

# STD5000 & STD6000

## Current to Pressure Transducers

User Guide

P/N MA45-5600-00

Revision F





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P/N MA45-5600-00

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# Revision History

Revision Level	Date	Comments
5F	--	--
A	06-2005	Revised per ECO 4882.
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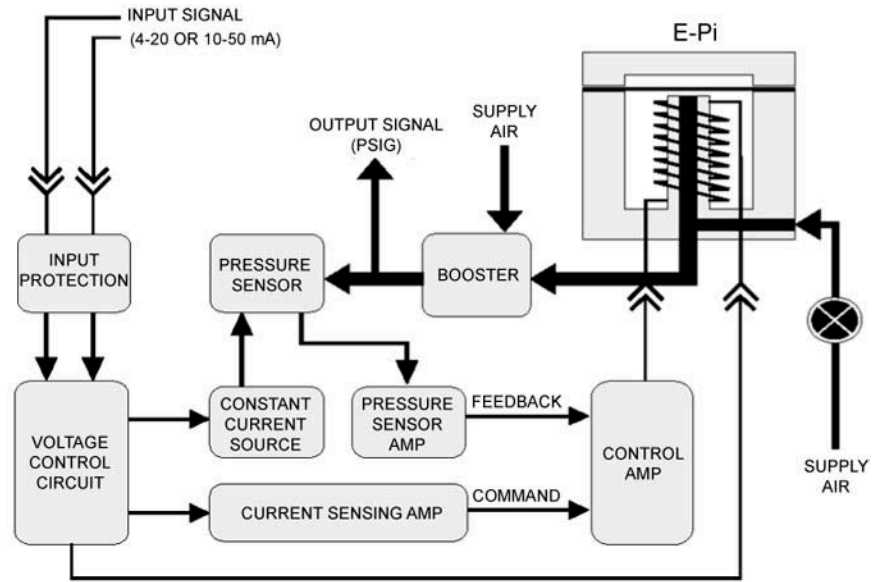
# Chapter 1

## Product Overview

Thermo Fisher Scientific's STD5000 and STD6000 current to pressure (I/P) transducers represent the highest standard in I/P technology. The rugged NEMA 4X housing, compact size, and plug-in E-Pi module coupled with Thermo Fisher's field proven technology make them the most accurate, reliable, and simplest I/P transducers to install, operate, and maintain in the industry.

Thermo Fisher's solid state current-to-pressure converter (E-Pi) technology uses minimal electrical energy and air consumption to convert an electronic input signal (4–20 or 10–50 mA) to a proportional pneumatic output signal (3–15 psig, 0.2–1 bar, etc.). The E-Pi transducer utilizes a virtually weightless membrane that is electromagnetically positioned over a nozzle to precisely modulate the pneumatic (backpressure) output. The low mass membrane is held in a continuously balanced position, providing an output that is unaffected by shock, vibration, or mounting position. The output of the E-Pi is then fed into an integral volume booster to deliver a pneumatic output signal with an output capacity of 4.0 standard cubic feet per minute (scfm).

The overall performance, accuracy, and repeatability are enhanced by employing an internal feedback network whose speed and resolution enable the transducer to quickly respond to input changes. The balanced supply and exhaust dynamics enhance control stability, while delivering accuracies of  $\pm 0.15$  to  $\pm 0.25$  percent of span.



**Figure 1-1.** Operation flow chart

## Chapter 2

# Installation & Wiring

### Requirements

1. Temperature: Ambient temperature must match specifications.
2. Mounting/Attitude: No restrictions.
3. Electrical input: Either a 4–20 or 10–50 mA dc current source. Shielded cable should be used and shield should be grounded to unit and earth ground. If cable contains shield and drain wire and metal conduit is NOT used, ground shield. If used, metal conduit should be grounded to earth ground. Refer to [Figure 2–4](#) for location of ground screw.
4. Air supply: Clean, dry, oil-free instrument air within acceptable pressure range for calibrated output.
  - a. Standard supply pressure should be  $20 \pm 2$  psi for 3–15 psig output and  $35 \pm 2$  psi for 3–27, 6–30, or 1–17 psig outputs.
  - b. Supply pressure for standard high pressure configurations should be 35–100 psig (2.4–6.9 bar).



**Note** The air line should be purged of all debris, oil, and water. Thermo Fisher strongly recommends using a coalescent external filter. Failures attributed to instrument air supply contamination are not covered by the warranty. ▲



**Note** If supply pressure is not within acceptable range, a regulator should be installed (contact Thermo Fisher). ▲



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

## Mounting

Refer to the dimensional drawings below (Figures 2–1 through 2–3) and the following:

- Instrument housing is designed for mounting to a standard valve yoke (2¼-inch bolt spacing) or a 2½-inch pipe.
- A valve mount kit consists of bolts and washers for mounting to the valve yoke.
- A pipe mount adapter accessory is available from Thermo Fisher.

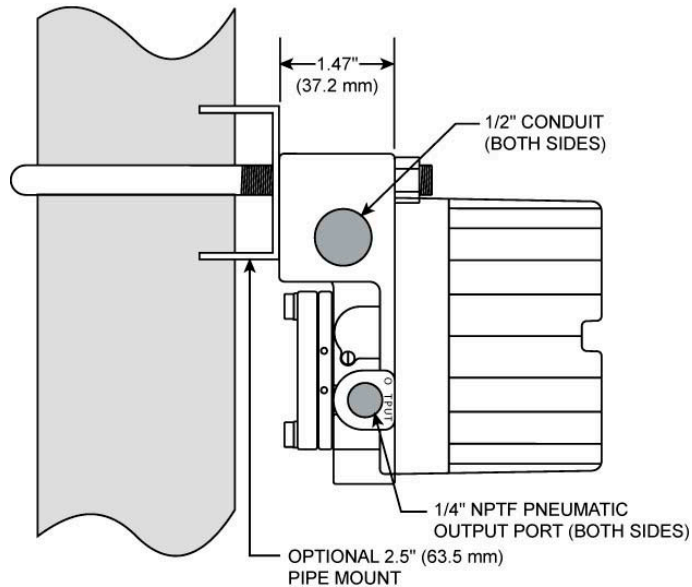


Figure 2–1.

