Instruction manual

O_2 Transmitter 4100 e

Order number: 52 121 114

METTLER TOLEDO

Warranty

Defects occurring within 1 year from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).

Subject to change without notice

Return of products under warranty

Please contact METTLER TOLEDO's Customer Service Dept. before returning a defective device. Ship the cleaned device to the address you have been given. If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.

Disposal (Directive 2002/96/EC of January 27, 2003)
Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

Mettler-Toledo GmbH, Process Analytics, Industrie Nord,
CH-8902 Urdorf, Tel. (01) 736 26 36
Subject to technical changes. Mettler-Toledo GmbH, 10/03.
Printed in Germany.

Contents

Contents

Safety information

Be sure to read and observe the following instructions!

The device has been designed in accordance with the state of the art and complying with the applicable safety regulations. When operating the device, certain conditions may nevertheless lead to danger for the operator or damage to the device.

Caution!
Commissioning may only be carried out by trained experts. Whenever it is likely that protection has been impaired, the device shall be made inoperative and secured against unintended operation.

The protection is likely to be impaired if, for example:
- the device shows visible damage
- the device fails to perform the intended measurements
- after prolonged storage at temperatures above 70 °C
- after severe transport stresses

Before recommissioning the device, a professional routine test in accordance with EN 61010-1 must be performed. This test should be carried out by the manufacturer.

Intended use

The O_2 Transmitter 4100 e is used for dissolved oxygen and temperature measurement in biotechnology, pharmaceutical industry, as well as in the field of environment, food processing, and sewage treatment.
The rugged molded enclosure can be wall or pipe mounted or fixed into a control panel.
The protective hood provides additional protection against direct weather exposure and mechanical damage.
The Transmitter has been designed for application with amperometric sensors of the InPro6000 ... InPro6800 Series.

Trademarks

The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.

InPro®
EasyClean®

EC Declaration of conformity

Mettler-Toledo GmbH
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Declaration of conformity
Konformitätserklärung CE
Déclaration de conformité

We/Wir/Nous	**Mettler-Toledo GmbH, Process Analytics** Im Hackacker 15 8902 Urdorf Switzerland declare under our sole responsibility that the product, erklären in alleiniger Verantwortung, dass dieses Produkt, déclarons sous notre seule responsabilité que le produit,
Description **Beschreibung/Description**	**02-4100e**
	to which this declaration relates is in conformity with the following standard(s) or other normative document(s). auf welches sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt, auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
Low-voltage directive/ **Nieder-spannungs-Richtlinie/** **Directive basse tension**	**73/23/EWG**
Norm/Standard/Standard	**DIN EN 61010-1 / VDE 0411 Teil 1: 2008-08**
EMC directive/EMV-Richtlinie **Directive concernant la CEM**	**89/336/EWG**
Norm/Standard/Standard	**DIN EN 61326 / VDE 0843 Teil 20 1998-01** **DIN EN 61326/A1 / VDE 0843 Teil 20/A1: 1999-05**
Place and Date of Issue **Ausstellungsort / - Datum** **Lieu et date d'émission**	**Urdorf, 26.11.2002**

Mettler-Toledo GmbH, Process Analytics

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METTLER TOLEDO

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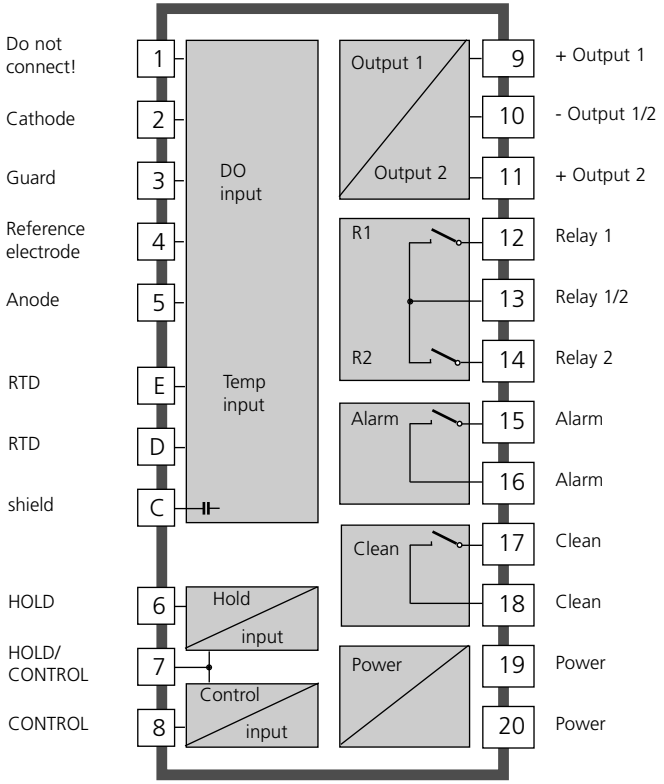
Corporate Headquarters: Mettler-Toledo GmbH, Im Langacher, CH-8606 Greifensee

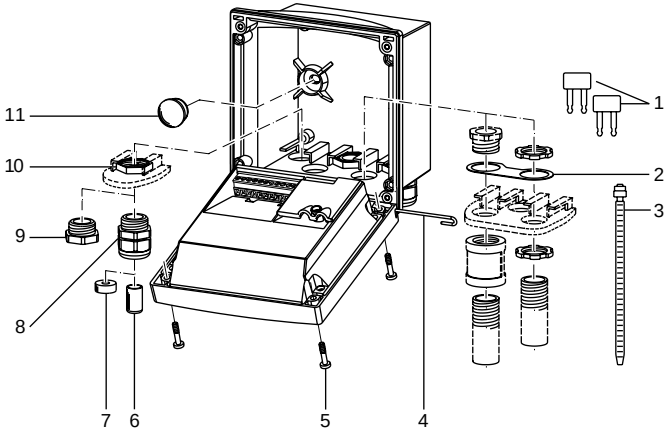
Overview of O_2 Transmitter 4100 e



Package contents

Check the shipment for transport damage and completeness.
The package should contain:

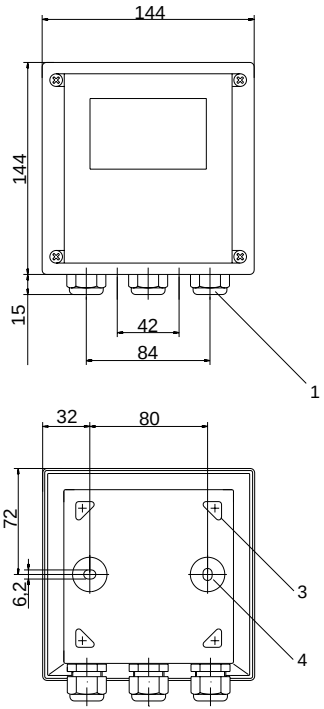
- Front unit
- Lower case
- Bag containing small parts
- Instruction manual
- Specific test report



1 Jumper (2 pieces)
2 Washer (1 piece), for conduit mounting: Place washer between enclosure and nut
3 Cable ties (3 pieces)
4 Hinge pin (1 piece), insertable from either side
5 Enclosure screws (4 pieces)
6 Sealing inserts (1 piece)
7 Rubber reducer (1 piece)
8 Cable glands (3 pieces)
9 Filler plugs (3 pieces)
10 Hexagon nuts (5 pieces)
11 Sealing plugs (2 pieces), for sealing in case of wall mounting

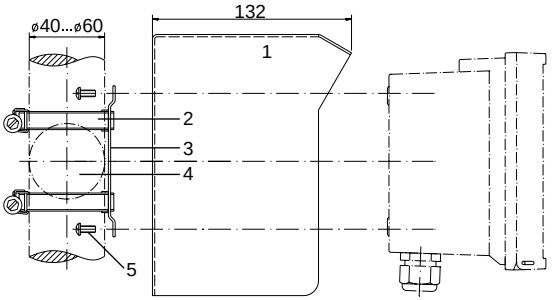
Fig.: Assembling the enclosure

Mounting plan



1 Cable gland (3 pieces)
2 Breakthroughs for cable gland or conduit 1/2", dia 21.5 mm (2 breakthroughs) Conduits not included!
3 Breakthroughs for pipe mounting (4 breakthroughs)
4 Breakthroughs for wall mounting (2 breakthroughs)

Fig.: Mounting plan



1 protective hood (if required)
2 Hose clamps with worm gear drive to DIN 3017 (2 pieces)
3 Pipe-mount plate (1 piece)
4 For vertical or horizontal posts or pipes
5 Self-tapping screws (4 pieces)

Fig.: Pipe-mount kit

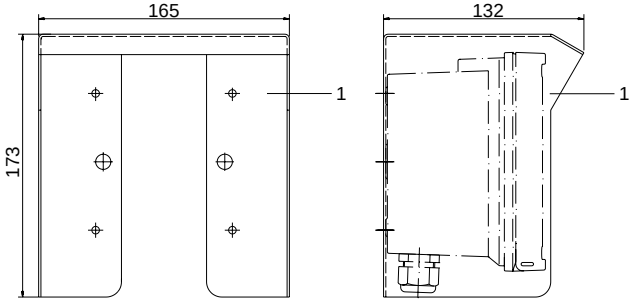
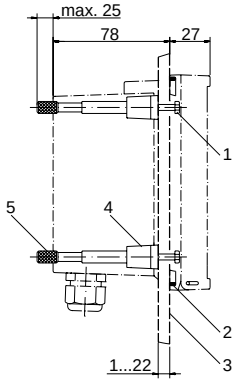


Fig.: Protective hood for wall and pipe mounting



1 Screws (4 pieces)
2 Gasket (1 piece)
3 Control panel
4 Span pieces (4 pieces)
5 Threaded sleeves (4 pieces)

Fig.: Panel-mount kit

Information on installation

Caution!

- Installation may only be carried out by trained experts in accordance with this instruction manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings.
- Be sure not to notch the conductor when stripping the insulation.
- Before connecting the device to the power supply, make sure that its voltage lies within the range 20.5 to 253 V AC/DC.
- When commissioning, a complete configuration must be carried out by the system administrator.

The terminals are suitable for single wires and flexible leads up to 2.5 mm² (AWG 14)

Warning!
Additional safety precautions have to be taken for applications in hazardous locations to CSA (CLI DIV2 GPA,B,C,D T4, Ex nA IIC T4)! (See Pg 93.)

