



Level



Pressure



Flow



Temperature

Liquid  
Analysis

Registration

Systems  
Components

Services



Solutions

## Technical Information

# Indumax H CLS52

Inductive conductivity sensor with fast temperature measurement and hygienic design



### Application

CLS52 conductivity sensors are intended specifically for use in the food industry. They are injection-moulded and consist of a highly resistant plastic material (PEEK) that meets the extremely exacting hygienic demands of the food industry.

- Alkali/acid concentration control in remaking
- Phase separation of product/water and product/product mixtures in pipe systems
- Monitoring and control of bottle cleaning systems
- Product monitoring in breweries, dairies and the beverage industry
- CIP system control
- Intended for use with the Liquisys M CLM223/253/223F and Mycom CLM153 transmitters; component of the Smartec S CLD132 measuring system

### Your benefits

- Insensitive to electrode soiling and polarisation due to electrodeless, inductive measuring principle
- Suitable for foodstuffs applications and hygienically perfect thanks to jointless design without crevices
- Hydrodynamic sensor design ensures low flow resistance
- Maintenance-free due to no-contact measurement
- Versions with ultrafast temperature response ( $t_{90} < 5$  s) available
- Easy in-line installation is guaranteed by use of standard process connections commonly used in the food industry

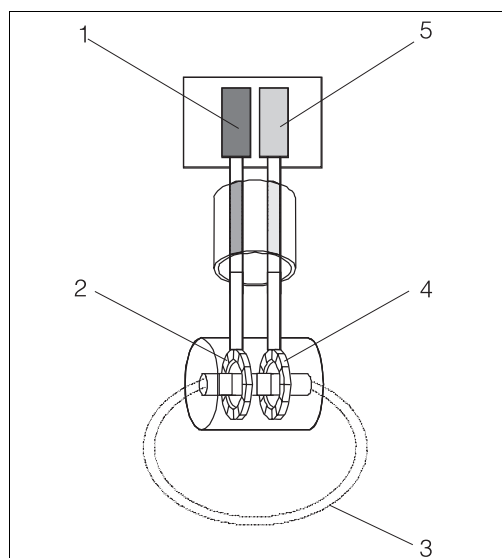
With  
quality certificate

## 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.



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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 polarisation
- 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 Indumax H CLS52

#### ■ Hygiene

The sensor, injection-moulded from highly chemically, mechanically and thermally resistant PEEK (polyether ether keton), does not have joints or crevices and is therefore hygienically safe.

#### ■ Temperature measurement and temperature compensation

- For applications requiring quick temperature measurement (e.g. CIP return, phase separation at various temperatures), the Pt 100 temperature sensor is installed in a stainless-steel thermal conductivity socket that is sealed by a Chemraz O-ring. This ensures extremely fast temperature response times ( $t_{90} < 5$  s).
- For high-load applications, particularly for alternating thermal load due to very frequent sterilisation cycles or temperature shocks, the Pt 100 temperature sensor is embedded in the PEEK sensor body thus eliminating the need for a seal. This ensures a long service life.

This sensor version can also be applied at underpressure.

#### ■ Process temperature

The use of special components and materials makes the sensor suitable for continuous exposure to temperatures of +125 °C. Short-time (max. 30 min.), it will work at +140 °C for sterilisation.

