Instruction manual

Transmitter Cond Ind 7100 e

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".

CE

FM

Mettler-Toledo GmbH, Process Analytics, Industrie Nord,
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Subject to technical changes. Mettler-Toledo GmbH, 04/05.
Printed in Germany.

Contents

Safety information

Be sure to read and observe the following instructions!

The device has been manufactured using state of the art technology and it complies 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.

Caution!
Before commissioning it must be proved that the device may be connected with other equipment.

Intended use

The Model Cond Ind 7100 e is used for measurement of electrical conductivity and temperature in liquids using electrodeless (toroidal) sensors.
Fields of application are: biotechnology, chemical industry, environment, food processing, water/waste-water treatment.
The rugged molded enclosure can be fixed into a control panel or mounted on a wall or at a post. The protective hood provides additional protection against direct weather exposure and mechanical damage.
The Model Cond Ind 7100 e has been designed for electrodeless sensors, in particular for sensors of the InPro7250 Series. It provides a second current output for temperature measurement, a PID controller (making use of the relay contacts), and a universal power supply for 24 ... 230 V AC/DC.
For CIP applications, you can switch between two parameter sets.

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
Process Analytics

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Declaration of conformity
Konformitätserklärung
Déclaration de conformité

CE

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

Cond Ind 7100e

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	**EN 61010-1**	**/ VDE 0411 Teil 1:**	**2002-08**

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

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Mettler-Toledo GmbH, Process Analytics

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Nr. 52 999 999C FL

Artikel Nr. 52960285 KE

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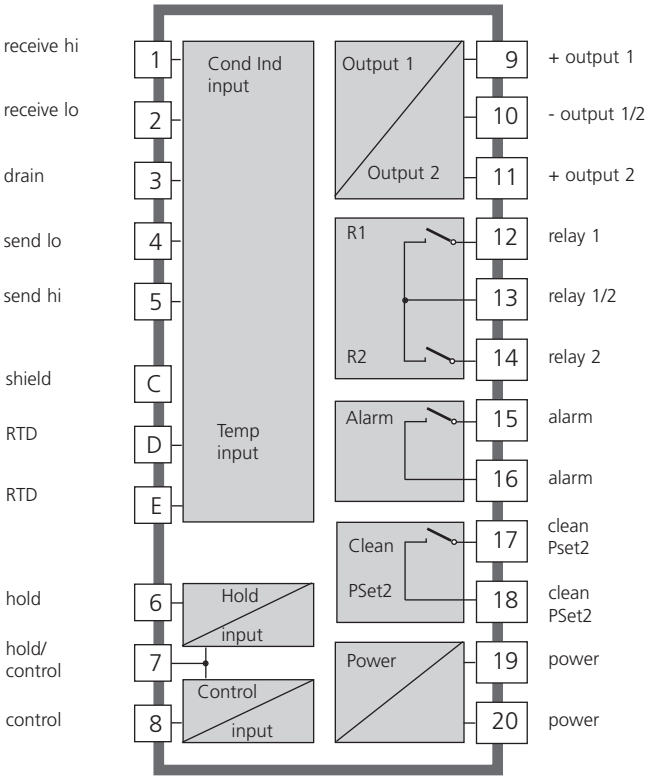
METTLER TOLEDO

Version a

Overview of Transmitter Cond Ind 7100 e

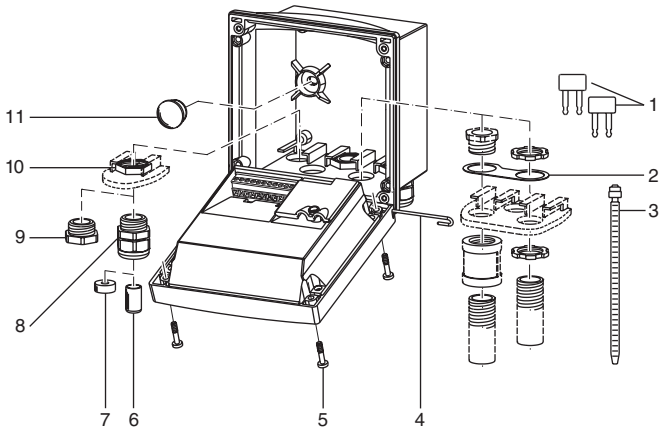


Assembly

Package contents

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

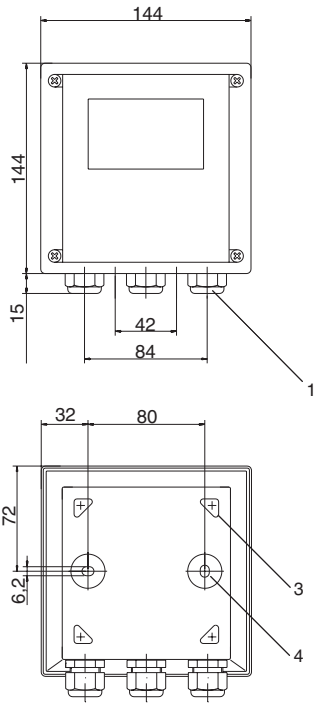
- Front unit
- Lower case
- Bag containing small parts
- Instruction manual
- Specific test report



1 Jumper (2 piece)
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

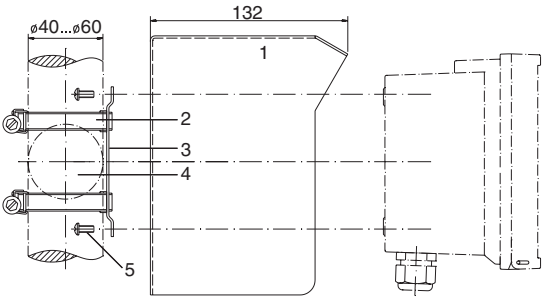
Mounting plan



1 Cable gland (3 pieces)
2 Breakthroughs for cable gland or conduit 1/2", ø 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

Pipe mounting, panel mounting



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

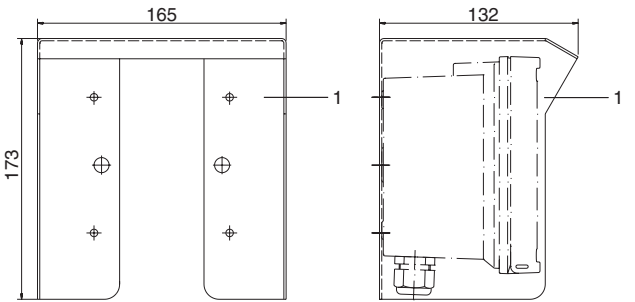


Fig.: Protective hood for wall and pipe mounting

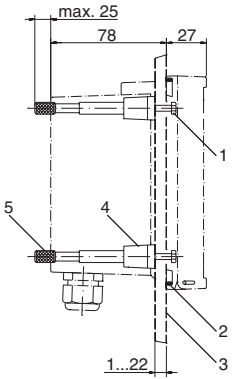


Fig.: Panel-mount kit

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

Panel cutout 138 x 138 mm
(DIN 43700)

Installation and connection

Information on installation
Caution!

- The Transmitter may only be installed 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 107)

Terminal assignments

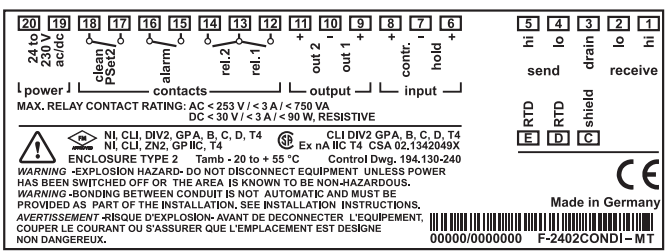
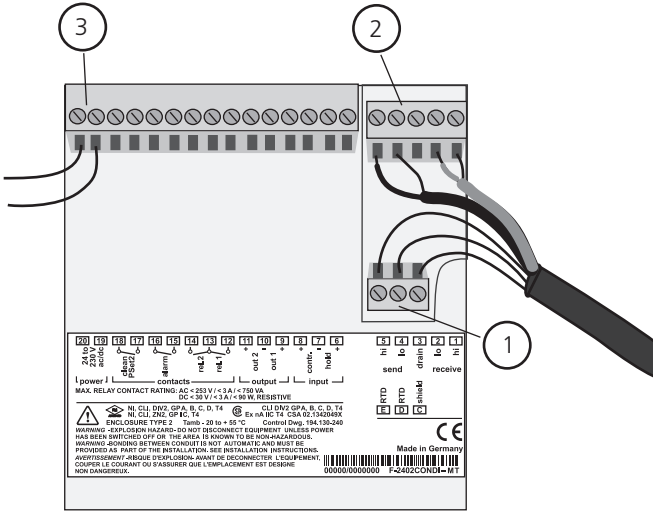


Fig.: Terminal assignments Cond Ind 7100 e



1 Terminals for temperature probe and outer shield
2 Terminals for sensor
3 Terminals for power supply

Fig.: Information on installation, rear side of device

Division 2 wiring

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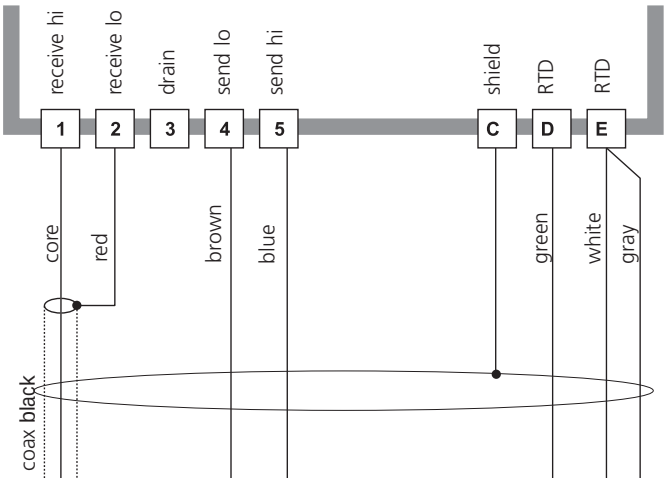
The connections to the Transmitter must be installed in accordance with the National Electric Code (ANSI-NFPA 70) Division 2 hazardous (classified) location non-incendive wiring techniques.

