-Temperaturbereich / temperature range 50 .. 280°C / 122 .. 536°F
-Alarm einstellbar / alarm adjustable ±5 .. 30°C / ±9 .. 54°F
vom Sollwert / from set-point
werksseitig eingestellt / factory set ±15°C / ±27°F
max. Schaltstrom / max. current 1A
-Schutzart / degree of protection IP54
-Umgebungstemperatur / ambient temperature -20 .. +70°C / -4 .. +158°F
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde/
sample gas probe
GAS 222.20-HT
Zeichng.-Nr. 46/126-201-01-2
Art.-Nr.
ARBEITSANWEISUNG:
BÜHLER

Sample gas probe GAS 222.20 Denox

In many applications gas analysis is key for safe and efficient control of process flows, environmental protection, and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- Adjustable up to 536 °F with Pt100
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas
- Built-in glass bead receptacle
- Anti-freeze heater optional

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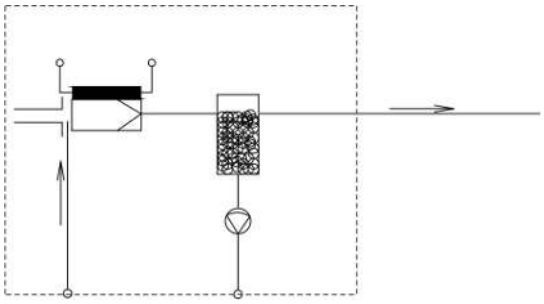
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 536 °F
Operating pressure:	90 kPa...100 kPa
Controller temperature range:	122 °F to 536 °F
Ambient temperature:	41 °F to 122 °F* without anti-freeze heater -4 °F to 122 °F* with optional anti-freeze heater
Electrical data:	230 V 50 Hz 650 W 3 A / 115 V 60 Hz 650 W 6 A
IP rating:	IP44
Parts in contact with media:	1.4571, glass, PVDF, Norprene, Viton, PTFE

* the ambient temperature upper limit varies by inlet dew point and gas composition.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

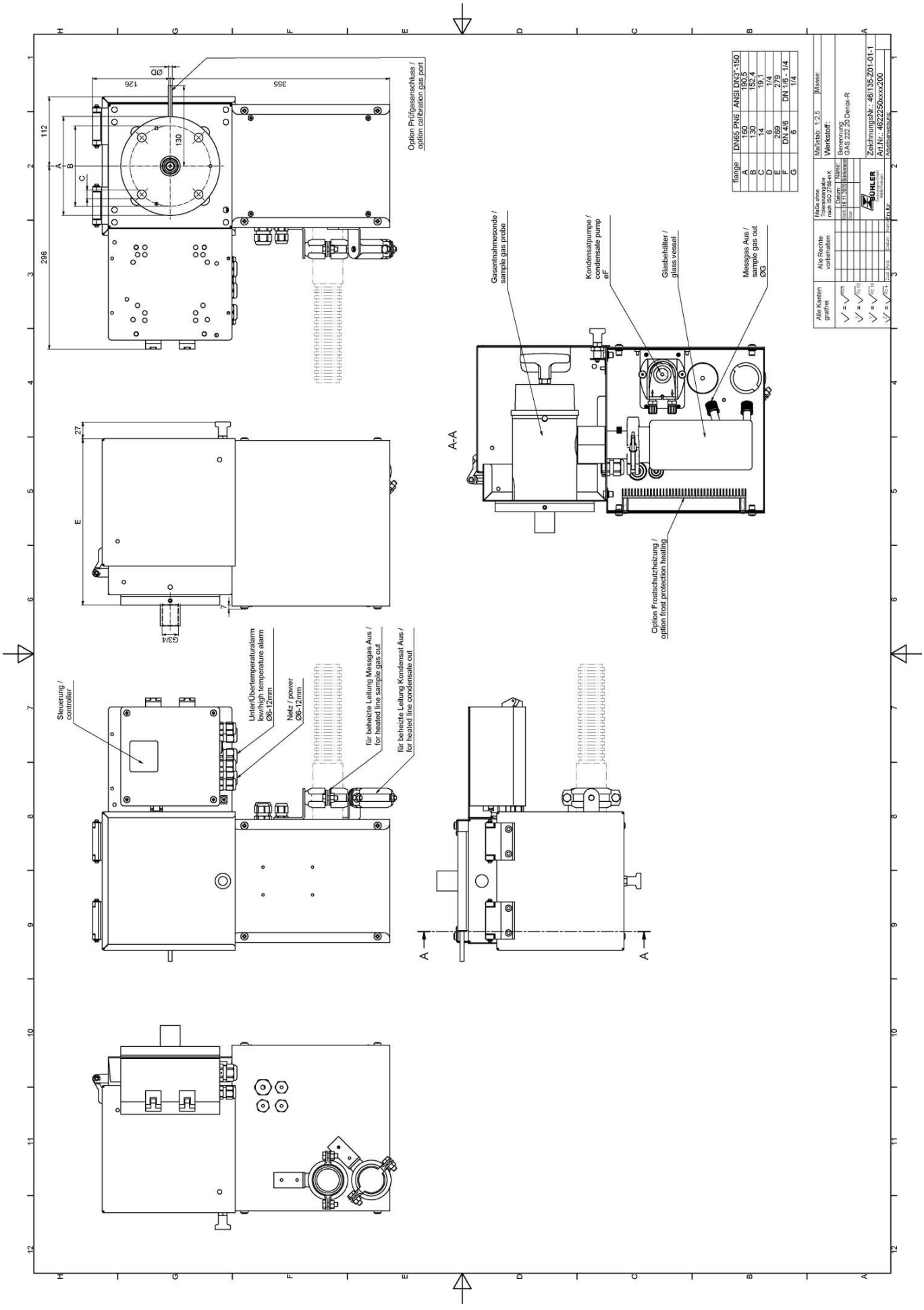
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

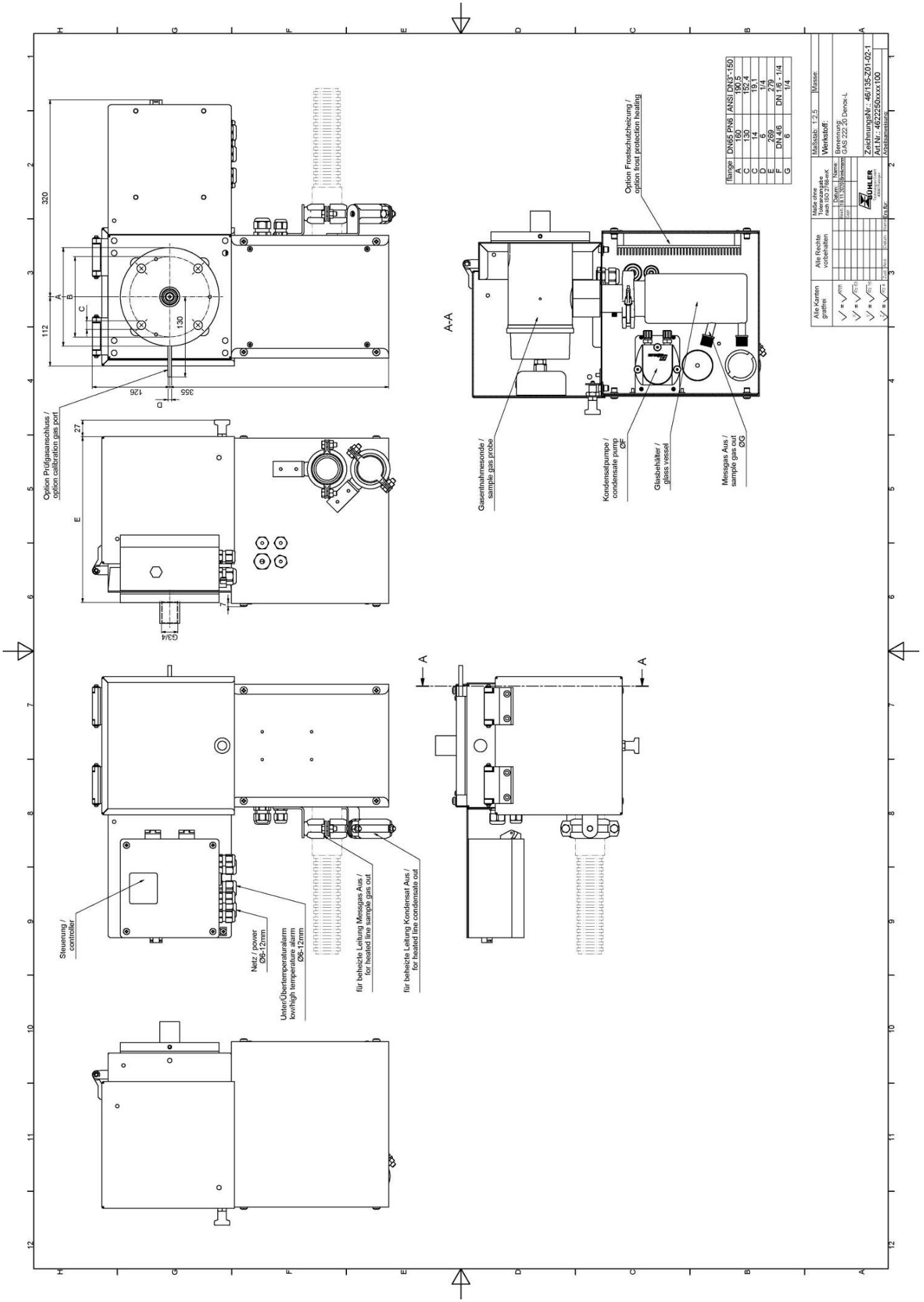
Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model code:

4622250	X	X	X	X	X	0	0	Product Characteristics
								Flange
	1							DIN DN65 PN6
	2							ASME DN3"-150
								Voltage
		1						115 V
		2						230 V
								Calibrating gas connection
			0					no calibrating gas connection
			1					6 mm
			2					6 mm + check valve
			3					1/4"
			4					1/4" + check valve
								Anti-free heater
				0				without anti-free heater
				1				with anti-free heater
								Connections
					1			Left
					2			Right

Dimensions


Option Prüfgasanschluss / option calibration gas port
Gasentnahmesonde / sample gas probe
Kondensatpumpe / condensate pump
Glasbehälter / glass vessel
Messgas Aus / sample gas out ØG
A-A
Option Frostschutzheizung / option frost protection heating
Steuerung / controller
Unter/Übertemperaturalarm low/high temperature alarm
Netz / power
für beheizte Leitung Messgas Aus / for heated line sample gas out
für beheizte Leitung Kondensat Aus / for heated line condensate out
Flange | DN65 PN6 | ANSI DN3"-150
A | 160 | 190.5
B | 130 | 152.4
C | 14 | 19.1
D | 6 | 1/4
E | 269 | 279
F | DN 4/6 | DN 1/6 - 1/4
G | 6 | 1/4
Maßstab: 1:2,5
Masse:
Werkstoff:
Maße ohne Toleranzangabe nach ISO 2768-mK
Alle Rechte vorbehalten
Alle Kanten gratfrei
Benennung: GAS 222.20 Denox-R
Zeichnungs-Nr.: 46135-Z01-01-1
Art.Nr.: 46222500xxx200
Ersatz für:
Ersatz durch:


Option Frostschutzheizung / option frost protection heating
A-A
Option Prüfgasanschluss / option calibration gas port
Gasentnahmesonde / sample gas probe
Kondensatpumpe / condensate pump
Glasbehälter / glass vessel
Messgas Aus / sample gas out ØG
Steuerung / controller
Netz / power Ø6-12mm
Unter/Übertemperaturalarm low/high temperature alarm Ø6-12mm
für beheizte Leitung Messgas Aus / for heated line sample gas out
für beheizte Leitung Kondensat Aus / for heated line condensate out
Länge
DN6E PN6
ANSI DN3"-150
A 160 190,5
C 130 152,4
C 14 19,1
D 6 1/4
E 269 279
F DN 4/6 DN 1/6 - 1/4
G 6 1/4
Maßstab: 1:2,5
Masse
Werkstoff:
Benennung
GAS 222.20 Denox-L
ZeichnungsNr.: 46/135-Z01-02-1
Art.Nr.: 4622250xxxx100
Anpassanweisung
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
BÜHLER

Sample gas probe Denox-MB

In many applications gas analysis is key for safe and efficient control of process flows, environmental protection, and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

- Heated probe with downstream filter inside GfP housing
- The downstream filter can easily be removed by turning the handle 90°
- Adjustable up to 536 °F with Pt100
- For dust loads up to 2 g/m³
- This probe is not suitable for use in Ex areas
- Built-in glass bead receptacle

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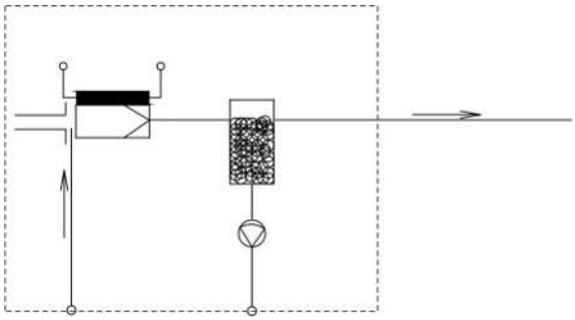
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 536 °F
Operating pressure:	90 kPa...100 kPa
Controller temperature range:	122 °F to 536 °F
Ambient temperature:	-4 °F to 122 °F
Electrical data:	230 V 50 Hz 650 W / 115 V 60 Hz 650 W
IP rating:	IP34
Parts in contact with media:	1.4571, glass, PVDF, Norprene, Viton, PTFE

* the ambient temperature upper limit varies by inlet dew point and gas composition.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

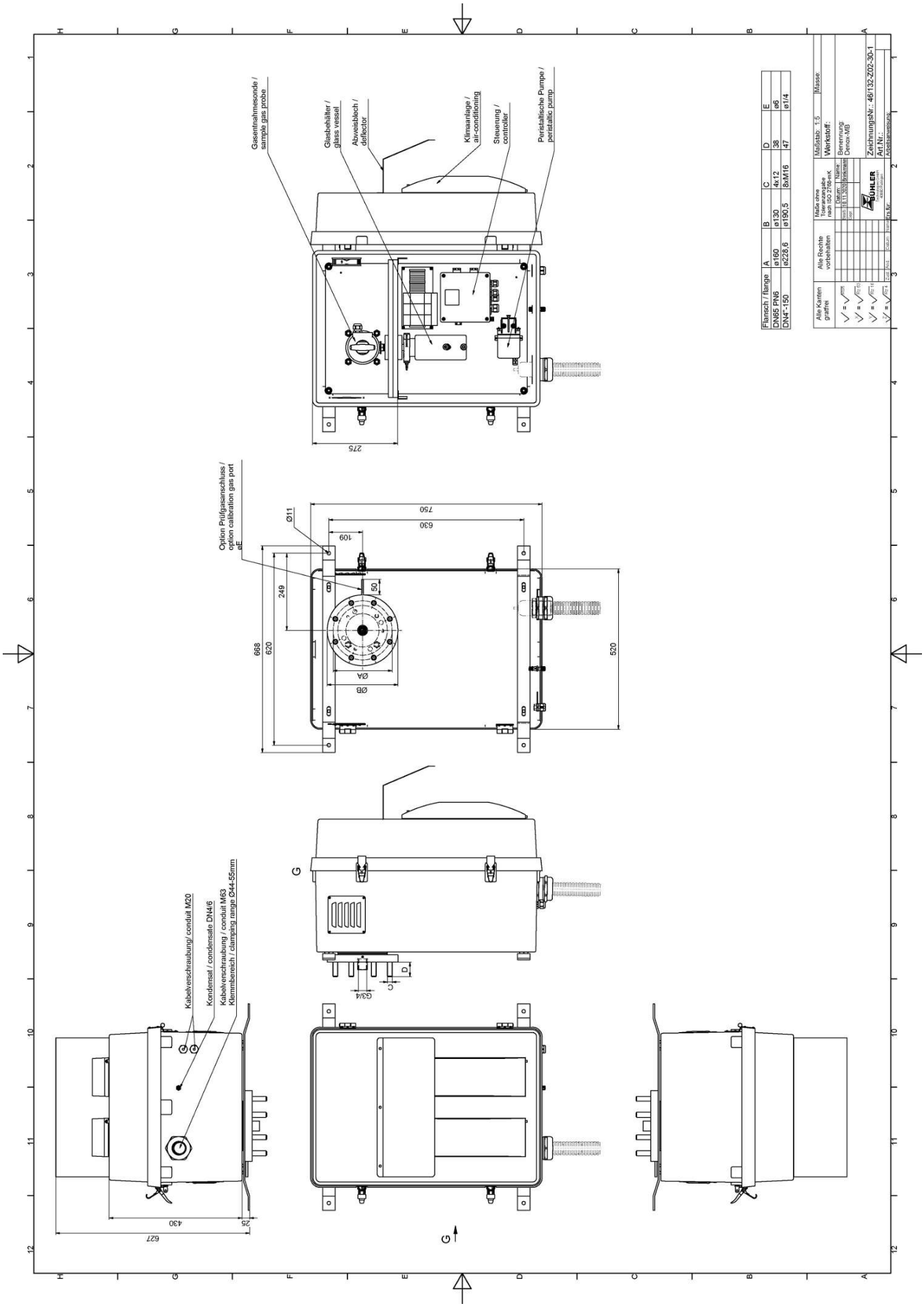
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model code:

4622251	X	X	X	0	0	0	0	Product Characteristics
								Flange
	1							DIN DN65 PN6
	3							ASME DN4"-150
								Voltage
		1						115 V
		2						230 V
								Calibrating gas connection
			0					no calibrating gas connection
			1					6 mm
			2					6 mm + check valve
			3					1/4"
			4					1/4" + check valve

Dimensions


Gasentnahmesonde / sample gas probe
Glasbehälter / glass vessel
Abweisblech / deflector
Klimaanlage / air-conditioning
Steuerung / controller
Peristaltische Pumpe / peristaltic pump
Option Prüfgasanschluss / option calibration gas port
Kabelverschraubung/ conduit M20
Kondensat / condensate DN4/6
Kabelverschraubung / conduit M63
Klemmbereich / clamping range Ø44-55mm
Flansch / flange
DN65 PN6
DN4"-150
Maßstab: 1:5
Masse:
Werkstoff:
Benennung
Denox-MB
Zeichnungsnr.: 46132-Z02-30-1
Art.Nr.:
Alle Rechte vorbehalten
Alle Kanten gratfrei
Maße ohne Toleranzangabe nach ISO 2768-mK

Sample gas probe GAS 222.20 DH

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

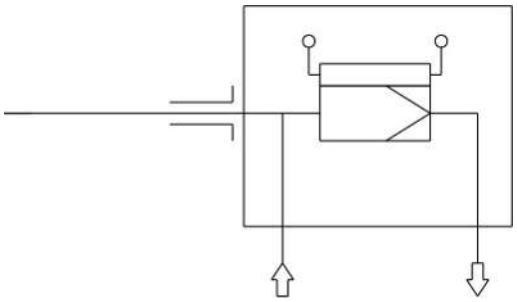
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Steam-heated
- For dust loads up to 2 g/m³
- The probe has no innate ignition source and is therefore suitable for use in Ex areas.

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 212 °F
Max. operating pressure:	85 psia
Max. steam pressure:	73 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

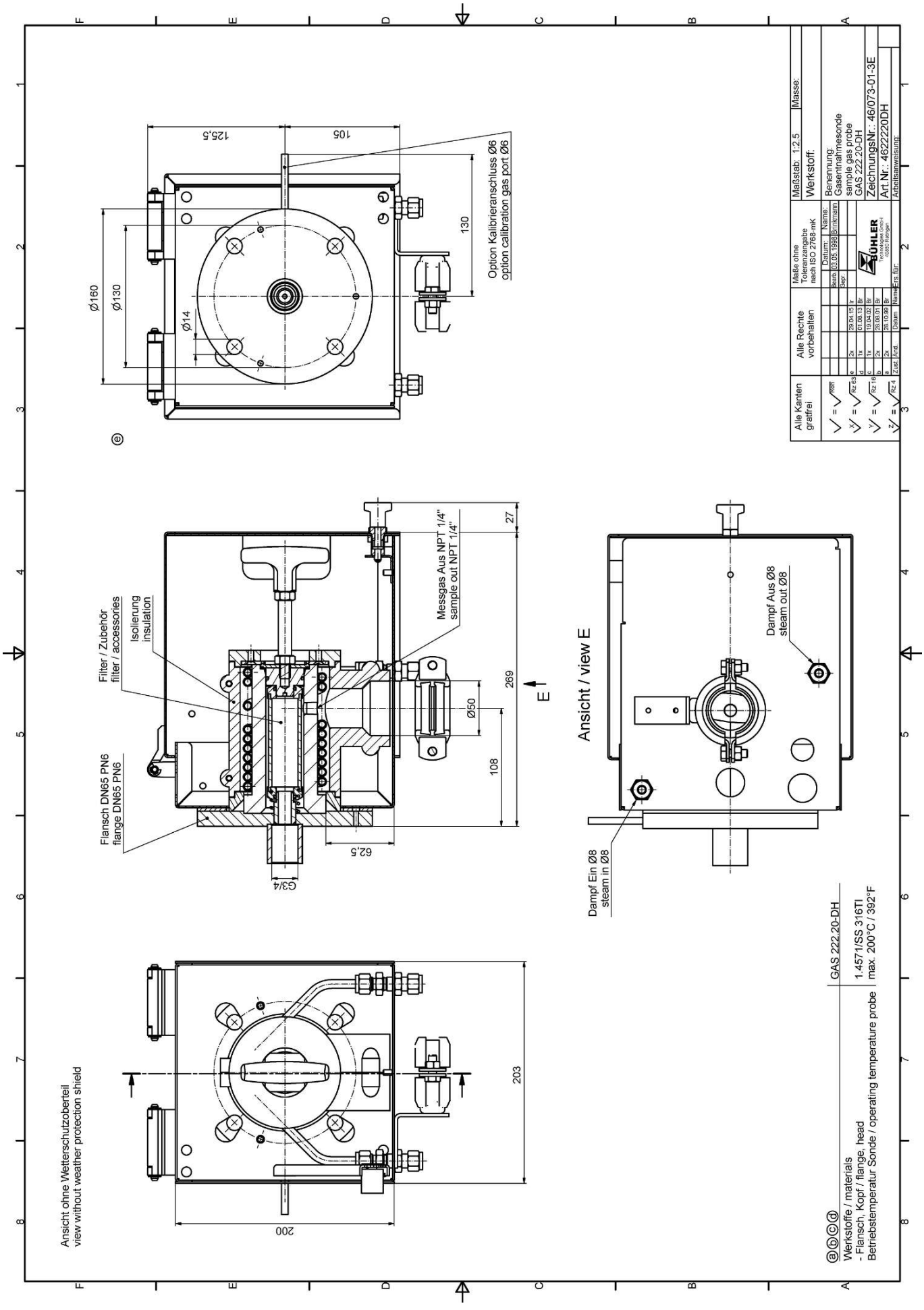
4622220	0	9	9	0	9	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange/approval
															DIN DN65 PN6
															Power supply sample probe
															Steam
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Option Kalibrieranschluss Ø6
option calibration gas port Ø6
Messgas Aus NPT 1/4"
sample out NPT 1/4"
Filter / Zubehör
filter / accessories
Isolierung
insulation
Flansch DN65 PN6
flange DN65 PN6
Ansicht / view E
Dampf Aus Ø8
steam out Ø8
Dampf Ein Ø8
steam in Ø8
Ansicht ohne Wetterschutzoberteil
view without weather protection shield
Werkstoffe / materials
- Flansch, Kopf / flange, head
Betriebstemperatur Sonde / operating temperature probe
1.4571/SS 316TI
max. 200°C / 392°F
GAS 222.20-DH
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:2,5
Masse:
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.20-DH
ZeichnungsNr.: 46/073-01-3E
Art.Nr.: 4622220DH
Arbeitsanweisung:

Sample gas probe GAS 222.20-DH ANSI

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

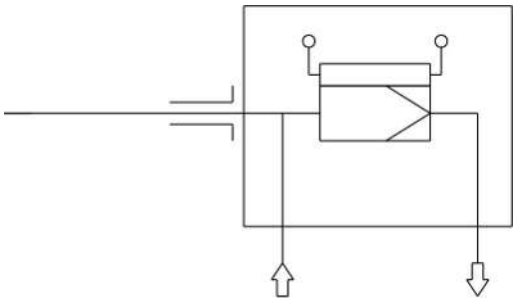
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Steam-heated
- For dust loads up to 2 g/m³
- This probe has no innate ignition source and is therefore suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow Diagram



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Ambient temperature:	-4 to 212 °F
Max. operating pressure:	85 psia
Max. steam pressure:	73 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

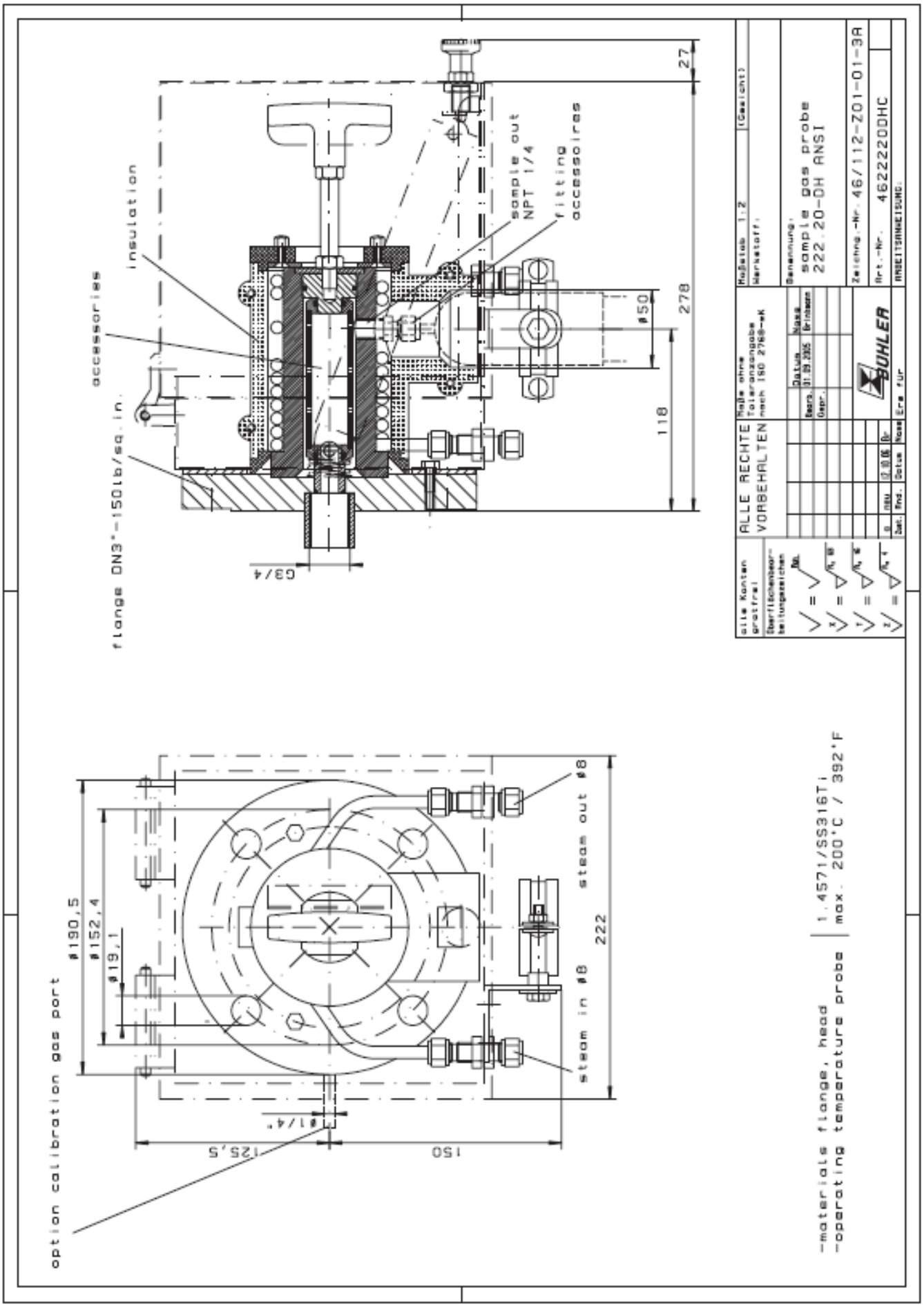
4622220	1	9	9	0	9	X	0	0	9	9	9	9	9	9	Product Characteristics
															Flange/approval
															ANSI 3"-150 lbs (ANSI CSA)
															Cleaning the probe
															Steam
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


insulation
accessories
flange DN3"-150lb/sq.in.
sample out NPT 1/4
fitting accessoires
G3/4
ø50
278
118
27
option calibration gas port
ø190,5
ø152,4
ø19,1
steam out ø8
steam in ø8
222
ø1/4"
125,5
150
-materials flange, head 1.4571/SS316Ti
-operating temperature probe max. 200°C / 392°F
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
Werkstoff:
Benennung:
sample gas probe
222.20-DH ANSI
Zeichng.-Nr. 46/112-Z01-01-3A
Art.-Nr. 46222200HC
BUHLER

Sample gas probe GAS 222.21

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Heated probe with shut-off valve, inlet and/or downstream filter and weather hood

The downstream filter can easily be removed by turning the handle 90°

The probe body and the area around the screw connection for the heated sample gas line are completely isolated

Electronic temperature controller up to 395 °F with low/high temperature alarm and display

For dust loads up to 2 g/m³
With upstream filter 10 g/m³ and up

This probe is not suitable for use in Ex areas

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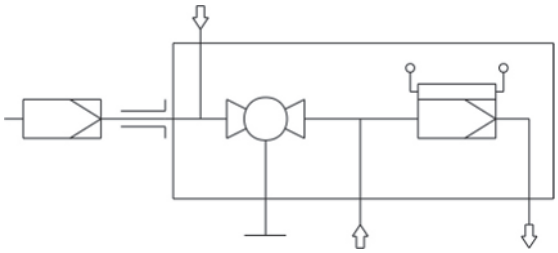
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data		
Probe operating temperature:	max. 395 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 F < T_{amb} < 131 °F
	Pneumatic drive:	14 F < T_{amb} < 131 °F
	Limit switch:	-4 °F < T_{amb} < 212 °F
Regulator setting range:	122 to 395 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset to 15 K, max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Material:	Ball valve 1.4408	
Parts in contact with media:	Flange: 1.4571 Seals: PTFE/Graphit/1.4404 and see filter	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622221	0	9	9	0	X	X	X	X	X	X	X	X	X	Product Characteristics
														Flange / approval
														DIN DN65 PN6
														Power supply sample probe
					1									115 V
					2									230 V
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve
														Connection heated extension
							0							No
							1							Yes
														Built-in temperature controller for heated extension [1]
								0						No
								1						Yes
														Blowback with air reservoir [2]
														Air reservoir heating
									1					Yes
									9					No
														Built-in blowback control [1]
										1				Internal controller
										9				No
														Compressed air valve / valve voltage information
											0			Manual
											1			115 V
											2			230 V
											3			24 V
											9			None (if no blowback requested)
														Pneumatic drive for ball valve
												0		Manual
												1		Monostable pressure-free open
												2		Monostable pressure-free closed
												3		Bi-stable
														Limit switch for pneumatic drive
													1	Yes
													9	No
														Control valve for pneumatic drive
													3	3/2-way valve
													5	5/2 way valve
													9	No control valve

[1] The electronics can either be equipped with temperature controller for heated extension or blowback control

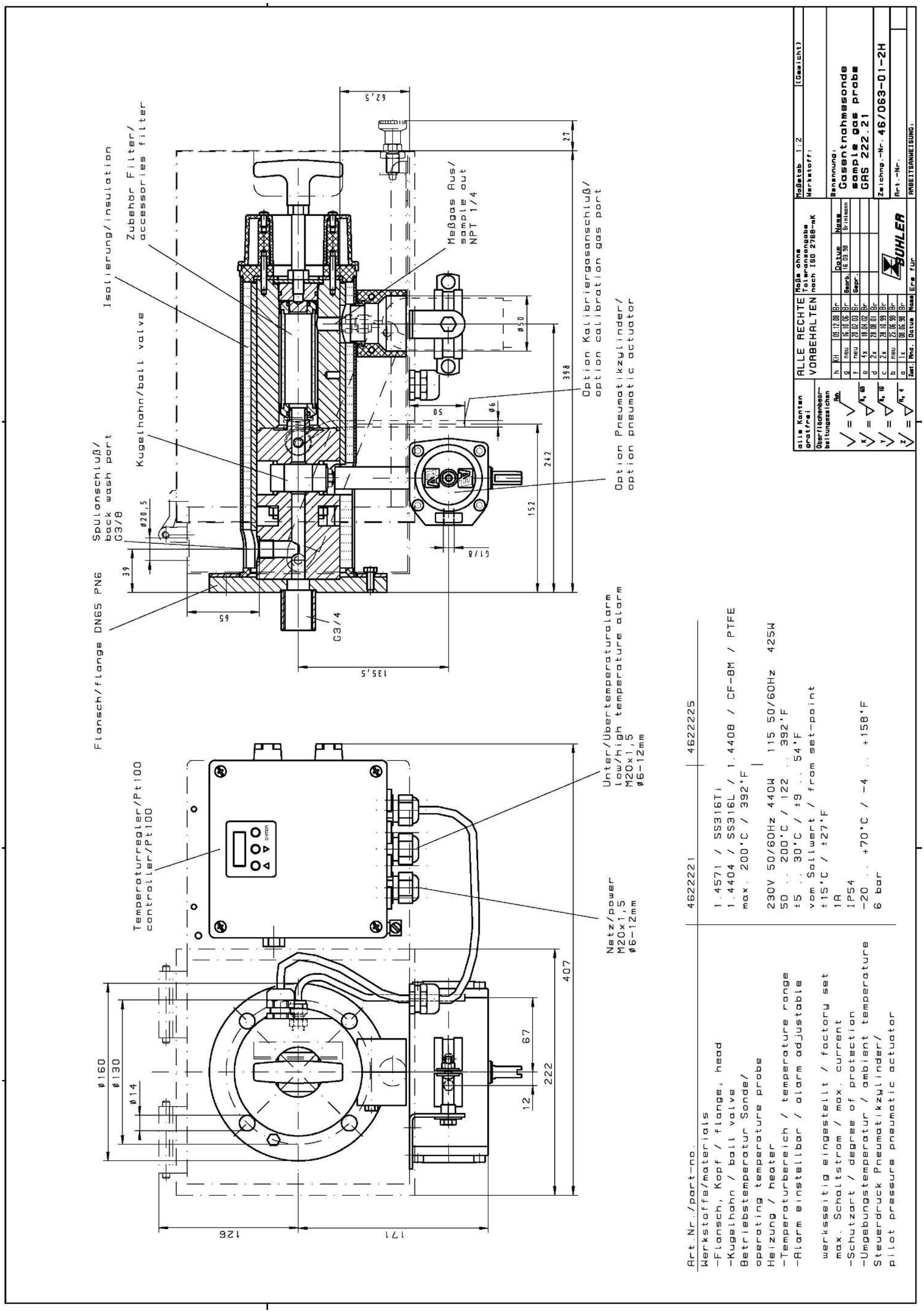
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Isolierung/insulation
Zubehör Filter/ accessories filter
Meßgas Aus/ sample out NPT 1/4
Kalibriergasanschluß/ calibration gas port
Option Pneumatikzylinder/ option pneumatic actuator
Option / option
Kugelhahn/ball valve
Spülanschluß/ back wash port G3/8
Flansch/flange DN65 PN6
G3/4
G1/8
Temperaturregler/Pt100 controller/Pt100
Unter/Übertemperaturalarm low/high temperature alarm M20x1,5 ø6-12mm
Netz/power M20x1,5 ø6-12mm
62,5
27
398
242
152
ø50
50
ø6
ø20,5
39
65
135,5
407
67
222
12
ø160
ø130
ø14
126
171
Art.Nr./part-no. | 4622221 | 4622225
Werkstoffe/materials
-Flansch, Kopf / flange, head | 1.4571 / SS316Ti
-Kugelhahn / ball valve | 1.4404 / SS316L / 1.4408 / CF-8M / PTFE
Betriebstemperatur Sonde/ operating temperature probe | max. 200°C / 392°F
Heizung / heater | 230V 50/60Hz 440W | 115 50/60Hz 425W
-Temperaturbereich / temperature range | 50 ... 200°C / 122 ... 392°F
-Alarm einstellbar / alarm adjustable | ±5 ... 30°C / ±9 ... 54°F vom Sollwert / from set-point
werksseitig eingestellt / factory set | ±15°C / ±27°F
max. Schaltstrom / max. current | 1A
-Schutzart / degree of protection | IP54
-Umgebungstemperatur / ambient temperature | -20 ... +70°C / -4 ... +158°F
Steuerdruck Pneumatikzylinder/ pilot pressure pneumatic actuator | 6 bar
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
Benennung: Gasentnahmesonde sample gas probe GAS 222.21
Zeichng.-Nr. 46/063-01-2H
BÜHLER

Sample gas probe GAS 222.21 ANSI CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

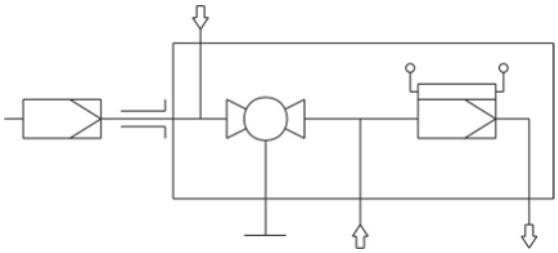
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with shut-off valve, inlet and/or downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 2 g/m³. With upstream filters up to 200 g/m³
- This probe is not suitable for use in Ex areas
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow Diagram



Technical Data

Gas Probe Technical Data

Probe operating temperature:	max. 395 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 F < T_{amb} < 131 °F
	Pneumatic drive:	14 F < T_{amb} < 131 °F
Regulator setting range:	122 to 395 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Material:	Ball valve 1.4408	
Parts in contact with media:	Flange: 1.4571 Seals: PTFE/Graphit/1.4404 and see filter	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622221	1	9	9	0	X	X	X	X	X	X	X	9	X	Product Characteristics
														Flange / approval
														ANSI 3"-150 lbs [1]
														Power supply sample probe
					1									115 V
					2									230 V
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve
														Connection heated extension
							0							No
							1							Yes
														Built-in temperature controller [2]
								0						No
								1						Yes
														Blowback with air reservoir [3]
														Air reservoir heating
									1					Yes
									9					No
														Built-in blowback control [2]
										1				Internal controller
										9				No
														Compressed air valve / valve voltage information
											0			Manual
											1			120 V 60 Hz
											2			240 V 60 Hz
											9			None (if no blowback requested)
														Pneumatic drive for ball valve
												0		Manual
												1		Monostable pressure-free open
												2		Monostable pressure-free closed
														Limit switch for pneumatic drive
														No
														Control valve for pneumatic drive
													3	3/2-way valve
													9	No control valve

[1] Probes with ANSI flange are CSA and C-US approved.

[2] The electronics can either be equipped with temperature controller for heated extension or blowback control.

[3] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

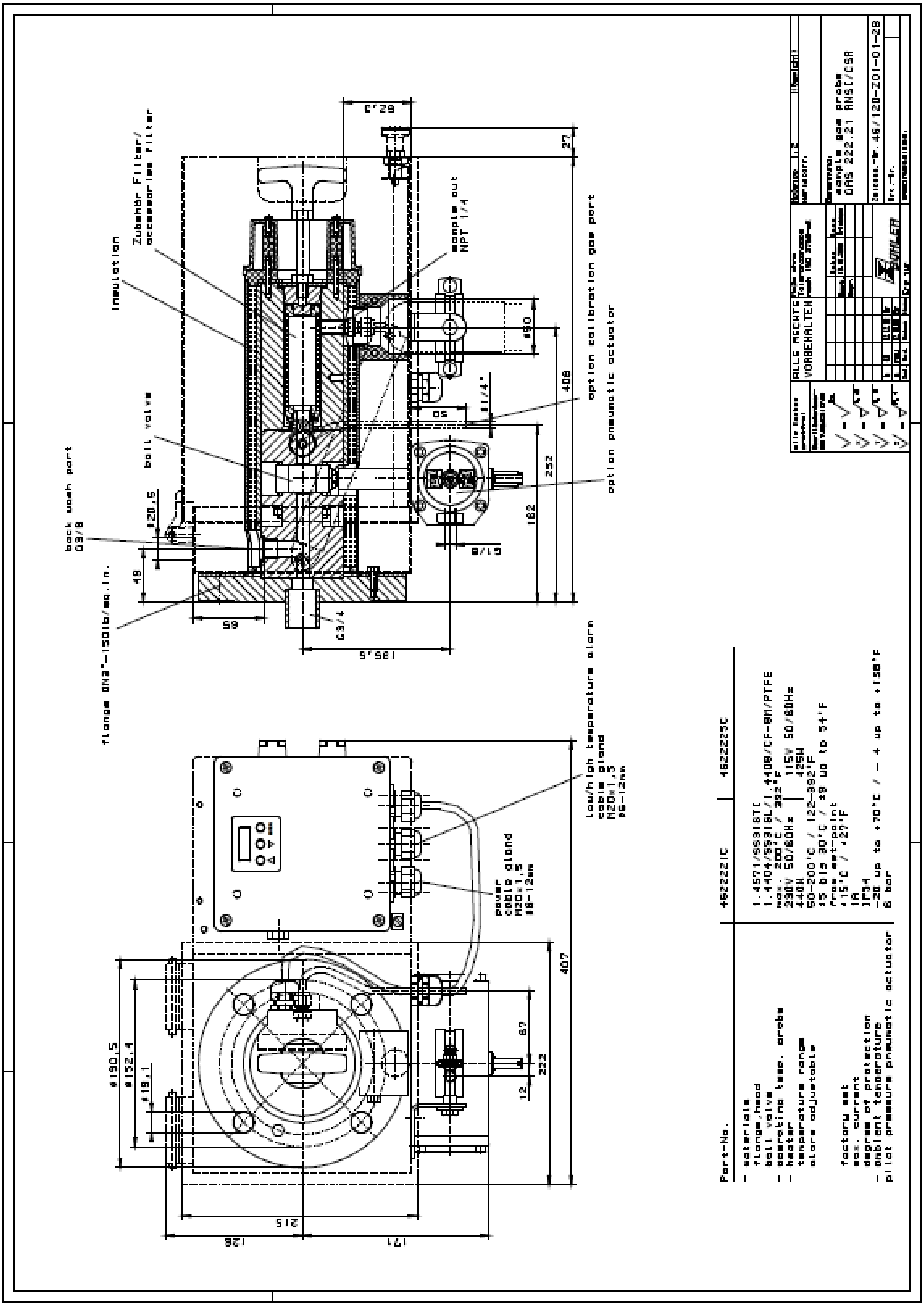
Please see overview data sheet "Sample Gas Probes GAS 222" DA461000 on page 4 for an application example for the circuitry with add-ons for blowback and calibrating gas control.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Insulation
Zubehör Filter/
accessories filter
sample out
NPT 1/4
ball valve
back wash port
G3/8
option calibration gas port
option pneumatic actuator
low/high temperature alarm
cable gland
M20x1.5
Ø6-12mm
power
cable gland
M20x1.5
Ø6-12mm

Sample gas probe GAS 222.21 Atex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

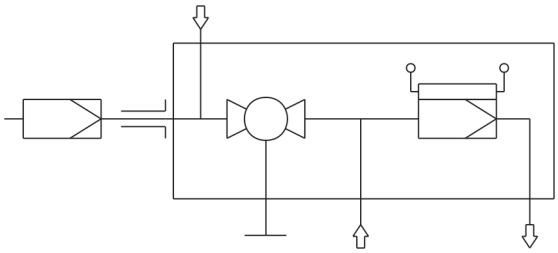
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Versions with Atex approval
Heated probe with shut-off valve, upstream and/or downstream filter and weather hood
The downstream filter can easily be removed by turning the handle 90°
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 194 °F
For dust loads up to 2 g/m³ with downstream filter or > 10 g/m³ with upstream filter
This probe is designed for use in explosive areas (Zone 21, 22 and extracting from Zone 20)

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 122 °F (basic unit without accessories)	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 140 °F
	Limit switch:	-4 °F < T_{amb} < 140 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
Permissible gas inlet temperatures:	**Outer zone temperature**	**Permissible gas inlet temperature**
	T3	275 °F
	T4	266 °F
Self-regulating heater:	194 °F	
Electrical data:	Probe: 230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	External circuit breaker type C: 230 V, 3 A, 50/60 Hz 115 V, 4 A, 50/60 Hz
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: PTFE/graphite/1.4404 and see filter	
Marks*:	ATEX: Ex 1GD / 2GD T4 T130 °C	

* Please note, using special accessories may limit the approved applications of the probes.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622221	0	X	X	4	X	X	0	0	9	9	X	X	X	X	Product Characteristics
															Flange
															DIN DN65 PN6
															Explosive outdoor areas
		4													Zone 21
		5													Zone 22
															Explosive indoor areas
			3												Zone 20
			4												Zone 21
			5												Zone 22
															Ex temperature classes
				4											T4
															Probe voltage
					1										115 V
					2										230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Blowback with air reservoir [2]
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V (labelled "mb")
											2				230 V (labelled "mb")
											3				24 V (labelled "mb")
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
															Limit switch for pneumatic drive
													1		Yes (labelled "db")
													9		No
															Control valve for pneumatic drive
														3	3/2-way valve
														9	No control valve

[1] Please note, using certain accessories may limit gas probe use in Ex areas! Observe the respective operating manuals, accessory compatibility charts, and data sheets to ensure proper technical product design!

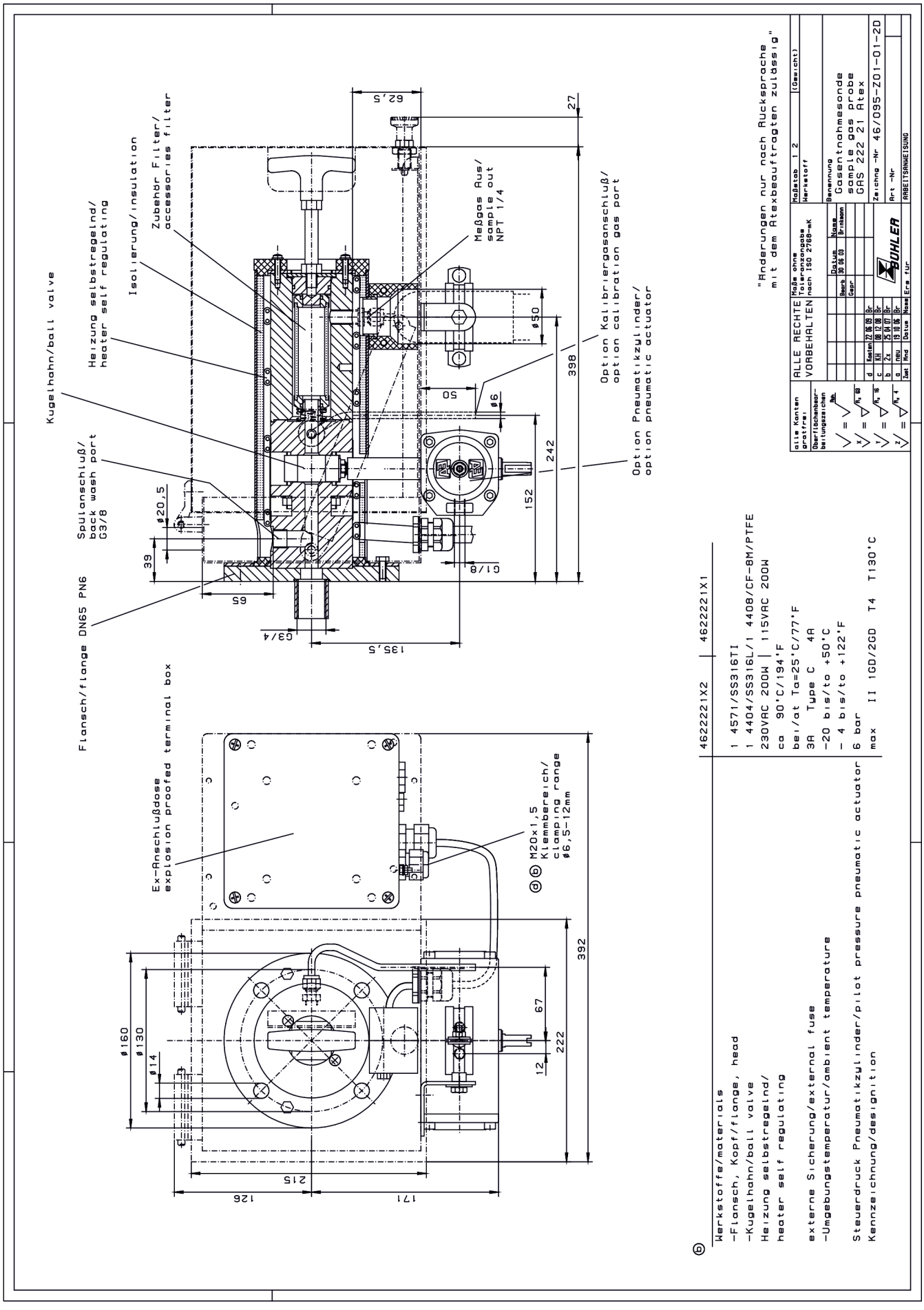
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Kugelhahn/ball valve
Heizung selbstregelnd/
heater self regulating
Isolierung/insulation
Zubehör Filter/
accessories filter
Meßgas Aus/
sample out
NPT 1/4
Option Kalibriergasanschluß/
option calibration gas port
Option Pneumatikzylinder/
option pneumatic actuator
Spulanschluß/
back wash port
G3/8
Flansch/flange DN65 PN6
Ex-Anschlußdose
explosion proofed terminal box
M20x1,5
Klemmbereich/
clamping range
ø6,5-12mm
62,5
27
398
242
152
135,5
50
39
65
ø20,5
ø50
ø6
G1/8
G3/4
392
222
67
12
215
126
171
ø160
ø130
ø14
"Änderungen nur nach Rücksprache
mit dem Atexbeauftragten zulässig"
ALLE RECHTE VORBEHALTEN
Maßstab 1:2 (Gewicht)
Werkstoff
Benennung
Gasentnahmesonde
sample gas probe
GAS 222.21 Atex
Zeichng-Nr 46/095-Z01-01-2D
Art-Nr
ARBEITSANWEISUNG
4622221X2 | 4622221X1
1 4571/SS316TI
1 4404/SS316L/1 4408/CF-8M/PTFE
230VAC 200W | 115VAC 200W
ca 90°C/194°F
bei/at Ta=25°C/77°F
3A Type C 4A
-20 bis/to +50°C
- 4 bis/to +122°F
6 bar
II 1GD/2GD T4 T130°C
Werkstoffe/materials
-Flansch, Kopf/flange, head
-Kugelhahn/ball valve
Heizung selbstregelnd/
heater self regulating
externe Sicherung/external fuse
-Umgebungstemperatur/ambient temperature
Steuerdruck Pneumatikzylinder/pilot pressure pneumatic actuator
Kennzeichnung/designation
max

Sample gas probe GAS 222.21 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

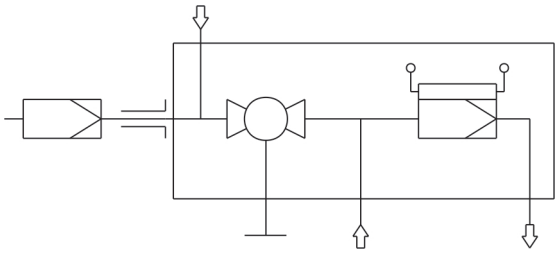
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with shut-off valve, upstream and/or downstream filter and weather hood
- The downstream filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 194 °F
- For dust loads up to 2 g/m³ with downstream filter or > 10 g/m³ with upstream filter
- This probe is designed for use in explosive areas (Zone 1 and extracting from Zone 0)

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 140 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 140 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 140 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Self-regulating heater:	194 °F	
Electrical data:	Probe: 230 V, 200 W, 50/60 Hz 115 V, 200 W, 50/60 Hz	External circuit breaker type C: 230 V, 3 A, 50/60 Hz 115 V, 4 A, 50/60 Hz
Max. operating pressure:	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: PTFE/graphite/1.4404 and see filter	
Markings:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db eb mb IIC T6...T2 Gb IECEx: Ex db eb mb IIC T6...T2 Gb	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

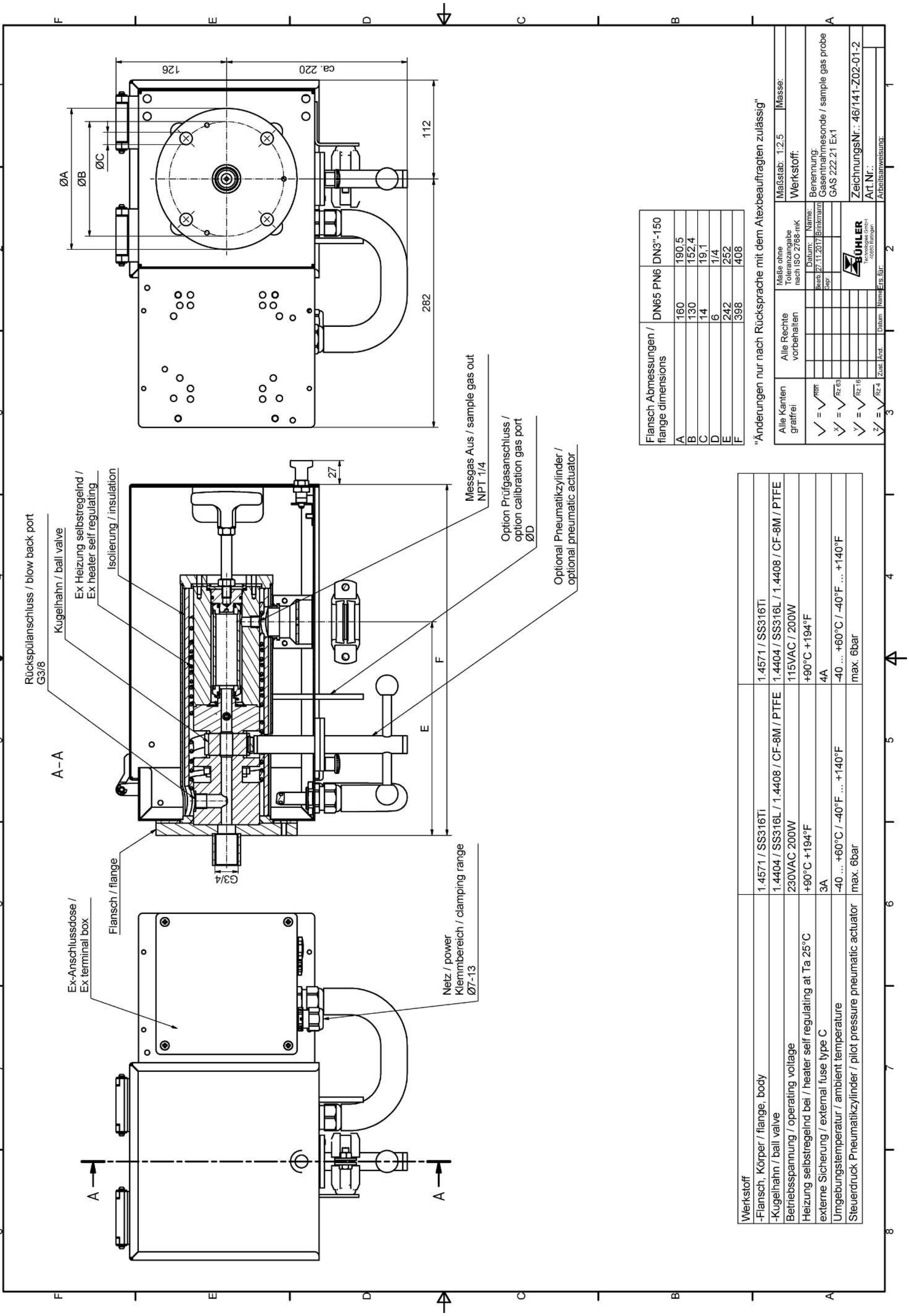
46222211	X	X	X	X	4	X	0	X	X	X	X	X	X	Product Characteristics
														Flange
	0	1												Flange DN65 PN6
	0	2												Flange DN3"-150
	x	x												Other
														Hazardous area outside
			4											Zone 1
			5											Zone 2
			9											none
														Hazardous area inside
				3										Zone 0
				4										Zone 1
				5										Zone 2
				9										none
														Power supply sample probe
						1								115 V
						2								230 V
														Calibration gas port
								0						No
								1						6 mm
								2						6 mm with check valve
								3						1/4"
								4						1/4" with check valve
														Capacitive vessel
									0					No
									1					Yes (not for gas zone inside)
														Valve for pressurized air
										0				Ball valve
										1				Solenoid valve 115 V (marked "mb")
										2				Solenoid valve 230 V (marked "mb")
										3				Solenoid valve 24 V (marked "mb")
										9				none
														Pneumatic actuator for internal ball valve
											0			No
											1			Mono stable depressurized open
											2			Mono stable depressurized closed
														Limit switch for pneumatic actuator
												0		No
												1		Yes (marked "db")
														Solenoid valve for pneumatic actuator
													0	No
													1	Yes (marked "mb")

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Werkstoff		
-Flansch, Körper / flange, body	1.4571 / SS316Ti	1.4571 / SS316Ti
-Kugelhahn / ball valve	1.4404 / SS316L / 1.4408 / CF-8M / PTFE	1.4404 / SS316L / 1.4408 / CF-8M / PTFE
Betriebsspannung / operating voltage	230VAC 200W	115VAC / 200W
Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+90°C +194°F	+90°C +194°F
externe Sicherung / external fuse type C	3A	4A
Umgebungstemperatur / ambient temperature	-40 ... +60°C / -40°F ... +140°F	-40 ... +60°C / -40°F ... +140°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	max. 6bar	max. 6bar

Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	242	252
F	398	408

Gas Analysis

Sample gas probe GAS 222.21 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with shut-off valve, inlet and/or outlet filter and weather hood
- The outlet filter can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Heater self-regulating to approx. 248 °F (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 2 g/m³ with outlet filter or > 10 g/m³ with inlet filter
- This probe is suitable for use in explosive areas

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Phone: 248.652.1546, Fax: 248.652.1598
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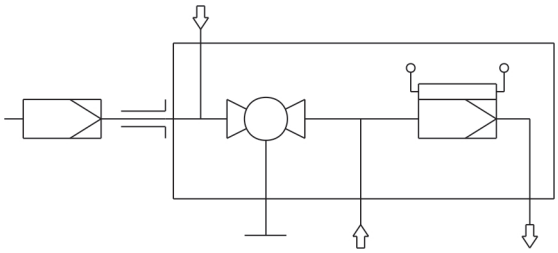
Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Self-regulating heater:	248 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure:	85 psia	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: PTFE/graphite/1.4404 and see filter	
Markings:	ATEX: Ex II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622221	X	0	X	X	X	X	3	X	X	X	X	X	X	X	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							3								115/230 V
															Low temperature alarm
								1							Opener (open at operating temperature) (marked with "ic")
								2							Closer (closed at operating temperature) (marked with "ic")
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Compressed air tank *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none
															Pneumatic actuator for internal ball valve
												0			No
												1			Mono stable depressurized open
												2			Mono stable depressurized closed
															Limit switch for pneumatic actuator
													0		No
													1		Yes
															Solenoid valve for pneumatic actuator
														0	No
														1	Yes (marked with "mb")

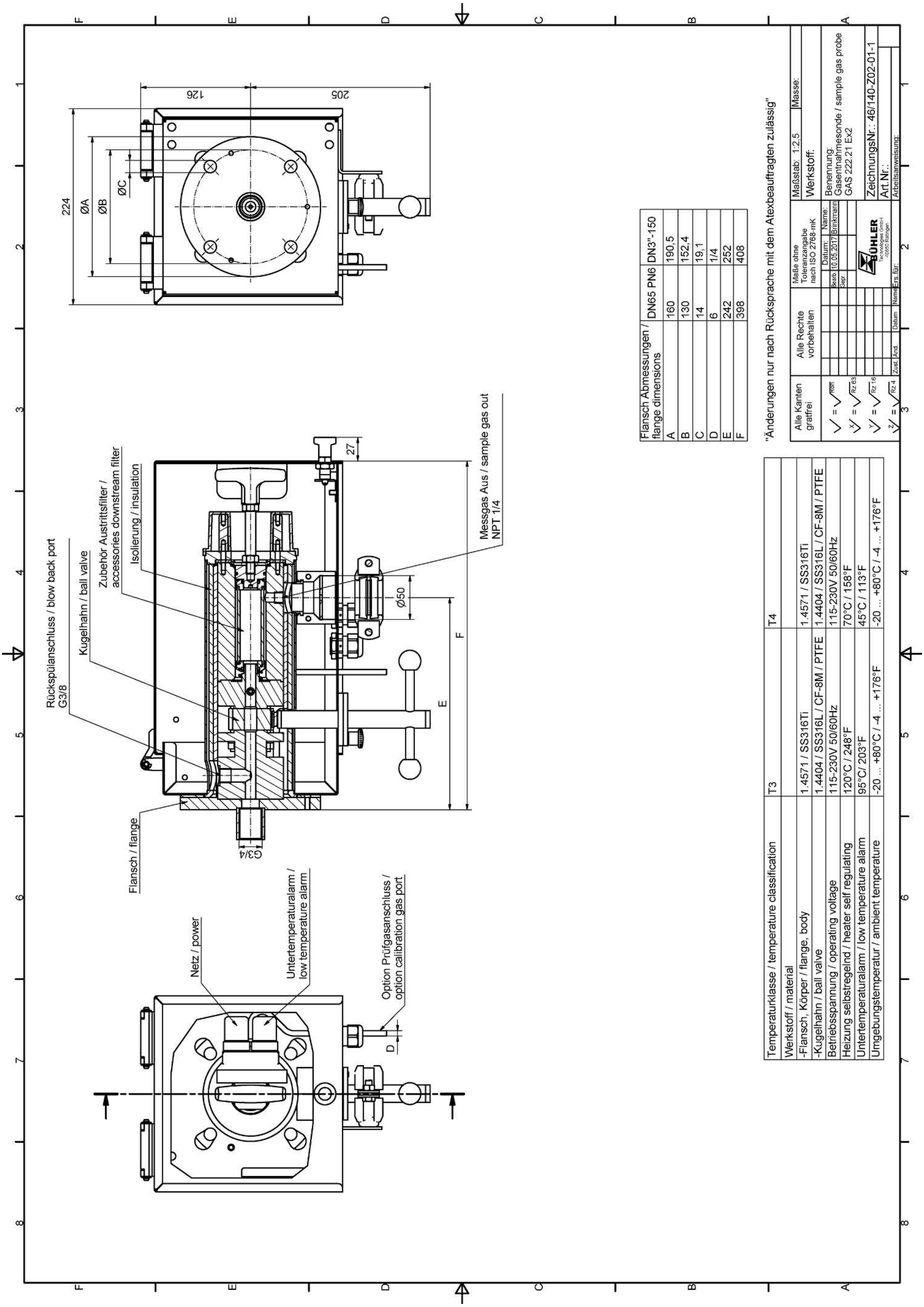
* Blowback of explosive atmosphere prohibited.

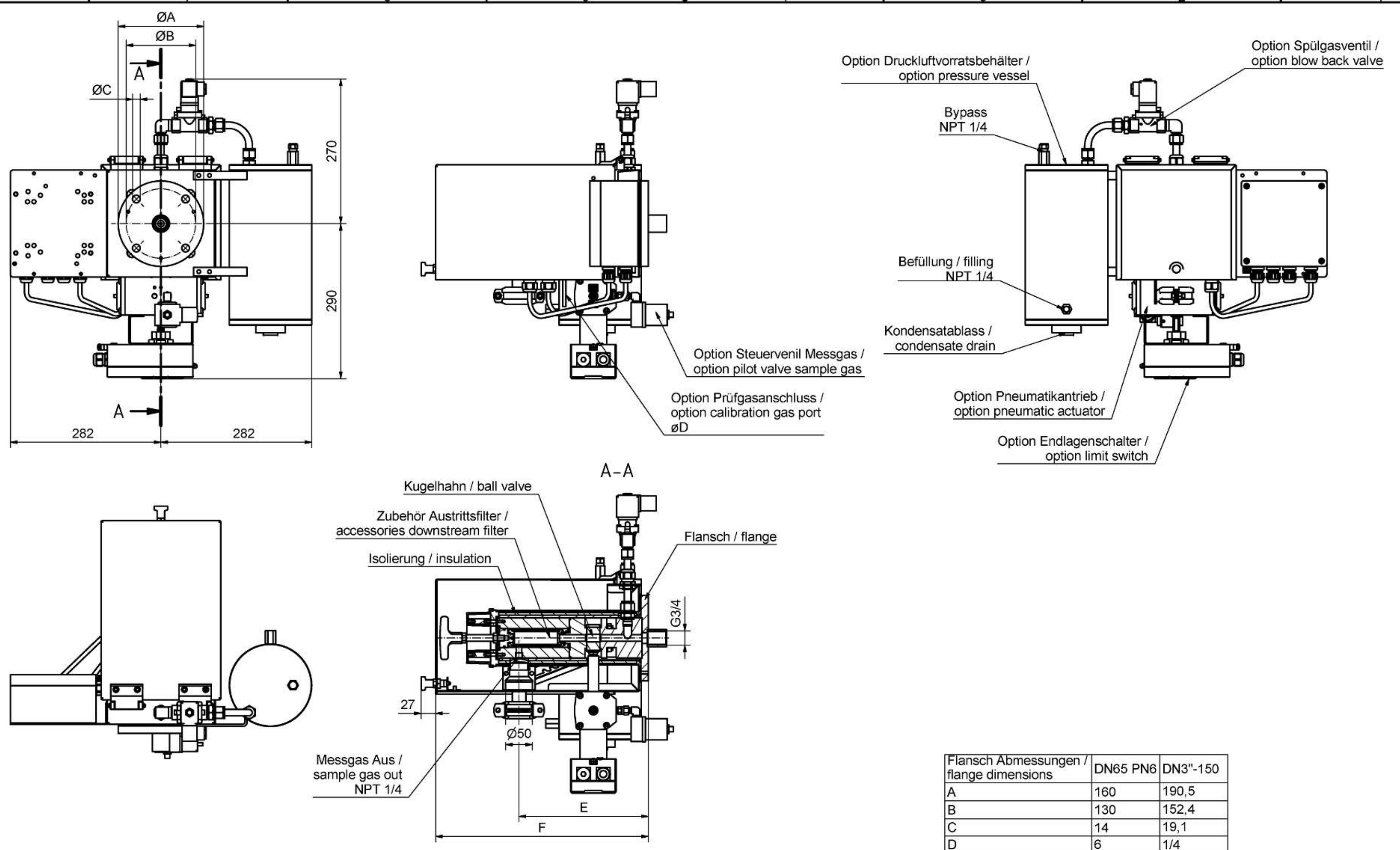
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


126
205
224
ØA
ØB
ØC
Rückspülanschluss / blow back port G3/8
Kugelhahn / ball valve
Zubehör Austrittsfilter / accessories downstream filter
Isolierung / insulation
Messgas Aus / sample gas out NPT 1/4
27
Ø50
F
E
G3/4
Flansch / flange
Netz / power
Untertemperaturalarm / low temperature alarm
Option Prüfgasanschluss / option calibration gas port
D
Flansch Abmessungen / flange dimensions | DN65 PN6 | DN3"-150
A | 160 | 190,5
B | 130 | 152,4
C | 14 | 19,1
D | 6 | 1/4
E | 242 | 252
F | 398 | 408
Temperaturklasse / temperature classification | T3 | T4
Werkstoff / material
-Flansch, Körper / flange, body | 1.4571 / SS316Ti | 1.4571 / SS316Ti
-Kugelhahn / ball valve | 1.4404 / SS316L / CF-8M / PTFE | 1.4404 / SS316L / CF-8M / PTFE
Betriebsspannung / operating voltage | 115-230V 50/60Hz | 115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating | 120°C / 248°F | 70°C / 158°F
Untertemperaturalarm / low temperature alarm | 95°C/ 203°F | 45°C / 113°F
Umgebungstemperatur / ambient temperature | -20 ... +80°C / -4 ... +176°F | -20 ... +80°C / -4 ... +176°F
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:2,5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.21 Ex2
Datum: 10.05.2017 Name: Brinkmann
ZeichnungsNr.: 46/140-Z02-01-1
Art.Nr.:
Arbeitsanweisung:
BÜHLER



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	242	252
F	398	408

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange, body	1.4571 / SS316Ti	1.4571 / SS316Ti
-Kugelhahn / ball valve	1.4404 / SS316L / CF-8M / PTFE	1.4404 / SS316L / CF-8M / PTFE
Betriebsspannung / operating voltage	115-230V 50/60Hz	115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating	120°C / 248°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C/ 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	6 bar	6 bar

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Datum: 10.05.2017 Name: Brinkmann
Bearb.
Gepr.
Benennung:
Gasentnahmesonde / sample gas probe
GAS 222.21-JB Ex2
mit Optionen / with options
BÜHLER Technologies GmbH 40880 Ratingen
ZeichnungsNr.: 46/140-Z02-10-2
Art.Nr.:
Arbeitsanweisung:
Zust. Änd. Datum Name Ers. für:

Sample gas probe GAS 222.21 Amex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

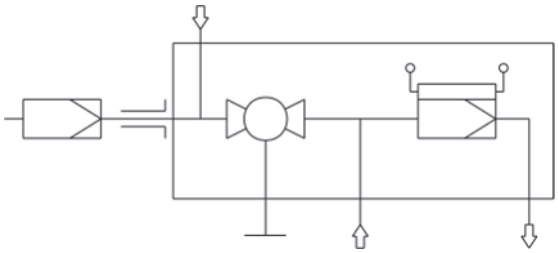
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Heated probe with shut-off valve, upstream and/or downstream filter, weather hood and terminal box
The downstream filter can easily be removed by turning the handle 90°
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 248 °F (T3)/158 °F (T4)
With downstream filter for dust loads up to 2 g/m³, with upstream filter and downstream filter for dust loads up to 200 g/m³ and more
This probe is suitable for use in explosive areas
C-US and CSA approval

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data		
Self-regulating temperature:	248 °F (T3)/158 °F (T4)	
Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 176 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 203 °F (T3) resp. < 122 °F (T4); U_{max}=30 VDC, I_{max}=100 mA, Ci/Li~0	
Electrical data:	115 V-230 V, 50/60 Hz	
Max. operating pressure:	85 psia	
Parts in contact with media:	1.4571, ball valve 1.4408 Seals: PTFE/Graphit/1.4404 and see filter	
Filter:	Upstream and/or downstream filter	
Explosion protection:	Class 1, Div 2, Gps B, C, D, T3 and T4	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622221	1	6	6	X	3	X	0	0	X	9	X	X	9	X	Product Characteristics [1]
															Ex temperature classes
				3											T3
				4											T4
															Sample probe power supply
					3										115 / 230 V
															Calibration gas connection
						0									No calibration gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Blowback with air reservoir [2]
															Air reservoir heating
									1						Yes
									9						No
															Compressed air valve/valve voltage information
											0				Manual
											1				120 V 60 Hz
											2				240 V 60 Hz
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
															Control valve for pneumatic drive
														3	3/2-way valve
														9	No control valve

[1] Please note, using certain accessories may limit gas probe use in Ex areas! Observe the respective operating manuals, accessory compatibility charts, and data sheets to ensure proper technical product design!

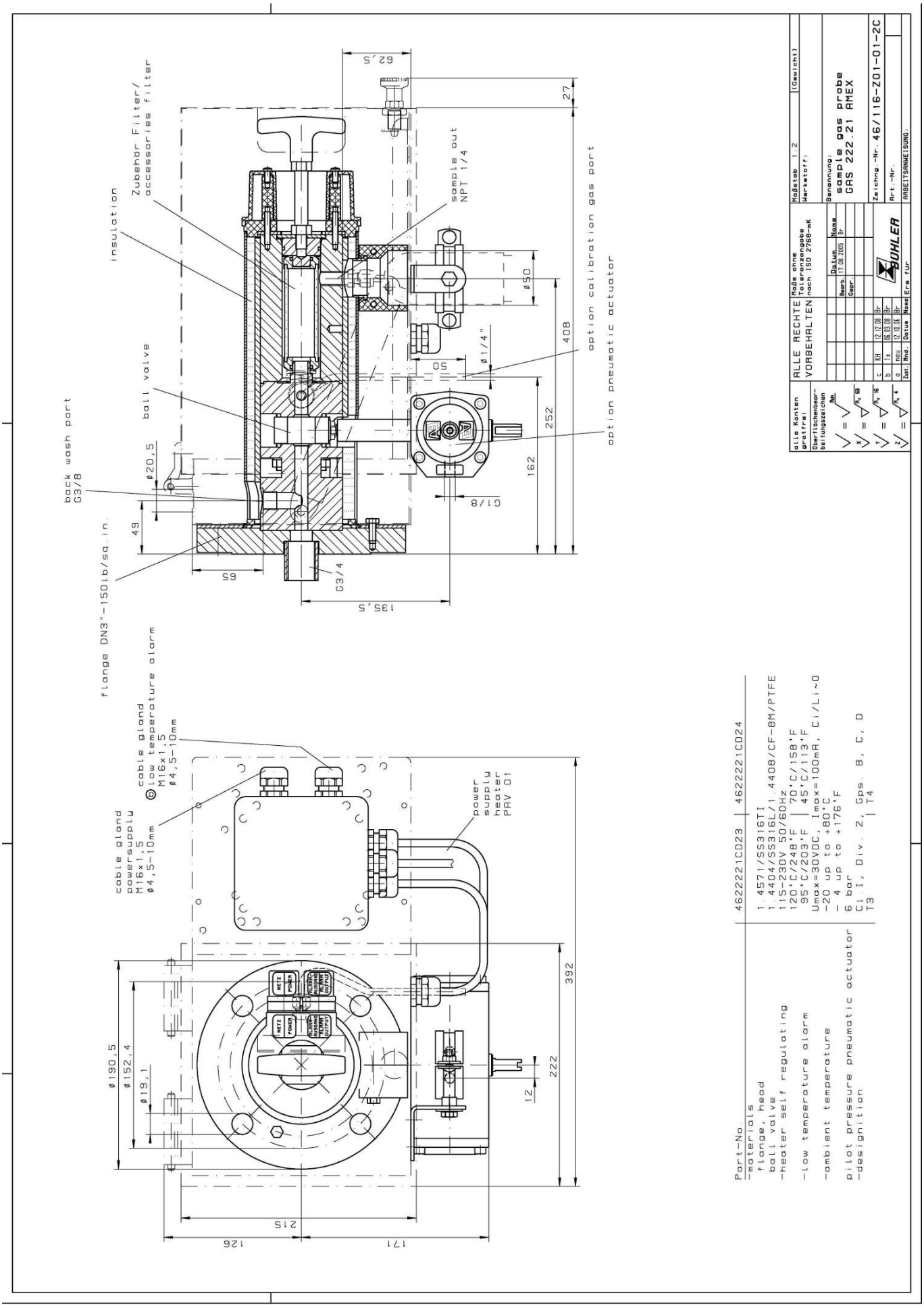
[2] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


insulation
Zubehör Filter/
accessories filter
sample out
NPT 1/4
option calibration gas port
option pneumatic actuator
ball valve
back wash port
G3/8
flange DN3"-150lb/sq.in.
cable gland
powersupply
M16x1,5
ø4,5-10mm
low temperature alarm
cable gland
M16x1,5
ø4,5-10mm
power
supply
heater
PAV 01
62,5
27
ø50
ø1/4"
408
252
162
50
G1/8
G3/4
135,5
65
49
ø20,5
392
222
12
215
126
171
ø190,5
ø152,4
ø19,1
Part-No 4622221CD23 | 4622221CD24
-materials
flange, head 1.4571/SS316Ti
ball valve 1.4404/SS316L/1.4408/CF-8M/PTFE
-heater self regulating 115-230V 50/60Hz
-low temperature alarm 120°C/248°F | 70°C/158°F
85°C/203°F | 45°C/113°F
Umax=30VDC, Imax=100mA, Ci/Li~0
-ambient temperature -20 up to +80°C
- 4 up to +176°F
pilot pressure pneumatic actuator 6 bar
-designition CL I, Div. 2, Gps. B, C, D
T3 | T4
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2 (Gewicht)
Werkstoff:
Benennung:
sample gas probe
GAS 222.21 AMEX
Zeichng.-Nr. 46/116-Z01-01-2C
Art.-Nr.
ARBEITSANWEISUNG:
BÜHLER

Sample gas probe GAS 222.30

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

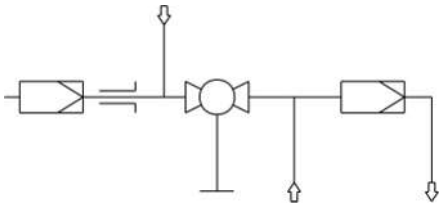
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with Shut-off valve and upstream filter
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Material:	Ball valve 1.4408
Parts in contact with media:	Flange: 1.4571 Seals: PTFE/Graphit/1.4404 and see filter

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622230	0	9	9	0	0	X	0	0	X	X	X	X	X	X	Product Characteristics
															Flange / approval
															DIN DN65 PN6
															Power supply sample probe
															none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
															No
															Built-in temperature controller for heated extension
															No
															Blowback with air reservoir [1]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
												3			Bi-stable
															Limit switch for pneumatic drive
													1		Yes
													9		No
															Control valve for pneumatic drive
														3	3/2-way valve
														5	5/2 way valve
														9	No control valve

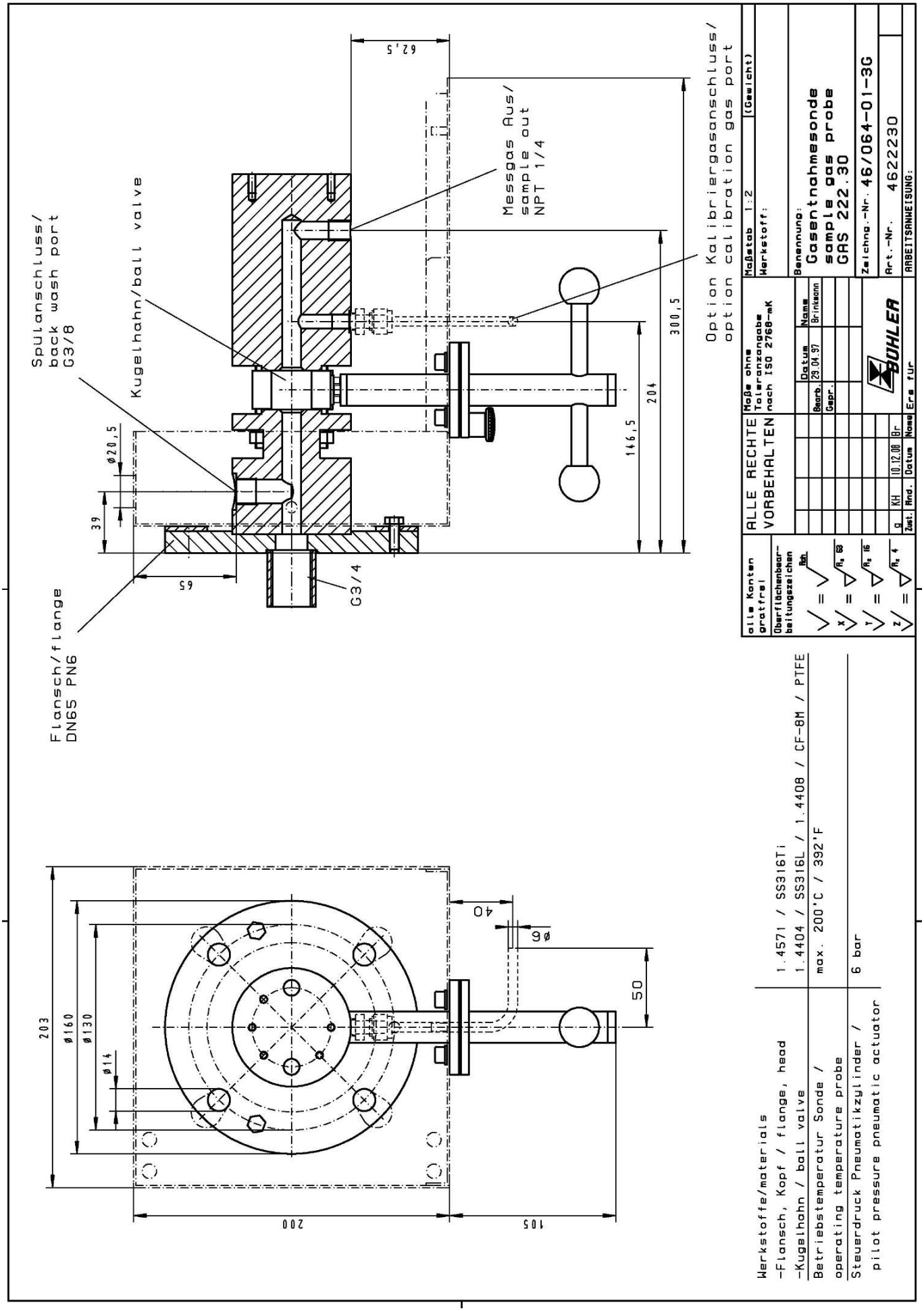
[1] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Spülanschluss/
back wash port
G3/8
Kugelhahn/ball valve
Messgas Aus/
sample out
NPT 1/4
Option Kalibriergasanschluss/
option calibration gas port
Flansch/flange
DN65 PN6
G3/4
62,5
300,5
204
146,5
39
Ø20,5
65
203
Ø160
Ø130
Ø14
40
Ø8
50
200
105
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
Rm
Ra 63
Ra 16
Ra 4
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab 1:2 (Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.30
Zeichng.-Nr. 46/064-01-3G
Art.-Nr. 4622230
ARBEITSANWEISUNG:
Datum Name
Bearb. 29.04.97 Brinkmann
Gepr.
Norm
Ers. für
Änd. Datum Name
KH 10.12.08 Br
Zust.
BUHLER
Werkstoffe/materials
-Flansch, Kopf / flange, head 1.4571 / SS316Ti
-Kugelhahn / ball valve 1.4404 / SS316L / 1.4408 / CF-8M / PTFE
Betriebstemperatur Sonde / operating temperature probe max. 200°C / 392°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator 6 bar

Sample gas probe GAS 222.30 ANSI/CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with Shut-off valve and upstream filter
- For dust loads up to 200 g/m³, non-condensable gases
- The probe has no innate ignition source and is therefore suitable for use in Ex areas.
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

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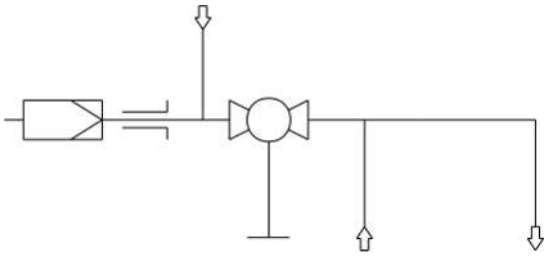
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow Diagram



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Material:	Ball valve 1.4408
Parts in contact with media:	Flange: 1.4571 Seals: PTFE/Graphit/1.4404 and see filter

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622230	1	9	9	0	0	X	0	0	X	X	X	X	9	X	Product Characteristics
															Flange / approval
															ANSI 3"-150 lbs [1]
															Power supply sample probe
															none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
															No
															Built-in temperature controller for heated extension
															No
															Blowback with air reservoir [2]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Pressure valve/valve voltage information
											0				Manual
											1				120 V 60 Hz
											2				240 V 60 Hz
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
												9			N/A
															Limit switch for pneumatic drive
															No
															Control valve for pneumatic drive
														3	3/2-way valve
														9	No control valve

[1] Probes with ANSI flange are CSA and C-US approved

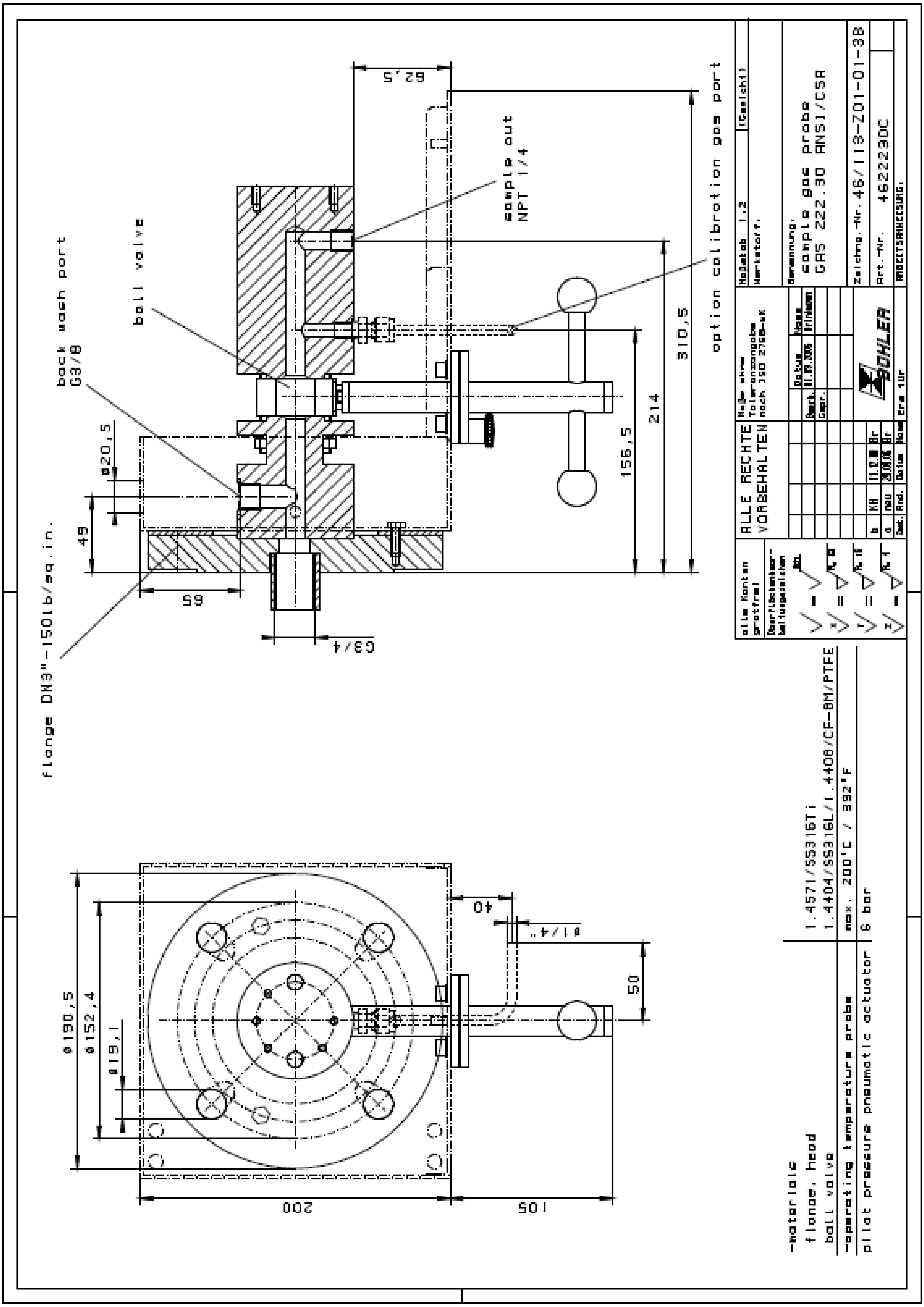
[2] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


flange DN3"-150lb/sq.in.
back wash port
G3/8
ball valve
sample out
NPT 1/4
option calibration gas port
62,5
310,5
214
156,5
49
ø20,5
65
G3/4
ø190,5
ø152,4
ø19,1
40
ø1/4"
50
200
105
-materials
flange, head 1.4571/SS316Ti
ball valve 1.4404/SS316L/1.4408/CF-8M/PTFE
-operating temperature probe max. 200°C / 392°F
pilot pressure pneumatic actuator 6 bar
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
Benennung:
sample gas probe
GAS 222.30 ANSI/CSA
Zeichng.-Nr. 46/113-Z01-01-38
Art.-Nr. 4622230C
BÜHLER

Sample gas probe GAS 222.30 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

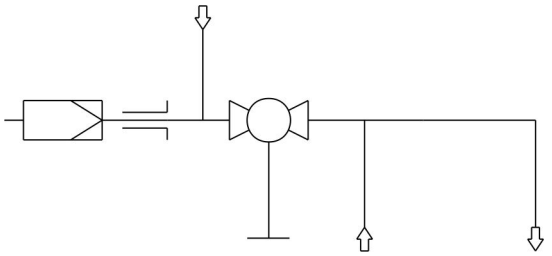
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Unheated probe with Shut-off valve and inlet filter
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Max. operating pressure	85 psia	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: PTFE/graphite/1.4404 and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec mb IIC T3/T4 Gc IECEx: Ex ec mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622230	X	X	X	X	X	X	0	0	X	X	X	X	X	X	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							0								none
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none
															Pneumatic actuator for internal ball valve
												0			No
												1			Mono stable depressurized open
												2			Mono stable depressurized closed
															Limit switch for pneumatic actuator
													0		No
													1		Yes
															Solenoid valve for pneumatic actuator
														0	No
														1	Yes (marked with "mb")

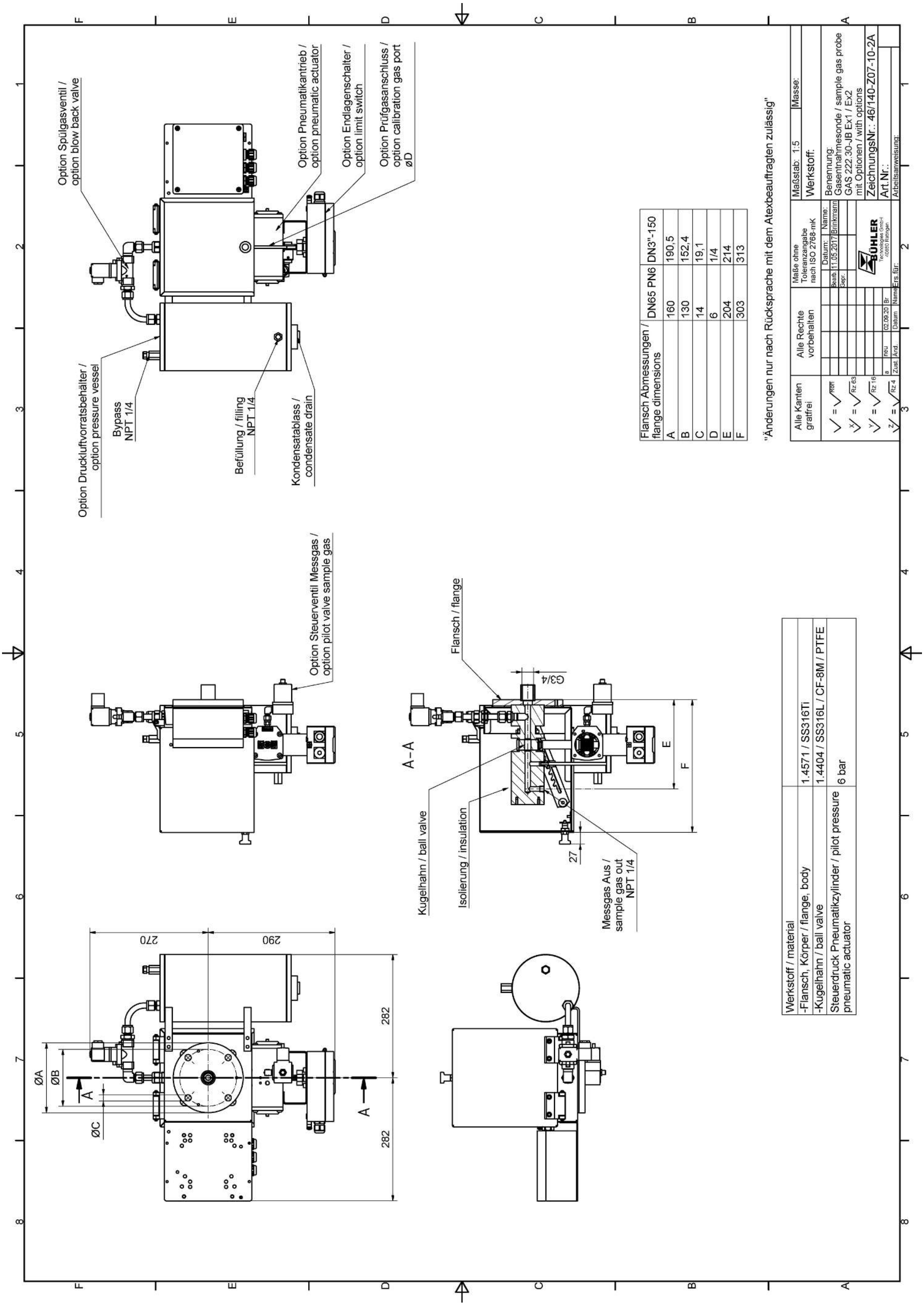
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	204	214
F	303	313

Werkstoff / material	
-Flansch, Körper / flange, body	1.4571 / SS316Ti
-Kugelhahn / ball valve	1.4404 / SS316L / CF-8M / PTFE
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	6 bar

Sample gas probe GAS 222.31

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

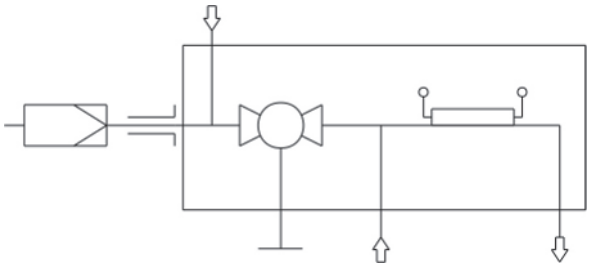
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with shut-off valve, upstream filter and weather hood
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 200 g/m³
- This probe is not suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Probe operating temperature:	max. 395 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 F < T_{amb} < 131 °F
	Pneumatic drive:	14 F < T_{amb} < 131 °F
	Limit switch:	14 F < T_{amb} < 212 °F
Regulator setting range:	122 to 395 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Material:	Ball valve 1.4408	
Parts in contact with media:	Flange: 1.4571 Seals: PTFE/graphite/1.4404	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622231	0	9	9	0	X	X	X	X	X	X	X	X	X	Product Characteristics
														Flange / approval
				0										DIN DN65 PN6
														Power supply sample probe
					1									115 V
					2									230 V
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve
														Connection heated extension
							0							No
							1							Yes
														Built-in temperature controller [1]
								0						No
								1						Yes
														Blowback with air reservoir [2]
														Air reservoir heating
									1					Yes
									9					No
														Built-in blowback control [1]
										1				Internal controller
										9				No
														Compressed air valve / valve voltage information
											0			Manual
											1			115 V
											2			230 V
											3			24 V
											9			None (if no blowback requested)
														Pneumatic drive for ball valve
												0		Manual
												1		Monostable pressure-free open
												2		Monostable pressure-free closed
												3		Bi-stable
														Limit switch for pneumatic drive
													1	Yes
													9	No
														Control valve for pneumatic drive
													3	3/2-way valve
													5	5/2 way valve
													9	No control valve

[1] The electronics can either be equipped with temperature controller for heated extension or blowback control

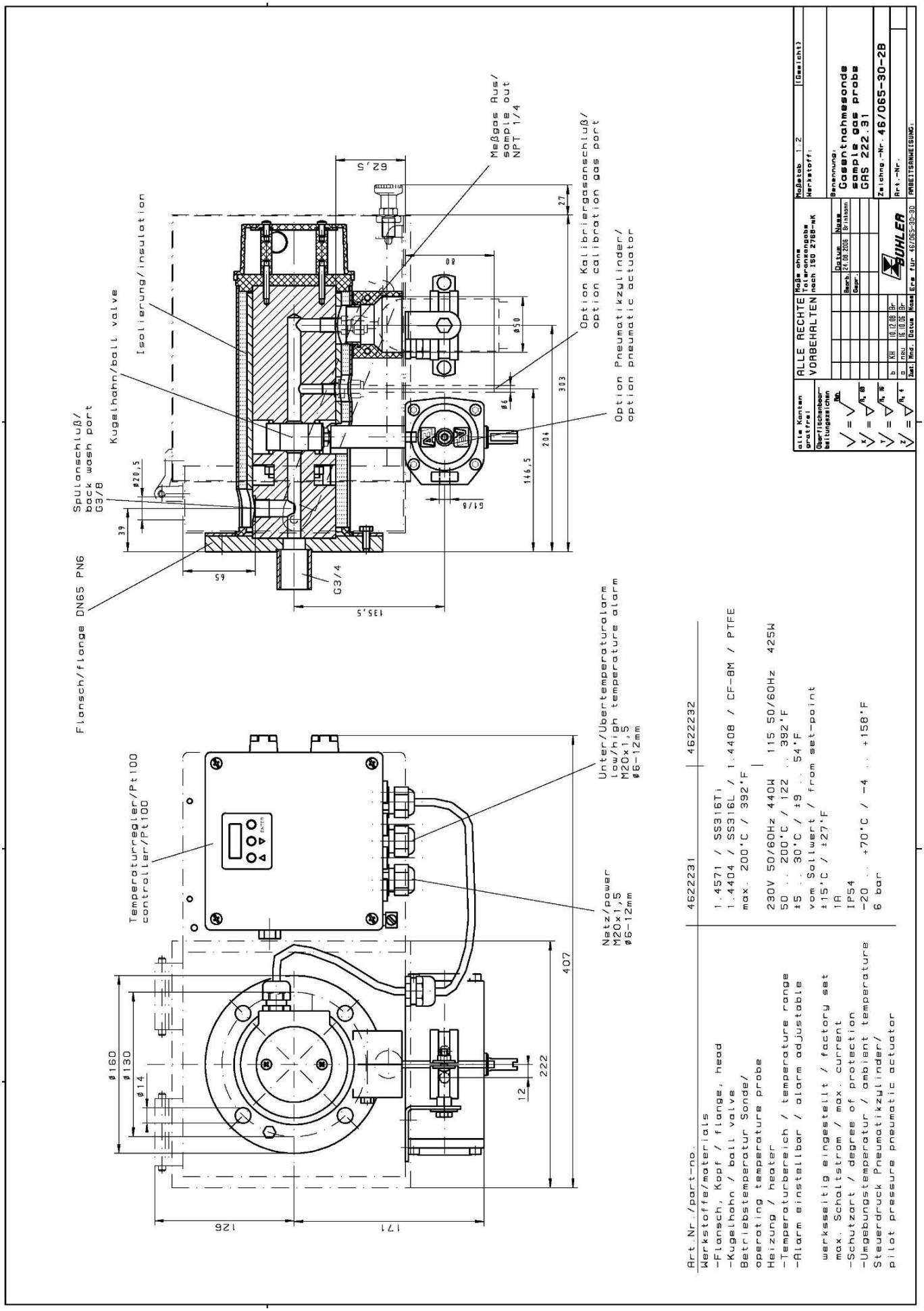
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Art.Nr./part-no.	4622231	4622232
Werkstoffe/materials		
-Flansch, Kopf / flange, head	1.4571 / SS316Ti	
-Kugelhahn / ball valve	1.4404 / SS316L / 1.4408 / CF-8M / PTFE	
Betriebstemperatur Sonde/	max. 200°C / 392°F	
operating temperature probe		
Heizung / heater	230V 50/60Hz 440W	115 50/60Hz 425W
-Temperaturbereich / temperature range	50 ... 200°C / 122 ... 392°F	
-Alarm einstellbar / alarm adjustable	±5 ... 30°C / ±9 ... 54°F	
	vom Sollwert / from set-point	
werksseitig eingestellt / factory set	±15°C / ±27°F	
max. Schaltstrom / max. current	1A	
-Schutzart / degree of protection	IP54	
-Umgebungstemperatur / ambient temperature	-20 ... +70°C / -4 ... +158°F	
Steuerdruck Pneumatikzylinder/	6 bar	
pilot pressure pneumatic actuator		

Sample gas probe GAS 222.31 ANSI CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

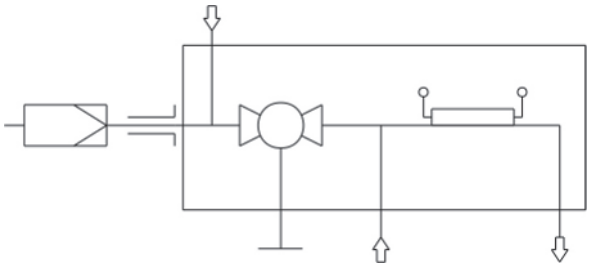
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with shut-off valve, upstream filter and weather hood
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 200 g/m³
- This probe is not suitable for use in Ex areas
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow Diagram



Technical Data

Gas Probe Technical Data

Probe operating temperature:	max. 395 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 F < T_{amb} < 131 °F
	Pneumatic drive:	14 F < T_{amb} < 131 °F
Regulator setting range:	122 to 395 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Material:	Ball valve 1.4408	
Parts in contact with media:	Flange: 1.4571 Seals: PTFE/graphite/1.4404	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622231	1	9	9	0	X	X	X	X	X	X	X	9	X	Product Characteristics
														Flange / approval
				0										ANSI 3"-150 lbs [1]
														Power supply sample probe
					1									115 V
					2									230 V
														Calibrating gas connection
						0								No calibrating gas connection
						1								6 mm
						2								6 mm + check valve
						3								1/4"
						4								1/4" + check valve
														Connection heated extension
							0							No
							1							Yes
														Built-in temperature controller [2]
								0						No
								1						Yes
														Blowback with air reservoir [3]
														Air reservoir heating
									1					Yes
									9					No
														Built-in blowback control [2]
										1				Internal controller
										9				No
														Compressed air valve / valve voltage information
											0			Manual
											1			120 V 60 Hz
											2			240 V 60 Hz
											9			None (if no blowback requested)
														Pneumatic drive for ball valve
												0		Manual
												1		Monostable pressure-free open
												2		Monostable pressure-free closed
														Limit switch for pneumatic drive
													9	No
														Control valve for pneumatic drive
													3	3/2-way valve
													9	No control valve

[1] Probes with ANSI flange are CSA and C-US approved.

[2] The electronics can either be equipped with temperature controller for heated extension or blowback control.

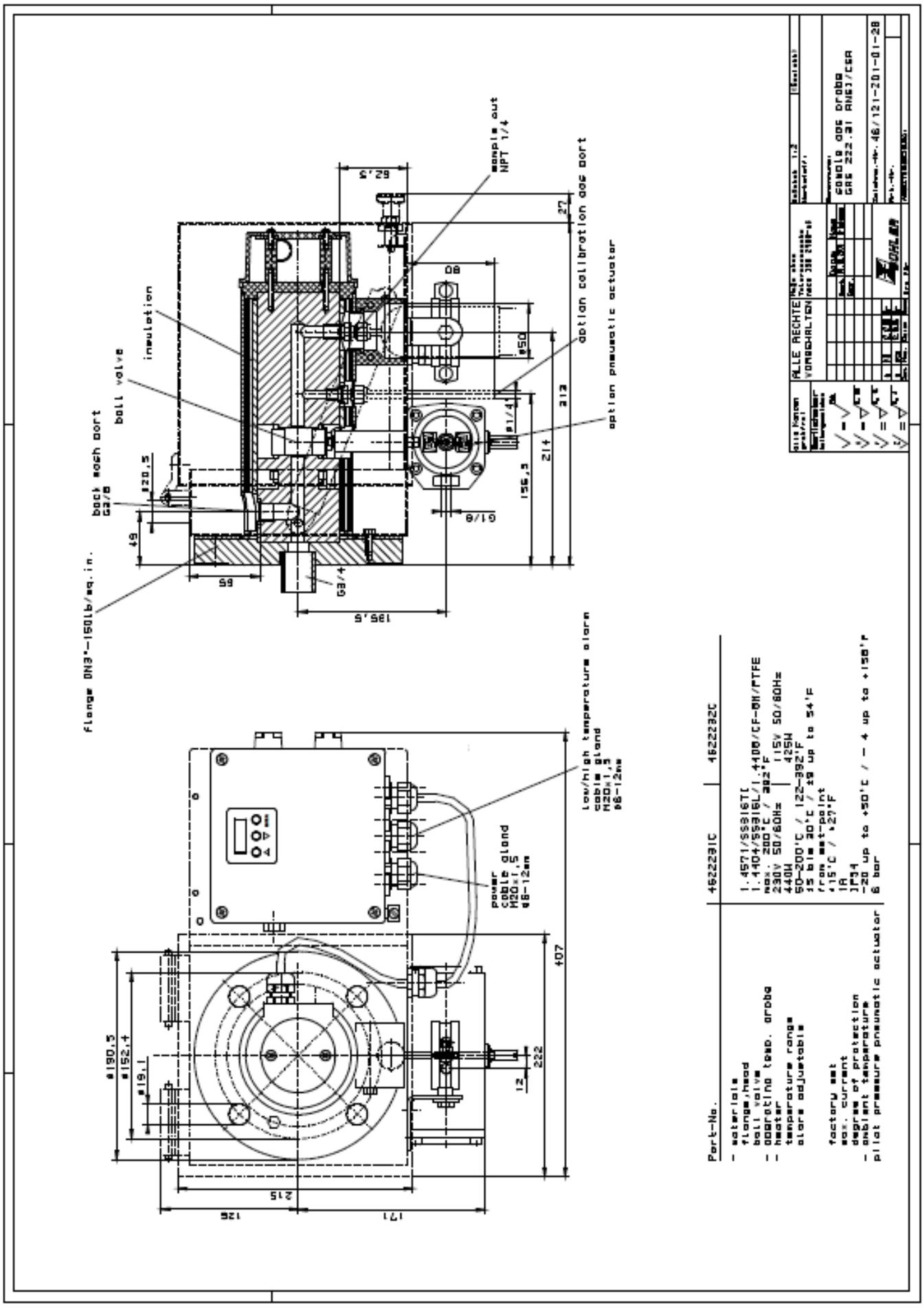
[3] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


sample out NPT 1/4
option calibration gas port
option pneumatic actuator
insulation
ball valve
back wash port G3/8
flange DN3"–150lb/sq.in.
low/high temperature alarm cable gland M20x1,5 Ø8–12mm
power cable gland M20x1,5 Ø8–12mm
Part-No.
- materials
flange,head
ball valve
- operating temp. probe
- heater
temperature range
alarm adjustable
factory set
max. current
degree of protection
- ambient temperature
pilot pressure pneumatic actuator
46222810
46222820
1.4571/SS316Ti
1.4404/SS316L/1.4408/CF-8M/PTFE
max. 200°C / 392°F
230V 50/60Hz | 115V 50/60Hz
440W | 425W
50–200°C / 122–392°F
15 bis 20°C / ±9 up to 54°F
from set-point
+15°C / +27°F
1A
IP54
-20 up to +50°C / – 4 up to +158°F
6 bar
ALLE RECHTE VORBEHALTEN
Console 005 probe
GAS 222.31 ANSI/CSA

Sample gas probe GAS 222.31 Atex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

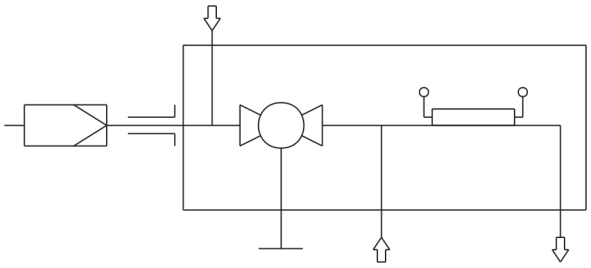
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Versions with Atex approval
Heated probe with shut-off valve, upstream filter and weather hood
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 194 °F
For dust loads up to 200 g/m³
This probe is designed for use in explosive areas (Zone 21, 22 and extracting from Zone 20)

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 122 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 140 °F
	Limit switch:	-20 °C < T_{amb} < 140 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 140 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T3	275 °F
	T4	266 °F
Self-regulating heater:	194 °F	
Electrical data:	Probe: 230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	External circuit breaker type C: 230 V, 3 A, 50/60 Hz 115 V, 4 A, 50/60 Hz
Max. operating pressure	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Marks*:	ATEX: Ex 1GD / 2 GD T4 T130 °C	

* Please note, using special accessories may limit the approved applications of the probes.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622231	0	X	X	X	X	X	0	0	9	9	X	X	X	X	Product Characteristics
															Flange
															DIN DN65 PN6
															Explosive outdoor areas
		4													Zone 21
		5													Zone 22
															Explosive indoor areas
			3												Zone 20
			4												Zone 21
			5												Zone 22
															Ex temperature classes
				4											T4
															Probe voltage
					1										115 V
					2										230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Blowback with air reservoir [2]
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V (labelled "mb")
											2				230 V (labelled "mb")
											3				24 V (labelled "mb")
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
															Limit switch for pneumatic drive
													1		Yes (labelled "db")
													9		No
															Control valve for pneumatic drive
														3	3/2-way valve
														9	No control valve

[1] Please note, using certain accessories may limit gas probe use in Ex areas! Observe the respective operating manuals, accessory compatibility charts, and data sheets to ensure proper technical product design!

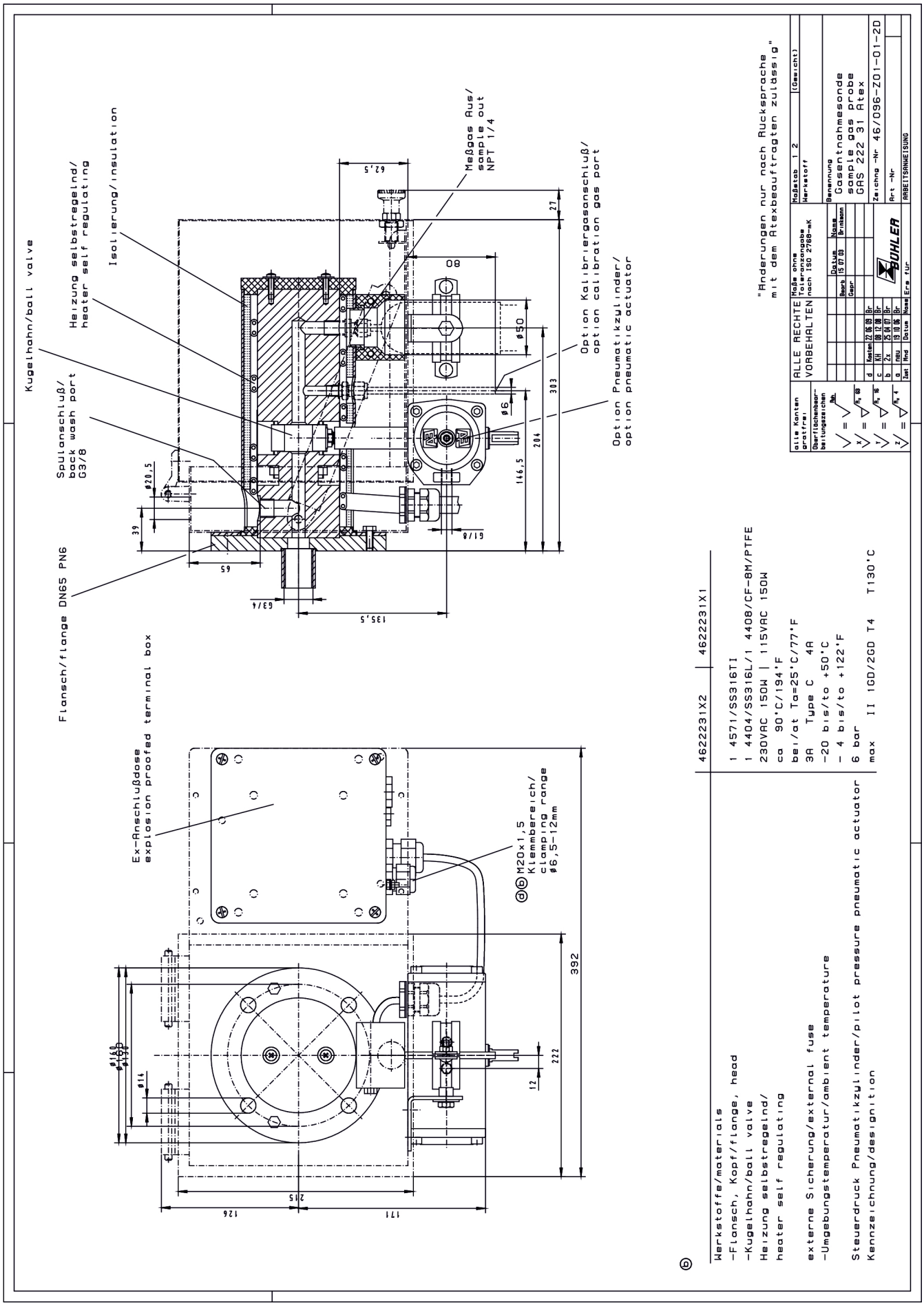
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Kugelhahn/ball valve
Heizung selbstregelnd/
heater self regulating
Isolierung/insulation
Spulanschluß/
back wash port
G3/8
Flansch/flange DN65 PN6
Meßgas Aus/
sample out
NPT 1/4
Option Kalibriergasanschluß/
option calibration gas port
Option Pneumatikzylinder/
option pneumatic actuator
Ex-Anschlußdose
explosion proofed terminal box
M20x1,5
Klemmbereich/
clamping range
ø6,5-12mm
"Änderungen nur nach Rücksprache
mit dem Atexbeauftragten zulässig"
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
(Gewicht)
Werkstoff
Benennung
Gasentnahmesonde
sample gas probe
GAS 222.31 Atex
Zeichng -Nr 46/096-Z01-01-2D
Art -Nr
ARBEITSANWEISUNG
4622231X2
4622231X1
Werkstoffe/materials
-Flansch, Kopf/flange, head
-Kugelhahn/ball valve
Heizung selbstregelnd/
heater self regulating
externe Sicherung/external fuse
-Umgebungstemperatur/ambient temperature
Steuerdruck Pneumatikzylinder/pilot pressure pneumatic actuator
Kennzeichnung/designation
1 4571/SS316TI
1 4404/SS316L/1 4408/CF-8M/PTFE
230VAC 150W | 115VAC 150W
ca 90°C/194°F
bei/at Ta=25°C/77°F
3A Type C 4A
-20 bis/to +50°C
- 4 bis/to +122°F
6 bar
max II 1GD/2GD T4 T130°C

Sample gas probe GAS 222.31 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with shut-off cock, upstream filter and weather hood
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 194 °F
- For dust loads up to 200 g/m³
- This probe is designed for use in explosive areas (Zone 1 and extracting from Zone 0)

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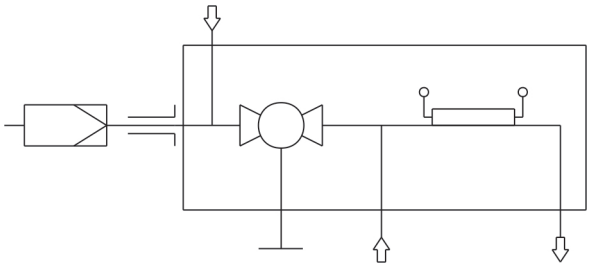
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 140 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 140 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 140 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
	Solenoid valve for pneumatic drive:	14 °F to 212 °F
Self-regulating heater:	194 °F	
Electrical data:	Probe: 230 V, 150 W, 50/60 Hz 115 V, 150 W, 50/60 Hz	External circuit breaker type C: 230 V, 3 A, 50/60 Hz 115 V, 4 A, 50/60 Hz
Max. operating pressure	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db eb mb IIC T6...T2 Gb IECEx: Ex db eb mb IIC T6...T2 Gb	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

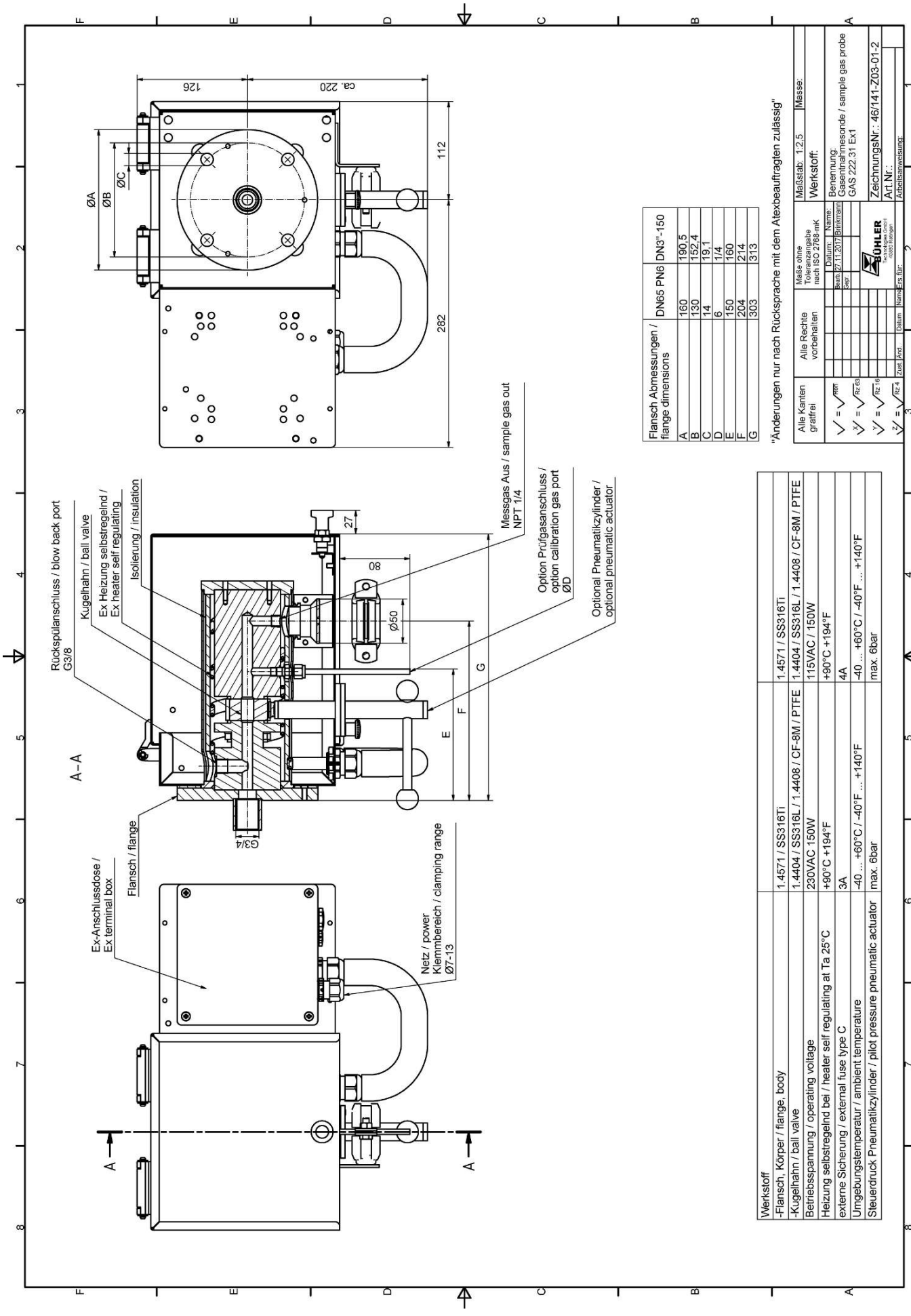
46222311	X	X	X	X	4	X	0	X	X	X	X	X	X	Product Characteristics
														Flange
	0	1												Flange DN65 PN6
	0	2												Flange DN3"-150
	x	x												Other
														Hazardous area outside
			4											Zone 1
			5											Zone 2
			9											none
														Hazardous area inside
				3										Zone 0
				4										Zone 1
				5										Zone 2
				9										none
														Power supply sample probe
						1								115 V
						2								230 V
														Calibration gas port
								0						No
								1						6 mm
								2						6 mm with check valve
								3						1/4"
								4						1/4" with check valve
														Capacitive vessel
									0					No
									1					Yes (not for gas zone inside)
														Valve for pressurized air
										0				Ball valve
										1				Solenoid valve 115 V (marked "mb")
										2				Solenoid valve 230 V (marked "mb")
										3				Solenoid valve 24 V (marked "mb")
										9				none
														Pneumatic actuator for internal ball valve
											0			No
											1			Mono stable depressurized open
											2			Mono stable depressurized closed
														Limit switch for pneumatic actuator
												0		No
												1		Yes (marked "db")
														Solenoid valve for pneumatic actuator
													0	No
													1	Yes (marked "mb")

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	150	160
F	204	214
G	303	313

Werkstoff	
-Flansch, Körper / flange, body	1.4571 / SS316Ti
-Kugelhahn / ball valve	1.4404 / SS316L / 1.4408 / CF-8M / PTFE
Betriebsspannung / operating voltage	230VAC 150W
Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+90°C +194°F
externe Sicherung / external fuse type C	3A
Umgebungstemperatur / ambient temperature	-40 ... +60°C / -40°F ... +140°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	max. 6bar

Werkstoff	
-Flansch, Körper / flange, body	1.4571 / SS316Ti
-Kugelhahn / ball valve	1.4404 / SS316L / 1.4408 / CF-8M / PTFE
Betriebsspannung / operating voltage	115VAC / 150W
Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+90°C +194°F
externe Sicherung / external fuse type C	4A
Umgebungstemperatur / ambient temperature	-40 ... +60°C / -40°F ... +140°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator	max. 6bar

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

Alle Kanten gratfrei

Alle Rechte vorbehalten

Maße ohne Toleranzangabe nach ISO 2768-mK

Maßstab: 1:2,5 | Masse:

Werkstoff:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.31 Ex1

Datum: Name:
Bearb. 27.11.2017 Blinkmann
Gepr.
Norm
Ers. für:

ZeichnungsNr.: 46/141-Z03-01-2

Art.Nr.:

Arbeitsanweisung:

Gas Analysis

Sample gas probe GAS 222.31 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

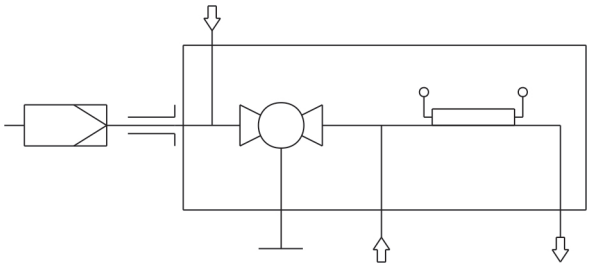
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with shut-off valve, inlet filter and weather hood
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Heater self-regulating to approx. 248 °C (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 200 g/m³
- This probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic actuator:	14 °F < T_{amb} < 131 °F
	Pneumatic actuator:	-4 °F < T_{amb} < 176 °F
	Limit switch:	-13 °F < T_{amb} < 140 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
	Solenoid valve for pneumatic actuator:	14 °F to 212 °F
Self-regulating heater:	248 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure	85 psia	
Material:	1.4571; ball valve 1.4408	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: Ex II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622231	X	0	X	X	X	X	3	X	X	X	X	X	X	X	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							3								115/230 V
															Low temperature alarm
								1							Opener (open at operating temperature) (marked with "ic")
								2							Closer (closed at operating temperature) (marked with "ic")
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none
															Pneumatic actuator for internal ball valve
												0			No
												1			Mono stable depressurized open
												2			Mono stable depressurized closed
															Limit switch for pneumatic actuator
													0		No
													1		Yes
															Solenoid valve for pneumatic actuator
														0	No
														1	Yes (marked with "mb")

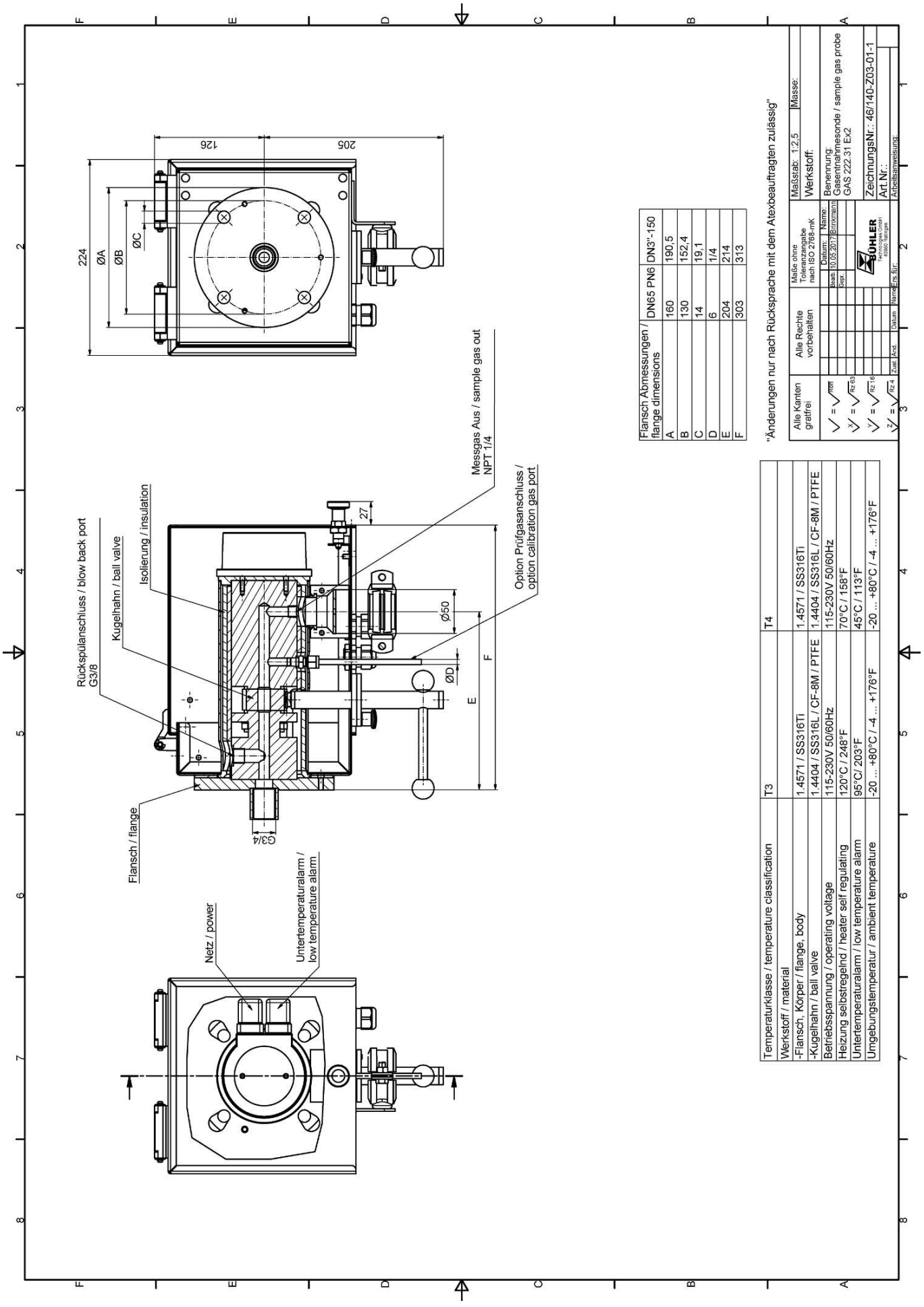
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	204	214
F	303	313

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange, body	1.4571 / SS316Ti	1.4571 / SS316Ti
-Kugelhahn / ball valve	1.4404 / SS316L / CF-8M / PTFE	1.4404 / SS316L / CF-8M / PTFE
Betriebsspannung / operating voltage	115-230V 50/60Hz	115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating	120°C / 248°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C/ 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

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Maße ohne Toleranzangabe nach ISO 2768-mK

Maßstab: 1:2,5

Masse:

Werkstoff:

Bearb. 10.05.2017 Brinkmann

Datum: Name:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.31 Ex2

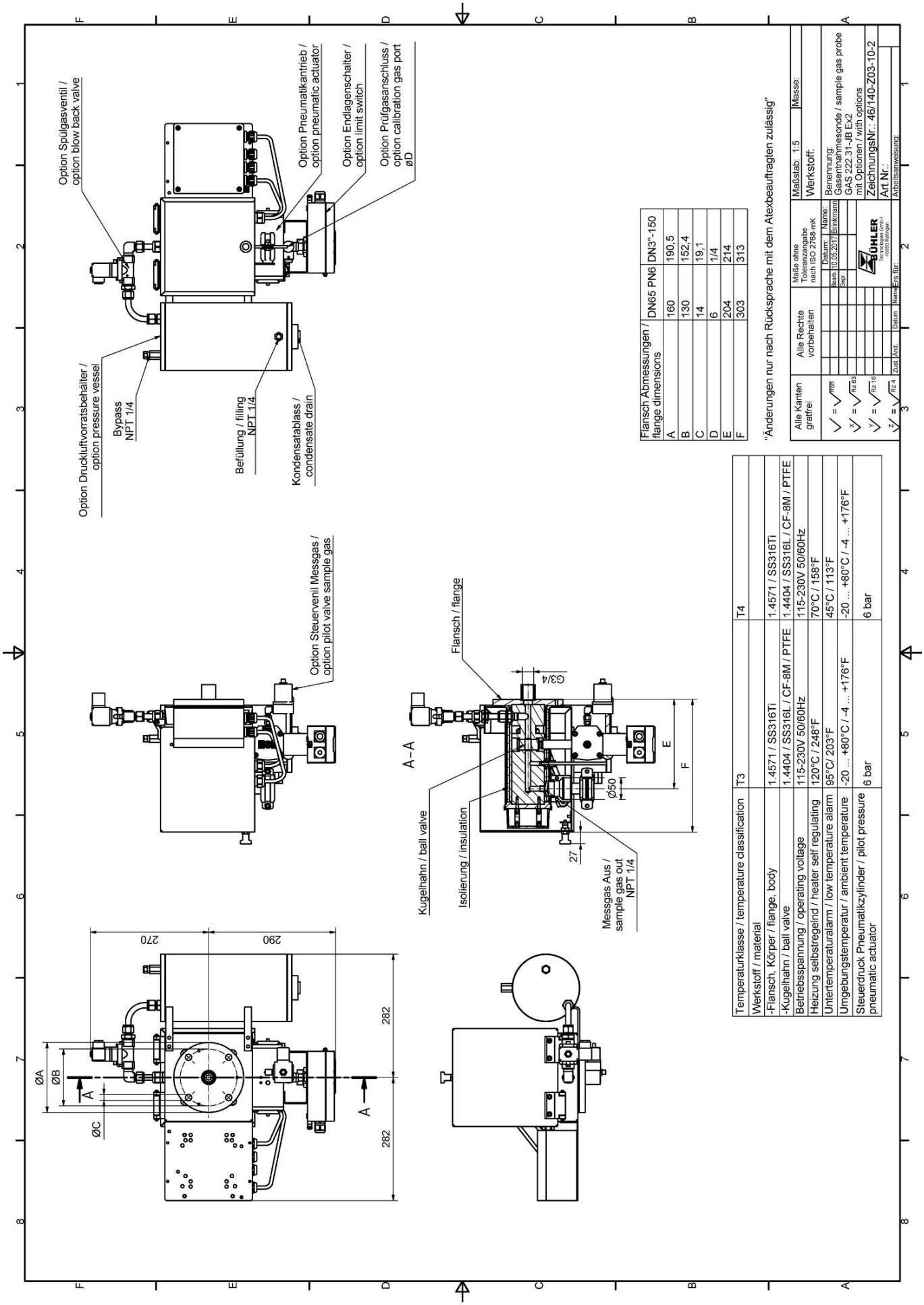
ZeichnungsNr.: 46/140-Z03-01-1

Art Nr.:

Ers. für:

Arbeitsanweisung:

Zust. Änd. Datum Name


Option Spülgasventil / option blow back valve
Option Pneumatikantrieb / option pneumatic actuator
Option Endlagenschalter / option limit switch
Option Prüfgasanschluss / option calibration gas port øD
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Option Steuerventil Messgas / option pilot valve sample gas
Flansch / flange
G3/4
A–A
Kugelhahn / ball valve
Isolierung / insulation
Messgas Aus / sample gas out NPT 1/4
ØA
ØB
ØC
270
290
282
282
27
Ø50
E
F
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 204 214
F 303 313
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Temperaturklasse / temperature classification T3 T4
Werkstoff / material
-Flansch, Körper / flange, body 1.4571 / SS316Ti 1.4571 / SS316Ti
-Kugelhahn / ball valve 1.4404 / SS316L / CF-8M / PTFE 1.4404 / SS316L / CF-8M / PTFE
Betriebsspannung / operating voltage 115-230V 50/60Hz 115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating 120°C / 248°F 70°C / 158°F
Untertemperaturalarm / low temperature alarm 95°C/ 203°F 45°C / 113°F
Umgebungstemperatur / ambient temperature -20 ... +80°C / -4 ... +176°F -20 ... +80°C / -4 ... +176°F
Steuerdruck Pneumatikzylinder / pilot pressure pneumatic actuator 6 bar 6 bar
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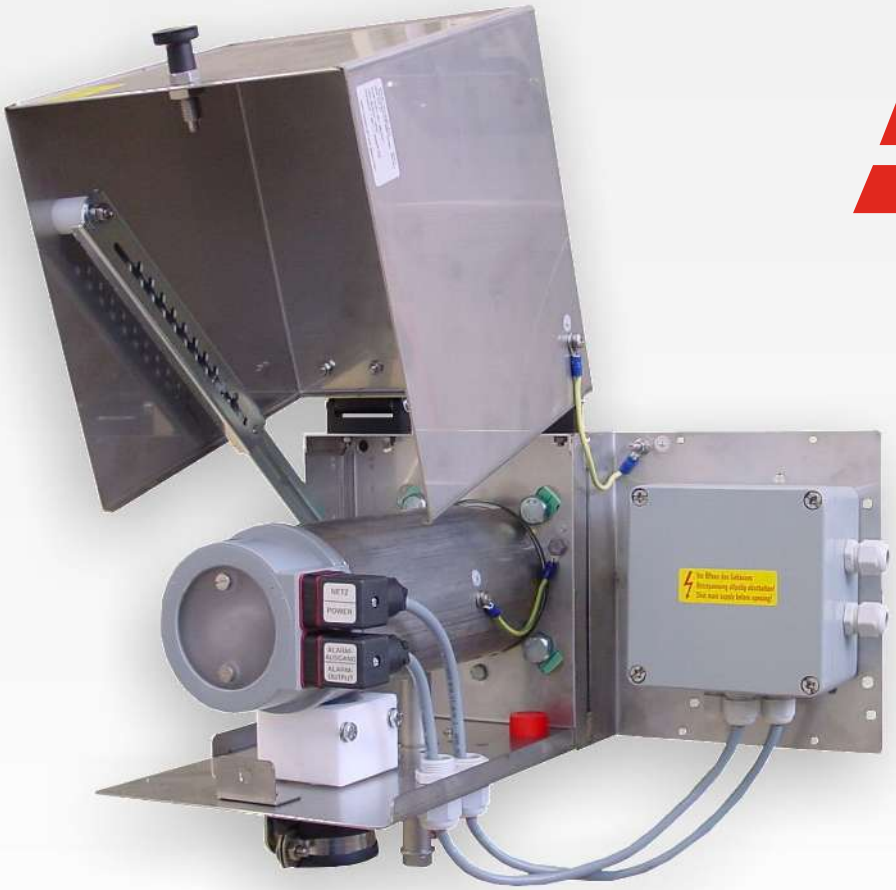
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.31-JB Ex2 mit Optionen / with options
ZeichnungsNr.: 46/140-Z03-10-2
Art Nr.:
Arbeitsanweisung:
Name
Datum
Bearb 10.05.2017 Brinkmann
Gepr
Ers. für:
Zust Änd.
BÜHLER Technologies GmbH



Sample gas probe GAS 222.31 Amex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with shut-off valve, upstream filter, weather hood and terminal box
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Heater self-regulating to approx. 248 °F (T3)/158 °F (T4)
- For dust loads up to 200 g/m³
- This probe is suitable for use in explosive areas
- C-US and CSA approval

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e-mail: sales@buhlertech.com
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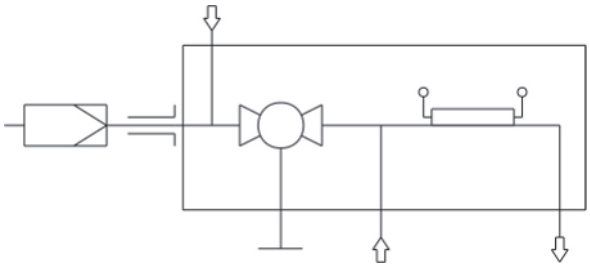
Flow diagram



Technical Data

Gas Probe Technical Data		
Self-regulating temperature:	248 °F (T3)/158 °F (T4)	
Ambient temperature:	-4 to 176 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
	Solenoid valve for pneumatic drive:	14 °F < T_{amb} < 131 °F
	Pneumatic drive:	-4 °F < T_{amb} < 176 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 203 °F (T3) resp. < 122 °F (T4); U_{max}=30 VDC, I_{max}=100 mA, Ci/Li~0	
Electrical data:	115 V-230 V, 50/60 Hz	
Max. operating pressure:	85 psia	
Parts in contact with media:	1.4571, ball valve 1.4408 Seals: PTFE/graphite/1.4404	
Explosion protection:	Class 1, Div 2, Gps B, C, D, T3 and T4	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622231	1	6	6	X	3	X	0	0	X	9	X	X	9	X	Product Characteristics [1]
															Ex temperature classes
				3											T3
				4											T4
															Sample probe power supply
					3										115 / 230 V
															Calibration gas connection
						0									No calibration gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Blowback with air reservoir [2]
															Air reservoir heating
									1						Yes
									9						No
															Compressed air valve/valve voltage information
											0				Manual
											1				120 V 60 Hz
											2				240 V 60 Hz
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												0			Manual
												1			Monostable pressure-free open
												2			Monostable pressure-free closed
															Control valve for pneumatic drive
														3	3/2-way valve
														9	No control valve

[1] Please note, using certain accessories may limit gas probe use in Ex areas! Observe the respective operating manuals, accessory compatibility charts, and data sheets to ensure proper technical product design!

