

# ECT

2-wire Economy  
Isolator/Converter



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## 2-Wire Economy Isolator/Converter

# ECT

### Introduction

This is the users' manual for Moore Industries' line of 2-wire, Economy Signal Isolator/Converters, the ECTs. Available in configurations that accept a variety of inputs, the principle function of the ECT family of products is to provide low cost isolation (up to 1500Vrms) between instruments at either end of a process loop.

Additionally, some ECT configurations perform signal conversion. They accept either dc or ac voltages and provide precise, industry-standard 4-20mA output.

The ECT is a highly cost-effective means of protecting process signals from distortions associated with ground loops, motor noise and other common types of ambient electrical interference.

**Pass Power.** The 4-20MATX ECT configuration (refer to the Ordering Specifications table later in this manual) features Moore Industries' innovative "Pass Power" capability. In addition to the superior isolation that is standard with the ECT line, the Pass Power unit transfers both process signals *and loop power* between transmitter and receiver. This eliminates the need to install additional power supplies. It also eliminates the requirements for transmitters with excitation output in many applications.

### Options

There is one option available for the ECT:

**EM Option** *Externally Mounted Transformer*, for use with the 0-5Aac input configuration, this option consists of a tuned, toroidal transformer that physically separates high-level current input from the receiving device in a process loop. This provides the added convenience of allowing the servicing of receivers without having to interrupt process signals.

### Specifications

| 2-Wire, Output-Loop Powered Models  |   |  |
|---|---|--|
| <b>Accuracy</b> ±0.1% of span   | <b>Burden</b> 4V typical with 4-20MATX input; 0.5V max. with 4-20mA input; 0.01V max. with 0-5A input | <b>Ambient Temperature Effect</b> ±0.007% of span/°C typical; ±0.015% of span/°C max |
| <b>Isolation</b> 1500Vrms between input and output  | <b>Load Capability</b> $V_s - 12V_{dc}$<br>————— =R Load<br>20mA<br>(Except 4-20MATX)                 | <b>Ambient Humidity Operating Range</b> 0-95% non-condensing                         |
| <b>Input Overrange</b> 250% of full scale for dc current inputs; 200V peak max. for dc voltage inputs; 600V peak max. for ac voltage inputs | <b>Response Time</b> 100msec max. to 99% of output (400msec to 99% of output max. for 0-5A input)     | <b>Span Adjustments</b> ±10%   |
| <b>Output Current Limiting</b> 25mA typical; 30mA max.  | <b>RF/EMI Protection</b> No effect at 10V/m at frequencies between 20-500MHz                          | <b>Zero Adjustments</b> ±5% (non-interactive when span is set first)                 |
| <b>Ripple</b> 10mV (measured across 250Ω resistor)  | <b>Ambient Temperature Operating Range</b> -20°C to +70°C (-4°F to +158°F)                            | <b>Weight</b> 85 g (3 oz)  |

(Table continues on following page)

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## Specifications

| 2-Wire, Input-Loop Powered Models |  |                          |  |  |                                  |
|-----------------------------------|--|--------------------------|--|--|----------------------------------|
| <b>Accuracy</b>                   | ±0.075% of span  | <b>Ripple</b>            | 10mV (measured across 250Ω resistor)   | <b>Ambient Temperature Operating Range</b> | -29°C to +82°C (-20°F to +180°F) |
| <b>Isolation</b>                  | 500Vrms between input and output   | <b>Burden</b>            | 5.5V when outputs are shorted for 4-20mA inputs, 10.5V with 250Ω load; 8.5V when inputs are shorted for 10-50mA inputs, 13.5V with 100Ω load; Output load voltage is reflected on input. Output should be trimmed for anticipated output load. | <b>Ambient Temperature Effect</b>          | ±0.018% of span/°C               |
| <b>Input Overrange</b>            | 200% of full scale for 4-20mA inputs; 150% of full scale max. for 10-50mA inputs | <b>Response Time</b>     | 20msec max. to 99% of output   | <b>Ambient Humidity Operating Range</b>    | 0-95% non-condensing             |
| <b>Output Current Limiting</b>    | 30mA with 250Ω output load   | <b>RF/EMI Protection</b> | No effect at 10V/m at frequencies between 20-500MHz  | <b>Trim Adjustment</b>                     | Adjusts output ±1%               |
|                                   |  |                          |  | <b>Weight</b>                              | 85 g (3 oz)                      |

