“Kele has what I like to refer to as the 21st-century HVAC products and tools. My coworkers totally agree.”

POWER MONITORING & PROTECTION

MADE IN USA

Products manufactured in the United States

NEW

Products that are new to the catalog

EnGenius pg. 761

PT9000 Series pg. 763

GP Series pg. 761

Kele®

www.kele.com

MODEL/SERIES — PAGE

Indicates New Products

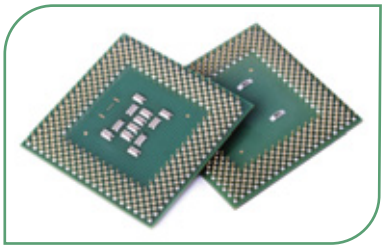
EnGenius SM

Intelligent Power Monitoring
Coming 2012

POWER MONITORING & PROTECTION

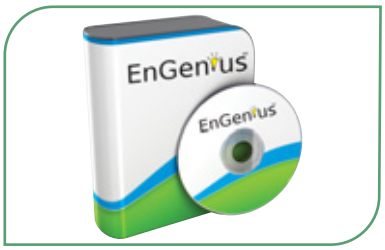
INTELLIGENT POWER MONITOR
*ENGENIUS*SM

In 2012 Kele will bring you the next generation of power monitoring. EnGenius℠ is a dual processor driven power monitoring device capable of monitoring a single piece of equipment or an entire building's energy use. Upgradeable and expandable, the EnGenius℠ may be the last power monitor you will ever have to purchase.



DUAL PROCESSOR BASED

The EnGenius℠ uses the latest power monitoring processor dedicated to power monitoring and microchip based calculations. A second processor works in tandem to deliver usable data via communications options, and LCD display.



CONFIGURATION SOFTWARE

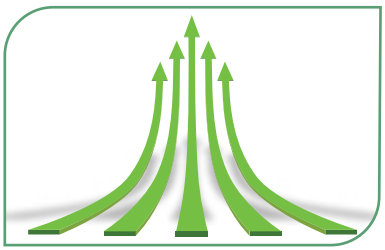
The EnGenius℠ configuration software allows for intuitive setup. Profiles can be saved, and used to program multiple EnGenius℠ installations. Trend logs and live data can be downloaded and viewed via the software interface.

ON BOARD DATA TRENDING

The EnGenius℠ comes standard with internal memory capable of storing up to 90 days of log entries depending upon setup. The device does not have to be tethered to a network in order to trend energy usage.

MULTIPLE COMMUNICATION OPTIONS

The EnGenius℠ optional communications cards allow you to pick the right communications for your application. BACnet MS/TP, Lonworks, Modbus RTU, N2 and many more protocols will be available to choose from.



EXPANDABLE, UPGRADEABLE

When new features become available you will have the capability to upload them directly into the Engenius℠ through the external Data Port. As your monitoring needs change, your EnGenius℠ can change to help you meet those needs.

POWER MONITORING & PROTECTION

KELE POWERTRAK POWER MONITORING INTERFACE

PT-9000 SERIES

DESCRIPTION

The **PT-9000 Series Power Monitoring Interface** monitors numerous power system parameters for local display and/or remote connection to a BAS or other data acquisition equipment. Any three or single-phase 50/60 Hertz electrical system from 120-600V can be monitored by the **PT-9000 Series** without the need for potential transformers. Higher voltage systems such as 5 kV or 15 kV services can also be monitored using potential transformers. The **PT-9000 Series** is available for use with 5A or 0.333V current transformers. Options include a current transformer shorting assembly and a digital LCD display.

Furnished in a NEMA 1 hinged-cover enclosure with external mounting feet and conduit knockouts on all sides, the **PT-9000 Series** is simple to install. Setup of the **PT-9000 Series** is easily accomplished with a selector switch and DIP switches. A truly unique feature of the **PT-9000 Series** is its ability to identify and electronically correct wiring problems such as reversed CT polarities or improper phasing of voltages with CT's.

FEATURES

- ***Auto-corrects for wiring errors***
- ***Three-phase (Wye or Delta) or single-phase systems***
- ***Voltage selector switch (120-600V)***
- ***Accepts 5A or 0.333V CTs***
- ***Low-voltage alarm contact***
- ***Two 4-20 mA outputs***
- ***Pulse output for kWh with selectable pulse rate***
- ***Optional two-line LCD display***
- ***Optional unique CT shorting assembly***
- ***Easily installed enclosure with external mounting feet***
- ***Optional LonWorks, Modbus, and Metasys communications***

PT-9500-D
(Shown with optional display)

APPLICATION

Remote (Outputs) and Local (Display) Monitoring

KWH	***Total KW***
Window KW	***Peak window KW***
Total KVA	***Total power factor (PF)***
True RMS voltage	***True RMS current***

Local (Display) Monitoring - Each Phase

True RMS voltage
True RMS current
kW (Wye systems)
kVA (Wye systems)
Power factor (Wye systems)

All parameters can be monitored over a single pair of wires with a communications module installed.

SPECIFICATIONS

Supply Voltage	120-600 VAC , 50/60 Hz
System Type	Three-phase (Wye or Delta), or single-phase
Input	0-5A or 0-0.333V
CT Burden	0.75 VA maximum (5A input)
Monitored Voltage	
Line to Line:	120 to 600 VAC
Line to Line with potential transformer:	601 to 32000 VAC
Monitored Current	5 to 6000 Amps with current transformer
PT Burden	4.8 VA maximum
Internal Fusing	0.5A, 600V (KLK-0.5)
Pulse Output	Pulsed contact closure for kWh solid-state relay, 50 VAC/VDC maximum, 100 mA maximum
Pulse Rate	Four selectable kWh per pulse rates, 50% duty cycle
Maximum Pulse Rate	Five pulses per second
Digital Output	Maintained contact closure for low-voltage alarm; 50 VAC/VDC, 100 mA maximum
Analog Output	Two externally powered 4-20 mA signals selectable for total kW, window kW, peak window kW, total power factor, total kVA, RMS current, or RMS voltage
Maximum Load	725Ω each output @ 24 VDC
Display	** Optional LCD, two lines, 16 characters/line
Accuracy	0.75% of FS (kW, kVA, V, A) ± 0.03 PF (0.4 to 1.0 PF)
Operating Temperature	32° to 122°F (0° to 50°C)
Operating Humidity	5 to 95% (non-condensing)
Dimensions	12"H x 10"W x 4"D (30.5 x 25.4 x 10.2 cm)
NEMA 3R	20"H x 16"W x 6"D (50.8 x 40.6 x 15.2 cm)
Weight	12 lb (5.5 kg)
NEMA 3R	43 lb (20 kg)
Approvals	UL and cUL listed, File #E161500 Certified to LonMark Interoperability Guidelines version 3.1
Warranty	18 months

POWER MONITORING & PROTECTION

KELE POWERTRAK POWER MONITORING INTERFACE

PT-9000 SERIES

CONFIGURATION

DIP Switches

Setting the DIP switches according to system requirements is suggested before applying power to the **PT-9000 Series**. However, it is not necessary to remove power from the **PT-9000 Series** in order to make changes to the DIP switch settings.

A1 - A2: Define the power system type. Set these switches to match the type of system that is to be monitored. Select from three-phase Wye or Delta and single-phase two- or three-wire systems.

A3 - A8: Define the low-voltage alarm threshold. Select an appropriate value for the system voltage that is monitored. For Delta systems, low voltage is measured line-to-line. For Wye and single-phase systems, low voltage is measured line-to-neutral. Select from alarm threshold values ranging from 51-540V**.**

B1 - B2: Define the kWh per pulse value. Set these switches to obtain an optimum pulse rate that can be read by the BAS controller or data acquisition equipment. Select from 10, 1, 0.1, and 0.01 kWh per pulse values.

B3 - B5: Define mA loop #2 signal type. Set these switches for the power parameter to be represented by this 4-20 mA output. Select from seven different parameters: Total kW, Window kW, Peak Window kW, Total kVA, Total Power Factor, True RMS Voltage*, True RMS Current*.

B6 - B8: Define mA loop #1 signal type. Set these switches for the power parameter to be represented by this 4-20 mA output. Select from seven different parameters: Total kW, Window kW, Peak Window kW, Total kVA, Total Power Factor, True RMS Voltage*, True RMS Current*.

C1 - C5: Define the current transformer ratio. Set switches to match the primary current rating of the current transformers connected to the PT-9000 Series. Select from CT primaries ranging from 50 to 6000.

* Voltage and current outputs are the average of the three-phase true RMS values.

System Voltage Select Switch

Set the SYSTEM VOLTAGE SELECT switch to the correct line-to-line system voltage (or potential transformer secondary voltage, if used) connected to the PT-9000 Series. If the actual system voltage is greater than the selector switch setting, the over voltage LED will flash, and the PT-9000 Series will cycle on and off to protect itself from over voltage. If this occurs, turn the selector switch to the correct system voltage setting.

Auto-Configuration

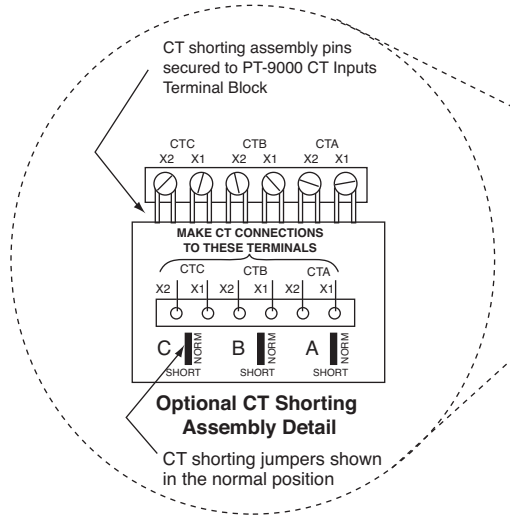
After all wiring connections are completed, the DIP switches are set correctly, the voltage selector switch is set to the correct system voltage, and the electrical system is energized, the **PT-9000 Series** can be auto-configured. To initiate the autoconfiguring system, press the AUTO-CONFIG button. The **PT-9000 Series** will examine the current and voltage waveforms for correct phasing and CT polarity. During the auto-configuring process, the Volts/Amps phasing LEDs and CT reverse polarity LEDs will light in sequence. When the process is completed only one of the Volts/Amps phasing LEDs will be lighted, indicating the actual phasing between the voltage and current inputs to the **PT-9000 Series**. A lighted CT polarity LED indicates that the corresponding CT is installed or wired backwards giving a reverse polarity. A correctly wired PT-9000 Series will be indicated by all CT polarity LEDs extinguished and the left-most Volts/Amps phasing LED lighted. Should any of the other phasing or CT polarity LEDs be lighted, the **PT-9000 Series** will electronically fix the wiring errors and provide correct and accurate outputs. No time-consuming troubleshooting or wire swapping is required.

Manual Configuration

If the auto-configuring system is unable to determine the correct wiring configuration, the **PT-9000 Series** will enter the manual configuration mode, and the manual config yellow LED will light. If this occurs, try initiating the auto-configuring system again, otherwise proceed with manual configuration. The electrical system load should be relatively constant during the manual configuration procedure. To manually configure the PT-9000 Series, set the DIP switches so that one of the 4-20 mA outputs represents Total KW. Connect a meter set to read DC milliamps to this output, or if the **PT-9000 Series** has the LCD display option, set one of the display lines to read Total kW. Next, press the manual config CT polarity button (CT POL) to scan through the different CT polarity combinations. Each time, record the reading of the Total kW display or mA output. Allow the reading to stabilize before recording it. After reviewing all of the CT polarity combinations, press the manual config V-A MATCH button and repeat the process of scanning through the CT polarity combinations. After trying all possible combinations of V-A match and CT polarity, the correct configuration is the one producing the highest value of kW on the display or the highest mA reading on the meter. Manually set the **PT-9000 Series** to the correct configuration using the CT POL and V-A MATCH push buttons.

WIRING - THREE-PHASE POWERTRAK APPLICATION

CAUTION: Lethal voltages may be present across the secondary terminals of all current transformers. Keep these terminals shorted or connected to the transducer.

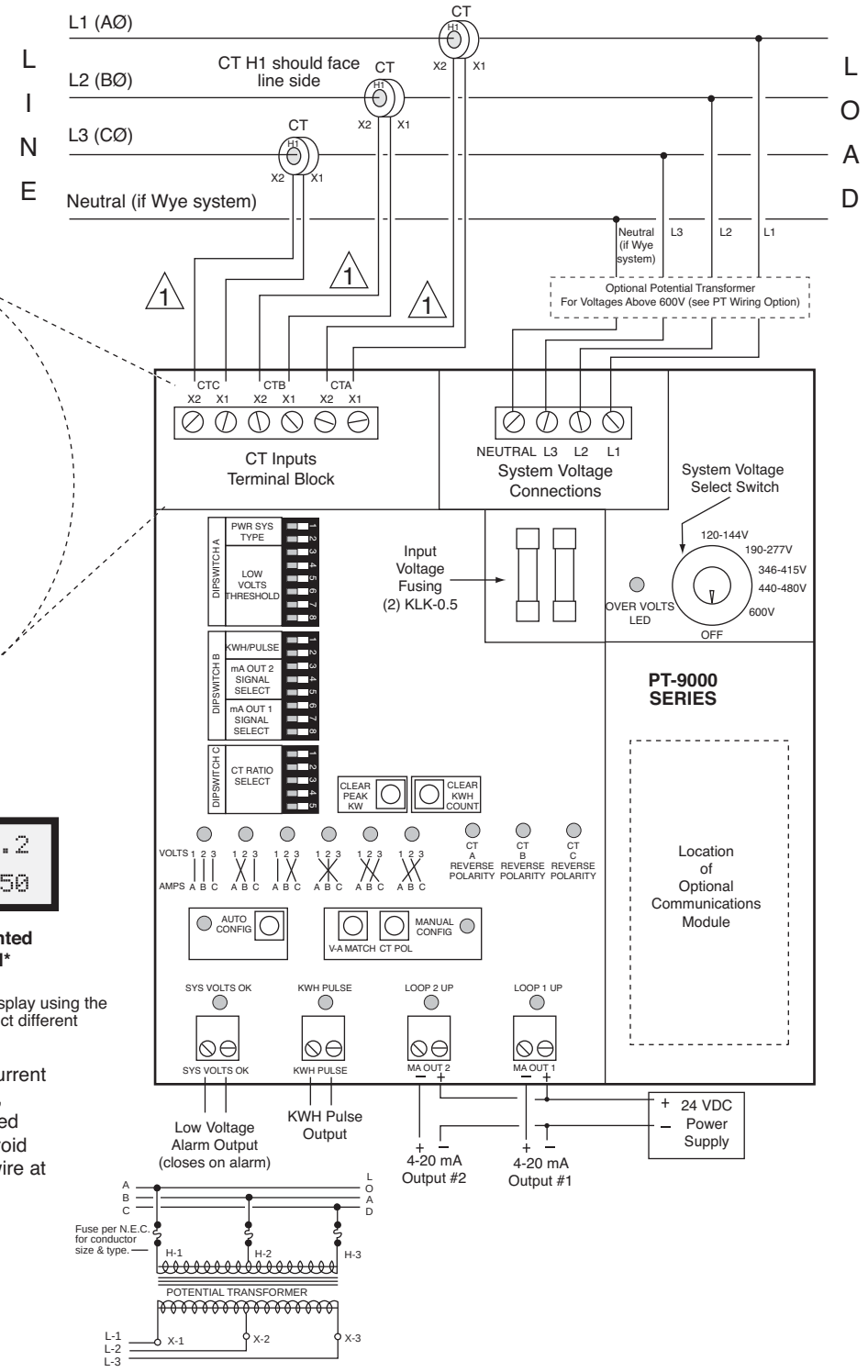


Optional CT Shorting Assembly Detail

Optional Cover-Mounted LCD Display Detail*

*Manually scroll individual lines of display using the cover-mounted push buttons, to select different power system parameters.

