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Operating Instructions
Indumax CLS50/CLS50D

Analog or digital sensors with Memosens protocol
For inductive measurement of conductivity in liquids

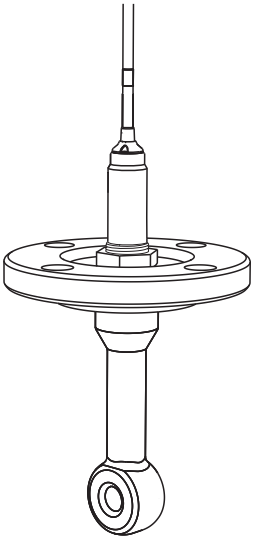

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Table of contents

1 Document information 4
1.1 Warnings 4
1.2 Symbols used 4

2 Basic safety instructions 5
2.1 Requirements for personnel 5
2.2 Designated use 5
2.3 Occupational safety 5
2.4 Operational safety 6
2.5 Product safety 6

3 Incoming acceptance and product identification 8
3.1 Incoming acceptance 8
3.2 Product identification 8
3.3 Certificates and approvals 12

4 Installation 13
4.1 Installation conditions 13
4.2 Installing the sensor 14
4.3 Post-installation check 17

5 Wiring 18
5.1 Connecting the sensor 18
5.2 Wiring diagram for explosion-hazardous areas 20

6 Commissioning 23

7 Maintenance 23

8 Repair 24
8.1 Spare parts 24
8.2 Return 25

9 Technical data 26
9.1 Input 26
9.2 Performance characteristics 26
9.3 Environment 27
9.4 Process 27
9.5 Mechanical construction 29

10 Appendix 31
10.1 Declaration of conformity for CLS50D-BA and CLS50-G 31
10.2 Declaration of conformity for CLS50D-BV and CLS50-V 33
10.3 NEPSI for CLS50D-NA and CLS50-H . . . 35
10.4 NEPSI for CLS50-V 38

Index 39

1 Document information

1.1 Warnings

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.

1.2 Symbols used

Additional information, tips

Permitted or recommended

Forbidden or not recommended

2 Basic safety instructions

2.1 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.

2.2 Designated use

Indumax CLS50/CLS50D conductivity sensors are especially suitable for application in the chemical industry and process engineering. The six-decade measuring range and the high chemical resistance of the materials in contact with medium (PFA or PEEK) permit to use this sensor in a number of various applications, e.g.:

- Concentration measurement of acids and bases
- Quality monitoring of chemical products in tanks and pipes
- Phase separation of product/product mixtures

Digital CLS50D sensors are used with Liquiline CM44x or Liquiline CM42. Analog CLS50 sensors are used with the transmitters Liquiline CM42, Liquisys CLM223/253 or Mycom CLM153.

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.

2.3 Occupational safety

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

- Guidelines for explosion protection
- Installation instructions
- Local prevailing standards and regulations.

2.4 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.

2.5 Product safety

2.5.1 State of the art

The sensor has been designed and tested according to the state of the art and left the factory in perfect functioning order.
Relevant regulations and European standards have been met.

2.5.2 Safety instructions for electrical equipment in hazardous locations

Sensors with ATEX approval (CLS50-G and CLS50D-BA for Zone 0, CLS50D-BV and CLS50-V for Zone 2) have been developed and manufactured in compliance with applicable European standards and guidelines and are suitable for use in hazardous locations. The Declaration of Conformity confirms compliance with the harmonized European standards for using the sensors in hazardous locations.

CLS50-G and CLS50D-BA
- The sensors may be operated in Zone 0 (1G) classified locations.
- The sensors may be operated in liquid media providing a conductivity of >10 nS/cm, only.
- The measurement cable must be protected from electrostatic charging when applied in Ex-Zone 0 (1G).

CLS50-G
- The sensor may only be connected to the following transmitters:
  - Mycom type CLM152-Z with transmitter module type FCL1, EC type-examination certificate DMT 99 ATEX E 076
  - Mycom type CLM153-G, EC type-examination certificate DMT 01 ATEX E 174
  - Liquiline type CM42-IG, EC type-examination certificate EX5 05 03 30266 012
- The maximum permitted length of the measuring cable is 55 m (180 ft).

CLS50D-BA
- CLS50D is a digital sensor with Memosens protocol. Its connection data are shown in the table below.
- The sensor may also be connected to the intrinsically safe Memosens connection of the FSDG1 module of the Liquiline type CM42-LG transmitter, EC type-examination certificate EX5 05 03 30266 012, provided the transmitter Liquiline M CM42-LG is connected to a galvanically isolated power supply.
- The maximum permitted length of the measuring cable is 100 m (330 ft).

U_i	5.1 V
I_i	130 mA
P_i	166 mW
C_i	18 µF
L_i	72 µH

CLS50-V and CLS50D-BV
- The sensor may be operated in Zone 2 (3G) classified locations.
- The sensor may only be connected to the following transmitter:
  Liquiline type CM42-IV (CLS50) or CM42-LV (CLS50D), EC type-examination certificate BVS 08 ATEX E 093
- The maximum permitted length of the measuring cable is 55 m (180 ft).

Sensors with FM or CSA approval (CLS50D-FB, CLS50D-C2, CLS50-O, CLS50-S)
- Observe the documentation and the control drawings of the transmitter.

Sensors with NEPSI approval (CLS50D-NA and CLS50-H for Zone 0, CLS50-V for Zone 2)
- Observe the safety instructions of the NEPSI certificates as shown in the appendix of these Operating Instructions.

General notes for all sensor types mentioned above
- Compliance with the ambient and medium temperature ranges indicated is mandatory to ensure safe operation of the device.
- Connection and operation of the sensor must be carried out in compliance with the instructions in the Operating Instructions of the sensor and of the transmitter connected. Observe all operating data of the sensor.
- Metallic process connection parts have to be mounted at the mounting location electrostatically conductive (<1 MΩ).
- Non metallic process connection parts have to be protected from electrostatic charging (even when applied in Ex zone 1 (2G)).
- Full compliance with regulations for electrical systems in hazardous locations (EN60079-14) is mandatory when using the devices and sensors.
- Make sure the device is mounted correctly to maintain the degree of protection of the housing (use genuine seals, mount the cable entry correctly, tighten the nut)!
- The degree of protection only applies when the flange is mounted.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

1. Make sure the packaging is not damaged.
   ↳ Inform your supplier of any damage to the packaging.
   Please keep the damaged packaging until any issues have been resolved.
2. Make sure the contents are not damaged.
   ↳ Inform your supplier of any damage to the contents.
   Please keep the damaged goods until any issues have been resolved.
3. Check that the delivery is complete and nothing is missing.
   ↳ Compare the scope of delivery against the delivery papers and your order.
4. Pack the product in such a way as to protect it reliably against impact and moisture for storage and transportation.
   ↳ Optimum protection is provided by the original packaging materials.
   The permitted ambient conditions must be observed (see Technical data).

If you have any queries, contact your supplier or local sales center.

3.2 Product identification

3.2.1 Type code for versions with Ex approval

Name	**Type**		**Version**							
Indumax	CLS50D	-	BA	x	x	x	x	-	x	x
			for the use in hazardous location, ATEX II 1G Ex ia IIC T4/T6 Ga	Process connections, material, cable connection, calibration, service no Ex relevance						

Name	**Type**		**Version**							
Indumax	CLS50D	-	BV	x	x	x	x	-	x	x
			for the use in hazardous location, ATEX II 3G Ex ic IIC T4/T6 Gc	Process connections, material, cable connection, calibration, service no Ex relevance						

Name	Type		Version							
Indumax	CLS50D	-	NA	x	x	x	x	-	x	x
			for the use in hazardous location, NEPSI Ex ia IIC T4/T6 Ga	Process connections, material, cable connection, calibration, service no Ex relevance						

Name	Type		Version							
Indumax	CLS50D	-	C2	x	x	x	x	-	x	x
			for the use in hazardous location, CSA IS NI Cl.I,II,III Div.1&2, Group A-G	Process connections, material, cable connection, calibration, service no Ex relevance						

Name	Type		Version							
Indumax	CLS50D	-	FB	x	x	x	x	-	x	x
			for the use in hazardous location, FM IS NI Cl.I,II,III Div.1&2, Group A-G	Process connections, material, cable connection, calibration, service no Ex relevance						

Name	Type		Version							
Indumax	CLS50	-	G	x	x	x				
			for the use in hazardous locations, ATEX II 1G Ex ia IIC T4/T6 Ga	Process connections, material no Ex relevance						

Name	Type		Version							
Indumax	CLS50	-	V	x	x	x				
			for the use in hazardous location, ATEX II 3G Ex ic IIC T4/T6 Gc, NEPSI Ex ic IIC T4/T6 Gc	Process connections, material no Ex relevance						

Name	Type		Version							
Indumax	CLS50	-	H	x	x	x				
			for the use in hazardous location, NEPSI Ex ia IIC T4/T6 Ga	Process connections, material no Ex relevance						

Name	Type		Version							
Indumax	CLS50	-	O	x	x	x				
			for the use in hazardous location, FM IS NI Cl.I,II,III Div.1&2, Group A-G	Process connections, material no Ex relevance						

Name	Type		Version							
Indumax	CLS50	-	S	x	x	x				
			for the use in hazardous location, CSA IS NI Cl.I,II,III Div.1&2, Group A-G	Process connections, material no Ex relevance						

3.2.2 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 CLS50D 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

3.2.3 Temperature classes for hazardous locations

The plant operator must guarantee the compliance with these temperatures by suitable installation measures.

