

# Installation and Operation Manual

## **IPS122 Series** **Indicating Pressure Switches**

**BROOKS**<sup>®</sup>  
INSTRUMENT

*Beyond Measure*

## Essential Instructions

### Read before proceeding!

Brooks Instrument designs, manufactures and tests its products to meet many national and international standards. These products must be properly installed, operated and maintained to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, operating and maintaining Brooks Instrument products.

- To ensure proper performance, use qualified personnel to install, operate, update, program and maintain the product.
- Read all instructions prior to installing, operating and servicing the product. If this instruction manual is not the correct manual, please see back cover for local sales office contact information. Save this instruction manual for future reference.
- ▲ **WARNING: Do not operate this instrument in excess of the specifications listed in the Instruction and Operation Manual. Failure to heed this warning can result in serious personal injury and / or damage to the equipment.**
  - If you do not understand any of the instructions, contact your Brooks Instrument representative for clarification.
  - Follow all warnings, cautions and instructions marked on and supplied with the product.
- ▲ **WARNING: Prior to installation ensure this instrument has the required approval ratings to meet local and national codes. Failure to heed this warning can result in serious personal injury and / or damage to the equipment.**
  - Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
  - Operation: (1) Slowly initiate flow into the system. Open process valves slowly to avoid flow surges. (2) Check for leaks around the flow meter inlet and outlet connections. If no leaks are present, bring the system up to the operating pressure.
  - Please make sure that the process line pressure is removed prior to service. When replacement parts are required, ensure that qualified people use replacement parts specified by Brooks Instrument. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result in fire, electrical hazards or improper operation.
  - Ensure that all equipment doors are closed and protective covers are in place to prevent electrical shock and personal injury, except when maintenance is being performed by qualified persons.
- ▲ **WARNING: For liquid flow devices, if the inlet and outlet valves adjacent to the devices are to be closed for any reason, the devices must be completely drained. Failure to do so may result in thermal expansion of the liquid that can rupture the device and may cause personal injury.**

## European Pressure Equipment Directive (PED)

All pressure equipment with an internal pressure greater than 0.5 bar (g) and a size larger than 25mm or 1" (inch) falls under the Pressure Equipment Directive (PED).

- The Specifications Section of this manual contains instructions related to the PED directive.
- Products described in this manual are in compliance with EN directive 2014/34/EU.
- All Brooks Instrument Flowmeters fall under fluid group 1.
- Products larger than 25mm or 1" (inch) are in compliance with PED category I, II or III.
- Products of 25mm or 1" (inch) or smaller are Sound Engineering Practice (SEP).

## European Electromagnetic Compatibility (EMC)

The Brooks Instrument (electric/electronic) equipment bearing the CE mark has been successfully tested to the regulations of the Electro Magnetic Compatibility (EMC directive 2014/30/EU). Special attention however is required when selecting the signal cable to be used with CE marked equipment.

### Quality of the signal cable, cable glands and connectors:

Brooks Instrument supplies high quality cable(s) which meets the specifications for CE certification. If you provide your own signal cable you should use a cable which is overall completely screened with a 100% shield. "D" or "Circular" type connectors used should be shielded with a metal shield. If applicable, metal cable glands must be used providing cable screen clamping. The cable screen should be connected to the metal shell or gland and shielded at both ends over 360 Degrees. The shield should be terminated to an earth ground. Card Edge Connectors are standard non-metallic. The cables used must be screened with 100% shield to comply with CE certification. The shield should be terminated to an earth ground. For pin configuration : Please refer to the enclosed Instruction Manual.

## ESD (Electrostatic Discharge)

- ▲ **CAUTION: This instrument contains electronic components that are susceptible to damage by static electricity. Proper handling procedures must be observed during the removal, installation or other handling of internal circuit boards or devices.**

### Handling Procedure:

1. Power to unit must be removed.
2. Personnel must be grounded, via a wrist strap or other safe, suitable means before any printed circuit card or other internal device is installed, removed or adjusted.
3. Printed circuit cards must be transported in a conductive container. Boards must not be removed from protective enclosure until immediately before installation. Removed boards must immediately be placed in protective container for transport, storage or return to factory.

### Comments

This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, SMOS, etc.). Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components, even though they appear to function properly, exhibit early failure.

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**Product Description**

The Brooks IPS122 Series Stainless Steel Indicating Pressure Switch provides a high-purity, precision pressure gauge and electronic switch with an adjustable pressure switch setpoint. This compact 2 inch unit has the ability to operate lights or relays up to a maximum of 12 watts. Available in a variety of pressure ranges and process connections. This device provides solid state switching for cleanroom and hazardous applications.

