

### Overview

The Adjustable Current Switches are designed for use in any AC current monitoring application in which you are looking to monitor a particular piece of equipment for equipment failure, preventative maintenance, status, and electrical load status. The current switches should be installed on the line side of the power to the electrical equipment. The current switches are available in both solid and split-core versions which also includes a Patented 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 may be of concern. The split-core version of the current switches work great in retro applications and for use on service technicians' vehicles since one part will work in most applications and can be easily installed without disconnecting any wires. The adjustable current switches can be used to determine the run time of your equipment as well as basic load trending applications where you want to know when how long your piece of equipment runs when logging the contact closures on your building management system or PLC.



**Applications:** Overload Conditions, Underload Conditions, Normal Operating Conditions, Broken Belts, Belt Slippage, Locked Rotors, Equipment Failure, Fans, Pumps, Compressors, Motors, Ovens, Industrial Equipment, Lighting Status and Usage, Electrical Load Status, Local Alarms (Strobes and Audible Alarms), Preventative Maintenance Scheduling

### Part Numbers

**NSA-A/ACS2**

**NSA-A/ASCS2**

**NSA-A/ASCS2-L**

### Specifications

<b>Monitored Current Type:</b>	AC Current
<b>Maximum AC Voltage:</b>	600 VAC
<b>Operating Frequency Range:</b>	40 to 1 kHz
<b>Core Style:</b>	<b>NSA-A/ACS2:</b> Solid   <b>NSA-A/ASCS2:</b> Split   <b>NSA-A/ASCS2-L:</b> Split
<b>Sensor Power:</b>	Induced from the Monitored Conductor
<b>Amperage Range:</b>	0 to 250A
<b>Isolation Voltage:</b>	2200 VAC
<b>Trip Point Style   Trip Point:</b>	Adjustable <b>NSA-A/ACS2:</b> 0.5 to 220A   <b>NSA-A/ASCS2:</b> 1.5 to 220A <b>NSA-A/ASCS2-L:</b> 0.6 to 180A
<b>Hysteresis:</b>	10% of trip point, typical
<b>Contact Type:</b>	Normally Open (N/O)
<b>“Status” Contact Rating:</b>	0.2A @ 200 VAC/VDC
<b>“Status” Contact “On” Resistance   “O” Resistance:</b>	< 10 Ohms (tripped)   > 1 Meg Ohms (Open)
<b>Response Time:</b>	See Response Time Table
<b>Status LED Indication --</b>	Red LED (Current above Trip Point) Blue LED (Current Below Trip Point)
<b>Aperture Size:</b>	0.75" (19.05 mm)
<b>Din Rail Size:</b>	35 mm (U.S. Patent No. 7,416,421)
<b>Operating Temperature Range:</b>	5 to 104°F (-15 to 40°C)
<b>Operating Humidity Range:</b>	0 to 95%, non-condensing
<b>Recommended Storage Temperature   RH Range:</b>	41 to 95°F (5 to 35°C)   40% to 85% RH, non-condensing
<b>Enclosure Material   Flammability Rating:</b>	PC/ABS (Polycarbonate/ABS Blend)   UL94-V0
<b>Wiring Connections:</b>	2 Position, Screw Terminal Block (Not Polarity Sensitive)
<b>Wire Size:</b>	16 to 22 AWG (1.31 mm <sup>2</sup> to 0.33 mm <sup>2</sup> ) Copper Wires only

Specifications subject to change without notice.



