

Instruction Manual

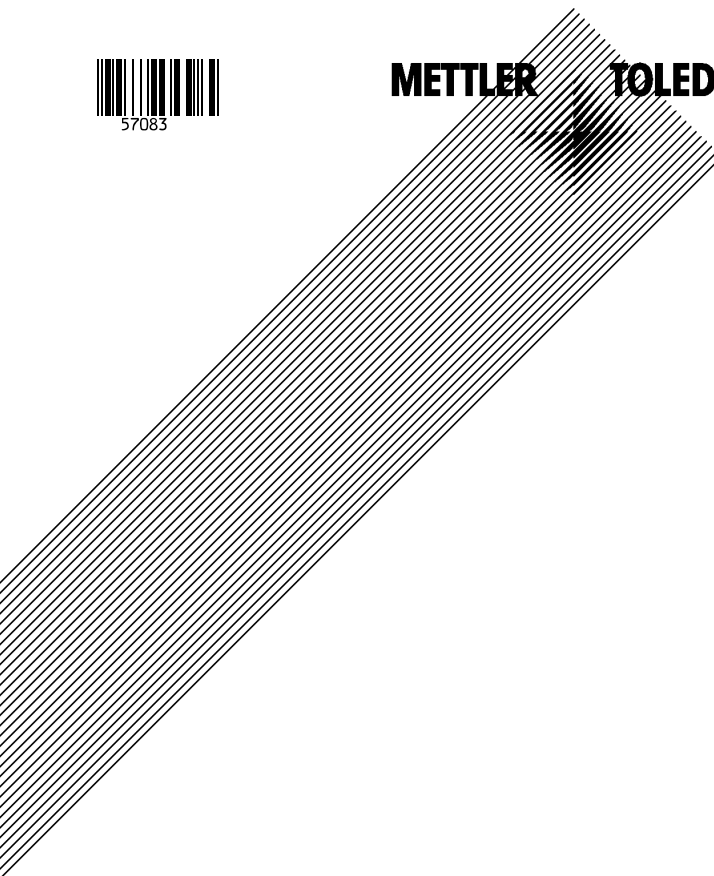
Transmitter Cond 7100

Order number: 52 120 919



57083

METTLER TOLEDO



Mettler Toledo GmbH,
Process Analytics
Postfach
CH-8902 Urdorf
Switzerland
Phone: +41 (1) 736 22 11
Fax: +41 (1) 736 26 36



Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Accessories: 1 year

Safety Precautions

Be sure to read and observe the following requirements!

Before connecting the instrument to mains, make sure that the mains voltage lies within the range
 $24 - 230 \text{ V} \approx \text{ac/dc}, -15 \% / +10 \%$.

Opening the instrument exposes live parts, it should not be opened in use. Care must be exercised when connecting signal and power supply cables. If a repair should be required, return the instrument to our factory.

If opening the instrument is inevitable, it shall first be disconnected from all voltage sources. Make sure that the mains supply has been disconnected.

Repair or adjustment of an opened instrument under voltage shall be carried out only by a skilled person who is aware of the hazards involved.

Remember that the voltage across accessible parts of the open instrument may be dangerous to life.

Whenever it is likely that the protection has been impaired, the instrument shall be made inoperative and secured against unintended operation.

The protection is likely to be impaired if, for example:

- the instrument shows visible damage
- the instrument fails to perform the intended measurements
- after prolonged storage at temperatures above $70 \text{ }^\circ\text{C}$
- after severe transport stresses

Before recommissioning the instrument, a professional routine test in accordance with EN 61010-1 must be performed. This test should be carried out at our factory.

The instrument shall not be used in a manner not specified by this manual.

Information on this Instruction Manual

ITALICS are used for texts which appear in the Transmitter Cond 7100 display.

Bold print is used to represent keys, e.g. **cal**.



Keys for which the functions are explained are frequently shown in the left-hand column.

Note



Notes provide important information that should be strictly followed when using the unit.

Warning



Warning means that the instructions given must always be followed for your own safety. Failure to follow these instructions may result in injuries.

Mode Codes

With **conf/cal** and input of a mode code you can activate one of the following modes:



conf, 0000: Error info
conf, 1200: Configuration mode
conf, 5555: Current source



cal, 0000: Cal info
cal, 1015: Temp probe adjustment
cal, 1100: Calibration mode
cal, 2222: Test mode

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1 Assembly

Package Contents and Unpacking

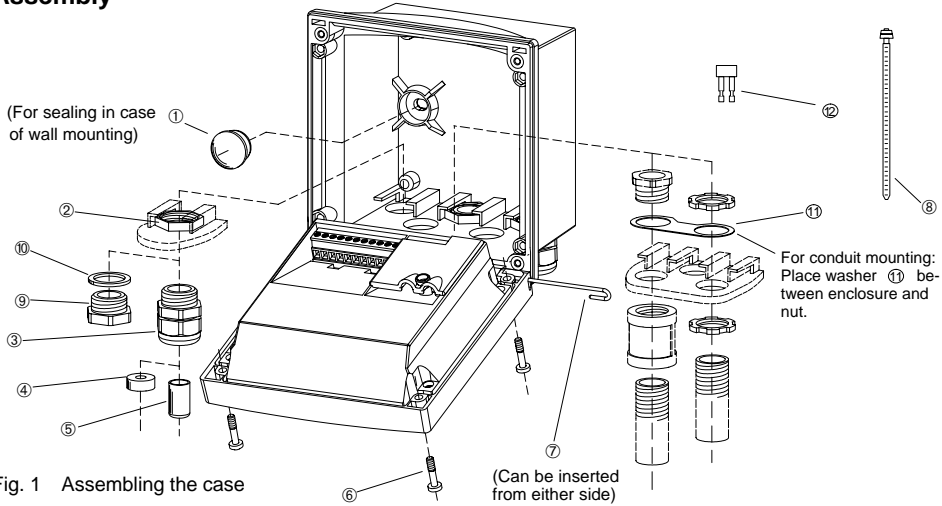
Unpack the transmitter carefully and check the shipment for transport damage and completeness.
The package contains:

- Front unit of Transmitter
- Lower case
- Short instruction sheet
- This instruction manual

- Bag containing:

- | | |
|----------------------|------------------|
| ① 2 sealing plugs | ⑦ 1 hinge pin |
| ② 5 hexagon nuts | ⑧ 3 cable ties |
| ③ 3 Pg cable glands | ⑨ 3 filler plugs |
| ④ 1 rubber reducer | ⑩ 3 gaskets |
| ⑤ 1 Pg plug | ⑪ 1 washer |
| ⑥ 4 enclosure screws | ⑫ 1 jumper |

