Technical Information
TI 085C/07/en/06.03
50059352

Conductivity Sensor
ConduMax W CLS 21

**Two-electrode sensors
fixed cable or connector versions
with integrated Pt 100 temperature sensor.
Cell constant k = 1 cm^{-1}**

Application

Measurements in media of medium and high conductivities:
- Medium separation in medium conductivities (milk/water)
- Medium separation in high conductivities (alkaline solution/water)
- Drinking water treatment
- Wastewater treatment

The cell constant of the sensor is k = 1 cm^{-1}. The measuring range reaches from 10 µS/cm to 20 mS/cm.

Sensors with a Pt 100 temperature sensor are used together with conductivity measuring instruments equipped with automatic temperature compensation:
- Mycom S CLM 153
- Liquisys M CLM 223/253
- MyPro CLM 431

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

With ATEX approval for application in hazardous areas.

Your benefits

- Different designs guarantee optimum adaptation to the process conditions and methods of installation
- Installation in pipes or flow chambers
- Compact design
- Available with connector or fixed cable
- High chemical, thermal and mechanical stability
- IP 65 (with connector) / IP 67 (with fixed cable)
- Quality certificate with statement of the individual cell constant

With quality certificate

Quality made by Endress+Hauser

ISO 9001

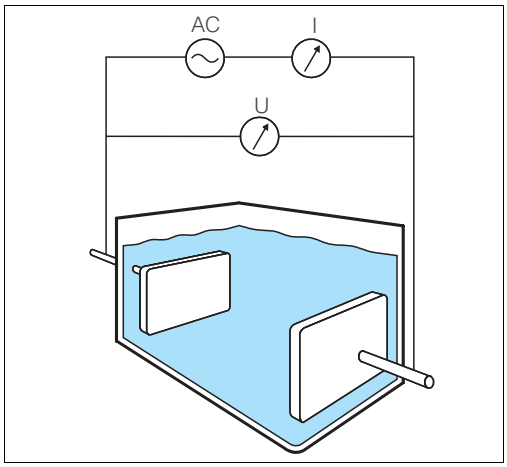
Endress+Hauser

The Power of Know How

Function and system design

Measuring principle

Conductive conductivity measurement



Conductive conductivity measurement

AC Power supply
I Current meter
U Voltage meter

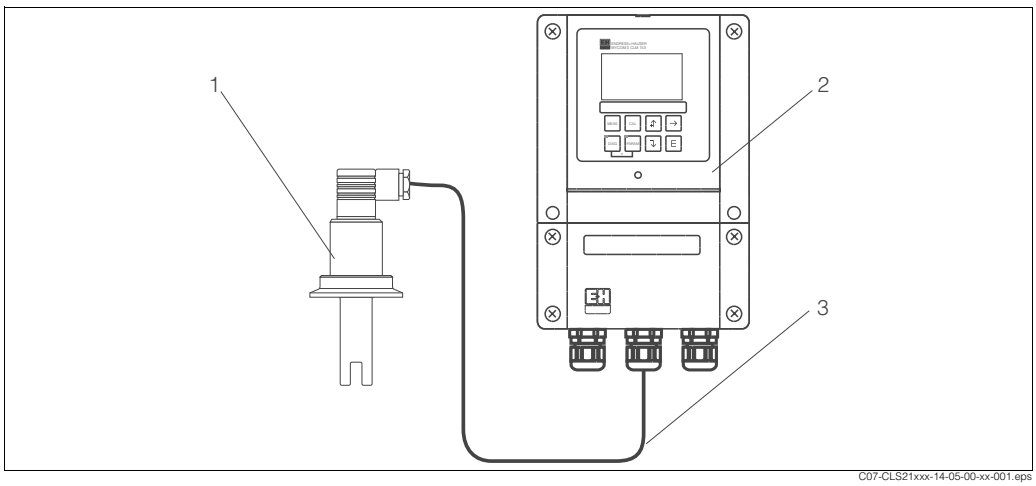
The conductivity of liquids is measured with a measuring system that has two coaxially arranged electrodes like a capacitor.
The electric resistance or its reciprocal value, the conductance G, is measured according to Ohm's law. The specific conductivity κ is determined using the cell constant k that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

