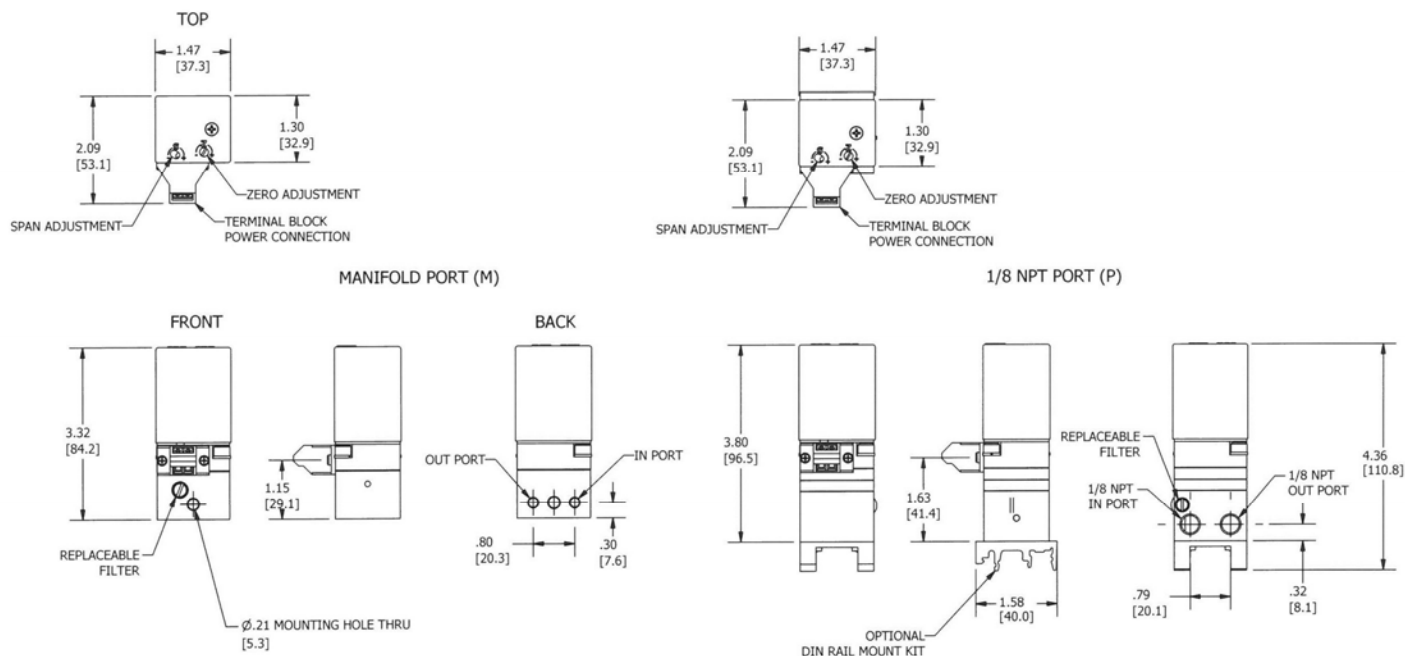


# Type 590X

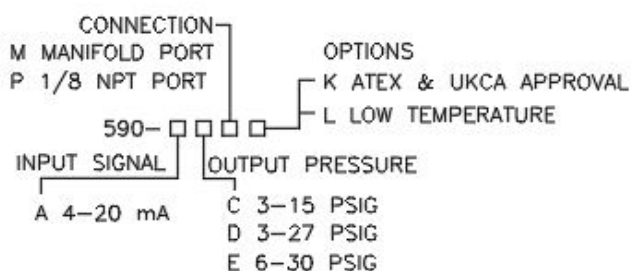
## I/P Transducer

### Installation, Operation and Maintenance Instructions



(Drawing downloads available at <http://www.controlair.com>)

Use this coding system to order:



### Contents

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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.**