CLS50D-BA

Temperature class	Sensor	Ambient temperature range T_a	Medium temperature range T_{med}
T4	CLS50D-BA*D CLS50D-BA*C CLS50D-BA*B	-20 °C to +60 °C -20 °C to +60 °C -20 °C to +60 °C	-20 °C to +110 °C -20 °C to +120 °C -20 °C to +120 °C
T6	CLS50D-BA*D CLS50D-BA*C CLS50D-BA*B	-20 °C to +60 °C -20 °C to +60 °C -20 °C to +60 °C	-20 °C to +70 °C -20 °C to +70 °C -20 °C to +70 °C

CLS50-G

Temperature class	Sensor	Ambient temperature range T_a	Medium temperature range T_{med}
T4	CLS50-G	-20 °C to +125 °C	-20 °C to +125 °C
T6	CLS50-G	-20 °C to +75 °C	-20 °C to +75 °C

CLS50D-NA

Temperature class	Sensor	Ambient temperature range T_a	Medium temperature range T_{med}
T4	CLS50D-NA*D CLS50D-NA*C CLS50D-NA*B	-20 °C to +60 °C -20 °C to +60 °C -20 °C to +60 °C	-20 °C to +110 °C -20 °C to +120 °C -20 °C to +120 °C
T6	CLS50D-NA*D CLS50D-NA*C CLS50D-NA*B	-20 °C to +60 °C -20 °C to +60 °C -20 °C to +60 °C	-20 °C to +70 °C -20 °C to +70 °C -20 °C to +70 °C

CLS50-H

Temperature class	Sensor	Ambient temperature range T_a	Medium temperature range T_{med}
T4	CLS50-H	-20 °C to +125 °C	-20 °C to +125 °C
T6	CLS50-H	-20 °C to +75 °C	-20 °C to +75 °C

CLS50D-BV

Temperature class	Sensor	Ambient temperature range T_a	Medium temperature range T_{med}
T4	CLS50D-BV	-20 °C to +120 °C	-20 °C to +120 °C
T6	CLS50D-BV	-20 °C to +75 °C	-20 °C to +75 °C

CLS50-V

Temperature class	Sensor	Ambient temperature range T_a	Medium temperature range T_{med}
T4	CLS50-V	-20 °C to +125 °C	-20 °C to +125 °C
T6	CLS50-V	-20 °C to +75 °C	-20 °C to +75 °C

3.3 Certificates and approvals

3.3.1 CE 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.

3.3.2 Ex approvals

CLS50D-BA and CLS50-G
ATEX II 1G Ex ia IIC T4/T6 Ga

CLS50D-BV
ATEX II 3G Ex ic IIC T4/T6

CLS50-V
ATEX II 3G Ex ic IIC T4/T6 Gc + NEPSI Ex ic IIC T4/T6 Gc

CLS50D-NA und CLS50-H
NEPSI Ex ia IIC T4/T6 Ga

CLS50D-FB und CLS50-O
FM IS NI Cl.I,II,III,Div.1&2,Group A-G

CLS50D-C2 und CLS50-S
CSA IS NI Cl.I,II,III,Div.1&2,Group A-G

4 Installation

4.1 Installation conditions

4.1.1 Installation position

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.

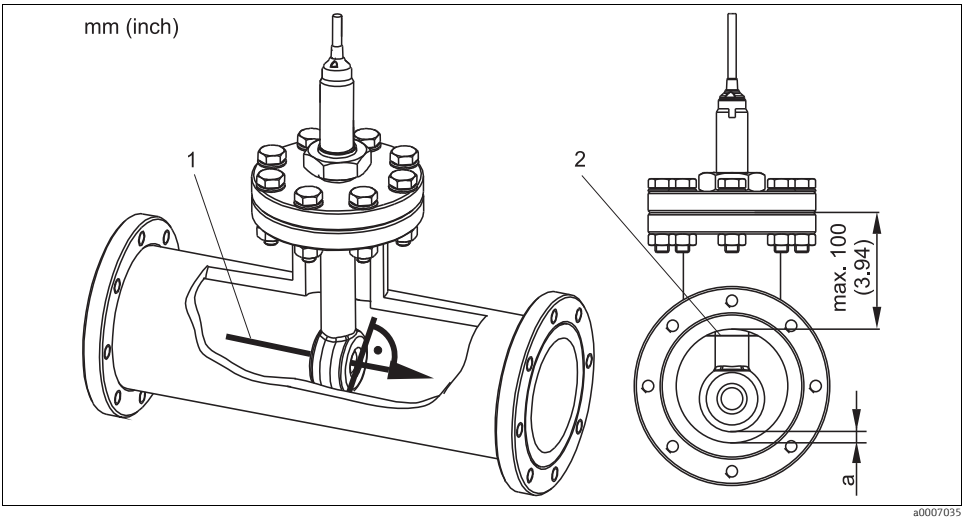


Fig. 1: Installation position of the sensor

1 Flow direction of medium
2 Minimum water level in the pipe
a Sensor distance from the pipe wall

4.1.2 Installation factor

In narrow installation conditions, the conductivity measurement is affected by the pipe walls. This effect is compensated by the so-called installation factor. The transmitter corrects the cell constant by multiplication with the installation factor.
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 (0.59"), from DN 80), 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 following diagram.

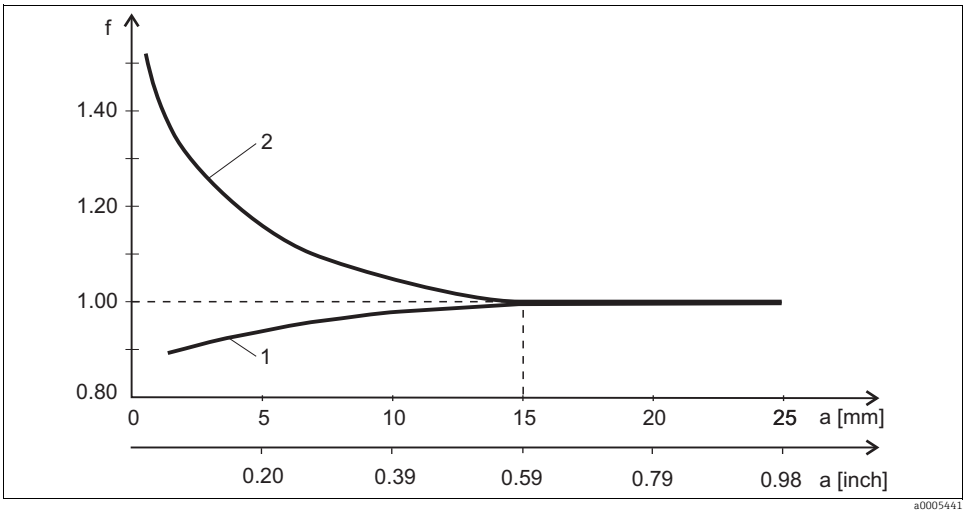


Fig. 2: Relationship between installation factor f and distance from wall a

1 Electrically conductive pipe wall
2 Insulating pipe wall

4.1.3 Air set

CLS50
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.

CLS50D
The digital sensor is already adjusted at the factory, an on-side compensation is not necessary.

4.2 Installing the sensor

4.2.1 Flange installation

The sensor is suitable for installation in T-pieces ≥ DN 80 with the outgoing diameter reduced to ≥ DN 50.

⚠ WARNING
Leakages
Danger of injuries by leaking medium
- ▶ Tighten the nut with a torque of 20 Nm.
- ▶ To avoid leakages, regularly check the tightness of the nut.

