Transmitters

Barton®

FCX
Series AII & AIIe

Electronic Transmitters

- Compact
- Cost Effective
- Reduced Cost of Ownership
- Ideal for:
  - Oil/Gas
  - Power
  - Chemical
  - Water/Waste Water
  - General Industrial
  - Food/Beverage

A single silicon crystal etched to exacting standards is at the core of Barton's latest generation of electronic transmitters. This micro capacitance sensor negates the effects of hysteresis and long term fatigue. Approved by various international regulatory agencies, the FCX AII and AIIe Series transmitters are intrinsically safe and explosion proof. From sealed sensing systems to high powered RTUs - for every application from natural gas to cryogenic liquids - the FCX measures, displays, alarms and outputs level, pressure and/or flow. Whether the requirement demands standard or high performance accuracy, the FCX provides years of trouble free service resulting in the ultimate control of both the process and long term maintenance costs.

- **FCX AII Series**
  - Premium performance
  - Gauge, absolute, differential pressure, flanged level, remote seal
  - Turndown to 100:1
  - HART compatible with optional Foundation Fieldbus, Profibus
  - Accuracy to ±0.07% of span
  - Stability to ±0.1% URL for 3 years
  - Response time to 40 mS
- **FCX AIIe Series**
  - Cost effective precision
  - Gauge pressure, differential pressure
  - Turndown of 30:1
  - HART compatible
  - Accuracy of ±0.1% of span
  - Stability of ±0.2% URL for 3 years

A closer look at the FCX AII and AIIe Series

Low Cost Ownership

Direct savings through:

- Interchangeable components
- Multiple stocking locations in the US, Canada and Europe
- Access to engineering specialists that can provide advice ranging from product applications to the specification of complete integrated measurement solutions

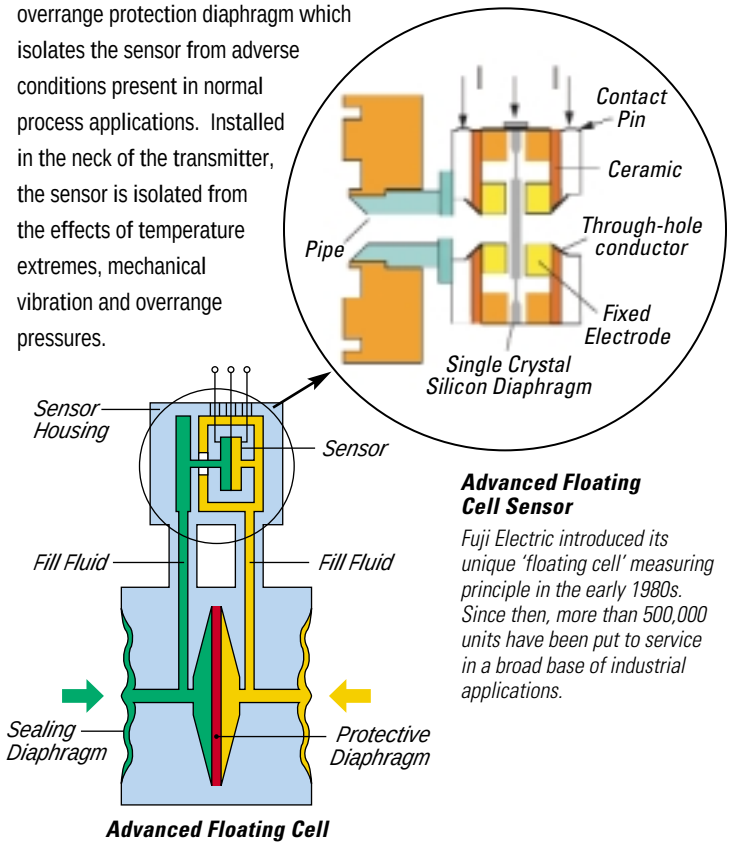
Fieldbus Compatible

The FCX AII series transmitter is well prepared to meet the requirements of the digital age. As option to the standard HART and Fuji compliant electronics, the AII can be supplied with digital electronics to support both IEC Foundation Fieldbus and Profibus specifications.

Existing AII transmitters in the field can be upgraded at an affordable cost through a simple electronics replacement. With appropriate electronics installed, Fieldbus or Profibus protocols are switch selectable.

Advanced Floating Cell Design

Barton's unique cell design incorporates an overrange protection diaphragm which isolates the sensor from adverse conditions present in normal process applications. Installed in the neck of the transmitter, the sensor is isolated from the effects of temperature extremes, mechanical vibration and overrange pressures.



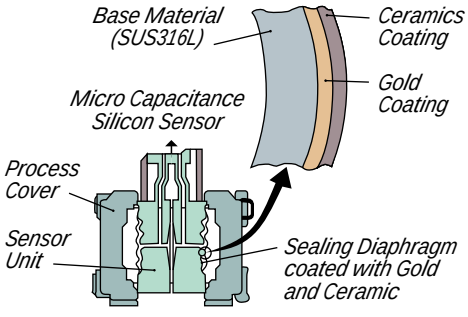
Advanced Floating Cell

Advanced Floating Cell Sensor

Fuji Electric introduced its unique 'floating cell' measuring principle in the early 1980s. Since then, more than 500,000 units have been put to service in a broad base of industrial applications.

Hydroseal Diaphragm

A unique 316L SS diaphragm coated with a layer of gold and a layer of ceramic eliminates Hydrogen penetration. The Hydroseal option for the AII series transmitter reduces penetration to 1/160th of 316 SS and 1/1600th of Hastelloy C-276.



