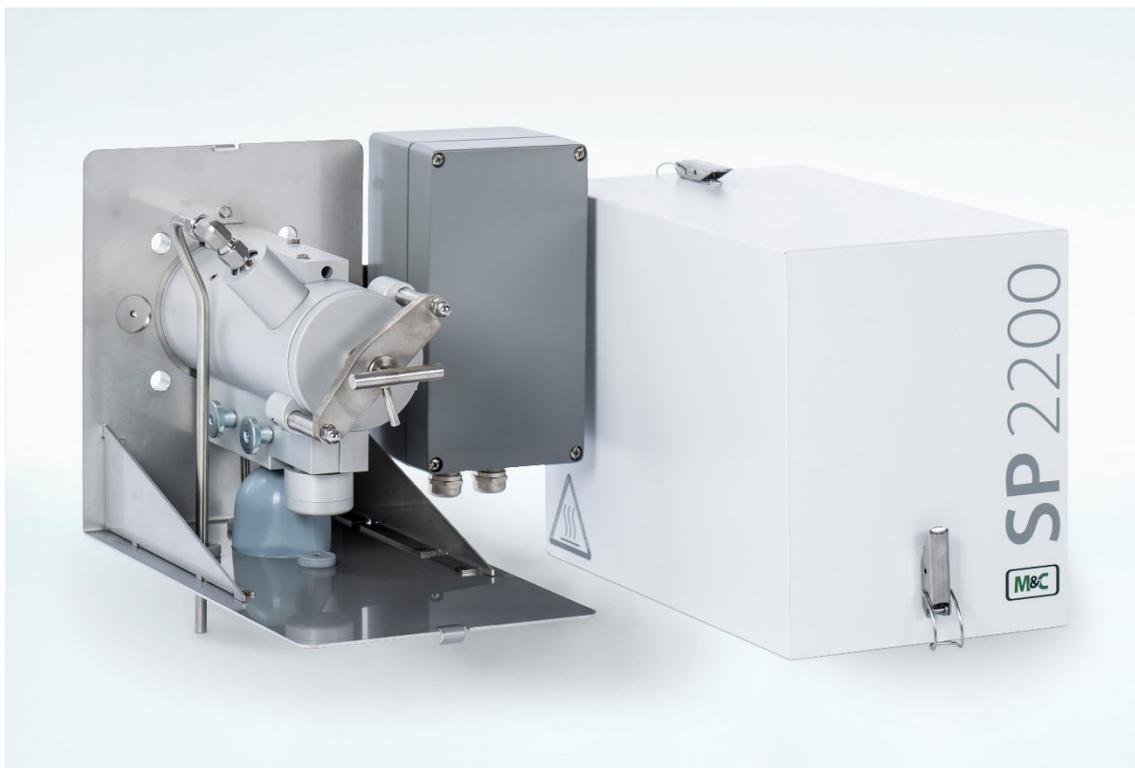


# Gas Sample Probe Series SP<sup>®</sup>

## SP2200-H/Z

Instruction Manual  
Version 1.00.00



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**Dear customer,**

Thank you for buying our product. In this instruction manual you will find all necessary information about this M&C product. The information in the instruction manual is fast and easy to find, so you can start using your M&C product right after you have read the manual.

If you have any question regarding the product or the application, please don't hesitate to contact M&C or your M&C authorized distributor. You will find all the addresses in the appendix of this manual.

For additional information about our products and our company, please go to M&C's website [www.mc-techgroup.com](http://www.mc-techgroup.com). There you will find the data sheets and manuals of all our products in German and English.

This Operating Manual does not claim completeness and may be subject to technical modifications.

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**SP**<sup>®</sup> is a registered trade mark.

Version: 1.00.00



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## 1 GENERAL INFORMATION

The product described in this manual has been built and tested in our production facility.

All M&C products are packed to be shipped safely. To ensure the safe operation and to maintain the safe condition, all instructions and regulations stated in this manual need to be followed. This manual includes all information regarding proper transportation, storage, installation, operation and maintenance of this product by qualified personnel.

Follow all instructions and warnings closely.

Read this manual carefully before commissioning and operating the device. If you have any questions regarding the product or the application, please don't hesitate to contact M&C or your M&C authorized distributor.

## 2 DECLARATION OF CONFORMITY



The product described in this operating manual complies with the following EU directives:

### EMC-Instruction

The requirements of the EU directive 2014/30/EU "Electromagnetic compatibility" are met.

### Low Voltage Directive

The requirement of the EU directive 2014/35/EU "Low Voltage Directive" are met.  
The compliance with this EU directive has been examined according to DIN EN 61010.

### RoHS Directive

The requirements of the RoHS2 ('Restriction of Hazardous Substances 2') directive 2011/65/EU and its annexes are met.

### Declaration of conformity

The EU Declaration of conformity can be downloaded from the **M&C** homepage or directly requested from **M&C**.

### 3 SAFETY INSTRUCTIONS

#### **Follow these basic safety procedures when mounting, starting up or operating this equipment:**

Read this instruction manual before starting up and use of the equipment. The information and warnings given in this instruction manual must be heeded.

Any work on electrical equipment is only to be carried out by trained specialists as per the regulations currently in force.

The installation and commissioning of the device must conform to the requirements of VDE 0100 (IEC 364) 'Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V' and must be in compliance with all relevant regulations and standards.

Check the details on the type plate to ensure that the equipment is connected to the correct mains voltage.

Protection against touching dangerously high electrical voltages:

Before opening the equipment, it must be switched off and hold no voltages. This also applies to any external control circuits that are connected.

The device is only to be used within the permitted range of temperatures and pressures.

Check that the location is weather-protected. It should not be subject to either direct rain or moisture.

Do not use the gas sample probe SP2200-H/Z in hazardous areas.

Installation, maintenance, inspections and any repairs of the devices must be carried out only by qualified skilled personnel in compliance with the current regulations.

### 4 WARRANTY

In case of a device failure, please contact immediately M&C or your M&C authorized distributor.

We have a warranty period of 12 months from the delivery date. The warranty covers only appropriately used products and does not cover the consumable parts. Please find the complete warranty conditions in our terms and conditions.

The warranty includes a free-of-charge repair in our production facility or the free replacement of the device. If you return a device to M&C, please be sure that it is properly packaged and shipped with protective packaging. The repaired or replaced device will be shipped free of delivery charges to the point of use.

## 5 USED TERMS AND SIGNAL INDICATIONS



**DANGER!**

This means that death, severe physical injuries and/or important material damages **will occur** in case the respective safety measures are not fulfilled.



**WARNING!**

This means that death, severe physical injuries and/or important material damages **may occur** in case the respective safety measures are not fulfilled.



**CAUTION!**

This means that minor physical injuries **may occur** in case the respective safety measures are not fulfilled.

**CAUTION!**

Without the warning triangle means that a material damage may **occur** in case the respective safety measures are not met.

**ATTENTION**

This means that an unintentional situation or an unintentional status **may occur** in case the respective note is not respected.



**NOTE!**

These are important information about the product or parts of the operating manual which require user's attention.

**QUALIFIED PERSONNEL**

These are persons with necessary qualification who are familiar with installation, use and maintenance of the product.



High voltages!

Protect yourself and others against damages which might be caused by high voltages.



Corrosive!