1 When using the **SCT Series** current transformers with the **PT-9300**, recommended wiring is a twisted shielded pair for each CT to avoid noise pick-up. Ground shield wire at **PT-9300** ground lug only.



PT Wiring Option
(for systems greater than 600V)

Connection option using one open Delta 3PT3 three-phase potential transformer with 120 VAC secondary.

POWER MONITORING & PROTECTION

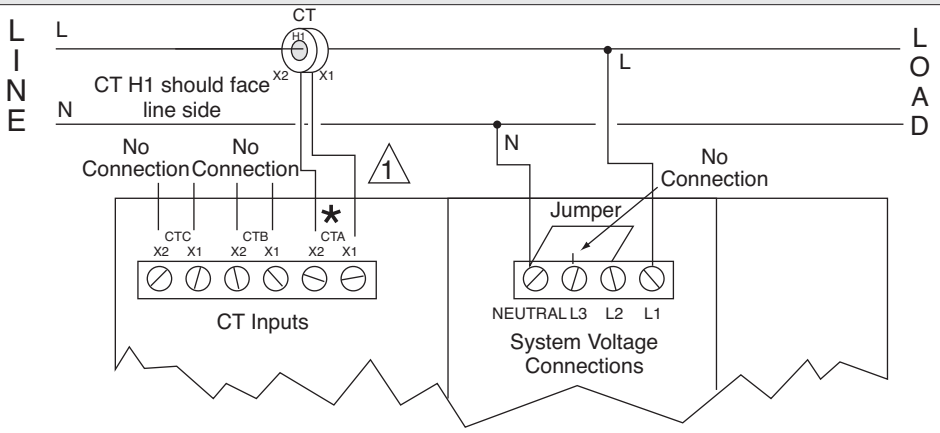
KELE POWERTRAK POWER MONITORING INTERFACE

PT-9000 SERIES

WIRING - SINGLE-PHASE POWERTRAK APPLICATIONS

1 When using the **SCT Series** current transformers with the **PT-9300**, recommended wiring is a twisted shielded pair for each CT to avoid noise pick-up. Ground shield wire at **PT-9300** ground lug only.

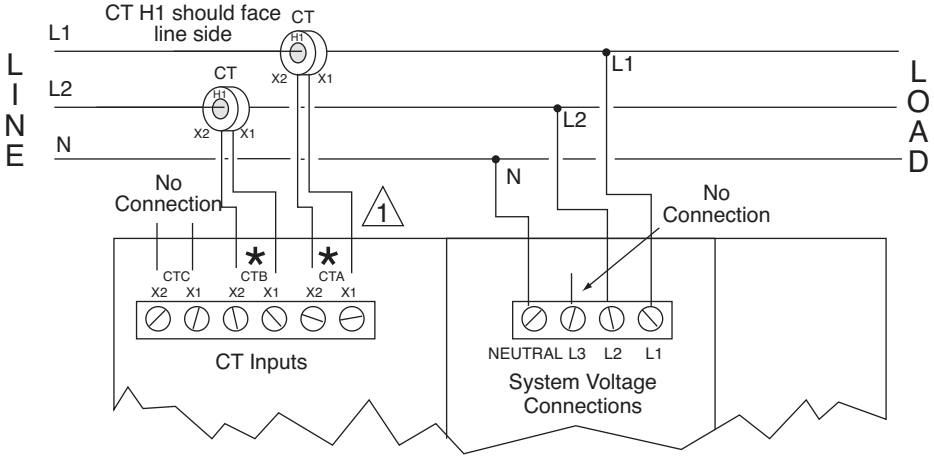
* Make CT connections to terminal strip on optional CT shorting assembly if present. See Wiring - Three-Phase PowerTrak Application.



Single-Phase Two-Wire Systems

1 When using the **SCT Series** current transformers with the **PT-9300**, recommended wiring is a twisted shielded pair for each CT to avoid noise pick-up. Ground shield wire at **PT-9300** ground lug only.

* Make CT connections to terminal strip on optional CT shorting assembly if present. See Wiring - Three-Phase PowerTrak Application.



Single-Phase Three-Wire Systems

ORDERING INFORMATION

MODEL	DESCRIPTION	
PT-9500	PowerTrak power monitoring interface, 5A CT input	
PT-9300	PowerTrak power monitoring interface, 0.333V CT input	
	OPTIONS	
	D	LCD display, cover-mounted for local monitoring
	S	CT shorting assembly (not necessary for PT-9300)
	3R	PowerTrak mounted in a NEMA 3R enclosure

PT-9500 – **D** – **S** ***Example:*** **PT-9500-D-S** PowerTrak with LCD display and CT shorting assembly

RELATED PRODUCTS		PAGE
A-L12AR	Cylinder lock kit	**228**
PT-NT4-BAC	BACnet MSTP communications module	**767**
PT-NT4-M	Modbus communications module	**767**
PT-NT4-N2	Metasys® communications module	**767**
PT-NTL-10	LonWorks communications module	**767**

POWER MONITORING & PROTECTION

COMMUNICATION MODULES FOR PT-9000

PT-NT4-BAC, PT-NTL-10, PT-NT4-N2, AND PT-NT4-M

DESCRIPTION

Models **PT-NTL-10 (LonWorks)**, **PT-NT4-N2 (Metasys)**, **PT-NT4-M (Modbus)** and **PT-NT4-BAC (BACnet)** are communication modules for the PowerTrak PT-9000 power monitoring interface. They read data from the PT-9000's main processor, format the data, and transmit it to a network. They allow all of the power system parameters measured by the PT-9000 to be monitored over a single pair of wires.

PT-9000

Communication Module

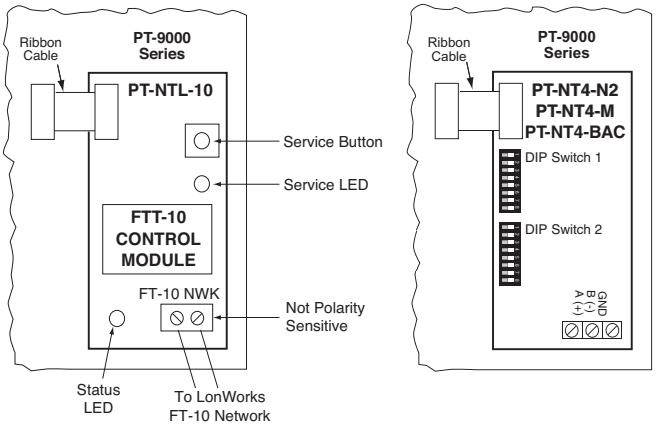
FEATURES

- ***Monitoring of all PT-9000 parameters over a single pair of wires***
- ***Remote reset with time stamp of kWh and peak kW parameters***
- ***Optically isolated RS-485 for elimination of network***
- ***grounding concerns on the PT-NT4-M, -N2 and -BAC***
- ***FTT-10 transceiver on the PT-NTL-10***
- ***Standard Network Variable Types (SNVT) are used to meet LonMark Interoperability Guidelines on the PT-NTL-10***
- ***Pluggable field-wiring screw terminals***
- ***Status LED indication***
- ***Factory or field installation to any PT-9000***

SPECIFICATIONS

Communication	
PT-NTL-10	LonWorks FTT-10 transceiver
PT-NT4-N2	Metasys N2 protocol, RS-485, halfduplex, 9600 baud
PT-NT4-M	Modbus protocol, RS-485, half duplex, selectable baud rate
PT-NT4-BAC	BACnet MSTP protocol, RS485 halfduplex selectable baud rate
Connections	Pluggable screw terminals
Operating Temperature	32° to 122°F (0° to 50°C)
Operating Humidity	0% to 95% (non-condensing)
Dimensions	4.5"H x 2.6"W x .6"D (11.4 x 6.6 x 1.5 cm)
Weight	0.7 lb (0.32 kg)
Approvals	UL listed, File #E161500
PT-NTL-10	Certified to LonMark Interoperability Guidelines v 3.1
PT-NT4-N2	Complies with Metasys guidelines
Warranty	18 months

WIRING



Visit www.kele.com for complete installation and operating instructions.

ORDERING INFORMATION

MODEL	DESCRIPTION
PT-NTL-10	LonWorks communications module
PT-NT4-N2	Metasys® communications module
PT-NT4-M	Modbus communications module
PT-NT4-BAC	BACnet MSTP communications module

Note: Module can be factory or field installed. Specify factory installation when ordering the PT-9000.

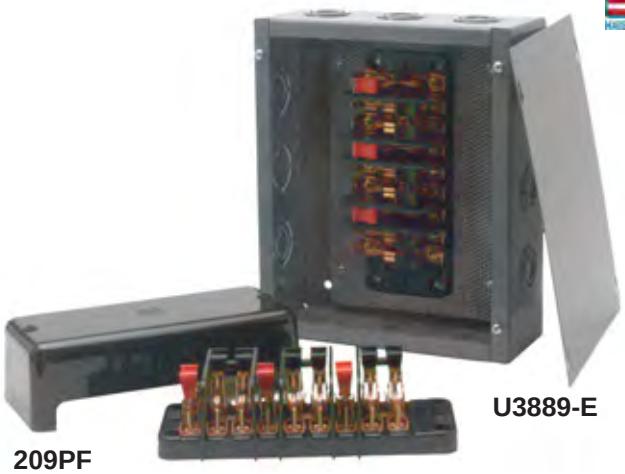
POWER MONITORING & PROTECTION

VOLTAGE DISCONNECT SWITCH BLOCK, CT SHORTING SWITCHES

U3889, 209PF

DESCRIPTION

The **Model U3889 Voltage Disconnect Switch Block** provides a means for disconnecting power monitoring equipment. It provides isolation from line voltage and will short out and disconnect current transformer secondaries, preventing transformer damage that may occur when the circuit is opened under load. One side of the switch is connected to the circuits being measured; the other side of the switch is connected to the power monitoring equipment. The black plastic cover (**209PF**) is constructed so that all switches must be in the closed position before the cover can be sealed.



209PF **U3889** **U3889-E**

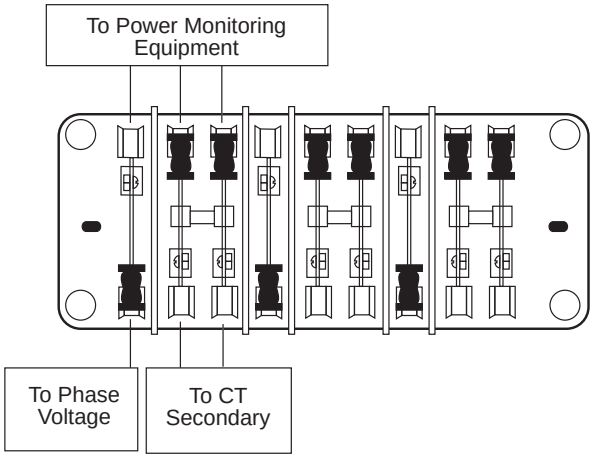
FEATURES

- ***Provides voltage disconnect and CT shorting/ disconnect for power instrumentation***
- ***Available in convenient metal screw cover enclosure***
- ***Color-coded switch handles***
- ***UL recognized***

SPECIFICATIONS

Voltage Rating	600V
Current Rating	30 A
Dimensions	
Switch	9.5"L x 3.5"W x 2.75"D (24.1 x 8.9 x 7 cm)
Cover (209PF)	10.1"L x 4.6"W x 3.1"D (25.7 x 11.7 x 7.9 cm)
Optional enclosure	Metal screw cover box, NEMA 1 12"L x 10"W x 4"D (30.5 x 25.4 x 10.2 cm)
Weight	2.9 lb (1.3 kg) 3.5 lb (1.5 kg) with cover 11 lb (5 kg) with enclosure
Approvals	UL-recognized component, File #E109317
Warranty	Lifetime (normal use)

WIRING



Notes:
1. Red switch pulled up disconnects voltage.
2. Black switch pair pulled up shorts CT secondary and disconnects load from CT.

ORDERING INFORMATION

MODEL	DESCRIPTION
U3889-E	Switch block mounted in a 12" x 10" x 4" metal screw cover box
U3889	Switch block
209PF	Switch cover (not for use with U3889-E)

POWER MONITORING & PROTECTION

GP SERIES POWER METER

GP SERIES

DESCRIPTION

The **GP Series** power meter provides a solution for measuring energy data with a single device. Inputs include Control Power, CT, and 3-phase voltage. The GP supports multiple output options, including solid state relay contacts, Modbus (with or without data logging), and pulse. The LCD screen on the faceplate allows instant output viewing.

