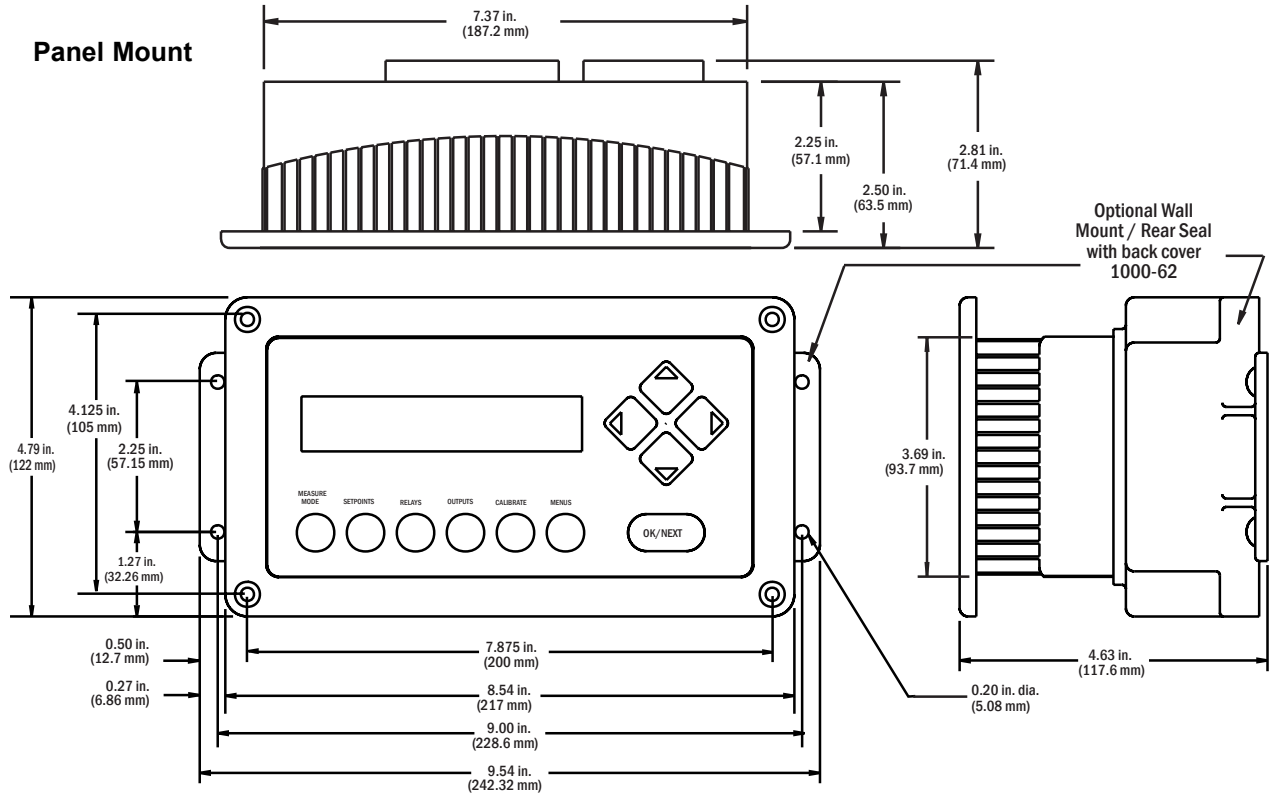


200CR Dimensions



200CR Sensors



240-212
&
1000-41

240-201
&
1000-30

243E223

240-401

240-501

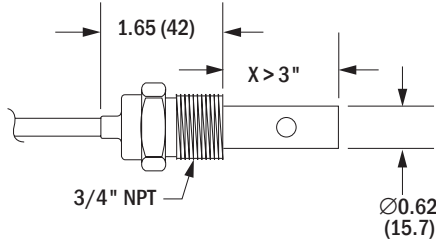
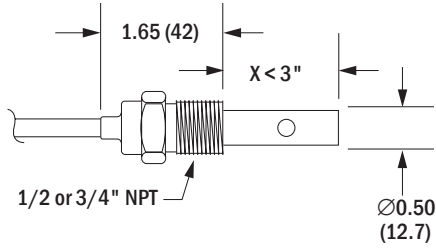
240-202

