Type 1000

Type 1000EX

Type 1000HR

Type 1000 Hazardous Use

Type 1001

Type 1001 Nema 3R

Type 1001 Nema 4X

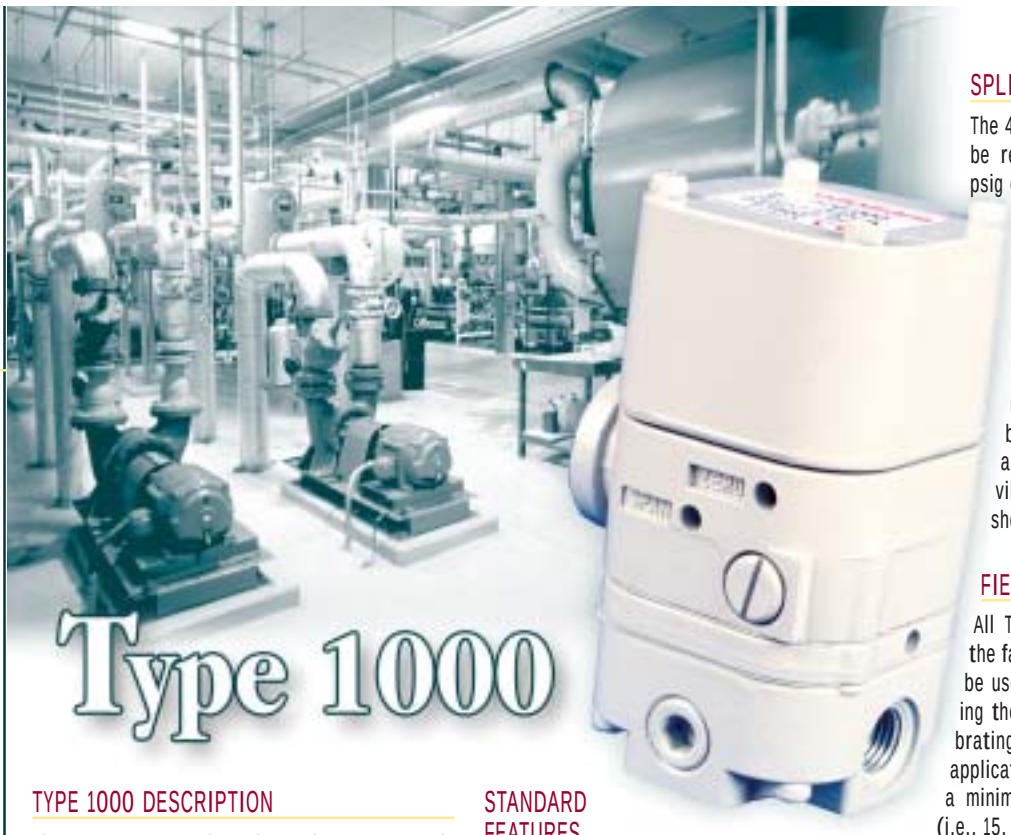
Type 1500

Type 1500 Zero Based

Type 2000

Type 2000 Hazardous Use

Type 5000



TYPE 1000 DESCRIPTION

The Type 1000 Transducer is an electro-pneumatic device that reduces a supply pressure to a regulated output pressure directly proportional to an electrical input signal. The Type 1000 accepts a wide range of supply pressures, ranging from a minimum of 3 psig (0.2 BAR) above the maximum output up to 100 psig (6.9 BAR). An integral pneumatic volume booster is included in the design to provide high flow capacity (up to 12 SCFM/339 slpm). Model selections include general purpose, NEMA 4X Type, extended range, high relief, intrinsically safe, and explosion proof.

APPLICATIONS

The Type 1000 Transducer converts an electrical signal to a pneumatic output which can be used to operate the following:

- Valve actuators
- Damper and louver actuators
- Valve positioners
- Controllers
- Relays
- Air cylinders
- Clutches & brakes

USED IN:

- Liquid, gas and slurry processing instrumentation
- HVAC systems
- Paper handling controls
- Textile processing systems
- Energy management systems
- Petrochemical processing systems

STANDARD FEATURES

- Low Cost
- Built-in Volume Booster
- Small Size
- Field Reversible
- Low Air consumption
- Mounts at Any Angle
- Convenient External Span & Zero Adjusts (Except for Explosion Proof Models)
- Light Weight
- Wide Supply Pressure Range
- Low Supply Pressure Sensitivity

PRINCIPLE OF OPERATION

The Type 1000 Transducer is a force balance device in which a coil is suspended in the field of a magnet by a flexure. Current flowing through the coil generates axial movement of the coil and flexure. The flexure moves against the end of a nozzle, and creates a back pressure in the nozzle by restricting air flow through it. This back pressure acts as a pilot pressure to an integral booster relay. Consequently, as the input signal increases (or decreases, for reverse acting), output pressure increases proportionally. Zero and span are calibrated by turning easily accessible adjusting screws on the front face of the unit. The zero adjusting screw causes the nozzle to move relative to the flexure. The span adjusting screw is a potentiometer that limits the current through the coil. A thermistor circuit in series with the coil provides temperature compensation.

SPLIT RANGING

The 4-20 mA input, 3-15 psig output model can be recalibrated to provide 3-9 psig or 9-15 psig output, for split ranging applications.

MOUNTING

The Type 1000 transducers can be pipe, panel, or bracket mounted in any position. Positions other than vertical will require recalibration of the zero adjustment. For maximum output pressure stability, the Type 1000 should be mounted in a vibration-free location or such that vibration is isolated to the X and Z axis shown on the dimensional drawings.

FIELD REVERSIBLE

All Type 1000 transducers are calibrated at the factory for direct acting operation but may be used in the reverse acting mode by reversing the polarity of the signal leads and recalibrating. When calibrated for reverse acting applications, the Type 1000 transducers provide a minimum of their full rated output pressure (i.e., 15, 27, or 30 psig) upon input signal failure.

TYPE 1000 FOR EXTENDED RANGE DESCRIPTION

The Bellofram Extended Range I/P and E/P Transducers are based on Bellofram's proven Type 1000 transducer line - the best selling transducers in the business.

The large span adjustment range of this line allows recalibration to fit applications with output ranges from approximately 3-35 psig (0.2-2.4 BAR) to 3-145 psig (0.2-10 BAR). The units accept supply pressures up to 150 psig (10.5 BAR) and provide flow capacity to 24 SCFM (677 slpm).

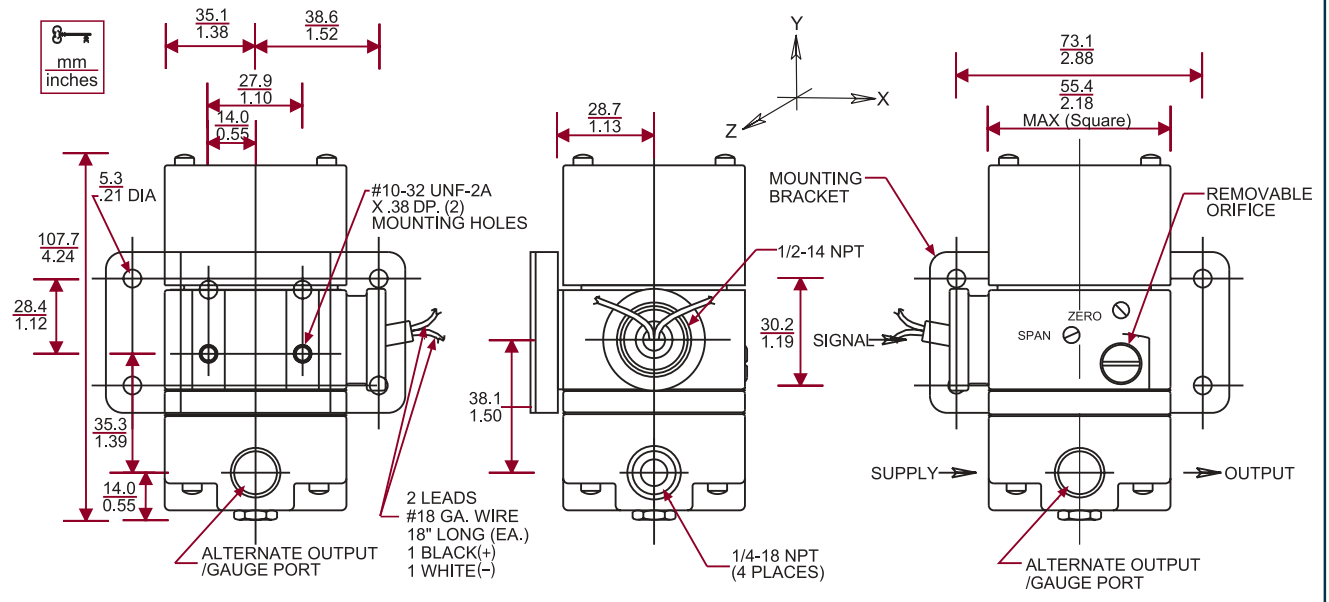
The Type 1000 I/P and E/P Transducers are more cost effective and more accurate than typical high output systems using transducers coupled to boosting or multiplying relays.

TYPE 1000 WITH HIGH RELIEF DESCRIPTION

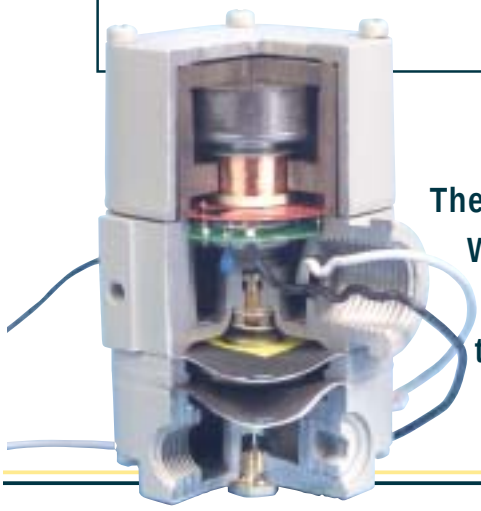
Expanding upon the proven accuracy, reliability, and rugged construction of the Type 1000 General Purpose, these transducers provide extra fast "blowdown" for a very rapid release of downstream pressure. The extra relief feature makes these units suitable for cylinder return stroke actuation, air hoists, and similar applications requiring fast exhaust. These units accept supply pressures to 100 psig (6.9 BAR), with output ranges from 1-17 psig (0.07-1.2 BAR) to 6-30 psig (0.4-2.1 BAR), and provide exhaust capacities of 7 SCFM (336 slpm).

	TYPE 1000 GENERAL PURPOSE	TYPE 1000 HIGH RELIEF	TYPE 1000 EXTENDED RANGE	TYPE 1000 EXPLOSION PROOF
Supply Pressure Range	3 psig (0.2 BAR) above max. output to 100 psig (7 BAR)	3 psig (0.2 BAR) above max. output to 100 psig (7 BAR)	5 psig (0.4 BAR) above max. output to 150 psig (10.4 BAR) (100 psig / 7 BAR for 2-60 psig / 0.1-4.1 BAR models)	3 psig (0.2 BAR) above max. output to 100 psig (7 BAR)
Supply Pressure Sensitivity	±0.15% of span per 1.5 psig (0.1 BAR)	±0.15% of span per 1.5 psig (6.1 BAR)	±0.004% of span per 1.0 psig (0.07 BAR)	±0.15% of span per 1.5 psig (0.1 BAR)
Linearity (terminal based)	<1.0% of span	<1.0% of span	<2.0% of span	<1.0% of span
Repeatability	<0.5% of span	<0.5% of span	<0.5% of span	<0.5% of span
Hysteresis	<1.0% of span	<1.0% of span	<1.0% of span	<1.0% of span
Minimum Flow Rate at Midrange 100 psig / 7 BAR	12 SCFM (339 slpm)	12 SCFM (339 slpm)	24 SCFM (677 slpm) 150 psig (10.4 BAR) Supply	12 SCFM (339 slpm)
Exhaust Capacity @ 5 psig (0.4 BAR) above setpoint	2 SCFM (56.5 slpm)	7 SCFM (336 slpm)	2 SCFM (56.5 slpm)	2 SCFM (56.5 slpm)
Air Consumption (max) at Midrange	0.1 SCFM (2.8 slpm)	0.1 SCFM (2.8 slpm)	0.07 SCFM (2.0 slpm)	0.1 SCFM (2.8 slpm)
Port Size (pneumatic / electric)	1/4 NPT & 1/2 NPT	1/4 NPT & 1/2 NPT	1/4 NPT & 1/2 NPT	1/4 NPT & 1/2 NPT
Size - inches mm	2⅛ X 2⅛ X 4 54 X 54 X 101	2⅛ X 2⅛ X 4 54 X 54 X 101	2⅛ X 2⅛ X 4 54 X 54 X 101	6 13/32 X 5 15/16 X 7 9/16 163 X 151 X 192
Weight	2.1 lb. / 0.95 Kg	2.1 lb. / 0.95 kg	2.1 lb. / 0.95 kg	5.2 lb. / 2.4 kg

DIMENSIONAL DRAWING; GENERAL PURPOSE, HIGH RELIEF, EXTENDED RANGE & INTRINSICALLY SAFE MODELS



Drawings and dimensions are for reference only.



The Type 1000 has long been a standard in the I/P & E/P industry. With a built-in booster, the T-1000 provides a flow capacity up to 12 SCFM, making it a versatile transducer for many applications.

T-1000 GENERAL PURPOSE ORDERING INFORMATION:

Input	Output* psig	Output* BAR	Part Number	Impedance (nominal)
4-20mA	3-9	0.2-0.6	961-072-000	90Ω
	9-15	0.6-1.0	961-073-000	90Ω
	3-15	0.2-1.0	961-070-000	180Ω
	3-27	0.2-1.9	961-074-000	220Ω
	6-30	0.4-2.1	961-075-000	220Ω
	1-17	0.07-1.2	961-116-000	250Ω
	3-15	0.2-1.0	961-089-000	180Ω
10-50mA	3-15	0.2-1.0	961-076-000	70Ω
	3-27	0.2-1.9	961-077-000	85Ω
	6-30	0.4-2.1	961-078-000	85Ω
0-5V	3-15	0.2-1.0	961-079-000	615Ω
	3-27	0.2-1.9	961-080-000	530Ω
	6-30	0.4-2.1	961-081-000	530Ω
1-9V	3-15	0.2-1.0	961-085-000	985Ω
	3-27	0.2-1.9	961-086-000	840Ω
	6-30	0.4-2.1	961-087-000	840Ω

NOTE: For NEMA4X, add 004 suffix.