## SPECIFICATIONS

### Functional Specifications

|  | M-Connection   | P-Connection   |
|--|--|--|
| <b>INPUT</b>   | 4-20 MA  |  |
| <b>Outputs</b>   | 3-15 psig 0.20-1.0 BAR<br>3-27 psig 0.20-1.8 BAR<br>6-30 psig 0.40-2.0 BAR               |  |
| <b>Air Consumption</b>   | 2.00 scfh @ 20 psig supply<br>4.94 scfh @ 85 psig supply<br>8.36 scfh @ 150 psig supply  | 6 scfh (170 NL/hr)   |
| <b>Supply Pressure</b><br>Note: Supply pressure must be a minimum of 5 psig (0.3 BAR) above maximum output | 150 psig (6.8 BAR) max.  | 3-15: 22 psig (1.5 BAR) max<br>3-27, 6-30: 42 psig (2.8 BAR) max |
| <b>Flow Capacity</b>   | Same as Air Consumption  | 2.4 scfm max.  |
| <b>Temperature Limits</b>  | -40°F to 185°F (-40°C to 85°C)<br>Low Temperature Option: -67°F to 158°F (-55°C to 70°C) |  |
| <b>Relative Humidity</b>   | 75% average - 95% short time non-condensing  |  |
| <b>Impedance</b>   | 260 Ohms @ 70°F (21°C)   |  |
| <b>Loop Load</b>   | 5.2 Volts @ 70°F (26°C)  |  |

### Performance Specifications

|                                |   |                         |
|--------------------------------|---|-------------------------|
| <b>Linearity (Independent)</b> | <±0.5% of span                          |                         |
| <b>Hysteresis</b>              | <±0.3% of span                          |                         |
| <b>Deadband</b>                | <±0.1% of span                          |                         |
| <b>Repeatability</b>           | <±0.3% of span; <±0.15% of span typical |                         |
| <b>Mounting Orientation</b>    | <±0.5% / 90-degree change               |                         |
| <b>Air Supply Sensitivity</b>  | <±0.6% / 25 psig change                 | < .3% / 1.5 psig change |
| <b>Vibration Effect</b>        | <±1% up to 10g and 20-80 Hz             |                         |
| <b>Temperature Effect</b>      | <±0.75% / 10°F change                   |                         |

### Physical Specifications

|                               |  |  |
|-------------------------------|--|--|
| <b>Housing</b>                | NEMA 1 (IP 20)   |  |
| <b>Port Sizes</b>             | 1/8" NPT (P-Connection)  |  |
| <b>Media</b>                  | Clean, dry, oil-free, instrument air, filtered to 40 micron  |  |
| <b>Electrical Connections</b> | Terminal block   |  |
| <b>Mounting</b>               | Pipe, DIN rail or manifold   |  |
| <b>Materials</b>              | Housing: Chromate-treated aluminum, plastic<br>Elastomers: Buna-N<br>Trim: Stainless steel; brass; zinc-plated steel<br>Cover: Polypropylene |  |
| <b>Weight</b>                 | 0.75 lbs (0.34 kg)   |  |

# 1. INSTALLATION AND APPROVALS

## 1.1 Pre-Installation Requirements

1.1.1 Environment: Suitable for installation in the following locations:

- Intrinsically safe operation in hazardous locations indoors (Nema 1)
- See section 1.5, 1.6 and 1.7 for Factory Mutual (FM), Canadian Standards (CSA) and ATEX/UKCA approvals.

### DANGER

**All wiring must be made to all local and national codes appropriate to the area of installation.**

1.1.2 Electrical Input: 4-20 mA dc current source.

1.1.3 Air supply: Clean, dry, oil free instrument air filtered to 40 micron.

### NOTE

**Clean all pipe lines to remove dirt and scale prior to installation. Failures attributable to instrument air supply contamination are not covered by the warranty.**

### CAUTION

**This instrument vents to atmosphere. The use of supply gas other than air can create a hazardous environment.**

### WARNING

**Specific Conditions of Use:**

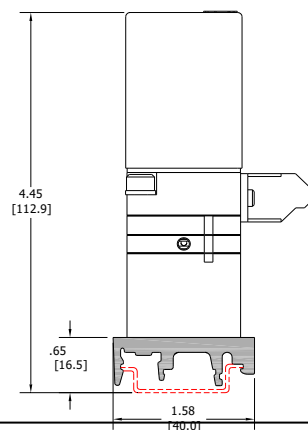
1. The non-metallic cover of the I/P transducer is considered to constitute an electrostatic discharge hazard. Clean only with a damp cloth.
2. The I/P transducer enclosure's metal base must be mounted as part of a bonded structure.
3. The I/P transducer enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction and must be taken into account during installation.
4. The Type 590 I/P Transducer shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1.
5. The Type 590 I/P Transducer shall be installed in an enclosure that provides a minimum ingress protection of IP 54 in accordance with IEC 60079-0.
6. The User shall permanently mark the protection type chosen. Once the type of protection has been marked, it shall not be changed.



