

# Inductive conductivity measurement *mypro CLM 431 / CLD 431 inductive*

**Two-wire transmitter for inductive measurement  
of conductivity in Ex and non-Ex areas with  
HART® or PROFIBUS communication**



The MyPro CLM 431 and its compact version MyPro CLD 431 are field-tested and reliable analytical transmitters used to determine conductivity or concentration in all areas of process control and engineering. Thanks to its compact dimensions and versatile mounting options, the MyPro can be used in any industrial environment.

#### Areas of application

- Chemical and petrochemical industries, including Ex areas
- Pharmaceutical industry
- Power plants
- Water processing
- Wastewater treatment



#### Benefits at a glance

- High reliability and accuracy thanks to:
  - comprehensive self-monitoring functions
  - convenient calibration functions for wet and dry calibration
- Smallest intelligent analytical transmitter currently available
- Extremely simple installation with numerous mounting options; display and housing can be rotated
- Convenient operation via:
  - keypad on instrument
  - hand-held HART® terminal
  - Commwin II via HART® or PROFIBUS-PA

#### Additional advantages of compact version

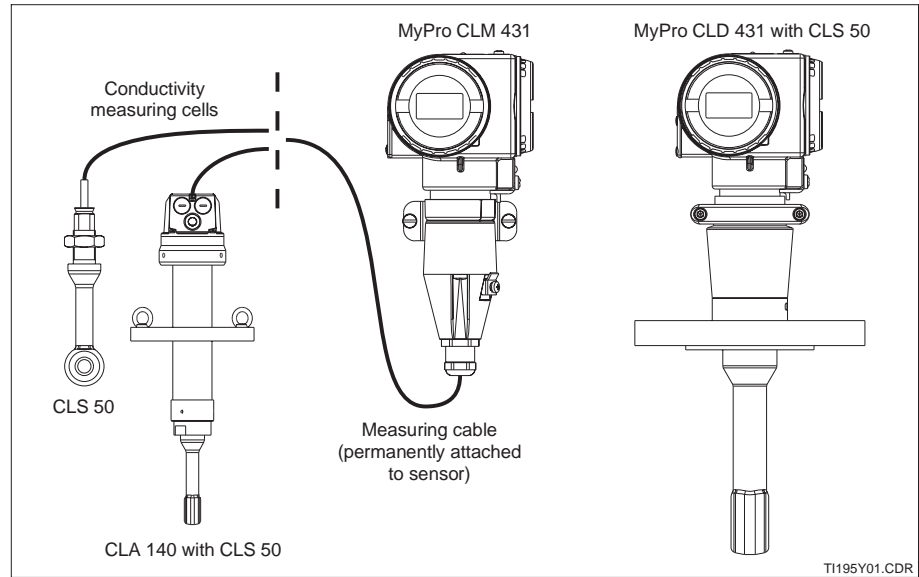
- Minimal installation requirements
- Simple handling
- Rugged measuring cells made of PFA or PEEK



# Measuring system

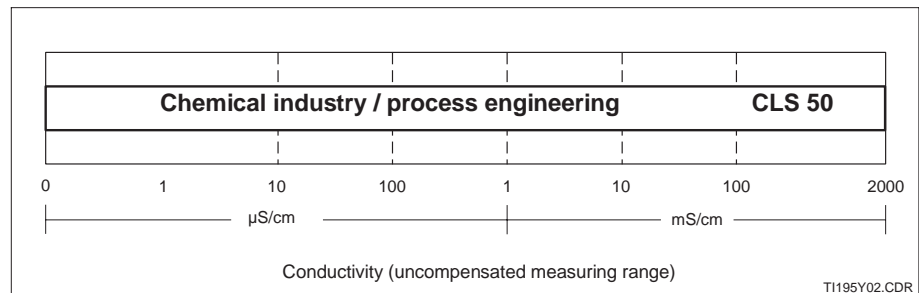
A measuring system generally comprises:

- the MyPro transmitter
- an inductive conductivity measuring cell with an integrated temperature sensor Pt 100 and a fixed cable
- a fitting for weld-mounting or an assembly for installation in a pipeline or tank



Examples of measuring system configurations

# Conductivity measuring cell CLS 50



Application range of inductive conductivity measuring cell CLS 50

The MyPro CLM 431 / CLD 431 transmitter has an overall measuring range of 0 ... 2000 mS/cm which may be spread as required by the application at hand.

# General information

## Measurement

The inductive transmitter MyPro CLM 431 / CLD 431 can be switched from conductivity to concentration measurement.

In the concentration measurement mode, several fixed concentration curves stored in the instrument and a user-programmable concentration curve are available:

- NaOH 0 ... 15%
- HNO<sub>3</sub> 0 ... 20%
- H<sub>2</sub>SO<sub>4</sub> 0 ... 30% / 96 ... 99.7%
- H<sub>3</sub>PO<sub>4</sub> 0 ... 12%
- HCl 0 ... 15%

The reliability and accuracy of the measurement are top priorities, particularly because inductive measurement is frequently subject to exacting conditions. For this reason, this version of the MyPro with its unique Sensor Check System, which monitors for ageing, breakage, short-circuit and moisture penetration, plays a leading role in this product segment. Cyclical automatic demagnetisation and a cyclical adjustment routine help to deliver accurate measured values at all times.

## General information (continued)

### Self-diagnosis

The MyPro permanently monitors the operating condition of the measuring system. 27 possible causes of errors are distinguished. Error conditions are signalled via the field display and the HART® or PROFIBUS interface and, in the case of HART® communication, also via an error current signal (22 mA).

