

Conductivity/Resistivity

THORNTON

Leading Pure Water Analytics

- NIST Traceable Calibration
- Two Analog Outputs Standard
- Three-Wire Temperature Measurement
- Wide Range of Sensor and Cable Selections



200CRS Single-Channel Conductivity/Resistivity Measurement System

METTLER TOLEDO

Benefits

- Single instrument for wide range of measurement with appropriate two-electrode sensors
- Easy operation with text-based menus
- One instrument model for:
 - Conductivity
 - Resistivity
 - Temperature
 - Total Dissolved Solids (ppm/ppb)
- Designed to operate with a full array of 0.01 and 0.1 cm⁻¹, 2-electrode sensors offered by Thornton.

Applications

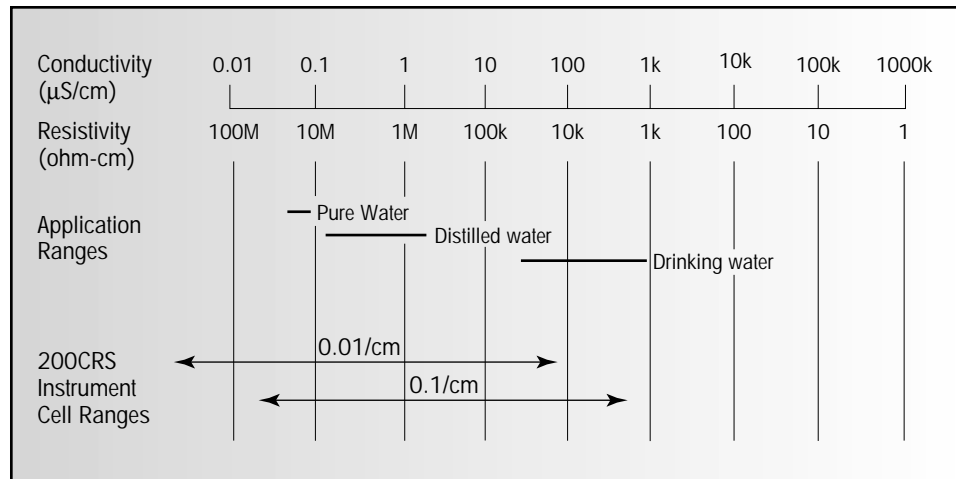
Pure water treatment for ultrapure semiconductor rinsing, critical power/steam makeup and pharmaceutical waters requires accurate, reliable monitoring of purification steps as well as the final product quality. The 200CRS provides efficient single-channel monitoring of unit processes, assuring in-spec operation throughout the system.

Semiconductor processing in rinsers and wet benches relies on precise resistivity alarming at ultrapure 18 Mohm-cm levels. Highest measurement accuracy and world-recognized Thornton-Light temperature compensation assure consistent water and product quality.

Power plant cycle chemistry monitoring requires specialized temperature compensation for cation conductivity measurements. Thornton's sophisticated compensation algorithms have proven themselves superior by a wide margin, fully accounting for the changing ionization of water as it is affected by acidic cation conductivity samples.

Reverse Osmosis and Ion Exchange water treatment systems require product water quality monitoring. The 200CRS provides a high quality, accurate and cost effective single channel monitoring package for RO and DI treatment systems. Industrial, Automotive and Clinical applications require accurate monitoring of pure water systems. The 200CRS is the ideal solution when single point measurement is required.

200CRS Application and Sensor Ranges



200CRS Instrument Models

Relays	Analog Outputs	Power	Part No.
2 SPDT mechanical	2	110VAC (24 VDC)	6122-1
2 SPDT mechanical	2	220VAC (24 VDC)	6122-2

200CRS units operate as a 4-wire transmitter with either AC or DC power.
All units include RS232/RS422 digital output.

Accessories

Description	Part No.
Wall Mount NEMA 4X, IP65 Back Cover	1000-62
Pipe Mount Bracket (1-1/2 to 4" vertical pipe)*	1000-63
Adapter plate, 800 Series to 200 Series	1000-64

* Requires back cover above.

