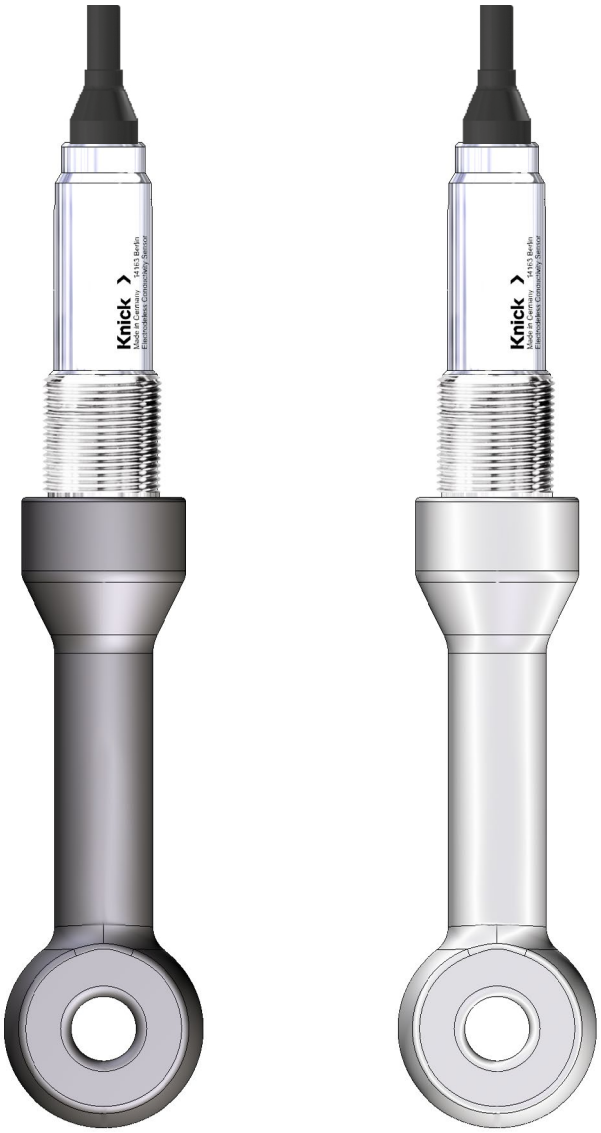
Knick

User Manual

SE655(N/X-*) / SE656(N/X-*) Digital Toroidal Conductivity Sensors

Memosens Protocol



Read before installation.
Keep for future use.

www.knick.de

2 Safety Instructions

WARNING – Failure to observe this warning may result in serious injury
The safety alert symbol on the nameplate means:
Read these instructions for use, observe the specifications, and follow the safety instructions.

Safety Instructions

1.1 All Applications

- Ensure that the sensor is in mechanically perfect condition. Only use the sensor for its intended purpose.
- Hazards due to pressure, temperature, aggressive media, and other influences may arise, depending on the location of use. Installation, operation, and servicing of the sensor may therefore only be carried out by suitably trained personnel authorized by the operating company.
- Manipulations of the equipment other than described in the User Manual are not permitted.
- The sensors are developed in compliance with the applicable European directives and standards.
  Be sure to follow the instructions given in this User Manual for connecting and operating the SE655(N/X) digital and SE656(N/X) digital sensors.
- Safe use of the sensors must be ensured by observing the specified ambient and media temperature ranges.
- Take care to maintain the IP68 protection when installing the sensor (use original seal, insert the cables in a professional manner).
- Make sure that the seals are securely in place. If not, the installation will not be leak-proof.
- The sensors may not be removed while the process medium is pressurized.

1.2 Hazardous Locations

- The SE655X digital / SE656X digital sensors have been developed and manufactured in accordance with currently valid European standards according to 2014/34/EU and are suitable for use in hazardous areas. Compliance with the harmonized European standards for the use of the equipment in hazardous areas is confirmed by the Declaration of Conformity.
- The regulations for electrical installation required in hazardous areas (IEC / EN 60079-14) must be observed for the use of the instrument and sensors.
- All sensor operating data must be observed. The sensor must be connected and operated according to the user manuals for the sensor and transmitter. Proper installation is required in order to maintain the protection type (IP68): Use original seal; install cable gland properly.

Intended Use

The SE655(N/X) digital and SE656(N/X) digital toroidal conductivity sensors are particularly suited for applications in the chemical industry and for process analysis. The SE655(N/X) digital and SE656(N/X) digital sensors are equipped with the Memosens protocol. This enables integrated sensor diagnostics and the ability to store calibration data, the operating time, the sensor name, and the serial number in the sensor. The serial number can also be found on the quality certificate and the packaging label. Using the Memosens protocol for data transmission allows the above-mentioned sensor data to be transmitted to the measuring device and to be saved and processed.
Thanks to the large measuring range over six decades and the high chemical resistance of the wetted parts made of PEEK or PFA, almost every conceivable application is possible, such as concentration determination of acids, bases and salt solutions, monitoring of product quality, or phase separation of product mixtures.

