Technical
Information
TI 109C/24/ae

Conductivity Measuring Cells for High-Temperature Applications *ConduMax W CLS 15*

Two-electrode measuring sensors with fixed cable or connector version with integrated Pt 100 temperature sensor
Cell constant *k* = 0.01/cm or 0.1/cm

Areas of application
Measurement in pure and ultrapure water:
- Monitoring ion exchangers
- Reverse osmosis
- Distillation
- Chip cleaning

The measuring range of the sensors depends on the cell constant k:
- k = 0.01/cm, 0.04 to 20 µS/cm
- k = 0.1/cm, 0.1 to 200 µS/cm

Sensors with Pt 100 temperature sensor are used together with transmitters with automatic temperature compensation.
- Mycom CLM 153
- Liquisys M CLM 223 / 253
- MyPro CLM 431

For measurement of specific resistance, MΩ · cm measuring ranges are available in the programs of these transmitters.

Benefits at a glance
- High measuring accuracy as cell constant is individually measured
- Installation in pipes or flow chambers
- Compact design
- Plug-in head or fixed cable, NEMA 6 (IP 67)
- Easy to clean due to polished measuring surface
- Can be sterilized up to maximum 302°F (150°C)
- 316L SS
- Available with inspection certificate according to EN 10204 3.1.B

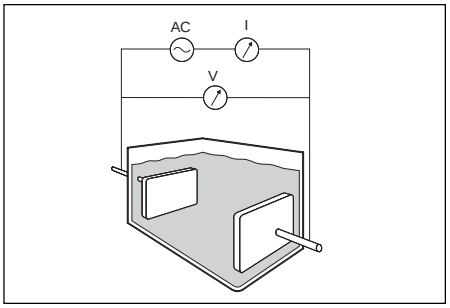
Endress+Hauser
The Power of Know How

Function and system design

Measuring principle

Conductive conductivity measurement

The conductivity of liquids is measured with a measuring system that has two coaxially arranged electrodes similar to a capacitor. The electric resistance or its reciprocal value, the conductance G, is measured according to Ohm's law. The specific conductivity **K** is determined using the cell constant k that is dependent on the sensor geometry.



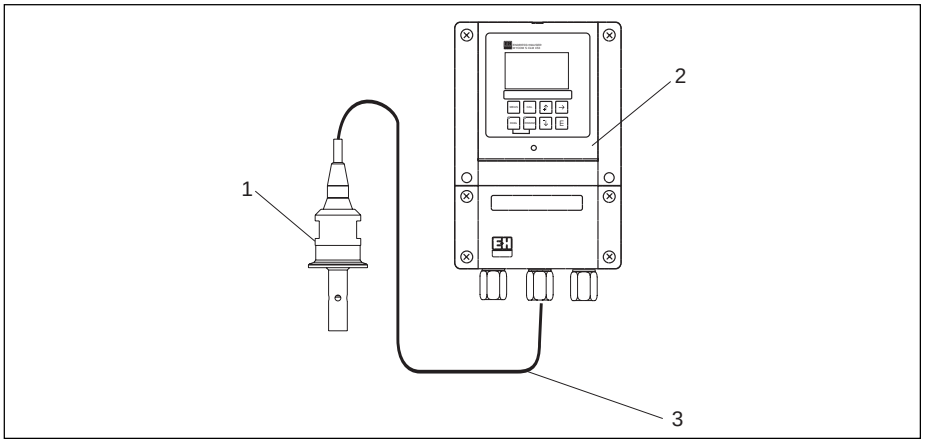
Conductive conductivity measurement
AC = Power supply
I = Current meter
V = Voltage meter

ConduMax W CLS 15 important properties

- **Electrodes**
  ConduMax W CLS 15 has two coaxial measuring electrodes made of polished 316L stainless steel
- **Temperature compensation**
  In addition, a Pt 100 temperature sensor is installed inside the electrode to measure the process temperature.
- **Easy connection**
  The connector versions are connected via a 4-pole circular plug. The plug is equipped with a Pg 9 cable gland for insertion of the measuring cable.
  The fixed cable versions are ready for operation and do not need any further cable connection.
- **Durable and sterilizable**
  The sensor is pressure-proof up to 180 psi (12 bar) at 68°F (20°C) and can be applied with temperatures of up to 248°F (120°C) at 14.5 psi (1 bar). It is sterilizable up to 302°F (150°C) for 30 minutes at 14.5 psi (1 bar). Refer to process specifications for type connection and duration of high temperatures.