4.2.2 Flange, not in contact with medium

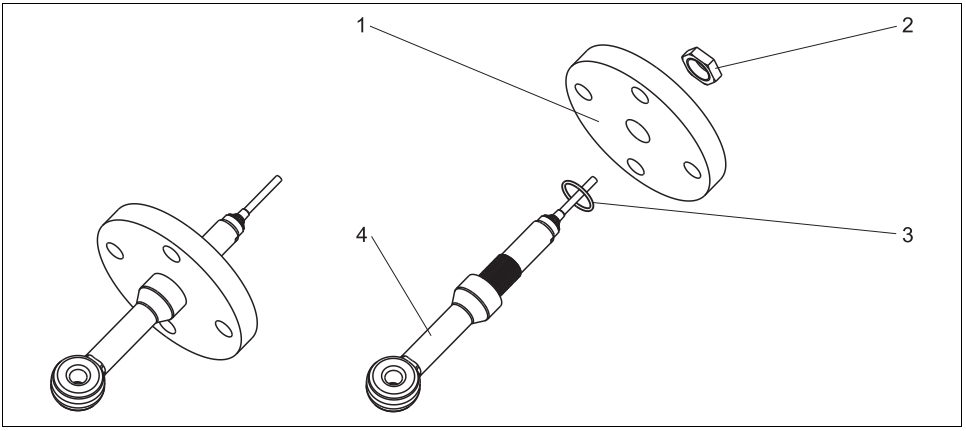


Fig. 3: Fixed flange, in contact with medium (order option "process connection": 3, 4)

1	*Flange (stainless steel)*	*3*	*O-ring*
2	*Nut*	*4*	*Sensor*

4.2.3 Flange, not in contact with medium

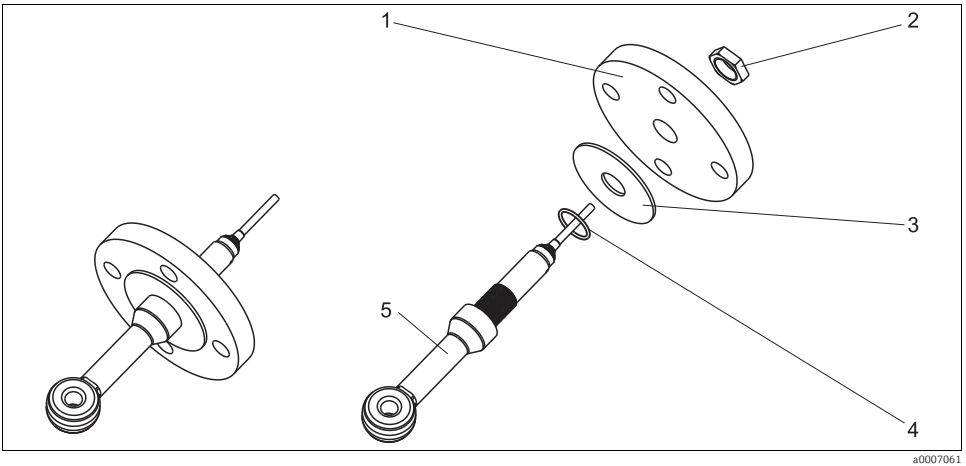


Fig. 4: Fixed flange, not in contact with medium (order option "process connection": 5, 6, 7)

1	*Flange (stainless steel)*	*4*	*O-ring*
2	*Nut*	*5*	*Sensor*
3	*Sealing disk (GYLON)*		

4.2.4 Lap-joint flange, not in contact with medium

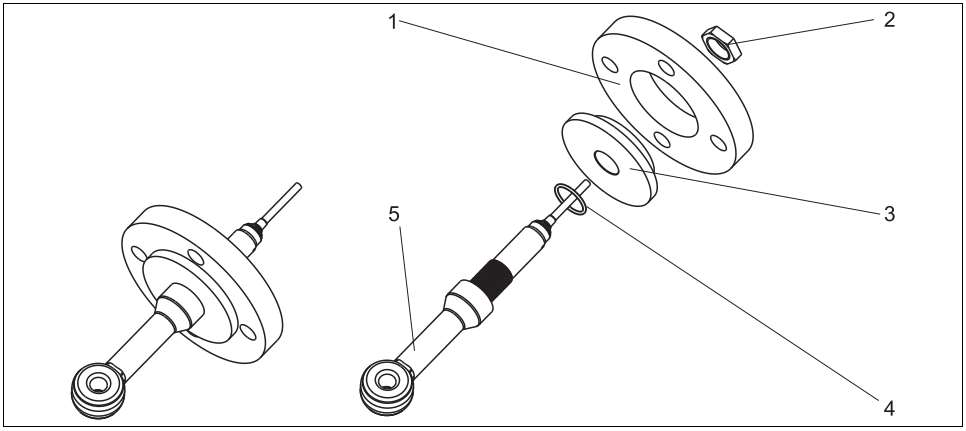


Fig. 5: Lap-joint flange, not in contact with medium (order option "process connection": A, B, C)

1	*Lap-joint flange (PP-GF)*	*4*	*O-ring*
2	*Nut (stainless steel)*	*5*	*Sensor*
3	*Flange (PVDF)*		

4.2.5 Assembly installation

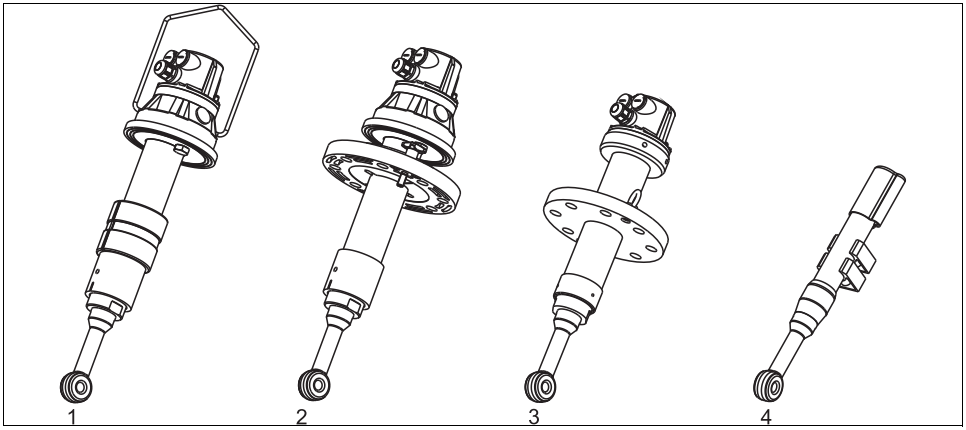


Fig. 6: Installation of sensor with assembly

1	*CLA111 with suspension bracket*	*3*	*CLA140 with flange connection*
2	*CLA111 with flange connection*	*4*	*CYA611*

4.3 Post-installation check

- Are sensor and cable undamaged?
- Is the installation position correct? Arrow on the threaded sleeve shows the flow direction = installation position.
- Is the sensor installed via process connection and not suspended from the cable?

5 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.

5.1 Connecting the sensor

5.1.1 Direct connection to the transmitter, e.g. to CM42

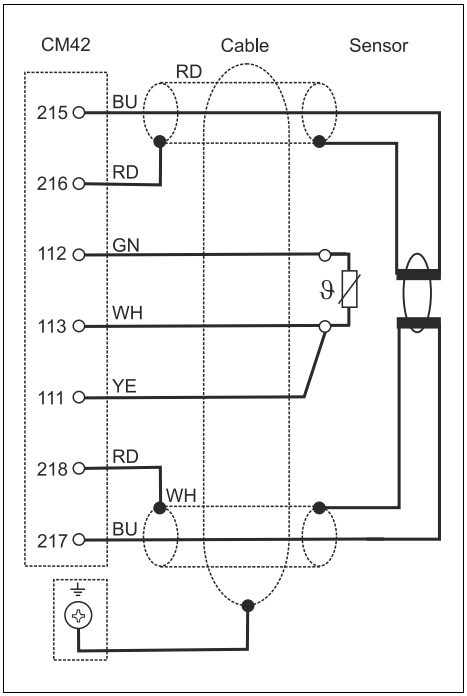


Fig. 7: CLS50 to CM42

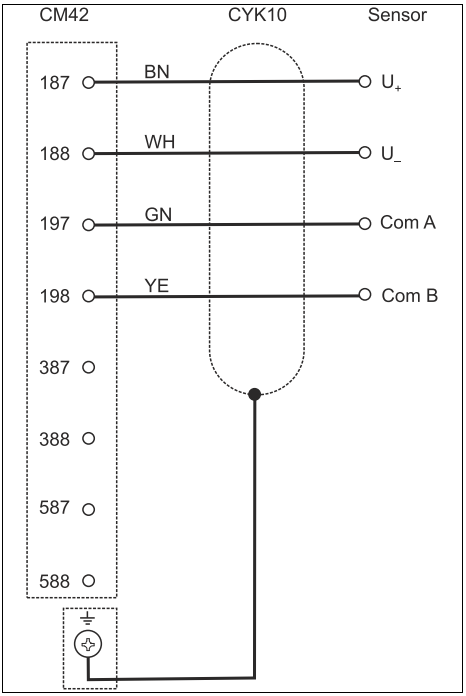


Fig. 8: CLS50D to CM42

5.1.2 Using cable extension

The sensor is supplied with a fixed cable. The connection to the transmitter can be extended using the CYK11 (CLS50D) or the CLK6 (CLS50) special measuring cable (not applicable for use in hazardous locations).

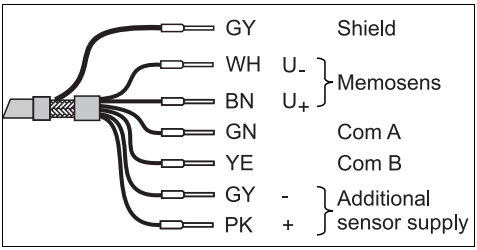


Fig. 9: CYK11 for cable extension for CLS50D –max. total cable length: 100 m (330 ft)

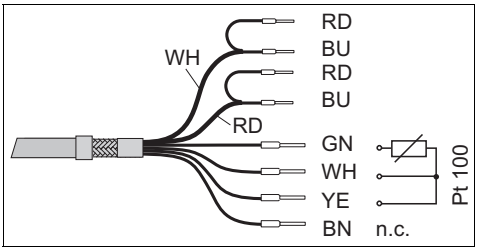


Fig. 10: CLK6 for cable extension for CLS50 –max. total cable length: 55 m (180 ft)

Please note that the residual coupling increases when the cable is extended.

