

Technical Information

Smartec CLD18

Compact inductive conductivity measurement for the food and beverage industry



Application

The compact measuring system is designed for inductive conductivity measurement of liquids with medium to high conductivity. The gap-free construction of durable and food safe polyetheretherketone (PEEK) meets the strict requirements of the food and beverage industry. The high chemical resistance of the sensor also allows the use in applications outside of the food industry. CLD18 is especially suitable for the following applications:

- Phase separation of product / water mixtures in the beverage industry
- Control of CIP equipment (cleaning in place), concentration adding, separation in CIP return line
- Process-water monitoring
- Rinsing processes in pickling plants

Your benefits

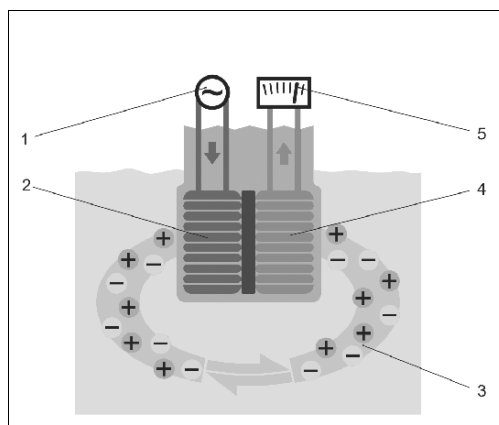
- Hygienic design, thus no risk of recontamination
- Transmitter housing of stainless steel or of plastic, IP 69k cleanable with high-pressure steam
- High repeatability, 0.5 % of the measuring value, ensures always same separation or monitoring.

Function and system design

Measuring principle

Inductive conductivity measurement

A generator (1) generates an alternating magnetic field in the primary coil (2) which induces a current in the medium (3). The strength of the induced current depends on the conductivity and thus the ion concentration of the medium. The current flow in the medium generates another magnetic field in the secondary coil (4). The resulting current induced in the coil is measured by the receiver (5) and processed to determine the conductivity.



Inductive conductivity measurement

- 1 Generator
- 2 Primary coil
- 3 Current flow in the medium
- 4 Secondary coil
- 5 Receiver

Benefits of inductive conductivity measurement

- No electrodes, therefore no polarization
- Accurate measurement in media or solutions with a high soiling degree and a tendency to deposition
- Complete galvanic separation of measurement and medium

Important properties

▪ Hygiene

The sensor is made of chemically, mechanically and thermally resistant PEEK (polyetheretherketone). It does not have joints or crevices and is therefore hygienically safe. The sensor has the 3-A approval required for hygienic areas. All materials in contact with medium are FDA listed. The sensor has been designed according to the effective guidelines of ASME BPE (The American Society of Mechanical Engineers - Bioprocessing Equipment).

▪ Process connections

The sensor is available with all process connections commonly used in hygienic applications. For the non-hygienic areas the measuring system is available with G1½ thread.

▪ Process temperature, process pressure

The sensor is suitable for continuous exposure to temperatures of 110 °C (230 °F). Short-time (max. 60 min.), it may be exposed to 130 °C (266 °F) for sterilization. The sensor is pressure-resistant up to 12 bar (174 psi) up to 50 °C (122 °F). At higher temperatures, its pressure resistance is always higher than the respective steam pressure.

▪ Temperature measurement

The sensor has an integrated temperature sensor Pt 1000. This enables economically efficient phase separations at varying and quickly changing process temperatures. The temperature sensor is embedded into the PEEK body.

▪ Temperature compensation

Linear compensation with freely selectable temperature coefficient α .