Important properties ConduMax W CLS 21

- **Electrodes**
  Condumax W CLS 21 has two coaxial electrodes made of graphite for a large measuring range.
- **Temperature compensation**
  A Pt 100 temperature sensor is installed to measure the medium temperature.
- **Easy connection**
  The connector versions are connected via a 4-pole DIN plug. For introduction of the measuring cable, the plug is equipped with a Pg 9 cable gland.
  The fixed cable versions are ready for operation and do not need any further cable connection.
- **Durability**
  The sensor is pressure-proof up to 16 bar / 232 psi (at 20 °C / 68 °F) and can be applied with temperatures of up to 150 °C / 302 °F (at 1 bar / 14.5 psi).

Measuring system

A complete measuring system comprises:
- a CLS 21 conductivity sensor
- a transmitter, e.g. Mycom S CLM 153
- for connector versions, a CYK 71 or CYK 71-Ex special measuring cable



Measuring system example

1 ConduMax W CLS 21
2 Mycom S CLM 153 transmitter
3 Special measuring cable

Input

Measured values

Conductivity
Temperature

Cell constant k

k = 1 cm^{-1}

Measuring ranges

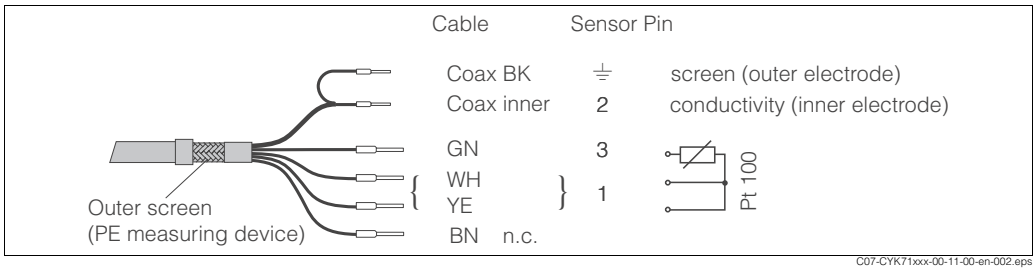
Conductivity	10 µS/cm ... 20 mS/cm
Temperature	–20 ... +150 °C / -4 ... +302 °F

Temperature sensor

Pt 100

Cable specification

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

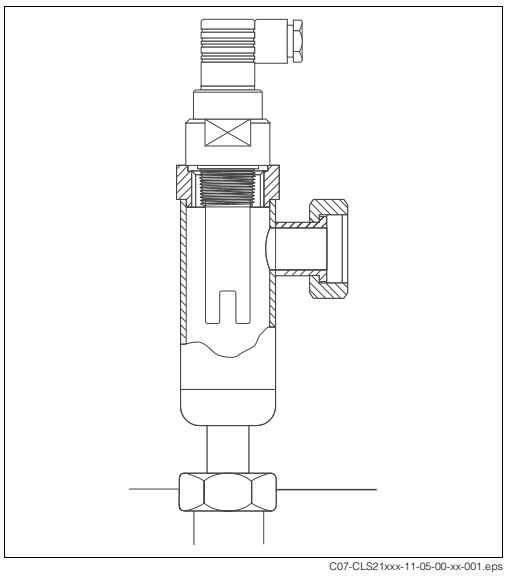


CYK 71/CYK 71-Ex or fixed cable

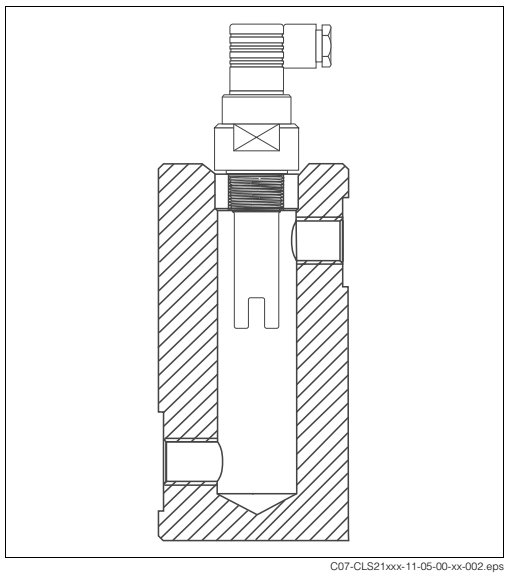
Installation

Installation instructions

The sensors are mounted directly via the process connection.
Optionally, the sensor can be installed in a flow chamber.

