

# Product-Highlights.

High-Performance Products For Your Requirements.





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# Peltier Gas Cooler Series ECP®

Version ECP1000C with 1 x 150 NL/h

Version ECP2000C with 2 x 150 NL/h

Version ECP3000C with 1 x 350 NL/h



ECP2000C with two SR25.2W peristaltic pumps

## Special Features

- Ambient temperature from +5 to +50 °C [41 to 122 °F] (no extra charge)
- Outlet dew point adjustable from +2 to +15 °C [35.6 °F to 59 °F]
- Dew point stability  $\pm 0.1$  °C [ $\pm 0.18$  °F]
- Control set point selectable between: absolute value mode or  $\Delta T$  mode
- Optional measurement of the gas outlet temperature in the gas path
- Ready for use in less than 3 minutes
- Option: config. mA output (no shielding necessary)
- Integrated evaluation for liquid alarm sensors type LA1 or LA1S
- Configurable, potential-free alarm output
- Universal power supply
- Mounting option for up to two SR25.2W peristaltic pumps below the unit
- Compact design, low weight
- Jet-Stream heat exchangers available in various materials
- Compatible with previous version

## Application

The M&C gas coolers of the ECP® series are used in analytical technology to reduce the dew point of humid gases in order to prevent condensation in the analyzer. By setting an extremely stable gas outlet dew point, water vapor cross-sensitivities and volumetric errors are minimized.

The compact, lightweight design makes the ECPX000C units particularly suitable for portable and compact stationary gas conditioning systems.

## Description

With the upgraded version ECPX000C, M&C combines the solid advantages of the ECPX000 devices with new future-oriented features, a significant increase in cooling power, more functions and improved

service friendliness. The ECPX000C gas cooler can be operated in ambient temperatures of up to 50 °C as standard.

It is characterized by a very high dew point stability of  $< \pm 0.1$  °C.

The broadband power supply makes the cooler universally usable. Plug-in electrical connections for power and alarm relays are standard. The connections of the configurable mA outputs (optional) are also supplied as plug-in versions.

The ECPX000C is equipped with a wear-free, capacitive control and display panel for improved handling of the cooler.

The absolute value control implemented by the previous ECPX000 version has been extended by the differential temperature mode.

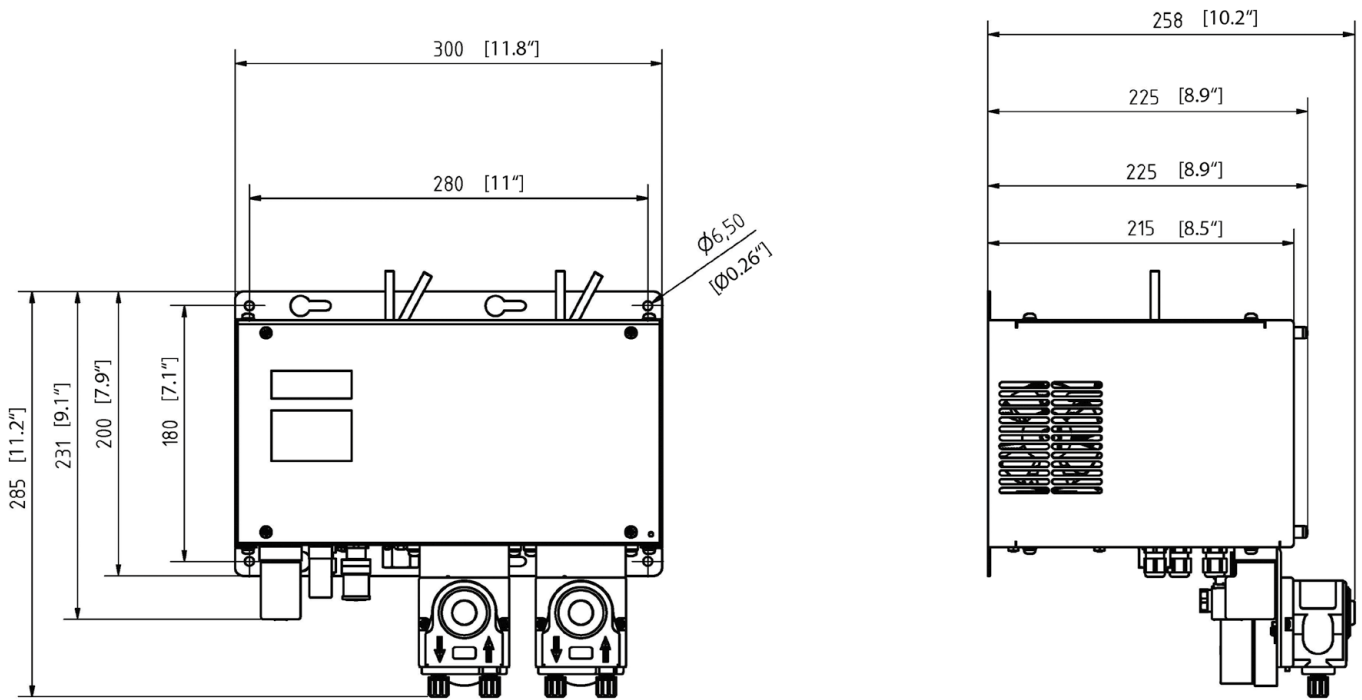
The cooling capacity has almost doubled compared to the previous version. The ECPX000C gas cooler is ready for use in less than 3 minutes under normal operating conditions.

The housings of the three ECPX000C devices have the same compact dimensions and are compatible with previous versions.

The units can be opened from the front for easier maintenance.

The condensate can be discharged externally by peristaltic pumps, traps or collecting vessels. Up to two peristaltic pumps for condensate removal can be mounted directly below the unit.

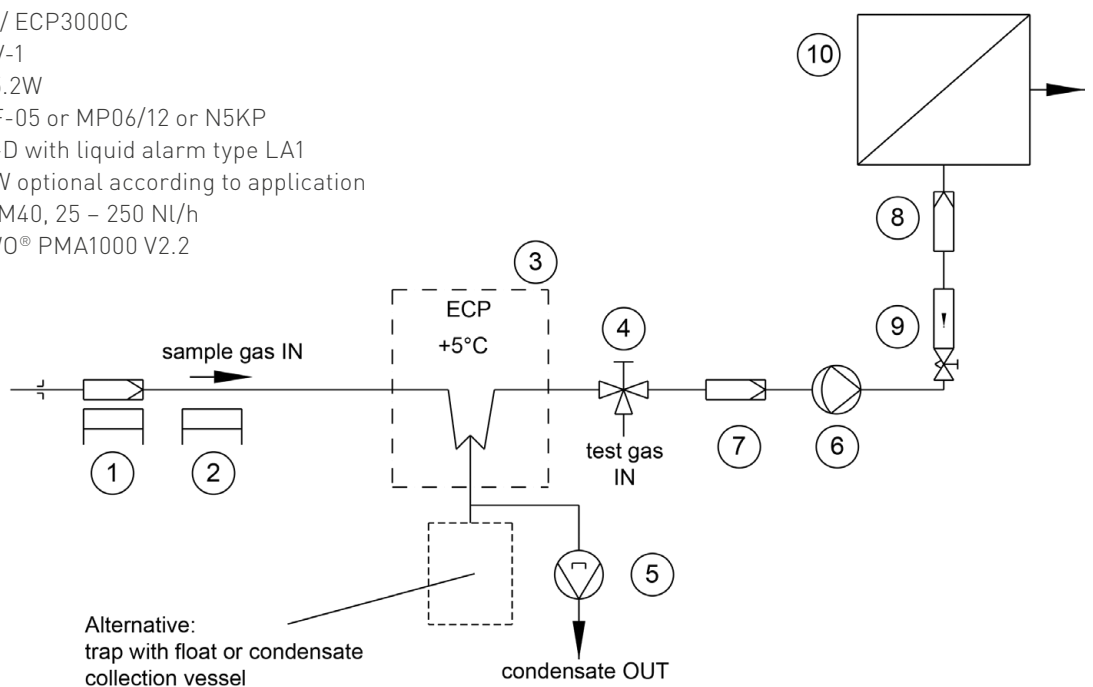
▼ Dimensions ECP1000C / 2000C / 3000C\*



\* Drawing shows ECP2000C with two optional SR25.2W peristaltic pumps. Dimensions in mm [inches]

▼ Application example for ECP1000C / ECP3000C

- 1 Gas sample probe SP180-H or SP2000-H
- 2 Heated sample line 4M4/6
- 3 Gas cooler ECP1000C / ECP3000C
- 4 3-way ball valve 3L/PV-1
- 5 Peristaltic pump SR25.2W
- 6 Diaphragm pump MPF-05 or MP06/12 or N5KP
- 7 Universal filter FP-2T-D with liquid alarm type LA1
- 8 Aerosol filter CLF-5 /W optional according to application
- 9 Flow meter FM10 or FM40, 25 – 250 NI/h
- 10 Analyzers e.g. GENTWO® PMA1000 V2.2



### ▼ Technical Data

Gas Cooler Serie EC®	ECP1000C	ECP2000C	ECP3000C
Part number without heat exchangers	01K1400x	01K2400x	01K3400x
Number of possible heat exchangers	1	2	1
Gas flow rate per heat exchanger	Max. 150 NI/h*	2 x Max. 150 NI/h*	Max. 350 NI/h*
Ambient temperature	+5 to +50 °C [41 to 122 °F]		
Storage temperature	-20 to +60 °C [--4 to 140 °F]		
Sample outlet dew point	Range of adjustment: +2 to +15 °C [35.6 to 59 °F], factory setting: +5 °C [41 °F]		
Dew point stability	±0.1 °C [±0.18 °F] at constant conditions		
Sample inlet temperature	Max. 180 °C [356 °F]*		
Sample inlet dew point	Max. 80 °C [176 °F]*		
Total cooling power at +25 °C ambient	110 kJ/h	2 x 90 kJ/h	110 kJ/h
Δ P per heat exchanger at	1 mbar at 150 NI/h	1 mbar at 150 NI/h	5 mbar at 350 NI/h
Stagnant space per heat exchanger	50 ml	2 x 50 ml	100 ml
Power consumption	150 VA	275 VA	150 VA
Power supply	115 – 230 V AC ±10%, 50/60 Hz		
Ready for use	< 3 min. (at 25 °C ambient temperature and with no load applied)		
Max. loudness	58 dBA		
Electrical connection	Power: Pluggable via solenoid valve plug type A Alarm relay: Pluggable via solenoid valve plug type B mA: When purchasing the mA option, pluggable via Phoenix circular connector 1681101		
Signal input and output	One mA output per channel possible (no shielding required) One M&C LA liquid alarm sensor type LA1 or LA1S can be connected per channel. The evaluation is integrated as standard.		
Status alarm: 2 changeover contacts	Contact rating: 250 V, 2 A, 500 VA, 50 W		
Case protection	IP20; EN 60529		
Electrical standard	EN 61010		
EMV standard	EN 61326		
Case color	RAL 9003		
Method of mounting	Wall-mount		
Case dimensions (W x H x D)	300 x 200 x 225 mm [11.8" x 7.9" x 8.9"]		
Weight without heat exchangers	6.5 kg [14.3 lbs.]	8.2 kg [18.1 lbs.]	6.7 kg [14.8 lbs.]

\* Maximum values in technical data must be rated in consideration of total cooling capacity at 25 °C [77 °F] ambient temperature and an outlet dew point of 5 °C [41 °F].

Please note: NI/h and NI/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar.

### ▼ Heat Exchanger Options

Gas Cooler Series ECP®	ECP1000C / ECP2000C				
Heat exchanger type	ECM-2 / ECP(1/2)000C / ECC-1 G, WT	ECM-2 / ECP(1/2)000C / ECC-1 PV, WT	ECM-2 / ECP(1/2)000C / ECC-1 SS, WT	ECM-2 / ECP(1/2)000C / ECC-1 SS / NPT, WT	ECM-2 / ECP(1/2)000C / ECC-1 G / GL14, WT
Part No.	97K0100	97K0110	97K0115	97K0115NN	97K0101
Material of heat exchanger	DURAN® glass	PVDF	SS 316Ti	SS 316Ti	DURAN® glass
Admissible gas pressure	Max. 3 bar abs. <sup>1)</sup> [2 bar abs. <sup>2) <td>Max. 3 bar abs. [2 bar abs.<sup>2) <td>Max. 10 bar abs. [2 bar abs.<sup>2) <td>Max. 10 bar abs. [2 bar abs.<sup>2) <td>Max. 3 bar abs.<sup>1)</sup> [2 bar abs.<sup>2) </sup></td></sup></td></sup></td></sup></td></sup>	Max. 3 bar abs. [2 bar abs. <sup>2) <td>Max. 10 bar abs. [2 bar abs.<sup>2) <td>Max. 10 bar abs. [2 bar abs.<sup>2) <td>Max. 3 bar abs.<sup>1)</sup> [2 bar abs.<sup>2) </sup></td></sup></td></sup></td></sup>	Max. 10 bar abs. [2 bar abs. <sup>2) <td>Max. 10 bar abs. [2 bar abs.<sup>2) <td>Max. 3 bar abs.<sup>1)</sup> [2 bar abs.<sup>2) </sup></td></sup></td></sup>	Max. 10 bar abs. [2 bar abs. <sup>2) <td>Max. 3 bar abs.<sup>1)</sup> [2 bar abs.<sup>2) </sup></td></sup>	Max. 3 bar abs. <sup>1)</sup> [2 bar abs. <sup>2) </sup>
Sample gas connection	GL 18 for tube Ø 6 mm OD	Tube Ø 6 mm	Tube Ø 6 mm	1/4" tube	GL 18 for tube Ø 6 mm OD; GL 14 for sensor
Condensate connection	GL 25 for tube Ø 12 mm, Ø 8 mm* or Ø 10 mm*	G 3/8" i	G 3/8" i	3/8" NPT	GL 25 for tube Ø 12 mm, Ø 8 mm* or Ø 10 mm*



