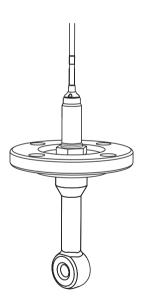
# Operating Instructions Indumax CLS50/CLS50D

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





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Document information Indumax CLS50/CLS50D

## 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
Cause (/consequences) Consequences if safety message is not heeded Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation <b>will</b> 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 <b>can</b> 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

Indumax CLS50/CLS50D Basic safety instructions

# 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.

Basic safety instructions Indumax CLS50/CLS50D

## 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).

Indumax CLS50/CLS50D Basic safety instructions

#### 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 <sub>i</sub>	5.1 V
$I_i$	130 mA
P <sub>i</sub>	166 mW
C <sub>i</sub>	18 μF
L <sub>i</sub>	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 F.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  $M\Omega$ ).
- 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)!
- $\ \ \, \blacksquare$  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.
- 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	Туре		Version							
Indumax	CLS50D	-	BA	х	х	х	х	-	х	х
			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	Туре		Version							
Indumax	CLS50D	-	BV	х	х	х	х	-	х	х
			for the use in hazardous location, ATEX II 3G Ex ic IIC T4/T6 Gc	conne		calibra	s, mate tion, se		able	

Name	Туре		Version							
Indumax	CLS50D	-	NA	х	х	х	х	-	х	х
			for the use in hazardous location, NEPSI Ex ia IIC T4/T6 Ga	conne		calibra	s, mate tion, se		ible	

Name	Туре		Version							
Indumax	CLS50D	-	C2	х	х	х	х	-	х	х
			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	Туре		Version							
Indumax	CLS50D	-	FB	х	х	х	х	-	х	х
			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	Туре		Version							
Indumax	CLS50	-	G	х	х	х				
			for the use in hazardous locations, ATEX II 1G Ex ia IIC T4/T6 Ga	Process connections, material no Ex relevance						

Name	Туре		Version							
Indumax	CLS50	-	V	Х	х	х				
			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	Туре		Version							
Indumax	CLS50	-	Н	х	х	х				
			for the use in hazardous location, NEPSI Ex ia IIC T4/T6 Ga	Process connections, material no Ex relevance						

Name	Туре		Version							
Indumax	CLS50	-	0	х	х	х				
			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	Туре		Version							
Indumax	CLS50	-	S	х	х	Х				
			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 <sub>a</sub>	Medium temperature range $T_{med}$
T4	CLS50D-BA*D	-20 °C to +60 °C	-20 °C to +110 °C
	CLS50D-BA*C	-20 °C to +60 °C	-20 °C to +120 °C
	CLS50D-BA*B	-20 °C to +60 °C	-20 °C to +120 °C
T6	CLS50D-BA*D	-20 °C to +60 °C	-20 °C to +70 °C
	CLS50D-BA*C	-20 °C to +60 °C	-20 °C to +70 °C
	CLS50D-BA*B	-20 °C to +60 °C	-20 °C to +70 °C

## CLS50-G

Temperature class	Sensor	Ambient temperature range T <sub>a</sub>	Medium temperature range $T_{med}$		
T4	CLS50-G	-20 °C to +125 °C	-20 °C to +125 °C		
Т6	CLS50-G	-20 °C to +75 °C	-20 °C to +75 °C		

#### CLS50D-NA

Temperature class	Sensor	Ambient temperature range T <sub>a</sub>	Medium temperature range $T_{med}$
T4	CLS50D-NA*D	-20 °C to +60 °C	-20 °C to +110 °C
	CLS50D-NA*C	-20 °C to +60 °C	-20 °C to +120 °C
	CLS50D-NA*B	-20 °C to +60 °C	-20 °C to +120 °C
Т6	CLS50D-NA*D	-20 °C to +60 °C	-20 °C to +70 °C
	CLS50D-NA*C	-20 °C to +60 °C	-20 °C to +70 °C
	CLS50D-NA*B	-20 °C to +60 °C	-20 °C to +70 °C

## CLS50-H

Temperature class	lass Sensor Ambient temperature range $T_a$		Medium temperature range $T_{med}$		
T4	CLS50-H	-20 °C to +125 °C	-20 °C to +125 °C		
Т6	CLS50-H	-20 °C to +75 °C	-20 °C to +75 °C		

