

**MB** MARSH *BELLOFRAM*<sup>®</sup>

**MB T-1000** I/P & E/P Transducers

# Type-1000

I/P & E/P  
Transducers



Precision  
Control  
Devices

ISO 9001:2000  
certified

# Type 1000

## TYPE 1000 FOR GENERAL PURPOSE 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 4 Type Option, 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.

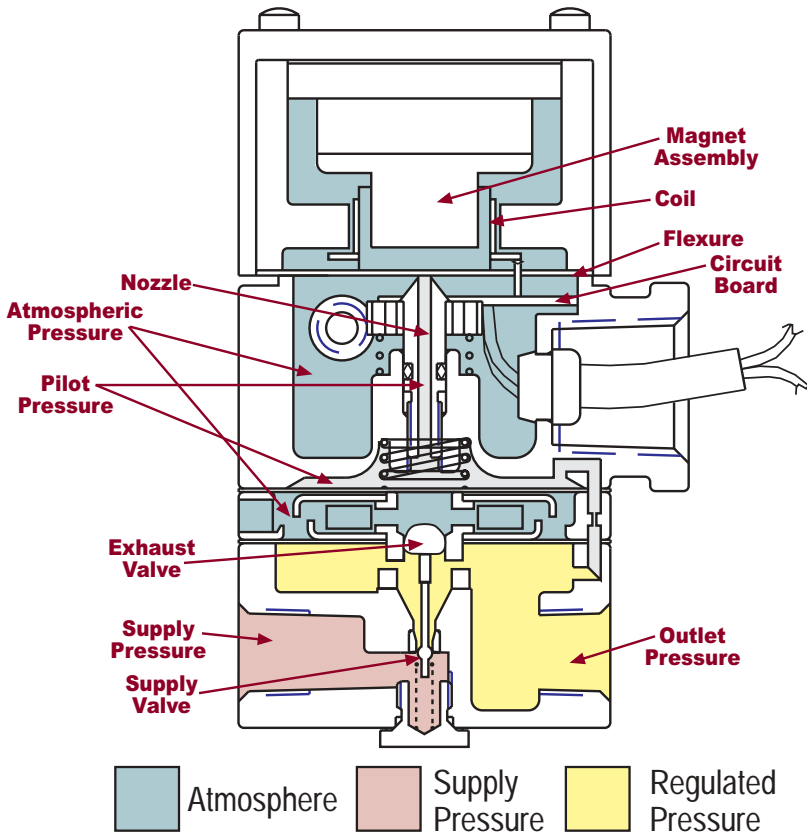
The large span adjustment range of this line allows recalibration to fit applications with output ranges from approximately 3-35 psig (0.2-2.4 BAR) to 3-145 psig (0.2-10 BAR). The units accept supply pressures up to 150 psig (10.5 BAR) and provide flow capacity to 24 SCFM (677 slpm).

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).





**T-1000 FOR HAZARDOUS LOCATION USE ORDERING INFORMATION:**

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

\*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.



