invensys™

Pneumatic Instruments Catalog

Foxboro®

Ordering

Specifying Your Instrument or Accessory

You can easily specify many instruments and accessories described in this catalog. Sections covering our most popular items include all the technical data you need to know for most applications. To specify the appropriate item, simply follow the step-by-step procedure at the end of each description. Your Foxboro representative can help also.

For Example:

Choose the product code.
Itemize the information needed to complete the specification.

Ordering:

To order, contact your Foxboro representative.
Or call, in North America: 1-866-746-6477, or International: 001-508-549-2424.
Or visit www.buyautomation.com/officelocator.
Give us the ordering information using this catalog. Then tell us where you want the order shipped and when you need it delivered. We'll do the rest.

Need Help?

If you have questions, let us know. We're ready, and eager, to assist you. Applications are a Foxboro specialty. We can help you figure out the best instrument for your purpose.

Instrument catalog available – ask your Foxboro representative about it.

1) SPECIFY MODEL NUMBER: 13 – ___ – ___ ___ ___ – ___

Transmitter:					
316 ss body	A				
Monel body	A4				
Hastelloy C body (supplied without process connectors)	A5				
Span Limits:					
5 and 62 kPa or 20 and 250 inH_2O ΔP		M			
50 and 210 kPa or 200 and 850 inH_2O ΔP		H			
Body Material:					
316 ss (13A only)			S		
Monel (13A4 only)			M		
Hastelloy C (13A5 only) (Process Connectors code 0 below must be specified			C		
Process Connectors:					
1/4 NPT				1	
1/2 NPT				2	
R1/4				3	
R1/2				4	
Welding neck for 14 x 21 mm tube and 1/2 in Schedule 80 pipe				6	
None, body tapped for 1/4 NPT				0	
Optional Features: (also see previous page)					
Zero elevation kit					L
Zero suppression kit					R

2) SPECIFY OUTPUT SIGNAL _____
3) SPECIFY CALIBRATED DIFFERENTIAL PRESSURE RANGE _____
4) SPECIFY ADDITIONAL OPTIONAL FEATURES _____
5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

Table of Contents

Foxboro Pneumatic Transmitters are the industry standard.

All of these instruments have been field proven through years of experience. They are precise, easy to maintain, and available in a wide range of materials.

The Foxboro line encompasses a variety of measurement types.

Flow Measurement
Differential pressure transmitters.

Temperature Measurement
Filled thermal systems and thermocouple/ RTD devices.

Pressure Measurement
Force balance and indicating transmitters.

Liquid Level Measurement
Differential pressure transmitters with or without chemical seals and buoyancy transmitters.

Other Applications
Sanitary designs, relative humidity transmitters, speed transmitters, and repeaters.

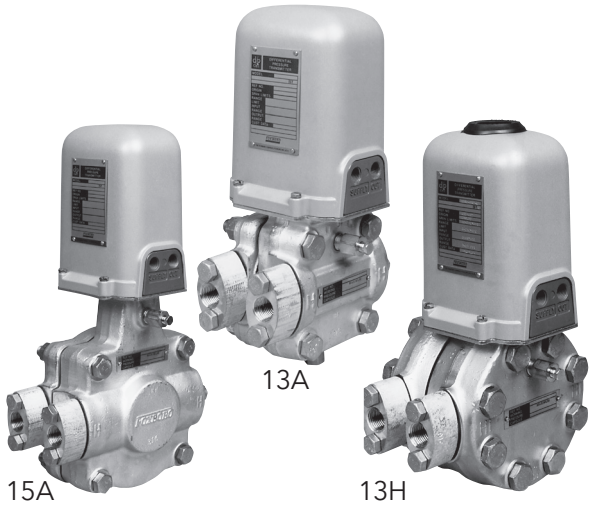
Foxboro is the leading single source of pneumatic transmitters for the process industries.

No other manufacturer makes as many types for as many applications.

15A, 13A, 13H Series Pneumatic d/p Cell Transmitters

- **15A–low range transmitter adjustable for ranges from 0-1.3 to 0-6 kPa (0-5 to 0-25 inH_20) ΔP at static pressures up to 3.5 MPa (500 psi)**
- **13A–adjustable for ranges from 0-5 to 0-210 kPa (0-20 to 0-850 inH_20) ΔP at static pressures up to 14 MPa (2000 psi)**
- **13H–adjustable for ranges from 0-5 to 0-210 kPa (0-20 to 0-850 inH_20) ΔP at static pressures up to 40 MPa (6000 psi)**
- **Low Air Consumption**

For complete specifications, refer to Product Specification Sheet PSS 2B-1C1 A.



The 15A, 13A, 13H Series Pneumatic d/p Cell Transmitters measure differential pressure and transmit a proportional pneumatic output signal.

Functional Specifications

Static Pressure, Span, and Range Limits

Series	Static Pressure Limit	
	MPa	psi
15A	3.5	500
13A	14	2000
13H	40	6000

Series	Span Code	Span Limits	
		kPa ΔP	inH_2O ΔP
15A	L	1.3 and 6	5 and 25
13A and 13H	M H	5 and 62 50 and 210	20 and 250 200 and 850

Series	Span Code	Range Limits (a)	
		kPa ΔP	inH_2O ΔP
15A	L	±12.5	±50
13A and 13H	M H	±62 ±210	±250 ±850

(a) Nonzero-based ranges require optional zero elevation or suppression kit. See "HOW TO ORDER." Upper and lower range values must not exceed range limits. Negative numbers indicate a higher pressure on the normal "Low Side" of the transmitter, such as may occur in closed tank application with a wet leg.

Process Temperature Limits:
-40 and +120°C (-40 and +250°F) at capsule.

Ambient Temperature Limits:
-40 and +120°C (-40 and +250°F).

Output Signal and Suppiy Pressure:

Output Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 kPa 20 psi

Performance Specifications

Accuracy:
15A Series: ±0.5% of calibrated span.
13A and 13H Series: ±0.5% of calibrated span except +0.75% of calibrated span for calibrated spans greater than 130 kPa or 525 inH_20 ΔP.

Repeatability:
0.1% of calibrated span.

Hysteresis:
0.1% of calibrated span.

Physical Specifications

Materials of Wetted Parts:

Wetted Part	Series		
	15A, 13A, 13HA	13A4	13A5
Body	AISI 316 ss	Monel	Hastelloy C
Capsule Diaphragm	316L ss	Monel 400 (a)	Hastelloy C276
Other Capsule Parts	316 ss	Monel	Hastelloy C
Force Bar	316 ss	Monel	Hastelloy C
Force Bar Seal	cobalt-nickel	cobalt-nickel	cobalt-nickel
Force Bar Gasket	silicone elastomer (b)	Viton-A	Viton-A
Capsule Gaskets	316 ss	Monel	ptfe
Process Connection Gaskets	ptfe (c)	ptfe	(d)

(a) Duranickel capsule diaphragm material supplied when Span Limits code H is specified.
(b) 13H Series uses Buna-N as standard.
(c) 13H Series uses glass filled ptfe as standard.
(d) Hastelloy C bodies are supplied without process connectors.

Mounting:
Direct to process or by bracket for DN 50 or 2 in horizontal or vertical pipe. Bracket is always supplied.

Enclosure Classification:
Meets IEC IP53 and provides the environmental protection of NEMA Type 3.

Materials:
Body Bolts: Alloy steel per ASTM A193 Grade B7; or 17-4 with Hastelloy C bodies.

Cover:
High impact, glass filled polycarbonate.

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

Optional Features

Capsule Materials:
Hastelloy C, Monel, Duranickel, and tantalum.

HF Alkylation Service:
Maximum life with economical materials.

Chlorine Service Preparation:
Cleaned for chlorine service.

Hydrogen Service Preparation:
Gold-plated capsule to prevent hydrogen penetration.

High Damping:
Medium and low range capsules only.

NACE:
Compliance to NACE Standard MR-01-75.

Air Supply Set:
Adjustable regulators with or without gauge.

High Process Temperature:
Body temperature up to 190°C (375°F).

Integral Orifice:
For low flow measurements. Refer to Page 31.

Bypass Manifolds:
Refer to Page 27.

Oxygen Service Preparation:
Cleaned and packaged for oxygen service.

Lower Spans:
Provides spans as low as one-half standard.

How to Order

1) SPECIFY MODEL NUMBER: 15 ____ - L ___ ___ - ___

Transmitter:
316 ss body ..... A

Span Limits:
1.3 and 6 kPa or 5 and 25 inH_20 ΔP L

Body Material:
316 ss (15A only) ..... S

Process Connectors:
1/4 NPT 1
1/2 NPT 2
R1/4 (metric) 3
R1/2 (metric) 4
Welding neck for 14 x 21 mm tube and 1/2 in Schedule 80 pipe 6
None, body tapped for 1/4 NPT 0

Optional Features: (also see previous page)
Zero elevation kit L
Zero suppression kit ..... R

1) SPECIFY MODEL NUMBER: 13 ____ - ___ ___ ___ - ___

Transmitter:
316 ss body ..... A
Monel body A4
Hastelloy C body (supplied without process connectors) A5

Span Limits:
5 and 62 kPa or 20 and 250 inH_20 ΔP ..... M
50 and 210 kPa or 200 and 850 inH_20 ΔP ..... H

Body Material:
316 ss (13A only) ..... S
Monel (13A4 only) ..... M
Hastelloy C (13A5 only) (Process Connectors code 0 below must be specified) C

Process Connectors:
1/4 NP 1
1/2 NP 2
R1/4 3
R1/2 4
Welding neck for 14 x 21 mm tube and 1/2 in Schedule 80 pipe 6
None, body tapped for 1/4 NPT 0

Optional Features: (also see previous page)
Zero elevation kit L
Zero suppression kit ..... R

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER: 13H ___ - __ __ __ - __

Transmitter:
316 ss body ..... A

Span Limits:
5 and 62 kPa or 20 and 250 inH_20 ΔP ..... M
50 and 210 kPa or 200 and 850 inH_20 ΔP ..... H

Body Material:
316 ss (13HA only) ..... S

Process Connectors: (a)
1/4 NPT 1
1/2 NPT 2
R1/4 3
R1/2 4
None, body tapped for 9/16-18 Aminco fitting 5
None, body tapped for 1/4 NPT 0

Optional Features: (also see Page 4)
Zero elevation kit L
Zero suppression kit ..... R

(a) The transmitter is normally supplied with body tapped for 1/4 NPT unless Process Connectors code 5 is specified.

2) SPECIFY OUTPUT SIGNAL _____

3) SPECIFY CALIBRATED DIFFERENTIAL PRESSURE RANGE _____

4) SPECIFY ADDITIONAL OPTIONAL FEATURES _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

11DM

11DM Series Pneumatic Differential Pressure Transmitters

- **Differential Pressure Measurement – ranges adjustable from 0-0.14 to 0-14.0 MPa (0-20 to 0-2000 psi) ΔP**
- **Low Air Consumption**

For complete specifications, refer to Product Specification Sheet PSS 2B-1A2 A.

The 11 DM Series Pneumatic Differential Pressure Transmitters measure differential pressure and transmit a proportional pneumatic signal.

Functional Specifications

Span and Range Limits:

Span Limits Code	Span Limits	
	MPa ΔP	psi ΔP
B	0.14 and 1.4	20 and 200
C	0.3 and 2.8	40 and 400
D	0.7 and 7.0	100 and 1000
E	1.4 and 14.0	200 and 2000

Span Limits Code	Range Limits (a), (b)	
	MPa ΔP	psi ΔP
B	-1.54 and +2.4	-220 and +350
C	-3.1 and +5.0	-440 and +750
D	-7.7 and +10.0	-1100 and +1500
E	-14.0 and +20.0	-2000 and +3000

(a) Negative values indicate that the higher of the two measured pressures is on the normal "low side" (body side) of the transmitter. Positive values indicate higher pressure is on the normal "high side" (connection block side). (b) Nonzero-based ranges require optional Zero Elevation or Suppression Kit.

Maximum Static Pressure:
The lower of the two measured pressures may not exceed the following pressure limits:

Span Limits Code	MPa	psi
B	2.4	350
C	5.0	750
D	10.0	1500
E	14.0	2000

Ambient Temperature Limits:
-40 and +120°C (-40 and +250°F).

Output Signal and Supply Pressure:

Output Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 kPa 20 psi

Performance Specifications

Accuracy:
±0.5% of calibrated span.

Repeatability:
0.1% of calibrated span.

Hysteresis:
Span Limits codes B, C, and D: 0.1% of calibrated span.

Span Limits code E: 0.2% of calibrated span.

11DM

Physical Specifications

Materials of Wetted Parts:
316 ss = AISI Type 316 stainless steel.
316L ss = AISI Type 316L stainless steel

Body	316 ss
Capsule Bellows	316L ss or Monel
Other Capsule Parts	316 ss or Monel
Force Bar	316 ss
Force Bar Seal	cobalt-nickel
Force Bar Gasket	silicone elastomer
Capsule Gasket	silicone elastomer

Body Bolts:
Alloy steel per ASTM A193 Grade B7.

Cover:
High impact, glass filled polycarbonate.

Enclosure Classification:
Meets IEC IP53 and provides the environmental protection of NEMA Type 3.

Mounting:
Bracket for DN 50 or 2 in vertical or horizontal pipe.

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

Optional Features

Oxygen Service Preparation:
Cleaned and packaged for oxygen service.

NACE:
Compliance to NACE Standard MR-01-71.

How To Order

1) SPECIFY MODEL NUMBER: 11DM- __ __ __ - __

Span Limits:
- 0.14 and 1.4 MPa or 20 and 200 psi ..... B
- 0.3 and 2.8 MPa or 40 and 400 psi C
- 0.7 and 7.0 MPa or 100 and 1000 psi ..... D
- 1.4 and 14 MPa or 200 and 2000 psi ..... E

Wetted Parts:
- 316ss ..... S
- 316 ss except Monel bellows assembly ..... D

Process Connection:
- 1/4 NPT 1
- 1/2 NPT 2
- R1/4 (metric) 3
- R 1/2 (metric 4

Optional Features: (also see previous page)
- Zero elevation L
- Zero suppression ..... R

2) SPECIFY OUTPUT SIGNAL _____

3) SPECIFY CALIBRATED PRESSURE RANGE _____

4) SPECIFY OPTIONAL FEATURES _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

14A

14A Series Pneumatic Flow Integrators

- **Durable**
  - Self-cleaning, self-aligning ball and thrust plate bearings
  - Gasketed cast aluminum cover
- **Versatile**
  - Field or panel mounting up to several hundred feet from point of measurement
- **Stable**
  - Force balance unit minimizes variations in air supply pressure or ambient temperature
- **Multiple Ranges**
  - Changeable counting speed can match almost any flow range
  - No recalibration required

For complete specifications, refer to General Specification Sheet GS 2B-5A1 A.

The 14A Series Pneumatic Flow Integrator receives signal from transmitter, extracts square root, and totalizes flow on integral counter in engineering units.

Functional Specifications

Input Signal and Suppiy Pressure

Intput Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 kPa 20 psi

Counter:
6-digit, nonreset except PB and EB Series which have 5-digit with manual reset.

Count Rates and Integrator Factors:
Count rate upper range values are shown in the following table. Integrated flow is displayed directly when the count rate is set equal to the maximum flow rate. Other flow rates can be accommodated using the count rate times the integrator factor. Example: Reading x 100 = Gallons.

Available Count Rate:
Upper Range Values

Counts per Minute	Counts per Hour	Counts per Day
4.75 to 49.21 excluding: 5.46 to 5.54, 9.11 to 9.50, and 10.93 to 11.08	285 to 2953 excluding: 328 to 332, 547 to 570, and 656 to 665	6840 to 70870 excluding: 7870 to 7980, 13120 to 13680, and 15750 to 15960

PB, EB Series Only

Output Signal:
PB: Taken from supply pressure source and going to 0 at termination of batch.

EB: Contact actuation either normally open or normally closed. Changes state at termination of batch. Switch rating 3 A at 120 V ac, 0.5 A at 125 V dc.

Manual Reset:
Resets counter and batch contact.

Batch Set:
Manually set predetermining wheels on counter.

Brake Assembly:
To prevent coasting.

Electrical Classification (EB only):
Foxboro and CSA certified for use in ordinary locations.

EP Series Only

Contact Actuation:
Either normally open or normally closed. Electric relay circuit limits contact duration to approximately 100 ms. Contact actuates once for each 1,10, or 100 counts, as specified.

Supply Voltage:
120 V + 10%, -15%, 50 or 60 Hz.

Electrical Classification:
Foxboro and CSA certified for use in ordinary locations.

Performance Specifications

Accuracy:
±0.5% of full scale calibrated between 30 and 100% of flow.

Repeatability:
0.2% of full scale.

Input Signal:
Input cutoff point set for approximately 7% flow.
Input startup point set for approximately 11 % flow.

Physical Specifications

Body:
Cast aluminum with acrylic enamel finish.

Specification	Cover	Case
14A Series	High-impact, glass-filled polycarbonate, gasketed, weatherproof.	–
14A-PB, 14A-EB Series	High-impact, glass-filled polycarbonate and drawn steel, gray acrylic enamel finish, gasketed, weatherproof.	Drawn steel, gray acrylic enamel finished, gasketed, weatherproof.
14A-EP Series	High-impact, glass-filled polycarbonate, gray acrylic enamel finish, gasketed, weatherproof.	Drawn steel, gray acrylic enamel finished, gasketed, weatherproof.

Optional Features

External Reset Knob:
For panel-mounted PB and EB only.

Foxboro and CSA Certified:
For use in Class I, Groups A, B. C, and D, Division 2. For EP Series only.

Brake Assembly:
Standard on PB and EB Series. Eliminates coasting of integrator rotor.

Integral Mounting to d/p Cell Transmitter:
For 14A-F, 14A-PBF,14AEBF, and 14A-EPF only. Supply regulator included with this option.

How to Order

1) SPECIFY MODEL NUMBER: 14A- _____

Integral Nonreset Counter:

Panel-Mounted	–
Field-Mounted	F
Field-Mounted with supply regulator	FR

Integral Predetermining Counter and Pneumatic Output Signal:

Panel-Mounted	PB
Field-Mounted	PBF
Field-Mounted with supply regulator	PBFR

Integral Predetermining Counter and Electric Contact Actuation:

Panel-Mounted	EB
Field-Mounted	EBF
Field-Mounted with supply regulator	EBFR

Integral Nonreset Counter and Electric Contact Actuation:

Panel-Mounted	EP (a)
Field-Mounted	EPF (a)
Field-Mounted with supply regulator	EPFR (a)

(a) Specify number of counts per contact actuation (1,10, or 100 counts).

2) SPECIFY ELECTRICAL CLASSIFICATION (EB and EP only) _____

3) SPECIFY INPUT SIGNAL _____

4) SPECIFY COUNTS PER MINUTE, HOUR, OR DAY (AT MAXIMUM FLOW RATE) _____

5) SPECIFY INTEGRATOR FACTOR _____

6) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

11GM, 11GH

The 11GM, 11GH Series Pneumatic Gauge Pressure Transmitters measure gauge pressure and transmit a proportional pneumatic output signal.

11GM, 11GH Series Pneumatic Gauge Pressure Transmitters

- **11GM–pressure measurement ranges adjustable from 0-0.07 to 0-14 MPa (0-10 to 0-2000 psi)**
- **11GH–pressure measurement ranges adjustable from 0-7.0 to 0-80 MPa (0-1000 to 0-12000 psi)**
- **Low Air Consumption**

For complete specifications, refer to Product Specification Sheet PSS 2B-1A3 A.

Functional Specifications

Span, Range, and Overrange Limits:

Series	Span Limits Code	Span Limits	
		MPa	psi
11GM	A	0.07 and 0.56	10 and 80
	B	0.14 and 1.4	20 and 200
	C	0.3 and 2.8	40 and 400
	D	0.7 and 7	100 and 1000
	E	1.4 and 14	200 and 2000
11GH	K	7 and 40	1000 and 6000
	N	14 and 80	2000 and 12000

Series	Span Limits Code	Range Limits (a)	
		MPa	psi
11GM	A	-0.1 and +0.6	-15 and +90
	B	-0.1 and +2.4	-15 and +350
	C	-0.1 and +5	-15 and +750
	D	-0.1 and +10	-15 and +1500
	E	-0.1 and +20	-15 and +3000
11GH	K	-0.1 and +40	-15 and +6000
	N	-0.1 and +80	-15 and +12000

(a) Nonzero-based ranges require optional zero elevation or suppression kit. See "HOW TO ORDER."

