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

Technical Information

Liquisys M COM223/253

Dissolved Oxygen Measurement
Transmitter for oxygen sensors

Application

The modular design of the transmitter allows easy adaption 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.

Areas of Application

- Sewage treatment plants
- Wastewater treatment
- Water treatment
- Drinking water
- Surface water: rivers, lakes, sea
- Fish farming
- Boiler feed water (trace measurement)

Your benefits

- Field or panel-mounted housing
- Universal application
- For analogue and digital sensors
- Simple handling
  - Logically arranged menu structure
  - Simple single-point calibration in air, air-saturated water or in the medium is possible
- Safe operation
  - Excellent interference immunity
  - 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
  - Process monitoring
  - Sensor live check
- 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

TI199C/07/en/07.05
51500281

Endress+Hauser

People for Process Automation

Function and system design

Features of the basic version

Measurement of oxygen content and of partial oxygen pressure

The oxygen content is displayed in mg/l or in %SAT, the partial oxygen pressure is displayed in hPa. This is selected via the menu. The **temperature** is displayed at the same time or, if desired, not shown at all.

Calibration

The amperometric sensors are zero-current-free and only require a **single-point calibration**. This takes place in air, air-saturated water or by reference calibration in the medium.
The optical sensor will be calibrated before shipment. If necessary it can be calibrated in air and for zero point.

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.

Additional functions of version WX/WS/DS

Automatic pressure compensation

Oxygen concentration is not only dependent on altitude but also on weather conditions (pressure). **Automatic pressure compensation** takes these fluctuations into account.

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.

Process Check System (PCS)

It comprises two independent safety functions:
- Errors in applications **without** control are detected by monitoring the limit beween plausible and implausible measured values, i.e. **the alarm theshold**.
- Errors in applications **with** control are detected by the **controller monitor** which monitors freely adjustable, maximum permissible time intervals and reference value overshoot or undershoot.

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.

Second current output

The second current output can be configured for temperature, main measured value (oxygen content, partial oxygen pressure) 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.

Explosion proof versions for zone 2

Field housing COM253 with power supply 24 V	Application of transmitter and sensor in hazardous area zone 2
Field housing COM253 with power supply 230 V	Application of transmitter as related electrical equipment in non-hazardous area or in simple pressurised apparatus; application of sensor in hazardous area zone 2
Panel mounted housing COM223 with power supply 230 V or 24 V	Application of transmitter as related electrical equipment in non-hazardous area or in simple pressurised apparatus; application of sensor in hazardous area zone 2

Measuring system

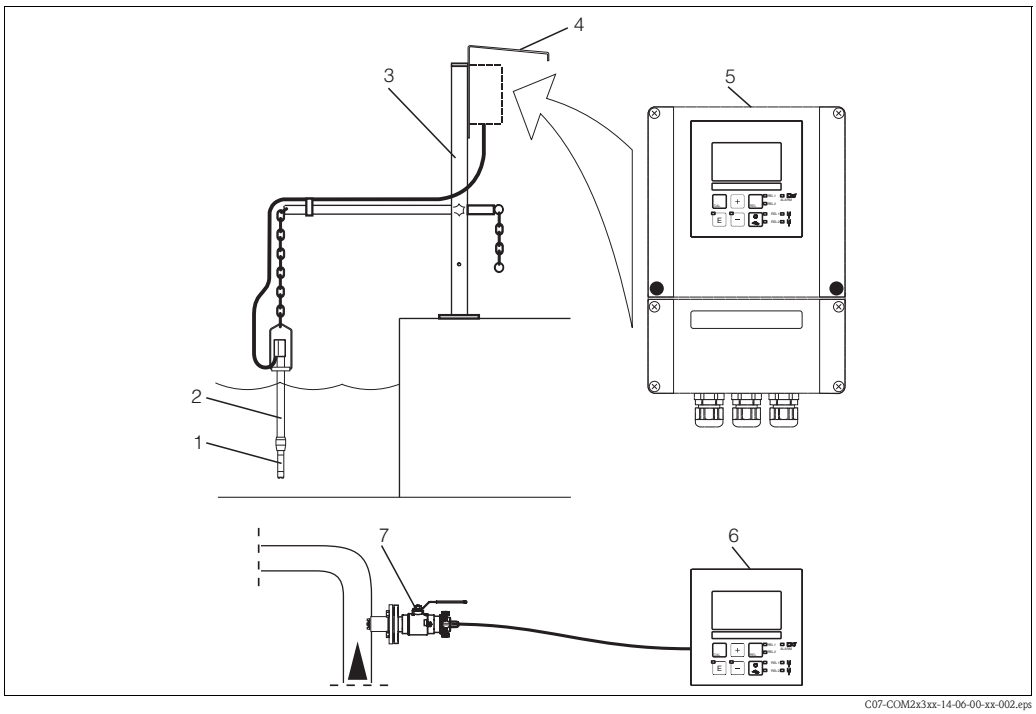
A complete measuring system comprises:

Variant 1 (DX/DS with COS41)
- The transmitter Liquisys M COM223 or COM253 in version DX or DS
- An oxygen sensor COS41
- An immersion, flow or retractable assembly

Options: extension cable CMK, junction box VBM

Variant 2 (WX/WS with COS31, COS61 or COS71)
- The transmitter Liquisys M COM223 or COM253 in version WX or WS
- An oxygen sensor COS31, COS61 or COS71
- An immersion, flow or retractable assembly

Options: extension cable OMK, junction box VS



Complete measuring system Liquisys M COM223/253

1 Oxygen sensor
2 Immersion assembly CYA611
3 Universal hanging assembly holder CYH101
4 Weather protection cover CYY101
5 Liquisys M COM253
6 Liquisys M COM223
7 Retractable assembly COA451

Input

Measured variables

Oxygen
Temperature

Measuring range

COS31:	
Oxygen concentration	0 ... 20 / 0 ... 60 mg/l
Oxygen saturation index	0 ... 200 / 0 ... 600 % SAT
Oxygen partial pressure	0 ... 400 / 0 ... 1200 hPa
COS41, COS61:	
Oxygen concentration	0 ... 20 mg/l
Oxygen saturation index	0 ... 200 % SAT
Oxygen partial pressure	0 ... 400 hPa
COS71:	
Oxygen concentration	0 ... 20 mg/l
Oxygen saturation index	0 ... 200 % SAT
Oxygen partial pressure	0 ... 400 hPa
Temperature:	–10 ... 60 °C (14 ... 140 °F)

Cable specification

Cable length:	
COS31, COS61, COS71	max. 100 m (328 ft)
COS41	max. 50 m (164 ft)

