Overview

The 4-20 mA Output Analog Current Sensors are designed for use in any AC current monitoring application in which you are looking to monitor a particular piece of equipment. The “Average” style current sensors should be used in applications where the Sinusoidal waveform has no distortion or noise on the conductor being monitored. Applications may include monitoring a resistive type load such as an incandescent light bulb, heating element as well as any single speed linear load. Note that the “True RMS” sensors are able to be used in all applications since the “True RMS” current sensors provide the best overall accuracy and should be used in applications which includes Variable Frequency Drives, Switching Power Supplies, Computers and Data Centers, Electronic Ballasts, SCR’s, and Variable Speed Loads. For currents monitored above 250 Amps, the CTA2-5 is ideal for use with a step down Ratio:5A Output CT (Current Transformer) in stepping down current in a monitored conductor to a proportional 0 to 5A output signal. The current sensors are available in both solid and split-core versions which also includes a Patented (Pat. No. US 7,416,421) 35 mm Din Rail mounting foot for easy installation in panel mount applications. The solid-core versions are a great choice for new installations or OEM applications in which cost sensitivity, lower trip points and environmental issues like dust and moisture may be of concern. The split-core version of the current sensors work great in retro-t applications and for use on service technicians vehicles since one or two parts will work in most applications and can be easily installed without disconnecting any wires.

Applications: Load Trending, Basic Power Monitoring, Electronic Ballasts, Computers/Data Centers, Industrial, Variable Speed Loads, Pumps, Compressors, Fans, Preventative Maintenance, LEED, Project Justification (ROI) Process Control, Solid State Environments (SCR’s)

Part Numbers

NSA-A/CTA2-250 **NSA-A/CTA2-5** **NSA-A/CTA2-50** **NSA-A/SCTA2-50-RMS**

Specifications

Monitored Current Type:	AC Current
Maximum AC Voltage:	600 VAC
Isolation Voltage:	2200 VAC
Operating Frequency Range[1]:	**NSA-A/CTA2 Series**: 40 to 1KHz | **NSA-A/SCTA2-50 RMS**: 15 to 100 Hz
Core Style:	**NSA-A/CTA2 Series**: Solid | **NSA-A/SCTA2-50 RMS**: Split
Supply Voltage:	+8.5 to 30 VDC (Reverse Polarity Protected) **250 Ohm Load (1-5 VDC)**: +13.5 to 30 VDC **500 Ohm Load (2-10 VDC)**: +18.5 to 30 VDC
Maximum Load Resistance @ 24 VDC:	775 Ohms (**Formula**: (24 VDC – 8.5 VDC) / 0.020A)
Supply Current:	25 mA minimum
Selectable Range:	**NSA-A/CTA2-5**: 0 to 5A | **NSA-A/CTA2-250**: 0 to 100/200/250A **NSA-A/CTA2-50**: 0 to 10/20/50A | **NSA-A/SCTA2-50-RMS**: 0 to 10/20/50A
Output Signal | Maximum Output Signal:	4 to 20 mA (2-Wire, Loop Powered) | Limited to 25 mA
Accuracy[2]:	**All Models**: +/- 1% of Selected Range except **NSA-A/SCTA2-50-RMS**: +/- 2% from 15 to 20 Hz, +/- 1% from 20 to 100 Hz
Response Time:	**NSA-A/CTA2-xxx**: < 600 mS (Rise and Fall Time) **NSA-A/SCTA2-50-RMS**: 600 mS (Rise Time) and 2800 mS (Fall Time)
Aperture Size:	0.75” (19.05 mm)
Din Rail Size:	35 mm (U.S. Patent No. 7,416,421)
Operating Temperature Range:	5 to 104ºF (-15 to 40ºC)
Operating Humidity Range:	0 to 95%, non-condensing
Storage Temperature | RH Range:	41 to 95°F (5 to 35°C) | 40% to 85% RH, non-condensing
Enclosure Material | Flammability Rating:	PC/ABS (Polycarbonate/ABS Blend) | UL94-V0
Wiring Connections:	2 Position, Screw Terminal Block (Polarity Sensitive)

Wire Recommendations:	2 Conductor (Shielded Cable)
Wire Size:	18 to 24 AWG (0.823 mm to 0.205 mm) Copper Wires only
Terminal Block Torque Rating:	4.43 to 5.31 in-lbs. (0.5 to 0.6 Nm)
Minimum Mounting Distance:	1" (2.6 cm) between current sensor & other magnetic
Agency Approvals:	CE (-RMS Versions): CE to IEC 61326-1: 2012 Class A, UL/CUL US Listed (UL 508) Ind. Control Equipment | (File # E309723), RoHS2, WEEE
Product Weight:	**NSA-A/CTA2-xxx**: 0.260 lbs (0.118 kg) **NSA-A/SCTA2-xxx-RMS**: 0.190 lbs (0.087 kg)
Product Dimensions:	**Solid Core Versions**: 2.760" (70.11 mm) x 3.343" (84.92 mm) x 1.050" (26.67 mm) **Split Core Versions**: 2.780" (70.51 mm) x 3.238" (82.25 mm) x 1.120" (28.45 mm)

