

SP3110V/RS/HEX4-135 resp. 180

## Gas Sample Probe Series SP®



Versions SP3110V and SP3110 for sampling from zones with explosive gas, featuring different options for calibration gas feeding, back-purging and shutting off

### Special Features

- Approval according to ATEX for sampling from Ex zones 1 and 2
- Approval according to ATEX for mounting in Ex zones 1, 2 or 21, 22
- Different options for test gas feeding, back-purging and shutting off
- High operational reliability
- Universal applicability
- Adaption to nearly all process conditions due to its compact and modular design
- Easy installation
- User-friendly maintenance
- Low internal dead volume

### Application

The M&C sample probes version SP3110V and version SP3110 are used for continuous sampling of explosive gases (Ex zones 1 and 2) from dust-loaded, high temperature and/or humid processes. The probes can be mounted in Ex zones 1, 2 or 21, 22. The two versions only differ in the sealing material of the filter housing. Version SP3110V has a sealing out of FKM for probe types which are heated up to max. 185 °C [max. 365 °F] and version SP3110 has a sealing out of graphite for all versions heated up to more than 185 °C [365 °F].

### Description

The sample probes are designed for easy installation, reliable operation and user-friendly maintenance. They are versatile in application and depending on the task to be performed, various sample tubes and pre-filters series V12 or V20 with integrated volume displacer, optionally with extension tubes, not included in the scale of delivery, can be simply screwed into the mounting flange (G 3/4") of the basic probe. The sample gas flow rate has to be observed externally for fault monitoring.

The M&C stainless steel or ceramic in-depth filter element with a large surface and high capacity is located in a housing with low internal dead volume outside the process chamber. The probe housing is covered with a protection shield which is part of the Ex approval.

The probes are designed in such a way that changing the filter element is possible without using tools. In this operation, neither the sample probe tube nor the sample line need to be removed, thus avoiding contamination of the clean gas path and maintaining the integrity of the system.

The special design of the optional heating of the M&C probes version SP3110(V) permits controlled heating of the complete filter housing, including the mounting flange. This ensures reliable operation outside the process preventing the temperature from falling below the dew point.

The temperature control of the M&C probes version SP3110(V) can be ensured by three different heater types.

The first possibility is a self-regulating heater version HEX4-135 or HEX4-180 for Ex zone 1 or 21 and for gas sampling from Ex zone 1 or 2. Depending on the ambient temperature and the heater type, the min. temperature in the probe is 90 °C [194 °F] or 120 °C [248 °F], the max. temperature is 120 °C [248 °F] or 160 °C [320 °F].

The second possibility is a controlled heating version HEX1-3 for Ex zone 1, adjustable up to 180 °C [356 °F] and for sampling from Ex zones 1 or 2. The controller has to be mounted outside the Ex zone.

The third possibility is a controlled heating version HEX1-1 for Ex zone 1, adjustable up to 180 °C [356 °F] and for sampling from Ex zone 1 or 2. The controller can be mounted inside the Ex zone.

For calibration gas feeding or back-purging, different options are possible: for example, the option RS with mounted buffer vessel triggered by an explosion-proof solenoid valve is available. With the mounted option for back-purging type RS, gas can be sampled from zones 1 and 2. The back-purge pressure has to be monitored externally and must be at least 1 bar higher than the process pressure. For the pressure control while back-purging, a corresponding special valve is mounted in the sample gas outlet. Thus, an additional solenoid valve to shut off the sample gas outlet is not necessary. The back-purge inlet is shut off by a check valve.