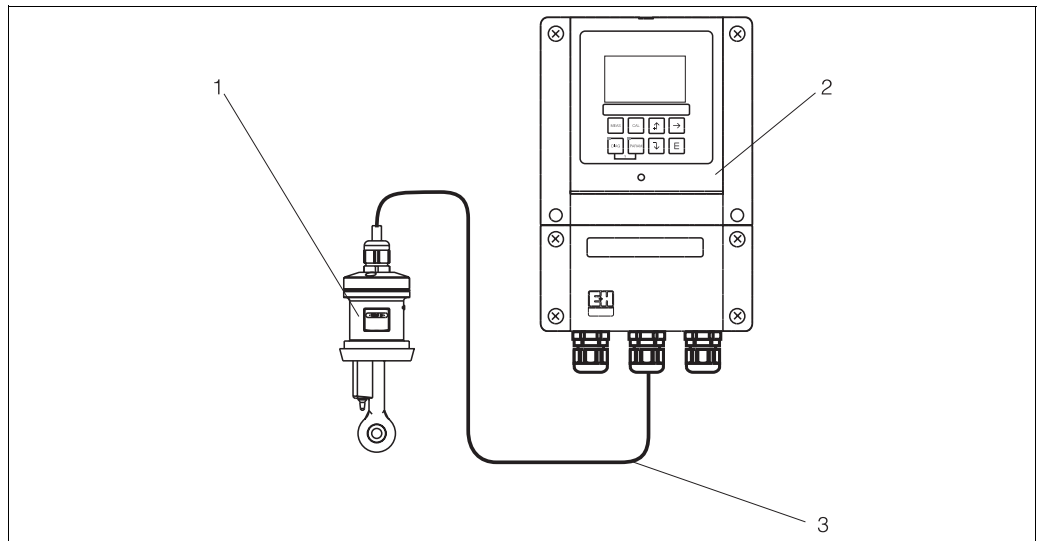
#### ■ Process connections

The sensor is available with all process connections commonly used in hygienic applications.

**Measuring system**

A complete measuring system comprises:

- a CLS52 inductive conductivity sensor
- a transmitter, e.g. Mycom S CLM153



Measuring system example

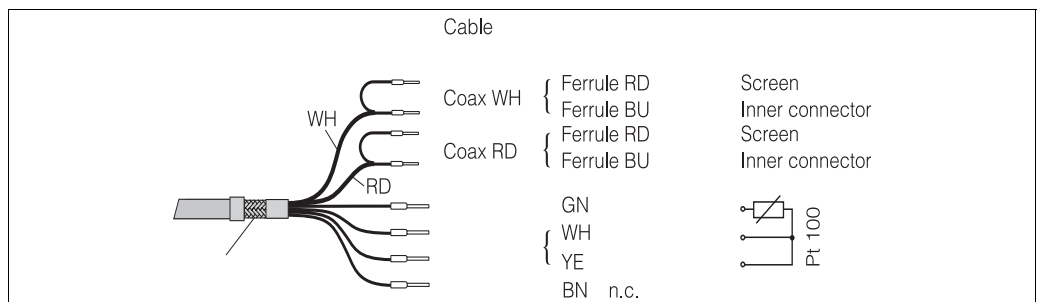
- 1 Indumax H CLS52
- 2 Mycom S CLM153 transmitter
- 3 Fixed cable (on the sensor)

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**Input**

<b>Measured values</b>	Conductivity Temperature	
<b>Cell constant k</b>	k = 5.9 cm <sup>-1</sup>	
<b>Measuring ranges</b>	Conductivity Temperature	recommended range: 100 µS/cm ... 2000 mS/cm (uncompensated) -5 ... +140 °C / -31 ... +284 °F
<b>Temperature measurement</b>	Pt 100 (class A acc. to IEC 60751)	

**Cable specification** Indumax H is supplied with a fixed cable. The connection to the transmitter can be extended using the CLK5 special measuring cable.



Fixed cable / CLK5 special measuring cable

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Cable length: max. 55 m / 180.46 ft total length