## 1.2 Mounting

1.2.1 The Type 590X in the ported ("P") version can be mounted to a DIN-rail using ControlAir part number 445-766-024. This will allow the transducer to mount to DIN 50045, 50035, 50022 rails (see figure 1).

**Figure 1 – DIN Rail mounting kit 445-766-024**



### 1.3 Pneumatic Connections

- 1.3.1 Clean all pipe lines to remove dirt and scale prior to installation.
- 1.3.2 Supply air must be filtered to 40 microns and free of moisture and lubricants.
- 1.3.3 One 1/8" NPT port is provided for supply air connection.
- 1.3.4 One 1/8" NPT port is provided for pneumatic output connection.

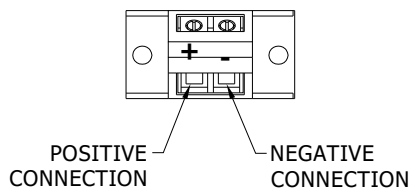
### 1.4 Electrical Connections

- 1.4.1 The Type 590X is a two-wire device (does not require a separate power source). It requires a variable input current of 4-20 mA.
- 1.4.2 Electrical connection is made to the positive (+) and negative (-) terminals. For direct acting operation connect the positive side of the input signal to the (+) terminal (see figure 2).

#### NOTE

*The use of shielded cable is recommended.*

**Figure 2 – Terminal Block Connections**



| Terminal | I/P Connection |
|----------|----------------|
| +        | Positive (+)   |
| -        | Negative (-)   |

### 1.5 FM Approvals (FM) & Canadian Standards (CSA) Approvals

Intrinsically Safe:

Class I, Div. 1, Groups A, B, C, D

Suitable for:

Class I, Div. 2, Groups A, B, C, D

Temp. Code T4 Ta=75°C

Entity Parameters

Ui (Vmax) = 40 VDC

Ii (Imax) = 150 mA

Ci = 0

Li = 0

Pi = 0.7 watts max.



Ex ia

### 1.6 ATEX & UKCA Approvals

|                  |                                |   |
|------------------|--------------------------------|---|
| Intrinsic Safety | FM07ATEX0002X<br>FM21UKEX0094X | II 1 G Ex ia IIC T* Ga Ta=-55°C to Ta max.    |
| Intrinsic Safety | FM07ATEX0003X                  | II 3 G Ex ic IIC T* Gc Ta=-55°C to Ta max     |
| Increased Safety | FM21UKEX0093X                  | II 3 G Ex ec ic IIC T6** Gc Ta=-55°C to +85°C |

\*See Table 1: Energy Limiting Parameters Table

\*\*Ui = 40 V ; Ii = 20 mA

**Table 1: Energy Limiting Parameters**

| Temperature Class | Ta max. | Ii     | Ui     | Pi      |
|-------------------|---------|--------|--------|---------|
| T6                | 60°C    | 50 mA  | 42.5 V | 0.53 W  |
| T6                | 55°C    | 60 mA  | 38.8 V | 0.58 W  |
| T5                | 70 °C   | 60 mA  | 38.8 V | 0.58 W  |
| T5                | 55°C    | 100 mA | 30.0 V | 0.75 W  |
| T5                | 45°C    | 120 mA | 28.0 V | 0.84 W  |
| T4                | 85°C    | 60 mA  | 38.8 V | 0.58 W  |
| T4                | 85°C    | 100 mA | 30.0 V | 0.75 W  |
| T4                | 80°C    | 120 mA | 28.0 V | 0.84 W  |
| T4                | 70°C    | 150 mA | 25.5 V | 0.95 W  |
| T5                | 85°C    | 23 mA  | 6.75 V | 0.038 W |