**When sampling from Ex zones, back-purging is only allowed with a gas suitable for the sampling point.**

Gas sample probe type	SP3110V (up to 185 °C [365 °F])	SP3110 (more than 185 °C [365 °F])
Part No.	20S5615	20S5610
Weather protection shield	Yes	
Filter housing material	Stainless steel 316/316Ti	
Sealing materials	Graphite, FKM	Graphite
Probe flange sealing material	Graphite	
Pre-filter/sample tubes	Optional, see data sheets for pre-filters and sample tubes	
Sample pressure max.	0.5 to 6 bar abs.	
Ambient temperature	-20 to +60 °C [-4 to +140 °F] depending on option selected	
Permissible process gas temperature	Depending on the temperature class, however max. 200 [392 °F] at the probe inlet	
Filter chamber volume	120 cm <sup>3</sup> [≈ 7.3 in <sup>3</sup> ]	
Filter element, porosity	F-3SS150= stainless steel*, 3 µm      S-2K150= ceramic**, 2 µm	
Sample gas outlet connection	1 x 1/4" NPT female for max. 8 mm tube connectors	
Connection gas outlet with option RS	6 mm Swagelok connector	
Mounting flange	DN 65 PN 6, FormB, SS 316Ti* > DN or ANSI possible**	
Weight	7 kg [≈ 15.4 lbs]	
Marking	II 2G/2GD -20°C ≤ Ta ≤ +60°C	
<b>Option heating type HEX4</b>	<b>HEX4-135</b>	<b>HEX4-180</b>
Part No.	20S5510	20S5520
Mounting of controller	In Ex zones 1, 2, 21 and 22	
Control	Self-regulating	
Power supply	115 V - 230 V, 50/60 Hz	
Electrical connection	Cable gland, terminal range 7 to 12 mm, terminals max. 4 mm <sup>2</sup>	
Marking	II 2G Ex e mb IIC T4.T3 Gb /  II 2D Ex tb IIIC 135°C...180°C Db EXAM BVS 04 ATEX E 253 / IECEx BVS 15.0060	
Case protection	IP66; EN 60529	
Power	400 W	
Max. temperature	120 °C [248 °F]	160 °C [320 °F]
Min. temperature	90 °C [194 °F]	120 °C [248 °F]
Ambient temperature	-20 to +60 °C [-4 to +140 °F]	
Low temperature alarm contact	< 60 °C [140 °F], 1 contact MC-NO, 230 V 1.5 A AC, 0.5 A DC	< 100 °C [212 °F], 1 contact MC-NO, 230 V 1.5 A AC, 0.5 A DC
<b>Option heating type HEX1</b>	<b>HEX1-3</b>	
Part No.	20S9037(a)	
Mounting of controller	Outside the Ex zone	
Control	Electronic	
Power supply	230 V, 50/60 Hz and for Part No. 20S9037a: 115 V, 50/60 Hz	
Electrical connection	3 x 1.5mm <sup>2</sup>	
Marking	II 2G Ex de ib IIC T3*, others on request	
Power	400 W	
Case protection	IP54; EN 60529	
Temperature	0 to 180 °C [32 to 356 °F] T3 or 0 to 135 °C [32 to 275 °F] T4	
Ambient temperature	-20 to +40 °C [-4 °F to +104 °F]	
Low temperature alarm contact	< 120 °C [< 248 °F], 1 change-over contact, 230 V 1.5 A AC, 0.5 A DC	
<b>Option heating type HEX1</b>	<b>HEX1-1</b>	
Part No.	20S9038(a)	
Mounting of controller	Inside Ex zone 1, 2	
Control	Electronic	
Power supply	230 V/50 Hz and for Part No. 20S9038a: 115 V/60 Hz	
Electrical connection	3 x 1.5 mm <sup>2</sup>	
Marking	II 2G Ex de ib IIC T3*, others on request	
Power	400 W	
Case protection	IP54; EN 60529	
Temperature	0 to 180 °C [32 to 356 °F] T3	
Ambient temperature	-20 to +40 °C [-4 to +104 °F]	
Low temperature alarm contact	< 120 °C [< 248 °F], 1 change-over contact, 230 V 1.5 A AC, 0.5 A DC	