Typical wiring
InPro7250 ST sensor

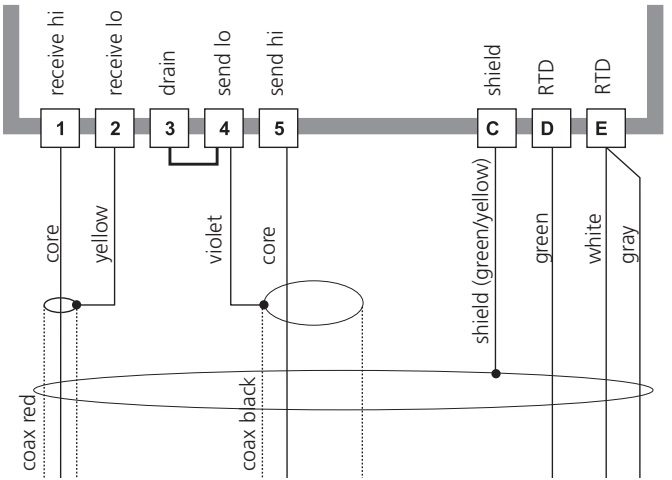
Cond Ind 7100 e



Typical wiring

InPro7250 HT sensor

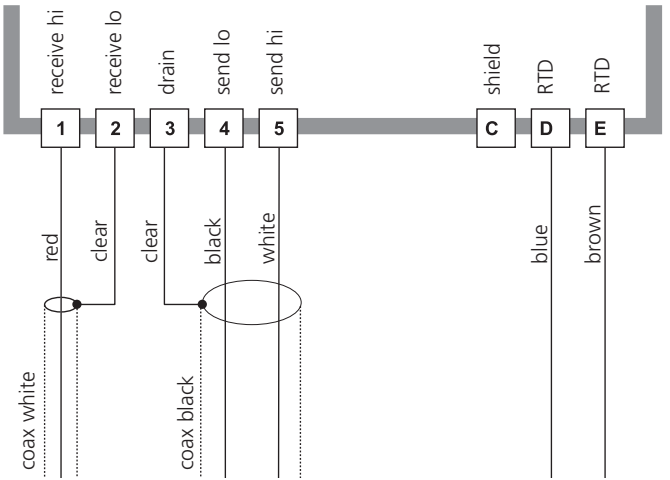
Cond Ind 7100 e



Typical wiring

InPro7200 sensor

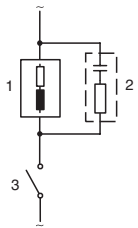
Cond Ind 7100 e

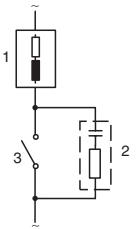


Protective wiring

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.

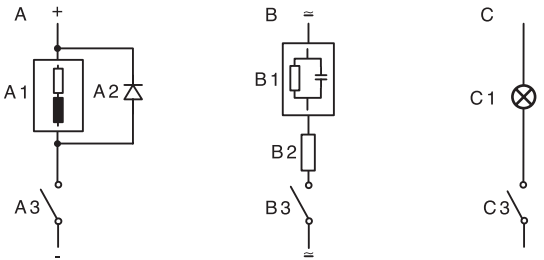




Typical AC applications with inductive load

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



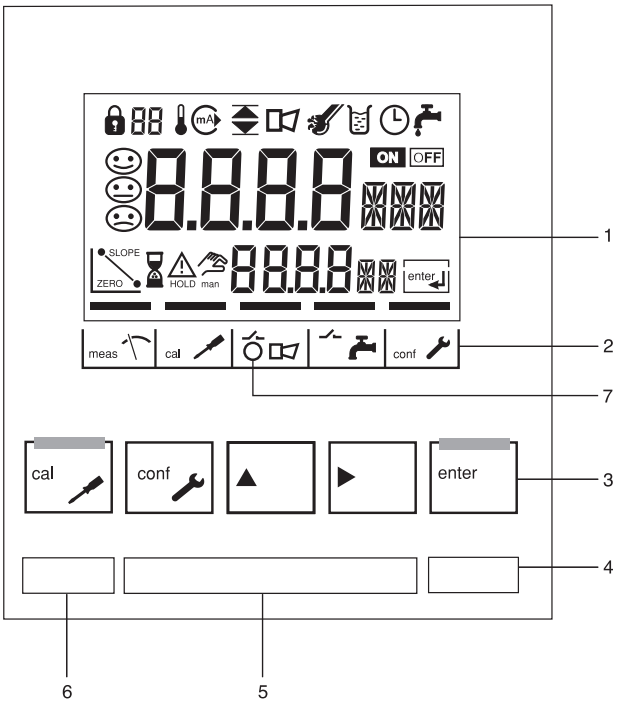
A: DC application with inductive load
B: AC/DC applications with capacitive load
C: Connection of incandescent lamps

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 and display

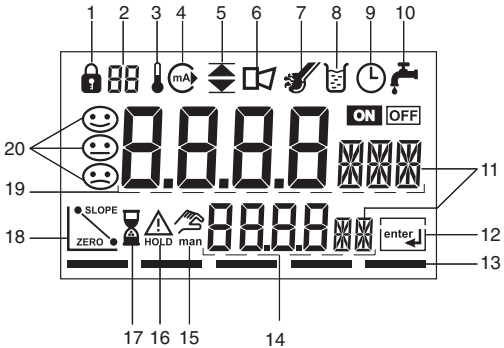
User interface



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

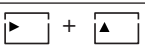


1 Mode code entry
2 Parameter set 2 selected
3 Temperature
4 Current output
5 Limit values
6 Alarm
7 Sensocheck
8 Calibration
9 Interval/response time
10 Wash contact
11 Measurement symbols
12 Proceed with enter
13 Bar for identifying the device status, above mode indicators from left to right:
- Measuring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

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

Operation: Keypad

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

	Cal Info: Display of cell factor and zero point
	Error Info: Display of last error message
	Start GainCheck device self-test

Sensocheck, Sensoface sensor monitoring

Sensocheck continuously monitors the sensor and its wiring. Sensocheck can be switched off (Configuration, Pg 57).

Sensoface provides information on the conductivity sensor condition. The primary coil and its wirings are continuously monitored for short circuits, the secondary coil and its wirings are checked for open circuits. The three Sensoface indicators inform of the sensor condition.

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 functions

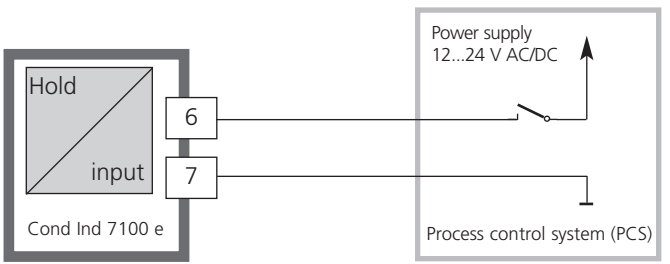
Hold mode

Display:

The Hold mode is a safety state 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 the functions

Calibration

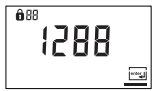
Key + Code	Description
cal 0000	**Cal Info** Display of cell factor and zero point
cal 1100	**Calibration** by entry of cell factor
cal 0110	**Calibration** by entry of solution
cal 1105	**Product calibration**
cal 1001	**Zero point calibration**
cal 1015	**Temp probe adjustment**

Configuration

Key + Code	Description
conf 0000	**Error Info** Display of last error
conf 1200	**Configuring parameter set 1**
conf 1288	**Configuring parameter set 2**
conf 2222	**Sensor monitor** Display resistance and temp
conf 7654	**Parameter set 1/2** Switchover internal / external
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

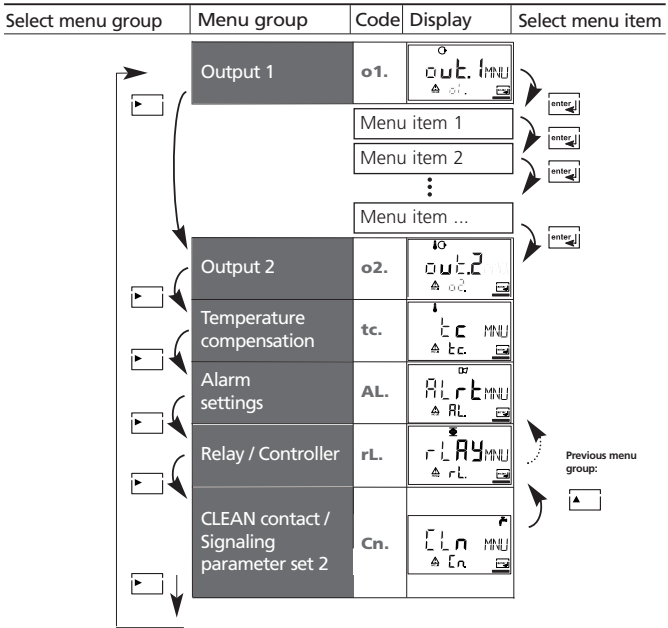
Configuration

In the Configuration mode you set the device parameters. The Transmitter can store two different parameter sets and switch between them. Sensor data and "Clean/PSEt2" output are edited in parameter set 1 only. They are valid for both parameter sets.

Configuring	conf	Press conf.
Parameter set 1		Enter mode code "1200": Edit **parameter set 1** with ► and ▲, confirm/proceed with **enter**.
Parameter set 2 Configure: "88" appears in the display.		Enter mode code "1288": Edit **parameter set 2** with ► and ▲, confirm/proceed with **enter**.
Hold HOLD During configuration the Transmitter remains in the Hold mode.	 HOLD icon	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	conf enter	End with **conf**. 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).

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**.



