Acromag®

User's Manual: Series 350T
AC Current Input (External Sensor), DC-Powered Transmitters

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IMPORTANT SAFETY CONSIDERATIONS

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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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 :
350T-Input-Output-Mounting-Certification[1]

B. Typical Model Number: 350T-CACX-Y-DIN-NCR[1]

Series	-Input	-Output	-Mounting	-Certification
350T	-CACX	-Y	-DIN	-NCR
		-V0		-Approval[2]
		-V5		

Notes (Table 1):

1. All units are factory calibrated (No "-C" suffix needed).
2. Consult the factory for current information on agency (e.g. Canadian Standards Association, etc.) approvals.

DESCRIPTION:

These DC-powered transmitters are used in conjunction with an external AC Current Sensor to condition an AC current input signal and convert this signal to a process current or voltage output. An AC Current Sensor is supplied with each transmitter (a highly accurate toroidal instrument transformer). The AC Current Sensor is fully insulated and designed to mount near the source of the AC current. It transmits a safe, low-level DC milliamp signal to the transmitter. Both the AC Current Sensor and transmitter are isolated for up to 250V AC, or 345V DC peak, between input and output. The transmitter Output (-) and DC power (-) share a common terminal. This transmitter is DIN-rail mounted. See Drawing 4501-382 for a simplified schematic.

The benefits to using an external sensor (external from the transmitter enclosure) include the following:

1. **Low losses**: It is not practical to run AC currents over long distances because of significant resistance voltage drops at high currents. However, a low level DC milliampere signal is output from the AC Current Sensor and can be transmitted safely over long distances, allowing the transmitter to be remotely located some distance from the AC power wiring.

2. **Safety:** The AC Current Sensor's output leads can be open or short circuited and these conditions do not affect the AC current loop or cause damage to the sensor. Likewise, the wires connecting the AC Current Sensor to the transmitter can be easily removed from the transmitter's input terminals without concern or hazard.

3. **Ease of Calibration**: The AC current input range can be easily scaled in the field by changing the number of primary turns at the sensor, with no additional calibration required. The transmitter is factory calibrated and can be used with any AC Current Sensor (Acromag Model 5020-350). The AC current input span is a simple function of the number of primary turns placed on the AC Current Sensor and transmitter calibration is not affected. Refer to Applications "A" and "B" of Drawing 4501-380. This method of changing ranges is much easier, more accurate, and convenient.

SENSOR PRIMARY TURNS	AC CURRENT INPUT RANGE	TRANSMITTER OUTPUT (350T)
4	0 to 5 Amps AC	4-20mA or VDC
1	0 to 20 Amps AC	4-20mA or VDC
2	0 to 10 Amps AC	4-20mA or VDC
10	0 to 2 Amps AC	4-20mA or VDC
20	0 to 1 Amps AC	4-20mA or VDC

Series 350T transmitters are designed as another functional component that provides the user with a modular approach to the varied applications in the field. Other 350T transmitters are available to condition DC voltage, DC current, frequency, thermocouple, RTD, slidewire/potentiometer, and AC voltage inputs. The Series 350T complements the Acromag Series 250T two-wire transmitter line, providing the same input conditioning for three-wire applications. That is, Series 350T transmitters require a separate power supply connection, while the output signal and DC power share a common lead. For AC powered applications, see the Acromag Series 450T. The small package size, low power requirements, and wide supply range offer maximum flexibility to the system designer. As a three-wire DC powered device, it can be used in critical applications that require the use of redundant supplies. The Series 350T includes reverse polarity protection, current limiting, and operates from a single 10V to 36V DC supply. In applications requiring only a single transmitter, the 350T can use available DC power, or it can be wired to an optional Series 35PS power supply module. The Series 35PS power supply module receives it's power from either 115V AC, 230V AC, or 10-36V DC. Applications requiring multiple transmitters at a single location can more efficiently share a single DC supply. 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.

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.

SPECIFICATIONS:

Function: This family of isolated, DC-powered, sensor/transmitter pairs condition an AC current input and convert this signal to a process current or voltage output. The sensor is designed to be field mounted near the AC current it is measuring and transmits a low level DC milliamp signal to the transmitter's input. The sensor and transmitter are both isolated between input and output. The transmitter output (-) and DC power (-) share a common terminal in a 3-Wire configuration. The transmitter zero and span adjustments utilize 22-turn pots accessible from the front of the unit. This transmitter is DIN-rail mounted.

MODEL/SERIES: 350T- (Color coded with a white label)

INPUT (Sensor and Transmitter):

AC Current Sensor (5020-350): One sensor is supplied with each Model 350T-CACX transmitter. The sensor is a highly accurate toroidal instrument transformer used to convert an AC current signal to a low level DC milliampere signal (0 to 11.17mA). The input AC current range is a simple function of the number of turns placed on the AC Current Sensor (see table below).

The user configures the AC current sensor with the required number of primary turns to obtain the desired input span.

AC CURRENT INPUT RANGE	PRIMARY TURNS	SENSOR OUTPUT (RED/BLACK WIRES)
0 to 5 Amps AC	4	0 to 11.17mA DC
0 to 20 Amps AC	1	0 to 11.17mA DC
0 to 10 Amps AC	2	0 to 11.17mA Dc
0 to 2 Amps AC	10	0 to 11.17mA DC
0 to 1 Amps AC	20	0 to 11.17mA DC

The output wires of the sensor are polarized: the Red wire is (+) plus and Black wire is (-) minus. Normally, these output wires are attached to one end of a cable (user supplied) and the other end connects to the transmitter's input (+) and (-) terminals.

Input Burden: A function of the wire gauge resistance used for the primary turns.

Input Overload: The AC Current Sensor withstands overloads as follows:

- 20 times full-scale for 0.01 second
- 10 times full-scale for 0.1 second
- 5 times full-scale for 1.0 second

AC Current Sensor to Transmitter Wiring Distance: 400 feet maximum for 18 AWG wire gauge. Other wire gauges can be used as long as the resistance of both wires is less than 5.0 Ω.