Measuring system

A complete measuring system consists of:
- A CLS 15 conductivity sensor
- A transmitter, e.g. Mycom S CLM 153
- For connector versions, a CYK 71 or CYK 71-Ex measuring cable



Measuring system example
1 CLS 15 ConduMax W sensor
2 CLM 153 Mycom S transmitter
3 Measuring cable

Input

Measured values

Conductivity and temperature

Cell constant k

k = 0.01/cm or 0.1/cm depending on version ordered

Measuring ranges

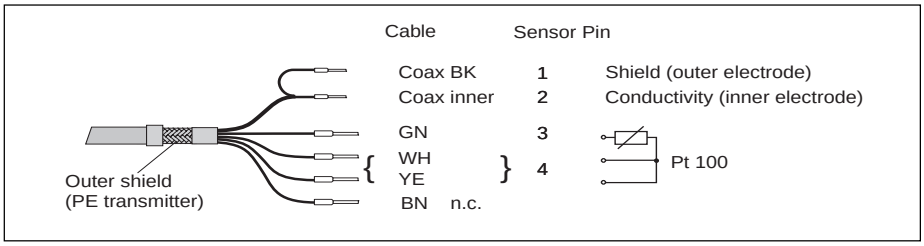
Conductivity	(referenced to water at 77°F)
k = 0.01/cm	0.04 μS/cm to 200μS/cm
k = 0.1/cm	0.1 μS/cm to 200μS/cm
Temperature	-4° to +302°F (-20° to +150°C)

Temperature sensor

Pt 100, Class A according to DIN IEC 751

Cable specifications

The ConduMax W is connected to the transmitter using the CYK 71 or CYK 71-Ex measuring cable



Measuring cable

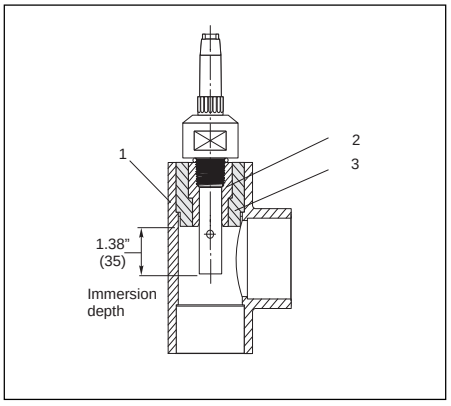
Installation

Installation instructions

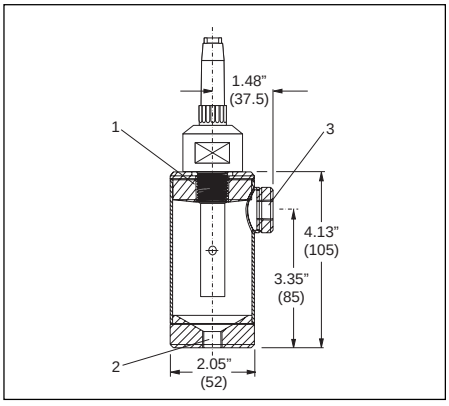
The sensors are mounted directly via the process connection. Optionally, the sensor can be mounted in a cross or T-piece or in a flow chamber.

When installing the sensor, the measuring surface must be completely wetted by the process fluid during operation. The minimum immersion depth is 1.26" (32 mm).

When working in ultrapure water, ingress of air must be avoided since dissolved air, particularly CO_2, may increase the conductiivity by up to 3 μS/cm.



CLS 15 with 1/2" NPT threaded connection installed in a T- or cross piece.
1 T-or cross piece (DN 32, 40 or 50)
2 PVC threaded coupling for gluing I1/2" NPT for DN 20, see accessories)
3 Adapter coupling for gluing (for DN 32, 40 or 50, see accessories)



CLS 15 with 1/2" NPT threaded connection installed in TSP C-LS011106-01 stainless steel flow chamber (see accessories)
1 1/2" sensor support
2 1/4" NPT inlet
3 1/4" NPT outlet

Environment

Ingress protection

NEMA 6 (IP 67)

Process

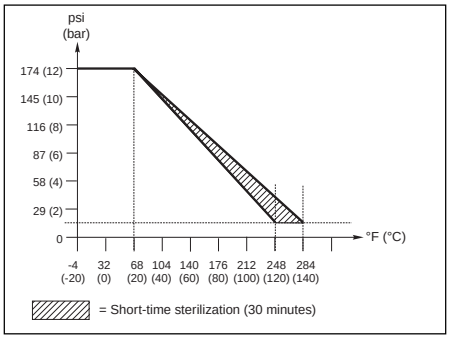
Process temperature

Threaded version:
Normal operation, -4° to +248°F (-20° to +120°C)
Short-time operation (maximum 1 minute), max. 284°F (140°C)
Tri-clamp version:
Normal operation, -4° to +266°F (-20° to +130°C)
Short-time operation (maximum 1 hour), max. 302°F (150°C)

