MOORE INDUSTRIES

ECT

Signal Isolator/Converter

September 2004 | Data Sheet 2.02

Description

The ECT family of signal isolators and converters delivers economical solutions for a wide variety of signal interface applications.

Isolator—The ECT provides total signal isolation between a non-isolated transmitter and a receiving device. This eliminates faulty readings in process measurement and control equipment caused by ground loops, motor noise, and other unpredictable electrical interference.

Converter—A precise interface, the ECT accurately converts signals, such as 1-5V (DC) or 0-5A (AC), to a proportional 4-20mA signal typically needed by a controller, recorder, indicator, PLC, DCS or PC-based SCADA system.

Booster—Featuring low 25 ohm input impedance (2-wire, output-loop powered model with 4-20mA input), the ECT can be used to increase drive capability in a process loop, allowing installation of additional instruments on the loop.

Compact thermoplastic DIN-style housing snaps *quickly and securely onto standard G-type and Top Hat rails*

Features

- **Superior signal isolation.** Industrial-strength 1500Vrms protection stops the harmful effects of even severe ground loop interference (input-loop powered ECTs provide 500Vrms isolation).
- **Common inputs and outputs.** Available models handle the current and voltage signal types most needed throughout your plant.
- **2-wire and 4-wire models.** Loop-powered and line (mains) powered models provide cost-effective alternatives for a wide array of field and control room applications.
- **Low-cost DCS troubleshooter.** Solve start-up problems caused by non-isolated transmitters by installing an ECT in each troublesome loop.

To choose the right ECT for your application, first determine power supply characteristics:

Power Supply Type	Page
2-Wire, **Output-Loop** Powered (12-42Vdc)	2-3
2-Wire, **Input-Loop** Powered (5.5VLP, 8.5VLP)	4
4-Wire, **Line (Mains)** Powered	5-7

Certifications

Underwriter's Laboratories: General Location

CE: Conformant to EMC 89/336/EEC EN 61326

ECT

Signal Isolator/Converter

2-Wire, Output-Loop Powered Models

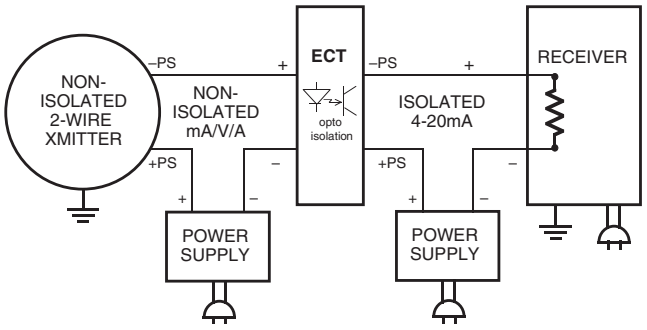
Easy to install in the field, the 2-wire, Output-Loop Powered ECT derives its operating power from the output side of the process loop via a 24Vdc power supply (Figure 1).

Solves "Bucking" Power Supplies

Many plants encounter problems when trying to interface a DCS with a 4-wire (line-powered) transmitter when both units are supplying power to the same loop. This results in "bucking" power supplies and a non-functioning loop.

If neither power supply can be eliminated, install a 2-wire, output-loop powered ECT between the two. It can operate with powered inputs from both sides, thus restoring normal loop operation.

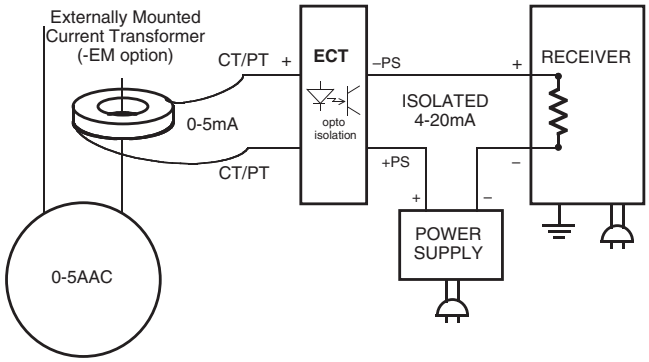
Figure 1. *2-Wire, Output-Loop Powered ECT*



Step Down Unsafe High Level Signals

To protect plant personnel, the ECT comes with an optional external input transformer (-EM option) to step down high level AC current inputs to a low level signal (Figure 2). This permits safer servicing without opening the secondary of the customer's current transformer.

