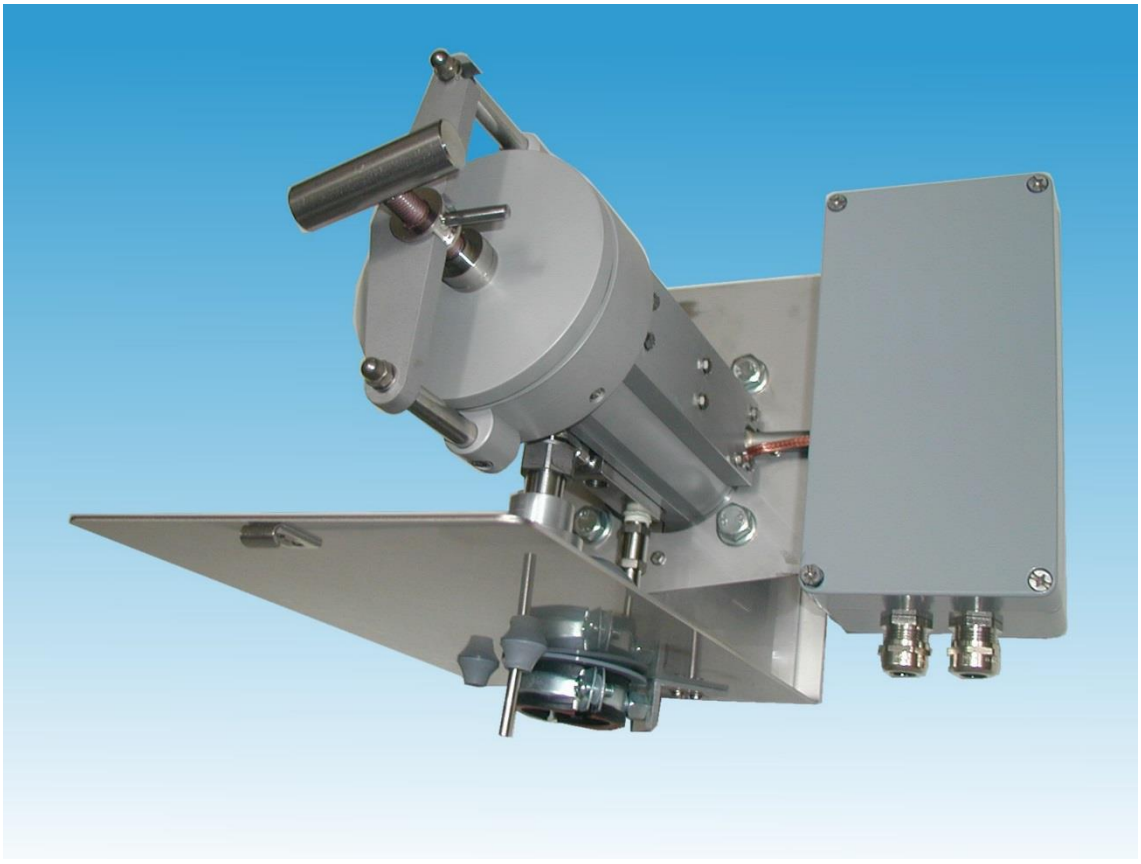
Embracing Challenge

Gas sample probe Series SP®

SP2600-H/C/I/BB/F/0,1GF, SP2600-H/C/I/BB/F/1K190

Instruction Manual
Version 1.00.01



Dear customer,

we have made up this operating manual in such a way that all necessary information about the product can be found and understood quickly and easily.
Should you still have any question, please do not hesitate to contact **M&C** directly or go through your appointed dealer. Respective contact addresses are to be found in the annexe to this operating manual.
Please also contact our homepage **www.mc-techgroup.com** for further information about our products. There, you can read or download the data sheets and operating manuals of all **M&C** products as well as further information in German, English and French.

Version: 1.00.01

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1 GENERAL INFORMATION

The product described in this operating manual has been examined before delivery and left our works in perfect condition related to safety regulations. In order to keep this condition and to guarantee a safe operation, it is important to heed the notes and prescriptions made in this operating manual. Furthermore, attention must be paid to appropriate transportation, correct storage, as well as professional installation and maintenance work.
All necessary information a skilled staff will need for appropriate use of this product are given in this operating manual.

2 DECLARATION OF CONFORMITY

CE - Certification

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

EMV-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.

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

Please take care of the following basic safety procedures when mounting, starting up or operating this equipment:

Read this operating manual before starting up and use of the equipment. The information and warnings given in this operating 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.

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

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.

The gas sample probes version SP2600-H.. must not be used in hazardous areas.

Installation, maintenance, monitoring and any repairs may only be done by authorized personnel with respect to the relevant stipulations.