Input

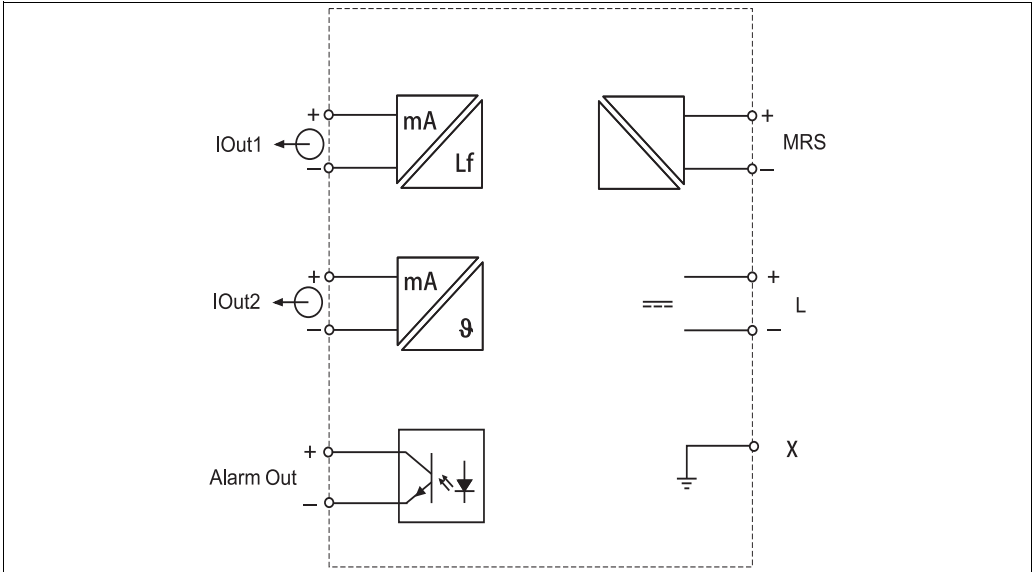
Measured variables	Conductivity Temperature	
Measuring range	Conductivity: Temperature:	recommended range: 200 μ S/cm to 1000 mS/cm (uncompensated) -10 to +130 °C (+14 to +266°F)
Temperature measurement	Pt 1000	
Binary input	The binary input is used for measuring range switching.	
	Voltage range:	0 V to 30 V
	Voltage HIGH min:	12 V
	Voltage LOW max:	9.0 V
	Current consumption at 24 V:	30 mA
	Undefined voltage range:	9.0 to 12 V

Output

Output signal	Conductivity: Temperature:	0/4 to 20 mA, galvanically isolated 0/4 to 20 mA, galvanically isolated
Load	max. 500 Ω	
Characteristic	linear	
Signal resolution	Resolution: Accuracy:	> 13 bit \pm 50 μ A

