

# Type 1000

## I/P & E/P Transducers

### 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 and 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).



**Type 1000**  
Transducers



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

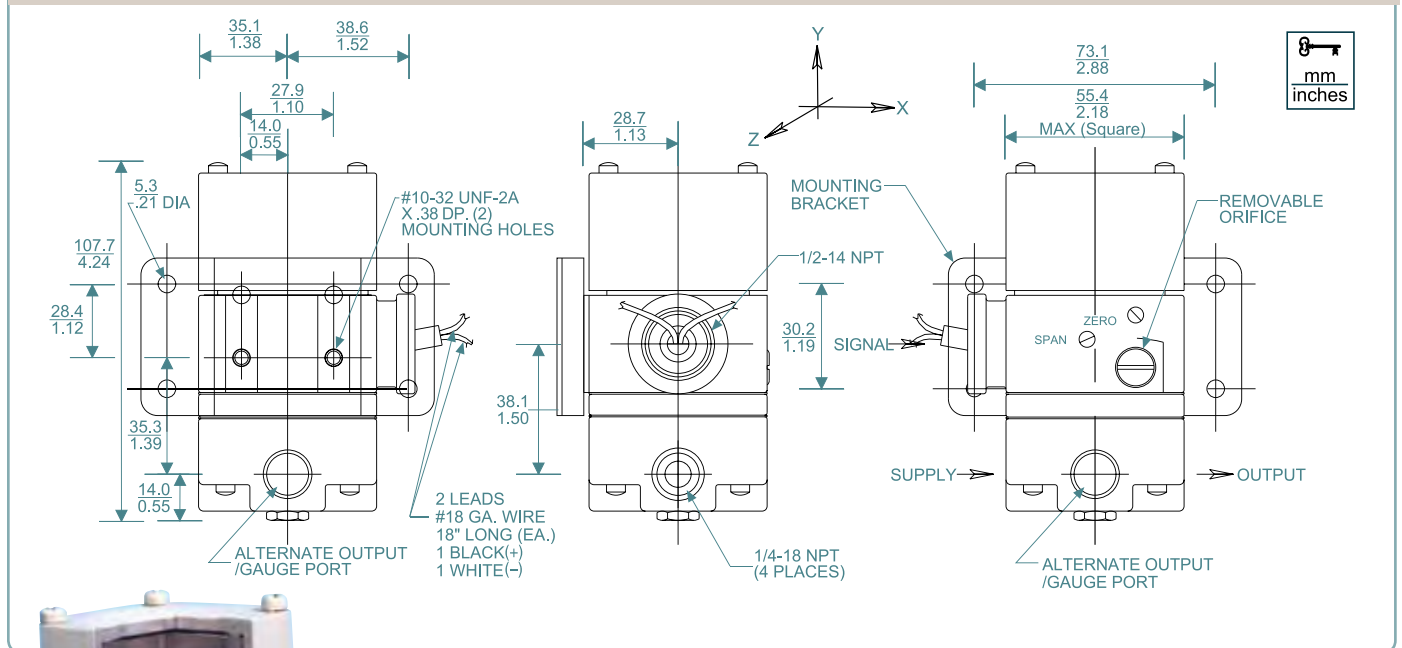
#### Description

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 Transducers

|  | Type 1000<br>General Purpose                           | Type 1000<br>High Relief                               | Type 1000<br>Extended Range   | Type 1000<br>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 and 1/2 NPT                                    | 1/4 NPT and 1/2 NPT                                    | 1/4 NPT and 1/2 NPT   | 1/4 NPT and 1/2 NPT                                    |
| Size   | inches   | 2-1/8 X 2-1/8 X 4                                      | 2-1/8 X 2-1/8 X 4   | 6-13/32 X 5-15/16 X 7-9/16                             |
|  | mm   | 54 X 54 X 101  | 54 X 54 X 101   | 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                                       |

## Type 1000 Dimensional Drawing



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.

### Type 1000 General Purpose Ordering Information

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

NOTE: For NEMA4X, add 004 suffix.