Overview of configuration steps

Code	Menu	Selection / Default
out1	**Output 1**	
o1.	Sensor selection *	InPro7250 / 7200 / 7201 / 7202 /other
	other *: Entry of cell factor	xx.xxx c
	Enter transfer ratio	xxx.xx
	Meas. frequency selection	8 kHz / 16 kHz
	Select temperature probe	Pt100/Pt1000/NTC100
	Select measured variable	mS/cm, S/m, Conc, SAL
	Select solution (Conc)	NaCl, HCl, NaOH, H_2SO_4, HNO_3 (Code 01 ... 10, see Pg 114)
	Select current range	0-20 mA / 4-20 mA
	Characteristic (not for Conc, SAL)	Linear LIN / Logarithmic LOG
	LIN: Enter current beginning	xxxx mS
	Enter current end	xxxx mS
	LOG: Enter current beginning	in decades: 0.001 ... 1000
	Enter current end	in decades: 0.001 ... 1000
	Time constant of output filter	xxxx SEC
	22 mA signal for error messages	ON / OFF
	Signal behavior during HOLD	Last / Fix
	Fix: Enter fixed value	xxx.x mA
out2	**Output 2**	
o2.	Select temperature unit	°C / °F
	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 SEC
	22 mA signal in the case of temp error	ON / OFF
	Signal behavior during HOLD	Last / Fix
	Fix: Enter fixed value	xxx.x mA

Code	Menu		Selection / Default
tc	**Temperature compensation**		
tc.	Temperature compensation selection		OFF / Lin / nLF
	Lin: Input of temp. coefficient		xx.xx %/K
ALrt	**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	Lo / Hi
		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_C	xxxx %
		(I) Reset time T_R	xxxx SEC
		(D) Rate time T_D	xxxx SEC
		Pulse length/frequency controller	PLC / PFC
		PLC: Pulse length	xxxx SEC
		PFC: Pulse frequency	xxxx /min
		Select HOLD behavior	Y Last / Y Off
Cln	**Contact CLEAN / PSEt2**		
Cn.	(Select Cleaning/Signal/Parameter set) *		rinse / PSEt 2
	rinse	Rinsing interval *	xxx.x h
		Rinse duration *	xxxx SEC
		Contact response *	N/O / N/C

*) These parameters are only edited in parameter set 1.
They are valid for both parameter sets.

Configuration
Output 1
Select sensor

Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LIN / LOG
			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.		Select configuration (Press **conf**.)	
	 After correct input a welcome text (CONF) is displayed for approx. 3 s	For parameter set 1: Enter mode code "1200" (Select position using ► arrow key and edit number using ▲. When the display reads "1200", press **enter** to confirm.)	
	 After correct input a welcome text (CONF) is displayed for approx. 3 s	For parameter set 2: Enter mode code "1288" (Select position using ► arrow key and edit number using ▲. When the display reads "1288", press **enter** to confirm.)	
	 HOLD	The Transmitter is in HOLD mode (HOLD icon is on).	
	 	Select sensor * with ► arrow key. Proceed with **enter**. **Note:** After each sensor selection the nominal cell factor of the sensor is stored. To adjust the cell factor to the Transmitter, calibrate the sensor afterwards!	**7250 IPR** (7200 IPR 7201 IPR 7202 IPR other)

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

*) These parameters are only edited in parameter set 1.
They are valid for both parameter sets.

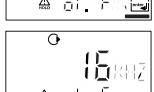
Configuration

Output 1

Select sensor and temperature probe

Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LIN / LOG
			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.		With **other *** selected, the sensor parameters are entered separately: • Enter cell factor *: (Select position using ► arrow key and edit number using ▲.) Proceed with **enter**. • Enter transfer ratio Proceed with **enter**.	
			
			
		• Select measuring frequency * with ► arrow key. Proceed with **enter**.	**8 KHZ** (8 KHZ 16 KHZ)
			
		• Select temperature probe * with ► arrow key. Proceed with **enter**. **Note:** When **other** is called up once more, the last sensor parameters are displayed and can be edited.	**1000Pt** (100Pt 1000Pt 100NTC)
			
			

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

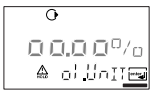
*) These parameters are only edited in parameter set 1.
They are valid for both parameter sets.

Configuration

Output 1
Select measured variable

Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LIN / LOG
			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.	    	Select measured variable: Select with ► arrow key Proceed with **enter** Conductivity: • 0.000 ... 9.999 mS/cm • 00.00 ... 99.99 mS/cm • 000.0 ... 999.9 mS/cm • 0000 ... 1999 mS/cm • 0.000 ... 9.999 S/m • 00.00 ... 99.99 S/m Salinity (SAL): • 0.0 ... 45‰ Concentration (Conc) • 00.00 ... 99.99 % by wt	**000.0 mS** (0.000 mS 00.00 mS 000.0 mS 0000 mS 0.000 S/m 00.00 S/m 00.00 SAL 00.00 % (Conc))

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

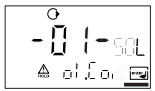
Configuration

Output 1

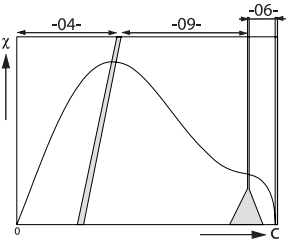
Concentration measurement: Select process solution

Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LIN / LOG
			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.	  	Only with 00.00 % CONC you can select the process solution: Select with ► arrow key NaCl* **-01-** HCl* **-02-** **-07-** NaOH* **-03-** **-10-** H_2SO_4* **-04-** **-06-** **-09-** HNO_3* **-05-** **-08-** Proceed with **enter** *Ranges: see Pg 114 and the following	**-01-SOL** (-01-SOL -02-SOL -03-SOL -04-SOL -05-SOL -06-SOL -07-SOL -08-SOL -09-SOL -10-SOL)

Example:
Measurement ranges for sulphuric acid



Concentration curves / ranges

see Pg 114 and the following

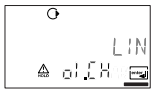
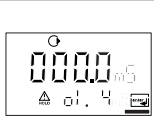
The concentration curves of many substances show a maximum. This means that if the substance concentration continues to increase and the temperature remains constant, the conductivity will drop. Therefore, a one-to-one correlation of values is only possible in defined ranges.
These partial ranges must be selected as measurement ranges in the configuration.

Configuration

Output 1
Output current range. LIN/LOG curve
LIN curve: Current beginning / end

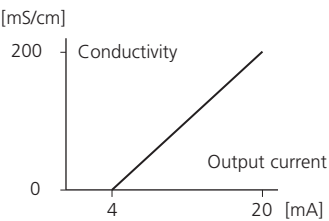
Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LIN / LOG
			Enter current beginning
			Enter current end
			Set output filter
			22 mA in the case of error
			Hold mode

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

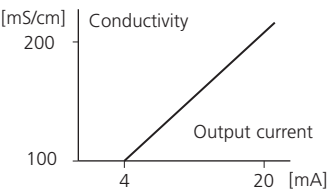
Code	Display	Action	Choices
o1.		Set output current range Select with ► key Proceed with **enter**	**4-20 mA** (0 - 20 mA 4 - 20 mA)
		Select output characteristic Select with ► key Proceed with **enter** (Step omitted for % (Conc) and SAL)	**LIN** (LIN / LOG)
		With **LIN** selected: • Enter current beginning Enter lower end of scale Select with ► key, edit number with ▲ key, proceed with **enter**	**000.0 mS** (xxx.x mS)
		• Enter current end Enter upper end of scale Proceed with **enter**	**100.0 mS** (xxx.x mS)

Assignment of measured values: Current beginning and current end

Example 1: Range 0...200 mS/cm



Example 2: Range 100...200 mS/cm
Advantage: Higher resolution in range of interest



Configuration

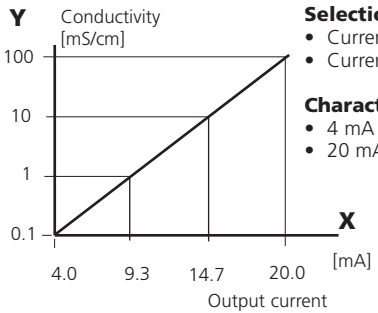
Output 1
Output current range. LOG curve
Current beginning / end

Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LOG
			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.		With **LOG** selected: • Enter current beginning Enter lower end of scale Select with ► key, edit number with ▲ key, proceed with **enter** key.	**0.1 mS** (0.001 mS 0.01 mS 1.0 mS 10 mS 100 mS 1000 mS)
		• Enter current end Enter upper end of scale Select with ► key, edit number with ▲ key. Proceed with **enter**.	**100 mS** (0.001 mS 0.01 mS 1.0 mS 10 mS 100 mS 1000 mS)

Example: Measurement range over 3 decades



Selection: **0-20/4-20mA**
- Current beginning: 4 mA
- Current end: 20 mA

Characteristic: **LOG**
- 4 mA 0.1 mS/cm
- 20 mA 100 mS/cm

Configuration

Output 1

Output filter: Time constant

Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LIN / LOG
			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** key.	**0 s** 0 ... 120 s

Time constant of output filter (attenuation)

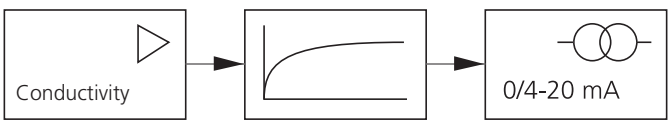
To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is 63 % after the time constant has been reached.

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

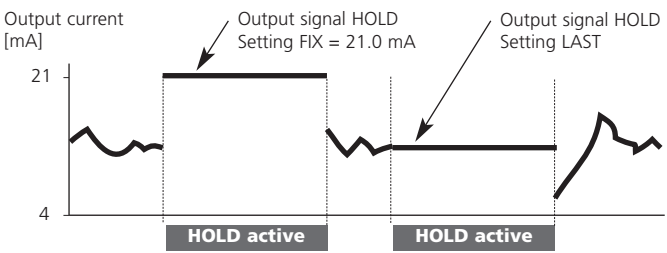
Output current during Error and HOLD.

Menu group	Code	Display	Select menu item
Output 1	o1.		Sensor selection
			Select measured variable
			Select solution (Conc)
			Select 0-20 / 4-20 mA
			Characteristic: LIN / LOG
			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** (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** (LAST FIX)
	 	Only with FIX selected: Enter current which is to flow at the output during HOLD. Select position with ► key, edit number with ▲ key, proceed with **enter** key.	**021.0 mA** (00.0 ... 21.0 mA

Output signal for HOLD:



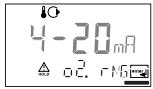
Configuration

Output 2

Temperature unit and output current.

