

FLWSIC600-XT
Ultrasonic Gas Meter



Maintenance
Inspection
Repairs



Document Information

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Manufacturer

SICK Engineering GmbH
Bergener Ring 27 · D-01458 Ottendorf-Okrilla · Germany
Phone: +49 35 20552410
Fax: +49 35 20552450
E-Mail: info.pa@sick.de

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Glossary

ATEX	ATEX: Atmosphères Explosifs: Abbreviation for European standards that govern safety in potentially explosive atmospheres
CSA	Canadian Standards Association (www.csa.ca)
DC	Direct Current
HF	High frequency, e.g. HF pulse
IEC	International Electrotechnical Commission
IECEX	IEC system for certification in accordance with standards for devices for use in potentially explosive atmospheres
IPxy	Ingress Protection: Degree of protection of a device in accordance with IEC/DIN EN 60529; x specifies the protection against contact and impurities, y protection against moisture.
MDR	Manufacturer Data Record
NAMUR	Abbreviation for "Normen-Arbeitsgemeinschaft für Mess- und Regeltechnik in der chemischen Industrie", now "Interessengemeinschaft Automatisierungstechnik der Prozessindustrie" (www.namur.de)
SPU	Signal Processing Unit

Warning Symbols



IMMEDIATE HAZARD
of severe injuries or death



Hazard (general)



Hazard by electrical voltage



Hazard in potentially explosive atmospheres



Hazard by explosive substances/mixtures



Hazard by unhealthy substances



Hazard by toxic substances

Warning Levels / Signal Words

HAZARD

Risk or hazardous situation which *will* 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.

Information Symbols



Information on product condition relating to protection against explosions (general)



Information on product characteristics related to European Directive 94/9/EC (ATEX)



Information on product characteristics related to explosion protection in accordance with the IECEx scheme.



Important technical information for this product



Important information on electric or electronic functions



Nice to know



Supplementary information



Link referring to information at another place

1	Important Information	7
1.1	About this document	8
1.2	For your safety	9
1.2.1	Intended use of the device	9
1.2.2	Authorized personnel	9
1.2.3	General safety instructions and protective measures	10
1.2.4	Hazards by hot, corrosive and explosive gases, or high pressure	10
1.2.5	Hazard through heavy loads	11
2	Components	13
2.1	Complete overview of the device family	14
2.1.1	FLOWSIC600-XT	14
2.1.2	FLOWSIC600-XT Forte	15
2.1.3	FLOWSIC600-XT 2plex	16
2.1.4	FLOWSIC600-XT Quatro	17
2.2	SPU (Signal Processing Unit) overview	18
2.2.1	Ex-d enclosure version	18
2.2.2	Ex-de enclosure version	19
2.2.3	Ex-i enclosure version	20
3	Repairs	21
3.1	General information	22
3.2	Prerequisites for repair work	22
3.3	Tools required	23
3.4	Working on the meter body	24
3.4.1	Replacing the sensors	24
3.4.1.1	Remove the sensors	24
3.4.1.2	Fit the new sensor	26
3.4.2	Replacing the integrated p/T sensor	28
3.4.2.1	Remove the p/T sensor	28
3.4.2.2	Fit the new p/T sensor	29

3.5	Working on the SPU	31
3.5.1	Replacing the display unit	31
3.5.1.1	Swivel the display unit downwards	31
3.5.1.2	Remove the display unit	32
3.5.1.3	Fit the new display unit	33
3.5.1.4	Connect the display unit	34
3.5.1.5	Swivel the display unit upwards and screw tight	34
3.5.2	Replacing the display cover	35
3.5.3	Replacing the backup battery	36
3.5.3.1	Remove the backup battery	36
3.5.3.2	Insert the new backup battery	36
3.5.4	Replacing the RTC battery	37
3.5.4.1	Replace the RTC battery	37
3.5.5	Replacing the SPU circuit board	38
3.5.5.1	Remove the electronics cover	38
3.5.5.2	Remove the SPU circuit board	39
3.5.5.3	Fit the new SPU circuit board	40
3.5.5.4	Fit the electronics cover	41
3.5.6	Replacing the Ex-d I/O block	42
3.5.6.1	Open the Ex-d terminal compartment	42
3.5.6.2	Remove the Ex-d I/O block	42
3.5.6.3	Fit the new Ex-d I/O block	44
3.5.6.4	Close the Ex-d terminal compartment	45
3.5.7	Replacing the Ex-d I/O block fuse	46
3.5.8	Replacing the Ex-e connection block	47
3.5.8.1	Open the Ex-e terminal compartment	47
3.5.8.2	Remove the connection blocks in the Ex-e terminal compartment	48
3.5.8.3	Fit the new connection block in the Ex-e terminal compartment	48
3.5.8.4	Close the Ex-e terminal compartment	49
3.5.9	Replacing the cable gland between the Ex-d and Ex-e terminal compartments ..	50
3.5.9.1	Remove the cable gland	50
3.5.9.2	Fit the Ex-e cable gland	51
3.5.10	Replacing the cable gland between the Ex-d terminal compartment and the Ex-i transducer electronics	52
3.5.10.1	Remove the cable gland	52
3.5.10.2	Fit the new cable gland	53
3.6	Parameter input	54
3.6.1	Configure sensor settings after transducer exchange	54
3.6.2	SOS Check	54
3.6.3	Configure Stacking	55
3.6.4	Configure Zerophase	55
3.6.5	Configure Pfix and Tfix	55
4	Accessories and Spare Parts	57
4.1	SPU Parts	58
4.2	Electronic boards	58
4.3	Transducers	59
4.4	Pressure/Temperature sensors	59
4.5	O-rings for transducers	60
4.6	Electronics accessories	60
4.7	Transducer covers	61

4.8	Covers p/T sensor	62
4.9	Accessories meter body	62
5	Annex	63
5.1	Component placement specification SPU (sensor cables)	64

FLWSIC600-XT

1 Important Information

About this document
For your safety

1.1 About this document

This Service Manual is part of the device documentation of the FLOWSIC600-XT with the further components:

- Operating Instructions (Part No. 8018846)
- Interface Description FLOWSIC600-XT

This version is valid for:

- FLOWSIC600-XT with firmware as from firmware version V1.x.xx
- Operating and Parameter program FLOWgate as from version 1.x.x

All service work that can be carried out by trained personnel is described. The valid Operating Instructions contain all basic information on the measurement method, layout and function of the measuring system and its components as well as on using the device, therefore additional information is only provided here where necessary to understand the function.

The Service Manual may therefore only be used together with the valid Operating Instructions.

1.2 **For your safety**

1.2.1 **Intended use of the device**

The measuring system FLOWSIC600-XT is used for measuring the actual volumetric flow rate of gases transported in pipelines. Apart from that, the FLOWSIC600-XT can also determine the actual corrected volume and the sound velocity.

The measuring system shall only be used as specified by the manufacturer and as set forth below. Special attention must be paid that:

- Usage is compliant with the technical data, specifications on allowable use as well as the requirements for assembly and connection, and ambient and operating conditions (to be found in the order documents, on the type plate and in approval documents, and the Operating Instructions).
- All measures required for value conservation, e.g. for maintenance and inspection, and/or transport and storage, are observed.
- The device is not subjected to any unallowed mechanical stress, e.g. through pig cleaning.

1.2.2 **Authorized personnel**

Persons responsible for safety must ensure the following:

- Any work on the measuring system may only be carried out by qualified persons and be approved by responsible skilled persons.
- Qualified persons are those who, based on their training, experience or instruction as well as their knowledge of relevant standards, regulations, accident prevention rules and plant conditions, and authorized by those responsible for persons and plants to carry out such work. It is decisive that these persons can recognize and avoid any possible hazards in good time. Skilled persons are persons in accordance with DIN VDE 0105 or IEC 364, or directly comparable standards.
- These persons must have and demonstrate exact knowledge on hazards arising from operation, e.g. through hot, toxic, explosive gases or gases under pressure, gas-liquid mixtures or other media as well as adequate knowledge of the measuring system gained through training.
- It is important that, during all work on the measuring system, the persons have received training by "SICK Engineering GmbH".
- In hazardous areas with potentially explosive atmospheres, wiring and installation shall only be carried out by staff trained according to EN60079-14 and according to national regulations.

1.2.3

General safety instructions and protective measures

Improper use or handling can cause health or material damage. Please therefore read this Section thoroughly and observe this information during all tasks on the FLOWSIC600-XT as well as the warning and caution information in the individual Sections of this Service Manual.

Basically applicable:

- Always comply with the statutory provisions and the associated technical rules and regulations relevant to the equipment when preparing for and carrying out any work on the measuring system. Pay particular attention to potentially hazardous aspects of the equipment, such as pressurized piping and explosion protection zones. Always pay special attention to the relevant regulations.
- All work must be carried out in accordance with the local, system-specific conditions and with due consideration to operating hazards and specifications.
- The Operating Instructions belonging to the measuring system as well as system documentation must be available on site. Always observe the information on the prevention of injuries and damage given therein.
- Depending on the particular hazard potential, an adequate number of suitable protection devices and personal safety equipment must be available and used by the personnel.

1.2.4

Hazards by hot, corrosive and explosive gases, or high pressure

The FLOWSIC600-XT is fitted directly in the gas-carrying line. The operating company is responsible for safe operation and for complying with additional national and company-specific regulations.

**WARNING: Hazards by the gas in the system**

The following conditions can increase the risk:

- Toxic gas or gas dangerous to health
 - Chemically aggressive gas
 - Explosive gas
 - High gas pressure
 - High gas temperature
- ▶ In installations with an increased risk, the FLOWSIC600-XT may only be fitted and removed when the line is vented or when the installation is at a standstill.
 - ▶ The same applies to repair and service work which involves opening any pressurized component or the explosion-proof SPU.

Otherwise health or injury risks can possibly arise through escaping gas (e.g. poisoning, burns).

**WARNING: Hazards through leaks**

Operation in leaky condition is not allowed and potentially dangerous.

- ▶ Regularly check leak tightness of equipment.

1.2.5

Hazard through heavy loads

The FLOWSIC600-XT measuring system must be attached securely to the carrying structure when being transported and installed.

- ▶ Only use lifting gear and equipment (e.g. lifting straps) suitable for the weight to be lifted. Maximum load information can be found on the type plate of the lifting gear.



NOTICE:

The lifting lugs are designed for transporting the measuring device only. Do not lift or transport the FLOWSIC600-XT with additional loads using these lugs.