#NSA-A/ACS2, NSA-A/ASCS2, NSA-A/ASCS2-L – 11/14/2019

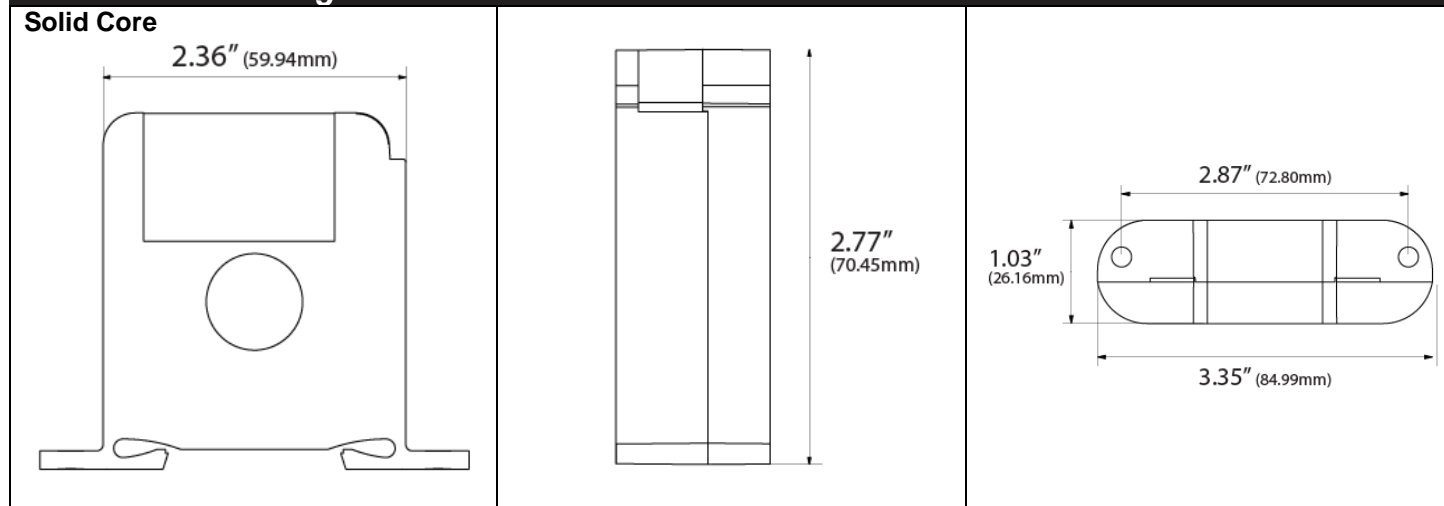
<b>Terminal Block Torque Rating:</b>	4.43 to 5.31 in-lbs. (0.5 to 0.6 Nm)
<b>Minimum Mounting Distance:</b>	1" (2.6 cm minimum) between current switch (Relays, Contactors, Transformers)
<b>Agency Approvals:</b>	UL/CUL US Listed (UL 508) Ind. Control Equipment (File # E309723), CE, RoHS2, WEEE
<b>Product Weight:</b>	<b>NSA-A/ACS2:</b> 0.216 lbs. (0.097 kg)   <b>NSA-A/ASCS2:</b> 0.270 lbs. (0.123 kg) <b>NSA-A/ASCS2-L:</b> 0.280 lbs. (0.127 kg)
<b>Product Dimensions (L x W x H):</b>	Solid Core: 2.760" (70.11 mm) x 3.343" (84.92 mm) x 1.050" (26.67 mm) Split Core: 2.780" (70.51 mm) x 3.238" (82.25 mm) x 1.120" (28.45 mm)

### Response Time

Model #	0.50 Amps	0.60 Amps	0.75 Amps	1.0 Amps	1.5 Amps	10 Amps	20 Amps
NSA-A/ACS2	221 mS	-	144 mS	109 mS	-	63 mS	59 mS
NSA-A/ASCS2	-	-	-	-	248 mS	68 mS	65 mS
NSA-A/ASCS2-L	-	400 mS	270 mS	183 mS	-	62 mS	60 mS

-: unit was not tested (below minimum trip point or for that range)

### Dimensional Drawing



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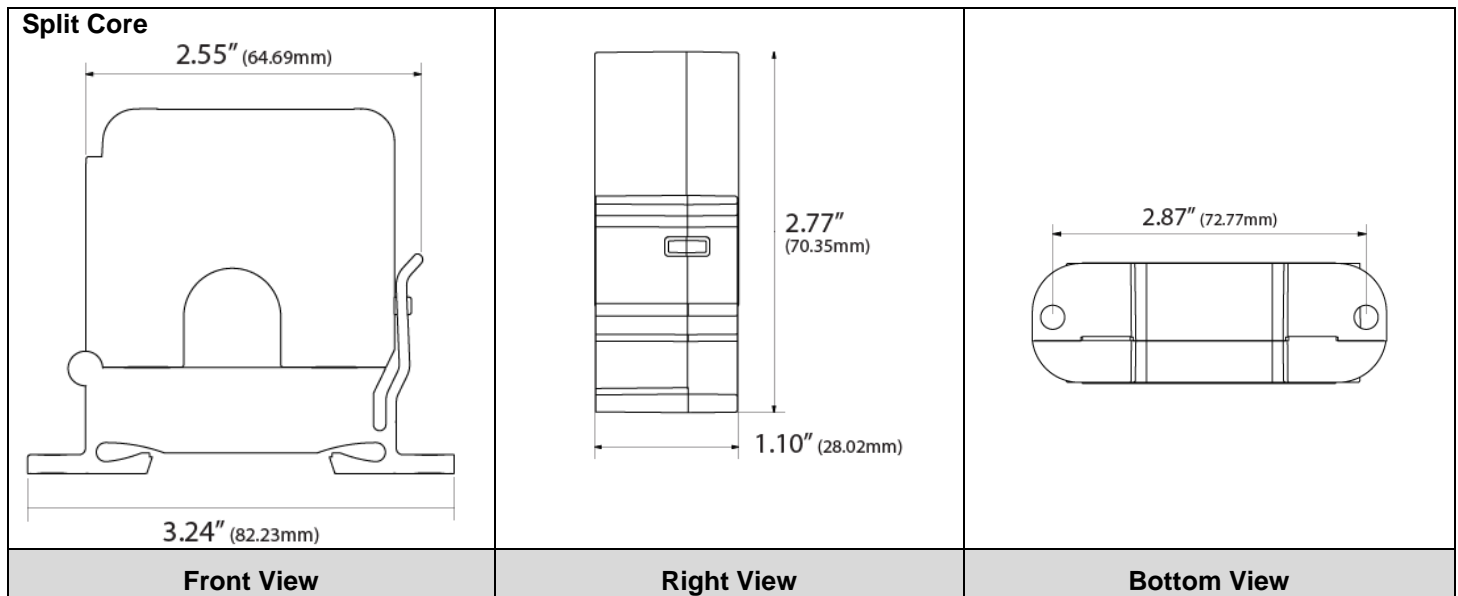