### Temperature compensation

The MyPro offers several temperature compensation options:

- Linear compensation 0 ... 10%/K with the reference temperature selectable by the user
- Compensation according to IEC 746-3 for NaCl
- Compensation with programmable  $\alpha$  table containing up to 10 elements. The temperature can either be measured continuously or entered as a fixed value.

## Operation

### Menu-guided operation

The functions of the MyPro CLM 431 / CLD 431 are arranged at two different levels and can be accessed using four keys:

#### Operating level 1

- ⊕ Viewing of current settings (secondary parameters)
- ⊖ Error diagnosis (diagnostic parameters)
- ⊕ Current output settings (parameter settings)
- ⊙ Calibration

#### Operating level 2

- All other settings are located at this level, e.g. selection of conductivity or concentration measurement.

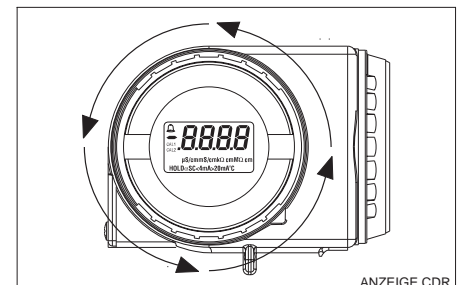
The keypad is located underneath a protective cover to prevent unintentional actuation and soiling.

### No unauthorised access

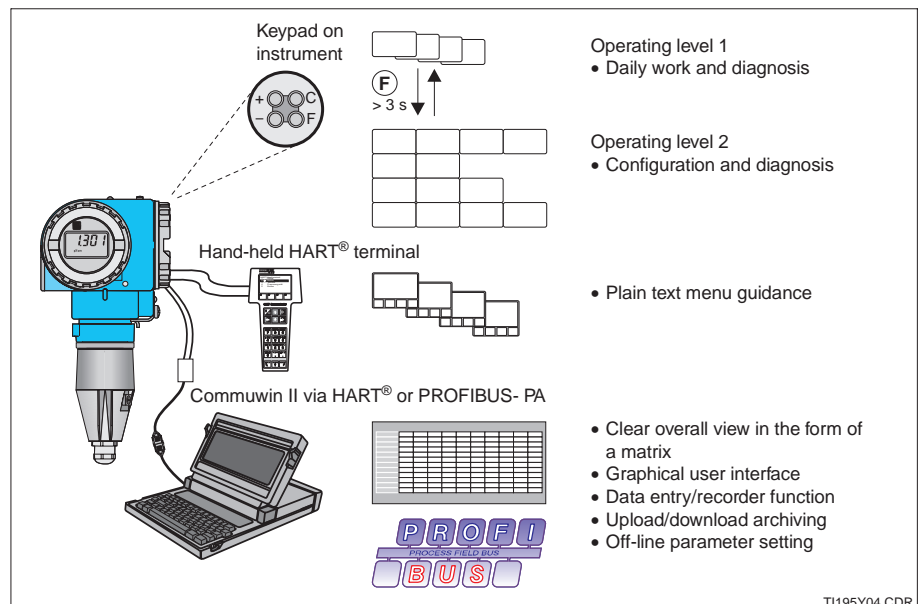
Configuration and calibration data are protected against undesirable modification by means of two access codes.

### Display

The high-contrast liquid crystal display locks in at 90° angles to guarantee optimal readability in different mounting positions.



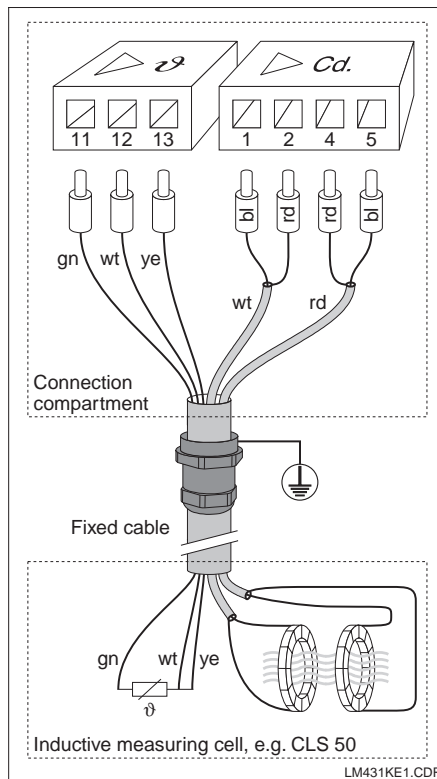
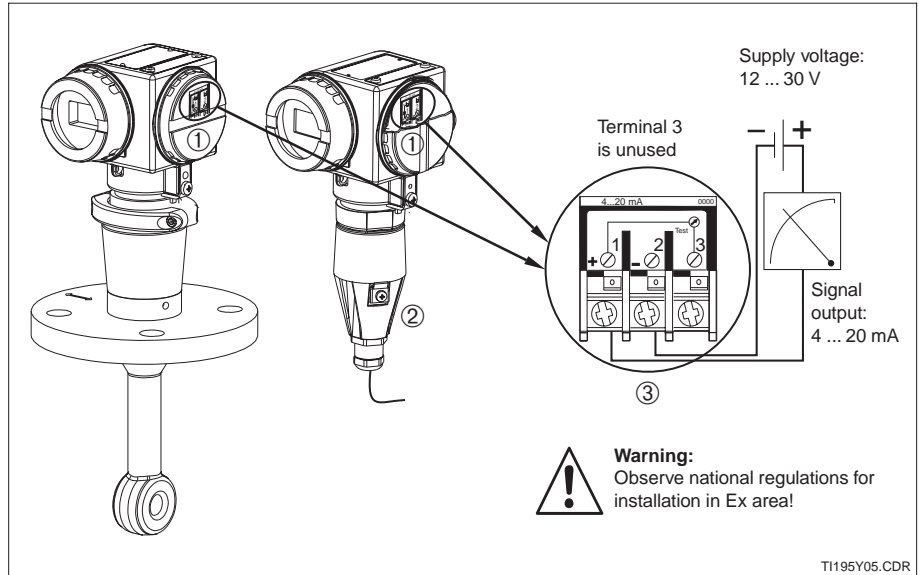
Display