Assembly



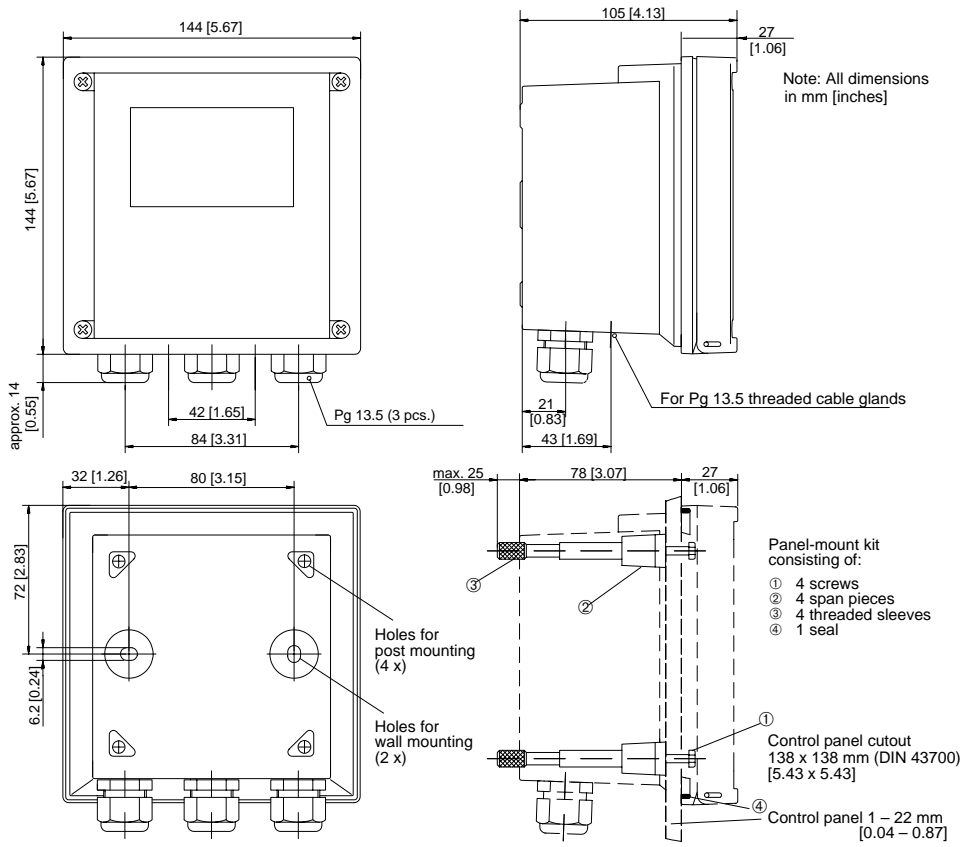


Fig. 2 Dimension drawing for Transmitter, mounting diagram and panel-mount kit

- Pipe-mount kit consisting of:
- ① 4 self-tapping screws
 - ② 1 post mounting plate
 - ③ 2 hose clamps with worm gear drive to DIN 3017

For vertical or horizontal post/pipe mounting

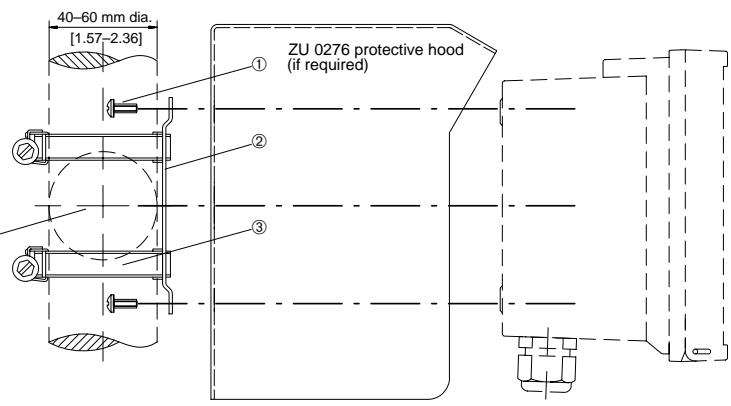
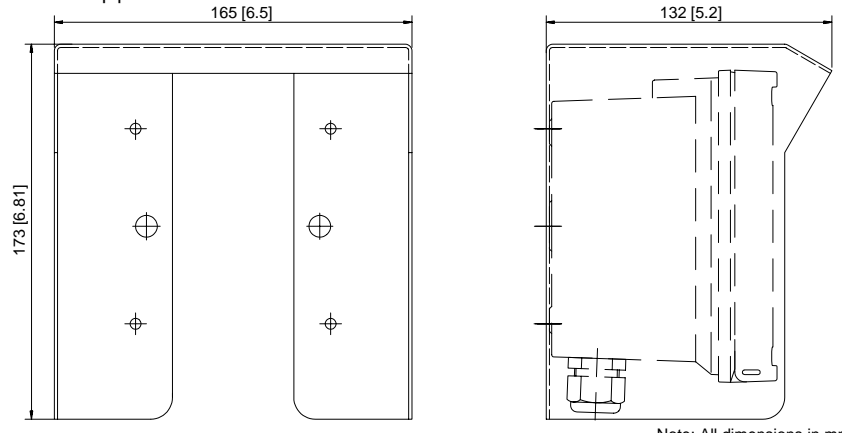
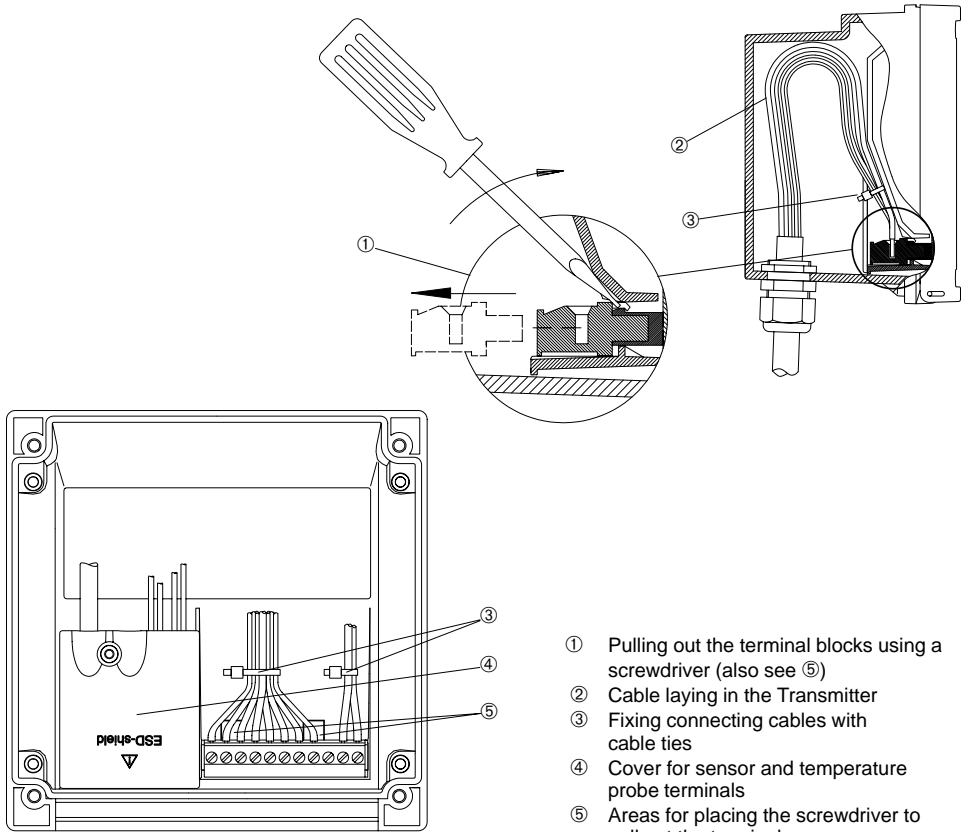


Fig. 3 ZU 0274 pipe-mount kit



Note: All dimensions in mm [inches]

Fig. 4 ZU 0276 protective hood for wall and pipe mounting



- ① Pulling out the terminal blocks using a screwdriver (also see ⑤)
- ② Cable laying in the Transmitter
- ③ Fixing connecting cables with cable ties
- ④ Cover for sensor and temperature probe terminals
- ⑤ Areas for placing the screwdriver to pull out the terminals

Fig. 5 Installation information Transmitter

2 Installation, Connection and Commissioning

Proper Use

The Transmitter Cond 7100 is used for conductivity and temperature measurement in biotechnology, food processing, pharmaceutical and chemical in-

dustry, waste-water treatment, as well as for monitoring ultrapure water. It can either be mounted on site or in a control panel.