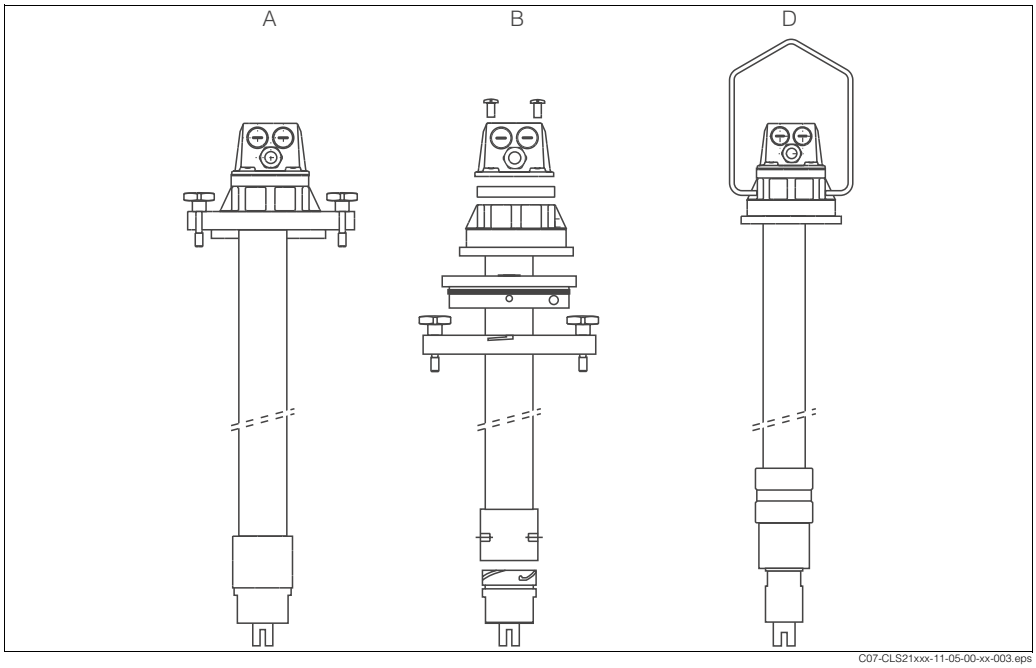


Installation in the CLA 751 flow chamber



Installation in the CLA 752 flow chamber

For installation of sensors with G1 thread in tanks, the CLA 111 immersion and process assembly is available (see Accessories).



DipFit W CLA 111, mounting versions A, B and D

Note!
Make sure that the measuring surfaces are completely wetted by the medium during operation.

Environment

Ingress protection

IP 67 / NEMA 6 (fixed cable)
IP 65 / NEMA 4X (connector)

Process

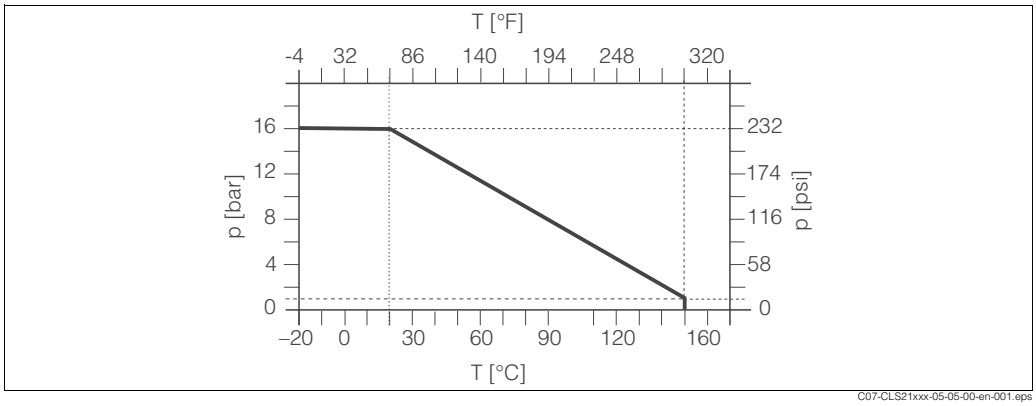
Process temperature

-20 ... 150 °C (at 1 bar) / -4 ... 302 °F (at 14.5 psi)