Table of Contents

4 Specifications

General

Cell factor (installation factor – for adaptation to installation conditions, see page 10)	1.98 /cm
Measuring range	0 ... 2,000 mS/cm
Resolution	0.002 mS/cm
Measurement error (-20 ... +100 °C)	± (0.005 mS/cm + 0.5 % meas. value)
Measurement error (> 100 °C)	± (0.010 mS/cm + 0.5 % meas. value)
Material SE655(N/X-*) SE656(N/X-*)	PEEK PFA
Process temperature	-20 ... +110 °C
Temperature response time t_{90} (DIN 746-1)	SE655(N/X-*): approx. 7 min SE656(N/X-*): approx. 11 min
Ambient temperature	-20 ... +60 °C
Storage temperature	-20 ... +80 °C
Process pressure p_{rel}	SE655(N/X-*): 0 ... 20 bar (see pT diagrams) SE656(N/X-*): 0 ... 16 bar (see pT diagrams)
Temperature detector	Pt1000 (Class A in acc. with IEC 60751)
Mounting	G ¾"

Thread adapter NPT 1“	steel	with ZU1046
NPT 1“ adapter	PEEK	with ZU1052
Flange ANSI 2“	PVDF	with ZU1035
Flange DN 50	steel	with ZU0343
Flange DN 50	PVDF	with ZU0344

Cable	
Length	3 m: SE655N-GEFFT0AM 7 m: SE655*-GEFTT0AM, SE656*-GEFTW0KM (extendable up to 100 m)
Connection	Ferrules
Ingress protection (EN 60529)	IP68 (sensor mounted, with original seal)
Weight	Approx. 1 kg

Product Code

SE65* N - GE FF T 0 A M

- **Memosens Protocol**
- **Seal materials**
  - A - FKM
  - K - FFKM
- **Process-wetted**
- **Process-wetted materials**
  - T - PEEK
  - W - PFA
- **Cable length**
  - FF - 3 m fixed cable
  - FT - 7 m fixed cable
- **Process connection G ¾"**
- **Ex approval**
  - N - no
  - X - yes

Chemical Resistance Depending on the Type, Concentration, and Temperature of the Process Medium

		Sensor		**Seals**	
Medium	**Concentration**	**Material**		**Material**	
		PEEK	**PFA**	**FKM**	**FFKM**
				(See product line for other materials)	
Sodium hydroxide solution NaOH	0 ... 50 %	20 ... 100 °C (68 ... 212 °F)	20 ... 50 °C (68 ... 122 °F)	Not suitable	0 ... 120 °C (32 ... 248 °F)
Nitric acid HNO_3	0 ... 10 %	20 ... 100 °C (68 ... 212 °F)	20 ... 80 °C (68 ... 176 °F)	0 ... 120 °C (32 ... 248 °F)	0 ... 150 °C (32 ... 302 °F)
	0 ... 40 %	20 °C (68 °F)	20 ... 60 °C (68 ... 140 °F)	0 ... 120 °C (32 ... 248 °F)	0 ... 150 °C (32 ... 302 °F)
Phosphoric acid H_3PO_4	0 ... 80 %	20 ... 100 °C (68 ... 212 °F)	20 ... 60 °C (68 ... 140 °F)	0 ... 120 °C (32 ... 248 °F)	0 ... 150 °C (32 ... 302 °F)
Sulfuric acid H_2SO_4	0 ... 2.5 %	20 ... 80 °C (68 ... 176 °F)	20 ... 100 °C (68 ... 212 °F)	0 ... 120 °C (32 ... 248 °F)	0 ... 150 °C (32 ... 302 °F)
	0 ... 30 %	20 °C (68 °F)	20 ... 100 °C (68 ... 212 °F)	0 ... 120 °C (32 ... 248 °F)	0 ... 150 °C (32 ... 302 °F)
Hydrochloric acid HCl	0 ... 5 %	20 ... 100 °C (68 ... 212 °F)	20 ... 80 °C (68 ... 176 °F)	0 ... 120 °C (32 ... 248 °F)	0 ... 150 °C (32 ... 302 °F)
	0 ... 10 %	20 ... 100 °C (68 ... 212 °F)	20 ... 80 °C (68 ... 176 °F)	0 ... 120 °C (32 ... 248 °F)	0 ... 150 °C (32 ... 302 °F)

