SP2000-H320/S

Gas Sample Probe Series SP®

Version SP2000-H320/S heated to 320 °C [608 °F] with separator vessel

Special Features

- **Special probe downstream of DENOX (SCR)**
- **Heated to 320 °C [608 °F]**
- **No salt formation in the heated filter part**
- **Condensate vessel in the gas outlet with glass globe filling to enlarge the reaction surface**
- **Optionally, heated condensate vessel**
- **Integrated peristaltic pump**
- **Connection for test gas feeding**
- **Easy maintenance and operation**

Application

M&C has developed a special sampling technique for continuous gas sampling of waste gas in DENOX plants (SCR) where NH_3 is added to the flue gas in order to reduce the NOx content. This new sampling technique has also proved to be suitable for processes with very high pollutant concentrations.

In these applications, the measurement of NOx, SO_2 and O_2 concentrations constitutes a major problem. At temperatures < 300 °C [572 °F], ammonium salts are produced by the chemical reaction of NH_3 and the SO_2/SO_3 present in the flue gas.

This salt formation inevitably results in the blockage of filters and sample lines in a relatively short time.

The special M&C gas sample probe SP2000-H320/S represents a good solution for these problems. In order to avoid the risk of blockage due to salification, the sample gas is filtered above 300 °C [572 °F].

Description

The M&C gas sample probe SP2000-H320/S is based on the standard sample probe.

The gas sample probe SP2000-H320/S is temperature-controlled via an integrated capillary sensor thermostat adjustable from 50 to 320 °C [122 to 608 °F] and including a high temperature limiter and low temperature alarm.

As an option, the gas sample probe is available with a FeCu-Ni thermocouple instead of the thermostat controller. For this version, an external temperature controller is necessary.

Due to the modular design and depending on the application, optional sample tubes or pre-filters of various sizes and designs can be connected upstream of the probe.

At the sample gas outlet of the probe, the gas passes via a heated adapter to a non-heated condensate vessel made of glass. It is filled with glass balls to enlarge the surface for the salification. The salt deposits and can be washed out with the condensate.

The peristaltic pump SR25.1G removes the condensate with the dissolved ammonium salts.

The temperature of the vessel is higher than the ambient temperature due to the hot gas stream and the heated adapter. Therefore, a loss of measured components is negligible because of warm condensate. In case of a DENOX application with a small content of NH_3 (normally only a few ppm), it is possible to analyze SO_2 and NOx without great losses (only some ppm which normally can be neglected). To determine the loss, it is possible to feed test gas via the probe to the analyzer(s). A measuring fault can be detected and calibrated.

Optionally, the vessel can also be heated to avoid chemical reactions of the sample gas components below a defined temperature.

The gas outlet of the separating vessel can be connected with a heated sample line 3/4-M for max. 200 °C [392 °F] operating temperature.

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Technical Data

	SP2000-H320/S	
Part No.	20S5000(a)	20S5000(a) + 20S9027
Temperature regulation	Thermostat adjustable 50 to 320 °C [122 to 608 °F], with high-temperature limiter and low-temperature alarm as contact output alarm point ΔT30 °C, contact rating 250 V 3 A~ 0.25 A =	With FeCu-Ni thermocouple, (instead of thermostat) option: external electronic temperature controller necessary e.g. Part No. 01B8350
Probe heating	Max. 320 °C [608 °F]	
Ambient temperature	+5 to +60 °C** [41 to 140 °F**] optionally with polyester protective housing -20 to +60 °C [-4 to 140 °F]	
Volume of filter chamber	120 ml	
Sample pressure	0.4 to 2 bar abs.	
Filter element	Ceramic, type S-2K 150*, filter porosity 2 µm	
Condensate vessel	Glass (optional SS 316Ti, Hastelloy®), volume 0.4 l (0.15 l glass ball filling)	
Adapter flange for condensate vessel	Hastelloy®	
Peristaltic pump	SR25.1G, 230/115 V, 50/60 Hz	
Ready for operation	After 2 h	
Connections sample gas outlet/condensate outlet	Hose fitting DN 4/6	
Connection test gas inlet	Tube connection ø 6 mm with blind plug, option: ø 1/4" (a)	
Power supply	230 V/50 Hz, 800 W, option: 115 V 60 Hz (a)	
Electrical connection	Terminals max 2.5 mm², 2 x PG11 cable glands	
Electrical equipment standard	EN 61010, EN 60519-1	
Degree of protection	IP54, EN 60529	
Mounting flange	DN 65 PN 6, B, stainless steel 316/316Ti, option: 3" ANSI 150 lbs RF (a)	
Connection sample tube	G 3/4" i	
Material of sample-contacting parts	Stainless steel 316Ti, graphite, ceramic, Hastelloy®, glass, FKM, PTFE, PVDF	
Weight	17 kg [≈ 37.5 lbs]	
Options		
Part No. 20S9053	2-way ball valve to shut off the process side /VA320	
Part No. 20S9330	3-way ball valve to shut off the process side /3VA320	
Part No. 20S9044	Test gas inlet via check valve 0.7 bar /R	
Part No. 20S9065 and following	Test gas inlet via check valve 0.7 bar /R	
Part No. 01B8350	Electronic temperature controller in wall-mounting housing	
Part No. on request	Heating of the condensate vessel to max. 180 °C [356 °F]	
Part No. 20S9410	Protective housing made of polyester	

