

IST Isolating Signal Transmitter



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Introduction

Moore Industries' Isolating Signal Transmitter, the IST, is used to provide isolation between the input and output in an instrumentation loop. A wide range of input/output configurations are available.

This manual contains the information necessary to calibrate, install, operate, maintain, and troubleshoot the IST. It includes a brief unit description, a table of performance and operational specifications, and an explanation of Moore Industries' model/serial number-based product data tracking system.

The following guidelines are used throughout the 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.

Description

The IST is configured at the factory to accept either current or voltage, non-isolated input, and to provide proportional, isolated output; breaking the galvanic path between a transmitted signal source and the receiving/recording device.

The IST is a 4-wire transmitter powered by 117, 230, or 240 Vac, according to customer requirement. AC power can be set or changed in the field by moving jumpers on the unit's internal printed circuit (PC) board. 24Vdc is also available upon request, but it is not jumper selectable.

The unit is packaged in a compact, DIN-style housing, designed for use with either G-type DIN rail (DIN EN50035) or Top-hat DIN rail (DIN EN50022), making it ideal for installations where space is at a premium.

Controls

The IST has two, labeled, multiturn potentiometers (pots) located on its front panel. These control the unit's zero and span settings. The Calibration Section of this manual contains the instructions for setting the pots.

Internally, the IST has three jumpers located on a PC board. The setting of these jumpers determines which of the IST's rated power inputs, 117, 230, or 240 Vac, is operational in the unit. Typically, the jumpers are positioned according to customer order specification before shipment, but they can be reset at any time. Jumpers are not available on 24dc powered units.

Specifications

<p>Performance Accuracy: $\pm 0.1\%$ of rated unit span including adjustment resolution and linearity</p> <p>Isolation: Input and Output are transformer-isolated with no galvanic path (dc connection)</p> <p>Ripple: 20mV peak-to-peak maximum, as measured across a 250 ohm load</p> <p>Frequency Response: 10Hz at the -3db point</p> <p>Load Capability: 4-20mA into 1400$\frac{1}{2}$ maximum, 10-50mA into 560 ohms maximum</p>	<p>Performance (continued) RF/EMI Effect: Negligible @ 10V/m. With RF option, effect is 50V/m $-ABC \leq 0.5\%$ of maximum span. Ratings based on testing conducted in typical hand-held communications frequency band according to SAMA Standard PMC 33.1</p> <p>Power Supply Effect: $\leq 0.05\%$ of span maximum over the entire rated power supply range</p> <p>Ambient Temperature Range: -30 to 82°C (-22 to 180°F)</p>	<p>Ambient Temperature (continued) Effect: $\pm 0.015\%$ of span per $^\circ\text{C}$ change over a 0 to 70°C range ($\pm 0.008\%$ of span per $^\circ\text{F}$ change over a 32 to 158°F range)</p> <p>Adjustments Type: External multiturn potentiometers</p> <p>Span: provides for 100% adjustment, $\pm 10\%$, with full-scale input</p> <p>Zero: Adjusts unit zero offset, $\pm 5\%$ of span (On dual channel models, each channel has independent adjustments)</p> <p>Weight Single unit: 454 grams (16 ounces) Dual unit: 663 grams (23 ounces)</p>
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Ordering Information

Unit	Input	Output	Power	Options	Housing
IST	<p>SINGLE INPUT CHANNEL: Factory Set</p> <p>0-20MA into 50 ohms</p> <p>4-20MA into 50 ohms</p> <p>10-50MA into 20 ohms</p> <p>0-1MA into 1K ohms</p> <p>(-1)+1MA into 1K ohms or</p> <p>.2-1V into 1M ohms</p> <p>0-1V into 1M ohms</p> <p>0-5V into 1M ohms</p> <p>0-10V into 1M ohms</p> <p>1-5V into 1M ohms</p> <p>(-10)VTO+10V into 200Kohms (-BI option required)</p> <p>0-30V into 200K ohms (-ATL option required)</p> <p>DUAL INPUT CHANNELS: Factory Set</p> <p>2X0-20MA into 50 ohms</p> <p>2X4-20MA into 50 ohms</p> <p>2X10-50MA into 20 ohms</p> <p>2X0-1MA into 1K ohms</p> <p>(2X-1)TO1MA into 1K ohms or</p> <p>2X .2-1V into 1M ohms</p> <p>2X 0-1V into 1M ohms</p> <p>2X 0-5V into 1M ohms</p> <p>2X 1-5V into 1M ohms</p> <p>2X 0-10V into 1M ohms</p> <p>2X 0-30V into 200K ohms (-ATL option required)</p>	<p>SINGLE OUTPUT CHANNEL: Factory-set</p> <p>4-20mA into 1400 ohms, max</p> <p>10-50mA into 560 ohms, max</p> <p>DUAL OUTPUT CHANNEL: 2X4-20mA into 1400 ohms</p>	<p>117AC 230AC 240AC</p> <p>Customer set using internal jumpers. All selections $\pm 10\%$ @ 50/60Hz. 5 watts, nominal</p> <p>24DC $\pm 10\%$, not jumper selectable</p>	<p>-ATL Low-impedance (200K) attenuated input (must be specified with greater than 10V input type)</p> <p>-EP Externally-powered output loop</p> <p>-RF Patented RF filter assembly</p> <p>-RFH Special version of the patented RF filter assembly for 230 or 240Vac power only</p> <p>-TX 2-wire transmitter excitation</p>	<p>DIN DIN-style housing mounts on 32mm G-type (EN50035) and 35mm Top Hat (EN50022) rails</p>