Series	Span Limits Code	Maximum Overrange Pressure Limit (b)	
		MPa	psi
11GM	A	0.7	100
	B	3.5	500
	C	7	1000
	D	14	2000
	E	28	4000
11GH	K	62	9000
	N	124	18000

(b) Overrange limit of Span Limits code E with Wetted Parts code M on Page 13 is reduced to 21 MPa (3000 psi).

Output Signal and Suppiy Pressure

Output Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 kPa 20 psi

Ambient Temperature Limits:
-40 and +120°C (-40 and +250°F).

Body Temperature Limits:
11GM Series: -40 and +190°C (-40 and + 375°F).
11GH Series: -40 and +120°C (-40 and +250°F).

Performance Specifications

Accuracy:

Series	Spans Between		Accuracy (% of Span)
	MPa	psi	
11GM	All Spans		±0.5
11GH-K	7 and 20 20 and 40	1000 and 3000 3000 and 6000	±0.5 ±1
11GH-N	14 and 40 40 and 80	2000 and 6000 6000 and 12000	±0.5 ±1

Repeatability:
11GM Series:
Wetted Parts code S: 0.1% of calibrated span.
Wetted Parts code M: 0.2% of calibrated span.

11GH Series:
0.15% of calibrated span.

Physical Specifications

Materials of Wetted Parts:

Item	Wetted Parts Code		
	S	M	C
Element	316ss	Monel	Ni-Span
Connection Block	316ss	Monel	316ss
Connection Gasket	Silicone Elastomer	Viton-A	(none)

Materials:
Cover: High-impact, glass-filled polycarbonate.

Body Bolts: Alloy steel per ASTM A193 Grade B7.

Enclosure Classification:
Meets IEC IP53 and provides the environmental protection of NEMA Type 3.

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

Optional Features

Air Supply Set:
Adjustable regulators with or without gauge.

Pressure Seals:
Refer to Page 34.

Oxygen Service Preparation:
Cleaned and packaged for oxygen service.

High Accuracy Calibration (11GM only):
Accuracy of +0.25% of calibrated span.

NACE (11 GM only):
Compliance to NACE Standard MR-01-75.

How to Order

1) SPECIFY MODEL NUMBER: 11GM- ___ ___ ___ - ___

Span Limits:
- 0.07 and 0.56 MPa or 10 and 80 psi ..... A
- 0.14 and 1.4 MPa or 20 and 200 psi ..... B
- 0.3 and 2.8 MPa or 40 and 400 psi C
- 0.7 and 7 MPa or 100 and 1000 psi ..... D
- 1.4 and 14 MPa or 200 and 2000 psi ..... E

Wetted Parts:
- 316ss ..... S
- Monel (a) ..... M

Process Connection:
- 1/4 NPT 1
- 1/2 NPT 2
- R1/4 (metric) 3
- R1/2 (metric) 4
- Machined for 9/16-18 Aminco fitting (b) 5

Optional Features: (also see above)
- Zero elevation L
- Zero suppression ..... R

(a) Not available with Span Limits code A above.
(b) Not available with Span Limits code A or Wetted Parts code M above.

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER: 11GH- __ C __ - __

Span Limits:
- 7 and 40 MPa or 1000 and 6000 psi ..... K
- 14 and 80 MPa or 2000 and 12000 psi ..... N

Wetted Parts:
- Ni-Span element with 316 ss connection C

Process Connection:
- 1/2 NPT 2
- R 1/2 (metric) 4
- Machined for 9/16-18 Aminco fitting 5

Optional Features: (also see previous page)
- Zero elevation L
- Zero suppression ..... R

2) SPECIFY OUTPUT SIGNAL _____

3) SPECIFY CALIBRATED PRESSURE RANGE _____

4) SPECIFY OPTIONAL FEATURES _____

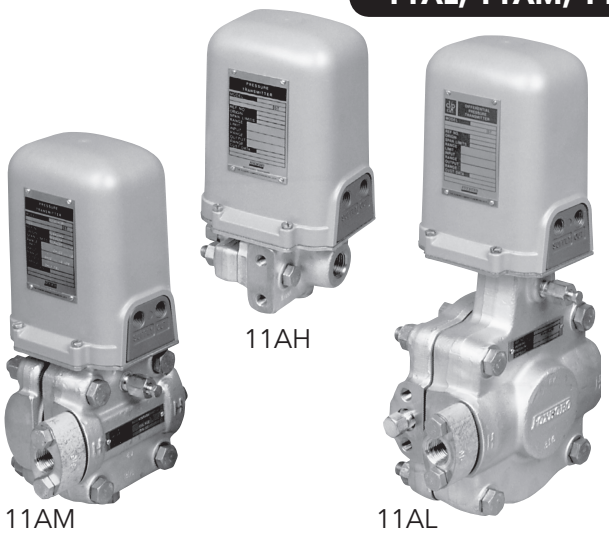
5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

11AL, 11AM, 11AH Series Pneumatic Absolute Pressure Transmitters

11AL, 11AM, 11AH

- **11AL–adjustable for ranges from 0-1.3 to 0-5.3 kPa (0-10 to 040 mmHg) absolute**
- **11AM–adjustable for ranges from 0-5.3 to 0-200 kPa (0-40 to 01520 mmHg) absolute**
- **11AH–adjustable for ranges from 0-0.7 to 0-2.7 MPa (0-10 to 0400 psi) absolute**
- **Low air consumption**

For complete specifications, refer to Product Specification Sheet PSS 2B-1A1 A.



The 11AL, 11AM, 11AH Series Pneumatic Absolute Pressure Transmitters measure absolute pressure and transmit a proportional pneumatic output signal.

Functional Specifications

Span, Range, and Overrange Limits (in absolute pressure units):

Series	Span Limits Code	Span Limits	
11AL	L	1.3 and 5.3kPa	10 and 40 mmHg
11AM	M	5.3 and 53 kPa	40 and 400 mmHg
	H	50 and 200 kPa	375 and 1520 mmHg
11AH	A	0.07 and 0.55 MPa	10 and 80 psi
	B	0.14 and 1.4 MP	20 and 200 psi
	C	0.3 and 2.7 MP	40 and 400 psi

Series	Span Limits Code	Maximum Overrange Pressure Limit	
		MPa	psi
11AL	L	0.8	115
11AM	M	0.8	115
	H	1.1	165
11AH	A	0.7	100
	B	2.4	350
	C	5.2	750

Series	Span Limits Code	Range Limits (a)	
11AL	L	0 and 9.3 kPa	0 and 70 mmHg
11AM	M	0 and 53 kPa	0 and 400 mmHg
	H	0 and 200 kPa	0 and 1520 mmHg
11AH	A	0 and 0.62 MPa	0 and 90 psi
	B	0 and 2.4 MPa	0 and 350 psi
	C	0 and 5 MPa	0 and 750 psi

(a) Nonzero-based ranges require optional zero suppression kit (standard for 11AM). See "HOW TO ORDER."

Maximum Process Temperature:
120°C (250°F) at capsule.

Ambient Temperature Limits:
-40 and + 120°C (-40 and +250°F).

Output Signal and Supply Pressure:

Output Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 kPa 20 psi

Performance Specifications

Accuracy:

Series	Spans Between		Accuracy (% of Span)
	kPa	mmHg	
11AL	All Spans		±1.0%
11AM-M	5.3 and 13 13 and 53	40 and 100 1100 and 400	±0.5% ±1.0%
11 AM-H	50 and 113 113 and 200	|375 and 850 1850 and 1520	±0.5% ±1.0%
11AH	All Spans		±0.5%

Repeatability:
11AL Series: 0.5% of calibrated span.
11AM, 11AH Series: 0.1% of calibrated span.

Hysteresis:
11AL Series: 0.5% of calibrated span.
11AM Series: 0.25% of calibrated span.
11AH Series: 0.15% of calibrated span.

11AL, 11AM, 11AH

Physical Specifications

Materials of Wetted Parts:

Wetted Part	Body Material	
	AISI 316 ss	Monel
Capsule Diaphragm	AISI 316L ss	Monel
Other Capsule Parts	316 ss	Monel
Force Bar	316 ss	Monel
Force Bar Seal	cobalt-nickel	cobalt-nickel
Force Bar Gasket	silicone elastomer	Viton-A
Capsule Gasket	316 ss (a)	Monel
Process Connector Gasket	ptfe (a)	ptfe

(a) 11AH Series uses single silicone elastomer gasket as capsule and connector gasket.

Materials:
Body Bolting: Alloy steel per ASTM A193 Grade B7.

Cover: High-impact, glass-filled polycarbonate.

Mounting:
Bracket for nominal DN 50 or 2 in pipe.

Enclosure Classification:
Meets IEC IP53 and provides the protection of NEMA Type 3.

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

Optional Features

Air Supply Sets:
Adjustable regulators with or without output gauge.

Oxygen Service Preparation:
Cleaned and packaged for oxygen service.

How to Order

1) SPECIFY MODEL NUMBER: 11AL- L S __ – __

Span Limits:
1.3 and 5.3 kPa or 10 and 40 mmHg absolute L

Body Material:
AISI Type 316 stainless steel (316 ss) ..... S

Process Connections:
Tapped for 1/4 NPT 1
Tapped for 1/2 NPT 2
Tapped for R1/4 (metric) 3
Tapped for R1/2 (metric) 4
Welding neck for 14 x 21 mm tube and 1/2 in Schedule 80 pipe 6

Optional Zero Suppression ..... R

HOW TO ORDER Continued on Next Page.

How to Order

1) SPECIFY MODEL NUMBER: 11AM - ___ ___ ___

Span Limits:
- 5.3 and 53 kPa or 40 and 400 mmHg absolute ..... M
- 50 and 200 kPa or 375 and 1520 mmHg absolute ..... H

Body Material:
- 316ss ..... S
- Monel Not available with Span Limits code H above ..... M

Process Connections:
- Tapped for 1/4 NPT 1
- Tapped for 1/2 NPT 2
- Tapped for R1/4 (metric) 3
- Tapped for R1/2 (metric) 4
- Welding neck for 14 x 21 mm tube and 1/2 in Schedule 80 pipe 6

1) SPECIFY MODEL NUMBER: 11AH- ___ S ___ - ___

Span Limits:
- 0.07 and 0.55 MPa or 10 and 80 psi absolute ..... A
- 0.14 and 1.4 MPa or 20 and 200 psi absolute ..... B
- 0.3 and 2.7 MPa or 40 and 400 psi absolute C

Body Material:
- 316 ss ..... S

Process Connections:
- Tapped for 1/2 NPT 2
- Tapped for R1/2 (metric) 4

Optional Zero Suppression ..... R

2) SPECIFY OUTPUT SIGNAL _____

3) SPECIFY CALIBRATED ABSOLUTE PRESSURE RANGE _____

4) SPECIFY OPTIONAL FEATURES _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

15F, 13F, 13FE

The 15F, 13F, 13FE Series Pneumatic Liquid Level or Density Flanged d/p Cell Transmitters measure hydrostatic head of liquid and transmit a proportional pneumatic output signal.

Pneumatic Liquid Level or Density Flanged d/p Cell Transmitters

- **15F – Low Range Flush Diaphram Transmitter adjustable for ranges from 0-0.13 to 0-0.63 m (0-5 to 0-25 in) head of water**
- **13F – Flush Diaphram Transmitter adjustable for ranges from 0-0.51 to 0-21.6 m (0-20 to 0-850 in) head of water**
- **13FE – Extended Diaphram Transmitter for measurements from 0-0.51 to 0-21.6 m (0-20 to 0-850 in) head of water**
- **Low Air Consumption**

For complete specifications, refer to Product Specification Sheet PSS 2B- 1D2 A.

Functional Specifications

Span Limits:

Series	Span Limits Code	Span Limits (Head of Water)	
		meters	inches
15F	L	0.13 and 0.63	5 and 25
13F, 13FE	M H	0.51 and 6.3 5.1 and 21.6	20 and 250 200 and 850

Range Limits:

Series	Span Limits Code	Range Limits (Head of Water) (a)	
		meters	inches
15F	L	±1.3	±50
13F, 13FE	M H	±6.3 ±21.6	±250 ±850

(a) Non zero-based ranges require optional zero elevation or suppression kit. Upper and lower range values must not exceed range limits. Negative numbers indicate a higher pressure on the normal "low side" of the transmitter, such as may occur in a closed tank application with a wet leg.

Process Temperature Limits:
ANSI Flanges: -40 and +190°C (-40 and +375°F).

DIN Flanges:
-40 and +120°C (-40 and +250°F).

Ambient Temperature Limits:
-40 and +120°C (-40 and +250°F).

Output Signal and Supply Pressure:

Output Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 kPa 20 psi

Performance Specifications

Accuracy:
±0.5% of calibrated span for all models except for spans greater than 13.3 m (525 in) head of water which are ±0.75%.

Repeatability:
0.1% of calibrated span.

Hysteresis:
15F Series: 0.1 % of calibrated span or 0.25 mm (0.01 in) head of water, whichever is larger.

13F and 13FE Series: 0.1 % of calibrated span or 1.25 mm (0.05 in) head of water, whichever is larger.

Physical Specifications

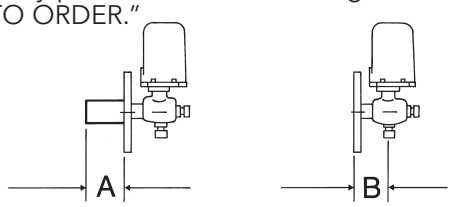
Body and Flange Material:
Zinc cobalt-plated carbon steel or 316 ss (b), as specified.

Materials of Wetted Parts:
High Pressure Side:
- Capsule Diaphragm: 316L ss (c).
- Other Capsule Parts: 316 ss.
- Capsule Gaskets:
  - 15F,13F Series: 316 ss.
  - 13FE Series: None.
- Retaining Ring (d): 316 ss.

Low Pressure Side (Partial List):
- Capsule Diaphragm: 316L ss.
- Force Bar: 316 ss.
- Force Bar Seal: Cobalt-nickel.
- Force Bar Gasket: Silicone elastomer.
- Capsule Gaskets:
  - 15F, 13F Series: 316 ss.
  - 13FE Series: ptfe.

(b) AISI Type 316 stainless steel.
(c) AISI Type 316L stainless steel.
(d) Raised face portion of flange.

Mounting:
Provided by process connection flange. See "HOW TO ORDER."



Nominal Diaphragm Extension Length "A"
(13FE Series)**:** See "HOW TO ORDER."

Flange Extension Length "B":
15F and 13FE Series: 125 mm (5 in).

13F Series: 125 or 200 mm (5 or 8 in), as specified.

Enclosure Classification:
Meets IEC IP53 and provides the environmental protection of NEMA Type 3.

Cover Material:
High-impact, glass-filled polycarbonate.

Optional Specifications

Wetted Parts Materials:
Monel, Duranickel, Hastelloy C, tantalum, and various coatings.

High Process Temperature:
To 315°C (600°F).

Lower Spans:
Provides spans as low as one-half standard.

Air Supply Sets:
Adjustable regulators with or without gauge.

How to Order

1) SPECIFY MODEL NUMBER: 15F- ___ - L ___ ___ 5 - ___

Transmitter:
- 316 ss body and flange ..... A
- Zinc cobalt-plated carbon steel body and flange A1

Span Limits:
- 0.13 and 0.63 m or 5 and 25 in head of water L

Body and Flange Material; and Connection:
- Zinc cobalt-plated carbon steel 6 in ANSI Class 150 ..... K61A
- 316 ss 6 in ANSI Class 150 ..... S61A
- Zinc cobalt-plated carbon steel 150 mm,16 Bar, DIN, and BS K61D
- 316 ss 150 mm,16 Bar, DIN, and BS S61D

Flange Extension Length:
- 125 mm (5 in) 5

Elevation or Suppression (Optional):
- Zero elevation kit L
- Zero suppression kit ..... R

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER: 13F- ___ - ___ ____ ___ - ___

Transmitter:
- 316 ss body and flange ... A
- Zinc cobalt-plated carbon steel body and flange ... A1

Span Limits:
- 0.51 and 6.3 m or 20 and 250 in head of water ... M
- 5.1 and 21.6 m or 200 and 850 in head of water ... H

Body and Flange Material; and Connection:
- Carbon steel 3 in ANSI Class 150 ... K31A
- Carbon steel 3 in ANSI Class 300 ... K33A
- 316 ss 3 in ANSI Class 150 ... S31A
- 316 ss 3 in ANSI Class 300 ... S33A
- Carbon steel 80 mm,10/40 Bar, DIN, and BS ... K33D
- 316 ss 80 mm,10/40 Bar, DIN, and BS ... S33D

Flange Extension Length:
- 125mm(5in) ... 5
- 200 mm (8 in) ... 8

Elevation or Suppression (Optional):
- Zero elevation kit ... L
- Zero suppression kit ... R

1) SPECIFY MODEL NUMBER: 13FE- ___ - ___ ____ 5 ___ - ___

Transmitter:
- 316 ss body and flange ... A
- Zinc cobalt-plated carbon steel body and flange ... A1

Span Limits:
- 0.51 and 6.3 m or 20 and 250 in head of water ... M
- 5.1 and 21.6 m or 200 and 850 in head of water ... H

Body and Flange Material; and Connection:
- Zinc cobalt-plated carbon steel 4 in ANSI Class 150 ... K41A
- Zinc cobalt-plated carbon steel 4 in ANSI Class 300 ... K43A
- 316 ss 4 in ANSI Class 150 ... S41A
- 316 ss 4 in ANSI Class 300 ... S43A
- Zinc cobalt-plated carbon steel 100 mm,16 Bar, DIN, and BS ... K41D
- Zinc cobalt-plated carbon steel 100 mm, 40 Bar, DIN, and BS ... K43D
- 316 ss 100 mm,16 Bar, DIN, and BS ... S41D
- 316 ss 100 mm, 40 Bar, DIN, and BS ... S43D

Flange Extension Length:
- 125 mm (5 in) ... 5

Nominal Diaphragm Extension Length:
- 50 mm (2 in) ... 2
- 100 mm (4 in) ... 4
- 150 mm (6 in) ... 6

Elevation or Suppression (Optional):
- Zero elevation kit ... L
- Zero suppression kit ... R

2) SPECIFY OUTPUT SIGNAL _____

3) SPECIFY CALIBRATED DIFFERENTIAL PRESSURE RANGE _____

4) SPECIFY OPTIONAL FEATURES _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

13DMP, 13DEMP Series Pneumatic d/p Cell Transmitters With Matched Pressure Seals for Liquid Level Measurement

13DMP, 13DEMP

- **Low Air Consumption**
- **13DMP–FLUSH TYPE with 3-inch flange connections**
- **13DEMP–EXTENDED TYPE with 4-inch flange connections**
- **Pressure Seals**
  - Eliminate problems caused by repeaters and wet and dry legs
  - Make installation and adjustments easier than other approaches
  - Provide positive isolation with a minimum of process wetted parts
  - Allow higher process temperatures
- **Ideal for Pressurized or Evacuated Vessels**

The 13DMP, 13DEMP Series Pneumatic d/p Cell Transmitters with matched pressure seals measure differential pressure and transmit a proportional pneumatic output signal.

For complete specifications, refer to Product Specification Sheet PSS 2B-1C1 B.

Functional Specifications

Span and Range Limits:

Series	Span Limits (Head of Water)	
	meters	inches
13DMP-M,13DEMP-M	0.51 and 6.4	20 and 250
13DMP-H,13DEMP-H	5.1 and 21.6	200 and 850

Series	Range Limits (Head of Water) (a)	
	meters	inches
13DMP-M,13DEMP-M	-6.4 and +6.4	-250 and +250
13DMP-H,13DEMP-H	-21.6 and +21.6	-850 and +850

(a) Negative numbers indicate a higher pressure on the normal "Low Side" of the transmitter.

Process Temperature Limits:
-37 and +150°C (-35 and +300°F).

Ambient Temperature Limits:
-37 and +80°C (-35 and +180°F).

Output Signal and Supply Pressure:

Output Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 kPa 20 psi

Performance Specifications

Accuracy:

Spans (Head of Water) Between		Accuracy (b) % of Span
meters	inches	
0.51 and 13	20 and 525	±0.5
13 and 21.6	525 and 850	±1.0

(b) Includes linearity, hysteresis, and repeatability.

Repeatability:
0.1% of calibrated span.

Hysteresis:
0.2% of calibrated span.