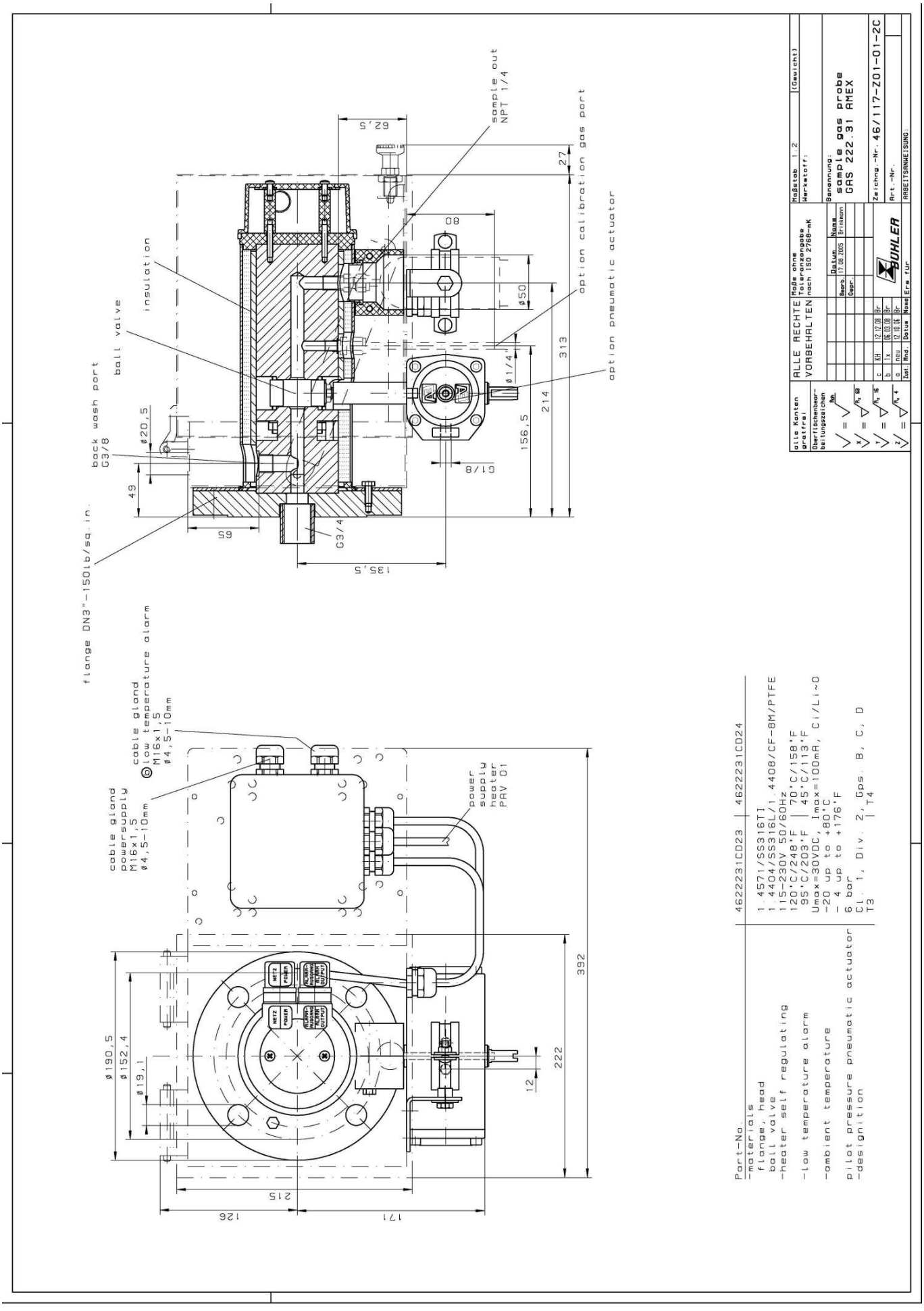
[2] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


sample out NPT 1/4
option calibration gas port
option pneumatic actuator
insulation
ball valve
back wash port G3/8
flange DN3"-150lb/sq.in.
cable gland low temperature alarm M16x1,5 ø4,5-10mm
cable gland powersupply M16x1,5 ø4,5-10mm
power supply heater PAV 01
62,5
80
27
ø50
ø1/4"
313
214
156,5
G1/8
G3/4
135,5
65
49
ø20,5
ø190,5
ø152,4
ø19,1
392
222
12
215
126
171
Part-No 4622231CD23 | 4622231CD24
-materials
flange, head 1.4571/SS316TI
ball valve 1.4404/SS316L/1.4408/CF-8M/PTFE
-heater self regulating 115-230V 50/60Hz
-low temperature alarm 120°C/248°F | 70°C/158°F
95°C/203°F | 45°C/113°F
Umax=30VDC, Imax=100mA, Ci/Li~0
-ambient temperature -20 up to +80°C
- 4 up to +176°F
pilot pressure pneumatic actuator 6 bar
-designition Cl. 1, Div. 2, Gps. B, C, D
T3 | T4
Maßstab 1:2 (Gewicht)
Werkstoff:
Benennung:
sample gas probe
GAS 222.31 AMEX
Zeichng.-Nr. 46/117-Z01-01-2C
Art.-Nr.
ARBEITSANWEISUNG:
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Datum Name
Bearb. 17.09.2005 Brinkmann
Gepr.
BÜHLER
Ers. für
Änd. Mod. Datum Name
c KH 12.12.08 Br
b 1x 06.03.08 Br
a neu 12.10.06 Br

Sample gas probe GAS 222.35-U

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is suitable for use in explosive areas

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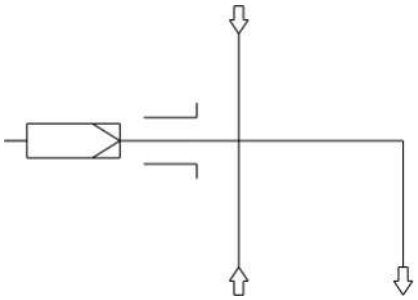
Flow chart



Technical Data

Gas Probe Technical Data	
Operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	0	9	9	0	0	X	0	0	X	X	X	X	X	X	Product Characteristics
															Flange / approval
															DIN DN65 PN6
															Power supply sample probe
															none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
															No
															Built-in temperature controller for heated extension
															No
															Blowback with air reservoir [1]
															Air reservoir bracket
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Limit switch for pneumatic drive
													9		No
															Control valve for pneumatic drive
														9	No control valve

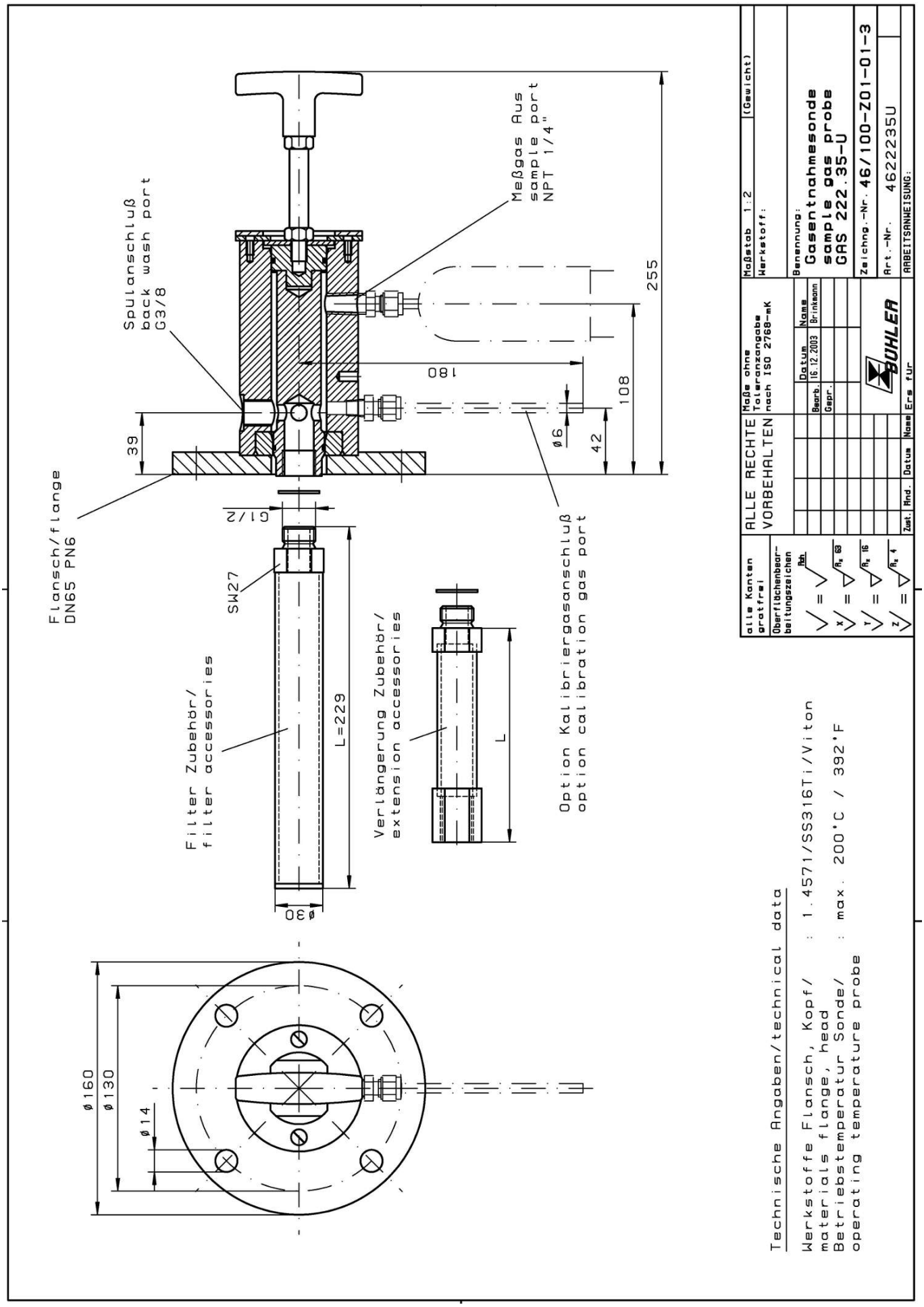
[1] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

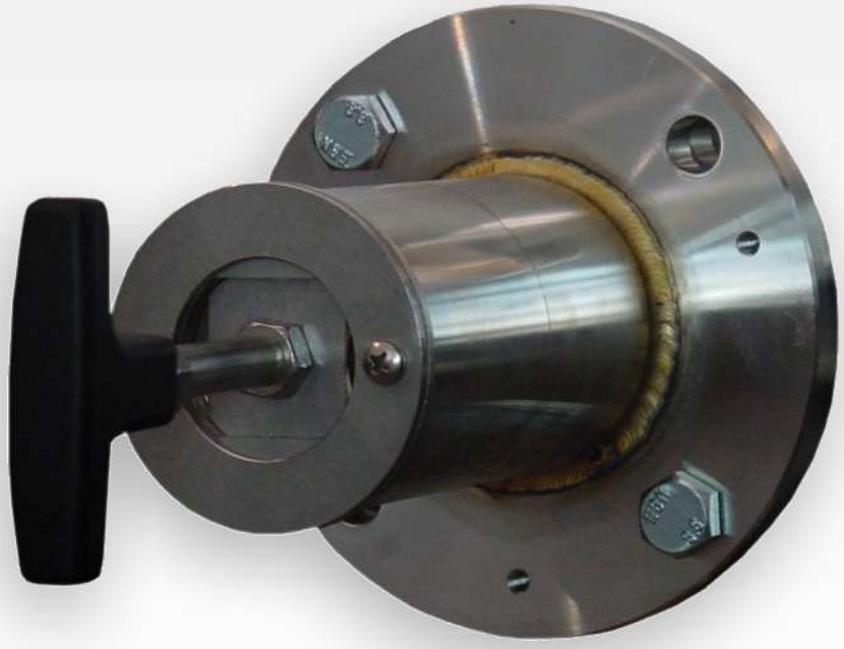
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Spulanschluß
back wash port
G3/8
Meßgas Aus
sample port
NPT 1/4"
255
180
108
42
39
ø6
Flansch/flange
DN65 PN6
G1/2
SW27
L=229
ø30
Filter Zubehör/
filter accessories
Verlängerung Zubehör/
extension accessories
L
Option Kalibriergasanschluß
option calibration gas port
ø160
ø130
ø14
Technische Angaben/technical data
Werkstoffe Flansch, Kopf/ : 1.4571/SS316Ti/Viton
materials flange, head
Betriebstemperatur Sonde/ : max. 200°C / 392°F
operating temperature probe
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
Gasentnahmesonde
sample gas probe
GAS 222.35-U
Zeichng.-Nr. 46/100-Z01-01-3
Art.-Nr. 4622235U
ARBEITSANWEISUNG:
BÜHLER



Sample gas probe GAS 222.35U Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

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- Versions with Atex and IECEx approval
- Unheated probe with inlet filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 200 g/m³, non-condensable gases
- The probe is suitable for use in explosive areas

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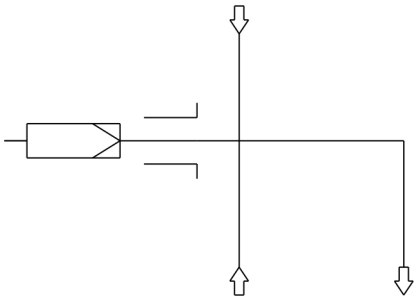
Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 176 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-22 °F < T_{amb} < 131 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/195 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
Max. operating pressure	85 psia	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec mb IIC T3/T4 Gc IECEx: Ex ec mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	X	X	X	X	X	X	0	0	X	X	X	0	0	0	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							0								none
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none

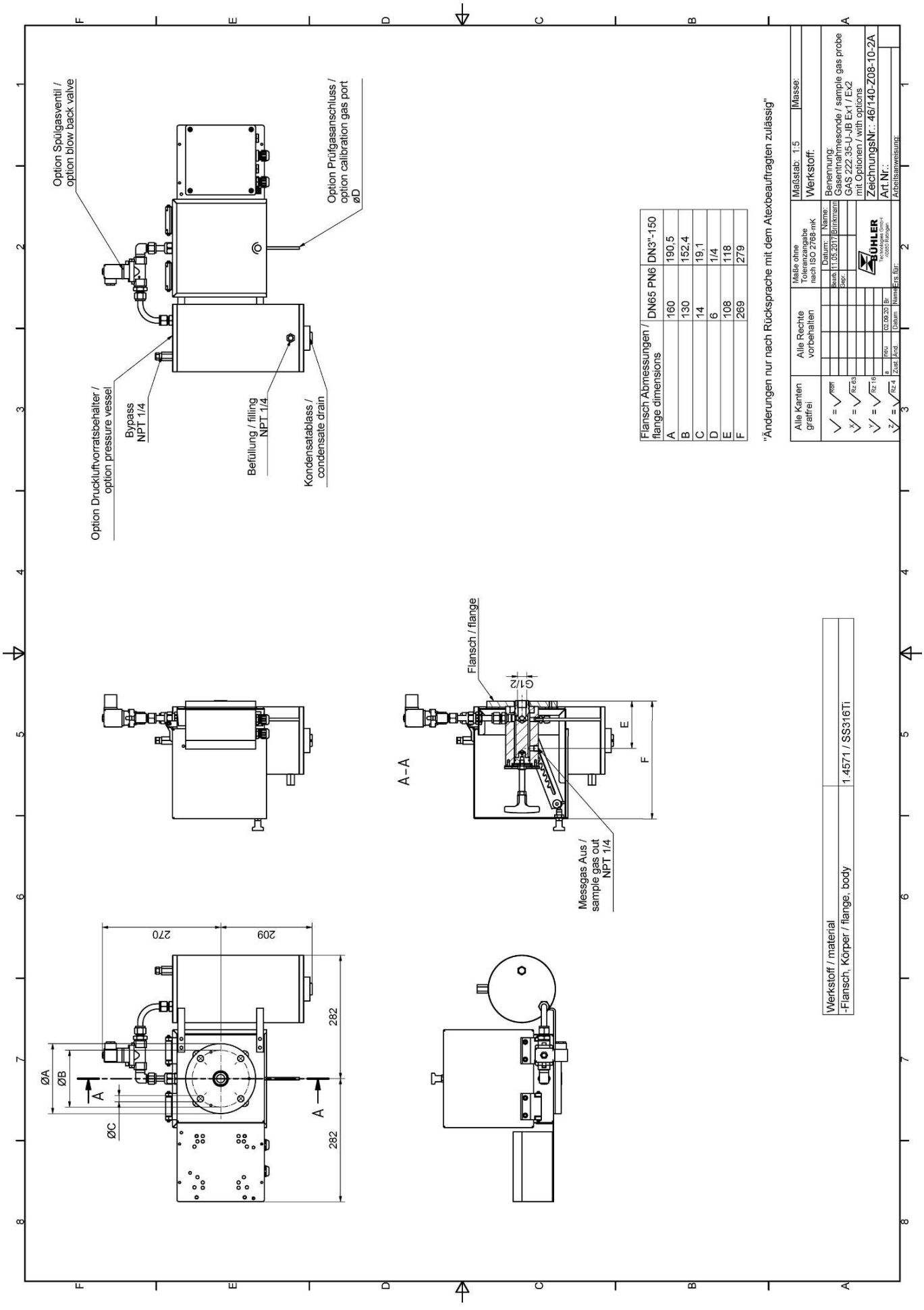
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Option Spülgasventil / option blow back valve
Option Prüfgasanschluss / option calibration gas port øD
Option Druckluftvorratsbehälter / option pressure vessel
Bypass NPT 1/4
Befüllung / filling NPT 1/4
Kondensatablass / condensate drain
Flansch / flange
G1/2
A-A
E
F
Messgas Aus / sample gas out NPT 1/4
270
209
282
282
ØA
ØB
ØC
A
A
Flansch Abmessungen / flange dimensions
DN65 PN6
DN3"-150
A 160 190,5
B 130 152,4
C 14 19,1
D 6 1/4
E 108 118
F 269 279
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Alle Kanten gratfrei
Alle Rechte vorbehalten
Maße ohne Toleranzangabe nach ISO 2768-mK
Maßstab: 1:5
Masse:
Werkstoff:
Benennung: Gasentnahmesonde / sample gas probe GAS 222.35-U-JB Ex1 / Ex2 mit Optionen / with options
ZeichnungsNr.: 46/140-Z08-10-2A
Art.Nr.:
Arbeitsanweisung:
Werkstoff / material
-Flansch, Körper / flange, body 1.4571 / SS316Ti

Sample gas probe GAS 222.35

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

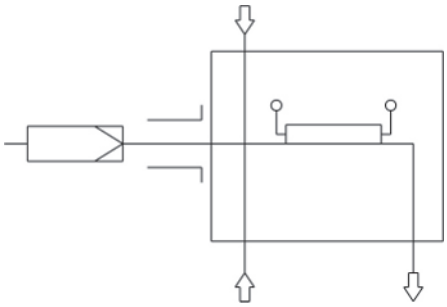
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with upstream filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 200 g/m³
- This probe is not suitable for use in Ex areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data		
Probe operating temperature:	max. 395 °F	
Ambient temperature	-4 to 158 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 F < T_{amb} < 131 °F
Regulator setting range:	122 to 395 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset 15 K Max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	0	9	9	0	X	X	0	0	X	X	X	9	9	9	Product Characteristics
															Flange / approval
				0											DIN DN65 PN6
															Power supply sample probe
					1										115 V
					2										230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
							0								No
															Built-in temperature controller [1]
								0							No
															Blowback with air reservoir [2]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control [1]
										1					Internal controller
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V
											2				230 V
											3				24 V
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Limit switch for pneumatic drive
													9		No
															Control valve for pneumatic drive
														9	No control valve

[1] The electronics can either be equipped with temperature controller for heated extension or blowback control

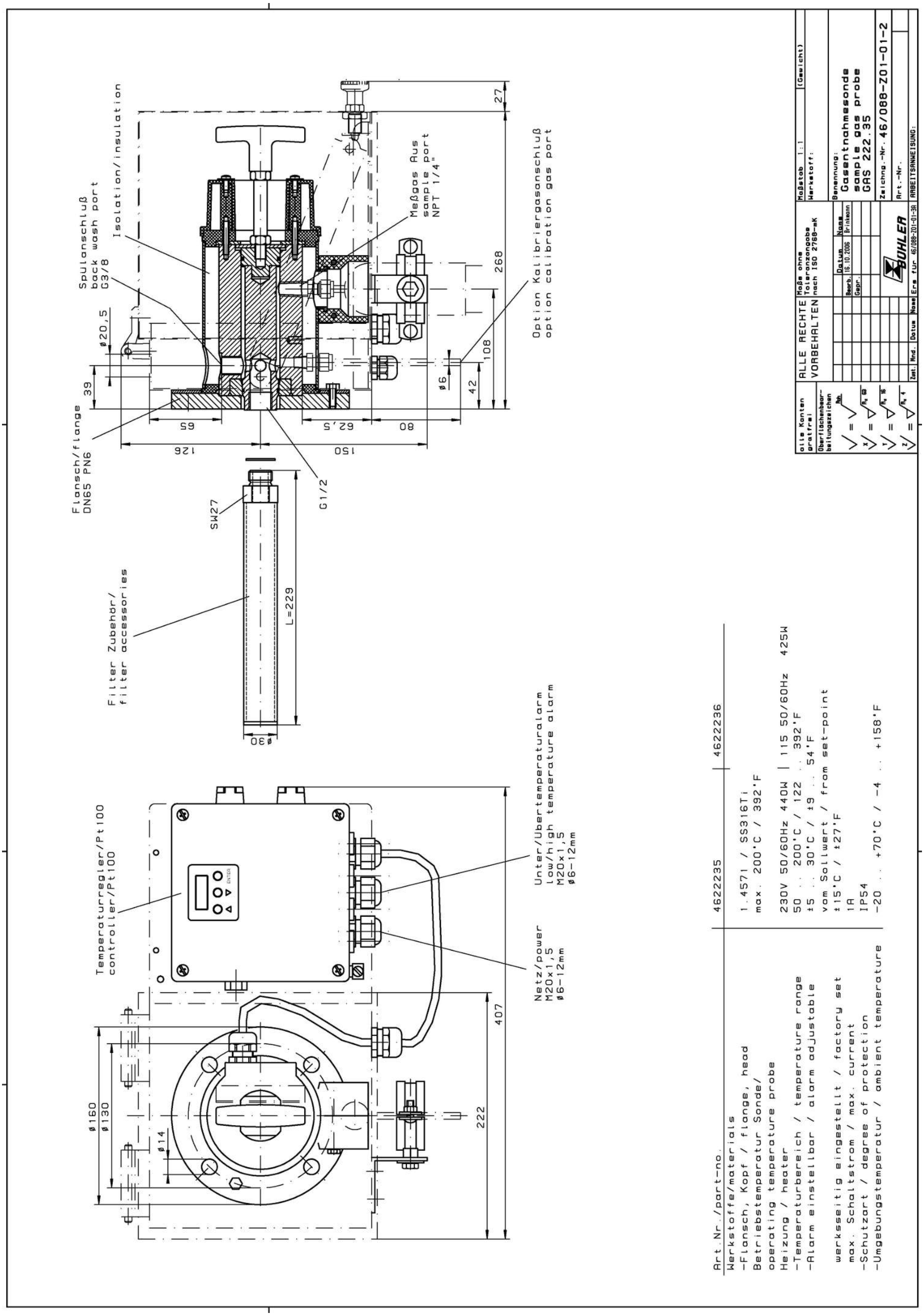
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

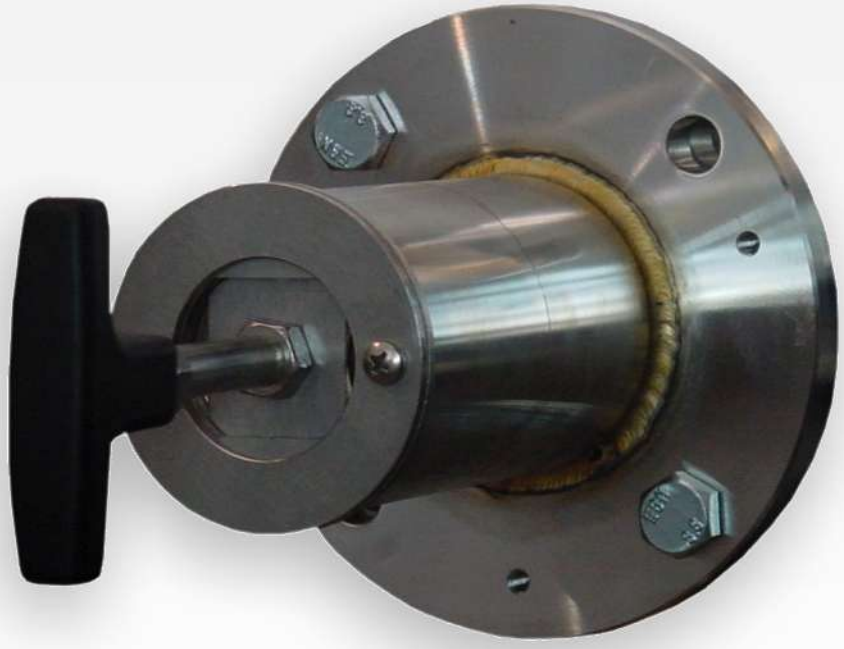
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Spulanschluß back wash port G3/8
Isolation/insulation
Meßgas Aus sample port NPT 1/4"
Option Kalibriergasanschluß option calibration gas port
Flansch/flange DN65 PN6
G1/2
SW27
Filter Zubehör/ filter accessories
L=229
ø30
27
268
108
42
ø6
39
ø20,5
65
62,5
80
126
150
Temperaturregler/Pt100 controller/Pt100
Unter/Übertemperaturalarm low/high temperature alarm M20x1,5 ø6-12mm
Netz/power M20x1,5 ø6-12mm
407
222
ø160
ø130
ø14
Art.Nr./part-no. | 4622235 | 4622236
Werkstoffe/materials
-Flansch, Kopf / flange, head | 1.4571 / SS316Ti
Betriebstemperatur Sonde/ operating temperature probe | max. 200°C / 392°F
Heizung / heater | 230V 50/60Hz 440W | 115 50/60Hz 425W
-Temperaturbereich / temperature range | 50 .. 200°C / 122 .. 392°F
-Alarm einstellbar / alarm adjustable | ±5 .. 30°C / ±9 .. 54°F vom Sollwert / from set-point
werksseitig eingestellt / factory set | ±15°C / ±27°F
max. Schaltstrom / max. current | 1A
-Schutzart / degree of protection | IP54
-Umgebungstemperatur / ambient temperature | -20 .. +70°C / -4 .. +158°F
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768-mK
Bearb. 16.10.2006 Brinkmann
Gepr.
BÜHLER
Maßstab 1:1
(Gewicht)
Werkstoff:
Benennung: Gasentnahmesonde sample gas probe GAS 222.35
Zeichng.-Nr. 46/088-Z01-01-2
Art.-Nr.
ARBEITSANWEISUNG:



Sample gas probe GAS 222.35-U ANSI/CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

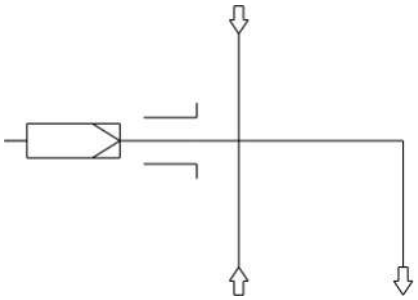
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Unheated probe with Shut-off valve and upstream filter
- The filter element can easily be removed by turning the handle 90°
- For dust loads up to 200 g/m³, non-condensable gases
- The probe has no innate ignition source and is therefore suitable for use in Ex areas
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow Diagram



Technical Data

Gas Probe Technical Data	
Probe operating temperature:	max. 395 °F
Max. operating pressure:	85 psia
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	1	9	9	0	0	X	0	0	X	X	X	X	9	X	Product Characteristics
															Flange / approval
															ANSI 3"-150 lbs [1]
															Cleaning the probe
															none
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
															No
															Built-in temperature controller for heated extension
															No
															Blowback with air reservoir [2]
															Air reservoir bracket
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control
										9					No
															Pressure valve/valve voltage information
											0				Manual
											1				120 V 60 Hz
											2				240 V 60 Hz
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Limit switch for pneumatic drive
															No
															Control valve for pneumatic drive
														9	No control valve

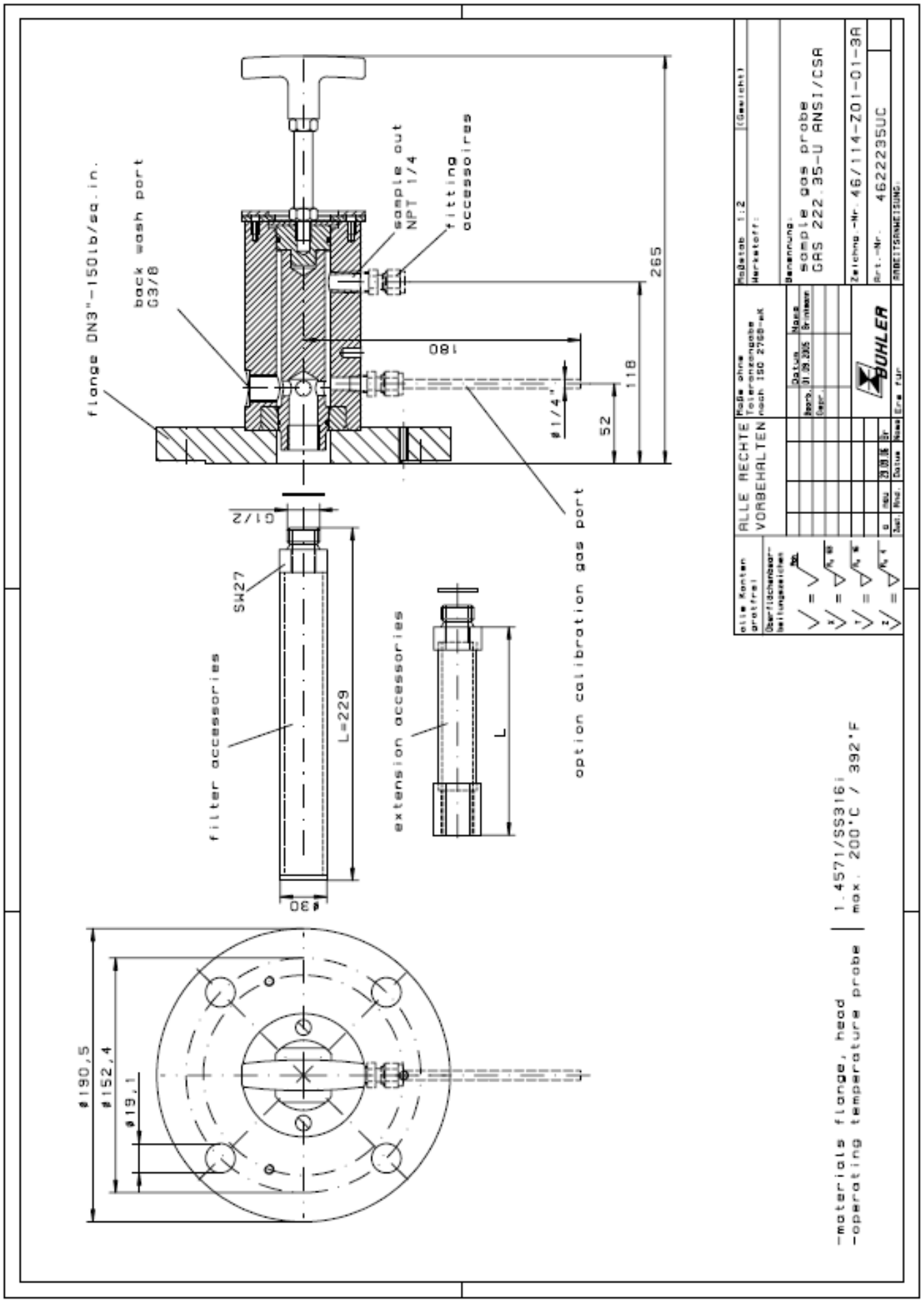
[1] Probes with ANSI flange are CSA and C-US approved

[2] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Dimensions


flange DN3"-150lb/sq.in.
back wash port G3/8
sample out NPT 1/4
fitting accessoires
265
180
118
52
Ø1/4"
option calibration gas port
G1/2
SW27
filter accessories
L=229
30
extension accessories
L
Ø190,5
Ø152,4
Ø19,1
-materials flange, head 1.4571/SS316i
-operating temperature probe max. 200°C / 392°F
ALLE RECHTE VORBEHALTEN
Maßstab 1:2
Benennung: sample gas probe GAS 222.35-U ANSI/CSA
Zeichng.-Nr. 46/114-Z01-01-3A
Art.-Nr. 462235UC
BUHLER

Sample gas probe GAS 222.35 ANSI CSA

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Heated probe with shut-off valve, upstream filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Electronic temperature controller up to 395 °F with low/high temperature alarm and display
- For dust loads up to 200 g/m³
- This probe is not suitable for use in Ex areas
- "CSA C & US" approval only when used with 3"" 150lbs. ANSI flange

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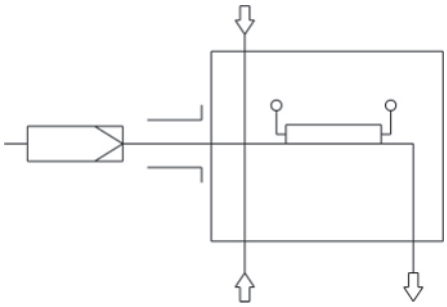
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow Diagram



Technical Data

Gas Probe Technical Data		
Probe operating temperature:	max. 395 °F	
Ambient temperature	-4 to 158 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 F < T_{amb} < 131 °F
Regulator setting range:	122 to 395 °F	
Low/high temperature alarm:	Alarm adjustable ±5.....30 K from setpoint, factory preset to 15 K, max. switching current 1 A	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
IP rating:	IP54	
Max. operating pressure:	85 psia	
Parts in contact with media:	Flange: 1.4571 Seals: Graphite/1.4404 and see filter	

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	1	9	9	0	X	X	0	0	X	X	X	9	9	9	Product Characteristics
															Flange / approval
				0											ANSI 3"-150 lbs [1]
															Power supply sample probe
					1										115 V
					2										230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Connection heated extension
							0								No
															Built-in temperature controller [2]
								0							No
															Blowback with air reservoir [3]
															Air reservoir heating
									1						Yes
									9						No
															Built-in blowback control [2]
										1					Internal controller
										9					No
															Compressed air valve / valve voltage information
											0				Manual
											1				120 V 60 Hz
											2				240 V 60 Hz
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Limit switch for pneumatic drive
													9		No
															Control valve for pneumatic drive
														9	No control valve

[1] Probes with ANSI flange are CSA and C-US approved.

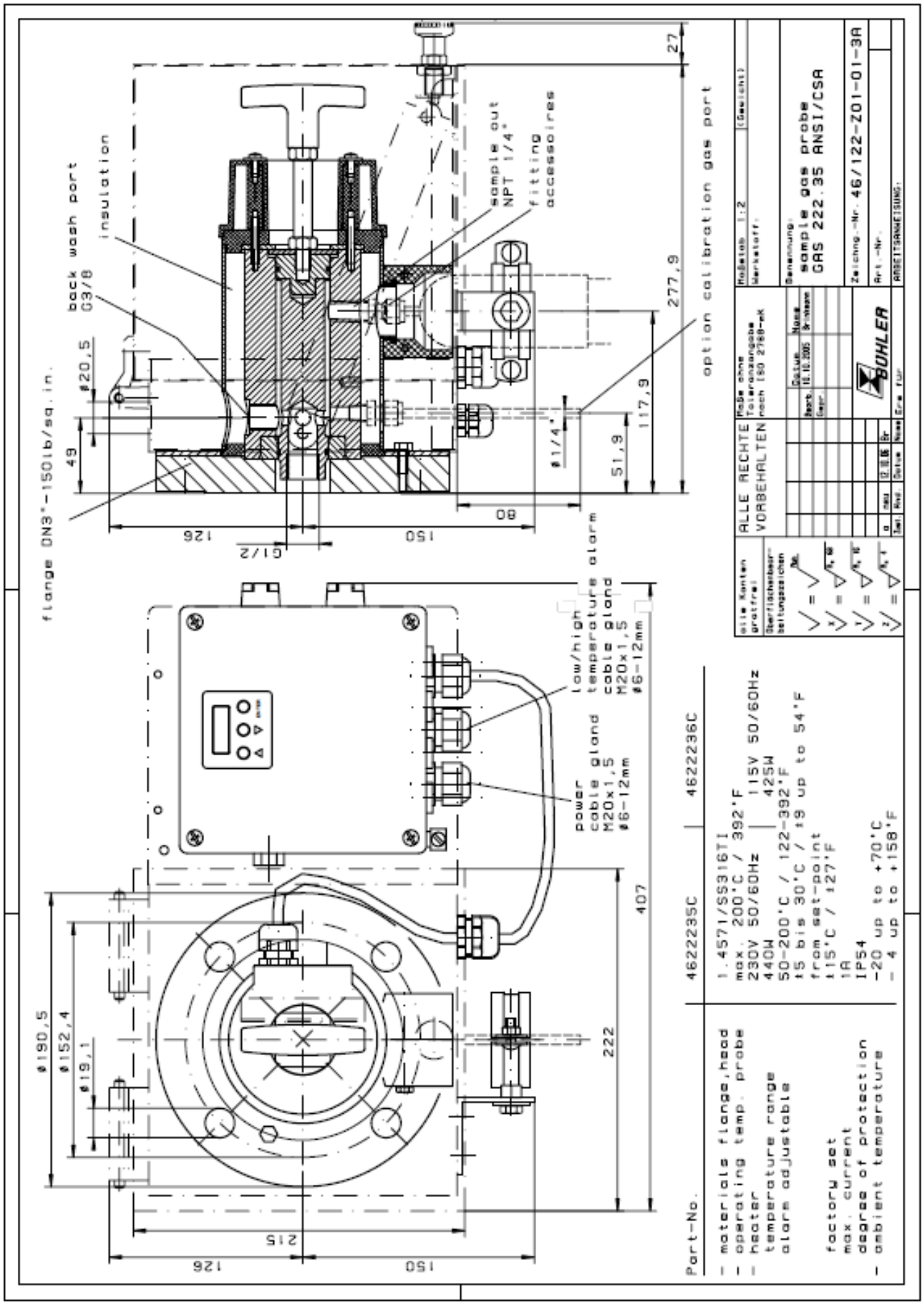
[2] The electronics can either be equipped with temperature controller for heated extension or blowback control.

[3] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Dimensions


flange DN3"-150lb/sq.in.
back wash port G3/8
insulation
sample out NPT 1/4"
fitting accessoires
option calibration gas port
low/high temperature alarm cable gland M20x1,5 ø6-12mm
power cable gland M20x1,5 ø6-12mm
ALLE RECHTE VORBEHALTEN
BÜHLER
sample gas probe GAS 222.35 ANSI/CSA
Part-No. 4622235C 4622236C
- materials flange,head 1.4571/SS316TI
- operating temp. probe max. 200°C / 392°F
- heater 230V 50/60Hz | 115V 50/60Hz
440W | 425W
- temperature range 50-200°C / 122-392°F
alarm adjustable ±5 bis 30°C / ±9 up to 54°F
from set-point
factory set ±15°C / ±27°F
max. current 1A
degree of protection IP54
- ambient temperature -20 up to +70°C
- 4 up to +158°F

Gas Analysis

Sample gas probe GAS 222.35 Atex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

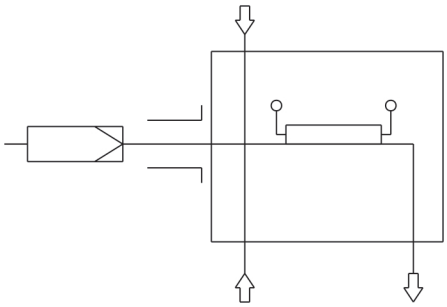
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex approval
- Heated probe with downstream filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Heater self-regulating to approx. 176 °F
- For dust loads up to 200 g/m³
- This probe is suitable for use in explosive areas (Zone 21, 22 and extraction from Zone 20)

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-4 to 122 °F	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 140 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T3	275 °F
	T4	266 °F
Self-regulating heater:	176 °F	
Electrical data:	Probe: 230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	External circuit breaker type C: 230 V, 2 A, 50/60 Hz 115 V, 3 A, 50/60 Hz
Max. operating pressure	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571	
Parts in contact with media:	Seals: PTFE/Graphit/1.4404 and see filter	
Marks*:	ATEX: Ex 1GD / 2GD T4 T130°C	

* Please note, using special accessories may limit the approved applications of the probes.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	0	X	X	X	X	X	0	0	9	9	X	X	X	X	Product Characteristics
															Flange
															DIN DN65 PN6
															Explosive outdoor areas
		4													Zone 21
		5													Zone 22
															Explosive indoor areas
			3												Zone 20
			4												Zone 21
			5												Zone 22
															Ex temperature classes
				3											T3
				4											T4
															Probe voltage
					1										115 V
					2										230 V
															Calibrating gas connection
						0									No calibrating gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Blowback with air reservoir [2]
															Compressed air valve / valve voltage information
											0				Manual
											1				115 V (labelled "mb")
											2				230 V (labelled "mb")
											3				24 V (labelled "mb")
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Limit switch for pneumatic drive
													9		No
															Control valve for pneumatic drive
														9	No control valve

[1] Please note, using certain accessories may limit gas probe use in Ex areas! Observe the respective operating manuals, accessory compatibility charts, and data sheets to ensure proper technical product design!

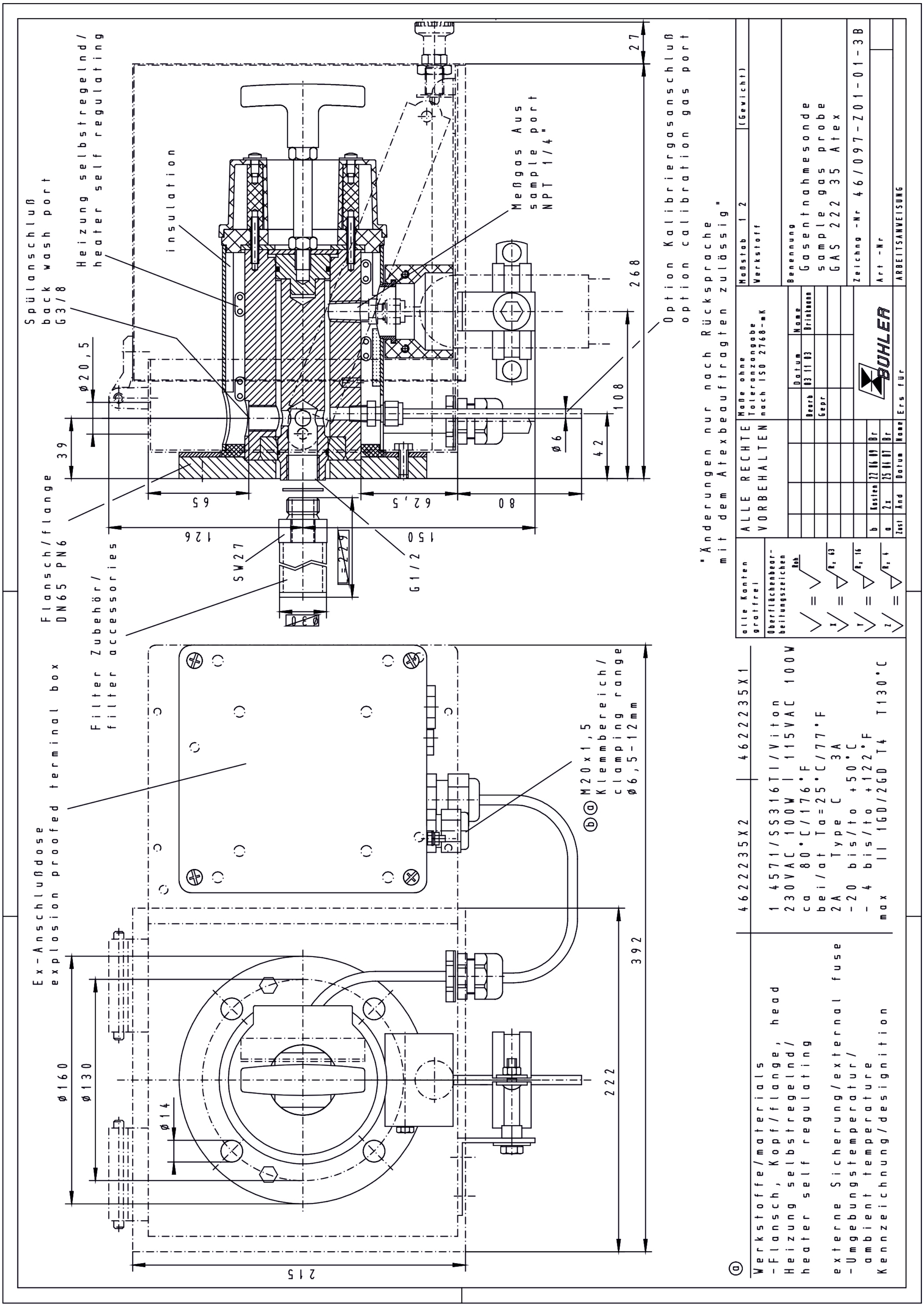
[2] For flammable sample gas, always use inert gas for blowback. Probe blowback prohibited when using explosive gases!

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions


Spülanschluß
back wash port
G3/8
Heizung selbstregelnd/
heater self regulating
insulation
Meßgas Aus
sample gas port
NPT 1/4"
Option Kalibriergasanschluß
option calibration gas port
"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"
Flansch/flange
DN65 PN6
Filter Zubehör/
filter accessories
Ex-Anschlußdose
explosion proofed terminal box
M20x1,5
Klemmbereich/
clamping range
ø6,5-12mm
27
268
108
42
ø6
80
62,5
65
126
150
39
ø20,5
SW27
G1/2
ø30
229
392
222
215
ø160
ø130
ø14
46222235X2
46222235X1
Werkstoffe/materials
-Flansch, Kopf/flange, head
Heizung selbstregelnd/
heater self regulating
externe Sicherung/external fuse
-Umgebungstemperatur/
ambient temperature
Kennzeichnung/designation
1.4571/SS316Ti/Viton
230VAC 100W
115VAC 100W
ca 80°C/176°F
bei/at Ta=25°C/77°F
2A Type C
3A
-20 bis/to +50°C
-4 bis/to +122°F
max II 1GD/2GD T4 T130°C
Maßstab 1:2
Benennung
Gasentnahmesonde
sample gas probe
GAS 222.35 Atex
Zeichng-Nr 46/097-Z01-01-3B
ALLE RECHTE VORBEHALTEN
BÜHLER

Sample gas probe GAS 222.35 Ex1

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

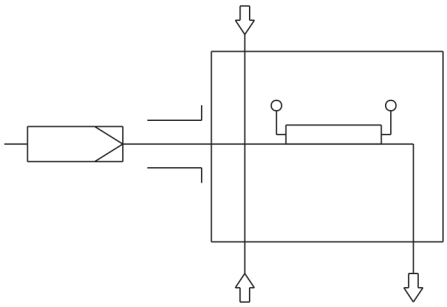
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with downstream filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely insulated
- Heater self-regulating to approx. 176 °F
- For dust loads up to 200 g/m³
- This probe is suitable for use in explosive areas (Zone 1 and extraction from Zone 0)

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-40 to 140 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	-22 °F < T_{amb} < 140 °F
Permissible gas inlet temperatures:	**Outer zone temperature class**	**Permissible gas inlet temperature**
	T2	275 °F
	T3	275 °F
	T4	266 °F
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Compressed air valve:	14 °F to 176 °F
Self-regulating heater:	176 °F	
Electrical data:	Probe: 230 V, 100 W, 50/60 Hz 115 V, 100 W, 50/60 Hz	External circuit breaker type C: 230 V, 2 A, 50/60 Hz 115 V, 3 A, 50/60 Hz
Max. operating pressure	85 psia	
Max. flow rate:	16.66 lpm	
Material:	1.4571	
Parts in contact with media:	Seals: PTFE/Viton	
Markings:	**for zone 0/1:** ATEX: Ⓔx II 1G/2G Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb IECEx: Ex db eb mb IIC T5/T6...T1/T2 Ga/Gb **for zone 1:** ATEX: Ⓔx II 2G Ex db eb mb IIC T6...T2 Gb IECEx: Ex db eb mb IIC T6...T2 Gb	
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-26 (Ed. 3.0); EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-26:2015	
IECEx certificate number:	IECEx IBE 17.0024X	
ATEX certificate number:	IBExU17ATEX1088X	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

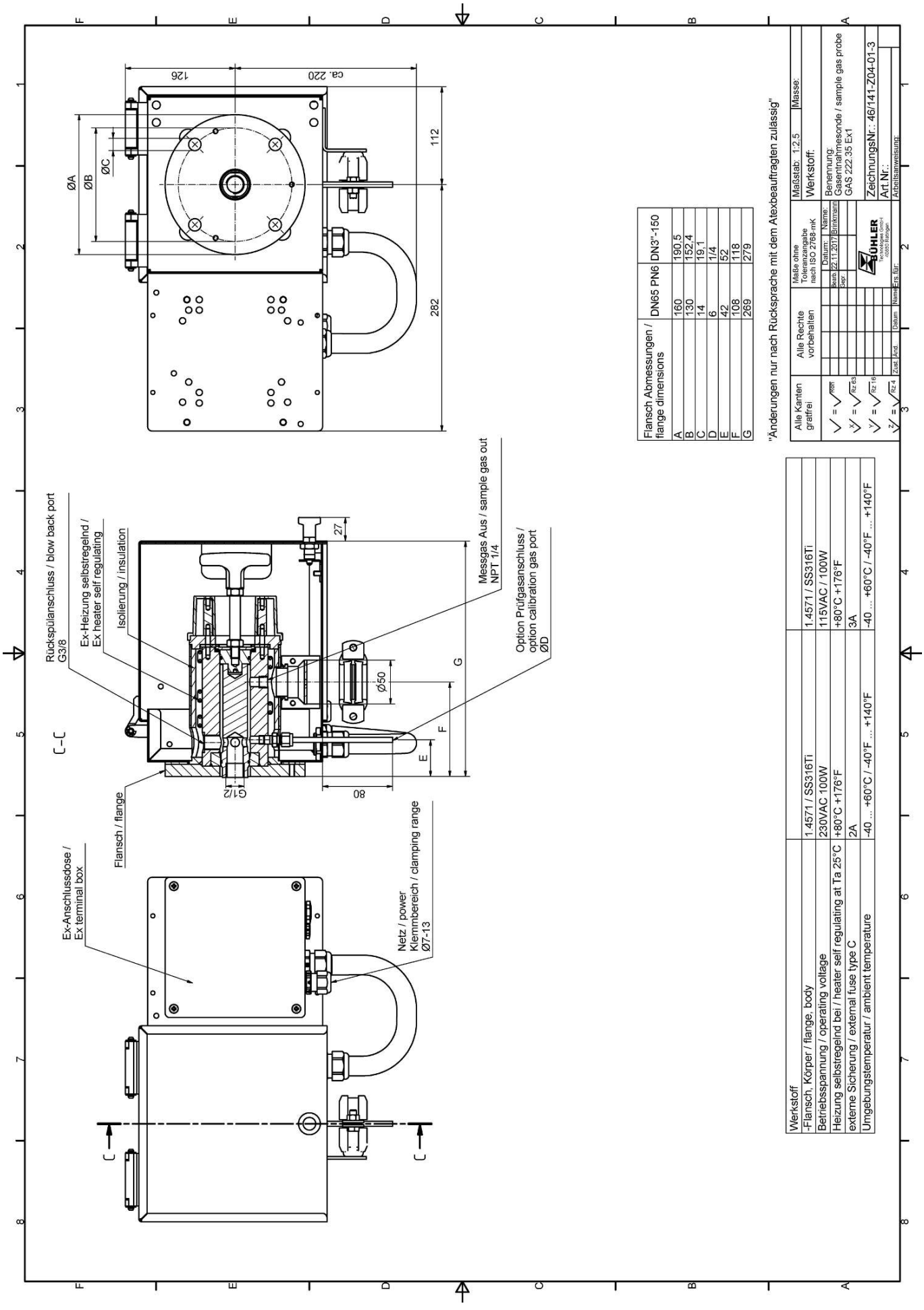
46222351	X	X	X	X	4	X	0	X	X	X	0	0	0	Product Characteristics
														Flange
	0	1												Flange DN65 PN6
	0	2												Flange DN3"-150
	x	x												Other
														Hazardous area outside
			4											Zone 1
			5											Zone 2
			9											none
														Hazardous area inside
				3										Zone 0
				4										Zone 1
				5										Zone 2
				9										none
														Power supply sample probe
						1								115 V
						2								230 V
														Calibration gas port
								0						No
								1						6 mm
								2						6 mm with check valve
								3						1/4"
								4						1/4" with check valve
														Capacitive vessel
									0					No
									1					Yes (not for gas zone inside)
														Valve for pressurized air
										0				Ball valve
										1				Solenoid valve 115 V (marked "mb")
										2				Solenoid valve 230 V (marked "mb")
										3				Solenoid valve 24 V (marked "mb")
										9				none

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	42	52
F	108	118
G	269	279

"Änderungen nur nach Rücksprache mit dem Atexbeauftragten zulässig"

Werkstoff	
-Flansch, Körper / flange, body	1.4571 / SS316Ti
Betriebsspannung / operating voltage	230VAC 100W
Heizung selbstregelnd bei / heater self regulating at Ta 25°C	+80°C +176°F
externe Sicherung / external fuse type C	2A
Umgebungstemperatur / ambient temperature	-40 ... +60°C / -40°F ... +140°F

1.4571 / SS316Ti	
115VAC / 100W	
+80°C +176°F	
3A	
-40 ... +60°C / -40°F ... +140°F	

Alle Kanten gratfrei | Alle Rechte vorbehalten | Maße ohne Toleranzangabe nach ISO 2768-mK | Maßstab: 1:2,5 | Masse:

Werkstoff:

Benennung: Gasentnahmesonde / sample gas probe GAS 222.35 Ex1

Bearb. 22.11.2017 Blinkmann | Datum | Name | Ers. für:

ZeichnungsNr.: 46/141-Z04-01-3

Art.Nr.:

Arbeitsanweisung:

Zust. | Änd. | Datum | Name

Sample gas probe GAS 222.35 Ex2

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

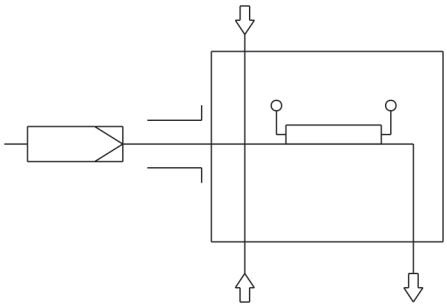
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

- Versions with Atex and IECEx approval
- Heated probe with outlet filter and weather hood
- The filter element can easily be removed by turning the handle 90°
- The probe body and the area around the screw connection for the heated sample gas line are completely isolated
- Heater self-regulating to approx. 266 °F (T3)/158 °F (T4) with low temperature alarm
- For dust loads up to 200 g/m³
- This probe is suitable for use in explosive areas

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow chart



Technical Data

Gas Probe Technical Data

Ambient temperature without accessories:	-20 to +80 °C	
Ambient temperature for accessories:	**Component**	**Ambient temperature range**
	Valve for pressurized air:	-4 °F < T_{amb} < 131 °F
	Junction box:	-4 °F < T_{amb} < 158 °F
Max. gas inlet temperature:	383 °F (T3)/266 °F (T4)	
Medium temperature (blowback):	**Component**	**Medium temperature range**
	Valve for pressurized air:	14 °F to 176 °F
Self-regulating heater:	266 °F (T3)/158 °F (T4)	
Low temperature alarm:	Contact switches at < 203 °F (T3) or < 122 °F (T4); Simple electrical equipment according to EN 60079-11; U_i 30 V, I_i = 100 mA; C_i/L_i~0	
Electrical data:	230 V, 2.0 A, 50/60 Hz 115 V, 3.8 A, 50/60 Hz	
Max. operating pressure	85 psia	
Material:	1.4571	
Parts in contact with media:	Seals: Graphite/1.4404 and see filter	
Markings:	ATEX: Ⓔx II 3G Ex ec ic mb IIC T3/T4 Gc IECEx: Ex ec ic mb IIC T3/T4 Gc	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	X	0	X	X	X	X	3	X	X	X	X	0	0	0	Product characteristics
															Junction box
	0														No
	1														Yes
															Flange
		0	1												Flange DN65 PN6
		0	2												Flange DN3"-150
															Hazardous area Outside and Inside
				2	9										Ex-Zone 2 outside, none inside
				2	2										Ex-Zone 2 outside and inside
															Temperature class
						3									T3
						4									T4
															Power supply sample probe
							3								115/230 V
															Low temperature alarm
								1							Opener (open at operating temperature) (marked with "ic")
								2							Closer (closed at operating temperature) (marked with "ic")
															Calibration gas port
									0						No
									1						6 mm
									2						6 mm with check valve
									3						1/4"
									4						1/4" with check valve
															Capacitive vessel *
										0					No
										1					Yes
															Valve for pressurized air *
											0				Ball valve
											1				Solenoid valve 110 V (marked with "mb")
											2				Solenoid valve 230 V (marked with "mb")
											3				Solenoid valve 24 V (marked with "mb")
											9				none

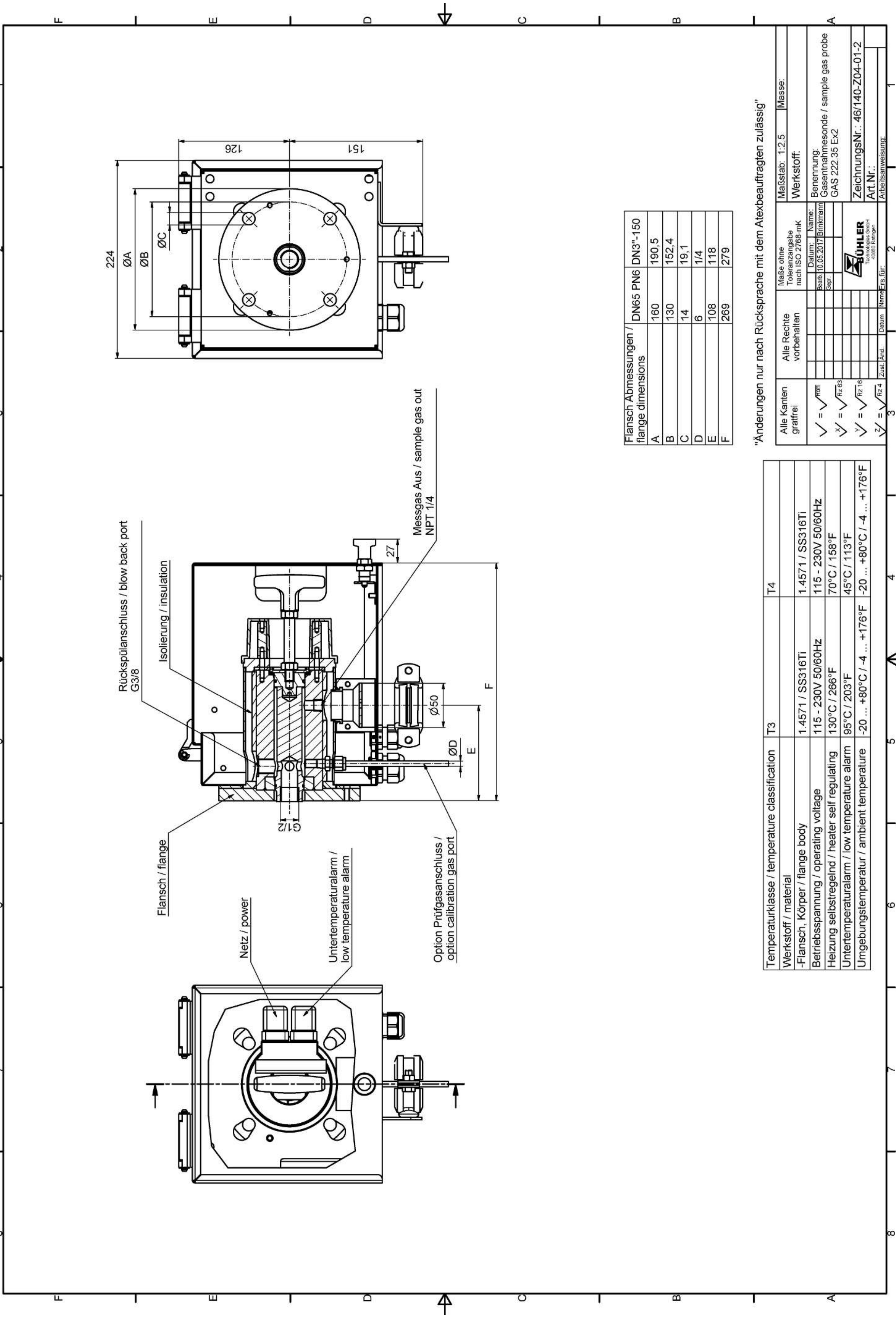
* Blowback of explosive atmosphere prohibited.

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

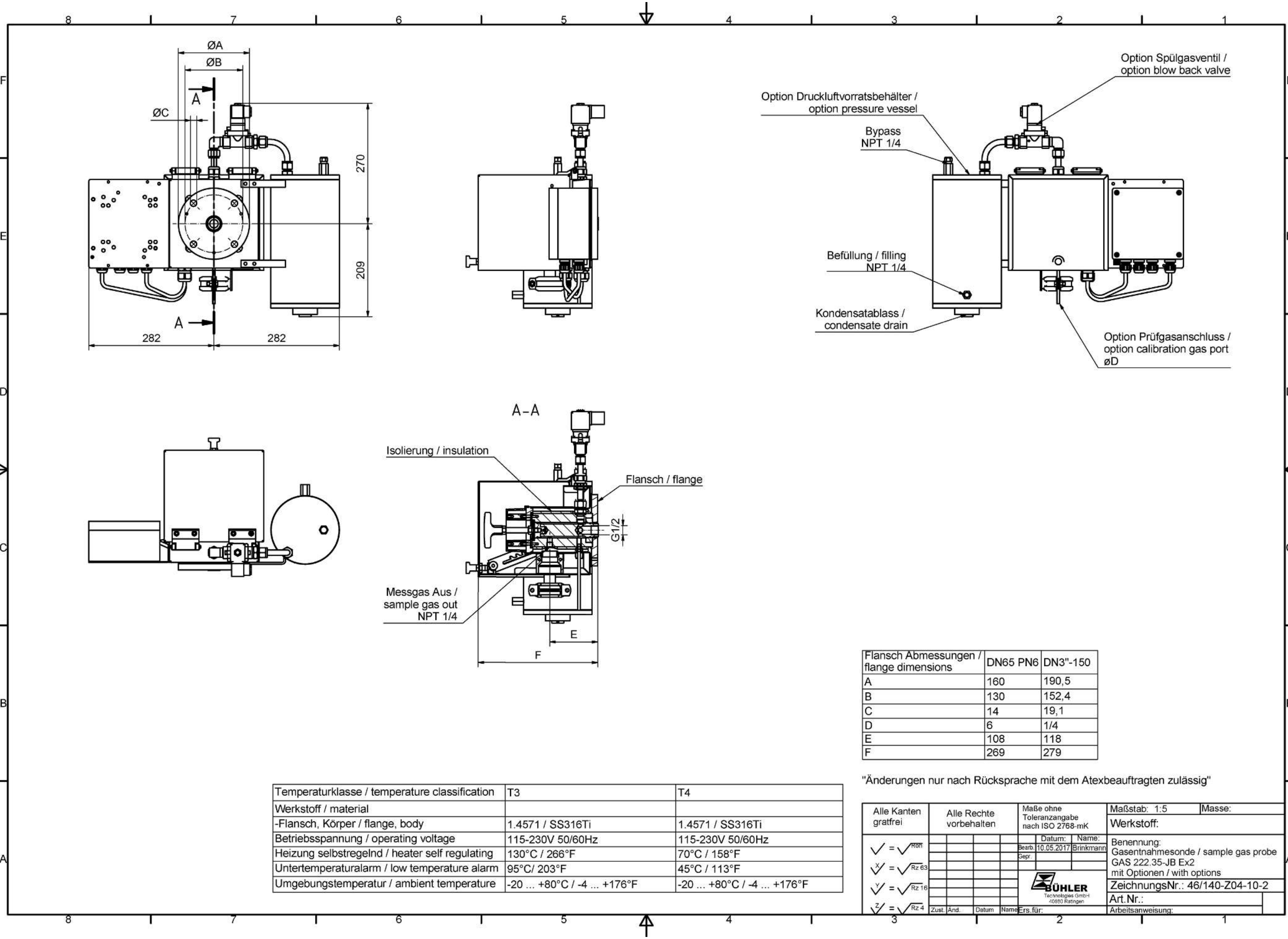
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Dimensions



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	115 - 230V 50/60Hz	115 - 230V 50/60Hz
Heizung selbstregelnd / heater self regulating	130°C / 266°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C / 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F



Flansch Abmessungen / flange dimensions	DN65 PN6	DN3"-150
A	160	190,5
B	130	152,4
C	14	19,1
D	6	1/4
E	108	118
F	269	279

Temperaturklasse / temperature classification	T3	T4
Werkstoff / material		
-Flansch, Körper / flange, body	1.4571 / SS316Ti	1.4571 / SS316Ti
Betriebsspannung / operating voltage	115-230V 50/60Hz	115-230V 50/60Hz
Heizung selbstregelnd / heater self regulating	130°C / 266°F	70°C / 158°F
Untertemperaturalarm / low temperature alarm	95°C/ 203°F	45°C / 113°F
Umgebungstemperatur / ambient temperature	-20 ... +80°C / -4 ... +176°F	-20 ... +80°C / -4 ... +176°F

Sample gas probe GAS 222.35 Amex

In many applications gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. In extractive gas analysis the location of the gas sampling point is crucial for the reproducibility and accuracy of the analysis results.

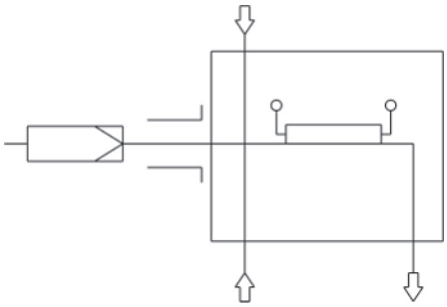
The specific filter capacity, corrosion resistance and functional equipment requirements for the probe arise from the composition of the sample gas.

However, operating costs are also an important criterion in the selection, as the sampling points are frequently located at hard to access points in the system. Effective particle filter backwashing options and low maintenance characterise the extensive GAS probe series.

Heated probe with shut-off valve, upstream filter, weather hood and terminal box
The filter element can easily be removed by turning the handle 90°
The probe body and the area around the screw connection for the heated sample gas line are completely isolated
Heater self-regulating to approx. 248 °F (T3)/158 °F (T4)
For dust loads up to 200 g/m³
This probe is suitable for use in explosive areas
C-US and CSA approval

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow diagram



Technical Data

Gas Probe Technical Data		
Self-regulating temperature:	257 °F (T3)/158 °F (T4)	
Ambient temperature:	-4 to 176 °F	
Ambient temperature with accessories:	**Component**	**Ambient temperature range**
	Compressed air valve:	14 °F < T_{amb} < 131 °F
Low temperature alarm:	Contact open at operating temperature, closes at < 203 °F (T3) resp. < 122 °F (T4); U_{max}=30 VDC, I_{max}=100 mA, Ci/Li~0	
Electrical data:	115 V-230 V, 50/60 Hz	
Max. operating pressure:	85 psia	
Parts in contact with media:	1.4571 Seals: PTFE/Graphit/1.4404 and see filters	
Explosion protection:	Class 1, Div 2, Gps B, C, D	

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4622235	1	6	6	X	3	X	0	0	X	9	X	9	9	9	Product Characteristics [1]
															Ex temperature classes
				3											T3
				4											T4
															Sample probe power supply
					3										115 / 230 V
															Calibration gas connection
						0									No calibration gas connection
						1									6 mm
						2									6 mm + check valve
						3									1/4"
						4									1/4" + check valve
															Blowback with air reservoir [2]
															Air reservoir heating
									1						Yes
									9						No
															Compressed air valve/valve voltage information
											0				Manual
											1				120 V 60 Hz
											2				240 V 60 Hz
											9				None (if no blowback requested)
															Pneumatic drive for ball valve
												9			N/A
															Control valve for pneumatic drive
														9	No control valve

[1] Please note, using certain accessories may limit gas probe use in Ex areas! Observe the respective operating manuals, accessory compatibility charts, and data sheets to ensure proper technical product design!

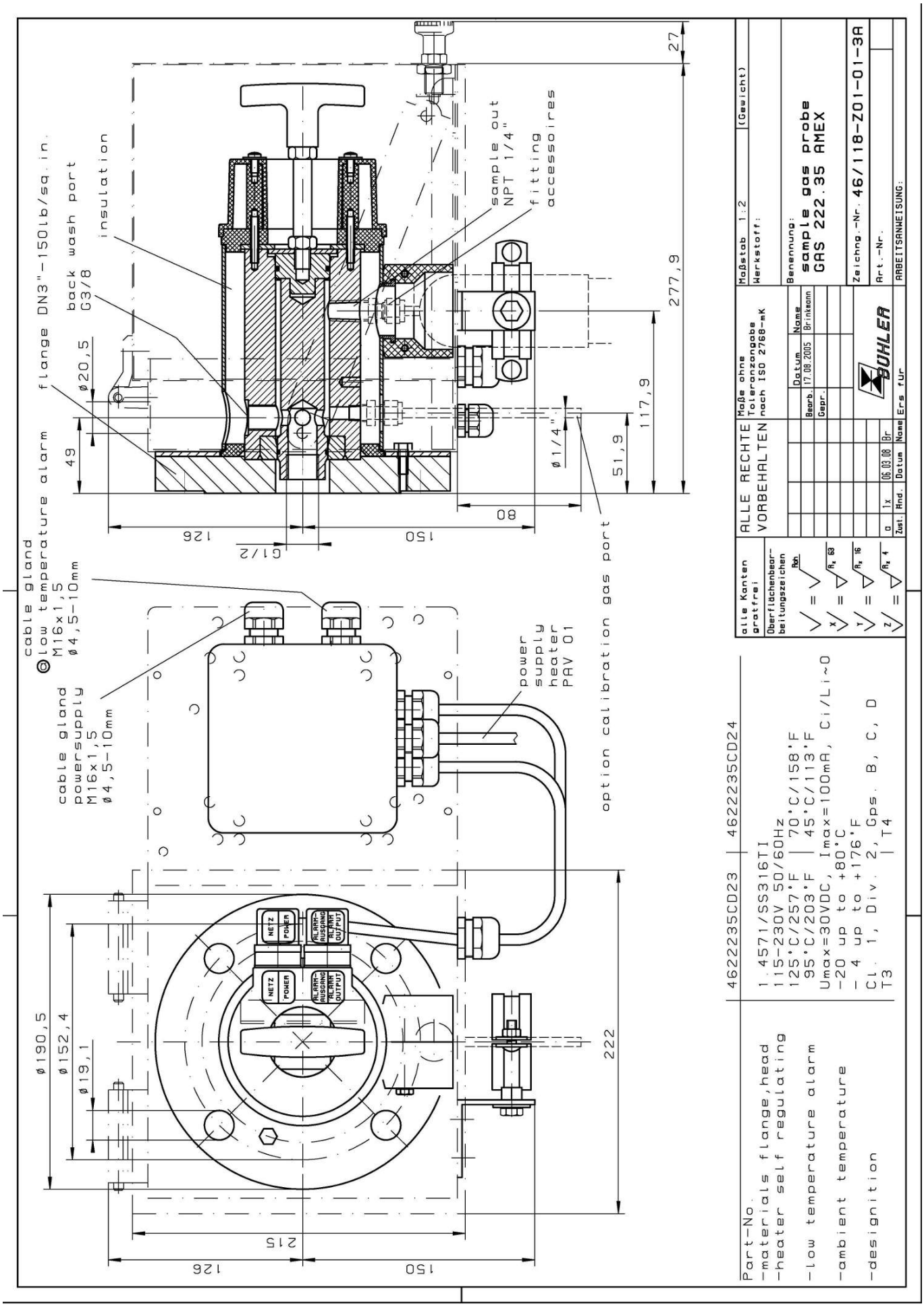
[2] In the case of flammable gases, always use inert gas for blowback. Probe blowback prohibited when using explosive sample gas!

Options

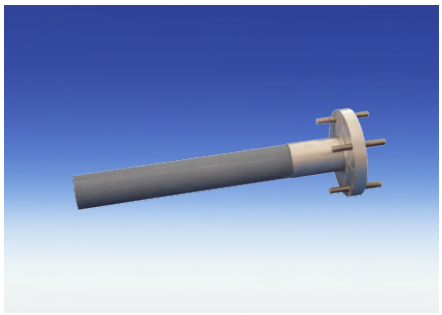
The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

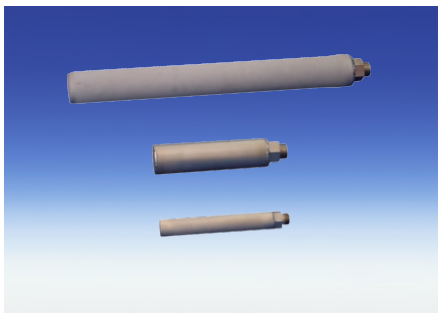
Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

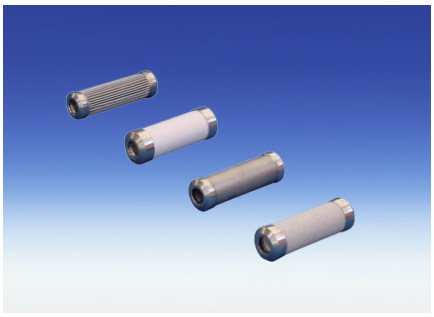
Dimensions

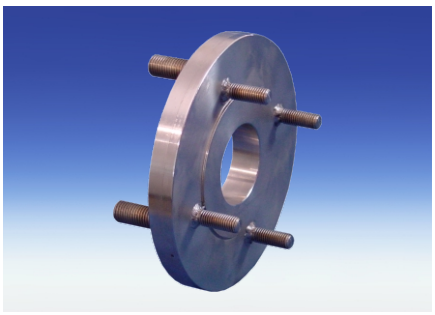

flange DN3"–150lb/sq.in.
back wash port G3/8
insulation
sample out NPT 1/4" fitting accessoires
cable gland low temperature alarm M16x1,5 ø4,5–10mm
cable gland powersupply M16x1,5 ø4,5–10mm
power supply heater PAV 01
option calibration gas port
ø20,5
49
126
150
G1/2
80
ø1/4"
51,9
117,9
277,9
27
222
215
ø190,5
ø152,4
ø19,1
4622235CD23 | 4622235CD24
1.4571/SS316TI
115–230V 50/60Hz
125°C/257°F | 70°C/158°F
95°C/203°F | 45°C/113°F
Umax=30VDC, Imax=100mA, Ci/Li~0
–20 up to +80°C
– 4 up to +176°F
Cl. 1, Div. 2, Gps. B, C, D
T3 | T4
Part–No.
–materials flange,head
–heater self regulating
–low temperature alarm
–ambient temperature
–designition
ALLE RECHTE VORBEHALTEN
Maße ohne Toleranzangabe nach ISO 2768–mK
alle Kanten gratfrei
Oberflächenbearbeitungszeichen
Maßstab 1:2
(Gewicht)
Werkstoff:
Benennung:
sample gas probe GAS 222.35 AMEX
Zeichng.–Nr. 46/118–Z01–01–3A
Art.–Nr.
ARBEITSANWEISUNG:
BÜHLER

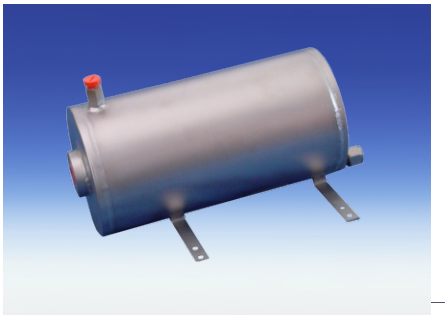
Accessories for Sample Gas Probe GAS 222

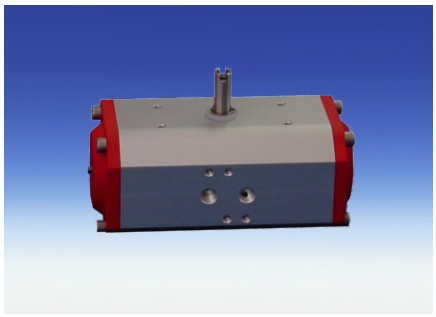












- **Sample tubes**
- **In-situ filters**
- **Extensions**

Page 2 - 4

- **Downstream filters**
- **Cal gas connections**
- **Adapter flanges**

Page 8

- **Capacitive vessel**
- **Pneumatic actuators**
- **3/2-way-solenoid valves**
- **Blowback controllers**

Page 5 - 7

For general information, see data sheet “Sample gas probes GAS 222” DA461000.

Buhler Technologies LLC
1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 Fax: 248.652.1598
Internet: www.buhlertech.com
e-mail:sales@buhlertech.com

Sample tubes, in-situ filters and extensions

- Various materials
- Various dimensions
- Heated or nonheated extensions

Sample tube					222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
	Material	T max.	Length	Part No.:																																			
01	1.4571	1100°F	300 mm (11.8 in)	462220010300	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	500 mm (19.7 in)	462220010500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	1000 mm (39.4 in)	462220011000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	1500 mm (59.0 in)	462220011500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
01	1.4571	1100°F	2000 mm (78.7 in)	462220012000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
02	Ceramics / 1.4571	2900°F	0.5 m (1.6 ft)	4622200205	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
02	Ceramics / 1.4571	2900°F	1.0 m (3.3 ft)	4622200210	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
02	Ceramics / 1.4571	2900°F	1.5 m (4.9 ft)	4622200215	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	500 mm (19.7 in)	462220060500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	1000 mm (39.4 in)	462220061000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	1500 mm (59.0 in)	462220061500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
06	Hastelloy / 1.4571	750°F	2000 mm (78.7 in)	462220062000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1050°F	500 mm (19.7 in)	462220040500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1050°F	1000 mm (39.4 in)	462220041000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1050°F	1500 mm (59.0 in)	462220041500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1050°F	2000 mm (78.7 in)	462220042000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
08	Inconel / 1.4571	1050°F	2500 mm (98.4 in)	462220042500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	600°F	500 mm (19.7 in)	462220160500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	600°F	1000 mm (39.4 in)	462220161000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	600°F	1500 mm (59.0 in)	462220161500	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
12	1.4571	600°F	2000 mm (78.7 in)	462220162000	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X	X			X	X	X		
13	Kanthal / 1.4571	2500°F	up to 1 m (3.3 ft)	46222017	X	X			X	X	X	X			X					X	X			X	X			X	X	X	X			X	X	X		
	Sample tube with demister PVDF/ETFE	250°F	800 mm (31.5 in)	46222040	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Demister ETFE / as spare part	250°F		462220402	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Sample tube with demister / 1.4571	750°F	300 mm (11.8 in)	4622204203	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Sample tube with demister / 1.4571	750°F	500 mm (19.7 in)	4622204205	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Sample tube with demister / 1.4571	750°F	1000 mm (39.4 in)	4622204210	X	X			X	X	X	X			X									X	X			X	X	X	X			X				
	Demister 1.4571 / as spare part	750°F		4611004	X	X			X	X	X	X			X									X	X			X	X	X	X			X				

Sample tubes, in-situ filters and extensions

- Various materials
- Various dimensions
- Heated or nonheated extensions

In-situ filter							222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
	Material	**T max.**	**Length**		**Pore size**	**Part No.:**																																			
03	Stainless steel	1100°F	237 mm	(9.3 in)	5 µm	46222303		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
03F	Stainless steel	1100°F	237 mm	(9.3 in)	0.5 µm	46222303F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
03H	Hastelloy	1100°F	237 mm	(9.3 in)	5 µm	46222303H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
03HF	Hastelloy	1100°F	237 mm	(9.3 in)	0.5 µm	46222303HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031	Stainless steel, with volume displacer	1100°F	237 mm	(9.3 in)	5 µm	462223031		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031F	Stainless steel, with volume displacer	1100°F	237 mm	(9.3 in)	0.5 µm	462223031F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031H	Hastelloy, with volume displacer	1100°F	237 mm	(9.3 in)	5 µm	462223031H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
031HF	Hastelloy, with volume displacer	1100°F	237 mm	(9.3 in)	0.5µm	462223031HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04	Stainless steel	1100°F	538 mm	(21.2 in)	5 µm	46222304		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04F	Stainless steel	1100°F	538 mm	(21.2 in)	0.5 µm	46222304F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04H	Hastelloy	1100°F	538 mm	(21.2 in)	5 µm	46222304H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
04HF	Hastelloy	1100°F	538 mm	(21.2 in)	0.5 µm	46222304HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041	Stainless steel, with volume displacer	1100°F	538 mm	(21.2 in)	5 µm	462223041		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041F	Stainless steel, with volume displacer	1100°F	538 mm	(21.2 in)	0.5 µm	462223041F*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041H	Hastelloy, with volume displacer	1100°F	538 mm	(21.2 in)	5 µm	462223041H*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
041HF	Hastelloy, with volume displacer	1100°F	538 mm	(21.2 in)	0.5 µm	462223041HF*		X	X					X	X				X	X			X	X			X	X						X	X			X	X	
07	Ceramics / 1.4571	1800°F[1)]	478 mm	(18.8 in)	2 µm	46222307		X	X					X	X				X	X			X	X																
07F	Ceramics / 1.4571	1800°F[1)]	478 mm	(18.8 in)	0.3 µm	46222307F*		X	X					X	X				X	X																				
07 ANSI	Ceramics / 1.4571	1800°F[1)]	478 mm	(18.8 in)	2 µm	46222307C																					X	X					X	X			X	X	
35	Stainless steel	1100°F	229 mm	(9.0 in)	5 µm	46222359				X						X					X				X			X								X				X
35F	Stainless steel	1100°F	229 mm	(9.0 in)	0.5 µm	46222359F*				X						X					X				X			X								X				X

1) Hot gas filtration, oxidizing atmosphere max. 1400 °F
Hot gas filtration, reductive atmosphere max. 1100 °F

* Prices and delivery time on request

Sample tubes, in-situ filters and extensions

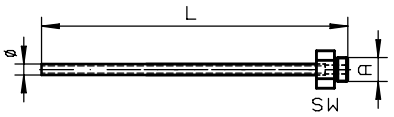
- Various materials
- Various dimensions
- Heated or nonheated extensions

					Part No.:	222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
Protection shield					**Part No.:**																																		
for in-situ filter 03					462223034		X	X					X	X				X	X			X	X			X	X								X	X		
for in-situ filter 04					462223044		X	X					X	X				X	X			X	X			X	X								X	X		
Extensions																																								
Type		Material	Mains Voltage	Length																																				
G3/4	nonheated	1.4571		0.2 m (0.7 ft)	4622230320200	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4	nonheated	1.4571		0.4 m (1.3 ft)	4622230320400	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4	nonheated	1.4571		0.5 m (1.6 ft)	4622230320500	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4	nonheated	1.4571		0.7 m (2.3 ft)	4622230320700	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4	nonheated	1.4571		1 m (3.3 ft)	4622230321000	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4	nonheated	1.4571		1,2 m (3.9 ft)	4622230321200	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4	nonheated	1.4571		1,5 m (4.9 ft)	4622230321500	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G3/4	nonheated	1.4571		2 m (6.6 ft)	4622230322000	X	X	X		X	X	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X	X		X	X	X	X	
G1/2	nonheated	1.4571		0,25 m (0.8 ft)	4622235910250				X						X					X				X				X						X					X
G1/2	nonheated	1.4571		0,5 m (1.6 ft)	4622235910500				X						X					X				X				X						X					X
G1/2	nonheated	1.4571		0,7 m (2.3 ft)	4622235910700				X						X					X				X				X						X					X
G1/2	nonheated	1.4571		1,5 m (4.9 ft)	4622235911500				X						X					X				X				X						X					X
GF	heated*	1.4571	230V	0.5 m (1.6 ft)	462223036							X	X	X																									
GF	heated*	1.4571	230V	1 m (3.3 ft)	462223033							X	X	X																									
GF	ANSI / CSA, heated*	1.4571	115V	0.5 m (1.6 ft)	462223036C1																											X	X	X					
GF	ANSI / CSA, heated*	1.4571	115V	1 m (3.3 ft)	462223033C1																											X	X	X					
Controller for heated extension integrated into probe controller					46222292							X	X	X																									

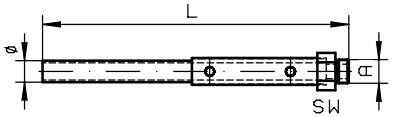
* Mounting is only possible at a plain flange without G3/4 thread. Therefore a G has to be added to the part number, e.g. 4622220G.
It is not possible to add a heated extension after delivery.

Entnahmerohre / tubes

Typ	L	ø	A	SW
01	var.	12	G3/4	36
06	var.	12	G3/4	36
08	var.	21,3	G3/4	36
12	var.	20	G3/4	36
13	var.	15	G3/4	36
14	var.	18	G3/4	36



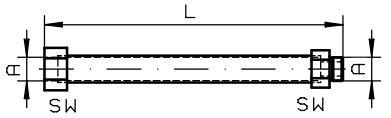
Typ	L	ø	A	SW
02-0,5	500	24	G3/4	36
02-1,0	1000	24	G3/4	36
02-1,5	1500	24	G3/4	36

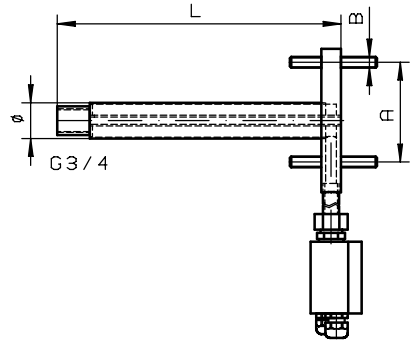


Verlängerungen / extensions

Unbeheizt / unheated

Typ	L	A	SW
G3/4	0,2-2 m	G3/4	36
G1/2	0,25-1,5m	G1/2	27



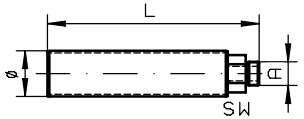


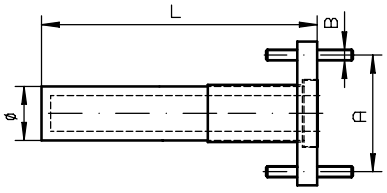
Beheizt / heated

Typ	L	ø	A	B
GF	500	40	DN65 PN6	M12
GF	1000	40	DN65 PN6	M12
GF ANSI/CSA	500	40	DN3"-150	M16
GF ANSI/CSA	1000	40	DN3"-150	M16

Eintritssfilter / in-situ filter

Typ	L	ø	A	SW
03	237	51	G3/4	36
031	237	51	G3/4	36
04	538	60	G3/4	36
041	538	60	G3/4	36
35	229	29	G1/2	27

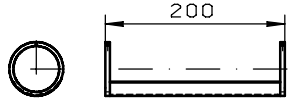




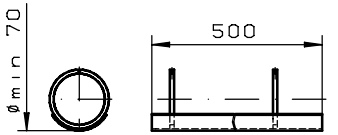
Typ	L	ø	A	B
07	500	60	DN65 PN6	M12
07 ANSI	500	60	DN3"-150	M16

Abweisblech / protection shield

Eintrittsfilter / in-situ filter 03



Eintrittsfilter / in-situ filter 04



alle Kanten gratfrei	ALLE RECHTE VORBEHALTEN	Maße ohne Toleranzangabe nach ISO 2768-mK						Maßstab 1 5	(Gewicht)
Oberflächenbearbeitungszeichen								Werkstoff	
√ = Rch						Datum	Name	Benennung	
X √ = Rz 63					Bearb	21 01 2004	Brinkmann	Rohre/Filter/Verlängerungen tubes/filter/extensions GAS 222	
Y √ = Rz 16					Gepr				
Z √ = Rz 4								Zeichng -Nr	46/107-Z01-01-3A
					BÜHLER			Art -Nr	
a	neu	29 09 06	Br						
Zust	Änd	Datum	Name		Ers für			ARBEITSANWEISUNG	

Blowback

- With ball valve or solenoid valve
- Heated or non-heated
- Manual or automatic control

Capacitive vessel	Ambient temperature	Part No.:	222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
PAV 01		46222PAV		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Accessories for capacitive vessel																																				
ball valve		46222PAVKH		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
2/2-way-MV 24VDC	15 to 130 °F	46222PAVMV1		X	X	X				X	X	X																								
2/2-way-MV 110V 50Hz	15 to 130 °F	46222PAVMV2		X	X	X				X	X	X																								
2/2-way-MV 220-230V 50/60Hz	15 to 130 °F	46222PAVMV3		X	X	X				X	X	X																								
2/2-way-MV 24VUC Atex II 2G/D EEx m II T4 IP65	15 to 140 °F	46222PAVMV4		X	X	X									X	X	X		X	X	X															
2/2-way-MV 110VUC Atex II 2G/D EEx m II T4 IP65	15 to 140 °F	46222PAVMV5		X	X	X									X	X	X		X	X	X															
2/2-way-MV 230VUC Atex II 2G/D EEx m II T4 IP65	15 to 140 °F	46222PAVMV6		X	X	X									X	X	X		X	X	X															
2/2- way- AMEX 24 V/ 60 Hz Cl. I Div 2	15 to 130 °F	46222PAVMV14																					X	X	X				X	X	X			X	X	X
2/2- way- AMEX 120 V/ 60 Hz Cl. I Div 2	15 to 130 °F	46222PAVMV8																					X	X	X				X	X	X			X	X	X
2/2- way- AMEX 240 V/ 60 Hz Cl. I Div 2	15 to 130 °F	46222PAVMV9																					X	X	X				X	X	X			X	X	X
self regulated heating system 115/230V 50/60Hz		46222PAVHZ1		X	X	X				X	X	X											X	X	X				X	X	X					
self regulated heating system 115-230V 50/60Hz Atex 2 II 3G Ex nA IIC T3 Gc X		46222PAVHZ2																	X	X	X															
self regulated heating system 115-230V 50/60Hz Atex 2 II 3G Ex nA IIC T4 Gc X		46222PAVHZ3																	X	X	X															
self regulated heating system AMEX,115-230V,50/60 Hz, Cl. I Div 2 B,C,D,T3		46222PAVHZ4																																X	X	X
self regulated heating system AMEX,115-230V,50/60 Hz, Cl. I Div 2 B,C,D,T4		46222PAVHZ6																																X	X	X
pressurized vessel support		462223502				X																			X											
Bourdon tube pressure gauge 0-10 bar		46222PAVMA		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Pneumatic actuators																																				
spring return, opened unpressurized		46222008		X	X					X	X				X	X			X	X			X	X					X	X				X	X	
spring return, closed unpressurized		46222030		X	X					X	X				X	X			X	X			X	X					X	X				X	X	
double action		46222009		X	X					X	X																									
limit switch		9008928		X	X					X	X																									
limit switch Atex II 2G/3D IIC T6 IP65		9008930													X	X			X	X																
limit switch Atex II 2G/2D IIC T6 IP65		9027002													X	X			X	X																
3/2-way-SV for pneumatic actuator control																																				
24VDC	15 to 130 °F	46222075		X	X					X	X																									
110V 50Hz	15 to 130 °F	46222076		X	X					X	X																									
230V 50Hz	15 to 130 °F	46222077		X	X					X	X																									
ATEX 24 V UC II 2G/D EEx m II T4	15 to 140 °F	46222078		X	X										X	X			X	X																
ATEX 110 V UC II 2G/D EEx m II T4	15 to 140 °F	46222079		X	X										X	X			X	X																
ATEX 230 V UC II 2G/D EEx m II T4	15 to 140 °F	46222080		X	X										X	X			X	X																
AMEX 24 V 60 Hz, NPT1/4", Cl. I Div 2	15 to 130 °F	46222116																					X	X					X	X				X	X	
AMEX 120 V 60 Hz, NPT1/4", Cl. I Div 2	15 to 130 °F	46222050																					X	X					X	X				X	X	
AMEX 240 V 60 Hz, NPT1/4", Cl. I Div 2	15 to 130 °F	46222056																					X	X					X	X				X	X	
5/2-way-SV for pneumatic actuator control	15 to 160 °F	9148000117		X	X					X	X																									
Blowback controller																																				
RSS 24VDC, IP65		46222199		X	X	X				X	X	X																								
RSS 115/230 VAC, IP65		46222299		X	X	X				X	X	X																								
RSS-MC integrated into probe controller cabinet		46222392								X	X	X																		X	X	X					

*max. pressure 6 bar

Details:

A) Blowback

Ordering note for capacitive vessel:

For attachment to GAS 222.11 / 30 / 35-U, a support is required.

Ordering note for pneumatic actuator:

If a blowback controller is required, only actuator P/N 46222030 is possible.

We advise the installation of a position indicator switch to control the pneumatic actuator.

Integrated blowback controller in the probe controller

In addition to the stand-alone blowback controller (RRS), an integrated blowback controller is optionally available

Blowback cycle time and actual blowback time can be adjusted via the keys and menu of the controller. The blowback and manual operation will be shown on the display. The blowback controller can be programmed via the keys – manual or automatic operation is possible. Besides the status output of the controller, a blowback status signal is provided. Blowback will be usually initiated by signals coming from the main controls.

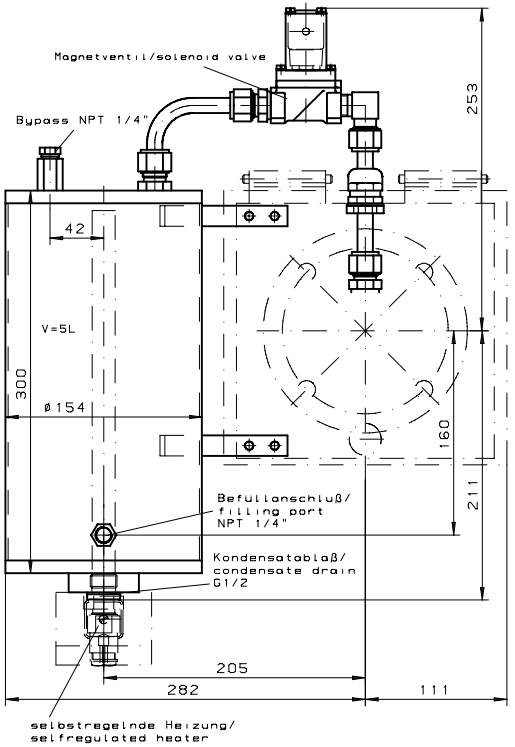
If the position indicator switch is installed, the controller will use this input for the process logic.

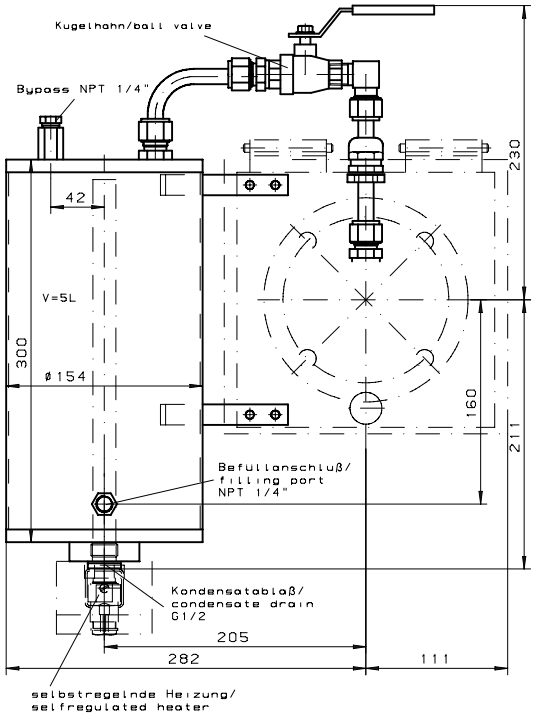
B) Hazardous Areas

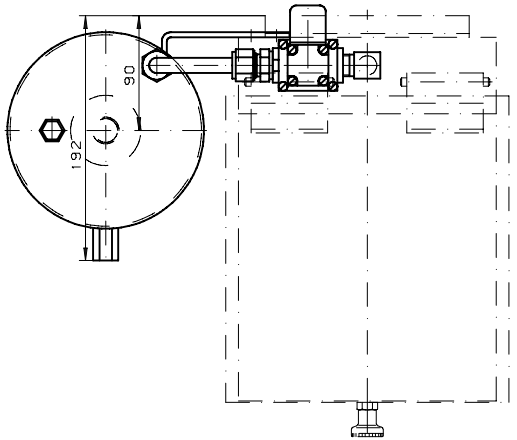
Please note that installed accessories may change the approved category of the probe.
Follow strictly the advices given in the installation- and operation manual and regard the marking on the type plate.

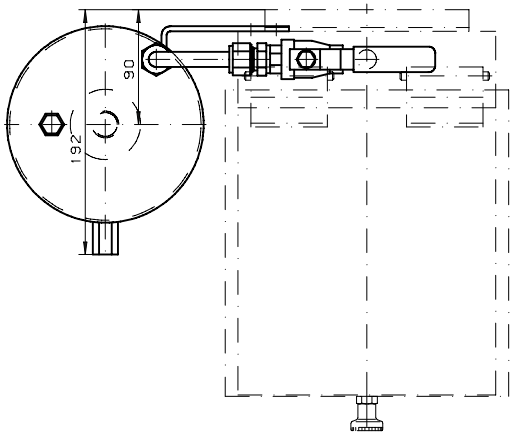
Sample Gas Probe GAS 222.xx Atex		
Model	**with Accessories**	**resuting restircted area; marking**
21 Atex, 31 Atex, 35 Atex	Pressure vessel PAV 01 (Part-No. 46222PAV with accessories)	II 1D / 2GD
21 Atex, 31 Atex,	In situ filter*, ceramics (Art.-Nr.:46222307 + 46222307F)	II 1D 3G / 2GD
20 Atex , 21 Atex,	Downstream filter*, ceramic (Part-No. 46222026 + 46222026P)	II 1D 3G / 2GD
20 Atex, 21 Atex,	Sample tube (Part-No. 46222001, 462220011, 46222006, 46222004, 46222016)	II 1G / 2GD
20 Atex, 21 Atex,	Sample tube**, ceramics (Part-No. 4622200205, 4622200210, 4622200215)	II 3G / 2GD
21 Atex, 31 Atex,	Pneumatic cylinder with end switch Atex (Part-No. 46222019)	II 1GD / 2G3D

* Accessory not suitable for sampling dust with extremely low ignition energy < 3mJ.
** When gases are sampled from Zone 2, ceramic sample tube must be used only if application related or process related electrostatic charging is eliminated.









max Betriebsdruck/operating pressure 10bar
max Betriebstemperatur/operating temperature 50°C

"Änderungen nur nach Rücksprache
mit dem Atexbeauftragten zulässig"

alle Kanten gratfrei	ALLE RECHTE VORBEHALTEN	Maße ohne Toleranzangabe nach ISO 2768-mK				Maßstab 1 2,5	(Gewicht)
Oberflächenbearbeitungszeichen						Werkstoff	
				Datum	Name	Benennung	
			Bearb	05 07 2004	Brinksann	Druckluftbehälter/ capacitive vessel PAV 01	
			Gepr				
				BÜHLER		Zeichng -Nr	46/106-Z01-01-2
						Art -Nr	
Zust	Änd	Datum	Name	Ers für		ARBEITSANWEISUNG	

Downstream filter elements and further options

Downstream filter			Part no.:	222.10	222.11	222.30	222.35-U	222.15	222.17	222.20	222.21	222.31	222.35	222.20 DH	222.20 Atex	222.21 Atex	222.31 Atex	222.35 Atex	222.20 Atex2	222.21 Atex2	222.31 Atex2	222.35 Atex2	222.10 ANSI	222.11 ANSI/ CSA	222.30 ANSI/ CSA	222.35-U ANSI/ CSA	222.15 ANSI/ CSA	222.17 ANSI/ CSA	222.20 ANSI/ CSA	222.21 ANSI/ CSA	222.31 ANSI/ CSA	222.35 ANSI/ CSA	222.20 DH ANSI/ CSA	222.20 AMEX	222.21 AMEX	222.31 AMEX	222.35 AMEX	Type GAS
Material	**O-Rings**	**Pore size**																																			
Ceramics	Viton	3 µm	46222026	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Ceramics	Perfluorelastomer	3 µm	46222026P	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Sintered stainless steel	Viton	5 µm	46222010	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Sintered stainless steel	Perfluorelastomer	5 µm	46222010P	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Sintered stainless steel	Viton	0,5 µm	46222010F*	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Sintered stainless steel	Perfluorelastomer	0,5 µm	46222010FP*	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Pleated stainless steel	Viton	10 µm	46222011	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Pleated stainless steel	Perfluorelastomer	10 µm	46222011P	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Handle for downstream filter with micro glass fibre element			46222067	X	X			X	X	X	X			X									X	X			X	X	X			X	X	X			
Micro glass fiber with silicate binder	Viton		462220671	X	X			X	X	X	X			X									X	X			X	X	X			X	X	X			
Micro glass fiber with silicate binder	Perfluorelastomer		462220671P	X	X			X	X	X	X			X									X	X			X	X	X			X	X	X			
Closing handle with filter tube and filter wool	Viton		46222163	X	X			X	X	X	X			X									X	X			X	X	X			X	X	X			
Closing handle with filter tube and filter wool	Perfluorelastomer		46222163P	X	X			X	X	X	X			X									X	X			X	X	X			X	X	X			
Filter wool			46222167	X	X			X	X	X	X			X									X	X			X	X	X			X	X	X			
Set of O-rings Viton incl. grease			46222012	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Set of O-rings Perfluorelastomer incl. grease			46222024	X	X			X	X	X	X			X	X	X			X	X			X	X			X	X	X			X	X	X			
Further options																																					
Adapter flange ANSI 3“-150lbs			46222014	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X															
Cal gas connection ø6mm			46222309	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cal gas connection ø6mm with check valve			46222311	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cal gas connection ø1/4"			46222336	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cal gas connection ø1/4" with check vavle			46222337	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for sample gas port ø6mm			9008173	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for sample gas port ø8mm			9008174	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for back wash port ø12mm			9008369		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Fitting for sample gas port ø1/4"			9008584	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for sample gas port ø3/8"			9008583	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fitting for back wash port ø1/2"			9028033		X	X	X				X	X	X			X	X	X		X	X	X		X	X	X				X	X	X			X	X	X
Locking screw G3/8 for backflush connection			9008084			X	X				X	X	X			X	X	X		X	X	X			X	X				X	X	X			X	X	X
Sealing ring for sealing the backflush connection with a locking screw			9009258			X	X				X	X	X			X	X	X		X	X	X			X	X				X	X	X			X	X	X
Mounting bracket with clamp ring for DN65 PN6			462220102					X																													
Mounting bracket with clamp ring for ANSI 3”-150 lbs			462220102C																								X										

* Prices and delivery time on request

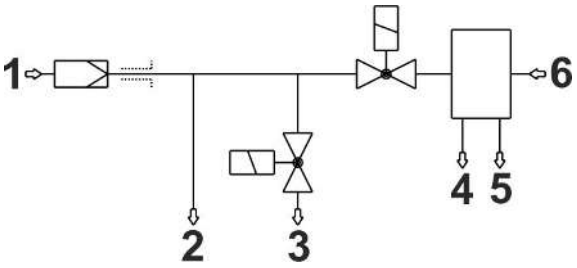
Sample gas probe ECO

The traditional assembly of sample gas probes vastly complies with the VDI/VDE guidelines 3516 from 1978. Based on advances made since then, particularly in dust filtration, we now have technical solutions which are far superior to the traditional versions. Particularly for use in low temperature applications but moderate to high dust loads, using the newly developed ECO probe can particularly considerably reduce the maintenance costs of filters. Yet a simple, compact design was also important to us to keep purchase and installation costs low. The heart of the ECO probe is the probe body, which holds the solenoid valves necessary to blowback the filter element, but also the air reservoir needed for more efficient blowback. The filter element is located directly inside the process and can be sintered stainless steel or textile. The dust which collects on the filter element is blow directly back into the process during blowback.

- Compact design
- Effective cleaning
- Various filter materials
- Dirt remains inside the process
- Long maintenance intervals
- Easy installation

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Functional diagram



1= sampling tube (accessory)
2= NPT 1/4" connection (e.g. calibrating gas)
3= sample gas Off NPT 1/4"
4= G1/4 connector (e.g. pressure gauge)
5= condensate Off G1/4
6= air connection G1/4

Technical Data

Gas Probe Technical Data	
Flange:	1.4571
Head:	1.4571
Gas inlet temperature:	max. 248 °F
Ambient temperature:	-4 to 140 °F
Solenoid valve:	VA/ Viton/ EPDM 24 VDC
Weight without filter element:	approx. 20 lb
Reservoir:	1.4571
Reservoir volume:	2 L
Reservoir max. operating pressure:	72 psi

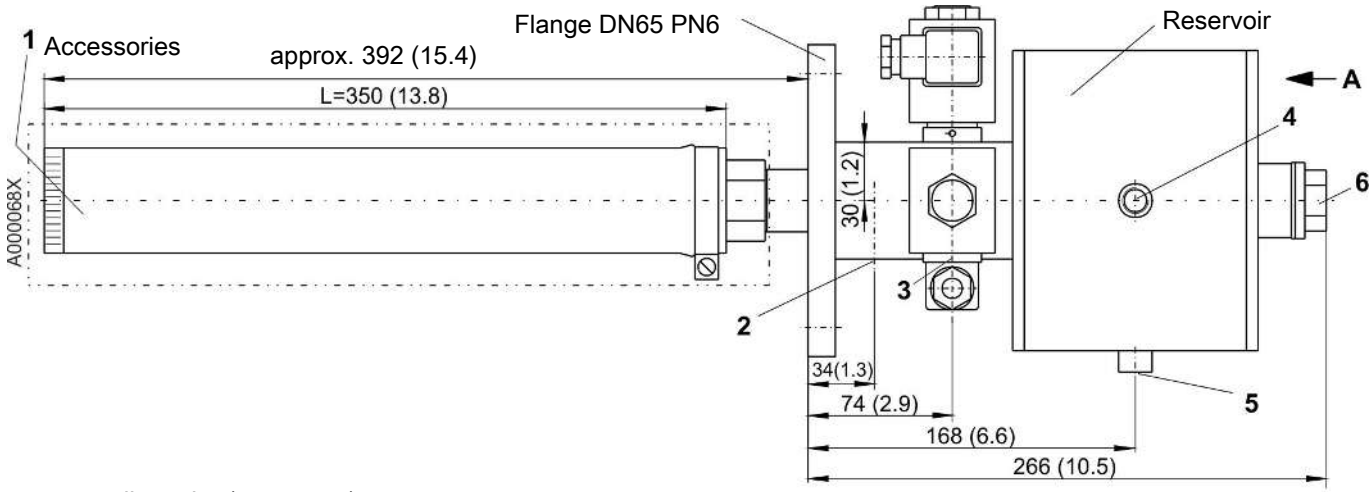
Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Ordering Instructions

Item no.	Description	Material
46 22 290	Sample Gas Probe ECO	
46 22 2007	Sampling tube 10, max. 275 °F	Polyester / 1.4571
46 22 2015	Sampling tube 11, max. 500 °F	PTFE / 1.4571
46 22 2303	Sampling tube 03, max. 1110 °F	1.4571
46 22 20071	Spare filter hose	Polyester
46 22 20072	Spare filter hose	PTFE

Dimensions



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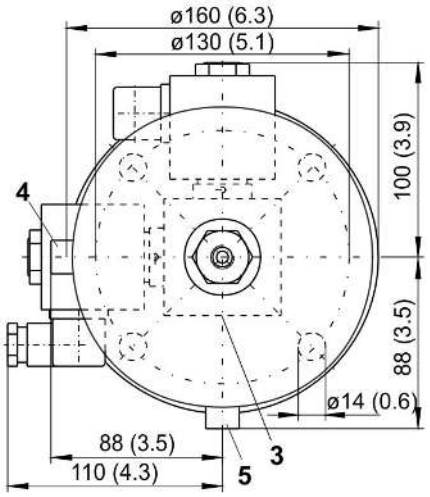
6= air connection G1/4

View A



Blowback control RSS24, RSS230

The blowback control RSS 24 / RSS 230 allows scheduled or manual probe filter cleaning. It is designed as a controller for probes suitable for blowback but can also control other external solenoid valves. One special application is controlling ATEX solenoid valves, however the RSS must be set up in a secure area.

The blowback control RSS 24 / RSS 230 has all equipment and controls required for control inside an IP65 housing. The cleaning time as well as the measuring time between cleaning intervals can be set within large ranges. The time is set using the programmable controller inside the housing to prevent accidental adjustments.

The front panel holds switches for activating the controller and setting the operating mode (auto or manual). A button allows manual blowback whenever needed. A green light indicates when the unit is in auto mode and a red light indicates manual mode. Both lights are switched internally by the controller, hence simultaneously serving as operation display for the blowback control. The status signals can be output on the outside via the internal terminal strips.

The blowback control RSS 24 / RSS 230 is designed for wall-mounting. At the back of the housing are 4 M6 threaded bushings for mounting. The leads are run through the PG screw connection at the bottom of the housing.

External solenoid valves must be equipped with contact protective circuit. On blowback controls complete with BÜHLER sample gas probe this protective circuit is already included in the supplied plug-in connectors for the solenoid valves.

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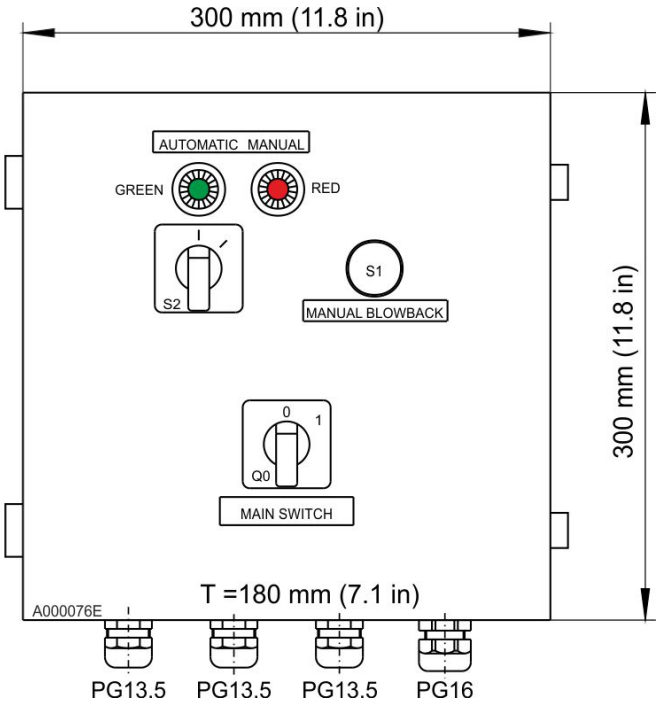
Internet: www.buhlertech.com

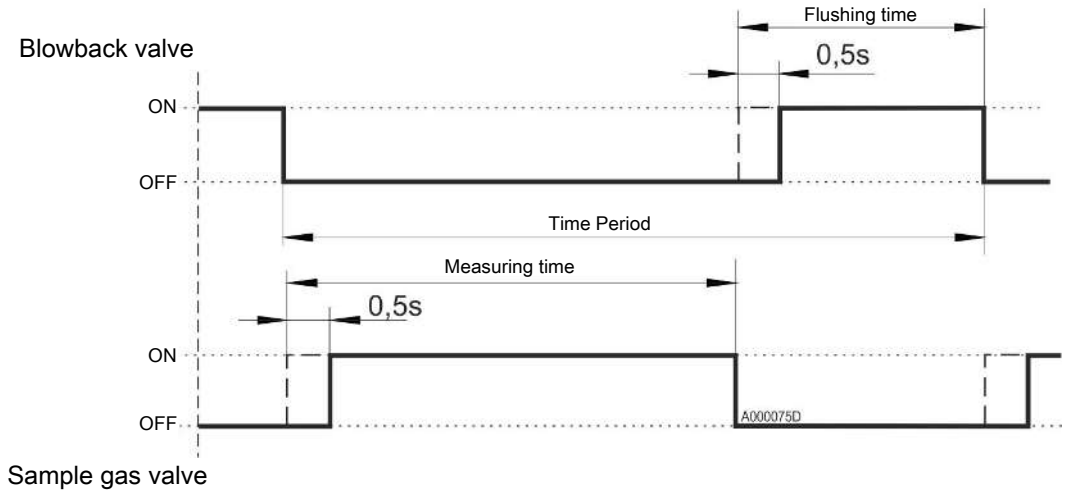
Technical Data

Type	RSS 24	RSS 230
Supply voltage:	24 VDC ± 10%	85 – 265 VAC 50/60 Hz
Protection:	5 A (delayed action)	1 A, delayed action
Relay switching capacity:	max. 10 A / 24 VDC / 75 W	max. 10 A / 230 VAC / 690 VA
Temperature range:	32 – 130 °F	32 – 130 °F
Blowback time	0 – 60 s	0 – 60 s
Test time	1 min – 99:59 h	1 min – 99:59 h
IP rating:	IP65	IP65
Weight:	approx. 6.6 lb	approx. 6.6 lb
Dimensions (H x W x D)	11.8 x 11.8 x 7.1	11.8 x 11.8 x 7.1

Dimensions



Time flowchart



Ordering Instructions

Item no.	Type
46 22 2199	Blowback control RSS 24, supply voltage 24 VDC
46 22 2299	Blowback control RRSS 230, supply voltage 115/230 VAC

Sample gas probe APO

The **APO** series sample gas probes are unheated probes for standard applications. A DN65 PN16 flange made from 1.4571 with G3/8" connector serves as the basis. This series also has versions made entirely from special materials and custom versions. Please feel free to request our specialist.

- compact installation
- modular design
- easy installation
- various materials

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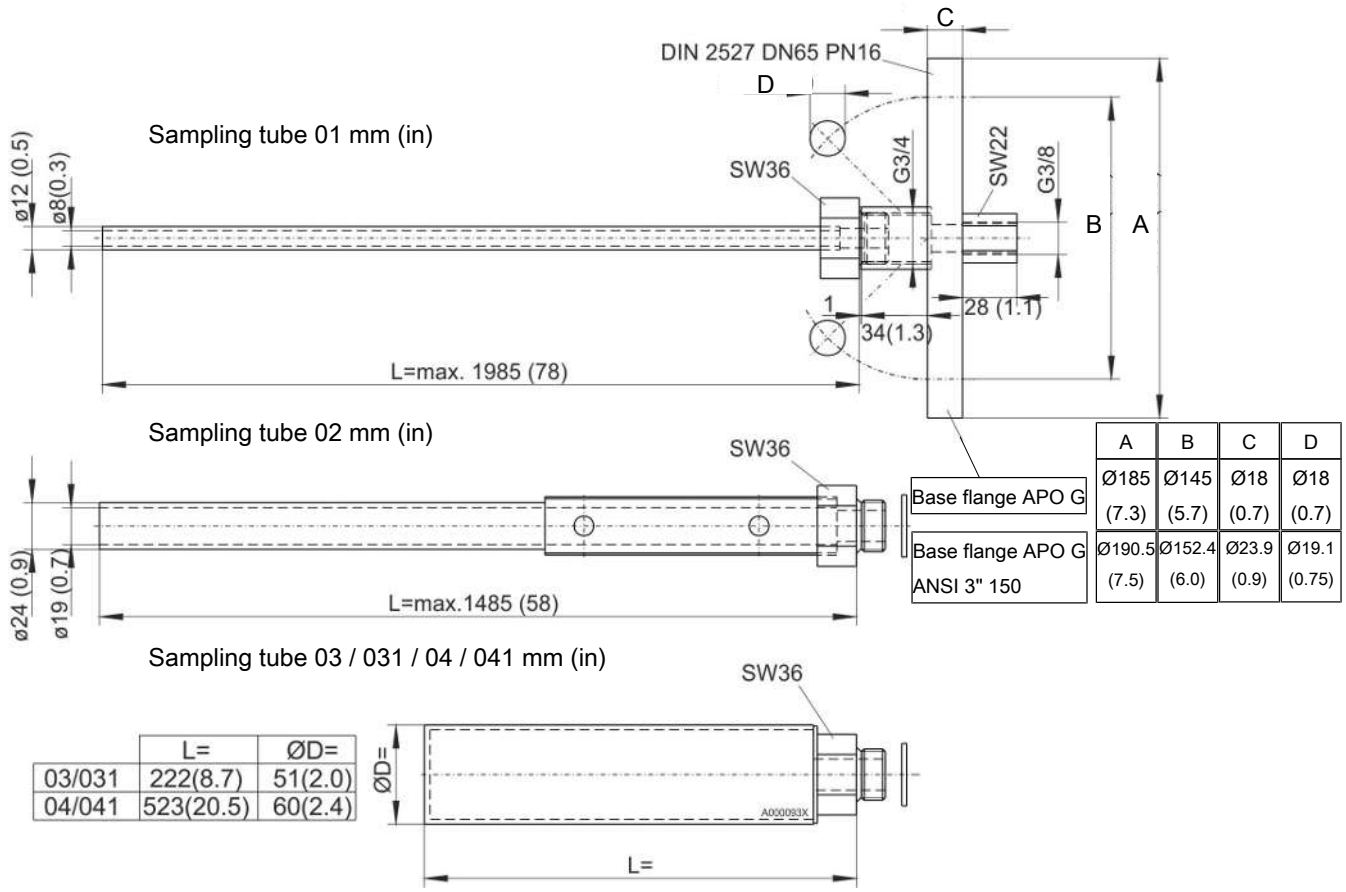
Modular standard APO-G

The modular standard series APO-G consists of a base flange APO-G and a sampling tube of your choice. Choose from a variety of sampling tubes in different lengths and materials.



A	B	C	D
Ø185 (7.3)	Ø145 (5.7)	Ø18 (0.7)	Ø18 (0.7)
Ø190.5 (7.5)	Ø152.4 (6.0)	Ø23.9 (0.9)	Ø19.1 (0.75)

	L=	ØD=
03/031	222(8.7)	51(2.0)
04/041	523(20.5)	60(2.4)

Options

The base unit becomes functional by adding accessories suitable for the application. Please refer to accessory data sheet no. 461099 for information.

Please also refer to data sheet no. 461000 "GAS 222 Gas Probes" for a general description.

Ordering Instructions

Description	Material	Gas temperature	Length	Item no.
Base flange APO-G	1.4571	Up to 1110 °F	--	46 006 000
Base flange APO-G ANSI 3" 150 lbs	1.4571	Up to 1110 °F		46 006 000C
Sampling tube				
Sampling tube 01	1.4571	Up to 1110 °F	max. 39.4 in	46 222 001 1000
Sampling tube 02	Ceramic/1.4571	Up to 2910 °F	max. 39.4 in	46 222 002 10
Sampling filter 03 / inlet filter dust load <4.4 gr/ft³	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	8.7 in	46 222 303
Sampling filter 031 / inlet filter dust load <4.4 gr/ft³ with built-in displacement	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	8.7 in	46 222 3031
Sampling filter 04 / inlet filter dust load >4.4 gr/ft³	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	20.6 in	46 222 304
Sampling filter 041 / Inlet filter dust load >4.4 gr/ft³ with built-in displacement	Sintered stainless steel 1.4404/1.4571	Up to 1110 °F	20.6 in	46 222 3041

Sample Pumps

- DA420000 Pump Finder
- DA420011 P1.x
- DA420013 P1.3
- DA420008 P2.x P2.8x.PDF
- DA420010 P4.x P4.8x
- DA420009 P2.x ATEX
- DA420012 P2.x AMEX

Pump Finder

System description

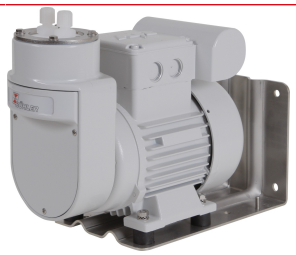
In gas analysis, conveying the gas to be analysed means particularly high requirements with respect to the sample gas pump. These **requirements** arise from the **composition of the gas** - often times highly corrosive components - and the common drop below the dew point = condensate in the sample gas. These sample gas pumps use a **bellows made of PTFE** which has already been proven in large quantities in this very challenging field due to the high durability and a long life. To convey sample gas **with condensate content**, the pump head is rotated facing down.
To facilitate using the pump for **hot applications**, the pump head and drive motor are isolated on the **P2.4 and P2.84**, i.e. these pumps have a split adapter which is mounted with one half inside a heated cabinet whilst the other half, mounted on the outside, supports the drive motor.

The **P4.3 and P4.83** pumps are used to convey sample gas in **two separate gas paths**. They consist of two separate pump heads mounted on a joint motor shaft. The P4.83 pump may be operated in parallel mode if very high delivery volumes are required.

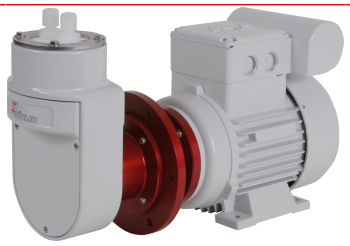
Pump models

P1.x

P2.x



P2.x



P4.x

Selection guide

	Direct-drive pumps				Pumps with intermediate flange			Double head pumps	
Nominal delivery rate	**280 L/h (0.16 cfm)**	**400 L/h (0.24 cfm)**	**700 L/h (0.42 cfm)**	**800 L/h (0.48 cfm)**	**400 L/h (0.24 cfm)**	**700 L/h (0.42 cfm)**	**800 L/h (0.48 cfm)**	**2 x 400 L/h 2 x (0.24 cfm)**	**2 x 800 L/h 2 x (0.48 cfm)**
Standard version - Europe (Non-explosive area)	P 1.1	P 2.3	---	P2.83	P 2.4	---	P 2.84	P 4.3	P 4.83
Standard Versions USA/ Canada (FM C-US Ordinary locations)	P 1.1	P 2.3 (115 V)	---	P 2.83 (115 V)	P 2.4 (115 V)	---	P 2.84 (115 V)	P 4.3 (115 V)	P 4.83 (115 V)
Data sheet	420011	420008	---	420008		---	420008	420010	
ATEX Models Europe (Explosive area)	P 1.3 Atex Zone 2	P2.2 Atex Zone 1	P2.72 Atex Zone 1	---	P2.4 Atex Zone 1	P2.74 Atex Zone 1	---	---	---
Data sheet	420023	420009		---	420009		---	---	---
ATEX Models Europe (Only for **conveying** flammable gases)	P1.2 Zone 2	P2.3C Zone 2	---	---	P 2.4C Zone 2	---	---	---	---
Data sheet	420011	420008	---	---	420008	---	---	---	---
AMEX Models USA/Canada (FM C-US Hazardous locations)	P1.3 AMEX Cl.1/Div.2	P2.2 AMEX Cl.1/Div.2	---	P2.82 AMEX Cl.1/Div.2	P 2.4 AMEX Cl.1/Div.2	---	P 2.84 AMEX Cl.1/Div.2	---	---
Data sheet	420023	420012	---	420012		---	420012	---	---
IECEx Models International (Explosive area)	P1.3 IECEx Zone 2	---	---	---	---	---	---	---	---
Data sheet	420023	---	---	---	---	---	---	---	---

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
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Sample gas pumps P1.1, P1.1E, P1.2, P1.2E

Gas analysis is key for safe and efficient system operation in the chemical industry, petrochemistry or biochemistry. Many of the analysis processes used in these fields require sample gas extraction and conditioning.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Easy to replace valves
- Single-piece bellows
- Conveys sample gas with condensate
- Proven pump technology
- Attractive price
- Requires little space
- Housing version IP20
- Optionally with built-in bypass valve
- FM C-US approval (general purpose) optional
- Used in **DNV-GL and LR type-tested** conditioning unit
- Can be used in a system to maintain **the IMO MARPOL MEPC.259(68)**
- Special design for use in high vibration environments

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Internet: www.buhlertech.com

Technical data

Technical data P1.1/P1.1E	
Nominal voltage/Power input:	230 V 50 Hz, 0.48 A 115 V 60 Hz, 0.84 A 12 V DC, 1.55 A 24 V DC, 0.8 A
Protection class OEM/housing & 12 V/24 V:	IP 00/IP 20
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration
Weight (without accessories):	approx. 2.9 lb (12 V/24 V approx. 1.8 lb)
Medium temperature:	158 °F
Ambient temperature:	32 °F to 122 °F
Nominal output:	280 l/h (4.7 lpm)
Materials in contact with media vary by configuration:	PTFE, PVDF, 1.4571, 1.4401, Viton

Technical Data P1.2/P1.2E	
Nominal voltage/Power input:	230 V 50 Hz, 0.48 A 115 V 60 Hz, 0.84 A
Protection class OEM/housing:	IP 00/IP 20
Weight (without accessories):	approx. 2.9 lb
Medium temperature:	see temperature classes
Ambient temperature:	32 °F to 122 °F
Nominal output:	280 l/h (4.7 lpm)
Materials in contact with media vary by configuration:	PTFE, PVDF, 1.4571, 1.4401, Viton

The gas lines are connected via screw-in connections (G1/4 thread). The respective screw-in connections as well as mounting bracket and vibration absorber are sold separately.

Temperature classes

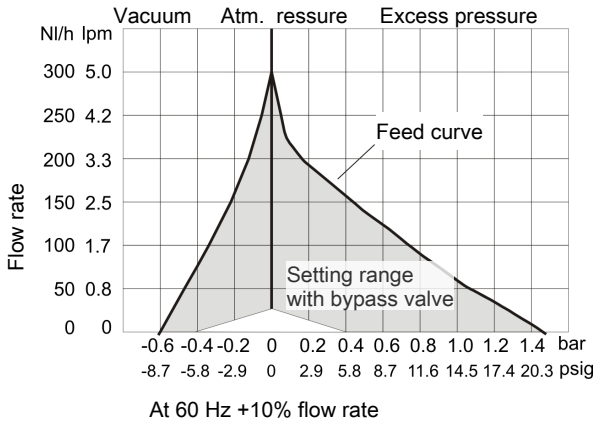
Pump models P1.2/P1.2E		Medium temperature
no flammable gasses in the gas circuit		158 °F
Flammable gasses in the gas circuit above the LEL	T3	158 °F
	T4	122 °F

Marking P1.2/P1.2E

II 3G/- c IIB T4

Note: This device is not suitable for use in explosive areas!

Feed curve

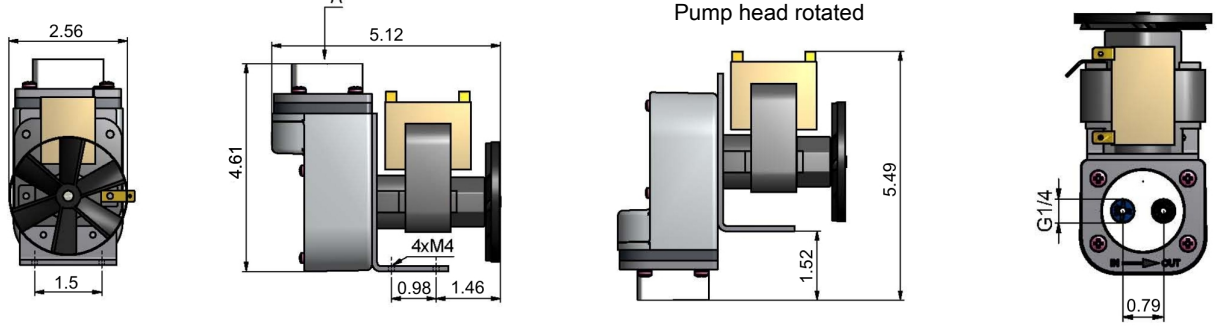


At 60 Hz +10% flow rate

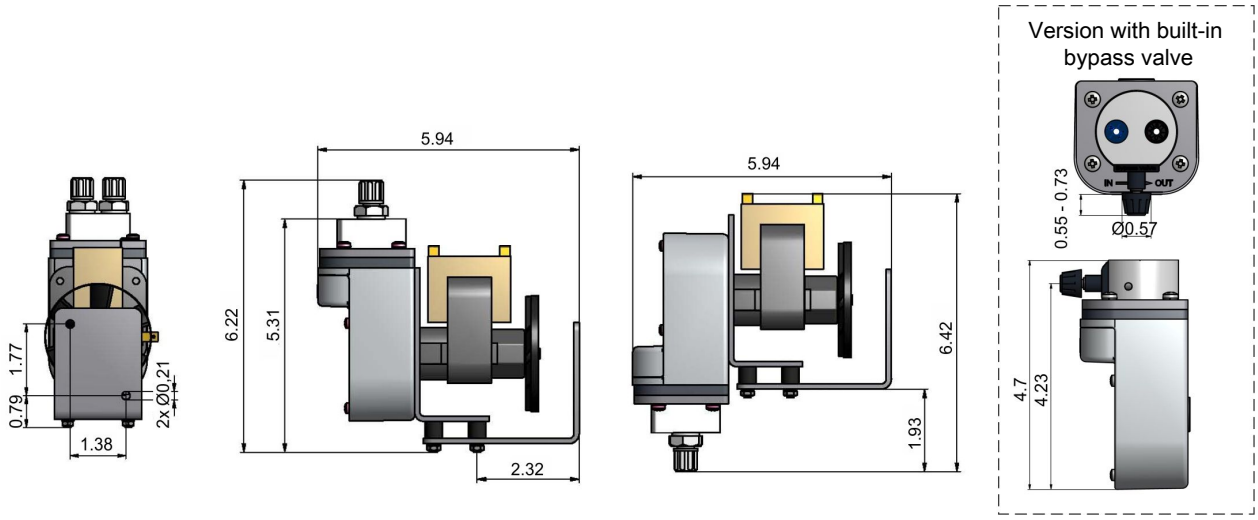
Dimensions P1.1 / P1.2 pump (115 V or 230 V)

The P1.1/P1.2 sample gas pump is connected to electricity via blade receptacles.

without accessories:

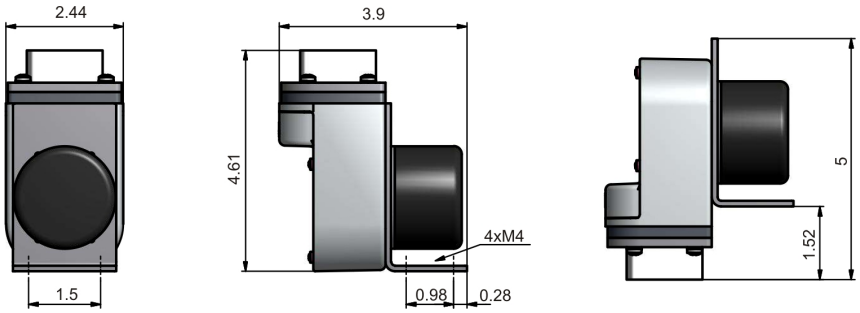


with accessories:



Dimensions P1.1 (12 V DC or 24 V DC)

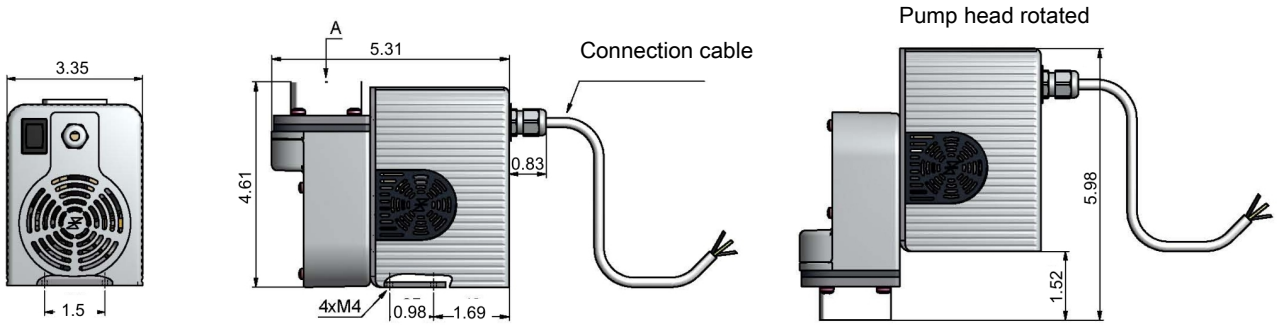
The P1.1 (24 V DC) sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.



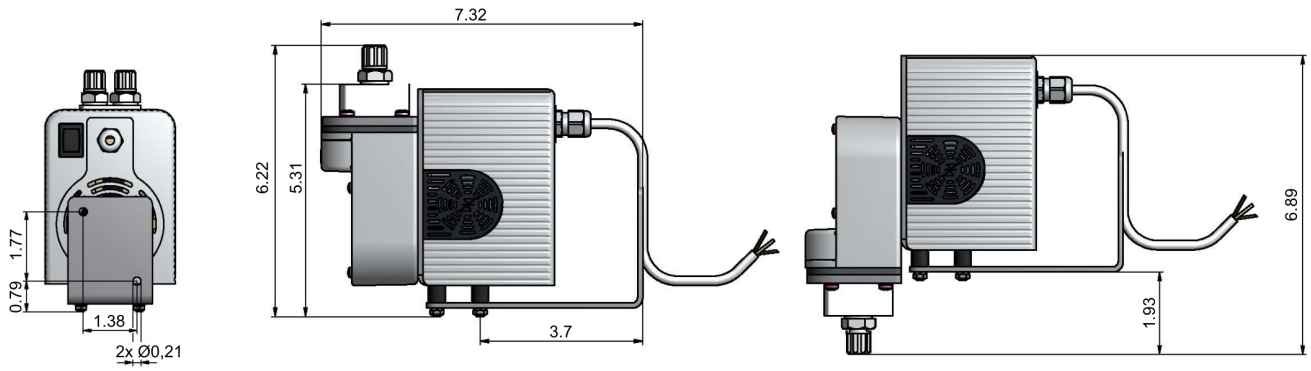
Dimensions P1.1E / P1.2E pump (all voltages)

The P1.1E/P1.2E sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.

without accessories:



with accessories:



Ordering instructions P1.1 / P1.1E

42	28	x	x	x	1	x	x	x	00	xx	Product feature
											Motor voltage
		1									230 V 50 Hz 0.48 A
		2									115 V 60 Hz 0.84 A
		3									12 V DC 1.55 A (on request)
		4									24 V DC 0.8 A
											Pump head position
			1								Normal position vertical
			2								turned by 180°
											Pump head material
				1							PTFE
				2							VA (1.4571)
				3							PVDF with bypass valve
				4							PVDF
											Valve material
					1						up to 158 °F; PTFE/PVDF
											Screw-in connections/pipe fittings
						0					without
						1					PVDF DN 4/6 *
						2					PVDF 1/4”-1/6” *
						3					PVDF 1/4"-1/8" *
						5					VA (1.4401) 6 mm **
						6					VA (1.4401) 1/4" **
											Mounting accessories
							0				without
							1				Mounting bracket and set of vibration dampers
							2				set of vibration dampers only
											Housing
								0			without
								1			Housing incl. 3 m (9.8 ft) connection cable
								2			Housing with on/off switch incl. 3 m (9.8 ft) connection cable ***
											Options
									00		without
											Approval
										--	without
										FM	FM-Approval

* PTFE or PVDF pump body only

** VA pump body only

*** not possible with 12V/24V and/or FM approval

Ordering instructions P1.2 / P1.2E

42	29	x	x	x	1	x	x	x	00	Product characteristic
										Motor voltage
		1								230 V 50 Hz 0.48 A
		2								115 V 60 Hz 0.84 A
										Pump head position
			1							Normal position vertical
			2							turned by 180°
										Pump head material
				1						PTFE
				2						VA (1.4571)
				3						PVDF with bypass valve
				4						PVDF
										Valve material
					1					up to 158 °F; PTFE/PVDF
										Screw-in connections/pipe fittings
						0				without
						1				PVDF DN 4/6 *
						2				PVDF 1/4"-1/6" *
						3				PVDF 1/4"-1/8" *
						5				VA (1.4401) 6 mm **
						6				VA (1.4401) 1/4" **
										Mounting accessories
							0			without
							1			Mounting bracket and set of vibration dampers
							2			set of vibration dampers only
										Housing
								0		without
								1		Housing incl. 3 m (9.8 ft) connection cable
								2		Housing with on/off switch incl. 3 m (9.8 ft) connection cable

* PTFE or PVDF pump body only

** VA pump body only

Sample gas pumps P1.3

Even in explosive systems in the chemical industry, petrochemistry or biochemistry, gas analysis is key for safe operation. Many of the analysis processes used in these fields require extracting and special conditioning of the sample gas. The P1.3 sample gas pump is the right solution for Atex Zone 2 gases and ambient as well as Class I, Division 2.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Atex and IECEx Zone 2 Approval
- FM C-US Approval for Class I, Division 2
- Easy to replace valves
- Single-piece bellows
- Conveys sample gas with condensate
- Proven pump technology
- Attractive price
- Requires little space
- Mounting accessories and screw connections sold separately
- IP20 housing version
- Optionally with built-in bypass valve
- 12 V/24 V version available

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

The following applies for all pump types with FM US/CANADA approval:

The apparatus is to be installed in a tool-secured enclosure in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

The following applies for all pump types with IECEx/ATEX approval:

The pump shall be mounted in an enclosure providing a minimum degree of protection of IP54 in accordance with IEC/EN 60079-15, and shall be installed within a tool-secured enclosure which meets the requirements of IEC/EN 60079-0 and IEC/EN 60079-15.

Technical data

Technical data	
Nominal voltage/current consumption:	230 V 50 Hz, 0,48 A 115 V 60 Hz, 0,84 A 12 V DC, 1,55 A 24 V DC, 0,8 A
Protection class OEM/housing & 12 V/24 V:	IP 00/IP 20
Weight (without accessories):	approx. 2.9 lb (12 V/24 V approx. 1.8 lb)
Medium temperature:	see “Temperature classes”
Surrounding temperature:	32 °F to 122 °F
Nominal output:	280 l/h (4.7 lpm)
Materials in contact with media vary by configuration:	PTFE, PVDF, 1.4571, 1.4401, Viton

The gas lines are connected via screw-in connections (G1/4 thread). The respective screw-in connections as well as mounting bracket and vibration absorber are sold separately.

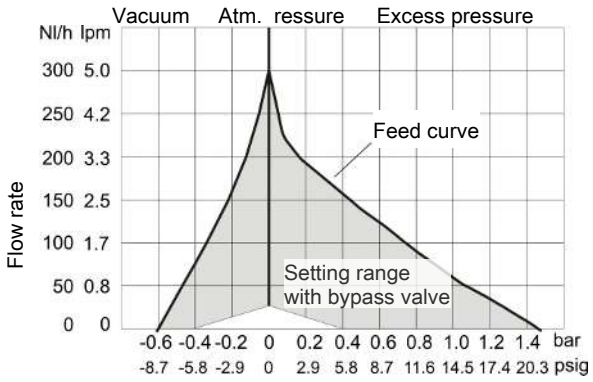
Temperature classes

Type of gas	Maximum medium temperature	Temperature class	
		at installation site	in gas path
non-flammable	122 °F	T4	---
	158 °F	T3	---
flammable	122 °F	T4	T3

Protection marking

P1.3 Atex	FM16ATEX0018X	II 3G Ex nA nC IIC T4...T3 Gc
	---	II 3/3G c IIC T3/T4 X (Examined by Bühler Technologies GmbH)
P1.3 IECEx	IECEx FMG 16.0012X	Ex nA nC IIC T4...T3 Gc
P1.3 US/Canada	Cl. I, Div. 2, Gps. A, B, C, D, T4...T3	

Feed curve



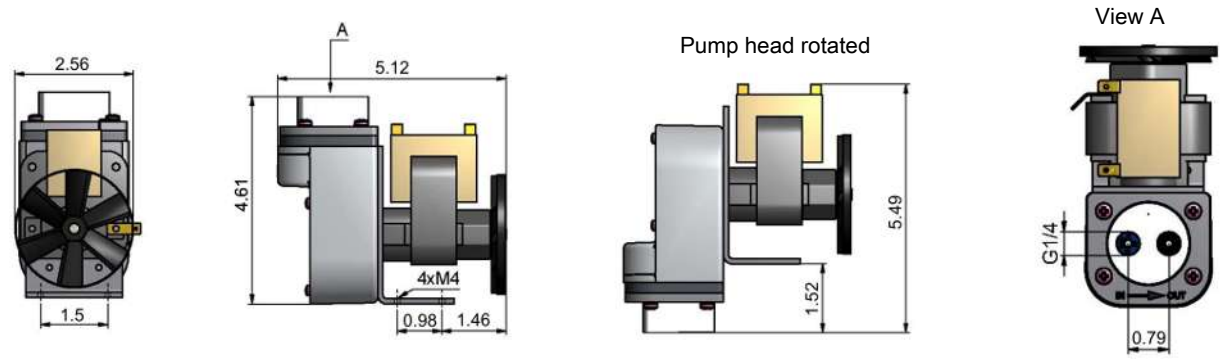
At 60 Hz +10% flow rate

Note: The notices regarding the pressure and flow rates in chapter 5 of the operating instructions (no. 420023) must be observed!

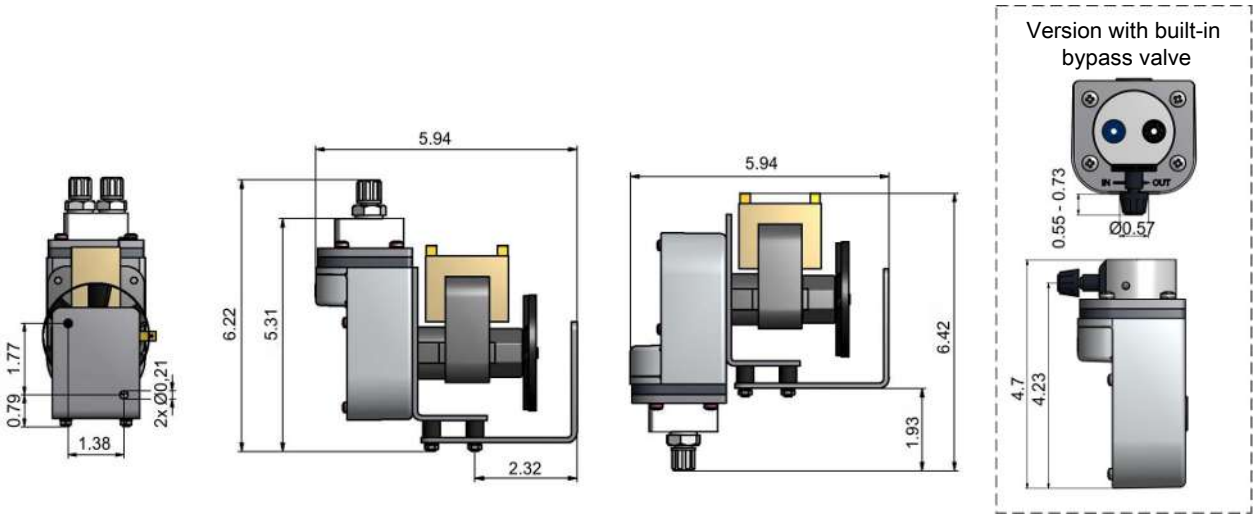
Dimensions P1.3 (115 V / 230 V)

The P1.3 sample gas pump is connected to electricity via blade receptacles..

without accessories:

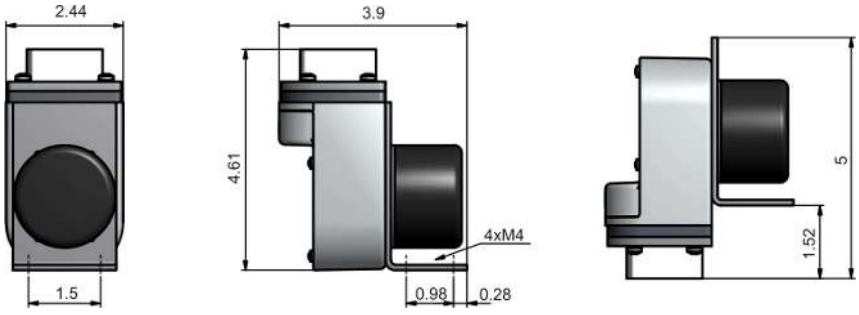


with accessories:



Dimensions P1.3 (24 V DC / 12 V DC)

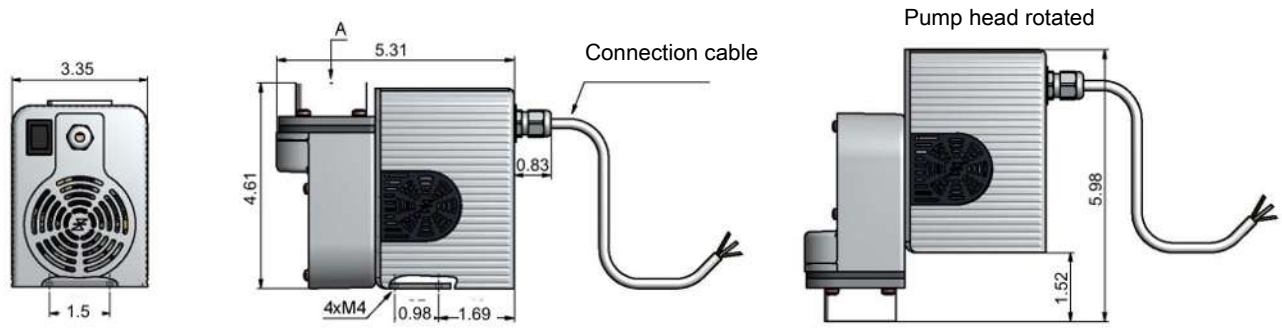
The P1.3 (24 V DC / 12 V DC) sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.



