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# FAIRCHILD T7800 STANDARD RANGE MINIATURE ELECTRO-PNEUMATIC TRANSDUCER

## Installation, Operation and Maintenance Instructions

**Figure 1. Model T7800 Standard Range Transducer Identification Number System**

**Identification Number**    T    7800 -

**Electrical Connections**

- 1/2 NPT Conduit (A)
- Fitting with Pigtail (A)
- Terminal Block (T)
- DIN 43650 Connection (D)
- Rack Mount (R)

**Underwriting Group**

- Factory Mutual (F)
- Canadian Standard (C)
- ATEX (E)

**Approval Class**

- Intrinsically Safe<sup>1</sup> (I)
- Non-Incendive (Division 2)<sup>2</sup> (N)

**Input**

- 4-20mA (4)
- 1-5 VDC (5)
- 0-5 VDC (7)
- 1-9 VDC (9)
- 0-10 VDC (0)

**Output**

*Select appropriate psig, [BAR] or (kPa).*

- 3-15 psig (01)
- 3-27 psig (02)
- 6-30 psig (03)
- [0.2-1.0 BAR] (11)
- [0.2-1.8 BAR] (12)
- [0.4-2.0 BAR] (13)
- (20-100 kPa) (21)
- (20-180 kPa) (22)
- (40-200 kPa) (23)

<sup>1</sup> Intrinsically Safe approval, including non-incendive (Division 2), on 4-20 mA units only.

<sup>2</sup> Non-incendive (Division 2) approval on FM voltage input units only.

### GENERAL INFORMATION

The Model T7800 Series of Electro-Pneumatic Transducer converts a DC input signal to a linearly proportional pneumatic output pressure.

### SPECIFICATIONS

Functional Specifications			
	psig [BAR] (kPa)	psig [BAR] (kPa)	psig [BAR] (kPa)
<b>Output Range</b>	3-15 [0.2-1.0] (20-100)	3-27 [0.2-1.8] (20-180)	6-30 [0.4-2.0] (40-200)
<b>Input Range</b>	4-20 mA DC, 0-10 VDC, 1-9 VDC, 0-5 VDC, 1-5 VDC		
<b>Supply Pressure</b>	20-120 [1.5-8.0] (150-800)	32-120 [2.2-8.0] (220-800)	35-120 [2.4-8.0] (240-800)
<b>Minimum Span</b>	5 [0.35] (35)	10 [0.7] (70)	10 [0.7] (70)

Air Consumption	Set Point			
	3 psig [0.2 BAR] (20 kPa)	9 psig [0.6 BAR] (60 kPa)	15 psig [1.0 BAR] (100 kPa)	30 psig [2.0 BAR] (200 kPa)
<b>All Ranges (SCFH)</b>	3.5 (.10 m <sup>3</sup> /HR)	7.0 (.20 m <sup>3</sup> /HR)	9.5 (.27 m <sup>3</sup> /HR)	13.5 (.38 m <sup>3</sup> /HR)
<b>Flow Rate (SCFM)</b>	2.5 (4.25m <sup>3</sup> /HR) @ 25 psig, [1.7 BAR], (170 kPa) supply & 9 psig, [0.6 BAR], (60 kPa) output.		9.0 (15.3m <sup>3</sup> /HR) @ 120 psig, [8.0 BAR], (800 kPa) supply & 9 psig, [0.6 BAR], (60 kPa) output.	
<b>Temperature Range</b>	Operating . . . . . -40°F to +160°F (-40°C to +71.2°C) Storage . . . . . -40°F to +180°F (-40°C to +82.2°C)			
<b>Span/Zero Adjustments</b>	Screwdriver adjustments located on front of unit			
<b>Required Operating Voltages</b>	<b>Two Wire Current Input</b> 7.2 VDC @ 20 mA (4-20 mA signal)			
<b>Supply Voltage</b>	<b>Three Wire Voltage Input</b> 7-30 VDC, less than 3 mA			
<b>Signal Impedance</b>	<b>Three Wire Voltage Input</b> 10 Kiloohms			

**Specifications (continued)**

Performance Specifications			
Accuracy (ISA S51.1)	±0.25% Full Scale Guaranteed ±0.15% Full Scale Typical		
Hysteresis (ISA S51.1)	0.1% Full Scale		
Deadband	0.02% Full Scale		
Repeatability (ISA S51.1)	0.1% Full Scale		
Position Effect	No measurable effect		
Vibration Effect	Less than ±1% of Span under the following conditions: 5-15 Hz @ 0.8 inches constant displacement 15-500 Hz @ 10 g's.		
Reverse Polarity Protection	No damage occurs from reversal of normal supply current (4-20 mA) or from mis-application of up to 60 mA.		
RFI/EMI Effect	Less than 0.5% of span @ 30 V/m class 3 Band ABC (20 to 1000 MHz) per SAMA PMC 33.1 1978 and less than 0.5% of span @ 10 V/m level. 2 Ghz band per EN 61000-4-3:1998+A1 EMC Directive 89/336/EEC European Norms EN 61326.		
Supply Effect Pressure	No measurable effect		
Temperature Effect	±[0.5% + 0.04% / F° Temperature Change] of Span guaranteed		
Frequency Response	psig [BAR] (kPa)	psig [BAR] (kPa)	psig [BAR] (kPa)
	3-15 [0.2-1.0] (20-100)	3-27 [0.2-1.8] (20-180)	6-30 [0.4-2.0] (40-200)
	-3 db @ 5 Hz per ISA S26.4.3.1 load configuration A.		
Materials of Construction	Body and Housing . . . . . Chromate Treated Aluminum Orifice . . . . . Nickel Plated Brass & Sapphire Trim . . . . . Stainless Steel Brass & Zinc Plated Steel Elastomers . . . . . Nitrile Finish . . . . . Epoxy Powder Coating		

**HAZARDOUS AREA CLASSIFICATION**

**Factory Mutual (FM) Approvals:**

**Intrinsically Safe: (4-20 mA only)**

**(TDFI7800, TAFI7800)**

Class I, Division 1, Groups C and D;  
Class II, Division 1, Groups E, F, and G;  
Class III, Division 1, Fibers;  
NEMA 4X Enclosure;  
Temperature Code T4.

**(TTFI7800, TRFI7800)**

Class I, Division 1, Groups C and D;  
Temperature Code T4.

Entity Parameters	
V <sub>max</sub> <sup>1</sup> = 30 VDC	C <sub>i</sub> <sup>3</sup> = 0 μF
I <sub>max</sub> <sup>2</sup> = 200 mA	L <sub>i</sub> <sup>4</sup> = 0 mH
<sup>1</sup> V <sub>max</sub> = Maximum Voltage	<sup>3</sup> C <sub>i</sub> = Capacitance
<sup>2</sup> I <sub>max</sub> = Maximum Current	<sup>4</sup> L <sub>i</sub> = Inductance

**Non-Incendive: (4-20 mA and voltage input units)**

**(TDFI7800, TAFI7800, TDFN7800, TAFN7800)**

Class I, Division 2, Groups A, B, C and D;  
Class II, Division 2, Groups F, and G;  
Class III, Division 2;  
NEMA 4X Enclosure;  
Temperature Code T4.

**(TTFI7800, TRFI7800, TTFN7800, TRFN7800)**

Class I, Division 2, Groups A, B, C and D;  
Temperature Code T4.

**Canadian Standards Association (CSA) Approvals:**

**Intrinsically Safe: (4-20 mA only)**

**(TDCI7800, TACI7800)**

Class I, Division 1, Groups C and D;  
Class 11, Division 1, Groups E, F, and G;  
Type 4 Enclosure;  
Rated 4-20 mA, 30 VDC maximum;  
Temperature Code T6.

**(TTCI7800, TRCI7800)**

Class 1, Division 1, Groups C and D;  
Temperature Code T6.

Approvals are valid when connected through a Shunt Zener Diode Safety Barrier that meets the parametric requirements shown in the following table.

Parametric Requirements	
System Type 1:	Single Channel Polarized Rated: 28.5V Max. 300 Ohm Min.
System Type 2:	Dual Channel Polarized Rated: 28.5V Max. 300 Ohm Min. and 10V Max. 50 Ohm Min.
System Type 3:	Dual Channel Polarized Rated: 28.5V Max. 300 Ohm Min. and 28V Diode return per channel.

**Division 2 Approvals: (4-20 mA only)**

**(TDCI7800, TTCI7800, TRCI7800)**

Class I, Division 2, Groups A, B, C and D;  
Rated 4-20 mA, 30 VDC maximum;  
Temperature Code T6.

**(TACI7800)**

Class I, Division 2, Groups A, B, C and D;  
Class II, Division 2, Groups E, F, and G;  
Type 4 Enclosure;  
Rated 4-20 mA, 30 VDC maximum;  
Temperature Code T6.

**ATEX Approvals:**

**Intrinsically Safe: (4-20 mA only)**

**(TAEI7800, TDEI7800, TTEI7800, TREI7800)**

EEx ia IIB, T4 (-20° C to +72° C) ambient

⊕ II 1G (T4)

**(TAEI7800, TDEI7800)**

IP65 Enclosure

Transducer Parameters	
U <sub>max</sub> <sup>1</sup> = 28 V	W <sub>max</sub> <sup>3</sup> = 0.7 W
I <sub>max</sub> <sup>2</sup> = 100 mA	C <sub>eq</sub> <sup>4</sup> = 0
	L <sub>eq</sub> <sup>5</sup> = 0
<sup>1</sup> U <sub>max</sub> = Maximum Voltage	<sup>3</sup> W <sub>max</sub> = Maximum Power
<sup>2</sup> I <sub>max</sub> = Maximum Current	<sup>4</sup> C <sub>eq</sub> = Capacitance
	<sup>5</sup> L <sub>eq</sub> = Inductance



## INSTALLATION

You can mount the Model T7800 on a flat surface using two 10-32 Screws. For more information, see Figure 2.

The Model T7800 ships from the factory with Mounting Kit 16799-1 for Panel or Wall Mounting and Mounting Bracket Kit 16893-1 for Din Rail Mounting. For more information, see Figure 3 and Figure 7.

An optional mounting kit, 19254-1, is available to install the unit on a 2" pipe. For more information, see Figure 8.

## ATEX Directive- Special Conditions for Safe Use

The enclosure is manufactured from aluminum alloy. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered when the equipment is installed in locations that specifically require Group II, category 1G equipment.

**NOTE:** The TR7800 transducer is designed for use with the TR Rack Kit. Physically, it is the same as the TT7800 (Terminal Block) unit except that the terminal block has been rotated to the back. For more information, see Figure 6.

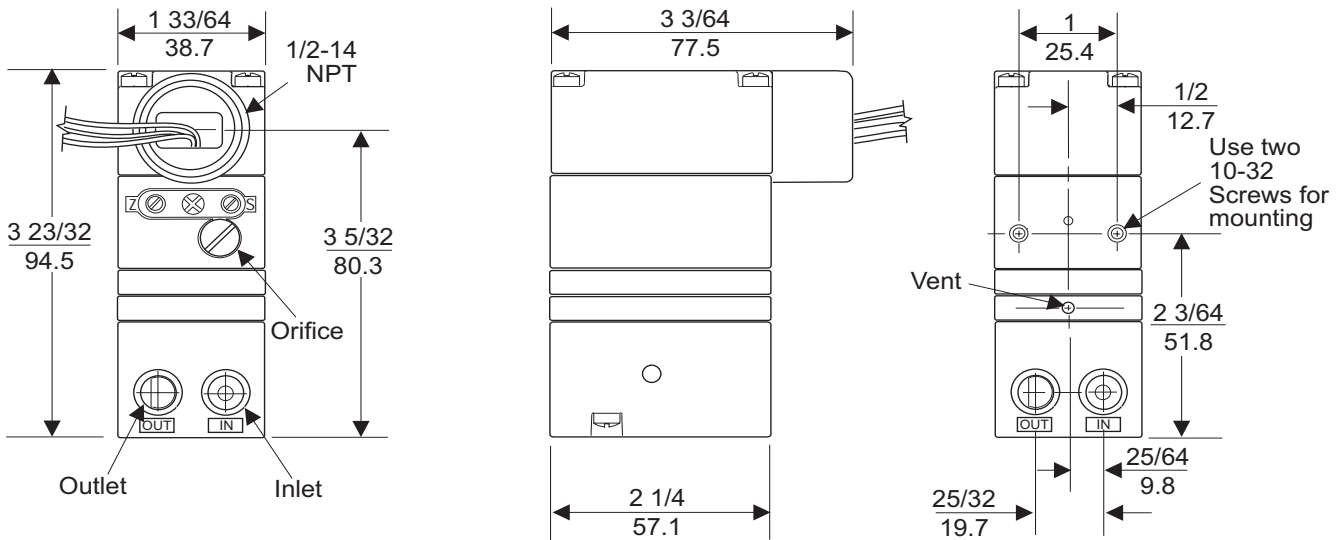
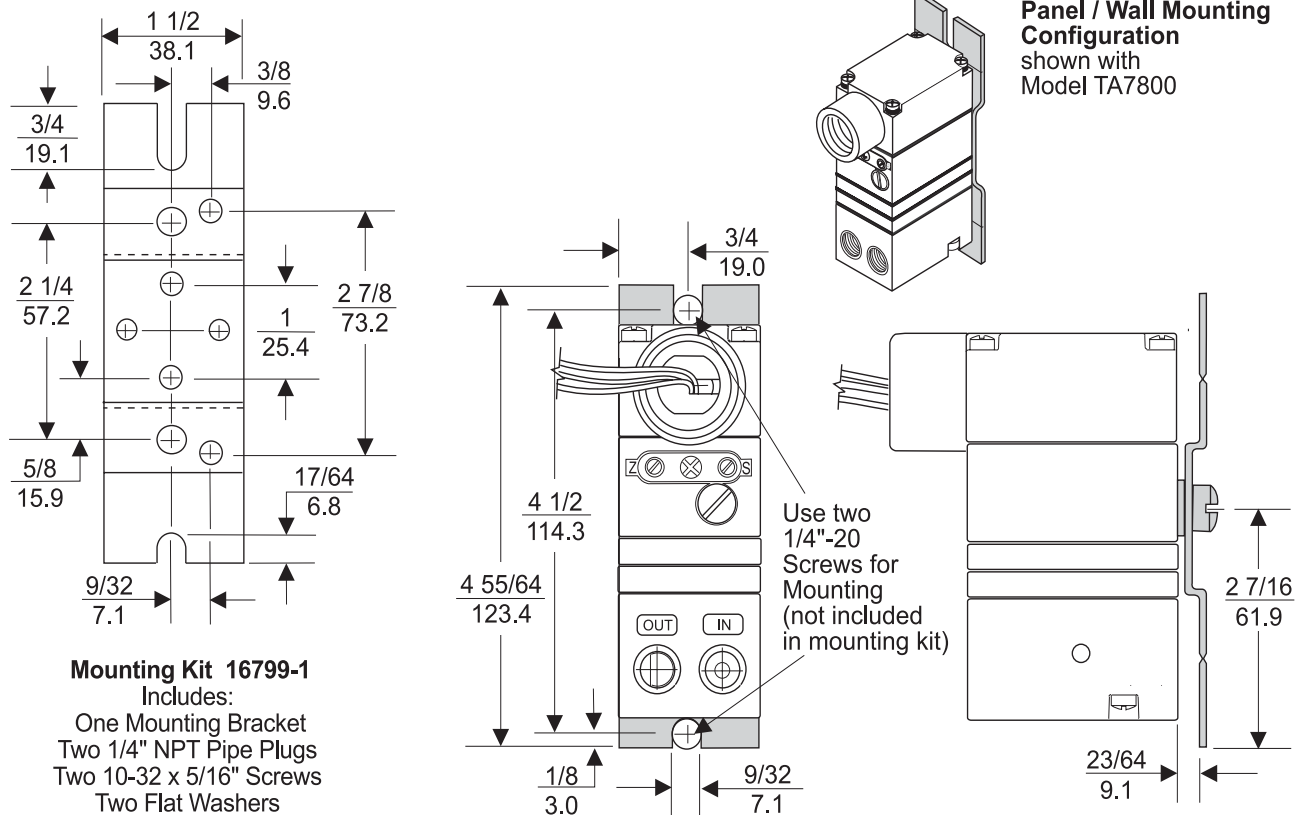


Figure 2. TA7800 Outline Dimensions



**Mounting Kit 16799-1**  
Includes:  
One Mounting Bracket  
Two 1/4" NPT Pipe Plugs  
Two 10-32 x 5/16" Screws  
Two Flat Washers

Figure 3. Mounting Kit 16799-1 (included with unit)

Installation (continued)

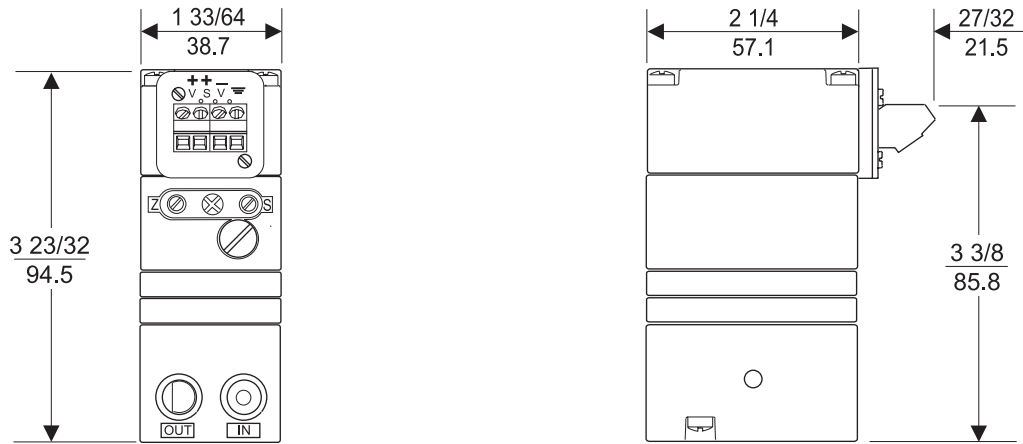


Figure 4. TT7800 Outline Dimensions

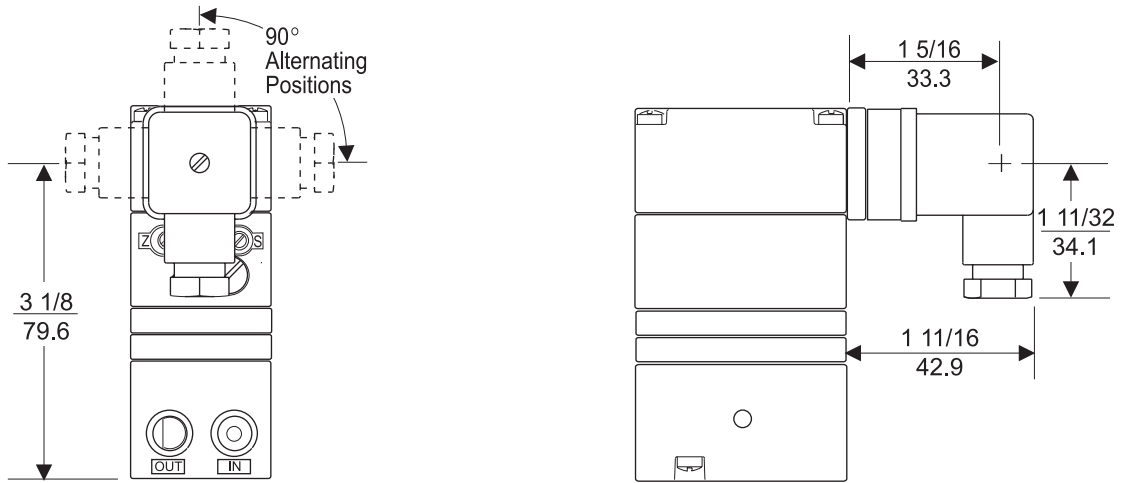


Figure 5. TD7800 Outline Dimensions

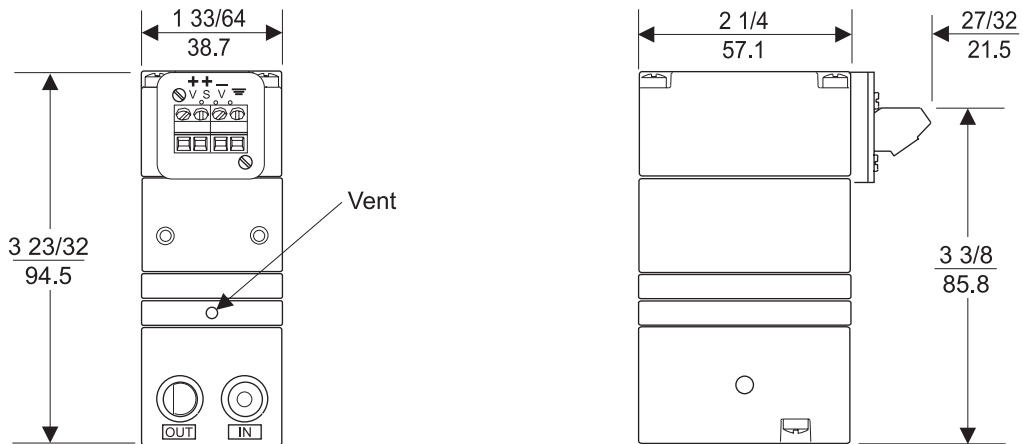
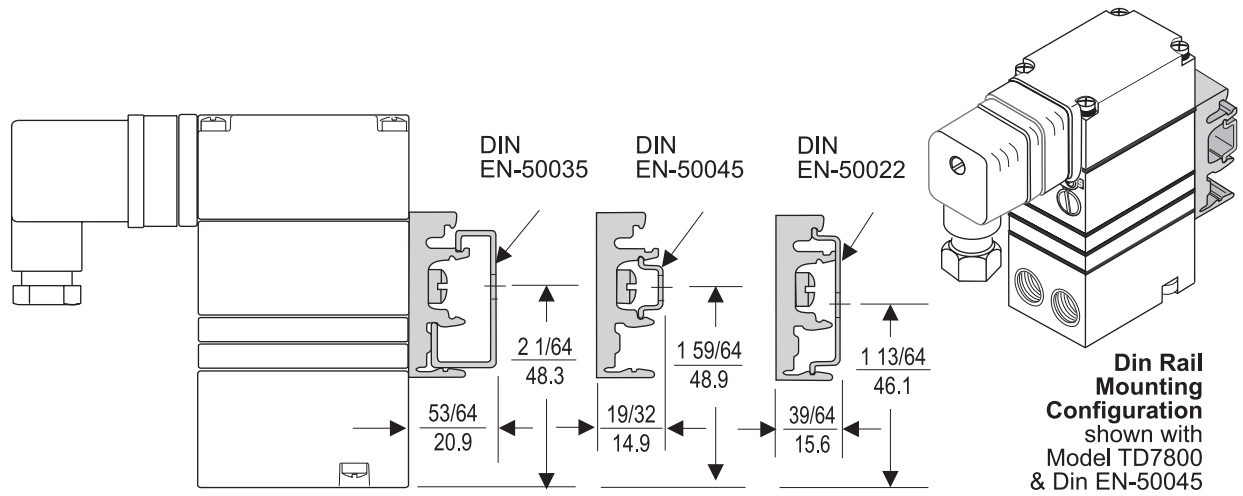
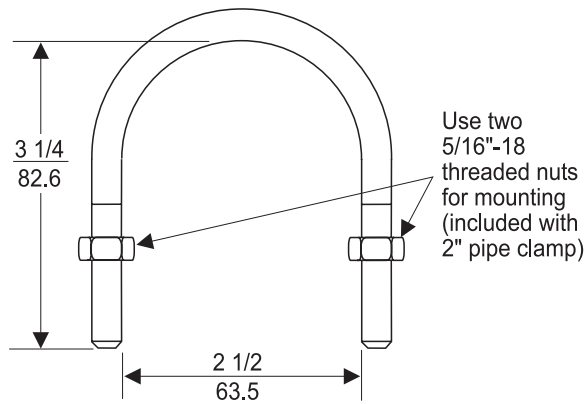


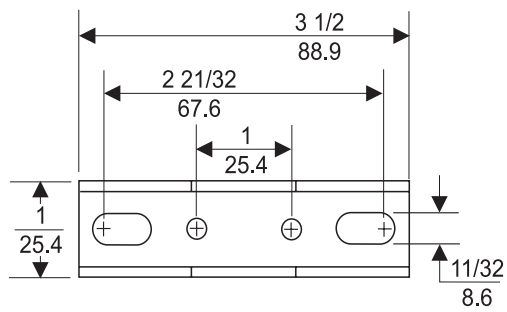
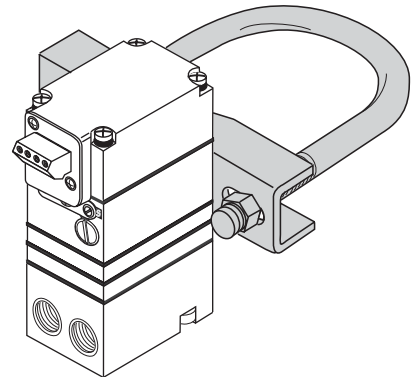
Figure 6. TR7800 Outline Dimensions



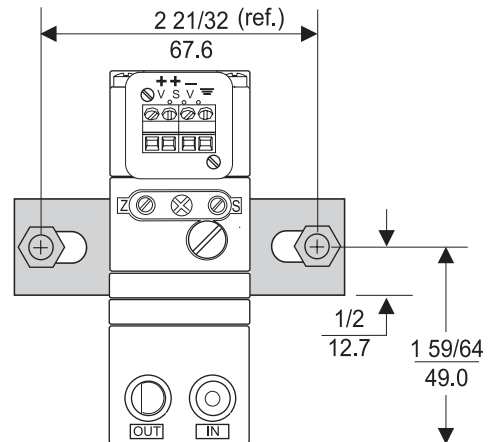
**Figure 7.** Din Rail Mounting Kit 16893-1 (included with unit)



**2" Pipe Mounting Configuration**  
shown with Model TT7800



**Optional Mounting Kit 19254-1**  
Includes:  
One Mounting Bracket  
One 2" Pipe Clamp  
Two 10-32 x 5/16" Screws



**Figure 8.** Optional Mounting Kit 19254-1 (sold separately)

## Pneumatic Connections

Clean all pipelines to remove dirt and scale before installation.

Apply a minimum amount of pipe compound to the male threads of the air line only. **Do not use teflon tape as a sealant.** Start with the third thread back and work away from the end of the fitting to avoid contaminating the transducer.

The inlet and outlet ports are labeled on the ends of the transducer. Tighten all connections securely. Avoid undersized fittings that will limit the flow through the transducer. For more information, see Figure 2.

**NOTE: Instrument quality air, per ISA Standards S7.3-1981, is required. Use a filter to remove dirt and liquid in the air line ahead of the transducer. If an air line lubricator is used, it MUST be located downstream to avoid interference with transducer performance.**

The user is responsible for ensuring that the environment in which the unit is installed and the operating gas are compatible with the materials in the transducer.

## Electrical Connections

Make connections to the Terminal Block, Conduit Connector or the DIN Connector as shown in Figure 9.

### Wiring in Hazardous Areas

Wiring in hazardous areas should comply with the codes in Table 1 and with any local codes that apply.

Country	Agency	Code
U.S.	FM	ANSI/ISARP 12.6 ANSI/NFPA70
Canada	CSA	CED Part 1
Europe	ATEX	EN 50 039, EN 60079-14, IEC60079-14

### Intrinsically Safe Connections

For more information, see the latest revisions of the drawings listed in Table 2.

Underwriting Group	Drawing Number
FM (Factory Mutual)	EC-18970
CSA (Canadian Standards)	EC-18971
ATEX	EC-18972

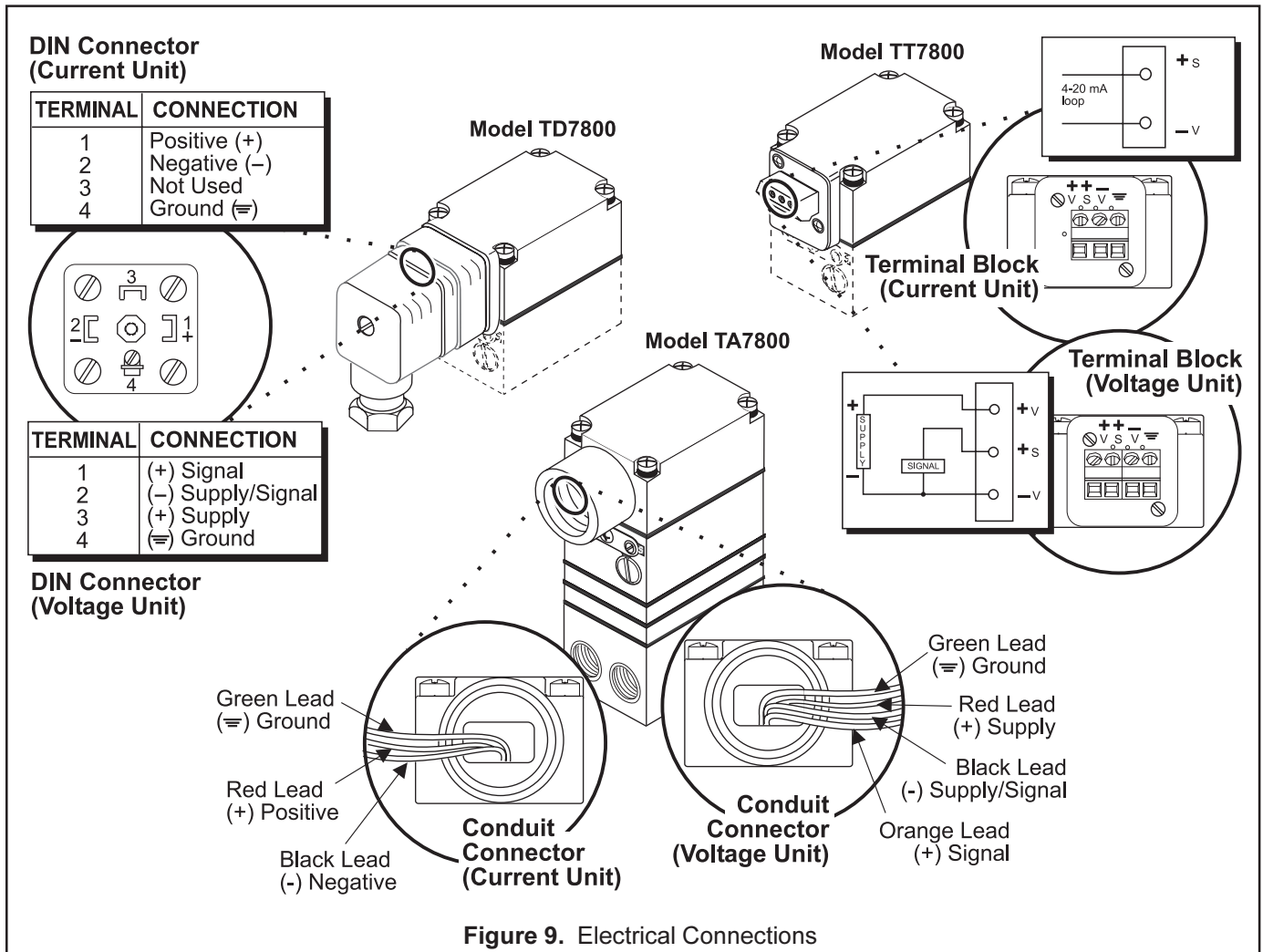


Figure 9. Electrical Connections

## CALIBRATIONS / ADJUSTMENTS

### Equipment Required for Calibration

- Pneumatic supply capable of delivering up to 120 psig
- Current supply capable of delivering up to 30 mA
- Pressure gauge capable of a digital readout up to 50 psig with an accuracy of 0.1%
- Digital volt meter capable of a readout up to 30 mA with an accuracy of .02%.

### The following adjustments are provided:

- Full Range Operation
- Lo/Hi Span
- Forward/Reverse Mode
- Calibration - Zero and Span
- Split Range Operation
- Damping Adjustments.

## FULL-RANGE OPERATION

### Lo/Hi Span Adjustment

1. Set the Lo/Hi Span Jumper to the **Lo** position for 3-15 psig output range. Set the Lo/Hi Span Jumper to the **Hi** position for 3-27 or 6-30 psig output range. For more information, see Table 3.

### Forward Acting Mode Adjustment

2. Set Fwd/Rev Mode Jumper to Forward position.
- **Forward Acting Calibration - Zero**
    3. Apply the minimum input signal and adjust the Zero Adjustment for minimum output pressure.
  - **Forward Acting Calibration - Span**
    4. Apply the maximum input signal and adjust the Span Adjustment for maximum output pressure.
    5. Repeat steps 3 and 4 until the desired output range is obtained.

### Reverse Acting Mode Adjustment

- NOTE: Do NOT reverse the input leads.**
6. Set Fwd/Rev Mode Jumper to the Reverse position.
- **Reverse Acting Calibration - Zero**
    7. Apply the maximum input signal and adjust the Zero Adjustment for minimum output pressure.
  - **Reverse Acting Calibration - Span**
    8. Apply the minimum input signal and adjust the Span Adjustment for maximum output pressure.
    9. Repeat steps 7 and 8 until the desired output range is obtained.

## SPLIT-RANGE OPERATION

### Lo/Hi Span Adjustment

1. Set the Lo/Hi Span switch to the **Lo** position for 3-9 psig or 9-15 psig output range and for 4-20 mA input range. Set the Lo/Hi Span Switch to the **Hi** position for 3-15 psig output range for 4-12 mA or 12-20 mA input range. For more information, see Table 4.

### Forward Acting Mode Adjustment

2. Set Fwd/Rev Mode Jumper to the Forward position.
- **Forward Acting Calibration - Zero**
    3. Apply the minimum input signal and adjust the Zero Adjustment for minimum output pressure.
  - **Forward Acting Calibration - Span**
    4. Apply the maximum input signal and adjust the Span Adjustment for maximum output pressure.
    5. Repeat steps 3 and 4 until the desired output range is obtained.

### Reverse Acting Mode Adjustment

- NOTE: Do NOT reverse the input leads.**
6. Set Fwd/Rev Mode Jumper to the Reverse position.
- **Reverse Acting Calibration - Zero**
    7. Apply the maximum input signal and adjust the Zero Adjustment for minimum output pressure.
  - **Reverse Acting Calibration - Span**
    8. Apply the minimum input signal and adjust the Span Adjustment for maximum output pressure.
    9. Repeat steps 7 and 8 until the desired output range is obtained.

## Additional Adjustments

- **Damping Adjustment**

The Damping Adjustment lets you tune the transducer for optimum response and stability in a particular application.

For best performance, start the Damping Adjustment at maximum adjustment, fully clockwise. Gradually turn counterclockwise until slight oscillation occurs. Turn back clockwise until oscillation is minimized. For more information, see Figure 10.

  1. Turn Damping Adjustment clockwise to increase damping function.
  2. Turn Damping Adjustment counterclockwise to decrease damping function.



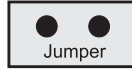
Calibrations / Adjustments (continued)

Input	Output			Span Position
	psig	BAR	(kPa)	
4-20 mA, 0-5, 1-5, 0-10 & 1-9 VDC	3-15	0.2-1.0	20-100	LO
	3-27 6-30	0.2-1.8 0.4-2.0	20-180 40-200	HI HI

Input	Output			Span Position
	psig	BAR	(kPa)	
4-20 mA, 0-5, 1-5, 0-10 & 1-9 VDC.	3-9 <sup>1</sup> 9-15 <sup>1</sup>	0.2-0.6 <sup>1</sup> 0.6-1.0 <sup>1</sup>	20-60 <sup>1</sup> 60-100 <sup>1</sup>	LO LO
	4-12, 12-20 mA, 0-2.5, <sup>2</sup> 2.5-5, 1-3, 3-5, 0-5, 5-10, 1-5, & 5-9 VDC.	3-15	0.2-1.0	20-100

<sup>1</sup> Split Range Output.  
<sup>2</sup> Split Range Input.

**LO SPAN SETTING**  
(Current & Voltage)



**HI SPAN SETTING**  
(Current & Voltage)

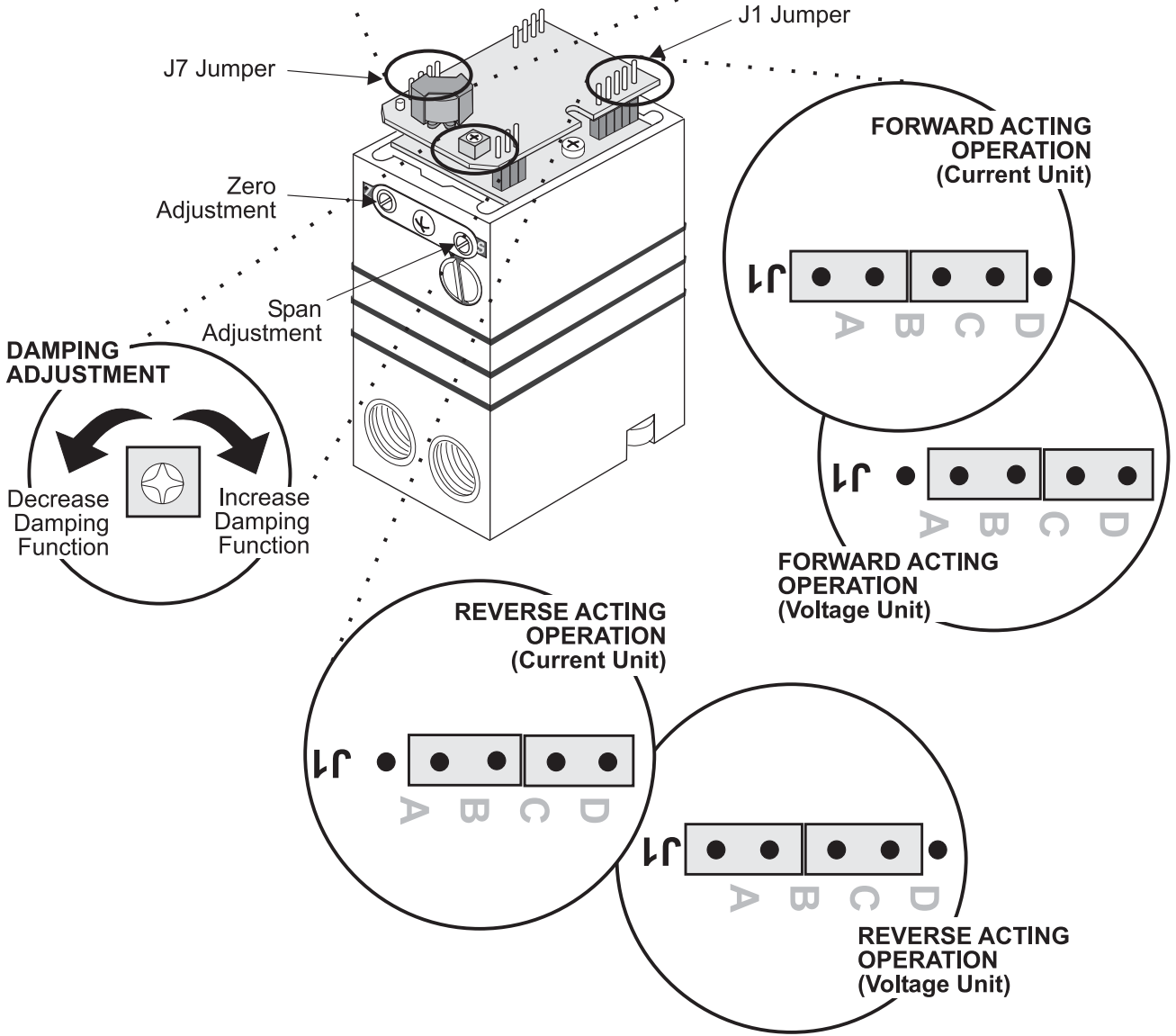
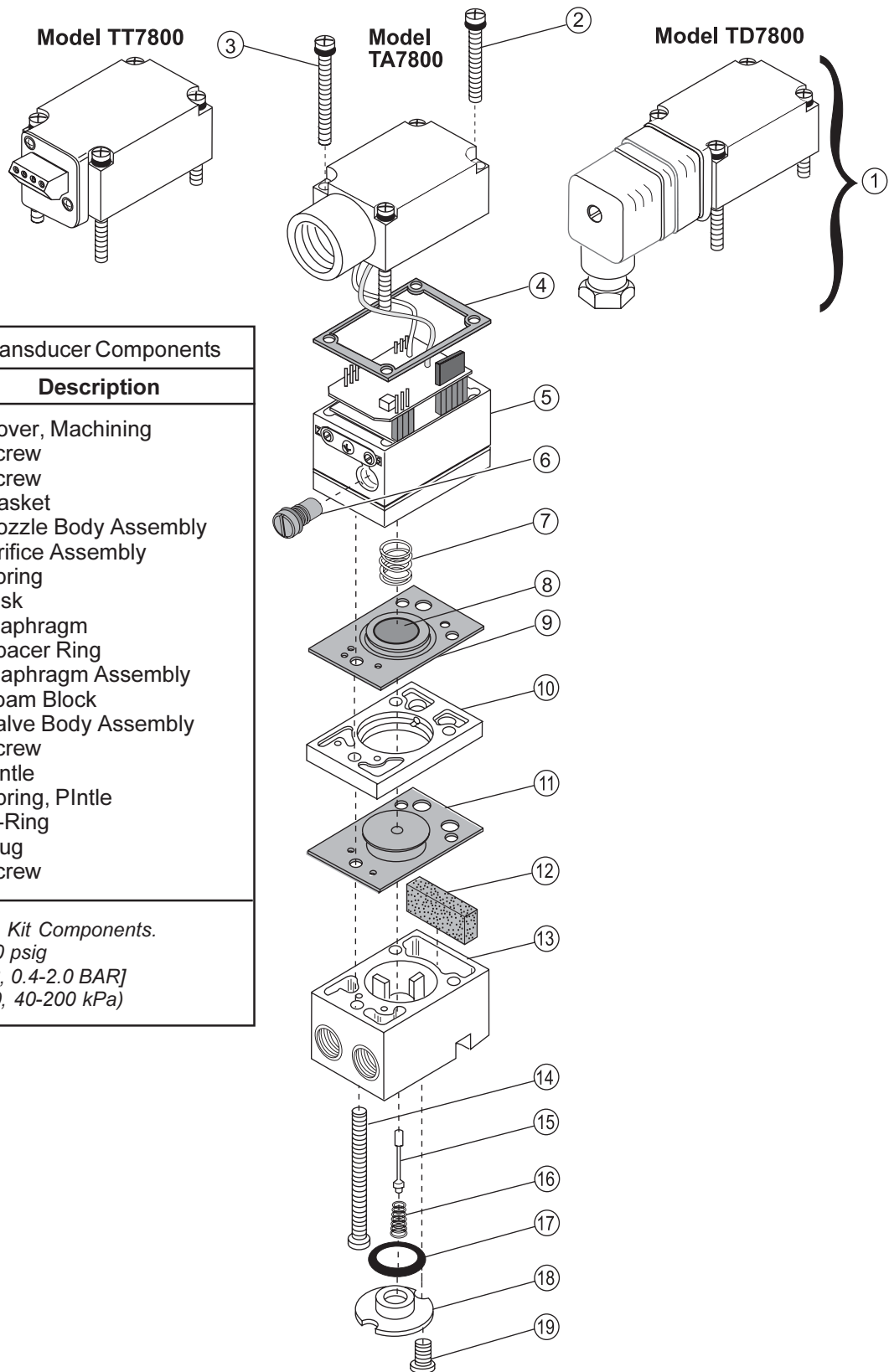


