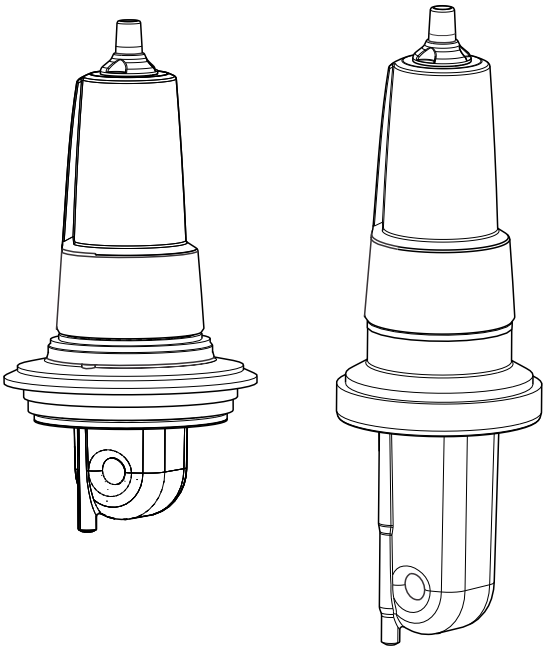
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operating Instructions

Indumax CLS54D

Inductive conductivity sensor with hygienic design for applications in the food, beverage and pharmaceutical industries and in biotechnology



BA00508C/07/EN/01.12
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Endress+Hauser
People for Process Automation

Document function

Safety messages

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
⚠ DANGER **Cause (/consequences)** Consequences if safety message is not heeded ■ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **will** result in a fatal or serious injury.
⚠ WARNING **Cause (/consequences)** Consequences if safety message is not heeded ■ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **can** result in a fatal or serious injury.
⚠ CAUTION **Cause (/consequences)** Consequences if safety message is not heeded ■ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE **Cause/situation** Consequences if safety message is not heeded ■ Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

Used symbols

→ 1 This symbol indicates a cross reference to a defined page (e.g. p. 1).

→ 2 This symbol indicates a cross reference to a defined figure (e.g. fig. 2).

Table of contents

1 Safety instructions

1.1 Requirements for personnel

- Installation, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may only be performed by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions they contain.
- Measuring point faults may only be rectified by authorized and specially trained personnel.

Repairs not described in the enclosed Operating Instructions may only be carried out directly at the manufacturer's or by the service organization.

1.2 Designated use

Indumax CLS54D conductivity sensors are especially suitable for application in the food and beverage industry.
The six-decade measuring range and the high chemical resistance of the materials in contact with medium permit to use this sensor in a number of various applications, e.g.:

- Concentration measurement of acids and bases
- Phase separation of products

The sensors are used with Liquiline CM44x, Liquiline CM42 or Liquiline CM14.

Any other use than the one described here compromises the safety of persons and the entire measuring system and is not permitted.
The manufacturer is not liable for damage caused by improper or non-designated use.

NOTICE

Use in not specified applications

Measurement errors and failures up to the breakdown of the measurement point possible

- Only use the product acc. to it's specification.
- Note the technical data of the nameplate.

1.3 Workplace safety

As the user, you are responsible for complying with the following safety conditions:

- Regulations for explosion protection
- Installation instructions
- Local standards and regulations

1.4 Operational safety

- Before commissioning the entire measuring point, make sure all the connections are correct. Ensure that electrical cables and hose connections are not damaged.
- Do not operate damaged products, and safeguard them to ensure that they are not operated inadvertently. Mark the damaged product as defective.
- If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

1.5 Product safety

The product is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. Relevant regulations and European standards have been observed.

2 Identification

2.1 Nameplate

The nameplate can be found on the sensor.

The following information is provided on the nameplate:
- Order code
- Extended order code
- Serial number
- Cell constant (nominal value)
- Protection class
- Pressure specification at 20 °C
- Continuous service temperature

Compare the data on the nameplate with your order.

