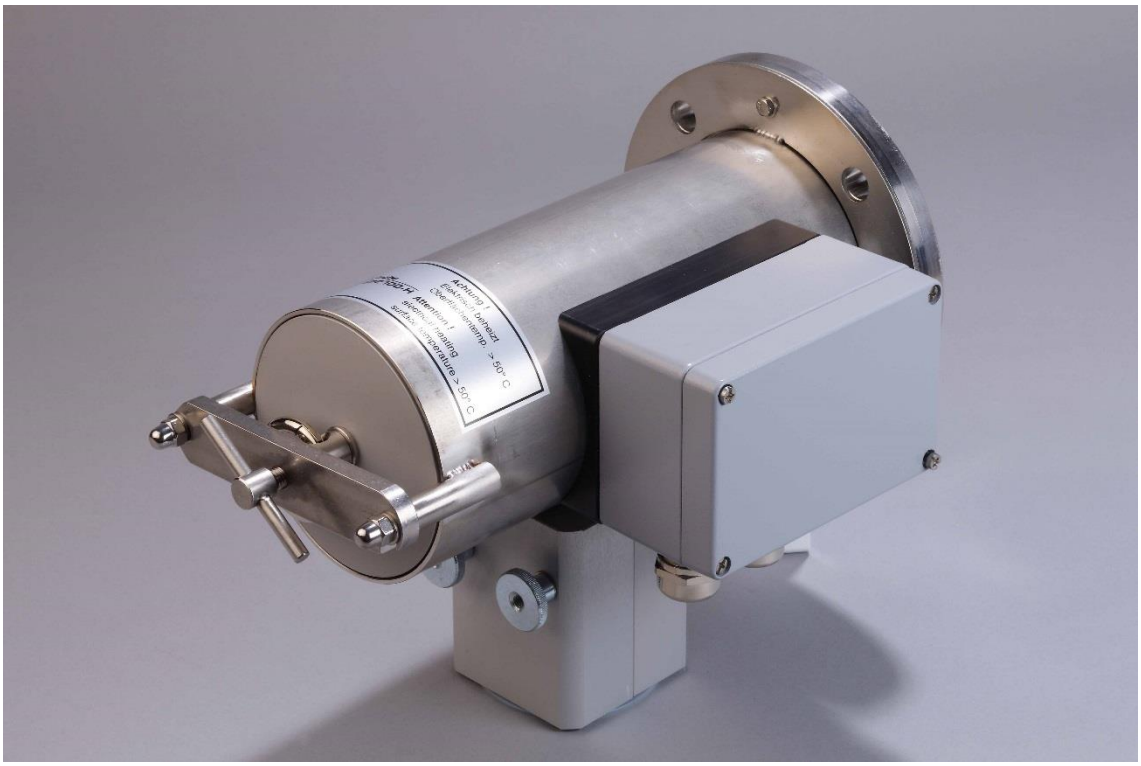
Embracing Challenge

Gas sample probe Series SP®

SP2100-H

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

Content

List of illustrations

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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 device 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 through your **M&C** authorised 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 unit. 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 send 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

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 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 is it possible to reduce maintenance to a minimum while ensuring maximum availability.

6.1 SERIAL NUMBERS

The nameplates bearing the serial number are located on the side of the electrical connection box. Always quote the device's serial number when making enquiries and ordering replacement parts.

6.2 POWER SUPPLY

The probe can be operated on alternating current in the range from 110 to 240 V.