FLWSIC600-XT

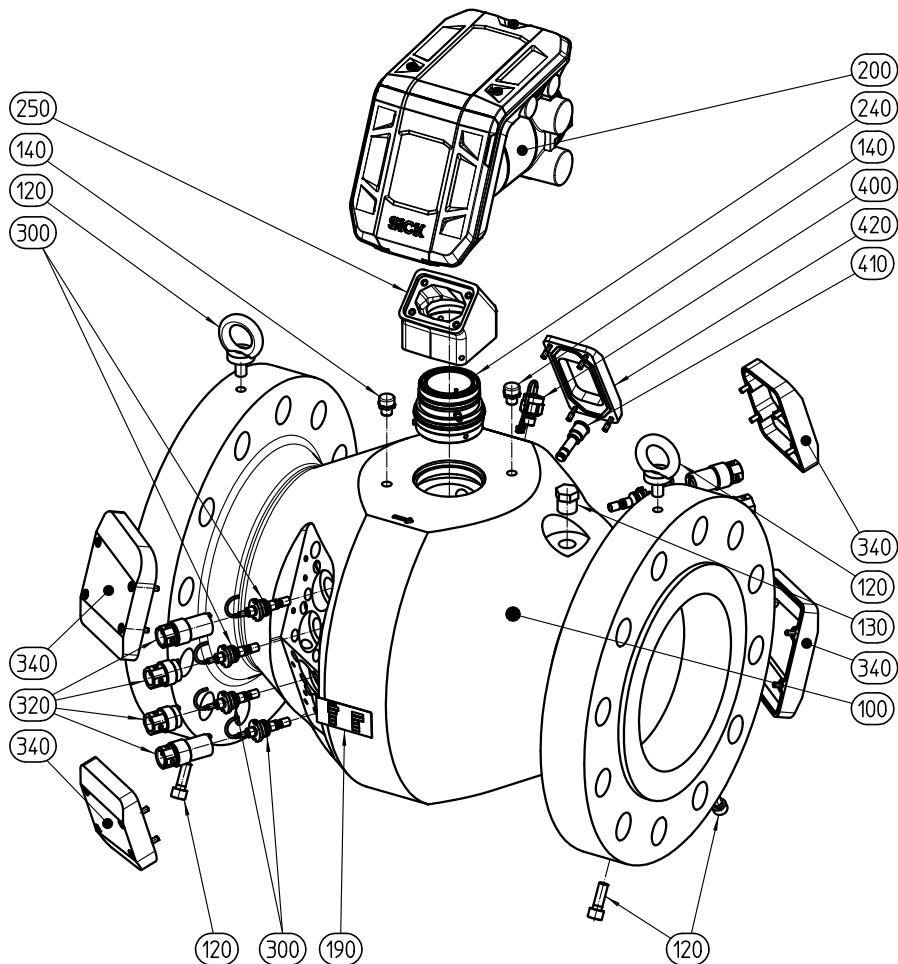
2 Components

Complete overview of the device family
SPU (Signal Processing Unit) overview

2.1 Complete overview of the device family

2.1.1 FLOWSIC600-XT

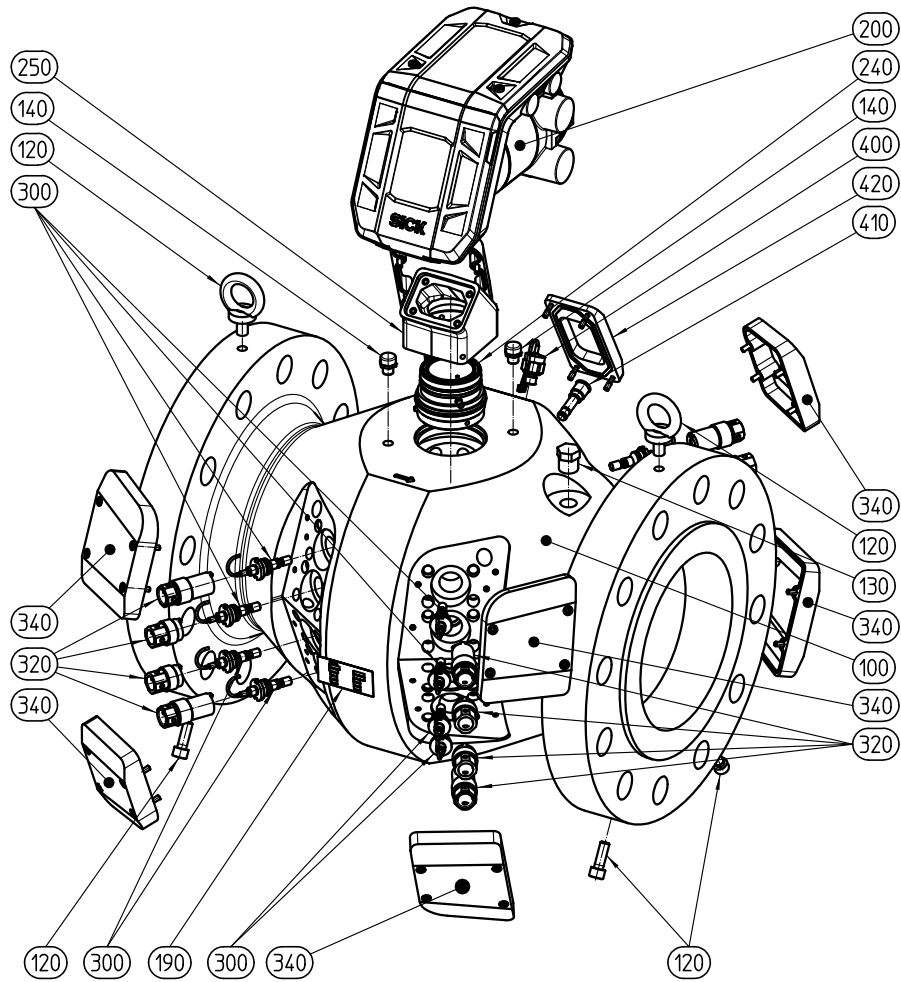
Fig. 1 Exploded view FLOWSIC600-XT



- | | |
|-----------------------------------|-------------------------|
| 100 Meter body | 300 Sensor |
| 120 Meter body screws | 320 Sensor assembly set |
| 140 Pressure compensation element | 340 Sensor cover |
| 190 Meter body type plate | 400 Pressure sensor |
| 200 SPU | 410 pT sensor set |
| 240 SPU neck assembly set | 420 pT sensor cover |
| 250 SPU neck | |

2.1.2 FLOWSIC600-XT Forte

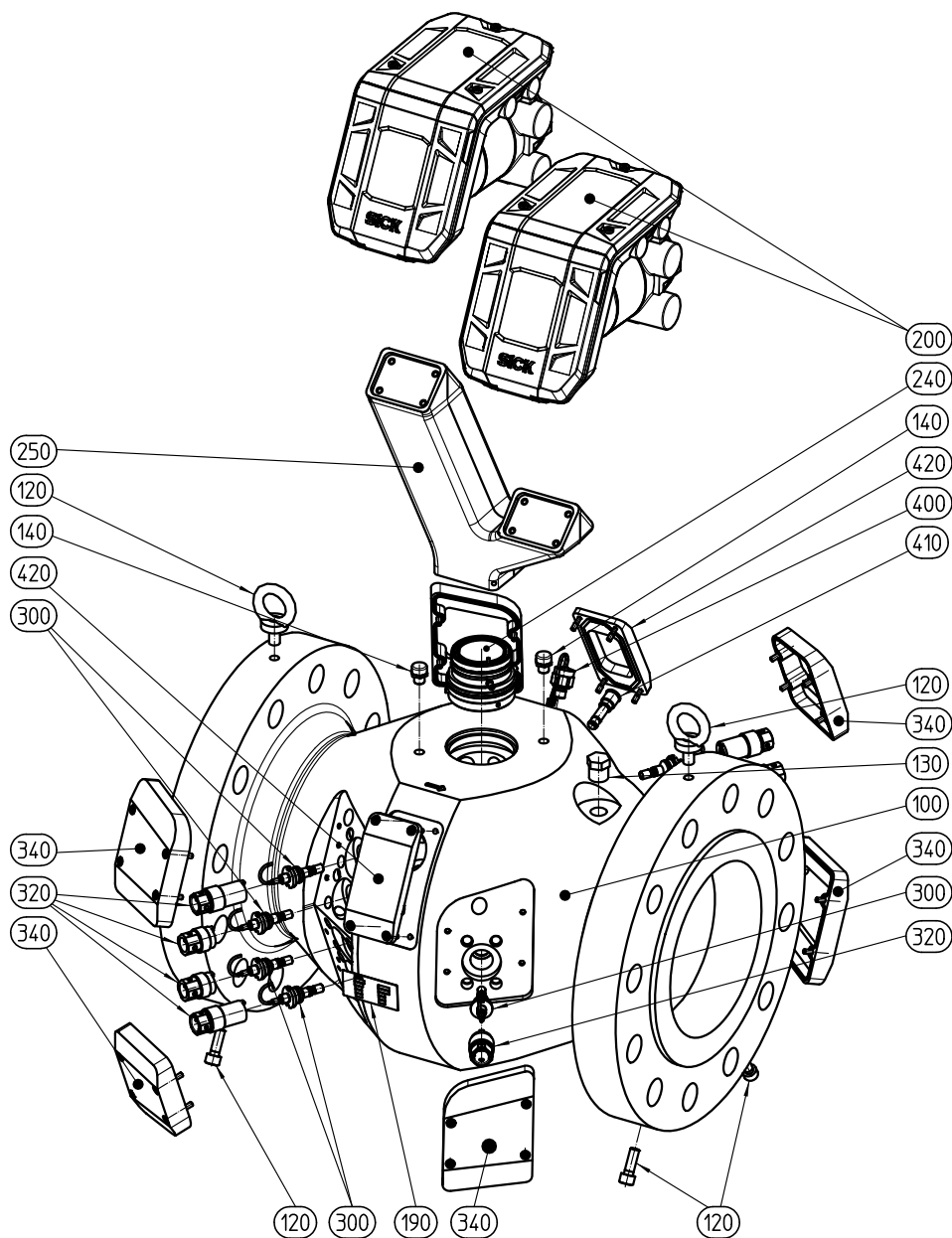
Fig. 2 Exploded view FLOWSIC600-XT Forte



- | | | | |
|-----|-------------------------------|-----|---------------------|
| 100 | Meter body | 300 | Sensor |
| 120 | Meter body screws | 320 | Sensor assembly set |
| 140 | Pressure compensation element | 340 | Sensor cover |
| 190 | Meter body type plate | 400 | Pressure sensor |
| 200 | SPU | 410 | pT sensor set |
| 240 | SPU neck assembly set | 420 | pT sensor cover |
| 250 | SPU neck | | |

2.1.3 FLOWSIC600-XT 2plex

Fig. 3 Exploded view FLOWSIC600-XT 2plex

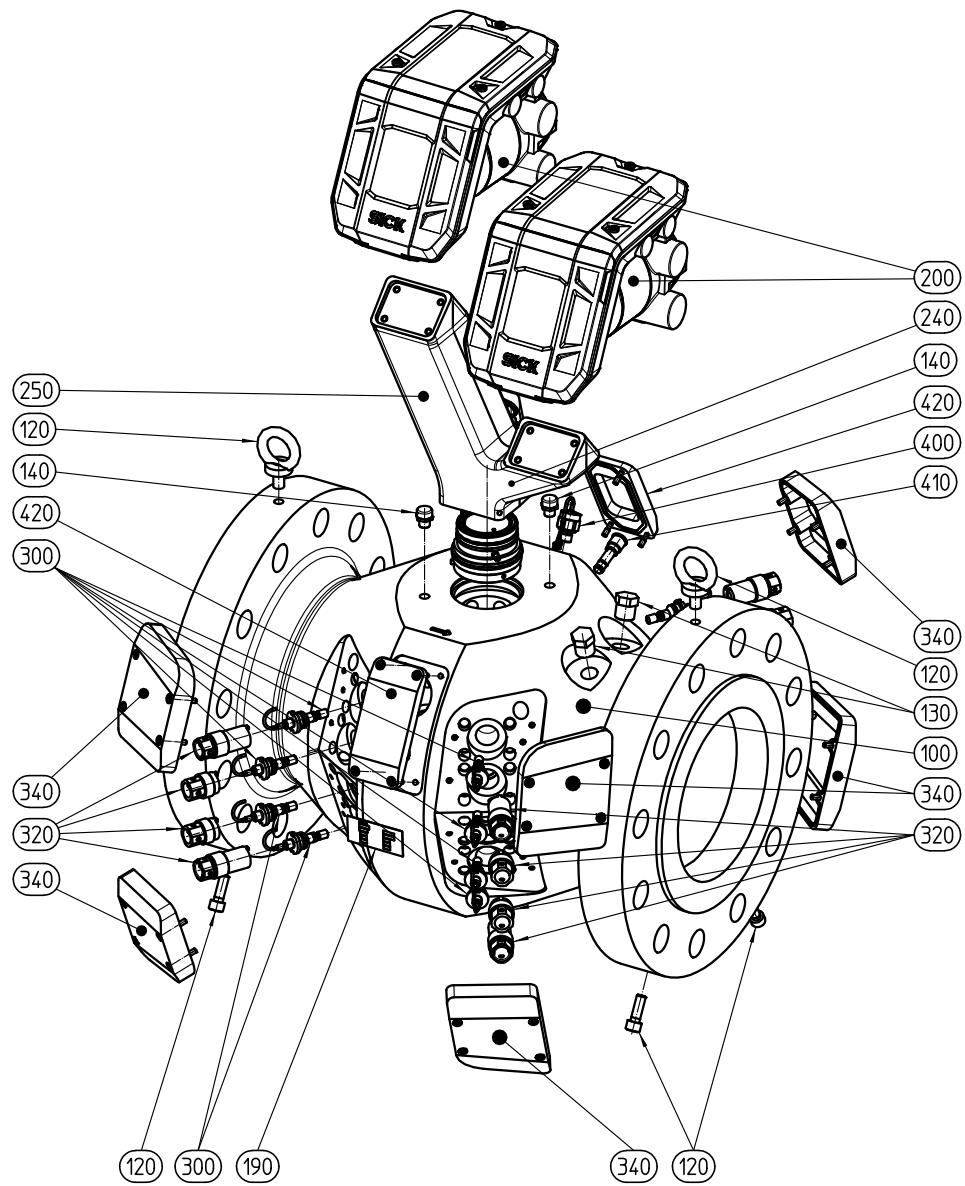


- | | |
|-----------------------------------|-------------------------|
| 100 Meter body | 300 Sensor |
| 120 Meter body screws | 320 Sensor assembly set |
| 140 Pressure compensation element | 340 Sensor cover |
| 190 Meter body type plate | 400 Pressure sensor |
| 200 SPU | 410 pT sensor set |
| 240 SPU neck assembly set | 420 pT sensor cover |
| 250 SPU neck | |

Subject to change without notice

2.1.4 FLOWSIC600-XT Quatro

Fig. 4 Exploded view FLOWSIC600-XT Quatro



- | | |
|-----------------------------------|-------------------------|
| 100 Meter body | 300 Sensor |
| 120 Meter body screws | 320 Sensor assembly set |
| 140 Pressure compensation element | 340 Sensor cover |
| 190 Meter body type plate | 400 Pressure sensor |
| 200 SPU | 410 pT sensor set |
| 240 SPU neck assembly set | 420 pT sensor cover |
| 250 SPU neck | |

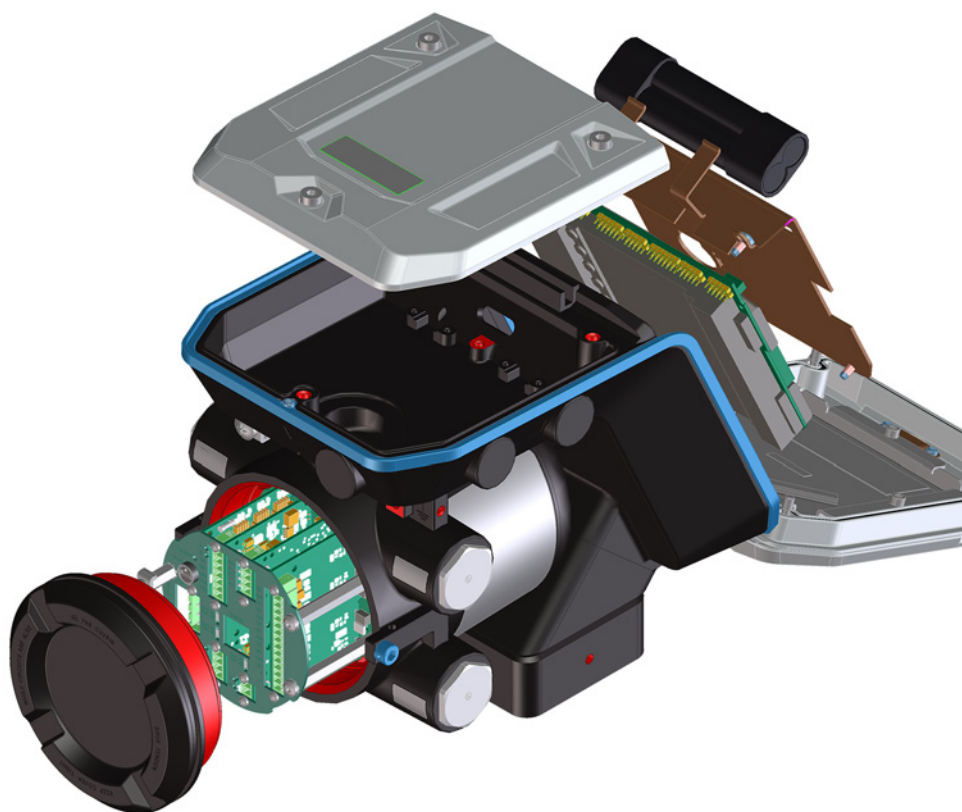
Subject to change without notice

2.2 SPU (Signal Processing Unit) overview

The SPU enclosure of the FLOWSIC600-XT comprises a flameproof enclosure and an adjacent separate chamber.