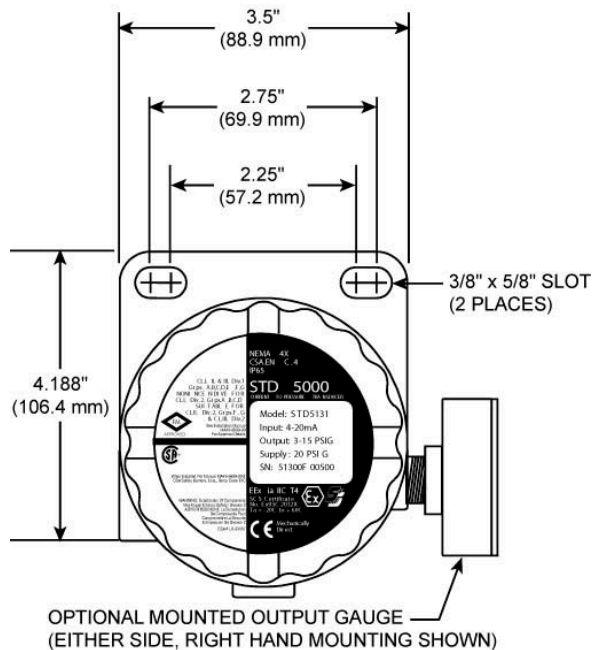
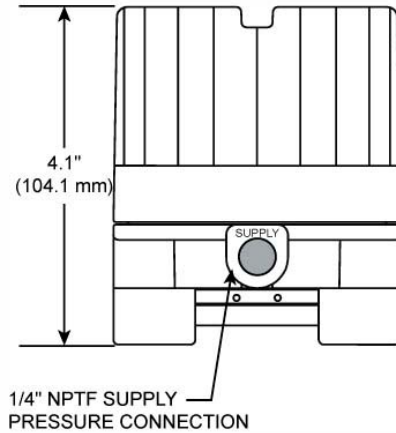


Figure 2–2.



**Figure 2-3.**

## Pneumatic Connections



**Note** Note the following PRIOR TO making any pneumatic connections:

- Blow out lines thoroughly.
- Soap test all joints and fittings for leaks.
- Do not use pipe thread tapes on pneumatic piping. ▲

Refer to the dimensional drawings and the following:

1. One ¼-inch FNPT port is provided for supply air connections. Each unit has a filter screen installed in this port.
2. Two ¼-inch FNPT ports are provided for pneumatic output connections. Either port may be used and one may be used for the mounting of an output gauge. Plug the unused port with the pipe plug included with the unit. Note that the pipe plugs are certified and suitable for the maintenance of the product's certification rating and protection concept.

## Electrical Connections



**Warning** All wiring must be made in accordance with all local and national codes appropriate to the area in which the instrument is installed. ▲

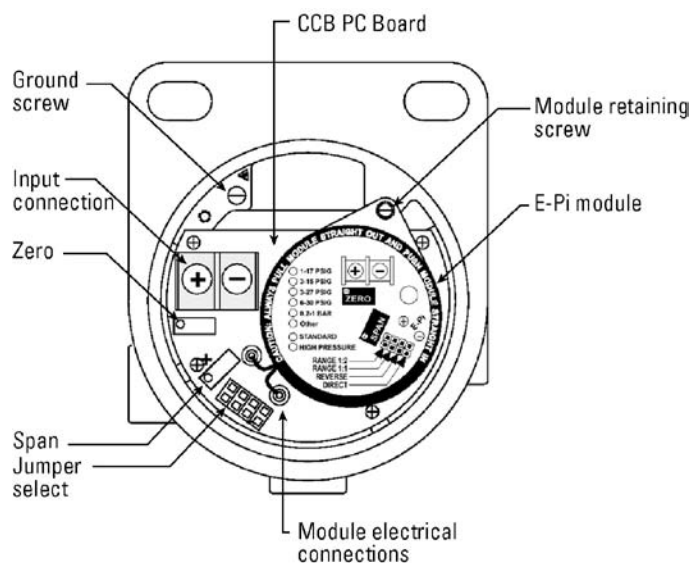


**Note** Observe polarity: Reverse polarity will not damage the unit but will prevent it from operating. ▲

Refer to the dimensional drawings and the following figure and instructions:



1. The instrument is supplied with two ½-inch FNPT electrical conduit connections. Insert a ½-inch FNPT pipe plug into the unused connection. Note that the pipe plugs are certified and suitable for the maintenance of the product's certification rating and protection concept.
2. A two-position “Barrier Type” terminal block with wire-ready #6-32 screws is supplied for 12–22 AWG wire. The terminal blocks accept spade lugs or stripped wire. Strip wire approximately ¼-inch before insertion. The terminals are labeled + and - on the E-Pi label.
3. The earth ground wire, connected to the ground screw, must be terminated using a spade lug for proper installation.



**Figure 2–4.** PCB connections



# Chapter 3

## Operation

### General

Operation is outlined in the flow chart displayed in [Figure 1–1](#). The electric to pneumatic conversion takes place in the E-Pi valve. A conditioned 4–20 mA input signal provides an electric current to the E-Pi coil, creating a magnetic field that magnetizes the valve. The magnetization is proportional to the input current signal and positions the membrane relative to the valve seat. The pneumatic output is modulated relative to the input current. Further conditioning of the pneumatic output is achieved with a volume booster.

Final conditioning of the boosted pneumatic output signal occurs by measuring the output with a pressure sensor. This signal is then compared with the current to the E-Pi, resulting in exact pneumatic output relative to the input signal.

### Programming

Programming is selectable via internal jumpers located on the circuit board. A label on the E-Pi module shows the location and position of these jumpers (shown in [Figure 3–1](#)).

To select the operating mode, plug in the jumpers according to the following table. The table also displays the part number of the E-Pi module required to achieve the desired outputs and the necessary supply pressure.



**Note** We recommend that you select the mode PRIOR TO final installation. ▲



**Note** When switched from direct to reverse or into split range, the span remains within  $\pm 1\%$ . ▲

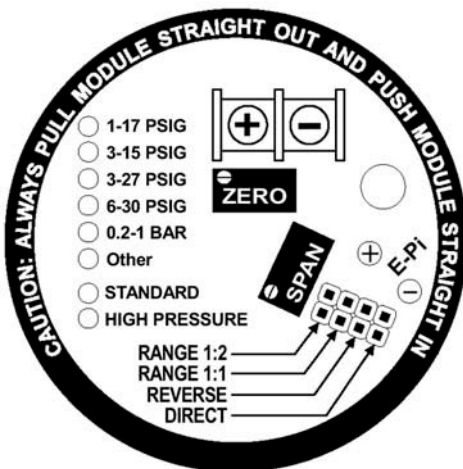


Figure 3–1. Jumper selection

Table 3–1.