Terminal assignments

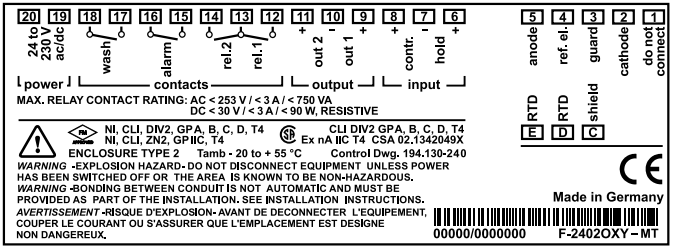
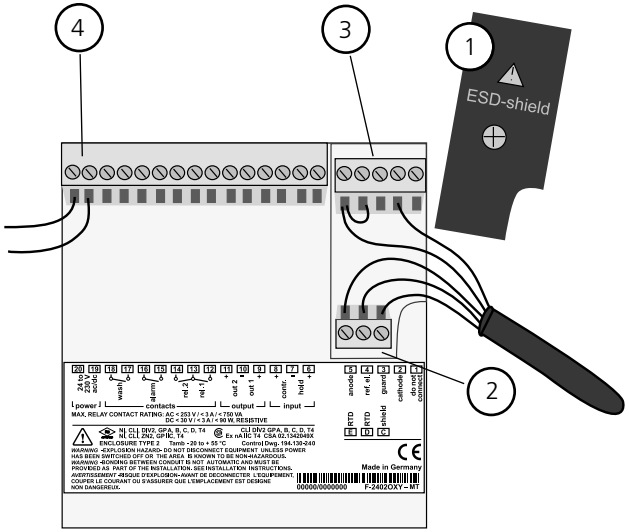


Fig.: Terminal assignments O_2 Transmitter 4100 e



1 ESD shield covering the sensor inputs
(Screw off for assembly)
Note: The cable shield must end under the ESD shield.
(Cut lines if required)
2 Terminals for temperature probe
3 Terminals for sensor
4 Connection of power supply

Fig.: Information on installation, rear side of Transmitter

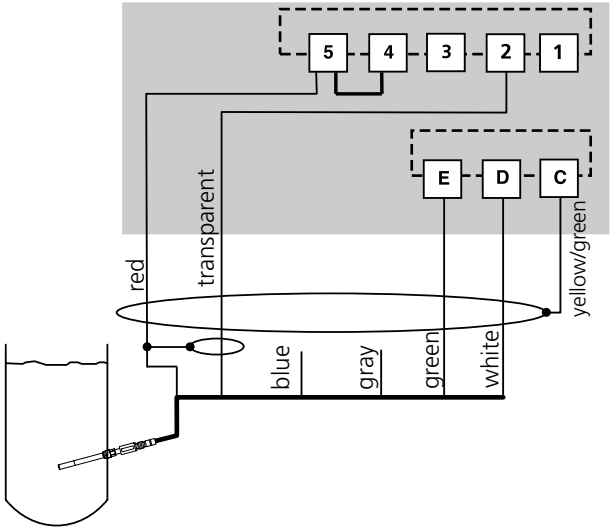
Division 2 wiring

FM

The connections to the Transmitter are incendive and must be installed in accordance with the National Electric Code (ANSI-NFPA 70) Division 2 hazardous (classified) location incendive wiring techniques.

Typical wiring

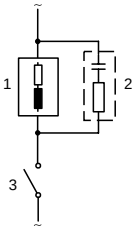
Sensors with connection via VP cable

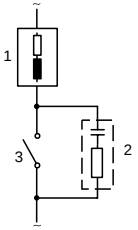


Connection	Terminal	**Sensor** VP cable
	1	not connected
cathode	2	transparent (coax core)
guard	3	not connected
ref. el.	4	(jumper 4-5)
anode	5	red (coax shield)
RTD	E	green
RTD	D	white
shield	C	yellow/green
		*gray, blue: not connected

Protective wiring of switching contacts

Relay contacts are subjected to electrical erosion. Especially with inductive and capacitive loads, the service life of the contacts will be reduced. For suppression of sparks and arcing, components such as RC combinations, nonlinear resistors, series resistors and diodes should be used.

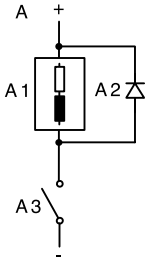


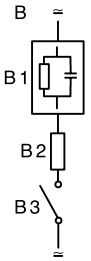


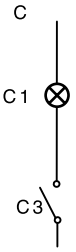
Typical AC applications with inductive load

1 Load
2 RC combination, e.g. RIFA PMR 209
Typical RC combinations for 230 V AC:
Capacitor 0.1µF / 630V,
Resistor 100 Ohms / 1 W
3 Contact

Typical protective wiring measures





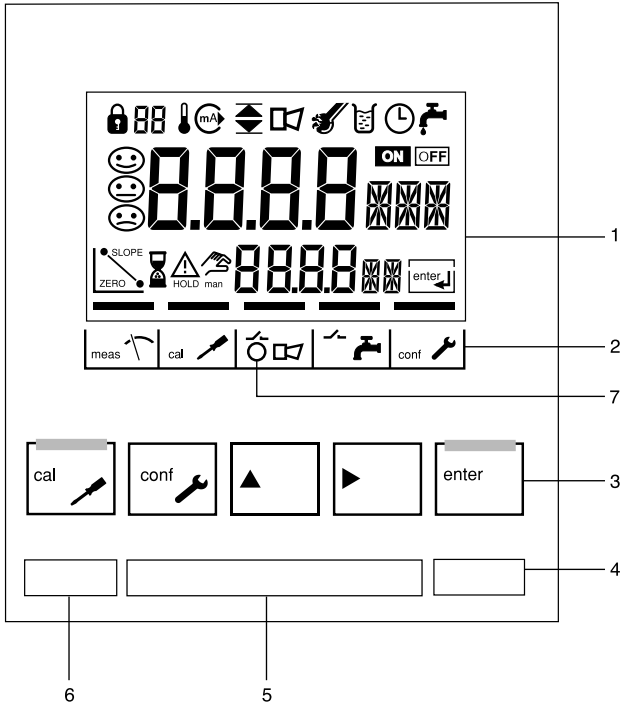


A: DC application with inductive load
B: AC/DC applications with capacitive load
C: Connection of incandescent lamps

A1 Inductive load
A2 Free-wheeling diode, e.g. 1N4007 (Observe polarity)
A3 Contact
B1 Capacitive load
B2 Resistor, e.g. 8 Ohms/1 W at 24 V / 0.3 A
B3 Contact
C1 Incandescent lamp, max 60 W / 230 V, 30 W / 115 V
C3 Contact

Warning!
Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!

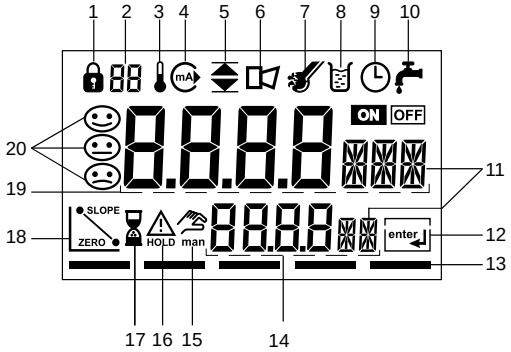
User interface



1 Display
2 Mode indicators (no keys), from left to right:
- Measuring mode
- Calibration mode
- Alarm
- Wash contact
- Configuration mode

3 Keypad
4 Coding
5 Rating plate
6 Model designation
7 Alarm LED

Display



1 Mode code entry
2 Display of meas. variable*
3 Temperature
4 Current output
5 Limit values
6 Alarm
7 Sensocheck
8 Calibration
9 Interval/response time
10 Wash contact
11 Measurement symbols
12 Proceed with enter
13 Bar for identifying the device status, above mode indicators, from left to right:
- Measuring mode
- Calibration mode
- Alarm
- Wash contact
- Configuration mode

14 Lower display
15 Manual temp indicator
16 Hold mode active
17 Waiting time running
18 Sensor data
19 Main display
20 Sensoface

* Not in use

cal	Start, end calibration
conf	Start, end configuration
▶	Select digit position (selected position flashes)
▲	Edit digit
enter	• Calibration: Continue in program sequence • Configuration: Confirm entries, next configuration step • Measuring mode: Display output current

cal ➔ enter	Cal Info, display of zero current and slope
conf ➔ enter	Error Info, display last error message
▶ + ▲	Start GainCheck device self-test

Sensocheck, Sensoface sensor monitoring
Sensocheck continuously monitors the sensor and leads. Sensocheck can be switched off (Configuration, Pg 46).

Sensoface provides information on the sensor condition.
The zero point, slope and response time during calibration are evaluated. The three Sensoface indicators provide the user with information about wear and required maintenance of the sensor.

GainCheck device self test
A display test is carried out, the software version is displayed and the memory and measured value transfer are checked.

Start GainCheck device self-test: ▶ + ▲

Automatic device self-test
The automatic device self-test checks the memory and measured-value transfer. It runs automatically in the background at fixed intervals.

Safety features

Hold mode

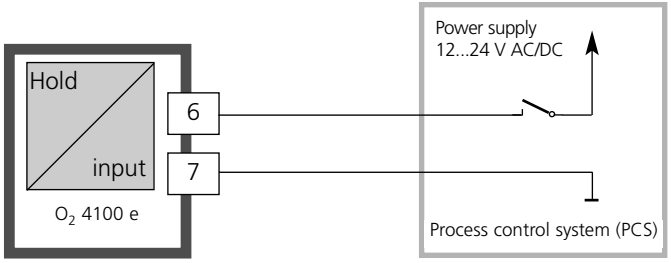
Display:

⚠ HOLD

The Hold mode is a safety mode during configuration and calibration. Output current is frozen (Last) or set to a fixed value (Fix). Alarm and limit contacts are disabled.
If the calibration or configuration mode is exited, the Transmitter remains in the Hold mode for safety reasons. This prevents undesirable reactions of the connected peripherals due to incorrect configuration or calibration. The measured value and "HOLD" are displayed alternately. The Transmitter only returns to measuring mode after **enter** is pressed and a waiting time of 20 s has passed.

To activate the Hold mode from outside

The Hold mode can be activated from outside by sending a signal to the Hold input (e.g. from the process control system).



Hold active	Hold inactive
10 ... 30 V AC/DC	0 ... 2 V AC/DC

Mode codes

The mode codes allow fast access to all functions

Calibration

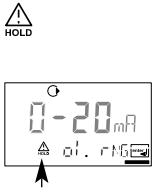
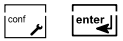
Key + Code	Description
cal 0000	**Cal Info** Display of zero point and slope
cal 1001	**Zero point calibration** Adjusting the zero point (sensor)
cal 1100	**Slope calibration** Adjusting the slope (sensor)
cal 1105	**Product calibration** Adjusting the zero / slope (product)
cal 1015	**Temperature probe** Temperature probe adjustment

Configuration

Key + Code	Description
conf 0000	**Error Info** Display last error and erase
conf 1200	**Configuration**
conf 2222	**Sensor monitor** Display uncorrected sensor current (nA)
conf 7654	**Parameter set 1/2** Selecting parameter set
conf 5555	**Current source 1** Output current 1 specified
conf 5556	**Current source 2** Output current 2 specified
conf 5557	**Relay test** Manual test of contacts
conf 5559	**Manual controller** Manual specification of controller output

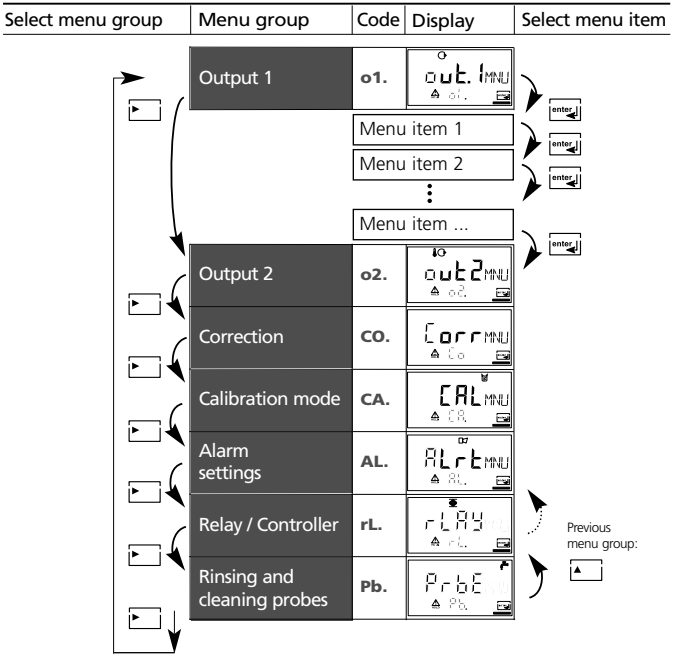
Configuration

In the Configuration mode you set the device parameters.

