

Technical Information

Condumax H CLS16

Conductivity Sensor

Fixed cable or connector versions with integrated temperature sensor Cell constant $k=0.1\ \mbox{cm}^{-1}$



Application

Measurement in pure and ultrapure water:

- Monitoring ion exchangers
- Reverse osmosis
- Distillation
- Electro-deionising
- WFI (Water for Injection) in the pharmaceutical industry

The cell constant k of the sensor is 0.1 $cm^{-1}.$ The measuring range reaches from 0.04 to 500 $\mu S/cm.$

Sensors with a Pt 100 or Pt 1000 temperature sensor are used with transmitters with automatic temperature compensation:

- Mycom S CLM153
- Liquisys M CLM223/253
- Mypro CLM431

For measurement of resistivity, $M\Omega \cdot \mbox{cm}$ measuring ranges are available in the menues of these transmitters.





Standard Number 74-02



With ATEX approval for application in hazardous areas.

Your benefits

- High measuring accuracy as cell constant is individually measured
- Installation in pipes or flow chambers
- Hygienic process connections
- Plug-in head (IP 68) / fixed cable (IP 67)
- Easy to clean due to electro-polished measuring surfaces
- Can be sterilised up to max. 150 °C
- Stainless steel 1.4435 (AISI 316L), meets the highest demands of the pharmaceutical industry
- Quality certificate stating the individual cell constant
- 3-A certificate
- Sterilisability according to EHEDG criteria
- Available with inspection certificate according to EN 10204 3.1.B



People for Process Automation

TI227C/07/en/10.04 51503431

Function and system design

Measuring principle

Conductive measurement of conductivity



The conductivity of liquids is measured with a measuring system that has two coaxially arranged electrodes like a capacitor.

The electric resistance or its reciprocal value, the conductance G, is measured according to Ohm's law. The specific conductivity κ is determined using the cell constant k that is dependent on the sensor geometry.

Conductive measurement of conductivity

AC Power supply

- I Current meter
- U Voltage meter

Important properties Condumax H CLS16

Electrodes

Condumax H CLS16 has coaxial measuring electrodes made of electro-polished, stainless steel 1.4435 (AISI 316L).

Temperature compensation

In addition, a Pt 100 or Pt 1000 temperature sensor is installed in the inside electrode to measure the medium temperature.

Easy connection

The connector versions are connected via a water-proof plug-in system (TOP 68).

The fixed cable versions are ready for operation and do not need any further cable connection.

Durable and sterilisable

The sensor is pressure-proof up to 12 bar / 180 psi (at 20 °C / 68 °F) and can be applied with temperatures of up to 120 °C / 248 °F (at 6.5 bar / 94.3 psi). It is sterilisable up to 150 °C / 302 °F (30 min, 5 bar / 72.5 psi).

Measuring system

A complete measuring system comprises:

- a CLS16 conductivity sensor
- a transmitter, e.g. Mycom S CLM153
- a CPK9 special measuring cable (for connector versions)



Measuring system example

- 1 Condumax H CLS16 (TOP68 version)
- 2 Mycom S CLM153 transmitter
- 3 Special measuring cable

Input

Measured values	Conductivity Temperature
Cell constant k	$k = 0.1 \text{ cm}^{-1}$
Measuring ranges	Conductivity $0.04 \mu\text{S/cm} \dots 500 \mu\text{S/cm}$ (referenced to water at 25 °C / 77 °F)Temperature $-20 \dots 150 \text{°C}$ / $-4 \dots 302 \text{°F}$
Temperature compensation	Pt 100 Pt 1000 Class A (T _K value at 0 °C)
Cable specification	The Condumax H is connected to the transmitter using the CPK9 measuring cable (see Accessories) or the fixed cable.
	BK Outer electrode WH Inner electrode GN Temp

CPK9 measuring cable or fixed cable

C07-CLS16xZY-00-11-00-

Installation

Installation instructions

The sensors are mounted directly via the process connection.

When installing the sensor in pipes, note the flow direction of the medium (see figure below).





Preferred flow direction

Non-permissible flow direction

When installing the sensor, the measuring surfaces must be completely wetted by the medium during operation.

When working in ultrapure water, ingress of air must be prevented since dissolved air, particularly CO_2 , may increase conductivity by up to 3 μ S/cm.

Environment

Ingress protection

IP 67 / NEMA 6 (fixed cable) IP 68 / NEMA 6 (TOP68 plug-in system)

Process

Process temperature

-20 ... 120 °C / -4 ... 248 °F (short-time operation up to 150 °C / 302 °F, max. 30 min)

Process pressure

12 bar (at 20 °C) / 174 psi (at 68 °F)



Endress+Hauser

Mechanical construction

Design, dimensions



Fixed cable version

- 1 Fixed cable
- 2 Process connection (clamp, Varivent, BioControl)
- 3 Coaxial measuring electrode made of
- electro-polished, stainless steel 1.4435 / AISI 316L 4 Measuring surface



Connector version

4

- 1 TOP68 plug-in head
- 2 Process connection (clamp, Varivent, BioControl)
- 3 Coaxial measuring electrode made of
 - electro-polished, stainless steel 1.4435 / AISI 316L Measuring surface



Clamp connection, fixed cable version *minimum immersion depth



Clamp connection, connector version *minimum immersion depth





 $R_a \leq 0.8 \ \mu m$, electro-polished

 $(R_a \le 0.4 \ \mu m$ available under TSP C-LS020130-02)

Weight

medium

Process connection	Clamp 1", 1½", 2" according to ISO 2852 Tuchenhagen Varivent [®] N DN 50 125 Neumo BioControl [®] D50
Cable connection	Connector version with TOP68 plug-in system Fixed cable version with cable gland

Maintenance

Checking the sensors	 Regularly check the sensor seals for damages. If the sensor is exposed to very high loads, you can order a factory replacement of the seals at your Endress+Hauser Service. Send your sensor to your Endress+Hauser sales centre. It will be factory fitted with new seals and re-calibrated (see Accessories).
Cleaning the sensors	To ensure accurate measurement, clean the sensor regularly:
	 Use appropriate cleaning solutions (e.g. Isopropanol) to remove light soilings and coatings of the sensor parts in contact with medium. After cleaning the sensor, rinse it with distilled or ultrapure water. Remnants of cleaning solutions might distort the measurement.