To find out what CLS54D version you have, enter the order code indicated on the nameplate in the search screen at the following address: www.products.endress.com/order-ident

2.2 Scope of delivery

The scope of delivery comprises:
- 1 sensor Indumax CLS54D in the ordered version
- 1 Operating Instructions BA00508C/07/EN

2.3 Certificates and approvals

2.3.1 Hygienic certificates

FDA
All materials in contact with medium are listet at FDA.

EHEDG
Certified for cleanability according to EHEDG document 2

The cleanability of a sensor also depends on the way of installation. To install the sensor in a pipe system use the appropriate and EHEDG certified flow assembly for the respective process connection.

3-A
Certified according to 3-A Standard 74-04 ("3-A Sanitary Standards for Sensor and Sensor Fittings and Connections Used on Milk and Milk Products Equipment").

Biological reactivity (USP class VI) (optional)
Certificate (Certificate of Compliance) on biological reactivity tests according to USP (United States Pharmacopeia) part <87> und part <88> class VI with traceability of the materials in contact with medium.

2.3.2 Declaration of Conformity

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.

3 Installation

3.1 Installation conditions

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

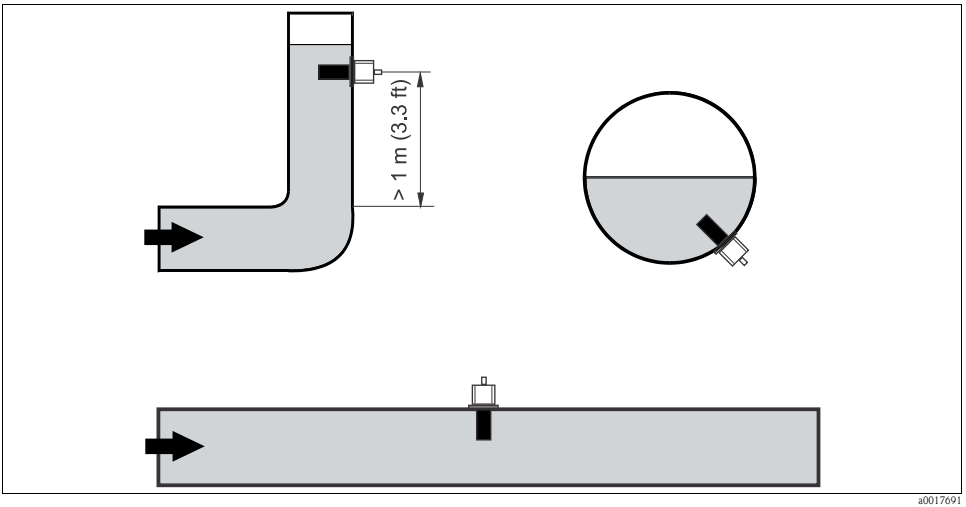

Abb. 1: Installation positions of conductivity sensors

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 mesauring 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 > 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.

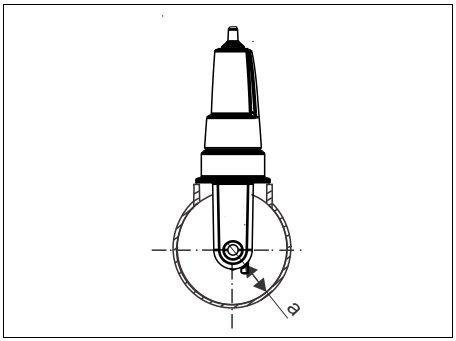

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Fig. 2: Installation of CLS54D