Hydroseal Diaphragm

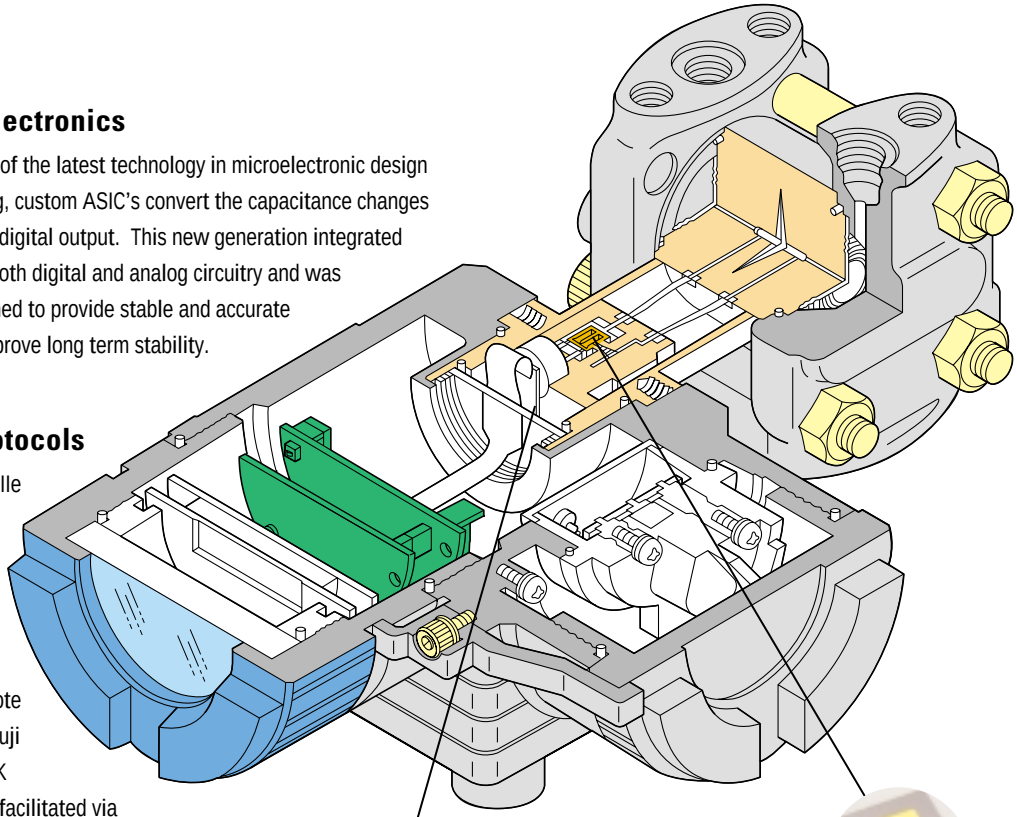
Programmable Linearization

In addition to supporting both linear and square root outputs, the AII and AIIe can output a current signal proportional to the volume of cylindrical tanks. Up to 14 level versus volume points can be entered to the memory of the transmitter's electronics.

...a cost effective, reliable, and high performance transmitter.

Enhanced Electronics

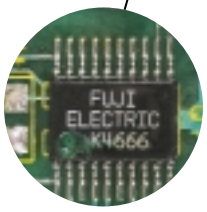
Taking advantage of the latest technology in microelectronic design and manufacturing, custom ASIC's convert the capacitance changes of the sensor to a digital output. This new generation integrated circuit combines both digital and analog circuitry and was specifically designed to provide stable and accurate conversions to improve long term stability.

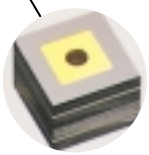


Multiple Protocols

Both the AII and AIIe are intelligent transmitters communicating in both HART (Highway Addressable Remote Transceiver) and Fuji protocols. Full FSK communication is facilitated via either a universal 275 or Fuji HHT handheld.

A simple electronics upgrade in the field converts the standard AII output to be compatible with both IEC Foundation Fieldbus and Profibus specifications.



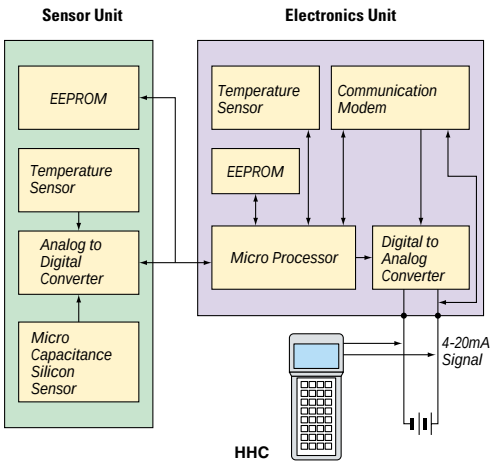


Micro Capacitance Silicon Sensor

A sensor etched from a single Silicon crystal is at the heart of every FCX transmitter. The highly elastic property of Silicon virtually eliminates hysteresis in a transducer that exhibits one quarter the fatigue of equivalent metal sensors. The single wafer construction technique results in repeatability of the manufacturing process and that translates directly to consistent, accurate and stable measurement performance. Hundreds of sensors are manufactured from each silicon wafer to ensure high yields, low manufacturing costs and practically no long term drift.

Fully Interchangeable

The transmitter electronics unit is fully interchangeable with any AII or AIIe series cell, irrespective of cell function or range. Configuration data is stored on separate EEPROMS, one in the sensor and the other in the transmitter electronics.



FCX AII Specifications

The FCX AII is a premium performance transmitter with a broad base of ranges and wetted materials including 316 SS, Hastelloy C276, Monel 400, and Tantalum. Intrinsically safe and explosion proof, the FCX AII can also be offered with a Hydroseal Diaphragm featuring excellent resistance to highly corrosive processes.

	Differential Pressure & Flow FKC			**Gauge Pressure** FKG			**Absolute Pressure** FKA			**Liquid Level** FKE		
Upper Range Limit	in. w.c. (psid)	mm w.c. (kPa)	mbar (bar)	psi	kPa (MPa)	bar	psi abs	kPa abs	bar abs	in. w.c. (psid)	kPa d	mbar d
Range: 1	4*	100	10	18	130	1.3	2.32*	16	0.16	125	32	320
2	24**	610	60	72	500	5	19***	130	1.3	520	130	1300
3	125	3175	320	435	3000	30	72	500	5	(72)	500	5000
4	520	(130)	(1.3)	1500	(10)	100	435	3000	30			
5	(72)	(500)	(5)	7000	(50)	500						
6	(435)	(3000)	(30)									

Safe Working Pressure										
	psi	kPa	bar	psi	mPa	bar	psi	kPa	bar	
	450	3200	32	145	1	10	72	500	5	
	1500	10000	100	215	1.5	15	72	500	5	Up to
	2300	16000	160	1300	9	90	215	1500	15	flange rating
	6000	42000	420	2175	15	150	1300	9000	90	
				10000	75	750				

Elevation/Suppression	–100% to +100% (zero plus span not to exceed URL)
Turn Down (Min. Span)	100 : 1 (1/100th of URL) * 10 : 1 (1/10th of URL) ** 60 : 1 (1/60th of URL) *** 80 : 1 (1/80th of URL)
Accuracy	± 0.07% of calibrated span for up to 10 : 1 turndown typical (see data sheets for further detail)
Sensor Temp Limit	–40° F to + 250° F (-40° C to + 120° C) for Silicone fill
Electronics Temp Limit	–40° F to + 185° F (-40° C to + 85° C)
Wetted Metallic Parts	316 (L) Stainless Steel, Hastelloy C276, Monel 400, Tantalum
Power Supply	11 – 45 VDC
Output Signal	4 – 20 mA
Comm./Protocol	FCX or HART Protocol IEC Foundation Fieldbus and Profibus (Optional)
Enclosure	IEC IP67 and NEMA 6/6P
Hazardous Locations	Intrinsically safe and/or flameproof (explosion proof) per CSA, FM, RIIS, ATEX
Options	Digital or analog indicator; lightning arrestor; stainless steel electronics housing; NACE specification; high temperature/high vacuum service; chlorine service; hydroseal diaphragm for corrosive service; tropicalization; material certification; process adapters

FCX AIIe Specifications

The AIIe series transmitter was designed to exceed the performance expectations of industrial process applications where economics is a key purchasing consideration. Offered in the most popular ranges and 316 stainless steel materials, the AIIe is an excellent choice for applications that require cost effective yet precision measurement.