\* Standard  
 \*\* optional

<b>Gas sample probe type</b>	<b>SP3110V (up to 185 °C [365 °F])</b>	<b>SP3110 (more than 185 °C [365 °F])</b>
Option back-purge unit type /RS	/RS	
Part No.	20S5560(a)	
Power supply	230 V 50/60 Hz 9 W and for Part No. 20S5560a: 115 V 50/60 Hz 9 W	
Electrical connection	Cable 3 x 1mm <sup>2</sup>	
Marking	II 2GD Ex m II 135°C, in combination with SP3110(V)	
Connection	G 1/2" female at the buffer vessel	
Max. backpurge pressure	6 bar abs.	
Volume buffer vessel	2 liters	
Ambient temperature	-20 to 55 °C [-4 to +131 °F]	
<b>Option 2-way-ball valve in the probe inlet</b>	<b>/VA</b>	
Part No.	20S9050	
Operating temperature	-20 up to 185°C [-4 up to +365 °F]	
<b>Option 2/3-way-ball valve in the probe inlet</b>	<b>/3VA</b>	
Part No.	20S9325	
Backflush test gas connection	6 mm tube	
Operating temperature	-20 to +185 °C [-4 up to +365 °F]	
<b>Option pneum. drive for ball valve /VA or /3VA</b>	<b>/MS1</b>	
Part No.	20S9055	
Connection control air	G 1/4" female	
Pressure control air	5 to 10 bar	
<b>Option valve for blowback or calibration gas 1/4"</b>	<b>/R</b>	
Part No.	20S9045	
Opening pressure	> 0.7 bar	
Connection	6 mm tube	
Maximum blowback pressure	6 bar abs.	
Maximum operating temperature	+185 °C [+365 °F]	
<b>Option high-performance blowback valve</b>	<b>/BB</b>	<b>/BB-F</b>
Part No.	20S9008	20S9006
Way of blowback gas	Via filter chamber	Via probe filter element
Check valve	High-performance check valve 3/8"	
Opening pressure	> 0.7 bar	
Connection	8 mm tube	
Maximum blowback pressure	6 bar abs.	
Maximum operating temperature	+185 °C [+365 °F]	
<b>Option test gas valve/shut-off valve</b>	<b>/C + /I</b>	
Part No.	20S9011 and 20S9009	
Way of test gas	Via sample gas outlet with shut-off to the process	
Check valve	Check valve 1/4"	
Opening pressure	> 0.7 bar	
Connection	6 mm tube	
Shut-off valve	Bellow-type valve with pneumatic drive	
Pressure control air	3 to 10 bar	
Connection control air	1/8" NPT female	
<b>Option second sample gas outlet</b>	<b>/2x</b>	
Part No.	20S9015	
Connection	1/4" NPT female	
<b>Option spun-glass cartridge</b>	<b>/FW</b>	
Part No.	20S9047	20S9046
Material	SS 316Ti, Novapress	SS 316Ti, Graphite

\* Standard  
\*\* Option

Option No.	1	2	3	4	5	6a	6b	7	8	9
	/RS	/VA	/3VA	/MS1	/R	/BB	/BB-F	/C/I	/2x	/FW
/RS		X							X	
/VA	X			X	X	X	X	X		X
/3VA				X				X	X	
/MS1		X	X							
/R		X								
/BB		X						X	X	
/BB-F		X						X	X	
/C/I	X	X	X			X	X			X
/2x	X	X	X			X	X			X