These substances destroy living tissue and equipment upon contact. Do not breathe vapors; avoid contact with skin and eyes.



Hot surface!

Contact may cause burn! Do not touch!



Wear protective gloves!

Working with chemicals, sharp objects or extremely high temperatures requires wearing protective gloves.



**Wear safety glasses!**

Protect your eyes while working with chemicals or sharp objects.  
Wear safety glasses to avoid getting something in your eyes.



**Wear protective clothes!**

Working with chemicals, sharp objects or extremely high temperatures requires wearing protective clothes.

## 6 INTRODUCTION

With continuous gas sampling for analytical measurements, fine dust filtration is carried out directly at the sampling point using **M&C** sampling probes. This means that part of the necessary maintenance of a system is concentrated at one point. This filter technology has the great advantage that dust mixtures of fine and coarse dusts are optimally retained, combined with minimum maintenance.

An optimal adaptation of the sampling probe to the process conditions or the measuring tasks is the basic condition for a perfect function of an entire measuring system. In principle, the quantity of gas extracted should be kept to a necessary minimum, which is possible by means of downstream optimized gas conditioning with **M&C** components. This is the only way to guarantee a minimum of maintenance work and a maximum of availability.

### 6.1 SERIAL NUMBERS

The type plates with the serial number are located on the side of the electrical terminal box.



**NOTE!**

**Always provide the serial number of the device when ordering spare parts or in case of queries.**

### 6.2 POWER SUPPLY

Depending on the version, the probe is operated with 115 or 230 Volt alternating voltage. Exact specifications can be found on the nameplates.

## 7 TECHNICAL DATA

<b>Gas Sample Probe Series SP®</b>	<b>SP2200-H/Z</b>
<b>Part-No</b>	20S2017
<b>Operating temperature</b>	Max. 180 °C [356 °F]
<b>Calibration gas valve /C</b>	Check valve, cracking pressure: >0.7 bar g
<b>Isolation valve /I</b>	Bellow valve with pneum. actuator, control pressure: 3 to 10 bar g connection: 1/8"NPT i
<b>Blow back valves /BB /BB-F</b>	High flow rate check valve, cracking pressure: > 0.7 bar g, recommended: 3-6 bar g We recommend short pressure pushes to avoid decreasing of temperature in blow back area. Connection: tube connector 12 mm OD
<b>Protective cover</b>	Yes
<b>Degree of protection terminal box</b>	IP54 EN 60529
<b>Filter housing material</b>	Stainless steel 316Ti / 316L*
<b>Sealing materials</b>	FKM*
<b>Probe flange sealing material</b>	Novapress
<b>Insitu probe tube/prefilter</b>	Optional
<b>Sample pressure max.</b>	0.4 to 6 bar* abs.
<b>Ambient temperature</b>	-20 up to 60 °C [-4 up to 140 °F]
<b>Filter chamber volume</b>	120 cm <sup>3</sup>
<b>Filter element porosity</b>	2 µm / filter type F-2DGF150
<b>Thermostat, temperature adjustment</b>	0 up to 180 °C* [32 up to 356 °F]*
<b>Ready for operation</b>	After 40 minutes
<b>Low temperature alarm contact*</b>	Contact rating: 250 V, 3 A~, 0.25 A= alarm point: ΔT 30 °C
<b>Sample gas outlet connection</b>	1x 1/4" NPTi*
<b>Test gas connection</b>	Tube ø 6 mm
<b>Power supply</b>	230 V 50/60 Hz, 800 W optional 115 V 60 Hz, 800 W (fuse 10 A)
<b>Electrical connections</b>	clamps max. 4 mm <sup>2</sup> , 2 x PG 13.5 cable glands
<b>Electrical equipment standard</b>	EN 61010, EN 60519-1
<b>Mounting flange</b>	DN 65 PN 6, Form B
<b>Mounting flange material</b>	SS 316Ti
<b>Dimensions ((W x H x D)</b>	Approx. 340 (including terminal box) x 260 x 345 mm [Approx. 13.4" (including terminal box) x 10.2 " x 13.6"]
<b>Weight</b>	19.2 kg* [42.3 lbs]*

\* = Standard

<b>Differential pressure and T<sub>90</sub>-time at different flow rates:</b>						
ΔP and T <sub>90</sub> at flow rate of	100	200	500	1000	1500	NI/h
ΔP with new filter element S-2K 150 or F-0,1GF150:	0.007	0.011	0.020	0.035	0.04	bar
T <sub>90</sub> -time without sample tube/pre filter:	6.0	3.5	1.0	<0.5	<0.5	sec.

