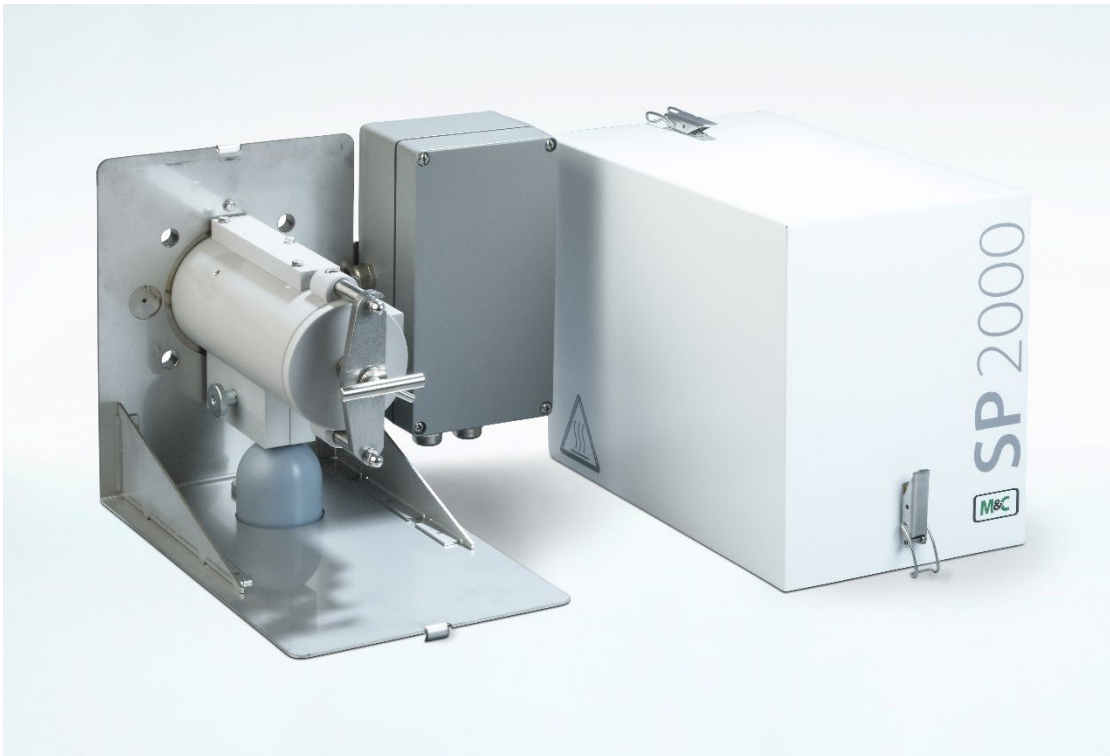


## **Gas Sample Probe Series SP<sup>®</sup>**

# **Option/HP25/400 °C for Operating Pressure of 25 bar max. for Gas Sample Probe SP2000 starting September 2023**

Instruction Manual  
Version 1.01.01



**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 Instruction manual does not claim completeness and may be subject to technical modifications.

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**SP**® is a registered trade mark.

With the release of this version all older manual versions will no longer be valid. The German instruction manual is the original instruction manual. In case of arbitration only the German wording shall be valid and binding.

Version: 1.01.01

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## 1 General Information

The product described in this instruction 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 instruction manual need to be followed. This instruction 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



CE - Certification

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.

### 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 safety directions and instructions regarding installation, commissioning and operation of this equipment:**

Read the operating instructions for the following products before commissioning and using the device: Option/HP25/400 °C, SP2000 and HEX5.2. The instructions and warnings in the operating instructions must be followed.

Strictly observe the certificate of conformity.

Installation and commissioning of electrical devices must be carried out only by qualified skilled personnel in compliance with the current regulations.

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 1000V' and must be in compliance with all relevant regulations and standards.

Before connecting the device, please make sure to compare the supply voltage with the specified voltage on the product label.

Protection against damages caused by high voltages:

Disconnect the power supply before opening the device for access. Make sure that all external power supplies are disconnected.

Operate the device only in the permitted temperature ranges.

Install the device only in protected areas, sheltered from rain, sun and moisture. The product should not be exposed to the elements.