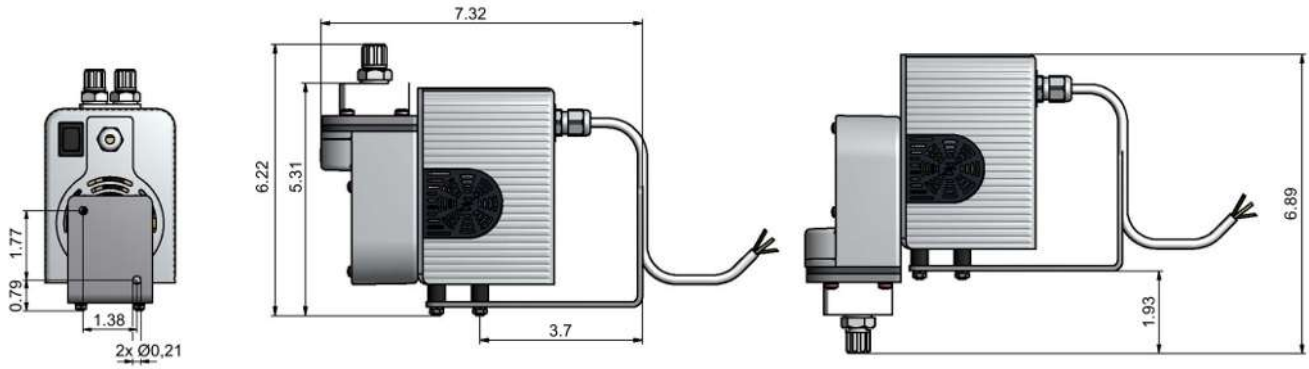
Dimensions P1.3E (all voltages)

The P1.3E sample gas pump may be connected by standard 3 m (9.8 ft) connecting cable.

without accessories:



with accessories:



Ordering instructions

42	xx	x	x	x	1	x	x	x	00	Product feature
										Basic model
	30									P1.3 ATEX, IECEx, US/Canada
										Motor voltage
		1								230 V 50 Hz 0,48 A
		2								115 V 60 Hz 0,84 A
		3								12 V DC 1,55 A (on request)
		4								24 V DC 0,8 A
										Pump head position
			1							Normal position vertical
			2							Turned by 180°
										Pump head material
				1						PTFE
				2						VA (1.4571)
				3						PVDF with bypass valve
				4						PVDF
										Valve material
					1					Up to 70 °C (158 °F); PTFE/PVDF
										Screw in connections (depending on pump head)
						0				without
						1				PVDF DN 4/6 *
						2				PVDF 1/4“-1/6“ *
						3				PVDF 1/4“-1/8“ 4“ *
						5				VA (1.4401) 6 mm **
						6				VA (1.4401) 1/4“ **
										Mounting accessories
							0			without
							1			Mounting bracket and set of vibration dampers
							2			Set of vibration dampers only
										Housing
								0		without
								1		Housing incl. 3 m connection cable

* PTFE or PVDF pump body only.

** VA pump body only.

Sample gas pumps P 2.3, P 2.3C, P 2.83, P 2.4, P 2.4C, P 2.84

Gas analysis is key for safe and efficient system operation in the chemical industry, petrochemistry or biochemistry. Many of the analysis processes used in these fields require sample gas extraction and conditioning.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Simple, sturdy construction
- Easy to replace valves
- Single-piece bellows
- Conveys sample gas with condensate
- Long life
- Atex versions (see separate data sheet)
- Low noise emission
- 115 V - versions with FM C-US approval
- C-versions specifically for conveying flammable gasses
- Bypass valve for PTFE and VA pump body

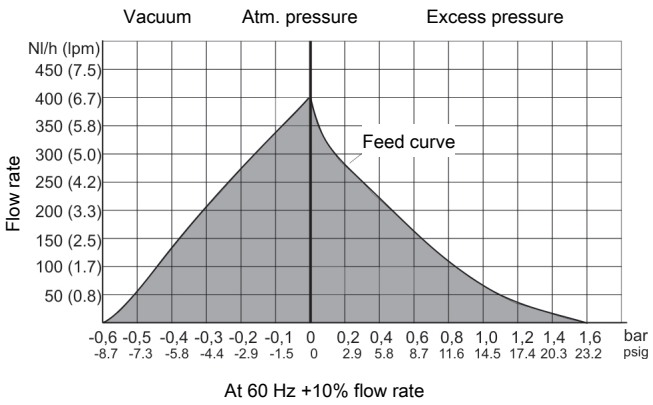
Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

General specifications for all pumps

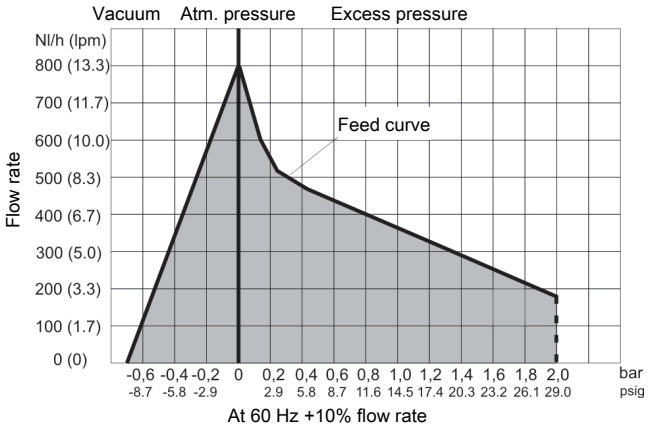
General Specifications	
Nominal voltage / Power input	see ordering information
Protection class:	electric IP55 mechanical IP20
Dead volume:	0.5 cu.in.
Materials of parts in contact with mediums by pump type:	PTFE / PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 320 °F valves) + Viton (standard pump with 212 °F valves and bypass valve) + PCTFE, Viton (standard pump with 320 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, Viton (VA pipe fitting) + Viton (VA pump body with bypass valve)

Feed Curves

P2.3, P2.3C, P2.4, P2.4C



P2.83, P2.84



P2.3 and P2.83 Pump Models

For easier installation, the P2.3 and P2.83 pumps include a mounting bracket with rubber mounting.

The pump head can optionally be ordered with adjustable bypass valve.

The difference between the P2.3 and P2.83 is the flow rate. The P2.3 pump has a capacity of 400 L/h (6.7 lpm) free flow and the P2.83 has a capacity of 800 L/h (13.3 lpm) free flow.

The P2.3 and P2.83 pumps are not suitable for use in explosive areas according to ATEX. The corresponding models for use in explosive areas are P2.2 ATEX, P2.2 AMEX and P2.82 AMEX, data sheet 420009, or US-P2.6Ex, data sheet 420005.

Technical data for P2.3 and P2.83

P2.3/P2.83 Technical Data	
Weight:	14.3 lb
FM C-US (115 V only) FM approval no.:	3038101/3038101C
Ambient temperature:	max. 140 °F
Medium temperature:	PTFE/PVDF valves max. 212 °F PTFE/PEEK valves max. 320 °F

P2.4 and P2.84 Pump Models

When installed inside an electric cabinet, wall thicknesses of up to 30 mm (1.18 in)can be bridged without additional modifications.

The difference between the P2.4 and P2.84 is the flow rate. The P2.4 pump has a capacity of 400 L/h (6.7 lpm) free flow and the P2.84 has a capacity of 800 L/h (13.3 lpm) free flow.

The P2.4 and P2.84 pumps are not suitable for use in explosive areas according to ATEX. The corresponding models for use in explosive areas are P2.4 ATEX, P2.4 AMEX and P2.84 AMEX, data sheet 420009.

Technical data for P2.4 and P2.84

P2.4/P2.84 Technical Data	
Weight:	16.5 lb
FM C-US (115 V only) FM approval no.:	 3038101/3038101C
Ambient temperature Motor: Pump head:	 max. 140 °F max. 212 °F
Medium temperature:	PTFE/PEEK valves max. 320 °F

P2.3C and P2.4C Pump Models

Pump models P2.3C and P2.4C are suitable for conveying flammable gasses in zone 2. The pumps are not suitable for use in explosive areas according to Atex.

Technical data for P2.3C and P2.4C

P2.3C/P2.4C Technical Data	
Weight P2.3 C: P2.4 C:	 14.3 lb 16.5 lb
Marking:	II 3G/- c IIB T4 X
Ambient temperature Motor: Pump head:	 max. 122 °F see table
Medium temperature:	see table

NOTICE! The devices are not suitable for use in explosive areas!

Temperature classes for P2.3C and P2.4C

P 2.3C		Medium temperature
no flammable gasses in the gas circuit		see P2.3/P.283
Flammable gasses in the gas circuit above the LEL	T3	248 °F
	T4	122 °F

P 2.4C		Medium temperature	Pump head temperature
no flammable gasses in the gas circuit		see P2.4/P2.84	
Flammable gasses in the gas circuit above the LEL	T3	212 °F	176 °F
	T4	122 °F	122 °F

P2.3, P2.4, P2.83, P2.84 Ordering instructions

42	xx	x	x	x	x	x	9	0	00	Product characteristic	
										Base model	
	56									P2.3 400 L/h	
	57									P2.4 400 L/h	
	63									P2.83 800 L/h	
	64									P2.84 800 L/h	
										Motor voltage	
		1								230 V 50/60 Hz. 0.85/0.8 A	
		2								115 V 50/60 Hz. 1.7/1.6 A	
		5								400 V 50/60 Hz. 0.5/0.43 A	
										Pump head position	
			1							Normal position vertical	
			2							turned by 180° *	
										Pump head material	
				1						PTFE	
				2						Stainless steel 1.4571	
				3						PTFE with bypass valve *	
				4						Stainless steel 1.4571 with bypass valve *	
										Valve material	
					1					up to 100°C; PTFE / PVDF **	
					2					up to 160°C; PTFE / PEEK	
										Screw-in connections (for 230 V and 400 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				DN 4/6 (Standard)	6 mm (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						4				1/4"-1/6”	1/4"
										Screw-in connections (for 115 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				1/4"-1/6" (Standard)	1/4" (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						5				DN 4/6	6 mm
										Mounting accessories	
							9			incl. mounting bracket and bumper *	

* not on P2.4 & P2.84

** not on P2.4, P2.83 & P2.84

P2.3C, P2.4C Ordering instructions

42	xx	x	x	x	x	x	9	0	00	Product characteristic	
										Base model	
	52									P2.3C 400 L/h (II 3G/- c IIB T4 X)	
	53									P2.4C 400 L/h (II 3G/- c IIB T4 X)	
										Motor voltage	
		1								230 V 50/60 Hz. 0.85/0.8 A	
		2								115 V 50/60 Hz. 1.7/1.6 A	
		5								400 V 50/60 Hz. 0.5/0.43 A	
										Pump head position	
			1							Normal position vertical	
			2							turned by 180° *	
										Pump head material	
				1						PTFE	
				2						Stainless steel 1.4571	
				3						PTFE with bypass valve *	
				4						Stainless steel 1.4571 with bypass valve *	
										Valve material	
					1					up to 100 °C; PTFE / PVDF *	
					2					up to 160°C; PTFE / PEEK	
										Screw-in connections (for 230 V and 400 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				DN 4/6 (Standard)	6 mm (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						4				1/4"-1/6”	1/4"
										Screw-in connections (for 115 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				1/4"-1/6" (Standard)	1/4" (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						5				DN 4/6	6 mm
										Mounting accessories	
							9			incl. mounting bracket and bumper *	

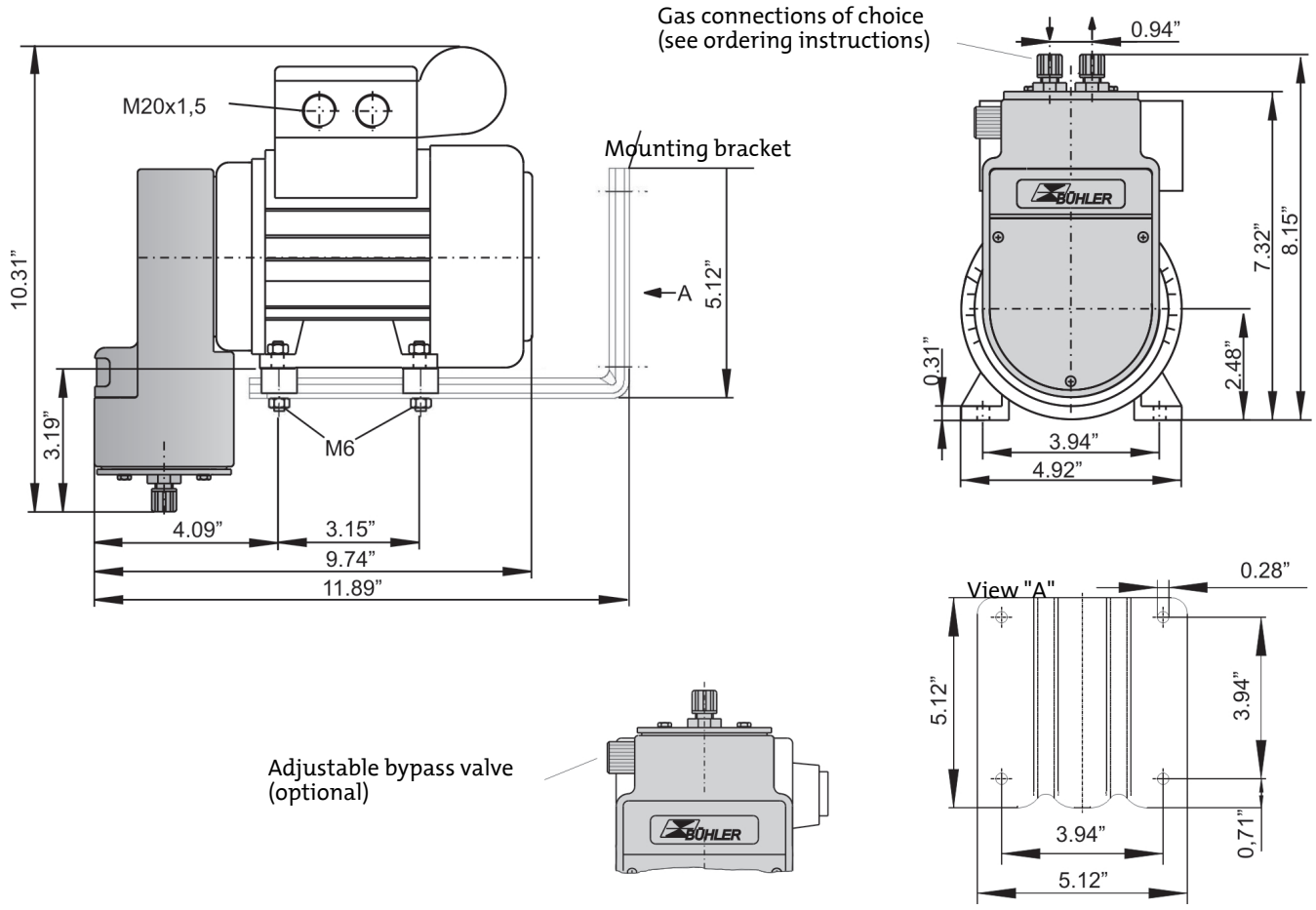
*not applicable to 2.4C

Ordering example

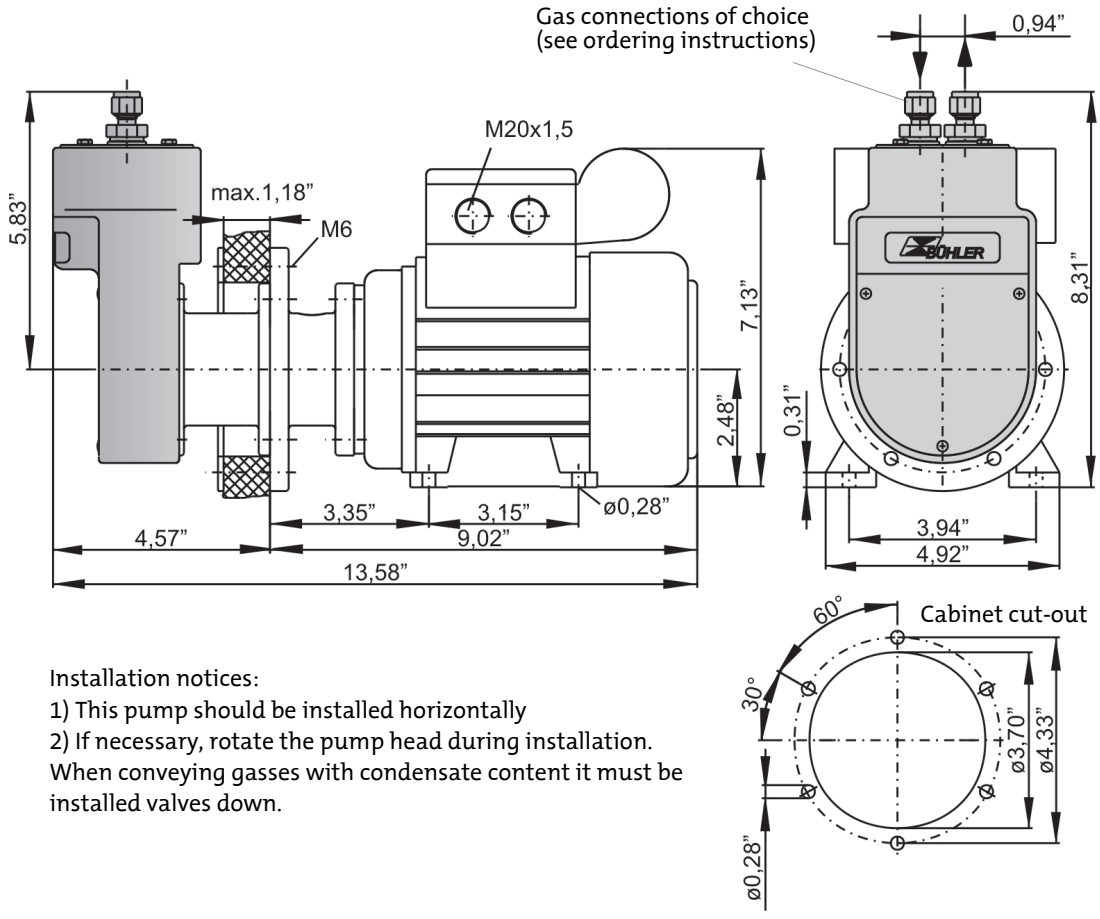
Item no.: 42 63 1112 99 000

63	for 800 litre P2.83 pump
1	for 230V 50/60Hz motor
1	for pump head in normal position
1	PTFE pump head
2	for 160 °C valves
9	for DN4/6 screw-in connection
9	includes mounting bracket and bumpers

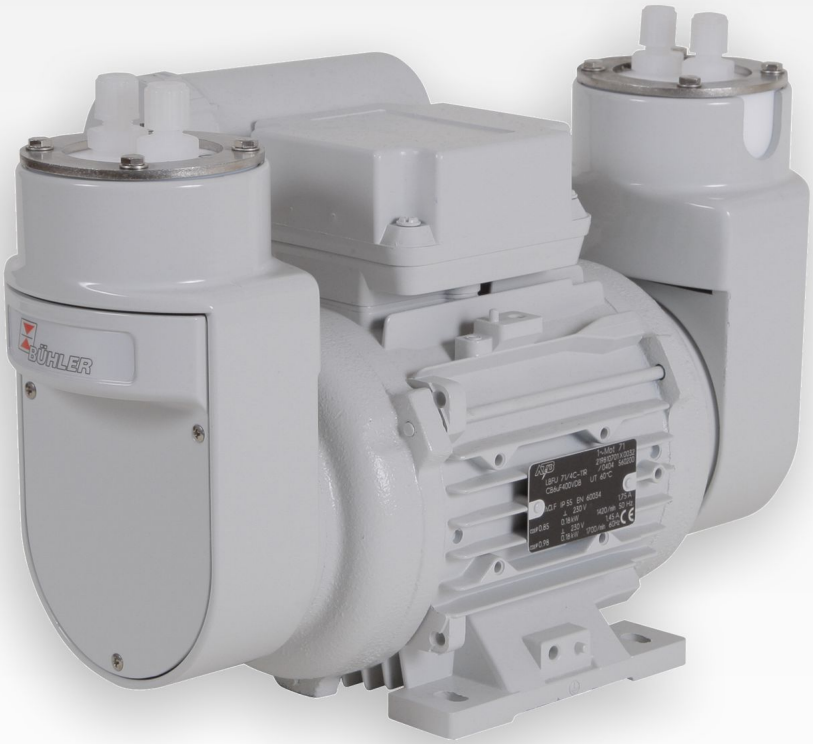
Dimensions P2.3, P2.3C and P2.83



Dimensions P2.4, P2.4C and P2.84



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation.
When conveying gasses with condensate content it must be installed valves down.



Sample gas pumps P 4.3, P 4.83

Gas analysis is key for safe and efficient system operation in the chemical industry, petrochemistry or biochemistry. Many of the analysis processes used in these fields require sample gas extraction and conditioning.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these pumps designed specifically for the application is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

- Simple, sturdy construction
- Easy to replace valves
- Adjustable bypass valve (optional)
- Single-piece bellows
- Conveys sample gas with condensate
- Long life
- Low noise emission
- 115 V - versions with FM C-US approval
- Mounting bracket and rubber mounting standard
- Bypass valve for PTFE and VA pump body

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

P4.3 and P4.83 Pump Models

For easier installation, the P4.3 and P4.83 pumps include a mounting bracket with rubber mounting. The pump head can optionally be ordered with adjustable bypass valve (not applicable with parallel operation).

The difference between the P4.3 and P4.83 is the flow rate. The P4.3 pump has a capacity of 2 x 400 L/h (1.76 gpm) free flow and the P4.83 has a capacity of 2 x 800 L/h (3.52 gpm) free flow.

The P4.3 and P4.83 pumps are not suitable for use in explosive areas according to ATEX.

Connecting the two gas paths with the optional piping or tubing kit significantly increases the flow rate.

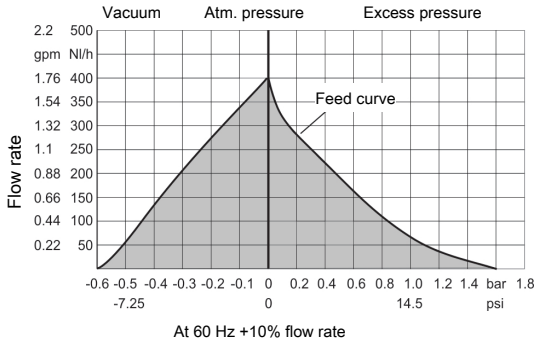
Technical Data

P4.3/P4.83 Technical Data

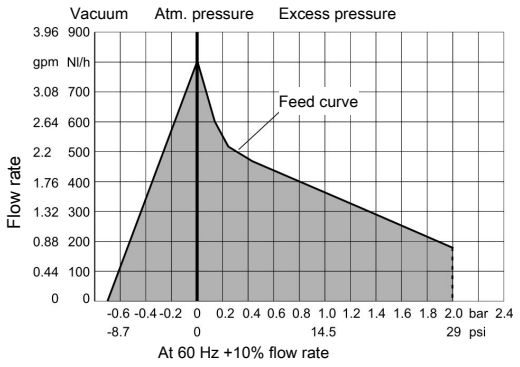
Nominal voltage:	see ordering information
Nominal current:	see ordering information
Protection class:	electric IP55 mechanical IP20
Weight:	27.6 lb
Dead volume:	2 x 0.5 cu.in.
FM C-US (115 V only) FM approval no.:	3038101/3038101C
Ambient temperature:	max. 140 °F
Medium temperature:	PTFE/PVDF valves max. 212 °F PTFE/PEEK valves max. 320 °F
Materials of parts in contact with mediums by pump type:	PTFE / PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 320 °F valves) + Viton (standard pump with 212 °F valves and bypass valve) + PCTFE, Viton (standard pump with 320 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, Viton (VA pipe fitting) + Viton (VA pump body with bypass valve)

Feed Curves

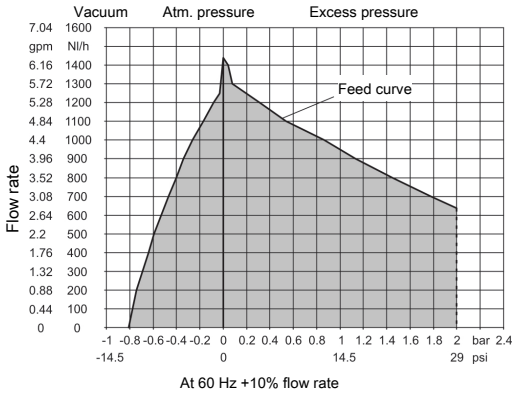
P4.3 (per head)



P4.83 (per head)



P4.83 (parallel circuit)



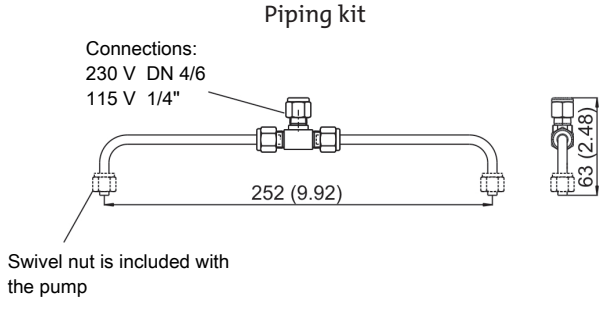
Ordering instructions

42	xx	x	x	x	x	x	9	0	00	Product characteristic	
										Base model	
	80									P4.3, 2 x 400 L/h	
	81									P4.83, 2 x 800 L/h	
										Motor voltage	
		1								230 V 50/60 Hz. 1.75/1.45 A	
		2								115 V 50/60 Hz. 3.5/2.9 A	
										Pump head position	
			1							Normal position vertical	
			2							turned by 180°	
										Pump head material	
				1						PTFE	
				2						Stainless steel 1.4571	
				3						PTFE with bypass valve *	
				4						Stainless steel 1.4571 with bypass valve *	
										Valve material	
					1					up to 100°C; PTFE / PVDF **	
					2					up to 160°C; PTFE / PEEK	
										Screw-in connections (for 230 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				DN 4/6 (Standard)	6 mm (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						4				1/4"-1/6”	1/4"
										Screw-in connections (for 115 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				1/4"-1/6" (Standard)	1/4" (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						5				DN 4/6	6 mm
										Mounting accessories	
							9			incl. mounting bracket and bumpers	
										Connection kit for parallel operation	
								0		without	
								1		Tubing kit PVDF/PTFE ***	
								2		Piping kit 1.4571/1.4401 ***	

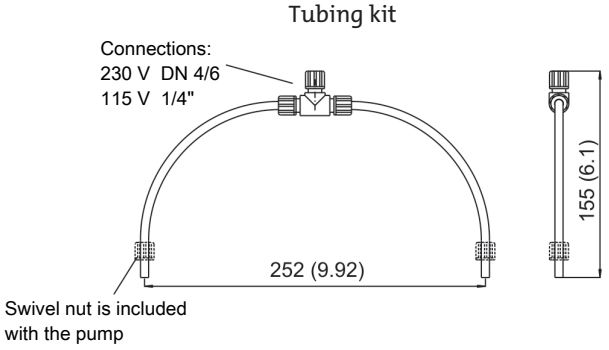
* not with parallel operation
** not P4.83
*** P4.83 only

Dimensions piping kit/tubing kit for P4.83 with parallel operation

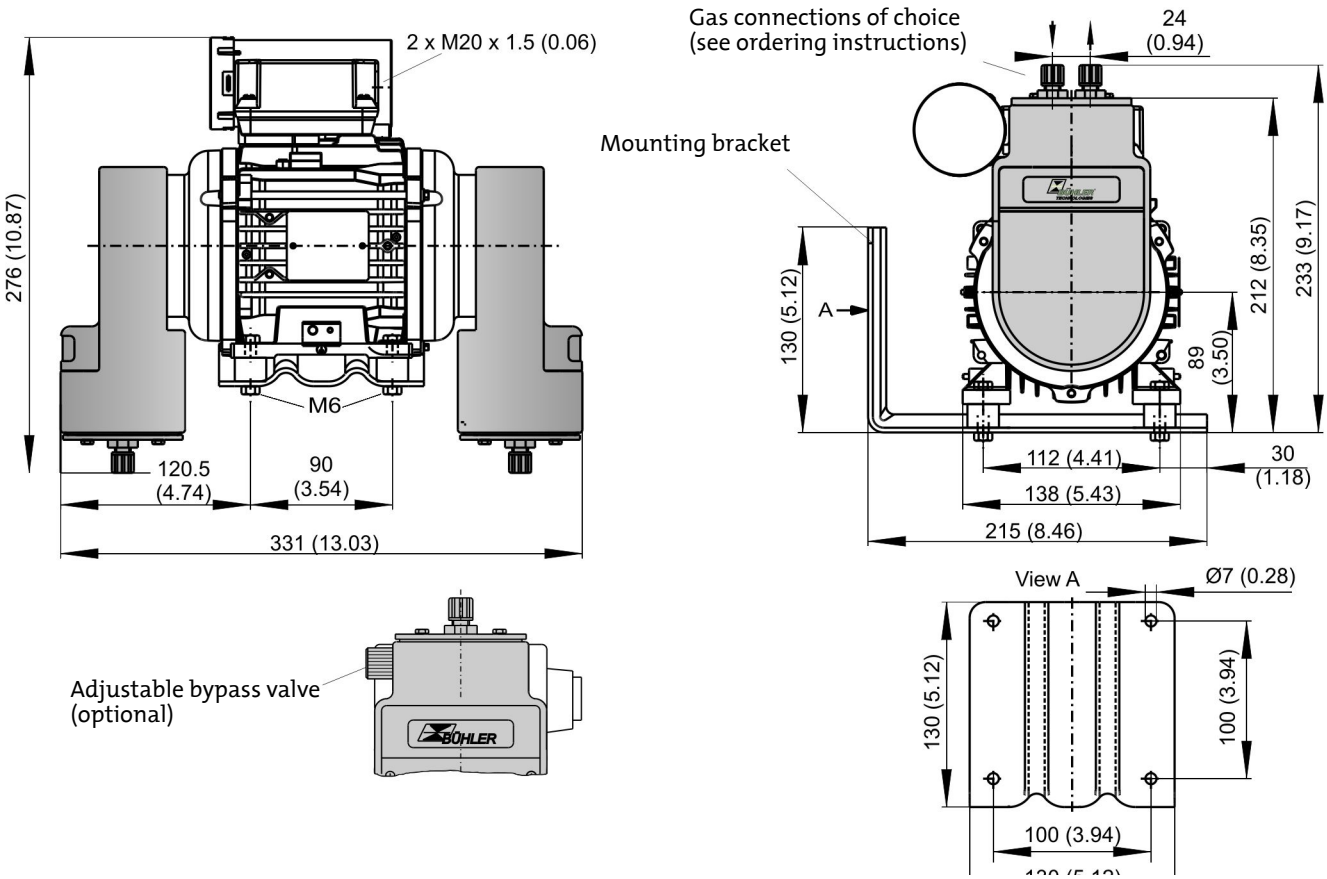
Piping kit



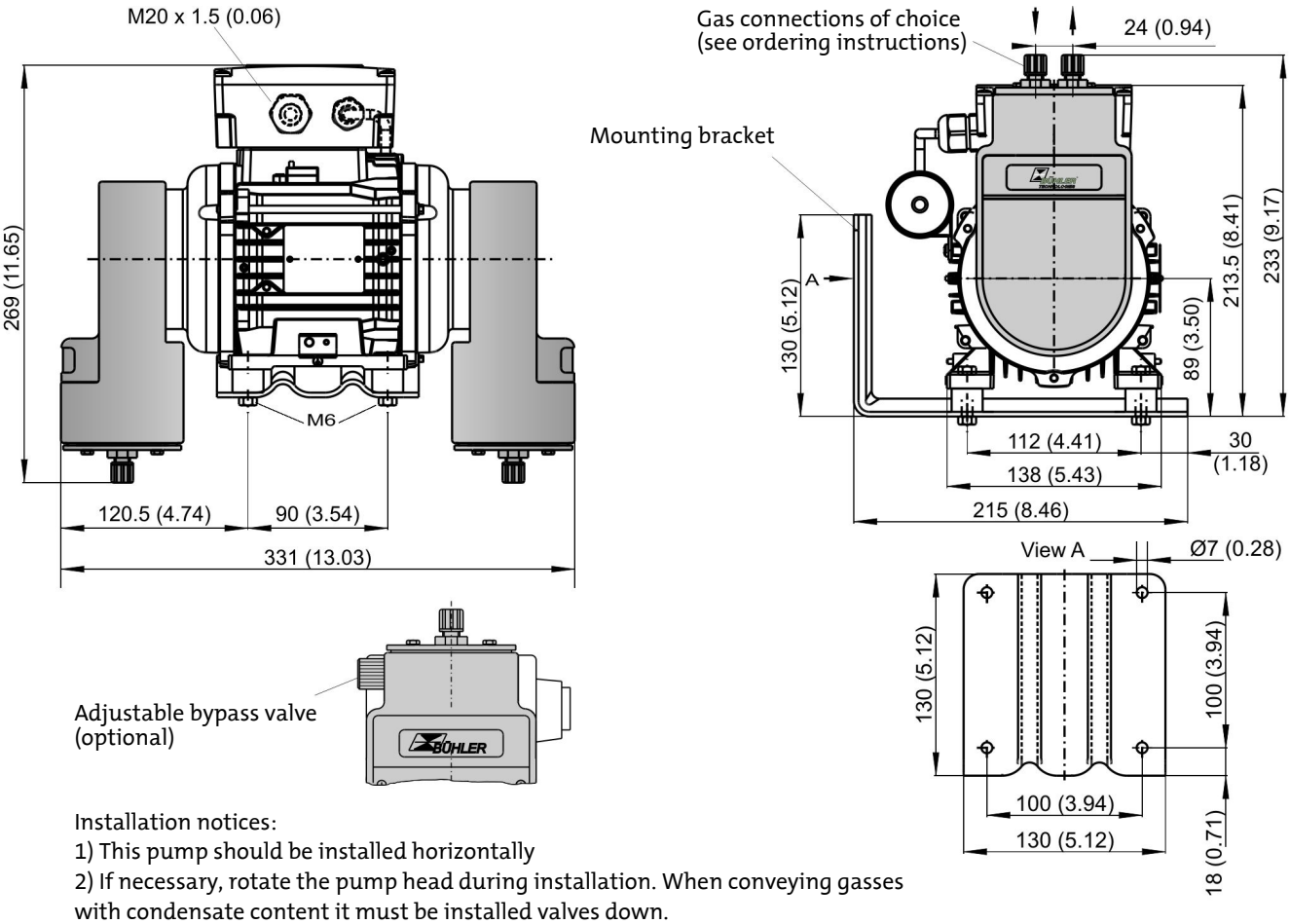
Tubing kit



Dimensions P4.3 and P4.83 (230 V)



Dimensions P4.3 and P4.83 (115 V)



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

Sample gas pumps P2.x ATEX

Even in explosive systems in the chemical industry, petrochemistry or biochemistry, gas analysis is key for safe operation. Many of the analysis processes used in these fields require extracting and special conditioning of the sample gas.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these specially designed pumps is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

There are several different models with separate drive, depending on the requirements. These versions allow the installation of a coupling flange to install the pump heads inside heated housings away from the motor whilst the motor remains outside the housing.

The series are available for various EX hazard and classification zones with flow rates up to 700 l/h (11.7 lpm).

- **Easy, sturdy set-up**
- **Easy to replace valves**
- **Single-piece bellows**
- **For aggressive sample gas**
- **Conveys sample gas with condensate**
- **Long life**
- **Pump head with optional adjustable bypass valve**
- **Bypass valve for PTFE and VA pump body**
- **Low noise emission**
- **With mounting bracket**
- **ATEX versions category 2**

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Pump Overview

	Direct-drive pumps		Pumps with intermediate flange	
Flow rate (see flow curve)	**6.7 lpm**	**11.7 lpm**	**6.7 lpm**	**11.7 lpm**
ATEX types II 2G Ex h IIC T3/T4 Gb X	P 2.2 ATEX		P 2.4 ATEX	
ATEX types II 2G Ex h IIC T3 Gb X		P 2.72 ATEX		P 2.74 ATEX
Weight	approx. 16.5 lb		approx. 18.7 lb	

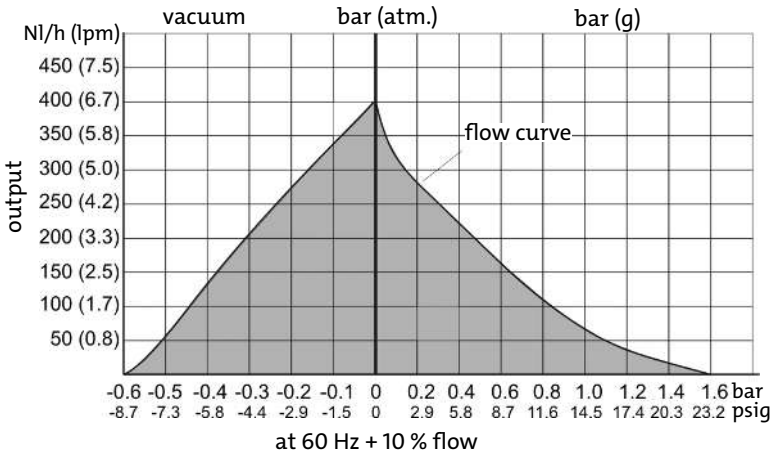
Technical data P 2.2 / P 2.4 ATEX

Technical Data	
Nominal voltage:	see ordering information
Marking:	II 2G Ex h IIC T3/T4 Gb X
IP rating:	electric IP65 mechanical IP20
Dead volume:	0.5 cu.in.
Weight:	approx. 16.5 lb (P 2.2 Atex) approx. 18.7 lb (P 2.4 Atex)
Materials in contact with media vary by configuration:	PTFE, PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 284 °F valves) + Viton (standard pump with 212 °F valves and bypass valve) + PCTFE, Viton (standard pump with 284 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, Viton (VA pipe fittings) + Viton (VA pump body with bypass valve)

Pumps 6.7 lpm	
Ambient temperature Motor:	-4 °F to 122 °F
Pump head:	see temperature classes
Valve medium temperature*:	PTFE/PVDF max. 212 °F PTFE/PEEK max. 284 °F

*see temperature classes

Feed curve 6.7 lpm



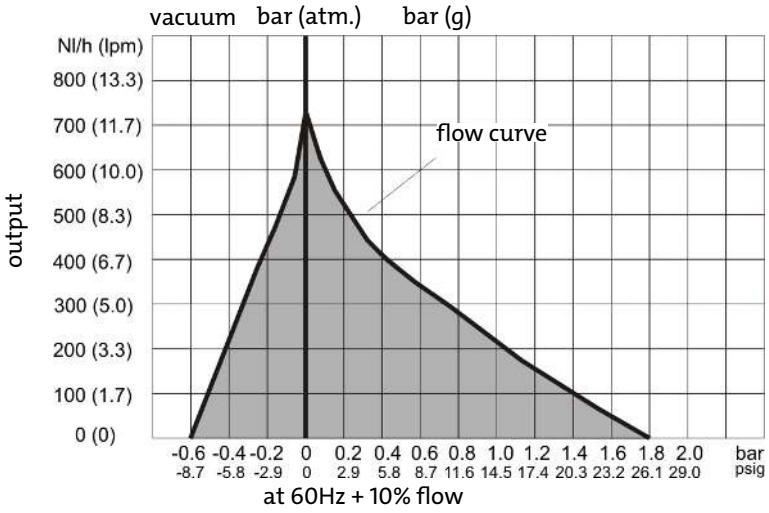
Technical data P 2.72 / P 2.74 ATEX

Technical Data	
Nominal voltage:	see ordering information
Marking:	II 2G Ex h IIC T3 Gb X
IP rating:	electric IP65 mechanical IP20
Dead volume:	0.5 cu.in.
Weight:	approx. 16.5 lb (P 2.72 Atex) approx. 18.7 lb (P 2.74 Atex)
Materials in contact with media:	PTFE, PEEK, 1.4571 (all models) + Viton (bypass valve) + 1.4401, Viton (VA pipe fitting)

Pumps 11.7 lpm	
Ambient temperature Motor:	-4 °F to 122 °F
Pump head:	see temperature classes
Valve medium temperature*:	PTFE/PEEK max. 248 °F

*see temperature classes

Flow curve 11.7 lpm



Temperature classes

P 2.2 ATEX		Medium temperature	Pump head temperature *
no flammable gasses in the gas circuit	T3	284 °F	122 °F
	T4	248 °F	122 °F
Flammable gasses in the gas circuit above the LEL	T3	248 °F	122 °F
	T4	122 °F	122 °F

P 2.4 ATEX		Medium temperature	Pump head temperature
no flammable gasses in the gas circuit	T3	248 °F	212 °F
	T4	176 °F	176 °F
Flammable gasses in the gas circuit above the LEL	T3	212 °F	176 °F
	T4	122 °F	122 °F

P 2.72 ATEX		Medium temperature	Pump head temperature *
no flammable gasses in the gas circuit	T3	248 °F	122 °F
Flammable gasses in the gas circuit above the LEL	T3	122 °F **	122 °F **

P 2.74 ATEX		Medium temperature	Pump head temperature
no flammable gasses in the gas circuit	T3	248 °F	212 °F
Flammable gasses in the gas circuit above the LEL	T3	122 °F **	122 °F **

* resulting from the pump's maximum ambient temperature.

** At a primary pressure of 0 to max. 7.3 PSI the pump head and medium temperature is max. 113 °F.

Important motor notices

Motors used in EX areas require a protection device!

Installing the protective motor switch outside the EX area

Motor voltage		Item no.
7 = 230 V 50/60 Hz	0.9 - 1.25 A	9132020072
8 = 115 V 50/60 Hz	2,2 - 3,2 A	9132020054

Installing the protective motor switch in EX area Zone 1 or 2 (ATEX only)

Motor voltage		Item no.
7 = 230 V 50/60 Hz	1 - 1.6 A	9132020032
8 = 115 V 50/60 Hz (operation at 50 Hz)	2,5 - 4 A	9132020035
8 = 115 V 50/60 Hz (operation at 60 Hz)	1.6 - 2.5 A	9132020033

Information about the versions

Pump head position (only P2.2 and P2.72):

If the gas contains condensate, the pump head must be installed rotated by 180°. In this case, turn the pump head as described in the operating instructions. Please note the correct pump head position for your application when placing your order to avoid conversion.

Pump head material:

The standard material is PTFE.

The pump head may be fitted with a bypass valve (P2.2, P2.72 only) to reach all the values in the grey area of the flow curve. Depending on the inlet and outlet pipe style, a stainless steel pump body may be ordered.

Valve material (P2.2 models only):

PTFE/PVDF valves must be used for unheated applications with a media temperature up to 212 °F. For higher temperatures up to 284 °F, use the respective PTFE/PEEK valves. Please note, the max. temperatures are limited by the temperature classes (see temperature class table).

Ordering instructions P 2.2 / P 2.4 ATEX

42	xx	x	x	x	x	x	9	0	00	Product characteristic	
										Base model	
	61									P2.2 Atex 6.7 lpm (direct operation without intermediate flange)	
	62									P2.4 Atex 6.7 lpm (with intermediate flange)	
										Motor voltage	
		7								230 V 50/60 Hz 1.09 - 1.17 A	
		8								115 V 50/60 Hz 2.3 - 2.78 A	
		9								380 - 420 V 50 Hz	
		0								500 V 50 Hz	
										Pump head position	
			1							Normal position vertical	
			2							turned by 180° *	
										Pump head material	
				1						PTFE	
				2						Stainless steel 1.4571	
				3						PTFE with bypass valve *	
				4						Stainless steel 1.4571 with bypass valve *	
										Valve material	
					1					up to 212 °F; PTFE / PVDF *	
					2					up to 284 °F; PTFE / PEEK	
										Screw-in connections (depending on pump body)	
										PTFE Pump body	**Stainless steel pump body**
						9				DN 4/6 (Standard)	6 mm (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						4				1/4"-1/6"	1/4"
										Mounting accessories	
							9			incl. mounting bracket and bumper *	

* not on P2.4 Atex

Ordering instructions P 2.72 / P 2.74 ATEX

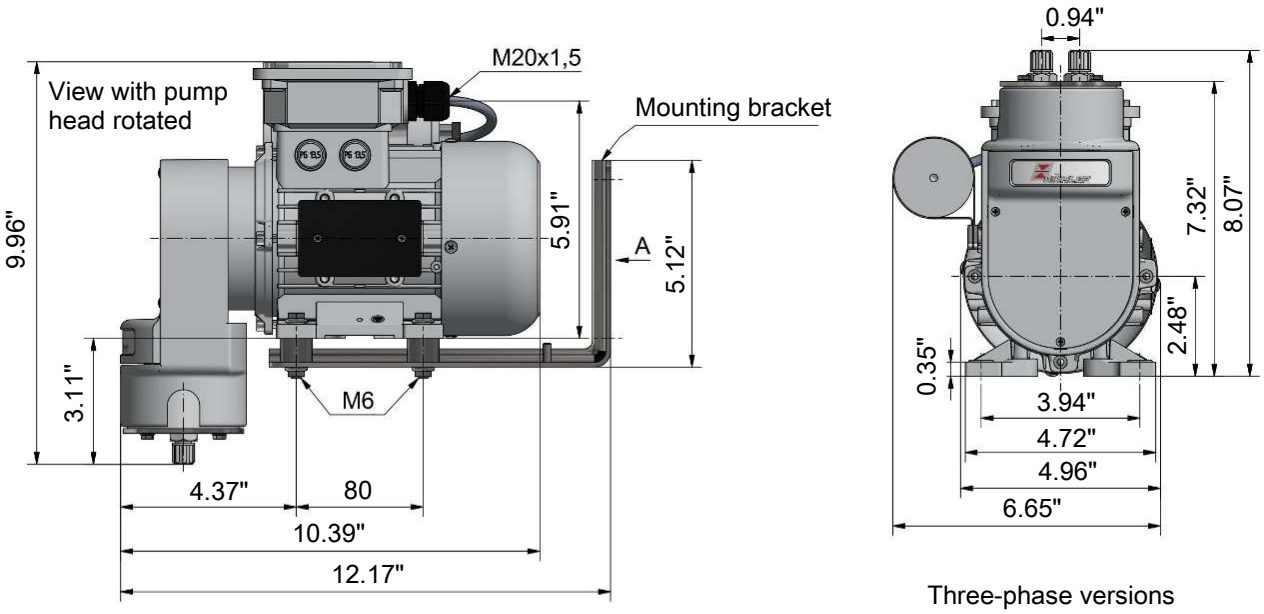
42	xx	x	x	x	x	x	9	0	00	Product characteristic
										Base model
	65									P2.72 Atex 11.7 lpm (direct operation without intermediate flange)
	66									P2.74 Atex 11.7 lpm (with intermediate flange)
										Motor voltage
		7								230 V 50/60 Hz 1.09 - 1.17 A
		8								115 V 50/60 Hz 2.3 - 2.78 A
		9								380 - 420 V 50 Hz
		0								500 V 50 Hz
										Pump head position
			1							Normal position vertical
			2							turned by 180° *
										Pump head material
				2						Stainless steel 1.4571
				4						Stainless steel 1.4571 with bypass valve *
										Valve material
					2					up to 284 °F; PTFE / PEEK
										Screw-in connections
						9				6 mm (Standard)
						1				8 mm
						2				3/8"
						4				1/4"
										Mounting accessories
							9			incl. mounting bracket and bumper *

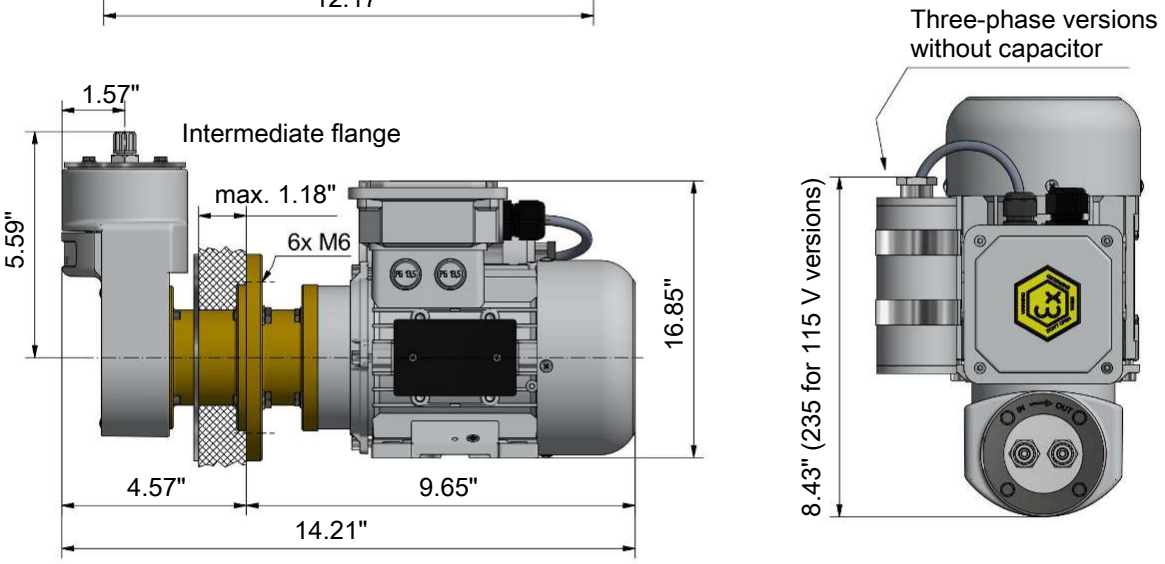
* not on P2.74 Atex

Dimensions

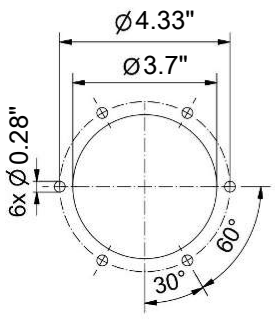
P2.2 Atex, P2.72 Atex – standard versions

P2.4 Atex, P2.74 Atex – versions with intermediate flange



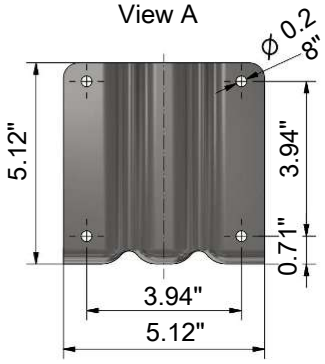


Cabinet cut-out for pumps with intermediate flange

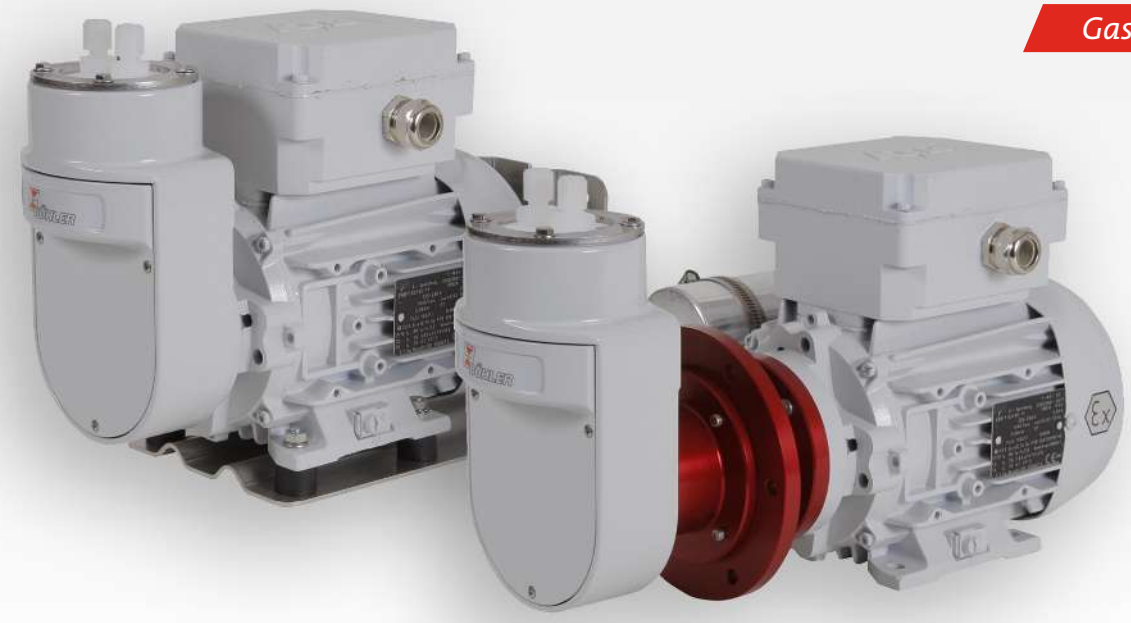


Adjustable bypass valve (optional)

View A



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.



Sample gas pumps P2.x AMEX

Even in explosive systems in the chemical industry, petrochemistry or biochemistry, gas analysis is key for safe operation. Many of the analysis processes used in these fields require extracting and special conditioning of the sample gas.

Sample gas pumps convey the sample gas from the sampling point to the conditioning system. The main item in these specially designed pumps is the PTFE single-piece bellow. Combined with the pump head, also single-piece, this solution provides high resistance against particularly aggressive sample gas. Turning the pump head allows gas with condensate to be conveyed without a problem.

There are several different models with separate drive, depending on the requirements. These versions allow the installation of a coupling flange to install the pump heads inside heated housings away from the motor whilst the motor remains outside the housing.

The series are available for various EX hazard and classification zones with flow rates up to 800 L/h (13.3 lpm).

- **Easy, sturdy construction**
- **Easy to replace valves**
- **Single-piece bellows**
- **For aggressive sample gas**
- **Conveys sample gas with condensate**
- **Long life**
- **Pump head with optional adjustable bypass valve**
- **Bypass valve for PTFE and VA pump body**
- **Low noise emission**
- **With mounting bracket**
- **FM C-US - approval for Class I Div. 2**

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Pump overview

	Direct-drive pumps (see drawing 1)		Pumps with intermediate flange (see drawing 2)	
Flow rate (see flow curve)	**400 L/h (6.7 lpm)**	**800 L/h (13.3 lpm)**	**400 L/h (6.7 lpm)**	**800 L/h (13.3 lpm)**
AMEX models (US) NI / I / 2 / BCD / T3, T4 CL.I Div.2 Gr BCD T3/T4 FM C-US approval no.: 3038101 / 3038101C	P 2.2 AMEX	P 2.82 AMEX	P 2.4 AMEX	P 2.84 AMEX
Weight	16.5 lb		18.7 lb	

Technical data

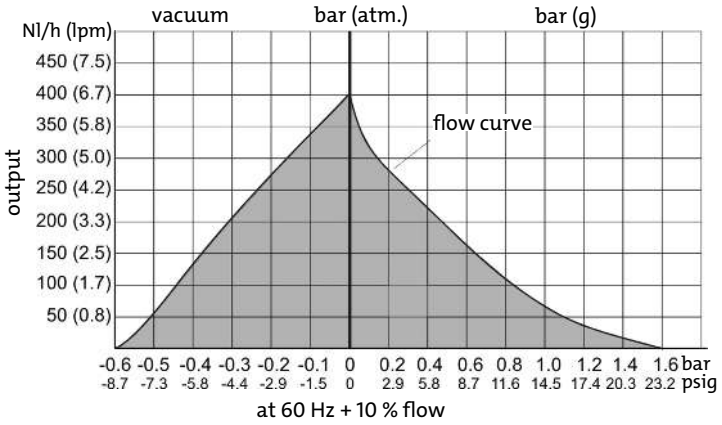
Technical data	
Nominal voltage:	see ordering information
Marking:	NI / I / 2 / BCD / T3, T4 CL.I Div.2 Gr BCD T3/T4
Protection class:	electric IP 54 mechanical IP 20
Dead volume:	0.5 cu.in.
Weight:	16.5 lb (P 2.2 / P 2.82 AMEX) 18.7 lb (P 2.4 / P 2.84 AMEX)
Materials in contact with media vary by configuration:	PTFE, PVDF (standard pump with 212 °F valves) + PEEK (standard pump with 284 °F valves) + Viton (standard pump with 212 °F valves and bypass valve) + PCTFE, Viton (standard pump with 284 °F valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, Viton (VA pipe fittings) + Viton (VA pump body with bypass valve)

Pumps 400 L/h (6.7 lpm)

Ambient temperature	
Motor 115 V / 230 V:	-4 °F to 122 °F
Motor 380 - 420 V	-4 °F to 104 °F
Pump head:	see temperature classes
Valve medium temperature*:	PTFE/PVDF max. 212 °F
	PTFE/PEEK max. 284 °F

*see temperature classes

Feed curve 400 L/h (6.7 lpm)

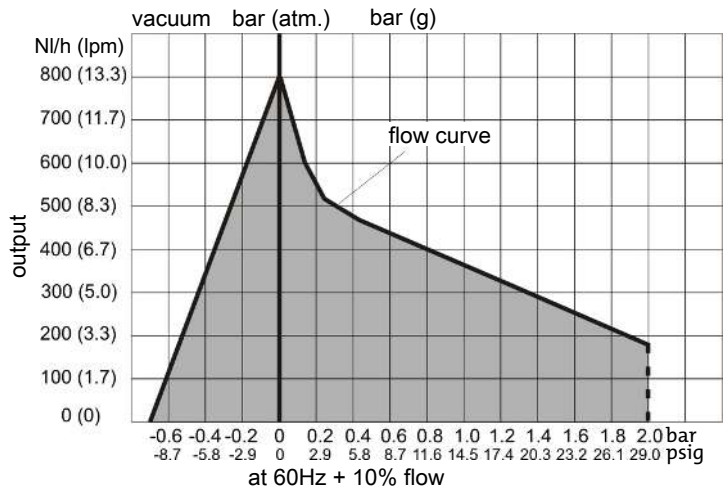


Pumps 800 L/h (13.3 lpm)

Ambient temperature	
Motor 115 V / 230 V:	-4 °F to 122 °F
Motor 380 - 420 V:	-4 °F to 104 °F
Pump head:	see temperature classes
Valve medium temperature*:	PTFE/PEEK max. 248 °F

*see temperature classes

Flow curve 800 L/h (13.3 lpm)



Temperature classes

P 2.2 AMEX		Medium temperature	Pump head temperature *
no flammable gasses in the gas circuit	T3	284 °F	122 °F
	T4	248 °F	122 °F
Flammable gasses in the gas circuit above the LEL	T3	248 °F	122 °F
	T4	122 °F	122 °F

P 2.82 AMEX		Medium temperature	Pump head temperature *
no flammable gasses in the gas circuit	T3	248 °F	122 °F
	T4	176 °F	122 °F
Flammable gasses in the gas circuit above the LEL	T3	212 °F	122 °F
	T4	122 °F	122 °F

P 2.4 AMEX		Medium temperature	Pump head temperature
no flammable gasses in the gas circuit	T3	248 °F	212 °F
	T4	176 °F	176 °F
Flammable gasses in the gas circuit above the LEL	T3	212 °F	176 °F
	T4	122 °F	122 °F

P 2.84 AMEX		Medium temperature	Pump head temperature
no flammable gasses in the gas circuit	T3	248 °F	212 °F
	T4	176 °F	176 °F
Flammable gasses in the gas circuit above the LEL	T3	212 °F	176 °F
	T4	122 °F	122 °F

* resulting from the pump's maximum ambient temperature.

Important motor notices

Motors used in EX areas require a protection device!

Protective motor switch	Motor voltage	Item no.
Installation outside the EX area	230 V; 380-400 V, 0,63-1 A	9132020021
	115 V, 1,6-2,5 A	9132020030
Installation in EX area Zone 1 or 2 (Atex only)	230 V; 380-400 V, 0,63-1 A	9132020036
	115 V, 1,6-2,5 A	9132020033

Information about the various designs

Pump head position (P2.2 and P2.82 only):

If the gas contains condensate, the pump head must be installed rotated by 180°. In this case, turn the pump head as described in the operating instructions. Please note the correct pump head position for your application when placing your order to avoid conversion.

Pump head material:

The standard material is PTFE.

The pump head may be fitted with a bypass valve (P 2.2 and P 2.82 only) to reach all the values in the grey area of the flow curve. Depending on the inlet and outlet pipe style, a stainless steel pump body may be ordered.

Valve material (models P2.2 and P2.82 only):

PTFE/PVDF valves must be used for unheated applications with a media temperature up to 212 °F. For higher temperatures up to 284 °F, use the respective PTFE/PEEK valves. Please note, the max. temperatures are limited by the temperature classes (see temperature class table).

Ordering instructions

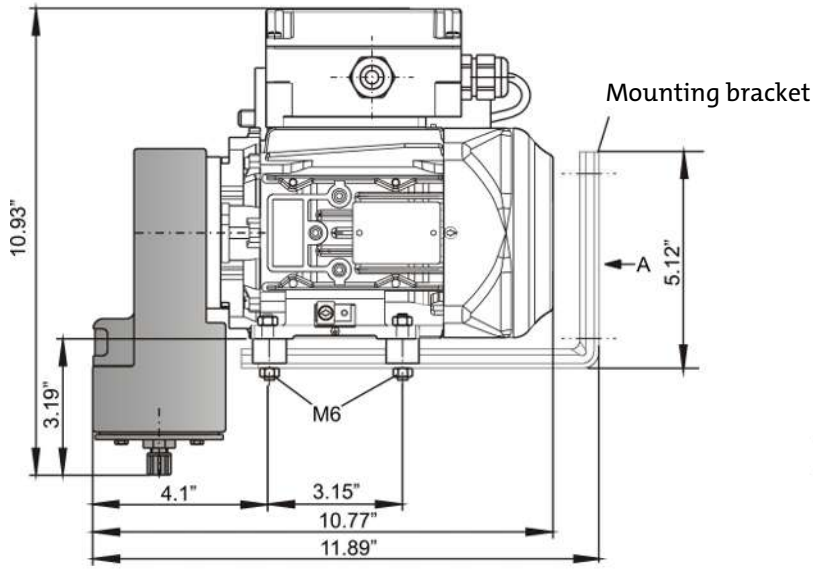
42	xx	x	x	x	x	x	9	0	00	Product characteristic	
										Base model	
	71									P2.2 Amex 400 L/h (6.7 lpm)	
	72									P2.4 Amex 400 L/h (6.7 lpm)	
	73									P2.82 Amex 800 L/h (13.3 lpm)	
	74									P2.84 Amex 800 L/h (13.3 lpm)	
										Motor voltage	
		1								230 V 50 Hz 0.88 A	
		2								230 V 60 Hz 0.89 A	
		3								115 V 50 Hz 1.76 A	
		4								115 V 60 Hz 1.78 A	
										Pump head position	
			1							Normal position vertical	
			2							turned by 180° *	
										Pump head material	
				1						PTFE	
				2						Stainless steel 1.4571	
				3						PTFE with bypass valve *	
				4						Stainless steel 1.4571 with bypass valve *	
										Valve material	
					1					up to 212 °F; PTFE / PVDF **	
					2					up to 284 °F; PTFE / PEEK	
										Screw-in connections (depending on pump body)	
										PTFE Pump body	**Stainless steel pump body**
						9				1/4"-1/6" (Standard)	1/4" (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						5				DN 4/6	6 mm
										Mounting accessories	
							9			incl. mounting bracket and bumper *	

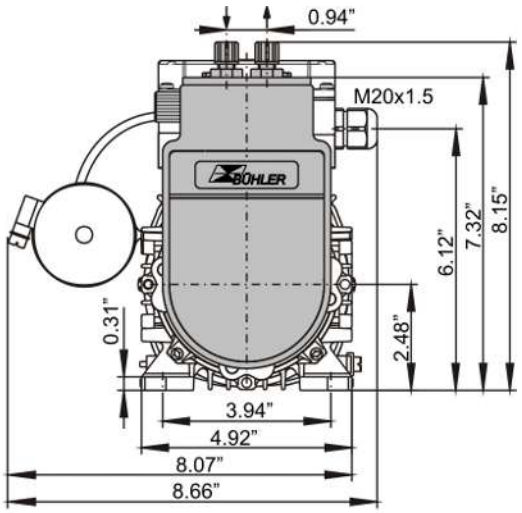
* not on P2.4 & P2.84

** not on P2.82 & P2.84

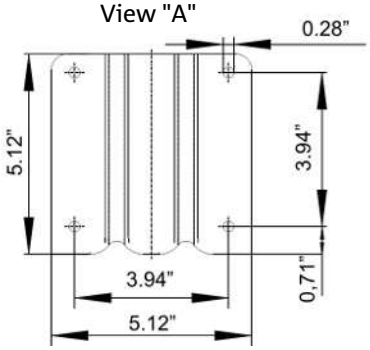
Dimensions P 2.2 AMEX, P 2.82 AMEX - Drawing 1

View with pump head rotated

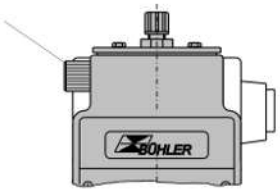




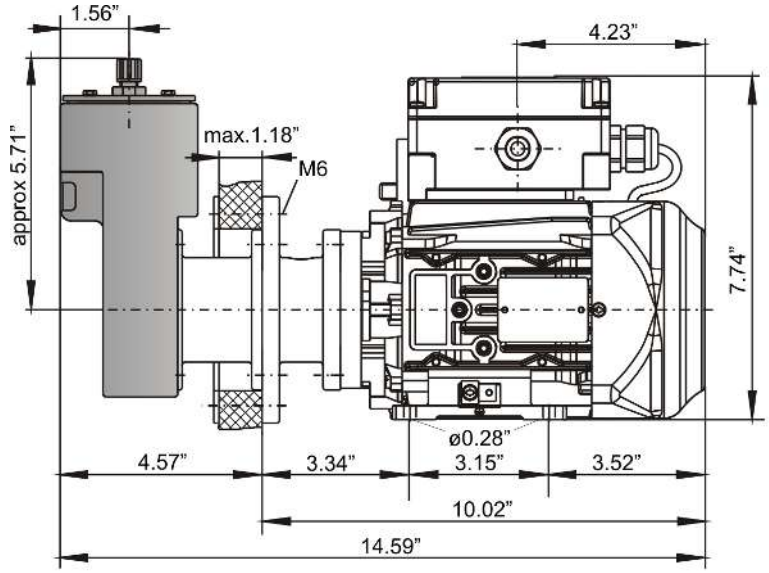
View "A"

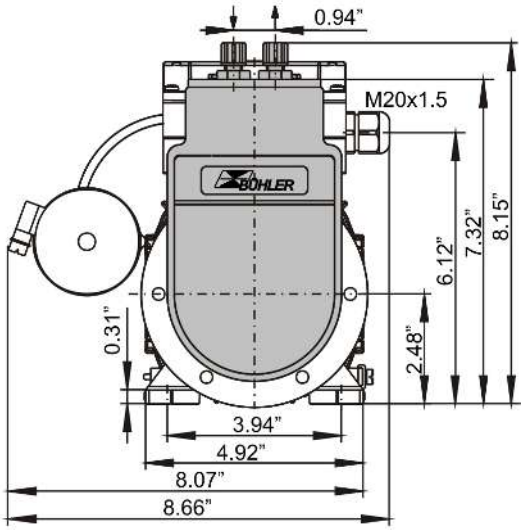


Adjustable bypass valve (optional)



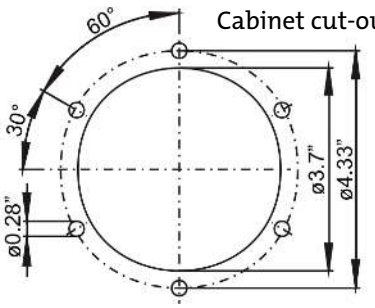
Dimensions P 2.4 AMEX, P 2.84 AMEX - Drawing 2





Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

Cabinet cut-out



Sample Filters

- DA410001 Sample Gas Filter AGF-PV-30xx
- DA410002 Sample Gas Filter AGF-T-30
- DA410003 Panel - Filte AGF-FE
- DA410012 Panel - Filter AGF-FE-4
- DA410004 Sample Gas Filter AGF-VA-23
- DA410005 Self-Cleaning Filter BF2-S
- DA410006 Ad- / Absorption Filter ADF-PV-30-L
- DA410007 Ambient Air Filter RAF-PV-30
- DA410008 Sample Gas Coalescing Filter K-AGF-PV-30-A
- DA410010 Sample Gas Filter K-AGF-VA-23
- DA410009 Heated Sample Gas Filter AHF-22
- DA410013 Sample Gas Filter AGF-VA-350
- DA410017 Sample Gas Coalescing Filter K-AGF-VA-350
- DA410014 Panel - Filter AGF-FA-5
- DA410018 Membrane Filter Water Stop
- DA410016 Housing for Absorption Filters ADF-170 / ADF-300

Sample Gas Filter AGF-PV-30

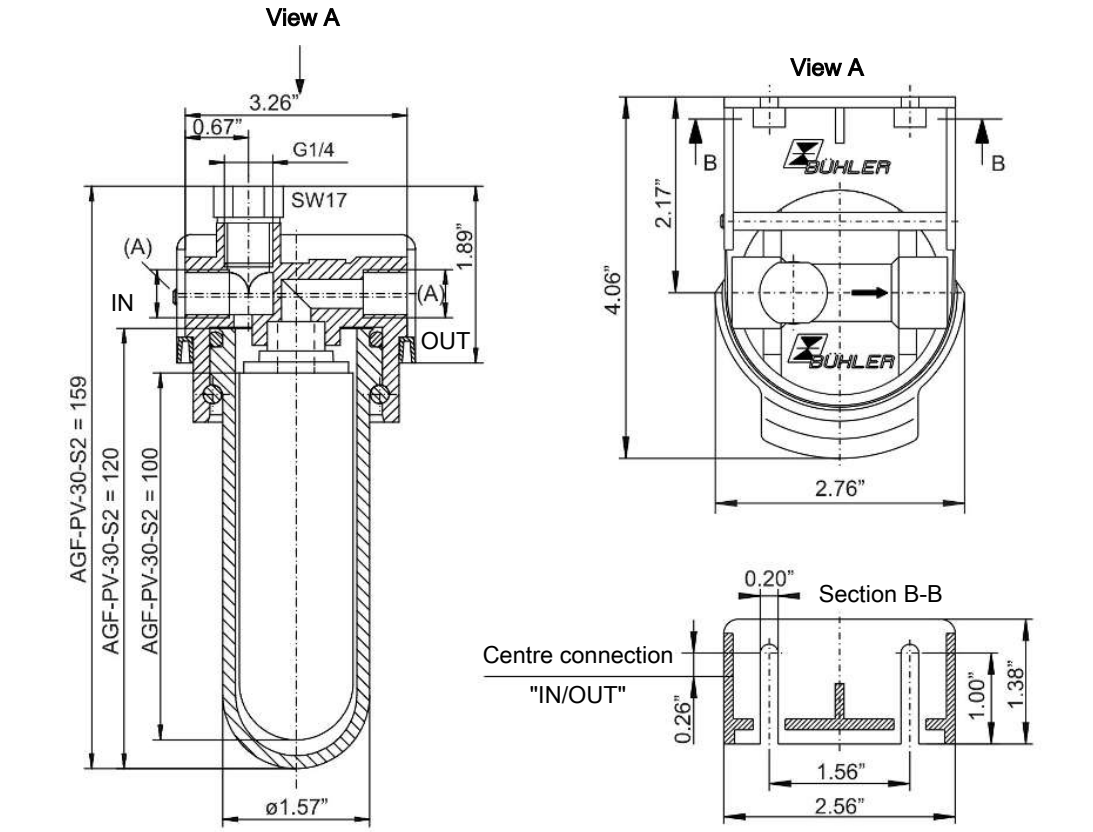
Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

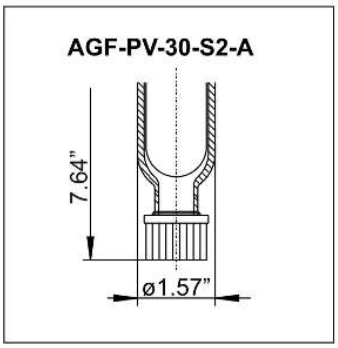
The AGF-PV-30 series features a PVDF and glass housing and is equipped with the Bühler Unique quick-release fastener. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

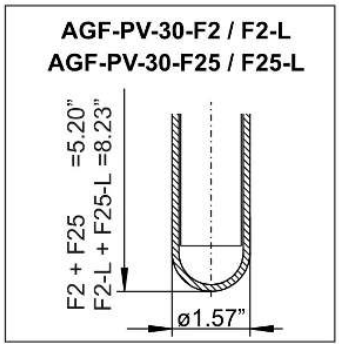
- Bühler Unique quick-release fastener
- Filter housing material: PVDF, glass
- Various filter elements
- Low dead volumes
- Bypass connection for moisture detector
- Used in **DNV-GL and LR type-tested** conditioning unit
- Compliance with requirements under **IMO MARPOL MEPC.259(68)** demonstrated
- Special design for use in high vibration environments

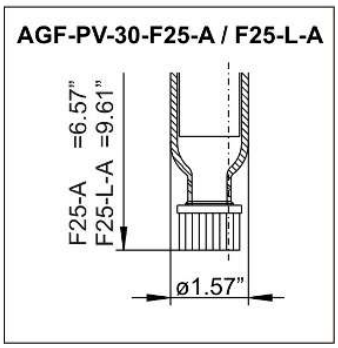
Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions









Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIB areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range for Ex area applications: 23 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

Fine mesh filter AGF-PV-30	
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread (A)	G1/4 or NPT 1/4" (see ordering information)
Max. operating pressure	58 psig
Max. operating temperature	212 °F
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration

Ordering instructions

Filter*

AGF-PV- AGF-PV-I	30-S2 30-S2-I	30-S2-A 30-S2-A-I	30-F2 30-F2-I	30-F2-A 30-F2-A-I	30-F2-L 30-F2-L-I	30-F25 30-F25-I	30-F25-A 30-F25-A-I	30-F25-L 30-F25-L-I	30-F25-L-A 30-F25-L-A-I	30-AKF 30-AKF-I
Filter fineness	2 µm	2 µm	2 µm	2 µm	2 µm	25 µm	25 µm	25 µm	25 µm	1 µm
Item no. (G1/4)	4150099	4150199	41502999	4151999	4150799	4150299	4150399	4150499	4150599	4153099
Item no. (NPT 1/4")	4150099I	4150199I	41502999I	4151999I	4150799I	4150299I	4150399I	4150499I	4150599I	4153099I
Element	S2	S2	F2	F2	F2-L	F25	F25	F25-L	F25-L	AKF
Dead volume	3.5 cu. in.	4.2 cu. in.	3.5 cu. in.	3.5 cu. in.	6.6 cu. in.	3.5 cu. in.	3.8 cu. in.	6.6 cu. in.	7.1 cu. in.	2.7 cu. in.
Weight approx.	0.62 lb	0.64 lb	0.53 lb	0.64 lb	0.64 lb	0.51 lb	0.53 lb	0.64 lb	0.66 lb	0.51 lb

* one filter element is included with delivery.

Filter elements

Item no.	Model	Material	Filter fineness	Filter surface	Packing unit	Ex application
41 01 00 10	S2	Fibreglass	2 µm	12.4 in²	5 pieces	IIC
41 01 00 2	S2	Fibreglass	2 µm	12.4 in²	25 pieces	IIC
41 03 00 50	F2	PTFE	2 µm	9.3 in²	5 pieces	IIB
41 02 00 50	F2-L	PTFE	2 µm	19.4 in²	2 pieces	IIB
41 02 01 30	F25	PTFE	25 µm	9.3 in²	5 pieces	IIB
41 01 01 20	F25-L	PTFE	25 µm	19.4 in²	2 pieces	IIB
41 010 130	AKF	Active carbon	1 µm	6.8 in²	1 pieces	not suitable for use in Ex areas

Sample Gas Filter AGF-T-30

Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

The AGF-T- 30 series has a PTFE and glass housing. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

- Full PTFE housing top
- Maximum chemical resistance, for use in highly aggressive mediums
- Filter fineness of 2 µm or 25 µm with sintered PTFE elements
- No absorption of trace gasses
- Quick response time in systems due to low dead volume
- Variable wall mount

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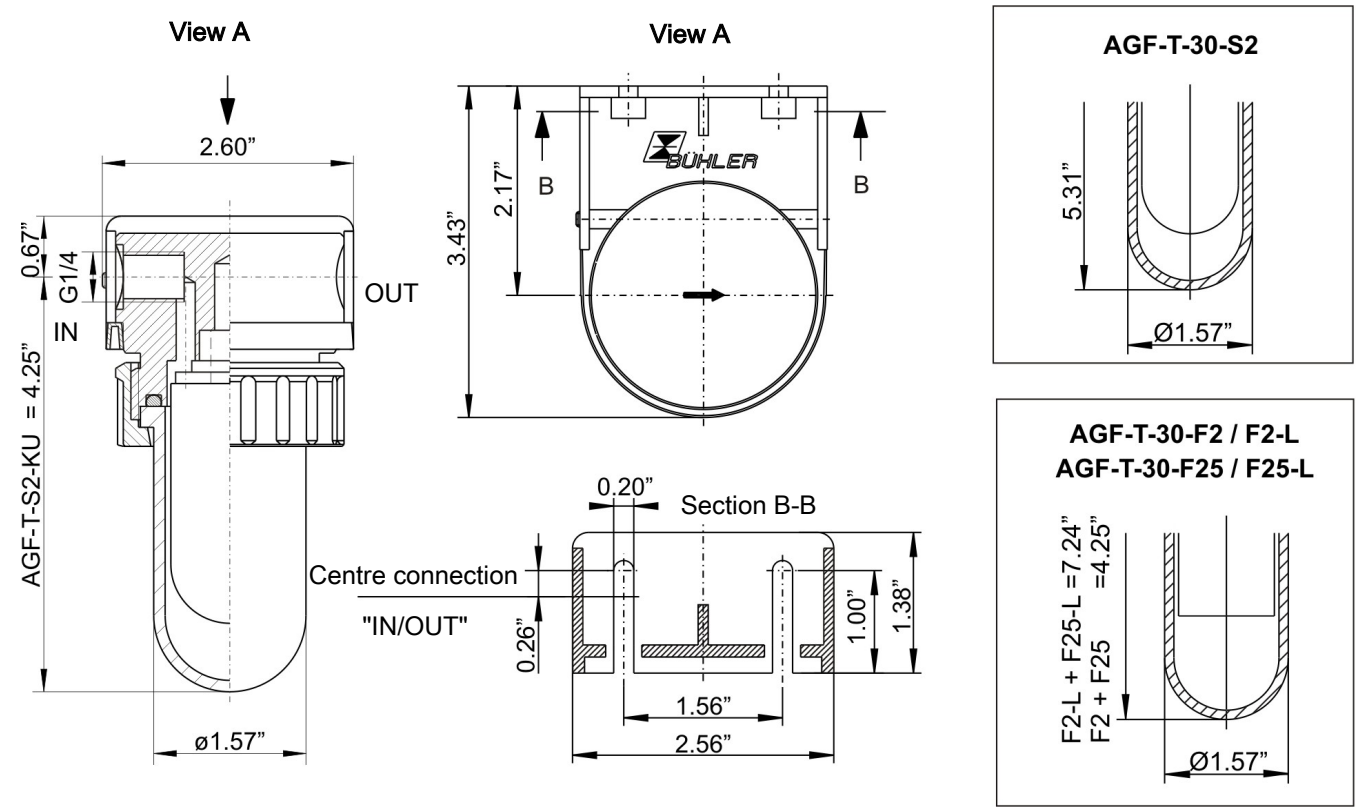
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIB areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range for Ex area applications: 23 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

AGF-T-30 Fine mesh filter	
Material – Filter head	PTFE
Material – Filter cover	Glass
Material – Gasket	Viton, PTFE shrouded
Operating pressure max.	58 psig
Operating temperature max.	212 °F

Ordering instructions

Filter*

AGF-T-	30-S2	30-S2-KU	30-F2	30-F2-L	30-F25	30-F25-L
Filter fineness	2 µm	2 µm	2 µm	2 µm	25 µm	25 µm
Item no.	4151399	4151499	4151799	4151099	4151199	4151299
Element	S2	S2KU	F2	F2-L	F25	F25-L
Dead volume	3.5 cu. in.	3.1 cu. in	3.5 cu. in	6.6 cu. in	3.5 cu. in	6.6 cu. in
Weight approx.	0.9 lb	0.77 lb	0.77 lb	0.95 lb	0.77 lb	0.95 lb

* one filter element is included with delivery.

Filter elements

Item no.	Model	Filter element	Material	Filter fineness	Filter surface	Packing unit	Ex application
41 01 00 10	S2	Sleeve	Fibreglass	2 µm	12.4 in²	5 pieces	IIC
41 01 00 2	S2	Sleeve	Fibreglass	2 µm	12.4 in²	25 pieces	IIC
41 01 01 40	S2-KU	Sleeve	Fibreglass	2 µm	9.5 in²	5 pieces	IIC
41 01 01 50	S2-KU	Sleeve	Fibreglass	2 µm	9.5 in²	25 pieces	IIC
41 03 00 50	F2	Sintered PTFE	PTFE	2 µm	9.3 in²	5 pieces	IIB
41 02 01 30	F25	Sintered PTFE	PTFE	25 µm	9.3 in²	5 pieces	IIB
41 02 00 50	F2-L	Sintered PTFE	PTFE	2 µm	19.4 in²	2 pieces	IIB
41 01 01 20	F25-L	Sintered PTFE	PTFE	25 µm	19.4 in²	2 pieces	IIB

Panel-Filter AGF-FE

Especially in emission control via portal analysis systems the sample gas cannot always be extracted without particle contamination. The necessary conditioning systems must be compact and lightweight and therefore require small and light system components.

We offer special filter housings for these applications and for installation into a standard 19” rack.

The AGF-FE filters screw into the front panel with sample gas connections at the back. They are available in a variety of material combinations.

- Front panel installation
- Easy installation
- Large filter surface
- Easy element replacement

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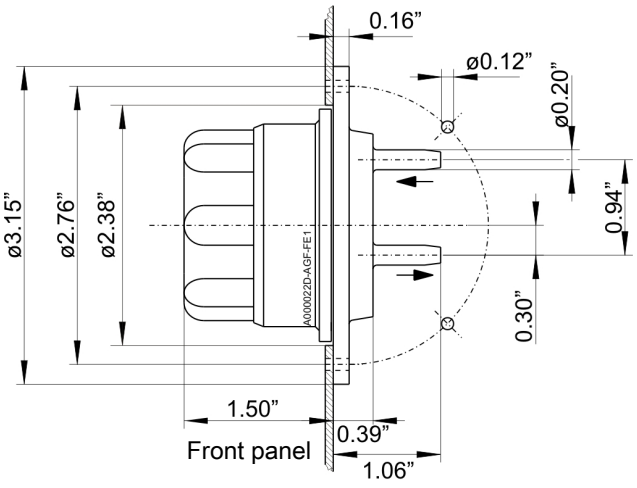
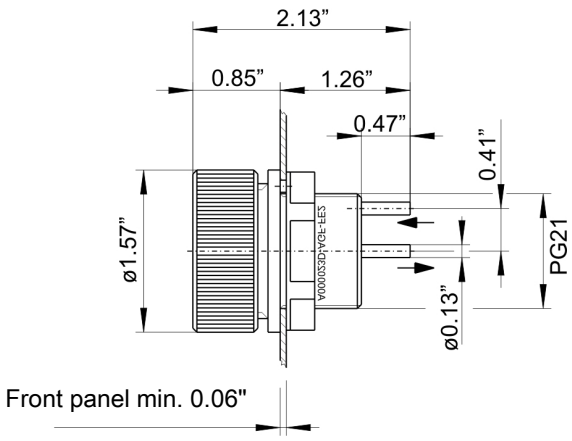
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions

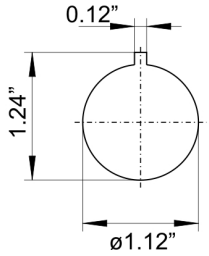
AGF-FE-1 / AGF-FE-1-T



AGF-FE-2



Installation diagram



Technical Data

Built-in filter	AGF-FE-1	AGF-FE-1-T	AGF-FE-2
Filter surface	6.2 in²	6.2 in²	2.0 in²
Filter fineness	2 µm	2 µm	8 µm
Dead volume	1.5 cu. in.	1.5 cu. in.	0.37 cu. in.
Material - filter housing	PC	PC	PVDF / 1.4571
Material - gasket	Viton	Viton	Viton
Material - filter element	Fibreglass / epoxy resin	PTFE	Fibreglass / epoxy resin
Connections	DN 4/6	DN 4/6	DN 2/4
Operating pressure max.	29 psig	29 psig	29 psig
Medium temperature	max. 175 °F	max. 175 °F	max. 175 °F

Ordering instructions

Filter*

Item no.	Model
41 15 9991	AGF-FE-1
41 15 8991	AGF-FE-1-T
41 15 099	AGF-FE-2
90 09 162	O-ring for model FE-E1 / FE-1-T
41 28 011	O-ring for model FE-E2

* one filter element is included with delivery.

Filter elements

Item no.	Model	for filter model	Packing unit
41 15 00 10	FE-E1	AGF-FE-1	5 pieces
41 15 00 90	FE-1-T	AGF-FE-1-T	5 pieces
41 15 09 910	FE-E2	AGF-FE-2	5 pieces

Panel-Filter AGF-FE-4

Especially in emission control via portal analysis systems the sample gas cannot always be extracted without particle contamination. The necessary conditioning systems must be compact and lightweight and therefore require small and light system components.

We offer special filter housings for these applications and for installation into a standard 19” rack.

The AGF-FE-4 filters screw into the front panel and their sample gas connections are located at the back.

- Front panel installation
- Easy installation
- Large filter surface
- Easy element replacement
- Acid-proof materials

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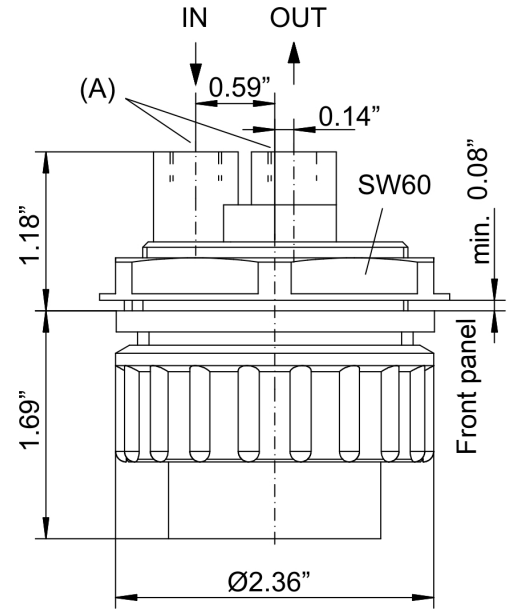
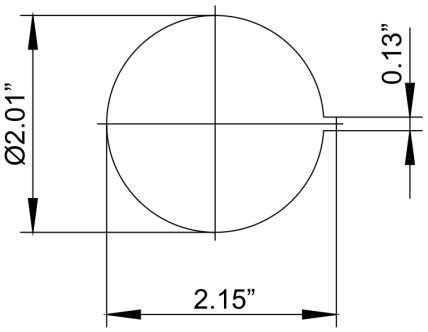
Dimensions



Installation diagram



Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIB areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas: -5 °C ≤ T_{amb} ≤ 60 °C.

Technical Data

AGF-FE-4 Built-In Filter	
Filter surface	6.5 in²
Filter fineness	2 µm
Dead volume	1.74 cu. in.
Material - filter housing	PTFE, PVDF, Duran glass (parts in contact with mediums)
Material - gasket	Viton or PTFE-reinforced Viton
Material - filter element	Sintered PTFE
Connections (A)	G1/8 or NPT 1/8 (see ordering information)
Operating pressure max.	29 psig
Medium temperature	max. 212 °F

Ordering instructions

Filter*

Item no.	Model	Connections
41 15 100	AGF-FE-4	G1/8
41 15 100I	AGF-FE-4-I	NPT 1/8
41 15 200	AGF-FE-4-Vi/PTFE	G1/8
41 15 200I	AGF-FE-4-Vi/PTFE-I	NPT 1/8
41 01 003	O-ring	

* one filter element is included with delivery.

Filter element

Item no.	Model	Material	Packing unit	Ex application
41 15 10 50	FE-4	Sintered PTFE	8 pieces	II B

Sample Gas Filter AGF-VA-23

Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

The AGF-VA-23 series is completely made from stainless steel and features the Bühler Unique quick-release fastener. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

Bühler Unique quick-release fastener
Very quick and easy filter changes without tools
Low dead volume
Variable wall-mounting via spacer block
(Auto) condensate drain option through the connection thread (G3/8) inside the filter cover
Bypass connection inside the filter head (G1/4), connection option for moisture detector or ventilation

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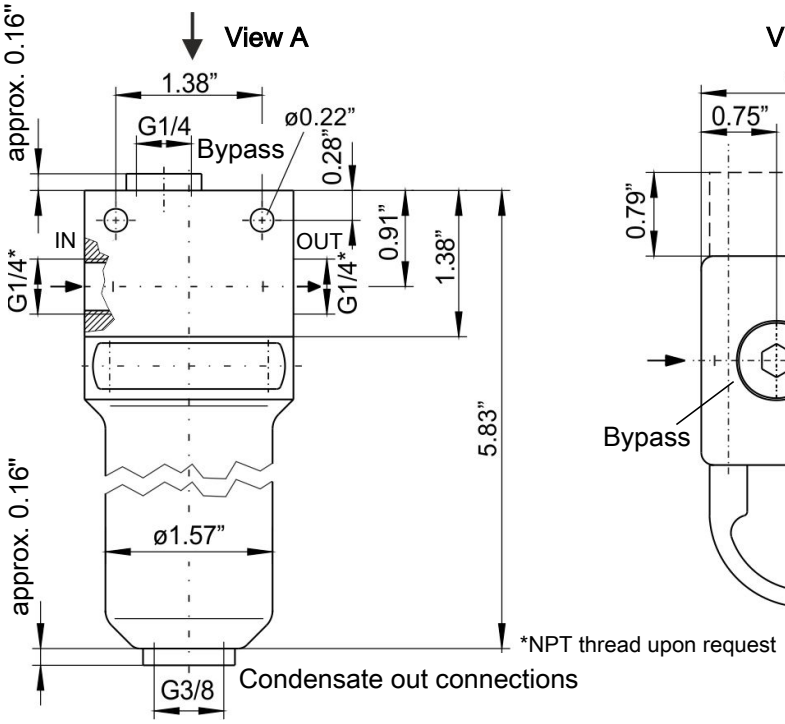
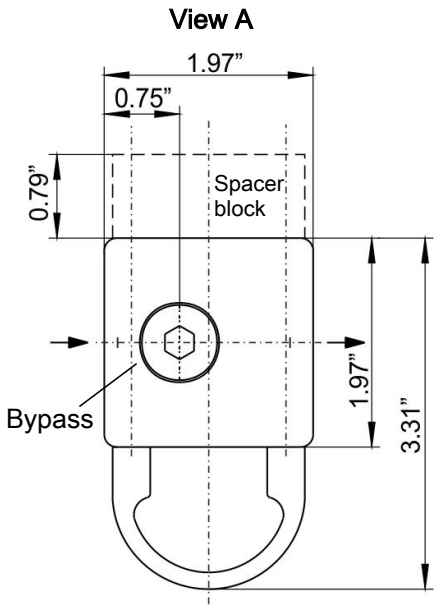
Dimensions





Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIC areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas: -5 °C ≤ T_{amb} ≤ 60 °C.

Technical Data

AGF-VA-23 Fine Mesh Filter	
Dead volume with filter element	
DRGxxxSO-V/-P	3.1 cu. in.
DRGxxxVA-V	3.4 cu. in.
F2/F25	3.1 cu. in.
Material - filter housing	1.4571 / SS 316 Ti
Material - gasket	available in Viton or perfluorelastomer
Material - filter element	see table
Weight	3.7 lb
Operating pressure max.*	160 bar
Medium temperature max.*	see table

* Pressures and temperatures are greatly reduced when connecting a moisture detector.

Ordering instructions

Filter (empty housing)

Item no.	Model	Seal
41 42 999	AGF-VA-23-V for installing DRG filter elements	Viton
41 45 999	AGF-VA-23-P for installing DRG filter elements	Perfluorelastomer
41 42 699	AGF-VA-23-V-F2/F25 for installing F2 / F25 filter elements	Viton
41 45 699	AGF-VA-23-P-F2/F25 for installing F2 / F25 filter elements	Perfluorelastomer

Filter elements

Item no.	Model	Seal	Material	Temperature max.	Filter fineness	Filter surface	Packing unit	Ex application
78 56 966	DRG 25 VA-V	Viton	1.4301 / epoxy resin	248 °F	25 µm	70 cm²	1 pieces	IIC
78 56 974	DRG 60 VA-V	Viton	1.4301 / epoxy resin	248 °F	60 µm	70 cm²	1 pieces	IIC
78 56 982	DRG 100 VA-V	Viton	1.4301 / epoxy resin	248 °F	100 µm	70 cm²	1 pieces	IIC
41 03 003	DRG 25 SO-V	Viton	1.4301 / 1.4401	302 °F	25 µm	70 cm²	1 pieces	IIC
41 03 004	DRG 60 SO-V	Viton	1.4301 / 1.4401	302 °F	60 µm	70 cm²	1 pieces	IIC
41 03 008	DRG 25 SO-P	Perfluoroelas-tomer	1.4301 / 1.4401	500 °F **	25 µm	70 cm²	1 pieces	IIC
41 03 009	DRG 60 SO-P	Perfluoroelas-tomer	1.4301 / 1.4401	500 °F **	60 µm	70 cm²	1 pieces	IIC
41 03 00 50	F2	--	Sintered PTFE	212 °F	2 µm	60 cm²	5 pieces	IIB
41 02 01 30	F25	--	Sintered PTFE	212 °F	25 µm	60 cm²	5 pieces	IIB
41 28 008	Viton O-ring (for filter...-V)							
41 26 004	Perfluoroelastomer O-ring (for filter...-P)							

Other filter elements available upon request.

** at reduced maximum pressure.

Self-cleaning filter BF2-S

Using so-called "self-cleaning" gas filters is worth considering for sample gas systems where secondary contamination primarily consisting of larger particles are to be expected.

The functional principle of these filters is that of the 'Cross Flow' process. Here a partial stream is continuously adequate for analysis is continuously extracted from the main sample gas flow. Inside the housing, the main stream is forced along the filter element in a spiral. The dirt particles from the partial stream deposited on the surface of the element are carried along by the main stream and discharged. The continuous discharge of dirt deposit results in a very long filter element life, thus low maintenance.

The BF2-S was developed specifically for these applications.

- For fluids and gasses
- Long filter life
- Low maintenance
- Compact installation
- Pipe fitting included

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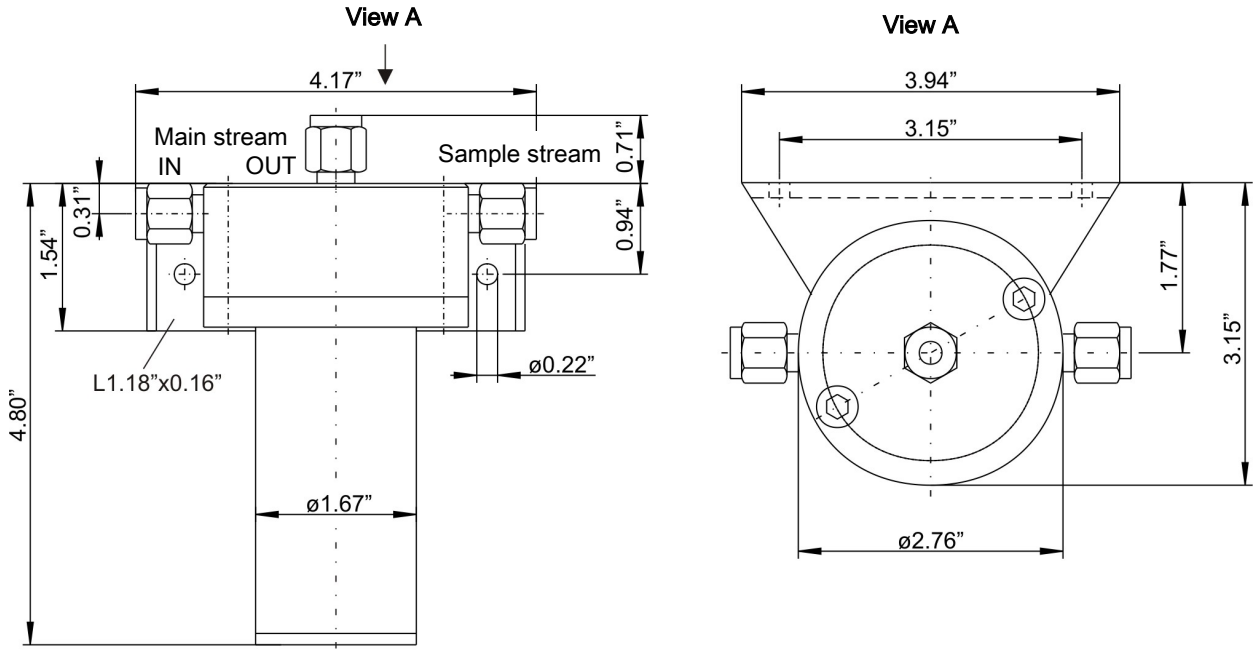
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions

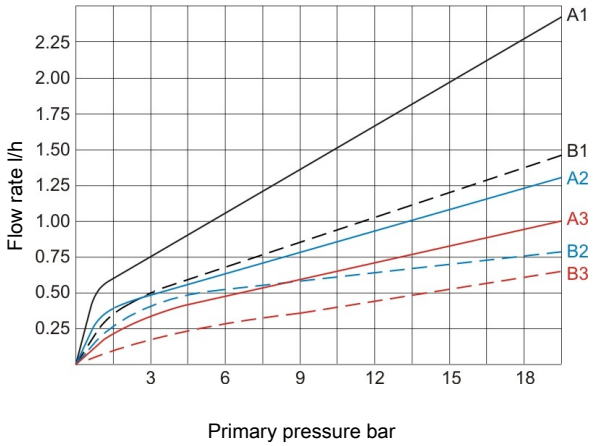


Flow characteristics

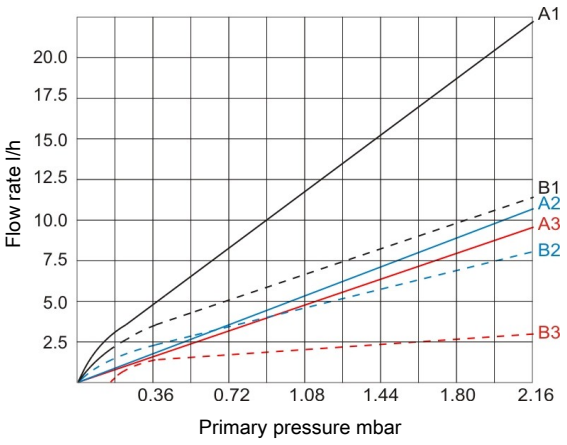
The flow rates indicated automatically arise when the main and sample stream discharge to outside.

		Total	Main stream	Sample stream
———	Element 5 M - 29 - 100 Filter fineness 5 micron	A1	A2	A3
– – – – –	Element 0.5 M - 29 - 100 Filter fineness 0.5 micron	B1	B2	B3

Flow medium water 55 °F



Flow medium nitrogen 68 °F



Technical Data

Fine mesh filter BF2-S	
Material – Housing	1.4571
Material – Arbor	PTFE
Material – Filter element	1.4404
Material – Gasket	Viton
Connections	fitting for Ø 6 mm (0.24 in) pipe
Weight	approx. 3.3 lb
Filter surface	19.4 in²
Filter fineness	0.5 or 5 µm
Operating pressure max.	362 psig
Operating temperature max.	248 °F

Ordering instructions

Filter*

Item no.	Model	Filter fineness
41 09 999	BF2-S-0.5	0.5 µm
41 08 999	BF2-S-5	5 µm

* one filter element is included with delivery.

Filter elements

Item no.	Model	Packing unit
41 09 001	0.5M - 29 - 100	1 pieces
41 08 001	5M - 29 - 100	1 pieces

Ad-/Absorption Filter ADF-PV-30-L

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results.

There frequently is a need to remove gaseous components from the sample gas through adsorption/absorption.

The ADF-PV-30 is a housing suitable for this application. Made from PVDF and glass and equipped with Unique quick-release fastener, it can be filled with various adsorbents/absorbents. The bottom gas inlet ensures sufficient contact times.

- Bühler Unique quick-release fastener
- Quick and easy filter material changes without tools
- Variable wall mount

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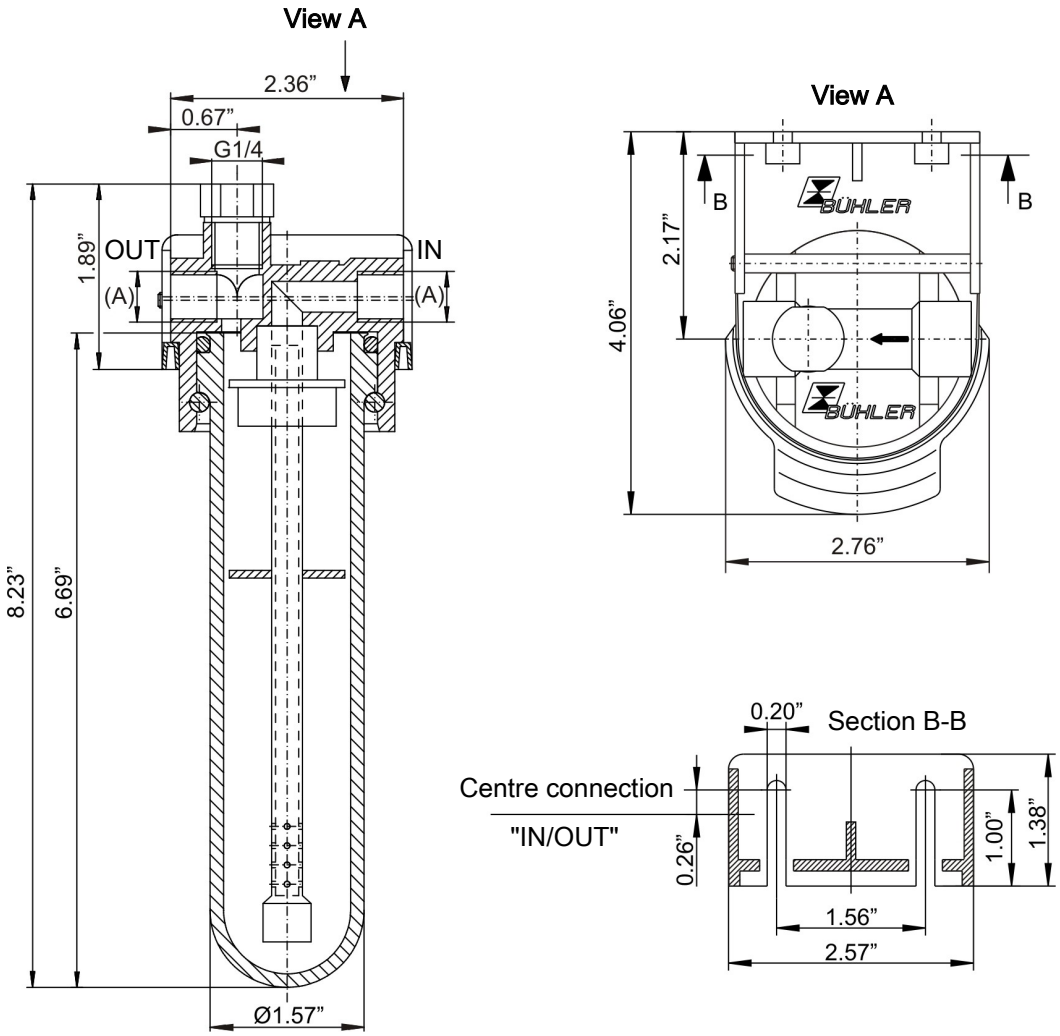

Technical Data

ADF-PV-30-L Ad-/Absorption Filter	
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread	G1/4 or NPT 1/4" (see ordering information)
Weight	approx. 0.66 lb
Fill volume	7.3 cu. in.
Operating pressure max.	58 psig
Operating temperature max.	212 °F (without adsorbent/absorbent)

Ordering instructions

Filter*

Item no.	Model	Connections
41 52 099	ADF-PV-30-L	G1/4
41 52 099I	ADF-PV-30-L-I	NPT 1/4"

* without adsorbent/absorbent.

Ambient Air Filter RAF-PV-30

The AGF-PV-30 series features a PVDF and glass housing and is equipped with the Bühler Unique quick-release fastener. The filter head has an additional connection for installing a moisture detector. A variety of materials is available based on the application.

Warehouse technology and other areas in food technology frequently require monitoring the composition of the ambient atmosphere. Ensuring reliable analysis results requires conditioning the sample gas. This also includes filtering out any particular matter in the sample gas.

- Bühler Unique quick-release fastener
- Very quick and easy filter changes without tools
- Variable wall mount

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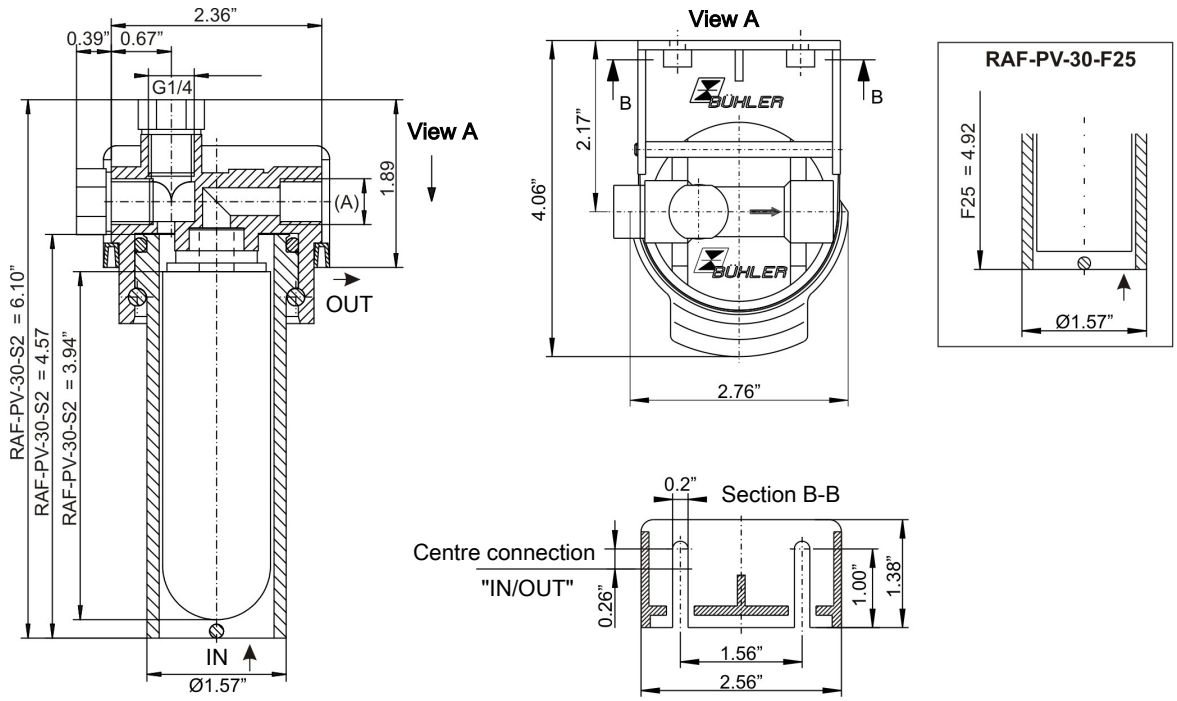

Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIB areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range for Ex area applications: 23 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

RAF-PV-30 Ambient air filter	
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread (A)	G1/4 or NPT 1/4" (see ordering information)
Weight	approx. 0.62 lb
Operating temperature max.	212 °F

Ordering instructions

Filter*

Item no.	Model	Filter fineness	Element	Connections
41 52 199	RAF-PV-30-S2	2 µm	S2	G1/4
41 52 199I	RAF-PV-30-S2-I	2 µm	S2	NPT 1/4"
41 52 299	RAF-PV-30-F25	25 µm	F25	G1/4
41 52 299I	RAF-PV-30-F25-I	25 µm	F25	NPT 1/4"

* one filter element is included with delivery.

Filter elements

Item no.	Model	Filter element	Material	Filter fineness	Filter surface	Packing unit	Ex application
41 01 001	S2	Sleeve	Fibreglass	2 µm	12.4 in²	5 pieces	IIC
41 01 002	S2	Sleeve	Fibreglass	2 µm	12.4 in²	25 pieces	IIC
41 02 013	F25	PTFE	Sintered PTFE	25 µm	9.3 in²	5 pieces	IIB

Sample Gas Coalescing Filter K-AGF-PV-30-A

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results. One disturbance variable which must also be eliminated is aerosols.

The aqueous suspended particles can easily be removed from the gas by coagulation using special filter matrices. During this process, the tiny aerosols accumulate on the fibres of the filter matrix through collision, forming drops increasing in size. Once large enough, the condensate which forms drains into the filter bowl and is then removed.

Model K-AGF-PV-30-A uses the AGF-PV filter series housing made from PVDF and glass and has the respective fittings to adapt it to the coagulation function.

The easy installation and the Unique quick-release fastener are additional advantages of this model.

Bühler Unique quick-release fastener
Very quick and easy filter changes without tools
Variable wall mount
Additional connection inside the filter head (G1/4) for moisture detector or bypass
Allows the connection of automatic condensate drains

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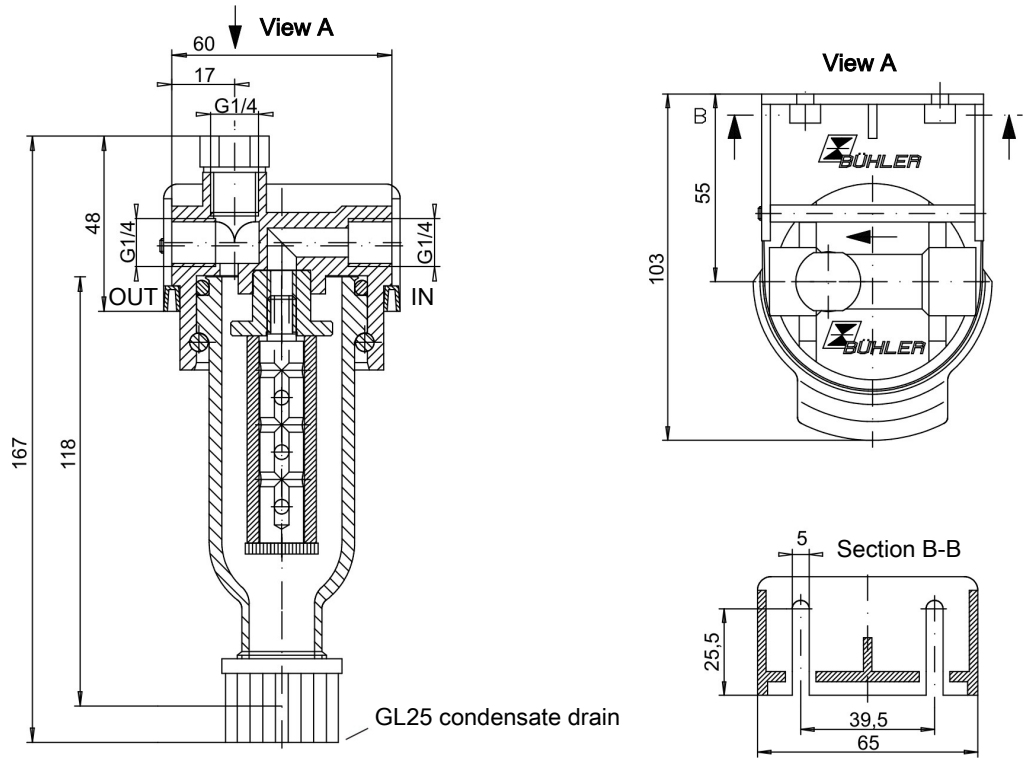

Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIB areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range for Ex area applications: 23 °F ≤ T_{amb} ≤ 140 °F.

Technical Data

K-AGF-PV-30-A Coalescence Filter	
Dead volume	4.5 cu. in.
Material – Filter head	PVDF
Material – Filter cover	Glass
Material – Gasket	Viton
Thread	G1/4 or NPT 1/4" (see ordering information)
Weight	0.53 lb
Operating pressure max.	58 psig
Operating temperature max.	212 °F

Ordering instructions

Filter*

Item no.	Model	Seal
41 50 699	K-AGF-PV-30-A; G1/4 outlet and inlet	Viton
41 50 699I	K-AGF-PV-30-A-I; NPT 1/4" outlet and inlet	Viton

* one filter element is included with delivery.

Filter element

Item no.	Model	Filter element	Material	Filter surface	Packing unit	Ex application
49 32 002	12-57-C	Screw-in sleeve	Borosilicate fibre	4.3 in²	1 pieces	IIC

Sample Gas Coalescing Filter K-AGF-VA-23

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results. One disturbance variable which must also be eliminated is aerosols.

The aqueous suspended particles can easily be removed from the gas by coagulation using special filter matrices. During this process, the tiny aerosols accumulate on the fibres of the filter matrix through collision, forming drops increasing in size. Once large enough, the condensate which forms drains into the filter bowl and is then removed.

Model K-AGF-VA-23 has the housing from the AGF-VA filter series made from stainless steel and with the respective fittings to adapt it for the coagulation function.

The easy installation and the Unique quick-release fastener are additional features of this model.

Bühler Unique quick-release fastener
Very quick and easy filter changes without tools
Low dead volume
Variable wall-mounting via spacer block
Condensate drain through connection thread (G3/8) inside the filter cover
Bypass connection inside the filter head (G1/4)

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e-mail: sales@buhlertech.com
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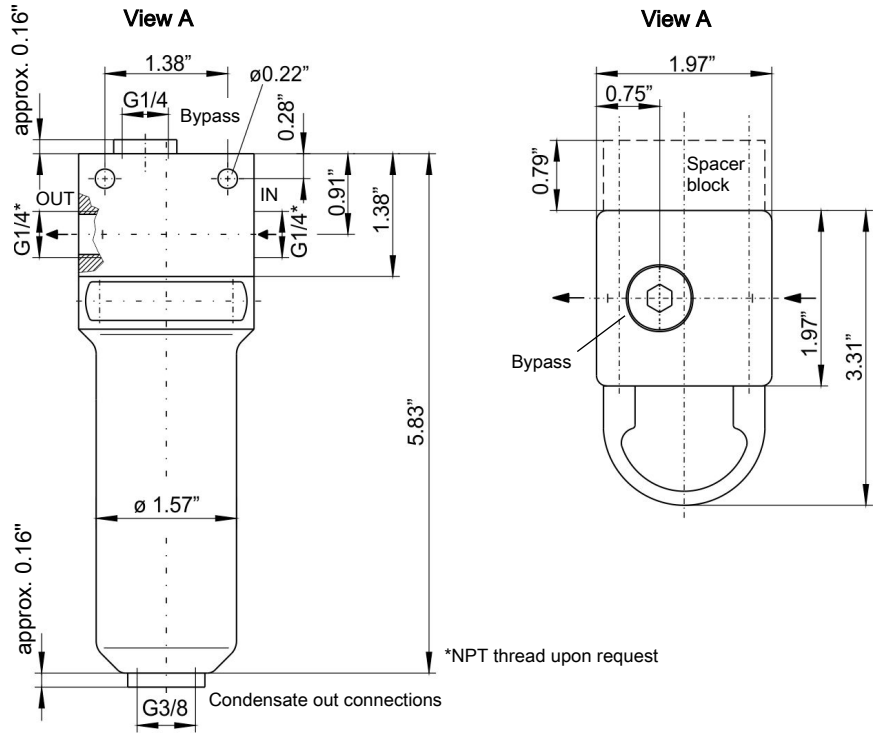


Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIC areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas: -5 °C ≤ T_{amb} ≤ 60 °C.

Technical Data

K-AGF-VA-23 Coalescence Filter	
Dead volume with filter element	3.3 cu. in.
Material - filter housing	1.4571 / SS 316 Ti
Material - gasket	available in Viton or perfluorelastomer
Material - filter element	see table
Weight	3.7 lb
Operating pressure max.	2320 psig
Medium temperature max.	285 °F

Ordering instructions

The filter includes a spacer block, 2 fixing bolts DN 912 M5 x 80, as well as sealing plugs inside the bypass and condensate out connection.

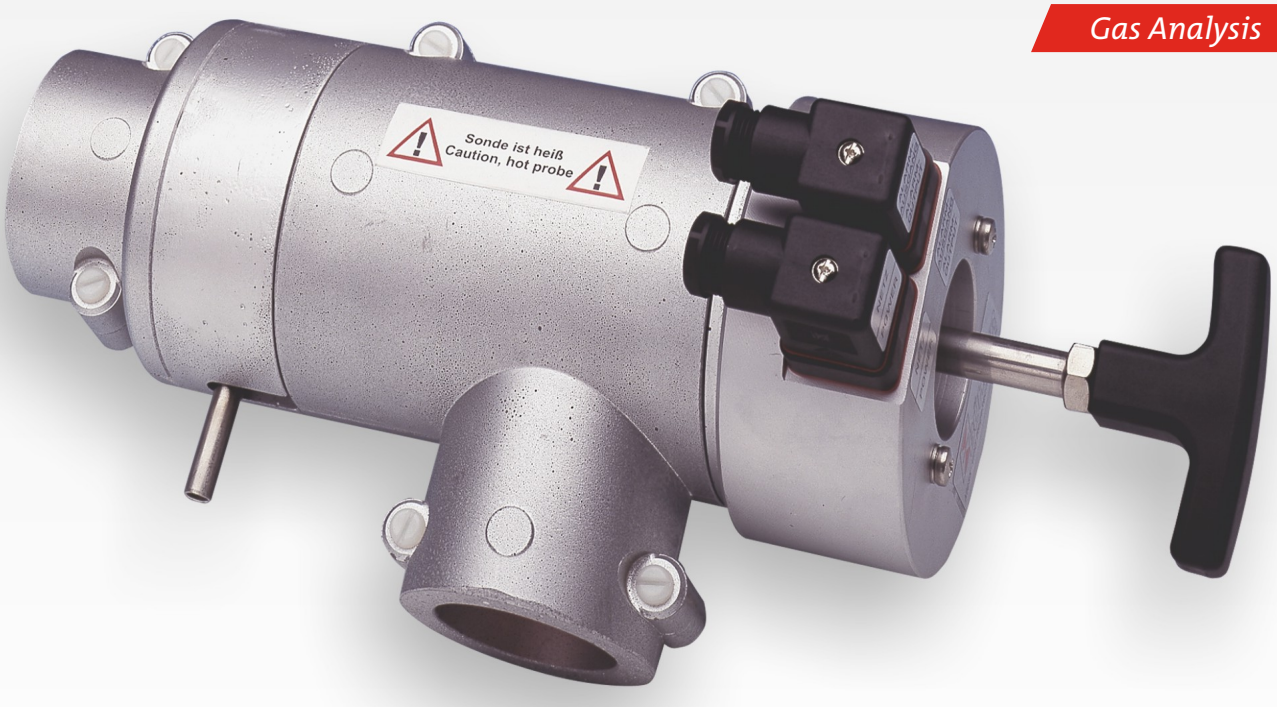
Filter*

Item no.	Model	Seal
41 42 799	K-AGF-VA-23-V	Viton
41 42 899	K-AGF-VA-23-P	Perfluorelastomer

* one filter element is included with delivery.

Filter element

Item no.	Model	Filter element	Material	Filter surface	Packing unit	Ex application
49 32 001	12-57-C	Sleeve	Borosilicate fibre	4.3 in²	1 pieces	IIC



Heated Sample Gas Filter AHF-22

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results.

One requirement may be that the sample gas be particle-free and extracted and transported hot.

The AHF-22 heated particle filter is particularly suited for this type of application. The filter element can quickly be changed without interruption and without tools.

- Simple, sturdy construction
- Easy installation
- Tool-less filter element change
- No disassembly required to replace filter
- Controlled or self-regulating heater
- Calibrating gas connection optional
- No cold spots

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e-mail: sales@buhlertech.com
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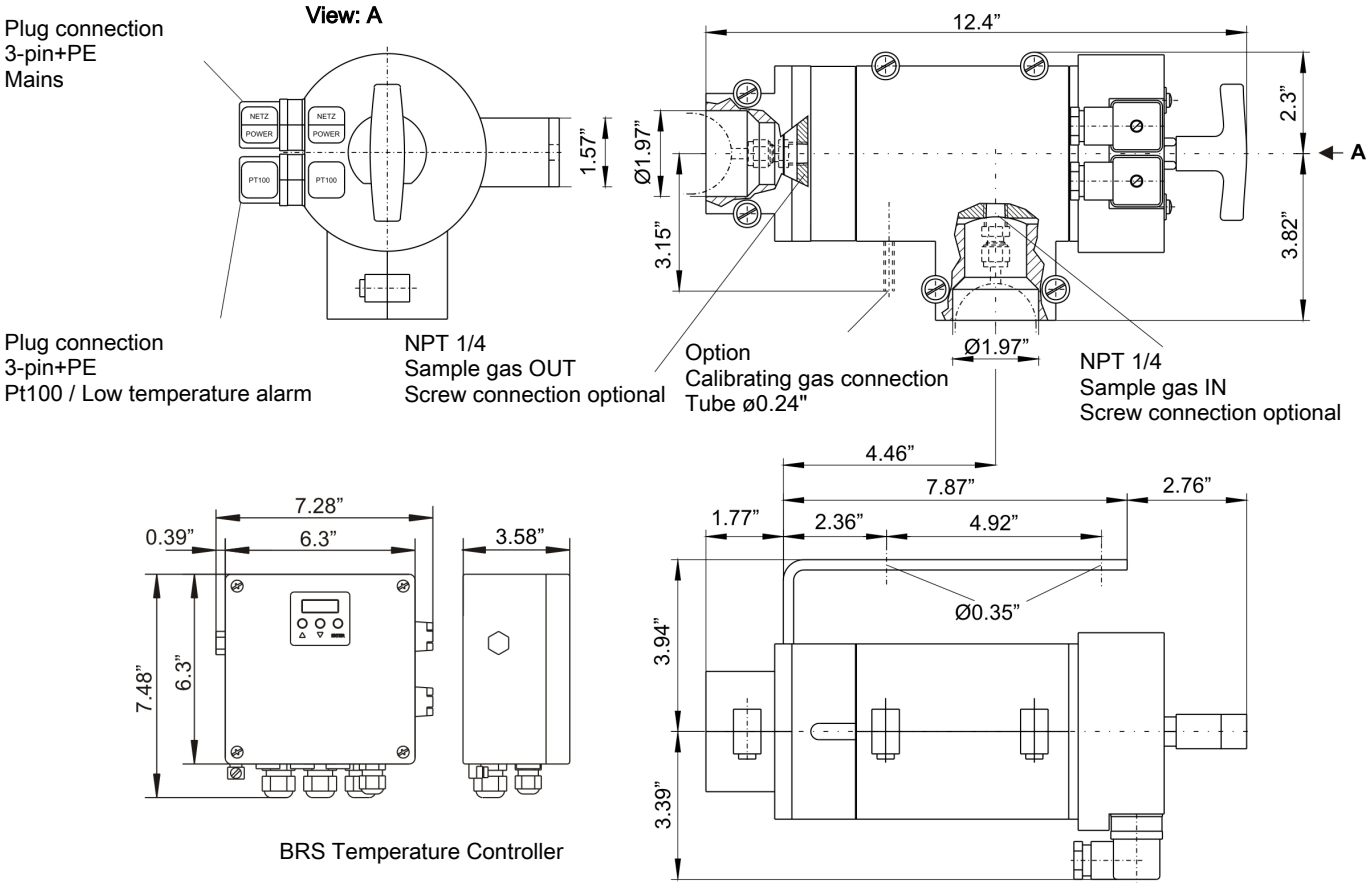
Dimensions



Technical Data

AHF-22 Heated Analysis Filter	
Dead volume	4.9 - 6.1 cu. in
Material - filter housing	1.4571
Material - gasket	Viton (perfluorelastomer upon request)
Insulation	filled resin
Heat output	400 W
Protection rating	IP 40
Weight	14.1 lb
Operating pressure max.*	230 psig
Temperatures	self-regulating heater: approx. 356°F adjustable heater: max. 392°F
Temperature sensor	self-regulating heater: contact 284 °F adjustable heater: Pt100
Ambient temperature	32...158°F

Ordering instructions

Filter*

Item no.	Model	Description	Voltage
41 22 2294	AHF-22-S	self-regulating	115-230 V A, 50/60 Hz
41 22 2295	AHF-22-S-K	self-regulating, calibrating gas connection	115-230 V A, 50/60 H
41 22 2296	AHF-22-115-R	adjustable**	115 V AC, 50/60 Hz
41 22 2299	AHF-22-230-R	adjustable**	230 V AC, 50/60 Hz
41 22 2297	AHF-22-115-R-K	adjustable, calibrating gas connection**	115 V AC, 50/60 Hz
41 22 2298	AHF-22-230-R-K	adjustable, calibrating gas connection**	230 V AC, 50/60 Hz
41 22 2092	BRS	Temperature controller	230 V AC, 50/60 Hz
41 22 2192	BRS	Temperature controller	115 V AC, 50/60 Hz

* no filter element

** no temperature controller

Filter elements

Item no.	Material	Filter fineness	Packing unit
46 22 2010	Sintered metal incl. gaskets (Viton)	5 µm	1 pieces
46 22 2011	Stainless steel mesh star-pleated incl. gaskets (Viton)	10 µm	1 pieces
46 22 2026	Ceramic incl. gaskets (Viton)	3 µm	1 pieces
46 222 012	Set of gaskets for filter element and filter (Viton)		1 pieces
46 222 024	Set of gaskets for filter element and filter (perfluorelastomer)		1 pieces

Sample Gas Filter AGF-VA-350

Even if the particular contaminant has already been removed at the extraction point through effective particle filtration inside the gas sampling probe, in long or branched sample gas line there is a risk of secondary contamination. Additional filters are therefore often installed at the point where the sample gas enters the analysis system and also before delicate system components. The filter housings must be made of corrosion-resistant, non-absorbent materials, easy to install and easy to maintain. They should further be compatible with various filter elements.

Model AGF-VA-350 has a small stainless steel housing and is suitable for operating pressures up to 5076 psi.

- Very quick and easy filter changes without tools
- Low dead volume
- Variable wall mounting via mounting bracket
- (Auto-) condensate drain option through connection thread (NPT 1/4”) inside the filter cover

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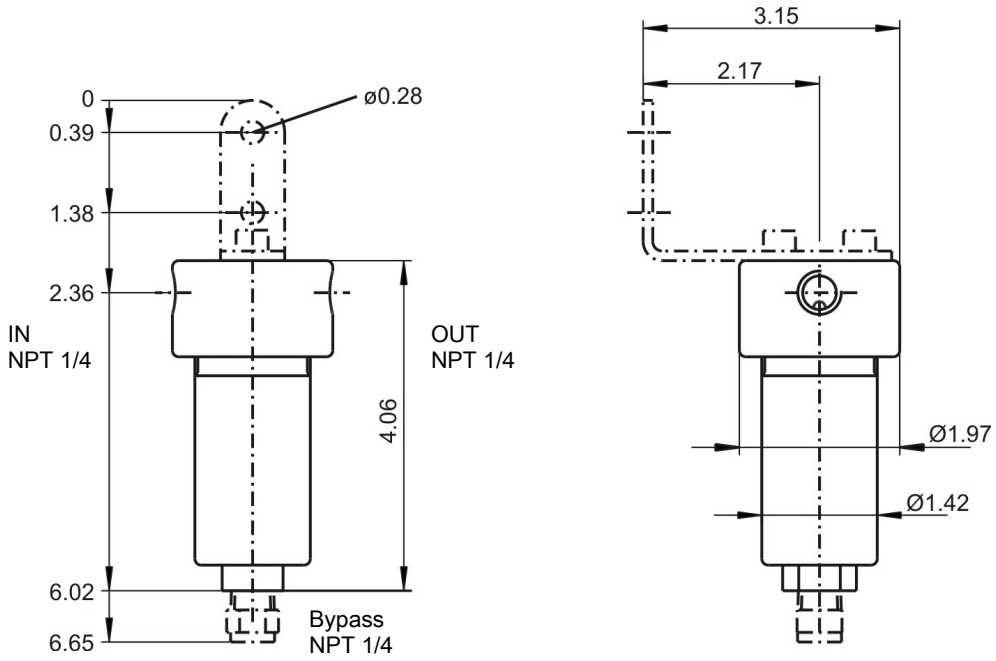

Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIC areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Do not convey flammable gases explosion class IIC through the filter which may occasionally be explosive during normal operation.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas: -5 °C ≤ T_{amb} ≤ 60 °C.

Technical Data

Filter	
Dead volume with filter element	1.1 cu. in.
Material - filter housing	1.4404 (SS 316L)
Material - gasket	Viton FEP shrouded
Material - filter element	see table
Weight	approx. 1.76 lb
Operating pressure max.	5076 psi
Medium temperature max.	302 °F

Ordering instructions

Filter

Item no.	Model	Material
41 35 999	AGF-VA-350-T, empty housing	1.4404 (SS316L), Viton gasket, FEP shrouded
41 35 9993	Mounting bracket	1.4301 (SS 304)
90 08 802	Plug NPT 1/4	1.4401 (SS 316)
90 09 297	O-ring	Viton / FEP shrouded

Filter elements

Item no.	Model	Material	Filter fineness	max. temperature	Packing unit	Ex application
41 35 G002	GF2	Fibreglass / epoxy resin	2 µm	302 °F	1 pieces	IIC
41 35 G005	GF5	Fibreglass / epoxy resin	5 µm	302 °F	1 pieces	IIC
41 35 G010	GF10	Fibreglass / epoxy resin	10 µm	302 °F	1 pieces	IIC

Sample Gas Coalescing Filter K-AGF-VA-350

In specific gas technology applications, high pressure keeps the gas inside the systems. The undesirable disturbance variables also include aerosols in the gas in these types of systems. The aqueous suspended particles can easily be removed from the gas by coagulation using special filter matrices. During this process, the tiny aerosols accumulate on the fibres of the filter matrix through collision, forming drops increasing in size. Once large enough, the condensate which forms drains into the filter bowl and is then removed.

Model K-AGF-VA-350 has a stainless steel housing for operating pressures up to 5076 psi.

- Very quick and easy filter changes without tools
- Low dead volume
- Variable wall mounting via mounting bracket
- (Auto-) condensate drain option through connection thread (NPT 1/4”) inside the filter cover

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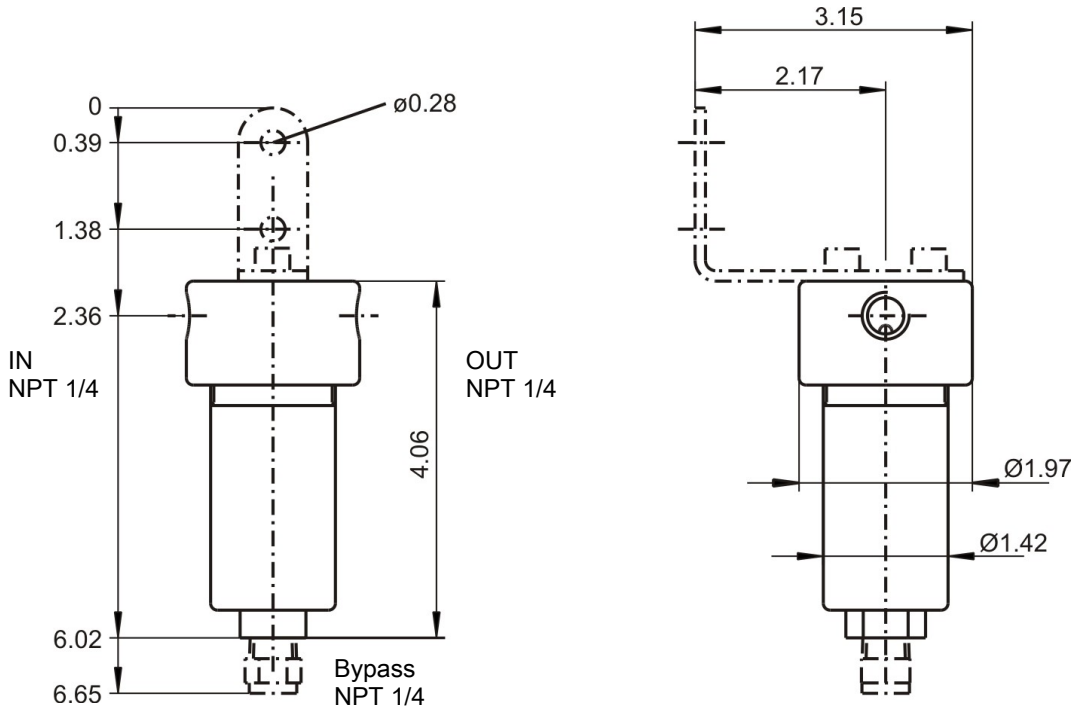

Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIC areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Do not convey flammable gases explosion class IIC through the filter which may occasionally be explosive during normal operation.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas: -5 °C ≤ T_{amb} ≤ 60 °C.

Technical Data

Filter	
Dead volume with filter element	1.1 cu. in.
Material - filter housing	1.4404 (SS 316L)
Material - gasket	Viton FEP shrouded
Material - filter element	see table
Weight	approx. 1.76 lb
Operating pressure max.	5076 psi
Medium temperature max.	302 °F

Ordering instructions

Filter

Item No.	Model	Material
41 35 099	K-AGF-VA-350-T, empty housing	1.4404 (SS 316L), Viton gasket, FEP shrouded
41 35 9993	Mounting bracket	1.4301 (SS 304)
90 08 802	Plug NPT 1/4	1.4401 (SS 316)
90 09 297	O-ring	Viton / FEP shrouded

Filter element

Item no.	Model	Filter element	Material	Filter surface	Packing unit	Ex application
49 32 002	12-57-C	Sleeve	Borosilicate fibre	4.3 in²	1 pieces	IIC

Panel-Filter AGF-FA-5

Especially in emission control via portal analysis systems the sample gas cannot always be extracted without particle contamination. The necessary conditioning systems must be compact and lightweight and therefore require small and light system components.

We offer special filter housings for these applications and for installation into a standard 19” rack.

AGF-FA-5 filters are screwed onto the front panel. The sample gas connections and an additional connection for the moisture detector can be accessed from the front panel.

Front panel
Easy installation
Large filter surface
Easy element replacement
Acid-proof materials
Bypass connection in the filter head (G1/4), connection options for bypass, moisture detector or ventilation

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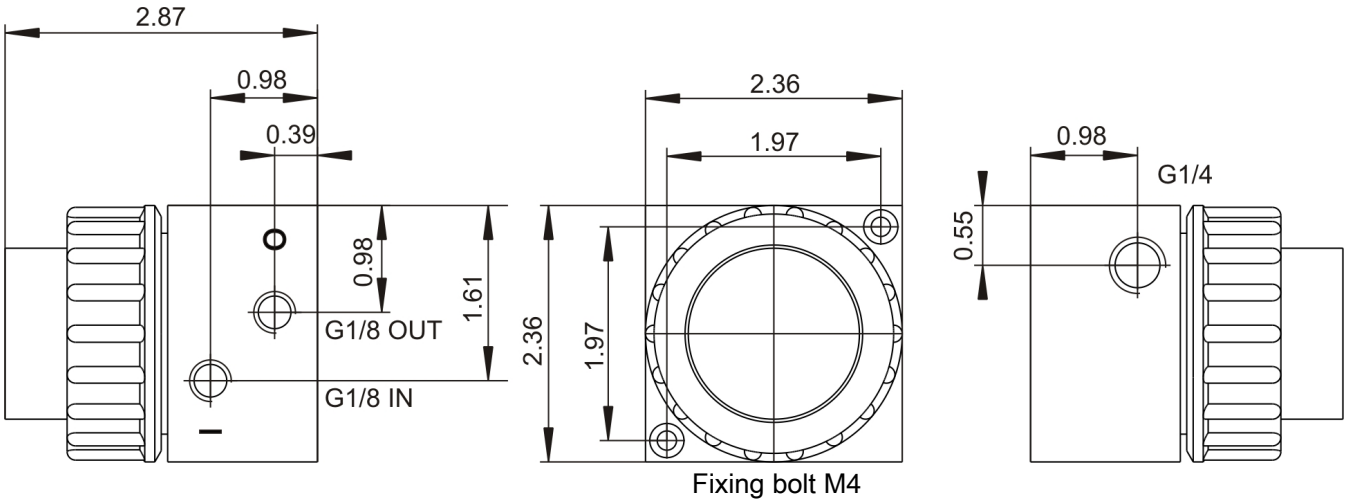

Use in explosive areas (additional notices):

The filter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in Category 2G, Explosion class IIB areas. The filter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Flammable gases, explosion class IIB, which could occasionally be explosive during normal operation may be conveyed through the filter.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas: -5 °C ≤ T_{amb} ≤ 60 °C.

Technical Data

Panel filter AGF-FA-5	
Filter surface	6.5 in²
Filter fineness	2 µm
Dead volume	1.74 cu. in. (without filter element)
Material - filter housing	PTFE, PVDF, Duran glass (parts in contact with mediums)
Material - gasket	Viton
Material - filter element	Sintered PTFE
Connections	G1/8 (gas IN / OUT) or G1/4 (bypass)
Operating pressure max.	29 psig
Medium temperature	max. 212 °F
Option	Moisture detector (see Data Sheet 41 0011)

Ordering instructions

Filter*

Item no.	Model
41 15 300	AGF-FA-5
41 01 003	O-ring

* one filter element is included with delivery.

Filter element

Item no.	Model	Material	Packing unit	Ex application
41 15 10 50	FE-4	Sintered PTFE	8 pieces	II B

Membrane filter water stop

The membrane filter water stop protects the gas analyser from liquids, aerosols and particles. The filter installs in the tubing (PTFE) or piping (stainless steel) directly before the gas analyser.

- Reliable gas analyser protection from condensate and dust
- Compact size
- Oil repellent membranes (stainless steel version)
- Bypass function ready (stainless steel version)
- Easy membrane replacement (stainless steel version)

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Description

The membrane filter water stop protects the gas analyser from liquids, aerosols and particles. The filter installs in the tubing (PTFE) or piping (stainless steel) directly before the gas analyser.

The membrane filter water stop protects the analyser in the event the upstream gas conditioner (e.g. cooler, peristaltic pump or gas filter) fails or is overloaded. Protection is implemented through a built-in semipermeable membrane, which separates the gas from condensation and dust. If this membrane is full, the gas flow is interrupted. Our upstream flow meters can be used to electrically output an alarm indicating the interruption.

The membranes in the PTFE version are not replaceable due to the economic design; on the stainless steel version they can be replaced in just a few simple steps. Simply remove the cover screws – the filter or the piping do not need to be removed. The membrane on the stainless steel version also has an oil repelling coating so it can be used for oily applications. The stainless steel filter is further designed as a bypass filter. The main gas flow and the condensate or oil it carries can therefore be discharged via the bypass. Targeted flow to the membranes yields a self-cleaning effect.

The filters are suitable for the following applications:

- Emission measurement with sulphuric fuels,
- Aerosols arising in waste incineration,
- Moist gasses, e.g. biogasses,
- Fine particle separation during processes, e.g. cement, glass, steel, paper industries,

Stainless steel version:

- Condensates containing hydrocarbons, e.g. oils and petrols in refinery process plants, engine test beds

Technical Data

Membrane filter water stop:	PTFE	Stainless steel
Max. Membrane water pressure:	29 psi	29 psi
Max. Operating pressure gas/oil:	29 psi gas	4 psi oil
Recommended max gas glow:	400 L/h (air)	120 L/h (air)
Pressure drop:	100 L/h: 10 mbar 400 L/h: 40 mbar	60 L/h: 20 mbar 120 L/h: 40 mbar
Membrane pore size:	< 0.1 µm	< 0.1 µm
Operating temperature:	32 °F...158 °F	-4 °F...338 °F
Effective filter area:	20 cm²	25 cm²
Housing volume:	0.3 cu.in	0.9 cu.in.
Materials used:	Coated PTFE, PP	1.4571, Viton, coated PTFE
Dimensions Diameter: Length/height:	 Ø2.76 in approx. 4.72 in	 Ø3.94 in approx. 2.36 in
Installation:	Tubing	Wall mounted
Gas connections:	NPT 1/8"–4/6 PVDF	IN: 1/4" NPT OUT: NPT 1/8"

Use in explosive areas (additional notices):

The membrane filter meet the fundamental safety requirements of Directive 2014/34/EU and are suitable for use in the areas specified below (see table). The membrane filters are not marked, as they do not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Version		Explosion classes		Operating temperature
		Internal	External	
PTFE	Zone 1	IIB	IIB	158 °F
	Zone 2	IIB	IIB	
Stainless steel	Zone 1	IIB	IIC	338 °F
	Zone 2	IIB	IIC	

Tab. 1: Provisions and limitations when used in Ex areas

DANGER **Impact**

Strong blows to the housing can produce sparks, which can ignite an EX atmosphere.
Protect the equipment from external impact. Damaged housing parts must be replaced immediately.