### ▼ Heat Exchanger Options

Gas Cooler Series ECP®	ECP3000C			
Heat exchanger type	ECM-1 / ECP3000(C) / ECC-1 G, WT	ECM-1 / ECP3000(C) / ECC-1 PV, WT	ECM-1 / ECP3000(C) / ECC-1 SS, WT	ECM-1 / ECP3000(C) / ECC-1 SS / NPT, WT
Part No.	93K0140	93K0170	93K0160	93K0160N
Material of heat exchanger	DURAN® glass	PVDF	SS 316Ti	SS 316Ti
Admissible gas pressure	Max. 3 bar abs. <sup>1)</sup> [2 bar abs. <sup>2)</sup>	Max. 3 bar abs. [2 bar abs. <sup>2)</sup>	Max. 10 bar abs. [2 bar abs. <sup>2)</sup>	Max. 10 bar abs. [2 bar abs. <sup>2)</sup>
Sample gas connection	GL 18 for tube Ø 6 mm OD	G 1/4" i	G 1/4" i	1/4" NPT
Condensate connection	GL 25 for tube Ø 12 mm, Ø 8 mm* or Ø 10 mm*	G 3/8" i	G 3/8" i	3/8" NPT

\* Optional

<sup>1)</sup> With GL adapter

<sup>2)</sup> With peristaltic pump SR25.2-W

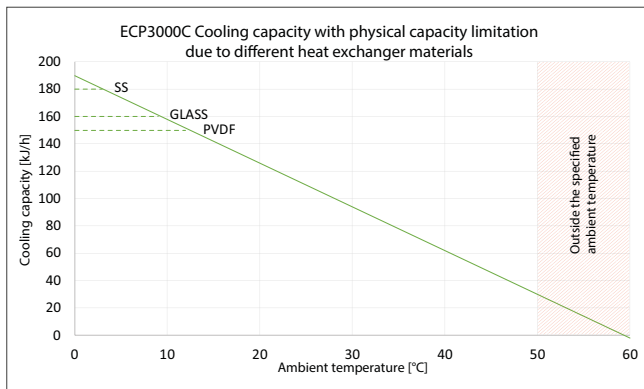
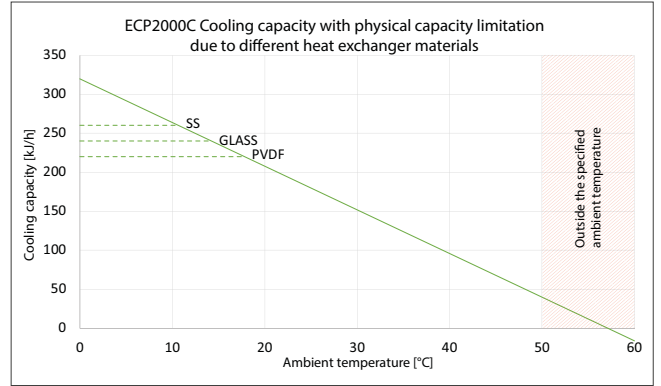
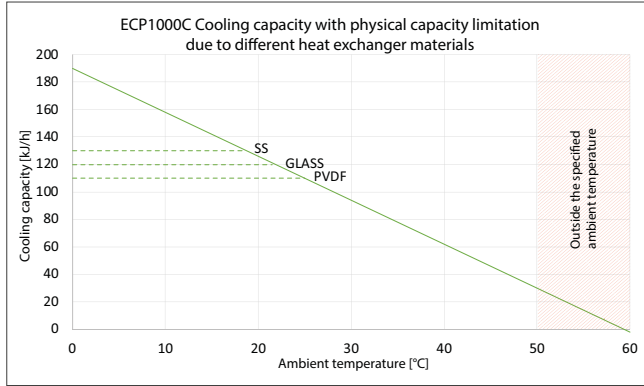
GL adapter and tube fittings for the connection of different tube diameters at the heat exchanger, see data sheets "Fittings for GL Glass Connections" and "Flexible and rigid tube fittings, plugs and connectors with barbed fitting".

### ▼ More Options

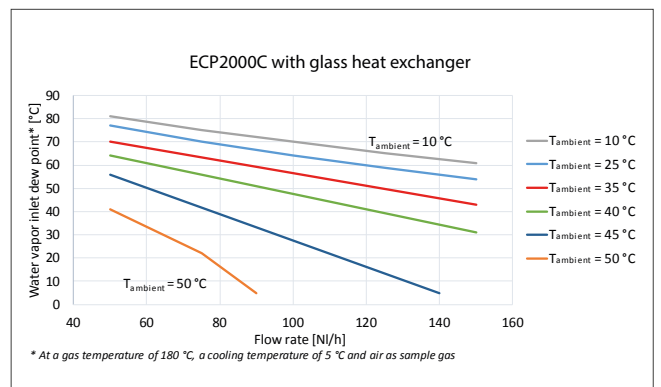
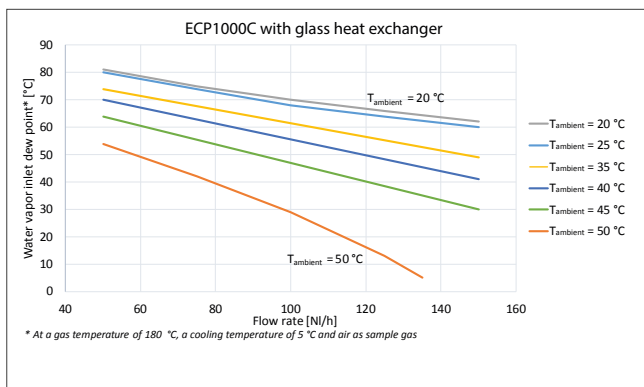
Options für ECPX000C	
Part No. 01K9200	1 x mA output incl. plug and socket, mounting and calibration (per channel)
Part No. 01K9250	1 x thermocouple incl. plug, socket, signal converter and mounting incl. special heat exchanger with three gas connections (ECP1000C only)
Part No. 03E1001	LA1S: Liquid alarm sensor with cable break detection Note: Evaluation is carried out as standard in the ECPX000C, LA1S for M&C universal filters with D connection
Part No. 03E1000	Type LA1: Liquid alarm sensor without cable break detection Note: Evaluation is carried out as standard in the ECPX000C, LA1 for M&C universal filters with D connection
Part No. 01P1307	Peristaltic pump SR25.2-W, 0.3 Nl/h, 115/230 V AC with PVDF tube connection fitting DN 4/6 mm
Part No. 01P9160X	SR25.2-W Connection set without peristaltic pump (PVDF screw connections for SS 316Ti, PVDF and glass HE, 0.5 m Novoprene hose and fixing screws)



▼ Cooling Capacity

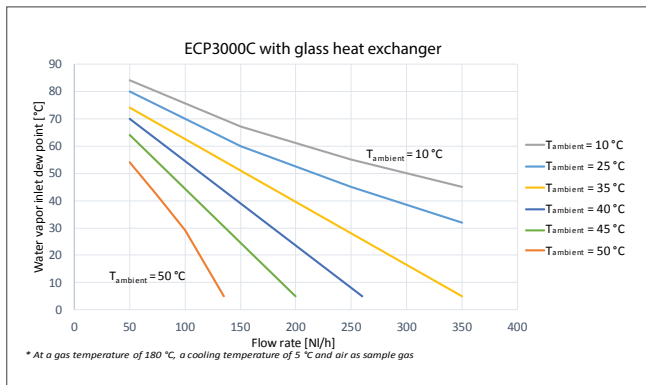


▼ Maximum Inlet Dew Point

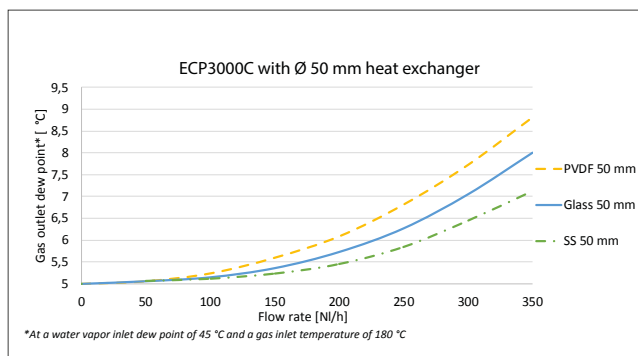
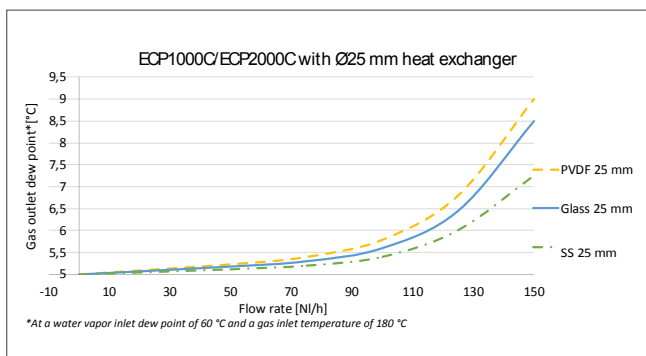




▼ Maximum Inlet Dew Point



▼ Gas Outlet Dew Point



# Portable Gas Conditioning Unit

## Series PSS®

PSS5C, PSS5C/2 and PSS5C/3



PSS5C

### ▼ Special Features

- Protection class IP42 according to EN 60529
- Optional measurement of the gas temperature in the outlet of the heat exchanger, 4 – 20 mA
- Optional control of cooler temperature (inside the cooling block), 4 – 20 mA
- Equipped with high-performance ECP1000C gas cooler as a standard
- Low maintenance
- Outlet dew point adjustable from +2 to +15 °C [35.6 to 59 °F]
- Dew point stability <math>\pm 0.1\text{ °C}</math> [ $\pm 0.18\text{ °F}</math>]$
- Ready for use in less than 3 minutes
- Compact construction, light weight
- Impact-resistant case with integrated trolley system
- Maximum operational safety
- Jet-stream heat exchangers available in various materials
- Can be supplied with a wide range of equipment
- Optional shoulder strap

### ▼ Application

The gas conditioning system PSS5C is suitable for variable discontinuous use as well as for continuous operation.

The PSS5C complies with protection class IP42 as required by the EN15267-4:2017 standard and includes standard-compliant gas temperature monitoring and a temperature display visible from the outside.

The entire gas conditioning system is housed in a compact and impact-resistant plastic case equipped with an integrated trolley with pull-out handle. This allows fast, low-maintenance and reliable gas analyses to be carried out at various locations with little effort. A robust shoulder strap for mounting on the case is also available as an option.

### ▼ Description

The PSS5C gas conditioning system is equipped with a powerful Peltier gas cooler of the new series as standard.

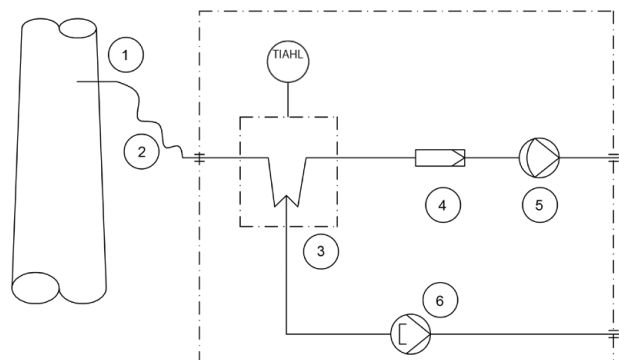
The cooler is equipped with a jet-stream heat exchanger, which cools the sample gas constantly to +5 °C [41 °F], independent of the ambient temperature. As soon as the operating temperature <math>< +8\text{ °C}</math> [46.4 °F] is reached after commissioning, the sample gas pump N3 KPE, N5 KPE or N9 KPE is automatically switched on by the gas cooler status contact. The peristaltic pump SR 25.2-W ensures continuous condensate removal. This also allows to easily accomplish long-term measurements with the gas conditioning system. The corresponding particle filtration is carried out by the FP-2T ultrafine filter.

For easy handling of the PSS5C, the display and function of the cooler are visible from the outside. The case only needs to be opened for maintenance.

The portable PSS5C gas conditioning system is a complete conditioning system for most gas analysis devices. The components installed in the PSS5C are intended for "continuous use". For special measuring tasks, additional or other components from our extensive product range can also be used.

