

# Type 500X

## Electro-Pneumatic Transducer (I/P, E/P)

### Installation, Operation and Maintenance Instructions

#### General Purpose Type 500X I/P Transducers (non-hazardous area)

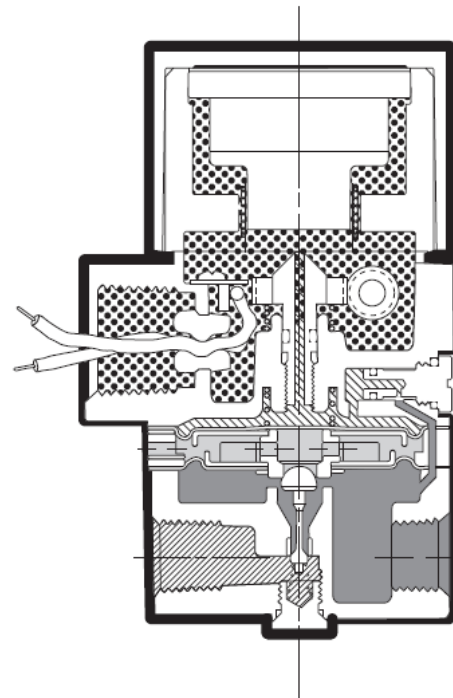
Model 500		Options	
Input Signal	Output	psig	bar
A 4-20 mA	A	3-9	0.20-0.6
	B	9-15	0.6-1.0
	C	3-15	0.20-1.0
	D	3-27	0.20-1.8
	E	6-30	0.40-2.0
	F	1-17	0.10-1.2
	G	2-60*	0.14-4.1
	H	3-120*	0.20-8.2

Options:  
**D** DIN 43650 connector  
**W** Nema-4X/IP65  
**U** 1/4" BSP Porting  
 Note: Options "D" and "W" cannot be combined.

#### General Purpose Type 500X E/P Transducers (non-hazardous area)

Model 500		Options	
Input Signal	Output	psig	bar
C 0-5 Vdc	C	3-15	0.20-1.0
	D	3-27	0.20-1.8
	E	6-30	0.40-2.0
	G	2-60*	0.14-4.1
	H	3-120*	0.20-8.2
D 1-9 Vdc	C	3-15	0.20-1.0
	D	3-27	0.20-1.8
	E	6-30	0.40-2.0
E 0-10 Vdc	H	3-120*	0.20-8.2

Options:  
**D** DIN 43650 connector  
**W** Nema-4X/IP65  
**U** 1/4" BSP Porting  
 Note: Options "D" and "W" cannot be combined.



Pilot Pressure      Supply Pressure  
 Atmospheric Pressure      Output Pressure

#### Intrinsically Safe Type 500X

With FM Approvals (FM) Intrinsically Safe Area Approvals  
 Nema-4X/IP65 Enclosure, Conduit Connection only.

Model 500		Options	
Input Signal	Output	psig	bar
A 4-20 mA	A	3-9	0.20-0.6
	B	9-15	0.6-1.0
	C	3-15	0.20-1.0
	D	3-27	0.20-1.8
	E	6-30	0.40-2.0
	F	1-17	0.10-1.2
	G	2-60*	0.14-4.1
	H	3-120*	0.20-8.2
	L	15-3	1.0-0.20
	M	27-3	1.8-0.20
	N	30-6	2.0-0.40

Options:  
**U** 1/4" BSP Porting

Agency Approvals:  
**H** FM Approvals Intrinsically Safe (Conduit Connection only)  
 \*Output shown as calibrated at the factory. Large span adjustment capability allows recalibration to achieve output ranges from 3-35 psig (0.2-2.4 bar) with 2-60 psig unit to 3-145 psig (0.2-10 bar) with 2-120 psig unit.

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# DANGER, WARNING, CAUTION and NOTE statements

## DANGER

Refers to conditions or hazards which could result in serious personal injury or death.

## WARNING

Refers to conditions or hazards which could result in personal injury.

## CAUTION

Refers to conditions or hazards which could result in equipment or property damage.

## NOTE

Alerts you to facts or special instructions.

