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IMPORTANT SAFETY CONSIDERATIONS
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It is very important for the user to consider the possible adverse effects of power, wiring, component, sensor, or software failures in designing any type of control or monitoring system. This is especially important where economic property loss or human life is involved. It is important that the user employ satisfactory overall system design. It is agreed between the Buyer and Acromag, that this is the Buyer's responsibility.

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INSTRUCTIONS: SERIES 330I

Process Current Three-way Isolator, DC-Powered

INTRODUCTION:

These instructions cover the model types listed in Table 1 below. Supplementary sheets are attached for units with special options or features.

Table 1:

A. Model Number Format : 330I-Input-Output-Mounting-Certification

B. Typical Model Number: 330I-C1-Y-DIN-NCR

Series	-Input	-Output	-Mounting	-Certification
330I	-C1	-Y	-DIN	-NCR -Agency Approval²

Notes (Table 1):

1. All units are factory calibrated for 4 to 20mA DC input and 4 to 20mA DC output (no "-C" suffix needed).
2. Consult the factory for current information on agency (e.g. Canadian Standards Association, etc.) approvals.

DESCRIPTION:

The Series 330I is a DC-powered, DIN-rail mounted, process current isolator which accepts a 4 to 20mA DC input signal, provides three-way isolation between the input, output, and power circuits, and delivers a 4 to 20mA DC output signal for loads up to 1025 ohms. This isolator operates over a wide supply range of 10V to 36V DC and has a low input burden less than 1.5V. Zero and span trim adjustments are independent of the load. The isolator is RFI and EMI protected and operates over a wide temperature range of -25°C to +85°C, with excellent temperature coefficients which minimize effects from the harsh plant environment.

The Series 330I isolator is another member of the Acromag flat-pack, DIN-rail mounted instrument family. It provides another functional component for a modular solution to varied field applications. Unlike the Series 270I which is a two-wire loop-powered isolator, or the Series 340I which is a DC-powered input isolator, the Series 330I is a DC-powered three-way isolator. That is, Series 330I isolators provide three-way isolation between the input, output, and power circuits. For AC-powered isolator applications, see the Acromag Series 430I. The modular approach of this design and companion Acromag flat-pack modules allows additional transmitters, input modules, isolators, and alarms to be easily integrated, as required. See Drawing 4501-368 for a simplified Series 330I schematic.

Input wiring is inserted in the bottom of the unit, while output and power wiring is inserted at the top of the unit. Screws to secure the wiring are located on the front panel. Connectors are screw-clamp type and accept wire size up to #14 AWG.

Key 330I Features:

- **Low Input Burden (less than 1.5V)**
- **Wide Ambient Temperature Range**
- **1.6 Inch Wide DIN Mounted Package**
- **Wide DC Supply Range, 10V to 36V DC**
- **True Galvanic (Transformer) Three-Way Isolation**
- **0 to 1025 ohm Load Range**
- **Highly Accurate and Stable**
- **No Load Trimming Required**
- **Current Limiting Included**

SPECIFICATIONS:

Function: This DC-powered isolator accepts a 4 to 20mA DC input signal, provides three-way isolation between the input, output, and power circuits, and delivers a 4 to 20mA DC output signal for loads up to 1025 ohms. Output current limiting is included. Zero and Span trim adjustments utilize 15-turn potentiometers accessible from the front of the unit. The isolator is DIN-rail mounted. See the Series 430I for an equivalent AC-powered isolator.

MODEL/SERIES: 330I- (Color coded with a white label)

INPUT:

-C1: 4 TO 20mA DC, with an input drop less than 1.5V at full-scale.

IMPORTANT: Input current must not exceed 100mA, or damage to the unit may occur.

Isolation: Three-way isolation is provided between input, output, and power circuits for common mode voltages up to 250V AC, or 354V DC off ground, on a continuous basis (will withstand 1500V AC dielectric strength test for one minute without breakdown). This complies with test requirements outlined in ANSI/ISA-S82.01-1988 for the voltage rating specified.

OUTPUT:

-Y: 4 to 20mA DC, R-load = 0 to 1025 ohms.

Output Limiting: Output current is limited to less than 28mA, nominal.