# Electrical connection

Electrical connection of MyPro CLM 431 / CLD 431 (HART® version):

- ① Connection compartment for two-wire line
- ② Connection compartment for measuring cell cable
- ③ Power supply / signal output connection

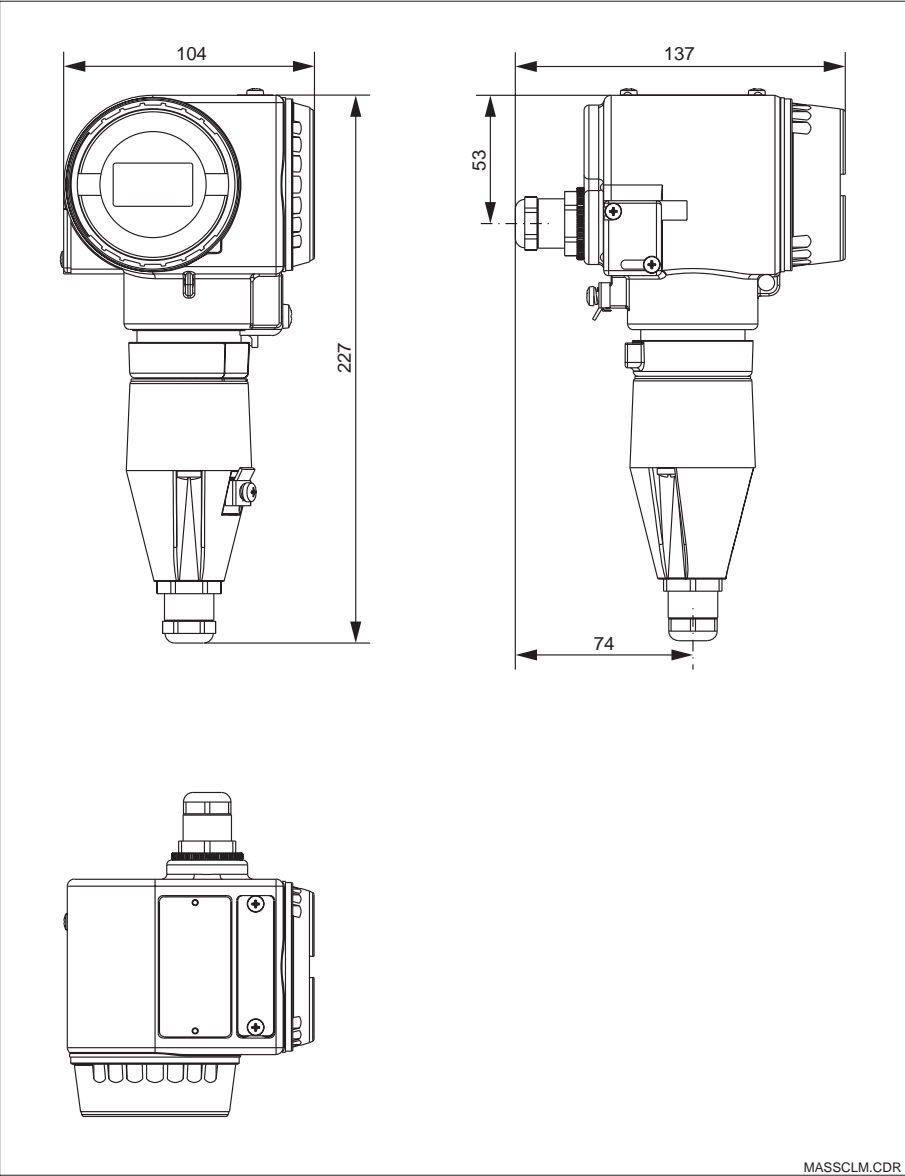


Connection of an inductive measuring cell

## Measuring cable

The MyPro CLM 431 transmitter comes with separate connection compartments for the two-wire line and the measuring cell cable. The conductivity measuring cells are connected via standard screened, multi-core measuring cables (permanently attached to sensor). Junction box VBM and extension cable CLK 5 are to be used for measuring cable extension.