II 1G  
II 3G



2809



1725

1.7 INSTALLATION DRAWING  
NO. 431-990-047

- 1. (North America) Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
- 2. (North America) The IS Barriers or Equipment (Associated Apparatus) must be FM Approved, and CSA certified and the configuration of associated Apparatus must be FM Approved, and CSA certified under the Entity Concept. The Associated Apparatus may be installed within the Hazardous (Classified) location for which it is certified. The Associated Apparatus and hazardous location loop apparatus manufacturer's control drawings must be followed when installing this equipment. An AEx [ib] Associated Apparatus is suitable only for connection to Class I, Zone 1, Hazardous (Classified) Locations and is not suitable for Class I, Zone 0, or Class I, Division 1 Hazardous (Classified) Locations.  
(ATEX) The IS Barriers or other Associated Apparatus shall comply with the ATEX directive 2014/34/EU. Permissible configurations are shown to the right or see Note 8.
- 3. (US) Installation should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and Article 500 of the National Electrical Code (ANSI/NFPA 70)  
(Canada) Installation should be in accordance with Section 18 of the Canadian Electrical Code.  
(ATEX) Installation shall be in accordance with the applicable local installation rules Energy Limitation Parameters specified.
- 4. (North America) Units must be mounted in a suitable enclosure for Type 4X installations.
- 5. (North America) Units are suitable for Class I, Division 2, Groups A, B, C, and D hazardous (classified) locations. Transducers to be installed in accordance with the (US) National Electrical Code (ANSI/NFPA 70) Division 2 hazardous (classified) location wiring techniques. (Canada) Canadian Electrical Code.
- 6. The Intrinsic Safety Entity concept allows the interconnection of two Intrinsically safe devices with entity parameters not specifically examined in combination as a system when:

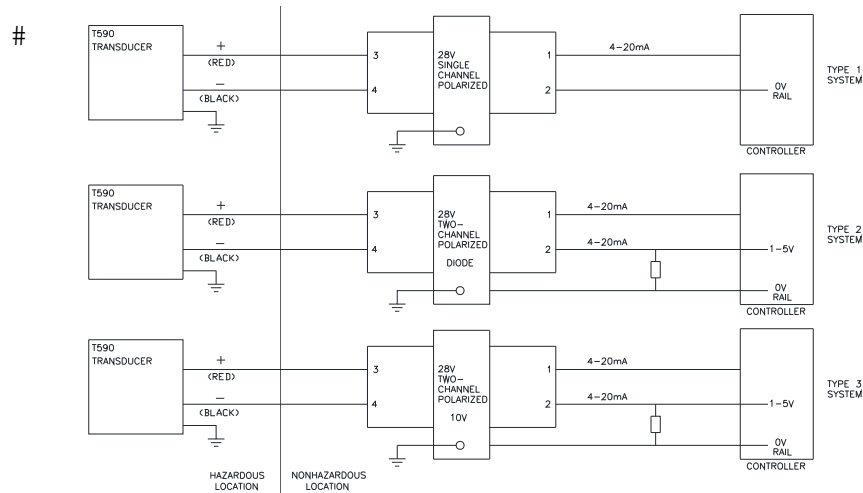
|  |   |             |
|--|---|-------------|
| $U_i \text{ or } V_{max} > U_o \text{ or } V_o$                    | $C_a \text{ or } C_o > C_i + C_{\text{cable}}$    | $P_i > P_o$ |
| $I_i \text{ or } I_{max} > I_o \text{ or } I_{sc} \text{ or } I_t$ | $L_a \text{ or } L_o > L_i \div L_{\text{cable}}$ |             |

Entity Parameters for: Type 590X

|                                  |           |                           |
|----------------------------------|-----------|---------------------------|
| $U_i (V_{max}) = 40 \text{ V}$   | $C_i = 0$ | $P_i = 0.7 \text{ watts}$ |
| $I_i (I_{max}) = 150 \text{ mA}$ | $L_i = 0$ |                           |

- 7. No revision to this drawing is permitted without prior FM Approval and CSA Certification.
- 8. The energy limiting parameters in Table 1 are for single channel resistively limited barriers.