Temperature and Pressure Resistance SE655(N/X) PEEK and SE656(N/X) PFA

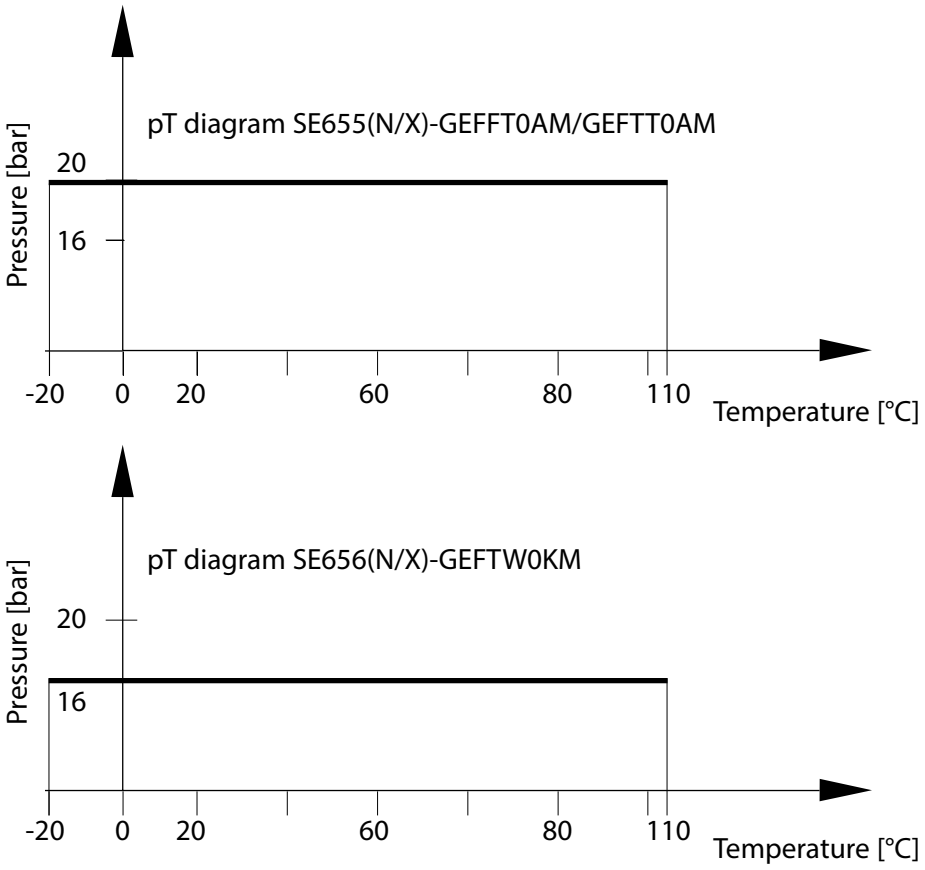


Fig. 1 Pressure/temperature resistance

pT Diagram (Assembled Version) for SE655(N/X-*) and SE656(N/X-*)

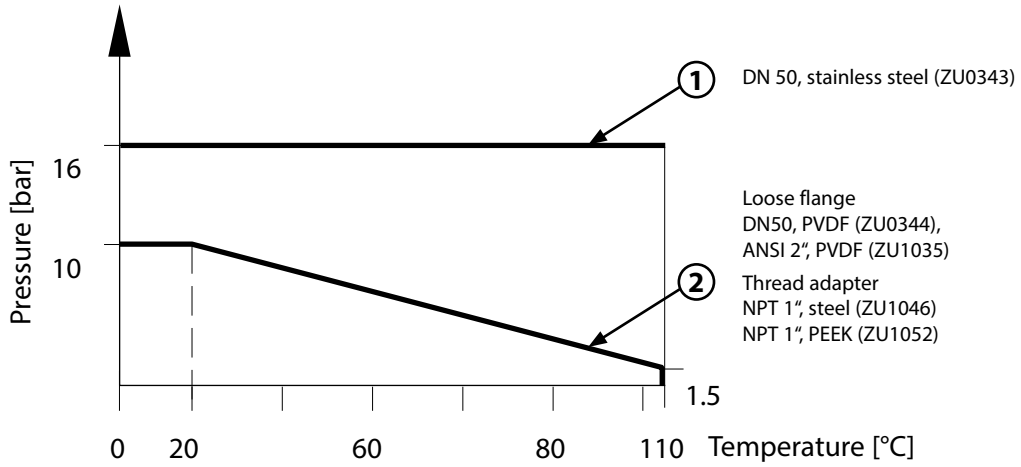


Fig. 2 Pressure/temperature curves for different process installations

Electrical Connection

Connect the sensor cable to the measuring device.
Refer to the user manual of the measuring device for information on the electrical connection.
For further information, see www.knick.de.

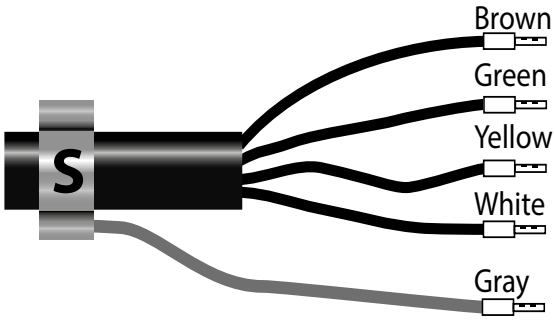


Fig. 3 Wire assignment of Memosens cable

Power supply +

RS485 (A)

RS485 (B)

Power supply – (GND)

Shielding

The shielding wire is included in the package.
Note: First, pass the sensor cable through the cable gland. Then, secure the clamp S on the bare shielding braid of the cable.