5.2 Wiring diagram for explosion-hazardous areas

5.2.1 Sensors for Zone 0 (ATEX)

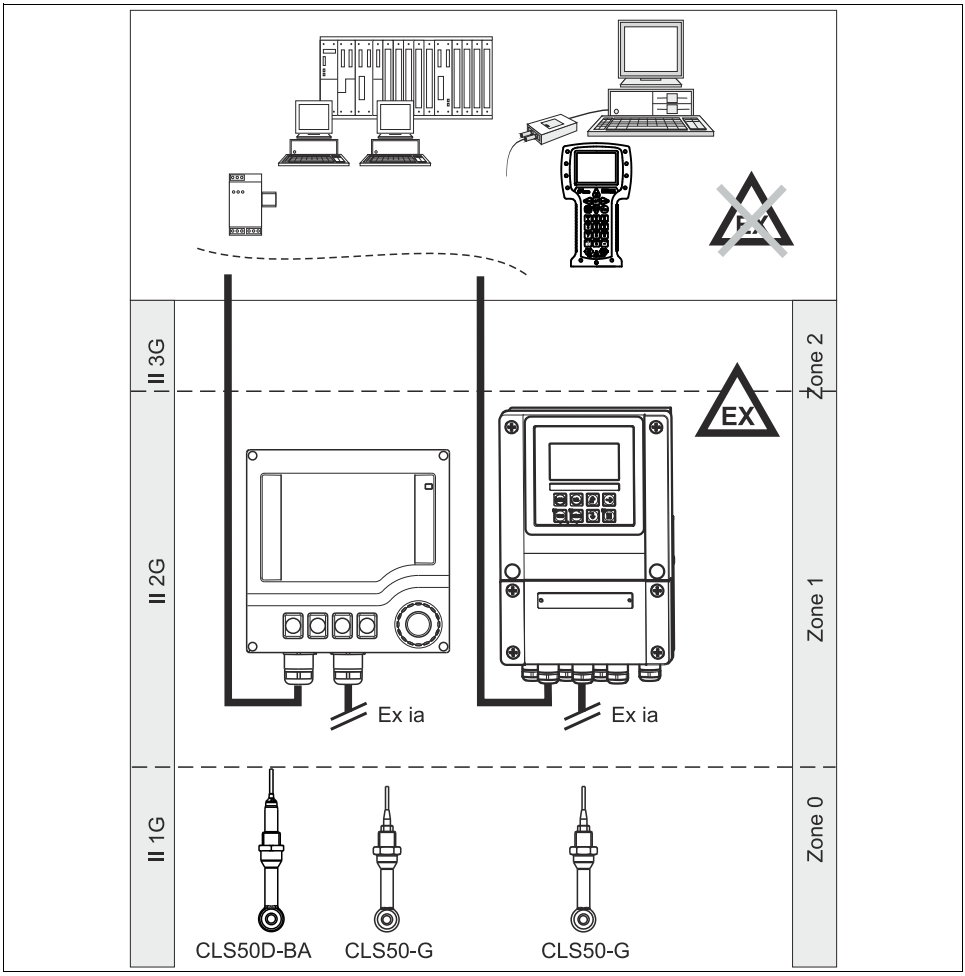


Fig. 11: Connection in hazardous location

5.2.2 Sensors for Zone 0 (NEPSI)

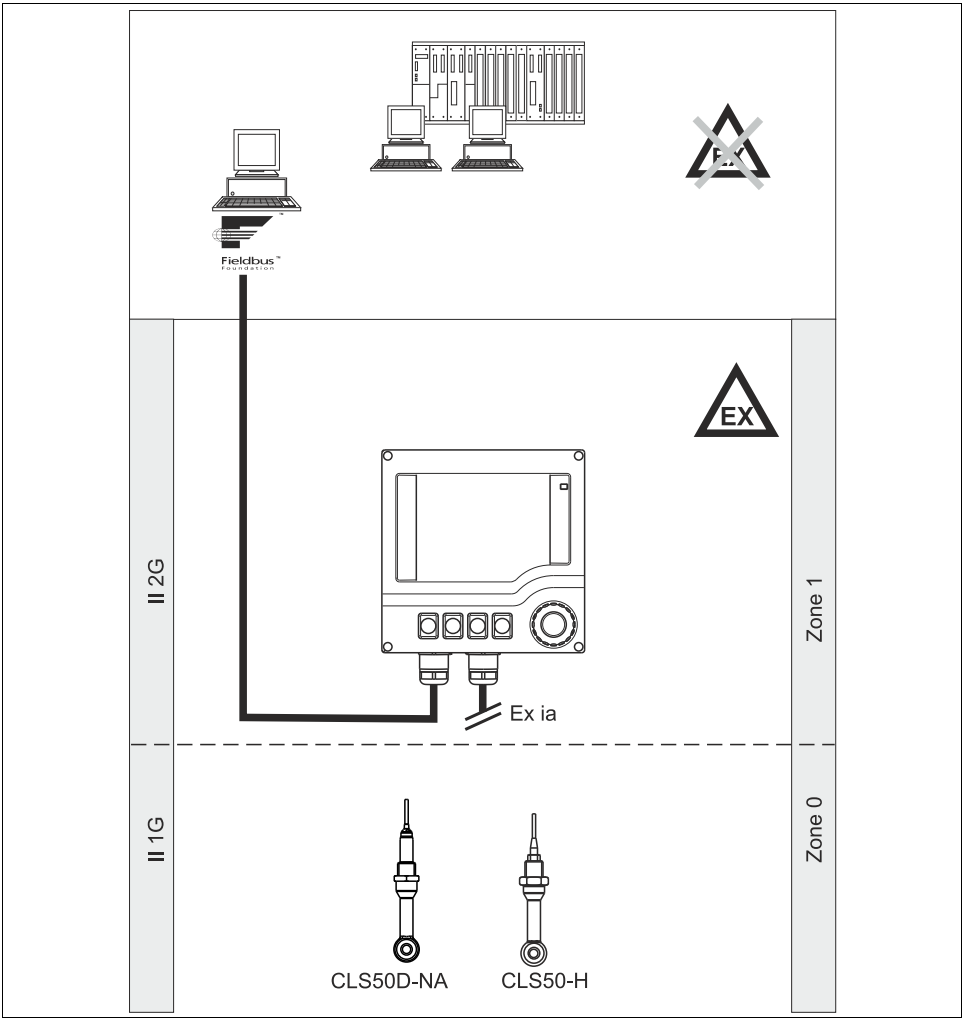


Fig. 12: Connection in hazardous location

5.2.3 Sensors for Zone 2 (ATEX/NEPSI)

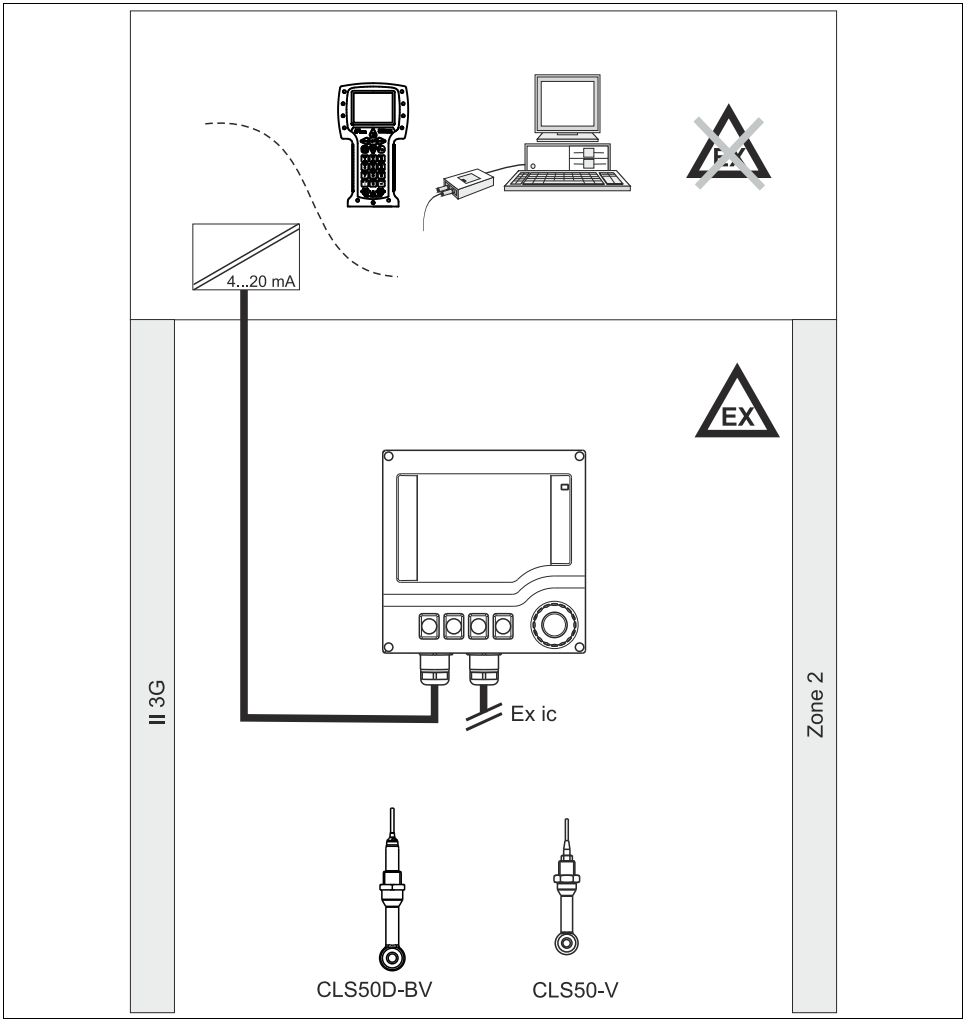


Fig. 13: Connection in hazardous location

5.2.4 Sensors with FM or CSA approval

For sensors CLS50D-C2 and -B and CLS-O and -S: Observe the instructions of the Control Drawing. You will find the Control Drawing in the Operating Instructions of the transmitter used.