Activate		Activate with **conf**
		Enter mode code "1200" Edit parameter with ► and ▲, confirm/continue with **enter**. (End with **conf enter**.)
Hold	 HOLD icon	During configuration the Transmitter remains in the Hold mode for reasons of safety. The output current is frozen (at its last value or at a preset fixed value, depending on the configuration), limit and alarm contacts are inactive. The controller is in the configured state, Sensoface is off, mode indicator "Configuration" is on.
Input errors		The configuration parameters are checked during the input. In the case of an incorrect input "Err" is displayed for approx. 3 s. The incorrect parameters cannot be stored. Input must be repeated.
End		End with **conf**. The measured value and Hold are displayed alternately, "**enter**" flashes. End Hold mode with **enter**. The display shows the measured value. The output current remains frozen for another 20 s (HOLD icon on, "hourglass" flashes).

Menu structure of configuration

The configuration steps are assigned to different menu groups.
With the arrow keys you can jump between the individual menu groups.
Each menu group contains menu items for setting the parameters.
Pressing **enter** opens a menu item. The values are edited using the arrow keys. Pressing **enter** confirms/stores the settings.
Return to measurement: Press **conf** key.



Overview of configuration steps

Code	Menu	Choices
out1	**Output 1**	
o1.	Select sensor type	Standard (Type A) / Traces (Type B)
	Select saturation / concentration	% / mg/l, ppm
	Select current range	0-20 mA / 4-20 mA
	Enter current beginning	xxxx
	Enter current end	xxxx
	Time constant of output filter	xxxx s
	22 mA signal in the case of error	ON / OFF
	Signal behavior during HOLD	Last / Fix
	Enter fixed value	xxx.x mA
out2	**Output 2**	
o2.	Select temperature unit	°C / °F
	Select temperature probe	22NTC / 30NTC
	Select current range	0-20 mA / 4-20 mA
	Enter current beginning	xxx.x
	Enter current end	xxx.x
	Time constant of output filter	xxxx s
	22 mA signal in the case of temp error	ON / OFF
	Signal behavior during HOLD	Last / Fix
	Enter fixed value	xxx.x mA
Corr	**Correction**	
Co.	Enter polarization voltage	0675 mV / xxxx mV
	Select pressure unit	bar / kPa / PSi
	Select process pressure correction	x.xxx bar / 1.013 bar
	Enter salt correction	xx.xx mg/l
CAL	**Calibration mode**	
CA.	Select saturation / concentration	SAt / Conc
	Enter cal timer interval	xxxx h

Code	Choices		Auswahl
ALr	**Alarm settings**		
AL.	Select Sensocheck		ON / OFF
	Enter alarm delay		xxxx s
	LED in HOLD mode		ON / OFF
rLAY	**Relay 1/2: Limit values, controller**		
rL.	Select limit function / controller		LiMIT / CtROL
	L1.	Select contact function	Lo / Hi
		Select contact response	N/O / N/C
		Enter switching point	xxxx
		Enter hysteresis	xxxx
		Enter delay	xxxx SEC
	L2.	Select contact function	xxxx s
		Select contact response	N/O / N/C
		Enter switching point	xxxx
		Enter hysteresis	xxxx
		Enter delay	xxxx SEC
	Ct.	Enter controller setpoint	xxxx
		Enter neutral zone	xxxx
		(P) Controller gain K_P	xxxx %
		(I) Reset time T_R	xxxx SEC
		(D) Rate time T_D	xxxx SEC
		Pulse length /Pulse frequency	PLC / PFC
		PLC: Pulse length	xxxx SEC
		PFC: Pulse frequency	xxxx /min
		Select HOLD behavior	Y Last / Y Off
PrbE	**Rinsing and cleaning probes**		
Pb.	Select rinsing/cleaning probe		EASYCLN / rinse
	rinse	Rinsing interval	xxx.x h
		Rinse duration	xxxx SEC
		Contact response	N/O / N/C
	EASYCLN	Cleaning interval	xxx.x h
		Lock cleaning interval	Off / On

Configuration

Output 1

Select sensor type. Measurement procedure.

Menu group	Code	Display	Select menu item
Output 1	o1.		Select sensor type*
			Select meas. procedure
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA in the case of error
			Hold mode
			End: Press **conf**, then **enter**

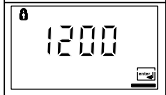
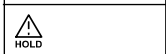
* Sensor Type A (standard applications)

Sensor type	Screw cap	Sensor current in air (25 °C)	Detection limit
InPro 6800	VP	typ. 60 nA	0.006 ppm

* Sensor Type B (traces)

Sensor type	Screw cap	Sensor current in air (25 °C)	Detection limit
InPro 6900	VP	typ. 350 nA	0.001 ppm

Note: The Transmitter 4100 e has a device a resolution of 0.01 ppm. For the sensor type B, we recommend the O_2 Transmitter 4100ppb with a device resolution of 0.001 ppm.

Code	Display	Action	Choices
o1.		Select configuration (Press **conf** key).	
	 After correct input a welcome text is displayed for approx. 3 s	Enter mode code "1200" (Select position using arrow key ► and edit number using ▲. When the display reads "1200", press **enter** to confirm.)	
		The Transmitter is in HOLD mode (HOLD icon is on).	
		Select sensor Type A / B (see table on left-hand side) Select with ► key Proceed with **enter**	**Type A** InPro 6000–6800 Type B InPro6900
	 	Select measurement procedure (valid for all following settings): • **SAt:** Saturation (%) • **Conc:** Concentration (mg/l or ppm) Select with ► key Proceed with **enter**	**%** mg/l ppm

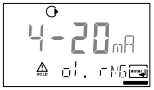
Note: Characters represented in gray are flashing and can be edited.

Output 1

Output current range. Current beginning. Current end.

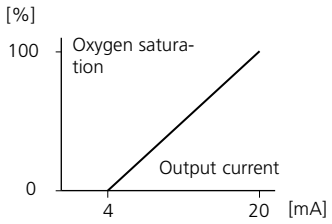
Menu group	Code	Display	Select menu item
Output 1	o1.		Select sensor type
			Select meas. procedure
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA in the case of error
			Hold mode

End:
Press **conf**, then **enter**

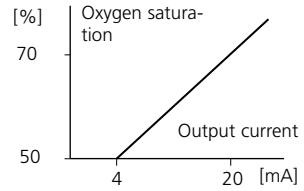
Code	Display	Action	Choices
o1.		Set output current range Select with ► key Proceed with **enter**	**4 - 20 mA** (0 - 20 mA)
		Current beginning Enter lower end of scale, depending on the measurement procedure selected (Saturation or Concentration) Select with ► key, edit number with ▲ key, proceed with **enter**	**0000 %** (mg/l, ppm)
		Current end Enter upper end of scale, depending on the measurement procedure selected (Saturation or Concentration) Select with ► key, edit number with ▲ key, proceed with **enter**	**0100 %** (mg/l, ppm)

Assignment of measured values: Current beginning and current end

Example 1: Range 0 to 100 %



Example 2: Range 50 to 70%.
Advantage: Higher resolution in range of interest



Output 1
Time constant of output filter.

Menu group	Code	Display	Select menu item
Output 1	o1.		Select sensor type
			Select meas. procedure
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA in the case of error
			Hold mode

End:
Press **conf**, then **enter**

Code	Display	Action	Choices
o1.		Time constant of output filter Default setting: 0 s (inactive). To specify a time constant: Select with ► key, edit number with ▲ key, proceed with **enter**	**0 s** (0 – 120 s)

Time constant of output filter

To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is 63 % after the time constant has been reached.
The time constant can be set from 0 to 120 s.
If the time constant is set to 0 s, the current output follows the input.

Note:
The filter only acts on the current output, not on the display, the limit values, or the controller!

Time constant 0 to 120 s

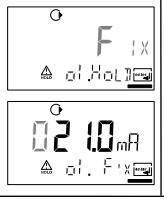
Configuration

Output 1

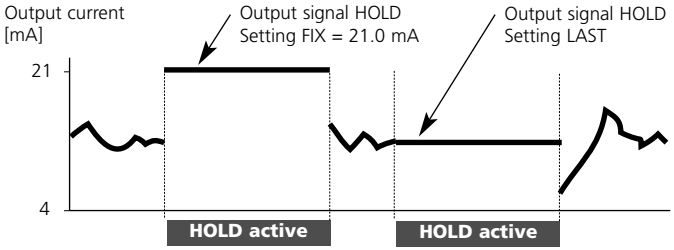
Output current during Error and HOLD.

Menu group	Code	Display	Select menu item
Output 1	o1.		Select sensor type
			Select meas. procedure
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA in the case of error
			Hold mode

End:
Press **conf**, then **enter**

Code	Display	Action	Choices
o1.		22 mA signal for error message Select with ► key Proceed with **enter**	**OFF** (ON)
		Output signal during HOLD LAST: During HOLD the last measured value is maintained at the output FIX: During HOLD a value (to be entered) is maintained at the output. Select with ► key Proceed with **enter**	**LAST** (FIX)
		Only with FIX selected: Enter current which is to flow at the output during HOLD Select position with ► key and edit number with ▲ key Proceed with **enter**	**21.0 mA** (00.0 – 21.0 mA

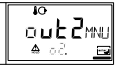
Output signal for HOLD:



Configuration

Output 2

Temperature unit and probe. Output current.

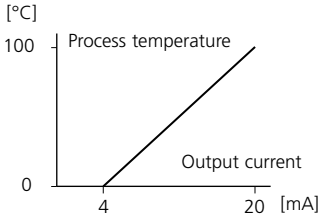
Menu group	Code	Display	Select menu item
Output 2	o2.		Select °C/°F
			Select temperature probe
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA for temp error
			Hold mode

End:
Press **conf**, then **enter**

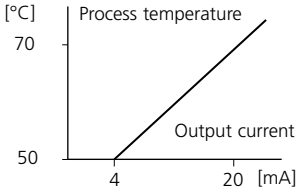
Code	Display	Action	Choices
o2.		Specify temperature unit Select with ► key Proceed with **enter**	**°C** (°F)
		Select temperature probe Select with ► key Proceed with **enter**	**22NTC** (30NTC)
		Set output current range Select with ► key Proceed with **enter**	**4 - 20 mA** 0 - 20 mA
		Current beginning: Enter lower end of scale. Select with ► key, edit number with ▲ key, proceed with **enter**	**000.0 °C**
		Current end: Enter upper end of scale. Select with ► key, edit number with ▲ key, proceed with **enter**	**100.0 °C**

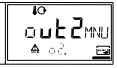
Process temperature: Current beginning and current end

Example 1: Range 0 to 100 °C



Example 2: Range 50 to 70 °C.
Advantage: Higher resolution in range of interest



Menu group	Code	Display	Select menu item
Output 2	o2.		Select °C/°F
			Select temperature probe
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA for temp error
			Hold mode

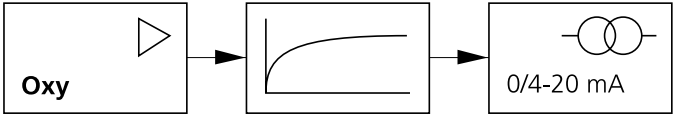
End:
Press **conf**, then **enter**

Code	Display	Action	Choices
o2.		Time constant of output filter Default setting: 0 s (inactive). To specify a time constant: Select with ► key, edit number with ▲ key, proceed with **enter**	**0 s** (0 - 120 s)

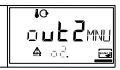
Time constant of output filter

To smoothen the current output 2, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is 63 % after the time constant has been reached.
The time constant can be set from 0 to 120 s.
If the time constant is set to 0 s (default), the current output follows the input.

Note:
The filter only acts on the current output, not on the display!