[1]Only the 0 to 100 Amp range in the NSA-A/CTA2-250-RMS will meet accuracy specifications from 15 to 100 Hz

[2]All current output sensors are calibrated at an ambient room temperature of 71ºF (21.5ºC)

Dimensional Drawing

Solid Core

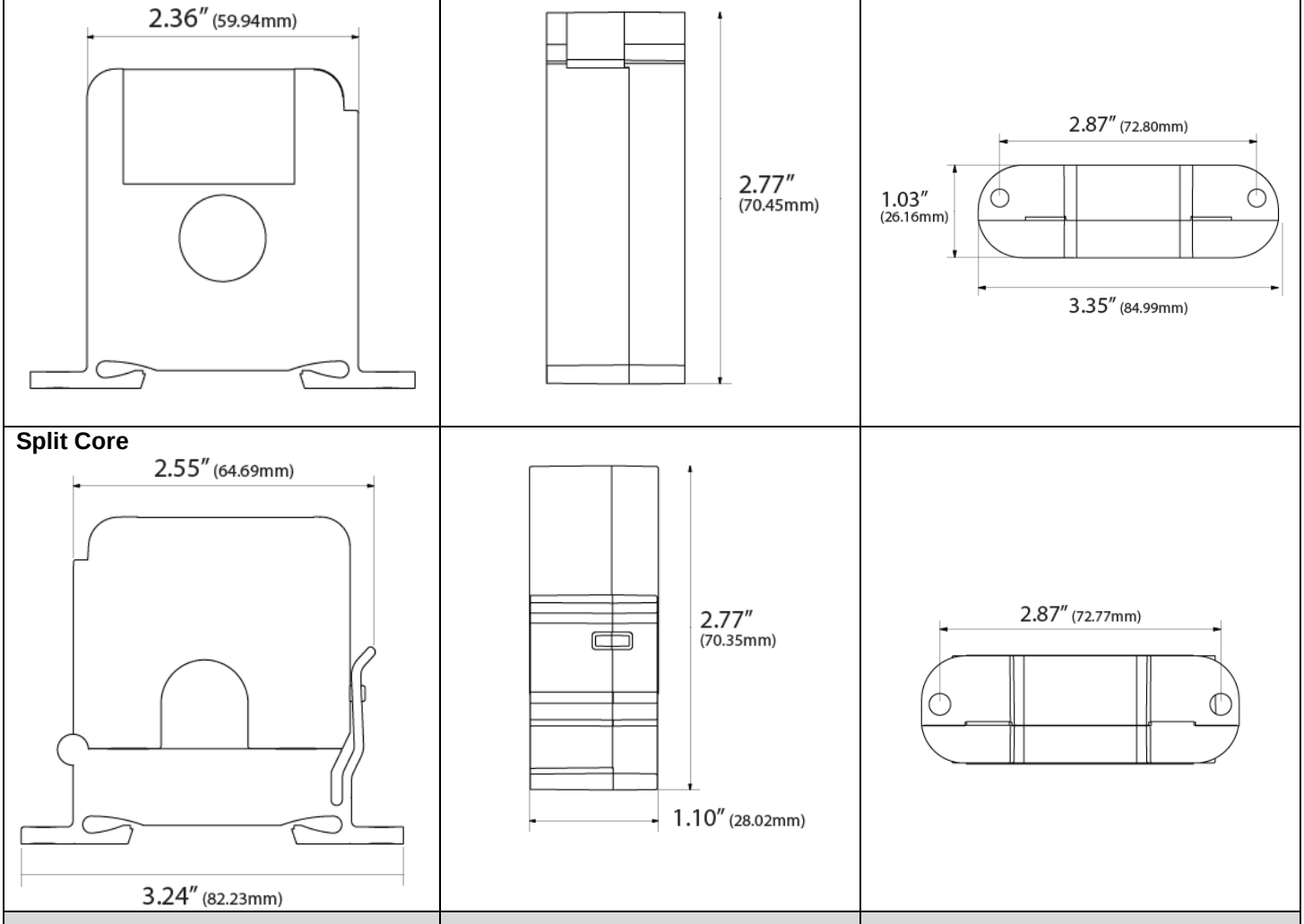

Figure 1

Precautions

- This product is not intended to be used for Life or Safety applications.
- This product is not intended for use in any hazardous or classified locations.
- The NSA-A/CTA2 and NSA-A/SCTA2 Series Current Sensors must be used on Insulated Conductors Only.
- **HIGH VOLTAGE**
  Disconnect and lock out all power sources before installation as severe injury or death may result from electrical shock due to contact with high voltage wires.