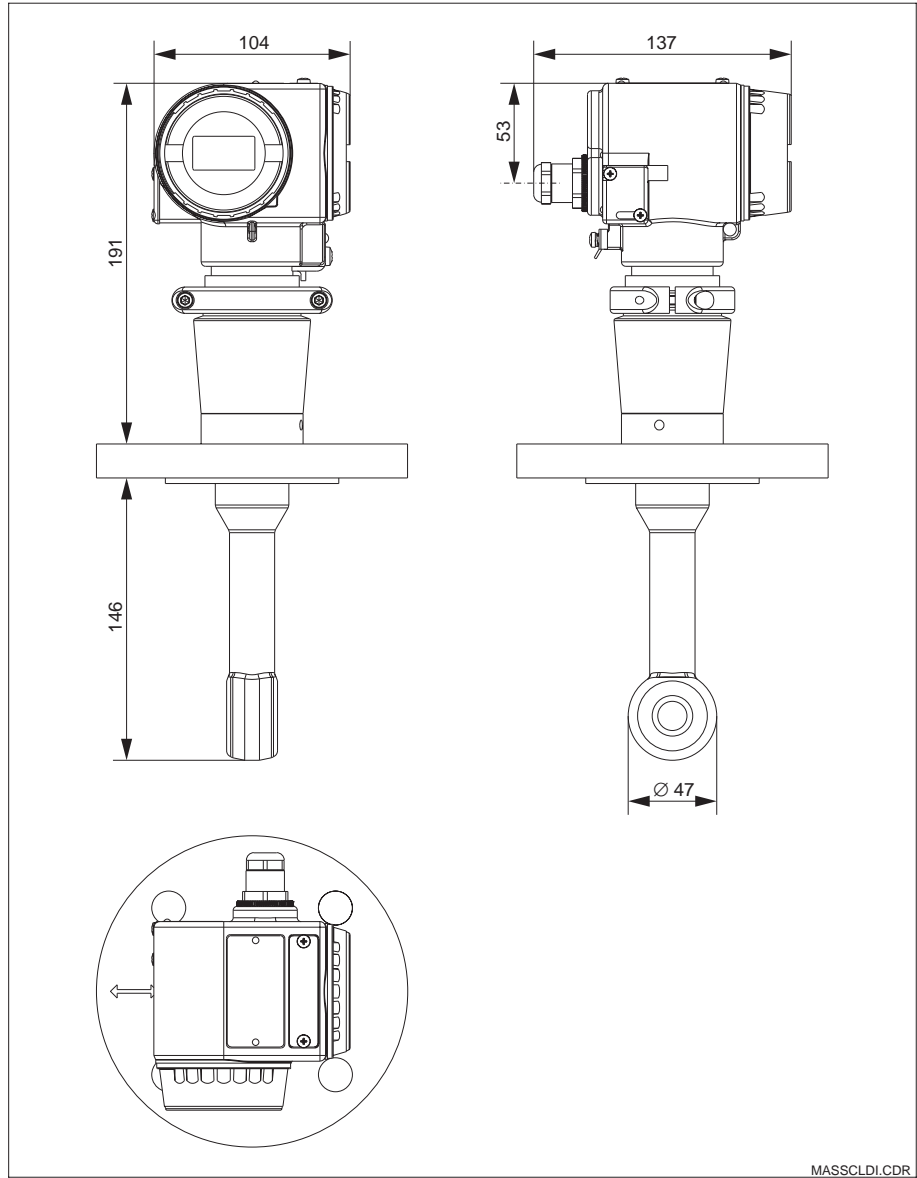
# Dimensions of MyPro CLM 431



Dimensions of MyPro CLM 431

MASSCLM.CDR

# Dimensions of MyPro CLD 431 inductive



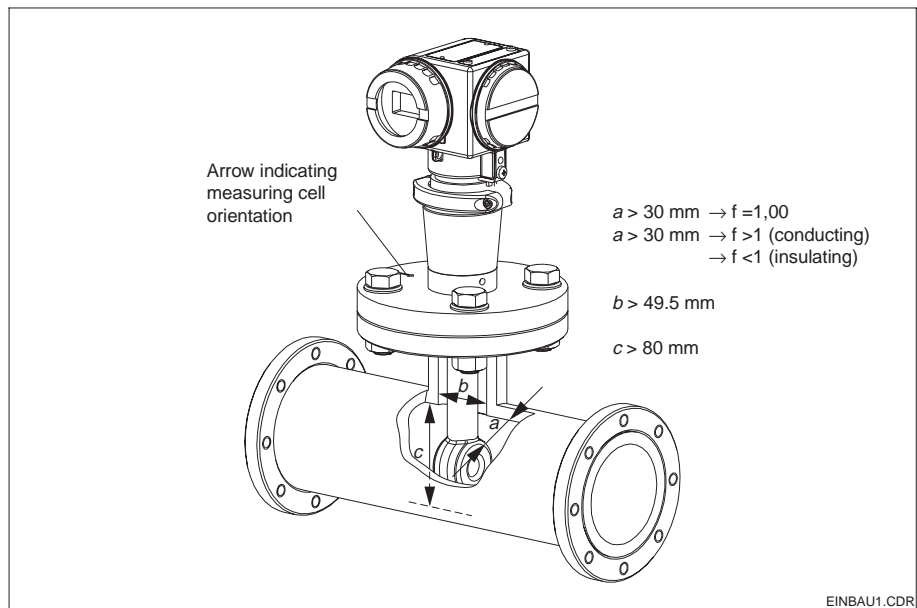
Dimensions of MyPro CLD 431 inductive

MASSCLDI.CDR

# Mounting of MyPro CLD 431 inductive

Compact version: The distance of the measuring cell from the inside pipe wall affects the accuracy. If the wall clearance is adequate ( $a > 30$  mm), the installation factor  $f$  can be neglected ( $f = 1.00$ ). If the

wall clearance is lower, the installation factor increases for electrically insulating pipes ( $f > 1$ ) and decreases ( $f < 1$ ) for electrically conducting pipes.