DANGER **Dangerous electrostatic charge (explosion hazard)**

Incendive electrostatic charges may occur when cleaning housing parts and decals (e.g. with a dry cloth or compressed air). The sparks this produces could ignite flammable, explosive atmospheres.
Always clean housing parts and decals **with a damp cloth**!
Metal housing parts must be earthed.

Ordering instructions

Item no.	Model
65 709 753	Membrane filter water stop with two female connectors, NPT 1/8" - 4/6 PVDF
65 709 754	Membrane filter water stop VA, external NPT 1/8" connectors
65 709 755	Replacement filter for membrane filter water stop VA
65 709 76	Membrane filter water stop with two connections, both sides 6 mm (0.24 in) tube

Housing for Absorption Filters ADF-170 / ADF-300 (Ammonia Filter)

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results.

There frequently is a need to remove gaseous components from the sample gas through ad-/absorption.

For applications where the incidence of interfering components may fluctuate or the materials must have a long lifetime, the ADF-170/300 model housings are the top choice.

- All-purpose, in various sizes
- Available with high-efficiency NH_3 absorber filling
- Up to 38.000 hours life time for NH_3 absorber
- Quick and easy maintenance (tool-less)
- Chemical and temperature-resistant materials
- Condensate output optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Absorbent granules

NH_3 absorber

The residual ammonia slip primarily causes problems in flue gas analysis when removing nitrogen from flue gas in DeNOx systems (catalytic reduction of nitric oxides; SCR). Ammonium chlorides may particularly form in temperatures below 230 °C, which frequently cause irreversible deposits along the sample gas path or analyser. In addition, ammonia generally promotes the formation of acidic aerosols. The processes may permanently damage both the components in the gas conditioning system as well as the gas analyser. Only selective removal of ammonia parts from the sample gas can ensure a long measurement system life along and low maintenance costs.

The NH_3 absorber is the very easy and cost-effective option to selectively and reliably remove traces of ammonia from the sample gas. Of course they do not affect the gas components to be monitored, such as SO_2, NO, NO_2, CO_2, CO.

- Reliable, selective NH_3 removal from the sample gas
- Long life of up to 38.000 h
- NH_3 absorber refill pack

Filter material life in hours (h) per ppm NH_3 per volume flow (l/min):

$$\text{ADF 170 life} = \frac{20.000\ \text{h}}{1\ \text{ppm} * 1\ \text{l/min}} \quad \text{for the filter with 170 mm filter length}$$

$$\text{ADF 300 life} = \frac{38.000\ \text{h}}{1\ \text{ppm} * 1\ \text{l/min}} \quad \text{for the filter with 300 mm filter length}$$

The housing size and volume flow can be selected so as to control maintenance intervals.

Example: Sample gas contains 2 ppm NH_3 at a flow rate of 2 l/min. For the 300 mm long filter, for example, this means:

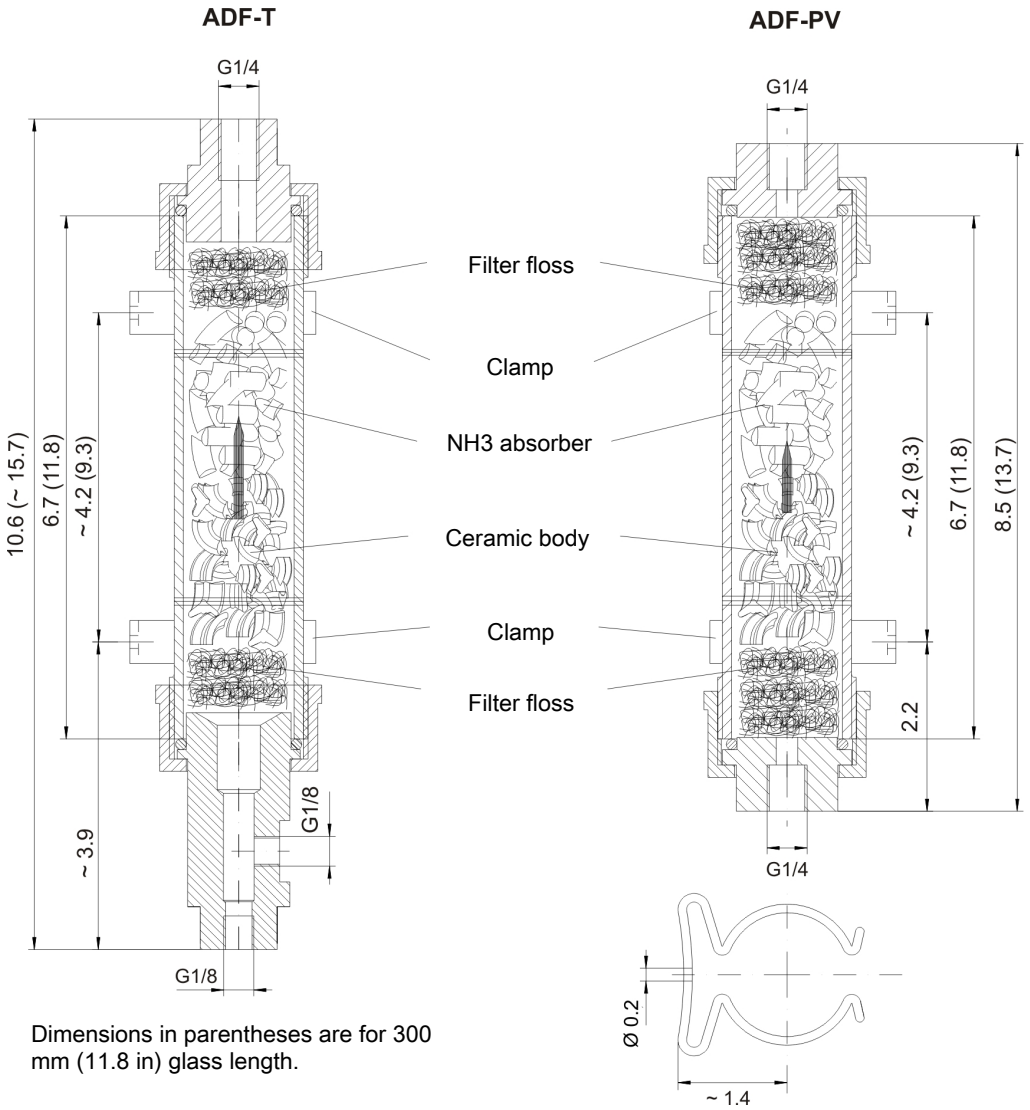
$$\text{ADF 300 life} = \frac{38.000\ \text{h}}{2\ \text{ppm} * 2\ \text{l/min}} = 9.500\ \text{h}$$

So the lives are then:

- 9.500 hours (approx. 13 months) for the ADF 300
- 5.000 hours (approx. 7 months) for the ADF 170

NOTICE! Other absorbent materials available upon request!

Dimensions



Dimensions in parentheses are for 300 mm (11.8 in) glass length.

Technical Data

ADF-170 / ADF-300	
Filter gas connections	PTFE - body (ADF-T-...), gas inlet: G1/8, gas outlet G1/4, condensate out connection G1/8 PVDF body (ADF-PV-...), gas inlet and outlet G1/4
Filter glass	Duran glass
Gasket material	Viton
Temperature max.	300 °F (gas) / 212 °F (ambient)
Pressure max.	2 bar abs. at 300 °F
Fill volume	approx. 7.6 in^3 for ADF-...-170 approx. 15.3 in^3 for ADF-...-300
Weight (without fill)	approx. 0.7 lb for ADF-...-170 approx. 0.9 lb for ADF-...-300
Weight (ceramic fill)	approx. 0.1 lb for ADF-...-170 approx. 0.2 lb for ADF-...-300
Weight (NH_3 absorbent material)	approx. 0.1 lb for ADF-...-170 approx. 0.2 lb for ADF-...-300

Ordering instructions

Absorption filter with NH_3 absorbent material

(The filter housings are filled with absorbent material)

Item no.	Model	Length	Material	Miscellaneous
41 57 599 KG	ADF-PV-170 KG	170 mm (6.7 in)	PVDF	
41 57 699 KG	ADF-PV-300 KG	300 mm (11.8 in)	PVDF	
41 57 799 KG	ADF-T-170-A KG	170 mm (6.7 in)	Teflon	
41 57 899 KG	ADF-T-300-A KG	300 mm (11.8 in)	Teflon	
46 222 167	Glass fibre filter floss			Package containing 0.2 lb
41 57 299 12	NH_3 ceramic granule refill pack			1 pack required for 170 mm (6.7 in) filter length 2 pack required for 300 mm (11.8 in) filter length

Absorption filter without absorbent material

Item no.	Model	Length	Material	Miscellaneous
41 57 599	ADF-PV-170	170 mm (6.7 in)	PVDF	
41 57 699	ADF-PV-300	300 mm (11.8 in)	PVDF	
41 57 799	ADF-T-170-A	170 mm (6.7 in)	Teflon	with condensate output
41 57 899	ADF-T-300-A	300 mm (11.8 in)	Teflon	with condensate output
46 222 167	Glass fibre filter floss			Package containing 0.2 lb

NOTICE! Other absorbent materials available upon request!

Coolers / Condensate Removal

- DA450000 Gas Cooler Overview
- DA440014 TC-MINI
- DA440015 TC-Standard
- DA440022 TC-Standard X2
- DA440020 TC-Standard+
- DA440025 TC-Standard+ X2
- DA440017 TC-Standard OEM
- DA440016 TC-MIDI
- DA440023 TC-MIDI X2
- DA440021 TC-MIDI+
- DA440026 TC-MIDI+ X2
- DA440018 TC-Double
- DA440024 TC-Double X2
- DA440019 TC-Double+
- DA440027 TC-Double+ X2
- DA440028 TC-Kit
- DA440029 TC-Kit+
- DA440030 CU-EMA+
- DA450028 RC 1.1
- DA450029 RC 1.2+
- DA450001 EGK 12
- DA450009 EGK 1SD
- DA450013 EGK 2-19
- DA450026 EGK 2-19+
- DA450006 EGK 4 S
- DA450007 EGK 10
- DA450019 EGK 2A Ex
- DA450024 EGK 1 Ex2
- DA450020 CPsingle CPdouble
- DA450034 CPsingle 1l
- DA450025 CPsingle CPdouble X1
- DA450022 CPsingle CPdouble X2
- DA460001 170 IST 161 PVDF
- DA460011 WF-AGF-PV-30

- DA450030 PC1
- DA450011 TS 10
- DA450031 EMIDos
- DA440003 Pre-separators
- DA450005 Automatic Condensate Drains
- DA440002 Condensate Vessels
- DA440004 Condensate Vessel
- DA410011 Moisture Detectors and Controllers

Gas Cooler Overview

System description

The configuration of the analysis gas conditioning system greatly affects the proper function and life of an analyser. One key component of this conditioner is the sample gas cooler, which lowers the dew point so moisture in the sample gas cannot condense in the analyser. Here, a consistent output dew point is particularly important.

We developed coolers both based on the **Peltier effect**as well as **compressor systems** for the various requirements. The two cooler designs differ in construction volume, and the performance based on system and environment.

Both technologies cool an aluminium block into which, depending on the cooler, one or multiple high-efficiency **heat exchangers in stainless steel, Duran glass or PVDF** with 1 or 2 gas paths can be inserted. This special cooling block design along with the sophisticated **Bühler consistent control system** ensure even heat dissipation. The main units of the coolers are maintenance free.

A **Display** shows the cooling block temperature in °C or °F. The **adjustable output dew point** is factory configured to 5 °C and may be adjusted if necessary. The display also shows status messages which may also be queried **guided by a menu**. These status outputs mark a range of ±3 K (factory preset / adjustable) of the output dew point setting. This status is also output via potential-free relay in fail-safe control. The **status output** can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached. The TC cooler series further allows for a ΔT control range, extending the available cooling capacity to the limits of the heat exchanger.

We also offer **cooler versions for explosive areas (Zone 1 and 2)**.

Gas cooler

EGK 12	EGK 2A Ex	TC-MINI
		

Accessories

We offer automatic condensate drains or peristaltic pumps for **draining condensate**, depending on the operating mode of the conditioning system. These and other accessories can be attached to or installed in some coolers.

Please note the information in the data sheets for the individual coolers and the accessory data sheets in our catalogue or on our website.

The TC-MINI, TC-Standard, TC-MIDI and EGK 2-19 coolers are special units with mounting options for peristaltic pumps, fine mesh filters or moisture detectors. The TC-MIDI is designed for attaching the sample gas pump P1.1.

Selection guide

1. Determine the application area: is it explosive?

2. Determine the **required number of gas paths** (1-4, possibly up to 8)

3. If you still have several models to choose from, consider the required **cooling output** next. You will achieve reliable results when using our **cooler configuration program** (included on the catalogue CD or on our website). After entering the key parameters, it will provide you with suitable, hence the most effective coolers for the cooling task.

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

You may also use the following **rough estimate**:

a) Determine the output per 1.7 lpm gas flow from the gas inlet parameters of a gas path (that with the highest cooling performance requirements) using the following table.

Gas inlet dew point	85	105	120	140	160	°F
Approx. capacity per 1.7 lpm	10	21	33	57	100	Btu/hr

Example: *A two-line gas cooler (non-Ex) is needed. The line with the higher loading has a gas inlet dew point of 120 °F at about normal pressure (14.5 PSI). In this case the table shows a capacity of 33 Btu/hr per 1.7 lpm flow.*

b) Multiply the value by the actual gas flow in L/h divided by 1.7 and by the number of gas paths.
For this example: *Each gas flow has 1 lpm and there are 2 gas flows:*
*33 Btu/hr per 1.7 lpm from a) x 1 lpm /1.7 * 2 paths = 39 Btu/hr kJ/h*

c) Compare this value with the cooling capacity of the cooler at an ambient temperature of 105 °F.
Example: *The table shows: The coolers TC-Standard, TC-MIDI and various compressor coolers are still suitable. Wit the first estimate the TC-Standard 61X2 with 52 Btu/hr at 105 °F still offers sufficient reserve.*

Nominal capacity at 75 °F	Capacity at 105 °F	Remark	Number of gas paths				Model[1]	Data sheet
			1	2	3 / 4	5...8		
Cooler for standard areas (non-explosive areas)								
47 Btu/hr	16 Btu/hr	Amb. 40...105 °F	TC – MINI 6111[2]	---	---	---	P	440014
52 Btu/hr	30 Btu/hr	Amb. 40...105 °F	TC – MINI 6112[2]	---	---	---	P	440014
95 Btu/hr	42 Btu/hr	Amb. 40...105 °F	TC-Standard 61X1[2]		---	---	P	440015
85 Btu/hr	52 Btu/hr	Amb. 40...105 °F	TC-Standard 61X2[2]		---	---	P	440015
190 Btu/hr	85 Btu/hr	Amb. 40...105 °F	TC-MIDI 6111[2]		---	---	P	440016
166 Btu/hr	104 Btu/hr	Amb. 40...105 °F	TC-MIDI 6112[2]		---	---	P	440016
303 Btu/hr	209 Btu/hr	Wall mounting	EGK 1/2		---	---	C	450001
303 Btu/hr	209 Btu/hr	19" rack/ wall mounted	EGK 2-19 [2]		---	---	C	450012
758 Btu/hr	569 Btu/hr		EGK 4S			upon request	C	450006
758 Btu/hr	569 Btu/hr	Additional installation options	EGK 4			upon request	C	450002
1374 Btu/hr	1043 Btu/hr		EGK 10 [3]	---	---	---	C	450007
Cooler for explosive areas (ATEX Zone 1)								
583 Btu/hr	341 Btu/hr	Amb. 41...113 °F	EGK 2a Ex			---	C	450019

Remarks:

1. P = Peltier; C = Compressor
2. Additional components may be built into this cooler: Fine mesh filter, condensate pump, moisture detector or sample gas pump.
3. Only heat exchanges in stainless steel or glass-coated stainless steel are available for this cooler at this time.

Gas cooler series TC-MINI

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The small dimensions make the TC-MINI sample gas cooler particularly suited for OEMs to build into compact sample gas conditioning systems.

- Peltier cooler with 1 heat exchanger
- Version for high ambient temperatures
- Nominal capacity 52 Btu/h (at 41 °F outlet dew point)
- Power supply 24 V DC
- Status display
- Analogue signal output
- Stainless steel, Duran-glass or PVDF heat exchanger
- Adjustable dew point 37/41/50/59 °F
- Adjustable Delta T-Control
- Add-on filter option
- Moisture detector option
- Maintenance-free
- Low operating noise

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Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
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Description and Overview

The TC-MINI series has two standard models which may have additional options added.

Standard	
TC-MINI 6111	moderate ambient temperature (up to approx. 104 °F)
TC-MINI 6112	higher ambient temperature (up to approx. 122 °F)

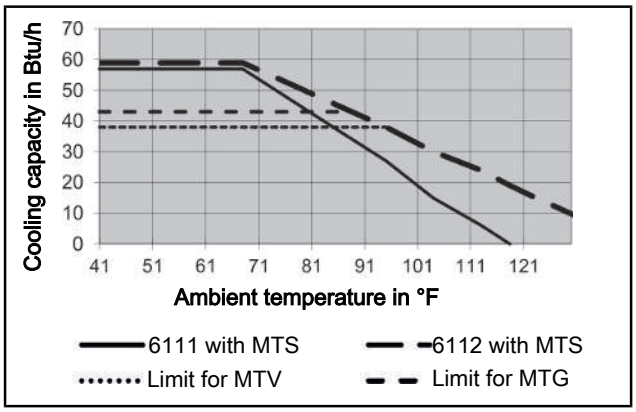
Typically intended for **small systems** designed for sample gas with low dew points and flow rate, providing a **24 V DC power supply**. In this context, typical is sample gas around normal pressure with a dew point of 104 °F, a gas inlet temperature of 158 °F, and an outlet per litre of approx. 1.7 lpm. This more or less corresponds to a cooling capacity of 22 Btu/h. Of course gasses with other parameters can also be cooled.

The cooler is **controlled** by a **microprocessor**. Flashing LEDs and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The **status output** can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached.

Connecting a **moisture detector** allows for the control to be expanded to monitoring condensate penetration.

Performance data



A selected outlet dew point of 50 °F or 59 °F shifts the curves 41 °F or 50 °F to the right.

The MTV and MTG limits apply to a normal operating point of τ_e = 104 °F and ϑ_G = 158 °F.

Outlet dew point

Remarks on outlet dew point

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so for the outlet dew point to have an adequate difference in temperature below the ambient temperature.

The advantage of a higher outlet temperature is that at a given ambient temperature the Peltier cooler provides significantly more cooling performance. So on the e.g. TC-MINI version model 6111, at an ambient temperature of 104 °F this means:

Outlet dew point:	41 °F	50 °F	59 °F
Available cooling capacity:	15 Btu/h	27 Btu/h	37 Btu/h

To fully utilize these advantages, the electronics feature several parameter settings:

1. **Adjustable outlet dew point**

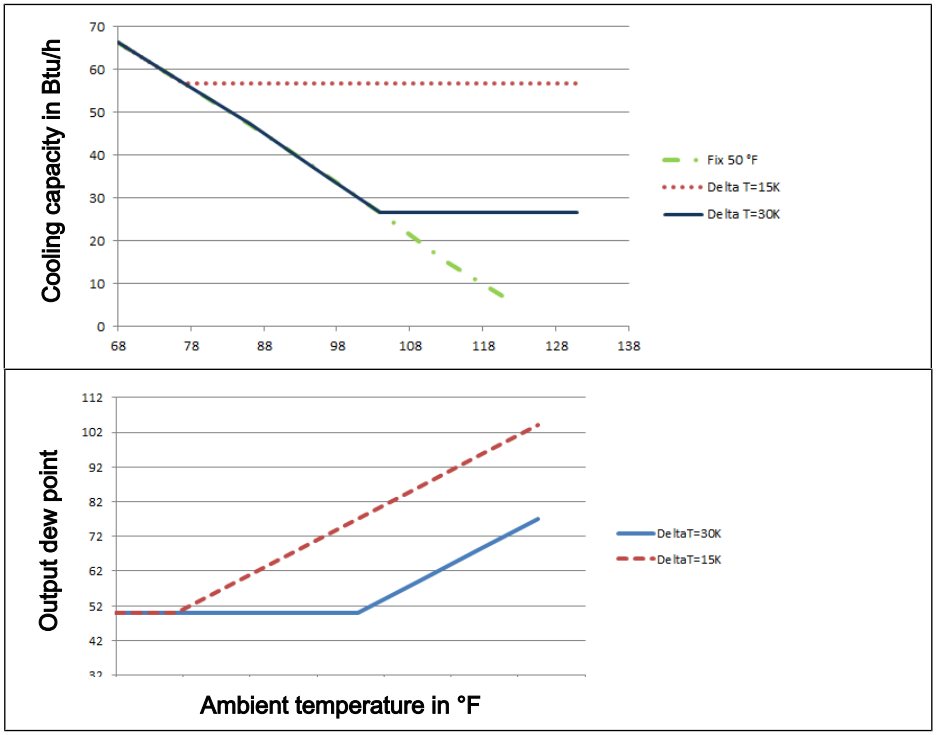
   An outlet dew point of 37, 41, 50 or 59 °F can be set to reach the specified values. Here it's important the ambient temperature is always ABOVE the outlet dew point setting, or condensation may form in the lines after the cooler. So the ambient temperature range is limited.

2. **Delta-T Control**

   Here the electronics measures the ambient temperature an regulates the outlet dew point to a an about 15 K or 30 K lower value, but no less than the dew point set under 1. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

   As seen in the following graphics using the TC-MINI 6111 as an example, a difference of 15 K from the ambient temperature means the focus is on drying the sample gas. The stability of the dew point then takes a backseat to the high performance which can be achieved.

At a difference of 30 K, at a set outlet dew point of 50 °F this means the dew point remains stable up to an ambient temperature of approx. 104 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 104 °F.



Gas cooler technical data

Gas Cooler Technical Data	
Ready for operation	after max. 10 minutes
Ambient temperature	41 °F to 131 °F
Gas outlet dew temperature, preset:	41 °F
IP rating:	IP 20
Housing	Stainless steel, brushed
Packaging dimensions	approx. 9.3 x 8.9 x 11 in (without add-on filter)
Weight incl. heat exchanger	approx. 7.7 lb
Power supply	24 VDC
24 V output	max. 1 A
Power input	max. 70 VA (plus max. 25 VA at 24 V output)
Status output switching capacity	33 VAC / 70 VDC, 1 A
Electrical connections, standard applications	Phoenix plug

Technical Data - Options

A moisture detector may be connected to the control. The moisture detector can be mounted to the cooler using a block or by installing it into the optional filter.

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials	
Filter:	PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	MTS [3] MTS-I [2,3]	MTG [3] MTG [3]	MTV [3] MTV-I [2,3]
Version / Material	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e\ max}$ [1]	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	363 psi	44 psi	29 psi
Pressure drop Δp (v = 2.5 lpm)	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G1/4	GL18 (8 mm) [4]	G1/4
Condensate out connections (US)	NPT 1/4"	GL18 (5/16)[4]	NPT 1/4"

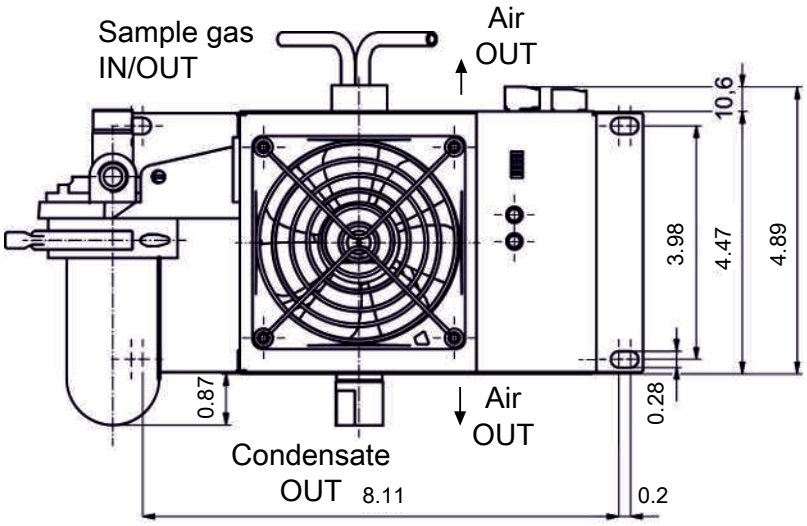
[1] Max. cooling capacity of the cooler must be considered.

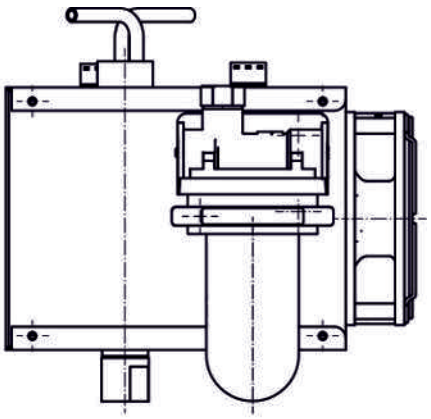
[2] Models marked I have NPT threads or US tubes, respectively.

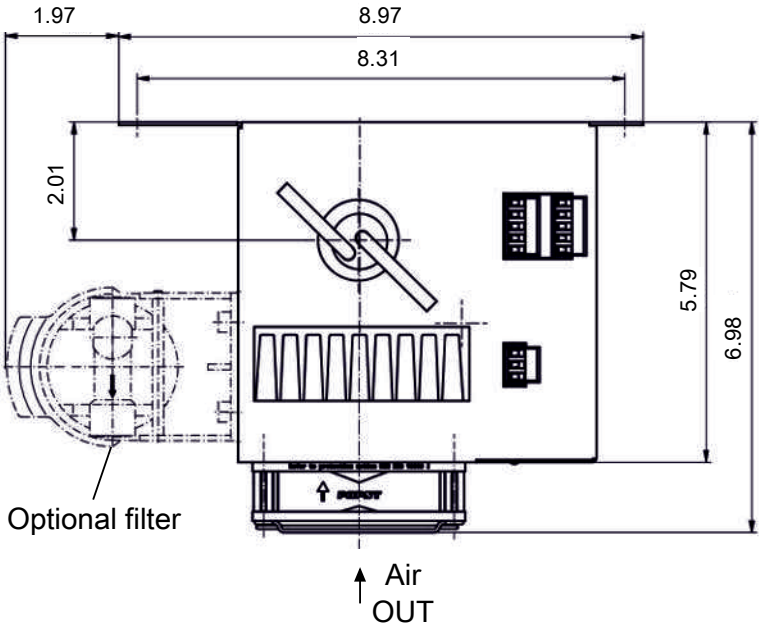
[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchanger. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter

Dimensions (inch)







Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model code:

4496	1	1	1	X	0	4	X	X	X	0	0	X	X	1	0	0	0	0	Product Characteristics
																			Gas cooler models (with 1 heat exchanger)
				1															TC-MINI 6111: moderate ambient temperature 104 °F
				2															TC-MINI 6112: higher ambient temperature 122 °F
																			Certifications
					0														Standard unit, no special certification
																			Supply voltage
						4													24 VDC
																			Heat exchanger [1]
							1	1	0	0	0								MTS, metric fittings
							1	1	5	0	0								MTS-I, US
							1	2	0	0	0								MTG, metric fittings
							1	2	5	0	0								MTG, US
							1	3	0	0	0								MTV, metric
							1	3	5	0	0								MTV-I, US
							1	6	0	0	0								MTS-WS, metric
							1	6	5	0	0								MTS-I-WS, US
																			Moisture Detector/Filter
												0	0						without filter, without moisture detector
												0	1						without filter, 1 moisture detector with block
												1	0						1 filter, without moisture detector
												1	1						1 filter with built-in moisture detector
																			Status outputs
														1	0	0	0	0	Analog output, 4...20 mA

[1] Moisture detector/filter screw-in fitting and tubes metric or US, accordingly

Consumables and accessories

Item no.	Description
91 12 00 00 39	24 V top-hat rail power supply
91 12 00 00 40	24 V top-hat rail power supply for using the 24 V output
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; 2 µm, Unit 5 count
43 81 045	Screw connection G1/4 - DN 8/12 for passive condensate connection MTS and MTV
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV

Gas cooler series TC-Standard

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Despite its small size, the TC-Standard sample gas cooler already covers a large percentage of standard applications in gas analysis.

- CE mark standard
- FM approval optional
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 95/85 Btu/h, 104 °F/122 °F version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Standard series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier cooler is distinguished by two types according to cooling capacity or reasonable operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications		
Operating temperature	104 °F	122 °F	
1 heat exchanger	TC-Standard 6111	TC-Standard 6112	3rd digit=1
2 heat exchangers	TC-Standard 6121	TC-Standard 6122	3rd digit=2
	4th digit=1	4th digit=2	

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas outlet dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T-control					
Protection class	IP 20					
Mechanical load	Tested to DNVGL-CG-0339, Table 6 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 VDC) approx. 19.8 lb at full expansion stage					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 VDC	**230 VAC**	**115 VAC**	**24 VDC**	**230 VAC**	**115 VAC**
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 VAC, 150 VDC 2 A, 50 VA, potential-free					
Electrical connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
FM No.	3062014					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data Peristaltic Pumps CPsingle / CPdouble

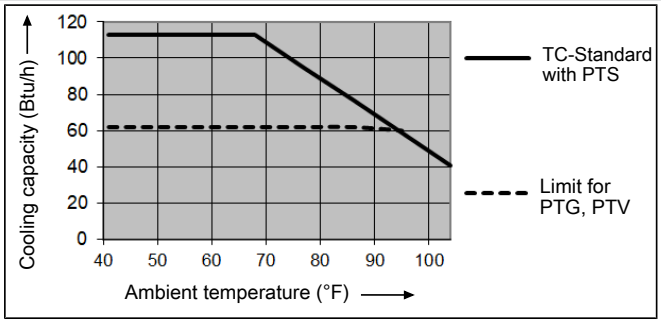
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 44
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

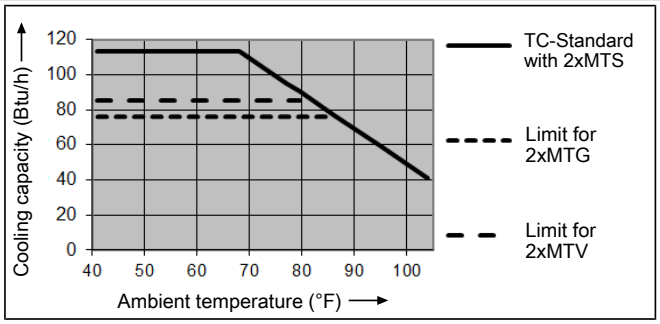
AGF-PV-30-F2 Filter Technical Data

Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

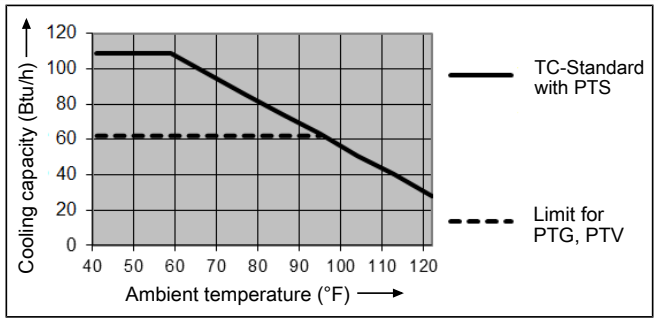
Outlet

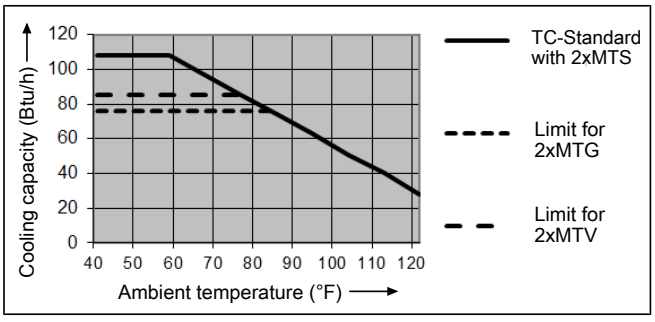
One heat exchanger		Two heat exchangers	
Model TC-Standard 6111 (X2)		**Model TC-Standard 6121 (X2)**	
Rated cooling capacity (at 77 °F)	95 Btu/h	Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F	Max. Ambient temperature	104 °F
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Model TC-Standard 6112 (X2)		**Model TC-Standard 6122 (X2)**	
Rated cooling capacity (at 77 °F)	85 Btu/h	Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F	Max. Ambient temperature	122 °F
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Note: The limit curves for the heat exchangers exchanger PTG, PTV or MTV apply to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

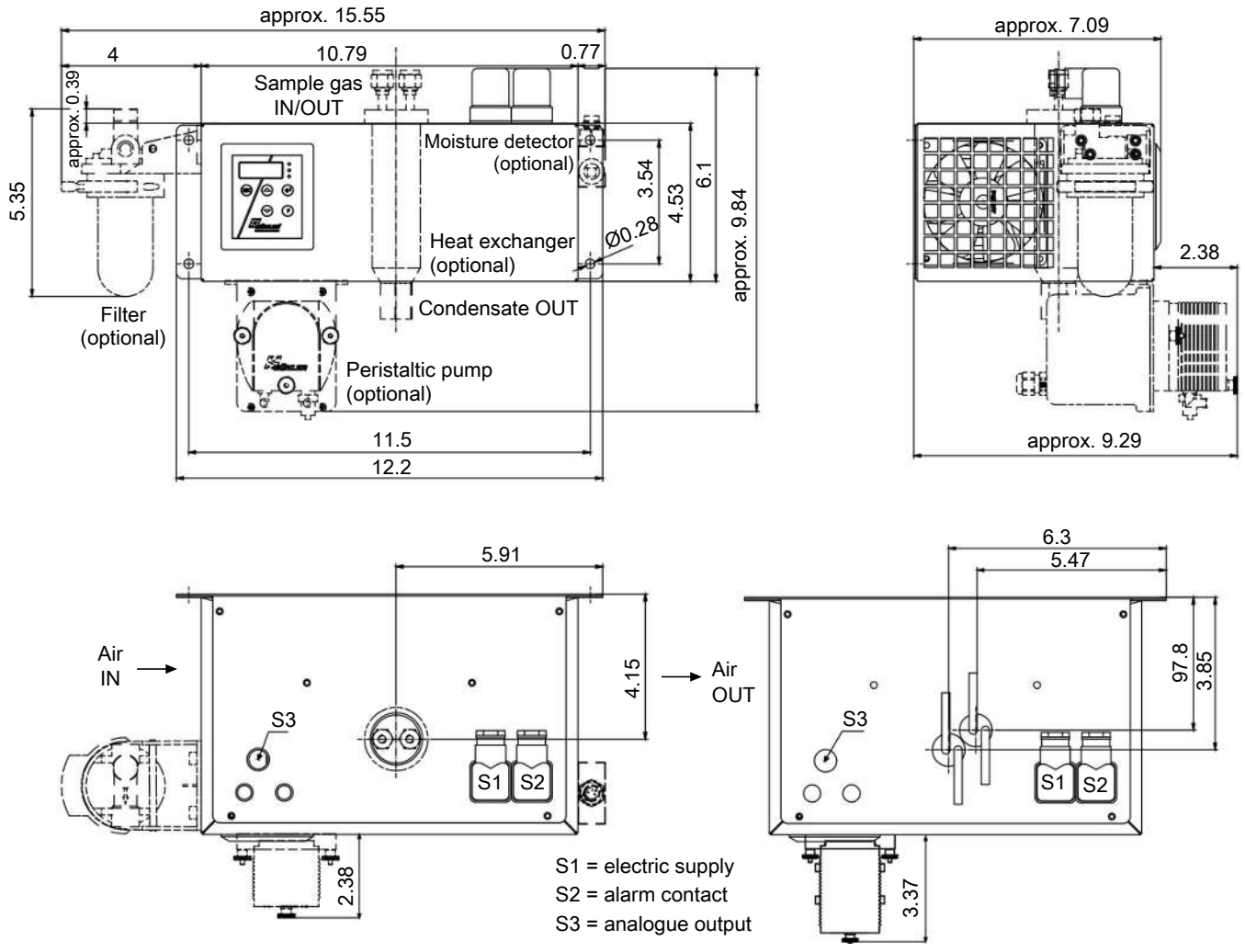
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 611x and 612x):



Ordering instructions

Gas cooler models with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	1	X	X	X	1	X	X	X	0	X	X	X	0	X	0	Product Characteristics
																		Gas cooler models (with 1 heat exchanger)
				1														TC-Standard 6111: Ambient temperature 104 °F
				2														TC-Standard 6112: Ambient temperature 122 °F
																		Certifications
					0													Standard applications - CE
					1													General purpose - FM
																		Supply voltage
						1												115 VAC, 50/60 Hz
						2												230 VAC, 50/60 Hz
						4												24 VDC
																		Heat exchanger
							1	1	0									Stainless steel, PTS, metric
							1	1	5									Stainless steel, PTS-I, US fitting
							1	2	0									Duran glass, PTG, metric
							1	2	5									Duran glass, PTG, US fitting
							1	3	0									PVDF, PTV, metric
							1	3	5									PVDF, PTV-I, US fitting
																		Peristaltic Pumps *
										0	0							without peristaltic pump
										1	0							CPsingle with hose nipple, angled
										3	0							CPsingle with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with adapter
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Status Outputs
														0	0			status output only
														1	0			Analog output option, add-on
																		Delta T-control
																0	0	without Delta T-control
																1	0	Delta T-control option

* 24 V DC CPsingle not connected electrically.

Gas cooler models with two heat exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	2	X	X	X	2	X	X	X	0	X	X	X	0	X	0	Product Characteristics
																		Gas cooler models (with 2 heat exchangers)
				1														TC-Standard 6121: Ambient temperature 104 °F
				2														TC-Standard 6122: Ambient temperature 122 °F
																		Certifications
					0													Standard applications - CE
					1													General purpose - FM
																		Supply voltage
						1												115 VAC, 50/60 Hz
						2												230 VAC, 50/60 Hz
						4												24 VDC
																		Heat exchanger
							2	1	0									Stainless steel, 2 MTS, metric
							2	1	5									Stainless steel, 2 MTS-I, US fitting
							2	2	0									Duran glass, 2 MTG, metric
							2	2	5									Duran glass, 2 MTG, US fitting
							2	3	0									PVDF, 2 MTV, metric
							2	3	5									PVDF, 2 MTV-I, US fitting
																		Peristaltic Pumps *
										0	0							without peristaltic pump
										2	0							CPdouble with hose nipple, angled
										4	0							CPdouble with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with adapter
												0	2					without filter, 2 moisture detectors with adapter
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
												2	0					2 filters, without moisture detector
												2	1					2 filters, 1 moisture detector
												2	2					2 filters, 2 moisture detectors
																		Status Outputs
														0	0			status output only
														1	0			Analog output option, add-on
																		Delta T-control
																0	0	without Delta T-control
																1	0	Delta T-control option

* 24 V DC CPdouble not connected electrically.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTS-I and MTV-I

Gas cooler series TC-Standard X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Standard X2 series provides solutions for Zone 2 or Class I, Division 2.

Despite its small size, the TC-Standard X2 sample gas cooler already covers a large percentage of standard applications in gas analysis.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 95/85 Btu/h, 104 °F/122 °F - Version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Standard X2 series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications		
Operating temperature	104 °F	122 °F	
1 heat exchanger	TC-Standard 6111 X2	TC-Standard 6112 X2	3rd digit=1
2 heat exchangers	TC-Standard 6121 X2	TC-Standard 6122 X2	3rd digit=2
	4th digit=1	4th digit=2	

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control					
IP rating	IP 20					
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC) approx. 19.8 lb at full expansion stage					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	**230 V AC**	**115 V AC**	**24 V DC**	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical Connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pumps CPsingle X2 / CPdouble X2

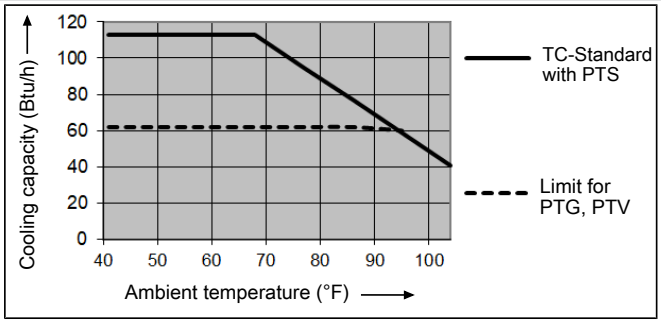
Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 44
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

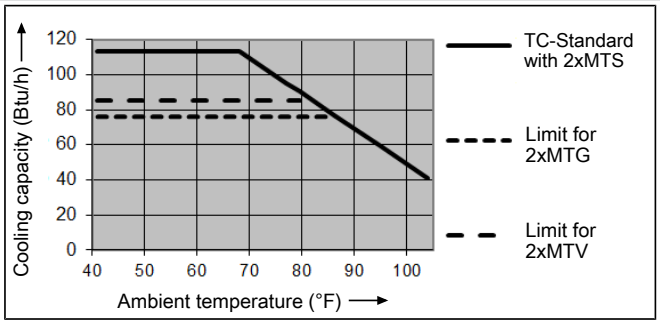
AGF-PV-30-F2 Filter Technical Data

Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

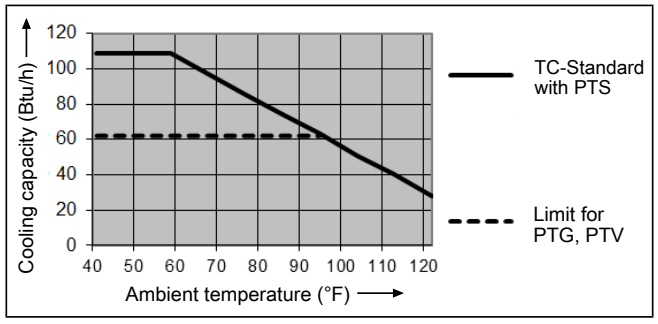
Outlet

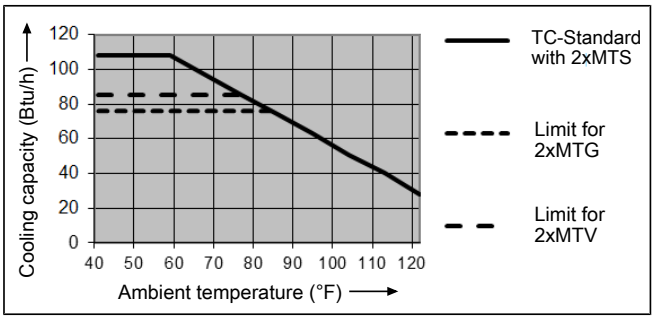
One heat exchanger		Two heat exchangers	
Model TC-Standard 6111 (X2)		**Model TC-Standard 6121 (X2)**	
Rated cooling capacity (at 77 °F)	95 Btu/h	Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F	Max. Ambient temperature	104 °F
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Model TC-Standard 6112 (X2)		**Model TC-Standard 6122 (X2)**	
Rated cooling capacity (at 77 °F)	85 Btu/h	Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F	Max. Ambient temperature	122 °F
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Note: The limit curves for the heat exchangers exchanger PTG, PTV or MTV apply to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG-I	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

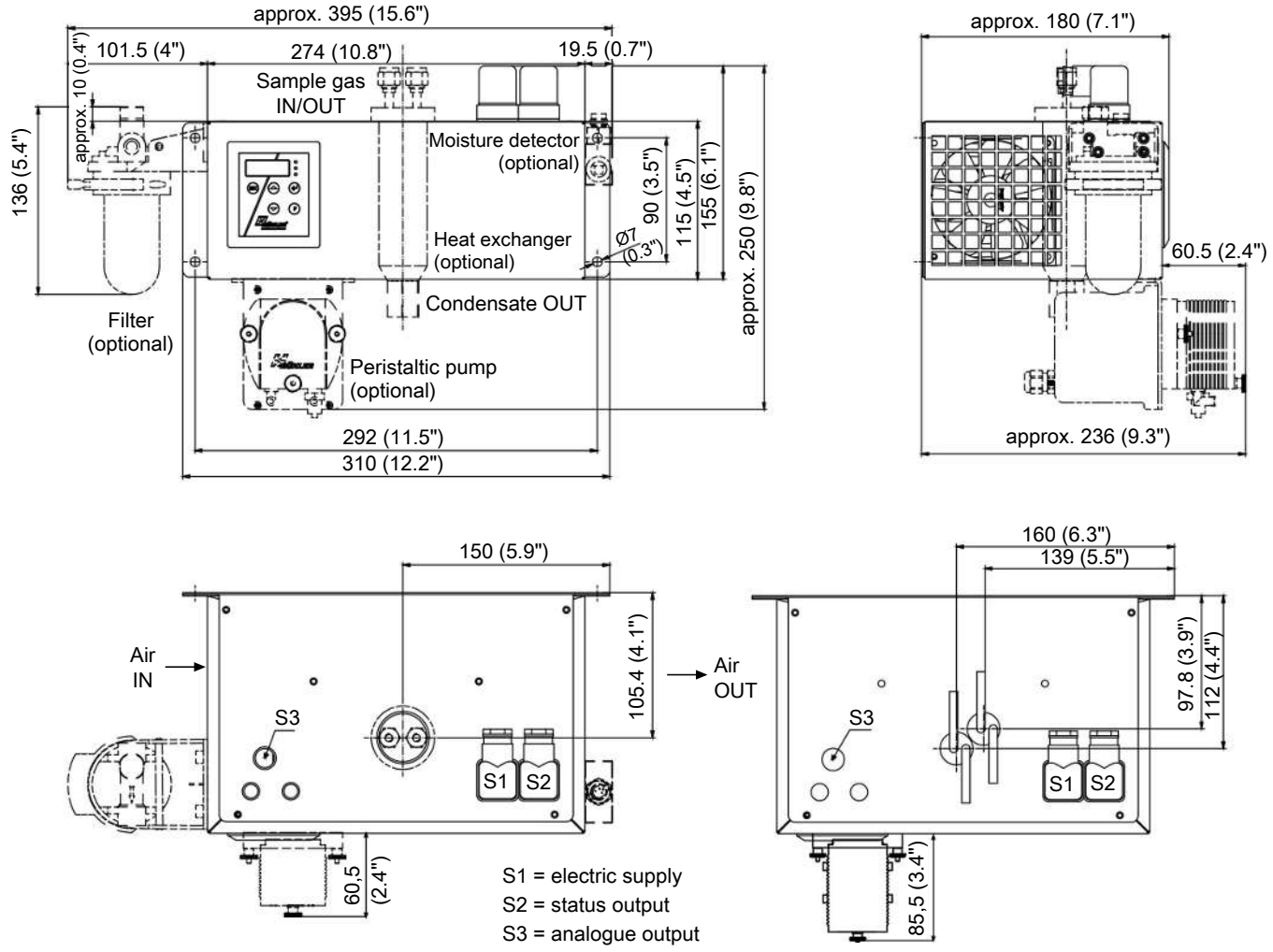
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 611x and 612x):



Ordering instructions

Gas cooler models with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	1	X	2	X	1	X	X	X	0	X	X	X	0	X	0	Product Characteristics
																		Gas cooler models (with 1 heat exchanger)
				1														TC-Standard 6111 X2: Ambient temperature 104 °F
				2														TC-Standard 6112 X2: Ambient temperature 122 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
						4												24 V DC
																		Heat exchanger
							1	1	0									Stainless steel, PTS, metric
							1	1	5									Stainless steel, PTS-I, US
							1	2	0									Duran glass, PTG, metric
							1	2	5									Duran glass, PTG-I, US
							1	3	0									PVDF, PTV, metric
							1	3	5									PVDF, PTV-I, US
																		Peristaltic pumps *
										0	0							without peristaltic pump
										1	0							CPsingle X2 with hose nipple, angled
										3	0							CPsingle X2 with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter **
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional
																		Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

* 24 V DC version not available.

** Also available in stainless steel.

Gas cooler models with two heat exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	2	X	2	X	2	X	X	X	0	X	X	X	0	X	0	Product Characteristics
																		Gas cooler models (with 2 heat exchangers)
				1														TC-Standard 6121 X2: Ambient temperature 104 °F
				2														TC-Standard 6122 X2: Ambient temperature 122 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
						4												24 V DC
																		Heat exchanger
							2	1	0									Stainless steel, 2 MTS, metric
							2	1	5									Stainless steel, 2 MTS-I, US
							2	2	0									Duran glass, 2 MTG, metric
							2	2	5									Duran glass, 2 MTG-I, US
							2	3	0									PVDF, 2 MTV, metric
							2	3	5									PVDF, 2 MTV-I, US
																		Peristaltic pumps *
										0	0							without peristaltic pump
										2	0							CPdouble X2 with hose nipple, angled
										4	0							CPdouble X2 with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter **
												0	2					without filter, 2 moisture detectors with PVDF adapter **
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
												2	0					2 filters, without moisture detector
												2	1					2 filters, 1 moisture detector
												2	2					2 filters, 2 moisture detectors
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional
																		Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

* 24 V DC version not available.

** Also available in stainless steel.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTV-2
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTV-2-I

Gas cooler series TC-Standard+

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The Standard+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly the wash out effect of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- CE mark standard
- FM approval optional
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One gas path
- Optimised heat exchanger type 2 in Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 95/85 Btu/h, 104 °F/122 °F version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Standard+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications		
Operating temperature	104 °F	122 °F	
2 heat exchangers in series	TC-Standard+ 6121	TC-Standard 6122+	3rd digit=2
	4th digit=1	4th digit=2	

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas outlet dew temperature preset: adjustable:	 41 °F 36 °F...68 °F					
Protection class	IP 20					
Mechanical load	Tested to DNVGL-CG-0339, Table 6 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC) approx. 19.8 lb fully upgraded					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	**230 V AC**	**115 V AC**	**24 V DC**	**230 V AC**	**115 V AC**
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6,3 A	1,25 A	2,5 A	6,3 A	1,25 A	2,5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
FM No.	3062014					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

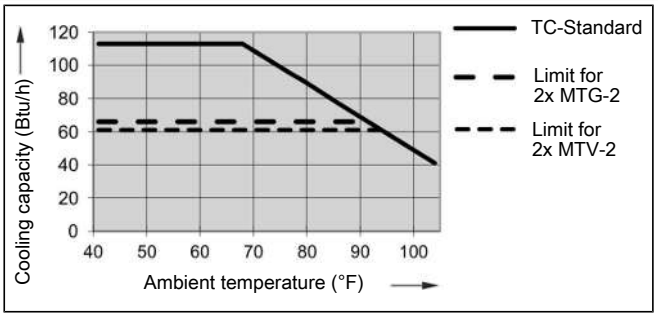
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPdouble Peristaltic Pump Technical Data	
Ambient temperature	32 °F to 131 °F
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

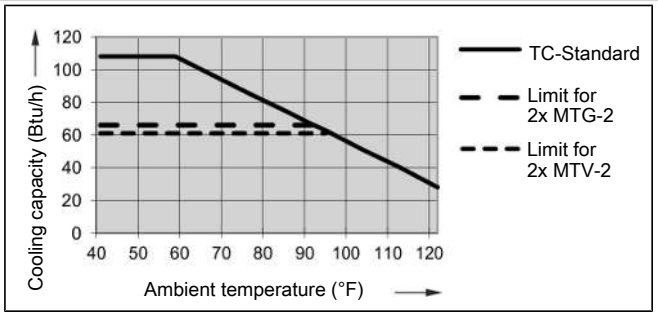
AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Outlet

Model TC-Standard+ 6121 (X2)	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Model TC-Standard+ 6122 (X2)	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers MTV-2 and MTG-2 apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	2x MTG-2 [3]	2x MTV-2 [3] 2x MTV-2-I [2] [3]
Version / Material	Glass	PVDF
Flow rate v_{max} [1]	3.5 lpm	1.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.28 psi	0.26 psi
Dead volume V_{tot}	2.3 cu. in.	2.1 cu. in.
Gas connections (metric)	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	GL14 (1/4") [4]	1/4"-1/6"
Condensate out connections (metric)	GL18 (8 mm) [4]	G1/4
Condensate out connections (US)	GL18 (8 mm) [4]	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

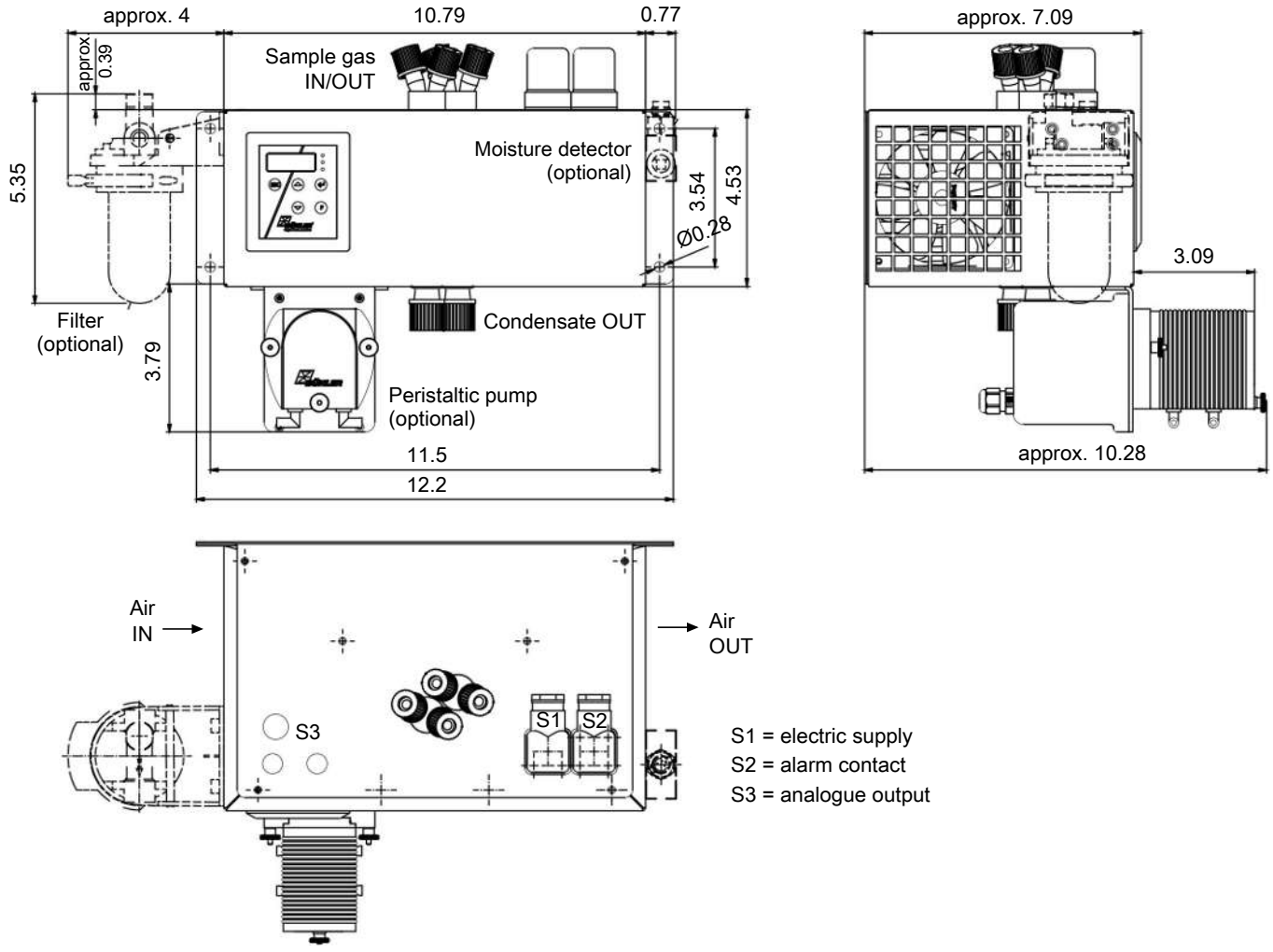
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG-2 heat exchangers. For passive discharge on the MTV-2 heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 612x):



Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	1	2	X	X	X	1	X	X	X	0	X	X	X	0	0	0	Product Characteristics
																		Gas cooler models (with 2 in-line heat exchangers)
				1														TC-Standard+ 6121: Ambient temperature 104 °F
				2														TC-Standard+ 6122: Ambient temperature 122 °F
																		Certifications
					0													Standard applications - CE
					1													General purpose - FM
																		Supply voltage
						1												115 VAC, 50/60 Hz
						2												230 VAC, 50/60 Hz
						4												24 VDC
																		Heat exchanger
							1	2	2									Duran glass, 2x MTG-2, metric
							1	2	7									Duran glass, 2x MTG-2, US fitting
							1	3	2									PVDF, 2x MTV-2, metric
							1	3	7									PVDF, 2x MTV-2-I, US fitting
																		Peristaltic pumps *
										0	0							without peristaltic pump
										2	0							CPdouble with hose nipple, angled
										4	0							CPdouble with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with adapter
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Status Outputs
														0	0			status output only
														1	0			Analog output option, add-on

* 24 V DC CPdouble not connected electrically.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTV-2
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTV-2-I

Gas Analysis

Gas cooler series TC-Standard+ X2

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Standard+ X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One gas path
- Optimised heat exchanger type 2 in Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 95/85 Btu/h, 104 °F / 122 °F - Version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Standard+ X2 series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications		
Operating temperature	104 °F	122 °F	
2 heat exchangers in series	TC-Standard+ 6121 X2	TC-Standard 6122+ X2	3rd digit=2
	4th digit=1	4th digit=2	

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

Gas cooler technical data

Gas Cooler Technical Data						
Ready for operation	after max. 10 minutes					
Ambient temperature	41 °F to 122 °F					
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F					
IP rating	IP 20					
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration					
Housing	Stainless steel, brushed					
Packaging dimensions	approx. 14 x 8.7 x 8.1 in					
Weight incl. heat exchanger	approx. 16.5 lb approx. 13.2 lb (for 24 V DC) approx. 19.8 lb at full expansion stage					
Electrical data	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	**230 V AC**	**115 V AC**	**24 V DC**	**230 V AC**	**115 V AC**
	±10%	+5/-10%	+5/-10%	±10%	+5/-10%	+5/-10%
	-	50/60 Hz	50/60 Hz	-	50/60 Hz	50/60 Hz
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Recommended fuse (characteristic: delayed action)	6.3 A	1.25 A	2.5 A	6.3 A	1.25 A	2.5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical Connections	Plug per EN 175301-803					
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton					
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20					

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

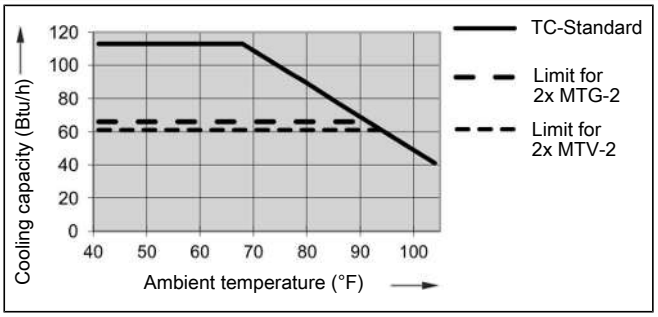
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pump CPdouble X2	
Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials	
Hose:	Norprene (standard), Marprene, Fluran
Connections:	PVDF

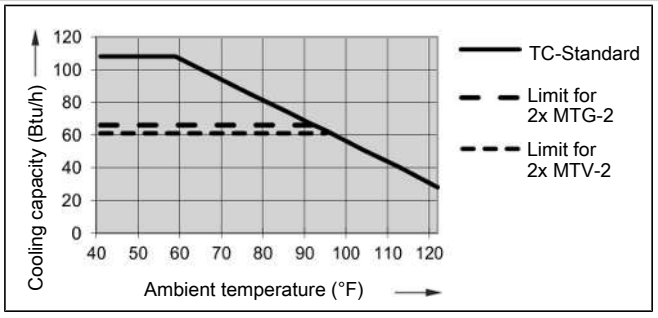
AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials	
Filter:	PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

Outlet

Model TC-Standard+ 6121 (X2)	
Rated cooling capacity (at 77 °F)	95 Btu/h
Max. Ambient temperature	104 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Model TC-Standard+ 6122 (X2)	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers MTV-2 and MTG-2 apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	2x MTG-2 [3] 2x MTG-2-I [2] [3]	2x MTV-2 [3] 2x MTV-2-I [2] [3]
Version/Material	Glass	PVDF
Flow rate v_{max} [1]	3.5 lpm	1.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.28 psi	0.26 psi
Dead volume V_{tot}	2.3 cu. in.	2.1 cu. in.
Gas connections (metric)	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	GL14 (1/4") [4]	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm) [4]	G1/4
Condensate out connection (US)	GL18 (8 mm) [4]	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

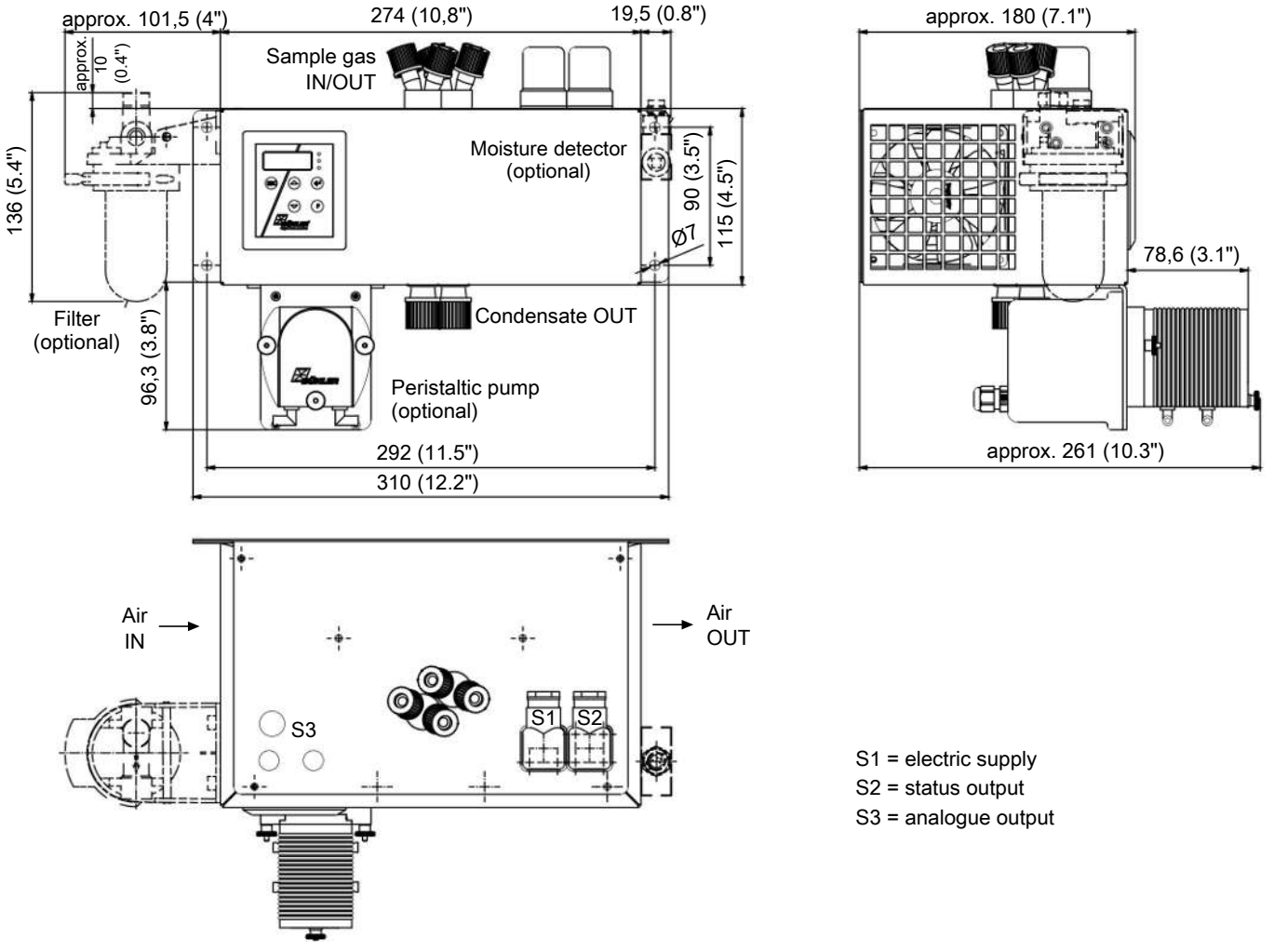
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG-2 heat exchangers. For passive discharge on MTV-2 heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

Dimensions (inch)

Models for standard applications (TC-Standard 612x):



Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

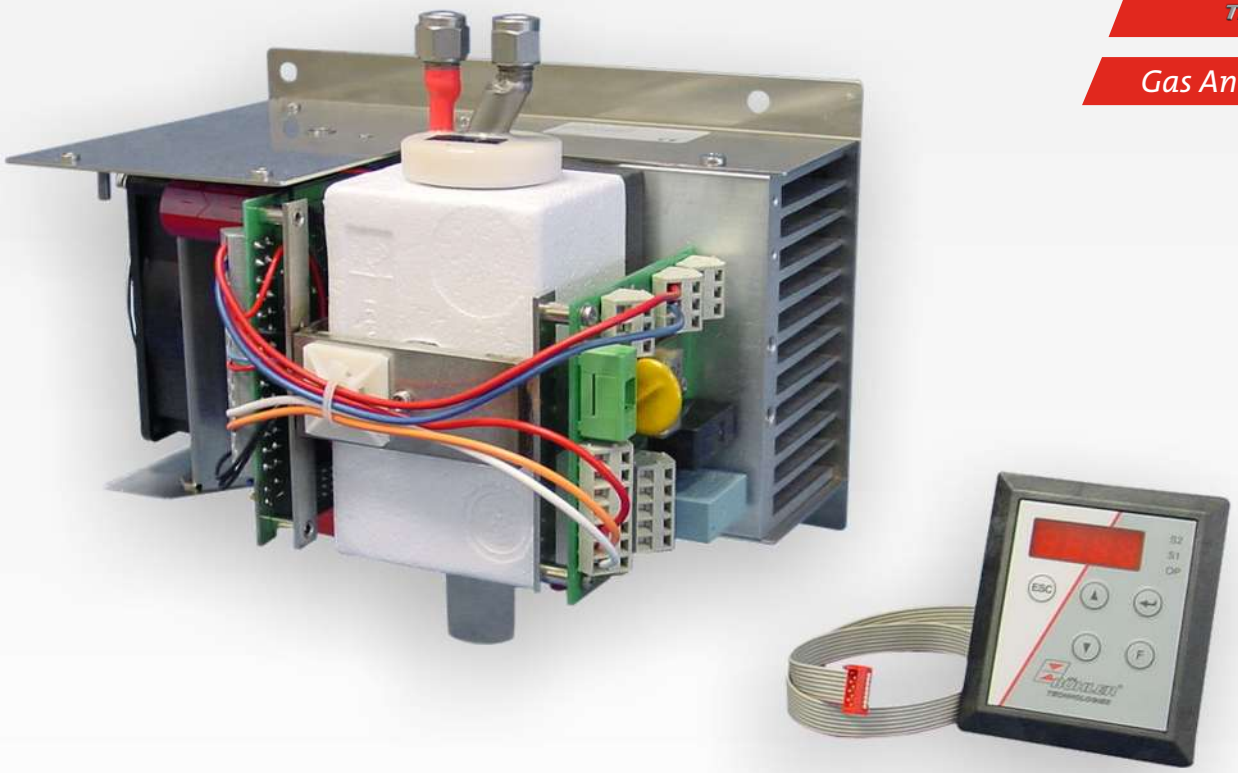
4496	2	1	2	X	2	X	1	X	X	X	0	X	X	X	0	0	0	Product Characteristics
																		Gas cooler models (with 2 in-line heat exchangers)
				1														TC-Standard+ 6121 X2 Ambient temperature 104 °F
				2														TC-Standard+ 6122 X2 Ambient temperature 122 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
						4												24 V DC
																		Heat exchanger
							1	2	2									Duran glass, 2x MTG-2, metric
							1	2	7									Duran glass, 2x MTG-2-I, US
							1	3	2									PVDF, 2x MTV-2, metric
							1	3	7									PVDF, 2x MTV-2-I, US
																		Peristaltic pumps *
										0	0							without peristaltic pump
										2	0							CPdouble X2 with hose nipple, angled
										4	0							CPdouble X2 with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter **
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional

* 24 V DC version not available.

** Also available in stainless steel.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTV-2
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTV-2-I



Gas cooler series TC-Standard OEM

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The small TC-Standard OEM sample gas cooler offers a variety of options for installation in gas analysis systems.

- Compact design for installation into a gas cooling system
- Version 230 V / 115 V or with 24 V transformer, lighter with switching power supply
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Nominal capacity 85 Btu/h
- Dew point stability 0.2 °F
- MCD400 display module for separate installation
- Moisture detector, condensate pump and sample gas pump connection and control option
- Option to connect an analogue output
- Successor of the PKE 50x OEM

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Standard OEM series consists of various models which can be classified by the number of heat exchangers.

This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the type code in the category ordering information.

Application	Standard applications	
Ambient temperature	122 °F	
1 heat exchanger	TC-Standard OEM 6912	3rd digit=1
2 heat exchangers	TC-Standard OEM 6922	3rd digit=2

Additional components which every conditioning system should feature can optionally be connected:

- Peristaltic pump for condensate separation
- Moisture detector
- Sample gas pump

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured using the menu and 5 buttons. For one, this applies to the target outlet dew point, which can be set from 36 to 68 °F (factory preset 41 °F).

The warning thresholds can then be adjusted for low and excess temperature. These are set relative to the outlet dew point T_a setting.

For the low temperature the range is T_a -1 to - 3 K (at min. 34 °F cooling block temperature), for the excess temperature the range is T_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after turning on).

The status output can be used to e.g. control the sample gas pump so the gas flow will only be turned on once the permissible cooling range has been reached, or to shut off the pump in the event of a moisture detector alarm.

Delta T control option

Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

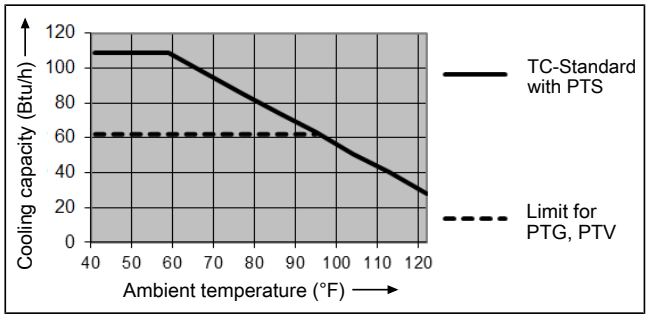
Gas cooler technical data

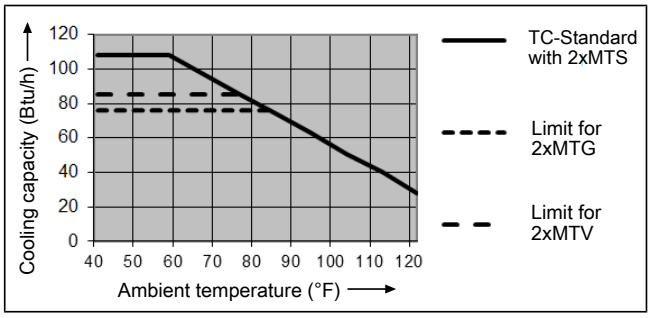
Gas Cooler Technical Data			
Ready for operation	after max. 10 minutes		
Ambient temperature	41 °F to 122 °F		
Gas outlet dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control		
Protection class:	IP00		
Rack material:	Stainless steel		
Packaging dimensions	approx. 14 x 8.7 x 8.1 in		
Weight without heat exchanger	approx. 10.3 lb (transformer) approx. 8.2 lb (switching power supply) approx. 7.4 lb (with 24 V DC)		
Electrical power input	24 V DC	230 V AC	115 V AC
	5 A	0.6 A	1.2 A
	120 W	110 W / 140 VA	
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical connections	Cable clamp (with transformer, 24 V DC) or blade receptacle (with switching power supply)		
Gas connections	Heat exchanger see table "Heat exchanger overview"		
Parts in contact with media Heat exchanger:	 see table "Heat Exchanger Overview"		

Outlet

One heat exchanger	
Model TC-Standard OEM 6912	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K

Two heat exchangers	
Model TC-Standard OEM 6922	
Rated cooling capacity (at 77 °F)	85 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K





Remark: The limit curves for the heat exchangers exchanger PTG, PTV or MTV apply to a dew point of 104 °F.

With ideal installation the TC-Standard OEM cooling capacity curves correspond with those for TC-Standard. Depending how it is installed, the value may deviate from the cooling capacity curve.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

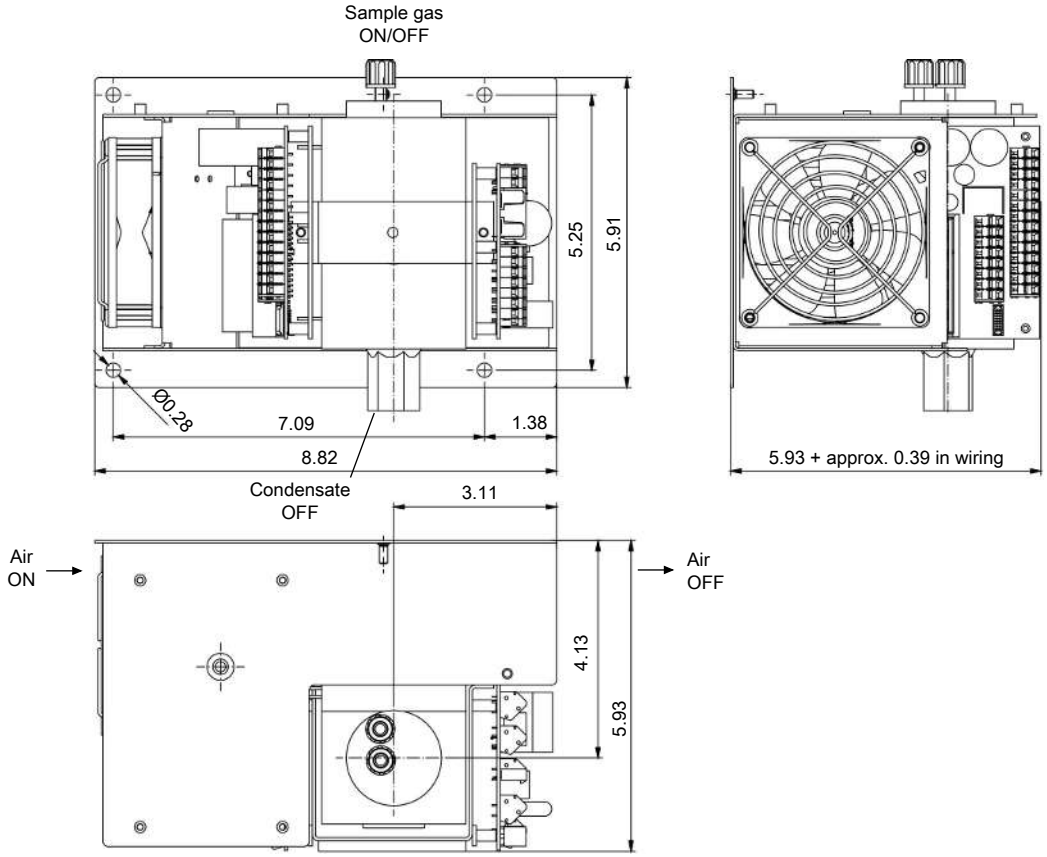
[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

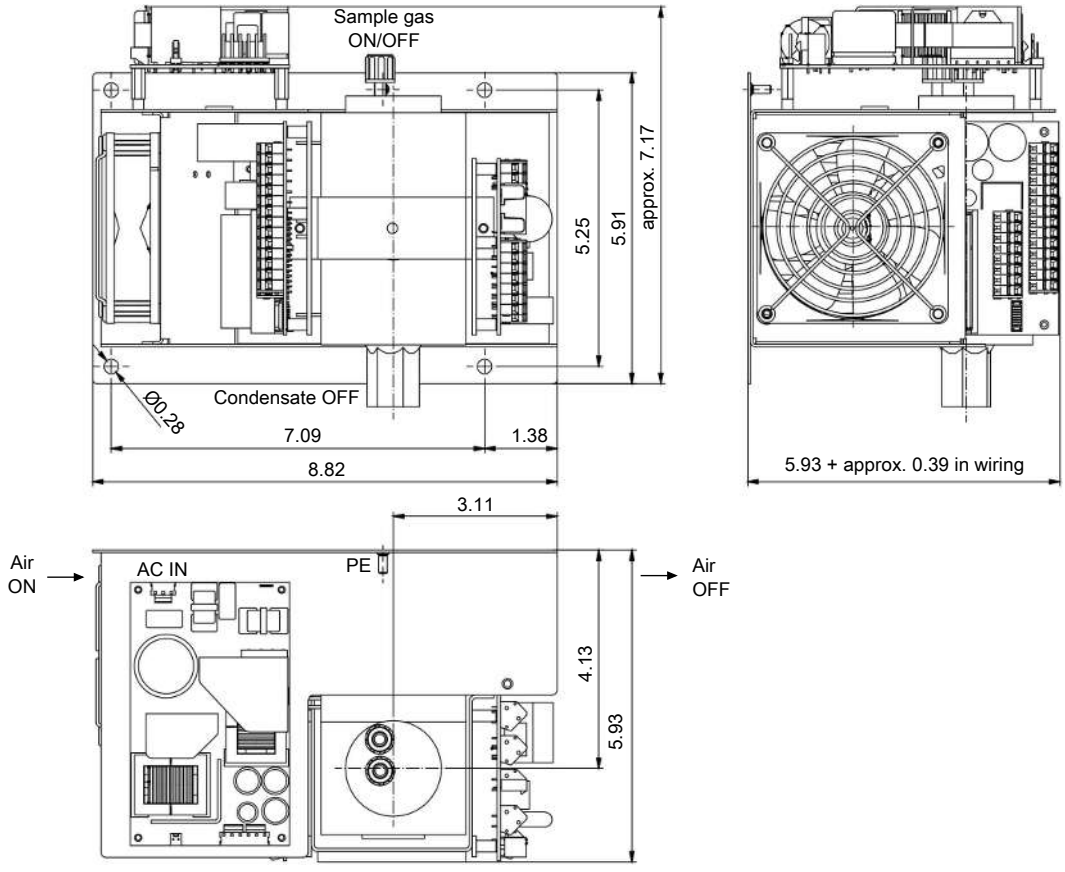
Dimensions (inch)

Models for standard applications TC-Standard OEM 6912 and 6922

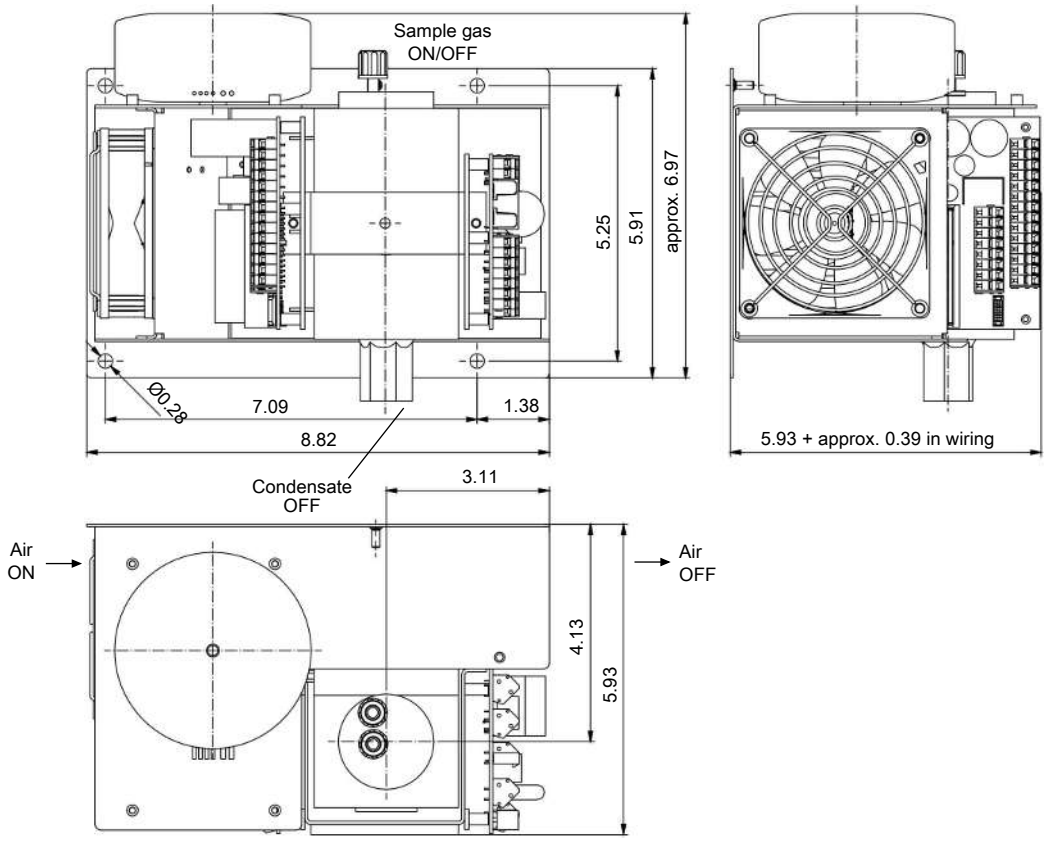
24 V DC models



Models with 230 V / 115 V switching power supply



Models with 230 V / 115 V transformer



Ordering instructions

Gas cooler models

The item number is a code for the configuration of your unit. Please use the following model key:

4496	2	9	X	2	0	X	X	0	Product characteristic
			1						Gas cooler with 1 heat exchanger
			2						Gas cooler with 2 heat exchangers
									Gas cooler type
				2	0				TC-Standard OEM: Ambient temperature 122 °F
									Supply voltage
						1			115 V AC, 50/60 Hz (transformer)
						2			230 V AC, 50/60 Hz (transformer)
						4			24 V DC
						5			115 V AC, 50/60 Hz (switching power supply)
						6			230 V AC, 50/60 Hz (switching power supply)
									DeltaT control
							0	0	without DeltaT control
							1	0	DeltaT control option
4496	2	9		2	0			0	Order key

Heat exchanger options

Item no.	Description
4465099	MTS, steel heat exchanger ø0.79 in, metric connections
4465099I	MTS-I, steel heat exchanger ø0.79 in, US connections
4465299	MTS-WS, steel heat exchanger ø0.79 in, horizontal gas inlet/output, metric connections
4465199	MTV, plastic heat exchanger ø0.79 in, metric connections
4465199I	MTV-I, plastic heat exchanger ø0.79 in, US connections
44651997	MTG, glass heat exchanger ø0.79 in, metric and US connections
4447999	PTS, steel heat exchanger ø1.38 in, metric connections
4447999I	PTS-I, steel heat exchanger ø1.38 in, US connections
4446999	PTV, plastic heat exchanger ø1.38 in, metric connections
4446999I	PTV-I, plastic heat exchanger ø1.38 in, US connections
4445999	PTG, glass heat exchanger ø1.38 in, metric and US connections

Spare parts and accessories

Item no.	Description
see data sheet 450005	Automatic condensate drain
see data sheet 410011	Moisture detector and flow cell, various models
41 11 10 00	Moisture detector connection cable, 4 m (13 ft)
91 44 05 00 82	Moisture detector connection cable, 450 mm (17.72 in)
91 44 05 00 38	Cable for cooler temperature analogue output 4 m (13 ft)
see data sheet 420011	Sample gas pump P1.x
see data sheet 450020	Peristaltic pump CPsingle, CPdouble and replacement hose
see data sheet 440002	Condensate trap
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV
44 96 01 00 0	Analogue Output Kit
44 96 00 04 9	Status/alarm output, M3 plug, cable length 340 mm (13.39 in)

Gas cooler series TC-MIDI

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The TC-MIDI sample gas cooler is a component in this conditioning chain if the process or ambient conditions require a higher cooling capacity.

- CE mark standard
- FM approval optional
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 185/166 Btu/h, 104 °C/122 °F version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector, filter, analog output, peristaltic pump, and sample gas pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-MIDI series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier cooler is distinguished by two types according to cooling capacity or reasonable operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger	TC-MIDI 6111	TC-MIDI 6112

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Delta T control option

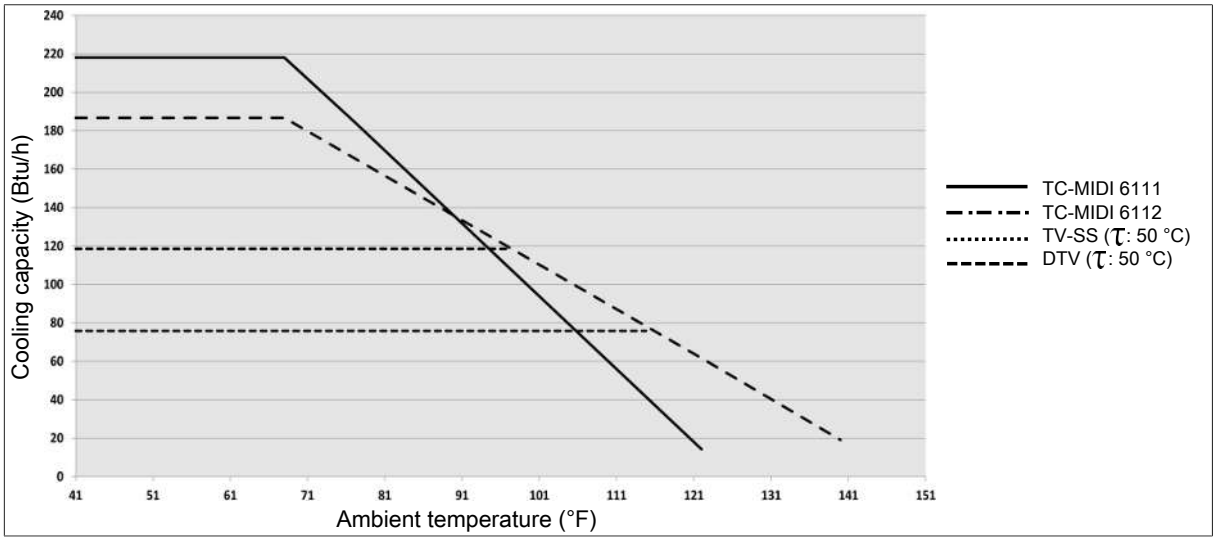
Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas outlet dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T-control			
Protection class	IP 20			
Mechanical load	Tested to DNVGL-CG-0339, Table 6 [1] 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 24.3 lb approx. 32 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + Peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3,15 A	6,3 A	3,15 A	6,3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
FM No.	3062014			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data Peristaltic Pumps CPsingle / CPdouble	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	19.4 in^2
Filter mesh	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e(moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load by the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below the parameters τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the heat exchanger, TG the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 7.1 lpm can also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.8 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV-SS TV-SS-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	8.3 lpm	6.7 lpm	3.9 lpm	2 x 4.2 lpm	2 x 3.3 lpm	2 x 2.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F	176 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.07 psi each	0.07 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in.	1.7/1.5 cu. in.	1.3/1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

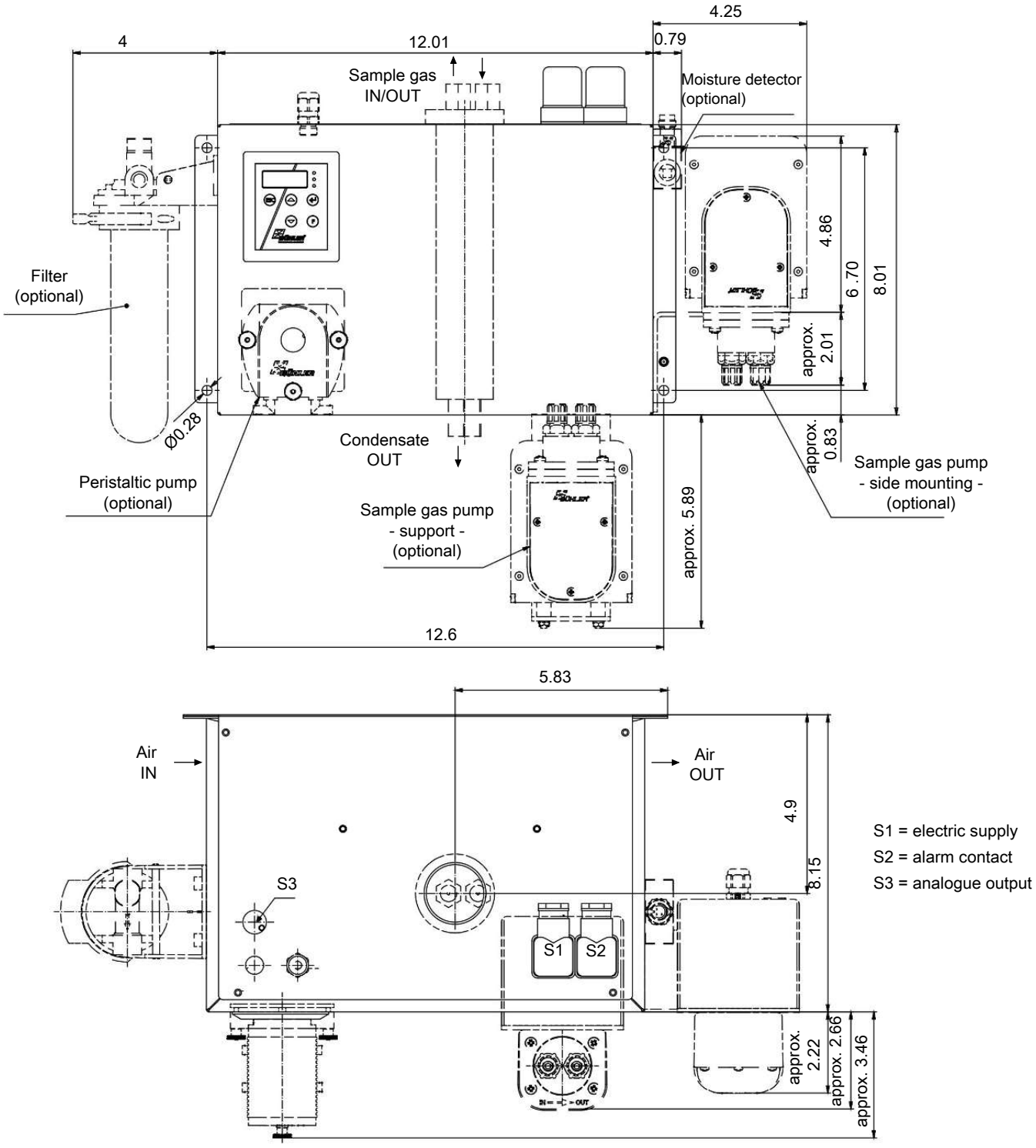
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler models with one gas path inside the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	X	X	1	X	X	X	X	X	X	0	X	0	Product Characteristics
																	Gas cooler types
				1													TC-MIDI 6111: Ambient temperature 104 °F
				2													TC-MIDI 6112: Ambient temperature 140 °F
																	Certifications
					0												Standard applications - CE
					1												General purpose - FM
																	Supply voltage
						1											115 VAC, 50/60 Hz
						2											230 VAC, 50/60 Hz
																	Heat exchanger
							1	1	0								Stainless steel, TS, metric
							1	1	5								Stainless steel, TS-I, US fitting
							1	2	0								Duran glass, TG, metric
							1	2	5								Duran glass, TG, US fitting
							1	3	0								PVDF, TV-SS, metric
							1	3	5								PVDF, TV-SS-I, US fitting
																	Peristaltic Pumps [2]
										0							without peristaltic pump
										1							CPsingle with hose nipple, angled
										3							CPsingle with screw connection, metric/US fitting
																	Sample Gas Pumps [1]
											0						without sample gas pump
											1						P1, PVDF, bottom mounted
											2						P1, with bypass valve, bottom mounted
											6						P1, PVDF, side mounted
											7						P1, with bypass valve, side mounted
																	Moisture detector [2] **/ Filter**
												0	0				without filter, without moisture detector
												0	1				without filter, 1 moisture detector with adapter
												1	0				1 filter, without moisture detector
												1	1				1 filter with built-in moisture detector
																	Status Outputs
														0	0		status output only
														1	0		Analog output option, add-on
																	Delta T-control
																0	without Delta T-control
																1	Delta T-control option

[1] Factory installed tubing for suction operation.

[2] If option is selected, the maximum ambient temperature is limited to 122 ° F.

Gas cooler models with two gas paths insides the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	X	X	2	X	X	X	X	X	X	0	X	0	Product Characteristics
																	Gas cooler types
				1													TC-MIDI 6111: Ambient temperature 104 °F
				2													TC-MIDI 6112: Ambient temperature 140 °F
																	Certifications
					0												Standard applications - CE
					1												General purpose - FM
																	Supply voltage
						1											115 VAC, 50/60 Hz
						2											230 VAC, 50/60 Hz
																	Heat exchanger
							2	6	0								Stainless steel, DTS, metric
							2	6	5								Stainless steel, DTS-I, US fitting
							2	6	1								Stainless steel, DTS 6, metric [1]
							2	6	6								Stainless steel, DTS 6-I, US fitting [1]
							2	7	0								Duran glass, DTG, metric
							2	7	5								Duran glass, DTG, US fitting
							2	8	0								PVDF, DTV, metric [1]
							2	8	5								PVDF, DTV-I, US fitting [1]
																	Peristaltic Pumps [4]
										0							without peristaltic pump
										2							CPdouble with hose nipple, angled
										4							CPdouble with screw connection, metric/US fitting
																	Sample Gas Pumps [3]
											0						without sample gas pump
											1						P1, 1 gas path, PVDF, bottom mounted
											2						P1, 1 gas path, with bypass valve, bottom mounted
											6						P1, 1 gas path, PVDF, side mounted [2]
											7						P1, 1 gas path, with bypass valve, side mounted [2]
																	Moisture detector [4] **/ Filter**
												0	0				without filter, without moisture detector
												0	1				without filter, 1 moisture detector with adapter
												0	2				without filter, 2 moisture detectors with adapter
												1	0				1 filter, without moisture detector
												1	1				1 filter with built-in moisture detector
												2	0				2 filters, without moisture detector [2]
												2	1				2 filters, 1 moisture detector [2]
												2	2				2 filters, 2 moisture detectors [2]
																	Status Outputs
														0	0		status output only
														1	0		Analog output option, add-on
																	Delta T-control
																0	without Delta T-control
																1	Delta T-control option

[1] Condensate outlets only suitable when connecting peristaltic pumps.

[2] Side mounted sample gas pump P1 only allows 1 filter.

[3] Factory installed tubing for suction operation.

[4] If option is selected, the maximum ambient temperature is limited to 122 ° F.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 02 00 50	Replacement filter element F2-L; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft.)
44 10 00 5	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump

Gas cooler series TC-MIDI X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-MIDI X2 series provides solutions for Zone 2 or Class I, Division 2.

The TC-MIDI X2 sample gas cooler is a component in this conditioning chain if the process or ambient conditions require a higher cooling capacity.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 185/166 Btu/h, 104 °F/122 °F - Version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector, filter, analog output, peristaltic pump, and sample gas pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-MIDI X2 series was designed specifically for high cooling capacities and high ambient temperatures.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
1 heat exchanger	TC-MIDI 6111 X2	TC-MIDI 6112 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Delta T control option

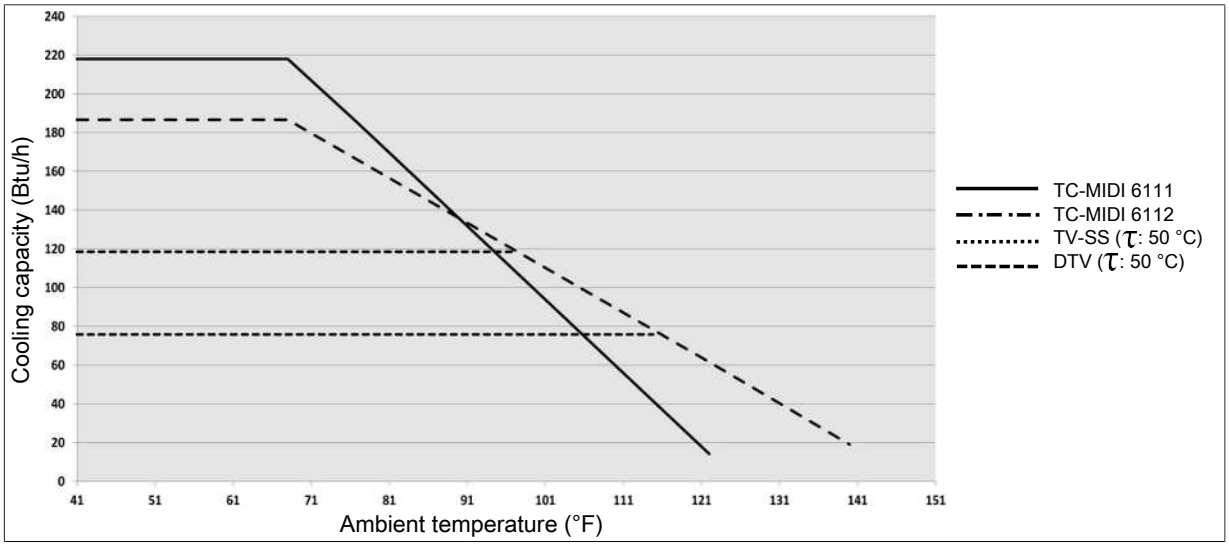
Not all applications require an outlet dew point of 41 °F. In some applications a higher dew point is sufficient. In other applications a stable outlet dew point doesn't matter, it's enough for the gas to be dry, so if the outlet dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the outlet dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the outlet dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

The target temperature range is defined by the ambient temperature, the adjustable temperature difference and the alarm limits. If the block temperature is not within the target range with active Delta T-control, the status message "dt" will flash in the display.

Example: At a difference of 30 K/54 °F, at a set outlet dew point of 41 °F this means the dew point remains stable up to an ambient temperature of approx. 95 °F, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 95 °F. The cooling capacity specified in the cooling capacity graphs at 95 °F is then available at above 95 °F.

Performance curves



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F or Delta T control			
IP rating	IP 20			
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) [1] 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3.15 A	6.3 A	3.15 A	6.3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data peristaltic pumps CPsingle X2 / CPdouble X2	
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1.3	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	19.4 in^2
Filter mesh	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e(moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load by the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below the parameters τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the heat exchanger, TG the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 7.1 lpm can also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.8 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV-SS TV-SS-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	8.3 lpm	6.7 lpm	3.9 lpm	2 x 4.2 lpm	2 x 3.3 lpm	2 x 2.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F	176 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.07 psi each	0.07 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in.	1.7/1.5 cu. in.	1.3/1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

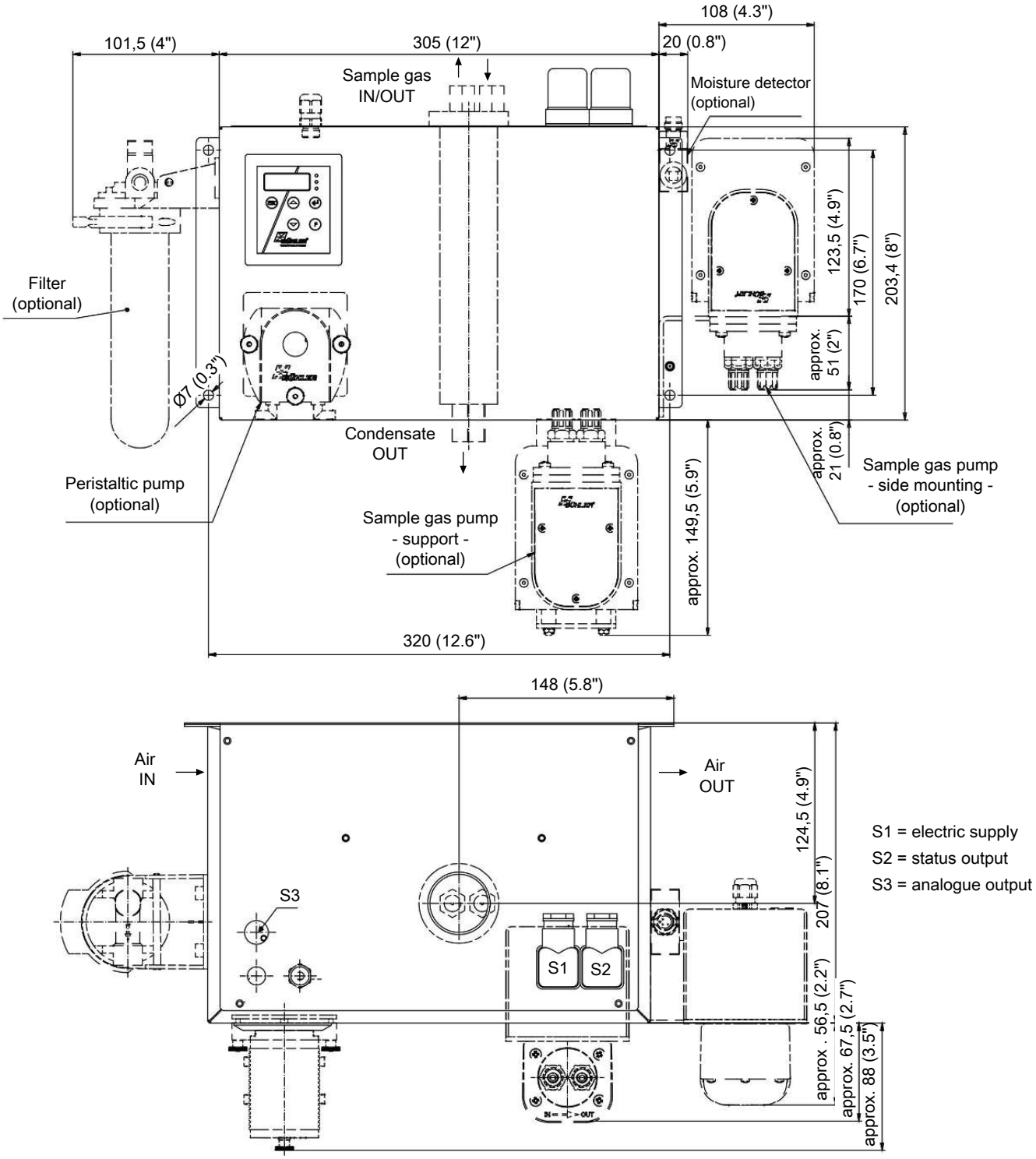
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler models with one gas path inside the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	2	X	1	X	X	X	X	X	X	X	0	X	0	Product Characteristics
																		Gas cooler types
				1														TC-MIDI 6111 X2: Ambient temperature 104 °F
				2														TC-MIDI 6112 X2: Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	1	0									Stainless steel, TS, metric
							1	1	5									Stainless steel, TS-I, US
							1	2	0									Duran glass, TG, metric
							1	2	5									Duran glass, TG-I, US
							1	3	0									PVDF, TV-SS, metric
							1	3	5									PVDF, TV-SS-I, US
																		Peristaltic Pumps [2]
										0								without peristaltic pump
										1								CPsingle X2 with hose nipple, angled
										3								CPsingle X2 with screw connection, metric/US
																		Sample Gas Pumps [1]
											0							without sample gas pump
											1							P1.3, PVDF, bottom mounted
											2							P1.3, with bypass valve, bottom mounted
											6							P1.3, PVDF, mounted externally
											7							P1.3, with bypass valve, mounted externally
																		Moisture detector [2] **/ filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [3]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional
																		Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

[1] Factory installed tubing for suction operation.

[2] With this option, the maximum ambient temperature is limited to 122 °F.

[3] Also available in stainless steel.

Gas cooler models with two gas paths insides the heat exchanger

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	1	X	2	X	2	X	X	X	X	X	X	0	X	0	Product Characteristics
																	Gas cooler types
				1													TC-MIDI 6111 X2: Ambient temperature 104 °F
				2													TC-MIDI 6112 X2: Ambient temperature 140 °F
																	Certifications
					2												for explosive areas
																	Supply voltage
						1											115 V AC, 50/60 Hz
						2											230 V AC, 50/60 Hz
																	Heat exchanger
							2	6	0								Stainless steel, DTS, metric
							2	6	5								Stainless steel, DTS-I, US
							2	6	1								Stainless steel, DTS 6, metric [1]
							2	6	6								Stainless steel, DTS 6-I, US [1]
							2	7	0								Duran glass, DTG, metric
							2	7	5								Duran glass, DTG-I, US
							2	8	0								PVDF, DTV, metric [1]
							2	8	5								PVDF, DTV-I, US [1]
																	Peristaltic Pumps [4]
										0							without peristaltic pump
										2							CPdouble X2 with hose nipple, angled
										4							CPdouble X2 with screw connection, metric/US
																	Sample Gas Pumps [3]
											0						without sample gas pump
											1						P1.3, 1 gas path, PVDF, bottom mounted
											2						P1.3, 1 gas path, with bypass valve, bottom mounted
											6						P1.3, 1 gas path, PVDF, mounted externally [2]
											7						P1.3, 1 gas path, with bypass valve, mounted externally [2]
																	Moisture detector [4] **/ filter**
												0	0				without filter, without moisture detector
												0	1				without filter, 1 moisture detector with PVDF adapter [5]
												0	2				without filter, 2 moisture detectors with PVDF adapter [5]
												1	0				1 filter, without moisture detector
												1	1				1 filter with built-in moisture detector
												2	0				2 filters, without moisture detector [2]
												2	1				2 filters, 1 moisture detector [2]
												2	2				2 filters, 2 moisture detectors [2]
																	Signal outputs
														0	0		status output only
														1	0		Analog output, 4...20 mA additional
																	Delta T control
																0	0	without Delta T control
																1	0	Delta T control option

[1] Condensate outlets only suitable when connecting peristaltic pumps.

[2] External sample gas pump P1.3 only allows 1 filter.

[3] Factory installed tubing for suction operation.

[4] With this option, the maximum ambient temperature is limited to 122 °F.

[5] Also available in stainless steel.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 02 00 50	Replacement filter element F2-L; Unit 2 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft.)
44 10 00 5	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump

Gas cooler series TC-MIDI+

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The TC-MIDI+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly the wash out effect of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- CE mark standard
- FM approval optional
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- Duran glass or PVDF heat exchanger
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 185/166 kJ/h, 104 °F/122 °F - Version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector, filter, analog output, peristaltic pump and sample gas pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-MIDI+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished by two types according to cooling capacity or operation temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-MIDI+ 6121	TC-MIDI+ 6122

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

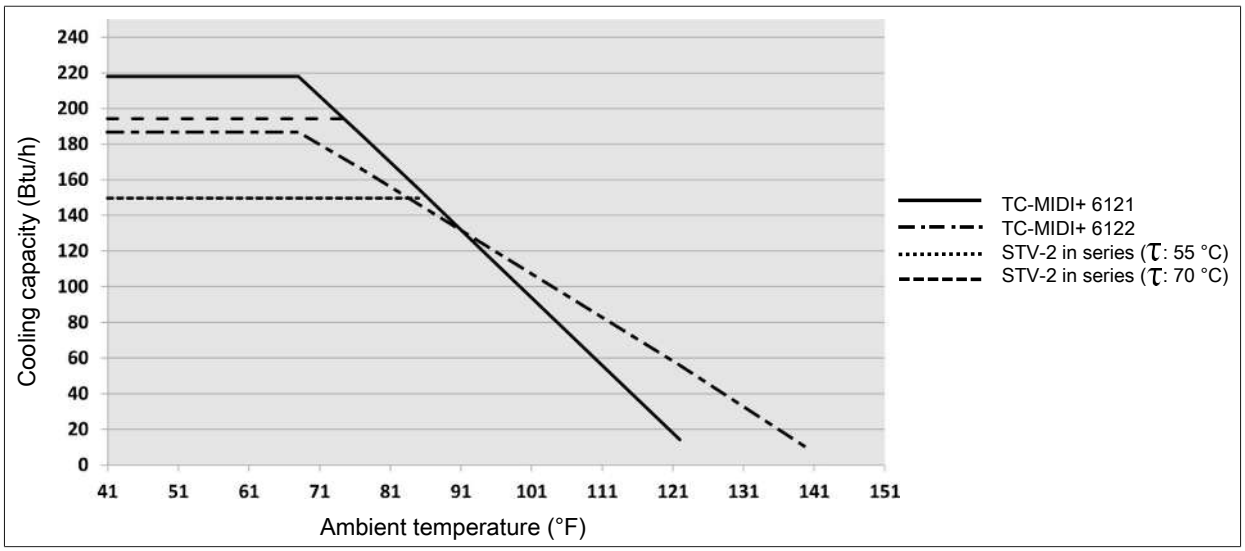
Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas outlet dew temperature preset: adjustable:	 41 °F 36 °F...68 °F			
Protection class	IP 20			
Mechanical load	Tested to DNVGL-CG-0339, Table 6 [1] 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 32 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + Peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3,15 A	6,3 A	3,15 A	6,3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
FM No.	3062014			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data Peristaltic Pumps CPdouble	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1,6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm Screw connection 4/6 (metric), 1/6“-1/4“ (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	19.4 in^2
Filter mesh	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in lpm of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the STG-2 heat exchanger the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 9.6 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.3 lpm.

Please contact our experts for clarification or refer to our design program.

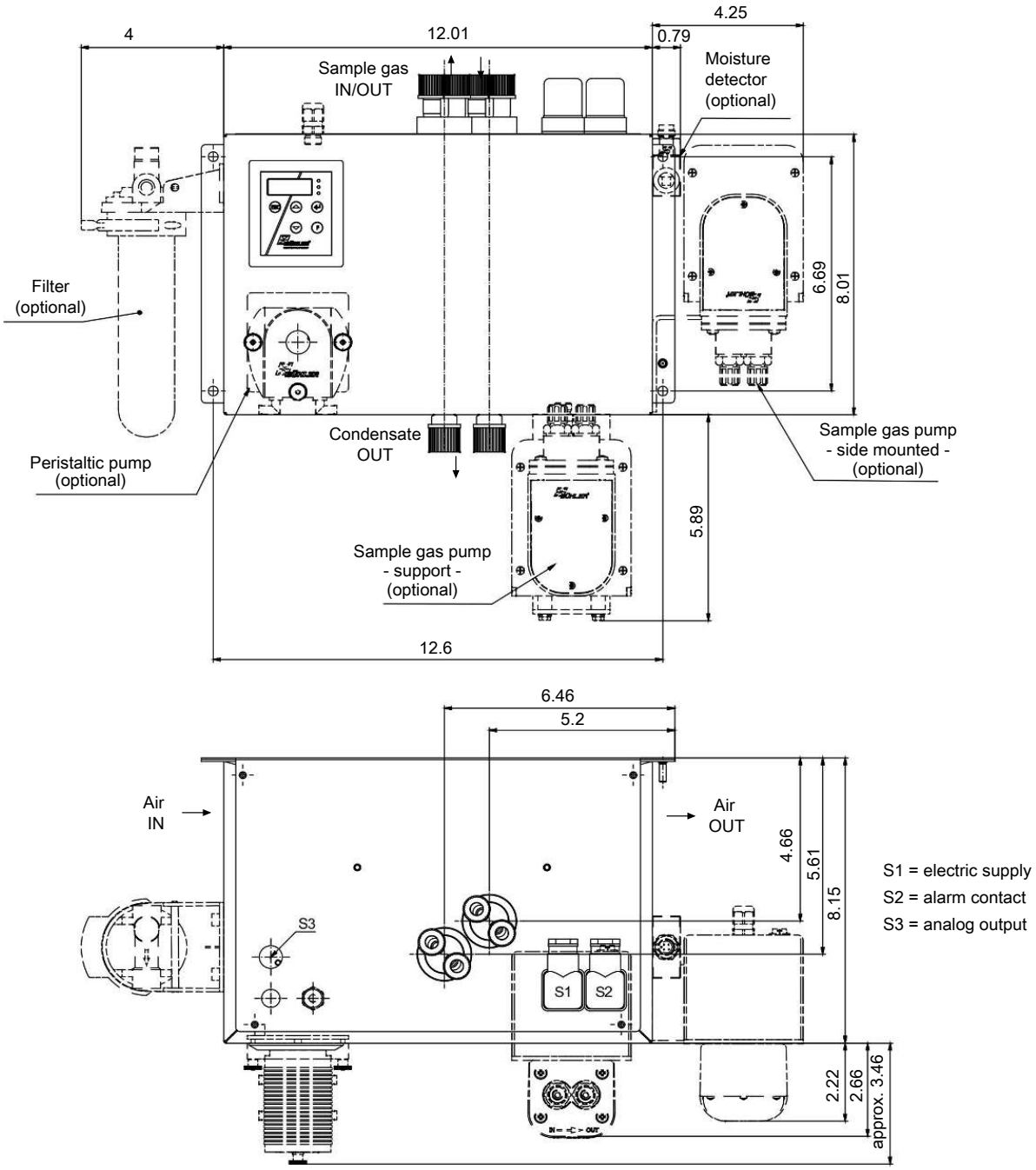
Heat exchanger overview

Heat exchanger	2x STG-2	2x STV-2
Version/Material	Glass	PVDF
Flow v_{max} [1]	5.3 lpm	5 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	327 Btu/h	199 Btu/h
Dead volume V_{tot}	47 ml	41 ml
Gas connections (metric)	GL 14 (6 mm) [2]	DN 4/6
Gas connections (US)	GL 14 (1/4") [2]	1/4”-1/6“
Condensate out connection (metric)	GL 18 (10 mm) [2]	G1/4
Condensate out connection (US)	GL 18 (10 mm) [2]	NPT 1/4“

[1] Max. cooling capacity of the cooler must be considered

[2] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	2	X	X	X	1	X	X	X	X	X	X	0	0	0	Product Characteristics
																	Gas cooler types
				1													TC-MIDI+ 6121: Ambient temperature 104 °F
				2													TC-MIDI+ 6122: Ambient temperature 140 °F
																	Certification
					0												Standard applications - CE
					1												General purpose - FM
																	Supply voltage
						1											115 V AC, 50/60 Hz
						2											230 V AC, 50/60 Hz
																	Heat exchanger
							1	2	2								Duran glass, STG-2 , metric
							1	2	7								Duran glass, STG-2, US fitting
							1	3	2								PVDF, STV-2, metric [1]
							1	3	7								PVDF, STV-2-I, US fitting [1]
																	Peristaltic Pumps [4]
										0							without peristaltic pump
										2							CPdouble with hose nipple, angled
										4							CPdouble with screw connection, metric/US fitting
																	Sample Gas Pumps[3]
											0						without sample gas pump
											1						P1, 1 gas path, PVDF, bottom mounted
											2						P1, 1 gas path, with bypass valve, bottom mounted
											6						P1, 1 gas path, PVDF, side mounted [2]
											7						P1, 1 gas path, with bypass valve, side mounted [2]
																	Moisture detector [4] **/ Filter**
												0	0				without filter, without moisture detector
												0	1				without filter, 1 moisture detector with adapter
												1	0				1 filter, without moisture detector
												1	1				1 filter with built-in moisture detector
																	Status Outputs
														0	0		status output only
														1	0		Analog output option, add-on

[1] Condensate outlets only suitable when connecting peristaltic pumps.

[2] Side mounted sample gas pump P1 only allows 1 filter.

[3] Factory installed tubing for suction operation.

[4] If option is selected, the maximum ambient temperature is limited to 122 ° F.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 02 00 50	Replacement filter element F2-L; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft.)
44 10 00 5	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump

Gas cooler series TC-MIDI+ X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-MIDI+ X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Compact design: Pre-installed and ready to connect
- Low maintenance costs based on easy accessibility
- Duran glass or PVDF heat exchanger
- Adjustable outlet dew point and alarm thresholds
- Low operating noise
- Rated capacity 185/166 Btu/h, 104 °F/122 °F version
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperature display
- Moisture detector, filter, analog output, peristaltic pump, and sample gas pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-MIDI+ X2 series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-MIDI+ 6121 X2	TC-MIDI+ 6122 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 °F to 68 °F) (factory preset 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C/ 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via connected peristaltic pumps or add-on automatic condensate drains.

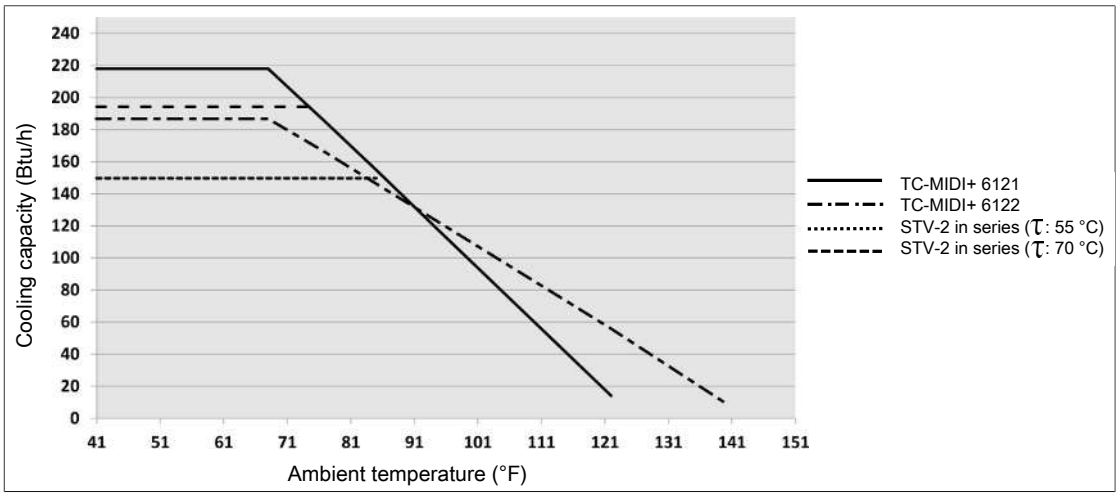
Fine mesh filters can also be used, which in turn can be installed in optional moisture detectors.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if a condensate enters the cooler due to a malfunction and the peristaltic pump or the automatic condensate drain is unable to remove it.

A P1 gas pump can be attached to the gas cooler, optionally also with bypass valve for regulating the flow. This allows the sample gas pump to be expanded by a single-leg system, so when equipped with a single heat exchanger or for the respective application the two gas paths of the dual heat exchangers are switched in series, for example Cooling 1 – Pump – Cooling 2.

Performance curves



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Gas cooler technical data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) [1] 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz acceleration			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 13.8 x 8.7 x 8.7 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 32 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (P1.x + peristaltic pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.2 A	2.4 A	1.8 A	3.6 A
	200 W / 280 VA		290 W / 420 VA	
Recommended fuse (characteristic: delayed action)	3.15 A	6.3 A	3.15 A	6.3 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections and condensate outlet	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Sample gas pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

[1] not in conjunction with add-on sample gas pump

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data Peristaltic Pumps CPdouble X2

Flow rate	0.3 L/h (50 Hz) / 0.36 L/h (60 Hz) with standard hose
Vacuum inlet	max. 11.60 psi
Pressure inlet	max. 14.50 psi
Output pressure	14.50 psi
Hose	0.16 x 0.06 in
Condensate outlet	Hose nipple Ø0.24 in Screw connection 4/6 (metric), 1/6”-1/4” (US)
IP rating	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1.3

Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

Technical Data Filter AGF-PV-30-F2-L

Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	19.4 in^2
Filter mesh	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. The maximum volume flow v_{max} in lpm of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the STG-2 heat exchanger the parameter triple τ_e = 104 °F, ϑ_G = 158 °F and v = 9.6 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 158 °F and v = 5.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

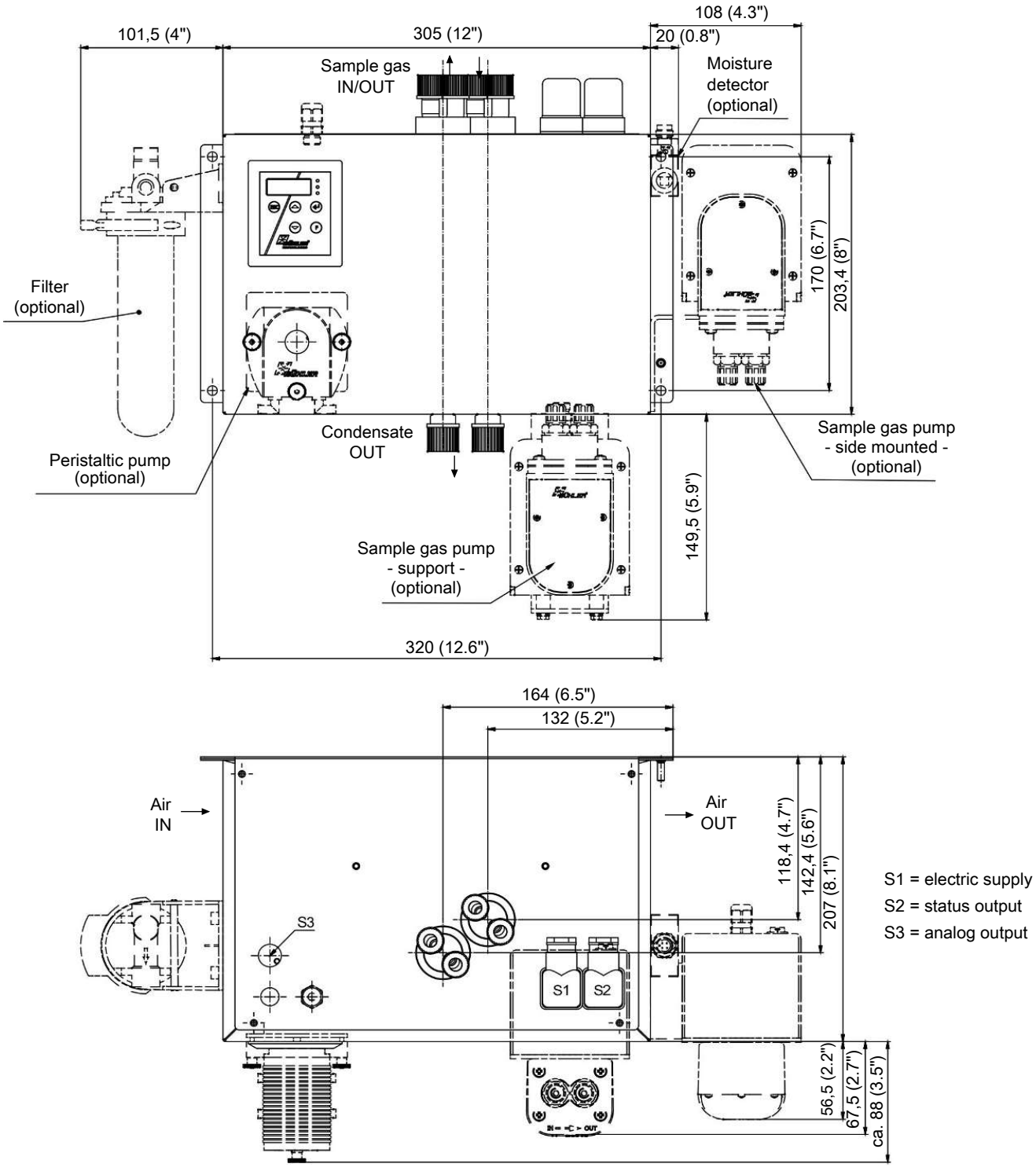
Heat exchanger	2x STG-2 2x STG-2-I [2]	2x STV-2 2x STV-2-I [2]
Version/Material	Glass	PVDF
Flow rate v_{max} [1]	5.3 lpm	5 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Gas pressure p_{max}	44 psi	44 psi
Pressure drop Δp (v=150 L/h)	0.04 psi	0.04 psi
Max. Cooling capacity Q_{max}	327 Btu/h	199 Btu/h
Dead volume V_{tot}	2.9 cu.in.	2.5 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connection (metric)	GL 18 (10 mm) [3]	G1/4
Condensate out connection (US)	GL18 (10 mm) [3]	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler models with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	3	1	2	X	2	X	1	X	X	X	X	X	X	X	0	0	0	Product Characteristics
																		Gas cooler types
				1														TC-MIDI+ 6121 X2: Ambient temperature 104 °F
				2														TC-MIDI+ 6122 X2: Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	2	2									Duran glass, STG-2, metric
							1	2	7									Duran glass, STG-2-I, US
							1	3	2									PVDF, STV-2, metric [1]
							1	3	7									PVDF, STV-2-I, US [1]
																		Peristaltic Pumps [4]
										0								without peristaltic pump
										2								CPdouble X2 with hose nipple, angled
										4								CPdouble X2 with screw connection, metric/US
																		Sample Gas Pumps [3]
											0							without sample gas pump
											1							P1.3, 1 gas path, PVDF, bottom mounted
											2							P1.3, 1 gas path, with bypass valve, bottom mounted
											6							P1.3, 1 gas path, PVDF, mounted externally [2]
											7							P1.3, 1 gas path, with bypass valve, mounted externally [2]
																		Moisture detector [4] **/ filter**
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with PVDF adapter [5]
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Signal outputs
														0	0			status output only
														1	0			Analog output, 4...20 mA additional

[1] Condensate outlets only suitable when connecting peristaltic pumps.

[2] External sample gas pump P1.3 only allows 1 filter.

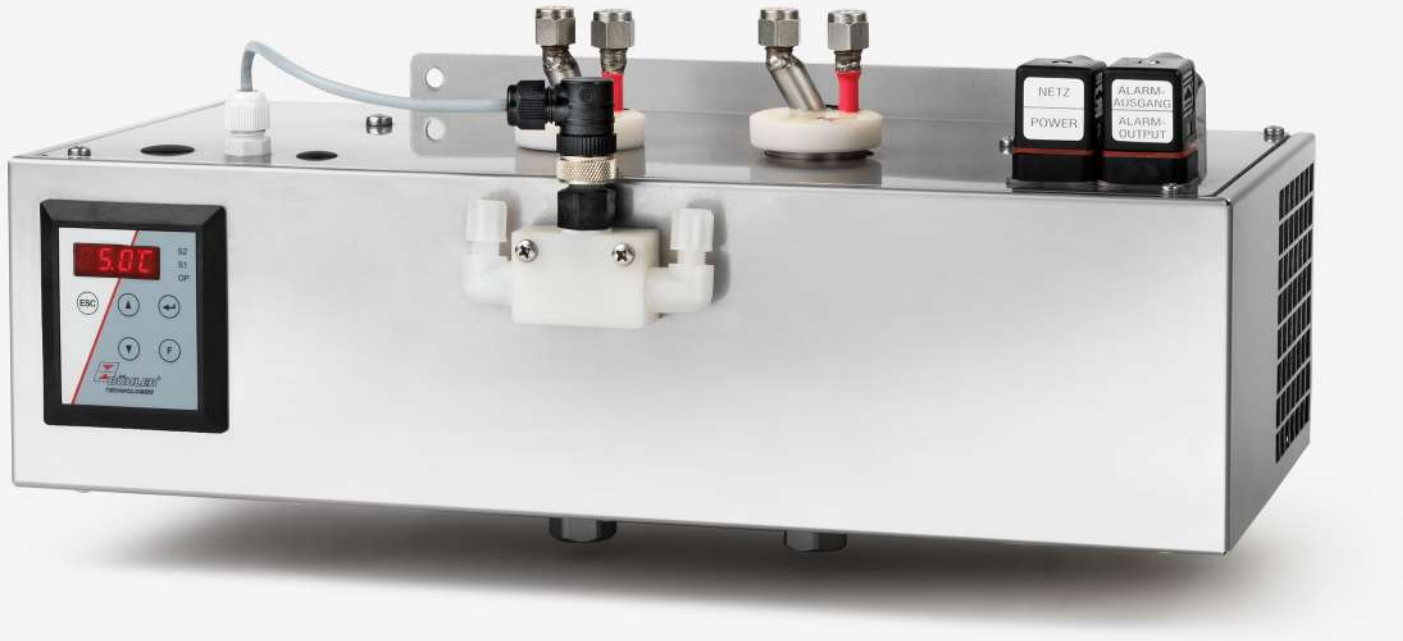
[3] Factory installed tubing for suction operation.

[4] With this option, the maximum ambient temperature is limited to 122 °F.

[5] Also available in stainless steel.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 02 00 50	Replacement filter element F2-L; Unit 2 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft.)
44 10 00 5	Condensate trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump



Gas cooler series TC-Double

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The TC-Double series allows you to precisely match the two-stage cooling system (series connection) through separate configuration of the cooling block temperatures. This allows the TC-Double to also be operated with built-in pre-cooler.

- CE mark standard
- FM approval optional
- One gas path
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Rated power 256/294 Btu/h, 104 °F/140 °F version
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperatures display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Double series was designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double 6111	TC-Double 6112

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

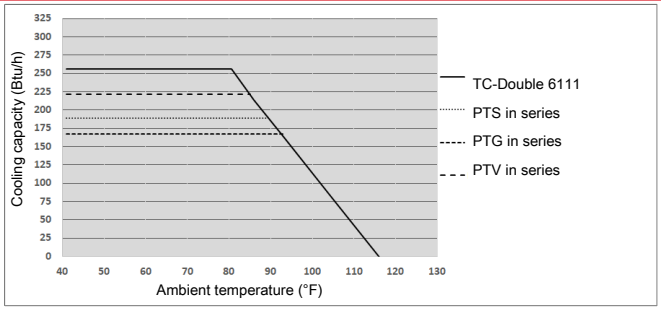
In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double and controlled. These are also available with bypass valve to regulate the flow rate.

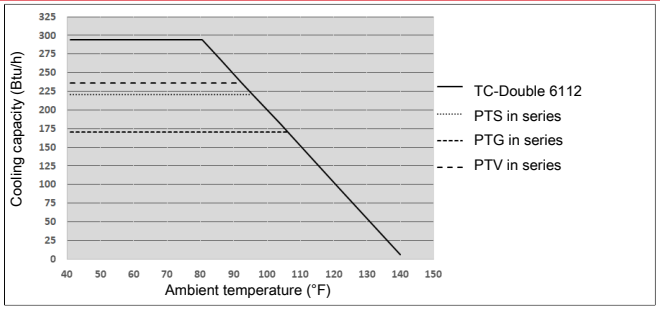
Performance curves

The TC-Double 6111 (X2) is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double 6112 (X2) on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Model TC-Double 6111 (X2)



Model TC-Double 6112 (X2)



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	2x PTS 2x PTS-I	2x PTG	2x PTV 2x PTV-I [2]
Version / Material	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	294 Btu/h	204 Btu/h	280 Btu/h
Gas pressure p_{max}	44 psi (2321 psi on request)	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	3.6 cu.in.	7 cu.in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas outlet dew temperature, preset:	41 °F			
Protection class	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 25.3 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2,5 A	4 A	2,5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
FM No.	3062014			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

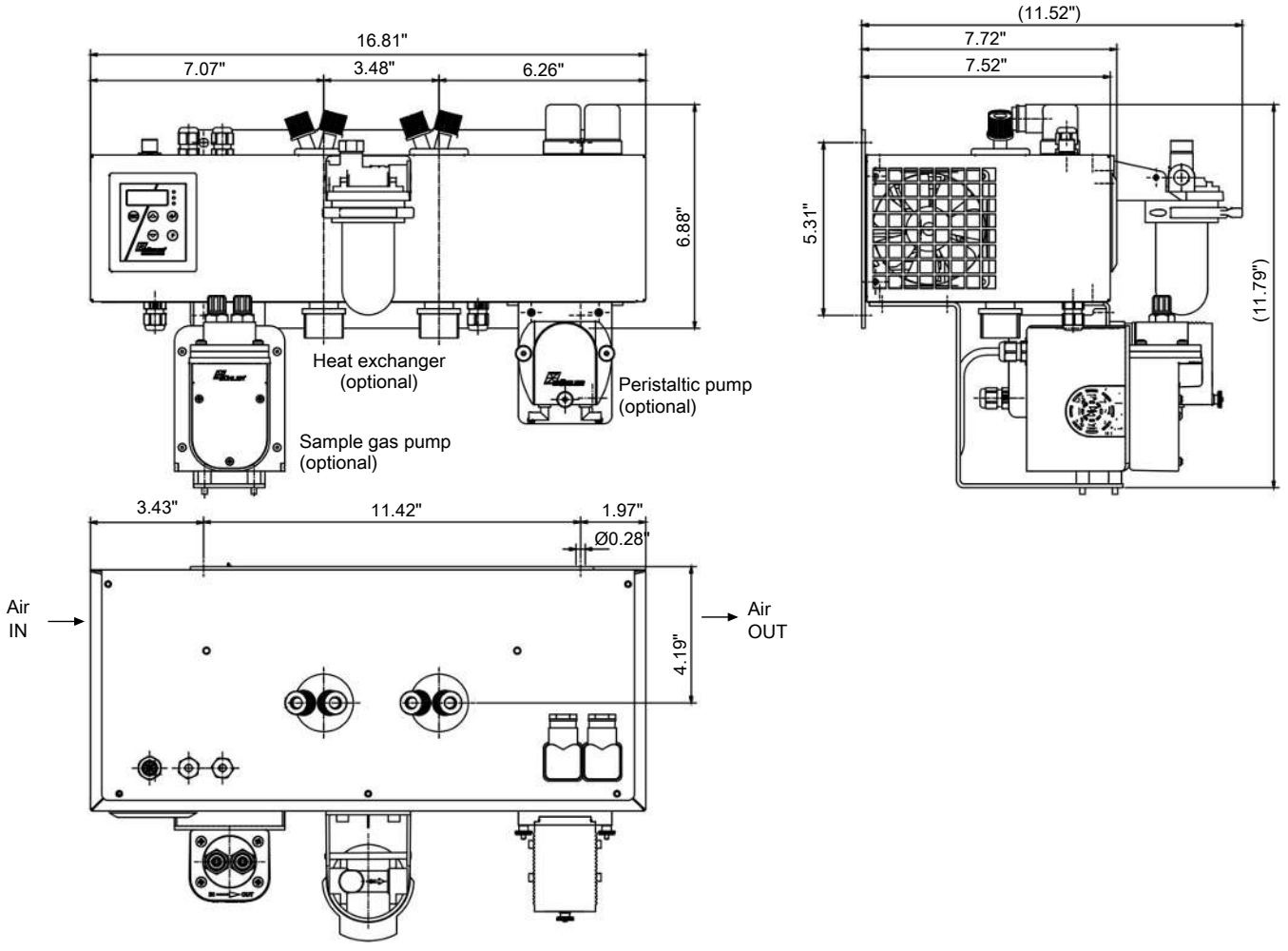
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPdouble Peristaltic Pump Technical Data	
Ambient temperature	32 °F to 131 °F
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials	
Filter:	PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

Dimensions (inch)



Ordering instructions

Gas cooler type with two in-line heat exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	6	1	1	X	X	X	1	X	X	X	X	X	X	0	0	0	Product Characteristics
																	Gas cooler type
				1													TC-Double 6111: Ambient temperature 104 °F
				2													TC-Double 6112: Ambient temperature 140 °F
																	Certifications
					0												Standard applications - CE
					1												General purpose - FM
																	Supply voltage
						1											115 VAC, 50/60 Hz
						2											230 VAC, 50/60 Hz
																	Heat exchanger
							1	1	0								Stainless steel, PTS, metric
							1	1	5								Stainless steel, PTS-I, US fitting
							1	2	0								Duran glass, PTG, metric
							1	2	5								Duran glass, PTG, US fitting
							1	3	0								PVDF, PTV, metric
							1	3	5								PVDF, PTV-I, US fitting
																	Peristaltic Pumps [1]
										0							without peristaltic pump
										2							CPdouble with hose nipple, angled
										4							CPdouble with screw connection [2]
																	Sample Gas Pumps [1] [3]
											0						without sample gas pump
											1						P1, PVDF
											2						P1, with bypass valve
																	Moisture Detector/Filter [1] [2]
												0	0				without filter, without moisture detector
												0	1				without filter, 1 moisture detector with adapter
												1	0				1 filter, without moisture detector
												1	1				1 filter with built-in moisture detector
																	Status Outputs
														0	0		status output only
														1	0		Analog output option, add-on

[1] If option is selected, the maximum ambient temperature is limited to 122 ° F.

[2] Metric or US fitting, per heat exchanger.

[3] Factory installed tubing for suction operation.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate Trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump

Gas cooler series TC-Double X2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Double X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- One gas path
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Rated power 256/294 Btu/h, 104 °F/140 °F version
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Cooling block temperatures display
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Double X2 series was designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double 6111 X2	TC-Double 6112 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

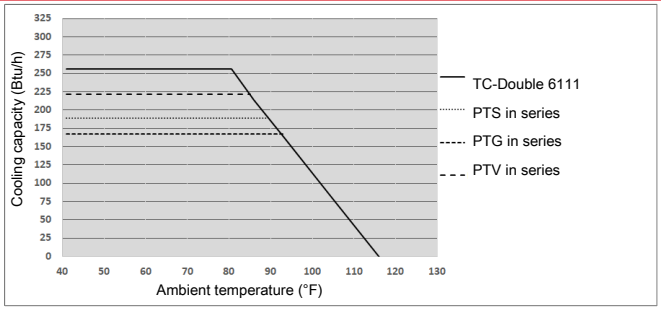
In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double and controlled. These are also available with bypass valve to regulate the flow rate.

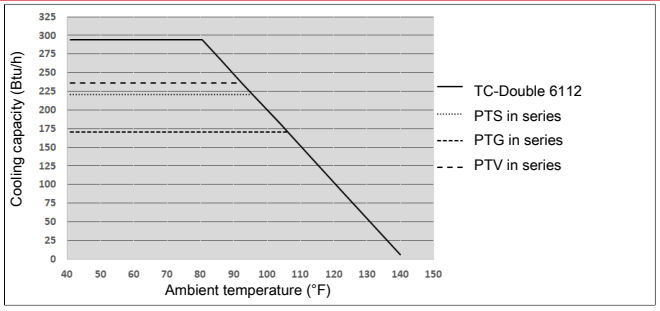
Performance curves

The TC-Double 6111 (X2) is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double 6112 (X2) on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Model TC-Double 6111 (X2)



Model TC-Double 6112 (X2)



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	2x PTS 2x PTS-I	2x PTG 2x PTG-I	2x PTV 2x PTV-I [2]
Version / Material	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	294 Btu/h	204 Btu/h	280 Btu/h
Gas pressure p_{max}	44 psi (2321 psi on request)	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	3.6 cu.in.	7 cu.in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature, preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2.5 A	4 A	2.5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

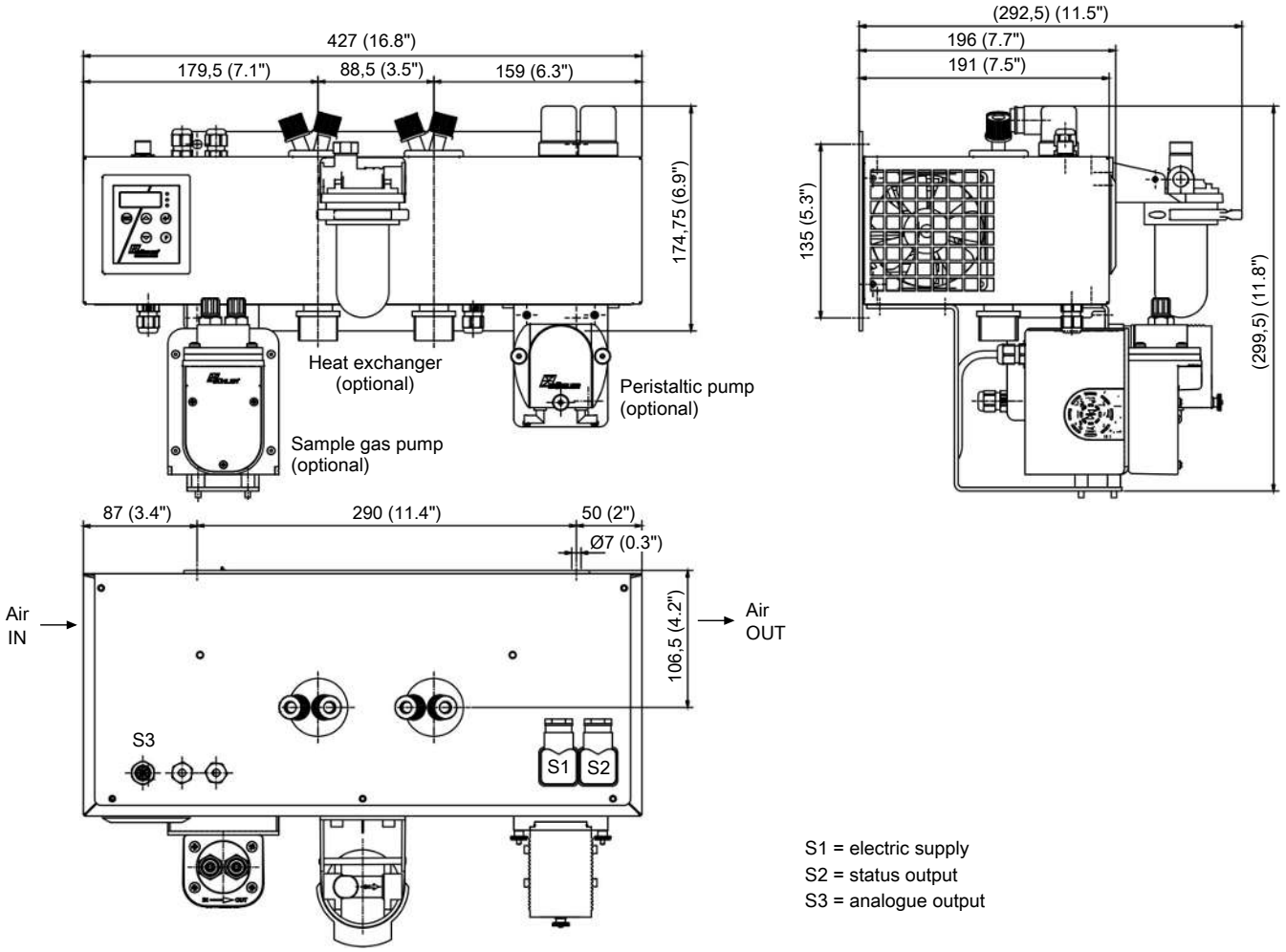
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pump CPdouble X2	
Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1.3	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Dimensions (inch)



Ordering instructions

Gas cooler type with two in-line heat exchangers

The item number is a code for the configuration of your unit. Please use the following model key:

4496	6	1	1	X	2	X	1	X	X	X	X	X	X	X	0	0	0	Product Characteristic
																		Gas cooler type
				1														TC-Double 6111 X2: Ambient temperature 104 °F
				2														TC-Double 6112 X2: Ambient temperature 140 °F
																		Certifications
					2													for explosive areas
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
																		Heat exchanger
							1	1	0									Stainless steel, PTS, metric
							1	1	5									Stainless steel, PTS-I, US fitting
							1	2	0									Duran glass, PTG, metric
							1	2	5									Duran glass, PTG, US fitting
							1	3	0									PVDF, PTV, metric
							1	3	5									PVDF, PTV-I, US fitting
																		Peristaltic Pumps [1]
										0								without peristaltic pump
										2								CPdouble X2 with hose nipple, angled
										4								CPdouble X2 with screw connection [2]
																		Sample Gas Pumps [1] [3]
											0							without sample gas pump
											1							P1.3, PVDF
											2							P1.3, with bypass valve
																		Moisture Detector/Filter [1] [2]
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with adapter
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Status outputs
														0	0			status output only
														1	0			Analogue output option, add-on

[1] If option is selected, the maximum ambient temperature is limited to 122 ° F.