Figure 1

## 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/ACS2 and NSA-A/ASCS2 Series Current Switches 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.
  - Never rely on the Red LED to determine whether power is present at the current switch. At very low monitored input currents the Red LED may not light to indicate the current is above the trip point.

## Installation

Ensure 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 switches will not require external power because the power for the current switch is induced from the conductor being monitored. The current switch may be mounted in any position using the two #8 x 3/4" 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 switch and any other magnetic devices such as contactors and transformers.

## Latch Operation

Press down on the side tab and swing the top of the unit up to open the split core current switch as shown in Figure 2. Press down firmly on the cover to close the current switch. 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.

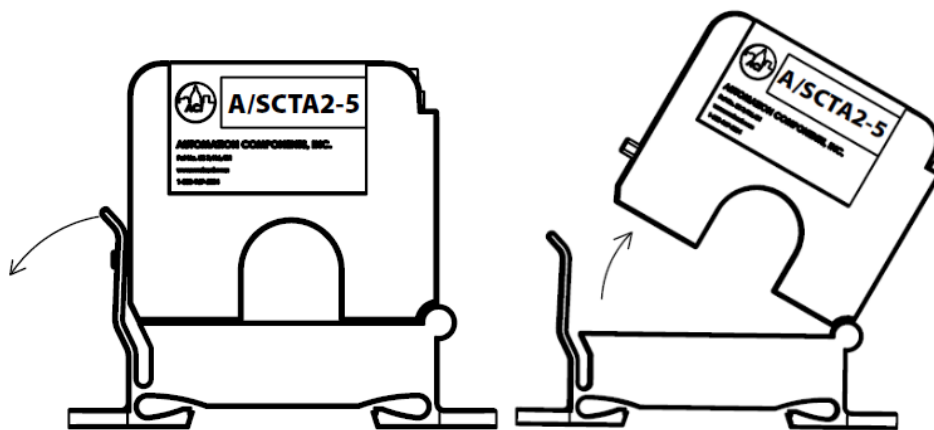


Figure 2

## LED

The Red LED will indicate whether the current is above (LED On) or below (LED Off) the fixed trip point. At very low monitored input currents the Red LED may not light to indicate the current is above the trip point.