Power supply

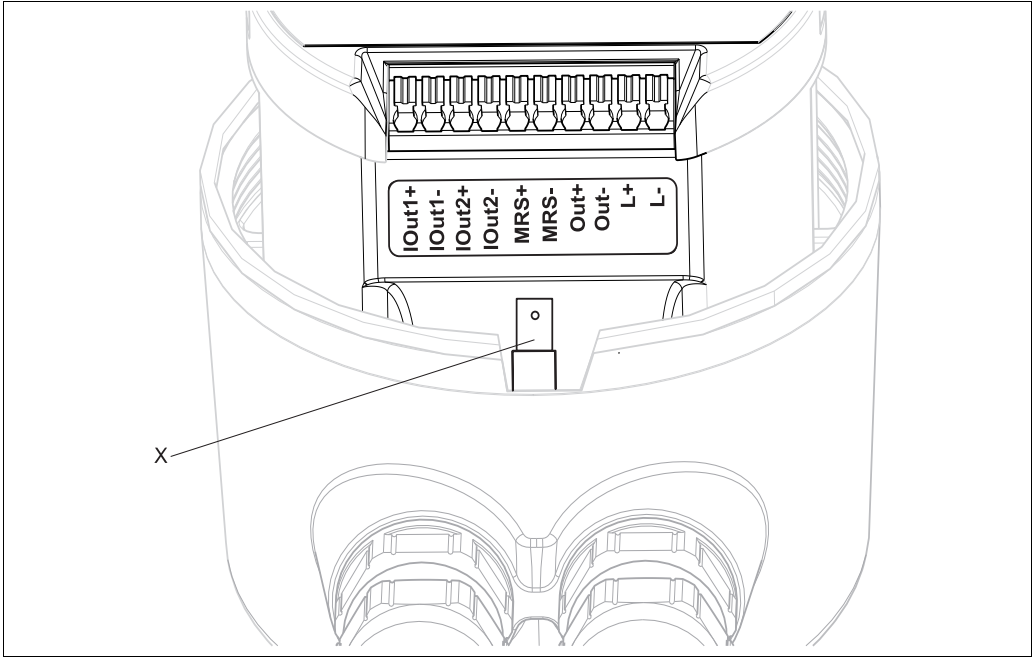
Electrical connection



Electrical connection

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Terminal assignment



Terminal assignment

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<i>IOut1</i>	<i>Conductivity</i>
<i>IOut2</i>	<i>Temperature</i>
<i>MRS</i>	<i>Binary input (measuring range switching)</i>
<i>Out</i>	<i>Alarm output (open-collector)</i>
<i>L+/L-</i>	<i>Power supply</i>
<i>X</i>	<i>Grounding pin (flat male tab 4.8 mm)</i>

Supply voltage 24 V DC +20/-15 %, reverse-polarity protected

Power consumption 3 W

Cable specification	Recommendation	0.5 mm ²
	max.	1.0 mm ²

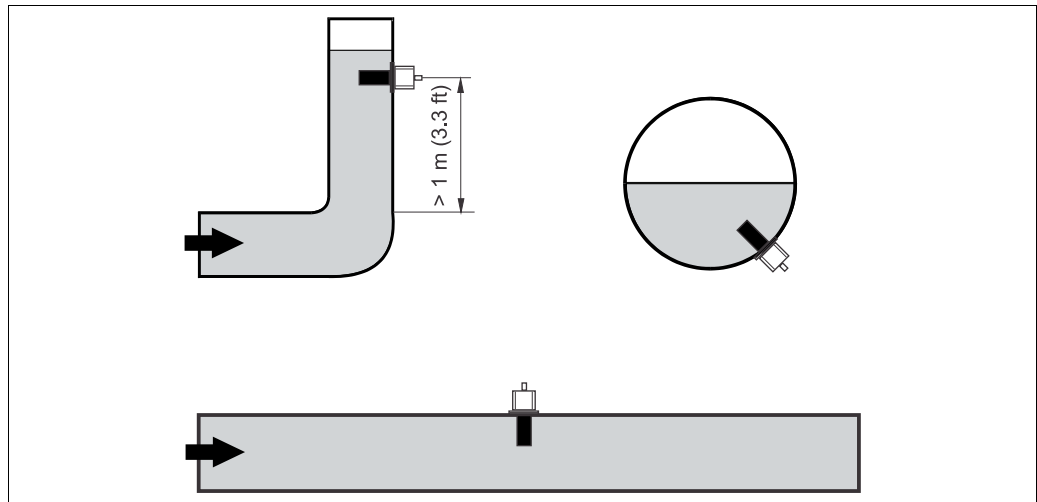
Performance characteristics

Response time	Conductivity	$t_{95} < 2 \text{ s}$
	Temperature	$t_{90} < 50 \text{ s}$
Maximum measured error	Conductivity	$\pm (2.0 \% \text{ of measured value} + 20 \text{ } \mu\text{S/cm})$
	Temperature	$\pm 1.5 \text{ K}$
	Signal outputs	$\pm 50 \text{ } \mu\text{A}$
Repeatability	Conductivity	max. 0.5 % of measured value $\pm 5 \text{ } \mu\text{S/cm} \pm 2 \text{ digits}$
Cell constant	11.0 cm^{-1}	
Temperature compensation	Range	-10 to +125 °C (+14 to +257 °F)
	Compensation types	- none
		- linear with freely selectable temperature coefficient
Reference temperature	25 °C (77 °F)	

Installation

Installation instructions

The sensor must be completely immersed in the medium. Avoid bubbles in the area of the sensor.