[2] Metric or US fitting, per heat exchanger.

[3] Factory installed tubing for suction operation.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate Trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump

Gas cooler series TC-Double+

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The TC-Double+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly the wash out effect of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- CE mark standard
- FM approval optional
- Low wash out effects
- One gas path
- Duran glass or PVDF heat exchanger
- Rated power 256/294 Btu/h, 104 °F/140 °F version
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

TC-Double+ coolers were designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects. The two cooling blocks can be set do different temperatures.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double+ 6111	TC-Double+ 6112

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

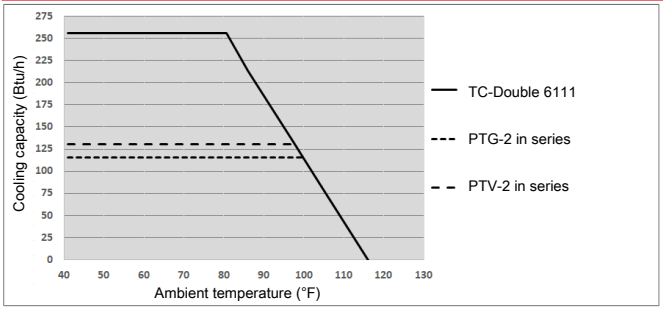
In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double+ and controlled. These are also available with bypass valve to regulate the flow rate.

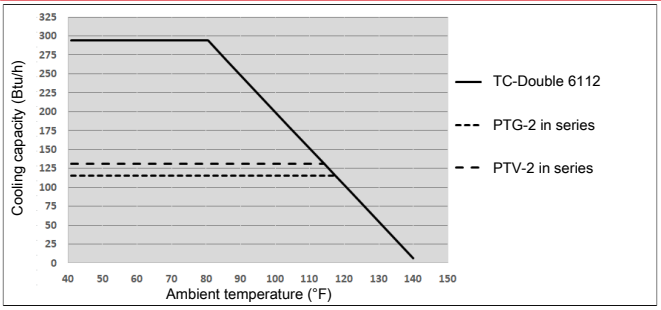
Performance curves

The TC-Double+ 6111 (X2) is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double+ 6112 (X2) on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Model TC-Double+ 6111 (X2)



Model TC-Double+ 6112 (X2)



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	2x PTG-2	2x PTV-2 2x PTV-2-I [2]
Version / Material	Glass	PVDF
Flow rate v_{max} [1]	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	218 Btu/h	204 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	7 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas outlet dew temperature, preset:	41 °F			
Protection class	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 25.3 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2,5 A	4 A	2,5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
FM No.	3062014			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

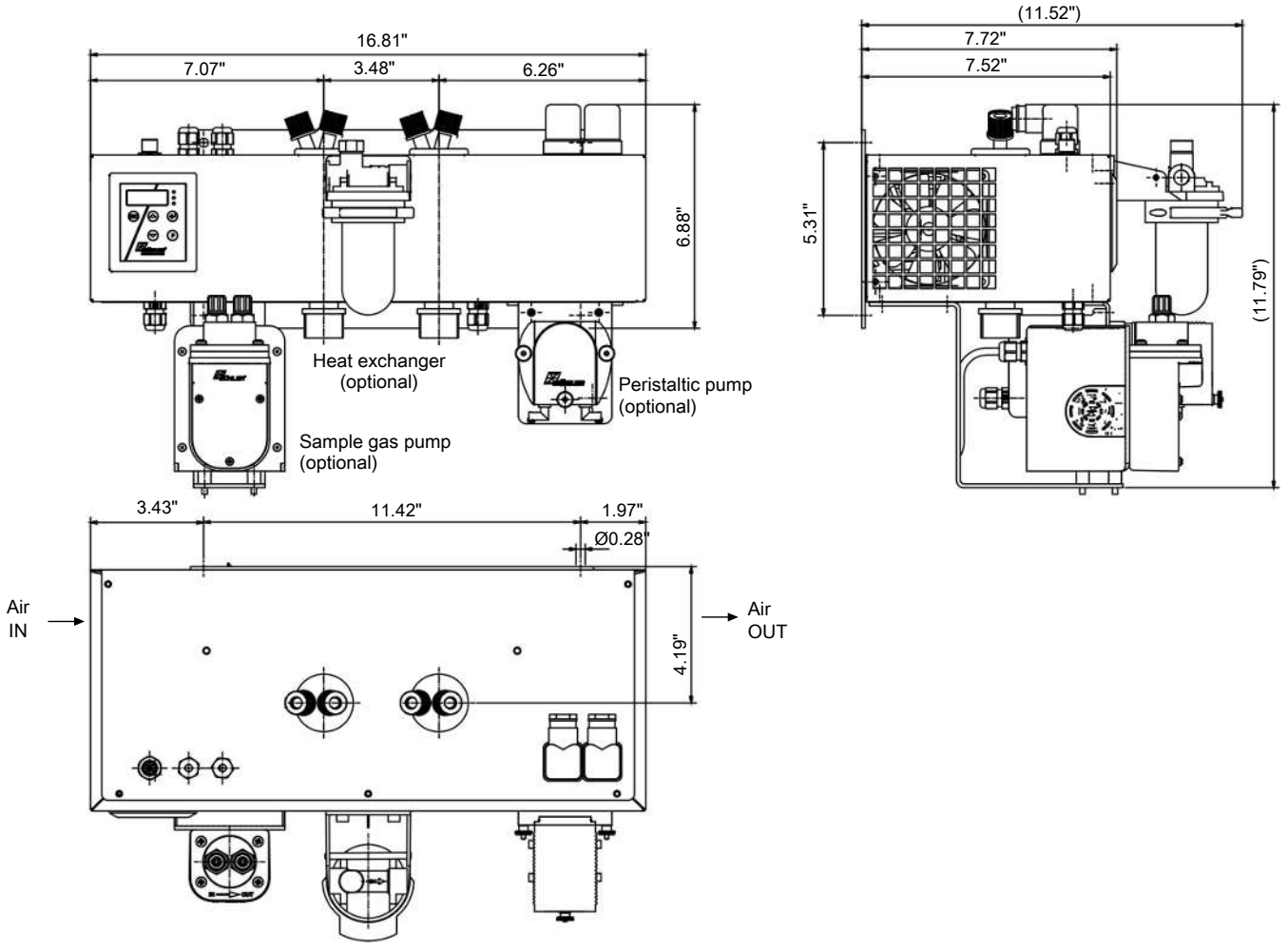
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPdouble Peristaltic Pump Technical Data	
Ambient temperature	32 °F to 131 °F
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Sample Gas Pump P1	
Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton, PFA

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials	
Filter:	PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

Dimensions (inch)



Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	6	1	1	X	X	X	1	X	X	X	X	X	X	0	0	0	Product Characteristics
																	Gas cooler type
				1													TC-Double+ 6111: Ambient temperature 104 °F
				2													TC-Double+ 6112: Ambient temperature 140 °F
																	Certifications
					0												Standard applications - CE
					1												General purpose - FM
																	Supply voltage
						1											115 VAC, 50/60 Hz
						2											230 VAC, 50/60 Hz
																	Heat exchanger
							1	2	2								Duran glass, PTG-2, metric
							1	2	7								Duran glass, PTG-2, US fitting
							1	3	2								PVDF, PTV-2, metric
							1	3	7								PVDF, PTV-2-I, US fitting
																	Peristaltic Pumps [1]
										0							without peristaltic pump
										2							CPdouble with hose nipple, angled
										4							CPdouble with screw connection [2]
																	Sample Gas Pumps [1] [3]
											0						without sample gas pump
											1						P1, PVDF
											2						P1, with bypass valve
																	Moisture Detector/Filter [1] [2]
												0	0				without filter, without moisture detector
												0	1				without filter, 1 moisture detector with adapter
												1	0				1 filter, without moisture detector
												1	1				1 filter with built-in moisture detector
																	Status Outputs
														0	0		status output only
														1	0		Analog output option, add-on

[1] If option is selected, the maximum ambient temperature is limited to 122 ° F.

[2] Metric or US fitting, per heat exchanger.

[3] Factory installed tubing for suction operation.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate Trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump

Gas cooler series TC-Double+ X2

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

Many applications require equipment which can be used in explosive areas. This is where the TC-Double+ X2 series provides solutions for Zone 2 or Class I, Division 2.

- ATEX and IECEx Zone 2 approval
- FM C-US approval for Class I, Division 2
- Low wash out effects
- One gas path
- Duran glass or PVDF heat exchanger
- Rated power 256/294 Btu/h, 104 °F/140 °F version
- Max. ambient temperature 140 °F
- Dew point stability 0.2 °F
- Status display and output
- Moisture detector connection, analog output, filter, and peristaltic pump optional

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

TC-Double+ X2 coolers were designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimise wash out effects. The two cooling blocks can be set do different temperatures.

Any other use of this cooler is determined by the type of built-in passive pre-cooling, i.e. the first cooling level is not controlled electronically.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications	
Operating temperature	104 °F	122 °F
2 heat exchangers in series	TC-Double+ 6111 X2	TC-Double+ 6112 X2

Additional components which every conditioning system should feature can optionally be integrated:

- Peristaltic pump for condensate separation,
- Filter,
- Moisture detector,
- Sample gas pump.

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperatures in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. This applies to the outlet dew point setting on one hand and to the low and excess temperature warning thresholds on the other hand. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 34 °F cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via the add-on peristaltic pump.

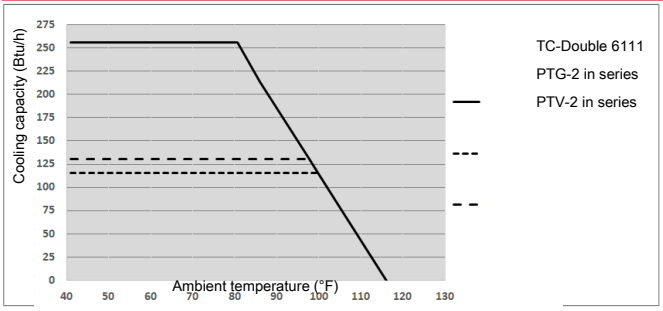
In addition, a fine filter can be attached to the cooler, which an optional moisture detector can be integrated into. The glass dome allows the dirt level of the filter element to easily be determined. The moisture detector can also be installed separately and is generally easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

A gas pump can be attached to the TC-Double+ and controlled. These are also available with bypass valve to regulate the flow rate.

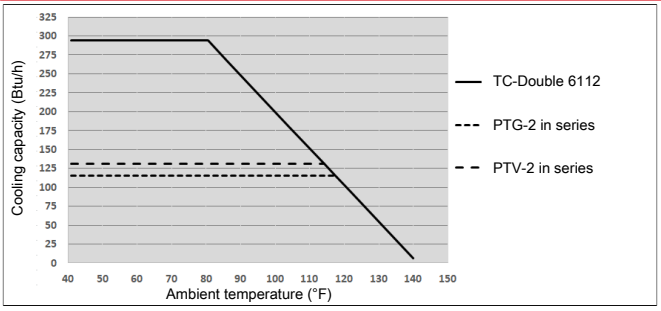
Performance curves

The TC-Double+ 6111 (X2) is designed for ambient temperatures of up to 104 °F. The cooling capacity is adequate up to this temperature. The TC-Double+ 6112 (X2) on the other hand can be used in higher temperatures up to nominal 140 °F. Please note the available cooling capacity.

Model TC-Double+ 6111 (X2)



Model TC-Double+ 6112 (X2)



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 122 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	2x PTG-2 2x PTG-2-I	2x PTV-2 2x PTV-2-I [2]
Version / Material	Glass	PVDF
Flow rate v_{max} [1]	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	218 Btu/h	204 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	7 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Gas Cooler Technical Data

Gas Cooler Technical Data				
Ready for operation	after max. 10 minutes			
Ambient temperature	41 °F to 140 °F			
Gas output dew temperature, preset: adjustable:	 41 °F 36 °F...68 °F			
IP rating	IP 20			
Housing	Stainless steel, brushed			
Packaging dimensions	approx. 16.8 x 11.8 x 11.5 in			
Weight incl. heat exchanger	approx. 13.8 lb approx. 33 lb at full expansion stage			
Electrical data	Unit without add-on		Unit with add-on (peristaltic pump + gas pump)	
	230 V AC	**115 V AC**	**230 V AC**	**115 V AC**
	+5/-10%	+5/-10%	+-5%	+-5%
	50/60 Hz	50/60 Hz	50 Hz	60 Hz
	1.6 A	3.2 A	2.1 A	4.1 A
	278 W / 350 VA	296 W / 370 VA	390 W / 487 VA	377 W / 472 VA
Recommended fuse (characteristic: delayed action)	2.5 A	4 A	2.5 A	5 A
Status output switching capacity	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free			
Electrical Connections	Plug per EN 175301-803			
Gas connections	Heat exchange see table "Heat Exchanger Overview" Filter, moisture detector adapter, gas pump, G1/4 or NPT 1/4" or metric/US tube or pipe			
Parts in contact with media Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton			
Markings:	FM18ATEX0012X: II 3 G Ex ec nC IIC T4 Gc IECEx FMG 18.0005X: Ex ec nC IIC T4 Gc FM18US0021X/FM18CA0010X: CL I DIV 2 GP ABCD RU C-DE.HA65.B.00608/20			

Technical Data - Options

Analogue Output Cooler Temperature Technical Data

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Technical Data peristaltic pump CPdouble X2

Ambient temperature	32 °F to 122 °F
Flow rate	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Degree of protection	IP 44
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

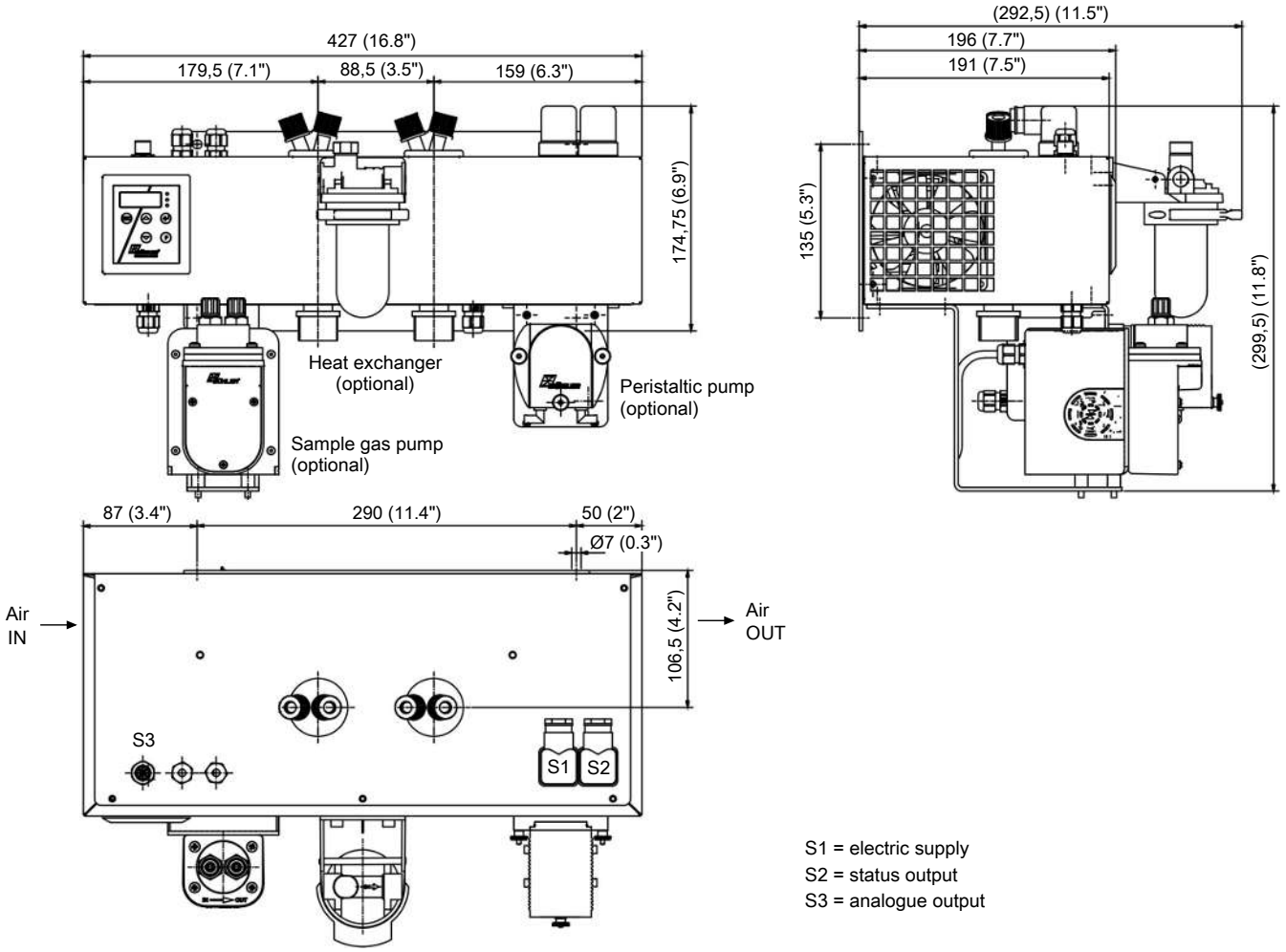
Technical Data Sample Gas Pump P1.3

Ambient temperature	32 °F to 122 °F
Operating pressure	max. 18.8 psi abs.
Nominal outlet	4.6 lpm (at p = 14.5 psi abs.)
Materials in contact with media vary by configuration	PTFE, PVDF, 1.4571, 1.4401, Viton

AGF-PV-30-F2 Filter Technical Data

Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in^2
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

Dimensions (inch)



S1 = electric supply
S2 = status output
S3 = analogue output

Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	6	1	1	X	2	X	1	X	X	X	X	X	X	0	0	0	Product Characteristics
																	Gas cooler type
				1													TC-Double+ 6111 X2 Ambient temperature 104 °F
				2													TC-Double+ 6112 X2 Ambient temperature 140 °F
																	Certifications
					2												for explosive areas
																	Supply voltage
						1											115 V AC, 50/60 Hz
						2											230 V AC, 50/60 Hz
																	Heat exchanger
							1	2	2								Duran glass, PTG-2, metric
							1	2	7								Duran glass, PTG-2-I, US
							1	3	2								PVDF, PTV-2, metric
							1	3	7								PVDF, PTV-2-I, US
																	Peristaltic Pumps [1]
										0							without peristaltic pump
										2							CPdouble X2 with hose nipple, angled
										4							CPdouble X2 with screw connection [2]
																	Sample Gas Pumps [1] [3]
											0						without sample gas pump
											1						P1.3, PVDF
											2						P1.3, with bypass valve
																	Moisture Detector/Filter [1] [2]
												0	0				without filter, without moisture detector
												0	1				without filter, 1 moisture detector with PVDF adapter [4]
												1	0				1 filter, without moisture detector
												1	1				1 filter with built-in moisture detector
																	Signal outputs
														0	0		status output only
														1	0		Analog output, 4...20 mA additional

[1] With this option, the maximum ambient temperature is limited to 122 °F.

[2] Metric or US connection, per heat exchanger.

[3] Factory installed tubing for suction operation.

[4] Also available in stainless steel.

Consumables and accessories

Item no.	Description
45 10 008	Automatic condensate drain AK 5.2
45 10 028	Automatic condensate drain AK 5.5
44 10 004	Automatic condensate drain AK 20
44 10 001	Automatic condensate drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
44 10 005	Condensate Trap GL1, 0.4 L
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.005 lpm
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.005 lpm
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump

Gas cooler series TC-Kit

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The small TC-Kit sample gas cooler offers a variety of options for installation in gas analysis systems.

- Compact design for installation in a gas cooling system
- Effective heat release through external fans and cooling ribs
- Version 24 V, optionally 230 V/115 V
- Protection class IPxxC, with tight installation IP54
- One or two gas paths
- Stainless steel, glass or PVDF heat exchanger
- Adjustable outlet dew point and alarm thresholds
- Nominal capacity 104 Btu/h
- Dew point stability ±0.2 °F
- MCD400 display module for separate installation
- Used in **DNV-GL and LR type-tested** conditioning unit
- Compliance with requirements under **IMO MARPOL MEPC.259(68)** demonstrated

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Kit series consists of various models which can be classified by the number of heat exchangers.

This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications
Operating temperature	131 °F
1 heat exchanger	TC-Kit 6312
2 heat exchangers	TC-Kit 6322

Additional components which every conditioning system should feature can optionally be connected:

- Peristaltic pump for condensate separation*,
- Moisture detector,
- Sample gas pump*,
- Power supply module 230/115 V,
- Alarm output*,
- Analog output
- Controller for heated line**.

* Expansion module (option 10 or 11) required.

** Controller (option 01 or 11) required.

This allows for various configurations of cooler and options. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display as well as a red LED on the display module along with the status relay indicate the conditions are below or above the configured warning range (e.g. after switching on).

The outputs are:

A potential-free status output. The relay is activated when the block temperature is within the target range. The output also serves as collective alarm for device faults, moisture ingress, etc.

A switched output for connecting a gas pump. The output uses the same relay as the status output. This output can only be used for pumps designed for 24 VDC operating voltage.

Another relay output is available for switching up to two peristaltic pumps. The pumps are supplied with the mains voltage and can be shut off via the device menu for maintenance purposes.

The TC-Kit can optionally be configured for connecting a heated line, which can be either self-regulating or a heated line regulated by the cooler.

Operation via 115 VAC/230 VAC and using the regulator for a heated line requires the optional expansion module.

Gas cooler technical data

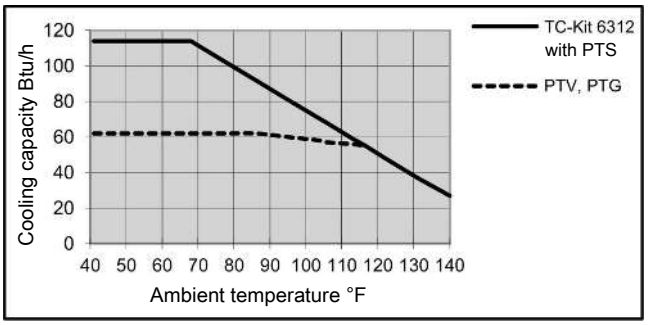
Gas cooler			
Ready for operation	after max. 10 minutes		
Ambient temperature	41 °F to 131 °F		
Gas output dew point preset: adjustable:	 41 °F 36 °C...68 °F		
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration		
Protection rating	IPxxC, with tight installation IP54		
Rack material (outdoors):	Stainless steel, aluminium		
Packaging dimensions	approx. 8.5 x 7.9 x 14.2 in		
Weight without heat exchanger	approx. 8.4 lb (switched-mode power supply + controller) approx. 7.5 lb (at 24 V DC)		
Electrical power input	Base version	Optional switching power supply	
	24 V DC	230 V AC	115 V AC
	5 A	0.6 A	1.2 A
	120 W	110 W/140 VA	
Status output switching capacity (optional)	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical Connections	Cable clamp (for 24 V DC) or blade receptacle (for 115/230 V AC)		
Gas connections	Heat exchanger see table "Heat exchanger overview"		
Parts in contact with mediums	Heat exchanger see table "Heat exchanger overview"		

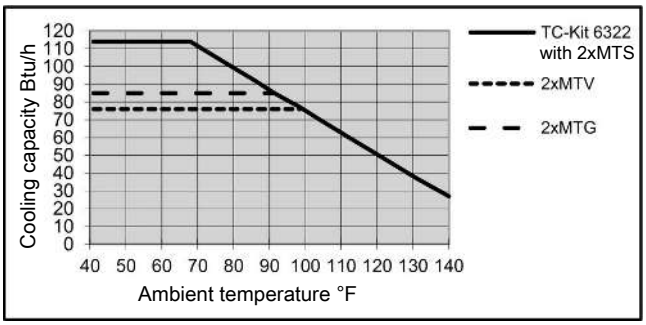
Technical Data - Options

Technical Data Controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F ... 392 °F
Motor power:	max. 1600 W (230 V) / 800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Outlet

One heat exchanger		Two heat exchangers	
Model TC-Kit 6312		**Model TC-Kit 6322**	
Rated cooling capacity (at 77 °F)	104 Btu/h	Rated cooling capacity (at 77 °F)	104 Btu/h
max. ambient temperature	131 °F	max. ambient temperature	131 °F
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Note: The limit curves for the heat exchangers exchanger PTG, MTG, PTV or MTV apply to a dew point of 122 °F.

The cooling capacity curves of the TC-Kit apply to ideal installation in a housing. Depending how it is installed, the value may deviate from the cooling capacity curve.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F	149 °F	149 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	284 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h	90 Btu/h	76 Btu/h	62 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	29 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.28 psi	0.26 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.48 cu. in.	1.2 cu. in.	1.1 cu. in.	1 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

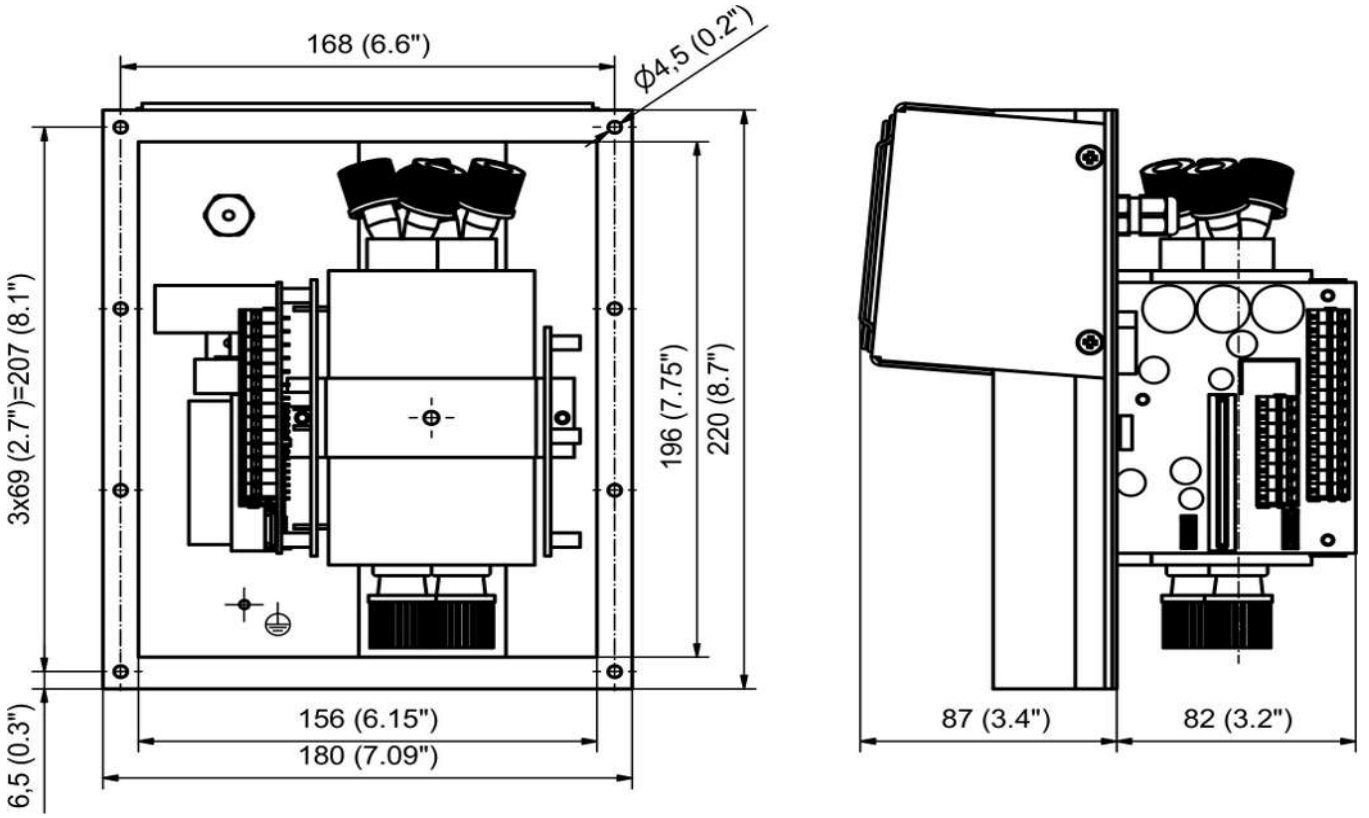
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

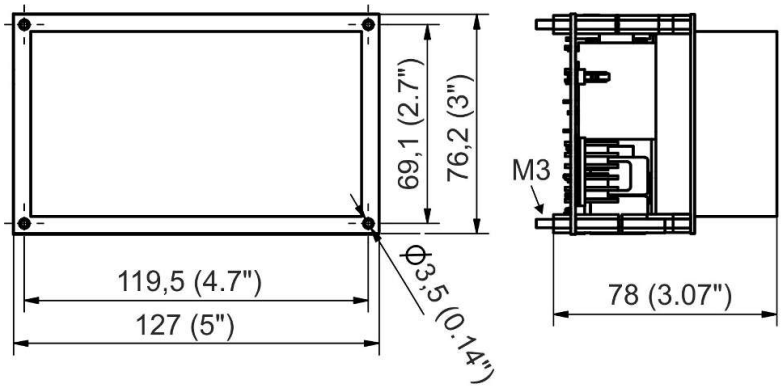
[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (9/32") (see accessories).

[4] Gasket inside diameter.

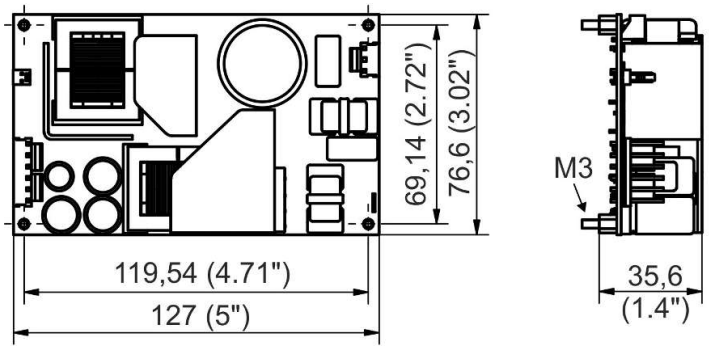
Dimensions basic version



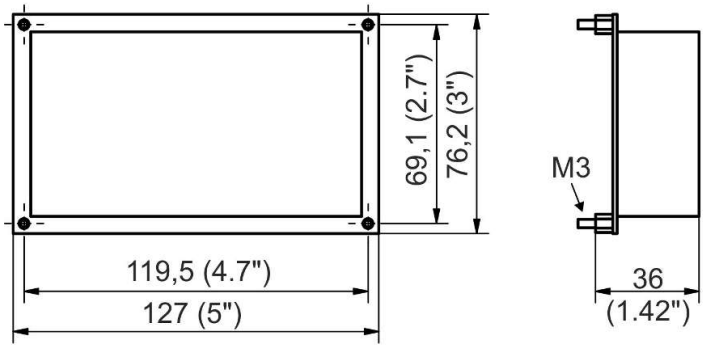
Power supply and expansion module



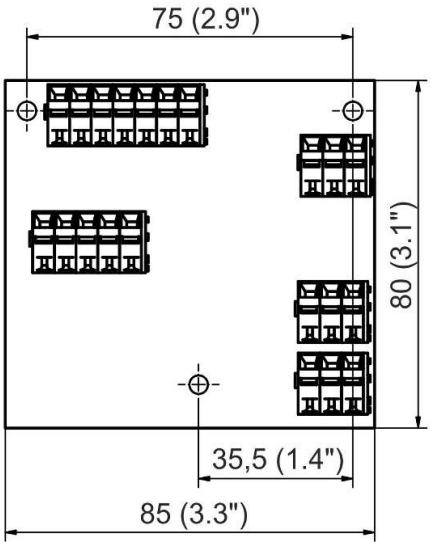
Power supply module



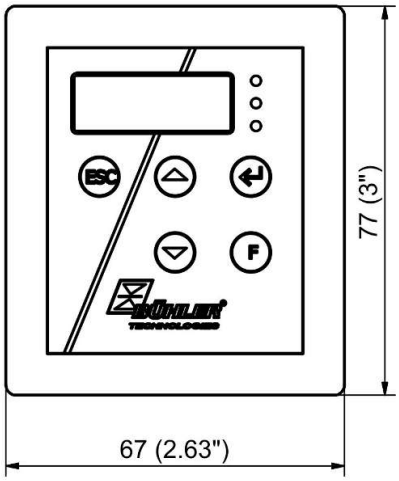
Expansion module (230 V/115 V)



Power board (option expansion module 24 V)



Display unit



Cut-out in front panel 55.5 x 65.4 mm (2.18" x 2.57")

Ordering instructions

Gas cooler models

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	3	X	X	0	X	X	X	0	Product Characteristics
			1							Gas cooler with 1 heat exchanger
			2							Gas cooler with 2 heat exchangers
										Gas cooler type
				2	0					TC-Kit: Ambient temperature 131 °F
										Supply voltage
						1				115 VAC, 50/60 Hz (power supply module)
						2				230 VAC, 50/60 Hz (power supply module)
						4				24 VDC
										Options
							0	0		Without option
							0	1		Controller for heated line
							1	0		Expansion module
							1	1		Controller and expansion module
4496	2	3			0				0	Order key

Heat exchanger options

Item no.	Description
4465099	MTS, steel heat exchanger ø20 mm, metric connections
4465099I	MTS-I, steel heat exchanger ø20 mm, US connections
4465299	MTS-WS, steel heat exchanger ø20 mm, horizontal gas inlet/output, metric connections
4465199	MTV, plastic heat exchanger ø20 mm, metric connections
4465199I	MTV-I, plastic heat exchanger ø20 mm, US connections
44651997	MTG, glass heat exchanger ø20 mm, metric and US connections
4447999	PTS, steel heat exchanger ø35 mm, metric connections
4447999I	PTS-I, steel heat exchanger ø35 mm, US connections
4446999	PTV, plastic heat exchanger ø35 mm, metric connections
4446999I	PTV-I, plastic heat exchanger ø35 mm, US connections
4445999	PTG, glass heat exchanger ø35 mm, metric and US connections

Spare parts and accessories

Item no.	Description
see data sheet 450005	Automatic condensate drain
see data sheet 410011	Moisture detector and flow cell, various models
41 11 10 00	Moisture detector connection cable, 4 m (13 ft)
91 44 05 00 82	Moisture detector connection cable, 450 mm (17.7 in)
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
see data sheet 420011	Sample gas pump P1.x
see data sheet 450020	Peristaltic pump CPsingle, CPdouble and replacement hose
see data sheet 440002	Condensate trap
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV
4496 01 000	Analog output kit
4496 00 047	Mains supply, M3 plug, cable length 400 mm (15.7 in)
4496 00 049	Status output, M3 plug, cable length 380 mm (15 in)
4496 01 001	Mounting kit 1 for thin housings

Gas cooler series TC-Kit+

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The TC-Kit+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly washout of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-4.

- Compact design for installation in a gas cooling system
- Effective heat release through external fans and cooling ribs
- Version 24 V, optionally 230 V/115 V
- Protection class IPxxC, with tight installation IP54
- One gas path
- Optimised glass or PVDF heat exchanger model
- Adjustable outlet dew point and alarm thresholds
- Nominal capacity 104 Btu/h
- Dew point stability ±0.2 °F
- MCD400 display module for separate installation
- Used in **DNV-GL and LR type-tested** conditioning unit
- Compliance with requirements under **IMO MARPOL MEPC.259(68)** demonstrated
- Low wash out effects confirmed by **DNV-GL**

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The TC-Kit+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-4. Dividing the interior and exterior ensures the IP rating required by the standard without requiring ventilation of the interior. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications
Operating temperature	131 °F
2 heat exchangers in series	TC-Kit 6322+

Additional components which every conditioning system should feature can optionally be connected:

- Peristaltic pump for condensate separation*,
- Moisture detector,
- Sample gas pump*,
- Power supply module 230/115 V,
- Alarm output*,
- Analog output
- Controller for heated line**.

* Expansion module (option 10 or 11) required.

** Controller (option 01 or 11) required.

This allows for various configurations of cooler and options. We further paid attention to easy access to wear parts and consumables.

Description of functions

The cooler is controlled by a microprocessor.

The programmable display shows the block temperature in the selected display unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting.

For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing display as well as a red LED on the display module along with the status relay indicate the conditions are below or above the configured warning range (e.g. after switching on).

The outputs are:

A potential-free status output. The relay is activated when the block temperature is within the target range. The output also serves as collective alarm for device faults, moisture ingress, etc.

A switched output for connecting a gas pump. The output uses the same relay as the status output. This output can only be used for pumps designed for 24 VDC operating voltage.

Another relay output is available for switching up to two peristaltic pumps. The pumps are supplied with the mains voltage and can be shut off via the device menu for maintenance purposes.

The TC-Kit can optionally be configured for connecting a heated line, which can be either self-regulating or a heated line regulated by the cooler.

Operation via 115 VAC/230 VAC and using the regulator for a heated line requires the optional expansion module.

Gas cooler technical data

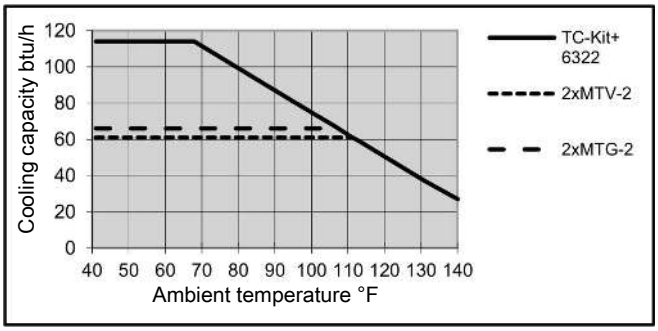
Gas cooler			
Ready for operation	after max. 10 minutes		
Ambient temperature	41 °F to 131 °F		
Gas output dew point preset: adjustable:	 41 °F 36 °C...68 °F		
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration		
Protection rating	IPxxC, with tight installation IP54		
Rack material (outdoors):	Stainless steel, aluminium		
Packaging dimensions	approx. 8.5 x 7.9 x 14.2 in		
Weight without heat exchanger	approx. 8.4 lb (switched-mode power supply + controller) approx. 7.5 lb (at 24 V DC)		
Electrical power input	Base version	Optional switching power supply	
	24 V DC	230 V AC	115 V AC
	5 A	0.6 A	1.2 A
	120 W	110 W/140 VA	
Status output switching capacity (optional)	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical Connections	Cable clamp (for 24 V DC) or blade receptacle (for 115/230 V AC)		
Gas connections	Heat exchanger see table "Heat exchanger overview"		
Parts in contact with mediums	Heat exchanger see table "Heat exchanger overview"		

Technical Data - Options

Technical Data Controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F ... 392 °F
Motor power:	max. 1600 W (230 V) / 800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Outlet

Two heat exchangers	
Model TC-Kit 6322+	
Rated cooling capacity (at 77 °F)	104 Btu/h
max. ambient temperature	131 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers MTV-2 and MTG-2 apply to a dew point of 122 °F.

The cooling capacity curves of the TC-Kit+ apply to ideal installation in a housing. Depending how it is installed, the value may deviate from the cooling capacity curve.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

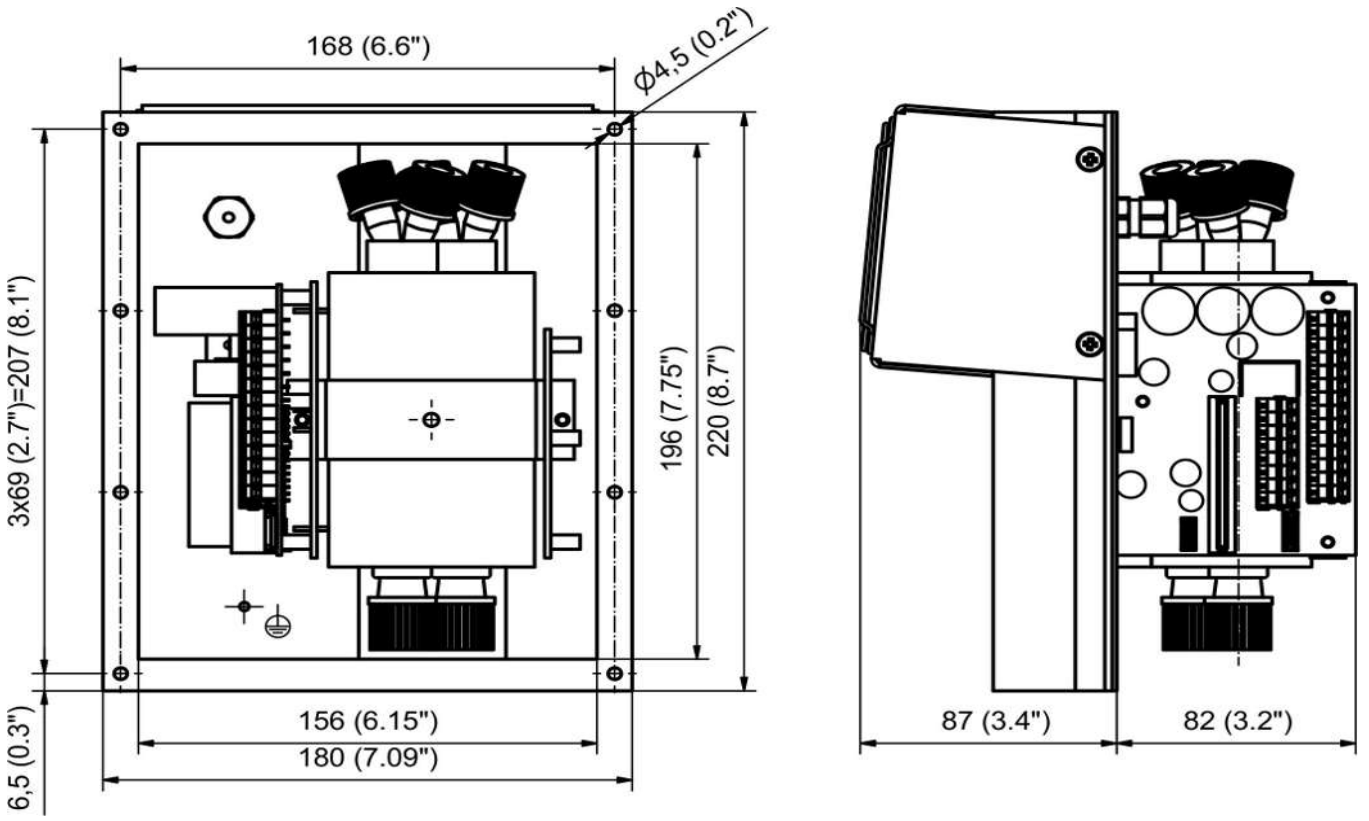
Heat exchanger	MTG-2 [3]	MTV-2 [3] MTV-2-I [2] [3]
Version / Material	Glass	PVDF
Flow rate v_{max} [1]	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.28 psi	0.26 psi
Dead volume V_{dead}	1.1 cu. in.	1 cu. in.
Gas connections (metric)	GL14 (6 mm)	DN 4/6
Gas connections (US)	GL14 (1/4")	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm)	G1/4
Condensate out connection (US)	GL18 (8 mm)	NPT 1/4"

[1] Considering the maximum cooling capacity of the cooler

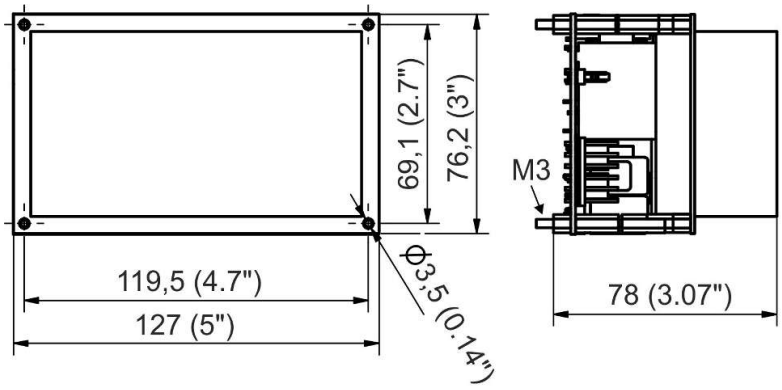
[2] Models marked I have NPT threads or US tubes, respectively

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG-2 heat exchangers. For passive discharge on the MTV-2 heat exchangers, use a screw connection with a clearance of at least 0.3 in (see accessories).

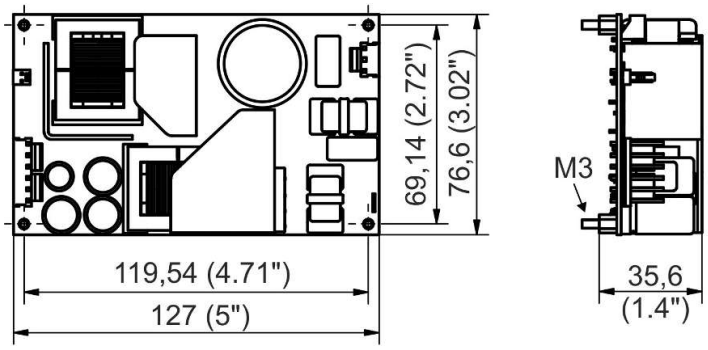
Dimensions basic version



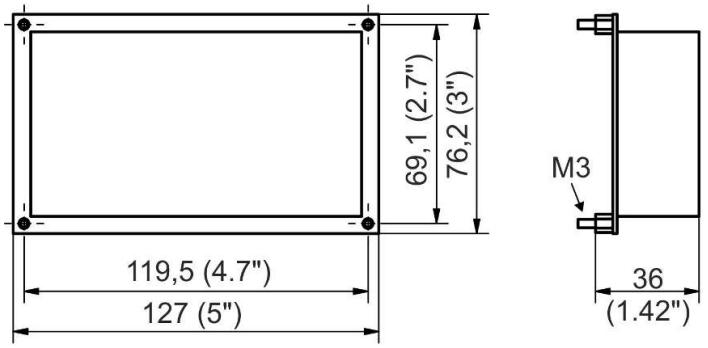
Power supply and expansion module



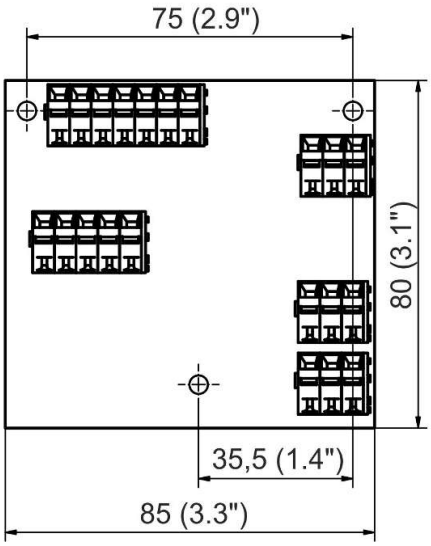
Power supply module



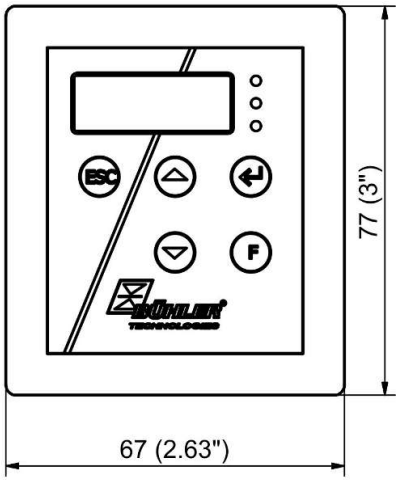
Expansion module (230 V/115 V)



Power board (option expansion module 24 V)



Display unit



Cut-out in front panel 55.5 x 65.4 mm (2.18" x 2.57")

Ordering instructions

Gas cooler model with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	3	2	X	0	X	X	X	0	Product Characteristics
			2							Gas cooler with 2 heat exchangers
										Gas cooler type
				2						TC-Kit+: Ambient temperature 131 °F
										Supply voltage
					1					115 VAC, 50/60 Hz (power supply module)
					2					230 VAC, 50/60 Hz (power supply module)
					4					24 VDC
										Options
						0	0			Without option
						0	1			Controller for heated line
						1	0			Expansion module
						1	1			Controller and expansion module
4496	2	3	2		0				0	Order key

Heat exchanger options

Item no.	Description
449601222	MTV-2, plastic heat exchanger ø20 mm, metric connections
449601232	MTV-2-I, plastic heat exchanger ø20 mm, US connections
449601237	MTG-2, glass heat exchanger ø20 mm, metric and US connections

Spare parts and accessories

Item no.	Description
see data sheet 450005	Automatic condensate drain
see data sheet 410011	Moisture detector and flow cell, various models
41 11 10 00	Moisture detector connection cable, 4 m (13 ft)
91 44 05 00 82	Moisture detector connection cable, 450 mm (17.7 in)
91 44 05 00 38	Cable for cooler temperature analog output 4 m (13 ft)
see data sheet 420011	Sample gas pump P1.x
see data sheet 450020	Peristaltic pump CPsingle, CPdouble and replacement hose
see data sheet 440002	Condensate trap
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV
4496 01 000	Analog output kit
4496 00 047	Mains supply, M3 plug, cable length 400 mm (15.7 in)
4496 00 049	Status output, M3 plug, cable length 380 mm (15 in)
4496 01 001	Mounting kit 1 for thin housings

BÜHLER TECHNOLOGIES

Gas Analysis

TYPE APPROVED PRODUCT DNV·GL MARITIME

Cooling unit CU-EMA+

The CU-EMA+ cooler unit is designed specifically for maritime applications. It is certified for **operation on ships and offshore units** and is type approved by **DNV-GL** and **Lloyd's Register**. The special design features allow the CU-EMA+ cooler unit to also be used in high vibration environments (e.g. on ships) up to an acceleration of 0.7 g.

The **Annex VI of the MARPOL convention** governs the prevention of air pollution from ships. To ensure compliance with sulphur oxides limits, e.g. desulphurisation units (SO_x scrubbers) are used on ships. The TC-Kit+ cooler used in the CU-EMA+ impresses when used in systems for monitoring this sulphur emission due to the **particularly low wash out effects of sulphur dioxide (SO_2),** which has also been established by the DNV-GL.

The innovative design allows the CU-EMA+ **to be installed close to the sample gas** sampling point. No further heated line is required from this point to the additional conditioning. This reduces costs and makes the CU-EMA+ not only interesting for use on ships, but also for stationary systems, e.g. for measuring flue gas emissions in power plants.

Type tested for use on ships according to **LR** and **DNV-GL**
Certified for high vibration environments up to 0.7 g
Use near the sampling point eliminates the use of heated lines
Low wash out effects confirmed by **DNV-GL**
2 heat exchangers (glass or PVDF) in series
Adjustable outlet dew point and alarm thresholds
Protection class IP44
Optional port for test gas and instrument air
Optional connection for heated line

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Overview

The CU-EMA+ cooler was designed specifically for the requirements of gas conditioning for continuously measuring emissions in maritime applications. Dividing the unit into an internal and external section achieves the IP rating required under the standard without requiring venting the interior. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The exact item number of the model defined by you is determined by the model code in the category ordering information.

The gas cooler comes standard with peristaltic pump and moisture detector. Additional components which every conditioning system should feature can optionally be connected:

- Connection for adding instrument air to purge the system,
- Solenoid valve for adding test gas,
- Heated line connection and regulation,
- metric/US style external connections.

Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

Description of functions

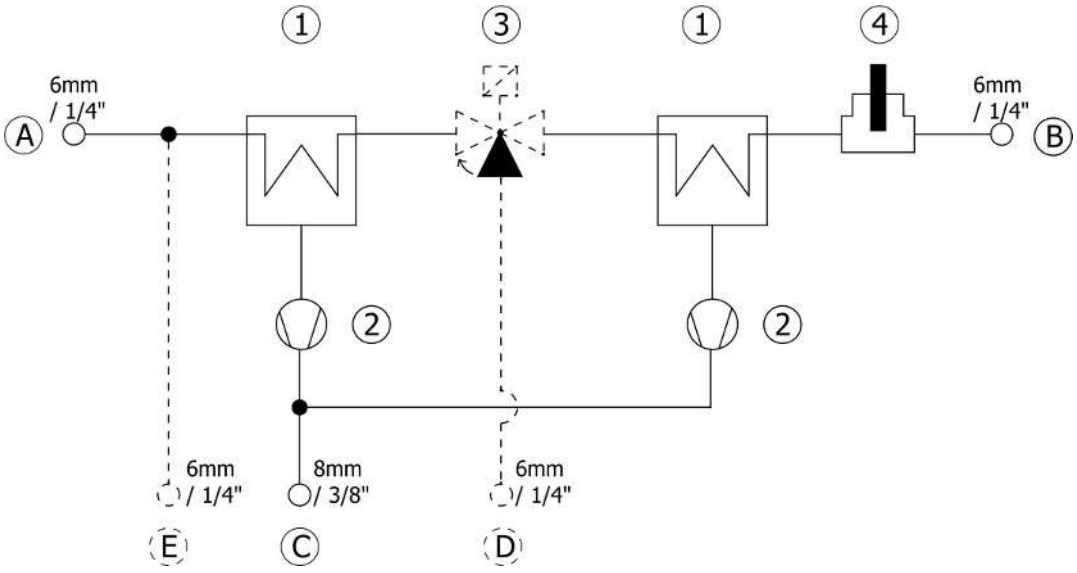
The sample gas cooler is controlled by a microprocessor.

The programmable display shows the block temperature in the selected display unit (°C/°F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (36 to 68 °F) (factory setting 5 °C/41 °F).

And then the warning thresholds can be adjusted for low and excess temperature. These are set relative to the outlet dew point τ_a setting. For the low temperature the range is τ_a -1 to - 3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is τ_a +1 to +7 K. The factory settings for both values are 3 K.

The flashing and an LED on the display unit plus the potential-free contact indicate the warning range has been overrun or underrun (e.g. after switching on) plus the potential-free contact.

Flow Diagram



A	Sample gas input	1	Cooler unit
B	Sample gas output	2	Condensate pumps
C	Condensate output	3	Solenoid valve for adding test gas (optional)
D	Test gas input (optional)	4	Moisture detector
E	Instrument air input (optional)		

Technical Data

Technical Data	
Type tested:	**DNV GL** rules for classification Ships, offshore units, and high speed and light craft Certificate no.: TAA00002RE **Lloyd's Register** Type Approval System, Test Specification Number 1 - March 2019 Certificate no.: LR2008137TA
Ambient categories as per DNVGL-CG-0339:	Temperature: A Humidity B Vibration A EMC A Housing: B
Environmental categories as per LR:	ENV1, ENV2
Switch cabinet	
Dimensions (h x w x d):	19.7 x 19.7 x 11.8 in
Material	Sheet steel, RAL 7035, single door
Degree of protection	IP44
Weight	68.3 lb
Climatic conditions	
Ambient temperatures:	41 °F ... 122 °F
Storage temperatures:	-4 °F ... 104 °F
Cooler Data	
Ready for operation	after max. 10 minutes
Gas output dew temperature preset: adjustable:	41 °F 36 °C...68 °F
Static dew point stability: throughout the specification range:	+- 0.1 K +- 1.5 K
Inlet dew point max.:	158 °F Gas input temperature on heat exchanger max. 284 °F
Rated cooling capacity (at 77 °F):	104 Btu/h
Other data	
Gas connections:	see flow diagram
Parts in contact with media:	PVDF, stainless steel, PTFE, Norprene, Viton, epoxy resin
Electrical data	
Supply:	115 VAC/230 VAC, 50/60Hz, 16A, cable clamps, cable cross-section 1.5...2.5 mm^2 shielded
Cooler: (power supply + peristaltic pump)	230 VAC. 300 VA
Status contact cooler, moisture and optional regulated heated line	max. 230 VAC, 24 VDC, 2 A, 50 VA, cable clamps, cable cross-section 0.75...2.5 mm^2 shielded
Max. additional consumers (e.g. heated probe)	115 VAC/230 VAC, 800 VA, cable clamps, cable cross-section 1.5...2.5 mm^2
Transfer clamps (e.g. status contact heated probe)	Cable clamps, cable cross-section 0.75...2.5 mm^2

Technical Data - Options

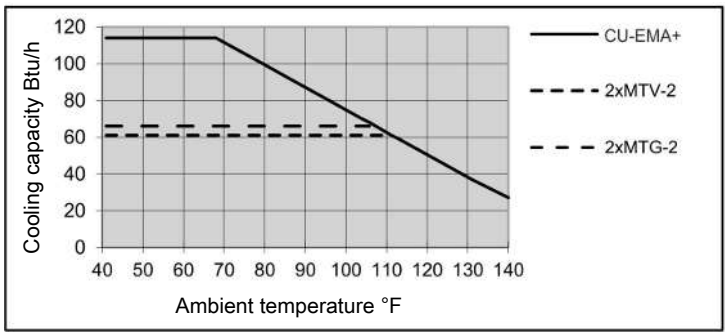
Controller for heated line	
Temperature, preset: adjustable:	 356 °F 104 °F ... 392 °F
Flow:	max. 115 VAC/230 VAC 1600 VA cable clamps, cable cross-section 1.5...2.5 mm²
Sensor type:	Pt100, 2-wire
Connection:	Cable clamps, cable cross-section 0.5...2.5 mm²

Self-regulating heated line	
Flow:	max. 115 VAC/230 VAC 1600 VA cable clamps, cable cross-section 1.5...2.5 mm²

Test gas solenoid valve	
Flow:	Activated with customer power via 230 VAC relay (Attention: cannot be activated with 115 VAC) or 24 VDC, cable clamps, cable cross-section 0.75...2.5 mm²

Outlet

Two heat exchangers	
Model CU-EMA+	
Rated cooling capacity (at 77 °F)	104 btu/h
max. ambient temperature	131 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Remark: The limit curves for the heat exchangers MTV-2 and MTG-2 apply at a dew point of 122 °F. Depending on the installation version, the cooling capacity curve may vary.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

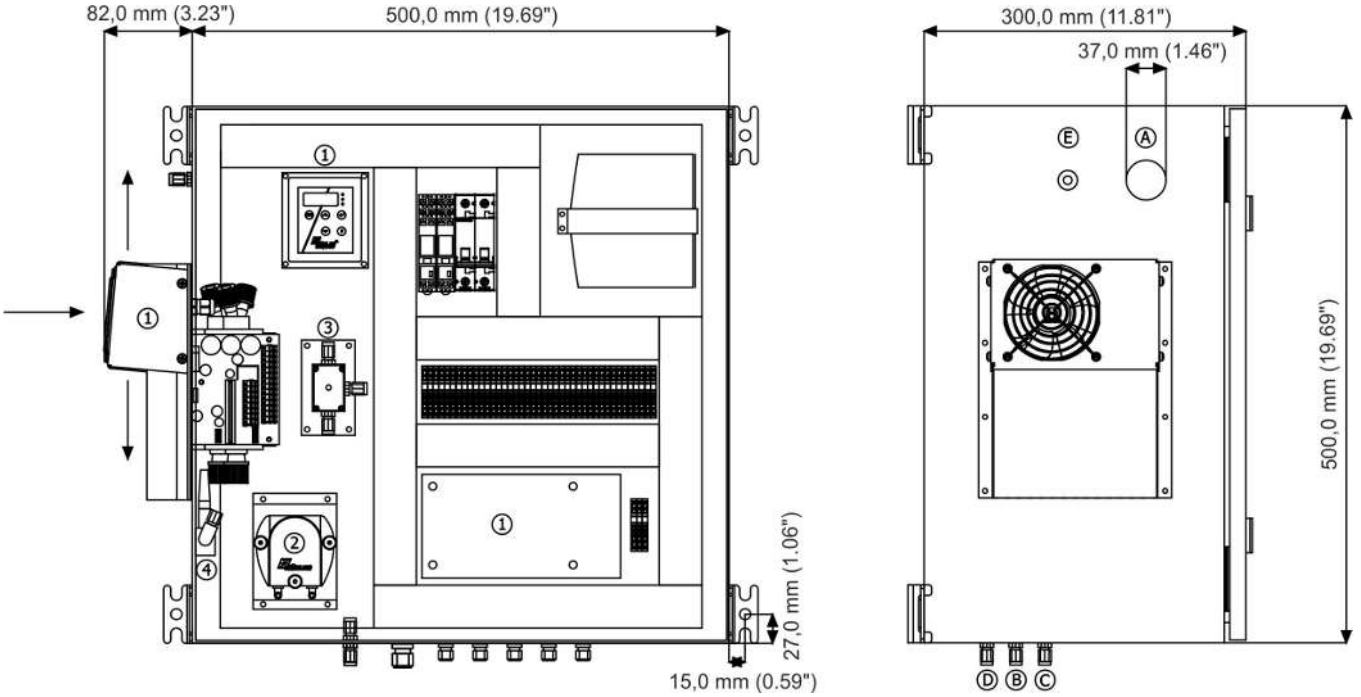
Heat exchanger	2x MTG-2	2x MTV-2 2x MTV-2-I [2]
Version / Material	Glass	PVDF
Flow rate v_{max} [1]	3.5 lpm	3.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	76 Btu/h	62 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=150 L/h)	0.27 psi	0.26 psi
Dead volume V_{tot}	2.3 cu. in.	2.2 cu. in.
Gas connections (metric)	GL14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL14 (1/4") [3]	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm) [3]	G1/4
Condensate out connection (US)	GL18 (8 mm) [3]	NPT 1/4"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions



1	Sample gas cooler and analyser	A	Sample gas input (6 mm / 1/4")
2	Peristaltic Pump	B	Sample gas output (6 mm / 1/4")
3	Solenoid valve for adding test gas (optional)	C	Condensate output (6 mm / 3/8")
4	Moisture detector	D	Test gas input (optional) (6 mm / 1/4")
		E	Instrument air input (optional) (6 mm / 1/4")

Ordering instructions

Cooler with Two In-Line Heat Exchangers

The item number is a code for the configuration of your unit. Please use the following model code:

4496	2	8	2	2	0	X	1	X	X	2	0	0	X	0	0	X	X	X	Product Characteristics
																			Cooler (with 2 in-line heat exchangers)
				2															CU-EMA+: Ambient temperature 122 °F
																			Certifications
					0														Standard applications – CE
																			Supply voltage
						1													115 VAC, 50/60 Hz
						2													230 VAC, 50/60 Hz
																			Heat exchanger
							1	2	2										Glass, 2 x MTG-2, metric
							1	2	7										Glass, 2 x MTG-2-I, US
							1	3	2										PVDF, 2 x MTV-2, metric
							1	3	7										PVDF, 2 x MTV-2-I, US
																			Peristaltic Pumps
										2	0								CPdouble with hose nipple, angled
																			Moisture detector
												0	0	0	0				without moisture detector
												0	1	0	0				1 moisture detector with adapter
																			Options
																0	0		Without option
																0	1		Instrument air purging connection
																1	0		Solenoid valve for test gas
																1	1		Instrument air purging connection and solenoid valve for test gas
																			Heated line
																		0	no heated line
																		1	ready for self-regulating heated line
																		2	-
																		3	-
																		4	-
																		5	ready for regulated heated line
																		6	**5 m** regulated heated line *
																		7	**8 m** regulated heated line *
																		8	**10 m** regulated heated line
																		9	**15 m** regulated heated line

*for 115 VAC only these lengths available

Spare parts and accessories

Item no.	Description
44922420102	Peristaltic pump CPdouble and replacement tube
41111000	Moisture detector and flow cell, various models
9148000182	Solenoid valve, 24 VDC
9120020143	230 VAC relay for controlling the solenoid valves
9120020139	24 VDC relay for controlling the solenoid valve
9110000018	Microfuse 500 mA delayed action, 5x20 mm
9110000032	Microfuse 63 mA delayed action, 5x20 mm
9110000067	Microfuse 8 A delayed action, 5x20 mm

Gas cooler series RC 1.1

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The RC 1.1 is a compressor sample gas cooler for up to 2 gas paths and is an essential component for sophisticated analysis systems.

- Compact design: Pre-installed and ready to connect
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass and PVDF
- Bühler constant control system
- Self-monitoring
- Cooling block temperature display
- Status alarm
- Rated cooling power 341 Btu/h
- Dew point stability 0.2 °F
- CFC-free
- Moisture detector, analogue output, filter and condensate pump optional
- Successor to the EGK 1/2 and EGK 1SD

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	360 kJ/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet dew temperature, preset	approx. 41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 16.5 x 17.3 x 13.8 in		
Weight incl. heat exchanger	approx. 35.2 lb		
Electric supply	115 V, 60 Hz or 230 V, 50/60 Hz ± 5% Plug per DIN EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	396 VA	402 VA
	max. operating current:	2.5 A	5 A
Alarm output switching connection	max. 250 V, 2 A, 50 VA Connector per DIN EN 175301-803		
Installation	stand-alone or wall-mounted		

Technical Data - Options

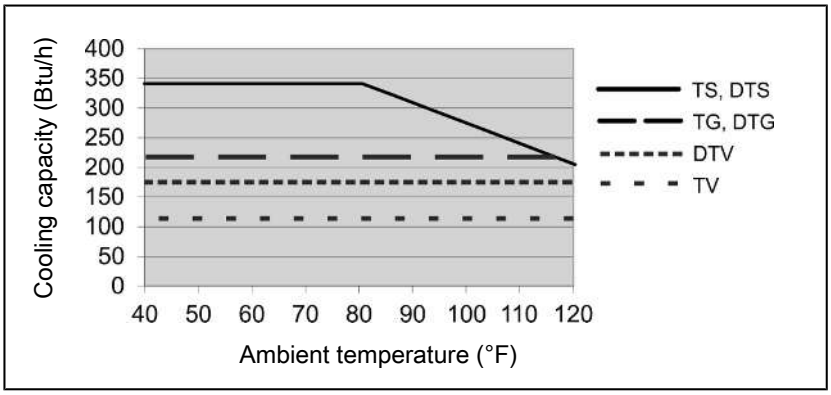
Technical Data Peristaltic Pumps CPsingle / CPdouble	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Condensate outlet	Hose nipple Ø6 mm (0.24 in) Screw connection 4/6 (metric), 1/6”-1/4” (US)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (Standard), Marprene, Fluran PVDF

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -4 °F to 140 °F cooler temperature
Connection	M12x1 plug, DIN EN 61076-2-101

Technical Data Filter AGF-PV-30-F2-L	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	19.4 in^2
Filter mesh	2 µm
Dead volume	6.59 cu. in.
Materials Filter: Seal: Filter element:	 PVDF, Duran glass (parts in contact with media) Viton sintered PTFE

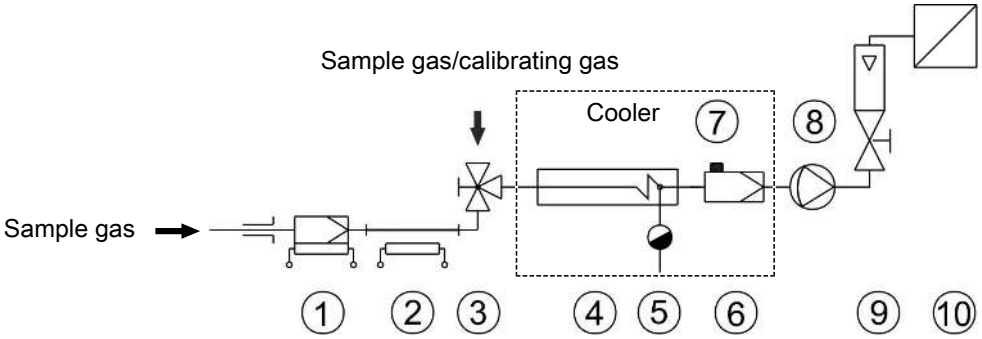
Technical Data FF-3-N Moisture Detector	
Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas cooler
5	Automatic condensate drain or peristaltic pump	6	Fine mesh filter
7	Moisture detector	8	Sample gas pump
9	Flow meter	10	Analyser

See data sheets for individual component types and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV-SS TV-SS-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7 / 1.5 cu. in.	1.7 / 1.5 cu. in.	1.3 / 1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

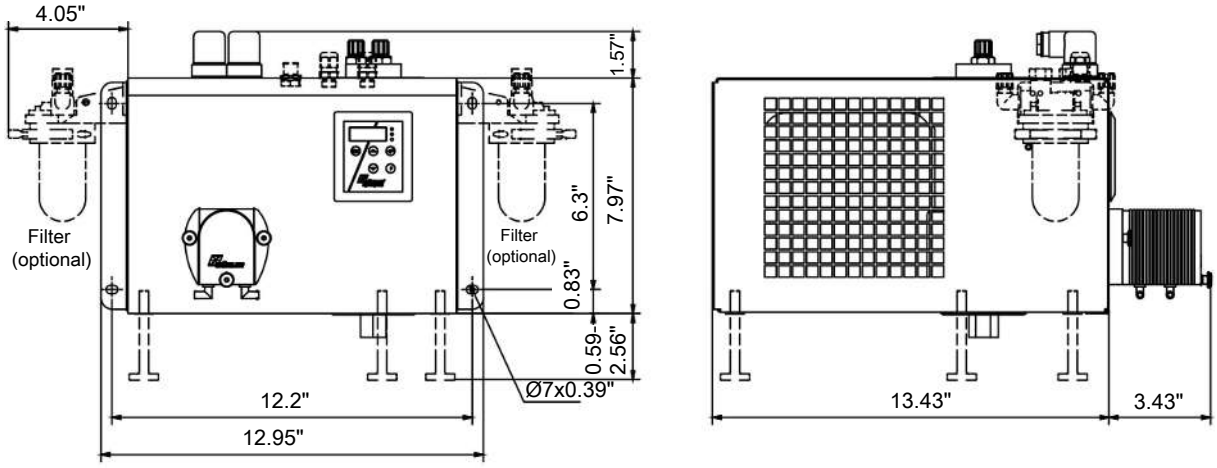
[1] Max. cooling capacity of the cooler must be considered

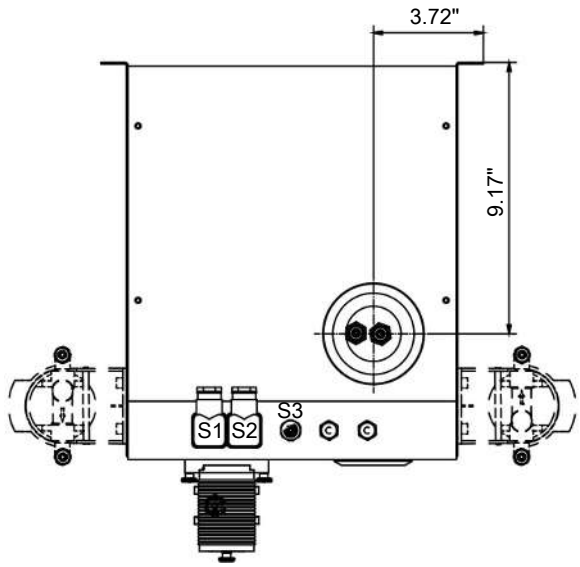
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions





S1 = electric supply
S2 = alarm contact
S3 = analogue output

Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model key:

4596	2	1	1	0	X	X	X	X	X	0	X	X	X	0	0	0	0	0	Product Characteristics
																			Voltage
					1														115 V, 60 Hz
					2														230 V, 50/60 Hz
																			Heat exchanger
						1	1	0											1 gas path, stainless steel/ (TS), metric
						1	1	5											1 gas path, stainless steel/ (TS-I), US
						1	2	0											1 gas path, glass/ (TG), metric
						1	2	5											1 gas path, glass/ (TG), US hoses
						1	3	0											1 gas path, PVDF/ (TV), metric
						1	3	5											1 gas path, PVDF/ (TV-I), US
						2	6	0											2 gas paths, stainless steel/ (DTS), metric
						2	6	1											2 gas paths, stainless steel/ (DTS-6) [1], metric
						2	6	5											2 gas paths, stainless steel/ (DTS-I), US
						2	6	6											2 gas paths, stainless steel/ (DTS-6-I) [1], US
						2	7	0											2 gas paths, glass/ (DTG), metric
						2	7	5											2 gas paths, glass/ (DTG-I), US hoses
						2	8	0											2 gas paths, PVDF/ (DTV) [1], metric
						2	8	5											2 gas paths, PVDF/ (DTV-I) [1], US
									0	0									**Condensate drain** [2]
									1	0									without condensate drain
									2	0									CPsingle with adapter, angled [3]
									3	0									CPdouble with adapter, angled [3]
									4	0									CPsingle with screw connection, metric/US [3]
																			CPdouble with screw connection, metric/US [3]
																			Filter/moisture detector
											0	0							without filter, without moisture detector
											0	1							without filter, 1 moisture detector
											0	2							without filter, 2 moisture detectors
											1	0							1 filter, without moisture detector
											1	1							1 filter, 1 moisture detector
											1	2							1 filter, 2 moisture detectors
											2	0							2 filters, without moisture detector
											2	1							2 filters, 1 moisture detector
											2	2							2 filters, 2 moisture detectors
																			Status outputs
													0	0					status output only
													1	0					Analog output option, add-on

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Peristaltic pumps also available for separate installation, see data sheet 450020.

[3] Each gas path equipped with a peristaltic pump. The supply voltage corresponds with that of the main unit.

Consumables and accessories

Item no.	Description
44 10 00 1	Automatic condensate drain 11 LD V 38
44 10 00 4	Automatic condensate drain AK 20, PVDF
44 10 00 5	Condensate trap GL 1; glass, 0.4 L
441 00 19	Condensate trap GL 2; glass, 1 L
4492 0035 012	Norprene replacement hose with angled connections for CP condensate pump 0.005 lpm
4492 0035 016	Norprene replacement hose with angled connection and screw connection (metric) for CP condensate pump 0.005 lpm
4492 0035 017	Norprene replacement hose with angled connection and screw connection (US) for CP condensate pump 0.005 lpm

Gas cooler series RC 1.2+

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

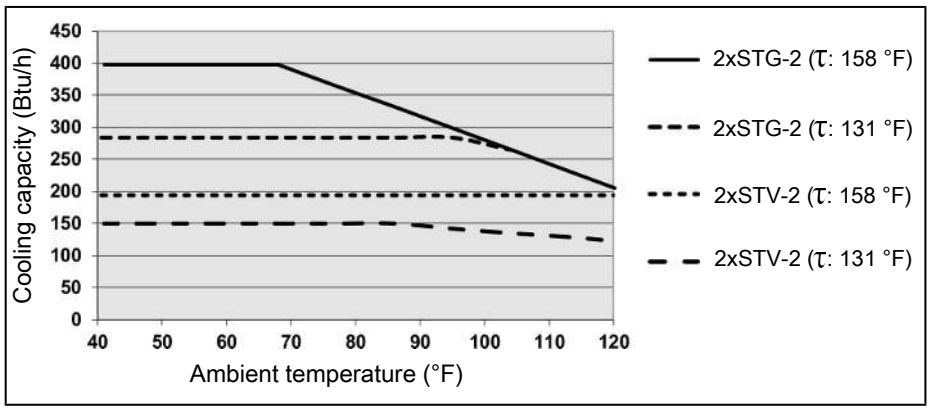
Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The RC 1.2+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Most notably, the washout of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- Low wash out effects
- Compact installation
- One gas path with two in-line heat exchangers
- Duran glass and PVDF heat exchanger
- Bühler constant control system
- Self-monitoring
- Cooling block temperature display
- Status alarm
- Rated cooling power 370 Btu/h
- Dew point stability 0.2 °F
- CFC-free

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Performance data



Note: The limit curves of the heat exchangers apply to different dew points (τ), see legend.

Technical Data

Gas Cooler Technical Data

Ready for operation:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	370 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew temperature, preset:	41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating:	IP 20		
Housing:	Stainless steel		
Weight incl. heat exchanger:	approx. 34.2 lb		
Electric supply:	115 V, 60 Hz or 230 V, 50/60 Hz ± 5% Plug per DIN EN 175301-803		
Electrical data:		230 V	115 V
	Typical power input:	396 VA	402 VA
	max. operating current:	2.5 A	5 A
Alarm output switching connection:	250 V, 2 A, 50 VA Plug per DIN EN 175301-803		
Packaging dimensions:	approx. 16.5 in x 17.3 in x 13.8 in		

Technical Data - Options

Technical Data CPdouble Condensate Pump

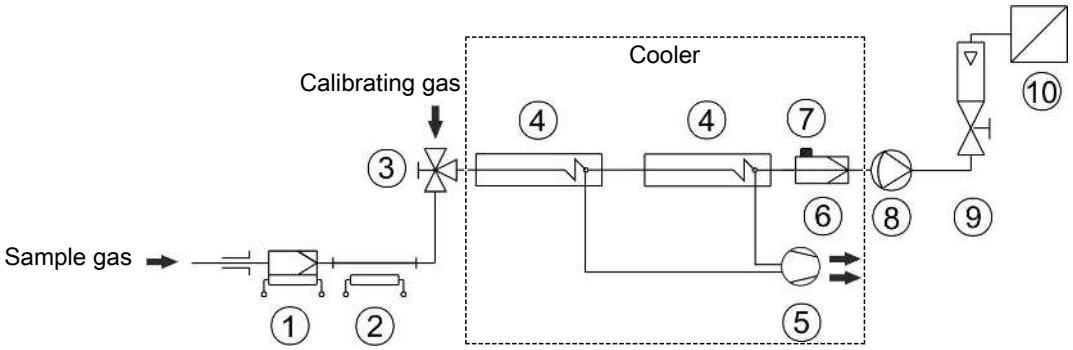
Flow rate:	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Inlet vacuum:	max. 11.6 psi
Inlet pressure:	max. 14.5 psi
Output pressure:	14.5 psi
Hose:	4 x 1.6 mm (0.04 in)
Protection class:	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

AGF-PV-30-F2 Filter Technical Data	
Ambient temperature	37 °F to 212 °F
max. operating pressure with filter	29 psi
Filter surface	9.3 in²
Filter mesh	2 µm
Dead volume	3.47 cu. In.
Materials	
Filter:	PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

Diagram typical installation



1	Sample gas probe	6	Fine mesh filter
2	Sample gas line	7	Moisture detector
3	Reversing tap	8	Sample gas pump
4	Sample gas cooler	9	Flow meter
5	Condensate Pump	10	Analyser

See data sheets for individual component types and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a standard operating point of τ_e = 158 °F and ϑ_G = 230 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, with the STG heat exchanger in place of τ_e = 158 °F, ϑ_G = 230 °F and v = 5.3 lpm the parameter triple τ_e = 122 °F, ϑ_G = 221 °F and v = 7 lpm may also be used.

Please contact our experts for clarification or refer to our design program.

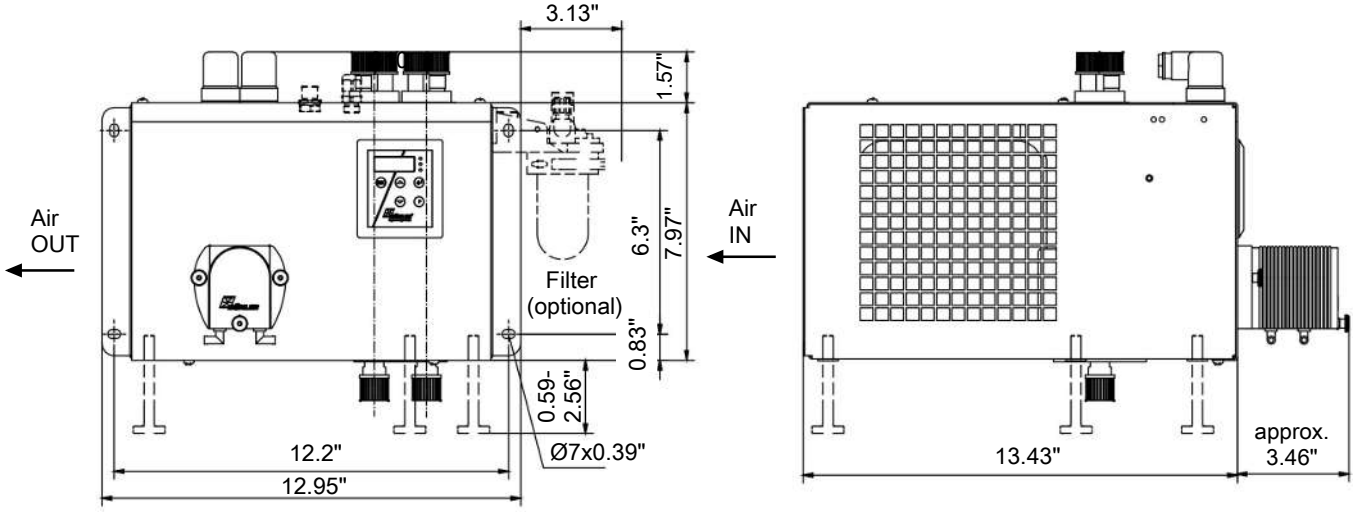
Heat exchanger overview

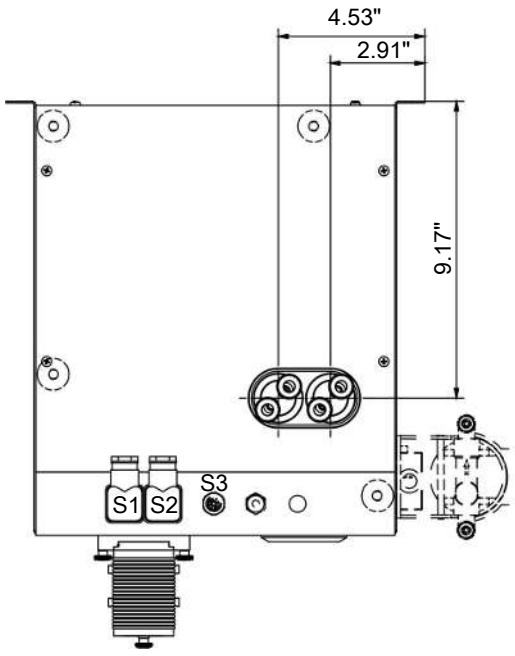
Heat exchanger	2x STG-2	2x STV-2
Version/Material	Glass	PVDF
Flow rate v_{max} [1]	5.3 lpm	5 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	248 °F	248 °F
Gas pressure p_{max}	44 psi	44 psi
Pressure drop Δp (v=150 L/h)	0.04 psi	0.04 psi
Max. cooling capacity Q_{max}	327 Btu/h	188 Btu/h
Dead volume V_{dead}	2.9 cu. in.	2.5 cu. in.
Gas connections (metric)	GL 14 (6 mm) [2]	DN 4/6
Gas connections (US)	GL 14 (1/4") [2]	1/4"-1/6"
Condensate out connection (metric)	GL 18 (10 mm) [2]	G1/4
Condensate out connection (US)	GL 18 (10 mm) [2]	NPT 1/4"

[1] Considering the maximum cooling capacity of the cooler

[2] Gasket inside diameter

Dimensions





S1 = electric supply
S2 = alarm contact
S3 = analogue output

Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model key:

4596	2	1	2	0	X	X	X	X	X	0	X	X	X	0	0	0	0	0	Product Characteristics
																			Voltage
					1														115 V, 60 Hz
					2														230 V, 50/60 Hz
																			Heat exchanger
						1	2	2											1 gas path/ 2 heat exchangers, glass/ (STG-2), metric
						1	2	7											1 gas path/ 2 heat exchangers, glass/ (STG-2), US
						1	3	2											1 gas path/ 2 heat exchangers, PVDF/ (STV-2), metric
						1	3	7											1 gas path/ 2 heat exchanger, PVDF/ (STV-2), US
																			Condensate drain [1]
									0	0									without condensate drain
									2	0									Condensate pump CPdouble with hose nipple, angled [2]
									4	0									Condensate pump CPdouble with screw connection, metric/US [2]
																			Filter
											0								without filter
											1								1 filter
																			Moisture detector
												0							without moisture detector
												1							1 moisture detector
																			Status outputs
													0						status output only
													1						Analog output option, add-on

[1] Condensate pumps also available for separate installation, see data sheet 450020.

[2] Each gas path equipped with a condensate pump. The supply voltage corresponds with that of the main unit.

Consumables and accessories

Item no.	Description
44 10 00 1	Automatic condensate drain 11 LD V 38
44 10 00 4	Automatic condensate drain AK 20, PVDF
44 10 00 5	Condensate trap GL 1; glass, 0.4 L
441 00 19	Condensate trap GL 2; glass, 1 L
4492 0035 012	Norprene replacement hose with angled connections for CP condensate pump 0.005 lpm
4492 0035 016	Norprene replacement hose with angled connection and screw connection (metric) for CP condensate pump 0.005 lpm
4492 0035 017	Norprene replacement hose with angled connection and screw connection (US) for CP condensate pump 0.005 lpm

Gas cooler series EGK 1/2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

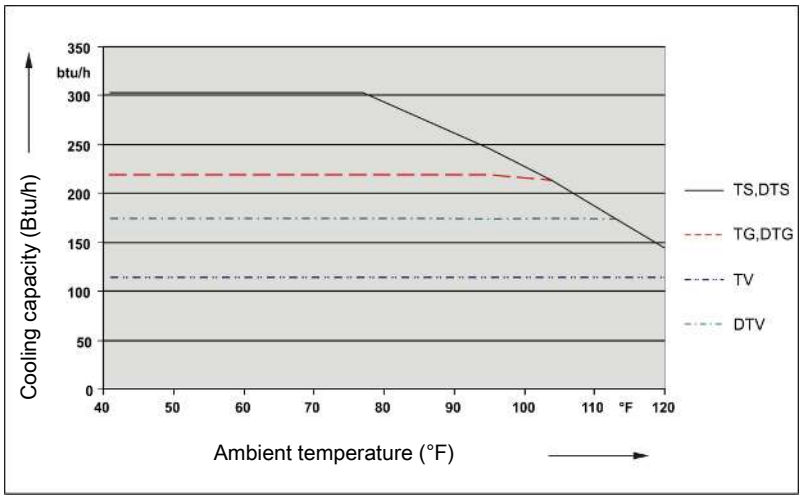
Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

EGK 1/2 is a compressor sample gas cooler for up to 2 gas paths and is an essential component for sophisticated analysis systems.

- Compact installation
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass and PVDF
- Bühler constant control system
- Self-monitoring
- Cooling block temperature display
- Status alarm
- Rated cooling power 303 Btu/h
- Dew point stability ±0.2 °F
- CFC-free

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Performance data



Remark: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

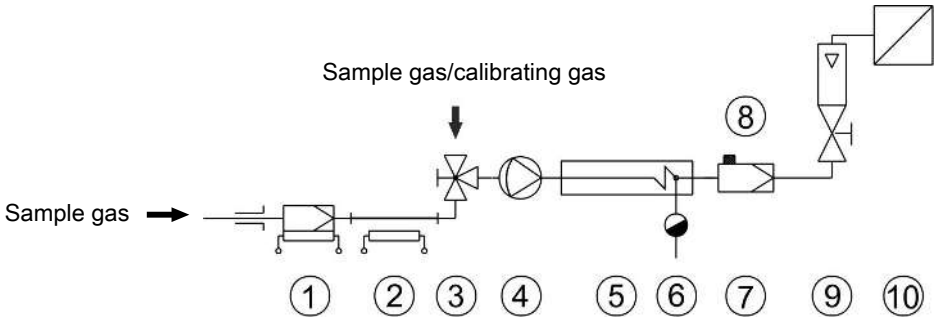
Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	303 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet temperature, preset:	 approx. 41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Protection class	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 15.4 x 11.8 x 15.7 in		
Weight incl. heat exchanger	approx. 33 lb		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per DIN EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	Max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A, 50 VA Terminating plug per DIN EN 175301-803		
Installation	stand-alone or wall-mounted		

Technical Data - Options

CPsingle Peristaltic Pumps Technical Data	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain or peristaltic pump
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV-SS TV-SS-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7 / 1.5 cu. in.	1.7 / 1.5 cu. in.	1.3 / 1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

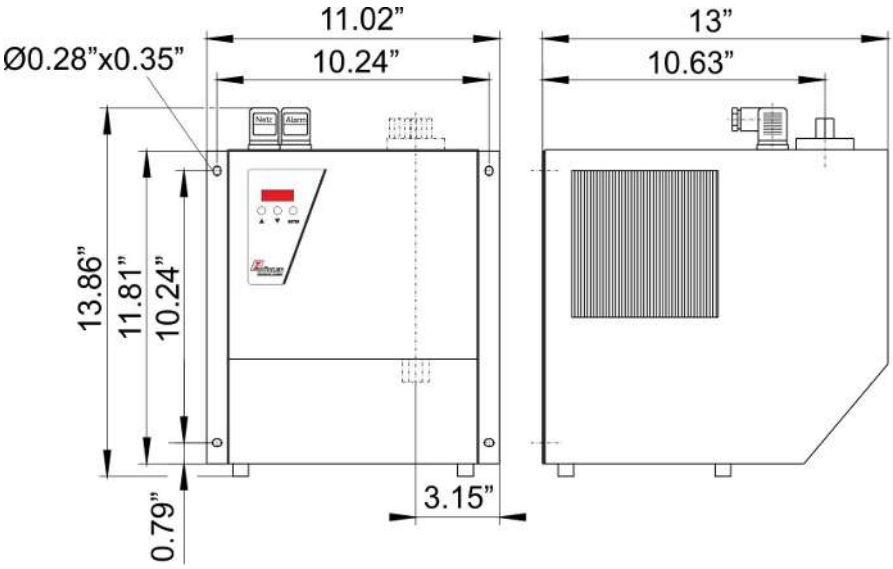
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions



Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4562	X	X	X	X	X	0	0	0	Product Characteristics
									Voltage
	1								115 V metric screw connections
	2								230 V metric screw connections
	3								115 V US screw connections
	4								230 V US screw connections
									Gas path / Material / Version
		0	0	0					without heat exchanger
		1	1	0					1 gas path / single stainless steel heat exchanger / (TS and TS-I)
		1	2	0					1 gas path / single glass heat exchanger / (TG)
		1	3	0					1 gas path / single PVDF heat exchanger / (TV-SS and TV-I)
		2	6	0					2 gas paths / dual stainless steel heat exchanger / (DTS and DTS-I)
		2	6	1					2 gas paths / dual stainless steel heat exchanger / (DTS-6 and DTS-6-I) [1]
		2	7	0					2 gas paths / dual glass heat exchanger / (DTG)
		2	8	0					2 gas paths / dual PVDF heat exchanger / (DTV and DTV-I) [1]
									Condensate drain [2]
					0				without condensate drain
					3				Peristaltic pump(s) CPsingle with hose connection 90° angle [3]
					4				Peristaltic pump(s) CPsingle with screw-in hose connection [3]

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Peristaltic pumps also available for separate installation, see data sheet 450020.

[3] Each gas path equipped with a peristaltic pump. The supply voltage corresponds with that of the main unit.

Consumables and accessories

Item no.	Description
44 10 00 1	Automatic condensate drain 11 LD V 38
44 10 00 4	Automatic condensate drain AK 20, PVDF
44 10 00 5	Condensate trap GL 1; glass, 0.106 gal
441 00 19	Condensate trap GL 2; glass, 0.264 gal
4492 0035 011	Norprene replacement hose with straight connections for CP peristaltic pump 0.005 lpm
4492 0035 012	Norprene replacement hose with angled connections for CP peristaltic pump 0.005 lpm
4492 0035 013	Norprene replacement hose with one straight and one angled connection for CP peristaltic pump 0.005 lpm
4492 0035 016	Norprene replacement hose with one angled connection and one screw connection (metric) for CP peristaltic pump 0.005 lpm
4492 0035 017	Norprene replacement hose with one angled connection and one screw connection (US) for CP peristaltic pump 0.005 lpm
44 92 12 20 102	CPsingle peristaltic pump with angled hose nipple
44 92 12 20 104	CPsingle peristaltic pump with screw-in hose connection (metric)
44 92 12 20 105	CPsingle peristaltic pump with screw-in hose connection (US)

Gas cooler series EGK 1SD

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

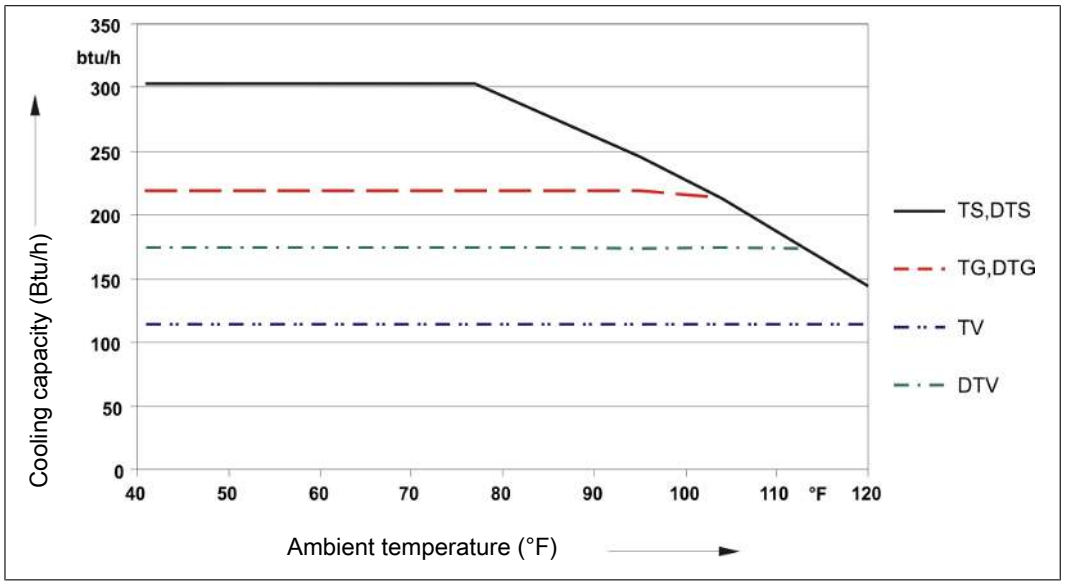
Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 1SD is a medium duty compressor sample gas cooler. It can be wall-mounted or used as a table-top cooler with up to two gas paths.

- Compact installation
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Bühler constant control system
- Self-monitoring
- Cooling block temperature display
- Status alarm
- Rated cooling power 303 Btu/h
- Dew point stability ± 0.2 F
- CFC-free
- FM approved

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Performance data

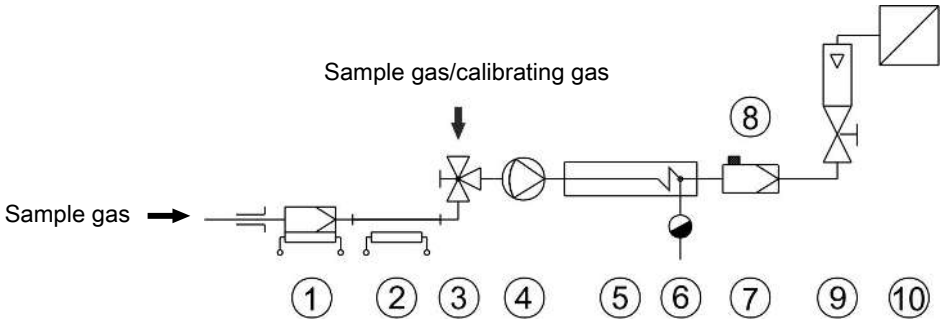


Remark: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Technical Data

Gas Cooler Technical Data			
Operational readiness:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	303 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew temperature preset:	41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Protection class:	IP 20		
Housing:	Stainless steel		
Weight incl. heat exchanger:	approx. 33 lb		
Electric supply:	115 V, 60 Hz or 230 V, 50 Hz Plug per DIN EN 175301-803		
Electrical data:		230 V	115 V
	Typical power input:	140 VA	155 VA
	Max. operating current:	1.6 A	3.2 A
Alarm output switching connection:	250 V, 2 A, 50 VA Plug per DIN EN 175301-803		
Packaging dimensions:	approx. 16.5 in x 17.3 in x 13.8 in		
FM approval no.:	3040918		

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain or peristaltic pump
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV-SS TV-SS-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7 / 1.5 cu. in.	1.7 / 1.5 cu. in.	1.3 / 1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

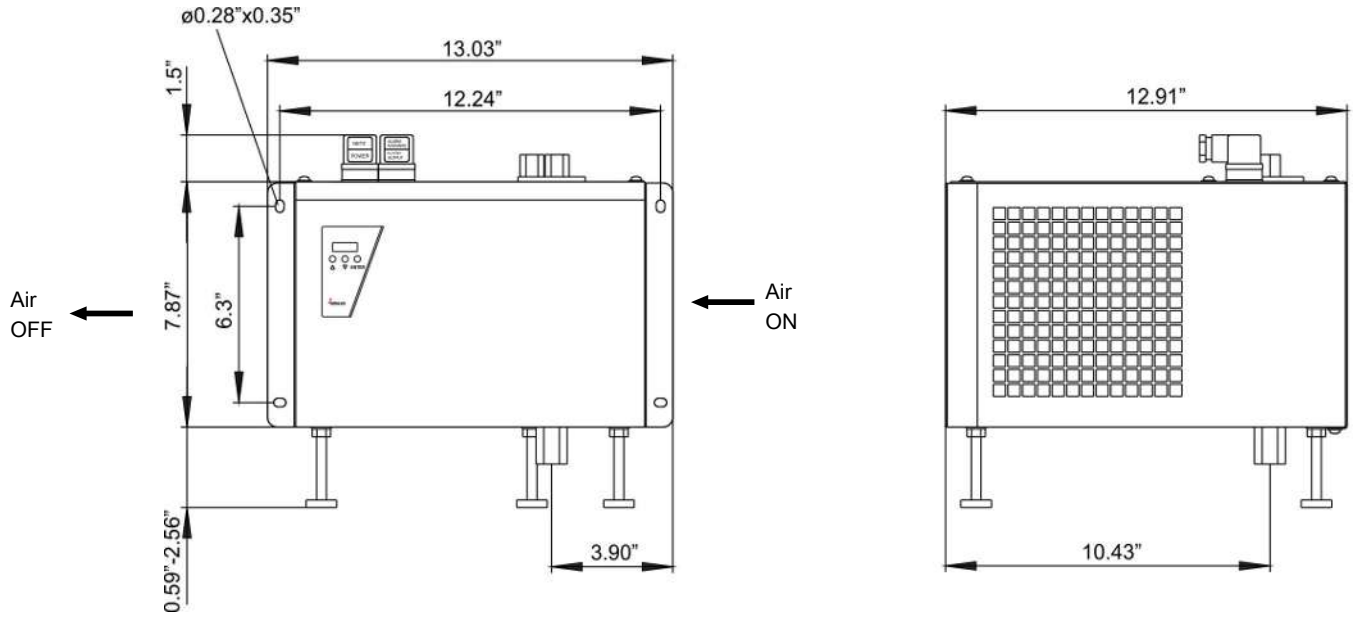
[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

Dimensions



Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4561	X	X	X	X	0	0	0	0	Product Characteristics
									Voltage
	1								115 V metric screw connections
	2								230 V metric screw connections
	3								115 V US screw connections
	4								230 V US screw connections
									Gas path / Material / Version
		0	0	0					without heat exchanger
		1	1	0					1 gas path / single stainless steel heat exchanger / (TS or TS-I)
		1	2	0					1 gas path / single glass heat exchanger / (TG)
		1	3	0					1 gas path / single PVDF heat exchanger / (TV-SS or TV-I)
		2	6	0					2 gas paths / dual stainless steel heat exchanger / (DTS or DTS-I)
		2	6	1					2 gas paths / dual stainless steel heat exchanger / (DTS-6 or DTS-6-I) [1]
		2	7	0					2 gas paths / dual glass heat exchanger / (DTG)
		2	8	0					2 gas paths / dual PVDF heat exchanger / (DTV or DTV-I) [1]
									Condensate drain[2]
					0	0	0	0	

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Peristaltic pumps available for separate installation.

Spare parts and accessories

Item no.	Description
44 10 00 1	Automatic condensate drain 11 LD V 38
44 10 00 4	Automatic condensate drain AK 20, PVDF
44 10 00 5	Condensate trap GL 1; glass, 0.106 gal
44 10 01 9	Condensate trap GL 2; glass, 0.264 gal
see data sheet 450020	Peristaltic Pump CPsingle, CPdouble

Gas cooler series EGK 2-19

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The compact system EGK 2-19 is a 19" rack with sample gas cooler and condensate drain, particle filter and moisture detector for up to two gas paths.

- Compact design: fully assembled and ready to connect
- Low maintenance costs based on easy accessibility
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Self-monitoring
- Status outputs
- Ambient temperatures up to 122 °F
- Rated cooling power 303 Btu/h
- Dew point stability ±0.2 F
- Available as 19" rack or for wall-mounting

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Description

Concept

The EGK 2-19 concept is firstly based on a cooler for one or two heat exchangers.

In addition, other components which every conditioning system should feature can optionally be integrated:

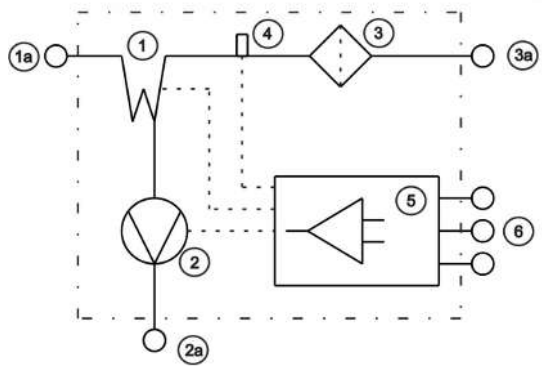
- Peristaltic pump for condensate separation
- Filter
- Moisture detector

This therefore allows for virtually any configuration of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to consumables, consequently located at the front.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

Description of a fully equipped gas path



No.	Description
1a	Heat exchanger inlet
1	Heat exchanger
2	Peristaltic pump
2a	Peristaltic pump outlet
3	Fine mesh filter
3a	Filter outlet
4	Moisture detector
5	Control
6	Electrical connections

The gas to be conditioned is fed directly into the inlet of the heat exchanger (1, 1a). A hose is pre-installed between the heat exchanger outlet and the fine mesh filter (3). Sample gas is continued directly from the outlet of this filter via hose fitting (3a).

Condensate is removed by the peristaltic pump (2), the inlet of which is directly connected to the heat exchanger via hose.

A moisture detector (4) may be installed directly into the filter, which is analysed by electronics (5). This eliminates the need to purchase additional controllers.

Control (5)

The control features a microprocessor-controlled Bühler Constant Regulation at its core.

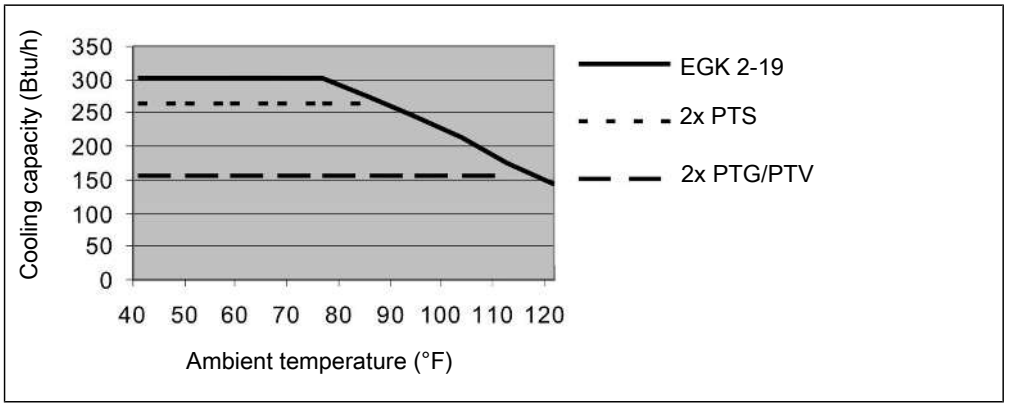
The display with control keys at the front displays the cooler temperature as well as all operating statuses.

Use the keys to set various parameters such as outlet dew point, alarm limits or the sensitivity of moisture detectors.

Electrical connections (6)

All signals output by the electronics can be accessed via Phoenix plug at the top of the cooler. The electric supply is also a plug connection. This means no fixed wiring is required.

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 104 °F.

Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	303 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet temperature, preset:	 41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Temperature difference between heat exchangers	< 0.5 K		
Max. Inlet temperature	see table "Heat Exchanger Overview"		
Max. pressure	see table "Heat Exchanger Overview" Limitations due to filter or peristaltic pump (see Technical Data - Options)		
Protection class	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 21.9 x 16.9 x 13.4 in		
Weight incl. heat exchanger	approx. 33 lb approx. 42 lb at full expansion stage		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per DIN EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	Max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A Phoenix plug		
Gas connections	Heat exchanger see table "Heat Exchanger Overview" Filter DN 4/6 or 1/4"-1/6"		
Condensate outlet	Hose nipple Ø5 mm (0.2 in)		
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton		

Technical Data - Options

Technical data analogue output cooler temperature

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 122 °F cooler temperature
	Phoenix Plug

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPsingle Peristaltic Pumps Technical Data

Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials	
Hose:	Norprene (standard), Marprene, Fluran
Connections:	PVDF

Technical Data Filter AGF-FA-5

max. operating pressure with filter	29 psi
Filter surface	6.5 in^2
Filter fineness	2 µm
Dead volume	1.74 cu. in.
Materials	
Filter:	PTFE, PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

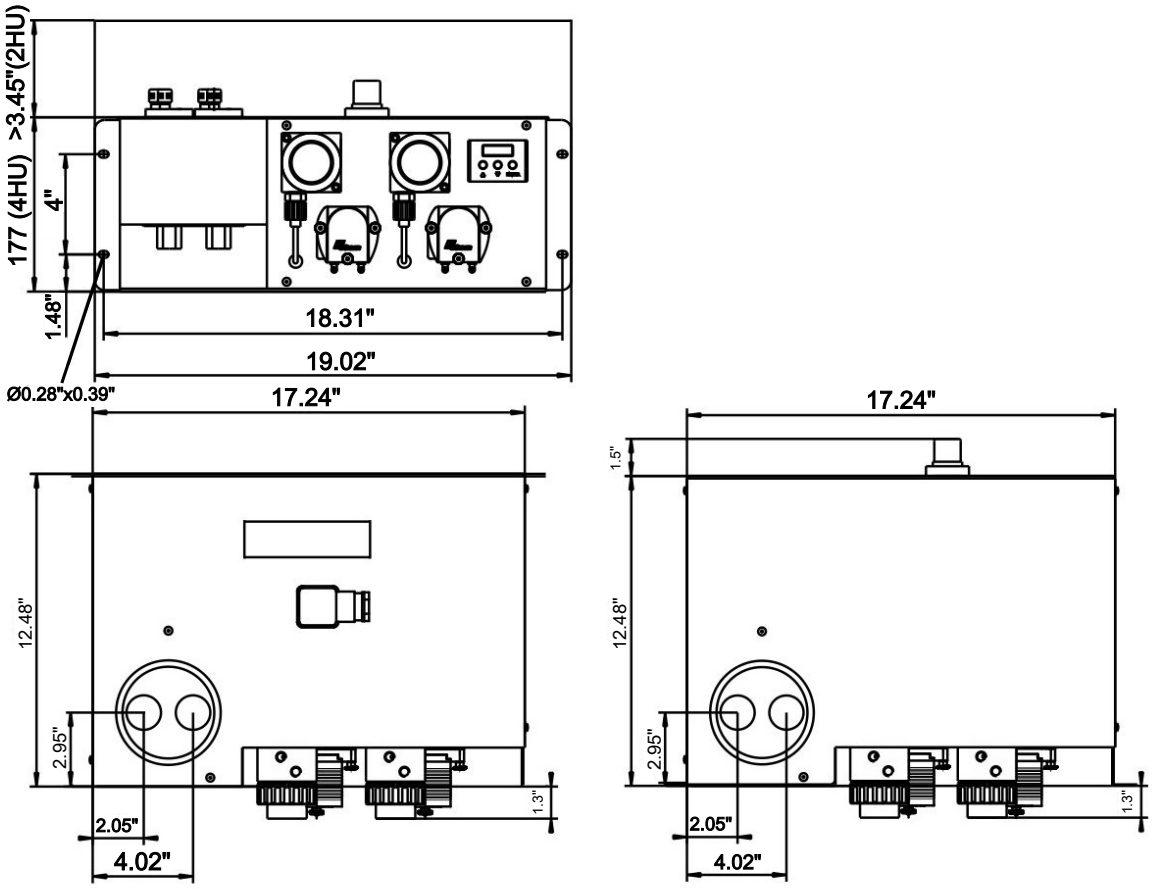
Heat exchanger	PTS PTS-I [2]	PTG	PTV PTV-I [2]
Version / Material	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	8.3 lpm	4.7 lpm	4.7 lpm
Inlet dew point $\tau_{e,max}$ [1]	150 °F	150 °F	150 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	142 Btu/h	85 Btu/h	85 Btu/h
Gas pressure p_{max}	2320 psi	43 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	.15 psi	.15 psi	.15 psi
Dead volume V_{tot}	1.8 cu. in.	1.8 cu. in.	3.5 cu. in.
Gas connections (metric)	6 mm	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler models with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 1 heat exchanger)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						without heat exchanger
			1	1						Single stainless steel heat exchanger / (PTS and PTS-I)
			1	2						Single glass heat exchanger / (PTG)
			1	3						Single PVDF heat exchanger / (PTV and PTV-I)
										Condensate drain
					0					without condensate drain
					1					1 CPsingle peristaltic pump with 90° angle hose connection [1]
					3					1 CPsingle peristaltic pump with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

Gas cooler models with two heat exchangers

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 2 heat exchangers)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						without heat exchanger
			2	1						2 single stainless steel heat exchangers / (PTS and PTS-I)
			2	2						2 single glass heat exchangers / (PTG)
			2	3						2 single PVDF heat exchangers / (PTV and PTV-I)
										Condensate drain
					0					Without condensate drain
					2					2 CPsingle peristaltic pumps with 90° angle hose connection [1]
					4					2 CPsingle peristaltic pumps with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
						2				2 filters installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed (only possible with 1 filter)
							2			2 moisture detectors installed (only possible with 2 filter)
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

Spare parts and accessories

Item no.	Description
41 15 10 50	Filter element FE-4; Unit 8 count
4492 0035 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
4492 0035 013	Norprene replacement hose with one straight and one angled connection for peristaltic pump 0.005 lpm
41 01 00 3	O-ring for filter AGF-FA-5, Unit 8 count, sintered PTFE

Gas cooler series EGK 2-19+

In emission measurement, process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations as well as measurements in small combustion plants or exhaust gas analysis in automotive engineering.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 2-19+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly the wash out effect of SO_2 is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-3.

- Compact design: fully assembled and ready to connect
- Low maintenance costs based on easy accessibility
- One gas path
- Optimised heat exchanger type 2 in Duran glass or PVDF
- Adjustable outlet dew point and alarm thresholds
- Self-monitoring
- Status outputs
- Ambient temperatures up to 122 °F
- Rated cooling power 303 Btu/h
- Dew point stability ±0.2 F
- Available as 19" rack or for wall-mounting

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

Concept

The EGK 2-19+ concept is firstly based on a cooler for two in-line heat exchangers.

In addition, other components which every conditioning system should feature can optionally be integrated:

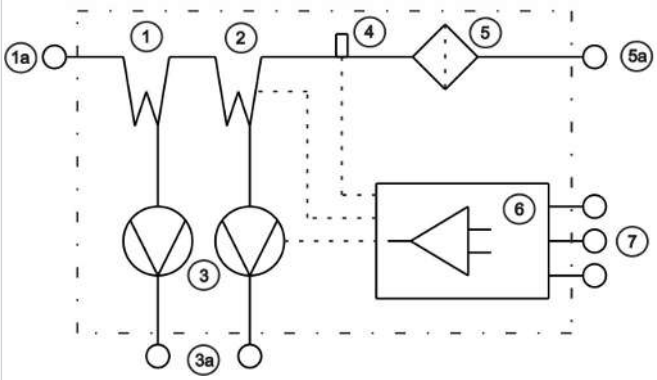
- Peristaltic pump for condensate separation
- Filter
- Moisture detector

This therefore allows for virtually any configuration of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to consumables, consequently located at the front.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

Description of a fully equipped gas path



No.	Description
1a	Heat exchanger inlet
1	Heat exchanger (pre-cooling)
2	Heat exchanger (after-cooling)
3	Peristaltic pump
3a	Peristaltic pump outlet
4	Moisture detector
5	Fine mesh filter
5a	Filter outlet
6	Control
7	Electrical connections

The gas to be conditioned is fed directly into the inlet of the heat exchanger (1, 1a). A hose is pre-installed between the heat exchanger (2) outlet and the fine mesh filter (5). Sample gas is continued directly from the outlet of this filter via hose fitting (5a).

Condensate is removed by the peristaltic pumps (3), the inlet of which is directly connected to the heat exchanger via hose.

A moisture detector (4) may be installed directly into the filter, which is analysed by electronics (6). This eliminates the need to purchase additional controllers.

Control (6)

The control features a microprocessor-controlled Bühler Constant Regulation at its core.

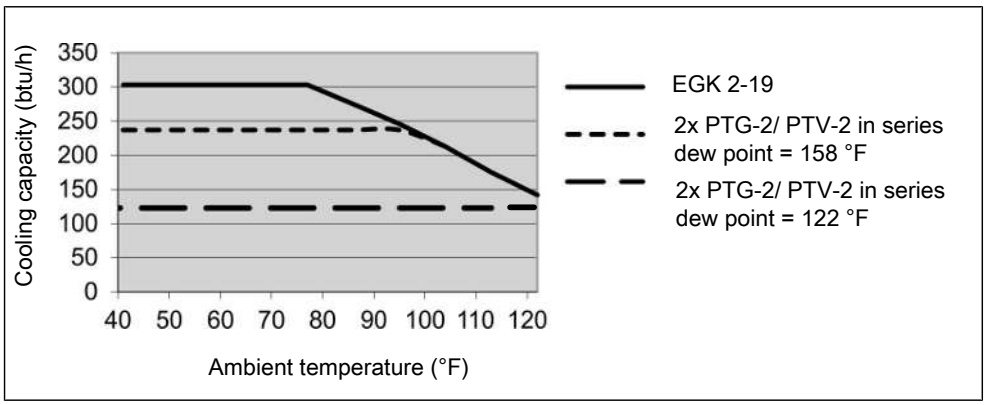
The display with control keys at the front displays the cooler temperature as well as all operating statuses.

Use the keys to set various parameters such as outlet dew point, alarm limits or the sensitivity of moisture detectors.

Electrical connections (7)

All signals output by the electronics can be accessed via Phoenix plug at the top of the cooler. The electric supply is also a plug connection. This means no fixed wiring is required.

Performance data



Remark: The limit curves for the heat exchanger apply to a dew point of 158 °F under standard conditions per DIN EN 15267-3:2008-03 and to a dew point of 122 °F under operating conditions.

Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	303 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet temperature, preset:	 41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Temperature difference between heat exchangers	< 0.5 K		
Max. Inlet temperature	see table "Heat Exchanger Overview"		
Max. pressure	see table "Heat Exchanger Overview" Limitations due to filter or peristaltic pump (see Technical Data - Options)		
Protection class	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 21.9 x 16.9 x 13.4 in		
Weight incl. heat exchanger	approx. 33 lb approx. 41 lb at full expansion stage		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per DIN EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	Max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A Phoenix plug		
Gas connections	Heat exchanger see table "Heat Exchanger Overview" Filter DN 4/6 or 1/4"-1/6"		
Condensate outlet	Hose nipple Ø5 mm (0.2 in)		
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton		

Technical Data - Options

Technical data analogue output cooler temperature

Signal	4-20 mA or 2-10 V corresponds to -4 °F to 122 °F cooler temperature
	Phoenix Plug

Technical Data FF-3-N Moisture Detector

Ambient temperature	37 °F to 122 °F
max. operating pressure with FF-3-N	29 psi
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPsingle Peristaltic Pumps Technical Data

Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials	
Hose:	Norprene (standard), Marprene, Fluran
Connections:	PVDF

Technical Data Filter AGF-FA-5

max. operating pressure with filter	29 psi
Filter surface	6.5 in^2
Filter fineness	2 µm
Dead volume	1.74 cu. in.
Materials	
Filter:	PTFE, PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. Indicated is the maximum flow v_{max} in Nl/h of cooled air, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

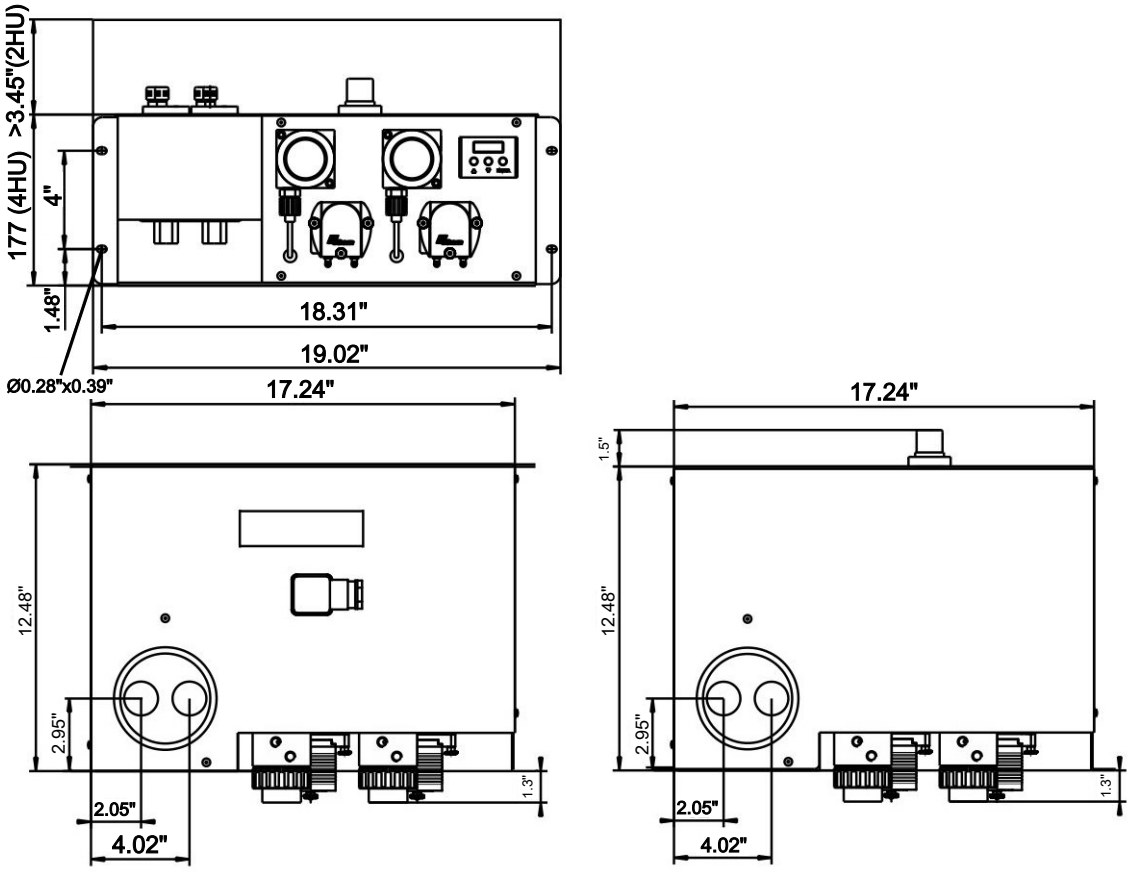
Heat exchanger	2x PTG-2	2x PTV-2 2x PTV-2-I [2]
Version / Material	Glass	PVDF
Flow rate v_{max} [1]	4.2 lpm	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1]	158 °F	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	284 °F	284 °F
Max. Cooling capacity Q_{max}	218 Btu/h	204 Btu/h
Gas pressure p_{max}	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm) total	0.29 psi	0.29 psi
Dead volume V_{tot} total	3.6 cu.in.	7 cu.in.
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)



Ordering instructions

Gas cooler type with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 2 heat exchangers)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						Without heat exchanger
			1	6						2 single glass heat exchangers/ (2x PTG-2)
			1	7						2 single PVDF heat exchangers/ (2x PTV-2 or PTV-2-I)
										Condensate drain
					0					Without condensate drain
					2					2 CPsingle peristaltic pumps with 90° angle hose connection [1]
					4					2 CPsingle peristaltic pumps with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed (only possible with 1 filter)
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

Spare parts and accessories

Item no.	Description
41 15 10 50	Filter element FE-4; Unit 8 count
4492 0035 012	Norprene replacement hose with angled connections for peristaltic pump 0.005 lpm
4492 0035 013	Norprene replacement hose with one straight and one angled connection for peristaltic pump 0.005 lpm
41 01 00 3	O-ring for filter AGF-FA-5, Unit 8 count, sintered PTFE

Gas cooler series EGK 4S

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

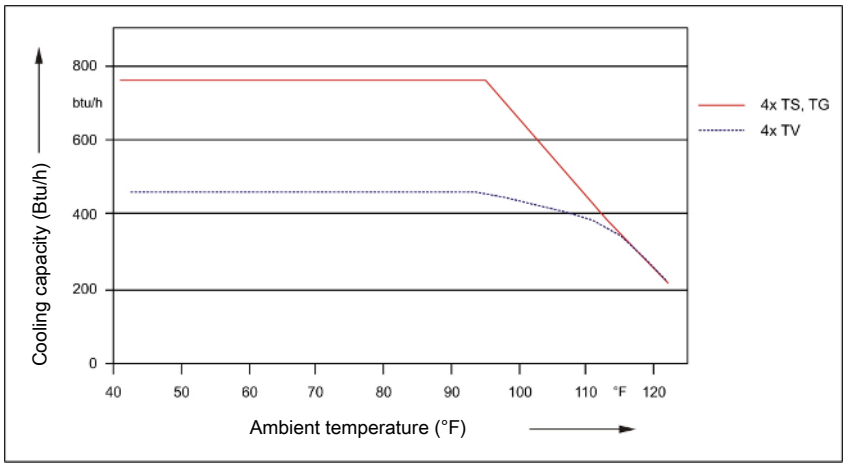
Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 4S is a compressor sample gas cooler for up to 8 separate gas paths and is an essential component in sophisticated analysis systems.

- For 19” rack installation, wall mounting or desktop housing
- Compact size
- Up to 4 stainless steel, glass or PVDF heat exchangers per unit, up to 8 gas paths available upon request
- Electronic control with cooling block temperature display
- Self-monitoring with contact output ± 3 K
- Rated cooling power 760 Btu/h
- Dew point stability ± 0.2 F
- CFC-free

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Performance Data

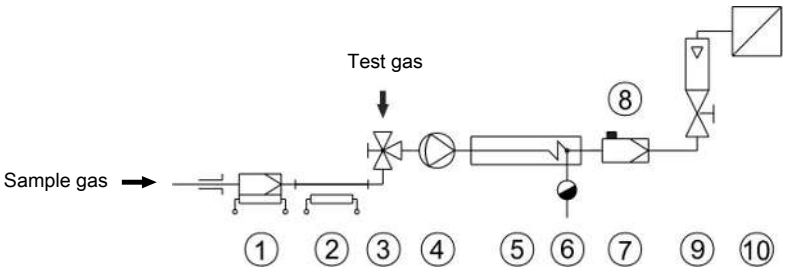


Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Technical Data

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 77 °F)	760 Btu/h		
Ambient temperature	41 °F to 122 °F		
Gas outlet temperature, preset:	 41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.2 K ± 2 K		
Protection class	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 20.1 x 14 x 17.7 in		
Weight incl. 4 heat exchangers	max. 71 lb		
Electric supply	Plug per EN 175301-803		
Status output switching capacity	250 V AC/ 150 V DC Changeover contact 2 A, 30 VA		
Electrical Data		230 V	115 V
	Typical power input:	240 VA	215 VA
	Max. operating current:	2.5 A	4.6 A
Starting current	10 A		

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

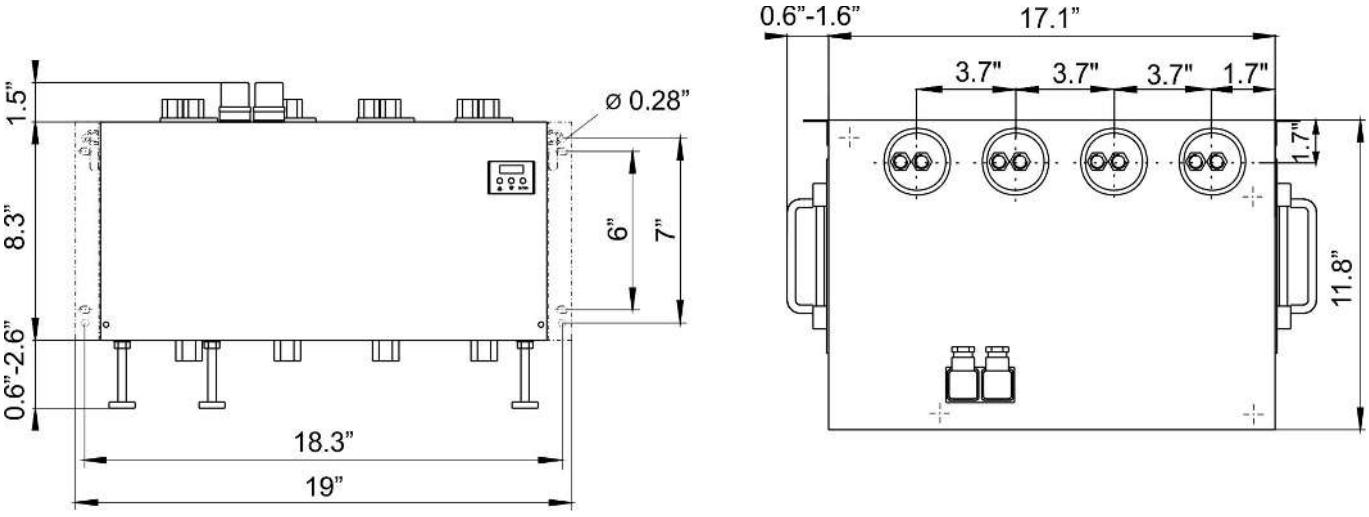
Heat exchanger	TS TS-I [2]	TG TG	TV TV-I [2]
Version / Material	Stainless steel	Glass	PVDF
Flow v_{max} [1]	8.8 lpm	4.7 lpm	2.5 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1]	356 °F	284 °F	284 °F
Max. Cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	NPT 1/4”	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

Dimensions (inch)



Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

457	X	X	X	X	0	0	0	0	X	Product Characteristics
										Gas cooler models
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Gas paths [1]
			0							without heat exchanger
			1							1 gas path
			2							2 gas paths
			3							3 gas paths
			4							4 gas paths
										Heat exchanger
				0	0					without heat exchanger
				1	0					Single stainless steel heat exchanger/ (TS or TS-I)
				2	0					Single glass heat exchanger/ (TG)
				3	0					Single PVDF heat exchanger/ (TV or TV-I)
										Condensate drain [2]
						0				without condensate drain
										Mounting Accessories
							0	0	0	without mounting accessories
							0	0	1	with mounting brackets
							0	0	2	with feet
							0	0	3	with mounting brackets and feet
							0	0	4	with handles
							0	0	5	with mounting brackets and handles
							0	0	6	with feet and handles
							0	0	7	with all mounting accessories

[1] up to 8 gas paths upon request.

[2] Peristaltic pumps must be installed separately or can be mounted to the cooler using a mounting angle. The supply voltage corresponds with that of the main unit. Automatic condensate drains are installed separately.

Spare Parts and Accessories

Item no.	Description
44 10 00 1	Automatic condensate drain 11 LD V 38
44 10 00 4	Automatic condensate drain AK 20, PVDF
44 10 00 5	Condensate trap GL 1; glass, 0.106 gal
44 10 01 9	Condensate trap GL 2; glass, 0.264 gal
see data sheet 450020	Peristaltic Pump CPsingle, CPdouble
45 70 00 8	Mounting angles for up to 4 peristaltic pumps

Gas cooler series EGK 10

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 10 is a compressor high performance cooler with a special heat exchanger. Suitable for wall-mounting or desktop operation.

- Stainless steel heat exchanger
- Rated cooling power 1375 Btu/h
- Use as wall mounting or desktop housing
- Compact size
- Electronic control with cooling block temperature display
- Adjustable outlet dew point and alarm thresholds
- Self-monitoring
- Dew point stability ± 0.2 °F
- CFC-free

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

Gas Cooler Technical Data

Operational readiness:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	1375 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew temperature preset: adjustable:	 41 °F 36 °F to 68 °F		
Alarm threshold adjustable um Dew point upper alarm threshold: lower alarm threshold:	 1 K to 7 K, factory setting 3 K -1 K to -3 K, factory setting: -3 K		
Dew point fluctuations static: in the entire specification range:	 ± 0.2 K ± 3.6 °F		
Protection class:	IP 20		
Housing:	Stainless steel		
Weight incl. heat exchanger:	approx. 70 lb		
Electric supply:	Plug per DIN EN 175301-803		
Electrical data:		230 V	115 V
	Typical power input:	300 VA	260 VA
	max. operating current:	3.6 A	6.8 A
Starting current:	12 A (230 V), 28 A (115 V)		
Status output switching capacity:	230 V AC/ 150 V DC Plug per DIN EN 175301-803		
Max. pressure p_{max}:	73 psi		
Pressure drop Δp (v = 1500 l/h /25 lpm):	0.35 psi		

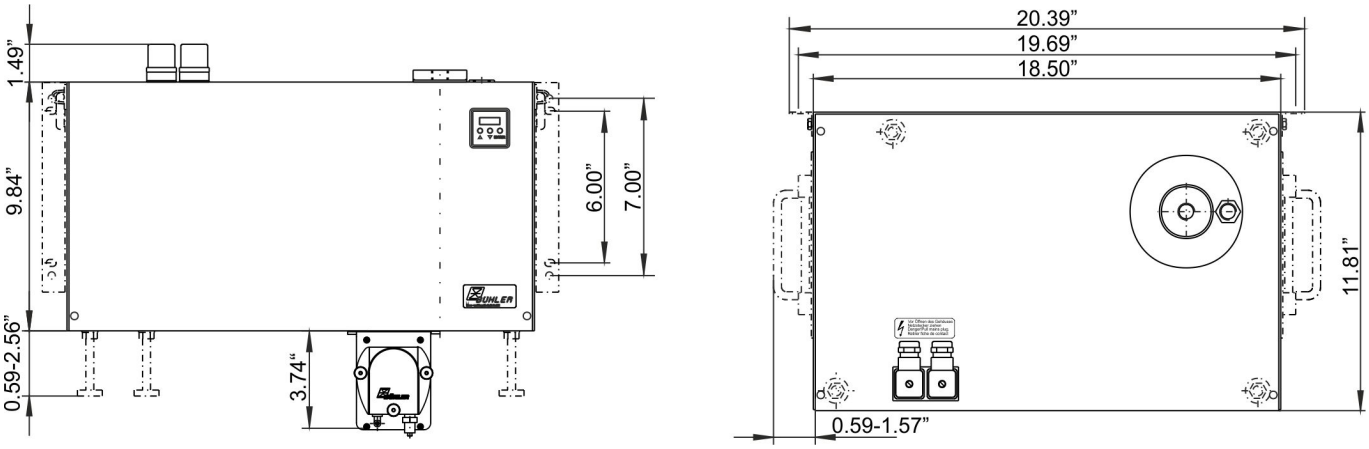
Flow parameter TS10

Inlet dew point (humidity)	Ambient temperature	Flow in lpm at a gas inlet temperature of					Condensate per h every 10 lpm
		140 °F	**176 °F**	**212 °F**	**284 °F**	**356 °F**	
104 °F (7 Vol%)	41...122 °F	65	58	52	43	37	2.6 cu. in.
122 °F (12 Vol%)	50...113 °F	55	50	47	41	36	4.4 cu. in.
	41...122 °F	32	29	28	24	22	
131 °F (16 Vol%)	72...95 °F	50	47	44	39	35	5.5 cu. in.
	41...122 °F	25	23	23	20	18	
140 °F (20 Vol%)	72...95 °F	42	39	37	33	31	7.3 cu. in.
	41...122 °F	20	18	17	16	15	
149 °F (25 Vol%)	72...95 °F	-	30	29	27	24	9.7 cu. in.
	41...122 °F	-	14	14	13	12	
158 °F (31 Vol%)	72...95 °F	-	23	21	20	19	13.4 cu. in.
	41...122 °F	-	11	11	10	10	
176 °F (47 Vol%)	72...95 °F	-	12	12	11	10	26.7 cu. in.
	41...122 °F	-	6.0	5.8	5.5	5.3	

Example: The ambient temperature can be maintained in the 72...95 °F range. The gas inlet temperature is 284 °F, the inlet dew point 140 °F.

Use row “inlet dew point” = 140 °F and ambient temperature 72...95 °F to locate the value 33 lpm in column 284 °F. For values between the gas temperature values in the table, use linear calculation between the flow values.

Dimensions



Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4569	X	X	X	X	0	0	0	X	Product Characteristics
									Voltage
	1								115 V
	2								230 V
									Gas path / Material / Version
		0	0	0					without heat exchanger
		1	1	0					Single heat exchanger / stainless steel / TS10 G 3/8"
		1	1	1					Single heat exchanger / stainless steel / TS10 NPT 3/8"
		1	2	1					Single heat exchanger / glass coated inside / TS10 GB NPT 3/8"
									Condensate drain [1]
					0				without condensate drain
									Mounting Accessories
						0	0	0	without mounting accessories
						0	0	1	with mounting accessories
						0	0	2	with feet
						0	0	3	with mounting accessories and feet
						0	0	4	with handles
						0	0	5	with mounting brackets and handles
						0	0	6	with feet and handles
						0	0	7	with all mounting accessories

[1] Peristaltic pumps cannot be mounted to the cooler. Peristaltic pumps only available for separate installation.

Spare Parts and Accessories

Item no.	Description
44 10 00 1	Automatic condensate drain 11 LD V 38
44 10 00 4	Automatic condensate drain AK 20, PVDF
44 10 00 5	Condensate trap GL 1; glass, 0.106 gal
44 10 01 9	Condensate trap GL 2; glass, 0,264 gal
44 92 11 20 114	CPsingle 115/230 V, 50/60 Hz, 1 L/h (0.016 lpm), metric screw-in connection DN 4/6, for separate installation
44 92 11 20 115	CPsingle 115/230 V, 50/60 Hz, 1 L/h (0.016 lpm), US screw-in connection 1/6”-1/4, for separate installation
44 92 00 35 114	Norprene replacement hose with screw connection (metric) for peristaltic pump 1 L/h (0.016 lpm)
44 92 00 35 115	Norprene replacement hose with screw connection (US) for peristaltic pump 1 L/h (0.016 lpm)

Gas Analysis

Gas cooler series EGK 2A Ex

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 2A Ex is ATEX and IECEx approved and equipped with up to four separate gas paths, making it suitable for operation in explosive zones. It has a digital temperature display and alarm outputs.

- ATEX and IECEx approval for Zone 1
- CFC-free
- Rated cooling power 583 Btu/h
- 1 or 2 heat exchangers plug-in: up to 4 gas paths
- Self-monitoring with temperature alarm output
- Status display and output
- Easy to use and inspect
- Easy to install construction
- Condensate drain inside device available
- Auto-start if refrigerant circuit intact

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

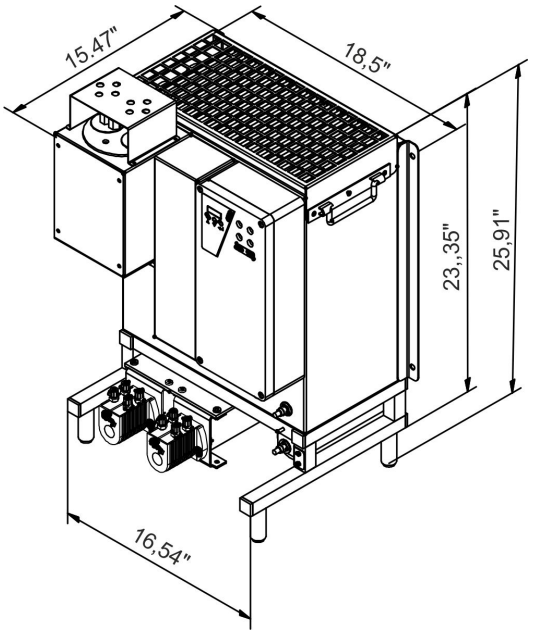
Gas Cooler Technical Data

ATEX approval	Ex II 2 G Ex pxb eb mb q [ia] IIC T4 Gb
IECEx approval	Ex pxb eb mb q [ia] IIC T4 Gb
Ready for operation	after max. 20 minutes
Rated cooling capacity (at 77 °F)	> 583 Btu/h (170 W)
Ambient temperature	-4 °F to 113 °F
Gas output dew temperature preset: adjustable:	 41 °F 36 °F to 68 °F
Alarm threshold adjustable around dew point upper alarm threshold: lower alarm threshold:	 34 °F to 45 °F, factory setting 37 °F 30 °F to 27 °F, factory setting 27 °F
Dew point fluctuations static: in the entire specification range:	 ±0.2 K (with stainless steel), ±0.5 K (with PVDF), ±0.5 K (with glass) ± 2 K
Type of protection electric	IP 54
Housing	Stainless steel/Polyester
Weight incl. heat exchanger	approx. 82 lb
Electric supply	115 V or 230 V, 50/60 Hz, terminals
Power input	250 VA (230 V) or 300 VA (115 V)
Protection:	Protective motor switch (breaking capacity 1.5 kA or higher) 115 V version: 3.2 A 230 V version: 1.3 A
Status output fuse:	Breaking capacity 1.5 kA or higher. Dimensioned per the status contact switching capacity and customer application (see type examination certificate, item 15.3.1.2).
Potential-free alarm output ("fail safe")	230 V / 3 A AC 115 V / 3 A AC 24 V / 1 A DC
Installation	Stand-alone or wall-mounted
Packaging dimensions:	27.6 x 20.5 x 20.5 in, on pallet (dimensions: 31.5 x 23.6)

Description

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on). If the cooler is stopped or in the event of service, an error code will appear.

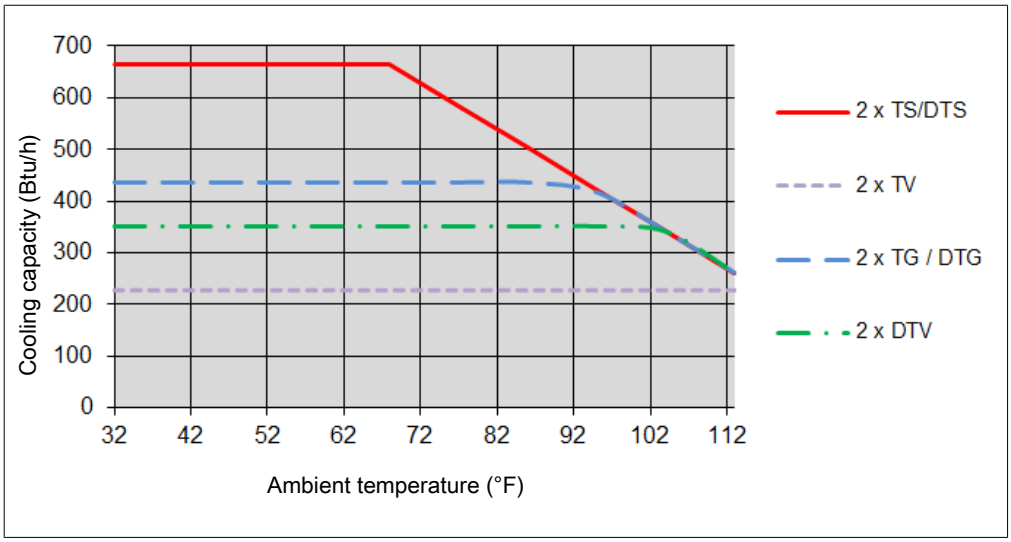
Dimensions



Mounting holes

17.5 x 16.5 x Ø0.4 (wide x high x diameter)

Performance data



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV-SS TV-SS-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Version/Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow v_{max} [1]	8.8 lpm	4.7 lpm	2.1 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 1.9 lpm
Inlet dew point $\tau_{e,max}$ [1]	176 °F	176 °F	149 °F	176 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$	266 °F (356 °F) [5]	266 °F	266 °F	266 °F (356 °F) [5]	266 °F	266 °F
Max. cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	363 psi	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.07 psi each	0.07 psi each	0.22 psi each
Dead volume V_{tot}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in	1.7/1.5 cu. in	1.3/1.3 cu. in
Gas connections (metric)	G1/4" i	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4" i	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4") [4]	1/4"-1/6"
Condensate out connection (metric)	G3/8" i	GL 25 (12 mm) [4]	G3/8" i	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connection (US)	NPT 3/8" i	GL 25 (1/2") [4]	NPT 3/8" i	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

[5] With temperature class T3 gases the permissible gas inlet temperature is max. 356 °F.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:
Please note: Every individual gas path must be equipped with condensate drain.