2.2.1 Ex-d enclosure version

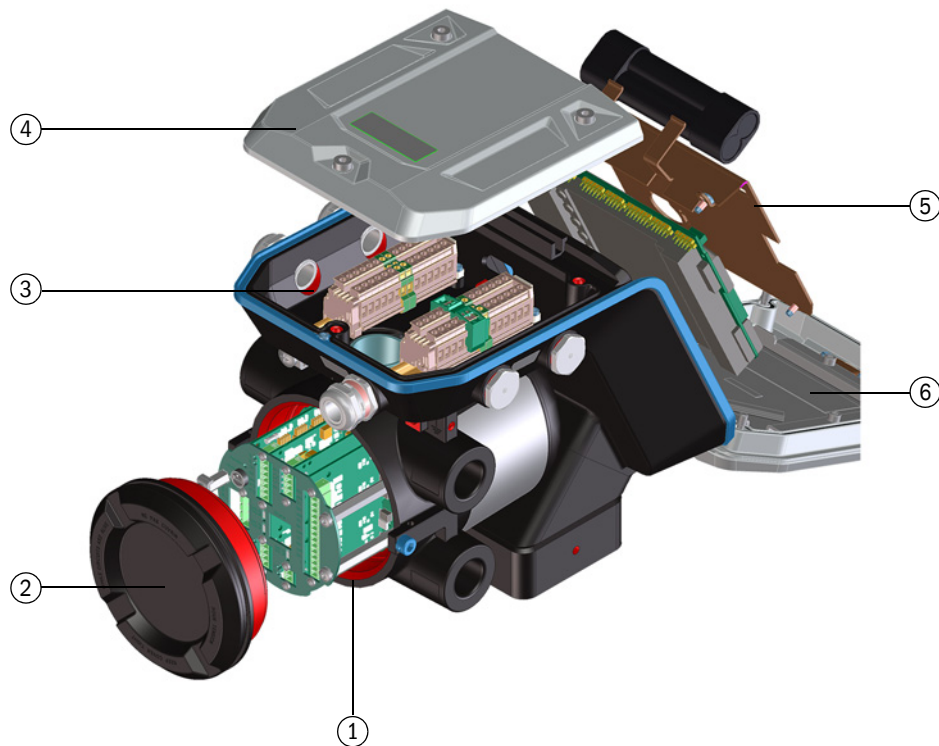
Fig. 5 Exploded view Ex-d



- 1 Flameproof enclosure with I/O electronics
- 2 Ex-d terminal compartment cover
- 3 Ex-e terminal compartment
- 4 Ex-e terminal compartment cover
- 5 Ex-i transducer electronics with cover and backup battery
- 6 Display unit

2.2.2 **Ex-de enclosure version**

Fig. 6 Exploded view Ex-de

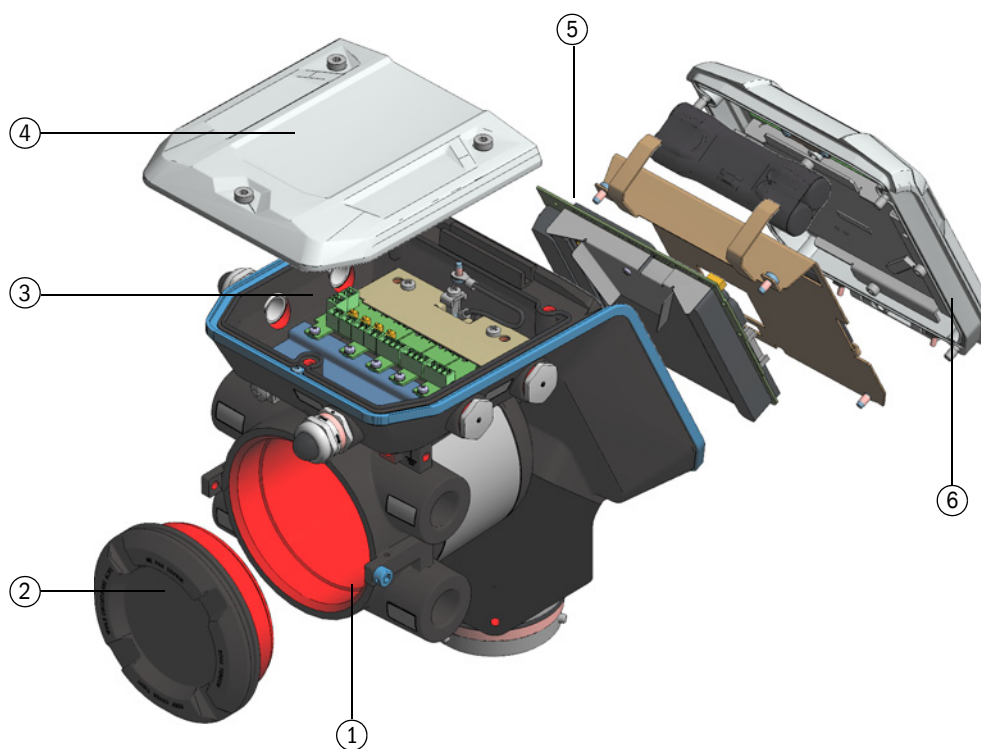


- 1 Flameproof enclosure with I/O electronics
- 2 Ex-d terminal compartment cover
- 3 Ex-e terminal compartment
- 4 Ex-e terminal compartment cover
- 5 Ex-i transducer electronics with cover and backup battery
- 6 Display unit

With Ex-e wiring, the Ex-d inputs and outputs run through a line duct to the Ex-e terminals in the Ex-e terminal compartment. The type of the line duct depends on the I/O configuration.

2.2.3 Ex-i enclosure version

Fig. 7 Exploded view Ex-i



- 1 Flameproof enclosure
- 2 Ex-d terminal compartment cover
- 3 Ex-i terminal compartment
- 4 Ex-i terminal compartment cover
- 5 Ex-i transducer electronics with cover and backup battery
- 6 Display unit

FLWSIC600-XT

3 Repairs

General information

Tools required

Working on the meter body

Working on the SPU

3.1 General information

The work described in the following may only be carried out by qualified personnel according to → p. 9, § 1.2.2 and after training by the manufacturer.

Repairs not authorized by the manufacturer result in the loss of possibly existing warranty claims.

SICK recommends backing up all system parameters before component disassembly/assembly or replacement.

3.2 Prerequisites for repair work



WARNING: Hazards due to combustible gases or high pressure

Gas under line pressure flows through the FLOWSIC600-XT when in operation. The pipeline at the installation site must be free from pressure and vented before replacing the ultrasonic transducers.

Exception: Extraction tools, Handling in accordance with the Operating Instructions for the extraction tool

Before starting work:

- ▶ Ensure the pipeline is free from pressure and free from combustible gases.
- ▶ Purge the pipeline with inert gas if necessary.
- ▶ Observe the safety information in §1.1 and §3.1 of the Operating Instructions.



WARNING: Danger through power voltage

- ▶ Disconnect the measuring system from the power supply before starting work on the FLOWSIC600-XT!
- ▶ When using the FLOWSIC600-XT in an Ex zone, the operating voltage must be switched off in the safe zone (switching off in the Ex zone is only allowed with intrinsically safe power supply).

- ▶ Record all work carried out in a repair protocol.
- ▶ Send the repair protocol to SICK to update the Data books at the factory.

3.3

Tools required

- SW 3 Allen key
- SW 3 Allen key
- SW 5 Allen key
- SW 4 socket wrench
- Phillips screwdriver, size 1
- Slot screwdriver, size 2 (blade width 3 mm)
- Slot screwdriver, size 3 (blade width 6 mm)
- Pointed pliers
- Snap ring pliers
- Sensor puller (Part No. 7041772)
- Coax connection tool (Part No. 4047938)
- SW 22 torque wrench, setting range up to 10 Nm)
- Adjustable wrench (8")
- Wrench, 19 mm

3.4 Working on the meter body

3.4.1 Replacing the sensors

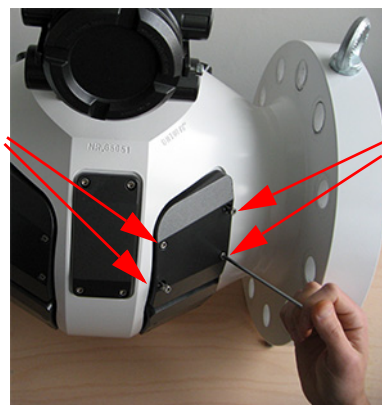
3.4.1.1 Remove the sensors



WARNING: Hazards due to combustible gases or high pressure

The pipeline at the installation site must be free from pressure and vented before replacing the ultrasonic transducers.

- 1 Take the sensor cover off: Loosen the 4 screws (captive) with an SW 4 Allen key.



- 2 Pull the sensor cable carefully off the sensor by hand. Only apply even tension when pulling off.

Important: Keep the sensor cable plug clean, make sure it does not come into contact with greasy substances (e.g. assembly paste).

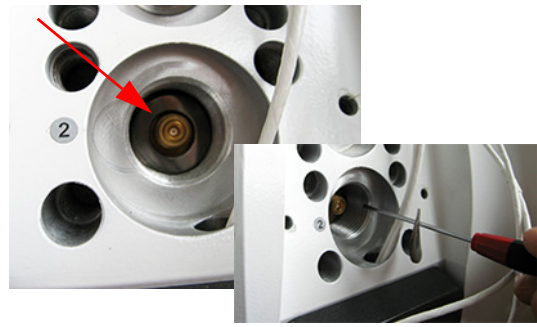


Protect the plug against dirt as necessary, e.g. with insulating tape. Ensure the requirements for explosion protection are complied with

- 3 Loosen the retaining screws with a size 19 bit (ratchet or socket wrench).



- 4 Loosen the lock washer with a small flat-blade screwdriver and take out.



- 5 Screw the sensor puller onto the sensor socket. Screw on carefully (not too tight, it is sufficient when the sensor puller is steady).
- 6 Turn the knurled nut until the sensor can be pulled out of the sensor support.
- 7 Unscrew the sensor from the sensor puller



3.4.1.2

Fit the new sensor

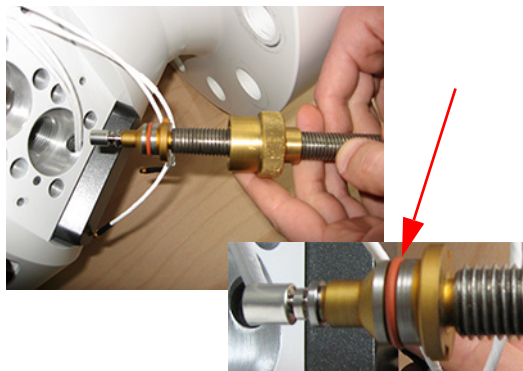
1 Unpack the new sensor and check for transport damage. Do not use the sensor when any damage can be seen at the sensor or the O-ring seal.

2 Screw the new sensor onto the assembly tool.

3 Grease the O-ring with lubricant.

Important:

- Do not let lubricant into the area with media contact.
- Step 3 does not apply to oxygen applications, do not use lubricant!



4 Insert the sensor into the sensor support until the resistance of the O-ring seal can be felt.

5 Fix the sensor carefully with one light axial circular movement.

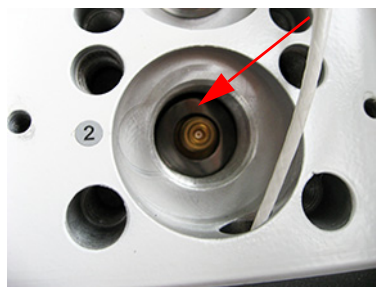
Important: The O-ring can be easily damaged. Only position once and do not tilt!



6 Unscrew the assembly tool from the sensor. If the sensor turns as well, press the assembly tool slightly from the top and carefully continue to screw.

7 Refit the lock washer.

Make sure the washer does not tilt otherwise the retaining screw cannot be completely screwed in.



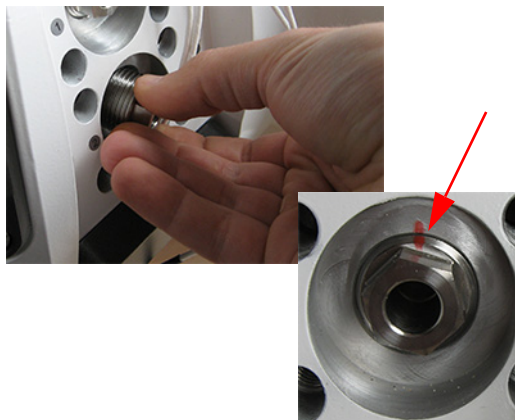
8 Screw the retaining screw in by hand

9 Then tighten with torque 20 Nm.

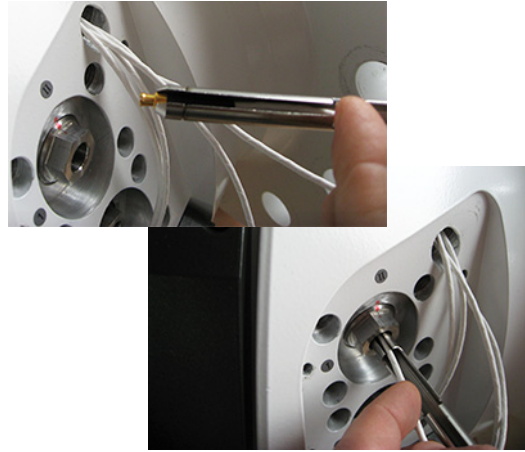
Check the position of the manufacturer's marking:

- The retaining screw has been screwed in completely when the markings are aligned.
- If the markings cannot be aligned, remove the retaining screw again and check the lock washer seating.