Output	Uses this		Supply pressure		Jumper select switch position				Adjust
	E-Pi	Input (mA)	Standard	High pressure	Direct	Reverse	Range 1:1	Range 1:2	
3–15 psig	SA45-1502-15	4–20 or 10–50	20 psig	35–100 psig	x		x		Zero
3–15 psig	SA45-1502-15	4–20 or 10–30	20 psig	35–100 psig	x			x	Zero
3–15 psig	SA45-1502-15	12–20 or 30–50	20 psig	35–100 psig	x			x	Zero
15–3 psig	SA45-1502-15	4–20 or 10–50	20 psig	35–100 psig		x	x		Zero
15–3 psig	SA45-1502-15	4–12 or 10–30	20 psig	35–100 psig		x		x	Zero
15–3 psig	SA45-1502-15	12–20 or 30–50	20 psig	35–100 psig		x		x	Zero
3–27 psig <sup>1,2</sup>	SA45-1502-27	4–20 or 10–50	35 psig	N/A	x			x	Zero
27–3 psig	SA45-1502-27	4–20 or 10–50	35 psig	N/A		x		x	Zero
6–30 psig <sup>1,3</sup>	SA45-1502-30	4–20 or 10–50	35 psig	N/A	x			x	Zero
30–6 psig	SA45-1502-30	4–20 or 10–50	35 psig	N/A		x		x	Zero
1–17 psig	SA45-1502-17	4–20 or 10–50	35 psig	N/A	x		x		Zero
1–17 psig	SA45-1502-17	4–12 or 10–30	35 psig	N/A	x			x	Zero
1–17 psig	SA45-1502-17	12–20 or 30–50	35 psig	N/A	x			x	Zero
17–1 psig	SA45-1502-17	4–20 or 10–50	35 psig	N/A		x	x		Zero
17–1 psig	SA45-1502-17	4–12 or 10–30	35 psig	N/A		x		x	Zero
17–1 psig	SA45-1502-17	12–20 or 30–50	35 psig	N/A		x		x	Zero

<sup>1</sup>Units with output ranges of 3–27 or 6–30 psig are programmed for 1:2 mode to achieve output range.

<sup>2</sup>Units factory calibrated for 3–27 psig can be converted to a 3–15 psig output range by changing mode selection from 1:2 to 1:1 and recalibrating. However, reducing supply pressure to 20 psig may cause the pneumatic zero to drop; attempt to use the unit at 35 psig supply first.

<sup>3</sup>Units factory calibrated for 6–30 psig may have a pneumatic zero too high to recalibrate to 3–15. You can attempt to recalibrate by changing mode selection from 1:2 to 1:1. If this does not work, send the unit to Thermo Fisher for recalibration or replace the 6–30 psig E-Pi module with a 3–15 psig module.

There is adequate adjustment of span and zero to put a dead spot in the output and thus prevent valve operation overlap in split range. Table 3–2 shows these values. Also note that there is adequate adjustment of span and zero to provide a margin of overlap, if desired.

**Table 3–2.**

<b>Mode</b>	<b>Input (mA)</b>	<b>Output (psig)</b>	<b>Adjustment</b>
Direct 1:2	4–11	3–15	Zero, Span
Direct 1:2	13–20	3–15	Zero, Span
Reverse 1:2	4–11	15–3	Zero, Span
Reverse 1:2	13–20	15–3	Zero, Span

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## Chapter 4

# The E-Pi Plug-In Module

### General

- Once removed, the E-Pi can be discarded or refurbished and used as a spare part.
- In both standard and high pressure units, it is not necessary to shut off the air supply to the unit. However, be aware that the output signal is lost during the replacement process.
- High pressure E-Pi modules come supplied with a stiffening bracket mounted under the mounting screw.
- Ensure the E-Pi you are installing matches the range of the unit.
- If the replacement E-Pi has been in storage for a long period of time, it may be necessary to apply a lubricant (Dow Corning® or equivalent) to the O-rings.



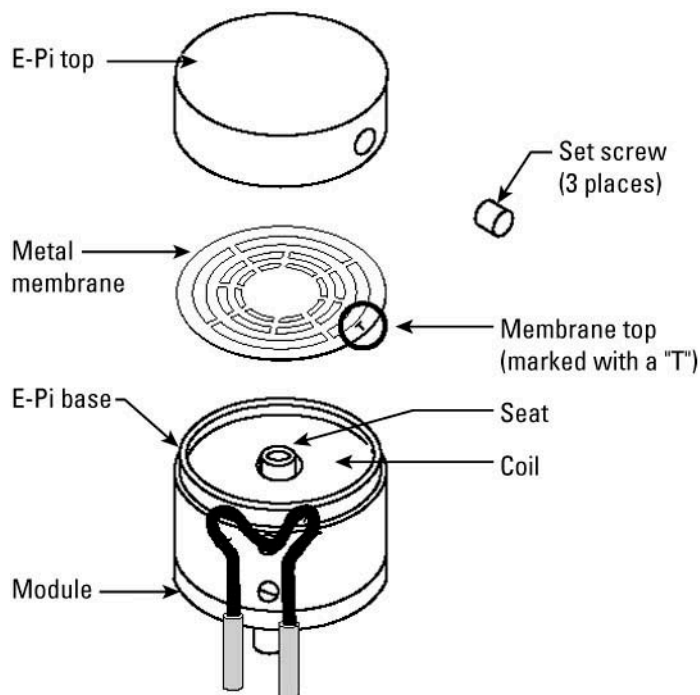
**Caution** When removing or installing the E-Pi plug-in module, always pull straight out or push straight in. Damage or breakage may occur if the module is pulled out at an angle. ▲



**Caution** Removing the E-Pi with the air supply still operating creates a situation where particles that may have accumulated from a contaminated air supply can be blown out. ▲



**Warning** Do not remove the cover when the instrument is powered unless the area is known to be non-hazardous. ▲



**Figure 4–1.** E-Pi plug-in module

## Replacing the E-Pi

1. Remove the cover.
2. Locate and loosen the module retaining captive screw from the manifold. Note that the module is designed so that the screw does not need to be removed from the plastic piece.
3. Grab the module firmly and pull it straight out.
4. Align the replacement module with the pneumatic and electrical connections. Press straight down into the manifold, and tighten the retaining screw.
5. Electrical connections are a two-point contact system. The first contact occurs when the connector is pushed onto the PCB male pin. The second occurs as the barrel of the connector is pushed further onto the pin. It may be necessary to use needle nose pliers to make the second connection. If this is the case, grip the connector firmly above the barrel section and push straight down. Refer to [Figure 4–2](#).

The unit should operate without requiring calibration.