Conductivity Flow Chambers

Description	Part No.
316 stainless steel, 1/8" NPTF inlet/outlet, 3/4" NPTF sensor port	1000-30
PVDF, 1/4" NPTF inlet/outlet, 3/4" NPTF sensor port	1000-31



1000-3X
Flow Chamber

Retractable Housings for 240-212 Sensor

Material	Connection	Pressure	Temp	Part No.
CPVC	1 1/2" NPTM	75 psig (5 bar)	176°F (80°C)	1000-40
PVDF	1 1/2" NPTM	75 psig (5 bar)	212°F (100°C)	1000-41
316SS	1" NPTM	100 psig (7 bar)	248°F (120°C)	1000-42



1000-4X
Retractable Housing

Sensor Patch Cords

Length	Standard Part No.	VP* Part No.
1 ft (0.3 m)	1001-66	-
5 ft (1.5 m)	1005-66	58 080 201
10 ft (3 m)	1010-66	58 080 202
15 ft (4.5 m)	1015-66	58 080 203
25 ft (7.6 m)	1025-66	58 080 204
50 ft (15.2 m)	1050-66	58 080 205
75 ft (23 m)	-	58 080 206
100 ft (30.5 m)	1110-66	58 080 207
150 ft (45.7 m)	1115-66	58 080 208
200 ft (61 m)	1120-66	58 080 209



58 080 20X
VP Patch Cord



1XXX-66
Std. Patch Cord

One cord is required for each sensor except 240-217, -218, -220

* For VP Conductivity sensors only. See sensor table, third column.

200CRS Plug-in Calibrators - NIST Traceable, ± 0.08% Accuracy

Description			Part No.
Complete Kit (Contains calibrators 1864-01, -02, -03, -04)			1865-03
High Resistivity/Low Conductivity Kit (includes 1864-01, -02)			1865-01
Cal. Resistance	Cal. Point (0.1 cm¹ cell)	Temp.	Calibrator
4 MΩ	40 MΩ-cm	104°C	1864-01
100,000 Ω	1 MΩ-cm	0°C	1864-02
Low Resistivity/High Conductivity Kit (includes 1864-03, -04)			1865-02
Cal. Resistance	Cal. Point (0.1 cm¹ cell)	Temp.	Calibrator
20,000 Ω	200,000 Ω-cm	104°C	1864-03
1,000 Ω	10,000 Ω-cm	0°C	1864-04
Cal. Resistance	Cal. Point (0.1 cm¹ cell)	Temp.	UPW Calibrator
1.818 MΩ	18.18 MΩ-cm	25°C	1865-04



1865-0X
Calibrator Kit

Adapter, VP to Standard connector for calibrating a channel with VP patch cord - 58 080 102.

Sensor Selection Criteria

Thornton offers a wide variety of conductivity/resistivity sensors to accommodate most applications. Use the following criteria to select the appropriate sensor for your installation:

- Conductivity or resistivity range — resistivity (Mohm-cm) = 1/conductivity ($\mu\text{S}/\text{cm}$)
- Mounting type — Insertion, retractable or submersion
- Pipe connection type and size
- Chemical compatibility, including cleaning and disinfection processes. Rely on process experience or consult Thornton for unusual process composition. PEEK is recommended for exposure to ozone and other oxidizers. Monel is recommended for exposure to hydrofluoric acid.
- Temperature requirements, including steam and/or hot chemical cleaning

Specifications

Cell Constant Accuracy:	$\pm 1\%$ of reading
Cell Constant Repeatability:	$\pm 0.25\%$
Temperature Sensor:	Pt1000 RTD
Temperature Accuracy:	$\pm 0.1\text{ }^\circ\text{C}$ at $25\text{ }^\circ\text{C}$
Cable Jacket Material:	240-Series - PVC, $80\text{ }^\circ\text{C}$ rating
Maximum Sensor Distance:	200 ft (61 m)

