Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Liquisys M CLM223/253

Conductivity/Resistivity Measurement
Transmitter for conductive and inductive sensors

Application

The modular design of the Liquisys M CLM223/253 allows easy adaption of the transmitter to a variety of customer requirements. Starting with the basic version for "measurement and alarm generation", the transmitter can be equipped with additional software and hardware modules for special applications. These modules can also be retrofitted as required.

Application

- Ultrapure water
- Water treatment
- Ion exchanger, reverse osmosis
- Cooling water desalinization
- Sewage

Your benefits

- Field or panel-mounted housing
- Universal application
- Simple handling
  - Logically arranged menu structure
  - Ultrasimple two-point calibration
- Safe operation
  - Overvoltage (lightning) protection
  - Direct access for manual contact control
  - User-defined alarm configuration

The basic unit can be extended with:

- 2 or 4 additional contacts for use as:
  - Limit contacts (also for temperature)
  - P(ID) controller
  - Timer for simple rinse processes
  - Complete cleaning with Chemoclean
- Plus package:
  - User defined current output characteristics
  - Automatic cleaning trigger on alarm or limit violation
  - Ultrapure water monitoring acc. to USP (United States Pharmacopeia) and EP (European Pharmacopoeia) (conductive)
  - Polarization detection (conductive)
  - Concentration measurement
  - Temperature compensation via table
  - Process Check System (PCS): live check of the sensor
  - Adaptive calibration with installation factor (inductive)
- HART or PROFIBUS-PA/-DP
- 2nd current output for temperature, main measured value or actuating variable
- Current input for flow rate monitoring with controller shut off or for feedforward control

TI193C/07/EN/13.11
71130248

Endress+Hauser
People for Process Automation

Function and system design

Features of the basic version

Conductive or inductive

Two instrument versions for measurement with conductive (two electrode) sensors or inductive sensors are available. The use of inductive sensors that are less sensitive to soiling than conductive sensors is recommended for high conductivity measurement, concentration measurement or adhering media.

Measuring of conductivity and resistivity (conductive)

This is selected via the menu. During measurement, the value measured can be displayed in the other measuring mode. The temperature is displayed at the same time or, if desired, not shown at all.

Temperature compensation

The following temperature compensation selections are available:

- Linear
- NaCl curve according to IEC 746
- Ultrapure water NaCl (neutral compensation)
- Ultrapure water HCl (acid compensation, also ammonia)

The **reference temperature** is user defined, the standard value is 25 °C (77 °F).

Configuration

Different alarms are required depending on application and operator. Therefore the transmitter permits independent **configuration of the alarm contact and error current** for each individual error. Unnecessary or undesirable alarms can be suppressed in this manner. **Up to four contacts** can be used as limit contacts (also for temperature), to implement a P(ID) controller or for cleaning functions.
Direct **manual operation of the contacts** (bypassing the menu) provides quick access to limit, control or cleaning contacts, permitting speedy correction of deviations.
The **serial numbers** of the instrument and modules and the order code can be called up on the display.
The cell constant can be edited and even **calibrated** for demanding special applications.

Additional functions of the plus package

Current output configuration

In order to output wide measuring ranges while still achieving a high resolution in specific ranges, the **current output** can be configured as required via a table. This permits **bilinear** or **quasi-logarithmic** curves, etc.

Polarization detection

Polarization effects in the boundary layer between the sensor and the medium to be measured limit the measuring range of conductive conductivity sensors.
The transmitter can detect polarization effects using an innovative, intelligent signal evaluation process.

Live check

The live check issues an alarm when the sensor signal does not change over a defined period of time. This may be caused by blocking, passivation, separation from the process, etc.

Ultrapure water monitoring acc. to USP (United States Pharmacopeia) and EP (European Pharmacopoeia)

Ultrapure water monitoring according to USP <645> and EP means that the uncompensated conductivity and the temperature are measured and compared to a table.
The transmitter (conductive with additional contacts) comes with the following functions:

- Monitoring of "Water for Injection" (WFI) according to USP and EP
- Monitoring of "Highly Purified Water" (HPW) according to EP
- Monitoring of "Purified Water" (PW) according to EP

The **user-adjustable pre-alarm** indicates undesirable operating values in due time. Full compliance with USP or EP requires the use of a precisely calibrated sensor, for example, the CLS16.

Concentration measurement

The conversion from conductivity to concentration is effected using four user-definable **concentration curves**. This permits concentrations to be displayed in %, ppm, mg/l or TDS (total dissolved solids).

Adaptive calibration for determination of the installation factor (inductive)

Inductive measuring sensors must normally be installed in pipes at a required minimum distance from the pipe wall. If this minimum distance is not observed, the measured value changes. The built-in adaptive calibration using the installation factor allows you to compensate for this once the sensor is installed.

Second current output

The second current output can be configured for temperature, main measured value (conductivity, resistivity, concentration) or actuating variable.

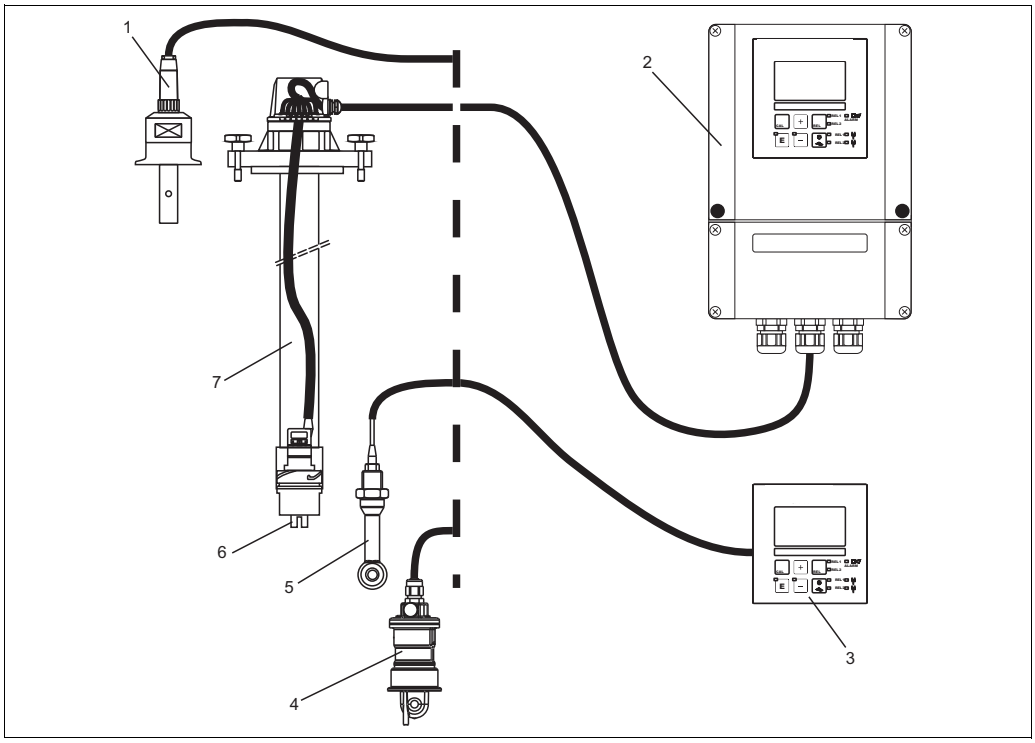
Current input

The current input of the transmitter allows two different applications: controller shut-down in case of lower flow rate violation or total failure in the main flow as well as feedforward control. Both functions are also combinable.