### 8 DIMENSIONS

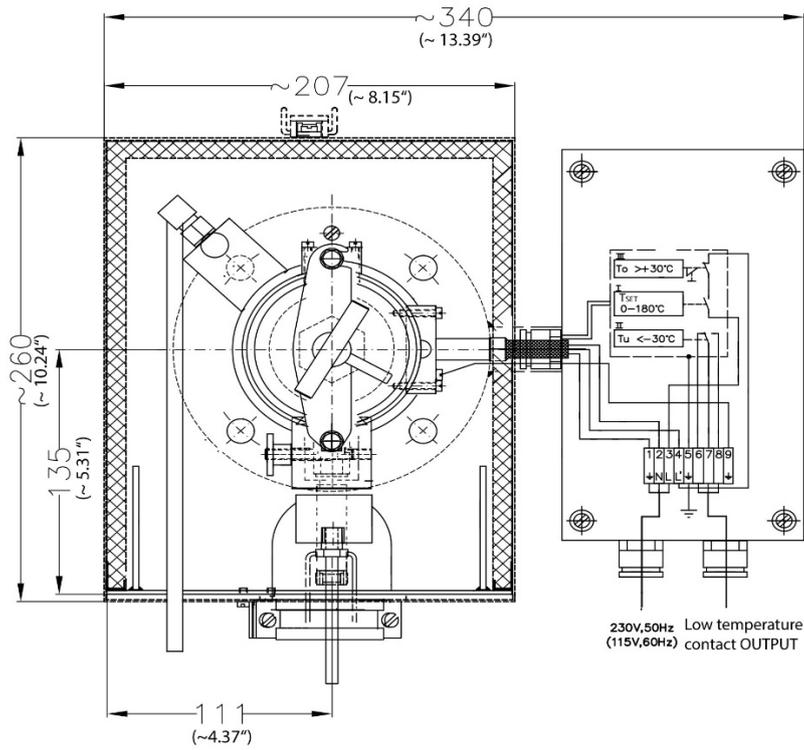


Figure 1 SP2200-H/Z front view with terminal box

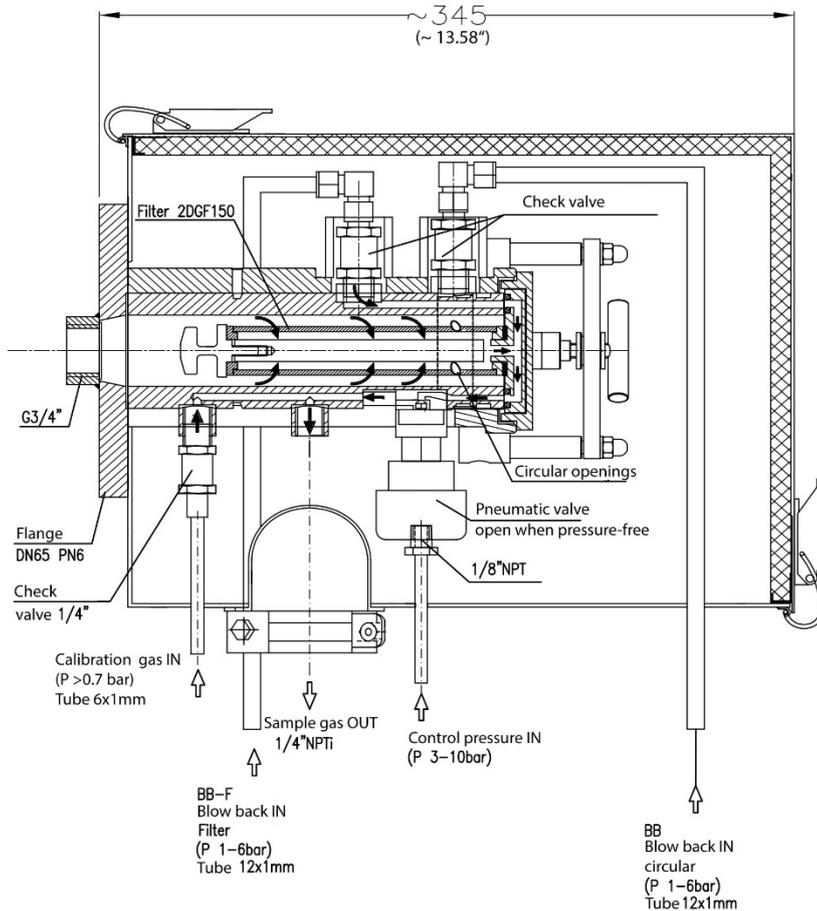


Figure 2 SP2200-H/Z side view

## 9 APPLICATIONS

The probe type **SP2200-H/Z** is used for continuous gas sampling in processes with a high dust load (e.g. cement plants), high temperature and/or high gas humidity.

Blow-back is standard (BB and BB-F) with large cross-sections in the check valves and connecting tubes. A circular flow with a cone at the outlet to the process is used to blow-back (BB) the filter chamber. The standard filter is a 2-layer wire mesh filter, which offers optimum backflush capability. Sampling from processes up to a maximum of 1900 °C are possible with this probe.

## 10 DESCRIPTION

The sample probes are designed for easy installation, reliable and flexible operation and trouble-free maintenance.

Filter elements can be changed without the need for tools and without disconnecting the sample line, the filter chamber can be cleaned easily, the probe tube can be cleaned without removing the probe: these are just a few of the many advantages offered by this probe.

The filter element, which has a large surface, is located in a stainless steel filter housing.

### The following filter elements are available:

Filter element type F-2DGF150 (standard)	2 micron	Stainless steel 316, 2-layer
Filter element type S-2K-150*	2 micron	Ceramic
Filter element type S-3G-150	3 micron	Glass
Filter element type S-3SS-150	3 micron	Stainless steel 316
Filter element type S-0,1GF-150	0.1 micron	Glass fibre

### The following sealing materials are used:

FKM (Viton®)*	Standard	Max. 180 °C
---------------	----------	-------------

### The following types of filter heating and adjustment are possible:

Electrically heated and adjustment with internal capillary tube thermostat*	Type /H*
Electrically heated and adjustment with external electronic controller	Type /PT100
Electrically heated and adjustment with external electronic controller	Type /Fe-CuNi

\*Standard

## 10.1 PROBE STRUCTURE

The filter holder with the heating jacket on all sides forms a unit with the standard mounting flange DN 65 PN 6 and the side-mounted electrical terminal box.

The heat-insulated cover hood is placed on the stainless steel angle plate mounted on the mounting flange and fastened with 2 draw latches. The cover ensures uniform heat distribution over the probe radiator and at the same time serves as weather protection and protection against accidental contact.

At the opening in the bottom side of the angle plate, which is closed with a silicone cap, there is the mounting clamp for fixing heated M&C sample lines with outside diameters of 40 mm to max. 50 mm. The mounting clamp is mounted on a sliding mounting bracket, which allows it to be adapted to different sample line diameters.

The sample gas outlet connection of the standard probe has a 1/4" NPT female thread. To connect the sample line gas-tight, a correspondingly dimensioned and temperature-resistant threaded fitting needs to be screwed into the sample gas outlet connection. This fitting is available from M&C on request.

The sample gas outlet connection is enclosed with special heat-conducting jaws after the threaded fitting and sample line have been installed in order to avoid temperature undershoots in the critical connection areas. The size of the thermal conduction jaws allows the use of connection fittings up to max. 10 mm tube outside diameter.

In the standard version, the temperature is controlled by the capillary tube thermostat installed in the terminal box, which has a control range of 0 to 180 °C. The set point can be adjusted up to max. 180 °C. The thermostat is equipped with an over-temperature limiter which automatically switches off the heating when the set temperature is exceeded by 30 °C. The thermostat is switched on again by pressing the green **RESET button** located under the opening in the thermostat mounting plate and marked **RESET**.

For temperature monitoring, the thermostat has an under-temperature alarm which activates a contact when the setpoint temperature falls below 30 °C. This status alarm is available on the terminal block as a potential-free changeover contact.

If the control is to be carried out with an external electronic controller, either a PT100 resistance thermometer (installation of max. 2 pcs. possible) or a Fe-CuNi thermocouple is provided as temperature sensor.

Non-return valves are integrated in the gas sampling probe for test gas feed and blow-back. In order to prevent a test gas loss due to a backflow of the test gas into the process during the test gas feed, a pneumatic shut-off valve is provided in the sample gas outlet of the gas sample probe.

The pneumatic shut-off valve must also be used to prevent a pressure surge to the analyzer during backflushing.

The gas sample probe **SP2200-H/Z** is designed for blow-back via the filter chamber (circular) and via the filterelement (see Figure 5). The output to the process is conical. In this version, the probe is particularly suitable for use in cement plants or other applications with a high dust content in the process gas.

Depending on the process gas temperature and composition, probe tubes made of different materials are used with 3/4" connections:

Material	Type	Process temperature	Max. length	Tube (nipple) OD.
Stainless steel 316Ti	<b>SS</b>	up to max. 600 °C	2.5 m	25 (37) mm ø
Titan	<b>Ti</b>	up to max. 400 °C	2.5 m *	25 (37) mm ø
Hastelloy	<b>Ha</b>	up to max. 900 °C	2.5 m *	25 (37) mm ø
Incoloy 956	<b>In</b>	up to max. 1200 °C	2.0 m *	25 (37) mm ø
Kanthal	<b>Ka</b>	up to max. 1300 °C	2.5 m *	25 (37) mm ø
Alu. oxide	<b>AO</b>	up to max. 1800 °C	1.5 m *	25 (55) mm ø
PVDF	<b>PV</b>	up to max. 90 °C	1.5 m *	25 (37) mm ø
PTFE	<b>T</b>	up to max. 160 °C	0.5 m	33 mm ø

1m standard \*

When the process gas has a high dust load, we strongly recommend the use of a pre-filter to increase the service life. Depending on the required response speed, the pre-filter is supplied with or without a volume displacer. These pre-filters can be screwed directly into the probe flange or via extension tubes with integrated volume displacer.