* Standard

** In case of higher ambient temperatures, use option PT100 (Part No. 20S9025) or thermocouple Fe-CuNi and Ni-CrNi, respectively (Part No. 20S9027 or 20S9028) instead of the thermostat controller. Then, an additional electronic temperature controller (see data sheet "Microprocessor-Controlled Temperature Controller Type 70304") is necessary.

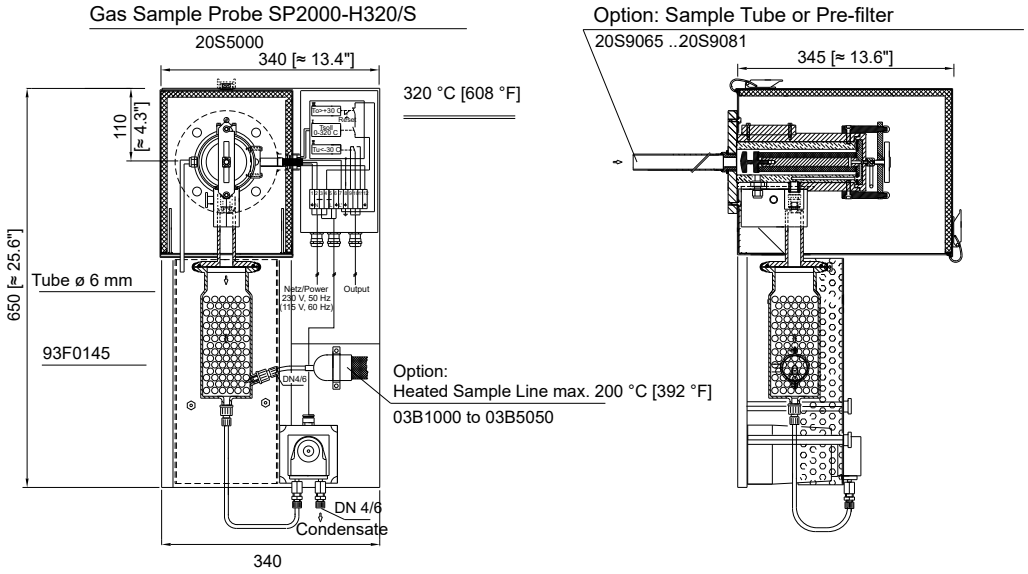
Part-No. ....(a) = power 115 V/60 Hz, flange 3"150 lbs, test gas connection ø 1/4".

Hastelloy® is a registered trademark for a nickel-chromium-molybdenum alloy by Haynes International, USA.

For further technical data, please see data sheet SP2000.

Dimensions

Gas Sample Probe SP2000-H320/S



Dimensions in mm [Inches]