Measuring system

A complete measuring systems comprises:
- The transmitter Liquisys M CLM223 or CLM253
- A sensor with or without an integrated temperature sensor
- A measuring cable CYK71 (conductive), CPK9 for Condumax H CLS16 or CLK5 (inductive)

Options: extension cable, junction box VBM



Complete measuring system Liquisys M CLM223/253

1 Conductive sensor CLS15
2 Liquisys M CLM253
3 Liquisys M CLM223
4 Inductive sensor CLS54
5 Inductive sensor CLS50
6 Conductive sensor CLS21
7 Immersion assembly CLA111

Input

Measured variables

Conductivity, resistivity, temperature

Measuring range

Conductivity (conductive):	0 to 600 mS/cm (uncompensated)
Conductivity (inductive):	0 to 2000 mS/cm (uncompensated)
Resistivity:	0 to 200 MΩ·cm
Concentration:	0 to 9999 (%, ppm, mg/l, TDS)
Temperature:	-35 to +250 °C (-31 to +482 °F)

Cable specification

Cable length (conductive):	conductivity: max. 100 m (328.1 ft) (CYK71) resistivity: max 15 m (49.22 ft) (CYK71)
Cable length (inductive):	max 55 m (180.46 ft) (CLK5)
Cable resistance CYK71:	165 Ω/km (conductivity measurement)

Cell constant

Adjustable cell constant:	k = 0.0025 to 99.99 cm^{-1}

Temperature sensors

Pt 100, Pt 1000, NTC 30K

Measuring frequency

Conductivity, resistivity (conductive):	170 Hz to 2 kHz
Conductivity (inductive):	2 kHz

Binary inputs

Voltage:	10 to 50 V
Power consumption:	max. 10 mA

Current input

4 to 20 mA, galvanically separated

Load: 260 Ω at 20 mA (voltage drop 5.2 V)

Output

Output signal

0/4 to 20 mA, galvanically separated, active

HART	
Signalkodierung	Frequency Shift Keying (FSK) + 0,5 mA über Stromausgangssignal
Datenübertragungsrate	1200 Baud
Galvanische Trennung	ja

PROFIBUS PA	
Signalkodierung	Manchester Bus Powered (MBP)
Datenübertragungsrate	31,25 kBit/s, Spannungsmodus
Galvanische Trennung	ja (IO-Module)

PROFIBUS DP	
Signalkodierung	RS485
Datenübertragungsrate	9,6 kBd, 19,2 kBd, 93,75 kBd, 187,5 kBd, 500 kBd, 1,5 MBd
Galvanische Trennung	ja (IO-Module)

Signal on alarm	2.4 or 22 mA in case of an error	
Load	maximum 500 Ω	
Linearization transmission behaviour	Conductivity:	adjustable
	Resistivity:	adjustable
	Concentration:	adjustable
	Actuating variable:	adjustable
	Temperature:	adjustable
Resolution	max. 700 digits/mA	
Min. distance for 0 / 4 to 20 mA signal	Conductivity:	
	Measured value 0 to 1.999 µS/cm	0.2 µS/cm
	Measured value 0 to 19.99 µS/cm	2 µS/cm
	Measured value 20 to 199.9 µS/cm	20 µS/cm
	Measured value 200 to 1999 µS/cm	200 µS/cm
	Measured value 2 to 19.99 mS/cm	2 mS/cm
	Measured value 20 to 2000 mS/cm	20 mS/cm
	Resistivity	
	Measured value 0 to 199.9 kΩ·cm	20 kΩ·cm
	Measured value 200 to 1999 kΩ·cm	200 kΩ·cm
	Measured value 2 to 19.99 MΩ·cm	2.0 MΩ·cm
	Measured value 20 to 200 MΩ·cm	20 MΩ·cm
	Concentration	no minimum distance
	Temperature	15 °C
Isolation voltage	max. 350 V_{RMS}/500 V DC	
Overvoltage protection	according to EN 61000-4-5	
Auxiliary voltage output	Output voltage:	15 V ± 0.6
	Output current:	max. 10 mA
Contact outputs	Switching current with ohmic load (cos φ = 1):	max. 2 A
	Switching current with inductive load (cos φ = 0.4):	max. 2 A
	Switching voltage:	max. 250 V AC, 30 V DC
	Switching power with ohmic load (cos φ = 1):	max. 500 VA AC, 60 W DC
	Switching power with inductive load (cos φ = 0.4):	max. 500 VA AC, 60 W DC
Limit contactor	Pickup/dropout delay:	0 to 2000 s
Controller	Function (adjustable):	pulse length/pulse frequency controller
	Controller response:	PID
	Control gain K_p:	0.01 to 20.00
	Integral action time T_n:	0.0 to 999.9 min
	Derivative action time T_v:	0.0 to 999.9 min
	Period for pulse length controller:	0.5 to 999.9 s
	Frequency for pulse frequency controller:	60 to 180 min^{-1}
	Basic load:	0 to 40% of max. set value
Alarm	Function (selectable):	Latching/momentary contact
	Alarm threshold adjustment range:	Conductivity, resistivity, concentration, temperature, USP, EP: complete measuring range
	Alarm delay:	0 to 2000 s (min)