Process pressure

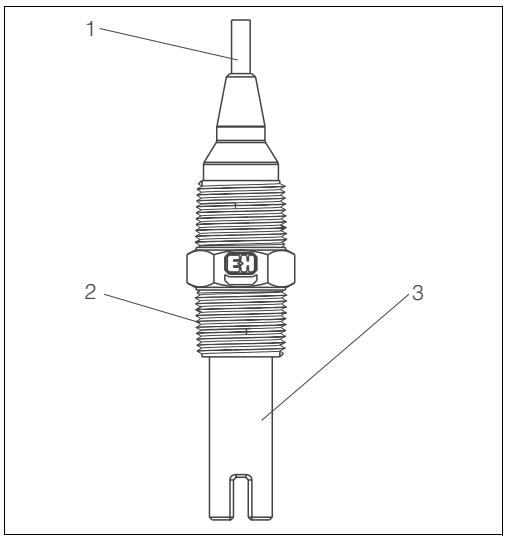
16 bar (at 20 °C) / 232 psi (at 68 °F)

Pressure/temperature load curve



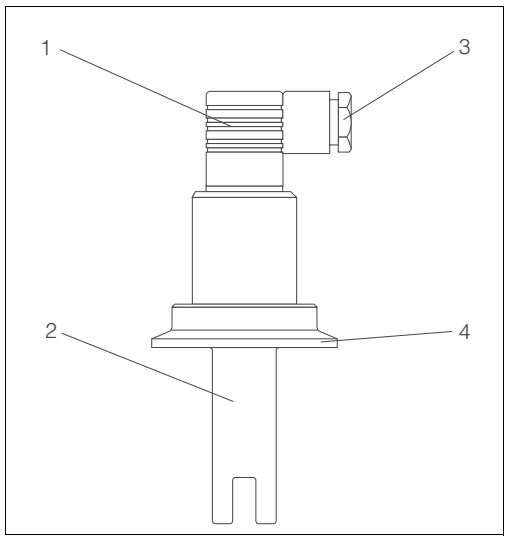
Mechanical construction

Design, dimensions



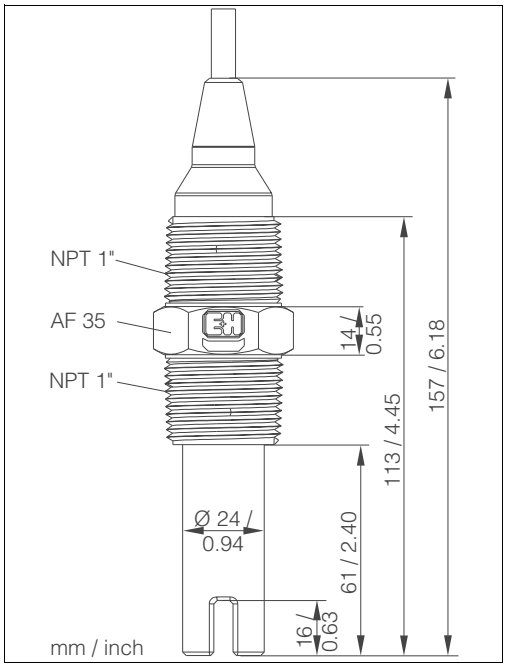
Fixed cable version with NPT 1" thread

1 Fixed cable
2 NPT 1" thread
3 Measuring electrode

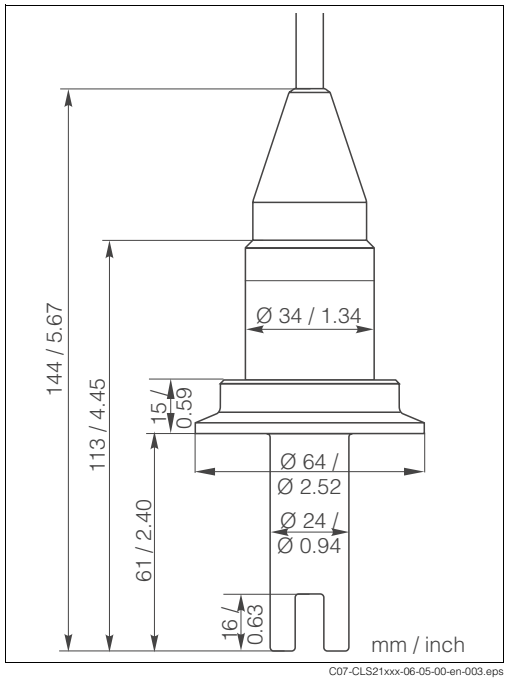


Connector version with 2" clamp