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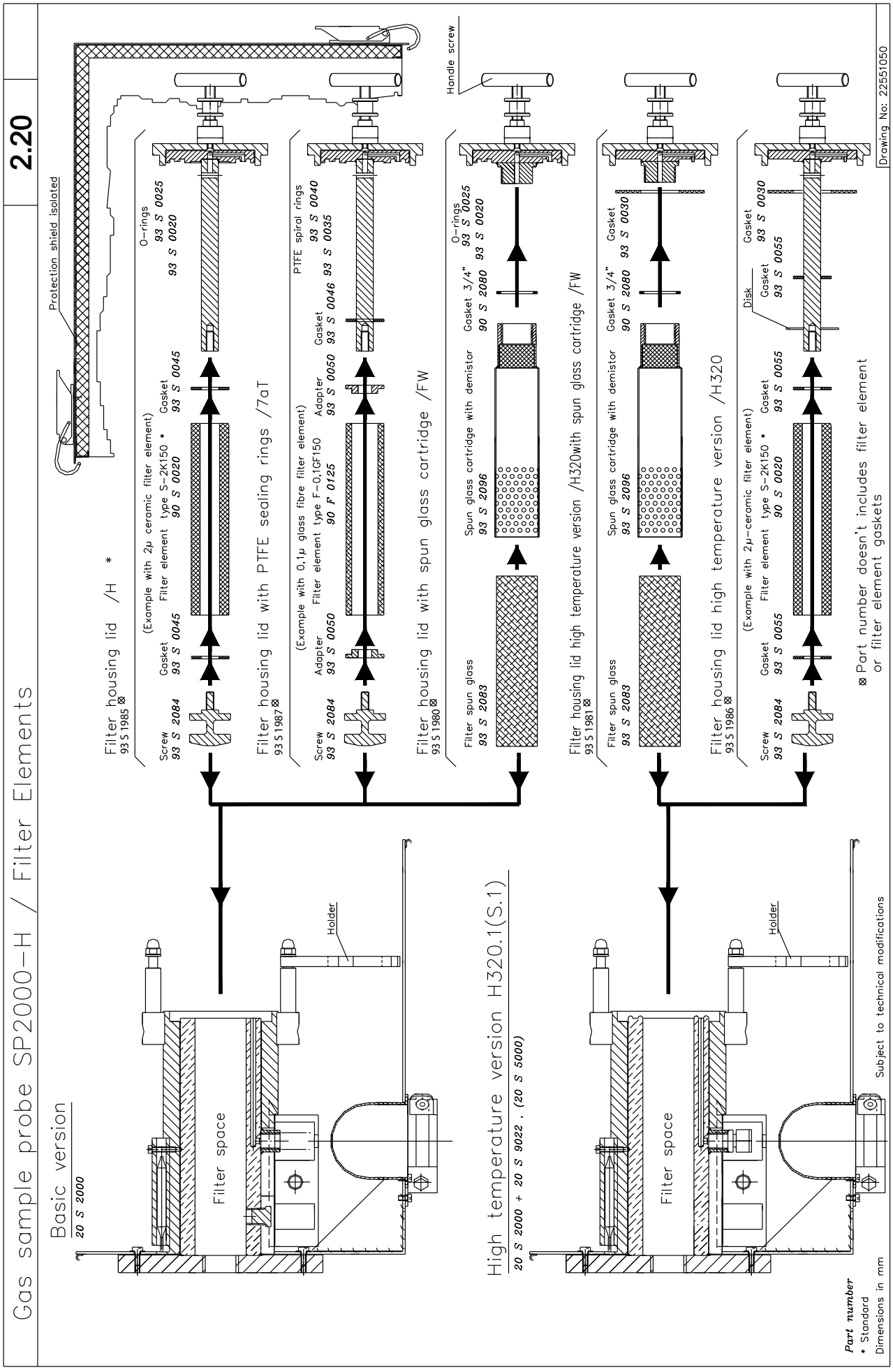
Gas sample probe SP2000-H / Filter Elements
2.20
Basic version
20 S 2000
Filter housing lid /H *
93 S 1985 ⊠
(Example with 2µ ceramic filter element)
Screw 93 S 2084
Gasket 93 S 0045
Filter element type S-2K150 * 90 S 0020
Gasket 93 S 0045
O-rings 93 S 0025 93 S 0020
Protection shield isolated
Filter housing lid with PTFE sealing rings /7aT
93 S 1987 ⊠
(Example with 0,1µ glass fibre filter element)
Screw 93 S 2084
Adapter 93 S 0050
Filter element type F-0,1GF150 90 F 0125
Adapter 93 S 0050
Gasket 93 S 0046 93 S 0035
PTFE spiral rings 93 S 0040
Filter housing lid with spun glass cartridge /FW
93 S 1980 ⊠
Filter spun glass 93 S 2083
Spun glass cartridge with demistor 93 S 2096
Gasket 3/4" 90 S 2080 93 S 0020
O-rings 93 S 0025
Handle screw
Filter space
Holder
High temperature version H320.1(S.1)
20 S 2000 + 20 S 9022 , (20 S 5000)
Filter housing lid high temperature version /H320with spun glass cartridge /FW
93 S 1981 ⊠
Filter spun glass 93 S 2083
Spun glass cartridge with demistor 93 S 2096
Gasket 3/4" 90 S 2080 93 S 0030
Gasket 93 S 0030
Filter space
Holder
Filter housing lid high temperature version /H320
93 S 1986 ⊠
(Example with 2µ-ceramic filter element)
Screw 93 S 2084
Gasket 93 S 0055
Filter element type S-2K150 * 90 S 0020
Gasket 93 S 0055
Disk Gasket 93 S 0055
Gasket 93 S 0030
⊠ Part number doesn't includes filter element or filter element gaskets
Part number
* Standard
Dimensions in mm
Subject to technical modifications
Drawing No: 22551050