Protocol specific data

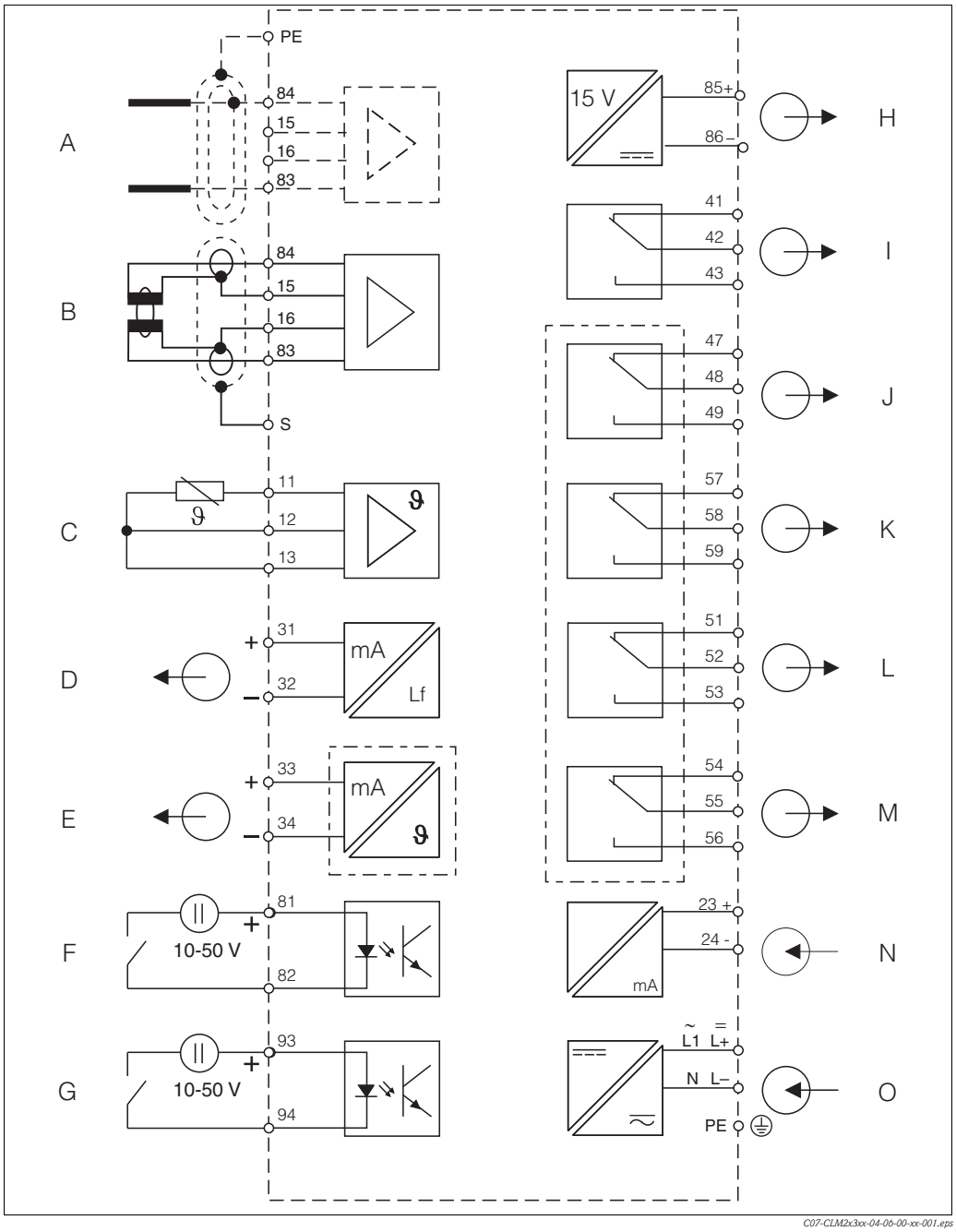
HART	
Manufacturer ID	11_h
Device type code	0092_h (ind. measured), 0093_h (cond. measured)
Transmitter specific revision	0001_h
HART specification	5.0
DD files	www.products.endress.com/profibus
Load HART	250 Ω
Device variables	None (dynamic variables PV, SV, only)
Features supported	-

PROFIBUS PA	
Manufacturer ID	11_h
Ident number	1515_h
Device revision	11_h
Profile version	2.0
GSD files	www.products.endress.com/profibus
GSD file version	
Output values	Main value, temperature value
Input values	Display value of PLC
Features supported	Device locking: The device can be locked by hardware or software.

PROFIBUS DP	
Manufacturer ID	11_h
Ident number	1521_h
Profile version	2.0
GSD files	www.products.endress.com/profibus
GSD file version	
Output values	Main value, temperature value
Input values	Display value of PLC
Features supported	Device locking: The device can be locked by hardware or software.

Power supply

Electrical connection



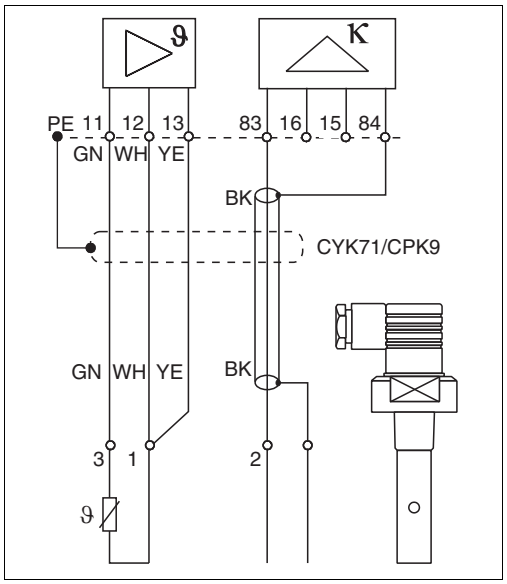
Electrical connetion of the transmitter

A	*Sensor (conductive)*	*I*	*Alarm (current-free contact position)*
B	*Sensor (inductive)*	*J*	*Relay 1 (current-free contact position)*
C	*Temperature sensor*	*K*	*Relay 2 (current-free contact position)*
D	*Signal output 1 conductivity*	*L*	*Relay 3 (current-free contact position)*
E	*Signal output 2 variable*	*M*	*Relay 4 (current-free contact position)*
F	*Binary input 1 (Hold)*	*N*	*Current input 4 ... 20 mA*
G	*Binary input 2 (Chemoclean)*	*O*	*Power supply*
H	*Aux. voltage output*		

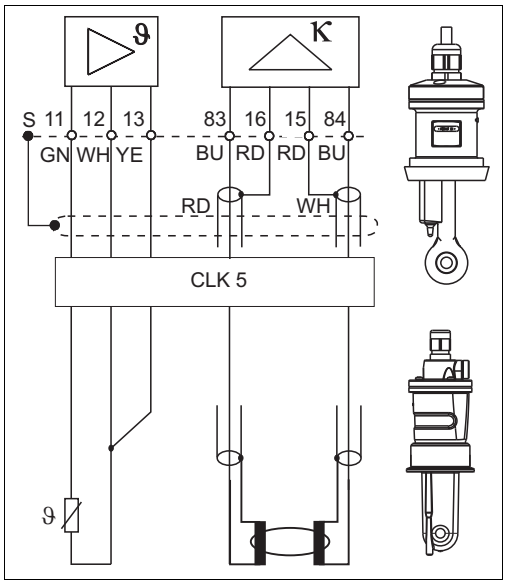
The instrument has protection class II and is generally operated without protective earth connection. To ensure the measuring stability and the function for conductive sensors you have to connect the outer screen of the sensor cable to the PE terminal.

Sensor connection

You require screened special measuring cables to connect conductivity sensors to the transmitter. To extend the measuring cable, use junction box and extension cable (see accessories).