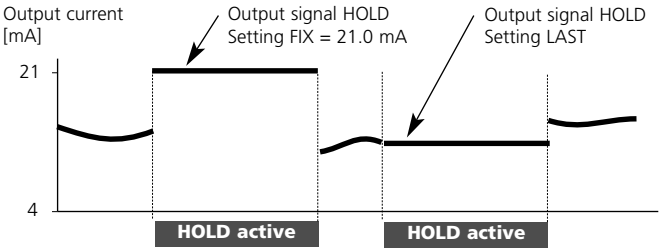
Time constant 0 to 120 s

Menu group	Code	Display	Select menu item
Output 2	o2.		Select °C/°F
			Select temperature probe
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA for temp error
			Hold mode

End:
Press **conf**, then **enter**

Code	Display	Action	Choices
o2.		22 mA signal for error message Select with ► key Proceed with **enter**	**OFF** (ON)
		Output signal during HOLD LAST: During HOLD the last measured value is maintained at the output FIX: During HOLD a value (to be entered) is maintained at the output Select with ► key Proceed with **enter**	**LAST** (FIX)
	 	Only with FIX selected: Enter current which is to flow at the output during HOLD Select position with ► key and edit number with ▲ key Proceed with **enter**	**21.0 mA** (00.0 ... 21.0 mA

Output signal for HOLD:



Configuration

Correction

Polarization voltage. Process pressure. Salt correction.

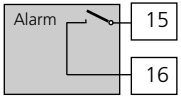
Menu group	Code	Display	Select menu item
Correction	**co.**		Polarization voltage
			Meas. unit (pressure)
			Process pressure
			Salt correction

End:
Press **conf**, then **enter**

Code	Display	Action	Choices
Co.		Enter polarization voltage Select with ► key, edit number with ▲ key, proceed with **enter**	**0675 mV**
		Select pressure unit Select with ► key Proceed with **enter**	**bar** (kPa, PSi)
		Process pressure correction Enter process pressure. This value is used to correct oxygen saturation. It has no influence on concentration measurement (Conc). Select position with ► key and edit number with ▲ key Proceed with **enter**	**1.013 bars**
		Enter salt correction (salinity) Select position with ► key and edit number with ▲ key Proceed with **enter**	**00.00 ppt***

* ppt (parts per thousand) - corresponds to g/kg

Menu group	Code	Display	Select menu item
Calibration mode	CA.		Calibration mode Cal timer interval **End:** Press **conf**, then **enter**
Alarm settings	AL.		Select Sensocheck Delay LED in HOLD mode **End:** Press **conf**, then **enter**



Alarm contact

The alarm contact is closed during normal operation (N/C). It opens in the case of alarm or power outage. As a result, a failure message is provided even in the case of line breakage (fail-safe behavior).
For contact ratings, see Specifications.

Error messages can also be signaled by a 22 mA output current (see Pg 37, 43, 78).

The operating behavior of the alarm contact is shown on Pg 80.

The **alarm delay** acts on the LED, the 22 mA signal and the alarm contact.

Code	Display	Action	Choices
CA.		Specify calibration mode (Calibration to saturation or concentration) Select with ► key Proceed with **enter**	**SAt** (Conc)
		Cal timer interval The cal timer reminds you to calibrate in time. Select with ► key, edit number with ▲ key, proceed with **enter**	**0000 h** (0 – 9999 h)
AL.		Select Sensocheck (continuous monitoring of sensor) Select with ► key Proceed with **enter**	ON / **OFF**
		Delay for alarm Select with ► key, edit number with ▲ key, proceed with **enter**	**0010 s** (xxxx s)
		LED in HOLD mode Select with ► key Proceed with **enter**	ON / **OFF**

LED state:	Alarm	HOLD
ON	on	flashes
OFF	flashes	off

Menu group	Code	Display	Select menu item
Relay / Controller	rL.		Use of relays
			L1. Contact function
			Contact response
			Enter switching point
			Enter hysteresis
			Delay
			L2. Relay 2 menu group
			Ct. Controller menu group

End:
Press **conf**, then **enter**

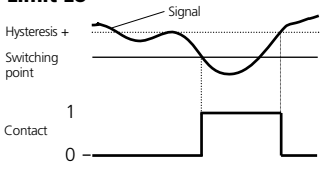
Code	Display	Action	Choices
rL.		Use of relays: • Limit function (LiMIT) • Controller (CtROL) Select with ► key Proceed with **enter** **Note:** Selecting **CtROL** leads to Controller menu group **Ct.**	**LiMIT** (CtROL)
L1.		Limit 1 function (see Fig. on Pg 51) Select with ► key, proceed with **enter**	**Lo** (Hi)
		Limit 1 contact response N/C: normally closed contact N/O: normally open contact Select with ► key Proceed with **enter**	**N/C** (N/O)
		Limit 1 switching point Select with ► key, edit number with ▲ key, proceed with **enter**	**0000 %** (xxxx %)
		Limit 1 hysteresis Select with ► key, edit number with ▲ key, proceed with **enter**	**0001 %** (xxxx %)
		Limit 1 delay The contact is activated with delay (deactivated without delay) Select with ► key, edit number with ▲ key, proceed with **enter**	**0010 s** (0 - 600 s)

Menu group	Code	Display	Select menu item
Relay / Controller	rL.	rLAY	Use of relays
			L1. Relay 1 menu group
			L2. Contact function
			Contact response
			Enter switching point
			Enter hysteresis
			Delay
			Ct. Controller menu group

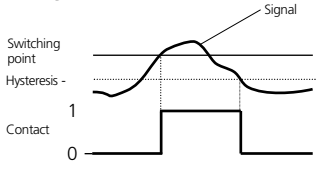
End:
Press **conf**, then **enter**

Code	Display	Action	Choices
L2.	Hi L2. FCT	Select Limit 2 (see Fig. below) Select with ► key Proceed with **enter**	**Hi** (Lo)
	N/C L2. typ	Limit 2 contact response N/C: normally closed contact N/O: normally open contact Select with ► key Proceed with **enter**	**N/C** (N/O)
	0500 % L2.SEtL	Limit 2 switching point Select with ► key, edit number with ▲ key, proceed with **enter**	**0500 %** (xxxx %)
	0001 % L2. HYS	Limit 2 hysteresis Select with ► key, edit number with ▲ key, proceed with **enter**	**0001 %** (xxxx %)
	0010 SEC L2. dLY	Limit 2 delay The contact is activated with delay (deactivated without delay) Select with ► key, edit number with ▲ key, proceed with **enter**	**0010 s** (0 - 600 s)

Limit Lo



Limit Hi

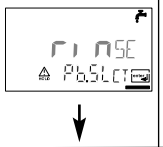
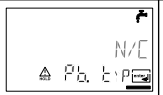


Menu group	Code	Display	Select menu item
Relay / Controller	rL.	rLAY	Use of relays
			L1. Relay 1 menu group
			L2. Relay 2 menu group
			Ct. Controller setpoint
			Enter neutral zone
			(P) Controller gain
			(I) Reset time TR
			(D) Derivative-action time TD
			Controller type PLC / PFC
			PLC: Pulse length
			PFC: Pulse frequency
			HOLD behavior

End:
Press **conf**, then **enter**

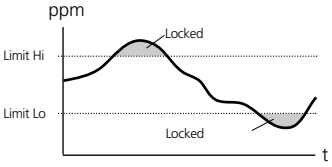
Code	Display	Action	Choices
Ct.	100 % Ct. SP	Setpoint Select with ► key, edit number with ▲ key, proceed with **enter**	**0100 %** (xxxx %)
	010 % Ct. dIN	Neutral zone (dead band) Select with ► key, edit number with ▲ key, proceed with **enter**	**0010 %** (xxxx %)
	100 % Ct. Pnn	Controller: P-action component Select with ► key, edit number with ▲ key, proceed with **enter**	**0100 %** (xxxx %)
	000 SEC Ct. Int	Controller: I-action component (reset time). Select with ►, edit number with ▲, proceed with **enter**	**0000 s** (0 – 9999 s)
	000 SEC Ct. dIF	Controller: D-action component (Rate time). Select with ► key, edit number with ▲ key, proceed with **enter**	**0000 s** (0 – 9999 s)
	PLC Ct. tYP	Pulse length / Pulse frequency Select with ► key Proceed with **enter**	**PLC** (PFC)
	010 SEC Ct.PLEN	PLC: Pulse length Select with ► key, edit number with ▲ key, proceed with **enter**	**0010 s** (0 – 600 s)
	060 /min Ct.PFnn	PFC: Pulse frequency Select with ► key, edit number with ▲ key, proceed with **enter**	**0060/min** (0 – 180 /min)
	Y LAST Ct.HoLd	Behavior during HOLD Select with ► key Proceed with **enter**	**Y Last** (Y Off)

Menu group	Code	Display	Select menu item
Cleaning probes	Pb.		Rinsing / Cleaning Rinsing interval Rinse duration Contact response Cleaning interval

Code	Display	Action (rinsing probe)	Choices
Pb.		Control of: • Rinsing probe (rinse) • Cleaning system (EasyClean) Select with ► key Proceed with **enter**	**rinse** (EASYCLN) EASYCLN: see opposite page
		Rinsing interval Select with ► key, edit number with ▲ key, proceed with **enter**	**000.0 h** (xxx.x h)
		Rinse duration Select with ► key, edit number with ▲ key, proceed with **enter**	**0060 s** (xxxx s)
		Contact type Select with ► key Proceed with **enter**	**N/C** (N/O)

Code	Display	Action (cleaning system)	Choices
Pb.		• Cleaning system (EasyClean) Select with ► key Proceed with **enter**	**EASYCLN** (rinse)
		Cleaning interval (EasyClean only) Select with ► key, edit number with ▲ key, proceed with **enter**	**000.0 h** (xxx.x h)
		Lock cleaning interval* **On**: The Transmitter only starts a cleaning interval if the measured value lies within the tolerated range (Limit Lo/Limit Hi).	**Off** (On)

***"Lock cleaning interval" function:**



The Transmitter only starts a cleaning interval if the measured value lies within the tolerated range (Limit Lo/Limit Hi).
(For limit setting, refer to Pages 49, 51)

Display	Action	Remark
	Switch between parameter sets Press **conf** key, enter code 7654 Select with ▶ key, edit number with ▲ key, proceed with **enter**	Wrong settings change the measurement properties! If an invalid code is entered, the Transmitter returns to measuring mode.
		Welcome text is displayed for approx. 3 s
	Select parameter set Select with ▶ key Proceed with **enter**	
 	Since the complete device configuration is changed in one step, there is a security prompt (No/Yes). When pressing **enter** directly, the selection is not stored.	

Default settings of parameter sets

Two complete parameter sets are stored in the EEPROM. As delivered, the two sets are identical but can be edited.

Note:

Fill in your configuration data on the following pages.