Approved by Factory Mutual

- Intrinsically safe (Entity) for use in Class I, Division 1, Group A, B, C and D indoor hazardous (classification) locations.
- Non-incendive for Class I, Division 2, Groups A, B, C and D indoor hazardous (classification) locations.

This manual is organized into the following sections:

Section 1 - Introduction

Section 2 - Installation

Section A-Essential Instructions

Back Cover - Limited Warranty and Contacts

It is recommended that this manual be read in its entirety before attempting to operate or repair the Model IPS122 Series.

Specifications

**⚠ WARNING**

**Do not operate this instrument in excess of the specifications listed below. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.**

**⚠ CAUTION**

**It is the user's responsibility to select and approve all materials of construction. Careful attention to metallurgy, engineered materials and elastomeric materials is critical to safe operation.**

	<b>OFF-ON SWITCH Type 1</b>	<b>LOGIC OUTPUT 8-30 Vdc Type 2</b>	<b>LOGIC OUTPUT 5 Vdc Type 3</b>
Case Material	300 Series stainless steel, electropolished		
Bezel and Lens Material	One-piece polycarbonate, screw-on		
Socket	316L stainless steel		
Movement	300 series stainless steel		
Bourdon Tube	316L stainless steel		
Proof Pressure	110%		
Burst Pressure	400%		
Connections	Face-seal, male, face-seal swivel male, face-seal swivel female and 1/4" NPT male		
Dial	White with black marking. "Use No Oil" is red		
Accuracy	1% of full scale		
Helium Leak Check	4 X 10 <sup>-9</sup> Inboard Standard cc/sec		
Cleaning	Cleaned for oxygen service to ANSI B40.1 level IV specifications		
Response Time	Less than 200 milliseconds		
Operating Ambient Temperature, Non-compensating (Non-intrinsically Safe)	0° to 160°F (-18° to 71°C)		
Operating Ambient Temperature, Compensating (Intrinsically Safe)	0° to 135°F (-18° to 57°C)		
Storage	-20° to 175°F (-29° to 79°C)		
Gauge Supply Input	8 to 30 Vdc	8 to 30 Vdc	4.8 to 5.2 Vdc
Gauge Supply Voltage Rating (V max) for Intrinsic Safety and non-intrinsic safety	<b>30 V</b>	<b>30 V</b>	<b>N/A</b>
Gauge Supply I max for Intrinsic Safety	<b>.089 A</b>	<b>.089 A</b>	<b>.089 A</b>
Gauge Current Draw (Maximum)	8 to 30 Vdc; 30 mA (indicator LED off) 45 mA (indicator LED on)	8 to 30 Vdc; 30 mA (indicator LED off) 45 mA (indicator LED on)	0 to 5 Vdc; 3 mA (indicator LED off) 11 mA (indicator LED on)
Threshold Switch Voltage Rating (V max) for Intrinsic Safety and non-Intrinsic Safety	<b>30 V</b>	<b>30 V</b>	<b>N/A</b>
Threshold Switch Current Handling non - Intrinsically Safe	Sinking 1A for non-intrinsically safe (See below for intrinsically safe I max)	60 mA (sink). Open collector NPN	60 mA sinking, 2K pullup to gauge supply voltage
Threshold Switch I max for Intrinsic Safety	<b>.089 A</b>	<b>.089 A</b>	<b>.089 A</b>
Intrinsic Safety Certifications	Class 1, Division 1, 2, Groups A, B, C, D Temp Class T4 (135C), Zone 0 Li = 0, mH, Ci = 0.022uF		
Source Power Supply Requirements	12 Watts @ 4.8 V to 30 V		
Sample Barrier for IS safety	Stahl "Dual Channel" 9002/11-280-186-00 Isc = 89 mA/Channel VOC = 28V/Channel		
Switch Leads	2 m [6"] cable, tinned ends, 0.23" in diameter		
Switch Differential	3% of scale; 0.25% of scale repeatability		
<b>Trip Position</b>	External adjust. Select to trip on ascending (N.O.) or descending (N.C.) pressure. (Field changeable by internal jumper)		
Pressure Ranges Available	Vacuum to 4,000 psi (276 bar). Metric also available. Offered in single scale only.		
Approximate Shipping Weight	0.65 lbs. (0.29 kg)		