240-201

243E233

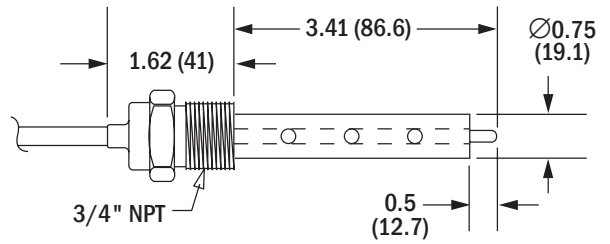
200CR Sensor Dimensions

NPT 0.01 and 0.1 Constant



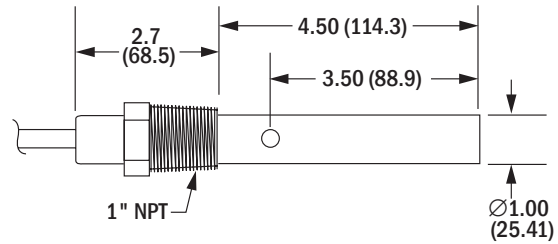
10 Constant

240-401



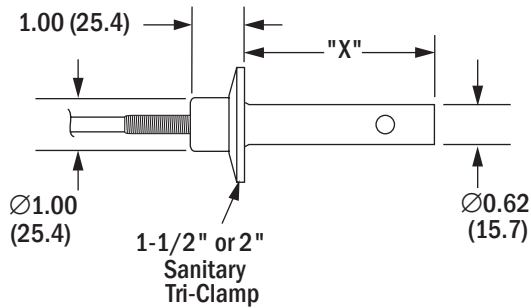
50 Constant

240-501



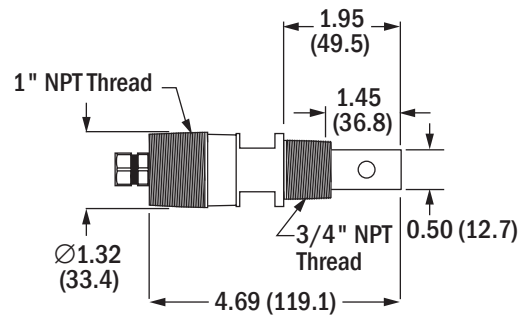
Sanitary

243E22X



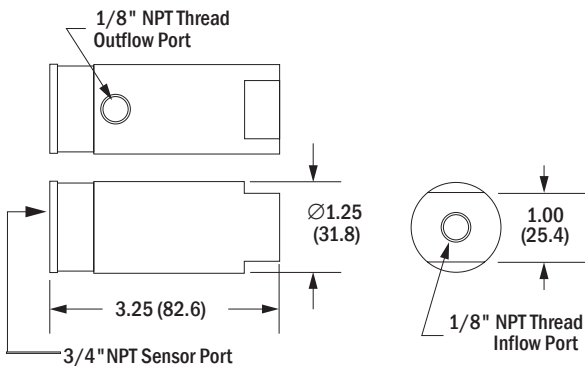
Submersion 0.1 Constant

240-207



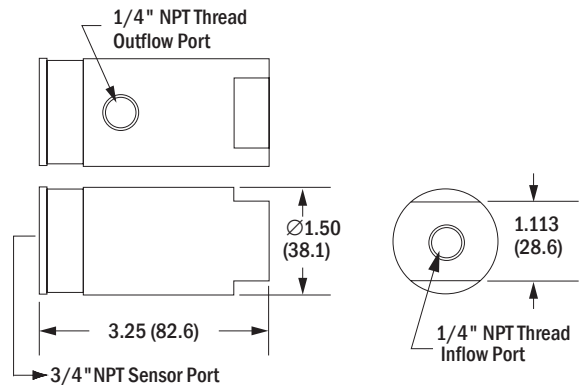
316SS Flow Chamber

1000-30

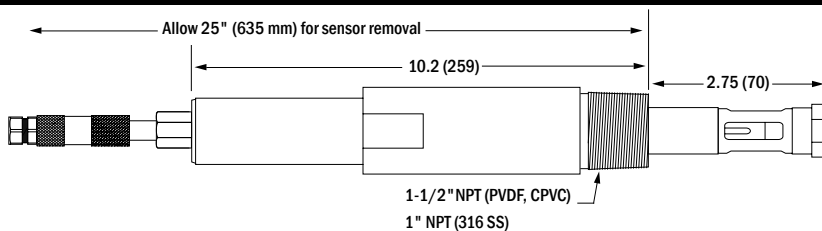


PVDF Flow Chamber

1000-31



240-212 Sensor and 1000-4X Retractable Housing



Dimensions: inches (mm)
See Sensor table for
"X" dimensions.

