

**MB** MARSH *BELLOFRAM*<sup>®</sup>

**MB T-1001** Electro Pneumatic I/P & E/P Transducers

Precision  
Control  
Devices



I/P & E/P  
Transducers

**Type-1001**

ISO 9002  
certified

# T-1001

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 counter-clockwise 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. The 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.

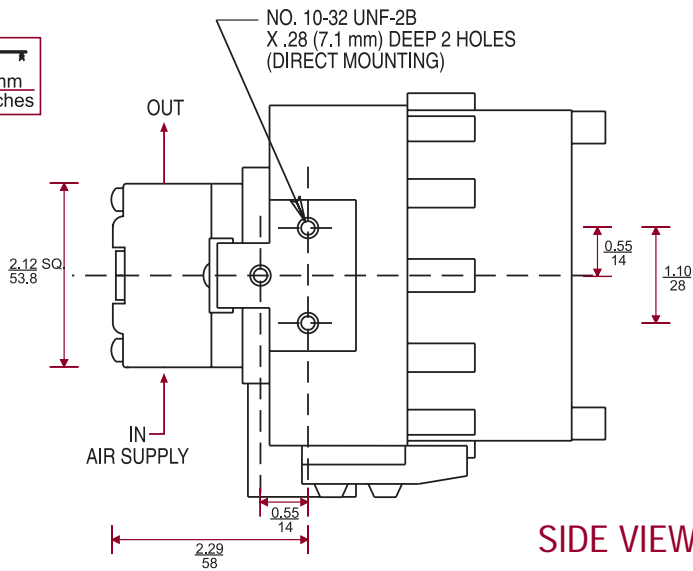
Watertight & Corrosion Resistant (NEMA 4X). This series of transducers has been certified by Factory Mutual Research as meeting NEMA 4X requirements (water tight, dust tight, and corrosion-resistant).

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.

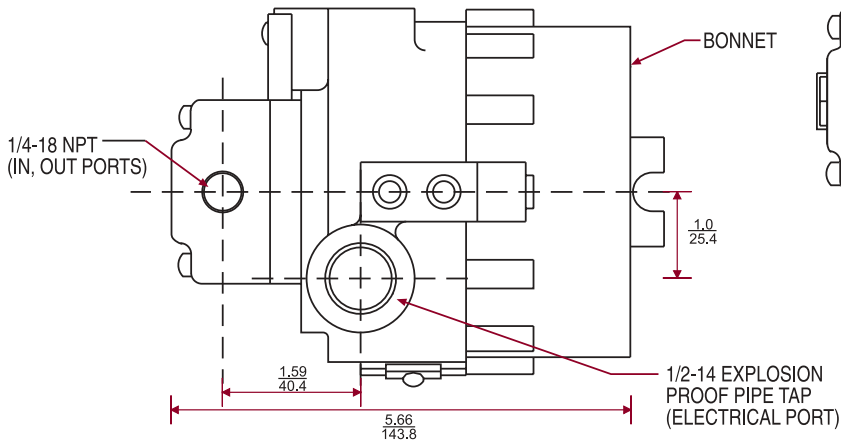


TYPE 1001 I/P & E/P TRANSDUCERS

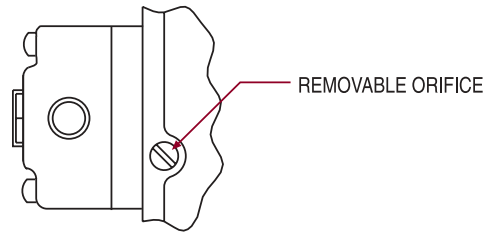
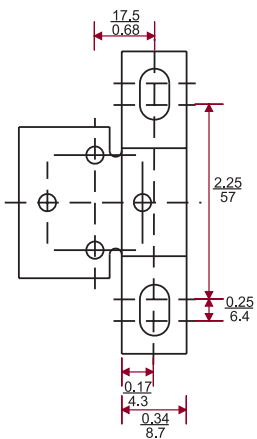
mm  
inches



SIDE VIEW



TOP VIEW



Drawings and dimensions are for reference only.

SEE TABLE 1

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 (+)

T-1001 EXPLOSION PROOF NEMA 4X

USA

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IMPORTANT NOTICE

Our recommendations, if any, for the use of this product are based on tests believed to be reliable. The greatest care is exercised in the selection of our raw materials and in our manufacturing operations. However, since the use of this product is beyond the control of the manufacturer, no guarantee or warranty, express or implied is made as to such use or effects incidental to such use, handling or possession or the results to be obtained, whether in accordance with the directions or claimed so to be. The manufacturer expressly disclaims responsibility therefor. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing laws and/or patents covering any material or us.