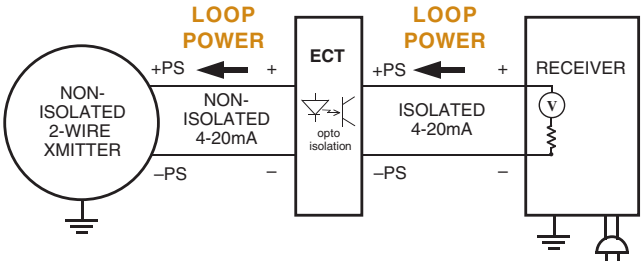
Figure 2. *2-Wire, Output-Loop Powered ECT with Externally-Mounted Current Transformer (-EM Option)*



Innovative "Pass Power" Advantage

The Output-Loop Powered ECT with the **4-20MATX** input type breaks the galvanic path between an output-loop powered 2-wire transmitter and a receiving device, but still transfers signals and loop power between the two without interruption (Figure 3). This advantage means the ECT can be installed as a "loop troubleshooter" with minimal loop alterations. You won't need to add a power supply between the ECT and the 2-wire transmitter, or specify a more expensive 4-wire transmitter with loop excitation capability.

Figure 3. *The ECT with the 4-20MATX Input Type*



Power Supply Sharing

Multiple ECT loops with the 4-20MATX input type can be powered by one 24Vdc supply, saving you power supply costs and installation time (Figure 4).

Specifications

2-Wire, Output-Loop Powered Models

Performance

Accuracy: DC inputs, ±0.1% of span; AC inputs, ±0.5% of span
Isolation: 1500Vrms between input and output
Common Mode Rejection: Exceeds 95dB at 60Hz with a limit of 1,500Vrms
Input Overrange: DC Current inputs, 250% of full scale; 200V peak maximum for DC Voltage inputs; AC current inputs, 20Aac peak for 1 second, 10Aac continuous; AC Voltage inputs, 600V peak maximum

Performance (continued)

Output Current Limiting: 25mA typical; 30mA maximum
Ripple: 10mV (measured across 250 ohm resistor)
Burden: 4V typical with 4-20MATX input; 0.5V maximum with 4-20mA input; 0.01V maximum with 0-5Aac input
Load Capability:

$$\frac{Vs - 12Vdc}{20mA} = R\ Load$$

(Except 4-20MATX input)
Response Time: 100msec maximum to 99% of output (400msec to 99% of output maximum for 0-5A input)

Ambient Conditions

Temperature Range: -20°C to +70°C (-4°F to +158°F)
Effect: ±0.007% of span/°C typical; ±0.015% of span/°C maximum
Humidity: 0-95% non-condensing

Adjustments

Type: Front panel pots
Span: ±10%
Zero: ±5% (non-interactive when span is set first)

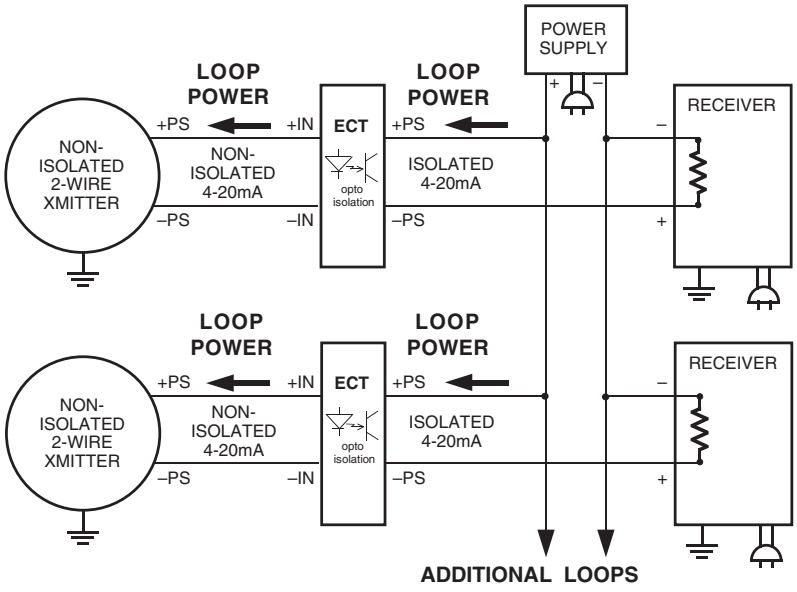
Weight 85 g (3 oz)

Ordering Information

Unit	Input	Output	Power	Options	Housing
ECT 2-wire (Output-Loop Powered) Isolator/ Converter	**4-20MA** into 25 ohms **4-20MATX** (24-42DC power required) **1-5V** into 1 Mohm **0-10V** into 1 Mohm **0-150AC** into 100 kohms **0-250AC** into 160 kohms **0-5AAC** into 0.002 ohms (Other ranges also available)	**4-20MA** into 600 ohms with 24Vdc power supply	**12-42DC** **24-42DC** (specify with 4-20MATX input)	**-EM** Externally-mounted input transformer for current input (available with 0-5A (AC) input type only)	**ECD** Thermoplastic, DIN-style housing mounts on 32mm G-type (EN50035) and Top Hat (EN50022) rails

