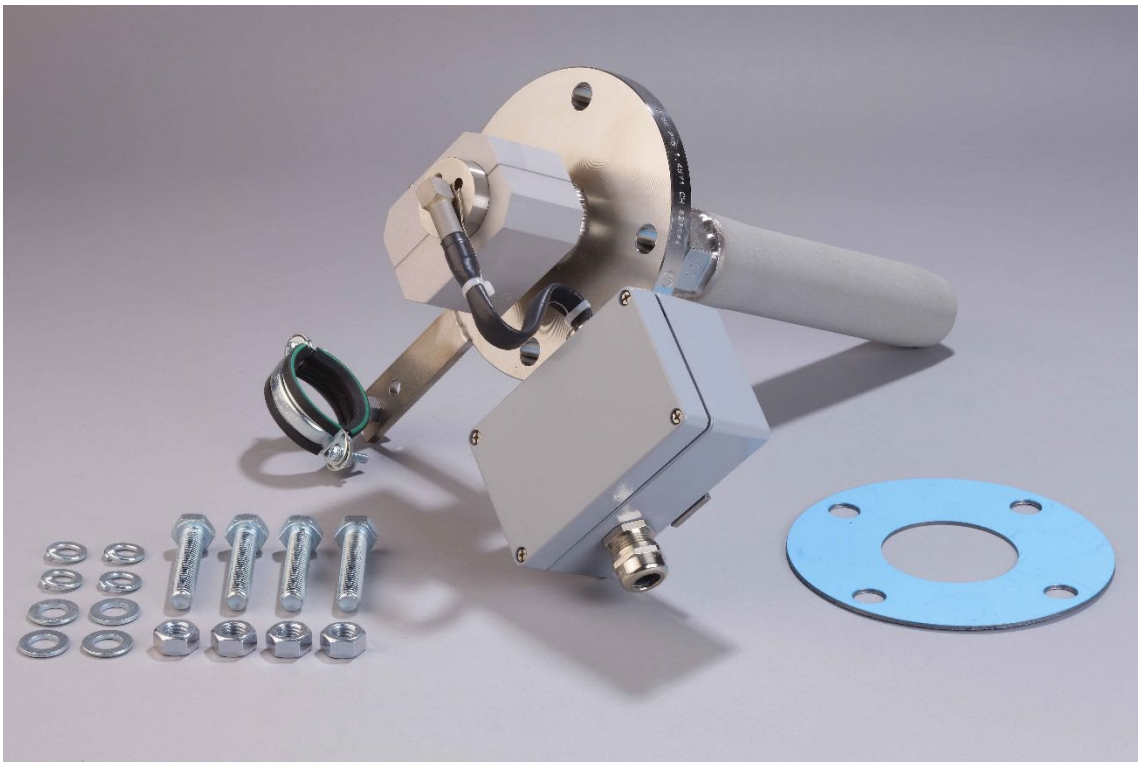
Embracing Challenge

Gas Sample Probe Series SP®

SP10, SP10-H

Instruction Manual
Version 1.01.00



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. There you will find the data sheets and manuals of all our products in German and English.

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: 1.01.00

Content

List of Illustrations

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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:

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

Follow these 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, sun or moisture.

Do not use the device 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.

3.1 Intended Use

The **SP10** gas sample probe is intended for use in general purpose areas (non-hazardous environments). It may only be operated in compliance with the information in chapter 7 Technical Data. Only use the device within the permitted temperature and pressure ranges.

Do not use this product for any other purpose. Improper use and handling can create hazards and cause damage. For more information, please refer to the safety information in this instruction manual.

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

The 'Danger' warning sign indicates that death, serious injury and/or significant material damage will be the consequence, if the appropriate precautions should not be taken.

Warning

The 'Warning' warning sign indicates that death, serious injury or damage to property may occur if the relevant precautionary measures are not observed.

Caution

The 'Caution' warning sign indicates that slight personal injury can occur if the appropriate safety precautions are not observed.

Caution

'Caution' indicates that damage to property can occur if the appropriate safety precautions are not observed.

Note

'Note' indicates important information relating to the product or highlights parts of the documentation for special attention.

Qualified personnel

'Qualified personnel' are experts who are familiar with the installation, mounting, commissioning and operation of these types of products.