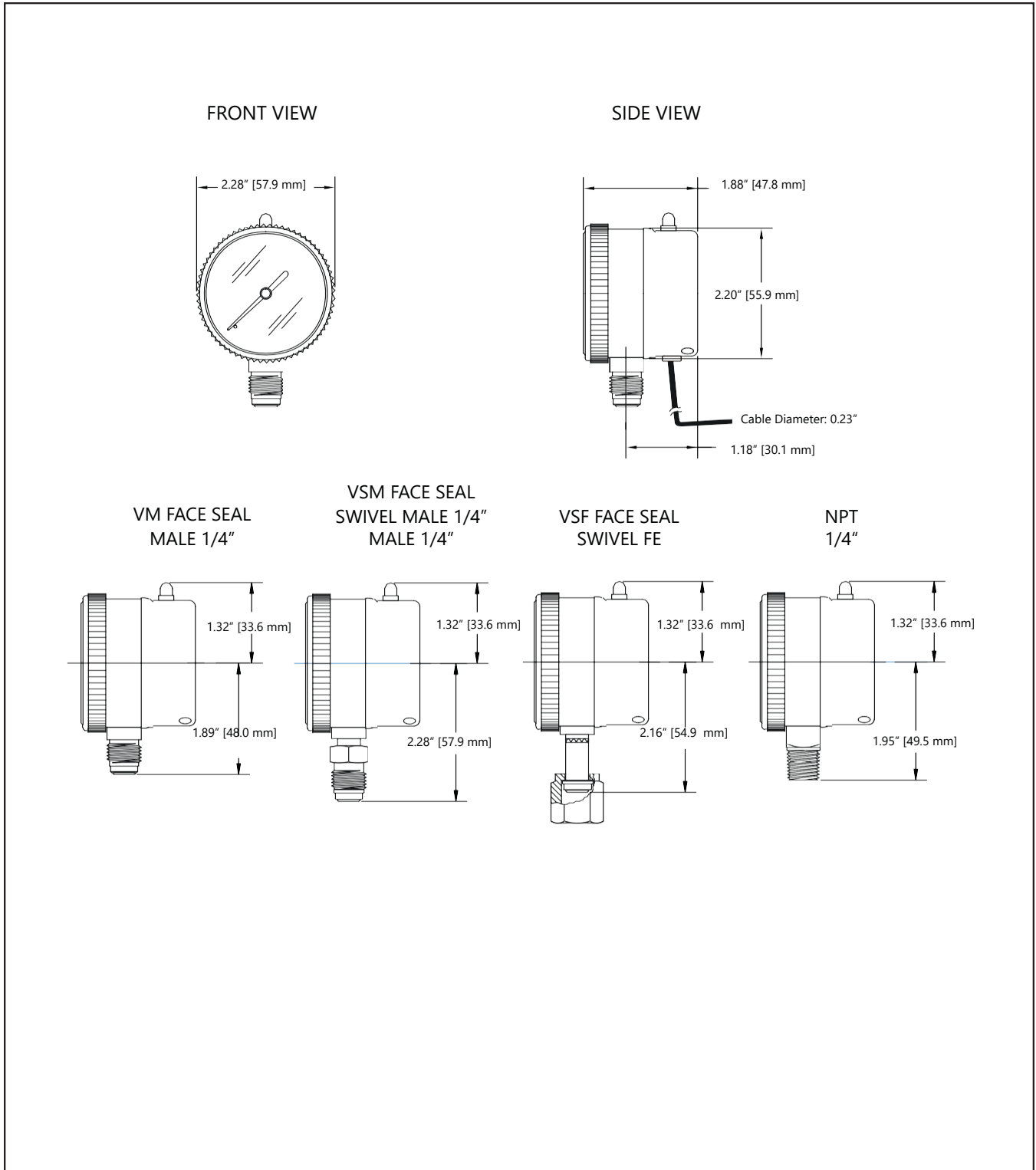


Figure 1-1 IPS122 Dimensions

**General**

This section provides installation instructions for the Brooks® IPS122 Series Indicating Pressure Switch devices. Refer to Section 1 of this manual for dimensions and process connections.

**Receipt of Equipment**

When the equipment is received, the outside packing case should be checked for damage incurred during shipment. If the packing case is damaged, the local carrier should be notified at once regarding his liability. A report should be submitted to our Technical Support group via the Service & Support section of our website [BrooksInstrument.com/Service](http://BrooksInstrument.com/Service).

Remove the envelope containing the packing list. Carefully remove the instrument from the packing case. Make sure spare parts are not discarded with the packing materials. Inspect for damaged or missing parts.