We recommend the following prefilters with 3/4" connection:

Dust loading	Prefilter Type	Process Temperature	Prefilter OD
< 2 g/m <sup>3</sup>	no filter, only probe tube	see above	
2-10 g/m <sup>3</sup>	/V20, /V20-0	up to max. 600 °C	ø 46 mm
	/V20-3, /V20-4	up to max. 600 °C	ø 31 mm
	/V20/HC, /V20-0/HC	up to max. 900 °C	ø 46 mm
	/V20-5	up to max. 500 °C	ø 50 mm
	<b>with deflector for high flow speed</b>		60 mm ø
> 10 g/m <sup>3</sup>	/V20-1, /V20-2	up to max. 600 °C	ø 60 mm
	/V20-1/HC, /V20-2/HC	up to max. 900 °C	ø 60 mm
	/V20-T	up to max. 200 °C	ø 65 mm
	/V20-6	up to max. 500 °C	ø 60 mm
	<b>with deflector for high flow speed</b>		65 mm ø
	/V20-7	up to max. 600 °C	ø 45 mm
	/V12-1A	up to max. 600 °C	ø 40 mm

## 11 RECEIPT OF GOODS AND STORAGE

- The gas sample probe and any special accessories should be removed carefully from the packaging and checked immediately for completeness against the delivery note.
- Check the goods for any damage incurred during transport and if necessary inform your transport insurer of any damage.

The gas sample probe is normally delivered in two packaging units:

1. The gas sample probe with the screws, nuts and flange seal required for mounting.
2. Sample tube or prefilter, if applicable with extension tube.



**NOTE!**

**The equipment should be stored in a protected, frost-free room!**

## 12 PREPARATION AND INSTALLATION

Select the optimum sampling site according to the generally applicable guidelines or consult the responsible authorities.

Place the sampling point in such a way that there is sufficient space for installation and removal of the probe and also consider the insertion length of the sampling tube or prefilter.

Ensure that the probe is easily accessible so that the maintenance work required later can be carried out without problems.

If possible, design the on-site connection piece so that the temperature of the connection piece is always above the acid dew point in order to avoid corrosion and clogging problems.

If the ambient temperature in the connection piece area is  $> 80\text{ }^{\circ}\text{C}$  due to radiant heat, a heat radiation reflection plate must be installed on site to protect the probe.

The mounting flange connection of the connection piece should be DN65 PN6.

The probe to be mounted must be adapted to the existing operating conditions.

**The existing operational parameters are to be checked accordingly prior to commencing mounting work:**

<b>Under / over pressure situation</b>		<b>mbar</b>	<b>bar</b>	
<b>Process temperature</b>	Min.	$^{\circ}\text{C}$	Max.	$^{\circ}\text{C}$
<b>Dust loading</b>		$\text{g}/\text{m}^3$		
<b>Dust composition - grain size</b>		$\mu\text{m}$		
<b>Gas composition</b>	corrosive		toxic	explosive
<b>Which parameters should be measured, e.g. <math>\text{O}_2</math>, <math>\text{CO}</math>, <math>\text{SO}_2</math>, <math>\text{NO}_x</math>, ...</b>		Vol. %	$\text{mg}/\text{Nm}^3$	ppm
<b>Required amount of gas</b>	Min.	l/h	Max.	l/h
<b>Necessary <math>T_{90}</math>-time</b>		sec.		

## 13 MOUNTING

M&C **SP2200-H/Z** probes are designed for stationary use and if properly selected and mounted a long service life and minimum maintenance are guaranteed.

- Remove the probe's protection cover after opening the two draw latches.
- Turn the T-handle at the front end of the filter receptacle one time to the left until the retaining bolt can also be turned sideways to the left.
- Remove the filter receptacle from the probe and check whether the filter element is screwed on tightly.
- Then insert the filter receptacle again, turn the retaining bolt in its original position and tighten the T-handle.
- Remove the heat-conducting jaws at the sample gas outlet after loosening the knurled-head screw.
- In order to connect the sample line, screw in a suitably sized threaded connector with a ¼" NPT connecting thread using PTFE sealing tape.



**NOTE!**

**Make sure that the connection is leakproof!**

- Screw the supplied sample tube or pre-filter directly or with an extension tube into the 3/4" female thread in the flange of the probe with the 3/4" flat gasket and tighten.
- First attach the flange seal to the connection piece. Then insert the process-internal probe section of the complete probe unit into the connection piece. Use the screws and nuts supplied to connect them.



**NOTE!**

**A preferred mounting position is to mount the probe with the sample gas outlet pointing downwards. However, this is not absolutely necessary for proper function. It is also advantageous if the probe is installed with a slight downward inclination (approx. 10°).**

### 13.1 PNEUMATIC CONNECTIONS

- Remove the upper part of the sample line fastening clamp and insert the sample line through the silicone cap in the bottom part of the elbow plate into the tube fitting and connect.
- **M&C's** optional temperature resistant stainless steel fittings have a double cutting ring system for secure sealing. Tighten the nuts of these tube fittings finger tight and then tighten them exactly 1 1/4 turns with a flat wrench.
- If a PTFE hose is used as the sample line, a support sleeve must be inserted into the end of the hose to prevent the hose from compressing and to avoid leaks.
- Unscrew the upper part of the fastening clamp.
- For larger sample line diameters, it may be necessary to shift the small mounting angle of the fastening clamp for central installation of the sample line. To do this, loosen the two retaining screws, move the mounting angle and tighten it again.
- Now place the heat conducting jaws laterally around the sample gas connection in the groove guide and secure with the knurled nut.

- The pneumatic shut-off valve has a 1/8" NPT i connection thread. Here screw in a screw connection corresponding to the dimensions of the compressed air line and connect the compressed air line.
- Connect the test gas and the backflushing air below the mounting angle to the tube socket DN 4/6 or DN 10/12 using a suitable tube connector.
- Now replace the cover and fasten it with the draw latches.