Options

The following paragraphs outline the options available for the IST.

ATL Option — *Low-impedance (200k) attenuated input.* Must be specified with greater than 10V input type.

EP Option — *Externally-powered output loop.* Allows the IST to accept operating power from its output side.

RF Option — *Radio Frequency/Electromagnetic Interference Protection.* Patented RF filter assembly provides levels of protection based on SAMA standard 33.1. 50V/m –ABC - 0.5% of maximum span. Consult the factory for RFI/EMI protection for dual output models.

RFH Option — Special version of the patented RF filter assembly for 230 and 240Vac powered units, provides levels of protection based on SAMA standard 33.1. 30V/m –ABC = ±0.1% of maximum span. Consult factory for RFI/EMI protection for dual output models.

TX Option — *Transmitter Excitation.* Provides a single, 2-wire transmitter excitation output of 24Vdc @ 25mA. Dual input units with –TX options require –EP option (Option not available as a standard with 2X10-50MA input type, consult factory for availability Option not available with voltage inputs).

IST Model Numbers

To order additional or replacement modules for your system, refer to the Ordering Information table and “build” a model number using the information in bold text. Specify the following in order:

Product / Input / Output / Power / Option [Housing]

For an IST with an input of 4-20mA and an output of 10-50mA using 117AC power and equipped with the TX option in DIN housing, specify:

IST / 4-20mA / 10-50MA / 117AC / -TX [DIN]

Calibration

Prior to shipment, every IST is subjected to rigorous testing by our team of skilled technicians. Every product Moore Industries manufactures, sells and services is guaranteed to meet the strict quality standards that have become synonymous with our name.

Before placing your IST into service, a bench check of basic operation is recommended to ensure that the unit hasn't sustained any damage during transit, and to set zero and span for your application.

Every unit should be:

- Checked to verify that the appropriate IST model has been ordered for the intended application.
- Connected in a calibration setup (described later in this section) and checked for desired output.
- Adjusted for desired zero and span.

Power Selection – Internal Jumpers.

Most ISTs are set at the factory to the power level used by the customer. To change the level, the units side panel must be removed. If the value in the power field of the model number is correct for your application, skip the next section and proceed with the Calibration Procedures section. Otherwise, continue with the following:

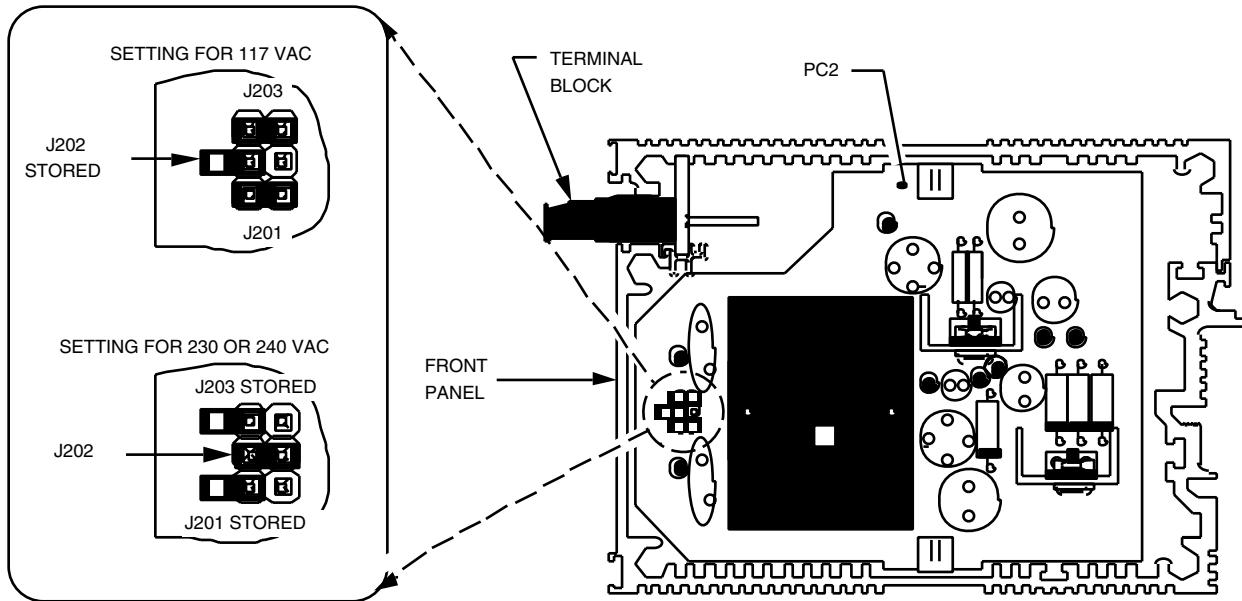
There are three jumpers on PC #2, inside the IST, which control the unit's input power level setting. Units are capable of accepting power inputs of 117, 230, or 240 Vac. The customer can change the power setting in the field as desired.