When ordering, specify: Unit / Input / Output / Power / Options [Housing]
Model number example: ECT / 4-20MA / 4-20MA / 12-42DC [DIN]

Figure 4. *Multiple ECTs with the 4-20MATX input type can be powered by one 24Vdc power supply*



ECT

Signal Isolator/Converter

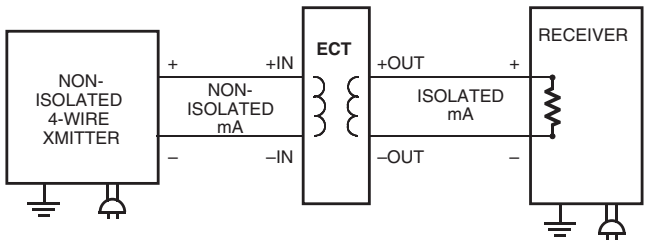
2-Wire, Input-Loop Powered Models

The 2-Wire, Input-Loop Powered ECT derives its operating power from the input side of the process loop (Figure 5). This model provides loop isolation when line power or output-loop power is not available.

Its simple hook-up method provides cost-effective interface between field signals and a computer, DCS or other multiple-input system.

Of special consideration when choosing this type of isolator is the total load imposed on the input loop. Because it derives all operating power from the input loop, that loop must be able to handle the isolator's input impedance and output load (maximum output load is 250 ohms).

Figure 5. *2-Wire, Input-Loop Powered ECT*



Specifications

2-Wire, Input-Loop Powered Models

Performance	**Accuracy:** ±0.075% of span **Isolation:** 500Vrms between input and output **Common Mode Rejection:** Exceeds 95dB at 60Hz with a limit of 500Vrms **Input Overrange:** 200% of full scale for 4-20mA inputs; 150% of full scale maximum for 10-50mA inputs **Output Current Limiting:** 30mA maximum with 250 ohm output load	**Performance (continued)**	**Ripple:** 10mV (measured across 250 ohm resistor) **Load Effect:** Less than 0.25% per 10 ohm change **Burden:** 5.5V when outputs are shorted for 4-20mA inputs, 10.5V with 250 ohm load; 8.5V when outputs are shorted for 10-50mA inputs, 13.5V with 100 ohm load (Output load voltage is reflected on input. Output should be trimmed for anticipated output load) **Response Time:** 20msec maximum to 99% of output	**Ambient Conditions**	**Temperature Range:** -29°C to +82°C -20°F to +180°F **Effect:** ±0.018% of span/°C; ±0.005% of span/°C gain change **Humidity:** 0-95% non-condensing
				Adjustments	**Type:** Front panel pots **Trim:** ±1%
				Weight	85 g (3 oz)

Ordering Information

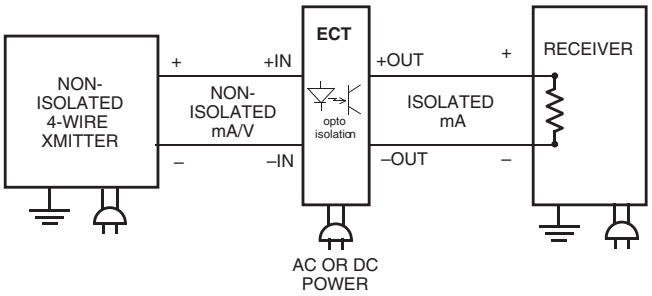
Unit	Input	Output	Power	Options	Housing
ECT 2-wire (Input-Loop Powered) Isolator/ Converter	**4-20MA** into 275 ohms **10-50MA** into150 ohms	**4-20MA** into 0-250 ohms **10-50MA** into 0-100 ohms (10-50MA output requires 10-50MA input)	Current Loop Excitation at 4mA: **5.5VLP** 5.5 volts loop powered with 4-20mA (plus voltage across output load) **8.5VLP** 8.5 volts loop powered with 10-50mA (plus voltage across the output load)	None Available	**ECD** Thermoplastic, DIN-style housing mounts on 32mm G-type (EN50035) and Top Hat (EN50022) rails

When ordering, specify: Unit / Input / Output / Power / Options [Housing]
Model number example: ECT / 4-20MA / 4-20MA / 5.5VLP [DIN]

4-Wire, Line (Mains) Powered Models

These ECT models are powered by standard 117Vac, 230Vac, and 24Vdc power supplies (Figure 6). They are designed for applications where line (mains) power is readily available, such as the back of a panel or in a control room.