Connection of conductive sensors



Connection of inductive sensors

Supply voltage

Depending on ordered version:
100/115/230 V AC +10/-15 %, 48 to 62 Hz
24 V AC/DC +20/-15 %

Fieldbus connection

HART	
Supply voltage	n/a, active current outputs
Integrated reverse voltage protection	n/a, active current outputs

PROFIBUS PA	
Supply voltage	9 V to 32 V, max. 35 V
Polarity sensitive	no
FISCO/FNICO compliant acc. to IEC 60079-27	no

PROFIBUS DP	
Supply voltage	9 V to 32 V, max. 35 V
Polarity sensitive	n/a
FISCO/FNICO compliant acc. to IEC 60079-27	no

Power consumption

max. 7.5 VA

Mains protection

Fine-wire fuse, medium-slow blow 250 V/3.15 A

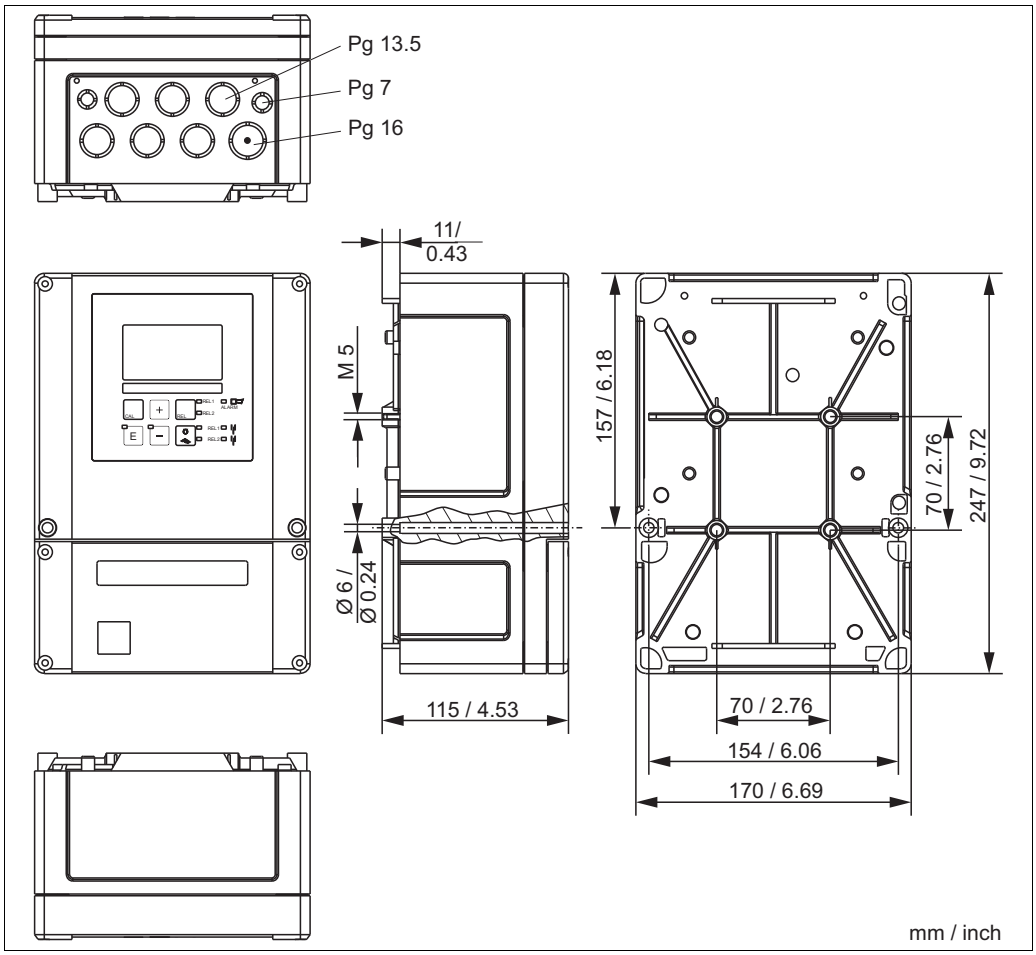
Performance characteristics

Reference temperature	25 °C (77 °F); adjustable for the compensation of the medium temperature	
Resolution	Conductivity:	depending on the measuring range: 0.001 µS/cm to 1.999 µS/cm and k ≤ 0.5 cm^{-1}
	Temperature:	0.1 °C
Maximum measured error[1)]	Conductivity:	
	Display:	max. 0.5 % of measured value ± 4 digits
	Conductivity signal output:	max. 0.75 % of current output range
	Resistivity:	
	Display:	max. 0.5 % of measured value ± 4 digits
	Resistivity signal output:	max. 0.75 % of current output range
	Temperature:	
	Display:	max. 1.0 % of measuring range
	Temperature signal output:	max. 1.25 % of current output range
Repeatability[1]	Conductivity:	max. 0.2 % of measured value ± 2 digits
	Resistivity:	max. 0.2 % of measured value ± 2 digits
Temperature compensation	Range:	-35 to +250 °C (-31 to +482 °F)
	Types of compensation:	uncompensated, linear, NaCl, table; conductive only: ultrapure water NaCl, ultrapure water HCl
Temperature offset	±5 °C; for the adjustment of the temperature display	

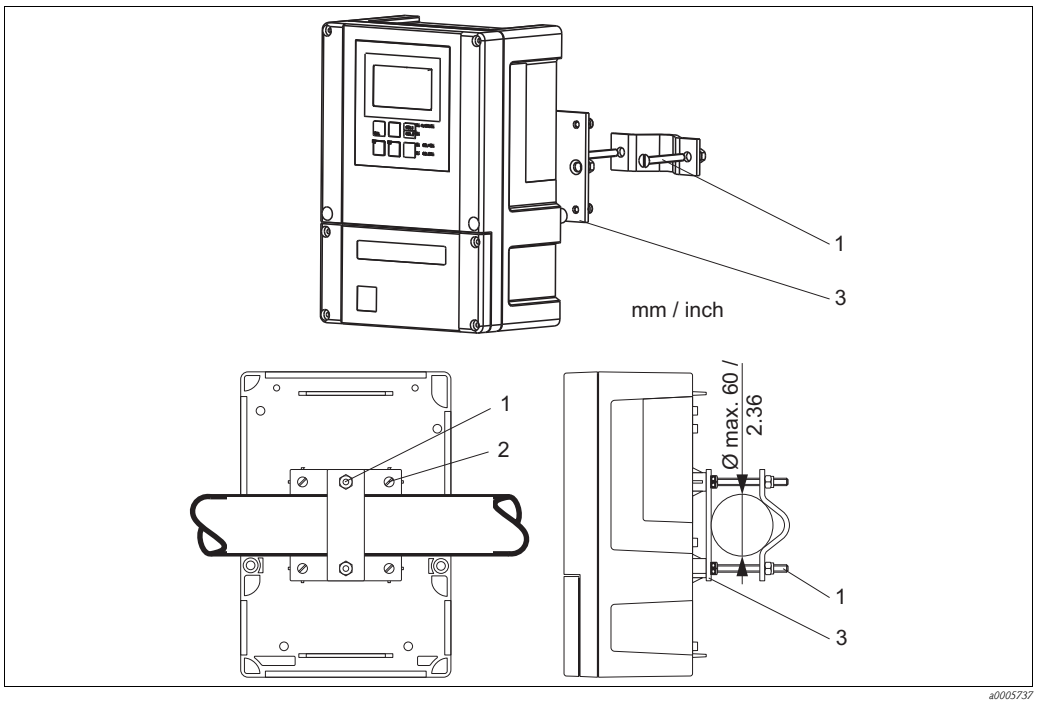
1) acc. to IEC 746-1, for nominal operating conditions