Output Ripple: Less than +/-0.1% of the maximum output span.

Power: +10V to 36V DC, current draw is a function of supply voltage (refer to table below). Connect an external DC power supply to the Power (P) and (-) terminals. Currents shown are maximum values for output currents specified. The diode-coupled power terminal provides reverse polarity protection.

CAUTION: To avoid damaging isolator, do not exceed 36V DC peak.

SUPPLY VOLTAGE	SUPPLY CURRENT AT 20mA OUTPUT	AT CURRENT LIMIT
10V	135mA	200mA
12V	105mA	145mA
15V	85mA	110mA
24V	55mA	70mA
36V	45mA	50mA

Power Supply Effect: Less than +/-0.001% of output span per volt for rated supply variations.

Reference Test Conditions: Input/Output current: 4 to 20mA; output load 250 ohms; 77 μ F (25°C) ambient; +15V DC supply.

Accuracy: Better than +/-0.1% of output span. This error includes the combined effects of isolator repeatability, hysteresis, terminal point linearity and adjustment resolution. Does not include sensor error.

Ambient Temperature Range: -13°F to 185°F (-25°C to 85°C).

Ambient Temperature Effect: Less than +/-0.003% of output span change per °F (+/-0.005% per °C or +/-50ppm/°C) over the ambient temperature range for reference test conditions. This specification includes the combined effects of zero and span over temperature.

Bandwidth: -3dB at 50Hz, typical, with 500 ohm load.

Response Time: For a step input, the output reaches 98% of output span in 25ms, typical, with a 500 ohm load. Response time will vary with load resistance.

Noise Rejection:

Normal Mode: -6dB at 60 Hz, typical, with 500 ohm load.

RFI Resistance: Less than +/-0.5%, of output span with RFI field strengths of up to 10V/meter at frequencies of 27, 151 and 467 MHz.

EMI Resistance: Less than +/-0.25% of output span effect with switching solenoids or commutator motors.

Surge Withstand Capability (SWC): Input/Output terminations rated per ANSI/IEEE C37.90-1978. Unit is tested to a standardized test waveform that is representative of surges (high frequency transient electrical interference), observed in actual installations.

Construction:

Printed Circuit Boards: Military grade FR-4 epoxy glass circuit board.

Terminals: Compression type, wire size 14 AWG maximum.

Case: Self-extinguishing NYLON Type 6.6 polyamide thermoplastic UL94V-2, color black. General Purpose, NEMA Type 1 enclosure.

Printed Circuit Board Coating: Fungus resistant acrylic conformal coat.

Mounting Position: Position insensitive.

MOUNTING:

-DIN: General Purpose Housing, DIN-Rail Mount - "G" & "T" rails. "G" Rail (32mm), Type EN50035; "T" Rail (35mm), Type EN50022. Refer to Drawing 4501-369 for outline and clearance dimensions.
Shipping Weight: 1 pound (0.45Kg) packed.

CERTIFICATION: Consult the factory for current information on the availability of agency (e.g. Canadian Standards Association, Factory Mutual, etc.) approvals.

-NCR: No Certification Required.

INSTALLATION:

The isolator is packaged in a general purpose type of enclosure. Use an auxiliary enclosure to protect against unfavorable environments and locations. Maximum operating ambient temperature should be within -13°F to 185°F (-25°C to 85°C) for satisfactory performance. If the unit has already been calibrated, it is ready for installation. Connect as shown in the connection diagram of Drawing 4501-368. To verify calibration, refer to the "CALIBRATION" section.

Mounting: Mount isolator assembly - refer to Drawing 4501-369 for DIN-rail mounting and clearance dimensions.

DIN Rail Mounting: Using suitable fastening hardware, secure the DIN rail to the designated mounting surface. An isolator can be mounted to either the "T" or "G" Rail. Installation of the isolator to the rail depends on the type of DIN rail used. Units can be mounted side-by-side on 1.6 inch centers, if required.

"T" Rail (35mm), Type EN50022: To attach an isolator to this style of DIN rail, angle the top of the unit towards the rail and locate the top groove of the adapter over the upper lip of the rail. Firmly push the unit towards the rail until it snaps solidly into place. To remove an isolator, insert a screwdriver into the lower arm of the connector and pull downward while applying outward pressure to the bottom of the unit.