The meter is housed in a plastic enclosure suitable for installation on T35 DIN rail according to EN50022. The GP can be mounted with any orientation over the entire ambient temperature range, either on a DIN rail or in a panel. The meter is not sensitive to CT orientation to reduce installation errors.

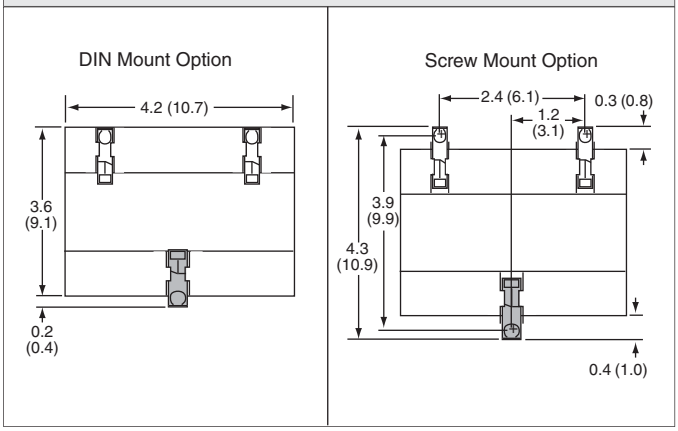
NEW!

GP953

FEATURES

- ***Monitors 1, 2, or 3 phase services***
- ***Monitors services up to 600 VAC directly and 32,000 VAC with use of a potential transformer***
- ***Accepts 0 to .333 VAC Current Transformer's(CT's)***
- ***DIN mounting for easy installation***
- ***ANSI 12.20 0.5% accuracy***
- ***MODBUS or pulse***
- ***90-600 VAC for application versatility***
- ***Bright backlit LCD with easy visibility***
- ***Pulse and phase loss alarms standard***
- ***User-enabled password protection***
- ***Approved for California Solar applications***

MOUNTING



SPECIFICATIONS

Supply Voltage	
UL	90 VAC (L-N) to 600 VAC (L-L), 50/60Hz
CE	90 VAC (L-N) to 300 VAC (L-L), 50/60Hz
Monitored Voltage	
Line to Line:	90 to 600 VAC
Line to Line with potential transformer:	601 to 32000 VAC
Monitored Current	5 to 32,000 Amps
Input	0 to 0.333 V or 0 to 1 V
Input Signal	2 (GP953 only) Pulse Solid-State or mechanical contacts (current less than 1 mA) Minimum Pulse Width 20 msec
Outputs	
GP911	Reactive energy pulse 30 VAC/DC
GP921	RS-485 2-wire Modbus RTU Basic Data Set
GP9122/GP922	RS-485 2-wire Modbus RTU Full Data Set
GP122/GP923	RS-485 2-wire Modbus RTU Full Data Set, data logging
GP953	RS-485 2-wire BACnet MS/TP Full Data Set, data logging
Accuracy	Real power and energy 0.5% (ANSI C12.20, IEC 62053-22 Class 0.5S)
Operating Temperature	
Meter	-22° to 158°F (-30° to 70°C)
Display	14° to 122°F (-10° to 50°C)
Operating Humidity	< 95% RH non-condensing
Mounting	DIN Rail or 3-point screw mount
Dimensions	2.3" x 4.2" x 3.6" (5.9 cm x 10.7 cm 9.1 cm)
Weight	0.62 lb (0.28 kg)
Approvals	CE, UL508, File #E339785,
RoHS Statement	Yes
Warranty	5 years

NEW!

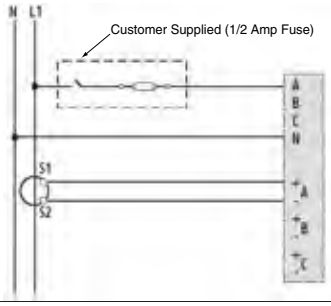
POWER MONITORING & PROTECTION

GP SERIES POWER METER

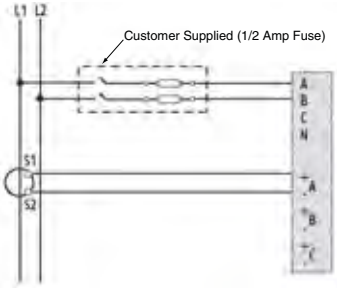
GP SERIES

WIRING

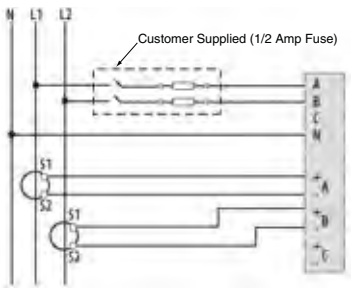
1-Phase Line-to-Neutral 2 - Wire System 1 CT



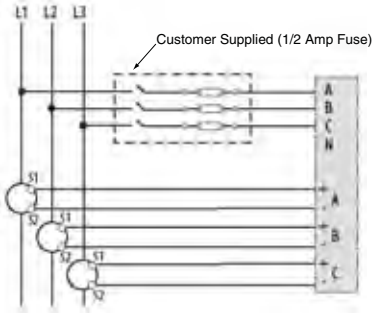
1-Phase Line-to-Line-Wire System 1 CT



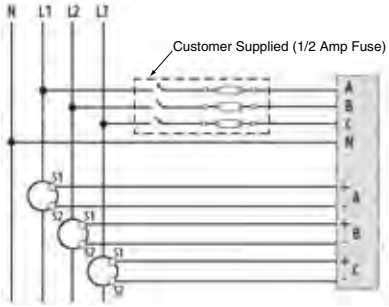
1-Phase Direct Voltage Connection 2 CT



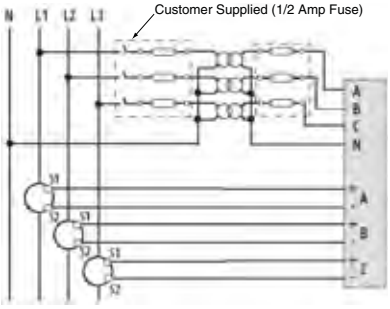
3-Phase 3-Wire 3 CT no PT



3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT



3-Phase 4-Wire Wye Connection 3 CT 3 PT



BACNET/MODBUS DATA OUTPUTS

Basic Data Set (BDS):
- Power (kW)
- Energy (kWh)

Full Data Set (FDS) includes BDS plus:
- Configurable for CT & PT ratios, system type, and passwords
- Diagnostic alerts
- Current: 3-phase average
- Volts: 3-phase average
- Current: by phase
- Volts: by phase Line-Line and Line-Neutral
- Power: Real, Reactive, and Apparent 3-phase total and per phase
- Power Factor: 3-phase average and per phase Frequency
- Power Demand: Most Recent and Peak
- Demand Configuration: Fixed, Rolling Block, and External Sync (Modbus only)

Data Logging (includes all FDS outputs, plus):
- Real Time Clock: user configurable
- 10 user configurable log buffers: each buffer holds 5760 16-bit entries
- (User configures which 10 data points are stored in these buffers)
- User configurable logging interval(When configured for a 15 minute interval, each buffer holds 60 days of data)
- Continuous and Single Shot logging modes: user selectable
- Auto write pause: read logs without disabling the meter's data logging mode

BACnet Data Logging (includes all FDS outputs, plus):
- Real Time Clock: uses BACnet Time
- Synchronization services
- 3 BACnet log events: each buffer holds 5760 32-bit entries
- (User configures which 3 data points are stored in these buffers)
- User configurable logging interval,
- (When configured for a 15 minute interval,each buffer holds 60 days of data)
- Continuous and single shot logging modes: user selectable
- Auto write pause: read logs without disabling the meter's data logging mode

ORDERING INFORMATION

MODEL	DESCRIPTION
GP122	Power meter bi-directional, Modbus, Pulse output
GP123	Power meter, bi-directional, Modbus, pulse output , data logging
GP911	Pulse output only
GP921	Modbus output, basic data set
GP922	Modbus output, full data set
GP923	Modbus output, full data set, data logging
GP953	Power meter FDS BACnet, 2 pulse inputs,data logging
GP-AE003	Nema 4 enclosure for GP Series meters
GP-AH02	Fuse pack, single
GP-AH03	Fuse pack, double
GP-AH04	Fuse pack, triple

POWER MONITORING & PROTECTION

ADVANCED KWH/DEMAND METER
CLASS 500 SUBMETERS

DESCRIPTION

The **Class 500 Submeters** come with enclosure, display, and necessary current sensors. Available outputs include pulse, LonWorks, BACnet, BACnet IP, Modbus RTU, or Modbus TCP. There are 38 different points of information available on the communicating models. In addition, they will accept up to two pulse inputs from other meters (water, gas, sewer, etc.) and communicate this information as two more data points. Accuracy meets or exceeds +/- 0.5%.

NEW!

FEATURES

- ***Direct-read 8-digit LCD display of cumulative kWh.***
- ***0-2 volt output split-core current sensors.***
- ***Remote mounting of current sensors up to 500 feet from meter.***
- ***Current sensor installation diagnostic indicator.***
- ***Available in standard JIC Industrial-grade steel enclosure.***
- ***UL Listed; meets or exceeds ANSI C12 national accuracy standards.***
- ***Optional power failure contact for alarming.***

SPECIFICATIONS

Supply Voltage	Up to 600 VAC RMS available, 50/60Hz
Battery	
Description	Non-rechargeable cell used for memory retention
Manufacturer	Eagle-picher
Mfg Part No.	LTC-3PN
Working Voltage	3.5 Vdc
Current Capacity	350 mAHr
Electrolyte	Lithium thionyl nitrate
Communication	
Modbus RTU or TCP/IP	
BACnet IP or MS/TP	
LonWorks	
Input	3-wire (Delta) or 4-wire (WYE)
Current Rating	Sensors - Up to 3200 Amp RMS AC available
Overload Rating	
Voltage Overload	+25% continuously; +100% for 20 cycles
Current Sensor Overload	100% for 1 minute without damaging meter
Accuracy	Certified to ANSI C12.16
Range	
4 Wire Wye	115/208 VAC: 100, 200, 400, 800, 1600, 3200 Amp
4 Wire Wye	277/480 VAC: 100, 200, 400, 800, 1600, 3200 Amp
3 Wire Delta	220/240 VAC: 100, 200, 400, 800, 1600, 3200 Amp
3 Wire Delta	480 VAC: 100, 200, 400, 800, 1600, 3200 Amp
Operating Temperature	
NEMA 4	(Outdoor) Housing: -4° to 158°F (-20° to 70°C)
NEMA 12	(Indoor) Housing: -4° to 122°F (-20° to 50°C)
Operating Humidity	0 to 95% RH (non-condensing)
Housing Type	
Models with R	NEMA 4
Models without R	NEMA 12
Dimensions	7.5 " H x 7 " W x 3.75 " D (19.1 x 17.8 x 8.3 cm)
Approvals	UL file#E249361
Warranty	1 year

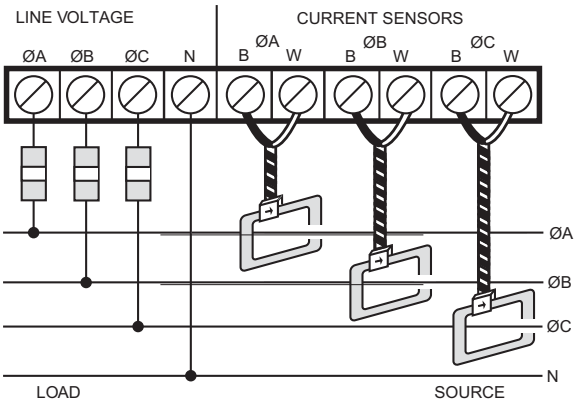
NEW!

POWER MONITORING & PROTECTION

ADVANCED KWH/DEMAND METER

CLASS 500 SUBMETERS

MAINS LINE VOLTAGE AND CURRENT SENSOR WIRING DIAGRAMS



NOTES: LINE VOLTAGE CONNECTIONS: 14-22 AWG

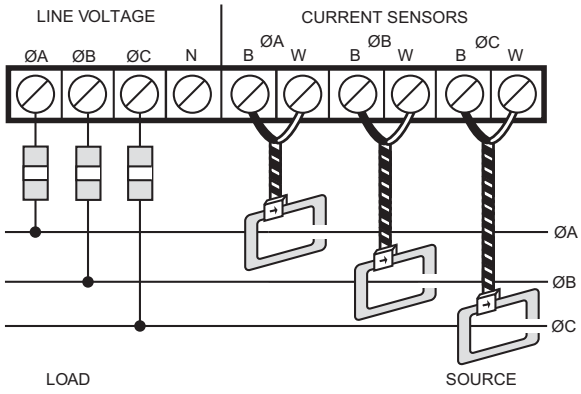
SENSOR CONNECTIONS: B=BLACK LEAD, W=WHITE LEAD

1/10A, 600 VAC INLINE FUSE PER CONDUCTOR.
LITTLEFUSE PART NUMBER KLDR 100.

NEUTRAL NOT USED IN DELTA SYSTEM. REMOVE NEUTRAL TERMINAL BLOCK SCREW FOR DELTA SYSTEMS.

M32788

3-phase, 4-wire installation diagram.



NOTES: LINE VOLTAGE CONNECTIONS: 14-22 AWG

SENSOR CONNECTIONS: B=BLACK LEAD, W=WHITE LEAD

1/10A, 600 VAC INLINE FUSE PER CONDUCTOR.
LITTLEFUSE PART NUMBER KLDR 100.

NEUTRAL NOT USED IN DELTA SYSTEM. REMOVE NEUTRAL TERMINAL BLOCK SCREW FOR DELTA SYSTEMS.

M32797

3-phase, 3-wire installation diagram.

ORDERING INFORMATION

SUB	Class 500 Submeter		
	(Blank) Modbus RTU		
	M	Modbus TCP	
	B	BACnet MS/TP	
	AC	BACnet IP	
	L	LON	
		208	208 VAC
		480	480 VAC
		600	600 VAC
			100C 100 AMP CTs
			200C 200 AMP CTs
			400C 400 AMP CTs
			800C 800 AMP CTs
			1600C 1600 AMP CTs
			3200C 3200 AMP CTs
			R NEMA 4

Example: **SUBM480-100** Modbus TCP power meter with 100 Amp CT's

NEW!