a Sensor distance from the pipe wall

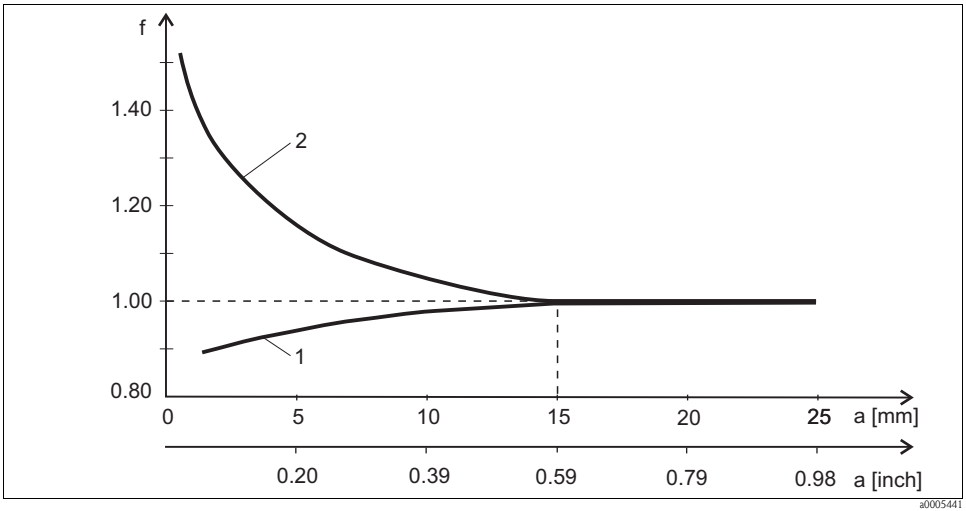

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Fig. 3: Dependance of installation factor f on wall distance a

1 Conductive pipe
2 Insulating pipe

3.2 Installation

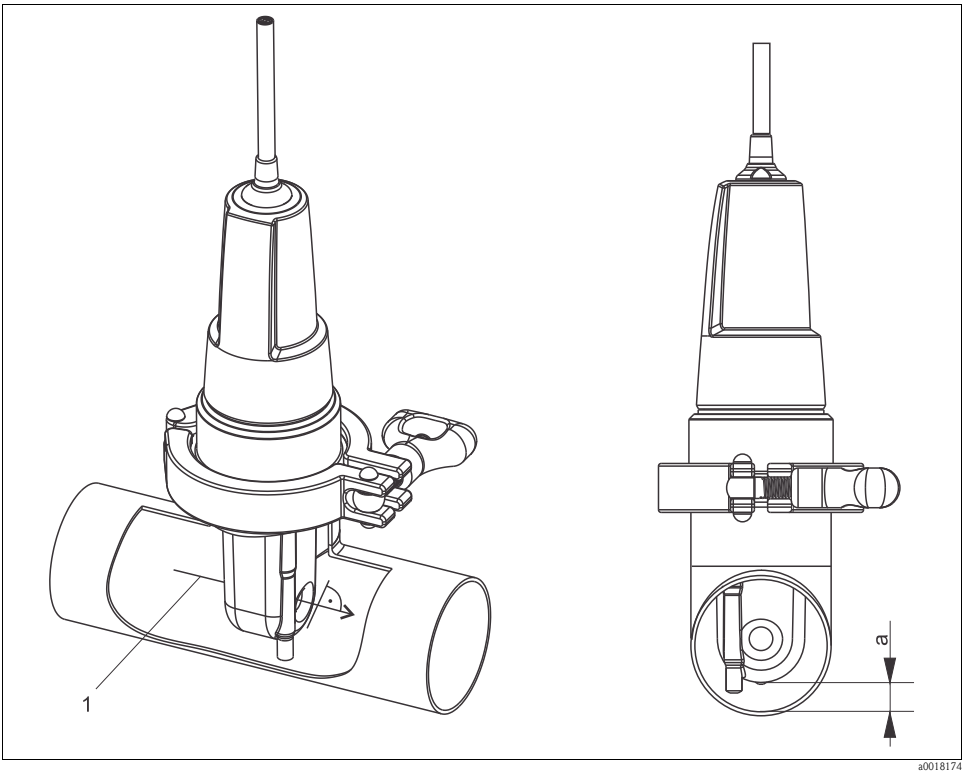

Fig. 4: Installation position of the sensor

1 Flow direction of medium
a Sensor distance from the pipe wall

Install the sensor in such a way that the sensor opening is oriented in the flow direction of the medium. The sensor head must be completely immersed in the medium.