Installation

Installation instructions

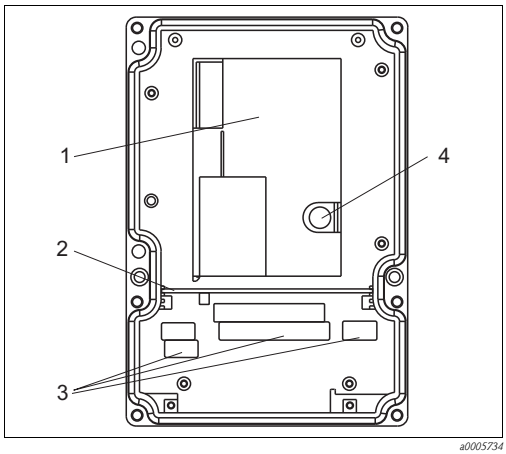


Field instrument



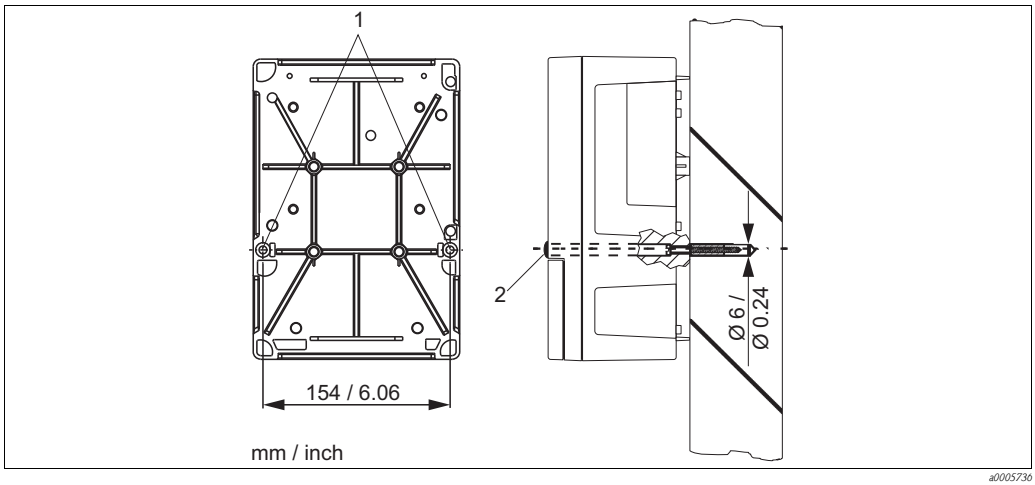
Mounting on pipes

1 - 3 Mounting screws and mounting plate



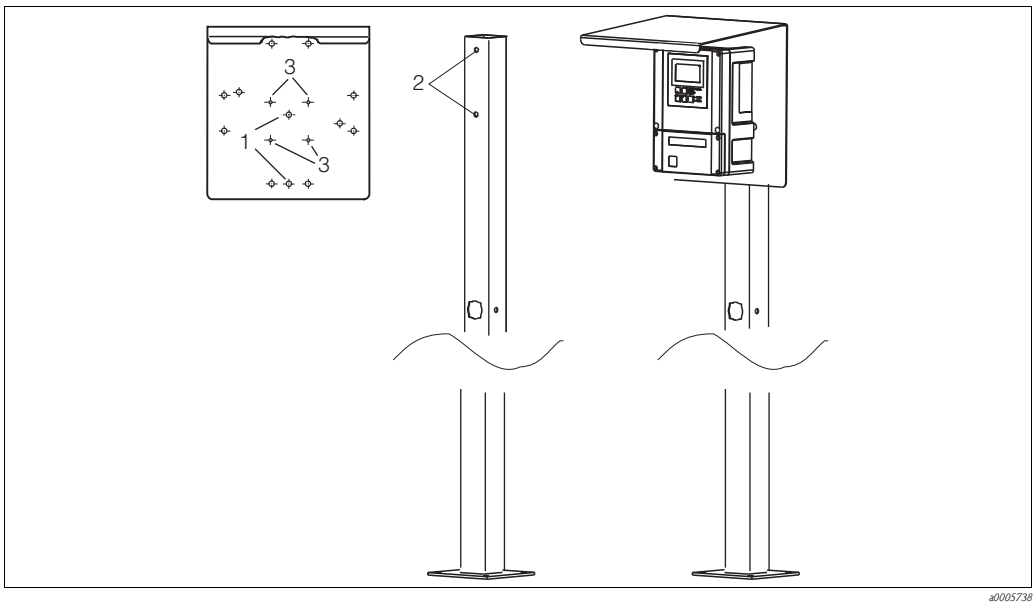
1 Removable electronics box
2 Partition plate
3 Terminal blocks
4 Fuse