	Differential Pressure & Flow FHC			**Gauge Pressure** FHG		
Upper Range Limit	in. w.c. (psid)	mm w.c. (kPad)	mbar (bar)	psi	kPa	bar
	125	3175	320	72	500	5
	520	13200	1300	435	3000	30
	(72)	(500)	(5)	1500	10000	100
Safe Working Pressure	psi	kPa	bar	psi	kPa	bar
	2300	16000	160	200	1500	15
				1300	9000	90
				2175	15000	150

Elevation/Suppression	–100% to +100% (zero plus span not to exceed URL)
Turn Down (Min. Span)	30 : 1 (1/30th of URL)
Accuracy	± 0.1% of calibrated span (up to 10:1 turndown) (see data sheets for further detail)
Sensor Temp Limit	–40° F to + 250° F (-40° C to + 120° C) for silicone fill
Electronics Temp Limit	–40° F to + 185° F (-40° C to + 85° C)
Wetted Metallic Parts	316 Stainless Steel, 316L Stainless Steel
Power Supply	11 – 45 VDC
Output Signal	4 – 20 mA
Comm./Protocol	FCX or HART Protocol
Enclosure	IEC IP67 and NEMA 6/6P
Hazardous Locations	Intrinsically safe and flameproof (explosion proof) per CSA, FM, RIIS, ATEX
Options	Digital or analog indicator; lightning arrestor; stainless steel electronics housing; NACE specification; degreasing; tropicalization; material certification; process adapters

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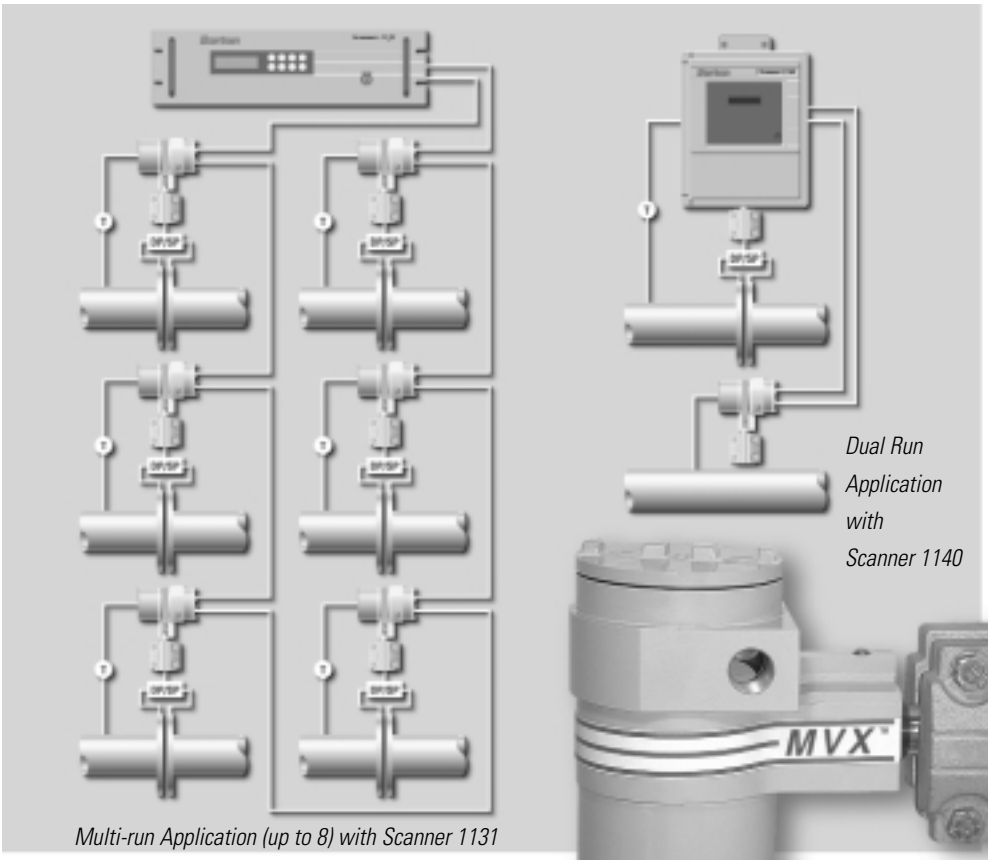
For representation in your area:

Document NF 00032 02 0504

NuFlo

NuFlo™

MVX™
Multi-Variable Transmitter



Multi-run Application (up to 8) with Scanner 1131

Dual Run Application with Scanner 1140

- **Powerful enhancement to NuFlo's Family of Scanner EFM/RTUs**
- **Scalable measurement and control platform for single to multistream flow runs**
- **Intrinsically safe, low power package**

Successfully applying the technology of multi-variable transmission to the specific requirements of natural gas takes an indepth understanding of the process and a committment to providing solutions.

After 60 years in the business of measuring, monitoring and control, NuFlo Measurement Systems is uniquely qualified, and proud to introduce, the right product for the job – the MVX Multi-Variable Transmitter. Built on the proven field experience of a patented, silicon-based DPE cell, the MVX Transmitter combines the accurate and stable measurement of differential pressure, static pressure and temperature with high speed input sampling/averaging and communications capabilities.

In combination with NuFlo's 1140 and 1131 EFM/RTUs, the MVX provides the natural gas industry with a truly scalable measurement and control platform for single stream wellhead applications through to multi-stream (up to 8) transmission measurement station applications.

Specifications

Environmental	Operating Temperature	-40° F to +140° F (-40° C to +60° C)
	Relative Humidity	0-95%, non-condensing
	Enclosure	NEMA 4, fiberglass reinforced plastic
	Noise Immunity	Less than 0.5% shift in any reading when exposed to 80 Mhz to 1 Ghz at a level of 3 V/m
Hazardous Area Approvals		CSA Intrinsically Safe, Class 1 Div 1, Groups C & D CSA Non-Incendive, Class 1, Div 2, Groups C & D
Connections	Electrical	(2) 1/2" NPT conduit connections (one for RTD Assembly)
	Process	(2) 1/4" NPT on 2-1/8" centers
	RTD Assembly	1/2" NPT compression fitting for 0.250" ID straight thermowell (field adjustable insertion length to 12" maximum)
Materials	Cell Process Covers	Carbon Steel or 316 Stainless Steel
	Bolting	Carbon Steel or 17-4PH Stainless Steel
	Electronics Housing	Epoxy coated aluminum
Power Supply	Input Voltage	9-30 Vdc
	Power Consumption	2-10 mA typical, depending on sampling speed and communications interval
A/D System	Resolution	16 bits
	Linearity Error	±0.015% typical
	Throughput	User settable from 16 per sec to 1 every 32 secs
Communications	Signal	RS-485, 2 wire half duplex
	Baud Rates	1200, 2400, 4800, or 9600, software selectable
	Parity	None
	Stop Bits	1
	Termination	Depluggable, elevator style terminal blocks RJ-45 for future local terminal device
	Protocol	Modbus RTU mode