Airset
The sensor has been adjusted at the factory, an on-site compensation is not necessary.

3.3 Post-installation check

- Are sensor and cable undamaged?
- Is the installation position correct?
- Is the sensor installed via process connection and not suspended from the cable?

4 Wiring

⚠ WARNING

Device is energized

Improper connection can cause injury or death.

- The electrical connection must only be carried out by a certified electrician.
- Technical personnel must have read and understood the instructions in this manual and must adhere to them.
- **Prior to beginning** any wiring work, make sure voltage is not applied to any of the cables.

4.1 Connection to the transmitter

The sensor is equipped with a fixed cable. For the wiring diagram refer to the operating instructions of the used transmitter.
To extend the cable, a junction box and a CYK11 extension cable are required.

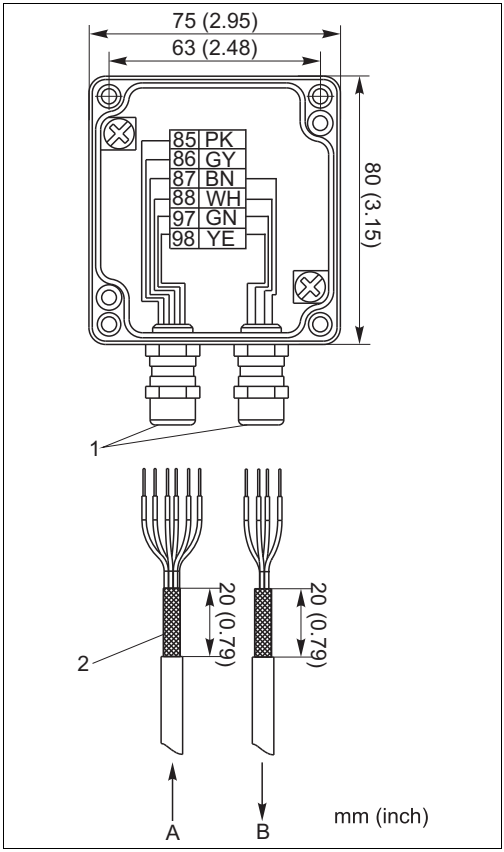

Fig. 5: Junction box

1 Cable gland – shield clamped in gland
2 Shield
A CYK11 to transmitter
B Sensor cable

To extend fixed cable sensors with M12 plug, use the measuring cable CYK11 with M12 female.

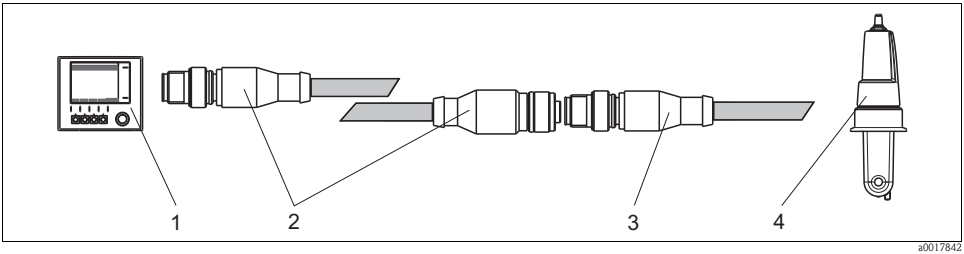

Fig. 6: CYK11 for extension with M12 connector pair

1 Transmitter
2 Measuring cable CYK11 with M12 connector pair
3 Measuring cable of CLS54D with M12 plug
4 CLS54D sensor

5 Commissioning

Prior to initial commissioning, make sure that:
- The sensor has been installed correctly
- The electrical connection is correct

6 Maintenance

Inductive sensors are less sensitive to soiling than conventional conductive sensors since there is no galvanic contact with the medium.
However, dirt may collect in the flow opening (making it narrower), which changes the cell constant. In this case, an inductive sensor also requires cleaning.