## Ordering Information

| Unit                                  | Input  | Output   | Power  | Option   | Housing  |
|---------------------------------------|--|--|--|--|--|
| ECT Economy Signal Isolator/Converter | <i>Output-Loop Powered</i><br><b>4-20MA</b> into 25Ω<br><b>4-20MATX</b><br>(24-42DC power required)<br>1-5V into 1MΩ<br>0-10V into 1MΩ<br>0-150AC into 100KΩ<br>0-250AC into 180KΩ<br>0-5AAC into 0.002Ω<br><br><i>Input-Loop Powered</i><br><b>4-20MA</b> into 275Ω<br>(525Ω with 250Ω output load)<br><b>10-50MA</b> into 170Ω<br>(270Ω with 100Ω output load) | <i>Output-Loop Powered</i><br><b>4-20MA</b> into 600Ω with 24Vdc power supply<br><br><i>Input-Loop Powered</i><br><b>4-20MA</b> into 0-250Ω<br><b>10-50MA</b> into 0-100Ω<br>(Consult factory for pricing and availability of other ranges.) | <i>Output-Loop Powered</i><br><b>12-42DC</b><br><b>24-42DC</b><br>(Specify with 4-20MATX input)<br><br><i>Input-Loop Powered</i><br>Current Loop Excitation at 4mA:<br><b>5.5VLP</b> 5.5 volts with 4-20mA*<br><b>8.5VLP</b> 8.5 volts*<br>* Plus voltage across output load | <i>Output-Loop Powered</i><br><b>-EM</b> Externally-mounted input transformer for current input (available with 0-5Aac input type only)<br><br><i>Input-Loop Powered</i><br>None available | <b>ECD</b><br>Thermoplastic economy DIN-style housing mounts on 32 mm G-type (EN50035) and 35 mm Top Hat (EN50022) rails |

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

Model number example: ECT / 0-5AAC / 4-20MA / 12-42DC / -EM [ECD]

## Calibration

Prior to shipment, every ECT 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 company name.

Before placing your ECT 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 ECT 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.

## Setup

Table 1 lists the equipment you will need to bench check the ECT. These materials are not supplied by Moore Industries, but should be available in environments suited for calibration and maintenance of electronic instruments. If an item is not available, contact the factory.

**Table 1.** *Gathering the Equipment for 2 -Wire ECT Calibration*

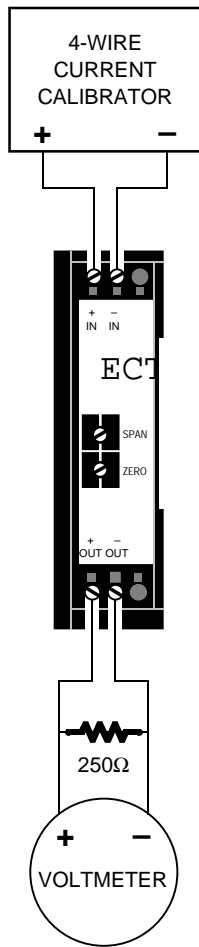
| Device                            | Specifications   |
|-----------------------------------|--|
| <b>Voltage/Current Calibrator</b> | Adjustable, calibrated to an accuracy of $\pm 0.025\%$ (EDC Model CR 103 or MV 105, or equivalent)<br><br>Rotek Model 811A (or equivalent) recommended for calibrating EM-equipped units |
| <b>Power Supply</b>               | Calibrated, 24Vdc, $\pm 10\%$ , nominal  |
| <b>Load Resistor</b>              | 250 $\Omega$ ( $\pm 0.01\%$ ) precision  |
| <b>Multimeter</b>                 | Calibrated to an accuracy of $\pm 0.025\%$ , minimum (Keithley Model 197, or Fluke Model 8840 or 8842, or equivalent)  |
| <b>Screwdriver</b>                | Standard (Blade-type), head width 3.1 mm (0.125 in), maximum   |