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

#### 3.1 Intended Use

The **SP2000/HP25** gas sample probe must be operated properly under the conditions described in chapter 8. Only use the **SP2000/HP25** in permissible temperature and pressure ranges.

Refrain from any use other than for this purpose.

Improper use can lead to serious injuries, see the safety instructions at the appropriate point.

### 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.



**Toxic!**

Danger to life if swallowed, in contact with skin or inhaled!

Do not swallow toxic substances, avoid skin contact and do not inhale toxic vapors. It is **MANDATORY** to take appropriate measures to reduce the risk and for personal protection.



**Corrosive!**

Risk of severe skin burns and serious eye damage! Living tissue and many materials are destroyed on contact with this chemical.

Do not inhale vapors and avoid contact with skin, eyes and clothing!

It is **MANDATORY** to take appropriate measures to reduce the risk and for personal protection.



**Electrical voltage!**

Danger to life due to electric shock!

Keep a safe distance and avoid contact with the electrical system. It is **MANDATORY** to take suitable measures to reduce the risk and for personal protection.



**Hot surface!**

Risk of burns from touching the surface!

Do not touch the surfaces which are marked with this warning sign. Allow the surfaces to cool down after operation. Use personal protective equipment (PPE).



**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.



Use protective gloves!

Risk of injury from corrosive, hot or sharp objects!

Use adequate hand protection when working with chemicals, sharp objects or extreme temperatures.



Wear safety goggles!

Risk of injury to the eyes from splashes or flying particles!

Use suitable safety goggles.



Wear protective clothing!

Risk of injury from corrosive, hot or sharp objects!

Wear adequate protective clothing when working with chemicals, sharp objects or extreme temperatures.



Use safety shoes!

Risk of injury from falling objects, slippery floors or sharp objects on the floor!

Wear safety shoes with a suitable safety class.



Use head protection and full safety goggles!

Risk of injury from falling objects and splashes or flying particles from all directions.

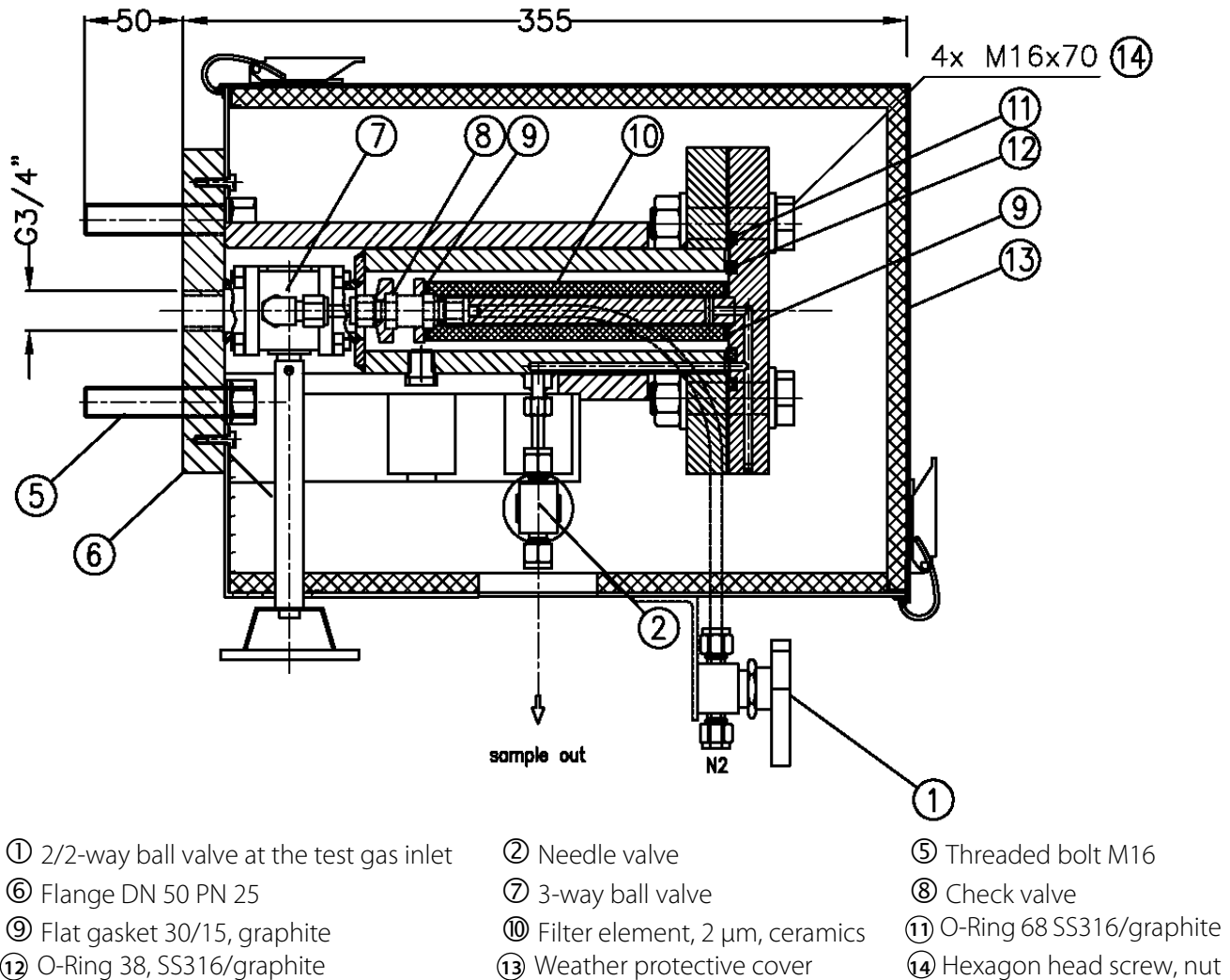
Wear a helmet and full safety goggles when working with heavy equipment and where there is a risk to the eyes from splashes or flying particles from all directions.