Identifying the Sensors

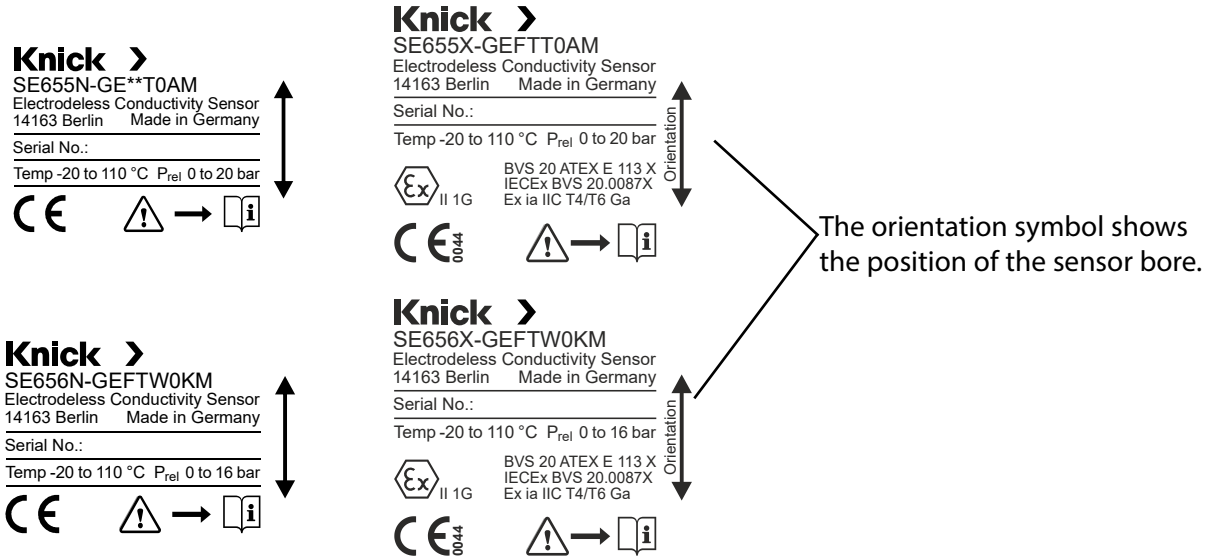


Fig. 4 Model designation / nameplate for **SE655(N/X-*) and SE656(N/X-*) sensors**

Assembly, with PTFE Washer (for Flange Protection)
Max. tightening torque 20 Nm, wrench A/F 36

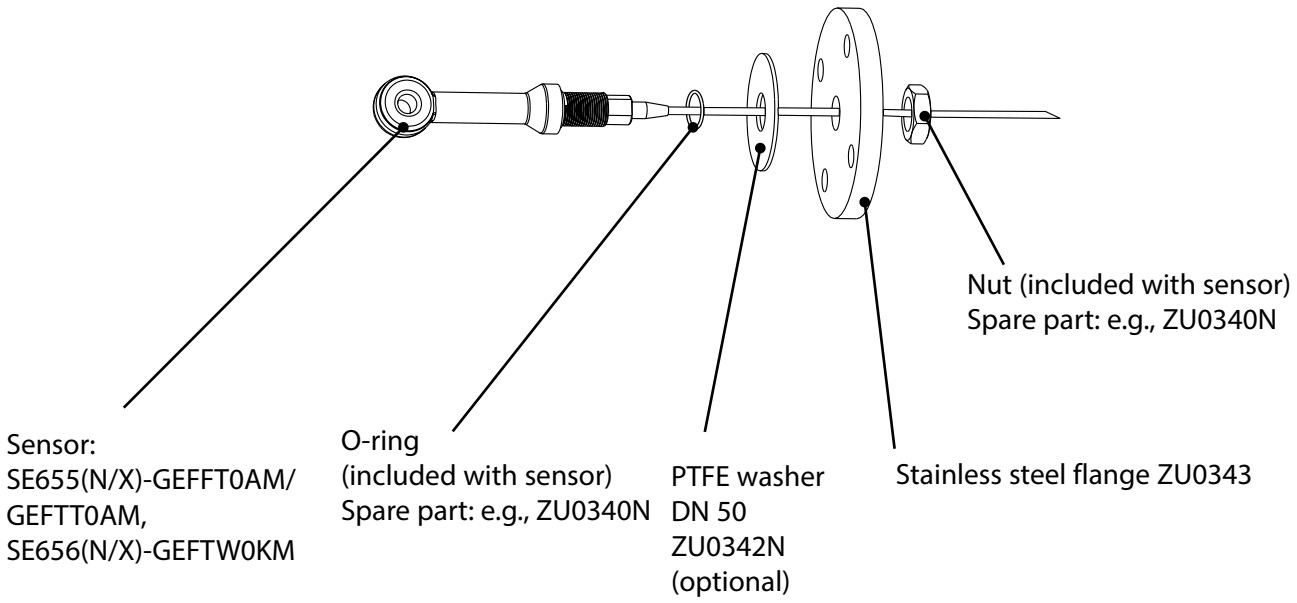


Fig. 6 Assembly with stainless steel DN 50 flange, with PTFE washer

Assembly with NPT 1" Adapter
Max. tightening torque 20 Nm, wrench A/F 41

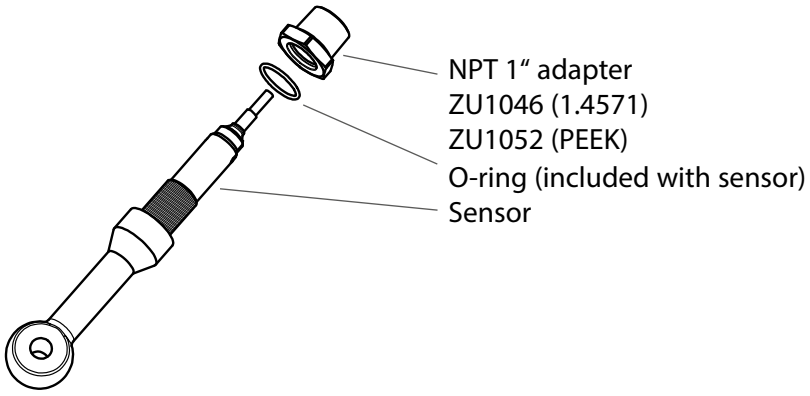


Fig. 7 Assembly with NPT 1" adapter

Assembly with Stainless Steel DN 50 Flange, without PTFE Washer (Flange Wetted by Process Medium)