Overview of the Transmitter

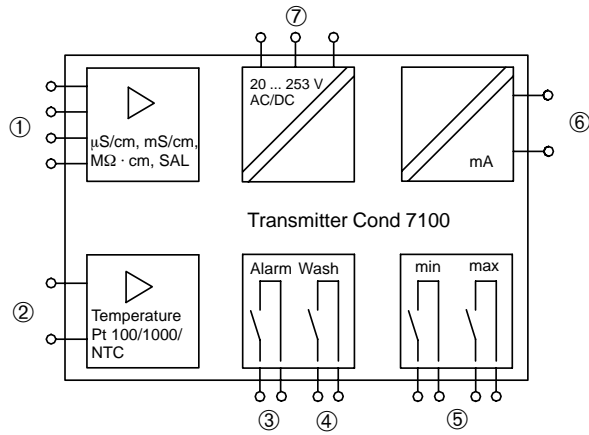


Fig. 6 System functions of the Transmitter Cond 7100

- | | |
|--|---------------------------------------|
| ① Input for 2-/4-electrode conductivity sensor | ⑤ Limit contacts |
| ② Input for temperature probe | ⑥ Current output 0(4) – 20 mA |
| ③ Alarm contact (closed circuit) | ⑦ ac/dc varying-voltage supply unit |
| ④ Wash contact | (20 – 253 V = ac/dc, ac: 45 to 65 Hz) |

Terminal Assignment

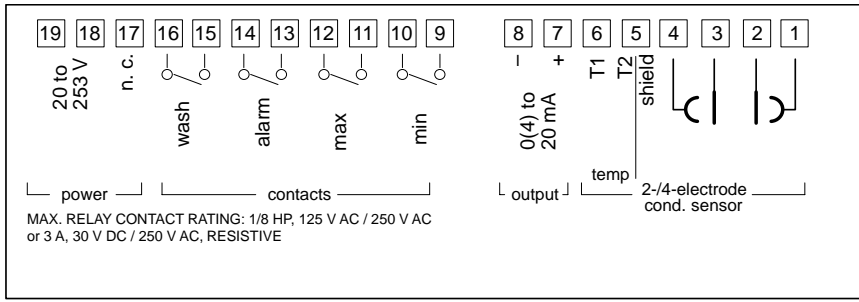





Fig. 7 Terminal assignment of the Transmitter Cond 7100


Installation and Commissioning

Prior to commissioning, a switch or circuit-breaker for disconnecting the instrument from mains shall be installed according to IEC 1010-1.

Warning  *Installation* and commissioning of the Transmitter Cond 7100 may only be carried out by trained experts in accordance with this instruction manual and per applicable local and national codes. Be sure to observe the technical specifications and input ratings.

Warning  The terminals must be fixed with cable ties as shown on page 9.

Warning  Before connecting the unit to the power supply, make sure that its voltage lies within the range
24 – 230 V \approx ac/dc, –15 %/+10 %.

Warning  When commissioning, a *complete configuration* must be carried out.

For easier installation, the terminal strips are of a plug-in design. The terminals are suitable for single wires and flexible leads up to 2.5 mm² (AWG 14) (see Pg. 9).
See Pg. 13 and following for connection examples.

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 are used.

Typical protective wirings

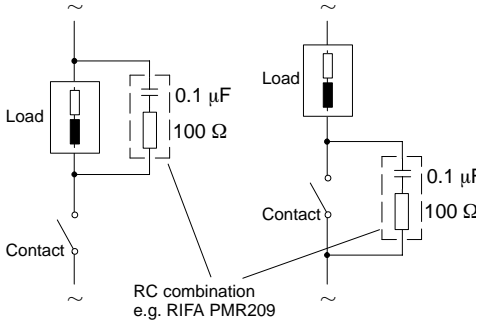


Fig. 8 AC applications with inductive load

Typical RC combination at 230 Vac:
 Capacitor 0.1 μ F / 630 V
 Resistor 100 Ω / 1 W

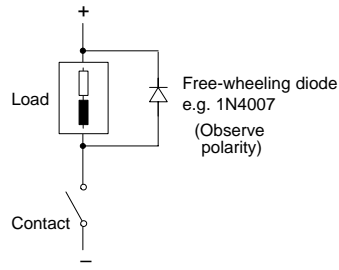


Fig. 9 DC application with inductive load

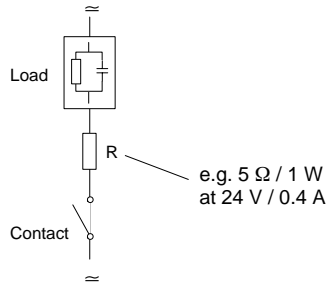


Fig. 10 AC / DC application with capacitive load

Connection of incandescent lamps



max. 120 W / 230 V
 max. 60 W / 115 V

Typical Wirings

Conductivity measurement with InPro® 7000 2-electrode cell

The InPro® 7000 2-electrode cell is used to measure in the range of lowest to medium conductivity values.

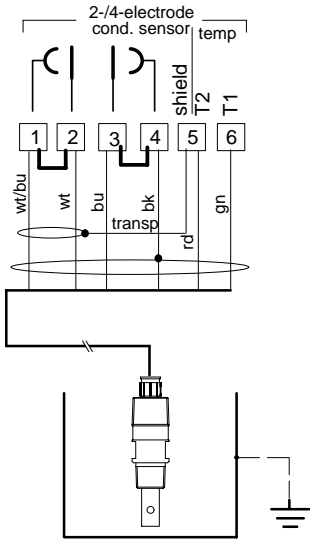


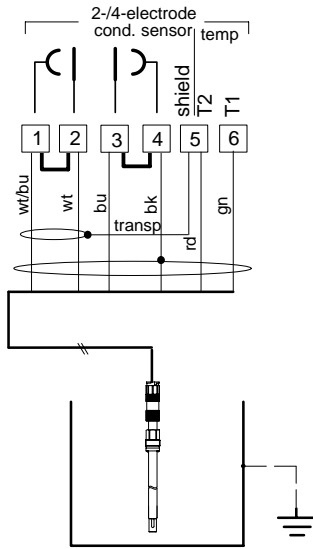
Fig. 11 Conductivity measurement with InPro® 7000 2-electrode cell

Settings for InPro® 7000 2-electrode cell

	Menu	Setting
Meas. procedure	conf 1200	2-EL
Temp probe	conf 1200	Pt 1000
Cell constant	cal 1100	0.1xxx (value on cell)

**Conductivity measurement
with InPro® 7001 or InPro® 7002/7003
2-electrode cell**

The InPro® 7001 and InPro® 7002/7003 2-electrode cells are used to measure lowest conductivity values. They are sterilizable and suitable for example for monitoring water quality according to USP 23 in the pharmaceutical industry.



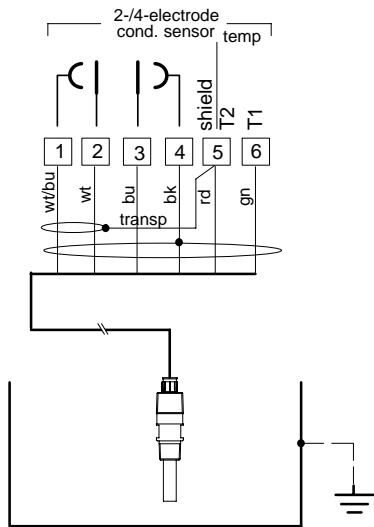
**Settings for InPro® 7001 and InPro® 7002/7003
2-electrode cells**

	Menu	Setting
Meas. procedure	conf 1200	2-EL
Temp probe	conf 1200	Pt 1000
Cell constant	cal 1100	0.1xxx (value on cell)

Fig. 12 Conductivity measurement with InPro® 7001 or InPro® 7002/7003 2-electrode cell

**Conductivity measurement
with InPro® 7100/7104 4-electrode cell**

The InPro® 7100/7104 4-electrode cell is used to measure medium-range conductivity values. It is suitable for applications in industrial water and waste waters as well as for chemical processes.



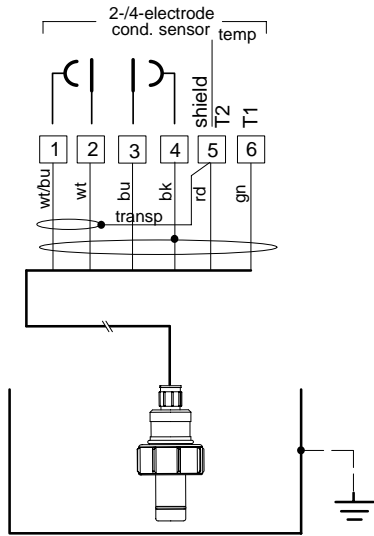
Settings for InPro® 7100/7104 4-electrode cell

	Menu	Setting
Meas. procedure	conf 1200	4-EL
Temp probe	conf 1200	Pt 1000
Cell constant	cal 1100	0.6xx (value on cell)

Fig. 13 Conductivity measurement with InPro® 7100/7104 4-electrode cell

**Conductivity measurement
with InPro® 7100-25/7104-25 4-electrode cell**

The InPro® 7100-25/7104-25 4-electrode cell is used to measure in the range of medium to high conductivity values. It is suitable for applications in chemical processes and in the pharmaceutical industry.