Transmitter (350T-CACX):

-CACX: Input is DC milliamperes from the AC Current Sensor supplied with the transmitter. The Input to the transmitter is 0 to 11.17mA DC (output of the AC Current Sensor). This signal represents 0 to 5 Amps AC with 4 primary turns at the input to the AC Current Sensor, or any other AC current range (a function of primary turns). Changing the number of primary turns does not change the calibration of the transmitter, only the input range is affected. The output and DC power share a common terminal (3-Wire connection).

Isolation (Both Sensor and Transmitter): The input circuit is electrically isolated from the output and power circuits (transmitter), allowing the input to operate at 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: Process Current or Voltage output. The output shares a common with the power supply. Voltage outputs are designed to provide true voltage output, with zero volts included, and to be stable with capacitive loads.

-Y : 4 to 20mA DC (see Load Resistance Range Equation)
-V0: 0 to 10V DC into 10,000 ohms or greater
-V5: 0 to 5V DC into 5,000 ohms or greater

Load Resistance Range Equation (-Y output option): The maximum load resistance for 20mA compliance is a function of input supply voltage as follows:

R-Load (Maximum) = (Minimum VDC supply - 2.5V) / 0.02A
At 10.0V DC supply, R-Load = 0 to 375 ohms
At 12.5V DC supply, R-Load = 0 to 500 ohms
At 15.0V DC supply, R-Load = 0 to 625 ohms
At 24.0V DC supply, R-Load = 0 to 1075 ohms

Output Limiting: Voltage units: 150% of full scale output, nominal; Current units: 125% of full-scale output, nominal.

Output Ripple: Less than ±0.1% of the maximum output span.

Power: An external DC power supply is required between the output (P) and (-) terminals. Transmitter current is for rated supply inputs, full-scale output, and no-load on voltage output units. Diode on transmitter provides reverse polarity protection.

CAUTION: Do not exceed 36V DC peak supply voltage, to avoid damage to the transmitter.

A. Process Current Output (-Y): +10.0V to 36.0V DC, 30mA (35mA at current limit).
B. Voltage Output (-V0): +12.5V to 36.0V DC, 9mA maximum.
C. Voltage Output (-V5): +10.0V to 36.0V DC, 9mA maximum.

Power Supply Effect:
DC Volts: less than ±0.001% of output span per volt DC, for rated power supply variations.
60/120 Hz ripple: less than ±0.01% of span per volt peak-to-peak of power supply ripple.

Reference Test Conditions: Input: 0 to 5 Amps AC, 60Hz. (4 turn primary); Output (-Y units): 4-20mA DC (500 ohm load); Output (-Vx units): 0-10V DC into 10K ohms or greater; Ambient 77^{o}F (25^{o}C); +15V DC supply.

Accuracy: Better than ±0.5% of calibrated span. This error includes the combined effects of transmitter repeatability, hysteresis, terminal point linearity, adjustment resolution and AC Sensor error.

Ambient Temperature Range: -13^{o}F to 185^{o}F (-25^{o}C to 85^{o}C).

Ambient Temperature Effect: Less than ± 0.01% of output span per ^{o}F (± 0.018% per ^{o}C) over the ambient temperature range for reference test conditions. Specification includes the combined effects of zero and span over temperature.

Bandwidth: -3dB at 2 Hz, typical (transmitter only).

Response Time: For a step input, the output reaches 98% of its transition in 300ms, typical (transmitter only).

Noise Rejection:
Common Mode: Better than 130dB at 60 Hz, typical, 100 ohm unbalance (transmitter only).
Normal Mode: Not applicable.

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

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

Surge Withstand Capability (SWC): Input/Output terminations are 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:
AC Current Sensor: Epoxy dipped and baked.
Circuit Boards: Military grade FR-4 epoxy glass circuit board.
Circuit Board Coating: Fungus resistant acrylic conformal coat.
Terminals: Compression type, wire size 14 AWG maximum.
Mounting Position: Position insensitive.
Case: Self-extinguishing NYLON Type 6.6 polyamide black thermo-plastic UL94 V-2, General Purpose, NEMA Type 1 enclosure.

MOUNTING (Transmitter):

-DIN: General Purpose Housing, DIN-Rail Mount - "G" & "T" rails. "G" Rail (32mm), Type EN50035; "T" Rail (35mm), Type EN50022. Refer to Drawing 4501-252 for outline and clearance dimensions.
Shipping Weight: 1 pound (0.45 Kg) 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 transmitter is packaged in a general purpose enclosure. Use an auxiliary enclosure to protect against unfavorable environments and locations. Maximum operating ambient temperatures should be within -13 to 185^{o}F (-25 to 85^{o}C) for satisfactory performance. Factory calibrated units are ready for installation. Connect as shown in Drawing 4501-380 and 4501-382. To verify calibration, refer to the "CALIBRATION" section.

Mounting: Mount transmitter assembly - refer to Drawing 4501-252 for mounting and clearance dimensions.

DIN Rail Mounting: Use suitable fastening hardware to secure the DIN rail to the designated mounting surface. A transmitter, can be mounted to either the "T" or "G" Rail. Installation of the transmitter to the rail depends on the type of DIN rail used (see Drawing 4501-252). Units can be mounted side-by-side on 1.0-inch centers, if required.

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 wire insulation 1/4-inch on each lead before installing into the terminal block. Input wiring may be 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 the output and power wiring be separated from the signal wiring for safety, as well as for low noise pickup.

1. **Power:** Connect DC power supply per Drawing 4501-382. 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 instantaneously, and must be adequate to furnish full-scale current or voltage to the load. Variations in power supply voltage above the minimum required, or variations in load resistance have negligible effect on transmitter accuracy. Refer to "POWER" in the preceding SPECIFICATIONS section for current requirements. The minus (-) power supply lead and the minus (-) output lead share a common terminal. This device includes input current limiting and reverse polarity protection. Refer to Drawing 4501-254 for other power supply configurations.