6 Commissioning

Before first commissioning, check if:
- the sensor is correctly installed
- the electrical connection is correct.

If using an assembly with automatic cleaning, check the correct connection of the cleaning agent (e.g. water or air).

⚠ WARNING

Incorrect connection of a cleaning unit to an assembly

Danger of medium leaking off

- ▶ Before applying compressed air to an assembly with cleaning facility, make sure the connections are correctly fitted. Otherwise, the assembly may not be inserted into the process.

7 Maintenance

⚠ WARNING

Burning chemicals

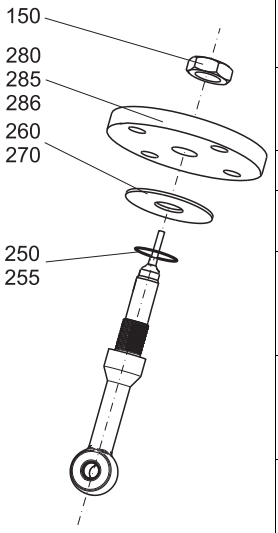
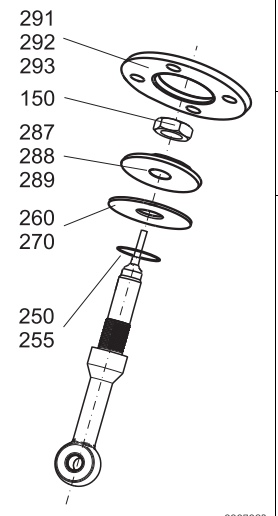
Danger of chemicals burns to the eyes and skin. Danger of damage to clothing and equipment.

- ▶ 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.
- Buildup containing proteins (e.g. food industry):
  Use a mixture of hydrochloric acid (0.5 %) and pepsin (commercially available) and then rinse thoroughly with plenty of clear water.

8 Repair

8.1 Spare parts

	Pos. no.	Spare part kit	Order no.
	150, 255	Kit CHEMRAZ seal ▪ Nut (Pos. 150) ▪ CHEMRAZ O-ring, 2 pcs. (Pos. 255)	71086368
	150, 250	Kit VITON seal ▪ Nut (Pos. 150) ▪ VITON O-ring, 3 pcs. (Pos. 250)	71086369
	260	Kit PTFE sealing disk for DN 50	71086372
	270	Kit PTFE sealing disk for ANSI 2" and JIS 10K 50A	71086374
	150, 280	Kit fixed flange DN 50, stainless steel 1.4404 (AISI 316L) ▪ Nut (Pos. 150) ▪ Flange DN 50 (Pos. 280)	51500525
	150, 285	Kit fixed flange ANSI 2", stainless steel 1.4404 (AISI 316L) ▪ Nut (Pos. 150) ▪ Flange ANSI 2" (Pos. 285)	51500527
	150, 286	Kit fixed flange JIS, stainless steel 1.4404 (AISI 316 L)Nut ▪ (Pos. 150) ▪ Flange DN 50 (Pos. 286)	51500934
	150, 288, 292	Kit lap-joint flange ANSI 2", PVDF ▪ Nut (Pos. 150) ▪ Flange ANSI 2", PVDF (Pos. 288) ▪ Lap-joint flange, UP-GF (Pos. 292)	51500937
	150, 287, 291	Kit lap-joint flange DN 50, PVDF ▪ Nut (Pos. 150) ▪ Flange DN 50, PVDF (Pos. 287) ▪ Lap-joint flange, UP-GF (Pos. 291)	51500936
	150, 289, 293	Kit lap-joint flange JIS, PVDF ▪ Nut (Pos. 150) ▪ Flange JIS, PVDF (Pos. 289) ▪ Lap-joint flange, UP-GF (Pos. 293)	51500935

8.2 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 = 1.98 cm^{-1}

9.1.3 Measuring frequency

2 kHz

9.1.4 Measuring ranges

Conductivity:	2 µS/cm to 2000 mS/cm (uncompensated)
Temperature:	–20 to +180 °C (-4 to +350 °F)

9.1.5 Temperature measurement

CLS50D
Pt 1000 (class A acc. to IEC 60751)

CLS50
Pt 100 (class A acc. to IEC 60751)

9.2 Performance characteristics

9.2.1 Maximum measured error

- **-20 to 100 °C (-4 to 212 °F):**
  ±(5 µS/cm + 0.5 % of the measured value)
- **> 100 °C (212 °F):**
  ±(10 µS/cm + 0.5 % of the measured value)

9.2.2 Conductivity response time

< 2 s

9.2.3 Temperature response time

- **PEEK versions:**
  t_{90} = approx. 7 min
- **PFA versions:**
  t_{90} = approx. 11 min

9.2.4 Repeatability

0.5 %

9.2.5 Linearity

1.9 %

9.3 Environment

9.3.1 Ambient temperature range

CLS50D
−10 to +60 °C (+10 to +140 °F)

CLS50
−10 to +70 °C (+10 to +160 °F)

9.3.2 Storage temperature

−20 to +80 °C (-4 to +180 °F)

9.3.3 Ingress protection

IP 68 / NEMA 6 (sensor installed, with original sealing)

9.4 Process

9.4.1 Process temperature

CLS50D

Sensor material		**Without flange** CLS50D-*1/2	**DN50, ANSI 2"** CLS50D-*3/4/5/6/8	**JIS** CLS50D-*7	**PVDF lap-joint flange** CLS50D-*A/B/C
PEEK	Non-Ex	−20 to 125 °C (-4 to 260 °F)	−20 to 125 °C (-4 to 260 °F)	−20 to 125 °C (-4 to 260 °F)	−20 to 125 °C (-4 to 260 °F)
	Ex	−20 to 120 °C (-4 to 248 °F)	−20 to 120 °C (-4 to 248 °F)	−20 to 120 °C (-4 to 248 °F)	−20 to 120 °C (-4 to 248 °F)
PFA		−20 to 110 °C (-4 to 230 °F)	−20 to 110 °C (-4 to 230 °F)	−20 to 110 °C (-4 to 230 °F)	−20 to 110 °C (-4 to 230 °F)

CLS50

Sensor	Without flange CLS50-*1/2	DN50, ANSI 2" CLS50-*3/4/5/6/8	JIS CLS50-*7	PVDF lap-joint flange CLS50-*A/B/C
PEEK	–20 to 180 °C (-4 to 360 °F)	–20 to 180 °C (-4 to 360 °F)	–20 to 180 °C (-4 to 360 °F)	–20 to 125 °C (-4 to 260 °F)
PFA	–20 to 125 °C (-4 to 260 °F)	–20 to 125 °C (-4 to 260 °F)	–20 to 125 °C (-4 to 260 °F)	–20 to 125 °C (-4 to 260 °F)

9.4.2 Process pressure

max. 20 bar (290 psi), acc. to the sensor version, see pressure-temperature diagram

9.4.3 Pressure-temperature diagram

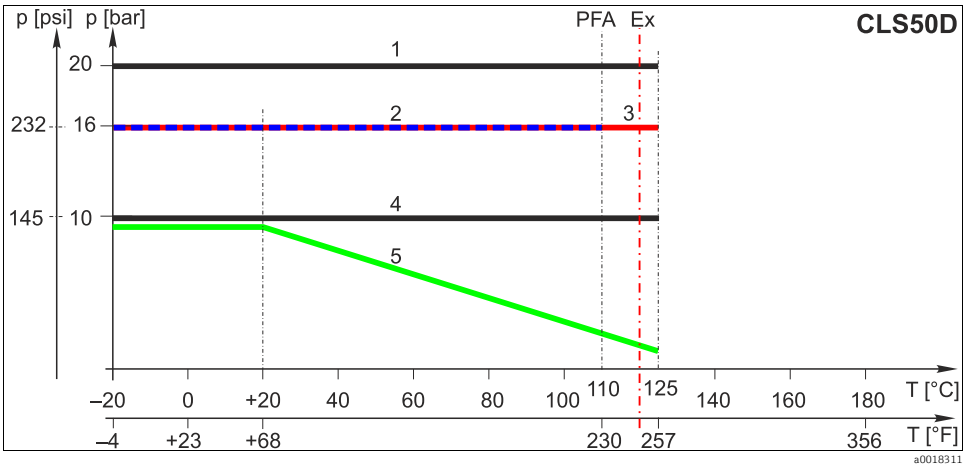


Fig. 14: Pressure-temperature-diagram of CLS50D

1 *PEEK sensor, without flange*
2 *PFA sensor, without flange (blue line)*
3 *PEEK or PFA sensor, with DN50/ANSI 2" flange (red line)*
4 *PEEK or PFA sensor, with JIS flange*
5 *PEEK or PFA sensor, with lap-joint flange PVDF (green line)*