200CR Conductivity/Resistivity Sensors

Sensor Selection:

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
- Suspended solids—four-electrode sensors have flat surfaces which are less likely to accumulate solids and are easier to clean than others. See the Thornton 2000 system data sheet for these applications.

| | |
|--|--|
| Cell Constant Accuracy: | $\pm 1\%$ of reading ($\pm 5\%$ for 240-401) |
| Cell Constant Repeatability: | $\pm 0.25\%$ ($\pm 2\%$ for 240-401) |
| Temperature Sensor: | Pt1000 RTD, (thermistor for 240-501) |
| Temperature Accuracy: | $\pm 0.1^\circ\text{C}$ at 25°C , except 240-501 |
| Cable Jacket Material: | 240-Series - PVC, 80°C rating 243-Series - Teflon, 200°C rating |
| Maximum Sensor Distance: | 200 ft (61 m) |
| Surface Finish (sanitary sensor): | Ra 8 microinches (0.2 micrometers), 316L SS is electropolished |

| Fitting | Insertion Length "X" in (mm) | Cable Length ft (m)/ Connector | Fitting Material | Range ($\mu\text{S}/\text{cm}$)* | Cell Constant (cm-1) | Electrode Material | Insulator Material | Max Pressure/Temp Psig (bar) at °F (°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*** | 1.45 (37) | 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 |
| 1.5" Tri-Clamp | 3.38 (86) | 1.5 (0.5)/S | Titanium | 0.02-600 | 0.1 | Titanium | PEEK | 150 (10) at 311 (155), 450 (31) at 77 (25) | 243E221† |
| 1.5" Tri-Clamp | 3.38 (86) | 1.5 (0.5)/S | 316L SS | 0.02-600 | 0.1 | 316L SS | PEEK | | 243E223† |
| 2.0" Tri-Clamp | 4.13 (105) | 1.5 (0.5)/S | 316L SS | 0.02-600 | 0.1 | 316L SS | PEEK | | 243E227† |
| 3/4" NPTM | 3.38 (86) | 1.5 (0.5)/S | Teflon/SS | 10-40,000 | 10 | Graphite | Noryl | 250 (17) at 200 (93) | 240-401 |
| 1" NPTM | 4.50 (114) | 1.5 (0.5)/S | PVDF/Epoxy | 20-1,000K | 50 | Graphite | Epoxy | 100 (7) at 200 (93) | 240-501†† |
| 3/4" NPTM | 1.35 (34) | 1.5 (0.5)/V | 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)/V | Teflon/SS | 0.02-600 | 0.1 | Titanium | PEEK | 250 (17) at 200 (93) | 240-236 |
| 1.5" Tri-Clamp | 3.35 (85) | None/V | 316L SS | 0.02-600 | 0.1 | 316L SS | PEEK | 150 (10) at 311 (155), 450 (31) at 77 (25) | 243E233† |
| 2.0" Tri-Clamp | 4.10 (104) | None/V | 316L SS | 0.02-600 | 0.1 | 316L SS | PEEK | | 243E237† |

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

† includes material certification to meet EN10204 3.1B. PEEK meets USP <88> Class VI requirements.

†† with a 50 constant sensor, the second channel must not be used.

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

V = Vario Pin sealed connector used with 58 080 20X patch cords only.

200CR Specifications

Functional

Ranges:

| | |
|---------------|---|
| Conductivity | 0.02 μ S/cm to 1000mS/cm |
| Resistivity | 1.0 Ω -cm to 50.0 M Ω -cm |
| TDS | (ppm/ppb) covers equivalent conductivity range |
| Concentration | 0-15% HCl, 0-20% H ₂ SO ₄ , 0-15% NaOH, by weight |
| Temperature | -40 to 200° C (-40 to 392° F) |

Resolution: 0.001 μ S/cm, 0.001 M Ω -cm, 0.01° C

Sensor Inputs: From Thornton conductivity sensors with Pt1000 RTD, via accessory patch cord.