2. **Output:** Connect output per connection diagram (see Drawing 4501-382). Load range is a function of the module's output type; refer to "Output" in the preceding "SPECIFICATIONS" section. The output shares a common with the power supply.

3. **Grounding:** The transmitter housing is plastic and does not require an earth ground connection.

4. **Input:** The AC Current Sensor is isolated and can be used in AC circuits up to 250V AC, 50 to 60 Hz. It is designed to be mounted at the source of the AC current to be measured. The sensor outputs a low-level DC milliampere signal, allowing the transmitter to be mounted remote from the AC signal using small gauge wires. The sensor's output (Red/Black) wires can be shorted, open-circuited, or removed from the transmitter's input terminals, without hazard to personnel or the AC Current Sensor.

   A. **AC Current Sensor:** Per the Input Range chart in the Specifications Section, loop the required number of turns through the toriod for the full-scale range needed in your application. Use the cable tie provided to mechanically secure the sensor. Refer to Drawing 4501-380.

DANGER: If the AC Current Sensor is used with an AC Current Transformer (C.T.), disconnect power to the C.T., or short the output of the C.T., before removing the wire going through the AC Current Sensor. If this is not done, an open-circuited C.T. will generate high voltages (hazardous) and possible C.T. damage.

The sensor output wires should be connected to the extension cable (wires) using wire nuts, or equivalent. Sensor output wires are color coded RED (+) and BLACK (-), proper polarity must be observed.

B. **Transmitter:** Connect the Current Sensor output leads to the transmitter: Red (+) to the Transmitter plus (+) terminal, Black (-) to the Transmitter minus (-) terminal.

WARNING: The input to the transmitter can only come from the AC Current Sensor output wires (Red/Black). If AC current is directly attached to the transmitter input terminals, the transmitter will be destroyed.

NOTE: The transmitter's input circuit is electrically isolated from the output/power circuit for voltages up to 250V AC ,or 354V DC off ground, on a continuous basis. In this application, it is recommended that the minus (-) transmitter input terminal be connected to an earth ground. The connections between the AC Current Sensor would be floating if not grounded. Grounding eliminates the risk of high common-mode voltages from showing up on the wires and reduces noise pickup.

CALIBRATION:

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

Adjustment Procedure:

Connect the transmitter as shown in Calibration Connection Drawing 4501-382. To simplify transmitter adjustment, it is recommended that a DC current method be used. For best results, the signal current source should be adjustable over the entire input range of the unit and settable to an accuracy of 0.1% or better. Load the module within the limitations listed in "Output" of the preceding "SPECIFICATIONS" section. The output voltage or current must be measured to 0.1% accuracy or better for proper results.

The Zero and Span adjustments are accessible from the front panel of the transmitter (see Drawing 4501-382). The screwdriver blade used to adjust the potentiometers should not be more than 0.1 inch (2.54mm) wide. There are no internal jumpers or switches to configure.

Transmitter - Calibration Example:

MODEL : 350T-CACX-VO-DIN-NCR
Output : 0 to 10V DC.
Input : 0 to 11.17mA DC (Note: The DC current range that the AC Current Sensor provides to the transmitter is independent of the number of primary turns).

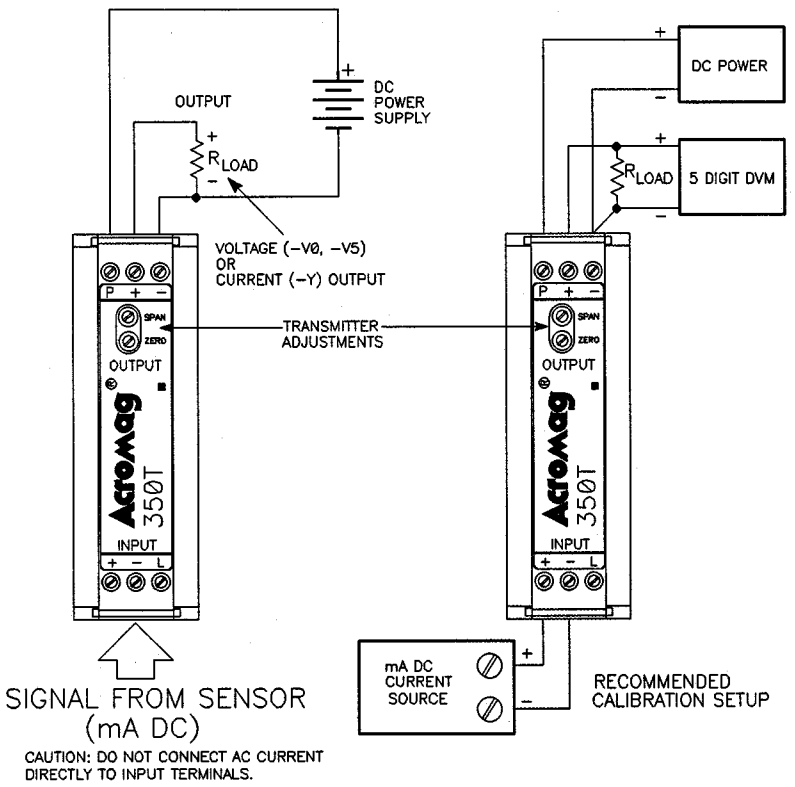
1. Set the input source to 0.000mA DC. Adjust the Zero (Z) pot until the output reads 0.000V DC.