T-1000 EXTENDED RANGE ORDERING INFORMATION:

Input	Output* psig	Output* BAR	Part Number	Impedance
0-60mA	2-120	0.1-8.3	961-107-000	220Ω
4-20mA	3-120	0.2-8.3	961-111-000	260Ω
	2-60	0.1-4.1	961-117-000	225Ω
0-10V	3-120	0.2-8.3	961-112-000	805Ω
0-5V	2-60	0.1-4.1	961-118-000	500Ω

T-1000 HIGH RELIEF ORDERING INFORMATION:

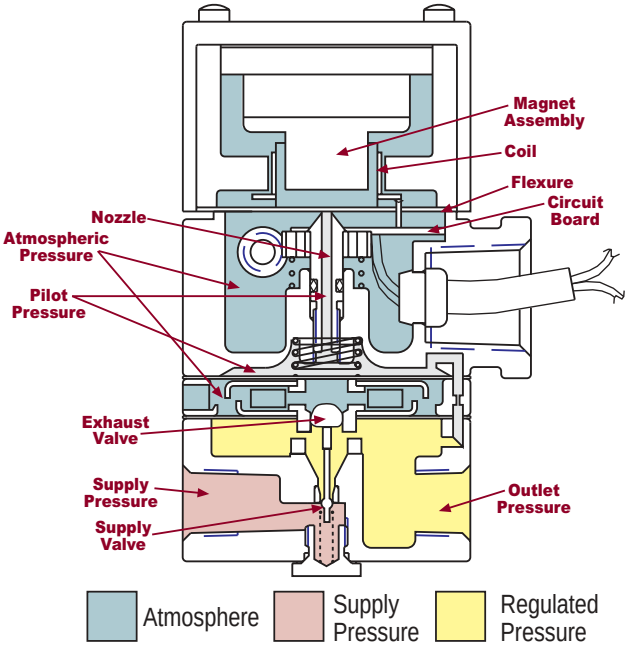
Input	Output* psig	Output* BAR	Part Number	Impedance (nominal)
4-20mA	3-9	0.2-0.6	961-130-000	90Ω
	9-15	0.6-1.0	961-131-000	90Ω
	3-15	0.2-1.0	961-132-000	180Ω
	3-27	0.2-1.9	961-133-000	220Ω
	6-30	0.4-2.1	961-134-000	220Ω
	3-15	0.2-1.0	961-135-000	180Ω
	1-17	0.07-1.2	961-136-000	250Ω
10-50mA	3-15	0.2-1.0	961-137-000	70Ω
	3-27	0.2-1.9	961-138-000	85Ω
	6-30	0.4-2.1	961-139-000	85Ω

OPTIONS AND ACCESSORIES:

Explosion Proof Mounting Kit: 971-079-000
Explosion Proof Panel Mounting: Kit: 971-078-000
DIN Rail Kit: 010-115-000
Hirschman Connector Kit (3-prong): 971-126-000
Filter Kit, Coalescing, 0.1 micron: 010-140-000
Filter Element Kit (for coalescing filter, package of 10): 010-141-000
Output Gauges: Option "8" ie: last 3 digits become - 008
Dielectric Strength Testing: Option "12" ie: last 3 digits become - 012
NEMA 4X Type Enclosure Option: Option "4" ie: last 3 digits become - 004**

* For output pressures less than 3 psi (0.2 BAR) or greater than 30 psi (21 BAR), the Type 1000 transducer can be coupled to Bellofram Type 75 pneumatic relay. Consult Applications Engineers for further information.

** NEMA 4 type enclosure option available on all input/output ranges. This option is separate from explosion proof, NEMA 4 units.



AGENCY APPROVAL NOTES:

1. The Type 1000 Explosion-Proof Transducer has been submitted, tested and approved by Factory Mutual Research for use in hazardous locations for Class I, Division 1, Group D, Class II, Division 1, Groups E, F & G and Class III requirements. It also has been approved to meet NEMA 4 Outdoor requirements.
2. Canadian Standards Association certified for hazardous locations: Class I, Group D, Class II, Groups E, F and G, Class III, CSA Enc. 4.
3. Factory Mutual Research Approved as intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, G when installed in accordance with interconnection diagram No. 541-000-012 and with the proper energy limiting barriers.
4. Factory Mutual Research Approved as non-incendive for Class I, Division 2, Groups A, B, C, D, and suitable for Class II and III, Division 2, Group G. Barriers are not required for nonincendive rating.
5. Canadian Standards Association certified as intrinsically safe when connected through certified diode safety barriers in accordance with Bellofram Installation Instruction 541-000-012.

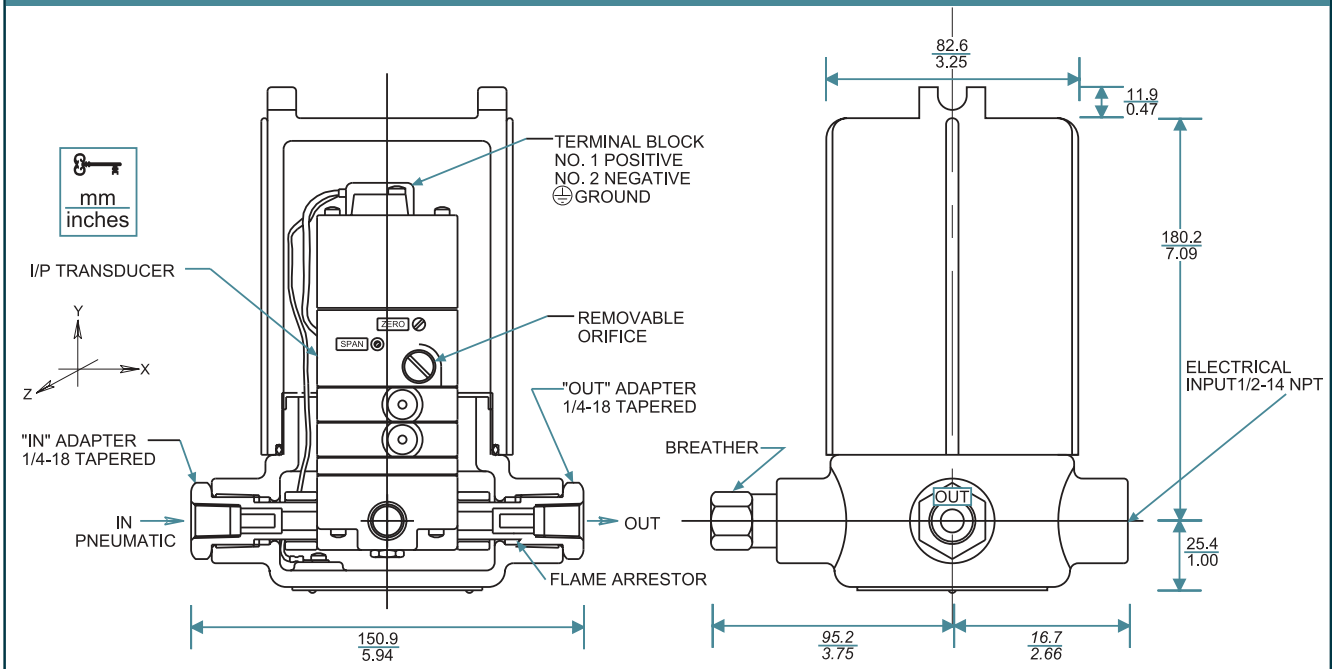
Explosion proof, intrinsically safe, and non-incendive ratings are not affected by recalibrating for split range or reverse acting applications.

CE The Bellofram T-1000 Transducers were tested and found to comply with Electromagnetic compatibility Directive effective January 1, 1996. The relevant EMC specifications tested were the following: EN 50081-1 (1992) and EN 50082-1 (1992). A Technical Construction File, Serial #107 was written and Certificate of Conformity issued by a Competent Body.

Filter Note:

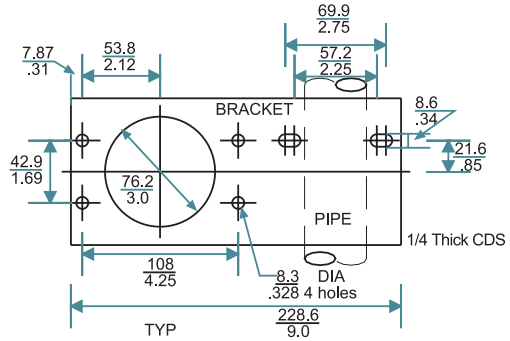
Bellofram specifies the use of instrument quality air (clean, dry, oil-free) for all transducers. The use of filters in the supply air system is highly recommended. Contact us for information on our filters and filter regulators.

DIMENSIONAL DRAWING; EXPLOSION PROOF MODEL



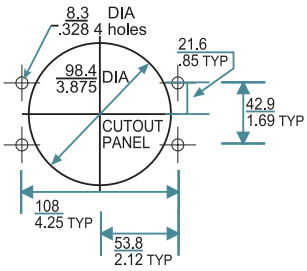
OPTIONAL MOUNTING BRACKET & HARDWARE:

ORDER KIT #201-971-079-000



OPTIONAL MOUNTING HARDWARE:

ORDER KIT #201-971-078-000



Drawings and dimensions are for reference only.

T-1000 FOR HAZARDOUS LOCATION USE ORDERING INFORMATION:

Input	Output* psig	Output* BAR	Part Number	Impedance (nominal)	Agency Approvals (see notes)
Type 1000 Explosion Proof					
4-20mA	3-15	0.2-1.0	961-098-000	180Ω	Explosion-Proof, Factory Mutual[1]
	3-15	0.2-1.0	961-098-100	180Ω	CSA Explosion Proof
1-9v	3-15	20-100	961-142-000	985Ω	Explosion Proof Factory Mutual[1]
Type 1000 Intrinsically Safe					
4-20mA	3-15	0.2-1.0	961-099-000	180Ω	Intrinsically Safe, Factory Mutual [3,4]
	3-27	0.2-1.9	961-100-000	220Ω	Intrinsically Safe, Factory Mutual [3,4]
	3-15	0.2-1.0	961-105-000	180Ω	Intrinsically Safe, CSA[5]
	3-27	0.2-1.9	961-106-000	220Ω	Intrinsically Safe, CSA[5]
	6-30	0.4-2.1	961-101-000	220Ω	Intrinsically Safe, Factory Mutual [3,4]
	15-3	1.0-0.2	961-175-000	180Ω	Intrinsically Safe, Factory Mutual [3,4]
	27-3	1.9-0.2	961-176-000	220Ω	Intrinsically Safe, Factory Mutual [3,4]
	30-6	2.1-0.4	961-177-000	220Ω	Intrinsically Safe, Factory Mutual [3,4]

*For output pressures less than 3 psi or greater than 30 psi the Type 1000 transducer can be coupled to Bellofram Type 75 pneumatic relay. Consult application engineers for further information.

TYPE 1001

DESCRIPTION

The Type 1001 is a patented family of electro-pneumatic instruments that is used to reduce a supply pressure to a regulated output pressure which is directly proportional to a two-wire current or three-wire voltage input. This design incorporates closed loop sensing of the output pressure to achieve excellent accuracy and vibration stability. It also features a unique damping circuit which can be adjusted to prevent overshoot and actuator "hunting." Model selection includes General Purpose (NEMA 1), Rainproof (NEMA 3R), and Watertight/Corrosion Resistant (NEMA 4X). NEMA 4X models are also explosion-proof, and all models are intrinsically safe.

FEATURES

- 0.1% accuracy typical
- Closed loop pressure feedback control minimizes effects of vibration, temperature, supply pressure and mounting angle
- Built-in volume booster provides flows up to 12 SCFM
- Easy access zero and span adjustment
- Damping pot prevents over shoot and "hunting"
- Low air consumption
- Mounts at any angle (NEMA 3R limited)
- Compact and lightweight
- Virtually no sensitivity to supply pressure changes
- Removable orifice (screw) for easy maintenance

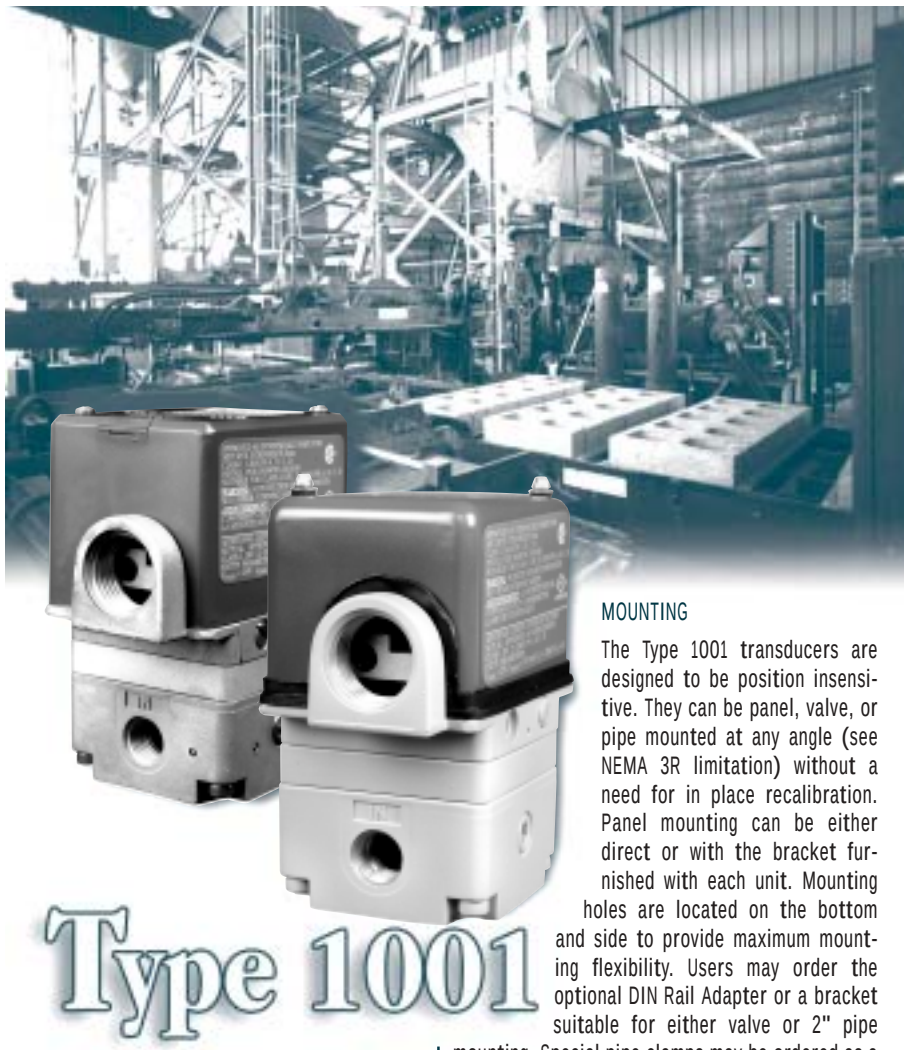
APPLICATIONS

The Type 1001's precisely regulated pneumatic output can be used to operate:

- Valve actuators
- Louver and damper actuators
- Valve positioners
- Relays
- Clutches and brakes
- Controllers
- Air cylinders

Industry Applications Include:

- Liquid and gas processing
- Pulp and paper
- Petrochemical processing
- HVAC systems
- Textile productions
- Energy management
- Environmental control
- Medical equipment



CALIBRATION ADJUSTMENTS

The Type 1001 contains multi-turn Zero and Span adjustment potentiometers which are accessible on NEMA 1 models by sliding the cover window open to its first detent position. Pots are clearly distinguished by legend on the cover. On NEMA 3R and 4X models, the cover should be removed to reach the pots (marked Z for zero and S for span).

Adjust the pots clockwise to increase Zero and Span as required to optimize factory set output with appropriate input signal and supply pressure applied.