View into the field instrument



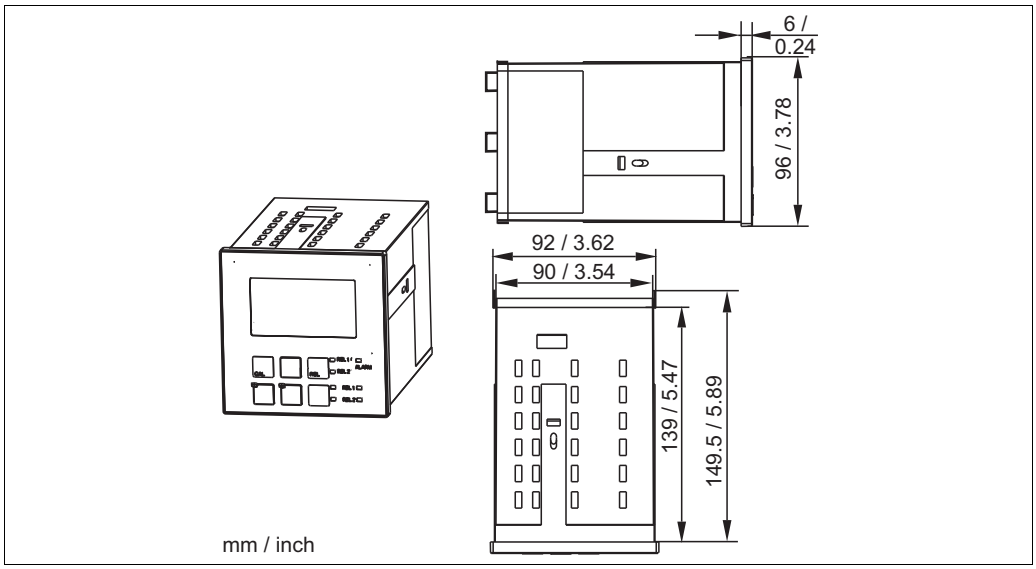
Wall mounting of the field instrument

1 Mounting holes
2 Protecting cap

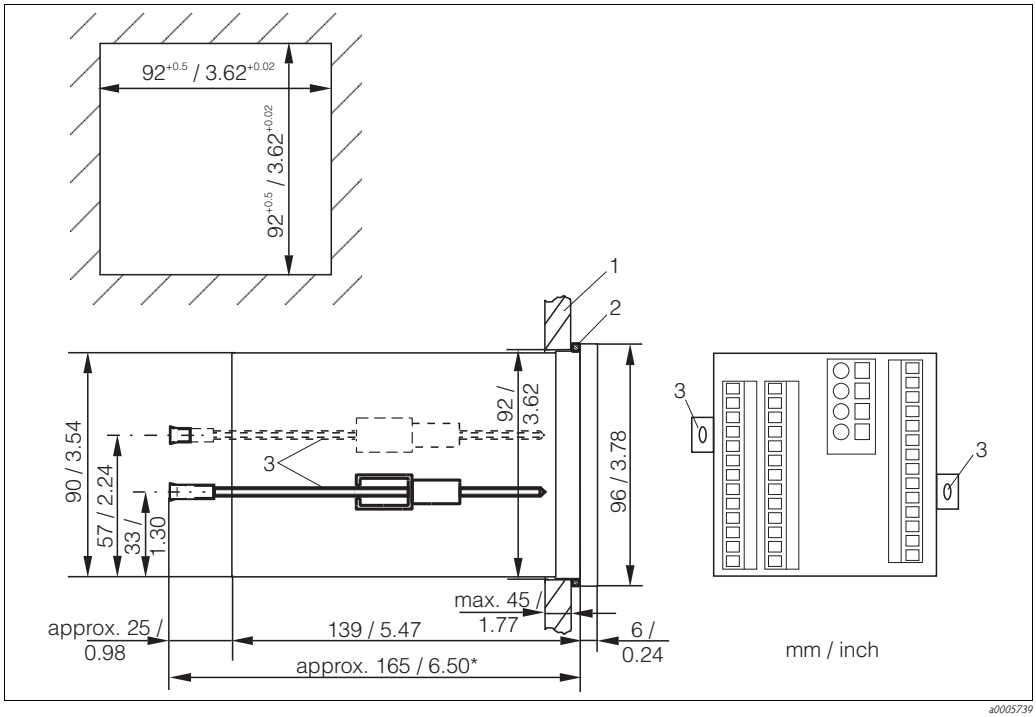


Mounting of the field instrument with mounting post and weather protection cover

1 - 3 Mounting holes



Dimensions panel-mounted instrument



Installation of the panel-mounted instrument

1 Wall of control cabinet
2 Gasket
3 Tensioning screws
** Required installation depth*

Environment

Ambient temperature	-10 to +55 °C (+14 to +131 °F)	
Storage temperature	–25 to +65 °C (-13 to +149 °F)	
Electromagnetic compatibility	Interference emission and interference immunity as per EN 61326-1:2006, EN 61326-2-3:2006	
Ingress protection	Panel mounted instrument: Field instrument:	IP 54 (front), IP 30 (housing) IP 65 / tightness acc. to NEMA 4X
Electrical safety	according EN/IEC 61010-1:2001, Installation Category II, for use up to 2000 m above sea level	
CSA	Apparatus with CSA General Purpose Approval are certified for indoor use.	
Relative humidity	10 to 95%, non-condensing	
Pollution degree	The product is suitable for pollution degree 2.	

Mechanical construction

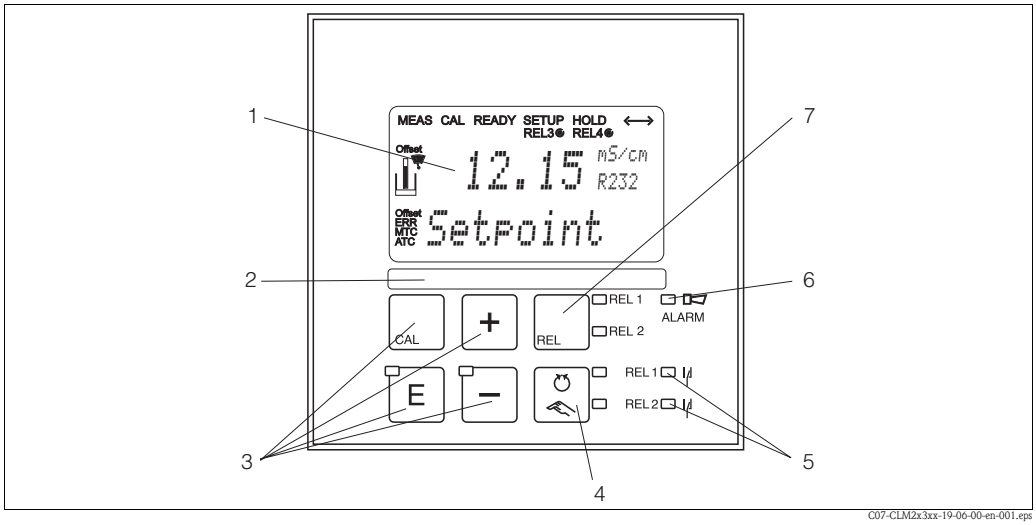
Dimensions	Panel mounted instrument: Field instrument:	96 x 96 x 145 mm (3.78 x 3.78 x 5.71 inches) Installation depth: approx. 165 mm (6.50") 247 x 170 x 115 mm (9.72 x 6.69 x 4.53 inches)
Weight	Panel mounted instrument: Field instrument:	max. 0.7 kg (1.5 lb) max. 2.3 kg (5.1 lb)
Materials	Housing of panel mounted instrument: Field housing: Front membrane:	Polycarbonate ABS PC FR Polyester, UV-resistant
Terminals	Cross section	max. 2.5 mm^2

Operability

Operating concept

All instrument control functions are arranged in a logical menu structure. Following access code entry, the individual parameters can be easily selected and modified as needed.

Display elements



Operating elements

1 LC display for display of measured values, configuration data and current menu field
2 Field for user labeling
3 4 main control keys for calibration and instrument configuration
4 Key for switching between automatic/manual operation of the relays
5 LED indicators for limit contactor relay (switch status)
6 LED indicator for alarm function
7 Display of active contact and key for relay switching in manual mode

The display simultaneously shows the current measured value and the temperature – the essential process data. Brief information texts in the configuration menu provide assistance with parameter configuration.

Certificates and approvals

CE symbol

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.

Ex approval for zone 2

Application of transmitter as related electrical equipment in non-hazardous area or in simple pressurized apparatus; application of sensor in hazardous area zone 2

C.M2.3-..4...	ATEX II (3)G (Ex nL) IIC
C.M223-..6...	
C.M253-..A...	

CSA General Purpose

C.M2.3-..2...
C.M2.3-..3...
C.M2.3-..7...

Ordering information

Product structure

	Input, software
CD	Conductivity/resistivity measurement (conductive two-electrode sensor)
CS	Conductivity/resistivity measurement (conductive two-electrode sensor) with additional functions (Plus package)
ID	Conductivity measurement (inductive sensor)
IS	Conductivity measurement (inductive sensor) with additional functions (Plus package)

	Power supply, approval
A	24 V AC/DC; ATEX II (3)G (Ex nL) IIC **(CLM253 only)**
0	230 V AC
1	115 V AC
2	230 V AC; CSA Gen. Purp.
3	115 V AC; CSA Gen. Purp.
4	230 V AC; ATEX II 3G [Ex nL] IIC
5	100 V AC
6	24 V AC/DC; ATEX II 3G [Ex nL] IIC **(CLM223 only)**
7	24 V AC/DC; CSA Gen. Purp.
8	24 V AC/DC

	Output
0	1 x 20 mA, primary value
1	2 x 20 mA, primary value + secondary value
3	PROFIBUS PA
4	PROFIBUS DP
5	1 x 20 mA, primary value, HART
6	2 x 20 mA, primary value, HART + secondary value

	Additional contacts
05	not selected
10	2 relays (limit/P(ID)/timer)
15	4 relays (limit/P(ID)/Chemoclean) **(not with PROFIBUS DP)**
16	4 relays (limit/P(ID)/timer) **(not with PROFIBUS DP)**
20	1 x 4 ... 20 mA input + 2 relays (limit/P(ID)/timer)
25	1 x 4 ... 20 mA input + 4 relays (limit/P(ID)/Chemoclean) **(not with PROFIBUS DP)**
26	1 x 4 ... 20 mA input + 4 relays (limit/P(ID)/timer) **(not with PROFIBUS DP)**

	Additional features (CLM223 only)
PRL	Protective layer

	Marking
1	Tagging (Tag), see additional spec.