X = possible combinations  
 X = recommended combinations

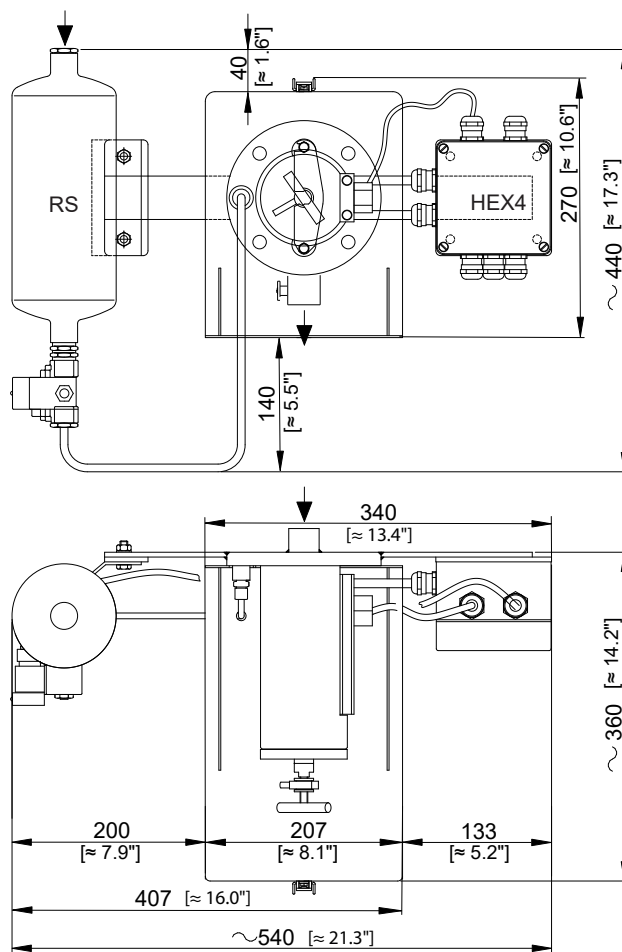
## Differential pressure and T<sub>90</sub> time

ΔP and T90 at a flow rate of:	100	200	500	1000	1500	NI/h
ΔP with new filter element F-3SS150	0.006	0.012	0.040	0.110	0.215	bar
ΔP with new filter element S-2K150	0.003	0.005	0.02	0.058	0.135	bar
T90 time for SP3110 without tube	6	3.5	1	< 0.5	< 0.5	s

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.

## Dimensions

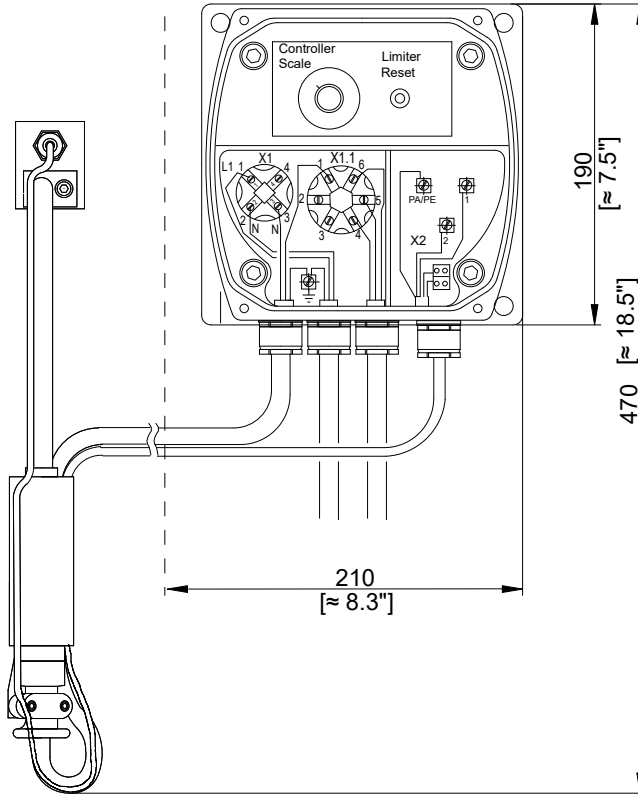
### SP3110(V) basic version with option back-purging type /RS and heating type HEX4



Dimensions in mm [Inches]