Process Variables	Differential Pressure	0-150"wc 0-300"wc 0-500"wc	Safe Working Pressure	2500 psig on all ranges up to and including 0-2500 psi 3750 psig on 0-3000 psig range
	Static Pressure	0-300 psi 0-500 psi 0-1000 psi 0-1500 psi 0-2500 psi 0-3000 psi	Accuracy	± 0.1% of span
			Stability	±0.1% of span/6months
			Temperature Effect	±0.25%/100° F
			Static Pressure Effect-Zero	±0.1%/2500 psig
			Temperature Range	-50 to +250° F
			Type	100 ohm, 3 wire platinum RTD (DIN standard)
			Accuracy (Transmitter Only)	±0.45° F at room temperature
			Temperature Effect (Transmitter Only)	±0.01° F measurement error/ ° F ambient change

NuFlo Measurement Systems
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For representation in your area:

Document NF 00057 02 0504

Barton®

Model 3920

Electronic RTD Temperature Transmitter

- MC approved for custody transfer
- +/- 0.1% accuracy
- +/- 0.005% of span repeatability
- Excellent long-term stability
- High noise immunity
- Self supporting bracket free mounting
- Upscale burnout protection
- CSA approved
- No handheld required

The Barton Model 3920 is an economical temperature transmitter that uses a platinum RTD to precisely convert process temperature to a 4-20mA current output. A broad variety of instrument enclosures will suit any installation requirement from wall mount to explosion proof and the transmitter is field proven to be extremely reliable.

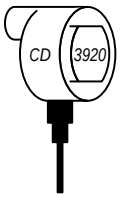
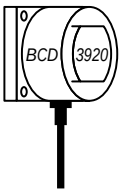
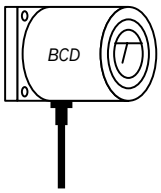
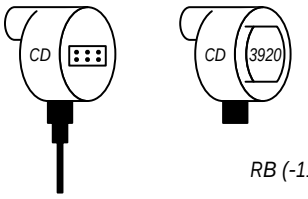
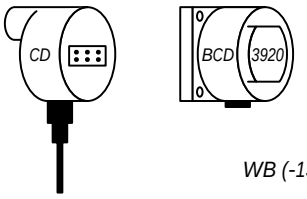
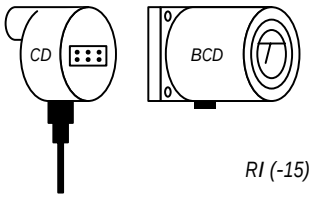
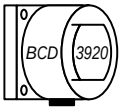
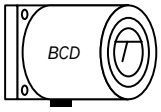
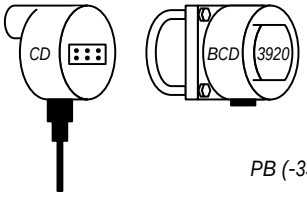
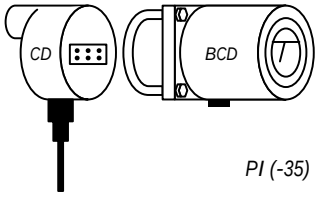
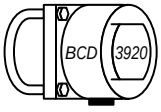
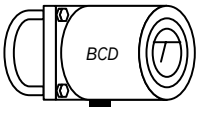
The 3920 accepts an input signal from either a 2 or 3-wire 100 ohm RTD, and employs constant current excitation that results in true lead length compensation. For narrow temperature spans (typically less than 55°C) the 3920 is optionally available with a 1000 ohm RTD input to effectively increase measurement precision and resolution. The 3920 is well suited to energy transfer calculation applications when assembled to accept (2) RTD inputs and output a signal proportional to the difference in measured temperatures. Finally, for the most unique applications, the 3920 can also be provided with a reverse temperature or linear with resistance output.

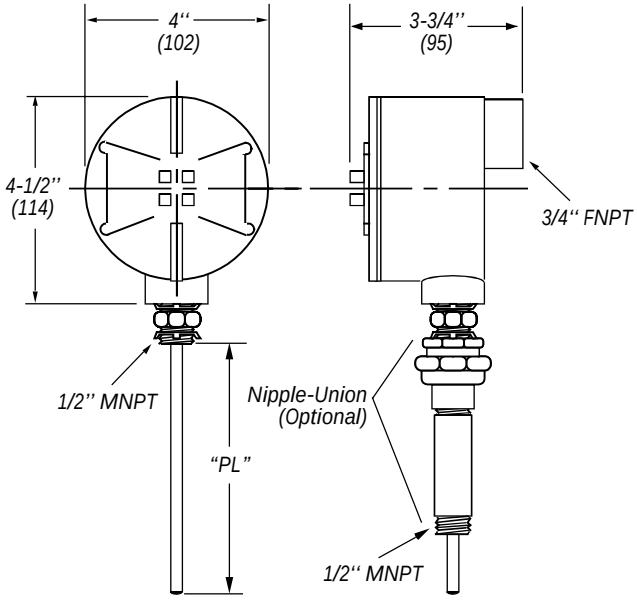
A “hockey puck” electronics design allows instrument personnel to quickly and easily effect repairs in the field, with minimal down time. Prompt deliveries are assured by maintaining a stock of semi-finished goods and finishing assembly to order. Temperature ranges are available between –200°C and 540°C. The zero temperature is set at the factory based on the minimum specified temperature and both zero and span are field adjustable across a +/-10% and 2:1 turndown ratio respectively.

To compliment our transmitter offering, standard thermowells are stocked in various lengths, process connections and materials while custom wells will be manufactured to suit any application requirement. Technical and application engineering assistance is available to help you obtain the best possible solution for your unique needs.

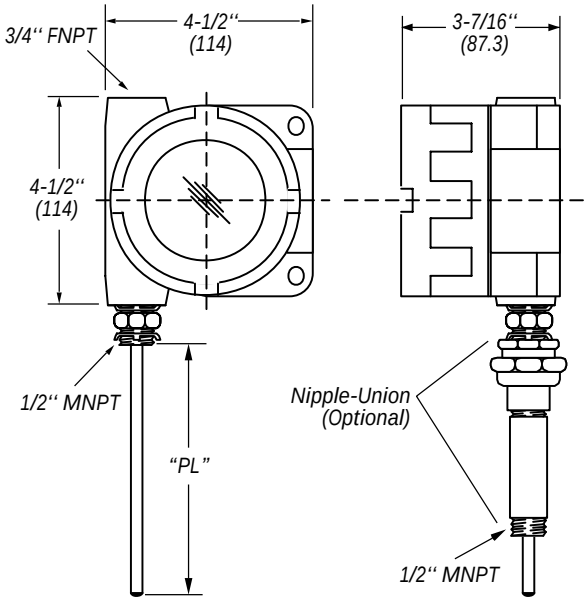
Model 3920 Electronic RTD Temperature Transmitter