4590	X	X	X	X	X	X	X	1	Product characteristics (metric connections)
									Voltage [1]
	1								115 V
	2								230 V
									Gas path/material/version
		0	0	0					without heat exchanger
									1 gas path/material/version
		1	1	0					1x single heat exchanger/stainless steel/TS
		1	2	0					1x single heat exchanger/glass/TG
		1	3	0					1x single heat exchanger/PVDF/TV
									2 gas paths/material/version
		2	1	0					2x single heat exchanger/stainless steel/TS
		2	2	0					2x single heat exchanger/glass/TG
		2	3	0					2x single heat exchanger/PVDF/TV
		2	6	0					1x dual heat exchanger/stainless steel/DTS (10 mm)
		2	6	1					1x dual heat exchanger/stainless steel/DTS-6
		2	7	0					1x dual heat exchanger/glass/DTG
		2	8	0					1x dual heat exchanger/PVDF/DTV [2]
									3 gas paths/material/version
		3	1	0					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS (10 mm)
		3	1	1					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS-6
		3	2	0					1x single heat exchanger + 1x dual heat exchanger/glass/TG+DTG
		3	3	0					1x single heat exchanger + 1x dual heat exchanger/PVDF/TV+DTV [2]
									4 gas paths/material/version
		4	6	0					2x dual heat exchanger/stainless steel/DTS (10 mm)
		4	6	1					2x dual heat exchanger/stainless steel/DTS-6
		4	7	0					2x dual heat exchanger/glass/DTG
		4	8	0					2x dual heat exchanger/PVDF/DTV [2]
									Condensate drain
					0	0	0		without condensate drain
									1 gas path
					1	1	1		1x peristaltic pump CPsingle with adapter [3]
					1	1	3		1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		1x AK20 installed [3]
					4	0	0		1x 11 LD V38 installed
									2 gas paths
					1	2	2		1x peristaltic pump CPdouble with adapter [3]
					1	2	4		1x peristaltic pump CPdouble with screw connection [3]
					3	0	0		2x AK20 installed [3]
					4	0	0		2x 11 LD V38 installed
									3 gas paths
					1	3	2		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with adapter [3]
					1	3	4		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		3x AK20 installed [3]
					4	0	0		3x 11 LD V38 installed
									4 gas paths
					1	4	2		2x peristaltic pump CPdouble with adapter [3]
					1	4	4		2x peristaltic pump CPdouble with screw connection [3]
					3	0	0		4x AK20 installed [3]
					4	0	0		4x 11 LD V38 installed

4590	X	X	X	X	X	X	X	1	Product characteristics (US connections)
									Voltage [1]
	1								115 V
	2								230 V
									Gas path/material/version
		0	0	0					without heat exchanger
									1 gas path/material/version
		1	1	5					1x single heat exchanger/stainless steel/TS-I
		1	2	5					1x single heat exchanger/glass/TG-I
		1	3	5					1x single heat exchanger/PVDF/TV-I
									2 gas paths/material/version
		2	1	5					2x single heat exchanger/stainless steel/TS-I
		2	2	5					2x single heat exchanger/glass/TG-I
		2	3	5					2x single heat exchanger/PVDF/TV-I
		2	6	5					1x dual heat exchanger/stainless steel/DTS-I (3/8")
		2	6	6					1x dual heat exchanger/stainless steel/DTS-6-I
		2	7	5					1x dual heat exchanger/glass/DTG-I
		2	8	5					1x dual heat exchanger/PVDF/DTV-I [2]
									3 gas paths/material/version
		3	1	5					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS-I (3/8")
		3	1	6					1x single heat exchanger + 1x dual heat exchanger/stainless steel/TS+DTS-6-I
		3	2	5					1x single heat exchanger + 1x dual heat exchanger/glass/TG+DTG-I
		3	3	5					1x single heat exchanger + 1x dual heat exchanger/PVDF/TV-I+DTV-I [2]
									4 gas paths/material/version
		4	6	5					2x dual heat exchanger/stainless steel/DTS-I (3/8")
		4	6	6					2x dual heat exchanger/stainless steel/DTS-6-I
		4	7	5					2x dual heat exchanger/glass/DTG-I
		4	8	5					2x dual heat exchanger/PVDF/DTV-I [2]
									Condensate drain
					0	0	0		without condensate drain
									1 gas path
					1	1	1		1x peristaltic pump CPsingle with adapter [3]
					1	1	3		1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		1x AK20 installed [3]
					4	0	0		1x 11 LD V38 installed
									2 gas paths
					1	2	2		1x peristaltic pump CPdouble with adapter [3]
					1	2	4		1x peristaltic pump CPdouble with screw connection [3]
					3	0	0		2x AK20 installed [3]
					4	0	0		2x 11 LD V38 installed
									3 gas paths
					1	3	2		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with adapter [3]
					1	3	4		1x peristaltic pump CPdouble + 1x peristaltic pump CPsingle with screw connection [3]
					3	0	0		3x AK20 installed [3]
					4	0	0		3x 11 LD V38 installed
									4 gas paths
					1	4	2		2x peristaltic pump CPdouble with adapter [3]
					1	4	4		2x peristaltic pump CPdouble with screw connection [3]
					3	0	0		4x AK20 installed [3]
					4	0	0		4x 11 LD V38 installed

[1] Cooler operation inside Ex area only permitted with suitable protective motor switch.

[2] Operation with condensate drains and traps not available.

[3] This option limits the approved application of the complete cooler to gas group IIB.

Spare Parts and Accessories

Item no.	Description
91 320 200 09	Protective motor switch for installation outside Ex area 230 V, 50/60 Hz
91 320 200 29	Protective motor switch for installation outside Ex area 115 V, 50/60 Hz
91 320 200 32	Protective motor switch for installation inside Ex area 230 V, 50/60 Hz
91 320 200 35	Protective motor switch for installation inside Ex area 115 V, 50/60 Hz
91 100 000 78	Microfuse 125 mA, interrupt rating 1500 A
91 200 201 39	Relay 24 VDC, 2 changeover contacts
91 200 201 43	Relay 230 VAC, 2 changeover contacts
91 460 303 14	Fuse clip
44 10 00 5	Condensate trap GL 1; glass, 0.4 L
44 10 01 9	Condensate trap GL 2; glass, 1 L
45 09 99 19	Mounting kit for peristaltic pump X1
44 92 00 35 011	Norprene replacement hose with straight connections for peristaltic pump 0.005 lpm
44 92 00 35 014	Norprene replacement hose with screw connection DN 4/6 for peristaltic pump 0.005 lpm

Gas Analysis

Gas cooler series EGK 1 Ex2

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is the key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The EGK 1 Ex2 compressor sample gas cooler is ATEX, IECEx and EAC Ex approved and is suitable for operation in explosive zones with up to 2 gas paths.

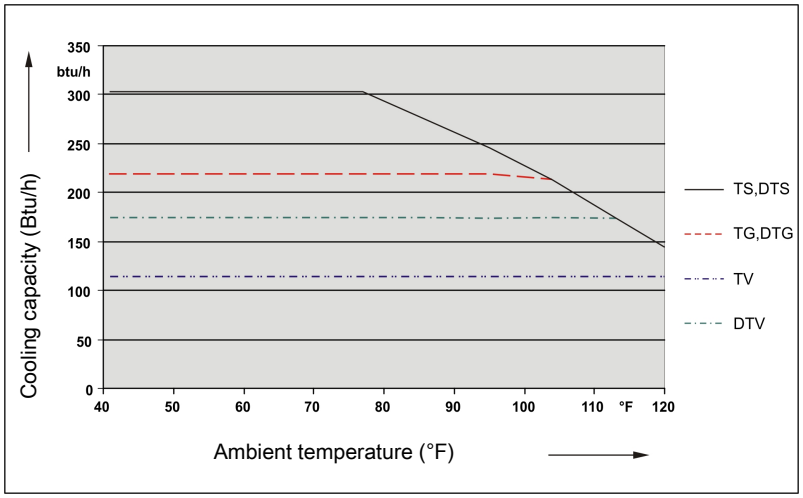
- Ex approved Zone 2
- EAC Ex approval
- Compact installation
- One or two gas paths
- Heat exchanger made from stainless steel, Duran glass and PVDF
- Bühler constant control system
- Self-monitoring
- Block temperature display
- Status alarm
- Rated cooling power 303 Btu/h
- Dew point stability 0.2 °F
- CFC-free

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Please note for this device:

The equipment must be installed in a housing which at a minimum meets EPL Gc.

Performance data



Remark: The limit curves for the heat exchangers exchanger apply to a dew point of 149 °F.

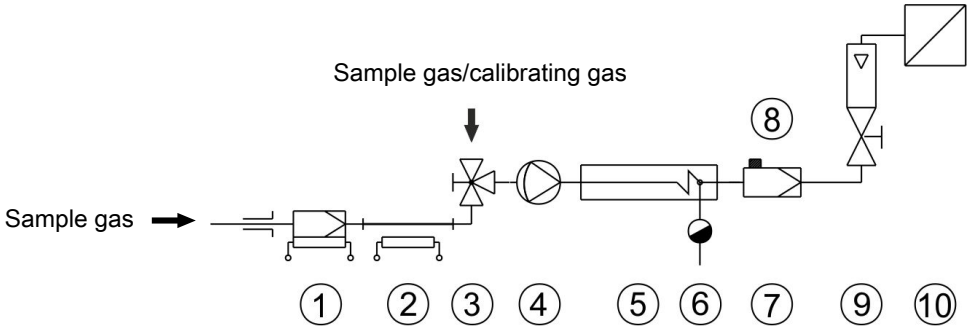
Gas cooler technical data

Gas Cooler Technical Data			
Ready for operation:	after max. 15 minutes		
Rated cooling capacity (at 77 °F):	303 Btu/h		
Ambient temperature:	41 °F to 122 °F		
Gas outlet dew temperature, preset:	approx. 41 °F		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
IP rating:	IP 20		
Housing:	Stainless steel		
Packaging dimensions:	approx. 15.4 x 11.8 x 15.7 in		
Weight incl. heat exchanger:	approx. 33.1 lb		
Electric supply:	115 V, 60 Hz or 230 V, 50 Hz Plug per DIN EN 175301-803 EAC Ex version incl. mains and alarm cable		
Electrical data:		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
	temporary starting currents are significantly higher.		
Alarm output switching connection:	max. 250 V, 2 A, 50 VA Terminal plug per DIN EN 175301-803		
Installation:	stand-alone or wall-mounted, dry and dust-free		
Markings:	ATEX: Ⓔx II 3G Ex ec nA nC IIC T4 Gc IECEx: Ex ec nA nC IIC T4 Gc EAC Ex: 2Ex e nA nC IIC T4		
Applied standards:	IEC 60079-0 (Ed. 6.0); IEC 60079-7 (Ed. 5.0); IEC 60079-15 (Ed. 4.0) EN 60079-0:2012+A11:2013; EN 60079-7:2015; EN 60079-15:2010		
IECEx certificate number:	IECEx IBE 17.0023X		
EAC Ex certificate number:	TC RU C-DE.МЮ62.B.05995		

Technical Data - Options

CPsingle Peristaltic Pumps Technical Data	
Flow rate	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose
Vacuum inlet	max. 11.6 psi
Pressure inlet	max. 14.5 psi
Outlet pressure	14.5 psi
Hose	4 x 1.6 mm (0.04 in)
Protection class	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	Sample gas pump
5	Sample gas cooler	6	Automatic condensate drain or peristaltic pump
7	Fine mesh filter	8	Moisture detector
9	Flow meter	10	Analyser

See data sheets for individual component models and data.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, (inlet) dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of τ_e = 149 °F and ϑ_G = 194 °F. The maximum volume flow v_{max} in Nl/h of cooled air is indicated, so after moisture has condensed.

If the values fall below τ_e and ϑ_G, the flow v_{max} may be increased. For example, on the TG heat exchanger the parameter triple τ_e = 149 °F, ϑ_G = 194 °F and v = 4.7 lpm may also be used in place of τ_e = 122 °F, ϑ_G = 176 °F and v = 6.3 lpm.

Please contact our experts for clarification or refer to our design program.

Heat exchanger overview

Heat exchanger	TS TS-I [2]	TG TG	TV-SS TV-SS-I [2]	DTS (DTS-6 [3]) DTS-I (DTS-6-I [3]) [2]	DTG DTG	DTV [3] DTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	8.9 lpm	4.7 lpm	2.6 lpm	2 x 4.2 lpm	2 x 2.3 lpm	2 x 2 lpm
Inlet dew point $\tau_{e,max}$ [1]	175 °F	175 °F	149 °F	175 °F	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$	266 °F (356 °F) [5]	266 °F	266 °F	266 °F (356 °F) [5]	266 °F	266 °F
Max. cooling capacity Q_{max}	427 Btu/h	218 Btu/h	114 Btu/h	427 Btu/h	218 Btu/h	175 Btu/h
Gas pressure p_{max}	2321 psi	44 psi	44 psi	25 bar	44 psi	29 psi
Pressure drop Δp (v=2.5 lpm)	0.12 psi	0.12 psi	0.12 psi	0.1 psi each	0.1 psi each	0.22 psi each
Dead volume V_{dead}	4.2 cu. in.	2.9 cu. in.	7.9 cu. in.	1.7/1.5 cu. in.	1.7/1.5 cu. in.	1.3/1.3 cu. in.
Gas connections (metric)	G1/4	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm) [4]	DN 4/6
Gas connections (US)	NPT 1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")[4]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	Tube 10 mm (6 mm)	GL18 (10 mm) [4]	DN 5/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	Tube 3/8" (1/4")	GL18 (3/8") [4]	3/16"-5/16"

[1] Considering the maximum cooling capacity of the cooler

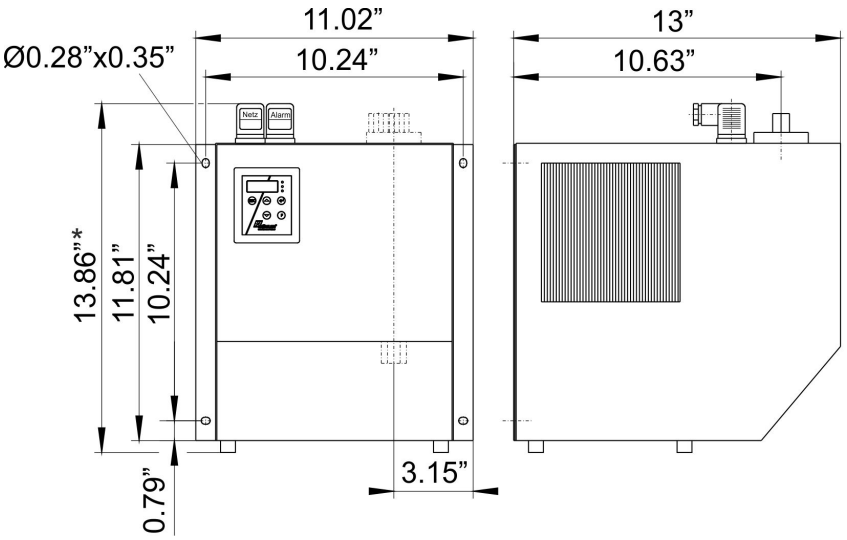
[2] Models marked I have NPT threads or US tubes, respectively

[3] Condensate drain only possible with condensate pump

[4] Gasket inside diameter

[5] With temperature class T3 gases the permissible gas inlet temperature is max. 356 °F.

Dimensions (mm)



* on EAC Ex unit 14.13 inch through connection cable.

Ordering instructions

Gas cooler

The item number is a code for the configuration of your unit. Please use the following model key:

Please note: Every individual gas path must be equipped with peristaltic pump or condensate drain.

4563	211	X	X	X	X	X	X	0	0	0	Product Characteristics
											Certifications
		2									ATEX Zone 2
		5									EAC Ex
											Voltage
			1								115 V, 60 Hz
			2								230 V, 50 Hz
											Heat exchanger
				1	1	0					1 gas path, stainless steel/ (TS), metric
				1	1	5					1 gas path, stainless steel/ (TS-I), US
				1	2	0					1 gas path, glass/ (TG), metric
				1	2	5					1 gas path, glass/ (TG), US hoses
				1	3	0					1 gas path, PVDF/ (TV), metric
				1	3	5					1 gas path, PVDF/ (TV-I), US
				2	6	0					2 gas paths, stainless steel/ (DTS), metric
				2	6	1					2 gas paths, stainless steel/ (DTS-6) [1], metric
				2	6	5					2 gas paths, stainless steel/ (DTS-I), US
				2	6	6					2 gas paths, stainless steel/ (DTS-6-I) [1], US
				2	7	0					2 gas paths, glass/ (DTG), metric
				2	7	5					2 gas paths, glass/ (DTG-I), US hoses
				2	8	0					2 gas paths, PVDF/ (DTV) [1], metric
				2	8	5					2 gas paths, PVDF/ (DTV-I) [1], US
											Condensate drain [2]
							0				without condensate drain
							1				Peristaltic pump CPsingle with hose connection 90° angle [2]
							2				2 peristaltic pumps CPsingle with 90° elbow hose connection [2]
							3				CPsingle peristaltic pump with screw-in hose connection [2]
							4				2 peristaltic pumps CPsingle with screw-in hose connection [2]

[1] Condensate outlets only suitable for connecting peristaltic pumps.

[2] Each gas path equipped with a peristaltic pump. The supply voltage corresponds with that of the main unit.

Consumables and accessories

Item no.	Description
44 10 00 1	Automatic condensate drain 11 LD V 38
44 10 00 4	Automatic condensate drain AK 20, PVDF *
44 10 00 5	Condensate trap GL 1; glass, 0.4 L *
441 00 19	Condensate trap GL 2; glass, 1 L *
4492 0035 011	Norprene replacement hose with straight connections for CP peristaltic pump 0.005 lpm
4492 0035 012	Norprene replacement hose with angled connections for CP peristaltic pump 0.005 lpm
4492 0035 013	Norprene replacement hose with one straight and one angled connection for CP peristaltic pump 0.005 lpm
4492 0035 016	Norprene replacement hose with one angled connection and one screw connection (metric) for CP peristaltic pump 0.005 lpm
4492 0035 017	Norprene replacement hose with one angled connection and one screw connection (US) for CP peristaltic pump 0.005 lpm
44 92 12 22 102	Peristaltic pump CPsingle-OEM-AC X2 with angled hose nipple
44 92 12 22 104	Peristaltic pump CPsingle-OEM-AC X2 with screw-in hose connection (metric)
44 92 12 22 105	Peristaltic pump CPsingle-OEM-AC X2 with screw-in hose connection (US)

*approved for non-flammable and flammable gases explosion class IIB.

Peristaltic condensate and metering pumps CPsingle, CPdouble

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

The CPsingle and CPdouble pump series were developed specifically for these severe operating conditions.

- Built-in and housing version
- FM approval optional
- Separate installation possible
- Various flow rates
- Metering pumps with low flow rates
- Easy to replace hoses
- Various hose materials available for demanding applications
- 115/230 V AC or 24 V DC
- Used in **DNV-GL and LR type-tested** conditioning unit
- Can be used in a system to maintain **the IMO MARPOL MEPC.259(68)**
- Special design for use in high vibration environments

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Pump models for the USA and Canada 4492***1*** in non-explosive areas

The peristaltic pumps must be installed inside a housing which requires a tool to open and meets the requirements of the overall installation with respect to the housing, layout, space requirement and condensate separation.

Select a housing which meets the requirements of the pump's intended use with respect to mounting, spacing and creepage paths. The housing must be suitable for operating temperatures of 0 °C to min. 52 °C.

It must be fully wired inside the housing. The cables and terminals used must be US-listed or (if applicable) CSA certified. They must be designed for the nominal voltage, the nominal current and an operating temperature range of 0 °C to 52 °C.

Water and contaminants must be prevented from entering the unit.

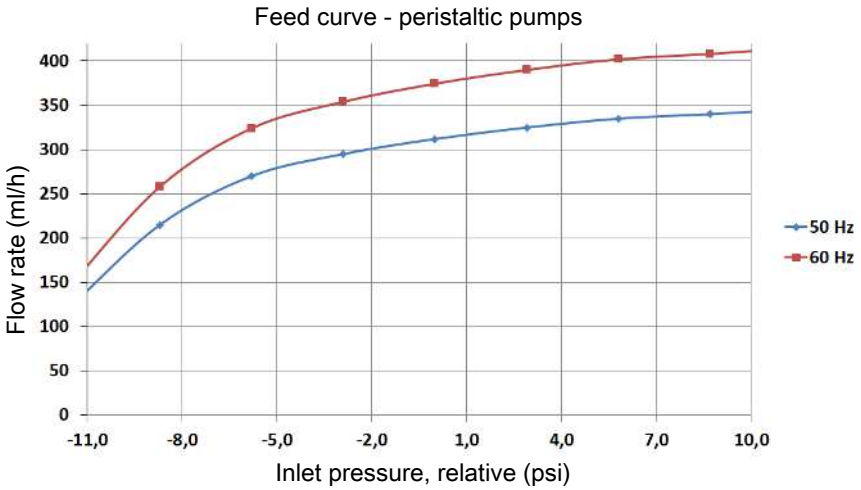
Technical data

Technical Data peristaltic pumps CPsingle/CPdouble

Nominal voltage / power input: at T_{amb} = 68 °F and under load	230 V 50 Hz, 0.025 A 115 V 60 Hz, 0.044 A 24 V DC, 0.1 A *)
Flow rate:	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose 0.016 lpm (50 Hz) / 0.02 lpm (60 Hz) 13 ml/h 61 ml/h 25 ml/min or 1.5 L/h (for 24 V DC)
Mechanical load:	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration
Inlet vacuum:	max. 11.6 psi
Inlet pressure:	max. 14.5 psi
Output pressure:	15 psi
Protection class:	IP 44 (housing version) IP 40 (built-in version)
Ambient temperatures:	T_{amb} = 131 °F (55 °C) (housing version) T_{amb} = 140 °F (60 °C) (built-in version) 32 ... 122 °F (0 ... 50 °C) (FM versions)
Cable lengths:	6.6 ft (2 m) (housing version 115/230 V) 19.7 in (500 mm) (built-in version 115/230 V) 9.8 in (250 mm) (24 V DC)
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF
FM approval no.:	3058168

*) Life 24 V DC 3000 h

Flow rate



When operating the pumps with 60 Hz, the values increase by 20 %.

Calculating condensate accumulation

Dew point	86	104	122	140	158	176	°F
Moisture content Vol %	4	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

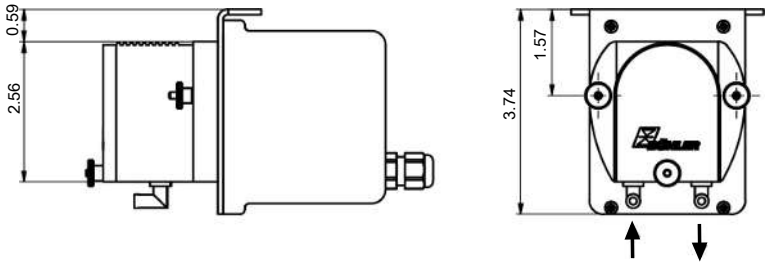
$$w_{tl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

Example: 180 Nl/h behind the cooler; Inlet dew point 122 °F (50 °C).

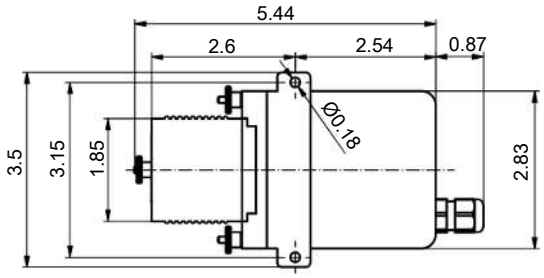
$$w_{tl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

Dimensions of peristaltic pumps 115 / 230 V

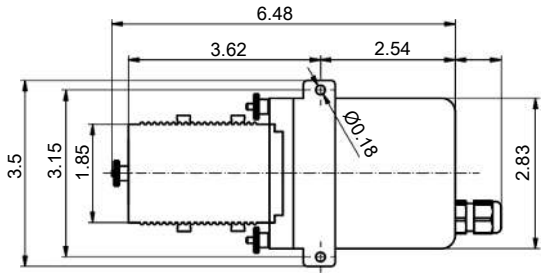
Housing versions



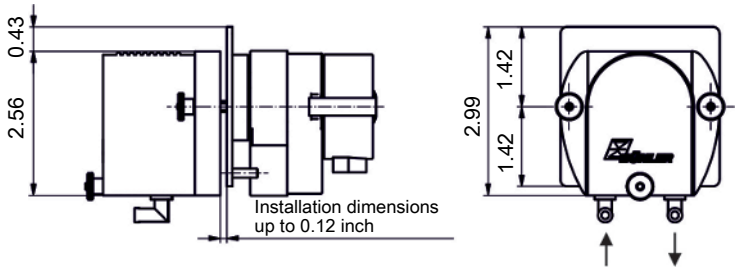
Housing version with 1 gas path



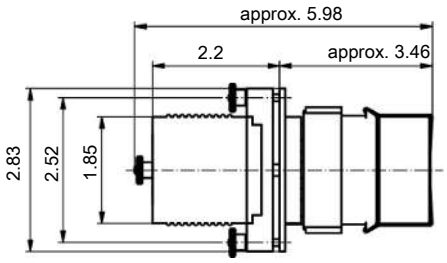
Housing version with 2 gas paths



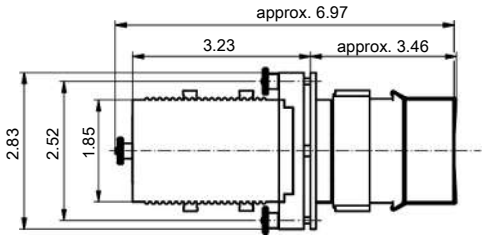
Built-in versions



Built-in version with 1 gas path



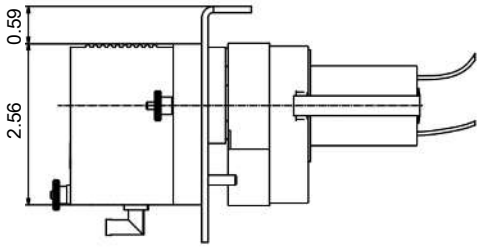
Built-in version with 2 gas paths

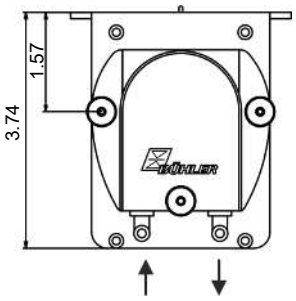


(All dimensions in inch)

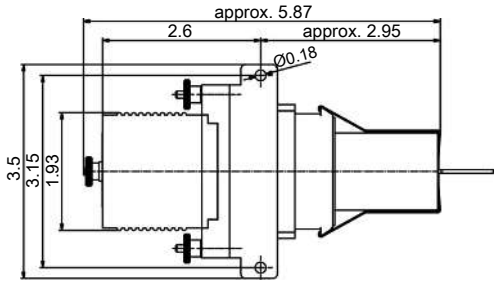
Dimensions of peristaltic pumps 24 V

Housing versions

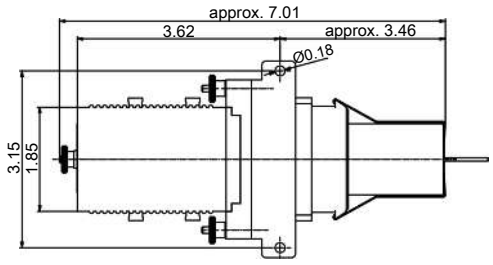




Housing version with 1 gas path

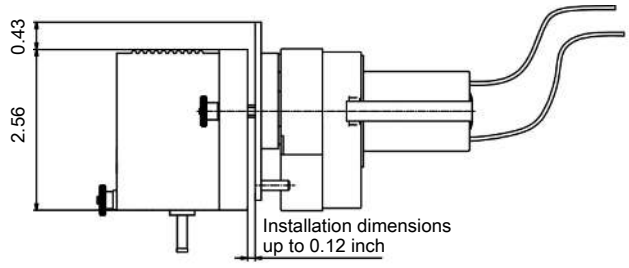


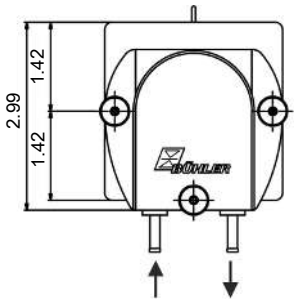
Housing version with 2 gas paths



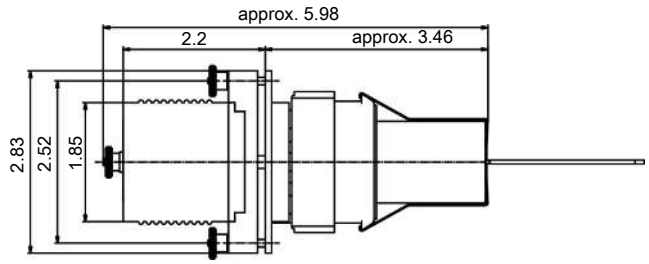
(All dimensions in inch)

Built-in versions

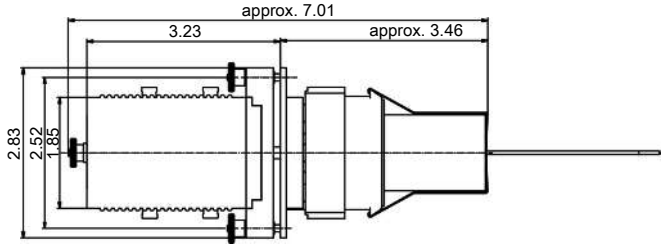




Built-in version with 1 gas path



Built-in version with 2 gas paths



(All dimensions in inch)

Selection matrix for peristaltic pumps and subsequent add-on cooler

Cooler model	Built-in (E)/housing version (G)	Flow rate lpm	Single (E)/double version (D)
TC-MINI	G (separate installation only)	0,3	E
TC-Standard	G	0,3	E / D
TC-MIDI	E	0,3	E / D
EGK 1/2	E	0,3	E / 2 x E
EGK 2-19	E	0,3	E / 2 x E
EGK 1SD	G (separate installation only)	0,3	E / D
EGK 10	G	1,0	E
TS 10	E	1,0	E
RC 1.1	E	0,3	E / D
RC 1.2	E	0,3	E / D

Peristaltic pump ordering information

The item number is a code for the configuration of your unit. Please use the following model key:

4492	X	X	X	X	X	X	X	Product characteristic
								Gas path
	1							Single gas path
	2							Double gas path
								Version
		1						Housing version
		2						Built-in version
								Supply voltage
			2					115 / 230 V AC
			4					24 V DC
								Area of application
				0				Standard applications – CE
				1				for common locations with FM approval
								Hose material [1) 2)]
					1			Norprene
					2			Fluran
					3			Marprene
								Flow rate / hour
						0		0.3 L/h (0.005 lpm)
						1		1 L/h (0.016 lpm) (only 115 / 230 V AC, single gas path)
						2		13 ml/h (only 115 / 230 V AC, single gas path)
						3		61 ml/h (only 115 / 230 V AC, single gas path)
						4		25 ml/min or 1.5 L/h (only 24 V DC, single gas path, for standard applications – CE)
								Hose connection [3)]
							1	straight hose nipple
							2	angled hose nipple
							3	straight and angled hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6"-1/4"
							6	angled hose nipple and screw connection (metric)
							7	angled hose nipple and screw connection (US)
							8	straight hose nipple and screw connection (metric)
							9	straight hose nipple and screw connection (US)

[1)] Please note hose material information during selection.

[2)] For 1 L/h (0.016 lpm) pumps as well as 13 ml/h and 61 ml/h metering pumps the only hose material option is Norprene.

[3)] For 1 L/h (0.016 lpm) pumps as well as 13 ml/h and 61 ml/h metering pumps the only hose connections choices are "Option 4 and 5".

Information on hose materials

The standard hose in Norprene has excellent mechanical properties with high chemical resistance to many substances.

Marprene offers a long life for many applications with high chemical resistance, particularly when oxidation agents are present. This is therefore the first alternative to the standard Norprene hose.

Fluran is particularly beneficial if the condensate contains oils, petrols and other solvents. The mechanical properties should rather be assessed weaker, so we only recommend this hose material for the specified chemicals.

The flow capacity of Fluran and Marprene hoses is slightly lower.

Other materials are available on request.

Peristaltic condensate and metering pumps CPsingle 11

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

The CPsingle pump series was designed specifically for severe conditions.

- Built-in and housing version
- 115/230 V AC
- Separate installation possible
- Easy to replace hoses

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical data

CPsingle 11 Peristaltic Pumps Technical Data	
Nominal voltage / Power input at T_{amb} = 68 °F and under load	230 V 50 Hz 0.025 A 115 V 60 Hz 0.044 A
Flow rate:	0.016 lpm (50 Hz) / 0.02 lpm (60 Hz)
Inlet vacuum:	max. 11.6 psi
Inlet pressure:	max. 14.5 psi
Outlet pressure:	1 bar
Weight:	CPsingle-SA: 1.540,47 lb (0.7 kg) (housing version) CPsingle-OEM: 1.03 lb (0.47 kg) (built-in version)
IP rating:	IP 44 (housing version) IP 40 (built-in version)
Ambient temperatures:	T_{max} = 131 °F (55 °C) (housing version) T_{max} = 140 °F (60 °C) (built-in version)
Cable lengths:	6.6 ft (2 m) (housing version 115/230 V) 19.7 in (500 mm) (built-in version 115/230 V)
Parts in Contact with Mediums Hose: Connections:	 Tygon (Norprene), others on request PVDF Straight 5 mm (recommended hose 4/6) Elbow 6 mm (recommended hose 5/8) Screw-in connection DN 4/6 or 1/6" – 1/4"

Calculating condensate accumulation

Dew point	86	104	122	140	158	176	°F
Moisture content Vol %	4	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

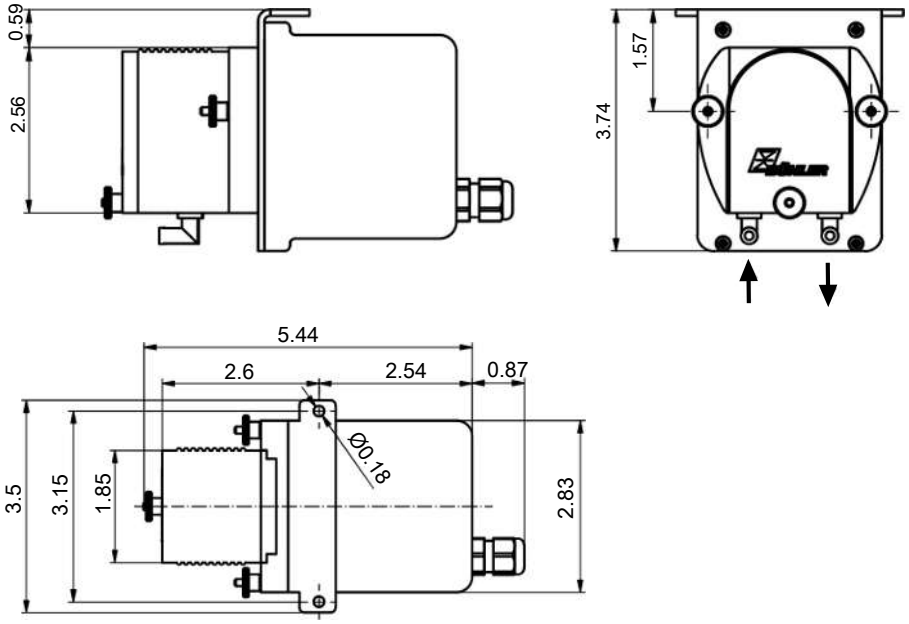
$$w_{tl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

Example: 180 Nl/h behind the cooler; Inlet dew point 122 °F (50 °C).

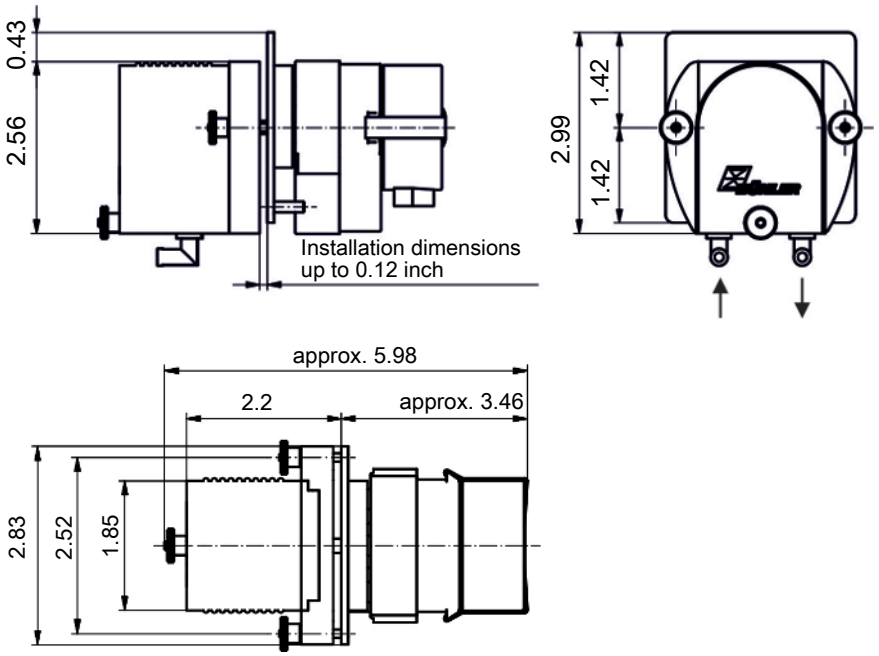
$$w_{tl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

Dimensions

Housing version



Built-in version



Selection matrix for peristaltic pumps and subsequent add-on cooler

Cooler model	Built-in (E)/housing version (G)	Flow rate L/h	Single (E)/double version (D)
EGK 10	G	1.0	E
TS 10	E	1.0	E

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4492	1	X	X	0	1	1	X	Product Characteristic
								Gas path
	1							Single gas path
								Version
		1						Housing version
		2						Built-in version
								Supply voltage
			7					115 V, 60 Hz
			8					230 V 50 Hz
								Area of application
				0				Standard applications – CE
								Hose material
					1			Tygon (Norprene)
								Flow rate/hour
						1		1 L/h
								Hose connection
							1	straight hose nipple
							2	angled hose nipple
							3	straight and angled hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6"-1/4"
							6	angled hose nipple and screw connection (metric)
							7	angled hose nipple and screw connection (US)
							8	straight hose nipple and screw connection (metric)
							9	straight hose nipple and screw connection (US)

Peristaltic condensate pumps CPsingle X1, CPdouble X1

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

Many applications require equipment which can be used in explosive areas. This is where the CPsingle X1 and CPdouble X1 with flame-proof synchronous geared motors solutions for zone 1.

The CPsingle X1 and CPdouble X1 pump series were developed specifically for these severe operating conditions.

- Suitable for use in Zone 1 according to ATEX and IECEx
- Housing version
- Pumps available with single or double head
- Separate installation possible
- Easy to replace hoses
- 115/230 V AC
- Reliable

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

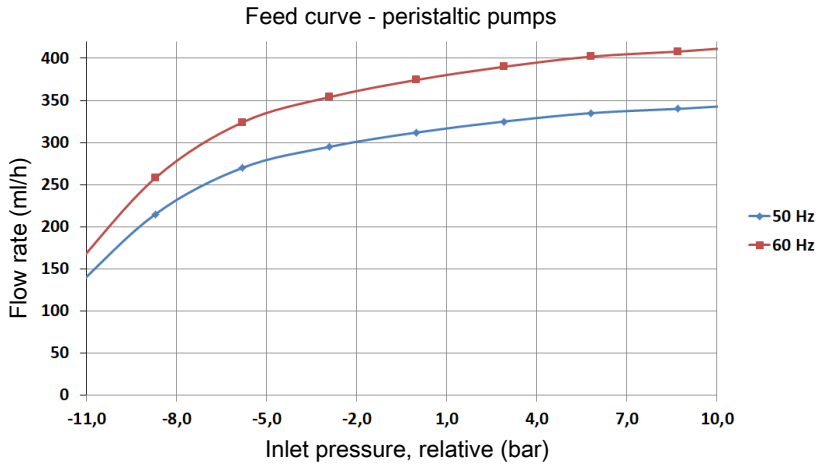
Technical data

Technical Data CPsingle/CPdouble Peristaltic Pumps	
Nominal voltage / power input: at T_{amb} = 68 °F and under load	230 V 50/60 Hz, 0.026 A (50/60 Hz) 115 V 50/60 Hz, 0.052 A (50/60 Hz) ±5 % voltage, ±2 % frequency
Flow rate:	0.005 lpm (50 Hz)/0.006 lpm (60 Hz) with standard hose
Inlet vacuum:	max. 12 psi
Inlet pressure:	max. 15 psi
Output pressure:	15 psi
Degree of protection:	IP 40
Ambient temperature:	32 ... +140 °F
Cord length:	9.8 ft (3 m)
Materials Hose: Connections:	 Norprene (standard) PVDF
Motor markings:	ATEX: ⟨Ex⟩ II 2G Ex db IIB T4 Gb IECEx: Ex db IIB T4 Gb
Pump marking:	⟨Ex⟩ II 2G c IIB T4 X

The motor may be operated without protective circuit and depending on the housing length is designed for maximum heating in the event of a fault.

The expected life of the motor is over 30,000 operating hours.

Flow rate



When operating the pumps with 60 Hz, the values increase by 20 %.

Calculating condensate accumulation

Dew point	86	104	122	140	158	176	°F
Moisture content Vol %	4	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

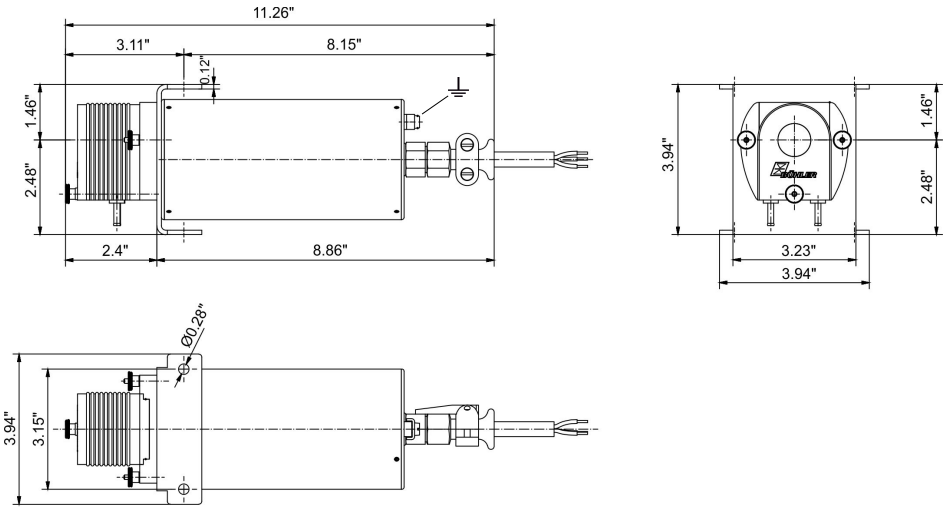
$$w_{tl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

Example: 180 Nl/h behind the cooler; Inlet dew point 122 °F (50 °C).

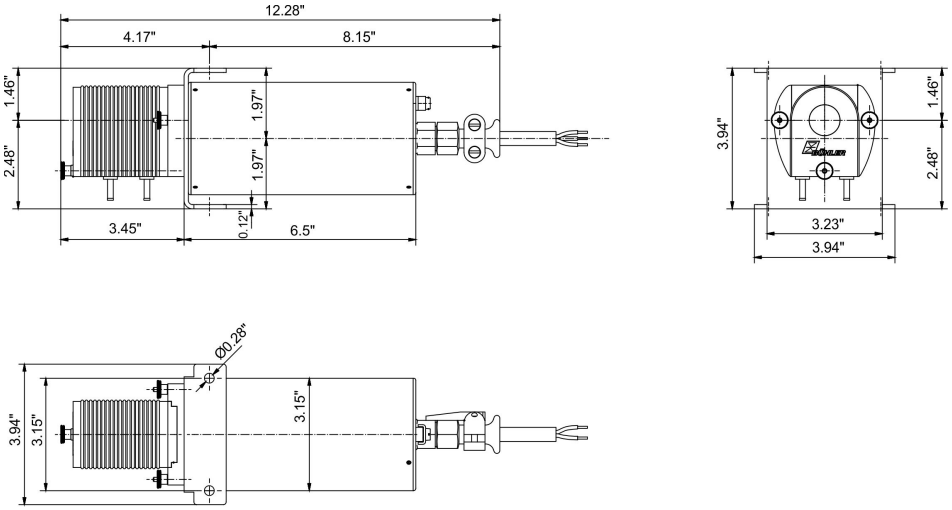
$$w_{tl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

Dimensions of peristaltic pumps 115 / 230 V

Version with 1 gas path



Version with 2 gas paths



Peristaltic pump ordering information

The item number is a code for the configuration of your unit. Please use the following model key:

4492	X	1	X	3	1	0	X	Product Characteristic
								Gas path
	1							Single gas path
	2							Double gas path
								Version
		1						Housing version
								Supply voltage
			1					115 V AC
			3					230 V AC
								Area of application
				3				for explosive areas zone 1
								Hose material
					1			Norprene
								Flow rate / hour
						0		0.3 L/h
								Hose connection
							1	straight hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6" - 1/4"

Peristaltic condensate pumps CPsingle, CPdouble X2 (Versions with ATEX 2, IECEx and Cl.1 Div.2 approval)

Condensate accumulates when conditioning gas in gas conditioning. It always accumulates when cooling moist sample gas. On one hand this may occur inadvertently if thermal bridges occur in the sample gas lines. On the other hand the deposit of moisture is necessary to protect the measuring cells in the analyser from damage and/ or stabilise measurements.

Since the sample gas is often conveyed through the analysis system with suction, the condensate must be pumped off to remove it.

So-called peristaltic pumps are particularly suited for this purpose. They systemically protect the sample gas system from external air and based on the hose material used offer high resistance against the often times highly corrosive condensate.

Many applications require equipment suitable for explosive areas. This is where CPsingle and CPdouble provides solutions for Zone 2 or Cl.1/Div.2

The CPsingle and CPdouble pump series were developed specifically for these severe operating conditions.

- Built-in and housing version
- Pumps available with single or double head
- Separate installation possible
- Various flow rates
- Easy to replace hoses
- Various hose materials available for demanding applications
- 115/230 V AC
- Reliable

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Pump models for the USA and Canada 4492***2*** in explosive areas

The peristaltic pumps must be installed inside a housing which requires a tool to open and meets the requirements of the overall installation with respect to the housing, layout, space requirement and condensate separation.

Select a housing which meets the requirements of the pump's intended use with respect to mounting, spacing and creepage paths. The housing must be suitable for operating temperature ranges of -20 °C to min. 52 °C (US) and 0 °C to min. 52 °C (Canada).

It must be fully wired inside the housing. The cables and terminals used must be US-listed or (if applicable) CSA certified. They must be designed for the nominal voltage, the nominal current and operating temperature ranges of -20 °C to min. 52 °C (US) and 0 °C to min. 52 °C (Canada).

Water and contaminants must be prevented from entering the unit.

ATEX and IECEx certified pump models 4492**22**

Wiring incl. earth conductor must be carried out using connection terminals and inside a housing which meets the requirements under EN/IEC 60947-7-1, 60947-7-2, or 60999-1 (if applicable) or is approved for the nominal voltage, nominal current and the operating temperature of 0 °C to at least 52 °C and is Ex e certified.

The earth conductor wiring must meet the earth conductor requirements per EN 60079-0 /IEC 60079-0.

The equipment must be installed in a lockable housing. The housing must have a minimum degree of protection of IP54 and meet the requirements under EN 60019-0 (IEC 60079-0) or be Ex e certified. The housing must require a tool to open. Install according to the installation requirements of IEC/EN 60079-14.

The housing must further meet the requirements of the overall installation with respect to the housing, layout, space requirement and condensate separation. The housing must be suitable for operating temperatures of 0 °C to min. 52 °C.

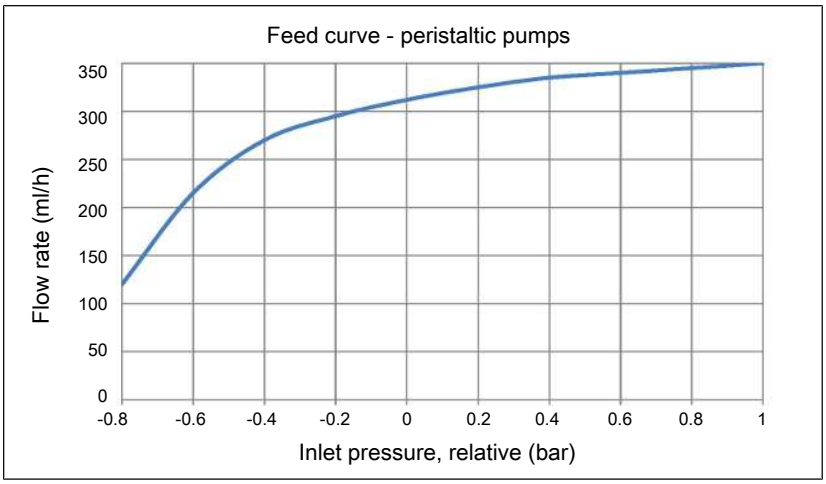
Water and contaminants must be prevented from entering the unit.

Technical data

Technical Data Peristaltic Pumps CPsingle / CPdouble

Nominal voltage / power input: at T_{amb} = 68 °F and under load	230 V 50 Hz, 0.025 A 115 V 60 Hz, 0.044 A
Flow rate:	0.005 lpm (50 Hz) / 0.006 lpm (60 Hz) with standard hose 0.016 lpm (50 Hz) / 0.02 lpm (60 Hz) 13 ml/h 61 ml/h
Inlet vacuum:	max. 12 psi
Inlet pressure:	max. 15 psi
Output pressure:	15 psi
Protection class:	IP 44 (housing version) IP 40 (built-in version)
Ambient temperatures:	32 ... 126 °F
Cable lengths:	6.6 ft (2 m) (115/230 V housing version) 19.69 in (500 mm) (115/230 V built-in version)
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF
Markings:	FM16ATEX0030X II 3G Ex nA IIC T4 Gc IECEx FMG 16.0018X Ex nA IIC T4 Gc USA/Canada: CL.1/Div. 2 Gps: A,B,C,D T4

Flow rate



When operating the pumps with 60 Hz, the values increase by 20 %.

Calculating condensate accumulation

Dew point	30	40	50	60	70	80	°C
Moisture content Vol %	40	7	12	20	31	47	Vol %
Moisture accumulation (w) per 100 Nl/h/cooled air	2.2	4	6.5	12	22	44	$\frac{ml}{h}$ per 100 Nl

Total condensate accumulation formula:

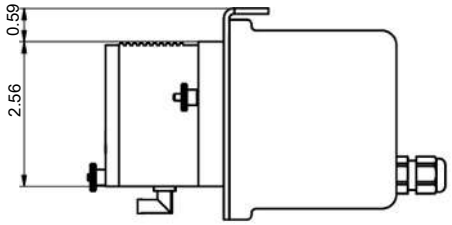
$$w_{ttl} = \frac{\text{Cooled air flow}}{100\ \text{Nl/h}} \cdot w\ (\text{inlet dew point})$$

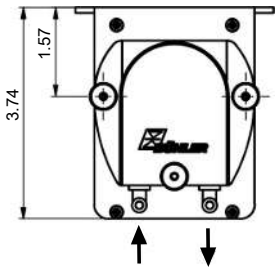
Example: 180 Nl/h behind the cooler; Inlet dew point 50 °C

$$w_{ttl} = \frac{180\ \text{Nl/h}}{100\ \text{Nl/h}} \cdot 6.5\ \frac{ml}{h} = 12\ \frac{ml}{h}$$

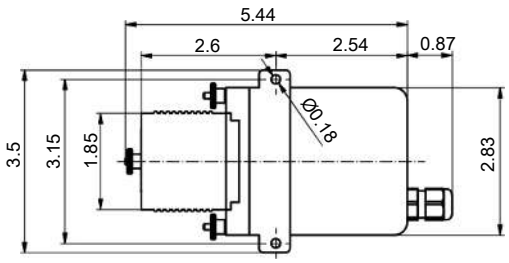
Dimensions of peristaltic pumps 115 / 230 V

Housing versions

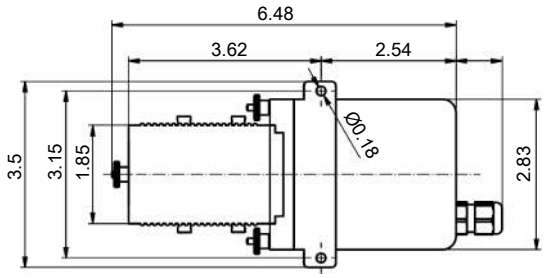




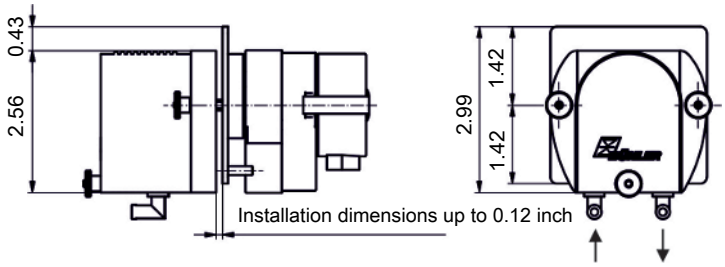
Housing version with 1 gas path



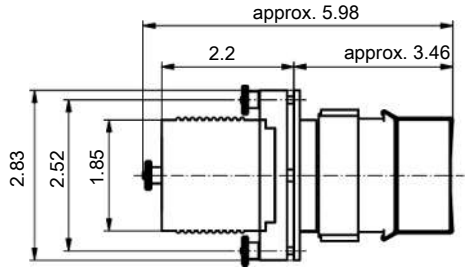
Housing version with 2 gas paths



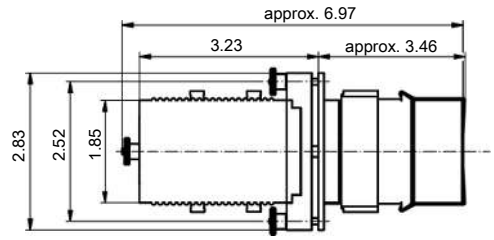
Built-in versions



Built-in version with 1 gas path



Built-in version with 2 gas paths



(All dimensions in inch)

Peristaltic pump ordering information

The item number is a code for the configuration of your unit. Please use the following model key:

4492	X	X	2	2	X	X	X	Product characteristic
								Gas path
	1							Single gas path
	2							Double gas path
								Version
		1						Housing version
		2						Built-in version
								Supply voltage
			2					115 / 230 V AC
								Area of application
				2				for explosive areas
								Hose material [1) 2)]
					1			Norprene
					2			Fluran
					3			Marprene
								Flow rate / hour
						0		0.3 L/h
						1		1 L/h (only 115 / 230 V AC, single gas path)
						2		13 ml/h (only 115 / 230 V AC, single gas path)
						3		61 ml/h (only 115 / 230 V AC, single gas path)
								Hose connection [3)]
							1	straight hose nipple
							2	angled hose nipple
							3	straight and angled hose nipple
							4	Screw connection (metric) DN 4/6
							5	Screw connection (US) 1/6"-1/4"
							6	angled hose nipple and screw connection (metric)
							7	angled hose nipple and screw connection (US)
							8	straight hose nipple and screw connection (metric)
							9	straight hose nipple and screw connection (US)

[1)] Please note hose material information during selection.

[2)] For 1 L/h (0.016 lpm) pumps as well as 13 ml/h and 61 ml/h metering pumps the only hose material option is Norprene.

[3)] For 1 L/h (0.016 lpm) pumps as well as 13 ml/h and 61 ml/h metering pumps the only hose connections choices are "Option 4 and 5".

Information on hose materials

The standard hose in Norprene has excellent mechanical properties with high chemical resistance to many substances.

Marprene offers a long life for many applications with high chemical resistance, particularly when oxidation agents are present. This is therefore the first alternative to the standard Norprene hose.

Fluran is particularly beneficial if the condensate contains oils, petrols and other solvents. The mechanical properties should rather be assessed weaker, so we only recommend this hose material for the specified chemicals.

The flow capacity of Fluran and Marprene hoses is slightly lower.

Other materials are available on request.

Sample gas water cooler and gas scrubber

In addition to electric sample gas coolers, we also offer scrubbers and water coolers for specific applications. The following models describe some of the basic versions. Please contact us with your request; we will gladly provide you with a version for your specific application:

Water Cooler 170 IST and 170 IST Titanium

Sample gas is transported through a tube coil inside an outer shell water flows through. The condensate outlet is located at the bottom of the unit, along with a thermometer (not applicable to titanium version) which displays the gas outlet temperature. Model 170 IST Titanium is entirely made from titanium.

Gas Scrubber 161 PVDF spec.

Gas scrubbers utilise the direct contact between the flow of sample gas and water to remove undesirable components from the sample gas. The gas inlet is far below the water level. The purified gas is discharged at the gas scrubber head.

- water connection for ease of use
- non-electric equipment

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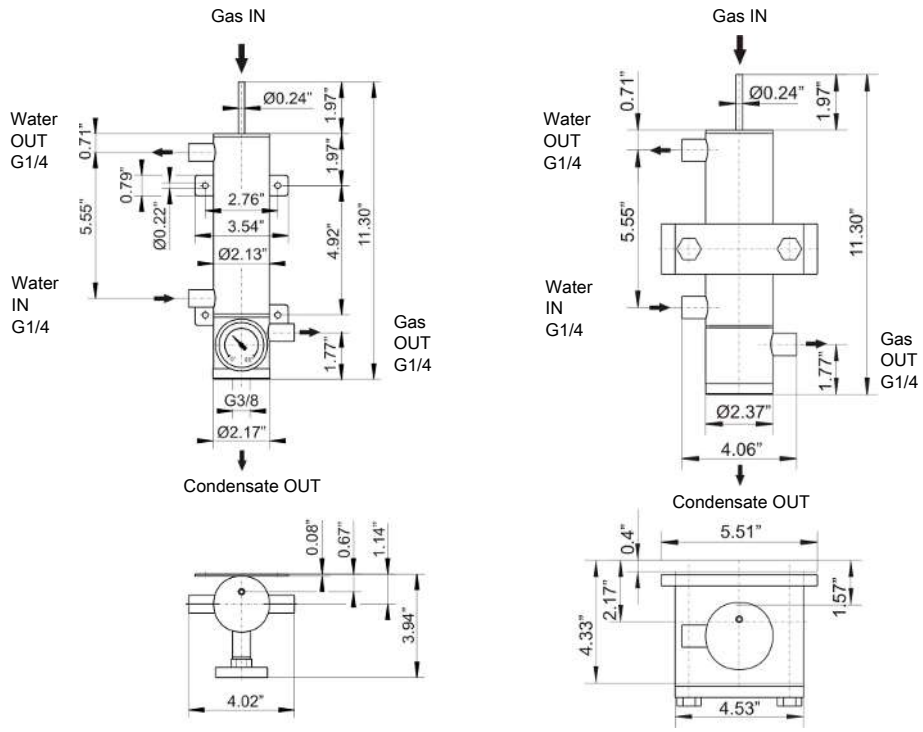
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

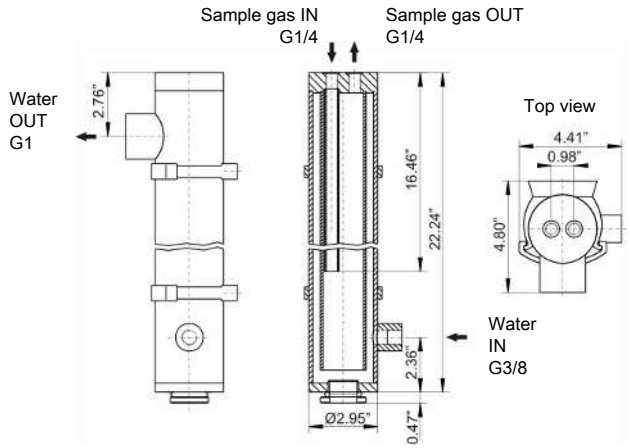
Technical Data

Technical Data	170 IST	170 IST Titanium	161 PVDF spec.
Device model:	Water cooler	Water cooler	Gas scrubber
Cooling medium:	Water	Water	-
Material:	1.4571	Titanium	PVDF
Max. operating pressure:	362 psi	218 psi	29 psi
Max. medium inlet temperature:	320 °F	320 °F	176 °F
Ambient temperature:	36 to 113 °F	36 to 113 °F	36 to 113 °F
Max. water volume:	-	-	2 lpm
Max. flow rate:	-	-	4 lpm

Dimensions type 170 IST/170 IST Titanium



Dimensions type 161 PVDF spec.



Ordering instructions

Item no.	Description
46 12 999	170 IST
46 41 999	170 IST Titanium
46 80 999	161 PVDF spec.

Wash bottle WF-AGF-PV-30

Gas analysis is a complex field. The sample gas to be analysed must be extracted and handled under quite diverse conditions to yield representative and reliable analysis results. There frequently is a need to remove gaseous components from the sample gas by washing these out.

The WF-AGF-PV-30 wash bottle is a product suitable for this purpose. The wash bottle is filled with water or another suitable medium to wash out interfering components.

It is made from non-corrosive PVDF and glass. The Unique quick-release fastener allows for easy medium changes. The bottom gas inlet ensures sufficient contact times.

An optional version with bubbler ensures the gas is finely dispersed in the washing medium.

- Bühler Unique quick-release fastener
- Quick and easy washing medium changes without tools
- Variable wall mount
- Bubbler optional

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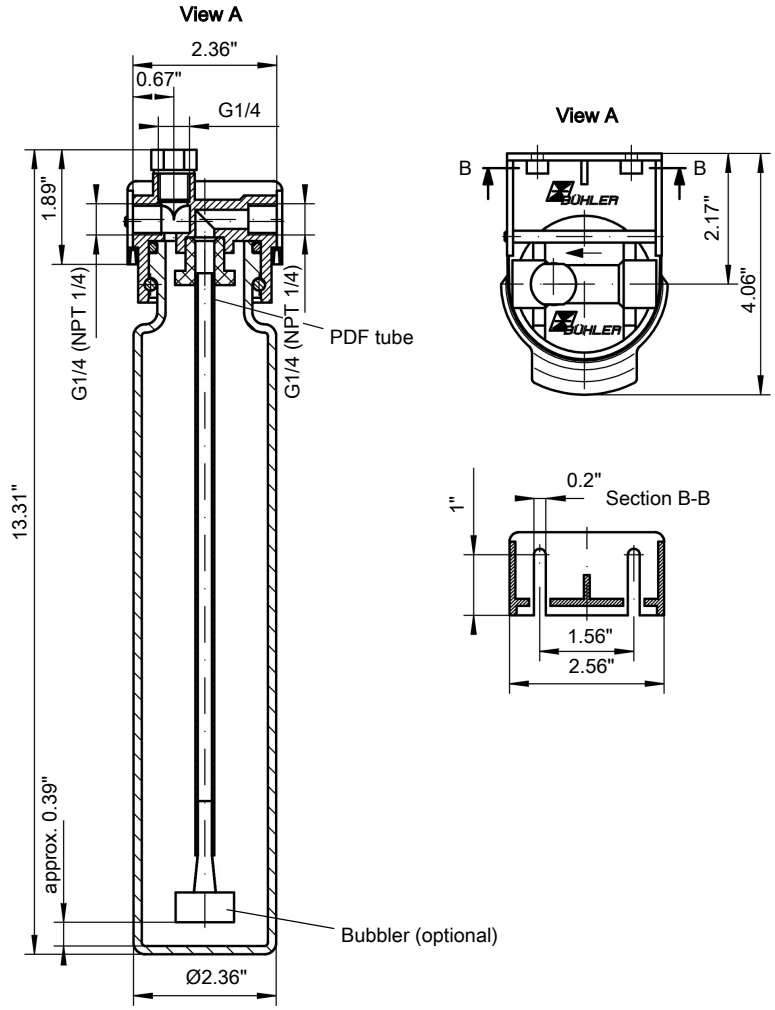
Dimensions



DANGER **Use in explosive areas**

The equipment is **not** suitable for use in explosive areas.

DANGER **Toxic, corrosive condensate**

a) Protect yourself from toxic, corrosive condensate when performing any type of work.

b) Wear appropriate protective equipment.

c) Please note the national safety rules!

Technical Data

Wash bottle WF-AGF-PV-30	
Material – filter head:	PVDF
Material – filter cover:	Duran
Material – gasket:	Viton
Material – bubbler:	Duran 3.3
Thread:	G1/4 or NPT 1/4" (see ordering information)
Weight:	approx. 0.5 kg (1.1 lb)
Volume:	0.6 L (0.16 gal)
Max. operating pressure:	4 bar (8 psi)
Max. operating temperature:	100 °C (212 °F)

Ordering instructions

Filter

Item no.	Model	Connections
44 100 89	WF-AGF-PV-30	G1/4
44 100 89I	WF-AGF-PV-30	NPT 1/4
44 100 91	WF-AGF-PV-30 with bubbler*	G1/4
44 100 91I	WF-AGF-PV-30 with bubbler*	NPT 1/4

*included, separate. Installation: Remove wash bottle head and insert bubbler in the tube end until firmly seated. Reattach wash bottle head.

Spare Parts and Accessories

Item no.	Model
44 100 893	Bubbler

Precooler PC1

In extractive analysis of process and flue gases, reliable and constant reduction of sample gas humidity is essential. Bühler Technologies offers a custom range of gas coolers based on Peltier and compressor technology. Process-based cooling temperature control guarantees maximum dew point stability. This allows highest quality industrial gas analysis.

Bühler Technologies developed the extremely compact PC1 precooler to further increase the energy efficiency of the above main coolers. It is used as a small passive cooling level upstream from the main cooler. The PC1 very effectively uses the ambient air supplied by the fan as a coolant. In moderate ambient temperatures (up to 104 °F) it therefore allows the use of small, cost-effective main coolers.

The intelligent gas path in the interchangeable precooling heat exchanger further ensures very low washout of water-soluble gases (e.g. SO_2/complies with EN 15267). Optional PC1 heat exchangers with built-in acid meter connection (H3PO4) complete the concept.

- High precooling output (up to approx. 40 W or 133 Btu/h)
- Very small, compact design
- Allows the use of small, cost-effective main coolers
- Low SO_2 washout (complies with EN 15267)
- Option acid meter connection
- Easy to replace glass heat exchanger
- Accessories: peristaltic pump (condensate and dosing pump)

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e-mail: sales@buhlertech.com
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Overview

Precooler components:

- Stainless steel housing with fan,
- Glass heat exchanger (replaceable without tools).

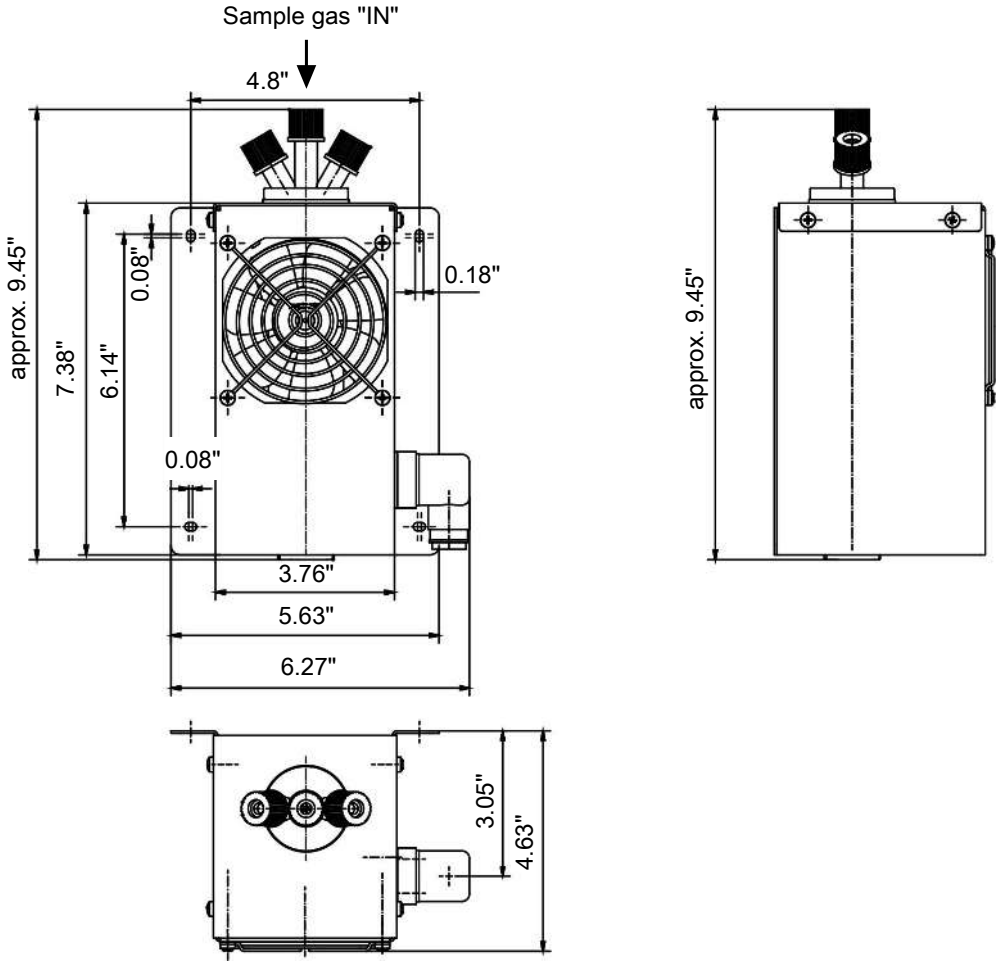
The precooler can generally be equipped with two different heat exchanger styles:

1. Precooling heat exchanger with two gas connections (gas in, gas out).
2. Precooling heat exchanger with three connections (gas in, gas out, acid meter connection).

The precooler can optionally be equipped with the following components:

- Condensate drain via peristaltic pump or condensate pre-separator.
- Dosing pump for dosing phosphoric acid (max. 15 %) into the heat exchanger.

Dimensions

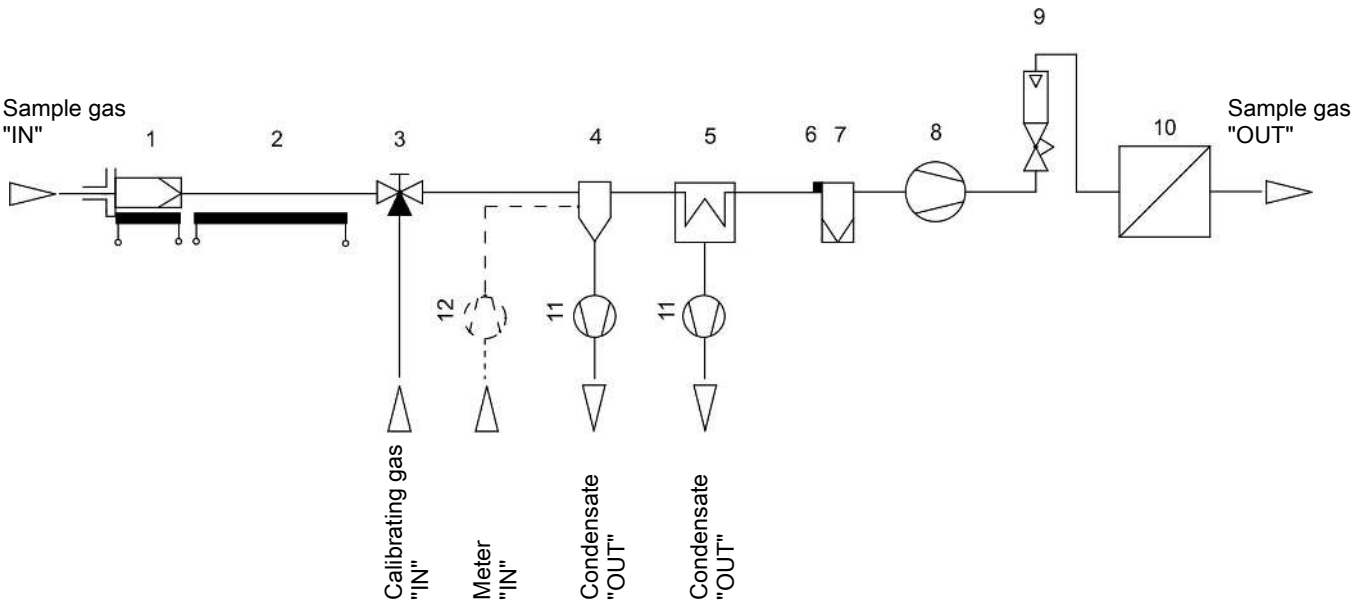


Detailed description of functions

The precooler is a passive cooling unit (without active cooling temperature control). The fan supplies the high efficiency precooling heat exchanger designed specifically for this with ambient air. This provides the initial relevant sample gas cooling to below the dew point. The majority of water is removed from primarily very moist sample gases or gases with high dew point using minimal electricity (approx. 6 W fan) (see diagrams 1a and 1b).

This allows the use of very small, regulated main coolers downstream from the precooler (see typical installation diagram). This increases the energy efficiency of the entire cooling system considerably. Condensate is drained at the corresponding connection for the precooling heat exchanger as usual. The proven Bühler peristaltic pumps or condensate pre-separators are available for this purpose. The already washout optimised precooling heat exchangers (≤ 4 % SO_2 washout input available) are further optionally available with acid meter connection. The Bühler dosing pump thus allows for highly efficient yet highly effective dosing of phosphoric acid. This results in minimal washout of highly water-soluble gases to below the detection limits typical in industrial applications.

Diagram typical installation



1	Sample gas probe	2	Sample gas line
3	Reversing tap	4	PC1 Precooler
5	Sample gas cooler	6	Moisture detector
7	Fine mesh filter	8	Sample gas pump
9	Flow meter	10	Analyser
11	Condensate pump	12	Dosing pump

Technical Data

PC1 Precooler Technical Data	
Ready for operation	Ready for use immediately after switching on
Ambient temperature	41 °F to 104 °F
IP rating	IP 20
Housing	Stainless steel
Packaging dimensions	approx. 13 in (L) x 6.7 in (H) x 9.8 in (W)
Weight incl. heat exchanger	approx. 2.8 lb
Max. inlet dew point	158 °F
Max. pressure	14.5 psi
Max. gas temperature	284 °F
Dead volume	4.88 cu. in.
Operating voltage	230 VAC / 24 VDC
Electrical Connections	Plug per EN 175301-803
Gas connections (metric)	GL 14 (6 mm)
Gas connections (US)	GL 14 (1/4")
Condensate out connection (metric)	GL 25 (12 mm)
Condensate out connection (US)	GL 25 (1/2")
Acid meter connection	GL 14 (6 mm)
Parts in contact with media Heat exchanger:	 Duran glass and borosilicate glass beads

Heat exchanger overview

Heat exchanger	PG1 (2 connections)	PG2 (with acid meter connection)
Version/Material	Duran glass	Duran glass
Max. inlet dew point	158 °F	158 °F
Gas inlet temperature	284 °F	284 °F
Gas pressure p_{max}	14.5 psi	14.5 psi
Pressure drop Δp (v=3.3 lpm) total	0.06 psi	0.06 psi
Dead volume V_{tot} total	4.88 cu. in.	4.88 cu. in.
Gas connections (metric)	GL 14 (6 mm)	GL 14 (6 mm)
Gas connections (US)	GL 14 (1/4")	GL 14 (1/4")
Condensate out connection (metric)	GL 25 (12 mm)	GL 25 (12 mm)
Condensate out connection (US)	GL 25 (1/2")	GL 25 (1/2")
Acid connection	---	GL 14 (6 mm)

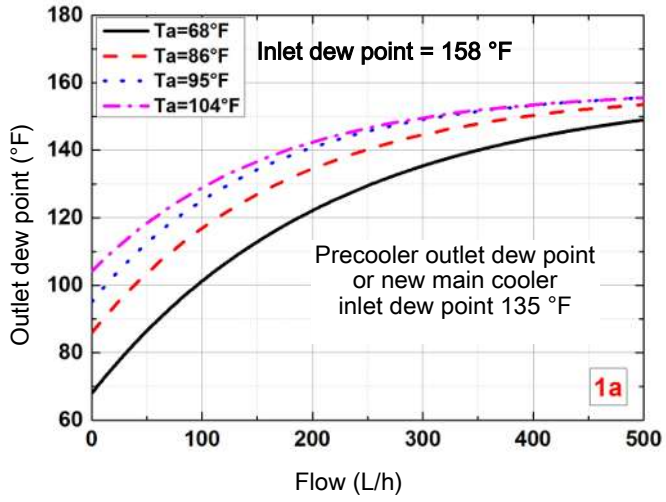
Cooling characteristics/aftercooler configuration

The outlet dew point of the precooler can be determined using the flow outlet dew point diagram (see diagrams 1a and 1b). This should be used as the inlet dew point for a downstream main cooler. Along with the gas flow parameters determined by the application and the ambient temperature the downstream main cooler can be configured for the required cooling capacity (also see cooler calculator at www.buehler-technologies.com). We will gladly also provide you with a personal consultation and configure the cooling units required for your application.

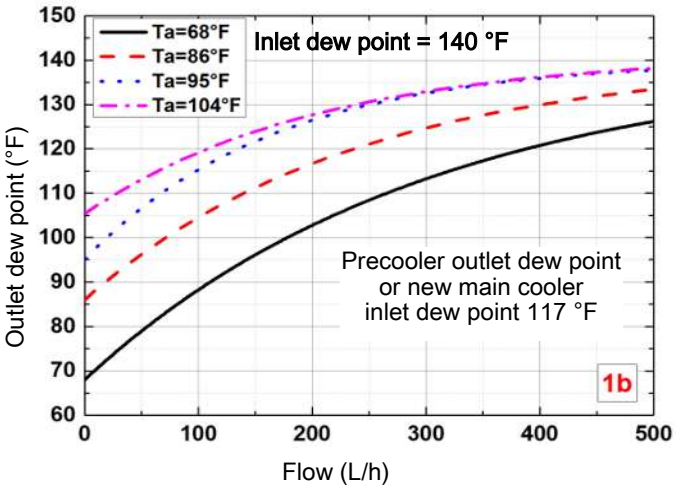
Examples for determining the precooler outlet dew point:

1. Diagram 1a: Precooler inlet dew point = 158 °F, flow = 200 L/h T_a = 86 °F; precooler outlet dew point = 135 °F (corresponds to approx. 30 W precooling capacity). The new inlet dew point for the downstream main cooler is therefore 135 °F.
2. Diagram 1b: Precooler inlet dew point = 140 °F, flow = 200 L/h, T_a = 86 °F; precooler outlet dew point = 117 °F (corresponds to approx. 18 W precooling capacity). The new inlet dew point for the downstream main cooler is therefore 117 °F.

Flow outlet dew point diagram for TP_{IN} = 158 °F



Flow outlet dew point diagram for TP_{IN} = 140 °F



Tab. 1: Precooler outlet dew point varies by sample gas flow (at inlet dew point 158 °F (1a left) and 140 °F (1b right) and different ambient temperatures T_a)

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

45002	X	2	0	0	X	0	Product Characteristics
							Voltage
	0						115 - 230 VAC
	4						24 VDC
							Heat exchanger
		2	0				Glass
							Options (acid meter)
				0	0	0	without acid meter
				0	1	0	ready for acid meter

Spare Parts and Accessories

Item no.	Description
45002014	Heat exchanger glass cartridge with inlet markings
45002015	Pack of borosilicate glass beads
45002007	Ball lock
4460028	230 VAC Fan
4460029	24 VDC fan
45002013	Dosing hose (acid meter)
4382006	Laboratory screw connection GL 14 (acid meter)
45100144	Seal for GL 14
45100134E	Seal for GL 14 DN 4/6
45100137E	Seal for GL 25 DN 5/8
4510028	Automatic condensate drain AK 5.5
4410004	Automatic condensate drain AK 20
see data sheet 450020	Peristaltic Pump CPsingle, CPdouble

Precooler TS 10

In extractive gas analysis the sample gas must be conditioned before it enters the measuring cell of the analyser.

One of these conditioning stages is moisture precipitating in so-called sample gas coolers.

Applications where the moisture content of the sample gas is particularly high or the moisture content fluctuates greatly, installing a precooler in the supply line to the actual sample gas cooler will increase reliability.

This precooler consists of an appropriately dimensioned heat exchanger, which only uses the temperature gradient between the sample gas and ambient air, and a condensate pump.

The TS precooler comes inside a protection cage, ready to install.

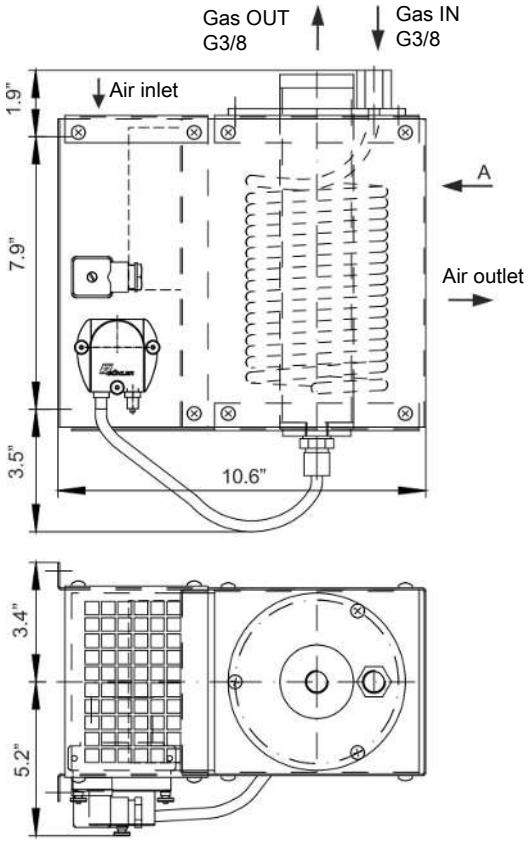
- Low maintenance
- Easy to install, compact size
- Heat exchanger in stainless steel or stainless steel with glass coating
- Built-in peristaltic pump

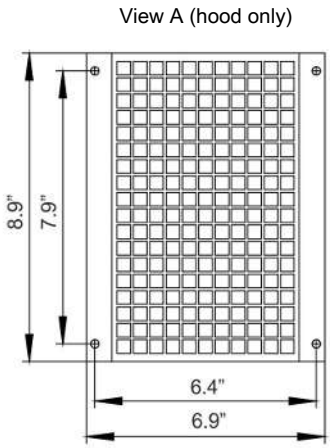
Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

TS 10 precooler Technical Data	
Ambient temperature:	32 .. 140 °F
Electric supply:	115 V, 60 Hz or 230 V, 50 Hz
Power input:	25 W
Type of protection electric:	IP 20
Housing:	Stainless steel
Installation:	wall-mounted
Heat exchanger	
Gas pressure P_{max}:	14.5 psi
Max. gas inlet temperature:	356 °F
Gas connections:	G3/8
Pump condensate connection:	DN 4 (screw connection, metric) on 230 V 1/6" (screw connection, US) on 115 V

Dimensions (inch)





Ordering Instructions

Precooler

Item no.	Description
45 00 999	TS 10 precooler, 230 V, 50 Hz
45 00 899	TS 10 precooler, 115 V, 60 Hz
45 00 799	TS 10 GB precooler (glass coated), 230 V, 50 Hz

Spare parts

Item no.	Description
44 92 00 35 114	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 1 L/h (0.016 lpm)
44 92 00 35 115	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 1 L/h (0.016 lpm)

Dosing unit EMIDos

One conditioning step in extractive analysis of process and emissions gases is reliable, constant reduction of humidity in the sample gas. The condensate this produces results in sometimes considerable washout effect. This can result in inaccurate measurements, particularly in acidic gas components (e.g. SO_2). Adding acidic liquids at an appropriate point in the conditioning system reduces the acid solubility by manipulating the pH level in the condensate, ensuring reliable measurements. The EMIDos dosing unit was designed for this specific application.

It consists of a wall mount made from non-corrosive stainless steel. This holds the reservoir for the dosing agent and the dosing pump with adequate capacity. The tubing has minimal cross-sections to ensure rapid response times. An adjustable sensor for monitoring the residual level is located on the side. The suction port us located inside the container cover.

- Compact design
- Dosing pump with consistent flow rate
- Dosing connection for heat exchanger included
- Reduces SO_2 washout (complies with EN 15267)
- Short feed time, fast response time
- Adjustable level monitor
- Optional: Collection pan for safe acid storage

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e-mail: sales@buhlertech.com
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Overview

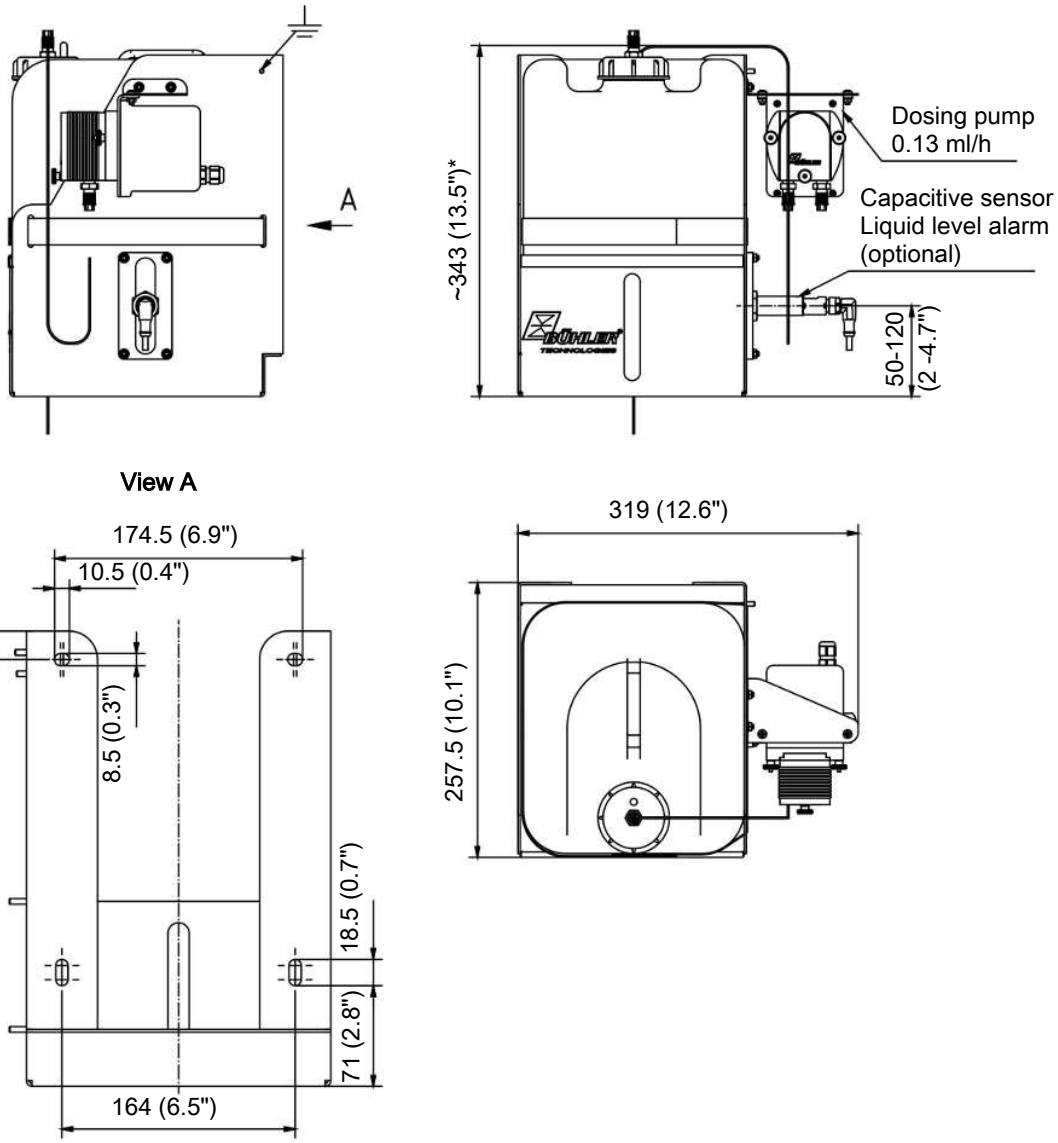
Dosing unit assemblies:

- Stainless steel wall mount
- Dosing pump with pump bracket
- Capacitive sensor for level monitoring
- Acid container with modified cover
- Dosing line kit

The dosing unit can optionally be equipped with the following components:

- Collection pan

Dimensions



*Dimensions apply to top edge of connection. Hose not included.

Detailed description of functions

For EN 15267 compliant systems, the pH level in the condensate is reduced with phosphoric acid to reduce SO_2 washout. At 13 ml/h, the flow rate of the dosing pump is optimised for 10 % acid. Dosing is continuous. With the connection kit, the 1.6 mm dosing line can be connected directly to the standard connection (DN 4/6) of the heat exchanger. The adapter system allows convenient installation of the dosing lines and is detailed in the included operating instructions.

An adjustable position capacitive sensor is optional and can be installed at the side of the metal bracket. If the acid is below the minimum level, a warning is output to be able to reorder acid early.

Technical Data

Dosing unit Technical Data	
Ready for operation:	Ready for use immediately after switching on
Ambient temperature:	41 °F to 122 °F
IP rating:	IP20
Bracket:	Stainless steel, brushed
Weight without acid:	approx. 11 lbs
Acid canister volume:	12.6 gal
Output pressure:	15 psi
Capacitive sensor operating voltage:	10...36 VDC
Dosing pump operating voltage:	115/230 VAC
Flow rate:	approx. 13 ml/h
Acid feed time:	5 min/m
Electrical connections:	Plug per EN 175301-803
Parts in contact with mediums	
Acid container:	HDPE
Dosing line:	PFA
Modified cover:	HDPE/PVDF

Ordering Instructions

The item number is a code for the configuration of your unit. Please use the following model key:

45003	1	1	X	0	0	Product Characteristics
						Voltage
	1					115 - 230 VAC
						Dosing pump
		1				CPsingle 0.13 ml/h
						Liquid level monitoring
			0	0	0	without liquid level sensor
			1	0	0	with liquid level sensor

Spare Parts and Accessories

Item no.	Description
44 9211 2012 3001	Dosing pump
45 00 3017	Capacitive sensor (connection kit)
45 00 3014	Modified cover
45 00 3008	Collection pan
43 82 006	Laboratory screw connection GL 14 DN 1.6
45 00 3011	Connection kit for heat exchanger with DN 4/6 input
45 00 3011I	Connection kit for heat exchanger with 1/4"-1/6" input

Pre-separators AK 20 V, 11 LD spec., 165 SS, 167 T

In extractive gas analysis it is important to protect the measuring cells from any type of contaminants. In addition to removing particle contamination, it's also extremely important to separate moisture and condensation.

Depending on the composition of the sample gas, a pre-separator may also need to be installed upstream from the sample gas cooler. This reduces the load on the cooler when the moisture content fluctuates.

In some applications removing the moisture with a pre-separator and downstream coalescence filter may suffice. If the sample gas is pressurised, the pre-separators may be equipped with built-in automatic drain valves.

- Various geometric shapes for easy installation
- High operating reliability
- Long life
- Various base materials

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e-mail: sales@buhlertech.com
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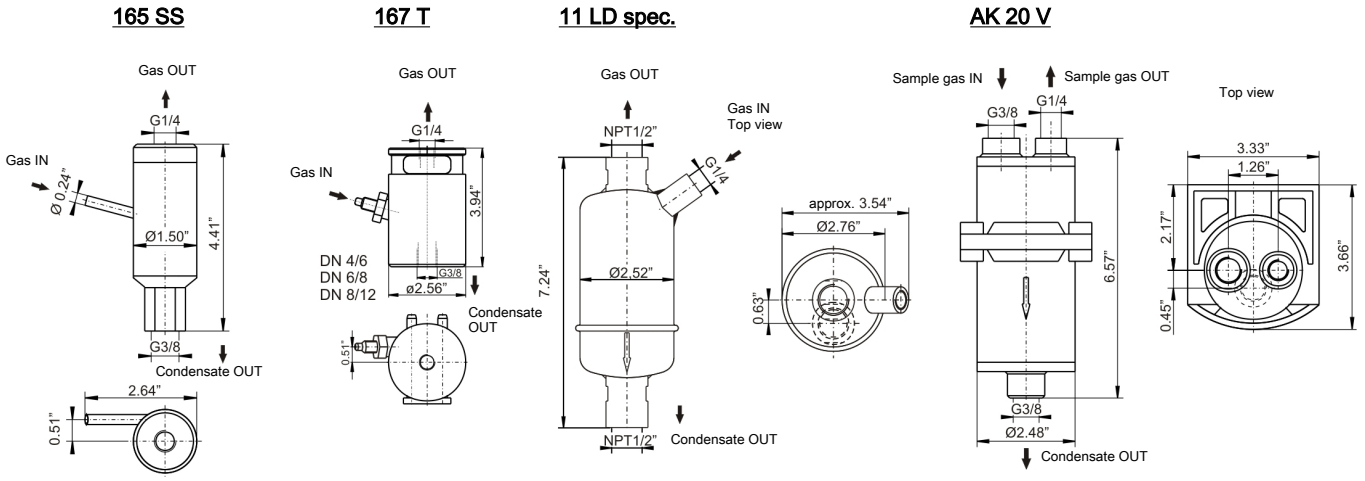
Dimensions



Type	165 SS	167 T-V	167 T-P	11 LD spec.	AK 20 V
max. operating pressure:	930 psi abs.	60 psi abs.	60 psi abs.	160 psi abs.	29 psi abs.
max. medium temperature:	360 °F	180 °F	180 °F	390 °F	210 °F
Ambient temperature:	41 to 176 °F	41 to 176 °F	41 to 176 °F	41 to 176 °F	41 to 176 °F
max. flow rate:	3.3 lpm	3.3 lpm	3.3 lpm		
Material:	Stainless steel 1.4571	PTFE/Viton	PTFE/Perfluorelas-tomer	Stainless steel 1.4306, 1.4401, 1.4301	PVDF

Use in explosive areas (additional notices):

The 165 SS, 11 LD spec. and AK 20 V condensate pre-separators meet the fundamental safety requirements of Directive 2014/34/EU and are suitable for use in category 2G, explosion group IIB or IIC areas. The condensate pre-separators are not marked, as they do not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Non-flammable and flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the condensate pre-separator.

Model	165 SS	11 LD spec.	AK 20 V
Zone	1	1	1
Explosion group	IIC	IIC	IIB

The maximum surface temperature T_{surf} of the equipment is based on the medium temperature T_{med}. $T_{surf} \leq T_{med}$ applies

DANGER

Dangerous electrostatic charge (explosion hazard)

Incendive electrostatic charges may occur when cleaning plastic housing parts and decals (e.g. with a dry cloth or compressed air). The sparks this produces could ignite flammable, explosive atmospheres.
Always clean plastic housing parts and decals **with a damp cloth**!
Metal housing parts must be earthed.

DANGER

Impact

Strong blows to the housing can produce sparks, which can ignite an EX atmosphere. Protect the equipment from external impact. Damaged housing parts must be replaced immediately.

WARNING **Gas emanation**

Health hazard from gas leaks due to incorrect operation or maintenance

a) Close the gas supply before beginning installation or maintenance.

b) Protect yourself from hot and toxic gases.

c) Wear safety gloves and face shield. Emergent gas could be explosive.

Ordering instructions

Item no.	Model
44 11 004	AK 20 V
46 13 099	Centrifugal separator 165 SS
46 12 299	Centrifugal separator 167 T-V, DN 4/6 connection
46 12 399	Centrifugal separator 167 T-V, DN 6/8 connection
46 12 499	Centrifugal separator 167 T-V, DN 8/12 connection
46 12 599	Centrifugal separator 167 T-P, DN 4/6 connection
46 12 699	Centrifugal separator 167 T-P, DN 6/8 connection
46 12 199	Centrifugal separator 167 T-P, DN 8/12 connection
44 10 002	11 LD spec.

Automatic Condensate Drains AK 5, AK 20, 11 LD V 38

In extractive gas analysis it is important to protect the measuring cells from any type of contaminants. In addition to removing particle contamination, it's also extremely important to separate moisture and condensation.

If the sample gas flowing through the conditioning system is pressurised, drains with automatic drain valves can be used to discharge condensate settling in the sample gas cooler. These do not require any additional energy supply and are available in various material combinations.

- Various geometric shapes for easy installation
- High operating reliability
- Long life
- Various base materials

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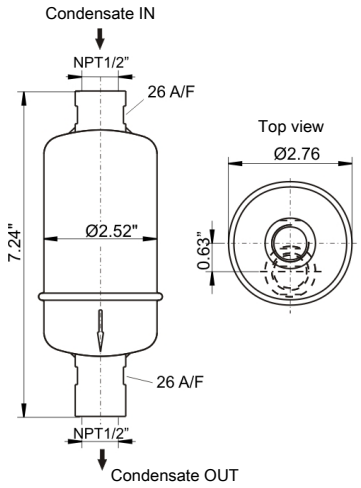
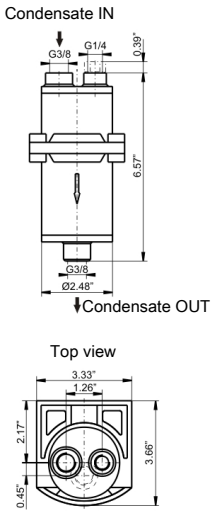
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions

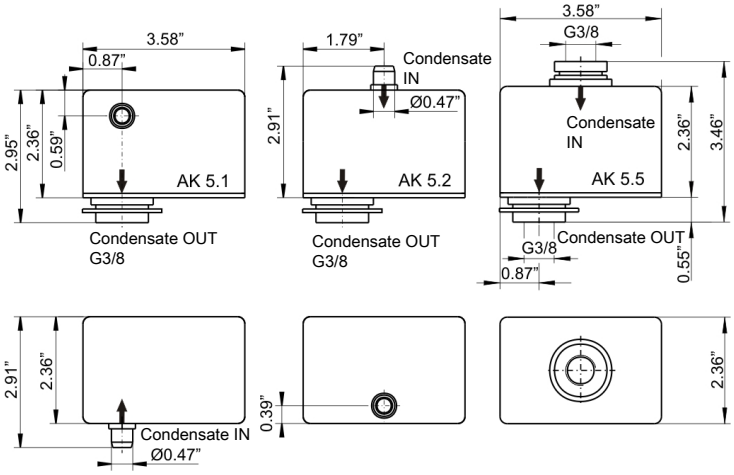
11 LD V 38



AK 20



AK 5



Type	11 LD V 38	AK 20	AK 5
max. operating pressure:	260 psi	29 psi	29 psi
max. medium temperature:	390 °F	210 °F	210 °F
Ambient temperature:	41 to 140 °F	41 to 140 °F	41 to 140 °F
Weight:	1.8 lb	0.7 lb with wall bracket (gas outlet sealed)	0.6 lb
Material:	Stainless steel 1.4306, 1.4401, 1.4301	PVDF	PVDF

Use in explosive areas (additional notices):

The condensate drains meet the fundamental safety requirements of Directive 2014/34/EU and are suitable for use in category 2G, explosion group IIB or IIC areas. The condensate drains are not marked, as they do not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Non-flammable and flammable gases, explosion class IIB or IIC, which could occasionally be explosive during normal operation may be conveyed through the condensate drains.

Model	11 LD V 38	AK 20	AK 5
Zone	1	1	1
Explosion group	IIC	IIB	IIB

DANGER

Dangerous electrostatic charge (explosion hazard)

Incendive electrostatic charges may occur when cleaning plastic housing parts and decals (e.g. with a dry cloth or compressed air). The sparks this produces could ignite flammable, explosive atmospheres.
Always clean plastic housing parts and decals **with a damp cloth**!
Metal housing parts must be earthed.

DANGER

Impact

Strong blows to the housing can produce sparks, which can ignite an EX atmosphere. Protect the equipment from external impact. Damaged housing parts must be replaced immediately.

WARNING **Gas emanation**

Health hazard from gas leaks due to incorrect operation or maintenance

a) Close the gas supply before beginning installation or maintenance.

b) Protect yourself from hot and toxic gases.

c) Wear safety gloves and face shield. Emergent gas could be explosive.

Ordering instructions

Item no.	Model
45 10 006	AK 5.1 horizontal inlet
45 10 008	AK 5.2 vertical inlet
45 10 028	AK 5.5
44 10 004	AK 20
44 10 001	11 LD V 38

Condensate Vessels GL 1-3

In sample gas conditioning systems which cannot be pressurised, condensate accumulating in the sample gas coolers must be removed with peristaltic pumps or collected in condensate traps.

The GL 1 and GL 2 receptacles have a drain valve and only differ in size.

The GL 3 receptacle has a level switch for displaying the fill level or controlling a pump. The drain is a glass thread version into which a drain valve can optionally be installed.

All condensate traps are made from Duran glass and PTFE, making them corrosion-resistant.

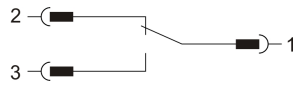
- May be used in explosive areas
- Level switch optional
- Alternative to peristaltic pumps

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

Technical Data Model GL 3	
Grounding receptacle GL 3:	230 V, 1 A, 40 VA, changeover In Ex areas only the following circuit values are permitted: U_i = 30 V, I_i = 50 mA T_{amb} in Ex areas: -5 °C...60 °C (23 °F...140 °F)
Material:	Duran glass, PTFE, PP
Medium temperature:	max. 176 °F

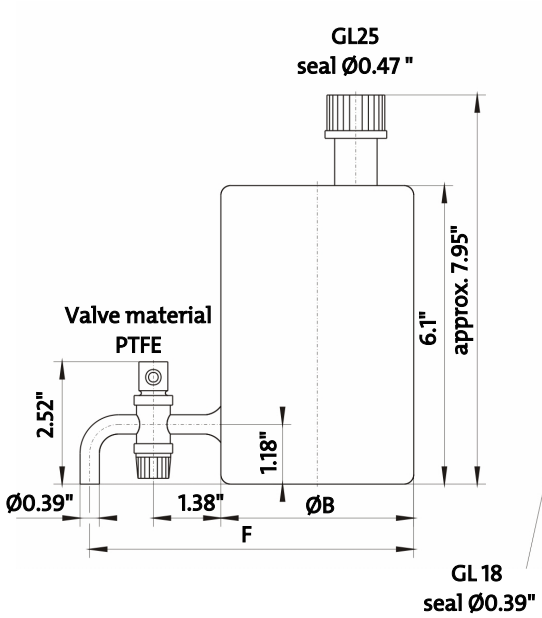
Pin assignment:



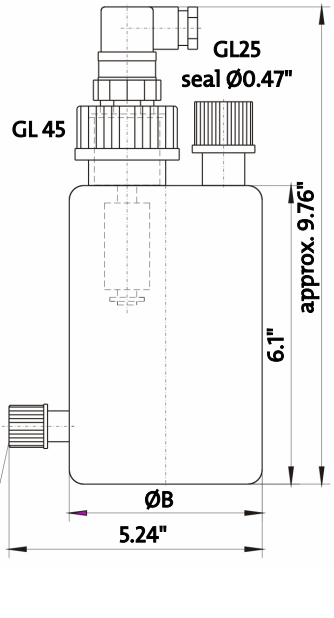
Dimensions

Condensate traps

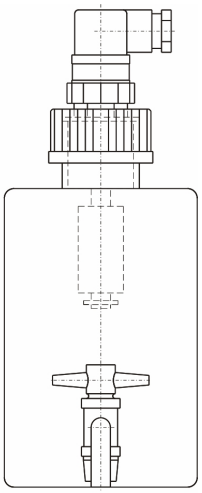
Model GL 1, GL 2



Model GL 3



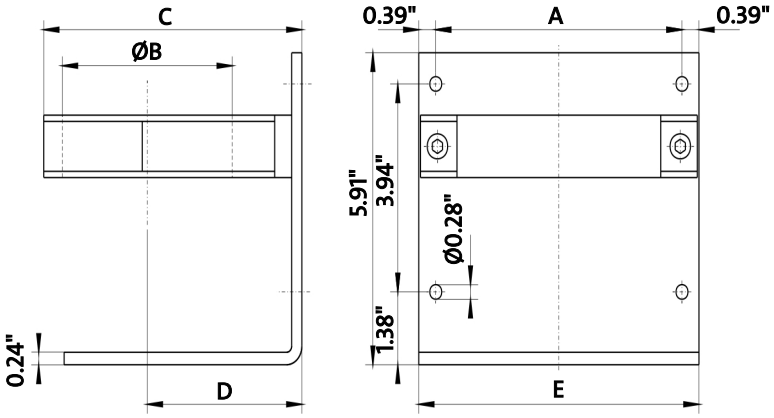
Model GL 3 with drain valve option



Model	A	B	C	D	E	F	Volume
GL 1	2.56 in	Ø 2.36 in	3.94 in	2.48 in	3.35 in	5.04 in	0.1 gal
GL 2 / GL 3	5.71 in	Ø 3.94 in	5.98 in	3.58 in	6.5 in	6.61 in	0.3 gal

Wall bracket

Material: PVC / PE



Use in explosive areas (additional notices):

The receptacles may be used in explosive atmosphere areas zone 1 and 2. Explosion groups IIA and IIB are approved. The receptacles have no innate ignition source and do not fall under Directive 2014/34/EU and therefore do not bear the CE mark.

Be sure to observe the instructions in the respective operating instructions!

Ambient temperature range when used in Ex areas:

GL 1, GL 2 and GL3 : -5 °C (23 °F) $<T_{amb}<$ +60 °C (140 °F)

- Electrostatic charge: Always clean plastic housing parts and decals with a damp cloth.
- Protect the equipment from external blows.

GL 3:

- Only operate in intrinsically safe electric circuits (observe EN 60079-11 and EN 60079-14!).
- U_i = 30 V, I_i = 50 mA. Never exceed these limits!
- Must be connected by a trained professional.

Ordering instructions

Item no.	Model
44 100 05	Condensate trap GL 1, with wall bracket
44 100 19	Condensate trap GL 2, with wall bracket
44 100 29	Condensate trap GL 3, with wall bracket, without drain valve
44 100 292	Drain valve for GL 3
44 100 293	Level switch

Condensate Vessel CV-3, CV-6, CV-10

In extractive gas analysis the sample gas must be conditioned before it enters the measuring cell of the analyser.

One of these conditioning stages is moisture precipitating in so-called sample gas coolers.

This condensate must be properly removed from inside the analysis cabinet. In applications where it is not corrosive or toxic, it can then be discharged into drains or channels on site. However, often times it must first be collected for intermediate storage and properly disposed of at a later time.

The CV-3 to CV-10 series feature vessels in suitable materials with or without fill level monitor for intermediate storage inside or on the system.

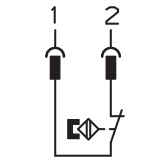
- Vessel sizes 3 L (0.8 gal)/6.5 L (1.7 gal)/10 L (2.6 gal)
- Chemically resistant materials
- Level switch for monitoring maximum level available (optional)
- Low maintenance
- Easy handling
- Removable top cover
- Robust mounting bracket

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

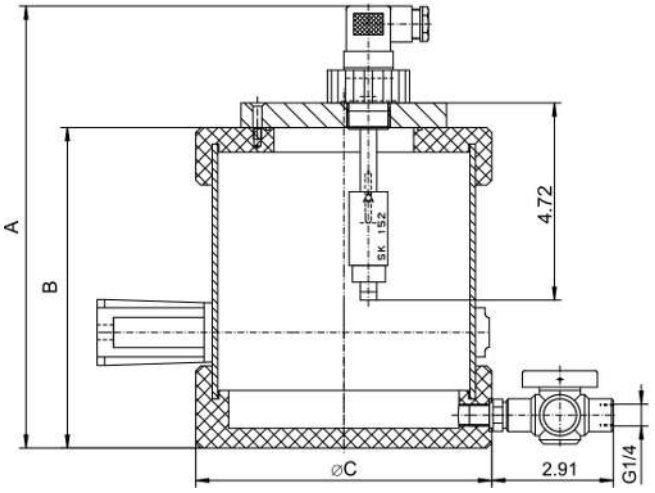
Technical Data Condensate Vessels	
Material:	PVC, PVDF, PP, Viton
Medium temperature:	max. 140 °F
Connections:	G3/8 and G1/4 for condensate inlet and ventilation G1/4 for outlet
Level switch	
Max. operating voltage:	230 V
Max. switching current:	0.5 A
Max. contact load:	10 VA

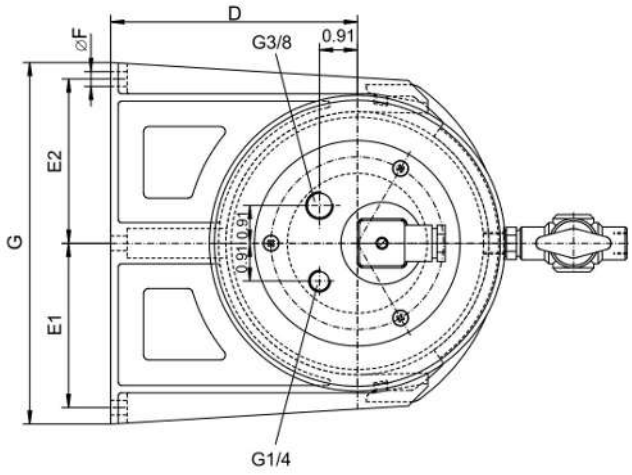
Contact function
Float down
(empty vessel)
Contacts K8-MS



L1 normally closed

Dimensions





Vessel type	A (inch)	B (inch)	C (inch)	D (inch)	E1 (inch)	E2 (inch)	F (inch)	G (inch)
V = 3 l (0.8 gal)	10.6	7.7	Ø 7.1	5.9	3.9	3.9	3 x Ø0.4	8.7
V = 6,5 l (1.7 gal)	13.5	10.6	Ø 8.9	6.9	4.7	5.9	2 x Ø0.5	12.2
V = 10 l (2.6 gal)	17.9	15.0	Ø 8.9	6.9	4.7	5.9	2 x Ø0.5	12.2

DANGER

Use in explosive areas

The equipment is **not** suitable for use in explosive areas.

DANGER

Toxic, corrosive condensate

a) Protect yourself from toxic, corrosive condensate when performing any type of work.

b) Wear appropriate protective equipment.

c) Please note the national safety rules!

Ordering instructions

Item no.	Description
44 10 085	Condensate vessel CV-3, V = 3 L (0.8 gal) without level switch
44 10 088	Condensate vessel CV-3-NS, V = 3 L (0.8 gal) with level switch
44 10 096	Condensate vessel CV-6-NS, V = 6.5 L (1.7 gal) with level switch
44 10 097	Condensate vessel CV-6, V = 6.5 L (1.7 gal) without level switch
44 10 094	Condensate vessel CV-10-NS, V = 10 L (2.6 gal) with level switch
44 10 095	Condensate vessel CV-10, V = 10 L (2.6 gal) without level switch
44 10 0943	Level switch Nivotemp M-K8MS-PVDF-L120

Moisture Detectors and Controllers

In extractive gas analysis the sample gas must be conditioned before it enters the measuring cell of the analyser. One of these conditioning stages is moisture precipitating in so-called sample gas coolers. Since the composition of the sample gas can fluctuate, a condensate slip downstream from the cooler cannot be entirely ruled out. Moisture detectors installed in the cooler output indicate such slip. Combined with suitable controllers this will generate the respective signals/alarms in the control system.

The moisture detector series features a wide range of options.

FF-HM series for rail mounting:

- Connect up to two parallel moisture detectors or one moisture detector
- Potential-free outputs for moisture alarm and cable break on standby current (fail-safe).
- LEDs for voltage, moisture and cable break.
- Fault analysis settings: auto-reset or lock.

FF-x-U series inside a small casing:

- Auto-resetting alarms, based on open circuit principle.
- LEDs for voltage, moisture and cable break.

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

Moisture detector	FF-3-N	FF-40
Material:	PVDF,1.4571, epoxy resin, 1.4576, PTFE	PE, 1.4571, epoxy resin, 1.4576
Cord length:	Standard 4 m (13 ft), 4 x 0.34²	Standard 4 m (13 ft), 2 x 0.25²
Max. operating pressure:	2 bar (29 psi)	40 bar (580 psi)
Operating temperature:	3 °C to 50 °C (37.5 to 122 °F)	3 °C to 50 °C (37.5 to 122 °F)
Cable break detection:	yes	yes

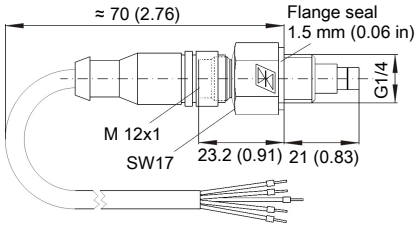
Type FF-3-N is suitable for ATEX areas (II 2G Ex ib IIC T5 T_{amb} 3...50 °C)
(Only when using ER-145/A/Ex, refer to operating instructions)

Adapters	Type G	Type S
Material:	PVDF	1.4571

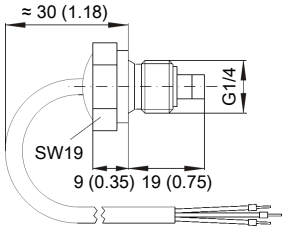
Controllers	FF-HM-230	FF-HM 24	FF-19	FF-x-U	ER-145/A/Ex
Supply voltage:	230/115 V AC 50/60 Hz ±10 %	24 V DC ±10 %	24 V DC ±10 %	230/115 V AC 50/60 Hz ±10 %	230/115 V AC 48/62 Hz ±10 %
Max. switching output current:	230 V/2 A	24 V AC/DC 2 A	24 V AC/DC 2 A	230 V/2 A	AC: 250 V/5 A DC: 150 V/5 A
Protection class:	IP 40 Terminals IP 20	IP 40 Terminals IP 20	IP 20 when built-in	IP 65	IP 40 Terminals IP 20
Ex protection class:	-	-	-	-	II(1)G [EEx ia Ga] IIC
Max. lead length:	4 m (13 ft)	4 m (13 ft)	4 m (13 ft)	4 m (13 ft)	70 m (230 ft)
Dimensions (WxHxD/mm/inch)	70 x 75 x 109 (2,8 x 3,0 x 4,3)	70 x 75 x 109 (2,8 x 3,0 x 4,3)	8TE x 3HE x 170 (8DU x 3 HU x 6,69")	94 x 180 x 81 (3,7 x 7,1 x 3,2)	22.5 x 99 x 120 (0,9 x 3,9 x 4,3)
Connection:	Terminals	Terminals	Multi-pole connector DIN 41612 style B	Terminals	Terminals

Dimensions

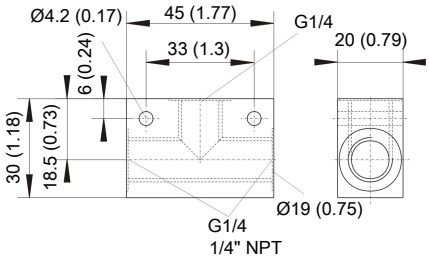
FF-3-N



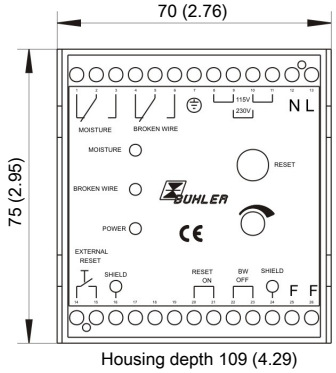
FF-40



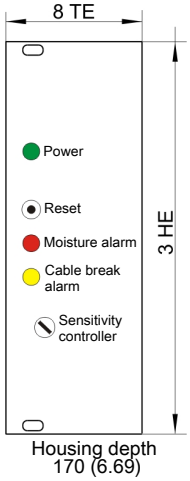
Mounting adapter



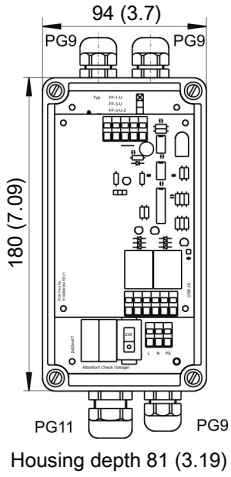
FF-HM230



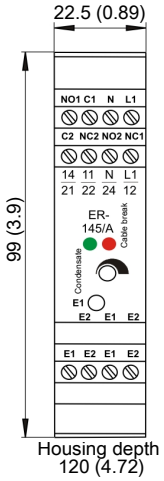
FF-19



FF-x-U



ER-145/A/Ex



Ordering instructions

Item no.	Description
41 11 100	FF-3-N moisture detector (without cable)
41 11 1000	FF-3-N moisture detector (with cable)
41 89 699	FF-40 moisture detector
40 11 000	Mounting adapter type G (PVDF)
40 11 000I	Mounting adapter type NPT (PVDF)
40 11 005	Mounting adapter type S-G (stainless steel)
40 11 005I	Mounting adapter type S-NPT (stainless steel)
41 11 020	Controller FF-HM-230
41 11 030	Controller FF-HM-24
41 11 017	Controller FF-1-U
41 11 015	Controller FF-3-U
41 11 016	Controller FF-3-U-2
41 11 012	Controller ER-145/A, 230 V
41 11 014	Controller ER-145/A, 115 V
41 11 040	Controller FF-19

Flow meter

- DA400001 SM-6xx
- DA400003 Controllers for SM - 6 / SM - 6 - V
- DA400002 S-SM

Flow Meter SM-6, SM-6-V

Flow meters perform different tasks in conditioning systems for gas analysis. The typically quite complex applications require the use of particularly corrosion-resistant materials and high operating reliability.

In addition to visual flow measurements, they are also suitable for determining the depletion of the filtration capacity of the filter installed in the conditioning line.

Electric limit switches can be mounted to the measuring tube for this purpose. These connect to the control system via suitable switch amplifiers.

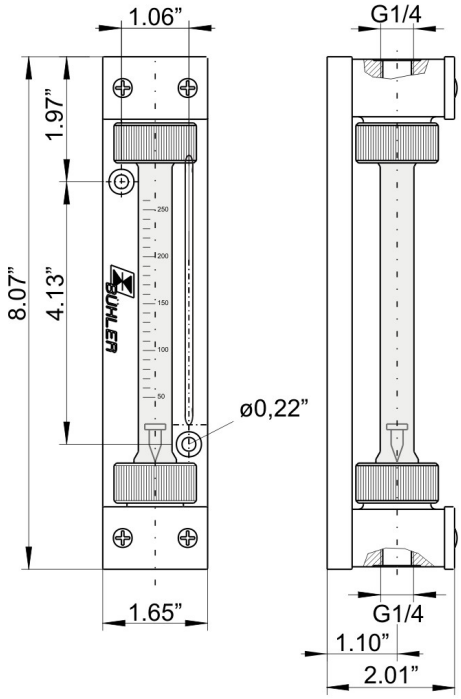
Types with built-in needle valve further allow for setting a specific flow rate.

- Corrosion-resistant materials
- Easy installation
- Easy measuring tube replacement
- Limit switch optional
- Used in **DNV-GL and LR type-tested** conditioning unit
- Can be used in a system to maintain **the IMO MARPOL MEPC.259(68)**
- Special design for use in high vibration environments

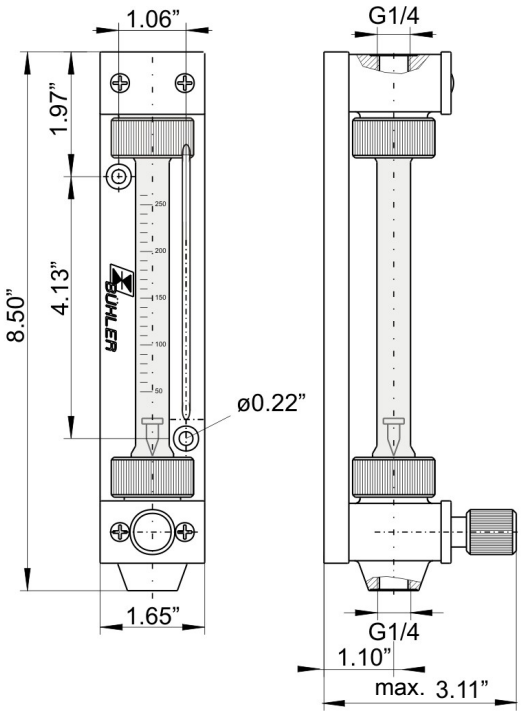
Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow meter dimensions

SM-6



SM-6-V



Use in explosive areas (additional notices):

The flow meter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in zone 1, explosion group IIB. The flow meter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Be sure to observe the instructions in the respective operating instructions!

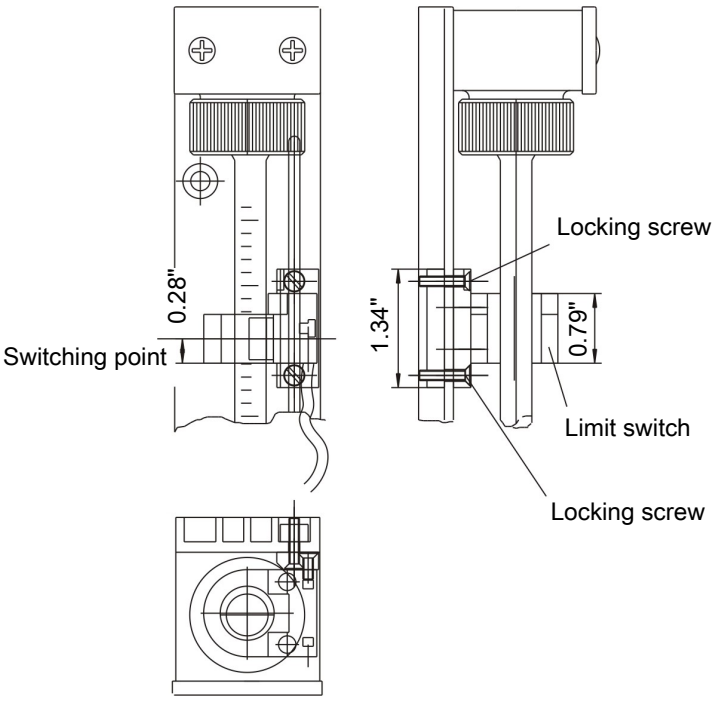
Technical Data

Flow meter	SM-6	SM-6-V
Ambient temperature:	-4 °F to 176 °F *	-4 °F to 176 °F *
Medium temperature:	≤ 302 °F,, for special ranges max. 176 °F	≤ 302 °F,, for special ranges max. 176 °F
Max. operating pressure	58 psi	58 psi
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration
Material		
Heads:	PTFE	PTFE
Seal:	PTFE	PTFE
Adjusting spindle:	-	PVDF / Viton or PCTFE / perfluoroelastomer
Measuring tube:	Borosilicate glass	Borosilicate glass
Float:	Hastelloy C 4	Hastelloy C 4
Swivel nut:	PPS fibreglass reinforced	PPS fibreglass reinforced
Base plate:	PA	PA

* Please note the ambient temperature for the configuration with limit switch!

Limit switch	Ø10 (0.39 in)	Ø15 (0.59 in)
Protection class:	IP 67	IP 67
Ambient temperature:	-4 °F to 212 °F	-4 °F to 158 °F
Housing material:	PBT	PBT
Operation:	bi-stable	bi-stable
Cord length:	2 m (6.6 ft)	2 m (6.6 ft)
Approval:	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb

Limit switch dimensions



Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4056	XX	X	99	X	Measuring range*
	0 0				Air 6 - 60 Nl/h
	0 1				Air 10 - 100 Nl/h
	0 2				Air 25 - 250 Nl/h
	0 3				Air 50 - 500 Nl/h
	0 4				Air 80 - 800 Nl/h
	0 5				Water 0.5 - 5 L/h
	0 6				Water 1.2 - 12 L/h
	0 7				Water 2.5 - 25 L/h
	0 8				Water 4 - 40 L/h
	0 9				Water 6 - 60 L/h
	1 0				Special range
		0			without needle valve
		1			Valve PVDF / Viton
		2			Valve PCTFE / perfluorelastomer
				S	Limit switch with mounting bracket
				-	without limit switch

* Standard measuring tubes; air 68 °F 17.4 psi abs; water 68 °F

Ordering information for limit switch: A limit switch is factory installed if the last character of the item number is "S". Without the "S" marking the flow meter has no limit switch. We offer various switch amplifiers for controlling the limit switch (see data sheet no. 400003).

Switch Amplifiers for SM-6, SM-6-V

We offer various switch amplifiers for connecting the limit switches to flow meters.

These may only be installed outside explosive areas and have a number of additional safety or monitoring functions.

- Mounts to 35 mm standard rail per DIN EN 60715
- Inherently safe inputs
- ATEX, FM, UL, CSA, IECEx approval

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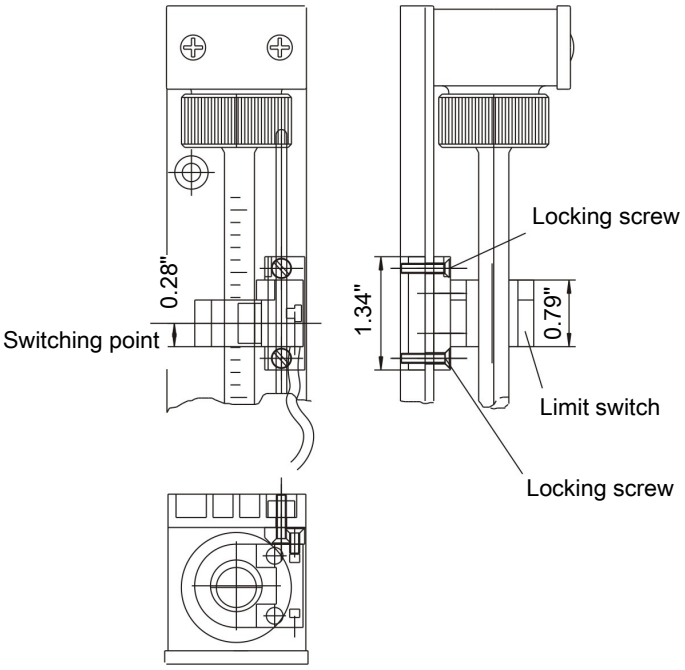
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

Model KFD/KFA: Single channel switch amplifier for inherently safe control circuits with one signal output (change-over), one LED each for monitoring the voltage and alarm output function.

Model KCD: Single channel amplifier inside a compact terminal box with LED switching status indicator.

Limit switch dimensions



Limit Switch Technical Data

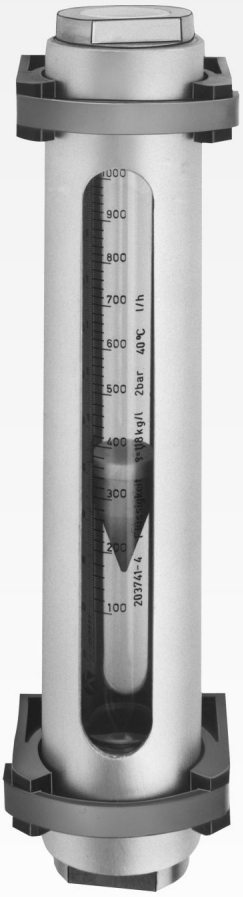
Limit switch	Ø10 (0.39 in)	Ø15 (0.59 in)
Protection class:	IP 67	IP 67
Ambient temperature:	-4 °F to 212 °F	-4 °F to 158 °F
Housing material:	PBT	PBT
Operation:	bi-stable	bi-stable
Cord length:	2 m (6.6 ft)	2 m (6.6 ft)
Approval:	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb	PTB 99 ATEX 2128X Ex II 2 G Ex ia II C T6...T1 Gb

Switch Amplifier Technical Data

Switch amplifier	KFD2-SR2-Ex 1.W	KFA5-SR2-Ex 1.W	KFA6-SR2-Ex 1.W	KCD2-E2L
Supply voltage:	20 - 30 V DC	103.5 - 126 V AC 45 - 65 Hz	207 - 253 V AC 45 - 65 Hz	10 - 30 V DC
Inherently safe per:	EN 60079-11	EN 60079-11	EN 60079-11	no
Line monitor:	yes	yes	yes	yes
Approvals: *(FM, UL, CSA, IECEx in accordance with the operating instructions)*	**PTB 00 ATEX 2080** Ex II(1)G [Ex ia Ga] IIC	**PTB 00 ATEX 2081** Ex II(1)G [Ex ia Ga] IIC	**PTB 00 ATEX 2081** Ex II(1)G [Ex ia Ga] IIC	
Output (not inherently safe):	Change-over contact	Change-over contact	Change-over contact	NO contact PNP transistor
Switching current output:	230 V AC, 2 A cos φ > 0.7 40 V DC, 2 A ohmic load	230 V AC, 2 A cos φ > 0.7 40 V DC, 2 A ohmic load	230 V AC, 2 A cos φ > 0.7 40 V DC, 2 A ohmic load	200 mA DC
Ambient temperature:	-4 °F ...140 °F	-4 °F ...140 °F	-4 °F ...140 °F	-13 °F ...158 °F
Protection class:	IP 20	IP 20	IP 20	IP 20
Dimensions:	0.79x4.69x4.53 in (WxHxD)	0.79x4.69x4.53 in (WxHxD)	0.79x4.69x4.53 in (WxHxD)	0.79x2.48x1.73 in (WxHxD)

Spare parts and accessories

Item no.	Description
91 000 700 04	Switch amplifier, KFD2-SR2-Ex 1.W, 24 V DC
91 000 700 05	Switch amplifier, KFA5-SR2-Ex 1.W, 115 V AC
91 000 700 06	Switch amplifier, KFA6-SR2-Ex 1.W, 230 V AC
91 000 700 07	Switch amplifier, KCD2-E2L, 24 V DC
49 490 21	Limit switch with mounting bracket Ø10
49 490 19	Limit switch with mounting bracket Ø15



Safety Flow Meter S-SM 3-1

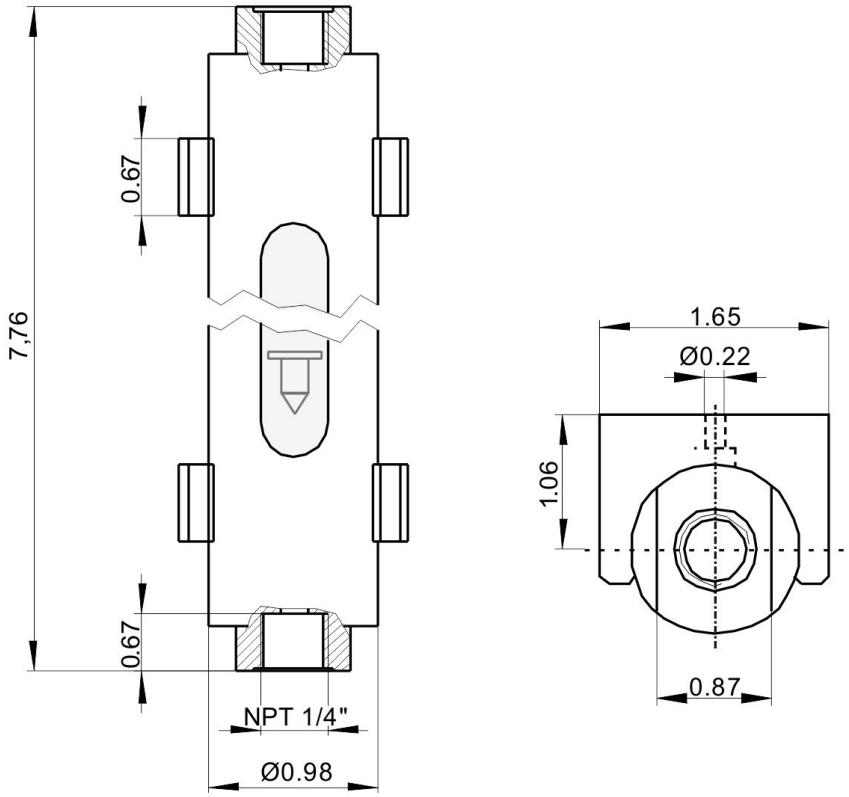
Certain applications in fluid and gas analysis require additional safety precautions, including flow meters. Here it's particularly important to protect the clear measuring tube from mechanical damage. In this series a solid, slotted stainless steel protective tube ensures this protection.

Even with the measuring tube already having a thick wall, the stainless steel casing of course also protects the surroundings in the event a glass cylinder bursts.

- Robust, simple protection
- Large range of applications
- High safety standard

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Flow meter dimensions



Use in explosive areas (additional notices):

The flow meter meets the fundamental safety requirements of Directive 2014/34/EU and is suitable for use in zone 1, explosion group IIC. The flow meter is not marked, as it does not have an innate ignition source and Directive 2014/34/EU therefore does not apply.

Be sure to observe the instructions in the respective operating instructions!

Technical Data

Safety Flow Meter S-SM	
Ambient temperature:	-4 °F to 176 °C *
Operating pressure:	10 bar (at max. 68 °F) **
Operating temperature:	212 °F (at max. 29 psi) **
Measuring range:	see table
Weight:	2 lbs
Float:	glass, Hastelloy, stainless steel or PTFE
End sections:	PTFE, stainless steel or titanium
Mounting:	via included pipe clamps

* specify in order, select mounting.

** Max. operating pressure [bar] = $10 - \frac{\text{Max. operating temperature [°C]} - 20}{10}$

Typical measuring ranges

	Flow Meter S-SM 3-1	
Medium:	Air	Water
Pressure:	+ 17.4 psi abs	
Temperature:	+ 68 °F	+ 68 °F
	1.6 – 16 Nl/h	0.25 - 2.5 l/h
	4 – 40 Nl/h	0.5 - 5 l/h
	6 - 60 Nl/h	1.2 - 12 l/h
	10 – 100 Nl/h	2.5 - 25 l/h
	25 – 250 Nl/h	4 - 40 l/h
	50 – 500 Nl/h	6 - 60 l/h
	80 – 800 Nl/h	10 - 100 l/h

Spare parts and accessories

Item no.	Description	
40 22 999	Flow Meter S-SM 3-1	End sections stainless steel 1.4571
40 23 999	Flow Meter S-SM 3-1	End sections titanium

Accessories for Sample Conditioning Systems

- DA400004 Needle Valve NVT-3
- DA400009 Directional Valves
- DA400008 Screw connections for hoses and pipes (PVDF/PFA)
- DA400013 Hose and Pipe fittings for Glass Vessels
- DA400014 Pipe Fittings and Plugs made of Stainless Steel
- DA460010 Back Pressure Regulator ARP-1.2
- DA400015 Heated sample gas line

Needle valve NVT-3

PTFE needle valves for fine regulation are indispensable in measurement and control system as well as in analysis and laboratory technology.

These needle valves are intended for fine regulation of highly aggressive mediums. The precise spindle adjustment to the valve seat allows for very fine adjustments. The valves can be used for gaseous and liquid mediums.

- Corrosion-resistant materials
- Easy installation

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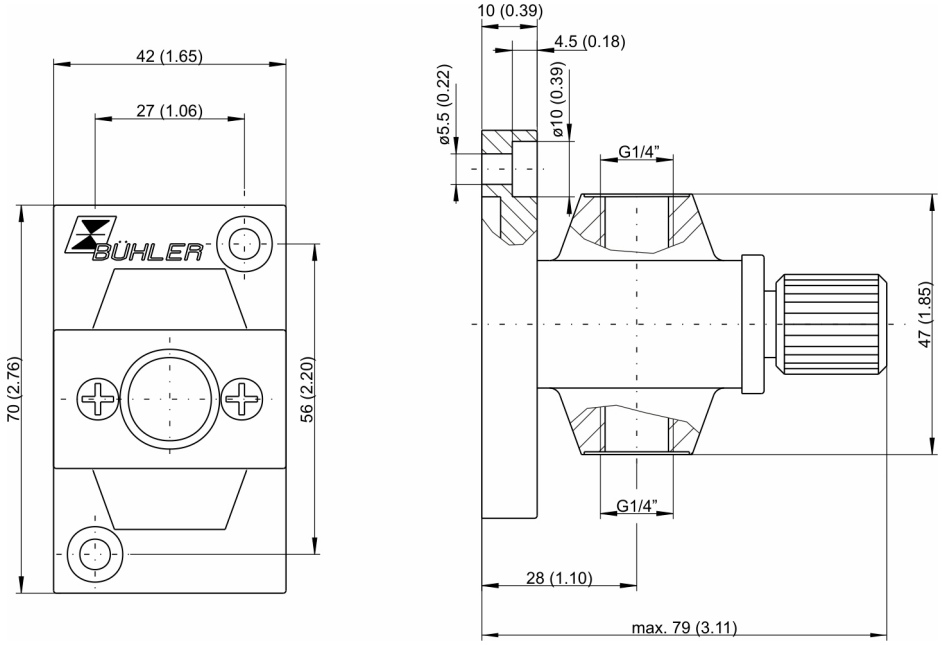
Dimensions

All dimensions in mm (inch)



Use in explosive areas (additional notices):

The type plate on NVT-3 needle valves has no Ex classification, as the mediums do not fall under Directive 2014/34/EU fallen. However, they do meet the fundamental safety requirements of Directive 2014/34/EU and are therefore suitable for use in Ex areas (Zone 1, explosion group IIB). Explosion group IIC non-flammable and flammable gasses which may occasionally be explosive during normal operation may be conveyed through the needle valves (Zone 1).

DANGER **Use in explosive areas**

Flammable gasses and dust could ignite or explode. Avoid the following hazard sources:

Electrostatic charge (sparking)!

Always clean plastic housing parts and decals with a damp cloth.

Keep the gas flow free from particles and drops.

Gas emanation!

Protect the equipment from external blows (shockproof installation).

Risk of fatal injury and explosion hazard from gas leaks due to improper use. Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield.

Technical Data

Needle valves	
Material:	see ordering information
Connections:	G 1/4
Flow rate:	up to approx. 6.6 lpm air
Max. operating pressure:	87 psi
Medium temperature max.	266 °F
Ambient temperature:	-4 °F to 176 °F

NOTICE! Please note: The NVT-3 needle valve is not suitable as a shut-off valve.

Ordering instructions

Item no.	Model	Area of application	Material
40 01 899	Needle valve NVT-3	for standard applications	PTFE, PVDF, Viton
40 01 799	Needle valve NVT-3-SO	for extremely aggressive mediums	PTFE, PCTFE, perfluorelastomer

Directional Valves GKH

These reversing taps are primarily used to switch analysis flows. They are available with different switching functions.

Clamps available for mounting.

- For corrosive gases
- Various designs

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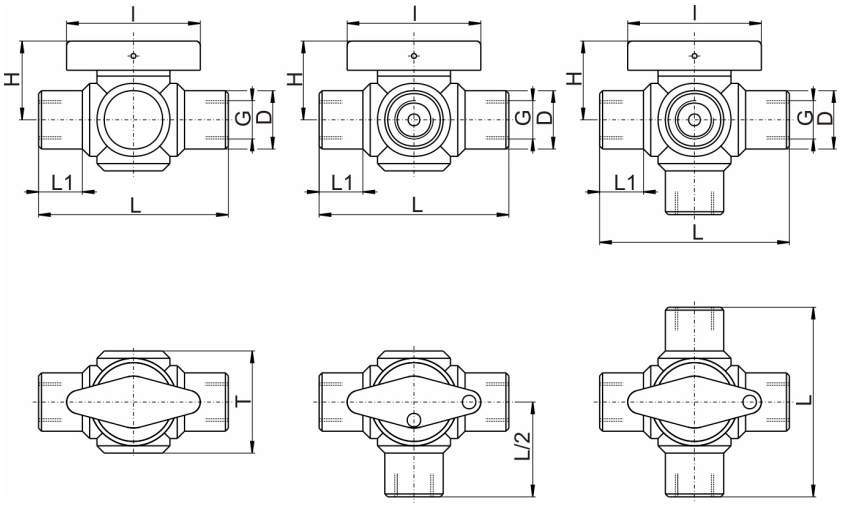
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions



DN	G	D	H	T	L	L1	l
4	1/4"	0.79	1.06	1.18	2.56	0.59	1.57 in

Use in explosive areas (additional notices):

The products do not fall under Directive 2014/34/EU. However, they do meet the fundamental safety requirements of Directive 2014/34/EU and are therefore suitable for use in explosive areas (Zone 1, explosion group II C).

DANGER **Use in explosive areas**

Flammable gasses and dust could ignite or explode. Avoid the following hazard sources:

Electrostatic charge (sparking)!

Always clean plastic housing parts and decals with a damp cloth.

Keep the gas flow free from particles and drops.

Gas emanation!

Protect the equipment from external blows (shockproof installation).

Risk of fatal injury and explosion hazard from gas leaks due to improper use.

Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield. Emergent gas can also be explosive. Run lines outside the work and traffic area.

Maximum surface temperature!

Please note the ignition temperatures of explosive gases as well as the maximum surface temperatures per the applicable directives and standards.