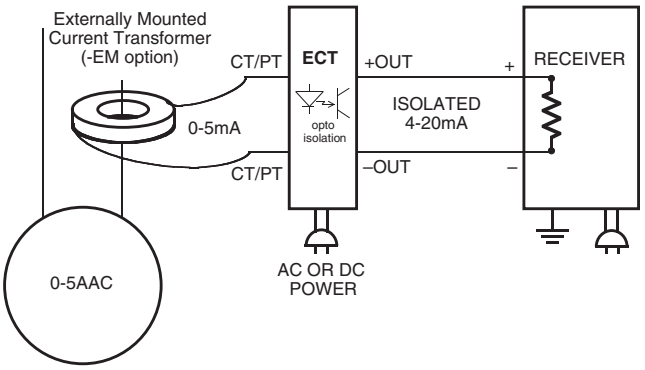
Figure 6. *4-Wire, Line (Mains) Powered ECT*



Step Down Unsafe, High Level Signals

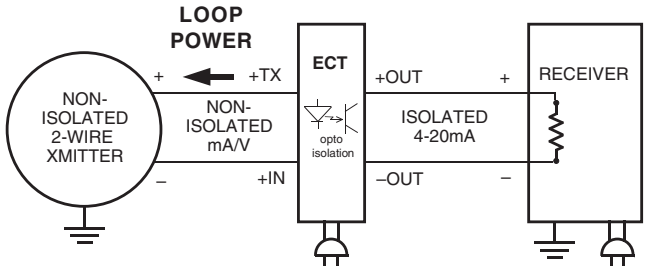
To protect plant personnel, the 4-wire ECT comes with an optional external input transformer (-EM option) to step down high level AC current inputs to a low level signal. This permits safer servicing without opening the secondary of the customer's current transformer (Figure 7).

Figure 7. *4-Wire, ECT with Externally-Mounted Current Transformer (-EM Option)*



Power a 2-Wire Transmitter– With the -TX option, our 4-wire ECTs provide 24V power to a 2-wire, output-loop powered instrument. This eliminates the need for an additional power supply (Figure 8).

Figure 8. *4-Wire ECT with 2-Wire Transmitter Excitation (-TX) Option*



ECT

Signal Isolator/Converter

Specifications

4-Wire, Line (Mains) Powered Models

Performance

Accuracy: DC inputs: ±0.1% of span; AC inputs: ±0.5% of span
Isolation: 1500Vrms between input and output
Common Mode Rejection: Exceeds 95dB at 60Hz with a limit of 1,500Vrms
Input Overrange: DC Current inputs, 250% of full scale; DC Voltage inputs, 200V peak maximum; AC Current inputs, 20Aac peak for 1 second, 10Aac continuous; AC Voltage inputs, 600V peak maximum
Output Current Limiting: 25mA typical; 30mA maximum
Ripple: 10mV (measured across 250 ohm resistor)
Response Time: 100msec maximum to 99% of output (400msec to 99% of output maximum for 0-5A input)

Ambient Conditions

Temperature Range: -20°C to +70°C -4°F to +158°F
Effect: ±0.007% of span/°C typical; ±0.015% of span/°C maximum
Humidity: 0-95% non-condensing

Adjustments

Type: Front panel pots
Span: ±10%
Zero: ±5% (non-interactive when span is set first)

Weight 221 g (7.8 oz)

Ordering Information

Unit	Input	Output	Power	Options	Housing
ECT 4-wire Line (Mains) powered Isolator/ Converter	**4-20MA** into 25 ohms **10-50MA** into 10 ohms **1-5V** into 1 Mohm **0-10V** into 1 Mohm **0-150AC** into 100 kohms **0-250AC** into 160 kohms **0-5AAC** into 0.002 ohms	**4-20MA** into 1200 ohms **10-50MA** into 480 ohms **1-5V** into 5 kohms minimum **0-10V** into 5 kohms minimum	**24DC**, ±10% **117AC**, 50/60Hz, ±15% **230AC**, 50/60Hz, ±15% (3W maximum)	**-EM** Externally-mounted input transformer for current input (available with 0-5A (AC) input type only) **-TX** 2-wire transmitter excitation (24V@25mA) for powering a 2-wire transmitter connected on the loop	**ECD** Thermoplastic, DIN-style housing mounts on 32mm G-type (EN50035) and Top Hat (EN50022) rails

When ordering, specify: Unit / Input / Output / Power / Options [Housing]
Model number example: ECT / 4-20MA / 4-20MA / 117AC / -TX [DIN]

Stop Ground Loop Noise!