## CLS50D-BV

Temperature class	ture class   Sensor   Ambient temperature range T <sub>a</sub>		Medium temperature range $T_{med}$	
T4	CLS50D-BV	-20 °C to +120 °C	-20 °C to +120 °C	
Т6	CLS50D-BV	-20 °C to +75 °C	-20 °C to +75 °C	

## CLS50-V

Temperature class	Sensor	Ambient temperature range T <sub>a</sub>	Medium temperature range $T_{med}$	
T4	CLS50-V	-20 °C to +125 °C	-20 °C to +125 °C	
Т6	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  $\mathbf{C}\mathbf{E}$  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

Indumax CLS50/CLS50D Installation

## 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.

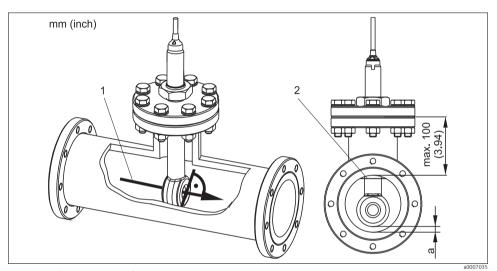


Fig. 1: Installation position of the sensor

1 Flow direction of medium

2 Minimum water level in the pipe

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.

Installation Indumax CLS50/CLS50D

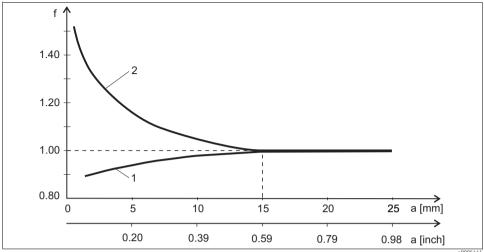


Fig. 2: Relationship between installation factor f and distance from wall a

a000344.

- 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  $\geq$  DN 80 with the outgoing diameter reduced to > DN 50.

## **A** 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.

Indumax CLS50/CLS50D Installation

## 4.2.2 Flange, not in contact with medium

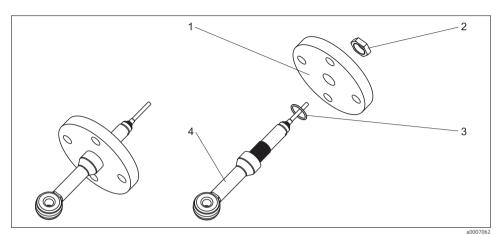


Fig. 3: Fixed flange, in contact with medium (order option "process connection": 3, 4)

Flange (stainless steel)

Nut

O-ring 4 Sensor

## 4.2.3 Flange, not in contact with medium

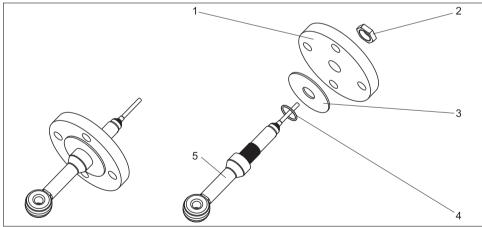


Fig. 4: Fixed flange, not in contact with medium (order option "process connection": 5, 6, 7)

Flange (stainless steel)

O-ring

2 3 Sealing disk (GYLON) Sensor

15 Endress+Hauser

Installation Indumax CLS50/CLS50D

## 4.2.4 Lap-joint flange, not in contact with medium

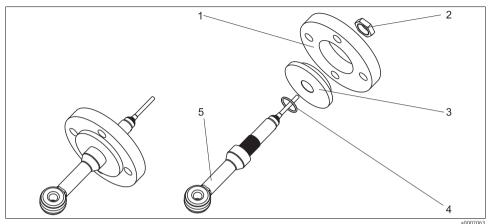


Fig. 5: Lap-joint flange, not in contact with medium (order option "process connection": A, B, C)

1 Lap-joint flange (PP-GF)

Nut (stainless steel)Flange (PVDF)

