

Inductive Conductivity



THORNTON

Leading Pure Water Analytics

7100E

Non-Fouling Sensors

PEEK or PFA Wetted Parts

Excellent Chemical Resistance

0/4 to 20mA Outputs for
Conductivity & Temperature

4 Relays

PID Control



7100E Inductive Conductivity System for Reliable Wide-Range Measurement

METTLER TOLEDO

7100E Inductive Conductivity System

Key Features

Advantages at a glance.

The Mettler-Toledo Thornton 7100E inductive conductivity transmitter has an extremely wide measuring range of 0-2000 mS/cm. The unit also provides simultaneous readings of the measured value (conductivity, concentration or salinity) and temperature, clearly portrayed in a well-arranged LC display, with analog outputs for both. Status annunciators indicate the mode of operation. The AC/DC universal power capability allows the transmitter to be connected to almost any power source.

Process safety - in the foreground.

SensoCheck® continuously monitors the sender coil and wiring for short circuits, and the receiver coil for any disruptions. GainCheck® allows a manual functional check of the transmitter at any time. In addition,

an installed background program carries out an independent, periodic check of all instrument functions. A red LED in the front panel optically signals any alarm condition. A 22 mA alarm signal can be set in the event of a malfunction.

Rapid connection and start-up.

Plug-in terminals and front panel access allow rapid installation of sensors and output wiring. Instrument mounting configurations include wall, pipe or panel mounting. The robust plastic enclosure can withstand the harshest process conditions with a rating of IP65, NEMA 4X.

Simple calibration. Calibration of the transmitter and sensor is carried out either through direct entry of the factory calibrated cell factor or through manual validation of the cell

factor using a standard calibration solution. Temperature may also be calibrated to provide more precise automatic temperature compensation of the measured conductivity values.

Variety of process adaptations.

The sensors can be inserted into a process pipe by means of a threaded bushing or Tri-Clamp fitting.

PID proportional, integral, derivative control.

Built-in control enables complete loop autonomy where desired. Control output is through relays based on pulse frequency for metering pumps or pulse duration for solenoid valves. Analog outputs are still available for conductivity and temperature.

Applications

Semiconductor processes

can be monitored with sensors of glass-filled PEEK and no wetted metal parts. Process purity requirements are protected.

Waste water monitoring

reliability is assured with non-fouling inductive sensors even at high conductivity and suspended solids levels.

Inductive sensors measure even in concentrated, zero-discharge applications.

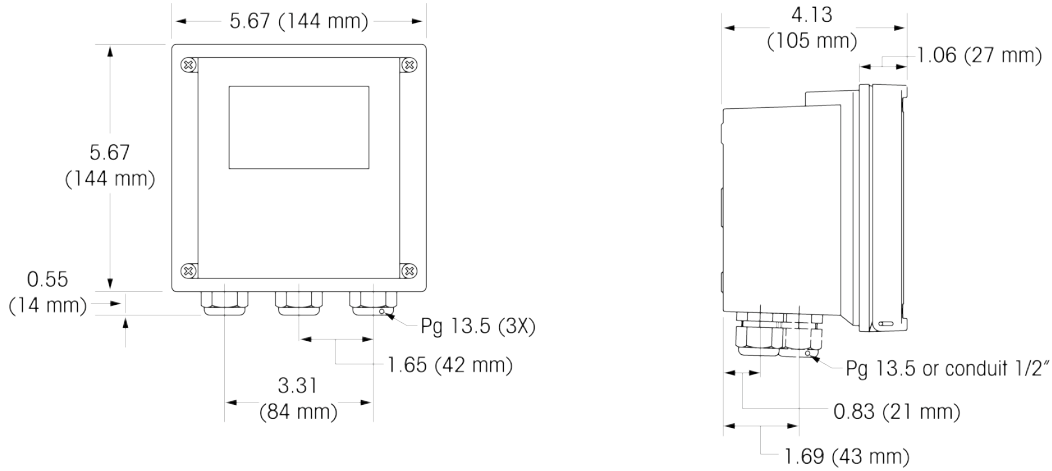
Deionization Regeneration acid and base concentrations can be controlled reliably and accurately with inductive conductivity measurement. Direct temperature-compensated, % by weight readout is

provided for all chemicals used for deionizer and softener regeneration.