DAMPING ADJUSTMENT

To eliminate undesirable system oscillation, the Type 1001 features a unique damping adjustment. The output response is optimized to varying downstream volumes by adjusting the feedback time constant of the coil drive amplifier. This is accomplished on NEMA 1 models by sliding the cover window open to its second detent position to expose the single-turn Damping Potentiometer (remove the cover on NEMA 3R and 4X models). To optimize response, turn the pot fully counterclockwise until system oscillation is just eliminated. System oscillation may be observed by monitoring output pressure or by observing the behavior of directly actuated system components in response to a changing input.

MOUNTING

The Type 1001 transducers are designed to be position insensitive. They can be panel, valve, or pipe mounted at any angle (see NEMA 3R limitation) without a need for in place recalibration. Panel mounting can be either direct or with the bracket furnished with each unit. Mounting holes are located on the bottom and side to provide maximum mounting flexibility. Users may order the optional DIN Rail Adapter or a bracket suitable for either valve or 2" pipe mounting. Special pipe clamps may be ordered as a separate kit.

HAZARDOUS AREA & USAGE CLASSIFICATION

All 1001 units are approved by Factory Mutual and CSA as intrinsically safe for Class I, Division 1, Groups A, B, C, D hazardous locations.

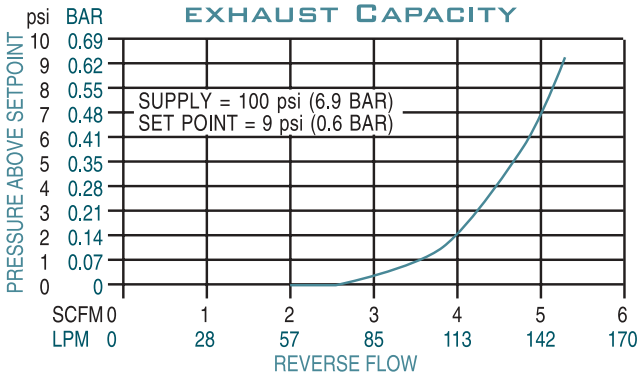
General Purpose (NEMA 1). The General Purpose series of transducers are intended for normal, non corrosive applications and environments. Cover is molded in high impact ABS plastic.

Rain proof (NEMA 3R). These models can be used outdoors, to ensure protection from moisture. The tamperproof cover screws require a special drive bit (p/n AT1-648-000-398), which is furnished with the product.

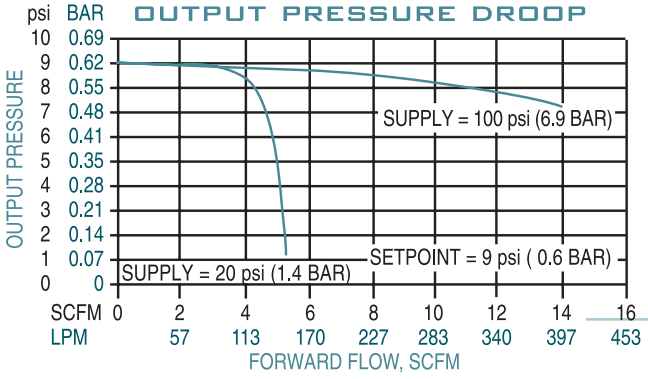
Watertight & Corrosion Resistant (NEMA 4X). This series of transducers has been certified by Factory Mutual Research as meeting NEMA 4X requirements (water tight, dust tight, and corrosion-resistant).

The NEMA 4X models also have Factory Mutual approval for explosion-proof service: Class I, Division 1 and 2, Groups B, C, and D. Dust ignition proof service: Class II, Divisions 1 and 2, Groups E, F, and G. The NEMA 4X is suitable for Class III, Divisions 1 and 2. Equivalents to the approvals previously described have also been obtained from the Canadian Standards Association.

EXHAUST CAPACITY



OUTPUT PRESSURE DROOP



SPECIFICATIONS

Accuracy (per ISA 51.1):	± 0.10% of output span, typical ± 0.25% of output span, maximum (Guaranteed)
Hysteresis:	0.01% of output span, typical 0.10% of output span, maximum
Dead Band:	No effect
Repeatability:	0.01% of output span, typical 0.10% of output span, maximum
Ambient Temperature Effect:	± 0.004% of nominal span per °F, typical ±0.022% of nominal span per °F, maximum
Span:	±0.013% of calibrated span per °F, typical ±0.022% of calibrated span per °F, maximum
Temperature Effect:	≤ 0.02%/°F, zero and span effects combined
Operating Temperature Range	
Buna-N elastomers:	-20°F to 160°F (-29 to 71°C)
Viton elastomers:	0°F to 160°F (-18 to 71°C)
Storage Temperature Range	
Buna-N elastomers:	-40°F to 200°F (-40 to 93°C)
Viton elastomers:	-15°F to 200°F (-26 to 93°C)
Vibration Effect:	Less than 0.5% of span per 1G, 5-2000 Hz, 3G maximum, 3 axes
Mounting Position Effect:	Not measurable
Loop Load, I/P Transducer:	Less than 10 VDC drop at 20 mA Less than 12 VDC drop at 50 mA
Supply Voltage, E/P Transducer:	
Intrinsically Safe/Nonincendive:	9 VDC to 28 VDC, less than 20 mA
General Purpose:	9 VDC to 40 VDC, less than 20 mA
Supply Voltage Effect:	No effect
Signal Impedance, E/P Transducer:	6000 Ohm minimum
RFI/EMI Effect (NEMA 4X):	Less than 0.25% of span change in output 10V/meter, 20-1000 MHz. (Reference SAMA PML 33.1-1978, 2-abc)
Supply Pressure Sensitivity:	No effect
Air Consumption:	0.07 SCFM (2 LPM) maximum
Supply Pressure*:	100 psig (6.9 BAR) maximum
Port Sizes:	Pneumatic: 1/4" NPT Electrical: 1/2" NPT

* For models with zero output capability maximum supply pressure = 40 psi (2.8 BAR) above maximum output, except for 0-100 PSI and 0-120 PSI models that have a maximum supply pressure of 130 psi (9 BAR) & 140 psi (9.7 BAR) respectively.

Bellofram specifies the use of instrument quality air (clean, dry, oil free) for all transducers. Transducer should be used within the following conditions:

Dew Point = 35°F (2°C)(indoor); Oil Content = < 1ppm; Particles = 3µm.

The use of filters in the supply air system is highly recommended. Contact us for information on our filters and filter regulators.

T-1001 ACCESSORIES

KITS	PART NUMBER
Panel Mounting Kit	010135-000
Valve Mounting Kit ***	010134-000
2" Pipe Mounting Kit (Valve Mounting Kit is required)	010143-000
DIN Rail Adapter	010115-000
Cover for Locking Device Kit (for NEMA 4X enclosure only)	010136-000
Type 1 Orifice with Buna-N O-rings*	010137-000
Type 1 Orifice with Viton O-rings*	010137-002
Type 2 Orifice with Buna-N O-rings**	010137-001
Type 2 Orifice with Viton O-rings**	010137-003
Filter Kit, 60 microns	010139-000
Filter Kit, Coalescing, 0.1 microns	010140-000
Filter Element Kit (for coalescing filter, package of 10)	010141-000
Hirschman® Connector Kit (DIN 43 650-A) (3 prong plug, O-ring sealed)	010142-000
Pressure Gauge Kit, 15 PSI	010138-000
Pressure Gauge Kit, 30 PSI	010138-001
Pressure Gauge Kit, 60 PSI	010138-002
Pressure Gauge Kit, 160 PSI	010138-003

* Type 1 Kits to be used with Ø based output units and 1-17 psig unit.
** Type 2 Kits to be used with all other units.
*** Supplied standard with Nema 4X

T-1001 SPECIALS TABLE

PART NUMBER	INPUT	OUTPUT	COMMENTS
962-145-000	4-20 mA	20-100 kPa	NEMA 1
962-146-000	4-20 mA	20-100 kPa	NEMA 3R
962-148-000	4-20 mA	0-200 kPa	NEMA 1

TYPE 1001 ORDERING INFORMATION

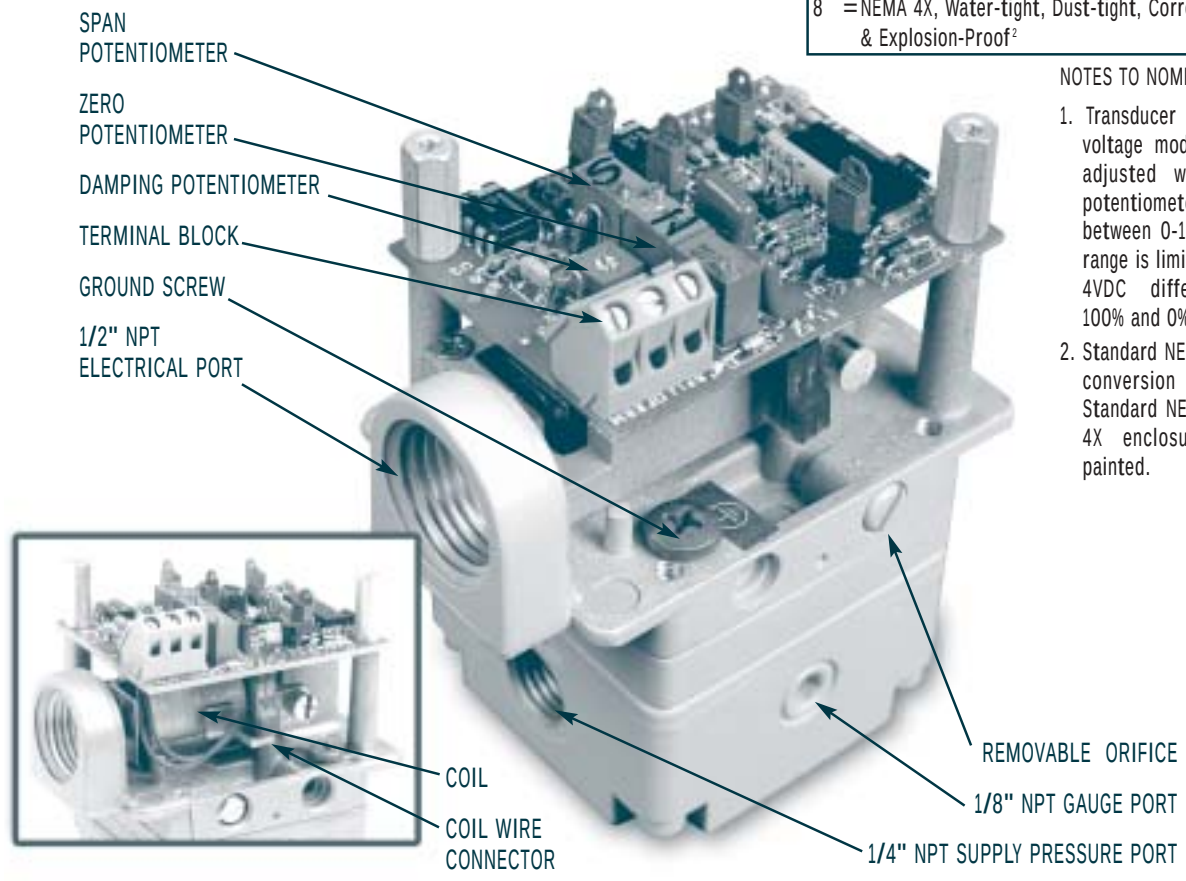
9 6 □ - □ □ □ - 0 □ □

OPTIONS
00 = None
06 = Fluorocarbon Elastomeric Diaphragm

AGENCY APPROVALS
0 = None
1 = Factory Mutual & CSA Explosion Proof

CALIBRATION
See Input / Output matrix below[1]

ENCLOSURES
6 = NEMA 1, General Purpose[2]
7 = NEMA 3R, Rainproof[2]
8 = NEMA 4X, Water-tight, Dust-tight, Corrosion Resistant, & Explosion-Proof[2]



NOTES TO NOMENCLATURE:

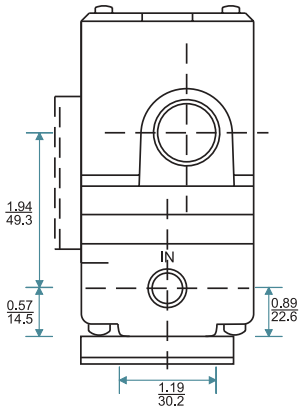
1. Transducer operating in the voltage mode (E/P), can be adjusted with the "span" potentiometer for any input between 0-10 VDC. The input range is limited to a minimum 4VDC difference between 100% and 0% Input voltage.
2. Standard NEMA 1 enclosure is conversion coated only. Standard NEMA 3R and NEMA 4X enclosures are epoxy painted.

T-1001 STANDARD INPUT / OUTPUT MATRIX

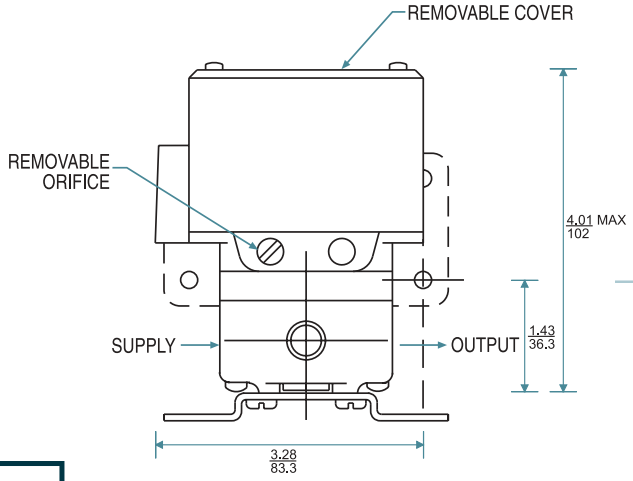
	OUTPUT												
psig	0-5	0-15	0-30	0-60	0-100	1-17	3-15	3-27	6-30	3-9	9-15	0-2	0-120
4-20mA	19	06	20	08	09	05	02	03	04	00	01	13	07
10-50 mA	11	16	85	98	89	15	12	87	14	10	90	91	17
0-5 VDC	21	26	18	28	29	25	22	35	24	30	31	92	27
1-5 VDC	81	36	86	38	39	97	32	33	34	50	41	93	37
1-9 VDC	82	46	40	48	49	45	42	43	44	60	51	94	47
1-10 VDC	83	56	96	58	59	55	52	53	54	88	61	95	57
0-10 VDC	84	66	70	68	69	65	62	63	64	80	99	23	67