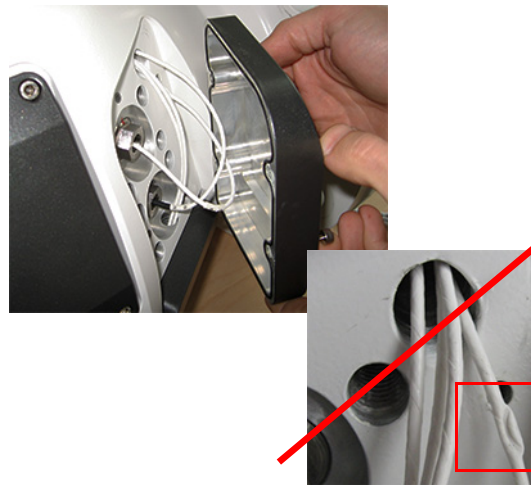
10 After sensor replacement, perform a leak tightness check. Apply leak detection spray to the sensors and slowly increase the pressure in the device.



- 11 Push the sensor cable into the connection tool
- 12 Plug the sensor plug onto the sensor connection according to the cable assignment in §5.1 (→ p. 64). The plug must engage audibly.
- 13 Make a tension test: The plug is engaged correctly when the cable cannot be pulled out with a slight pull.



- 14 Refit the sensor cover:
 - First position the cover side with the cable gland.
 - Make sure the cable is not crimped under the cover edge: No gap should be visible between the cover and meter body.



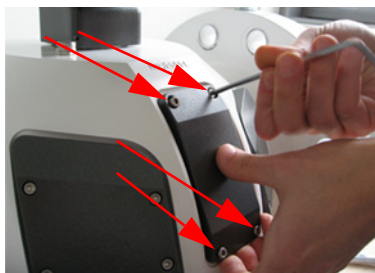
- 15 First slightly tighten the 4 screws with an SW 4 Allen key.
- 16 Then tighten crosswise by hand (5 Nm).



3.4.2 Replacing the integrated p/T sensor

3.4.2.1 Remove the p/T sensor

- 1 Take the sensor cover off: Loosen the 4 screws (loss-secure) with an SW 4 Allen key.



- 2 Carefully pull the cable out (locking lug upwards)
- 3 Then disconnect the plug. Make sure that the cables are not pulled out the plug.



- 4 Push the sensor cable with plug into the socket wrench
- 5 Position the socket wrench and turn the PT sensor out.



- 6 Take the PT sensor out of the meter body.



3.4.2.2

Fit the new p/T sensor

1 Unpack the new sensor and check for transport damage. Do not use the sensor when any damage can be seen at the sensor or the seal.

2 Position the p/T sensor in the SW 22 socket wrench (push the cable in first).

3 Grease the thread (separating agent that does not rub on stainless steel).



4 Insert the sensor as straight as possible and screw tight (tightening torque: 20 Nm).

5 After sensor replacement, perform a leak tightness check. Apply leak detection spray to the sensors and slowly increase the pressure in the device.



6 Connect the plug connection again.



7 Fold the sensor cable as small as possible so that it is not crimped under the sensor cap.



- 8 Position the sensor cover from the top downwards.
- 9 First slightly tighten the 4 screws.
- 10 Then tighten crosswise hand-tight (5 Nm).



3.5 **Working on the SPU**

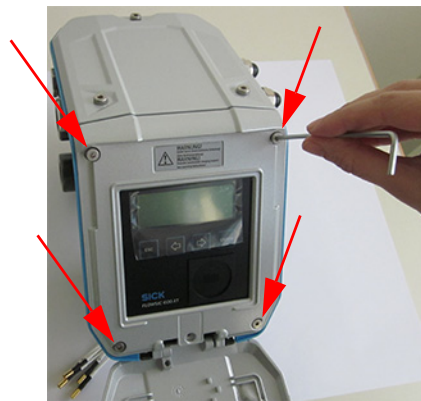
3.5.1 **Replacing the display unit**

3.5.1.1 **Swivel the display unit downwards**

1 Open the display cover.



2 Loosen the 4 screws on the display unit with an SW 3 Allen key.



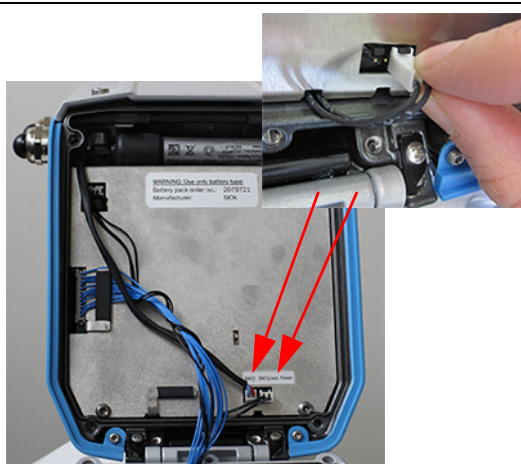
3 Carefully swivel the display unit downwards.



3.5.1.2

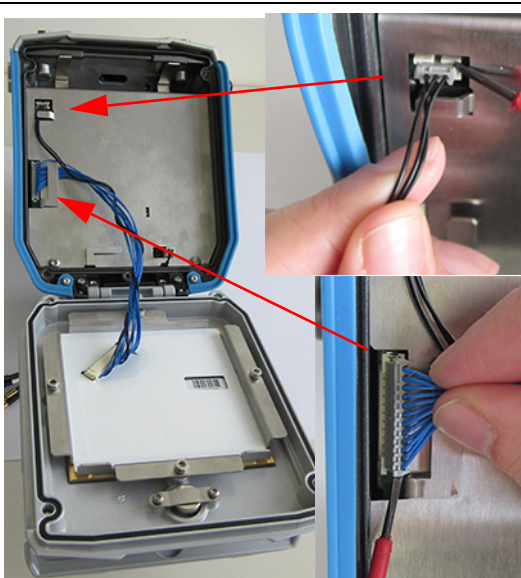
Remove the display unit

- 1** Disconnect the connection cable for external power supply and backup battery.



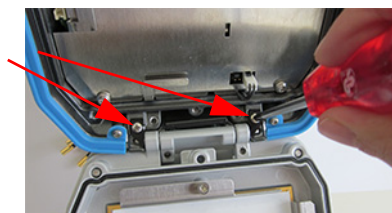
- 2** Disconnect the connection cables of the display unit from the electronics unit:

To do this, carefully lift the plugs with a small flat-blade screwdriver. Disconnect the plugs carefully with even tension on the cables.



- 3** Loosen the retaining screws on the swivel joint of the electronics unit with a Phillips screwdriver.

When swiveled, the display unit and display cover are pressed against the swivel joint when in the lowest position. This obviates any additional protection against the unit dropping down during the work step.



- 4 Swivel the display unit and display cover to a vertical position and remove upwards out of the swivel holder.



3.5.1.3

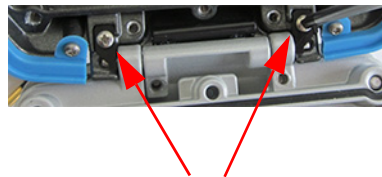
Fit the new display unit

- 1 Unpack the new display unit and check for transport damage. Do not use the display unit when any damage can be seen.

- 2 Position the display unit vertically in the swivel holder and swivel down.



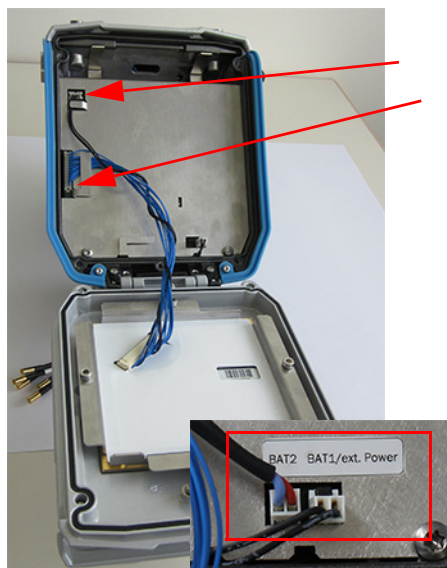
- 3 Position the retaining screws and small plates on the swivel joint of the electronics and screw tight. Check the small retaining plates are positioned correctly (straight side towards the hinge).



3.5.1.4

Connect the display unit

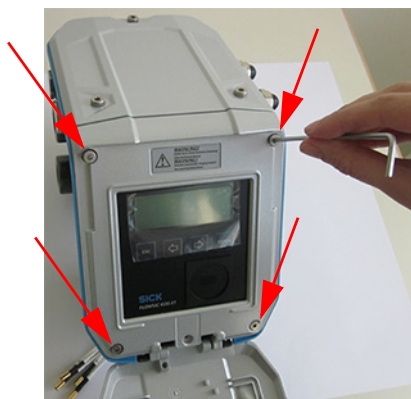
- 1 Connect the display cables.
- 2 Connect the connection for external power supply to the “BAT1/Ext. Power” connection.
- 3 Insert the backup battery and connect to the “BAT2” connection.
Make sure the external power supply is active before connecting the backup battery. Otherwise the backup battery is immediately active.



3.5.1.5

Swivel the display unit upwards and screw tight

- 1 Swivel the display unit upwards.
- 2 Tighten the 4 screws on the display unit with an SW 4 Allen key (5 Nm).



3.5.2 Replacing the display cover

Prerequisites

- ▶ The display unit has been removed:
 - Swivel the display unit downwards, → p. 31, §3.5.1.1.
 - Remove the display unit, → p. 32, §3.5.1.2.

Replace the display cover

- 1 Loosen the pins on the display cover.
- 2 Take the display cover out of the swivel joint.
- 3 Unpack the new display cover and check for transport damage. Do not use the display cover when any damage can be seen.
- 4 Position the display cover in the swivel joint.
- 5 Fix the new display cover with the pins.



- 6 Refit the display unit, → p. 33, §3.5.1.3.

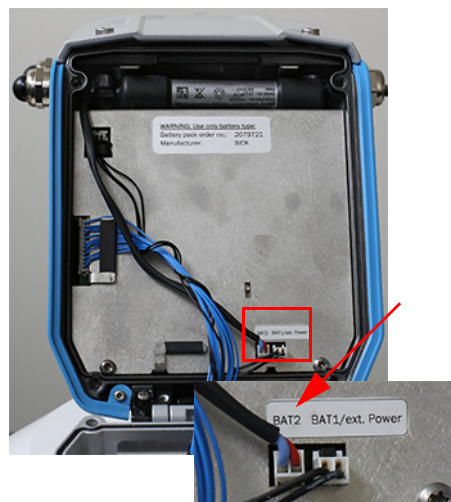
3.5.3 Replacing the backup battery

Prerequisites:

- ▶ The display unit is swiveled down:
 - Swivel the display unit downwards, → p. 31, §3.5.1.1.

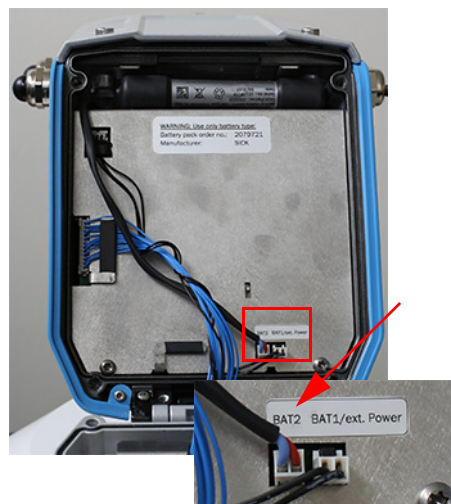
3.5.3.1 Remove the backup battery

- 1 Disconnect the backup battery connection.
- 2 Take the backup battery out of the holder.



3.5.3.2 Insert the new backup battery

- 1 Unpack the new backup battery and check for transport damage.
- 2 Do not use the backup battery when any damage can be seen.
- 3 Make sure the external power supply is active before connecting the backup battery. Otherwise the backup battery is immediately active.
- 4 Insert the backup battery in the holder and connect to the "BAT2" connection.



- 5 Swivel the display unit back up and screw tight, → p. 34, §3.5.1.5.

3.5.4 Replacing the RTC battery

Prerequisites

- ▶ The display unit is swiveled down:
 - Swivel the display unit downwards, → p. 31, §3.5.1.1.

3.5.4.1 Replace the RTC battery

- 1 Loosen the battery cover screw with a Phillips screwdriver.
- 2 Remove the battery cover.



- 1 Take the RTC battery out of the holder
- 2 Insert the new battery.
- 3 Refit the battery cover.



- 4 Swivel the display unit back up and screw tight, → p. 34, §3.5.1.5.