CLM253-	complete order code
CLM223-	

Additional functions of the Plus package

- Current output table to cover large ranges with varying resolution, fields O33x
- Process Check System (PCS): live check of the sensor, function group P
- Ultrapure water monitoring for "Water for injection" (WFI) and "Purified water" (PW) acc. to United States Pharmacopeia (USP) and European Pharmacopoeia (EP) with pre-alarm (conductive, additional contacts necessary), fields R26x and R27x
- Polarization detection (conductive), function group P
- Concentration measurement, function group K
- Temperature compensation via coefficient table, function group T
- Adaptive calibration with installation factor (inductive), fields C13x
- Automatic cleaning function start, field F8

Scope of delivery

The delivery of the field instrument includes:
- 1 transmitter CLM253
- 1 plug-in screw terminal
- 1 cable gland Pg 7
- 1 cable gland Pg 16 reduced
- 2 cable glands Pg 13.5
- 1 Operating Instructions BA193C/07/EN
- versions with HART communication:
  1 Operating Instructions Field Communication with HART, BA208C/07/EN
- versions with PROFIBUS communication:
  1 Operating Instructions Field Communication with PROFIBUS PA/DP, BA209C/07/EN
- versions with explosion protection for hazardous area zone II (ATEX II 3G):
  Safety Instructions for use in explosion-hazardous areas, XA194C/07/A3

The delivery of the panel mounted instrument includes:
- 1 transmitter CLM223
- 1 set of plug-in screw terminals
- 2 tensioning screws
- 1 Operating Instructions BA193C/07/EN
- versions with HART communication:
  1 Operating Instructions Field Communication with HART, BA208C/07/EN
- versions with PROFIBUS communication:
  1 Operating Instructions Field Communication with PROFIBUS PA/DP, BA209C/07/EN
- versions with explosion protection for hazardous area zone II (ATEX II 3G):
  Safety Instructions for use in explosion-hazardous areas, XA194C/07/A3

Accessories

Sensors

- Condumax W CLS12
  Conductive conductivity sensor for standard, Ex and high-temperature applications;
  Ordering acc. to version, see Technical Information TI082C/07/en
- Condumax W CLS13
  Conductive conductivity sensor for standard, Ex and high-temperature applications;
  Ordering acc. to version, see Technical Information TI083C/07/en
- Condumax W CLS15
  Conductive conductivity sensor for pure and ultra-pure water applications (incl. Ex);
  Ordering acc. to version, see Technical Information TI109C/07/en
- Condumax H CLS16
  Hygienic conductive conductivity sensor for pure and ultra-pure water applications (incl. Ex);
  Ordering acc. to version, see Technical Information TI227C/07/en
- Condumax W CLS19
  Conductive conductivity sensor for pure and ultra-pure water applications;
  Ordering acc. to version, see Technical Information TI110C/07/en
- Condumax W CLS21
  Conductive conductivity sensor for applications with middle to high conductivity
  (incl. Ex); Ordering acc. to version, see Technical Information TI085C/07/en
- Indumax P CLS50
  Inductive conductivity sensor for standard, Ex and high-temperature applications
  Ordering acc. to version, see Technical Information (TI118C/07/en)
- Indumax H CLS52
  Inductive conductivity sensor with short response time for food applications
  Ordering acc. to version, see Technical Information (TI167C/07/en)
- Indumax H CLS54
  Inductive conductivity sensor in certified hygienic design for applications in:
  food, beverages, pharmaceuticals and biotechnology
  Ordering acc. to version, see Technical Information (TI400C/07/en)

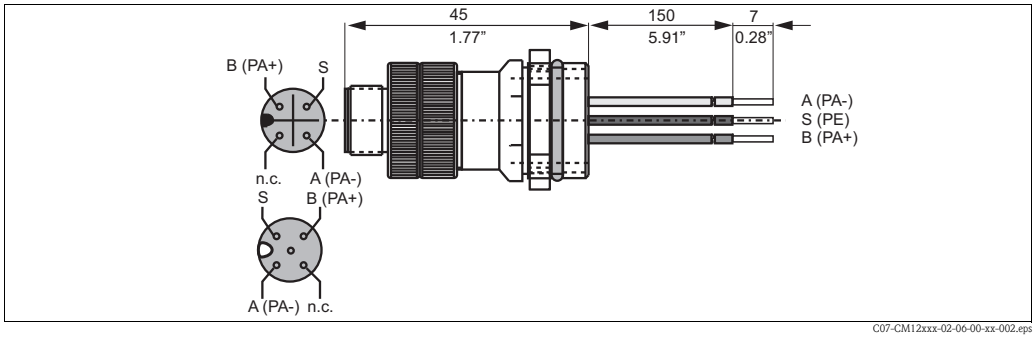
Connection accessories

CYK71 measuring cable
- Non-terminated cable for the connection of sensors (e.g. conductivity sensors) or the extension of sensor cables
- Sold by the meter, order numbers:
  - non-Ex version, black: 50085333
  - Ex version, blue: 51506616

Extension cable CLK5
- For inductive conductivity sensors, for extension via the VBM junction box, sold by the meter
- Order no.: 50085473

Junction box VBM
- For cable extension
- 10 terminals
- Cable entries: 2 x Pg 13.5 or 2 x NPT ½"
- Material: aluminum
- Ingress protection: IP 65 (≙ NEMA 4X)
- Order numbers:
  - cable entries Pg 13.5: 50003987
  - cable entries NPT ½": 51500177