13DMP, 13DEMP

Physical Specifications

Materials of Wetted Parts:

Remote Seal Diaphragms	Raised Face Backup Pads (Gasket Surface)
AISI Type 316L stainless steel (316L ss)	AISI Type 316 stainless steel (316 ss)
Hastelloy C276	Hastelloy C
Tantalum	

Materials of Nonwetted Parts:

Description	Material
Flanges	316 ss or carbon steel
Capillary	316ss
Transmitter Body	316ss
Fill Fluid	DC 200 silicone (c)

(c) Relative density (specific gravity) is 0.90 at 25°C (77°F).

Capillary Lengths:
See "HOW TO ORDER."

Mounting:
Seals mount by process connection flanges. See "HOW TO ORDER." Transmitter body mounts to bracket for DN 50 or 2 in vertical or horizontal pipe.

Enclosure Classification:
Meets IEC IP53 and provides the environmental protection of NEMA Type 3.

Cover Material:
High-impact, glass-filled polycarbonate.

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

Optional Specifications

Air Supply Set:
Adjustable regulators with or without gauge.

High Temperature Fill:
For process temperatures up to 300°C (580°F).

How to Order

1) SPECIFY MODEL NUMBER: 13DMP- ___ ___ ___ _____

Span Limits:
- 0.51 and 6.4 m or 20 and 250 in head of water ..... M
- 5.1 and 21.6 m or 200 and 850 in head of water ..... H

Wetted Parts Material:
- 316 ss with 316L ss diaphragm ..... S
- Hastelloy C with Hastelloy C276 diaphragm C
- Tantalum ..... T

Capillary Length (each capillary):
- 1.5m(5ft) ..... A
- 4.5m(15ft) ..... B
- 8 m (26 ft) C

Process Connections (nonprocess wetted):

Zinc cobalt-plated carbon steel	3 in ANSI Class 150	K31A
Zinc cobalt-plated carbon steel	3 in ANSI Class 300	K33A
Zinc cobalt-plated carbon steel	3 in ANSI Class 600	K36A
316 ss	3 in ANSI Class 150	S31A
316 ss	3 in ANSI Class 300	S33A
316 ss	3 in ANSI Class 600	S36A
Zinc cobalt-plated carbon steel	80 mm 10/40 Bar, DIN and BS	K33D
316 ss	80 mm 10/40 Bar, DIN and BS	S33D

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER: 13DEMP- ___ ___ ___ ___ _____

Span Limits:
- 0.51 and 6.4 m or 20 and 250 in head of water ..... M
- 5.1 and 21.6 m or 200 and 850 in head of water ..... H

Wetted Parts Material:
- 316 ss with 316L ss diaphragm ..... S
- Hastelloy C with Hastelloy C276 diaphragm C

Capillary Length (each capillary):
- 1.5m (5 ft) ..... A
- 4.5m (15 ft) ..... B
- 8m (26 ft) C

Extension Length:
- 50mm (2 in) 2
- 100mm (4 in) 4
- 150mm (6 in) 6

Process Connections (nonprocess wetted): Carbon steel, 4 in ANSI
- Class 150 ..... K41A
- Class 300 ..... K43A
- Class 600 ..... K46A

2) SPECIFY OUTPUT SIGNAL _____

3) SPECIFY CALIBRATED DIFFERENTIAL PRESSURE RANGE _____

4) SPECIFY OPTIONAL FEATURES _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

Note: For liquid level applications, zero elevation kits always required due to wet leg effect of filled seal system; therefore, it is a standard part of the 13DMP and 13 DEMP Series Transmitters.

12A

The 12A Series Pneumatic Temperature Transmitters measure temperature and transmit a proportional pneumatic output signal.

P12A Series Pneumatic Temperature Transmitters

- **Trouble-Free**
  - Force balance mechanism has no moving parts
- **Accurate**
- **Responsive**
  - Comparable to an unsheathed thermocouple
- **Simple Range Change**
  - Span can be elevated or suppressed 100%
  - Adjustment involves only three parts
- **Easy Installation**
  - A variety of mounting positions
- **Low Air Consumption**

For complete specifications, refer to Product Specification Sheet PSS 2B-1B1 A.

Functional Specifications

Range Limits, Spans, and Maximum Overrange Temperatures (Maximum ORT):

Series	Sensor Sensitive Length "X"		Fahrenheit (F°)			
			Range Limits			Maximum
	mm	in	Lower	Upper	Span	ORT
12A* and 12AS*	150	6	-100	+330	50	330
			-100	+1000	100	1000
			-100	+1000	125	1000
			-100	+1000	150	1000
			-100	+1000	200	1000
12A and 12AS	75	3	-100	+150	50	330
			-100	+650	100	1000
			-100	+850	150	1000
			-100	+1000	200	1000
	75 or 150	3 or 6	-100	+1000	250	1000
			-100	+1000	300	1000
			-100	+1000	400	1000
			-40	+1000	500	1000
	150	6	0	+1000	600	1000
			+200	+1000	800	1000
12A-C	150	6	-350	+330	50	330
			-350	+400	100	600
			-300	+600	150	600
			-250	+600	200	600
			-200	+600	250	600
			-150	+600	300	600
	75	3	-250	+600	200	600
12A-H	150	6	+600	+1400	400	1400
			+500	+1400	500	1400
			+400	+1400	600	1400
			+300	+1400	700	1400
			+200	+1400	800	1400

*See statement under "PERFORMANCE SPECIFICATIONS."

Series	Sensor Sensitive Length "X"		Celsius (C°)			
			Range Limits			Maximum
	mm	in	Lower	Upper	Span	ORT
12A* and 12AS*	150	6	-75	+125	25	125
			-75	+460	50	460
			-75	+550	75	550
			-75	+550	100	550
12A and 12AS	75	3	-75	+70	25	125
			-75	+300	50	460
			-75	+550	75	550
			-75	+550	100	550
	75 or 150	3 or 6	-75	+550	150	550
			-75	+550	200	550
	150	6	0	+550	300	550
12A-C	150	6	-210	+125	25	125
			-220	+200	50	320
			-170	+320	100	320
			-140	+320	150	320
			-95	+320	200	320
	75	3	-160	+320	100	320
12A-H	150	6	+350	+760	200	760
			+250	+760	300	760
			+150	+760	400	760

Output Signal: 20 to 100 kPa or 3 to 15 psi.

Ambient Temperature Limits:
-35 and +80=°C (-30 and +180°F). The vinyl covered portion of the capillary tubing must be in an area between -55 and +105°C (-65 and +220°F).

Supply Pressure: 140 kPa or24 20 psi.

Performance Specifications

(12A and 12AS Series with range limits, spans, and sensitive lengths as noted by asterisks in Range Limits table.)

Accuracy (Includes linearity, hysteresis, and repeatability): ±0.5% of calibrated span.

Repeatability:
0.2% of calibrated span.

Step Response Time (Basic thermal system and agitated water bath): Maximum of 12 seconds for a 90% recovery from a step change on a bare sensor and less than 2 seconds for a 63% recovery.

Physical Specifications

Body:
Die-cast, low copper aluminum alloy with baked gray vinyl finish.

Cover:
Blue, high impact, glass filled polycarbonate.

Environmental Protection:
The transmitter housing is weatherproof. It is dust-protected as defined in IEC IP53 and, with its constant air purging, provides the environmental protection of NEMA Type 3.

Thermal System:
SAMA (Scientific Apparatus Makers' Association) Class IIIB gas pressure system.

Connecting Tubing:
Vinyl covered AISI Type 302 stainless steel (302 ss) flexible armor over 316 ss capillary. The length is 1m (3.5 ft).

Bushings:
Fabricated of 316 ss and available with R1/2, R3/4, R1, G1/2B, G3/4B, G1B, 1/2 NPT, 3/4 NPT, or 1 NPT external thread and 1-18 NS internal thread. Bushing not required if temperature is well specified.

Adjustable Union Packing:
ptfe: For temperatures up to 205°C (400°F).

Graphite Impregnated Inconel Mesh: For maximum temperature of 540°C (1000°F).

Sensor:
Fitted with an adjustable union and bendable extension. The jam nut has an external 1-18 UNS thread. All process wetted parts are 316 ss except for the 12A-H Series, which has a sensor and bendable extension fabricated of Inconel. Also, the 12A-H Series has a fixed union.

Diameter (Y): 9.53 mm (0.375 in).

Sensitive Length (X): 75 or 150 mm (3 or 6 in).

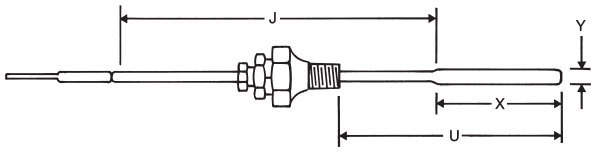
Extension Length (J): 450 mm (18 in). the J dimension for the 12A-A Series must be long enough to limit the temperature of the capillary tubing to 105°C (220°F).

Insertion Length (U): 200 to 530 mm (8 to 21 in), adjustable.

Immersion Length (R): As specified.

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

Plain Bendable Sensor with Adjustable Union:



Optional Features

Air Supply Sets:
Available as fixed or adjustable filter regulators with or without gauges. Refer to Page 27.

Sausage Type Sensors:
For measurement of gas temperature in ducts or flues.

Thermowells:
For mechanical or corrosive protection. Refer to Page 35.

Derivative Unit:
Compensates for thermal lag in process.

Intermediate Spans:
Spans different from those listed in table under "FUNCTIONAL SPECIFICATIONS."

Optional Thermal System Configurations:
Other connection tubing, sensor types, and mounting are available.

How to Order

1) SPECIFY MODEL NUMBER: _____ – _____ ___ __ __ __

Transmitter with Basic Thermal System and Code 3542 Sensor 12A

Cryogenic Thermal System and Code 3542 Sensor 12A-C

High Temperature Thermal System and Code 3482 Sensor 12A-H

Sanitary Thermal System (see additional specifications below) 12AS

ADDITIONAL SPECIFICATIONS FOR 12AS SERIES SANITARY THERMAL SYSTEMS ONLY:

Sensor Code: 3242

Connector:
- 16A Bevel Seat S1
- 16AMP Clamp Seat S2
- Type RJT S3
- Type ISS S4
- ISO Clamp Flange S5
- DIN Seat S6

Nominal Line Size:
- 25 mm (1 in) ..... A
- 40mm(1 1/2in) ..... B
- 50 mm (2 in) C
- 65mm(21/2in) ..... D
- 75 mm (3 in} ..... E
- 100 mm (4 in) ..... F

Sensor Sensitive Length (X):
- 75mm (3 in) ..... R
- 150 mm (6 in) ..... T

Capillary Tubing Length:
- 1 m (3.5 ft) ..... N
- 3 m (10 ft) ..... P

2) SPECIFY OUTPUT SIGNAL _____

3) SPECIFY RANGE LIMITS AND SPAN _____

4) SPECIFY CALIBRATED RANGE _____

5) SPECIFY SENSOR CODE _____

6) SPECIFY CONNECTING TUBING LENGTH _____

7) SPECIFY SENSOR DIMENSIONS _____

A. Diameter (Y) [9.53 mm (0.375 in) standard] _____

B. Length (X) [75 or 150 mm (3 or 6 in)–see Range Limits table] _____

C. Extension length (J) [450 mm (18 in) standard] _____

D. Insertion length (U) _____

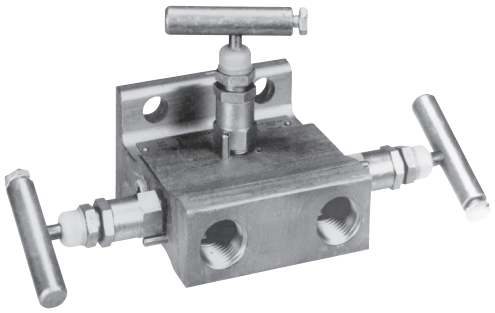
E. Immersion length (R) _____

8) SPECIFY BUSHING EXTERNAL THREAD (if required) _____

9) SPECIFY OPTIONAL FEATURES _____

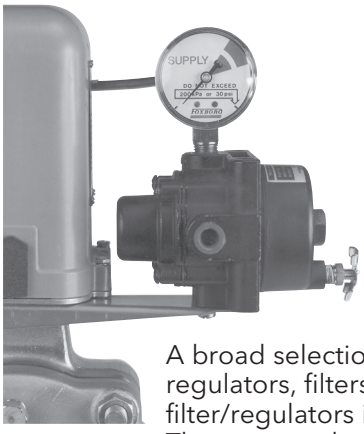
10) SPECIFY INFORMATION FOR INSTRUMENT TAG AND APPLICATION _____

Bypass Manifolds



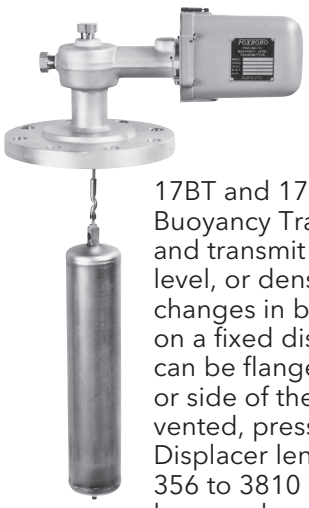
A variety of 3 and 5 valve manifolds is available for fast, convenient zero checks and adjustment of transmitters, and to isolate the transmitter from the process for maintenance.

Air Supply Pressure Regulators and Filters (Airsets)



A broad selection of air pressure regulators, filters, and combination filter/regulators is available. They are used with pneumatic instruments requiring a regulated filtered air supply.

17BT, 17BS Series Pneumatic Buoyancy Transmitters for Liquid Level Measurement



17BT and 17BS Series Pneumatic Buoyancy Transmitters measure and transmit liquid level interface level, or density by sensing changes in buoyant force exerted on a fixed displacer element. They can be flange-mounted to the top or side of the vessel which may be vented, pressurized, or evacuated. Displacer lengths range from 356 to 3810 mm (14 to 150 in) or longer when required.

45P Series Pneumatic Indicating Transmitters

45P Series Pneumatic Indicating Deflection Type Transmitters measure pressure, temperature, differential pressure, or liquid level, depending on element selection, and transmit a proportional 20 to 100 kPa or 3 to 15 psi signal.

Primary Measurement Elements

Using primary measurement elements, you can adapt many instruments to specific applications.

Foxboro makes elements for all types of measurements – flow, pressure, temperature, moisture, and humidity.

Orifice Plates and Flange Unions
Used with differential pressure meters to measure flow rate.

Pressure Seals
Ideal for measuring corrosive, viscous, or hot fluids.

Thermocouple/RTDs
Numerous configurations for use with transmitters,recorders, and controllers.

Thermowells
Protect thermocouples and RTDs from damaging process materials.

Dewcel Elements
The most accurate, reliable way to measure moisture and humidity.

These elements are designed for use with both pnuematic and electronic devices. With them, you can count on the high performance and dependability you expect from all Foxboro instruments.

Orifice Plates and Flange Unions

- **Proven Performance**
  - Widely recognized as the industry standard
- **Versatile**
  - Works with either a d/p Cell Transmitter or a bellows meter
- **Broad Choice of Sizes and Materials**
  - For just about any line size or application

For complete specifications, refer to Product Specification Sheet PSS 3-5A1 A.

Orifice Plates are used with differential pressure meters to measure flow rate.

Orifice Plate Specifications

Material:
These plates conform to National Association of Corrosion Engineer's (NACE) Standard MR-01-75.

Flange Type Rating:
ANSI Class 150, 300, 400, or 600, as specified.

Bore:
Concentric, with sharp and square inlet edge. Plate is beveled if required by conformity specifications.

Nominal Plate Thickness:
4 mm (0.125 in) for 25 to 200 mm (1 to 8 in) pipe sizes, 7 mm (0.250 in) for 250 to 350 mm (10 to 14 in) pipe sizes, and 10 mm (0.375 in) for 400 to 500 mm (16 to 20 in) pipe sizes.

Legend:
Upstream side of tab handle marked "inlet" and with bore size and flange type/rating. Downstream side marked with trademark, material, and tag.

Conformity (Specifications and Computations)**:**
Finish: Number 4 (45 microinch or better).

Dimensions:
Meet the intent of applicable portions of ASME "Fluid Meters" (Sixth Edition) and/or AGA Report 3 (1969), adopted as ANSI/API 2530.

Computations:
According to R.W. Miller's "Flow Measurement Engineering Handbook." This handbook is available from Foxboro. Refer to Part No. B0150YW.

Orifice Flange Union Specifications

Orifice Flange Unions are furnished in accordance with latest AGA and ASME code recommendations.

Construction:
Unions include 2 flanges, 2 jackbolts with nuts, 2 composition gaskets, 4 pipe plugs, and bolting.

Material:
Flanges: ASTM A-105 carbon steel, ASTM A-182 F304 ss, or ASTM A-182 F316 ss, as specified.

Bolting:With steel on stainless steel flanges; ASTM A193 Grade B7 alloy steel stud bolts with ASTM A194 Grade 2H nuts.

Pressure Tap Connections:
2 sets per union, 180 degrees apart. Class 300 and 600 unions are threaded for 1/2-inch pipe nipples. Class 900 and 1500 unions are threaded for 3/4-inch pipe nipples. The pressure tap hole diameter is: 6.35 mm (0.25 in) for 65 mm (2 1/2 in) pipe size and smaller, 9.53 mm (0.375 in) for 80 mm (3 in), and 12.7 mm (0.50 in) for 100 mm (4 in) pipe size and larger.

Optional Features

Reverse Flow:
For reverse flow applications, the plate is bored and finished equally on both faces and the bore is not beveled. The plate must be used with symmetrical taps.

Preparation for Nuclear, Oxygen, or Chlorine Service is Available.

Optional Orifice Bores:
Eccentric, segmental, or quadrant edge bore.

Materials of Construction:
Hastelloy C, Monel, Alloy 20, and titanium are available.

ORIFICE PLATES, FLANGE UNIONS

Optional Features (continued)

High Temperature and High Differential Pressure Operation:
The Orifice Plate may warp if the temperature of the process fluid exceeds 200°C (400°F) and the differential pressure (ΔP) is greater than 50 kPa (200 inH_2O). Refer to Foxboro for determination of the plate thickness for these conditions.

Drain or Vent Hole:
Plate drilled with recommended maximum diameter hole to applicable standard.

Other materials of construction, flange ratings, plate thickness, and line size are available.

How to Order

1) SPECIFY ORIFICE PLATE CODE: SERIES 120 - ____ – ____

Plate, Foxboro Tab Type ..... SERIES 120

Material: ASTM A-240 Type
- 304 ss 304
- 316 ss 316

For use with Flange Type Rating: ANSI Class
- 150 150
- 300 300
- 400 400
- 600 600

2) SPECIFY NOMINAL LINE (PIPE) SIZE AND SCHEDULE NUMBER _____

3) SPECIFY ORIFICE DIAMETER OR SUPPLY COMPLETED FLOW DATA SHEET (Refer to Foxboro) _____

4) SPECIFY OPTIONAL FEATURES _____

5) SPECIFY INFORMATION FOR IDENTIFICATION TAG _____

1) SPECIFY FLANGE UNION CODE: ____ ___ - ____ – ____

Style:
- Slip-On ..... FU-S
- Threaded ..... FU-T
- Welding-Neck ..... FU-W

Flange Facing:
- Raised Face ..... RF
- Ring Joint (Not available with FU-T) ..... RJ

Material:
- ASTM A-105 Carbon steel ..... CS
- ASTM A-182 F304 ss 304
- ASTM A-182 F316 ss 316

ANSI Rating:
- Class 300 300
- Class 600 (Not available with FU-T) 600
- Class 900 (Not available with FU-T) 900
- Class 1500 (Not available with FU-T) 1500

2) SPECIFY NOMINAL LINE (PIPE) SIZE _____

3) SPECIFY PIPE SCHEDULE NUMBER OR ACTUAL INTERNAL DIAMETER FOR WELDING-NECK TYPE UNIONS _____

4) SPECIFY OPTIONAL FEATURES _____

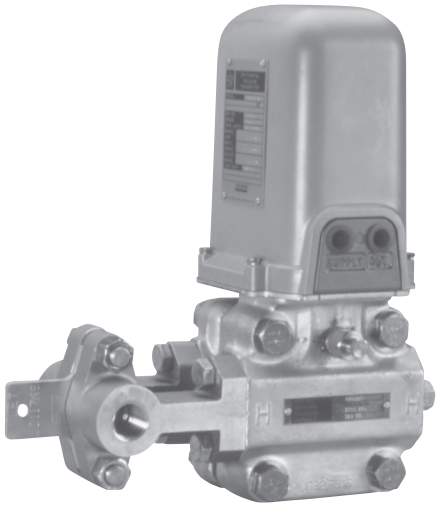
5) FOR DIFFERENTIAL PRESSURE TRANSMITTER, REFER TO: Page 3.

