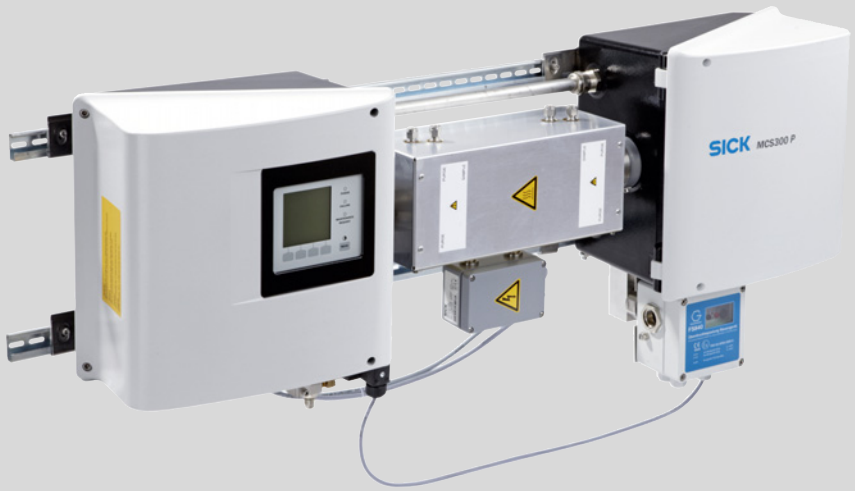
OPERATING INSTRUCTIONS

MCS300P Ex

Multicomponent Analysis System

SICK
Sensor Intelligence.



Described Product
Product name: MCS300P Ex

Manufacturer
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SICK AG
Rengoldshauser Str. 17a · 88662 Überlingen · Germany

Legal Information

Original document
This document is an original document of SICK AG.

Contents

1 Important information

1.1 Symbols and document conventions

1.1.1 Warning symbols

Symbol	Significance
	Hazard (general)
	Hazard by voltage
	Hazard by toxic substances
	Hazard in potentially explosive atmospheres
	Hazard by explosive substances/mixtures
	Hazard by noxious substances
	Hazard by high temperature or hot surfaces
	Hazard for the environment/nature/organic life

1.1.2 Warning levels and signal words

DANGER: Risk or hazardous situation which *could* result in severe personal injury or death.
WARNING: Risk or hazardous situation which *could* result in severe personal injury or death.
CAUTION: Hazard or unsafe practice which *could* result in less severe or minor injuries.
NOTICE: Hazard which *could* result in property damage.

1.1.3 Information symbols

Symbol	Significance
	Information on product condition with regard to explosion protection
	Important technical information for this product
	Important information on electrical or electronic functions

1.2 Main safety information

CAUTION: Risk of explosion in potentially explosive atmospheres

- Do not open when an explosive atmosphere is present. (Enclosure contains batteries).
- Wait 15 minutes after switching off the main power supply before opening the enclosure.

CAUTION: Health risk through dangerous measured medium

The operator is responsible for the safe handling of the measured medium.

- In addition to these Operating Instructions, follow all local laws, technical rules and company-internal operating directives applicable at the respective installation location of the MCS300P Ex.
- Operate the MCS300P Ex only in adequately ventilated rooms
  OR
  install a suitable gas monitor.
- Feed and drain the measured medium in a safe manner.
- Regularly check the state of the device/module seals.
- Only open the device when well ventilated, especially when a leak of a device component is suspected.

CAUTION: Risk of suffocation when opening the enclosure

Protective gas escapes when the enclosure is opened.
Risk of suffocation when using inert protective gas.

- Do not inhale the escaping gas when opening the enclosure.

1.3 Intended use

1.3.1 Purpose of the device

The MCS300P Ex measuring equipment serves for process monitoring of gases and liquids and for raw gas monitoring in combustion plants.

The measured medium is extracted at a sampling point and led through the cell of the MCS300P Ex (extractive measurement).

1.3.2 Installation location

MCS300P Ex is intended for indoor operation.

1.3.3 Operation in potentially explosive atmospheres

ATEX

The MCS300P Ex meets the following qualifications in accordance with ATEX Directive 2014/34/EU:

- Ⓔx II 2G Ex pxb IIC T4 Gb *or*
- Ⓔx II 2G Ex pxb IIC T3 Gb

or

- Ⓔx II 3G Ex pzc IIC T4 Gc *or*
- Ⓔx II 3G Ex pzc IIC T3 Gc

IECEx

The MCS300P Ex meets the following qualifications in accordance with IECEx:

- Ex II 2G Ex pxb IIC T4 Gb *or*
- Ex II 2G Ex pxb IIC T3 Gb

or

- Ex II 3G Ex pzc IIC T4 Gc *or*
- Ex II 3G Ex pzc IIC T3 Gc

Further information: see “Explosion protection according to ATEX/IECEx”, page 15

1.3.4 Combustible sample gas

When used with an appropriate SICK cell, the MCS300P Ex is capable of measuring combustible and occasionally ignitable gases (corresponding to Zone 1).

Further information on measuring combustible and ignitable gases: see “Explosion protection according to ATEX/IECEx”, page 15

1.4 Responsibility of user

Designated users

The MCS300P Ex should only be installed and operated by skilled technicians who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

Correct use

This Manual presumes that the MCS300P Ex has been delivered as specified during project planning (i.e., based on the SICK application questionnaire) and the relevant delivery state of the MCS300P Ex (delivered System Documentation).

- ▶ If you are not sure whether the MCS300P Ex complies with the planned configuration or the delivered System Documentation:
  Please contact SICK Customer Service.

- ▶ Use the device only as described in these Operating Instructions.
  The manufacturer assumes no responsibility for any other use.
- ▶ Perform the specified maintenance work.
- ▶ Do not remove, add or modify any components to or on the device unless described and specified in the official manufacturer information. Otherwise:
  - Any warranty by the manufacturer becomes void.
  - The device could become dangerous.

Special local conditions

- ▶ Follow all local laws, regulations and company-internal operating directives applicable at the installation location.

Retention of documents

These Operating Instructions:

- ▶ Must be kept available for reference.
- ▶ Must be passed on to new owners.

1.5 Additional documentation/information

▶ Observe the supplied documents.

Additional instructions

The following documents are applicable in addition to these Operating Instructions:

- Operating Instructions of the cell used
- “Modular I/O System” Operating Instructions
- *For MCS300P Ex for ATEX/IECEx category 2G / Gb:*
  - Pressurized enclosure system F850S Manual
  - Ex Relay SR852 (interface relays) Manual
  - Ex Relay SR853 (power relay) Manual
- *For MCS300P Ex for ATEX/IECEx category 3G / Gc:*
  - Pressurized enclosure system F840 Manual
  - Optional: Ex Relay SR853 (power relay) Manual

System Documentation

Some parameter settings, components and characteristics depend on the individual device configuration. The delivery state is documented in the System Documentation provided.

The individual characteristics include for example:

- Measured components and measuring ranges
- Additional equipment (options)
- Basic settings

2 Product description

2.1 Product identification

Product name:	MCS300P Ex
Manufacturer:	SICK AG Erwin-Sick-Str. 1 · D-79183 Waldkirch · Germany
Production location:	SICK AG Rengoldshauser Str. 17a · 88662 Überlingen · Germany

The type plate is located on the sender unit next to the cell flange.

Type plate

Observe the Ex marking on the type plate.

Example:

SICK
MCS300P-EXxxx (xxx = internal type number)
SN: yyww nnnn (serial number: Year, week, consecutive number)
BVS 10 ATEX ... (= number of ATEX Type Examination Certificate)
BVS 17 IEC ... (= number of IECEx Certificate)
+5 °C ≤ Ta ≤ 40 °C
II 2G Ex pxb IIC T4 Gb
Operating voltage
Power input
Number of supervising body

2.2 Features of the MCS300P Ex

The MCS300P Ex has customized equipment.
▶ For the equipment fitted on your MCS300P Ex, see the System Documentation provided.

Fig. 1: MCS300P Ex category 3G with pressurized enclosure system

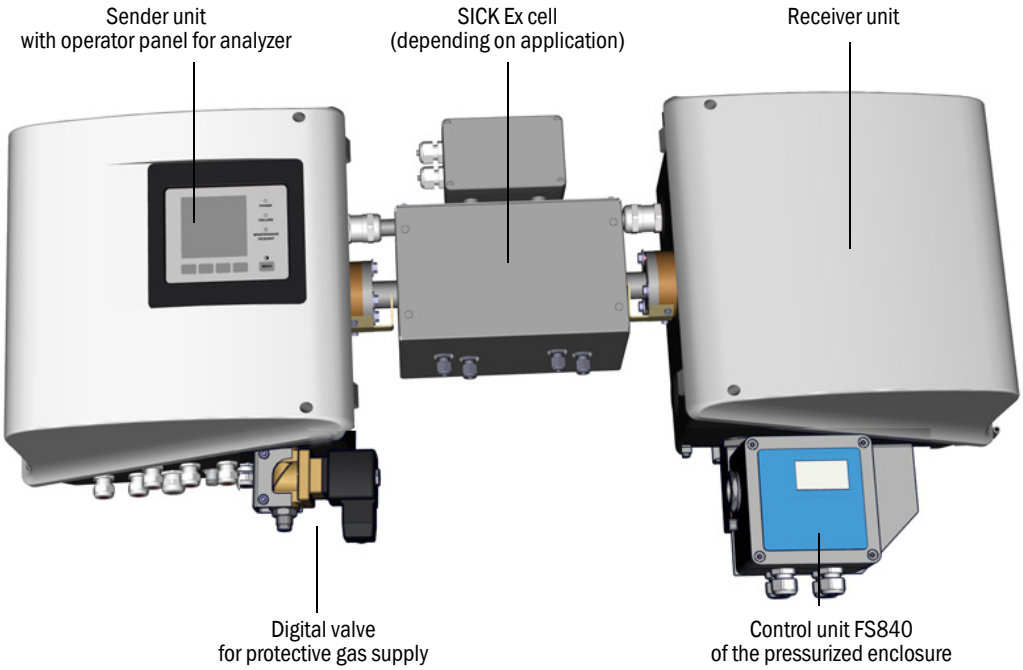
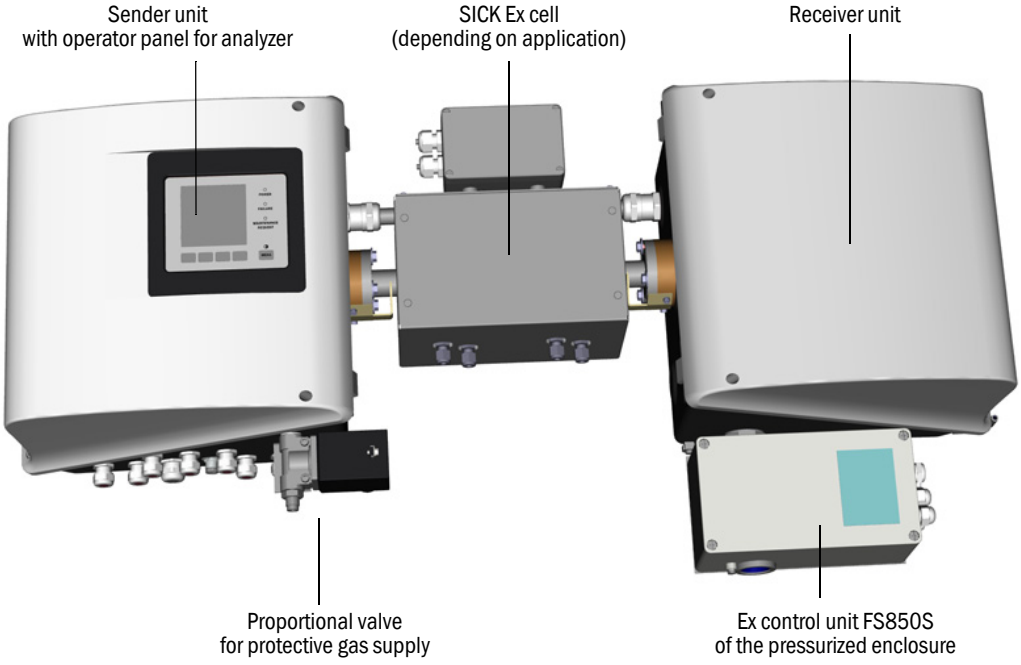


Fig. 2: MCS300P Ex category 2G with pressurized enclosure system



Function

The MCS300P Ex serves for process monitoring of gases and liquids as well as for raw gas monitoring in combustion plants.

The measured medium is extracted at a sampling point and led through the cell of the MCS300P Ex (extractive measurement).

Photometer

Spectral acquisition of gas concentrations: Non-dispersive photometer with interference and optional gas filters.

Gas components and measured values

Number of gas components: 6 simultaneously.

Correction of cross-sensitivity values: Max. 6.

Internal computation of measured values (depending on parameter settings): Cross-sensitivity compensation, scaling (pressure, temperature), conversion to “dry flue gas”.

Measuring range switch-over and sampling points

Number of measuring ranges: 2 measuring ranges per component.

Number of sampling points: Max. 8.

Cells

The intended cell has been fitted according to the preceding project planning (→ System Documentation provided).

External signals and sensors

External analog and digital signals can be read in.gas pressure and sample gas temperature can be acquired via external sensors, their signals fed to the MCS300P Ex and computed there.

2.3 Explosion protection according to ATEX/IECEx

▶ This Section contains information on operating the MCS300P Ex in Ex zones.

EX

- The MCS300P Ex meets the following qualifications in accordance with ATEX Directive 2014/34/EU:
  - Ex II 2G Ex pxb IIC T4 Gb *or*
  - Ex II 2G Ex pxb IIC T3 Gb

  or
  - Ex II 3G Ex pzc IIC T4 Gc *or*
  - Ex II 3G Ex pzc IIC T3 Gc
- The MCS300P Ex meets the following qualifications in accordance with IECEx:
  - Ex II 2G Ex pxb IIC T4 Gb *or*
  - Ex II 2G Ex pxb IIC T3 Gb

  or
  - Ex II 3G Ex pzc IIC T4 Gc *or*
  - Ex II 3G Ex pzc IIC T3 Gc

Further information:

▶ Location of Ex relevant subassemblies: see “MCS300P Ex category 3G with pressurized enclosure system”, page 13 and/or see “MCS300P Ex category 2G with pressurized enclosure system”, page 13

▶ Do not remove, add or modify any components to or on the device unless described and specified in the official manufacturer information.
Otherwise the approval for use in potentially explosive atmospheres becomes void.

▶ Adhere to the prescribed maintenance intervals (see “Maintenance plan”, page 56).

▶ When using the MCS300P Ex in potentially explosive atmospheres:
Only use a SICK Ex cell with suitable ATEX/IECEx category and suitable temperature class.

▶ Do not open when an explosive atmosphere is present. (Enclosure contains batteries).

▶ After switching off the main power supply: Wait 15 minutes before opening the enclosure.

Each device has an ATEX and IECEx marking.
For simplification, only the ATEX terms are specified in the following.

2.3.1 Function of the pressurized enclosure

2.3.1.1 *Purpose*

The pressurized enclosure prevents an explosive atmosphere from being created inside the enclosure. To this purpose, the gas analyzer enclosure is filled with a protective gas. Apart from that, it also ensures the gas pressure inside the gas analyzer enclosure is higher than the ambient air pressure.

2.3.1.2 *Functionality during operation*

The pressurized enclosure system functions in “leakage compensation” operating mode: A protective gas pressure is created in the gas analyzer enclosure after pre-purging has completed. If the protective gas pressure drops below the minimum pressure set, protective gas feed is activated until the rated pressure is reached again.

2.3.2 Safety functions

For MCS300P Ex category 3G

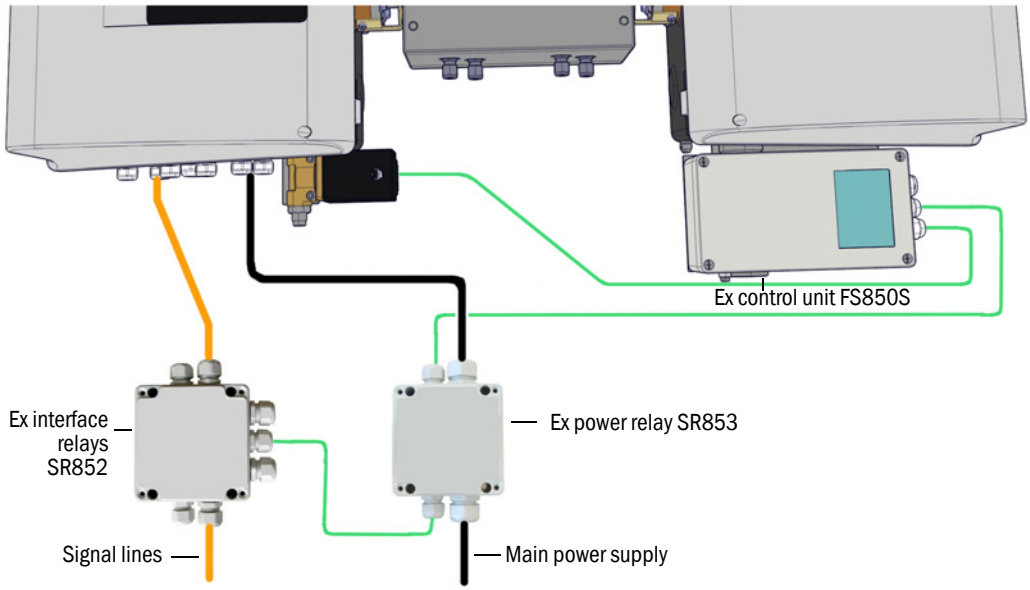
An alarm will sound on Ex control unit FS840 to alert the operator and must be evaluated (operator responsibility → Pressurized enclosure system F840 Manual) when the pressurized enclosure is not in the correct operating state (malfunction),

For MCS300P Ex category 2G

- The enclosure is pre-purged automatically before commissioning. The main power supply for the gas analyzer is switched on automatically after pre-purging has completed.
- The main power supply of the gas analyzer is switched off automatically when the pressurized enclosure is not in the correct operating state (malfunction).