**Recommended Storage Practice**

If intermediate or long-term storage of equipment is required, it is recommended that the equipment be stored in accordance with the following:

- a. Within the original shipping container.
- b. Ambient temperature 21°C (70°F) nominal, 79°C (175°F) maximum -29°C (-20°F) minimum.
- c. Relative humidity 45% nominal, 60% maximum, 25% minimum.

**Return Shipment**

Prior to returning any instrument to the factory for any reason, visit our website for instructions on how to obtain a Return Materials Authorization Number (RMA #) and complete a Decontamination Statement to accompany it: [BrooksInstrument.com/Service](http://BrooksInstrument.com/Service). All instruments returned to Brooks also require a Material Safety Data Sheet (MSDS) for the fluid(s) used in the instrument. Failure to provide this information will delay processing of the instrument.

Instrument must have been purged in accordance with the following:

**⚠ WARNING**

Before returning the device, purge thoroughly with a dry inert gas such as Nitrogen before disconnecting process connections. Failure to correctly purge the instrument could result in fire, explosion or death. Corrosion or contamination may occur upon exposure to air.

**Transit Precautions**

To safeguard against damage during transit, transport the device to the installation site in the same container used for transportation from the factory, if circumstances permit.

**Removal from Storage**

Upon removal of the device from storage, a visual inspection should be conducted to verify its "as-received" condition. If the device has been subject to storage conditions in excess of those recommended (refer to "Recommended Storage Practice" on p. 7), it should be subjected to a pneumatic pressure test in accordance with applicable vessel codes.

**Gas Connections**

Prior to installation, ensure that all piping is clean and free from obstructions. Install piping in such a manner that permits easy access to the device if removal becomes necessary.



## Installation

### ⚠ CAUTION

Perform all operations with standard gas handling procedures in accordance with all local codes for safety and ventilation. You **MUST** wear appropriate clothing and safety apparatus for the gas you are using.

### ⚠ CAUTION

DO NOT twist the cable so that it turns inside the IPS housing. This may cause permanent damage to the device.

Failure to follow these procedures may adversely affect the product's performance and could void the product warranty. Inspect but **DO NOT** unwrap any parts until installation. Contact your Brooks representative with any problems.

In most cases, physical mounting, wiring to the power supply and control circuit, and setting setpoint is all that is required to complete installation of the IPS pressure switch as received from the factory. Refer to the tag on the back of the IPS pressure switch for factory configuration of close on ascending or close on descending pressure.

For some applications it may be necessary to invert operation of the LED indicator and/or logic signal configuration to ascending or descending operation, disassembly is required to change internal jumper switches.

## Mounting

Mount the IPS pressure switch to the proper fitting in the piping arrangement following standard piping procedures.

## Electrical Configuration

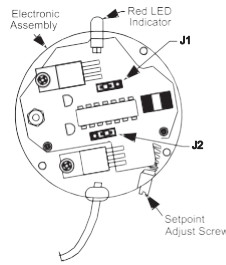
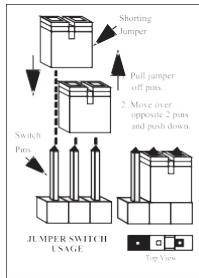
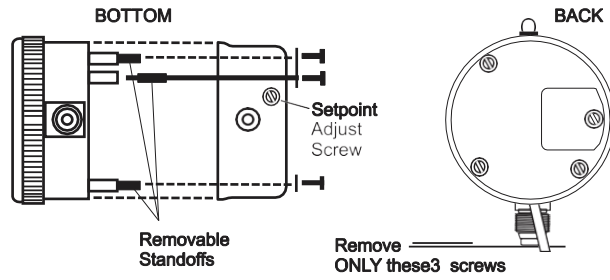
The IPS pressure switch contains two internal "jumper switches" to invert operating functions. Use needle nose pliers to change the switch jumpers. (Refer to Figure 2-1)

- **LED Indicator**

A red LED (light emitting diode) indicates when the pressure setpoint is reached. Its operation is controlled by jumper switch J1. Changing the position of the internal jumper switch inverts the operation of the LED. For example, the LED may be set to turn ON when pressure either rises above or drops below the setpoint.

- **Output Switch - Ascending/Descending Operation**


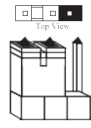
The IPS electronic switch may be configured to Close (turn ON) when pressure either rises above the setpoint (ascending), or drops below the set-point. (descending). This operation is controlled by jumper switch J2.



The back half of the pressure switch may be removed to change the position of the jumper switches:

- Remove 3 screws on back of pressure switch and carefully lift electronic assembly straight off.
- DO NOT bend the bourbon tube flag. If bent, factory service is required.
- Upon re-assembly, assure the wires are away from the mounting holes and flag.