IFOA

Integral Flow Orifice Assemblies (IFOA) Series

- **The IFOA has very high accuracy when equipped with associated piping**
- **The IFOA can be used with any differential pressure transmitter having standard process connections**
- **Process wetted materials are available for use with both corrosive and noncorrosive fluids**
- **The transmitter can be either integrally coupled or remotely connected**
- **Process wetted material meets NACE Standard MR-01-75**

For complete specifications, refer to Product Specification Sheet PSS 3-5A1 B.



The IFOA Series Integral Flow Orifice Assemblies adapt electronic and/or pneumatic d/p Cell Transmitters for measuring small flow rates.

Specifications

Assemblies with Associated Piping:

Body Material:
Cast AISI Type 316 ss ASTM A351 Grade CF-8M stainless steel.

Piping Material:
Seamless stainless alloy steel pipe to ASTM A-312 Grade TP-316, Schedule 40 for the 15 and 25 mm (1/2 and 1 in) sizes, Schedule 80 for the 40 mm (1 1/2 in) size.

Flange Material:
Forged 316 ss ASTM A182-F316.

Assemblies without Associated Piping:

Body Material:
Cast AISI Type 316 ss ASTM A351 Grade CF-8M stainless steel or cast Hastelloy C Grade CW-2M per ASTM A494/A494M-86, as specified.

Both Types:

Static Pressure Rating and Process Temperature Limits:

End Connection	Assembly Size		Static Pressure Rating and Process Temperature Limits (a)	
	mm	in	SI Units	U.S.Units
WELD ENDS	15	1/2	20 MPa from -40 to +40°C 16 MPa at 150°C	3000 psi from -40 to +100°F 2300 psi at 300°F
	25	1	14 MPa from -40 to +40°C 10.5 MPa at 150°C	2000 psi from -40 to +100°F 1550 psi at 300°F
	40	1 1/2	5 MPa from -40 to +40°C 4 MPa at 150°C	750 psi from -40 to +100°F 580 psi at 300°F
THREADED ENDS	15 & 25	1/2 & 1	10 MPa from -40 to +150°C	1500 psi from -40 to +300°F
	40	1 1/2	5 MPa from -40 to +40°C 4 MPa at 150°C	750 psi from -40 to +100°F 580 psi at 300°F
FLANGED ENDS (b)	All sizes		Static Pressure Rating of Flange Selected	

a) Process temperature limits are -40 and +150°C (-40 and +300°F). Transmitter temperature limitations must be observed when integrally mounted to IFOA assembly. For higher pressures and temperatures, refer to Foxboro.
b) Available with associated piping only.

IFOA

Specifications (continued)

Body Bolting:
ASTM A193 Grade B7 cadmium- or zinc-plated with yellow chromate finish alloy steel stud bolts and ASTM A194 Grade 2H nuts.

Orifice Plate Material:
316 ss ASTM A240, Monel ASTM B127, or Hastelloy C276 ASTM B626, as specified.

Orifice Sealing Gasket Material:
Glass-reinforced ptfe.

Optional Features

Process wetted materials in compliance with NACE Standard MR-01-75.

High pressure assembly (IFO). Static pressure rating 40 MPa (6000 psi).

17-4 PH ss body bolting.

Oxygen service preparation.

3-valve manifolds.

180° U-Bend Integral Orifice Attachment.

Orifice Kits:

316 ss	Consisting of 7 bored diameters per standard specifications for 15 mm (1/2 in) assembly.
	Consisting of 5 bored diameters per standard specifications for 25 mm (1 in) assembly.
	Consisting of 5 bored diameters per standard specifications for 40 mm (1 1/2in) assembly.
Monel	Consisting of 7 bored diameters per standard specifications for 15 mm (1/2 in) assembly.

How to Order

1) SPECIFY MODEL NUMBER: IFOA - ___ __ __ __ __ __ - ___

Nominal Size:
- 15 mm (1/2 in) 0H
- 25 mm (1 in) 01
- 40 mm (1 1/2 in) 1H

Body Material:
- 316 ss ..... S
- Hastelloy C, Grade CW-2M (without associated piping only) ..... H

End Connection without Associated Piping:
- Socket Weld Body 1
- Threaded Body (NPT) 2
- Threaded Body (R metric) 8

End Connection with Associated Piping:
- Pipe Ends Prepared for Welding 3
- Pipe Ends Threaded (NPT) 4
- Pipe Ends Threaded (R metric) 9
- Pipe Ends Flanged ANSI Class 150 5
- Pipe Ends Flanged ANSI Class 300 6
- Pipe Ends Flanged ANSI Class 600, 15 and 25 mm (1/2 and 1 in) only 7

Orifice Plate Material:
- 316 ss ..... S
- Monel ..... M
- Hastelloy C276 ..... H

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER (continued): IFOA – ___ _ _ _ _ _ _ – ___

Orifice Bore Diameter: Nominal Size 15 mm (1/2 in):

0.508 mm (0.020 in)	A
0.889 mm (0.035 in)	B
1.524 mm (0.060 in)	C
2.540 mm (0.100 in)	D
4.064 mm (0.160 in)	E
6.350 mm (0.250 in)	F
8.890 mm (0.350 in)	G
Jewel orifice. 316 ss base material. 0.0508 to 0.381 mm (0.002 to 0.015 in)	U
Nonstandard within beta limits of 0.1 to 0.8	V

Orifice Bore Diameter: Nominal Size 25 mm (1 in):

6.147 mm (0.242 in)	H
8.661 mm (0.341 in)	J
12.14 mm (0.478 in)	K
16.64 mm (0.655 in)	L
21.13 mm (0.832 in)	M
Nonstandard within beta limits of 0.1 to 0.8	V

Orifice Bore Diameter: Nominal Size 40 mm (1 1/2 in):

9.703 mm (0.382 in)	N
13.67 mm (0.538 in)	P
19.08 mm (0.751 in)	R
25.86 mm (1.018 in)	S
29.97 mm (1.180 in)	T
Nonstandard within beta limits of 0.1 to 0.8	V

Optional Connectors: For remote mounting d/p Cell Transmitter:

316ss, 1/2NPT	1S
316 ss, R1/2	2S
Hastelloy C, 1/2 NPT	1H
Hastelloy C, R1/2	2H

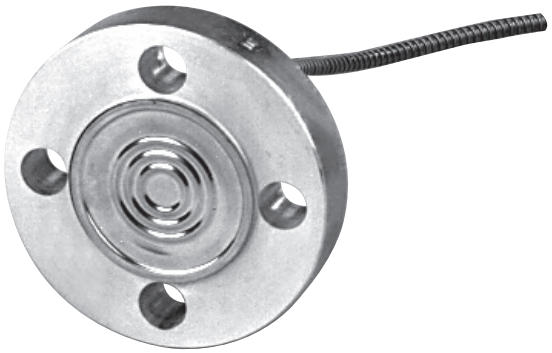
2) SPECIFY ORIFICE BORE DIAMETER OR SUPPLY COMPLETED FLOW DATA SHEETS (Refer to Foxboro) FOR NONSTANDARD OR JEWEL ORIFICE _____

3) SPECIFY OPTIONAL FEATURES _____

4) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

DIAPHRAGM PRESSURE SEALS

Diaphragm Pressure Seals

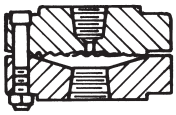
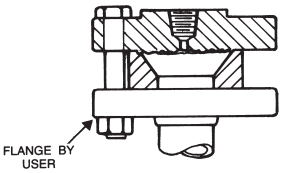
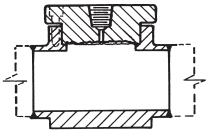


Diaphragm Pressure Seals are for connection to pressure instruments– to isolate the process from the instrument and piping.

- **Foxboro offers a comprehensive line of Diaphragm Pressure Seals. These seals are used to separate pressure instruments from process fluids.**
- **Separation is required if the process:**
  - is corrosive
  - is viscous enough to clog
  - contains suspended solids
  - could freeze or solidify
  - is toxic
  - requires sanitary handling
- **Diaphragm Pressure Seals are available in a wide range of designs and materials**

For complete specifications, refer to Product Specification Sheet PSS 3-2C1 A.

Diaphragm Pressure Seals

Selection	Description	Illustrations and AS References (a)
THREAD ATTACHED	Process Connection: PES-SB: 1/4,1/2, 3/4,1,1 1/4, or 1 1/2 NPT PES-SG: 1/4,1/2,3/4, or 1 NPT Operating Pressure: Maximum working pressure: 0 to 17.5 MPa (0 to 2500 psi).	 As Illustrated .....AS Reference PES-SB With 1/4-inch flushing connection.....AS Reference PES-SG
FLANGE ATTACHED	Process Connection: ANSI raised face flange. Operating Pressure: Maximum working pressure: Governed by flange rating.	 As Illustrated .....AS Reference PES-SC With 1/4-inch flushing connection.....AS Reference PES-SD
IN-LINE FLOW-THROUGH	Process Connection: Welded to process line. Operating Pressures: Maximum working pressure: Governed by user's weld, 0 to 10.5 MPa at 38 C (0 to 1500 psi at 100'F).	 80 mm (3 in) line only 100 mm (4 in) line & larger As Illustrated .....AS Reference PES-SJ  As Illustrated .....AS Reference PES-SM

a) Other types available. Wetted parts materials available: Steel, AISI Types 304 and 316 ss, Carpenter 20, Monel, nickel, ... titanium, Hastelloy B and C, PVC,polypropylene, ptfe, and Inconel.

Thermowells

- **Rigid material, concentricity specifications, and individual hydrostatic testing assures maximum soundness and highest quality**
- **Connections:**
  - Flanged (ANSI and ISO): Variety of sizes and pressure ratings
  - Threaded (metric and NPT): R1/2, R3/4, and R1 (1 /2, 3/4, and 1 NPT)
- **Type:**
  - Drilled construction, welded construction, plain, with lagging, sanitary, straight, tapered, restricted tip
- **Materials:**

Brass	347 ss	316L ss
Carpenter 20 Cb-3	F11 Alloy Steel	Aluminum
C1018 Carbon Steel	F22 Alloy Steel	Copper
R-Monel 405	Hastelloy B	K-Monel
304 ss (standard)	Hastelloy C 276	309 ss
304 Low Carbon (304L) ss	Inconel 600	310 ss
	Nickel 200	410 ss
316 ss (standard)	Titanium	446 ss

THERMOWELLS AND DEWCEL

Foxboro Thermowells separate the temperature measuring sensitive portion of an RTD, Thermocouple, or Filled Thermal System from a potentially corrosive or damaging process media. These wells permit ready removal of the sensor without process shutdown.

Dew Point Measurement System – DEWCEL

- **The DEWCEL System provides a direct reading of absolute humidity in ambient temperature between -45 and +105°C (-50 and +220°F)**

  When connected to a temperature measurement device, the DEWCEL System measures absolute humidity. By means of appropriate tables, the temperature can be converted to dew point, percent water vapor, parts per million, or other units of absolute moisture. In practice, the conversion is accomplished in recorder chart layouts, characterized amplifiers, or computer programs.
- **Accuracy:** ±0.8°C (±1.5°F) at 32°C (90°F) dew point (not including temperature sensor tolerances)
- **Dew Point Range Limits:** -45 and +60°C (-50 and +140°F)
- **Relative Humidity Limits:** 12 and 100% relative humidity
- **Pressure Rating:** Zero Pa absolute to 865 kPa gauge (zero psia to 125 psig)

The DEWCEL is used with RTD, thermocouple, or filled thermal system temperature measuring equipment.

Large Case Instruments

Foxboro large case instruments have been on the job for years in process plants around the world.

These versatile instruments fit a wide range of applications. There's a unit for just about every process function:

- **Recording**
- **Indicating**
- **Controlling**
- **Totalizing**
- **Transmitting**

And they are available with a selection of measurement elements:

- **Flow**
- **Pressure**
- **Humidity**
- **Temperature**
- **Servo Elements for RTDs/Thermocouples and other Electrical Inputs**

You can also choose from an extensive list of options such as electrical contacts, integrators, batch controls, pen types, control modes—and numerous other features.

Foxboro large case instruments can be field mounted on pipe stands, in panels, or on flush surfaces. And their durable housings are resistant to moisture, corrosion, and damaging environments.

Their dependability is legendary. That's why process engineers specify them time and again.

40P, 40M Series Recording and Indicating Pneumatic Controllers

- **Precise Control**
- **Chart Records or Indication**
- **Weatherproof Construction (40P): NEMA Type 3**
- **Wide Selection of Measuring Elements**
- **Versatile Mounting: Surface, Panel, or Pipe Mounting**

For complete specifications, refer to Product Specification Sheets PSS 3-1A1 A and 3-1A2 A, B, C, and F.

The 40P, 40M Series Recording and Indicating Pneumatic Controllers receive a mechanical input from an integrally mounted measuring element, compare it to a set point, and produce a pneumatic output signal.

Functional Specifications

Control Modes:
See "HOW TO ORDER."

Measurement Elements:
See "HOW TO ORDER."

Controller Action:
The output signal either increases or decreases with increasing measurement, as specified.

Output Signal:
See "HOW TO ORDER."

Supply Pressure:
140 kPa (20 psi, 1.4 bar or kg/cm^2).

Single Action:
One control unit per 40P or 40M case. Dual, duplex, and auto-selector versions are also available.

Recorder Chart Drives:
Electrical: The standard speed is 1 revolution per 24 hours for nominal 120 or 240 V, 50 or 60 Hz, as specified.

Mechanical: The standard speed is 1 revolution per 24 hours with a 24-hour movement.

Battery Operated: 11 Speed

Recorder Pens:
Fiber tip disposable or box.

Physical Specifications

Enclosure:
40P Series: The case and door are glass-fiber reinforced polyester moldings, compounded for superior corrosion resistance. The overall construction provides the environmental protection of IEC IP53 and NEMA Type 3.

40M Series:
Durable, die-cast aluminum case and door with corrosion-resistant vinyl finish.

Mounting:
Standard mounting is flush in a panel up to 16 mm (0.6 in) thick or on a surface. A kit of parts for vertical mounting on a DN 50 or 2 in pipe is available (40P Series only).

Expendable Accessories:
Charts: 100 HUMITEX nominal 300 mm (12 in) circular charts [nominal 100 mm (4 in) calibrated scale] are supplied with each instrument.

Ink:
1 U.S. fl oz (30 cm3) is supplied for each box type pen.

40P, 40M

Performance Specifications

Accuracy:
See Measurement Element selected.

Repeatability:
0.25% of calibrated span.

Optional Features

Pneumatic Set:
For remote set point adjustment.

External Manual Set Point Knob.

Ratio:
Maintains ratio between uncontrolled and controlled variable.

Batch:
For batch control.

Type 70 Contacts:
For electrical contact output. Refer to Page 57.

External Connection to Integral Bellows.

How to Order

1) SPECIFY MODEL NUMBER:

40P or 40M ___ - **A** ___ ___ - ___ ___ ___ ___ ___ /_____

Function:
- Recording ..... R
- Indicating ..... N

Action:
- Single (One control unit actuated by one measuring element. Control will apply to first listed element.) ..... A

Control:
- On/Off 1
- Full proportional 0.5 to 200% 2
- Full proportional plus derivative 0.01 to 50 minutes 3
- Full proportional plus integral (reset) 0.01 to 50 minutes per repeat. 4
- Full proportional plus integral (reset) plus derivative ... 5
- Narrow band proportional 0.5 to 25% or 1.0 to 50% .. 6

Automatic/Manual Internal Transfer Switching:
- Without internal regulator, without transfer switch (a) ..... J
- 2-position nozzle seal switch (b) L
- Balanceable automatic/manual unit - right (b) ..... N
- Balanceable automatic/manual unit - left (b) ..... P

Output Signal and Gauge:
- 20 to 100 kPa signal, 150 kPa gauge 5
- 3 to 15 psi signal, 22 psi gauge 2
- 0.2 to 1.0 bar signal, 1.5 bar gauge 6
- 0.2 to 1.0 kg/cm^2 signal, 1.5 kg/cm^2 gauge 4

Mounting:
- Flush (c) ..... F
- Pipe (c), (d) ..... P
- Surface (c) ..... S
- Yoke. 40P Series available with Type 37 Element only ..... Y

(a) Available with Control code 1 only. (b) Not available with Control code 1. (c) Not available with 40P Series with Type 37 Element. (d) Not available with 40M Series.

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER:

40P or 40M __-A __ __-__ __ __ __ __/_____

Chart Drive or Scale:

Electrical - 24 h rotation, 120 V, 60 Hz (options available)	E
Mechanical - 24 h rotation and wind (options available)	M
Sector	N

Pens or Pointers:

1 pen or pointer	1
2 pens or pointers	2
3 pens	3

Pen Type or Scale Type:

Fiber tip disposable	F
Box	B
Single range scale	S
Double range scale	D

Elements: (Refer to Pages 48-56 for Element Descriptions)

Type 37 (a)	DE-A, B
Absolute pressure bellows	PA-CA
Receiver	PC
Absolute pressure double spiral	PA-MA
Pressure helical	PB-M, PB-AA
Pressure spiral	PB-BA
Pressure bellows	PB-CA, CC
Diaphragm	PB-DF, PF
Stainless long helical	PBGA
Temperature	TA-1A, 2A, 2B, 3B
Electronic servo	E

(a) Only one per instrument.

2) SPECIFY MEASUREMENT RANGE _____

3) SPECIFY CONTROLLER ACTION _____

4) SPECIFY OPTIONAL FEATURES _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

43AP

The 43AP Series Pneumatic Indicating Controllers continuously indicate and control pressure, vacuum, temperature, or flow.

43AP Series Pneumatic Indicating Controllers

- **Wide Selection of Direct Connected Measurement Elements**
- **Broad Choice of Control Modes**
  - On/off, proportional, proportional plus derivative, proportional plus integral (reset), proportional plus integral (reset) plus derivative, differential gap, and automatic shutdown
- **Internal Bumpless Auto/Manual Transfer**
  - Smooth internal switching
- **Weatherproof**
  - Glass-fiber reinforced case, gasketed door
  - NEMA Type 3 protection
- **Accuracy Unaffected by Mounting**
  - Measurement element and control unit mounted on rigid steel plate

For complete specifications, refer to Product Specification Sheet PSS 3-1B3 A.

Functional Specifications

Control Modes:
See "HOW TO ORDER."

Measurement Elements:
See "HOW TO ORDER."

Output Gauge:
0 to 200 kPa, 0 to 30 psi, or 0 to 2 bar or kg/cm^2, as specified.

Set Point Adjustment:
By means of a knob mounted inside the case.

Controller Action:
Output signal either increases or decreases with increasing measurement, as specified; action is reversible in the field.

Supply Pressure:
140 kPa, 20 psi, 1.4 bar or kg/cm^2.

Output Signal:
See "HOW TO ORDER."

Ambient Temperature Limits:
-40 and +80°C (-40 and +180°F).

Performance Specifications

Accuracy (When used with the elements as listed under "HOW TO ORDER")**:** ±0.5% of calibrated span.

Repeatability:
0.2% of calibrated span.

Physical Specifications

Mounting:
Panel, surface, pipe, or yoke. Panel: Flush in a panel up to 16 mm (0.6 in) thick.

Surface: suitable for all controllers having internally mounted elements. This mounting is not available with heavy duty helical elements. (These elements extend through the back of the case.)

Pipe: a kit of parts to fit a DN 50 or 2 in vertical pipe.

Yoke: a kit of parts to fit a vertical DN 50 or 2 in pipe stub. This mounting scheme is designed specifically for controllers having rear-mounted differential pressure elements.

Physical Specifications (continued)

Enclosure:
The case and door are glass-fiber reinforced polyester moldings, compounded for superior corrosion resistance. The door has a shatterproof polycarbonate window, ultraviolet-resistant. The overall construction is weatherproof, meets IEC IP53, and provides the environmental protection of NEMA Type 3.

Scale:
Black markings on a white background, sector-shaped with nominal effective length of 150 mm (6 in). Refer to Chart and Dial Catalog 600 for available ranges.

Optional Features

Integral Air Supply Set.

Type 70 Contacts:
For electrical contact output. Refer to Page 57.

Control Valve Mounting.

External Connection to Integral (Reset) Bellows (ECRB) .

External Set Point.

Batch:
For batch control.

Vent Connection.

External Phenolic Nameplate.

Glass Window in Door.

Stainless Steel Data Plate.

Tamperproof Door Knob.

How to Order

1) SPECIFY MODEL NUMBER: 43AP- ___ ___ ___ ___ - ___/_____

Mounting:
- Field (pipe or yoke) ..... F
- Panel or surface ..... P

Control:
- On/Off A1
- Proportional 4 to 400% A2
- Proportional plus derivative 0.05 to 50 minutes A3
- Proportional plus integral (reset) 0.01 to 50 minutes per repeat A4
- Proportional plus integral (reset) plus derivative A5
- Differential gap 1 to 100% A7
- Automatic shutdown A8

Output Signal and Gauge:
- 20 to 100 kPa signal, 200 kPa gauge 5
- 3 to 15 psi signal, 30 psi gauge 2
- 0.2 to 1.0 bar signal, 2 bar gauge 6
- 0.2 to 1.0 kg/cm' signal, 2 kg/cm2 gauge 4

Automatic/Manual Internal Transfer Switching:
- None ..... N
- Bumpless with 2-position switch, balance gauge, regulator C
- 2-position nozzle seal switch for manual control ..... D

Optional Suffix:
- Remote pneumatic set point (not available with pressure element codes PA-CA, PA-CC, PB-CA, PB-GA, PB-PF; servo element code E; Type 70 Contacts; or options ECRB and "BATCH") ..... P

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER: 43AP- __ __ __ __- __/_____

Elements: (Refer to Pages 48-56 for Element Descriptions)

Type 37 (43AP-F only)	DE-A, B
Absolute pressure bellows	PA-CA, CC
Absolute pressure double spiral	PA-MA
Pressure helical	PB-AA
Pressure spiral	PB-BA
Pressure bellows	PB-CA, CC
Diaphragm	PB-DF, PF
Stainless long helical (43AP-F only)	PB-GA
Receiver	PC
Temperature	TA-1A, 2A, 2B, 3B
Electronic servo	E

2) SPECIFY CONTROLLER ACTION _____

3) SPECIFY OPTIONAL FEATURES _____

4) SPECIFY INFORMATION FOR INSTRUMENT TAG AND APPLICATION _____

_____

40P, 40M Series Recorders and Indicators

- **Wide Selection of Measuring Elements**
- **Versatile Mounting: Surface, Panel, or Pipe Mounting**
- **Choice of Circular Chart Recorder or either Concentric or Sector Scale Indicator**
- **Weatherproof Construction (40P Series): NEMA Type 3**

For complete specifications, refer to Product Specification Sheets PSS 3-1A1 A and 3-1A2 A, B, C, and E.

The 40P and 40M Series Instruments continuously record or indicate measurement of one or more process variables.

Functional Specifications

Measurement Elements:
See "HOW TO ORDER."

Recorder Chart Drives:
Electrical: The standard speed is 1 revolution per 24 hours for nominal 120 or 240 V, 50 or 60 Hz, as specified.

Mechanical: The standard speed is 1 revolution per 24 hours with a 24-hour movement.

Battery Operated: 11 speed.

Ambient Temperature Limits:
-30 and +60°C (-20 and +140°F).

Recorder Pens:
Fiber tip disposable or box.

Performance Specifications

See Measurement Element selected.

Physical Specifications

Enclosure:
40P Series: The case and door are glass-fiber reinforced polyester moldings, compounded for superior corrosion resistance. The door has a shatterproof glass window. The overall construction provides the environmental protection of IEC IP53 and NEMA Type 3.

40M Series: Durable, die-cast aluminum case and door with corrosion-resistant epoxy powder finish.

Mounting:
Standard mounting is flush in a panel up to 16 mm (0.6 in) thick or on a wall. A kit of parts for vertical mounting on a DN 50 or 2 in pipe is available as an option (40P Series only).

Cardboard Nameplate:
A cardboard nameplate is supplied for displaying the chart factor.

Expendable Accessories:
Charts: 100 HUMITEX nominal 300 mm (12 in) circular charts [nominal 100 mm (4 in) calibrated scale] are supplied with each instrument.

Ink:
1 U.S. fl oz (30 cm^3) is supplied for each box pen.

Indicator Pointer:
Sector indicators have an orange pointer and concentric indicators have a black pointer.

Indicator Scales:
Black markings on white background. Refer to Chart and Dial Catalog 600 for available ranges.

Sector:
The effective length is 171 mm (6.75 in).

Concentric:
The effective length is 594 mm (23.4 in).

Optional Features

Incandescent Type Internal Illumination.

Bakelite Nameplate.

Flush Door Lock.

Segmental Indicating Scale.

Indicating Scale Transparent Mounted in Instrument Door.

Plexiglass Circular Disc.

Portable Mounting.

How to Order

1) SPECIFY MODEL NUMBER: 40P or 40M- ___ - ___ ___ ___ ___ ___/_____

Function:
- Circular Chart Recorder ..... R
- Sector Scale Indicator ..... N
- Concentric Scale Indicator ..... K

Internal Mechanism:
- Recorder - standard ..... R
- Indicator- sector ..... N
- Indicator - concentric ..... K
- With Type 70 Contacts (recorder or indicator) ..... E

Mounting:
- Flush (a) ..... F
- Pipe (a), (b) ..... P
- Surface (a) ..... S
- Yoke. 40P Series available with Type 37 Element only ..... Y

Chart Drive or Scale:
- Electrical, 24 h rotation, 120 V, 60 Hz (options available) ..... E
- Mechanical, 24 h rotation and wind (options available) ..... M
- Sector scale ..... N
- Concentric scale ..... K
- Battery operated (11 speed) XX

Pens or Pointers:
- 1 pen (R) or 1 pointer (N or K) 1
- 2 pens (R) or 2 pointers (N) 2
- 3 pens (R) 3
- 4 pens (R) 4

Pen Type or Scale Type:
- Fiber tip disposable ..... F
- Box ..... B
- Single range scale ..... S
- Dual range scale. For 40PN and 40MN Series only. ..... D

(a) Not available with 40P Series with Type 37 Element. (b) Not available with 40M Series.

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER: 40P or 40M- __ __ __ __ __ - __/_____

Elements: (Refer to Pages 48-56 for Element Descriptions)

Type 37 (yoke mounting only) (a)	DE-A, B
Absolute pressure bellows	PA-CA
Receiver	PC
Absolute pressure double spiral	PA-MA
Pressure helical	PB-M, PB-AA
Pressure spiral	PB-BA
Pressure bellows	PB-CA, CC
Diaphragm	PB-DF, PF
Stainless long helical	PB-GA
Temperature	TA-1A, 2A, 2B, 3B
Electronic servo	E
Relative humidity (b)	MA-K

(a) Only one per instrument.

(b) Not available with 40P Series.

2) SPECIFY OPTIONAL FEATURES _____

3) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

43APG

43APG Series Controllers provide precise indication and control of flow, pressure, vacuum, and temperature.

Oil & Gas Industry Flow Recorders and Controllers

- **43APG Series Controllers:**
  - NACE compliant element materials available.
  - Low air consumption and internal corrosion resistance means the 43APG can be operated directly from the process gas
  - Wide choice of measurement elements
- **Glass-fiber reinforced case with gasketed door provides NEMA Type 3 protection.**

For complete specifications, refer to Product Specification Sheets PSS 7-3C3 A and B.

Functional Specifications

Measurement Elements and Configurations:
See "HOW TO ORDER."

Controller Output Signal and Supply Pressure:

Output Signal	Supply Pressure
20 to 100 kPa (a) 3 to 15 psi 0.2 to 1.0 bar or kg/cm² (a)	140 kPa (a) 20 psi 1.4 bar or kg/cm2 (a)

(a) Not applicable to the 43APG Series Controllers.

WARNING:
EXPLOSION HAZARD CAN RESULT FROM USE OF NATURAL GAS AS SUPPLY. INSTRUMENT LOCATION MUST BE PROPERLY CLASSIFIED PER NFPA-70. TOXICITY HAZARD CAN RESULT FROM USE OF SUPPLY GAS CONTAINING HYDROGEN SULFIDE (H2S). AREA MUST BE VENTILATED OR BREATHING APPARATUS USED. REFER TO MI 011-111.

Performance Specifications

Recorder Accuracy:
Spans less than 12:5 kPa, 50 inH_20, 125 mbar ΔP and all compound ranges: ±0.50% of span.

Controller (less element) **Accuracy:**

Repeatability: Less than 0.2% of span.

Dead Band: Less than 0.1 % of span.

Hysteresis: ±1 % of output span.

Physical Specifications

Door:
Hinged, glass-fiber reinforced phenylene oxide molding with blue polyurethane finish. The clear polycarbonate window is ultraviolet-resistant and shatterproof.

Case:
Glass-fiber reinforced, gray polyester molding.

Enclosure Classification:
Meets IEC IP53 and provides the environmental protection of NEMA Type 3.

Optional Features

Refer to Foxboro. *(What? Vague reference.)*

How to Order

1) SPECIFY MODEL NUMBER: 43APG- ___ ___ 2 ___ - ___/_____

Mounting:

Field	F
Panel or Surface	P

Control:

On-Off	A1
Proportional 4 to 400%	A2
Proportional plus Derivative 0.05 to 50 minutes	A3
Proportional plus Reset (Integral) 0.01 to 50 minutes per repeat	A4
Proportional plus Integral plus Derivative	A5
Differential Gap 1 to 100%	A7

Output Signal and Gauge:

3 to 15 psi signal, 30 psi gauge	2

Automatic/Manual Internal Transfer Switching:

Bumpless with 2-position switch, balance gauge, regulator	C
2-position nozzle seal switch for manual control	D
None	N

Optional Suffix:

Remote Pneumatic Set Point (not available with element code PA-CA, PA-CC, PB-PF, or PB-GA)	P

Element: (Select one, refer to Pages 48-56 for Element Descriptions)

Type 37 (43APG-F only)	DE-A (a), B
Absolute pressure bellows	PA-CA, CC
Receiver	PC-OC
Absolute pressure double spiral	PA-MA
Pressure helical	PB-AA, AM (b)
Pressure spiral	PB-BA, BM (b)
Pressure bellows	PB-CA, CC
Diaphragm	PB-DF, PF
Stainless long helical (43APG-F only)	PB-GA
Temperature (c)	TA-1A, 2A, 2B, 3B

(a) Available in NACE compliant version.

(b) Element codes PB-AM and PB-BM comply with NACE Standard MR-01-75.

(c) Available with AISI Type 316 stainless steel tubing only.

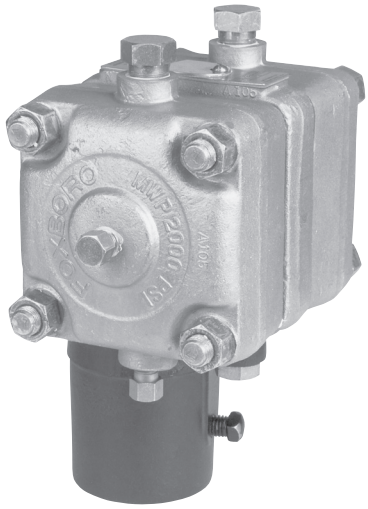
2) SPECIFY SCALE FROM CHART AND DIAL CATALOG 600 OR REFER TO FOXBORO _____

3) SPECIFY CALIBRATED RANGE _____

4) SPECIFY CONTROL ACTION (FIELD REVERSIBLE) _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

TYPE 37



Type 37 Diaphragm Differential Pressure Elements translate differential pressure to angular shaft position.

Type 37 Diaphragm Differential Pressure Element

- **Ideal for Liquid, Gas, and Steam Flow Measurement**
- **No Mercury Used: Safe Operation**
- **Ambient Temperature Compensation**
- **Overrange Protection**
- **Requires No Power for Operation**

For complete specifications, refer to Product Specification Sheet PSS 3-4A2 A.

Functional Specifications

Spans:
Available between 5 and 50 kPa or 20 and 200 inH_20.

Standard Differential Pressure Ranges:
0 to 5, 0 to 12.5, 0 to 25, and 0 to 50 kPa; or 0 to 20, 0 to 50, 0 to 100, and 0 to 200 inH_20 ΔP.

Maximum Process Pressure:
14 MPa (2000 psi).

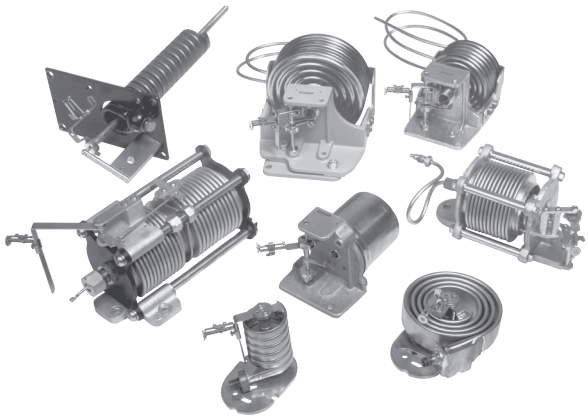
Ambient Temperature Limits:
-34 and +110°C (-30 and +230°F).

Pressure Measuring Elements

PRESSURE MEASURING ELEMENTS

- **Wide variety of element types, materials, and pressure ranges**
- **Durable and dependable for long service life**

For complete specifications, refer to Product Specification Sheet PSS 3-2A1 A.



Pressure Measuring Elements measure gauge and absolute pressure and actuate recorders, indicators, controllers, and transmitters.

Performance Specifications

Accuracy:
Better than ±0.5%.

Physical Specifications

Element Materials:
AISI Type 316 ss (316 ss).

Bronze or Brass.

Copper-Nickel-Manganese (Cu-Ni-Mn) Alloy.

K-Monel.

Optional Features

Overrange Protection, Underrange Protection:
Provides protection to the linkage and pointer, not the pressure element.

Oxygen Service Preparation:
Available for 316 ss spirals and 316 ss helicals. Copper bearing brazing material will be in contact with process.

PRESSURE MEASURING ELEMENTS

How to Order

1) SPECIFY ELEMENT CODE:

Element		Normal Recorder Measurement Ranges (Torque Factor rating 30)		
Type	Material	kPa	psi,psia	
Receiver (Bellows)	Brass	80 kPa 100 kPa –	12 psi 15 psi 24 psi	..... PC (a)
Diaphragrn 75 mm (3 in)	Cu-Ni-Sn Pfinodal	2 and 10 kPa 2 and 6 kPa vac	0.3 and 1.5 psi 0.3 and 0.9 Psi vac	..... PB-PF
Diaphragm 50 mm (2 in)	Cu-Ni-Sn Pfinodal	6 and 70 kPa 6 and 35 kPa vac	0.9 and 10 psi 0.9 and 5 Psi vac	..... PB-DF
Bellows	316 ss	35 and 200 kPa	4.5 and 29 Psi	..... PB-CA
	Brass	30 and 180 kPa 34 and 100 kPa vac	4 and 26 psi 4.9 and 15 psi vac	..... PB-CC
Spiral	316 ss	82 and 1400 kPa 82 and 100 kPa vac	12 and 200 psi 12 and 15 psi vac	..... PB-BA
	K-Monel	140 and 1400 kPa	20 and 200 psi	..... PB-BM
Helical	316 ss	1400 and 40 000 kPa	200 and 6000 psi	..... PB-AA
	K-Monel	1700 and 14 000 kPa	250 and 2000 psi	..... PB-AM
Heavy Duty Helical	316 ss	500 and 200 000 kPa	75 and 30 000 psi	..... PB-GA
Absolute Bellows	316 ss	17 and 240 kPa abs	2.5 and 35 psia	..... PA-CA
	Bronze	13 and 270 kPa abs	1.9 and 39 psia	..... PA-CC
Absolute Double Spiral	316 ss	140 and 700 kPa abs	20 and 100 psia	..... PA-MA

(a) Code PC-OC when used with the 43APG Series Controller on Page 46.

2) SPECIFY MEASUREMENT RANGE _____

3) SPECIFY OPTIONAL FEATURES _____

4) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

Filled Thermal System Elements

THERMAL ELEMENTS

- **Dependable**
  - Field-proven performance
- **Nonelectric**
  - Continuous operation, even with power failure
- **Safe**
  - Suitable for Class I, Division 1 hazardous locations

For complete specifications, refer to Product Specification Sheet PSS 3-3A1 A.

Filled Thermal System Elements consist of sensor, connection tubing, and mechanical element.

Functional Specifications

Thermal System Types:

Class IA:
A thermal system that is completely filled with an incompressible liquid under pressure. The system is fully compensated for ambient temperature variations at case and along the tubing.

Class IIA:
A thermal system that is evacuated and partially filled with a volatile liquid, such as methyl chloride (CL), ether (ET), butane (BU), or toluene (T).

Class IIIB:
A gas system that is filled under pressure with purified nitrogen.

Standard Ranges, Standard Spans and Range Limits:

CLASS IA					CLASS IIA	CLASS IIIB		
Standard Spans	X Length		Range Limits		Standard Ranges (Fills)	Standard Spans	Range Limits	
			Minimum	Maximum			Minimum	Maximum
°C	mm	in	°C	°C	°C	°C	°C	°C
25	122	4.8	13	120	38 to 105 (BU)	100	-40	170
50	69	2.7	-15	200	105 to 150 (ET)	150	-15	400
75	53	2.1	-38	200	50 to 205 (T)	200	-15	500
100	43	1.7	-63	200	38 to 150 (ET)	250	-15	500
150	36	1.4	-73	250	50 to 250 (T)	300	-15	500
200	30	1.2	-73	260		400	-15	500
250	28	1.1	-73	260		500	-15	500
°F	mm	in	°F	°F	°F	°F	°F	°F
50	112	4.4	50	250	100 to 180 (CL)	150	-50	240
100	69	2.7	0	400	100 to 220 (BU)	200	-50	425
150	51	2.0	-50	400	100 to 250 (BU)	300	0	825
200	43	1.7	-100	400	100 to 270 (BU)	400	0	1000
250	36	1.4	-100	400	100 to 300 (ET)	500	0	1000
300	33	1.3	-100	500	100 to 350 (ET)	600	0	1000
400	28	1.1	-100	500	100 to 400 (T)	700	0	1000
500	25	1.0	-100	500	200 to 500 (T)	800	0	1000
						1000	0	1000

THERMAL ELEMENTS

Performance Specifications

Accuracy:
Class IA:
±0.5% of calibrated span for spans up to 215°C (400°F).
±0.75% of calibrated span for spans between 215 and 330°C (400 and 600°F).

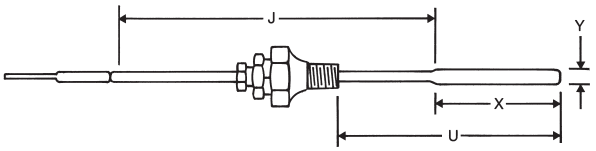
Class IIA:
±0.5% of calibrated span over upper 2/3 of scale.

Class IIIB:
±0.5% of calibrated span for spans up to 330°C (600°F).
±0.75% of upper range value for upper range value above 330°C (600°F).
±0.75% of lower range value for lower range value below45°C (-50°F).

Physical Specifications

Sensor Type:
Adjustable union, bendable extension.

Sensor Dimensions:
X = Sensitive portion length.
U = Insertion length.
J = Extension length.
B = Bushing thread type and size.
Y = Sensor diameter.



Connecting Tubing:
1.5, 4.5, or 7.5 m (5, 15, or 25 ft) flexible stainless steel over stainless capillary.

J = 450mm(18in).

X = 100 mm (4 in) for Class IIA and 150 mm (6 in) for Class IIIB systems. For Class IA systems, X is governed by sensor diameter and measurement span. See table under "FUNCTIONAL SPECIFICATIONS" on previous page.

U = (minimum) = X + 50 mm (2 in).

U = (maximum) = X + 380 mm (15 in).

B = 1/2, 3/4, or 1 NPT external threads as specified for Class IA or IIA systems and 1 NPT external threads for Class IIIB systems.

Y = 9.53 mm (3/8 in) for Class IA and IIA, 22.26 mm (7/8 in) for Class IIIB.

Optional Features

Alternative Thermal Systems:

a) Longer capillary lenghts and types.

b) Other ranges and spans.

c) Sanitary fittings.

d) IIB system.

Thermowells:
Refer to Page 35.

Mounting Flanges.

Special Purpose Sensors:
Preformed capillary, coated type, etc.

How to Order

1) **SPECIFY BASE INSTRUMENT BY MODEL NUMBER** (Recorder, Indicator, Controller, Transmitter) _____
2) **SPECIFY CLASS/TUBING/SENSOR CODES**
   IA Liquid Filled: TA-1A/D-FS-SS/4542-J18 _____
   IIA Vapor Filled: TA-2A/S-FS-SS/2542-J18 _____
   IIIB Gas Filled: TA-3B/S-FS-SS/3542-J18 _____
3) **SPECIFY CALIBRATED RANGE** (must meet requirements of table under "Functional Specifications" on Page 51)_____
4) **SPECIFY NORMAL WORKING TEMPERATURE**_____
5) **SPECIFY AMBIENT TEMPERATURE AT CASE AND ALONG TUBING** _____
6) **SPECIFY SENSOR DISTANCE ABOVE OR BELOW CASE (Class IIA systems only)**_____
7) **SPECIFY ANTICIPATED "U" DIMENSION** (insertion length)_____
8) **SPECIFY BUSHING THREAD SIZE "B" DIMENSION; SPECIFY 1/2, 3/4, OR 1 NPT FOR IA OR IIA SYSTEMS, 1 NPT FOR IIIB SYSTEMS** _____
9) **SPECIFY OPTIONAL FEATURES** _____
10) **SPECIFY INFORMATION FOR INSTRUMENT TAG**_____

SERVO ELEMENTS

Electronic Servo Elements are used with 40P and 40M Series Recorders, Indicators, and Controllers; 43AP and 43EP Series Indicating Controllers; and 45P Series Transmitters.

Electronic Servo Elements

- **Sealed Conductive Plastic Slidewire**
  - Does not need frequent cleaning
  - Fast response and long life
- **RFI Protected Electronics**
  - Module may be field-mounted
- **dc Torque Motor**
  - No brushes or gears

For complete specifications, refer to Technical Information Sheet TI 27-1a.

Functional Specifications

Standard Ranges:

Measurement Range Code Table (see "HOW TO ORDER" for description of sensor codes)**:**

Range Code	Range	Sensor Codes Available											
		mV	mA	°C				°F					
01	0 to 5	M											
02	0 to 10	M											
03	0 to 20	M											
04	0 to 30							Q					
05	0 to 50	M						Q					Q
06	-50 to -50							Q					Q
07	-100 to +50				J								
08	0 to 75	M						Q					
09	-20 to +80				J								
10	0 to 100	M			J			Q					Q
11	-100 to 0							Q					
12	-200 to +100				J	E				J	E		
13	-100 to +100					E							
14	50 to 100							Q					
15	-20 to +120												Q
16	–												
17	-25 to +125			T									
18	0 to 150				J			Q					Q
19	-50 to -150				J	E							
20	50 to 150												Q
21	4 to 20		A										
22	10 to 50		A										
23	0 to 200			T	J		K	Q		J			Q
24	-100 to +200					E				J	E		
25	100 to 200							Q					Q
26	0 to 250			T	J			Q	T		E		Q
27	-50 to +250			T						J			
28	50 to 250							Q		J			Q
29	0 to 300				J		K	Q	T	J			Q
30	-350 to +300								T		E		
31	100 to 300				J			Q		J			Q
32	0 to 40				J		K	Q	T	J		K	Q
33	100 to 40											K	Q
34	200 to 400				J			Q					Q
35	0 to 500				J		K	Q	T	J		K	Q
36	-150 to +500								T		E		
37	200 to 500						K						Q
38	300 to 500				J								
39	0 to 600				K			T	J				Q
40	–												
41	200 to 600								J				
42	300 to 600			J				T					
43	0 to 700			J									Q
44	200 to 700			J					J				
45	0 to 750			J	K					K			
46	0 to 800					R			J				Q
47	100 to 800								J	K			
48	300 to 800				K				J	K			
49	0 to 900								J				Q
50	500 to 900				K				J				
51	700 to 900				K		S		J				
52	0 to 1000				K		S		J	K			
53	500 to 1000								J	K			
54	0 to 1200								J	K			
55	200 to 1200								J	K			
56	400 to 1200								J	K			
57	0 to 1300					R							
58	–												
59	800 to 1400					R							
60	900 to 1400						S						
61	0 to 1500					R			J				
62	500 to 1500								J	K			
63	0 to 1600									K			
64	1100 to 1600						S		J				
65	1200 to 1600									K			
66	500 to 1700					R				K			
67	0 to 1800								J	K			
68	0 to 2000									K			
69	1000 to 2000								J		R		
70	1200 to 2000										R		
71	0 to 2400									K			
72	1200 to 2400									K			
73	0 to 2500									K			
74	1000 to 2500									K			
75	1500 to 2500									K	R	S	
76	1700 to 2500											S	

Input Impedance (mA inputs):
4 to 20 mA (Range Code 21)-6.25 ohms.
10 to 50 mA (Range Code 22)-2.5 ohms.

Power Required:
See "HOW TO ORDER."

Performance Specifications

Accuracy:
±0.5% of calibrated span.

Repeatability:
0.25% of calibrated span.

Optional Features

Loop Power Supply:
30 V dc.

dc Voltage Inputs:
0.055 to 42 V dc.

Nonstandard Ranges:

Replacement Range Card:
Specify measurement type, measuring range code, range units, and thermocouple burnout (if required).

Power Failure Detection:
Positions pen either to 100% of range or to zero when ac power fails.

Item	Range Limits		Range Limits	
	lower	upper	minimum	maximum
Millivolts, Thermocouples	-15 mV	100 mV	5 mV	100 mV
Resistance Temperature Detectors (RTDs)	18 ohms	330 ohms	8 ohms	300 ohms

SERVO ELEMENTS

How to Order

1) SPECIFY BASE INSTRUMENT BY MODEL NUMBER: _____

2) SPECIFY SERVO ELEMENT: E ___ ___ ___ ___ ___

Power Supply:

120Vac	S
220 V ac	N
240 V ac	P

Measurement–Sensor Type:

EC/ISA T (Cu-CuNi) Thermocouple	T
DIN 43710-77 (Cu-CuNi) Thermocouple	C
EC/ISA J (Fe-CuNi) Thermocouple	J
DIN 43710-77 (Fe-CuNi) Thermocouple	D
EC/ISA E (NiCr-CuNi) Thermocouple	E
EC/ISA K (NiCr-NiAl) Thermocouple (DIN 43710-77)	K
EC/ISA R (Pt13Rh-Pt) Thermocouple	R
EC/ISA S (Pt10Rh-Pt) Thermocouple (DIN 43710-77)	S
EC/ISA B (Pt30Rh-Pt6Rh) Thermocouple	B
dc mV	M
dc mA	A
Platinum RTD, 100-ohm DIN Resistance	Q
Nonstandard (including Temperature Difference)	X

Measurement Range:

Select 2-digit number from Measurement Range Code Table on Page 54.	__

Range Units:

Degrees Celsius	C
Degrees Fahrenheit	F
Millivolts	M
Milliamperes	A

Burnout Feature (thermocouples only):

Upscale action (not available with RTD)	U
Downscale action (not available with RTD)	D
None	N
Upscale action–Reverse Range (not available with RTD)	R
Downscale action–Reverse Range (not available with RTD)	S
None–Reverse Range	T

3) SPECIFY OPTIONAL FEATURES _____

4) SPECIFY SENSOR (e.g., THERMOCOUPLE OR RTD) **TO BE ORDERED SEPARATELY** _____

5) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

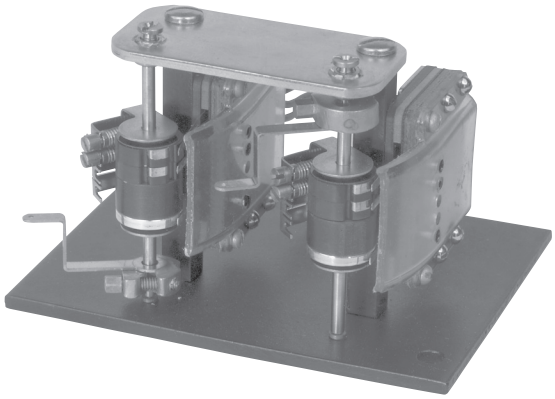
Type 70 Electronic Contacts

70, MR

- **Used in 40P and 40M Series Recorders, Indicators, and Controllers and 43AP Series Indicating Controllers**

Rotor Units:
Single or double rotor units are available, each having 3 or 5 contact segments. One segment serves as the common or collector ring contact resulting in 2, 4, or 6 segments being available for relay actuation. Contact segments are adjustable with relation to each other by micrometer adjustment screws. This relationship is not disturbed by the contact setting mechanism.

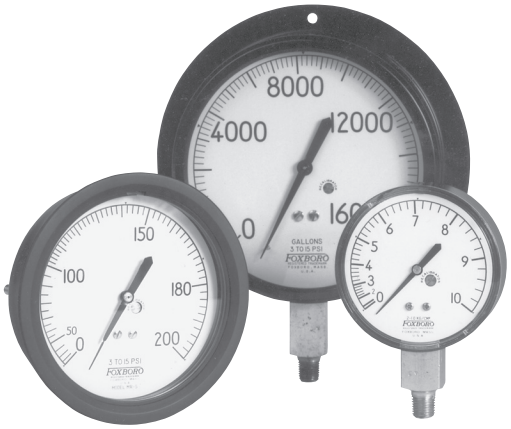
Contact Setting Mechanism:
Each rotor unit is independently positioned to operate at desired values of measurement. A wide selection of setting mechanisms is available.



A Type 70 Electric Contact System is used to actuate external control or alarm circuits.

MR Series Receiver Gauges

MR Series Receiver Gauges accept 3 to 15 psi inputs from remotely located pneumatic transmitters. A wide variety of dials and scales is available to indicate measurements in convenient engineering units.



Panel-Mounted Pneumatic Instruments

CONSOTROL 100 is a complete family of pneumatic controllers, recorders, indicators, and auxiliary devices.

These instruments can handle the special requirements of virtually any application – from simple single control loops to interrelated multivariable systems.

Each CONSOTROL 100 unit is perfectly matched with other foxboro pneumatic instruments – including transmitters, valves, and accessories.

And they are engineered to fit into control configurations of all sizes. Together, they deliver exceptionally high system performance.

CONSOTROL 100 Instruments give you:

Bold, Readable Displays
Continuous scale indication of process variables and deviation from set point.

Separate Automatic and Manual Functions
Avoids forced shutdowns – control can be maintained in either mode.

Accurate Force Balance Control Modules
Metallic bellows, flexure-suspended balance member for precise opeation.

Balanceless, Bumpless Auto/Manual Transfer
Fast, safe selection of operating mode.

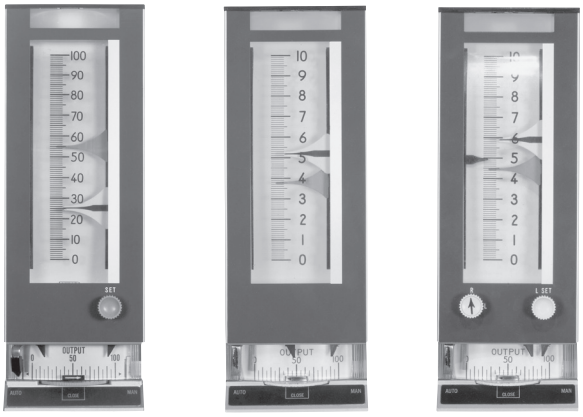
Simple, Low Cost Mounting
Shelves accomodate up to ten instruments. Integral air manifold reduces piping costs. Individual air shutoff valve for each instrument.

Easy Service
Pneumatic circuit board has simple piping and connections. Components are highly accessible – all behind one sliding cover.

130M, 130P, 130F Series Pneumatic CONSOTROL Indicating Controllers

- **130M–manual set point adjustment**
- **130P–set point pneumatically adjusted by a remote signal**
- **130F–remote/local switch for manual or pneumatic adjustment of set point**

For complete specifications, refer to Product Specification Sheet PSS 2B-4H 1 A.



130M 130P 130F

130M, 130P, and 130F Series Pneumatic CONSOTROL Indicating Controllers compare a remote transmitter signal with a set point and produce a control signal to a final actuator.

Functional Specifications

Supply Pressure:
140 to 150 kPa or 20 to 22 psi.

Input/Output Signal:
20 to 100 kPa or 3 to 15 psi, as specified.

Mode Adjustment Limits:
Proportional Band: 5 and 500%.

Integral Action:
0.01 and 50 minutes per repeat.

Derivative Action:
0.01 and 50 minutes.

Ambient Temperature Limits:
-20 and +65°C (0 and 150°F) .

Control Action Reversal:
The control action is reversed by a 90 degree rotation of the reversing switch.

Auto/Manual Transfer Unit:
A 2-position switch lever located on the front of the manual unit is used to switch directly from automatic to manual or, on controllers with integral, from manual to automatic without bumping the process.

Performance Specifications

Accuracy:
Measurement and Set Point Indicators: ±0.5% of calibrated span.

Output Indicator:±2% of calibrated span.

Repeatability:
Measurement and Set Point Indicators: Better than 0.25% of calibrated span.

Alignment Error:
Automatic Control Unit: Less than 0.5% of calibrated span.

Dead Band:
Automatic Control Unit: Less than 0.1 % of calibrated span.

Measurement and Set Point Indicators: Less than 0.1% of calibrated span.

Physical Specifications

Mounting:
These controllers are designed for flush mounting in vertical panels 3 to 25 mm (0.13 to 1 in) thick using 102 or 101 Series Shelves. Each controller requires 1 unit of shelf capacity. They may be calibrated for mounting in a panel inclined up to 75 degrees from vertical with the rear of the instrument lower than the front.

Connections:
Separate electric and pneumatic connectors are located on the rear of the chassis in accordance with the standard arrangement for 102 Series Shelves.

Nameplate:
White translucent plastic with 2.5 mm (0.1 in) high black letters. There can be a maximum of 2 lines with 17 characters or spaces per line.

Physical Specifications (continued)

Pointers:
Measurement: Red.

Manual Set (130M Series) and Remote Set (130P and 130F Series):Black on white.

Local Set (130F Series): Black.

Output: Red.

Scales:
Vertical Scale: Removable, transparent plastic with black markings; 100 divisions, scaled as specified.

Output: Black markings on a white background; 20 divisions from 0 to 100% output signal. The red pointer continuously indicates automatic or manual output. Refer to Chart and Dial Catalog 600.

Optional Features

"Batch" Controller:
Prevents integral circuit saturation during shutdown or other periods of sustained set point and measurement deviation. Includes internal adjustment for preload.

High "Batch" Unit:
Operates when controller output pressure exceeds 100 kPa or 15 psi. Specify by substituting 130MB, 130PB, or 130FB in place or 130M,130P, or 130F in Model Number.

Low "Batch" Unit:
Operates when controller output pressure falls below 20 kPa or 3 psi. Specify by substituting 130MB, 130PB, or 130FB in place of 130M, 130P, or 130F in Model Number plus AS Reference BSL.

External Connection to Integral Bellows:
Permits connection of external feedback signal to prevent integral circuit saturation.

External Set Point Connection:
Not available for 130F Series with External Connection to Integral Bellows option. Provides access to set point signal. Maximum transmission distance is 1.5 m (5 ft) and all external connections must be leaktight due to low air delivery of aspirating relay. Use 1:1 repeating relay for greater transmission distances.

Alarm Actuators and Alarm Lamps:
Refer to Page 72.

How to Order

1) SPECIFY MODEL NUMBER: _____ __

Controller:

with Manually Positioned Set Point	130M-N
with Pneumatically Positioned Set Point	130P-N
with Remote/Local Set	130F-N

Control Function:

On/off	1
Proportional	2
Proportional plus derivative	3
Proportional plus integral	4
Proportional plus integral plus derivative	5

2) SPECIFY INPUT/OUTPUT SIGNAL _____

3) SPECIFY SET POINT AND MEASUREMENT SCALE RANGE–REFER TO CHART AND DIAL CATALOG 600 _____

4) SPECIFY MOUNTING EQUIPMENT–102 OR 101 SERIES SHELVES _____

5) SPECIFY OPTIONAL FEATURES _____

6) SPECIFY INFORMATION FOR NAMEPLATE AND INSTRUMENT TAG _____

130 Series Pneumatic CONSOTROL Auto Selector Control System

130 AUTO-SELECTOR

The 130 Series Pneumatic CONSOTROL Auto-Selector Control System controls two or more related variables within preset limits.

- **One Final Actuator**
  - To prevent any of several process measurements from exceeding their set points
- **Continuous Measurement**
  - Variables are measured and control is transferred to the one that is tending to exceed its limit
- **Auto/Manual Switch**
  - Smooth transfer by means of a single 2-position switch
  - Balanceless, bumpless
- **A Complete System Consists of:**
  - One 130MS (local set) or 130FS (local/remote set) controller with manual transfer unit
  - One or more 130MA (local set) or 130FA (local /remote set) controllers without manual units
  - Rack-mounted high or low selector relays
  - A rack-mounted seal valve

For complete specifications, refer to General Specification Sheet GS 2B-4H 1 D.

Functional Specifications

Supply Pressure:
140 to 150 kPa or 20 to 22 psi.

Input/Output Signal:
20 to 100 kPa or 3 to 15 psi, as specified.

Mode Adjustment Limits:
Proportional Band: 5 and 500%.

Integral Action:
0.01 and 50 minutes per repeat.

Derivative Action:
0.01 and 50 minutes.

Ambient Temperature Limits:
-20 and +65°C (0 and 150°F) .

Control Action Reversal:
The control action is reversed by a 90 degree rotation of the reversing switch.

Auto/Manual Transfer Unit:
A 2-position switch lever located on the front of the manual unit is used to switch directly from automatic to manual and from manual to automatic without bumping the process.

Performance Specifications

Accuracy:
Measurement and Set Point Indicators: ±0.5% of calibrated span.

Output Indicator: ±2% of calibrated span.

Repeatability:
Measurement and Set Point Indicators: Better than 0.25% of calibrated span.

Dead Band:
Automatic Control Unit: Less than 0.1% of calibrated span.

Measurement and Set Point Indicators: Less than 0.1% of calibrated span.

Alignment Error:
Automatic Control Unit: Less than 0.5% of calibrated span.

Physical Specifications

Mounting:
These controllers are designed for flush mounting in vertical panels 3 to 25 mm (0.13 to 1 in) thick using 102 or 101 Series Shelves.

Each controller requires 1 unit of shelf capacity. They may be calibrated for mounting in a panel, inclined up to 75 degrees from vertical, with the rear of the instrument lower than the front.

130 AUTO-SELECTOR

Physical Specifications (continued)

Connections:
Separate electric and pneumatic connectors are located on the rear of the chassis in accordance with the standard arrangement for 101, 102 Series Shelves..

Nameplate:
White translucent plastic with 2.5 mm (0.1 in) high black letters. There can be a maximum of 2 lines with 17 characters or spaces per line.

Pointers:
Measurement: Red.

Manual Set (130M Series) and Remote Set (130F Series): Black on white.

Local Set (130F Series): Black.

Output: Red.

Scales:
Vertical Scale: Removable, transparent plastic with black markings; 100 divisions, scaled as specified.

Output:
Black markings on a white background; 20 divisions from 0 to 100% output signal. The red pointer continuously indicates automatic or manual output. Refer to Chart and Dial Catalog 600.

Nominal Dimensions (including manual unit)**:**
205 mm high x 70 mm wide x 555 mm deep (8.2 in high x 2.8 in wide x 21.8 in deep).

Selector Relays and Volume Booster:
A low selector relay is required for each controller in a "LOW" Auto-Selector System. A "HIGH" selector system requires one less high selector relay than the number of controllers and one low selector relay used as a volume booster in the system output. Specify High Selector, Part No. B0114YL or Low Selector, Part No. B0114BZ.

Seal Valve:
One pneumatically actuated seal valve is required per Auto-Selector System. Specify Part No. C0138RM.

Optional Features

"Batch" Controller:
High "Batch" feature available only for controllers used in "LOW" Auto-Selector Systems. Add Suffix -B to Model Number.

Alarm Actuators and Alarm Lamps:
Refer to Page 72.

How to Order

1) SPECIFY MODEL NUMBER: _____ __ ___

Controller:
- with Manually Positioned Set Point 130M
- with Remote/Local Set Point 130F

Auto-Selector:
- without Manual Transfer Unit ..... A
- with Manual Transfer Unit ..... S

Control Function:
- Proportional plus integral N4
- Proportional plus integral plus derivative N5

2) SPECIFY INPUT/OUTPUT SIGNAL _____

3) SPECIFY SET POINT AND MEASUREMENT SCALE–REFER TO CHART AND DIAL CATALOG 600 _____

4) SPECIFY SELECTOR RELAYS AND SEAL VALVE _____

5) SPECIFY MOUNTING EQUIPMENT–102 OR 101 SERIES SHELVES _____

6) SPECIFY OPTIONAL FEATURES _____

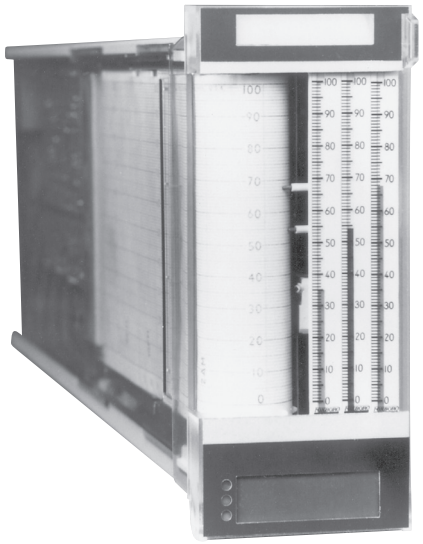
7) SPECIFY INFORMATION FOR NAMEPLATE AND INSTRUMENT TAG _____

127S Series Pneumatic CONSOTROL Recorders

127S

- **Bold, Readable Displays**
  - Bright red, green, and blue ribbon indicators
  - Individual scales
- **Simple Maintenance**
  - Accessible modular components
  - Adjustments can be made while instrument is in operation
- **Easy Chart Changing and Pen Replacement**
  - Removable chart drive
  - Snap-in, fiber-tip pen cartridges
- **Precise Servo Mechanism**
  - Accurately positions pens
  - All-pneumatic
  - Guided by force balance detector

For complete specifications, refer to Product Specification Sheet PSS 2B-3E2 B.



The 127S Series Pneumatic CONSOTROL Recorders record up to 3 process measurements received from remote transmitters.

Functional Specifications

Pneumatic Input Signal:
3 to 15 psi (20 to 100 kPa) (0.20 to 1.0 Kg/cm^2) or 3 to 18 psi (20 to 120 kPa) (0.2 to 1.2 Kg/cm).

Supply Pressure:
120 to 150 kPa or 18 to 22 psi.

Power Requirements:
24 ±4 V ac, 120 or 240 V ac, +10, -15%, 50 or 60 Hz, as specified. Required with electric chart drive only.

Fusing:
Required with electric chart drive only. For 24 V ac: No fuse required.

For 120 V ac: 3/8 A.

For 240 V ac: 1/4 A.

Ambient Temperature Limits:
5 and 50°C (40 and 120°F) .

Pen Speed:
The elapsed time for the pen to travel from 10 to 90% of full scale is adjustable from less than 3 to greater than 20 seconds.

Mounting Position:
Normal mounting position is horizontal. Instrument can also be mounted up to a 15 degree angle with the rear of the instrument above the front, or down to a 75 degree angle with the rear of the instrument below the front.

Adjustments:
Zero and span adjustments are accessible in the service (partially withdrawn) position, and provide a minimum of ±2% adjustment after the instrument has been calibrated. Ribbon indicator has an adjustment for zeroing relative to pen. No separate ribbon span adjustment is necessary, since the ribbon travels with the pen.

Electrical Classification:
These instruments have been designed for use in ordinary locations.

Performance Specifications

Accuracy:
±0.5% of calibrated span.

Repeatability:
0.15% of calibrated span.

Physical Specifications

Connections:
Separate electric and pneumatic connectors are located on the rear of the instrument chassis in accordance with the standard arrangement for 102 and 101 Series Shelves.

Front Door:
Hinged at bottom to provide access to chart and pens. Lens material is transparent molded polycarbonate.

Right Side Access Cover and Calibration Door:
Removable access cover and a hinged-down calibration door provide access to internal parts and adjustments.

Nominal Dimensions:
69 mm wide x 165 mm high x 478 mm long (2.7 in wide x 6.5 in high x 18.8 in long).

Pens:
1, 2, or 3, as specified.

Red Pen: Located in center position.

Green Pen: Located in inner position.

Blue Pen: Located in outer position.

Pen Separation: Approximately 12 minutes at the standard chart speed of 20 mm/h (0.8 in/h).

Left Side Access Cover:
Sliding cover provides access to internal parts. Cover material is transparent molded polycarbonate.

Instrument Mounting:
Up to 10 instruments can be mounted in Foxboro 102 Series Shelves (706 mm [27.8 in] deep). Up to 4 instruments can be mounted in Foxboro 101 Series Shelves (544 mm [21.4 in] deep). Shelves are designed for flush mounting in 3 to 25 mm (0.13 to 1 in) thick panels.

Nameplate:
A gray polycarbonate nameplate is attached to the lower surface of the front door. It provides space for 3 lines which can have approximately 24 characters (including spaces) to accommodate a description of each input signal. A green, red, and blue (from top to bottom) color identification dot at the beginning of each line corresponds to the pen color and applicable input signal description.

Optional Features

Chart Drives:
The following chart drives are available at supply voltages of 24, 120, or 240 V, and frequencies of 50 or 60 Hz; EXCEPTION: 5 mm/h (0.2 in/h) not available with 24 V. Selectable by specifying single or dual speed, chart speed, voltage, and frequency.

Single Speed: 5, 10, 20, 40, 80, 120, 320, 720 and 2400 mm/h (0.2, 0.4, 0.8, 1.6, 3.1, 4.7, 6.4, 28.2 and 96.0 in/h).

Dual Speed: 20 mm/h and 20 mm/min (0.8 in/h and 0.8 in/min). 20 mm/h and 40 mm/min (0.8 in/h and 1.6 in/min).

Pneumatic Impulse: 20 mm/h (0.75 in/h).

Special Pen Position for 2-Pen Recorder:
Optionally available is a 2-pen recorder with the red pen in the center position and the blue pen in the outer position. Selectable by specifying model number for 2-pen recorder and AS Reference SPP.

Charts:
A selection of standard charts is available. Refer to Foxboro Chart and Dial Catalog 600.

Alarm Lamps:
Refer to Page 72.

How to Order

1) SPECIFY MODEL NUMBER: 127S- __ __ __ __ - __

Pen and Indicator Quantity and Color:
- 1 pen and 1 indicator (red) 1
- 2 pens and 2 indicators (red and green) 2
- 3 pens and 3 indicators (red, green, and blue) 3

Chart Drive:
- Electric, single speed, 20 mm/h (0.8 in/h) ..... E
- Pneumatic impulse, 20 mm/h (0.8 in/h). Not available with code 3 above. Codes X and 0 below must be specified ..... P

Voltage:
- 120 V ac ..... A
- 240 V ac ..... B
- 24 V ac C
- None. Select with Chart Drive code P X

Frequency:
- 50 Hz 5
- 60 Hz 6
- None. Select with Chart Drive code P 0

Optional Feature:
- 3 alarm lamps, externally operated. Available with Voltage code C above only. L

2) SPECIFY INPUT SIGNAL _____

3) SPECIFY SCALE RANGES AND CHART RANGES FROM CHART AND DIAL CATALOG 600 _____

4) SPECIFY MOUNTING EQUIPMENT–102 OR 101 SERIES SHELVES _____

5) SPECIFY OPTIONAL FEATURES _____

6) SPECIFY INFORMATION FOR NAMEPLATE AND INSTRUMENT TAG _____

110

The 110 Series Pneumatic CONSOTROL Indicators indicate 1, 2, or 3 process measurements received as proportional pneumatic signals from remote transmitters.

110 Series Pneumatic CONSOTROL Indicators

- **Simple Construction**
  - No cables, clutches, or complicated mechanisms
  - Ball and socket connectors for frictionless linkage
- **Bold, Readable Display**
  - Large, brightly colored pointers
- **Easy Calibration**
  - Indicator partially slides out of shelf
  - Adjustments made at front end of panel
- **Integral Recording**
  - Optional circular chart recording mechanism
- **Versatile Mounting**
  - Singly or with other instruments in 102 or 101 Series Shelves

For complete specifications, refer to General Specification Sheet GS 2B-3D1 A.

Functional Specifications

Element:
One brass bellows per variable.

Damping:
Integral and adjustable.

Input Signal:
20 to 100 kPa or 3 to 15 psi, as specified.

Scale:
Vertical. Effective length 100 mm (4 in). Black figures on clear plastic, scaled as specified.

Pointers:
Red, green, blue.

Ambient Temperature Limits:
-20 and +65°C (0 and 150°F).

Performance Specifications

Accuracy:
±0.5% of calibrated span.

Repeatability:
0.25% of calibrated span.

Dead Band:
Less than 0.1 % of calibrated span.

Physical Specifications

Mounting:
Flush in panels 3 to 25 mm (0.13 to 1 in) thick using 102 or 101 Series Shelves. Indicators require 1 unit width of mounting capacity.

Connections:
Electrical and pneumatic multiprong receptacles on rear of chassis.

Nameplate:
White translucent plastic with 2.5 mm (0.1 in) high black characters. Maximum of 2 lines, 17 characters or spaces per line.

Overall Dimensions:
165 mm high x 71 mm wide x 554 mm deep (6.5 in high x 2.8 in wide x 21.8 in deep).

Optional Features

Chart Record:
Single variable indicators only may be furnished with an integral recording mechanism to provide a continuous record on a nominal 125 mm (5 in) circular chart with 50 mm (2 in) wide recording area. Electrical 2-speed chart drive, 24 h/24 min/off or 7 day/2.8 h/off rotation, as specified. Supply voltage 24, 120, or 240 V ac, 50 or 60 Hz, as specified. 24 V ac must be specified when alarm option is used. Foxboro and CSA certified for ordinary and Class I, Groups C and D, Division 2 hazardous locations. CSA certified units, Source - Canada. Maximum angle mounting is 15 degrees from vertical.

Alarm Actuators and Alarm Lamps:
Refer to Page 72.

How to Order

1) SPECIFY MODEL NUMBER:

One Variable	111
Two Variables	112
Three Variables	113

2) SPECIFY INPUT SIGNAL _____

3) SPECIFY SCALE RANGES–REFER TO CHART AND DIAL CATALOG 600 _____

4) SPECIFY MOUNTING EQUIPMENT–102 OR 101 SERIES SHELVES _____

5) SPECIFY OPTIONAL FEATURES _____

6) SPECIFY NAMEPLATE AND INFORMATION FOR INSTRUMENT TAG _____

135

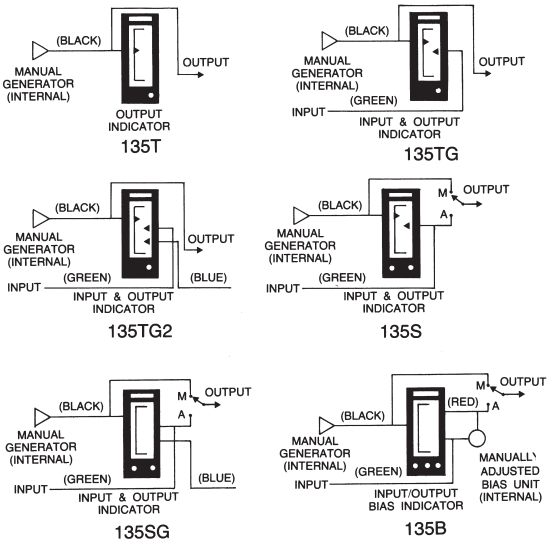
135 Series Stations are complementary auxiliary units for 100 Series Control Systems.

135 Series Manual Loading, Switching, and Bias Stations

- **Selective Pneumatic Switching**
- **Remote Control Setting**
- **Manual Loading of Final Operators**

For complete specifications, refer to General Specification Sheet GS 2B-4H2 A.

Functional Specifications



Model 135T:
Provides an accurate manually adjusted standard output signal used for remote manual control of final operators or for the remote setting of any pneumatic receiver. A manual adjusting knob regulates a stable standard output indicated on a 100 mm (4 in) vertical scale.

Model 135TG:
Performs the same function as the Model 135T (above). An additional pointer is provided to display a standard input signal.

Model 135TG2:
Performs the same function as the Model 135T. Two additional pointers are provided to display standard input signals.

Model 135S:
Passes a standard input signal to a final operator or manually generates an accurate standard signal. It is normally used in control loops where a single master controller regulates two or more final operators. The station contains a vertical scale, indicating the input signal and the output of the manual generator. By matching the two indicators on the vertical scale and flipping the simple 2-position transfer switch, a bumpless transfer is ensured.

Model 135SG:
Performs the same function as the Model 135S (above). An additional pointer is provided to display a standard input signal.

Model 135B:
Performs the same functions as the Model 135S with the added feature that up to ±100% bias may be manually added to the standard input signal. It is normally used where a single master controller regulates two or more final operators, or where it remotely sets two or more controllers, and where it is necessary to bias one with respect to the other. This unit has three pointers. One is used to indicate the manually generated signal and the other two indicate the input signal before and after it is biased.

Ambient Temperature Limits:
-20 and +65°C (0 and 150°F).

Input/Output Signal and Supply Pressure:

Input/Output Signal	Supply Pressure
20 to 100 kPa 3 to 15 psi	140 to 150 kPa 20 to 22 psi

Performance Specifications

Receiver-Indicator:
Accuracy: ±0.5% of calibrated span.

Repeatability: 0.25% of calibrated span.

Dead Band: Less than 0.1% of calibrated span.

Manual Output Pointer:
Output Indicator: 0.5% of calibrated span.

Repeatability of Setting: 0.25% of calibrated span.

Physical Specifications

Element:
Brass bellows.

Scale:
100 mm (4 in) vertical, black markings on white background.

Pointers:
Manual output: black.

Bias output: red.

Inputs: green and blue.

Connections:
Electrical and pneumatic multiprong receptacles on rear of chassis.

Nameplate:
White translucent plastic with 2.5 mm (0.1 in) high black letters. Maximum of 2 lines, 17 letters or spaces per line.

Mounting:
Flush in panels 3 to 25 mm (0.13 to 1 in) thick using 102 or 101 Series Shelves. Units require 1 unit of mounting capacity.

Optional Features

Alarm Actuators and Alarm Lamps:
Refer to Page 72.

How to Order

1) SPECIFY MODEL NUMBER: _____

Manual Loading	135T
Manual Loading with Variable Indicator	135TG
Manual Loading with Two Variable Indicators	135TG2
Automatic/Manual Switching	135S
Automatic/Manual Switching with Variable Indicator	135SG
Automatic/Manual Switching and Bias	135B

2) SPECIFY INPUT AND OUTPUT SIGNALS _____

3) SPECIFY SCALE RANGES–REFER TO CHART AND DIAL CATALOG 600 _____

4) SPECIFY MOUNTING EQUIPMENT–102 OR 101 SERIES SHELVES _____

5) SPECIFY OPTIONAL FEATURES _____

6) SPECIFY INFORMATION FOR NAMEPLATE AND INSTRUMENT TAG _____

556, 557

Units provide output proportional to mathematical function of input. Model 557 performs square root function only.

556 Series and Model 557 Pneumatic Analog Computers

- **Versatile**
  - Multiply
  - Divide
  - Square
  - Square root
- **Wide Range of Applications**
  - Flexible scaling for multiplication and division
- **Built-in Function Switch**
  - To select any of four computing functions
- **Weatherproof**
  - Plastic cover
  - Die-cast, low copper content aluminum alloy manifold
  - IEC IP53 and NEMA Type 3

For complete specifications, refer to Product Specification Sheets PSS 2B-5E1 A and B.

Functional Specifications

Functions and Related Equations:
The 556 Series performs any one of four functions and solves an equation as shown in the table. The 557 performs square root only.

Function	Equation
Multiplication	$A = fB(z+sC)$
Division	$B = \frac{A}{(f)(z + sC)}$
Square Root	$B = \sqrt{A}$
Square	$A = C^2$

A, B. and C are pneumatic signals expressed as decimal equivalents of percent of span.

f = Scaling factor (limits: 0.750 and 3.500).

s = Span factor for C signal (limits: 0.050 and 1.000).

z = Zero suppression of C signal (limits: 0.000 and 0.950).

NOTE: The sum of s and z must equal 1.000.

Input and Output Signals:
20 to 100 kPa or 3 to 15 psi, as specified.

Supply Pressure Limits:
130 and 150 kPa or 19 and 22 psi.

Ambient Temperature Limits:
-40 and +80°C (-40 and + 180°F).

Air Consumption Under Normal Operation:
<.10 m^3/h (.06 scfm) at standard conditions.

Air Connections:
All air connections are tapped for 1/4 NPT.

Mounting:
A bracket is supplied for vertical mounting on a rack or DN 50 or 2 in pipe. The bracket is designed for either horizontal or vertical pipes or rack struts.

Performance Specifications

Accuracy:
Multiplication: ±0.5% of output span referred to input.

Division: ±0.5% of output span referred to input.

Square Root:
556: ±0.25% of output span referred to input.
557: ±0.5% of output span referred to input.

Square: ±0.5% of output span.

Repeatability:
0.1 % of output span.

Physical Specifications

Materials of Construction:
Cover: Molded plastic with textured gray finish.

Manifold: Low copper content aluminum alloy die-casting with a gray epoxy finish.

Flexures: 17-4 PH stainless steel.

A and C Bellows: Brass.

B Diaphragm: Copper alloy.

Environmental Protection:
The housing construction is weatherproof. It is dust-protected as defined in IEC IP53 and provides the environmental protection of NEMA Type 3.

How to Order

1) SPECIFY MODEL NUMBER:

Function	Formula	
Multiplication	A = fB(z+sC)	556-8
Division	B = A/f(z + sC)	556-9
Square Root (a)	$B = \sqrt{A}$	 556-10
Square	$a + C^2$	 556-11
Square Root	$B = \sqrt{A}$	 557

(a) Refer also to Model 557, and accuracy statement in "PERFORMANCE SPECIFICATIONS."

2) SPECIFY INPUT/OUTPUT RANGE IN PROCESS UNITS_____

3) SPECIFY FOR MODELS 556-8 AND 556-9:
SUPPLY THE VALUE OF f, s, AND z_____
DEFINE INPUT/OUTPUT SIGNAL RANGE DESIRED, kPa OR psi _____

4) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

130MD, 130PD & 130FD Series Pneumatic CONSOTROL Control Stations

130MD, 130PD, and 130FD Series Pneumatic CONSOTROL Control Stations provide Panel-Mounted measurement, set point, and auto/ manual transfer functions to operate separately mounted controllers. The stations are used with the 138 Series Controllers to minimize time lag resulting from long distances between control panels and the process.

138 Series Remote Mounted Pneumatic Controllers

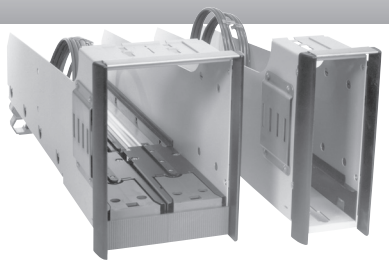
138 Series Remote Mounted Pneumatic Controllers are used with 130MD,130PD, and 130FD Series Control Stations. They provide the response advantage of a local controller with the convenience of a Panel-Mounted display.

130M-N Series Pneumatic CONSOTROL Indicating Gap Controllers

The Model 130M-N7 Differential Gap Controller is an on/off unit with an adjustable inert zone (gap) within which the controller will not respond to changes in the measurement.

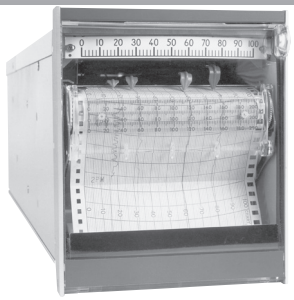
The Model 130M-N94 Gap Action Floating Controller provides standard proportional plus integral control action when the measurement exceeds the high or low gap limit.

102 & 101 Series Pneumatic CONSOTROL Shelves



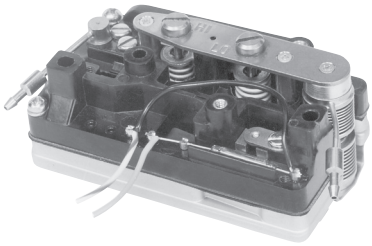
102 and 101 Series Pneumatic CONSOTROL Shelves allow flush panel mounting of pneumatic CONSOTROL instruments in panels. They are compact units, available in ten sizes for one to ten instruments. The shelves allow instruments to be wholly or partially withdrawn without interfering with the operation of others.

120 Series Pneumatic CONSOTROL Recorders



120 Series Pneumatic CONSOTROL Recorders record up to four process measurements received as standard pneumatic transmission signals from remote transmitters. Large, brightly colored pens clearly indicate the measurement. The recording is on a SCAN-FOLD chart.