Installation

Make sure that all installations are in compliance with all national and local electrical codes. Only qualified individuals that are familiar with codes, standards, and proper safety procedures for high-voltage installations should attempt installation. The current sensor is a 2-wire, 4 to 20 mA Loop Powered device that requires a regulated +13.5 to 30VDC external power source. The current sensor may be mounted in any position using the two #8 x ¾" Tek screws and the mounting holes in the base, or snapped directly on to the 35mm DIN rail (Figure 3). Leave a minimum distance of 1" (3 cm) between the current sensor and any other magnetic devices such as contactors and transformers.

Latch Operation for NSA-A/SCTA2 Series

Press down on the side tab and swing the top of the unit up to open the split core current sensor as shown in Figure 2. Press down firmly on the cover to close the current sensor. An audible "click" will be heard as the tab slides over the tongue on the base. CAUTION: Mating surfaces of the magnetic core are exposed when the sensor is open. Electrical contact grease, present on the cores to prevent corrosion, can capture grit and dirt if care is not exercised. Operation can be impaired if anything prevents good contact between pole pieces. Visually check the mating parts of the core before closing the current sensor.

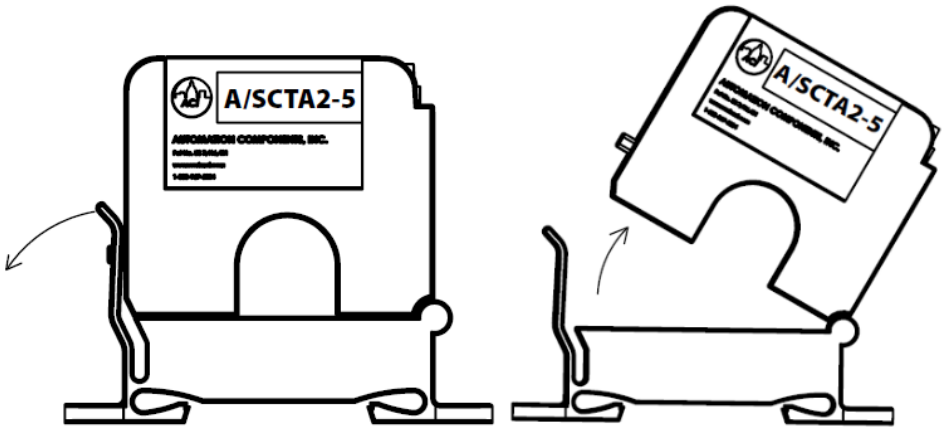

Figure 2

Current Sensor Setup

The amperage range selected represents the maximum current that can be applied to the conductor being monitored, Do not exceed! All current sensors with selectable ranges will have the range selection jumper factory set on the high range. For models with field selectable amperage ranges, select the correct amperage range using the range selection jumper. Note that all -RMS models have True RMS outputs and should be used with Variable Frequency Drives.

NOTES

- An extra jumper shunt is included. It can be discarded if not needed.
- In applications where high vibrations are encountered, Carrier recommends to use the jumper shunt without tab. A pliers can help with jumper shunt installation onto the pins.