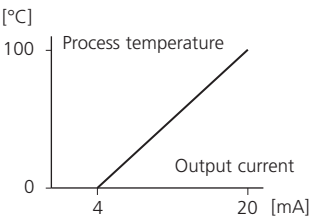
Menu group	Code	Display	Select menu item
Output 2	o2.		Select °C/°F
			Select 0-20 / 4-20 mA
			Enter current beginning
			Enter current end
			Set output filter
			22 mA for temp error
			Hold mode

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

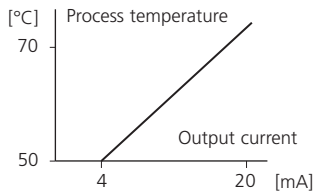
Code	Display	Action	Choices
o2.		Specify temperature unit: Select with ► key. Proceed with **enter**.	**°C** (°C °F)
		Set output current range: Select with ► key. Proceed with **enter**.	**4-20 mA** (4 - 20 mA 0 - 20 mA)
		Current beginning: Enter lower end of scale. Select with ►, edit number with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



Configuration

Output 2

Time constant of output filter.

Menu group	Code	Display	Select menu item
Output 2	o2.		Select °C/°F
			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** key.	**0 s** (0 - 120 s)

Time constant of output filter (attenuation)

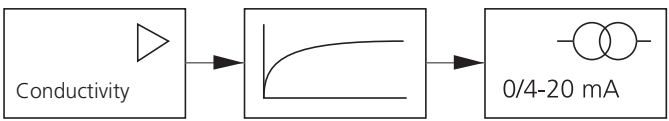
To smoothen the current output 2, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is 63 % after the time constant has been reached.

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

Configuration

Output 2

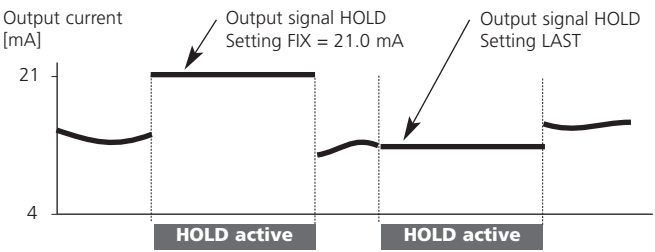
Temperature error. Output current during HOLD.

Menu group	Code	Display	Select menu item
Output 2	o2.		Select °C/°F
			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 arrow 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 ►arrow 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, edit number with ▲ key, proceed with **enter** key.	**21.0 mA** (00.0 ... 21.0 mA

Output signal during HOLD:



Configuration

Temperature compensation

Select temperature compensation

Menu group	Code	Display	Select menu item
Temperature compensation	tc.		**Select temperature compensation**

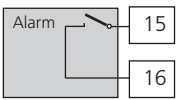
End:
Press **conf**, then **enter**

Code	Display	Action	Choices
tc.		Temperature compensation selection (not for SAL, CONC) **OFF:** Temperature compensation switched off Select with ► key, proceed with **enter** **LIN:** Linear temperature compensation with entry of temperature coefficient and reference temperature **NLF:** Temperature compensation for natural waters to EN 27888	**OFF** (OFF LIN nLF)
			
			
		Only with linear temperature compensation (LIN) selected: Enter temperature coefficient. Select position with ► key, edit number with ▲ key, proceed with **enter** key.	**02.00%/K** (xx.xx%/K)

Configuration
Alarm settings

Menu group	Code	Display	Select menu item
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 47, 53, 92).

The operating behavior of the alarm contact is shown on Pg 94.

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

Code	Display	Action	Choices
AL.		Select Sensocheck (Continuous monitoring of sensor properties) Select with ►, proceed with **enter**.	**OFF** (ON / OFF)
		Alarm delay Select with ►, edit number with ▲, proceed with **enter**.	**0010 s** (xxxx s)
		LED in HOLD mode Select with ►, proceed with **enter**. LED state: Configuration | Alarm | HOLD ON | on | flashes OFF | flashes | off	**OFF** (ON / OFF)

Configuration

Limit function

Relay 1. Use of relays.

Menu group	Code	Display	Select menu item	
Relay / Controller	rL.		**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 ►. Proceed with **enter**.	**LiMIT** (LiMit CtROL)
		Note: Selecting **CtROL** leads to Controller menu group **Ct.**	
L1.		Limit 1 function , see Pg 61. Select with ►. Proceed with **enter**.	**Lo** (Lo/Hi)
		Limit 1 contact response N/O: normally open contact N/C: normally closed contact Select with ►. Proceed with **enter**.	**N/O** (NO N/C)
		Limit 1 switching point Select with ►, edit number with ▲, proceed with **enter**.	**000.0 mS** (xxxx)
		Limit 1 hysteresis Select with ►, edit number with ▲, proceed with **enter**.	**001.0 mS** (xxxx)
		Limit 1 delay The contact is activated with delay (deactivated without delay). Select with ►, edit number with ▲, proceed with **enter**.	**0010 s** (0 ... 9999 s)

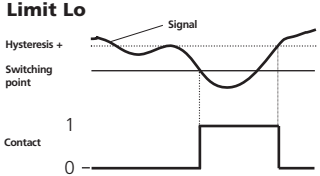
Configuration
Limit function
Relay 2

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

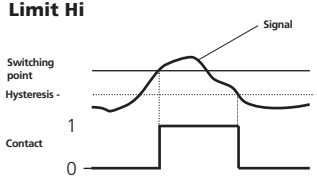
End:
Press **conf**, then **enter**

Code	Display	Action	Choices
L2.		Select Limit 2, see Fig. below. Select with ►. Proceed with **enter**	**Hi** (Lo/Hi)
		Limit 2 contact response N/O: normally open contact N/C: normally closed contact Select with ►. Proceed with **enter**	**N/O** (N/O N/C)
		Limit 2 switching point Select with ►, edit number with ▲, proceed with **enter**.	**100.0 mS** (xx.xx mS)
		Limit 2 hysteresis Select with ►, edit number with ▲, proceed with **enter**.	**001.0 mS** (xx.xx mS)
		Limit 2 delay The contact is activated with delay (deactivated without delay) Select with ►, edit number with ▲, proceed with **enter**.	**0010 s** (0 ... 9999 s)

Limit Lo



Limit Hi



Configuration

Controller

(for description see Pg 88 and the following)
Setpoint. Neutral zone.

Menu group	Code	Display	Select menu item	
Relay / Controller	rL.		**L1.**	Relay 1 menu group
			L2.	Relay 2 menu group
			Ct.	Controller setpoint
				Enter neutral zone
				(P) Controller gain
				(I) Reset time T_R
				(D) Rate time T_D
				Pulse length/Pulse frequency
				PLC: Pulse length
				PFC: Pulse frequency
				HOLD behavior

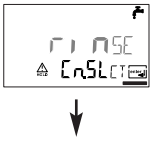
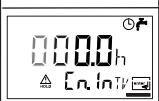
End:
Press **conf**, then **enter**

Code	Display	Action	Choices
Ct.		Setpoint Select with ►, edit number with ▲, proceed with **enter**.	**050.0 mS** (xxx.x mS)
		Neutral zone (dead band) Select with ►, edit number with ▲, proceed with **enter**.	**001.0 mS** (xxx.x mS)
		Controller: P action Select with ►, edit number with ▲, proceed with **enter**.	**0100 %** (xxxx %)
		Controller: I action (reset time) Select with ►, edit number with ▲, proceed with **enter**.	**0000 s** (xxxx s)
		Controller: D action (rate time) Select with ►, edit number with ▲, proceed with **enter**.	**0000 s** (xxxx s)
		Pulse length /Pulse frequency Select with ►. Proceed with **enter**	**PLC** (PLC/PFC)
		PLC: Pulse length Select with ►, edit number with ▲, proceed with **enter**.	**0010 s** (xxxx s)
		PFC: Pulse frequency Select with ►, edit number with ▲, proceed with **enter**.	**0060 /min** (xxxx /min)
		Behavior during HOLD Select with ►. Proceed with **enter**.	**Y Last** (Y Off/Y Last)

Configuration

Controlling a rinsing probe or signaling parameter set 2

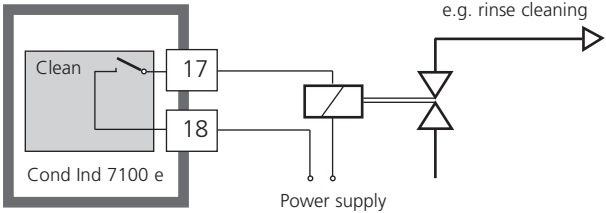
Menu group	Code	Display	Select menu item
Contact: CLEAN / PSEt2	**Cln**		Select CLEAN/ PSEt2 Rinsing interval Rinse duration Contact response

Code	Display	Action (Rinsing probe)	Choices
Cn.		Control of *: • Rinsing probe (**rinse**) • Signaling parameter set 1/2 Select with ►. Proceed with **enter**	**rinse** (rinse / PSEt2) For PSEt2, see next page
		Rinsing interval * Select with ►, edit number with ▲, proceed with **enter**.	**000.0 h** (xxx.x h)
rinse		Rinse duration * Select with ►, edit number with ▲, proceed with **enter**.	**0060 s** (xxxx s)
		Contact response * N/O: normally open contact N/C: normally closed contact Select with ►. Proceed with **enter**	**N/O** (N/O N/C)

*) These parameters are only edited in parameter set 1. They are valid for both parameter sets.

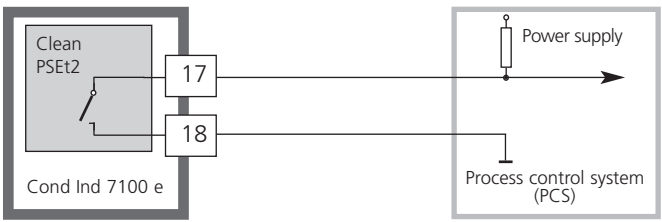
Controlling a rinsing probe

The "Clean" contact can be used to connect a simple rinsing probe. Rinse duration and rinsing interval are defined during configuration. Contact response can be set as N/O, N/C.



Signaling parameter set 2

Depending on the selected parameter set, the relay is active or inactive. The signal can be used for superordinated process control systems.
Parameter set 2 is indicated by "88" in the upper left corner of the display.