**Settings for InPro® 7100-25/7104-25
4-electrode cell**

	Menu	Setting
Meas. procedure	conf 1200	4-EL
Temp probe	conf 1200	Pt 1000
Cell constant	cal 1100	0.8xx (value on cell)

Fig. 14 Conductivity measurement with
InPro® 7100-25/7104-25 4-electrode cell

3 Operation

User Interface

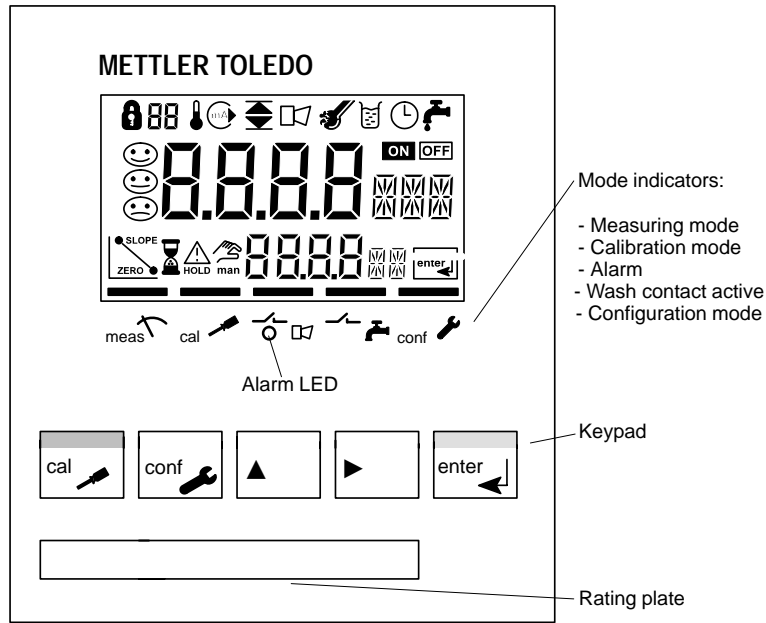


Fig. 15 Front view of Transmitter

Display

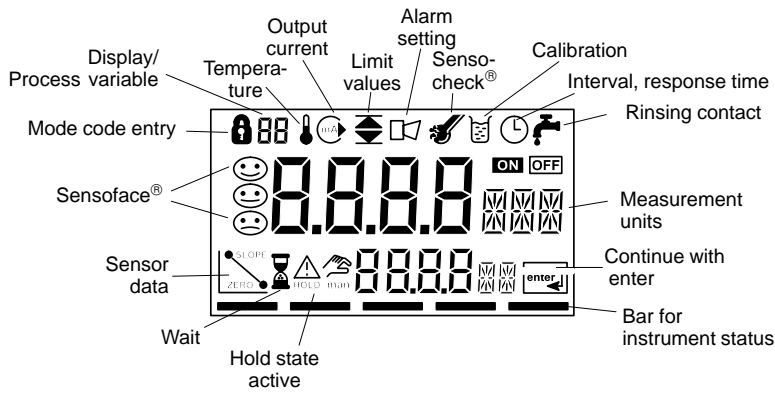


Fig. 16 Transmitter Cond 7100 display

Keypad



Start, end calibration



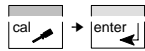
Prompt in display:
continue in program sequence,
Configuration: Confirm entries, next
configuration step,
Measuring mode: Display output
current



Start, end configuration



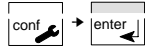
Select digit position
(selected position flashes)



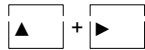
Cal info, display cell constant
(See Pg 32)



Change digit



Error info, display last output error
message (See Pg 32)



Start manual self-test
GainCheck® (See Pg 32)

Safety Functions

Sensoface[®] sensor monitoring

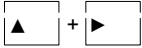


Sensoface[®] provides information on the sensor condition. A sad "Smiley" indicates that there is a **Sensocheck[®]** message.

Sensocheck[®] alerts for significant sensor polarization or excessive cable capacitance caused by an unsuitable cable or a cable that is too long. **Sensocheck[®]** can be switched off. With **Sensocheck[®]** switched off, no friendly Smiley appears.

For more detailed information, see chapter "Troubleshooting and Maintenance" (Pg. 30).

Manual instrument self-test **GainCheck[®]**



Simultaneously pressing ▲ and ► starts the manual instrument self-test.

A display test is carried out, the software version is displayed and internal functions are checked.

Automatic instrument self-test

The automatic instrument self-test checks internal functions. It runs automatically in the background at fixed intervals.

Outputs

Current output

The current output is controlled by the process variable selected in the configuration.

The current characteristic can be configured as linear or logarithmic curve for conductivity and resistivity.

The current range can be set to either 0 – 20 mA or 4 – 20 mA. The current beginning and end can be set to any desired value.

With linear characteristic the minimum span is 5% of the selected range, with logarithmic characteristic it is one decade.

To check connected peripherals (e.g. limit switches, controllers), the output current can be manually specified (see Pg. 32).

Limit contacts

The limit contacts report values below the lower limit and above the upper limit or are used, for example, to actuate valves or pumps (also see Pg. 12). One min and one max contact each can be configured as desired within the measurement range. If a value outside the limits is detected, ▲ or ▼ appears in the display.

With USP ON the min contact is closed as long as the measured value is below the USP limit value (or the reduced USP limit value). When the limit value is exceeded, the min contact will be opened and the max contact be closed (also see Pg. 21)

Alarm contact

The alarm contact is closed during normal operation (closed circuit). 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 (also see Pg. 12).

Error messages can also be signaled with a 22 mA signal via the output current (see Configuration, Pg. 24).

Wash contact

With the wash contact the conductivity cell can be automatically cleaned with a suitable probe. The washing interval and duration can be configured as desired.

USP Function

According to the "USP 23" directive (U. S. Pharmacopeia), Appendix 5, Section 645 "Water conductivity" the conductivity of pharmaceutical waters can be monitored online. To do so, the conductivity is measured without temperature compensation and compared with limit values (temperature/conductivity). The limit contacts are permanently assigned to the USP function. The water is usable if the conductivity is below the USP limit ("min" contact closed). If the limits are exceeded, the USP directive specifies

further test procedures which shall not be explained further at this point. In the configuration the USP limit can be reduced by up to 10 % (reduced limit).

With USP, the "min" contact functions as a fail-safe contact, i.e. it is closed only when everything is alright.

With USP function configured, temperature compensation is automatically switched off. The corresponding configuration steps are omitted. In addition, temperature is monitored.

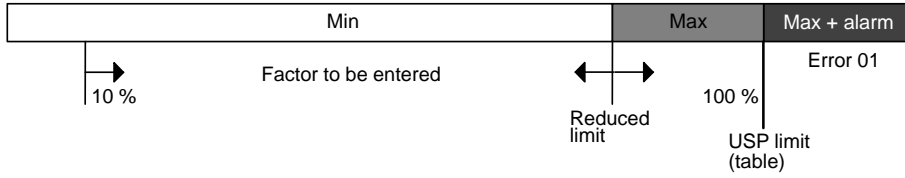


Fig. 17 Limits for USP

Transmitter behavior with USP

	"Min" contact	"Max" contact	"Alarm" contact	Alarm LED	Display message
Cond < reduced limit	closed	open	closed	–	▼ –
Cond > reduced limit	open	closed	closed	–	▲ –
Cond > USP limit	open	closed	open (after 10 s)	flashes (after 10 s)	▲ ERR 01
Temperature < 0 °C	open	closed	open (after 10 s)	flashes (after 10 s)	▲ ERR 03
Temperature > 100 °C	open	closed	open (after 10 s)	flashes (after 10 s)	▲ ERR 03
Cal, Conf, Wash	open	open	closed	–	– –
Power outage/transmitter	open	open	open	–	– –

Temperature/conductivity table to USP

Temperature in °C	Conductivity in $\mu\text{S/cm}$	Temperature in °C	Conductivity in $\mu\text{S/cm}$
0	0.6	55	2.1
5	0.8	60	2.2
10	0.9	65	2.4
15	1.0	70	2.5
20	1.1	75	2.7
25	1.3	80	2.7
30	1.4	85	2.7
35	1.5	90	2.7
40	1.7	95	2.9
45	1.8	100	3.1
50	1.9		

Configuration

The instrument arrives from the factory configured and ready to operate as a conductivity transmitter. This section provides detailed procedures for changing operation values for specific applications.