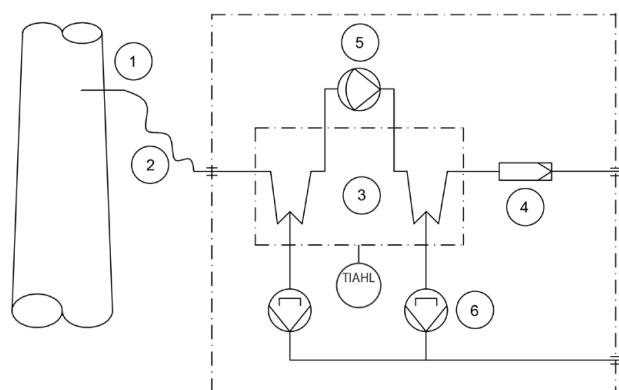
## ▼ Gas flow diagram PSS5C

- 1 Gas sample probe
- 2 Sample line, 3 m PVC hose
- 3 Peltier gas cooler with temperature alarm (TIAHL)
- 4 Fine filter FP-2T, filter porosity 2  $\mu\text{m}$
- 5 Sample gas pump
- 6 Peristaltic pump SR25.2-W

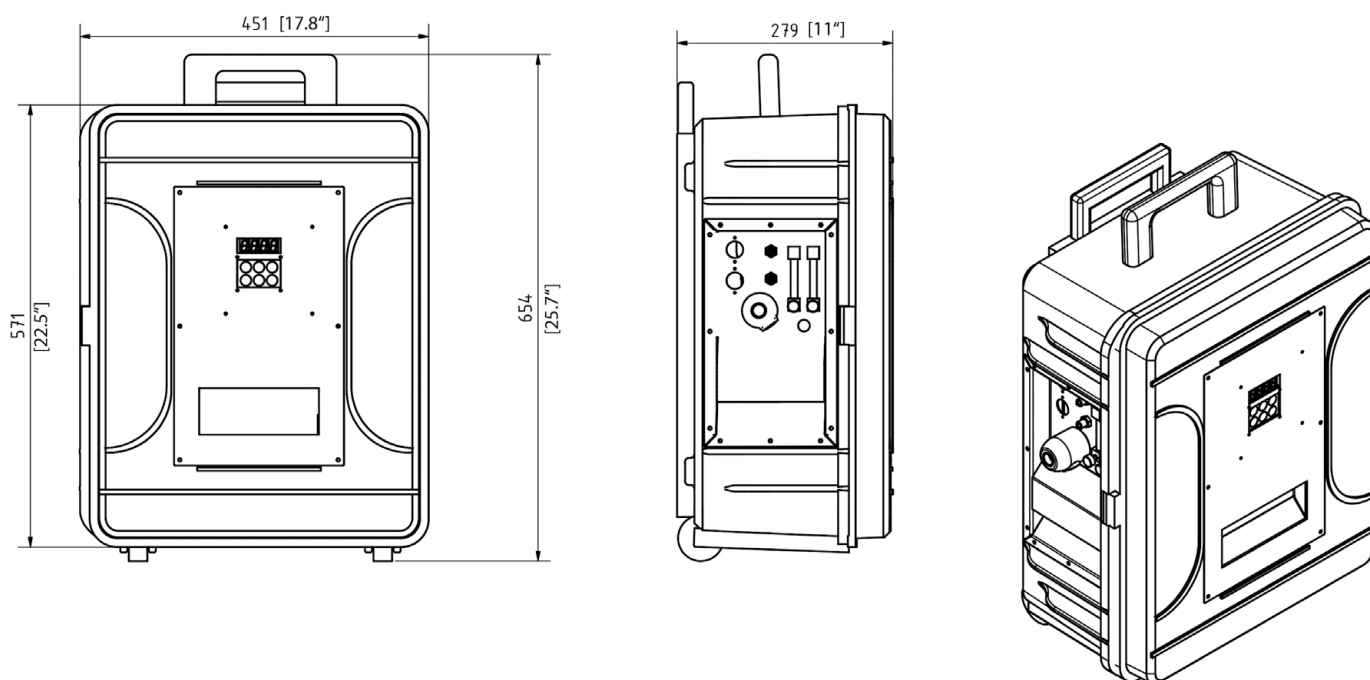


## ▼ Gas flow diagram PSS5C/2

- 1 Gas sample probe
- 2 Sample line, 3 m PVC hose
- 3 Peltier gas cooler with temperature alarm (TIAHL)
- 4 Fine filter FP-2T, filter porosity 2  $\mu\text{m}$
- 5 Sample gas pump
- 6 Peristaltic pumps 2 x SR25.2-W



## ▼ Dimensions



Dimensions in mm [inches]



## ▼ Technical Data

Gas Conditioning Unit series PSS®	Version PSS5C	Version PSS5C/2	Version PSS5C/3
Part No.	01G4000	01G4250	01G4500
Sample outlet dew point	Range of adjustment: +2 to +15 °C [35.6 to 59 °F], factory setting: +5 °C [41 °F]		
Dew point stability sample outlet	At constant conditions < ±0.1 °C [±0.18 °F]		
Sample inlet temperature	*Max. 80 °C [176 °F] optional: *max.180 °C [356 °F] with stainless steel bulkhead union		
Sample inlet water vapour saturation	*Max. 80 °C [176 °F]		
Gas flow rate heat exchanger	*Max. 150 NI/h	*Max. 150 NI/h per heat exchanger	*Max. 350 NI/h
Ambient temperature	*+5 to +40 °C [41 to 104 °F]		
Storage temperature	-25 to +65 °C [-13 to 149 °F]		
Pressure	0.7 bar up to 1.4 bar abs.		
Total cooling capacity	*Max. 80 kJ/h		
Number of gas inlets	1		
Number of gas outlets	1, optional: max. 2		
Medium connections	Tube connections 4/6 mm, material: PVDF		
Material of sample contacting parts	Stainless steel 1.4571, glass, PVDF, PTFE, Novoprene®		
Ready for operation	Approx. 3 min.		
Power supply	230 V AC ±10 %, 50/60 Hz or Part No. with [a]**: 115 V AC ±10 %, 60 Hz		
Power consumption	Max. 240 VA; with option temperature controller and heated sample line 230 V: max. 1620 VA, 115 V: max. 920 VA		
Fuse protection	4 A t, 5 x 20 mm, with option temperature controller: 10 A t		
Electrical connection	2 m [≈ 6.56 ft] long cable		
Case protection	IP42 EN 60529		
Housing	Impact-resistant case with integrated trolley system and pull-out handle		
Housing color	Black		
Housing dimensions (W x H x D)	451 x 654 x 279 mm [≈ 17.8" x 25.7" x 11"] with casters and handle		
Electrical equipment standard	EN 61010		
Weight w/o options	Approx. 18.5 kg [≈ 40.8 lbs]	Approx. 19.7 kg [≈ 43.4 lbs]	Approx. 18.9 kg [≈ 41.7 lbs]

Options	Type	Part No
Sample gas pump N5 KPE, replacement	Extra charge for replacing the standard N3 KPE by the N5 KPE	01G9090
Sample gas pump N9 KPE, replacement	Extra charge for replacing the standard N3 KPE by the N9 KPE	01G9095
Flow meter including sample gas outlet, max. 2 pieces	FM40 7 – 70 NI/h air	01G9072
	FM40 15 – 150 NI/h air	01G9077
	FM40 25 – 250 NI/h air	01G9082
	FM40 50 – 500 NI/h air	01G9087
Further sample gas outlet w/o flow meter	Parallel sample gas outlet, tubing via T-piece on lateral PVDF bulkhead fitting, DN 4/6, max. 1 piece	01G9065
Sample tube	Sample tube out of Kanthal® ø 6 mm, length: 1 m, sampling temperature: max. 1300 °C [2372 °F]	01G9030
3-way ball valve	3L/PV-1 for switching over from test gas to sample gas in the inlet of the sample gas conditioning unit, mounted with mounting brackets, fitting PVDF	01G9046
5-way ball valve	5L/PV-1 for switching over from test gas to sample gas in the inlet of the sample gas conditioning unit, mounted with mounting brackets, fitting PVDF	01G9045
Needle valve	Needle valve in the bypass of the sample gas pump type N3/N5/N9 for pressureless control, with PVDF screw connections, angle bracket and assembly	01G9050
Electronic temperature controller for max. 12 m [≈ 39.4 ft] (230 V) or max. 6 m [≈ 19.7 ft] (115 V) heated sample line 100 W/m for PT100	701 control range: 0 to 200 °C [32 to 392 °F], input PT100, power: 230 V 50/60 Hz (Part No. 01G9055) or 115 V 50/60 Hz (Part No. 01G9055a), contact capacity: 250 V AC max. 10 A, completely mounted incl. 7-pin plug 10 A	01G9055
Electronic temperature controller for max. 12 m [≈ 39.4 ft] (230 V) or max. 6 m [≈ 19.7 ft] (115 V) heated sample line 100 W/m for thermocouple Ni-CrNi	701 control range: 0 to 200 °C [32 to 392 °F], input thermocouple Ni-CrNi, power: 230 V 50/60 Hz (Part No. 01B8245) or 115 V 50/60 Hz (Part No. 01B8245a), contact capacity: 250 V AC max. 10 A, completely mounted incl. 7-pin plug 10 A	01G9055(a)



## ▼ Technical Data

Options	Type	Part No
Connecting adapter DN 4/6 for heated sample line	PSS5C connecting adapter with anti-kink protection for rigid mounting of heated sample line with replaceable PTFE tube DN 4/6, consisting of special Swagelok fitting with 4 mm cartridge, material: SS316Ti	01B8245(a)
Connecting adapter DN 6/8 for heated sample line	PSS5C connecting adapter with anti-kink protection for rigid mounting of heated sample line with replaceable PTFE tube DN 6/8, consisting of special Swagelok fitting with 6 mm support sleeve, material: SS316Ti	01G9061
Analog output	Analog output of the sample gas cooler temperature at the PSS5C case with connection socket, mA output for PSS5C 0/4 to 20 mA, galvanically isolated, load: 500 Ohm	01G9010
mA output	Thermocouple type K for temperature measurement in the heat exchanger with 4 – 20 mA output for -10 to 50 °C [14 to 122 °F], load 180 Ohm	01K9250
Liquid alarm detection	Liquid alarm detection inside the PSS5C case incl. switch-off function for the sample gas pump, liquid alarm sensor type LA1S, for conductive media, completely wired, evaluation via front display	01G9015
Sample gas inlet made of stainless steel	Extra charge for gas conditioning unit series PSS® with stainless steel fittings in the sample gas inlet for 6 mm tube, material: SS316Ti	C40002
Built-in aerosol filter CLF-5	Extra charge for gas conditioning unit series PSS® with built-in aerosol filter CLF-5, fittings and mounting included	C40003
Sample gas outlet made of stainless steel	Extra charge for gas conditioning unit series PSS® with stainless steel fittings in the sample gas outlet for 6 mm tube, material: SS316Ti	C40005
Shoulder strap for mounting on the PSS5C case	Padded and adjustable shoulder strap made of robust polyester material for mounting on the PSS5C case.	90G0270

PTFE = Polytetrafluoroethylene (Teflon®)

PVDF = Polyvinylidenfluoride

\* Maximum values in technical data must be rated in consideration of total cooling capacity at 25 °C [77 °F] ambient temperature and 5 °C [41 °F] outlet dew point.

\*\* [a] is an addition to the Part No. for 115 V versions.

Teflon® is a registered trademark used by DuPont Performance Elastomers, USA. Please note: NI/h and NI/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar. Other versions on request.

## ▼ Option: Shoulder strap for mounting on the PSS5C case



# Portable Sampling System

## PSS-STS

for the determination of total mercury concentrations in flue gases



Portable sampling system PSS-STS

### Special Features

- Two parallel sampling channels for traps with 10 mm diameter and up to a length of 400 mm
- Simple replacement of the traps
- Automatic leakage tests before and after the collecting cycle
- Designed for short- and long-term measurements up to 2 weeks
- Flow rates from 2 to 87 NL/h
- Peltier cooler for condensate separation
- Control and cooler unit in two mobile and portable plastic cases
- Ready for operation incl. warm-up phase in 30 minutes
- Suitable for monitoring of low emission limits

### ▼ Application

The portable sampling system PSS-STS (Sorbent Trap Sampler) meets the requirements of DIN CEN/TS 17286:2019-07 (mercury measurement with Sorbent Traps). In this mercury measurement, a defined volume flow is directed through two traps. The use of two Sorbent Traps in independent parallel gas paths ensures a high reliability of the measurement results. The traps are divided into up to six sections. The criteria which these sections must meet are defined in the relevant regulations. The analysis of the Sorbent Traps is carried out in the laboratory.

Typical applications are sampling of flue gases from combustion plants.

### ▼ Description

The portable sampling system PSS-STS is a reliable and precise sampling system which is used for the determination of total mercury concentrations in flue gases.

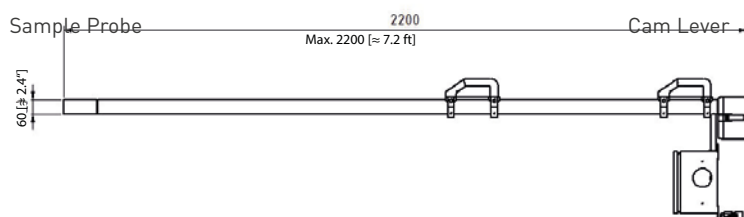
The Sorbent Traps are inserted into the heated probe and removed after a defined and programmed collection cycle. If required, the probe can be equipped with new traps for further collection cycles. The traps in the probe are tested for gas tightness before and after each collection cycle.

The device is controlled by a front-panel PC and an internal programmable logic controller (PLC). The user-friendly software intuitively guides the user through all measurement settings, automatic leak tests and the entire sampling process. All measurement data is recorded by the software and then automatically generated in the format of a report.

Downstream of the probe, there is a cooler to separate the condensate. For volume control of the flue gas, pumps and mass flow controllers (MFCs) are controlled by the PLC.

The main components of the system are the sample probe for the Sorbent Traps, the heated sample gas line, the cooler, the volume flow control, the vacuum sensors, the peristaltic pumps for condensate removal, the filter and the electronics.