## 6 Application

Gas sample probes with the **/HP25/400 °C** option are used for continuous gas sampling at high pressures of up to 25 bar abs. at the sampling point in clean gas systems and also for corrosive media.

## 7 Description

The design of the gas sample probe **SP2000-H/3VA320/2K/HP25/400 °C** is shown in the following figure.



**Figure 1: SP2000-H/3VA320/2K/HP25/400 °C**

The gas sample probe SP2000-H with mounting flange DN 50 PN 25 ⑥ and option /HP25/400 °C (high-pressure version) also includes the option /3VA (3-way ball valve). A non-return valve ⑧ is mounted between the inlet of the probe and the sample gas outlet, followed by a ceramic filter element ⑩ with a filter fineness of 2 µm (F-2K150) with two graphite flat gaskets ⑨. An optional needle valve ② is fitted to the sample gas outlet. The probe lid is sealed by two graphite gaskets set in stainless steel and mounted to the probe body with 4 hexagon head screws, washers and nuts.

The probe can be shut off from the process using the 3-way ball valve ⑦ and test gas can be supplied via the optional ball valve ①. The probe is heated by a HEX5.2 or HEX1.3 heater and covered by the weather protective cover.



**Danger**

Make sure that the maximum operating pressure of 25 bar is not exceeded.

Please refer to the HEX5.2 instruction manual or the HEX1.3 specifications for technical data.

## 8 Technical Data

<b>Option: HP25/400 °C</b>	
Standard mounting flange	DN 50 PN 25
Sample pressure	0.5 to 25 bar
Operating temperature	Max. 400 °C [752 °F]
Ambient temperature	-20 to 70 °C [-4 to 158 °F]
Material wetted parts	SS 316Ti, stainless steel 316, graphite, ceramics
Sample gas outlet connection	Tube fitting 6 mm
Test gas connection	Tube fitting 6 mm
Probe lid screw connection	4 x M16 x 35 DIN 933 V4A strength class 70
Torque for probe lid screw connection	110 N m

## 9 Receipt of Goods and Storage

- The gas sample probe with option **/HP25/400 °C** is a completely pre-installed unit.
- 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.

**Note**

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

## 10 Mounting

- Close the shut-off valve before installing the gas sample probe.
- Fit the gas sample probe to the DN 50 PN 25 flange on the process side using the 4 stud bolts and the flange gasket supplied. If the process-side flange has other dimensions, an adapter flange (part no. 20S9004) must be used.