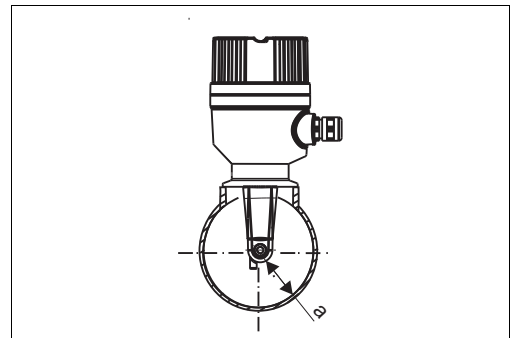


Installation positions of conductivity sensors

- i** After elbow pipes, turbulences can occur in the medium. Therefore it is necessary to install the sensor with a minimum distance of 1 m (3.3 ft) after an elbow pipe.

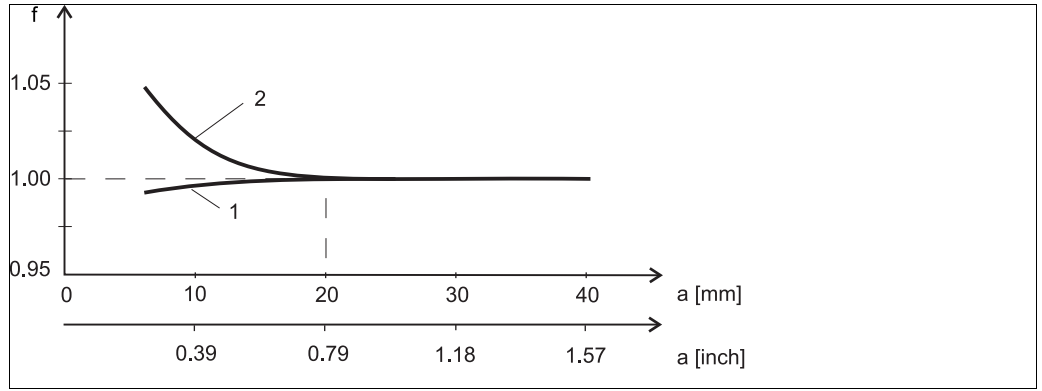
The medium should flow through the flow opening of the sensor (see indicator arrow of the sensor body). The symmetrical measuring channel allows a flow in both directions.

In narrow installation conditions, the ion flow in the medium is affected by the pipe walls. This effect is compensated by the so-called installation factor. The installation factor can be entered in the transmitter or the cell constant can be corrected by multiplication with the installation factor to ensure correct measurement. The value of the installation factor depends on the diameter and the conductivity of the pipe as well as the sensor's distance from the wall. If the distance from the wall is sufficient ($a > 20$ mm, from DN 40), it is not necessary to consider the installation factor ($f = 1.00$). If the distance from the wall is smaller, the installation factor increases in case of electrically insulating pipes ($f > 1$) and decreases in case of electrically conductive pipes ($f < 1$). The installation factor can be measured using calibration solutions or it can be approximately determined from the diagram beside.



Installation of CLD18

a Sensor distance from the pipe wall



Dependence of installation factor f on wall distance a

- 1 Conductive pipe
- 2 Insulating pipe

i Avoid direct solar radiation to the housing.