## Din Rail Installation

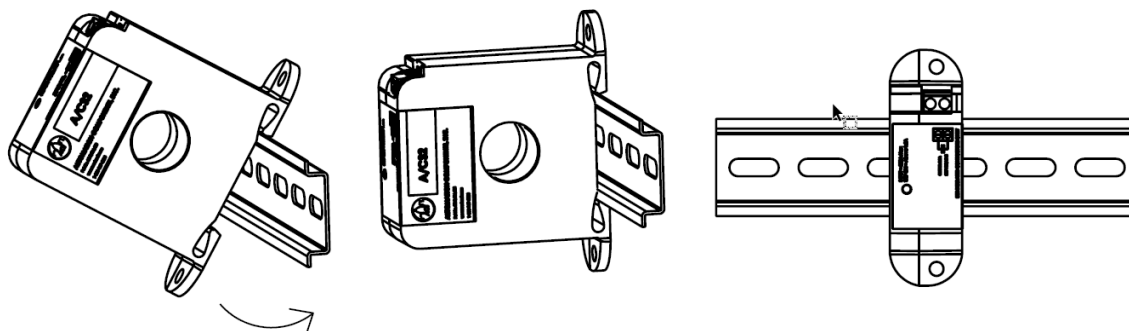


Figure 3

## Wires Through Sensors

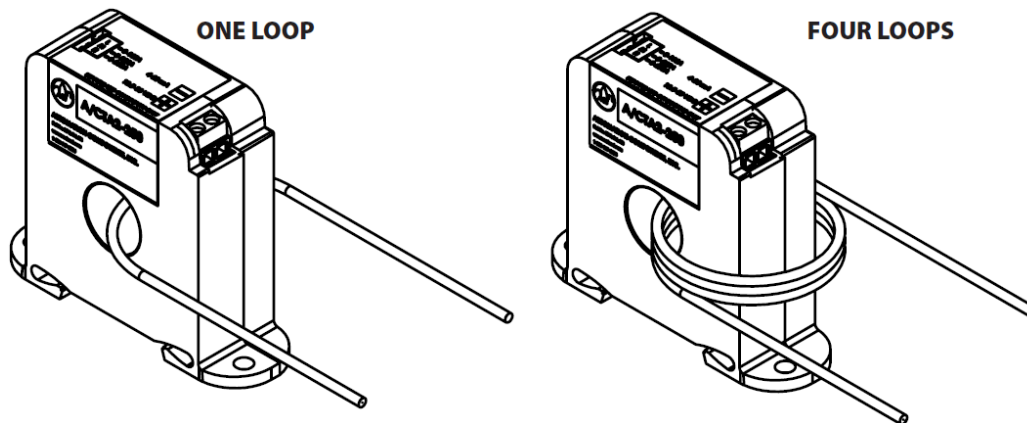


Figure 4

## APPLICATION NOTES

The conductor being monitored may be looped through the sensor multiple times. The loops increase the current measured by the current switch. Each time the conductor passes through the current switch window equals one loop (Figure 4). To determine the proper number of loops required, take the rated Fixed Trip Point of the current switch and divide it by the Operating Current of the Monitored Device, add one (1), then round up to the nearest whole number. Example: When using the NSA-A/ACS2, a small fan operating at 0.1A should be wrapped through the sensor four times to give you a total operating current of 0.4 Amps flowing through the NSA-A/ACS2. Formula Example:  $(0.25A/0.1A) = 2.5 + 1 = 3.5$ , which rounded up equals 4 loops.

## Wiring Instructions

Carrier recommends the use of a two conductor 16 to 22 AWG shielded cable or twisted pair copper wire only, for all current switch applications. A maximum wire length of less than 30 meters (98.4 feet) should be used between the current switch and the Building Management System or controller. 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 switch output terminals represent a solid-state switch for controlling both AC and DC loads and are not polarity sensitive. 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 switch is 0.75" (1.90 cm).