4 O-ring 5 Sensor

## 4.2.5 Assembly installation

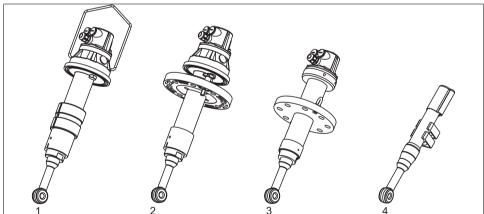


Fig. 6: Installation of sensor with assembly

CLA111 with suspension bracket
 CLA111 with flange connection

3 CLA140 with flange connection

4 CYA611

16 Endress+Hauser

400070

Indumax CLS50/CLS50D Installation

## 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?

Wiring Indumax CLS50/CLS50D

# 5 Wiring

## **WARNING**

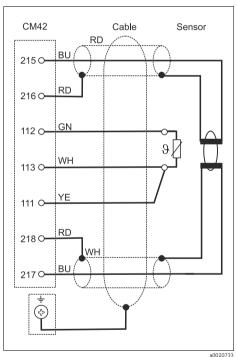
#### Device is energized

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





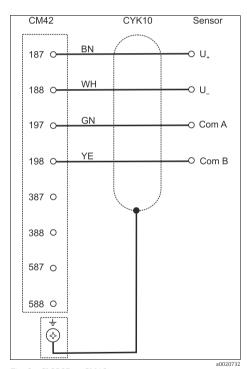
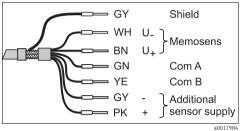


Fig. 8: CLS50D to CM42

Indumax CLS50/CLS50D Wiring

#### 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).



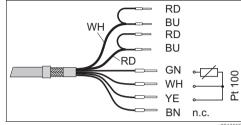


Fig. 9: CYK11 for cable extension for CLS50D -max. total cable length: 100 m (330 ft)

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

 $\ensuremath{\blacksquare}$  Please note that the residual coupling increases when the cable is extended.