2.3.2.1 *Subassemblies used*

Fig. 3: Ex peripherals for MCS300P Ex category 2G



Ex control unit FS840 (for MCS300P Ex category 3G)

Ex control unit FS840 will trigger an alarm signal when the pressurized enclosure is not in the correct operating state (malfunction).

Ex control unit F840S (for MCS300P Ex category 2G)

Ex control unit FS850S switches the main power supply of the MCS300P Ex and the Ex interface relays on and off.

- ON: After the pre-purge phase has ended.
- OFF: When the pressurized enclosure is not in the correct operating state (malfunction).

The Ex power relay controls the main power supply of the MCS300P Ex (see “Ex peripherals for MCS300P Ex category 2G”, page 16).

Ex power relay SR853 (for MCS300P Ex category 2G)

Ex power relay SR853 (optional for MCS300P Ex category 3G) serves to separate the non-intrinsically safe main power supply of the MCS300P Ex and the Ex interface relay.

Ex interface relay SR852 (for MCS300P Ex category 2G)

Ex interface relay SR852 serves to separate the non-intrinsically safe signal lines (data lines).

The number of required interface relays depends on the individual application.
▶ Observe the System Documentation provided.

2.3.3 Internal temperature monitor

The MCS300P Ex has 2 monitor devices for both internal temperature controllers.

Depending on the temperature class, there is a maximum temperature of (T_{max}) at which the temperature monitor triggers and switches the heater off.

Tolerances can cause the temperature monitoring to trigger at a temperature slightly lower than T_{max}.

Observe the maximum nominal temperature:

Temperature class	T_{max}	Maximum nominal temperature
T4	135 °C (275 °F)	123 °C (253 °F)
T3	150 °C (302 °F)	137 °C (278 °F)

2.3.4 Combustible sample gas

When using an appropriate SICK Ex cell, the MCS300P Ex is capable of measuring combustible and occasionally ignitable gases (corresponding to Zone 1).

2.4 Method of operation

Operating states

The actual operating state is displayed on the operator panel and output via status signals.

Error messages are shown on the display and recorded in a logbook (SOPAS ET).

For more information concerning the operating states, see “Status and classification”, page 36

Sequence control programs

Various sequence control programs can be started via the operator panel.

Typical sequence control programs (depending on parameter settings) are:

- Adjustment with test medium
- Adjustment with internal adjustment standard (optical filter, option)

For the parameterized sequence control programs, see the System Documentation provided.

2.5 Interfaces

- Analog and digital interfaces (depending on equipment).
- Ethernet (depending on individual version)

2.6 SOPAS ET (PC program)

SOPAS ET can be used to set the MCS300P Ex parameters and provides access to the MCS300P Ex logbook.

SOPAS ET runs on an external PC connected to the MCS300P Ex via the Ethernet interface.

3 Installation

3.1 Important information for installation

CAUTION: Health risk through dangerous measured medium

The operator is responsible for the safe handling of the measured medium.

- In addition to these Operating Instructions, follow all local laws, technical rules and company-internal operating directives applicable at the respective installation location of the MCS300P Ex.
- Operate the MCS300P Ex only in adequately ventilated rooms
  OR
  install a suitable gas monitor.
- Feed and drain the measured medium in a safe manner.
- Regularly check the state of the device/module seals.
- Only open the device when well ventilated, especially when a leak of a device component is suspected.

This Manual presumes that the MCS300P Ex has been installed as specified during project planning (e.g., based on the SICK application questionnaire) and the relevant delivery state of the MCS300P Ex (delivered System Documentation).

- If you are not sure whether the MCS300P Ex complies with the planned configuration or the delivered System Documentation:
  Please contact SICK Customer Service.
- If you intend to make changes to the MCS300P Ex:
  Please contact SICK Customer Service.

The operator is responsible for:

- Determining and preparing the sampling point (e.g., determining a representative sampling point).
- Feeding and discharging the measured medium.
- Feeding and discharging the protective gas.
- Supplying zero and test gases.

CAUTION: Risk of injury through incorrect lifting and carrying the equipment

Injuries can occur due to the weight and projecting enclosure parts when the equipment tips over or drops. Observe the following information to avoid such accidents:

- Do not use protruding parts on the enclosure to carry the equipment (apart from the wall fixture or carrying grips).
- *Never* lift the equipment using the open equipment door.
- Consider the equipment weight before lifting.
- Observe the regulations for protective clothing (e.g., safety shoes, non-slip gloves)
- Grip underneath the equipment when possible to carry it safely.
- Use a hoist or transport equipment as an option.
- Use the help of a second person when necessary.
- Secure the equipment during transport.
- Before transporting, ensure obstacles that could cause falls or collisions are cleared away.

3.2 Information on installation in potentially explosive atmospheres

For an MCS300P Ex used in potentially explosive atmospheres:

- Installation, commissioning, maintenance and inspection should only be performed by technicians having knowledge of the relevant rules and regulations for potentially explosive atmospheres, especially:
  - Ignition protection types
  - Installation regulations
  - Range specification
- Only use the MCS300P Ex with a fault current or isolation monitoring system. Use a residual current device with a rated operating residual current of 30mA (supply of connected heaters).
- Standards to be applied (examples):
  - IEC 60079-14, Annex F: Knowledge, skills and competencies of responsible persons, operatives and designers.
  - IEC 60079-17: Electrical installations inspection and maintenance
  - IEC 60079-19: Device repair, overhaul and reclamation

WARNING: Risk of explosion with a cell not suitable for Ex zones

- When using the MCS300P Ex in potentially explosive atmospheres:
  Only use a SICK Ex cell with suitable ATEX/IECEx category and suitable temperature class.

3.3 Overview of assembly steps

3.3.1 Material required

Assembly material	Part No./reference	Required for
Dowels / screws M5	----	Assembly of G-type rails
El. supply line	see “Preparing the main power supply”, page 28	Analyzer power connection
El. lines for signals	----	Connection of signal lines
Hose/tube for measured medium	see Operating Instructions of the cell	Measured medium feed and drain line
Purge air supply	see Operating Instructions of the cell	Cells with purge compartments
Tubes for protective gas	see “Protective gas”, page 79	Feed and drain for protective gas.

Tool	Part No./reference	Required for
4 mm Allen key	----	Retaining bracket
5 mm Allen key	----	MCS300P Ex cover

3.3.2 Overview of assembly steps

Assembly step	Remark/reference
Determining the installation location	As close as possible to the sampling point. Fitting position according to System Documentation.
Fitting the G-type rails	see “Fitting the G-type rails”, page 22
Attaching the analyzer to the G-type rails	see “Fastening the MCS300P Ex on the G-type rails”, page 22
Connecting the measured medium feed and drain lines	see “Connecting the tubes of the measured and test medium”, page 23
Connecting the protective gas feed and drain lines	see “ Connecting the protective gas”, page 23
Connecting the main power supply	see “Preparing the main power supply”, page 28
Connecting signal lines	see “Connecting signal lines”, page 27
For the “Modbus” option: Establish a connection via Ethernet.	see “Connecting Ethernet for Modbus”, page 32

3.4 Assembly

CAUTION: Accident risk through inadequate fastening of the device
- Consider the device weight specifications when planning the mounting supports.
- Check the load capacity/condition of the wall/rack on/in which the device is to be installed.

3.4.1 Fitting the G-type rails

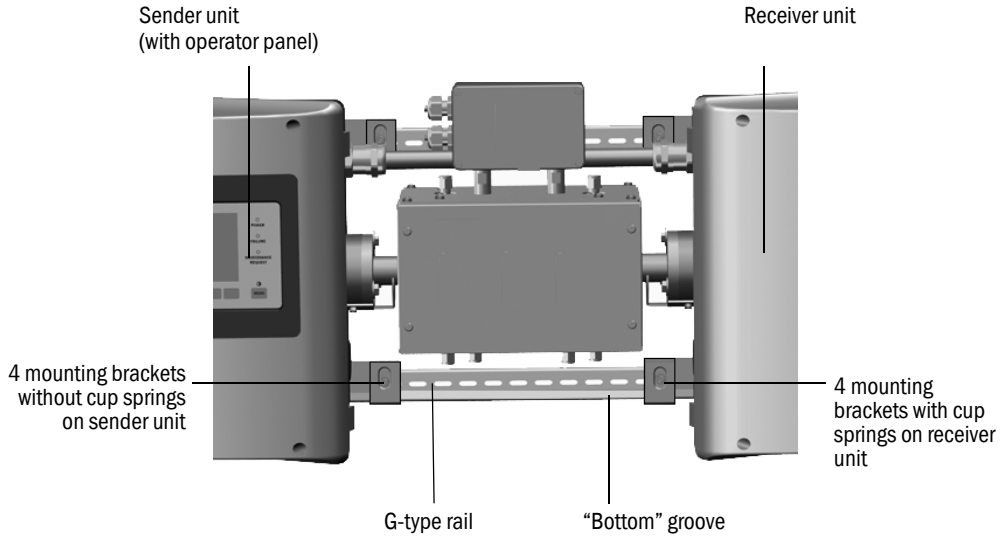
NOTICE:
MCS300P ExThe MCS300P Ex can twist when lifted, especially with long cells.
- Use 2 persons to carefully lift the MCS300P Ex.
- Avoid twisting or bending.
- Do not place the MCS300P Ex on the proportional valve and/or control unit.

NOTICE:
- Install the MCS300P Ex in the position specified during project planning for the MCS300P Ex.

1 Unscrew the G-type rails from the MCS300P Ex.
2 Fasten the G-type rails to the wall or installation plate (fitting direction and drilling diagram, see “Technical Data”, page 72 cont.).
- Observe the carrying capacity of approx. 30 kg (plus cell).
- Position groove, see Fig. 4) for mounting the MCS300P Ex at the bottom.

3.4.2 Fastening the MCS300P Ex on the G-type rails

Fig. 4: Mounting position (example: horizontal installation)



1 Lift the MCS300P Ex carefully and slot it into the G-type rails.
   a) *For horizontal installation:* Fit the sender unit on the left side.
   b) *For vertical installation:* Fit the sender unit with the operator panel at the top.
2 Screw the sender unit tight (4 mounting brackets).
3 Screw the receiver unit on loosely so that enough clearance remains for temperature equalization (4 mounting brackets and cup springs).

3.4.3 Fitting the Ex power relay and Ex interface relays

▶ Install the Ex power relay (SR853) and the Ex interface relays (SR852) near the MCS300P Ex.

→ Ex power relay (SR853) Manual and Ex interface relays (SR852) Manual.

3.4.4 Connecting the tubes of the measured and test medium

The operator is responsible for correct connection of the tubes of the measured medium as well as for the supply with zero and test medium.
Information → Operating Instructions of the connected cell.

3.4.5 Connecting the protective gas

Fig. 5: Protective gas connections for MCS300P Ex category 2G

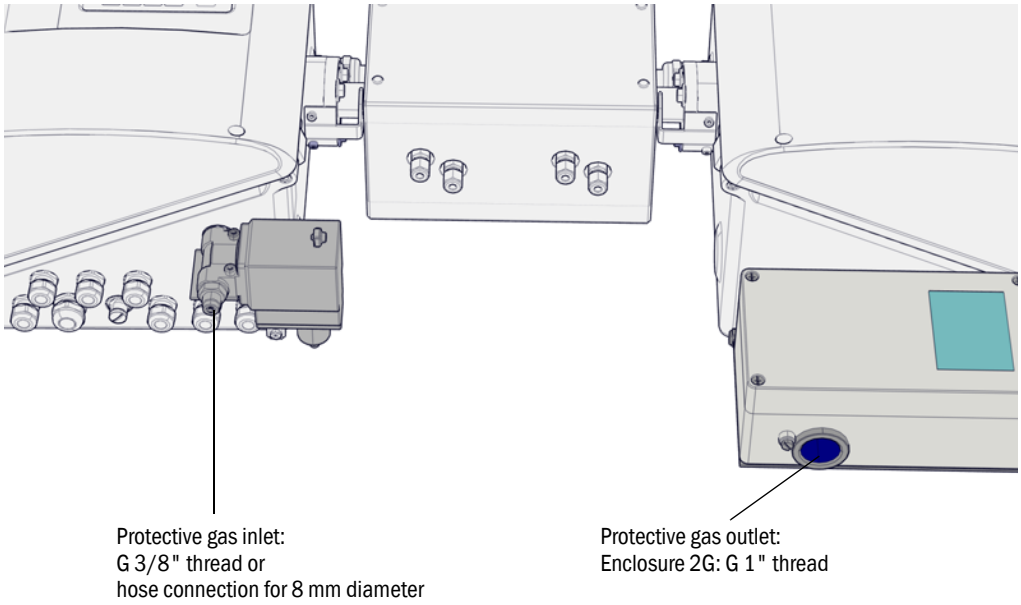
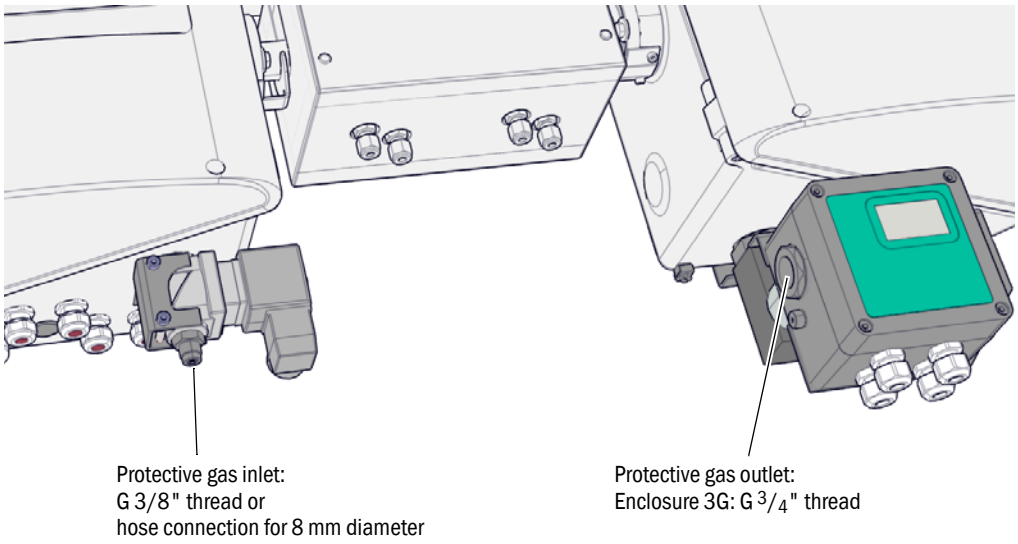


Fig. 6: Protective gas connections for MCS300P Ex category 3G



3.4.6 Feeding protective gas

The pressurized enclosure requires a permanent supply of a protective gas.

- ▶ Feed the protective gas via the protective gas connection (see Fig. 5 and/or see Fig. 6).
- ▶ Requirements for protective gas, see “Protective gas”, page 79

3.4.7 Discharging protective gas

- ▶ Ensure the protective gas can flow out of the protective gas outlet unhindered, i.e., against atmospheric pressure.

3.5 Electrical installation

CAUTION: Hazards through electric voltages

- Only let the work described in the following be carried out by skilled electricians who can recognize potential risks.
- Before opening the enclosure: Separate all connectors of the MCS300P Ex from the main power supply.

When a removable power cable is used, electrical accidents can occur when the specifications are not fully observed.

- Always observe the exact specifications in the Operating Instructions (Technical Data Section) when replacing a removable power cable.

NOTICE: Screw cable glands gas-tight

- Only use lines (according to IEC 60079-14) with suitable outer diameters (see “Horizontal installation”, page 73).
- Close off cable inlets “vapor-proof” (virtually gas-tight).
- Only open those cable inlets to be used for installing cables.
- Keep the plugs. Refit the original plug when a cable inlet must be closed again afterwards.

Cable inlets and plugs belong to the certification.

- Do not replace cable inlets or plugs with other types.

NOTICE: Observe the System Documentation during installation

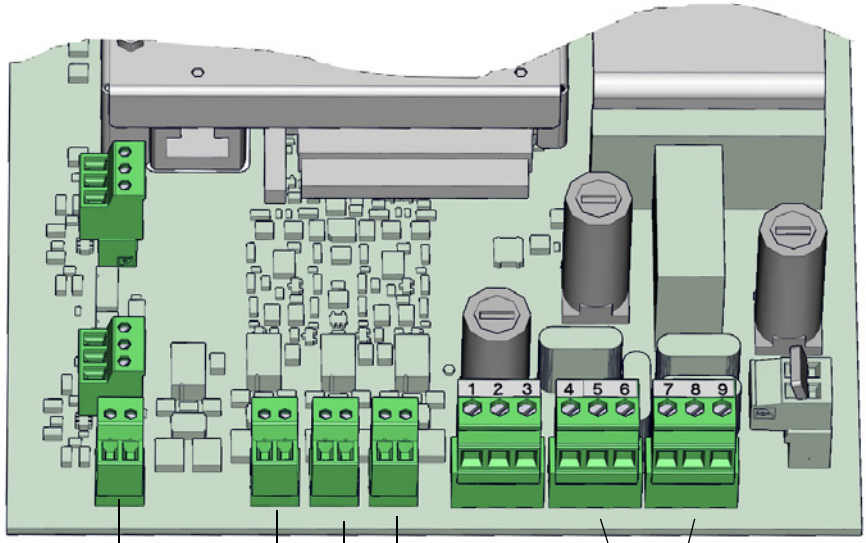
- Observe the terminal assignment (→ System Documentation).

CAUTION: Device damage through incorrect or missing grounding

During installation and maintenance work, it must be ensured that the protective grounding to the devices and/or lines involved is effective in accordance with EN 61010-1.

3.5.1 Signal connections in the sender unit

Fig. 7: Electrical connections in the sender unit main power supply (see "Preparing the main power supply", page 28)



Pt100 Line: AWG26-15
Temperature monitor 2
Temperature monitor 1 (cell)
Controller 2
Controller 1 (cell)

Heaters
Output voltage as main supply voltage
Capacity: Max. 550 VA (per output)
Line: AWG24-12

Heater	Line	Pin
Heater 1 (cell)	L1	4
	N	5
	PE	6
Heater 2	L1	7
	N	8
	PE	9

3.5.1.1 *Opening the sender unit*

WARNING: Damage to eyes by radiation
Depending on the lamp type, eyes can be damaged by radiation.
▶ Before opening the cover of the sender unit: Switch off the MCS300P Ex at the external main power switch.