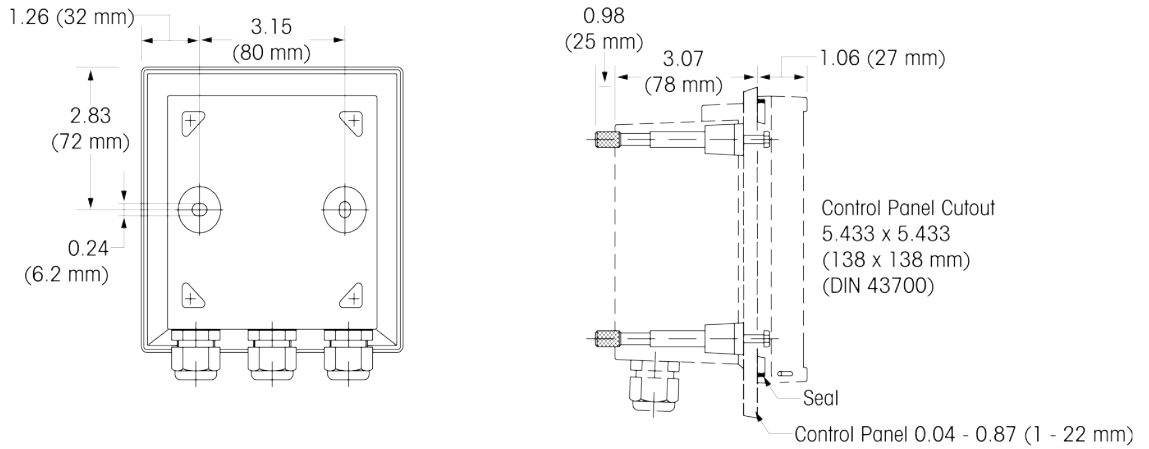
Pharmaceutical Clean-in-Place

(CIP) processes requiring control of chemical concentrations can use inductive conductivity measurement. It can also be used to validate concentrations at the return end of the line and for waste treatment.

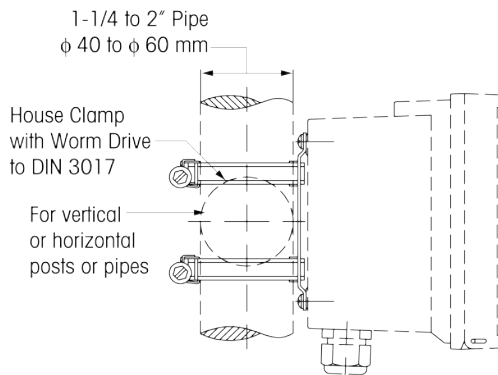
7100E Inductive Conductivity System



With 52 120 740 Panel Mounting Kit



With 52 120 741 Pipe Mounting Kit



7100E Inductive Conductivity Transmitter Specifications

Conductivity Input	Mettler-Toledo Thornton 7250 Series inductive sensors		
Conductivity Ranges	0.000 to 9.999 mS/cm	–	
	00.00 to 99.99 mS/cm	0.000 to 9.999 S/m	
	000.0 to 999.9 mS/cm	00.00 to 99.99 S/m	
	0000 to 1,999 mS/cm	–	
Concentration Ranges	NaCl	0 to 26%	(0 to 60 °C)
	HCl	0 to 18%	(-20 to 50 °C)
	NaOH	0 to 14%	(0 to 100 °C)
	H ₂ SO ₄	0 to 30%	(-17 to 110 °C)
	HNO ₃	0 to 30%	(-20 to 50 °C)
	H ₂ SO ₄	32 to 84%	(-17 to 115 °C)
	H ₂ SO ₄	92 to 99%	(-17 to 115 °C)
	HCl	22 to 39%	(-20 to 50 °C)
	HNO ₃	35 to 96%	(-17 to 115 °C)
	NaOH	18 to 50%	(0 to 100 °C)
Salinity Range	0.0 to 45.0% (0 to 35 °C)		
Measurement Error	< 1% of measured value + 0.005 mS/cm		
Temperature Input*	Pt100 / Pt1000 / NTC 100 kΩ		
Measuring Range	Pt: -20 to +200 °C / -4 to +392 °F		
	NTC: -20 to +130 °C / -4 to +266 °F		
Resolution	0.1 °C / 1 °F		
Measurement Error	0.5 K; ± 1K with Pt100		
Temperature Compensation	Linear: 00.00 to 19.99 %/K (Reference temp. 25 °C)		
	Non-Linear: natural water to EN 27888 (0 to 35 °C)		
Display	3-1/2 digit liquid crystal display with alarm LED		
Current Outputs	Two, 0 to 20 mA or 4 to 20 mA, max. 10 V, isolated, 22 mA for error message, can be disabled; dedicated to conductivity and temperature		
Current Characteristics	Linear or logarithmic		
Current Error	< 0.3 % of current value ± 0.05 mA		
Start/End Scale	Selectable within the measurement range for mS, S, % by wt, salinity, temperature		
Minimum Measurement Span	Linear: 5% of selected measurement range		
	Logarithmic: 1 decade		