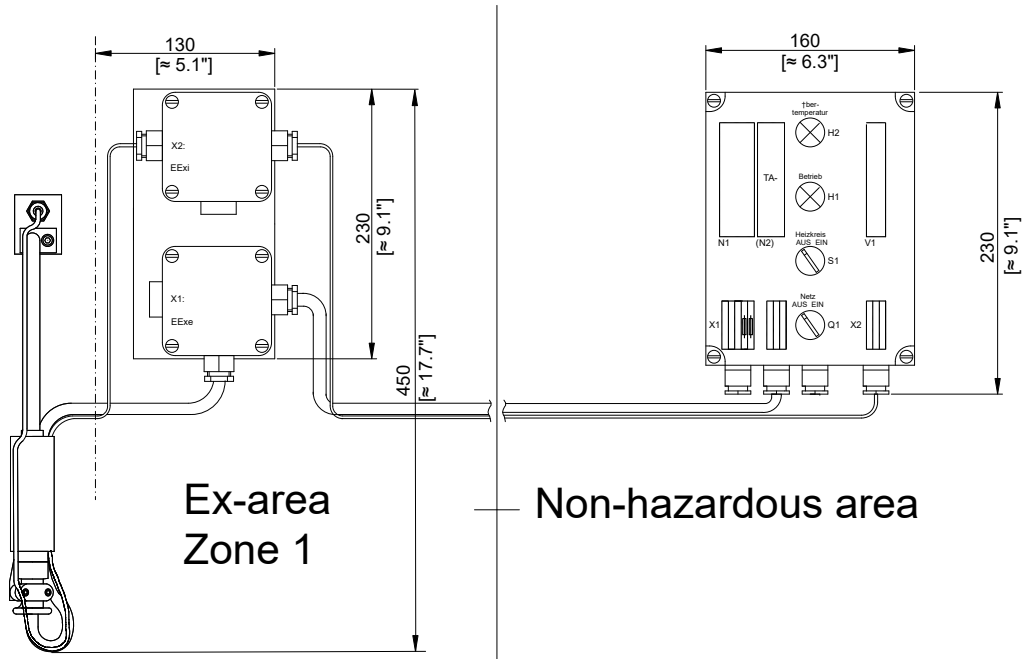
# Dimensions

## Option heating HEX1-1



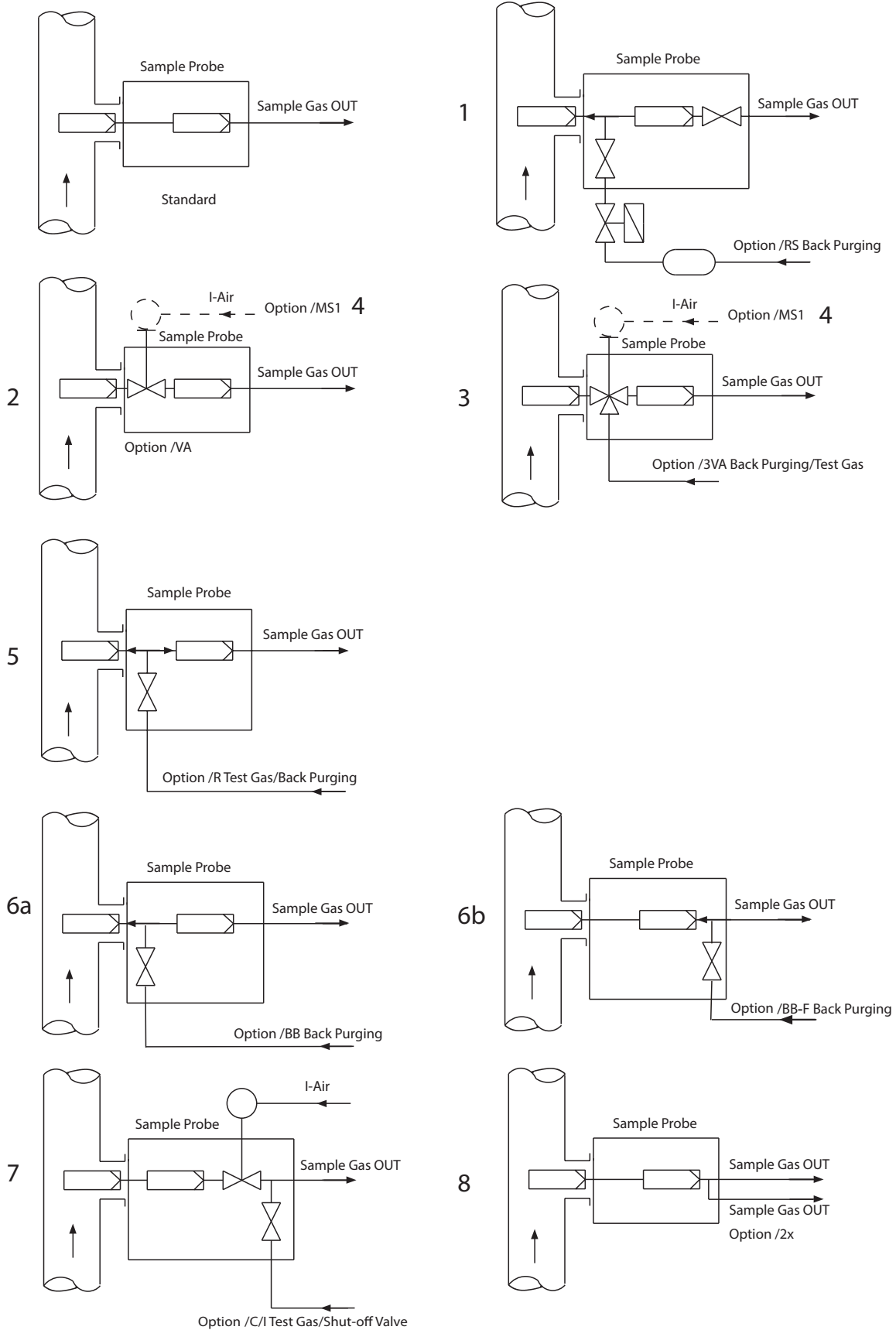
Dimensions in mm [Inches]