# ECT 2-Wire Economy Isolator/Converter

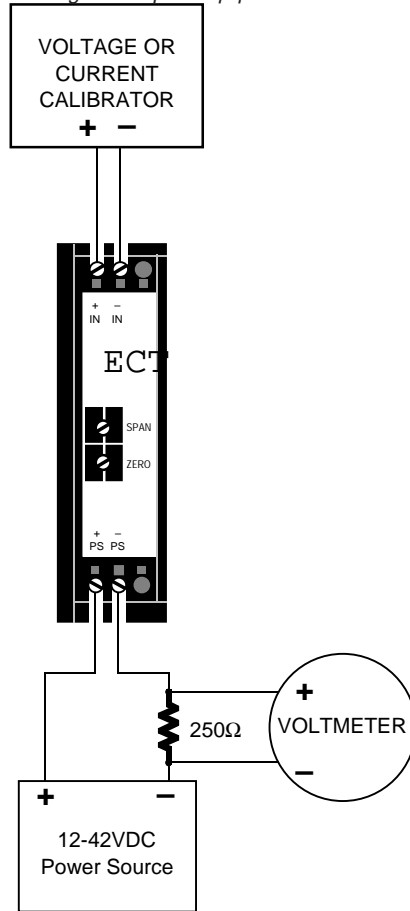
Figure 1 shows the calibration setup for input loop-powered ECTs (5.5VLP, 8.5VLP in the power field of the model number). Figure 2 shows the setup for output loop-powered units, including those equipped with 4-20MATX transmitter excitation. Figure 3 shows how to set up for calibrating units with the -EM option.

Moore Industries recommends that the procedures in this section be carried out at a technicians' bench or in a similar, lab-type environment. Do not calibrate the ECT in the field, or installed in the application.