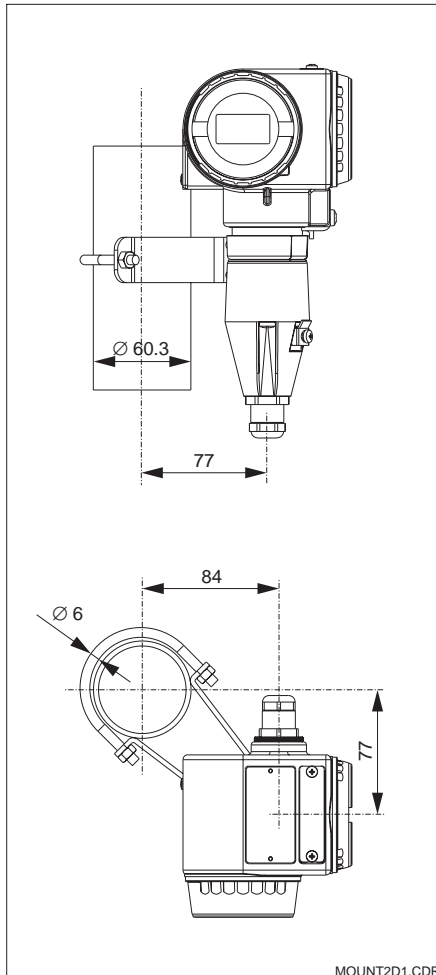
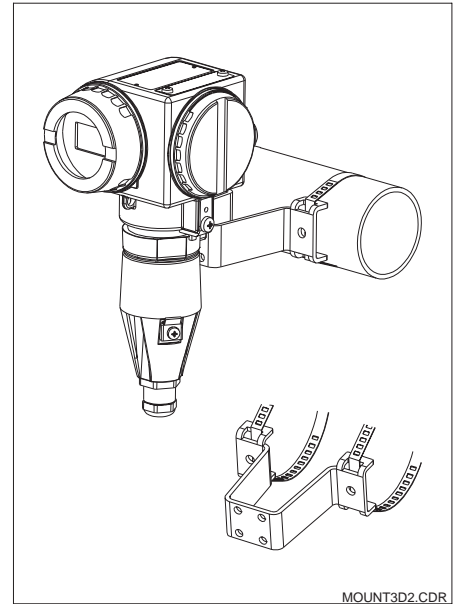
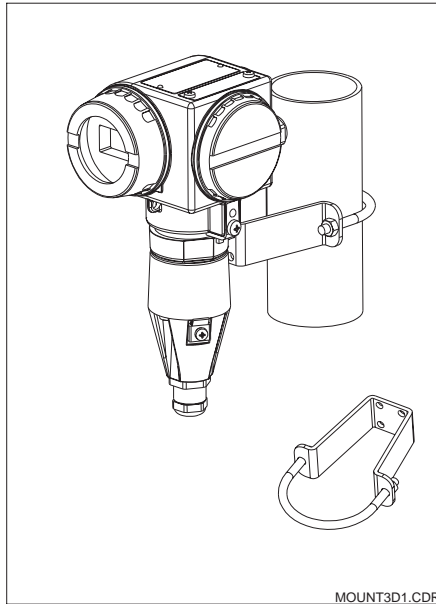
Flange mounting of MyPro CLD 431 inductive

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# Pipe mounting of MyPro CLM 431

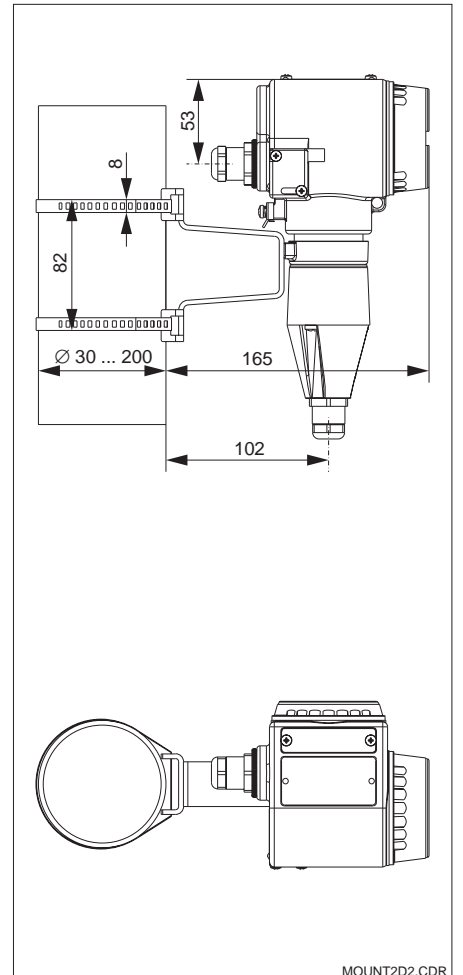
*Left:*  
Pipe mounting DN 60  
with mounting bracket

*Right:*  
Pipe mounting  
DN 30 ... 200 with  
mounting bracket  
(horizontal attachment)