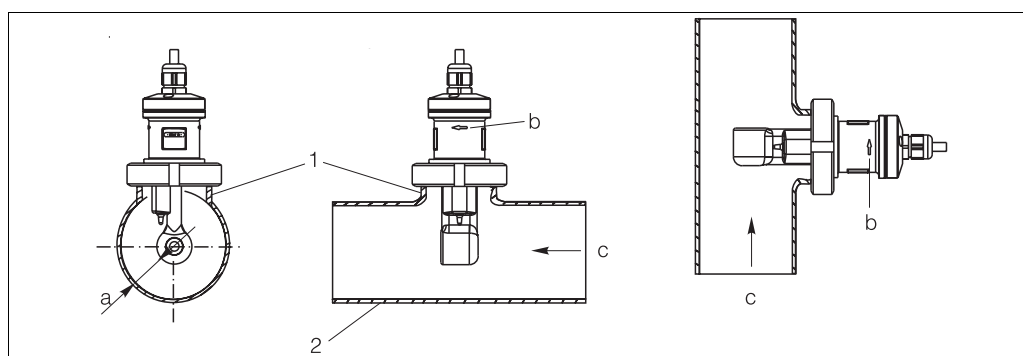
## Performance characteristics

<b>Temperature response time</b>	$t_{90} < 5$ s	versions with stainless steel socket (CLS52-*****A*)
	$t_{90} < 3.5$ min	versions with encapsulated Pt 100 (CLS52-*****B*)
<b>Measured error</b>	-5 ... +100 °C:	$\pm (10 \mu\text{S}/\text{cm} + 0.5 \% \text{ of measured value})$
	> 100 °C:	$\pm (30 \mu\text{S}/\text{cm} + 0.5 \% \text{ of measured value})$

## Installation

### Installation instructions

The medium should flow through the conical measuring channel in the indicated direction.



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Installation of the CLS52 in pipes with horizontal (middle) and vertical (right) flow directions

- a Sensor distance from the pipe wall
- b Indicator arrow for the flow direction
- c Flow direction
- 1 Welding neck
- 2 Pipe

### Installation factor

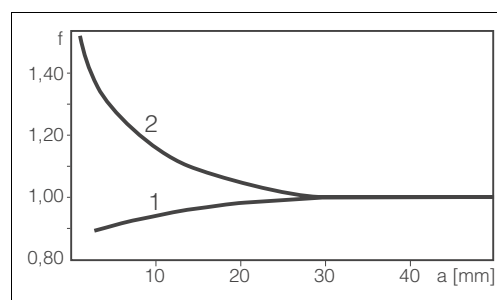
In narrow installation conditions, the ion flow in the medium is affected by the pipe walls. This effect is compensated by the so-called installation factor. The installation factor can be entered in the transmitter or the cell constant can be corrected by multiplication with the installation factor 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 ( $a > 15$  mm, from DN 65), 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.



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Dependence of installation factor  $f$  on wall distance  $a$

- 1 Conductive pipe
- 2 Insulating pipe

### Air set

To compensate residual coupling in the cable and between the two sensor coils, you must perform a zero calibration in air ("air set") before installing the sensor.

For further information, refer to the Operating Instructions of your transmitter.

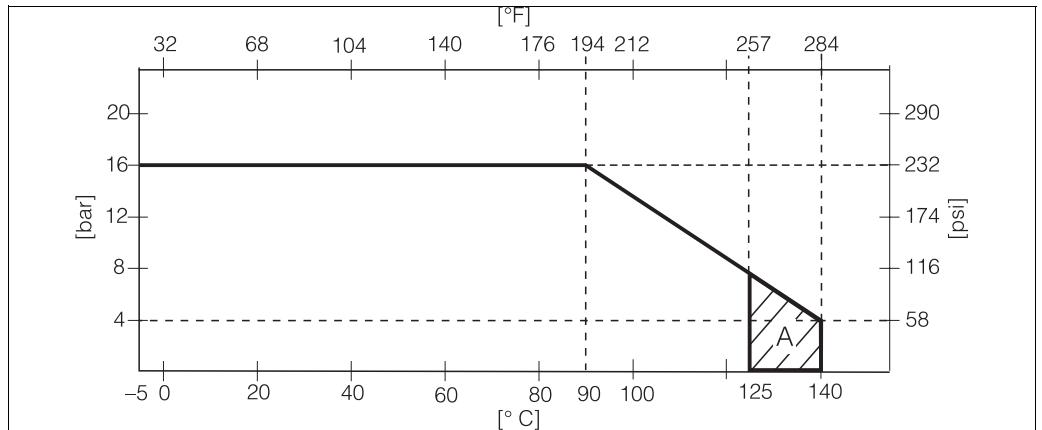
## Environment

<b>Ambient temperature</b>	-10 ... +70 °C / 14 ... 158 °F
<b>Storage temperature</b>	-25 ... +80 °C / -13 ... +176 °F
<b>Relative humidity</b>	5 ... 95 %
<b>Ingress protection</b>	IP 67 / NEMA 6