Environment

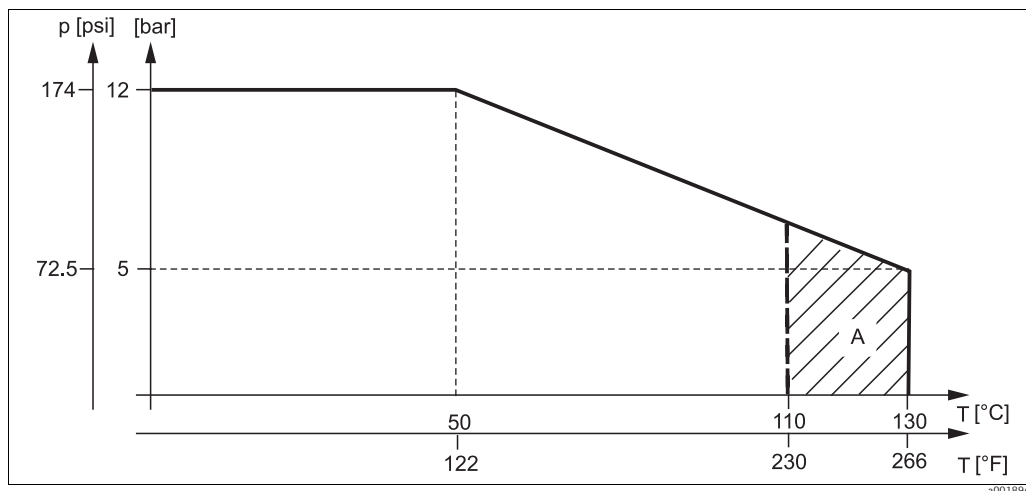
Ambient temperature range	-20 to +60 °C (-4 to +140 °F)
Storage temperature	-25 to +80 °C (-13 to +176 °F)
Humidity	≤ 100%, condensing
Climate class	Climate class 4K4H acc. to EN 60721-3-4
Degree of protection	IP 69k acc. to EN 40050:1993 Protection class NEMA TYPE 6P acc. to NEMA 250-2008
Shock resistance	Complies with IEC 61298-3
Vibration resistance	Complies with IEC 61298-3
Electromagnetic compatibility	Interference emission acc. to EN 61000-6-3:2007 + A1:2011 and EN 55011:2009 + A1:2010 Interference resistance acc. to EN 61326-1:2006

Process

Process temperature range -10 to +110 °C (14 to 230 °F)

Process pressure range 12 bar (174 psi) up to 50 °C (122 °F)
 6.75 bar (98 psi) at 110 °C (230 °F)
 5.0 bar (72.5 psi) at 130 °C (266 °F) max. 60 minutes