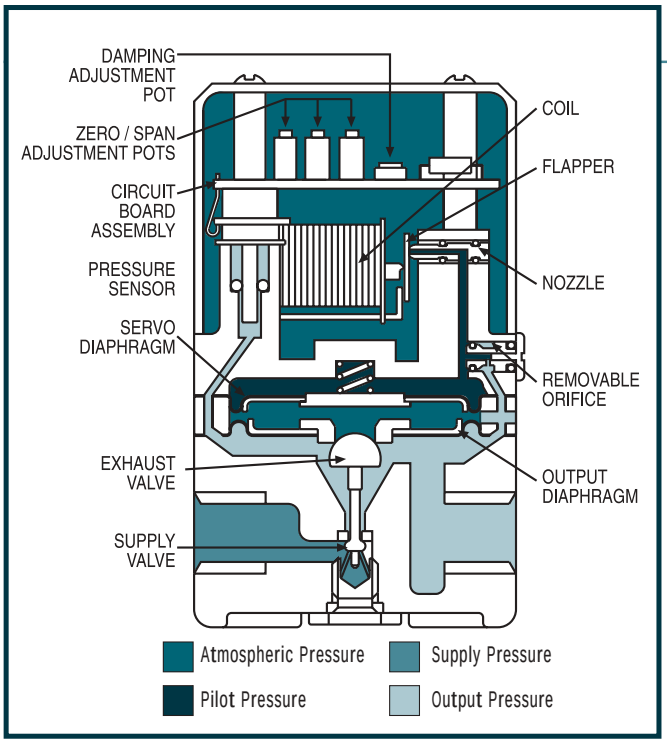
mm
inches

FRONT VIEW

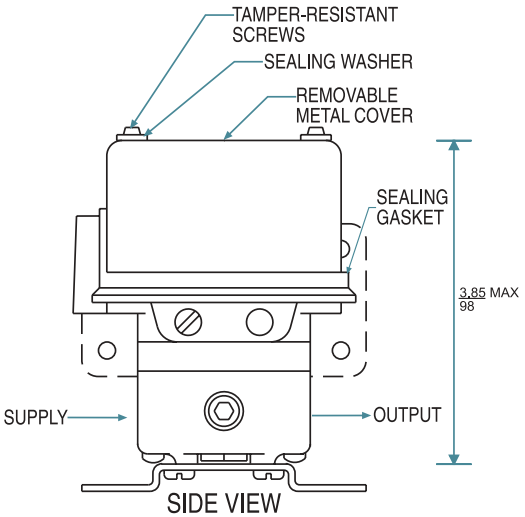


SIDE VIEW



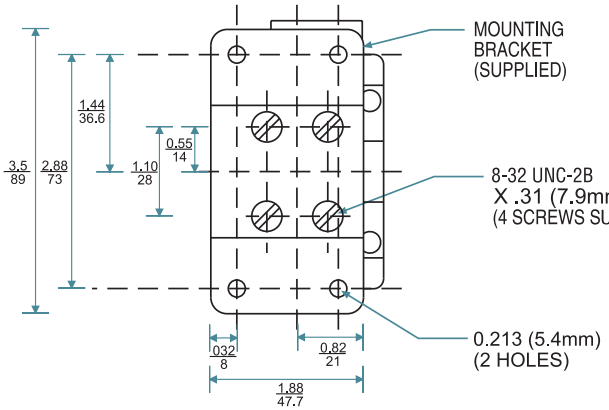


SIDE VIEW
(VERTICAL MOUNT ONLY)
NEMA 3R

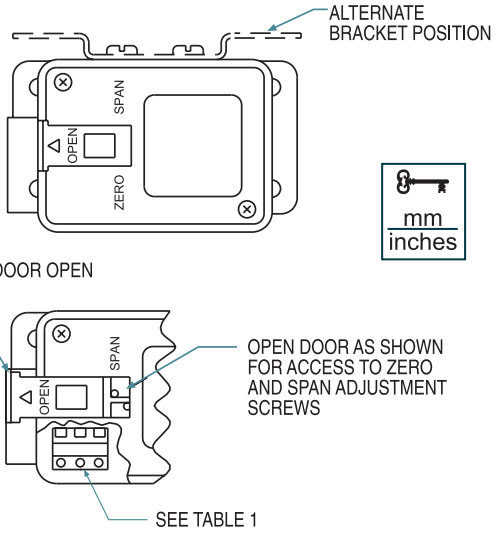


SIDE VIEW
(NEMA 3R-Vertical Mount Only)

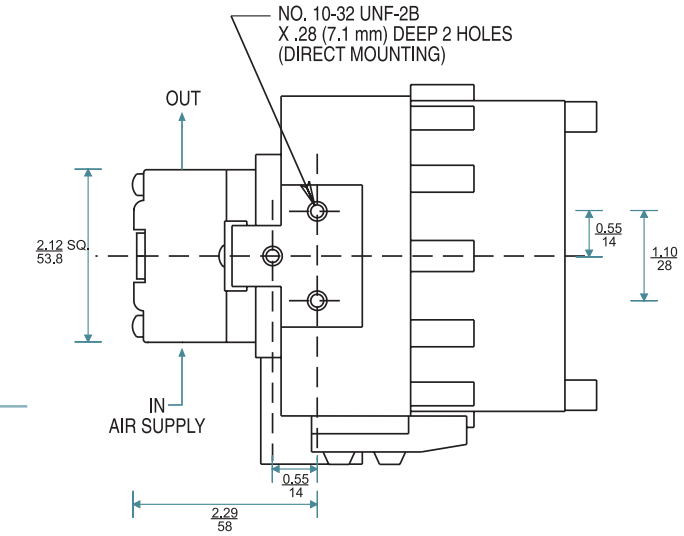
BOTTOM VIEW



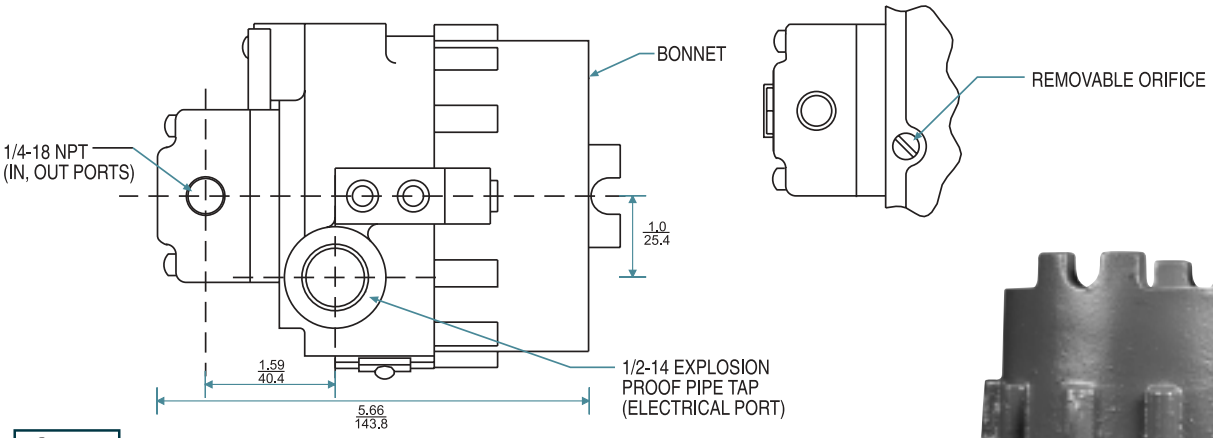
TOP VIEW



Drawings and dimensions are for reference only.



SIDE VIEW



mm
inches

TOP VIEW

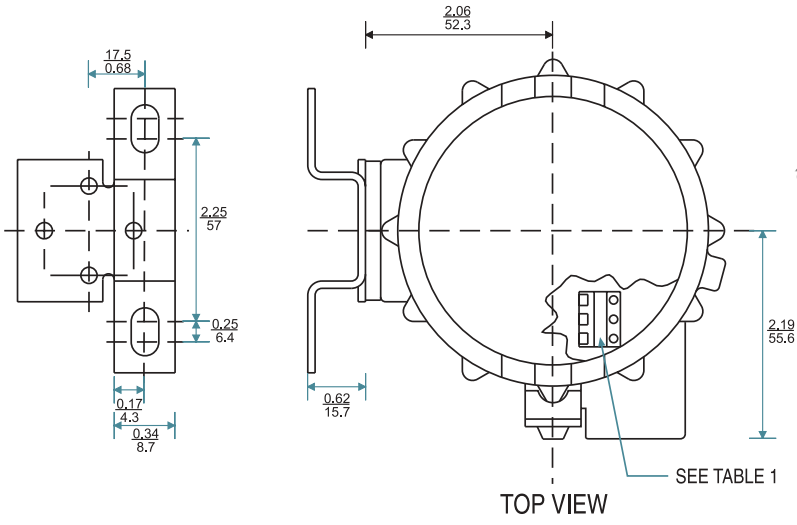
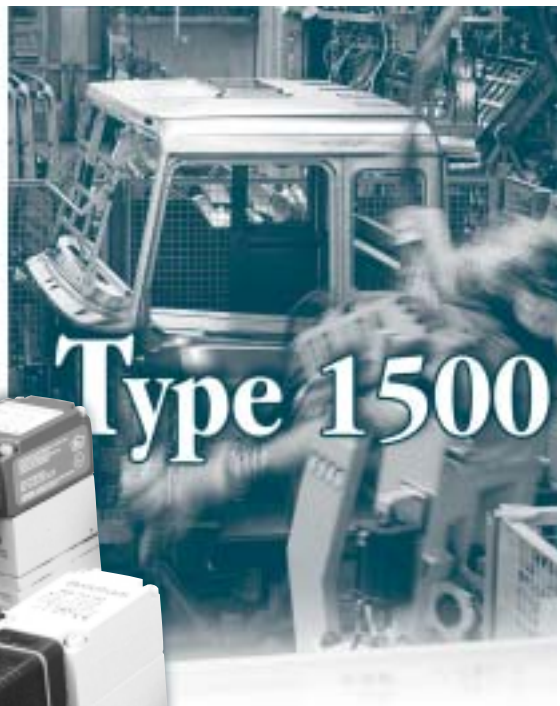


TABLE 1: WIRING TERMINATION

PWB Terminal Block	I/P Transducer	E/P Transducer
Position 3	Positive (+)	Supply (+)
Position 2	No Connection	Common
Position 1	Negative (-)	Signal (+)

Drawings and dimensions are for reference only.



T-1500 DESCRIPTION

The T-1500 is a new series of electro-pneumatic transducers that convert an electrical signal to a proportional pressure output. It provides precision electro-pneumatic control to actuators, valves, positioners, final control elements and is ideally used for high-flow control devices. The Type 1500's compact size and accessibility to ports and adjustments allow the unit to be installed in space-constrained locations or in a manifold for multi-device control.

DIN rail and manifold assemblies are available in kits that provide three, five or ten mounting points.

An integral pneumatic volume booster is included in the Type 1500 design to provide high flow capacity. (See specifications for flow data.)

STANDARD FEATURES

- Small footprint, compact size
- Manifold mounting configurations
- Built-in volume booster
- Electrical Connections: Conduit 1⁄2" NPT or BSPT, Terminal Block, Hirschmann® Connectors (DIN 43 650-A)
- Supply and output ports on front and back of unit
- Low air consumption
- External zero and span adjustments
- Low cost
- Field accessible orifice
- Electrical conduit connection meets CE requirements

OPTIONS AVAILABLE

- Intrinsically Safe (FM, CSA, ATEX)
- NEMA 4X (FM, CSA) Excludes Terminal Block

T-1500 I/P TRANSDUCER PRINCIPLE OF OPERATION

(see Fig. 2 & 6)

The T-1500 Transducer is a force balance device in which a coil is suspended in the field of a magnet by a flexure. Current flowing through the coil generates axial movement of the coil and flexure. The flexure moves against the end of a nozzle and creates a back pressure in the nozzle by restricting air flow. This back pressure acts as a pilot pressure to an integral booster relay. Consequently, as the input signal increases (or decreases for reverse acting), output pressure increases proportionally.

In the zero based T-1500, the output of the transducer section is routed to an integral negative bias booster relay. The bias relay allows the complete unit to regulate output pressure down to 0 psig/BAR. The bias relay also amplifies the output of the transducer which allows the zero based units to regulate higher output pressures than the standard T-1500.

Zero and Span are calibrated by turning easily accessible adjusting screws on the front face of the unit (see Figures 3, 4, 5, 7, 8 & 9). The zero adjustment causes the nozzle to move relative to the flexure. The span adjustment is a potentiometer that limits the flow of current through the coil. A thermistor circuit in series with the coil provides temperature compensation.

APPLICATIONS

The T-1500 transducer can be used as an electro-pneumatic control device to operate:

- Valve actuators
- Valve positioners
- HVAC systems
- Material handling systems
- Paper handling controls
- Automation systems
- Liquid and gas processing systems

MOUNTING

The T-1500 can be mounted at any angle but should be calibrated after mounting. For maximum output pressure stability, the T-1500 should be mounted vertically in a vibration free location or such that the vibration is isolated to the X and Z axis. The T-1500 can be in-line, panel, pipe, DIN rail or manifold mounted.

AIR CONNECTIONS

1. Supply Air must be instrument quality air regulated between 5 psi above maximum output pressure up to 120 psig / 8.3 BAR (See table: Supply Pressure Range).
2. Instrument-quality air consists of:
   a. A dew point less than 35º F
   b. No particles larger than three microns
   c. Maximum oil content of 1 ppm
3. All unused ports must be plugged.

SUPPLY

Connect supply to either of two ports marked "IN" on the base of the transducer. Avoid getting pipe sealant inside the piping or transducer.

OUTPUT

Connect output to either of two ports marked "OUT" on the base of the transducer. The second "OUT" port may be used for a pressure gauge.

	STANDARD RANGE	ZERO BASED
Hysteresis	<0.75% of span	<1.0% of span
Repeatability	<0.5% of span	<0.5% of span
Linearity (Independent)	<0.75% of span <1.0% of span for fluorocarbon units	<1.0% of span
Flow @ Mid Range	6.5 SCFM (Minimum) @ 15.0 psig / 1.0 BAR output pressure, 120 psig / 8.3 BAR supply pressure	9.0 SCFM (Minimum) @ 15.0 psig / 1.0 BAR output pressure,150 psig / 10.3 BAR supply pressure
Maximum Air Consumption	3 SCFH @ 15 psi / 1.0 BAR output pressure	18 SCFH @ Maximum output pressure
Exhaust Capacity	>1.0 SCFM @ 5 psi / 0.4 BAR above set point	>1.0 SCFM @ 5 psi / 0.4 BAR above set point
Supply Pressure Range	5 psi above maximum output up to 120 psig / 8.3 BAR maximum	0-15 units: 25-150 psig / 1.7-10.3 BAR 0-30 units: 40-150 psig / 2.8-10.3 BAR 0-60 units: 70-150 psig / 4.8-10.3 BAR 0-120 units: 125-150 psig / 8.6-10.3 BAR
Weight	1.3 lbs	1.63 lbs
Port Size	1/4" NPT, BSPT, BSPP	1/4" NPT, BSPT, BSPP
Supply Pressure Sensitivity	<2.5% of span for a supply pressure change of 15 psig / 1.0 BAR	<1.7% of span change in output pressure over full supply pressure range (0-120 units)
Temperature Range	-20°F to +150°F	-20°F to +150°F
Input Signal	4-20 mA DC, 0-5 VDC, 1-5 VDC, 1-9 VDC, 0-10 VDC, 1-10 VDC	4-20 mA DC, 0-5 VDC, 1-5 VDC, 1-9 VDC, 0-10 VDC, 1-10 VDC
Output Range	3-15, 3-27, 6-30 psig 0.2-1.0, 0.2-1.9, 0.4-2.1 BAR	0-15, 0-30, 0-60, 0-120 psig 0-1.0, 0-2.1, 0-4.1, 0-8.3 BAR
Electrical Connections: Both the I/P & E/P versions are two-wire devices, plus a safety ground. The E/P requires a DC voltage input signal; example: 1 to 9 VDC. The I/P models require an input current of 4 to 20 mA.		