To access the jumpers, use a Phillips-head screwdriver to remove the screws from the side panel with the serial/model number label. Figure 1 shows the printed circuit board and the location of the jumpers for setting 117, 230, or 240 Vac.

There are no other internal adjustments or controls in the IST. Re-install the side panel when jumper setting is complete.

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Figure 1. Setting Power Jumpers



Calibration Setup

Table 1 lists the equipment you will need to calibrate the IST. These items are not supplied by Moore Industries, but should be available in environments qualified to perform the procedure.

Figures 2 and 3 show the calibration setup for the single and dual IST. Connect the unit as shown in the illustration, and apply appropriate ac power. Allow approximately five minutes for setup stabilization/warm-up.

Use the appropriate materials listed in Table 1 in the hookup, apply appropriate power, and allow approximately 5 minutes for unit warm-up and hookup stabilization.

Table 1. IST Calibration Equipment

Equipment	Characteristics
Signal Source	Appropriate for the intended IST application, current or voltage. Accurate to within $\pm 0.05\%$ of span, minimum. Refer to Ordering Specifications for input specification.
DC Voltmeter with Precision Resistor	Voltmeter: Accurate $\pm 0.05\%$ of span, minimum. Resistor: 250 ohms ($\pm 0.1\%$) for 4-20mA units. 100 ohms ($\pm 0.1\%$) for 10-50mA units.
AC Power Source	Variac or equivalent unit set to 117, 230, or 240 Vac, as appropriate.
Screwdrivers	Slotted-tip with head width 2.54 mm (0.1 inch), maximum and Small Phillips-head
Pliers	Needle-nosed (or technician's tweezers).