Barrier Configurations



## 1.8 EU Declaration of Conformity



We, ControlAir LLC  
8 Columbia Drive  
Amherst, NH 03031

Declare that the Type 590X Transducer family to which this declaration applies:

Conforms to the emissions requirements of  
EN 61326-1: 2013 Clause 7.2, Class A

Conforms to the immunity requirements of  
EN 61326-1: 2013 Table 2

Following the provisions of EMC directive 2014/30/EU

EN IEC 60079-0:2018  
EN IEC 60079-7:2015+A1:2018  
EN 60079-0:2018  
EN 60079-11:2012

Following the provisions of ATEX directive 2014/34/EU & UKCA

## 2. OPERATION

### 2.1 Calibration

2.1.1 All units are shipped from the factory calibrated, direct acting.

#### NOTE

*Factory calibration is susceptible to shift due to handling during transit. ControlAir recommends that all units be recalibrated prior to use.*

2.1.2 Though the units are shipped fully calibrated it is suggested that the user check the calibration to ensure that settings and operation match the application requirements.

### 2.2 Direct Acting Calibration

2.2.1 In direct acting operation the unit is calibrated so that minimum input signal corresponds to minimum output pressure and increasing input signal results in increasing output pressure.

2.2.2 Apply the minimum input signal of the range being used (e.g., 4 mA).

2.2.3 Observe the output pressure. If necessary, adjust the zero screw until reaching minimum output pressure setting. Turn zero screw clockwise to increase and counterclockwise to decrease.

2.2.4 Apply the maximum input signal of the range being used (e.g., 20 mA for a 4-20 mA unit).

2.2.5 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 clockwise to increase pressure, counterclockwise to decrease pressure.*

2.2.6 After setting the span it will be necessary to recheck the zero. Repeat steps 1-4 until both end points are at required values.

### 2.3 Reverse Acting Calibration

2.3.1 For reverse acting calibration, consult the factory.

## 3. MAINTENANCE AND REPAIRS

### NOTE

*Under normal circumstances, no maintenance should be required.*

### 3.1 Instrument Air Filtration

- 3.1.1 Failures due to instrument supply air contamination are not covered by warranty.
- 3.1.2 Use of oil and/or water saturated instrument air can cause erratic operation.
- 3.1.3 Poor quality instrument air can result in unit failure. It is recommended that a filter regulator (such as ControlAir Type-300) be placed upstream of each unit where oil and/or water laded instrument air is suspected.

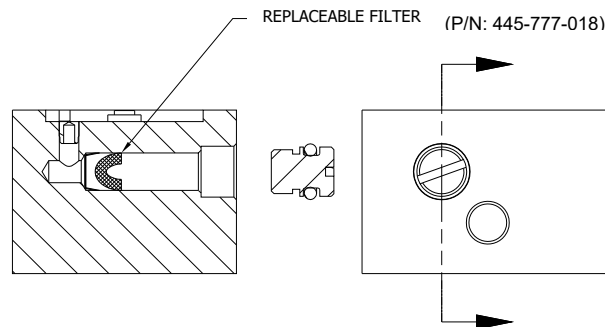
### 3.2 Factory Repairs

- 3.2.1 In the event of unit failure, the Type-590X can be returned to the factory through point of purchase for warranty repair if the warranty period has not expired.
- 3.2.2 All units returned for repair must be authorized prior to receipt at the factory. Contact a representative at the point of purchase to receive a Return Authorization Number.

### 3.3 Filter Replacement

- 3.3.1 Supply pressure can become obstructed should the felt filter element become clogged. To replace filter (P/N: 445-777-018), remove slotted plug and carefully remove filter using tweezers. Ensure no dust or dirt particles remain in filter chamber. Insert new filter into chamber in orientation as shown in figure 3. Replace slotted plug, ensuring O-ring is properly seated.

**Figure 3 – Replacing Filter**



## 4. TROUBLESHOOTING

| PROBLEM                       | LOOK FOR   | SOLUTION  |
|-------------------------------|--|---|
| No or low output              | Zero adjustment<br>Clogged filter<br>Supply pressure too low | Reset zero (2.2.3)<br>Replace filter (see figure 3)<br>Increase supply pressure (see specs)       |
| Unstable / low output         | Electrical connection  | Check connection/signal (1.1.2)   |
| Erratic operation             | Liquid/contamination in air supply                           | Clean air supply (1.1.3)  |
| Output equals supply pressure | Improper pneumatic connections                               | Ensure that supply is connected to "IN" port and output is connected to "OUT" port (1.3.3, 1.3.4) |

### NOTE

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

## 5. 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 LLC'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 Specification*