



Field Mount Pressure-to-Current Transmitter

PIH

User's Manual

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Customer Support

Moore Industries is recognized as the industry leader in delivering top quality to its customers in products and services. We perform a sequence of stringent quality assurance checks on every unit we ship. If any Moore Industries product fails to perform up to rated specifications, call us for help. Our highly skilled staff of trained technicians and engineers pride themselves on their ability to provide timely, accurate, and practical answers to your process instrumentation questions. Our headquarters and other facilities phone numbers are listed below.

There are several pieces of information that can be gathered before you call the factory that will help our staff get the answers you need in the shortest time possible. For fastest service, gather the complete model and serial number(s) of the problem unit(s) and the job number of the original sale.

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Safety Messages

Please read this manual in its entirety. It should answer most of your questions. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product. Should you still have questions please visit our web site at www.miinet.com or contact any of our sales/support offices nearest you.

Your safety and the safety of others is very important. We have provided many important safety messages in this manual. Please read these messages carefully. These safety messages alert you to potential hazards that could hurt you or others or render damage to units.

All Moore Industries instrumentation should only be used for the purpose and in the manner described in this manual. If you use this product in a manner other than that for which it was intended, unpredictable behavior could ensue with possible hazardous consequences.

Each safety message is associated with a safety alert symbol. These symbols are found in the throughout the manual. The definition of these symbols is described below:

Pay particular attention wherever you see the following symbols:



Note – Information that is helpful for a procedure, condition or operation of the unit.



Caution – Hazardous procedure or condition that could damage or destroy the unit.



Warning – Hazardous procedure or condition that could injure the operator.

Qualified Personnel

The Moore Industries' product/systems described in this manual may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these Moore Industries' products/systems.

Proper use of Moore Industries products

Moore Industries' products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Moore Industries'. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

We have reviewed the contents of this publication to ensure consistency with the hardware and/or software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions. Specifications and information are subject to change without notice.

All product and company names are trademarks™ or registered® trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement by them unless otherwise specified.

Warranty Disclaimer

Moore Industries ("The Company") makes no express, implied or statutory warranties (including any warranty of merchantability or of fitness for a particular purpose) with respect to any goods or services sold by the company. The company disclaims all warranties arising from any course of dealing or trade usage, and any buyer of goods or services from the company acknowledges that there are no warranties implied by custom or usage in the trade of the buyer and of the company, and that any prior dealings of the buyer with the company do not imply that the company warrants the goods or services in any way.

Any buyer of goods or services from the company agrees with the company that the sole and exclusive remedies for breach of any warranty concerning the goods or services shall be for the company, at its option, to repair or replace the goods or services or refund the purchase price. The company shall in no event be liable for any consequential or incidental damages even if the company fails in any attempt to remedy defects in the goods or services, but in such case the buyer shall be entitled to no more than a refund of all monies paid to the company by the buyer for purchase of the goods or services.

Any cause of action for breach of any warranty by the company shall be barred unless the company receives from the buyer a written notice of the alleged defect or breach within ten days from the earliest date on which the buyer could reasonably have discovered the alleged defect or breach, and no action for the breach of any warranty shall be commenced by the buyer any later than twelve months from the earliest date on which the buyer could reasonably have discovered the alleged defect or breach.

Return Policy

For a period of thirty-six (36) months from the date of shipment, and under normal conditions of use and service, Moore Industries ("The Company") will at its option replace, repair or refund the purchase price for any of its manufactured products found, upon return to the Company (transportation charges prepaid and otherwise in accordance with the return procedures established by The Company), to be defective in material or workmanship. This policy extends to the original Buyer only and not to Buyer's customers or the users of Buyer's products, unless Buyer is an engineering contractor in which case the policy shall extend to Buyer's immediate customer only. This policy shall not apply if the product has been subject to alteration, misuse, accident, neglect or improper application, installation, or operation. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

Warranty Repair –

If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

Non-Warranty Repair –

If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
 - a) A note listing the symptoms that indicate the unit needs repair
 - b) Complete shipping information for return of the equipment after repair
 - c) The name and phone number of the person to contact if questions arise at the factory
3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.
4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.