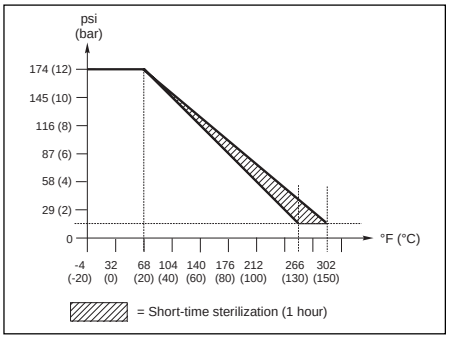
Process pressure

174 psi (12 bar) at 68°F (20°C)

Pressure / temperature load curves



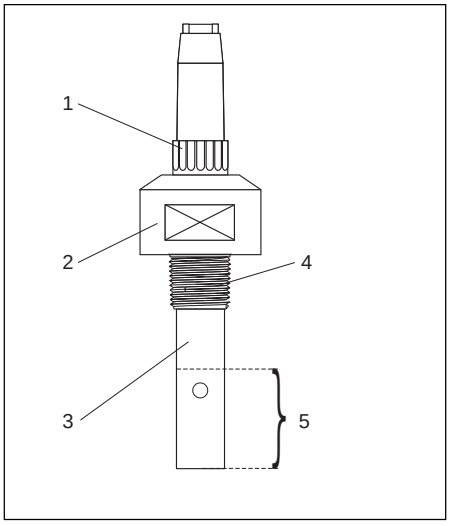
Threaded version



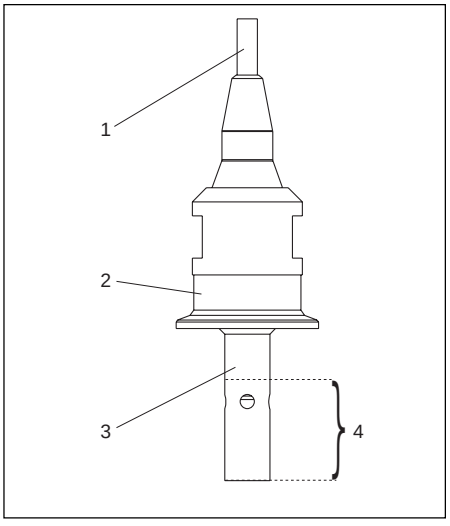
Tri-clamp version

Mechanical construction

Design

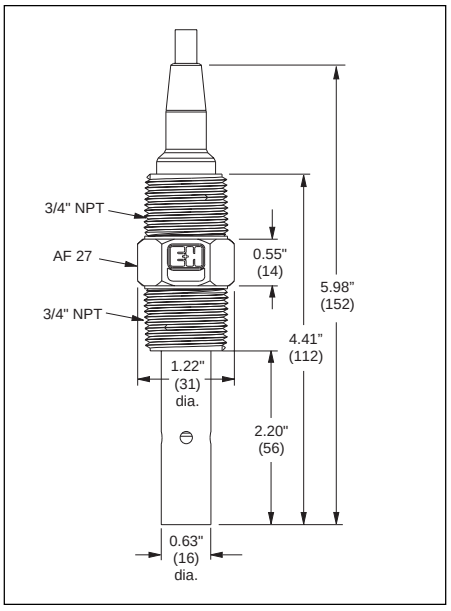


Connector version
1 Connector
2 Connection head
3 Coaxial measuring electrode
4 1/2" NPT mounting thread
5 Measuring surface

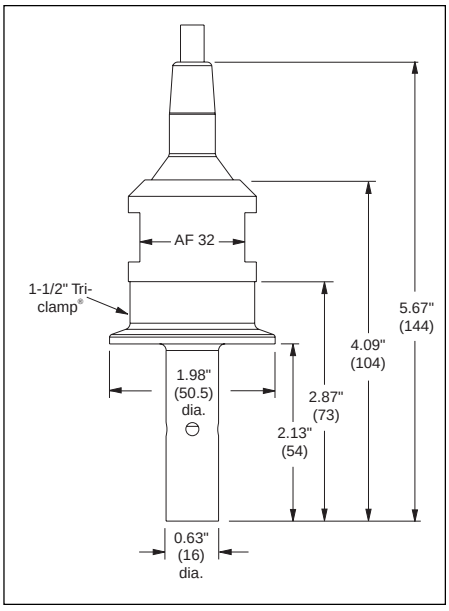


Fixed cable version
1 Fixed cable
2 1-1/2" Tri-clamp
3 Coaxial measuring electrode
4 Measuring surface