Certificates and approvals

Ex approval	 ATEX II 1G EEx ia IIC T3 / T4 / T6 FM/CSA in combination with the Mypro CLM431 and Mycom S CLM153 transmitters
	for all product versions listed in the product structure (see Ordering Information)
EHEDG	In-line steam sterilisability certified to EHEDG test criteria. Test report is available.
3-А	Certified according to 3-A Standard Number 74-02.
Quality certificate	with statement of the individual cell constant
Inspection certificate acc. to EN 10204 3.1.B	available for all process connections

Ordering information

Product structure Condumax Process connection and materials H CLS16 3C Clamp 1", stainless steel 1.4435 (AISI 316L) 3D Clamp 11/2", stainless steel 1.4435 (AISI 316L) 3E Clamp 2", stainless steel 1.4435 (AISI 316L) 3F Varivent N DN 50 ... 125 3G Neumo BioControl D50 Clamp 1", stainless steel 1.4435 (AISI 316L), with inspection certificate acc. to EN 10204 3.1.B 4C 4D Clamp 11/2", stainless steel 1.4435 (AISI 316L), with inspection certificate acc. to EN 10204 3.1.B 4E Clamp 2", stainless steel 1.4435 (AISI 316L), with inspection certificate acc. to EN 10204 3.1.B 4F Varivent N DN 50 ... 125, with inspection certificate acc. to EN 10204 3.1.B 4G Neumo BioControl D50, with inspection certificate acc. to EN 10204 3.1.B Measuring cable connection with TOP68 1 2 with 5 m / 15 ft fixed cable 3 with 10 m / 30 ft fixed cable Temperature sensor Integrated Pt 100 temperature sensor А В Integrated Pt 1000 temperature sensor Additional option Basic version 1P CLS16complete order code

Measuring cables	Measuring cable CPK9 for sensors equipped with ESA / ESS plug-in head, IP 68 / NEMA 6X, high-temperature version without PM for ordering information, see product structure in the technical information TI 118C/07/en			
	 Extension cable CYK71 for two-electrode conductivity sensors with integrated temperature sensor, 1 low-noise coaxial line, 4 auxiliary cores at 0,75 mm² each with a common screen, outer diameter 7 mm / 0,25" 			
	Sold by the metre, minimum length 5 m / 15 ft Length 5 m / 15 ft Length 10 m / 30 ft Length 50 m / 150 ft Length 100 m / 300 ft	Order no. 50085333 Order no. 50088280 Order no. 50088281 Order no. 50088284 Order no. 50088285		
	□ Extension cable CYK71-Ex for Ex applications, see CYK71, but with a blue sheath			
	Sold by the metre, minimum length 5 m / 15 ft Junction box VBM for cable extension, with 10 terminals, IP 65 / NE	Order no. 50085673 MA 4X		
	Cable entry Pg 13.5 Cable entry NPT ½"	Order no. 50003987 Order no. 51500177		
	□ Junction box VBM-Ex for cable extension in hazardous areas, with 10 high-impedance terminals (blue), IP 65 / NEMA 4X; order no. 50003991			
Service	Factory replacement of seals and factory recalibration of sensors; order no. 51505585			
Calibration solutions	 Calibration solutions Precision solutions referred to SRM (Standard Reference Material) of NIST for qualified calibration of conductivity measuring systems according to ISO, with temperature table, CLY11-A 74 µS/cm (reference temperature 25 °C / 77 °F), 500 ml; order no. 50081902 CLY11-B 149,6 µS/cm (reference temperature 25 °C / 77°F), 500 ml; order no. 50081903 			
Calibration sets	 Calibration set Concal Conductivity calibration set for ultrapure water applications, complete, factory-calibrated measuring set with certificate, traceable to SRM of NIST and DKD, comparative measurement in ultrapure water applications up to 10 μS/cm 230 V AC, order no. 50083777 115 V AC, order no. 50083778 Recalibration Concal Factory recalibration and new issue of calibration certificate, traceable to SRM of NIST and DKD, factory calibration procedure according to ASTM D-5391-93; order no. 51502486 			
Related products	□ Conductive conductivity sensor Condumax W CLS For measurement in pure and ultrapure water, for ordering information, see the product structure	515 in the CLS15 technical information		

Accessories

Ex documentation	Conductivity sensors for application in hazardous areas, XA 083C/07/a3; order no. 51512902	
Transmitters	 Mycom S CLM153, Technical Information TI 234C/07/en; order no. 51503792 Liquisys M CLM223/253, Technical Information TI 193C/07/en; order no. 51500279 Mypro CLM431, Technical Information TI 202C/07/en; order no. 51500563 	
Measuring cables	CPK1-12, Technical Information TI 118C/07/en; order no. 50068526	
Calibration solutions	□ Precision calibration solution CLY11, Technical Information TI 162C/07/en; order no. 50086574	
Calibration set	Concal, Technical Information TI 163C/07/en; order no. 50085983	
Related products	□ Condumax W CLS15, Technical Information TI 109C/07/en; order no. 50065950	

Documentation

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