## ▼ Sample Probe PSP-ST5

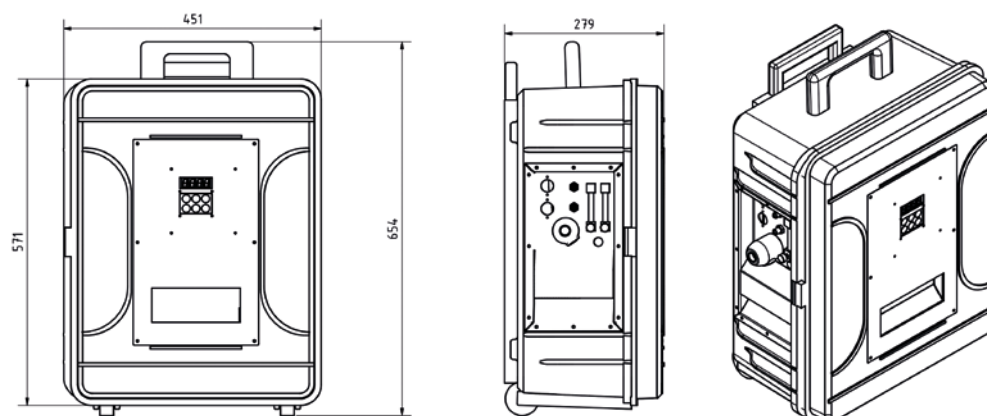


Dimensions in mm [Inches]

## ▼ Technical Data

Portable Sampling System	Sample Probe PSP-ST5		
Immersion depth	1 m [≈ 3.3 ft]	1.5 m [≈ 4.9 ft]	2 m [≈ 6.6 ft]
Part No. for 230 V AC	07A2340	07A2350	07A2360
Part No. for 115 V AC	07A2340a	07A2350a	07A2360a
Sampling temperature	Up to +200 °C [392 ° F]		
Ambient temperature	+5 to +40 °C [41 to 104 °F]		
Temperature controlling	Via control unit		
Ready for operation	After 30 min.		
Time for cooling to +50 °C [≈ 122 °F]	Approx. 1 hour until sample probe reaches approx. +50 °C [≈ 122 °F]		
Connection gas OUT	Tube connection DN 4/6 stainless steel		
Number of Sorbent Traps	For two traps with a length of approx. 400 mm and Ø 10 mm		
Heating capacity	1200 W		
Power supply	230 or 115 V AC		
Electrical connection	2 m [≈ 6.6 ft] long cable		
Device fuse	16 A		
Ethernet connection	IP68		
Electrical equipment standard	EN 61010		
Protection class terminal box	IP42 EN 60529		
Material	Stainless steel 904L, others on request		
Protection tube for Sorbent Traps	Yes, screw-on		
Mounting flange	DN 65 PN 6 or 3", with camlock fitting		
Weight	Approx. 18 kg [≈ 39.7 lbs] for 2 m [≈ 6.6 ft] immersion depth		

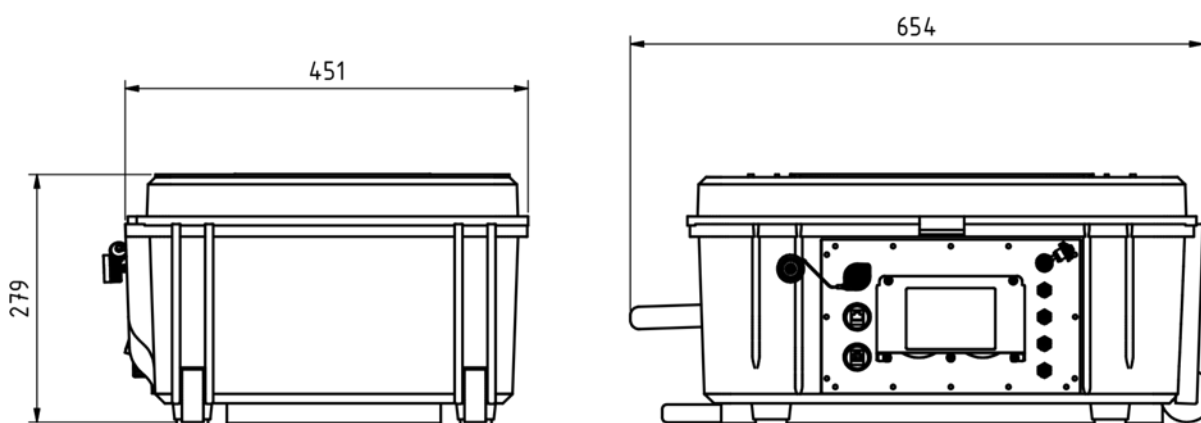
## ▼ Cooler Unit PSS-ST5-C



## ▼ Technical Data

Portable Sampling System	Cooler Unit PSS-ST5-C
Part No. for 230 V AC	07A2200
Part No. for 115 V AC	07A2200a
Dew point gas OUT	Setting range: +2 to +15 °C [35.6 to 59 °F], factory setting: +5 °C [41 °F]
Dew point stability gas OUT	Under constant conditions <math>\pm 0.1\text{ °C}</math> [<math>\pm 0.18\text{ °F}</math>]
Temperature gas IN	*Max. +180 °C [356 °F] with stainless steel bulkhead fitting
Water vapor saturation gas IN	*Max. +80 °C [176 °F]
Ambient temperature	*+5 to +40 °C [41 to 104 °F]
Storage temperature	-25 to +65 °C [-13 to 149 °F]
Connection gas IN	Tube connection DN 4/6
Connection gas OUT	Tube connection DN 4/6
Connection condensate OUT	Tube connection DN 4/6
Material of wetted parts	Stainless steel 316 Ti, glass, PVDF, PTFE, Novopren
Ready for operation	After 3 min.
Power supply	115 or 230 V AC $\pm 10\%$ , 50/60 Hz
Electrical connection	2 m [ $\approx 6.6$ ft] long cable
Device fuse	10 A, time-delay, 5 x 20 mm
Power consumption	At 230 V: max. 1620 VA, 115 V: max. 920 VA
Electrical equipment standard	EN 61010
Protection class	IP42 EN 60529
Housing version	Portable impact-resistant plastic case with integrated trolley and pull-out handle
Housing color	Black
Dimensions (W x H x D)	451 x 654 x 279 mm [ $\approx 17.8\text{''} \times 25.8\text{''} \times 11.0\text{''}$ ] with casters and handle
Weight	Approx. 16 kg [ $\approx 35.3$ lbs]
Option: Shoulder straps (Part No. 90G0270)	Padded and adjustable shoulder straps made of robust polyester material for mounting on the cooler unit.

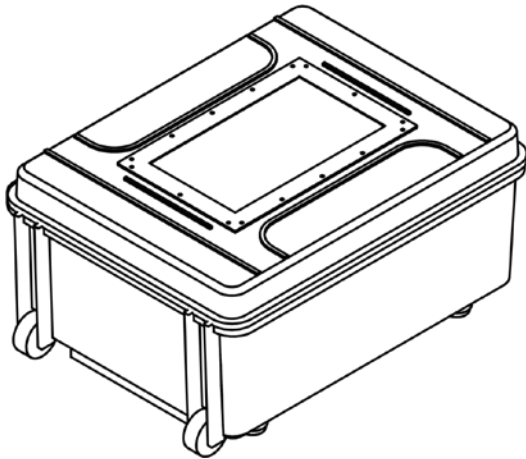
## ▼ Control Unit PSS-ST5-M



Dimensions in mm [Inches]



## ▼ Control Unit PSS-ST5-M



## ▼ Technical Data

Portable Sampling System	Control Unit PSS-ST5-M
Part No.	07A2100
Ambient temperature	*+5 to +40 °C [41 to 104 °F]
Storage temperature	-25 to +65 °C [-13 to 149 °F]
Operating pressure	0.7 to 1.4 bar abs.
Number of connections gas IN	2
Number of connections gas OUT	2
Connection gas IN	Tube connection DN 4/6
Connection gas OUT	Tube connection DN 4/6
Material of wetted parts	SS 316 Ti, glass, PVDF, PTFE, Novopren
Ready for operation	After 30 min.
Power supply	115 or 230 V AC ±10 %, 50/60 Hz
Electrical connection	2 m [≈ 6.6 ft] long cable
Device fuse	4 A, time-delay, 5 x 20 mm
Electrical equipment standard	EN 61010
Protection class	IP42 EN 60529
Housing version	Portable impact-resistant plastic case with integrated trolley and pull-out handle
Housing color	Black
Dimensions (W x H x D)	451 x 654 x 279 mm [≈ 17.8" x 25.8" x 11.0"] with casters and handle
Weight	Approx. 16 kg [≈ 35.3 lbs]
Option: Shoulder straps (Part No. 90G0270)	Padded and adjustable shoulder straps made of robust polyester material for mounting on the control unit.

\* Technical data with max. specifications are to be evaluated in consideration of the total cooling capacity at 25 °C [77 °F] and an outlet dew point of 5 °C [41 °F].

# Sorbent Traps

for mercury measurements



Sorbent Traps

## ▼ Special Features

- Short-term measurements up to 12 hours
- Long-term measurements up to 2 weeks
- Length of the short-term traps: 270 mm [≈ 7.1" ]
- Length of the long-term traps: 400 mm [≈ 15.7" ]
- For clean and raw gas
- Specification Traps for separate quantification of elemental and ionic mercury

## ▼ Application

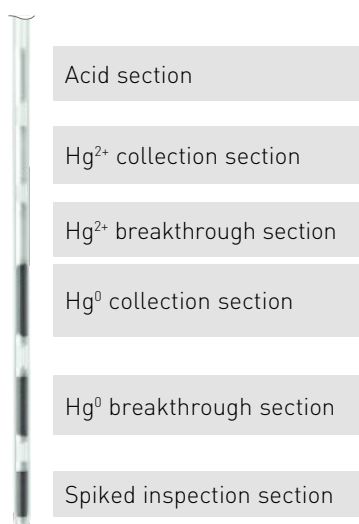
The Sorbent Traps are used for mercury measurement according to DIN CEN/TS 17286:2019-07. In this mercury measurement, a defined volume flow is passed through two traps. The use of two Sorbent Traps in independent parallel gas paths ensures a high reliability of the measurement results. The traps are divided into up to six sections. The criteria which these sections must meet are defined in the relevant regulations. The analysis of the Sorbent Traps is carried out in the laboratory.

Typical applications are sampling of flue gases from combustion plants. Mercury measurement with Sorbent Traps is a very efficient tool for tests to separate mercury from flue gas.

## ▼ Description

The M&C Sorbent Traps are part of M&C's PSS-STs portable sampling system which is used to determine the total mercury concentration in flue gases. Mercury detection limits as low as 10 ng/m<sup>3</sup> can be achieved depending on sampling conditions, parameter settings and analytical method. The Sorbent Traps are inserted into the heated probe and removed according to a defined and programmed collection cycle.

## ▼ Sorbent Trap Design



# Multigas Analyzer GenTwo® V2.4

M&C premium series GenTwo® features an innovative modular navigation and sensor concept



Multigas-Analyzer GenTwo® V2.4

## Special Features

- Modular design for up to 6 different sensors
- Resistive 7" color touch display
- Multi-sensor enabled
  - Paramagnetic oxygen sensor (PMA2)
  - Electrochemical oxygen sensor
  - Electrochemical H<sub>2</sub>S sensor
  - Thermal conductivity detector (TCD)
  - NDIR/NDUV/UVRAS photometers
- Measured value storage over one year in the analyzer
- Pressure compensation 0.8 to 1.2 bar abs.
- Analog signal outputs 0–20/4–20 mA
- Modbus and AK protocol TCP/IP
- Ethernet/USB
- User-programmable limit values
- Remote operation via VNC viewer
- Three different housings
  - 19" rack housing short
  - 19" rack housing long
  - Wall-mount housing

## Application

The Multigas Analyzer of the GENTWO® series is suitable for continuous measurements of gases in gas mixtures.

Areas of application are in particular combustion control, process optimization in a wide variety of industries, inertization monitoring, environmental protection or laboratory measurements, each in non-explosive environments.

## Description

The Multigas Analyzer is characterized by its modular design and innovative navigation concept. This enables fast intuitive understanding and adaptation of the analyzer to a wide variety of applications. Display and functions can be set according to the operator's requirements, for example language,

measuring ranges, physical units, application-related designations.

The basic design of the analyzer is mounted in a 19" rack or wall-mount housing and is connected using FKM (Viton®) tubing. As an option, the internal gas paths can be ordered in PTFE or stainless steel. All device variants have a wide-range power supply, a resistive 7" color touch display and can be equipped with up to 6 measuring channels/sensors incl. the corresponding sensor and I/O electronics. Pressure transducers are used for process pressure compensation and flow monitoring. Depending on the sensor type temperature monitoring is available.

For NDIR benches, humidity compensation can be builtin if necessary. Each measured value is available as mA signal. The Multigas Analyzer offers

status and alarm outputs as well as two freely programmable limit values per measuring channel. All measured values are provided via the Modbus and AK communication protocol on the Ethernet port. A special feature is the integrated data logger function for time-resolved display and long-term recording of measurement, warning and alarm messages. The Multigas Analyzer offers the user convenient calibration functions for zero point and full scale calibration.

## ▼ Sensors

### Paramagnetic oxygen sensor PMA2

The M&C oxygen transmitter uses the paramagnetic properties of oxygen. The compact design of the transmitter and the small measuring cell offers short response times and a long service life.

The dumbbell principle implemented here represents a physical, wear-free and proven measuring method. It is suitable for low-drift, long-term stable measurements in the range from 0 to 100 vol% or for purity measurements with suppressed zero point.

### Electrochemical oxygen sensor

This compact, fast-response, long-life sensor measures the oxygen content in a gas mixture, typically up to 25 vol% over an electrochemically generated voltage. The electrochemical oxygen sensor is CO<sub>2</sub>-resistant.

### Electrochemical H<sub>2</sub>S sensor

This compact sensor is available for different hydrogen sulfide concentrations from 0 to 10 000 ppm.

### Thermal conductivity detector (TCD)

This type of sensor uses the thermal properties of gases. In the design implemented here, the thermal conductivity of hydrogen in a binary gas mixture is used to determine the H<sub>2</sub> concentration.

### NDIR/NDUV/UVRAS photometers

With this technique, the concentration of multiatomic gases, i.e. molecules with permanent or induced electrical dipole moment, can be determined.

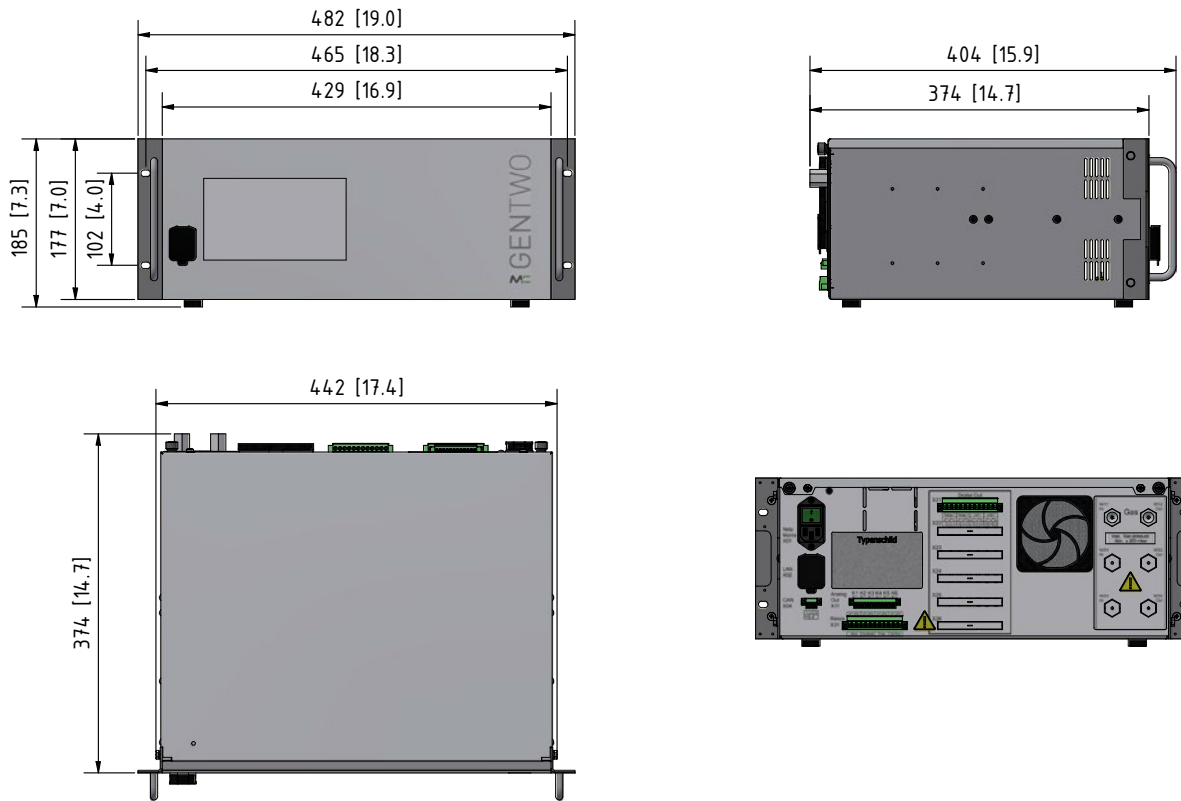
For the measurement of nitrogen monoxide (NO), the UV resonance absorption method is used. In contrast to the LED-based UV measuring benches, the UVRAS uses an electrode-free UV discharge lamp (EDL). The measuring cells are available in various lengths for different measuring ranges.