"G" Rail (32mm), Type EN50035: To attach an isolator to this style of DIN rail, angle the unit so that the upper groove of the adapter hooks under the top lip of the rail. Firmly push the unit towards the rail until it snaps solidly into place. To remove an isolator, pull the lower part of the unit outward until it releases from the rail, lift unit from rail.

Electrical Connections:

The wire size used to connect the unit to the control system is not critical. All terminal strips can accommodate wire from 14-26 AWG. Strip back the insulation 1/4 inch on each lead before installing it into the terminal block. Input wiring may be either shielded or unshielded twisted pair. Output wires should be twisted pair. Since common mode voltages can exist on signal wiring, adequate wire insulation should be used and proper wiring practices followed. It is recommended that output, power, and signal wiring be separated from each other for safety, as well as for low noise pickup.

1. **Power (Refer to Drawing 4501-368 for power connections):** The label on the unit specifies the power requirements. Connect DC power as shown in the connection diagram (Drawing 4501-368). Use suitable wire per applicable codes. This isolator operates from DC power supplies only. Power supply voltage is not critical and normally should be from 10.0V to 36V DC. The supply voltage must not exceed 36 Volts, even momentarily, and must be adequate to furnish full-scale current (see "Power" in the Specifications section for current requirements). Variations in power supply voltage or load resistance have negligible effect on isolator accuracy, within rated specifications. Power terminals are reverse polarity protected.
2. **Output:** Connect output per connection diagram, refer to Drawing 4501-368. Load range is 0 to 1025 ohms. Output current is limited to less than 28mA.
3. **Input:** Input is 4 to 20mA DC. Connect input per connection diagram, observe proper polarity. NOTE: The input circuit is electrically isolated from the output and power circuits, allowing the input to operate up to 250V AC, or 354V DC, off ground on a continuous basis.

CALIBRATION:

All units are calibrated and checked for proper performance at the factory before they are shipped. The calibration example below is provided for reference.

Isolator - Adjustment Procedure:

Connect the isolator as shown in the recommended calibration connections of the connection diagram (Drawing 4501-368). The input current source must be adjustable over the entire input range of the unit and settable to an accuracy of 0.05% or better for proper results.

The Zero and Span adjustments are accessible at the front panel of the isolator, see Drawing 4501-368 for location. The Zero and Span trim provided are not wide-range adjustable and are suitable for fine tuning only. The screwdriver blade used to adjust the potentiometers should not be more than 0.1 inch (2.54mm) wide.

Isolator - Calibration Example: MODEL : 330I-C1-Y-DIN-NCR

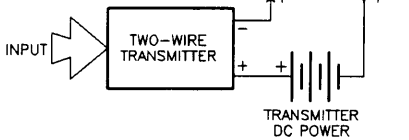
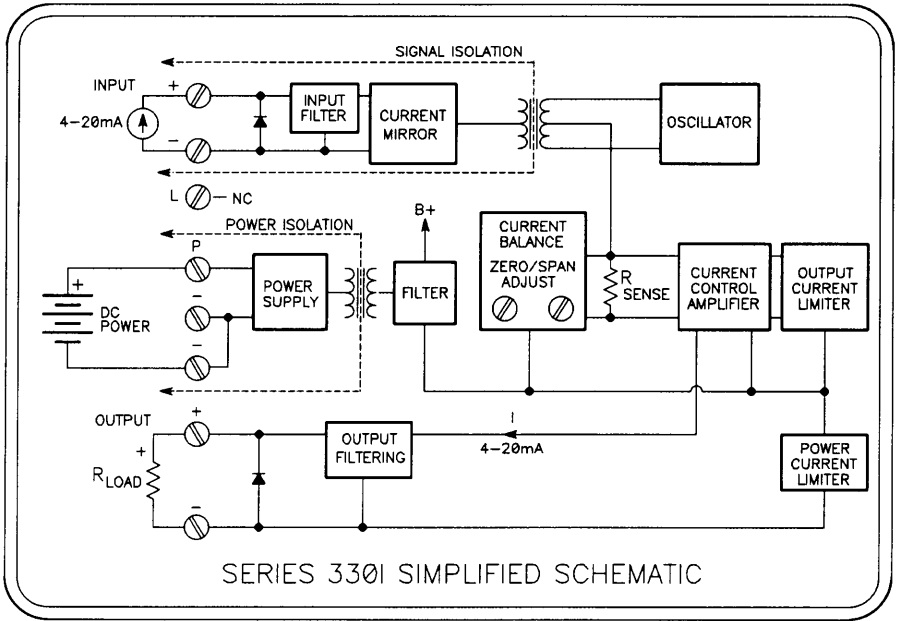
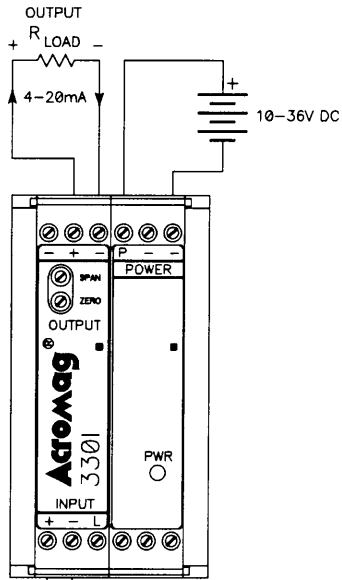
Input : 4 to 20mA DC