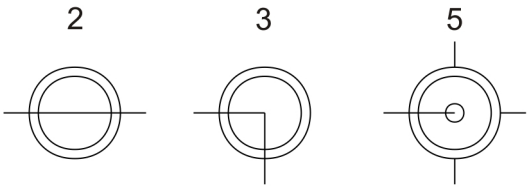
Technical Data

Model GKH	-PVDF	-PFA
Housing material:	PVDF	PFA
O-ring material:	Viton	Viton
Connections:	G 1/4"	G 1/4"
Max. operating pressure*:	145 psi	145 psi
Max. medium temperature:	-22 °F to 284 °F	-22 °F to 392 °F
Nominal width:	0.16 in	0.16 in

* The maximum operating pressure drops as the temperature increases (see chart); specifications in % of the maximum pressure at 68 °F.

Material	max. pressure	68	86	104	122	140	158	176	194	212	230	248	266	284	302	320	338	356	374	392	°F
PVDF	145 psi	100	80	70	60	50	45	40	35	35	30	25	25								%
PFA	145 psi	100	90	85	80	70	60	50	45	40	35	30	30	25	20	15	10	10	10	10	%

Ordering instructions

Item no.	Model	Function
40 61 299	Shut-off valve model GKH-2-PVDF	
40 71 299	Shut-off valve model GKH-2-PFA	
40 61 399	Three-way reversing tap model GKH-3-PVDF	
40 71 399	Three-way reversing tap model GKH-3-PFA	
40 61 599	Five-way reversing tap model GKH-5-PVDF	
40 71 599	Five-way reversing tap model KH-5-PFA	

One of the following items must also be ordered for fastening:	
40 60 098	Fastening claw
40 60 099	Clamp 2-pack

Screw connections for hoses and pipes (PVDF/PFA)

The fittings are used to connect plastic tubes and pipes. Only screw fittings frequently used with our gas conditioning components are listed:

- Screw-in connections, straight and angled
- Female connectors, straight and angled
- Fork screw fittings
- T screw fittings
- Couplers, straight, T- and four-way
- Tube-pipe couplers, straight and angled
- Bulkhead couplings
- Sealing plug
- Spare parts

Please contact us for other types and dimensions!

Removable compressing fittings
Material: PVDF and PFA
G- and NPT threads; standard 1/8", 1/4", 3/8" and 1/2"
Metric hose and pipe sizes; standard DN 4/6, DN 5/8, DN 6/8, DN 8/12 and DN 10/12
US hose and pipe sizes; standard: 1/4"-1/8", 1/4"-1/6", 3/8"-1/4" and 1/2"-3/8"

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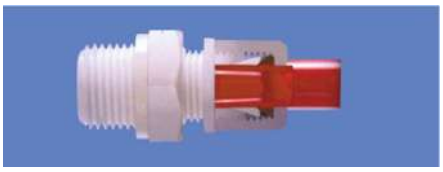
General Technical Data

PVDF version:

With PVDF fittings the hose slides of a cylindrical connection piece and secured with a clamping collar and the knurled nut.



PFA version:

With PFA fittings the rigid tube slides over a cylindrical connection piece. When tightening the knurled nut, the gasket will seal the connection and a cutting ring secure it.

All specifications in this data sheet in mm, US specifications in parentheses!

Approved pressure varies by medium temperature

Max. rated pressure:	145 psi
Medium temperature max.	PVDF -40 °F to 284 °F
	PFA -85 °F to 392 °F

Overview

Medium temperature	< 20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	°C
	< 68	86	104	122	140	158	176	194	212	230	248	266	284	302	320	338	356	374	392	°F
PVDF	10	8	7	6	5	4.5	4	3.5	3	2.5	2.5	2	1	-	-	-	-	-	-	bar
	145	116	101.5	87	72.5	65.25	58	50.75	43.5	36.25	36.25	29	14.5	-	-	-	-	-	-	psig
PFA	10	9	8.5	8	7	6	5	4.5	4	3.5	3.5	3	2.5	2	1.5	1	1	1	1	bar
	145	130.5	123.25	116	101.5	87	72.5	65.25	58	50.75	50.75	43.5	36.25	29	21.75	14.5	14.5	14.5	14.5	psig

Use in explosive areas (additional notices):

The products do not fall under Directive 2014/34/EU. However, they do meet the fundamental safety requirements of 2014/34/EU and are therefore suitable for use in explosive areas (Zone 1, explosion group II C).

DANGER **Use in explosive areas**

Flammable gasses and dust could ignite or explode. Avoid the following hazard sources:

Electrostatic charge (sparking)!

Always clean plastic housing parts and decals with a damp cloth.

Keep the gas flow free from particles and drops.

Gas emanation!

Protect the equipment from external blows (shockproof installation).

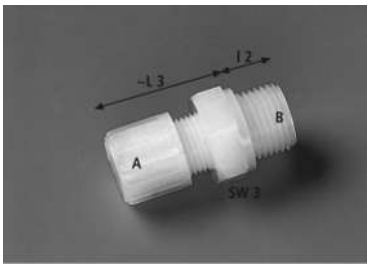
Risk of fatal injury and explosion hazard from gas leaks due to improper use.

Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield. Emergent gas can also be explosive. Run lines outside the work and traffic area.

Maximum surface temperature!

Please note the ignition temperatures of explosive gases as well as the maximum surface temperatures per the applicable directives and standards.

Straight screw-in connection



See table for dimensions

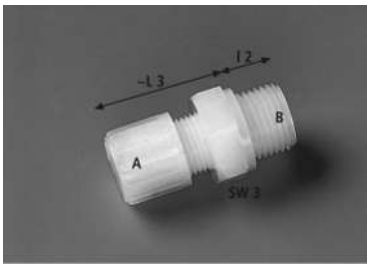
A	Hose dimensions
B	Thread (external)
L3	Installation size
L2	Thread length
SW3	Spanner size

Other dimensions available upon request

	A	B	L3 mm	L3 (US)	L2 mm	L2 (US)	SW3 mm	SW3 (US)	Item no. PVDF	Item no. PFA
Straight screw fitting **Metric hose G thread**	DN 4/6	G 1/8	23.5	(0.93)	8	(0.31)	14	(0.55)	4346054	43701003
		G 1/4	25	(0.98)	12	(0.47)	17	(0.67)	4346055	4346009
		G 3/8	26.5	(1.04)	12	(0.47)	22	(0.87)	4346056	4346010
		G 1/2	29	(1.14)	14	(0.55)	27	(1.06)	4346057	4346011
	DN 5/8	G 1/8	28.5	(1.12)	8	(0.31)	17	(0.67)	43701001	43701004
		G 1/4	29	(1.14)	12	(0.47)	17	(0.67)	4368083	43701005
		G 3/8	30.5	(1.20)	12	(0.47)	22	(0.87)	4368003	
		G 1/2	33	(1.30)	14	(0.55)	27	(1.06)	43701002	43701006
	DN 6/8	G 1/8	28.5	(1.12)	8	(0.31)	17	(0.67)	4368050	4368008
		G 1/4	29	(1.14)	12	(0.47)	17	(0.67)	4368051	4368009
		G 3/8	33	(1.30)	12	(0.47)	22	(0.87)	4368052	4368010
		G 1/2	28.5	(1.12)	14	(0.55)	27	(1.06)	4368053	4368011
	DN 8/12	G 1/4	37	(1.46)	12	(0.47)	22	(0.87)	4381045	4381008
		G 3/8	37.5	(1.48)	12	(0.47)	22	(0.87)	4381046	4381009
		G 1/2	40	(1.57)	14	(0.55)	27	(1.06)	4381047	4381010
	DN 10/12	G 3/8	37.5	(1.48)	12	(0.47)	22	(0.87)	4346095	43701007
		G 1/2	40	(1.57)	14	(0.55)	27	(1.06)	4368086	43701008

	A	B	L3 mm	L3 (US)	L2 mm	L2 (US)	SW3 mm	SW3 (US)	Item no. PVDF	Item no. PFA
Straight screw fitting **Metric hose NPT thread**	DN 4/6	NPT 1/8	22	(0.87)	10	(0.39)	12	(0.47)	4346058	4346016
		NPT 1/4	23	(0.91)	15	(0.59)	17	(0.67)	4346059	4346017
		NPT 3/8	24	(0.94)	15.3	(0.60)	19	(0.75)	4346060	4346018
		NPT 1/2	25	(0.98)	20	(0.79)	24	(0.94)	4346061	4346019
	DN 5/8	NPT 1/4	27	(1.06)	15	(0.59)	17	(0.67)	43460603	
		NPT 3/8	24	(0.94)	15.3	(0.60)	19	(0.75)	43460602	
		NPT 1/2	29	(1.14)	20	(0.79)	24	(0.94)	43701009	43701011
	DN 6/8	NPT 1/8	27	(1.06)	10	(0.39)	17	(0.67)	4368054	4368016
		NPT 1/4	27	(1.06)	15	(0.59)	17	(0.67)	4368055	4368017
		NPT 3/8	28	(1.10)	15.3	(0.60)	19	(0.75)	4368056	43701012
		NPT 1/2	29	(1.14)	20	(0.79)	24	(0.94)	4368057	43701013
	DN 8/12	NPT 1/4	35	(1.38)	15	(0.59)	22	(0.87)	4381048	4381014
		NPT 3/8	35	(1.38)	15.3	(0.60)	22	(0.87)	4381049	43701014
		NPT 1/2	36	(1.42)	20	(0.79)	24	(0.94)	4381050	43701015
	DN 10/12	NPT 3/8	35	(1.38)	15.3	(0.60)	22	(0.87)	43701010	43701016
		NPT 1/2	36	(1.42)	20	(0.79)	24	(0.94)	4369037	43701017

Straight screw-in connection



See table for dimensions

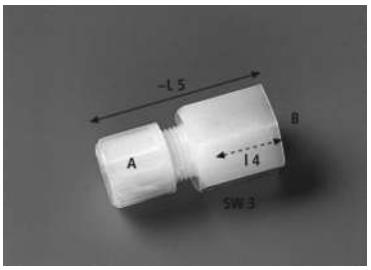
A	Hose dimensions
B	Thread (external)
L3	Installation size
L2	Thread length
SW3	Spanner size

Other dimensions available upon request

	A	B	L3 mm / (US)		L2 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight screw fitting	1/4"-1/8"	G 1/8	25.5	(1.00)	8	(0.31)	14	(0.55)	43701020	43701042
US hose		G 1/4	27	(1.06)	12	(0.47)	17	(0.67)	4347010	43701043
G thread		G 3/8	28.5	(1.12)	12	(0.47)	22	(0.87)	43701021	
		G 1/2	31	(1.22)	14	(0.55)	27	(1.06)	43701022	43701044
	1/4"-1/6"	G 1/8	25.5	(1.00)	8	(0.31)	14	(0.55)	43701023	43701045
		G 1/4	27	(1.06)	12	(0.47)	17	(0.67)	4347008	43701046
		G 3/8	28.5	(1.12)	12	(0.47)	22	(0.87)	43701025	43701047
		G 1/2	31	(1.22)	14	(0.55)	27	(1.06)	43701026	43701048
	3/8"-1/4"	G 1/4	35	(1.38)	12	(0.47)	19	(0.75)	43701027	43701049
		G 3/8	35.5	(1.40)	12	(0.47)	22	(0.87)	43701028	43701050
		G 1/2	38	(1.50)	14	(0.55)	27	(1.06)	43701029	43701051
	1/2"-3/8"	G 3/8	39.5	(1.56)	12	(0.47)	22	(0.87)	43701030	
		G 1/2	42	(1.65)	14	(0.55)	27	(1.06)	43701031	43701052

	A	B	L3 mm / (US)		L2 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight screw fitting	1/4"-1/8"	NPT 1/8	24	(0.94)	10	(0.39)	12	(0.47)	43701032	43701053
US hose		NPT 1/4	25	(0.98)	15	(0.59)	17	(0.67)	43701033	43701054
NPT thread		NPT 1/2	27	(1.06)	20	(0.79)	24	(0.94)	43701034	
	1/4"-1/6"	NPT 1/8	24	(0.94)	10	(0.39)	12	(0.47)	43701035	43701055
		NPT 1/4	25	(0.98)	15	(0.59)	17	(0.67)	43701036	43701056
		NPT 3/8	26	(1.02)	15.3	(0.60)	19	(0.75)		43701057
		NPT 1/2	27	(1.06)	20	(0.79)	24	(0.94)	43701037	
	3/8"-1/4"	NPT 1/4	33	(1.30)	15	(0.59)	19	(0.75)	43701038	43701058
		NPT 3/8	33	(1.30)	15.3	(0.60)	19	(0.75)	43701039	43701059
		NPT 1/2	34	(1.34)	20	(0.79)	24	(0.94)	43701040	43701060
	1/2"-3/8"	NPT 3/8	37	(1.46)	15.3	(0.60)	22	(0.87)		43701061
		NPT 1/2	38	(1.50)	20	(0.79)	27	(0.94)	43701041	43701062

Straight female connector



See table for dimensions

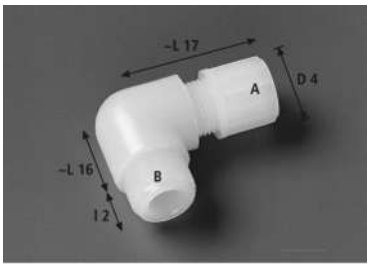
A	Hose dimensions
B	Thread (internal)
L4	Thread length
L5	Length
SW3	Spanner size

Other dimensions available upon request

	A	B	L5 mm / (US)		L4 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight female connector **Metric hose G thread**	DN 4/6	G 1/8	31	(1.22)	10	(0.39)	14	(0.55)	4346062	4346024
		G 1/4	36	(1.42)	15	(0.59)	17	(0.67)	4346063	4346025
		G 3/8	36	(1.42)	15	(0.59)	22	(0.87)	4346064	4346026
		G 1/2	38	(1.50)	16	(0.63)	27	(1.06)	4346065	43708013
	DN 6/8	G 1/8	36	(1.42)	10	(0.39)	17	(0.67)	4368058	4368024
		G 1/4	41	(1.61)	15	(0.59)	17	(0.67)	4368059	4368025
		G 3/8	41	(1.61)	15	(0.59)	22	(0.87)	4368060	43708014
		G 1/2	42	(1.65)	16	(0.63)	27	(1.06)	4368061	4368074
	DN 8/12	G 1/4	48	(1.89)	15	(0.59)	22	(0.87)	4381051	4381041
		G 3/8	48	(1.89)	15	(0.59)	22	(0.87)	4381052	
		G 1/2	49	(1.93)	16	(0.63)	27	(1.06)	4381053	43708015
	DN 10/12	G 3/8	48	(1.89)	15	(0.59)	22	(0.87)	4368081	43708016
		G 1/2	49	(1.93)	16	(0.63)	27	(1.06)	43708001	43708017

	A	B	L5 mm / (US)		L4 mm / (US)		SW3 mm / (US)		Item no. PVDF	Item no. PFA
Straight female connector **Metric hose NPT thread**	DN 4/6	NPT 1/8	32	(1.26)	11.6	(0.46)	14	(0.55)	4346081	43708018
		NPT 1/4	38	(1.50)	16.4	(0.65)	17	(0.67)	43708002	43708019
		NPT 3/8	39	(1.54)	17.4	(0.69)	22	(0.87)	43708003	43708020
		NPT 1/2	47	(1.85)	22.6	(0.89)	27	(1.06)	43708004	43708021
	DN 6/8	NPT 1/8	35	(1.38)	11.6	(0.46)	19	(0.75)	43708005	
		NPT 1/4	41	(1.61)	16.4	(0.65)	19	(0.75)	43708006	43708022
		NPT 3/8	42	(1.65)	17.4	(0.69)	22	(0.87)	43708007	43708023
		NPT 1/2	48	(1.89)	22.6	(0.89)	27	(1.06)	43708008	43708024
	DN 8/12	NPT 1/4	48	(1.89)	16.4	(0.65)	24	(0.94)	43708009	
		NPT 1/2	53	(2.09)	22.6	(0.89)	27	(1.06)	43708010	
	DN 10/12	NPT 3/8	49	(1.93)	17.4	(0.69)	24	(0.94)	43708011	
		NPT 1/2	53	(2.09)	22.6	(0.89)	27	(1.06)	43708012	43708025

Elbow screw fitting



See table for dimensions

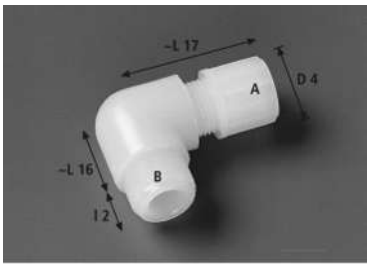
A	Hose dimensions
B	Thread (external)
L16	Installation size
L17	Angular dimension
L2	Thread length

Other dimensions available upon request

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting **Metric hose G thread**	DN 4/6	G 1/8	12	(0.47)	25	(0.98)	8	(0.31)	4346068	4346034
		G 1/4	13	(0.51)	26	(1.02)	12	(0.47)	4346069	4346035
		G 3/8	19	(0.75)	29	(1.14)	12	(0.47)	4346070	43702009
		G 1/2	15	(0.59)	32	(1.26)	14	(0.55)	4346071	43702010
	DN 5/8	G 1/8	15	(0.59)	30	(1.18)	8	(0.31)	43702001	
		G 1/4	15	(0.59)	30	(1.18)	12	(0.47)	43702002	
		G 3/8	15	(0.59)	33	(1.30)	12	(0.47)	4368084	
		G 1/2	15	(0.59)	36	(1.42)	14	(0.55)	43702003	
	DN 6/8	G 1/8	15	(0.59)	30	(1.18)	8	(0.31)	4368064	43702011
		G 1/4	15	(0.59)	30	(1.18)	12	(0.47)	4368065	43702012
		G 3/8	15	(0.59)	33	(1.30)	12	(0.47)	4368066	43702013
		G 1/2	15	(0.59)	36	(1.42)	14	(0.55)	4368067	4368036
	DN 8/12	G 1/4	19	(0.75)	40	(1.57)	12	(0.47)	4381056	4381027
		G 3/8	19	(0.75)	40	(1.57)	12	(0.47)	4381057	
		G 1/2	19	(0.75)	43	(1.69)	14	(0.55)	4381058	43702014
	DN 10/12	G 3/8	19	(0.75)	40	(1.57)	12	(0.47)	43702004	43702015
		G 1/2	19	(0.75)	43	(1.69)	14	(0.55)	4381085	43702016

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting **Metric hose NPT thread**	DN 4/6	NPT 1/8	12	(0.47)	25	(0.98)	10	(0.39)	4346072	43702017
		NPT 1/4	13	(0.51)	26	(1.02)	15	(0.59)	4346073	4346042
		NPT 3/8	15	(0.59)	29	(1.14)	15.3	(0.60)	4346074	4346043
		NPT 1/2	15	(0.59)	32	(1.26)	20	(0.79)	4346075	4346044
	DN 5/8	NPT 1/8	15	(0.59)	30	(1.18)	10	(0.39)	43702005	
		NPT 1/4	15	(0.59)	30	(1.18)	15	(0.59)	43702006	
		NPT 3/8	15	(0.59)	33	(1.30)	15.3	(0.60)	4368148	
	DN 6/8	NPT 1/8	15	(0.59)	30	(1.18)	10	(0.39)	4368068	43702018
		NPT 1/4	15	(0.59)	30	(1.18)	15	(0.59)	4368069	4368040
		NPT 3/8	15	(0.59)	33	(1.30)	15.3	(0.60)	4368070	4368041
		NPT 1/2	15	(0.59)	36	(1.42)	20	(0.79)	4368071	4368042
	DN 8/12	NPT 1/4	19	(0.75)	40	(1.57)	15	(0.59)	4381059	
		NPT 3/8	19	(0.75)	40	(1.57)	15.3	(0.60)	4381060	43702019
		NPT 1/2	21	(0.83)	40	(1.57)	20	(0.79)	4381061	
	DN 10/12	NPT 3/8	19	(0.75)	40	(1.57)	15.3	(0.60)	43702007	
		NPT 1/2	21	(0.83)	40	(1.57)	20	(0.79)	43702008	43702020

Elbow screw fitting



See table for dimensions

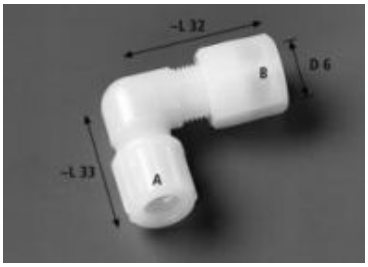
A	Hose dimensions
B	Thread (external)
L16	Installation size
L17	Angular dimension
L2	Thread length

Other dimensions available upon request

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting	1/4"-1/8"	G 1/8	12	(0.47)	27	(1.06)	8	(0.31)	43702021	
		G 1/4	13	(0.51)	28	(1.10)	12	(0.47)	43702022	
US hose G thread		G 3/8	19	(0.75)	31	(1.22)	12	(0.47)	43702023	
	1/4"-1/6"	G 1/8	12	(0.47)	27	(1.06)	8	(0.31)	43702024	43702033
		G 1/4	13	(0.51)	28	(1.10)	12	(0.47)		43702034
		G 3/8	19	(0.75)	31	(1.22)	12	(0.47)		43702035
	3/8"-1/4"	G 1/4	17	(0.67)	38	(1.50)	12	(0.47)	43702025	43702036
		G 3/8	17	(0.67)	38	(1.50)	12	(0.47)	43702026	43702037
		G 1/2	17	(0.67)	41	(1.61)	14	(0.55)		43702038
	1/2"-3/8"	G 1/2	19	(0.75)	45	(1.77)	14	(0.55)	43702027	43702039

	A	B	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Elbow screw fitting	1/4"-1/8"	NPT 1/8	12	(0.47)	27	(1.06)	8	(0.31)		43702040
		NPT 1/4	13	(0.51)	28	(1.10)	12	(0.47)		43702041
US hose NPT thread	1/4"-1/6"	NPT 1/8	12	(0.47)	27	(1.06)	10	(0.39)	43702028	43702042
		NPT 1/4	13	(0.51)	28	(1.10)	15	(0.59)	43702029	43702043
		NPT 1/2	15	(0.59)	34	(1.34)	20	(0.79)		43702044
	3/8"-1/4"	NPT 1/4	17	(0.67)	38	(1.50)	15	(0.59)	43702030	43702045
		NPT 1/2	17	(0.67)	41	(1.61)	20	(0.79)	43702031	
	1/2"-3/8"	NPT 3/8	19	(0.75)	42	(1.65)	15.3	(0.60)		43702046
		NPT 1/2	21	(0.83)	42	(1.65)	15.3	(0.60)	43702032	43702047

Elbow fitting tube - pipe



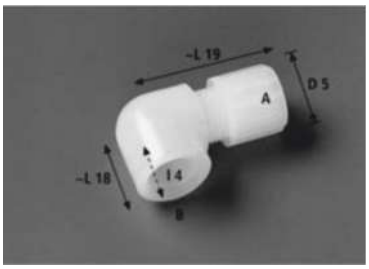
See table for dimensions

A	Hose dimensions
B	Thread (internal)
L32	Angular dimension
L33	Installation size
SW	Spanner size

Other dimensions available upon request

	A	B	L32 mm / (US)		L33 mm / (US)		SW mm / (inch)		Item no. PVDF	Item no. PFA
Elbow coupler tube - pipe	DN 4/6	6	39	(1.54)	26	(1.02)	17	(0.67)	4346086	43704005
		10	45	(1.77)	29	(1.14)	22	(0.87)	43704001	43704006
metric - metric	DN 6/8	6	40	(1.57)	30	(1.18)	17	(0.67)	4368085	
		10	45	(1.77)	33	(1.30)	22	(0.87)	43704002	
	DN 10/12	10	45	(1.77)	43	(1.69)	22	(0.87)	43704003	
US - US	1/4"-1/8"	1/4"	39	(1.54)	26	(1.02)	17	(0.67)	43704004	43704007

Elbow female connector



See table for dimensions

A	Hose dimensions
B	Thread (internal)
L18	Installation size
L19	Angular dimension
L4	Thread length

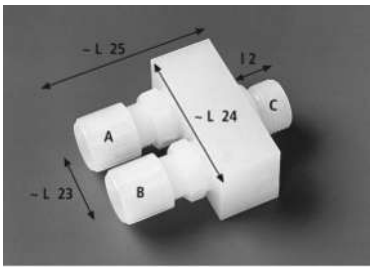
Other dimensions available upon request

	A	B	L18 mm / (US)		L19 mm / (US)		L4 mm / (US)		Item no. PVDF	Item no. PFA
Elbow female connector	DN 4/6	G 1/8	17	(0.67)	26	(1.02)	10	(0.39)	43703001	43703025
		G 1/4	20	(0.79)	29	(1.14)	15	(0.59)	43703002	43703026
Metric hose G thread		G 3/8	20	(0.79)	32	(1.26)	15	(0.59)	43703003	
		G 1/2	23	(0.91)	34	(1.34)	16	(0.63)	43703004	
	DN 6/8	G 1/8	17	(0.67)	30	(1.18)	10	(0.39)	43703005	43703027
		G 1/4	20	(0.79)	33	(1.30)	15	(0.59)	43703006	43703028
		G 3/8	20	(0.79)	36	(1.42)	15	(0.59)	43703007	
		G 1/2	23	(0.91)	38	(1.50)	16	(0.63)	43703008	43703029
	DN 8/12	G 1/4	20	(0.79)	40	(1.57)	10	(0.39)	43703009	
		G 3/8	20	(0.79)	43	(1.69)	15	(0.59)	43703010	43703030
		G 1/2	23	(0.91)	45	(1.77)	15	(0.59)	43703011	43703031
	DN 10/12	G 3/8	20	(0.79)	43	(1.69)	15	(0.59)	43703012	
		G 1/2	23	(0.91)	45	(1.77)	16	(0.63)	43703013	43703032

	A	B	L18 mm / (US)		L19 mm / (US)		L4 mm / (US)		Item no. PVDF	Item no. PFA
Elbow female connector	DN 4/6	NPT 1/8	20	(0.79)	26	(1.02)	11.6	(0.46)	43703014	43703033
		NPT 1/4	24	(0.94)	29	(1.14)	16.4	(0.65)	43703015	43703034
Metric hose NPT thread		NPT 1/2	32	(1.26)	34	(1.34)	22.6	(0.89)	43703016	
	DN 6/8	NPT 1/8	20	(0.79)	30	(1.18)	11.6	(0.46)	43703017	
		NPT 1/4	24	(0.94)	33	(1.30)	16.4	(0.65)	43703018	43703035
		NPT 3/8	26	(1.02)	36	(1.42)	17.4	(0.69)	43703019	
		NPT 1/2	32	(1.26)	38	(1.50)	22.6	(0.89)	43703020	
	DN 8/12	NPT 1/2	32	(1.26)	45	(1.77)	22.6	(0.89)	43703021	
	DN 10/12	NPT 1/2	32	(1.26)	45	(1.77)	22.6	(0.89)	43703022	43703036

	A	B	L18 mm / (US)		L19 mm / (US)		L4 mm / (US)		Item no. PVDF	Item no. PFA
Elbow female connector	1/4"-1/6"	G 1/8	17	(0.67)	32	(1.26)	10	(0.39)		43703040
		G 1/4	20	(0.79)	35	(1.38)	15	(0.59)	43703037	
US hose G thread	1/2"-3/8"	G 3/8	20	(0.79)	45	(1.77)	15	(0.59)	43703038	43703041
		G 1/2	23	(0.91)	47	(1.85)	16	(0.63)		43703042
US hose NPT thread	3/8"-1/4"	NPT 1/4	24	(0.94)	42	(1.65)	16.4	(0.65)	43703039	
	1/2"-3/8"	NPT 1/2	32	(1.26)	47	(1.85)	22.6	(0.89)		43703043

Fork screw fitting



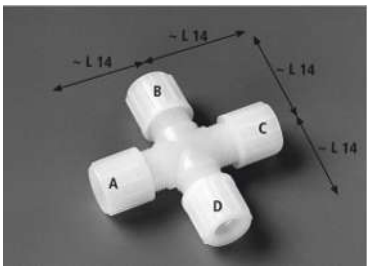
See table for dimensions

A=B	Hose dimensions
C	Thread (external)
L24, 25	Spanner size
L23	Hose spacing
L2	Thread length

Other dimensions available upon request

	A=B	C	L23 mm / (US)		L24 mm / (US)		L25 mm / (US)		L2 mm / (US)		Item no. PVDF
Metric hose G thread	DN 4/6	G 1/8	20	(0.79)	40	(1.57)	43	(1.69)	8	(0.31)	43705001
		G 1/4	20	(0.79)	40	(1.57)	43	(1.69)	12	(0.47)	4346050
	DN 6/8	G 1/8	25	(0.98)	50	(1.97)	54.5	(2.15)	8	(0.31)	43705002
		G 1/4	25	(0.98)	50	(1.97)	54.5	(2.15)	12	(0.47)	43705003
Metric hose NPT thread	DN 4/6	NPT 1/8	20	(0.79)	40	(1.57)	43	(1.69)	10	(0.39)	43705004
		NPT 1/4	20	(0.79)	40	(1.57)	43	(1.69)	15	(0.59)	4346084
US hose NPT thread	1/4"-1/6"	NPT 1/4	20	(0.79)	40	(1.57)	45	(1.77)	15	(0.59)	43705005

4-way fitting, hose connection all ends



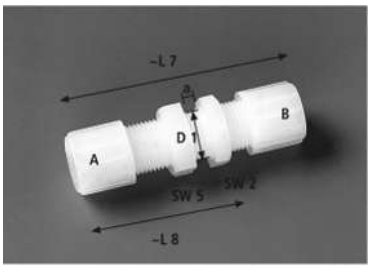
See table for dimensions

A=B=C=D	Hose dimensions
L14	Dimensions

Other dimensions available upon request

	A=B=C=D	L14 mm / (US)		Item no. PVDF	Item no. PFA
Cross fitting metric	DN 4/6	25	(0.98)	4346077	4346048
	DN 6/8	33	(1.30)	4368073	
	DN 8/12	43	(1.69)	4381063	4381039
	DN 10/12	43	(1.69)	43714001	

Bulkhead coupling, hose connection both ends



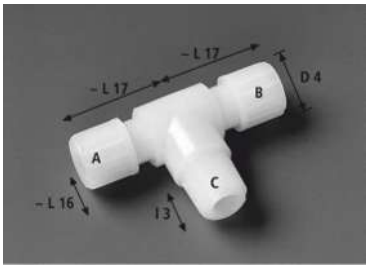
See table for dimensions

A=B	Hose dimensions
D1	Hole diameter
L7	Total length
L8	Inside length
SW2	Fixed spanner size
SW5	Spanner size loose nut

Other dimensions available upon request

	A=B	D1 mm	D1 (US)	L7 mm	L7 (US)	L8 mm	L8 (US)	SW2 mm	SW2 (US)	SW5 mm	SW5 (US)	Item no. PVDF	Item no. PFA
Bulkhead couplings	DN 4/6	10.5	(0.41)	53	(2.09)	36	(1.42)	14	(0.55)	14	(0.55)	4346067	4346030
	DN 6/8	14.5	(0.57)	64	(2.52)	43	(1.69)	19	(0.75)	19	(0.75)	4368063	4368030
metric	DN 8/12	18.5	(0.73)	84	(3.31)	56	(2.20)	24	(0.94)	24	(0.94)	4381055	4381023
	DN 10/12	18	(0.71)	84	(3.31)	55	(2.17)	24	(0.94)	24	(0.94)	4381953	43713003
US	1/4"-1/8"	10	(0.39)	55	(2.17)	36	(1.42)	14	(0.55)	14	(0.55)	43713001	43713004
	1/4"-1/6"	10.5	(0.41)	57	(2.24)	38	(1.50)	14	(0.55)	14	(0.55)	4346087	43713005
	3/8"-1/4"	16.5	(0.65)	77	(3.03)	51	(2.01)	22	(0.87)	22	(0.87)	43713002	43713006

T-fitting



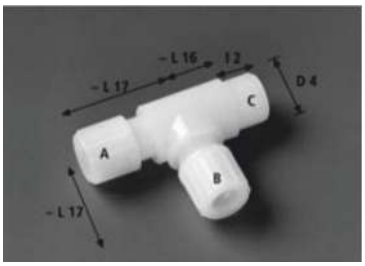
See table for dimensions

A=B	Hose dimensions
C	Thread (external)
L16	Outside dimensions
L17	Spacing
L3	Thread length

Other dimensions available upon request

	A=B	C	L16 mm	L16 (US)	L17 mm	L17 (US)	L3 mm	L3 (US)	Item no. PVDF	Item no. PFA
Metric hose G thread	DN 4/6	G 1/8	20	(0.79)	26	(1.02)	8	(0.31)	4346079	43706008
		G 1/4	27	(1.06)	27	(1.06)	12	(0.47)	4346103	43706009
	DN 6/8	G 1/8	20	(0.79)	31	(1.22)	8	(0.31)	43706001	43706010
		G 1/4	27	(1.06)	31	(1.22)	12	(0.47)	43706002	43706011
Metric hose NPT thread	DN 4/6	NPT 1/8	12	(0.47)	26	(1.02)	10	(0.39)		43706012
		NPT 1/4	15	(0.59)	27	(1.06)	15	(0.59)		43706013
	DN 6/8	NPT 1/4	15	(0.59)	31	(1.22)	15	(0.59)		43706014
US hose G thread	1/4"-1/8"	G 1/4	15	(0.59)	30	(1.22)	12	(0.47)	43706003	
	1/4"-1/6"	G 1/8	20	(0.79)	28	(1.10)	8	(0.31)	43706004	
		G 1/4	27	(1.06)	29	(1.14)	12	(0.47)	43706005	
US hose NPT thread	1/4"-1/8"	NPT 1/8	12	(0.47)	30	(1.22)	10	(0.39)	43706006	
		NPT 1/4	15	(0.59)	30	(1.22)	15	(0.59)		43706015
	1/4"-1/6"	NPT 1/8	12	(0.47)	28	(1.10)	10	(0.39)	43706007	

T screw fitting (asymmetric)



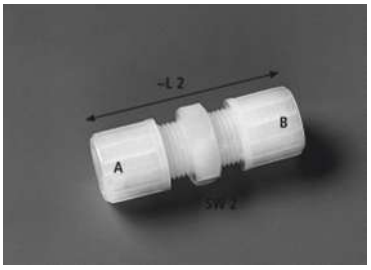
See table for dimensions

A=B	Hose dimensions
C	Thread (internal)
L16	Outside dimensions
L17	Spacing
L2	Thread length

Other dimensions available upon request

	A=B	C	L16 mm / (US)		L17 mm / (US)		L2 mm / (US)		Item no. PVDF	Item no. PFA
Metric hose G thread	DN 4/6	G 1/8	12	(0.47)	26	(1.02)	8	(0.31)	43707001	43707008
		G 1/4	15	(0.59)	27	(1.06)	12	(0.47)	4346078	43707009
	DN 6/8	G 1/8	12	(0.47)	31	(1.22)	8	(0.31)	43707002	
		G 1/4	15	(0.59)	31	(1.22)	12	(0.47)	43707003	
Metric hose NPT thread	DN 4/6	NPT 1/8	12	(0.47)	26	(1.02)	10	(0.39)	43707004	
		NPT 1/4	15	(0.59)	27	(1.06)	15	(0.59)	4346083	43707010
	DN 6/8	NPT 1/8	15	(0.59)	31	(1.22)	10	(0.39)	43707005	
		NPT 1/4	15	(0.59)	31	(1.22)	15	(0.59)	43707006	43707011
US hose G thread	1/4"-1/8"	G 1/4	15	(0.59)	29	(1.14)	12	(0.47)	43707007	
US hose NPT thread	1/4"-1/6"	NPT 1/4	15	(0.59)	29	(1.14)	17	(0.67)		43707012
	3/8"-1/4"	NPT 1/4	18	(0.71)	38	(1.50)	17	(0.67)		

Coupler, hose connection both ends



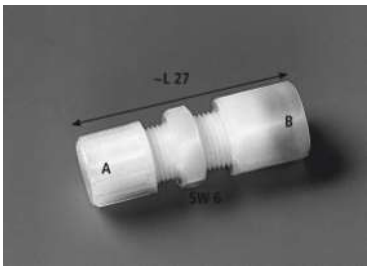
See table for dimensions

A	Hose dimension 1
B	Hose dimension 2
L2	Length
SW2	Spanner size

Other dimensions available upon request

	A	B	L2 mm / (US)		SW2 mm / (US)		Item no. PVDF	Item no. PFA
Straight coupler hose - hose	DN 4/6	DN 4/6	39	(1.54)	14	(0.55)	4346066	43709004
		DN 6/8	45	(1.77)	19	(0.75)	4346051	43709005
metric	DN 6/8	DN 6/8	49	(1.93)	19	(0.75)	4368062	43709006
	DN 8/12	DN 8/12	64	(2.52)	24	(0.94)	4381054	43709007
	DN 10/12	DN 10/12	64	(2.52)	24	(0.94)	4346121	43709008
US	1/4"-1/8"	1/4"-1/8"	47	(1.85)	14	(0.55)	43709001	43709009
	1/4"-1/6"	1/4"-1/6"	47	(1.85)	14	(0.55)	43709002	43709010
		3/8"-1/4"	48	(1.89)	22	(0.87)		43709011
	3/8”-1/4”	3/8"-1/4"	63	(2.48)	22	(0.87)	43709003	43709012

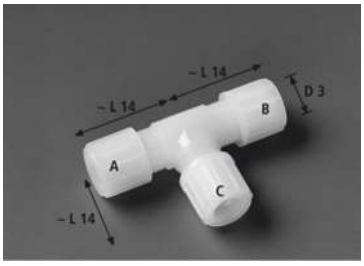
Coupler hose - pipe



See table for dimensions
A Hose dimensions
B Pipe dimensions
L Length
2
7
S Spanner size
W
6
Other dimensions available upon request

	A	B	L27 mm / (US)		SW6 mm / (US)		Item no. PVDF	Item no. PFA
Straight coupler hose - pipe	DN 4/6	6	50	(1.97)	17	(0.67)	4346088	43710008
		10	54	(2.13)	19	(0.75)	43710001	
metric - metric	DN 6/8	6	54	(2.13)	17	(0.67)	43710002	
		10	58	(2.28)	22	(0.87)	43710003	43710009
	DN 8/12	10	65	(2.55)	22	(0.87)	43710004	
	DN 10/12	10	65	(2.55)	22	(0.87)	43710005	
US - US	1/4"-1/8"	1/4"	54	(2.13)	17	(0.67)	43710006	
	3/8"-1/4"	1/4"	62	(2.44)	22	(0.87)		43710010
US hose Metric pipe	1/4"-1/6"	6	52	(2.05)	17	(0.67)	43710007	

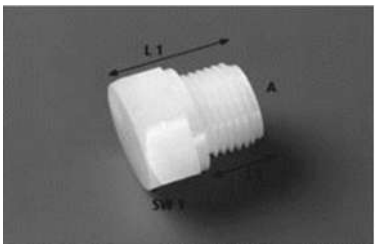
T-piece, hose connection all ends



See table for dimensions
A=B=C Hose dimensions
L14 Dimensions
Other dimensions available upon request

	A=B=C	L14 mm / (US)		Item no. PVDF	Item no. PFA
T-coupler	DN 4/6	26	(1.02)	4346076	4346046
metric	DN 6/8	31	(1.22)	4368072	4368044
	DN 8/12	43	(1.69)	4381062	43711003
	DN 10/12	43	(1.69)	4381083	43711004
US	1/4"-1/8"	28	(1.10)	43711001	43711005
	1/4"-1/6"	28	(1.10)	4346099	43711006
	3/8"-1/4"	38	(1.50)	43711002	43711007

Sealing plug



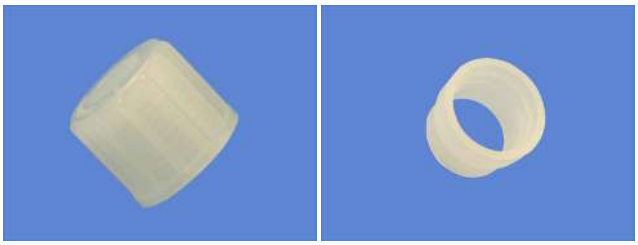
See table for dimensions

A	Thread (external)
l1	Thread length
L1	Total length
SW1	Spanner size

Other dimensions available upon request

	A	L1 mm / (US)		l1 mm / (US)		SW1 mm / (US)		Item no. PVDF	Item no. PFA
metric	G 1/8	14	(0.55)	8	(0.31)	14	(0.55)	43712001	43712008
	G 1/4	22.5	(0.89)	12	(0.47)	17	(0.67)	43712002	43712009
	G 3/8	25.5	(1.00)	12	(0.47)	22	(0.87)	43712003	43712010
	G 1/2	28.5	(1.12)	14	(0.55)	27	(1.06)	4346096	43712011
US	NPT 1/8	10	(0.39)	15	(0.59)	12	(0.47)	43712004	43712012
	NPT 1/4	15	(0.59)	23	(0.91)	17	(0.67)	43712006	43712013
	NPT 3/8	15.3	(0.60)	25	(0.98)	19	(0.75)	43712005	43712014
	NPT 1/2	20	(0.79)	32	(1.26)	24	(0.94)	43712007	43712015

Spare parts: Knurled nuts and clamping collars



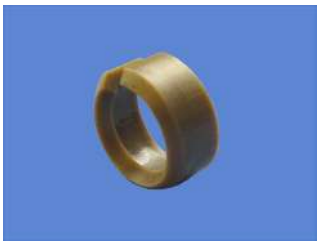
Knurled nut Clamping collar

Connection principle 1A – Material: PVDF

	A (hose)	Knurled nut PVDF	Clamping collar PVDF
metric	DN 4/6	4350213	9008925
	DN 5/8	4350214	4350219
	DN 6/8	4350214	4350219
	DN 8/12	4350215	4350220
	DN 10/12	4350215	4350220
US	1/4"-1/8"	43712022	43712024
	1/4"-1/6"	43712022	43712024
	3/8"-1/4"	43712023	43712025

Spare parts: Gaskets and cutting rings

Gasket



Cutting ring

Connection principle 1C – Material: PFA

	A (hose)	Knurled nut PVDF	Gasket PTFE	Cutting ring PEEK
metric	DN 4/6	4350213	43712026	43712031
	DN 5/8	4350214	43712027	43712032
	DN 6/8	4350214	43712027	43712032
	DN 8/12	4350215	43712028	43712033
	DN 10/12	4350215	43712028	43712033
US	1/4"-1/8"	43712022	43712029	43712034
	1/4"-1/6"	43712022	43712029	43712034
	3/8"-1/4"	43712023	43712030	43712035

PVDF and PFA hose and pipe fittings for glass connections

The fittings are used to connect plastic tubes and pipes to glass fittings, for example in glass heat exchangers or glass condensate traps. We further offer types with hose fittings integrated in the swivel nut and types to insert and secure in existing glass fittings.

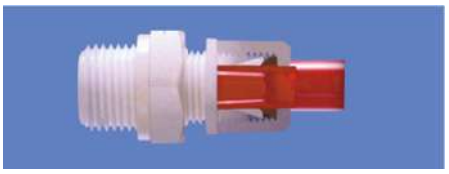
You will further find seals required for using the selected plug-in fittings with your existing glass fittings.

Tubes can also be connected to glass connections without fittings by using a support tube and secured with the glass seal. These support tubes are also listed in this data sheet.

Glass fittings GL14, GL18 and GL25
PVDF removable compression fittings
Metric hose and pipe sizes; standard: DN 4/6, DN 5/8, DN 6/8, DN 8/12, and DN 10/12
US hose and pipe sizes; standard: 1/4" – 1/8", 1/4" – 1/6", 3/8" – 1/4"und 1/2" – 3/8"

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

General Data



PVDF version

With PVDF fittings the hose slides over a cylindrical connection piece and secured with a clamping collar and the knurled nut

PFA version:

With PFA fittings the rigid tube slides over a cylindrical connection piece. When tightening the knurled nut, the gasket will seal the connection and a cutting ring secure it.

All fittings with cylindrical female threads have a gasket strip, omitting washers and gasket during installation. The thermoplastic material can be considered self-sealing

NOTICE

Use in explosive areas (additional notices)

The products do not fall under Directive 2014/34/EU. However, they do meet the fundamental safety requirements of Directive 2014/34/EU and are therefore suitable for use in explosive areas (Zone 1, Group II C).

NOTICE

Electrostatic charge (sparking)

Always clean (wipe) plastic housing parts and decals with a damp cloth. Keep the gas flow free from particles and drops.

WARNING

Gas emanation

Protect the equipment from external blows (shockproof installation). Risk of fatal injury and explosion hazard from gas leaks due to improper use. Close the shut-off valve (if applicable) to the process or switch off the process for maintenance. Protect yourself from hot and toxic gases. Wear gloves and face shield. Emergent gas can also be explosive. Run lines outside the work and traffic area.

NOTICE

Maximum surface temperature

Please note the ignition temperatures of explosive gases as well as the maximum surface temperatures per the applicable directives and standards.

Glass fittings with hose connection (O-ring)

A: Hose connection
B: Glass threaded connection

	A	B	Item no. PVDF	Item no. PFA
Screw connections (metric)	DN 4/6	GL 14	43715001	437150011
		GL 18	43715002	437150012
		GL 25	43715003	437150013
	DN 5/8	GL 18	43715004	
	DN 6/8	GL 18	43715005	437150014
		GL 25	43715006	437150015
	DN 8/12	GL 25	4550299	437150016
	DN 10/12	GL 25	43715007	437150017
Screw connections (US)	1/4" – 1/8"	GL 14	43715008	437150018
	1/4" – 1/6"	GL 14	43715009	437150019
	1/2“ – 3/8“	GL 25	43715010	437150020

Approved pressure varies by medium temperature

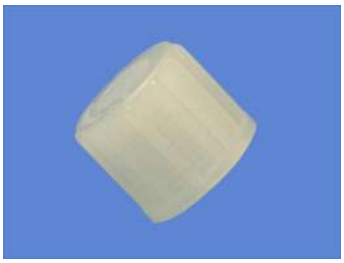
Materials in contact with media: PVDF or PFA, Viton
Max. medium temperature: -30 °C bis +140 °C (-22 °F to +284 °F)

Medium temperature	< 50	60	70	80	90	100	110	120	130	140	°C
	< 122	140	158	176	194	212	230	248	266	284	°F
Max. pressure	6	5	4.5	4	3.5	3	2.5	2.5	2	1	bar
	87	72.5	65.25	58	51	43.5	36.25	36.25	29	14.5	psi

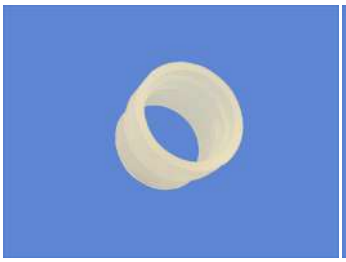
NOTICE

The actual permissible pressures of these fittings are determined by the approved pressure ratios of the connected glass receptacle!

Hardware (replacement)



Knurled nut



Clamping collar

Gasket

Cutting ring

Connection principle 1A – Material: PVDF

	A (hose)	PVDF knurled nut	PVDF clamping collar
metric	DN 4/6	43 50 213	90 08 925
	DN 5/8	43 50 214	43 50 219
	DN 6/8	43 50 214	43 50 219
	DN 8/12	43 50 215	43 50 220
	DN 10/12	43 50 215	43 50 220
US	1/4" – 1/8"	43 712 022	43 712 024
	1/4" – 1/6"	43 712 022	43 712 024
	3/8" – 1/4"	43 712 023	43 712 025

Connection principle 1C – Material: PFA

	A (hose)	PVDF knurled nut	PTFE gasket	PEEK cutting ring
metric	DN 4/6	43 50 213	43 712 026	43 712 031
	DN 5/8	43 50 214	43 712 027	43 712 032
	DN 6/8	43 50 214	43 712 027	43 712 032
	DN 8/12	43 50 215	43 712 028	43 712 033
	DN 10/12	43 50 215	43 712 028	43 712 033
US	1/4" – 1/8"	43 712 022	43 712 029	43 712 034
	1/4" – 1/6"	43 712 022	43 712 029	43 712 034
	3/8" – 1/4"	43 712 023	43 712 030	43 712 035

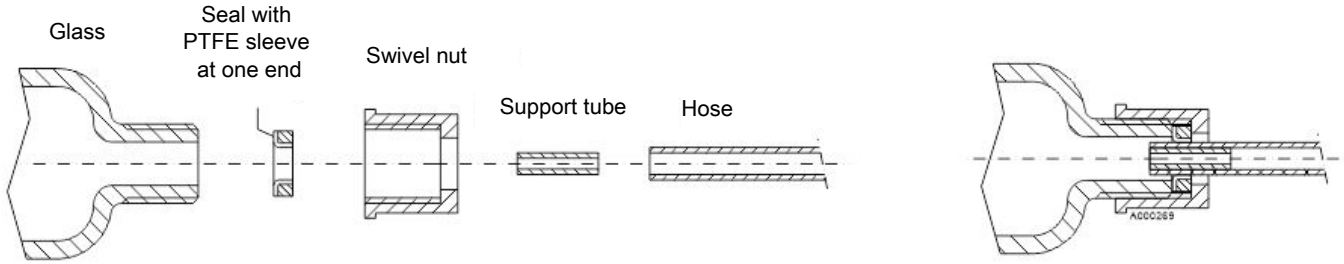
Glass fittings with hose connection

When using hoses with simple swivel nuts and seals, support tubes must be used, as the hose will otherwise deform and not seal. The size must be determined based on the inside diameter of the hose, which is approximately the outside diameter of the support tube.

Support tubes for hoses	A	Hose connection
Swivel nut with glass thread	B	Glass threaded connection
Seal with PTFE sleeve at one end	Di	Seal inside diameter

	A	B	Di	Swivel nut	Seal with sleeve at one end	Support tubes for hoses
	DN 4/6	GL 14	6	45100132	45100134E	4445014
	1/4" – 1/8"					
	1/4" – 1/6"					
	DN 5/8	GL 18	8	45100140	45100138E	4445012
	5/16" – 3/16"	GL 25	8	45100133	45100137E	4445012
	DN 6/8	GL 18	8	45100140	45100138E	4510273
	DN 8/10	GL 18	10	45100140	45100141E	4445013
	3/8" – 1/4"					4445015
	3/8" – 1/4"	GL 25	10	45100133	451001352E	4445015
	DN 8/12	GL 25	12	45100133	45100135E	4445013
	1/2" – 3/8"					4445016
	DN 10/12	GL 25	12	45100133	45100135E	4445010
	1/2" – 3/8"					4445016

Connection principle



Approved pressure varies by medium temperature

Materials in contact with media: PTFE
Max. medium temperature: -30 °C to +140 °C (-22 °F to +284 °F)

Medium temperature	< 100	110	120	130	140	°C
	< 212	230	248	266	284	°F
max. pressure	3	2.5	2.5	2	1	bar
	43.5	36.25	36.25	29	14.5	psi

NOTICE

The actual permissible pressures of these fittings are determined by the approved pressure ratios of the connected glass receptacle!

Straight screw connections with hose connection for GL seals

A: Hose connection
B: Glass threaded connection
Di: Seal inside diameter

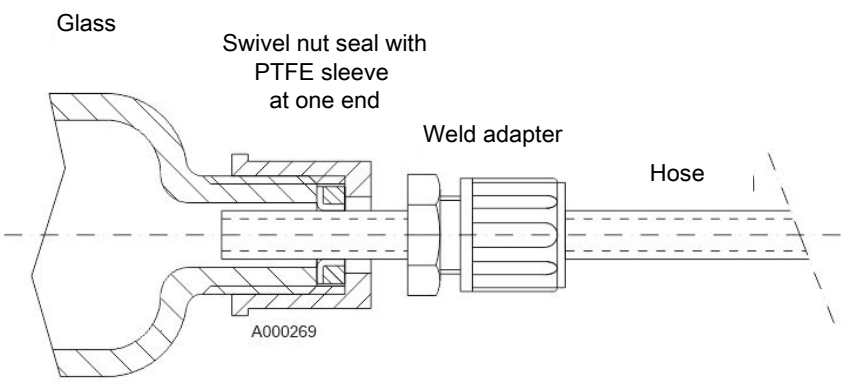
	A	B	Di	Item no. PVDF	Item no. PFA
Screw connections (metric)	DN 5/8	GL 18	8	43716001	
	DN 8/10	GL 25	10	43716007	
	DN 8/12	GL 25	12	43716002	
	DN 10/12	GL 25	12	43716003	43716005
Screw connections (US)	1/4" – 1/8"	GL 18 / 25	8	43716004	
	3/8" – 1/4"	GL 18 / 25	8		43716006

Elbow fittings with hose connection for GL seals

A: Hose connection
B: Glass threaded connection
Di: Seal inside diameter

	A	B	Di	Item no. PVDF	Item no. PFA
Screw connections (metric)	DN 4/6	GL 14	6	43717001	43717007
		GL 18 / 25	8	43717002	
	DN 6/8	GL 14	6	43717003	
		GL 18 / 25	8	43717004	13717008
	DN 8/12	GL 18 / 25	12	43717005	
	DN 10/12	GL 18 / 25	12	43717006	43717009
Screw connections (US)	1/4" – 1/6"	GL 18 / 25			43717010
	3/8" – 1/4"	GL 18 / 25	8		43717011

Connection principle



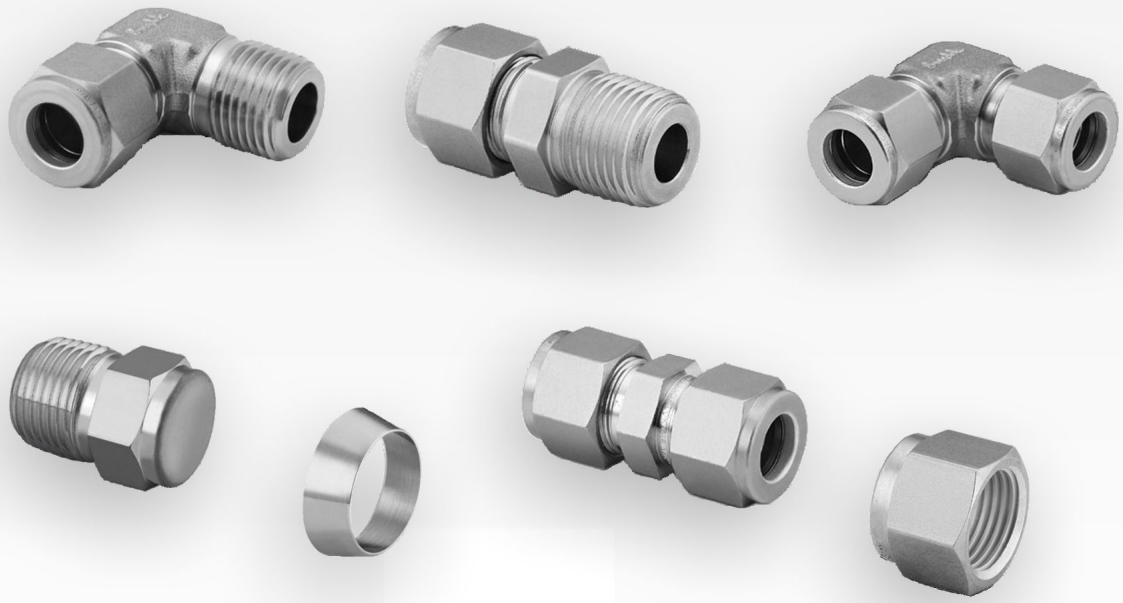
Approved pressure varies by medium temperature

Materials in contact with media: PVDF or PFA, PTFE
Medium temperature max.: -30 °C to +140 °C (-22 °F to +284 °F)

Medium temperature	< 100	110	120	130	140	°C
	< 212	230	248	266	284	°F
max. pressure	3	2.5	2.5	2	1	bar
	43.5	36.25	36.25	29	14.5	psi

NOTICE

The actual permissible pressures of these fittings are determined by the approved pressure ratios of the connected glass receptacle!



Pipe fittings and plugs made of stainless steel

The screw fittings are only for connecting and joining stainless steel tubes. Only screw fittings frequently used with our gas conditioning components are listed:

- Screw-in connections, straight and angled
- Tube adapter, straight and angled
- Sealing plug
- Spare parts

Please contact us for other types and dimensions!

Removable compression fittings; material: Stainless steel 316
Tapered thread (ISO/BSP); standard: 1/4" and 3/8"
NPT thread; standard: 1/4" and 3/8"
Metric tube sizes; standard: 6, 8, 10 and 12 mm
US tube sizes; standard: 1/4", 3/8" and 1/2"
Grease-less versions available upon request

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Examples for using screw fittings and plugs

- Connecting stainless steel gas heat exchangers
- Probes: Connections for sample gas, calibrating gas, purge air, control air
- Connecting stainless steel filters
- Spare parts for gas pumps with stainless steel head

General Technical Data

Material: Stainless steel 316 (1.4401 / 1.4436)

All specifications in this data sheet in mm, US specifications in parentheses!

Permissible pressures

Permissible operating pressure in bar/psig for seamless stainless steel tubes.

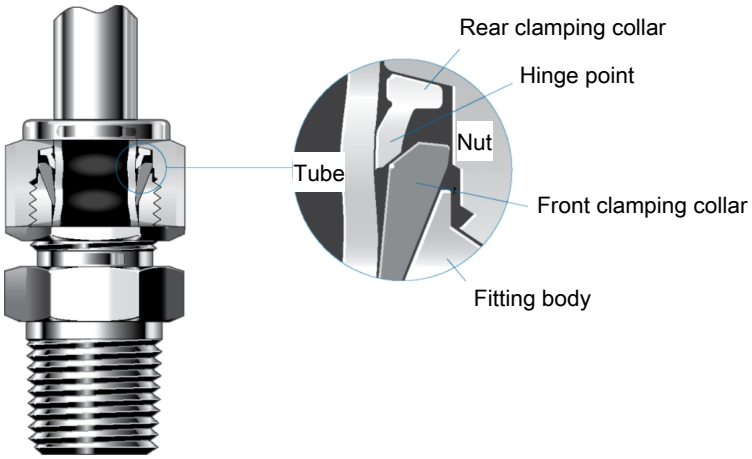
For single weld tubes, multiply the specified pressure by 0.8.

Information in the pressure tables are guidelines!

	Tube wall thickness	6 mm	8 mm	10 mm	12 mm	1/8"	1/4"	3/8"	Pressure
metric	1 mm	420	310	240	200				bar
		6094	4498	3482	2902				psig
	1.5 mm	710	520	400	330				bar
		10302	7545	5804	4788				psig
	2 mm			580	470				bar
				8415	6819				psig
US	0.89 mm (0.035 inch)					720	341.5	227	bar
						10900	5100	3300	psig
	1.25 mm (0.049 inch)						517	330	bar
							7500	4800	psig
	1 mm (0.065 inch)						703	448	bar
							10200	6500	psig

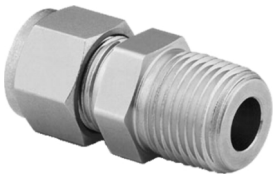
Special properties

- Spring-loaded design with two clamping collars.
- Easy installation.
- No torque is applied to the tube during installation.



When installing the design with the new geometry the front clamping collar is pressed onto the fitting body and the tube, creating primary seals, whilst the rear clamping collar folds inward to firmly clamp around the tube. The geometry of the rear clamping collars creates a better hinge-tension effect, which converts axial movement into radial pressure onto the tube, requiring little torque.

Straight screw-in connection



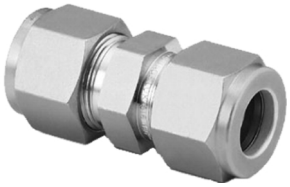
See table for dimensions

A	Outside tube diameter
B	Threaded connection
L	Total length
SW	Spanner size

Other dimensions available upon request

	A	B (inch)	L mm / (inch)		SW mm / (inch)		Item no.
Tapered ISO / BSP thread (RT)	6 mm	1/4"	37.9	(1.492)	14	(0.55)	9029007
		3/8"	38.4	(1.51)	18	(0.708)	9029009
Metric tube	8 mm	1/4"	38.7	(1.52)	15	(0.59)	9029041
		3/8"	39.2	(1.54)	18	(0.708)	9029042
	10 mm	3/8"	40.9	(1.61)	18	(0.708)	9029043
	12 mm	3/8"	43.4	(1.7)	22	(0.866)	9029044
US tube	1/4"	1/4"	37.9	(1.49)	14	(0.56)	9029006
		3/8"	38.4	(1.51)	17.45	(0.688)	9029045
	3/8"	1/4"	39.87	(1.57)	15.88	(0.625)	9029046
		3/8"	39.87	(1.57)	17.45	(0.688)	9029047
	1/2"	3/8"	43.4	(1.71)	20.64	(0.813)	9029048
NPT thread	6 mm	NPT 1/4	37.9	(1.492)	14	(0.55)	9029000
Metric tube		NPT 3/8	38.4	(1.51)	18	(0.708)	9029049
	8 mm	NPT 1/4	38.7	(1.52)	15	(0.59)	9029001
		NPT 3/8	39.2	(1.54)	18	(0.708)	9029050
		NPT 1/2	45.6	(1.8)	22	(0.866)	9029068
	10 mm	NPT 3/8	40.9	(1.61)	18	(0.708)	9029051
	12 mm	NPT 3/8	43.4	(1.7)	22	(0.866)	9029052
US tube	1/4"	NPT 1/4	37.9	(1.49)	14	(0.56)	9029003
		NPT 3/8	38.4	(1.5)	17.45	(0.688)	9029053
	3/8"	NPT 1/4	39.87	(1.57)	15.88	(0.625)	9029011
		NPT 3/8	39.87	(1.57)	17.45	(0.688)	9029054
	1/2"	NPT 3/8	43.4	(1.71)	20.63	(0.813)	9029055

Straight connector



See table for dimensions

A	Outside tube diameter 1
B	Outside tube diameter 2
L	Length
SW	Spanner size

Other dimensions available upon request

	A	B	L	Item no.
metric	6 mm	6 mm	41 mm	9029024
		8 mm	39.4 mm	9029056
	8 mm	8 mm	43.2 mm	9029057
	10 mm	10 mm	46.2 mm	9029058
US	1/4"	1/4"	1.61 inch	9029059
		3/8"	1.70 inch	9029060
	3/8"	3/8"	1.77 inch	9029061

Elbow screw fitting

See table for dimensions

A	Outside tube diameter
B	ISO threaded connection
C	Screw-in connection pivoting radius
SW	Screw-in connection spanner size

Other dimensions available upon request

	A	B (inch)	C mm / (inch)		SW mm / (inch)		Item no.
Tapered ISO / BSP thread (RT)	6 mm	1/4"	27	(1.06)	12.7	(0.5)	9029017
		3/8"	29.8	(1.17)	17.5	(0.688)	9029062
Metric tube	8 mm	1/4"	28.8	(1.134)	14.29	(0.563)	9029063
		3/8"	30.6	(1.2)	17.5	(0.688)	9029064
	10 mm	3/8"	31.5	(1.24)	17.5	(0.688)	9029065
	12 mm	3/8"	36	(1.42)	20.64	(0.813)	9029066
US tube	1/4"	1/4"	27	(1.06)	12.7	(0.5)	9029067
		3/8"	29.8	(1.17)	17.5	(0.688)	9029069
	3/8"	1/4"	30.48	(1.20)	15.89	(0.625)	9029070
		3/8"	31.24	(1.23)	17.5	(0.688)	9029071
	1/2"	3/8"	36.07	(1.42)	20.64	(0.813)	9029072
NPT thread	6 mm	NPT 1/4	27	(1.06)	12.7	(0.5)	9029016
Metric tube		NPT 3/8	29.8	(1.17)	17.5	(0.688)	9029073
	8 mm	NPT 1/4	28.8	(1.134)	14.29	(0.563)	9029074
		NPT 3/8	30.6	(1.29)	17.5	(0.688)	9029075
	10 mm	NPT 3/8	31.5	(1.24)	17.5	(0.688)	9029076
	12 mm	NPT 3/8	36	(1.42)	20.64	(0.813)	9029077
US tube	1/4"	NPT 1/4	27	(1.06)	12.7	(0.5)	9029078
		NPT 3/8	29.8	(1.17)	17.5	(0.688)	9029079
	3/8"	NPT 1/4	30.48	(1.20)	15.89	(0.625)	9029080
		NPT 3/8	31.24	(1.23)	17.5	(0.688)	9029081
	1/2"	NPT 3/8	36.07	(1.42)	20.64	(0.813)	9029082

Angled connector

See table for dimensions

A	Outside tube diameter 1
B	Outside tube diameter 2
C	Screw-in connection pivoting radius
SW	Screw-in connection spanner size

Other dimensions available upon request

	A	B	C	SW	Item no.
metric	6 mm	6 mm	27 mm	1/2 inch	9029083
	8 mm	8 mm	28.8 mm	9/16 inch	9029084
	10 mm	10 mm	31.5 mm	11/16 inch	9029085
US	1/4"	1/4"	1.06 inch	1/4 inch	9029086
	3/8"	3/8"	1.2 inch	5.8 inch	9029087

Spare parts: Swivel nuts and cutting rings

Swivel nut

Front clamping collar

Rear clamping collar

	Tube OD	Spanner size SW mm / (inch)		Swivel nut	Clamping collars set = 10 count
metric	6 mm	14	(0.55)	9029091	9029032
	8 mm	16	(0.63)	9029092	9029033
	10 mm	19	(0.75)	9029093	9029034
	12 mm	22	(0.866)	9029094	9029035
US	1/8"	11.11	(0.44)	9029095	9029036
	1/4"	14.29	(0.56)	9029096	9029037
	3/8"	17.46	(0.687)	9029097	9029038

Screw-in plug

US (NPT thread)

US (G thread)

See table for dimensions

SW Screw-in connection spanner size

L Length

Other dimensions available upon request

		SW mm / (inch)		L mm / (inch)		Item no.
metric	G 1/8"	10	(0.4)	17	(0.67)	9008471
	G 1/4"	13	(0.51)	21	(0.83)	9008472
	G 3/8"	17	(0.67)	21	(0.83)	9008456
US	NPT 1/8"	11.11	(0.44)	19.1	(0.75)	9029039
	NPT 1/4"	14.29	(0.56)	24.4	(0.96)	9029022
	NPT 3/8"	17.46	(0.687)	25.1	(0.99)	9029040

Back Pressure Regulator ARP-1.2

The back pressure regulator is used to maintain a constant sample gas pressure inside the analyser regardless of the respective barometer reading, and installs in the gas outlet of the analyser.

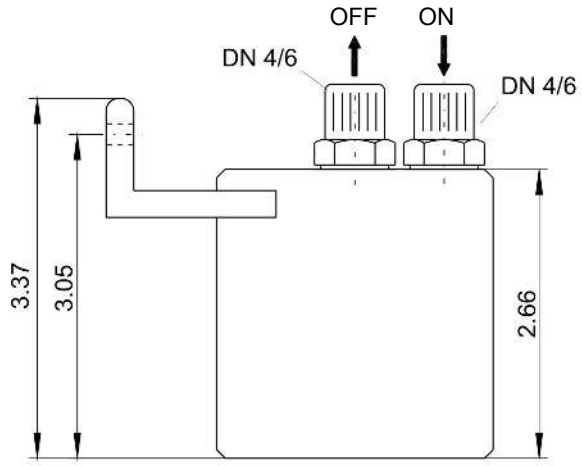
Using the back pressure regulator eliminates measuring errors due to barometric variation. The back pressure regulator is set to a pressure higher than the normal fluctuations in the atmospheric air pressure.

- Constant sample gas pressure
- High accuracy ± < 0.03 psia
- Maintenance-free

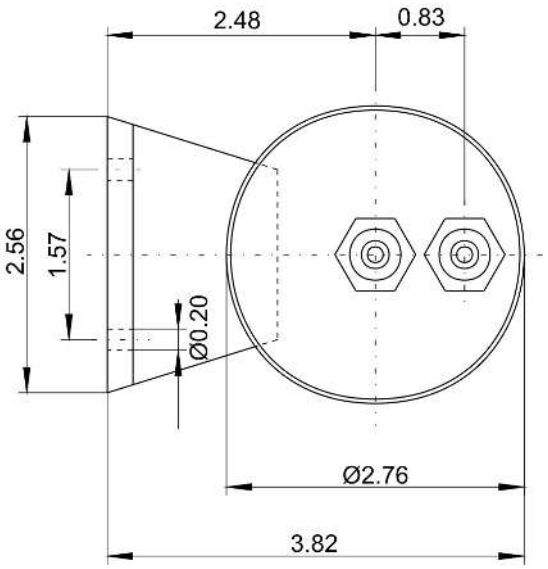
Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Dimensions (inch)

Side view



Top view



Technical Data

ARP-1.2 Back Pressure Regulator	
Flow rate:	min. 0.42 lpm max. 3.3 lpm
Settings:	Standard 1067 ± 0.03 psia* max. 20 psia
Accuracy:	< 0.03 psia < 0.02 psia at constant flow
Sample gas temperature:	41 °F to 122 °F
Gas connections:	Hose DN 4/6
Materials:	CuBe/1.4571/PP PVDF/Viton
Dead volume:	2.75 cu. in.
Weight:	0.53 lb

* unless otherwise specified you will receive the standard version. Other pressures available upon request

Ordering Instructions

Item no.	Model
46 00 999	ARP-1.2 Back Pressure Regulator

NOTICE! For safety reasons, the back pressure regulator comes with hose connection between the inlet and outlet. This must be removed prior to installation.

Heated sample gas line

The most common problems in gas analysis systems are related to sample gas conditioning and the sampling lines. Condensate in the sample gas, adsorption and contamination from the sample gas line can affect the accuracy of measurements considerably.

Sampling lines transport the sample gas from the sampling point to the gas conditioner or the analyser. The heated sampling lines keep the temperature of the sample gas above the dew point or the reaction temperature, preventing gas condensation in the analysis system. Condensation must be prevented in the sampling lines for accurate, reliable measurements.

Our experts will gladly advise you on selecting suitable sampling lines and other components for your specific application.

- Proven, reliable sampling line
- Corrugated PA outer sheath standard
- Self-regulating lines at 65 °C (149 °F) and 120 °C (248 °F)
- Regulated lines up to 200 °C (392 °F)
- Pt100 standard, thermal element optional
- Atex Zone 1 lines available
- PTFE- and VA core standard
- Double and replaceable cores available
- Options with additional power supply and sensor line
- Helpful options such as insufficient temperature contact, plug and screw connections
- Helpful accessories such as insulating sleeves and transitional heaters

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e-mail: sales@buhlertech.com
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Technical Data

Heated lines for non-explosive applications

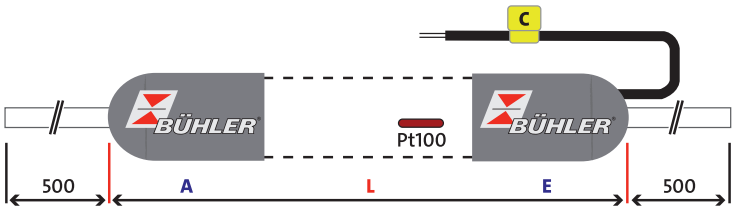
Self-regulating lines	
Voltage:	230 V/50 Hz or 115 V/60 Hz
Max. operating temperature:	65 °C (149 °F): Output 25 W/m 120 °C (248 °F): Output 60 W/m
Materials/lengths:	End caps silicone, cable end sleeves, connecting cable length 2 m (3.28 ft), sheath corrugated PA tube Core: PTFE DN 4/6 and stainless steel (1.4571) 6 mm (0.24 in), fixed, 500 mm (19.69 in) unheated protrusion both ends

Controllable lines	
Voltage:	230 V/50 Hz or 115 V/60 Hz
Max. operating temperature:	200 °C (392 °F): Output 100 W/m
Sensor:	1 x Pt100 (2-lead) standard (others available upon request)
Materials/lengths:	End caps silicone, cable end sleeves, connecting cable length 2 m (6.56 ft), sheath corrugated PA tube Core: PTFE DN 4/6 and stainless steel (1.4571) 6 mm (0.24 in), fixed, 500 mm (19.69 in) unheated protrusion both ends

Other dimensions, materials and replaceable core available upon request.

Dimensions

Schematic heated line construction. The Pt100 only is only installed standard in the controllable line.



Ordering Instructions

Item no.	Type
48 5000 XXXX	self-regulating to 65 °C (149 °F)
48 5001 XXXX	self-regulating to 120°C (248 °F)
48 5012 XXXX	controllable up to 200 °C (392 °F)

Item numbers of lines only for non-explosive gases and environments. Lines for use in explosive areas available upon request.

XXXX indicates consecutive numbering. Please contact us for the version you require.

Special types available upon request.

Temperature controller for use in controllable lines type 48 5012 XXXX

Item no.	Type
48 5300 0002	Wall-mounted temperature controller, terminal clamps, operating voltage 90...250 V, switching current 10 A
48 5300 0003	Wall-mounted temperature controller, heating connects via round connector 4+PE, operating voltage 90...250 V, switching current 20 A

Helpful accessories for connecting heated lines

A suitable connection between heated lines requires thermal insulation or active heating between the unheated ends. Silicone foam insulating sleeves are available for this purpose. If passive insulation is inadequate, you may choose a self-regulating transitional heater.

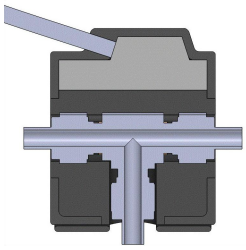
Insulating Sleeve

Technical Data - Insulating Sleeve	
Type:	ID 20 mm/OD 42 mm
Length:	80 mm (3.15 in)
Item number:	48 5300 0016

Self-regulating transitional heater

Outside view

Inside view



The self-regulating transitional heater can be used for cutting ring fittings as well as tubes and pipes with an outside diameter of 6 mm (0.24 in), 8 mm (0.31 in) and 1/4". The construction allows heating straight connectors, 90° elbows as well as T-fittings.

Technical Data - Self-Regulating Transitional Heater	
Material:	Silicone (elastic)
Ambient temperature:	-60 °C to +200 °C (-76 °F to 392 °F)
Operating temperature:	+200 °C (392 °F) (self-regulating)
Voltage:	$230V_{AC}$ / $115V_{AC}$
Electrical connection:	1 m (3.28 ft)silicone cable with cable ends, protection rating II
International protection rating:	IP62
Dimensions:	$Ø_o$ = 63 mm (2.48 in), $Ø_i$ = 17 mm (0.67 in), L = 60 mm (2.36 in)
Item number:	48 5300 0017

NOx-Converter

DA550018 BÜNOx 2+

Gas-Converter BÜNOx 2+

In order to protect humans and the environment, the emission of nitric oxides must be reduced as much as possible. In order to use cost-effective gas analysis methods, e.g. infrared technology the NO_2 rate in the emitted gasses must be catalytically converted to NO.

The conversion takes place in small reactors with electric heating which are filled with various catalyst materials developed specifically for this process.

The BÜNOx 2+ converter series offers high energy efficiency, high conversion rates and a long life with a service computer for predictable maintenance.

The NOx computer uses specific user data input by the customer to calculate the remaining life of the converter cartridge based on a configured standard curve and if desired alerts the customer to service requirements.

- NOxCal service computer for predictable service alerts
- 19” rack mount housing
- Optional bypass solenoid valves
- Optional long-life cartridges (extended service life)
- Low temperatures for high efficiency
- Optimised menu navigation
- Easy cartridge replacement without tools
- High conversion rate > 97%
- High NO_2 capacity

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

General

	19" Rack mount
Operating temperature	752 °F *
Ready for operation	after approx. 30 min (max. 45 min) heat up time

* varies by converter material

Gas inlet conditions

Sample gas pressure	up to 21.8 PSI absolute
Sample gas flow rate	up to 120 L/h (2 lpm)
Sample gas temperature	41 °F to 122 °F
Dew point after cooler	< 50 °F

Ambient conditions

during operation	
Ambient temperature	41 °F to 122 °F
in storage	
Ambient temperature	-4 °F to 158 °F
Humidity	< 80 % rel. humidity

Electrical specifications

Power supply	115 V AC or 230 V AC; 50/60 Hz
Power input	< 500 W
Thermal load	85 W at an oven temperature of 752 °F

Signal inputs and outputs

Status outputs:	
– Service / NOXCal	Changeover contact max. 230 V AC / DC, 1 A
– Operating mode	Changeover contact max. 230 V AC / DC, 1 A
– Temperature	Changeover contact max. 230 V AC / DC, 1 A
Analogue output	Temperature 4-20 mA
Signal input	Solenoid valve control, 24 V DC, 1 mA via external switch

Structural specifications

Dimensions (w x h x d)	19 x 5.2 x 11.2 in
Weight	approx. 22.5 lb
Protection class per EN 60529	IP20

Reactor cartridge

	Model MC
Filling material	metal-based
Life	see diagram
Conversion factor $NO_2 \rightarrow NO$	≧ 97 % when cartridge new
Max. NO_2 capacity at 1.17 lpm	300 ppm
Max. conversion temperature *	797 °F

* The converter temperature should only be increased if the conversion level drops below 95 % with the cartridge almost depleted.

Service life (laboratory operation)

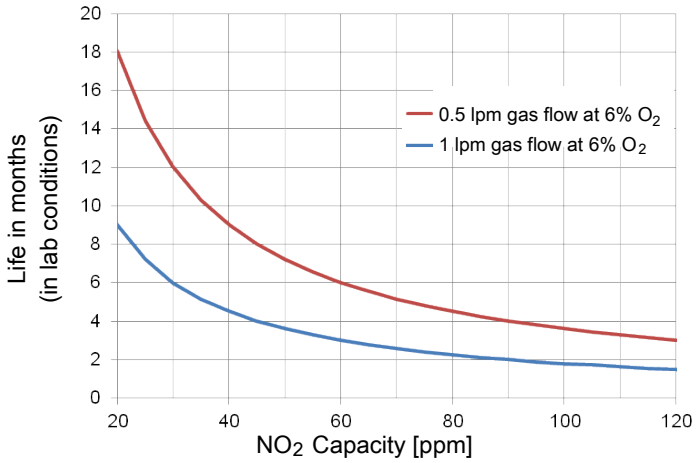


Fig. 1: Diagram converter cartridge life in lab conditions

Life of standard cartridges MC shown.

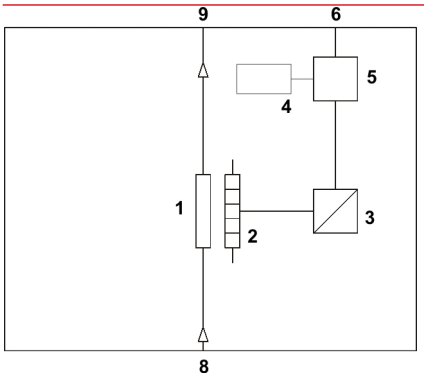
When using the long-life cartridge the life increases significantly.

Values determined in lab conditions. Actual life during operation may differ.

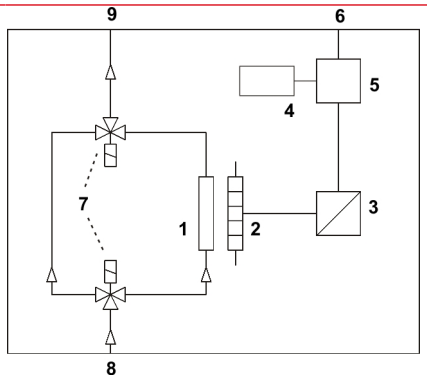
Flow chart

19" housing, unheated

Converter without solenoid valves



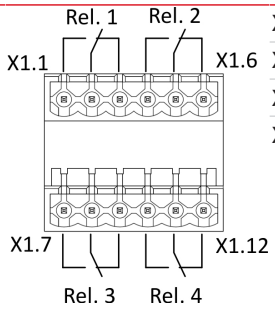
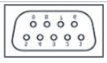
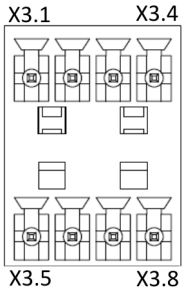
Converter with Solenoid valves



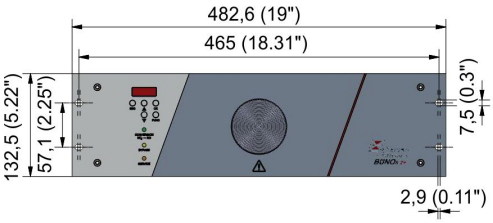
Legend

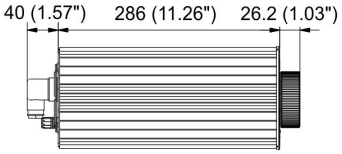
1: Reactor cartridge
2: Tubular furnace
3: Temperature controller
4: Temperature display
5: BÜNOx 2+ control unit
6: Signal inputs and outputs
7: 3/2 directional solenoid valves
8: Gas inlet
9: Gas outlet

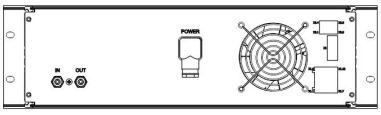
Connection terminals

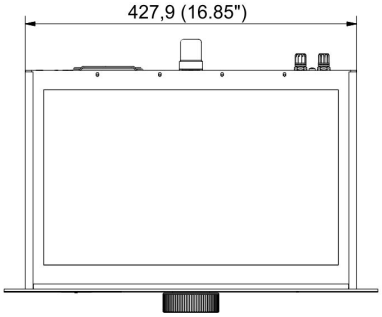
Plug		Terminal	Relay	Description
X1		X1.1 ...X1.3	Rel. 1	Operating mode status conversion / bypass
		X1.4...X1.6	Rel. 2	Status: Excess/low temperature alarm
		X1.7...X1.9	Rel. 3	Status: Service alert
		X1.10...X1.12	Rel. 4	Option
X2				reserved
X3		X3.1		PE / cable shield
		X3.2		External solenoid valve switchover (potential-free) 
		X3.3		
		X3.4		N/C
		X3.5		PE / cable shield
		X3.6		+; analogue output
		X3.7		-; analogue output
		X3.8		N/C

Dimensions

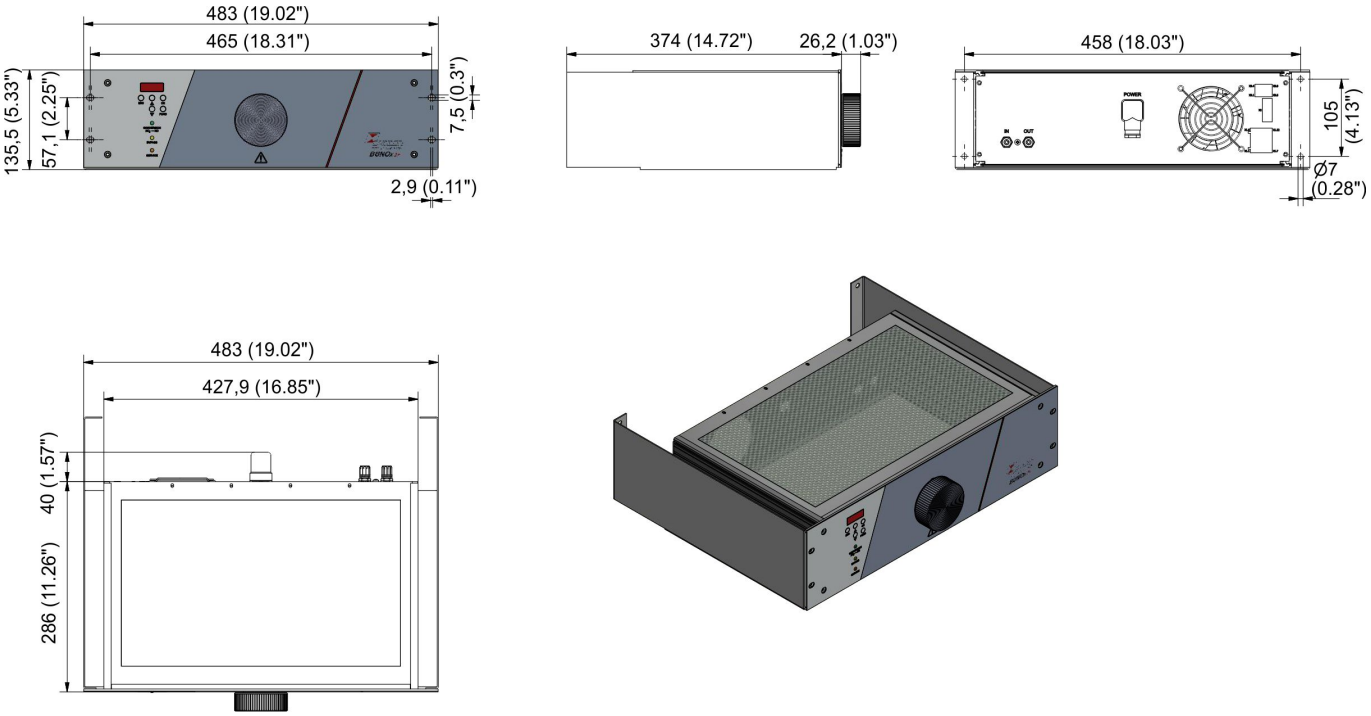








Option wall bracket



Ordering instructions

BÜNOx 2+

The item number is a code for the configuration of your unit. Please use the following model key:

553	1	XX	XX	X	Product characteristic
					Solenoid valves option
		00			without solenoid valves
		10			with solenoid valves
					Power supply
			99		230 V AC, 50-60 Hz
			98		115 V AC, 50-60 Hz
					Gas connections
					Standard 6 mm
				I	1/4"

Accessories

Item no.	Description
metal-based material	
553 199 70	Long-Life cartridge MC
553 199 90	Cartridge MC
Accessories	
553 199 992	Set of Gaskets
553 000 01	Wall bracket for Bünox 2+ and Bünox

Portable Analyzers

- DA550004 BA 4000 Injection
- DA550011 BA 4510
- DA550020 BA 4S

Portable O2-Analyzer BA 4000 Inj.

The portable Bühler O_2 analyser model BA 4000 Inj. is a special unit for determining oxygen in low gas volumes. This analyser is a modification of the BA 4000, primarily used in the food industry to analyse small residual amounts in modified atmosphere packaging, bottles or tins. The O_2 content in insulating glass panes can also be determined. We offer two versions:

The BA 4000 Inj. GV is used for volumes > 1.2 floz.

The BA 4000 Inj. KV is used for gas volumes < 1.2 floz. This analyser is operated by an external vacuum pump. There are different puncturing devices available, depending on the type of packaging.

The optional pressure gauge allows for comparison measurements in vacuum packaging. With the electronic correction when using the pressure gauge, no zero gas is required for zero gas calibration. In addition, the zero point may be corrected between N_2 and CO_2.

- Paramagnetic cell measuring principle
- Long measuring cell life
- O_2 analysis in modified atmosphere packaging
- Easy to use
- Quick, accurate and reliable O_2 analysis
- Optional pressure gauge

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Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Measuring with the BA 4000 Inj.

The device has a tube equipped with an injection needle at its end. To check a package, apply a self-adhesive piece of rubber to the package to be tested. Depending on the equipment version, this adhesive septum is used to evacuate the analyser or to seal off atmospheric air. With the BA 4000 Inj. KV, the injection needle is now inserted into the rubber piece until the side bore in the needle is covered. After evacuating, the injection needle is pushed all the way through the rubber piece and into the package.

Residual gas flows from the package through the needle and into the measuring cell in the analyser and the measurement can be read on the analyser display. Switch the toggle switch at the front of the unit to display the internal pressure when using the optional pressure gauge. These values can be used to calculate the actual O_2 concentration.

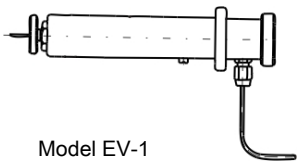
On the BA 4000 Inj. GV version the needle is inserted all the way through the rubber piece and sample gas extracted from the package by switching on the internal pump.

Technical Data

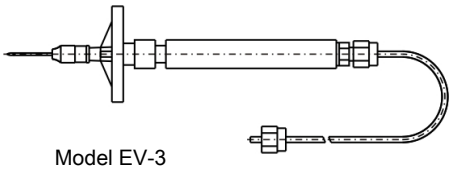
Technical Data	
Measuring component:	Oxygen
Measuring range (specify when ordering):	0 ... 25 Vol. %
Measuring principle:	paramagnetic cell measuring principle
Measuring Data	
Accuracy:	0.1 % O_2 absolute
Reproducibility:	± 0.05 % O_2
Response time:	T_{90} <10 s
Zero drift:	± 0.1 Vol.% O_2 per week
Sensitivity drift:	± 1% of measuring span per week
Gas inlet conditions	
Gas temperature:	41 °F to 104 °F
Sample gas conditioning	
Dew point:	at least 41 °F below ambient temperature
Dust particles:	Equipment filter with replaceable 8 µ filter element
Calibration	
Zero point:	with nitrogen (technically pure), optionally with vacuum
Endpoint:	with ambient air or test gas, depending on the measuring range
Climatic conditions	
Ambient temperature:	50 °F to 113 °F
Transport and storage temperature:	-13 °F to 149 °F
Relative humidity:	<75 % annual average
Measurement output	
Current signal:	4...20 mA (max. 400 Ω)
Voltage signal:	0...1 V (min. 1 k Ω) optional
Displays	
Measurement display:	LCD 3½ digits
Power supply	
Wall power supply:	100-240 V, 50/60 Hz
Construction	
Housing:	Aluminium housing with handle
Housing protection class:	IP20 (standard)
Dimensions (h x w x d):	5.7 x 7.2 x 9.4 in (standard housing)
Weight	approx. 10 lb

Puncture devices

EV-1	Puncture device for single-hand operation. Suitable for sampling gas from soft packaging of modified atmosphere packed products.
EV-3	Puncture device with fixed needle. Suitable for sampling gas from soft packaging of modified atmosphere packed products. The additional fine mesh filter also makes it suitable for sampling packages with powdered products, e.g. coffee.
Water Stop fine mesh filter	For protecting the measuring cell when analysing moist gasses (bottles, tinned foods). Filters particles, the special coating retains water liquids and aerosols.



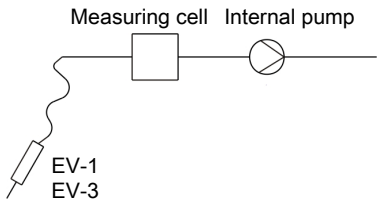
Model EV-1
for soft packaging



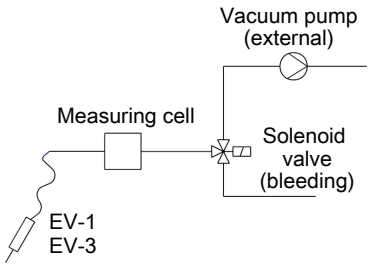
Model EV-3
for soft packaging

Flow charts

BA 4000 Inj. GV



BA 4000 Inj. KV



Ordering instructions

Device model

Item no.	Description
55 11 399	BA 4000 Inj. GV
55 11 5991	BA 4000 Inj. KV

Accessories

Item no.	Description
65 70 520	Vacuum pump 230 V
65 70 521	Vacuum pump 115 V
55 11 0994	Pressure gauge
65 71 999	EV-1
65 70 9021	EV-3
65 70 901	Needles for EV-3
65 70 9012	Needles for EV-1
65 70 970	Septum for EV-3 (1 m / 3.3 ft)
65 70 971	Septum for EV-3 (10 m / 32.8 ft)
65 70 9471	Septum for EV-1 (33 m / 108.3 ft)
65 70 9033	Pre-filter for EV-3
65 70 975	Water Stop fine mesh filter
55 11 0992	Wall power supply for GV 100-240 V AC, 12 V DC
91 12 000014	Wall power supply for KV 100-240 V AC, 15 V DC

Portable O2-Analyzer BA 4510

The portable analyser BA 4510 is used to measure traces of oxygen in inert gas. At the core of this unit is a tried and tested, maintenance-free zirconium dioxide measuring cell.

This oxygen-ion conductor combines the advantage of high selectivity with high mechanical stability and consistency. As the oxygen content drops in inert gases, the voltage zirconium oxide cells supply increases, making it particularly easy to measure traces.

An internal processor converts the measuring signal to oxygen concentration, displays it on the LCD screen, and can be output as an analogue current signal. An internal switchable gas pump provides the necessary flow rate if the primary pressure of the sample gas is too low.

The unit is menu-driven using membrane keys at the front.

A special version (BA4510 KIZ) is available for measuring gases with flammable components.

- calibration- and virtually drift-free measuring cell
- 4 – 20 mA output signal
- RS 232 interface
- internal, switchable pump
- easy to navigate menu
- programmable limits
- no test gas required

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

Technical Data	
Measuring components	
Measuring component:	Oxygen
Measuring range	0 Vol.-ppm ... 20.9 Vol.-% O_2
Measuring principle:	Zirconium dioxide
Measuring Data	
Accuracy:	< 5 % (from measured value)
Reproducibility:	< 1.5 % O_2
Detection limit:	0.1 vpm O_2
Response time (T_{50})	< 5 s
Linearity deviation	< 0.4 vpm O_2
Zero drift	< 0.2 vpm O_2 per week
Sensitivity drift	< 0.02 % from measured value per week or 200 vpb per week, whichever is higher
Gas inlet conditions	
Gas temperature:	41 °F to 176 °F
Gas overpressure.	max: 0.29 psig
Gas flow without pump:	0.08 ... 0.17 lpm (regulated to 0.12 lpm when using the internal pump)
Sample gas conditioning	
Dew point:	at least 41 °F below ambient temperature
Climatic conditions	
Ambient temperature:	50 °F to 113 °F
Transport and storage temperature:	-4 °F to 140 °F
Relative humidity:	< 80 % at 68 °F
Signal outputs	
Current signal:	0/4 ... 20 mA (on error near 0 mA); scalable
Alarm relay:	1x limit, 200 VDC, 0.5 A, 10 W
Serial port:	RS 232
Keyboard and displays	
Measurement display:	LCD plain text display
Keyboard:	3 keys
Power supply	
Voltage:	100 - 240 V AC, 47 - 63 Hz
Power input:	20 VA
Construction	
Housing:	Aluminium housing with handle
Dimensions (h x w x d):	5.31 x 3.94 x 9.45 in
Sample gas inlet:	3 mm (0.12 in) screw-in connection
Sample gas outlet:	Stainless steel hose nipple for hose with 4 mm (0.16 in) inside diameter
Housing protection class:	IP40
Weight:	approx. 6.6 lb

Ordering instructions

Device model

Item no.	Description
55 15 000	BA 4510
55 15 001	BA 4510 KIZ

Portable O2 and CO2-Analyser BA 4S

The BA 4S is a high performance O_2 and CO_2-gas analyser you can really depend on. With easy and intuitive operation and single or dual O_2/CO_2 measurement functions, BA 4S is ideal for a wide range of measurement applications.

A small sized, big monitoring capability device, the BA 4S provides flexible use and full portability. With a size that belies its strength, the BA 4S delivers reliable, leading-edge performance and accuracy you can rely on in an affordable, low-maintenance and easy-to-use unit.

- Paramagnetic O_2 and infrared CO_2 sensing technology
- Flexible, portable device
- Mains or battery power option
- Durable measuring cell
- Quick, accurate and reliable O_2 and CO_2 analysis
- Easy to use

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

When you work in light industrial or laboratory applications, you need equipment you can depend on and help you get the job done as efficiently as possible.

In certain applications you'll need equipment that's suitable for the highest level. No matter what your application monitoring requirement, you'll want a device that offers long battery runtime, low operational costs, simplified ongoing maintenance and ease of use. And we don't believe you should have to compromize.

With the full capability to meet the demands of sensitive, accurate testing, the BA 4S has long-life operation powered by a durable battery system.

This, combined with gas-specific accuracy, ensures the BA 4S is ready for a range of monitoring needs from the verification of medical oxygen to CEMS testing.

It's always ready to work when you are. When you want sensitive, accurate detection, low maintenance requirements and the flexibility to do the job the way you want it done, the BA 4S provides a small, easy to use and cost-effective solution that delivers on all levels.

Examples for application:

- Laboratories and research
- Air separation and gas bottling plants
- Medical gas storage facilities
- Physiology and respiration studies
- Diving centers
- Transfilling
- Fermentation
- Combustion analysis

Technical Data

General Technical Data	
Size:	150 mm (6.0") x 300 mm (12.0") x 260 mm (10.5") WxHxD
Weight:	2.6 kg (5.7 lbs) - 3.9 kg (8.6 lbs) depending on configuration

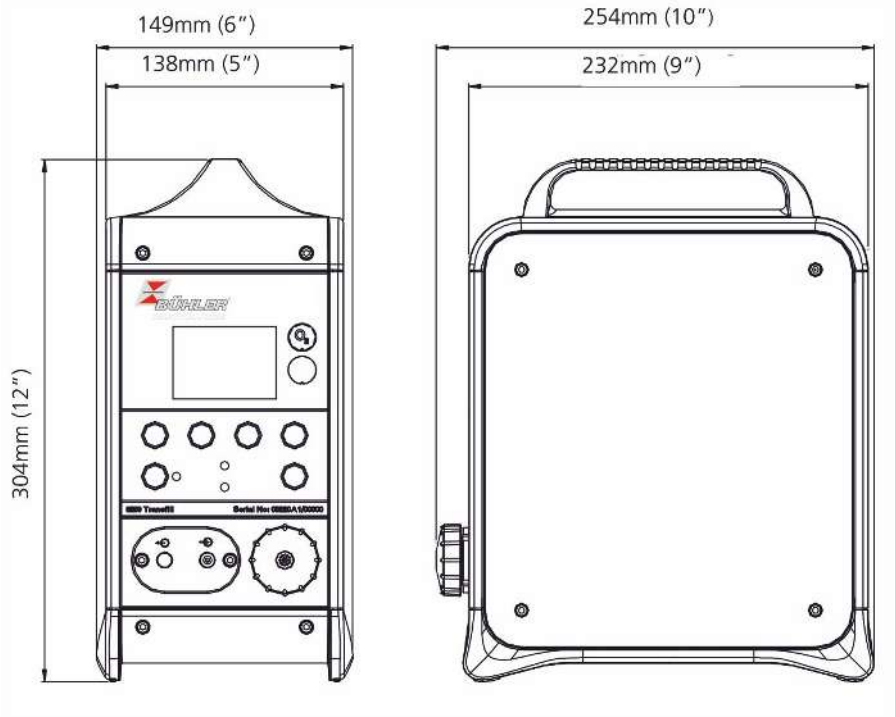
Options	Description	Specification
Internal pump:	Integrated internal pump with a timer	700 ml/min

Monitoring Performance			
Sensor:	O_2	O_2	CO_2
Technology:	-	-	Infrared
Variant:	Pro (1 dp)	Premium (2 dp)	All variants (1 dp)
Full scale and Min. output:	0-100 % 0-1 % (min.)	0-100 % 0-1 % (min.)	25 %
Cell construction:	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel
Accuracy (intrinsic error):	±0.1 % O_2	±0.05 % O_2	±2 % FSR
Zero drift/week:	±0.2 % O_2	±0.2 % O_2	±4 % FSR
T_{90} in sec.:	<15	<15	<10
Operating temperature:	-10 to +50 °C (14 to 122 °F)	-10 to +50 °C (14 to 122 °F)	+5 to +45 °C (41 to 113 °F)

Please note: Allow 1 hour warm up to meet performance specification.

Sample for Measurement	
Sample gas:	Clean, dry, non-flammable and non-toxic gases only. Through samples containing >5 % CO_2 are toxic, they can be analyzed if the suitable precautions are taken.
Flow Control:	AFCD maximizes measurement stability for unpumped units over specified inlet pressure range, 1.5 – 6 ltr (0.05 -0.2 ft^3)/min)
Sample inlet connection:	5 mm OD stub
Sample outlet connection:	5 mm OD stub (sample and bypass)
Inlet pressure:	With optional internal pump – 7 kPa (1 psig) to 3.5 kPa (0.5 psig) Without pump – 7 kPa (1 psig) to 70 kPa (10 psig)

Dimensions



Ordering instructions

Item no.	Description
55905260701	BA 4S O_2 Pro without pump
55905260702	BA 4S O_2 Pro including internal pump
55905260703	BA 4S O_2 Premium without pump
55905260704	BA 4S O_2 Premium including internal pump
55905260705	BA 4S O_2 Pro + CO_2 without pump
55905260706	BA 4S O_2 Pro + CO_2 including internal pump
55905260707	BA 4S O_2 Premium + CO_2 without pump
55905260708	BA 4S O_2 Pro + CO_2 including internal pump

Stationary Analyzers

- DA550021 BA 1LT
- DA550012 BA 2000
- DA550016 BA 3 select

Zirconia Oxygen Analyser BA 1LT

The BA 1LT oxygen analyser is designed to determine concentrations of residual oxygen content in flue gas of furnaces (max. 350 °C/662 °F) and to measure the oxygen concentration in air and inert gas mixtures (N_2, CO_2, noble gases).

Its strengths further include use in hard to reach areas and in self-contained systems (ventilation pipes, containers, etc.).

- Low energy consumption
- Not temperature dependent
- 4 – 20 mA output signal
- No zero drift
- High measuring accuracy
- Long life
- Versatile
- No reference gases required
- No calibration gases required

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Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Functional principle

The BA 1LT oxygen analyser measures the oxygen partial pressure directly in the gas mixture, the absolute oxygen content. At a constant pressure the measurement value equals the oxygen concentration in Vol.%. The measuring method is based on a dynamic process using two zirconium dioxide discs forming a hermetically sealed chamber.

The entire measuring range is linear.

The sinter protects the sensor element from dust. Available in two styles:

- Full sinter, with enlarged surface, thus faster response time.
- Internal sinter, enhanced draining properties (condensate protection), slower response time.

Since the measuring system monitors the function during operation and alerts to hardware and sensor malfunctions and further features a diagnostic function, it can be operated safely as needed. No second oxygen sensor required for this purpose!

Can be calibrated without reference gas, using atmospheric air.

Measurement values are output via analogue 4-20 mA channel, and error messages via digital channel.

Technical Data

Transmitter		
Power supply	7-pin plug contact	IP 67 round plug
	Voltage / tolerance	24 V DC ± 20 %
	Output	< 13 W
Signal transmission	Up to 300 metre distance	For cables with 1.5 mm (0.06 in)^2 strands
Connections	Pin 1	24 V DC
	Pin 2	0 V
	Pin 3	Sense
	Pin 4	Test
	Pin 5	K1 analogue output 4-20 mA
	Pin 6	K2 digital I/O impulse and error, electric calibration
	Pin 7	Functional earth
Transmitter ambient temperature	-20 °C to +60 °C (-4 °F to 140 °F)	Please note sunlight!
Permissible humidity	5 to 95% relative humidity	not condensed
Output	4-20 mA, max. burden 500 W	
Resolution	DAC resolution 12 bit	
Housing	Makrolon 8030 (30% GV), UL94 V-1	red
Housing degree of protection	IP 65	
Housing weight	approx. 150 g (0.3 lb)	without rod sensor
Housing dimensions	approx. 105L x 42W x 62.3H mm (L4.1 x W1.7 x H2.4 inch)	without rod sensor

Sensor/rod sensor	Full sinter	Internal sinter
Measuring ranges	0.1 – 25 Vol.% oxygen at 1013.25 hPa 1 – 253.31 hPa (O_2)	0.1 – 25 Vol.% oxygen at 1013.25 hPa 1 – 253.31 hPa (O_2)
Gas ingress	Via diffusion through full sinter or internal sinter	Via diffusion through full sinter or internal sinter
Heat-up time	approx. 10 min (at a flow rate of 0 m/s)	approx. 10 min (at a flow rate of 0 m/s)
Accuracy K1	±2% full scale at 25 °C (77 °F) and 1013.25 hPa	±2% full scale at 25 °C (77 °F) and 1013.25 hPa
Reproducibility K1	±1% full scale at 25 °C (77 °F) and 1013.25 hPa	±1% full scale at 25 °C (77 °F) and 1013.25 hPa
Temperature	up to +350 °C (662 °F)	up to +350 °C (662 °F)
Flue gas speed	up to 5 m/s	up to 5 m/s
Sensor degree of protection	IP40	IP40
Response times		
T20	10 s	15 s
T60	12 s	26 s
T90	18 s	50 s
T95	25 s	60 s
Probe length L1 (±4 mm/±0.16 in)		
200 (350 °C/662 °F)	197 mm (7.8 in)	211.5 mm (8.3 in)
Diameter	approx. 12 mm (0.5 in)	approx. 12 mm (0.5 in)
Material	Tube stainless steel 1.4301 Sinter stainless steel 1.4404	Tube stainless steel 1.4301 Sinter stainless steel 1.4404

Ordering Instructions

Item no.	Description
55015001	BA 1LT O_2 Analyser, 24V DC, L: 220 mm (8.7 in), internal sinter
55015002	BA 1LT O_2 Analyser, 24V DC, L: 220 mm (8.7 in), full sinter
55015001-SEN	Replacement probe for BA 1 LT O2 analyser, L: 220 mm (8.7 in), internal sinter
55015002-SEN	Replacement probe for BA 1 LT O2 analyser, L: 220 mm (8.7 in), full sinter

Drawing

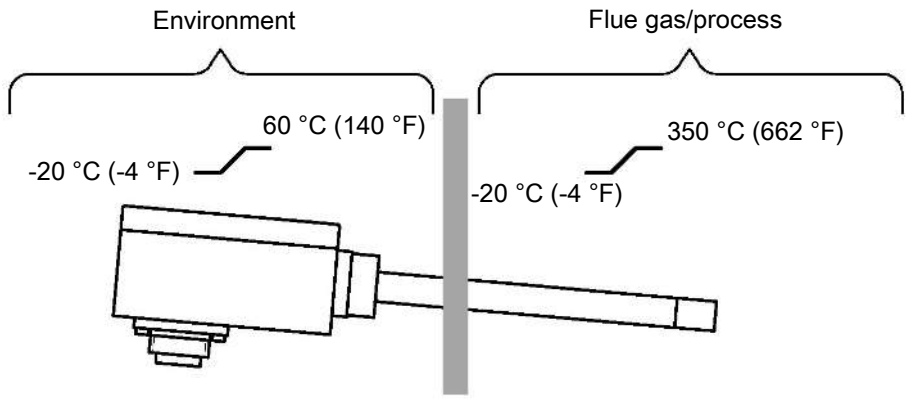

Fig. 1: Installation BA 1LT

Oxygen Flue Gas Analyzer BA 2000

Some combustion processes, e.g. process heaters, steam boilers or heating furnaces the air required to achieve optimal system efficiency can easily fluctuate. And the economic optimum of the process fluctuates within a relatively narrow range. Both elevated NO_x or SO_x emission due to an excess supply of air (excess O_2) as well as energy loss within the system due to incomplete combustion (lack of O_2) require measuring the oxygen level in the flue gas of the combustion process. Sampling near the combustion chamber is therefore just as vital as using a rapid response sensor to allow for responding to changes in the combustion gas temperature and/or other variables in the combustion process promptly.

The BA 2000 was developed specifically for this application.

- Fast response time
- Tool-less filter change
- Easy handling
- Flue gas temperatures up to 1600 °C (2912 °F)
- Durable ZrO_2 measuring cell
- Display includes O_2
- 4-20 mA output signal
- Ambient temperature -20 to +70 °C (-4 to 158 °F)
- No reference gas required
- No test gas required
- No gas conditioning required
- Calibration with instrument air

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e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

The injector built into the filter housing constantly supplies the ZrO_2 sensor with fresh process gas. The self-regulating probe part is heated to 180 °C (356 °F) to prevent condensation. The ZrO_2 sensor in the BA 2000 provides accurate, extremely fast measurements.

No reference gas needed for operation. The sensor's 1-point calibration uses instrument air also needed to operate the injector. If necessary, 2-point calibration may also be performed. The test gas additionally needed for calibration in this case should ideally correspond with the O_2 concentration of the sample gas.

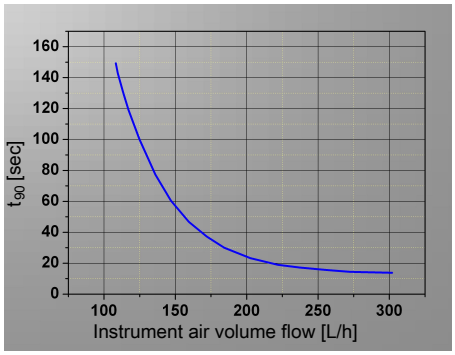
A filter built into the probe protects the measuring cell from dust exposure. The filter can be changed in seconds without tools by simply turning the handle 90°.

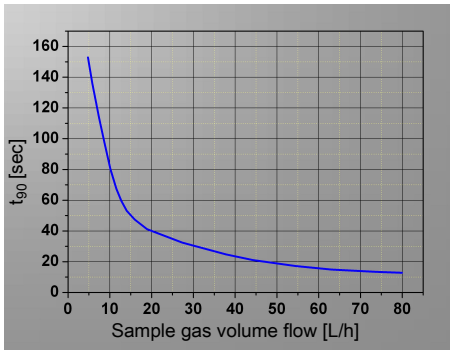
The filter elements are available in ceramic, sintered or star-pleated stainless steel.

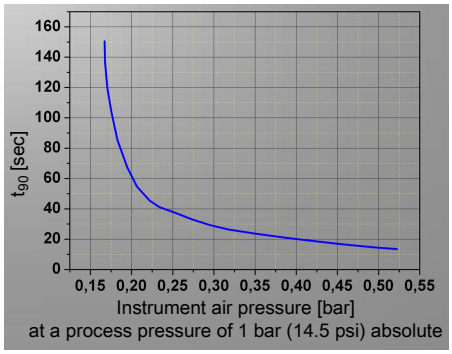
Together with the filters listed, the BA 2000 can be used for gases with a dust load of up to approx. 2 g/m³.

The BA 2000 will provide all the information required for safe operation. The controller features a display with key pad for entering commands, alarm output, calibration function and 4 - 20 mA output signal.

t_{90} times depending on volume flow and pressure







Oxygen measurement principle with ZrO_2 cells

The NERNST equation serves as the basis for determining the oxygen concentration in gases by zirconium dioxide measuring cell.

(I) $$U = \frac{RT}{4F} \ln \frac{p_{O_2,\,air}}{p_{O_2,\,sample\ gas}}$$

U	Cell voltage in V
R	Universal gas constant, R = 8.31447 J/(mol·K)
T	Measuring temperature in K
F	Faraday-constant, F = 96485.34 C/mol
$p_{O_2,\,air}$	Partial pressure of oxygen at the reference electrode in dry air in Pa
$p_{O_2,\,Sample\ gas}$	Partial pressure of oxygen at the reference electrode in dry air in Pa

The conductivity of the oxide ions of zirconium oxide increases exponentially with the temperature and reaches adequate values above 600 °C (1112 °F).

Provided the total pressures of the gases are about equal on both electrodes (in this case volume concentrations can be used in place of partial pressures), after adding the numeric values for the constants in equation (I) results in the following equation for the oxygen concentration.

(II) $$\varphi_{O_2} = 20{,}9 \cdot e^{(-46{,}42 \cdot \frac{U}{T})}$$

φ_{O_2}	Oxygen concentration in sample gas in Vol.-%
U	Potential difference in mV
T	Measuring temperature in K
$20{,}9$	Oxygen concentration in dry air in Vol.-%

The BA 2000 uses a potentiometric cell. The reference and the sample gas electrode are located in two different gas chambers with different oxygen partial pressure. The two chambers are separated by the gas-tight ZrO_2 tube. The electrodes generate e.m.f. (electromotive force) proportional to the partial pressure difference of the oxygen. The NERNST equation applies.

Technical Data

BA 2000 Technical Data	
Sampling tube length:	0.5...2 m (1.6...6.6 ft)
Voltage:	115 or 230 V, 50/60 Hz
Probe heat output:	400 W
Measuring range:	0.1 to 21 Vol.-% O_2
Output signal:	4-20 mA = 0-21 Vol.-% O_2 (scalable 0-2.5/0-5/0-10/0-15)
Accuracy:	relative error < 5 %
Sensor T_{90} time:	< 15 sec
Alarm Sensor:	Upper and lower limit of nominal value for heating (fixed) Upper and lower limit of O_2 concentration (adjustable)
Probe alarm:	Insufficient temperature
Ambient temperature:	-20 ... +70 °C (-4 ... 158 °F)
Process temperature:	up to 1600 °C (2912 °F), depending on sampling tube
Probe operating temperature:	max. 200 °C (392 °F)
Probe material:	1.4571
Test gas 1-point calibration:	Instrument air 20.9 Vol.-% O_2
Test gases 2-point calibration:	Instrument air 20.9 Vol.-% O_2 and test gas 0.1 to 15 Vol.-% O_2

Ordering instructions

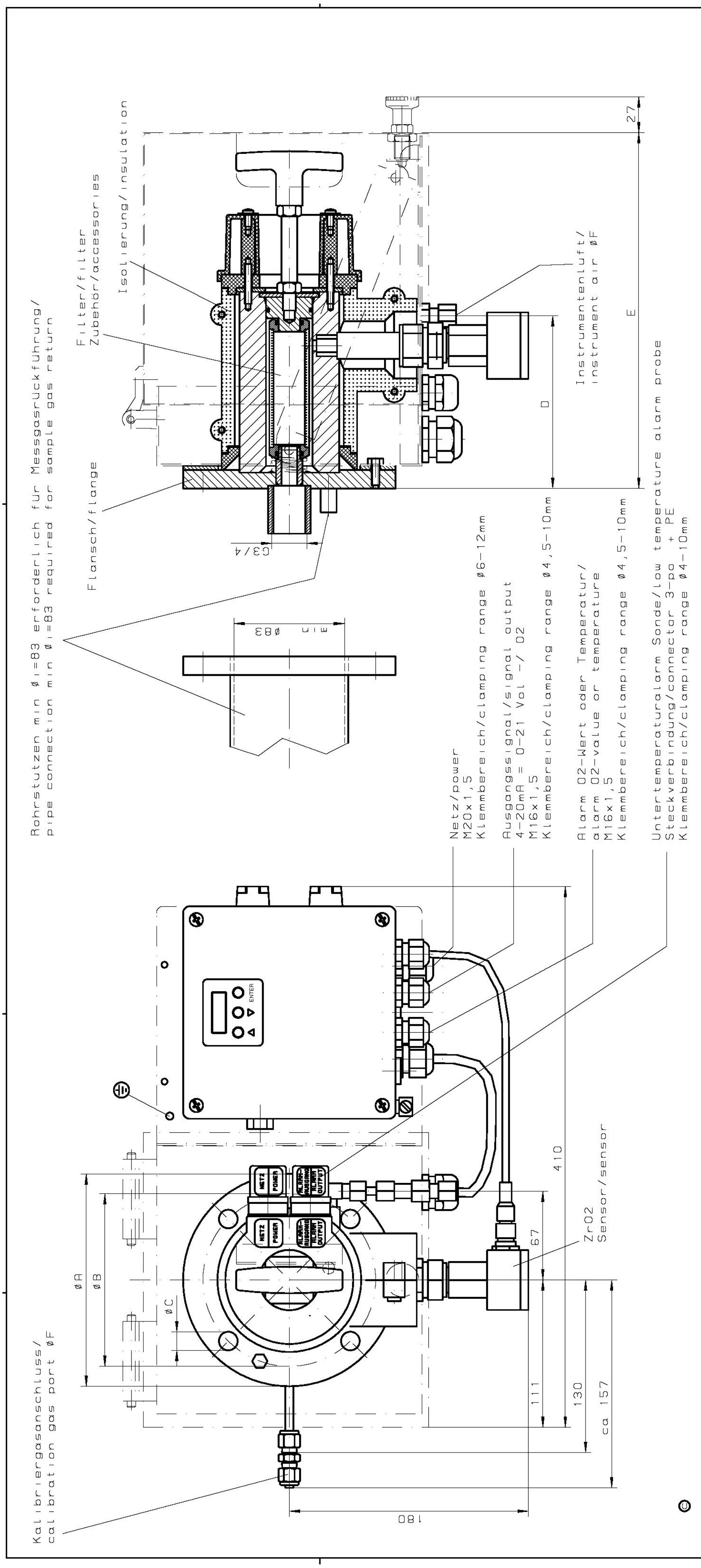
Item no.	Description
55200099	BA 2000, 230 V 50/60Hz
55201099	BA 2000-MF, 230 V 50/60Hz
55202099	BA 2000-SE, 230 V 50/60Hz
55200098	BA 2000, 115 V 50/60Hz
55201098	BA 2000-MF, 115 V 50/60Hz
55202098	BA 2000-SE, 115 V 50/60Hz
55200098I	BA 2000I, 115 V 50/60Hz, US sized
55201098I	BA 2000I-MF, 115 V 50/60Hz, US sized
55202098I	BA 2000I-SE, 115 V 50/60Hz, US sized
55200099I	BA 2000I, 230 V 50/60Hz, US sized
55201099I	BA 2000I-MF, 230 V 50/60Hz, US sized
55202099I	BA 2000I-SE, 230 V 50/60Hz, US sized

MF = separate sample gas recovery
SE = separated electronics up to approx. 15 m (49.2 ft)

Adapter flanges

Item no.	Description
55200001	Adapter flange DN65 PN6 to Servomex
55200002	Adapter flange DN65 PN6 to Thermox
55200001I	Adapter flange DN3-150 to Servomex
55200002I	Adapter flange DN3-150 to Thermox

Drawings



Art Nr	55200099	55200098	55200099I	55200098I
Umgebungstemperatur/ ambient temperature	-20 bis/up to +70°C -4 bis/up to 158°F			
Werkstoffe/materials -Flansch, Kopf/flange head	1.4571/SS316Ti			
Betriebstemp. Sonde/ operating temp. probe	max. 200°C / 392°F			
Betriebsspannung/power supply	230VAC	115VAC	230VAC	115VAC
-Temperatur/temperature selbstregelnd/self regulating	180°C / 356°F			
-Untertemperaturalarm/ low temperature alarm	140°C / 284°F			
-max. Schaltstrom/max. current	4A			
Messbereich/measuring range	0,1 ... 20,9 Vol.-% O2			
Ausgangssignal skalierbar/ signal output scalable	4 ... 20mA=0-2,5/0-5/0-10/0-15/0-20,9 Vol.-% O2			
Abmessung/dimension Flansch/flange	DN65 PN6		DN3"-150	
A	Ø160		Ø190,5	
B	Ø130		Ø152,4	
C	Ø14		Ø19,1	
D	130		140	
E	268		278	
F	Ø6		Ø1/4	

Alle Kanten gratfrei | Alle Rechte vorbehalten | Maße ohne Toleranzangabe nach ISO 2768-mK | Maßstab: 1:2 | Gewicht:

Werkstoff:

Bearb. 15.02.2007 Brinkmann | Gepr.

Benennung: Rauchgas-Sauerstoff-Analysator / Oxygen Flue Gas Analyzer / BA 2000

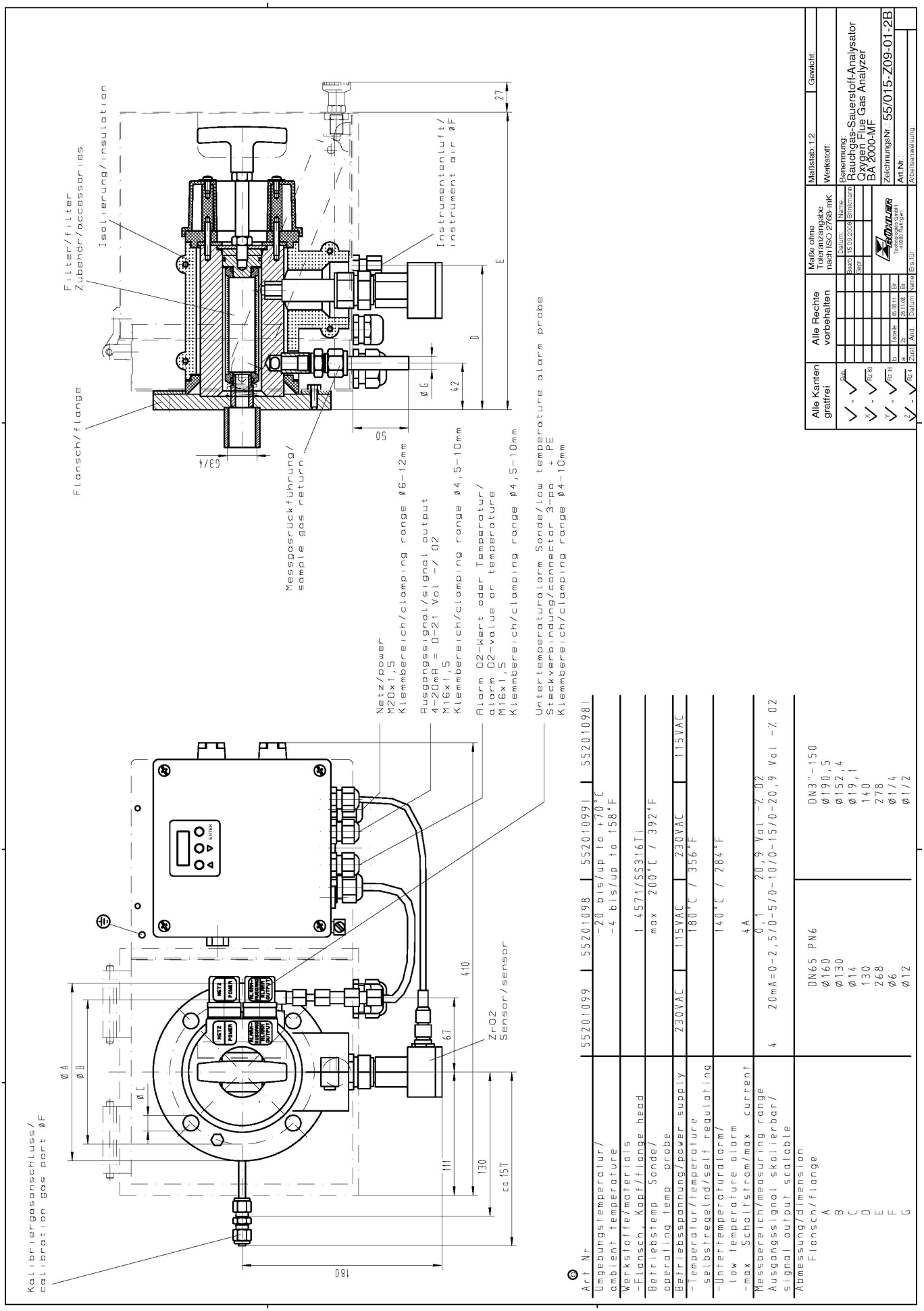
C Tabelle 04.08.11 Br | b 1x 15.09.08 Br | a 2x 29.05.07 Br | Zust. Änd. Datum Name | Ers.für:

Bühler Technologies GmbH 40880 Ratingen

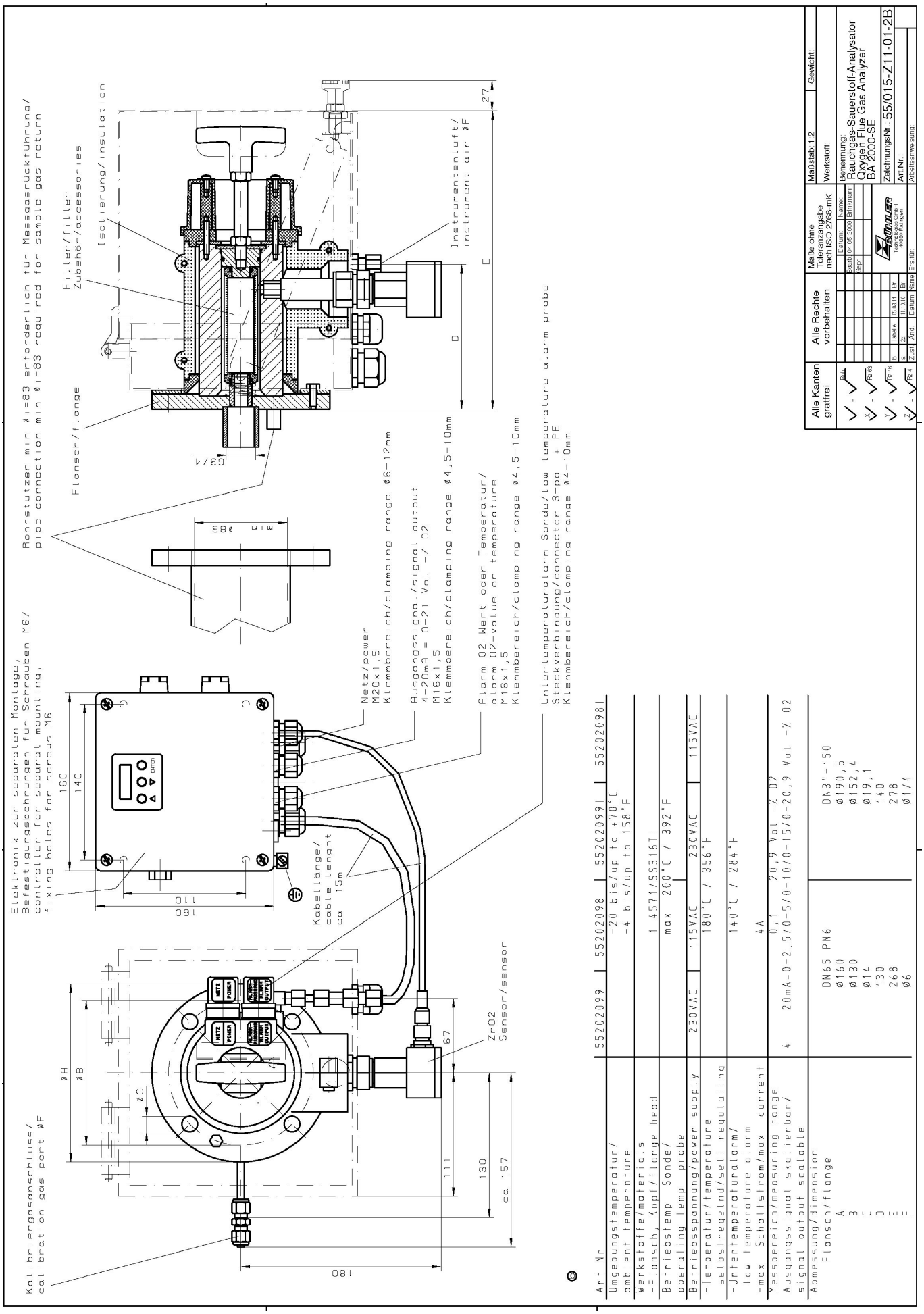
ZeichnungsNr.: 55/015-Z01-01-2C

Art.Nr.:

Arbeitsanweisung:



Art Nr	55201099	55201098	55201099I	55201098I
Umgebungstemperatur/ ambient temperature		-20 bis/up to +70°C -4 bis/up to 158°F		
Werkstoffe/materials				
-Flansch, Kopf/flange head		1 4571/SS316Ti		
Betriebstemp Sonde/ operating temp probe		max 200°C / 392°F		
Betriebsspannung/power supply	230VAC	115VAC	230VAC	115VAC
-Temperatur/temperature selbstregelnd/self regulating		180°C / 356°F		
-Untertemperaturalarm/ low temperature alarm		140°C / 284°F		
-max Schaltstrom/max current		4A		
Messbereich/measuring range		0,1 20,9 Vol -% O2		
Ausgangssignal skalierbar/ signal output scalable	4 20mA=0-2,5/0-5/0-10/0-15/0-20,9 Vol -% O2			
Abmessung/dimension				
Flansch/flange	DN65 PN6		DN3"-150	
A	Ø160		Ø190,5	
B	Ø130		Ø152,4	
C	Ø14		Ø19,1	
D	130		140	
E	268		278	
F	Ø6		Ø1/4	
G	Ø12		Ø1/2	



Art Nr	55202099	55202098	55202099I	55202098I
Umgebungstemperatur/ ambient temperature		-20 bis/up to +70°C -4 bis/up to 158°F		
Werkstoffe/materials				
-Flansch, Kopf/flange head		1.4571/SS316Ti		
Betriebstemp. Sonde/ operating temp. probe		max. 200°C / 392°F		
Betriebsspannung/power supply	230VAC	115VAC	230VAC	115VAC
-Temperatur/temperature		180°C / 356°F		
selbstregelnd/self regulating				
-Untertemperaturalarm/ low temperature alarm		140°C / 284°F		
-max. Schaltstrom/max. current		4A		
Messbereich/measuring range	4 20mA=0-2,5/0-5/0-10/0-15/0-20,9 Vol -% O2		0,1 20,9 Vol -% O2	
Ausgangssignal skalierbar/ signal output scalable				
Abmessung/dimension				
Flansch/Flange		DN65 PN6		DN3"-150
A		Ø160		Ø190,5
B		Ø130		Ø152,4
C		Ø14		Ø19,1
D		130		140
E		268		278
F		Ø6		Ø1/4

Alle Kanten gratfrei	Alle Rechte vorbehalten	Maße ohne Toleranzangabe nach ISO 2768-mK	Maßstab: 1:2	Gewicht:
		Datum Name	Werkstoff:	
		Bearb. 04.05.2009 Birnmann	Benennung: Rauchgas-Sauerstoff-Analysator Oxygen Flue Gas Analyzer BA 2000-SE	
		Gepr.		
		Buehler Technologies GmbH 40880 Ratingen	ZeichnungsNr.: 55/015-Z11-01-2B	
			Art Nr.:	
			Arbeitsanweisung	

Multi Component Gas Analyser BA 3 select

The BA 3 select is a gas analyser for 19" rack mounting with a modular design which can be expanded from 1-channel all the way to 3-channel O_2 analyser.

One specific advantage of the analyser is the modularity. This also allows for easily upgrading measuring cells. The user is then able to adapt his equipment to changing measuring requirements inexpensively.

The analyser is standard equipped with touchscreen. Along with a clear menu structure this ensures intuitive, particularly user-friendly equipment operation.

Of course the customer is provided with analogue and digital status-, limit- and alarm messages required for effective monitoring. Extensive analysis functions (e.g. interfering gas correction and graphic display of response characteristics) complete the ease of use.

- Up to three separate gas paths
- O_2 measurement paramagnetic, electro-chemical and/or ZrO_2
- Modular, maintenance-friendly layout
- User-friendly touchscreen
- All relevant limit- and status alarms
- Optional: Graphic flow display via screen
- Optional: Up to three float flow meters
- Optional: Up to three built-in pumps
- Optional: Pressure- and temperature compensation

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Technical Data

General

Housing	Dimensions:	19" rack mount housing, 3 HE
	H x W x D, style 1:	5.2 x 17.3 x 16.7 in
	H x W x D, style 2:	5.2 x 17.3 x 13.2 in
	Protection class:	IP 20
	Weight:	max. 15 lb
	Display and control:	4.7" touchscreen display
Electric supply	Voltage:	230 V AC or 115 V AC *(note nameplate on the unit)*
	Mains frequency:	50/60Hz
	Max. power input:	60 W
Ambient parameters	Ambient temperature:	50 °F ... 113 °F
	Relative humidity:	< 75 %
	Ambient pressure:	12.7 PSI to 17.4 PSI
	Transport and storage temperature:	41 °F - 149 °F
AUTO cal. function	Optional for each measuring channel: Zero gas (air) + span gas	
Warm up time	Minimum 30 min (up to 2 h recommended for high-precision measurements)	

Sample gas connections

Gas paths	Max. three separate gas paths (with auto cal. function)	
	Screw-in connection:	6 mm PVDF for 4/6 tube
Inlet parameters	Gas inlet temperature:	41 °F to 122 °F
	Sample gas pressure (absolute):	12.7 PSI to max. 26.1 PSI, reduced to max. 17.4 PSI with internal pump
	Sample gas conditioning:	purified/ filtered (<15 µ filtration) sample gas with dew point < 50 °F (always 5 K below ambient temperature).

Signal inputs and outputs

Analogue output:	0-20 mA / 4-20 mA / 0-10 V / 2-10 V inside unit variable by channel
Limit relay:	2x per measuring channel (125 V AC, 0.5 A / 30 V DC, 1 A)
Status relay:	Error, service, calibration, measuring range (125 V AC, 0.5 A / 30 V DC, 1 A)
Binary inlets:	1x per channel + 2 x per unit: designed for 24V, potential-free
24 Volt output:	1x per channel (for supply binary inputs), protected by T250mA
Serial port:	RS 232

Parts in contact with sample gas

Component	Materials in contact with media		
Pump	PET, PPS		
Flow regulator	PTFE, stainless steel (1.4571)		
Gas lines	FPM (Viton), stainless steel (1.4571)		
Solenoid valves	PVDF or stainless steel (1.4571)		
Gas ducts	PVDF or stainless steel (1.4571)		
Flow meter	PVDF, borosilicate glass		
Measuring cell	ZrOx cell	Paramagnetic cell	EC cell
	1.4571, ZrOx ceramic	1.4401 Borosilicate glass Platinum-iridium alloy	ABS

Measuring cells

Measuring cell	ZrOx cell*	Paramagnetic cell	EC cell
Largest measuring range (MR)	0-10000 vpm (0-21 Vol.%)**	0-100 %	0-25 %
Smallest measuring range	0-10 vpm	0-1 %	0-10 %
Response time t90***	< 4 sec	< 5 sec	< 15 sec
Linearity deviation	< 1 % FS (< 2 % FS within the smallest MR)	< 0.2 Vol.%	< 1 % FS
Zero drift	< 1 % FS /week	< 0.2 Vol.% /week	< 2 % FS /week
Measurement value drift	< 0.3 % FS / week	< 0.2 % MW /week	< 2 % FS /week
Repeatability	1 % FS (2 % within the smallest MR)	1 % FS	1 % FS
Detection limit	0.1 vpm within MR 0-10 vpm	0.1 %	0.2 %
Pressure compensation	optional	yes	yes
Thermal stabilisation	yes	yes	-

* Two cell types available: (A) catalytically active cell (CAC) => not for flammable carrier gases. (B) catalytically inactive cell => suitable if traces of flammable gases are present (< 10 vpm H2, CO, CH4)

** Optional for unit with modified calibration routine

*** Signal damping adjustable fr. 1 sec to 20 sec

Abbreviations:

FS ...from span

MW ...from measurement

r.F. ...relative error

Oxygen measurement

There are three different cells available for measuring oxygen. The most cost-efficient electrochemical O2 cell can be used for measuring in the %-range.
A maintenance flap at the front of the housing for easy access to the cell ensures low-cost, easy maintenance. In addition, extra durable and ultra-precise paramagnetic cells may be used for measuring in the %-range. A zirconium dioxide (ZrO2) cell may be selected for accurate oxygen trace measurement. This is also available in a catalytic inactive version.

Options for integration

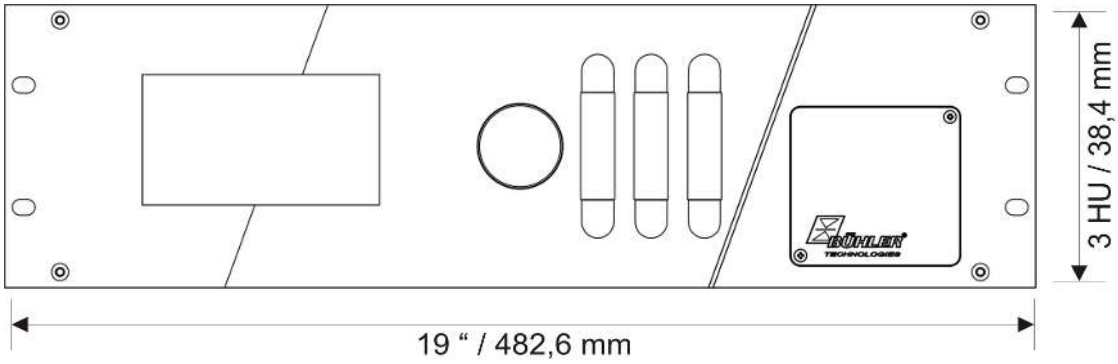
Options currently available:

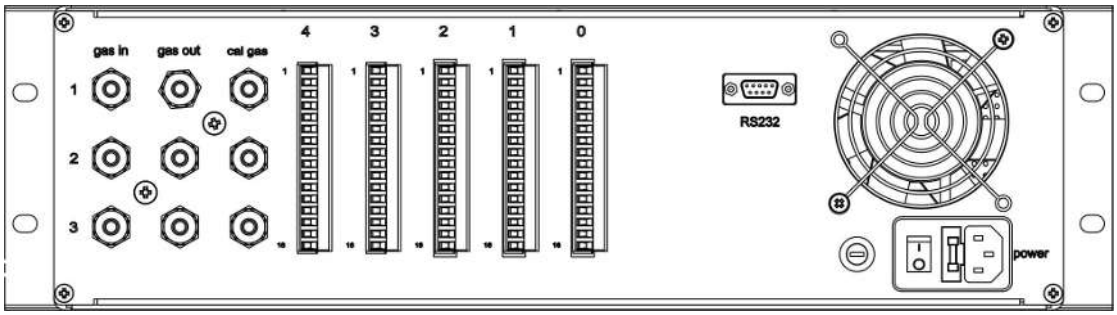
- Built-in pump(s)
- Gas analysis filter
- Float Flow Meter

Gas connections

- up to 3x pipe fitting (Ø6 mm)
- up to 3x PVDF hose screw connections (Ø4/6 mm)

Equipment overview





Portable probes and conditioning systems

- DA464004 Portable probes and conditioning systems
- DA464001 Baseline
- DA464002 Smartline
- DA464003 PCS.base
- DA464005 PCS.smart
- DA464006 PCS.smart+
- DA464007 PCS.smart+ AMS

Portable probes and conditioning systems

System description

Portable probes are ideal **for mobile applications** in changing locations. They are particularly suitable for use with mobile sample gas conditioning, e.g. for control or sample measurements.

We offer **small, compact gas conditioning systems** as the optimal upgrade for the respective probe. These systems are available inside either a **sturdy, lightweight bag** or a **sturdy case** for safe storage.

Portable probes

Model	Baseline	Smartline
		
Sampling line:	Unheated	Heated
Heater:	no	Self-regulating/adjustable
Mounting options:	Fitting cone/plug/flange	Fitting cone/plug/flange Mounting bracket to fasten to the flue
Pressure:	Atmosphere	87 psi
Weight:	approx. 0.77 lb	5 lb (3 m/9.8 ft length)/8.2 lb (5 m/16.4 ft length)
Data sheet no.:	464001	464002

Portal gas conditioners

Model	PCS.base	PCS.smart
		
Style:	Sturdy, lightweight shoulder bag	Aluminium case
Weight:	approx. 15 lb (without accessories)	approx. 29.8 lb
Data sheet no.:	464003	464005

Please refer to the respective data sheets for additional information.

In addition to portable gas conditioning systems, we also offer other mobile gas conditioners. Please refer to chapter analysis systems in overview data sheet 450021.

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
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Portable sample probes type Baseline

In addition to stationary analysers, gas analysis for monitoring emissions also uses portable methods. The actual measuring task determines the complexity of the sampling/analysis units. Since not all control points are easy to access, operators are interested in suitable and light equipment with a small pack size. Even under this premise, extracting the sample gas must meet high standards to ensure the measurements are reliable.

The portable Baseline series gas probe has a light weight, a compact size and a convenient range of accessories.

- Designed for sample measurements
- Also suitable for control measurements
- Unheated version
- Unheated 10 ft NBR hose
- Also ideal for service companies
- Easy to handle
- Low weight
- Reduced maintenance
- Ideal for combining with PCS.base series portable sample gas conditioning
- Optional accessories

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Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
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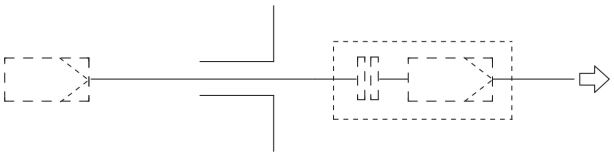
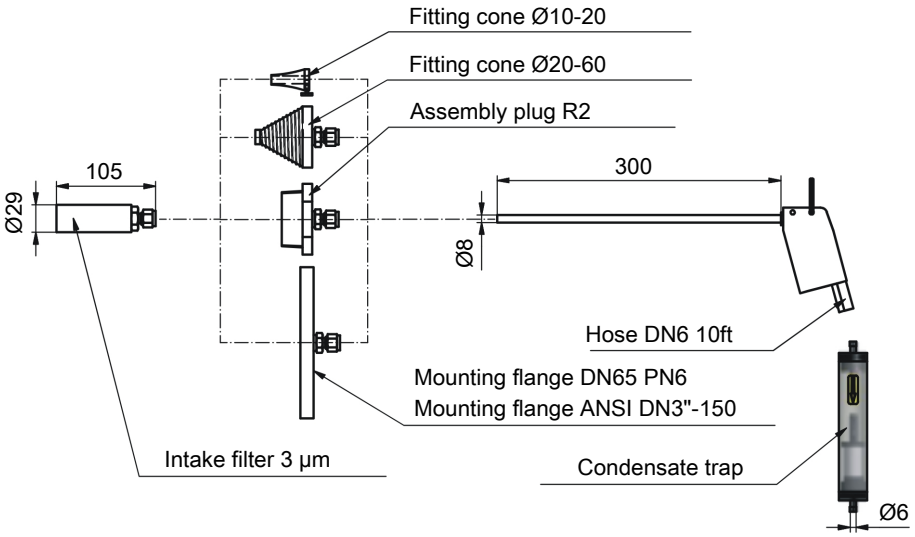
Flow chart



Technical Data

Technical Data Baseline	
Weight:	12 oz
Material tube: handle: hose:	 stainless steel polyamide NBR
Temperature inside stack:	max. 1112 °F
Pressure:	atmospheric
Dust load:	max. 2 g/m³ using the intake filter
Fixed probe tube length:	300

Drawing



Spare parts and accessories

Item no.	Description
	Probe and accessories
46760100000	Probe Baseline
46760008	Mount 6.5 ft chain and karabiner; Material: Galvanized steel
46760007	Condensate trap ø30x155; Tube: Plexiglas PMMA; Cover: PVC; Seal: NBR; Filter element: Fiberglass
	Filter / filter elements
46760020	Filter element for condensate trap; Material: Fiberglass
46760030	Filter element for condensate trap; Material: PTFE
46760006	Sintered metal intake filter 3 µm; Material: Stainless steel
	Mounting accessories
46760001	Tapered assembly plug ø10-20; Material: 11SMnPb30
46760002	Tapered assembly plug ø20-60; Material: 1.4571
46760003	Assembly plug R2; Material: 1.4571
46760004	Mounting flange DN65 PN6; Material: 1.4571/1.4401/PTFE
46760005	Mounting flange ANSI DN3"-150; Material: 1.4571/1.4401/PTFE

Special mounts on request!