### 10.1 Connecting the Heated Sample Line

Follow these instructions to connect the heated sample line:

- Remove the protective cover after opening the toggle latches.
- Open the mounting clamp and insert and fasten the heated sample line.
- Once the heated sample line has been secured, connect the line to the 2/2-way ball valve.
- Connect the heated sample line. A support sleeve must be used for heated lines with inner tubing/hose.

Follow these instructions to connect the heated sample line via Swagelok® fittings:

- Insert the sample gas line into the tube fitting as far as it will go;
- Tighten the union nut finger-tight;
- Before further tightening, mark the union nut at the '6 o'clock position';
- Hold the body with a wrench and tighten the union nut by 1 ¼ turns; after a full turn, the marking must be turned further to the 9 o'clock position.
- Replace the protective cover.



Always use a support sleeve when connecting tubing/hose lines to stainless steel tube fittings.  
Check the connection for leaks.

## 11 Electrical Connections

For the electrical connection of the heater, see the HEX5.2 instruction manual or the HEX1.3 specification.

## 12 Preparations for Commissioning

Before initial startup, all plant- and process-specific safety measures must be observed. It is mandatory for the operator to complete the enclosed risk assessment of the product.

The gas exposure risk must be assessed by the operator with regard to the hazards posed by process and calibration gas and the setup at the installation site (e.g. tubing, system cabinet/container/plant). If the risk assessment reveals increased exposure hazards, further measures are required.

A visible label must be attached to the installation site in accordance with the risk assessment provided by the operator.

## 13 Commissioning

- Check that the mains voltage matches the specifications on the rating plate before commissioning.
- Make sure that the ball valve is closed.
- Switch on the mains voltage.
- The total heating time is approx. 2 hours.
- The ball valve can now be opened.
- The probe is now ready for operation.

## 14 Decommissioning



**Danger**

Before decommissioning the gas sample probe, close the shut-off valve and purge the probe with inert gas (e.g. nitrogen).

## 15 Maintenance



**Warning**



When working during operation:  
High surface temperatures!  
Touching can lead to burns. Wear protective gloves.



**Warning**



Aggressive condensate possible!  
Chemical burns due to aggressive media possible!  
Wear safety goggles and appropriate protective clothing when disassembling, repairing or cleaning.



**Danger**

In the event of overpressure at the sample point, the ball valve must be closed before working on the probe!  
Operating overpressure in the sample probe must be atmospherically depressurized before opening!



**Danger**

When sampling toxic gases, the ball valve must be closed, and the gas sample probe must be purged before any work is carried out on the gas sample probe!



**Danger**

The requirements of VDE 0100 and its relevant standards and regulations must be observed when installing and maintaining power installations with rated voltages of up to 1000 V!