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Introduction

This is the users' manual for Moore Industries' PIH Pressure-to-Current Transmitter. It contains all of the information that is needed to configure, install, operate, maintain, and troubleshoot the PIH. If you would like additional assistance, call one of our STAR centers.

The following guidelines are used in this manual:

WARNING - Hazardous procedure or condition that could injure the operator.

Caution - Hazardous procedure or condition that could damage or destroy the unit.

Note - Information that is helpful for a procedure, condition, or operation of the unit.

The PIH

The PIH is Moore Industries' rugged and compact Field-Mount Pressure-to-Current (P/I) Transmitter. It is designed to be CE Conformant and to meet FM, Cenelec, and CSA requirements. The PIH is watertight, dust-tight, and resistant to corrosion and chemicals, making it the ideal transmitter for extended use in harsh environments.

The loop-powered PIH accepts a pneumatic signal (3-15psig, 0.2-1 Bar, 20-100 kPa, etc.) and converts it to a 4-20mA current signal. As input pressure increases, output increases proportionally toward 20mA. Inversely, as pressure decreases, output drops.

The unit is configured at the factory, according to customer specification, to accept pneumatic input in one of several ranges. It can function in a single-instrument loop or together with several PIH's interconnected in a pneumatic system.

A special reverse output option is also available that sets the output to decrease proportionally as input increases. This makes the PIH a flexible choice for a variety of applications.

Model/Serial Number. Moore Industries tracks all their PIH units with a system of model numbers and serial numbers. Please be prepared to provide these numbers if you need service information or assistance.

The PIH serial and model numbers can be found under the cap of the unit faceplate.

Specifications

<p>Performance</p> <p>Calibration Capability: $\pm 0.2\%$ of span including independent linearity as defined in SAMA Standard PMC 20.1-1973</p> <p>Repeatability: Within $\pm 0.1\%$ of input span</p> <p>Resolution: $\pm 0.05\%$ of input span</p> <p>Maximum Non-Linearity: $\pm 0.2\%$ as per SAMA PMC 20.1-1973</p> <p>Load Capability: 600 ohms at nominal 24Vdc</p> <p>Load Effect: $\pm 0.01\%$ of span from zero to maximum load</p> <p>Pressure Limit: 150% full scale input pressure without damage</p>	<p>Performance (continued)</p> <p>RFI/EMI Effect: With field strengths of 30 V/m at frequencies of 20-1000MHz, less than $\pm 0.2\%$ span change when tested according to IEC 1000-4-3-1995</p> <p>Input: Instrument air only</p> <p>Output Limit: 130% of output span</p> <p>Output Ripple: Negligible</p> <p>Line Voltage Effect: Less than $\pm 0.01\%$ of span per volt of line voltage change at the input terminals</p> <p>Ambient Temperature Range: -1°C to $+54^{\circ}\text{C}$ ($+30^{\circ}\text{F}$ to $+129^{\circ}\text{F}$)</p> <p>Effect: Less than $\pm 2.0\%$ of full scale input over above range</p>	<p>Connections $\frac{1}{2}$-inch NPT entry ports or M20 cable and $\frac{1}{4}$-inch NPT process connection.</p> <p>Adjustments Type: Multiturn adjustments (no interaction between span and zero adjustments) Span: Fully adjustable to 100% of output span Zero: Adjusts 0 to $\pm 10\%$ of span</p> <p>Weight Metal Cover: 808 grams (29 ounces) Polyester Cover: 624 grams (22 ounces)</p>
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Ordering Information

Unit	Input	Output	Power	Options	Housing
PIH Field-Mount Pressure-to- Current Transmitter	0-15PSIG 3-15PSIG 0-30PSIG 3-27PSIG 6-30PSIG .2-1BAR .2-1KGCM2 20-100KPA 20-186KPA (special ranges available, consult factory for specification changes)	4-20MA	12-42DC	-RO Reverse Output, output decreases as input increases.	WDNS Aluminum body with black polycarbonate cover; NPT pneumatic ports and ½- inch NPT female electrical entry port WDNA Aluminum body with aluminum cover (black powder coated); NPT pneumatic ports and ½-inch NPT female electrical entry port WDMS Aluminum body with black polycarbonate cover; NPT pneumatic ports and M20X1.5 (metric) female electrical entry port WDMA Aluminum body with aluminum cover (black powder coated); NPT pneumatic ports and M20X1.5 (metric) female electrical entry port P suffix indicates enclosure comes equipped with base plate and U-bolts for mounting on a 2-inch pipe (i.e. WDNAP)

To order, specify: Unit / Input / Output / Power / Options [Housing]

Model Number Example: PIH / 3-15PSIG / 4-20MA / 12-42DC / -RO [WDMS]

Calibration

Prior to shipment, every PIH is fully tested to ensure compliance with Moore Industries' strict quality control guidelines. Before installation, however, your PIH(s) should be bench checked in order to set and verify the desired operating levels.