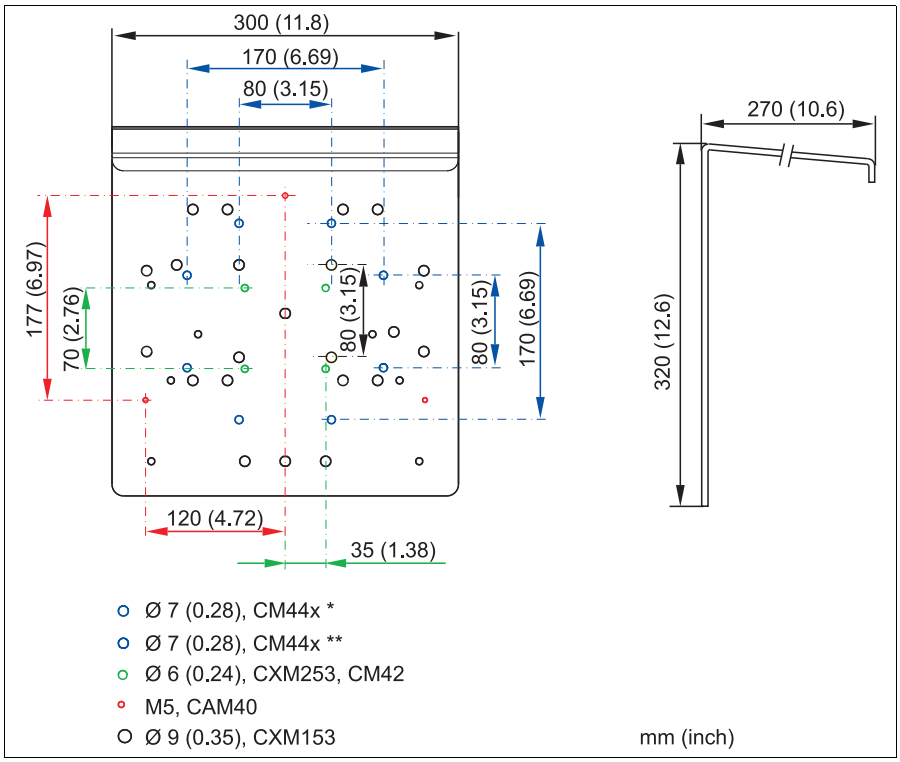
- Four-pole metal plug M12 for fieldbus connection
  order no. 51502184



M12 plug with socket

Mounting accessories

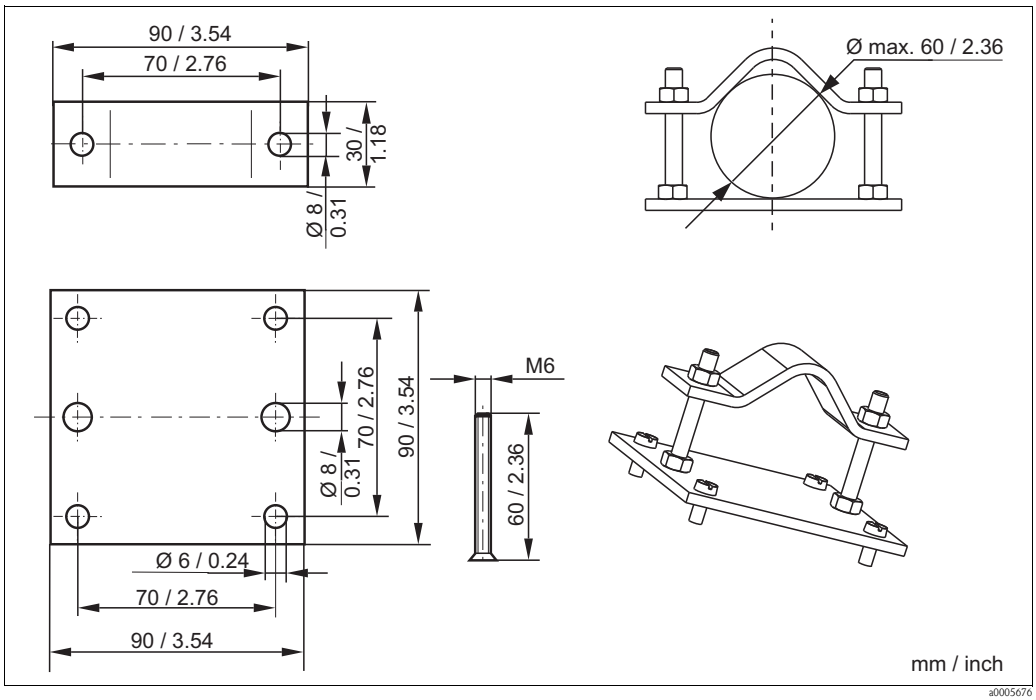
CYY101 weather protection cover for field devices, absolutely essential if operating the unit outdoors
- Material: stainless steel 1.4031 (AISI 304)
- Order No. CYY101-A



Weather protection cover for field devices

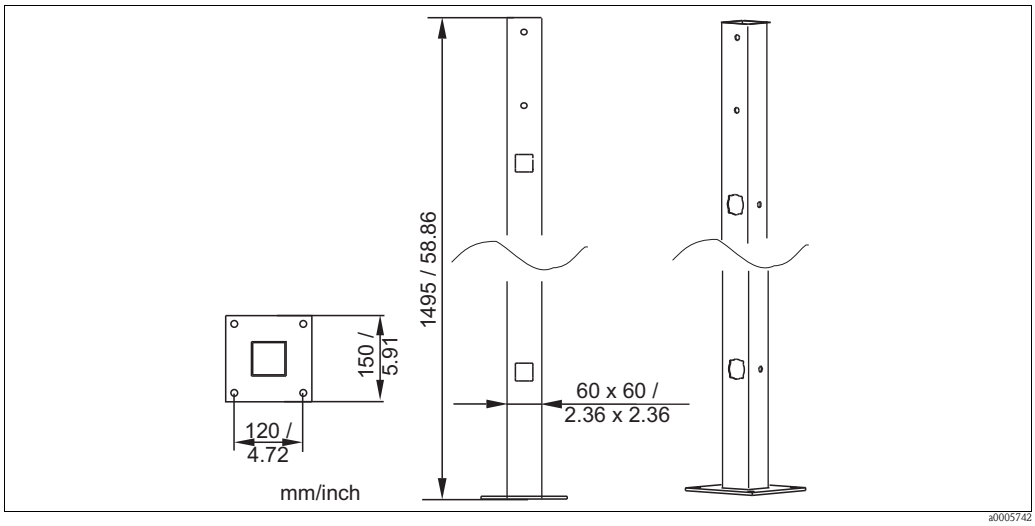
* *Wall and post mounting*
** *Rail mounting*

Post mounting kit
- For mounting of field housing on horizontal or vertical pipes (Ø max. 60 mm (2.36"))
- Material: stainless steel 1.4301
- order no. 50086842



Post mounting kit

CYY102 universal post
- Square pipe for mounting transmitters
- Material: stainless steel 1.4301 (AISI 304)
- Order No. CYY102-A



Universal post

Buffer solutions

Precision calibration solutions, acc. to SRM (Standard reference material) of NIST, reference temperature 25 °C (77 °F), with temperature table
- CLY11-A, 74.0 µS/cm, 500 ml (16.9 fl.oz); order no. 50081902
- CLY11-B, 149.6 µS/cm, 500 ml (16.9 fl.oz); order no. 50081903
- CLY11-C, 1.406 mS/cm, 500 ml (16.9 fl.oz); order no. 50081904
- CLY11-D, 12.64 mS/cm, 500 ml (16.9 fl.oz); order no. 50081905
- CLY11-E, 107.0 mS/cm, 500 ml (16.9 fl.oz); order no. 50081906

Optoscope

Optoscope
- Interface between transmitter and PC / laptop for service purposes.
- The Windows software "Scopeware" required for the PC or laptop is supplied with the Optoscope. The Optoscope is supplied in a sturdy plastic case with all the accessories required.
- Order no. 51500650

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