### Type 1000 Extended Range Ordering Information

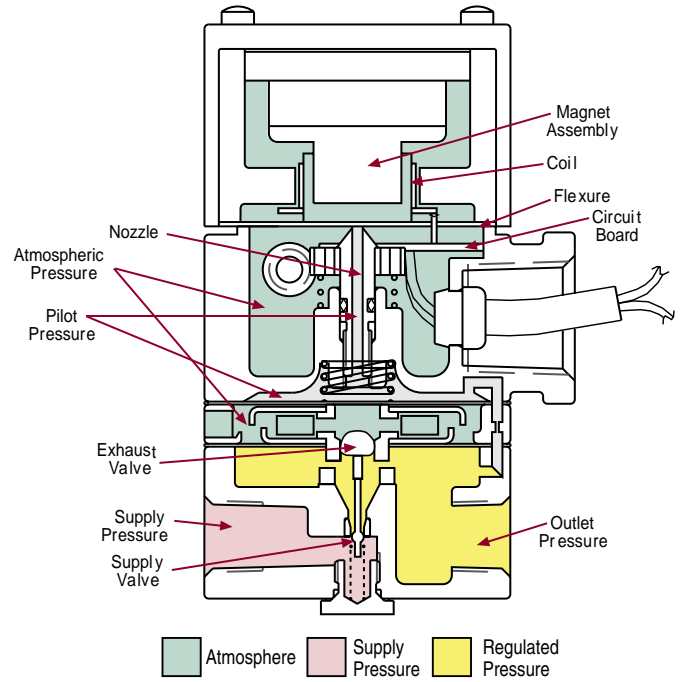
| Input  | Output* |       | Part Number | Impedance (Nominal) |
|--------|---------|-------|-------------|---------------------|
|        | BAR     | PSIG  |             |                     |
| 0-60mA | 0.1-8.3 | 2-120 | 961-107-000 | 220 Ω               |
| 4-20mA | 0.2-8.3 | 3-120 | 961-111-000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

### Type 1000 High Relief Ordering Information

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

### Type 1000 Options and Accessories

|                                    | Part Number                                |
|------------------------------------|--|
| 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, 60 micron              | 010-139-000                                |
| 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  |



### Agency Approval Notes

#### Factory Mutual

#### T-1000 I/P Transducers

**Intrinsically Safe:** Class I, Division 1, Groups A, B, C, & D, T6

**Non-Incendive:** Class I, Division 2, Groups A, B, C, & D, T6.

#### T-1000 I/P / E/P Transducer

**Explosion Proof:** Class I, Division 1, Group D, T6

**Dust-Ignition Proof:** Classes II & III, Division 1, Groups E, F, & G, T6

Type 4 **NEMA 4**



#### Canadian Standards Association

#### T-1000 I/P Transducers

**Hazardous Locations:** Class I, Group D; Class II, Groups E, F, & G;

Class III; CSA Enc. 4 **NEMA 4:**

I/P transducer, supply pressure 100 psig max, input 4-20mA, output 3-15 psig.

#### Intrinsically Safe and Non-Incendive Systems - For Hazardous

**Locations:** Class I, Groups A, B, C, & D; Class II, Groups E, F, & G; Class III: I/P transducer rated input 4-20mA, intrinsically safe when connected through CSA Certified diode safety barriers in accordance with Bellofram Installation Instruction.

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.