The following procedures should be conducted in an environment considered appropriate for general testing of electronic and pneumatic equipment. It is recommended that the procedures in this section not be carried out in the field. Use a technician's bench or a similar lab-type

setup, so that any unit damage that may have occurred during shipment can be discovered easily, i.e., separated from the intended process or application.

Calibration Setup

Table 1 lists the equipment required to configure the PIH. This equipment is not supplied by Moore Industries, but should be available in most labs or maintenance areas.



WARNING: Always remember that potentially harmful voltages are present at the PIH's AC input terminals once power is present in the configuration setup.

When the setup is complete, apply appropriate input pressure and dc power (refer to table 1 and unit model number for specifications). Allow approximately 5 minutes for setup stabilization.

Table 1. PIH Calibration Equipment

Equipment	Characteristics
Air Supply	Calibrated, adjustable, regulated, instrument-quality. Must be capable of discrete output levels within the appropriate, rated range of the unit under test.
Air Pressure Gauge	Calibrated. Accuracy of $\pm 0.05\%$, scaled as appropriate for the specified input of the unit being calibrated.
Power Source	Calibrated. 12-42Vdc, capable of 4-20mA output.
DC Voltmeter	Calibrated. Accuracy of $\pm 0.005\%$, minimum.
Precision Resistor	250 Ω , $\pm 0.01\%$
Screwdriver	Slotted-tip. Head width of 2.5mm (0.1 in), maximum.

Calibration Procedure

The calibration of the PIH consists of the measurement of the voltage drop across a precision resistor when the input pressure in the setup is varied within the unit's rated span.

Controls and Indicators. The zero and span adjustment pots are located on the inside front panel of the unit. The words "ZERO" and "SPAN" are used as labels.

The Zero pot provides for offsets as great as $\pm 10\%$ of rated span. The Span pot adjusts unit full-scale to 100-percent at maximum input pressure. The adjustment pots are not interactive. Neither setting is affected during the adjustment of the other.

To calibrate the PIH, make sure that the setup has been completed as described in the preceding section. Turn both adjustment pots fully counterclockwise (approximately 15 turns), then 7.5 turns clockwise. This approximates the mid-scale setting. They are each equipped with slip clutch mechanisms to prevent damage in case of overturning.

The Front Panel LED. This indicator serves two functions; when the unit is supplied with power, it lights to show that pneumatic input is present, and the intensity of its light is used as a simple indicator of pressure level. When pressure is relatively low, the light is dim. Increasing pressure increases the LED's brightness.