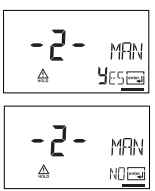


	Parameter set 1 selected
	Parameter set 2 selected

Power supply:
AC< 250 V / < 3 A / < 750 VA
DC< 30 V / < 3 A / < 90 W

Selecting parameter set (1/2)

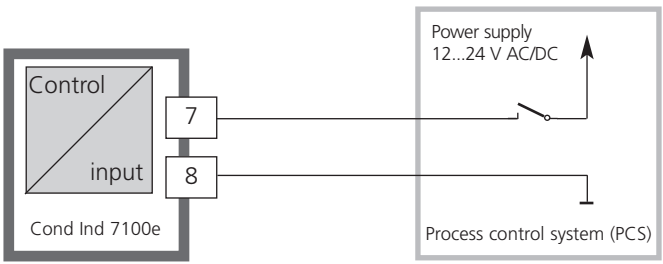
Manually or via a signal at the Control input

Display	Action	Choices
 After correct input a welcome text (CONF) is displayed for approx. 3 s	Select parameter set: Press **conf**, enter code 7654 Select with ►, edit number with ▲, proceed with **enter**. Wrong settings change the measurement properties! If an invalid code is entered, the Transmitter returns to measuring mode.	
	Select: • Parameter set 1 (MAN) • Parameter set 2 (MAN) • Automatic switchover via Control input (**Ctr-EXT**) Select with ►, proceed with **enter**	**-1-** (-1- MAN -2-MAN Ctr-EXT) Ctr-EXT: see next page →
	With **-1-** or **-2-** selected: Since the complete device configuration is changed in one step, there is a security prompt (No/Yes). **Note:** When pressing **enter** directly, the selection is not stored. Activation of parameter set 2 is indicated by "88" in the upper left corner of the display.	

Display	Action	Choices
	With Control input **Ctr-EXT** selected: You can switch between the parameter sets by applying an external signal to the Control input.	

External switchover of parameter sets

The parameter set can be selected from outside by sending a signal to the Control input (e.g. from the process control system). To do so, the Control input is set to **Ctr-EXT** during configuration.



0 ... 2 V AC/DC	Parameter set 1 selected
10 ... 30 V AC/DC	Parameter set 2 selected

Note:
Parameter set 2 is indicated by "88" in the upper left corner of the display.

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.
The sensor data and "Clean/PSEt2" output are only edited in parameter set 1, but are valid for both parameter sets.

Note:
Fill in your configuration data on the following pages.

Code. Parameter	Default setting
o1. Sensor selection *	InPro7250
o1. Process variable	000.0 mS
o1. Conc solution	-01-
o1. 0/4-20 mA	4-20 mA
o1. Characteristic	LIN
o1. Current start (LIN)	000.0 mS
o1. Current end (LIN)	100.0 mS
o1. Current start (LOG)	0.1 mS
o1. Current end (LOG)	100 mS
o1. Filter time	0 s
o1. 22mA signal	OFF
o1. Hold behavior	Last
o1. Fix current	021.0 mA
o2. Unit °C / °F	°C
o2. 0/4...20mA	4-20 mA
o2. Current start	000.0 °C
o2. Current end	100.0 °C
o2. Filter time	0 s
o2. 22mA signal	OFF
o2. Hold behavior	Last
o2. Fix current	021.0 mA
tc. Temp compensation	OFF
tc. Temp coefficient	02.00%/K
AL. Sensocheck	OFF
AL. Alarm delay	0010 s
AL. LED Hold	OFF

Code. Parameter	Default setting
rL. Relay function	Limit
L1. Contact function	Lo
L1. Contact response	N/O
L1. Switching point	000.0 mS
L1. Hysteresis	001.0 mS
L1. Delay	0010 s
L2. Contact function	Hi
L2. Contact response	N/O
L2. Switching point	100.0 mS
L2. Hysteresis	001.0 mS
L2. Delay	0010 s
Ct. Setpoint	050.0 mS
Ct. Neutral zone	001.0 mS
Ct. P action	0100 %
Ct. I action	0000 s
Ct. D action	0000 s
Ct. PLC/PFC controller	PLC
Ct. Pulse length	0010 s
Ct. Pulse frequency	0060 /min
Ct. Hold behavior	Last
Cn. Rinse/PSEt2 *	rinse
Cn. Rinsing interval *	000.0 h
Cn. Rinse duration *	0060 s
Cn. Contact response*	N/O

*) These parameters are only edited in parameter set 1.
They are valid for both parameter sets.

Parameter set - user settings

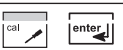
Code. Parameter	Setting P1 (conf 1200)	P2 (conf 1288)
o1. Sensor selection *	_____	*
o1. Process variable	_____	_____
o1. Solution (Conc)	_____	_____
o1. 0/4-20 mA	_____	_____
o1. Characteristic (LIN/LOG)	_____	_____
o1. Current start	_____	_____
o1. Current end	_____	_____
o1. Filter time	_____	_____
o1. 22 mA signal	_____	_____
o1. Hold behavior	_____	_____
o1. Fix current	_____	_____
o2. Unit °C / °F	_____	_____
o2. 0/4...20mA	_____	_____
o2. Current start	_____	_____
o2. Current end	_____	_____
o2. Filter time	_____	_____
o2. 22mA signal	_____	_____
o2. Hold behavior	_____	_____
o2. Fix current	_____	_____
tc. Temp compensation	_____	_____
tc. Temp coefficient	_____	_____
AL. Sensocheck	_____	_____
AL. Alarm delay	_____	_____
AL. LED Hold	_____	_____

Code. Parameter	Setting P1 (conf 1200)	P2 (conf 1288)
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	_____	_____
Cn. Rinse/ PSEt2 *	_____	*
Cn. Rinsing interval *	_____	*
Cn. Rinse duration *	_____	*
Cn. Contact response *	_____	*

*) These parameters are only edited in parameter set 1. They are valid for both parameter sets.

Calibration

Calibration adjusts the Transmitter to the sensor.

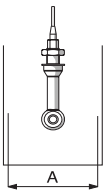
Activate		Activate with **cal**
		Enter mode code: • Entry of cell factor 1100 • With calibration solution 0110 • Product calibration 1105 • Zero point 1001 • Temp probe adjustment 1015 Select with ►, edit number with ▲, proceed with **enter**. (End with **cal** + **enter**.)
Hold During calibration the Transmitter remains in the Hold mode for reasons of safety.	  HOLD icon	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, "Calibration" mode indicator 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).

Information on calibration

Calibration can be performed by:

- Entry of cell factor
- Determining the cell factor with a known calibration solution taking account of the temperature
- Product calibration
- Zero calibration in air or with calibration solution
- Temperature probe adjustment

Note:



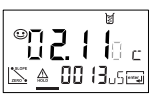
If measurements are taken in containers with A < 110 mm, be sure to choose the same distance and the same container material (metal/plastic) for calibration.

Caution

- All calibration procedures must be performed by trained personnel. Incorrectly set parameters may go unnoticed, but change the measuring properties.
- When another sensor is used, its sensor data (cell factor, transfer ratio, measuring frequency, temperature probe) must be entered in the configuration menu before calibration.
- Each time a new sensor is connected, the Transmitter must be calibrated.

Calibration by input of cell factor

Input of cell factor with simultaneous display of conductivity and temperature (without temperature compensation)

Display	Action	Remark
	Press **cal** key. Enter code 1100 Select with ►, edit number with ▲, proceed with **enter**.	If an invalid code is entered, the Transmitter returns to measuring mode.
	Ready for calibration Dismount and clean sensor	Display (3 s) Transmitter in Hold mode, measured value frozen. Sensoface inactive.
 	Enter cell factor: Select with ►, edit number with ▲, proceed with **enter**. Conductivity and temperature are alternately displayed during the input (lower display). Confirm entry with **enter**.	
	The entered cell factor and zero point are displayed. Confirm with **enter**.	

Display	Action	Remark
	Conductivity and temperature are displayed. The measured value is shown in the main display alternately with "Hold". "enter" flashes. Press **enter** to end calibration.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Calibration with calibration solution

Be sure to use known calibration solutions and the respective temperature-corrected conductivity values (see Calibration solutions Pg 112). During the calibration procedure the temperature should be kept constant.

Display	Action	Remark
	Press **cal** key. Enter code 0110. Select with ►, edit number with ▲, proceed with **enter**.	If an invalid code is entered, the Transmitter returns to measuring mode.
	Ready for calibration Dismount and clean sensor	Display (3 s) Transmitter in Hold mode, measured value frozen. Sensoface inactive.
	Immerse sensor in calibration solution. Enter the temperature-corrected conductivity value of the calibration solution: Select with ►, edit number with ▲, proceed with **enter**. Cell factor and temperature are alternately displayed in the lower display. Confirm entry with **enter**.	When there has not been an entry for 6 sec, the lower display alternately shows the conductivity and temperature value.

Display	Action	Remark
	The determined cell factor and zero point are displayed. Confirm cell factor with **enter**.	
	Conductivity and temperature are displayed. The measured value is shown in the main display alternately with "Hold". "enter" flashes. Press **enter** to end calibration.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Product calibration

Calibration by sampling

The measurement process is only interrupted briefly. During product calibration the sensor remains in the process. Calibration is without TC correction!

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 sample is measured in the lab or directly on the site using a portable meter. The measured sample value is then entered in the Transmitter. The new cell factor is calculated from these two values.
If the sample is invalid, you can take over the value stored during sampling. In that case the old calibration values are stored. Afterwards, you can start a new product calibration.

Display	Action	Remark
	Product calibration step 1: Press **cal** key. Enter code 1105. (Select position with ► key, edit number with ▲ key, proceed with **enter** key.)	If an invalid code is entered, the Transmitter returns to measuring mode.
		Display (approx. 3 sec)
	Take sample and store value. Proceed with **enter**	Now the sample can be measured in the lab.

Display	Action	Remark
	Measuring mode: From the flashing CAL mode indicator you see that sample calibration has not been terminated.	While the sample value is determined, the Transmitter is in measuring mode.
	Product calibration step 2: When the sample value has been determined, call up the product calibration once more (**cal**, code 1105).	Display (approx. 3 sec)
	Enter sample value. The new cell factor is calculated. Confirm with **enter**.	
	The new cell factor and zero point are displayed. Confirm with **enter**.	New calibration: Press **cal**.
	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.

Zero calibration in air

Display	Action	Remark
	Press **cal** key, enter code 1001. Select position with ► key, edit number with ▲ key, proceed with **enter** key.	Transmitter is in the Hold mode. If an invalid code is entered, Transmitter returns to measuring mode.
	Ready for calibration Dismount and clean sensor. (Sensor must be dry!)	Display (3 s)
	Modify the zero point until zero is displayed as conductivity value in the lower display. Select with ►. Edit number with ▲. If required, change the sign of the zero point. Press **enter** to confirm the zero point.	When there has not been an entry for 6 sec, the lower display alternately shows the conductivity and temperature value.
		