*Left:*  
Pipe mounting DN 60  
with mounting bracket

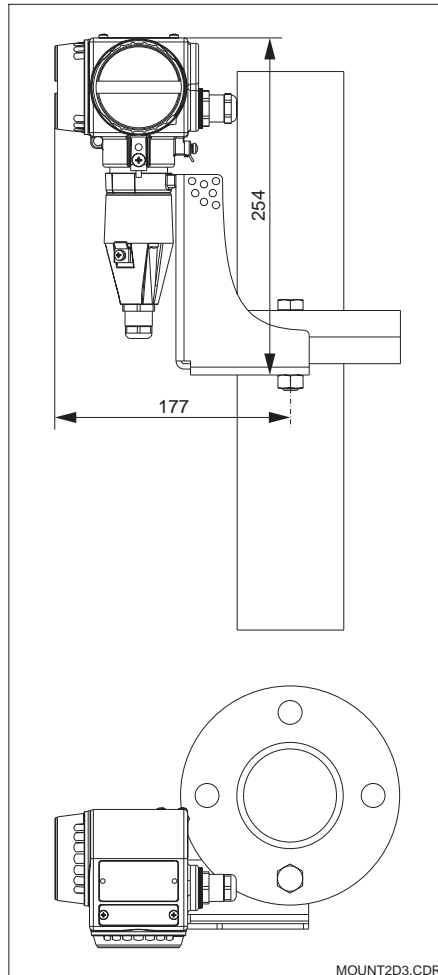
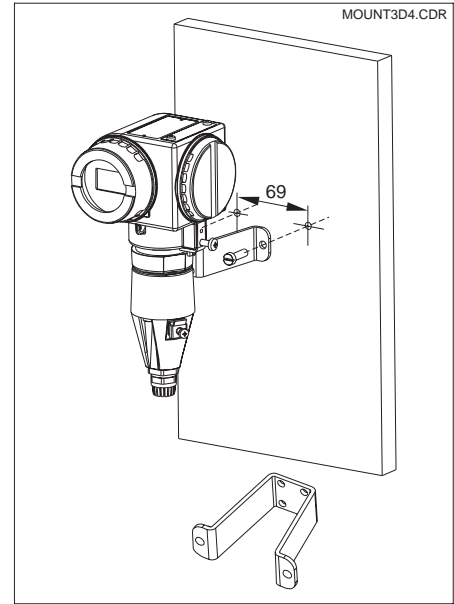
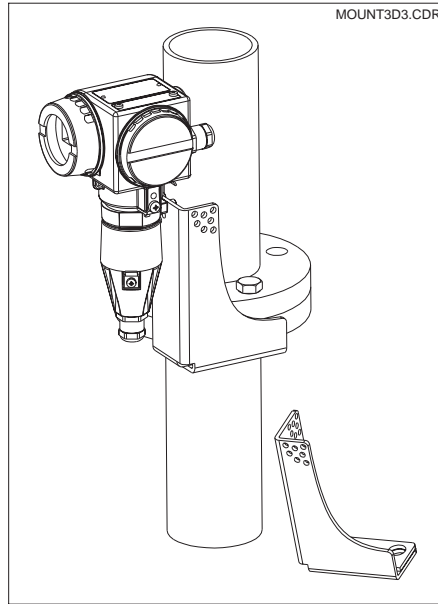
*Right:*  
Pipe mounting  
DN 30 ... 200 with  
mounting bracket  
(vertical attachment)



# Flange and wall mounting of MyPro CLM 431

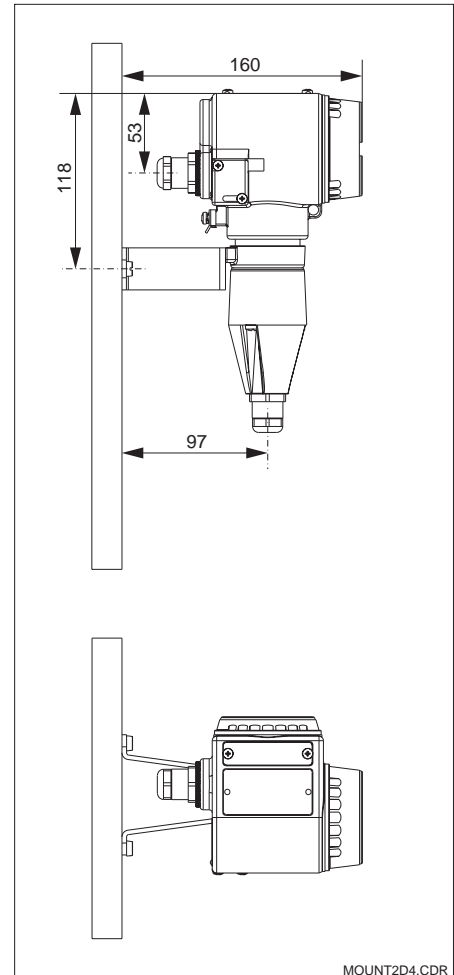
*Left:*  
Flange mounting with angle bracket

*Right:*  
Wall mounting with mounting bracket



*Left:*  
Flange mounting with angle bracket

*Right:*  
Wall mounting with mounting bracket





# Technical data

## MyPro CLM 431 inductive

### General specifications

Manufacturer	Endress+Hauser
Product designation	MyPro CLM 431 inductive

### Physical data

Dimensions (H x W x D)	227 x 104 x 137 mm
Weight	max. 1.25 kg
Protection type	IP 65
Housing material	GD-AISI 10 Mg, plastic-coated
Measured value display	liquid crystal display

### Conductivity measurement

Measuring range	uncompensated: 0 ... 2000 mS/cm
Measurement deviation <sup>1</sup>	±0.5% of measured value ± 4 digits
Reproducibility <sup>1</sup>	±0.2% of measured value ± 4 digits
Cell constant of CLS 50	$k \approx 2 \text{ cm}^{-1}$
Usable cell constants	$k = 0.0025 \dots 99.99 \text{ cm}^{-1}$
Max. measuring cable length	55 m (CLK 5)
Max. resolution (in most sensitive measuring range)	0.1 µS/cm
Measuring frequency	2 kHz

### Temperature measurement

Suitable temperature sensor	Pt 100
Measuring range of Pt 100	-35 ... +250 °C
Measurement deviation <sup>1</sup>	range from 0 to 100 °C: ±0.5 K remaining measuring range: ±1 K
Measured value resolution	0.1 °C
Reproducibility <sup>1</sup>	±0.1 K
Adjustable temperature offset	±20 °C

### Temperature compensation

Compensation types	no ( $\alpha=0$ ), linear, NaCl, table
Range	-35 ... +250 °C
Reference temperature	adjustable; factory setting 25 °C

### Signal output

Current range	4 ... 20 mA
Accuracy	$\pm (22 \mu\text{A} + 0.5 \mu\text{A} \cdot I_{\text{real}} / \text{mA} \cdot \Delta T / \text{K})$ $\Delta T = T_a - 25 \text{ °C}$ for $T_a \geq 25 \text{ °C}$ $\Delta T = 25 \text{ °C} - T_a$ for $T_a < 25 \text{ °C}$
Load	max. 820 Ω
Resolution	< 6 µA

### Electrical data

Supply voltage	12 ... 30 V DC
Power consumption	max. 660 mW
Signal output	4 ... 20 mA, potential separated from meas. cell circuit
Error current signal output	22 mA ± 0.02 mA
HART® transfer: load	250 ... 820 Ω
HART® transfer: signal output	0.8 ... 1.2 mA (peak to peak)
Terminals, max. cable cross section	2.5 mm <sup>2</sup> , screen 4 mm <sup>2</sup>

### Ambient conditions

Electromagnetic compatibility (EMC)	interference emission and interference immunity acc. to EN 61326-1:1998
Ambient temperature $T_a$ (nom. operating conditions)	-15 ... +55 °C
Relative humidity (nominal operating conditions)	10 ... 95%, non-condensing
Ambient temperature $T_a$ (limit operating conditions)	-20 ... +60 °C (Ex: -20 ... +55 °C)
Storage and transport temperature	-20 ... +70 °C

### Vibration stability acc. to IEC 770

Mounting position	pipeline
Vibration frequency	10 ... 60 Hz
Maximum amplitude	0.21 mm

### Ex version of instrument

**CLM 431-H**

# Technical data (continued)

Intrinsically safe power supply and signal circuit, protection type EEx ib IIC T4	
Max. input voltage $U_i$	30 V DC
Max. input current $I_i$	100 mA
Max. input power $P_i$	750 mW
Max. internal inductance $L_i$	200 $\mu$ H
Max. internal capacitance $C_i$	$\approx 0$ , to screen = 5.3 nF

Intrinsically safe sensor circuit, protection type EEx ia IIC T4	
Max. output voltage $U_o$	$\pm 6.3$ (12.6) V DC
Max. output current $I_o$	130 mA
Max. output power $P_o$	211 mW
Max. external inductance $L_o$	100 $\mu$ H
Max. external capacitance $C_o$	100 nF

## Supplementary documentation

Technical Information CLS 50	order no. 50090385
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## MyPro CLD 431 inductive

### General specifications

Manufacturer	Endress+Hauser
Product designation	MyPro CLD 431 inductive

### Physical data

Length with CLS 50	350 ... 360 mm (depending on flange)
Process connection	fixed flange DN50/PN16; ANSI 2"/300 lbs; JIS 10K/50A lap joint flange DN50/PN10; ANSI 2"/150 lbs; JIS 10K/50A
Weight	approx. 4.5 kg
Protection type	IP 65
Housing material	GD-ALSi 10 Mg, plastic-coated
Materials in contact with medium	PFA/PTFE or PEEK/PTFE
Measured value display	liquid crystal display

### Conductivity measurement

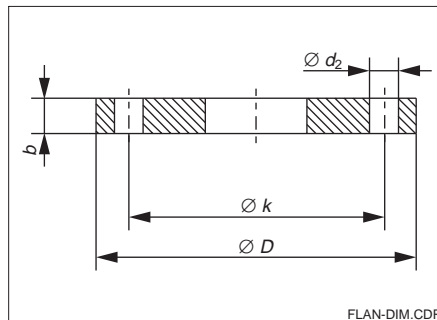
Measuring cell	CLS 50
Measuring range	0 ... 2000 mS/cm
Cell constant	$k \approx 2 \text{ cm}^{-1}$

### Other data

See MyPro CLM 431 inductive
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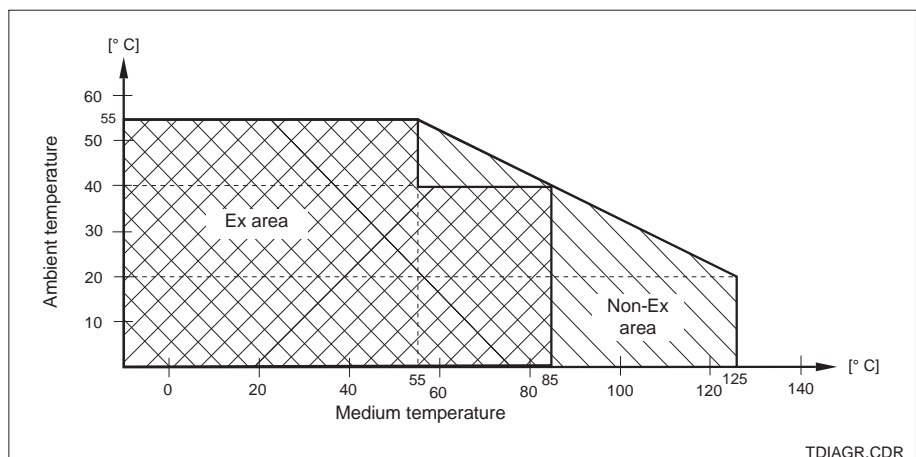
<sup>1</sup>acc. to IEC 746-1, for nominal operating conditions

Subject to modifications.



Flange dimensions

	DN 50/PN 16 Fixed / Lap joint flange	ANSI 2"/300 lb Fixed / Lap joint flange	JIS 10K/ 50A Fixed / Lap joint flange
D	165 / 165	165 / 165	155 / 152
$\varnothing k$	125 / 125	127 / 121	120 / 120
$d_2$	4x18 / 4x18	8x19 / 8x9	4x19 / 4x19
b	18 / 18	22.2 / 18	16 / 18
a	27 / 78	27 / 78	27 / 78
Bolts	M16 / M16	M16 / M16	M16 / M16



Permissible temperature ranges  
MyPro CLD 431

TDIAGR.CDR

# Product structure

**Conductivity transmitter MyPro CLM 431 inductive**

**Certificate type**  
 A Version for non-Ex area  
 H Cenelec EEx ia/ib IIC T4 (dir. 76/117/EEC, dir. 94/9/EC)

**Cable entry for power supply**  
 1 Cable gland Pg 13.5  
 3 Cable entry M 20 x 1.5  
 5 Cable entry NPT 1/2"  
 7 Cable entry G 1/2  
 8 Cable entry M 12

**Electronics, communication, display**  
 A 4 ... 20 mA, HART, without display  
 B 4 ... 20 mA, HART, LCD  
 C PROFIBUS-PA, without display  
 D PROFIBUS-PA, LCD

**Accessories**  
 1 No accessories  
 2 For wall and pipe mounting (DN 60)  
 3 For wall and pipe mounting (DN 30 ... 200)  
 4 With flange mounting bracket

**Preset measuring parameter**  
 I Inductive measurement

**Cable, measuring cell connection**  
 A Cable not included

**CLM 431-**

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**complete order code**

**Compact conductivity measuring system MyPro CLD 431 inductive**

**Certificate type**  
 A Version for non-Ex area  
 H Cenelec EEx ia/ib IIC T4 (dir. 76/117/EEC, dir. 94/9/EC)

**Cable entry for power supply**  
 1 Cable gland Pg 13.5  
 3 Cable entry M 20 x 1.5  
 5 Cable entry NPT 1/2"  
 7 Cable entry G 1/2  
 8 Cable entry M 12

**Electronics, communication, display**  
 A 4 ... 20 mA, HART, without display  
 B 4 ... 20 mA, HART, LCD  
 C PROFIBUS-PA, without display  
 D PROFIBUS-PA, LCD

**Accessories**  
 1 No accessories

**Measuring cell, process connection, material**  
 IA CLS 50, DIN flange DN 50, PFA, PTFE  
 IB CLS 50, DIN flange DN 50, PEEK, PTFE  
 IE CLS 50, 2 " ANSI flange / 300 lbs, PFA, PTFE  
 IF CLS 50, 2 " ANSI flange / 300 lbs, PEEK, PTFE  
 IK CLS 50, JIS flange 10K / 50A, SS 316L, PFA, PTFE  
 IL CLS 50, JIS flange 10K / 50A, SS 316L, PEEK, PTFE  
 IO CLS 50, DIN flange DN 50 / PN 10, PVDF, PFA  
 IP CLS 50, DIN flange DN 50 / PN 10, PVDF, PEEK  
 IS CLS 50, 2 " ANSI flange / 150 lbs, PVDF, PFA  
 IT CLS 50, 2 " ANSI flange / 150 lbs, PVDF, PEEK  
 IW CLS 50, JIS flange 10K / 50A, PVDF, PFA  
 IX CLS 50, JIS flange 10K / 50A, PVDF, PEEK

**CLD 431-**

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**complete order code**

## Accessories

### ❑ Transmitter power supply units

- RN 221 power separator (non-Ex)
- RN 221 Z power separator (Ex)
- NX 9120 power supply (one channel, non-Ex)
- NX 9121 power supply unit (three channels, Ex)
- One-channel transmitter power supply units with galvanically separated power output

Output voltage: typ. 24 V DC  $\pm$  1 V  
Output current: max. 33 mA  
Current limiting: 38 mA  $\pm$  5 mA

### ❑ Hand-held HART® terminal DXR 275

The hand-held terminal communicates with any HART®-compatible unit via the 4 ... 20 mA line.

The digital communication signal is superimposed on the 4 ... 20 mA signal without altering it. The simple, straightforward design of the user interface provides convenient access to the entire functionality of the instrument.

### ❑ Commuwin II with Commubox

Commuwin II is a graphical, PC-based operating program for intelligent measuring instruments.

DDE interfaces (DDE = dynamic data exchange, Windows communication standard) are used for communication between Commuwin II and measuring transmitters. One DDE server (driver) per communication channel is available.

Depending on the application, either the serial interface built into the personal computer or a special interface (card to be plugged into the PC) is used. The Commubox serves as the required interface module between the HART® interface and the serial PC interface.

### ❑ Junction box VBM

Junction box for extension of measuring cable connection between measuring cell and instrument.

Protection type: IP 65.

Order no. 50003987

### ❑ Junction box VBM-Ex

Junction box for extension of measuring cable connection between measuring cell and instrument in Ex zone 1.

Protection type: IP 65.

Order no. 50003991

### ❑ Extension cable CLK 5

For inductive measuring cells. For use with junction box type VBM.

Order no. 50085473

### ❑ Calibration solutions

Precision solutions referred to SRM by NIST; error limit 0.5%, reference temperature 25 °C; quantity 500 ml. See Technical Information CLY 11, order no. 50086574.

Type	Conductivity <sup>1</sup>	Order no.
CLY 11-A	74.0 $\mu$ S/cm	50081902
CLY 11-B	149.6 $\mu$ S/cm	50081903
CLY 11-C	1.406 mS/cm	50081904
CLY 11-D	12.64 mS/cm	50081905
CLY 11-E	107.00 mS/cm	50081906

<sup>1</sup> Values may deviate due to manufacturing tolerances. The error limit refers to the value specified on the bottle.

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Nothing beats know-how