WARNING: Hot lamp
Components in the area of the lamp can be hot.
▶ Do not touch components in the area of the lamp; allow to cool down first.

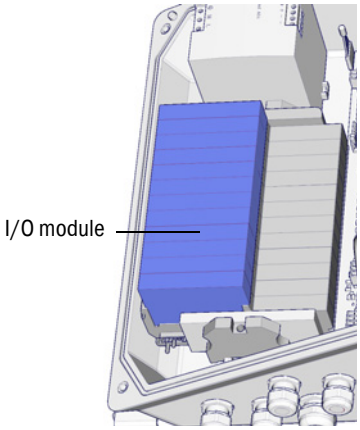
Also observe the general information on opening the enclosure (see "Observe before opening the device enclosure", page 57).

1 Loosen 4 screws (5 mm Allen key).
2 Open the cover.

3.5.1.2 *Connecting signal lines*

For *MCS300P Ex* category 2G: Observe information on connecting the Ex interface relays (see “Connecting Ex peripherals (for MCS300P Ex category 3G)”, page 29).

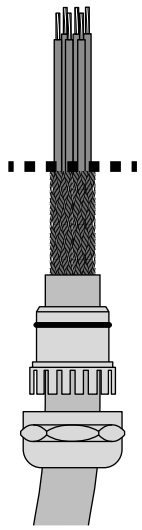
Fig. 8: Position of I/O interfaces in the sender unit



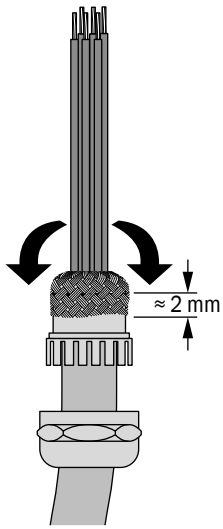
- Use signal cables with a shielding.
- Route each signal cable through a cable gland (see Figure 12, page 30).
- Establish a safe contact between the shield of the signal cable and the cable gland (see Fig. 9).
- Connect the signal lines to the I/O modules (terminal assignment → System Documentation provided).

Information on the I/O modules → Operating Instructions “Modular I/O System”.

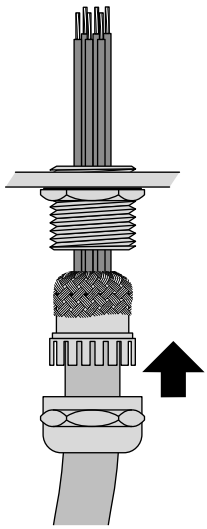
Fig. 9: Handling the cable glands for signal cables



1 Push the screw cap and the clamp sleeve of the cable gland on the signal cable.
2 Uncover and shorten the shield of the signal cable.



3 Push the shielding braid backwards over the clamp sleeve. Make sure the shielding braid overlaps the sealing ring of the clamp sleeve (≈ 2 mm).



4 Insert signal cable + clamp sleeve in the cable gland.
5 Screw the cable gland gastight (see page 25).

3.5.1.3 *Connecting thermostatic-controlled subassemblies*

- ▶ Route the lines through the cable gland and connect the lines (see “Preparing the main power supply”, page 28).

3.5.1.4 *Preparing the main power supply*

Observe information on connecting the Ex control unit and, when necessary, the Ex power relay (see “Connecting Ex peripherals (for MCS300P Ex category 3G)”, page 29).

- ▶ Connect MCS300P Ex only with power supply systems with a residual current and/or insulation monitoring system.
- ▶ Provide separate external main power switches which can be disconnected on all connectors and fuses in the proximity of the MCS300P Ex (max. power input of the MCS300P Ex → Technical data).
  Make sure the disconnector switch is easily accessible.

3 Check the main supply voltage specified in the System Documentation.

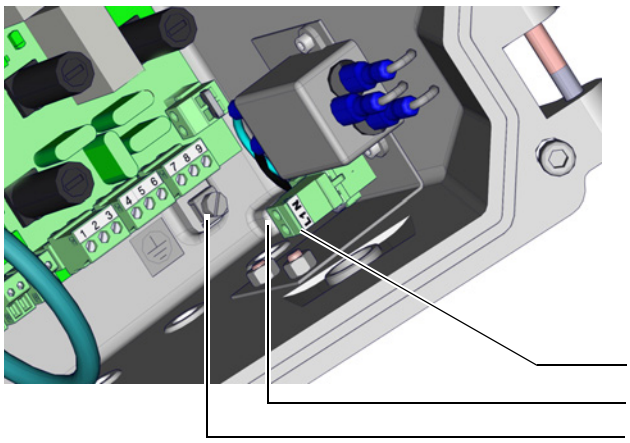
NOTICE: Fuse values depend on the power voltage

If the power voltage available locally is not identical with the power voltage specified in the System Documentation or there are any doubts concerning the power voltage set:

- ▶ Check the fuse values in the MCS300P Ex (see “Fuses”, page 67).

4 Route the electric lines through the cable gland and connect the lines.

Fig. 10: Connecting the main power supply



Shown without protective gas supply

Main power supply voltage 100 ... 240 V / 50 ... 60 Hz Line: Max. AWG14 The fuses depend on the power voltage.	
Line	Terminal
L1	L1
N	N
PE	G[1]

[1] G = enclosure ground

3.5.1.5 *Closing the sender unit*

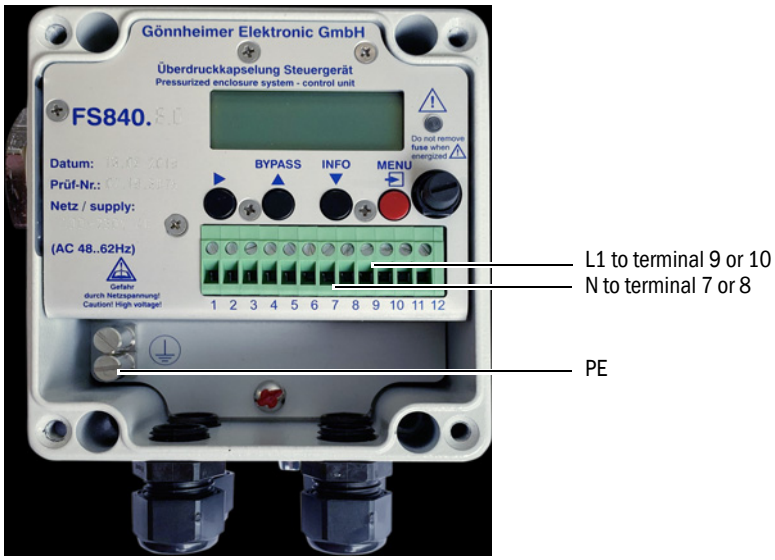
- ▶ Close the sender unit and screw tight.

3.5.2 Connecting Ex peripherals (for MCS300P Ex category 3G)

- ▶ Check the power voltage specified in the System Documentation and on the type plate of the solenid valve.

3.5.2.1 *Ex control unit FS840 main power supply*

Fig. 11: FS840 power connection



Further information → Pressurized enclosure system FS840 Manual

3.5.2.2 *Alarm signal of the pressurized enclosure system*

- ▶ Connect the alarm signal (relay-switching contact) of the pressurized enclosure system as described in the Manual of the pressurized enclosure system and in the System Documentation of the MCS300P Ex.

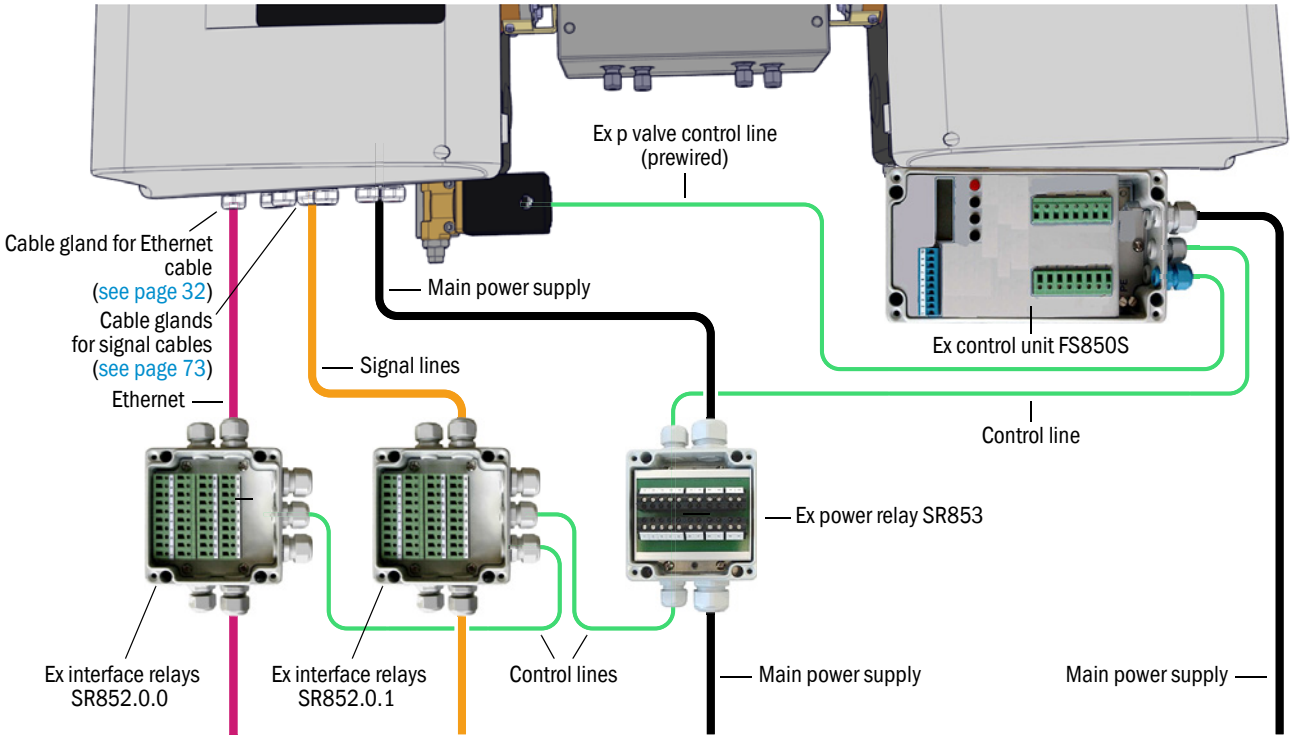
3.5.2.3 *Ex power relay SR853 (optional)*

Ex power relay SR853 connection, see “Connecting Ex peripherals (for MCS300P Ex category 2G)”, page 30

3.5.3 Connecting Ex peripherals (for MCS300P Ex category 2G)

EX All electrical connections must be connected using Ex approved relays.

Fig. 12: Ex peripheral connection for MCS300P Ex category 2G

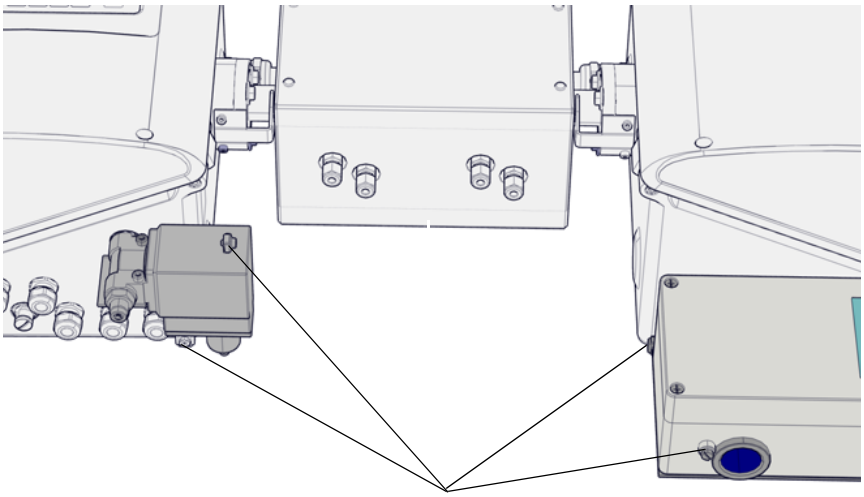


Further information:
→ Pressurized enclosure system F850S Manual
→ Ex Relay SR852 (interface relays) Manual
→ Ex Relay SR853 (power relay) Manual

3.5.4 Connecting the potential equalization

▶ Connect 4 potential equalizers (line: 2.5 mm^2).
(Connect additional potential equalization for cell, Ex interface relays and Ex power relay)

Fig. 13: Connecting the potential equalization (Example using Ex control unit FS850S)



3.5.5 Connecting Ethernet for Modbus

Applicable only for device versions with “Modbus” option.

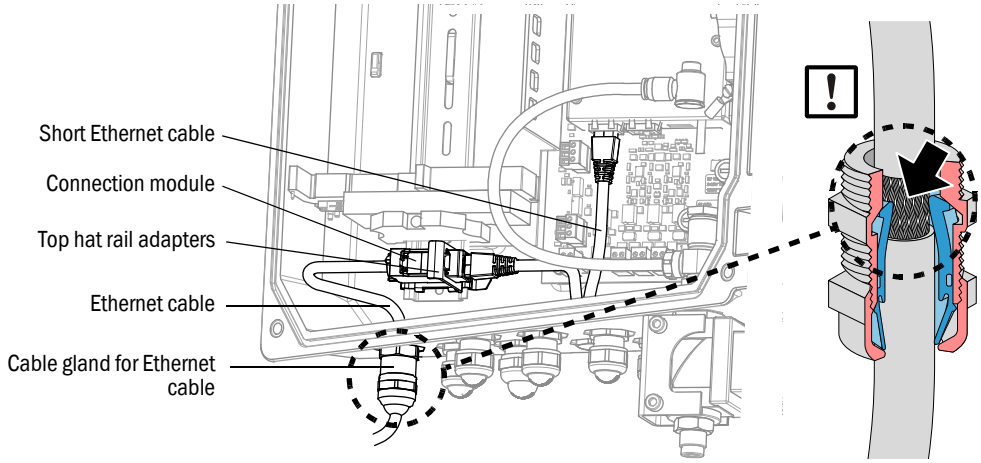
Components

- 1 Ex interface relay
- 2 connection modules for Ethernet (CAT6a, 1 connection module as reserve)
- 1 hat rail adapter (installed in sender unit)
- 1 short Ethernet cable (2x RJ45 for internal connection)

Installation

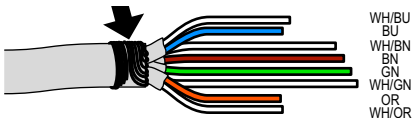
1 *For MCS300P Ex category 2G:* – Install the Ex interface relay. – Route the Ethernet lines via this Ex interface relay. – Observe the regulations and specifications applicable for network connections at the installation location.	see “Connecting Ex peripherals (for MCS300P Ex category 2G)”, page 30
2 Route the Ethernet cable through the cable gland for Ethernet cables into the sender unit. Establish a safe contact between the shield of the signal cable and the cable gland. ▶ Uncover the outer shield of the Ethernet cable (approx. 10 mm) in the area of the cable gland. ▶ Insert the Ethernet cable until the uncovered shield has reached the contact position.	see Fig. 14
3 Screw the cable gland gas-tight.	see page 25
4 Connect the Ethernet cable with the connection module.	see “Handling the connection module”, page 33
5 Place the finished connection module on the hat rail.	see Fig. 14
6 Connect the connection module and the electronic board with the short Ethernet cable.	

Fig. 14: Ethernet connection

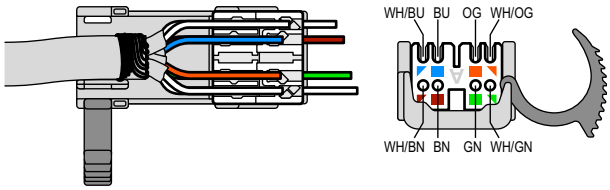


Handling the connection module

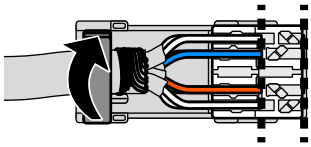
- ▶ Prepare the cable end.



- ▶ Push bottom wires through.
- ▶ Insert top wires.

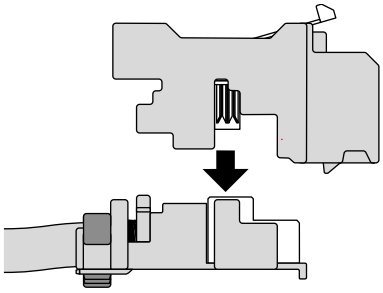


- ▶ Close the strain reliefs.
- ▶ Shorten the wire ends.

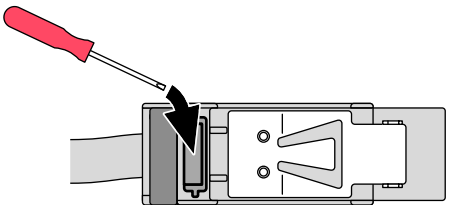


- ▶ Place the top part on the bottom part.

  Press both parts together (use a suitable tool).