Figure 10. T7800 Calibration Configuration

# COMPONENTS



**Table 5. T7800 Transducer Components**

Item	Qty.	Description
1	1	Cover, Machining
2	2	Screw
3	2	Screw
4 <sup>1</sup>	1	Gasket
5	1	Nozzle Body Assembly
6 <sup>1</sup>	1	Orifice Assembly
7	1	Spring
8 <sup>1</sup>	1	Disk
9 <sup>1</sup>	1	Diaphragm
10	1	Spacer Ring
11 <sup>1</sup>	1	Diaphragm Assembly
12 <sup>1</sup>	1	Foam Block
13	1	Valve Body Assembly
14	3	Screw
15	1	Pintle
16	1	Spring, Pintle
17 <sup>1</sup>	1	O-Ring
18	1	Plug
19	2	Screw

<sup>1</sup> 19267-1 Service Kit Components.  
 3-15, 3-27, 6-30 psig  
 [0.2-1.0, 0.2-1.8, 0.4-2.0 BAR]  
 (20-100, 20-180, 40-200 kPa)

**Figure 11. Exploded Drawing**

## MAINTENANCE

To clean the Orifice, use the following procedure:

1. Shut off the valve that supplies air to transducer. **It is not necessary to remove the Transducer from the air line.**
2. Remove the Orifice Assembly (6) from the unit. For more information, see Figure 11.
3. Clean with alcohol and dry with compressed air.

**NOTES: 1. Parts must be completely dry before reassembling.**

2. If the standard maintenance procedure does not correct the problem, install the appropriate service kit.

## TROUBLESHOOTING

Problem	Solution (check)
No output	<ul style="list-style-type: none"><li>• Supply pressure</li><li>• Clogged orifice</li></ul>
Leakage	<ul style="list-style-type: none"><li>• Connections</li></ul>
Low or improper Span adjust	<ul style="list-style-type: none"><li>• Zero and Span adjust</li><li>• Low supply pressure</li><li>• Output leakage</li></ul>
Erratic operation	<ul style="list-style-type: none"><li>• DC signal</li><li>• Loose wires or connections</li><li>• Liquid in air supply</li></ul>

**WARNING: Transducer failure could result in output pressure increasing to supply pressure and possibly causing personal injury or damage to equipment.**

## LEGAL NOTICE

The information set forth in the foregoing Installation, Operation and Maintenance Instructions shall not be modified or amended in any respect without prior written consent of Fairchild Industrial Products Company. In addition, the information set forth herein shall be furnished with each product sold incorporating Fairchild's unit as a component thereof.



ISO 9001:2000  
Certified