Activate with **conf**
change parameter with ▲ and ►,
confirm/continue with **enter**,
end configuration with **conf**



Mode code "1200"



HOLD

During configuration the transmitter is in the Hold state, the output current is frozen, and the limit and alarm contacts are inactive.

When the configuration mode is exited, the transmitter remains in the Hold state for safety reasons. This prevents undesirable reactions of the connected peripherals (e.g. limit switches, controllers) due to incorrect settings. The measured value and *Hold* are displayed alternately. Now you can check whether the measured value is plausible and specifically end the Hold state with **enter**. After 20 sec. (measured value stabilization) the transmitter returns to measuring mode.

















Note






The configuration parameters are checked during the input. In the case of an incorrect input "ERR" is displayed for 3 sec. The parameters cannot be stored with **enter** until the input has been repeated.

Configuration parameters

Before attempting any changes refer to the parameter setup list shown below. This table presents the possible options and the factory settings.

Picto-graph	Parameter	Choices	Factory setting
CELL	Sensor selection	2-EL (2-electrode cell) 4-EL (4-electrode cell)	2-electrode cell
USP	USP function	ON / OFF	OFF
USP	USP factor (only with USP ON, range fixed: 00.00 µS)	10 % – 100 %	100 %

	Process variable / meas. range (not with USP ON) Selected process variable and measuring range control current output and measured values. Complete configuration required after change.	0.000 μ S / 00.00 μ S / 000.0 μ S / 0000 μ S 0.000 mS / 00.00 mS / 000.0 mS / 0000 mS 0.000 M Ω / 00.00 M Ω / 000.0 M Ω 0.000 SAL	000.0 mS
	Temperature display	$^{\circ}$ C $^{\circ}$ F	$^{\circ}$C
	Temperature probe	Pt 100 / Pt 1000 / NTC 30 k Ω / NTC 100 k Ω	Pt 100
	Temperature compensation (not with USP ON and SAL)	OFF LIN NLF (natural waters) -01- FCT (ultrapure water, NaCl traces) -02- FCT (ultrapure water, HCl traces) -03- FCT (ultrapure water, NH ₃ traces)	OFF
	Temperature coefficient (only with tc LIN)	xx.xx %/K	02.00 %/K
	Output current range	0 – 20 mA / 4 – 20 mA	4 – 20 mA
	Output current characteristic (not with SAL)	LIN LOG	LIN
	Current beginning (0 / 4 mA) (only with LIN)	μ S / mS / M Ω / SAL	000.0 mS
	Current end (20 mA) (only with LIN)	μ S / mS / M Ω / SAL	100.0 mS
	Current beginning (0 / 4 mA) (only with LOG)	μ S / mS / M Ω	0.1 mS
	Current end (20 mA) (only with LOG)	μ S / mS / M Ω	100 mS
	Hold state	Last: Last output current value Fix: Output current specified	Last
	Hold value (only with Fix)	xx.xx mA	21.00 mA
	22 mA signal for error message	ON / OFF	OFF

	Limit values min (not with USP ON)	μS / mS / M Ω / SAL	000.0 mS
	Limit values max (not with USP ON)	μS / mS / M Ω / SAL	100.0 mS
	Sensocheck [®]	ON / OFF	OFF
	Washing interval	xxx.x hours	0000 (OFF)
	Washing time	xxxx seconds	0000 (OFF)

Calibration

In the calibration mode the cell constant can be changed in two ways. If the cell constant of the cell in use is known, it can be entered directly. Furthermore, the cell constant can be determined with a known calibration solution under consideration of the temperature.



Activate with **cal**, confirm/continue with **enter**, abort with **cal** → **enter**



During calibration the transmitter is in the Hold state. The output current is frozen, limit and alarm contacts are inactive.

When the calibration mode is exited, the Transmitter remains in the Hold state for safety reasons. This prevents undesirable reactions of the connected peripherals (e.g. limit switches, controllers) due to incorrect settings. The measured value and *Hold* are displayed alternately. Now you can check whether the measured value is plausible and specifically end the Hold state with **enter** or repeat calibration with **cal**. If you end the Hold state, the transmitter will return to measuring mode after 20 sec. (measured value stabilization).

Calibration by input of cell constant



Activate calibration by pressing the **cal** key.



Using the ▲, ► keys enter mode code "1100" and then press **enter**.



Using the ▲, ► keys enter the cell constant. The lower display shows the conductivity value.



A change in the cell constant also changes the conductivity value.



When there has not been an entry for approx. 6 sec, conductivity and temperature are displayed alternately.



Press **enter** to confirm the cell constant.



The transmitter remains in the Hold state. You can end the Hold state with **enter**. After 20 sec (measured value stabilization) the transmitter returns to measuring mode.

Calibration with calibration solution

Note



Be sure to use known calibration solutions and the respective temperature-corrected table values (see Calibration Solutions, Pg. 46).



Activate calibration by pressing the **cal** key. Using the **▲**, **▶** keys enter mode code "1100" and then press **enter**.



Immerse the conductivity cell in the calibration solution.

After approx. 6 sec the lower display alternately shows the conductivity and temperature values. Read the conductivity value corresponding to the displayed temperature from the table of the used calibration solution (for tables see Pg. 46).

Using the **▲**, **▶** keys change the cell constant until the display shows the conductivity value from the table.

Make sure that the temperature is stable during the calibration procedure.



Press **enter** to confirm the cell constant.

Hold

The transmitter remains in the Hold state. You can end the Hold state with **enter**. After 20 sec (measured value stabilization) the transmitter returns to measuring mode.

Adjustment of temperature probe

Note



This function should only be used by experts. Incorrectly set parameters may go unnoticed, but change the measuring properties. Especially for Pt 100 temperature probe, it is advisable to perform an adjustment.



Activate calibration by pressing the **cal** key.



Using the ▲, ► keys enter mode code "1015" and then press **enter**.



Measure the temperature of the process medium using an external thermometer.



Using the ▲, ► keys enter the determined temperature value in the main display. If you take over the temperature value shown in the lower display, the correction is without effect.



Press **enter** to confirm the temperature value.



The transmitter remains in the Hold state. You can end the Hold state with **enter**. After 20 sec (measured value stabilization) the transmitter returns to measuring mode.

Measurement

Measuring mode

In the measuring mode the main display shows the configured process variable and the lower display the temperature.

Cal info

With **cal** and mode code "0000" you can activate the cal info. Cal info shows the current calibration data for approx. 20 sec. The 20 sec can be reduced by pressing **enter**. During cal info the transmitter is not in Hold state.

Error info

With **conf** and mode code "0000" you can activate the error info. Error info shows the most recent error message for approx. 20 sec. After that the message will be deleted. The 20 sec can be reduced by pressing **enter**. During error info the transmitter is not in Hold state.

Hold state

The transmitter will enter the Hold state under the following conditions:



For calibration: Mode code 1015
Mode code 1100
Mode code 2222

configuration: Mode code 1200
Mode code 5555

The output current is frozen at *Last* or *Fix* (configuration Pg. 24), and the limit and alarm contacts are inactive.

If the calibration or configuration mode is exited, the unit remains in the Hold state for safety reasons. This prevents undesirable reactions of the connected peripherals (e.g. limit switches, controllers) due to incorrect settings. The measured value and *Hold* are displayed alternately. Now you can check whether the measured value is plausible and specifically end the Hold state with **enter**. After 20 sec. (measured value stabilization) the transmitter returns to measuring mode.