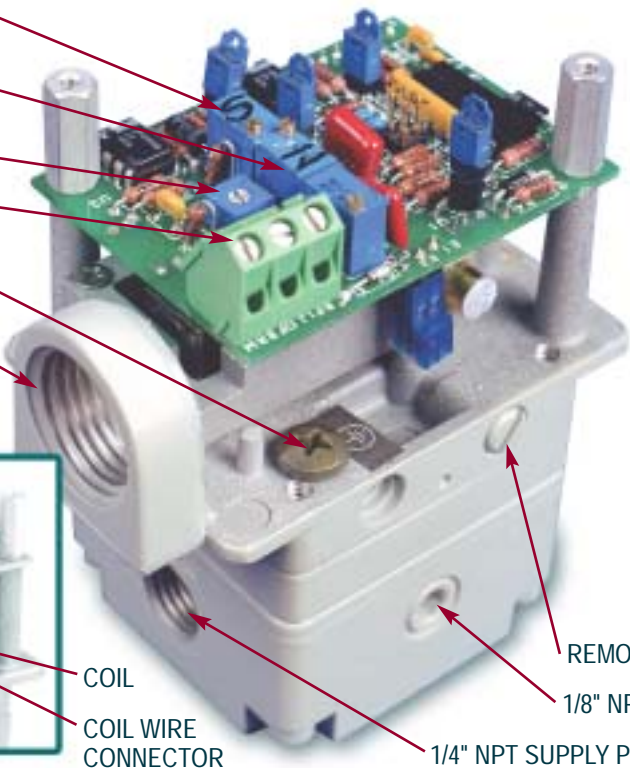
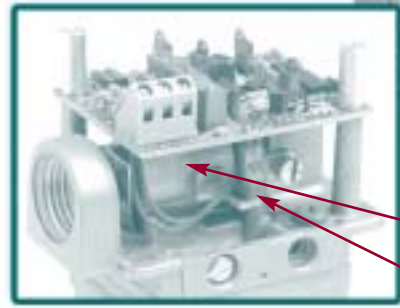
SALES & APPLICATIONS

800.727.5646 fax: 304.387.4417

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SPAN  
POTENTIOMETER  
ZERO  
POTENTIOMETER  
DAMPING  
POTENTIOMETER  
TERMINAL BLOCK  
GROUND SCREW  
1/2" NPT  
ELECTRICAL PORT



COIL  
COIL WIRE  
CONNECTOR

REMOVABLE ORIFICE  
1/8" NPT GAUGE PORT  
1/4" NPT SUPPLY PRESSURE PORT

9 6 - - 0

- 00 = None
- 06 = Fluorocarbon Elastomeric Diaphragm
- 0 = None
- 1 = Factory Mutual & CSA Explosion Proof
- Calibration- See Input / Output matrix below<sup>1</sup>
- 6 = NEMA 1 General Purpose<sup>2</sup>
- 7 = NEMA 3R, Rainproof<sup>2</sup>
- 8 = NEMA 4X Water-tight, Dust-tight, Corrosion Resistant, & Explosion-Proof<sup>2</sup>

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.

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

TYPE 1001 SPECIFICATIONS

**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® (DIN 43 650-A) Connector Kit (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 STANDARD INPUT / OUTPUT MATRIX**

OUTPUT	INPUT													
	psig BAR	0-5 0-0.35	0-15 0-1	0-30 0-2.1	0-60 0-4.1	0-100 0-6.9	1-17 0.07-1.2	3-15 0.2-1	3-27 0.2-1.9	6-30 0.4-2.1	3-9 0.2-0.6	9-15 0.6-1	0-2 0-0.1	0-120* 0-8.3
4-20 mA		19	06	20	08	09	05	02	03	04	00	01	13	07
10-50 mA		11	16	A5	98	89	15	12	87	14	10	90	B1	17
0-5 VDC		21	26	18	28	29	25	22	35	24	30	31	B2	27
1-5 VDC		A1	36	A6	38	39	97	32	33	34	50	41	B3	37
1-9 VDC		A2	46	40	48	49	45	42	43	44	60	51	B4	47
1-10 VDC		A3	56	B6	58	59	55	52	53	54	88	61	B5	57
0-10 VDC		A4	66	70	68	69	65	62	63	64	80	99	23	67