**Figure 1.** Calibrating the input current loop-powered 2-Wire ECT

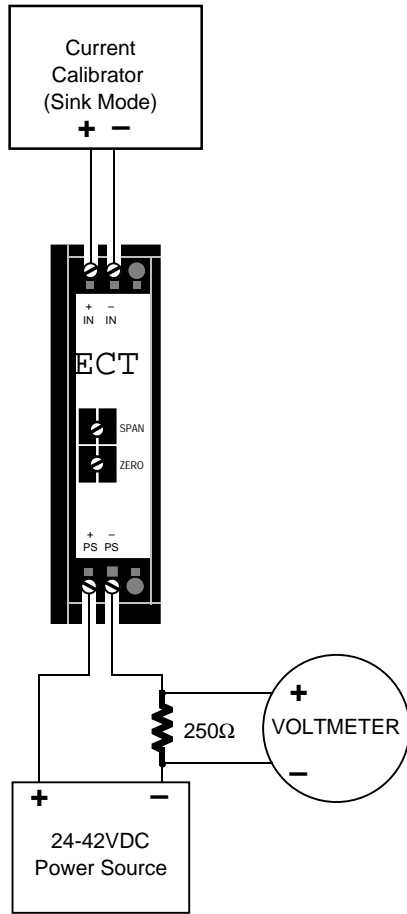


**Figure 2.** Calibrating the output loop-powered 2-Wire ECT

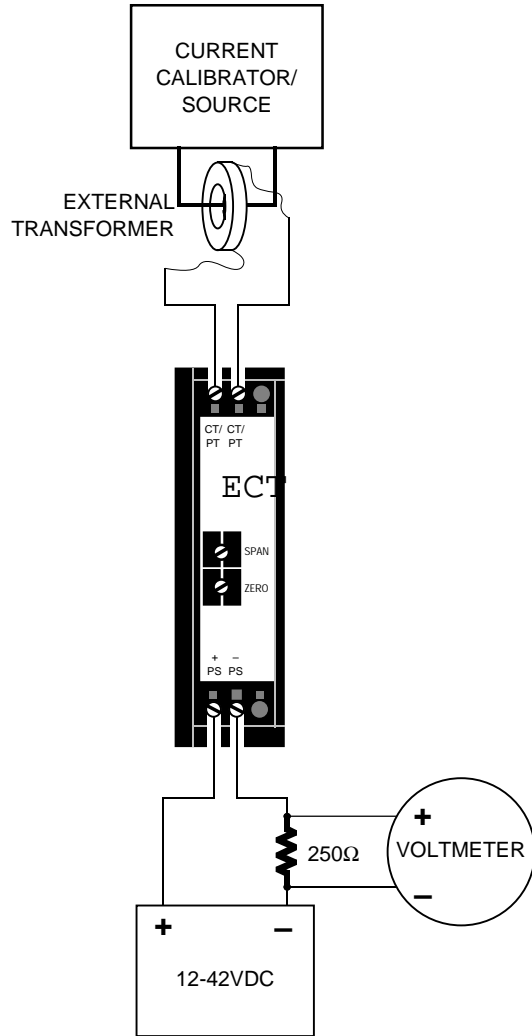


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**Figure 3.** Calibrating the output loop-powered 2-Wire ECT with 4-20MATX



**Figure 4.** Calibrating the 2-Wire ECT equipped with the -EM option



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## Procedure

With the unit incorporated into the setup shown (Figure 1 for input-loop powered units; figure 2 for output-loop powered units, figure 3 for TX-equipped units or figure 4 for EM-equipped units.):

1. Apply the appropriate power to the “PS” side of the setup for output-powered units or to the “IN” side of the setup for input-powered ECTs.
2. Set the Current/Voltage Calibrator (Calibrator) to 0% of the rated span for the type of ECT being calibrated.

For example, 4mA for a 4-20mA input unit or 1V for a 1-5V input unit.

3. If calibrating an input-powered ECT, skip to step 6.
4. Adjust the ECT Zero potentiometer (pot) until the voltmeter in the setup reads 1V ( $\pm 4\text{mV}$  for dc input units,  $\pm 8\text{mV}$  for AC input units).
5. Skip to step 7.
6. If calibrating an input-powered ECT, turn the trim pot fully counter-clockwise, then adjust it clockwise until the voltmeter in the setup reads 1V,  $\pm 4\text{mV}$ .
7. Set the calibrator to 100% of the rated span (full scale) for the type of ECT being calibrated.

For example, 20mA for a 4-20mA input unit or 5V for a 1-5V input unit.

8. Adjust the span pot until the voltmeter reads 5V ( $\pm 4\text{mV}$  for dc input units,  $\pm 8\text{mV}$  for AC input units) across the precision resistor. If calibrating an input-powered ECT, adjust the trim pot for the application’s anticipated load.
9. Repeat steps 2 through 8 until the voltage across the resistor is stable and within rated unit accuracy at both zero and 100% of input span.

## Installation

Figure 5 shows the physical dimensions of the ECT, including both types of DIN rail. To install, set the appropriate lip on the back of the unit on the top edge of the DIN rail and pivot downward until the unit snaps into place.

## Recommended Ground Wiring Practices

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

- Any Moore Industries product in a metal case, enclosure 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 an 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