Figure 2. Calibrating the IST

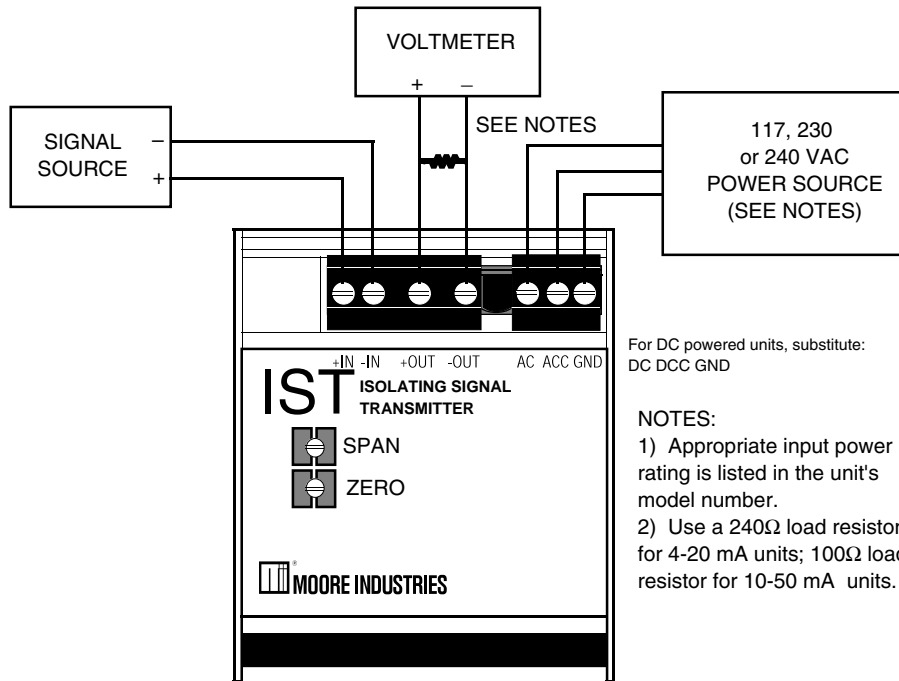
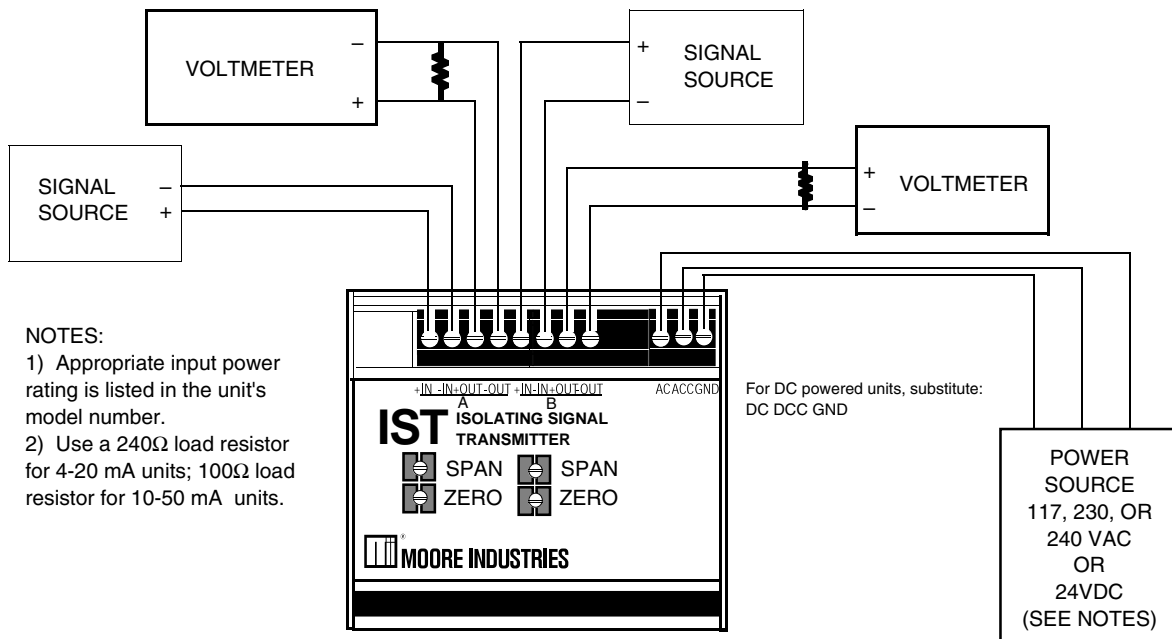


Figure 3. Calibrating the Dual IST



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Calibration Procedure

IST calibration consists of the procedure to adjust unit Zero and Span pots while receiving input across the entire rated range. The IST Zero pot provides offset capability of unit minimum output of $\pm 5\%$ of span. The unit's Span pot provides full-scale capability, $\pm 10\%$, over the entire input range.

The IST Zero and Span pots are labeled and accessible on the front panel. Each is equipped with a slip clutch mechanism that prevents damage if turned past the wiper stop. If unable to sense the wiper stop when preparing the pot for calibration, simply turn it 15 times in either direction. With calibration setup complete, adjust both potentiometers 15 turns counterclockwise, then 7.5 turns clockwise (approximate mid-scale).

To adjust Zero and Span pots:

1. **Simulate 0% input.**
2. **Adjust ZERO pot until voltmeter reads 1 V, $\pm 0.1\%$.**

Caution:

To avoid damaging the unit housing, use a screwdriver with a head not wider than 2.54 mm (0.1 inch) to adjust the Zero and Span pots.

3. **Set input to 100%.**
4. **Adjust SPAN pot until voltmeter reads 5 V, $\pm 0.1\%$.**
5. **Repeat steps 1 through 4 until 0 and 100% readings are stable, $\pm 0.1\%$.**

Installation

The IST is housed in a universal DIN-style case that mounts easily on both G-type and Top Hat rails.

Mounting the IST

To mount the IST on Top Hat DIN rail, seat the upper extrusion on the back panel over the top of the rail and pivot downward until the housing locks into place.

To mount the unit on G-type rail, seat the extrusion under the top lip of the rail and pivot downward.

Figure 4 shows the unit's dimensions.