**T-1001 SPECIALS TABLE**

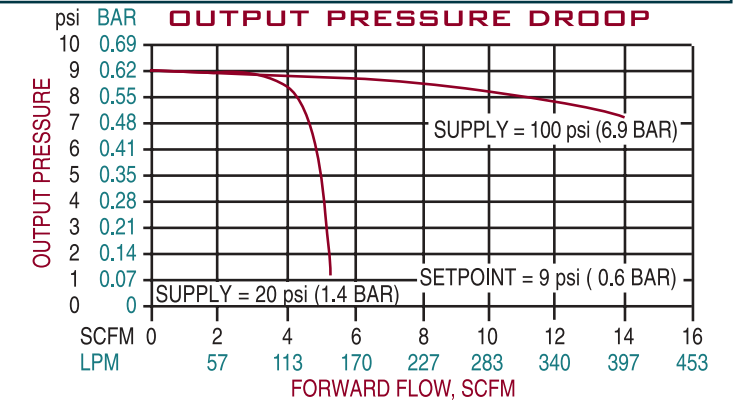
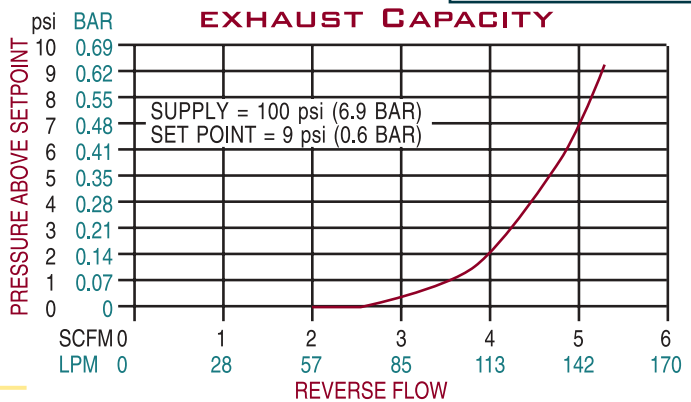
PART NUMBER	INPUT	OUTPUT	COMMENTS
962-145-000	4-20 mA	20-100 kPa	NEMA 1
962-146-000	4-20 mA	20-100 kPa	NEMA 3R
962-148-000	4-20 mA	0-200 kPa	NEMA 1

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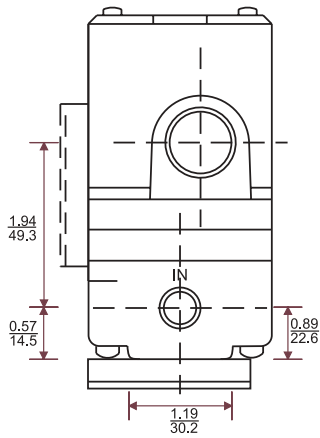
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fax:(304) 387-4417



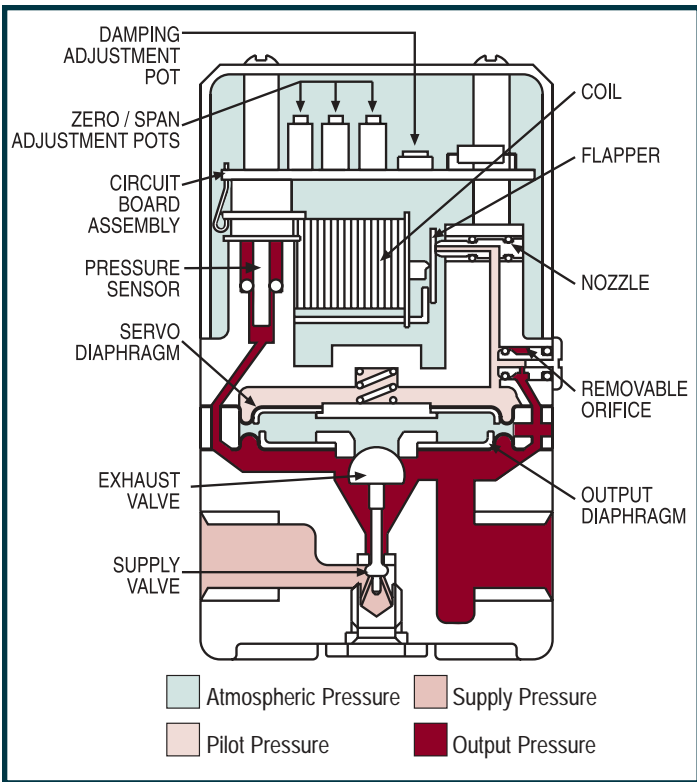
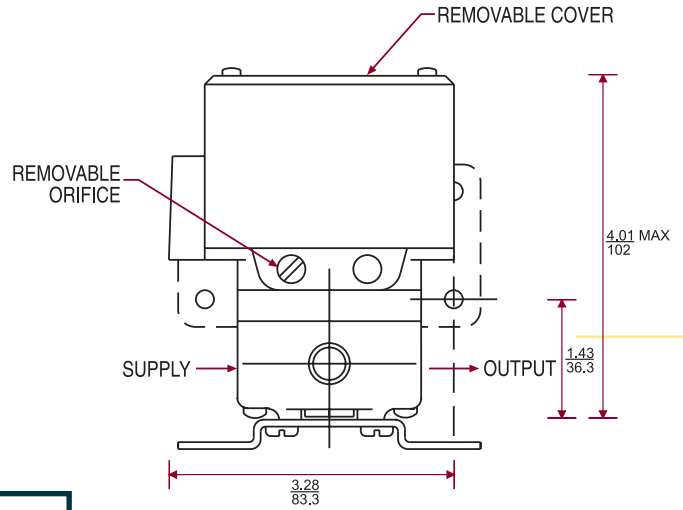
\* For models with zero output capability maximum supply pressure = 40 psi (2.8 BAR) above maximum output, except for 0-100 PSI and 0-120 PSI models that have a maximum supply pressure of 130 psi (9 BAR) & 140 psi (9.7 BAR) respectively.  
Bellofram specifies the use of instrument quality air (clean,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