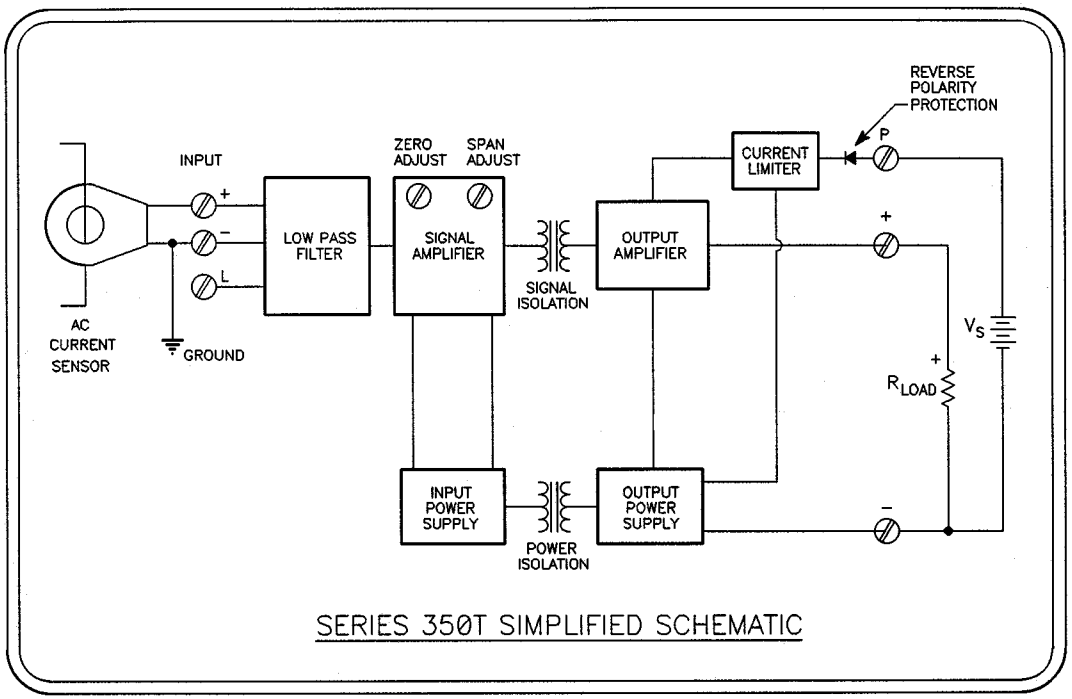
2. Set the input source to 11.17mA DC. Adjust the Span (S) pot until the output reads 10.000V DC.

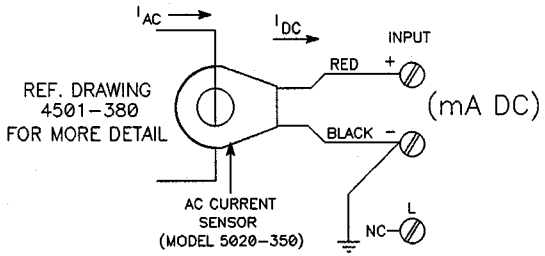
3. Repeat steps 1 and 2 until the readings converge. The instrument is now calibrated. Several mid-point values should also be checked to verify proper operation of the transmitter.

GENERAL MAINTENANCE:

The transmitter 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 transmitter is to exchange it with a known good unit. It is highly recommended that a non-functioning transmitter 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 transmitter.







SERIES 350T CACX INPUT ELECTRICAL CONNECTIONS

Acromag WIXOM, MICH.	18-SEP-93 DATE	A REV	ECN	BC DR	BC ENG	BC CLP	
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D SIZE	350T SERIES	1 of 1	DWG NO. 4501-382	A REV			

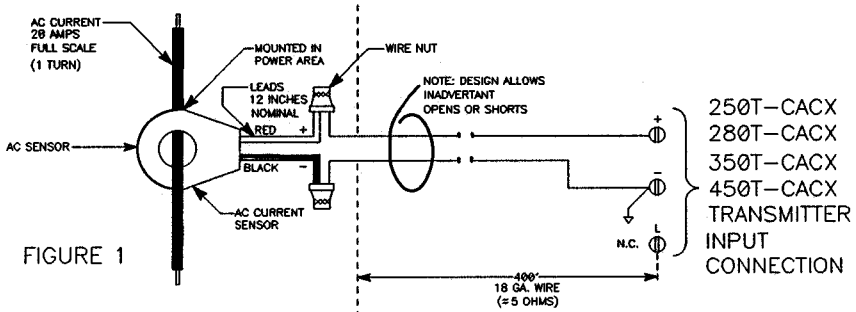


FIGURE 1

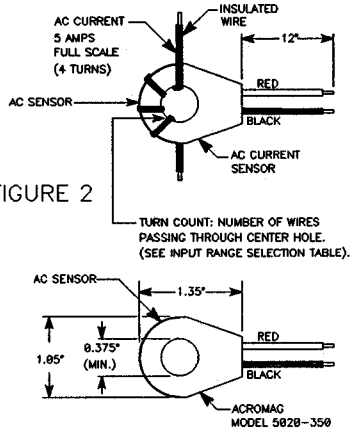


FIGURE 2

CAUTION: DO NOT CONNECT AC CURRENT DIRECTLY TO TRANSMITTER INPUT TERMINALS.

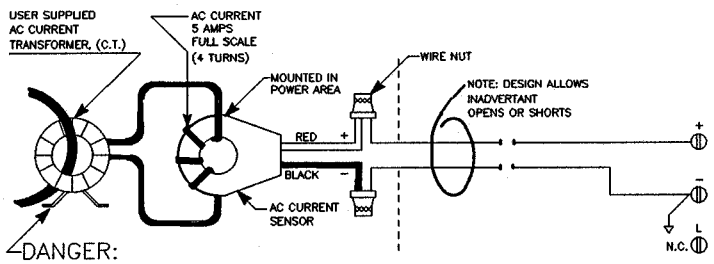
NOTE: ONE AC SENSOR IS INCLUDED WITH EACH 350T-CACX MODULE.