Code. Parameter	Default setting	Code. Parameter	Default setting
o1. Sensor type	A	rL. Relay function	Limit
o1. %, mg/l, ppm	%	L1. Contact function	Lo
o1. 0/4-20 mA	4-20 mA	L1. Contact response	N/C
o1. Current beginning	0000 %	L1. Switching point	0000 %
o1. Current end	0500 %	L1. Hysteresis	0001 %
o1. Filter time	0 s	L1. Delay	0010 s
o1. 22mA signal	OFF	L2. Contact function	Hi
o1. Hold behavior	Last	L2. Contact response	N/C
o1. Fix current	021.0 mA	L2. Switching point	0500 %
o2. Unit °C / °F	°C	L2. Hysteresis	0001 %
o2. Temp probe	22 NTC	L2. Delay	0010 s
o2. 0/4...20mA	4-20 mA	Ct. Setpoint	0100 %
o2. Current beginning	000.0 °C	Ct. Neutral zone	0010 %
o2. Current end	100.0 °C	Ct. P action	0100 %
o2. Filter time	0 s	Ct. I action	0000 s
o2. 22mA signal	OFF	Ct. D action	0000 s
o2. Hold behavior	Last	Ct. PLC/PFC controller	PLC
o2. Fix current	021.0 mA	Ct. Pulse length	0010 s
Co. Polariz. voltage	675 mV	Ct. Pulse frequency	0060 /min
Co. Pressure unit	bar	Ct. Hold behavior	Last
Co. Pressure	1,013 bars	Pb. Probe selection	rinse
Co. Salinity	00.00 mg/l	Pb. Rinsing interval	000.0 h
CA. Cal mode	Sat	Pb. Rinse duration	0060 s
CA. Cal interval	0000 h	Pb. Contact type	N/C
AL. Sensocheck	OFF	Pb. Cleaning interval	000.0 h
AL. Alarm delay	0010 s	Pb. Lock interval	Off
AL. LED Hold	off		

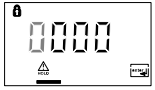
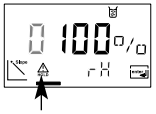
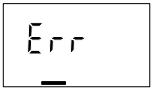
Parameter set – user settings

Code. Parameter	Setting	
o1. Sensor type	_____	_____
o1. %, mg/l, ppm	_____	_____
o1. 0/4-20 mA	_____	_____
o1. Current beginning	_____	_____
o1. Current end	_____	_____
o1. Filter time	_____	_____
o1. 22mA signal	_____	_____
o1. Hold behavior	_____	_____
o1. Fix current	_____	_____
o2. Unit °C / °F	_____	_____
o2. Temp probe	_____	_____
o2. 0/4...20mA	_____	_____
o2. Current beginning	_____	_____
o2. Current end	_____	_____
o2. Filter time	_____	_____
o2. 22mA signal	_____	_____
o2. Hold behavior	_____	_____
o2. Fix current	_____	_____
Co. Polarization voltage	_____	_____
Co. Pressure unit	_____	_____
Co. Pressure	_____	_____
Co. Salinity	_____	_____
CA. Cal mode	_____	_____
CA. Cal interval	_____	_____
AL. Sensocheck	_____	_____
AL. Alarm delay	_____	_____
AL. LED Hold	_____	_____

Code. Parameter	Setting	
rL. Relay function	_____	_____
L1. Contact function	_____	_____
L1. Contact response	_____	_____
L1. Switching point	_____	_____
L1. Hysteresis	_____	_____
L1. Delay	_____	_____
L2. Contact function	_____	_____
L2. Contact response	_____	_____
L2. Switching point	_____	_____
L2. Hysteresis	_____	_____
L2. Delay	_____	_____
Ct. Setpoint	_____	_____
Ct. Neutral zone	_____	_____
Ct. P action	_____	_____
Ct. I action	_____	_____
Ct. D action	_____	_____
Ct. PLC/PFC controller	_____	_____
Ct. Pulse length	_____	_____
Ct. Pulse frequency	_____	_____
Ct. Hold behavior	_____	_____
Pb. Probe selection	_____	_____
Pb. Rinsing interval	_____	_____
Pb. Rinse duration	_____	_____
Pb. Contact type	_____	_____
Pb. Cleaning interval	_____	_____
Pb. Lock cleaning interval	_____	_____

Calibration

Calibration adjusts the Transmitter to the sensor.

Activate		Activate with **cal**
		Enter mode code • Zero point: 1001 • Saturation/Concentration: 1100 Edit parameter with ► and ▲, confirm/continue with **enter**. (End with **cal enter**.)
Hold	  HOLD icon	During calibration the Transmitter remains in the Hold mode for reasons of safety. Output current is frozen (last value or preset fixed value, depending on configuration), limit and alarm contacts are inactive. The controller is in the configured state. Sensoface is off, mode indicator "Calibration" is on.
Input errors		The calibration parameters are checked during the input. In the case of an incorrect input "Err" is displayed for approx. 3 s. The incorrect parameters cannot be stored. Input must be repeated.
End		End with **cal**. The measured value and Hold are displayed alternately, "enter" flashes. Press **enter** to end the Hold mode. The measured value is displayed. The output current remains frozen for another 20 s (HOLD icon on, "hourglass" flashes).

Calibration

It is always recommended to calibrate in air.
Compared to water, air is a calibration medium which is easy to handle, stable, and thus safe. In the most cases, however, the sensor must be dismounted for a calibration in air.
When dealing with biotechnological processes which require sterile conditions, the sensor cannot be removed for calibration. Here, calibration must be performed with aeration directly in the process medium (e.g. after sterilization).

The calibration procedures for these two common applications are described on the following pages. Of course, other combinations of process variable and calibration mode are possible.

Note:
When a 2-point calibration is required, the zero point calibration should be performed prior to saturation or concentration calibration, resp.
All calibration procedures must be performed by trained personnel.

Display	Action	Remark
	Activate calibration (Press **cal**.) Enter mode code 1100 Select with ► key, edit number with ▲ key, proceed with **enter**	SAT or Conc calibration is selected during configuration. If an invalid code is entered, the Transmitter returns to measuring mode.
	Place sensor in calibration medium Start with **enter**	The Transmitter is in the Hold mode
	Enter relative humidity Select with ► key, edit number with ▲ key, proceed with **enter**	Default for relative humidity in aqueous media: rH = 100 % (in air approx. 50 %
	Enter calibration pressure Select with ► key, edit number with ▲ key, proceed with **enter**	Default for calibration pressure is the process pressure configured
	Automatic drift check Display of sensor current (related to 25°C and 1013 mbars normal pressure) and measuring temperature. The drift check might take some time.	Drift check can be stopped after > 10 sec by pressing **cal** (accuracy reduced).

Display	Action	Remark
	Enter desired value for saturation Select with ► key, edit number with ▲ key, proceed with **enter**	Default: last value entered
	Display new slope and zero (related to 25°C and 1013 mbars). End calibration with **enter.**	New calibration: Press **cal** key.
	Place sensor in process The percent saturation is shown in the main display alternately with "Hold"; enter flashes. End with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Information on saturation calibration (SAT)

- The calibration medium must be in equilibrium with air (percent saturation for water is 100 %).
  Oxygen exchange between water and air is very slow. To speed up the adjustment processes, make sure that there is a steady medium flow during calibration.
- If the percent saturation is known from a simultaneous measurement, it can be entered manually.
- For 2-point calibration, perform zero point calibration first.

Calibration to concentration (Conc)

Display	Action	Remark
	Activate calibration (Press **cal**.) Enter mode code 1100 (Select with ► key, edit number with ▲ key, proceed with **enter**)	SAT or Conc calibration is selected during configuration. If an invalid code is entered, the Transmitter returns to measuring mode.
	Place sensor in air Start with enter	The Transmitter is in the Hold mode
	Enter relative humidity (Select with ► key, edit number with ▲ key, proceed with **enter**)	Default for relative humidity in air: rH = 50 %
	Enter calibration pressure (Select with ► key, edit number with ▲ key, proceed with **enter**)	Default for calibration pressure is normal pressure 1.013 bars.
	Automatic drift check Display of input current (related to 25 °C and 1013 mbars) and measuring temperature. The drift check might take some time.	Drift check can be stopped after > 10 sec by pressing **cal** (accuracy reduced).

Display	Action	Remark
	Enter default for concentration (Select with ► key, edit number with ▲ key, proceed with **enter**)	Default value is calculated from rel. humidity, cal pressure, and cal temperature. (The unit of measurement, ppm or mg/l, ... is preset during configuration.)
	Display of new slope and zero (related to 25 °C and 1013 mbars) Press **enter** to end concentration calibration.	New calibration: Press **cal** key.
	Place sensor in process The new value is shown in the main display alternately with "Hold"; enter flashes. End with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

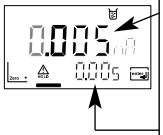
Information on concentration calibration (Conc)

Calibration in air. This calibration method is recommended when the sensor can be removed for calibration. Air has a stable oxygen content. Therefore the adjustment processes during calibration run more quickly.

- For 2-point calibration, perform zero point calibration first.

Zero point calibration

The Series InPro6000 sensors have a very low zero current. Therefore, a zero point calibration is only recommended for measurement of oxygen traces. If a zero point calibration is performed, the DO sensor should remain for at least 10 to 30 minutes in the calibration medium in order to obtain stable, non-drifting values.
During zero point calibration, a drift check is not performed. Zero point current of a properly functioning sensor is notably less than 0.5 % of air current. The display (secondary: measured value, main: entered value) does not change until an input current is entered for the zero point.
When measuring in an oxygen-free medium, the displayed current can be taken directly.

Display	Action	Remark
	Activate calibration (press **cal** key) Enter mode code 1001 Select with ► key, edit number with ▲ key, proceed with **enter**	The Transmitter is in the Hold mode; If an invalid code is entered, the Transmitter returns to measuring mode.
	Place sensor in oxygen-free medium	
	Main display: Zero point current; store with **enter** or correct with arrow keys and then store with **enter**. Lower display: Sensor current measured	
	Display of slope Display of new zero point current End calibration with **enter** key, place sensor in process	New calibration: Press **cal** key.
	The oxygen value is shown in the main display alternately with "Hold"; "enter" flashes. Stop Hold with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Product calibration

Calibration by sampling

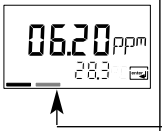
During product calibration the sensor remains in the process. The measurement process is only interrupted briefly.

Procedure: During sampling the currently measured value is stored in the Transmitter. The Transmitter immediately returns to measuring mode. The calibration mode indicator flashes and reminds you that calibration has not been terminated. The comparison value is measured on the site, e.g. using a portable DO meter in a bypass. This value is then entered in the Transmitter. The new values for slope and zero are calculated from the stored value and the comparison value. From the measured value, the Transmitter automatically recognizes whether a new slope or zero must be calculated (above approx. 5 % saturation: slope, below: zero).

If the sample is invalid, you can take over the measured value stored during sampling instead of the comparison value. In that case the old calibration values remain stored. Afterwards, you can start a new product calibration.

The following describes a product calibration with slope correction. A product calibration with zero correction is performed correspondingly.

Display	Action	Remark
	Product calibration step 1: Activate calibration (press **cal** key) Enter mode code 1105 (Select position with ► key, edit number with ▲ key, proceed with **enter**)	The type of product calibration (SAT or Conc) is selected during configuration (measurement procedure).If an invalid code is entered, the Transmitter returns to measuring mode.
	Store value. Proceed with **enter**	Now measure the comparison value. The Transmitter is in measuring mode.

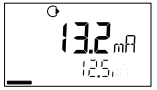
Display	Action	Remark
	Measuring mode	From the flashing CAL mode indicator you see that product calibration has not been terminated.
	Product calibration step 2: When the comparison value has been determined, call up the product calibration once more (**cal** key, mode code 1105).	Display (approx. 3 sec)
	Enter comparison value. Confirm with **enter.**	The new slope is calculated.
	Display of new slope and zero (related to 25°C and 1013 mbars) End calibration with **enter**	New calibration: Press **cal** key.
	The measured value is shown in the main display alternately with "Hold"; "enter" flashes. End with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Temperature probe adjustment

Display	Action	Remark
	Activate calibration (Press **cal**, enter mode code 1015) Select position with ► key, edit number with ▲ key, proceed with **enter** key.	Wrong settings change the measurement properties! If an invalid code is entered, the Transmitter returns to measuring mode.
	Ready for calibration	Transmitter is in Hold mode (Display for approx. 3 sec)
	Measure the temperature of the process medium using an external thermometer. Enter measured temperature value: Select with ► key, edit number with ▲ key, proceed with **enter** key. End adjustment with **enter**. HOLD will be deactivated after 20 sec.	Default: Current value of secondary display.