Wiring Indumax CLS50/CLS50D

# 5.2 Wiring diagram for explosion-hazardous areas

## 5.2.1 Sensors for Zone 0 (ATEX)

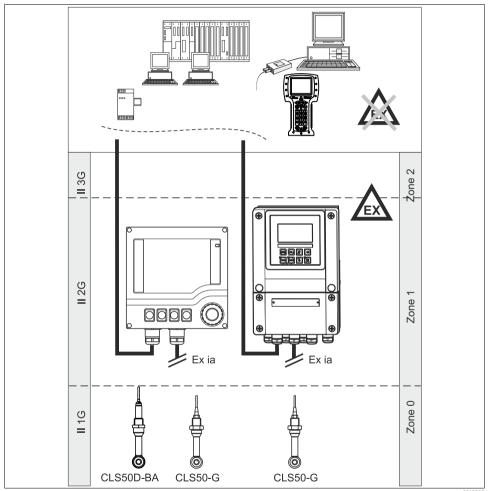


Fig. 11: Connection in hazardous location

a0013258

Indumax CLS50/CLS50D Wiring

## 5.2.2 Sensors for Zone 0 (NEPSI)

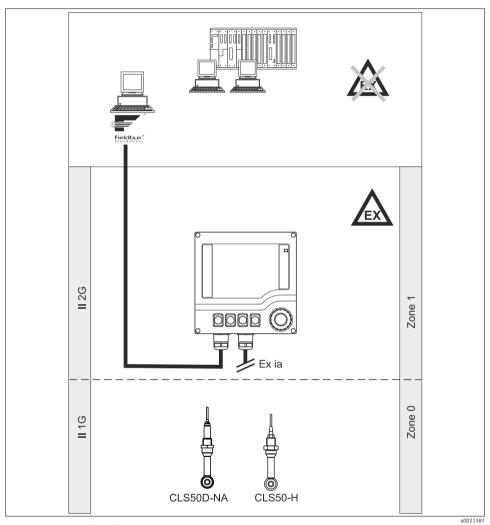


Fig. 12: Connection in hazardous location

Wiring Indumax CLS50/CLS50D

## 5.2.3 Sensors for Zone 2 (ATEX/NEPSI)

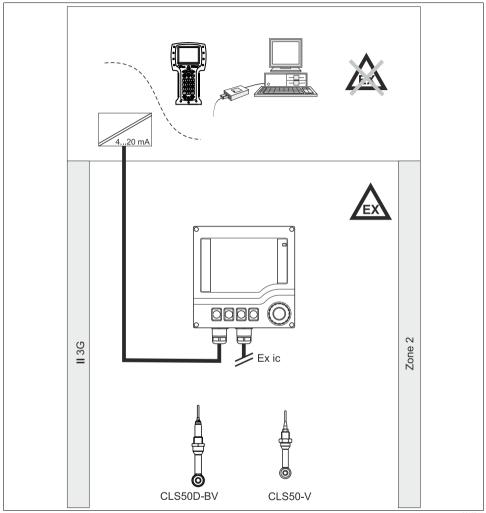


Fig. 13: Connection in hazardous location

a0010316

## 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.

Indumax CLS50/CLS50D Commissioning

# 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

#### **A 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.

Repair Indumax CLS50/CLS50D

# 8 Repair

# 8.1 Spare parts

	Pos. no.	Spare part kit	Order no.
150	150, 255	Kit CHEMRAZ seal  Nut (Pos. 150)  CHEMRAZ O-ring, 2 pcs. (Pos. 255)	71086368
285 286 260	150, 250	Kit VITON seal  Nut (Pos. 150)  VITON O-ring, 3 pcs. (Pos. 250)	71086369
270	260	Kit PTFE sealing disk for DN 50	71086372
250	270	Kit PTFE sealing disk for ANSI 2" and JIS 10K 50A	71086374
250 255	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
i a0007081	150, 286	Kit fixed flange JIS, stainless steel 1.4404 (AISI 316 L)Nut (Pos. 150) Flange DN 50 (Pos. 286)	51500934
291 292 293	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
150 287 288 289	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
260 270 250 255	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
a0007082			

Indumax CLS50/CLS50D Repair

## 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

Technical data Indumax CLS50/CLS50D

## 9 Technical data

## 9.1 Input

#### 9.1.1 Measured variable

- Conductivity
- Temperature

#### 9.1.2 Cell constant

 $k = 1.98 \text{ cm}^{-1}$ 

## 9.1.3 Measuring frequency

2 kHz

#### 9.1.4 Measuring ranges

Conductivity:  $2 \mu \text{S/cm}$  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):

 $\pm$ (5 µS/cm + 0.5 % of the measured value)

■ > 100 °C (212 °F):

 $\pm$ (10  $\mu$ S/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

Indumax CLS50/CLS50D Technical data

## 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

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

Technical data Indumax CLS50/CLS50D

#### CLS50

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

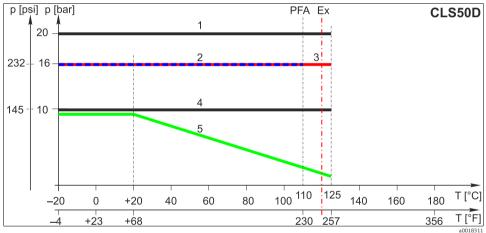


Fig. 14: Pressure-temperature-diagram of CLS50D

- 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)

Indumax CLS50/CLS50D Technical data

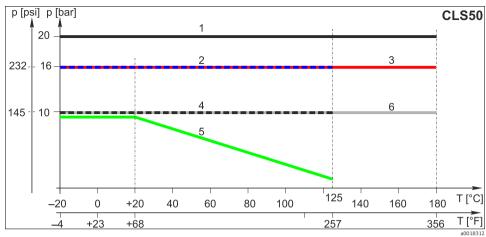


Fig. 15: Pressure-temperature-diagram of CLS50

- 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)
- PFA sensor, with IIS flange (black line) 5
- PEEK or PFA sensor, with lap-joint flange PVDF (green line)

PEEK sensor, with JIS flange (grey line)

#### 9.5 Mechanical construction

#### 9.5.1 Weight

approx. 650 q (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 3/4: 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)

PP-GF Lap-joint flange: Flange combined with lap-joint **PVDF** 

flange:

Technical data Indumax CLS50/CLS50D

# 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	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)
HNO <sub>3</sub>	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 <sub>3</sub> PO <sub>4</sub>	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	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)
H <sub>2</sub> SO <sub>4</sub>	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	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)
HCI	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.