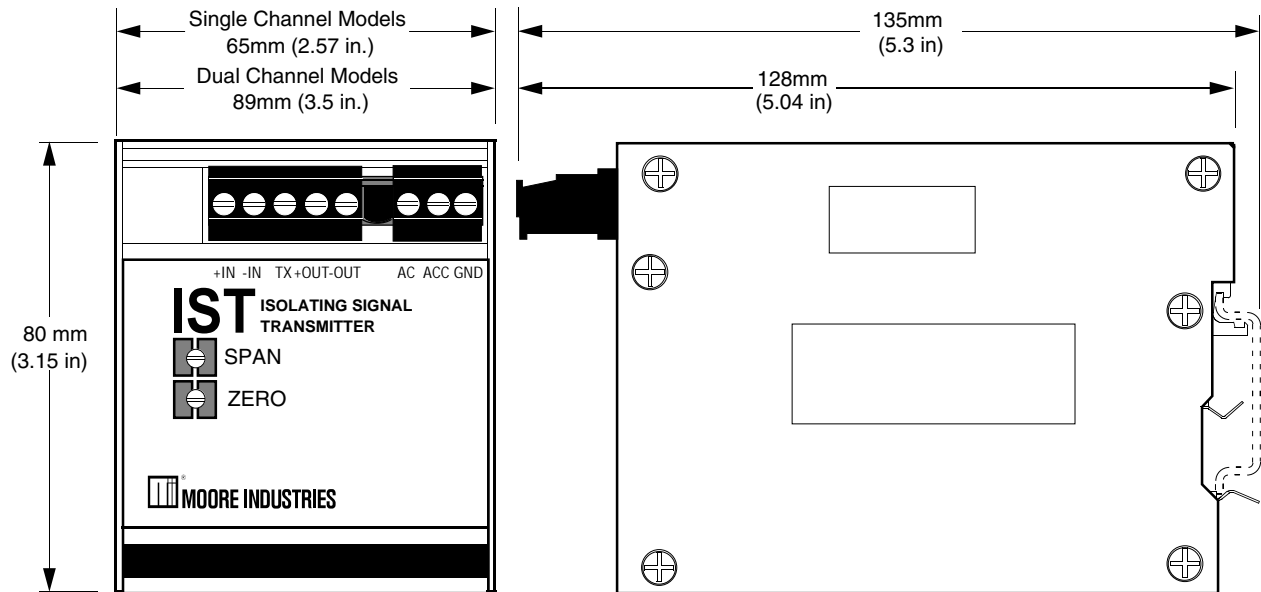
Electrical Connections

The standard IST has seven active terminals on its front panel. Units equipped with the TX Option have eight. Each is labeled according to its intended function in your application. The terminal blocks are removable, so that units can be replaced without having to disconnect wiring.

Note:

Some old-style ISTs do not have removable terminal blocks. Contact your Moore Industries' Sales Representative for information on a Removeable Terminal Block Option, which makes old unit connections compatible with the new style IST.

Figure 4. Dimensions of the IST



NOTE: Unit front panel shows TX Option installed.

–IN and +IN terminals are for connection of negative and positive signal input, respectively; –OUT and +OUT are for the connection of current-driven instrumentation (load) to IST output; and AC, ACC, and GND are the terminals for connection of unit power.

Figure 5 illustrates the installation hookup of the standard IST and figure 6 shows the installation hookup of the IST when configured with the TX Option. As shown in figure 6, TX-equipped units have an additional +TX terminal, and the –IN terminal is not used. Figure 7 illustrates the installation hookup for the single IN, dual OUT model. Figures 8 and 9 show the installation hookup for the dual IST.

Terminal wires used should be between 14 and 22 AWG. Connections are made with compression-screw sockets. Use a slotted-tip screwdriver with a head width no greater than 3 mm (0.12 inch).

WARNING:

Make sure all connections are secure before applying power to the IST. Potentially harmful voltages are present at the ac terminals during operation. Adhere to all local safety guidelines.

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Figure 5. Installing the IST