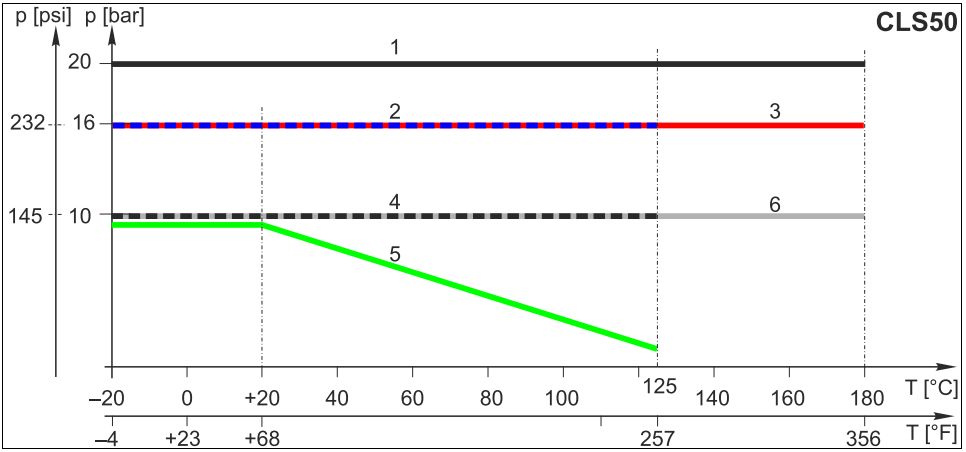


Fig. 15: Pressure-temperature-diagram of CLS50

1 PEEK sensor, without flange
2 PFA sensor, without flange or with DN50/ANSI 2" flange (blue line)
3 PEEK sensor, with DN50/ANSI 2" flange (red line)
4 PFA sensor, with JIS flange (black line)
5 PEEK or PFA sensor, with lap-joint flange PVDF (green line)
6 PEEK sensor, with JIS flange (grey line)

9.5 Mechanical construction

9.5.1 Weight

approx. 650 g (1.43 lbs)

9.5.2 Material

Sensor:	PEEK, PFA (depending on ordered version)
Sensor seal:	VITON, CHEMRAZ (depending on ordered version)
Process connections:	
G ¾:	CLS50-**A: stainless steel 1.4571 (AISI 316Ti) CLS50-**B/C: PEEK GF30 CLS50D-**D: stainless steel 1.4571 (AISI 316Ti) CLS50D-**B/C: PEEK GF30
NPT 1":	PEEK
Fixed flange:	stainless steel 1.4404 (AISI 316 L)
Sealing disk:	GYLON (ceramic-filled PTFE)
Lap-joint flange:	PP-GF
Flange combined with lap-joint flange:	PVDF

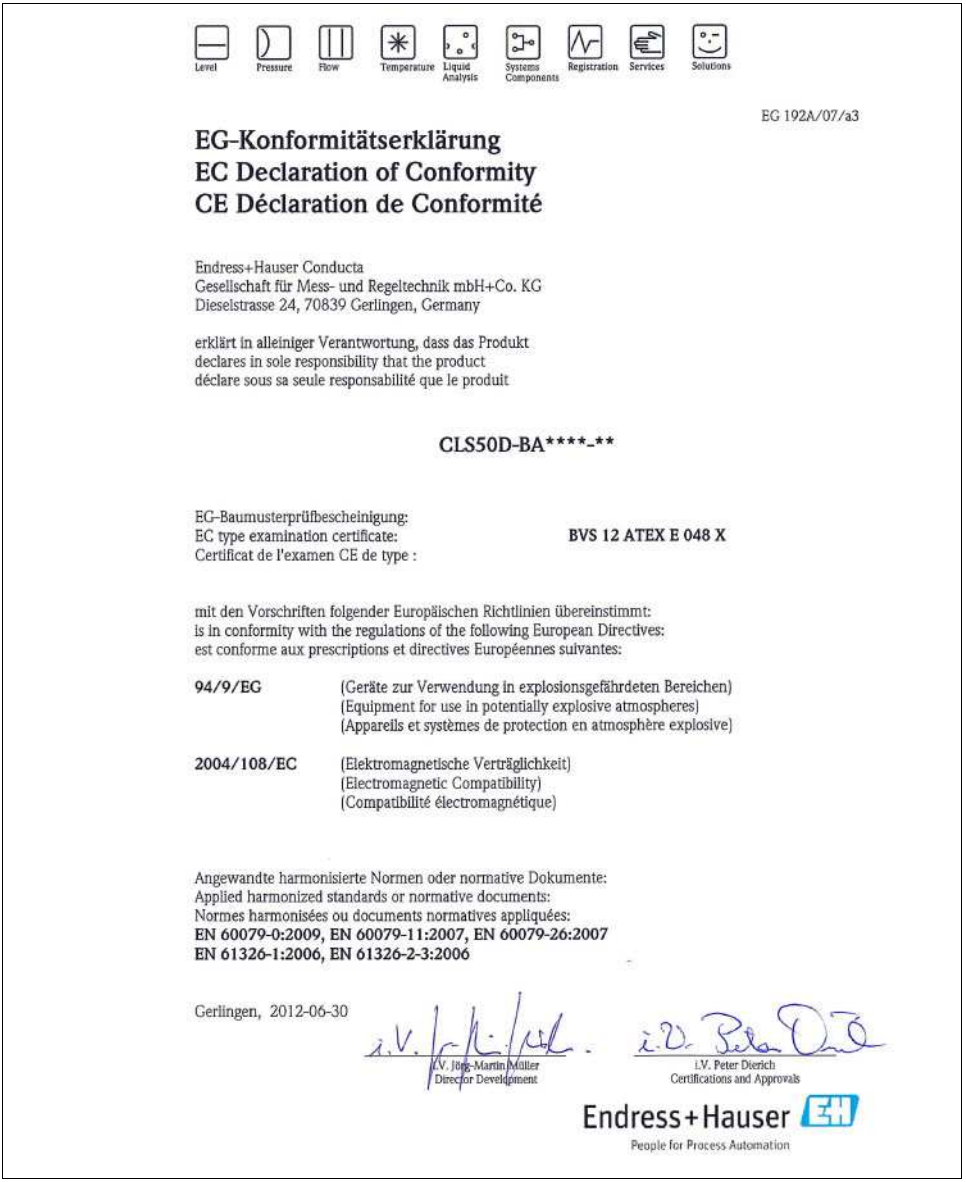
9.5.3 Chemical durability

Medium	Concentration	PEEK	PFA	CHEMRAZ	VITON
Sodium hydroxide solution NaOH	0 to 50 %	20 to 100 °C (68 to 212 °F)	not suitable	0 to 150 °C (32 to 302 °F)	not suitable
Nitric acid HNO_3	0 to 10 %	20 to 100 °C (68 to 212 °F)	20 to 80 °C (68 to 176 °F)	0 to 150 °C (32 to 302 °F)	0 to 120 °C (32 to 248 °F)
	0 to 40 %	20 °C (68 °F)	20 to 60 °C (68 to 140 °F)	0 to 150 °C (32 to 302 °F)	0 to 120 °C (32 to 248 °F)
Phosphoric acid H_3PO_4	0 to 80 %	20 to 100 °C (68 to 212 °F)	20 to 60 °C (68 to 140 °F)	0 to 150 °C (32 to 302 °F)	0 to 120 °C (32 to 248 °F)
Sulphuric acid H_2SO_4	0 to 2.5 %	20 to 80 °C (68 to 176 °F)	20 to 100 °C (68 to 212 °F)	0 to 150 °C (32 to 302 °F)	0 to 120 °C (32 to 248 °F)
	0 to 30 %	20 °C (68 °F)	20 to 100 °C (68 to 212 °F)	0 to 150 °C (32 to 302 °F)	0 to 120 °C (32 to 248 °F)
Hydrochloric acid HCl	0 to 5 %	20 to 100 °C (68 to 212 °F)	20 to 80 °C (68 to 176 °F)	0 to 150 °C (32 to 302 °F)	0 to 120 °C (32 to 248 °F)
	0 to 10 %	20 to 100 °C (68 to 212 °F)	20 to 80 °C (68 to 176 °F)	0 to 150 °C (32 to 302 °F)	0 to 120 °C (32 to 248 °F)

No responsibility is taken for the correctness of this information.