4 WARRANTY

If the equipment fails, please contact **M&C** directly or else go via your appointed **M&C** dealer.
We offer a one year warranty as of the day of delivery as per our normal terms and conditions of sale and assuming technically correct operation of the device. Consumables are hereby excluded. The terms of the warranty cover repair at the factory at no cost or the replacement at no cost of the equipment free ex user location. Reshipments must be sent in a sufficient and proper protective packaging.

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.
 **CARE!**	This means that minor physical injuries **may occur** in case the respective safety measures are not fulfilled.
CARE!	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.
SKILLED STAFF	These are persons with necessary qualification who are familiar with installation, use and maintenance of the product.

6 INTRODUCTION

The **M&C** gas sample probes type **SP2600-H..** are based on the patented probe **SP2000-H** and are used for continuous gas sampling in processes with a high extent of dust, high temperature and/or high gas moisture.

6.1 SERIAL NUMBER

The type plates are to be found where the electrical connection box is placed.

NOTE!

Please indicate the serial number of the equipment in case of any question and when ordering spare parts.

7 APPLICATION

Due to its large filter surface and the possibility to back-purge the filter element, the probes **SP2600-H/C/I/BB/F..** achieve a high service life especially in cases where no pre-filter can be applied. For this purpose, a back-purge valve and a pneumatic stop valve for the sample gas outlet is integrated in the probe.

Version **SP2600-H/C/I/BB/F/0,1GF** is suitable for dusts with extremely fine particles up to 0,1 µm and version **SP2600-H/C/I/BB/F/1K190** can be very efficiently back-purged thanks to the double-ply filter element and an external filter membrane of 1 µm porosity.

8 TECHNICAL DATA

Technical Data Series SP ®	SP2600-H/C/I/BB/F/0,1GF	SP2600-H/C/I/BB/F/1K190
Part Number	**20 S 3550**	**20 S 3540**
Integrated back purging	Via the filter element	
Weather protection cap	yes	
Protection terminal box	IP54 EN60529	
Materials filter housing	Stainless steel 1.4571, 1.4404	
Sealing material	FPM*	
Material probe flange sealing	Novapress	
Sample tube	optionally	
Sampling pressure max.	0,4 – 6 bar* abs.	
Ambient temperature	-20 °C bis +60 °C*** /PT100, /Fe-CuNi, /Ni-CrNi** = -20 °C bis +80 °C	
Filter housing volume	300 cm^3	
Filter porosity	0,1 micron	1 micron
Thermostat, Temperature adjustments	0-180°C* /PT100** /Fe-CuNi** /Ni-CrNi**	
Readyness for working	After 40min	
Alarm contact for insufficient temperature	Capacity 250V 3A~, 0,25A=, Switch point: ΔT 30°C to T_{SOLL}	
Connection sample gas outlet	1 x ¼“ NPTi* Tube connection Ø 6, 8 or 10 mm**	
Backpurge connection (BB/F)	Back purging: for tube Ø 8mm	
Test gas connection (/C)	Ø 6mm socket piece	
Connection stop valve (/I)	Ø 6mm socket piece	
Pressure range control air (/I)	3 – 10bar	
Power supply	230V 50/60Hz, 800W or 115V 60Hz, 800W (fuse 10A)	
Electrical connection	terminals; max. 4 mm^2, 2 x M20 x 1,5 cable gland	
Standard electrical equipment	EN 61010, EN 60519-1	
Mounting flange	DN65 PN6, Form B, 1.4571* >DN or ANSI possible**	
Weight	approx. 20 kg*	

* Standard
** Options
*** If there are high ambient temperatures, please choose option PT100 (Part No. 20S9025) or thermoelement Fe-CuNi or Ni-CrNi (Part No. 20S9027 resp. 20S9028) instead of thermostat regulator. In this case, an additional electronic temperature regulator is necessary (see also data sheet 2-5.1).

9 DESCRIPTION

The probe has been designed for easy installation, safe operation, easy maintenance and a great variety of applications. Depending on the particular problem, various sample tubes or preliminary filters (see data sheets **2-1.1.0.6** and **2-1.1.0.8**), which are not included in the scope of supply of the probe, are screwed into the G3/4"i thread of the filter holder.

The large surface ceramic or glass fibre filter element is installed outside the process area in a housing with minimal dead space. The probes are designed for replacement of the filter element without having to remove the sample line so that contamination of the clean gas side is avoided.

Owing to the special design of the heating element of probe **SP2600-H...**, the entire filter housing including mounting flange can be heated adjustable to 180°C, thus ensuring reliable operation without cooling down below the dew point in the external area.

Temperature control of the standard version takes place by means of an integrated capillary sensor thermostat with excess temperature limiter and alarm function for insufficient temperature in a compact arrangement directly on the probe. Test gas feeding is possible via an integrated check valve.