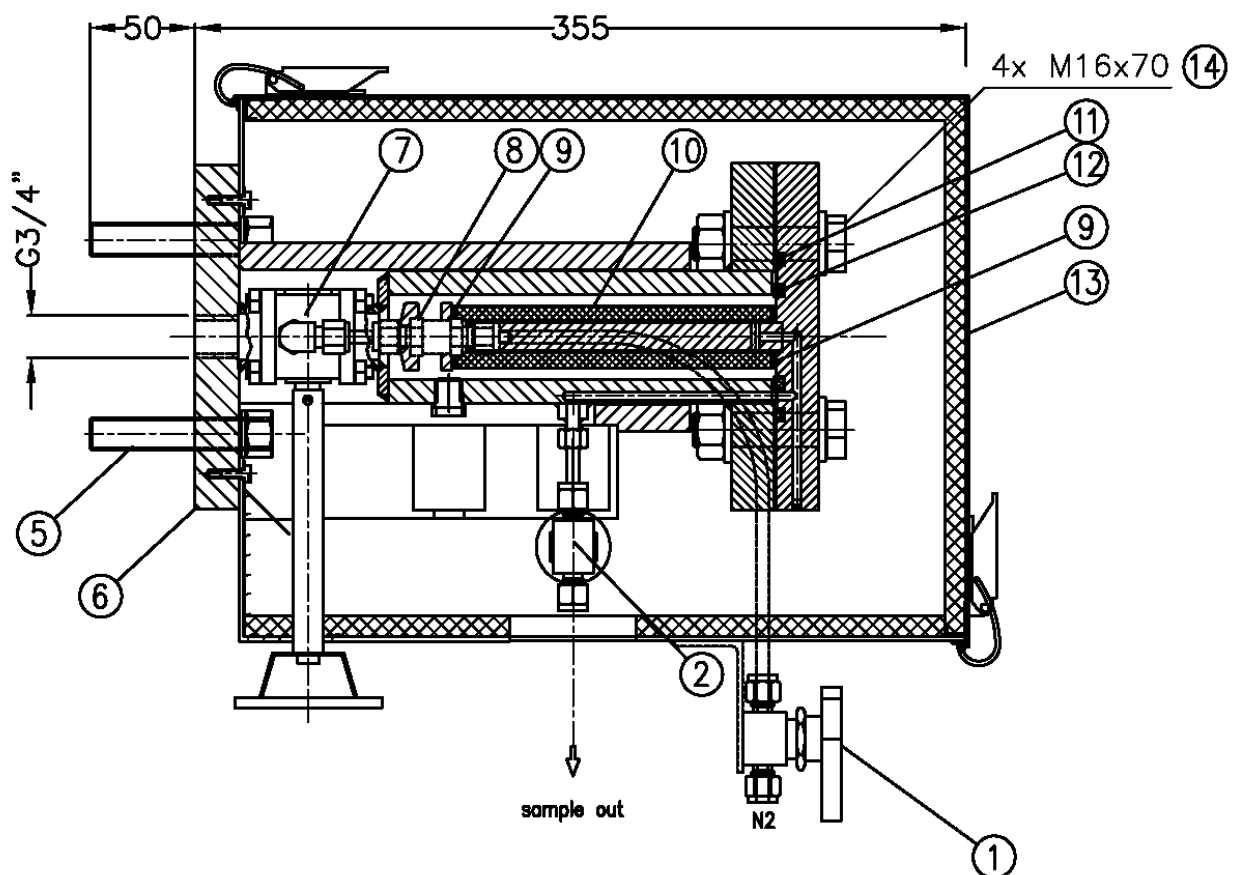


**Warning**

Check the lid seals each time the filter chamber is opened.

## 15.1 Changing the Filter Element

- Close the ball valve and relieve the operating pressure in the sample probe to atmospheric pressure!
- Purge the sample probe in case of toxic gases!
- Switch off the heating and leave the sample probe to cool down for approx. 2 hours.
- Open the toggle latches and remove the weather protective cover.
- Carefully check the temperature of the sample probe to ensure that it is safe to work with.



- |  |                                  |                            |
|--|----------------------------------|----------------------------|
| ① 2/2-way ball valve at the test gas inlet | ② Needle valve                   | ⑤ Threaded bolt M16        |
| ⑥ Flange DN 50 PN 25                       | ⑦ 3-way ball valve               | ⑧ Check valve              |
| ⑨ Flat gasket 30/15, graphite              | ⑩ Filter element, 2 µm, ceramics | ⑪ O-Ring 68 SS316/graphite |
| ⑫ O-Ring 38, SS316/graphite                | ⑬ Weather protective cover       | ⑭ Hexagon head screw, nut  |

**Figure 2: Changing the filter element**

- Unscrew the four M16 hexagon head screws⑭ on the probe lid.
- Pull the probe lid with the attached filter holder part out of the filter housing.
- Unscrew the filter knurled screw and replace the filter element ⑩.

- Check the filter element flat gaskets ⑨ and replace if necessary.
- Check cover gaskets ⑪ + ⑫ and replace if necessary.
- Clean the filter chamber.
- Reinsert the probe lid into the filter housing.
- Tighten the four M16 screws ⑭ crosswise.
- Tightening torque 110 N m
- Use only V4A screws 4 x M16 x 35 DIN 933 minimum strength class 70.
- Replace the protective cover.
- Wait approx. 60 minutes for the cooled probe to heat up completely, pre-purge the probe with inert gas if necessary, open the ball valve.