**ALL DANGER, WARNING, AND CAUTION NOTICES MUST BE COMPLIED WITH IN FULL.**

## 1. SPECIFICATIONS

### Functional Specifications

INPUT	Standard Range						High Output	
	4-20 mA, 0-5 VDC, 1-9 VDC, 0-10 VDC							
Outputs psig (bar)	3-9 (0.2-0.6)	9-15 (0.6-1.0)	3-15, 15-3 (0.2-1.0)	3-27, 27-3 (0.2-1.8)	6-30, 30-6 (0.4-2.0)	1-17 (0.1-1.2)	2-60 (0.14-4.1)	3-120 (0.2-8.2)
Supply Pressure psig (bar)	12-100 (0.8-6.9)	18-100 (1.2-6.9)	18-100 (1.2-6.9)	30-100 (2.1-6.9)	33-100 (2.3-6.9)	20-100 (1.4-6.9)	65-150 (4.5-10.3)	125-150 (8.6-10.3)
Air Consumption	0.05 scfm (1.41 NL/min) midrange typical						0.07 scfm (1.98 NL/min) midrange typical	
Flow Rate	4.5 scfm (127 NL/min) at 25 psig (1.7 bar) supply  12.0 scfm (340 NL/min) at 100 psig (6.8 bar)						20.0 scfm (566 NL/min) at 150 psig (10.5 bar)	
Temperature Range (Operating)	-20°F to 140°F (-30°C to 60°C)							
Relief Capacity	2 scfm (56.6 NL/min) at 5 psig (2.4 bar) above 20 psig (1.3 bar) setpoint						7 scfm (198 NL/min) at 10 psig (0.7 bar) above 20 psig (1.3 bar) setpoint	
Impedance	4-20 mA 90 Ohms	4-20 mA 90 Ohms	4-20 mA 180 Ohms	4-20 mA 220 Ohms	4-20 mA 220 Ohms	4-20 mA 250 Ohms	4-20 mA 225 Ohms	4-20 mA 260 Ohms
			0-5 VDC 615 Ohms	0-5 VDC 530 Ohms	0-5 VDC 530 Ohms		0-5 VDC 500 Ohms	0-10 VDC 805 Ohms
			1-9 VDC 985 Ohms	1-9 VDC 840 Ohms	1-9 VDC 840 Ohms			

### Performance Specifications

Terminal Based Linearity	<± 0.75% of span	<± 1.5% of span typical, ± 2.0% max.
Hysteresis	< 1.0% of span	< 0.5% of span
Repeatability	< 0.5% of span	< 0.5% of span
Response Time	Dependent on pressure range - typically less than 0.25 sec for 3-15 psig units	
Supply Pressure Sensitivity	<± 0.1% of span per psig (<± 0.15% of span per 0.1 bar)	<± 0.1% of span per psig, ± 2.0% max.

### Physical Specifications

Housing	NEMA 1 (standard); NEMA 4X (IP65) (optional)
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<b>Port Sizes</b>	1/4" NPT (Pneumatic) 1/2" NPT (Electric)	1/4" NPT (Pneumatic) 1/2" NPT (Electric)
<b>Media</b>	Clean, dry, oil-free, instrument air, filtered to 40 micron	
<b>Electrical Connections</b>	Conduit 1/2" NPT (standard); DIN 43650 (optional)	
<b>Mounting</b>	Pipe, panel, or bracket	
<b>Weight</b>	2.1 lbs. (0.94 kg)	2.1 lbs. (0.94 kg)

## 2. DESCRIPTION AND INSTALLATION

### 2.1 Description

- 2.1.1 The ControlAir Type 500X converts a current or voltage input signal to a linearly proportional pneumatic output pressure. This versatile instrument is designed for control applications that require a high degree of reliability and repeatability at an economical cost.

### 2.2 Principle of Operation

- 2.2.1 The Type 500X 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 towards the nozzle and creates back pressure which acts as a pilot pressure to an integral booster relay. Input signal increases (or decreases for reverse acting) cause proportional output pressure increases.