Additional functions of the **SP2600-H..**:

- The calibration gas can be supplied directly at the check valve/**C** (return valve) to the probe outlet. Calibration gas supply at the probe is possible without any expensive gas loss via the otherwise open probe inlet.

- The cut-off valve **/I** cuts off the gas outlet of the heated filter chamber.

- The filter element, and via this indirectly, the filter space and sample tube or preliminary filter can be back-flushed via the check valve **/BB/F** installed in the heated chamber wall.

9.1 OPTIONS

The following list shows the options available. The diversity of options and the modular design of the **M&C** gas sample probes ensure optimum probe selection to suit the particular process and ambient conditions.

Description	Part No.
Basic version SP2600-H/C/I/BB/F/0,1GF, heated up to 0-180 °C, with weatherproof cover, material stainl. Steel 1.4571	**20 S 3540**
Basic version SP2600-H/C/I/BB/F/1K190, heated up to 0-180 °C, with weatherproof cover, material stainl. Steel 1.4571	**20 S 3550**
Power supply 115V/60Hz /115V	**20 S 9030**
Type with back-flush/calibration gas valve (C*), opening pressure 0,7 bar, Socket piece 6 mm*	**20 S 9435**
Type with PT100 sensor instead of capillary controller, without thermostat /PT100	**20 S 9025**
Type with thermo-element Fe-CuNi (Typ J) instead of capillary controller, without thermostat /Fe-CuNi	**20 S 9027**
Type with thermo-element Ni-CrNi (Typ K) instead of capillary controller, without thermostat /Ni-CrNi	**20 S 9028**
Type with second PT100 sensor /2-PT100	**20 S 9026**
Type with special intermediate flange adapter DN..PN6 or ANSI..150 lbs /DN	**20 S 9004**
Type with gas pre-heater GVW1, material stainl. Steel 2-1.2.5 /GVW1	**20 S 9058**
Junction of the gas pre-heater to the connection „BB“ and to the gas inlet /GVW	**20 S 9062**
Type with steam heating without thermostat and valves instead of the capillary controller /D	**20 S 9033**

10 RECEIPT OF GOODS AND STORAGE

- Please take the probe and possible special accessories carefully out of the packaging immediately after receipt and compare the goods with the items listed on the packing list.
- Check the goods for any damage caused during delivery and, if necessary, notify your transport insurance company without delay of any damage discovered.

NOTE!

The probe must be stored in a weather-protected and frost-proof area !

11 INSTALLATION AND DIMENSIONS

During installation, the prescriptions for accident prevention and safety instructions for mounting and operation have to be heeded.
Please strictly observe the notifications of chapter 3 „Safety Instructions“.

Furthermore, you have to consider the following:

- Select the optimum sampling point according to the prescriptions actually valid and coordinate with the responsible persons.
- Place the sampling point in such a way that sufficient space for mounting and dismounting of the probe is available. Also consider the insertion length of the sample tube.
- Take care of easy access to the probe in order to enable you to execute any maintenance work necessary in future without problem.
- The bleeder connection must be prepared so that the temperature of the connection piece remains above the acid dew point in order to avoid problem due to corrosion and obstruction.
- In case the temperature in the area of the connection piece is >60°C due to radiant heat, you have to mount a device of sheet steel in order to reflect the radiant heat.
- The mounting flange of the connection piece should be connected with size DN65 PN6. Should you desire other dimensions, we can provide you suitable adapter intermediate flanges as option. The minimum flange size or connection piece diameter respectively is determined by the sample tube diameter or pre-filter diameter you apply.
- We recommend to mount the probe horizontally with an angle of inclination of 10° to the process.

NOTE!

Before mounting the probe, you have to check its suitability on the basis of the given operating parameters. (see type plate).