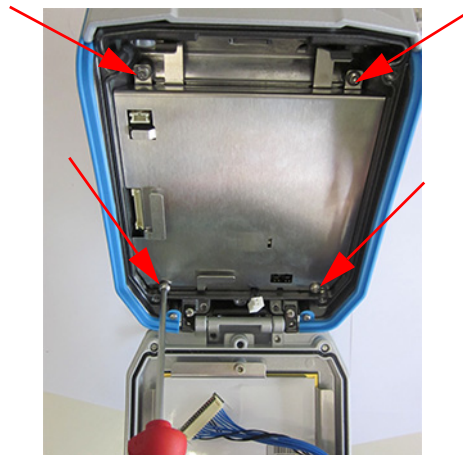
3.5.5 Replacing the SPU circuit board

Prerequisites

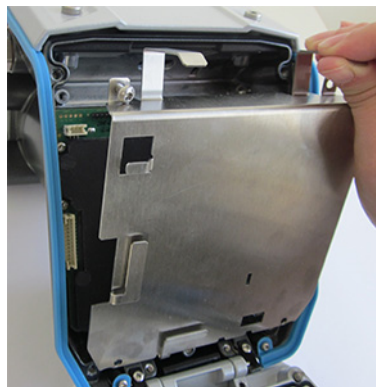
- ▶ The display unit is swiveled down:
 - Swivel the display unit downwards, → p. 31, §3.5.1.1.
- ▶ The connection cables of the display unit and the connections for external power supply and backup battery are disconnected:
 - Remove the display unit, → p. 32, §3.5.1.2, step 1 and 2

3.5.5.1 Remove the electronics cover

- 1** Loosen the 4 screws of the electronics cover with a T20 Torx key.



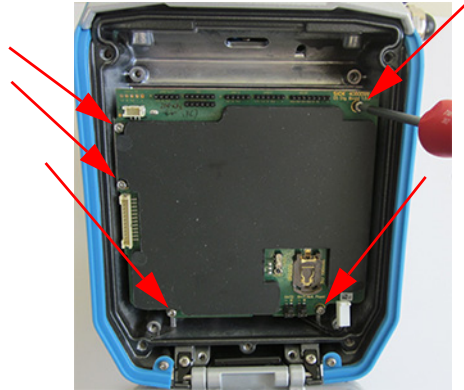
- 2** Take the electronics cover off.



3.5.5.2

Remove the SPU circuit board

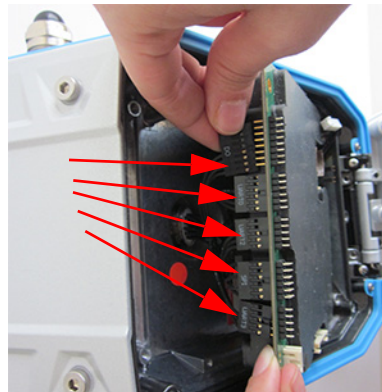
- 1 Loosen the 5 screws of the SPU circuit board with a T10 Torx key.



- 2 Carefully tilt the circuit board to the front.

Take care that the power connections on the front side of the circuit board do not impact against the enclosure and get damaged.

- 3 Pull the circuit board out until the connections of the interface plugs on the top edge of the circuit board can be accessed.
- 4 Disconnect the connections of the interface plugs.



- 5 Pull the circuit board out further so that the transducer connections on the rear side of the circuit board can be accessed.

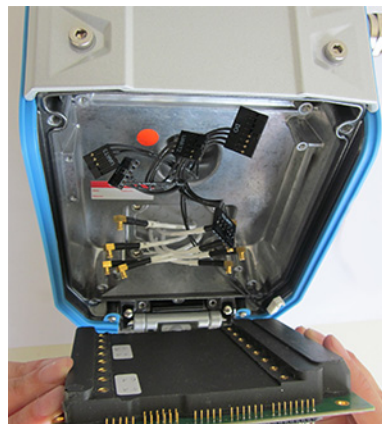
- 6 Carefully loosen the transducer connections with a flat-blade screwdriver.

Too much force when loosening the connecting plugs can damage the cable connections or the cables.

Replace cables when any damage can be seen.



- 7 Carefully remove the SPU circuit board.
- Take care not to damage the connections on the front side of the circuit board.



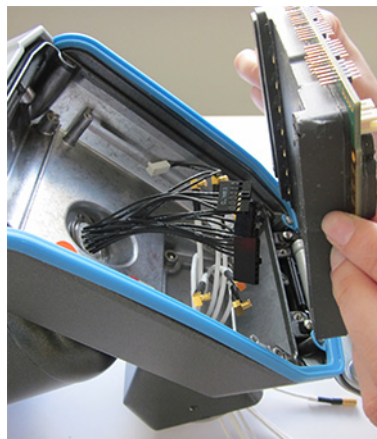
3.5.5.3

Fit the new SPU circuit board

- 1 Unpack the new SPU circuit board and check for transport damage. Do not use the SPU circuit board when any damage can be seen.

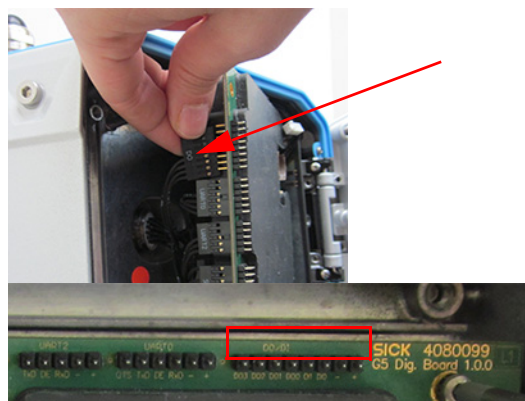
- 2 Carefully insert the new SPU circuit board.

Take care that the power connections on the front side of the circuit board do not impact against the enclosure and get damaged during all work steps.

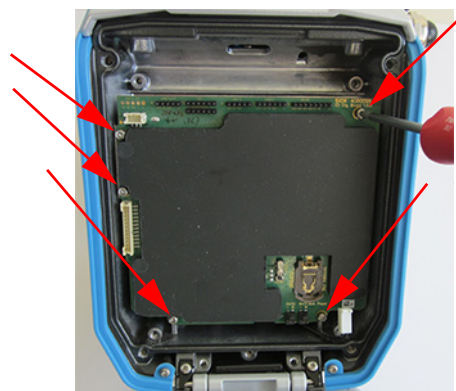


- 3 Connect the transducer cables on the rear side of the circuit board according the wiring diagrams in §5.1 (→ p. 64).

- 4 Connect the interface plugs on the rear side of the circuit board according to the markings on the circuit board and the plugs.



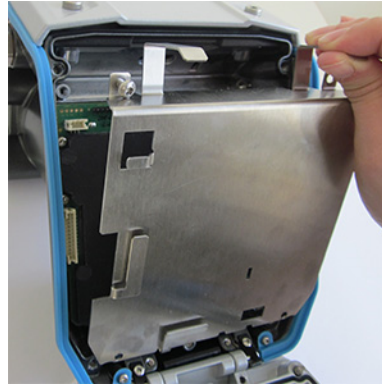
- 5 Insert the circuit board.
- 6 Screw the 5 retaining screws tight (1 Nm) with T10 Torx key.



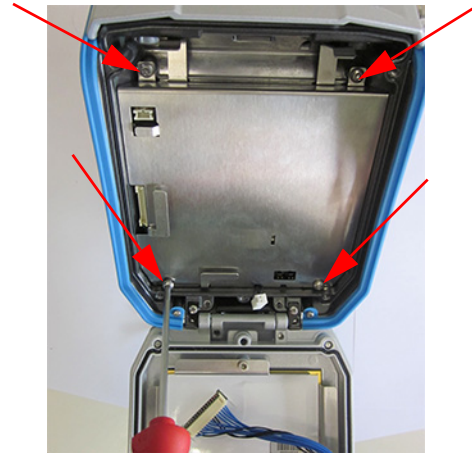
3.5.5.4

Fit the electronics cover

- 1 Position the electronics cover.
- 2 Lead the cable of the external power supply through the recess in the cover.
Make sure the cable is not crimped.



- 3 Tighten the 4 screws of the electronics cover with a T20 Torx key.

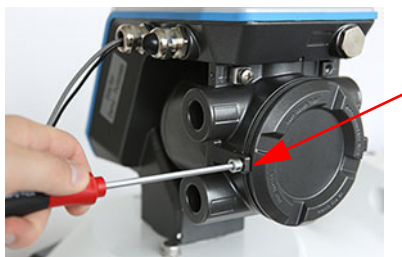


- 4 Connect the display unit again and close. → p. 34, §3.5.1.4.

3.5.6 Replacing the Ex-d I/O block

3.5.6.1 Open the Ex-d terminal compartment

- 1 Loosen the securing screw on the Ex-d terminal compartment cover with an SW 10 Allen key.

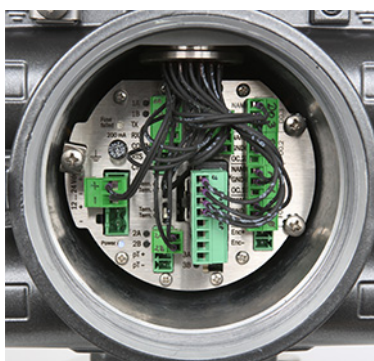


- 2 Unscrew the clamping compartment cover.
A wrench can be applied in the grooves, for example, to loosen the compartment cover.

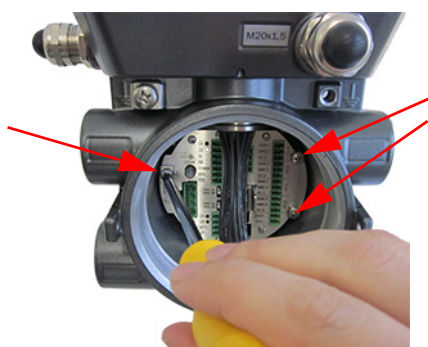


3.5.6.2 Remove the Ex-d I/O block

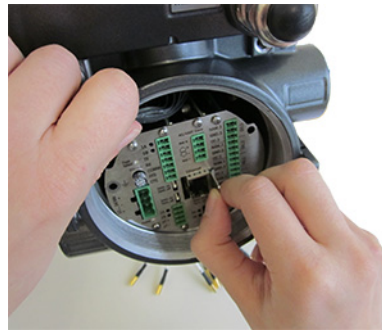
- 1 Disconnect terminal connections in use on the Ex-d electronics block.



- 2 Loosen the 3 screw fittings of the I/O block with a Phillips screwdriver.



- 3** Pull the I/O block out with the tab provided.
- Take care not to damage the cable gland in the Ex-e terminal compartment.
 - Carefully push the cables upwards and move the I/O block past the cables.

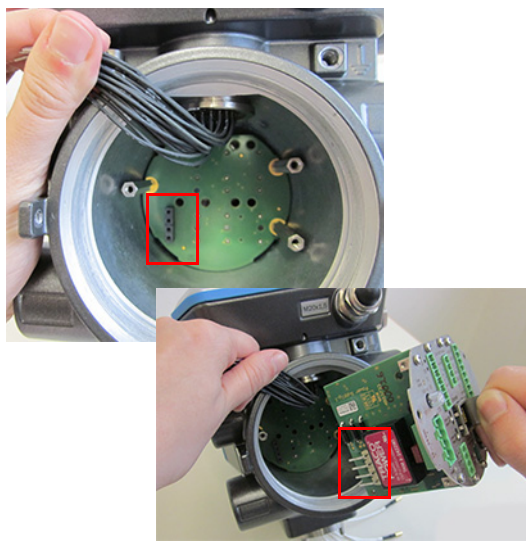


3.5.6.3

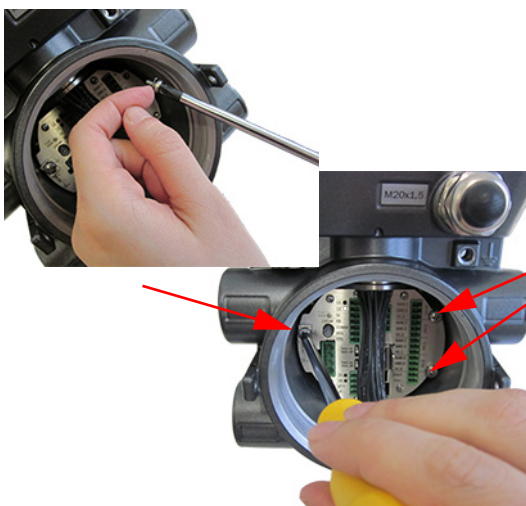
Fit the new Ex-d I/O block

1 Unpack the new I/O block and check for transport damage.
Do not use the I/O block when any damage can be seen.

2 Carefully guide the I/O block past the Ex-e cables and plug into the main board.
Take care not to bend any pins.



3 Insert the 3 screws and screw tight.
Take care that the cutting ring washers do not drop down.



4 Connect the electrics as described in §3.4 “Electrical Installation” in the FLOWSIC600-XT Operating Instructions.

3.5.6.4

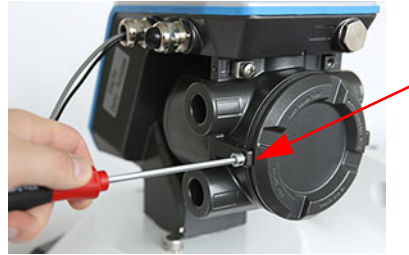
Close the Ex-d terminal compartment

- 1** Screw the terminal compartment cover back on.



- 2** Insert the securing screw on the Ex-d terminal compartment cover and screw tight with an SW 10 Allen key.

Do not operate the device without the securing screw!



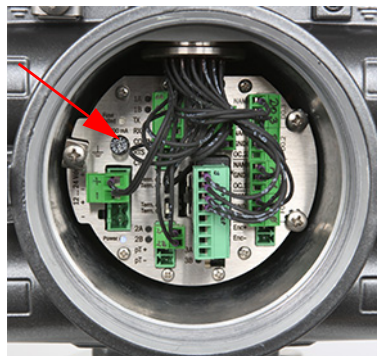
3.5.7 Replacing the Ex-d I/O block fuse

Prerequisites

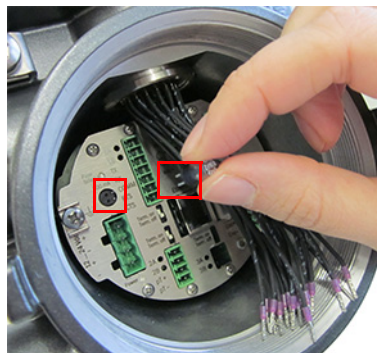
- ▶ The Ex-d terminal compartment is open:
 - Open the Ex-d terminal compartment, → p. 42, §3.5.6.1

Replace the fuse

- 1 Remove the fuse.
- 2 Unpack the new fuse and check for transport damage.
Do not use the fuse unit when any damage can be seen.