T1500 ORDERING NOMENCLATURE

9	6	-				-			
9	6	-				-			
									ENCLOSURE RATING
	6							0	NEMA 4X (INCLUDES APPROVALS)
	9								INDOOR USE / GENERAL PURPOSE
									"IN & OUT" PNEUMATIC PORT CONNECTIONS
			7						1/4" NPT
			8						1/4" BSPT
			9						1/4" BSPP
									INPUT (SIGNAL)
				1					4-20 mA DC
				2					0-5 VDC
				3					1-9 VDC
				4					1-10 VDC
				5					0-10 VDC
				6					1-5 VDC
									OUTPUT (PRESSURE)
					0				3-15 psig / 0.2-1.0 BAR
					1				3-27 psig / 0.2-1.9 BAR
					2				6-30 psig / 0.4-2.1 BAR
					3				0-15 psig / 0-1.0 BAR
					4				0-30 psig / 0-2.1 BAR
					5				0-60 psig / 0-4.1 BAR
					6				0-120 psig / 0-8.3 BAR
									ELECTRICAL CONNECTION
						0			1/2" NPT (1/4" NPT PORTS ONLY)
						1			Terminal Block (Indoor Use / General Purpose Only)
						2			Hirschmann® Connection (DIN 43 650-A)
						3			1/2" BSPT Conduit (1/4" BSPT or BSPP Ports Only)
									ELASTOMER
							0		Nitrile
							1		Fluorocarbon
									AGENCY APPROVALS and CERTIFICATIONS
								0	FM, CSA and ATEX Intrinsically Safe
								1	None - General Purpose Only

T-1500 MANIFOLD & ADAPTER KIT PRINCIPLE OF OPERATION

The T-1500 manifold assembly allows multiple T-1500 Transducers to be mounted in parallel. This minimizes the number of individual supply air lines required. Manifolds are available to hold three, five, or ten units. Each manifold comes with check valves so that a unit can be pulled off of the manifold for service or replacement without affecting the whole manifold. (See Figure 1.)

MOUNTING: The manifolds may be mounted flush with a wall or cabinet or may be mounted away from the wall. Both mounting options are included in the basic manifold kit. In addition, all fittings required to mount the full number of units in each manifold are included in the basic kit. An additional adapter kit may be purchased which contains all of the hardware required to manifold mount a single T-1500 Transducer should the need arise.

AIR SUPPLY ATTACHMENT: The air supply can be attached to either side of the manifold via a 3/4" NPT connection or to the back of the manifold via a 3/8" NPT connection. After an air supply port is selected, the open ports should be plugged using the plugs provided with the manifold kit and a pneumatic sealant.

OUTPUT AIR ATTACHMENT: Connect the output ports from each of the T-1500 Transducers to the bottom or back of the manifold. After connecting the transducers, plug the other 1/8" NPT ports using the plugs provided and a pneumatic sealant.

T-1500 MANIFOLD ADAPTER KIT: The T-1500 manifold kit includes the adapter kits required for each transducer.

ELECTRICAL CONNECTIONS: Two brackets supplied with the manifold kit allow an electrical conduit to be attached to the manifold. Mounting screws and nuts are provided, and the brackets have an 11/64" diameter hole which will fit standard 8-36 UNF or 8-32 UNC screws (not supplied).

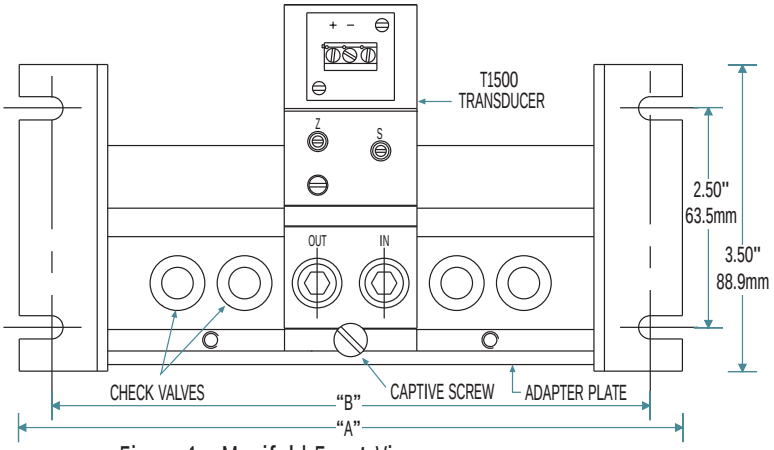


Figure 1 - Manifold Front View

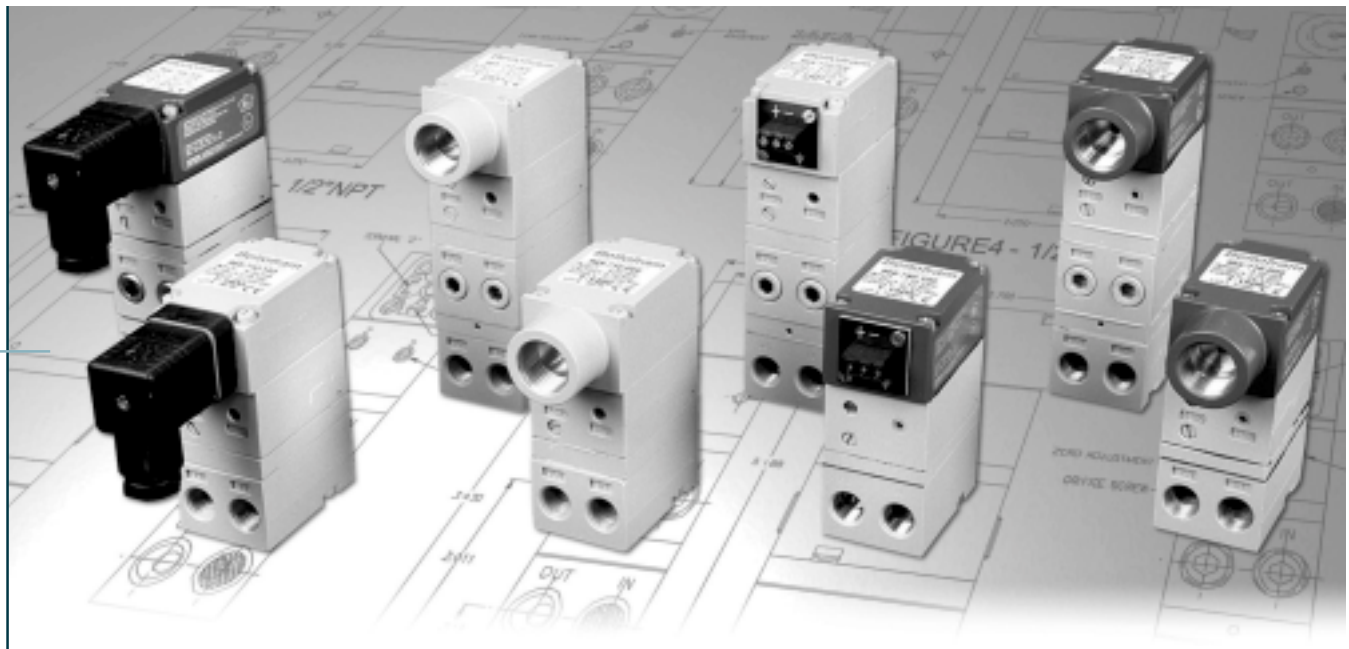
Number of Transducers	Length "A"	Length "B"
3	7.57" 192.3 mm	6.83" 173.5 mm
5	10.75" 273.1 mm	10.01" 254.3 mm
10	18.70" 475.0 mm	17.96" 456.2 mm

T-1500 MANIFOLD ORDERING INFORMATION

T-1500 Wall Mount Kit, 3 unit	010-606-000
T-1500 Wall Mount Kit, 5 unit	010-606-001
T-1500 Wall Mount Kit, 10 unit	010-606-002
T-1500 Manifold Adapter Kit (Replacement)	010-602-000

T-1500 KITS

DIN Rail Mounting Kit	971-140-000
Pneumatic Repair Kit (3-15, 3-27 psi / 0.2-1.0, 0.2-1.9 BAR)	971-141-000
Pneumatic Repair Kit (6-30 psig / 0.4-2.1 BAR)	971-141-002
Pneumatic Repair Kit, Fluorocarbon (3-15, 3-27 psig / 0.2-1.0, 0.2-1.9 BAR)	971-141-003
Pneumatic Repair Kit, Fluorocarbon (6-30 psig / 0.4-2.1 BAR)	971-141-004
Pneumatic Repair Kit (0-120 psig / 0-8.3 BAR)	971-145-000
Pneumatic Repair Kit Fluorocarbon, (0-120 psi / 0-8.3 BAR)	971-145-001
Electronic Repair Kit (4-20 mA)	971-142-000
Electronic Repair Kit (0-5 VDC or 1-5 VDC)	971-142-001
Electronic Repair Kit (1-9, 1-10 VDC, or 0-10 VDC)	971-142-002
2" Pipe Mounting Kit	971-159-000



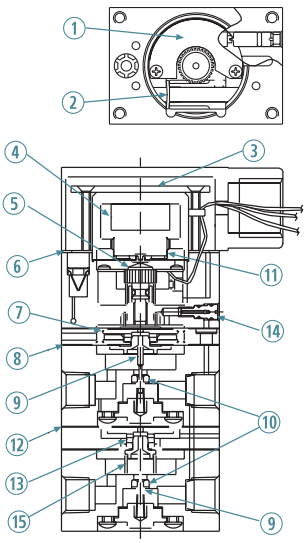


FIGURE 2

T-1500 EXTENDED RANGE DIMENSIONS

NUMBER	DESCRIPTION
1	Circuit Board
2	Worm Gear
3	Duckbill Valve (NEMA 4X Only)
4	Magnet Assembly
5	Nozzle Assembly
6	Bonnet Gasket (NEMA 4X Only)
7	Servo Diaphragm (I/P Section)
8	Control Diaphragm (I/P Section)
9	Pintle
10	Supply Seat
11	Coil/Flexure Assembly
12	Servo Diaphragm (Bias Relay)
13	Control Diaphragm (Bias Relay)
14	Orifice Screw
15	Bias Spring

Drawings and dimensions are for reference only.

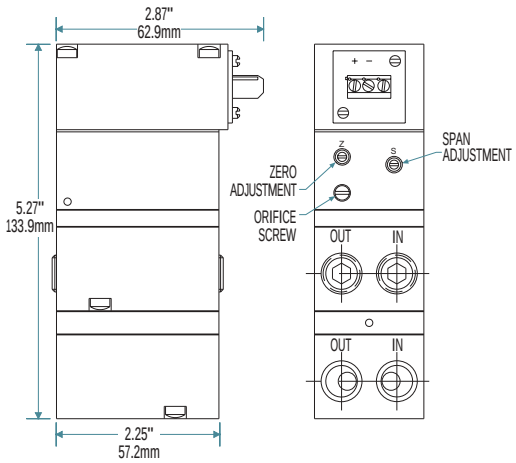
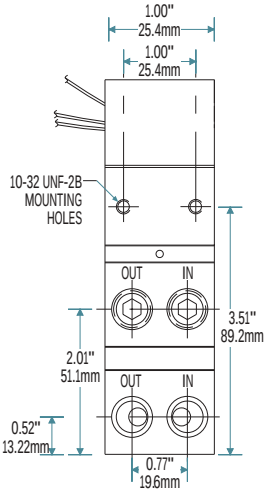


FIGURE 3 - TERMINAL BLOCK



BACK DIMENSIONS

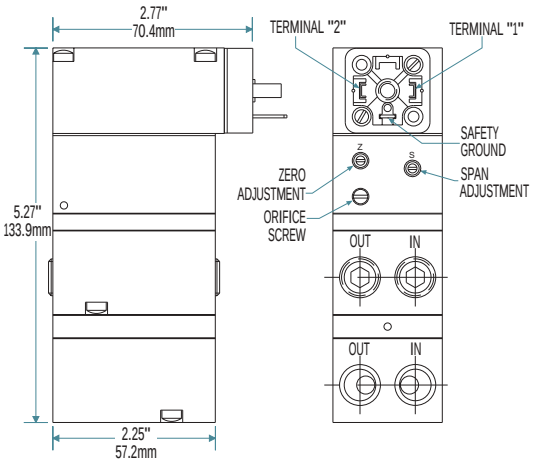


FIGURE 4 - Hirschmann® (DIN 43 650-A)

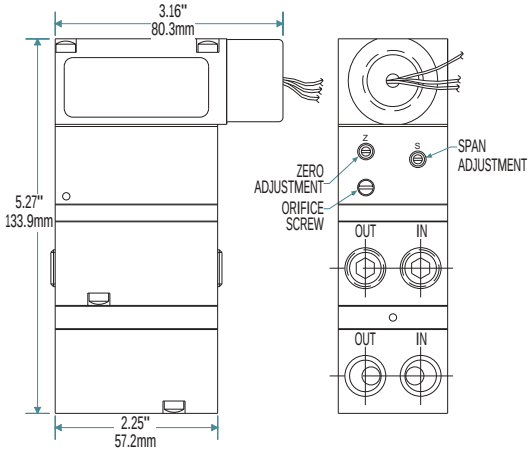


FIGURE 5 - 1/2" NPT / BSPT

T-1500 STANDARD RANGE DIMENSIONS

NUMBER	DESCRIPTION
1	Circuit Board
2	Worm Gear
3	Duckbill Valve (NEMA 4X Only)
4	Magnet Assembly
5	Nozzle Assembly
6	Bonnet Gasket (NEMA 4X Only)
7	Servo Diaphragm (I/P Section)
8	Control Diaphragm (I/P Section)
9	Pintle
10	Supply Seat
11	Coil/Flexure Assembly

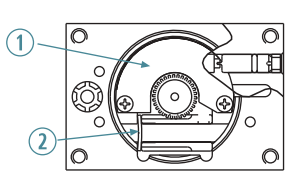
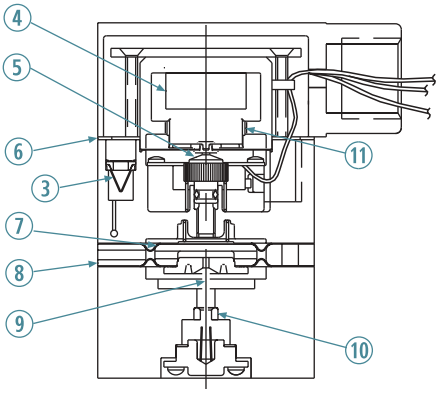
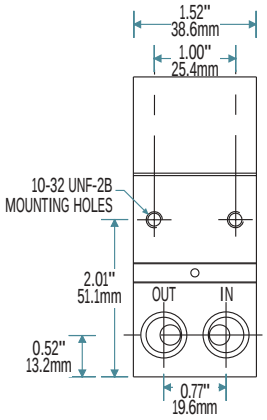


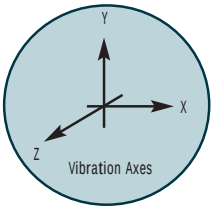
FIGURE 6

Drawings and dimensions are for reference only.





BACK DIMENSIONS



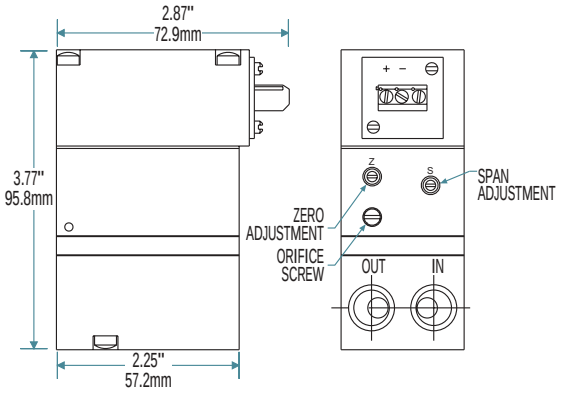


FIGURE 7 - TERMINAL BLOCK

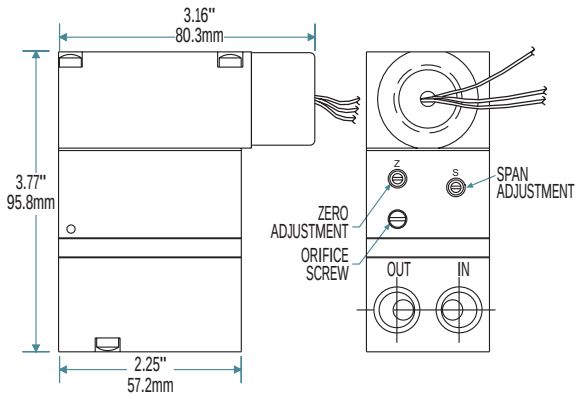


FIGURE 8 - 1/2" NPT / BSPT

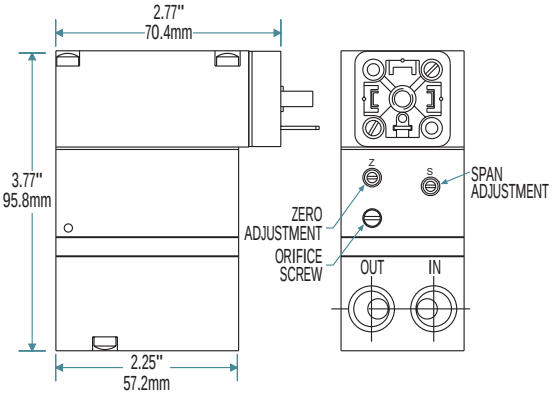


FIGURE 9 - Hirschmann® (DIN 43 650-A)

AGENCY APPROVALS - APPLIES ONLY TO UNITS ORDERED WITH APPROVALS

FACTORY MUTUAL & CSA

NEMA/TYPE 4X : The T-1500 Transducers, NPT, BSPT, Hirschmann models are rated intrinsically safe by FM & CSA for:

- DUST-PROOF FOR CLASS II, DIV 1, GROUP E,F,G.
- SUITABLE FOR CLASS III LOCATIONS.

Warning - These ratings are valid ONLY WHEN the cover is fully installed, and the electrical connections conform to required standards.

INDOOR USE / GENERAL PURPOSE:

T-1500 model transducers are rated intrinsically safe by FM & CSA for:

- CLASS I, DIVISION 1, GROUPS A, B, C, D HAZARDOUS LOCATIONS.

ENTITY PARAMETERS

Vmax = 30 VDC, Imax = 100 mA Ci = 0 uF, Li = 0 mH T4 Max. Ambient 70°C.
Voc and Isc of a barrier shall not exceed Vmax and Imax of the transducer.
(Li + Wiring) and (Ci + Cwiring) shall not exceed La and Ca of a barrier.

NON-INCENDIVE: The T1500 Transducer is approved as non-incendive by FM & CSA for :

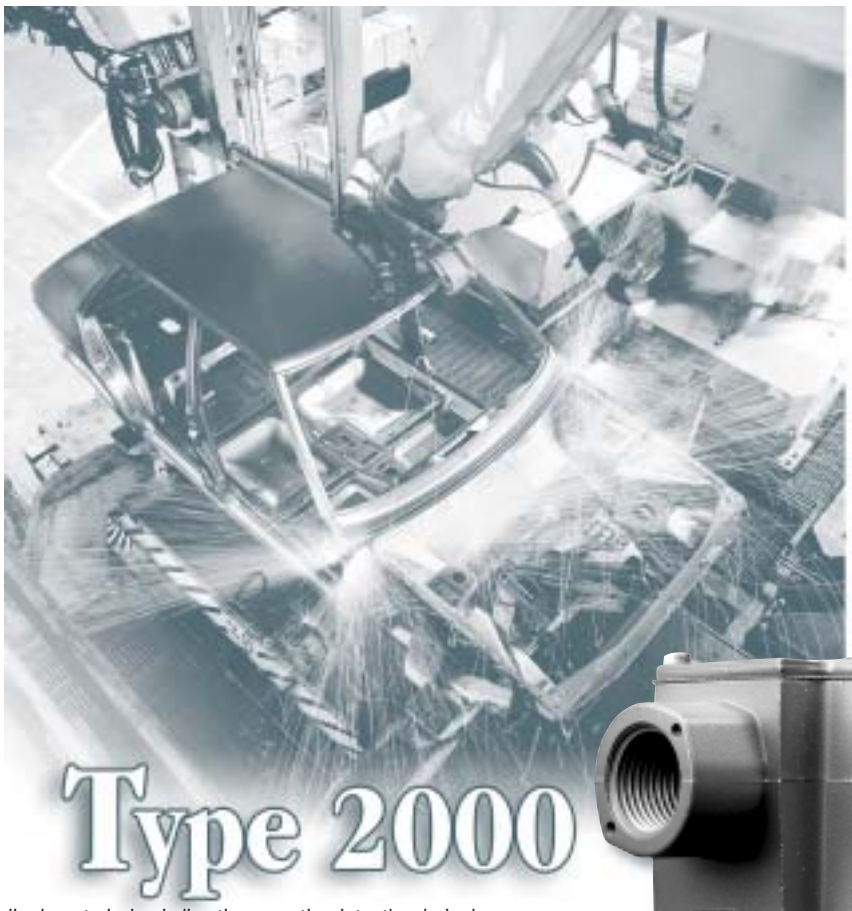
- CLASS I, DIVISION 2, GROUP A, B, C, D HAZARDOUS LOCATIONS.

A barrier is not necessary when the T-1500 Transducer is in any of these locations.

ATEX

Intrinsically safe for II 2 G EEx ia IIB T4 Tamb = -20 to 65˚C
Input Parameters: Vmax = 30V, Pi = 1W, Ii = 100 mA, Req = 180 OHMS, Ci = 0, Li = 24mH
Models are CE marked for use in the European Union, and meet the EMC heavy machinery directives.

TYPE 2000 I/P & E/P TRANSDUCERS



PRINCIPLE OF OPERATION

The Type 2000 I/P and E/P transducers utilize closed-loop pressure feedback-control for precision pressure output and minimized effects of temperature, supply pressure changes, supply voltage changes, and mounting angle.

Supply pressure is reduced by the supply valve to provide an output pressure which is internally routed to a precision temperature compensated piezoresistive pressure sensor. Supply pressure is also routed to an externally removable orifice which provides a reduced pilot pressure to a chamber containing a servo diaphragm and nozzle. Pilot pressure is controlled by modulating the gap between the face of a nozzle and an adjacent piezo-ceramic actuator, which is part of a unique patented mechanism.

The piezo-ceramic actuator serves as a control link between electrical input and pressure output as follows:

- The input current (I/P) or voltage (E/P) signal is conditioned to provide a normalized control signal directly proportional to the desired pressure output.
- Simultaneously the output of the pressure sensor is amplified and conditioned to produce a feedback signal.
- The sum of the control signal and the feedback signal produce a command signal which is delivered as a DC voltage to the piezo-ceramic actuator.
- As voltage increases, the force applied by the actuator increases, so as to restrict nozzle bleed and thus increase pilot pressure.
- Increased pilot pressure applied to the servo diaphragm directly causes opening of the supply valve and an increase in the output pressure until the output feedback signal and control signal combine to produce the correct command signal.

DESCRIPTION

The Marsh Bellofram Type 2000 is a robust electronic instrument that regulates an incoming supply pressure down to a precise output pressure which is directly proportional to an electrical control signal. The secret to the Type 2000's precise, reliable performance under a variety of demanding environmental conditions is a patented piezo-ceramic actuator with many industry-wide firsts.

The Type 2000 has been designed to meet the electropneumatic needs of the world:

- Field-selectable inputs and direct/reverse/split ranging
- Multiple input/output/mounting configurations
- Precise, reliable performance under extreme conditions of temperature, vibration, orientation, supply pressure changes, supply voltage changes, RFI/EMI, humid / oil-laden media, and corrosive surroundings

APPLICATIONS

The Type 2000's precisely regulated pneumatic output can be used to operate:

- Valve actuators
- Louver and damper actuators
- Valve positioners
- Relays
- Clutches and brakes
- Controllers
- Air cylinders

INDUSTRY APPLICATIONS INCLUDE:

- Chemical & Petrochemical Industries
- Petroleum production
- Pipeline Transmission
- Electric Utilities
- Water & Wastewater Systems
- Pulp & Paper
- Textiles
- Semiconductor Industry
- Food & Beverage
- Environmental Control Systems
- Construction Equipment
- Agricultural Equipment
- Machine Tool
- Material Handling
- Automotive Testing & Assembly
- Medical Equipment

FINE-TUNING YOUR APPLICATION

For optimal performance in your application, the calibration of the Type 2000 can be fine-tuned in the field. An easily-removable cover provides access to the isolated electronics. All potentiometers, connections, jumpers, and switches are clearly marked on the circuit board or on the handy chart located on the inside of the cover. The three elements of calibration (Gain, Zero, and Span) are described below. Consult the Type 2000 User's Manual for detailed calibration procedures, cautions, and instrumentation requirements.

GAIN (DAMPING) ADJUSTMENT

The output response of the Type 2000 can be optimized for varying downstream volumes by adjusting the system gain of the control circuit. Adjust the Gain Pot counterclockwise for increased gain; clockwise for increased oscillation damping. For maximum allowable gain in your application, the pot should be turned clockwise until oscillation just disappears.

ZERO & SPAN ADJUSTMENTS

The Type 2000 contains multi-turn Coarse-Zero, Fine-Zero, and Span adjustment potentiometers which are clockwise positive. Adjustment of either Zero Pot changes the unit's minimum output while the Span Pot changes the maximum output. The adjustments are interactive, so it may take iterations to reach the desired calibration.

WIDE RANGEABILITY

The Type 2000 can be field calibrated to pressure ranges other than the standard ones by combinations of recalibration, pressure range switching, and split high/low ranging. A unit should not be switched to a range outside its pressure sensor family (eg., a 0-15 psig can be switched to a 3-15 psig, but not to 0-30 psig). (Caution: Do not exceed the range of the onboard pressure sensor.) For example, the easiest way to recalibrate a 0-30 psig unit to 3-15 psig would be to change the switch setting to 3-27 psig, then switch to split range low.

FIELD-SELECTABLE FEATURES

Onboard switches allow the user to easily reconfigure the Type 2000 for any of several electrical inputs, direct/reverse acting, or output split-ranging high/low. Fine tuning of the unit's calibration may be necessary after a reconfiguration.

DIRECT/REVERSE ACTING

Direct Acting transducers regulate to their minimum output when supplied with minimum input; maximum out with maximum in. Reverse Acting transducers regulate to their maximum output at minimum input.

SPLIT RANGING HIGH & LOW

The Type 2000 can be configured to regulate either half (top or bottom) of it's normal output range, when supplied with it's normal full-ranging electrical input. For example, a 0-10V 0-30psi unit set to split range low will regulate 0-15psi @ 0-10V. It will regulate 15-30psi @ 0-10V if set to split range high.

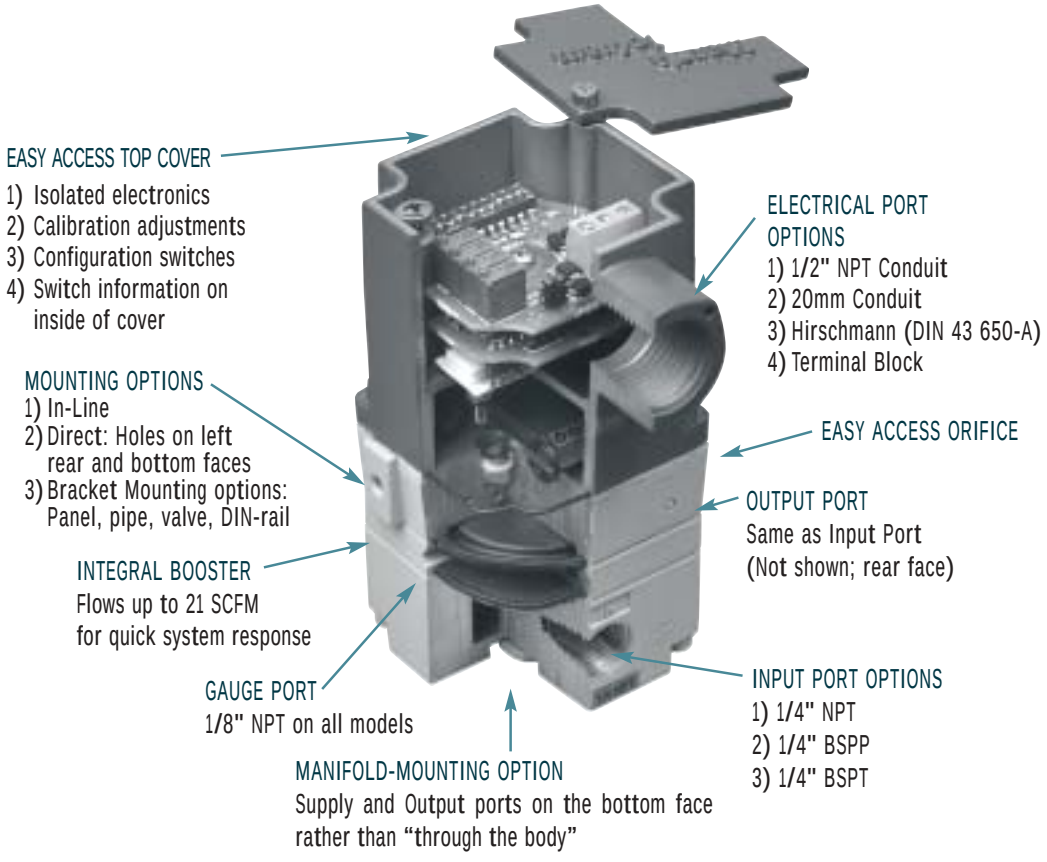
HAZARDOUS AREA & USAGE CLASSIFICATION

INTRINSIC SAFETY: (S Enclosure) Factory Mutual approvals: Class I, II, and III, Divisions 1 and 2, Groups A through G. ATEX Approvals: Ex II 1 G EEx ia IIC T4 (-20˚C<Ta<+60˚C)

NEMA 4X / IP66: (Conduit and Hirschmann Connectors only) Water tight, dust tight, and corrosion resistant.

EXPLOSION PROOF (E Enclosure; N Electrical Port; G Agency Approval) Certified to CSA standards. Class I, Division 1, Groups C and D, T3. Exia IIB Ci=0, Li=0, 24VDC, 25MA. Meets the requirements for CSA Class I Division 1, Group D gas use, including natural gas as the media flowing through the transducer.

CE (CONDUIT CONNECTOR ONLY): (Conduit Connector Only) EN 50081-1 Residential, commercial & light industry; EN-50082-2 Heavy Industrial.



The secret to the Type 2000's precise, reliable performance under a variety of demanding environmental conditions is a patented piezo-ceramic actuator with many industry-wide firsts.

SPECIFICATIONS

ACCURACY 0.1% of full-scale output typical (0.25% guaranteed); includes effects of hysteresis, dead band, and repeatability

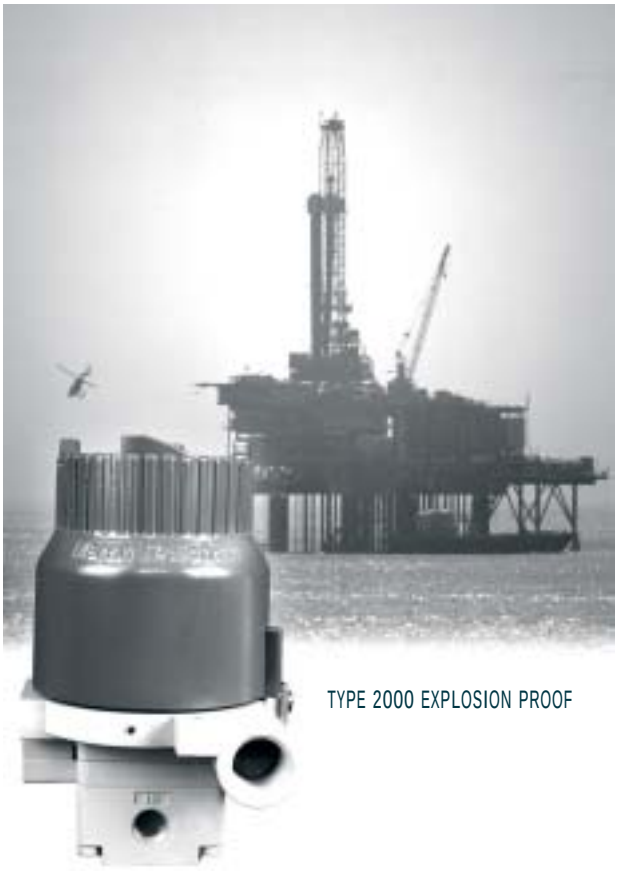
ELECTRICAL	
Inputs	Switch-Selectable 4-20mA. 0-5, 1-5, 1-9, 1-10, or 0-10VDC
Connections	1/2" NPT or 20mm Conduit DIN Hirschmann (S model only) External Terminal Block (S model only)
Power Supply	5-28VDC (with voltage inputs only)
Direct/Reverse Acting	Switch-Selectable
PNEUMATIC	
Outputs	0-2, 0-5, 0-15, 3-15, 1-17, 0-30, 6-30, 3-27, 0-60, 0-100, or 120 psig 0-0.1, 0-0.3, 0-1.0, 0.2-1.0, 0.07-1.2, 0-2.1, 0.4-2.1, 0.2-1.9, 0-4.1, 0-6.9, 0-8.3 BAR
Ports (Input/Output)	1/4" (NPT, BSPT, or BSPP threads) Bottom-ported for Manifold Mounting
Exhaust	(Explosion proof only) 1/8" - 27 NPT
Ports (Gauge)	1/8" NPT
Supply	From 5 psi (0.3 BAR) above output, up to 140 psi (9.7 BAR) maximum (20 psi [1.4 BAR] minimum)
Split-Ranging	Switch-Selectable, Full-Range or Split-Range High or Split-Range Low
Consumption	4 scfh maximum (1.9 LPM)

Flow Capacity

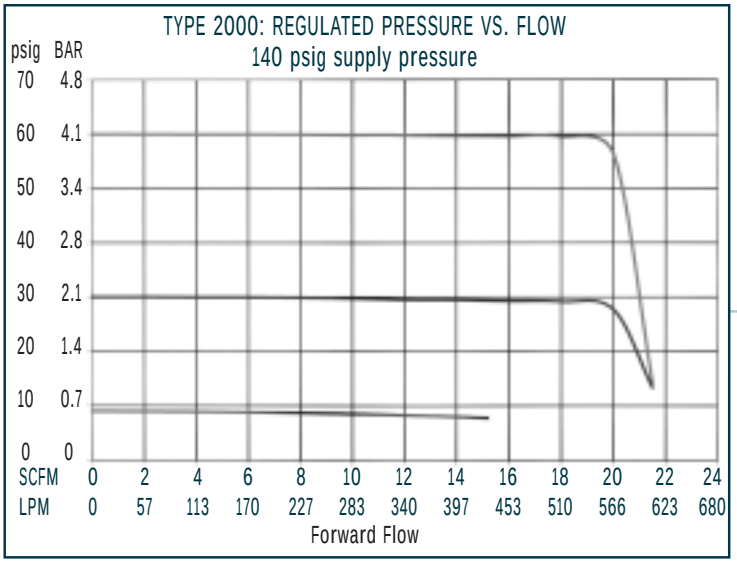
RANGE		SENSOR		FLOW	
psig	BAR	psig	BAR	scfm	LPM
0-2	0-0.1	2	0.1	4	113
0-5	0-0.3	5	0.3	11	312
0-15	0-1.0	15	1.0	19	538
3-15	0.2-1.0	15	1.0	19	538
1-17	0.07-1.2	15	1.0	19	538
0-30	0-2.1	30	2.1	21	595
3-27	0.2-1.9	30	2.1	21	595
6-30	0.4-2.1	30	2.1	21	595
0-60	0-4.1	50	3.5	21	595
0-100	0-6.9	100	6.9	21	595
0-120	0-8.3	100	6.9	21	595

(Typical Flow @ 140 psi (9.7 BAR) in and maximum out)

Exhaust Capacity	3 SCFM (85 LPM) @ 5 psig (0.3 BAR) above setpoint (0-15 psig range unit set at mid range)
STABILITY	
Supply Voltage Effect	None
Supply Pressure Effect	None
Vibration Effect	<1%FS (+/-1G; 5-1000Hz)
Mounting Position Effect	None
RFI/EMI	CE-compliant
Temperature Effect	0.02%FS/ºF (-40º to 180ºF [-40º to 82ºC])
Storage Temperature	-40º to 200ºF (-40 to 93ºC)



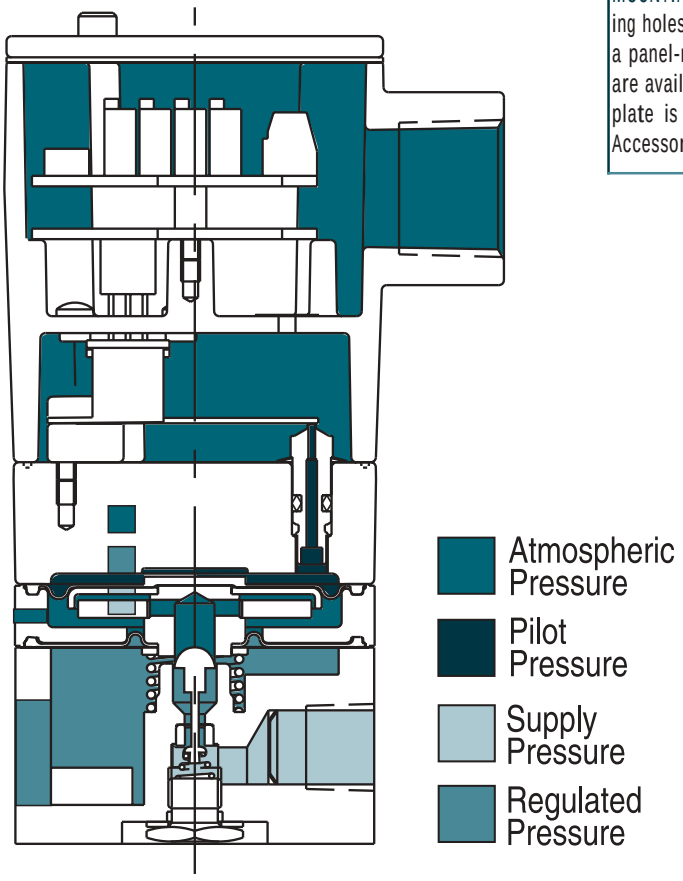
TYPE 2000 EXPLOSION PROOF

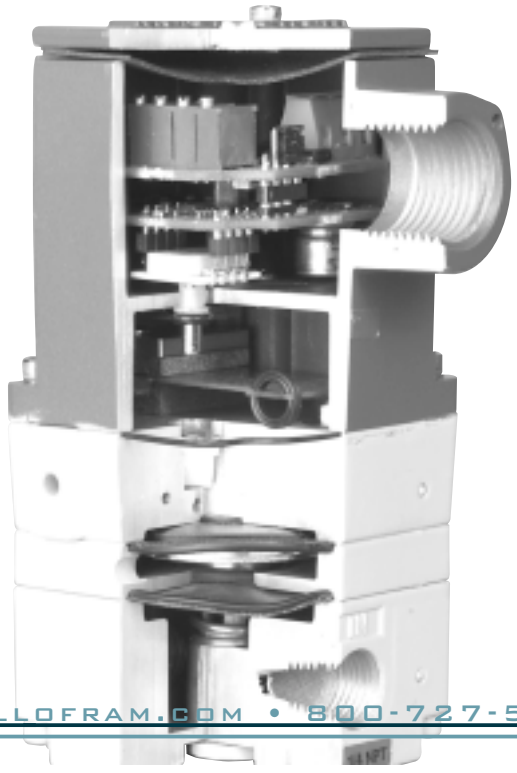


MOUNTING OPTIONS

Mounting Method	Intrinsically-Safe (S) Model	Explosion-Proof (E) Model
In-Line	Yes	Yes
Direct Mounting	Side or Bottom Holes	Side or Bottom Holes
Panel Bracket	Supplied	Accessory
Valve Bracket	Accessory	Supplied
Pipe Bracket	Accessory	Accessory
DIN-Rail Bracket	Accessory	Accessory
Manifold Plate	Accessory	Accessory

MOUNTING: The Type 2000 can be mounted in-line, or directly to a panel via mounting holes located in the side and bottom of the unit. In addition, the S model includes a panel-mounting bracket; while the E model includes a valve-mounting bracket. Kits are available for mounting of either model to panel, valve, pipe, or DIN-Rail. A custom plate is available for mounting of the bottom-ported version to a manifold. (See Accessories)





ORDERING INFORMATION

Series		Model				Electrical Input			Pneumatic Output				Specials	
2	K	-				-						-	0	0

Enclosure
S = Intrinsically Safe
E = Explosion Proof

Electrical Port [1]
N = 1/2" NPT Conduit
M = 20mm Conduit
H = Hirschmann
T = Terminal Block [2]

Pneumatic Ports
N = NPT
T = BSPT
P = BSPP
M = Manifold Mount [3]

Agency Approval
F = FM/CSA
C = ATEX
G = Certified to CSA Standards[4]
N = None

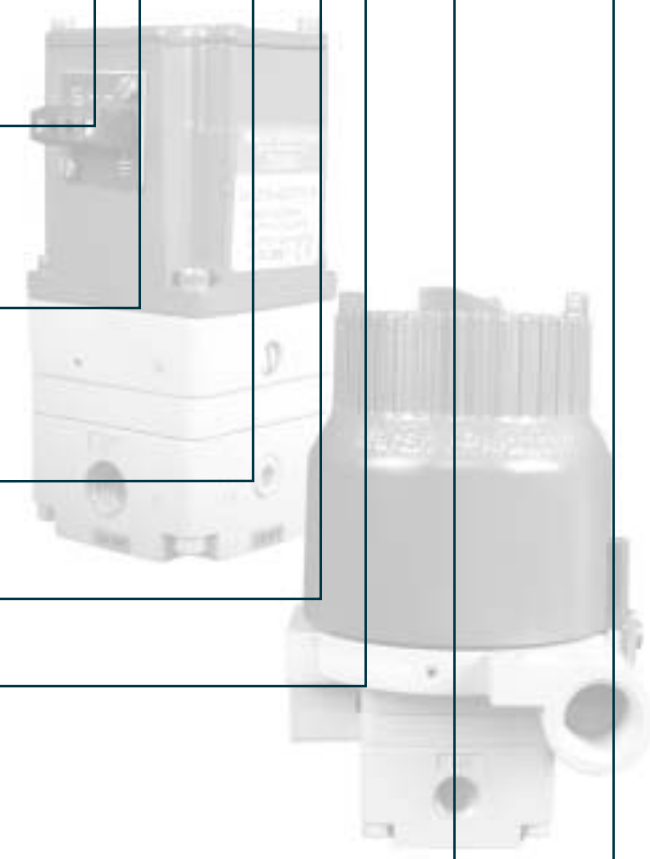
42 = 4-20 mA
05 = 0-5 V
15 = 1-5 V
19 = 1-9 V
11 = 1-10 V
01 = 0-10 V

D = Direct Acting
R = Reverse Acting

F = Full Range
H = Split Range High
L = Split Range Low

002 = 0-2 psig	0-0.1 BAR
005 = 0-5 psig	0-0.3 BAR
015 = 0-15 psig	0-1.0 BAR
315 = 3-15 psig	0.2-1.0 BAR
117 = 1-17 psig	0.07-1.2 BAR
030 = 0-30 psig	0-2.1 BAR
630 = 6-30 psig	0.4-2.1 BAR
327 = 3-27 psig	0.2-1.9 BAR
060 = 0-60 psig	0-4.1 BAR
100 = 0-100 psig	0-6.9 BAR
120 = 0-120 psig	0-8.3 BAR

00 = None



ACCESSORIES

	P/N
Panel Mounting Kit	010-135-000
Valve Mounting Kit	010-134-000
2" Pipe Mounting Kit (Valve Mounting Kit is required)	010-143-000
DIN Rail Adapter	010-115-000
Manifold Adapter Kit	971-158-000
Filter Kit, 60 microns	010-139-000
Filter Kit, Coalescing, 0.1 microns	010-140-000
Filter Element Kit (for coalescing filter, package of 10)	010-141-000
Pressure Gauge Kit 15 psig (1 BAR)	010-138-000
Pressure Gauge Kit 30 psig (2.1 BAR)	010-138-001
Pressure Gauge Kit 60 psig (4.1 BAR)	010-138-002
Pressure Gauge Kit 160 psig (11 BAR)	010-138-003

NOTES:

[1] Availability	Matrix	Enclosure S	Enclosure E
Electrical Port	N	yes	yes
	M	yes	yes
	H	yes	no
	T	yes	no