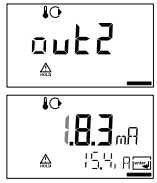
Measurement

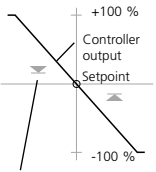
Display	Remark
	In measuring mode the main display shows the configured process variable (%, mg/l, or ppm), the secondary display shows the temperature. During calibration you can return to measuring mode by pressing the **cal** key, during configuration by pressing the **conf** key. (Waiting time for measured value stabilization approx. 20 sec).

Display	Remark
	**Display of output currents** Press **enter** while in measuring mode. The current at output 1 is shown in the main display, the current at output 2 in the secondary display. After 5 sec the Transmitter returns to measuring mode.
	**Display of calibration data (Cal Info)** Press **cal** key while in measuring mode and enter code 0000. The slope is shown in the main display, the zero point current in the secondary display. After 20 sec the Transmitter returns to measuring mode (immediate return at pressing **cal**).
	**Display of sensor current (Sensor monitor)** Press **conf** key while in measuring mode and enter code 2222. The (uncompensated) sensor current is shown in the main display, the measuring temperature in the secondary display. Press **enter** to return to measurement.
	**Display of last error message** (Error info) Press **conf** key while in measuring mode and enter code 0000. The last error message is displayed for approx. 20 sec. After that the message will be deleted (immediate return to measurement at pressing **enter**).

Diagnostics functions

These functions are used for testing the connected peripherals.

Display	Action / Remarks
	**Specify current at output 1** • Press **conf** key, enter code 5555. The current indicated in the main display for output 1 can be edited. Select with ► key, edit number with ▲ key, proceed with **enter** The actually measured current is shown in the secondary display. The Transmitter is in Hold mode. Press **enter** to return to measurement (Hold remains active for another 20 sec).
	**Specify current at output 2** • Press **conf** key, enter code 5556. The current indicated in the main display for output 2 can be edited. Select with ► key, edit number with ▲ key, proceed with **enter** The actually measured current is shown in the secondary display. The Transmitter is in Hold mode. Press **enter** to return to measurement.
 ► Select a relay ▲ Test 0/1 enter Return to measurement	**Relay test (manual test of contacts)** • Press **conf** key, enter code 5557. The relays are frozen. This state is indicated in the display. The 4 digits in the display correspond to the 4 relays (as on terminal plate): 1st digit: R1 2nd digit: R2 3rd digit: AL 4th. digit: CLN Function test using arrow keys – see left column. When exiting the function (**enter**), the relays are set corresponding to the measured value.

Display	Action / Remarks
  **Controller characteristic**  The arrows indicate which relay (valve) is active: ▲ Relay 2 active (Meas. value > setpoint) ▼ Relay 1 active (Meas. value < setpoint) 	**Controller test (manual specification of controller output)** • Press **conf** key, enter code 5559. After function activation "Ctrl" is displayed for approx. 3 sec. With controller turned off, "OFF" is displayed in addition, then return to measuring mode. The function is used to start up control loops or check the actuators. For bumpless changeover to automatic operation (exiting this function), configure an I-action component (reset time). Specify value: Select with ► key, edit number with ▲ key, proceed with **enter** The Transmitter is in Hold mode. Press **enter** to return to measurement (Hold remains active for another 20 sec). Controller output -100 to 0 %: Relay 2 active Controller output 0 to +100 %: Relay 1 active Momentary controller output (adjusted value has not been stored yet)

Controller functions

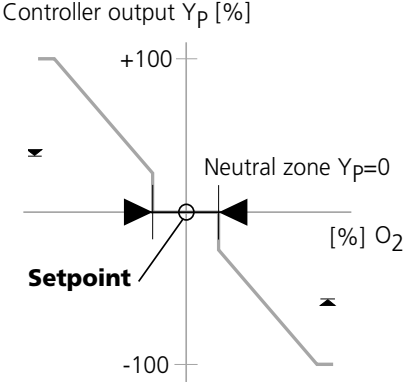
PID controller

P controller
Application in integrating systems
(e.g. closed tank, batch processes).

PI controller
Application in non-integrating systems
(e.g. aeration basin).

PID controller
The additional derivative action compensates for measurement peaks.

Controller characteristic



Note:
In Hold mode the controller output acts as configured (Y = const. or Y = 0).

Controller equations

$$\text{Controller output } Y = Y_P + \frac{1}{T_R}\int Y_P dt + T_D \frac{dY_P}{dt}$$

P action | I action | D action

Proportional action Y_P

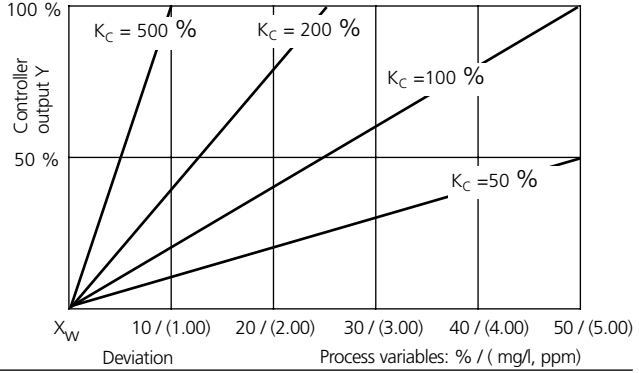
$$Y_P = \frac{\text{Setpoint - Meas. value}}{\text{Constant}} * K_C$$

with:

Y_P	Proportional action
T_R	Reset time [s]
T_D	Rate time [s]
K_C	Controller gain [%]
Constant	50 % (for %O2, % Air)
	5.00 mg/l (for mg/l)
	5.00 ppm (for ppm)

Neutral zone (Y=0)
Tolerated deviation from setpoint.
The setting "010%", for example, permits a deviation of ± 5 % from the desired value without activating the controller.

Proportional action (Gradient K_C [%])



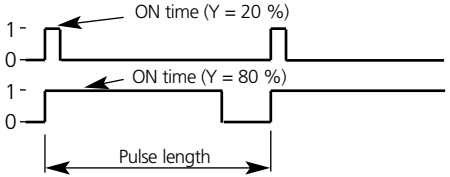
Controller functions

Pulse length / pulse frequency controller

Pulse length controller (PLC)

The pulse length controller is used to operate a valve as an actuator. It switches the contact on for a time that depends on the controller output. The period is constant. A minimum ON time of 0.5 sec is maintained even if the controller output takes corresponding values.

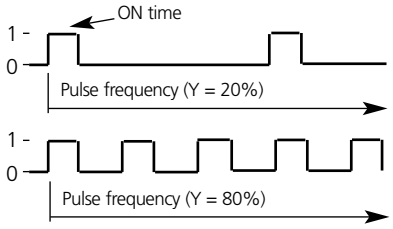
Output signal (switching contact) of pulse length controller



Pulse frequency controller (PFC)

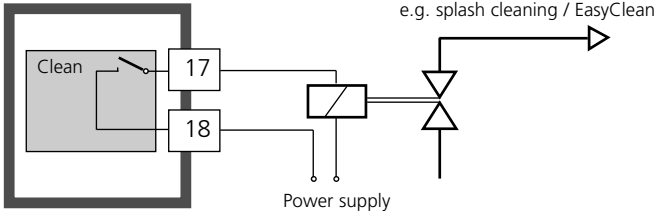
The pulse frequency controller is used to operate a frequency-controlled actuator. It varies the frequency with which the contacts are switched on. The maximum pulse frequency [pulses/min] can be defined. It depends on the actuator. The Contact ON time is constant. It is automatically calculated from the user-defined maximum pulse frequency:

Output signal (switching contact) of pulse frequency controller



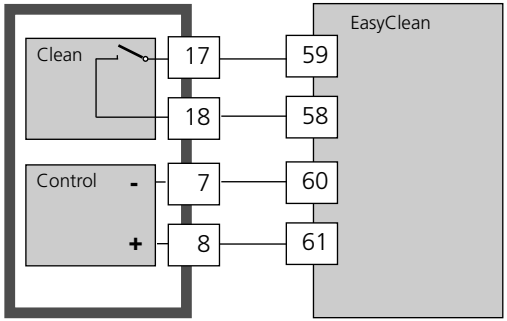
Connecting a rinsing system

The "Clean" contact can be used to connect a simple splash cleaning system. Rinse duration and rinsing interval are defined during configuration (Pg 54).



Operation with automatic cleaning system

"EasyClean" is a separate automatic cleaning system. The cleaning cycle is activated according to the cleaning interval defined during configuration (Pg 55).



Errors	Display	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
ERR 01	Measured value flashes	**SAT range** Sensor defective Wrong sensor connected Measurement range exceeded	x	x	x	
ERR 02	Measured value flashes	**Conc range** Sensor defective Wrong sensor connected Measurement range exceeded	x	x	x	
ERR 98	"ConF" flashes	**System error** Configuration or calibration data defective; completely reconfigure and recalibrate the device Memory error in device program (PROM defective)	x	x	x	x
ERR 99	"FAIL" flashes	**Factory settings** EEPROM or RAM defective This error message only occurs in the case of a complete defect. The Transmitter must be repaired and recalibrated at the factory.	x	x	x	x

Errors	Symbol (flashing)	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
ERR 03		**Temperature probe** Open or short circuit Temperature range exceeded	x	x	x	x
ERR 11		**Current output 1** Current below 0 (3.8) mA	x	x	x	
ERR 12		**Current output 1** Current above 20.5 mA	x	x	x	
ERR 13		**Current output 1** Current span too small / too large	x	x	x	
ERR 21		**Current output 2** Current below 0 (3.8) mA	x	x		x
ERR 22		**Current output 2** Current above 20.5 mA	x	x		x
ERR 23		**Current output 2** Current span too small / too large	x	x		x
ERR 41		**Rinsing probe** Communication error	x	x	x	x
ERR 33		**Sensocheck** Sensor: Connecting cable defective	x	x	x	
		• Zero error, Sensoface active, see Pg 82				
		• Slope error, Sensoface active, see Pg 82				
		• Response time exceeded, Sensoface active, s. Pg 82				
		• Calibration interval expired, Sensoface active, s. Pg 82				

Calibration error messages

Symbol flashes:	Problem Possible causes
	**Slope out of range** Wrong calibration values specified (relative humidity, pressure, saturation, concentration)
 In addition "CAL Err" is flashing	**Calibration aborted after 12 minutes** Sensor defective or dirty •No electrolyte in the sensor •Sensor cable insufficiently shielded or defective •Strong electric fields influence the measurement •Temperature fluctuation of calibration solution

Operating states

Operating state	Out 1	Out 2	Rel.1/2 Controller	Rel.1/2 Limit value	Cleaning contact	Alarm contact	LED	Time out
Measurement	■	■	■	■	■	■	■	
Cal Info (cal) 0000	■	■	■	■	■	■	■	20 s
Error Info (conf) 0000	■	■	■	■	■	■	■	20 s
Calibration (cal) 1100	■	■	■					
Temp adjustment (cal) 1015	■	■	■					

Operating state	Out 1	Out 2	Rel.1/2 Controller	Rel.1/2 Limit value	Cleaning contact	Alarm contact	LED	Time out
Product cal 1 (cal) 1105	■	■	■	■	■	■		
Product cal 2 (cal) 1105	■	■	■					
Configuration (conf) 1200	■	■	■					20 min
Parameter set 1/2 (conf) 7654	■	■	■					20 min
Sensor monitor (conf) 2222	■	■	■	■	■	■		20 min
Current source 1 (conf) 5555	■	■	■					20 min
Current source 2 (conf) 5556	■	■	■					20 min
Relay test (conf) 5557	■	■	■	■	■	■		20 min
Manual controller (conf) 5559	■	■	■					20 min
Rinsing function	■	■	■		■			
HOLD input	■	■	■					

Explanation:
■ active
■ as configured (Last/Fix or Last/Off)

Sensoface

(Sensocheck must have been activated during configuration.)