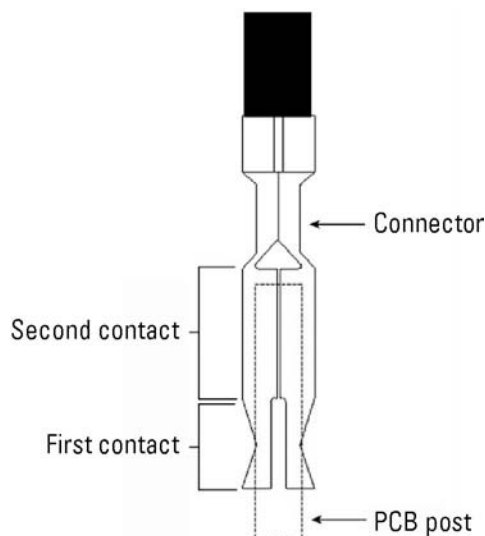
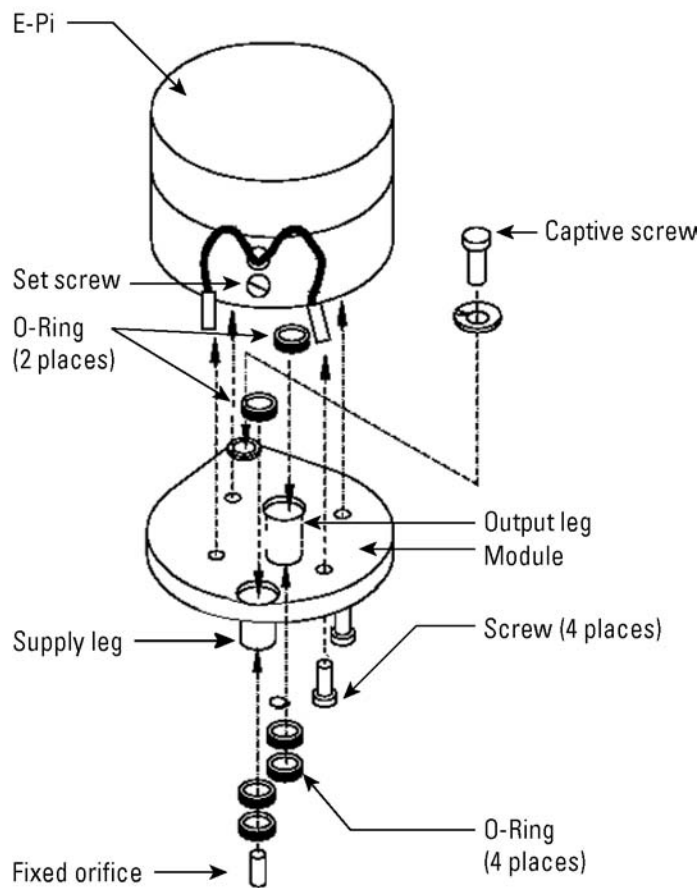


Figure 4–2.

## Fixed Orifice Replacement

1. Used fixed orifice replacement kit SA45-8002-00.
2. Remove the E-Pi from the manifold according to “[Replacing the E-Pi.](#)”
3. Refer to [Figure 4–3](#) and attempt to pull the fixed orifice out of the supply leg with needle nose pliers. If this is possible, continue to step 5.
4. If you are unable to remove the fixed orifice with needle nose pliers, turn the module over. Remove the four screws holding the E-Pi to the plastic module. It is not necessary to disconnect the wires from the module. Do not discard the O-rings. Push the fixed orifice out of the leg with a small diameter wire.
5. Choose a corresponding color fixed orifice from the replacement kit. Press the orifice tapered end first into the supply leg as far as it will go; approximately  $\frac{1}{32}$ -inch will stick out of the leg.
6. Reassemble the E-Pi and plastic module (if necessary).



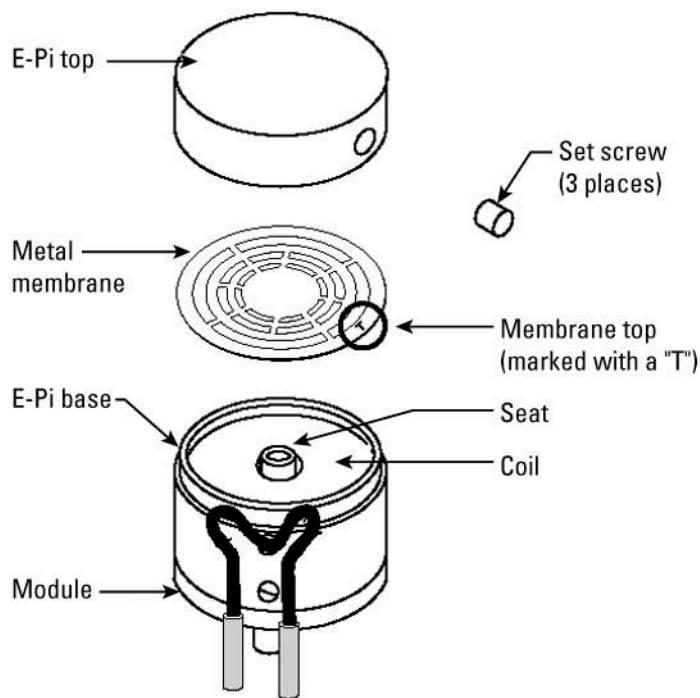
**Figure 4-3.**

## Cleaning & Repair

1. Refer to [Figure 4-4](#) and remove the E-Pi from the manifold according to “[Replacing the E-Pi.](#)”
2. Locate and loosen the three set screws from the E-Pi top. It is not necessary to remove them.
3. Carefully remove the E-Pi top from the base.
4. Carefully remove the membrane.
5. Insert the “straw” of an alcohol-based contact cleaner (or equivalent) into the small holes in the bottom of the module and seat and spray. Allow the cleaner to air dry. Note that you can also use clean, instrument quality air (30 psi) to blow out the module.



6. Use the contact cleaner to spray off both sides of the membrane. Allow the cleaner to air dry. Place the membrane on the E-Pi base (membrane top "T" side up).
7. Use the contact cleaner to spray off the top, and allow to air dry.
8. Reassemble the E-Pi, applying downward pressure to the top of the module while tightening the three set screws.