**Danger**

The probe must be checked for leaks after the filter chamber has been closed again or at least once a year.

## 16 Proper Disposal of the Device

At the end of the service life of our products, it is important to take care of the appropriate disposal of obsolete electrical and non-electrical devices. To help protect our environment, follow the rules and regulations of your country regarding recycling and waste management.

## 17 Spare Part List

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

		Recommended quantity being in operation [years]			
Part No.	Description	C/R/S	1	2	3
90S0020	Filter element type S-2K150, length: 150 mm, material: ceramics, filter porosity: 2 µm	S	6	12	18
93S0146	O-Ring 68 SS316/graphite	S	2	4	8
93S0147	O-Ring 39 SS316/graphite	S	2	4	8
93S0055	Flat gasket (30) for filter element, material: graphite	S	4	8	12

For more spare parts see the instruction manuals for SP2000 and HEX5.

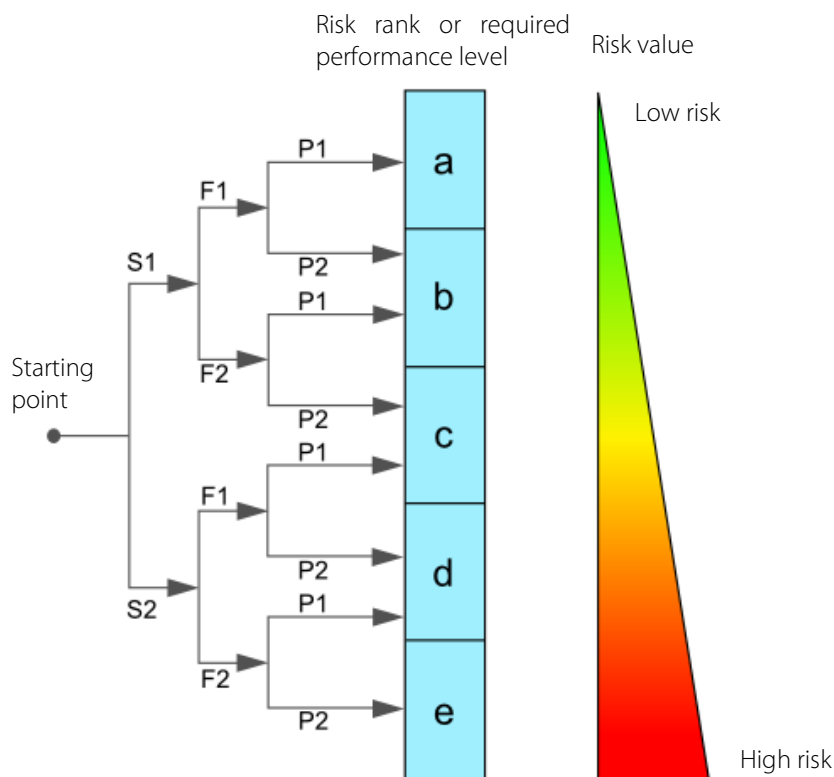
## 18 Risk Assessment

The risk assessment provided in this chapter is intended for all work activities on the product. The hazards can occur in the work steps of assembly, commissioning, maintenance, disassembly and in the event of a product fault. During normal operation, the product is protected by a system cabinet or appropriate covers.

Only qualified personnel is permitted to perform the work. The following minimum knowledge is required for the work:

- Employee instruction provided in process engineering
- Employee instruction provided in electrical engineering
- Detailed knowledge of the instruction manual and the applicable safety regulations

The product complies with the current regulations according to state-of-the-art science and technology. Nevertheless, not all sources of danger can be eliminated while observing technical protective measures. Therefore, the following risk assessment and the description of exposure hazards refer to the work steps mentioned above.



### Severity of injury:

S1 = 1 = minor (reversible injury)

S2 = 2 = serious (irreversible injury, death)

### Frequency and duration:

F1 = 1 = infrequent or short exposure to hazard

F2 = 2 = frequent (more than once per hour/shift)

### Possibility of preventing or limiting the damage

P1 = 1 = possible

P2 = 2 = hardly possible

**Figure 3: Overview risk assessment**



### Aggressive condensate possible

#### Risk rank group A

Chemical burns due to aggressive media possible!