Note During error conditions the Hold state will not be active.

4 Diagnostics, Maintenance and Cleaning

Sensoface[®], Sensocheck[®]



Sensoface[®] provides information on the sensor condition. A sad "Smiley" indicates that there is a Sensocheck[®] message.

Sensocheck[®] alerts for significant sensor polarization or excessive cable capacitance caused by an unsuitable cable or a cable that is too long. Sensocheck[®] can be switched off. With Sensocheck[®] switched off, no friendly Smiley appears.

Error Messages

When one of the following error messages is output, the transmitter can no longer correctly determine the process variable or output it via the current output.

During an error message the alarm contact is open and the alarm LED flashes. The alarm response time is permanently set to 10 sec.







Error messages can also be signaled with a 22 mA signal via the current output (see Configuration, Pg. 24).

Error info



With **conf** and mode code "0000" you can activate the error info. Error info shows the most recent error message for approx. 20 sec. After that the message will be deleted. The 20 sec can be reduced by pressing **enter**. During error info the transmitter is not in Hold state.

Error number	Display (flashing)	Problem	Possible causes
Err 01	1179 m ³	Conductivity cell	<ul style="list-style-type: none"> - Wrong cell constant - Conductivity \geq 1000 mS/cm - SAL > 45 ‰ - Cell connection or cable defective - USP limit exceeded
Err 02		Conductivity cell	<ul style="list-style-type: none"> - Unsuitable cell
Err 03		Temperature probe	<ul style="list-style-type: none"> - Outside temp range - Outside temp range for TC - Outside temp range for SAL - Outside temp range for USP

Error number	Display (flashing)	Problem	Possible causes
Err 21		Output current	- Output current < 3.8 mA or < 0 mA, resp. - Wrong configuration for current beginning (see Pg. 24)
Err 22		Output current	- Output current > 20.5 mA - Wrong configuration for current end (see Pg. 24)
Err 23		Output current	- Configured current span too small (Difference between current beginning and end)
Err 33		Sensocheck®	- Wrong conductivity cell - Conductivity cell defective - Connection cable or screw cap defective - Connection terminals or screw cap dirty
Err 98		System error	- Configuration or calibration data defective; completely reconfigure and recalibrate the transmitter - Measured value transmission defective - Memory error in transmitter program (PROM defective)
Err 99		Factory settings	- EEPROM or RAM defective - Error in factory settings This error message normally should not occur, as the data are protected from loss by multiple safety functions. Should this error message nevertheless occur, there is no remedy. The transmitter must be repaired and recalibrated at the factory.

Diagnostics Functions

Cal info

Pressing **cal** and entering mode code "0000" is going to activate the cal info. Cal info shows the current calibration data for approx. 20 sec. During cal info the transmitter is not in Hold state.

Test mode

Pressing **cal** and entering mode code "2222" is going to activate the test mode. In the test mode you can check the measuring equipment with a resistor. Sensoface[®] is disabled. The resistor is connected instead of the conductivity cell. The equivalent resistance value is shown in the main display in kΩ. With a resistance value > 2 MΩ the display reads "OPEN". Pressing **enter** ends the test mode. The transmitter goes to Hold state.

Error info

Pressing **conf** and entering mode code "0000" is going to activate the error info. Error info shows the most recent error message for approx. 20 sec. After that the message will be deleted. During error info the instrument is not in Hold state.

Display output current

Pressing **enter** in measuring mode displays the output current for a few seconds.

Current source

To check the connected peripherals (e.g. limit switches, controllers), the output current can be manually specified.

Warning



In the current source mode the output current no longer follows the measured value! It is manually specified. Limit and alarm contact are disabled.

Therefore, it must be ensured that the connected devices (control room, controllers, indicators) do not interpret the current value as a measured value!

Pressing **conf** and entering mode code "5555" is going to activate the current source mode. Specify the output current using **▶**, **▲** and **enter**. The actually flowing output current is shown in the lower display.

Pressing **conf** exits the current source mode again.

GainCheck[®] manual instrument self-test

The manual instrument self-test is started by simultaneously pressing **▲** and **▶**.

A display test is carried out, the software version is displayed and internal functions are checked.

Automatic self-test

The automatic self-test checks internal functions. It runs automatically in the background at fixed intervals.

Maintenance and Cleaning

Maintenance

The Transmitter Cond 7100 contains no user repairable components. If problems persist even after reviewing section 4, please contact the factory.

Cleaning

To remove dust, dirt and spots, the external surfaces of the transmitter may be wiped with a damp, lint-free cloth. A mild household cleaner may also be used if necessary.

5 Annex

Product Line

Instruments

Transmitter Cond 7100
Works certificate 2.3

Part No.
52 120 901

Mounting Accessories

ZU 0274 pipe-mount kit
ZU 0275 panel mount kit
ZU 0276 protective hood

Part No.
52 120 741
52 120 740
52 120 739

Specifications

Cond input	Input for 2-/4-electrode cells
Display range	0.2 $\mu\text{S} \cdot \text{c}$ to 1000 $\text{mS} \cdot \text{c}$
Accuracy ¹⁾	< 1 % of meas. value + 0.4 $\mu\text{S} \cdot \text{c}$
Process variable/range	0.000 to 9.999 $\mu\text{S}/\text{cm}$ 00.00 to 99.99 $\mu\text{S}/\text{cm}$
(display resolution)	000.0 to 999.9 $\mu\text{S}/\text{cm}$ 0.000 to 9.999 mS/cm 00.00 to 99.99 mS/cm 000.0 to 999.9 mS/cm 0.000 to 9.999 $\text{M}\Omega/\text{cm}$ 00.00 to 99.99 $\text{M}\Omega/\text{cm}$ 000.0 to 999.9 $\text{M}\Omega/\text{cm}$
Salinity	0.0 to 45.0 ‰ (0 to 35 °C)
Cell monitoring	Sensocheck [®] : polarization detection and monitoring of cable capacitance (can be switched off)

Cell standardization^{*)}	– Entry of cell constant with display of conductivity and temperature
	– Temperature probe adjustment
Perm. cell constant	0.0050 to 1.9999 cm^{-1}
Temperature input	Pt 100 / Pt 1000 / NTC 30 k Ω / NTC 100 k Ω
Ranges	– NTC –20.0 to +130.0 °C –4 to +266 °F
	– Pt –20.0 to +150.0 °C –4 to 302 °F
Resolution	0.1 °C / 1 °F
Accuracy	< 0.5 K ²⁾

Temperature compensation ¹⁾ (Ref. temp 25 °C)	LIN NLF	00.00 to 19.99 %/K Natural waters to EN 27888 (0 to 36 °C)	Loadability	ac < 250 V / < 3 A / < 750 VA dc < 120 V / < 3 A / < 90 W (resistive load)
	-01-	Ultrapure water with NaCl traces (0 to 120 °C)	Protection class	II
	-02-	Ultrapure water with HCl traces (0 to 120 °C)	Protection against electrical shock	Protective separation of all low-voltage circuits against power supply and switching contacts to VDE 0100 Part 410 as defined in DIN VDE 0106 Part 101 to EN 61010-1
	-03-	Ultrapure water with NH ₃ traces (0 to 120 °C)	Data retention	> 10 years (EEPROM)
USP function	Water monitoring in the pharmaceutical industry (USP 23) with possibility to enter a reduced limit value (10 to 100 %)		RFI suppression	to EN 50 081-1 and EN 50 081-2
Display	LC display, alarm LED		Immunity to interference	to EN 50 082-1 and EN 50 082-2
Current output²⁾	0 to 20 mA or 4 to 20 mA, max. 10 V, floating 22 mA for error message ³⁾		Power supply	24 to 230 V ≈ ac/dc -15 % / +10 %, 45 to 65 Hz, approx. 2 VA
Characteristic ¹⁾	Linear or logarithmic		Fuse	160 mA T, 250 V, IEC 127-2/III
Output current accuracy	< 0.3 % of current value + 0.05 mA		Protection class	II
Start/End of scale¹⁾	As desired within ranges for μS, mS, MΩ, SAL		Overvoltage category	II
Min. span	LIN LOG	5 % of selected range 1 decade	Ambient conditions	
Current source	0.00 mA to 22.00 mA		Ambient temperature	Operation -20 to +55 °C Transport and storage -20 to +70 °C
Switching contacts³⁾	4 switching contacts, floating Min. limit contact N/O Max. limit contact N/O Alarm contact N/C Wash contact N/O Hysteresis limit contacts 0.2 % of range ³⁾		Max. rel. H	80 % up to 31 °C decreasing linearly to 50 % at 55 °C
			Altitude	max. 2000 m