**Figure 4-4.**

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# Chapter 5

## Calibration & the Test Jack

### Calibration



**Warning** Do not remove the cover when the instrument is powered unless the area is known to be non-hazardous. ▲

1. Make all pneumatic connections, and plug all unused ports.
2. Provide a supply pressure.
3. Connect a high accuracy pressure indicator to the output port.
4. Connect a current source to the positive and negative terminals of the terminal block.
5. Input 0% of the calibrated range, and adjust the zero for 0% of desired output.
6. Input 100% of the calibrated range, and adjust the span for 100% of desired output.
7. Repeat steps 5 and 6 until no further adjustments are necessary.

### The Test Jack

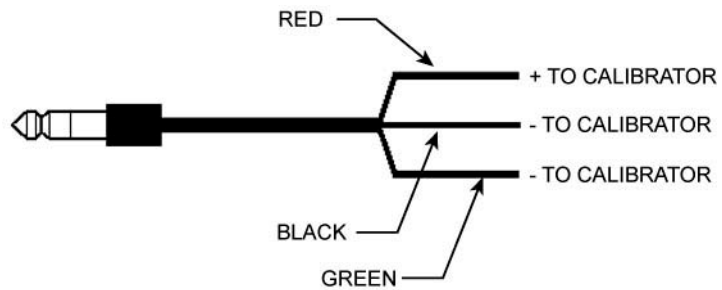


**Note** Inserting the test jack without connecting a calibrator or ammeter will interrupt the loop power signal. ▲

### Calibration & Operation

1. Refer to [Figure 5–1](#) and connect a current calibrator to the jack plug cable as shown.
2. Insert the jack plug cable into the test jack. The current calibrator is now the input signal source.

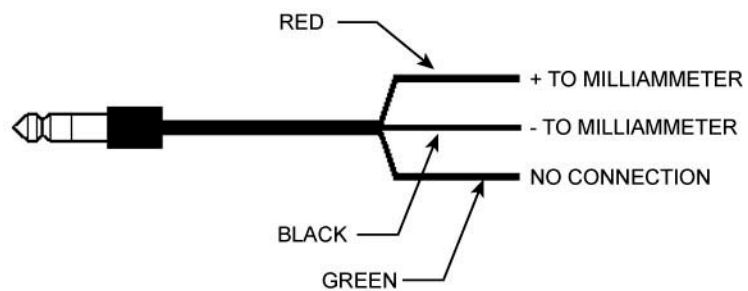
3. Calibrate according to the previous section.
4. Return operation of the unit to the original source by remove the jack plug.



**Figure 5–1.** Test jack calibration connections

## Monitoring

1. Refer to Figure 5–2 and connect an ammeter to the jack plug cable as shown.
2. Insert the jack plug into the test jack, and use the ammeter to monitor the input current loop.



**Figure 5–2.** Test jack monitoring connections

## Chapter 6

# Troubleshooting & Support

### External Filtration

Note the following:

- Failures due to instrument supply air contamination are not covered by original equipment warranty.
- Applying instrument air that is heavily laden with oil or water can cause the loss of unit output.
- Poor quality instrument air can result in unit failure. We recommend placing a coalescent, oil efficient filter upstream of each unit where oil and/or water laden instrument air is suspected.
- We recommend providing proper filtration off the compressor for the removal of oil and water. Proper filtration will ensure reliable, long-term operation with minimal maintenance.
- An external filter system is available from Thermo Fisher.

### Supply Pressure Regulation

1. Maintain supply air at pressures required by the output range.
2. For standard configurations: Although the units should not be damaged by excessive supply pressure, elevated zero levels may result. The maximum supply pressure is 10 psig above the maximum calibrated range.

For high pressure configurations: The units are calibrated to operate within the published range. Supply pressures below the minimum range may cause the unit to function abnormally. Pressures above the maximum range can cause elevated zero levels. A regulator is not required.

3. A filter regulator is available.

## Replacing the CCB

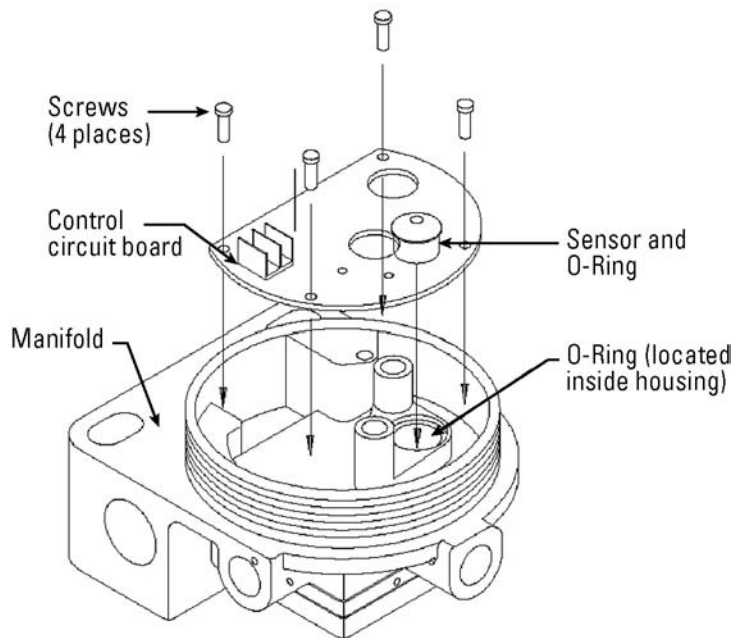


**Caution** If this procedure is performed in the field, ensure no contaminants enter the unit. ▲

1. Refer to Figure 6–1. Cut off the air supply.
2. Remove the cover. Remove the E-Pi according to “Replacing the E-Pi.”
3. Disconnect the input leads.
4. Remove the four screws holding the CCB in the manifold.

**Note** The replacement CCB should have an O-ring around the pressure sensor mounted to the CCB. Another O-ring is in the recessed hole where the pressure sensor plugs in. Do not discard. ▲

5. Mount the new CCB by reversing these steps.



**Figure 6–1.** CCB assembly

# Troubleshooting Guide

**Table 6–1.**

Problem	Possible Cause	Corrective Action
Output pressure is 0 psig.	<ol style="list-style-type: none"> <li>1. Instrument supply not applied.</li> <li>2. E-Pi failure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check air supply (Chapter 6).</li> <li>2. Replace E-Pi module (Chapter 4).</li> </ol>
Output remains between 1–2 psi with input increase.	<ol style="list-style-type: none"> <li>1. Input leads are reversed.</li> <li>2. Faulty internal connections.</li> <li>3. Circuit board failure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct leads.</li> <li>2. Check connections.</li> <li>3. Replace circuit board (Chapter 6).</li> </ol>
Unit will not zero down to 3 psi.	<ol style="list-style-type: none"> <li>1. Oil contamination in E-Pi.</li> <li>2. E-Pi failure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean/replace module (Chapter 4).</li> <li>2. Clean/replace module (Chapter 4).</li> </ol>
Output signal fails below calibrated zero level, 1–2.5 psi.	<ol style="list-style-type: none"> <li>1. Input current loop is open.</li> <li>2. Loss of loop power.</li> <li>3. Open input loop due to instrument protection circuit breakdown.</li> <li>4. No power to the E-Pi.</li> <li>5. E-Pi coil is open or shorted.<sup>1</sup></li> <li>6. Circuit board failure.<sup>2</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. Check input loop.</li> <li>2. Check input loop.</li> <li>3. Check input for over current, replace circuit board (Chapter 6).</li> <li>4. Disconnect/reseat connector.</li> <li>5. Replace module (Chapter 4).</li> <li>6. Replace board (Chapter 6).</li> </ol>
Output signal fails to 0 psig.	<ol style="list-style-type: none"> <li>1. Instrument air supply failure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check supply air.</li> </ol>
Unit will not go to full scale with full scale input.	<ol style="list-style-type: none"> <li>1. E-Pi is contaminated.</li> <li>2. Circuit board failure.<sup>3</sup></li> <li>3. Leak in tubing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean or replace (Chapter 4).</li> <li>2. Replace circuit board (Chapter 6).</li> <li>3. Check tubing.</li> </ol>
Unit will not split range.	<ol style="list-style-type: none"> <li>1. Circuit board failure.</li> <li>2. Bad connection.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace board (Chapter 6).</li> <li>2. Check connections, jumpers (Chapter 3).</li> </ol>
Unit operates in 1:1 only.	<ol style="list-style-type: none"> <li>1. Circuit board failure.</li> <li>2. Bad connections.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace board (Chapter 6).</li> <li>2. Check connections, jumpers (Chapter 3).</li> </ol>
Unit goes to full scale with no input.	<ol style="list-style-type: none"> <li>1. E-Pi is contaminated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean or replace (Chapter 4).</li> </ol>

<sup>1</sup>**TEST:** Disconnect the E-Pi leads from the circuit board and measure the resistance across the coil. A reading of 0 ohms indicates a shorted coil. A reading above 10 Kohms indicates an open coil.

<sup>2</sup>**TEST:** Disconnect power and the E-Pi leads from the circuit board. Connect a current calibrator to the power leads and connect an ammeter to the E-Pi leads. Input 4 mA, and the ammeter should read 3.5 mA. If the ammeter reads 0 mA, the test has failed.

<sup>3</sup>**TEST:** Disconnect the positive E-Pi lead from the module. Connect an ammeter in series with the lead and pin. Input 20 mA. If full scale output is not achieved, approximately 3.5 mA should be measured. Less than 3 mA indicates circuit board failure.

## Contact Information

The local representative is the first contact for support and is well equipped to answer questions and provide application assistance. Your representative also has access to product information and current software revisions. You can also contact Thermo Fisher directly.

### In the United States

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### On the Web

[www.thermo.com](http://www.thermo.com)

## Warranty

Thermo Scientific products are warranted to be free from defects in material and workmanship at the time of shipment and for one year thereafter. Any claimed defects in Thermo Scientific products must be reported within the warranty period. Thermo Fisher shall have the right to inspect such products at Buyer's plant or to require Buyer to return such products to Thermo Fisher's plant.

In the event Thermo Fisher requests return of its products, Buyer shall ship with transportation charges paid by the Buyer to Thermo Fisher's plant. Shipment of repaired or replacement goods from Thermo Fisher's plant shall be F.O.B. Thermo Fisher plant. A quotation of proposed work will be sent to the customer. Thermo Fisher shall be liable only to replace or repair, at its option, free of charge, products which are found by Thermo Fisher to be defective in material or workmanship, and which are reported to Thermo Fisher within the warranty period as provided above. This right to replacement shall be Buyer's exclusive remedy against Thermo Fisher.

Thermo Fisher shall not be liable for labor charges or other losses or damages of any kind or description, including but not limited to, incidental, special or consequential damages caused by defective products. This warranty shall be void if recommendations provided by Thermo



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# Appendix A

## Toxic & Hazardous Substances Tables

The English and Chinese versions of the Toxic and Hazardous Substances tables are shown below.

### Toxic & Hazardous Substances Table – STD5000/6000

For Chinese Regulation: Administrative Measure on the Control of Pollution Caused by Electronic Information Products

Names and Content of Toxic and Hazardous Substances or Elements

Parts Name	Toxic and Hazardous Substances or Elements (STD5000/6000)					
	Pb	Hg	Cd	Cr6+	PBB	PBDE
Housing	o	o	o	o	o	o
Motherboard	x	o	o	o	o	o
Range Assembly	o	o	o	o	o	o
Cabling	o	o	o	o	o	o

o: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in **SJ/T11363-2006**  
x: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in **SJ/T11363-2006**

有毒有害物质名称及含量的标识格式

部件名称	有毒有害物质或元素 (STD5000/6000)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
外壳	o	o	o	o	o	o
主板	x	o	o	o	o	o
范围组件	o	o	o	o	o	o
缆线连接	o	o	o	o	o	o

o: 表示该有毒有害物质在该部件所有均质材料中的含量均在**SJ/T 11363-2006**标准规定的限量要求以下  
x: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出**SJ/T 11363-2006**标准规定的限量要求

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# Appendix B

## Ordering Information

**Table B-1.** STD5000/STD6000 ordering information

Code	Series
5	STD5000, NEMA 4X
6	STD6000, NEMA 4X, explosion proof <sup>1</sup>
Code	Input
1	4–20 mA, Intrinsically Safe
2	10–50 mA
3	Other (contact Thermo Fisher)
Code	Output
1	6–30 psig <sup>2</sup>
2	3–27 psig <sup>2</sup>
3	3–15 psig (standard or high pressure supply)
4	1–17 psig
5	Other (contact Thermo Fisher)
6	0.2–1.0 bar (standard or high pressure supply)
Code	Case Style
1	Standard
H	High pressure supply (3–15 psig and 0.2–1.0 bar outputs)
Code	Options
-1	Pipe mount kit
-2	Test jack
-3	Direct only
-4	Mounted filter regulator
-5	Valve mount kit
-6	Mounted output gauge

Typical model number: STD6131-1

<sup>1</sup>All models supplied with the appropriate combination of Factory Mutual and Canadian Standards approvals.

<sup>2</sup>Split range not available on these units.