This applies to all liquids in vessels and in the product.

In general, for electrical and mechanical work on the product, wear personal protective equipment (PPE) in accordance with the risk assessment.



### Caution hot surfaces

#### Risk rank group A

The temperature inside the product can be higher than 180 °C.

The hot parts are shielded by mechanical devices. Before opening the products, they must be disconnected from the power supply and a cooling time of more than 180 minutes must be observed. In general, for electrical and mechanical work on the product, wear personal protective equipment (PPE) in accordance with the risk assessment.



### Caution electric shock

#### Risk rank group C

When installing high-power systems with nominal voltages of up to 1000 V, the requirements of VDE 0100 and their relevant standards and regulations must be observed!

This also applies to any connected alarm and control circuits. Before opening the products, they must always be disconnected from the power supply.



### Gas hazard

#### Risk rank group A-B-C

The hazard potential mainly depends on the gas to be extracted.

If toxic gases, oxygen displacing or explosive gases are conveyed with the product, an additional risk assessment by the operator is mandatory.

In principle, the gas paths must be purged with inert gas or air before opening the gas-carrying parts.

The escape of potentially harmful gas from the open process connections must be prevented.

The relevant safety regulations must be observed for the media to be conveyed. If necessary, flush the gas-carrying parts with a suitable inert gas. In the event of a gas leakage, the product may only be opened with suitable PPE or with a monitoring system.

Furthermore, the work safety regulations of the operator must be observed.





### Caution crushing hazard

#### **Risk rank group A**

The work must be performed by trained personnel only.

This applies to products weighing less than 40 kg [ $\approx$  88.2 lbs]:

The product can be transported by 1 to 2 person(s). The instructions for appropriate personal protective equipment (PPE) must be observed.

The weight specifications are contained in the technical data of this product.

Furthermore, the work safety regulations of the operator must be observed.

## 19 Appendix

- Technical drawing: SP2000/3VA320/HP25/HEX5.2
- Technical drawing: SP2000/3VA320/HP25/HEX1.3



More product documentation is available on our Internet catalogue:

[www.mc-techgroup.com](http://www.mc-techgroup.com)



Item	Quantity	Description	Type	Part-number	Material
8	1	Check valve	SS-BOWM-10	<i>93 S 0760</i>	SS316, Viton
9	2	Gasket	#30/15	<i>93 S 0065</i>	Graphite
10	1	Filter element 2micron	S-2K-150	<i>90 S 0080</i>	Ceramik
11	1	O-Ring	Type 68	<i>93 S 0746</i>	SS316/Graphite
12	1	O-Ring	Type 38	<i>93 S 0747</i>	SS316/Graphite
13	1	Weather protection cover	SP2000-H320		Stainless steel
14	4	Hex bolt + nut + washer	M16x70		V4A
15	1	heating cartridge	240V/800W	<i>93 S 0008</i>	