⚠ WARNING

Burning chemicals

Danger of chemicals burns to the eyes and skin. Danger of damage to clothing and equipment.

- It is absolutely essential to protect the eyes and hands properly when working with acids, bases and organic solvents!
- Wear protective goggles and safety gloves.
- Clean away splashes on clothes and other objects to prevent any damage.
- Pay particular attention to the information provided in the safety data sheets for the chemicals used.

Clean away fouling on the sensor as follows depending on the particular type of fouling:

- Oily and greasy films:
  Clean with grease remover, e.g. alcohol, acetone, as well as hot water and dishwashing detergent if necessary.
- Lime and metal hydroxide buildup:
  Dissolve buildup with diluted hydrochloric acid (3 %) and then rinse thoroughly with plenty of clear water.
- Sulfidic buildup (from flue gas desulfurising or sewage treatment plants):
  Use a mixture of hydrochloric acid (3 %) and thiocarbamide (commercially available) and then rinse thoroughly with plenty of clear water.

7 Accessories

7.1 Measuring cables

CYK11 Memosens data cable
- Extension cable for digital sensors with Memosens protocol
- Ordering as per product structure (—> Online configurator, www.products.endress.com/cyk11)

Junction box M12 connector/cable
- Material: aluminum, painted
- Cable extension: Memosens sensors, Liquiline
- Order no. 71145498

Junction box cable/cable
- Material: aluminum, painted
- Cable extension: Memosens sensors, Liquiline
- Order no. 71145499

7.2 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 / 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

8 Return

The device must be returned if repairs or a factory calibration are required, or if the wrong device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the internet site:
www.services.endress.com/return-material

9 Technical data

9.1 Input

9.1.1 Measured variable

- Conductivity
- Temperature

9.1.2 Cell constant

$k = 6.3\ cm^{-1}$

9.1.3 Measuring ranges

Conductivity	recommended range: 100 µS/cm to 2000 mS/cm (uncompensated)
Temperature	–10 to +150 °C (+14 to +302 °F)

9.1.4 Temperature measurement

Pt 1000 (class A acc. to IEC 60751)

9.2 Performance characteristics

9.2.1 Temperature response time

$t_{90} \leq 26$ s

9.2.2 Conductivity response time

$t_{95} \leq 2$ s

9.2.3 Measured error

± (0.5 % of measured value + 10 µS/cm) after calibration, valid for T < 100 °C (212 °F)
± (0.5 % of measured value + 25 µS/cm) after calibration, valid for T > 100 °C (212 °F)
(plus inaccuracy of the calibration)

9.2.4 Repeatability

0.2 % of the measured value

9.3 Environment

9.3.1 Ambient temperature range

–20 to +60 °C (-4 to +140 °F)

9.3.2 Storage temperature

-25 to +80 °C (-13 to +176 °F)

9.3.3 Relative humidity

5 to 95 %

9.3.4 Ingress protection

IP 68 (10 m water column, 25 °C, 168 h) / NEMA Type 6P

9.4 Process

9.4.1 Process temperature

-10 to +125 °C (14 to 257 °F)

9.4.2 Sterilization

150 °C / 5 bar (300 °F / 72.5 psi) (max. 60 minutes)

9.4.3 Process pressure

12 bar (174 psi) up to 90 °C (194 °F)
8 bar (116 psi) at 125 °C (257 °F)
Underpressure down to 0.1 bar (1.45 psi) absolute