Ground loops and other electrical interferences result in faulty readings in DCS, SCADA, and other signal measurement systems.

Our technical bulletin **Ground Loops: Causes & Cures** presents practical solutions to ending problems using signal isolators. Ask your Moore Industries Sales Engineer for a FREE copy.

Need Enhanced Features?

We also have a full line of isolators with special features:

Superior Environmental Protection. Aluminum DIN-style and explosion-proof enclosures are ideal for demanding applications.

Unusual Inputs and Outputs. We have isolators with a wide array of non-standard inputs and outputs.

RFI/EMI Protection. Some applications necessitate superior protection. We have the answer!

Custom Signal Isolators. We have engineers on-hand to modify our instruments to meet your unique needs.

Figure 9. *Featuring a compact DIN-style housing, the ECT snaps securely on both G-type and Top Hat rails*

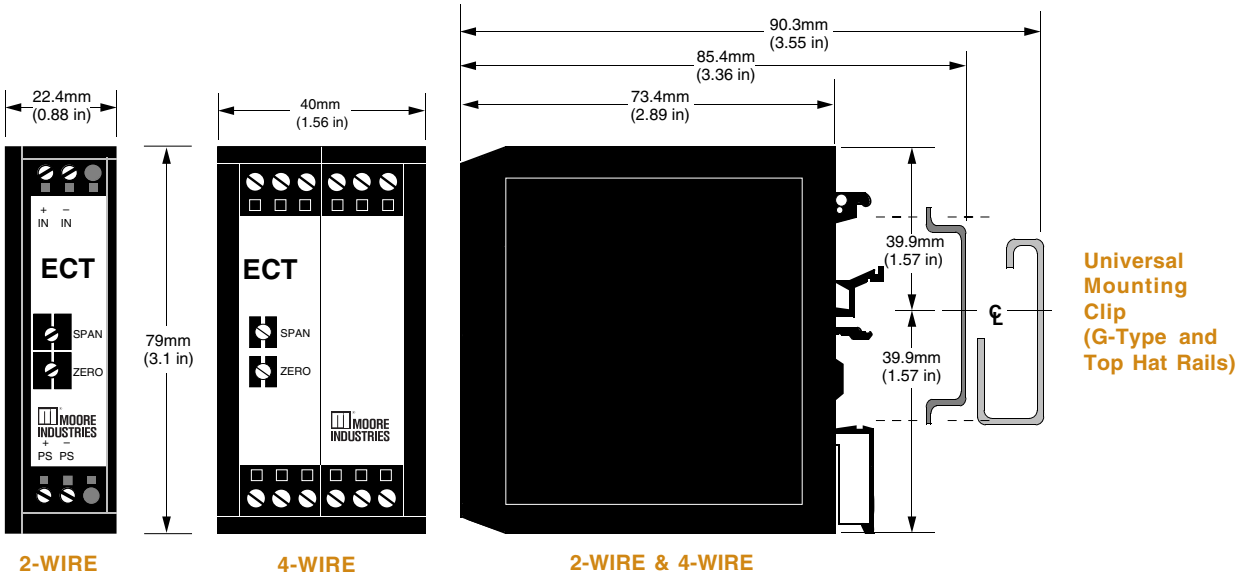


Table 1. *Terminal Designations*

2-Wire (Loop-Powered) Models	Top Terminals (left to right)			Bottom Terminals (left to right)		
	T1	T2	T3	B1	B2	B3
Output-Loop Powered	+IN	-IN		+PS	-PS	
Output-Loop Powered with 4-20MATX	+IN	-IN		+PS	-PS	
Output-Loop Powered & -EM Option	CT/PT	CT/PT		+PS	-PS	
Input-Loop Powered	+IN		-IN	+OUT		-OUT

4-Wire (Line-Powered) Models	Top Terminals (left to right)						Bottom Terminals (left to right)					
	T1	T2	T3	T4	T5	T6	B1	B2	B3	B4	B5	B6
AC Power		+IN	-IN		AC	ACC	+OUT	-OUT				
AC Power & -EM Option	CT/PT	CT/PT			AC	ACC	+OUT	-OUT				
AC Power & -TX Option	+TX	+IN	-IN		AC	ACC	+OUT	-OUT				
DC Power		+IN	-IN		+DC	-DCC	+OUT	-OUT				
DC Power & -EM Option	CT/PT	CT/PT			+DC	-DCC	+OUT	-OUT				
DC Power & -TX Option	+TX	+IN	-IN		+DC	-DCC	+OUT	-OUT				

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