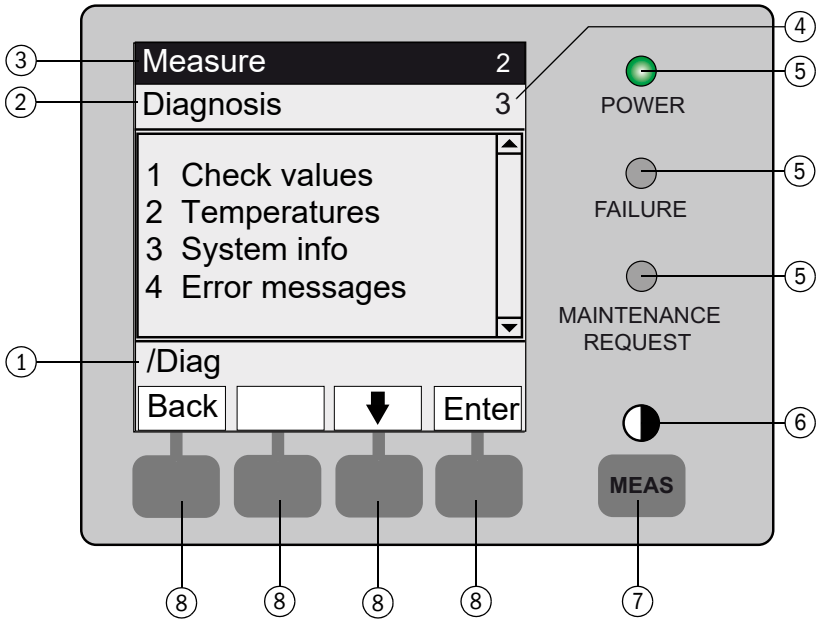
- ▶ Press on the shield contact.



4 Operation

4.1 Operating and display elements

Fig. 15: Display (example: Menu “Diagnosis”)



1 Current menu branch
2 Current menu
3 Status bar (see “Status (operating state)”, page 36)
4 Menu number
5 LED (see “Classification, LEDs”, page 36)
6 Contrast icon (see “Button assignment”, page 35)
7 “MEAS” button (see “Button assignment”, page 35)
8 Function buttons (see “Button assignment”, page 35)

4.1.1 Button assignment

Button	Significance
<MEAS> button	
<MEAS>	Back to the Measuring screen from any menu. – Press <*Save*> to store any changes made. Otherwise the changes are lost. – When the MCS300P Ex is set to *"Maintenance"* (see "Classification, LEDs", page 36): Pressing the <MEAS> button does not affect the "*Maintenance*" state.
	In the Measuring screen: Toggle between list, bar and line representation (see "Measuring screens", page 38).
	◐ To set the contrast: Press the MEAS button for longer than 2 seconds.
Function buttons (menu-dependent buttons)	
<Menu>	Return to the main menu (see "Main menu", page 41). If the <Menu> button is not shown: Press <MEAS> first.
<Back>	Return to the higher level menu. Press <*Save*> to store any changes made. Otherwise the changes are lost.
<Enter>	Open the selected menu.
<Save>	Save changed parameters.
<Start>	Start the displayed action.
<Set>	Set the value.
⇩	Move/scroll downward.
⇧	Move/scroll upward. When numbers are entered: Next higher number.
⇨	Moves to the right in the line.
<Diag>	*Diag* is shown only when there is a message. To display the message: Press this button. More information on diagnosis, see "Diagnosis/error messages and Diag button", page 50. List of error messages, see "Error messages and possible causes", page 69.

4.2 Status and classification

4.2.1 Status (operating state)

The respective operating state (e.g., measuring, heating, etc.) is displayed in the top line of the operator panel.

4.2.2 Classification, LEDs

The classification (error status) is indicated by LEDs on the operator panel and recorded in the logbook (SOPAS ET).

Classification	LED	Significance	Measuring screen	Analog outputs[1]	Status signal[2],[3]
Maintenance		The MCS300P Ex is switched to "*Maintenance*" via the menu or program. The status bar shows: "*Status: Maintenance*"	Actual	Frozen[4]	According to setting
Uncertain		The *uncertain* measured value (e.g., outside calibration range) *blinks*. To view the cause: Press the <Diag> button.	Actual	Actual	According to setting
Maintenance request	*Yellow*	Irregularities (e.g., deviation from check cycle too high) that require a review of the cause. To view the cause: Press the <Diag> button.	Actual	Actual	According to setting
Failure	*Red*	Device failure (e.g., lamp failed) To view the cause: Press the <*Diag*> button.	Frozen[4]	Frozen[4]	According to setting

[1] Typical default (→ System Documentation).
[2] Option (→ System Documentation).
[3] See SOPAS ET in the "Digital outputs" menu.
[4] The last valid measured value is retained.

4.3 Commissioning of MCS300P Ex

4.3.1 Check before commissioning

- Enclosures are closed (enclosure cover, cable inlets, enclosure openings).
- Permanent protective gas feed is ensured (see “Protective gas”, page 79).

Further information on the pressurized enclosure system → see pressurized enclosure system Manual delivered with the system.

4.3.2 Commissioning procedure

Commissioning procedure for MCS300P Ex category 3G

1 Switch the main power supply of the pressurized enclosure system on (at an external source).
2 The pressurized enclosure system will start pre-purging the enclosure with protective gas.
The Ex control unit will signal the end of the pre-purge phase.
3 Switch the main power supply of the MCS300P Ex on (at an external source).
▶ Continue with see step 4

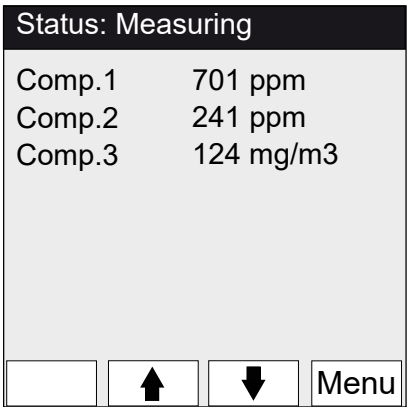
Commissioning procedure for MCS300P Ex category 2G

1 Switch the main power supply of the pressurized enclosure system on (at an external source).
2 The pressurized enclosure system will start pre-purging the enclosure with protective gas.
3 The MCS300P Ex will be switched on automatically after a few minutes.
4 The *green* “*POWER*” LED on the MCS300P Ex display will signal that supply voltage is present.
5 “*SICK*” will appear on the screen.
6 The Measuring screen will then be displayed (see “Display (example: Menu “Diagnosis”)”, page 34)
7 Until the measuring system reaches its measuring operating state (e.g., the operating temperature has not yet been reached):
– Only the green “*POWER*” status LED will light.
– Display will read: “*Status: Heating*”
– Classification “*Uncertain*” (all measured values blink).
8 Measuring operating state reached:
– Only the green “*POWER*” status LED will light.
– Display will read: “*Status: Measuring*” (see “Display (example: Menu “Diagnosis”)”, page 34).
– No measured value blinks (If a measured value blinks: Measured value invalid, see “Malfunction messages”, page 65).
9 Set a new zero point after an adequate run-in phase of the device (min. 4 hours) (see “Adjustment”, page 44).
See also System Documentation.

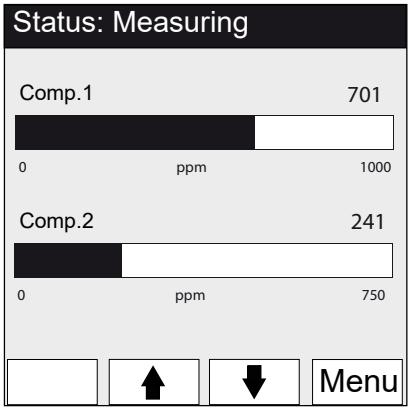
4.4 Measuring screens

Measuring screens:

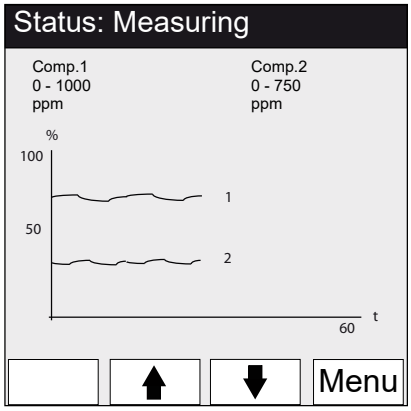
"List" (default)



Bar graph



Line graph



▶ To toggle between the Measuring screens: <*MEAS*> button

4.4.1 "List" Measuring screen

Display of measured values in tabular form.

The "List" Measuring screen is displayed:

- Automatically after the system start
- When the <*MEAS*> button is pressed

Update interval: 1 second (default)

4.4.2 "Bar graph" Measuring screen

Display of 2 measured values each time in bar format.

Update interval: 1 second

▶ Parametrization of display ranges, see "Timeline", page 52

4.4.3 “Line graph” Measuring screen

Display of 2 measured values each time in the time diagram.

The y-axis is always scaled to 0 ... 100% of the display range.

(The respective display range is shown below the component)

Line 1 = left component.

Line 2 = right component.

Update interval:

Time axis [min]	Update interval [sec]
6	4
15	10
30	20
60	40

▶ Parametrization of display ranges, see “Timeline”, page 52

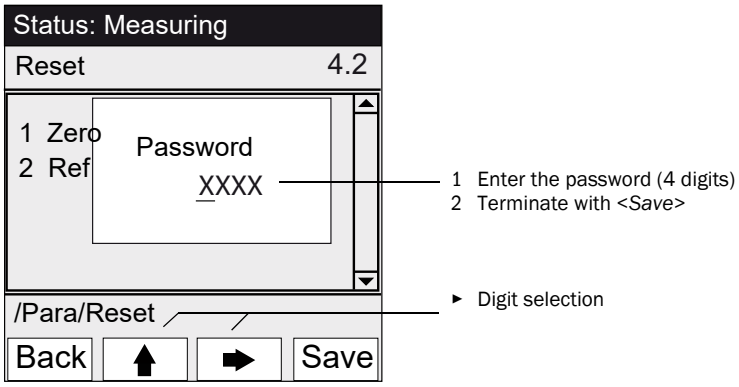
4.4.4 Password

Menus which allow changing the measuring sequence are protected with a password.

The password is prompted automatically when such a menu is called up.

A complete description of the password-protected menus can be found in the MCS300P Ex “Technical Information”.

Fig. 16: Password input (example: Reset menu)



- The password contains 4 digits.
- The password is: “*1234*” (default)
- The password level remains valid for 30 minutes (default).

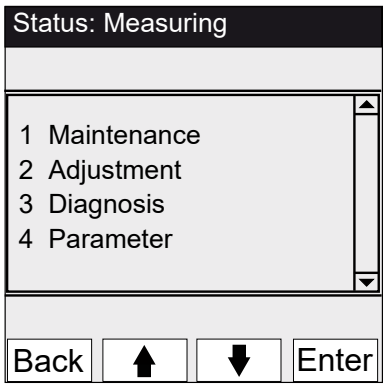
The password and duration of validity can be changed in SOPAS ET.

5 Menus

5.1 Menu tree

Menu No.	Menu tree	Explanation
1	**Maintenance**	see “Maintenance”, page 41
1.1	**Maintenance signal**	
1.2	**Operating states**	
1.2.1	System stop	
1.2.2	Measure	
1.2.3	Initialize	
1.3	**Hardware Reset**	
1.4	**Reset messages**	
2	**Adjustment**	see “Adjustment”, page 44
2.1	**Manual**	
2.1.1	Zero point	
2.1.2	Span point	
2.2	**Automatic**	
2.3	**Parameter**	
2.3.1	Concentration	
2.3.2	Factors	
2.3.3	Start time 1-8	
2.3.4	Start time 9-16	
3	**Diagnosis**	see “Diagnosis”, page 48
3.1	**Check values**	
3.1.1	Zero drift	
3.1.2	Reference energy	
3.1.3	Amplification	
3.1.4	Intensity	
3.2	**Temperatures**	
3.3	**System info**	
3.4	**Error messages**	
4	**Parameter**	see “Parameter setting”, page 51
4.1	**Display**	
4.1.1	Scale 1 ... 8	
4.1.2	Scale 9 ... 16	
4.1.3	Timeline	
4.2	**Reset**	
4.2.1	Zero drift	
4.2.2	Reference energy	

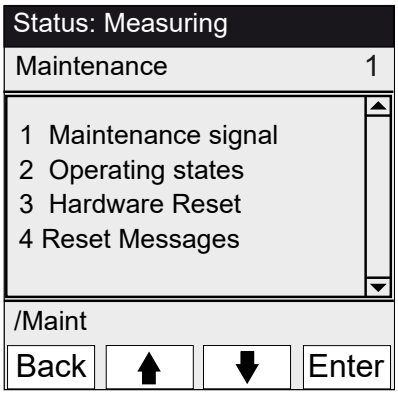
5.2 Main menu



see “Maintenance”, page 41
see “Adjustment”, page 44
see “Diagnosis”, page 48
see “Parameter setting”, page 51

5.3 Maintenance

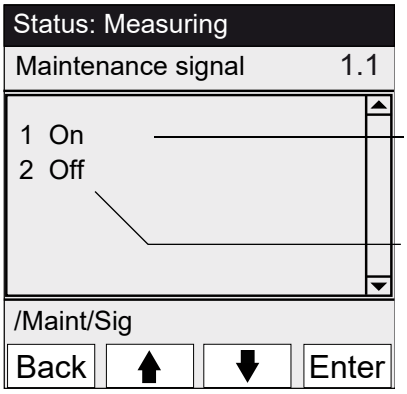
Menu 1: Maintenance



see “Maintenance/maintenance signal”, page 41
see “Maintenance/operating states”, page 42
see “Maintenance/Hardware Reset”, page 43
see “Maintenance/Reset Messages”, page 43

5.3.1 Maintenance/maintenance signal

Menu 1.1: Maintenance/Maintenance sig

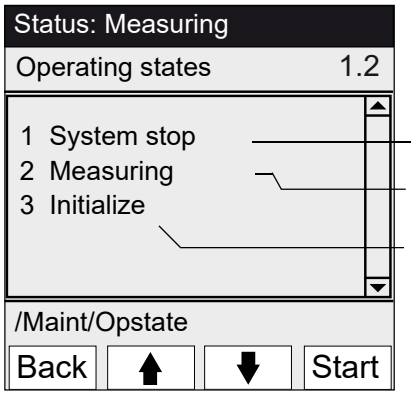


The maintenance signal is set/reset in this menu.

- ▸ The maintenance signal is set. Then:
  - – Classification: “*Maintenance*” (see “Classification, LEDs”, page 36)
  - – Status bar: “*Status: Maintenance*”.
- ▸ The maintenance signal is reset.

5.3.2 Maintenance/operating states

Menu 1.2: Maintenance/Operating states

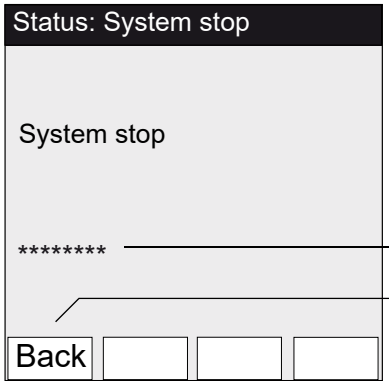


The operating states are switched on in this menu.

- ► System stop (see “System stop”)
- ► Switch the MCS300P Ex to measuring operation.
- ► New start (reset) of the MCS300P Ex.

5.3.2.1 *System stop*

Menu 1.2.1: Maintenance/Operating states/System stop

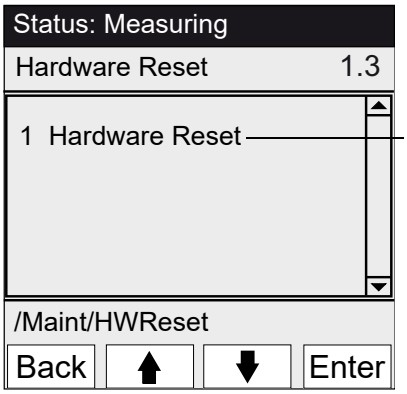


Switch off the measuring function and (If available) the gas sampling peripherals (valves, pumps).
The device function is maintained (e.g., heater operation will continue).
Operating state: *“Maintenance”.*

- • Display: Row of blinking asterisks.
- ► To exit the menu: Press the “*Back*” button.
- ► Then switch measuring operation on again:
  - Press “*Measuring*”.
  - Switch the maintenance signal off (see “Maintenance/maintenance signal”, page 41).

5.3.3 Maintenance/Hardware Reset

Menu 1.3: Maintenance/Hardware Reset

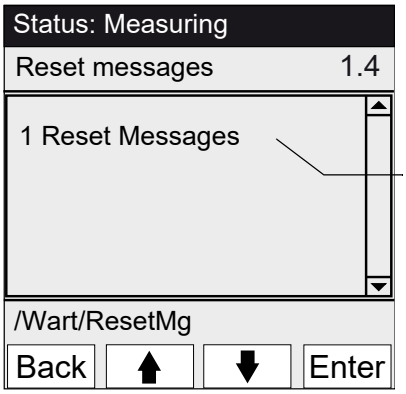


This menu starts a hardware reset (same effect as switching the main supply voltage off/on).

▸ Start hardware reset.

5.3.4 Maintenance/Reset Messages

Menu 1.4: Maintenance/Reset Messages

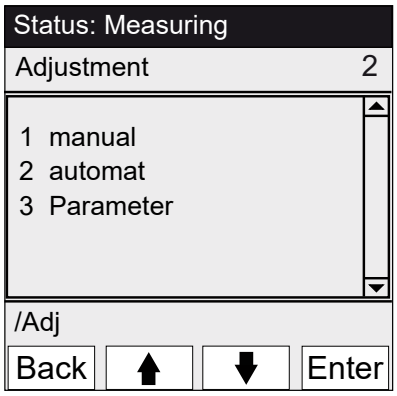


This menu resets all existing error messages.
LED “MAINTENANCE REQUEST” goes off.

▸ Reset error messages.