**IMPORTANT NOTICE**

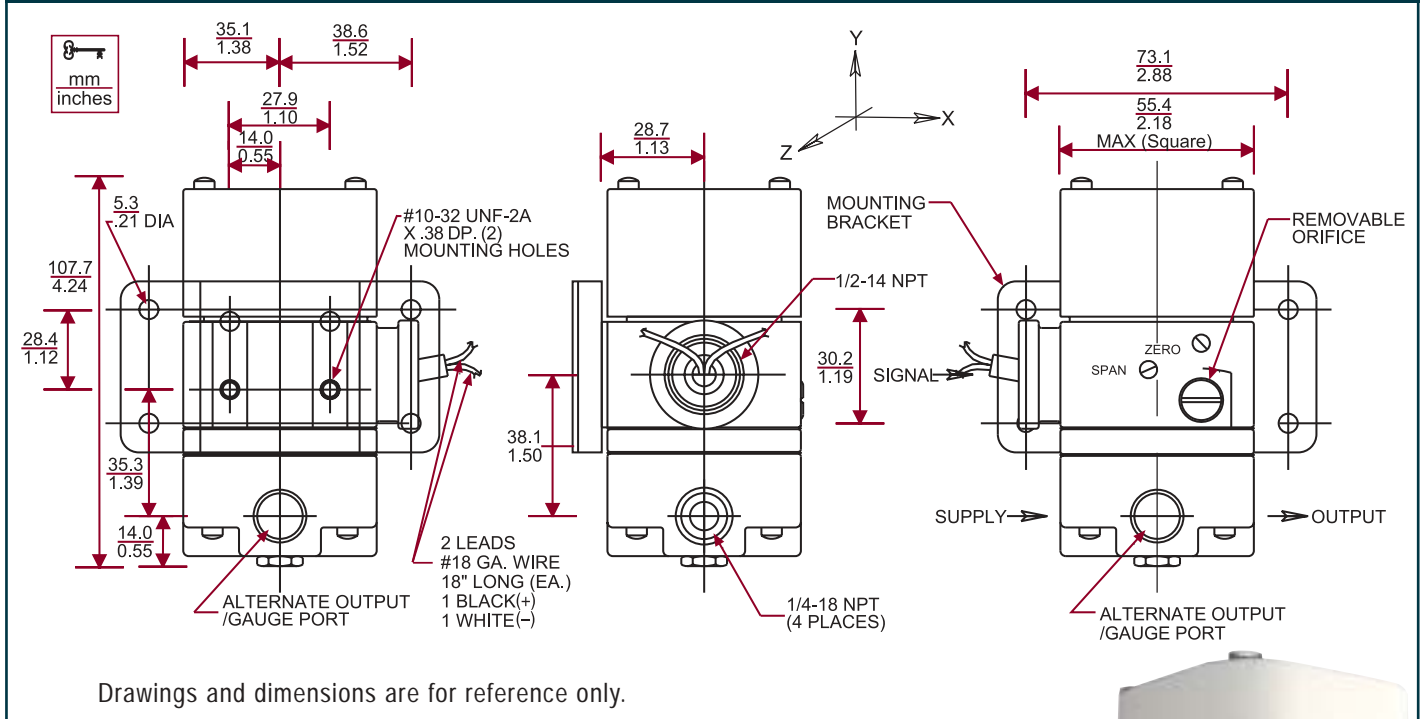
Our recommendations, if any, for the use of this product are based on tests believed to be reliable. The greatest care is exercised in the selection of our raw materials and in our manufacturing operations. However, since the use of this product is beyond the control of the manufacturer, no guarantee 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.