Din Rail Installation

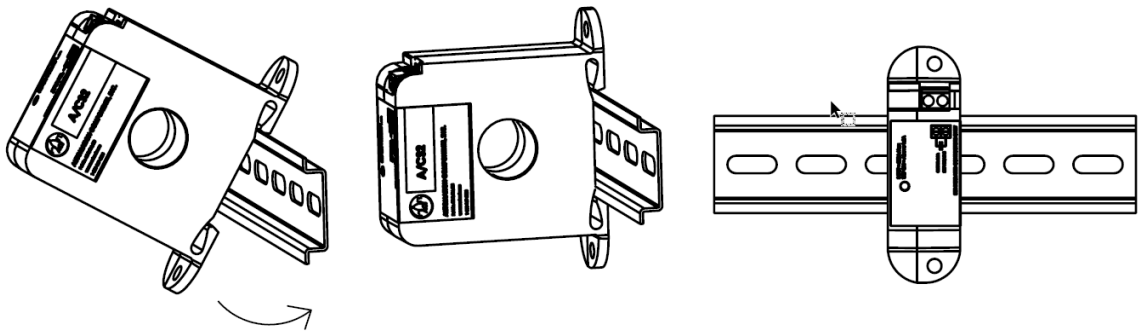

Figure 3

Current Transformer

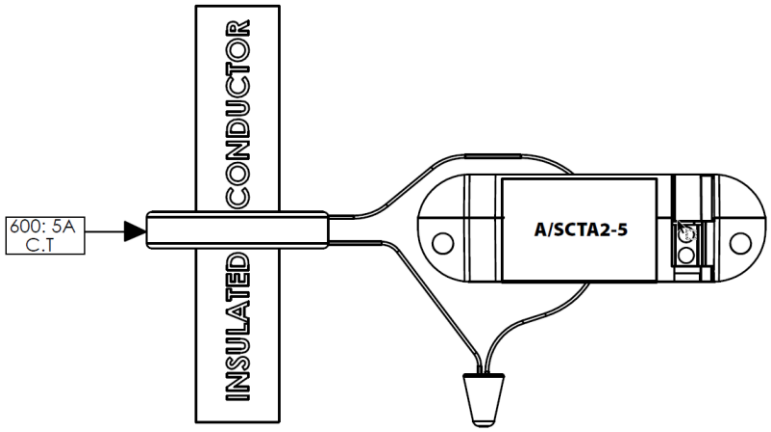

Figure 4

Application Notes

For load currents greater than sensor maximum continuous current rating:

For applications in which the normal operating current is greater than 250 Amps or for conductors larger than 0.750” (1.90 cm) in diameter, an external 5 Amp Current Transformer must be used as shown in Figure 4. Use the NSA-A/CTA2-5 to scale the 5A current to a 4-20ma current.

Wiring Instructions

Carrier recommends the use of a two conductor 16 to 22 AWG shielded cable, copper wire only, for all 4 to 20mA current sensor installations. A maximum wire length of less than 30 meters (98.4 feet) should be used between the current sensors and the Building Management System or controller. All wiring must comply with all local and National Electric Codes.

NOTE When using a shielded cable, be sure to connect only 1 end of the shield to ground at the controller. Connecting both ends of the shield to ground may cause a ground loop. When removing the shield from the sensor end, make sure to properly trim the shield to prevent any chance of shorting. The current sensor terminals are polarity sensitive and represent a linear and proportional 4 to 20mA output signal. Tighten the screws at the terminal block connections to the recommended torque of 0.5 to 0.6 Nm (4.43 to 5.31 in-lbs.). The aperture (hole) size of the current sensor is 0.75” (1.90 cm).

Analog Circuit

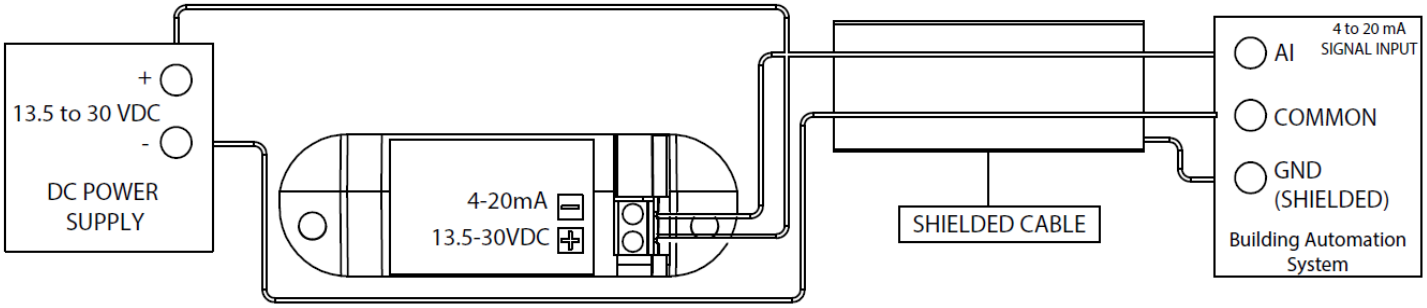

Figure 5

Troubleshooting

Problem	Solution
No reading	• Confirm that you have +13.5 to 30VDC in series with the current sensor output terminals and the analog input of the control panel. • Check the polarity of the circuit. • Verify that the terminals are screwed down, wires are firmly in place. • Disconnect the input to the control panel and then insert a current meter (mA range) in series with the current sensor output to verify that the circuit is working properly.
Erratic readings	• Verify that the wires are terminated properly. • Check that the +13.5 to 30VDC input is clean. In areas of high RF interference, shielded cable may be necessary to stabilize signal.
Inaccurate readings	If you suspect that the current sensor is not reading within the accuracy specifications, please contact the factory for assistance.
Current Sensor is operating at a low-level current or failing to operate within the accuracy specifications.	• Visually check the mating parts of the core to ensure there is no debris between the split contacts. See Figure 2. • Remove all debris or dust manually and close the current sensor. • Continue to retest the sensor in your application.