5.4 Adjustment

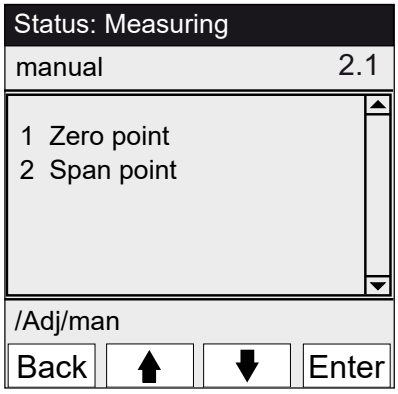
Menu 2: Adjustment



see “Adjustment/manual”, page 44
see “Adjustment/automatic”, page 45
see “Adjustment/Parameter”, page 45

5.4.1 Adjustment/manual

Menu 2.1: Adjustment/manual



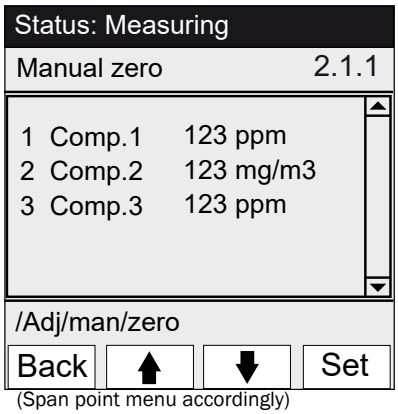
see “Zero point and span point”, page 44
see “Zero point and span point”, page 44

5.4.1.1 *Zero point and span point*

Menu 2.1.1: Adjustment/manual/Zero point

Menu 2.1.2: Adjustment/manual/Span point

Manually adjust zero point and/or span point (recalculate the correction factor) of individual components within this menu item.

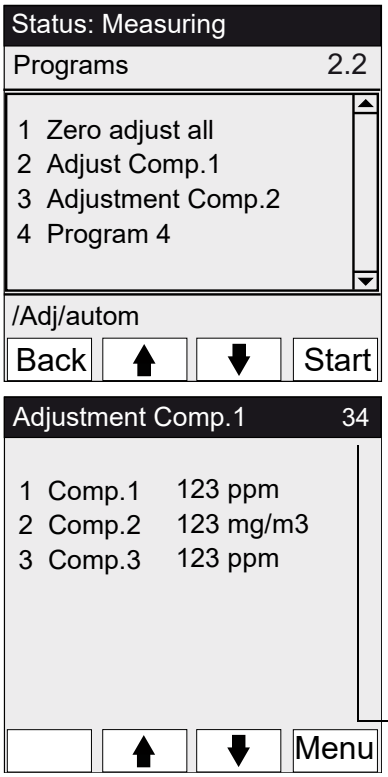


(Span point menu accordingly)

1 Set the maintenance signal (see “Maintenance/maintenance signal”, page 41).
2 Lead the zero and/or reference medium into the cell (“manually”).
3 Wait for the end of the run-in time, (If necessary, exit the menu with “*Back*” to review the run-in behavior in the line graph, see ““Line graph” Measuring screen”, page 39).
4 Select the component.
5 Press “*Set*”: The measured value is set to the nominal concentration. If the deviation is too large (parameter settings → SOPAS ET), the MCS300P Ex switches to classification “ *Maintenance request*” (see “Status and classification”, page 36).
6 Press “*Back*” to exit the menu.
7 Reset the maintenance signal.

5.4.2 Adjustment/automatic

Menu 2.2: Adjustment/automatic



Initiate automatic adjustments within in this menu item (parameter settings → System Documentation).
The sequences of these programs depend on the parameter settings of the programs (in the Figure: Examples).
For typical programs, status signals are set automatically and valves for the test medium switched automatically.
For devices with internal adjustment standard (see System Documentation): A corresponding program appears.

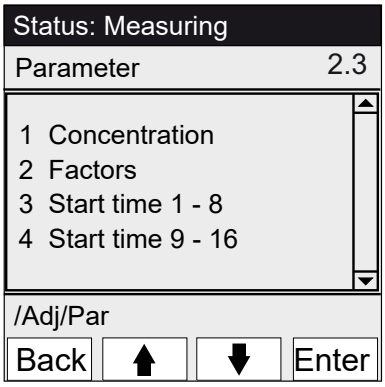
1 To start adjustment: Select the adjustment program and press "*Start*".
2 Operating state: *"Maintenance"*.
3 The Measuring screen is displayed (with a down counter to the end of the adjustment).
4 After the end of the adjustment, the MCS300P Ex switches back to the operating mode "Measuring" (If "*Maintenance*" was previously set manually: Back to "*Maintenance*").

- If the deviation exceeds a limit (parameter settings in SOPAS ET), the MCS300P Ex switches to classification *"Maintenance request"* (see "Status and classification", page 36).

- Down counter to the end of adjustment [seconds].

5.4.3 Adjustment/Parameter

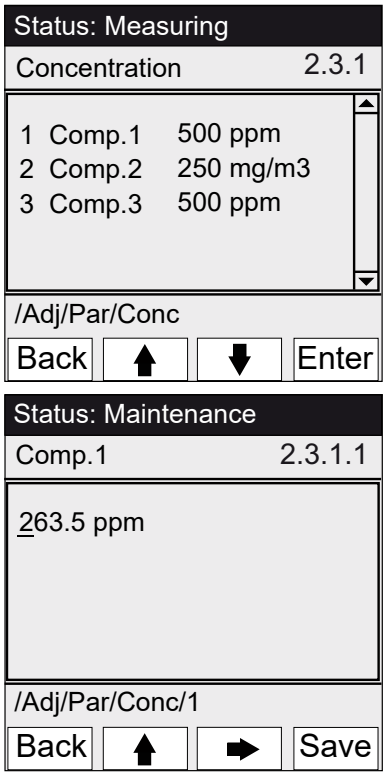
Menu 2.3: Adjustment/Parameter



see "Concentration", page 46
see "Factors", page 47
see "Start times", page 48
see "Start times", page 48

5.4.3.1 *Concentration*

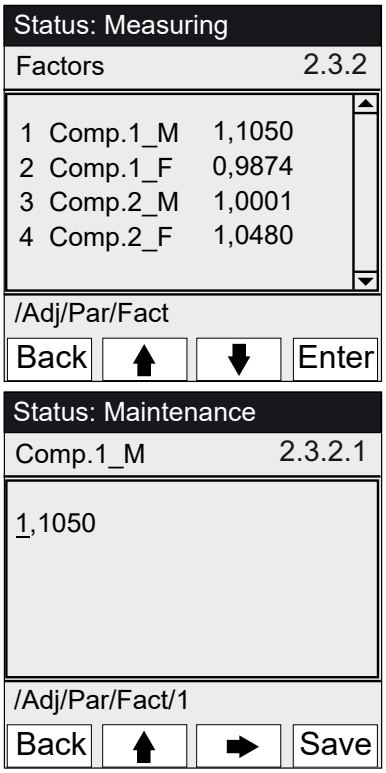
Menu 2.3.1: Adjustment/Parameter/Concentration



Enter the concentrations of the test media within this menu.

5.4.3.2 *Factors*

Menu 2.3.2: Adjustment/Parameter/Factors



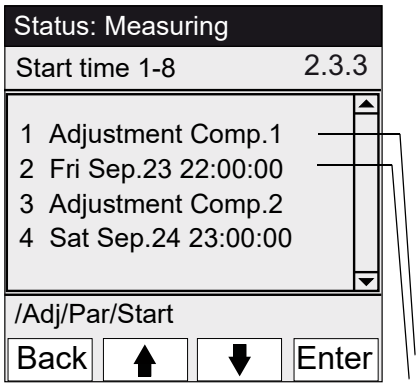
The correction factors of the measured components are displayed and can be manually changed in this menu.

- 2 correction factors exist per component:
  _M: Correction factor for test medium
  _F: Correction factor for internal adjustment standard (internal optical filter) (option).

5.4.3.3 *Start times*

Menu 2.3.3: Adjustment/Parameter/Start time 1 - 8

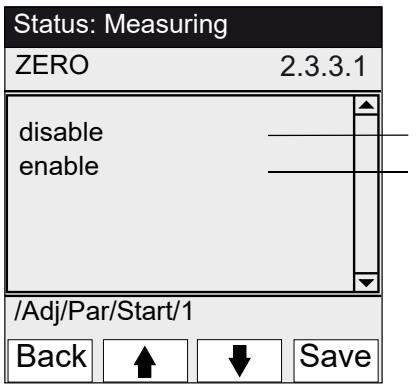
Menu 2.3.4: Adjustment/Parameter/Start time 9 - 16



In this menu item:
- The respective next start time of a “cyclic trigger” is shown and
- the “cyclic triggers” are disabled or enabled.

Explanation: A “cyclic trigger” can be assigned to sequence control programs (→ SOPAS ET).
“Cyclic trigger” means: The respective program is started in a fixed cycle (hours, days or weeks).

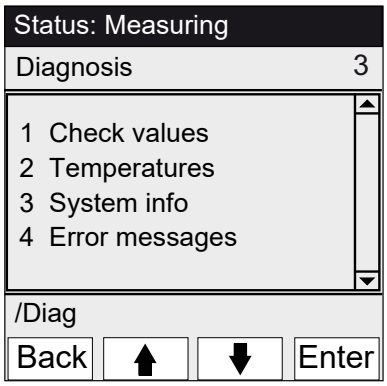
- Cyclic trigger name
- Next start time (dd.mm.yy hh:mm:ss) or “-disabled-”.



- ► Disable the cyclic trigger
- ► Enable the cyclic trigger

5.5 Diagnosis

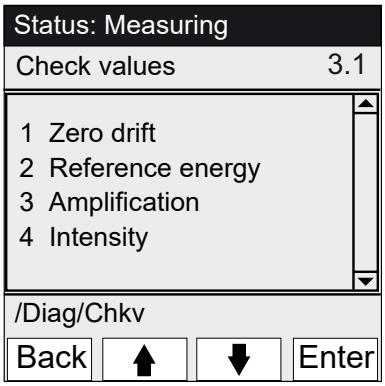
Menu 3: Diagnosis



see “Diagnosis/check values”, page 49
see “Diagnosis/temperatures”, page 50
see “Diagnosis/system info”, page 50
see “Diagnosis/error messages and Diag button”, page 50

5.5.1 Diagnosis/check values

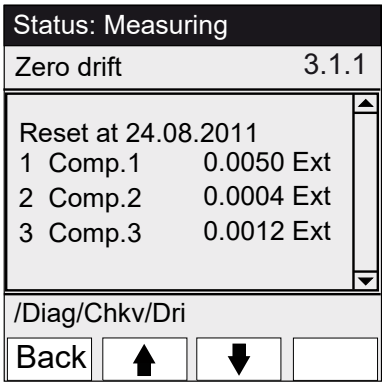
Menu 3.1: Diagnosis/Check values



see “Zero drift”, page 49
see “Reference energy”, page 49
see “Amplification”, page 49
see “Intensity”, page 50

5.5.1.1 *Zero drift*

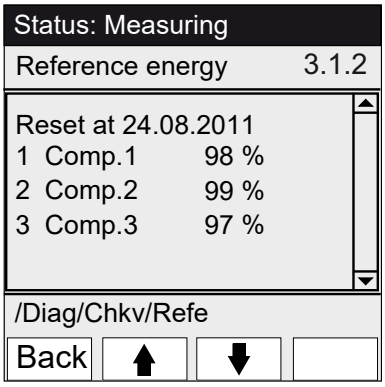
Menu 3.1.1: Diagnosis/Check values/ Zero drift



The zero drift since the last “Reset” of the zero drift (e.g., during maintenance, see “Parameter/reset”, page 53) is shown in this menu.
The zero drift is recalculated during each zero adjustment and displayed in extinction.
This value can be used for system diagnosis.
Typical cause: Decrease in lamp energy, contamination of cell windows.

5.5.1.2 *Reference energy*

Menu 3.1.2: Diagnosis/Check values/Reference energy



The actual reference energy (in percent) is shown in this menu.
This value is monitored automatically. If the value is below a limit value (default: 60%), the MCS300P Ex switches to classification “Maintenance request”. Typical cause: Contamination of cell windows or decrease in lamp energy.
A “Reset” (see “Parameter/reset”, page 53, e.g., during maintenance) sets the reference energy to 100%.

5.5.1.3 *Amplification*

Menu 3.1.3: Diagnosis/Check values/Amplification

The amplification levels of the measured components are shown in this menu.

The amplification levels serve as information for SICK Customer Service.

5.5.1.4 *Intensity*

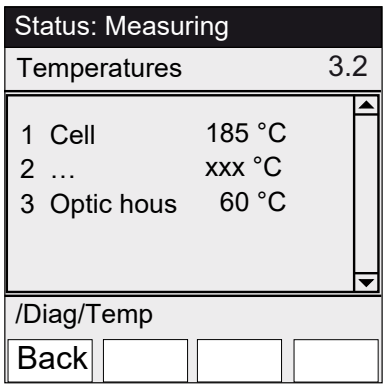
Menu 3.1.4: Diagnosis/Check values/Intensity

The intensities (energies) of the measured components are shown in this menu.

The amplification levels serve as information for SICK Customer Service.

5.5.2 Diagnosis/temperatures

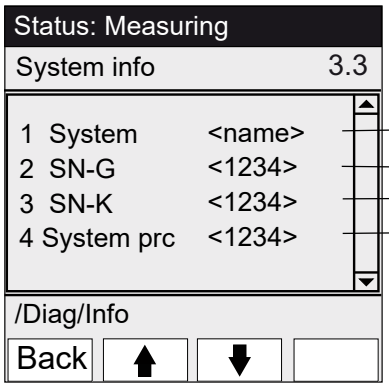
Menu 3.2: Diagnosis/Temperatures



The actual temperatures are shown in this menu.

5.5.3 Diagnosis/system info

Menu 3.3: Diagnosis/System info

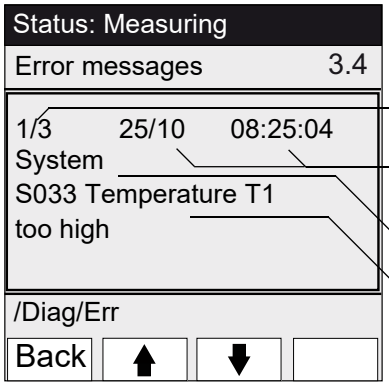


Device numbers and software versions are shown in this menu.

- Name of the system
- Serial number of device
- Serial number of cell
- System software version
- Etc.

5.5.4 Diagnosis/error messages and Diag button

Menu 3.4: Diagnosis/Error messages and <*Diag* button>

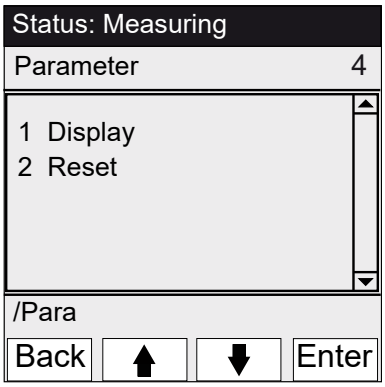


Existing messages are shown in this menu (Logbook → SOPAS ET).

- Message number / number of existing messages
- Date of occurrence (dd/mm)
  Time of occurrence (hh:mm:ss)
- Source (e.g., system, measured component, receiver, etc.)
- Error cause (error number and plain-text)
  (list of messages, see “Error messages and possible causes”, page 69)

5.6 Parameter setting

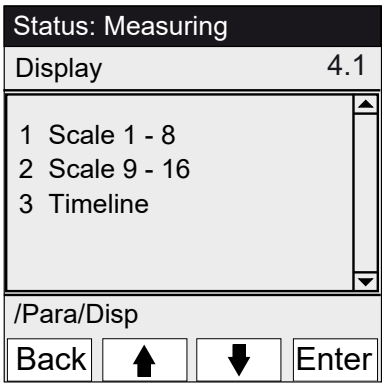
Menu 4: Parameter



see “Parameter settings/display”, page 51
see “Parameter/reset”, page 53

5.6.1 Parameter settings/display

Menu 4.1: Parameter/Display

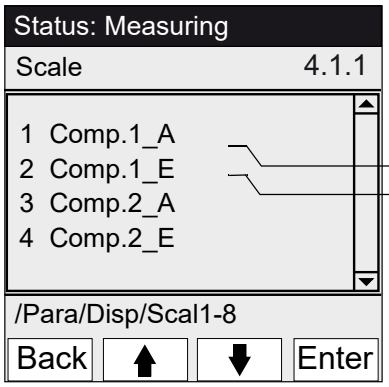


see “Scale”, page 52
see “Scale”, page 52
see “Timeline”, page 52

5.6.1.1 *Scale*

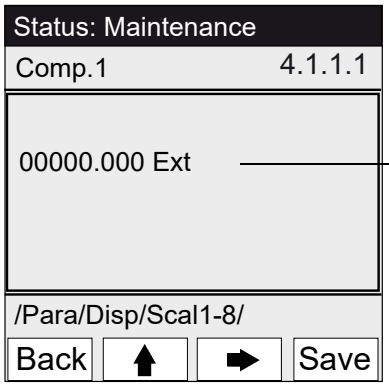
Menu 4.1.1: Parameter/Display/Scale 1 - 8

Menu 4.1.2: Parameter/Display/Scale 9 - 16



Bar graphs and line graphs are scaled in this menu. The scaling shown is valid for both types of graph.
Graph update interval: 1 second.

- _A: Scaling start value
- _E: Scaling end value

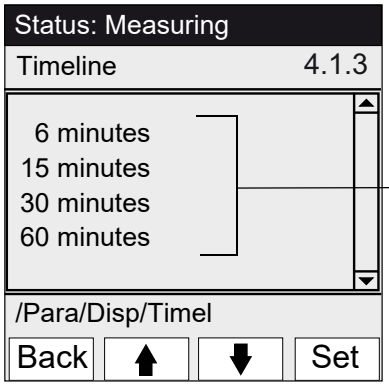


► Enter the numeric value.
For a minus sign: Press ⇧ 10 times before first digit.

Invalid entries (start value > end value) are not accepted.

5.6.1.2 *Timeline*

Menu 4.1.3: Parameter/Display/Timeline

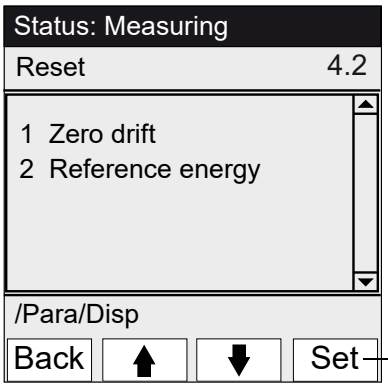


The parameters of the line graph timeline are set in this menu.
Graph update interval: Depending on scale (see ""Line graph" Measuring screen", page 39)

► Timeline end value (specified times)

5.6.2 Parameter/reset

Menu 4.2: Parameter/Reset



In this menu, the drifts/reference energies for all components are set to:

- "0" (for zero drift)
- "100%" (for reference energy)

The complete history is lost when the drifts/reference energies are reset.