**J1 Top Switch for LED Operation**

	 Ascending Setting	 Descending Setting
Pressure ABOVE setpoint	LED turn ON	LED turns OFF
Pressure BELOW setpoint	LED turns OFF	LED turn ON

**J2 Bottom Switch for Switch Operation**

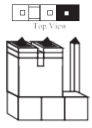

	 Ascending Setting			 Descending Setting		
	ON-OFF SWITCH (Type 1)	LOGIC OUTPUT 8-30 VDC (Type 2)	LOGIC OUTPUT 5 VDC (Type 3)	ON-OFF SWITCH (Type 1)	LOGIC OUTPUT 8-30 VDC (Type 2)	LOGIC OUTPUT 5 VDC (Type 3)
Pressure ABOVE setpoint	Switch CLOSES	Logic is less than 0.1 VDC		Switch OPENS	Logic = 8-30 VDC	Logic = +5 VDC
Pressure BELOW setpoint	Switch OPENS	Logic = 8-30 VDC	Logic = +5 VDC	Switch CLOSES	Logic is less than 0.1 VDC	

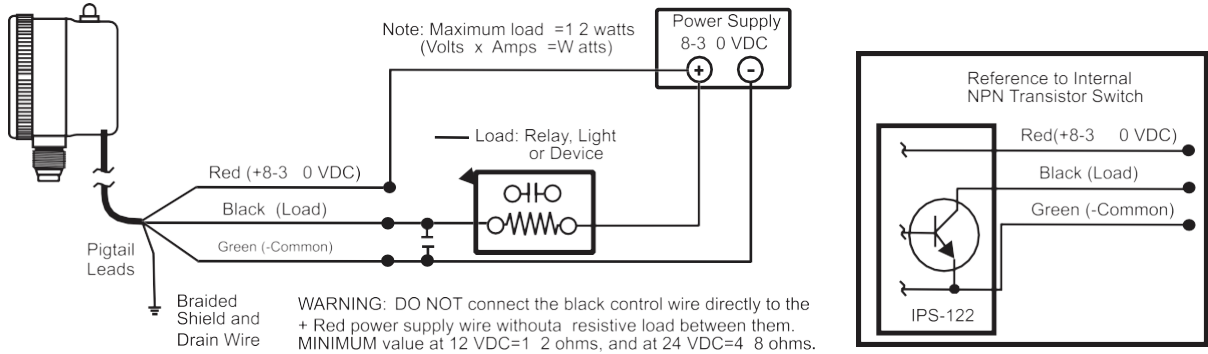
Figure 2-1 IPS122 Internal Jumper Settings

**Electrical Connections**

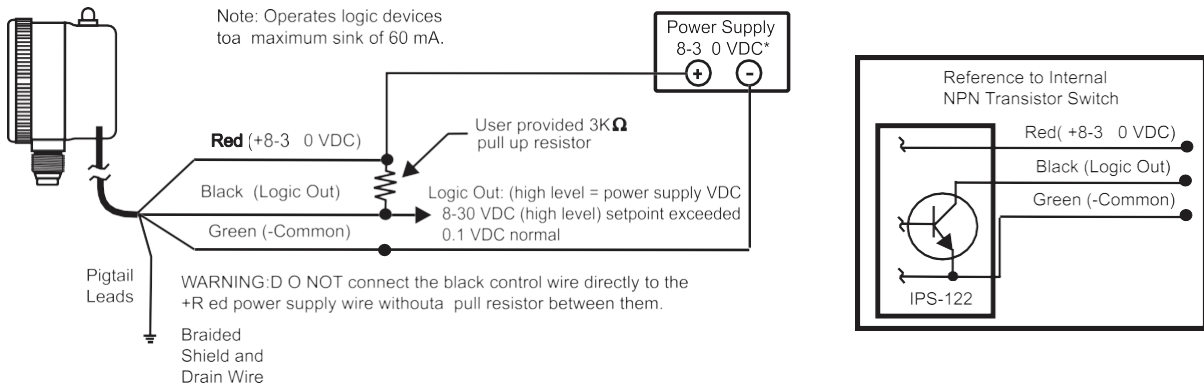
Refer to the appropriate wiring diagram for wiring connections to the IPS pressure switch (Figure 2-2).

Refer to the appropriate wiring diagram for hazardous locations (Figure 2-3 or Figure 2-4).

**ON-OFF SWITCH (Type 1)**



**LOGIC OUTPUT 8-30 VDC (Type 2)**



**LOGIC OUTPUT 5 VDC (Type 3)**

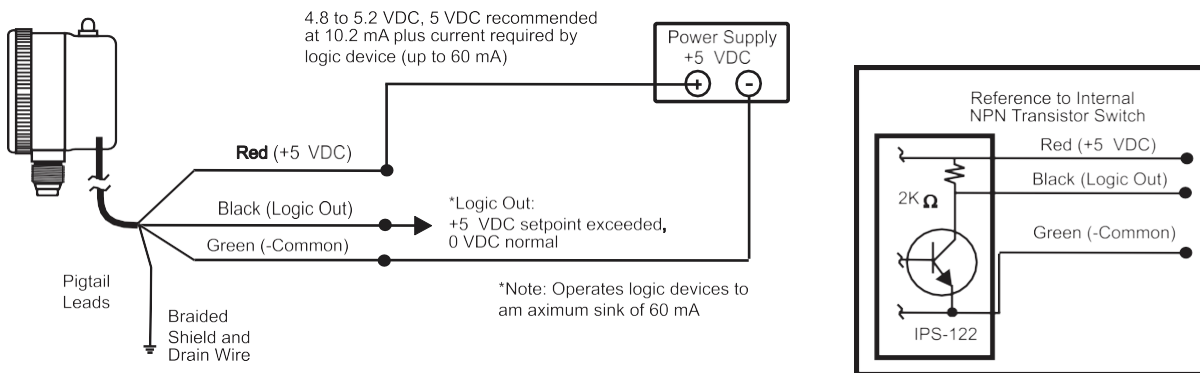


Figure 2-2 IPS122 Wiring Diagrams

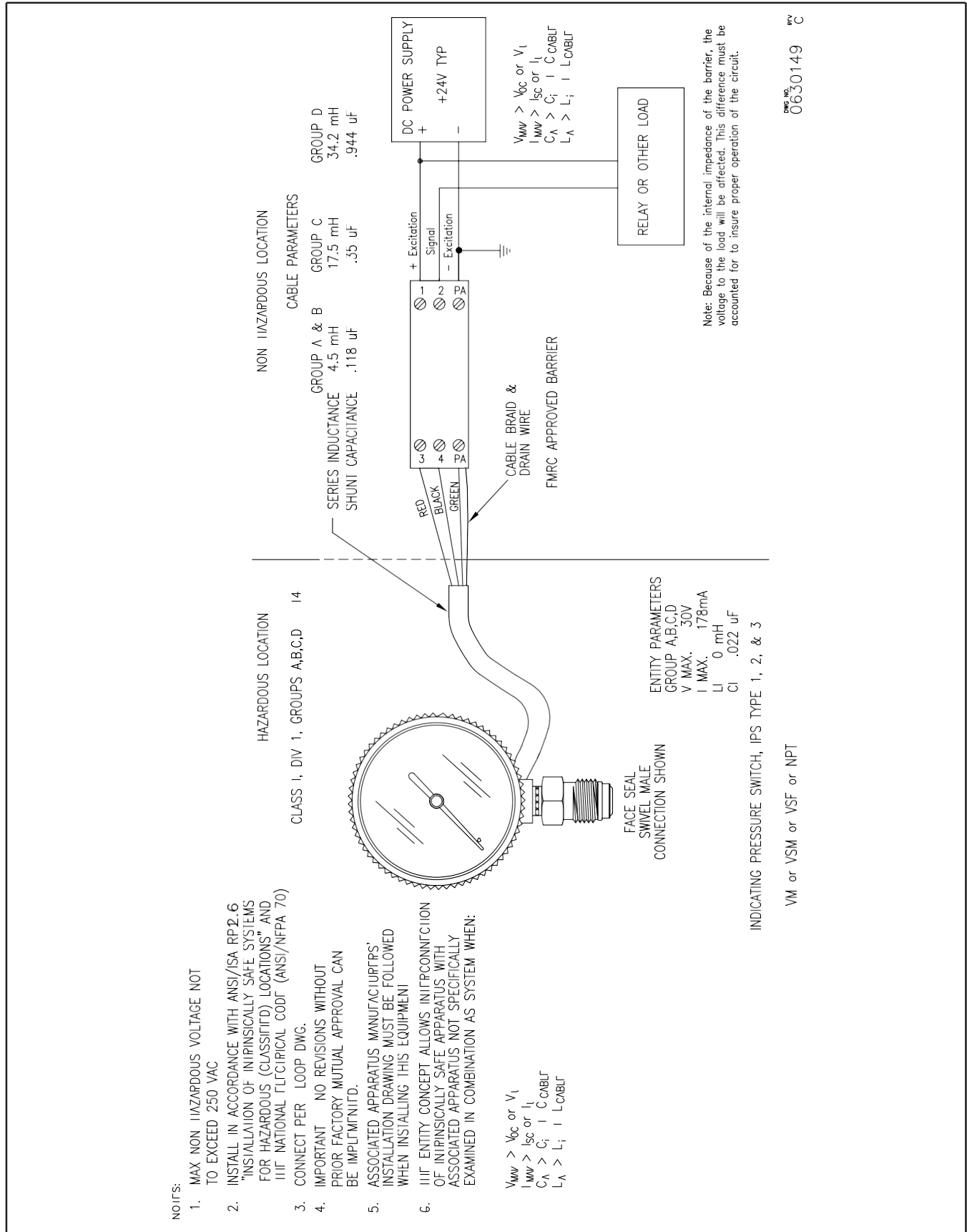


Figure 2-3 0630149 Entity Drawing, Hazardous Location Applications, Indicating Pressure Switch