## Process

<b>Process temperature</b>	-5 ... +125 °C / 23 ... 257 °F
<b>Sterilisation</b>	140 °C / 4 bar (max. 30 min.) / 284 °F / 58 psi (max. 30 min.)
<b>Process pressure</b>	16 bar (up to 90 °C) / 232 psi (up to 194 °F) no underpressure permissible for sensor versions with stainless steel socket (CLS52-****A*)

### Pressure/temperature load curve

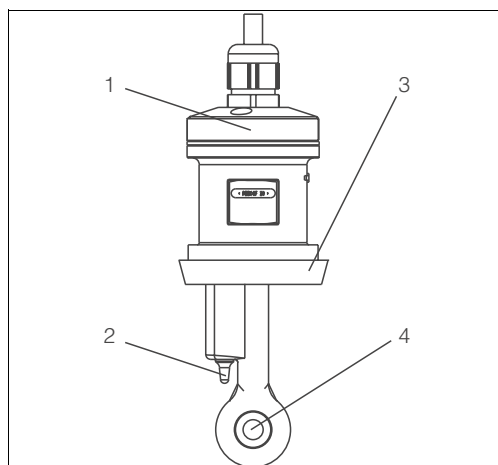


A = short-time sterilisation (max. 30 min.)

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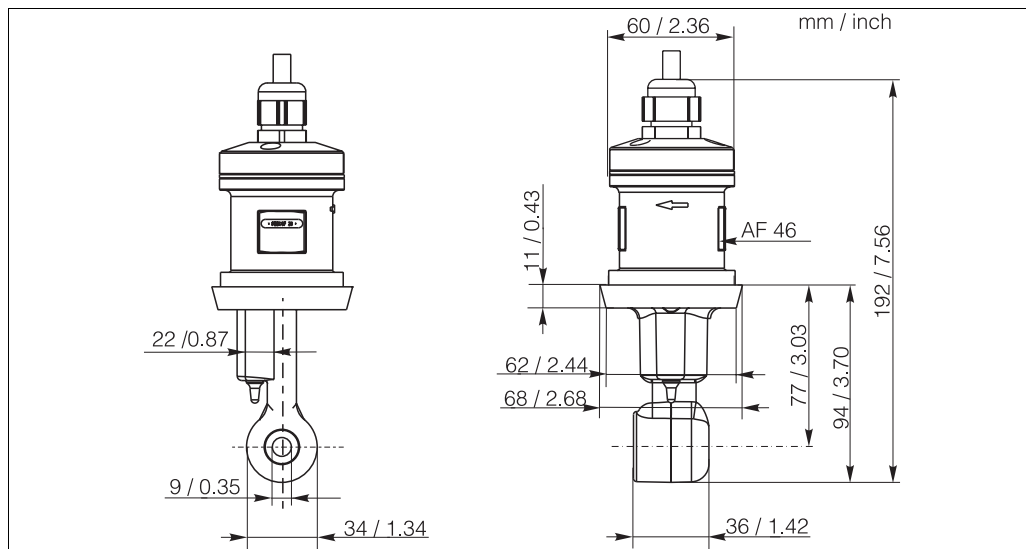
## Mechanical construction

### Design, dimensions



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- Indumax H CLS52*
- 1 Housing
  - 2 Temperature sensor
  - 3 Process connection
  - 4 Flow opening