► Reset the drifts/reference energies only when you are sure that you want to reset the values.

6 Decommissioning

6.1 Decommissioning

CAUTION: Hazards through electric voltages

- ▶ Only let the work described in the following be carried out by skilled electricians who can recognize potential risks.
- ▶ Before opening the enclosure: Separate all connectors of the MCS300P Ex from the main power supply.

CAUTION: Acid, risk of chemical burns

The cell and the connected hoses could contain caustic or corrosive media (noxious or irritating substances).

Risk of splashing when tubes are removed or cut off.

- ▶ Take suitable protective measures when working on parts having contact with the measured medium (e.g., wear protective goggles or a safety mask, protective gloves and acid-proof protective clothes).

CAUTION: Risk of contamination when the device is switched off

When the device is switched off, there is a risk of contamination by medium remaining in the cell.

- ▶ Before switching off the device, purge the connected cell and tubes for a sufficient period with an inert medium.

WARNING: Risk of explosion through residual voltages and hot surfaces

- ▶ Do not open when an explosive atmosphere is present. (Enclosure contains batteries).
- ▶ Wait 15 minutes after switching off the main power supply before opening the enclosure.

WARNING: Risk of explosion through residual gases.

When using combustible and ignitable gases:

- ▶ Before switching off the device, purge the connected cell and tubes for a sufficient period with an inert medium.

To switch the device off for a short time, use the “*System stop*” function (see “System stop”, page 42).

1 Set the maintenance signal (see “Maintenance/maintenance signal”, page 41).
2 Feed the inert medium into the cell:
   – manually or
   – with the program (If parameters were set).
3 Allow the MCS300P Ex to run in this state long enough so that the cell and the connected tubes are purged of the measured medium (duration depends on the measured medium).
4 Disconnect the MCS300P Ex from the main power supply.
5 Disconnect the Ex control unit from the main power supply.
6 If heated subassemblies are connected: Disconnect these subassemblies from the main power supply.
7 If necessary, remove liquid from the cell and allow the cell to dry.

6.2 Disposal

▶ The MCS300P Ex can easily be disassembled into its components which can then be sent to the respective raw material recycling facilities.

WARNING: Gases in gas filters

Depending on the application, MCS300P Ex sample gas filters (option) contain minor gas volumes which represent a hazard only under particularly unfavorable circumstances.

- ▶ Do not destroy sample gas filters directly in front of your face and do not directly breathe in emerging gases.
- ▶ Do not destroy sample gas filters in small, closed rooms, especially when large quantities must be destroyed.

The sample gas filters are located on the filter wheel in the receiver unit.

The following subassemblies contain substances that may have to be disposed of separately:

- *Electronics*: Condensers, batteries.
- *Display*: Liquid of LC display.
- *Sample gas paths*: Toxic substances of the measured medium can adhere to soft materials of the gas path (e.g., tubes, O-rings) or penetrate them.

7 Maintenance

7.1 Spare parts

- Use original SICK spare parts only.

For devices used in potentially explosive atmospheres:

- Maintenance and inspection should only be carried out by experienced/trained personnel with knowledge of the rules and regulations for potentially explosive atmospheres, especially:
  - Ignition protection types
  - Installation regulations
  - Range specification
- Standards to be applied (examples):
  - IEC 60079-14, Annex F: Knowledge, skills and competencies of responsible persons, operatives and designers.
  - IEC 60079-17: Electrical installations inspection and maintenance
  - IEC 60079-19: Device repair, overhaul and reclamation

7.1.1 Recommended spare parts

Spare part	Part No.
Desiccant cartridge (including assembly key)	2010549
Halogen lamp[1]	6023466
IR source insert[1]	2024574
IR chopper / source unit complete	2045537
UV chopper / source unit complete	2047806
24 V power supply unit	6035276
Cell-dependent spare parts → Cell Manual or System Documentation	

[1] Depending on device configuration

7.2 Maintenance plan

Interval[1]	Maintenance work	Reference
1W	Visual inspection	see “Visual inspection”, page 57
	Check the measured values for plausibility	
	Device with VIS source: Adjustment with zero gas[2] [3]	see “Adjustment”, page 44
1M	Device with IR source: Adjustment with zero gas[2] [3]	see “Adjustment”, page 44
	Adjustment with internal adjustment standard[4]	see “Adjustment/automatic”, page 45
6M	Check the desiccant cartridge and replace if necessary	see “Checking/replacing the desiccant cartridge”, page 59
	Adjustment of all measuring components with test medium	see “Adjustment”, page 44
6M	Function test of the pressurized enclosure system	see “Function test of the pressurized enclosure system”, page 57
1Y	Device with VIS source: Replace the source[2]	Replacement by trained skilled person or SICK Service
	Recommendation: Maintenance work on the cell	see Operating Instructions of the cell
	Device with IR source: Check reference energy	see “Reference energy”, page 49
3Y[5]	Device with IR source: Replace the source[2]	Replacement by trained skilled person or SICK Service

[1] 1W = weekly, 1M = monthly, 6M = half-yearly, 1Y = yearly
[2] Source type, see System Documentation
[3] Not required for devices with automatic zero point adjustment (see System Documentation)
[4] Option. See System Documentation
[5] Recommendation

7.2.1 Function test of the pressurized enclosure system

Procedure

1 Keep the MCS300P Ex in operation.
2 Interrupt protective gas feed to the MCS300P Ex.
The Ex control unit should signal an error state after a few minutes.
3 Start protective gas feed again.
The Ex control unit should now reset the error state and start the pre-purge phase.

7.2.2 Before commencing maintenance work

Before starting maintenance work, consider the following as applicable:

CAUTION: Risk of contamination when the device is switched off
When the device is switched off, there is a risk of contamination by medium remaining in the cell.
- Before switching off the device, purge the connected cell and tubes for a sufficient period with an inert medium.

▶ Set the maintenance signal (menu 1.1).
▶ Disable “Cyclic programs” (menu 2.3.3 or 2.3.4).

7.2.3 Observe before opening the device enclosure

CAUTION: Hazards through electric voltages
▶ Before opening the enclosure: Separate all connectors of the MCS300P Ex from the main power supply.

WARNING: Risk of toxic gases in receiver unit
If the device is not operating correctly, it is possible that a gas-filled filter is leaky and the gas is in the receiver unit.
▶ If it is necessary to open the receiver unit, do so in a well-ventilated room.

WARNING: Risk of explosion through residual voltages and hot surfaces
▶ Separate the MCS300P Ex from all external voltages (e.g., signal lines). Exception: Connections to intrinsically safe power circuits can remain connected.
▶ Do not open when an explosive atmosphere is present. (Enclosure contains batteries).
▶ In Ex zones: Wait 15 minutes after switching the main power supply off before opening the enclosure.

CAUTION: Risk of suffocation when opening the enclosure
Protective gas escapes when the enclosure is opened.
Risk of suffocation when using inert protective gas.
▶ Do not inhale the escaping gas when opening the enclosure.

7.2.4 Visual inspection

MCS300P Ex

- Only the “*green*” LED on the operator panel lights and *no* measured value blinks.
Otherwise: Press the <*Diag*> button to view the cause.
- Perform a visual inspection of the device enclosure
  - Dryness
  - Corrosion
  - Unusual smell
  - Unusual noises

Peripherals

- Sampling and discharging measured medium, tubes: Condition.
- Test gas supply: Condition, availability (use-by date), pressures.
- Protective gas: Condition, availability, pressures.

7.2.5 Zero and test gas feed

Feed a test gas with a defined test gas concentration (nominal value) and compare the displayed measured value with the nominal value.

▶ Feed the test gas at the cell inlet (For systems: See System Description delivered with the system).
▶ Test gas flow: Max. 100 l/h (to ensure adequate temperature and to avoid pressure build-up).

The test gas must have approximately the same temperature as the cell (See System Description delivered with the system).
▶ E.g., provide heated lines.

▶ Observe an adequate run-in time of the test gas until the measured value is stable.

In case of deviation:

▶ Check the gas flow
▶ Check the gas path for leak tightness
▶ Correct the measured value:
  – If programmed: In Menu “Adjustment/automatic”, page 45 and see provided System Description
  – Or in Menu “Adjustment/manual”, page 44 or in the respective menu in SOPAS ET

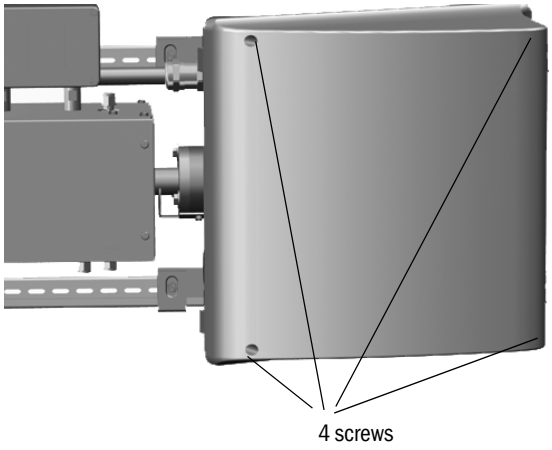
7.2.6 Checking/replacing the desiccant cartridge

Observe information on opening the enclosure (see “Observe before opening the device enclosure”, page 57).

Spare parts	Part No.	Required for
Desiccant cartridge with key	2010549	----

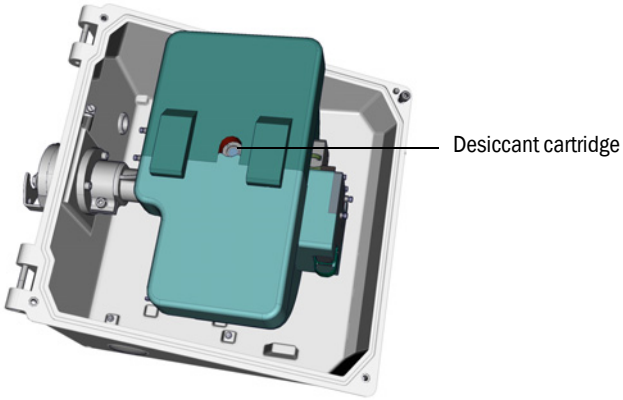
Tool
5 mm Allen key

Fig. 17: Receiver unit screws



1 Separate the MCS300P Ex from the main power supply using the external main power switch.
2 *In Ex zones:* Wait 15 minutes after switching the main power supply off before opening the enclosure.
3 Unscrew the 4 screws (5 mm Allen key) of the receiver unit.
4 Open the cover.

Fig. 18: Desiccant cartridge



5 When the desiccant cartridge is *light blue*: Desiccant cartridge is dry and OK.
When the desiccant cartridge is *pink*: Desiccant cartridge is damp.
▶ Renew the desiccant cartridge.
6 Replace the desiccant cartridge:
a) Unscrew the desiccant cartridge with the key.
b) Screw in the new desiccant cartridge.

7 Close the receiver unit again.
Make sure sealing surfaces are clean and seals are properly seated.
8 Start the MCS300P Ex again (“Commissioning of MCS300P Ex”, page 37).

7.2.7 Removing/installing the cell

CAUTION: Acid, risk of chemical burns
The cell and the connected hoses could contain caustic or corrosive media (noxious or irritating substances).
Risk of splashing when tubes are removed or cut off.
- ▶ Take suitable protective measures when working on parts having contact with the measured medium (e.g., wear protective goggles or a safety mask, protective gloves and acid-proof protective clothes).

WARNING: Hot surfaces
- ▶ Before touching heated subassemblies, allow to cool down first.

CAUTION: Risk of contamination when the device is switched off
When the device is switched off, there is a risk of contamination by medium remaining in the cell.
- Before switching off the device, purge the connected cell and tubes for a sufficient period with an inert medium.

Observe information on opening the enclosure (see “Observe before opening the device enclosure”, page 57).

Spare parts	Number	Part No.
O-ring (cell flange)	2	5310003 (1 pc)
Cell-dependent spare parts → Cell Manual or System Documentation		

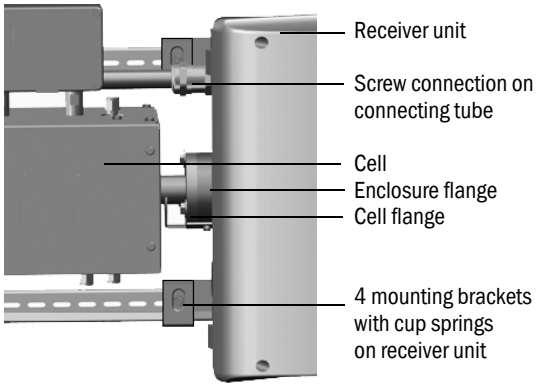
Tool
4 mm Allen key
10 mm open-end wrench
30 mm open-end wrench

Preparation work

1 Note reference energy *and* intensities (see menu: *Diagnosis/Check values*) (to compare the energy after installation).
2 Put the MCS300P Ex out of operation and disconnect from the main power supply with the external main power switch.

Removing the cell

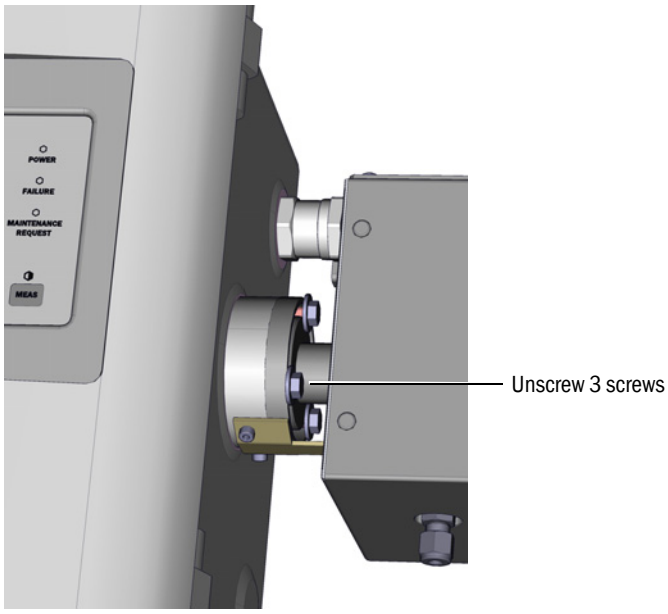
Fig. 19: Screw connections on receiver side



1 Mark the position of the cell with a marking line on the cell flange and on the enclosure flange.
2 Remove all tubes from the cell.

3 If necessary, disconnect the cell electric lines on the cell (→ Cell Operating Instructions).
4 Loosen the 4 mounting brackets on the receiver unit (do not remove).
5 Unscrew the screw connection of the connecting tube on the receiver unit side (see “Connecting tube, receiver side”, page 63).
6 Unscrew the 3 screws of the vario flange (on sender and receiver unit).

Fig. 20: Vario flange (as shown on the sender unit)



7 Push the receiver unit approx. 5 mm to the right or down.

NOTICE:
Vertical installation: Make sure that the receiver unit does not slide down out of the G-type rails and drop down.

8 Remove the cell.
Vertical installation: Immediately tighten the retaining brackets of the receiver unit.

Information on work on the cell or cell heater:
→ Cell Operating Instructions and System Documentation.

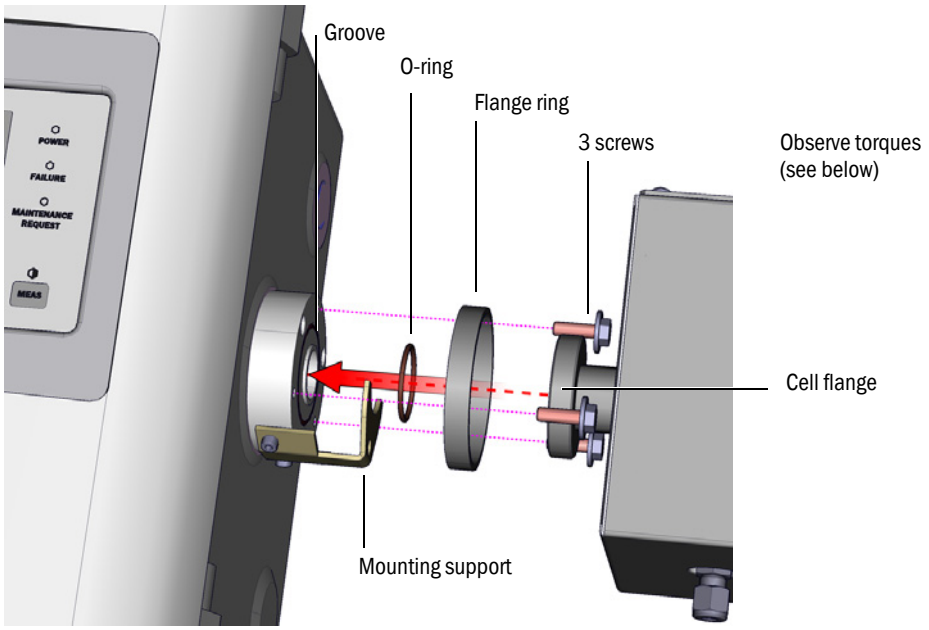
Installing the cell

- Preferred cell position
  - Mount the cell according to the marking made during removal.

  Otherwise:
  - Gas cell: Gas feed and drain lines from below, heating connection up.
  - Liquid cell: Liquid inlet from below, liquid outlet up.

1 Place 1 O-ring each into the groove on the sender or receiver unit (the outer groove remains empty).

Fig. 21: Installation of cell (shown on the sender unit)

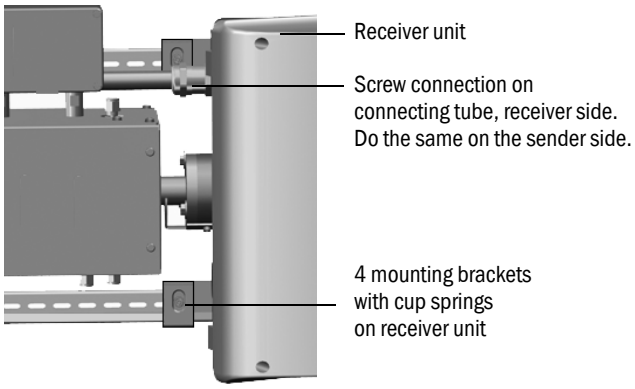


2 Insert the cell: Place the flange ring and cell flange on the flange of the sender or receiver unit (see Fig. 21).

3 Turn the cell into the correct position (according to the marking made during removal) and push the receiver unit to the left or upwards until the cell is clamped.

4 Screw on the cell on the receiver and sender side with 3 screws each (M6x20, DIN 933) and 2 washers each (DIN 137 and DIN 9021).

Fig. 22: Connecting tube, receiver side



5 Tighten the screw connection of the connecting tube again.
Torques:
– Receiver side: 1 Nm (see “Connecting tube, receiver side”, page 63)
– Sender side: 2 Nm
6 Screw the 4 mounting brackets and cup springs loosely on the receiver unit so that enough clearance remains for temperature equalization.

Final steps

1 Screw the tubes for the measured medium back onto the cell.
2 If necessary, connect the electric lines to the cell heating.
3 Perform a leak test (depending on the cell and measured medium used).
4 Put the MCS300P Ex back into operation.
5 Compare the intensity (Menu: *Diagnosis/Check values/Intensity*) with the notes made: The intensity must not have deteriorated significantly.
If this is the case: Please contact SICK Service.
6 Compare the reference energy (Menu *Diagnosis/Check values/Reference energy*) with the notes made: The reference energy must not have deteriorated significantly.
If so: Reset reference energy (see Menu: *Reset/Reference energy*).
7 Perform the adjustment of zero point and span point (see Menu *Adjustment*).

8 Clearing malfunctions

8.1 If the MCS300P Ex does not function at all ...

Possible cause	Notes
Main power supply has failed.	Check main power supply (e.g., external switch, external fuses).
Defective internal fuse.	Check fuses (see “Fuses”, page 67).
Software not working correctly.	Switch the MCS300P Ex off with the external main power switch and switch it on again after a few seconds.
Ex control unit does not switch on.	Protective gas feed interrupted or too low.
	Ex control unit indicates an error (see Pressurized enclosure system Manual).
	Enclosure parts are not closed properly (→ check screw fittings).

8.2 When measured values are obviously incorrect ...

Possible cause	Notes
The MCS300P Ex is not measuring the measured medium.	Check measured medium path and all valves (e.g., switching from the test medium to measured medium).
Measured medium path leaks.	Check installations.
The MCS300P Ex is not correctly adjusted.	Perform an adjustment (see “Adjustment”, page 44); check the test media first (nominal value, service life, throughflow and the concentrations in Menu 2.3.1).

8.3 Malfunction messages

A malfunction has occurred when:

- The measured values blink.
- The “*yellow*” LED lights.
- The “*red*” LED lights.

▶ Press the <*Diag*> button for more information (list with error messages and possible causes, see “Error messages and possible causes”, page 69).

+i For more information concerning operating and display elements, see “Operating and display elements”, page 34

8.4 Heater failure

The MCS300P Ex has two heaters with temperature monitors to heat external subassemblies (e.g., cell and heated sample gas line).

- Both heaters are switched off when one temperature exceeds the allowable limit value (depending on the temperature class).
- After 15 minutes, the MCS300P Ex switches to error state “Failure” (see “Classification, LEDs”, page 36) because both heated subassemblies cool down.

▶ Switch the MCS300P Ex off and on again to switch the heaters back on.

8.5 Overpressure monitoring failure

- MCS300P Ex category 2G: A control unit failure triggers an automatic switch-off of the MCS300P Ex.
- MCS300P Ex category 3G: A control unit malfunction is only indicated with an alarm signal on the Ex control unit with no automatic switch-off of the MCS300P Ex.

Further information → Pressurized Enclosure Manual (see “Additional documentation/ information”, page 11)

8.5.1 Possible causes

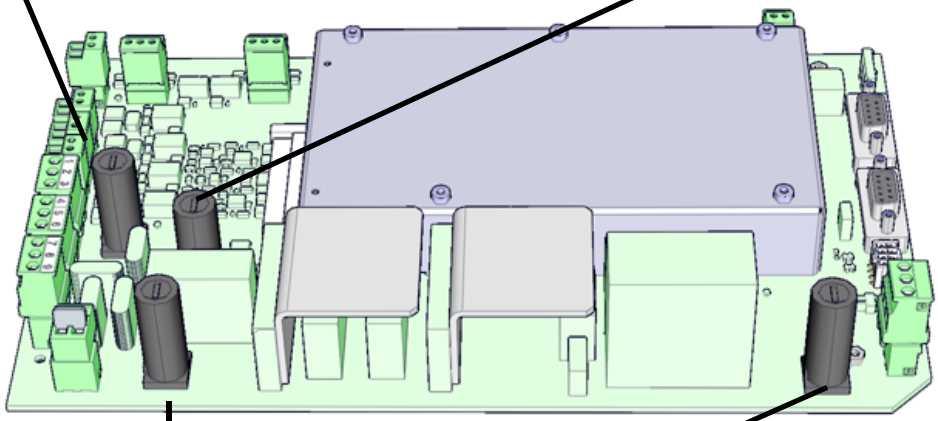
Possible cause	Possible clearance
Protective gas feed interrupted	Check protective gas feed
Screw fittings on connecting tube leaky	Tighten screw fittings Torques: Receiver side: 1 Nm (see “Connecting tube, receiver side”, page 63) Sender side: 2 Nm
Enclosure of sender or receiver unit leaky	Check screw fittings and seals (as shown in see “Receiver unit screws”, page 59).

8.6 Fuses

Fig. 23: Fuses

Controller 1 fuse (cell)		
Power voltage	Fuse rating	Part No.
240 V	2.5 A	6004305
120 V	5 A	6023695

Main fuse		
Power voltage	Fuse rating	Part No.
240 V	6.3 A	6006661
120 V	10 A	6000297



Main power supply unit fuse		
Power voltage	Fuse rating	Part No.
240 V	1 A	6004298
120 V	2 A	6004303

Controller 2 fuse		
Power voltage	Fuse rating	Part No.
240 V	2.5 A	6004305
120 V	5 A	6023695

1 Put the MCS300P Ex out of operation (see “Decommissioning”, page 54) and separate all connectors from the main power supply.
2 Unscrew the 4 screws of the sender unit (5 mm Allen key).

WARNING: Risk when opening the sender unit
- Observe warning information, see “Opening the sender unit”, page 26 and see “Observe before opening the device enclosure”, page 57

3 Open the cover.
4 Check and, If necessary, replace the fuses.

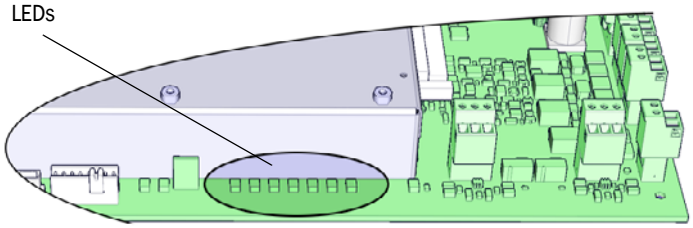
NOTICE:
Fuse ratings depend on the power voltage.
- Only use fuses with the correct fuse rating.

5 Close the sender unit. Ensure gas tightness.

8.6.1 LEDs on circuit board

If no LED is on: Check “Power supply unit” fuse (see “Fuses”, page 67).

Fig. 24: LEDs position



8.7 Error messages and possible causes

Source	Code	Error text	Classification	Description	Possible clearance[1]
System	S001	Temperature T1 too high	Failure	If T1 > (nom.temp + param.limit)	Check the heater
	S002	Temperature T2 too high		If T2 > (nom.temp + param.limit)	
	S003	Temp. 1 not reached		After 60 min. in current operation: 15 min Refer also to see “Heater failure”, page 66	
	S004	Temp. 2 not reached			
	S005	Temperature sensor 1		OVO (HC3X) signals that the input range of an analog input (temperature sensor) was exceeded	
	S006	Voltage range		OVO (HC3X) signals that the input range of an analog input (temperature sensor) was exceeded	Please contact SICK Customer Service
	S007	Check sum error		OVO (HC3X) signals that the input range of an analog input (temperature sensor) was exceeded	
	S008	Chopper signal missing		This message is first displayed when the receiver has set the corresponding bit 5 times (seconds) in succession	
	S009S 010 S011	Motor x: Ref.pos.incorrect		Filter wheel motor x does not detect the reference position	
	S012	No emitter detected		No emitter detected	Check the voltage supply of the emitter and replace If necessary
	S013	Communication error		During important routines or when S062 occurred 30 times	Please contact SICK Customer Service
	S014	No result		No measval or ecorr file	
	S015 S016 S017	Motor x: defect		If, from system start, 30 step losses or 30 watchdog actions	
	S018	Source failure		Detection I < 0.1 A	Check the emitter and replace If necessary
	S019	Chopper error		Detection: f_Motor < 50 Hz or sender SW signals chopper error	Please contact SICK Customer Service
	S020	Configuration error		CONF (HC3X)	
	S021	Communication error		COM (HC3X)	
	S022	Controller not found		EXIST (HC3X)	
	S023	Frequent reset		Receiver, sender. If error occurred 30 times as from system start	
	S024	No active component		If “Active” checkmarks of all components disabled	Check in SOPAS ET

[1] This Table also contains recommended solutions that should only be performed by specially trained personnel.

Source	Code	Error text	Classification	Description	Possible clearance[1]
System	S025	Evaluation module failure	Failure	Evaluation module could not be started	Please contact SICK Customer Service
	S026	Evaluation module: File error		Files for evaluation module were not set up (espec, config, condition, measval)	
	S027	Updating low		TOO (HC3X)	
	S028 S029 S030	Motor x: communication		No communication with motor x	
	S031	Optics temp. too high		If optics temp. > 1.05 * 60 °C = 63 °C	
	S032	Temperature sensor 1		OVO (HC3X) signals that the input range of an analog input (temperature sensor) was exceeded	Check the heater
	S113	Check sum error		BCK (I/O) indicates that the transmission process performed beforehand from the master to the slave (controller) had an incorrect check sum and the slave has not accepted the data.	Check the I/O modules, cable damage
	S114	Communication error		COM (I/O) communication error with an I/O module	
	S115	High/low voltage		PFO (I/O) signals that the internal voltage supply of the 5 V and 24 V supply voltages has determined a range overflow or underflow	Please contact SICK Customer Service
	S116	Output without current		TOO (I/O) signals that the output was switched free from current because of the time-out.	Check the I/O modules, cable damage

[1] This Table also contains recommended solutions that should only be performed by specially trained personnel.

Initiator	Code	Error text	Classification	Description	Possible clearance[1]
System	S033	Dev. zero point too high	Maintenance request	Parameters set for measured component	Check the zero gas, contamination
	S034	Configuration I/O module		CONF (I/O) configuration error, module found does not correspond to nominal configuration	Check the IO modules, check the parameters: IO hardware plan
	S035	Ref.energy too low		Parameters set for measured component	Check the emitter current, contamination: clean/replace cell window
	S036	Optics temp. not reached		Delay time: 1800 s = 30 min	Please contact SICK Customer Service
	S037	VIS: source current low		Only UV: current: 50% (I_max = 2.8 A) –> message If I < 1.4 A	Check the emitter and replace If necessary
	S038 S039	Channel x error		OVO (I/O) signals that the current required on the analog module connection (node y, module z) is not reached.	Check the I/O modules, cable damage
	S042	Busy		BSY (I/O and HC3X) signals that the microcontroller of the module is still busy executing the last command	Please contact SICK Customer Service
	S043	IR: Emitter voltage high		Only IR: Voltage: 150% of V_max (V_max = 3.5 V) → message if U > 5.3 V	Check the emitter and replace If necessary
	S044	Chopper tight		Detection: If setting variable > 1000	Please contact SICK Customer Service
	S045	Factor invalid: medium		If the F_Medium calculation is refused because it is outside the tolerable range; parameters set with measured component	Check the test gas, check the input of the test gas concentration, contamination
	S046	Factor invalid: filter		If the F_Filter calculation is refused because it is outside the tolerable range; parameters set with measured component	Check the zero gas, contamination
	S049	FlashCard not detected		FlashCard not detected	Please contact SICK Customer Service
	S050	Factor=zero medium/filter		If one of the factors F_Medium or F_Filter is in the range -0.000001 < x < 0.000001	Check the test gas, check the input of the test gas concentration, contamination

[1] This Table also contains recommended solutions that should only be performed by specially trained personnel.

Initiator	Code	Error text	Classification	Description	Possible clearance[1]
System	S057	sin/cos-overflow	Uncertain	If at least one value of 100 averaged less than -2^{15} or greater than $+2^{15}$	Please contact SICK Customer Service
	S058	Temperature 1 too low		If T1 < nom.temp. - param.limit	Wait. After a restart, max. 60 min., during operation: 15 min
	S059	Temperature 2 too low		If T2 < nom.temp. - param.limit	
	S060	Temp. optics too low		If optics temp. < 60 °C * 95% = 57 °C	Wait for max. 30 min.
	S061	Chopper frequency range		If chopper frequency: 125< x < 131	Please contact SICK Customer Service
	S062	Communication problem		Sender and receiver for cyclic routines (reading out of measurement signals, diagnosis values)	
	S063	Wrong no. of filter wheels		According to the SOPAS ET parameters, fewer filter wheels defined than actually present in the device	Check the SOPAS ET parameters

[1] This Table also contains recommended solutions that should only be performed by specially trained personnel.

Initiator	Code	Error text	Classification	Possible clearance
Evaluation process	E001	Unknown command	Failure	Please contact SICK Customer Service
	E002	OS error		
	E003	Incorrect configuration		
	E004	Incorrect configuration		
	E005	Internal file error		
	E006	Incorrect configuration		
	E007	Internal file error		
	E008	Internal file error		
	E009	Internal file error		
	E010	Incorrect configuration		
	E011	Incorrect configuration		
	E012	Incorrect configuration		
	E013 ... E021	Internal file error		
	E022	Resolution out of range		
	E023	Numerical error		
	E024	Incorrect configuration		
	E025	Internal file error		
	E026	Numerical error		
	E027	Incorrect configuration		
	E028	Incorrect configuration		
	E029	Unknown failure		
	E030	OS error		
	E031	OS error		
	E032	Internal file error		
	E033	Internal file error		
	E034	Internal file error		
	E035	Numerical error		
	E036	Syntax error		
	E037	Processing error		
	E038	Absorption too high		
	E039	Internal file error		
	E040	Internal file error		

Initiator	Code	Error text	Classification	Possible clearance
Evaluation process	E097	Evaluation uncertain	Uncertain	Please contact SICK Customer Service
	E098	Medium temp. too high/low		
	E099	Medium pressure too high/low		
	E100	Medium flow too high/low		
	E101	Measured value too high/low		
	E102	Evaluation uncertain		
	E103	Evaluation uncertain		

9 Specifications

9.1 Compliances

The technical design of this device complies with the following EU directives and EN standards:

- EU Directive: LVD (Low Voltage Directive)
  EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use
- EU Directive: EMC (Electromagnetic Compatibility)
  EN 61326: Electrical equipment for measurement, control and laboratory use - EMC requirements

Further standards and directives: see Declaration of Conformity delivered with the device.

9.2 Ex certifications

- The MCS300P Ex corresponds to the ATEX category (according to ATEX Directive 2014/34/EC):
  - Ⓔx II 2G Ex pxb IIC T4 Gb *or*
  - Ⓔx II 2G Ex pxb IIC T3 Gb

  or
  - Ⓔx II 3G Ex pzc IIC T4 Gc *or*
  - Ⓔx II 3G Ex pzc IIC T3 Gc
- The MCS300P Ex corresponds to the IEC-Ex category (according to IEC Directive 60079):
  - Ex II 2G Ex pxb IIC T4 Gb *or*
  - Ex II 2G Ex pxb IIC T3 Gb

  or
  - Ex II 3G Ex pzc IIC T4 Gc *or*
  - Ex II 3G Ex pzc IIC T3 Gc

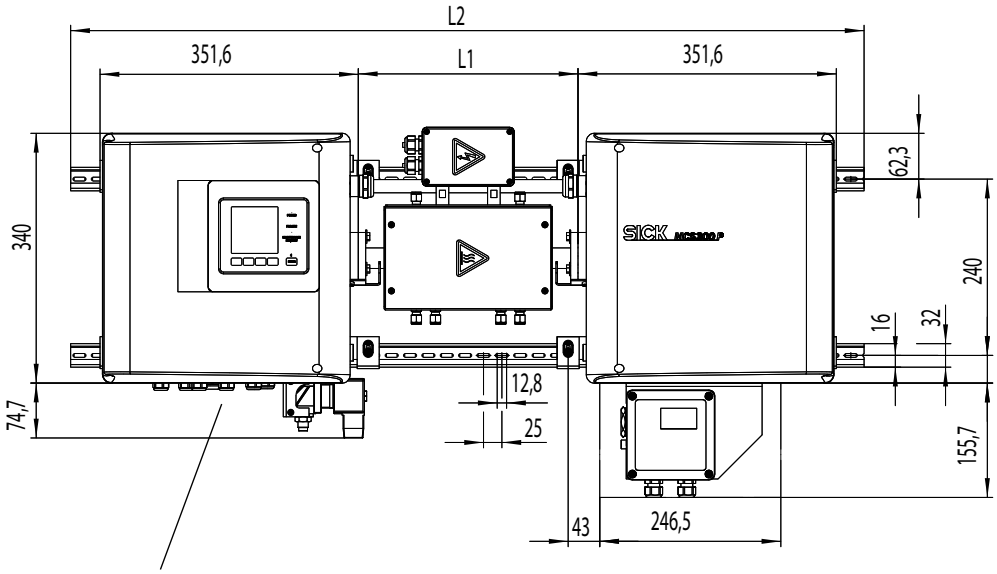
Further information on Ex certification: see “Explosion protection according to ATEX/IECEx”, page 15

9.3 Technical Data

The MCS300P Ex equipment depends on the application.
Refer to the System Documentation delivered with the MCS300P Ex for the fitted equipment.

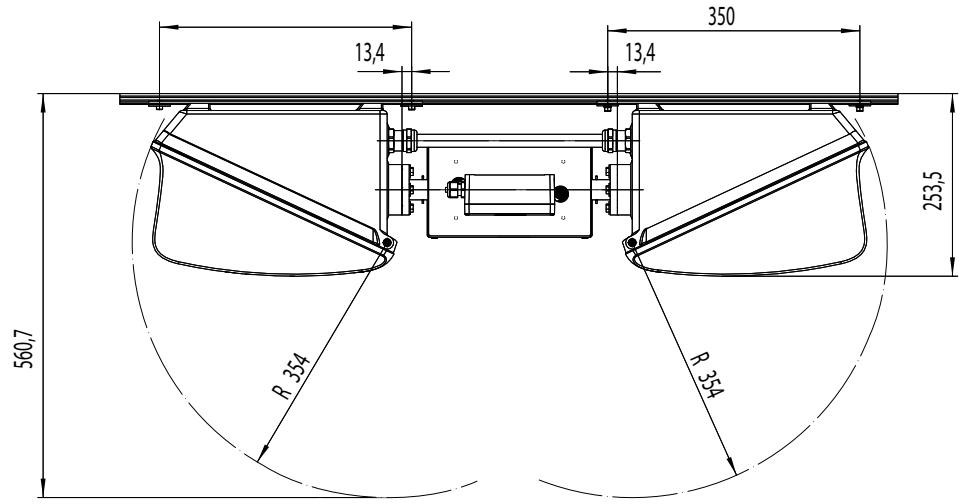
9.3.1 Dimensions and drilling diagram

Fig. 25: Horizontal installation

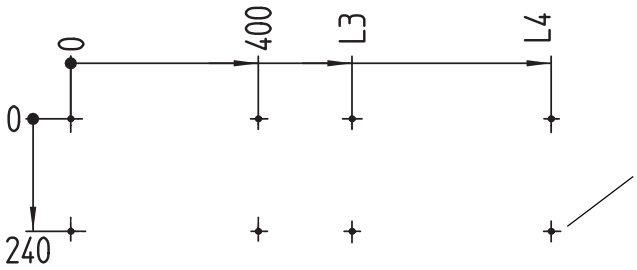


Cable bushings:
8 * M16x1.5 for Ø 5 ... 10 mm (0.2 ... 0.4 in)
1 * M20x1,5 for Ø 10 ... 14 mm (0.4 ... 0.55 in)

Ex control unit dimensions 246.5 and 155.7 are applicable for FS840 and FS850S (maximum dimension)



mm	inch
12.8	0.50
13.4	0.53
16	0.63
25	1.0
32	1.3
62.3	2.4
133.5	5.2
240	9.4
253.5	10
340	13.4
350	13.8
351.6	13.8
354	14
400	15.7
560.7	22

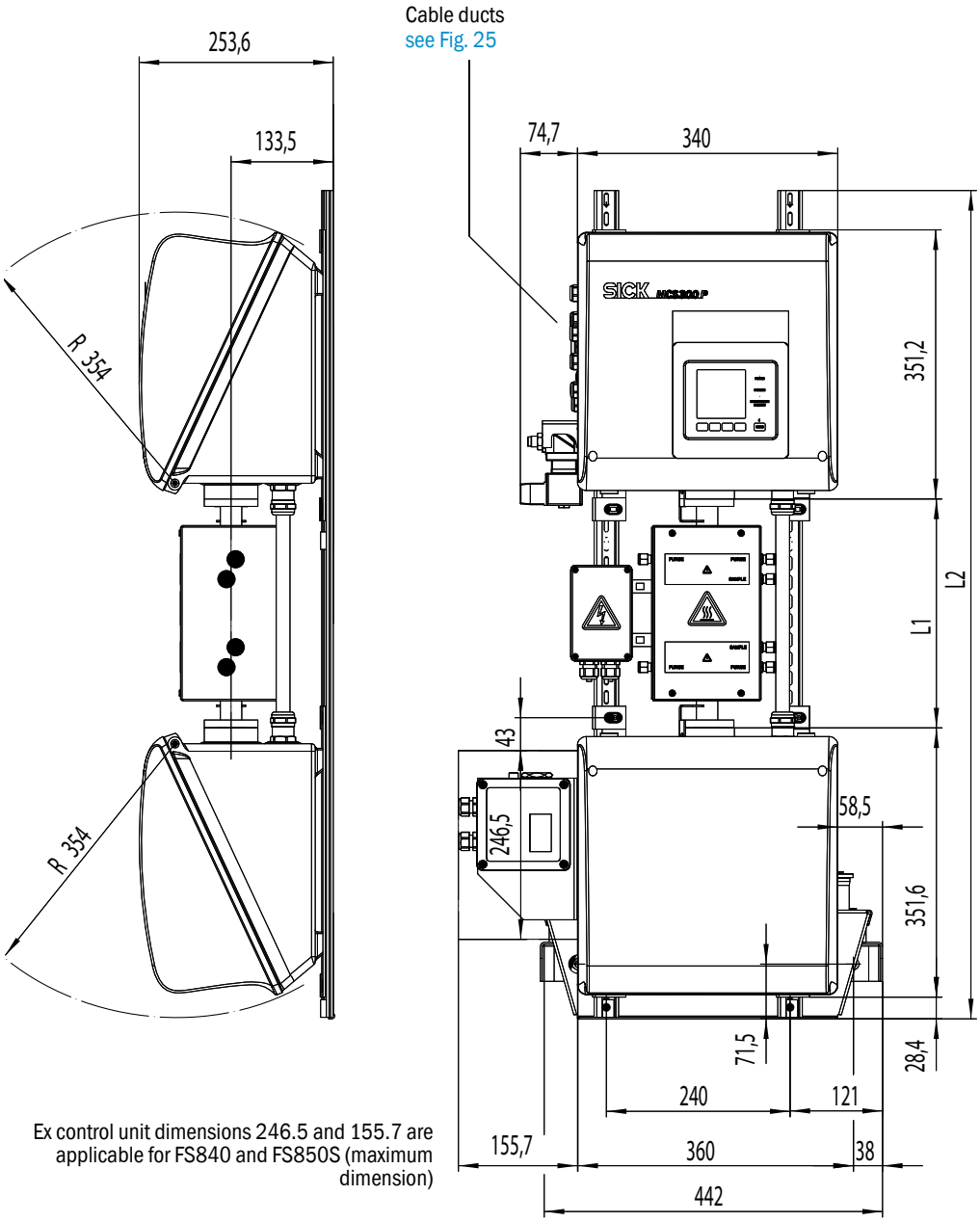


Drilling diagram
Threaded hole M5 or dowel hole

Dimensions in mm (in) and weights in kg (lb) with typical SICK Ex cells:

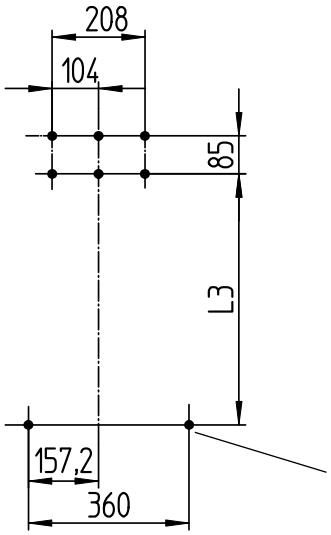
Cell	L1	L2	L3	L4	Total weight
PGK10 Ex	299 (11.8)	1080 (42.5)	600 (23.6)	1025 (40.4)	37 (82)
PGK20 Ex	399 (15.7)	1180 (46.5)	700 (27.6)	1125 (44.3)	39 (86)
PGK50 Ex	699 (27.5)	1480 (58.3)	1000 (39.4)	1425 (56.1)	45 (99)
PGK75 Ex	949 (37.4)	1730 (68.1)	1250 (49.2)	1675 (65.9)	50 (110)

Fig. 26: Vertical installation



Ex control unit dimensions 246.5 and 155.7 are applicable for FS840 and FS850S (maximum dimension)

mm	inch
22.5	0.88
28.4	1.12
38	1.5
49	1.93
51	2
58.5	2.3
71.5	2.8
74.7	2.9
85	3.3
100	3.9
101	4
104	4.1
133.5	5.2
155.7	6.1
157.2	6.2
208	8.2
240	9.4
246.5	9.7
253.6	10
351.2	13.8
351.6	13.8
354	13.9
360	14.2



Drilling diagram
Threaded hole M8 or dowel hole for M8

Dimensions in mm (in) and weights in kg (lb) with typical SICK Ex cells:

Cell	L1	L2	L3	L4	Total weight
PGK10 Ex	299 (11.8)	1080 (42.5)	562 (22.2)	569 (22.4)	43 (95)
PGK20 Ex	399 (15.7)	1180 (46.5)	662 (26.1)	669 (26.3)	45 (99)
PGK50 Ex	699 (27.5)	1480 (58.3)	962 (37.9)	969 (38.1)	51 (112)
PGK75 Ex	949 (37.4)	1730 (68.1)	1212 (47.7)	1219 (48.0)	56 (123)

9.3.2 Measured value recording

Measuring principle	Photometer, interference and gas filter correlation method
Spectral range	VIS version: 300 ... 1200 nm IR version: 1200 ... 11000 nm
Measured components	All IR-/NIR-/VIS-active gases and liquids. Simultaneously up to 6 components, e.g., CO, CO_2, NO, NO_2, N_2O, HCl, NH_3, H_2O, hydrocarbons, Cl_2.
External sensors	Read-in and processing of up to 4 external sensors.
Number of measuring ranges	2, automatic measuring range switch-over (adjustable)
Cross-sensitivity compensation	Max. 6 disturbance variables (also external disturbance variables)
Detection limit	< 2% of respective measuring range
Zero drift	VIS: < 1% of full scale / day IR: < 2% of full scale / week
Temperature effect	< 2% of respective measuring range / 10 K
Setting time t_{90}	Approx. 30 ... 120 s, adjustable specific for system and component
Limit values	2 limit values per measured component
Sample point switching	Max. 8 sampling points

9.3.3 Enclosure specification

Enclosure material	Aluminum, coated
Weight	Approx. 30 kg (66 lb) (without cell)
Highest surface temperature	+47 °C (+117 °F)
Degree of protection	IP 65 (cell separate)

9.3.4 Ambient conditions

Ambient temperature	+5 ... +40 °C (+40 ... +105 °F)
Storage temperature	–20 ... +60 °C (-5 ... +140 °F)
Relative humidity	Max. 80% (non-condensing)

9.3.5 Interfaces and protocols

Analog outputs[1]	0/4 ... 22 mA, electrically isolated; max. load: 500 Ohm
Analog inputs[1]	0/4 ... 22 mA, electrically isolated; input resistance: 100 Ohm
Digital inputs[1]	Open contact; potential-free
Digital outputs[1]	Power relay, electrically isolated outputs and potential-free outputs
Interface	Ethernet (depending on individual version)
PC operation	SOPAS ET via Ethernet

[1] Number dependent on device configuration: → System Documentation

9.3.6 Electrical connection

Supply voltage	*MCS300P Ex:* 1~230 V ± 10%; 50 ... 60 Hz or 1~115 V ± 10%; 50 ... 60 Hz
	Ex control unit: 230 VAC, 48 ... 62 Hz or 115 VAC, 48 ... 62 Hz
Power input	Analyzer: Max. 230 VA – with cell heater: Max. 805 VA – with second heater: Max. 1450 VA
Heater outputs	2 outputs, each max. 550 VA
Line cross-sections	Power voltage: Max. 2.5 mm², AWG14, (depending on equipment) Heater for external subassemblies: AWG24-12 Pt100 external subassemblies: AWG26-15
Pt100	4 connections for Pt100

9.4 Parameters for pressurized enclosure system

9.4.1 Protective gas

Protective gas	Instrument air or inert gas – Particle size max. 1 µm, – Oil content max. 0.1 ppm, – Dew point –30 °C (–22 °F).
Connections – Inlet: – Outlet:	 – G ⅜" thread *or* – hose connection for 8 mm diameter – *For version ATEX-2G:* G 1" thread – *For version ATEX-3G:* G ¾" thread
Inlet temperature:	+5 ... +40 °C (+40 ... +105 °F)
Primary pressure: – Max.: – Min.:	 2500 hPa (2.5 bar) (36 psi) (relative) 2000 hPa (2 bar) (30 psi) (relative)

9.4.2 Enclosure data

Enclosure data	
Free volume:	40 l (2440 in³)
Minimum overpressure:	80 Pa (0.8 mbar) (0.012 psi) (relative)
Maximum overpressure:	1800 Pa (18 mbar) (0.26 psi) (relative)

Pre-purging during commissioning	
Typical pre-purge time:	Approx. 6 minutes

9.4.3 Pressurized enclosure system settings for ATEX-2G

Pressurized enclosure system used: Gönnheimer F850S

WARNING: Risk of explosion with incorrect parameters

- Do not change parameters.
  (The parameter password is specific for SICK and only available for SICK Customer Service)

F850S parameters	Setting
Valve control:	Proportional valve (P-valve)
Operating mode:	Leakage compensation (purging not continuous)
Purge amount:	500 l (30000 in³))
Nominal purge pressure:	10 mbar (0.145 psi) (relative)
Minimum pressure in enclosure:	0.8 mbar (0.012 psi) (relative)
Maximum pressure in enclosure:	18 mbar (0.26 psi) (relative)
Nominal pressure in enclosure:	2 mbar (0.03 psi) (relative)
Signal pressure:	1.5 mbar (0.022 psi) (relative)

9.4.4 Pressurized enclosure system settings for ATEX-3G

Pressurized enclosure system used: Gönnheimer F840

WARNING: Risk of explosion with incorrect parameters

- Do not change the parameters of F840 and purge valve setting.
  (The parameter password is specific for SICK and only available for SICK Customer Service)

F840 parameter	Setting
Pre-purging:	Yes
Purging method Auto:	Yes
Input function:	None
Output function A1 (signal contact 1):	Ex OK
Control direction A1 (signal contact 1):	Normally open (no)
Output function A2 (signal contact 2):	p<p alarm
Control direction A2 (signal contact 2):	Normally open (no)
Volume[1]:	50 l (3000 in^3)
Primary pressure[2]:	2.0 mbar (29 psi) (relative)
Nozzle:	2.0 mm (0.079 m)
Minimum pre-purging pressure:	7.0 mbar (0.1 psi) (relative)
Minimum pressure in operation:	0.8 mbar (0.012 psi) (relative)
Signal pressure	1.5 mbar (0.022 psi) (relative)
Maximum pressure during operation:	18.0 mbar (0.26 psi) (relative)
Maximum bypass time:	Off

[1] Safety factor: 1.25
[2] Minimum primary pressure (longer purge time)

10 Appendix

10.1 Ex certifications

10.1.1 ATEX

The MCS300P Ex meets the following qualifications in accordance with ATEX Directive 2014/34/EU:

- Ⓔx II 2G Ex pxb IIC T4 Gb *or*
- Ⓔx II 2G Ex pxb IIC T3 Gb

or

- Ⓔx II 3G Ex pzc IIC T4 Gc *or*
- Ⓔx II 3G Ex pzc IIC T3 Gc

10.1.2 IECEx

The MCS300P Ex meets the following qualifications in accordance with IECEx:

- Ex II 2G Ex pxb IIC T4 Gb *or*
- Ex II 2G Ex pxb IIC T3 Gb

or

- Ex II 3G Ex pzc IIC T4 Gc *or*
- Ex II 3G Ex pzc IIC T3 Gc

10.1.3 TR CU certification

Measuring device MCS300P complies with TR CU (in accordance with TR CU 012/2011):

Photometer, type MCS300P-Ex	1Ex px IIC T4 Gb X or 1Ex px IIC T3 Gb X	Use in zone 1 and (or) 2
Photometer, type MCS300P-Ex	2Ex pz IIC T4 Gc X or 2Ex pz IIC T3 Gc X	Use in zone 2
Cell, type PGK..Ex	Ex e IIC Gb U	Ex component

Parameters of the purge air supply system

Enclosure volume, dm^3	40
Minimum protective gas volume required for pre-purging (purging before the start) the enclosure, dm^3	200
Minimum protective gas consumption during purging, dm^3/min	66
Minimum pressure in enclosure, mbar	0.8
Maximum pressure in enclosure, mbar	12

Explosion protection identification in accordance with GOST 31610.0-2014 (IEC 60079-0:2011)

Photometer, type MCS300P-Ex	1Ex px IIC T4 Gb X or 1Ex px IIC T3 Gb X	Use in zone 1 and (or) 2
Photometer, type MCS300P-Ex	2Ex pz IIC T4 Gc X or 2Ex pz IIC T3 Gc X	Use in zone 2
Cell, type PGK..Ex	Ex e IIC Gb U	Ex component

Photometers as explosion-protected version are devices with ignition protection type Gb or Gc, with ignition protection type px - filling or purging the enclosure with overpressure (for ignition protection type Mb or Gb) or pz - filling or purging the enclosure with overpressure (for the device ignition protection type Gc), depending on the location in potentially explosive atmospheres, with gas of subgroup IIC, at a maximum surface temperature of 135 °C (T4) or 200 °C (T3) and with special conditions for safe use «X».

The cell as explosion-protected version is a device with ignition protection type increased degree of protection “e” (for device ignition protection type Mc or Gb), with gas of subgroup IIC and with special conditions for safe use.

Special conditions for safe use «X».

- Compliance with the special requirements for safe use «X» specified in the technical documentation for accessories in explosion-protected version.

Type plate identification

The identification on the device contains the following data:

- Name of manufacturer or registered trademark of manufacturer (SICK logo)
- Device type name
- Identification of explosion protection in accordance with ATEX and IECEx qualification
- Serial number
- Number of Certificates of Conformity
- Special explosion protection identification in accordance with Annex 2 TR CU 012/2011
- Uniform identification for the movement of goods within the member states of the Customs Union according to paragraph 1 art. 7 TR CU 012/2011
- Date of manufacture

8013741/16LH/V1-7/2020-04

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