

# Type 1500

## I/P & E/P Transducers

### Type 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

### 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

### Principle of Operation

(See Fig. 2 and 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 and 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.

### 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 35 ° F
  - b. No particles larger than three microns
  - c. Maximum oil content of 1 ppm
3. All unused ports must be plugged.



**Type 1500**  
Transducers



### 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.

## Type 1500 Transducers

	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.

## Type 1500 Ordering Information

96									
	↑	↑	↑	↑	↑	↑	↑	↑	Enclosure Rating
	6							0	NEMA 4X (Includes Approvals)
	9								Indoor Use / General Purpose
									"In and 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

NOTE: Individual regulators, FRs, filters, and lubricators come complete with bracket.

FRL assemblies come complete with all bracket/connectors.

## T-1500 Manifold and 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).

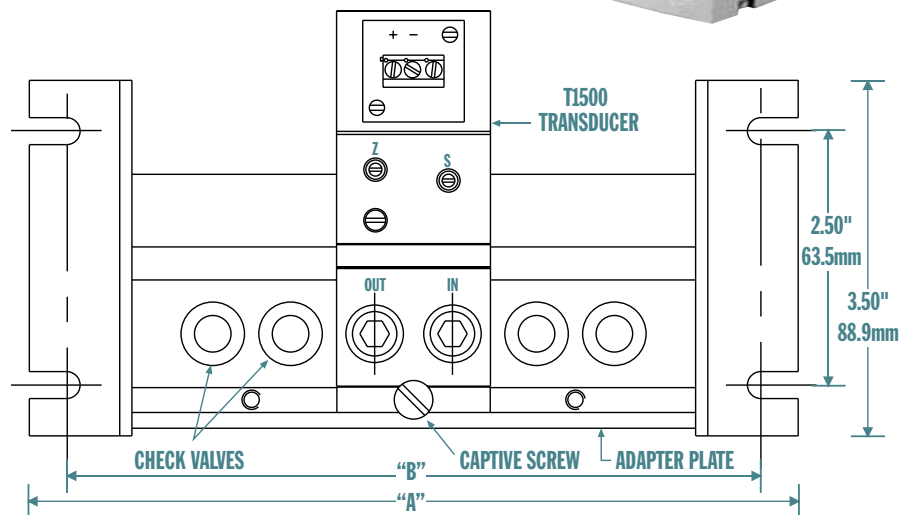


## Type 1500 Dimensions

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



Figure 1 - Manifold Front View



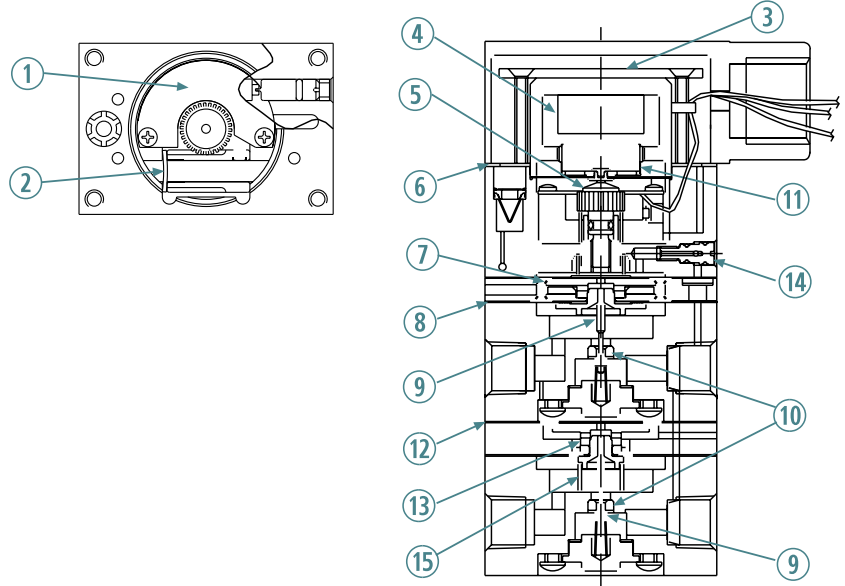
## Type 1500 Manifold Ordering Information

Kit	Part Number
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
DIN Rail Mounting Kit	971-140-000
Pneumatic Repair Kit (3-15, 3-27 PSIG / 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
Filter Kit, 60 Micron	010-139-000

