

## 15A, 13A, and 13HA Series Pneumatic d/p Cell<sup>®</sup> Transmitters



These transmitters measure differential pressure and transmit a standard pneumatic signal to receivers which may be several hundred metres or yards away.

### PROVEN DEPENDABILITY

Foxboro d/p Cell Transmitters have been the standard of process industry ever since Invensys Foxboro developed them more than 30 years ago. Many thousands of successful, trouble-free installations have demonstrated the exceptional dependability of these outstanding transmitters.

### APPLICATION VERSATILITY

These transmitters are used in flow, liquid level, density, and low pressure measurement applications. They offer wide span adjustability and broad zero suppression and zero elevation capabilities within the range limits for each series. They are ideal for the most demanding applications.

### EASE OF MAINTENANCE

The simple design of the topworks and the field-replaceable capsule makes servicing these transmitters exceptionally easy and economical. Interchangeability of most of the topworks parts with other Foxboro pneumatic force balance transmitters provides further savings to the user by minimizing spare parts inventory.

**FUNCTIONAL SPECIFICATIONS**

**Static Pressure, Span, And Range Limits**

Series	Static Pressure Limit			Capsule Code	Span Limits(a)			Range Limits(b)		
	MPa	psi	bar or kg/cm <sup>2</sup>		kPa ΔP	inH <sub>2</sub> O ΔP	mbar ΔP	kPa ΔP	inH <sub>2</sub> O ΔP	mbar ΔP
15A	3.5	500	35	L	1.3 and 6	5 and 25	13 and 60	±12.5	±50	±125
13A	14	2000	140	M	5 and 62	20 and 250	50 and 620	±62	±250	±620
				H	50 and 210	200 and 850	500 and 2100	±210	±850	±2100
13H	40	6000	400	M	5 and 62	20 and 250	50 and 620	±62	±250	±620
				H	50 and 210	200 and 850	500 and 2100	±210	±850	±2100

(a) See Optional Capsule Materials (13A Series Only) for span limits of 13A4 (Monel capsule construction).

(b) Nonzero-based ranges require an optional zero elevation or suppression kit. See Suppressed-Zero and Elevated-Zero Ranges.

Upper and lower range values must not exceed range limits. Negative numbers indicate a higher pressure on the normal "low side" of the transmitter.

**Mounting**

Transmitter mounts direct to the process piping or onto a nominal DN 50 or 2 in pipe. A bracket for pipe mounting is always supplied.

**Air Connections**

The supply and output connections are tapped for 1/4 NPT.

**Output Signal**

20 to 100 kPa, 3 to 15 psi, or 0.2 to 1.0 bar or kg/cm, as specified.

**Air Consumption Under Normal Operation**

0.42 m<sup>3</sup>/h (0.25 cfm) at standard conditions.

**Suppressed-Zero and Elevated-Zero Ranges**

The optional zero elevation or zero suppression kits (Model Code Optional Selection -L or -R) allow adjustment of the measured pressure range within the full range limits of the capsule. These kits may be added in the field. Refer to Figures 1 and 2 for examples of suppressed-zero and elevated-zero ranges.

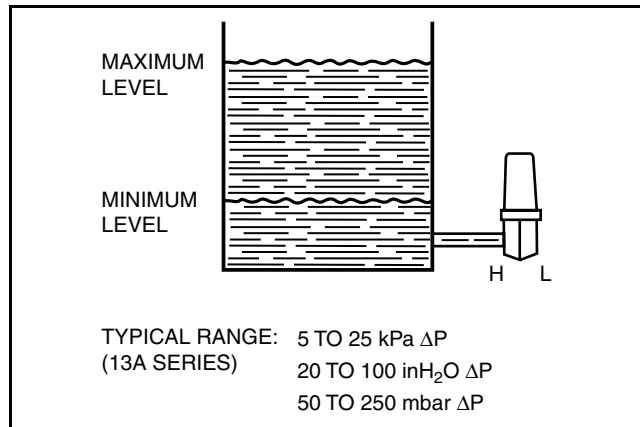


Figure 1. Zero Suppression

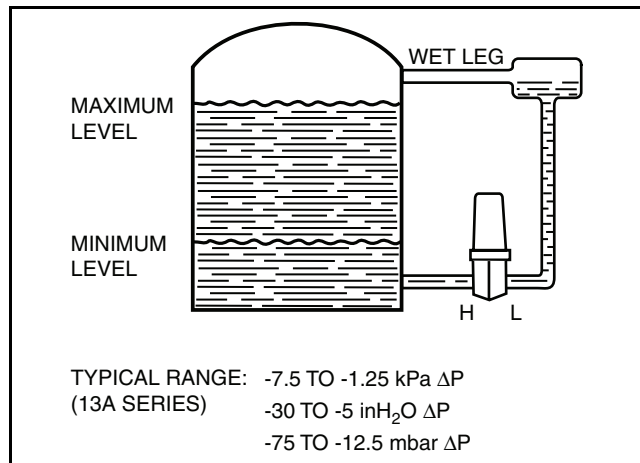


Figure 2. Zero Elevation

## OPERATING CONDITIONS

Influence	Reference Operating Conditions	Normal Operating Condition Limits	Operative Limits
Body Temperature	24 ± 2°C (75 ± 3°F)	-40 and +120°C (-40 and +250°F)	-45 and +175°C (a,b) (-50 and +350°F)
Ambient Temperature	24 ± 2°C (75 ± 3°F)	-40 and +120°C (-40 and +250°F)	-45 and +140°C (-50 and +280°F)
Supply Pressure	140 ± 1.4 kPa 20 ± 0.2 psi 1.4 ± 0.014 bar or kg/cm <sup>2</sup>	120 and 150 kPa 18 and 22 psi 1.2 and 1.5 bar or kg/cm <sup>2</sup>	Up to 240 kPa Up to 35 psi Up to 2.4 bar or kg/cm <sup>2</sup>

(a) See Optional Features section for higher limits.

(b) Topworks temperature cannot exceed 120°C (250°F).

## PERFORMANCE SPECIFICATIONS

**Accuracy (Under Reference Operating Conditions)**

Includes Linearity, hysteresis, and repeatability

15A SERIES

±0.5% of span

13A AND 13HA SERIES

Spans between 5 and 130 kPa, 20 and 525 inH<sub>2</sub>O, or 50 and 1300 mbar differential pressure (ΔP)

±0.5% of span

Spans between 130 and 210 kPa, 525 and 850 inH<sub>2</sub>O, or 1300 and 2100 mbar ΔP ±0.75% of span

**Dead Band (Under Reference Operating Conditions)**

0.05% of span

**Repeatability (Under Reference Operating Conditions)**

0.1% of span

**Hysteresis (Under Reference Operating Conditions)**

15A SERIES

0.0025 kPa, 0.01 inH<sub>2</sub>O, or 0.025 mbar ΔP, or 0.10% of span, whichever is greater

13A AND 13HA SERIES

0.12 kPa, 0.05 inH<sub>2</sub>O, or 0.12 mbar ΔP, or 0.10% of span, whichever is greater

**Reproducibility (Under Reference Operating Conditions)**

Includes effects of hysteresis, repeatability, dead band, and drift over a one-hour period

15A SERIES

0.2% of span

13A AND 13HA SERIES

0.15% of span

**Vibration Effect**

The zero shift is less than 1.5% of span for peak-to-peak displacement of 6.4 mm (0.25 in) between 1 and 9 Hz, or constant acceleration of 10 m/s<sup>2</sup> (1 "g") from 9 to 100 Hz.

**Supply Pressure Effect**

The maximum zero shift is 0.05% of span for 1 kPa (0.01 bar or kg/cm<sup>2</sup>) change in supply pressure. A 1 psi change in supply pressure results in a maximum zero shift of 0.35% of span.

**Position Effect**

The 15A Series must be operated with the capsule in the vertical plane. The 13A and 13HA Series may be mounted up to 90° from vertical and the zero shift may be corrected with the zero adjustment screw.

**Ambient Temperature and Static Pressure Effects**

Model	Ambient Temperature Effect (a)	Static Pressure Effect (b)
15A	1% at 6 kPa (25 inH <sub>2</sub> O, 60 mbar) ΔP span.  2.5% at 1.3 kPa (5 inH <sub>2</sub> O, 13 mbar) ΔP span.	0.5% of span
13A	M Capsule: 1% for spans from: 12.5 to 62 kPa (50 to 250 inH <sub>2</sub> O 125 to 620 mbar) ΔP Span  2.5% for spans from: 6.2 to 12.5 kPa (25 to 50 inH <sub>2</sub> O) (62 to 125 mbar) ΔP Span  H Capsule: 2% for all spans	0.5% for spans: >12.5 kPa (>50 inH <sub>2</sub> O, >125 mbar) ΔP  1% for spans from: 5 to 12.5 kPa (20 to 50 inH <sub>2</sub> O, 50 to 125 mbar) ΔP
13HA	Same as for Model 13A above.	1.5% for spans: >12.5 kPa (>50 inH <sub>2</sub> O, >125 mbar) ΔP (c)  2% for spans from: 5 to 12.5 kPa (20 to 50 inH <sub>2</sub> O, 50 to 125 mbar) ΔP (c)

(a) Maximum zero shift in % of span for a change of 55°C (100°F).

(b) Zero shift in % of span for any change up to static pressure limit.

(c) If the process is subject to static pressure cycling of excessive magnitude, contact Invensys Foxboro.

**PHYSICAL SPECIFICATIONS**

**Material of Construction, Wetted Parts**

Item	Series		
	15A, 13A, 13HA	13A4	13A5
Body	316 ss	Monel	Hastelloy C
Capsule Diaphragm	316L ss	Monel 400(a)	Hastelloy C276
Other Capsule Pats	316 ss	Monel	Hastelloy C276
Force Bar	316 ss	Monel	Hastelloy C
Force Bar Steel	cobalt-nickel-chrome	cobalt-nickel-chrome	cobalt-nickel-chrome
Force Bar Gasket	Silicone elastomer(b)	Viton-A	Viton-A
Capsule Gaskets	316 ss (15A, 13A) Chemloy (13HA)	Monel	ptfe
Process Connection Gasket	ptfe(c)	ptfe	(d)

(a) Duranickel capsule diaphragm material is supplied when Span Limit Code -H is specified.

(b) Buna-N is standard in the 13H Series.

(c) Glass-filled ptfe is standard in the 13H Series.

(d) Hastelloy C bodies do not have process connectors.

**Materials of Construction, NonWetted Parts**

**COVER**

Blue, high impact, glass-filled polycarbonate.

**COVER GASKET**

Silicone rubber and cork composition

**BODY BOLTS AND NUTS**

Cadmium plated alloy steel per ASTM A 193 grade B7 and ASTM A 194 grade 2H, respectively, or equivalent. 17-4 PH if Hastelloy C body is specified. See Optional Features for Monel or 17-4 PH stainless steel bolting.

**CAPSULE FILL MATERIAL**

Dow Corning dimethylsiloxane (DC-200) with viscosity of 500 mm<sup>2</sup>/s (500 cSt) at 25° C (77° F). Some options require other fill materials. See Optional Features.

**Environmental Protection**

The transmitter housing is weatherproof. It is dust-protected as defined by IEC IP53 and, with its constant air purging, provides the rain tight protection of NEMA Type 3.

**Mass**

Approximate  
 15A SERIES  
 13.6 kg (30 lb)  
 13A SERIES  
 8.6 kg (19 lb)  
 13HA SERIES  
 13 kg (29 lb)

### OPTIONAL FEATURES

#### Optional Capsule Materials (13A Series Only)

Diaphragm Material	Span Limits			Other Wetted Capsule Parts	AS Reference(a)
	kPa $\Delta P$	inH <sub>2</sub> O $\Delta P$	mbar $\Delta P$		
Hastelloy C276	5 and 62 50 and 210	20 and 250 200 and 850	50 and 620 500 and 2100	Hastelloy C276	D-CSC
Monel 400	5 and 62 50 and 100	20 and 250 200 and 400	50 and 620 500 and 1000	Monel	D-MMM(b)
Duranickel	5 and 62 50 and 210	20 and 250 200 and 850	50 and 620 500 and 2100	Monel	D-DMM
Tantalum	5 and 50	20 and 200	50 and 500	Hastelloy C276	D-TSC

(a) When ordering optional capsule (or any option) add AS Reference to Model Code. Example: 13A-MS1, AS Reference D-CSC.

(b) The ambient temperature effects are double.

#### Miscellaneous Options

Optional Feature	Description	AS Reference
Preparation for Oxygen Service	Transmitter is cleaned, assembled, calibrated, and packaged in a clean room, or using acceptable alternative facilities. Includes Fluorolube fill for capsules. Available for instruments with 316 ss body and capsule material.	OS-FC
Special Degreasing	Transmitter is cleaned and packaged same as above, but the capsule has standard fill. <b>NOT FOR USE ON OXYGEN, CHLORINE, OR OTHER FLUIDS THAT MAY REACT WITH SILICONE OIL.</b>	OS-W
Preparation for Chlorine Service	Transmitter is cleaned, assembled, calibrated, and packaged in a clean room, or using acceptable alternative facilities. Only Fluorolube filled Hastelloy C276 capsules are used. Includes 17-4 PH stainless steel body bolts, pte gaskets, a dashpot kit, and tantalum sheath over the force bar diaphragm. Available with body materials 316 ss, Monel, or Hastelloy C. The ambient temperature limits are -20 and +120° C (0 and 250° F). Available with 13A Series only.	CLS
Nuclear Service Cleaning	Transmitter is cleaned, assembled, calibrated, and packaged in a clean room or using acceptable alternative facilities.	NS-C
High Damping	Low and medium range capsules are available filled with high viscosity silicone fluid which increases the damping. Note: Corner frequency 3 dB down at 0.3 to 0.4 Hz. The damping is greatly increased below 25° C (75° F). The lower ambient temperature limit is -20° C (0° F). Formerly AS Reference D-SSS-2H.	D-SSS-2V4
Optional Output Signal	Output signal is 3 to 27 psi. Air supply is between 29.5 and 30.5 psi	TR 3-27
Reverse Output	100 to 20 kPa, 15 to 30 psi, or 1.0 to 0.2 bar or kg/cm <sup>2</sup> , as specified. Accomplished by adding zero elevation kit and reversing high and low process connections.	TR 15-3
Electrical Heating	Two body bolts are replaced by two studs; one containing a heat element, the other a thermostat switch. Available with set points of 10 or 40° C (50 or 100° F). Recommended for use with an approved insulated enclosure (O'Brien HeatPak or equivalent) only. The maximum working pressure (MWP) of the 13H Series is reduced to 20 MPa (3000 psi, 200 bar or kg/cm <sup>2</sup> ). Not for use in hazardous locations.	IEH
Steam Tracing	One or two hollow studs may be substituted for body bolts with glass reinforced pte gaskets fitted at the process connections. Saturated steam at a maximum pressure of 1 MPa (150 psi, 10 bar or kg/cm <sup>2</sup> ) through the studs maintains the process liquid at temperatures up to 190° C (375° F) when used with an approved insulated enclosure. The MWP of the 13H Series is reduced to 20 MPa (3000 psi, 200 bar or kg/cm <sup>2</sup> ). Multiply operating condition effects by 2 for body temperature above 120° C (250° F).	ISTR-1 or ISTR-2

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**OPTIONAL FEATURES (Cont.)**
**Miscellaneous Options (Cont.)**

Optional Feature	Description	AS Reference
Lower Differential Spans	Provides for minimum span of 2.5 kPa, 10 inH <sub>2</sub> O, or 25 mbar ΔP in the 13A and 13H Series; 0.5 kPa, 2.0 inH <sub>2</sub> O, or 50 mbar ΔP in the 15A Series. The maximum calibrated spans are reduced by a factor of 2. The performance specifications and operating conditions effects are reduced by factors of up to 3. This option is not available with the Optional Output Signal feature (AS Reference TR 3-27).	LD
High Process Temperature	Glass reinforced process connector gaskets are fitted for operation at process temperatures up to 190° C (375° F). Multiply operating condition effects by 2 for body temperature above 120° C (250° F).	DG-5
Hydrogen Service	Transmitter is supplied with gold plated 316 ss capsule to retard hydrogen penetration. Not for corrosion protection.	D-SSS-G
Tantalum Force Bar Steel Protection	Tantalum sheath protection over cobalt-nickel-chrome alloy force bar diaphragm.	FBP-T
Monel Force Bar	Available with Monel, Hastelloy C276, or Duranickel diaphragm capsules. Standard with transmitters having Monel body and capsule.	Add Suffix -3 to AS Reference for capsule
Monel Bolting	K-Monel studs and Monel nuts for both body and process connectors. This option is not available for the 15A and 13H Series	MMB
Stainless Steel Bolting	Type 17-4 PH stainless steel cap screws for the process connectors and cap screws and nuts of the same material for the body bolting.	SSB
Stainless Steel Mounting Bracket Bolting	316 ss bolting through mounting brackets to transmitter.	SSB-A
Integral Orifice	For the measurement of extremely low flow rates. Selection of six standard orifice bores is available.	Refer to PSS 2B-1Z3 A
Bypass Manifolds for Integral Mounting	A variety of 1-, 3-, and 5-valve manifolds is available. Some manifold assemblies are not rated to the full MWP of the 13H Series.	Refer to Foxboro
Air Supply Sets	A wide selection of air supply sets is available to provide filtered, regulated air supply to the transmitter.	Refer to Foxboro
R1/4 Air Connections	Air connections tapped for R1/4	ACR
Test Tee	A T-connector tapped for 1/4 NPT and fitted with a shut-off valve is mounted on the transmitter for monitoring the output signal.	OTT
Insulated Enclosure	A custom made enclosure which insulates the body for more effective use of the Electrical Heating or Steam Tracing options.	Refer to Foxboro
Lloyd's Approval for Marine Use	A version of the 13A Series approved by Lloyd's Register of Shipping.	Refer to Foxboro
Compliance to NACE Standard MR-01-75	The National Association of Corrosion Engineers (NACE) Standard MR-01-75 (1980 revision) covers metallic requirements for resistance to sulfide stress cracking. This option includes process wetted parts selected to comply with the standard. Non-process wetted bolting complying with NACE MR-01-75 Class II is also available.	Refer to Foxboro

## MODEL CODES

## Model 15A

<b>Description</b>	<b>Model</b>
Transmitter AISI Type 316 Stainless Steel (316 ss) Body	15A
<b>Span Limits</b>	
1.3 and 6 kPa, 5 and 25 inH <sub>2</sub> O, or 13 and 60 mbar ΔP	-L
<b>Body Material</b>	
316 ss	S
<b>Process Connectors(a)</b>	
Tapped for 1/4 NPT	1
Tapped for 1/2 NPT	2
Tapped for R1/4	3
Tapped for R1/2	4
Weld neck for 14 x 21 mm tube (1/2 in Schedule 80 pipe)	6
None. Body tapped for 1/4 NPT	0
<b>Optional Suffix</b>	
Zero Elevation Kit	-L
Zero Suppression Kit	-R

(a) Body is always tapped for 1/4 NPT.

## Model 13A

<b>Description</b>	<b>Model</b>
Transmitter 316 ss body	13A
Transmitter Monel Body	13A4
Transmitter Hastelloy C Body (Process connector Code 0 must be specified)	13A5
<b>Span Limits</b>	
5 and 62 kPa, 20 and 250 inH <sub>2</sub> O, or 50 and 620 mbar ΔP	-M
50 and 210 kPa, 200 and 850 inH <sub>2</sub> O, or 0.5 and 2.1 bar ΔP	-H
<b>Body Material</b>	
316 ss (13A only)	S
Monel (13A4 only)	M
Hastelloy C (13A5 only)	C
<b>Process Connectors(a)</b>	
Tapped for 1/4 NPT	1
Tapped for 1/2 NPT	2
Tapped for R1/4	3
Tapped for R1/2	4
Weld neck for 14 x 21 mm tube (1/2 in Schedule 80 pipe)	6
None. Body tapped for 1/4 NPT	0
<b>Optional Suffix</b>	
Zero Elevation Kit	-L
Zero Suppression Kit	-R

(a) Body is always tapped for 1/4 NPT.

MODEL CODES (Cont.)