Pollution degree 2

Enclosure Material: thermoplastic polyester, reinforced (polybutylene terephthalate)
Protection: IP 65 (Europe)
NEMA 2 (USA)
IP 65, indoor use (Canada)
Color: bluish gray RAL 7031

Cable glands 3 Pg 13.5 threaded cable glands (not mounted), up to 5 Pg threaded cable glands or 3 Pg threaded glands and 2 1/2" conduits possible

Dimensions See Dimension drawings, Pg. 7 ff

Weight Approx. 1 kg

*) user defined

1) ± 1 count

2) with Pt $100 < 1$ K, with NTC > 100 °C < 1 K

3) with USP always $0.05 \mu\text{S/cm}$, with SAL 0.2 ‰

Declaration of Conformity

Declaration of conformity Konformitätserklärung Déclaration de conformité		CE
We/Wir/Nous	Mettler-Toledo GmbH, Process 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 7100	
	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/Nieder- spannung/basse tension	73/23/EEC	
el. Safety el. Sicherheit/sécurité el.	EN 61010-1, EN 61010-1/A1	
EMC Directive/EMV- Richtlinie Directive concernant la CEM Emissions	89/336/EEC	
Funktstörungen/Emissions	EN 50081-1, EN 61326, EN 61326/A1	
Immunity Immunität/immunité	EN 50082-2, EN 61326, EN 61326/A1	
Date of issue/Datum Freigabe Date d'émission	7. August 1999	
Nr. 52 999 9990 FL Artikel Nr. 52960115 KE	E2120115	
	METTLER TOLEDO	

Sensors

InPro® 7000

Model InPro® 7000 (2-electrode cell)	
Cell constant	Approx. 0.1 cm^{-1} (exact value printed on cell)
Range	0.02 – 5,000 $\mu\text{S/cm}^1$
Material	Body PVDF Electrodes Titanium
Max. temperature	100 °C
Max. pressure	34 bars (25 °C) 7 bars (95 °C)
Temp probe	Pt 1000 IEC Class A
Dimensions	See dimension drawing fig. 18

1) For 1.5 m cable length. With longer cables, the measuring range can be reduced.

InPro® 7001

Model InPro® 7001 (2-electrode cell)	
Cell constant	Approx. 0.1 cm^{-1} (exact value printed on cell)
Range	Approx. 0.02 to 500 $\mu\text{S/cm}^1$
Material	Body and stainless steel electrodes AISI 316L (1.4435)
Max. temperature	100 °C (steam sterilizable up to 131 °C)
Max. pressure	14 bars (25 °C) 7 bars (95 °C)
Length	120 mm, 225 mm
Temp probe	Pt 1000 IEC Class A
Cable	Length 5 m Connection wire end ferrule
Dimensions	See dimension drawing fig. 21

1) For 1.5 m cable length. With longer cables, the measuring range can be reduced.

InPro®7002/7003

InPro®7002/7003 (2-electrode cell)

Cell constant	Approx. 0.1 cm^{-1} (exact value printed on cell)	
Range	Approx. 0.02 to $2,000 \text{ }\mu\text{S/cm}^{-1}$)	
Material	Body and electrodes	stainless steel AISI 316L (1.4435)
Max. temperature	$100 \text{ }^\circ\text{C}$	(steam sterilizable up to $131 \text{ }^\circ\text{C}$)
Max. pressure	14 bars 7 bars	($25 \text{ }^\circ\text{C}$) ($95 \text{ }^\circ\text{C}$)
Temp probe	Pt 1000	IEC Class A
Dimensions	See dimension drawing fig. 18	

- 1) For 1.5 m cable length. With longer cables, the measuring range can be reduced.

InPro®7100

InPro®7100/7100-25 (4-electrode cell)		
Cell constant	InPro®7100	(exact value appr. 0.6 cm ⁻¹ printed on cell)
	InPro®7100-25	(exact value appr. 0.8 cm ⁻¹ printed on cell)
Range	InPro®7100	approx. 0.01 to 300 mS/cm
	InPro®7100-25	approx. 0.01 to 500 mS/cm
Material	Body	CPVC
	Electrodes	stainless steel AISI 316L (1.4435)
Max. temperature	80 °C	
Max. pressure	7 bars	(25 °C)
Connection	InPro®7100	3/4" NPT thread
	InPro®7100-25	coupling nut for 25 mm weld nip- ple
Temp probe	Pt 1000	IEC Class A
Dimensions	InPro®7100	See dimension drawing fig. 21
	InPro®7100-25	See dimension drawing fig. 22

InPro®7104

InPro®7104/7104-25 (4-electrode cell)		
Cell constant	InPro®7104	(exact value appr. 0.6 cm ⁻¹ printed on cell)
	InPro®7104-25	(exact value appr. 0.8 cm ⁻¹ printed on cell)
Range	InPro®7104	approx. 0.01 to 300 mS/cm
	InPro®7100-25	approx. 0.01 to 500 mS/cm
Material	Body	PVDF
	Electrodes	stainless steel AISI 316L (1.4435)
Max. temperature	120 °C	
Max. pressure	14 bars	(25 °C)
	7 bars	(95 °C)
Connection	InPro®7104	3/4" NPT thread
	InPro®7104-25	coupling nut for 25 mm weld nip- ple
Temp probe	Pt 1000	IEC Class A
Dimensions	InPro®7104	See dimension drawing fig. 21
	InPro®7104-25	See dimension drawing fig. 22

Note:
All dimensions
in millimeters [inches]

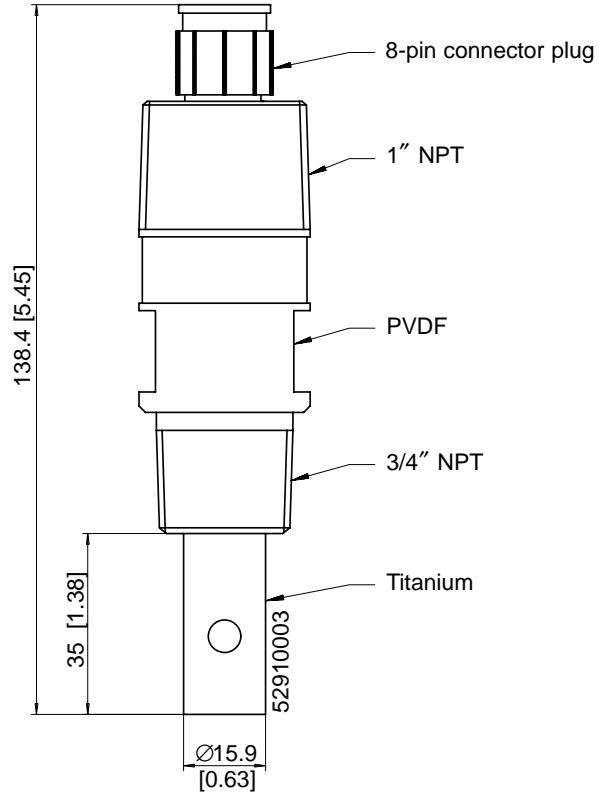
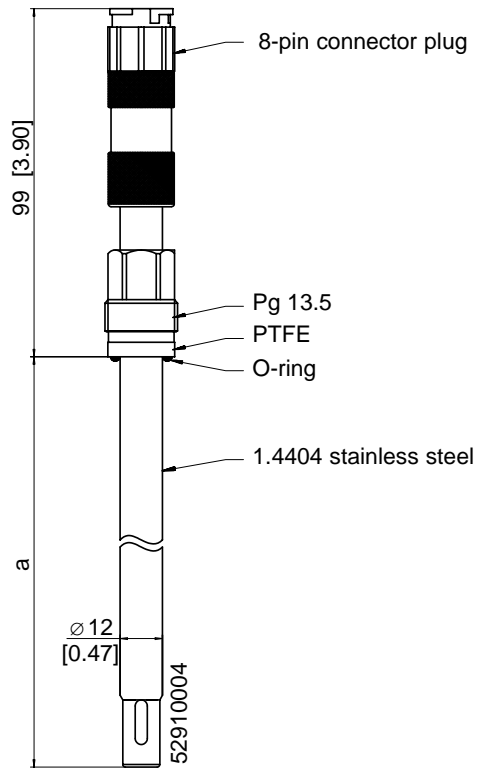