The little smiley in the display (Sensoface) alerts for sensor problems (defective cable, maintenance required).
The permitted calibration ranges and the conditions for a friendly, neutral, or sad Sensoface are summarized in the following chart. Additional icons refer to the error cause.
Replace membrane module or filling solution, if required.

Sensors Type A (InPro6800)

	Slope	Zero point	Response time	Cal timer
adm. range	25 to 130 nA	-2 to +2 nA	max. 720 s	
☺	> 35 to < 90 nA	> -0.3 to < 0.3 nA	≤ 300 s	≤ 80 %
😐	Slope / Zero 30 ... 35 nA or 90 ... 110 nA	Zero -0.6 to -0.3 nA or +0,3 ... +0.6 nA	300 to 600 s	80 to ≤ 100 %
☹	Slope / Zero < 30 nA or > 110 nA	Zero < -0.6 nA or > +0.6 nA	> 600 s	Timer expired

Note

The worsening of a Sensoface criterion leads to the devaluation of the Sensoface indicator (Smiley becomes "sad"). An improvement of the Sensoface indicator can only take place after calibration or removal of a sensor defect.

Sensor Type B (InPro6900)

	Slope	Zero point	Response time	Cal timer
adm. range	200 to 550 nA	-2 to +2 nA	max. 720 s	
☺	> 250 to < 500 nA	> -0.5 to < 0.5 nA	< 300 s	< 80 %
😐	Slope / Zero 225 to 250 nA or 500 to 525 nA	Zero -1.0 to -0.5 nA or +0.5 to +1.0 nA	300 to 600 s	80 to ≤ 100 %
☹	Slope / Zero < 225 nA or > 525 nA	Zero < -1.0 nA or > +1.0 nA	> 600 s	Timer expired

🌡 ☹	Thermometer and Sensoface: Temperature out of concentration or saturation range

Sensocheck

Continuously monitors the sensor and lines for short circuits or open circuits. Critical values make the Sensoface "sad" and the corresponding icon flashes:

The Sensocheck message is also output as error message Err 33. The alarm contact is active, the red LED is lighted, output current 1 is set to 22 mA (when configured correspondingly). Sensocheck can be switched off during configuration (then Sensoface is also disabled). Exception: After a calibration a Smiley is always displayed for confirmation.

Appendix

Product line and accessories

Devices	Order No.
O_2 Transmitter 4100 e	**52 121 103**

Mounting accessories

Pipe-mount kit	52 120 741
Panel-mount kit	52 120 740
Protective hood	52 120 739

Sensors

Mettler-Toledo GmbH, Process Analytics offers a wide range of sensors for the following fields of applications:
- Chemical process industry
- Pharmaceutical industry
- Food and beverage industry
- Water/waste-water

For more information concerning our sensors and housings program, please refer to http://www.mt.com.

DO input	Sensor Type A:	InPro6000 – 6800
	Sensor Type B:	InPro6900
	Measuring current	-2 to 1800 nA,
	Resolution (with Vpol = 800 mV and Vref = 200 mV)	0.05 nA
	Saturation (-10 to 80 °C)	0 to 500 %
	Meas. error[1,2,3]	0.5 % meas.val. + 0.5 %
	Concentration	(-10 to 80 °C) 0.00 to 50.00 mg/l 0.00 to 50.00 ppm
	Meas. error[1,2,3]	0.5 % meas.val. + 0.05 mg/l or 0.05 ppm
	Adm. guard current	≤ 20 µA
	Polarization voltage*	0 to 1000 mV,
	Process pressure *	0.000 to 9.999 bars (to 999.9 kPa / to 145.0 psi)
	Salt correction *	00.00 to 45.00 g/kg

Sensor standardization

Operating modes *	DO saturation (automatic) DO concentration (automatic) Product calibration Zero point calibration	
Calibration range Sensor Type A	Zero point	± 2 nA
	Slope (at 25 °C, 1013 mbars)	25 to 130 nA
Calibration range Sensor Type B	Zero point	± 2 nA
	Slope (at 25 °C, 1013 mbars)	200 to 550 nA
Calibration timer *	0000 to 9999 h	
Pressure correction *	0.000 to 9.999 bars / 999.9 kPa / 145.0 psi	

Sensocheck Monitoring for short circuits / open circuits (can be disabled)

Sensoface Provides information on the sensor condition
Evaluation of zero/slope, response, calibration interval, Sensocheck

Temperature input	NTC 22 kOhms / NTC 30 kOhms, selectable 2-wire connection, adjustable	
Measurement range	-20.0 to +150.0 °C / -4 to +302 °F	
Adjustment range	10 K	
Resolution	0.1 °C / 1 °F	
Meas. error[1,2,3]	< 0.5 K (<1 K at > 100°C)	
HOLD input	Galv. separated (OPTO coupler)	
Function	Switches Transmitter to HOLD mode	
Switching voltage	Inactive	0 to 2 V (AC/DC)
	Active	10 to 30 V (AC/DC)
CONTROL input	Galv. separated (OPTO coupler)	
Function	Control input for automatic cleaning system	
Switching voltage	Inactive	0 to 2 V (AC/DC)
	Active	10 to 30 V (AC/DC)
Output 1	0/4 to 20 mA, max. 10 V, floating (galv. connected to output 2)	
Process variable *	DO saturation/DO concentration	
Overrange *	22 mA in the case of error messages	
Output filter *	Low-pass, filter time constant 0 to 120 s	
Meas. error [1]	< 0.3 % current value + 0.05 mA	
Start/end of scale	Configurable within selected range	
Adm. span	5 to 500 % / 0.5 to 50 mg/l (ppm)	
Output 2	0/4 to 20 mA, max. 10 V, floating (galv. connected to output 1)	
Process variable	Temperature	
Overrange *	22 mA in case of temp error messages	
Output filter *	Low-pass, filter time constant 0 to 120 s	
Meas. error [1]	< 0.3 % current value + 0.05 mA	
Start/end of scale*	-20 to +150 °C / -4 to +302 °F	
Adm. span	20 to 170 K (68 to 338 °F)	

Specifications

Alarm contact	Relay contact, floating	
Contact ratings	AC< 250 V / < 3 A / < 750 VA	
	DC< 30 V / < 3 A / < 90 W	
Contact response	N/C (fail-safe type)	
Response delay *	0000 to 0600 s	
Limit values	Output via relay contacts R1, R2	
	Contacts R1, R2 floating but inter-connected	
Contact ratings	AC< 250 V / < 3 A / < 750 VA	
	DC< 30 V / < 3 A / < 90 W	
Contact response*	N/C or N/O	
Response delay *	0000 to 0600 s	
Switching points*	Within selected range	
Hysteresis*	000.0 to 050.0 % / 00.00 to 05.00 mg/l (ppm)	
PID process controller	Output via relay contacts R1, R2 (Relay R1: below setpoint, Relay R2: above setpoint)	
Setpoint specification*	0 to 500 % / 0.00 to 50.00 mg/l (ppm)	
Neutral zone*	000.0 to 050.0 % / 00.00 to 05.00 mg/l (ppm)	
P-action component*	Controller gain Kp:	0010 to 9999 %
I-action component*	Reset time Tr:	0000 to 9999 s (0000 s = no integral action)
D-action component*	Rate time Td:	0000 to 9999 s (0000 s = no derivative action)
Controller type*	Pulse length controller or pulse frequency controller	
Pulse period*	0001 to 0600 s, min. ON time 0.5 s (pulse length controller)	
Max. pulse frequency*	0001 to 0180 min^{-1} (pulse frequency controller)	

Cleaning function*	Relay contact, floating, for controlling a simple rinsing system or an automatic cleaning system (EasyClean)
Contact ratings	AC < 250 V / < 3 A / < 750 VA
	DC < 30 V / < 3 A / < 90 W
Contact response*	N/C or N/O
Interval *	000.0 ... 999.9 h (000.0 h = cleaning function switched off)
Rinse duration*	0000 ... 1999 s
Display	LC display, 7-segment with icons
Main display	Character height 17 mm, unit symbols 10 mm
Secondary display	Character height 10 mm, unit symbols 7 mm
Sensoface	3 status indicators (friendly, neutral, sad Smiley)
Mode indicators	5 status bars "meas", "cal", "alarm", "cleaning", "config" 18 further icons for configuration and messages
Alarm indication	Red alarm LED in case of alarm or HOLD (user defined)
Keypad	5 keys
Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 to 22.00 mA)
Manual controller	Controller output entered directly (start of control process)
Device self-test	Automatic memory test (RAM, FLASH, EEPROM)
Display test	Display of all segments
Last Error	Display of last error occurred
Sensor monitor	Display of direct, uncorrected sensor signal
Relay test	Manual control of the four switching contacts
Parameter sets	Two selectable parameter sets for different applications
Data retention	Parameters and calibration data > 10 years (EEPROM)

Specifications

Protection against electrical shock	Protective separation of all extra-low-voltage circuits against mains by double insulation as per EN 61010-1
Power supply	24 (-15%) to 230 V AC/DC (+10%); approx. 5 VA, 2.5 W AC: 45 to 65 Hz; Overvoltage category II, Class II

Nominal operating conditions

Ambient temperature	-20 to +55 °C
Transport/Storage temp.	-20 to +70 °C
Relative humidity	10 to 95 % not condensing
Power supply	24 (-15%) to 230 V AC/DC (+10%)
Frequency for AC	45 to 65 Hz

EMC	EN 61326
Emitted interference	Class B (residential environment) Class A for mains supply > 60 V DC
Immunity to interference	Industrial environment

Explosion protection

FM:	NI Class I Div 2 Group A, B, C & D, T4 Ta = 55 °C; Type 2 NI Class I Zone 2 Group IIC, T4 Ta = 55°C; Type 2
CSA:	Class I Div 2 Groups A, B, C and D, T4 Ex nA IIC T4

Enclosure	Molded enclosure made of PBT (polybutylene terephtalate)
Color	Bluish gray RAL 7031
Assembly	• Wall mounting • Pipe mounting: dia 40 to 60 mm, □ 30 to 45 mm • Panel mounting, cutout to DIN 43 700 Sealed against panel
Dimensions	H 144 mm, B 144 mm, T 105 mm
Ingress protection	IP 65 / NEMA 4X
Cable glands	3 breakthroughs for cable glands M20x1.5 2 breakthroughs for NPT 1/2 " or Rigid Metallic Conduit
Weight	Approx. 1 kg

*) User-defined
[1]) To IEC 746 Part 1, at nominal operating conditions
[2]) ± 1 count
[3]) Plus sensor error

CSA INTERNATIONAL

Certificate of Compliance

Certificate: 220331

Project: 1430364 **Date Issued:** May 14, 2003

Issued to: **Mettler-Toledo GmbH**
Im Hackacker 15
Urdorf, 8902
SWITZERLAND
Attention: Mr. Alfred Peer

The products listed below are eligible to bear the CSA Mark shown

Issued by: Pocholo Laforteza

Authorized by: Nick Alfano
Operations Manager

PRODUCTS

Class 2258 02 PROCESS CONTROL EQUIPMENT - For Hazardous Locations

Class I, Division 2, Groups A, B, C and D
Ex nA IIC T4

2100e pH Transmitter, 5100e CO2 Transmitter, 4100e O2 Transmitter, 7100e Cond Transmitter, 7100e Cond Ind Transmitter and 4100ppb Oxy (trace elements) Transmitter, conduit connected, rated Input 24-230V ac/dc -15%/+10%, 45 to 65 Hz, 6VA; four sets of relay contacts 250V ac, 3.0 amps or 120Vdc, 3.0 amps, milliamp outputs rated 0 to 20 mA (with 130Vac/dc isolation), and other signal circuits all SELV including sensor connection which provides non-incendive connections to one of the following sensor type: InPro 3200, 4250, 6800, 6900, CO_2, 7000, 7100 and 7200 using maximum 3.2 metres of cable. (Refer to control drawing 194.130-240). Operating ambient: -20 to 55°C, installation category II, pollution degree 2. Type 2 enclosure. Temperature Code T4.