Input	RTD platinum, 2-wire (integral) or 3-wire (remote sensing); 1 mA maximum sensor current	
Resistivity	0.00385 Ω / Ω /°C, 100 Ω at 0°C (DIN standard) 1000 Ω recommended for spans less than 55°C (100°F)	
Temperature Range	-300°F to +1000°F (-200°C to +540°C)	
Adjustments	Twenty-two turn potentiometers	
Span	Adjustable across 2:1 ratio of full scale span	
Zero	± 10% of full scale span centered at the factory ordered zero	
Performance		
Accuracy	± 0.1% of span excluding RTD Standard RTD accuracy 0.5°C @ 0°C, 2.3°C @ 500°C	
Ambient Temp. Range	-40°F to + 180°F* (-40°C to +82°C)	
Temperature Effect	± 0.01% of span / °F (± 0.02% of span / °C)	
	*Where process temperature exceeds 250°F (120°C) please specify a 3-wire RTD and remote mount transmitter electronics.	
Power Input	12 VDC - 42 VDC, measured at input terminals Loop Load Effect ± 0.002% of span/volt change	
Output Load	R (ohms)= (Supply voltage - 12)/0.02 (600 ohm @ 24 VDC)	
Output	4-20 mA (limited to 30 mA max)	
Weight	Net Weight lbs (kg)	Shipping lbs (kg)
Electronic module	.28 (0.13)	1 (0.45)
Blind housing	1.75 (0.79)	3 (1.4)
Indicating housing	4 (1.81)	5 (2.3)
Agency Approvals	CSA Explosion proof Class 1, Division 1, Group C and D; Class II, Group E, F and G; Class III; Enclosure 4	
	CSA Explosion proof Class 1, Division 1, Group B, C and D; Class II, Group E, F and G; Class III; Enclosure 4 (optional)	
	CSA Intrinsic Safe (non-indicating models only), Class 1, Division 1, Groups A, B, C and D; Entity Parameters, 27 V max, 270 Ω min or 28 V max, 300 Ω min.	
	Measurement Canada G-190 (optional)	
Accessories	See Series 20 RTD brochure for information on thermowell and probe options	

	BLIND	BLIND - GROUP B	INDICATING
INTEGRAL	 IB (-01)	 IB-GB (-03)	 II (-05)
REMOTE	 RB (-11)	 WB (-13)	 RI (-15)
REMOTE - NO PROBE	 RB-NP (-21)	 WB-NP (-23)	 RI (-25)
RPE MT	N/A	 PB (-33)	 PI (-35)
RPE MT - NO PROBE	N/A	 PB-NP (-43)	 PI-NP (-45)



(IB) HOUSING



(II) HOUSING

Ordering Information – RTD Temperature Transmitter

MODEL 3920 _____ (min) to _____ (max) **Degrees C/F**

1. Temperature Range
Specify range, minimum to maximum and °C or °F X-X°C/F[7]

2. RTD Input Type

2 Wire (Integral)	2W
3 Wire (Remote)	3W

3. Transmitter Output

4-20 mA	20

4. Output Type

Linear with temperature	LN
Differential temperature	DT
Reverse Output	RO
Linear with Resistance	UC

5. Housing

None, Electronic Module Only, Aluminum (No probe supplied)[1]	EM
None, Electronic Module Only, Wall Mountable (No probe supplied)[1]	WL
Integral, Hazardous Location, Blind [2 (3 with GB)]	IB
Integral, Hazardous Location, 0-100% Indicating[3]	II
Remote, Hazardous Location, Blind[2]	RB
Remote, Hazardous Location, Blind Wall Mountable [2 (3 with NP)]	WB
Remote, Hazardous Location, 0-100% Indicating, Wall Mountable [2 (3 with NP)]	RI
Remote, Hazardous Location, Blind, 2" Pipe Mount [2 (3 with NP)]	PB
Remote, Hazardous Location, 0-100% Indicating, 2" Pipe Mount [2 (3 with NP)]	PI

6. Sensors

100 Ohm Fixed RTD	FX
100 Ohm Spring Loaded RTD[4]	SL
1000 Ohm Fixed RTD (Narrow Temperature Span)	NF
1000 Ohm Spring Loaded RTD (Narrow Temperature Span)	NS
No Probe Supplied (For Integral Configurations IB, II)	NP
No Probe Supplied (For Remote Configurations RB, WB, RI, PB, PI)	NP

7. Special Requirements

Additional RFI Protection	RF
CSA Group B Explosion Proof Housing (Applicable to IB or RB Housings only)	GB
CSA Parametric Intrinsically Safe Approval (Blind units only)	IS
MC approval per CS04-191	CA
Union Nipple 3"	N3
Union Nipple 6"	N6
Ceramic Terminal Block (over 290°F) RB, RI, PB PI Housings only	CB
Extra High Accuracy RTD	HA
Long Length RTD (over 12 inches)	LL
Special Scale (Specify) II, RI and PI housings only	SS
Other, Submit drawings and / or Specifications	SR
Anti-fungus tropicalization	TR

1. CSA General Purpose approved
2. CSA Explosion Proof, Class I, Division I, Group C and D; Class II, Groups E, F and G; Class III; CSA Enclosure 4
3. CSA Explosion Proof, Class I, Division I, Group B, C and D; Class II, Groups E, F, G; Class III; CSA Enclosure 4
4. Spring loaded probes require thermowell for CSA approval
5. CSA Intrinsically safe, Entity parameter Class I, Division I, Groups A, B, C and D; when installed per Canadian Dwg 3920-9000-O
6. Probe length or Thermowell dimension must be specified; narrow temperature is required when span is less than 50°C or 100°F
7. Select a remote transmitter (RB) for process temperatures exceeding 250°F

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NuFlo

Barton®

Model 3940

Temperature Transmitter with Hart Communications

- **Stable**
  - Continuous self-diagnostics
  - < 0.1% per year
- **Accurate**
  - < 0.1%
  - Rapid response
- **Versatile mounting options**
  - DIN Rail
  - Explosion proof
- **Easy to use**
  - Calibrate without handheld
- **HART Communications**
  - Set up, configuration & calibration

The Barton 3940 Temperature Transmitter is a Smart, HART compatible, isolated, two-wire, transmitter that accommodates any one of eleven types of thermocouples, six types of RTD's, millivolt or ohm inputs. Once input type is selected the 3940 is precision linearized over the entire usable range of the selected sensor. This transmitter is simple to configure and operates like a high performance analog transmitter.

Numerous advanced features are achieved through the use of digital signal processing and micro-controller technologies. Typical of these features are the precision linearization, the independent zero and full-scale settings as well as digital filtering. Other advanced features, such as automatic self-diagnostics and exceptional stability, are continuously active and transparent to the user.