Max. tightening torque 20 Nm, wrench A/F 36

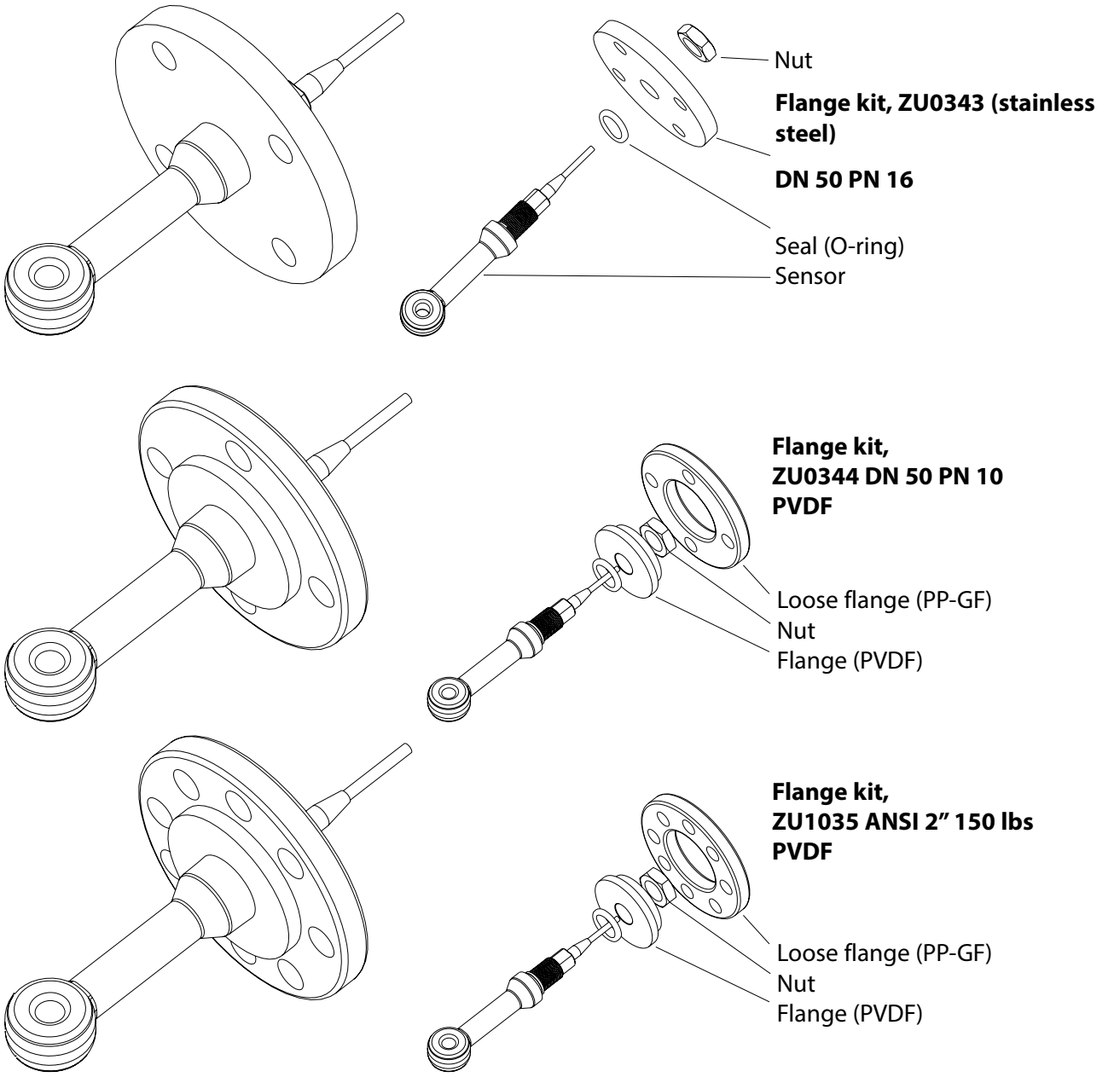


Fig. 8 Assembly with DN 50, ANSI 2“ loose flange

Installation Conditions

With a distance of 15 mm or more, the cell factor does not change.
With a distance of less than 15 mm to metallic tank or pipe walls, the cell factor will be reduced.
With insulating walls, the cell factor will increase.