DQD 507WD 2002/04/30

Warnings and notes to ensure safe operation

Warning: Do not disconnect equipment unless power has been switched off.
Warning: Clean only with antistatic moistened cloth.
Warning: Substitution of components may impair suitability for hazardous locations.

- The equipment shall be installed and protected from mechanical impact and ultraviolet (UV) sources.
- Clean only with a moistened antistatic cloth as potential electrostatic hazard may exist. Service equipment only with conductive clothing, footwear and personal grounding devices to prevent electrostatic accumulation.
- Internal grounding provisions shall be provided for field wiring. Bonding between conduit shall be provided during installation, and all exposed non-current carrying metallic parts shall be bonded and grounded.
- Installation in a Class I, Division 2 or Class I, Zone 2 hazardous location shall be in accordance with the Canadian Electrical Code (CEC Part 1) Section 18 Division 2 wiring methods.
- The equipment shall have a switch or circuit breaker in the building installation (that is in close proximity to the equipment) that is marked as the disconnect switch.
- The enclosure Type 2 is only for indoor use.
- The mains supply voltage fluctuations should not exceed -15/+10 percent of the nominal supply voltage.
- Do not use the equipment in a manner not specified in this documentation.
- **Caution:** Use supply wires suitable for 30 °C above ambient and rated at least 250 V.
- **Caution:** Use signal wires suitable for at least 250 V.

SPECIAL INSTRUCTIONS FOR FIELD REPRESENTATIVES
None

Hazardous Location

Class I Divison 2, Groups A, B, C, D T4
Ex nA IIC T4 CSA 02.1342049X

Enclosure Type 2, Tamb = - 20 °C to + 55 °C

Installation category II, pollution degree 2

pH/ORP measuring circuit or
CO_2 measuring circuit
(Terminals KL. 1, 2, 3, KL. C)
maximum values: V_{oc} = 10 V C_a = 20 µF
I_{sc} = 12 mA L_a = 1 H
P_o = 15 mW

DF supply circuit
(Terminals KL. 3, 4, 5)
maximum values: V_{oc} = 10 V C_a = 20 µF
I_{sc} = 14 mA L_a = 1 H
P_o = 35 mW

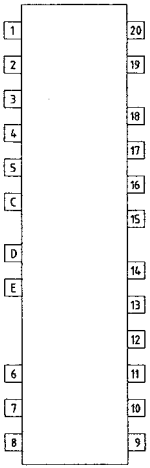
or DO measuring circuit or
DO measuring circuit (trace elements)
(Terminals KL. 1, 2, 3, 4, 5, KL. C)
maximum values: V_{oc} = 10 V C_a = 20 µF
I_{sc} = 17 mA L_a = 1 H
P_o = 22 mW

or Cond measuring circuit
(Terminals KL. 1, 2, 3, 4, 5)
maximum values: V_{oc} = 10 V C_a = 20 µF
I_{sc} = 112 mA L_a = 8 mH
P_o = 140 mW

or Condl measuring circuit
(Terminals KL. 1, 2, 3, 4, 5)
maximum values: V_{oc} = 7.1 V C_a = 100 µF
I_{sc} = 72 mA L_a = 20 mH
P = 128 mW

Temp measuring circuit
(Terminals KL. D, KL. E)
maximum values: V_{oc} = 5 V C_a = 1000 µF
I_{sc} = 10 mA L_a = 1 H
P_o = 13 mW

OK inputs HOLD, CONTROL
(Terminals KL. 6, 7 and 8, 7)
maximum values: V_{max} = 30 V C_i = 0
I_{max} = no limitation L_i = 0



TERMINALS 1, 2, 3, 4, 5, C, D, E:
NON-INCENDIVE FIELD WIRING CONNECTIONS FOR CLASS I, DIVISION 2, GROUPS A, B, C, D

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISON 2, GROUPS A, B, C, D
OR NON-HAZARDOUS LOCATIONS ONLY

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISON 2

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS

AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.

WARNING - CLEAN ONLY WITH A MOISTENED ANTISTATIC CLOTH AS POTENTIAL ELECTROSTATIC HAZARD MAY EXIST. SERVICE EQUIPMENT ONLY WITH CONDUCTIVE CLOTHING, FOOTWEAR AND PERSONAL GROUNDING DEVICES TO PREVENT ELECTROSTATIC ACCUMULATION.

WARNING - INTERNAL GROUNDING PROVISIONS SHALL BE PROVIDED FOR FIELD WIRING. BONDING BETWEEN CONDUIT SHALL BE PROVIDED DURING INSTALLATION, AND ALL EXPOSED NON-CURRENT CARRYING METALLIC PARTS SHALL BE BONDED AND GROUNDED.

THE EQUIPMENT SHALL BE INSTALLED AND PROTECTED FROM MECHANICAL IMPACT AND ULTRAVIOLET (UV) SOURCES.

Transmitter 2100 e, 4100 e, 4100 ppb, 5100 e, 7100 e

pH 2100 e	one pH/ORP input with DF supply circuit
CO_2 5100 e	one CO_2 input
O_2 4100 e	one DO input
O_2 4100 ppb	one DO input (measurement of trace elements)
Cond 7100 e	one Conductivity input for 2-/4-electrode sensors
Cond Ind 7100 e	one Conductivity input for electrodeless conductivity sensors

Power supply circuit
(Terminals Kl. 19, 20)
24 to 230 V AC/DC -15% / +10 %
45 to 65 Hz

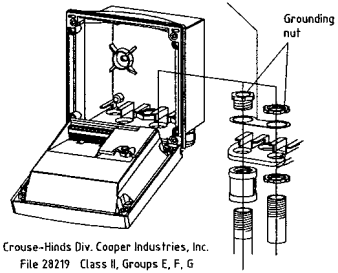
Switching circuits
ALARM and CLEAN
(Terminals KL. 15, 16 and 17, 18)
maximum values:
AC: < 250 V / < 3 A / <750 VA / resistive load
DC: < 30 V / < 3 A / < 90 W / resistive load

Switching circuits
REL. 1 and REL. 2
(Terminals KL. 12, 13 and 14, 13)
maximum values:
AC: < 250 V / < 3 A / <750 VA / resistive load
DC: < 30 V / < 3 A / < 90 W / resistive load

Output circuits
OUT 1 and OUT 2
(Terminals KL. 9, 10 and 11, 10)
maximum values:
V_{oc} = 10 V C_a = 10 µF
I_{sc} = 22 mA L_a = 100 mH
P_o = 220 mW

Conduit mounting:

Place washer between enclosure and nut



Crouse-Hinds Div. Cooper Industries, Inc.
File 28219 Class II, Groups E, F, G
HUB BASIC SCRU-TITE: ST-1, STA-1
GROUND HUB: SSTG-1, STG-1, STAG-1
GROUND NUT: STGN-1, STAGN-1
FILE 13046 Class I, Zone 1, Ex e II; IP 66
GROUND HUB BASIC SCRU-TITE: STGK-1, SSTGK-1

Appleton
FILE 208042 Class II, Groups E, F, G
HUBG-50D, HUBL-50D

Thomas & Betts Corporation
FILE 23086 Class I, Div 2
Hub: 370AL, 370
Grounding Bushing: 3870

Installation in a Class I, Division 2 or Class I, Zone 2 hazardous locations shall be in accordance with the Canadian Electrical Code C22.1 Section 18 Division 2 wiring methods.

Version: METTLER TOLEDO

Verteiler: FGL (Zx)	Zul. Abweichungen für Maße ohne Toleranzangabe ISO 2768 - m	Oberfläche	Maßstab	Blatt 1/2	
			Halbzeug		
		Datum	Name	Benennung	
	Bearb.	07.03.03	dam	control drawing CSA Transmitter 2100, 4100, 5100, 7100	
	Gepr. (KON)				
	Freigabe (FGL)				
	Schutzvermerk nach DIN 34 beachten			Zeichnungsnummer	
				194.130-240	
Nr. / AE / Datum / Bearbeiter FGL KON				Ungültig ab:	Ersetzt durch:

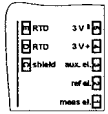
pH sensor group InPro 3xxx

- InPro3200

pH sensor group InPro 4xxx

- InPro4250/120/Pt1000

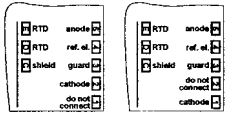
terminal assignment



O_2 sensor group InPro 6xxx

- InPro6900/12
- InPro6910/12
- InPro6800/12
- InPro6800/25

terminal assignment



CO_2 sensor group InPro 5xxx

- CO_2-sensor

terminal assignment

Cable: VP6-HT/XM, VP6-ST/XM

	A	B	C	D	E	F	Shield
Cable type X Koax+4L / measuring system	Core/ transparent	Shield/ red	grey	blue	white	green	yellow/ green
pH + BE + Temp	pH	BE	(T3)		T1	T2	
ORP + BE + Temp	ORP	BE	(T3)		T1	T2	
pH + BE + Temp + ORP/HE	pH	BE	(T3)	HE/ORP	T1	T2	
pH + BE + Temp (CO_2-sensor)	pH	BE	(T3)		T1	T2	Shaft
OX (2P) + Temp (InPro6100/6800)	Kathode	Anode			T1	T2	Shaft
OX (2P) + Guard +Temp (InPro6900)	Kathode	Anode	Guard		T1	T2	Shaft

Legende:
- -pH: pH-Lead-off
- -BE: reference electrode
- -HE: solution ground, auxilliary electrode
- -ORP: Redox electrode
- -Kathode: cathode of O_2-sensors
- -Anode: anode of O_2-sensors
- -Guard: guard-electrode of O_2-sensors
- -T1: temperature device
- -T2: temperarure device (zero)
- -T3: temperature device (compensation lead)

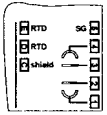
Cond sensor group InPro 70xx-VP

- InPro7000-VP
- InPro7005-VP
- InPro7001/120-VP
- InPro7001/225-VP
- InPro7002/1.5"TC-VP
- InPro7002/2"TC-VP

Cond sensor group InPro 71xx-VP

- InPro7108-VP/CPVC
- InPro7108-VP/PEEK
- InPro7108-VP/PEEK/HA-C22
- InPro7108-25/40-VP
- InPro7108-25/40/HA-C22-VP
- InPro7108-26/65-VP
- InPro7108-25/65/HA-C22-VP
- InPro7108/1.5"TC-VP
- InPro7108/2"TC-VP

terminal assignment

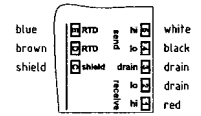


Wire color Patch cord	VP connector pin (on sensor)	Transmitter Cond 7100 e
bare	G	unused
blue	D	3
black	E	4
red	C	D
green	F	E
white	H	2
clear	B	C
white/blue	A	1

CondI sensor group InPro 72xx

- InPro7200
- InPro7201
- InPro7202

terminal assignment



Version: METTLER TOLEDO

Verteiler: FOL 12x1	Zul. Abweichungen für Maße ohne Toleranzangabe ISO 2768 - m	Oberfläche	Maßstab		Blatt 2/2
			Halbzeug		
		Datum	Name	Benennung	control drawing CSA Transmitter 2100, 4100, 5100, 7100
		Bearb.	07.03.03	dam	
		Gepr. (KOM)			
		Freigabe(FGL)			
		Schutzvermerk nach DIN 34 beachten		Zeichnungsnummer	194.130-240
Nr. AE Datum Bearbeiter FGL KOM				Ungültig ab:	Ersetzt durch: