Overview

The Miniature Adjustable Current switches are designed for use in any AC current monitoring application in which you are looking for an adjustable current switch to monitor normal operating conditions, equipment failure or preventative maintenance scheduling for a particular piece of equipment. The adjustable current switches should be installed on the line side of the power to the motor, pump, compressor or other equipment. The miniature adjustable current switches are available in both solid and split-core versions in a smaller enclosure style than that of the NSA-A/ACS2 and NSA-A/ASCS2 Series adjustable current switches. 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 retrofit applications and for use in service vehicles since one part will work in most applications and can be installed without disconnecting any wires. The adjustable current status switches can also be used to determine the run time of your equipment where you want to know when your piece of equipment runs and for how long it runs when logging the contact closures on your building management system or PLC.

Applications: Overload Conditions, Under Load Conditions, Normal Load Conditions, Broken Belts, Belt Slippage, Locked Rotors, Electrical Failure, Load Status, Local Alarms such as Strobes/Audible Alarms, Pumps, Fans, Compressors, Lighting Status and Usage Information, Ovens, Process Control, Industrial Equipment, Equipment Maintenance, OEM

Part Numbers

NSA-A/MCS-A **NSA-A/MSCS-A**

Specifications

Monitored Current Type:	AC Current
Maximum AC Voltage:	600 VAC
Operating Frequency Range:	50/60 Hz
Core Style:	**NSA-A/MCS-A**: Solid | **NSA-A/MSCS-A**: Split
Sensor Power:	Induced from the Monitored Conductor (Insulated Conductors only)
Amperage Range:	Max Sensing Current Voltage: 600 VAC | Max Continuous Current: 158 A Max Current for 6 Seconds: 204 A | Max Current for 1 Second: 600 A
Isolation Voltage:	2200 VAC
Output Switch Rating	1.00 Amp @ 36 VAC/VDC
Trip Point Style | Adjustable Trip Point Range:	Adjustable Trip Point | **NSA-A/MCS-A**: 0.32 – 150 A **NSA-A/MSCS-A**: 0.70 - 150 A
Hysteresis:	10% Trip Point, typical
Contact Type:	Normally-Open "N/O"
Contact Rating:	1A Continuous @ 36 VAC/VDC
Contact "On" Resistance | "Off" Resistance:	< 0.5 Ohms (tripped) | > 1 Meg Ohms (Open)
Response Time:	**NSA-A/MCS-A**: < 90 mS, typical | **NSA-A/MSCS-A**: < 45 mS typical
Status LED Indication[1]:	Red LED (Current above trip point) | Blue LED (Current below trip point)
Aperture Size (Diameter):	0.53" (13.46 mm)
Operating Temperature Range:	-22 to 140ºF (-30 to 60ºC)
Operating Humidity Range:	0 to 95%, non-condensing
Recommended 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 (Not Polarity Sensitive)
Wire Size:	16 to 22 AWG (1.31 mm^2 to 0.33 mm^2) Copper Wires only
Terminal Block Torque Rating:	4.43 to 5.31 in-lbs. (0.5 to 0.6 Nm)

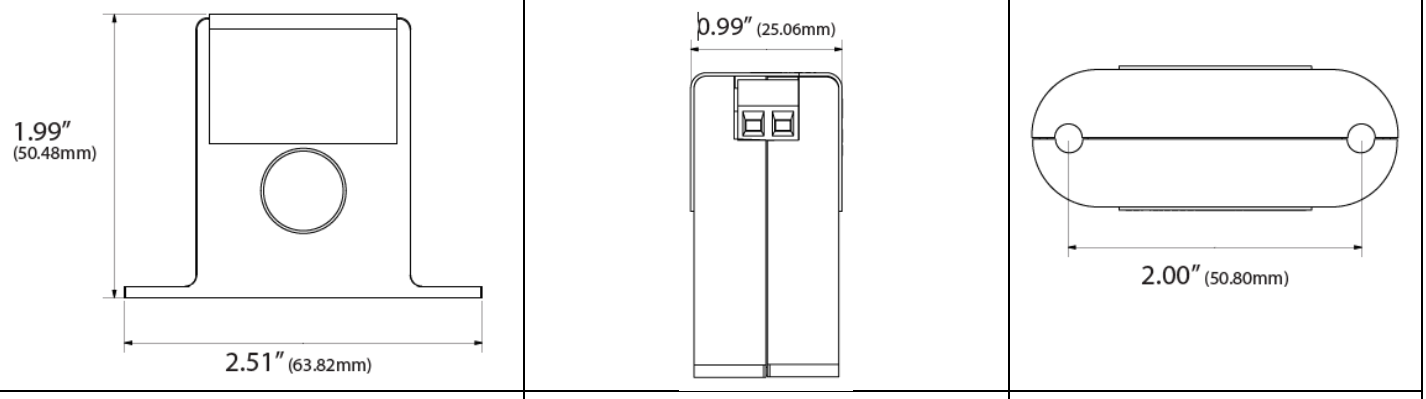
Minimum Mounting Distance:	1” (2.6 cm) between current switch (Relays, Contactors, Transformers)
Agency Approvals[2]:	UL/CUL US Listed (UL 916) Energy Management Equipment (File # E334792), CE, RoHS2, WEEE
Product Weight:	**NSA-A/MCS-A**: 0.15 lbs. (0.068 kg) | **NSA-A/MSCS-A**: 0.20 lbs. (0.091 kg)
Product Dimensions (L x W x H):	**NSA-A/MCS-A (Solid-Core)**: 2.510” (63.82 mm) x 0.940” (23.94 mm) x 2.000” (50.80 mm) **NSA-A/MSCS-A (Split-Core)**: 2.650” (67.19 mm) x 0.940” (23.94 mm) x 2.380” (60.49 mm)

[1]The LED should not be used to determine if current is present. At low currents the LED may not be visible.

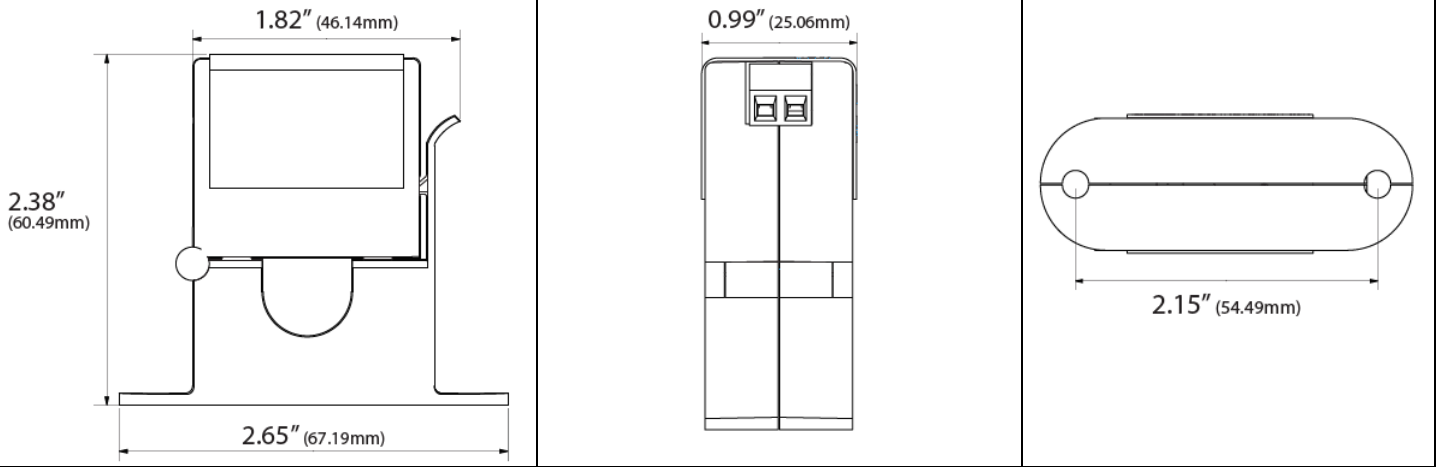
[2]Maximum wire length not to exceed 98.4 Feet (30 meters) in order to meet the CE Requirements

Dimensional Drawing

Solid-Core



Split-Core



Front View	Right View	Bottom View

Figure 1

Installation

Warnings

- 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.
- 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 LED's to determine whether power is present at the current switch. The Red LED indicates whether the current is above the adjustable trip point. The Blue LED will indicate that the current is below the adjustable trip point.

All installations must be 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, since the power for the current switch is induced from the conductor being monitored.

The NSA-A/MCS-A and NSA-A/MSCS-A Current Switches should be used on Insulated Conductors Only! The current switch may be mounted in any position using the (2) #8 x 3/4" Tek screws and the mounting holes in the base. Leave a minimum distance of 1" (3 cm) between the current switch and any other magnetic devices such as contactors and transformers.

For applications in which the normal operating current is below the 0.32Amps (NSA-A/MCS-A) or 0.70Amps (NSA-A/MSCS-A) trip point (See Figure 3 below), the conductor being monitored may be looped through the sensor 6 times giving you a total operating current of 6X the original current. **Example**: A small fan operating at 0.2A should be wrapped through the sensor 7 times to give you a total operating current of 1.4Amps flowing through the NSA-A/MCS-A or NSA-A/MSCS-A.

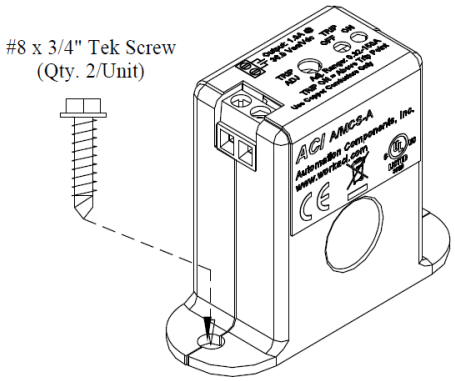


Figure 2

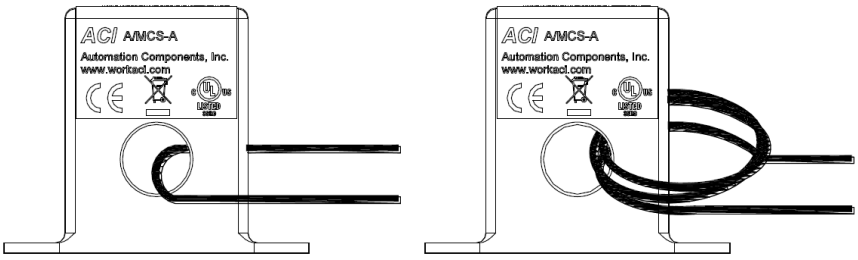


Figure 3

For applications in which the normal operating current is greater than 150 Amps or for conductor diameters larger than 0.530” (1.35 cm) in diameter, an external 5 Amp Current Transformer must be used as shown in Figure 4 below. Remember that the secondary of the 5A CT must be shorted together before the power may be turned onto the monitored device.

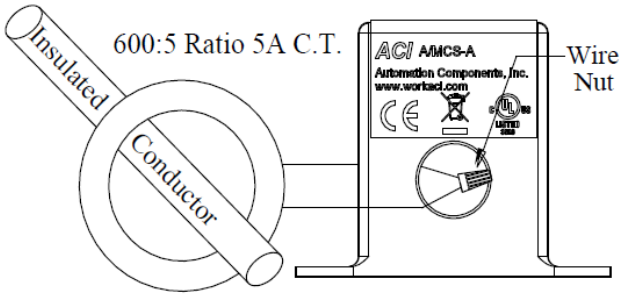


Figure 4

Wiring Instructions

Carriers 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 NSA-A/MCS-A and NSA-A/MSCS-A current switches 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 so as to prevent any chance of shorting. The current switch output terminals represent a solid-state switch for controlling both AC and DC loads and is not polarity sensitive. The recommended torque to be used on the terminal block connections is 0.67 Nm or 5.93 in-lbs. The aperture (hole) size of the current switch is 0.53” (1.35 cm) and will accept a 1 AWG maximum wire diameter.

See Figure 5 and Figure 6 for two different current switch applications using your Building Management System (DDC/PLC Controller). Figure 5 shows the use of the Adjustable Current Switch as a Digital Input to your DDC Controller, whereas Figure 6 shows you how to use the Adjustable Current Switch in conjunction with your building management system to monitor belt loss on a motor.

Digital Circuit

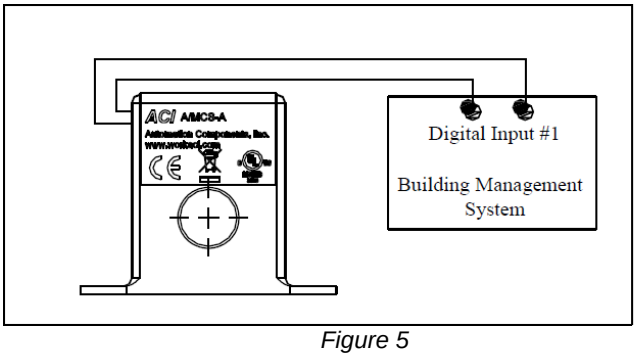


Figure 5

Analog Circuit

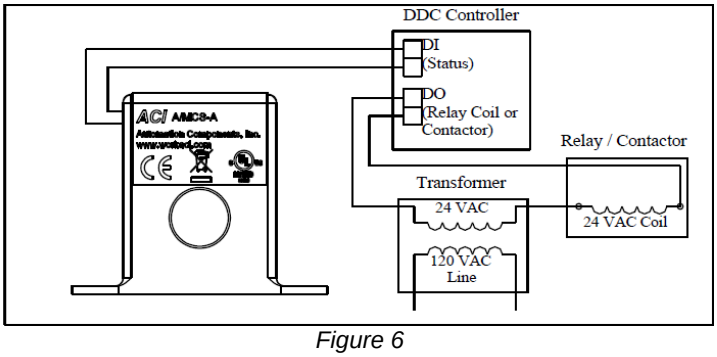


Figure 6

Calibration of Adjustable Trip Point

The adjustable current switch has an operating range of 0-150 Amps. Do not exceed! The adjustable current switch comes with its fifteen-turn adjustment potentiometer set to the 100 Amp trip point position. The adjustable current switch can be used to monitor Under Load, Normal Load, and Over Load conditions, depending on how it's set. The procedure below is for the Normal load condition for part numbers NSA-A/MCS-A- and NSA-A/MSCS-A.

Normal Loads

With current flowing through the aperture of the NSA-A/MCS-A and NSA-A/MSCS-A current switches, first verify that the Blue LED is on. If the Blue LED is on, now slowly adjust the potentiometer clockwise until the Red LED just turns on and stop immediately. This sets the trip point at your normal operating load current. If the RED LED is on after initial power up, this means that you need to slowly adjust the potentiometer counter-clockwise until the Blue LED turns on and then slowly adjust the potentiometer clockwise until the Red LED just turns on and stop immediately. The adjustable current switch is now tripped. Now verify the output with an Ohmmeter to verify that the contacts of the switch are approximately 0.200 Ohms. The adjustable current switch Hysteresis (Dead Band) is typically 10% of the trip point.

Troubleshooting

Problem	Solution
Red LED is on but the current switch didn't activate	Disconnect the wires from the current switch output. Measure the resistance across the contacts with an Ohmmeter. See the table below for resistance readings for a good unit.
Red LED didn't turn on and the current switch didn't activate	Verify that the conductor you are monitoring is above the adjustable trip point. If the sensor is monitoring less than the adjustable trip point, see Figure 3**Error! eference source not found.**.
Sensor doesn't switch at all, regardless of current level.	Adjustment potentiometer is probably set to its maximum or minimum position. Turn the Pot counter-clockwise all the way and verify if the LED switches from Red to Blue.

Resistance Readings		
Carrier Model #	**Resistance if switch open**	**Resistance if switch closed**
NSA-A/MCS-A	Greater than 1 Meg ohms	Approximately 0.2 ohms
NSA-A/MSCS-A	Greater than 1 Meg ohms	Approximately 0.2 ohms

W.E.E.E. Directive

At the end of their useful life the packaging and product should be disposed of via a suitable recycling center. Do not dispose of with household waste. Do not burn.