10 Appendix

10.1 Declaration of conformity for CLS50D-BA and CLS50-G



Level Pressure Flow Temperature Liquid Analysis Systems Components Registration Services Solutions

EG 192A/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

CLS50D-BA**-****

EG-Baumusterprüfbescheinigung:
EC type examination certificate: **BVS 12 ATEX E 048 X**
Certificat de l'examen CE de type :

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:

94/9/EG (Geräte zur Verwendung in explosionsgefährdeten Bereichen)
(Equipment for use in potentially explosive atmospheres)
(Appareils et systèmes de protection en atmosphère explosive)

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 60079-0:2009, EN 60079-11:2007, EN 60079-26:2007
EN 61326-1:2006, EN 61326-2-3:2006

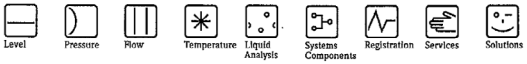
Gerlingen, 2012-06-30

i.V. Jörg-Martin Müller
Director Development

i.V. Peter Dierich
Certifications and Approvals

Endress+Hauser
People for Process Automation

a0014933



EG 094B/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 die Produkte
declares in sole responsibility that the products
déclare sous sa seule responsabilité que les produits

Memosens Sensoren / sensors / capteurs

Indumax P CLS50-G***

EG-Baumusterprüfbescheinigung:
EC type examination certificate: **DMT 99 ATEX E 075 X**
Certificat de l'examen CE de type :
ausgestellt von / issued by / exposé par : **DEKRA EXAM GmbH**

mit den Vorschriften folgender Europäischen Richtlinien übereinstimmen:
are in conformity with the regulations of the following European Directives:
sont conformes aux prescriptions et directives Européennes suivantes:

94/9/EG (Geräte zur Verwendung in explosionsgefährdeten Bereichen)
(Equipment for use in potentially explosive atmospheres)
(Appareils et systèmes de protection en atmosphère explosive)

2004/108/EG (Elektromagnetische Verträglichkeit)
(Electromagnetic Compatibility)
(Compatibilité électrotechnique)

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents:
Normes harmonisées ou documents normatives appliquées:
EN 60079-0:2009, EN 60079-11:2007, EN 60079-26:2007
EN 61326-1:2006, EN 61326-2-3:2006

Benannte Stelle für QS-Überwachung:
Notified body for QA control:
Organisme notifié pour l'assurance qualité :
DEKRA EXAM GmbH
Kennnummer / Identification number /
numéro d'identification (0158)

Gerlingen, 2010-10-28

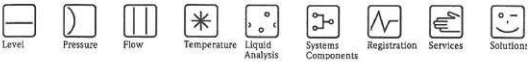
i.V. Jörg-Martin Müller
Director Development

i.V. Peter Dierich
Certifications and Approvals

Endress+Hauser
People for Process Automation

a0007216

10.2 Declaration of conformity for CLS50D-BV and CLS50-V



EG-Konformitätserklärung
EC Declaration of Conformity
CE Déclaration de Conformité

Wir erklären in alleiniger Verantwortung, dass das Produkt
We declare in sole responsibility that the product
Nous déclare sous sa seule responsabilité que le produit

Indumax CLS50D-BV**-****

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 :

94/9/EC	Geräte zur Verwendung in explosionsgefährdeten Bereichen - Kategorie 3G Equipment for use in potentially explosive atmospheres – Category 3G Appareils et systèmes de protection en atmosphère explosive Catégorie 3G

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents:
Normes harmonisées ou documents normatives appliquées:

EN 60079-0:2009, EN 60079-11:2012

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

Date: July 12th, 2013

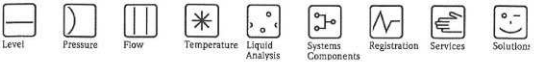
i. V. Jörg-Martin Müller
Technology

i. V. Gunnar Fischer
Technology Certifications and Approvals

Zertifikats-Nr. | Certificate-no.: <EC_201_A_13>
Seite | Page 1

Endress+Hauser
People for Process Automation

a0021392



EG-Konformitätserklärung
EC Declaration of Conformity
CE Déclaration de Conformité

Wir erklären in alleiniger Verantwortung, dass das Produkt
We declare in sole responsibility that the product
Nous déclare sous sa seule responsabilité que le produit

Indumax P CLS50-V***

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 :

94/9/EC

Geräte zur Verwendung in explosionsgefährdeten Bereichen – Kategorie 3G
Equipment for use in potentially explosive atmospheres – Category 3G
Appareils et systèmes de protection en atmosphère explosive Catégorie 3G

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents:
Nomes harmonisées ou documents normatives appliquées:

EN 60079-0:2009, EN 60079-11:2012

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

Date: July 11th, 2013

i. V. Jörg-Martin Müller
Technology

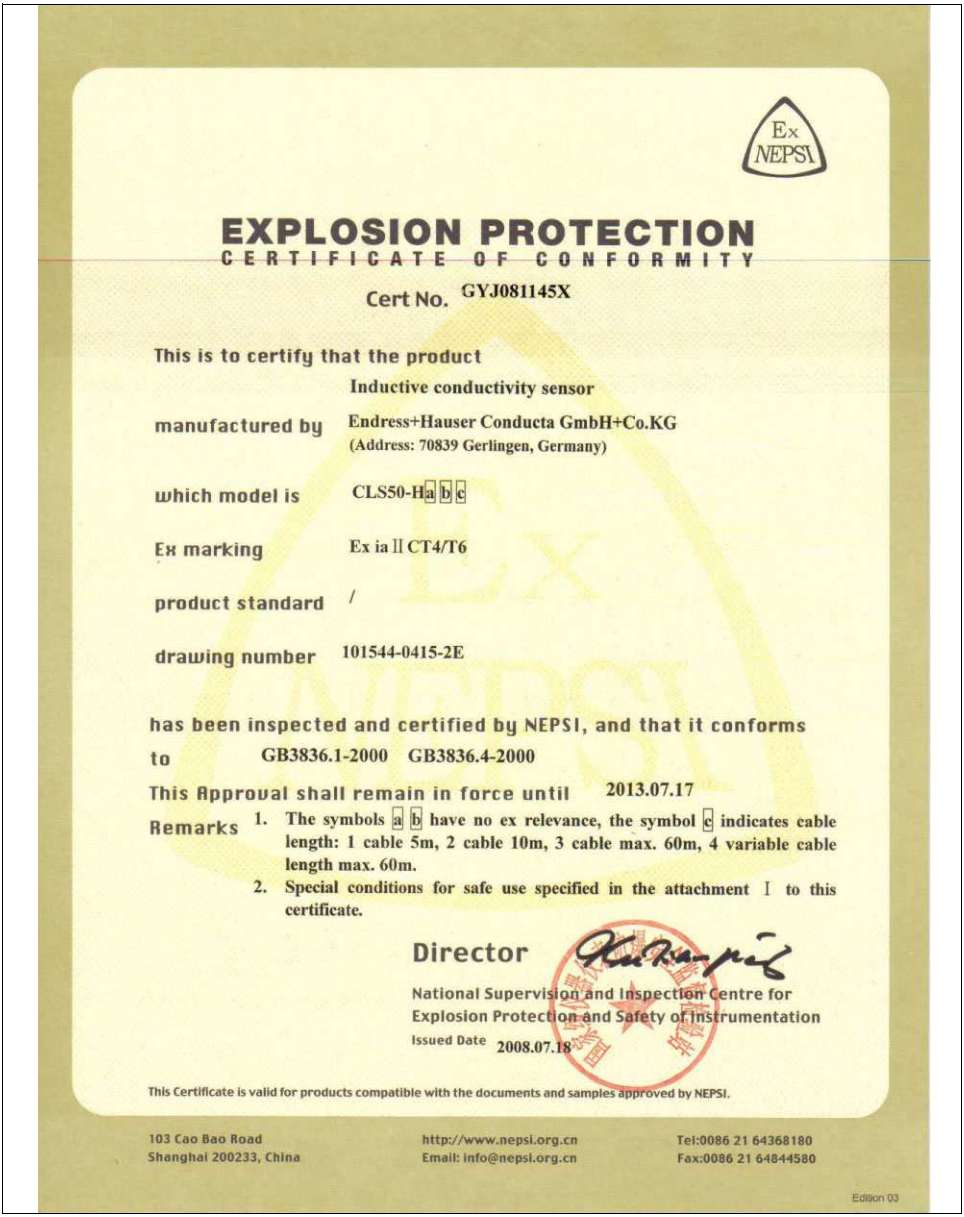
i. V. Gunnar Fischer
Technology Certifications and Approvals

Zertifikats-Nr. | Certificate-no.: <EC_200_A_13>
Seite | Page 1

Endress+Hauser
People for Process Automation

a0013271

10.3 NEPSI for CLS50D-NA and CLS50-H



EXPLOSION PROTECTION
CERTIFICATE OF CONFORMITY

Cert No. GYJ081145X

This is to certify that the product

Inductive conductivity sensor

manufactured by Endress+Hauser Conducta GmbH+Co.KG
(Address: 70839 Gerlingen, Germany)

which model is CLS50-Ha[b][c]

Ex marking Ex ia IIC T4/T6

product standard /

drawing number 101544-0415-2E

has been inspected and certified by NEPSI, and that it conforms to GB3836.1-2000 GB3836.4-2000

This Approval shall remain in force until 2013.07.17

Remarks
1. The symbols [a] [b] have no ex relevance, the symbol [c] indicates cable length: 1 cable 5m, 2 cable 10m, 3 cable max. 60m, 4 variable cable length max. 60m.
2. Special conditions for safe use specified in the attachment I to this certificate.