The 3940 transmitter can also accept one of two optional plug-in displays. One, an inexpensive, single line display provides low-cost, local indication of the measured temperature. The other is a two-line display that provides a local indication of the process value and alarms. Both displays facilitate local configuration and ranging of the transmitter.

The standard configuration includes a 3-wire 100 ohm platinum RTD. This element is installed in a 6.3 mm (0.25") OD, 316 SS sheath and connected to the thermowell with a 12.7 mm (1/2") NPT. The Barton 3940 Temperature Transmitter can communicate with any HART Communicator for various setup, configuration and calibration procedures.

Ordering Information – RTD Temperature Transmitter

MODEL 3940 0 °C to 100 °C (32 °F to 212 °F)

Model 3940 is a Smart, Hart Compatible Temperature Transmitter. Standard features include: 4-20 analog output, 3-wire RTD input, output linear with temperature.

1. Temperature Range				
Specify range, minimum to maximum and °C or °F	X-X° C/F			
2. Housing				
None, Electronic Module Only, Aluminum (No probe supplied) GP		MBL		
None, Electronic Module Only, Indicating 1 line display w/o probe GP		MI1		
None, Electronic Module Only, Indicating 2 line display w/o probe GP		MI2		
Integral, Hazardous Location, Blind		IBL		
Integral, Hazardous Location, Indicating, 1 line display		II1		
Integral, Hazardous Location, Indicating, 2 line display		II2		
Remote, Hazardous Location, Wall Mount, Blind		WBL		
Remote, Hazardous Location, Wall Mount, Indicating, 1 line display		WI1		
Remote, Hazardous Location, Wall Mount, Indicating, 2 line display		WI2		
Remote, Hazardous Location, 2" Pipe Mount, Blind		PBL		
Remote, Hazardous Location, 2" Pipe Mount, Indicating, 1 line display		PI1		
Remote, Hazardous Location, 2" Pipe Mount, Indicating, 2 line display		PI2		
3. Sensors				
100 Ohm Fixed RTD			FX	
100 Ohm 3 Spring Loaded RTD			SL	
Thermocouple - Fixed or Spring Loaded			TC	
No Probe Supplied (For Integral Configurations)			NP	
No Probe Supplied (For Remote Configurations)			NP	
4. Special Requirements				
CSA Group B Explosion-proof housing (applicable to remote housings only).				
Union Nipple 3" (IBL, II1, or II2 only)				N3
Union Nipple 6" (IBL, II1, or II2 only)				N6
High Accuracy RTD (IBL, II1, or II2 only)				HA
Long Length RTD (over 12 inches) (IBL, II1, or II2 only)				LL
Temperature Bath Calibration (4 points between -25 to 260° C (31 to 500° F)				TB
Ceramic Terminal Block (required temperatures in excess of 290° F - applicable to remote housing)				
Other, Submit drawings and / or Specifications				SR

1. Non-indicating transmitter require HART HC275 Hand Held Communicator or equivalent for setup and configuration purposes.
2. Hazardous Location housings are CSA Explosion Proof, Class I, Div I, Groups B, C, D; Class II, Groups E, F, G; Class III; CSA Enclosure 4.
3. Remote Transmitters required for temps in excess of 120° C (250° F).
4. Spring loaded probes require thermowell for CSA approval.
5. Probe length or Thermowell dimension must be specified.
6. Consult Factory when ordering transmitters with thermocouple input.

SENSOR INPUT	RANGE, °F	ACCURACY	RANGE,°C	ACCURACY
Thermocouple Type B	+109 to +3,308° F	±0.99° F	+43 to +1,820° C	±0.55° C
Thermocouple Type C	+32 to +4,208° F	±0.72° F	0 to +2,320° C	±0.40° C
Thermocouple Type E	-454 to +1,832° F	±0.18° F	-270 to +1,000° C	±0.10° C
Thermocouple Type J	-346 to +2,129° F	±0.27° F	-210 to +1,200° C	±0.15° C
Thermocouple Type K	-454 to +2,502° F	±0.27° F	-270 to +1,372° C	±0.15° C
Thermocouple Type L	-328 to +1,652° F	±0.27° F	-200 to +900° C	±0.15° C
Thermocouple Type N	-454 to +2,372° F	±0.36° F	-270 to +1,300° C	±0.20° C
Thermocouple Type R	-58 to +3,214° F	±0.81° F	-50 to +1,768° C	±0.45° C
Thermocouple Type S	-58 to +3,214° F	±0.90° F	-50 to +1,768° C	±0.50° C
Thermocouple Type T	-454 to +752° F	±0.18° F	-270 to +400° C	±0.10° C
Thermocouple Type U	-328 to +1,112° F	±0.18° F	-200 to +600° C	±0.10° C
100Ω Platinum RTD DIN Curve (α = 0.00385)	-328 to +1,000° F	±0.09° F	-200 to +540° C	±0.05° C
100Ω Platinum RTD SAMA Curve (α = 0.003923)	-328 to +1,000 F	±0.09° F	-200 to +540° C	±0.05° C
Call Factory for 100Ω Ni, 120Ω Ni, and 10Ω Cu				
Millivolt	-15 to 115mV	±0.006 mV		
Ohm	0 to 500 Ω	±0.002 Ω		

General Specifications – Standard Series RTD Temperature Transmitter

TRANSMITTER ACCURACY:

± 0.01% of the millivolt or ohm equivalent input reading, or the value from the Accuracy Table, whichever is greater; plus ±0.04% of the span. For thermocouples, add ±0.5° C (0.9° F) for cold junction effect.

Accuracy includes transmitter repeatability, hysteresis and linearity as well as A/D conversion error, analog output error, line voltage effects, humidity effect under non-condensing conditions, vibration effect to 2g's & 500Hz.

STANDARD RTD ACCURACY:

±0.32° C @ 0° C
±2.3° C @ 500° C
0.00385 Ω/Ω/° C

TRANSMITTER AMBIENT TEMPERATURE EFFECT:

One-half the transmitter accuracy per 28° C (50° F).

TRANSMITTER REPEATABILITY:

One-half the transmitter accuracy.

COLD-JUNCTION COMPENSATION:

Digital self-correcting over the ambient temperature range to ±0.5° C.

LINEARIZATION:

Thermocouple and RTD linearization to ±0.05°C. Custom linearization with 22 point curve via HART® Communications.

OUTPUT:

Analog:	Two wire 4 to 20mA.
Digital:	HART® simultaneous communication

OUTPUT RANGING ADJUSTMENTS:

Analog Zero:	100% of Sensor range – Noninteracting
Analog Full-scale:	Normal or Reverse Acting

LONG TERM STABILITY:

Stability deviation per year is less than: (0.04% of output span + 0.05% of the milivolt or ohm equivalent reading.)