The measuring benches realized here are robust and do not require any moving parts. Up to three gases can be measured using one bench. In addition, the three basic measuring principles can be combined on one bench.

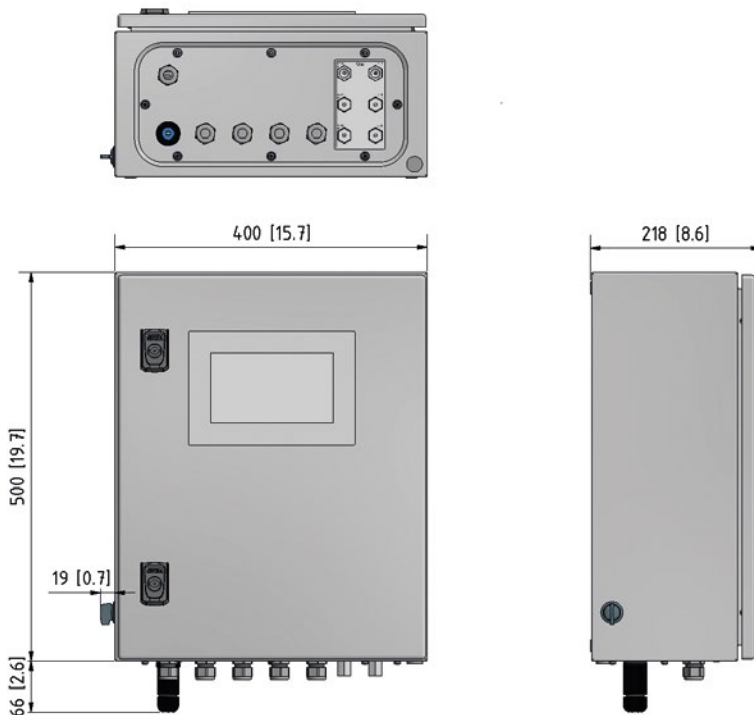
A temperature compensation at zero and end point is standard. If required, additional water vapor compensation can be added using a capacitive humidity sensor for NDIR measurements. For increased stability of the measurement, the measurement benches can be installed in a thermobox heated to a temperature between 45 and 50 °C [113 and 122 °F]. An optional AutoZero- module for automatic cyclic zero adjustment is available.



▼ Dimensions 19"-rack housing (long housing)



▼ Dimensions wall-mount housing

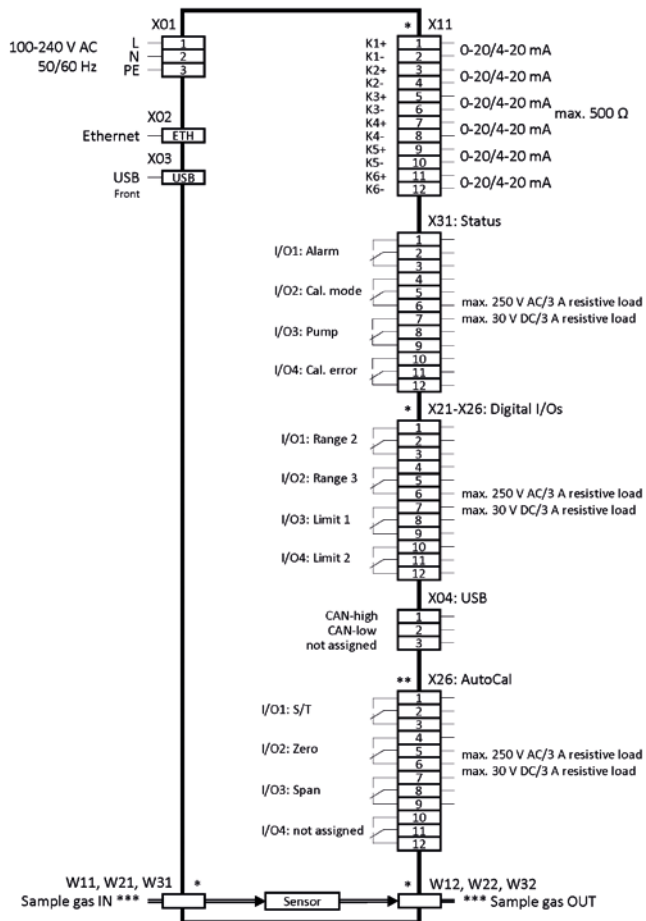


Dimensions in mm [Inches]

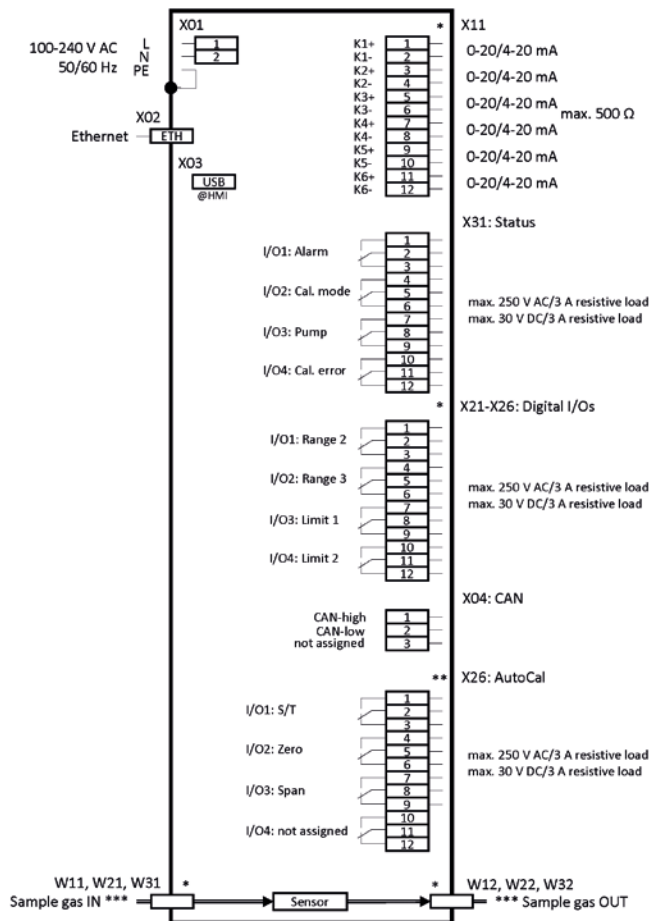


▼ Interfaces diagrams

19"-rack housing



Wall-mount housing



\* Number of these interfaces depending on the application

\*\* Only equipped with the AutoCal function

\*\*\* G 1/4" female, if internal tubing is made of Viton®/PTFE; 1/8" NPT female, if internal tubing is made of stainless steel



## ▼ Technical specifications in general

Multigas Analyzers of the GenTwo® Series	GenTwo V2.4
Basic device w/o sensors, short housing: Part No.	08A2240
Basic device w/o sensors, long housing: Part No.	08A2230
Basic device w/o sensors, wall-mount housing: Part No.	08A2220
Warm-up period	Approx. 30 min. depending on sensor configuration
Response time for 90 %	Depending on sensor used and on configuration
Sample gas flow rate	25 to max. 120 NL/h, depending on sensor used
Sample gas inlet pressure	800 to 1200 mbar abs. pressure-compensated
Sample gas outlet pressure	Recommendation: discharge freely into atmosphere (requires higher pressure at the analyzer inlet compared to the outlet)
Sample gas temperature and characteristics	0 to +50 °C [+32 to +122 °F]; dry, oil- and dust-free gas, avoid temperature dropping below dew point
Ambient temperature	Depending on sensor configuration, for details see technical data for sensors
Relative Humidity	0 - 90 %, non-condensing
Storage temperature	-20 to +60 °C [-4 to +140 °F], avoid condensation
Display	7" capacitive color touchscreen
Measuring ranges in general	4 measuring ranges, two of them adjustable, suppressed zero point possible
Analog output signals	Analog: 0-20/4-20 mA, max. 500 Ohm burden, short-circuit proof, electrically isolated
Status relay outputs	4 x relay output (1 x status, 1 x Cal. mode, 1 x pump, 1 x Cal. error) contacts: 250 V AC/3 A or 30 V DC/3 A at resistive load, change-over contact, potential-free
Digital relay outputs	4 x per measuring signal DO (2 x limit values, 2 x measuring range feedback) contacts: 250 V AC/3 A or 30 V DC/3 A at resistive load, change-over contact, potential-free
Interfaces	Ethernet/USB
Communication protocol	Modbus TCP/IP and AK protocol TCP/IP
Mains power supply	100 to 240 V AC, -15/+10 %, 50 to 60 Hz, power supply unit
Overvoltage category	OVC II
Power consumption	Max. 150 VA
Mains power connection	Wall-mount housing: 3 x 1.5 mm <sup>2</sup> wires (customer provided), rack-housing: power cord (3 x 1.5 mm <sup>2</sup> wires) with 3-pin IEC plug and Schuko plug (included)
Wetted materials	Platinum, Epoxy resin, glass, FKM (Viton®), stainless steel 316Ti, PVDF, PPS, depending on tubing material and of the components installed
Sample gas connection	Screw-on bulkhead fitting with 1/4" internal thread, PVDF (standard)
Case protection	19" rack housing: IP20, EN 60529; wall-mount housing: IP54, EN 60529
Electrical standard	EN 61010
Housing color	19" rack housing: RAL 9003, signal white
Maximum installation altitude	2000 m [≈ 6561.7 ft]
Pollution degree of the intended environment	PD 2
Long housing: dimensions (W x H x D)	482 x 185 x 404 mm [≈ 19" x 7.3" x 15.9"], length of gas connection fittings is additional
Short housing: dimensions (W x H x D)	482 x 185 x 265 mm [≈ 19" x 7.3" x 10.4"], length of gas connection fittings is additional
Wall-mount housing: dimensions (W x H x D)	400 x 500 mm plus approx. 66 mm gas connection fitting x 218 mm [≈ 15.7" x 19.7" plus approx. 2.4" gas connection fitting x 8.6" ]
Long housing: weight	Approx.13 kg [≈ 29 lbs] (depending on sensor configuration)

Please note: NL/h and NL/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar.

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## ▼ Technical specifications in general

Multigas Analyzers of the GenTwo® Series	GenTwo V2.4
Short housing: weight	Approx.11 kg [≈ 24 lbs] (depending on sensor configuration)
Wall-mount housing: weight	Approx.18 kg [≈ 39.7 lbs] (depending on sensor configuration)
<b>Options</b>	
08A2650	Front filter PPF+, for Multigas Analyzers with gas paths made of Viton®/PTFE tubing
08A2660	Flow meter FM40, for Multigas Analyzers with gas paths made of Viton®/PTFE tubing
98A2550	For 19" housing: telescopic slides in EU version
98A2500	For 19" housing: telescopic slides in US version

Please note: NL/h and NL/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar. Viton® is a registered trademark of DuPont Performance Elastomere

## ▼ Technical specifications sensors

### Paramagnetic oxygen sensor PMA2

	GenX Sensor O <sub>2</sub> PMA2 and sensor environments
PMA2 HL, thermostatted to 55 °C incl. preheating loop	10A4010
PMA2 HD, thermostatted to 55 °C	10A4015
PMA2 HDC with chlorine-resistant measuring cell, thermostatted to 55 °C	10A4025
PMA2 HDS with solvent resistant measuring cell, thermostatted to 55 °C	10A4035
PMA2 NL, incl. preheating loop, not thermostatted	10A4110
PMA2 ND, not thermostatted	10A4115
GenX sensor environm. O <sub>2</sub> PMA2 VI for gas paths in Viton® tubing	08A2730
GenX sensor environm. O <sub>2</sub> PMA2 PT for gas paths in PTFE tubing	08A2740
GenX sensor environm. O <sub>2</sub> PMA2 SS for gas paths with stainless steel tubing	08A2750
Gas measured	O <sub>2</sub>
Measuring ranges (min./max. range)	0 – 1/0 – 100 vol%
Limit of detection (LOD)*	Up to 0.02 vol%
Response time for 90 % FSD**	< 3 s at 60 NL/h
Noise	≤ 0.2 % of full scale value or better
Linearity error	< ±0.1 vol%
Reproducibility deviation*	< ±0.01 vol%
Accuracy after calibration*	±1 % of full scale value or 0.02 vol% O <sub>2</sub> , depending on which value is greater
Zero drift	< 0.06 vol% in 72 hours
Ambient temperature	0 - 50 °C [32 to 122 °F]
Sample gas flow rate	25 – 60 NL/h
Transducer temperature (for GenX Sensor O <sub>2</sub> PMA2 H sensors only)	Factory setting +55 °C [131 °F]
Wetted materials	Glass, platinum, FKM (Viton®), stainless steel 316Ti, epoxy resin, PP, ceramic, nickel, depending on tubing material and of the components installed

\* At constant ambient conditions in the compensated temperature and pressure range (±0.015 %/mbar). Additionally the limit of detection (LOD) is depending on sample gas and the selected measuring range.