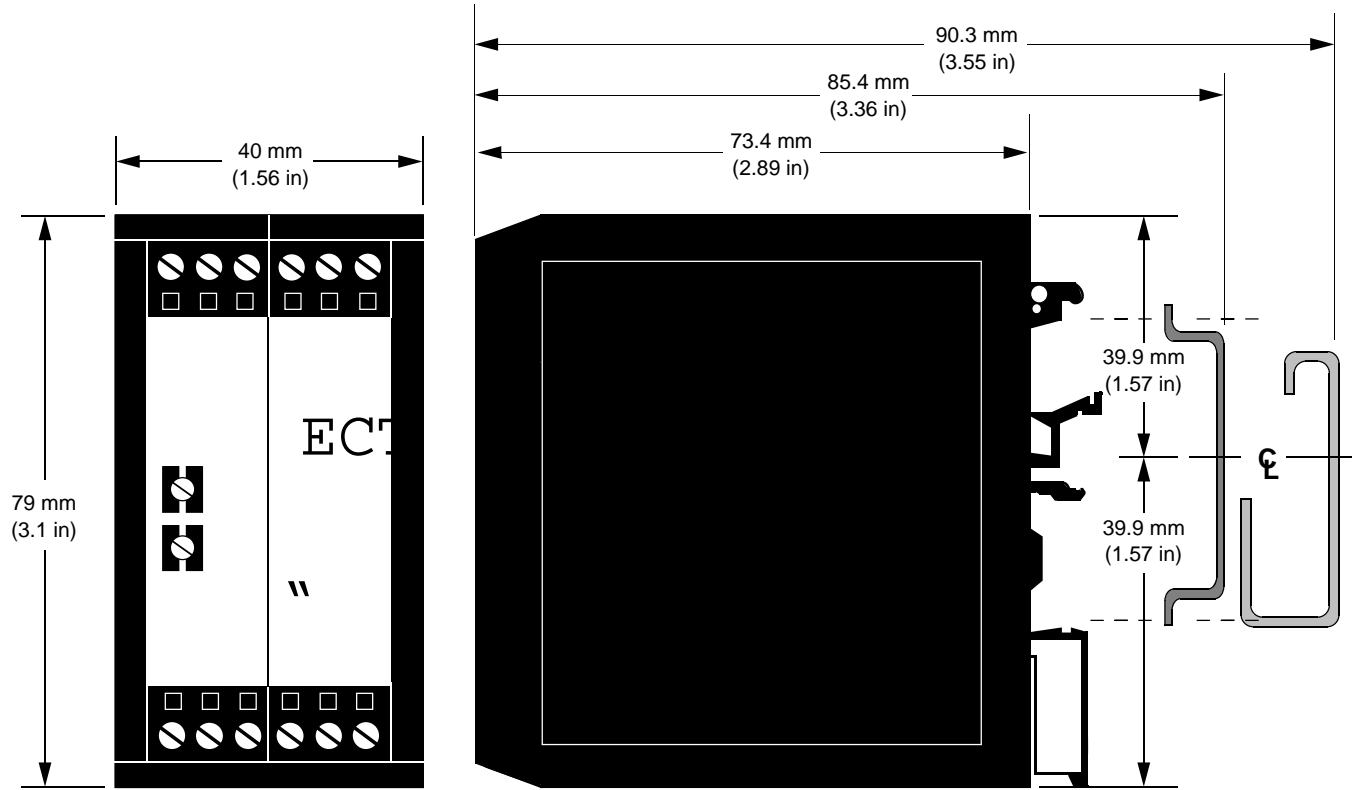
Installation of any Moore Industries products that carry CE the certification (Commission Electrotechnique) ***must*** adhere to the guidelines above in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directives (EN55011, EN 50082-1, EN50082-2, etc.)

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



# 2-Wire Economy Isolator/Converter **ECT**

Figure 5. ECT Dimensions Showing Din Rails



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## Electrical Connections

When considering the 2-wire ECT units for installation, it may help to group them in terms of their 3 most common applications:

- Standard current or voltage, dc inputs in a loop-powered mode
- Standard dc current input in an input loop-powered mode
- Current inputs in a Pass Power mode (4-20MATX input configuration required)

The following figures illustrate various types of ECT installation. Figure 6 shows an input loop-powered ECT, Figure 7 shows an output loop-powered unit, Figure 8 shows the connections for units equipped with the EM option and Figure 9 shows Pass Power hookups.