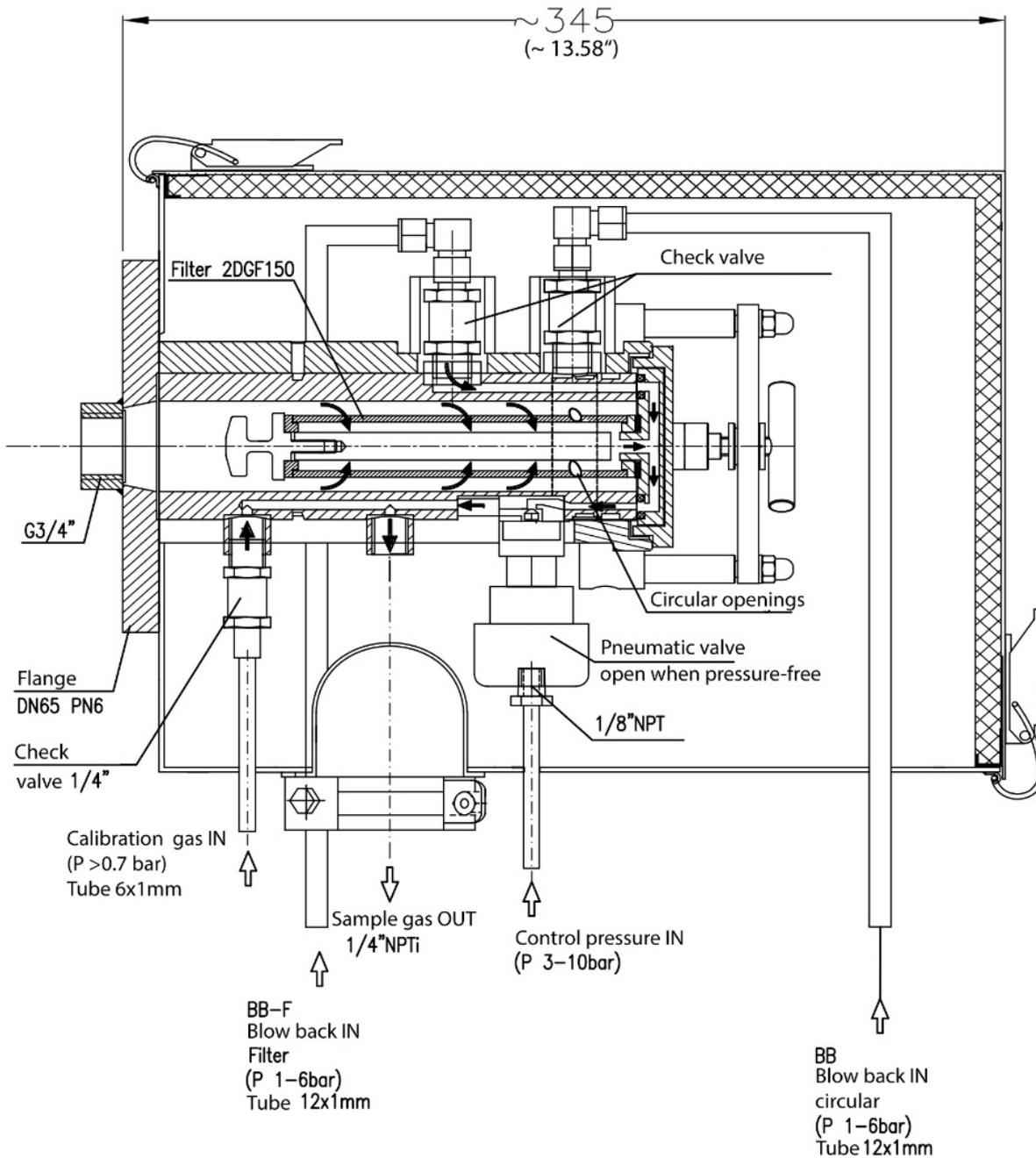


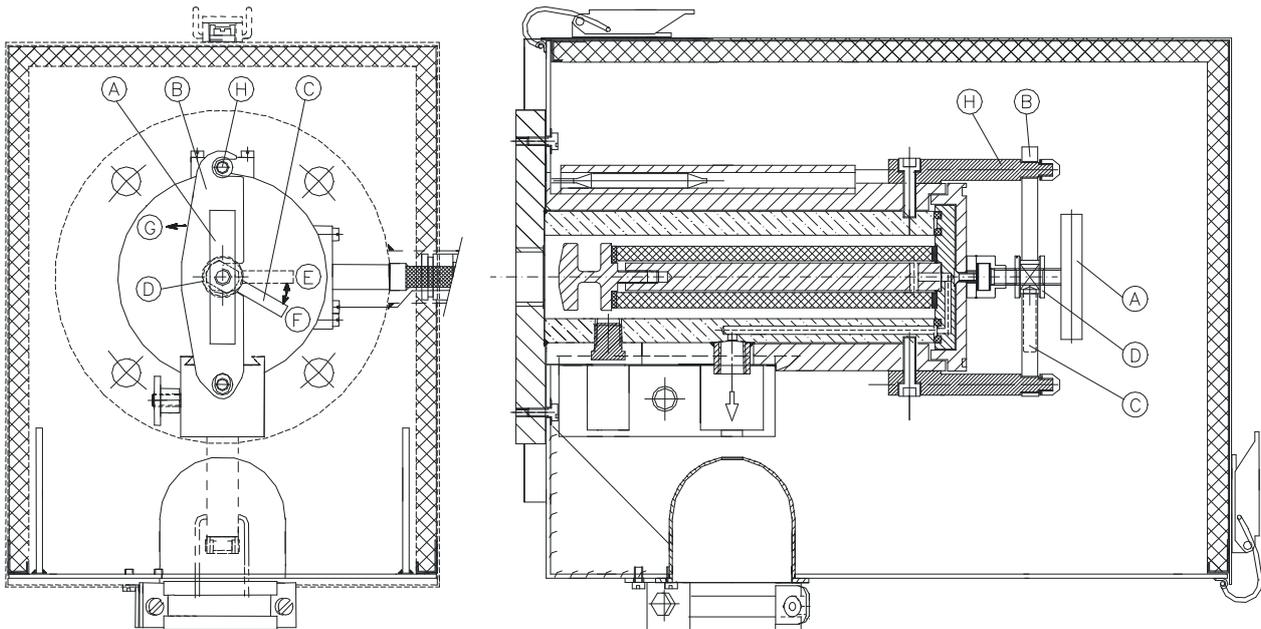
Figure 3 Sample gas connections SP2200-H/Z

### 13.2 NEW FILTER HOUSING LID FROM SERIAL NOS. 10283

The sample probe series SP2000 will be delivered, starting with the serial number 10283, with a new filter housing lid lock, to make filter replacement easier.

The modification consists of a T-handle „A“, which allows to fasten the filter housing lid by turning the handle clockwise and lifting up the lid by turning it anti-clockwise.

After swiveling the clamp „B“ to the left hand side, the filter housing lid can be removed.



**Figure 4 New filter housing lid ex serial number 10283**

The following steps are recommended removing the filter housing lid:

- Turn T-handle "A" approx. 1 turn to the left so that the cover is lifted;
- Set handle "C" to position "E";
- Swivel the clamp "B" to the left in direction "G";
- Pull out the filter housing lid with the T-handle "A";
- Replace the filter element and any associated seals;
- Push the filter housing lid back into the filter chamber;
- Swivel the clamp "B" to the right and move the eyebolt "D" to position "E" using the handle "C" so that the clamp engages in the eyebolt "D" and the threaded bolt "H". If necessary, push the filter housing lid with the T-handle "A" slightly in or out;
- Then turn handle "C" to position "F" and hand-tighten T-handle "A" by turning it clockwise.

The following pictures show the above mentioned steps.