\*\* Depends on sample gas input pressure, density and flow rate at the analyzer input.





## ▼ Technical specifications sensors

### Electrochemical oxygen sensor

GenX Sensor O <sub>2</sub> and sensor environment	
GenX Sensor O <sub>2</sub> 25 vol% EC IT-P03 VI/PT, for Viton® or PTFE tubing	08A3060
GenX Sensor O <sub>2</sub> 25 vol% EC IT-P03 SS, for stainless steel tubing	08A3065
GenX sensor environm. EC for integration of up to 4 electrochemical sensors	08A3050
Gas measured	O <sub>2</sub>
Measuring ranges (min./max. range)	0 – 1/0 – 25 vol%
Limit of detection (LOD)*	0.1 vol%
Response time for 90 % FSD**	< 10 s, depending on the number and type of sensors used
Linearity error	0 – 2 vol% O <sub>2</sub> : ±0.1 vol%; 2.1 – 25 vol% O <sub>2</sub> : 0.5 % of measured value
Reproducibility deviation*	±1 vol% at 100 vol% O <sub>2</sub> applied for 5 min
Accuracy after calibration*	±1 % of full scale value, not better than 0.1 vol%
Drift	< 1 % per month, averaged over 12 months
Ambient temperature	10 – 40 °C [50 to 104 °F]
Sample gas flow rate	25 – 60 NL/h
O <sub>2</sub> sensor temperature	Not heated
Wetted parts	ABS, PVC, PPS, PVDF, PTFE, stainless steel, depending on tubing material and of the components installed
Shelf time	< 6 months recommended
Cross-sensitivities	< 20 ppm at 100 vol% CO, CO <sub>2</sub> , C <sub>3</sub> H <sub>8</sub> , < 400 ppm at 100 vol% H <sub>2</sub> (complete list on request)

\* At constant ambient conditions in the compensated temperature and pressure range (±0.015 %/mbar). Additionally the limit of detection (LOD) is depending on sample gas and the selected measuring range.

\*\* Depends on sample gas input pressure, density and flow rate at the analyzer input.



▼ Technical specifications sensors

**Electrochemical H<sub>2</sub>S sensor**

	<b>GenX sensor H<sub>2</sub>S and sensor environment</b>
GenX sensor H <sub>2</sub> S 50 ppm EC IT-P46 VI/PT (0-50 ppm) for Viton® or PTFE tubing	08A3100
GenX sensor H <sub>2</sub> S 50 ppm EC IT-P46 SS (0-50 ppm) for stainless steel tubing	08A3105
GenX Sensor H <sub>2</sub> S 1,000 ppm EC IT-P41 VI/PT (0-1,000 ppm) for Viton® or PTFE tubing	08A3110
GenX sensor H <sub>2</sub> S 1,000 ppm EC IT-P41 SS (0-1,000 ppm) for stainless steel tubing	08A3115
GenX Sensor H <sub>2</sub> S 10,000 ppm EC IT-P43 VI/PT (0-10,000 ppm) for Viton® or PTFE tubing	08A3120
GenX Sensor H <sub>2</sub> S 10,000 ppm EC IT-P43 SS (0-10,000 ppm) for stainless steel tubing	08A3125
GenX sensor environm. EC for integration of up to 4 electrochemical sensors	08A3050
Gas measured	H <sub>2</sub> S
Measuring ranges (min./max. range)	0 – 50/0 – 10,000 ppm
Response time for 90 % FSD**	< 25 – 90 s, depending on the number and type of sensors used
Reproducibility deviation*	< 2 % of measured value, applied for 5 min alternating test gas and dry air
Accuracy after calibration*	±1 % of full scale value, not better than 0.1 vol%
Ambient temperature	10 – 40 °C [50 to 104 °F]
Sample gas flow rate	25 – 60 NL/h
Sensor temperature	Not heated
Wetted parts	PP, PPS, PVDF, PTFE, stainless steel, depending on tubing material and of the components installed
Shelf time	< 3 months recommended
Cross-sensitivities	Depending on sensor type, complete list on request

**Thermal conductivity detector (TCD)**

	<b>Thermal conductivity detector (TCD) and sensor environments</b>
GenX Sensor H <sub>2</sub> WLD MK-F200	08A2845
GenX sensor environm. WLD MK-F VI/PT for gas paths in Viton® or PTFE tubing	08A2850
GenX sensor environm. WLD MK-F SS for gas paths in stainless steel tubing	08A2860
Gas measured	H <sub>2</sub>
Measuring ranges (min./max. range)	0 – 1/0 – 100 vol%
Limit of detection (LOD)*	0.1 vol%
Response time for 90 % FSD**	< 1 s at 60 NL/h
Noise	< 1 % of full scale value
Linearity error	< 1 % of full scale value
Reproducibility deviation*	< 1 % of full scale value
Accuracy after calibration*	< 1 % of full scale value, not better than 0.01 vol%
Ambient temperature	10 – 40 °C [50 to 104 °F]
Zero drift	< 2 % of full scale value per week
Sample gas flow rate	25 – 60 NL/h
Sensor temperature	63 °C
Wetted parts	SS 316Ti, silicon oxinitrite (ceramic), gold, covar, epoxy, depending on tubing material and of the components installed
Cross-sensitivities	Sensor is suitable for binary gas mixtures, complete list on request

\* At constant ambient conditions in the compensated temperature and pressure range (±0.015 %/mbar). Additionally the limit of detection (LOD) is depending on sample gas and the selected measuring range.

\*\* Depends on sample gas input pressure, density and flow rate at the analyzer input.



▼ Technical specifications sensors

Available measuring ranges: oxygen sensors, electrochemical H<sub>2</sub>S sensor and TCD

Measuring ranges	O <sub>2</sub> PMA2	O <sub>2</sub> electrochemical	H <sub>2</sub> S electrochemical	H <sub>2</sub> TCD
0 – 100 vol%	x	-	-	x
0 – 50 vol%	x	-	-	x
0 – 30 vol%	x	-	-	x
0 – 25 vol%	x	x	-	x
0 – 20 vol%	x	x	-	x
0 – 10 vol%	x	x	-	x
0 – 5 vol%	x	x	-	x
0 – 1 vol%	x	x	x	x
0 – 50 ppm	-	-	x	-

x: Available gas and measuring range

-: Measuring range not available

Other gases on request

NDIR/NDUV/UVRAS photometers

Technical Data	NDIR	NDUV	UVRAS
Limit of detection (LOD) in % of full scale value [3 σ]*	< 0.1 – 1	< 0.1 – 0.5	< 0.1 – 0.5
Response time for 90 % FSD**	< 10 s		
Linearity error	< ±1 % of full scale value		
Reproducibility deviation*	±0.5 % of full scale value		
Long time stability (zero drift)***	< ±2 % of full scale value per week	< ±1 % of full scale value per 24 hours	< ±2 % of full scale value per 24 hours
Long time stability (measuring range drift)	< ±2 % of full scale value per month	< ±1 % of full scale value per month	
Temperature influence: zero point****	< 1 % of full scale value per 10 Kelvin		
Temperature influence: measuring range****	< 2 % of full scale value per 10 Kelvin		
Ambient temperature	10 to 40 °C [50 to 104 °F]		
Pressure influence	< 1.5 % per 10 hPa of the measured value (with pressure compensation < 0.15 % per 10 hPa of the measured value)		
Wetted parts	Depending on the selected version: FKM (Viton®), stainless steel 1.4571, aluminium with/without protective coating, PVDF, PPS, depending on tubing material and of the components installed		
Cross-sensitivities	Internal compensation for multiple measuring benches, application-dependent, complete list on request		

Options

Pressure sensor for process pressure compensation

Capacitive H<sub>2</sub>O sensor for internal water vapor compensation, measuring range 0 – 1 vol%, for selected NDIR measuring benches

\* At constant ambient conditions in the compensated temperature and pressure range (±0.015 %/mbar). Additionally the limit of detection (LOD) is depending on sample gas and the selected measuring range.

\*\* Depends on sample gas input pressure, density and flow rate at the analyzer input.

\*\*\* The long-term zero drift can be reduced by using an AutoZero module.

\*\*\*\* The temperature dependence can be reduced by using a heated box (THB 50 °C).

The cross-sensitivities of the sensors depend on the individual gas composition. For a general list of cross-sensitivities, please refer to the Multi-gas Analyzer operating manual.

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▼ Technical specifications sensors

Available gases and standard measuring ranges: NDIR photometers

Measuring ranges	CO <sub>2</sub>	CO	CH <sub>4</sub>	C <sub>n</sub> H <sub>m</sub>	N <sub>2</sub> O	SF <sub>6</sub>	CF <sub>4</sub>	NO	H <sub>2</sub> O
0 – 100 vol%	x	x	x	x	x	x	x	-	-
0 – 50 vol%	x	x	x	x	x	x	x	-	-
0 – 30 vol%	-	*	*	*	*	*	*	-	-
0 – 20 vol%	x	-	-	-	*	*	*	-	-
0 – 10 vol%	x	x	x	x	*	*	*	-	-
0 – 5 vol%	x	x	x	x	*	*	*	-	-
0 – 1 vol%	x	x	x	x	-	-	*	x	x
0 – 5000 ppm	x	x	x	x	-	x	*	x	x
0 – 2000 ppm	x	x	x	x	x	x	*	x	-
0 – 1000 ppm	x	x	x	x	x	x	*	x	-
0 – 500 ppm	x	x	x	-	x	-	-	-	-
0 – 300 ppm	-	-	-	-	x	-	-	-	-
0 – 100 ppm	x	-	-	-	x	x	-	-	-
0 – 50 ppm	x	-	-	-	-	x	-	-	-
0 – 10 ppm	-	-	-	-	-	-	-	-	-

Available gases and standard measuring ranges:  
NDUV photometers

Measuring ranges	H <sub>2</sub> S	SO <sub>2</sub>	NO <sub>2</sub>	Cl <sub>2</sub>	O <sub>3</sub>
0 – 100 vol%	-	-	-	-	-
0 – 50 vol%	-	-	-	-	-
0 – 30 vol%	-	-	-	x	-
0 – 20 vol%	-	-	-	-	-
0 – 10 vol%	*	x	-	x	-
0 – 5 vol%	*	x	-	x	-
0 – 1 vol%	*	*	-	*	-
0 – 5000 ppm	x	x	x	*	-
0 – 2000 ppm	x	x	x	*	x
0 – 1000 ppm	x	x	x	*	x
0 – 500 ppm	x	x	x	x	x
0 – 300 ppm	-	x	x	-	-
0 – 100 ppm	x	x	x	-	x
0 – 50 ppm	-	x	x	-	x
0 – 10 ppm	-	-	-	-	x
0 – 1 ppm	-	-	-	-	x

Available gases and standard measuring ranges:  
UVRAS photometers

Measuring ranges	NO
0 – 100 vol%	-
0 – 50 vol%	-
0 – 30 vol%	-
0 – 20 vol%	-
0 – 10 vol%	-
0 – 5 vol%	-
0 – 1 vol%	-
0 – 5000 ppm	x
0 – 2000 ppm	x
0 – 1000 ppm	x
0 – 500 ppm	x
0 – 300 ppm	x
0 – 100 ppm	-
0 – 50 ppm	-
0 – 10 ppm	-

x: Available gas and standard measuring range

\*: customized range, available on request

-: Measuring range not available

Other gases on request

\* NDIR: non-dispersive infrared photometer, NDUV: non-dispersive ultraviolet photometer, UVRAS: ultraviolet resonance absorption spectrometer

The cross-sensitivities of the sensors depend on the individual gas composition. For a general list of cross-sensitivities, please refer to the Multi-gas Analyzer operating manual.

Viton® is a trademark of DuPont Performance Elastomers.



# Gas Sample Probe Series SP®

Electrically heated, compact version with protection cover and test gas connection as standard SP180-H/MA for special applications aboard ships



SP180-H/MA

## Special Features

- DNV Type Examination Certificate VI-7-2 for application aboard ships
- Sampling of dust-loaded process gases
- Small volume, fast response time
- Self-regulating electrical heating
- Alarm contact for low temperature
- With test gas connection according to EN 14181 (test gas feeding via filter element)
- Easy mounting and maintenance
- Sample tube made of Hastelloy® optional

## Application

The M&C gas sample probe version SP180-H/MA is suitable for continuous gas sampling. The compact design of the SP180-H/MA requires only limited space. The gas sample probe has a DNV Type Approval Certificate for special application aboard ships.

## Description

The design of the M&C gas sample probe version SP180-H/MA guarantees easy mounting, safe operation and problem-free maintenance.

Changing of the external filter element does not require tools or disassembling of the gas sample line. To change the filter element, the complete filter assembly can be removed out of the probe head.

The gaskets can easily be checked for leaks, the filter housing is easy to clean, and the sample tube can be removed without dismantling the entire sample probe. These are only a few advantages of the M&C probe.

The 0.1 micron glass fibre filter is placed in a heated stainless steel filter housing. Other filter element materials and filter porosities are available on request. The compact design and the new all-round heat insulation and protection cover ensures an optimised heat distribution, as well as a safe operation by keeping the temperature above the dew point in the filter or flange area.

Specially designed self-regulating heating elements are heating the gas sample probe to 180 °C (356 °F) within the range of 110 V to 240 V without switching.

There is no external temperature controller or temperature limitation necessary. The terminals of the electrical connections are inside a junction box.



The gas sample probe SP180-H/MA is equipped with a calibration gas connection according to EN14181 (regulation for calibration of emission measuring systems). With this standard feature, calibration gas can enter the gas sample probe via the filter element.

Please select the sample tube, which is right for your application, from the table "Sample Tubes" in this data sheet.