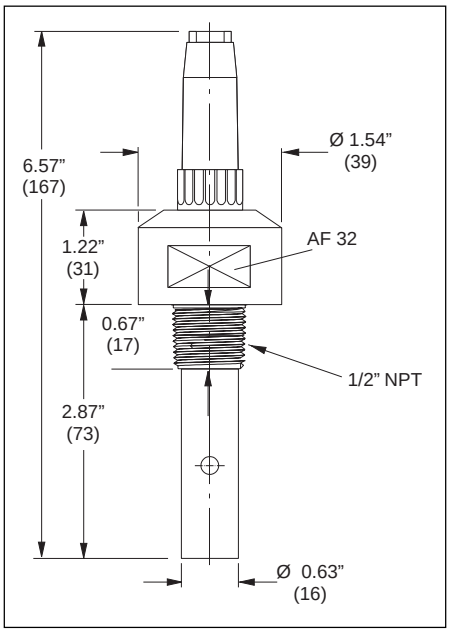
Dimensions inches (mm)



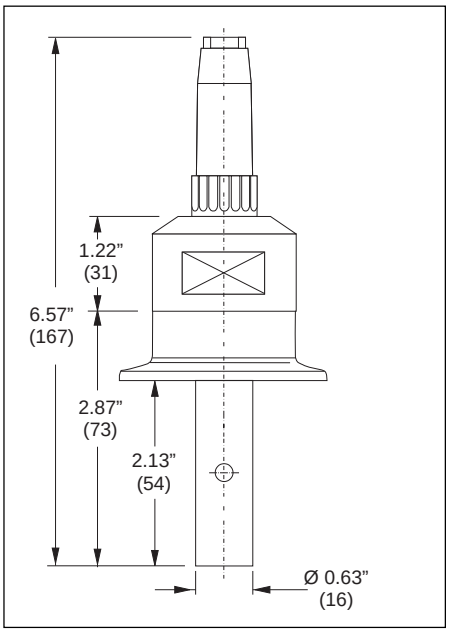
1/2" NPT mounting, fixed cable version



1-1/2" Tri-clamp mounting, fixed cable version



1/2" NPT mounting, connector version



1-1/2" Tri-clamp, connector version

Weight	Approximately 0.7 lb (0.3 kg), depending on version	
Mateirals	Electrodes	Polished 316L SS
	Sensor shaft	Polyethersulfone (PES)
Surface roughness	$R_a \leq 0.8$ µm / 150 grit, electro-polished ($R_a \leq 0.4$ µm / 240 grit, electro-polished available under TSP C-LS020130-02)	
Process connection	Fixed cable versions:	
	Threaded	3/4" NPT
	Tri-clamp	1-1/2" according to ISO 2852
	Connector versions:	
	Threaded	1/2" NPT
	Tri-clamp	1-1/2" according to ISO 2852
Cable connection	Connector version	With SXP plug and Pg 9 cable gland
	Fixed cable version	No additional cable required, 15 ft or 30 ft (5 m or 15 m)

Certificates and approvals

Hazardous approvals

ATEX II 1G EEx ia IIC T3 / T4 / T6

FM approved, when used with MyPro CLM 431 and Mycom S CLM 153 transmitters, contact Endress+Hauser for approval.

Quality certificate

With statement of the individual cell constant

Inspection certificate

Process connection certiifcates for 1-1/2" Tri-clamp process connectors according to EN 10204 3.1.B, available from Endress+Hauser.

Accessories

Installation accessories

For sensors with 1/2" NPT process connection (CLS 15 - x 1A x x)

PVC threaded coupling

For gluing in standard PVC cross or T-piece with DN 20, with G 1/2 internal thread, self-sealing with 1/2" NPT senosr thread: Order number 50066536

PVC equalizing sleeves AM

For adaption of the PVC threaded coupling to larger nominal diameters, for installation into PVC cross or T-piece

- AM 32, DN 32 cross or T-piece: Order number 50004738
- AM 40, DN 40 cross or T-piece: Order number 50004739
- AM 50, DN 50 cross or T-piece: Order number 50004740

PVDF threaded coupling

With G 1/2 internal thread and G 1 external thread, pressure-proof up to 174 psi (12 bar) at 68°F (20°C), maximum temperature 248°F (120°C) at 14.5 psi (1 bar), including o-ring, internal thread, self-sealing with 1/2" NPT sensor thread:

Order number 50004381

Flow chamber, 316L SS, with inspection certificate EN 10204 3.1.B (on request), with 1/2" NPT sensor thread, 1/4" inlet and outlet:

Order number TSP C-LS011106-01

Measuring cables

Special measuring cable CYK 71 for two electrode conductivity sensors with integrated temperature sensors, 1 low-noise coaxial line, 4 auxiliary cores at 0.75 mm² each with a common shield, outer diameter 0.25" (7 mm).