7100E Inductive Conductivity Transmitter

Specifications

Cell Factor Range	00.100 to 19.999	
Monitoring of Cell	Sensocheck®: monitoring of sender coil and leads for short circuits, and of the receiver coil for disruption (can be disabled).	
Relays*	4 SPST relay switching contacts, isolated Relays 1 & 2 for limits, with adjustable NO/NC, hysteresis and delay Optionally, relays 1 & 2 for PID control Relay 3 for system alarm Relay 4 for sensor wash	
Relay Ratings	AC: < 250 V, < 3 A, < 750 VA DC: < 30 V, < 3 A, < 90 W	
PID Process Controller*	Output via relay contacts	
Proportional Action	Controller Gain	K _C : 0010...9999%
Integral Action	Reset Time	T _R : 0000...9999 S
Derivative Action	Reset Time	T _D : 0000...9999 S
Controller Type	Pulse length or pulse frequency controller	
Pulse Period	0001...0600 S, minimum ON time 0.5 S (pulse length controller)	
Maximum Pulse Frequency	0001...0180 pulses/minute (pulse frequency controller)	
Power Supply	20 to 253 VAC/DC, AC: 45 to 65 Hz, approx. 5 VA , 2.5 W Overvoltage category II; Protection class II	
Ambient Conditions	Operating/ambient temperature -20 to +55 °C; Transport and storage temperature -20 to +70 °C Relative humidity 10 to 95% non-condensing	
Enclosure	Polymer case, PBTP (polybutyleneterephthalate)	
Installation	Wall-mounting hardware, standard Pipe/bracket for 1-1/4 to 2" pipe, φ 40 to 60 mm, with kit ordered separately Control panel, cutout to DIN 43700, with kit ordered separately	
Dimensions	144 x 144 x 105 mm (5.67 x 5.67 x 4.13 in.)	
Protection	IP 65, NEMA 4X	
Cable Entry	5 ports for cable glands M20 x 1.5 or 1/2" conduit	
Weight	Approx. 1 kg (0.5 lb.)	
FM/CSA	NI, Class I, Div 2, Group A, B, C, D; T4	
EMC	EN 61326 EN 61326/A1 EN 61000-4-5, Installation Class 2	

* Configurable

Description	Part No.
Inductive Conductivity Transmitter with Wall Mounting Hardware	7100E
Panel Mounting Kit for 7100E	52 120 740
Pipe Mounting Kit for 7100E (1-1/4" to 2" Pipe)	52 120 741

7250 Inductive Conductivity Sensors

Features

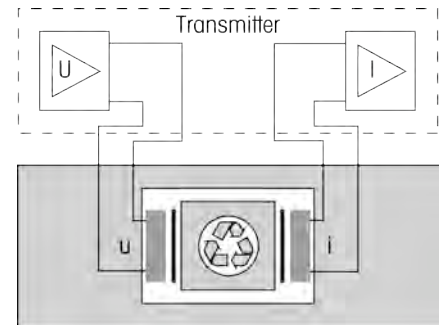
- Chemically resistant PEEK (polyetheretherketone) or PFA (perfluoro alkoxy)
- No metal wetted parts
- High-Temperature to 180 °C (356 °F)
- Wide measuring range to 2,000 mS/cm
- Unaffected by severe fouling
- Simple installation of sensors and accessories
- Variety of process insertion fittings
- Submersion installation for wastewater treatment
- Robust sensor design for maintenance-free operation
- Integrated temperature probe for direct temperature compensation

Operation

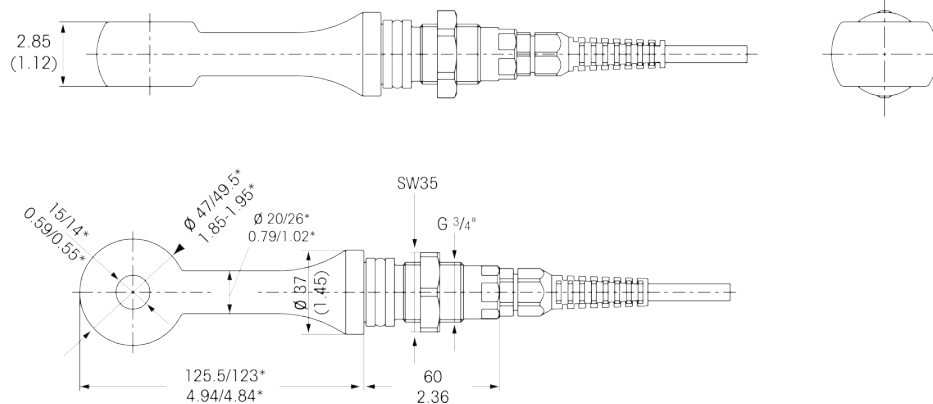
The inductive conductivity sensor consists of two high-grade toroids (coils) which are incorporated concentrically and adjacent to one another in a polymer body. These coils form a current transformer.