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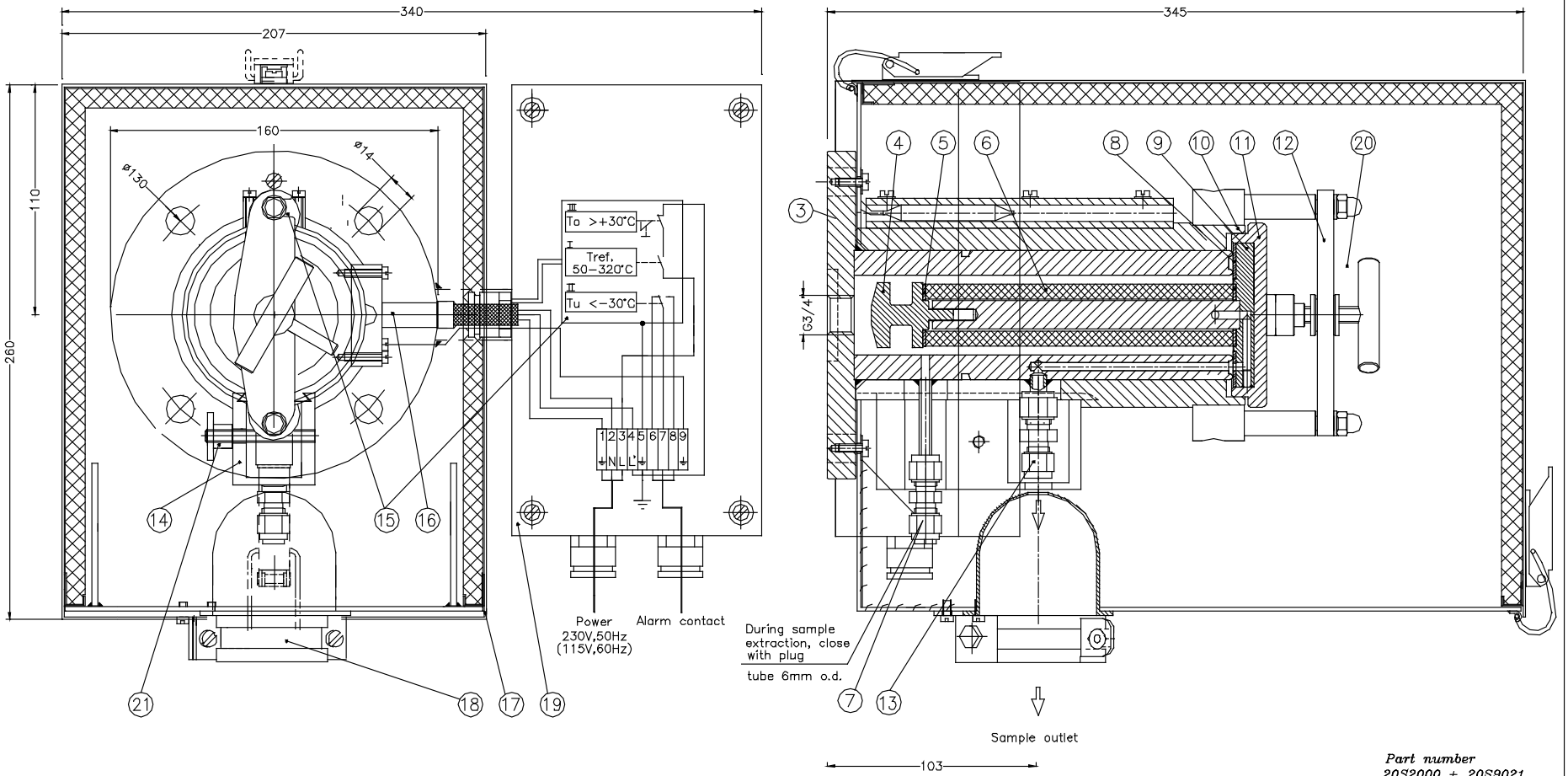
Gas sample probe SP2000–H320 / Version 320°C

2.22



Part number
20S2000 + 20S9021

* Standard

Dimensions in mm

Subject to technical modifications

Item	Description	Type	Part–No	Material	
1	–	–	–	–	
2	–	–	–	–	
3	Flange with G3/4"–thread	DN65/PN6		SS316	*
4	Filter screw M6		*93S2084*	SS316	
5	Gasket 30		*93S0055*	graphit	
6	Filter element 2 micron	S–2K–150	*90S0020*	Ceramic	*
7	Cal. gas connection			SS316	

Item	Description	Type	Part–No	Material	
8	Gasket		*93S0030*	Graphit	*
9	Cover plate with filter holder and filter screw	SP2000./H320	*93S2086*	SS316	*
10	Al–heater body			Anodized Al	
11	Al–cover plate			Anodized Al	
12	Clamp			SS304	
13	Reducing union for pipe 6/8 – 4/6			SS316	*
14	Thermal conductivity jaws			Anodized AL	

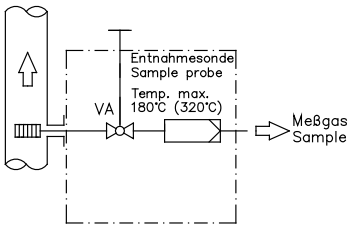
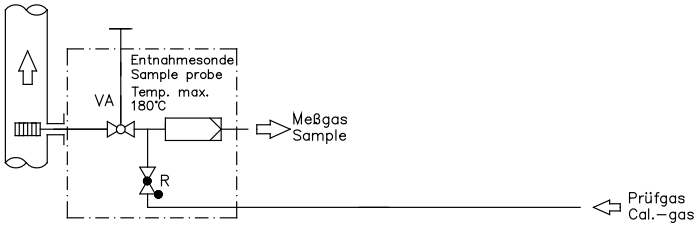
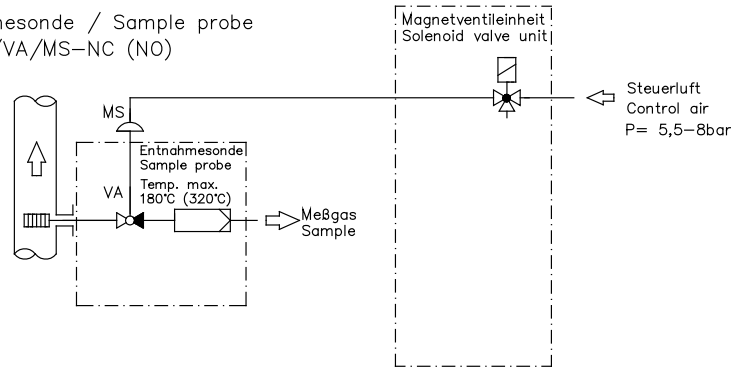
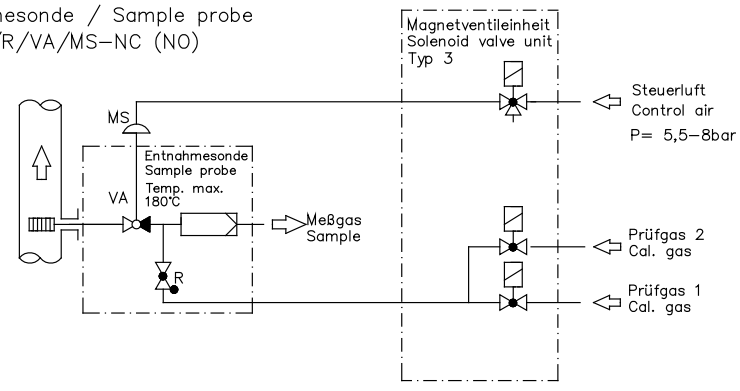
Item	Description	Type	Part–No	Material	
15	Thermostate 50–320°C	EMFf–134	*93S0011*		*
16	Cartridge heater	HLP	*93S0015*		*
17	Weather protection shield		*93S0070*	painted Steel	
18	Clamp 1 1/4"		*93S0065*	galvan. Steel	
19	Terminal box			painted Al	
20	Handle screw M8		*93S0085*	SS304	
21	Knurl screw M6		*93S0090*	galvan. Steel	

Drawing No: 2255/071

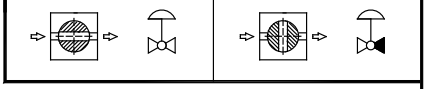
Gasentnahmesonde/Sample probe SP2000-H.../...VA... | 2.25

Version mit 2-Wege-Kugelhahn zum Absperren für Prüfgasaufgabe oder Service
Anwendungsempfehlung: Filterwechsel, Reinigung usw. bei über-/Unterdruck, giftigen, korrosiven Gasen.

Type with 2-way ball valve to shut off for calibration or maintenance.
Recommended application: filter changing, cleaning etc. at over- or underpressure conditions, poisonous or corrosive samples.

Funktion / function	Version / type
2-Wege-Kugelhahn VA zum Absperren der Gasentnahmesonde vom Prozeß. 2-way ball valve VA for shut off the sample probe from process.	Gasentnahmesonde / Sample probe SP2000-H/VA 
2-Wege-Kugelhahn VA zum Absperren der Gasentnahmesonde vom Prozeß Prüfgasaufgabe über Rückschlagventil R . 2-way ball valve VA for shut off the sample probe from process. Calibration gas trough checkvalve R .	Gasentnahmesonde / Sample probe SP2000-H/R/VA 
2-Wege-Kugelhahn VA mit pneum. Antrieb MS zum aut. Absperren der Gasentnahmesonde vom Prozeß. 2-way ball valve VA with pneum. actuator MS for aut. shut off the sample probe from process.	Gasentnahmesonde / Sample probe SP2000-H/VA/MS-NC (NO)  Version 320°C : pneum. Antrieb MS-DA mit 2.Steuermagnetventil (P=>6,5bar) / Type 320°C : pneum. actuator MS-DA with 2. control solonoid valve (P=>6,5bar)
2-Wege-Kugelhahn VA mit pneum. Antrieb MS zum aut. Absperren der Gasentnahmesonde vom Prozeß. Prüfgasaufgabe über Rückschlagventil R . 2-way ball valve VA with pneum. actuator MS for aut. shut off the sample probe from process. Calibration gas trough checkvalve R .	Gasentnahmesonde / Sample probe SP2000-H/R/VA/MS-NC (NO)  Zeichn.-Nr.: /Drawing No: 22551110

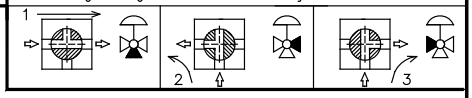
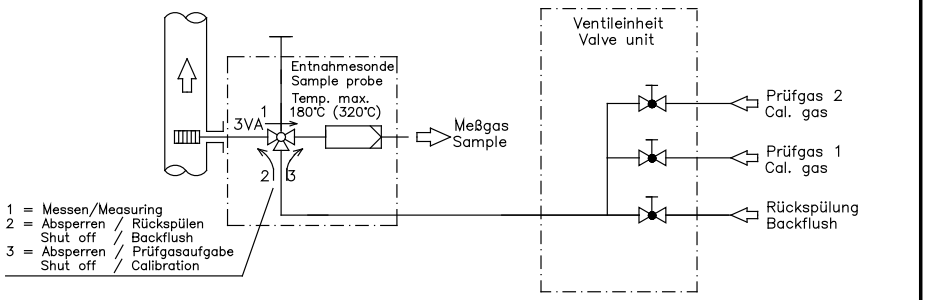
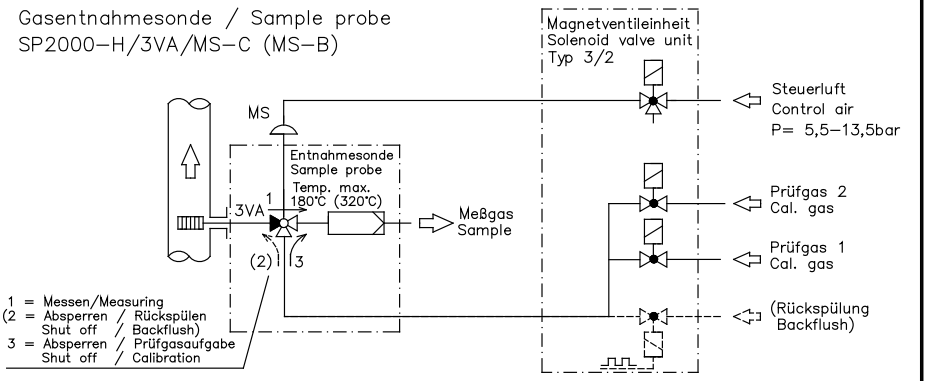
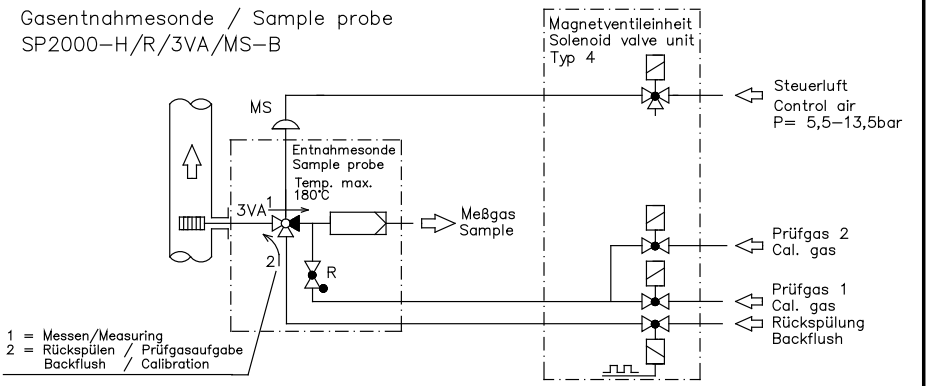
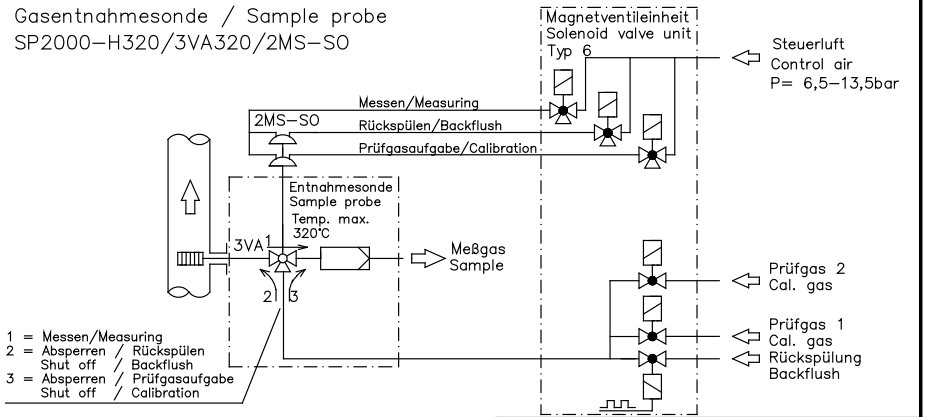
2-Wege-Kugelhahn VA/2-way ball valve VA



Gasentnahmesonde/Sample probe SP2000-H.../...VA... 2.25

Version mit 3-Wege-Kugelhahn zum Absperren für Rückspülen, Prüfgasaufgabe oder Service
Anwendungsempfehlung: Filterwechsel, Reinigung usw. bei Über-/Unterdruck, giftigen, korrosiven Gasen.