**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.

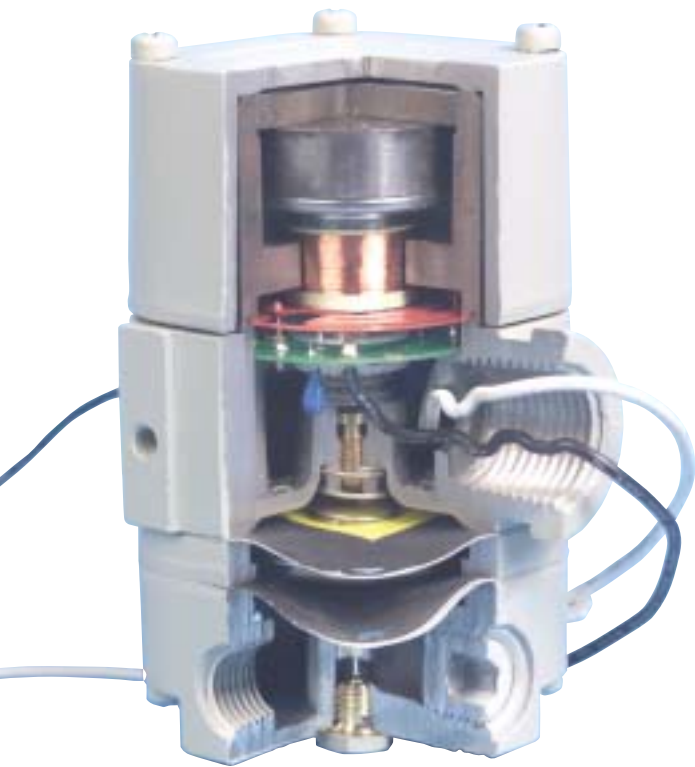
	TYPE 1000 GENERAL PURPOSE	TYPE 1000 HIGH RELIEF	TYPE 1000 EXTENDED RANGE	TYPE 1000 EXPLOSION-PROOF
Supply Pressure Range	3 psig (0.2 BAR) above max. output to 100 psig (7 BAR)	3 psig (0.2 BAR) above max. output to 100 psig (7 BAR)	5 psig (0.4 BAR) above max. output to 150 psig (10.4 BAR) (100 psig / 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 (198 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	2 7/8 X 2 7/8 X 4 54 X 54 X 101	2 7/8 X 2 7/8 X 4 54 X 54 X 101	2 7/8 X 2 7/8 X 4 54 X 54 X 101	6 13/32 X 5 15/16 X 7 7/16 163 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



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.





**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.

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.*

**T-1000 GENERAL PURPOSE ORDERING INFORMATION:**

Input	Output*		Part Number	Impedance (nominal)
	psig	BAR		
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 NEMA 4 Type Option, add 004 suffix.

**T-1000 EXTENDED RANGE ORDERING INFORMATION:**

Input	Output*		Part Number	Impedance
	psig	BAR		
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*		Part Number	Impedance (nominal)
	psig	BAR		
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:**

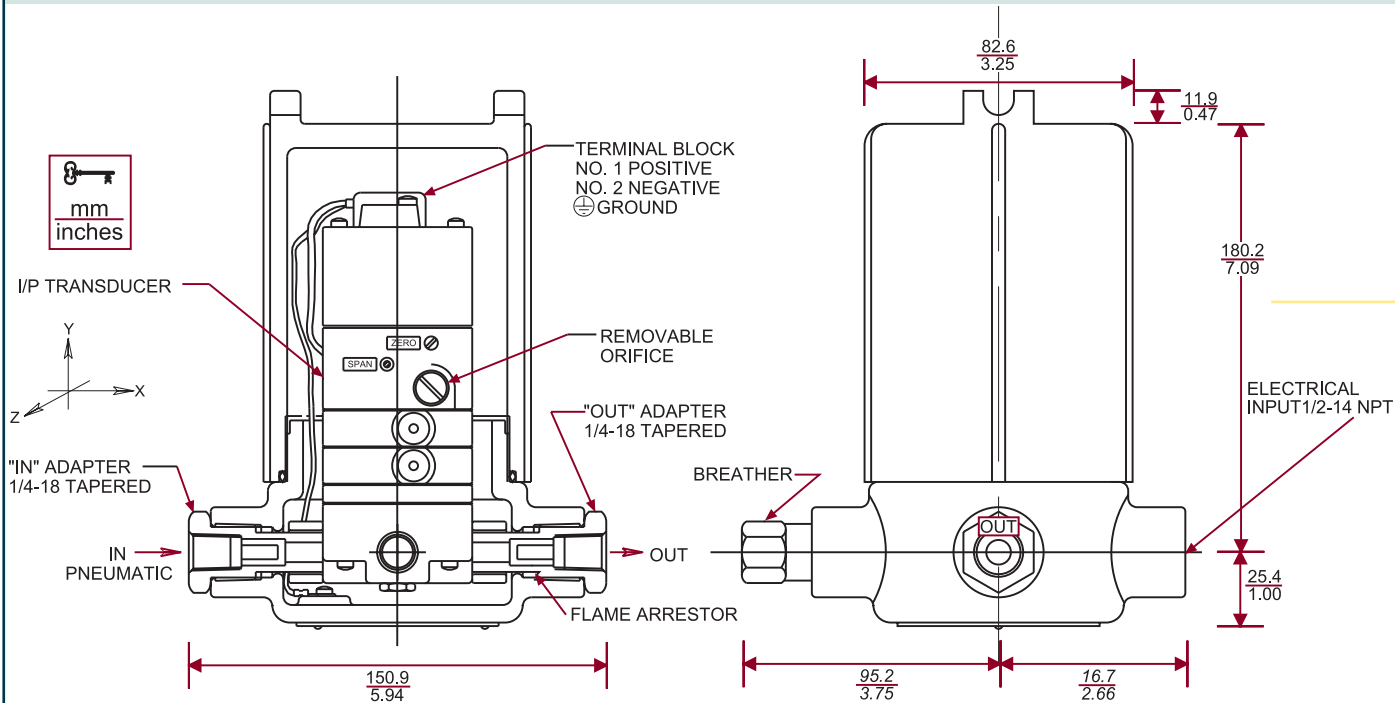
- Explosion Proof Mounting Kit: 971-079-000
- Explosion Proof Panel Mounting. Kit: 971-078-000
- DIN Rail Kit: 010-115-000
- Hirschman Connector Kit (3-prong): 971-126-000
- Filter Kit, Coalescing, 0.1 micron: 010-140-000
- Filter Element Kit (for coalescing filter, package of 10): 010-141-000
- Output Gauges: Option "8" ie: last 3 digits become - 008
- Dielectric Strength Testing: Option "12" ie: last 3 digits become - 012
- NEMA 4 Type 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 enclosure option available on all input/output ranges. This option is separate from explosion proof, NEMA 4 units.