Portable sample probes type Smartline

In addition to stationary analysers, gas analysis for monitoring emissions also uses portable methods. The actual measuring task determines the complexity of the sampling/ analysis units. Since not all control points are easy to access, operators are interested in suitable and light equipment with a compact size. Even under this premise, extracting the sample gas must meet high standards to ensure the measurements are reliable.

The Smartline series of portable gas sampling probes features a lightweight, self-regulating or temperature controlled heated sample gas line with built-in particle filter.

- Portable probe and heated line as all-in-one solution for mobile applications
- Designed for sample measurements
- Also suitable for control measurements or continuous sampling
- Self-regulating or temperature-controlled heated
- Also ideal for service companies
- Built-in, heated filter element
- Low weight
- Reduced maintenance
- Stack mounting possible
- Tool-less filter element change
- Space-saving version for sampling with high moisture content
- Option: Test gas function option on input end
- Option: Transport case

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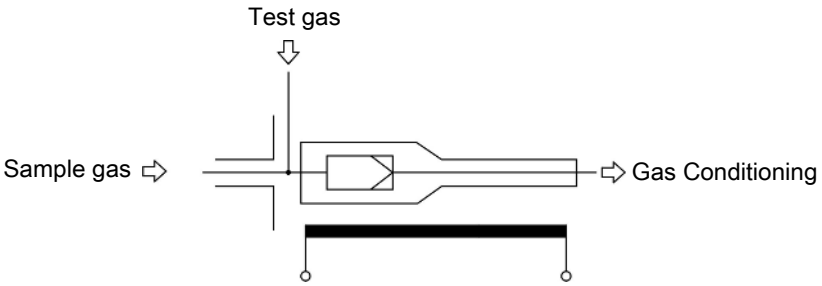
Flow chart



Technical Data

Smartline Technical Data	
Warm up time at 77 °F	approx. 30 minutes
Ambient temperature	-4 °F to 104 °F
Max. operating temperature	Varies by heating tube type, see type plate
Heater	controllable with Pt100, 100 W/m, max. 356 °F self-regulating, 60 W/m, 248 °F
Dust load	max. 2 g/m³
Temperature inside stack	max. 752 °F – 1922 °F, varies by sampling tube, see spare parts and accessories
Pressure	max. 87 psi
Protection class	IP 54

Electrical specifications

Electric supply	
Voltage (optional supply via portable conditioning PCS.smart)	230 V AC - 60 W/m or 100 W/m +/- 10% 115 V AC - 60 W/m or 100 W/m +/- 10%
Length	1 m (3.2 ft)

Mechanical specifications

Heating tube diameter	approx. 1.26 in
Heating tube length	3 (9.8 ft) or 5 m (16.4 ft)
Weight	approx. 5.1 lb at 3 m (9.8 ft) length approx. 8.2 lb at 5 m (16.4 ft) length

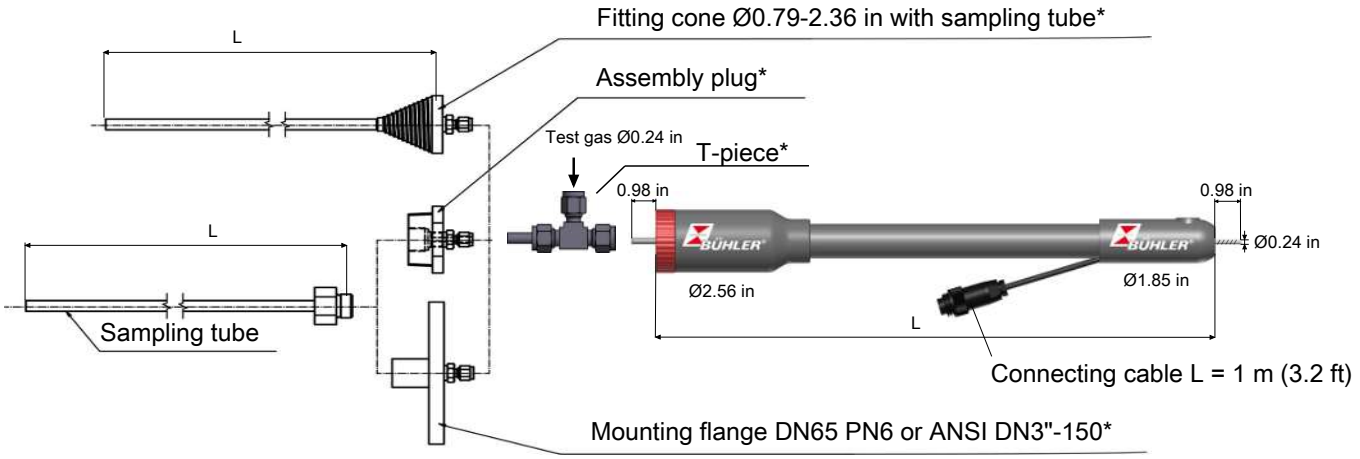
Materials

Material	Silicone, PTFE, stainless steel, polyamide
Parts in contact with mediums	Stainless steel 1.4571, 1.4404, 1.4305, PTFE
Bend radius	min. 5.51 in
PTFE core	DN 4/6
End termination	Stainless steel, Ø0.24 in

Transport case (accessory)

Outside dimensions	approx. 22.64 in x 18.5 in x 8.07 in
with space for the following parts	Smartline 3 m (9.8 ft)/5 m (16.4 ft), 3 x filter element, 2 x sampling tube, 2 x assembly plug, 2 x mounting flange, mounting bracket with chain, T-piece with insulation, 2 x compartment for small parts, operating instructions

Drawing



Mounting bracket with 2 m (6.6 ft) chain*

Insulating sleeve for T-piece 0.24 in*

*optional

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key.

Item no.							Smartline
4677	X	X	X	X	0	0	**Product Characteristics**
							Voltage
	1						115 V AC
	2						230 V AC
							Length
		3					3 m (9.8 ft)
		5					5 m (16.4 ft)
							Temperature control
			1				self-regulating (120 °C/248 °F)
			2				regulated (max. 180 °C/356 °F) [1]
							End termination
				1			Ø6 mm tube
				2			Quick-Lock female (ideal for PCS.smart)

[1] Temperature controller required.

Other lengths and styles available upon request!

Filter element required for operation (see notes under "Spare Parts and Accessories").

Spare parts and accessories

Item no.	Description
46770070	Transport case
	Filter elements
46770020	Sintered metal filter element incl. seals; Material: 1.4404/Viton
46770030	Ceramic filter element incl. seals; Material: Ceramic/Viton
	Sampling tubes
467700030500	Tapered assembly plug ø20-60 (0.79-2.36 in) with sampling tube; Material: 1.4571/1.4401; length 500 mm (19.69 in)
467700060500	Tapered assembly plug ø20-60 (0.79-2.36 in) with sampling tube; length 500 mm (19.69 in) Material: Hastelloy/1.4571/1.4401
462220010500	Sampling tube length 500 mm (19.69 in), material: 1.4571, T_{max} 600 °C
462220060500	Sampling tube length 500 mm (19.69 in), material: Hastelloy, T_{max} 400 °C
462220040500	Sampling tube length 500 mm (19.69 in), material: Inconel, T_{max} 1050 °C
	For more sampling tubes see accessory data sheet for sample gas probes DB461099
	Mounting accessories
46770004	Assembly plug R2; Material: 1.4571/1.4401
46770001	Mounting flange DN65 PN6; Material: 1.4571/1.4401
46770002	Mounting flange ANSI DN3"-150; Material: 1.4571/1.4401
46770005	Mounting bracket with 2 m (6.6 ft) chain; EPDM/galvanised steel
46770060	T-piece, 6 mm (0.24 in), stainless steel material for test gas
46770050	Insulating sleeve for T-piece
467700202	Seal kit, Viton material for FE sintered metal
467700302	Seal kit, Viton material for FE ceramic
9146100267	Flange socket 6-pin + PE
467707	Screw cap O-ring

BÜHLER TECHNOLOGIES

Gas Analysis

Portable sample gas conditioning PCS.base

In addition to stationary analysers, gas analysis for monitoring emissions also uses portable methods. The actual measuring task determines the complexity of the sampling/ analysis units. Since not all control points are easy to access, operators are interested in suitable and light equipment with a small pack size. Even under this premise, extracting the sample gas must meet high standards to ensure the measurements are reliable.

Depending on the application, this also requires conditioning the sample gas on site.

The PCS Base portable gas conditioning system has a gas cooler to lower the dew point and separate condensation, particle filter, condensate trap and pump. The entire unit comes inside a compact, light carrying bag which also has room for electric lines and the simple Baseline sample gas probe.

- Developed for mobile gas analysis
- Optimal for probe type Baseline
- Compact design
- Ideal for service, comparison- and sample measurement
- System and accessories built into a lightweight transport bag
- Consists of cooler with condensate trap, filter, and pump
- Moisture detector, flow meter, condensate pump, and various accessories optional
- Selectable Delta-T control for optimal cooling capacity
- Adjustable outlet dew point and alarms

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

Accurate gas analyses in changing locations require compact gas conditioning systems. PCS.base was developed for these applications.

The low weight and small dimensions of the system are ideal for e.g. service engineers using sample- or comparison measurements.

A carrying bag provides reliable protection from the weather and mechanical damage to the product and allows for convenient system transport.

The base version of the gas condition system consists of a gas cooler with condensate trap, a gas pump and filter. For more accessories and options please refer to the table in the data sheet.

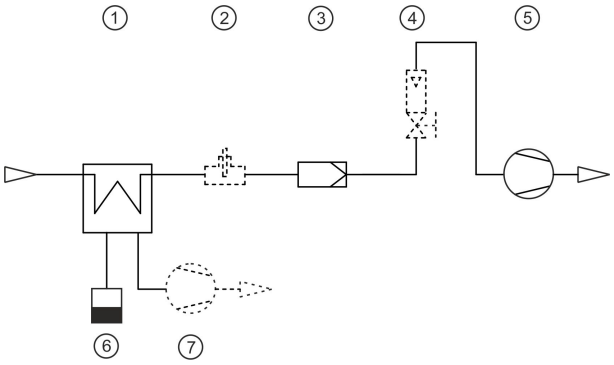
The sample gas is cooled to the preset dew point (factory preset 41 °F) regardless of the ambient temperature. This safely falls below the dew point and moisture in the sample gas is separated as condensate. A safety circuit only starts the gas pump once the operating point of the cooler has been reached. The optional moisture detector communicates with the sample gas pump, switching it off in the event of water burst or cooler overload.

Additional options or variations are also available if necessary.

Consists of:

- Connection hose nipple (inlet DN6; output DN4)
- TC-MINI with control
- Condensate trap or optional condensate pump
- Filter
- Pump
- Flow meter 0-2 L/min optional
- Moisture detector optional
- Transport bag in a fire retardant high quality material for transporting the Baseline probe and various accessories, e.g. mounting flanges and plugs, and spare filter elements
- Operation with open transport bag

Flow chart



1	Cooler	5	Pump
2	Moisture detector (optional)	6	Condensate trap
3	Filter	7	Condensate pump (optional)
4	Flow meter with needle valve (optional)		

Delta-T Control

The PCS.base generally provides the operator with two options to adapt the system function to the ambient conditions or the main areas of measurement.

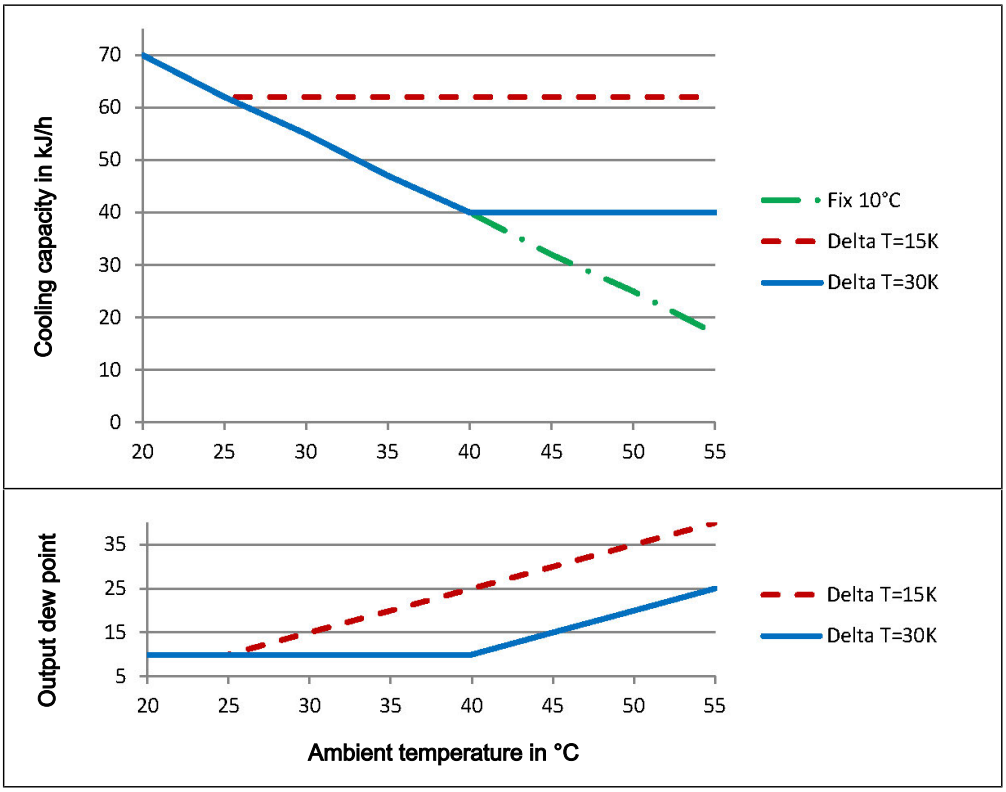
Sturdy dew point conditions inside the gas cooler are seen alongside against safe gas drying whilst utilising the maximum cooling capacity.

1. **Adjustable output dew point**

   An output dew point of 37 °F, 41 °F, 50 °F or 59 °F can be set to reach the specified values. Here it's important the ambient temperature is always ABOVE the output dew point setting, or condensation may form in the lines after the cooler. So the ambient temperature range is limited.

2. **Delta-T Control**

Here the electronics regulate the output dew point to a value about 59 °F or 86 °F lower, but no less than the dew point set under 1). This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the output dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.



Technical Data

General

Technical Data PCS.base	
Ready for operation	at TU = 77 °F after approx. 10 minutes
Ambient temperature	41 °F to 113 °F
Gas inlet temperature	176 °F
Gas output dew temperature, preset	41 °F
Dew point stability	± 0.2 K
Max. pressures	14.5 PSI
Flow rate	1.83 lpm max.
Rated cooling capacity at 77 °F and dew point	41 °F: 52 Btu/h 50 °F: 57 Btu/h 59 °F: 62 Btu/h

Electrical specifications

Electric supply	
Power supply	110 - 260 V AC, 50/60 Hz (for version: with condensate trap) 115 V AC, 60 Hz oder 230 V AC, 50 Hz (for version: with condensate pump)
Electrical connection	IEC connector

Mechanical specifications

Hose connections	Inlet: DN 6 PVDF hose nipple Output: DN 4 PVDF hose nipple
Weight excl. accessories	15 lb
Weight incl. probe and accessories	approx. 23.1 lb
Dimensions (w x h x d)	approx. 18.9 x 10.6 x 10.2 in

Materials

Parts in contact with mediums	
Heat exchanger, filter, tubing, pump	PVDF, PC, PTFE, Viton, EPDM, PP, PVC
Optional moisture detector	PVDF, stainless steel 1.4571 / 1.4576, epoxy resin
Optional flow meter	PP, glass, Viton
Optional condensate pump	Norprene

Dimensions

Dimensions: approx. 18.9 x 10.6 x 10.2 in (w x h x d)

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

CSPB1	X	X	X	0	0	Product Characteristics
						Moisture detector
	0					No
	1					Yes
						Flow meter
		0				No
		1				Yes
						Condensate drain
			0			Condensate trap*
			1			Condensate pump 115 V
			2			Condensate pump 230 V

*When selecting the condensate trap the system can be operated at a 110-260 V voltage range.

Spare parts and accessories

Item no.	Description
	Spare filter
41 15 00 90	AGF-FE-1T, 2 µm, 80 °C (176 °F), Unit: 5 count
	Connection hoses
90 14 033	PVC hose DN 4/6 (for gas outlet)
90 14 136	Viton hose DN 4/6 (for gas outlet)
90 14 036	PVC hose DN 6/8 (for gas inlet)
90 14 138	Viton hose DN 6/8 (for gas inlet)
44 92 00 35 012	Condensate pump replacement hoses

For more information on the Baseline probe and suitable accessories please refer to data sheet 464001.

Portable sample gas conditioning PCS.smart

Carrying out accurate and reliable gas analyses in changing locations requires a small, compact gas conditioning system. We developed a complete sample gas conditioning system protected inside a case for this application.

The basic version of this system consists of a gas cooler with condensate pump and a filter. A gas pump, moisture detector, flow meter or temperature controller are optional.

The sample gas cooler cools the sample gas to the preset dew point (factory preset 41 °F) regardless of the ambient temperature. The safety circuit only activates the sample gas pump once the cooler has reached its operating point.

The selected materials are fit for conditioning corrosive gases. This also applies to the filter element.

- Adjustable outlet dew point and alarm thresholds
- TC-Standard OEM Cooling system with 76 Btu/h nominal capacity
- Optional moisture detector, sample gas pump, flow meter, bypass
- Optimal for Smartline heated line or alternative heated lines
- Optionally available with built-in controller up to max. 1600 W
- Successor of the TGAK3

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description and Function

The PCS.smart series portable gas conditioners offer a variety of options and other useful features for a variety of applications.

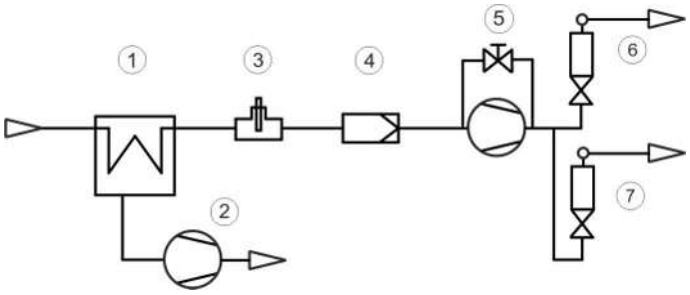
An optional built-in type P1 sample gas pump with bypass valve and flow meters is available to supply up to two gas outputs separately.

A heated line can be connected directly. An unregulated or regulated sample gas line can be connected. The PCS.smart will also control the temperature. The Smartline is specially coordinated and as a heated line with panel filter can simultaneously also be used as a portable probe. We offer a variety of gas inlet or outlet fittings which can be mixed and matched.

The "cold start" function ensures it is ready for use quickly if the storage temperature before use is 41 °F.

Flow chart

PCS.Smart, Item No. CSPS 1xxx



1	Cooler	5	Sample gas pump with bypass (optional)
2	Condensate pump	6	Flow meter (optional)
3	Moisture detector (optional)	7	Flow meter (optional)
4	Filter		

Technical Data

Technical Data PCS.smart	
Ambient temperature:	41 °F to 122 °F [1]
Gas output dew point: Warning thresholds:	adjustable, 36 °F ... 68 °F adjustable, -3 ... -1 K and +1 ... +7 K around dew point
Flow rate:	approx. 0.8 ... 4.7 lpm [2]
Operating pressure:	3 ... 29 psi abs. [2]
Dew point static throughout the range:	0.1 K ±1.5 K
Max. inlet dew point:	158 °F [1]
Gas inlet temperature:	max. 356 °F [1] [4]
Rated cooling capacity (at 77 °F):	76 Btu/h [2] [3]
Electric supply:	230/115 V, 50/60 Hz
IEC connector, termination length:	8.2 ft
Power input:	max. 250 VA (without heated line)
Operational readiness:	after approx. 10 min.
Dimensions without line (h x w x d):	approx. 18.1 x 14.2 x 10.2 in
Weight standard version:	approx. 29.8 lb
Parts in contact with media:	PVDF, glass, stainless steel, PTFE, Norprene, Viton, epoxy resin, sintered PTFE [2]
IP rating:	IP 20 D

[1] Considering the available total cooling capacity (see Technical Data TC-Standard OEM). Please also refer to our calculation program or contact our sales department for guidance.

[2] May vary due to optional add-on parts.

[3] Subject to installation conditions.

[4] Varies by device configuration.

Technical Data - Options

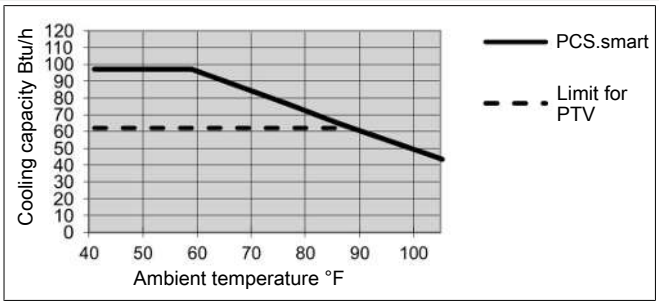
Technical Data Sample Gas Pump P1	
Inlet:	7 ... 19 psi abs.
Outlet:	Back-pressure max. 15 psi rel.
Nominal output:	4.7 lpm (at p = 15 psi abs.)

Technical Data DK 702 Flow Meter	
Standard measuring tubes:	Air 68 °F, 17 psi abs.
Meas. range:	25 ... 250 NL/h
Options:	Built-in needle valve

Technical Data Controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F ... 392 °F
Motor power:	max. 1600 W (230 V) / 800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Output

PCS.smart	
Rated cooling capacity (at 77 °F)	76 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K



Remark: The limit curve for the heat exchanger applies to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	PTV
Version / Material	PVDF
Flow rate v_{max} [1)]	4.2 lpm
Inlet dew point $\tau_{e,max}$ [1)]	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1)]	284 °F
Max. Cooling capacity Q_{max}	85 Btu/h

[1)] Max. cooling capacity of the cooler must be considered.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

PCS.smart

CSP	S	1	X	3	1	X	X	X	1	X	X	X	0	X	X	Product characteristic
																Supply voltage
			1													115 V AC
			2													230 V AC
																Heat exchanger
				3												PVDF
																Filter
					1											Panel filter, AGF-FE-4
																Moisture detector
						0										without moisture detector
						1										with moisture detector
																Sample gas pump and flow meter
							0	0								none
							0	3								without P1, 1x flow meter with needle valve
							2	0								P1 with bypass, without flow meter
							2	1								P1 with bypass and 1x flow meter
							2	4								P1 with bypass and 2x flow meters with needle valve [1]
							2	5								P1 with bypass, 1x flow meter and 1x flow meter with needle valve
																Condensate pump
									1							CPsingle with angled adapter
																Gas inlet
										0						Screw connection, metric, PVDF, DN 4/6 [2]
										1						Screw connection, US, PVDF, 1/4" / 1/6" [2]
										2						Screw connection, metric, stainless steel, 6 mm [3]
										3						Screw connection, US, stainless steel, 1/4" [3]
										4						Quick-coupler with counter piece, metric, PVDF, DN 4/6 [2]
										5						Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6" [2]
										6						Quick-Lock [2]
																Gas outlet
											0					Screw connection, metric, PVDF, DN 4/6
											1					Screw connection, US, PVDF, 1/4" / 1/6"
											2					Screw connection, metric, stainless steel OD, 6 mm
											3					Screw connection, US, stainless steel, 1/4"
											4					Quick-coupler with counter piece, metric, PVDF, DN 4/6
											5					Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6"
											6					Quick-Lock
																heated line
												0	0			none
												2	0			heated line
																Status outputs
														0		status output only
														1		Analogue output option, add-on
																Trolley
															0	No
															1	Yes
CSP	S	1		3	1				1				0			Order key

[1] Version 2 x SM with needle valve includes an additional bypass gas outlet. The connection corresponds with the selected gas outlet configuration.

[2] Maximum medium temperature 284 °F.

[3] Recommended for connecting a heated line.

Spare parts and accessories

Item no.	Description
CS PX 00012	Removable trolley case with 50 mm (2 in) casters; aluminium
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.3 L/h (0.005 lpm)
41 15 10 50	FE-4 spare filter, 8 count
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 70 °C (158 °F) for P1 pump
see data sheet 4640002	Smartline

Portable sample gas conditioning PCS.smart+

Carrying out accurate and reliable gas analyses in changing locations requires a small, compact gas conditioning system. We developed a complete sample gas conditioning system protected inside a case for this application.

The basic version of this system consists of a gas cooler with condensate pump and a filter. A gas pump, moisture detector, flow meter or temperature controller are optional.

The sample gas cooler cools the sample gas to the preset dew point (factory preset 41 °F) regardless of the ambient temperature. The safety circuit only activates the sample gas pump once the cooler has reached its operating point.

The sample gas cooler in the PCS.smart+ features a new generation heat exchangers with a particularly low scrubbing effect of water-soluble components and are specifically suitable for measuring emissions. The PCS.smart+ can therefore be used for measurements according to EN 15267-4.

- Low scrubbing effects of water-soluble gas components
- Particularly suited for sample measurement in emissions monitoring
- Adjustable outlet dew point and alarm thresholds
- TC-Standard OEM Cooling system with 76 Btu/h nominal capacity
- Optional moisture detector, sample gas pump, flow meter, bypass
- Optimal for Smartline heated line or alternative heated lines
- Optionally available with built-in controller up to max. 1600 W

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Description and Function

The PCS.smart series portable gas conditioners offer a variety of options and other useful features for a variety of applications.

An optional built-in type P1 sample gas pump with bypass valve and flow meters is available to supply up to two gas outputs separately.

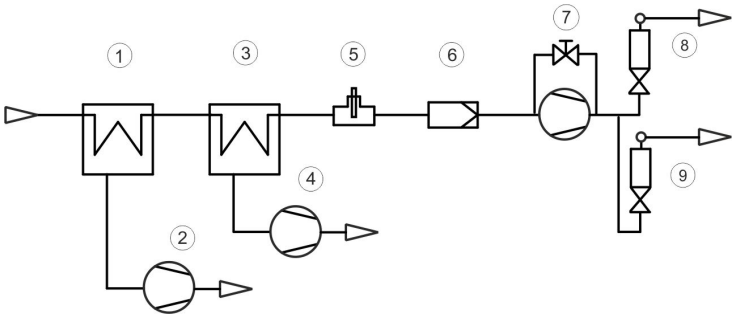
A heated line can be connected directly. An unregulated or regulated sample gas line can be connected. The PCS.smart will also control the temperature. The Smartline is specially coordinated and as a heated line with panel filter can simultaneously also be used as a portable probe. We offer a variety of gas inlet or outlet fittings which can be mixed and matched.

The "cold start" function ensures it is ready for use quickly if the storage temperature before use is 41 °F.

Unlike the PCS.smart (see data sheet no. 464005), the PCS.smart+ has two heat exchangers. The special configuration of the PCS.smart+ reduces scrubbing of water-soluble gas components. This makes the PCS.smart+ particularly suited for sample measurement when monitoring emissions.

Flow chart

PCS.Smart+, Item No. CSPS 2xxx



1	Cooler	6	Filter
2	Condensate pump	7	Sample gas pump with bypass (optional)
3	Cooler	8	Flow meter (optional)
4	Condensate pump	9	Flow meter (optional)
5	Moisture detector (optional)		

Technical Data

Technical Data PCS.smart	
Ambient temperature:	41 °F to 122 °F [1]
Gas output dew point: Warning thresholds:	adjustable, 36 °F ... 68 °F adjustable, -3 ... -1 K and +1 ... +7 K around dew point
Flow rate:	approx. 0.8 ... 4.7 lpm [2]
Operating pressure:	3 ... 29 psi abs. [2]
Dew point static throughout the range:	0.1 K ±1.5 K
Max. inlet dew point:	158 °F [1]
Gas inlet temperature:	max. 356 °F [1] [4]
Rated cooling capacity (at 77 °F):	76 Btu/h [2] [3]
Electric supply:	230/115 V, 50/60 Hz
IEC connector, termination length:	8.2 ft
Power input:	max. 250 VA (without heated line)
Operational readiness:	after approx. 10 min.
Dimensions without line (h x w x d):	approx. 18.1 x 14.2 x 10.2 in
Weight standard version:	approx. 29.8 lb
Parts in contact with media:	PVDF, glass, stainless steel, PTFE, Norprene, Viton, epoxy resin, sintered PTFE [2]
IP rating:	IP 20 D

[1] Considering the available total cooling capacity (see Technical Data TC-Standard OEM). Please also refer to our calculation program or contact our sales department for guidance.

[2] May vary due to optional add-on parts.

[3] Subject to installation conditions.

[4] Varies by device configuration.

Technical Data - Options

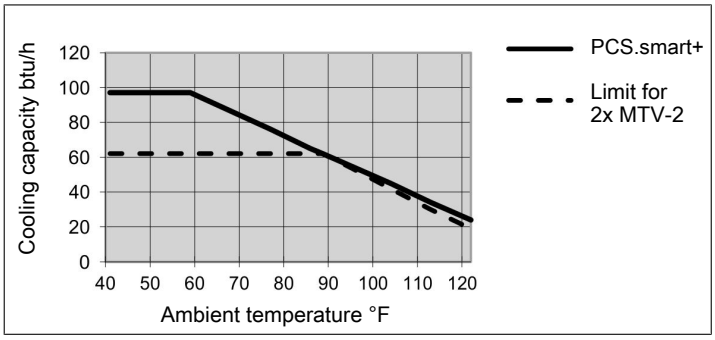
Technical Data Sample Gas Pump P1	
Inlet:	7 ... 19 psi abs.
Outlet:	Back-pressure max. 15 psi rel.
Nominal output:	4.7 lpm (at p = 15 psi abs.)

Technical Data DK 702 Flow Meter	
Standard measuring tubes:	Air 68 °F, 17 psi abs.
Meas. range:	25 ... 250 NL/h
Options:	Built-in needle valve

Technical Data Controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F ... 392 °F
Motor power:	max. 1600 W (230 V) / 800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Output

PCS.smart+	
Rated cooling capacity (at 77 °F)	76 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations static in the entire specification range	 ± 0.1 K ± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Remark: The limit curve for the heat exchanger applies to a dew point of 122 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Volume flow temperature chart

T_e	V_{max} [NL/h]*
40 (104 °F)	205
50 (122 °F)	180
65 (149 °F)	100

*at 25 °C (77 °F) ambient temperatures.

Heat exchanger overview

Heat exchanger	2x MTV-2 in-line
Version / Material	PVDF
Flow rate v_{max} [1)]	1.7 lpm
Inlet dew point $\tau_{e,max}$ [1)]	158 °F
Gas inlet temperature $\vartheta_{G,max}$ [1)]	284 °F
Max. Cooling capacity Q_{max}	85 Btu/h

[1)] Considering the maximum cooling capacity of the cooler

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

PCS.smart+

CSP	S	2	X	8	1	X	X	X	2	X	X	X	0	X	X	Product characteristic
																Supply voltage
			1													115 V AC
			2													230 V AC
																Heat exchanger
				8												PVDF
																Filter
					1											Panel filter, AGF-FE-4
																Moisture detector
						0										without moisture detector
						1										with moisture detector
																Sample gas pump and flow meter
							0	0								none
							0	3								without P1, 1x flow meter with needle valve
							2	0								P1 with bypass, without flow meter
							2	1								P1 with bypass and 1x flow meter
							2	4								P1 with bypass and 2x flow meters with needle valve [1]
							2	5								P1 with bypass, 1x flow meter and 1x flow meter with needle valve
																Condensate pump
									2							2x CPsingle with angled adapter
																Gas inlet
										0						Screw connection, metric, PVDF, DN 4/6 [2]
										1						Screw connection, US, PVDF, 1/4" / 1/6" [2]
										2						Screw connection, metric, stainless steel, 6 mm [3]
										3						Screw connection, US, stainless steel, 1/4" [3]
										4						Quick-coupler with counter piece, metric, PVDF, DN 4/6 [2]
										5						Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6" [2]
										6						Quick-Lock [2]
																Gas outlet
											0					Screw connection, metric, PVDF, DN 4/6
											1					Screw connection, US, PVDF, 1/4" / 1/6"
											2					Screw connection, metric, stainless steel OD, 6 mm
											3					Screw connection, US, stainless steel, 1/4"
											4					Quick-coupler with counter piece, metric, PVDF, DN 4/6
											5					Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6"
											6					Quick-Lock
																heated line
												0	0			none
												2	0			heated line
																Status outputs
														0		status output only
														1		Analogue output option, add-on
																Trolley
															0	No
															1	Yes
CSP	S	2		8	1				2				0			Order key

[1] Version 2 x SM with needle valve includes an additional bypass gas outlet. The connection corresponds with the selected gas outlet configuration.

[2] Maximum medium temperature 284 °F.

[3] Recommended for connecting a heated line.

Spare parts and accessories

Item no.	Description
CS PX 00012	Removable trolley case with 50 mm (2 in) casters; aluminium
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.3 L/h (0.005 lpm)
41 15 10 50	FE-4 spare filter, 8 count
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 70 °C (158 °F) for P1 pump
see data sheet 4640002	Smartline

Portable sample gas conditioning PCS.smart+ AMS

Carrying out accurate and reliable gas analyses in changing locations requires a small, compact gas conditioning system. We developed a complete sample gas conditioning system protected inside a case for this application.

The basic version of this system consists of a gas cooler with condensate pump and a filter. A gas pump, moisture detector, flow meter or temperature controller are optional.

The sample gas cooler cools the sample gas to the preset dew point (factory preset 41 °F) regardless of the ambient temperature. The safety circuit only activates the sample gas pump once the cooler has reached its operating point.

The sample gas cooler in the PCS.smart+ AMS features a new generation heat exchangers with a particularly low scrubbing effect of water-soluble components and are specifically suitable for measuring emissions. The PCS.smart+ AMS can therefore be used for measurements to EN 15267-4. In addition to displaying the dew point, the gas output temperature can optionally be measured and displayed.

- Adjustable outlet dew point and alarm thresholds
- Cooling system TC-Kit with nominal capacity 104 Btu/h
- Optional moisture detector, sample gas pump, flow meter, bypass
- Optimal for Smartline heated line or alternative heated lines
- Optionally available with built-in controller up to max. 1600 W
- Suitable for measurements to EN 15267-4
- IP 42 rated housing
- Low wash out effects of water-soluble gas components
- Particularly suited for sample measurement in emissions monitoring
- Optional temperature measurement with gas output with additional display

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Description and Function

The PCS.smart series portable gas conditioners offer a variety of options and other useful features for a variety of applications.

An optional built-in type P1 sample gas pump with bypass valve and flow meters is available to supply up to two gas outputs separately.

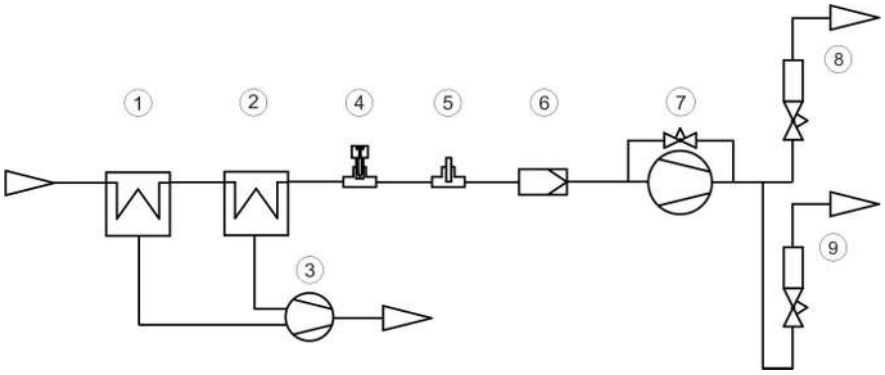
A heated line can be connected directly. An unregulated or regulated sample gas line can be connected. The PCS.smart will also control the temperature. The Smartline is specially coordinated and as a heated line with panel filter can simultaneously also be used as a portable probe. We offer a variety of gas inlet or outlet fittings which can be mixed and matched.

The "cold start" function ensures it is ready for use quickly if the storage temperature before use is 41 °F.

Unlike the PCS.smart+ (see data sheet no. 464006), the PCS.smart+ AMS features a new, higher capacity cooling system. The special configuration of the PCS.smart+ AMS reduces scrubbing of water-soluble gas components. This makes the PCS.smart+ AMS particularly suited for sample measurement when monitoring emissions. Furthermore, the housing is rated IP42.

Plus, the temperature in the gas outlet can optionally be measured and output on a designated display. The device can be uninstalled and can simply be removed for calibrations.

Flow diagram



1	Cooler	6	Filter
2	Cooler	7	Sample gas pump with bypass (optional)
3	Condensate pump	8	Flow meter (optional)
4	Thermocouple (optional)	9	Flow meter (optional)
5	Moisture detector (optional)		

Technical Data

Technical Data PCS.smart+ AMS	
Ambient temperature:	41 °F to 122 °F [1]
Gas output dew point: Warning thresholds:	adjustable, 36 °F ... 68 °F adjustable, -3 ... -1 K and +1 ... +7 K around dew point
Flow rate:	approx. 0.8 ... 4.7 lpm [2]
Operating pressure:	3 ... 29 psi abs. [2]
Static dew point stability: in the entire range:	0.1 K ±1.5 K
Inlet dew point max.:	158 °F [1]
Gas inlet temperature:	max. 356 °F [1]
Rated cooling capacity (at 77 °F):	104 Btu/h
Electric supply:	230/115 V, 50/60 Hz
IEC connector, termination length:	9.8 ft
Power input:	max. 250 VA (without heated line)
Operational readiness:	after approx. 10 min.
Dimensions without line (h x w x d):	approx. 18.9 x 14.6 x 14.6 in
Weight standard version:	approx. 33 lb
Parts in contact with media:	PVDF, glass, stainless steel, PTFE, Norprene, Viton, epoxy resin, sintered PTFE [2]
IP rating:	IP 42 D

[1] Considering the available total cooling capacity (see technical data TC-Kit).

[2] May vary due to optional add-on parts.

Technical Data - Options

Technical Data Sample Gas Pump P1	
Inlet:	7 ... 19 psi abs.
Outlet:	Back-pressure max. 15 psi rel.
Nominal output:	4.7 lpm (at p = 15 psi abs.)

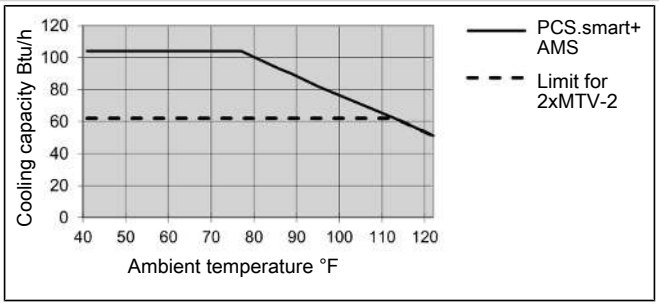
Technical Data DK 702 Flow Meter	
Standard measuring tubes:	Air 68 °F, 17 psi abs.
Meas. range:	25 ... 250 NL/h
Options:	Built-in needle valve

Technical Data Controller for heated line	
Temperature, preset: adjustable:	 212 °F 104 °F ... 392 °F
Motor power:	max. 1600 W (230 V) / 800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

Technical data thermocouple inside heat exchanger	
Type:	K
Length:	6.6 ft
Operating temperature:	14 °F to 752 °F

Output

PCS.smart+ AMS	
Rated cooling capacity (at 77 °F)	104 Btu/h
Max. Ambient temperature	122 °F
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K



Remark: The limit curve for the heat exchanger applies to a dew point of 104 °F.

Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of T_e = 104 °F and ϑ_G = 158 °F. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation program.

Heat exchanger overview

Heat exchanger	2x MTV-2	MTV-2 & MTV-2-T
Version / Material	PVDF	PVDF
Flow rate v_{max} [1)]	1.7 lpm	1.7 lpm
Inlet dew point $\tau_{e,max}$ [1)]	149 °F	149 °F
Gas inlet temperature $\vartheta_{G,max}$ [1)]	284 °F	284 °F
Max. Cooling capacity Q_{max}	85 Btu/h	85 Btu/h

[1)] Max. cooling capacity of the cooler must be considered.

Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

CSP	S	4	X	X	X	X	X	X	4	X	X	X	0	X	X	Product characteristic
																Supply voltage
			1													115 VAC
			2													230 VAC
																Heat exchanger and temperature measurement
				8												2x MTV-2, 1x CPdouble, no in-line temperature measurement
				H												1x MTV-2 and 1x MTV-2-T.-Sensor, 1x CPdouble, incl. in-line temperature measurement
																Filter
					1											Panel filter, AGF-FE-4
					3											3x panel filter, AGF-FE-2
																Moisture detector
						0										without moisture detector
						1										with moisture detector
																Sample gas pump and flow meter
							0	0								none
							0	3								without P1, 1x flow meter with needle valve
							2	0								P1 with bypass, without flow meter
							2	1								P1 with bypass and 1x flow meter
							2	4								P1 with bypass and 2x flow meters with needle valve [1]
							2	5								P1 with bypass, 1x flow meter and 1x flow meter with needle valve
																Condensate pump
									4							CPdouble with screw connection DN 4/6
																Gas inlet
										0						Screw connection, metric, PVDF, DN 4/6 [2]
										1						Screw connection, US, PVDF, 1/4" / 1/6" [2]
										2						Screw connection, metric, stainless steel, 6 mm [3]
										3						Screw connection, US, stainless steel, 1/4" [3]
										4						Quick-coupler with counter piece, metric, PVDF, DN 4/6 [2]
										5						Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6" [2]
										6						Quick-Lock [3]
																Gas outlet
											0					Screw connection, metric, PVDF, DN 4/6
											1					Screw connection, US, PVDF, 1/4" / 1/6"
											2					Screw connection, metric, stainless steel OD, 6 mm
											3					Screw connection, US, stainless steel, 1/4"
											4					Quick-coupler with counter piece, metric, PVDF, DN 4/6
											5					Quick-coupler with counter piece, US, PVDF, 1/4" / 1/6"
											6					Quick-Lock
																heated line
												0	0			none
												2	0			heated line
																Status outputs
														0		status output only
														1		Analog output option, add-on
																Trolley
															0	No
															1	Yes

[1] Version 2 x SM with needle valve includes an additional bypass gas outlet. The connection corresponds with the selected gas outlet configuration.
[2] Maximum medium temperature 284 °F.
[3] Recommended for connecting a heated line.

Spare parts and accessories

Item no.	Description
CSPS400012	Removable trolley
CSPS449612	Carrying strap to attach to carrying rings
44 92 00 35 014	Norprene replacement hose with screw connection DN4/6 for peristaltic pump 0.3 L/h (0.005 lpm)
41 15 10 50	FE-4 spare filter, 8 count
42 28 00 3	Bellow for P1 pump
90 09 39 8	O-ring for bypass P1 pump
42 28 06 6	Set inlet/outlet valves 158 °F for P1 pump
91 02 02 00 67	Thermocouple with plug
see data sheet 4640002	Smartline

Gas Conditioning Systems

- DA450021 Conditioning Systems
- DACS0001 19″ Sample Gas Conditioning System SCS
- DACS0002 Questionnaire for 19″ Sample Gas Conditioning Systems SCS
- DACS0003 Mobile Analysis System MAS
- DA490001 Technical Questionnaire

Conditioning Systems

Analysentechnik

System description

Precise measurement of gasses in various locations or even sites requires a suitable **analyser** and reliable **sample gas conditioning**. Both must be relatively simple and most importantly allow safe and protected transport to the sampling site.

In gas analysis it's important to condition gas before feeding it into the analyser. This requires components such as gas cooler, gas pump, filter, condensate pump and flow meter. Additional functions - e.g. feeding calibrating gasses - may be required depending on the application.

When designing the **19" sample gas conditioning system SCS** we set great value upon modularity to allow it to easily be adapted to various tasks at a low cost. The control is adapted to the respective application and can be operated manually or externally. The system status is indicated via displays at the front and can also be retrieved externally.

The **mobile MAS type systems** use a 19" analyser and sample gas conditioning inside a sturdy case, with a sample gas cooler, filter, pump, flow meter, etc. configuration based on the application.

Conditioning and Analysis Systems

Model	Sample Gas Conditioning System SCS	Mobile Analysis System MAS
		
Layout	19" rack mount	robust, mobile 19" transport housing
Built-in analyser	No	Yes
Gas paths	1 or 2	1 or 2
Condensate pre-separator	Yes	Yes
Cooler type	Peltier or compressor	Peltier or compressor
Configurable	Number of gas paths Cooling capacity Number of calibrating gases	Number of gas paths Cooling capacity Number of calibrating gases
Data sheet	CS0001	CS0003

Please refer to the respective data sheets for additional information.

Aside from these conditioning systems, we also offer additional **portable systems**. Please refer to data sheet 450021 for an overview.

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e-mail: sales@buhlertech.com
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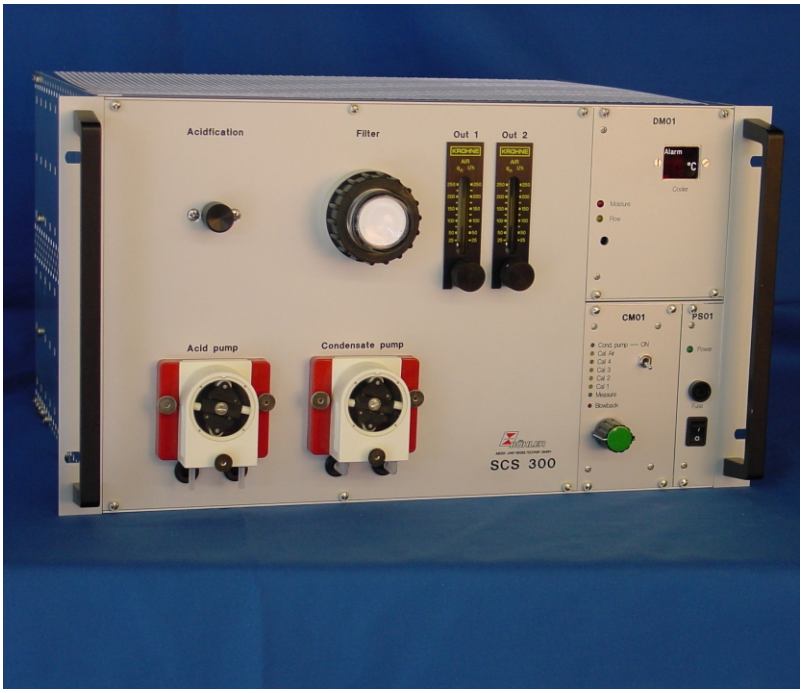
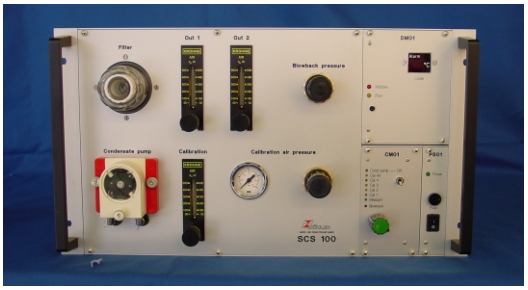
19” Sample Gas Conditioning System SCS





The Buhler Model SCS Sample Gas Conditioner is a pre-engineered, pre-packaged sampling system including all pneumatic components that are normally used in gas analysis systems. The SCS integrates the following pneumatic functions: sample pump, sample cooler, calibration gas valves, flow meters, condensate drains, particulate filtration, and operator interface, PLC or data logger control features all into a single 19” rack-mount enclosure.

The design concept emphasizes modularity allowing easy and cost effective configuration to different applications. The SCS may be controlled manually or externally. System status is shown on the front panel and may be output to external devices.

To create a complete analysis system, a probe, a heated sample line and an analyzer can be added to the SCS. A PLC may also be used to automate the system. All parts requiring maintenance are easily accessible from the front panel.

Many variations and options are available for this unit depending on the specific requirements of the application.

Please contact one of our application specialists for further details on how the SCS Gas Conditioning system can be configured to meet your requirements.

- **Includes all necessary gas conditioning components**
- **Modular design: very cost effective**
- **Installs easily: Rack mountable (plug and play)**
- **Low maintenance cost due to efficient design**
- **1 or 2 gas paths**
- **2 standard flow rates**
- **Up to 5 calibration gases**
- **Corrosion resistant materials available**
- **Optional acidification**
- **Manually or externally controlled**
- **Self surveillance**
- **A variety of connections are available**

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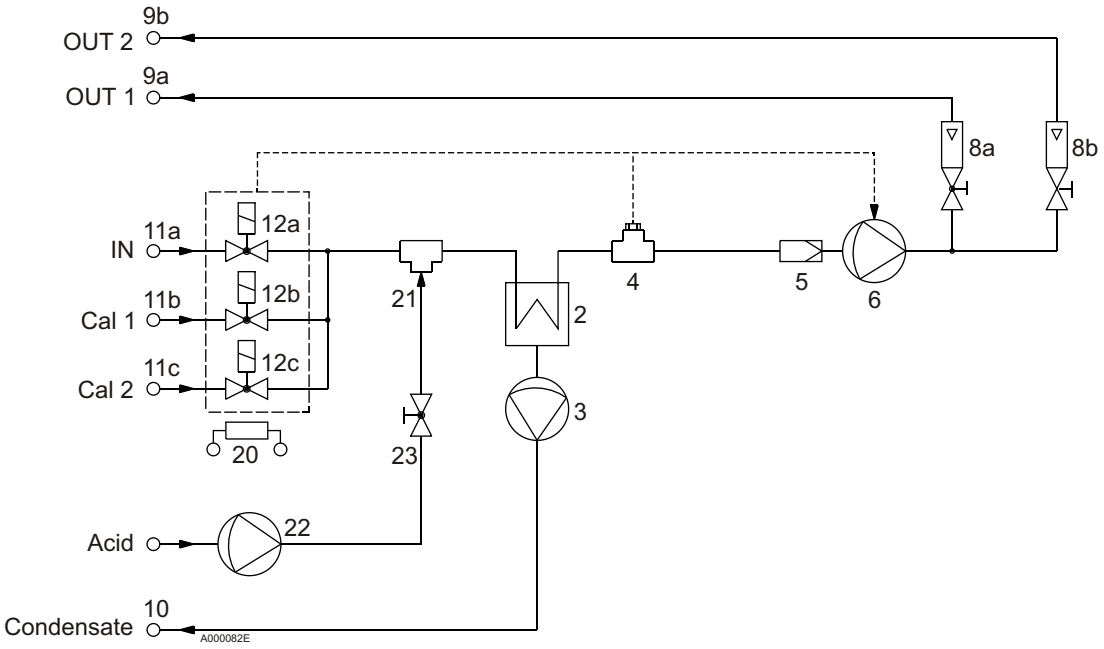
Phone: 248.652.1546 Fax: 248.652.1598
Internet: www.buhlertech.com
e-mail: sales@buhlertech.com

Description

There are six standard stock configurations of the SCS. However, due to the modular design of the SCS, the unit can be configured for a wide variety of flow and control options. As an example, the SCS 300 (shown on the first page) is described below. Drawings of the views and dimensions are shown on the last page. Not all of the described modules are required for all applications (e.g. the acidification).

Please contact one of our application specialists for detailed configuration information relevant to your specific application.



The sample gas is pumped through the heated valve block (12) and the sample gas cooler PKE 19 (2) by the gas pump (6). The moisture condenses inside the cooler's heat exchanger. The condensate pump (3) removes to the condensate outlet (10). Upstream of the cooler, acidification with phosphoric acid reduces the scrubbing of sulfur dioxide inside the heat exchanger (This is not a necessary option in every system). The acid is added by a pump (22) regulated by a valve (23).

The temperature of the cooling block is shown on a display on the front panel. A dewpoint alarm is provided in case the temperature deviates from the setpoint by more than 3K (5F). An LED display will flash and the gas pump will be immediately stopped to prevent damage to downstream devices.

A moisture detector (4) is added downstream of the cooler providing an alarm in case of moisture breakthrough. This will also shut down the gas pump (6). The alarm is displayed on the front panel.

The filter (5) on the front panel protects the downstream components and analyzer from being particulate contamination. The final components are the flow meters (8) including needle valves (two in this application).

Two calibration gases may be regulated by the magnetic valves (12a,b). These are located on the heated valve block together with the input valve (12a). The temperature is regulated by the SCS controller. A low temperature will stop the pump.

Gas wetted material used in this application are: stainless steel, Viton, glass, Novopren, and PVDF. The lines are Viton.

Manual control is accomplished by a simple rotary switch with the functions "external control", "measure", "calibration gas 1" and "calibration gas 2". The condensate pump can be switched off for easy maintenance of the pump hose.

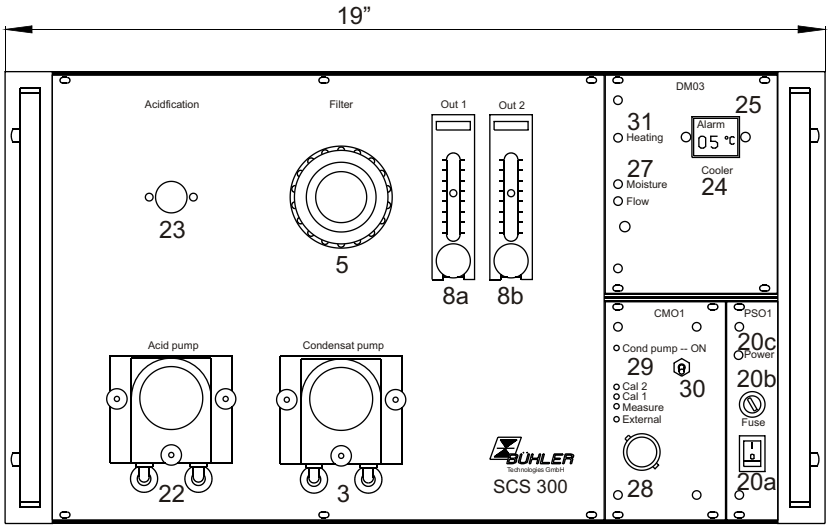
All status and mode signals of the SCS are shown on the front panel and can be accessed on terminals on the back side. Another terminal is used to control the system mode from outside.

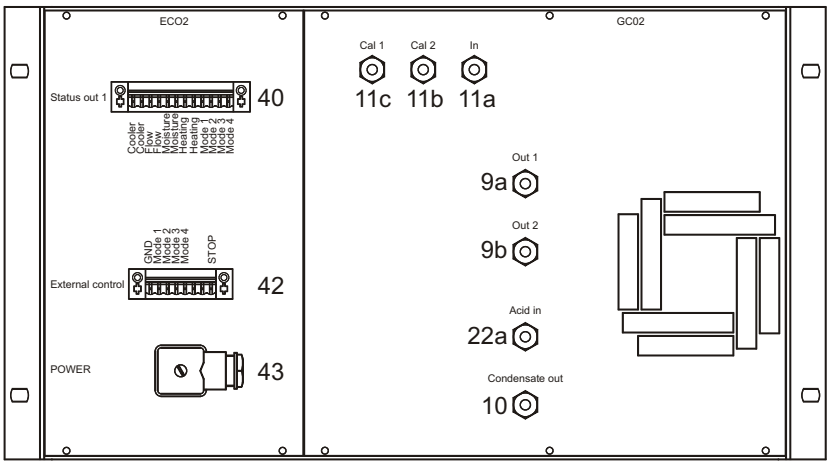
Technical Data for the 19" Sample Gas Conditioning System SCS

Possible cooler modules / No. of gas streams	PKE 19 / 1 stream	EGK 19 / 1 stream	EGK 19 / 2 stream
Gas paths			
Number of gas outs / calibration gases	Depending on application		
Gas covered materials standard [2]	Viton, PTFE, stainless steel, Novopren, PVDF, PP [2]		
Maximum pressure[3]	Depending on application and built-in parts		
Gas terminals (standard)	Hose fittings DN 4/6		
Standard flow rate free	300 l/h 5 lpm	550 l/h 9 lpm	2 x 300 l/h 2 x 5 lpm
With -2.2 psi rel. at input and +1.7 psi rel at output	150 l/h 2.5 lpm	350 l/h 5.8 lpm	2 x 150 l/h 2 x 2.5 lpm
Dead Volume approx. (dep. on application)	85 cm^3 5.2 cu. in.	100 cm^3 6.1 cu. in.	70 cm^3 each 4.3 cu. in. each
Electrical data			
Electrical control contacts	Driven by dry contacts or common ground		
Electrical status and mode outputs max.	230 VAC / 150 VDC; 0.5 A; 50 VA, dry contacts		
Power supply	115 V / 60 Hz or 230 V / 50 Hz		
Power consumption (dep. on application)	200...350 VA	450...550 VA	500...600 VA
Gas cooler data			
Cooling power at 25°C (40°C) (77°F (104°F)) [1]	70(30) kJ/h 66(28) Btu/h	360(100) kJ/h 340(95) Btu/h	360(100) kJ/h 340(95) Btu/h
Max. flow rate [1] (steel / glass)	300 l/h 5.0 lpm	400 l/h 6.7 lpm	2 x 200/125 l/h 2 x 3.3/2.1 lpm
Max. gas inlet temperature [1]	180°C / 355°F	180°C / 355°F	180°C / 355°F
Max. inlet dew point (1 bar abs.) [1]	65°C / 150°F	80°C / 175°F	80°C / 175°F
Ambient temperature [1]	50°C / 120°F	50°C / 120°F	50°C / 120°F
Outlet dew point	Standard 5°C (41°F) factory pre-adjustable 3...15°C (37...60°F)		
Dew point stability static	0.2K	0.2K	0.2K
General data			
Dimensions	See table below		
Weight (depending on application)	15...20 kg 33...44 lb	15...20 kg 33...44 lb	25...30 kg 55...66 lb
Start-up time max.	15 min	15 min	15 min

Remarks:

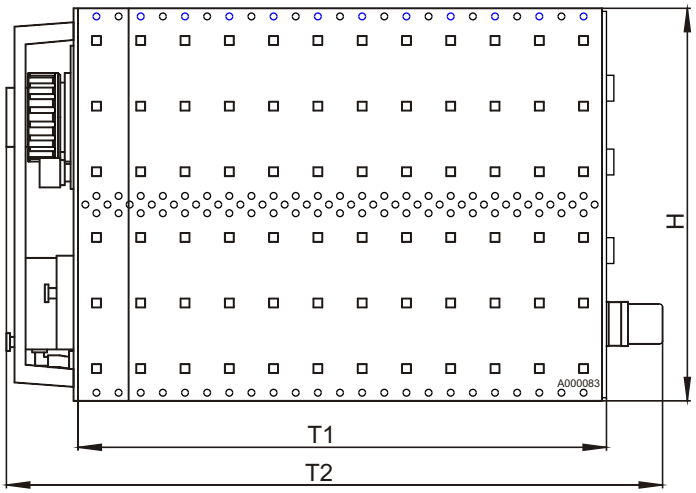
1) The maximum values depend on: the ambient temperature and therefore the available cooling power. Our application specialists can help determine the appropriate cooling module for your application..
2) Appropriate materials are application specific.
3) The pressure values depend on the selected components. Internal tubing for higher pressures is an option.





Explanations

3	Condensate pump
5	Filter
8a,b	Flow meters for output
9a,b	Gas outlet
10	Condensate outlet
11a	Sample gas inlet
11b,c	Calibration gas inlets
20a	Main power switch
20b,c	Main fuse and LED
22,23	Acid pump and valve
22a	Acid inlet
24,25	Cooler display and alarm LED
27	Moisture alarm LED
28	Rotary switch for mode selection
29	LEDs showing system mode
30	Switch for condensate pump
31	LED valve block temperature
40	Status output terminals
42	External control inputs
43	Power terminal



Dimensions

	with cooler type PKE 19	EGK 19	2-stream
H	6 HU	6 HU	9 HU
T1	355 mm 14.98"	475 mm 18.70"	475 mm 18.70"
T2 appr.	420 mm 16.5"	540 mm 21.3"	540 mm 21.3"

Ordering hints

Please answer the attached questionnaire or contact one of our application specialists.
Based on your specification, we will customize the modules and components.

For applications with 2 gas paths, please fill in one questionnaire for each path (unless identical). Please note that the possible extensions may be limited by the room given on the front panel.

Use the second page for explanations. Any specifications and drawings e.g. gas flow charts may also be attached

Spare parts recommended for maintenance

Filter elements: (according to built in filter):	FE-E1 (5 pieces)	Part no. 41 15 00 10
	FE-4	Part no. 41 15 10 4

Hose for condensate pump or hose for acid pump — Part no. 9124 030027

we reserve the right to amend specification

Questionnaire for
19” Sample Gas Conditioning Systems SCS

Project:

Page of pages

Please use the following pages for explanations and number them. Already existing specifications and data e.g. gas flow charts should be added.

Send the papers to:

Buhler Technologies LLC
1030 Hamlin Road
Rochester Hills, MI 48309

Phone 248.652.1546
Fax 248.652.1598
e-mail: sales@buhlertech.com

Customer: Company:_____

_____

_____

Person to call: _____

Phone:_____ Fax:_____

e-mail: _____

Description of the application:

_____

_____

_____

_____

_____

_____

O System with 2 gas paths: Please fill in one questionnaire for each path. Please keep in mind that the number of components may be limited by the front panel dimensions.

Note: Systems with one gas path are 6HU high, and systems with two gas paths are 9 HU high.

Unit labelling: **O** German **O** English
Documentation: **O** German **O** English

Project:

Page of pages Gas path no.:_____

Gas composition: _____

_____

Gas inlet parameter: Gas inlet dew point _____°F (°C) or moisture content _____ vol%
Gas inlet temperature: _____°F (°C)
Particle content:_____

Pressure: Gas inlet: _____ psi (bar) Gas outlet: _____ psi (bar)

Ambient conditions: Temperature inside of rack max _____ °F (°C); Other: _____

Volume flow at outlet: **O** 3 lpm (200 l/h) **O** 6.7 lpm (400 l/h) **O** _____lpm

Probe blowback: **O** None **O** Magnetic valve only **O** With pressure gauge **O** With pressure regulator

			Flow switch:	
Outlets:	**1**	Range flow meter 1:_____ at pressure: _____psi (bar)	**O** Yes	**O** No
	2	Range flow meter 2:_____ at pressure: _____psi (bar)	**O** Yes	**O** No

O additional outlet with pressure regulator (compensation of atmospheric variations)

Gas terminals:	**O** DN 4/6 tube/ hose fittings	**O** 3/8" internal thread	**O** 1/4" internal thread	**O** NPT 1/4" internal thread

Panel filter	**O** Yes	**O** No
Moisture detector	**O** Yes	**O** No
Peristaltic pump	**O** Yes	**O** No

Materials NOT allowed	**O** Viton	**O** PTFE	**O** 1.4571	**O** 1.4401	**O** Novopren
materials in gas path:	**O** PVDF	**O** PP	**O** PC	**O** Glas	**O** _____

Project:

Page of pages Gas path no.:_____

Electrical control: **O** Rotary switch **O** Single switches **O** _____

O External control only **O** no external control
(please specify external control)

O Electrical terminal for heated line wanted

Power supply: **O** 230V 50Hz **O** 115V 60Hz

Calibration gases: **O** None **O** Switched to inlet **O** Switched to probe

	Cal. Gas 1	Cal. Gas 2	Cal. Gas 3
Gas			
Pressure (psi / bar)			
Flow meter	O	O	O
With needle valve	O	O	O
Range			

Explanations and additional notes:

we reserve the right to amend specification

Mobile Analysis System MAS

Precise measurement of gasses in various locations or even sites requires a suitable analyser and reliable sample gas conditioning. Both must be relatively simple and most importantly allow safe and protected transport to the sampling site. Type MAS systems use a 19” analyser and a sample gas conditioning system configured for the application with sample gas cooler, filter, pump, flow meter, etc. inside a sturdy case.

The case is a “housing-in-housing” style with shock absorption, rollers, carrying handles, and a handle for pulling the housing make the MAS easy to move.

A locking drawer to store lines, cables, documentation, etc. is optional. The connections are quick couplers.

- Analyser and sample gas conditioning inside a housing
- Choose any analyser
- Programmable sample gas conditioning
- Fully interconnected
- Quick couplings
- Sturdy shock absorbing “flight case" with rollers and handles
- Locking accessory drawer available

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System example

The analyser is a BA 5000 multi component analyser for measuring CO, NO, SO_2 and O_2 per 13th BImSchV and TA-Luft.

Sample gas conditioning consists of a condensate pre-separator, a Peltier cooler, a moisture detector with control unit, acid-proof filter, a gas pump and a condensate pump. The system statuses and the cooling temperature can be read from displays. The gas connections and the condensate drain have self-locking quick couplers.

An accessory drawer with 2 heights holds connection hoses, mains cable and documentation.

The MAS stands on 4 large wheels, has handles at the sides and an extending handle for pulling the system at the back.

Technical Data

Technical data for the system example shown	
Ambient temperature:	32...122 °F
Weight:	approx. 121 lb
Supply voltage:	230 V
Total flow rate:	approx. 2 lpm

Dimensions

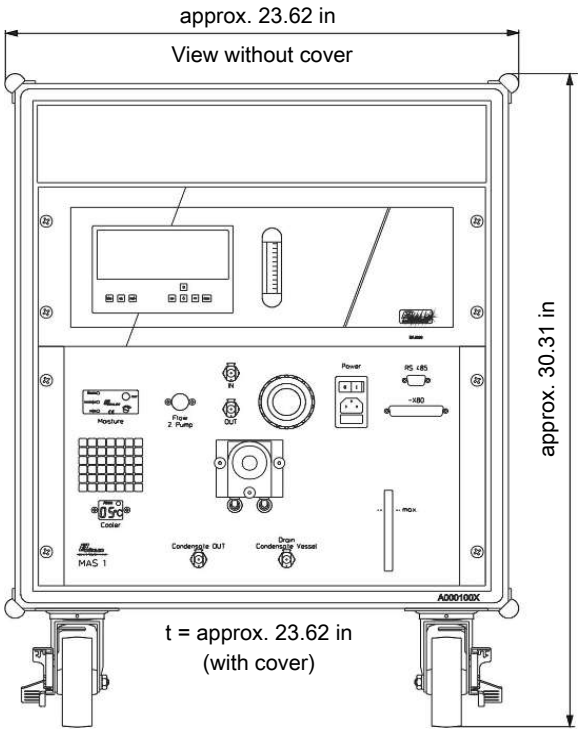

Fig. 1: System example dimensions

Configuration of a MAS

HOUSING

The housing dimensions mainly depend on the built-in components. Also available with a single wall housing, which reduces the dimensions.

ANALYSERS

All 19" rack mount analysers may be used:

- Oxygen analyser: BA 3000 and BA 6000-O_2
- Multi component analysers: BA 3500, BA 5000 and BA 6000-IR

SAMPLE GAS CONDITIONING

The sample gas conditioning is freely configurable. It is based on the model SCS sample gas conditioners. For a description and configuration, please refer to the data sheet and questionnaire "19" sample gas conditioning systems".

ORDERING INSTRUCTIONS

- Choose an analyser and define the required specifications such as measuring range and equipment, etc.
- Complete the SCS 19” systems questionnaire to define the sample gas conditioning.
- Would you like the MAS with or without accessory drawer?
- Do you have special housing requirements?

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1030 West Hamlin Road
USA - Rochester Hills, MI 48309
www.buhlertech.com

Phone: 248.652.1546
Fax: 248.652.1598
e-mail: sales@buhlertech.com

Technical Questionnaire

Please fill in this questionaire as complete as possible. It will help for quoting you an analyser system in a short time.

Customer:

Company:	_____	Contact person:	_____
Department:	_____	Phone:	_____
Address:	_____	Fax:	_____
Signature:	_____	e-mail:	_____

Sample gas composition:

Component	Concentration			Unit	Measuring component		Remark
	min.	norm.	max.		Yes	No	
Σ		100		%			

Is the sample gas toxic? O Yes O No

Process description:

Corrosive/reactive components:

Suitable materials:

Fuel type:

Parameters of sample point (circle appropriate unit)						
Temperature (°F °C)	Min:		Norm:		Max:	
Density (kg/ m^3 lb/dscf)	Min:		Norm:		Max:	
Pressure (psi in. H_2O in. Hg)	Min:		Norm:		Max:	
Dew point (°C)	Min:		Norm:		Max:	
Particulate loading (mg/ m^3)	Min:		Norm:		Max:	
Gas velocity (m/s)	Min:		Norm:		Max:	
Flange ∅		Orientation		Breaching depth (in)		
Explosive environment	O Yes	O No	if yes, class:			

Parameters of sample return (circle appropriate unit)						
Temperature (°F °C)	Min:		Norm:		Max:	
Pressure (psi in. H2O in. Hg)	Min:		Norm:		Max:	
Explosive environment	O Yes	O No	if yes, which:			

Mounting place:						
O Indoor O Outdoor						
Ambient temperature (°C)	Min:		Norm:		Max:	
Relative humidity (%)	Min:		Norm:		Max:	
Ex- Zone	O Yes	O No	if yes, class:			
Distance: Sample probe - Analyzer (m ft):						

Additional information:
Electricity:
Pressure air:
Pressure nitrogen:

Design:				
Design according to DIN EN 15267	O Yes	O No		
Output signals:				
Required T_{90} time:				
Required protection class:				
Required Explosive protection:				
Auto Calibration	O Yes	O No		
Position sample gas line	O Top	O Bottom	O Left	O Right
Position power supply/ output signals	O Top	O Bottom	O Left	O Right

Service:		
Do you desire on-site assembly of the system?	O Yes	O No
Do you desire initial operation ?	O Yes	O No
Do you desire to enter a service contract?	O Yes	O No

Mounting
Regulations at the premisses:
special qualification required:
special training required:

Cable specifications
Indoors:
Voltage:
Signals
Outdoors:
Voltage:
Signals:

Mounting equipment		
Lifting platform	O Yes	O No
Ladder	O Yes	O No
Cable trays	O Yes	O No
Work shop	O Yes	O No
Person responsible on-site	O Yes	O No
Other		

Time restrictions at the premises:		
Are there any time restictions for working at the premises?	O Yes	O No
if yes, please specify:		

Particle monitors

- DA08F000 Overview Particle-Monitoring
- DA08F001 BDA 02
- DA08F002 BDA 02 Ex
- DA08F004 BDA 06 ED
- DA08F005 BDA 15
- DE020010 Questionnaire

US

V04.19

BÜHLER TECHNOLOGIES

PARTICLE MONITORING

FILTER MONITOR / FINE DUST MONITOR

TOGETHER FOR A CLEAN ENVIRONMENT

FILTER MONITOR BDA 02

Particle Monitor BDA 02

The user-friendly BDA series particle monitors are high quality systems for monitoring dust filters and separators. Monitoring and diagnosing dust leaks makes filtration system service predictable for active filter management. Depending on the version the units can be calibrated, and the measurement can be displayed in mg / m^3.

"We are able to look into your filter."

TECHNICAL FEATURES:

- Visual filter condition diagnosis on site
- 2.5" Graphics display
- Automatic service notification
- Zero point and range monitoring
- Calibratable (mg / Nm^3)
- Filter damage can be localized
- Active environmental protection
- Predictive Maintenance
- Longer safe use of bag filters and filter cartridges

HOW A BAG FILTER WORKS

A fabric filter consists of a multitude of textile filter bags, which are pulled over a wire support cage.

These filter bags are exposed on the outer surface to the particle-containing raw gas. The retained particles will form a so-called “filter cake” on the surface of the filter bags over time and it will become increasingly difficult to transport the waste gas / raw gas through the web.

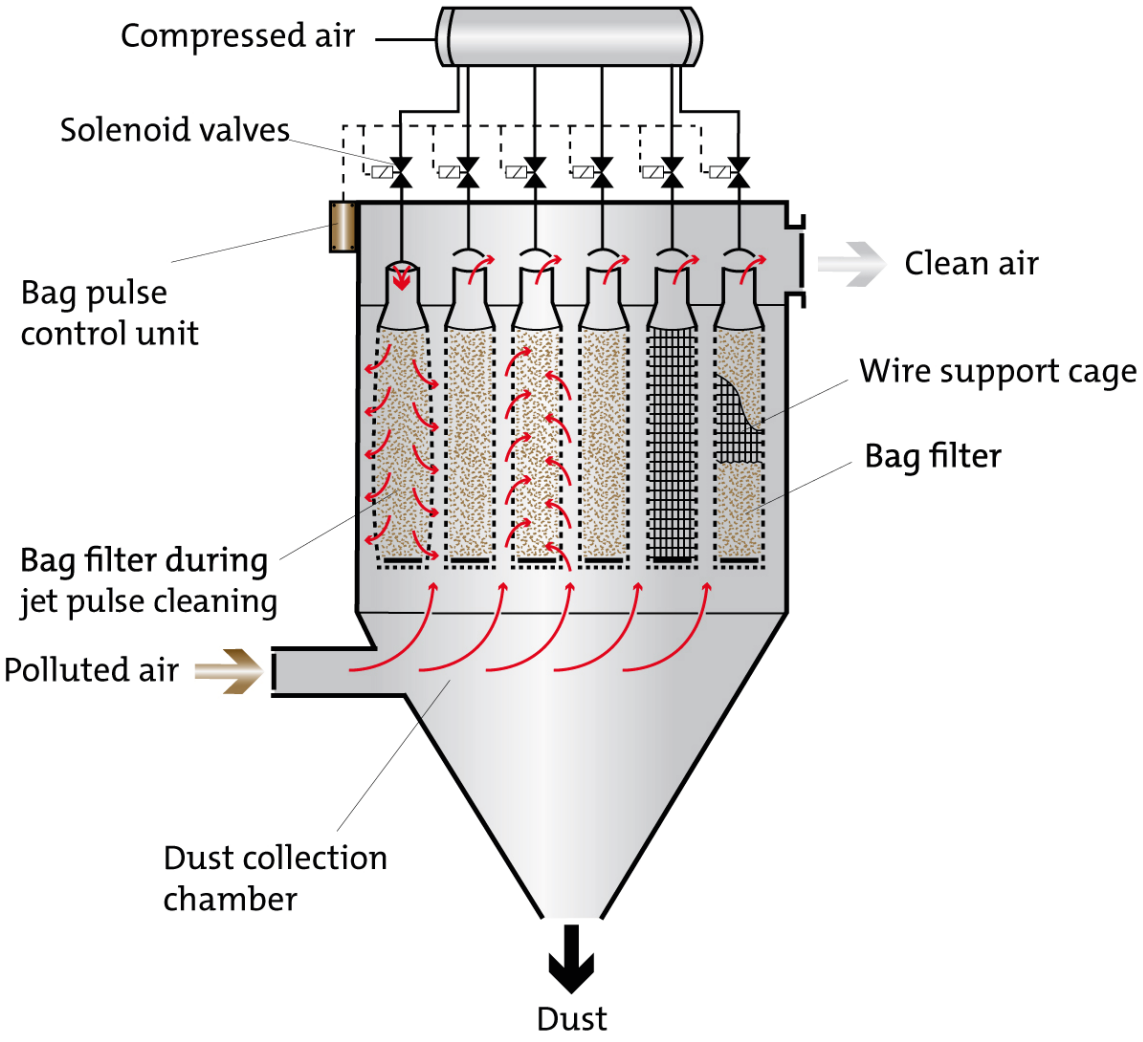
The differential pressure between the raw gas and the clean gas side increases strongly. Now the time has come for a “Bag Pulse Cleaning”.
Via a valve control, a large amount of compressed air is blown backwards into the filter bag.

The filter fabric expands outwards and the collected “filter cake” falls into the dust collection chamber.

The backflush cycle is controlled either by a fixed time interval (e. g. every 30 minutes) or by the pre-set maximum differential pressure.

As a result of this continuous movement (friction) of the textile filter tube on the wire support, small holes develop in the tissue over time, through which unfiltered raw gas can reach the clean air side.

These initially very small quantities of dust particles can already be reliably detected with the BDA 02.



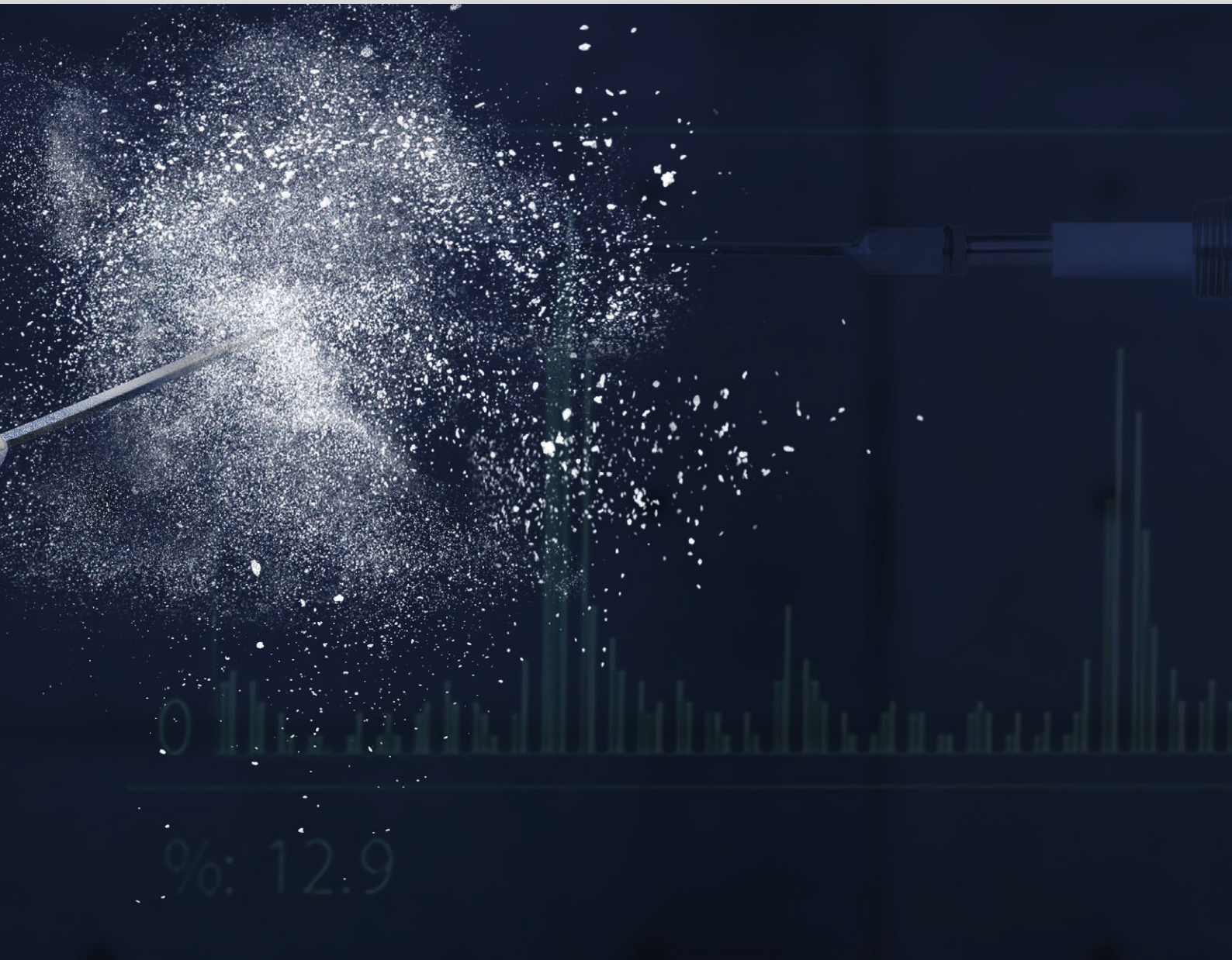
FILTER MONITOR BDA 02

“DETECTS” EACH BAG PULSE CLEANING PEAK

THE SHAPE AND HEIGHT PROVIDE INFORMATION ABOUT THE STATE OF THE FILTER

FILTER MONITORING WITH THE BÜHLER BDA 02

- **Filter damage can be localized**
  It is not always necessary to replace all filter elements; the operator can see where the problem inside the filter is caused.
- **Active environmental protection**
  Particles do not exhaust unnoticed, because normally a filter damage is only visually visible higher than 50 mg / m³.
- **Predictive Maintenance**
  The operator has the opportunity to see the real-time results before a critical value is reached and allows to forecast potential problems with minimizing or eliminating possible down time.
- **Longer safe use of filter elements**
  Manufacturers of filter elements often recommend to change the cartridge within 12-18 months.



FINE DUST MONITOR BDA 15

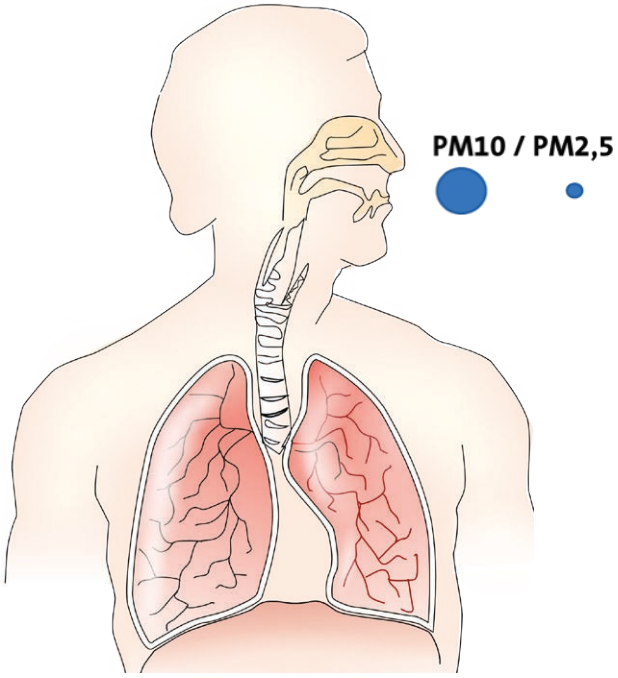
WHY DO WE NEED TO MONITOR FINE DUST?

Fine dust particles are not visible particles (solid or liquid) which float in the ambient air due to their small dimensions (<10 µm).

PM10 can invade the nasal cavity PM2.5 into the bronchi and alveoli and ultrafine particles into the lung tissue and even into the bloodstream.

Depending on the size and therefore the penetration depth, fine dust is classified as hazardous to health.

The Fine Dust Monitor BDA 15 is able to monitor the ambient air containing increasing dust levels in many production processes.



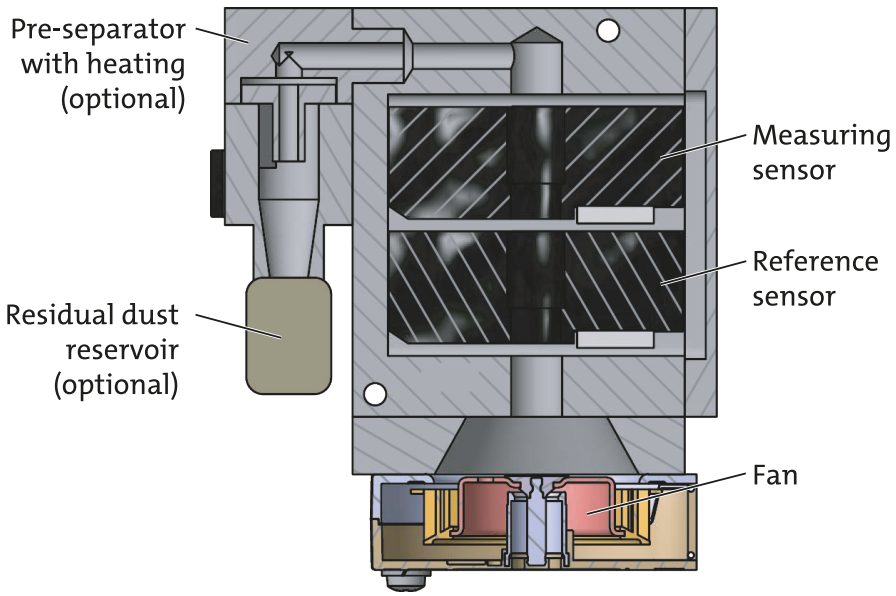
WHERE DOES FINE DUST COME FROM?

- Particulate matter is generated by combustion plants, during the production and machining of metal, and also in the manufacturing and transfer of all bulk materials.
- Fine dust is often produced by diffusion sources and can generally not be localized because a continuous monitoring 24 h / 365 days does not exist.

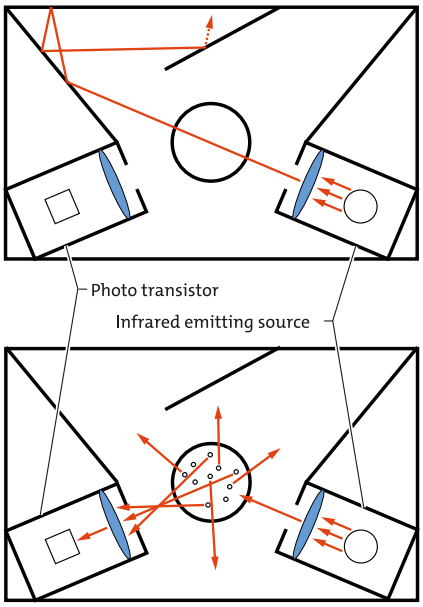
HOW DOES THE BDA 15 WORK?

- The BDA 15 determines the fine dust content based on the principle of light-scattering.
- The incoming air is preheated to 50°C. The built-in fan ensures a forced flow (2 l/min).
- The BDA 15 periodically analyzes and corrects the zero point and reference point.

Sensor design



Light path inside the sensor housing



YOUR CONTACT

Oliver Fries
Vice President
Canada, West USA, South West USA
T. +1 248 . 652 . 1546
oliver@buhlertech.com

Larry La France
Technical Sales Manager
East USA
T. +1 248 . 792 . 1147
larry@buhlertech.com

Terrence Keegan
Technical Sales Manager
Mid-West USA
T. +1 440 . 879 . 6360
terrance@buhlertech.com

BUHLER TECHNOLOGIES LLC

1030 W. Hamlin Road • Rochester Hills, MI 48309 • USA
P. +1 248 . 652 . 1546 • F. +1 248 . 652 . 1598
sales@buhlertech.com • www.buhlertech.com

Particle monitor BDA 02

In many production and thermal processes the process- or exhaust air also contain dust particles of various sizes. To ensure this dust does not enter the environment unchecked, they are separated or retained using suitable filter systems.

Whilst in e.g. manufacturing powdered milk, plastics, soot and fertilisers this primarily means recovering valuable substances, in steel production, the wood industry, in foundries, crematoriums and in the cement industry as well as plasterboard product, just to name some of the possible applications, the focus is on environmental protection.

Since the separation elements in the filter systems used wear due to more or less frequent backwashing, dust breaches or increasing particle emission often occur. In addition to ensuring operating safety in the interest of the owner, TA Luft even requires the use of certified residual dust monitoring equipment for many applications and air exhaust ducts.

The particle monitor BDA 02 is one version in a series for this scope of application.

- Unit made in Germany
- Robust, low-maintenance technology
- Easyjust installation kit for easy installation
- German / English menu navigation
- Automatic service notification
- Zero point and range monitoring
- Calibratable (mg/Nm^3)
- Visual filter condition diagnosis on site
- 2.5" Graphics display
- Suitability-tested technology according to TA-Luft
- Low operating costs / high energy efficiency (3 W)

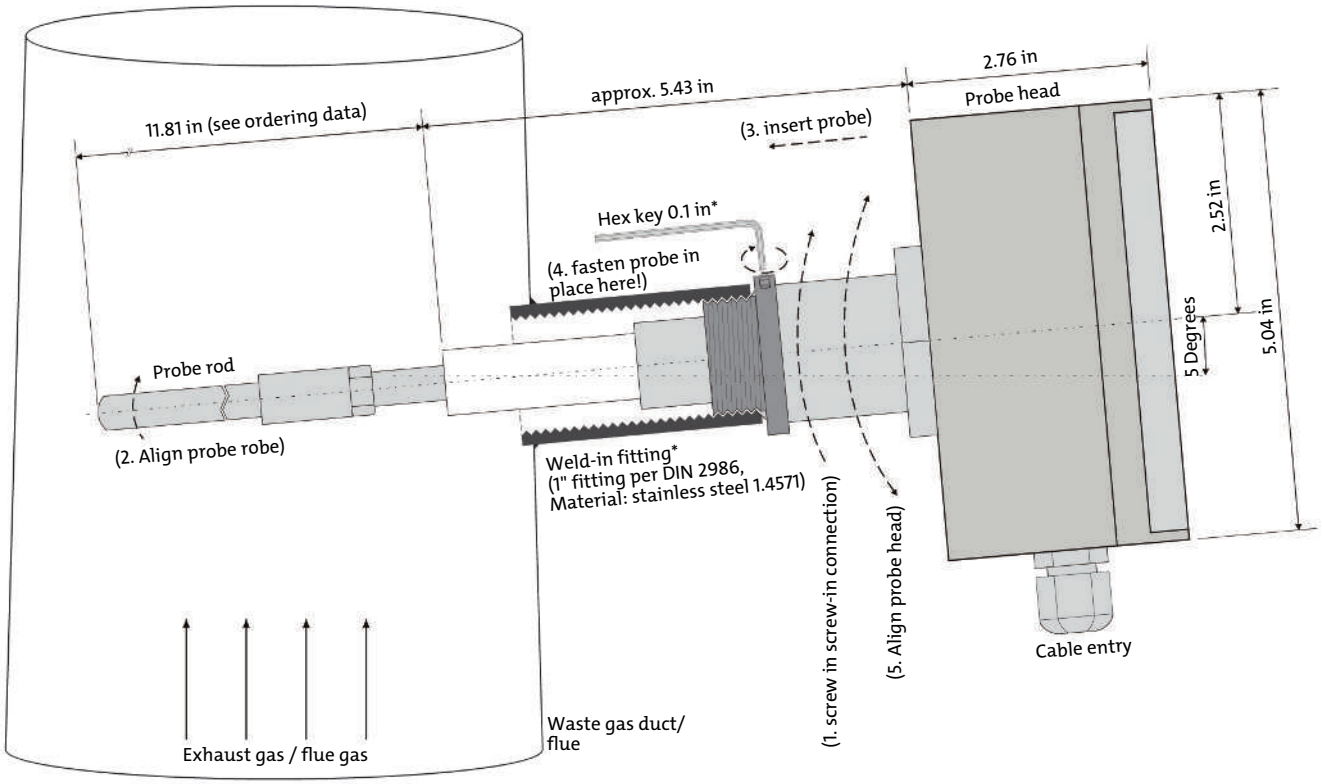
Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

Particle monitors by Bühler are used to monitor filters and separators in normal, moist, non-condensing exhaust gas / processes. They combine progressive signal processing with the proven triboelectric measuring principle. The interaction between particles and the sensor rod result in an electric charge crossing to the sensor rod. This does not require the particles to be in direct contact with the sensor rod. The resulting low current is analysed by the electronics and generates an analogue standard signal proportional to the dust content. The units can be calibrated in mg/m^3 through isokinetic reference measurement. This technology is TA Luft approved. The triboelectric measuring process works in flow speeds of 3 m/s and up, and is largely insusceptible to deposits on the sensor rod. Manual amplification adjustment allows the units to be adapted to a variety of systems and applications.

The directly attached control unit features a 2.5" graphics display and the four control keys. The cable inlet along with the Easyjust installation kit are standard components and make installation significantly easier. The menu features two languages - German and English. The graphics display allows for on the monitoring of the filter condition. In addition to the signals for status and limits, the BDA 02 also outputs a signal to notify of service needs.

Installation example

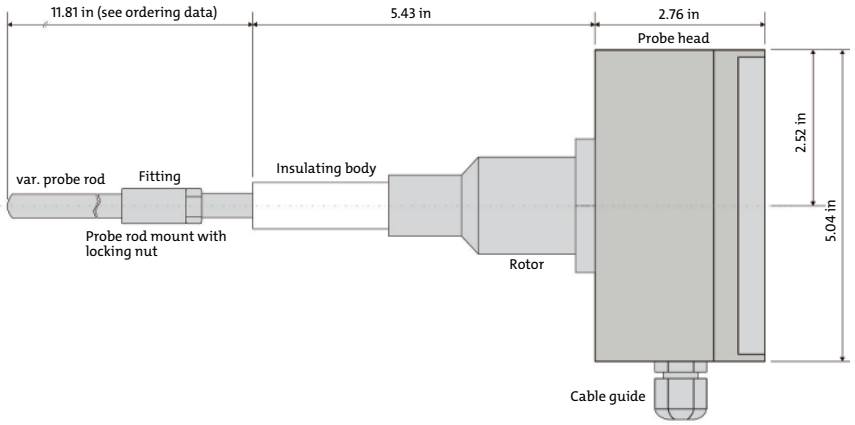


* The fitting is welded to the waste gas flue and the Conversion nipple screwed in tightly. Then insert the BDA 02 all the way and secure in the desired position by socket screw.

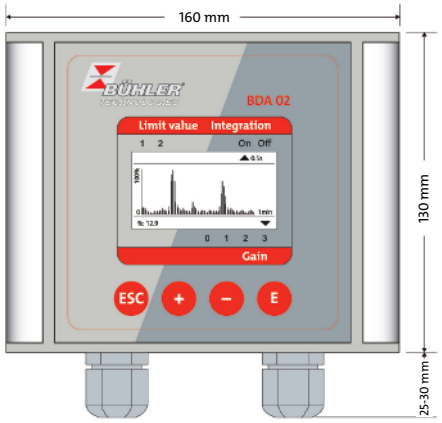
Easyjust installation kit

Dimensions

Side view



Front view



Technical data

Technical Data	
Housing	IP 65 compact unit
Weight	approx. 5.5 lb
Probe	triboelectric probe consisting of probe rod and probe head
Probe rod	insulated from housing, length: variable (mechanically trimmable)
Probe material	Stainless steel 1.4571 (Isolator PTFE)
Immersion depth	Varies by application (max. 39.37 in)
Display / Operation	2.5" graphics display, 4 control keys
Ambient temperature	-4...122 °F
Humidity	not particularly sensitive
Dew point difference	min. +5 K
Sample gas temperature	max. 482 °F (higher temperatures on request)
Flow rate	approx. 3 m/s and up
Dust measuring range	qualitative: 0...100 %; quantitative: 0...10 mg/m³ (0...1000 mg/m³)
Amplification levels	arbitrary from 0 to 3
Calibration	by gravimetric comparison measurements
Analogue output	4...20 mA, galvanically isolated from equipment earth, max. load impedance 500 Ω
Digital outputs	3 relays, max. 24 V DC at 0.1 A (for failure, service, required service)
Process connection	1" Easyjust installation kit serial / flange DN25 PN6 optional
Cable fitting	2x M20 x 1.5 / 0.35...0.51 in, 1x dummy plug
Power supply	230/110 V AC, 50-60 Hz, 24 V DC
Performance test	Technology suitability-tested to TA Luft

See also

DE020010 Questionnaire [▸ 4]

Project-No.: _____

Questionnaire Filter Monitoring and Dust Measurement

BÜHLER TECHNOLOGIES

Gas Analysis

Company

Company		Name	
Street		Dept.	
ZIP code, city		Phone	
Country		Email	

Person in charge

General process information

Industry
(e. g.: Metal, Chemistry, Food, Energy, etc.)

Industry sector
(e. g.: Casting, Plastics, Powdered milk , coal-fired power plant, etc.)

Process
(e. g.: Drying, Material transport, Material processing, Material recycling, etc.)

Filter type
(e. g.: Bag filter, Cartidge filter, Cyclone, Electrofilter, etc.)

Reason for filter monitoring
(e. g.: Official requirements, active environmental protection, process control, filter monitoring, etc.)

Certificates / Approvals

Ex-Zone ☐ Yes ☐ No

Zone

Technical Data

Duct diameter [L1]: [mm]

Junction length [L2]: [mm]

Insulation thickness [L3]: [mm]

Straight length upstream [L4]: [mm]

Straight length downstream [L5]: [mm]

Velocity exhaust gas [v]: Constant? ☐ Yes ☐ No

from to [m/s]

Amount of exhaust gas [V]: [Nm³/h]

Temp. of exhaust gas [T]: [°C]

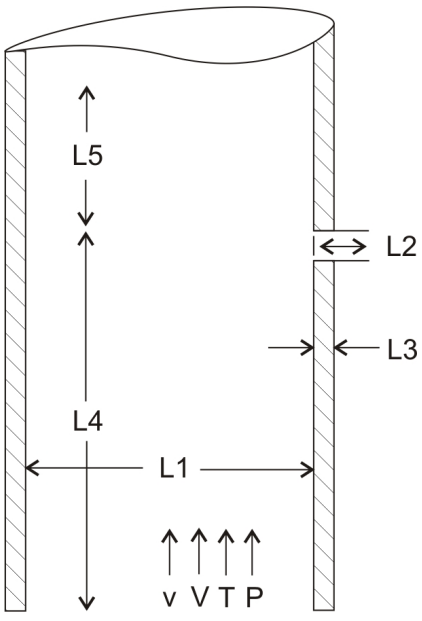
Pressure exhaust gas [P]: [mbar]

Residual dust content: [mg/Nm³]

Material of particles:

Particle size: [µm]

Relative humidity: [%]



Duct direction: ☐ horizontal
☐ vertical

flow direction: ↑ ↓ → ←
☐ ☐ ☐ ☐

Water drops contained? ☐ Yes ☐ No

Corrosive gas? ☐ Yes ☐ No

Which type:

Mains supply: ☐ 110-230 V ☐ 24 V DC

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
analyse@buehler-technologies.com
Internet: www.buehler-technologies.com

Particle monitor BDA 02 Ex

In many production and thermal processes the process- or exhaust air also contain dust particles of various sizes. To ensure this dust does not enter the environment unchecked, they are separated or retained using suitable filter systems.

Whilst in e.g. manufacturing powdered milk, plastics, soot and fertilisers this primarily means recovering valuable substances, in steel production, the wood industry, in foundries, crematoriums and in the cement industry as well as plasterboard product, just to name some of the possible applications, the focus is on environmental protection.

Since the separation elements in the filter systems used wear due to more or less frequent backwashing, dust breaches or increasing particle emission often occur. In addition to ensuring operating safety in the interest of the owner, TA Luft even requires the use of certified residual dust monitoring equipment for many applications and air exhaust ducts.

The BDA 02 Ex particle monitor is one version in a series for this scope of application.

- Device made in Germany
- Robust, low-maintenance technology
- Easyjust installation kit for easy installation
- German / English menu navigation
- Automatic service notification
- Zero point and range monitoring
- Calibratable (mg/Nm^3)
- Visual filter condition diagnosis on site
- 2.5" graphics display
- Low operating costs / high energy efficiency (3 W)
- Ex Zone 2 / 22

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
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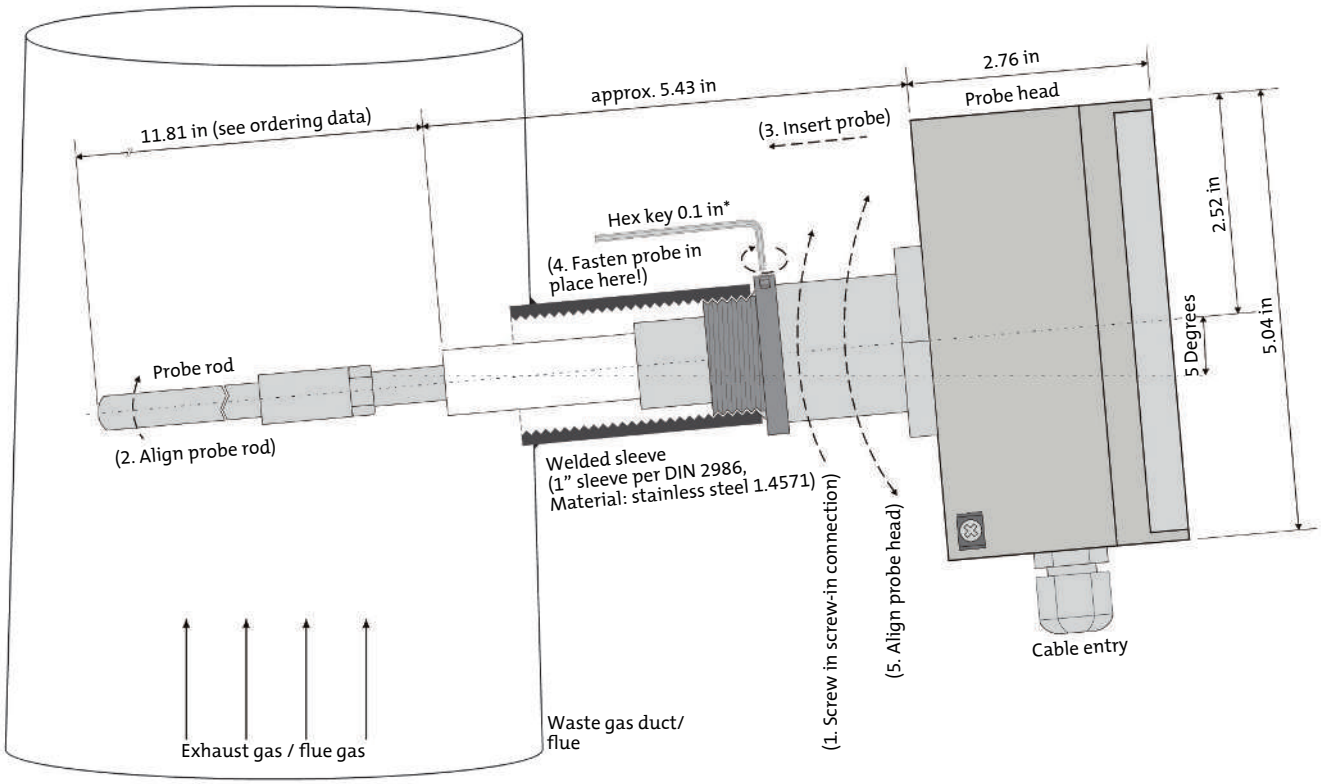
Description

Particle monitors by Bühler are used to monitor filters and separators in normal, moist, non-condensing exhaust gas / processes. They combine progressive signal processing with the proven triboelectric measuring principle. The interaction between particles and the sensor rod result in an electric charge crossing to the sensor rod. This does not require the particles to be in direct contact with the sensor rod. The resulting low current is analysed by the electronics and generates an analogue standard signal proportional to the dust content. The units can be calibrated in mg/m^3 through isokinetic reference measurement. This technology is TA Luft approved. The triboelectric measuring process works in flow speeds of 3 m/s and up, and is largely insusceptible to deposits on the sensor rod. Manual amplification adjustment allows the units to be adapted to a variety of systems and applications.

The directly attached control device features a 2.5" graphics display and the four control keys. The cable inlet along with the Easyjust installation kit are standard components and make installation significantly easier. The menu features two languages - German and English. The graphics display allows for on the monitoring of the filter condition. In addition to the signals for status and limits, the BDA 02 Ex also outputs a signal to notify of service needs.

Installation example

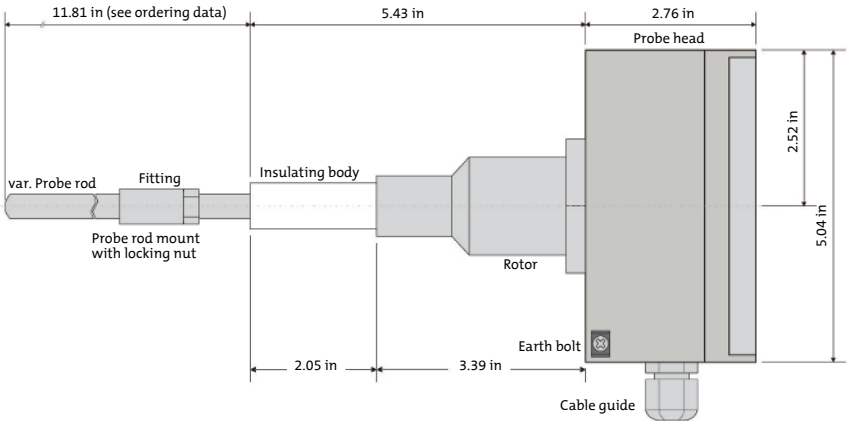


* The fitting is welded to the waste gas flue and the Conversion nipple screwed in tightly. Then insert the BDA 02 Ex all the way and secure in the desired position by socket screw.

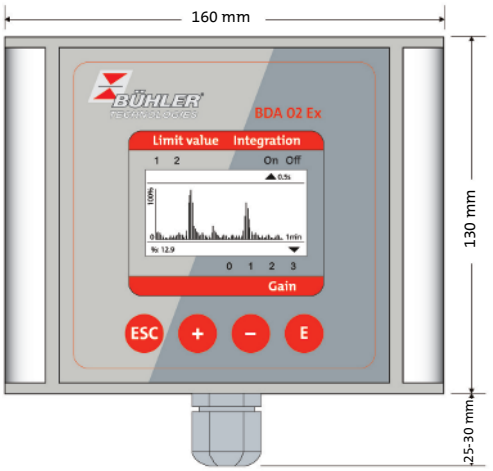
Easyjust installation kit

Dimensions

Side view



Front view



Technical data

Technical Data	
Housing	IP 65 compact unit
Weight	approx. 5.5 lb
Probe	triboelectric probe consisting of probe rod and probe head
Probe rod	insulated from housing, length: variable (mechanically trimmable)
Probe material	Stainless steel 1.4571 (isolator PTFE)
Immersion depth	Varies by application (max. 39.37 in)
Display / Operation	2.5" graphics display, 4 control keys
Ambient temperature	-4...122 °F
Humidity	not particularly sensitive
Dew point difference	min. +5 K
Sample gas temperature	max. 482 °F
Flow rate	approx. 3 m/s and up
Dust measuring range	qualitative: 0...100 %; quantitative: 0...10 mg/m³ (0...1000 mg/m³)
Amplification levels	arbitrary from 0 to 3
Calibration	by gravimetric comparison measurements
Analogue output	4...20 mA, max. load impedance 500 Ω
Digital outputs	3 relays, max. 24 V DC at 0.1 A (for failure, service, required service)
Process connection	1" Easyjust installation kit serial / flange DN25 PN6 optional
Cable fitting	M20 x 1.5 / 0.35...0.51 in, dummy plug
Power supply	24 V DC, electrically isolated (U_{max} < 36 V)
ATEX mark	Ex II 1/3 D Ex ia/tc IIIC T74 °C Da/Dc Ex II 3G Ex ic nA IIC T4 Gc

See also

DE020010 Questionnaire [▶ 4]

Project-No.: _____

Questionnaire Filter Monitoring and Dust Measurement

BÜHLER TECHNOLOGIES

Gas Analysis

Company

Company		Name	
Street		Dept.	
ZIP code, city		Phone	
Country		Email	

Person in charge

General process information

Industry
(e. g.: Metal, Chemistry, Food, Energy, etc.)

Industry sector
(e. g.: Casting, Plastics, Powdered milk , coal-fired power plant, etc.)

Process
(e. g.: Drying, Material transport, Material processing, Material recycling, etc.)

Filter type
(e. g.: Bag filter, Cartidge filter, Cyclone, Electrofilter, etc.)

Reason for filter monitoring
(e. g.: Official requirements, active environmental protection, process control, filter monitoring, etc.)

Certificates / Approvals

Ex-Zone ☐ Yes ☐ No

Zone

Technical Data

Duct diameter [L1]: [mm]

Junction length [L2]: [mm]

Insulation thickness [L3]: [mm]

Straight length upstream [L4]: [mm]

Straight length downstream [L5]: [mm]

Velocity exhaust gas [v]: Constant? ☐ Yes ☐ No

from to [m/s]

Amount of exhaust gas [V]: [Nm³/h]

Temp. of exhaust gas [T]: [°C]

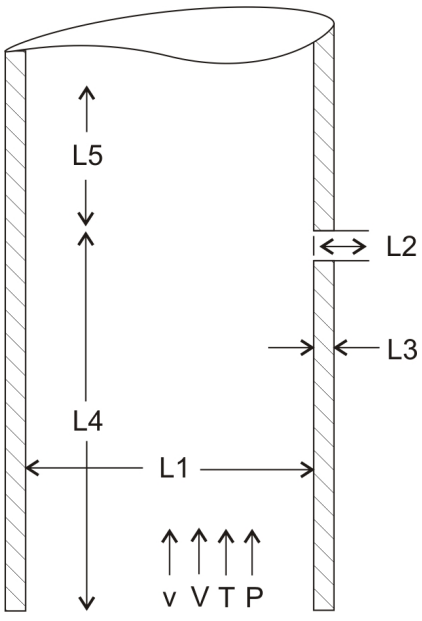
Pressure exhaust gas [P]: [mbar]

Residual dust content: [mg/Nm³]

Material of particles:

Particle size: [µm]

Relative humidity: [%]



Duct direction: ☐ horizontal
☐ vertical

flow direction: ↑ ↓ → ←
☐ ☐ ☐ ☐

Water drops contained? ☐ Yes ☐ No

Corrosive gas? ☐ Yes ☐ No

Which type:

Mains supply: ☐ 110-230 V ☐ 24 V DC

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
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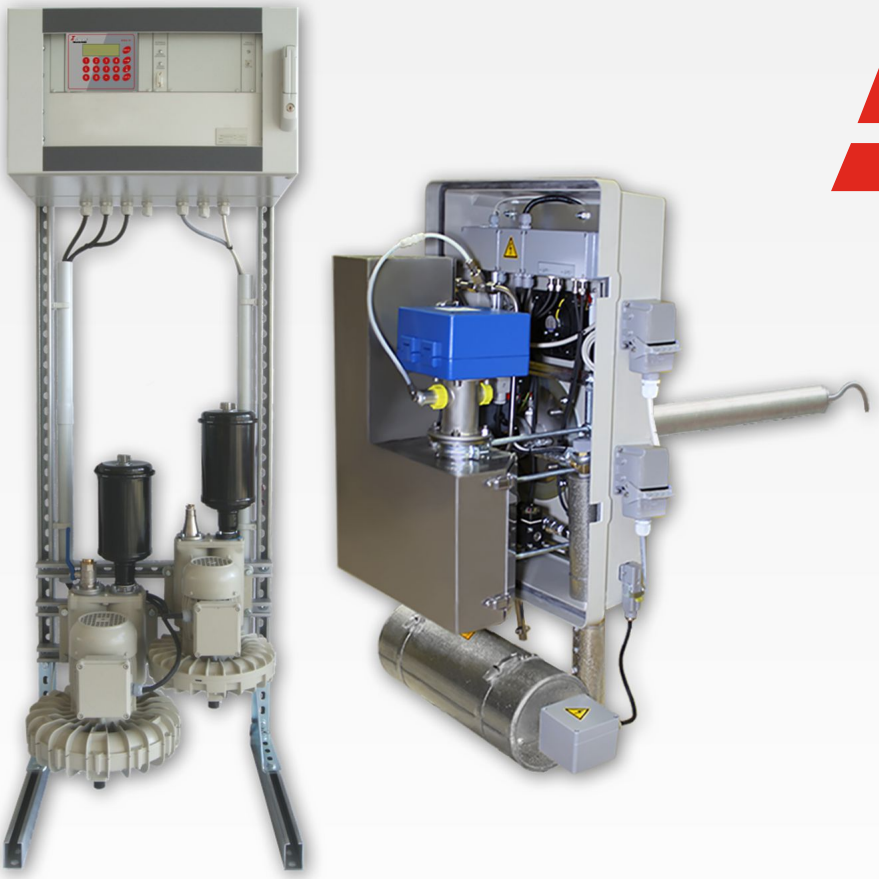


Particle monitor BDA 06 ED

In many production and thermal processes the process- or exhaust air also contain dust particles of various sizes. To ensure this dust does not enter the environment unchecked, they are separated or retained using suitable filter systems.

Whilst in e.g. manufacturing powdered milk, plastics, soot and fertilisers this primarily means recovering valuable substances, in steel production, the wood industry, in foundries, crematoriums and in the cement industry as well as plasterboard product, just to name some of the possible applications, the focus is on environmental protection.

Within this spectrum e.g. moist exhaust gas compositions may arise which do not allow the use of in-situ monitors, requiring extractive analysis methods.

The BDA 06 ED particle monitor was designed specifically for these complex applications.

- Device made in Germany
- Suitable for monitoring moist and tacky dust
- Robust technology
- Measuring unit and control-support unit
- Suitable for separate installation
- Easy to install to a mounting pipe
- Easy, menu-guided application
- Calibratable in mg/Nm^3
- On-site diagnostics
- Display / analogue outputs

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
e-mail: sales@buhlertech.com
Internet: www.buhlertech.com

Description

The BDA 06 ED particle monitor is suitable for monitoring moist and tacky residual dust. The unit consists of two installation units:

The sampling-/ analysis unit installs directly to the exhaust gas stack. In contains the sampling tube reaching into the process, all switching- and heating elements, as well as the measuring chamber with the optical measuring equipment.

The control- and support unit, inside a installation frame, can be set up in a suitable location away from the exhaust gas stack and contains the electric control unit and the fan for injector- and dilution air.

Functional principle

An injector extracts a continuous sample stream through a heated, specially shaped sampling tube. This is then diluted with heated air and the dried stream suctioned into a measuring chamber which is also heated. Inside the measuring chamber is a laser and lance unit which continuously emits a signal using the principle of scattering measurement. After calibration the control unit outputs this signal as a flow signal equivalent to the amount of residual dust.

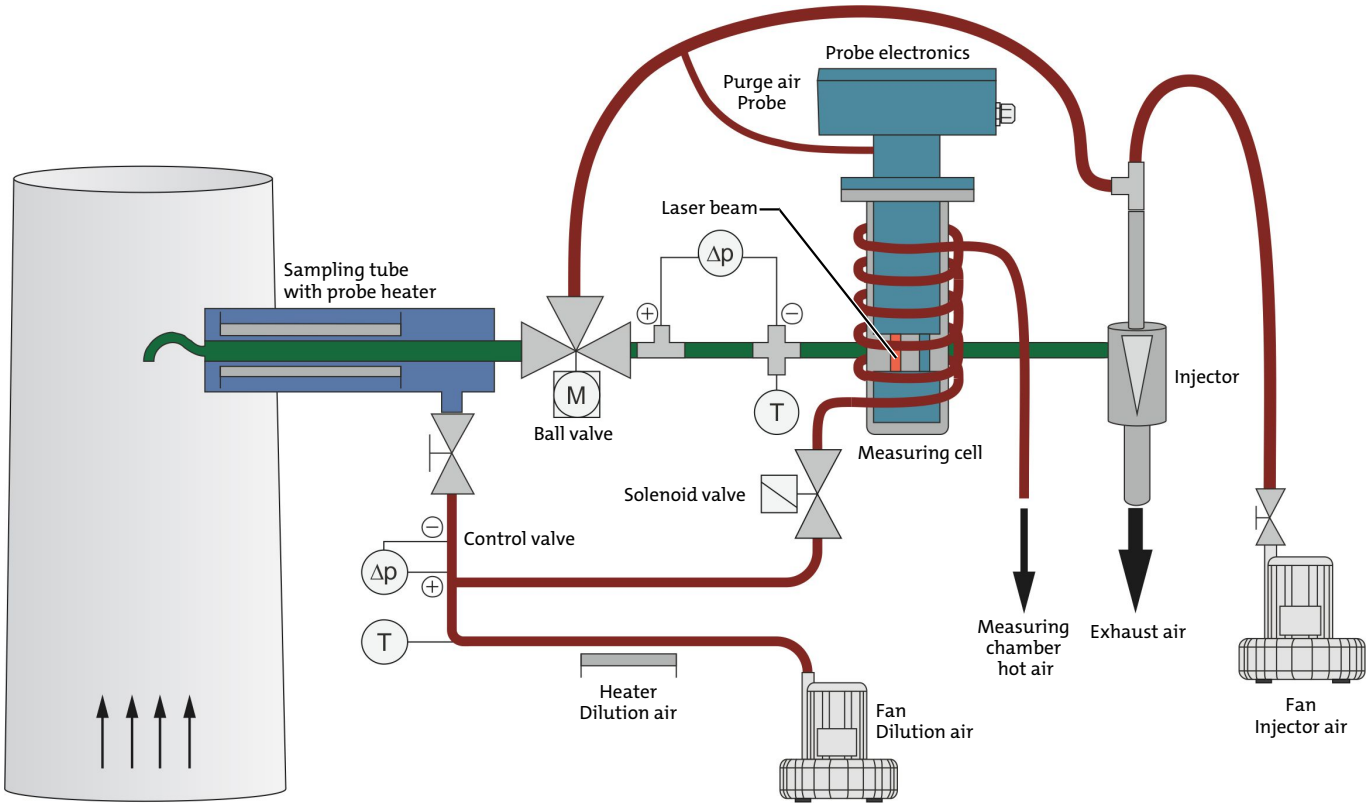
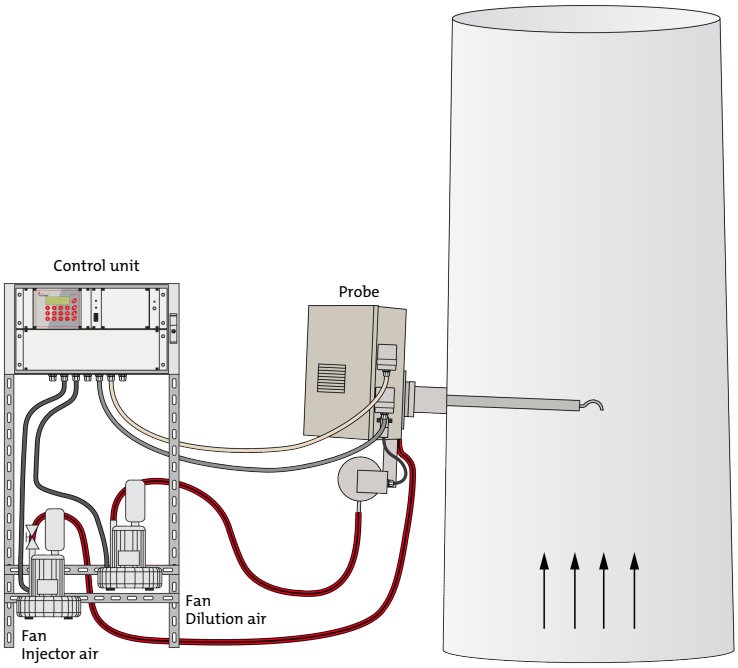


Fig. 1: Functional diagram

Installation example



Technical data

Technical Data	
Control unit:	Sheet steel housing over profile frame (incl. fan) 23.62 in x 66.93 in x 19.69 in (w x h x d), approx. 198 lb, IP 55
Probe:	Extractive sampling with GFK weather hood 19.69 in x 29.53 in x 39.37 in (w x h x d), approx. 143 lb, IP 55
Flange:	DN 80 PN 6, special version: Tube Ø 3.94 in
Measuring principle:	Dust: optical dust measurement by laser beam (scattered light), extractive
Measuring range:	Dust i.b.: 0...15 mg/m³ (max. 500 mg/m³)
Calibration:	by gravimetric comparison measurement
Display:	4-line LC display
Medium temperature:	max. 356 °F
Exhaust gas moisture:	rel. humidity: 100%
Pressure against ambient:	-30...+2 hPa
Ambient temperature:	-4...122 °F
Sample gas flow rate:	6...12 m³/h (extracted sample gas and dilution air)
Power supply:	3L, N, PE, 400 V AC 50 Hz, 4 kVA
Analogue outputs:	4 x 4...20 mA, galvanically isolated by shared mass, load impedance max. 1 kΩ
Digital outputs:	6 x potential-free contact, max. 35 V UC, 0.4 A
Digital input:	Optional, external switching contact for switching measurement/flushing
Clip contacts:	max. 2.5 mm²
Performance test	DIN EN 15267, QAL1 (in preparation)

Special versions available upon request.

See also

DE020010 Questionnaire [▸ 4]

Project-No.: _____

Questionnaire Filter Monitoring and Dust Measurement

BÜHLER TECHNOLOGIES

Gas Analysis

Company

Company		Name	
Street		Dept.	
ZIP code, city		Phone	
Country		Email	

Person in charge

General process information

Industry
(e. g.: Metal, Chemistry, Food, Energy, etc.)

Industry sector
(e. g.: Casting, Plastics, Powdered milk , coal-fired power plant, etc.)

Process
(e. g.: Drying, Material transport, Material processing, Material recycling, etc.)

Filter type
(e. g.: Bag filter, Cartidge filter, Cyclone, Electrofilter, etc.)

Reason for filter monitoring
(e. g.: Official requirements, active environmental protection, process control, filter monitoring, etc.)

Certificates / Approvals

Ex-Zone ☐ Yes ☐ No

Zone

Technical Data

Duct diameter [L1]: [mm]

Junction length [L2]: [mm]

Insulation thickness [L3]: [mm]

Straight length upstream [L4]: [mm]

Straight length downstream [L5]: [mm]

Velocity exhaust gas [v]: Constant? ☐ Yes ☐ No

from to [m/s]

Amount of exhaust gas [V]: [Nm³/h]

Temp. of exhaust gas [T]: [°C]

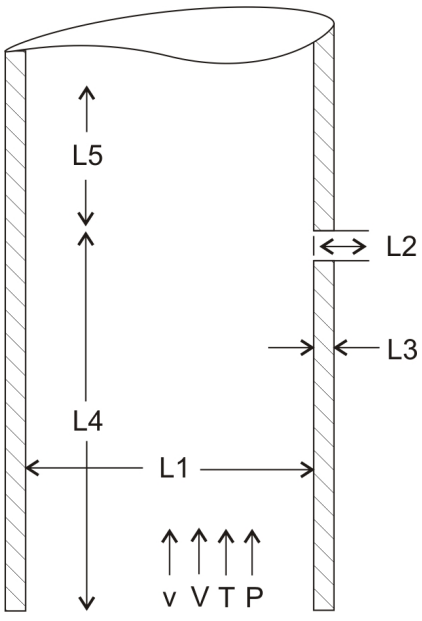
Pressure exhaust gas [P]: [mbar]

Residual dust content: [mg/Nm³]

Material of particles:

Particle size: [µm]

Relative humidity: [%]



Duct direction: ☐ horizontal
☐ vertical

flow direction: ↑ ↓ → ←
☐ ☐ ☐ ☐

Water drops contained? ☐ Yes ☐ No

Corrosive gas? ☐ Yes ☐ No

Which type:

Mains supply: ☐ 110-230 V ☐ 24 V DC

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
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Internet: www.buehler-technologies.com

Fine particle monitor BDA 15

Regardless of the emitter, fine dust particles hazardous for people and the environment. Particles in the submicron range can enter the respiratory tract and are hazardous to the health, regardless of the substance. A number of directives and standards, such as DIN EN 481, require monitoring the surrounding atmosphere.

The BDA 15 fine dust monitor will determine the dust content in shops, factory buildings, offices and public building such as schools and hospitals, as well as private areas.

The compact unit is an autonomous functional unit and can be operated as a stand-alone device or with a linked monitoring system.

The BDA 15 fine dust monitor employs the scattered light principle.

- Device made in Germany
- Sturdy construction
- Quiet operation
- Active suction
- Two sensors for long-term stability
- Multiple BDA 15 can be connected
- Network compatible, WLAN
- Easy to install without speciality tools
- Low operating costs
- Excellent price-performance ratio

Buhler Technologies LLC, 1030 West Hamlin Road, Rochester Hills, MI 48309
Phone: 248.652.1546 / 49 89-0, Fax: 248.652.1598
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Description

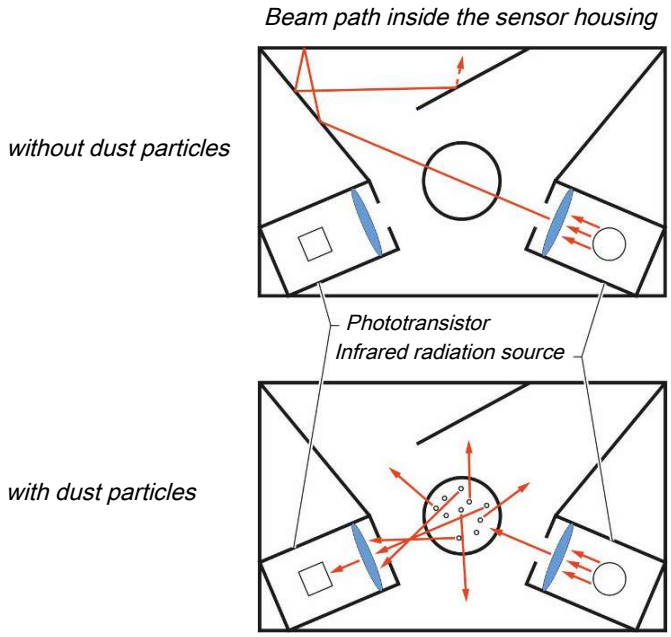
The BDA 15 fine dust monitor is an optical sensor to continuously measure and monitor fine particle concentrations. It can be built into various applications.

The BDA 15 will determine the current fine particle load in the surrounding area and detect a health hazard.

Application examples:

- Monitoring fine dust particles in the production area (shops, factory buildings, etc.),
- Monitoring the indoor air quality in offices and public buildings (hospitals, schools, etc.) or private areas,
- Monitoring the ambient air,
- Add-on for weather stations.

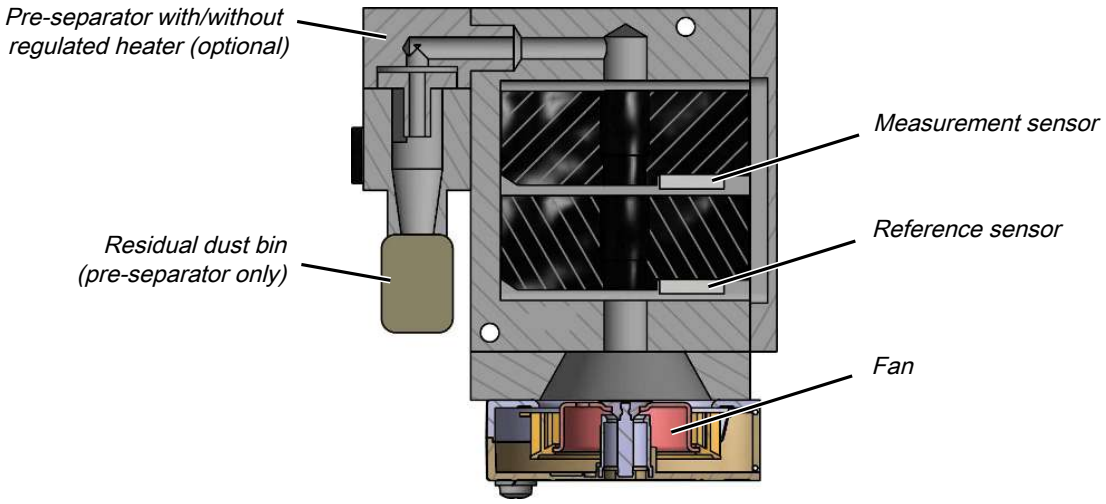
Functional principle



The BDA 15 determines the dust content based on the principle of light-scattering measurement. The incoming air is preheated to 50 °C (122 °F). A built-in fan ensures a forced flow (2 L/min). The sample gas is set to a speed which allows representative particle detection.

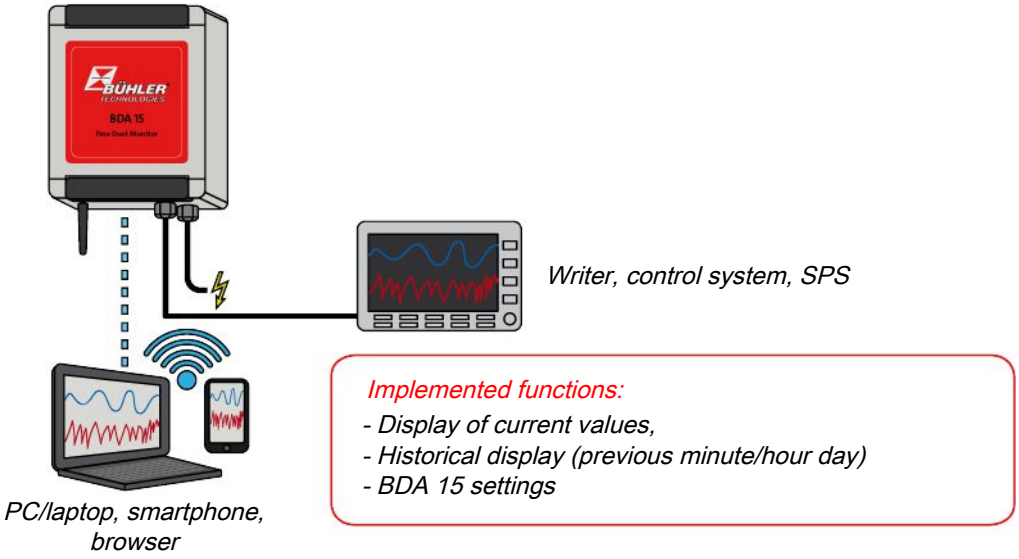
The BDA 15 periodically analyses and corrects the zero point and reference point. Analysis of the internal measurement signals ensures high zero point stability.

Layout

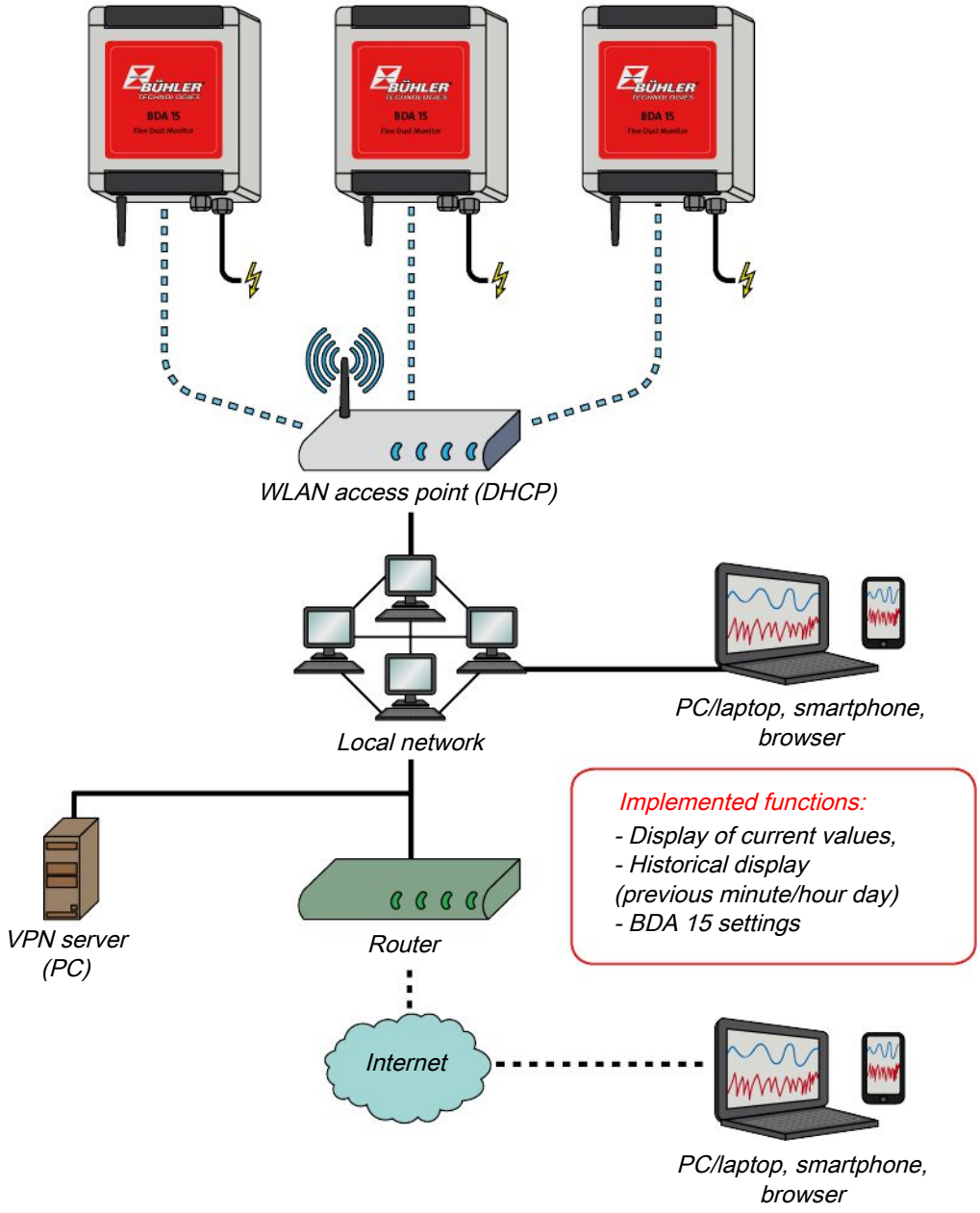


Application WLAN module (including 4-20 mA output)

a: Access Point
(Standard)



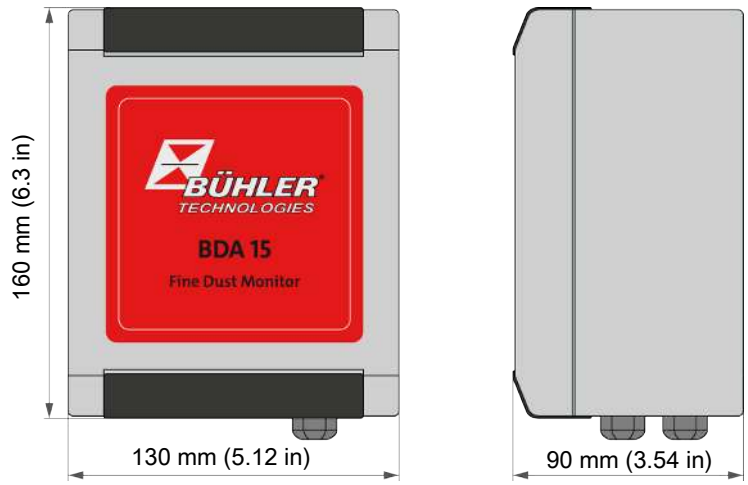
b: Station
(via setting in
access point)

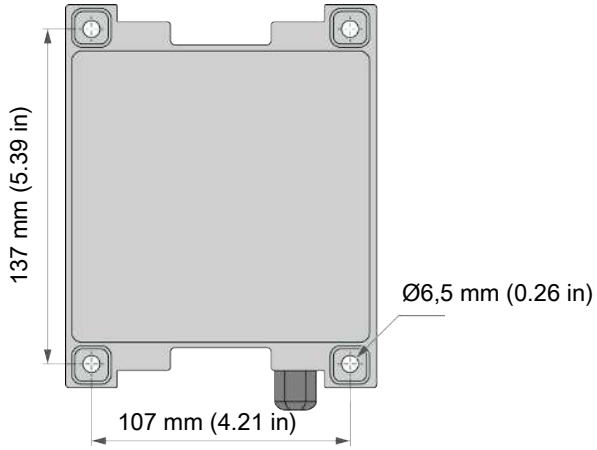


Technical Data

Technical Data	
Housing:	compact aluminium sensor housing
Dimensions:	5.12 in x 6.3 in x 3.54 in (W x H x D)
Weight:	approx. 4.4 lb
Degree of protection:	IP 33
Voltage:	100-240 V AC, 0.7 A, 50-60 Hz (optional 12 V DC, 2.1 A); prefuse min. 5 A
Ambient temperature:	-4...122 °F
Relative humidity:	0...95 %
Measuring principle:	Light-scattering measurement
Sensors:	2 x optical sensor; separate control and signal analysis
Volume flow:	2 L/min
Port:	RS485 (modbus), WLAN
Clip contacts:	max. 0.5 mm (0.02 in); Voltage supply connection: max. 2.5 mm (0.1 in)
Fan:	for forced flow
Heater:	for sample gas conditioning (maintaining the dew point difference)
Average dust contents:	up to 200 µg/m³ (with electrostatic filter 500 µg)
Detection limit:	3 µg/m³
Outlet:	4...20 mA current loop
Optional:	- Pre-separator with regulated heater (aerosols) - Electrostatic filter (for zero point control in high fine dust pollution) - Built-in pre-separator for measuring fine particles ($PM_{2.5}$)

Dimensions





Project-No.: _____

Questionnaire Filter Monitoring and Dust Measurement

BÜHLER TECHNOLOGIES

Gas Analysis

Company

Company		Name	
Street		Dept.	
ZIP code, city		Phone	
Country		Email	

Person in charge

General process information

Industry
(e. g.: Metal, Chemistry, Food, Energy, etc.)

Industry sector
(e. g.: Casting, Plastics, Powdered milk , coal-fired power plant, etc.)

Process
(e. g.: Drying, Material transport, Material processing, Material recycling, etc.)

Filter type
(e. g.: Bag filter, Cartidge filter, Cyclone, Electrofilter, etc.)

Reason for filter monitoring
(e. g.: Official requirements, active environmental protection, process control, filter monitoring, etc.)

Certificates / Approvals

Ex-Zone ☐ Yes ☐ No

Zone

Technical Data

Duct diameter [L1]: [mm]

Junction length [L2]: [mm]

Insulation thickness [L3]: [mm]

Straight length upstream [L4]: [mm]

Straight length downstream [L5]: [mm]

Velocity exhaust gas [v]: Constant? ☐ Yes ☐ No

from to [m/s]

Amount of exhaust gas [V]: [Nm³/h]

Temp. of exhaust gas [T]: [°C]

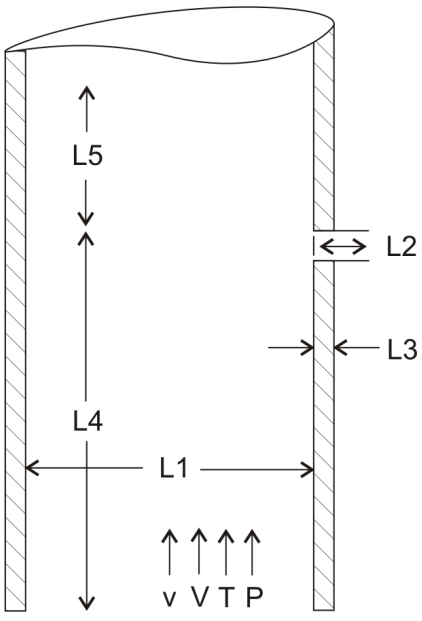
Pressure exhaust gas [P]: [mbar]

Residual dust content: [mg/Nm³]

Material of particles:

Particle size: [µm]

Relative humidity: [%]



Duct direction: ☐ horizontal
☐ vertical

flow direction: ↑ ↓ → ←
☐ ☐ ☐ ☐

Water drops contained? ☐ Yes ☐ No

Corrosive gas? ☐ Yes ☐ No

Which type:

Mains supply: ☐ 110-230 V ☐ 24 V DC

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
analyse@buehler-technologies.com
Internet: www.buehler-technologies.com

Certificates

- Certicifacte ISO 9001:2008
- Certificate ATEX

Certificate of Approval

This is to certify that the Management System of:

Bühler Technologies GmbH

Harkortstrasse 29, 40880 Ratingen, Germany

has been approved by LRQA to the following standards:

ISO 9001:2015

P.G. Cornelissen - Area Manager North Europe

Issued by: Lloyd's Register Deutschland GmbH

for and on behalf of: Lloyd's Register Quality Assurance Limited

Current issue date: 14 December 2018
Expiry date: 13 December 2021
Certificate identity number: 10146601

Original approval(s):
ISO 9001 – 11 December 1995

Approval number(s): ISO 9001 – 0017734

The scope of this approval is applicable to:
Design and manufacture as well as procurement of products for instrumentation, process control and for the fluid power industry.

UKAS MANAGEMENT SYSTEMS
001

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Issued by: Lloyd's Register Deutschland GmbH, Adolf-Grimme-Allee 3 50829 Köln Germany for and on behalf of: Lloyd's Register Quality Assurance Limited, 1 Trinity Park, Bickenhill Lane, Birmingham B37 7ES, United Kingdom

1

Production Quality Assurance Notification

2 Equipment and Protective Systems intended for use in potentially explosive atmospheres
Directive 2014/34/EU
Annex IV - Module D: Conformity to type based on quality assurance of the production process
Annex VII - Module E: Conformity to type based on product quality assurance

3 Notification number: **BVS 18 ATEX ZQS/E213**

4 Product category: **Equipment and components**
equipment-group II, categories 1G, 1D, 2G, 2D: Equipment and components for measurement and control

5 Manufacturer: **Bühler Technologies GmbH**

6 Address: **Harkortstr. 29, 40880 Ratingen, Germany**

Site(s) of manufacture: **Harkortstr. 29, 40880 Ratingen, Germany**

7 The certification body of DEKRA EXAM GmbH, Notified Body No 0158 in accordance with Article 17 of the Council Directive 2014/34/EU of 26 February 2014 notifies that the manufacturer has a production quality system, which complies with Annex IV of the Directive.
This quality system in compliance with Annex IV of the Directive also meets the requirements of Annex VII.
In the updated annex all products covered by this notification and their type examination certificate numbers are listed.

8 This notification is based on audit report ZQS/E213/18 issued 2018-07-27.
Results of periodical re-assessments of the quality system are a part of this notification.

9 This notification is valid from 2018-07-22 until 2021-07-22 and can be withdrawn if the manufacturer does not satisfy the production quality assurance surveillance according to Annex IV and VII.

10 According to Article 16 (3) of the Directive 2014/34/EU the CE marking shall be followed by the identification number 0158 of DEKRA EXAM GmbH as notified body involved in the production control phase.

DEKRA EXAM GmbH
Bochum, 2018-07-27

Certifier

Approver

This is a translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

This notification may only be reproduced in its entirety and without any change.
DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany Phone +49.234.3696-105 Fax +49.234.3696-110
e-mail zs-exam@dekra.com