Sold by 1 meter lengths, minimum 15 ft (5 m)	Order number: 50085333
15 ft (5 m) length	Order number: 50088280
30 ft (10 m) length	Order number: 50088281
150 ft (50 m) length	Order number: 50088284
300 ft (100 m) length	Order number: 50088285

Special measuring cable / extension cable CYK 71-Ex, for hazardous applications, see CYK 71 above. Special cable is in blue sheath.

Sold by 1 meter lengths, minimum 15 ft (5 m)	Order number: 50085673

Junction box

VBM junction box for cable extension, with 10 screw terminals, NEMA 4X (IP 65)

Cable entry, 1/2" NPT	Order number: 50003987
Cable entry, Pg 13.5	Order number: 51500177

VBM junction box for cable extension in hazardous area, with 10 high-impedance screw terminals (blue), NEMA 4X (IP 65): Order number 50003991

Calibration solutions

Calibration solutions are precision solutions to SRM (Standard Reference Material) of NIST for qualified cablibration of conductivity measuring systems according to ISO, accuracy ± 0.5%, with temperature table.

CLY 11-A: 74 µS/cm, reference temperature 77°F (25°C), 500 ml container
Order number: 50081902

CLY 11-B: 149.6 µS/cm, reference temperature 77°F (25°C), 500 ml container
Order number: 50081903

Calibration set

ConCal conductivity calibration set is for ultrapure water applications, complete, factory-calibrated measuring set with certificate, traceable to SRM of NIST and DKD, comparative measurement in ultrapure water applications of up to 10 µS/cm.

230 VAC units, order number: 50083777

115 VAC units, order number: 50083778

ConCal recalibration, for 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 number: 51502486

Related products

Conductivity sensor ConduMax H CLS 16, for measurement in pure and ultrapure water, with 3-A and EHEDG certification.
Refer to Technical Information TI 227C/24/ae

Supplemental documentation

Hazardous documentation	Conductivity senosrs for application in hazardous areas Order number: 51512902	XA 083C/07/a3
Transmitters	Mycom S CLM 153 transmitter Technical Information Liquisys M CLM 223/253 transmitter Technical Information MyPro CLM 431 transmitter Technical Information	TI 234C/24/ae TI 193C/24/ae TI 202C/24/ae
Calibration solutions / Calibration set	CLY 11 Calibration solutions Technical Information ConCal Calibration set Technical Information	TI 162C/24/ae TI 163C/24/ae
Measuring cables	CPK 1-12 connection cables Technical Information	TI 118C/07/en

Ordering information

ConduMax W CLS 15

Conductivity Measuring Cell CLS 15 - 1 2 3 4 [ ][ ][ ][ ]

1 Measuring range and cell constant
- A Measuring range: 0.04 to 20 µS/cm (k = 0.01)
- B Measuring range: 0.1 to 200 µS/cm (k = 0.1)

2 Process connection / material
- 1A 1/2" NPT threaded / PES sensor shaft (connector version only)
- 1M 3/4" NPT threaded / PES sensor shaft (fixed cable version only)
- 3D 1-1/2" Tri-clamp / 316L SS
- 4D 1-1/2" Tri-clamp / 316L SS with inspection certificate EN 10204 3.1.B

3 Measuring cable connection
- 1 4-pole SXP connector
- 2 With 15 ft (5 m) fixed cable
- 3 With 30 ft (10 m) fixed cable

4 Temperature sensor
- A Integrated Pt 100 temperature sensor

For application and selection assistance,
in the U.S. call 888-ENDRESS

For total support of your installed base, 24 hours
a day, in the U.S. call 800-642-8737

Visit us on our web site, www.us.endress.com

United States	Canada	Mexico
Endress+Hauser, Inc. 2350 Endress Place Greenwood, IN 46143 Phone: (317) 535-7138 888-ENDRESS FAX: (317) 535-8498	Endress+Hauser Canada Ltd. 1440 Graham's Lane Unit 1, Burlington ON, L7S 1W3 Phone: (905) 681-9292 800-668-3199 FAX: (905) 681-9444	Endress+Hauser Paseo del Pedregal No. 610 Col. Jardines del Pedregal 01900, Mexico D.F. Mexico Phone: (525) 568-2405 FAX: (525) 568-7459

TI 109C/24/ae/07.03