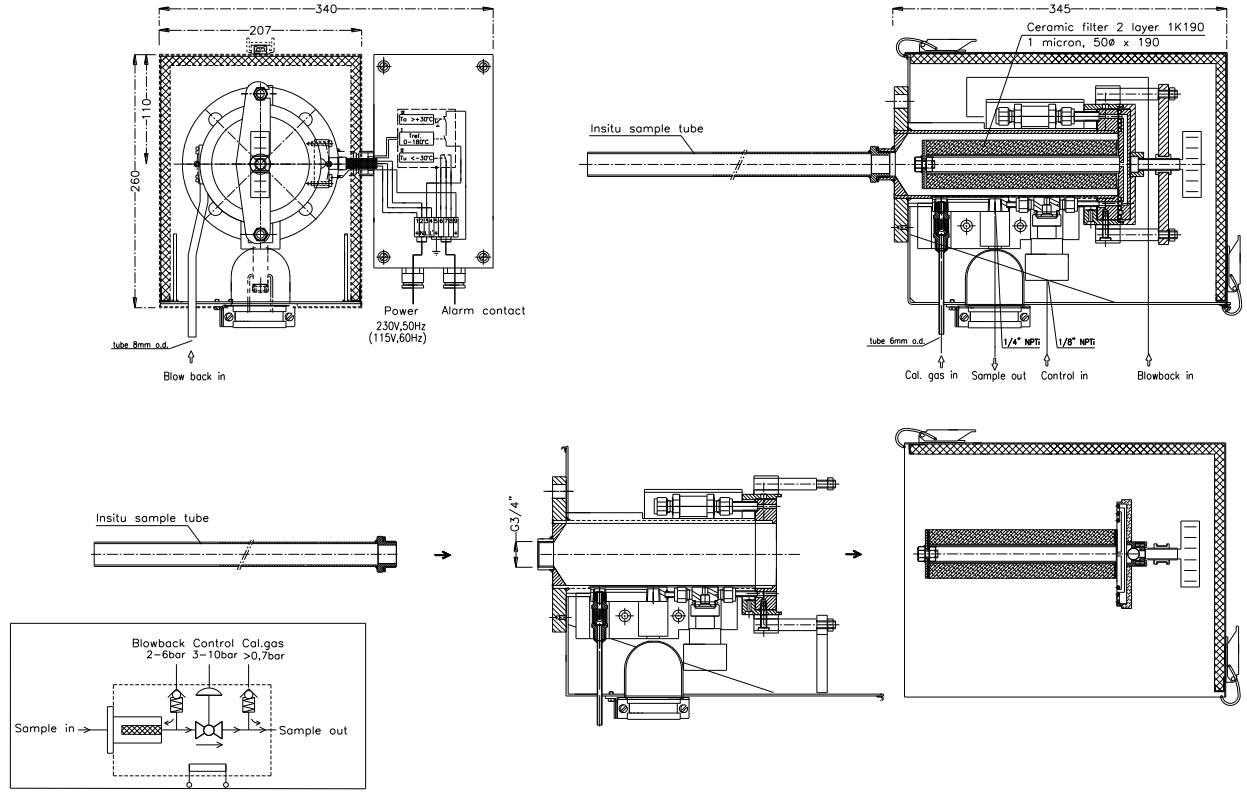


Figure 1 Construction and dimensions of the SP2600-H/C/I/BB/F/1K190

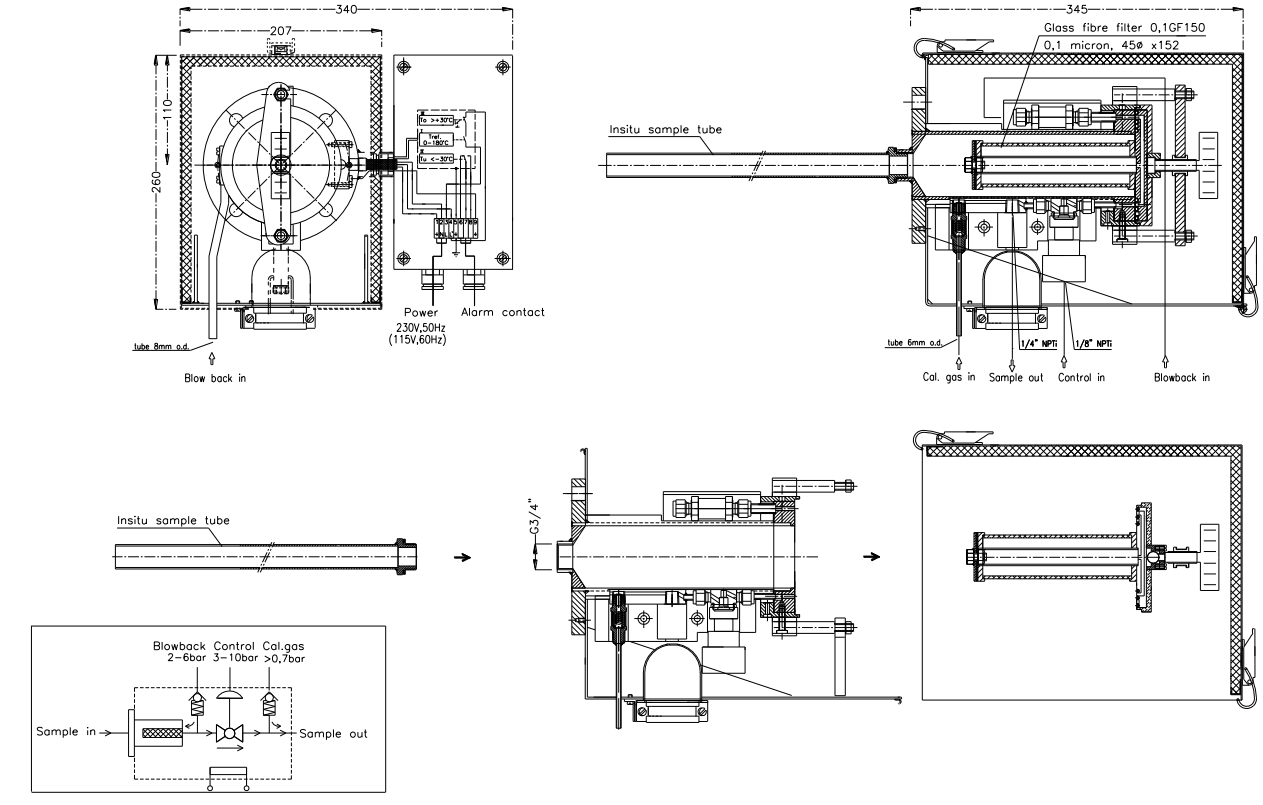


Figure 2 Construction and dimensions of the SP2600-H/C/I/BB/F/0,1GF

12 MOUNTING

The **M&C** probes **SP2600-H..** are designed for stationary use and provide a long service life and a minimum of maintenance work under the premise of professional selection of the sampling point and professional mounting.

12.1 MOUNTING OF THE PREFILTER RESPECTIVELY THE SAMPLE TUBE

The pre-filter or sample tube is mounted together with a suitable sealing by screwing into the G ¾“ thread of the probe flange.

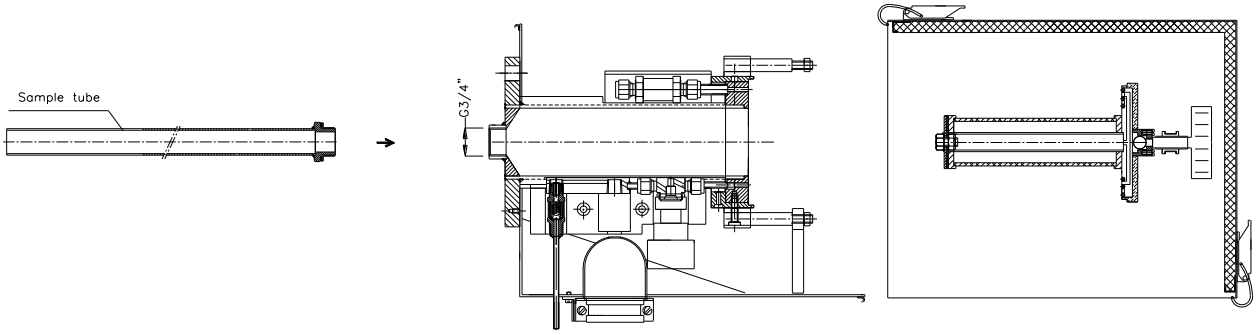


Figure 3 Mounting of the pre-filter or sample tube

12.2 MOUNTING OF THE PROBE

- Remove the protection cover of the probe after having opened both bent-level closures.
- Put the flange sealing on the bleeder connection.
- Fit the mounting piece and the probe flange by means of the attached screws and screw nuts.

In case the bleeder connection does not fit with the standard flange connection DN65 PN6, please mount the attached optional adapter flange in the same way onto the probe.

NOTE!

It is recommended to mount the probe with its sample gas outlet showing downwards (not necessary for perfect function).
Further it is recommended to mount the probe with a slight descending gradient downwards so that possible deposited drops may flow back into the process.

- Remove the heat conducting jaws on the sample gas outlet after having unscrewed the knurled screw. For connection of the sample line, you have to screw in a correctly dimensioned tube joint connection **1/4"-NPT** by using a PTFE sealing tape.

CARE!

The fittings must be tightened carefully in order to protect the integrated components against damage. Do not screw down the fittings to much.
In case of leakage, do not tighten the fittings further. Dismount the respective fitting completely, screw in and tighten it again.
Check the connection for tightness.

12.3 DISMOUNTING OF THE FILTER HOUSING COVER AND CHECKING THE FILTER ELEMENT

The filter housing cover is dismounted as followed:

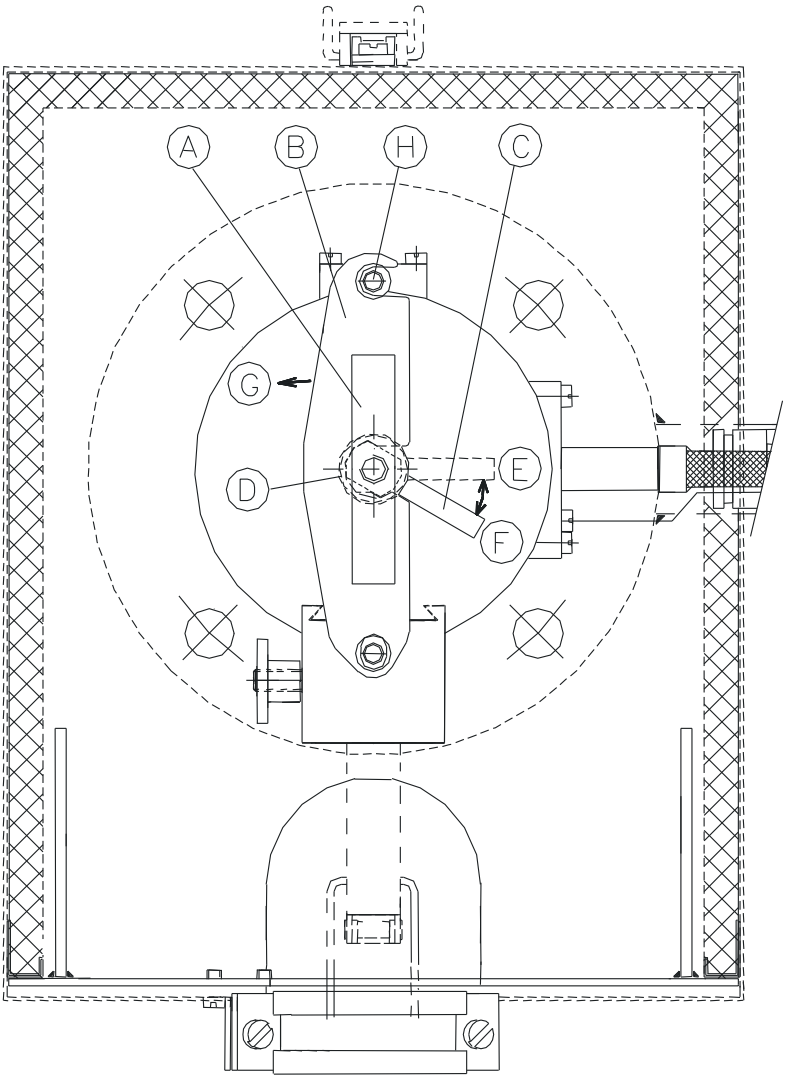
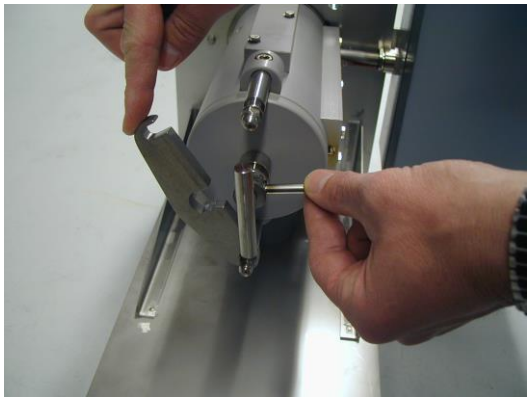


Figure 4 Schematic drawing of the filter housing cover

- Turn the toggle handle **A** approximately one rotation to the left side so that the cover is lifted;
- Put the handle **C** into position **E**;
- Turn the clamp clip **B** to the left side (direction **G**);
- Pull out the filter housing cover with the toggle handle **A.**

The photos shall illustrate the above mentioned steps.



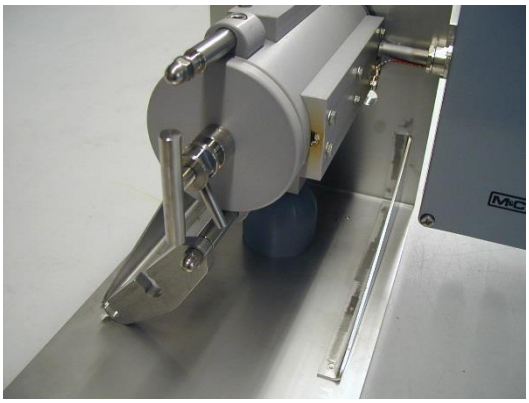


Figure 5 Dismounting of the filter housing cover

Now, the filter element is visible.

- Check on the filter pressing screw whether the filter element is screwed on tightly.
- Push the cover with filter element into the probe again.
- Turn the clamp clip **B** to the right side and bring the ring bolt **D** into position **E** by using the handle **C** so that the clamp clip locks into place of the ring bolt **D** and the threaded bolt **H**. For this purpose, you may push in or pull out a little the filter housing cover by means of the straining screw **A**; afterwards, turn the handle **C** into position **F** and screw the toggle handle **A** hand-tight by turning to the right.

13 SUPPLY CONNECTIONS

13.1 PNEUMATIC CONNECTION

13.1.1 CONNECTION OF THE SAMPLE LINE

On the probe, a thread ¼“ NPTi is available for connecting the sample line. You can screw in respective connection joints for lines with dimensions of Ø6mm (standard), 8mm or 10mm.