- 3 Insert the new fuse.
Take care not to bend the pins.



- 4 Make sure the fuse has a tight seat.
- 5 Close the Ex-d terminal compartment again → p. 45, §3.5.6.4.



3.5.8 **Replacing the Ex-e connection block**

3.5.8.1 **Open the Ex-e terminal compartment**

- 1 Loosen the 3 screws (captive) of the Ex-e terminal compartment cover with an SW 4 Allen key.



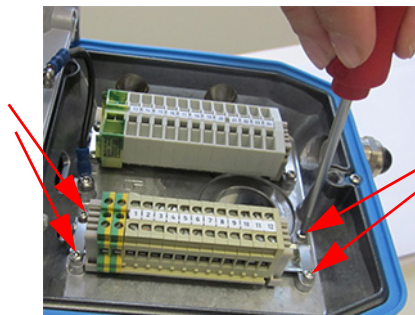
- 2 Put the terminal compartment cover in the holder provided.



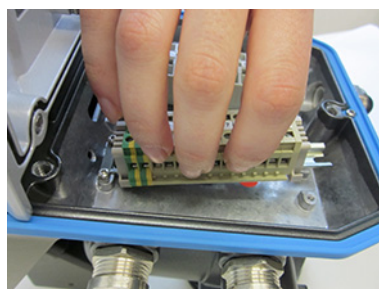
3.5.8.2

Remove the connection blocks in the Ex-e terminal compartment.

- 1 Disconnect the connections in the Ex-e terminal compartment.
- 2 Loosen the screws of the front bracket of the connection block with a T10 Torx key and remove the bracket.
Loosen the screws of the rear bracket.



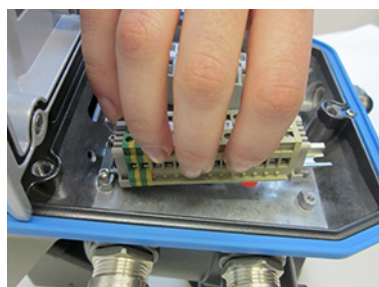
- 3 Carefully take the Ex-e connection block out.



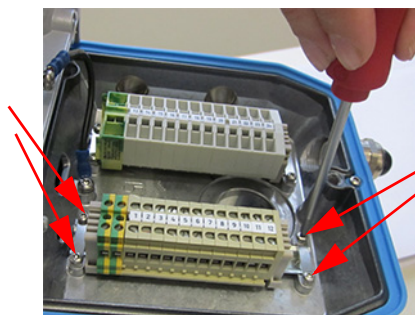
3.5.8.3

Fit the new connection block in the Ex-e terminal compartment

- 1 Unpack the new connection block and check for transport damage. Do not use the connection block when any damage can be seen.
- 2 Carefully position the new Ex-e connection block.



- 3 Fit the second bracket and fix with the screws (1 Nm).



- 4 Connect the electrics as described in §3.4 "Electrical Installation" in the FLOWSIC600-XT Operating Instructions.

3.5.8.4

Close the Ex-e terminal compartment

- 1 Position the cover on the Ex-e terminal compartment.
- 2 Tighten the 3 screws (captive) of the terminal compartment cover with an SW 4 Allen key (5 Nm).



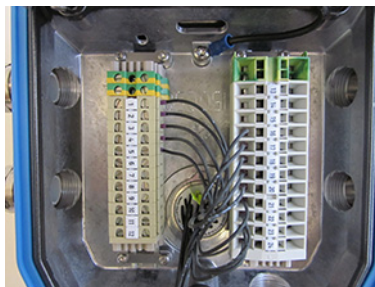
3.5.9 Replacing the cable gland between the Ex-d and Ex-e terminal compartments

Prerequisites

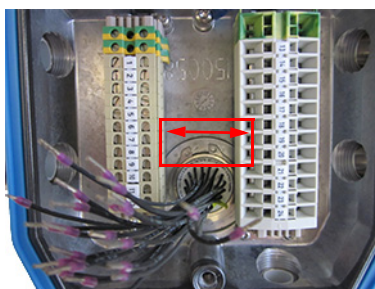
- ▶ Ex-e terminal compartment is open
 - Open the Ex-e terminal compartment, → p. 47, §3.5.8.1
- ▶ The Ex-d I/O block has been removed:
 - Open the Ex-d terminal compartment, → p. 42, §3.5.6.1
 - Remove the Ex-d I/O block, → p. 42, §3.5.6.2

3.5.9.1 Remove the cable gland

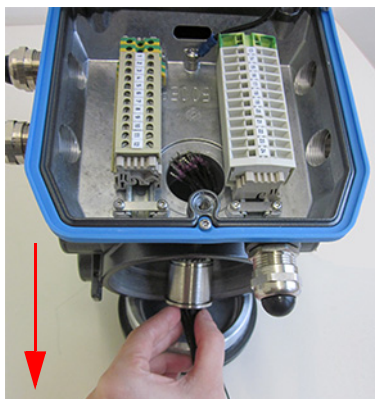
- 1** Disconnect the terminals in the Ex-e terminal compartment; these can be spring-loaded or screw terminals (Figure shows an example).
To create space for the repair work, the connection blocks can be removed, → p. 48, §3.5.8.2.



- 2** Loosen the snap ring in the Ex-e terminal compartment with the snap ring pliers.
Hold the cable gland tight when loosening the snap ring so that it does not slip down.



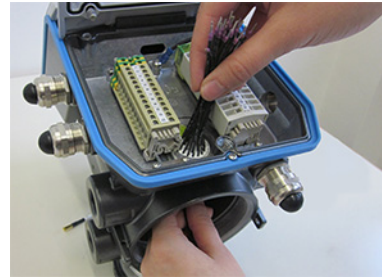
- 3** Remove the cable gland downwards through the Ex-d terminal compartment.



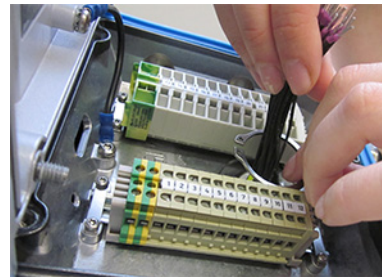
3.5.9.2 **Fit the Ex-e cable gland**

1 Unpack the new cable gland and check for transport damage. Do not use the cable gland when any damage can be seen.

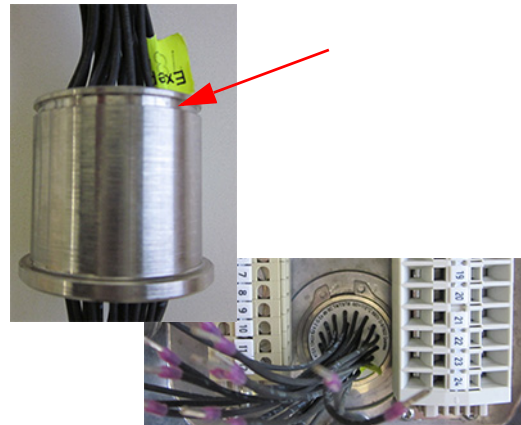
2 Guide the cable gland through the Ex-d terminal compartment.



3 Fit the snap ring.



4 Make sure the snap ring engages properly in the groove.



5 Connect the electrics as described in §3.4 “Electrical Installation” in the FLOWSIC600-XT Operating Instructions.

6 Close the Ex-e terminal compartment again, → p. 49, §3.5.8.4.

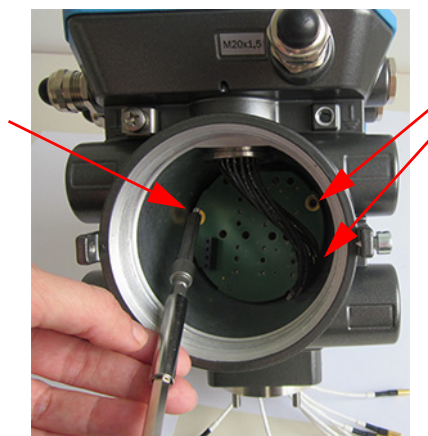
3.5.10 Replacing the cable gland between the Ex-d terminal compartment and the Ex-i transducer electronics

Prerequisites

- ▶ The SPU circuit board has been removed:
 - Swivel the display unit downwards, → p. 31, §3.5.1.1.
 - Remove the electronics cover, → p. 38, §3.5.5.1.
 - Remove the SPU circuit board, → p. 39, §3.5.5.2
- ▶ The Ex-d I/O block has been removed:
 - Open the Ex-d terminal compartment, → p. 42, §3.5.6.1.
 - Remove the Ex-d I/O block, → p. 42, §3.5.6.2.

3.5.10.1 Remove the cable gland

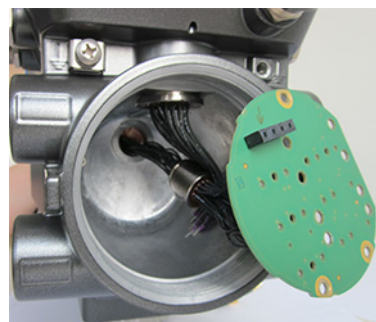
- 1** Loosen the 3 long screws of the main board.



- 2** Loosen the snap ring of the cable gland with the snap ring pliers.



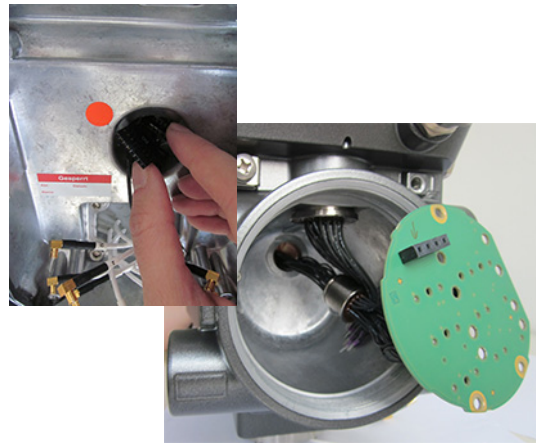
- 3** Remove the main board with cable gland.



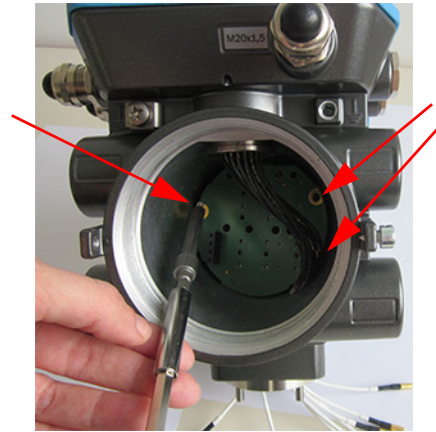
3.5.10.2 **Fit the new cable gland**

1 Unpack the new cable gland and check for transport damage. Do not use the cable gland when any damage can be seen.

2 Position the cable gland. Use a small screwdriver as aid when necessary.

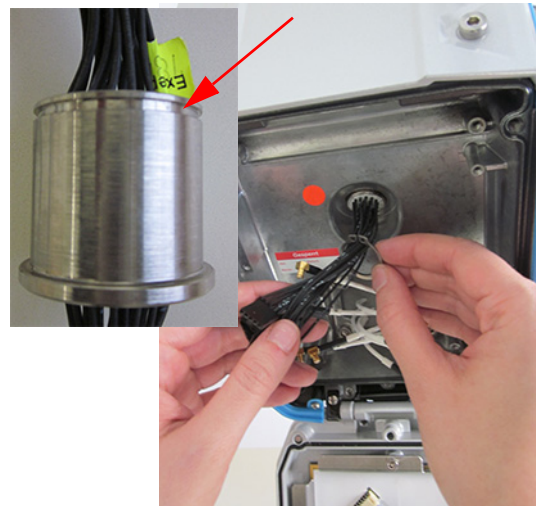


3 Fix the main board with the 3 long screws.



4 Fit the snap ring.

5 Make sure the snap ring engages properly in the groove.



6 Refit the Ex-d I/O block, → p. 44, §3.5.6.3.

7 Refit the SPU circuit board, → p. 40, §3.5.5.3.

3.6 Parameter input

3.6.1 Configure sensor settings after transducer exchange

In order to configure settings after exchanging a transducer pair, follow these steps:

- 1 Open a FLOWSIC600-XT meter using the Device Manager with user level "Service" or higher.
- 2 Navigate to "Service"/"Register Tree".
- 3 For each exchanged transducer select the appropriate branch underneath "Flow/Path plane X/Path X-Y" and modify the following values according to the "Data Sheet Transducer Pair":
 - Register "Sensor Serial X-Y Position".
 - Register "Sensor Length X-Y Position".
 - Register "TimeOffset X-Y".
 - Register "TimeDifference".
 - Register "DiffractionTime".
- 4 Confirm each modification by clicking "Write".
- 5 Repeat each above step for the each exchanged transducer.
- 6 Disable configuration mode, if required.
- 7 If required, generate a new Parameter Protocol" in "Parameter Modification".

3.6.2 SOS Check

In order to compare theoretical and measured SOS, follow these steps

For a detailed description, please refer to " FLOWgate Software Manual":

- 1 Open a FLOWSIC600-XT meter using the device manager with user level "Service" or higher.
- 2 Navigate to "Diagnosis/SOS Calculator".
- 3 Select the "Gas Composition" and click "Apply"
- 4 Calculate the theoretical speed of sound.
- 5 Open the trend chart.
 - The theoretical speed of sound is visualized as a horizontal red line.
 - The measured speed of sound for each path is plotted along the timeline in different colors.