[2] NEMA 4X / IP66 not available

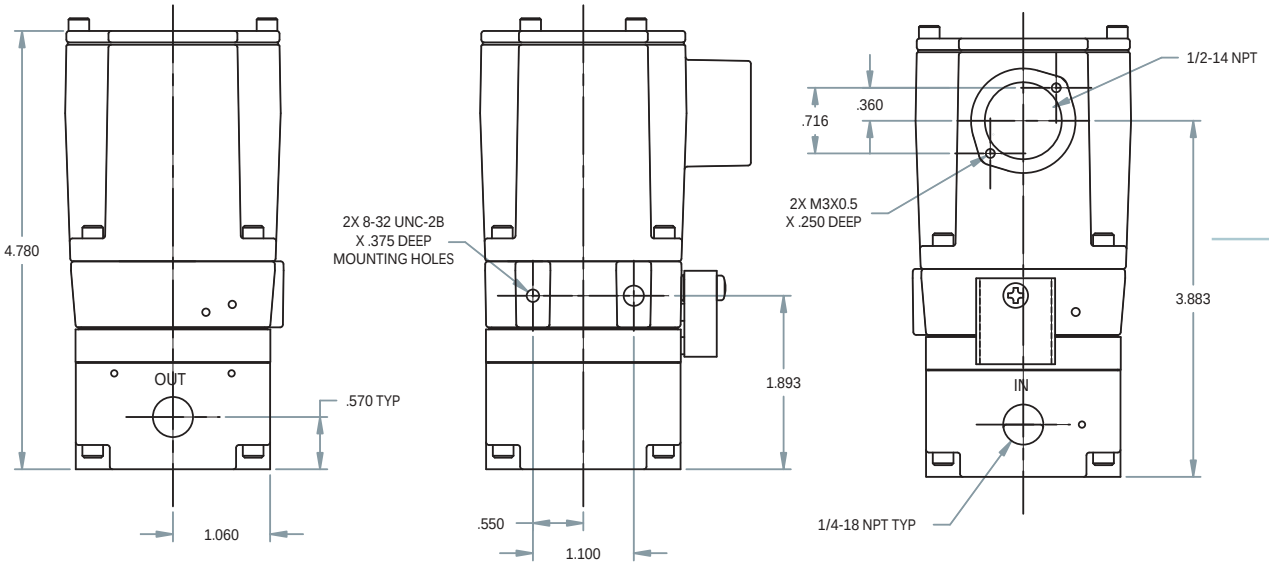
[3] Bottom O-Ring Ports

[4] "E" Enclosure and "F" Electrical port required

Terminal Block	I/P Transducer	E/P Transducer
S	N/C	+ Signal
+	+ Signal	+Power Supply
-	- Signal	Common

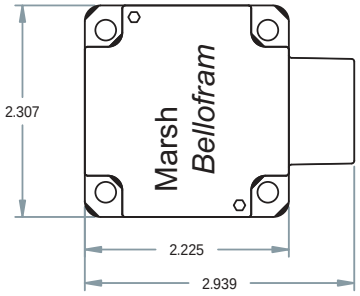
WIRING CONNECTIONS AND SWITCH POSITIONS

Switch #	1: psig	BAR	2	3	4	5	6: psig	BAR	7	8	9
ON	0-2 0-15 3-15 1-17 0-30 3-27 6-30 0-100	0-0.3 0-1.0 0.2-1.0 0.07-1.2 0-2.1 0.2-1.9 0.4-2.1 0-6.9	1-5 VDC 0-5 VDC	Split Low	Voltage Input (E/P)	Split Low Full	0-2 0-15 1-17 0-30 0-60 0-100 0-120	0-0.3 0-1.0 0.07-1.2 0-2.1 0-4.1 0-6.9 0-8.3	Reverse Acting	Full	I/P
Switch #	1: psig	BAR	2	3	4	5	6: psig	BAR	7	8	9
OFF	0-60 0-120	0-4.1 0-8.3	1-9 VDC 1-10 VDC 4-20 mA	Full Split High	Current Input (I/P)	Split High	3-15 3-27 6-30	0.2-1.0 0.2-1.9 0.4-2.1	Direct Acting	Split Low Split High	E/P

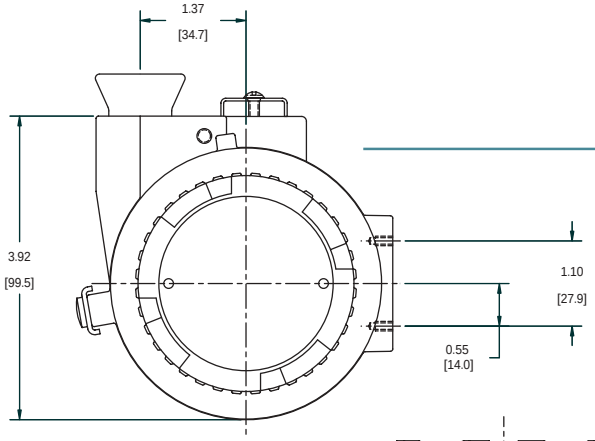


mm
inches

Drawings and dimensions
are for reference only.



TYPE 2000 EXPLOSION PROOF



mm
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Drawings and dimensions
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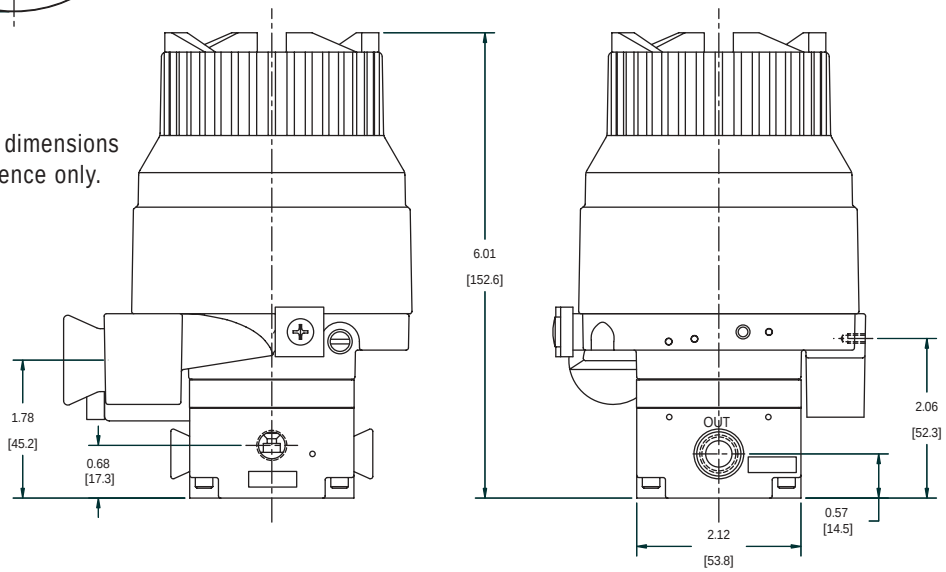
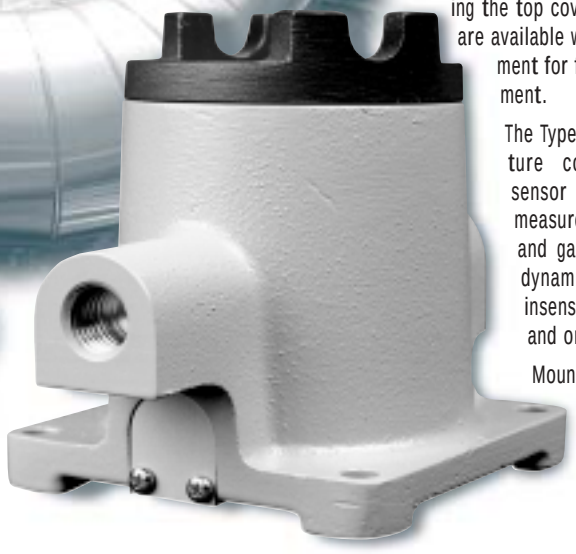


Type 5000
P/I Transducers



FEATURES

- 0.1% accuracy typical
- Piezo resistive pressure sensor resists vibration
- Mounts at any angle
- Easily accessible zero and span adjustments
- NEMA 4X housing approved for explosion proof service

DESCRIPTION

The Type 5000 series is a compact, rugged and reliable family of two-wire pressure transmitters designed for industrial field service. These instruments convert a signal pressure input into a precise 4-20 or 10-50mA output. The lightweight transmitter housing includes a 1/4" NPT pressure port and a 1/2" NPT conduit port for field wiring. Connections are easily accessible simply by removing the top cover. Zero and span adjustments are available within the field wiring compartment for fine, on-site calibration adjustment.

The Type 5000 uses a unique, temperature compensated piezo resistive sensor suitable for gauge pressure measurement of non-corrosive liquids and gases. The sensor has excellent dynamic response and is virtually insensitive to mounting orientation and ordinary industrial vibration.

Mounting holes on the transmitter housing are arranged to permit direct pipe (2") mounting for minimum installed cost.

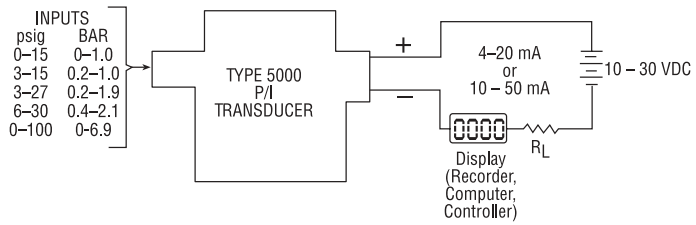
NEMA 4X ENCLOSURE

The Type 5000 transducers have been certified by Factory Mutual Research as meeting the requirements for NEMA 4X (water tight, dust and corrosion resistant).

The transducers also have Factory Mutual approvals for:

1. Explosion proof service (Class 1, Divisions 1 and 2, Groups B, C and D)
2. Dust ignition proof service (Class II, Divisions 1 and 2, Groups E, F and G)
3. Class III, Divisions 1 and 2. Equivalents to the above approvals have been obtained from the Canadian Standards Association.

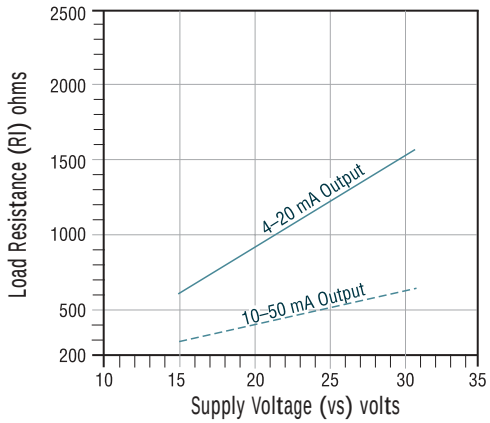
FUNCTIONAL DIAGRAM



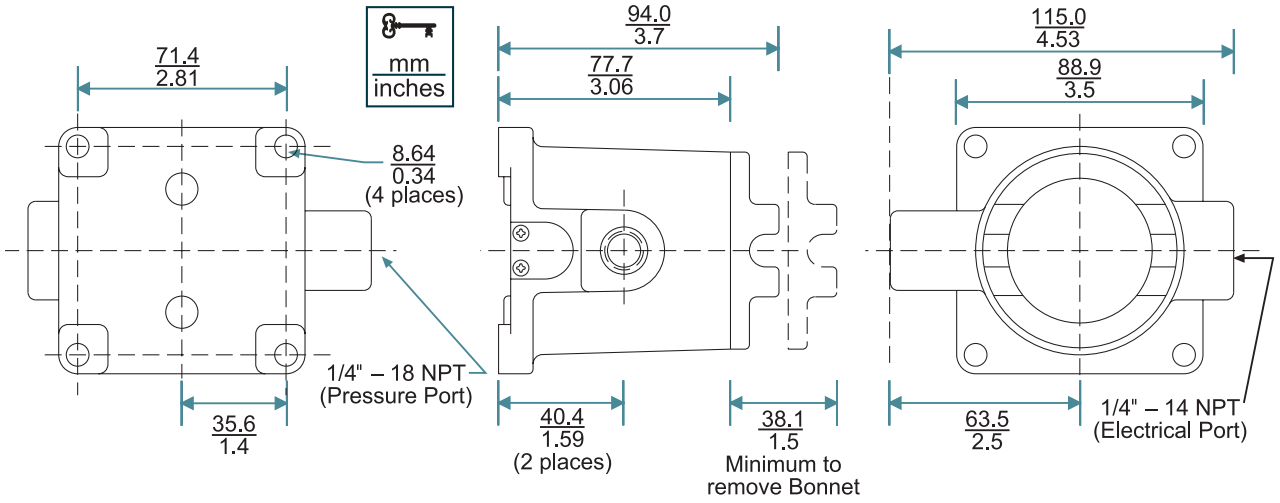
MAX LOAD RESISTANCE VS. SUPPLY VOLTAGE

4–20 mA Output: RI = 50 ohms / volt

10–50 mA Output: RI = 20 ohms / volt



TYPE 5000 DIMENSIONAL DRAWING



SPECIFICATIONS

Input signal	0–15 psig (0–1.0 BAR) 3–15 psig (0.2–1.0 BAR) 3–27 psig (0.2–1.9 BAR) 6–30 psig (0.4–2.1 BAR) 0.2–1.0 BAR (3–15 psig) 0–100 psig (0–6.9 BAR)
Output Signal	4–20 mA DC, 2 wire
	10–50 mA DC, 2 wire
Output Protections	Reverse polarity protected
Accuracy includes nonlinearity, hysteresis and non-repeatability	± 0.1% span typical; ± 0.25% span max.
Overpressure	45 psig (3.1 BAR) without calibration shift 60 psig (4.1 BAR) without failure
Allowable Loads	See Graph
Response Time 99%R	Less than 10 msec for step change to
Temperature Range-Operating	-40° F to +180° F (-40° C to +82° C)
Temperature Effect	Zero - Less than ± 0.01% R/°F Span - Less than ± 0.01% R/°F
RFI Effect	Less than 1% R at 10V/meter per SAMA PMC 33.1, 2-abc
Power Supply	12–30 VDC
Power Supply Effect input terminals within specified power supply limits	Less than 0.005% per volt change at the
Calibration Adjustments with ± 25% min. adjustment	Multi-turn Zero and Span potentiometers
In-Process Output Monitoring	Via test jacks within enclosure without disturbing field wiring
Connections	1/4 – 18 NPT female pressure input, 1/2 – 14 NPT female electrical output
Mounting	Suitable bracket or optional 1/4–20 U-bolt pipe mounting kit
Finish	Epoxy coated aluminum body and cover
Weight	1.7 lbs. (0.8 kg)

ORDERING MATRIX

9	6	4			1	0		

INPUT	
0	0–15 psig (0–1.0 BAR)
1	3–15 psig (0.2– 1.0 BAR)
2	3–27 psig (0.2–1.9 BAR)
3	6–30 psig (0.4–2.1 BAR)
4	0.2–1.0 BAR (3–15 psig)
5	0–100 psig (0–6.9 BAR)

OUTPUT	
0	4 – 20 mA
1	10–50 mA

AGENCY APPROVAL	
1	X /P FM/CSA

OPTIONS	
00	None
01	Pipe Clamp Mounting Kit

NOTES