Model 13HA

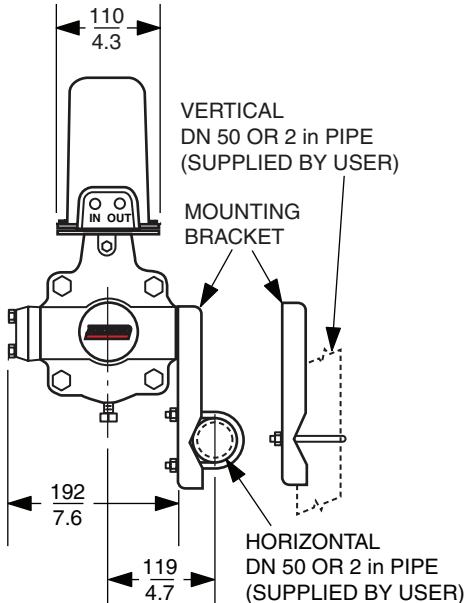
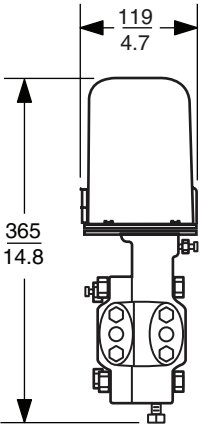
<u>Description</u>	<u>Model</u>
Transmitter 316 ss body	13HA
<b><u>Span Limits</u></b>	
5 and 62 kPa, 20 and 250 inH <sub>2</sub> O, or 50 and 620 mbar ΔP	-M
50 and 210 kPa, 200 and 850 inH <sub>2</sub> O, or 0.5 and 2.1 bar ΔP	-H
<b><u>Body Material</u></b>	
316 ss (13A only)	S
<b><u>Process Connectors(a)</u></b>	
Tapped for 1/4 NPT	1
Tapped for 1/2 NPT	2
Tapped for R1/4	3
Tapped for R1/2	4
Machined for 9/16-18 Aminco fitting	5
None. Body tapped for 1/4 NPT	0
<b><u>Optional Suffix</u></b>	
Zero Elevation Kit	-L
Zero Suppression Kit	-R

(a) Body is always tapped for 1/4 NPT.

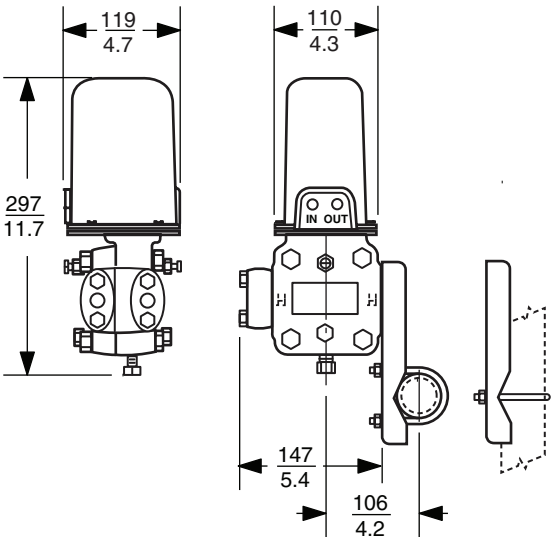


**DIMENSIONS – NOMINAL**

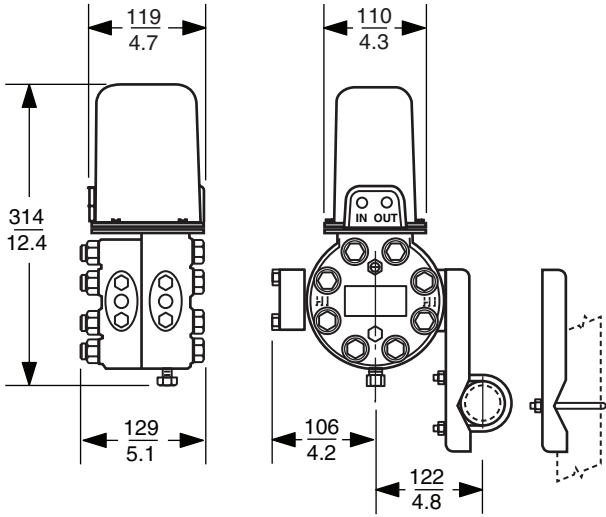
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**15A SERIES**



**13A SERIES**



**13HA SERIES**





**ORDERING INSTRUCTIONS**

1. Model Code
2. Output Signal
3. Calibrated Differential Pressure Range
4. Optional Features
5. Tag

**OTHER M&I PRODUCTS**

Invensys Foxboro provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the Invensys Foxboro web site at:

[www.foxboro.com/instrumentation](http://www.foxboro.com/instrumentation)

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