OPERATING TEMPERATURE RANGE:

-40°C to 85°C (-40° F to 185° F)	Electronics
-20°C to 70°C (-4° F to 158° F)	Display (full visibility)
-40°C to 85°C (-40° F to 185° F)	Display (with reduced visibility)

INSTRUMENT CONNECTION:

1/2" NPT

STORAGE TEMPERATURE RANGE:

-50° C to 85° C; -58° F to 185 °F

DAMPING:

Factory selectable time constant (63%) from 0 to 32 sec.

FAILSAFE:

User settable to 3.6 mA or 23 mA or user specified value.

MOUNTING POSITION:

No effect on measurement value.

WEIGHT:

Module only: 0.2 kg (0.4 lbs.)
Explosion proof: 1.6 kg (3.5 lbs.)

ISOLATION:

Input to Output 500 VAC

INPUT IMPEDANCE:

Greater than 1 MΩ

POWER SUPPLY:

The transmitter operates on 12 to 42 VDC (30 VDC for I/S installations) with no load. Transmitter is protected against reverse polarity connection.

LOAD LIMITATIONS:

Loop resistance including optional indicator:
R (KΩ) = (Supply Voltage - 12 VDC) / (23 mA)
For communication with HART Handheld Communicator, a minimum of 250 Ω is required.

INTERCHANGEABILITY:

Fully interchangeable without field calibration.

ELECTROMAGNETIC COMPATIBILITY (CE COMPLIANCE):

Transmitter operates within specification in fields from 20 to 1,000 MHz with field strengths to 30 V/m. Meets EN 50082-1 Generic Immunity Standard and EN 55011 Compatibility Emissions Standard.

DYNAMIC RESPONSE, EXCLUDING TEMPERATURE SENSOR:

UPDATE RATE:
150 milliseconds (7 times per second), typical.

RESPONSE TO STEP CHANGE:
250 milliseconds, minimum; 1 second, typical.

START-UP TIME: 7 sec.
Operation to specification less than 30 sec.

AMBIENT TEMPERATURE CHANGE:
Self-correcting for ambient temperature changes up to 20° C/hr.

HAZARDOUS LOCATION CERTIFICATIONS:

Explosion Proof:

Explosion Proof Housings available with and without windows; CSA listed for Class I, Div I Group, C, & D; Class II, Div I & II, Groups E, F & G, Class III and enclosure 4, Group B optional.

Nonincendive:

Transmitter is CSA rated nonincendive in Class I, Div II, Groups A, B, C & D; Class II, Div II, Groups F & G, Class III, Div II.

Intrinsic Safety:

The Intrinsically Safe Model 3940 is CSA and FM listed for Class I, Div I, Groups A, B, C & D & Class II, Div I, Groups E, F, & G, & Class III, Div I, when installed per AIC Drawing 6022588, Rev B.

Barrier Entity Parameters:

30 VDC Max
240Ω Min.

OPTIONS:

THERMOWELLS:
Order as required. See Series 20 Product Bulletin

MOUNTING:
2" Pipe Yoke for XP housing
DIN Rail Mounting Adapter

RTD:
Extra high accuracy
Spring loaded probe, supplied with thermowell
Armoured flexible leads.
Not available as explosion proof

PROBE:
Nipple union 76 mm (3") or 152 mm (6")

HOUSING:
Module only
Din rail mount
Explosion proof
Remote mount (Series 20 Sensor)
Explosion proof - Group B

DISPLAYS
Includes LCD
Two-button keypad configures & calibrates

One-Line: Local Display and Keyboard
4 digits and minus sign, decimal point
6 mm (0.25") numerals
Responds with codes during programming and calibration

Two-Line: Smart Local Display and Keyboard
Line one displays 4 digits, minus sign, decimal point and engineering units
Mid line displays analog bar graph of output current
14 segment, 2 mm x 40 mm (0.08" x 1.5")

STANDARD CONFIGURATION:

Sensor Input	RTD
LRV (4mA)	0° F Lower Range Value
URV (20mA)	200° F Upper Range Value
Damping	0 seconds
Output	Linear with Temperature
Failsafe	Upscale (23 mA)

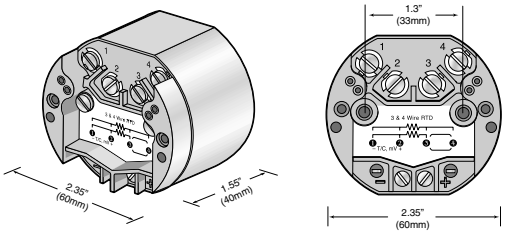
ORDERING INFORMATION:

Specify calibration.

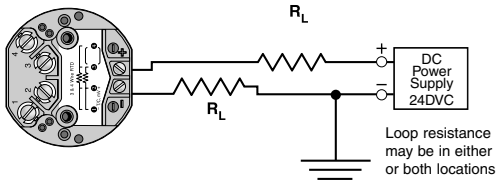
NOTE:

Specifications are determined with the factory default software settings or with the various software parameters set to optimize the performance for a given specification.

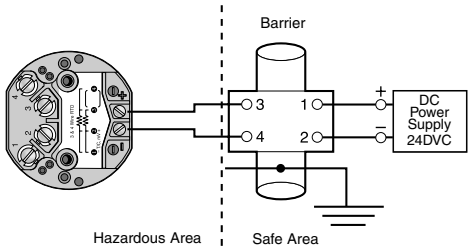
Dimensions



Connections



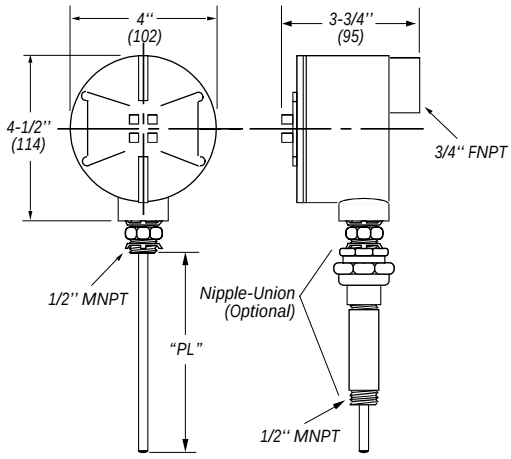
INTRINSICALLY SAFE INSTALLATION



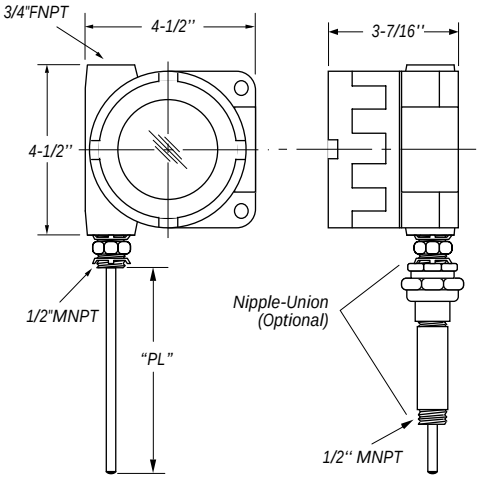
Device Description Function Map

Display Data (Read Only)	*Process Variable in EGUs* *Process Variable in mA Output* *Process Variable in % of Range* *Lower Range Value (LRV)* *Upper Range Value (URV)*
Review Setup (Read Only)	*Sensor Setup Information* *Connection* *Linearization* *Lower Range Value (LRV) in EGU's* *Upper Range Value (URV) in EGU's* *Offset Curve Status* *Failure Detection System* *Fail Safe Report* *Line Frequency & Filter* *Damping* *Xmtr Serial Number* *Sensor Serial Number*
Transmitter Setup	*Input Setup* *Output Setup* *Fail Safe Setup* *Output Trim* *Other Setup*
Transmitter Identification	*Tag Setup* *Device Information (Read Only)*
Diagnostics	*Xmtr Internal Diagnostics* *Xmtr Internal Variables (Read Only)*