TABLE 1: TURNS CHART

INPUT RANGE SELECTION	
INPUT RANGE (RMS)	TURNS
0 TO 20A	1
0 TO 10A	2
0 TO 5A	4
0 TO 2A	10
0 TO 1A	20

AC CURRENT SENSOR CONNECTIONS

APPLICATION EXAMPLE A: AC CURRENT TRANSFORMER (C.T.)

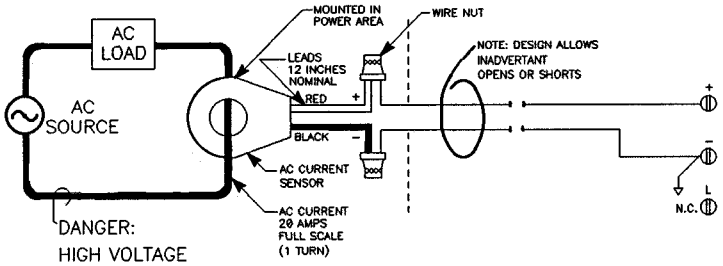


CAUTION: CONNECT TO AC CURRENT SENSOR ONLY.

DO NOT CONNECT AC CURRENT DIRECTLY TO INPUT TERMINALS.

DANGER:
AC CURRENT TRANSFORMER (C.T.) CONNECTIONS:
DISCONNECT POWER TO C.T. OR SHORT OUTPUT OF C.T. BEFORE REMOVING INPUT CONNECTIONS TO AC CURRENT SENSOR. IF THIS PROCEDURE IS NOT FOLLOWED, AN OPEN CIRCUIT C.T. WILL GENERATE HIGH VOLTAGES AND POSSIBLE C.T. DAMAGE WILL RESULT.

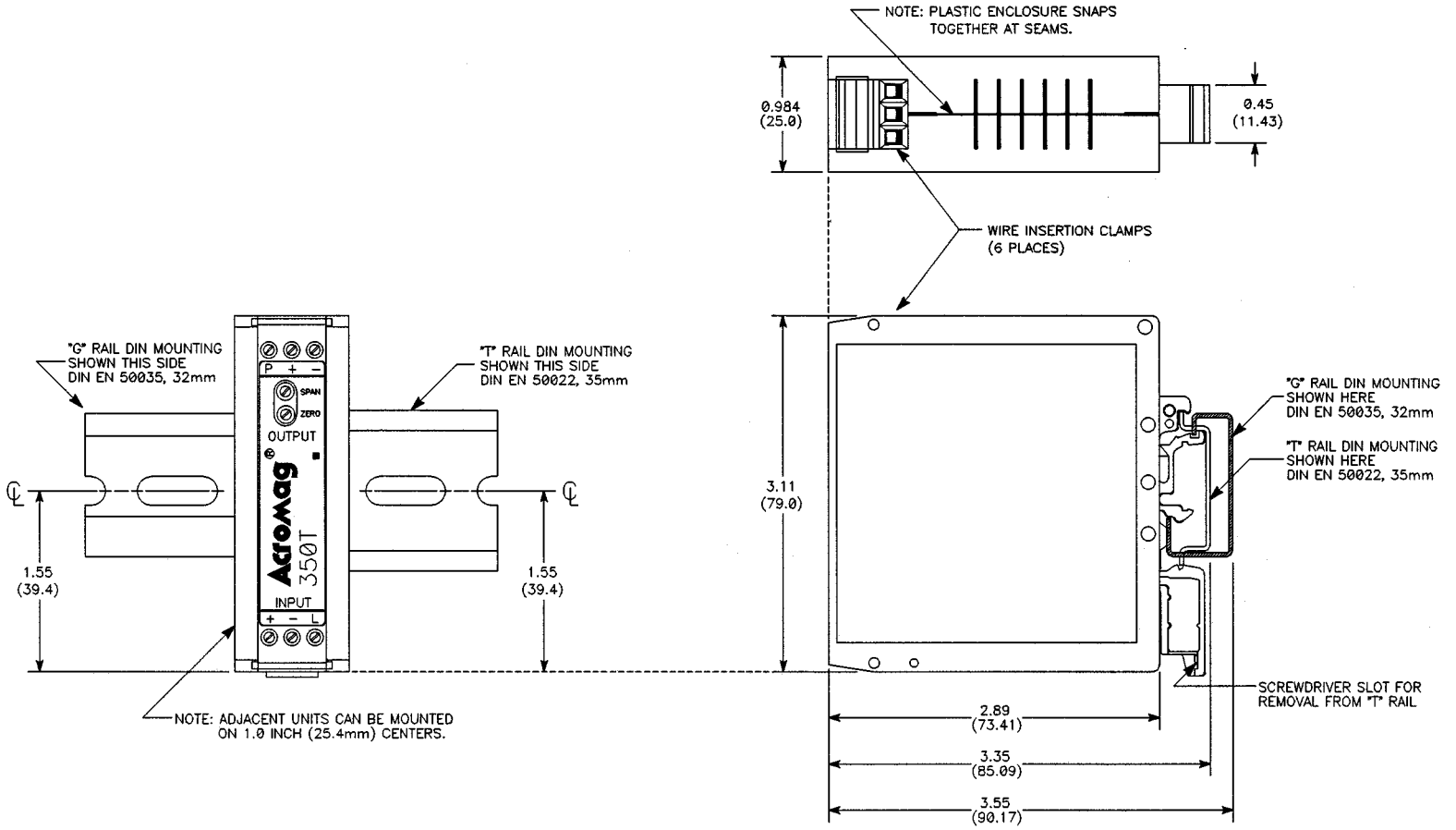
APPLICATION EXAMPLE B: 115V/230VAC ELECTRICAL CIRCUIT



CAUTION: CONNECT TO AC CURRENT SENSOR ONLY.

DO NOT CONNECT AC CURRENT DIRECTLY TO INPUT TERMINALS.