Fitting	Insertion Length "X" in (mm)	Cable Length ft (mm)/ Connector	Fitting Material	Range ($\mu\text{S}/\text{cm}$)*	Cell Const. (cm-1)	Electrode Material	Insulator Material	Max Pressure/Temp Psig (bar) at $^\circ\text{F}$ ($^\circ\text{C}$)	Part No.
3/4" NPTM	1.35 (34)	1.5 (0.5)/S	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-201
3/4" NPTM	5.19 (132)	1.5 (0.5)/S	Teflon/SS	0.02-600	0.1	Titanium	Ryton	250 (17) at 200 (93)	240-202
3/4" NPTM	1.35 (34)	1.5 (0.5)/S	Teflon/SS	0.02-600	0.1	Monel	PEEK	250 (17) at 200 (93)	240-203
3/4" NPTM	5.19 (132)	1.5 (0.5)/S	Teflon/SS	0.02-600	0.1	Monel	Ryton	250 (17) at 200 (93)	240-204
3/4" NPTM	5.19 (132)	1.5 (0.5)/S	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-206
3/4" NPTM***	1.15 (29)	None/S	PVDF	0.02-600	0.1	Titanium	PEEK	100 (7) at 203 (95) & 500 (34) at 77 (25)	240-207
Retractable for 1000-4X housing	2.75 (70)	None/S	SS	0.02-200	0.1	316L SS	PEEK	58 (4) at 268 (131) & 100 (7) at 203 (95) & 250 (17) at 77 (25)	240-212
1/2" NPTM	1.14 (29)	1.5 (0.5)/S	Noryl	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-213
3/4" NPTM	1.14 (29)	1.5 (0.5)/S	Noryl	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-214
3/4" NPTM	1.35 (34)	10 (3)/S	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-215
1/2" NPTM	1.14 (29)	1.5 (0.5)/S	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-216
3/4" NPTM	1.35 (34)	20 (6.1)**	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-217
1/2" NPTM	1.14 (29)	10 (3)**	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-218
3/4" NPTM	1.35 (34)	30 (9)**	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-220
3/4" NPTM	2.38 (60)	1.5 (0.5)/S	Teflon/SS	0.002-100	0.01	Titanium	PEEK	250 (17) at 200 (93)	240-101
3/4" NPTM	1.35 (34)	1.5 (0.5)/VP	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-231
3/4" NPTM	5.19 (132)	1.5 (0.5)/VP	Teflon/SS	0.02-600	0.1	Titanium	PEEK	250 (17) at 200 (93)	240-236

All 0.01 and 0.1 cm^{-1} Sensors include calibration certificates. Others may be requested at additional cost.

* Megohm-cm = $1/(\mu\text{S}/\text{cm})$

** tinned leads, no patch cord required

*** plus 1" NPTM submersion connection

S = Standard connector used with 1XXX-66 patch cords only.

VP = Vario Pin sealed connector used with 58 080 20X patch cords only, provides highest integrity connection. (58 080 101 3-ft. adapter cable can connect an existing 1XXX-66 patch cord to a VP sensor.)

Functional

Ranges:

Conductivity	0.002 $\mu\text{S/cm}$ to 600 $\mu\text{S/cm}$ (using 0.01 and 0.1 cm^{-1} sensors)
Resistivity	1667 $\Omega\text{-cm}$ to 500.0 $\text{M}\Omega\text{-cm}$
TDS	(ppk/ppm/ppb) covers equivalent conductivity range
Temperature	-40 to 200 $^{\circ}\text{C}$ (-40 to 392 $^{\circ}\text{F}$)

Resolution: 0.001 $\mu\text{S/cm}$, 0.001 $\text{M}\Omega\text{-cm}$, 0.01 $^{\circ}\text{C}$

Sensor Inputs: From Thornton conductivity sensors with Pt1000 RTD, via appropriate patch cord(s) or integral sensor cable (depends on sensor used).

Temperature Compensation: Automatic, referenced to 25 $^{\circ}\text{C}$ for resistivity, conductivity, and TDS. Field selectable for Standard, Linear, Light 84, Cation and None (Non-temperature compensated measurement)**Outputs**

Setpoints/Alarms: Two controlled setpoints. Any relay can be activated by either setpoint.

Relays: Two electro-mechanical SPDT, rated at 5 amp, 250 VAC or 30 VDC resistive load; Relays have individually adjustable delay and hysteresis (deadband).

Analog output Signals: Two powered 4-20 mA outputs (recalibratable to 0-20 mA), 500 ohm load maximum, freely scalable to any parameter and range; isolated from input and from ground. Not for use with externally powered circuits.

Serial output: RS232, maximum distance of 50 feet (15 m); RS422, maximum distance of 4000 feet (1220 m); field selectable up to 19.2 kbaud.