Director

National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation

Issued Date 2008.07.18

This Certificate is valid for products compatible with the documents and samples approved by NEPSI.

103 Cao Bao Road
Shanghai 200233, China

http://www.nepsi.org.cn
Email: info@nepsi.org.cn

Tel:0086 21 64368180
Fax:0086 21 64844580

Edition 03

a0013273

国家级仪器仪表防爆安全监督检验站

National Supervision and Inspection Centre for
Explosion Protection and Safety of Instrumentation

(GYJ081145X) **(Attachment Ⅰ)**

Attachment Ⅰ to GYJ081145X

1. Description

CLS50-Ha b c inductive conductivity sensor, manufactured by Endress+Hauser Conducta GmbH+Co.KG, has been certified by National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI). The inductive conductivity sensor accords with following standards:

GB3836.1-2000 "Electrical apparatus for explosive gas atmospheres- Part 1: General requirements"

GB3836.4-2000 "Electrical apparatus for explosive gas atmospheres- Part 4: Intrinsic safety 'i'"

The inductive conductivity sensor has the Ex marking Ex ia II CT4/T6. The certificate number is GYJ081145X.

2. Special Condition for Safe Use

2.1 The relationships between the tenperature class and the ambient temperature of the inductive conductivity sensor are as following:

Ambient temperature	-20℃~+125℃	-20℃~+75℃
Temperature class	T4	T6

2.2 The symbol "X" placed after the certificate number indicates special condition for safe use, that is the sensor may only be applied in liquid media with a conductivity of > 10nS/cm.

2.3 The connecting parameters of the sensor is as following:

U_i=14.0V I_i=100mA P_i=0.35W

2.4 The perminent connected cable of the sensor is ≤ 60m.

2.5 When installation, use and maintenance of the sensor, observe following standards

GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13:Repair and overhaul for apparatus used in explosive gas atmospheres"

GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15:Electrical installations in hazardous area (other than mines)"

Page 1 of 2

a0013276

(GYJ081145X) **(Attachment Ⅰ)**

GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16:Inspection and maintenance of electrical installation (other than mines)"
GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"

3. Manufacturer's Responsibility

3.1 Special condition for safe use specified above should be included in the instruction manual.
3.2 Manufacturing should be done according to the documentation approved by NEPSI.
3.3 Any modification with influence on the type of protection should be submitted to NEPSI before application.
3.4 Following items should be added to the nameplate

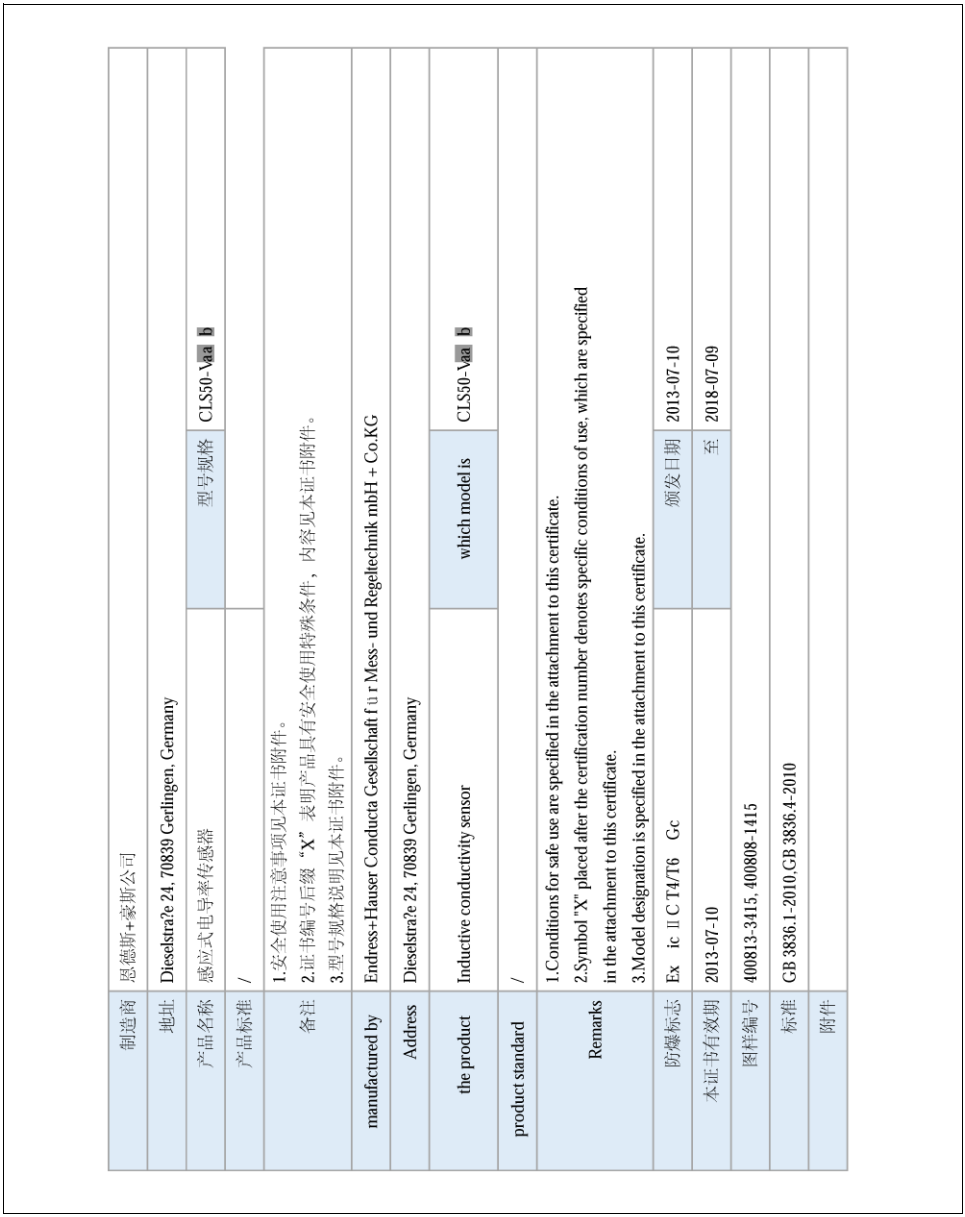
a) NEPSI logo
b) Ex marking
c) Number of certificate
d) Ambient temperature range

National Supervision and Inspection Center
for Explosion Protection and Safety of Instrumentation
2008.07.18

Page 2 of 2

a0013277

10.4 NEPSI for CLS50-V



制造商	恩德斯+豪斯公司		
地址	Dieselstra?e 24, 70839 Gerlingen, Germany		
产品名称	感应式电导率传感器	型号规格	CLS50-Vaa b
产品标准	/		
备注	1.安全使用注意事项见本证书附件。 2.证书编号后缀 "X" 表明产品具有安全使用特殊条件，内容见本证书附件。 3.型号规格说明见本证书附件。		
manufactured by	Endress+Hauser Conducta Gesellschaft f u r Mess- und Regeltechnik mbH + Co.KG		
Address	Dieselstra?e 24, 70839 Gerlingen, Germany		
the product	Inductive conductivity sensor	which model is	CLS50-Vaa b
product standard	/		
Remarks	1.Conditions for safe use are specified in the attachment to this certificate. 2.Symbol "X" placed after the certification number denotes specific conditions of use, which are specified in the attachment to this certificate. 3.Model designation is specified in the attachment to this certificate.		
防爆标志	Ex ic II C T4/T6 Gc	颁发日期	2013-07-10
本证书有效期	2013-07-10	至	2018-07-09
图样编号	400813-3415, 400808-1415		
标准	GB 3836.1-2010,GB 3836.4-2010		
附件			

a0021394

Index

A
Airset 14
ANSI Z535.6 4

C
Certificate
  Declaration of conformity Zone 0 . . . . . 31, 33
  NEPSI Zone 0 35
  NEPSI Zone 2 38
Certificates 12
Commissioning 23

D
Declaration of conformity 12
Designated use 5

E
Electrical connection 18
Explosion protection 6

F
Flange 14

I
Identification
  Certificates 12
  Nameplate 10
  Temperature classes 10
  Type code 8
Incoming acceptance 8
Installation
  Airset 14
  Installation factor 13
  Installation position 13
  With assembly 16
  With flange 14
  With lap-joint flange 16

L
Lap-joint flange 16

N
Nameplate 10

O
Occupational safety 5
Operational safety 6

P
Product identification 8
Product safety 6

R
Repair 24
Requirements for personnel 5

S
Safety
  Designated use 5
  Explosion protection 6
  Occupational safety 5
  Operational safety 6
  Product safety 6
  Requirements for personnel 5
Sensor
  Installation 14
Spare parts 24
State of the art 6
Symbols 4

T
Temperature classes 10
Type code 8

U
Use 5

W
Warnings 4
Wiring 18

Z
Zone 0 20
Zone 2 22

www.addresses.endress.com

Endress+Hauser

People for Process Automation