**Figure 6.** Installing the Input Loop-powered 2-Wire ECT

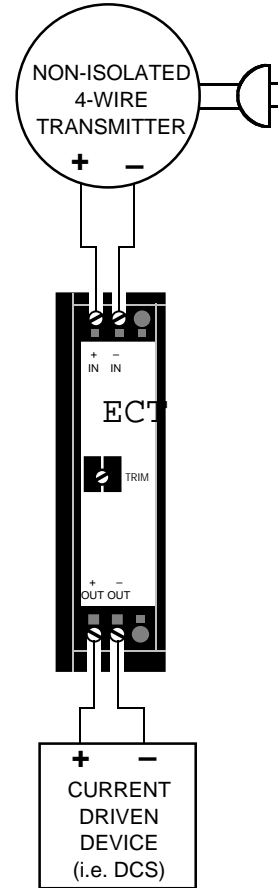
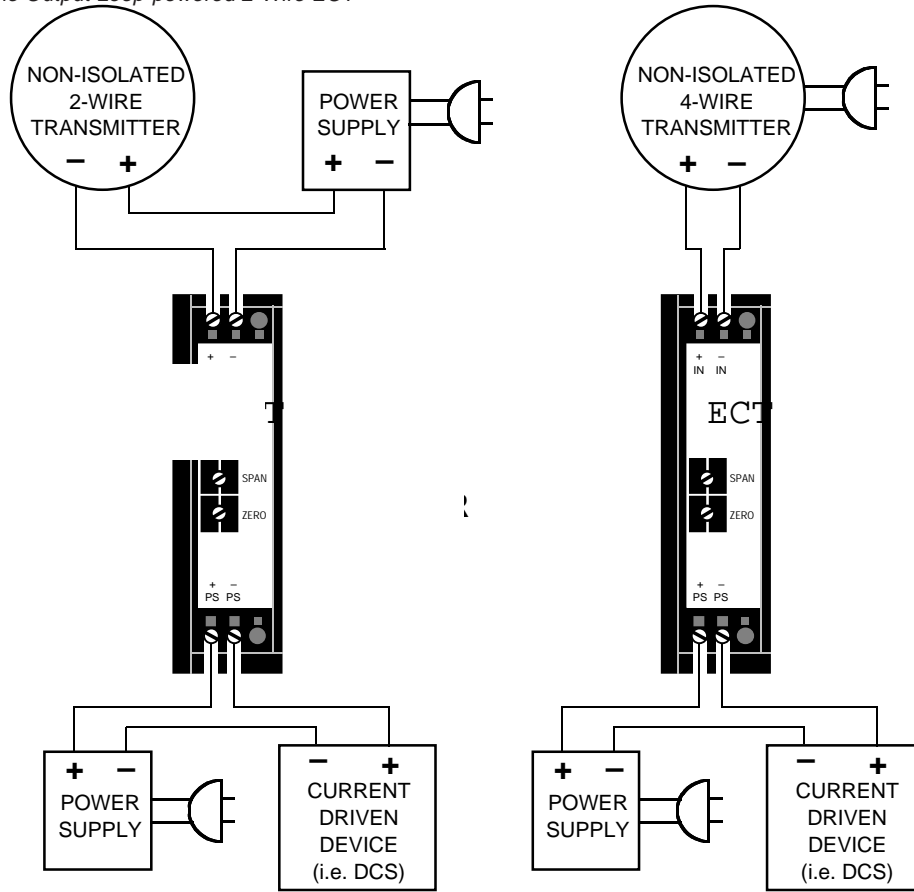


Figure 7. Installing the Output Loop-powered 2-Wire ECT



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Figure 8. Installing the EM Equipped 2-Wire ECT