PerformanceAccuracy: $\pm 0.5\%$ of reading or ± 0.5 ohm, whichever is greater; ± 0.25 $^{\circ}\text{C}$
(Lower accuracy may result when using the integral tinned-lead sensors.)Repeatability: $\pm 0.1\%$ of reading, ± 0.13 $^{\circ}\text{C}$

Update Rate: All measurements and outputs, once per second

Ratings/approvals: Meets CSA/NRTL and CE requirements, UL listed

Analog output accuracy: ± 0.05 mA within 15-30 $^{\circ}\text{C}$ ambient**Environmental**Storage temperature: -40 to 70 $^{\circ}\text{C}$ (-40 to 158 $^{\circ}\text{F}$)Operating temperature: -10 to 55 $^{\circ}\text{C}$ (14 to 131 $^{\circ}\text{F}$)

Humidity: 0 to 95% RH, non-condensing

General: If the equipment is used in a manner not specified by Thornton, the protection provided by the equipment may be impaired. For indoor use, pollution degree 1.

UL Electrical Environment: Installation (overvoltage) Category II

Enclosure

Display: 16 character backlit LCD (4.8 x 9.6 mm)

Keypad: 11 flush, tactile feedback keys

Material: ABS-PC polymer alloy

Panel cutout: 3.78 x 7.56" (96 x 192 mm) DIN

Wall mount: Available with accessory back cover

Pipe mount: For 1-1/2 to 4" pipe, available with accessory kit and back cover

Weight: 1.9 lb. (0.9 kg)

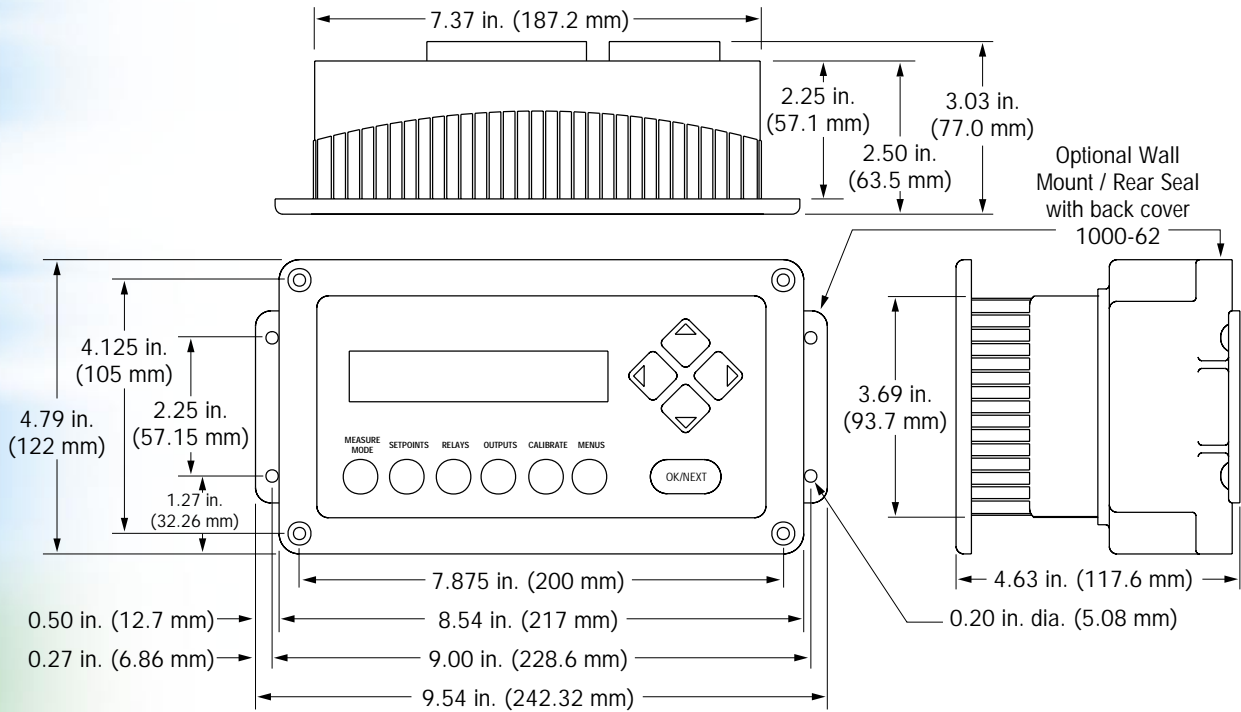
Rating: NEMA 4X, IP65 panel mount and accessory back cover

Sensor cable length, max: 200 feet (61 m) with appropriate patch cable

Power

Line: 90-130 VAC or 180-250 VAC, 50-60 Hz, 12W maximum; or 12-30 VDC, 300 mA steady state, 600 mA inrush.

Memory retention: On power loss all programmed values are retained in non-volatile memory without batteries.



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