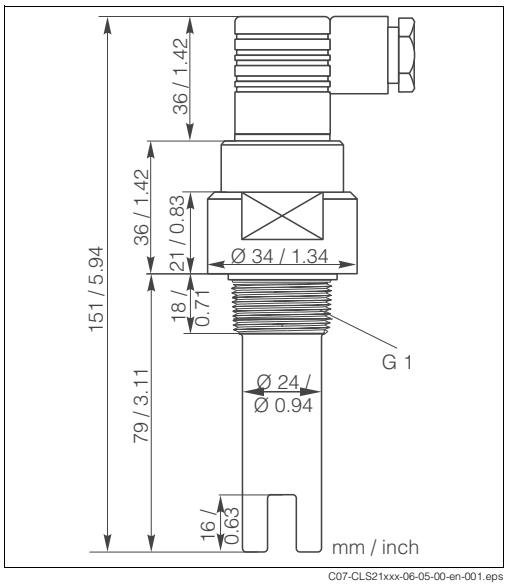
1 Four-pole connector
2 Measuring electrode
3 Pg 9 cable gland
4 2" clamp



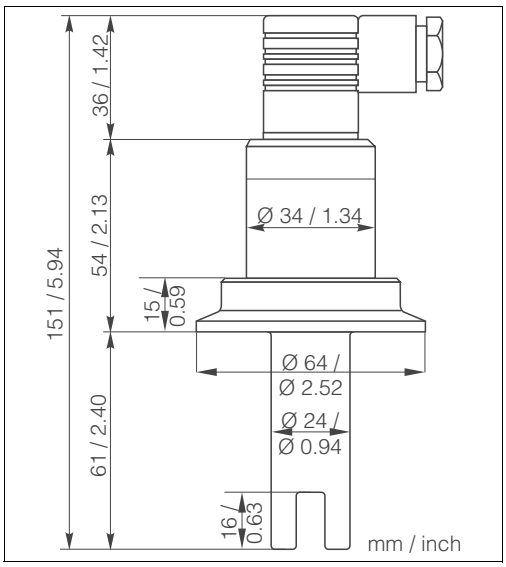
Fixed cable version with NPT 1" thread



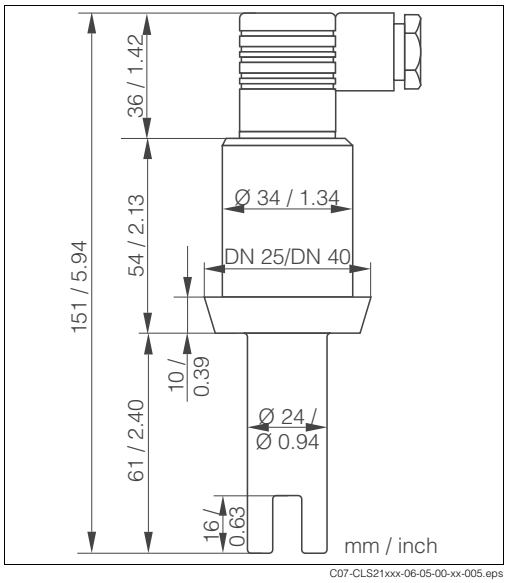
Fixed cable version with 2" clamp



Connector version with G 1 thread



Connector version with 2" clamp



Connector version with dairy fitting

Weight

Depending on version, approx. 0.3 kg / 0.7 lb.