The sample line is to be mounted as follows:

- Loosen the bent-lever closures of the insulating cover and remove the cover;

- If you have got the 180°C version, screw the respective screws with insulating tape into the probe head (see also 12.2);
- Insert the line through the corresponding opening in the bottom of the probe and through the silicone retainer;
- Connect the line to the tube joint. For Swagelok®-Fittings, the following is valid:

- Put the line with supporting socket into tube joint until the limit stop;
  Screw the union nut hand-tight;
- Before drawing up, mark the union nut on the “6-a’clock position”;
- Hold the body with a wrench and screw down the union nut by 1 ¼ rotations; after one entire rotation, the marking has to be turned furthermore up to the “9-a’clock position”.

NOTE!

For the connection of tube lines to stainless steel tube joints, you must always use a supporting socket.
Check the connection for tightness.

Place the probe cover again and shut it by both bent-lever closures.

13.1.2 CONNECTION OF THE BACKPURGE AND CALIBRATION GAS

WARNING!

The back-purge pressure must always be higher than the process pressure. The admissible maximum pressures must not be exceeded (see technical data).

The return valve has got an opening pressure of 0,7bar.

Versions**SP2600-H/C/I/BB/F..** include separate connections for test gas feeding and back-purge gas (see figure 1 and figure 2):

- Back-purge gas for pipe Ø8 x 1mm, and
- Calibration gas pipe socket Ø6 x 1mm.

The control of the stop valve **/I** is made separately within a pressure range of 3 to 10 bar. It is equipped with a 6mm pipe socket.

13.2 ELECTRICAL CONNECTION

The temperature adjustment of probes type **SP2600-H..** is effected with a capillary regulator as standard. Optionally, the probe can be equipped with a PT100 or thermocouple. This requires the connection of an external thermostat.

WARNING!

Incorrect supply voltage may damage the device. When connecting the equipment, please ensure that the supply voltage corresponds to the information given on the type plate !

Please install the probes in such a way that any contact of the live parts is impossible!

We recommend in any case to use heat-resistant cables !

The alarm contact for insufficient temperature must be monitored !

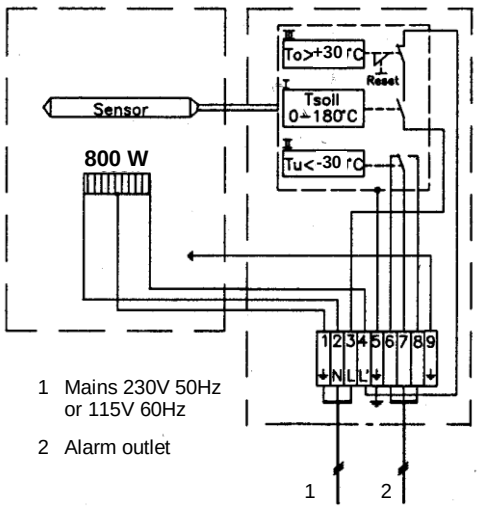
In case of a low temperature alarm (failure of the probe heating or sensor), the gas sampling must be interrupted in order to avoid a damage of the probe or downstream components.

NOTE!

For the erection of high-power electrical units with nominal voltages of up to 1000V, the requirements of VDE 0100 (IEC 364) must be observed together with the associated standards and stipulations.
A main switch must be provided externally.
The main circuit of the device must be equipped with a fuse corresponding to the nominal voltage (over current protection); for electrical details see technical data.
When mounting the capillary regulator or PID regulator on the sampling place, the maximum admissible ambient temperature must be heeded (see chapter 8). In case it is exceeded, you must install a PID regulator externally and outside the critical temperature zone.

13.2.1 VERSION WITH INTERNAL CAPILLARY TUBE THERMOSTAT

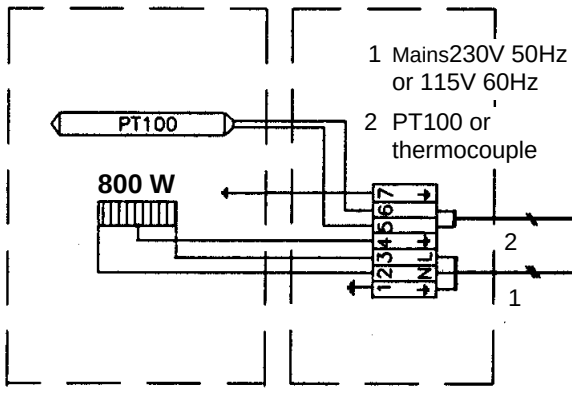
- Remove the lid of the connection box. Inside the lid, you can find the electrical connection plan as shown here.
- Insert the mains cable (min. 3 x 1,5 mm^2) through the cable gland and connect it to the appropriate terminals.
- Insert the signal cable (insufficient temperature alarm) through the cable entry and connect it to the appropriate terminals (contact position T_u indicates the event of alarm).
- Screw on the lid again.