SOLID-CORE CURRENT TRANSFORMERS

AL, RL

DESCRIPTION

Models AL and **RL** Solid-Core Current Transformers provide a low-amperage current output proportional to line current and are for use in building automation and metering applications. These low-cost current transformers are ideal as inputs to power monitors, such as the Model PT-9500 and current transducers, such as Models 4CTV and 4CMA.

AL RL

FEATURES

- ***5A secondary***
- ***Flexible leads are UL 1015 105ºC, CSA approved, #16 AWG, 24"L (61 cm)***
- ***UL recognized component, CSA certified***

SPECIFICATIONS

Secondary	0-5A
Frequency	50-400 Hz
Insulation Class	600V, 10 kV BIL
Lead Wires	24" (61 cm), 16 AWG
Materials Of Construction	
	Plastic, UL94V-1
Weight	
2AL	0.5 lb (0.23 kg)
5RL	1.0 lb (0.45 kg)
7RL	1.5 lb (0.63 kg)
8RL	2.5 lb (1.2 kg)
Approvals	UL-recognized component, File #E93779; CSA certified, File #LR89403
Warranty	1 year

CAUTION: Proper safety precautions must be followed by a trained electrician during installation. It is recommended that the incoming power be de-energized before installation. The current transformer must have its secondary terminals short-circuited or the burden (load) connected before energizing the primary circuit. For indoor use only. Use on insulated conductors only.

ORDERING INFORMATION

CURRENT RATIO CODE	CURRENT RATIO	MODELS							
		MODEL 2AL Outer dia 2.74" (6.9 cm) Window dia 1.05" (2.67 cm)		MODEL 5RL Outer dia 3.56" (9.0 cm) Window dia 1.56" (3.9 cm)		MODEL 7RL Outer dia 4.58" (11.6 cm) Window dia 2.50" (6.4 cm)		MODEL 8RL Outer dia 5.73" (14.6 cm) Window dia 3.25" (8.3 cm)	
		Accuracy %	VA	Accuracy %	VA	Accuracy %	VA	Accuracy %	VA
500	50:5	±3	2.0	±2	1.0	--	--	--	--
750	75:5	±2	2.0	±2	1.5	--	--	--	--
101	100:5	±1	2.0	±2	2.0	±2	2.5	--	--
151	150:5	±1	4.0	±1	5.0	±1	5.0	--	--
201	200:5	±1	4.0	±1	5.0	±1	5.0	±1	5.0
251	250:5	±1	6.0	±1	10.0	±1	5.0	±1	7.5
301	300:5	±1	8.0	±1	12.5	±1	12.5	--	--
401	400:5	--	--	±1	12.5	±1	15.0	±1	25.0
501	500:5	--	--	±1	20.0	±1	25.0	±1	35.0
601	600:5	--	--	±1	25.0	±1	30.0	±1	50.0
751	750:5	--	--	±1	25.0	±1	30.0	--	--
801	800:5	--	--	±1	25.0	±1	35.0	±1	60.0
102	1000:5	--	--	±1	25.0	±1	35.0	±1	75.0
122	1200:5	--	--	--	--	±1	35.0	--	--
162	1600:5	--	--	--	--	±1	45.0	--	--
202	2000:5	--	--	--	--	--	--	±1	120.0
252	2500:5	--	--	--	--	--	--	±1	50.0

5RL (Model) – **201** (Current Ratio Code)

Example: **5RL201** Model RL current transformer with 1.56" (3.9 cm) window diameter and a 200:5 current ratio

Important! Shaded items in Ordering Information are available by special order and are not returnable for credit.

POWER MONITORING & PROTECTION

SPLIT-CORE CURRENT TRANSFORMERS

500T, 501T

DESCRIPTION

Model 500T and **501T** Split-Core Current Transformers provide a low-amperage current output proportional to line current and are for use in energy management control and metering applications. These transformers are ideal for use as inputs to power monitors such as the Model PT-9500 and current transducers such as Models 4CTV and 4CMA. These transformers are designed to be assembled around an existing insulated conductor without the need for dismantling the primary bus or cables. The portion of the transformers marked "This End Removable" can be disassembled and then reassembled around the conductors that require current monitoring.

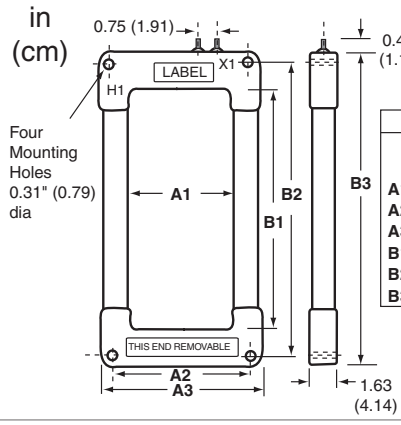
500T
(shown with end removed)

FEATURES

- ***5A secondary***
- ***Split-core construction for easy installation***
- ***Brass stud terminals #8-32 with one flat washer, lockwasher, and regular nut***

CAUTION: Proper safety precautions must be followed by a trained electrician during installation. It is recommended that the incoming power be de-energized before installation. The current transformer must have its secondary terminals short-circuited or the burden (load) connected before energizing the primary circuit. For indoor use only. Use on insulated conductors only.

DIMENSIONS



DIMENSIONS	MODEL	
	500T	501T
A1	4.1 (10.4)	4.1 (10.4)
A2	6.4 (16.3)	6.4 (16.3)
A3	7.3 (18.5)	7.3 (18.5)
B1	7.1 (18.0)	11.7 (29.7)
B2	10.0 (25.4)	14.5 (36.8)
B3	10.9 (27.7)	15.4 (39.1)

SPECIFICATIONS

Secondary	0-5A
Frequency	50-400 Hz
Continuous Current	1.33 @ 30°C ambient (86°F) 1.0 @ 55°C ambient (131°F)
Terminations	Brass stud terminal with nut, flat washer, lockwasher
Materials Of Construction	Plastic, UL94V-1
Insulation Class	600V, 10 kV BIL
Window Size	
500T	4.1" x 7.1" (10.4 x 18.0 cm)
501T	4.1" x 11.7" (10.4 x 29.7 cm)
Weight	8 lb (3.6 kg)
Approvals	UL-recognized component, File #E93779; CSA certified, File #LR89403
Warranty	1 year

ORDERING INFORMATION

MODEL 500T - 4.1" x 7.1" (10.4 x 18.0 cm) Window

MODEL	CURRENT RATIO	ANSI METER CLASS @ 60Hz B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	ACCURACY CLASS WITH UNITY POWER FACTOR
500T-301	300:5	–	–	–	±5% @ 1.5 VA
500T-401	400:5	–	–	–	±3% @ 2.5 VA
500T-501	500:5	–	–	–	±2% @ 2.5 VA
500T-601	600:5	4.8	–	–	±1% @ 4.0 VA
500T-751	750:5	4.8	–	–	±1% @ 5.0 VA
500T-801	800:5	2.4	–	–	±1% @ 5.0 VA
500T-102	1000:5	2.4	4.8	–	±1% @ 7.5 VA
500T-122	1200:5	1.2	2.4	–	±1% @ 10.0 VA
500T-152	1500:5	1.2	1.2	2.4	±1% @ 12.5 VA
500T-162	1600:5	1.2	1.2	2.4	±1% @ 12.5 VA
500T-202	2000:5	0.6	1.2	2.4	±1% @ 15.0 VA
500T-252	2500:5	0.6	0.6	1.2	±1% @ 25.0 VA
500T-302	3000:5	0.6	0.6	1.2	±1% @ 25.0 VA
500T-402	4000:5	0.3	0.6	0.6	±1% @ 25.0 VA

MODEL 501T - 4.1" x 11.7" (10.4 x 29.7 cm) Window

MODEL	CURRENT RATIO	ANSI METER CLASS @ 60Hz B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	ACCURACY CLASS WITH UNITY POWER FACTOR
501T-102	1000:5	2.4	4.8	–	±1% @ 7.5 VA
501T-122	1200:5	1.2	2.4	–	±1% @ 10.0 VA
501T-152	1500:5	1.2	1.2	2.4	±1% @ 12.5 VA
501T-202	2000:5	0.6	1.2	2.4	±1% @ 15.0 VA
501T-252	2500:5	0.6	0.6	1.2	±1% @ 25.0 VA
501T-302	3000:5	0.6	0.6	1.2	±1% @ 25.0 VA
501T-352	3500:5	0.6	0.6	0.6	±1% @ 25.0 VA
501T-402	4000:5	0.3	0.6	0.6	±1% @ 25.0 VA

Example: **500T-102** Split-core current transformer with a current ratio of 1000:5 and a window size of 4.1" x 7.1" (10.4 x 18.0 cm)

SPLIT-CORE CURRENT TRANSFORMERS

600T, 601T

DESCRIPTION

The **600T** and **601T** Split-Core Current Transformers provide a low amperage current output proportional to line current. They are for use in energy management control and metering applications, and are ideal for use as inputs to power monitors like the Model PT-9500 and current transducers like Models 4CTV and 4CMA.

These transformers are designed to be assembled around an existing insulated conductor without the need for dismantling the primary bus or cables. The portion of the transformers marked "This End Removable" can be disassembled and then reassembled around the conductors that require current monitoring.

601T
(shown with end removed)

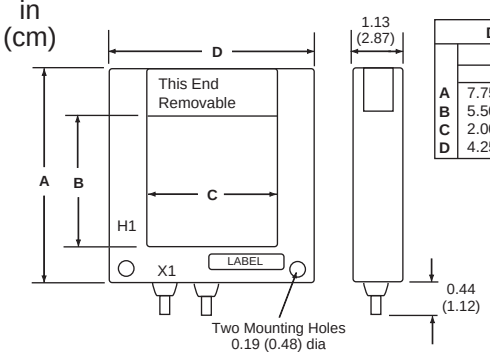
FEATURES

- ***5A secondary***
- ***Split-core construction for easy installation***
- ***Brass stud terminals #8-32 with one flat washer, lockwasher and regular nut***

SPECIFICATIONS

Secondary	0-5A
Frequency	50-400 Hz
Insulation Class	600V, 10 kV BIL
Continuous Current	1.33 @ 30°C (86°F) ambient 1.0 @ 55°C (131°F) ambient
Terminations	Brass stud terminals with nut, flat washer, lockwasher
Materials Of Construction	Plastic, UL94V-1
Window Size	
600T	2.0" x 5.5" (5.08 x 13.97 cm)
601T	4.5" x 4.5" (11.43 x 11.43 cm)
Weight	1.5 lb (0.68 kg)
Approvals	UL-recognized component, File #E93779; CSA certified, File #LR89403
Warranty	1 year

DIMENSIONS



DIMENSIONS	MODEL 600	MODEL 601
A	7.75 (19.69)	6.75 (17.15)
B	5.50 (13.97)	4.50 (11.43)
C	2.00 (5.08)	4.50 (11.43)
D	4.25 (10.80)	6.75 (17.15)

CAUTION: Proper safety precautions must be followed by a trained electrician during installation. It is recommended that the incoming power be deenergized before installation. The current transformer must have its secondary terminals short-circuited or the burden (load) connected before energizing the primary circuit. For indoor use only. Use on insulated conductor only.

ORDERING INFORMATION

MODEL 600T - 2.0" x 5.5" (5.1 x 14 cm) Window

MODEL	CURRENT RATIO	ANSI METER CLASS @ 60 Hz B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	ACCURACY CLASS WITH UNITY POWER FACTOR
600T-401	400:5	2.4	4.8	--	± 1% @ 1.5 VA
600T-501	500:5	2.4	4.8	--	± 1% @ 2.0 VA
600T-601	600:5	2.4	2.4	--	± 1% @ 2.5 VA
600T-801	800:5	1.2	1.2	2.4	± 1% @ 5.0 VA
600T-102	1000:5	1.2	1.2	2.4	± 1% @ 7.5 VA
600T-122	1200:5	0.6	1.2	1.2	± 1% @ 15.0 VA
600T-162	1600:5	0.6	0.6	1.2	± 1% @ 20.0 VA
600T-202	2000:5	0.6	0.6	0.6	± 1% @ 30.0 VA

MULTI RATIO	CURRENT RATIO
600T-122-801	1200/800:5

MODEL 601T - 4.5" x 4.5" (11.4 x 11.4 cm) Window

MODEL	CURRENT RATIO	ANSI METER CLASS @ 60 Hz B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA	ACCURACY CLASS WITH UNITY POWER FACTOR
601T-301	300:5	--	--	--	± 1% @ 0.5 VA
601T-401	400:5	4.8	--	--	± 1% @ 1.0 VA
601T-501	500:5	4.8	4.8	--	± 1% @ 1.5 VA
601T-601	600:5	2.4	4.8	--	± 1% @ 2.0 VA
601T-801	800:5	1.2	2.4	4.8	± 1% @ 2.5 VA
601T-102	1000:5	1.2	1.2	4.8	± 1% @ 5.0 VA
601T-122	1200:5	1.2	1.2	2.4	± 1% @ 10.0 VA
601T-152	1500:5	1.2	1.2	1.2	± 1% @ 15.0 VA
601T-162	1600:5	1.2	1.2	1.2	± 1% @ 15.0 VA
601T-202	2000:5	0.6	0.6	1.2	± 1% @ 20.0 VA

MULTI RATIO	CURRENT RATIO
601T-122-MR	1200/800/400:5

***Example*: 601T-102** Split-core curretn transformer with a current ratio of 1000:5 and a window size of 4.5" x 4.5" (11.4 x 11.4 cm)

POWER MONITORING & PROTECTION

CURRENT TRANSFORMERS WITH VOLTAGE OUTPUT

SCT SERIES

DESCRIPTION

The **SCT Series** of current transformers provides a low-voltage (0-0.333 V) output proportional to line current and is used in conjunction with the PowerTrak PT-9300 to monitor electrical power systems. Often referred to as "Safe CTs," the mV output of these current transformers eliminates the need for shorting switches, and their split-core design makes them easy to install.

FEATURES

- ***Millivolt output (0-0.333V)***
- ***Split-core design***
- ***Low-cost***
- ***No need for shorting switches***

SCT-0400

SCT-0750

SCT-1250

SCT-2000

CE

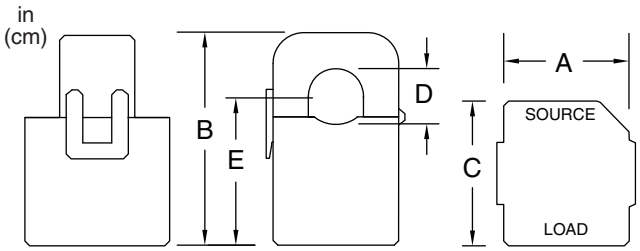
RoHS

UL

SPECIFICATIONS

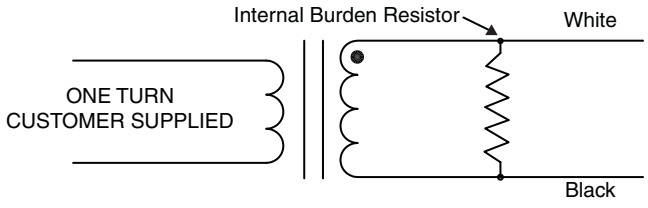
Primary	5-1500A (see Ordering Information below)	**Lead Wires**	8' (2.44m) twisted pair leads, 22 AWG
Secondary	0-0.333 VAC, 0% to 100% rated current	**Weight**	1 lb (0.45 kg) maximum
Frequency	60 Hz	**Approvals**	UL-recognized component, File #E96927, CE
Insulation Class	600V	**RoHS Statement**	Yes
Accuracy	±1%, 10% to 130% rated current	**Warranty**	3 years

DIMENSIONS



DIMENSIONS	MODEL			
	SCT-0400	SCT-0750	SCT-1250	SCT-2000
A	1.00 (1.54)	2.00 (5.1)	3.25 (8.25)	4.75 (12.07)
B	1.55 (3.9)	2.10 (5.3)	3.35 (8.51)	5.00 (12.70)
C	1.05 (2.7)	0.61 (1.5)	1.00 (2.54)	1.20 (3.05)
D	0.40 (1.0)	0.75 (1.9)	1.25 (3.18)	2.00 (5.08)
Window { E	1.09 (2.8)	0.75 (1.9)	1.25 (3.18)	2.00 (5.08)

WIRING



RELATED PRODUCTS		PAGE
PT-9300	Powertrak, 0.333 V input	**766**

ORDERING INFORMATION

MODEL	DESCRIPTION
SCT-0750-005	Split-core current transformer, 5A:0.333V
SCT-0750-050	Split-core current transformer, 50A:0.333V
SCT-1250-100	Split-core current transformer, 100A:0.333V
SCT-1250-200	Split-core current transformer, 200A:0.333V
SCT-1250-300	Split-core current transformer, 300A:0.333V
SCT-1250-400	Split-core current transformer, 400A:0.333V
SCT-2000-600	Split-core current transformer, 600A:0.333V
SCT-2000-800	Split-core current transformer, 800A:0.333V
SCT-2000-1000	Split-core current transformer, 1000A:0.333V
SCT-2000-1200	Split-core current transformer, 1200A:0.333V
SCT-2000-1500	Split-core current transformer, 1500A:0.333V
SCT-0400-000	Split-core current transformer, 0.333V
SCT-0400-005	Split-core current transformer, 5A:0.333V
SCT-0400-010	Split-core current transformer, 10A:0.333V
SCT-0400-015	Split-core current transformer, 15A:0.333V
SCT-0400-020	Split-core current transformer, 20A:0.333V
SCT-0400-025	Split-core current transformer, 25A:0.333V
SCT-0400-030	Split-core current transformer, 30A:0.333V
SCT-0400-050	Split-core current transformer, 50A:0.333V

*-000 have no burden resistor and the output voltage is clamped to 22 volts

POWER MONITORING & PROTECTION

ROPECT AC CURRENT SENSOR
RCT-1800 SERIES

DESCRIPTION

Magnelab's innovative RopeCT is based on the Rogowski principle of mutual inductance, which allows accurate measurement of AC current in a flexible medium. The resulting rope-like CT is highly accurate throughout its range and is easy to install by snaking it around parallel conductors or buswork. The RopeCT is both the ultimate in convenience and, often, the only solution to tough installation situations.

FEATURES

- ***Available in 250A to 5000A ratings***
- ***Phase angle error < 0.5 degrees measured at 50% rated current***
- ***0-0.333 VAC safe output, no shorting switches required***
- ***Eight-foot twisted pair leads***
- ***One percent accuracy from 10 to 300 percent of rating***

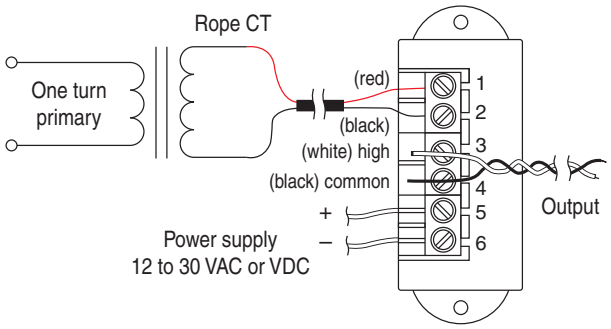
RCT-1800-1000

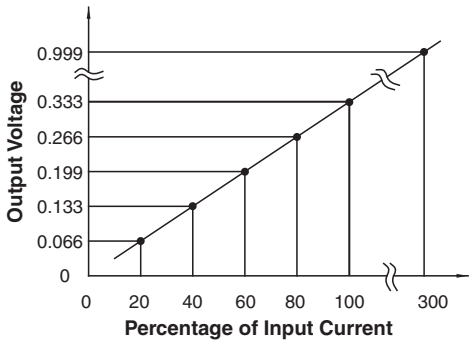
ISO 9100:2000

SPECIFICATIONS

Supply Voltage	12 to 30 VAC/VDC
Primary	250A to 5000A
Secondary	0-0.333 V
Frequency	50 to 10,000 Hz
Insulation Class	600V
Accuracy	±1%
Lead Wires	8' twisted pair leads
Weight	0.4 lb (0.18 kg)
Approvals	CE, UL recognized file #E96927
RoHS Statement	Yes
Warranty	1 year

WIRING





ORDERING INFORMATION

MODEL	DESCRIPTION
RCT-1800-0250	250A, 18-inch Rogowski coil flexible current sensor
RCT-1800-0500	500A, 18-inch Rogowski coil flexible current sensor
RCT-1800-1000	1000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-2000	2000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-3000	3000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-4000	4000A, 18-inch Rogowski coil flexible current sensor
RCT-1800-5000	5000A, 18-inch Rogowski coil flexible current sensor

POWER MONITORING & PROTECTION

METER PULSE-TO-ANALOG TRANSDUCER

MPA-2

DESCRIPTION

The **Model MPA-2** Meter Pulse-to-Analog Transducer accepts kWh totalizer pulses from a utility meter and calculates kW demand using a 5, 15, or 30-minute sliding window averaging scheme. The average kW demand value is provided as a milliamp or voltage signal, which can be read by a BAS. The average kW demand can also be displayed using panel meter indicators such as the LPI Series.

MPA-2

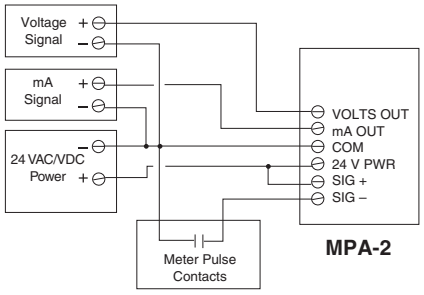
FEATURES

- ***Converts kWh pulses to an analog kW signal***
- ***Both milliamp and VDC signals available***
- ***5, 15, or 30-minute sliding window selection***
- ***24 VAC/VDC power***
- ***Adjustable zero and span***
- ***Snap track-mounted***
- ***Furnished with complete instructions***

OPERATION

The **Model MPA-2** accumulates all the input pulses for the previous sliding window time period (i.e.,15 minutes). It calculates an average kW value over this time period and outputs an analog signal representing this kW. The sliding window pulse count is updated on one-second intervals with the input from the oldest interval constantly being replaced by the input pulses from the most recent interval.

WIRING



MPA-2

Notes:
1. Meter pulse contact can switch either negative or positive signal connection.
2. Any 24V power supply may be used to power the signal input from the meter pulse contacts, including the **MPA-2** power supply as shown.

SPECIFICATIONS

Supply Voltage	24 VAC ±10% or 24 VDC ±10%
Supply Current	120 mA maximum @ 24 VAC 50 mA Maximum @ 24 VDC
Dip Switches	Sliding window size is DIP switch-selectable for 5-, 15-, or 30-minute periods; kWh pulses to produce full-scale output are DIP switch selectable from 10 pulses per period to 18,000 pulses per period
Input Signal	24 VAC/VDC switched through electronic or mechanical contact closure
Input Current	15 mA non-inductive at 24V
Max Pulse Rate	10 pulses/seconds
Output Signal	4-20 mA factory set, adjustable 0-20 mA zero and span; 2-10 VDC factory set, adjustable 0-18 VDC (both outputs can be used simultaneously)
Output Impedance	Maximum output resistance 650Ω for mA output; maximum current available from voltage and current outputs combined is 25 mA
LED Indication	
Green status LED (L2)	
Steady green	Normal
Slow flashing green	Calibration mode
Rapid flashing green	kW demand overflow
Red signal LED (L1)	Contact closure on the utility meter kWh contacts (LED is off when contacts open)
Note: L3 and L4 stay ON during operation	
Mounting	3.25" (8.3 cm) snap track (supplied with unit)
Dimensions	3.25"H x 4.6"W x 1"D (8.3 x 11.7 x 2.54 cm)
Weight	0.39 lb (0.17 kg)
Warranty	18 months

ORDERING INFORMATION

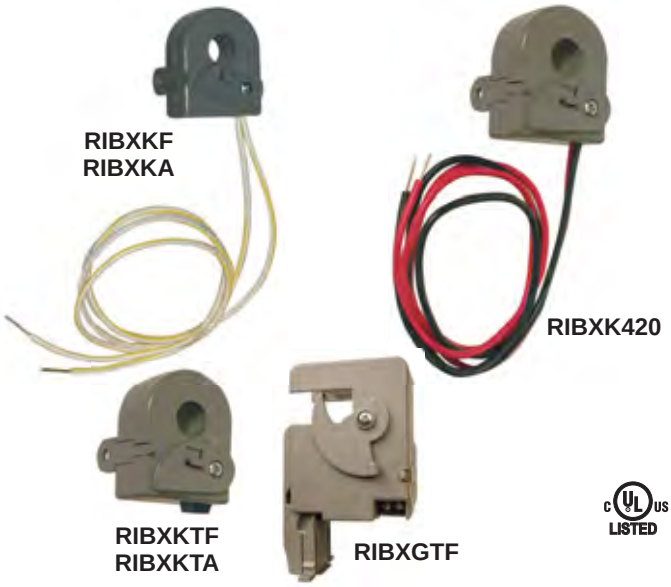
MODEL	DESCRIPTION
MPA-2	Meter pulse-to-analog transducer

CURRENT-OPERATED SWITCHES & TRANSDUCERS

RIBXG, RIBXK, RIBXK420 SERIES

DESCRIPTION

The **RIBXK, RIBXG, RIBXK420 Series** include both current-operated switches and current transducers. Solid-core and split-core current-operated switch models have a solid-state switch that operates when the current level sensed by the internal current transformer exceeds a fixed or adjustable set point. Solid-core current transducer models output a 4-20 mA signal proportional to the line current being monitored.



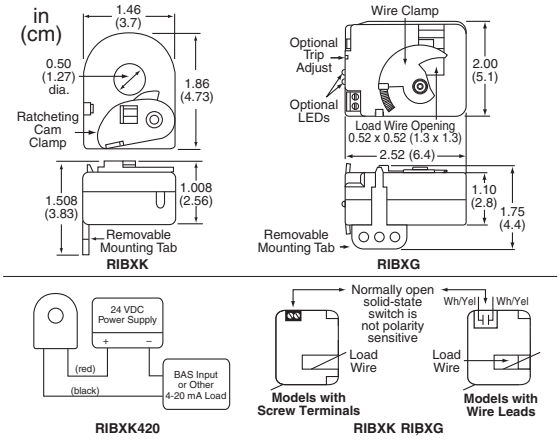
SPECIFICATIONS

RIBXK, RIBXG SERIES	
Monitored AC Current	
RIBXKF, RIBXKTF	0.25-150A
RIBXKA, RIBXKTA	0.5-150A
RIBXGF, RIBXGTF	0.35-150A
RIBXGA, RIBXGTA	0.75-150A
Switch Trip Point	
RIBXKF, RIBXKTF	0.25A, fixed
RIBXKA, RIBXKTA	0.5-150A, adjustable
RIBXGF, RIBXGTF	0.35A, fixed
RIBXGFL, RIBXGTFL	0.75A, fixed
RIBXGA, RIBXGTA	0.75-150A, adjustable
Switch Type	Solid state, normally open
Switch rating	30 VAC/VDC, 0.4A maximum
Off State Leakage	<30 µA @ 30 VAC/VDC
On State Voltage Drop	<0.3 VAC/VDC @ 0.1A <1.6 VAC/VDC @ 0.4A
RIBXK420 SERIES	
Supply Voltage	24 VDC
Output	4-20 mA, 30 mA maximum
Accuracy	±5% FS
Linearity	±1% FS
Output Impedance	500Ω maximum @ 24 VDC
Input Range	20, 50, or 100A
General	
Frequency	Suitable for most VFD applications
Maximum Sensed Voltage	600 VAC
Connections	16" (40.6 cm), 18 AWG, 600V wires or terminals for 14-22 AWG
Operating Temperature	-30° to 140°F (-34.4° to 60°C)
Weight	0.3 lb (0.13 kg)
Approvals	UL listed, UL916, UL864 file #57312
RoHS Statement	Yes
Warranty	1 year

FEATURES

- ***Solid- and split-core switch models have fixed (go/no go) or adjustable trip points***
- ***Solid-core transducer models have a 4-20 mA output***
- ***Low cost***
- ***Ratcheting cam clamp to secure switch to wire***
- ***Removable mounting tab***

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
RIBXKF	Solid-core current-operated switch, wire leads, fixed-trip
RIBXKTF	Solid-core current-operated switch, terminals, fixed-trip
RIBXKA	Solid-core current-operated switch, wire leads, adjustable-trip
RIBXKTA	Solid-core current-operated switch, terminals, adjustable-trip
RIBXK420-20	Solid-core current transducer, 0-20A
RIBXK420-50	Solid-core current transducer, 0-50A
RIBXK420-100	Solid-core current transducer, 0-100A
RIBXGF	Split-core current-operated switch, fixed 0.35A trip, wire leads
RIBXGTF	Split-core current-operated switch, fixed 0.35A trip, terminal strip
RIBXGFL	Split-core current-operated switch, fixed 0.75A trip, wire leads, LEDs
RIBXGTFL	Split-core current-operated switch, fixed 0.75A trip, terminal strip, LEDs
RIBXGA	Split-core current-operated switch, adjustable trip, wire leads, LEDs
RIBXGTA	Split-core current-operated switch, adjustable trip, terminal strip, LEDs

POWER MONITORING & PROTECTION

CURRENT-OPERATED SWITCHES

CS1A, CS1150A-LED, SCS1.5A, SCS1150A-LED

DESCRIPTION

The Kele **Models CS1A, SCS1.5A, CS1150A** and **SCS1150A** are solid-state switches that operate when the AC current level sensed by the internal current transformer exceeds a fixed or adjustable trip point. Internal circuits are totally powered by induction from the conductor being monitored. There is zero off-state leakage current in the solid-state relay output that can switch AC or DC circuits. The Smart LED indication option eliminates the need for meters when setting the adjustable trip point of the current switch. Solid-core and split-core models are available.

SCS1150A-LED
SCS1.5A

CS1150A-LED
CS1A

FEATURES

- ***Models with fixed or adjustable trip point***
- ***Switch AC or DC circuits***
- ***Power and status LED***
- ***Applicable for VFD applications down to 6Hz***
- ***Powered by monitored line***
- ***Available in solid-core models or split-core models that clamp easily around cables***
- ***Five-year warranty***
- ***UL listed, CE certified***

SPECIFICATIONS

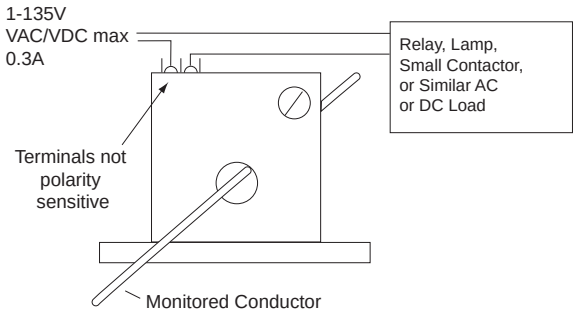
Frequency	6-100 Hz
Switch Type	Normally open, solid state (SC250-NC is normally closed)
Rating	1-135 VAC/VDC, 0.3A (SC250-NC model 0.2A)
Insulation Class	600V
Trip Point	
CS1A	Fixed, 1A
SCS1.5A	Fixed, 1.25A
CS1150A	Adjustable 1-200A
SCS1150A, SC250-NC	Adjustable 1.25-200A
Range	
CS1A, CS1150	1 - 200A, Jumper High
SCS1.5A, SCS1150A, SC250-NC	1.25 - 200A, Jumper High
Deadband	5% of setpoint
Response Time	Less than 250 milliseconds
Off State Leakage	< 25 mA
Jumper	
None	= 0-100A
Mid	= 0-150A
High	= 0-200A

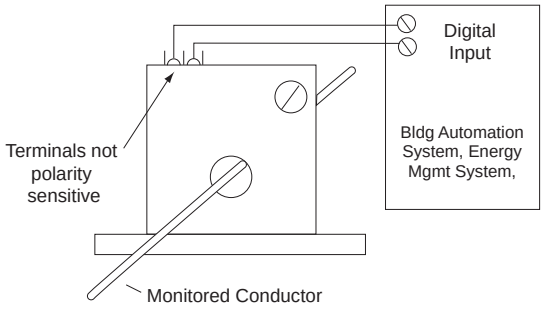
Operating Temperature	-22° to 158°F (-30° to 70°C)
Mounting	3.5"L (8.9 cm) with 3.0" (7.6 cm) mounting centers
Dimensions	
CS1A, CS1150	1.9 x 3.45 x 1 (4.82 x 8.76 x 2.54 cm)
SCS1.5A, SCS1150A, SC250-NC	2.75 x 3.45 x 1.2 (6.98 x 8.76 x 3.04 cm)
Window Size	
CS1A, CS1150	0.75" (1.9 cm) dia, for up to 250 MCM cable
SCS1.5A, SCS1150A, SC250-NC	0.85" (2.2 cm) square aperture, for up to 350 MCM cable
Weight	0.25 lb (0.11 kg)
Approvals	UL listed, File #E320368 CE certified
Warranty	1 year

CURRENT-OPERATED SWITCHES

CS1A, CS1150A-LED, SCS1.5A, SCS1150A-LED

WIRING





INSTALLATION / ADJUSTMENT

Sensors can be mounted in any position or hung directly on wires. For larger mounting screws, drill out mounting holes. Use up to #14 AWG copper wire to terminals. Tighten to 7 in-lb torque.

Adjustment for CS1150A and SCS1150A

1. With the sensor wired as shown, use a voltmeter across the sensor contacts. A full voltage across the contact confirms the switch is open. Turn on the motor or other load being monitored.
2. The sensor is shipped with the multiturn adjustment set to the most sensitive position. If the sensor now operates, turn the adjustment counter-clockwise (CCW) until the operation reverses. The meter will indicate this action.
3. Now, turn the adjustment clockwise (CW) until the sensor just operates its controlled circuit. It is desirable to turn the adjustment slightly beyond this threshold point to provide a margin for normal current variations.

Status LED Indicator

1. **Light:** Sufficient current is **flowin**g to opposite device.
2. **No light:** Current is either **OFF** or **below the bottom of the range.**

Application Notes

1. Make sure that switched current (connected to terminals) is limited to 0.3A continuous. Switched voltage should be no higher than 135 VAC/VDC.
2. **Important!** Monitoring excessive current can damage the sensor. Make sure monitored currents do not exceed maximum ratings.
3. For proper operation of the split-core model, make certain that the mating surfaces of the magnetic core are clean.

Troubleshooting

Problem	Probable Causes and Corrections
1. **Sensor does not switch at all, regardless of current level.**	Adjustment pot is probably backed off completely, which disables the sensor. See Installation/Adjustment immediately above for instructions. Verify that mating surfaces of the split core are free of foreign particles.
2. **Adjustment has no stops; keeps turning.**	The multiturn adjustment pot has a slip-clutch that prevents damage at either end of its rotation.

ORDERING INFORMATION

MODEL	DESCRIPTION
CS1A	Solid-core current switch, fixed 1.0A trip, normally open
SCS1.5A	Split-core current switch, fixed 1.25A trip, normally open
CS1150A-LED	Solid-core current switch, adjustable, normally open with LED
SCS1150A-LED	Split-core current switch, adjustable, normally open with LED
SC250-NC	Split-core current switch, adjustable, normally closed with LED

POWER MONITORING & PROTECTION

ACI CURRENT-OPERATED SWITCHES

A/ACS, A/ASCS, A/CS, A/SCS, A/CR SERIES

DESCRIPTION

The ACI current switches are solid-state devices that operate when the sensed AC current level exceeds a fixed or adjustable trip point. The **A/CS Series** is solid-core with a fixed trip point. The **A/SCS Series** is split-core with a fixed trip point. The **A/ACS Series** is solid-core with adjustable trip point. The **A/ASCS Series** is split-core with adjustable trip point. All models monitor either a 0-200 or 0-250 amp current flow in the wire and are available in normally-open or normally-closed configurations. The **A/CR Series** command relay brings control to monitoring applications.

A/CS, A/ACS

A/SCS, A/ASCS

A/CR-D-12A

FEATURES

- ***Available in solid or split-core***
- ***Fixed or adjustable trip points***
- ***Switches AC or DC circuits***
- ***Status LED's***
- ***Integral DIN rail mount***
- ***Powered by monitored line***
- ***Enclosure rated UL94-5VB***
- ***Pilot duty rated (A/CR Series)***

SPECIFICATIONS

Supply Voltage	Induced from monitored conductor
Frequency	40 Hz to 1 kHz
Outputs	Normally Open 0.3A @ 200 VAC/ VDC Normally Closed 0.15A @ 300 VAC/VDC
Isolation Rating	1270 VAC
Insulation	600 VAC
LED Indication	Red = Above trip point Green = Below trip point
Deadband	10% Setpoint
Operating Temperature	5° to 104°F (-15° to 40°C)
Operating Humidity	0 to 95% RH,(non-condensing)
Mounting	DIN rail (35 mm), screw
Window Size	0.75" (1.9 cm), accepts up to 350 MCM cables
Weight	0.21 lb (0.1 kg)
Approvals	UL and cUL listed, file #E309723 and #E179139 CE
RoHS Statement	Yes
Warranty	5 years, limited

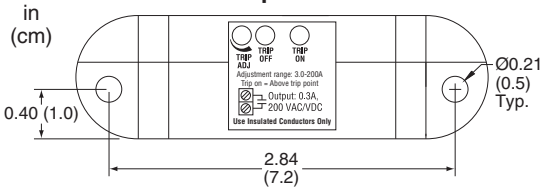
RELAY SPECIFICATIONS (COMMAND RELAY)

Model	Relay Type	Contact Rating	Coil Voltage	Coil Current
A/CR-DC-5A	SPDT	5A	23-31.2 VDC	15mA @ 24 VDC
A/CR-DC-12A	SPDT	12A	20-31.2 VDC	16mA @ 24 VDC
A/CR-12DC-12A	SPDT	12A	10-15.6 VDC	30mA @ 12 VDC
A/CR-24AC-10A	SPDT	10A	16-25.4 VAC	28mA @ 24 VAC
A/CR-115AC-8A	SPDT	8A	80-132 VAC	10mA @ 115 VAC
A/CR-230AC-8A	SPDT	8A	165-264 VAC	5mA @ 230 VAC

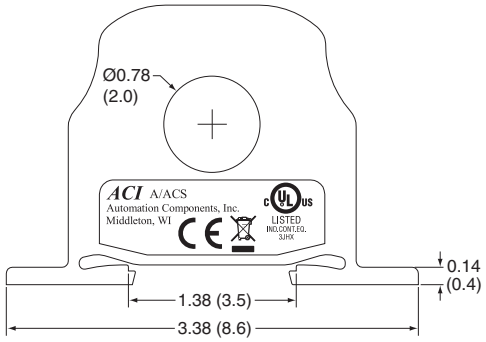
DIMENSIONS

A/ASCS, A/SCS

Top View

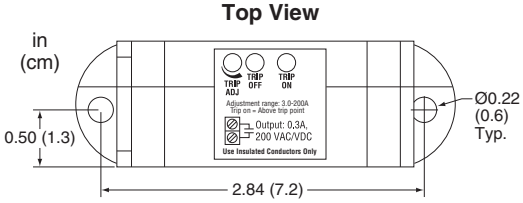


Front View

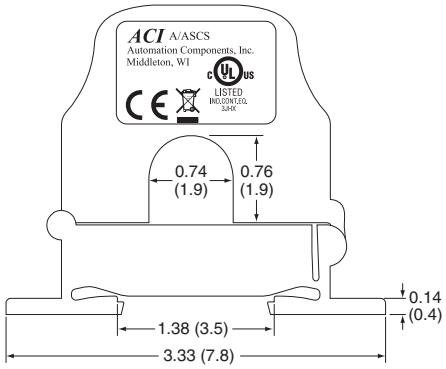


A/ASCS, A/SCS

Top View

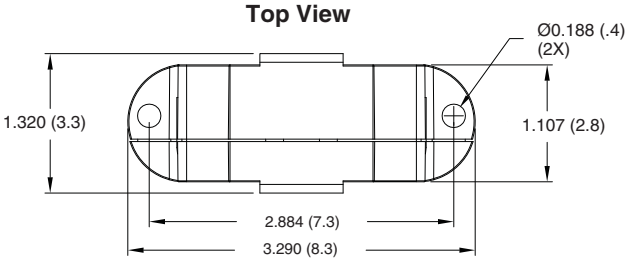


Front View

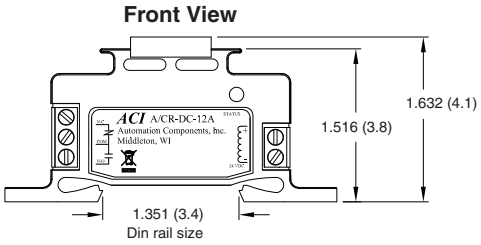


A/CR-CD-12A

Top View



Front View



ORDERING INFORMATION

MODEL	DESCRIPTION
A/CS	Solid-core current switch, 0.5A trip, normally-open, 0-250A range
A/CS-L	Solid-core current switch, 0.2A trip, normally-open, 0-250A range
A/CS-X	Solid-core current switch, 1A trip, normally-closed, 0-250A range
A/CS-X-L	Solid-core current switch, 0.5A trip, normally-closed, 0-250A range
A/ACS	Solid-core current switch, adjustable trip, normally-open, 1-250A range
A/ACS-L	Solid-core current switch, adjustable trip, normally-open, 0.5-250A range
A/ACSX	Solid-core current switch, adjustable trip, normally-closed, 1-250A range
A/SCS	Split-core current switch, 2.5A trip, normally-open, 0-200A range
A/SCS-L	Split-core current switch, 1.5A trip, normally-open, 0-200A range
A/SCSX	Split-core current switch, 2.5A trip, normally-closed, 0-250A range
A/ASCS	Split-core current switch, adjustable trip, normally-open, 3-200A range
A/ASCS-L	Split-core current switch, adjustable trip, normally-open, 2-200A range
A/ASCSX	Split-core current switch, adjustable trip, normally-closed, 3-250A range
A/ASCSX-L	Split-core current switch, adjustable trip, normally-closed, 2.5-250A range
A/CR-DC-5A	5 Amp SPDT RELAY, 23-31.2 VDC Coil Voltage
A/CR-DC-12A	12 Amp SPDT RELAY, 20-31.2 VDC Coil Voltage
A/CR-12DC-12A	12 Amp SPDT RELAY, 10-15.6 VDC Coil Voltage
A/CR-24AC-10A	10 Amp SPDT RELAY, 16-26.4 VAC Coil Voltage
A/CR-115AC-8A	8 Amp SPDT RELAY, 80-132 VAC Coil Voltage
A/CR-230AC-8A	8 Amp SPDT RELAY, 165-264 VAC Coil Voltage

POWER MONITORING & PROTECTION

ACI MINI CURRENT-OPERATED SWITCHES

A/MCS, A/MSCS, A/MCS-A, A/MSCS-A

DESCRIPTION

The **ACI Mini Current Switch** line has a normally-open, solid state contact that is non-polarity sensitive. They can be used to switch both AC and DC circuits up to 36 volts. The adjustable switches also include two status LED indicators that will indicate three states: tripped on, current present but below trip point, and current off or below the low end of the adjustable trip point range.

The **A/MCS** and **A/MSCS** current switches should be used in applications in which a go/no-go current status switch is required. A current status switch can be used to monitor fan and pump status, motors, compressors, and any other electrical equipment for on or off status. The **A/MCS-A** and **A/MSCS-A** adjustable current switches should be used in applications such as monitoring over and under loads, changes in the normal operating current or equipment status.

FEATURES

- ***Go / no-go status switch***
- ***Rated up to 150A***
- ***5-year warranty***
- ***UL94V-0 enclosure rating***
- ***LED indication (adjustable models)***
- ***Small size***

SPECIFICATIONS

Supply Voltage	Induced by monitored conductor
Frequency	50/60 Hz
Rating	
A/MCS, A/MSCS	0.5 A continuous 36 VAC/VDC
A/MCS-A, A/MSCS-A	1 A continuous 36 VAC/VDC
Insulation Class	600 VAC
Isolation Rating	2,200 VAC
LED Indication	
	Red = Above trip point Green = Below trip point
Trip Point	
A/MCS	Fixed 0.20A
A/MCS-A	0.32 - 150A
A/MSCS	Fixed 0.55A
A/MSCS-A	0.70 - 150A
Range	
A/MCS	0.20 - 150A
A/MCS-A	0.32 - 150A
A/MSCS	0.55 - 150A
A/MSCS-A	0.70 - 150A
Operating Temperature	-22° to 140°F (-30° to 60°C)
Operating Humidity	0 to 95% RH, (non condensing)
Dimensions	
A/MCS, A/MCS-A	2.50" x 1.96" x 0.95" (6.35 x 4.97 x 2.41 cm)
A/MSCS, A/MSCS-A	2.65" x 2.35" x 0.95" (6.73 x 5.08 x 2.43 cm)
Window Size	
A/MCS, A/MCS-A	0.55" (1.39 cm) dia., up to 1 AWG cables
A/MSCS, A/MSCS-A	0.53" (1.34 cm) dia., up to 1 AWG cables
Weight	0.21 lb (0.1 kg)
Approvals	UL and cUL, file #E309723, CE
RoHS Statement	Yes
Warranty	5 years

ORDERING INFORMATION

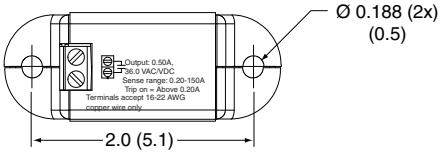
MODEL	DESCRIPTION
A/MCS	Solid-core, fixed current switch, N.O., 0-150A <0.20A
A/MCS-A	Solid-core, adjustable current switch, N.O., 0-150A 0.32 – 150A
A/MSCS	Split-core, fixed current switch, N.O., 0-150A <0.55A
A/MSCS-A	Split-core, adjustable current switch, N.O., 0-150A 0.70 – 150A

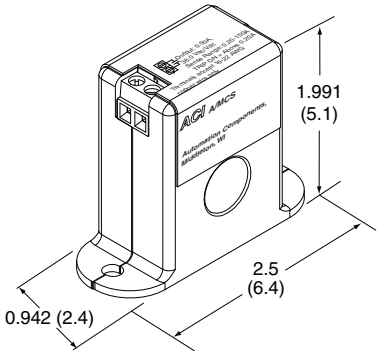
DIMENSIONS

in
(cm)

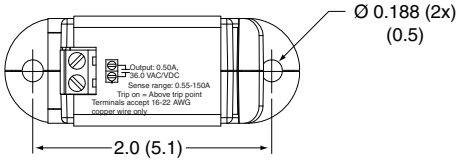
A/MCS
A/MSCS

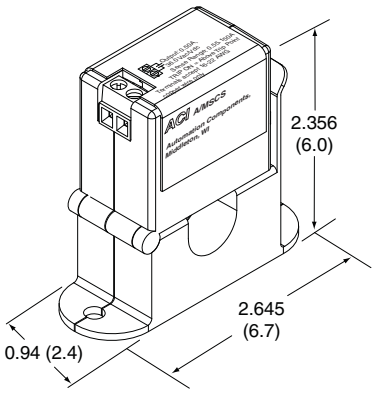
Solid Core





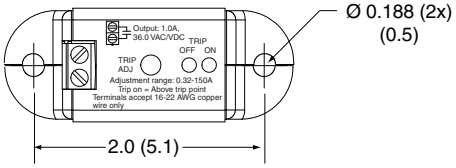
Split Core

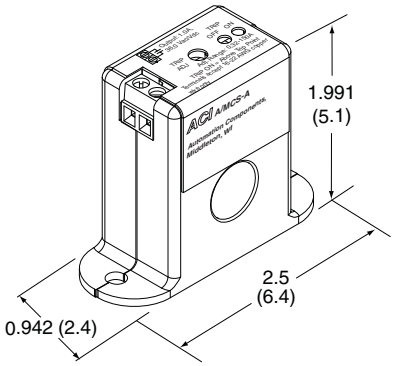




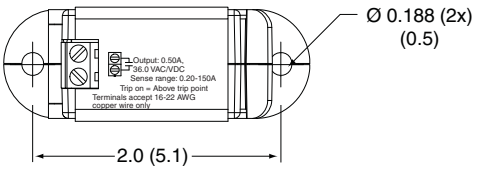
A/MCS-A
A/MSCS-A

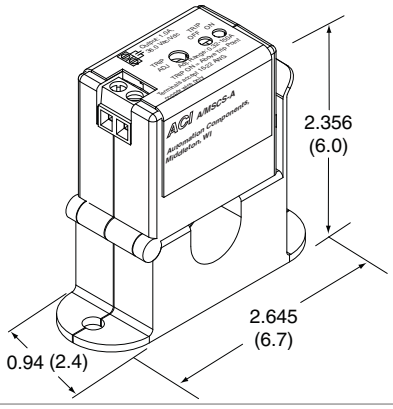
Solid Core





Split Core





POWER MONITORING & PROTECTION

FUNCTIONAL DEVICES CURRENT SWITCH AND RELAY

RIBX SERIES

DESCRIPTION

The Relay in a Box **RIBX Series** provides a unique and cost-effective solution to on/off motor control and current sensing status indication. Combined in a single, convenient junction box with high- and low-voltage separation are a control relay and a current sensing status switch. A three-position closed/open/auto switch is available to override the output of the relay. This versatile product allows both control and status sensing of electrical loads by a BAS, all in a self-contained, easy-to-install housing.

RIBX Solid-Core Remote Current Sensing

RIBX Internal Current Sensing

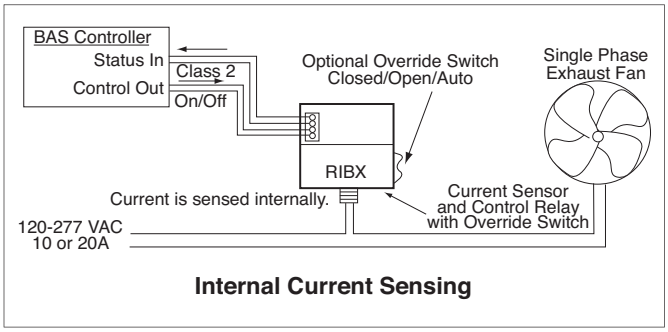
RIBX Split-Core Remote Current Sensing

FEATURES

- ***Cost-effective current sensing with a control relay***
- ***Self-contained housing with high and low voltage separation***
- ***LED indication of relay and current sensor trip***
- ***Optional relay contact override switch***
- ***Plenum-rated housing***
- ***UL and ULC listed for UL 916 Energy Management and UL 864 Fire***

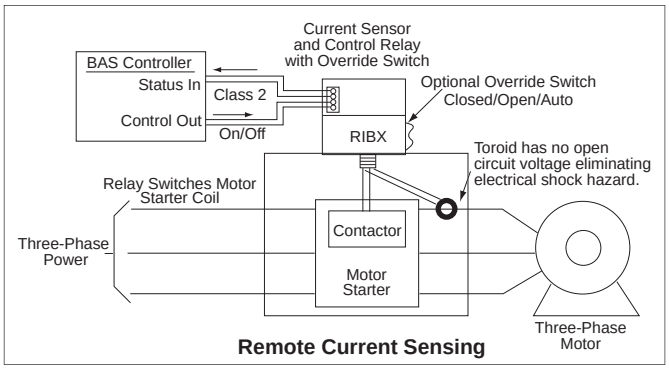
APPLICATION

Internal Current Sensing (for single-phase loads)
Models with internal current-sensing are great for direct-control and current-sensing of exhaust fans, pumps, and other single-phase electrical loads up to 20A. The control relay contacts of these models wire directly in series with single-phase motors using the wires that exit the housing through the 1/2" conduit hub. The current of the load is sensed within the housing. Low-voltage wiring from the controller for the control relay coil and status switch enter the separate Class 2 wiring compartment in the housing through star bushings or conduit and are connected to screw terminals.



Internal Current Sensing

Remote Current Sensing (for loads with motor starters)
Models with remote current-sensing are great for control and status sensing of electrical loads that require a motor starter. The control relay contacts of these models are wired in series with the motor starter coil using the two wires that exit the housing through the 1/2" conduit hub. Currents up to 150A are sensed externally with a current sensing ring connected to the two gray wires that also exit through the 1/2" conduit hub. Low-voltage wiring from the controller for the control relay coil and status switch enter the separate Class 2 wiring compartment in the housing through star bushings or conduit and are connected to screw terminals.



Remote Current Sensing

FUNCTIONAL DEVICES CURRENT SWITCH AND RELAY

RIBX SERIES

SPECIFICATIONS

Frequency	50/60 Hz
Switch Rating	30 VAC/VDC @ 0.4A maximum
LED Indication	
LED#1 ON	Relay activated
LED#2 ON	Current trip point exceeded
Response Time	20mS
Relay	
Life Rating	10 million cycles minimum mechanical
Coil Pull In Voltage	
10- 30 VAC/VDC models	9 VAC, 10 VDC
24 VAC/VDC models	18 VAC, 22 VDC
Coil Drop Out Voltage	
10-30 VAC/VDC models	2.1 VAC, 2.8 VDC
24 VAC/VDC models	3 VAC, 3.8 VDC
Off State Leakage	< .03 mA @ 30 VAC/VDC
On State Voltage Drop	<0.3 VAC/VDC @ 0.1A
	<1.6 VAC/VDC @ 0.4A
Lead Wires	16" (40.6 cm) 600V Rated
Operating Temperature	-30° to 140°F (-34° to 60°C)
Operating Humidity	5 to 95% (non-condensing)
Dimensions	
Enclosure	4"H x 4"W x 1.8"D (10.2 x 10.2 x 4.6 cm), NEMA 1 with 1/2" NPT
Solid Core	1.86" x 1.46" (3 x 3.71 cm)
Split Core	2.52" x 2.0" (6.4 x 5.08 cm)
Window Size	
Solid Core	0.5" (1.27 cm)
Split Core	0.52" x 0.52" (1.32 x 1.32 cm)
Weight	1 lb (0.45 kg)
Approvals	UL and cUL listed, file #E68805 (UL 916) and #S7312 (UL 864)
RoHS Statement	Yes
Warranty	1 year