## Option heating HEX1-3



Dimensions in mm [Inches]

# Functional diagram of options 1 to 8



Possible combinations of options, see table page 3.

## Options pre-filters and extension tubes

Options	Version	Part No.
Pre-filter type V20-0 for SP probes, internal stainless steel filter frit with volume displacer inside, length: 220 mm [≈ 8.7"], 51 mm OD, filter porosity: 2 µm, temperature: max. 600 °C [1112 °F], connection: G 3/4", material: SS 316L and 316Ti	V20-0	20S9105
Pre-filter type V20-0/HC for SP probes, internal Hastelloy filter frit with volume displacer inside, length: 220 mm [≈ 8.7"], 51 mm OD, filter porosity: 2 µm, temperature: max. 900 °C [1652 °F], connection: G 3/4", material: Hastelloy X	V20-0/HC	20S9115
Pre-filter type V20-1 for SP probes, internal stainless steel filter frit with volume displacer inside, length: 520 mm [≈ 20.5"], 60 mm OD, filter porosity: 2 µm, temperature: max. 600 °C [1112 °F], connection: G 3/4", material: SS 316L and 316Ti	V20-1	20S9145
Pre-filter type V20-1/HC for SP probes, internal Hastelloy filter frit with volume displacer inside, length: 520 mm [≈ 20.5"], 60 mm OD, filter porosity: 2 µm, temperature: max. 900 °C [1652 °F], connection: G 3/4", material: Hastelloy-X	V20-1/HC	20S9155
Pre-filter type V20-1/HC for SP probes, internal Hastelloy filter frit with volume displacer inside, length: 520 mm [≈ 20.5"], 60 mm OD, filter porosity: 0.5 µm, temperature: max. 900 °C [1652 °F], connection: G 3/4", material: Hastelloy-X	V20-1/HC	20S9156
Pre-filter type V20-3 for SP probes, internal stainless steel filter frit with volume displacer inside, length: 300 mm [≈ 11.8"], 31 mm OD, filter porosity: 2 µm, temperature: max. 600 °C [1112 °F], connection: G 3/4", material: SS 316L/316Ti	V20-3	20S9300
Extra charge for extension of in-situ stainless steel filter frit V20-3 or V20-4 for each 100 mm [≈ 3.9"] additional length (from standard length 300 mm [≈ 11.8"] to ... mm), max. 1000 mm [≈ 3.3 ft] total filter length, material: SS 316L/316Ti	V20-3	20S9310
Pre-filter type V20-T for SP probes, backflushable internal hose pre-filter with support tube, length: 400 mm [≈ 15.8"], 40 mm OD, filter porosity: 3 µm, temperature: max. 200 °C [392 °F], connection: G 3/4", material: PTFE, SS 316Ti	V20-T	20S9315
Extension tube Vm 500 mm for pre-filters at SP probes, with G 3/4" male connection and internal volume displacer, length: 500 mm [≈ 19.7"], incl. gasket set, sampling temperature: max. 600 °C [1112 °F], material: SS 316 Ti (for pre-filters V20)	Vm500	20S9165
Extension tube Vm1000 mm for pre-filters at SP probes, with G 3/4" male connection and internal volume displacer, length: 1000 mm [≈ 3.3 ft], incl. gasket set, sampling temperature: max. 600 °C [1112 °F], material: SS 316 (for pre-filters V20)	Vm1000	20S9170
Extension tube Vm1500 mm for pre-filters at SP probes with G 3/4" male connection and internal volume displacer, length: 1500 mm [≈ 4.9 ft], incl. gasket set, temperature: max. 600 °C [1112 °F], material: SS 316Ti (for pre-filters V20)	Vm1500	20S9175