## ▼ Technical Data

Series SP®	Version SP180-H/MA	Version SP180-H/MA SS
Part No.	02S1860	02S1865
DNV Type Approval Certificate	TAA00002J3	
Protection cover	Yes	
Outdoor mounting	Not for mounting on open deck	
Degree of protection	IP66 EN60529	IP66 EN60529
DNV: Location classes	Temperature D, Humidity B, Vibration B, EMC A, Enclosure B	
Ambient temperature category H	-25 °C to +60 °C (-13 °F to +140 °F)	
Vibration/Shock for sample tubes (optional)	4 g, classified acc. to GL (Germanischer Lloyd) [GL-2012 VI section 7, Tab 3.16, characteristic curve 2a]	
Sample pressure	0.4 to 1.5 bar abs.	
Sample temperature	Max. 600 °C (1112 °F)*	
Gas Flow	Max. 500 NI/h	
Dust load	Max. 1 g/m <sup>3</sup> *	
Filter chamber volume	70 ml (4.27 in <sup>3</sup> )	
Filter element	Type S-0,1GF, filter porosity 0.1 µm, fibre ( other filter elements on request)	
Probe heating	+180 °C (356 °F) self-regulating	
Ready for operation	After 2 hours	
Low temperature alarm contact, alarm point	< 160 °C (< 320 °F), NO	
Low temperature alarm contact, contact rating	250 V - 3 A AC, 30 V - 3 A DC	
Connection sample outlet	1/4" NPT inside with Swagelok tube connector for 6 mm (approx. 0.24") tube (DN 4/6)	
Connection calibration gas	Swagelok tube connector for 6 mm (approx. 0.24") tube (DN 4/6)	
Power supply	110 V up to 240 V, 50/60 Hz	
Power consumption	Start up: 400 VA, during operation: 100 VA, fuse 6 A	
Terminal box	Aluminium	Stainless steel VA
Electrical connection	Terminals max. 2.5 mm <sup>2</sup> (0.0039 in <sup>2</sup> ), 1 x M20, 1 x M16 cable glands	
Electrical equipment standard	EN 61010, EN 60335-1	
Flammability test protection cover	Needle-flame test method IEC 60695-11-5:2005 severity level: 30 s	
Mounting flange	DN 65 PN 6, Form B stainless steel 316Ti	
Material of sample contacting parts	Stainless steel 316 / 316Ti, FKM, glass fiber	
Dimensions (W x H x D)	Approx. 270 mm (with calibration gas connection) x 280 mm x 225 mm, (10.63" x 11.02" x 8.86")	
Weight	Approx. 7.5 kg (approx. 16.5 lbs)	

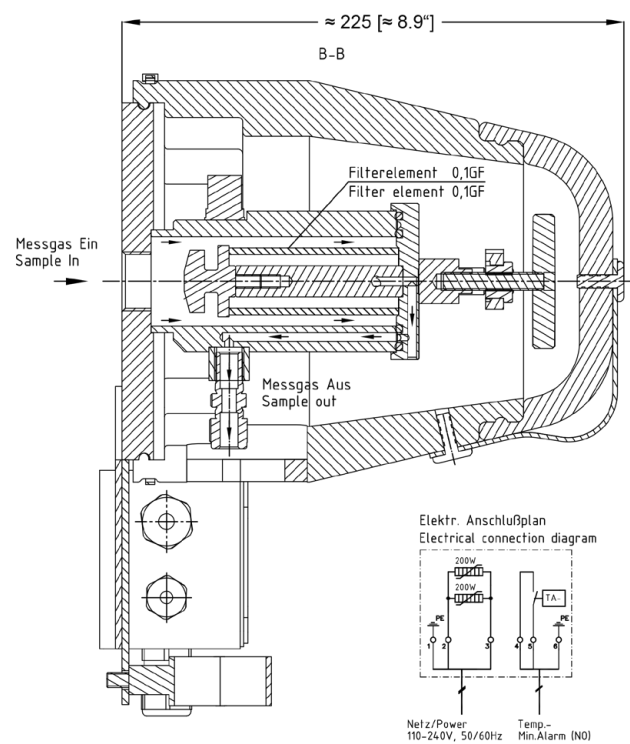
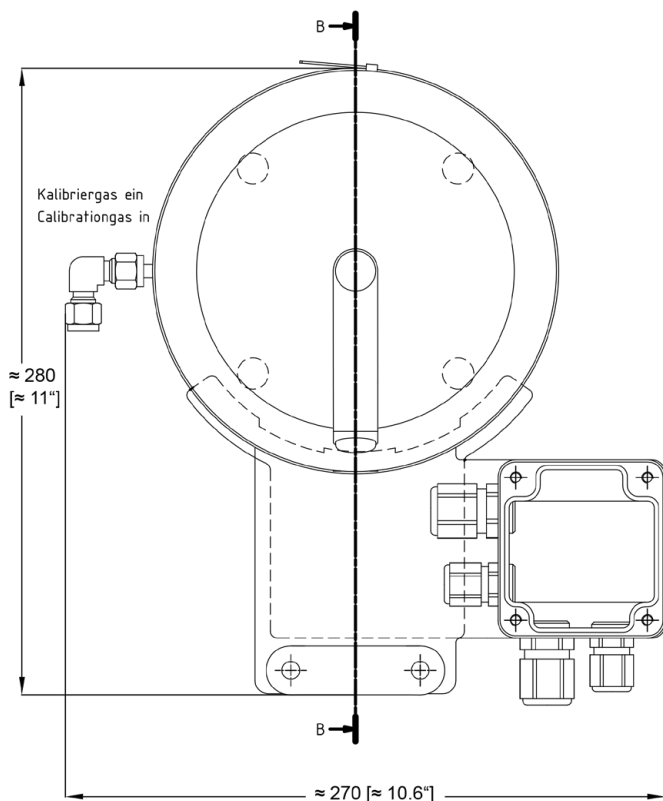
\* Standard, other versions on request.

Please note: NI/h and NI/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar.

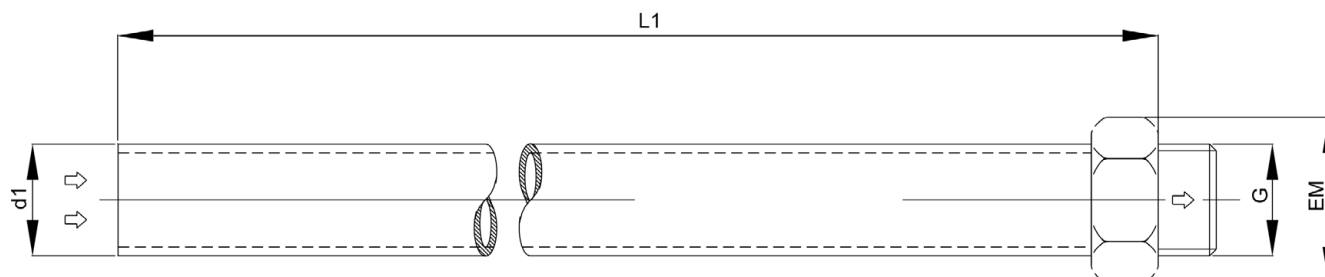
ΔP and T90 at flow of:	100	200	500	NI/h
ΔP pressure loss with new filter element 0,1 GF	< 4	7	15	mbar
T90 time-without sample tube/prefilter	4,0	2,5	<1,0	s



▼ Dimensions SP180-H/MA



▼ Option: Sample Tubes



Classified according to GL [Germanischer Lloyd] GL-2012 VI section 7, Tab 3.16, characteristic curve 2b)

Classified acc. to GL (Germanischer Lloyd) GL-2012 VI section 7, Tab 3.16, characteristic curve 2b)							
M&C Probe Sample Tube Type	Part-No.	max. Temperature °C	Material Tube / Connection	Length "L1" mm	Connection Thread "G"	Tube ø d1 outer/inner mm	Connection ø a "EM" mm
SP180M/HC/400	92S0040	600 (1112 °F)	Hastelloy®	400 (15.75")	G 3/4"a	27/20	40
SP180M/HC/600	92S0060	600 (1112 °F)	Hastelloy®	600 (23.62")	G 3/4"a	27/20	40
SP180M/HC/800	92S0080	600 (1112 °F)	Hastelloy®	800 (31.5")	G 3/4"a	27/20	40

Hastelloy® is the brand name of a nickel-based alloy from Haynes International.





# Gas Sample Probe Series SP®

Electrically heated, compact version with protection cover and test gas connection as standard

SP180-H-EX1 T2, SP180-H-EX1 T3, SP180-H-EX1 T4



SP180-H-EX1

## Special Features

- 3 EX2 versions: T2/T3/T4 with Ex certification according to ATEX, suitable for use in Ex zone 2
- 3 EX1 versions: T2/T3/T4 with Ex certification according to ATEX, suitable for use in Ex zone 1
- IECEX for zone 1
- Sampling of dust-loaded process gases
- Small volume, fast response time
- Self-regulating electrical heating
- Alarm contact for low temperature
- With test gas connection according to EN 14181 (test gas feeding via filter element)
- Easy mounting and maintenance
- Sample tube and pre-filter optional

## Application

The M&C gas sample probe version SP180-H-EX1 is applicable for continuous gas sampling. The compact design requires only limited space. The gas sample probe is equipped with a new protective cover and thus also suitable for outdoor mounting.

## Description

The design of the M&C probe version SP180-H-EX1 guarantees simple mounting, safe operation and problem-free maintenance.

Changing the external filter element needs no tools and no disassembling of the sample line. For the change of the filter element, the complete filter assembly is removed out of the probe head. Easy checkup of the filter element and the gaskets, cleaning the filter area of the probe head and the in-situ probe tube respectively without dismounting the sample probe are only a few advantages of the M&C probe. In the heated filter housing out of stainless steel, the 2 micron ceramic filter element is located.

More filter element materials are available as option. The compact design and the new all-round heat insulation and weather protection ensure an optimized heat distribution as well as safe operation in the filter or flange area without dew point underrun.

The gas sample probe can be heated up to 180 °C [356 °F] with special self-regulating heating elements within a range of 110 V to 240 V without switching. Neither a temperature controller nor a temperature limitation is necessary. The separate thermostwitch of the SP180-H enables a low temperature monitoring (< 160 °C [320 °F], NO). For electrical connection, a junction box with terminals is mounted.

The gas sample probe SP180-H-EX1 has a calibration gas connection as standard according to EN14181 (regulation for calibration of emission monitoring systems) that enables calibration gas feeding via the filter element of the gas sample probe.

The three versions are suitable for usage in Ex zone 1. The alarm contact for low temperature corresponds to the temperature classes of the Ex versions.

The stainless steel in-situ probe tube SP210/SS (option) is screwed into the DN 65 PN 6 mounting flange. The maximum operating temperature of the tube out of stainless steel is 600 °C [1112 °F].

To solve specific sampling problems you can find more filter elements, probe tubes and pre-filters in our wide range of M&C probe accessories (see data sheets for sample tubes with G 3/4" connection thread and pre-filters with G 3/4" connection, with flange connection and with tube connection).



## ▼ Technical Data SP180-H-EX1

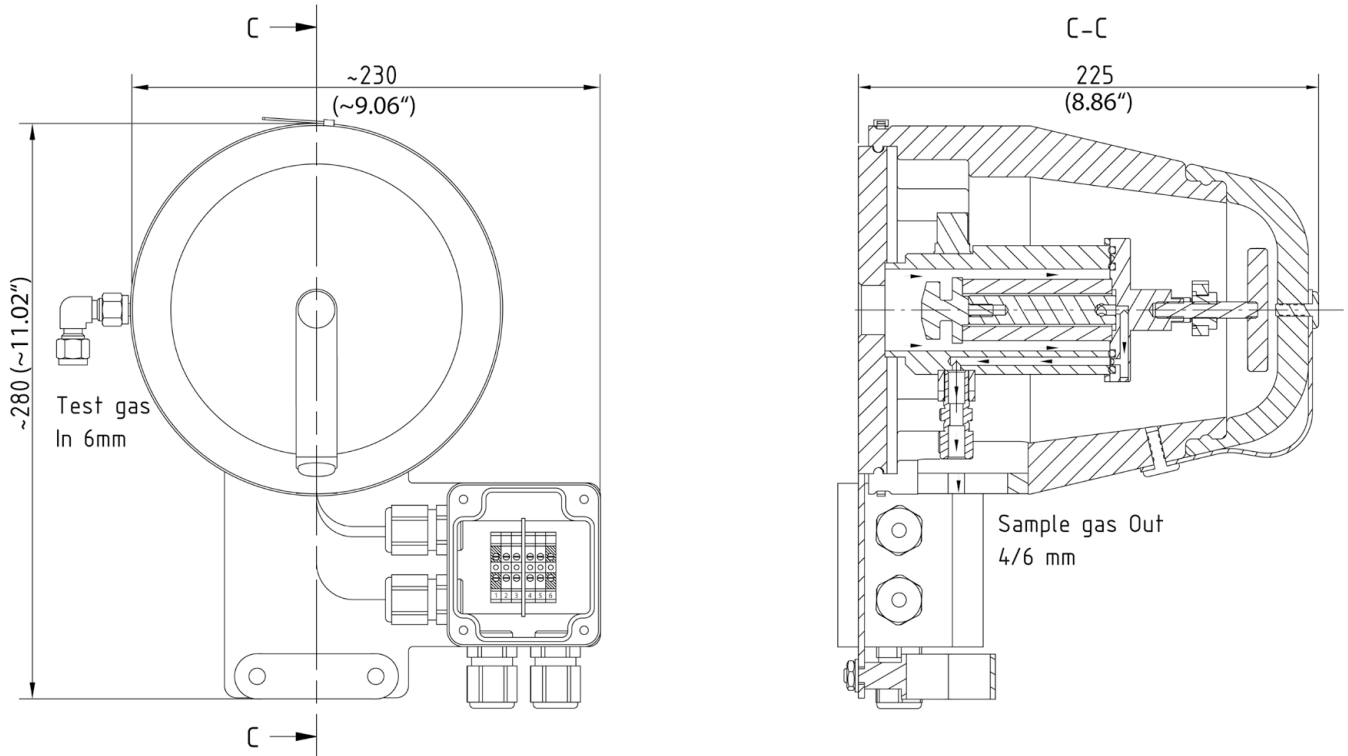
Series SP®	SP180-H-EX1 T2	SP180-H-EX1 T3	SP180-H-EX1 T4
Part No.	02S1874	02S1872	02S1870
Protective cover	Yes		
Outdoor mounting	Yes		
Sample temperature	Max. 600 °C [1112 °F]*		
Sample pressure	0.4 to 6 bar abs.		
Ambient temperature	-20 to +80 °C [--4 to +176 °F]	-20 to +80 °C [--4 to +176 °F]	-20 to +80 °C [--4 to +176 °F]
Dust load	Max. 1 g/m <sup>3</sup>		
Filter chamber volume	70 ml		
Filter element	Type S-2K, filter porosity: 2 µm, ceramic (others on request)		
Probe heating	+150 to +180 °C [+320 to +356 °F] self-regulating	+120 to +160 °C [+266 to +320 °F] self-regulating	+90 to +120 °C [+194 to +248 °F] self-regulating
Ready for operation	After 2 hours		
Low temperature alarm contact, alarm point	< 90 °C [266 °F], NO	< 90 °C [266 °F], NO	< 90 °C [194 °F], NO
Low temperature alarm contact, contact rating	250 V - 1.5 A AC 0.5 A DC		
Connection sample outlet	1/4" NPT inside with Swagelok tube connector ø 6 x 1 mm [DN 4/6]		
Connection calibration gas	Swagelok tube connector ø 6 x 1 mm [DN 4/6]		
Power supply	110 up to 240 V 50 / 60 Hz, rated current 3.5 A		
Power consumption	Typically: 100 VA, (fuse 6 A)		
Electrical connection	Terminals max. 2.5 mm <sup>2</sup> , 1 x M20, 1 x M16 cable glands		
Mounting flange	DN 65 PN 6, B stainless steel 316Ti		
Material of sample contacting parts	Stainless steel 316 / 316Ti, FPM, ceramic		
Degree of protection / Electrical equipment standard	IP54 EN 60529 / EN 61010		
Ex Certification	EX II 2G Ex eb mb IIC T2 Gb	EX II 2 G Ex eb mb IIC T3 Gb	EX II 2G Ex eb mb IIC T4 Gb
	EXAM BVS 18 ATEX E 043		
	IECEX BVS 18.0034		
Dimensions (W x H x D)	230 x 280 x 225 mm [9.06" x 11.02" x 8.86"]		
Weight	Approx. 7.5 kg [approx. 16.53 lb]		
Flow	Max. 500 NI/h		
<b>Options</b>			
02S9200	In-situ probe tube out of stainless steel 316Ti type SP210/SS, connection: G 3/4" o, ø 10/12, length: 1 m [3.28"]*, incl. flange gasket		