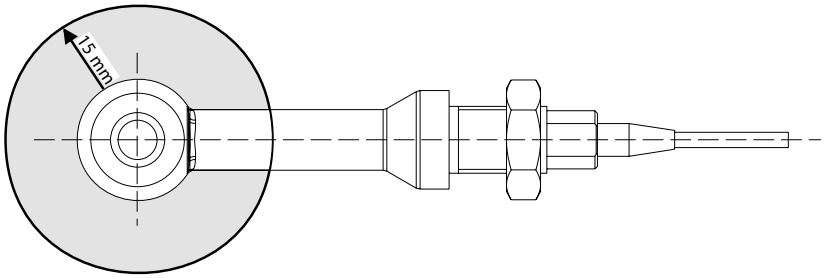


Fig. 9 Minimum extent of the free field without change of the cell factor

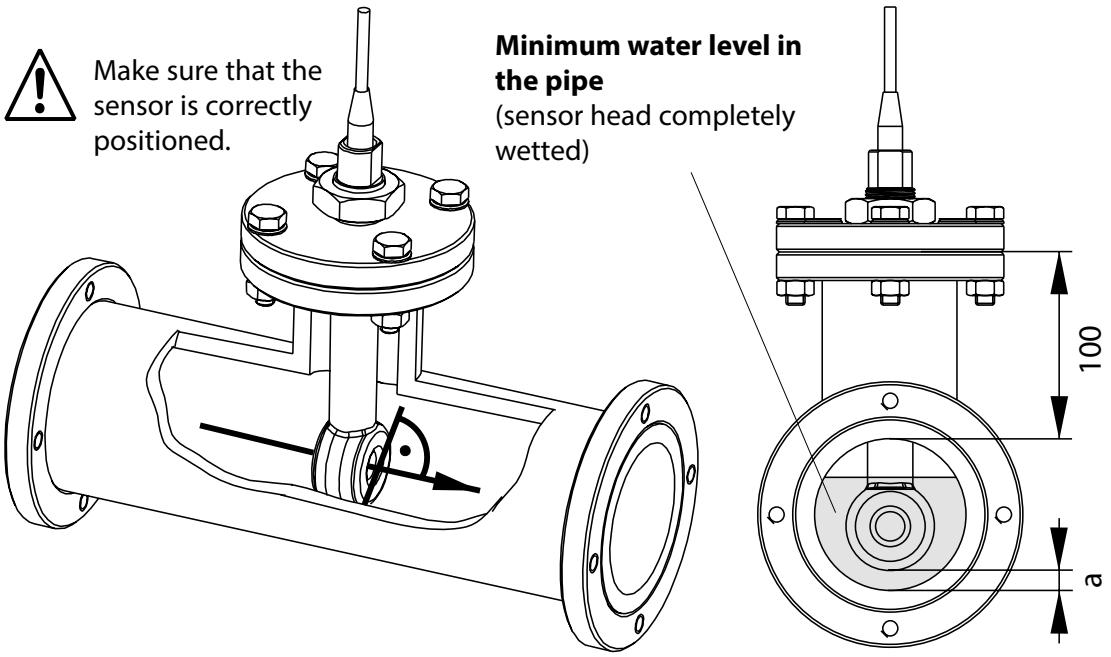


Fig. 10 Typical installation in a pipe