O_2 signal input

Version DX/DS:	0 ... 3000 nA
Version WX/WS:	digital communication or 0 ... –7500 mV

Binary inputs

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

Current input

4 ... 20 mA, galvanically separated

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

Output

Current range

0/4 ... 20 mA, galvanically separated, active

Error current

2.4 or 22 mA in case of an error

Load

maximum 500 Ω

Transmission range

COS31:	
Oxygen concentration	Δ 0.2 ... Δ 20 / Δ 0.6 ... Δ 60 mg/l
Oxygen saturation index	Δ 2 ... Δ 200 / Δ 6 ... Δ 600 % SAT
Oxygen partial pressure	Δ 4 .... Δ 400 / Δ 12 ... Δ 1200 hPa
COS41, COS61:	
Oxygen concentration	Δ 0.2 ... Δ 20 mg/l
Oxygen saturation index	Δ 2 ... Δ 200 % SAT
Oxygen partial pressure	Δ 4 .... Δ 400 hPa
COS71:	
Oxygen concentration	Δ 0.02 ... Δ 20 mg/l
Oxygen saturation index	Δ 0.2 ... Δ 200 % SAT
Oxygen partial pressure	Δ 0.4 .... Δ 400 hPa
Temperature:	Δ 7 ... Δ 70 °C

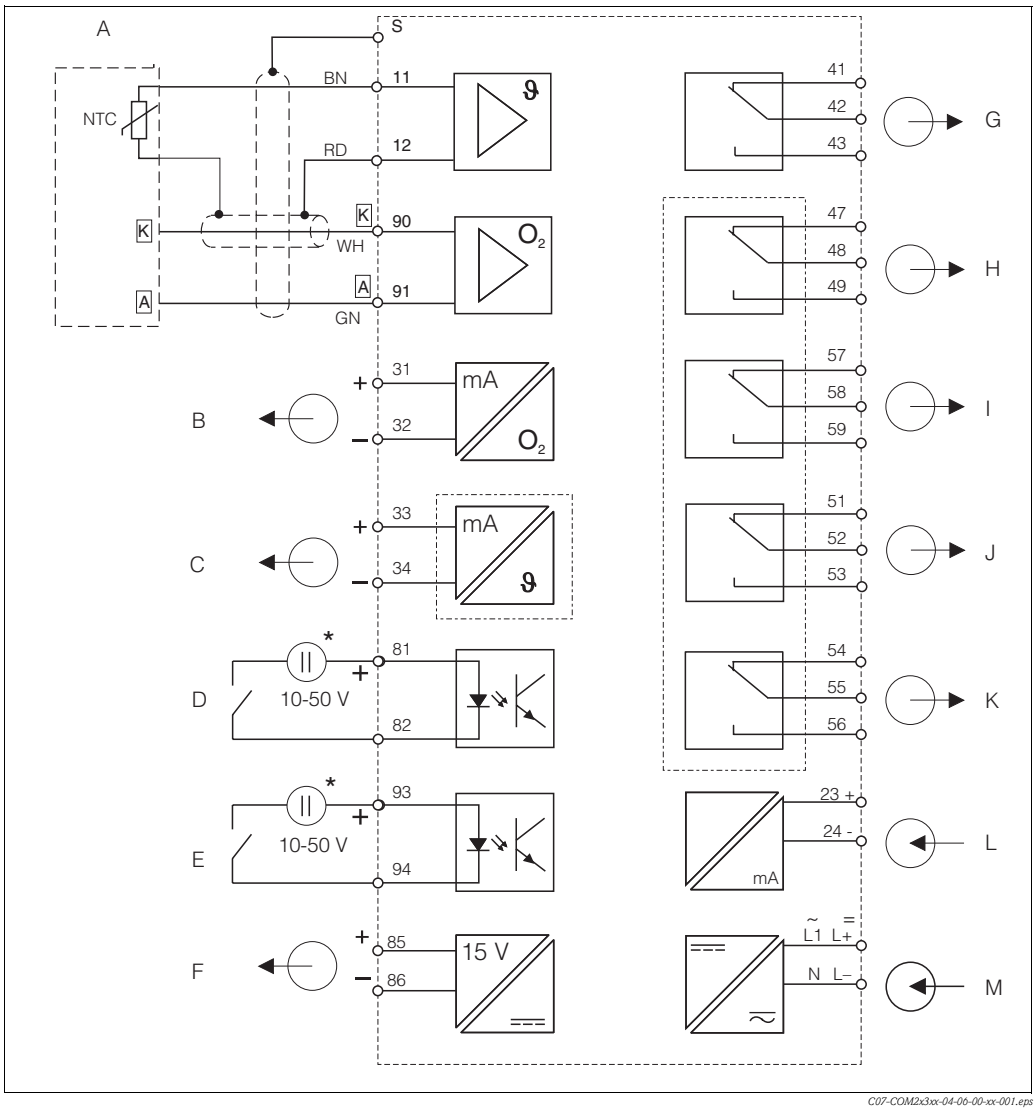
Resolution

max. 700 digits/mA

Isolation voltage	max. 350 V_{RMS}/500 V DC	
Overvoltage protection	according to EN 61000-4-5	
Auxiliary voltage output	Output voltage: Output current:	15 V ± 0.6 max. 10 mA
Contact outputs	Switching current with ohmic load (cos φ = 1): Switching current with inductive load (cos φ = 0.4): Switching voltage: Switching power with ohmic load (cos φ = 1): Switching power with inductive load (cos φ = 0.4):	max. 2 A max. 2 A max. 250 V AC, 30 V DC max. 500 VA AC, 60 W DC max. 500 VA AC, 60 W DC
Limit contactor	Pickup/dropout delay:	0 ... 2000 s
Controller	Function (adjustable): Controller response: Control gain K_p: Integral action time T_n: Derivative action time T_v: Period for pulse length controller: Frequency for pulse frequency controller: Basic load:	pulse length/pulse frequency controller PID 0.01 ... 20.00 0.0 ... 999.9 min 0.0 ... 999.9 min 0.5 ... 999.9 s 60 ... 180 min^{-1} 0 ... 40% of max. set value
Alarm	Function (switchable): Alarm threshold adjustment range: Alarm delay: Monitoring time lower limit violation: Monitoring time upper limit violation:	latching/momentary contact O_2 / temperature: entire measuring range, depending on sensor type 0 ... 2000 s (min) 0 ... 2000 min 0 ... 2000 min

Power supply

Electrical connection variant 1 (DX/DS)



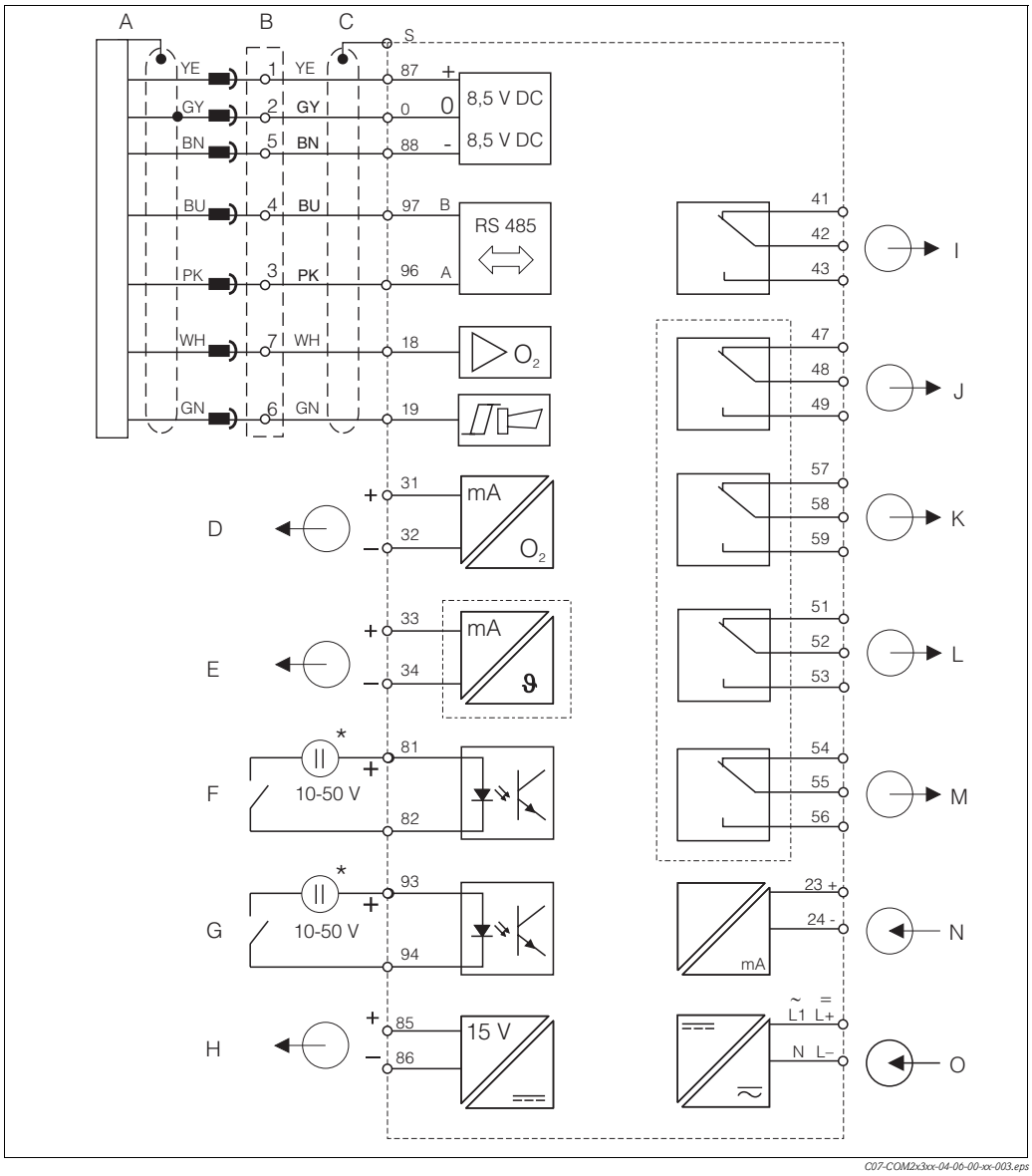
Electrical connection version DX or DS

A	*Sensor COS41*
B	*Signal output 1 oxygen*
C	*Signal output 2 temperature*
D	*Binary input 1 (Hold)*
E	*Binary input 2 (Chemoclean)*
F	*Aux. voltage output*
G	*Alarm (current-free contact position)*
H	*Relay 1 (current-free contact position)*
I	*Relay 2 (current-free contact position)*
J	*Relay 3 (current-free contact position)*
K	*Relay 4 (current-free contact position)*
L	*Current input 4 ... 20 mA*
M	*Power supply*

* *Aux. voltage output terminal 85/86 applicable*

The device is approved for protection class II and is generally operated without a protective earth connection.

Electrical connection variant 2 (WX/WS)



Electrical connection version WX/WS

A	*Oxygen sensor COS31/61/71*	*I*	*Alarm (current-free contact position)*
B	*Junction box VS with extension*	*J*	*Relay 1 (current-free contact position)*
C	*COM253: Plug connection for oxygen sensor*	*K*	*Relay 2 (current-free contact position)*
	COM223: The sensor cable plug must be removed or junction box VS used	*L*	*Relay 3 (current-free contact position)*
		M	*Relay 4 (current-free contact position)*
D	*Signal output 1 oxygen*	*N*	*Current input 4 ... 20 mA*
E	*Signal output 2 temperature*	*O*	*Power supply*
F	*Binary input 1 (Hold)*		
G	*Binary input 2 (Chemoclean)*		
H	*Aux. voltage output*		

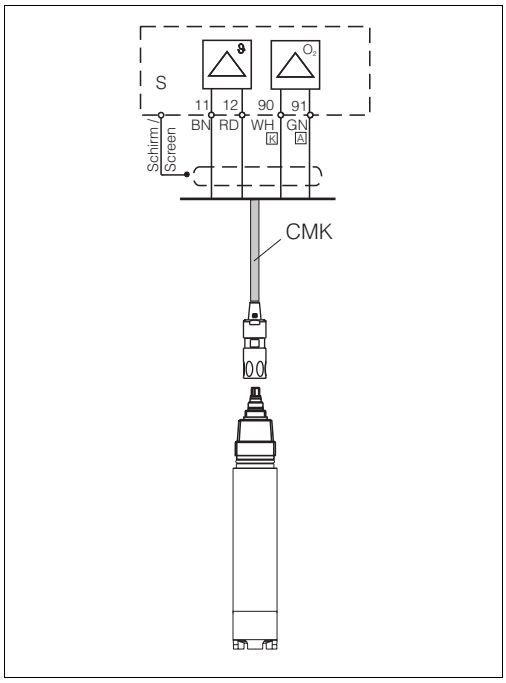
* *Aux. voltage output terminal 85/86 applicable*

The device is approved for protection class II and is generally operated without a protective earth connection. COS61 uses the additional 15 V powersupply of the Liquisys.

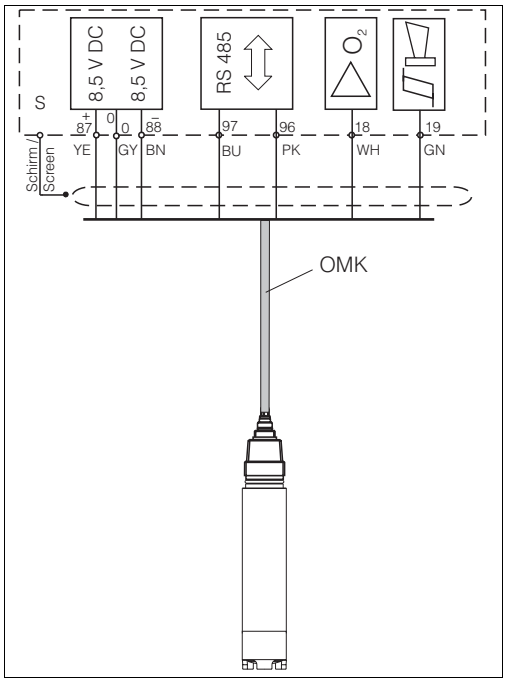
Note!
The signals "Sensor signal" and "Alarm" are not used by COS61 and the TOP68-versions.

Connection of sensor

The oxygen sensors are supplied with the measuring cable. To extend this cable, you have to use a junction box and an extension cable (see "Accessories").



Connection of COS41 to transmitter (DX/DS)



Connection of COS31/61/71 to transmitter (WX/WS)

Power supply

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

Power consumption

max. 7.5 VA

Mains protection

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

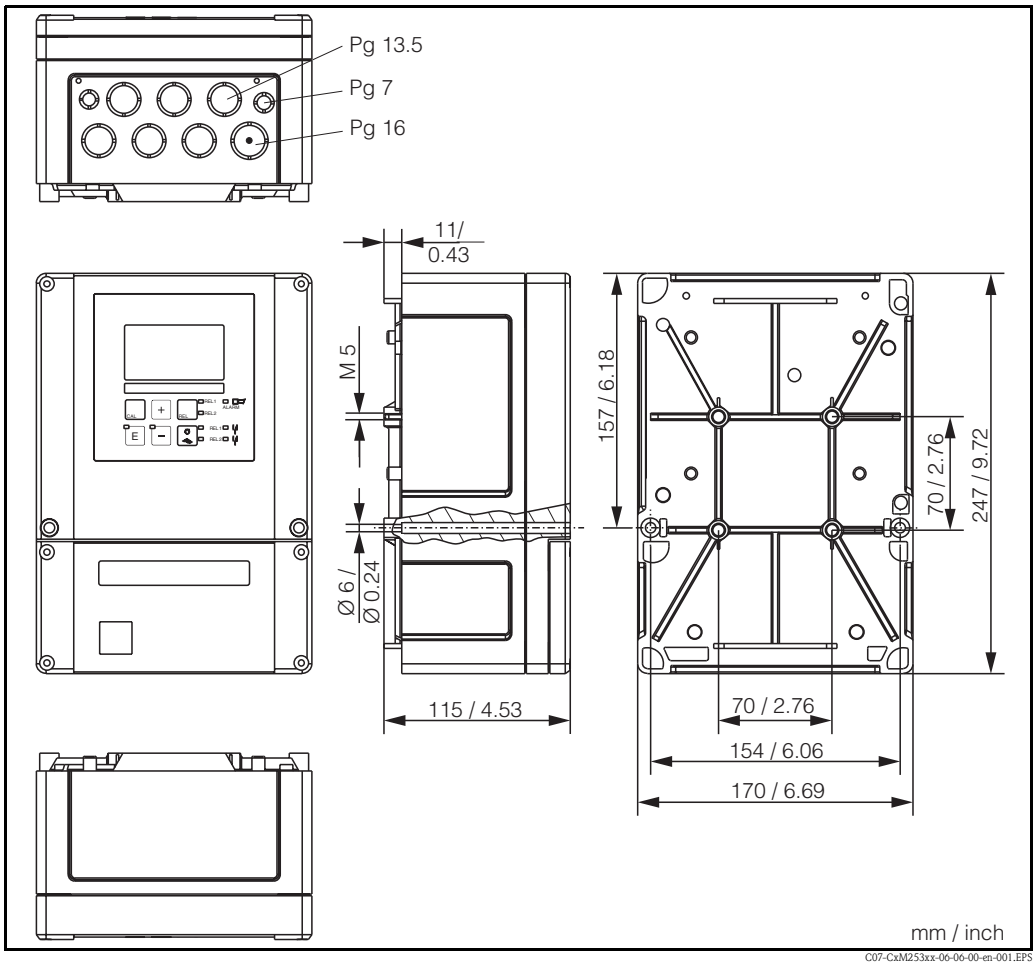
Performance characteristic

Resolution	Oxygen:	
	COS31, COS41, COS61:	0.01 mg/l / 0.1 % SAT / 1 hPa
	COS71:	0.001 mg/l / 0.1 % SAT / 1 hPa
	Temperature:	0.1 °C
Deviation of indication[a]	Display	
	Oxygen:	max. 0.5 % of measuring range
	Temperature:	max. 1.0 % of measuring range
	Signal output	
	Oxygen:	max. 0.75 % of measuring range
	Temperature:	max. 1.25 % of measuring range
Repeatability[a]	max. 0.2 % of measuring range	
Temperature compensation range	0 ... 50 °C (32 ... 104 °F)	
Pressure compensation range	500 ... 1100 hPa	
Altitude adjustment range	0 ... 4000 m (0 ... 13124 ft)	
Salinity adjustment range	0 ... 4 %	
Slope adjustment range	COS31:	75 ... 140 % (nominal 290 nA, in air, 20 °C (68 °F), 1013 hPa)
	COS41:	75 ... 140 % (nominal 290 nA, in air, 20 °C (68 °F), 1013 hPa)
	COS61:	75 ... 140 % (nominal 1340 nA, in air, 20 °C (68 °F), 1013 hPa)
	COS71:	50 ... 150 % (nominal 8000 nA, in air, 20 °C (68 °F), 1013 hPa)

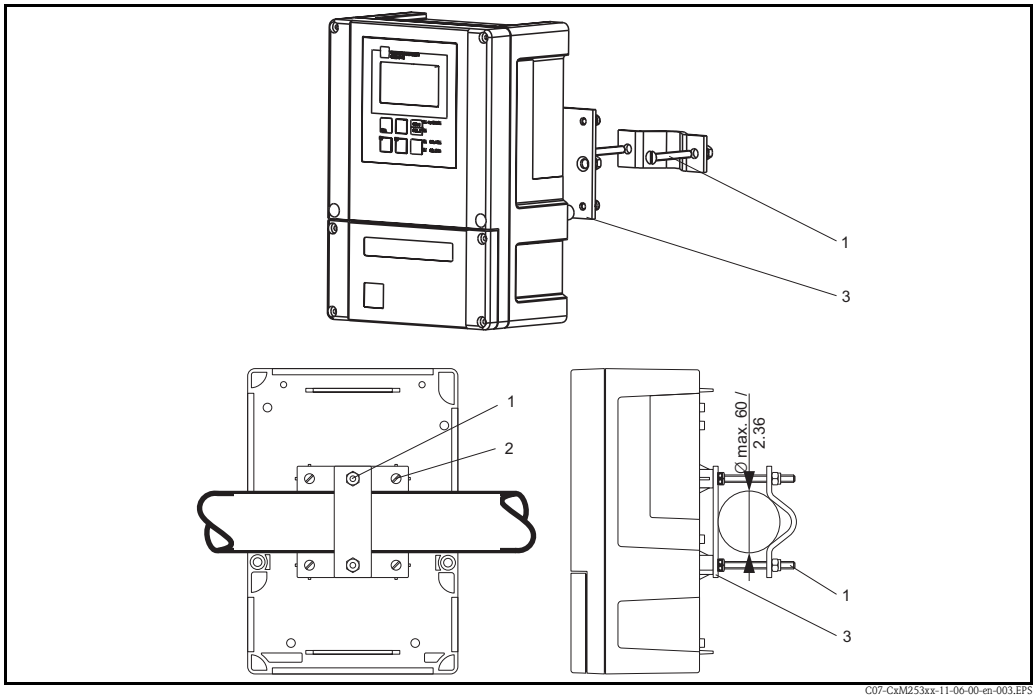
a) acc. to IEC 746-1, for nominal operating conditions

Installation conditions

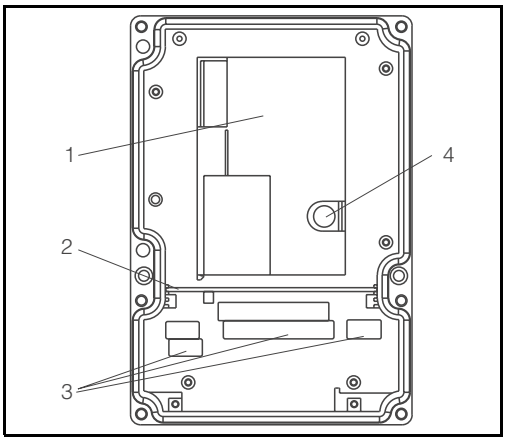
Installation instructions



Field instrument

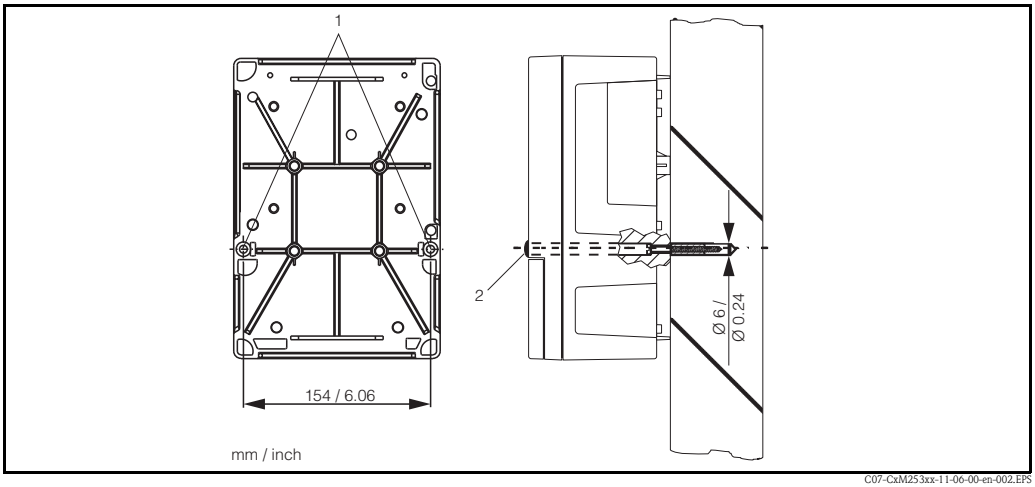


Mounting on pipes



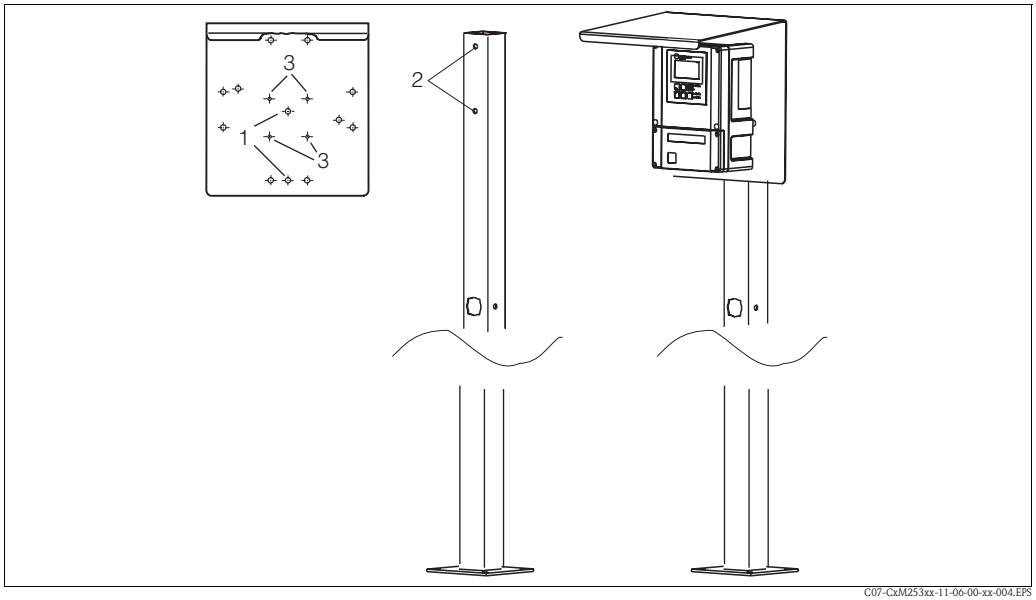
1 Removable electronics box
2 Partition plate
3 Terminal blocks
4 Fuse

Inside of field instrument



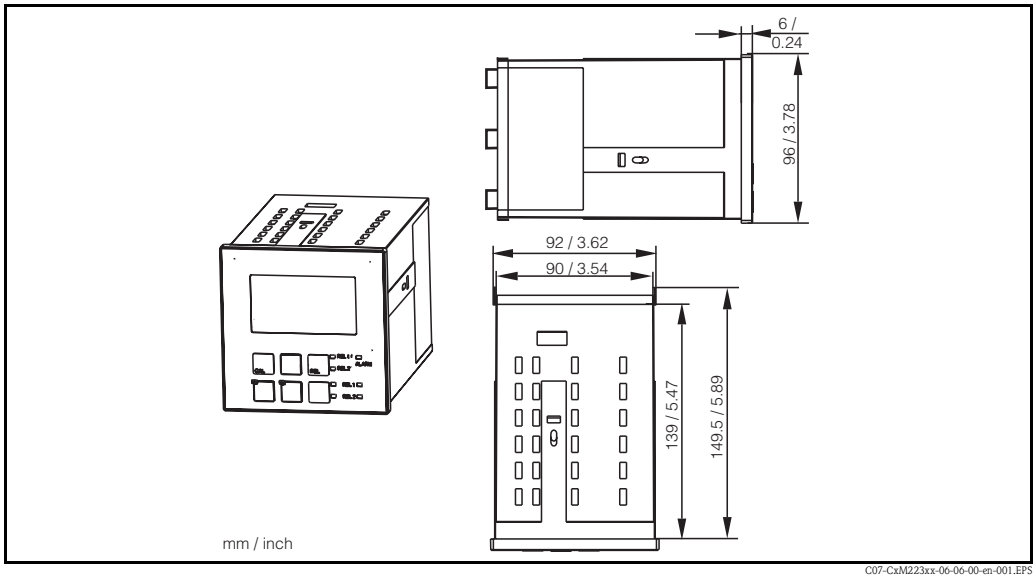
Wall mounting of the field instrument

1 Mounting holes
2 Protecting cap

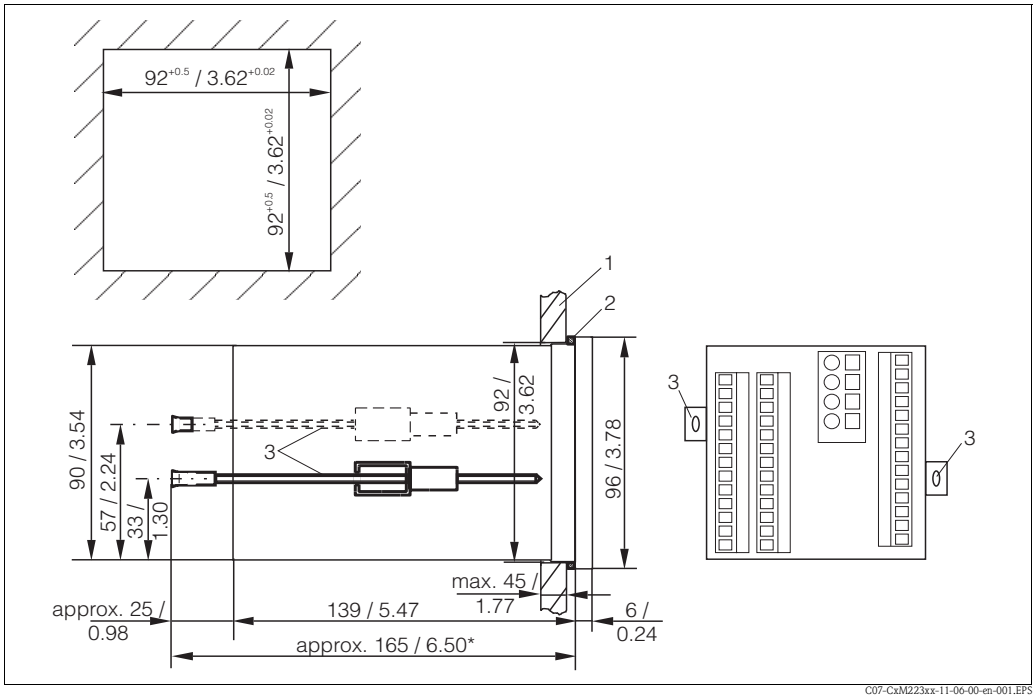


Mounting of the field instrument with mounting post and weather protection cover

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

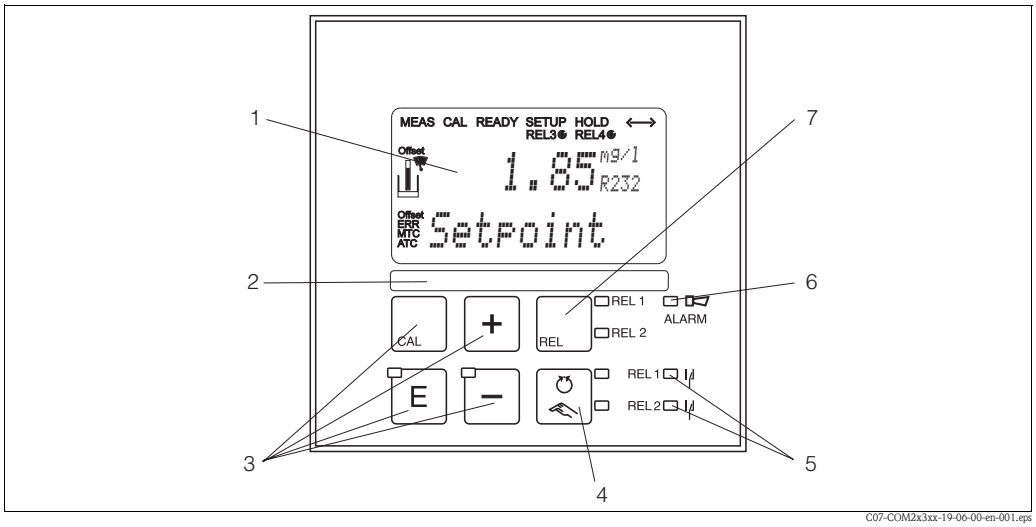
Ambient temperature	-10 ... +55 °C (+14 ... +131 °F)	
Ambient temperature limit	–20 ... +60 °C (-4 ... +140 °F)	
Storage and transport temperature	–25 ... +65 °C (-13 ... +149 °F)	
Electromagnetic compatibility	Interference emission and interference immunity acc. to EN 61326: 1997 / A1: 1998	
Ingress protection	Panel mounted instrument: Field instrument:	IP 54 (front), IP 30 (housing) IP 65
Relative humidity	10 ... 95%, non-condensing	

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

Human interface

Display elements



C07-COM2x3xx-19-06-00-en-001.eps

Operating elements

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.

Instrument control functions

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.

Certificates and approvals

CE symbol

Declaration of conformity
The product meets the legal requirements of the harmonized European standards.
The manufacturer confirms compliance with the standards by affixing the CE symbol.

Ex approval for zone 2

Explosion protection for Zone 2

Version	Approval
COM253-..6...	ATEX II 3G EEx nA[L] IIC T4
COM253-..4... COM223-..4... COM223-..6...	ATEX II 3G [EEx nAL] IIC

Ordering information

Product structure

	Version
DX	Sensor COS41 / 4 / 4HD, basic functions
DS	Sensor COS41 / 4 / 4HD, with additional functions (Plus package)
WX	Sensor COS31 / 61 / 71 / 3 / 3HD, basic functions
WS	Sensor COS31 / 61 / 71 / 3 / 3HD, with additional functions (Plus package)

	Power supply; approval
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 [EEx nAL] IIC
5	100 V AC
6	24 V AC/DC; ATEX II 3G [EEx nAL] IIC for COM223, EEx nA[L] IIC T4 for COM253
7	24 V AC/DC; CSA Gen. Purp.
8	24 V AC/DC

	Output
0	1 x 20 mA, dissolved oxygen
1	2 x 20 mA, dissolved oxygen and temperature/actuating variable
3	PROFIBUS PA
4	PROFIBUS DP
5	1 x 20 mA, dissolved oxygen with HART®
6	2 x 20 mA, dissolved oxygen with HART® and temperature/actuating variable

	Additional contacts; analogue input
05	Not selected
10	2 x relay (limit/controller/timer)
15	4 x relay (limit/controller/Chemoclean)
16	4 x relay (limit/controller/timer)
20	2 x relay (limit/controller/timer); current input
25	4 x relay with cleaning (limit/controller/timer/Chemoclean); current input
26	4 x relay with timer (limit/controller/timer); current input

COM253-					complete order code
COM223-					

Additional functions of the Plus package

- Current output table to cover large areas with varying resolution, fields O23x
- Process Check System (PCS): live check of the sensor, function group P
- Automatic cleaning function start, field F8

Scope of delivery

The delivery of the field instrument includes:
- 1 transmitter COM253
- 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 BA 199C/07/en
- versions with HART communication:
  1 operating instructions Field Communication with HART, BA 208C/07/en
- versions with PROFIBUS communication:
  1 operating instructions Field Communication with PROFIBUS PA/DP, BA 209C/07/en
- versions with explosion protection for hazardous area zone 2 (ATEX II 3G):
  Safety instructions for use in explosion-hazardous areas, XA 194C/07/a3

The delivery of the panel mounted instrument includes:
- 1 transmitter COM223
- 1 set of plug-in screw terminals
- 2 tensioning screws
- 1 BNC-plug (solder-free)
- 1 operating instructions BA 199C/07/en
- versions with HART communication:
  1 operating instructions Field Communication with HART, BA 208C/07/en
- versions with PROFIBUS communication:
  1 operating instructions Field Communication with PROFIBUS PA/DP, BA 209C/07/en
- versions with explosion protection for hazardous area zone 2 (ATEX II 3G):
  Safety instructions for use in explosion-hazardous areas, XA 194C/07/a3

Accessories

Sensors

- Oxymax W COS31
  oxygen sensor for drinking water and wastewater measurements, SS 1.4571 , potentiostatic amperometric principle
  ordering acc. to product structure, see Technical Information (TI 285/07/en)
- Oxymax W COS41
  oxygen sensor for drinking water and wastewater measurements, POM, amperometric principle
  ordering acc. to product structure, see Technical Information (TI 284/07/en)
- Oxymax W COS61
  optical oxygen sensor for drinking water and wastewater measurements, SS 1.4571, fluorescence quenching principle
  ordering acc. to product structure, see Technical Information (TI 387/07/en)
- Oxymax W COS71
  oxygen sensor for trace measurement, SS 1.4571, potentiostatic amperometric principle
  ordering acc. to product structure, see Technical Information (TI 286/07/en)

Assemblies

- Flow assembly COA250
  for sensor installation in pipe lines, PVC;
  ordering acc. to product structure (Technical Information TI111C/07/en)
- Flow assembly COA260
  for plate or wall mounting, for oxygen trace measurements;
  ordering acc. to product structure (Technical Information TI310C/07/en, 51507520)
- Retractable assembly Cleanfit COA451
  manually driven retractable assembly, stainless steel, with ball valve, for oxygen sensors;
  ordering acc. to product structure (Technical Information TI368C/07/en)
- Immersion assembly COA110
  for sensor immersion in the basin, PVC pipe resp. PUR floating body with SS 1.4571 (AISI 316Ti) immersion tube;
  Ordering acc. to product structure (see Technical Information TI 035C/07/en)
- Immersion assembly Dipfit W CYA611
  for sensor immersion in basins, open channels and tanks, PVC;
  Ordering acc. to product structure (Technical Information TI 166C/07/en)
- Immersion assembly CYY105
  for sensor immersion in basins, SS 1.4404 (AISI 316L) pipe, SS 1.4571 (AISI 316Ti) fitting;
  Ordering acc. to product structure (Technical Information TI 092C/07/en, 50061228)
- Basin rim holder CYY106
  for sensor immersion in basins, SS 1.4301 (AISI 304);
  Order no. CYY106-A
- Immersion assembly holder CYH101
  for pH, ORP, oxygen, conductivity assemblies and for oxygen and turbidity sensors;
  Ordering acc. to product structure (Technical Information TI092C/07/en)

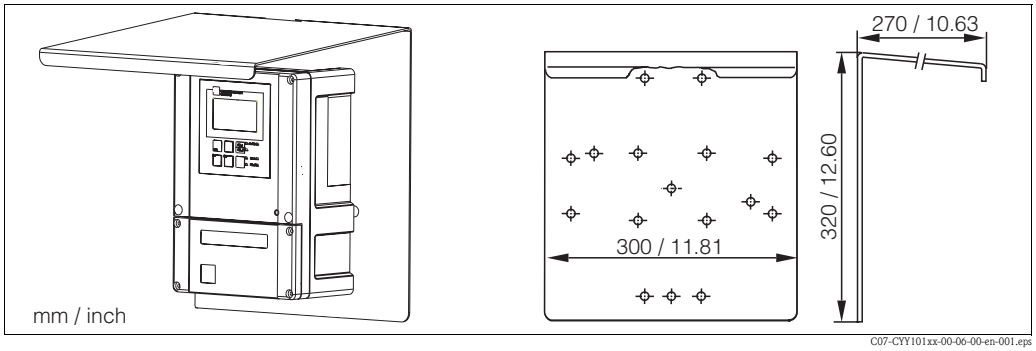
Connection accessories

- Measuring cable OMK for oxygen sensors COS31, COS61 and COS71
  for use as extension cable between junction box VS and transmitter, not terminated
  sold by the metre - order no. 50004124
- Measuring cable CMK for oxygen sensor COS41
  for use as extension cable between junction box VBM and transmitter, not terminated
  sold by the metre - order no. 50005374
- VS junction box
  with plug-in socket and 7-pole plug,
  for cable extension from sensor (COS71, COS61, COS31, COS3 with SXP connector) to transmitter, IP 65;
  order no. 50001054
- Junction box VBM
  for cable extension for sensors COS41, COS4 (fixed cable versions),
  with 10 terminals, IP 65 / NEMA 4X

Cable entry Pg 13.5	Order no. 50003987
Cable entry NPT ½"	Order no. 51500177

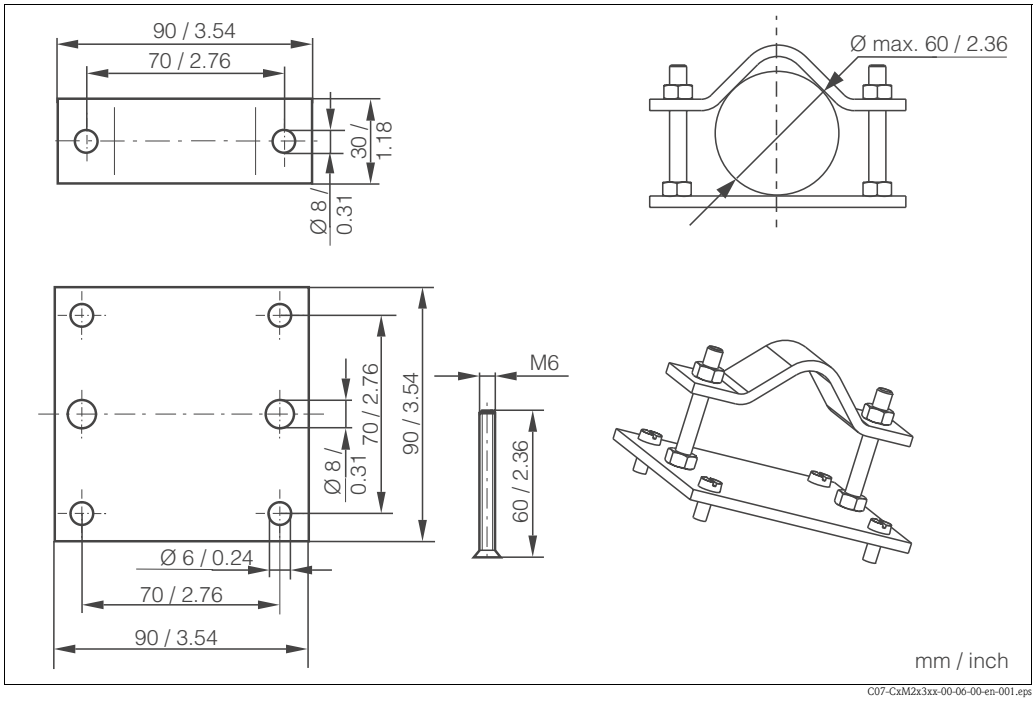
Mounting accessories

- Weather protection cover CYY101 for mounting of field housing, for outdoor installation
  material: stainless steel 1.4031;
  order no. CYY101-A



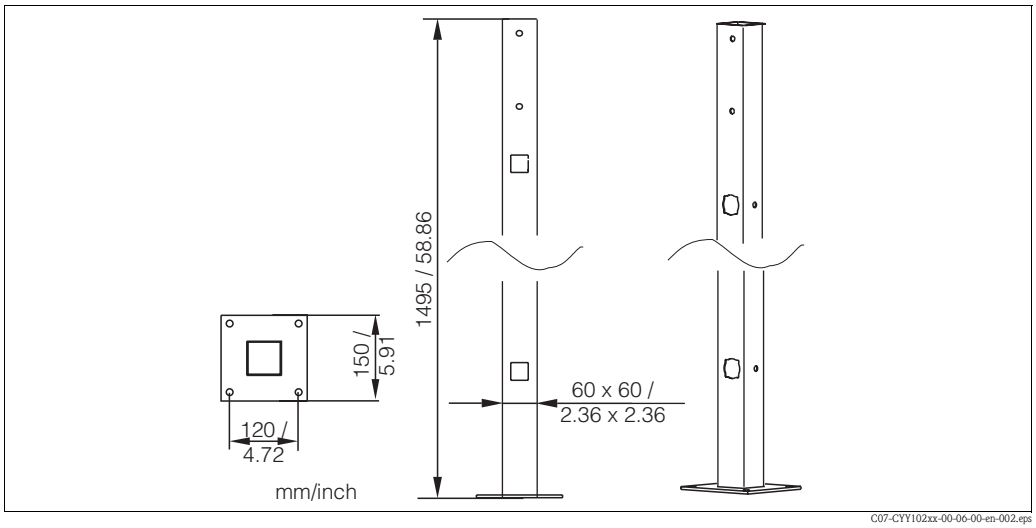
Weather protection cover for field instrument

- Kit for mounting of field housing on horizontal or vertical pipes (Ø max. 60 mm (2.36"))
  order no. 50086842



Pipe mounting kit

- Universal upright post CYY102
  Square post for mounting of field housing, material: stainless steel 1.4301;
  order no. CYY102-A



Square post CYY102

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

International Head Quarter

Endress+Hauser
GmbH+Co. KG
Instruments International
Colmarer Str. 6
79576 Weil am Rhein
Deutschland

Tel. +49 76 21 9 75 02
Fax +49 76 21 9 75 34 5

TI199C/07/en/07.05
51500281
Printed in Germany / FM+SGML 6.0 / DT

Endress+Hauser

People for Process Automation