Output: 4 to 20mA DC

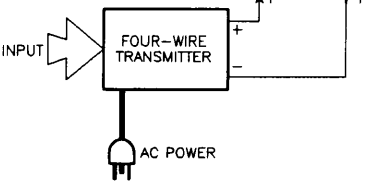
1. Set the input source to 4.000mA. Adjust the Zero (Z) pot until the output reads 4.000mA DC (NOTE: If you have trouble reaching zero, you may have to first set the span near 16.000mA).
2. Set the input source to 20.000mA. Adjust the Span (S) pot until the output reads 20.000mA DC.
3. Repeat steps 1 and 2 until the readings converge.
4. Check the midpoint by setting the input source to 12.000mA. The output should read 12.000mA +/-0.016mA DC. The instrument is now calibrated.

GENERAL MAINTENANCE:

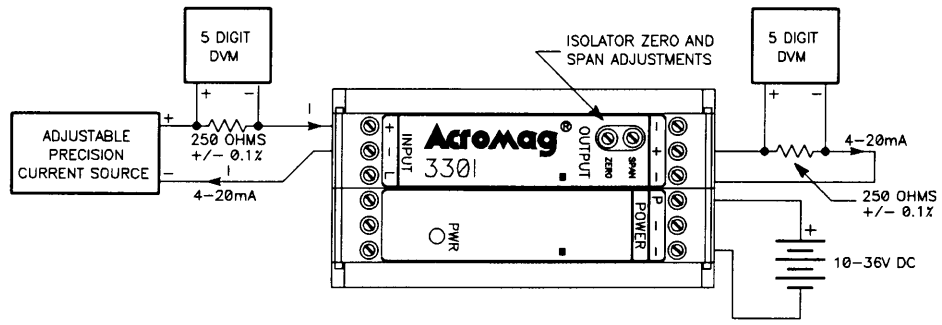
The isolator contains solid-state components and requires no maintenance, except for periodic cleaning and calibration verification. When a failure is suspected, a convenient method for identifying a faulty isolator is to exchange it with a known good unit. It is highly recommended that a non-functioning isolator be returned to Acromag for repair, since Acromag makes use of tested and burned-in parts, and in some cases, parts that have been selected for characteristics beyond that specified by the manufacturer. Further, Acromag has automated test equipment that thoroughly checks the performance of each isolator.



TYPICAL TWO-WIRE TRANSMITTER CONNECTIONS



TYPICAL FOUR-WIRE TRANSMITTER CONNECTIONS



RECOMMENDED CALIBRATION CONNECTIONS

SERIES 330I THREE-WAY ISOLATOR ELECTRICAL CONNECTIONS

Acromag VIXOM BICK		14-SEP-93	A				
DATE	REV	EDN	DC	DF	DHG	CLP	
TITLE SERIES 330I ISOLATOR CONNECTIONS							
D	SERIES	330I	1	OF	1	DRG	NO. 4501-368 A