DANGER:
HIGH VOLTAGE



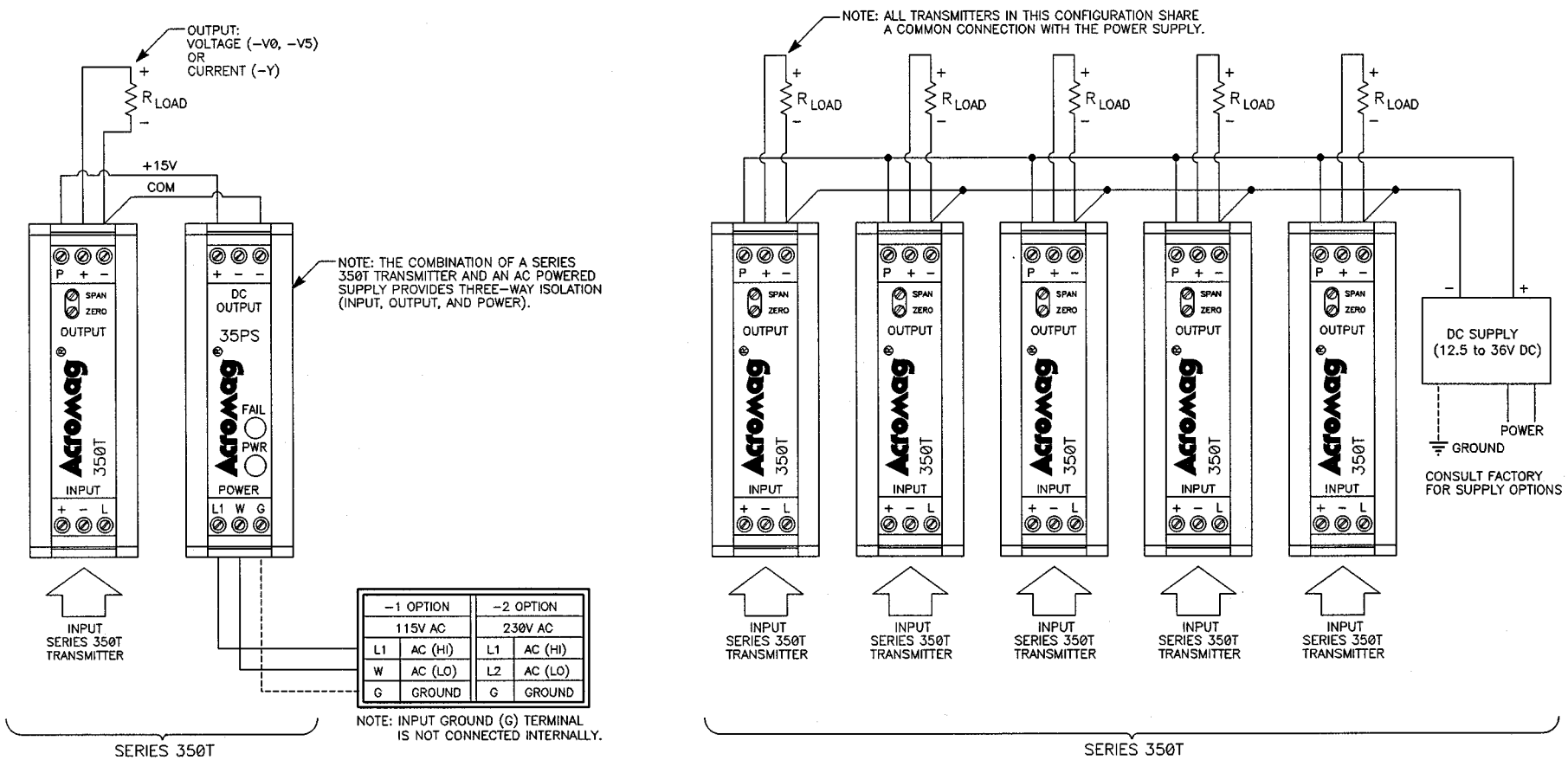
ENCLOSURE DIMENSIONS FOR DIN RAIL MOUNTING

NOTE: ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).

Acromag WIXOM, MICH.	DATE	REV	ECN	DR	ENG	CLP
	12-FEB-93	B	93801	BC	BC	TH
	27-JAN-93	A	———	BC	BC	

TITLE: 350T HOUSING: DIN RAIL MOUNT

SIZE	SERIES		DWG NO.	REV
D	350T	1 OF 1	4501-252	B



POWER SUPPLY CONFIGURATIONS

Acromag WIXOM, MICH.							
	11–JAN–93	A		BC	BC		
	DATE	REV	ECN	DR	ENG	CLP	
TITLE: ELECTRICAL CONNECTIONS							
D	SERIES: 350T	1 of 1	DWG NO. 4501–254	A	REV		

Acromag®

Supplemental Instructions
MODEL 5020-350, AC Current Input (External Sensor) Modules

IMPORTANT SAFETY CONSIDERATIONS

IMPROPER CONNECTIONS, OR CONNECTING TO MODULE INPUTS FROM ANYTHING OTHER THAN THE SUPPLIED AC CURRENT SENSING TRANSFORMER COULD CAUSE PERMANENT DAMAGE TO THE MODULE AND CREATE A SAFETY HAZARD TO THE USER. PLEASE READ THE FOLLOWING AND REFER TO THE CONNECTION DRAWINGS ON THE REVERSE SIDE BEFORE INSTALLATION.