Zero and Span are calibrated by turning adjust screws on the front face of the unit. Adjustment of the zero screw repositions the nozzle relative to the flexure. The span adjustment is a potentiometer that controls the amount of current through the coil.

### 2.3 Mounting

- 2.3.1 Unit may be pipe, panel, or bracket mounted. Mounting may be at any angle, though may require field adjustment. High external vibration may cause output fluctuations. Mounting in a vibration-free area is recommended.

### 2.4 Pneumatic Connections

- 2.4.1 The 1/4 NPT (1/4 BSP option) supply and output ports are marked "IN" and "OUT" respectively on the base of the unit. Clean all pipe lines to remove contamination before installation. Apply pipe compound to male threads of the air line only. Avoid getting compound in the air lines.

Clean dry instrument quality air must be used. To ensure optimum performance supply pressure should be regulated. To provide stable inlet pressure and prevent contamination of the internal section of the transducer the use of an Instrument Air Filter Regulator is recommended.

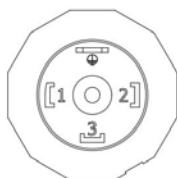
The two unmarked ports on the base of the unit are gage ports but may be used as alternative output ports. Any unused ports must be plugged.

**WARNING** The I/P transducer enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction and must be considered during installation.

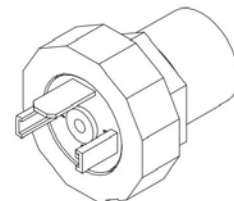
### 2.5 Electrical Connections

- 2.5.1 Electrical connections are made to the black and white leads extending out from the 1/2 NPT conduit fitting. When the side of the input signal is connected to the black lead, the output pressure will increase as the t signal increases.

**Figure 1 DIN 43650 Connector ("D" option)**



TERMINAL	CONNECTION
1	POSITIVE (+)
2	NEGATIVE (-)
3	NOT USED
⊕	GROUND (↕)



## 3. OPERATION

### 3.1 Calibration

3.2.1 Zero and Span should always be checked after mounting. If unit is calibrated in a vertical position and then mounted at an angle, readjustment of the zero is necessary. To calibrate use the following procedure:

1. Open protective covers to expose zero and span adjustment screws.
2. Connect the recommended air supply to the inlet of the transducer and an accurate pressure gage to the outlet.
3. Connect the electrical input and set the input signal to the minimum value of the range being used (e.g., 4 mA for a 4-20 mA unit).
4. Observe the output pressure. If necessary, adjust zero screw until reaching minimum output pressure setting. Turn zero screw counterclockwise to increase pressure, clockwise to decrease pressure.

**NOTE**

*If unable to achieve output during calibration process, turn zero adjustment screw counterclockwise for up to 30 revolutions, until output pressure rises.*

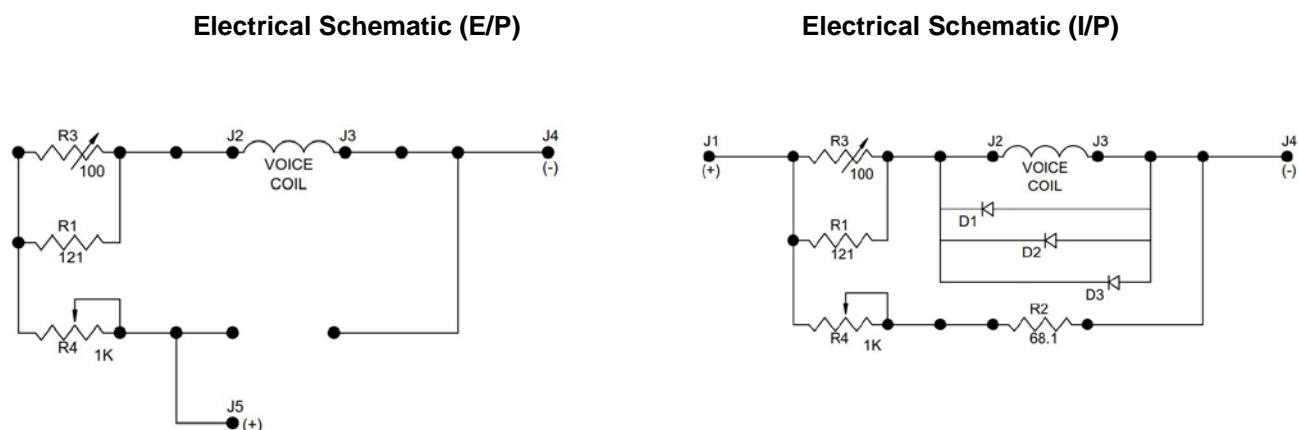
5. Increase electrical input signal to its maximum value (e.g., 20 mA for a 4-20 mA unit).
6. Observe the output pressure. If necessary, adjust the span screw until reaching maximum output pressure setting.

**NOTE**

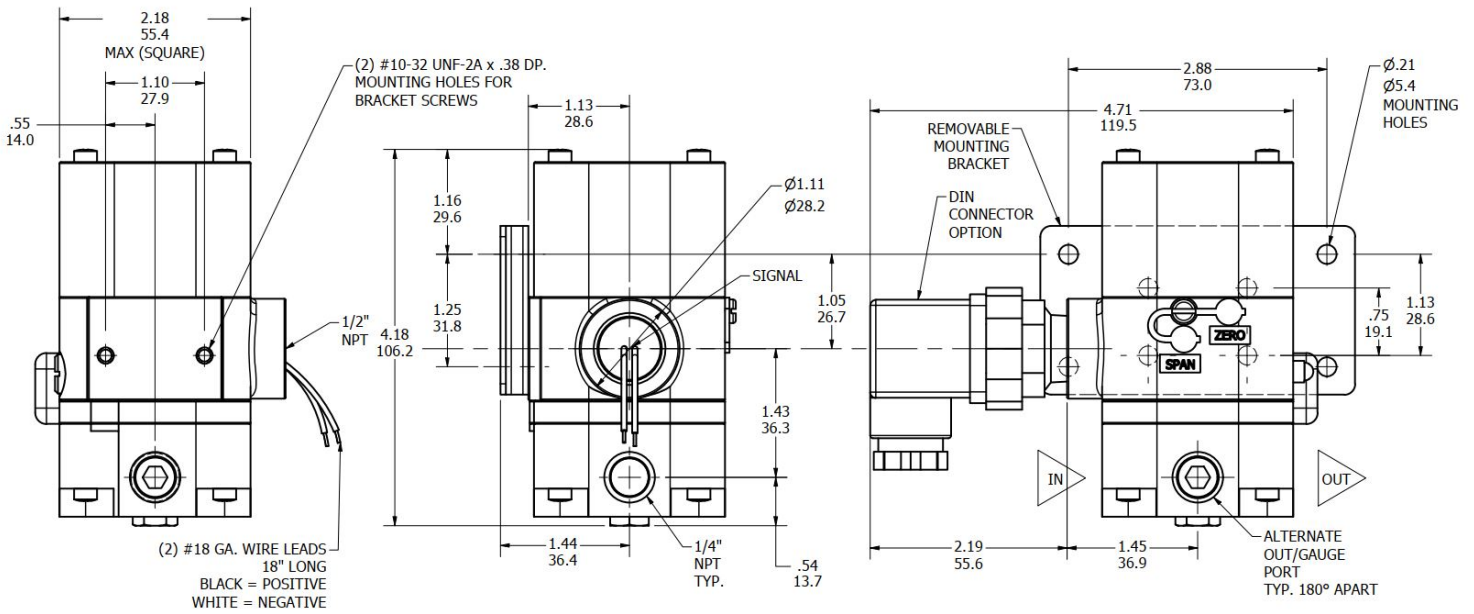
**For I/P (current) input models turn span screw counterclockwise to increase pressure, clockwise to decrease pressure. For E/P (voltage) input models turn span screw clockwise to increase pressure, counterclockwise to decrease pressure.**

7. The Zero and Span adjustments are interactive. After adjusting the span, it will be necessary to recheck the zero. Repeat steps 3-6 until both end points are at the required values.
8. **For reverse acting** performance interchange the black and white electrical signal leads and carry out the same input (4mA) to get maximum output then with maximum input (20mA) to get minimum output. Repeat as necessary. FM Approvals approved units must be ordered per specific model code.