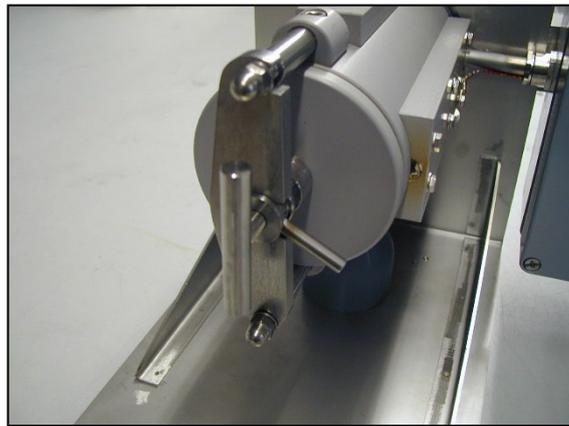


Figure 5 Removing the filter housing lid

## 14 ELECTRICAL CONNECTIONS



**WARNING!**

**Incorrect mains voltage can destroy the device. When connecting, make sure that the mains voltage is correct as indicated on the nameplate!**



**WARNING!**

**Always use the low temperature alarm contact to stop the flow of gas through the probe in the event of an alarm, protecting the downstream components.**

**NOTE!**

Attention must be paid to the requirements of IEC 364 (DIN VDE 0100) when setting high-power electrical units with nominal voltages of up to 1000 V, together with the associated standards and stipulations.

In any case we recommend the use of temperature resistant cable!

A main switch and matching fuse must be provided externally!

The main circuit must be equipped with a fuse corresponding to the nominal current (over current protection); for electrical details see technical data.

#### 14.1 STANDARD VERSION WITH INTERNAL CAPILLARY TUBE THERMOSTAT

- Remove the lid of the terminal box. The electrical connection layout is located in the lid.
- Insert the mains cable (min.  $3 \times 1.5 \text{ mm}^2$ ) through the threaded cable gland and connect to the appropriate terminals.
- Insert the signal cable through the threaded cable gland and connect to the appropriate terminals.
- Screw lid back on.

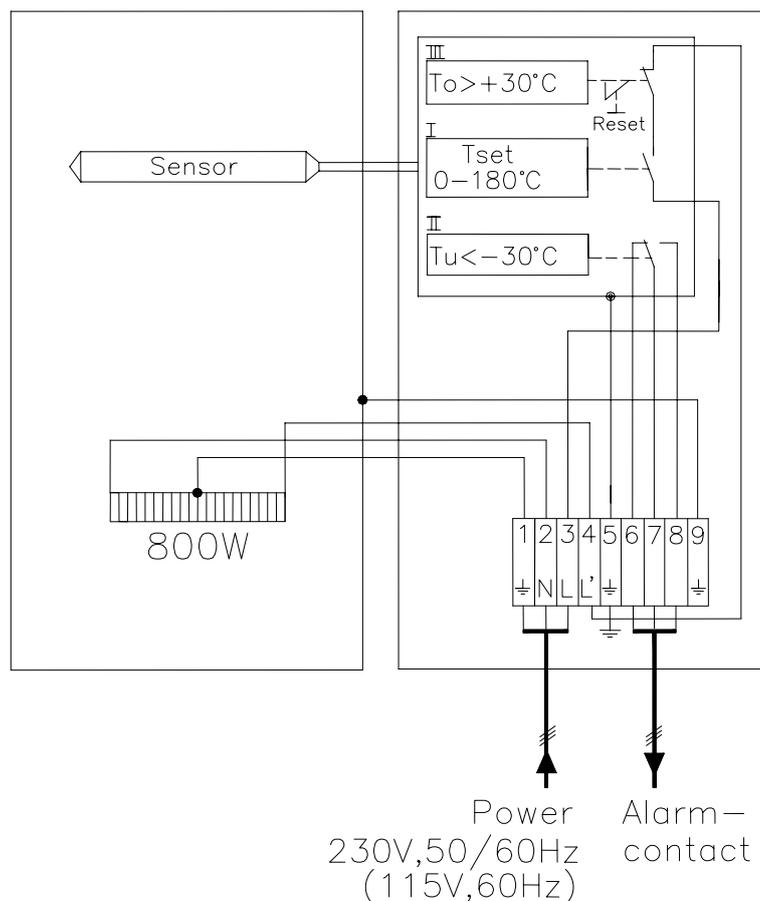


Figure 6 Electrical connections at the capillary tube thermostat

## 14.2 VERSION WITH EXTERNAL TEMPERATURE CONTROL

- Remove the lid of the terminal box. The electrical connection layout is located in the lid.
- Insert the mains cable coming from the external temperature controller (min. 3 x 1.5 mm<sup>2</sup>) through the threaded cable gland and connect to the appropriate terminals.
- Insert the temperature sensor cable through the threaded cable gland and connect to the appropriate terminals.
- Screw lid back on.