This AC current input module is used in conjunction with an external AC Current Sensor to pre-condition the AC current input signal. The sensor is a highly accurate toroidal instrument transformer used to convert the AC current signal to a safe, low-level, DC milliampere signal (0 to 11.17mA). The module only accepts the isolated low-level signal produced by the AC current sensing transformer and cannot be connected directly to the source of AC power without damage or safety risk. The AC Current Sensor is fully insulated and designed to mount near the source of the AC current. The input AC current range is a simple function of the number of turns placed on the AC Current Sensor (see the table below). The benefits to using an external sensor (external from the module enclosure) include the following:

- **Low losses**: It is not practical to run AC currents over long distances because of significant resistance voltage drops at high currents. The low-level DC milliampere signal output from the AC Current Sensor can be transmitted safely over long distances, allowing the transmitter to be remotely located from the AC power wiring.
- **Safety:** The AC Current Sensor's output leads can be open or short circuited and these conditions do not affect the AC current loop or cause damage to the sensor. Likewise, the wires connecting the AC Current Sensor to the transmitter can be easily removed from the transmitter's input terminals without concern or hazard.
- **Ease of Calibration**: The AC current input range can be easily scaled in the field by simply changing the number of primary turns at the sensor, with no additional calibration required. That is, the AC current input span is a simple function of the number of primary turns placed on the AC Current Sensor and sensor/transmitter calibration is not affected by this. Refer to Applications "A" & "B" of the Drawings on the back.

SENSOR PRIMARY TURNS	AC CURRENT INPUT RANGE	SENSOR OUTPUT (RED/BLACK WIRES)
1	0 to 20 Amps AC	0 to 11.17mA DC
2	0 to 10 Amps AC	0 to 11.17mA DC
4	0 to 5 Amps AC	0 to 11.17mA DC
10	0 to 2 Amps AC	0 to 11.17mA DC
20	0 to 1 Amps AC	0 to 11.17mA DC

The AC Current Sensor is isolated and can be used in AC circuits up to 250V AC, 50 or 60 Hz. It is designed to be mounted at the source of the AC current to be measured. The module can be located remotely from the AC signal and wired using small gauge wire. The sensor's output wires can be shorted, open-circuited, or removed from the transmitter's input terminals, without hazard to personnel or the AC Current Sensor.

DANGER: If the AC Current Sensor is used with an AC Current Transformer (C.T.), disconnect power to the C.T., or short the output of the C.T., before removing the wire going through the AC Current Sensor. If this is not done, an open circuited C.T. will generate high voltages (hazardous) and possible C.T. damage.

The output wires of the sensor are polarized: the Red wire is (+) plus and the Black wire is (-) minus. Normally, these output wires are attached to one end of a cable (user supplied) and the other end connects to the module's input. Connect the Current Sensor output leads to the module input by connecting Red (+) to the module's plus (+) terminal, and Black (-) to the module's minus (-) terminal. Proper polarity must be observed.

WARNING: The input to the module can only come from the AC Current Sensor output wires (Red/Black). If AC current is directly attached to the module's input terminals, the module will be destroyed and safety compromised.

For most applications, it is recommended that the minus (-) module input terminal be connected to an earth ground. The connections between the AC Current Sensor would be floating if not grounded. Grounding eliminates the risk of high common-mode voltages from showing up on the wires and reduces noise pickup.

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Tel: (248) 624-1541, FAX: (248) 624-9234

CAUTION: DO NOT CONNECT AC CURRENT DIRECTLY TO MODULE INPUT TERMINALS

FIGURE 1

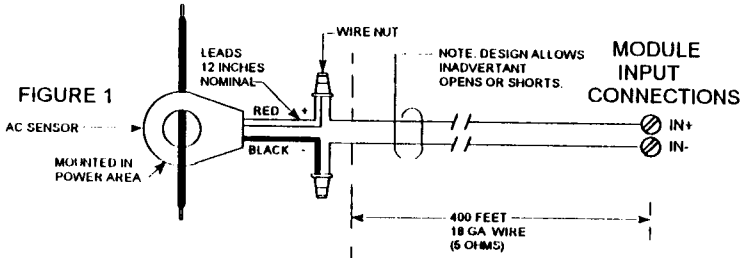


FIGURE 2

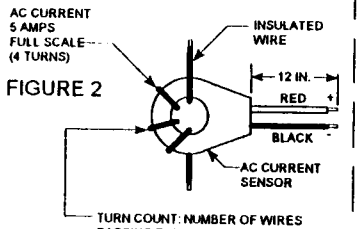
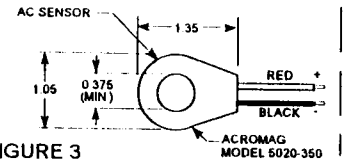


FIGURE 3

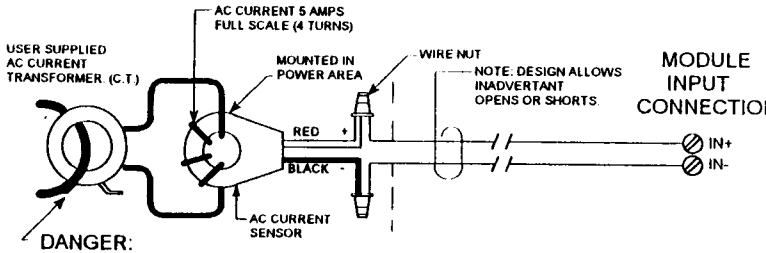


ACROMAG MODEL 5020-350

TABLE 1: TURNS CHART

INPUT RANGE SELECTION	
INPUT RANGE (RMS)	TURNS
0 TO 20A	1
0 TO 10A	2
0 TO 5A	4
0 TO 2A	10
0 TO 1A	20

APPLICATION EXAMPLE A: AC CURRENT TRANSFORMER (C.T.)