7 TECHNICAL DATA

Probe series SP®	**compact version SP 2100-H**
Part No.	10S1000
Sample tube	Type SS, stainless steel 316Ti, length 1 m*
Sample temperature	max. 600 °C*
Sample pressure	0.4 to 2 bar abs.
Ambient temperature	-20 °C to +60 °C
Recommended for dust loadings	up to 2 g/m³*
Filter chamber volume	120 ml
Filter element	S-2K 150, filter porosity 2 µm, ceramic
Probe heating temperature	+180 °C self-regulating
Ready for operation	after 2 hours
Temperature alarm contact, alarm point	<160 °C, NO
Temperature alarm, contact rating	250V-3A AC, 30V-3A DC
Connection sample outlet	1/4"-NPT inside, for max. 10 mm tube connectors
Power supply	110 up to 240V 50 / 60Hz
Power consumption	start up: 400VA, usual: 100VA, (fuse 6A)
Electrical connection	terminals max. 2,5 mm², 2x PG11 cable gland
Electrical equipment standard	EN 61010, EN 60335-1
Degree of protection	IP54, EN 60529
Mounting flange	DN65 PN6,B stainless steel 316Ti
Material of sample contacting parts	SS 316 / 316Ti, FPM, ceramic
Weight	9 kg
Options	not available

* Standard, other versions on request.

ΔP und T90 at flow of:	100	200	500	1000	Nl/h
ΔP pressure loss with new filter element S-2K150:	0,007	0,011	0,020	0,035	bar
T90 time-without sample tube/prefilter-	6,0	3,5	1,0	<0,5	sec

8 APPLICATIONS

The patented **M&C SP2100-H** gas sample probe is used for continuous gas sampling in processes with dust densities of up to 2g/m³, operating pressure up to max. 2 bar abs., temperatures of up to a maximum of 600°C or higher gas humidity. Thanks to its compact design it requires only limited space. It has to be mounted in a weatherproof position.

9 DESCRIPTION

The sample probes are designed for easy installation, reliable 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 and the probe tube can be cleaned without removing the probe: these are just a few of the many advantages offered by this probe.

The 2 µm ceramic filter element, which has a large surface, is located in a stainless steel filter housing.

The gas sample probe is heated up to + 180°C using a special self-regulating heating element. No thermostat or temperature limiter is necessary.

A separate thermo switch is provided for under-temperature monitoring (< 160°C, NO).
Probe Structure:

The filter housing with its all-round heating element forms a unit with the standard mounting flange DN65 PN6 and the laterally mounted electrical connection socket.

Mounting jaws are located at the aperture on the underside of the outer protective casing. These have an integrated silicon cap for the connection of heated M&C sampling tubes with external diameters of 40 mm to a max. 55 mm.

The probe sample gas outlet connection has a ¼" NPT internal thread to which the customer must connect a suitable size of temperature resistant and threaded connector to connect the sample line in a gas tight manner. These connectors can be supplied by M&C.

After assembly of the bolted pipe joint and of the sampling tube the sample gas outlet connection is enclosed with the red silicon insulation provided. The mounting jaws and the integrated silicon cap close off the connection to the exterior.

In order to sample gases, a one-meter long, stainless steel sampling tube is mounted in the mounting flange. The maximum operating temperature for the sampling tube is 600° C.

Depending on the process gas temperature and composition or critical set up situations, heated probe elements made of stainless steel with flange connection DN65 PN are used:

Type	Process temperature	Length Standard/max.	Tube, outer diameter
SP30H1, heating max. 320°C	up to max. 550 °C	1,0m / 2,0m	40mm
SP30H2, heating max. 200°C	up to max. 200 °C	1,0m / 2,0m	40mm
SP35H, heating max. 320°C	up to max. 550 °C	0,175m	40mm

10 RECEPTION

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 with gasket.

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.

11 PREPARATION AND INSTALLATION

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 probe and pay attention to the insertion length of the probe tube.
Make certain that the probe is easily accessible so that you can carry out any subsequent maintenance work without trouble.

Locate the probe connections in such a way that the connections' temperature is always above the acid dew point in order to avoid corrosion and blockage problems. If this is not possible, a heated **SP35/SP30** probe tube is recommended for cold connections.

If the ambient temperature in the area of the connections is >80°C as a result of radiated heat, then a radiated-heat deflector must be mounted to protect the probe.

The connection's mounting flange connection should comply with DN65 PN6. If other connection sizes are required, a special adapter flange **/S010** can be supplied as an option.