Fig. 18 Dimension drawing InPro® 7000

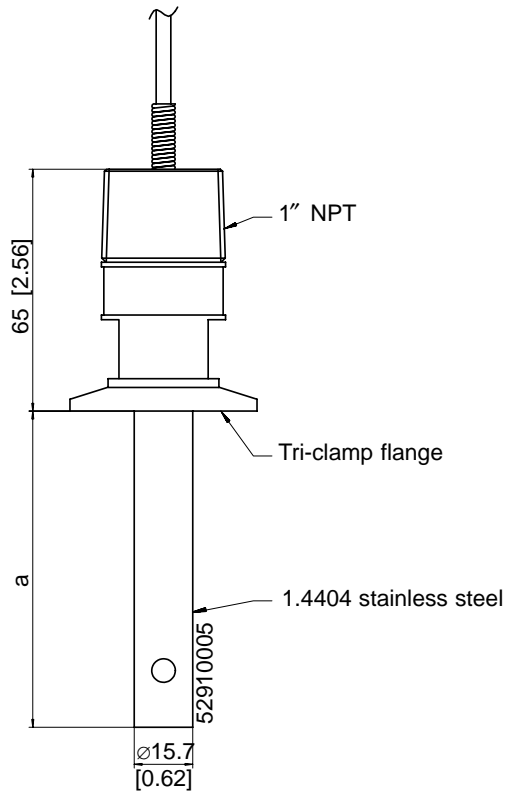
Note:
All dimensions
in millimeters [inches]



	a
InPro® 7001/120	116 [4.57]
InPro® 7001/225	221 [8.70]

Fig. 19 Dimension drawing InPro® 7001 2-electrode cell

Note:
 All dimensions
 in millimeters [inches]



	a	Flange
InPro® 7002	85 [3.35]	1 1/2"
InPro® 7003	104 [4.09]	2"

Fig. 20 Dimension drawing InPro® 7002 / 7003 2-electrode cell

Note:
All dimensions
in millimeters [inches]

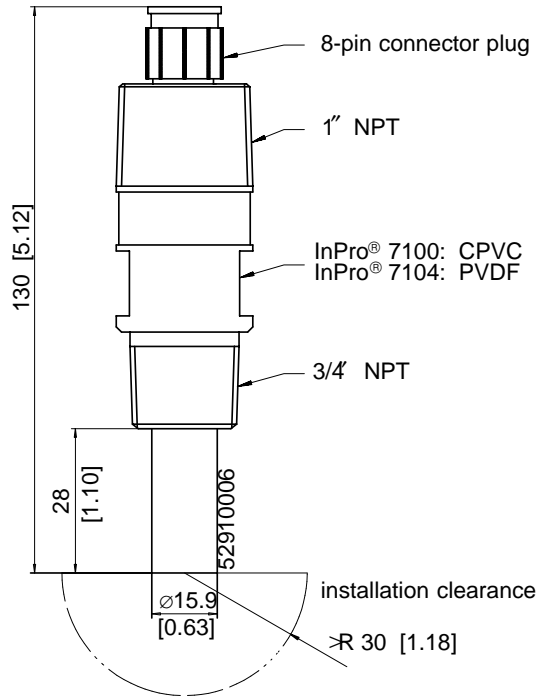


Fig. 21 Dimension drawing InPro® 7100 / 7104 4-electrode cell

Note:
All dimensions
in millimeters [inches]

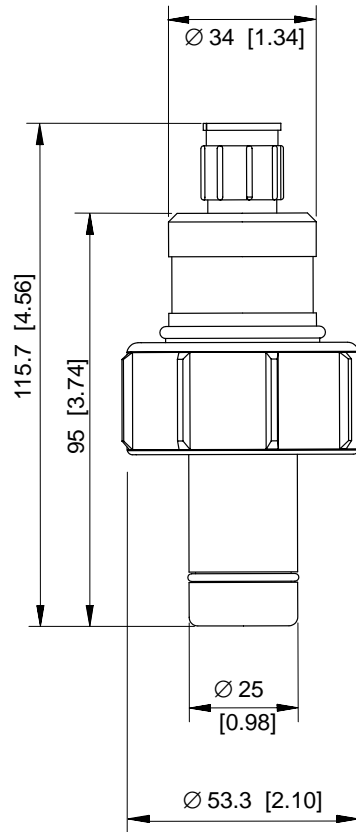


Fig. 22 Dimension drawing InPro® 7100-25 / 7104-25 4-electrode cell

Calibration Solutions

Potassium Chloride Solutions				Sodium Chloride Solutions			
Electrical Conductivity in mS/cm				Electrical Conductivity in mS/cm			
Temperature	Concentration			Temperature	Concentration	0.1 mol/l(**)	0.01 mol/l(**)
[°C]	0.01 mol/l	0.1 mol/l	1 mol/l	[°C]	saturated*)		
0	0.776	7.15	65.41	0	134.5	5.786	0.631
5	0.896	8.22	74.14	1	138.6	5.965	0.651
10	1.020	9.33	83.19	2	142.7	6.145	0.671
15	1.147	10.48	92.52	3	146.9	6.327	0.692
16	1.173	10.72	94.41	4	151.2	6.510	0.712
17	1.199	10.95	96.31	5	155.5	6.695	0.733
18	1.225	11.19	98.22	6	159.9	6.881	0.754
19	1.251	11.43	100.14	7	164.3	7.068	0.775
20	1.278	11.67	102.07	8	168.8	7.257	0.796
21	1.305	11.91	104.00	9	173.4	7.447	0.818
22	1.332	12.15	105.94	10	177.9	7.638	0.839
23	1.359	12.39	107.89	11	182.6	7.831	0.861
24	1.386	12.64	109.84	12	187.2	8.025	0.883
25	1.413	12.88	111.80	13	191.9	8.221	0.905
26	1.441	13.13	113.77	14	196.7	8.418	0.927
27	1.468	13.37	115.74	15	201.5	8.617	0.950
28	1.496	13.62		16	206.3	8.816	0.972
29	1.524	13.87		17	211.2	9.018	0.995
30	1.552	14.12		18	216.1	9.221	1.018
31	1.581	14.37		19	221.0	9.425	1.041
32	1.609	14.62		20	226.0	9.631	1.064
33	1.638	14.88		21	231.0	9.838	1.087
34	1.667	15.13		22	236.1	10.047	1.111
35	1.696	15.39		23	241.1	10.258	1.135
36		15.64		24	246.2	10.469	1.159
				25	251.3	10.683	1.183
				26	256.5	10.898	1.207
				27	261.6	11.114	1.232
				28	266.9	11.332	1.256
				29	272.1	11.552	1.281
				30	277.4	11.773	1.306
				31	282.7	11.995	1.331
				32	288.0	12.220	1.357
				33	293.3	12.445	1.382
				34	298.7	12.673	1.408
				35	304.1	12.902	1.434
				36	309.5	13.132	1.460

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

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

**) Test solutions calculated according to IEC 746-3

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Mettler-Toledo GmbH, Process Analytics, Industrie Nord, CH-8902 Urdorf, Phone (01) 736 26 36
Subject to technical changes. Mettler-Toledo GmbH, 6/99. Printed in Germany.