**Table B–2.** Accessories & spare parts

Part Number	Description	Notes
FR20-0001-00	External filter system (5-micron pre-filter, 0.3-micron coalescent filter)	¼" compression fittings
FP45-OPTN-VM	Valve mount kit (bolts and washers)	Refer to <a href="#">Chapter 2</a> .
FP45-OPTN-PM	2½" pipe mount adapter	Refer to <a href="#">Chapter 2</a> .
FP45-OPTN-TSW	Stainless steel tag, mounted with wire	Engraved
FP45-OPTN-TSD	Stainless steel tag (small), mounted with drive screws	Engraved
FP82-2022-00	FAS2022 filter regulator with supply gauge	
GA21-1200-30	Output gauge, 0–30 psi, ¼" CBM	2 inch
GA21-1200-60	Output gauge, 0–60 psi, ¼" CBM	2 inch
MA45-5600-00	STD5000 & STD6000 user guide	1 provided, no charge
SA45-1502-XX	E-Pi module replacement, standard pressure	XX = Specify model number and output; contact Thermo Fisher
SA45-1502-XXHP	E-Pi module replacement, high pressure	XX = Specify model number and output; contact Thermo Fisher
SA45-2501-00	Circuit board/O-ring, 4–20 mA	Specify model number
SA45-2501-01	Circuit board/O-ring, 10–50 mA	Specify model number
SA45-8502-XX	Fix orifice replacement kit	XX = Output; contact Thermo Fisher. Recommended spare part

# Appendix C

## Specifications

**\*Results may vary under different operating conditions.**

**Table C–1.** Performance specifications

Accuracy	± 0.15% of span (3–15, 1–17 psi, and 0.2–1.0 bar outputs) ± 0.25% of span (3–27 and 6–30 psi outputs)
Stability	± 0.5% of span/6 months
Repeatability	± 0.05% of span
Dead Band	0.02% of span
Frequency Response	-3 db at 5 Hz (ISA S26.4.3.1 Config. A)
Temperature Effect	± 0.02% per °F of span (range 0°F to 150°F / -18°C to +66°C) or ± 0.04% per °F of span (range -40°F to 150°F / -40°C to +66°C)
Vibration Effect	<0.25% from 1–200 Hz/1 G
RFI-EMI Effect	< ± 1% effect on zero and span (26–1000 mHz at 30 V/m) when installed per installation guidelines ( <a href="#">Chapter 2</a> ). Refer to CE Conformity for test standards.

**Table C–2.** Functional specifications

Input	4–20 or 10–50 mA
Output	6–30, 3–27, 3–15, or 1–17 psig and 0.2–1.0 bar
Supply Pressure	Standard Configuration: Minimum of 3 psig and maximum of 10 psig above the maximum calibrated output (except for a 1–17 psig output, which will be 35 psig) High Pressure Configuration: For 3–15 psi (0.2–1.0 bar) outputs, standard supply range is 35–100 psi (2.4–6.9 bar). Some units may be calibrated to operate using a unique range. Contact Thermo Fisher for other output and supply ranges.
Supply Pressure Effect	Not measurable within the recommended supply pressure range
Operating Current	3.7 mA minimum, 200 mA maximum: continuous at 120°F (50°C); half-cycle 70 A, 1/120 s at 68°F (20°C)
Loop Load	3.8 Vdc ± 5 ohms (195-ohm load at 20 mA)

**Table C–2, cont.**





Output Capacity	Standard Configuration: 4.0 scfm (supply and exhaust characteristics balanced to within ± 10%) High Pressure Configuration: 4–8 scfm possible, depending on air supply and tubing sizes
Air Consumption	0.04 scfm steady state average (0.06 scfm maximum)
Operating Temperature	-40°F to +150°F (-40°C to +66°C)
Ambient Temperature ATEX	STD5000: Intrinsic Safety -20°C to +60°C  STD6000: Intrinsic Safety -20°C to +60°C  Flame proof -20°C to +40°C
Operational Modes	Direct, reverse, and/or split range
Failure Mode	Transducers always fail in the direct mode regardless of mode selection

**Table C–3. Physical specifications**

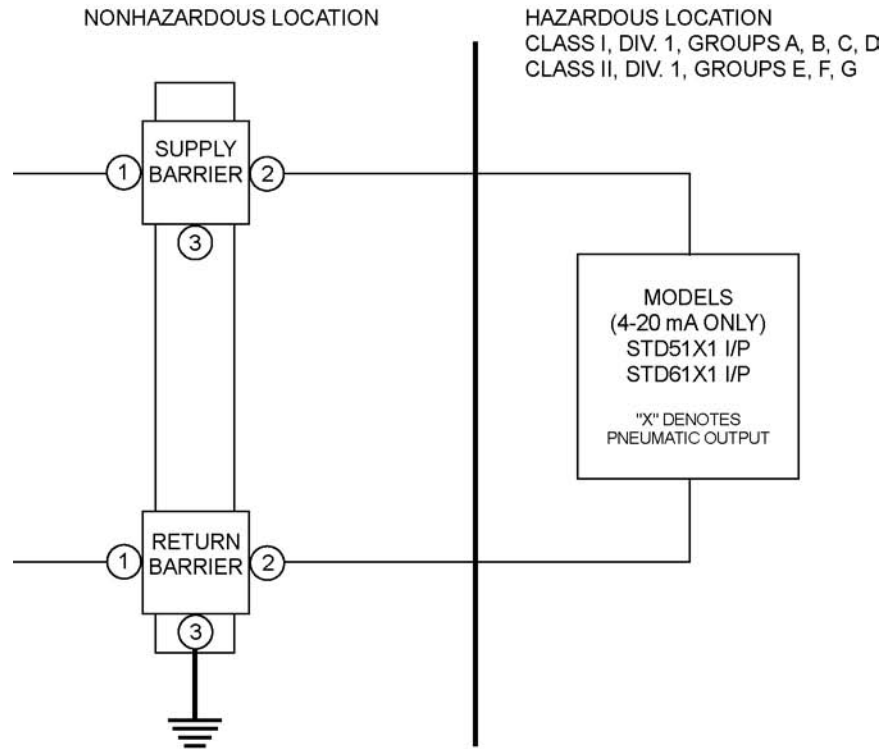
Enclosure	Internally purged NEMA 4X. Cast aluminum with powder coat epoxy
Enclosure Electrical Safety	CSA, ATEX approved Intrinsically Safe (I.S.) and explosion proof operation. Refer to qualifications table.
Weight	2.5 lb. (1.13 kg)