Before mounting, the probe must be adjusted to the existing operating conditions. The existing operational parameters are to be checked accordingly prior to commencing mounting work.

weatherproof mounting position	**_____present**	**_____set**	
Under / over pressure situation	**mbar**	**bar**	
Process temperature	**°C, Min.**	**°C, Max.**	
Dust loading	**g/m³**		
Dust composition - grain size	**µm**		
Gas composition	**corrosive**	**toxic**	**explosive**
Which parameters should be measured, e.g. O_2, CO, SO_2, NO_X,..,	**Vol.%**	**mg/Nm³**	**ppm**
Required amount of gas	**l/h, Min.**	**l/h, Max.**	
Necessary T_{90} time	**sec.**		

12 MOUNTING

M&C **SP2100-H** probes are designed for stationary use and if properly selected and mounted a long service life and minimum maintenance are guaranteed.
It is advisable to mount the probe in an operational position which is at a 10% inclination to the process.

Checking the filter element:

- Turn the U-bolt at the front end of the filter receptacle several times 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. Replace the filter receptacle
- Place the retaining bolt in its original position and tighten the U-bolt.

Connection of the heated sample line:

- Remove the heat-conducting shoes 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 !

- Push the silicon cap onto the end of the heated sampling tube and introduce the tube connection piece into the bolted pipe joint and connect.
- If a PTFE tube is used as sample line, a carrying bracket must under all circumstances be inserted in the end of the tube in order to prevent the tube being pressed together.
- 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 1¼ of a turn using a flat spanner and are then properly mounted.
- Now place the red silicon heat insulation around the connection and push the mounting jaws sideways onto the mounting disc and tighten with the knurled nuts.

Mounting of sample tube and adapter flange:

Screw either the probe tube directly into the ¾" inner thread in the flange of the probe with the ¾" flat gasket and tighten.
If the heated probe tube type **SP30/35** is used then the probe is to be screwed to their flange (with welded threaded bolt). First insert the flange seal between the two flanges.
If the probe connection does not correspond to the standard flange connection DN65 PN6, then the optionally supplied adapter flange should be mounted to the probe in the same way.
Now insert the process-internal probe section of the complete probe unit into the probe connection, but first attach the flange seal to the probe connection and screw using the screws and nuts supplied.

NOTE!

A preferred mounting position is to have the probe with its sample gas outlet pointing downwards, although this is not absolutely necessary for perfect functioning.

13 ELECTRICAL CONNECTION

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.

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.

It is recommended to use the low temperature alarm. In case of an alarm the flow can be stopped and the components downstream the probe are safe for demage.

- Remove the lid of the connection socket. The electrical connection layout is located in the lid.
- Insert the mains cable (min. 3 x 1.5 mm²) through the threaded cable connection and connect to the appropriate terminals.
- Insert the signal cable through the threaded cable connection and connect to the appropriate terminals. Screw lid back on.

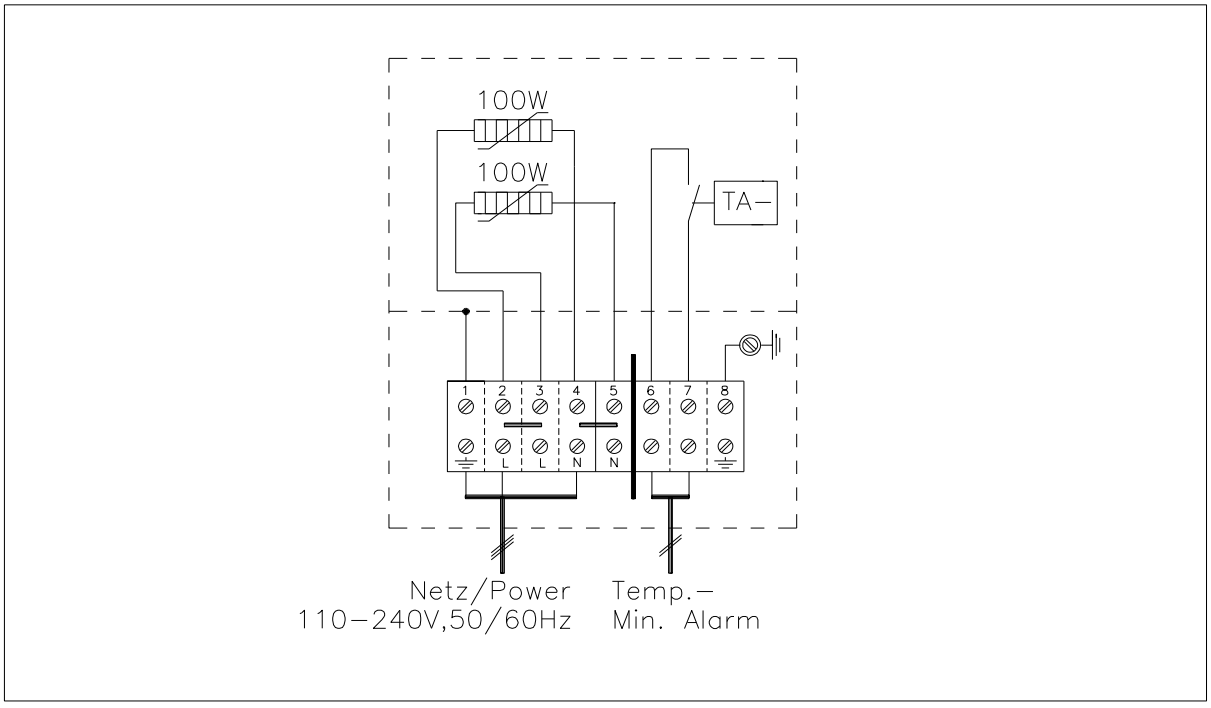


Figure 1 Electrical connection diagram

14 STARTING 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 2 hours. After about 1 hour the probe is already sufficiently heated for the temperature to have exceeded the temperature failure alarm value (160°C), but it still takes about another hour until operating temperature is reached.

The sample gas can now be extracted via the probe after this minimum heating-up time of 2 hours.

15 MAINTENANCE

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

NOTE!

Prior to carrying out maintenance work on electrical parts, mains voltage should be disconnected from all poles!
This also applies to any external control circuits which may be connected.

It is difficult to give any recommendations as to a particular maintenance cycle. Depending on your process conditions, a meaningful maintenance cycle must be elaborated for the specific application.
An indication that probe-maintenance may be necessary could be shown by a constant decline in the amount of sample gas in the analysis system.

Probe maintenance is restricted essentially to replacing filter elements and checking seals:

WARNING!

Aggressive condensate is possible.
Wear protective glasses and proper protective clothing!
High surface temperatures!
Wear protective gloves!

- Loosen U-bolt, swing retaining bolt to the left, hold filter receptacle by the ring
- and draw out.
- Screw out the filter's knurled screw and renew filter element.
- Check filter element seals and replace if necessary.
- Check O-rings in the lid and change if necessary.
- Clean filter chamber.
- It is now also possible to rod through the probe tube in order to remove deposits.
- Replace filter receptacle, swing retaining bolt to the right and tighten the U-bolt firmly.

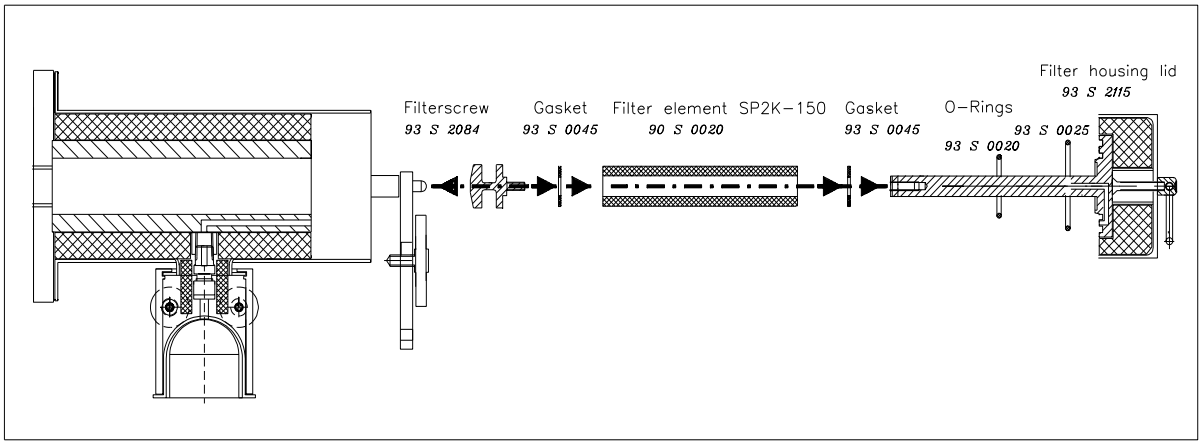


Figure 2 Replacing the filter element

16 SWITCHING OFF

Before switching off, i.e. switching off the heating, the probe be flushed with inert gas or air in order to avoid condensation of aggressive components from the process gas.

17 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.

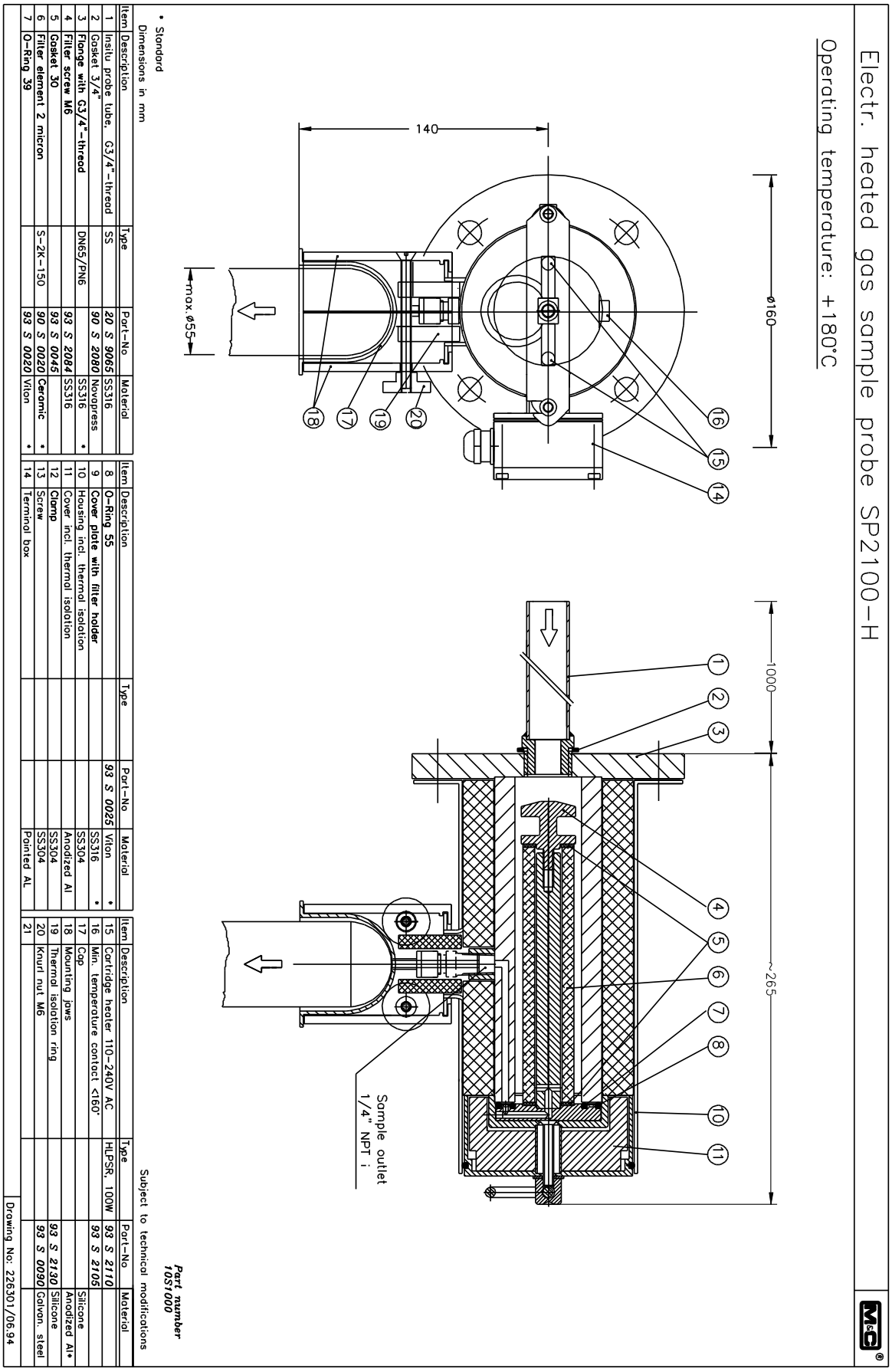
Gas sample probe SP2100-H					
(C) Consumable parts **(R) Recommended spare parts** **(S) Spare parts**					
		Recommended quantity being in operation [years]			
Part No.	**Indication**	**C/R/S**	**1**	**2**	**3**
90 S 0020	Ceramic filter element **S-2K150,** 2 µm, 150 mm	C	6	12	18
93 S 0045	Viton - gasket (30)	R	4	8	12
93 S 0020	Viton O-ring (39)	R	2	4	8
93 S 0025	Viton O-ring (55)	R	2	4	8
90 S 2080	Novapress gasket 3/4" *(blue)*, max. 600°C	R	1	2	3
90 S 2077	Novapress flange gasket DN65PN6 (67mm i.)	R	1	1	1
90 S 2075	flange gasket set for **DN65 PN6 B,** consisting of Novapress gasket (67mm i.) and screws set M12	S	1	1	1
93 S 2105	Min. temperature contact <160°C	R	1	1	1
93 S 2110	Cartridge heater HLPSR, 100mm, 110-240V 100W	R	2	2	4
93 S0085	Hand screw M8 for filter housing	S	-	-	-
93 S 2125	Clamp LK115	S	-	-	-
93 S 2115	Filter housing lid compl. with Viton O-ring lid seals and filter element clamp, SP2100-H owithout filter element and gaskets	S	-	-	1
93 S 2084	Filter element mounting screw M6, SS316	R	-	1	1
93 S 0090	Finger screw M6 for thermoblock "sample out"	S	2	2	2
93 S 2130	Silicon-thermal insulation (red)	R	0	1	1
93 S 0028	Viton O-Ring (94)	E	0	0	1
20 S 9065	1m insitu probe tube SP2100/SS out of SS316	R	0	1	1

18 APPENDIX

- Drawings - dimensions and mechanical construction **no. 226301**

Further product documentation can be seen and downloaded from our home page:
www.mc-techgroup.com

- Sample tubes series **SP,** Document: **2-1.1.0.6**
- Prefilter series **SP,** Document: **2-1.1.0.8**



Item	Description	Type	Part-No	Material
1	Insitu probe tube, G3/4"-thread	SS	20 S 9065	SS316
2	Gasket 3/4"		90 S 2080	Novapress
3	Flange with G3/4"-thread	DN65/PN6		SS316 *
4	Filter screw M6		93 S 2084	SS316
5	Gasket 30		93 S 0045	
6	Filter element 2 micron	S-2K-150	90 S 0020	Ceramic *
7	O-Ring 39		93 S 0020	Viton *
8	O-Ring 55		93 S 0025	Viton *
9	Cover plate with filter holder			SS316 *
10	Housing incl. thermal isolation			SS304
11	Cover incl. thermal isolation			Anodized Al
12	Clamp			SS304
13	Screw			SS304
14	Terminal box			Painted AL
15	Cartridge heater 110-240V AC	HLPSR, 100W	93 S 2110	
16	Min. temperature contact <160°		93 S 2105	Silicone
17	Cap			Anodized Al*
18	Mounting jaws			
19	Thermal isolation ring		93 S 2130	Silicone
20	Knurl nut M6		93 S 0090	Galvan. steel
21				

Figure 3 Dimensions and mechanical construction SP2100-H