Materials

Electrodes	graphite
Sensor shaft	polyethersulfone (PES)

Process connections

Fixed cable version	
Thread	NPT 1"
Clamp	2" acc. to ISO 2852
Connector version	
Thread	G 1
Dairy fitting	DN 25 or DN 40 acc. to DIN 11851
Clamp	2" acc. to ISO 2852

Certificates and approvals

Ex approval

- ATEX II 1G EEx ia IIC T3 / T4 / T6
- FM in combination with the MyPro CLM 431 and Mycom S CLM 153 transmitters

for all product versions listed in the product structure (see Ordering Information)

Quality certificate

with statement of the individual cell constant

Ordering information

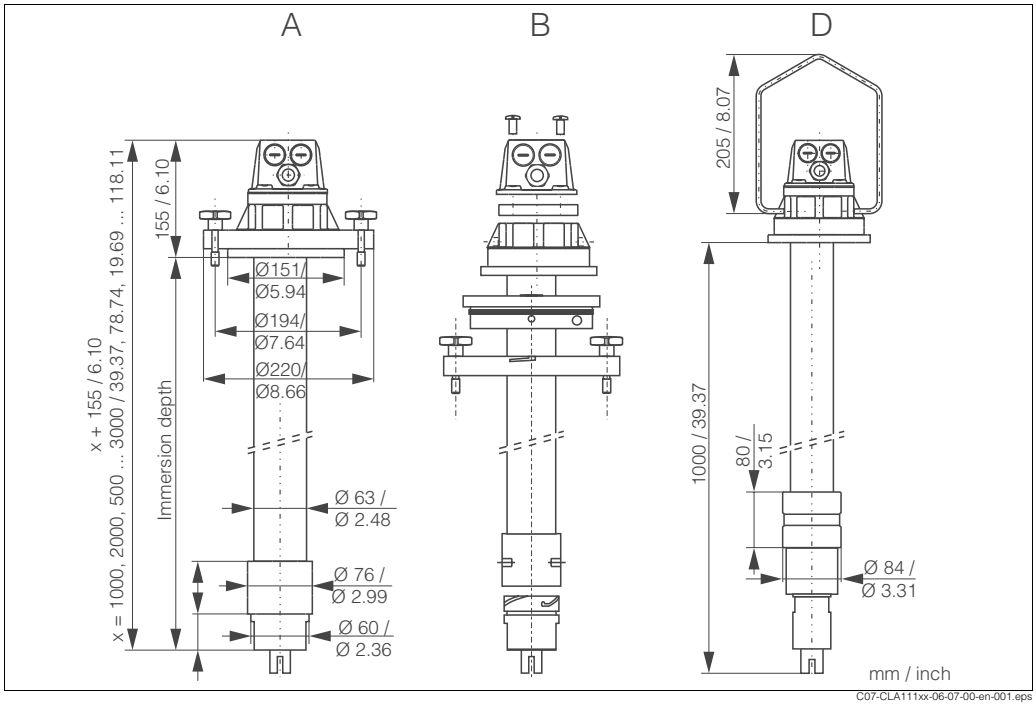
Product structure ConduMax W CLS 21

	Measuring range and cell constant				
	C	Measuring range: 10.0 µS ... 20 mS/cm (k = 1)			
		Process connection and materials			
		1E	Thread G 1, PES (connector version only)		
		1N	Thread NPT 1", PES (fixed cable version only)		
		2A	Dairy fitting DN 25, DIN 11851, PES (connector version only)		
		2B	Dairy fitting DN 40, DIN 11851, PES (connector version only)		
		3B	Clamp 2", PES		
			Measuring cable connection		
			2	with 5 m / 16.41 ft fixed cable	
			3	with 10 m / 32.81 ft fixed cable	
			4	four-pole DIN connector with Pg 9	
				Temperature sensor	
				A	Integrated Pt 100 temperature sensor
				D	No temperature sensor
CLS 21-					**complete order code**

Accessories

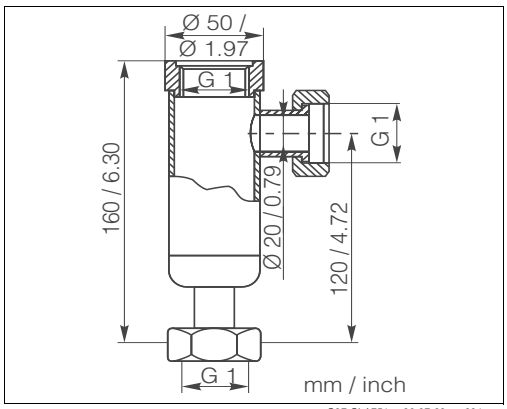
Assemblies

❑ DipFit W CLA 111 immersion and process assembly
For open and closed tanks with DN 100 flange,
for ordering information, see Technical Information DipFit W CLA 111 (TI 135C/07/en)