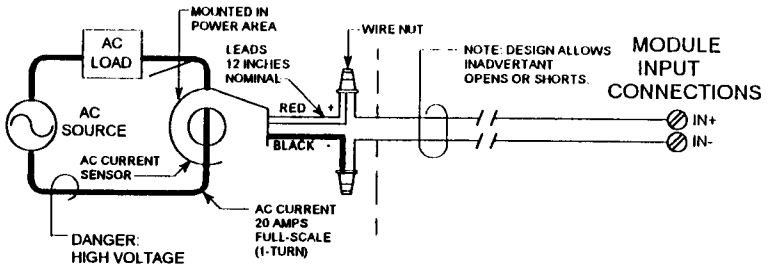


DANGER:
AC CURRENT TRANSFORMER (C.T.) CONNECTIONS:
DISCONNECT POWER TO C.T. OR SHORT OUTPUT OF C.T. BEFORE REMOVING INPUT CONNECTIONS TO AC CURRENT SENSOR. IF THIS PROCEDURE IS NOT FOLLOWED, AN OPEN CIRCUIT C.T. WILL GENERATE HIGH VOLTAGES AND POSSIBLE C.T. DAMAGE WILL RESULT.

CAUTION:
CONNECT MODULE TO AC CURRENT SENSOR ONLY.

DO NOT CONNECT AC CURRENT DIRECTLY TO MODULE INPUT TERMINALS.

APPLICATION EXAMPLE B: 115V/230VAC ELECTRICAL CIRCUIT



CAUTION:
CONNECT MODULE TO AC CURRENT SENSOR ONLY.

DO NOT CONNECT AC CURRENT DIRECTLY TO MODULE'S INPUT TERMINALS.

THIS SENSOR IS USED WITH VARIOUS ACROMAG INPUT MODULES - PLEASE REFERENCE THE USER'S MANUAL FOR THE MODULE FOR ADDITIONAL INFORMATION.

MODEL 5020-350 AC CURRENT SENSOR ELECTRICAL CONNECTIONS

Acromag® WIXOM, MICH.						
21 OCT 96	A	—	KG	KG	KG	
DATE	REV	ECN	DR	ENG	CLP	

TITLE: AC CURRENT SENSOR ELEC. CONNECTIONS

D	SERIES 5020-530	1 OF 1	DWG NO. 4501-636	A REV

Acromag®

Supplemental Instructions
MODEL 5020-350, AC Current Input (External Sensor) Modules

IMPORTANT SAFETY CONSIDERATIONS

IMPROPER CONNECTIONS, OR CONNECTING TO MODULE INPUTS FROM ANYTHING OTHER THAN THE SUPPLIED AC CURRENT SENSING TRANSFORMER COULD CAUSE PERMANENT DAMAGE TO THE MODULE AND CREATE A SAFETY HAZARD TO THE USER. PLEASE READ THE FOLLOWING AND REFER TO THE CONNECTION DRAWINGS ON THE REVERSE SIDE BEFORE INSTALLATION.

This AC current input module is used in conjunction with an external AC Current Sensor to pre-condition the AC current input signal. The sensor is a highly accurate toroidal instrument transformer used to convert the AC current signal to a safe, low-level, DC milliampere signal (0 to 11.17mA). The module only accepts the isolated low-level signal produced by the AC current sensing transformer and cannot be connected directly to the source of AC power without damage or safety risk. The AC Current Sensor is fully insulated and designed to mount near the source of the AC current. The input AC current range is a simple function of the number of turns placed on the AC Current Sensor (see the table below). The benefits to using an external sensor (external from the module enclosure) include the following:

- **Low losses**: It is not practical to run AC currents over long distances because of significant resistance voltage drops at high currents. The low-level DC milliampere signal output from the AC Current Sensor can be transmitted safely over long distances, allowing the transmitter to be remotely located from the AC power wiring.
- **Safety:** The AC Current Sensor's output leads can be open or short circuited and these conditions do not affect the AC current loop or cause damage to the sensor. Likewise, the wires connecting the AC Current Sensor to the transmitter can be easily removed from the transmitter's input terminals without concern or hazard.
- **Ease of Calibration**: The AC current input range can be easily scaled in the field by simply changing the number of primary turns at the sensor, with no additional calibration required. That is, the AC current input span is a simple function of the number of primary turns placed on the AC Current Sensor and sensor/transmitter calibration is not affected by this. Refer to Applications "A" & "B" of the Drawings on the back.

SENSOR PRIMARY TURNS	AC CURRENT INPUT RANGE	SENSOR OUTPUT (RED/BLACK WIRES)
1	0 to 20 Amps AC	0 to 11.17mA DC
2	0 to 10 Amps AC	0 to 11.17mA DC
4	0 to 5 Amps AC	0 to 11.17mA DC
10	0 to 2 Amps AC	0 to 11.17mA DC
20	0 to 1 Amps AC	0 to 11.17mA DC

The AC Current Sensor is isolated and can be used in AC circuits up to 250V AC, 50 or 60 Hz. It is designed to be mounted at the source of the AC current to be measured. The module can be located remotely from the AC signal and wired using small gauge wire. The sensor's output wires can be shorted, open-circuited, or removed from the transmitter's input terminals, without hazard to personnel or the AC Current Sensor.

DANGER: If the AC Current Sensor is used with an AC Current Transformer (C.T.), disconnect power to the C.T., or short the output of the C.T., before removing the wire going through the AC Current Sensor. If this is not done, an open circuited C.T. will generate high voltages (hazardous) and possible C.T. damage.

The output wires of the sensor are polarized: the Red wire is (+) plus and the Black wire is (-) minus. Normally, these output wires are attached to one end of a cable (user supplied) and the other end connects to the module's input. Connect the Current Sensor output leads to the module input by connecting Red (+) to the module's plus (+) terminal, and Black (-) to the module's minus (-) terminal. Proper polarity must be observed.

WARNING: The input to the module can only come from the AC Current Sensor output wires (Red/Black). If AC current is directly attached to the module's input terminals, the module will be destroyed and safety compromised.

For most applications, it is recommended that the minus (-) module input terminal be connected to an earth ground. The connections between the AC Current Sensor would be floating if not grounded. Grounding eliminates the risk of high common-mode voltages from showing up on the wires and reduces noise pickup.

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