Alarm Actuators and Alarm Lamps



100 Series Pneumatic Alarm Actuators are available integrally mounted in CONSOTROL 100 instruments. The actuators are operated directly by the pneumatic input signals. They provide high sensitivity, accuracy, and dependability by eliminating intermediate receiver mechanisms. A wide variety of alarm configurations is available.

Converters

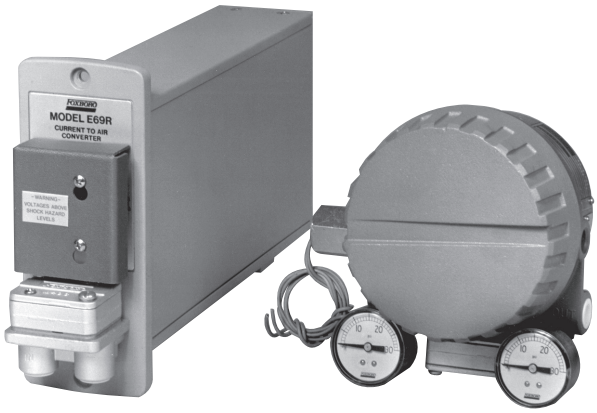
Many processes require both electronic and pneumatic instrumentation. Converters allow you to integrate that combination into your control strategy.

Foxboro makes converters for both purposes:

CURRENT-TO-PNEUMATIC (I/P) E69 SERIES

- Available with a selection of input/output signals
- Small, compact, lightweight–for easy installation
- High air delivery rate for direct valve actuation

E69, E69R



E69F and E69R Series Current-to-Pneumatic Converters accept a dc milliampere input signal and convert to a proportional pneumatic output signal.

E69F and E69R Series Current-to-Pneumatic Converters

- **Light, Compact**
  - Easy to install
- **Low Air Consumption**
  - Reduced operation costs
- **High Air Capacity**
  - Eliminates need for volume boosters
- **Choice of Various Input and Output Signals**
  - Suitable for all applications
- **Sealed Air Purged Case (E69F)**
  - Long-term dependability in dirty environments
- **Precise Performance**

For complete specifications, refer to Product Specification Sheets PSS 4-8B1 A (E69F) and 2B-2A2 A (E69R).

Functional Specifications

Input Signal Ranges (mA dc):
4 to 20, 4 to 12, 12 to 20.
10 to 50, 10 to 30, 30 to 50.

Output Signal Ranges:
20 to 100 kPa or 3 to 15 psi.
40 to 200 kPa or 6 to 30 psi.
3 to 27 psi.
7 to 125 kPa or 1 to 18 psi.
7 to 220 kPa or 1 to 32 psi.

Input Impedance:
170 Ω (4 to 20 mA dc).
27 Ω (10 to 50 mA dc).

Supply Pressure: (a)

Nominal	Limits
140 kPa or 20 psi	130 and 160 kPa or 19 and 23 psi
240 kPa or 35 psi	225 and 260 kPa or 33 and 38 psi

a) Not less than 20 kPa or 3 psi above maximum output.

Electrical Classification:
FM, CSA, and ATEX certified. Explosion proof and intrinsically safe versions available. Refer to Foxboro for complete specifications.

Physical Specifications

Accuracy:
Output Signal codes 2 and 3: ±1.0% of calibrated span.

Output Signal codes 7 and 8: ±2% of calibrated span.

Linearity:
0.5% of calibrated span typical.

Repeatability:
0.25% of calibrated span typical.

E69F Enclosure:
Die-cast copper (1% maximum) aluminum alloy body and cover (ASTM 512A and 512B), with a vinyl or epoxy powder finish. Meets the requirements of IEC IP65 and provides the environmental protection of NEMA Type 4.

Mounting:
Valve yoke, surface, or DN 50 or 2 in pipe. Calibrated for vertical mounting unless otherwise specified. Bracket is supplied as standard.

Input/Output Connections:
Electrical: Tapped 1/2 in for conduit fitting to connect to a pair of 0.5m (18 in) long 18 AWG (1.0 mm^2) twisted leads.

Pneumatic:
1/4 NPT for air supply and output signal.

Physical Specifications (continued)

E69R

Enclosure:
Die-cast aluminum front and back plates with extruded top and bottom rails and steel side covers. Finish is vinyl, polyurethane, or acrylic enamel.

Mounting:
Up to 6 units may be mounted across in a 483 mm (19 in) rack.

Input/Output Connections (on front panel):
Electrical: Screw terminal with terminal cover.

Pneumatic: 1/4 NPT for air supply and out signal.

Optional Features

Alternative Output Signal:
Refer to Foxboro for other than standard output signals.

Adjustable Filter Regulator (E69F):
Provided without gauge.

Supply (Input) and Output Pressure Gauges (E69F):
Mounted integral to converter.

Explosionproof Junction Box (E69F):
Mounted integral to converter. PG 11 Cable Gland (Trumpet Connector) for non explosion-proof applications.

Miniature Junction Box (E69F):
Consists of an aluminum box, 64 x 58 x 33 mm (2.5 x 2.3 x 1.3 in), and meets the IEC/ IP65 requirements and the environmental protection of NEMA Type 4. Provided with 1/2 in conduit, 20 mm threaded hole, or PG 11 or PG 13.5 Trumpet Type Cable Connectors.

Assembled to Valve Actuator by Foxboro (E69F).

How to Order

1) SPECIFY MODEL NUMBER: E69F- __ __ __ - __

Housing:
- Bolted cover (weatherproof) ..... B
- Threaded cover (explosionproof) ..... T

Input Signal (a), (b) and Impedance:
- 4 to 20 mA dc (170 Ω) I
- 10 to 50 mA dc (27 Ω) ..... H

Output Signal (c):

kPa	psi	
20 to 100	3 to 15	 2
40 to 200	6 to 30	 3
–	3 to 27	 3
7 to 125	1 to 18	 7
7 to 220	1 to 32	 8

Other X

Optional Features:
- Explosionproof junction box ..... J
- Adjustable filter regulator without gauge ..... R
- Supply/output gauges ..... S
- Miniature junction box (1/2 in conduit connector) - front entry (d) ..... M
- Miniature junction box (1/2 in conduit connector) - rear entry (d) ..... P

a) Converter action may be direct or reverse. (Specify.)
b) Input signal may be split-ranged (i.e., 4 to 12 mA). (Specify.)
c) When ordering valves not employing valve positioners, specify code 7 or 8 depending on the actuator spring range.
d) Cannot be used with Electrical Classification CS-E/LD-E.

HOW TO ORDER Continued on Next Page.

How to Order (continued)

1) SPECIFY MODEL NUMBER: E69R- __ - __

Housing:

Input Signal (a), (b) and Impedance:

4 to 20 mA dc (170 Ω) I
10 to 50 mA dc (27 Ω) ..... H

Output Signal (c):

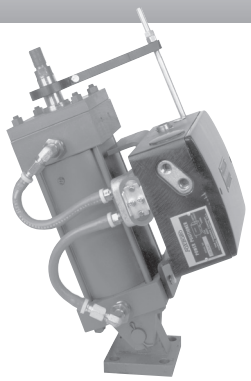
kPa	psi	
20 to 100	3 to 15	 2
40 to 200	6 to 30	 3
–	3 to 27	 3
7 to 125	1 to 18	 7
7 to 220	1 to 32	 8

Other X

a) Converter action may be direct or reverse. (Specify.)
b) Input signal may be split-ranged (i.e., 4 to 12 mA) (Specify.)
c) When ordering valves not employing valve positioners, specify code 7 or 8 depending on the actuator spring range.

2) SPECIFY DIRECT OR REVERSE ACTION _____
3) SPECIFY OUTPUT SIGNAL _____
4) SPECIFY ELECTRICAL CLASSIFICATION _____
5) SPECIFY OPTIONAL FEATURES _____
6) SPECIFY INFORMATION FOR INSTRUMENT TAG _____

2A Series Cylinder Actuator with Power Positioner



The 2A Series Cylinders are used to actuate dampers, gates, shutters, doors, and large control valves. Power positioners are required with all pneumatic cylinders for throttling action. They convert the standard 20 to 100 kPa (3 to 15 psi) controller signal to full supply pressure on the cylinder piston and assure precise, positive positioning. Cylinders are available in bore sizes 83 through 355 mm (3 1/4 through 14 in) with strokes up to 810 mm (32 in).

E69P Series Current-To-Pneumatic Valve Positioners

The E69P Series Current-to-Pneumatic valve Positioner converts a direct current milliampere input signal into a pneumatic output signal for positioning control valve actuators. It eliminates the need for a separate converter and a separate positioner. It is available with the following input signal ranges (mA): 4 to 20, 4 to 12, 12 to 20, 10 to 50, 10 to 30, 30 to 50 with a corresponding output sugnal of up to 240 or 420 dPa (35 or 60 psi, 2.4 or 4.2 bar of kg/cm^2).

Models 20F/P50 & 30C/P110 Diaphragm Lever Actuators

The Models 20F/P50 and 30C/P110 Diaphragm Lever Actuators are used to actuate dampers, gates, and butterfly valves. The topworks of the size P50 and P110 Diaphragm Actuators are made of vinylcoated, die-cast aluminum. Maximum input pressure is 420 kPa (60 psi). Bracket material is cast iron, and the carbon steel lever is predrilled. Lever strokes range from 116 to 254 mm (4.56 to 10 in).

P Series Pneumatic Spring Diaphragm Actuators

The P Series Actuators can operate a variety of control valves, dampers, louvers, and gates. They are lightweight field-reversible units with low hysteresis and fast, precise response.

Model	Maximum Stroke		Effective Area		Material Construction
	mm	in	m^2	in^2	
P25	19	3/4	0.016	25	aluminum
P50	38	1 1/2	0.032	50	with cast
P110	57	2 1/4	0.071	110	iron yoke

Nominal input signal: 20 to 100 or 40 to 200 kPa (3to 15 or 6 to 30 psi).

Humitex Circular and Strip Charts

Foxboro recording charts complement the precision and fine craftsmanship of our wide range of recording instruments. Charts combine the essential elements of special high-quality paper with rigidly controlled printing and trimming procedures. Over 17,000 different charts can be supplied in ranges and calibrations to meet the requirements of practically any process recording application. Special charts and new ranges not listed in the Chart Catalog and Dial List (Catalog 600) may require a new electro printing plate for specific customer needs. Contact our nearest Branch Office for Catalog 600.

Chart Purchase Agreement

Any Foxboro instrument user with an estimated yearly requirement of 500 boxes of circular and/or 500 boxes of strip charts or more may request a Chart Purchase Agreement. Under the agreement system, quantity prices are applied to the individual chart purchase order. The agreement is continuous, reviewed yearly for actual purchases, and a 30-day advance notice to changes is given. Refer to Foxboro with your annual requirements to receive a Chart Purchase Agreement.

Minimum Order Quantity—15 boxes of circular charts or 15 boxes of strip charts.

Toll Free Number

To order charts, call 888-FOXBORO (888-369-2676).

Types of Calibration Charts Available for Circular and Strip Charts

Uniform, Differential Pressure, Flow (Type 27), Vacuum Pressure, Square Root, Vapor Pressure, Dairy Charts, Dew Point, Thermocouple, Thermopile, Flow-Open Channel Weir and Flume, Log Function, Specific Gravity, and Balsbaugh.

Circular Chart Specifications

Standard circular charts are printed with gray ink, 1 side only, on 0.122 mm (0.0048 in) thick paper. Circular charts with heavy paper are printed on 0.178 mm (0.0070 in) paper. Charts are packaged 100 to a box.

Instrument	Chart Size
125 mm (5 in) Side-Mounted Recorder	125 mm (5 in) (a)
12 Series Recorders	300 mm (12 in)
40/740 Series Recorders	300 mm (12 in)
39A Series Flow Recorders	300 mm (12 in) (a)
39 B Series Flow Recorders	MW Series 300mm (12in)(a)
740R Series Recorders	300 mm (12 in)

a) Always printed on heavy paper.

Foxboro also prints circular charts for American Meter, Arcco-Anubis, Bailey, Bristol, Gotham (Ametek), Honeywell (Brown), Mercury, Palmer, Ranarex (Permutit), Rockwell, Taylor, UGC Industries, Warren Controls (Tagliabue), and Weksler which are made to their specifications.

Options for 300 mm (12 in) Circular Charts:

Description	Code (b)
Heavy Paper	-HP
Backprinting (c)	-BP
Mullins Slotting (d)	-MS-HP
Overprinting of Two-Color Charts (f)	-OP
Color of Ink on Chart:	
Green	-GRN
Scanner Blue Ink	-BLU-SBI
Black	-BLK
Aqua	-AQUA
Dark Blue	-DBLU
Shrink Wrap	-SW

b) Add as suffix to circular chart number.
c) Add Foxboro backprint number.
d) Specify drop time and/or day of the week.
e) Specify time.
f) Must be available as an existing chart; see Catalog 600.

Strip Chart Specifications

4 in Roll,100 mm Roll, and SCAN-FOLD charts can be supplied with or without time mark numbering. Standard time mark numbering is the hour of the day printed on the left side of the chart at 2-hour intervals (on the even hour). The standard speed for the 4 in Roll and SCAN-FOLD is 3/4 in/h which coincides with the chart drive speed. The standard speed for the 100 mm Roll is 20 mm/h.

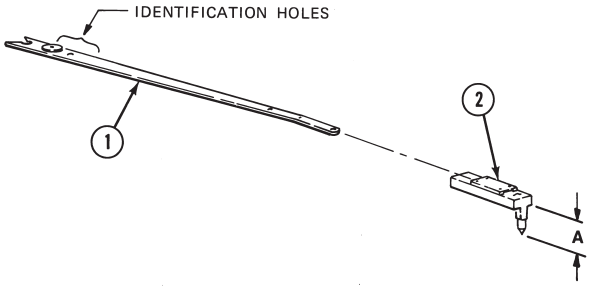
A large selection of non-standard time mark numbering is available to match the chart speeds of your recorders. Refer to Catalog 600 for a listing.

4 in Roll Chart..... One 30-day chart per box
100 mm Roll Chart..... One 30-day chart per box
SCAN-FOLD Chart..... Two 16-day charts per box

Recorders	Chart
E20S 53 54 64 120 220S	4 in Roll or SCAN-FOLD For 4 in Roll, specify chart number suffix -T if time numbering is required. For SCAN-FOLD, specify chart number suffix -6TX if time numbering is required.
E27R 126S 127S 226S 227S 760R	100 mm Roll only Specify chart number suffix -T if time numbering is required.
761R	L0120NP
762R	Fold - L0122RQ 50 Divisions - L0122RS 0-100 Linear Roll - L0122RR 50 Divisions - L0122RT 0-100 Linear
751R	Fold - L0122RS 0-100 Linear Roll - L0122RT 0-100 Linear

Pens and Pen Arms

- **Large, Disposable, Fiber Tip Pens for Circular Chart Recording Instruments**
- **Designed to Write 365 meters (1200 feet)**
- **Prepackaged 6 Pens per Card**



Recording

40, 40M, 40P, and 39 Series Rectangular Case Recorders:

	Pen Arm, Item 1		Fiber Tip Pens (Package of 6), Item 2			
					A Length	
Pen Location	Part Number	Identification Holes	Color	Part Number	mm	in
1-Pen	0044897	2	Red	L0121CH	12	0.47
2-Pen						
inner	M0122AC	1	Violet	L0121CM	6	0.24
outer	0044897	2	Red	L0121CH	12	0.47
3-Pen						
inner	M0122AC	1	Violet	L0121CM	6	0.24
center	0044897	2	Red	L0121CH	12	0.47
outer	M0122AB	3	Green	L0121CU	18	0.71
4-Pen						
inner	M0122AC	1	Violet	L0121CM	6	0.24
next to inner	0044897	2	Red	L0121CH	12	0.47
next to outer	M0122AB	3	Green	L0121CU	18	0.71
outer	M0122AA	0	Blue	L0121DA	24	0.94

12R Series Round Case Recorders:

	Pen Arm, Item 1		Fiber Tip Pens (Package of 6), Item 2			
					A Length	
Pen Location	Part Number	Identification Holes	Color	Part Number	mm	in
1-Pen	0044899	2	Red	L0121CH	12	0.47
2-Pen						
outer	0046965	3	Violet	L0121CR	6	0.24
inner	0044899	2	Red	L0121C J	12	0.47

12RD (1 to 3 Pen) and 12RM (1 and 2 Pen) Series Round Case Recorders:

	Pen Arm, Item 1		Fiber Tip Pens (Package of 6), Item 2			
					A Length	
Pen Location	Part Number	Identification Holes	Color	Part Number	mm	in
1-Pen	0044899	2	Red	L0121CT	18	0.71
2-Pen						
inner	0046964	1	Violet	L0121CR	12	0.47
outer	0044899	2	Red	L0121CT	18	0.71
3-Pen						
inner	M0122NE	0	Violet	L0121CR	12	0.47
center	0046964	1	Red	L0121CT	18	0.71
outer	0044899	2	Green	L0121CZ	24	0.94

To order, call 888-FOXBORO (888-369-2676).

Recording Controllers

40, 40M, and 40P Series Rectangular Case Recording Controllers:

Controller Type	Pen Location	Pen Arm/Index, Item 1		Fiber Tip Pens (Package of 6), Item 2			
		Part Number	Identification Holes or Color	Color	Part Number	A Length mm	A Length in
Single Action	1-Pen Index	0044897 0032301	2 Plain	Red	L0121CH	12	0.47
Single Action with Additional Pen	2-Pen inner outer Index	 M0122AC 0044897 M0122LT	 1 2 Red	 Violet Red	 L0121CR L0121CT	 12 18	 0.47 0.71
Single Action with 2 Additional Pens	3-Pen inner center outer Index	 M0122AC 0044897 M0122AB M0122LT	 1 2 3 Red	 Violet Red Green	 L0121CR L0121CT L0121CZ	 12 18 24	 0.47 0.71 0.94
Triple Setting	1-Pen Index inner center outer	0044897 M0122LS M0122LT M0122MA	2 Violet Red Green	Red	L0121CY	24	0.94
Ratio	2-Pen inner outer Index	 M0122AC 0044897 M0122LS	 1 2 Violet	 Violet Red	 L0121CR L0121CT	 12 18	 0.47 0.71
Ratio with inner Additional Pen	3-Pen inner center outer Index	 M0122AC 0044897 M0122AB M0122LS	 1 2 3 Violet	 Violet Red Green	 L0121CR L0121CT L0121CZ	 12 18 24	 0.47 0.71 0.94
Duplex	1-Pen Index inner outer	0044897 M0122LT M0122LS	2 Red Violet	Red	L0121CT	18	0.71
Auto-Selector, Dual, or Duplex with Additional Pen	2-Pen inner outer Index inner outer	 M0122AC 0044897 M0122LT M0122LS	 1 2 Red Violet	 Red Violet	 L0121CT L0121DB	 18 24	 0.71 0.94

1. On multiple pen recorders, if pens L0121CR (Violet), LC 121CS (Black), L0121CP (Green), or L012 CQ (Blue) are used as arcing pens, then the red inner pen (L0121CJ) must be used. Its length is 6 mm (0.24 in)
2. Black pens may be substituted for red or violet as follows:
   Use L0121CN for pen arm lengths of 6 mm (0.24 in)
   Use L0121CS for pen arm lengths of 12 mm (0.47 in)
3. If replacing box pens with fiber tip pens, the color dot on the pen arm (Item 1 in drawing on preceding page) must be removed.

Disposable Fiber Tip Pen Cartridges for 40P/40M/12 and 740 Chart Recorders:

A-Length mm	A-Length in	Red	Violet	Green	Blue	Black
6	0.24	L0121CJ	L0121CM	L0121CK	L0121CL	L0121CN
12	0.47	L0121CH	L0121CR	L0121CP	L0121CQ	L0121CS
18	0.71	L0121CT	L0121CW	L0121CU	L0121CV	L0121CX
24	0.94	L0121CY	L0121DB	L0121CZ	L0121DA	L0121DC

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continued next page

Foxboro®

33 Commercial Street
Foxboro, Massachusetts 02035-2099 U.S.A.

Your Foxboro representative:

Invensys Operations Management
5601 Granite Parkway III, Suite 1000
Plano, Texas 75024 U.S.A
1.469.365.6400
iom.invensys.com

Foxboro
33 Commercial Street
Foxboro, Massachusetts 02035-2099 U.S.A
1.866.746.6477 Toll-free within U.S.A
1.508.549.2424 Global

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