The sensor is designed so part of the liquid media forms a closed conductive current path passing through the toroids. The primary coil is activated with a sinusoidal alternating voltage, which induces an alternating voltage in the liquid loop (sample medium). In liquids which conduct electricity, this causes a current flow which is proportional to the conductivity of the sample medium.

The liquid loop is also acting as the primary winding of the secondary coil which functions as a current transformer. This current is rectified to the correct phase and amplified. If the toroid of the sensor is mounted in a relatively small (< 3") pipe, the field around the toroid, and therefore the effective cell factor, will be influenced. In that case, calibration in the pipe is needed to achieve rated accuracy.



7250 Dimensions



* PFA version

Dimensions: mm (inches).

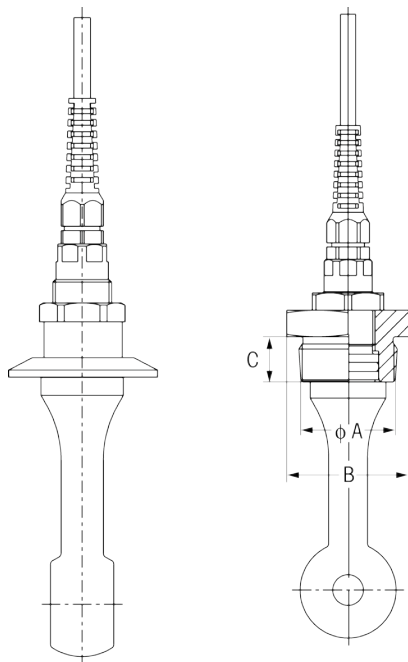
7250 Inductive Conductivity Sensors & Accessories

7250 Series Sensors

	Peek	PFA
Measuring Range	0 to 2,000 mS/cm	0 to 2,000 mS/cm
Cell Factor	2.17	2.30
Transfer Ratio	120	120
Installation	2"NPT bushing or Tri-Clamp fitting (see table below)	2"NPT bushing or Tri-Clamp fitting (see table below)
Weight	0.9 kg (2 lb.)	0.9 kg (2 lb.)
Temperature Sensor	Pt 1000	Pt 1000
Temperature Response	Approx 5 minutes (90%)	Approx 5 minutes (90%)
Wetted Material	Glass filled PEEK (GF30)	Unfilled PFA
Mounting Thread	1.4435 (316) Stainless Steel	1.4435 (316) Stainless Steel
O-ring / Gasket	Viton / Viton	FEP/PTFE
Cable Lengths	5, 10 m (16, 33 ft)	5,10 m (16, 33 ft)

Temperature	Max Pressure	Measurement Value Deviation	Cable Jacket Material	Cable Length m (ft)	Part No.
-20 to 100 °C (-4 to 212 °F)	8 bar (116 psig)	± (0.5% of measurement + 25 µS/cm)	PVC	5 m (16 ft)	52 002 737
				10 m (33 ft)	52 002 738
-20 to 180 °C (-4 to 356 °F)	20 bar (290 psig)	± (0.5% of measurement + 1 µS/cm)	Silicone	5 m (16 ft)	52 002 740
				10 m (33 ft)	52 002 741
-20 to 125 °C (-4 to 257 °F)	16 bar (232 psig)	± (0.5% of measurement + 25 µS/cm)	Silicone	5 m (16 ft)	52 005 424
				10 m (33 ft)	52 005 425

A combination of high pressure, high temperature and/or aggressive process medium can reduce sensor life.



Tri-Clamp

NPT

7250 Series Insertion Adapters

7250 Series Adapter Dimensions

Description	A	B	C	Part No.
Threaded bushing 2" NPT PVDF	2" NPT	SW75	24 (0.95")	52 403 453
Sanitary Fitting 2" Tri-Clamp SS	—	—	—	58 084 013

Conductivity Standard Solutions

Provided for sensor verification and recalibration, conductivity standards are produced, analyzed, and documented in the Mettler-Toledo Thornton ISO 9001 certified facility with processes similar to those used to calibrate high accuracy Thornton conductivity sensors. They are provided with label and certificate with lot number, certified value, expiration date, plus ASTM and NIST traceability data. These standards are analyzed and used at equilibrium with the atmosphere.



Standard	Accuracy	Shelf Life	Part No.
1000 $\mu\text{S/cm}$, 500 mL, KCl	$\pm 1\%$	12 mo	58 078 003
10,000 $\mu\text{S/cm}$, 500 mL, KCl	$\pm 1\%$	12 mo	58 078 004
100,000 $\mu\text{S/cm}$, 500 mL, KCl	$\pm 1\%$	12 mo	58 078 005

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