\* Standard, other versions on request.

ΔP and T90 at flow of:	100	200	500	NI/h
ΔP pressure loss with new filter element S-2K	4	7	15	mbar
T90 time with insitu probe tube SP210/SS	4.0	2.5	<1.0	sec.



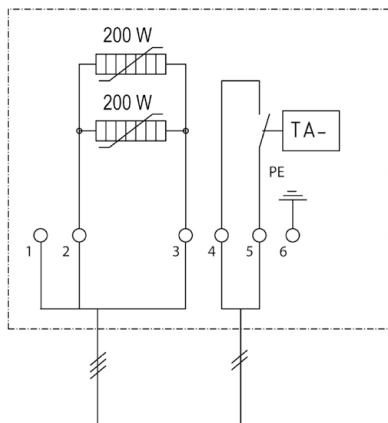
▼ Dimensions SP180-H and EX versions



Dimensions in mm

▼ Wiring diagram

Electrical wiring plan



Power  
240V, 50/60Hz

Temperature  
min.Alarm (NO)



# Gas Conditioning Unit

## Series SS-M05

Version SS-M05 Marine for Marine Application



SS-M05 Marine

### Special Features

- Type examination approval according to DNVGL-CG-0339
- Stainless steel Jet-Stream heat exchanger
- Ambient temperature up to +45 °C (113 °F)
- Outlet dew point adjustable from +2 °C (35.6 °F) to +15 °C (59 °F)
- Dew point stability <math>\pm 0.1\text{ °C}</math> ( $\pm 0.18\text{ °F}</math>)$
- Status alarm contact
- Compact design
- Self-controlling
- Possibility of test gas feeding through a solenoid valve

### Application

The SS-M05 Marine gas conditioning system is suitable for variable discontinuous use as well as for continuous operations in the maritime sector.

The components used in the SS-M05 Marine gas conditioning system have been specially designed and tested for marine applications.

### Description

All components of the gas conditioning system are either housed in a compact stainless steel housing or attached to it. The sample gas line is connected directly to the heat exchanger of the sample gas cooler.

The sample gas cooler cools the sample gas down to 5 °C (41 °F).

The heat exchanger is placed inside a heat-insulated cooling block.

The cooling block is cooled to a constant temperature of +5 °C (41 °F) by an electronically controlled (analog technology) Peltier element. A PT100 sensor is used to measure the temperature.

The thermal energy generated by the cooling system is dissipated via a fan-cooled heat sink.

The cooler is equipped with a temperature alarm contact that switches off the sample gas pump in case of a temperature deviation of  $\pm 3\text{ °C}$  ( $\pm 5.4\text{ °F}$ ) from the factory set point (+5 °C (41 °F)).

The peristaltic pump removes the accumulated condensate.

Downstream the cooler, there is a micro-filter with a 0.1  $\mu$  filter element and integrated liquid alarm sensor LA. In case of liquid leaking, the liquid alarm sensor also switches off the sample gas pump automatically.

A PTFE bellows pump is mounted onto the outside of the housing. This pump draws the sample gas from the sampling point via the sample probe SP180H/MA. The sample probe is sold separately. The gas is drawn through the heated sample gas line (optional) into the cooler and further through the micro-filter.

In the outlet of the sample gas pump a flow meter FM40 with flow monitoring FA-20mo is integrated. The flow rate controller reports the failure of the sample gas flow. The now filtered and dried sample gas is passed on to the analyzers.

To calibrate the system, there is a switchover for test gas feeding through a solenoid valve. The switchover is implemented in the system.



## ▼ Technical Data

Gas Conditioning System Series SS®	SS-M05 Marine			
Part-No.:	03 G 6000			
DNV Type Examination Certificate	TAA000018R			
Location classes	Temperature	A	EMC	A
	Humidity	B	Enclosure	B
	Vibration	A		
Sample outlet dew point	Range of adjustment: +2 °C up to +15 °C (35.6 °F up to 59 °F) , factory setting: +5 °C (41 °F)			
Sample outlet dew point stability	< ±0,1 °C (±0,18 °F) at constant conditions			
Sample inlet temperature**	Max. 70 °C (158 °F)			
Sample inlet water vapour saturation**	Max. 70 °C (158 °F)			
Gas flow rate/heat exchanger**	Max. 100 l/h			
Number of heat exchangers	1			
heat exchanger material	Stainless steel 316Ti			
Ambient temperature**	+5 up to +45 °C (41 °F up to 113 °F)			
Storage temperature	-20 up to +60 °C (-4 °F up to 140 °F)			
Pressure	Max. 1 bar overpressure			
Total cooling power at 25 °C ambient temperature	80 KJ/h			
Sample gas connection Inlet	Tubing 6 mm Ø*			
Sample gas connection Outlet	Tube connections 4/6 mm			
Condensate connection	Tube connections 4/6 mm			
Condensate removal	Peristaltic pump SR25.2			
Sample gas pump	MP-F 05			
Ready for operation	10 min			
Power consumption	250 VA (up to 1600 VA for sample gas line)			
Power supply	230 V ±10%, 50 Hz or 115 V ±10%, 60 Hz			
Electrical connections	Clamps 2.5 mm <sup>2</sup> , cable glands 2 x M20			
Status alarm: gas flow rate	1 change-over contact			
Switching power: status alarm	250 V, 2 A, 500 VA, 50 W			
Case protection	IP54, EN 60529			
Electrical equipment standard	EN 61010			
Housing color	RAL 9005			
Type of installation	Wall-mount			
Dimensions (W x H x D)	600 x 780 x 600 mm (23.62" x 30.71" x 23.62") with opened door			
Weight	Approx. 30 kg (approx. 66.14 lbs)			

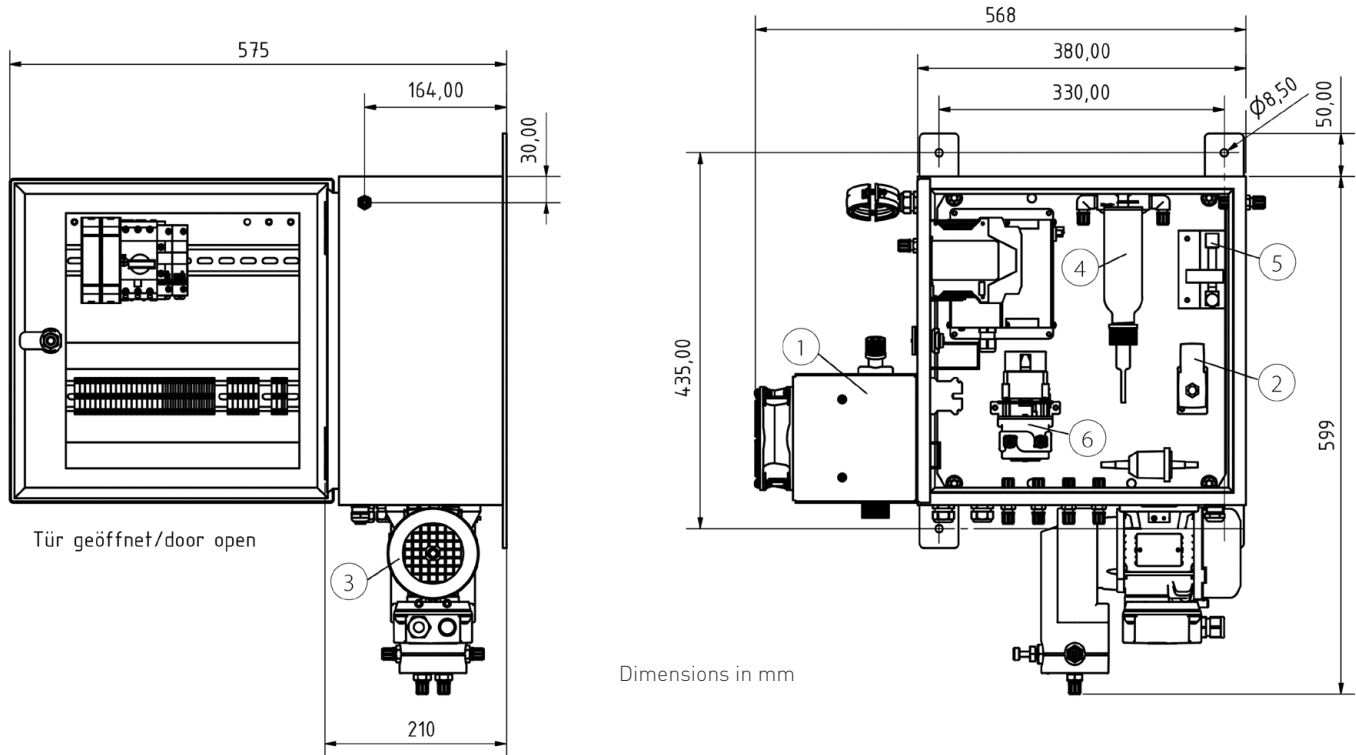
\* Standard, others on request

\*\* Maximum values in technical data must be rated in consideration of total cooling capacity at 25 °C (77 °F) ambient temperature and an outlet dew point of 5 °C (41 °F).

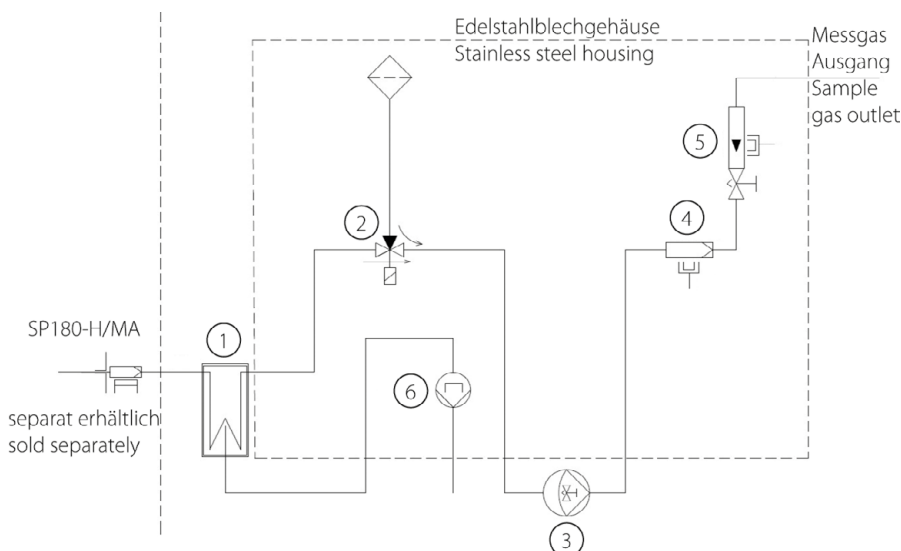


Version SS-M05 Marine for Marine Application

▼ Dimensions



▼ SS-M05 Marine design



- 1 Gas cooler
- 2 Solenoid valve for test gas feeding
- 3 Sample gas pump MP-F 05
- 4 Filter FP-0.1 GF-D filter porosity 2  $\mu$  with integrated liquid alarm sensor LA
- 5 Flow meter FM40 with flow monitoring FA-20mo
- 6 Peristaltic pump SR25.2 for continuous automatic condensate drainage






# Company & Product Certifications above average.



For more details visit [www.mc-techgroup.com](http://www.mc-techgroup.com)



M&C TechGroup Germany GmbH . Rehhecke 79 . 40885 Ratingen, Germany . P. +49 2102.935-0 . [sales@mc-techgroup.com](mailto:sales@mc-techgroup.com)

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