Pressure temperature ratings



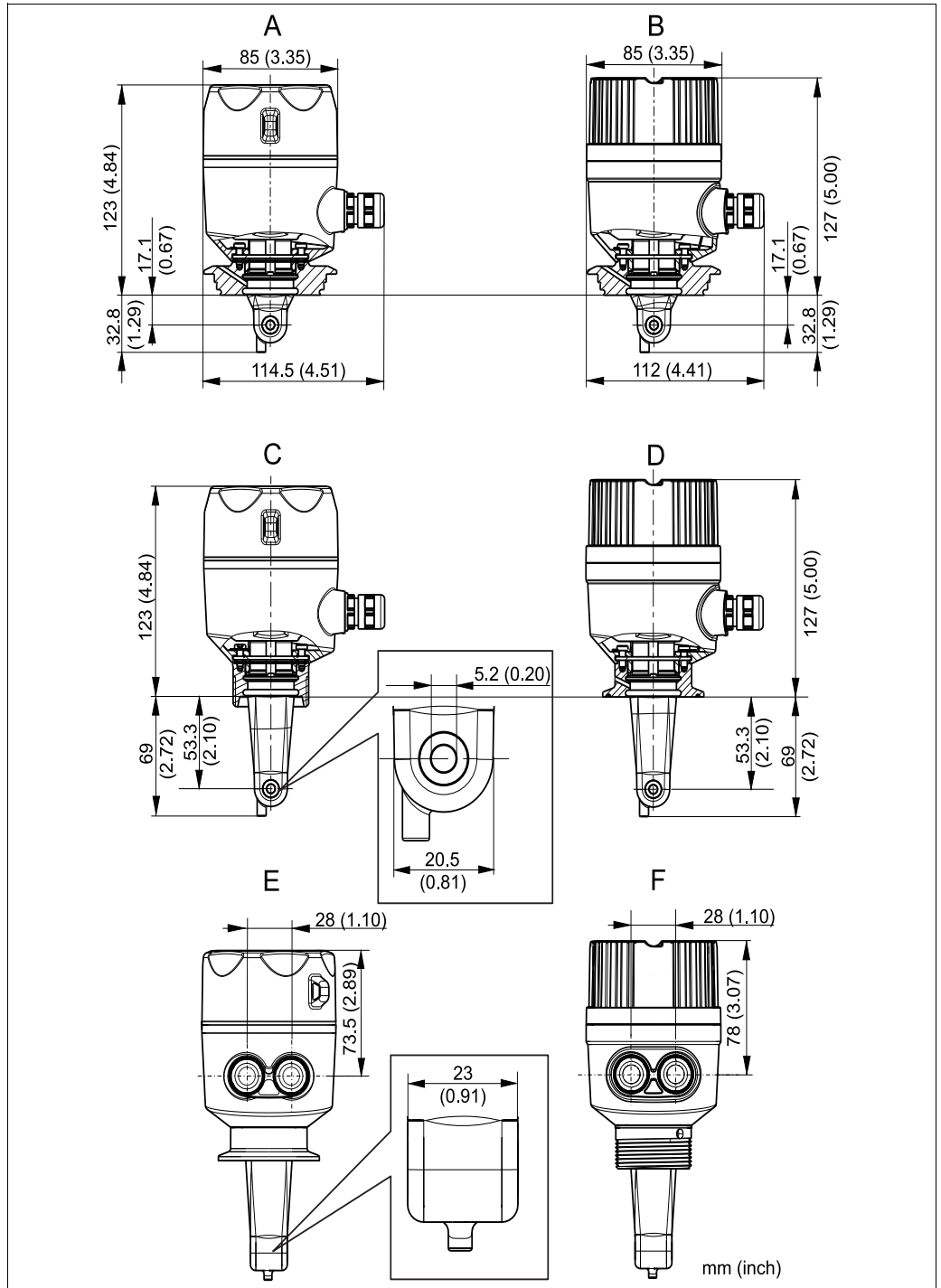
Pressure-temperature load curve

A Short-term increased process temperature (max. 60 minutes)