Figure 2



### 3.2 Dimensional Drawings (Dimensions are in/mm)



### 3.3 Intrinsically Safe Operation

3.3.1 ControlAir LLC offers FM Approvals Intrinsically Safe/NEMA 4X Order input option 'A' 4-20 mA and option 'H'.

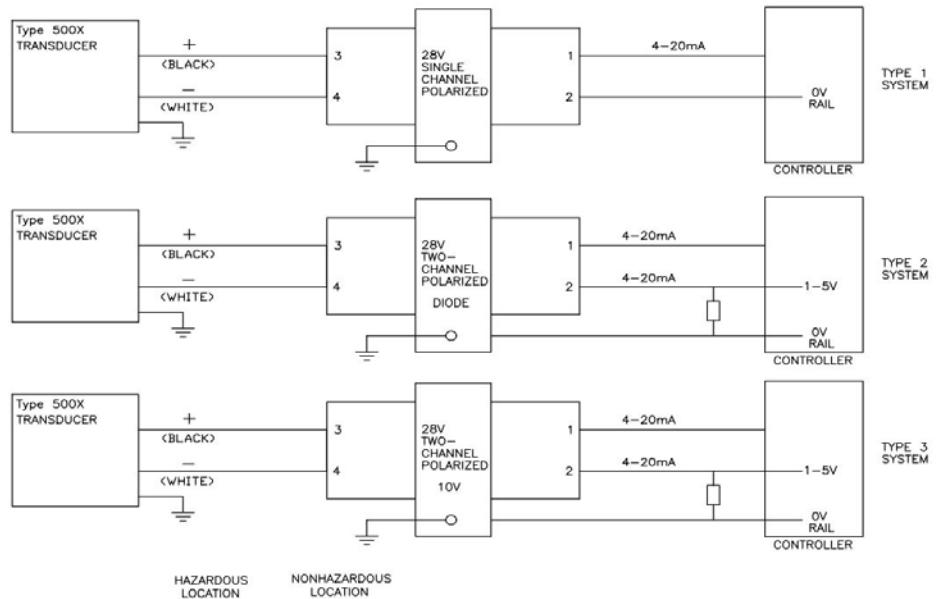


NOTES:

1. INSTALLATION TO BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE, NFPA 70, ARTICLE 504, AND ANSI/ISA RP 12.6.
2. APPARATUS CONNECTED TO THE SYSTEM SHALL NOT USE OR GENERATE VOLTAGE GREATER THAN 250 V.
3. INSTALL INTRINSICALLY SAFE BARRIERS IN ACCORDANCE WITH BARRIER INSTRUCTIONS.
4. FM APPROVALS APPROVED AS INTRINSICALLY SAFE FOR CLASS I, II, AND III, DIV. 1, GROUPS C, D, E, F AND G WHEN INSTALLED AS SHOWN.
5. FM APPROVALS APPROVED AS NONINCINDIVE FOR CLASS I, DIV. 2 GROUPS A, B, C AND D AND SUITABLE FOR CLASS II, DIV. 2 GROUPS F, G, AND CLASS III DIV. 1 AND 2. BARRIERS ARE NOT REQUIRED FOR NONINCENDIVE RATING. MAX V=30 VDC.
6. CAUTION: SUBSTITUTION OF COMPONENTS MAY VOID FM APPROVALS APPROVAL.
7. AMBIENT TEMPERATURE RANGE: -30°C TO 60°C.
8. FM APPROVALS APPROVED AS INTRINSICALLY SAFE FOR CLASS I, II AND III DIV. 1 GROUPS C, D, E, F, AND G WHEN USED ASSOCIATED APPARATUS. THE LINEAR BARRIER PARAMETERS MUST MEET THE FOLLOWING REQUIREMENTS:

Voc OR Vt <V max; Ca> Ci + Ccable  
Isc OR It <I max; La> Li + Lcable  
ENTITY PARAMETERS FOR MODEL 500-A\_H\_  
Vmax=30V Ci=0  
Imax=125mA Li=0mH  
Ci IS CAPACITANCE CONTRIBUTED BY THE TRANSDUCER  
Li IS INDUCTANCE CONTRIBUTED BY THE TRANSDUCER

9. FOR NEMA 4X OPTION, ADD H TO THE MODEL NUMBER. ONLY THE STANDARD 1/2NPT CONDUIT IS SUITABLE FOR NEMA 4X INSTALLATIONS.
10. MODELS WITH NEMA 4X OPTION ARE FM APPROVALS APPROVED FOR INDOOR/OUTDOOR USE PER THE REQUIREMENTS OF NEMA 4X AS DESCRIBED IN THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION STANDARD NO. 250 "ENCLOSURES FOR ELECTRICAL EQUIPMENT, 1000 VOLTS MAX".



## 4. MAINTENANCE

Under normal circumstances, no maintenance should be required. If clean dry air is not used the orifice can become blocked. To clean, first turn off supply air, unscrew and remove orifice assembly (large silver screw head located above the out port). Then unplug orifice by using a wire that has a smaller diameter than 0.015 in. (0.38 mm). Use compressed air to blow out any loose particles inside the orifice assembly. Screw orifice assembly back into unit.

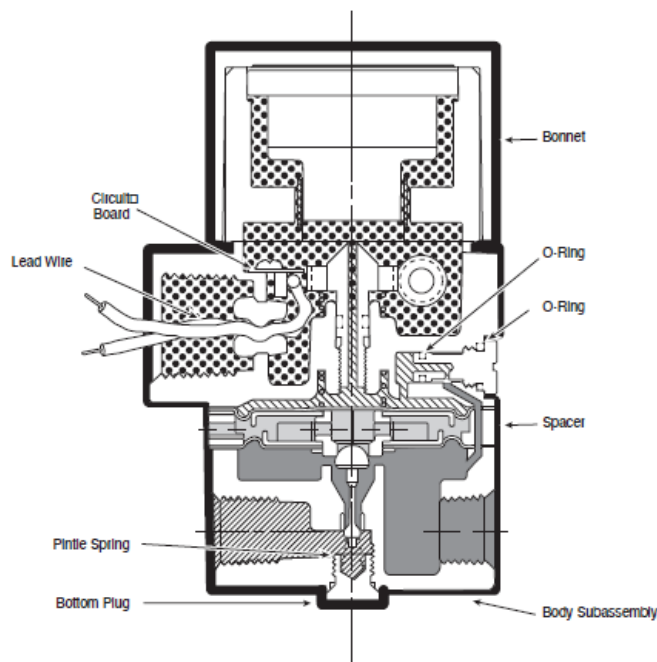
## 5. TROUBLESHOOTING

PROBLEM	CHECK
No or low output	Zero adjustment * Clogged orifice Supply pressure too low
Leakage	Connections
Low or improper span	Zero and Span adjustments Supply pressure too low Output leakage
Erratic operation	Electrical input signal Loose wires or connections Liquid in air supply

\*most common

### NOTE

***If problems are not solved by troubleshooting procedures, contact a factory application's engineer at (603) 886-9400 for further assistance.***



## 6. WARRANTY & DISCLAIMER

ControlAir LLC products are warranted to be free from defects in materials and workmanship for a period of eighteen months from the date of sale, provided said products are used according to ControlAir LLC recommended usages. ControlAir LLC's liability is limited to the repair, purchase price refund, or replacement in kind, at ControlAir, Inc.'s sole option, of any products proved defective. ControlAir LLC reserves the right to discontinue manufacture of any products or change products materials, designs or specifications without notice. Note: ControlAir does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for the proper selection, use, and maintenance of any ControlAir product remains solely with the purchaser and end user.

### WARNING

***These products are intended for use in industrial compressed-air systems only. Do not use these products where pressures and temperatures can exceed those listed under Specifications.***

Before using these products with fluids other than air, for non-industrial applications, life-support systems, or other applications not within published specifications, consult ControlAir LLC.