Housing Dimensions



(IB) BLIND HOUSING



(II) INDICATING / BLIND HOUSING WITH GROUP B OPTION

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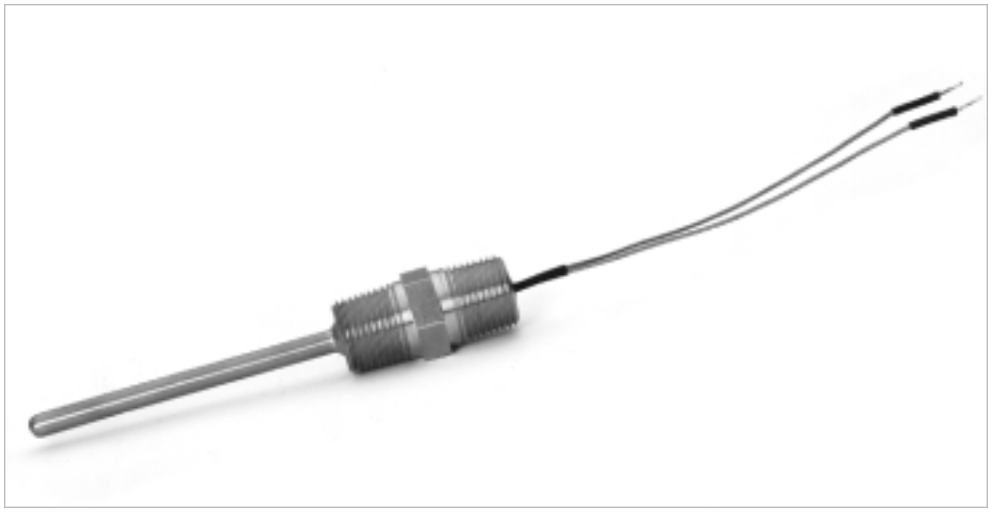
NuFlo

Barton®

Series 20

Resistance Temperature Detectors (RTD)



- **RTD Advantages:**
  - Stability
  - Accuracy
  - Long life
- **Ranges (Platinum):**
  - -200°C to 540°C
  - (-320°F to 1000°F)
- **Recommended Practices:**
  - Use shielded twisted conductors
  - Maximum cable lengths of 75 m (225 ft)
  - Do not sharply bend leads
  - Direct couple 2 wire RTDs
  - Remote couple 3 wire RTDs

Barton RTD assemblies are designed to provide accurate, stable temperature measurements based on the DIN 43760 platinum, 100 ohm-base resistance element (0.00385 Ω/Ω/°C) element. (Other standards, base resistances and materials are available).

Platinum RTDs are considered a most stable temperature sensor between -200 and 540°C. They show almost no calibration drift with time and their stability, wide temperature range, near linear output and cost effectiveness make them a popular choice for the most demanding applications.

To ensure quick response and accurate readings, the RTD is tip sensitive with active measurement occurring in the first 25 mm (1") of the probe assembly. The inside of the SS sheath is filled with silica and sealed from contaminants with high temperature epoxy.

As a "simple device" all Series 20 RTDs are intrinsically safe when used with an appropriate intrinsic safety barrier. An optional terminal housing provides the assembly with a CSA Class 1, Division 1, Group C and D; Class II, E, F, G; Class III; Explosion-proof certification. A Groups B, C and D enclosure is optionally available. The assembly is a certified weatherproof Enclosure 4.

As an accessory to the Series 20, NuFlo can provide (see table on the reverse side for details) a broad variety of thermowells to isolate the RTD probe assembly from process pressures and forces. When ordered together, a fixed RTD probe is manufactured to a precise length such that it is in constant contact with the inside bottom of the thermowell. This RTD to thermowell contact results in efficient temperature transfer and fast response to process temperature changes. For retrofit applications where the RTD is supplied without a thermowell, spring loaded RTDs are recommended to provide the additional tolerance required to ensure an appropriate RTD to thermowell fit.

General Specifications – Standard Series 20 RTD Probes

Element	100 ohm Platinum	**Connection**	1/2" x 1/2" MNPT Spud	**Terminal**	
Probe	1/4" O.D.		Fixed or spring-loaded	**Housing**	Hazardous Location
Material	316 S.S.	**Leads**	Standard - 6"	(optional)	3 terminal duplex strip
		Accuracy	± 0.2 Ω at 0°C		3/4" NPT conduit
Sealant	High temperature epoxy		± 3.0 Ω at 500°C		connection
Length	Specified by customer				Epoxy coated Aluminum

Ordering Information – Series 20

RTD SERIES 20

1. Number of Leads
- 2-Wire — 2W
- 3-Wire — 3W

2. Element Type
- Platinum-0.00385 Ω/Ω/°C – 100 ohm (Std) — 38
- Other (Please Specify) — XX

3. Probe
- Fixed — FX
- Spring-Loaded — SL

4. Length
- Measured from bottom of spud to probe tip
  Specify units (inches, mm) — Specify

5. Enclosure
- None — 00
- Standard Terminal Housing — TH

6. Options
- None — 00
- Union Nipple – 3" — N3
- Union Nipple – 6" — N6
- Ceramic Terminal Block, over 290°F — CB
- Extra High Accuracy RTD
  (± 0.01°C @ 0°C ± 0.38°C @ 500°C) — HA
- Long Length RTD Over 12 inches — LL
- Other, Submit Drawings and/or Specifications — SR
- CSA Group "B" Explosion Proof Terminal Housing — GB

RTD Thermowells

Barton stocks over 100 thermowells comprising of different bores, process connections, materials of construction, and dimensions. The attached list indicates our most popular models only. Please contact your Barton representative for other stocked thermowells.

Nominal Pipe Size	"U" Dimension Length	3/4" NPT Part Number	1" NPT Part Number
3/4 or 1"	1-3/8"	1315-1910T03	1315-1910T07
2 to 3"	2"	1315-1752T	1315-1755T
2 to 4"	2- 1/2"	1315-1758T	1315-1761T
4 to 8"	4-1/2"	1315-1778T	1315-1781T
10 to 12 "	7-1/2"	1315-1814T	1315-1817T

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