Display	Action	Remark
 	The cell factor and zero point are displayed. Press **enter** to confirm the calibration data. Conductivity and temperature are displayed. The measured value is shown in the main display alternately with "Hold". "enter" flashes. Place sensor in process.	
	End calibration with **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Zero calibration with calibration solution

Calibration solution with low conductivity

Display	Action	Remark
	Press **cal** key, enter code 1001. Select position with ► key, edit number with ▲ key, proceed with **enter** key.	Transmitter is in the Hold mode. If an invalid code is entered, Transmitter returns to measuring mode.
	Ready for calibration Dismount and clean sensor	Display (3 s)
	Immerse sensor in calibration solution. Modify the value until the lower display shows the conductivity value of the calibration solution. Press **enter** to confirm calibration.	When there has not been an entry for 6 sec, the lower display alternately shows the conductivity and temperature value.
	The cell factor and zero point are displayed. Press **enter** to confirm the calibration data.	

Display	Action	Remark
	Conductivity and temperature are displayed. Remove the sensor from the calibration solution and clean it. Place sensor in process.	
	The measured value is shown in the main display alternately with "Hold". "enter" flashes. Place sensor in process. End calibration 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 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	Display (approx. 3 sec) Transmitter is in Hold mode.
	Measure the temperature of the process medium using an external thermometer. Enter measured temperature value: Select with ►, edit number with ▲, proceed with **enter**. End adjustment with **enter**. HOLD will be deactivated after 20 sec.	Default: Current value of secondary display.

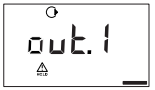
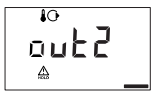
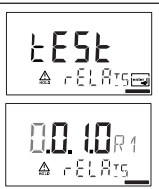
Measurement

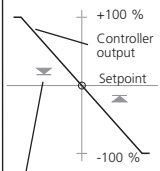
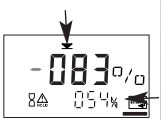
Display	Remark
	In the measuring mode the main display shows the configured process variable (conductivity [mS/cm, S/m] or resistivity [MΩ·cm] or concentration [% by wt] or salinity [SAL]) and the lower display the temperature. During calibration you can return to measuring mode by pressing the **cal** key, during configuration by pressing **conf**.

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** while in measuring mode and confirm code 0000. The current cell constant is shown in the main display. After 20 sec the Transmitter returns to measuring mode (immediate return at pressing **enter**).
 	**Sensor monitor for validation** of sensor and complete measured-value processing. Loop a defined sensing resistor (e.g. R = 100 Ω) through the sensor as shown in the figure. Press the **conf** key and enter code 2222. The sensor monitor displays the directly measured resistance and the temperature. If there is a significant difference between resistor value and display, the sensor and its transmission behavior should be checked. Press **enter** to return to measurement. **Note:**The Transmitter does not automatically go to Hold mode.
	**Display of last error message (Error Info)** Press **conf** while in measuring mode and confirm 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 for output 1 (current source 1)** • Press **conf**, 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** key. The actually measured current is shown in the secondary display. The Transmitter is in Hold mode. Press **conf**, then **enter** to return to measurement (Hold remains active for another 20 sec).
	**Specify current at output 2 (current source 2)** • Press **conf**, enter code 5556 The current indicated in the main display for output 2 can be edited. Select with ►, edit number with ▲, proceed with **enter.** The actually measured current is shown in the secondary display. The Transmitter is in Hold mode. Press **conf**, then **enter** to return to measurement.
	**Relay test (manual test of contacts)** • Press **conf**, 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 test (manual specification of controller output)** • Press **conf**, 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).
	
Controller characteristic 	Specify value: Select with ►, edit number with ▲, proceed with **enter**.
The arrows indicate which relay (valve) is active:	The Transmitter is in Hold mode. Press **enter** to return to measurement (Hold remains active for another 20 sec).
Relay 2 active (Meas. value < setpoint)	Controller output -100 to 0 %: Relay 2 active
Relay 1 active (Meas. value > setpoint)	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).

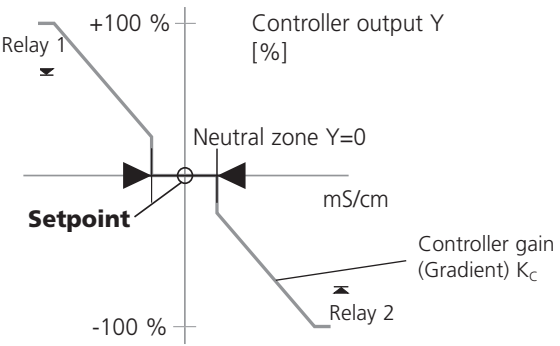
PI controller

Application in non-integrating systems
(e.g. drains).

PID controller

The additional derivative action compensates for measurement peaks.

Controller characteristic



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

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

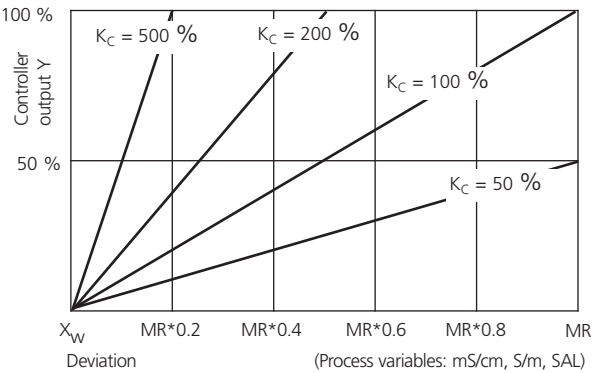
with:

Y_P	Proportional action
T_R	Reset time [s]
T_D	Rate time [s]
K_C	Controller gain [%]

Neutral zone (Y=0)

Tolerated deviation from setpoint.
The setting "1mS/cm" for example, permits a deviation of
± 1 mS/cm from the desired value without activating the controller.

Proportional action (Gradient K_C [%])



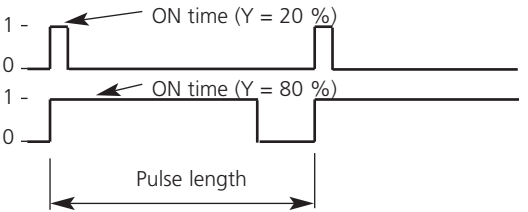
Controller functions

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

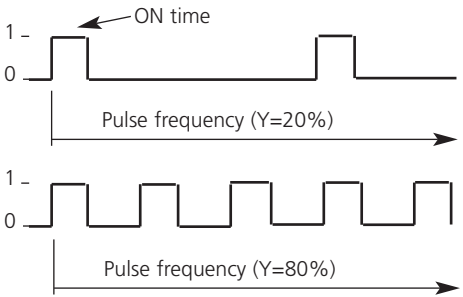


Pulse frequency controller (PFC)

The pulse frequency controller is used to operate a frequency-controlled actuator (metering pump). 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



Error messages (Error Codes)

Errors	Display	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
ERR 01	Measured value flashes	**Sensor** • Wrong cell factor • Measurement range exceeded • SAL > 45 ‰ • Sensor connection or cable defective	x	x	x	
ERR 02	Measured value flashes	**Unsuitable sensor** • Conductance range > 3000 mS	x	x	x	
ERR 98	"FAIL" flashes	**System error** Configuration or calibration data defective; completely reconfigure and recalibrate the Transmitter. Memory error in device program	x	x	x	x
ERR 99	"Conf" 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
ERR 03	🌡	**Temperature probe** Open or short circuit Temperature range exceeded	x	x	x	x

Errors	Symbol (flashes)	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
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 33		**Sensocheck**: Primary coil	x	x	x	
ERR 34		Secondary coil	Sensoface active s. Pg. 96			
		Temperature outside conversion tables (TC, conc, SAL)	Sensoface active s. Pg. 96			

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
Zero point (cal) 1001								
Calibration (cal) 1100								
Calibration (cal) 0110								
Temp adjustment (cal) 1015								
Product cal 1 (cal) 1105								
Product cal 2 (cal) 1105								
Conf par set 1 (conf) 1200								20 min
Conf par set 2 (conf) 1288								20 min
Parameter set 1/2 (conf) 7654								20 min

Operating state	Out 1	Out 2	Rel. 1/2 Controller	Rel. 1/2 Limit value	Cleaning contact	Alarm contact	LED	Time out
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
Cleaning function								
HOLD input								

Explanation:

active

as configured (Last/Fix or Last/Off)

Sensoface

The little smiley in the display (Sensoface) alerts to sensor problems (defective sensor, defective cable).
The conditions for a friendly, neutral, or sad Sensoface are summarized in the following chart. Additional icons refer to the error cause.

Sensocheck
Continuously monitors the primary coil and its lines for short circuits and the secondary coil and its lines for 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.

Note
The worsening of a Sensoface criterion leads to the devaluation of the Sensoface indicator (Smiley becomes "sad").
To reset the Sensoface indicator, the defect must be remedied and the Transmitter be calibrated.

Display	Problem	Status
	Sensor defect	 Short circuit in primary coil Open circuit in secondary coil (see also Error messages Err 33 and Err 34, Page 93).
	Temperature error	 Temperature outside range for TC, conc, SAL

Product line and accessories

Devices	Order No.
Transmitter Cond Ind 7100 e	52 121 127
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 electrodeless sensors for the following fields of applications:
- Chemical process industry
- Pharmaceutical industry
- Food and beverage industry
- Pulp and paper industry
- Water/waste-water treatment

For more information concerning our sensors and housings program, please refer to our website:

http://www.mtpro.com/transmitters

Note:
For special applications (chemical resistance, type of mounting), you can also connect sensors from other manufacturers.