**Type 1500 Extended Range Parts**

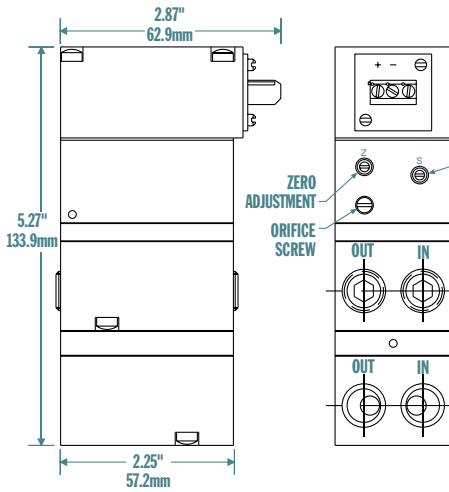
Number	Description
1	Circuit Board
2	Worm Gear
3	Duckbill Valve (NEMA 4X Only)
4	Magnet Assembly
5	Nozzle Assembly
6	Bonnet Gasket (NEMA 4X Only)
7	Servo Diaphragm (I/P Section)
8	Control Diaphragm (I/P Section)
9	Pintle
10	Supply Seat
11	Coil/Flexure Assembly
12	Servo Diaphragm (Bias Relay)
13	Control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

**Figure 2: Type 1500 Extended Range Parts**

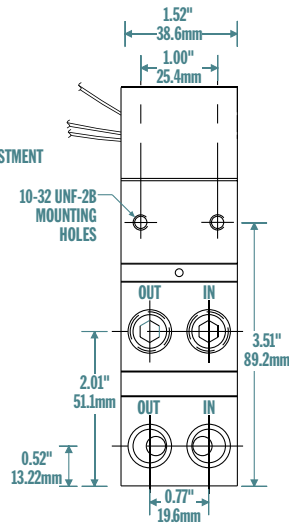


**Type 1500 Extended Range Dimensions**

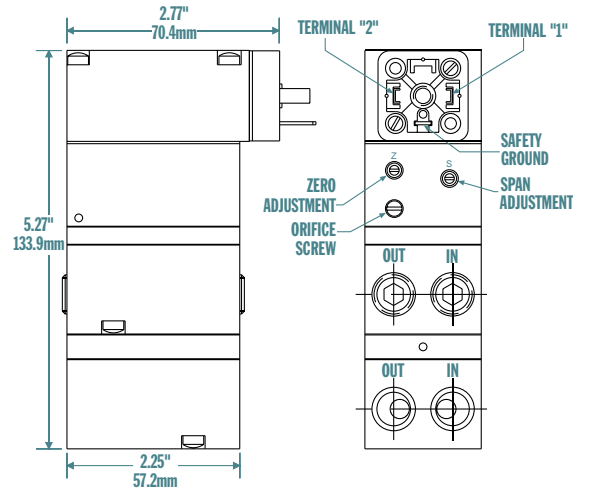
**Figure 3: Terminal Block**



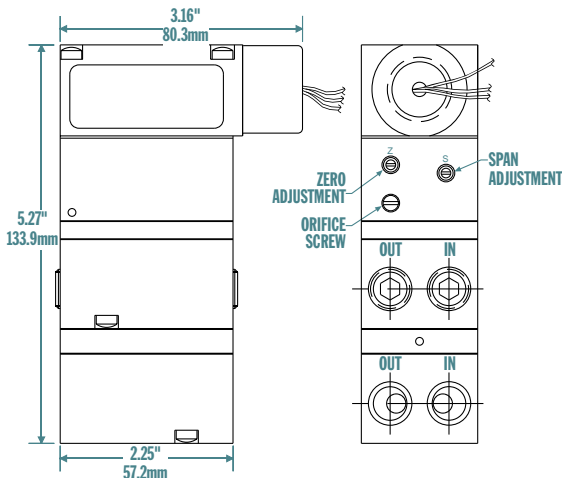
**Back Dimensions**



**Figure 4 - Hirschmann® (DIN 43 650-A)**



**FIGURE 5: 1/2 NPT / BSPT**

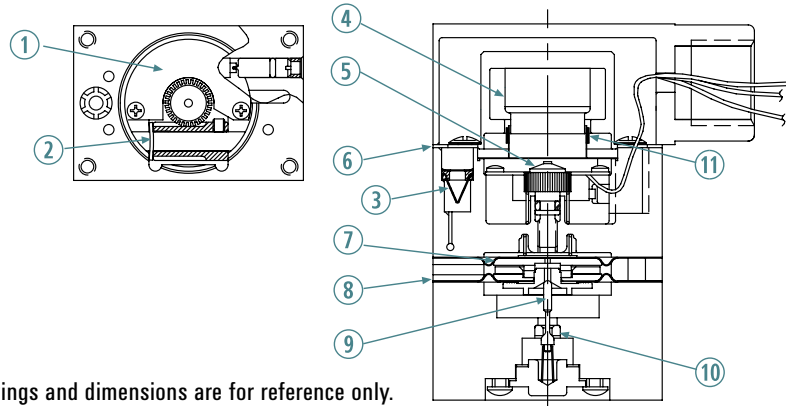


Drawings and dimensions are for reference only.

### Type 1500 Standard Range Parts

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: Type 1500 Standard Range Parts



Drawings and dimensions are for reference only.