Flow rate Max. 5 m/s (16.4 ft/s) at medium of low viscosity in pipes NW 50

Mechanical construction

Design, dimensions

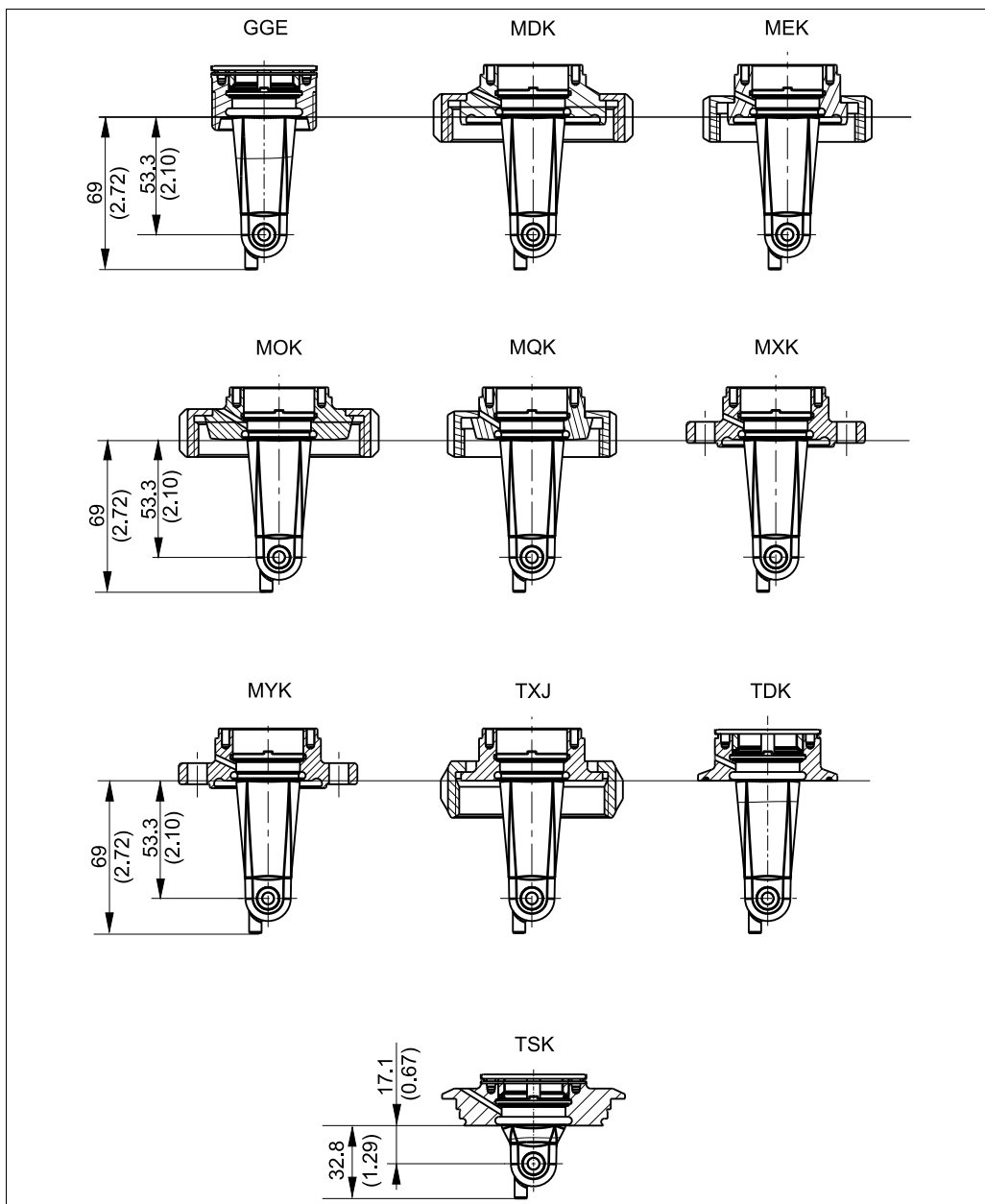


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Dimensions and versions (examples)

- A Stainless steel housing with Varivent DN 40 to 125
- B Plastic housing with Varivent DN 40 to 125
- C Stainless steel housing with thread G 1½
- D Plastic housing with ISO 2852 Clamp 2"
- E Stainless steel housing with ISO 2852 Clamp 2"
- F Plastic housing with thread G 1½

Process connections



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Process connections

- GGE Thread G1½
- MDK Aseptic DIN 11864-1-A DN 50
- MEK Aseptic DIN 11864-1-A DN 40
- MOK Dairy fitting DIN 11851 DN 50
- MQK Dairy fitting DIN 11851 DN 40
- MXK Dairy fitting DIN 11853-2 DN 40
- MYK Dairy fitting DIN 11853-2 DN 50
- TXJ SMS 2"
- TDK Tri-Clamp ISO 2852 2"
- TSK Varivent N DN 40 to 125

Weight	Stainless-steel housing:	up to 1.870 kg (4.12 lbs)
	Plastic housing:	up to 1.070 kg (2.36 lbs)