## Digital Circuit

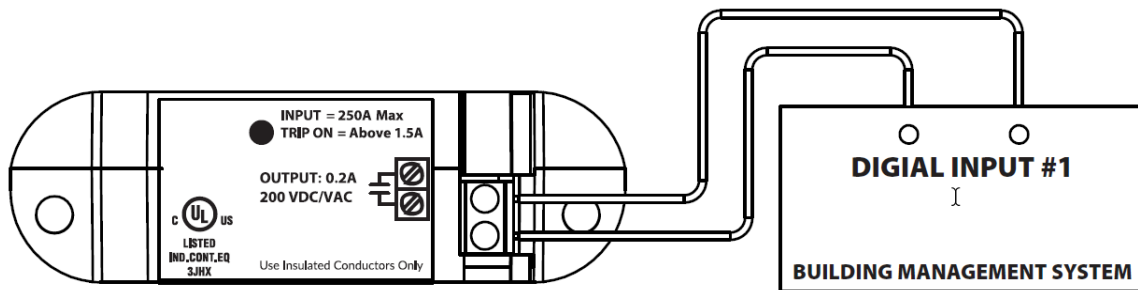


Figure 5

## Motor/Fan Control

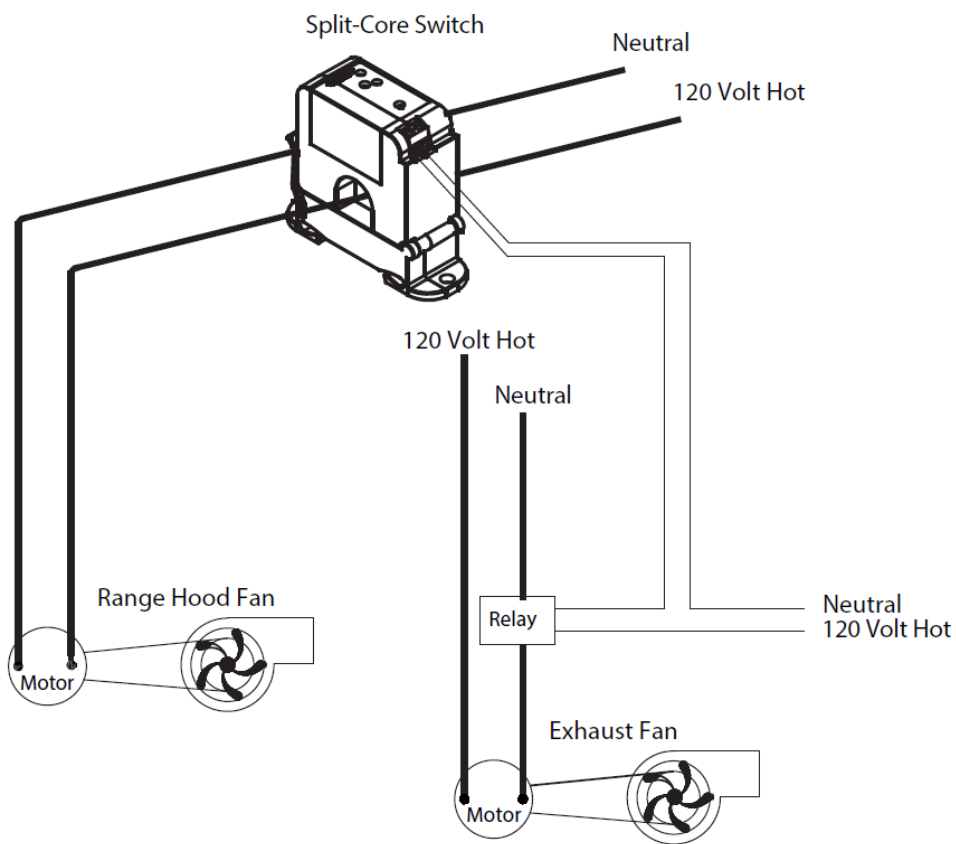


Figure 6



### Application Examples

See Figure 5 and Figure 6 for two different current switch applications. Figure 5 shows the use of the Go/No Go Current Switch as a Digital Input to your BAS/PLC Controller. Figure 6 shows a Go/No/Go Current Switch in conjunction with a Contactor to control an exhaust fan.

**NOTE** The Go/No Go Current switches are only rated at 0.2A @ 200 VAC/VDC and must use an additional Contactor if controlling motor/fans.

### Calibration of Adjustable Trip Point

The adjustable current switch has an operating range of 0-250 Amps, **Do not exceed!** The current switch has an adjustable trip point range of 0.50 - 220 Amps, 1.50 - 220 Amps, or 0.60 - 180 Amps depending on the model. See the Specifications table to determine the adjustable trip point range per model number. The adjustable current switch comes with its fifteen-turn adjustment potentiometer set to the maximum trip point position. The adjustable current switch can monitor Underload, Normal Load, and Overload conditions, depending on how it's set. The procedure below is for the Normal load condition for part numbers NSA-A/ACS2, NSA-A/ASCS2 and NSA-A/ASCS2-L.

### Normal Loads

With power on, turn the 15-turn adjustment potentiometer clockwise until the Red LED turns on and stop immediately. Clockwise is referenced with the terminal block location on the right. The adjustable current switch is now tripped. The adjustable current switch Hysteresis (Dead Band) is 10% of the trip point typically.

- Clockwise = Decrease Trip
- Counter-clockwise = Increase Trip

### Troubleshooting

Problem	Solution
<b>LED is on but the current switch didn't activate</b>	Disconnect the wires from the current switch output. Measure the resistance across the contacts with an Ohmmeter. See Specifications table for the actual resistance readings for an open or closed switch reading.
<b>LED didn't turn on and the current switch didn't activate</b>	Verify that the current flowing in the conductor being monitored is above the fixed trip point as listed in the operating specifications. If the sensor is monitoring less than the fixed trip point, see Figure 3.
<b>LED not on but the Current Switch is Activated</b>	LED not indicating correctly, may have been damaged.
<b>Current Switch is operating at a low-level current or failing to operate within the accuracy specifications</b>	For NSA-A/ASCS2 Series, visually check the mating parts of the core to ensure there is no debris between the split contacts. Remove all debris or dust manually and close the current sensor, see Figure 2. Retest the sensor in your application.