Specifications

Conductivity input	Input for electrodeless conductivity sensors	
Display ranges	Conductivity	0.000 ... 1999 mS/cm
	Concentration	0.00 ... 100.0 % by wt
	Salinity	0.0 ... 45 ‰ (0 ... 35 °C)
Measurement ranges	Conductivity	0.000 ... 9.999 mS/cm 00.00 ... 99.99 mS/cm 000.0 ... 999.9 mS/cm 0000 ... 1999 mS/cm 0.000 ... 9.999 S/m 00.00 ... 99.99 S/m
	Concentration	00.00 ... 99.99 % by wt
	Salinity	0.0 ... 45 ‰ (0 ... 35 °C)
Response time (T_{90})	Approx. 2/sec	
Measurement error [1,2,3]	< 1% meas.val. + 0.005 mS	

Temperature compensation *)

(Reference temp 25 °C)	**(OFF)**	Without
	(Lin)	Linear characteristic 00.00 ... 19.99 % /K
	(NLF)	Natural waters to EN 27888 (0 ... 35°C)

Concentration determination
Operating modes: *)

NaCl**	**-01-**
HCl**	**-02-**
	-07-
NaOH**	**-03-**
	-10-
H_2SO_4**	**-04-**
	-06-
	-09-
HNO_3**	**-05-**
	-08-

**Ranges: see Pg 114 and the following
See graphs in the Appendix Pg 115 and following

Sensor standardization

Operating modes	• Entry of cell factor with simultaneous display of conductivity and temperature • Entry of conductivity of calibration solution with simultaneous display of cell factor and temperature • Product calibration • Zero point adjustment • Temperature probe adjustment
Adm. cell factor	00.100 ... 19.999
Adm. transfer ratio	01.00 ... 199.99
Adm. zero point deviation	±0.5 mS/cm

Sensor monitoring Sensocheck	• Monitoring of primary and wiring for short circuit • Monitoring of secondary and wiring for open circuit
Sensoface	Provides information on the sensor condition (evaluation of zero point, Sensocheck)
Sensor monitor	Sensor monitor for validation of sensor and complete measured-value processing (Display: resistance / temperature)

Temperature input [*)]	Pt100 / Pt1000 / NTC 100 kOhms 2-wire connection, adjustable	
Ranges	Pt100 / Pt1000:	-20 .. +200 °C (-4 ... +392 °F)
	NTC100 kOhms	-20 ... +130 °C (-4 ... +266 °F)
Resolution	0.1 °C / 1 °F	
Measurement error [1,2,3)]	0.5 K (<1 K for Pt100; <1 K for NTC >100 °C)	

Specifications

HOLD input	Galv. separated (OPTO coupler)
Function	Switches Transmitter to HOLD mode
Switching voltage	0 ... 2 V (AC/DC) Hold inactive 10 ... 30 V (AC/DC) Hold active
CONTROL input	Galv. separated (OPTO coupler)
Function	Switch-over to second parameter set
Switching voltage	0 ... 2 V (AC/DC) Parameter set 1 10 ... 30 V (AC/DC) Parameter set 2
Output 1	0/4 to 20 mA, max. 10 V, floating (galv. connected to output 2)
Measured variable *)	Conductivity, concentration or salinity
Characteristic	Linear or logarithmic
Overrange *)	22 mA in the case of error messages
Output filter *) (attenuation)	Low-pass, filter time constant 0 ... 120 s
Measurement error 1)	< 0.3 % current value + 0.05 mA
Start/end of scale	As desired within range
Min. span	LIN: 5 % of selected range LOG: 1 decade
Output 2	0/4 ... 20 mA, max. 10 V, floating (galv. connected to output 1)
Process variable	Temperature
Overrange *)	22 mA in the case of temp error messages
Output filter *)	Low-pass, filter time constant 0 ... 120 s
Meas. error 1)	< 0.3 % current value + 0.05 mA
Start/end of scale *)	-20 to +200 °C / -4 ... +392 °F
Adm. span	20 ... 320 K (36 to 608 °F)
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)
Alarm delay	0000 ... 0600 s

Limit values	Output via relay contacts R1, R2 (see PID process controller)
	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/O or N/C
Delay *)	0000 ... 9999 s
Switching points *)	As desired within range
Hysteresis *)	0 ... 50 % full scale
PID process controller	Output via relay contacts R1, R2 (see limit values)
Setpoint *)	As desired within range
Neutral zone *)	As desired within range
Proportional action *)	Controller gain K_C: 0010 ... 9999 %
Integral action *)	Reset time T_R: 0000 ... 9999 s (0000 s = no integral action)
Derivative action *)	Rate time T_D: 0000 ... 9999 s (0000 s = no derivative action)
Controller type *)	Pulse length or pulse frequency controller
Pulse period *)	0001 ... 0600 s, min. ON time 0.5 s (pulse length controller)
Max. pulse frequency *)	0001 ... 0180 min^{-1} (pulse frequency controller)

Cleaning function / Parameter set 2 *)

Clean / PSEt2	Relay contact, floating, for controlling a rinsing probe or signaling that 2nd parameter set is active
Contact ratings	AC< 250 V / < 3 A / < 750 VA DC< 30 V / < 3 A / < 90 W
Contact response	N/O when signaling parameter set 2 N/O or N/C when used as cleaning contact *)
Rinsing interval *)	000.0 ... 999.9 h (000.0 h = cleaning function switched off)
Rinse duration *)	0000 ... 1999 s

Specifications

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 Sensoface)
Mode indicators	5 status bars "meas", "cal", "alarm", "cleaning", "config" 18 further icons for configuration and messages
Alarm indication	Red LED in case of alarm or HOLD, user defined
Keypad	5 keys: [cal] [conf] [►] [▲] [enter]
Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 to 22.00mA)
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 sensor signal (resistance/temperature)
Relay test	Manual control of the four switching contacts
Parameter sets *)	Two selectable parameter sets for different process phases Switchover via CONTROL input or manually Signaling via relay contact PSEt2
Data retention	Parameters and calibration data > 10 years (EEPROM)

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

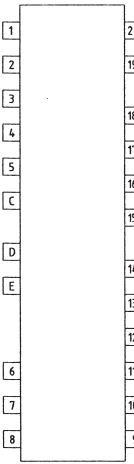
Hazardous Location

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 I_{sc} = 12 mA P_o = 15 mW	C_a = 20 µF L_a = 1 H	1
DF supply circuit (Terminals KL. 3, 4, 5)	maximum values:	V_{oc} = 10 V I_{sc} = 14 mA P_o = 35 mW	C_a = 20 µF L_a = 1 H	2 3
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 I_{sc} = 17 mA P_o = 22 mW	C_a = 20 µF L_a = 1 H	4
or Cond measuring circuit (Terminals KL. 1, 2, 3, 4, 5)	maximum values:	V_{oc} = 10 V I_{sc} = 112 mA P_o = 140 mW	C_a = 20 µF L_a = 8 mH	5 C
or Cond! measuring circuit (Terminals KL. 1, 2, 3, 4, 5)	maximum values:	V_{oc} = 7.1 V I_{sc} = 72 mA P = 128 mW	C_a = 100 µF L_a = 20 mH	D
Temp measuring circuit (Terminals KL. D, KL. E)	maximum values:	V_{oc} = 5 V I_{sc} = 10 mA P_o = 13 mW	C_a = 1000 µF L_a = 1 H	E
OK inputs HOLD, CONTROL (Terminals KL. 6, 7 and 8, 7)	maximum values:	V_{max} = 30 V I_{max} = no limitation	C_i = 0 L_i = 0	6 7 8



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 EQUIPMEMT 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

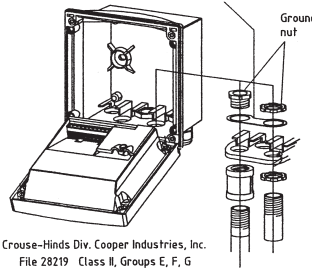
Switching circuits
ALARM and CLEAN
(Terminals KL. 15, 16 and 17, 18)
maximum values:
AC: < 250 V / < 3 A / <750 VA / resistive load
DC: < 30 V / < 3 A / < 90 W / resistive load

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: FUL (2x)	Zul. Abweichungen für Maße ohne Toleranzangabe ISO 2768 - m	Oberfläche	Maßstab: Halbzeug — Blatt 1/2
	Datum / Name		Benennung: control drawing CSA Transmitter 2100, 4100, 5100, 7100
	Bearb. 07.03.03 dam		
	Gepr.(KON) 10.3.3		
	Freigabe(FGL) 4 4		
	Schutzvermerk nach DIN 34 beachten		Zeichnungsnummer: 194.130-240
Nr. / AE / Datum / Bearbeiter FGL KON			Ungültig ab: / Ersetzt durch:

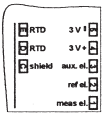
pH sensor group InPro 3xxx

- InPro3200

pH sensor group InPro 4xxx

- InPro4250/120/Pt1000

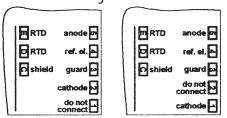
terminal assignment



O_2 sensor group InPro 6xxx

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

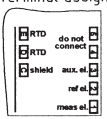
terminal assignment



CO_2 sensor group InPro 5xxx

- CO_2-sensor

terminal assignment



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

Cable type X Koax+4L / measuring system	A Core/ transparent	B Shield/ red	C grey	D blue	E white	F green	Shield 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)

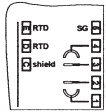
Cond sensor group InPro 70xx-VP

- 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

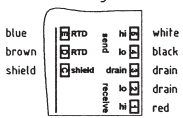


Wire color Patch cord	VP connector pin (on sensor)	Transmitter Cond 7100 e
bare	G	unused
blue	D	3
black	E	4
red	C	D
green	F	E
white	H	2
clear	B	C
white/blue	A	1

Condl sensor group InPro 72xx

- InPro7200
- InPro7201
- InPro7202

terminal assignment



Version: METTLER TOLEDO

Verteiler: FUL (2x)					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 (KON)	10.3.03		
					Freigabe(FGL)			
					Schutzvermerk nach DIN 34 beachten		Zeichnungsnummer	194.130-240
Nr.	AE	Datum	Bearbeiter	FGL KON			Ungültig ab:	Ersetzt durch:

Calibration solutions

Potassium chloride solutions (conductivity in mS/cm)

Temperature	**Concentration**		
[°C]	0.01 mol/l	0.1 mol/l	1 mol/l
0	0.776	7.15	65.41
5	0.896	8.22	74.14
10	1.020	9.33	83.19
15	1.147	10.48	92.52
16	1.173	10.72	94.41
17	1.199	10.95	96.31
18	1.225	11.19	98.22
19	1.251	11.43	100.14
20	1.278	11.67	102.07
21	1.305	11.91	104.00
22	1.332	12.15	105.94
23	1.359	12.39	107.89
24	1.386	12.64	109.84
25	1.413	12.88	111.80
26	1.441	13.13	113.77
27	1.468	13.37	115.74
28	1.496	13.62	
29	1.524	13.87	
30	1.552	14.12	
31	1.581	14.37	
32	1.609	14.62	
33	1.638	14.88	
34	1.667	15.13	
35	1.696	15.39	
36		15.64	