**Table C-4.** Qualifications

<b>CSA</b>	
STD5000	<p>I.S.: Class I, Groups A and B; Class II, Groups E, F, &amp; G and Class III with 4–20 mA input and outputs of 3–15, 3–27, 6–30, 1–17 psig. Temperature code T3C. I.S. when connected to CSA Certified Safety Barriers rated 31.5 V maximum, 463 ohms minimum. CSA.ENC.4 Outdoors.</p> <p>I.S.: Class I, Groups C &amp; D; Class II, Groups E, F, &amp; G; and Class III with 4–20 mA input and outputs of 3–15, 3–27, 6–30, 1–17 psig. Temperature code T3C. I.S. when connected to CSA Certified Safety Barriers rated 28 V maximum, 120 ohms minimum. CSA.ENC.4 Outdoors.</p> <p>Class I, Div. 2, Groups A, B, C, &amp; D with 4–20 or 10–50 mA input and outputs of 3–15, 3–27, 6–30, and 1–17 psig without Safety Barriers. CSA.ENC.4 Outdoors.</p> <p> <b>Caution</b> Substitution of components may impair Intrinsic Safety. ▲</p> <p><b>Caution</b> Open circuit before removing cover. ▲</p>
STD6000	<p>Class I, Groups B, C, D; Class II, Groups E, F, G; Class III</p> <p>Class I, Div. 2, Groups A, B, C, D with 4–20 mA input and outputs of 3–15, 3–27, 6–30, and 1–17 psi</p> <p>CSA Enc. 4 Outdoors</p>
<b>CE – ATEX (94/9/EC)</b>	
STD5000	<p> II 1G Ga Ex ia IIC T4 (Tamb -20°C to +60°C) II 1D Da Ex iaD 20 T62°C</p> <p>BS EN60079-0:2006, BS EN60079-11:2007, BS EN60079-26:2007, BS EN1241-0:2006, BS EN1241-11:2006</p>
STD6000	<p> II 1G Ga Ex ia IIC T4 (Tamb -20°C to +60°C) II 1D Da Ex iaD 20 T62°C</p> <p> II 2 GD Ex d IIC T5 Gb Ex tb IIC T100°C Db IP6X Tamb -20°C to +50°C</p> <p>BS EN60079-0:2009, BS EN60079-1:2007, BS EN60079-31:2009.</p>

## Specifications



### ENTITY PARAMETERS

- MAXIMUM CURRENT:  $I_{max} = 250$  mA FOR GROUPS A, B, C, D, E, F, G
- MAXIMUM UNPROTECTED INTERNAL INDUCTANCE:  $L_i = 0$  mH
- VOLTAGE RATING OF PROTECTIVE BARRIERS:  $V_{oc}$  MUST BE GREATER THAN 7.9 AND LESS THAN 40 V
- UNPROTECTED INTERNAL CAPACITANCE:  $C_i = 0$   $\mu$ F

### NOTES

1. IS BARRIERS MUST BE FACTORY MUTUAL RESEARCH CORPORATION APPROVED.
2. BARRIERS MUST BE OF SAME POLARITY.
3. CABLE INDUCTANCE PLUS IS APPARATUS INDUCTANCE MUST BE LESS THAN MARKED INDUCTANCE ON ANY ASSOCIATED APPARATUS USED.
4. COMBINED CURRENT OF BOTH BARRIERS MUST NOT EXCEED  $I_{max}$  ( $I_{SUPPLY} + I_{RETURN} \leq 250$  mA).

**Figure C-1.** I.S. installation drawing



## ATEX

### STD5000 and STD6000 IS operation

Enclosure is manufactured from aluminum alloy. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered when equipment is installed in locations that specifically require Group II, Category IG equipment.

Equipment may be used in Zones 0, 1, and 2 with flammable gases and vapors with temperature classes T1, T2, T3, and T4. Installation must be in accordance with applicable code of practice (e.g. EN 60079-14).

Equipment may also be used in the presence of explosive dust atmospheres in Zones 20, 21, and 22. Installation must be in accordance with applicable codes of practice (e.g. EN 61241-14). Be sure to apply the required safety margins for temperature.

The equipment must be connected to a suitably certified ATEX barrier whose parameters must be compatible with the following electrical parameters:

$U_i$	30Vdc
$I_i$	100mA
$P_i$	0.75W
$C_i$	5.3nF
$L_i$	7 $\mu$ H



### STD6000 flame proof operation

Refer to the STD6000 label in [Figure C-2](#).

In accordance with the exclusion of EN 60079-1-2007 clause 15.4.3.2.2 for enclosures containing sinters and with volumes above 0.1 L, the STD6000 converter shall not be used in the presence of carbon disulphide.

Equipment is supplied with a ½-inch NPTF (tapered) thread for electrical connections, which shall be as follows:

1. An approved metallic conduit incorporating a stopper box, or
2. A suitably certified flame proof gland.



**Warning** Parallel thread glands should not be inserted directly into the tapered thread conduit entry without the use of a suitably certified flame proof ½-inch NPTF-to-metric adapter. ▲

## Specifications

Equipment may be used in Zones 1 and 2 with flammable gases and vapors with all temperature classes. Installation must be in accordance with the applicable code of practice (e.g. EN 60079-14).

Equipment may also be used in the presence of explosive dust atmospheres in Zones 21 and 22. Installation must be in accordance with the applicable code of practice (e.g. EN 61241-14). Be sure to apply the required safety margins for temperature.



Figure C-2.

### Instructions Specific to Hazardous Area Installations

(Reference European ATEX Directive 94/9/EC, Annex II, 1.0.6.)

The following instructions apply to equipment covered by certificate number ITS09ATEX26170X for the STD5000 and ITS09ATEX16128X for the STD6000.

1. The equipment may be used in a hazardous area with flammable gases and vapors with apparatus groups IIC, IIB, and IIA and with temperature classes T1, T2, T3, and T4 for the STD5000 and T1, T2, T3, T4, and T5 for the STD6000.

STD5000 Category 1G zone 0

STD6000 Category 2G zone 1

2. The equipment may be used in the presence of combustible dust, the STD5000 being in zone 20 and the STD6000 in zone 21.
3. The equipment is certified for use in ambient temperatures in the following range and should not be used outside this range:
  - 20°C to +60°C for the STD5000
  - 20°C to +50°C for the STD6000
4. Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel.
5. The equipment is not intended to be repaired by the user. Repair of this equipment shall be carried out by the manufacturer in accordance with the applicable code of practice.
6. If the equipment is likely to come into contact with aggressive substances and environments or excessive external stresses, e.g. vibration or heat, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

Aggressive Substances - e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.

Suitable Precautions - e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

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