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.

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.

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).

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 Introduction

M&C gas sample probes provide direct insitu ultra-fine filtration during continuous gas sampling for analytic measurements. In this way, part of the necessary maintenance work for a system is concentrated on a single point. This filter technology has the major advantage that dust mixtures consisting of ultra-fine and coarse dusts can be optimally retained with the least possible maintenance work.

Optimal adaptation of the **M&C** gas sample probe to processing conditions and to measurement work is a necessary condition for a measurement system to work smoothly. Basically, the gas sample should be kept to a necessary minimum. This is made possible thanks to optimised downstream gas processing using **M&C** components. Only in this way it is possible to reduce maintenance to a minimum while ensuring maximum availability.

7 Application

The **M&C** gas sample probes **SP10** respectively **SP10-H** are used for continuous gas sampling in processes with dust loadings up to 10 g/m^3, operating pressures up to max. 6 bar abs., temperatures up to max. 600 °C and high gas humidities. The modular design allows the combination of different pre-filter materials (max. 900 °C) and length (>10 g/m^3) and therefore an optimum adaption to the process conditions. The compact design requires only little space.

Note

Install the probe at a weather-protected sample point. For outdoor applications please use a version with option weather protection shield.

8 Technical Data

Series **SP**®	Version **SP10**	Version **SP10-H**
Part No.	**01S1000**	**01S2000**
System of protection	IP54 EN 60529	
Sample temperature	V10 max. 600 °C (standard), optionally HC max. 900 °C	
Sample pressure	0.4 to 6 bar abs. (standard)	
Ambient temperature	-20 to +60 °C*	
Dust load	Max. 10 g/m³ (standard), optionally higher 10 g/m³	
In-situ probe length	270 mm (standard)	
Heater temperature adjustable	+100 to +200 °C, optionally with Pt100 without controller	
Ready for operation	After 1 h	
Sample gas outlet connection	1/8"-NPT internal for tube connectors max. ∅ 10 mm	
Power supply	230 V/50 Hz / 240 V/60 Hz 315 W, optionally 115 V/60 Hz 300 W	
Electrical connection	Terminals max 4 mm², 1 x PG13,5 cable gland	
Electrical equipment standard	EN 60529/61010, EN 60519-1	
Mounting flange	DN 65 PN 6, form B, stainless steel 1.4571	
Material of sample connecting parts	SS 316, SS 316Ti, Novapress® (standard)	
Weight	4 kg	

*In case of higher ambient temperatures use option Pt100 (Part No. 20S9025) or thermocouple Fe-CuNi respectively Ni-CrNi (Part No. 20S9027 resp. 20S9028) instead of the thermostat controller. Then, an additional electronic temperature controller (see data sheet for temperature controller) is necessary.

Novapress® is a registered trademark for elastomer-bonded gasket material by Frenzelit GmbH, Germany.

9 Description

The **M&C** gas sample probes are designed for easy installation, reliable operation and trouble-free maintenance. Advantages are:

- Gas sampling with dust loaded processes;
- Low volume, fast response time;
- Different pre-filters as an option.

The gas sample probe is heated up to max. +200 °C.

10 Probe Design

The probe head with its all-round heating element forms a unit with the standard mounting flange DN 65 PN 6 and the laterally mounted junction box.

A mounting clamp and a 1/8" internal thread are located on the underside of the probe for the connection of heated **M&C** gas sampling lines with external diameters of 40 mm to a max. 55 mm and a tube diameter of max. 10 mm.

After assembly of the sample line and the tube connector the sample gas outlet connection is enclosed with the heat conducting shells. The maximum operating temperature for stainless steel pre-filters type **V10..** is 600 °C and for the pre-filters **V10..HC** 900 °C.

The modular system of our gas sample probes allows the usage of all **M&C** pre-filters type **V10** and extension tubes type **Vo** and **Vm** with 1" thread. This guarantees an optimal adaptation to the process conditions.

The following cross-sectional drawing shows the gas sample probe **SP10-H.**

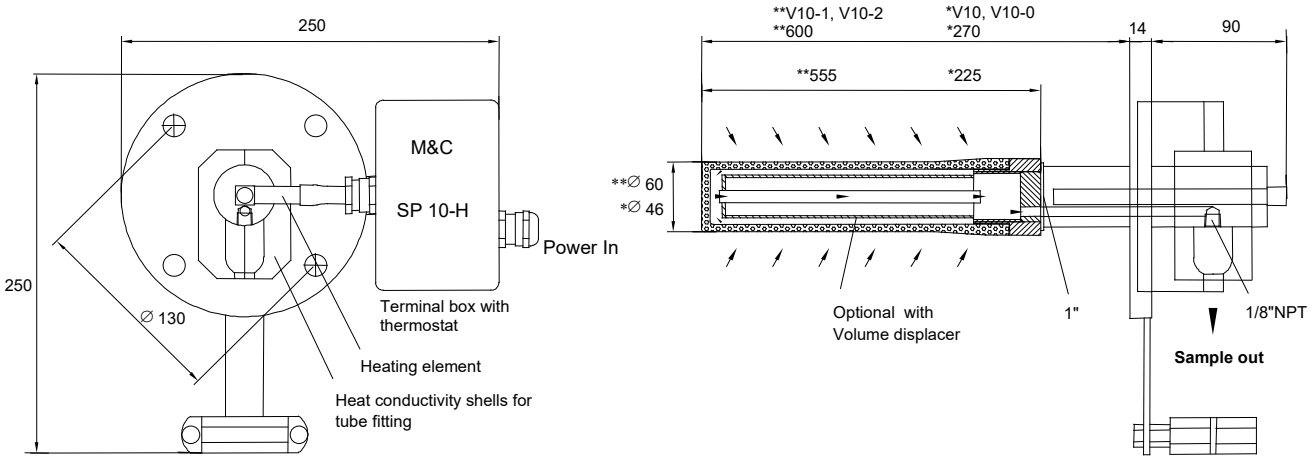


Figure 1 Dimensions SP10-H

11 Receipt of Goods

The **M&C** gas sample probe is normally delivered in one unit. It comprehends the gas sample probe with pre-filter, screws, nuts and flange gasket.

Note

The gas sample probe 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.

12 Preparation for Installation

Please pay attention to the following points:

- Select the optimal sampling point in accordance with the generally applicable guidelines or consult the competent persons.
- Locate the sampling point in such a way that there is adequate space for inserting and removing the gas sample probe and pay attention to the insertion length of the probe tube.
- Make certain that the gas sample probe is easily accessible so that you can carry out any subsequent maintenance work without trouble.
- Design and isolate the bleeder connection in such a way that the temperature of the whole connection is always above the acid dew point in order to avoid corrosion and blockage problems.
- If the ambient temperature in the area of the bleeder connection is > 80 °C as a result of radiated heat, then a radiated heat deflector must be mounted to protect the probe.
- The mounting flange at the bleeder connection should comply with DN 65 PN 6. If other connection sizes are required, a special adapter flange can be supplied as an option (Part No. 20S9004).

Before mounting, the gas sample probe must be adjusted to the existing operating conditions. We recommend to check the existing parameters accordingly to the following table:

Weatherproof mounting position	**_____present**	**_____install**	
Low/overpressure situation	**mbar**	**bar**	
Process temperature	**°C, Min.**	**°C, Max.**	
Dust loading	**g/m³**		
Dust composition - grain size	**µm**		
Gas composition	**corrosive**	**toxic**	**explosive**
Parameters to be measured, e.g. 0_2, CO, SO_2, NO_X, ...,	**vol%**	**mg/Nm³**	**ppm**
Required gas flow	**l/h, Min.**	**l/h, Max.**	
Required reaction time T90	**sec.**		

13 Mounting

M&C SP10 resp. **SP10-H** gas sample probes are designed for stationary use and if properly selected and mounted a long service life and maintenance are guaranteed.

It is advisable to mount the gas sample probe in a position which has a 10° inclination to the process (not necessary for the function of the probe).

Screw the prefilter directly on to the 1" outer thread with the 1" flat gasket and tighten.

If an extension tube is used, it should be mounted between the gas sample probe and the pre-filter.

If the gas sample probe connection does not correspond to the standard flange connection DN 65 PN 6, then the optionally supplied adapter flange should be mounted to the probe.
Before fixing the gas sample probe at the bleeder connection first attach the flange gasket to the mounting flange.

The temperature-resistant, stainless steel connectors supplied by **M&C** have a double-blade ring system to ensure reliable sealing. After tightening the nuts of these connectors by hand, they should then be tightened exactly 1 1/4 of a turn using a flat spanner and are then properly mounted.

Note

If a PTFE tube is used as sample line, an insert must be installed in the end of the tube in order to prevent the tube being pressed together!

Now place the heat conductivity shells on the connection of the gas sample line and prove it's fit to prevent cold spots.

14 Electrical Connections

For the electrical installation take the relevant safety instructions into consideration. Before connecting the probe ensure that the mains is voltage-free.

Warning

When connecting the equipment, please ensure that the supply voltage is identical with the information provided on the model type plate!

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!

The junction box is mounted on the side of the gas sample probe. The wiring plan is located in the lid of the junction box. A cable bushing is available for the mains cable.

Carry out the following steps:

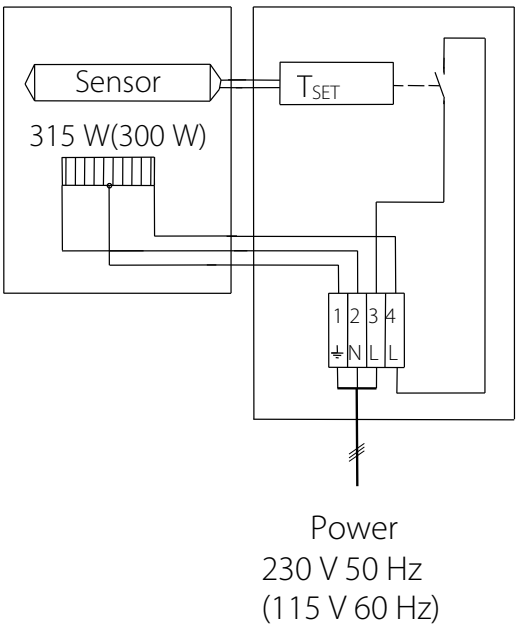


Figure 2 Electrical connection SP10-H

1. Remove the lid of the junction box;
2. Insert the mains cable (min. 3 x 1.5 mm^2) through the cable gland and connect it to the appropriate terminals as in the wiring above;
3. Screw lid back on;

15 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.

16 Start up

Before starting up check whether the mains power supply voltage corresponds with the information stated on the probe's nameplate.

Switch on mains power supply.

The total heating-up time is approximately 1 hour. The sample gas can now be extracted via the gas sample probe after this heating-up time.

17 Maintenance

The safety instructions specific to the plant and process are to be consulted prior to any maintenance work!

Warning

Before starting maintenance work on electrical parts ensure that the mains and the eventually connected alarm and control circuits are switched off completely!

Maintenance cycles have to be carried out depending on your process or ambient conditions. An indication for a possible gas sample probe maintenance could be a constant decline in the amount of sample gas to the analysis system.

Probe maintenance is restricted essentially on replacing or cleaning the pre-filter. The pre-filter can be cleaned for example in an ultrasonics bath.

Warning

High surface temperatures. Wear protective gloves!

To change or clean the pre-filter the gas sample probe has to be dismounted.
For this loosen the 4 screws at the flange and remove the gas sample probe from the process.
Unscrew pre-filter from the probe body and screw on the new or cleaned pre-filter.

18 Closing Down

Before switching off, that means switching off the heating, the **M&C** gas sample probe should be flushed with inert gas or air in order to avoid condensation of aggressive components from the process gas. After that, close gas outlet tight.

There are no other precautions to take.

19 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.

20 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.