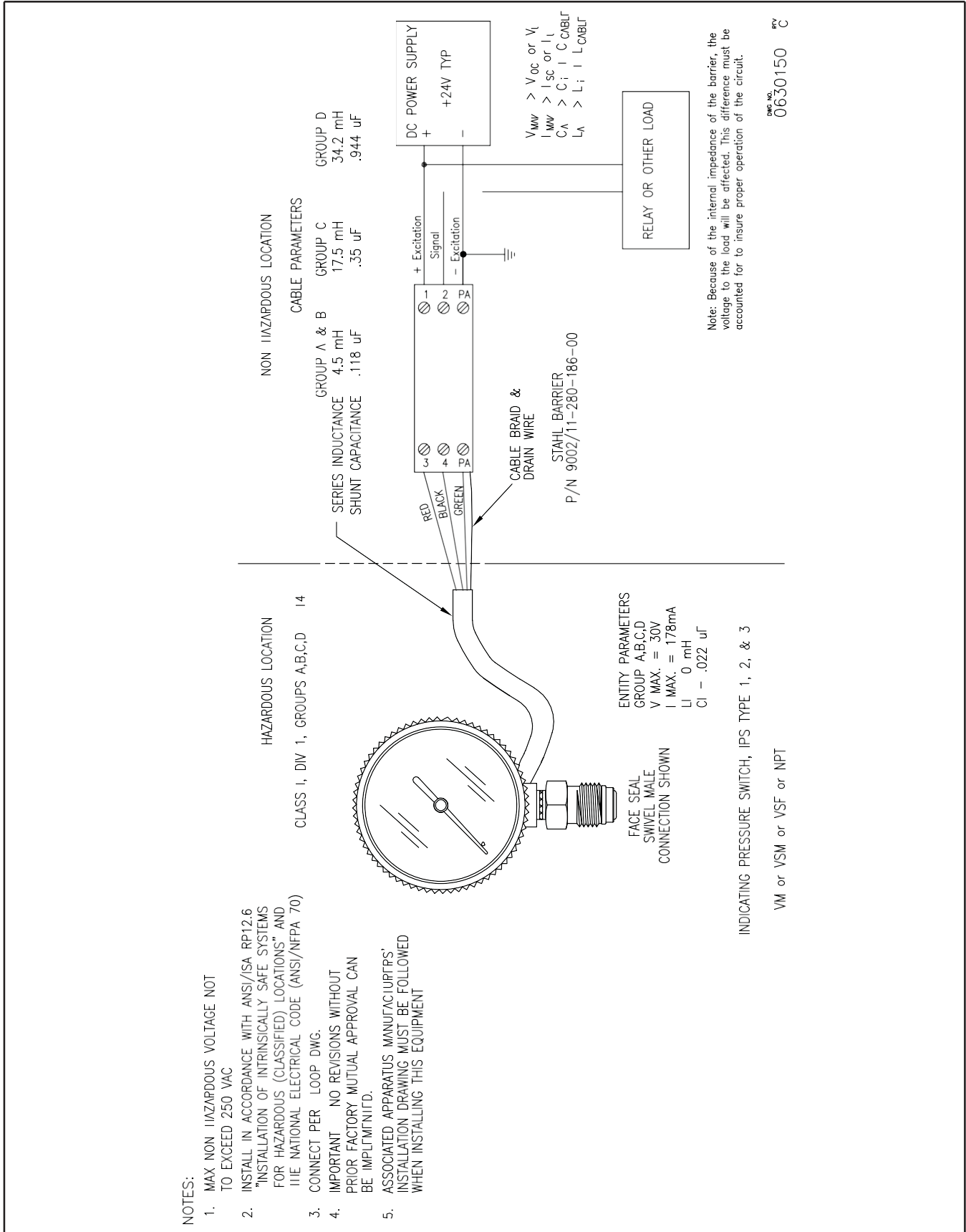


Figure 2-4 0630150 Entity Drawing, Hazardous Location Applications, Indicating Pressure Switch

## Setpoint Adjustment

**⚠ NOTICE**

Note: Moving the red-pointer does not change the setpoint. It is merely a visual reminder of where the setpoint was previously set.