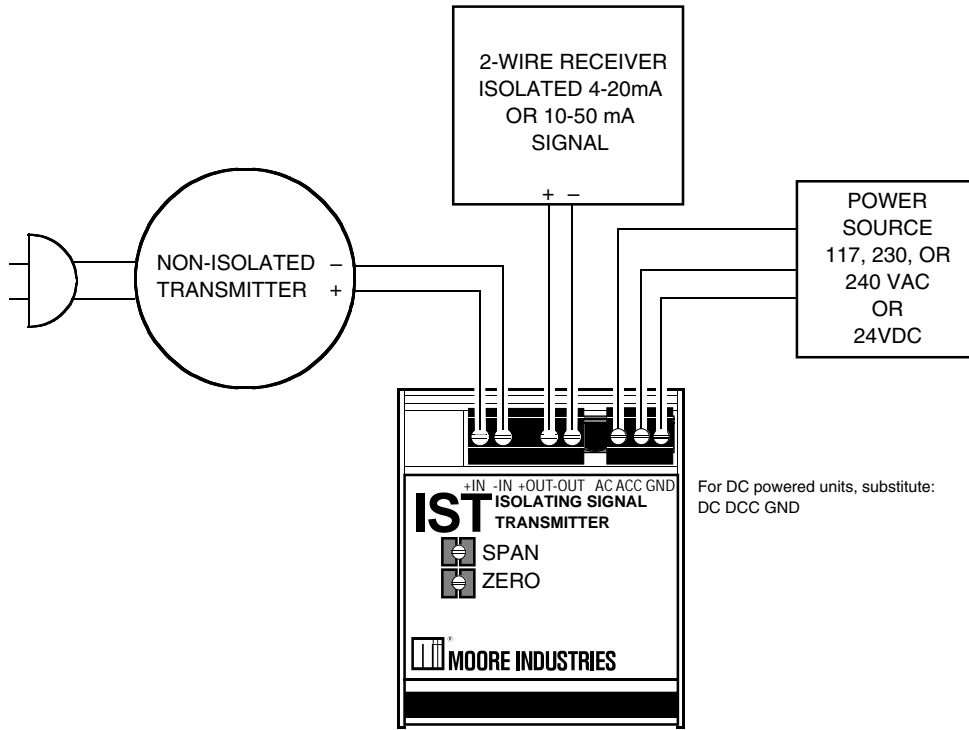


Figure 6. Installing the IST with the TX option

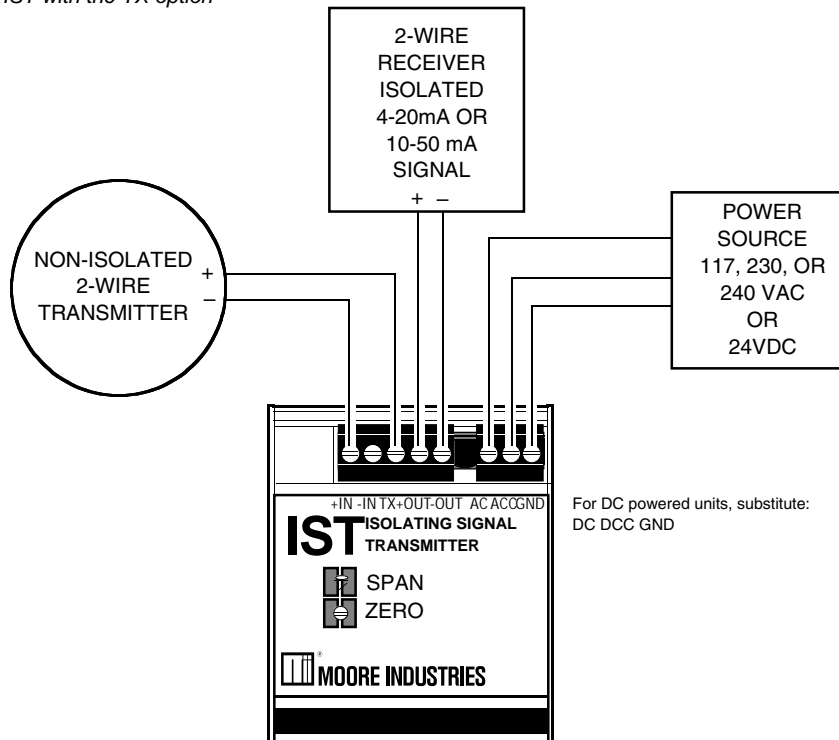


Figure 7. Installing the Single