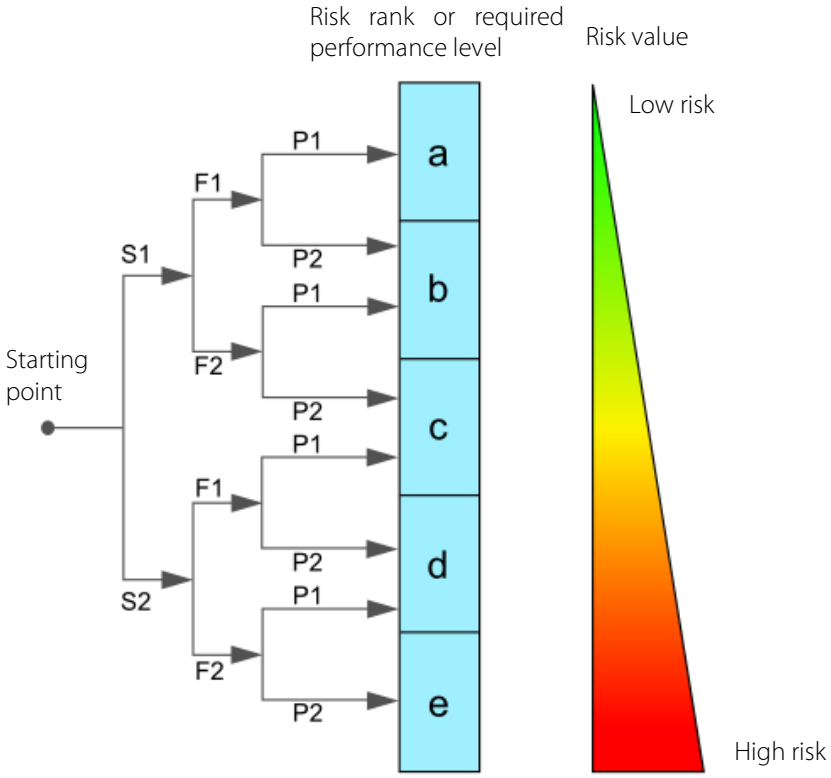
M&C Gas sample probe SP®10, SP®10-H					
(C) Consumable part (R) Recommended spare parts (S) Spare parts (b.d.) by demand					
			Recommended quantity for operation [years]		
Part No.	Description	C/R/S	1	2	3
90S1005	In-situ stainless steel filter type V10, without volume displacer Filter porosity: 2 µm, Length: 225 mm, 51 mm OD, Material: SS 316	V	b.d.	b.d.	b.d.
90S1010	In-situ Hastelloy filter type V10/HC, without volume displacer Filter porosity: 2 µm, Length: 225 mm, 51 mm OD, Material: Hastelloy® C4	V	b.d.	b.d.	b.d.
90S1012	In-situ Hastelloy® filter type V10-0/HC, with volume displacer Filter porosity: 2 µm, Length: 225 mm, 51 mm OD, Material: Hastelloy® C4	V	b.d.	b.d.	b.d.
90S1015	In-situ stainless steel filter type V10-1, with volume displacer, filter porosity: 2 µm, length: 550 mm, 60 mm OD, material: SS 316	V	b.d.	b.d.	b.d.
90S1016	In-situ Hastelloy® filter type V10-1/HC, with volume displacer, filter porosity: 2 µm, length: 550 mm, 60 mm OD, material: Hastelloy® C4	V	b.d.	b.d.	b.d.
90S1017	In-situ stainless steel filter type V10-2, without volume displacer, filter porosity: 2 µm, length: 550 mm, 60 mm OD, material: SS 316	V	b.d.	b.d.	b.d.
90S1018	In-situ Hastelloy® filter type V10-2/HC, without volume displacer, filter porosity: 2 µm, length: 550 mm, 60 mm OD, material: Hastelloy® C4	V	b.d.	b.d.	b.d.
90S1020	Gasket 1" for SP10/11/21/31, V10	E	b.d.	b.d.	b.d.
90S2077	Flange gasket DN 65 PN 6B (67), material: Novapress®	E	b.d.	b.d.	b.d.
90S0005	Cartridge heater element for SP10/23H, SP23, Filter H/H0, L=130 mm, 230 V AC/315 W.	E	b.d.	b.d.	b.d.
90S0006	Cartridge heater element for SP10/23H, SP23, Filter H/H0, L=130 mm, 115 V AC/300 W.	E	b.d.	b.d.	b.d.
90S0011	Thermostat 100 – 300 °C for SP21-H/300 probe diameter 8 mm.	E	b.d.	b.d.	b.d.
93S0018	Temperature resistant heat sink compound, 100 g.	E	b.d.	b.d.	b.d.

21 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 [≈ 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.

22 Appendix

More product documentation is available on our Internet catalogue:
www.mc-techgroup.com