3.6.3 **Configure Stacking**

In order to configure Stacking of signals, please follow these steps:

- 1 Open a FLOWSIC600-XT meter using the device manager with user level "Service" or higher.
- 2 Navigate to "Diagnostics"/"Signal View".
- 3 Ensure, that configuration mode is set on meter.
- 4 In the section "Parameters" select the appropriate stacking size 1, 2, 4, 8, or 16.
- 5 Click "Write to device" in the toolbar.
- 6 Disable configuration mode, if required.

3.6.4 **Configure Zerophase**

In order to configure or adjust the zerophase of a path, follow these steps:

- 1 Open a FLOWSIC600-XT meter using the Device Manager with user level "Service" or higher.
- 2 Navigate to "Diagnostics"/"Signal View".
- 3 Ensure, that configuration mode is set on meter.
- 4 Select a path to configure.
- 5 Identify the current zero phase error inside the panel "Signal Values" identified by "O-Error"
- 6 Inside Panel "Parameter", please modify the parameter "Phaseshift" by adding the O-Error to the current value of "Phase Shift"
- 7 Click "Write to device" in the toolbar.
- 8 Repeat steps 4-7 for each required path and direction.
- 9 Disable configuration mode, if required.

3.6.5 **Configure Pfix and Tfix**

In order to configure settings for Pfix or Tfix, follow these steps:

- 1 Open a FLOWSIC600-XT meter using the Device Manager with user level "Service" or higher.
- 2 Navigate to "Parameter Modification"/"Pressure/Temperature Sensors".
- 3 Ensure, that configuration mode is set on meter.
- 4 For Pfix value, please modify "Replacement and fix value" inside panel "Pressure value source settings".
- 5 For Tfix value, please modify "Replacement and fix value" inside panel "Temperature value source settings".
- 6 Click "Write to device" in the toolbar.
- 7 Disable configuration mode, if required.

FLWSIC600-XT

4 Accessories and Spare Parts

SPU Parts

Electronic boards

Transducers

Pressure/Temperature sensors

O-rings for transducers

Electronics accessories

Transducer covers

Covers p/T sensor

Accessories meter body

4.1

SPU Parts

Order number	Description
2085275	Ex-d SPU housing; metric M25; incl. Backplane and Cable feedthrough
2085333	Ex-d SPU housing; imperial 3/4" NPT; incl. Backplane and Cable feedthrough
2085282	Ex-e SPU housing; metric M25; incl. Backplane and Cable feedthrough
2085332	Ex-e SPU housing; imperial 3/4" NPT; incl. Backplane and Cable feedthrough
2085283	Ex-i SPU housing; metric M25; incl. Backplane and Cable feedthrough
2085331	Ex-i SPU housing; imperial 3/4" NPT; incl. Backplane and Cable feedthrough
2085284	Terminal compartment Ex-d
2085285	Terminal compartment cover Ex-e /Ex-i
2085287	Display flap
2085286	Display unit with flap
2085290	Elektronik cover
2085288	Display connection cable
2085289	Keder
2085300	Cable feedthrough SPU -- I/O
2085301	Cable feedthrough Ex-d – Ex-e
2085303	Screw type terminal Ex-e
2085304	Spring type terminal Ex-e
2085320	Electronics neck; single; screw in
2085321	Electronics neck; single; screw in; extended
2085322	Electronics neck; Y-type; screw in; extended
2085323	Electronics neck; single
2085324	Electronics neck; single; extended
2085325	Electronics neck; Y-type

4.2

Electronic boards

Order number	Description
2085291	Electronic board; 200kHz; IIA; 8path
2085292	Electronic board; 200kHz; IIC; 8path
2085293	Electronic board; 200kHz; IIC; 4path
2085294	Electronic board; 300kHz; IIA; 8path
2085295	Electronic board; 135kHz; IIA; 8path
2085296	Electronic board; 135kHz; IIC; 8path
2085297	Electronic board; 135kHz; IIA; 8path; HS
2085298	Electronic board; 80kHz; IIA; 8path
2085315	I/O unit with Ethernet
2085305	I/O unit with Ethernet
2085302	Fuse I/O unit

4.3

Transducers

Order number	Description
2080032	Transducer pair, type 210
2080027	Transducer pair, type 218
7041787	Transducer pair, type S2 (200 kHz, 100 bar, 120 C, titanium, P18)
2039997	Transducer pair, type 22 (200 kHz, 250 bar, 120 C, titanium, P18)
2039441	Transducer pair, type 26 (200 kHz, 250 bar, 120 C, titanium, P10)
2032538	Transducer pair, type 28 (135 kHz, 250 bar, 180 C, titanium, P18)
7042607	Transducer pair, type S6 (200 kHz, 100 bar, 120 C, titanium, P10)
2034125	Transducer pair, type S8 (135 kHz, 100 bar, 180 C, titanium, P18)
7042604	Transducer pair, type S3 (135 kHz, 16 bar, 280 C, titanium, P14)
On request	Transducer pair, type S5 (300 kHz, 16 bar, 280 C, titanium, P10)
7042605	Transducer pair, type S4 (135 kHz, 100 bar, 180 C, titanium, P14)
2040391	Transducer pair, type 46 (200 kHz, 450 bar, 120 C, titanium, P14)
2040392	Transducer pair, type S7 (135 kHz, 16 bar, 180 C, titanium, P18)
2032592	Transducer pair, type M6 (200 kHz, 10 bar, 120 C, titanium/ +layer, P10)
2040393	Transducer pair, type N4 (135 kHz, 40 bar, 180 C, NIROSTA, P14)
2040394	Transducer pair, type L8 (135 kHz, 100 bar, 280 C, titanium, P18)

4.4

Pressure/Temperature sensors

Order number	Description
2083110	p/T sensor I (20 bar)
2083118	p/T sensor II (110 bar)
2083119	p/T sensor III (160 bar)

4.5

O-rings for transducers

Order number	Description
2085270	O-ring Set Natural gas 15,0 * 2,0 VITON LT170-TT
2085271	O-ring Set Oxygen
2085272	O-ring Set Hydrogen
2085273	O-ring Set Carbon dioxide
2085274	O-ring Set Natural gas 7,5 * 1,5 VITON LT170-TT

4.6

Electronics accessories

Order number	Description
2085326	Tool kit
2085327	Tamper proof protection set
2085328	Set cable connection I/O unit
6050602	Interface converter USB/IR
2085329	Set cable glands / blind plugs Ex-e
2085330	Backup battery unit
2085319	RTC backup battery
On request	Set of screws for FI600-XT SPU housing

4.7

Transducer covers

Order number	Description
2083170	Transducer cover, Al, 3"
2083172	Transducer cover, Al, 4"
2085207	Transducer cover, Al, 4"; exchangeable version
2085202	Transducer cover, Al, 6"-A
2085201	Transducer cover, Al, 6"-B
2085203	Transducer cover, Al, 8"-A
2085204	Transducer cover, Al, 8"-B
2085205	Transducer cover, Al, 10"-12"-A
2085206	Transducer cover, Al, 10"-12"-B
2085208	Transducer cover, Al, 14"-A
2085209	Transducer cover, Al, 14"-B
2085214	Transducer cover, Al, 16"-A
2085215	Transducer cover, Al, 16"-B
2085216	Transducer cover, Al, 18"-A
2085217	Transducer cover, Al, 18"-B
2085218	Transducer cover, Al, 20"-A
2085219	Transducer cover, Al, 20"-B
2085220	Transducer cover, Al, 22"-A
2085221	Transducer cover, Al, 22"-B
2085222	Transducer cover, Al, 24"-A
2085223	Transducer cover, Al, 24"-B
2083171	Transducer cover, SS, 3"
2083174	Transducer cover, SS, 4"
2085224	Transducer cover, SS, 4"; exchangeable version
2085225	Transducer cover, SS, 6"-A
2085226	Transducer cover, SS, 6"-B
2085227	Transducer cover, SS, 8"-A
2085228	Transducer cover, SS, 8"-B
2085229	Transducer cover, SS, 10"-12"-A
2085230	Transducer cover, SS, 10"-12"-B
2085231	Transducer cover, SS, 14"-A
2085232	Transducer cover, SS, 14"-B
2085233	Transducer cover, SS, 16"-A
2085234	Transducer cover, SS, 16"-B
2085235	Transducer cover, SS, 18"-A
2085236	Transducer cover, SS, 18"-B
2085237	Transducer cover, SS, 20"-A
2085238	Transducer cover, SS, 20"-B
2085239	Transducer cover, SS, 22"-A
2085240	Transducer cover, SS, 22"-B
2085241	Transducer cover, SS, 24"-A
2085242	Transducer cover, SS, 24"-B

4.8 **Covers p/T sensor**

Order number	Description
2083181	p-/T transducer cover 4"- 6"; aluminum
2083179	p-/T transducer cover 8"-16"; aluminum
2083182	p-/T transducer cover 4"- 6"; stainless steel
2083180	p-/T transducer cover 8"-16"; stainless steel

4.9 **Accessories meter body**

Order number	Description
On request	Meterbody parts for transport and storage
On request	Set of screws for FI600-XT meter body

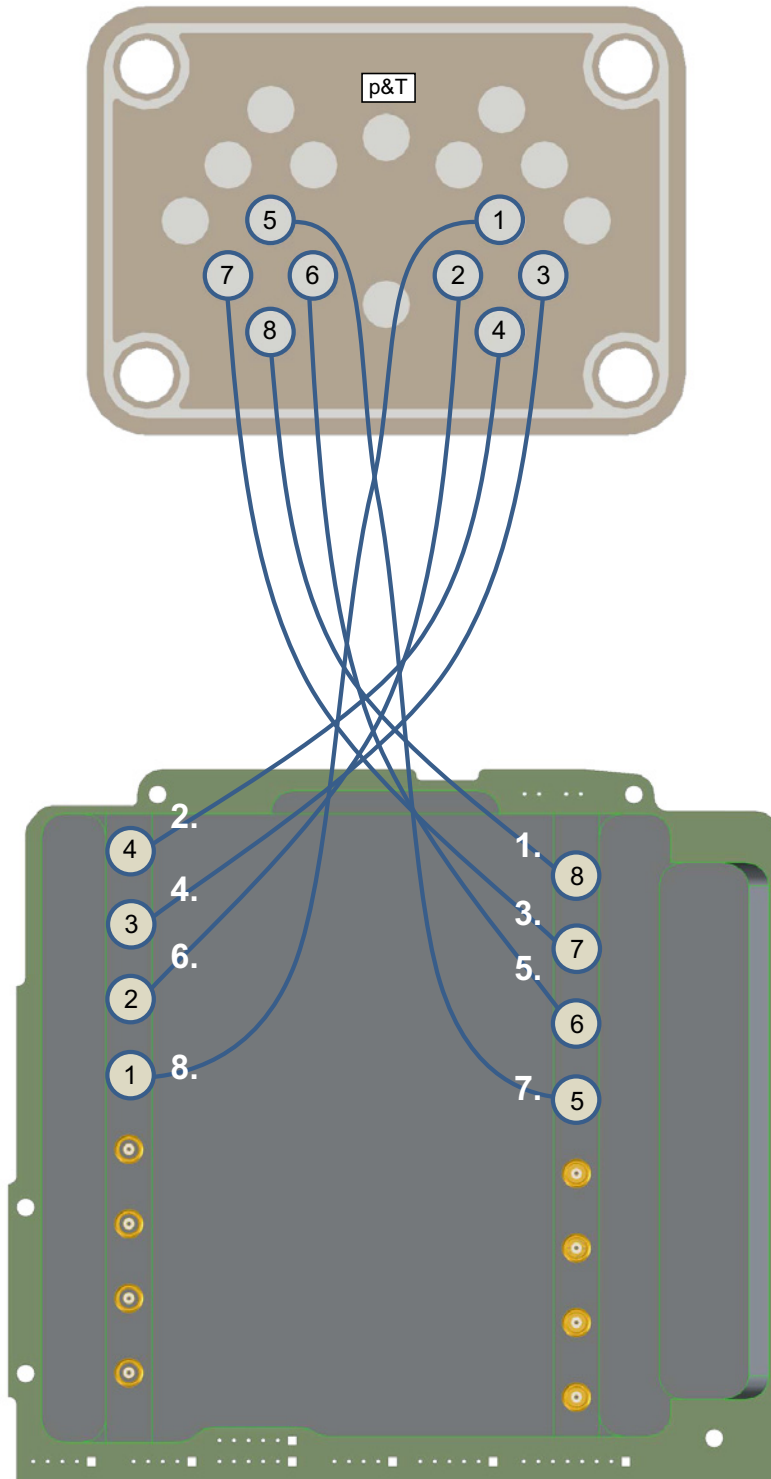
FLWSIC600-XT

5 Annex

Component placement specification SPU (sensor cables)