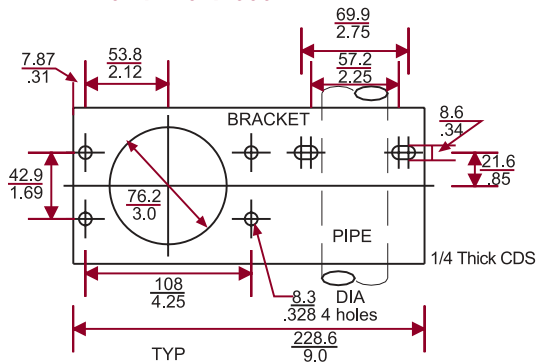
**T-1000 SPECS & DIMENSIONS**

**DIMENSIONAL DRAWING; EXPLOSION-PROOF MODEL**



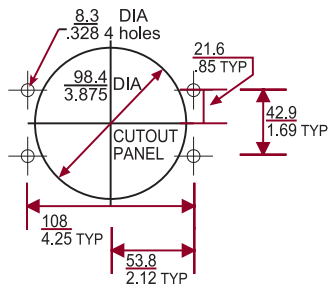
**OPTIONAL MOUNTING BRACKET & HARDWARE:**

**ORDER KIT #201-971-079-000**



**OPTIONAL MOUNTING HARDWARE:**

**ORDER KIT #201-971-078-000**



Drawings and dimensions are for reference only.

**T-1000 EXPLOSION-PROOF MODEL**

**USA**

State Route 2, Box 305  
Newell, WV 26050  
800- 727-5646 or (304)387-1200  
FAX (304) 387-4417  
info@marshbellofram.com

**EUROPE**

9 Castle Park, Queens Drive  
Nottingham NG2 1AH, UK  
Tel +44 (0) 115 993 3300  
Fax +44 (0) 115 993 3301  
bellofram@aol.com



**SALES & APPLICATIONS**

(800)727-5646 fax:(304) 387-4417

[www.marshbellofram.com](http://www.marshbellofram.com)