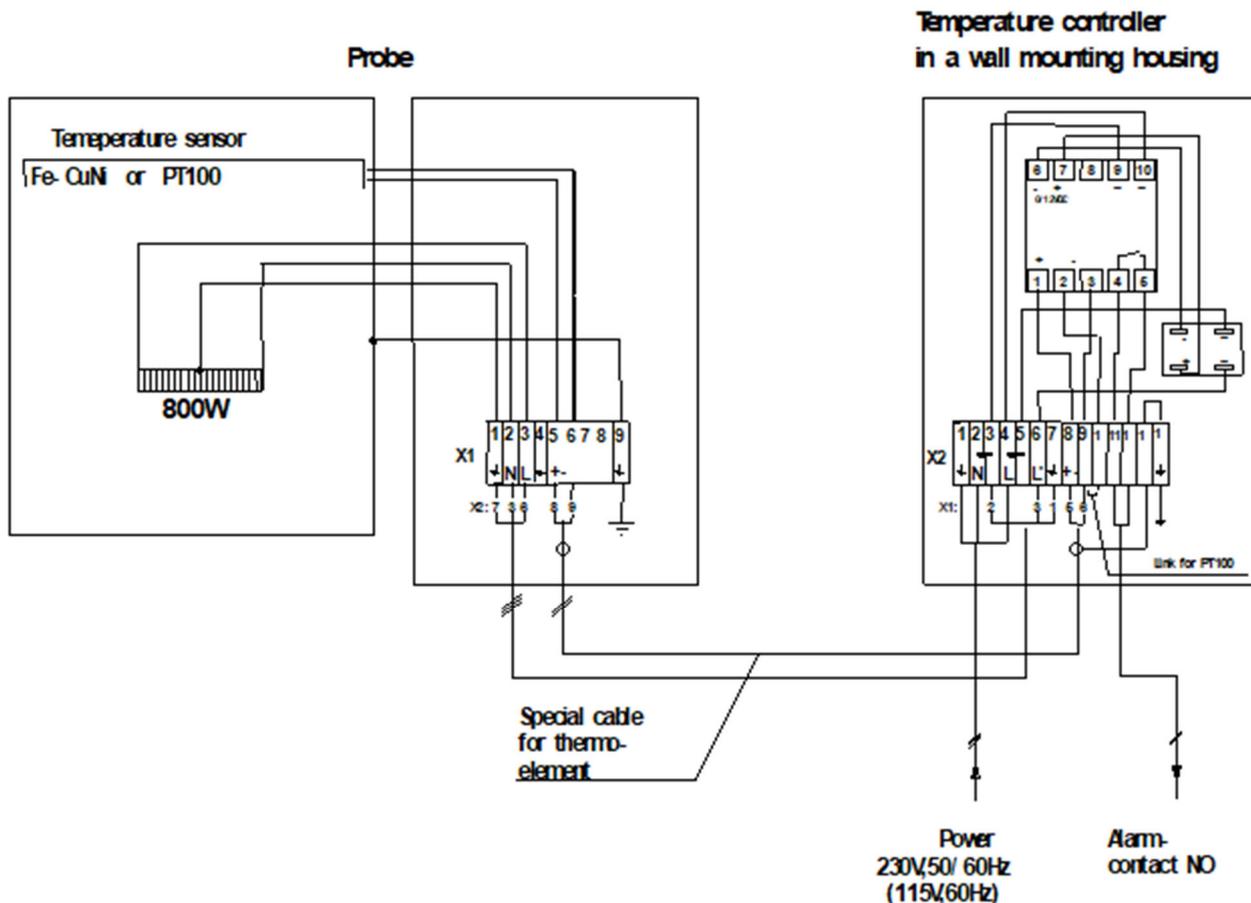


Figure 7 Electrical connections at the electronic controller 70304G

## 15 STARTING UP

- Before starting up check whether the mains power supply voltage corresponds with the information stated on the sample probe's nameplate.
- Check the set point adjustment on the built-in thermostat or on the external controller.
- Switch on the mains voltage. The total heating time is approx. 2 hours. After approx. 1 h, the probe has already heated up to such an extent that the temperature has exceeded the under-temperature alarm value (30 °C below the set point).
- After the minimum heating time of 2 hours, the sample gas can be extracted via the probe.

**NOTE!**

If the set point temperature setting on the control thermostat is lowered by more than 30 °C in one step during operation, the over-temperature switch-off of the thermostat is triggered!

**WARNING!**

When working during operation:

High surface temperatures!



Touching may cause burns.



Wear protective gloves and secure the probe against unauthorized access!

## 15.1 CALIBRATION GAS FEED AND BLOW-BACK

To blow-back the sample tube or the prefilter, purge gas is supplied via the blow-back check valve. The downstream analysis system with the pneumatic shut-off valve must be separated from the probe in order to avoid pressure surges on the system during blow-back. The opening pressure of the check valve is 0.7 bar. The purge gas pressure must therefore be greater than 1.7 bar abs. In order to achieve optimum blow-back, the blow-back pressure should be at least 5 bar and an additional buffer vessel should be used. The pneumatic shut-off valve is operated with a pressure of 3 - 10 bar.

**NOTE!**

To avoid cooling of the probe interior, blow-back must be carried out at short intervals (< 1 s).

Close the pneumatic shut-off valve for the test gas feed, as this prevents the expensive test gas from flowing back to the process. The opening pressure of the test gas check valve is 1.7 bar abs. The test gas pressure must be correspondingly higher than 1.7 bar abs.

The pneumatic shut-off valve is actuated with a pressure of 3 - 10 bar.

**NOTE!**

It should be noted that in vacuum operation starting from 300 mbar abs., false air can be drawn in via the open non-return valves.

## 16 MAINTENANCE

Before any maintenance work, the plant-specific and process-specific safety measures must be observed!

Recommendations for a maintenance cycle cannot be made. Depending on your process conditions, a meaningful maintenance cycle must be determined for each specific application.

An indication for a necessary probe maintenance can be a constant decrease of the sample gas quantity supplied to your analysis system.

The maintenance of the probe is mainly focused on the replacement of the filter element as well as the inspection and possible replacement of the seals.



**WARNING!** Aggressive condensate is possible.



**Wear protective glasses and proper protective clothing!**



**When working during operation:**



**High surface temperatures!**



**Touching may cause burns.**

**Wear protective gloves and secure the probe against unauthorized access!**

- Changing the filter element see chapter 13.2
- Additionally check O-rings in the lid and change if necessary.
- Clean filter chamber.
- If necessary, puncture the sampling tube to remove any deposits. Be careful, there is a risk of breakage with aluminium oxide sampling tubes!



**NOTE!**

**To replace pre-filters, remove the complete probe unit from the process. Depending on the type and degree of contamination, the pre-filters can be cleaned mechanically or in an ultrasonic bath.**



**WARNING!**

**Before carrying out maintenance work on electrical parts, the mains voltage must be disconnected at all poles!**



**This also applies to any connected alarm and control circuits.**

## 17 DECOMMISSIONING

The probe should be flushed with inert gas or air to prevent condensation of aggressive components from the process gas before shutting it down, i.e. switching off the heating system.

## 18 SPARE PARTS LIST

Wear, tear and replacement part requirements depend on specific operating conditions. The recommended quantities are based on experience and they are not binding.

Gas sample probe SP2200-H/Z					
(C) Consumable parts					
(R) Recommended spare parts					
(S) Spare parts					
					Recommended quantity being in operation [years]
Part No.	Indication	C/R/S	1	2	3
90S0022	Filter element <b>S-2DGF150</b> , stainless steel, 2 µm, 150 mm	C	2	4	6
90S0020	Filter element <b>S-2K150</b> , ceramic, 2 µm, 150 mm	C	6	12	18
90F0125	Filter element <b>F-0,1GF150</b> , glass fiber, 0.1 µm, 150 mm	C	6	12	18
93S0045	Gasket (30) for filter element. Material: Viton.	R	4	8	12
93S0051	Adaptor for probe filter element F-0,1GF. Material: PTFE	R	4	8	12
93S0020	O-ring (39) for lid. Material : Viton	R	2	4	8
93S0025	O-Ring (55) for lid. Material : Viton	R	2	4	8
90S2080	Gasket 3/4" (blue), max. 600 °C for sample tube. Material Novapress	R	1	2	3
90S2077	Flange gasket DN65PN6 (67 mm i.) Material : Novapress	R	1	1	1
90S2075	Flange gasket set DN65 PN6 B, consisting of gasket (67) and a set of screws 12x60.	S	1	1	1
93S0010	Thermostat (0-180 °C), with over-temperature limiter and low-temperature alarm for probe series SP.	R	-	-	1
93S0015	Heating cartridge 230 VAC/800 W, length 160 mm	R	-	-	1
93S0017	Heating cartridge 115 VAC/800 W, length 160 mm	R	-	-	1
93S0059	PT100 sensor	R	-	-	1
93S0060	Spare thermoelement Fe-CuNi with clamping ring and screw	R	-	-	1
93S0061	Spare thermoelement Ni-CrNi with clamping ring and screw	R	-	-	1

## 19 APPENDIX

- Electrical connection diagrams



More product documentation is available on our Internet catalogue:  
[www.mc-techgroup.com](http://www.mc-techgroup.com)

- Sample tubes series **SP**  
Document: **2.14**
- Prefilter series **SP**  
Document: **2.17**

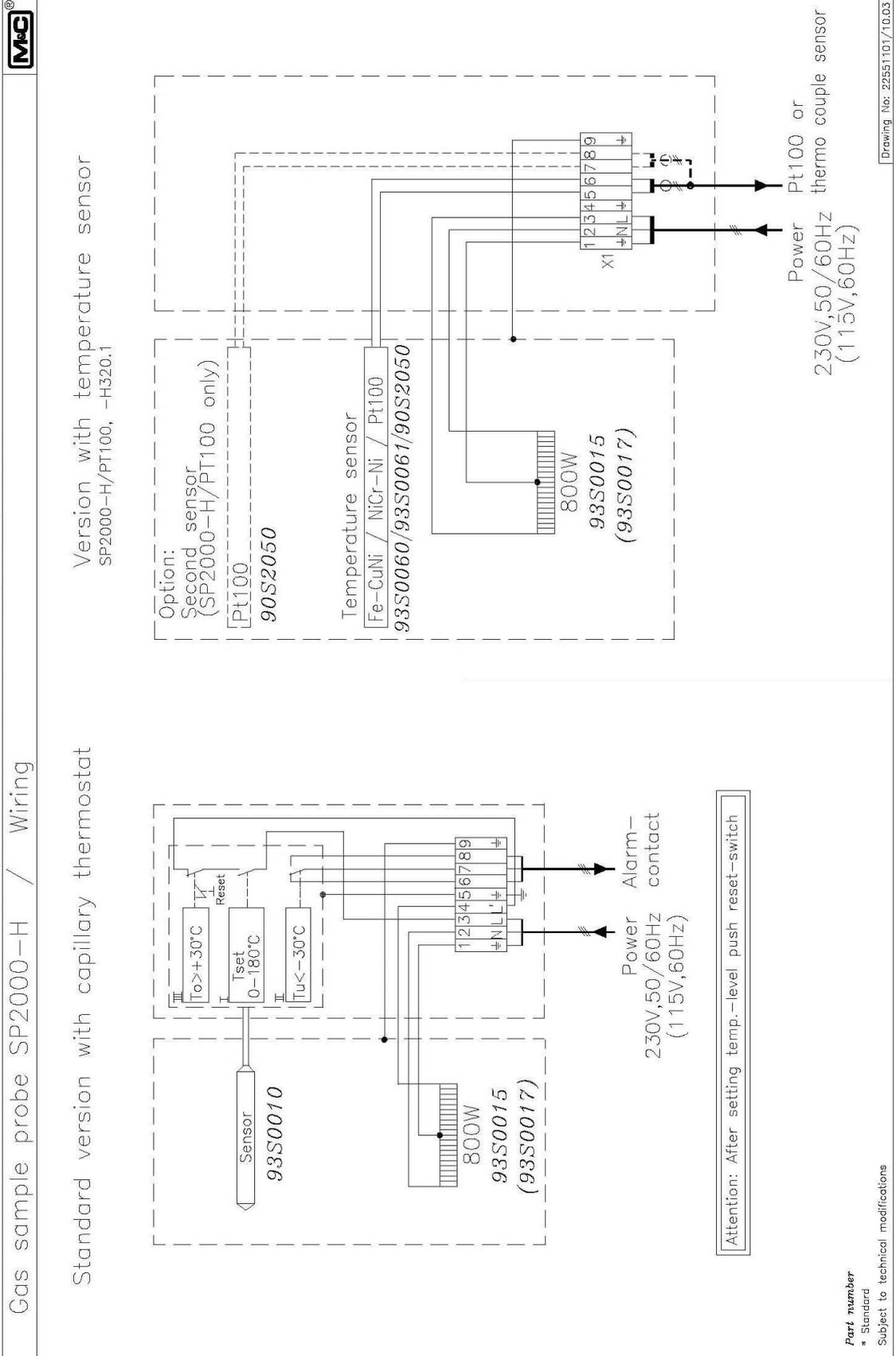


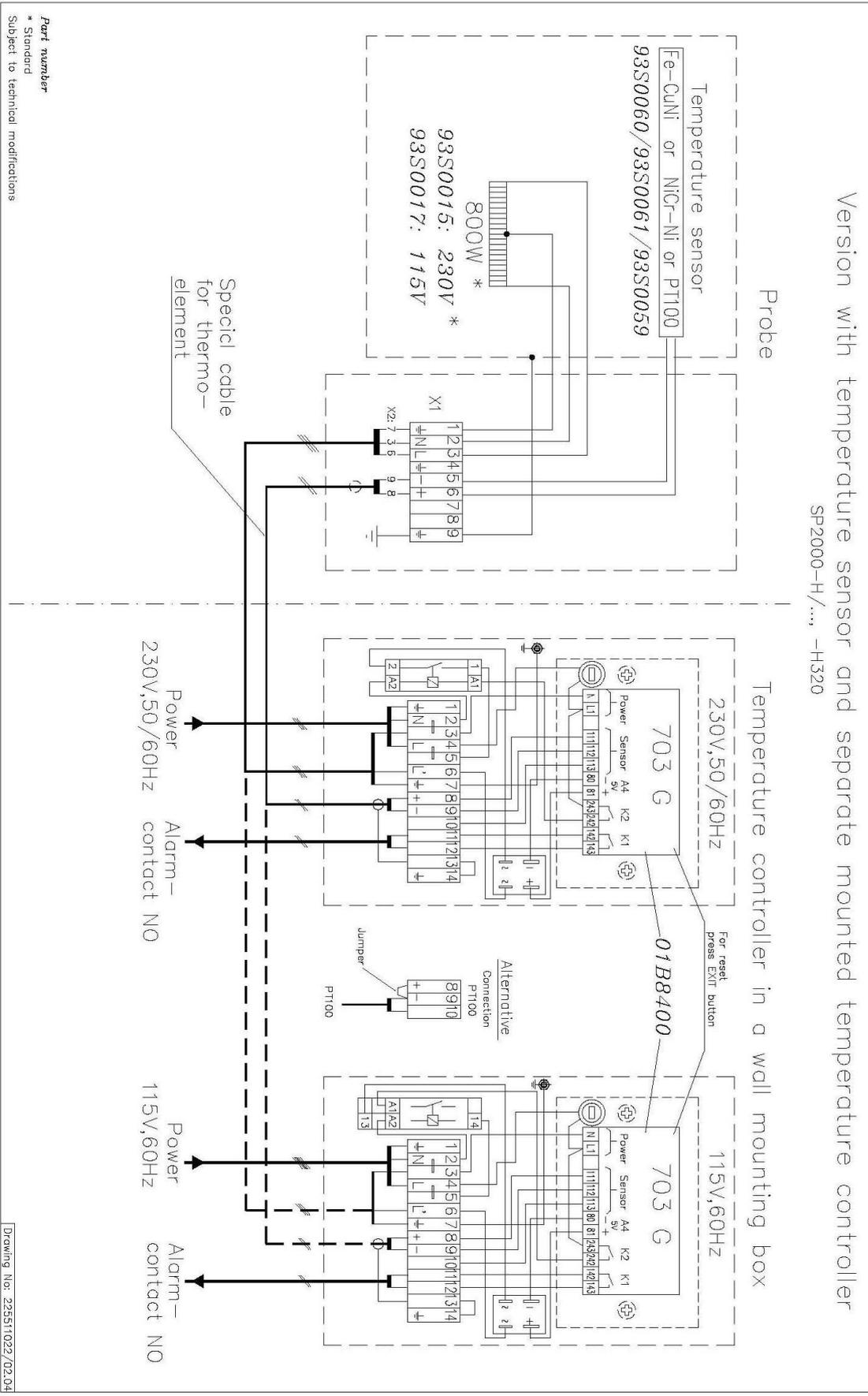
Figure 8 Electrical connections for SP2200-H/Z with thermostate controller

Gas sample probe SP2000-H / Wiring

Version with temperature sensor and separate mounted temperature controller  
 SP2000-H/... -H320

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Analytentechnik mit System



Part number  
 \* Standard  
 Subject to technical modifications

Drawing No: 225511022/02.04

Figure 9 Electrical connections for SP2200-H/Z with electronic controller 70304G