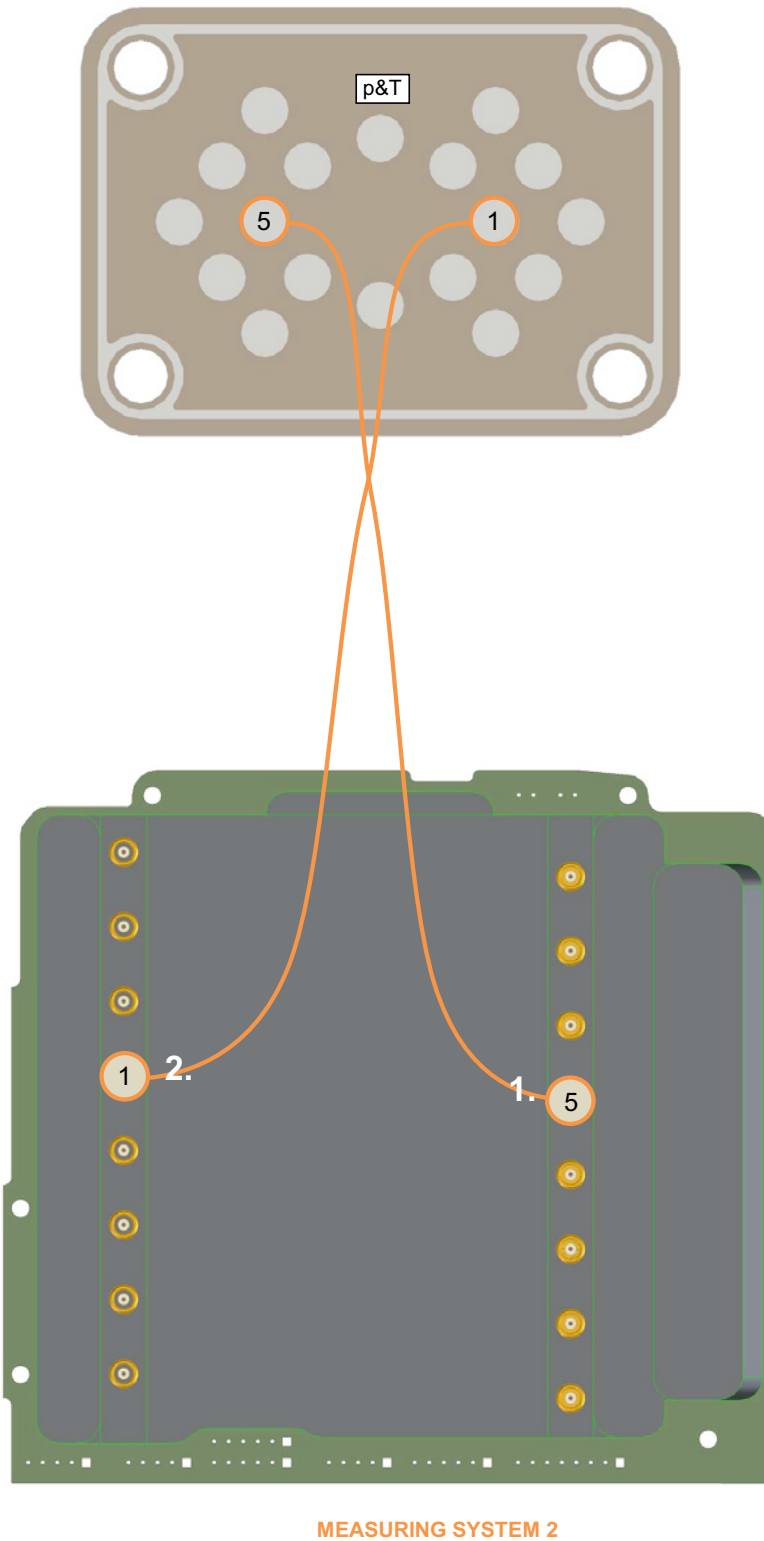
5.1 Component placement specification SPU (sensor cables)

Bild 8 4-Path devices: FLOWSIC600-XT (Single), FLOWSIC600-XT 2plex and Quatro, measuring system 1



MEASURING SYSTEM 1

Bild 9 FLOWSIC600-XT 2plex, measuring system 2 (1-Path)



Subject to change without notice

Bild 10

FLAWSIC600-XT Quatro, measuring system 2

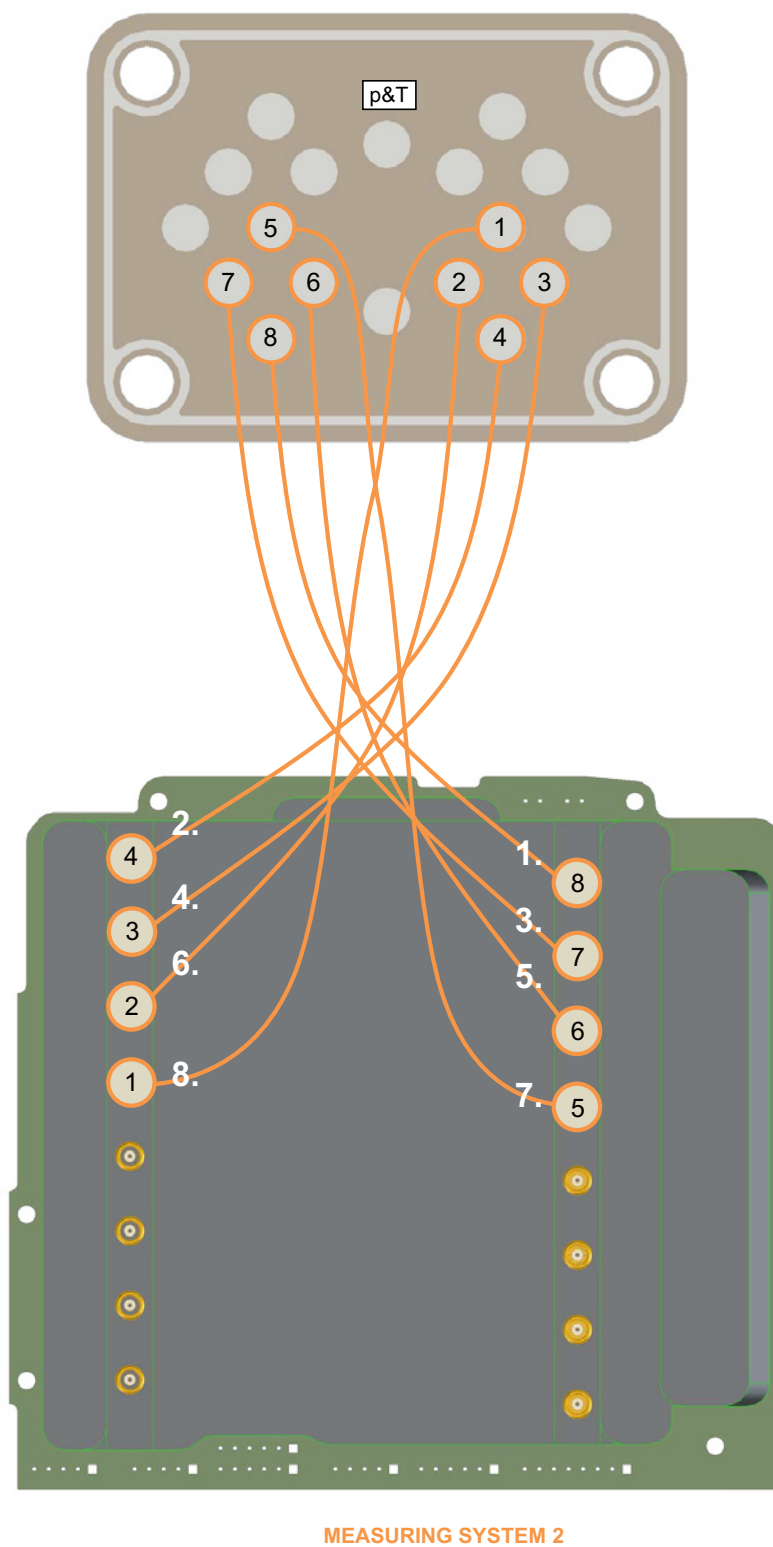
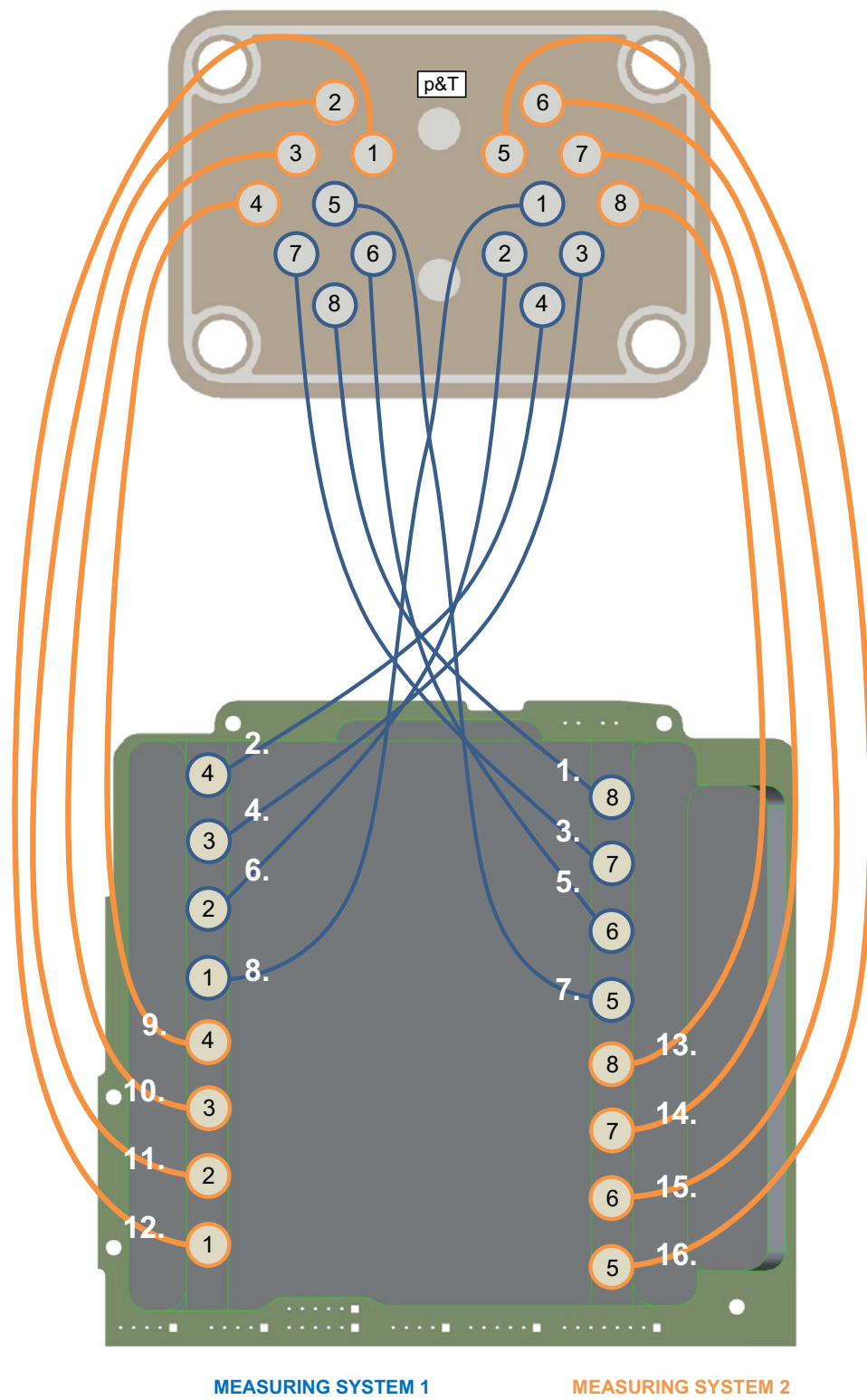


Bild 11 FLOWSIC600-XT Forte, measuring system 1 and 2



Subject to change without notice

Australia

Phone +61 3 9457 0600
1800 334 802 – tollfree
E-Mail sales@sick.com.au

Austria

Phone +43 (0)22 36 62 28 8-0
E-Mail office@sick.at

Belgium/Luxembourg

Phone +32 (0)2 466 55 66
E-Mail info@sick.be

Brazil

Phone +55 11 3215-4900
E-Mail marketing@sick.com.br

Canada

Phone +1 905 771 14 44
E-Mail information@sick.com

Czech Republic

Phone +420 2 57 91 18 50
E-Mail sick@sick.cz

Chile

Phone +56 2 2274 7430
E-Mail info@schadler.com

China

Phone +86 4000 121 000
E-Mail info.china@sick.net.cn

Denmark

Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland

Phone +358-9-2515 800
E-Mail sick@sick.fi

France

Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany

Phone +49 211 5301-301
E-Mail info@sick.de

Great Britain

Phone +44 (0)1727 831121
E-Mail info@sick.co.uk

Hong Kong

Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary

Phone +36 1 371 2680
E-Mail office@sick.hu

India

Phone +91-22-4033 8333
E-Mail info@sick-india.com

Israel

Phone +972-4-6881000
E-Mail info@sick-sensors.com

Italy

Phone +39 02 27 43 41
E-Mail info@sick.it

Japan

Phone +81 (0)3 5309 2112
E-Mail support@sick.jp

Malaysia

Phone +603 808070425
E-Mail enquiry.my@sick.com

Netherlands

Phone +31 (0)30 229 25 44
E-Mail info@sick.nl

New Zealand

Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway

Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland

Phone +48 22 837 40 50
E-Mail info@sick.pl

Romania

Phone +40 356 171 120
E-Mail office@sick.ro

Russia

Phone +7-495-775-05-30
E-Mail info@sick.ru

Singapore

Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia

Phone +421 482 901201
E-Mail mail@sick-sk.sk

Slovenia

Phone +386 (0)1-47 69 990
E-Mail office@sick.si

South Africa

Phone +27 11 472 3733
E-Mail info@sickautomation.co.za

South Korea

Phone +82 2 786 6321
E-Mail info@sickkorea.net

Spain

Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden

Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland

Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan

Phone +886 2 2375-6288
E-Mail sales@sick.com.tw

Thailand

Phone +66 2645 0009
E-Mail tawiwat@sicksgp.com.sg

Turkey

Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates

Phone +971 (0) 4 88 65 878
E-Mail info@sick.ae

USA/Mexico

Phone +1(952) 941-6780
1 (800) 325-7425 – tollfree
E-Mail info@sick.com

Vietnam

Phone +84 8 62920204
E-Mail Ngo.Duy.Linh@sicksgp.com.sg

More representatives and agencies
at www.sick.com