DipFit CLA 111, DN 100 flange, mounting versions A, B und D

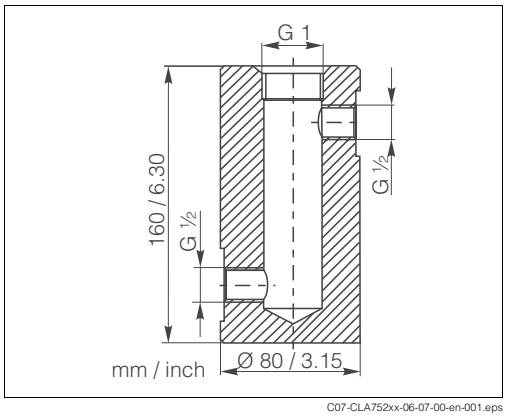
❑ CLA 751 flow assembly



CLA 751 flow assembly

For installation of conductivity sensors with G 1 thread.
Inlet (bottom) and outlet (lateral) DN 20 with union nuts G 1.
Stainless steel 1.4571 (AISI 316Ti)
Max. temperature: 160 °C / 320 °F
Max. pressure: 12 bar / 174 psi
Order no.: 50004201

❑ CLA 752 flow chamber



CLA 752 flow chamber

For installation of conductivity sensors with G 1 thread
Inlet (bottom) and outlet (lateral) DN 20 with G ½ internal thread
Polypropylene (PP)
Max. temperature: 90 °C / 194 °F
Max. pressure: 6 bar / 87 psi
Order no.: 50033772

Measuring cables

❑ Special measuring cable / extension cable CYK 71
for two-electrode conductivity sensors with integrated temperature sensor,
1 low-noise coaxial line, 4 auxiliary cores at 0,75 mm^2 each with a common screen, outer diameter 7 mm / 0,25"

Sold by the metre, minimum length 5 m / 15 ft	Order no. 50085333
Length 5 m / 15 ft	Order no. 50088280
Length 10 m / 30 ft	Order no. 50088281
Length 50 m / 150 ft	Order no. 50088284
Length 100 m / 300 ft	Order no. 50088285

❑ Special measuring cable / extension cable CYK 71-Ex
for Ex applications,
see CYK 71, but with a blue sheath

Sold by the metre, minimum length 5 m / 15 ft	Order no. 50085673

❑ Junction box VBM
for cable extension, with 10 terminals, IP 65 / NEMA 4X

Cable entry Pg 13,5	Order no. 50003987
Cable entry NPT ½"	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

Calibration solutions

❑ Calibration solutions
Precision solutions referred to SRM (Standard Reference Material) of NIST for qualified calibration of conductivity measuring systems according to ISO, accuracy ± 0,5 %, with temperature table,
- CLY 11-A
  74 µS/cm (reference temperature 25 °C), 500 ml;
  order no. 50081902
- CLY 11-B
  149.6 µS/cm (reference temperature 25 °C), 500 ml;
  order no. 50081903
- CLY 11-C
  1.406 mS/cm (reference temperature 25 °C), 500 ml;
  order no. 50081904
- CLY 11-D
  12.64 mS/cm (reference temperature 25 °C), 500 ml;
  order no. 50081905

Documentation

Ex documentation	❑ Conductivity sensors for application in hazardous areas, XA 083C/07/a3; order no. 51512902
Assembly	❑ DipFit W CLA 111, Technical Information TI 135C/07/en; order-no. 50076858
Transmitters	❑ Mycom S CLM 153, Technical Information TI 234C/07/en; order no. 51503792 ❑ Liquisys M CLM 223/253, Technical Information TI 193C/07/en; order no. 51500279 ❑ MyPro CLM 431, Technical Information TI 202C/07/en; order no. 51500563
Calibration solutions	❑ Precision calibration solution CLY 11, Technical Information TI 162C/07/en; order no. 50086574

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