Materials

In contact with medium

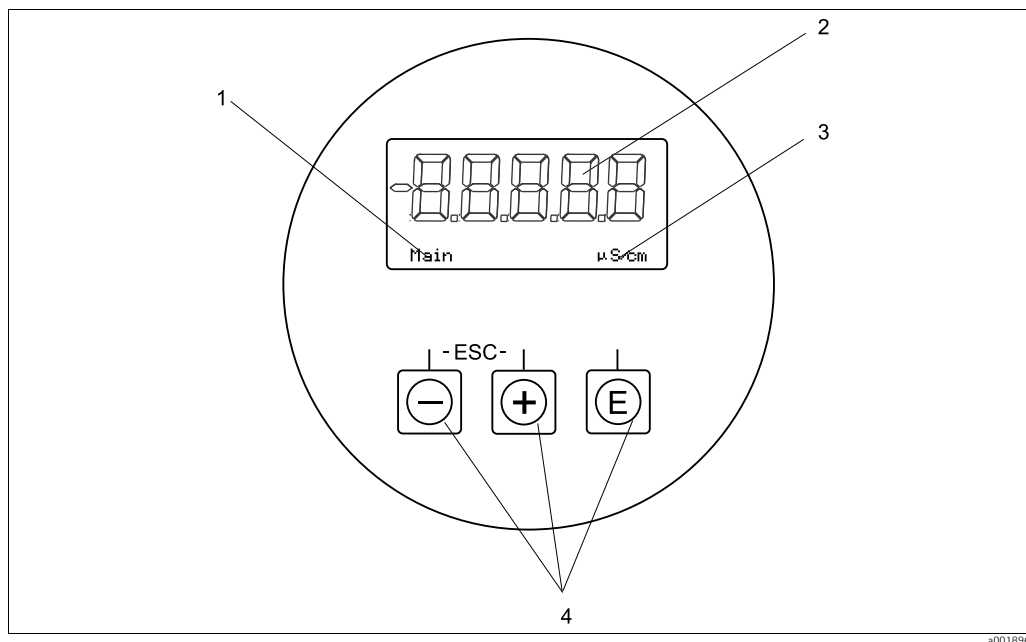
Sensor:	PEEK (polyetheretherketone)
Process connection:	Stainless steel 1.4435 (AISI 316 L)
Seal:	EPDM

Not in contact with medium

Stainless-steel housing:	Stainless steel 1.4308 (ASTM CF-8, AISI 304)
Plastic housing:	PBT GF20
Seal:	EPDM
Window:	PC
Cable glands:	PA, TPE

Operability

Display and operating elements



Display and keys of CLD18

- 1 Parameter
- 2 Measured value
- 3 Unit
- 4 Keys

Certificates and approvals

Hygiene

FDA

All materials in contact with medium are listed at FDA.

3-A

Certification according to 3-A Standard 74-06 ("3-A Sanitary Standards for Sensor and Sensor Fittings and Connections Used on Milk and Milk Products Equipment").

CE approval

Declaration of conformity

The product meets the requirements of the harmonized European standards. It thus complies with the legal requirements of the EC directives.

The manufacturer confirms successful testing of the product by affixing the **CE** symbol.

Ordering Information

Order code

You can create a valid and complete order code using the Endress+Hauser Configurator tool on the Internet.

Enter the following address into your browser to access the relevant product page:
www.products.endress.com/cld18

1. You can choose from the following options on the product page located on the right:

Product page function
:: Add to product list
:: Price & order information
:: Compare this product
:: Configure this product

2. Click "Configure this product".
3. The configurator opens in a separate window. You can now configure your device and receive the complete order code that applies for the device.
4. Afterwards, export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the page.

Scope of delivery

The scope of delivery comprises:

- Measuring system Smartec CLD18 in the ordered version
- Operating instructions BA01149C/07/EN

Accessories



In the following sections, you find the accessories available at the time of issue of this documentation.

For information on accessories that are not listed here, please contact your local service or sales center.

Calibration solutions

Precision solutions, traceable to SRM (standard reference material) by NIST, for qualified calibration of conductivity measurement systems according to ISO 9000, with temperature table

- CLY11-B
149.6 $\mu\text{S}/\text{cm}$ (reference temperature 25 °C / 77 °F), 500 ml / 16.9 fl.oz
Order no. 50081903
- CLY11-C
1.406 mS/cm (reference temperature 25 °C / 77 °F), 500 ml / 16.9 fl.oz
Order no. 50081904
- CLY11-D
12.64 mS/cm (reference temperature 25 °C / 77 °F), 500 ml / 16.9 fl.oz
Order no. 50081905
- CLY11-E
107.0 mS/cm (reference temperature 25 °C / 77 °F), 500 ml / 16.9 fl.oz
Order no. 50081906

www.addresses.endress.com