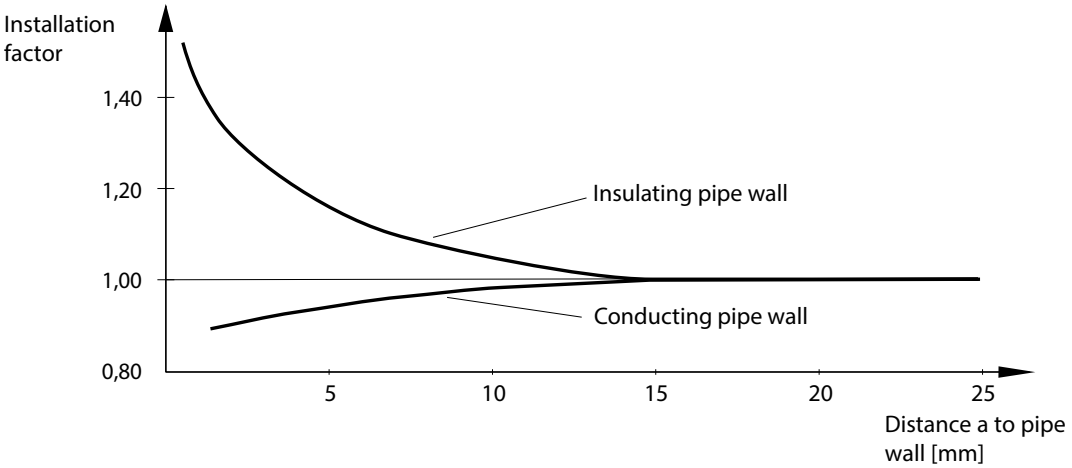


Fig. 11 Influence of wall distance on the installation factor

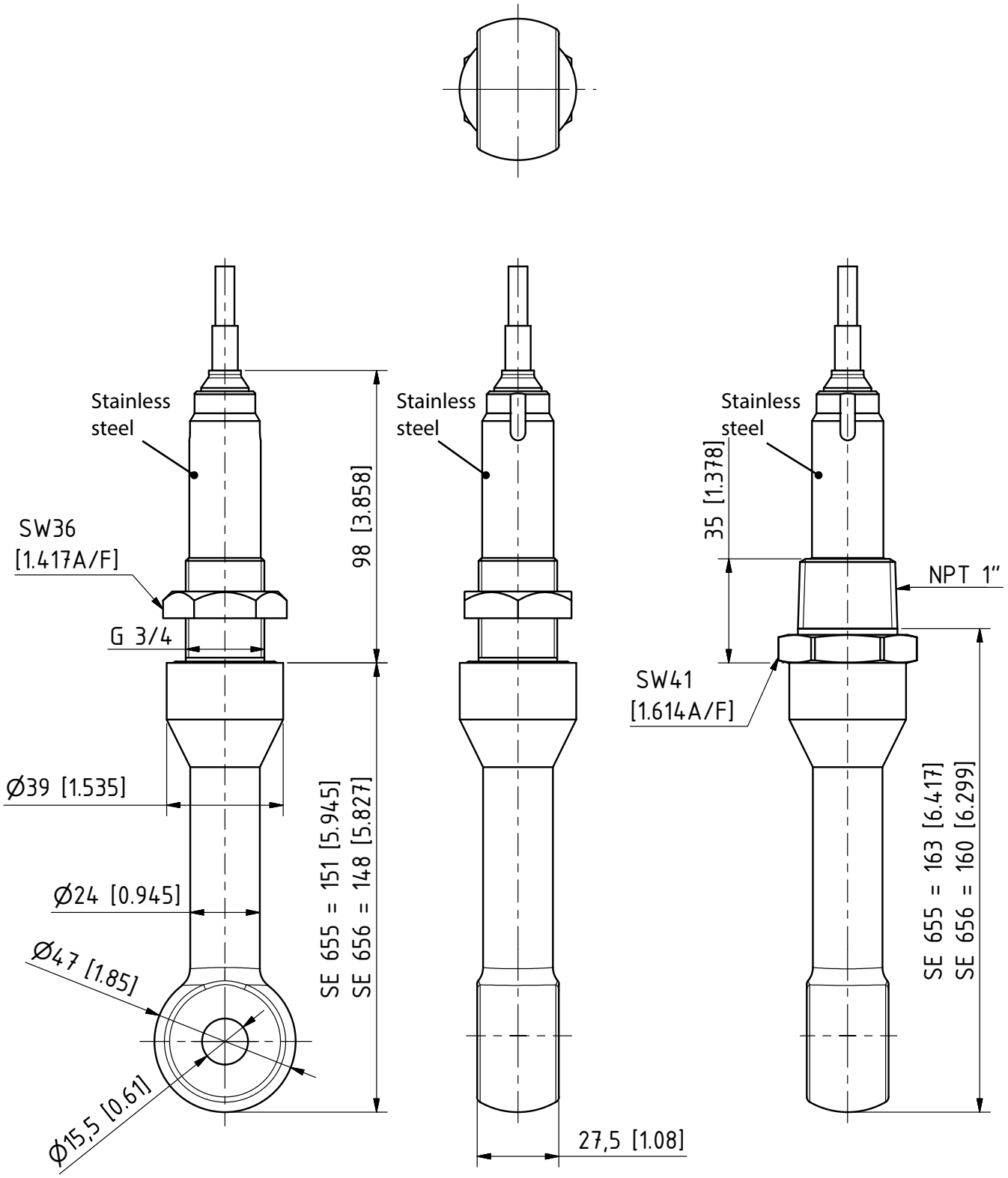
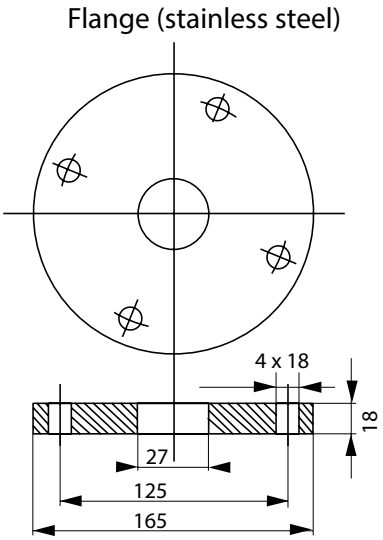
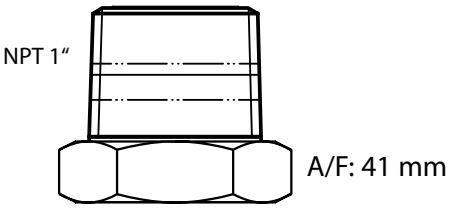