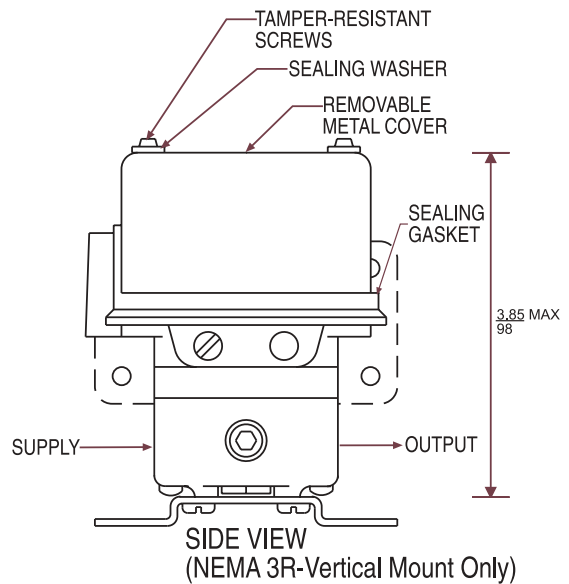
**FRONT VIEW**



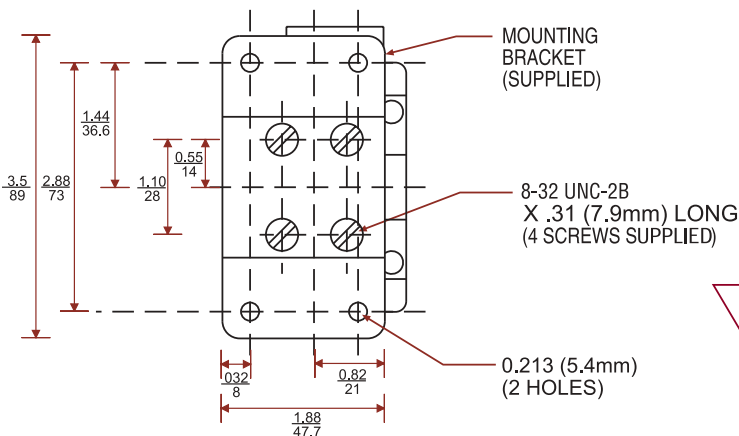
**SIDE VIEW**



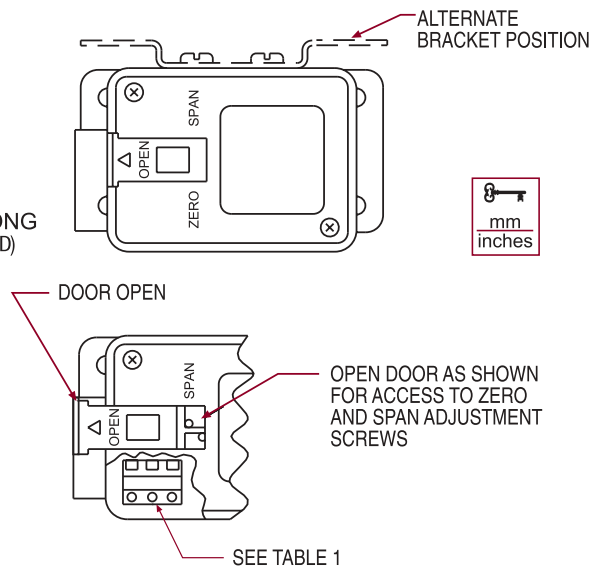
**SIDE VIEW  
(VERTICAL MOUNT ONLY)  
NEMA 3R**



**BOTTOM VIEW**



**TOP VIEW**



Drawings and dimensions are for reference only.

**T-1001 I/P & E/P TRANSDUCERS**