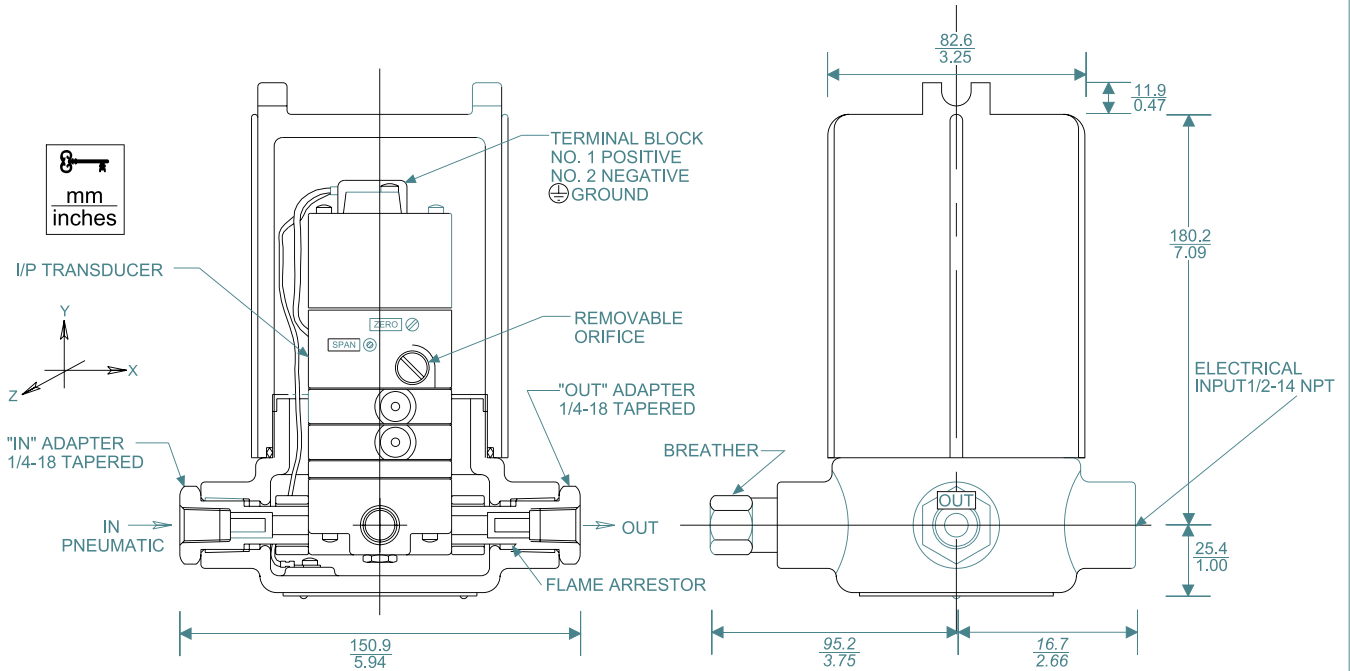
### Filter Note

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.

\* 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.

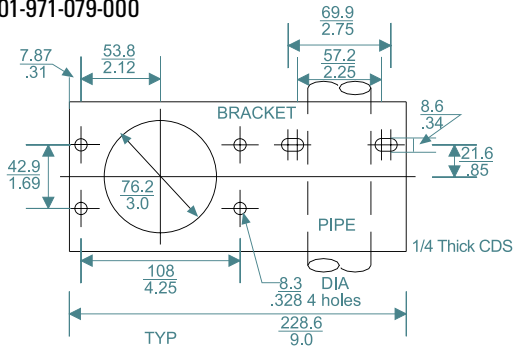
\*\* NEMA 4 type enclosure option available on all input/output ranges. This option is separate from explosion proof, NEMA 4 units.

## Type 1000 Explosion Proof Dimensional Drawing;



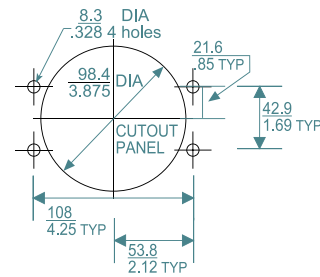
### Optional Mounting Bracket & Hardware

Order kit #201-971-079-000



### Optional Mounting Hardware

Order Kit #201-971-078-000



Drawings and dimensions are for reference only.



## Type 1000 Hazardous Location Use Ordering Information

| Input                               | Output* |      | Part Number | Impedance (Nominal) | Agency Approvals (See notes)                      |
|-------------------------------------|---------|------|-------------|---------------------|---|
|                                     | BAR     | PSIG |             |                     |   |
| <b>Type 1000 Explosion Proof</b>    |         |      |             |                     |   |
| 4-20mA                              | 0.2-1.0 | 3-15 | 961-098-000 | 180 Ω               | Explosion-Proof, Factory Mutual <sup>1</sup>      |
|                                     | 0.2-1.0 | 3-15 | 961-098-100 | 180 Ω               | CSA Explosion Proof                               |
| 1-9v                                | 20-100  | 3-15 | 961-142-000 | 985 Ω               | Explosion Proof Factory Mutual <sup>1</sup>       |
| <b>Type 1000 Intrinsically Safe</b> |         |      |             |                     |   |
| 4-20mA                              | 0.2-1.0 | 3-15 | 961-099-000 | 180 Ω               | Intrinsically Safe, Factory Mutual <sup>3,4</sup> |
|                                     | 0.2-1.9 | 3-27 | 961-100-000 | 220 Ω               | Intrinsically Safe, Factory Mutual <sup>3,4</sup> |
|                                     | 0.2-1.0 | 3-15 | 961-105-000 | 180 Ω               | Intrinsically Safe, CSA <sup>5</sup>              |
|                                     | 0.2-1.9 | 3-27 | 961-106-000 | 220 Ω               | Intrinsically Safe, CSA <sup>5</sup>              |
|                                     | 0.4-2.1 | 6-30 | 961-101-000 | 220 Ω               | Intrinsically Safe, Factory Mutual <sup>3,4</sup> |
|                                     | 1.0-0.2 | 15-3 | 961-175-000 | 180 Ω               | Intrinsically Safe, Factory Mutual <sup>3,4</sup> |
|                                     | 1.9-0.2 | 27-3 | 961-176-000 | 220 Ω               | Intrinsically Safe, Factory Mutual <sup>3,4</sup> |
|                                     | 2.1-0.4 | 30-6 | 961-177-000 | 220 Ω               | 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.