Fig. 12 Sensor dimensions in mm [inch]. A/F: Width across flats

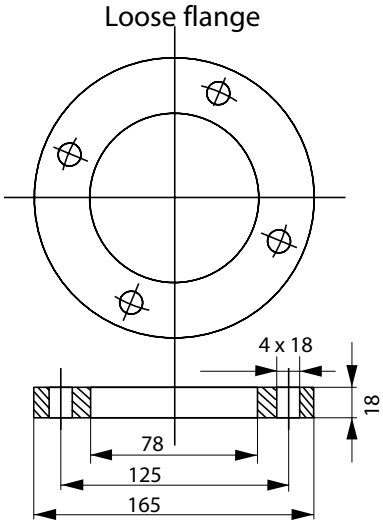
Flange kit DN 50 PN 16, 316L,
ZU0343

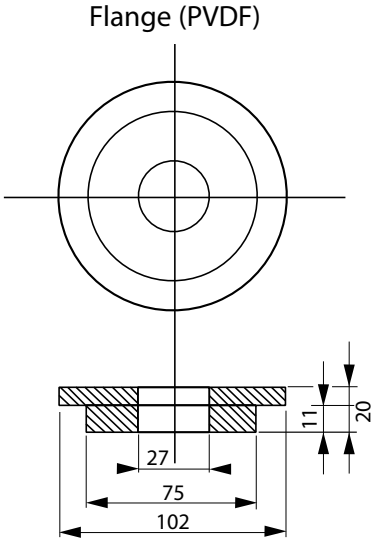




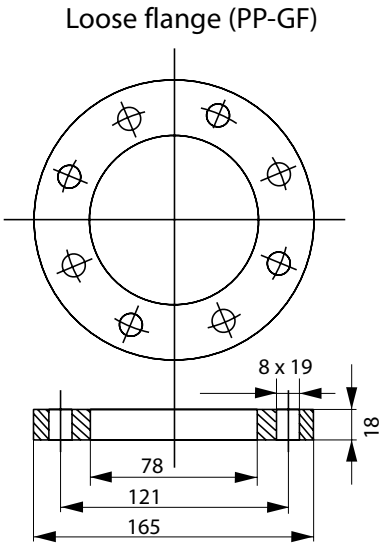
NPT 1“ stainless steel
ZU1046
NPT 1“ PEEK **ZU1052**

Flange kit DN 50 PN 10, PVDF
ZU0344





Flange kit ANSI 2“, 150 lbs
ZU1035



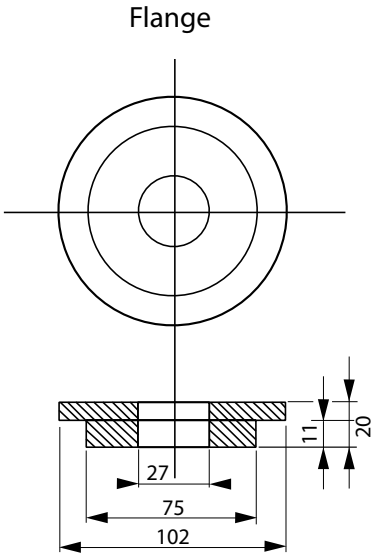


Fig. 13 Flange and adapter dimensions in mm

		Order No.
NPT 1“ adapter	Material: stainless steel	**ZU1046**
NPT 1“ adapter	Material: PEEK	**ZU1052**
Flange, DN 50 PN 16	Material: 316L Sealing kit C is additionally required when measuring in aggressive media.	**ZU0343**
Flange, DN 50 PN 10	Material: PVDF	**ZU0344**
Flange, ANSI 2" 150 lbs	Material: PVDF	**ZU1035**
Sealing kit A Spare part for SE655(N/X)-GEFFT0AM/ GEFTT0AM	Nut + FKM O-ring (3x)	**ZU0340N**
Sealing kit B Spare part for SE656(N/X)-GEFTW0KM	Nut + FFKM O-ring (1x)	**ZU0341N**
Sealing kit C	PTFE washer DN 50 (protects ZU0343 flange against aggressive media)	**ZU0342N**
O-rings	Material: FKM	**O-ring 30x2.5 FKM**
	Material: EPDM-FDA	**O-ring 30x2.5 EPDM-FDA**
	Material: FFKM	**O-ring 30x2.5 FFKM**
Conductivity standard	KCl 0.1 mol/l 500 ml 12.88 mS/cm $\pm$ 1.5 %	**CS-C12880K/500**

14 Hazardous Locations

Identification:

ATEX: Ⓔx II 1G Ex ia IIC T4/T6 Ga

IECEx: Ex ia IIC T4/T6 Ga

Connections:

The sensor may be operated in Zone 0 (1G) classified areas.

Max. length of measuring cable may not exceed 100 m.

Electrical Parameters:

The sensor has the following entity parameters:

Ui = 5.1 V DC
Ii = 130 mA
Pi = 166 mW
Ci = 18 µF
Li = 0.72 µH/m

The sensors may only be connected as described below:

- to the approved Memosens sensor output of the product families Stratos, Protos and Portavo or
- to an ATEX/IECEx approved, intrinsically safe Memosens sensor output providing not more than the maximum values as described above.

Thermal Parameters:

Suitable measures must be taken to ensure that the temperature of the sensor connection head and the connection line is decoupled from the process temperature.

The sensors are suitable for use in the following ambient and process temperature range:

Temperature Class	Ambient Temperature Range for Sensor Head and Cable	Max. Permissible Process Temperature
T4	-20 °C ... +60 °C	-20 °C ... +110 °C
T6	-20 °C ... +60 °C	-20 °C ... +70 °C

Specific Conditions of Use:

- The sensors may only be used in liquid media with a conductivity of at least 10 nS/cm.
- Metallic process connection parts must be installed at their mounting position electrostatically conductive (< 1 MΩ).
- Non-metallic process connection parts must be protected from electrostatic charging.
- The connection cable must be protected from electrostatic charging, if installed through areas requiring EPL Ga equipment.

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The latest documents are available for download on our website
under the corresponding product description.

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