CARE! **We recommend to use heat-resistant cables !**

13.2.2 VERSION WITH EXTERNAL TEMPERATURE REGULATOR

- Remove the lid of the connection box. Inside the lid, you can find the electrical connection plan as shown here.
- Insert the mains cable (min. 3 x 1,5 mm^2) through the cable gland and connect it to the appropriate terminals.
- Insert the temperature sensor cable through the cable entry and connect it to the appropriate terminals.
- Screw on the lid again.



ATTENTION! If you apply thermocouples, please use corresponding calibration lines !

14 STARTING

Before starting the equipment for the first time, the safety instructions related to the installation and the process have to be heeded.

Please consider the appropriate safety requirements and respective measures regarding the mediums to be extracted.

WARNING!

Please ensure before starting that the mains supply corresponds to the indication on the type plate !

Be careful when you get in contact with the probe's surface during operation. The high surface temperatures may cause burnings. Protective gloves are to be born and any unauthorized access to the probe must be made impossible !

We recommend the following procedure:

- Check the temperature set value on the integrated thermostat or on the external controller.

NOTE!

In case the adjustment of the temperature set value on the capillary controller should be changed during operation by more than 30°C in one step, the thermostat's excess temperature cut-off is activated (push the reset key to switch it on again).

- Switch on power.

NOTE!

The total heat up time is approximately 40 minutes. The probe is ready for work after having exceeded the below alarm level value (30°C below set value).

WARNING!

In case of insufficient temperature (failure of the probe heating), the feeding of sample gas must be interrupted by appropriate measures !

15 CLOSING DOWN

Before closing down, i.e. switching off the heating, the probe should be purged with inert gas or air in order to avoid condensation of aggressive components from the sample gas.

16 MAINTENANCE AND REPAIR

Before carrying out any maintenance and repair work, the specific installation and process safety measures are to be observed.

WARNING!

Aggressive condensat is possible. Wear protective glasses and appropriate protecting clothes !

Attention must be paid when touching the probe surface during operation. Due to the high surface temperatures, you may suffer from burnings. Protective gloves have to be born, and the probe must absolutely be protected against unauthorized access!

Before carrying out any maintenance work on electrical equipment, the mains voltage must be switched off on all poles. The same is valid for eventually connected alarm and control circuits!

We cannot give any recommendation regarding maintenance cycles. This must be determined specifically depending on the process conditions.

The principal maintenance work of the probe is changing the filter element and control of the sealings.

NOTE!

When carrying out any maintenance of repair work, the probe does not need being dismounted.

16.1 CHANGE OF THE FILTER ELEMENT AND THE SEALINGS

WARNING!

Please ensure that no contaminations that are bad for one's health remain on the probe before carrying out any maintenance or repair work. An appropriate measure is to flush the probe with inert gas.

Before changing the filter element, the gas feeding must be stopped!

The following steps are recommended when changing the filter element or the sealings:

- Remove the protection cap after having opened the bent-lever closures;
- Dismount the filter housing lid according to 12.3;
- Screw out the filter pressing screw, check the filter element and exchange it if necessary;
- Check the filter element sealings and exchange them if necessary;
- Check the O-rings inside the lid and exchange them if necessary;
- Clean the filter chamber;
- Mount again the filter housing lid in reverse order and put it into the filter head;
- Bolt the filter housing lid according to 12.3;
- Put on again the protection cover.

NOTE!

Pay attention that after putting in the filter housing lid the strap bolt is screwed down hand-tight in cold condition and that it is tightened again after the operating temperature is reached.

17 SPARE PARTS LIST

Wear, tear and replacement part requirements depend on the specific operating conditions.

The following table shows an extract of the recommended spare parts for probe of type **SP2600-H..** .

Recommended spare parts	
Part-No.	**Description**
90 S 0030	Spare filter element S-1K190, ceramic, 1µm, 190mm
90 S 0035	Spare filter element S-0,1GF190, glass fiber, 0,1µm, 190mm
93 S 1000	Spare O-ring (68), Viton® , for lid SP2600-H/C/I/BB/F..
93 S 1005	Spare O-ring (86), Viton® , for lid SP2600-H/C/I/BB/F..
93 S 1010	Spare O-ring (105), Viton® , for lid SP2600-H/C/I/BB/F..
90 S 2077	Flange sealing DN65 PN6B (67), for SP2000, SP2600-H/C/I/BB/F..
93 S 0010	Spare thermostat 0-180°C
93 S 0015	Spare heating cartridge HLP, 230V 800W
93 S 0017	Spare heating cartridge HLP, 115V 800W
93 S 0018	Heat conducting paste for putting in the heating cartridge
93 S 2126	Clamp clip LK145 for SP2500/2600
90 S 0050	PTFE adapter for filter element S-0,1GF190
93 S 0059	Spare PT100 SP2000-H, SP2600-H
93 S 0044	Flange sealing (50) for filter element S-1K190, FPM

18 ANNEX

Additional product information may be seen and downloaded under:
www.mc-techgroup.com