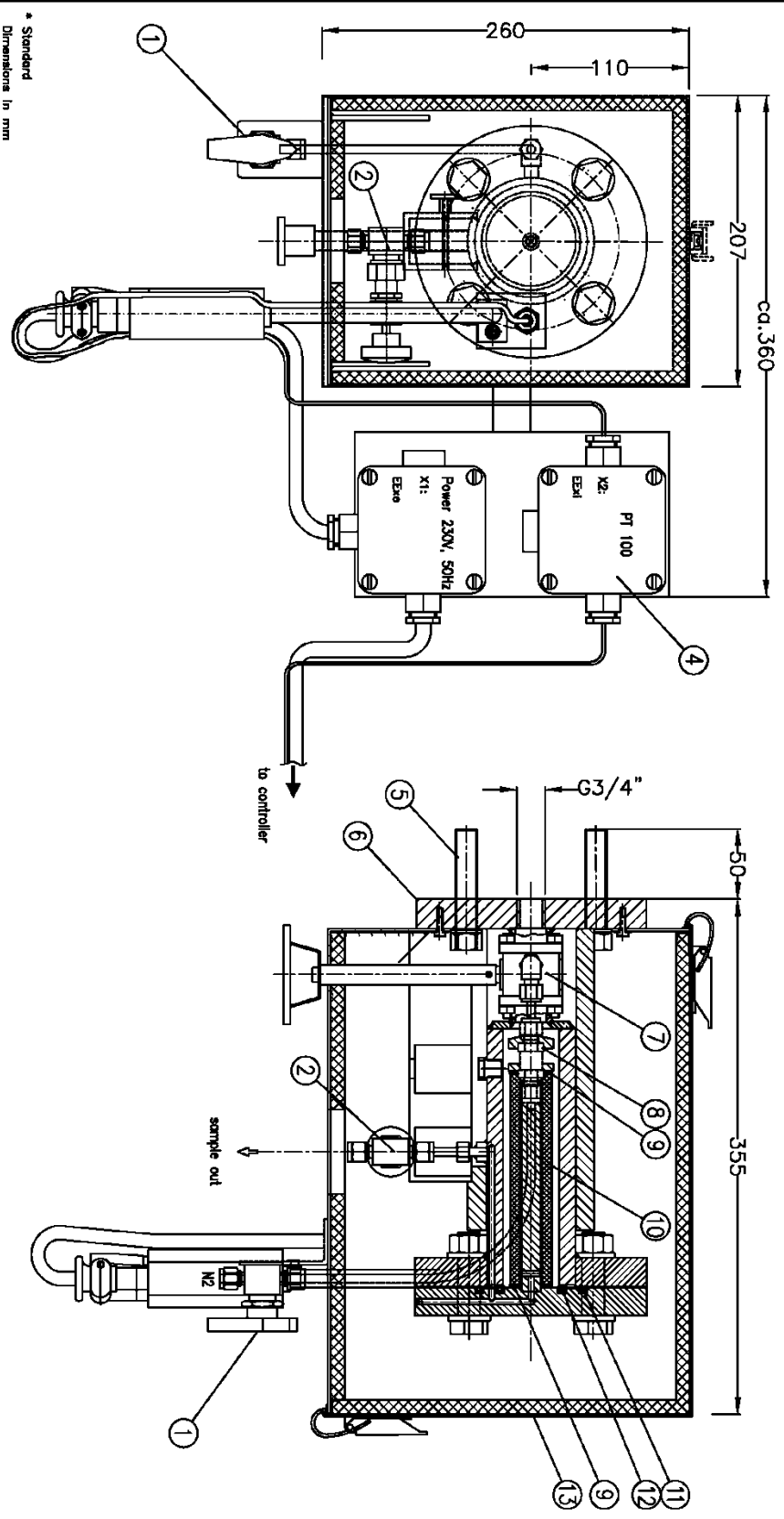
Part number 20S9051  
subject to technical modifications

Drawing No:

[www.mc-techgroup.com](http://www.mc-techgroup.com)

Gas sample probe SP2000-H/3VA320/Hex1.3/2K/HP25/400°C

M & C Techgroup Germany GmbH · Rahlstedt 79 · D-40885 Ratingen · Germany · Telefon 02102-935-0



Item	Quantity	Description	Type	Part-number	Material
1	1	Boil valve 2/2way	SS-425	1722-007	SS316, PTFE
2	1	Needle valve	SS-316S9MM	171-0072	SS316
4	2	Terminal box	120x120		Al, painted
5	4	Threaded rod	M18x65		V4A
6	1	Flange	DIN50140		1.4571
7	1	Boil valve 3/2way	SP2000/VA320		SS316, Gredfil

Item	Quantity	Description	Type	Part-number	Material
8	1	Check valve	SS-62MM-10	88 S 0160	SS316, Viton
9	2	Gasket	450/15	88 S 0065	Graphite
10	1	Filter element 2micron	S-2K-150	80 S 0080	Ceramik
11	1	O-Ring	Type 68	88 S 0148	SS316/Graphite
12	1	O-Ring	Type 38	88 S 0147	SS316/Graphite
13	1	Weather protection cover	SP2000-H320		Stainless steel

Part number  
Subject to technical modifications  
Drawing No: 22041043/05.25

Figure 5: Technical drawing SP2000-H/3VA320/HEX1.3/2K/HP, max. 25 bar, 400 °C