Temperature Compensation: Automatic, referenced to 25°C for resistivity, conductivity, % rejection and TDS. Field selectable for standard high purity (Thornton/Light), cation/ammonia/ETA (power industry), or 75% isopropyl alcohol. Non-temperature compensated measurement is also standard, to meet USP <645> requirements. Concentration measurements also include specialized compensation for the specific material.

Outputs

Setpoints/Alarms: Four controlled setpoints can be set as high or low limits (or USP <645> limit for conductivity).

Any relay can be activated by multiple setpoints.

Relays:

Standard: 2 mechanical SPDT, 5 amp at 250 VAC or 30 VDC resistive load; Optional, additional: 2 AC-only, solid state, SPST, 1.5 amp, 250 VAC resistive load, 10 mA minimum. All relays have individually adjustable delay and hysteresis (deadband).

Analog output Signals:

Two optional 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. External isolation required with 50/cm sensor.

Performance

Accuracy: \pm 0.5% of reading or \pm 0.5 ohm, whichever is greater; \pm 0.25°C

Repeatability: \pm 0.1% of reading, \pm 0.13°C

Update Rate: All measurements and outputs, once per second

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

Analog output accuracy: \pm 0.05 mA within 15-30°C ambient

Environmental

Storage temperature: -40 to 70°C (-40 to 158°F)

Operating temperature: -10 to 55°C (14 to 131°F)

Humidity: 0 to 95% RH, non-condensing

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: Sealed, IP65, with back cover

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

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. DC power must be isolated from earth ground when using 50/cm sensor.

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

200CR Ordering Information

200CR Instruments

| Relays | Analog Outputs | Power | Part No. |
|--|----------------|------------------|---------------|
| 2 SPDT mechanical | 0 | 110 VAC (24 VDC) | 6220-1 |
| 2 SPDT mechanical | 0 | 220 VAC (24 VDC) | 6220-2 |
| 2 SPDT mechanical | 2 | 110 VAC (24 VDC) | 6222-1 |
| 2 SPDT mechanical | 2 | 220 VAC (24 VDC) | 6222-2 |
| 2 SPDT mechanical & 2 solid state, AC only | 2 | 110 VAC (24 VDC) | 6242-1 |
| 2 SPDT mechanical & 2 solid state, AC only | 2 | 220 VAC (24 VDC) | 6242-2 |

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

200CR Instrument Calibrators - NIST Traceable

| 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 | | |
| Calibrator Resistance | Calibration Point (0.1/cm cell) | | |
| Temp. | Temp. | | |
| 4 MΩ | 40 MΩ-cm | 104°C | 1864-01 |
| 100,000 Ω | 1MΩ-cm | 0°C | 1864-02 |
| Low Resistivity/High Conductivity Kit (includes 1864-03, -04) | 1865-02 | | |
| Calibrator Resistance | Calibration Point (0.1/cm cell) | | |
| Temp. | Temp. | | |
| 20,000 Ω | 200,000 Ω-cm | 104°C | 1864-03 |
| 1,000 Ω | 10,000 Ω-cm | 0°C | 1864-04 |
| UPW Calibrator | 1865-04 | | |
| Calibrator Resistance | Calibration Point (0.1/cm cell) | | |
| Temp. | Temp. | | |
| 1.818 MΩ | 18.18 MΩ-cm | 25°C | 1865-04 |

Adaptor; VP to standard connector, for calibrating a channel with VP patch cord: 58 080 102.

Retractable Housings for 240-212 Sensor

| Material | Connection | Pressure Psig (bar) | Temp °F (°C) | Part No. |
|----------|-------------|---------------------|--------------|----------------|
| CPVC | 1 1/2" NPTM | 100 (6.9) | 176 (80) | 1000-40 |
| PVDF | 1 1/2" NPTM | 100 (6.9) | 212 (100) | 1000-41 |
| 316SS | 1" NPTM | 150 (10.3) | 248 (120) | 1000-42 |

Accessories

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

* requires back cover above

Sensor Patch Cords

| Length | Connector | |
|-----------------|-------------------|-------------------|
| | 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 |

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

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

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 |

Used for side stream monitoring, verification and calibration with 240-201, 240-207, 240-214, 240-215, 240-217, 240-220 sensors

200CR Sensor Ranges