Indumax CLS50/CLS50D Appendix

# 10 Appendix

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

















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: Certificat de l'examen CE de type :

94/9/EG

**BVS 12 ATEX E 048 X** 

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

est conforme aux prescriptions et directives Européennes sulvantes:

(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

V. Jörg-Martin Müller Director Development

i.V. Peter Dierich Certifications and Approvals

Endress+Hauser

People for Process Automation

Appendix Indumax CLS50/CLS50D

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Solutions

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: Certificat de l'examen CE de type : ausgestellt von / issued by / exposé par :

**DMT 99 ATEX E 075 X** 

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)

(Apparells et systèmes de protection en atmosphère explosive) (Elektromagnetische Verträglichkeit)

2004/108/EG

(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

1.V. C. Muller

i,V. Peter Dierich Certifications and Approvals

Endress+Hauser 4

People for Process Automation

## 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: 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 12th, 2013

Technology

Technology Certifications and Approvals

Zertifikats-Nr. | Certificate-no.: <EC\_201\_A\_13> Seite | Page 1

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People for Process Automation

Appendix Indumax CLS50/CLS50D



















## 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>

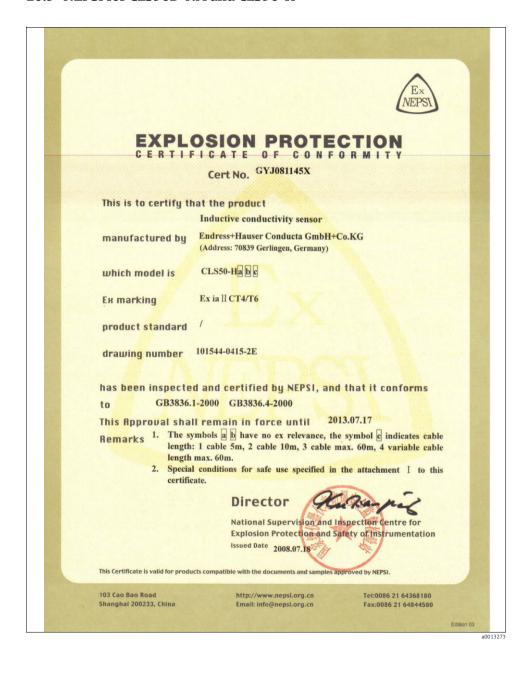
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People for Process Automation

Indumax CLS50/CLS50D Appendix

#### 10.3 NEPSI for CLS50D-NA and CLS50-H



Appendix Indumax CLS50/CLS50D

# 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 do do 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<sub>i</sub>=14.0V

I=100mA

P<sub>i</sub>=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

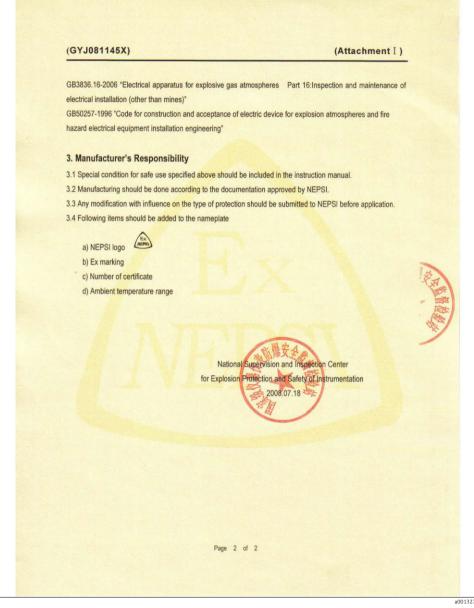
GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13:Repair and overhaul for apparatus used in explosive gas atmospheres"

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

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Indumax CLS50/CLS50D Appendix



Appendix Indumax CLS50/CLS50D

# 10.4 NEPSI for CLS50-V

	总德斯+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	型号规格 CLS50-Vaa B
产品标准	/		
备注 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。	〈件,内容见本证书附件	0
manufactured by	Endress+Hauser Conducta Gesellschaft f $\dot{u}$ r Mess- und Regeltechnik mbH + Co.KG	Regeltechnik mbH + Co.K	9
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.	o this certificate. es specific conditions of us certificate.	e, which are specified
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

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D	S
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L	Zone 0
Lap-joint flange	Zone 2
N	
Namenlate 10	



www.addresses.endress.com