CLS52 dimensions

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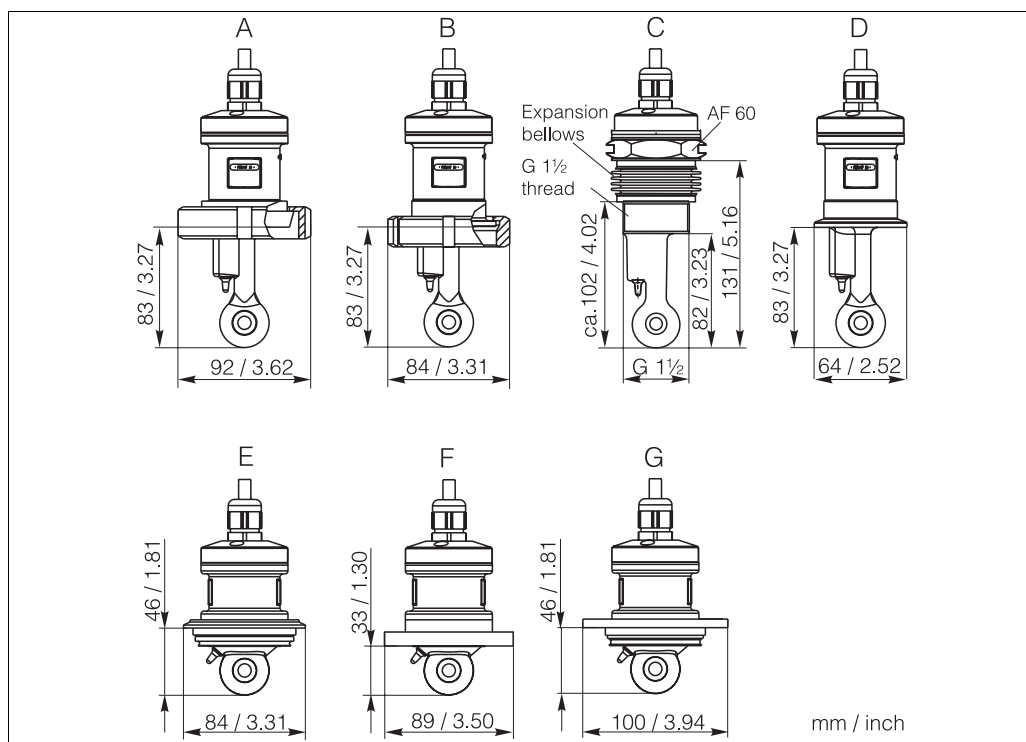
**Weight**

Depending on version, approx. 400 ... 800 g / 0.9 ... 1.8 lb.

**Materials (in contact with medium)**

Sensor PEEK-GF20  
 Varivent flange, APF flange, Perlick flange:  
 Flange: stainless steel 1.4435 (AISI 316L)  
 Seal: EPDM  
 Metall temperature sensor socket:  
 Socket: stainless steel 1.4435 (AISI 316L)  
 Seal: Chemraz®

**Process connections**



Process connections of CLS52

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- |  |                               |
|--|-------------------------------|
| A Dairy pipe fitting DN 50 (DIN 11851) | E Varivent N DN 40 ... DN 125 |
| B SMS 2"                               | F Perlick 2"                  |
| C Internal thread G 1½                 | G APV DN 40 ... DN 100        |
| D Clamp 2" (ISO 2852)                  |                               |



**Note!**

■ **Clamp connection**

Sensors with clamp connections can be fixed using sheet metal brackets or solid brackets.

Sheet metal brackets have a lower dimensional stability, uneven bearing surfaces causing point loads and sometimes sharp edges that can damage the clamp.

We **strongly** recommend to always use solid brackets because of their higher dimensional stability. Solid brackets may be applied over the total pressure-temperature range (see diagram on page 5).

■ **Threaded connection**

Sensors with threaded connections are supplied with expansion bellows (compensator) to be able to align them in flow direction. The two O-rings (Viton) of the expansion bellows have no sealing function and are not in contact with medium. The process is usually sealed off by PTFE tape on the G 1½ thread.