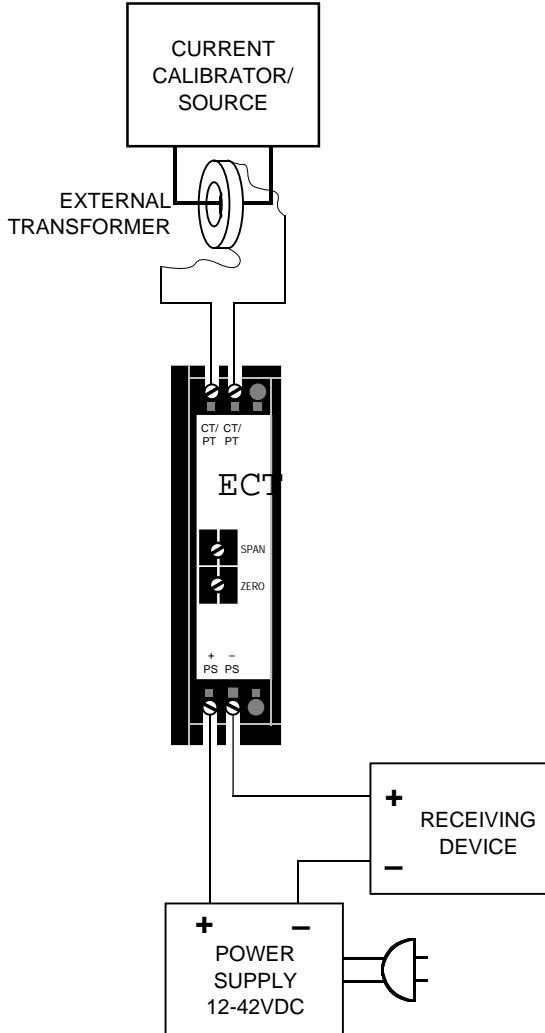
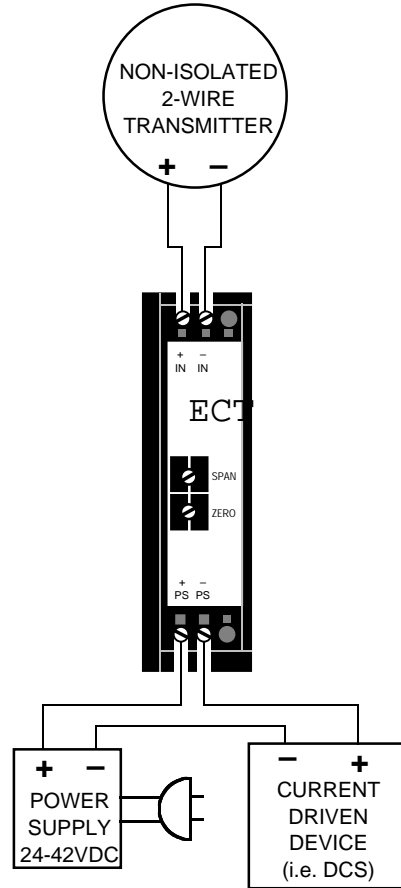


Figure 9. Installing the 2-Wire ECT with 4-20MATX



## Customer Support

Moore Industries is recognized as the industry leader in delivering top quality to its customers, 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 specification, 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.

If problems involve a particular ECT, 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)

Factory phone numbers are on the back cover.



# Declaration of Conformity

EMC Directive 89/336/EEC



**Manufacturer's Name:** Moore Industries-International, Inc.  
**Manufacturer's Address:** 16650 Schoenborn Street  
 North Hills, CA 91343-6196  
 USA

**Declares that the product(s):**

**Product Name:** ECT

**MODEL / INPUT / OUTPUT / POWER / OPTIONS / HOUSING**

**Model Number(s):** ECT \* \* \* \* \*

\*Indicates any input, output, option and housing as stated in the product data sheet.

**Conforms to the following EMC specifications:**

- EN50081-2, 1993, Generic Emissions Standard, Industrial Environment.
- EN50082-2, 1995, Generic Immunity Standard, Industrial Environment.
- EN61010-1, 1995, Safety requirements for electrical equipment for measurement and control use.

**Supplemental Information:**

None.

May 19, 2000

Date

**Fred Adt**

Quality Assurance Director

**Robert Stockham**

Moore Industries-International, Inc.

*European Contact: Your Local Moore Industries Sales and Service Office*

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## 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.

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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.



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