**⚠ WARNING**

Before operating the device, ensure all fluid connections have been properly tightened and where applicable, all electrical connections have been properly terminated.

**⚠ CAUTION**

When adjusting the setpoint, DO NOT overtighten the setpoint adjustment screw in either direction. This may cause permanent damage to the device.

(Typical factory setting is at mid-scale.)

1. Connect the IPS pressure switch to a variable pressure source.
2. Apply pressure equal to the desired setpoint.
3. Slowly turn the setpoint adjustment screw (with a 1/8" or smaller flathead screwdriver only) until the LED indicator on top of the IPS pressure switch is activated. DO NOT OVERTIGHTEN.

(Refer to Figure 2-1 for adjustment screw location)


- CLOCKWISE to activate the electronic switch to decrease pressure setpoint.
  - COUNTERCLOCKWISE to activate the electronic switch to increase pressure setpoint.
4. Change the applied pressure until the gauge is within the normal zone of operating pressure.
  5. Slowly continue to change the pressure and verify that the LED indicator is activated at the desired setpoint.
  6. Repeat pressure cycle to verify setting and readjust if necessary.
  7. Adjust the red pointer mounted on the lens cover with a small screwdriver to indicate the setpoint setting.

**⚠ CAUTION**

DO NOT attempt to adjust the red pointer by rotating the cover.

8. On a compound gauge, the zero is indicated by a range on the dial rather than a setpoint.
9. Clean the non-metallic parts with a damp cloth to avoid electric discharge.

No routine maintenance is required on this device.

	<b>⚠ WARNING</b>
<b>METER/CONTROLLER SEAL COMPATIBILITY</b>	
<p>Products in this manual may contain metal or elastomeric seals, gaskets, O-rings or valve seats. It is the "user's" responsibility to select materials that are compatible with their process and process conditions. Using materials that are not compatible with the process or process conditions could result in the Meter or Controller leaking process fluid outside the pressure boundary of the device, resulting in personnel injury or death.</p> <p><b>It is recommended that the user check the Meter or Controller on a regular schedule to ensure that it is leak free as both metal and elastomeric seals, gaskets, O-rings and valve seats may change with age, exposure to process fluid, temperature, and /or pressure.</b></p>	

<b>⚠ WARNING</b>
If it becomes necessary to remove the device from the system, power to the device must be disconnected.

<b>⚠ WARNING</b>
If it becomes necessary to remove the device from the system after exposure to toxic, pyrophoric, flammable or corrosive gas, purge the device thoroughly with a dry inert gas such as Nitrogen before disconnecting gas connections. Failure to correctly purge the device could result in fire, explosion or death. Corrosion or contamination of the device upon exposure to air may occur.

<b>⚠ CAUTION</b>
This instrument contains electronic components that are susceptible to damage by static electricity. Proper handling procedures must be observed during the removal, installation or other handling of internal circuit boards or devices.

## LIMITED WARRANTY

Visit [www.BrooksInstrument.com](http://www.BrooksInstrument.com) for the terms and conditions of our limited warranty.

## BROOKS SERVICE AND SUPPORT

Brooks is committed to assuring all of our customers receive the ideal flow solution for their application, along with outstanding service and support to back it up. We operate first class repair facilities located around the world to provide rapid response and support. Each location utilizes primary standard calibration equipment to ensure accuracy and reliability for repairs and recalibration and is certified by our local Weights and Measures Authorities and traceable to the relevant International Standards.

Visit [www.BrooksInstrument.com](http://www.BrooksInstrument.com) to locate the service location nearest to you.

## START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required.

For some process applications, where ISO-9001 Quality Certification is important, it is mandatory to verify and/or (re)calibrate the products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

## SEMINARS AND TRAINING

Brooks Instrument can provide seminars and dedicated training to engineers, end users and maintenance persons.

Please contact your nearest sales representative for more details.

Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

## TRADEMARKS

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