**Chemical durability**

Medium	Concentration	PEEK	1.4435 (AISI 316L)	Chemraz	EPDM
Caustic soda NaOH	0 ... 10 %	20 ... 100 °C / 68 ... 212 °F	20 ... 90 °C / 68 ... 194 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F
	0 ... 50 %	20 ... 100 °C / 68 ... 212 °F	20 ... 90 °C / 68 ... 194 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 60 °C / 68 ... 140 °F
Nitric acid HNO <sub>3</sub>	0 ... 10 %	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	20 °C / 68 °F
	0 ... 25 %	20 ... 40 °C / 68 ... 104 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	not suitable
Phosphoric acid H <sub>3</sub> PO <sub>4</sub>	0 ... 10 %	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 80 °C / 68 ... 176 °F
	0 ... 30 %	20 ... 100 °C / 68 ... 212 °F	20 ... 85 °C / 68 ... 185 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 80 °C / 68 ... 176 °F
Sulphuric acid H <sub>2</sub> SO <sub>4</sub>	0 ... 2.5 %	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	20 ... 70 °C / 68 ... 158 °F	20 ... 100 °C / 68 ... 212 °F	20 ... 30 °C / 68 ... 86 °F
	0 ... 30 %	20 ... 100 °C / 68 ... 212 °F <sup>1</sup>	not suitable	20 ... 100 °C / 68 ... 212 °F	20 ... 30 °C / 68 ... 86 °F

1) slight affect possible

No responsibility is taken for the correctness of this information.

## Ordering information

**Product structure  
Indumax H CLS52**

Approval	
A1	Standard
Version	
MV1	Dairy pipe fitting DN 50, DIN 11851
CS1	Clamp 2" fitting, ISO 2852
GE1	Internal thread G 1½
VA1	Varivent N connection DN 40 ... 125
AP1	APV connection DN 40 ... 100
PL1	Perlick adapter
SMS	SMS 2" connection
Temperature sensor insert	
A	Stainless steel socket 1.4435 (AISI 316L), Chemraz seal, fast temperature measurement
B	PEEK encapsulated for high loads
Cable length	
1	5 m / 16.41 ft cable
2	10 m / 32.81 ft cable
3	20 m / 65.62 ft cable
CLS52-	<b>complete order code</b>

## Accessories

### Measuring cables

- CLK5 measuring cable  
Extension cable for connecting CLS52 and transmitter via the VBM junction box, sold by the metre;  
order no. 50085473
- 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

### 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 µS/cm (reference temperature 25 °C / 77 °F), 500 ml / 0.13 US.gal.  
Order no. 50081903
  - CLY11-C  
1.406 mS/cm (reference temperature 25 °C / 77 °F), 500 ml / 0.13 US.gal.  
Order no. 50081904
  - CLY11-D  
12.64 mS/cm (reference temperature 25 °C / 77 °F), 500 ml / 0.13 US.gal.  
Order no. 50081905
  - CLY11-E  
107.0 mS/cm (reference temperature 25 °C / 77 °F), 500 ml / 0.13 US.gal.  
Order no. 50081906

### Related products

- Indumax P CLS50  
Highly resistant inductive conductivity sensor for standard, hazardous and high-temperature applications;  
for ordering information, see Technical Information TI 182C/07/en; order no. 50090385
- Smartec S CLD132  
Measuring system for conductivity and concentration measurement in the food industry;  
for ordering information, see Technical Information TI 207C/07/en; order no. 51501593

## Documentation

### Transmitters

- Mycom S CLM153, Technical Information TI 234C/07/en; order no. 51503792
- Lquisys M CLM223/253, Technical Information TI 193C/07/en; order no. 51500279
- Lquisys M CLM223F, Technical Information TI 237C/07/en; order no. 51505427

### Calibration solutions

- Precision calibration solution CLY11, Technical Information TI 162C/07/en; order no. 50086574

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