IN, Dual OUT IST with the TX & EP options

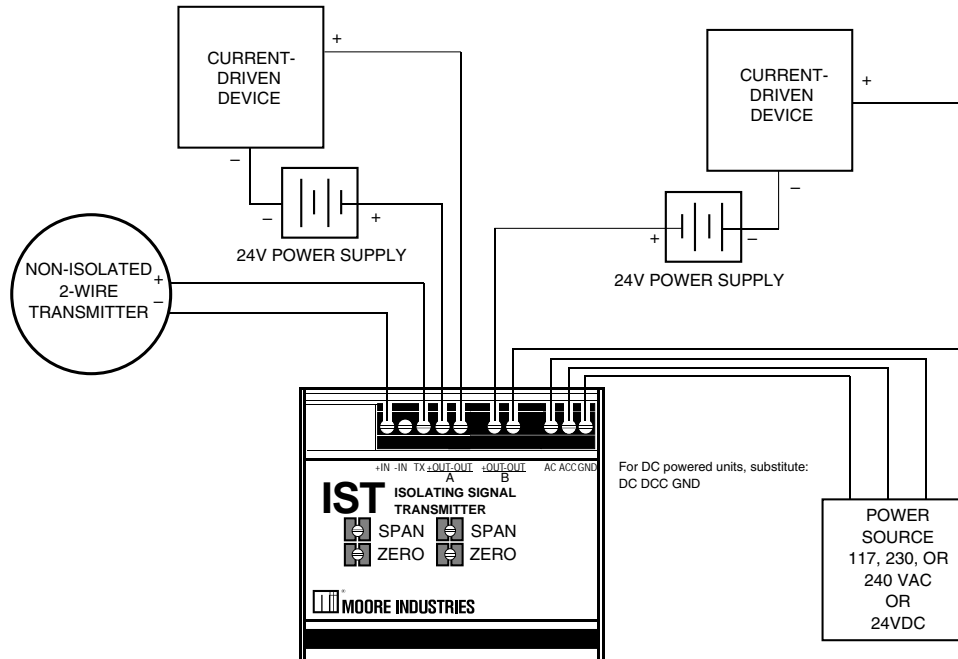
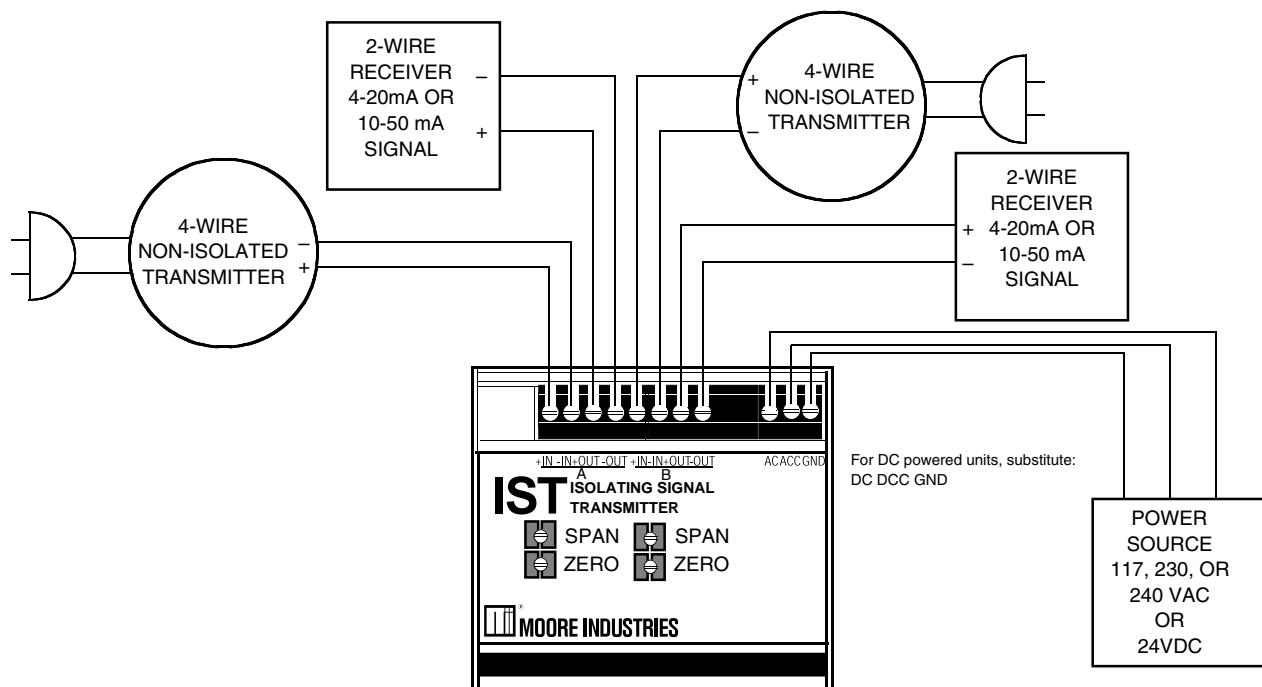
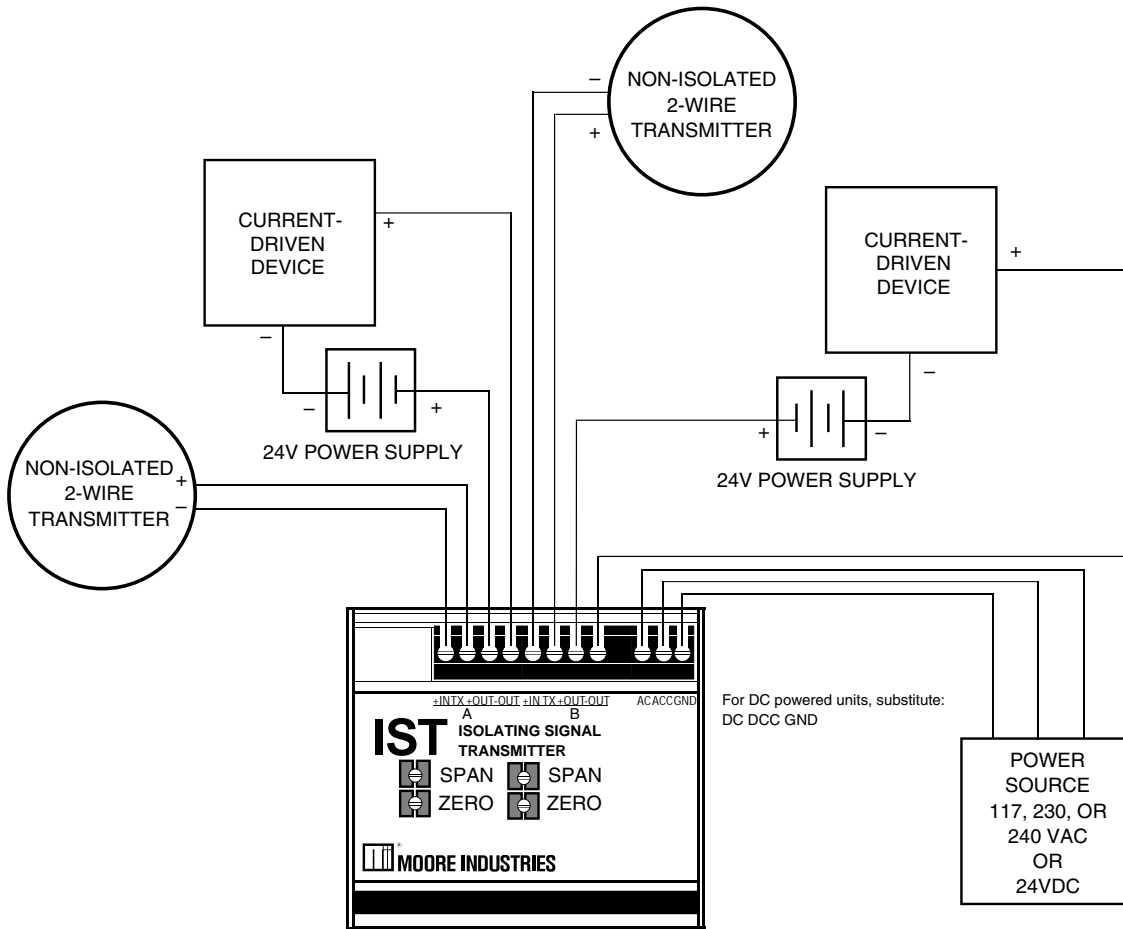