### Type 1500 Standard Range Dimensions

#### Back Dimensions

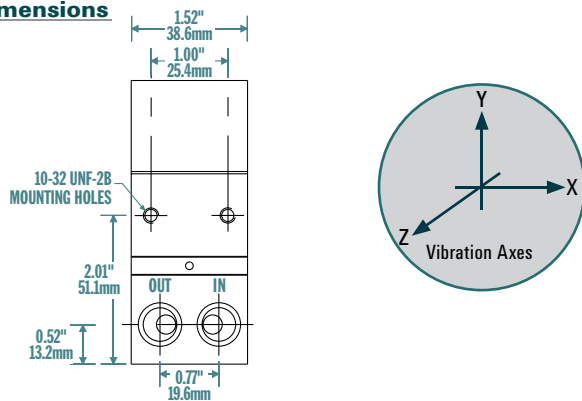


FIGURE 8: 1/2 NPT / BSPT

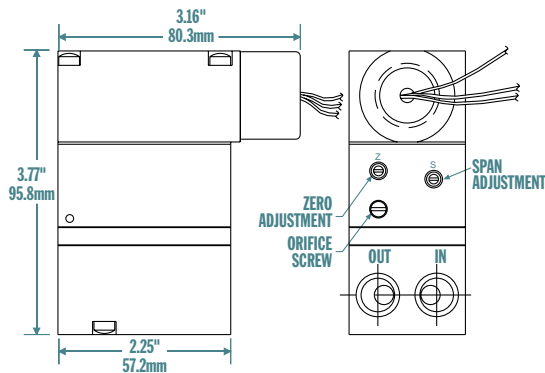


Figure 7: Terminal Block

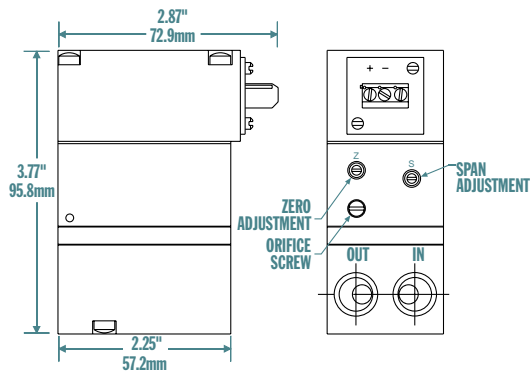
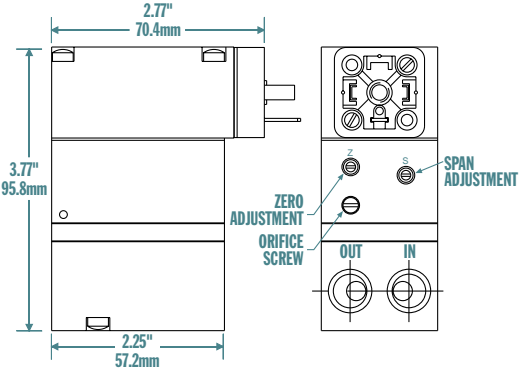


Figure 9: Hirschmann® (DIN 43 650-A)



### Agency Approvals - Applies only to units ordered with approvals

#### Factory Mutual

##### T-1500 I/P and E/P Transducers

**Intrinsically Safe:** Class I, Division 1, Groups A, B, C, & D, T4 Ta = 70°C; Entity;

**Non-Incendive:** Class I, Division 2, Groups A, B, C, & D, T4 Ta = 70°C

**Dust-Ignition Proof:** Classes II & III, Division 1, Groups E, F, & G, T4 Ta = 70°C

**Suitable:** Classes II & III, Division 2, Groups F & G, T4 Ta = 70°C Type 4X **NEMA 4X**

Entity Parameters:  $V_{Max} = 30$  V dc,  $I_{Max} = 100$  mA,  $C_1 = 0$   $\mu$ F,  $L_1 = 0$  mH.

#### Canadian Standards Association

**T-1500 I/P Transducers Hazardous Locations:** Class I, Division 2,

Groups A, B, C, & D; Type 4X **NEMA 4X:**

I/P transducer, rated  $V_{Max} = 30$  V dc,  $I_{Max} = 100$  mA. Temp Code T4. Max ambient 70°C.

IN COMPLIANCE WITH STD C22.2 No 213.

**Intrinsically Safe, Entity - Hazardous Locations:** Class I, Groups A, B, C, & D;

Class II, Group E, F, & G; Class III; Type 4X **NEMA 4X:**

I/P transducer. Entity Parameters:  $V_{Max} = 30$  V dc,  $I_{Max} = 100$  mA,  $C_1 = 0$ ,  $L_1 = 0$ . Intrinsically Safe

when connected per Installation Instruction 010632. Temp Code T4. Max ambient 70°C.

#### ATEX

**Intrinsically safe** for II 1 G EEx ia IIB T4 Tamb = -20 to 65 °C

Input Parameters:  $V_{Max} = 30$  V,  $P_i = 1$  W,  $I_i = 100$  mA,  $R_{eq} = 180$  OHMS,  $C_1 = 0$ ,  $L_1 = 24$  mH

Models are CE marked for use in the European Union, and meet the EMC heavy machinery directives.

The Bellofram T-1500 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