For choosing the adequate pre-filter, see also data sheet "Pre-Filters for Gas Sample Probes Series SP®, Version SP2000/V20 with G 3/4" connection, SP2000/V12 with flange connection, Version SP2000/20SS 150 with tube connection"

## Options sample tubes

Options	Version	Part No.
Sample tube SP 2000/SS, length: 1 m [≈ 3.3 ft], connection: G 3/4" male, temperature: max. 600 °C [1112 °F], material: SS 316Ti	SP2000/SS	20S9065
Sample tube SP 2000/SS-Vm, length: 1 m [≈ 3.3 ft], with volume displacer, connection: G 3/4" male, temperature: max. 600 °C [1112 °F], material: SS 316Ti	SP2000/SS-Vm	20S9067
Sample tube SP 2000/HC, length: 1 m [≈ 3.3 ft], connection: G 3/4" male, temperature: max.: 900 °C [1652 °F], material: Hastelloy-X	SP2000/HC	20S9090
Sample tube SP2000/KA, length: 1 m [≈ 3.3 ft], connection: G 3/4" male, temperature: max. 1300 °C [2372 °F], material: Kanthal	SP2000/KA	20S9080
Sample tube SP2000/IN, length: 1 m [≈ 3.3 ft], connection G 3/4" male, temperature: max. 1100 °C [2012 °F], material: Inconel	SP2000/IN	20S9077
Sample tube SP2000/HR, length: 1 m [≈ 3.3 ft], connection G 3/4" male, temperature: max. 1200 °C [2192 °F], material: Alloy HR160	SP2000/HR160	20S9103

For choosing the adequate sample tube, see also data sheet "Sample Tubes for Gas Sample Probes Series SP® with G 3/4" connection thread"

## Temperature classes for sampling from zone 1 or 2

Type	Possible Options*	Marking	Temperature class	Max. process gas temperature at the probe inlet in °C [°F]	Max. surface temperature in °C [°F]
SP3110V		II 2 G / 2GD	T6	≤ 80 [≤ 176 °F]	80 [176 °F]
SP3110V		II 2G / 2GD	T5	≤ 95 [≤ 203 °F]	95 [203 °F]
SP3110V	/RS, /HEX4-135	II 2G / 2GD	T4	≤ 130 [≤ 266 °F]	135 [266 °F]
SP3110	/RS, /HEX	II 2G / 2GD	T3	≤ 195 [≤ 383 °F]	195 [383 °F]
SP3110	/RS	II 2G / 2GD	T2	≤ 200 [≤ 392 °F]	200 [392 °F]

\* All further options mentioned on pages 2 and 3 can be used additionally in all temperature classes