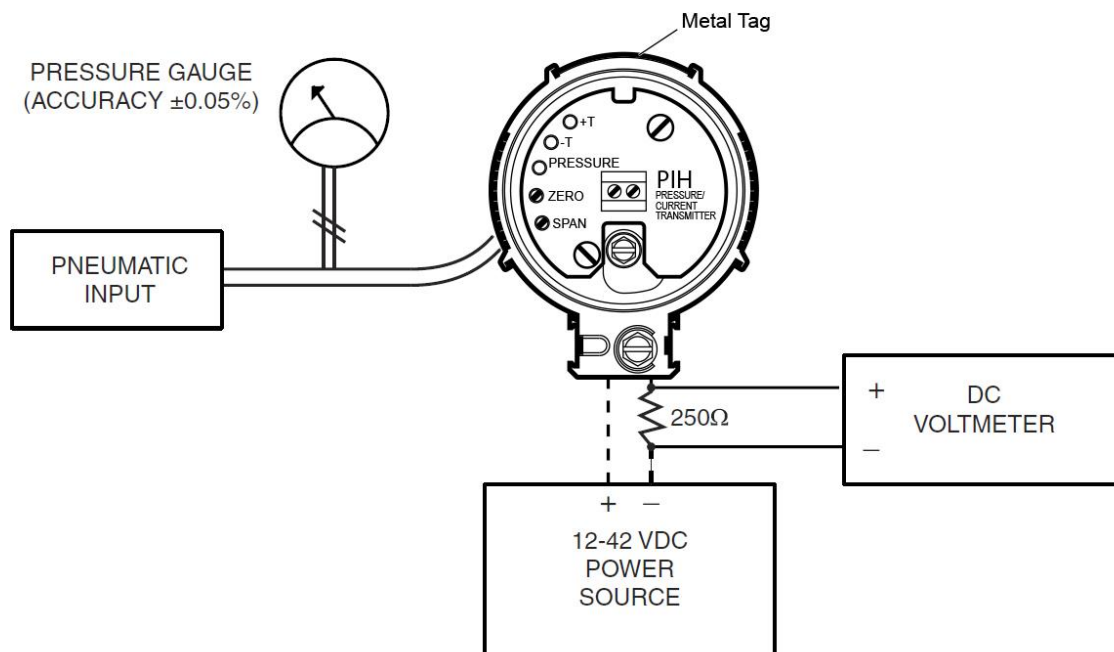
1. Set adjustable instrument air supply to 0% of rated input range. Refer to input field of unit model number, and explanation of model numbering system in Description Section, earlier in this manual.
2. Apply DC power.
3. Monitor voltmeter and adjust ZERO pot for reading of 1V.



CAUTION: Use of a screwdriver larger than specified may damage the PIH housing.