Type with 3-way ball valve to shut off for backflush, calibration or maintenance.
Recommended application: filter changing, cleaning etc. at over- or underpressure conditions, poisonous or corrosive samples.

Funktion / function	Version / type
3-Wege-Kugelhahn 3VA zum Absperren der Gasentnahmesonde vom Prozeß. Rückspülung und Prüfgasaufgabe über Kugelhahn 3VA. 3-way ball valve 3VA to shut off the sample probe from process. Backflush and calibration through 3-way ball valve 3VA.	Gasentnahmesonde / Sample probe SP2000-H/3VA 3-Wege-Kugelhahn 3VA/3-way ball valve 3VA  
3-Wege-Kugelhahn 3VA mit pneum. Antrieb MS (0-90°) zum autom. (Fernansteuerung) Absperren der Gasentnahmesonde vom Prozeß. Rückspülung (MS-B) oder Prüfgasaufgabe (MS-C) über Kugelhahn 3VA. 3-way ball valve 3VA with pneum. actuator MS (0-90°) to shut off the sample probe form process automatically Backflush (MS-B) or calibration (MS-C) through 3-way ball valve 3VA.	Gasentnahmesonde / Sample probe SP2000-H/3VA/MS-C (MS-B)  Version 320°C : pneum. Antrieb MS-DA mit 2.Steuermagnetventil (P=>6,5bar) / Type 320°C : pneum. actuator MS-DA with 2. control solonoid valve (P=>6,5bar)
3-Wege-Kugelhahn 3VA mit pneum. Antrieb MS (0-90°) zum autom. (Fernansteuerung) Absperren der Gasentnahmesonde vom Prozeß. Rückspülung über Kugelhahn 3VA. Prüfgasaufgabe über Rückschlagventil R . 3-way ball valve 3VA with pneum. actuator MS (0-90°) to shut off the sample probe form process automatically. Backflush through 3-way ball valve 3VA. Calibration through check valve R .	Gasentnahmesonde / Sample probe SP2000-H/R/3VA/MS-B 
3-Wege-Kugelhahn 3VA320 mit pneum. Antrieb 2MS-SO (0-90-180°)zum autom. Absperren der Gasentnahmesonde vom Prozeß. Rückspülung und Prüfgasaufgabe über Kugelhahn 3VA. 3-way ball valve 3VA320 with pneum. actuator 2MS-SO (0-90-180°) to shut off the sample probe from process automatically. Backflush and calibration through 3-way ball valve 3VA.	Gasentnahmesonde / Sample probe SP2000-H320/3VA320/2MS-SO  Zeichn.-Nr.: /Drawing No: 22551110/Bl.2

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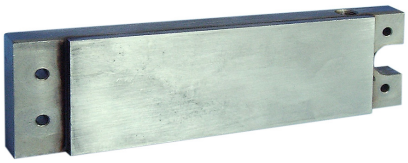

SP2000-H/GVW1

Gas Pre-Heater Series SP®

Version SP2000-H/GVW1(2)

Special Features

- **Prevents temperature drop below the dew point inside the probe**
- **Factory assembly**
- **2 variants with one or two paths**

Application

The M&C GVW1(2) gas pre-heater is used to pre-heat the backpurging or dilution gas of gas sample probes of the SP2000 series in order to prevent possible cooling down inside the gas sample probe. Subsequent problems related to temperatures drops below the dew point resulting in malfunction and corrosion are thus avoided.

Description

The M&C gas pre-heaters GVW1(2) consist of heat exchanger plates made of stainless steel and can be directly mounted to the heating system of the sample probe series SP2000-H.

The pre-heater type GVW2 is especially designed for the dilution probes SP2000-H/DIL. With its two gas paths, dilution gas as well as bypass gas can be pre-heated to achieve faster response times.

The optional backpurging connection to the probe of series SP2000-H is ensured via a 6-mm-tube (standard).