Data source: K. H. Hellwege (Editor), H. Landolt, R. Börnstein: Zahlenwerte und Funktionen ..., volume 2, part. volume 6

Sodium chloride solutions (conductivity in mS/cm)

Temperature	**Concentration**		
[°C]	0.01 mol/l *)	0.1 mol/l *)	saturated **)
0	0.631	5.786	134.5
1	0.651	5.965	138.6
2	0.671	6.145	142.7
3	0.692	6.327	146.9
4	0.712	6.510	151.2
5	0.733	6.695	155.5
6	0.754	6.881	159.9
7	0.775	7.068	164.3
8	0.796	7.257	168.8
9	0.818	7.447	173.4
10	0.839	7.638	177.9
11	0.861	7.831	182.6
12	0.883	8.025	187.2
13	0.905	8.221	191.9
14	0.927	8.418	196.7
15	0.950	8.617	201.5
16	0.972	8.816	206.3
17	0.995	9.018	211.2
18	1.018	9.221	216.1
19	1.041	9.425	221.0
20	1.064	9.631	226.0
21	1.087	9.838	231.0
22	1.111	10.047	236.1
23	1.135	10.258	241.1
24	1.159	10.469	246.2
25	1.183	10.683	251.3
26	1.207	10.898	256.5
27	1.232	11.114	261.6
28	1.256	11.332	266.9
29	1.281	11.552	272.1
30	1.306	11.773	277.4
31	1.331	11.995	282.7
32	1.357	12.220	288.0
33	1.382	12.445	293.3
34	1.408	12.673	298.7
35	1.434	12.902	304.1
36	1.460	13.132	309.5

*) Data source: Test solutions calculated according to DIN IEC 746-3

**) Data source: K. H. Hellwege (Editor), H. Landolt, R. Börnstein: Zahlenwerte und Funktionen ..., volume 2, part. volume 6

Concentration measurement

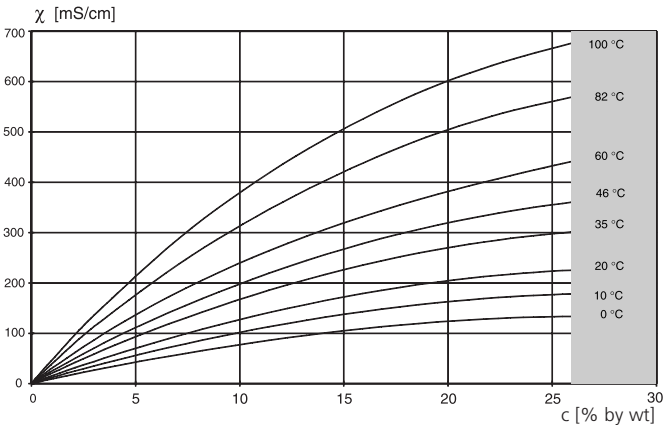
Ranges

Substance	Concentration ranges		
NaCl Configuration	0-26 % by wt (0°C) 0-28 % by wt (100°C) **-01-**		
HCl Configuration	0-18 % by wt (-20 °C) 0-18 % by wt (50 °C) **-02-**	22-39 % by wt (-20 °C) 22-39 % by wt (50°C) **-07-**	
NaOH Configuration	0-13 % by wt (0 °C) 0-24 % by wt (100 °C) **-03-**	15-50 % by wt (0 °C) 35-50 % by wt (100°C) **-10-**	
H_2SO_4 Configuration	0-26% by wt (-17°C) 0-37% by wt (110°C) **-04-**	28-88% by wt (-17°C) 39-88% by wt (115°C) **-09-**	94-99% by wt (-17°C) 89-99% by wt (115°C) **-06-**
HNO_3 Configuration	0-30 % by wt (-20°C) 0-30 % by wt (50°C) **-05-**	35-96 % by wt (-20°C) 35-96 % by wt (50°C) **-08-**	

For the solutions listed above, the Transmitter can determine the substance concentration from the measured conductivity and temperature values in % by wt. The measurement error is made up of the sum of measurements errors during conductivity and temperature measurement and the accuracy of the concentration curves stored in the Transmitter.
We recommend to calibrate the Transmitter together with the sensor. For exact temperature measurement, you should perform a temperature probe adjustment. For measuring processes with rapid temperature changes, a separate temperature probe with fast response should be used.
When measuring processes such as dilution or intensification of CIP solutions (Clean-In-Place), it is helpful to switch between the parameter sets for measuring the process medium and for measuring the CIP solution.

Concentration curves
-01- Sodium chloride solution NaCl

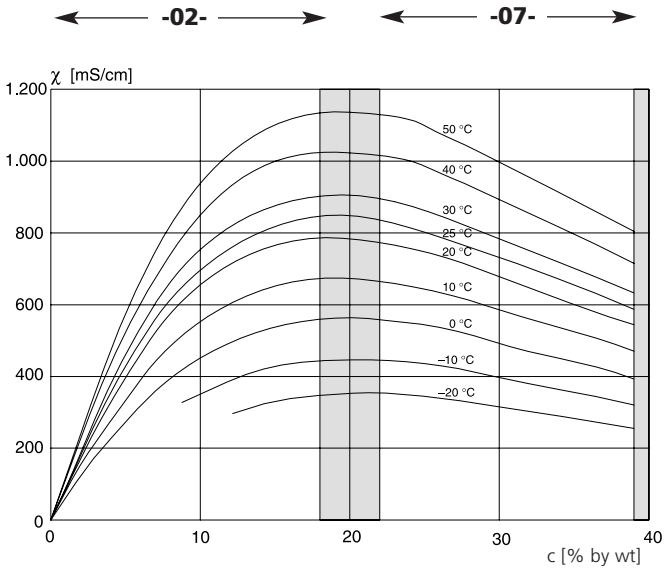
-01-



Concentration measurement not possible in this range.

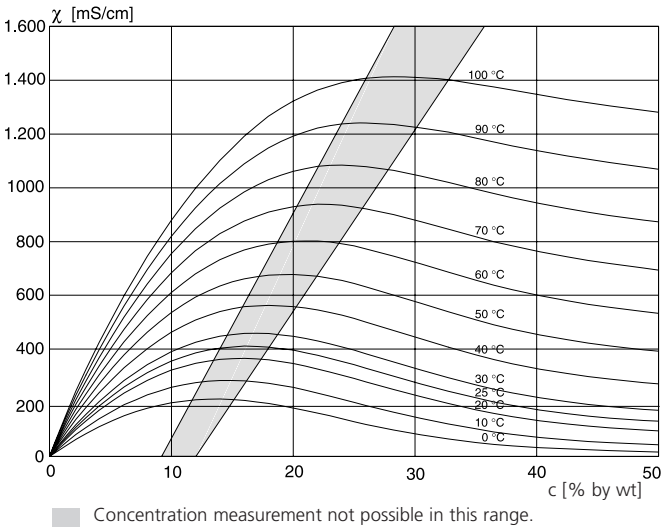
Conductivity in dependence on substance concentration and process temperature for sodium chloride (NaCl)

-02- Hydrochloric acid solution HCl -07-



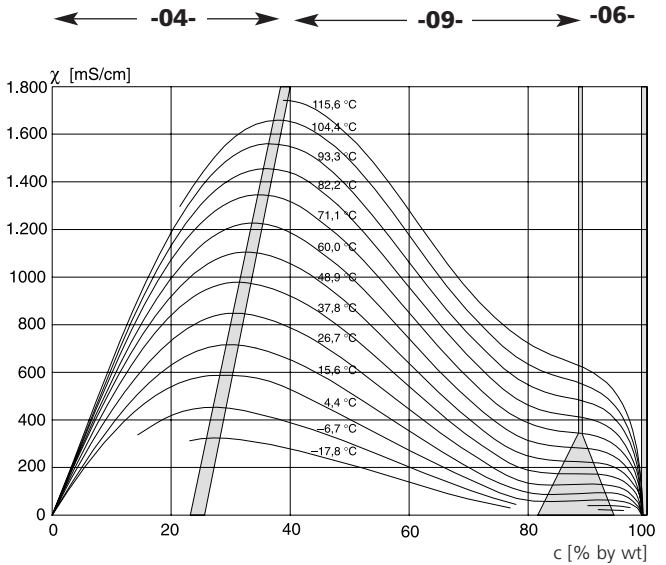
Conductivity in dependence on substance concentration and process temperature for hydrochloric acid (HCl)
Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

-03- Sodium hydroxide solution NaOH -10-



Conductivity in dependence on substance concentration and process temperature for sodium hydroxide solution (NaOH)

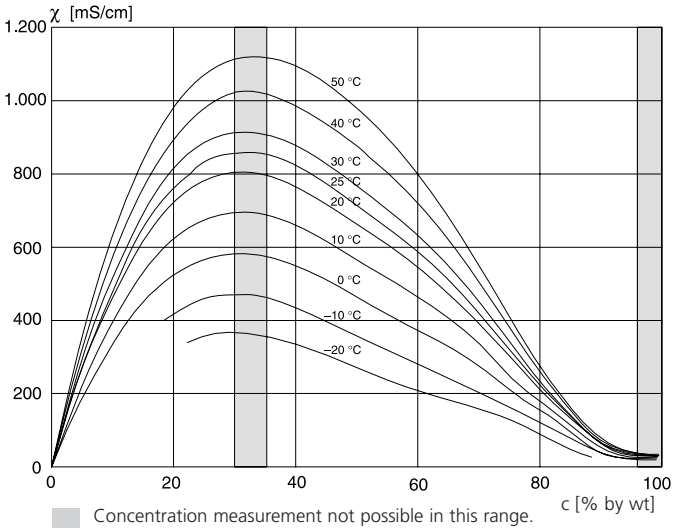
-04- Sulfuric acid H_2SO_4
-06-
-09-



Concentration measurement not possible in this range.

Conductivity in dependence on substance concentration and process temperature for sulfuric acid (H_2SO_4)
Source: Darling; Journal of Chemical and Engineering Data; Vol. 9 No. 3, July 1964

-05- Nitric acid HNO_3
-08-



Conductivity in dependence on substance concentration and process temperature for nitric acid ($HN0_3$)
Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 46 (1965)

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