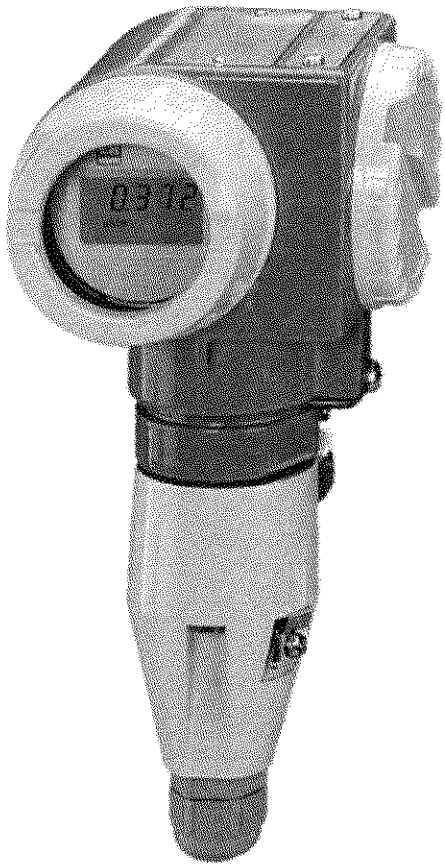
Technical
Information
TI 172C/07/en

Conductivity Measurement
mypro CLM 431

Two-wire transmitter for conductivity and MΩ with HART® communication for use in Ex and non-Ex areas



Areas of application
The analytical measuring transmitter MyPro CLM 431 is intended for highly reliable conductivity or resistance measurement in all areas of process control and engineering.
Compact design and versatile mounting options make MyPro a perfect match for any industrial environment. Major areas of application include:

- Ex areas in the chemical and petrochemical industries
- Pharmaceutical industry
- Power plants
- Water conditioning
- Waste water treatment

Benefits at a glance
- High reliability is guaranteed by:
  – comprehensive self-monitoring functions
  – polarisation detection
  – user-friendly calibration functions supporting both wet and dry calibration
- Flexible: can be switched from conductivity to specific resistance and vice versa
- Compact design: smallest intelligent analytical transmitter available
- Ultrasimple installation and versatile mounting; display and housing can be rotated
- Convenient operation via keypad, hand-held HART®terminal or Commuwin II

Quality made by
Endress+Hauser

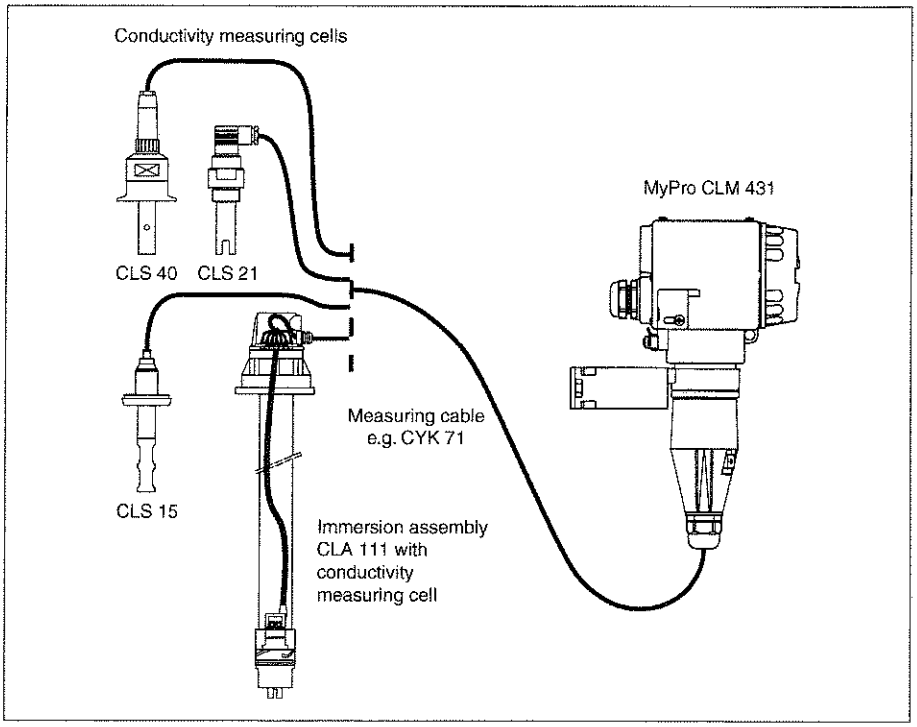
ISO 9001

Endress+Hauser
Nothing beats know-how

Measuring system

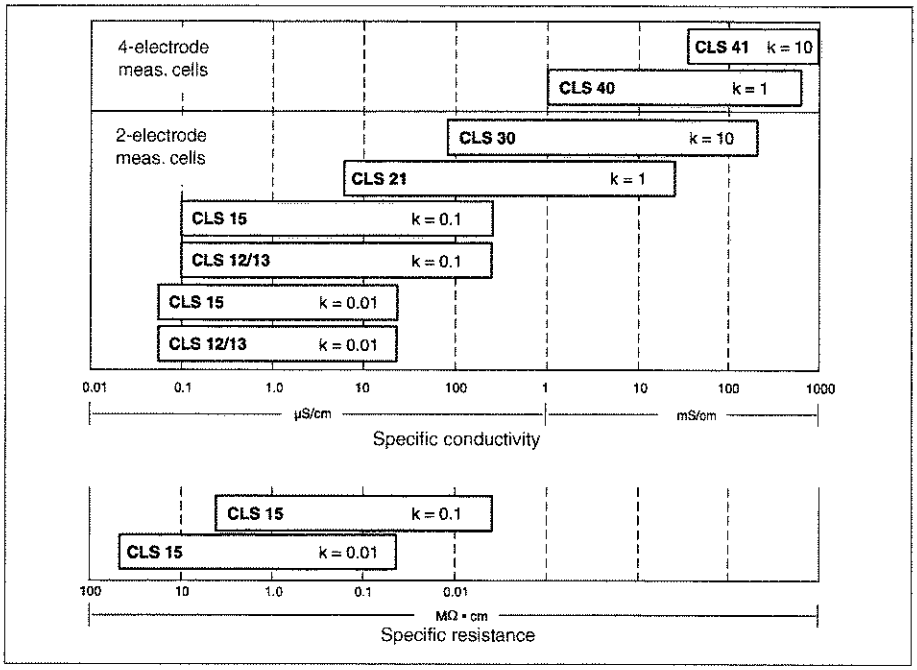
A measuring system generally comprises:

- a 2-electrode or 4-electrode conductivity measuring cell with an integrated temperature sensor Pt 100,
- a welded socket or an assembly for installation in a pipeline or tank,
- the corresponding measuring cable, and
- the MyPro CLM 431 measuring transmitter.



Examples of possible measuring systems

Conductivity measuring cells



The correct measuring cell for every measuring range

The MyPro CLM 431 transmitter has an overall measuring range of 0 ... 2000 mS which can be spread as required. The selection of the correct measuring cell is critical for the application in question due to the physical limitations of measuring cells. Polarisation of a measuring cell occurs when the measuring range is exceeded, and this may result in inaccurate measurement.

General information

Self-diagnosis
The MyPro CLM 431 continually checks the operational reliability of the measuring point. The instrument can identify 20 possible problems.
Errors are signalled in the field via the display and simultaneously via the HART®interface, and optionally via an error current signal (22 mA).

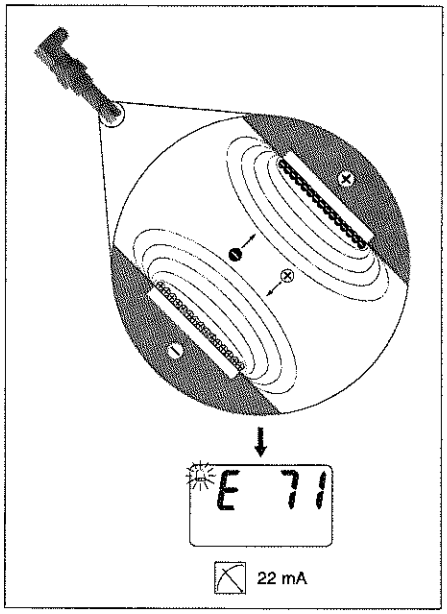
Polarisation detection
High ion concentrations at the boundary layer between the electrode and medium impede free ion movement. These polarisation effects limit the measuring range of conductive measuring cells. Soiling and coatings may also lead to polarisation within the measuring cell and produce inaccurate results.

The MyPro CLM 431 measuring transmitter employs the latest technology to safely detect polarisation effects. Polarisation detection is available for 2-electrode conductivity measuring cells and can be activated or deactivated by the user.

Polarisation detection is a major step forward in increasing the functional accuracy of conductive measuring systems.

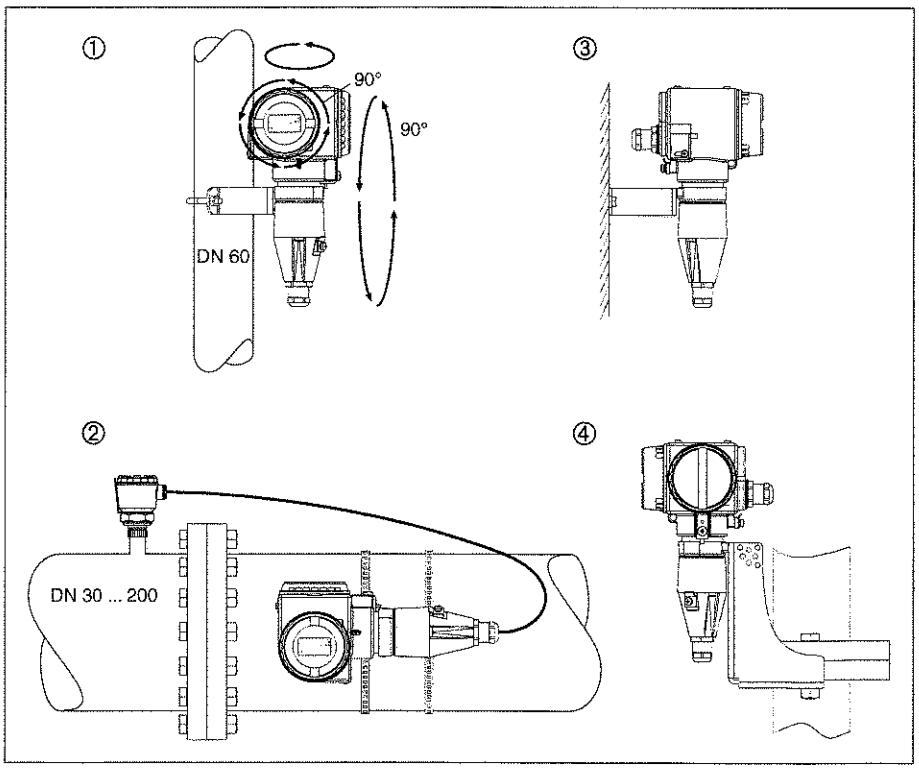
Temperature compensation
MyPro offers several temperature compensation options:
- Linear compensation 0 ... 10 %/K with user-selectable reference temperature
- Compensation acc. to DIN IEC 746, part 3 according to NaCl
- Temperature compensation for ultrapure water with trace impurities
- Compensation with user-programmable T_K table of up to 10 elements

The temperature can either be continually measured or programmed as a fixed value.



Polarisation detection

Mounting options



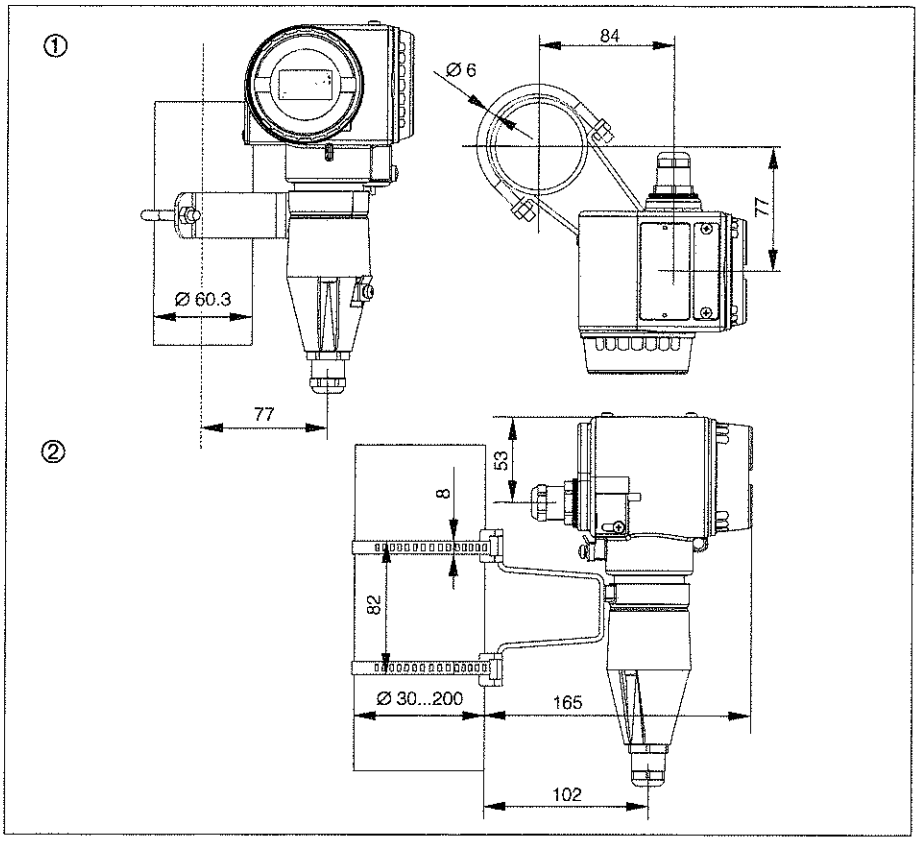
① Mounting on DN 60 pipe.
Instrument can be rotated in different axes (LCD in 90° steps)

② Pipe mounting DN 30 ... 200

③ Wall mounting

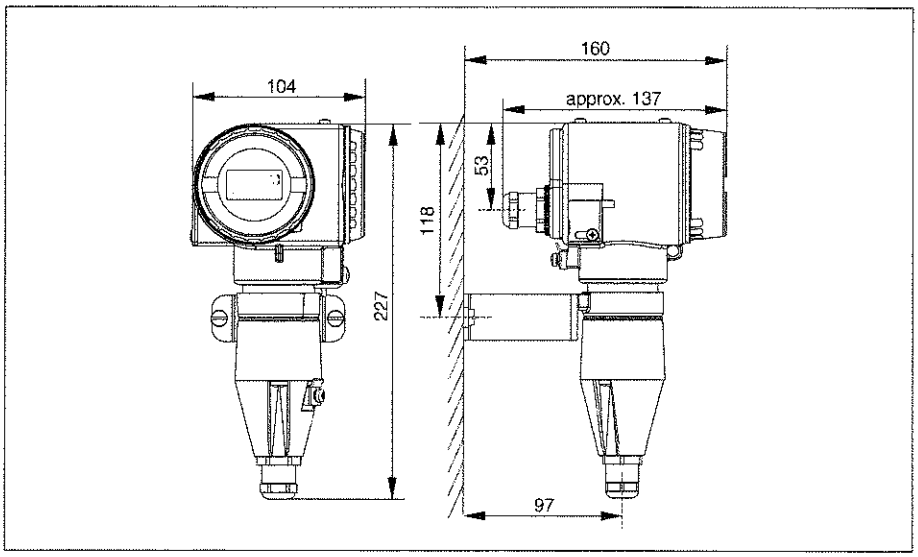
④ Installation on assembly with flange mounting bracket

Mounting / dimensions

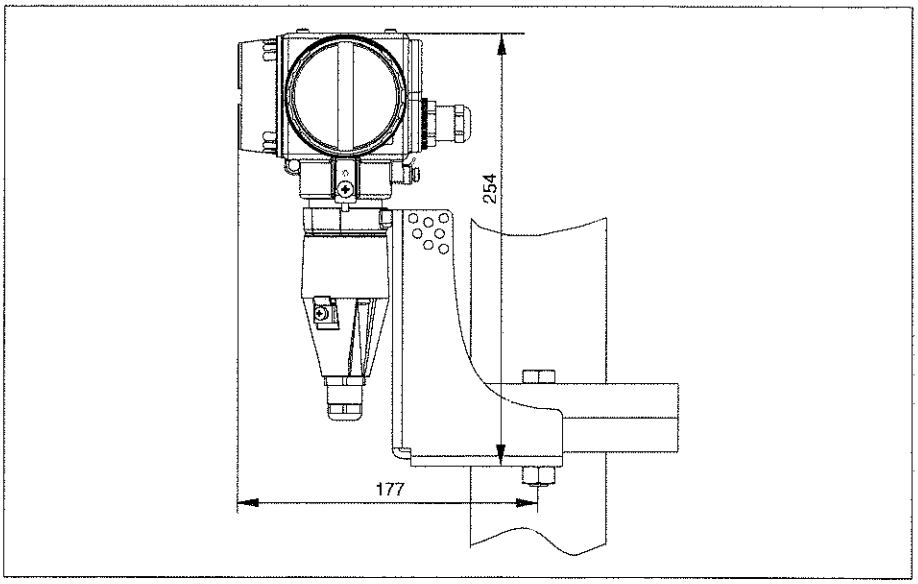


① Pipe mounting DN 60

② Pipe mounting DN 30 ... 200

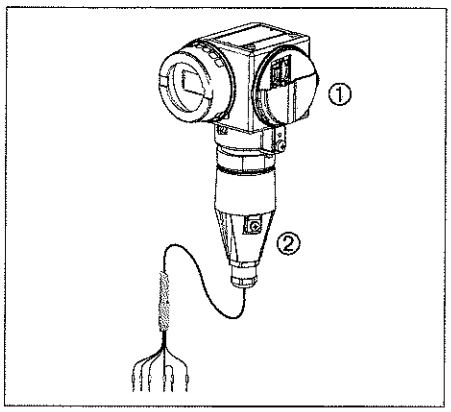


Wall mounting



Installation with flange mounting bracket

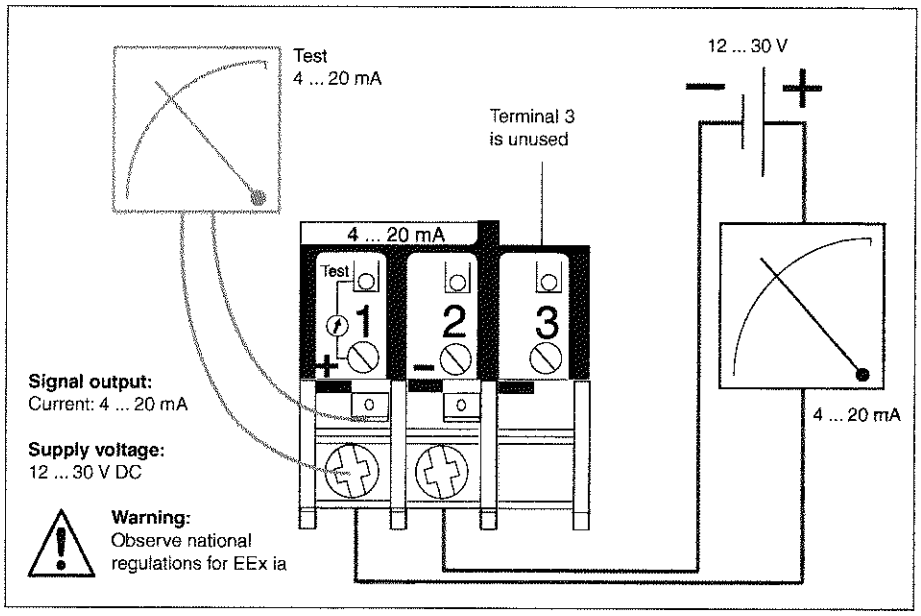
Electrical connection



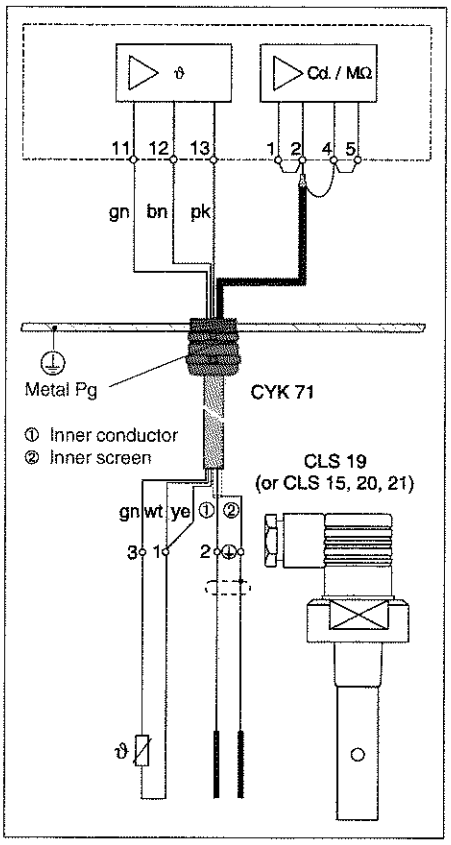
① Connection space for two-wire line

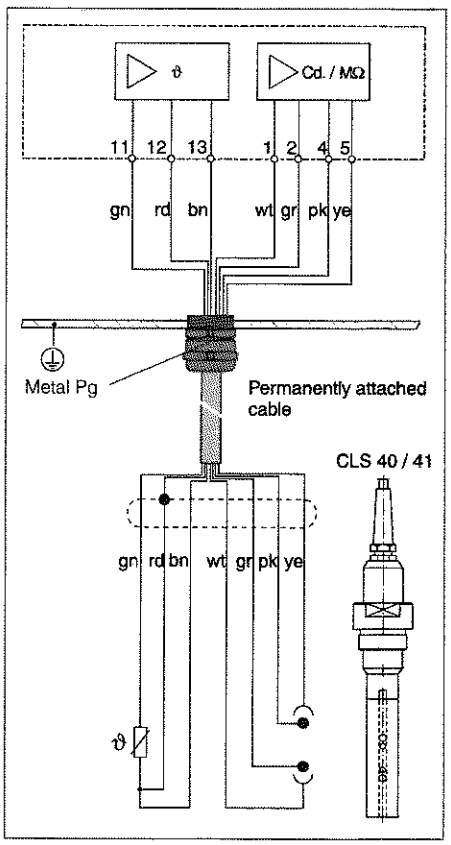
② Connection space for sensor cable

Measuring cable
The Mypro CLM 431 transmitter comes with separate wiring compartments for the two-wire line and the sensor cable. The conductivity measuring cells are connected via special screened, multi-core measuring cables of the types KMK and CYK 71. Junction box VS is to be used for measuring cable extension.



Supply voltage / signal output connection





Left:
Connection of a 2-electrode measuring cell CLS 19 (or CLS 15, CLS 20, CLS 21) with cable CYK 71

Right:
Connection of a 4-electrode measuring cell CLS 40 or CLS 41 with permanently attached 3 m cable

Operation

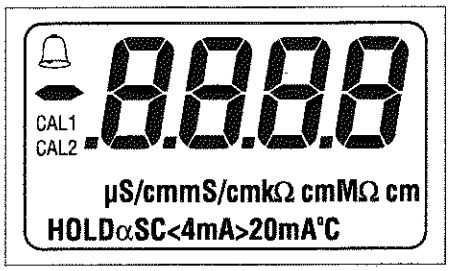
Menu-guided operation
The functions of the MyPro CLM 431 are arranged at two different levels:
Operating level 1
- Viewing of current settings (secondary parameters) ⊕
- Error diagnosis (diagnostic parameters) ⊖
- Current output settings (parameter settings) Ⓕ
- Calibration Ⓒ

Operating level 2
- All other settings are located at this level, e.g. selection of conductivity or resistance measurement.

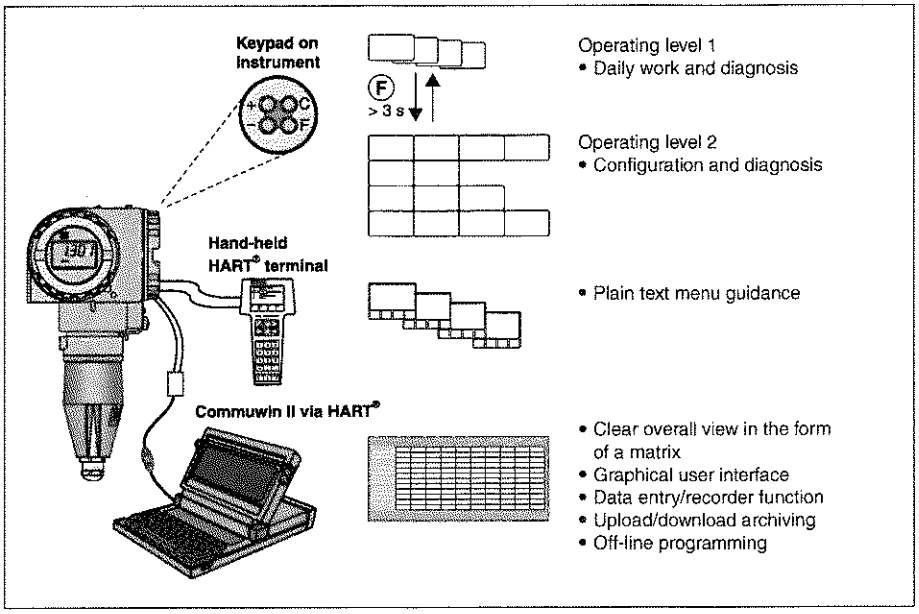
(See MyPro CLM 431 operating instructions for description).
The keypad is located underneath a protective cover to prevent unintentional actuation and soiling.

No unauthorised access
Configuration and calibration data are protected against undesirable modification using two access codes.

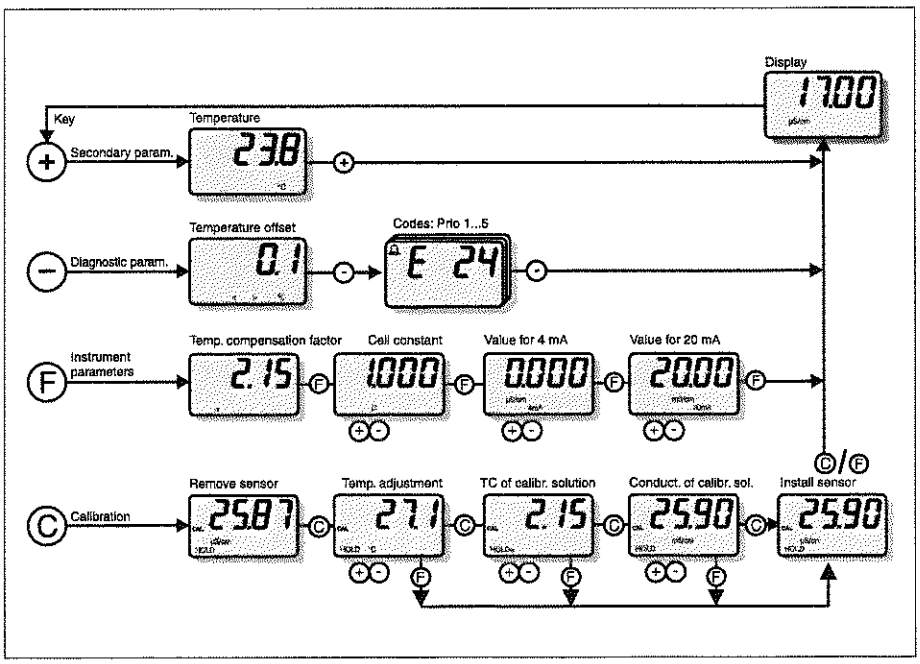
Display
The high-contrast liquid crystal display locks in at several angles to guarantee optimal readability in different mounting positions.



Display



Operation of MyPro CLM 431 via:
- keys on instrument
- hand-held HART® terminal
- Commuwin II



Short menu for operation of MyPro CLM 431

Technical data

Conductivity measurement

Refer to the diagram on page 2 for the measuring ranges (MR) attainable in conjunction with the corresponding measuring cells.	
Deviation of indication[1]	max. 0.5 % of measured value ± 4 digits
Reproducibility[1]	max. 0.1 % of measured value ± 2 digits
Measured value resolution	0.05 % of URV
Usable cell constants	k = 0.0025 ... 99.99
Measuring frequency	300 ... 1077 Hz
Temperature compensation	linear, acc. to NaCl, ultrapure water or table
Automatic temperature compensation range	–20 ... +250 °C
Reference temperature	adjustable, factory setting 25 °C
Max. sensor cable length	100 m (CYK 71)

Resistance measurement

Refer to the diagram on page 2 for the measuring ranges (MR) attainable in conjunction with the corresponding measuring cells.	
Deviation of indication[1]	max. 0.5 % of measured value ± 4 digits
Reproducibility[1]	max. 0.1 % of measured value ± 2 digits
Measured value resolution	0.05 % of URV
Usable cell constants	k = 0.0025 ... 99.99
Measuring frequency	32 ... 425 Hz
Temperature compensation	linear, acc. to NaCl, ultrapure water or table
Automatic temperature compensation range	–20 ... +250 °C
Reference temperature	adjustable, factory setting 25 °C
Max. sensor cable length	15 m (CYK 71)

Temperature measurement

Temperature sensor	Pt 100 (3-wire connection)
Measuring range (MR)	–20 ... +250 °C
Deviation of indication[1]	max. 0.5 % of MR
Measured value resolution	0.1 °C
Reproducibility	max. 0.1 % of MR
Temperature offset	±20 °C

Signal output

Current range	4 ... 20 mA
Deviation[1]	max. 0.1 % of upper current range value
Load	depending on operating voltage, max. 600 Ω

Electrical data and connections

Aux. energy, DC (w/o / with HART®transfer)	+12 ... +30 V / +13.5 ... +30 V
Power consumption	max. 700 mW
Signal output	4 ... 20 mA, potential separated from sensor circuit
Isolation voltage	30 V_{RMS} / 50 V DC
Error current signal output	22 mA ± 0.5 mA
HART®transfer: load	230 ... 1100 Ω
HART®transfer: signal output	0.8 ... 1.2 mA (peak to peak)
Terminals, max. cable cross section	2.5 mm², PE 4 mm²

General technical data

Measured value display	liquid crystal display (LCD)
Electromagnetic compatibility (EMC)	emitted interference acc. to EN 50081-2, 01.92 immunity to interference acc. to EN 50082-2, 03.95
Ambient temperature (nominal operating cond.)	–10 ... +55 °C
Relative humidity (nominal operating cond.)	10 ... 95 %, non-condensing
Ambient temperature (limit operating cond.)	–20 ... +60 °C (Ex: –20 ... +55 °C)
Storage and transport temperature	–25 ... +80 °C

Ex version

Intrinsically safe power supply and signal circuit, protection type EEx ib IIC T4

Max. input voltage U_i	30 V
Max. input current I_i	100 mA
Max. input power P_i	700 mW
Max. internal inductance L_i	200 µH
Max. internal capacitance C_i	negligible; to PE = 5.3 nF

Intrinsically safe sensor circuit, protection type EEx ib IIC T4

Max. output voltage U_o	±5.4 V (10.8 V)
Max. output current I_o	320 mA
Max. output power P_o	200 mW
Max. external inductance L_o	100 µH
Max. external capacitance C_o	100 nF

Physical data

Dimensions (H x W x D)	223 x 103 x 137 mm
Weight	max. 1.25 kg
Protection type	IP 65
Material of housing	GD-AlSi 10 Mg, plastic-coated

[1]acc. to DIN IEC 746 part 1, nominal operating conditions

How to order

Conductivity/MΩ transmitter MyPro CLM 431

Certificate type
A Variant for non-Ex area
G Cenelec EEx ia/ib IIC T4

Power supply cable entry
1 Cable gland Pg 13.5
3 Cable entry M20 × 1.5
5 Cable entry NPT ½
7 Cable entry G ½

Electronics, communication, display
A 4 ... 20 mA, HART®, no display
B 4 ... 20 mA, HART®, liquid crystal display

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

Factory parameter configuration
C Conductive, 2-/4-electrode measurement
M Conductive, MΩ measurement

Cable, sensor connection
A Without cable
C With 1 m cable CYK 71
D With 2 m cable CYK 71

CLM 431- [ ][ ][ ][ ][ ][ ] **complete order code**

Accessories

Calibration solutions

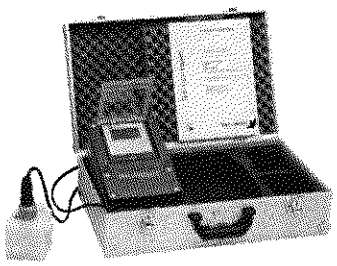
Precision calibration solutions for conductivity, accuracy 0.5 % at 25 °C, referred to NIST SRM.
Bottle with 500 ml.

Type	Conductivity at 25 °C[1)]	Order number
CLY 11-A	74.0 µS/cm	50081902
CLY 11-B	149.6 µS/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

[1)] Values may deviate due to manufacturing tolerances. The accuracy refers to the value specified on the bottle.

Pure water calibration system ConCal

Calibration solutions are not stable at low conductivities. For this reason, DIN/IEC only permits solutions > 74 µS/cm. The alternative is to use the factory-calibrated ConCal comparison system. Its factory calibration is traceable to SRM by NIST.



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TI 172C/07/en/11.97
Printed in Germany / DT / CV5 (50088311)