4. Set adjustable instrument air supply to 100% of rated input range.

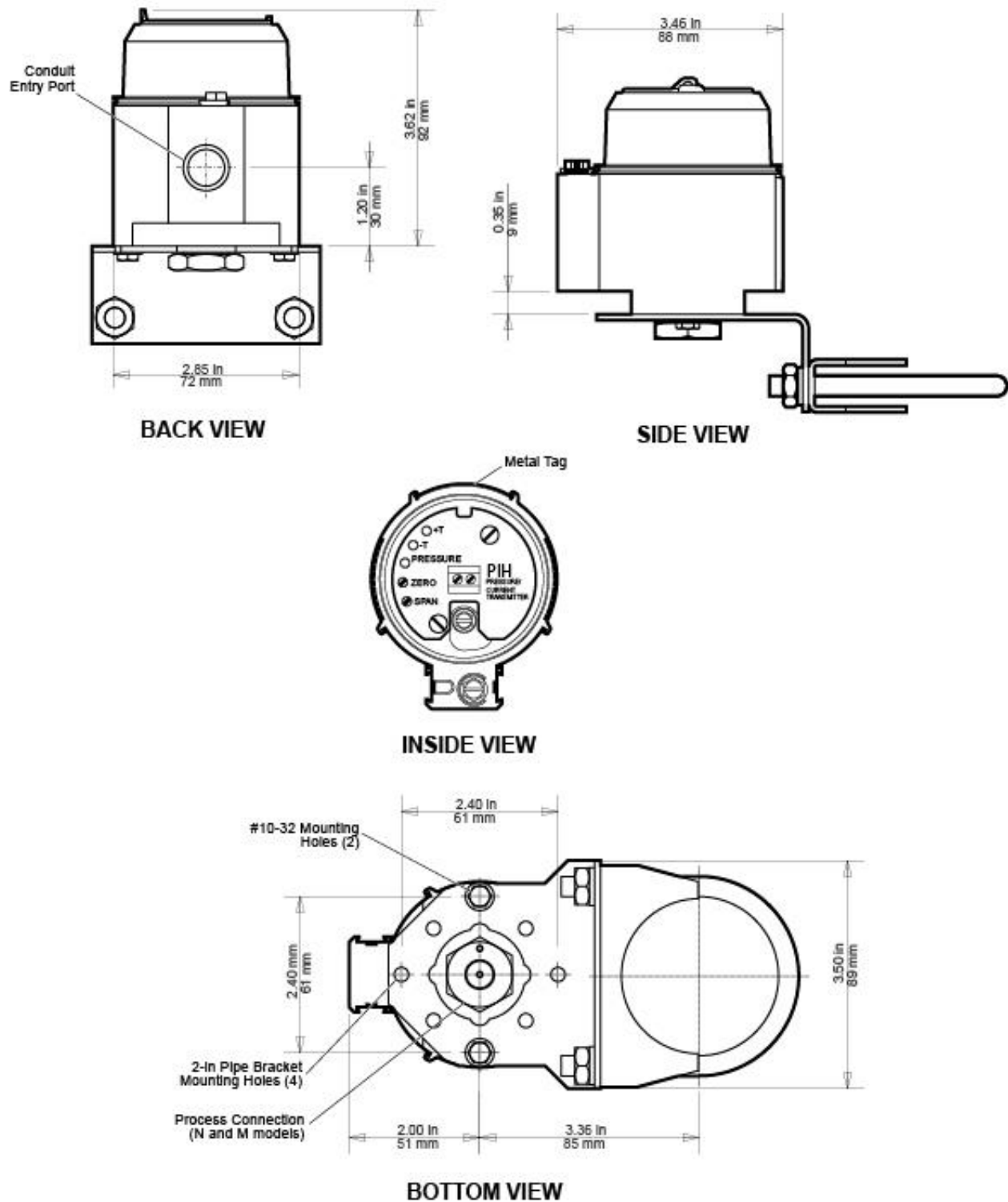
Figure 1. PIH Calibration Setup



5. Monitor voltmeter and adjust SPAN pot for reading of 5V.

6. Verify correct settings by varying pneumatic input between 0 and 100%. Monitor voltmeter, noting a 1V reading at 0% pneumatic input, and 5V at 100% pneumatic input.
7. Verify proper operation of LED. At lower input pressures, light is dim. As pressure increases, light brightens.

Figure 2. PIH Dimensions



Installation

The installation of the PIH is carried out in three phases. The first phase is the physical mounting of the unit. Next is the pneumatic connection phase, and finally, electrical connections can be made. It is strongly recommended that PIH's be installed in this order. It is recommended that each unit be calibrated according to the instructions in this manual before being placed into service.

The PIH may be installed at any angle: either surface mounted or attached to pipe or round conduit. When deciding on the placement of the PIH unit, make sure to consider the possibility of needing to access the front panel or check the fittings.

Closed Loop/Open Loop. The PIH should be installed in a closed loop. A closed loop is the best way to measure a control variable. It also helps determine if a deviation from a desired value exists and provides feedback for actuator loading pressure.

An open loop has limitations that are not consistent with precise control. Long term drift of the loop dynamics, load fluctuations that require constant adjustments of the actuator loading pressure, and performance quality variations due to inconsistencies between operating personnel are all problems commonly associated with open loops. A controlled variable cannot be directly measured in an open loop; this prevents compensating adjustments to the system input.

Phase One: Mounting

The PIH's durable casing and flexible pipe-mount hardware allows you to select from a number of mounting options. Figure 2 provides the outline dimensions for the PIH with its pipe-mounting hardware, which is recommended for most installations.

After placing the PIH in the desired location and orientation, secure the housing with the optional pipe mounting hardware or other appropriate fasteners.

If you have further questions on how to mount the PIH, contact your Moore Industries Sales Representative for assistance.

Phase Two: Pneumatic Connection

Before connecting a pneumatic input line to the PIH, ensure that the line is free of debris. To do this, separate the block and the transmitter and apply high input pressure (up to 60 psig) to the line, then slowly open each valve to clear larger objects like loose tape or pipe compound.



CAUTION: Air nozzles and valves should be lubricated before installation. Teflon® spray lubricant is recommended. If grease is used, exercise extreme care to ensure that it is kept out of the unit's air passage.

To complete the pneumatic connection, connect the supply line to the 1/4-inch NPT female port.

Seal all fittings with Teflon® tape, or equivalent. Always “blow down” (purge) all tubing and the controlled device before connecting the PIH.

Phase Three: Electrical Connections

To complete the electrical connections, route the wiring through the conduit port to the terminal block, then use a slotted-tip screwdriver with a maximum head width of 2.5 mm (0.1 inch) to loosen the terminal screws.

The terminals are comprised of compression-screw sockets that accommodate 28-12 AWG wiring.