Figure 8. Installing the Dual IST



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Figure 9. Installing the Dual IST with the TX and EP Options



Recommended Ground Wiring Practices

The following ground wiring practices must be followed to ensure proper performance of the IST:

- Any Moore Industries product in a metal case or housing should be grounded. Units in DIN housings, for example, should be mounted on a grounded rail.
- All input signals to, and output signals from Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to earth or safety ground at the unit itself.
- The maximum length of any unshielded input and/or output signal wiring is 2 inches.

CE Conformity

Installation of any Moore Industries products that carry CE the certification (Commission Electrotechnique) **must** adhere to the guidelines above in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directives (EN55011, EN 50082-1, EN50082-2, etc.)

Consult the factory for the most current information on products that have been CE certified.

Maintenance & Troubleshooting

Once mounted and connected according to the instructions, the IST operates unattended. After the initial calibration of the Zero and Span potentiometers, no further adjustment is required.

A check of terminal connections is recommended every six months. Ensure that all terminal screws are tight and free of corrosion. Check that adequate ventilation exists, or that heat-sinking materials are used in mounting.

If the IST is found to be performing below specification, complete the following checklist.

- Make sure all connections are clean and tight.
- Verify the accuracy and calibration of bench instruments used to take measurements.
- Ensure that signal and power levels in the instrumentation loop have not changed since the unit was installed. Make sure that power is within specified limits (refer to Ordering Information).
- Perform the calibration procedure from this manual. To verify proper functioning of the IST, the unit should be removed from the application and the procedures for setup and actual calibration shown in the Calibration Section of this manual should be carried out.

If, after re-calibration, the unit continues to malfunction, contact the factory Customer Service Department. The phone numbers are listed on the back cover. Instructions for the return of the unit to the factory for further testing or rehab can be found in the Customer Support section.

Customer Support

Moore Industries is recognized as the industry leader in delivering top quality to its customer, both in products and services. We perform a battery 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. Factory phone numbers are on the back cover.

If problems involve a particular IST, there are several pieces of information you can gather **before** you call the factory that will help our staff to get you answers more efficiently. When you call, please have:

- The model number of the unit in question.
- The serial number of the unit in question.
- The job number (if available).
- The purchase order under which the unit was shipped (if available).

RETURN PROCEDURES

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.

WARRANTY DISCLAIMER

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.



WORLDWIDE • www.miinet.com

United States • info@miinet.com Tel: (818) 894-7111 • FAX: (818) 891-2816	Belgium • info@mooreind.be Tel: 03/448.10.18 • FAX: 03/440.17.97	China • sales@mooreind.sh.cn Tel: 86-21-62491499 • FAX: 86-21-62490635
Australia • sales@mooreind.com.au Tel: (02) 8536-7200 • FAX: (02) 9525-7296	The Netherlands • sales@mooreind.nl Tel: (0)344-617971 • FAX: (0)344-615920	United Kingdom • sales@mooreind.com Tel: 01293 514488 • FAX: 01293 536852