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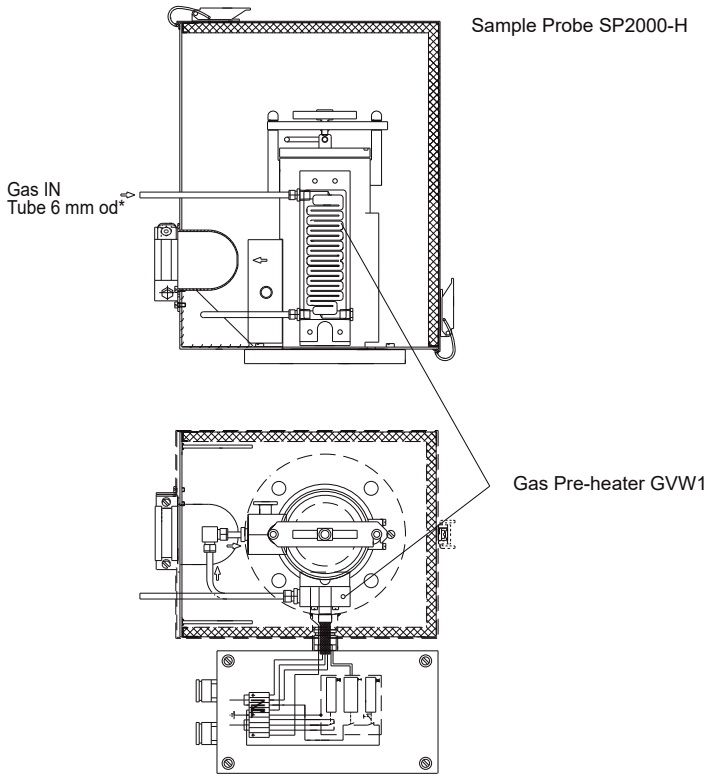
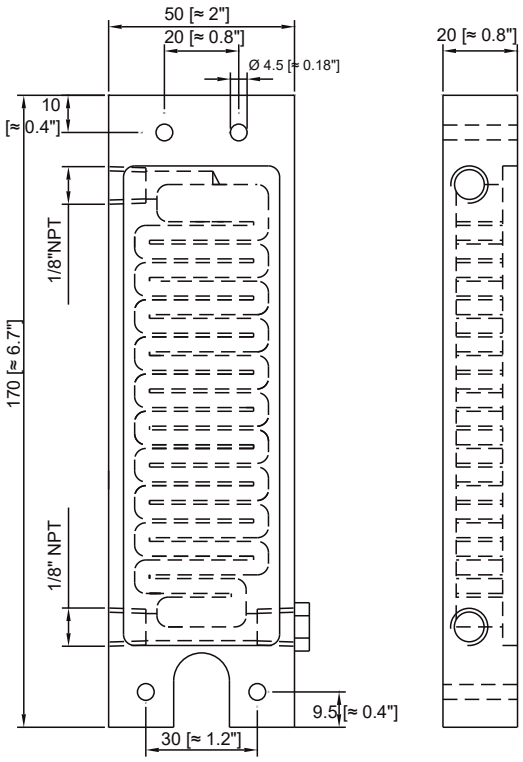
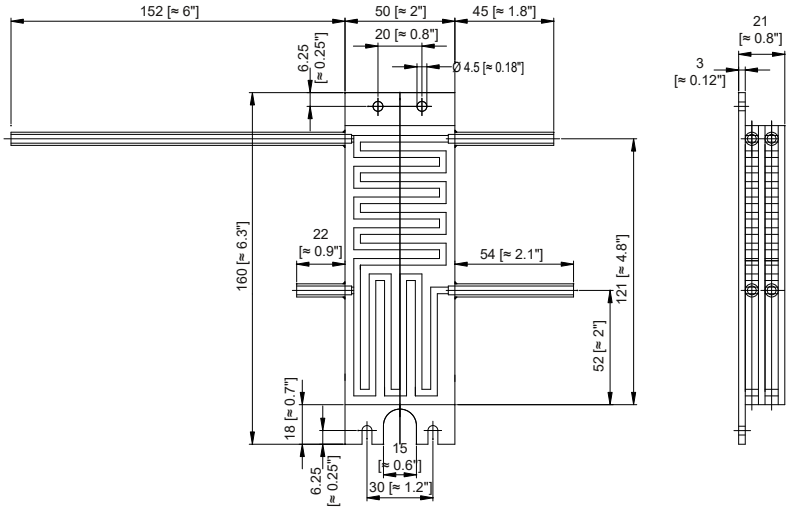
Dimensions



GVW1



GVW2



Dimensions in mm [Inches]

Technical Data

	Version GVW1	Version GVW2
Part No.	20S9058	20S9060
Material	Stainless steel SS 316Ti	
Operating temperature max.	350 °C [662 °F]	
Operating pressure max.	6 bar g	
Flow rate max. (GVW2 1/2 value per gas path)	-R, 2 bar inlet pressure: 3.0 m^3/h, with constant outlet temperature -R, 6 bar inlet pressure: 8.5 m^3/h, with outlet temperature drop of 10 °C in 1 min	
Gas connections	GVW1: 1/8" NPT i, GVW2: 6-mm-tube	
Option	SP2000-H/GVW, Part No. 20S9062 connection from the pre-heater GVW1 to the backpurging/calibration gas valve /R and gas inlet via 6-mm-tube made of SS 316Ti .	

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