Connect positive lead (+) to terminal labeled “+I”, and negative lead (–) to terminal labeled “–I”. Tighten the terminal screws until snug.

Use shielded, twisted-pair wiring for input. Ground the shielding wire as close as possible to the installed PIH.

Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The protective earth conductor must be connected to a system safety earth ground before making other connections.
- All input signals to, and output signals from, Moore Industries’ products should be wired using a shielded, twisted pair wiring technique. Shields should be connected to an earth or safety ground.
- For the best shielding, the shield should be run all the way from the signal source to the receiving device. (see Note below)
- The maximum length of un-shielded input and output signal wiring should be 2 inches.



NOTE: Some of Moore Industries’ instruments can be classified as receivers (IPT2, IPX2, etc.) and some can be classified as transmitters (TRX, TRY, etc.) while some are both a receiver and a transmitter (SPA2, HIM, etc). Hence, your shield ground connections should be appropriate for the type of signal line being shielded. The shield should be grounded at the receiver and not at the signal source.

CE Conformity

Installation of any Moore Industries products that carry the CE certification (Conformité Européenne) must adhere to guidelines set forth in applicable EMC (Electromagnetic Compatibility) directive (2014/30/EU - EN 61326). Consult the factory for the most current information on products that have been CE certified.

Operation

Once properly installed, supplied with pneumatic input, and connected to load instrumentation in the process loop, PIH transmitters operate unattended.

If a unit is determined to be the cause of a loop discrepancy or malfunction, refer to the Troubleshooting Section of this manual for instructions.

Maintenance & Troubleshooting

PIH transmitters are built with highly reliable components and contain no moving parts. These two aspects ensure that these units operate reliably for extended periods of time.

Once installed and operating, the PIH requires no field maintenance other than an occasional visual inspection of the unit connection terminals and pneumatic connection. This inspection is recommended at least once every six months, or more frequently in those installations where the unit is subjected to extremes in vibration or dust and dirt.

Field troubleshooting of the PIH is limited to visual inspection of the housing, the pneumatic connections, and verification of specified signal response.

If problems arise in the function of the unit in its application,

- Make sure that the pneumatic connection is clean and tight, and that the air supply is not blocked or contaminated.
- Remove the unit from service and recalibrate, making sure that bench instruments used are properly calibrated.
- Verify loop power levels.

If, after re-calibration, the PIH fails to perform up to specifications, contact the factory Customer Service Department. The email address, snail mail addresses, and phone numbers of your local STAR Center are listed on the back cover of this manual. Instructions for the return of the unit to the factory for further testing or repair can also be found on the back cover of this manual.

When calling for assistance, always remember to provide the Customer Service Representative with the model and serial number of the offending unit, and, if possible, the job number and the purchase order number under which the unit was ordered.

Current-to-Pressure Product Solutions

IPT² DIN-style Current-to-Pressure Transmitter



The high-performance IPT² Current-to-Pressure (I/P) DIN-style Transmitter converts a current signal to a pneumatic signal so that an electronic-based system such as a DCS, PLC, or PC can control a pneumatic actuator, valve, or damper drive. Available models accept a wide range of current inputs (4-20mA, 4-12mA, and 12-20mA) and provide a proportional pneumatic signal (3-15psig, 0.2-1 Bar, 20-100kPa, etc.).

Features:

- 22 direct and reverse output ranges
- Low air consumption and high output volume
- High accuracy and fast response
- Immune to supply pressure variation
- Clog-resistant design, clean start up
- RFI/EMI protection

IPH² and IPX² Field Mount Current-to-Pressure Transmitter



The IPH² and IPX² Field Mount I/P transmitters accept a current signal (such as 4-20mA) from a DCS, PLC or PC-based control system. They convert the current signal to a pneumatic signal (3-15psig, 0.2-1bar, 20-100kPa, etc.) to provide precise, proportional control of valves, actuators and other pneumatically controlled devices.

Features:

- 22 direct and reverse output ranges
- Low air consumption and high output volume
- Accurate and stable
- Immune to supply pressure variation
- Clog Resistant Filtered Nozzle and Orifice

IPX² Additional Features:

- Switch-selectable reverse output
- Removable electronics module
- Approved for use with Natural Gas with -NG1 and -NG2 options
- Both intrinsically-safe and flameproof approved



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