9.4.4 Pressure-temperature diagram

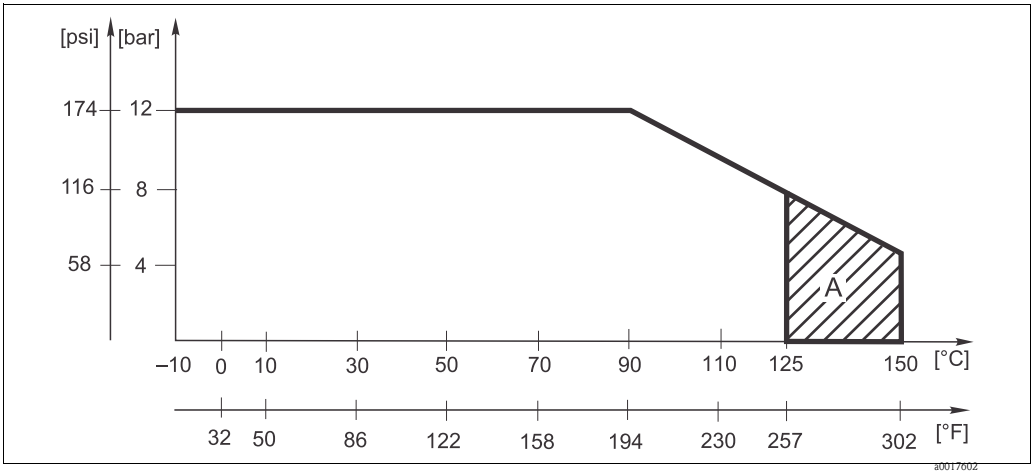

Abb. 7: Pressure / temperature load curve

A short-time sterilization (max. 60 min.)

9.4.5 Flow velocity

max. 10 m/s (33 ft/s) for pipe diameters ≥ 80 mm for low viscous media
max. 5 m/s for pipe diameters ≥ 50 mm and < 80 mm for low viscous media

9.5 Mechanical construction

9.5.1 Weight

Depending on version 0.3 to 0.5 kg (0.66 to 1.1 lb.) plus cable

9.5.2 Material

In contact with medium	Virgin PEEK
Not in contact with medium	PPS-GF40 Stainless steel 1.4404 (AISI 316L) FKM, EPDM (seal) PEEK (cable gland) TPE (cable)

9.5.3 Chemical durability

Medium	Concentration	PEEK
Caustic soda NaOH	0 to 15 %	20 to 90 °C (68 to 194 °F)
Nitric acid HNO_3	0 to 25 %	20 to 90 °C (68 to 194 °F)
Phosphoric acid H_3PO_4	0 to 15 %	20 to 80 °C (68 to 176 °F)
Sulphuric acid H_2SO_4	0 to 30 %	20 °C (68 °F)
Peracetic acid H_3C-CO-OOH	0.2 %	20 °C (68 °F)

No responsibility is taken for the correctness of this information.

Index

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EG 191A/07/a3

EG-Konformitätserklärung
EC Declaration of Conformity
CE Déclaration de Conformité

Endress+Hauser Conducta
Gesellschaft für Mess- und Regeltechnik mbH+Co. KG
Dieselstrasse 24, 70839 Gerlingen, Germany

erklärt in alleiniger Verantwortung, dass das Produkt
declares in sole responsibility that the product
déclare sous sa seule responsabilité que le produit

CLS54D-AA****

in Verbindung mit Messumformer
in connection with measuring transmitter
en connection avec le transmetteur

CM44, CM42 or CM14

mit den Vorschriften folgender Europäischen Richtlinien übereinstimmt:
is in conformity with the regulations of the following European Directives:
est conforme aux prescriptions et directives Européennes suivantes:

2004/108/EC (Elektromagnetische Verträglichkeit)
(Electromagnetic Compatibility)
(Compatibilité électromagnétique)

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents:
Normes harmonisées ou documents normatives appliquées:
EN 61326-1:2006

Gerlingen, 2012-06-26

i.V. Jörg-Martin Müller
Director Development

i.V. Peter Dierich
Certifications and Approvals

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People for Process Automation

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