ORDERING INFORMATION

MODEL	CURRENT SENSING	CURRENT SENSING RANGE/THRESHOLD	OVER SW	RELAY CONTACT RATINGS	RELAY CONTACT WIRING	RELAY COIL AND CURRENT SWITCH
RIBXLCA	Internal	0.5-10A/Adjustable	–	10A resistive 120/240/277 VAC - 28 VDC 480 VA pilot duty 240/277 VAC 480 VA ballast 277 VAC 600W tungsten 120 VAC N.O 240W tungsten 120 VAC N.C. 1/3 hp for N.O. 120/240 VAC 1/6 hp for N.C. 120/240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	**1-SPDT Relay** (blue) N.C. (yellow) COM (orange) N.O.	**Relay input current** 30 mA @ 10 VAC 12 mA @ 10 VDC 32 mA @ 12 VAC 14 mA @ 12 VDC 42 mA @ 24 VAC 16 mA @ 24 VDC 50 mA @ 30 VAC 18 mA @ 30 VDC **Relay coil wiring** 10-30 VAC/VDC Common **Current switch wiring** Current Sensor Status **Solid- and split-core models** Current Sensor (gray) (gray)
RIBXLCF		0.5-10A/Fixed, 0.5A				
RIBXLCJA	Split-core	3-150A/Adjustable				
RIBXLCJF		3-150A/Fixed, 3A				
RIBXLCRA	Solid-core	1.25-150A/Adjustable	–			
RIBXLCRF		1.25-150A/Fixed, 1.25A				
RIBXLSA	Internal	0.5-10A/Adjustable	Yes	10A resistive 277 VAC 480 VA pilot duty 277 VAC 480 VA ballast 277 VAC 600W tungsten 120 VAC N.O 240W tungsten 120 VAC N.C. 1/3 hp for N.O. 120/240 VAC 1/6 hp for N.C. 120/240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	**1-SPST Relay** (orange) (orange) Closed Open Auto 1	
RIBXLSF		0.5-10A/Fixed, 0.5A				
RIBXLSJA	Split-core	3-150A/Adjustable				
RIBXLSJF		3-150A/Fixed, 3A				
RIBXLSRA	Solid-core	1.25-150A/Adjustable				
RIBXLSRF		1.25-150A/Fixed, 1.25A				
RIBX24BA	Internal	0.5-20A/Adjustable	–	20A resistive 277 VAC 1110 VA pilot duty 277 VAC 770 VA pilot duty 120 VAC 20A ballast 277 VAC N.O. 10A ballast 277 VAC N.C. 10A tungsten 120 VAC N.O. 240W tungsten 120 VAC N.C. 2 hp 277 VAC 1 hp 120 VAC	**1-SPDT Relay** (blue) N.C. (yellow) COM (orange) N.O.	**Relay input current** 75 mA @ 24 VAC 32 mA @ 24 VDC **Relay coil wiring** 24 VAC/VDC Common **Current switch output** Current Sensor Status
RIBX24BF		0.5-20A/Fixed, 0.5A				
RIBX24SBA	Internal	0.5-20A/Adjustable	Yes		**1-SPST Relay** (orange) (orange) Closed Open Auto 1	
RIBX24SBF		0.5-20A/Fixed, 0.5A				
RIBX243PA	Internal	0.5-20A/Adjustable	–	20A resistive 300 VAC 20A resistive 28 VDC 15A resistive 600 VAC 1 hp 120 VAC, 1 Ph 2 hp 240-277 VAC, 1 Ph 3 hp 480-600 VAC, 1 Ph 5 hp 240 VAC, 3 Ph 7.5 hp 480 VAC, 3 Ph 20A ballast 277-480 VAC	(blue) (blue) N.O. (yellow) (yellow) N.O. (orange) (orange) N.O. 2	**Relay input current** 190 mA @ 24 VAC 140 mA @ 30 VDC **Relay coil wiring** 24 VAC/VDC Common **Current switch output** Current Sensor Status
RIBX243PF		0.5-20A/Fixed, 0.5A				
RIBXF	Internal	0.5-30A/Fixed, 0.5A	–	Current switch only	**Current Sensor Wiring Internal Models** Current Sensor (purple) (purple) **Solid- and split-core models** Current Sensor (gray) (gray)	**Current switch wiring** Current Sensor Status
RIBXA	Internal	0.5-30A/Adjustable	–	Current switch only		
RIBXRF	Solid-core	1.25-150A/Fixed, 1.25A	–	Current switch only		
RIBXRA	Solid-core	1.25-150A/Adjustable	–	Current switch only		
RIBXJF	Split-core	3-150A/Fixed, 3A	–	Current switch only		
RIBXJA	Split-core	3-150A/Adjustable	–	Current switch only		

Note: 1 Internal yellow jumper determines if SPST contacts are N.O. or N.C. 2 Can be ordered N.C. by adding **-NC** after model number.

POWER MONITORING & PROTECTION

KELE AC CURRENT TRANSDUCER

4CTV, 4CMA

DESCRIPTION

Models 4CTV and **4CMA** are AC amperage-to-analog DC transducers that can be used to directly monitor loads of up to 20A. For loads of 20-5000A, an external current transformer can be used. Developed for building automation and energy management, the **Model 4CTV** converts an AC current to a 0-5 VDC voltage and the **Model 4CMA** converts an AC current to a 4-20 mA current that can be monitored by any processor that accepts analog DC voltage or current.

4CTV

4CMA

FEATURES

- ***4CTV requires no external power supply***
- ***Rugged design to withstand momentary AC inrushes of 120A (6x rating)***
- ***Easy to install, only two connections***
- ***50/60 Hz operation***

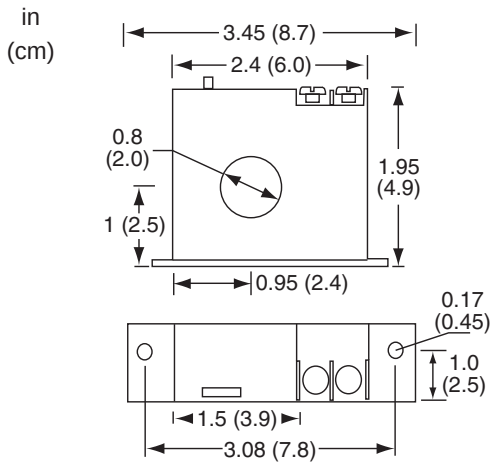
APPLICATION

- ***AC current input to DC voltage or milliamp output***
- ***Monitoring of AC current of motors, lighting, heating, industrial processes, etc.***
- ***Monitoring of chiller loads using existing current transformers***

SPECIFICATIONS

Supply Voltage	
4CMA	24 VDC
4CTV	Induced by monitored conductor
Inputs	0-20A (change jumper to 0 to 50A)
Outputs	
4CMA	4-20 mA, 600Ω maximum load
4CTV	0-5 VDC, 30 kΩ minimum load
Insulation Class	600V
Ripple	<2% FS
Accuracy	±1% FS (24 VDC @ 25°C)
Operating Temperature	-22° to 158°F (-30° to 70°C)
Dimensions	2.9" x 1" x 2.45" (7.4 x 2.5 x .6.2 cm)
Weight	0.25 lb (0.11 kg)
Approvals	UL File# E320368, CE
RoHS Statement	Yes
Warranty	1 year

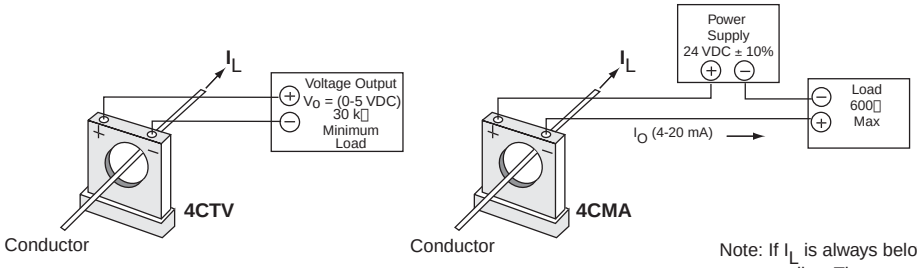
DIMENSIONS



Solid-Core

WIRING

APPLICATION #1. Monitoring Loads Under 20A



4CTV Formula:

I_L (load amps) = $\frac{20}{\text{turns}} \times \left(\frac{V_O}{5}\right)$

V_O= VDC from 4CTV
turns= number of times conductor passes through 4CTV

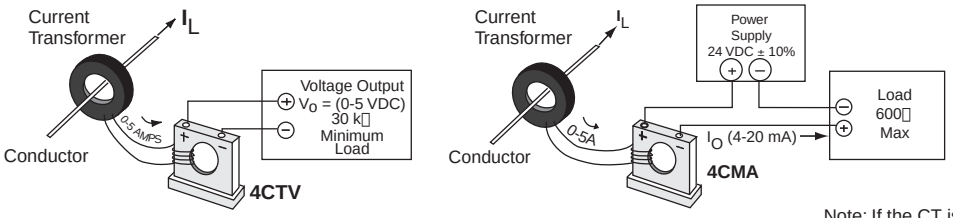
4CMA Formula:

I_L (load amps) = $\frac{20}{\text{turns}} \times \left(\frac{I_O - 4}{16}\right)$

I_O= mA DC from 4CMA
turns= number of times conductor passes through 4CMA

Note: If I_L is always below 10A, multiple passes of the conductor will improve scaling. The sum of these amperages must remain below 20A.

APPLICATION #2. Monitoring Loads Over 20A with a Current Transformer



4 turns for CTs with 5A secondaries
20 turns for CTs with 1A secondaries

4 turns for CTs with 5A secondaries
20 turns for CTs with 1A secondaries

4CTV Formula:

I_L (load amps) = $\frac{\text{CT primary rating}}{} \times \left(\frac{V_O}{5}\right)$

V_O= VDC from 4CTV

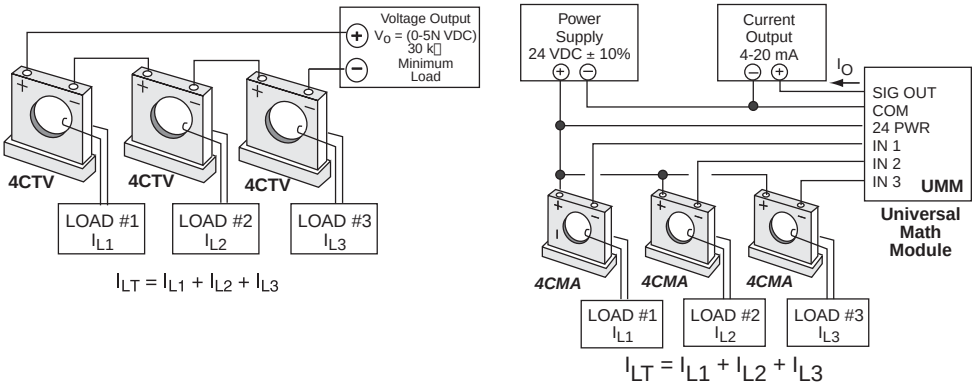
4CMA Formula:

I_L (load amps) = $\frac{\text{CT primary rating}}{} \times \left(\frac{I_O - 4}{16}\right)$

I_O= mA DC from 4CMA

Note: If the CT is oversized, multiple conductor passes or more secondary turns through the **4CTV** or **4CMA** will improve scaling. The CT output should not exceed 5A or the CT secondary turns should not total more than 20A.

APPLICATION #3. Monitoring and Summing Multiple Loads



4CTV Formula: For loads **under 20 amps**

I_{LT} (load amps) = $\frac{20 \times N}{\text{turns}} \times \left(\frac{V_O}{5 \times N}\right)$

4CTV Formula: For loads **over 20 amps**

I_{LT} (load amps) = $\frac{\text{CT primary rating total}}{} \times \left(\frac{V_O}{5 \times N}\right)$

V_O= VDC from **4CTVs**
turns = number of times conductor passes through **4CTV**
N = number of loads monitored

4CMA Formula: For loads **under 20 amps**

I_{LT} (load amps) = $\frac{20 \times N}{\text{turns}} \times \left(\frac{I_O - 4}{16}\right)$

4CMA Formula: For loads **over 20 amps**

I_{LT} (load amps) = $\frac{\text{CT Primary rating total}}{} \times \left(\frac{I_O - 4}{16}\right)$

N= number of loads monitored

turns = number of times conductor passes through **4CMA**

I_O= mA from UMM

Note: If the loads are from secondaries of current transformers, the CT ratios and the turns on the **4CTVs** and **4CMA** must all be the same. If CTs are used, the CT primary amps would be the total for all CTs used.

ORDERING INFORMATION

MODEL	DESCRIPTION
4CTV	Current transducer, 0-5 VDC voltage output
4CMA	Current transducer, 4-20 mA current output

	RELATED PRODUCTS	PAGE
500T/501T	Split-core current transformers	**774**
600T/601T	Split-core current transformers	**775**
AL/RL	Solid-core current transformers	**773**

POWER MONITORING & PROTECTION

AC CURRENT TRANSDUCER WITH CURRENT OUTPUT

CX, SCX SERIES (CURRENT)

DESCRIPTION

The **Kele CX/SCX Series** AC Current Transducers can be used to directly monitor up to 200 amps and output a 4-20 mA signal. Available in a split-core design that allows for easy installation of the transducer on existing wiring or in a lower cost solid-core version.

SCX42050

CX42050

SCX420200

CX420200

FEATURES

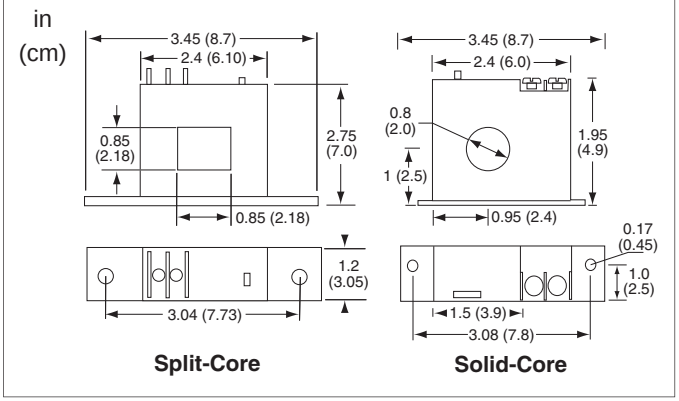
- ***May eliminate the need for a current transformer***
- ***Small size***
- ***Loop powered***
- ***Easily installed over existing cable with split-core design***
- ***UL listed, CE certified***

SPECIFICATIONS

MODEL	RANGE (amps)	JUMPER	MAX CONT (amps)
CX42050 **SCX42050**	0-10 0-20 0-50	None Mid High	80 120 200
CX420200 **SCX420200**	0-100 0-150 0-200	None Mid High	175 300 400

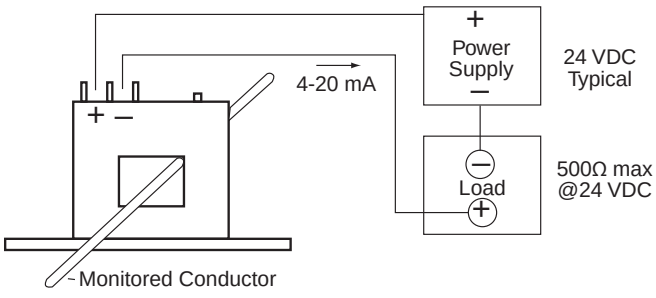
Frequency	10-400 Hz
Output	4-20 mA
Output Impedance	500Ω maximum @ 24 VDC
Isolation Rating	1270 VAC
Accuracy	±1% FS
Response Time	250 ms, 0-90%
Internal Protection	Reverse voltage protection
Overrange Limit	Sensor self-limits output to 40 mA
Operating Temperature	-22° to 158°F (-30° to 70°C)
Materials Of Construction	Thermoplastic (meets UL flammability rating 94V-0)
Weight	0.25 lb (0.11 kg)
Approvals	UL and ULC listed, File #E320368, CE
RoHS Statement	Yes
Warranty	5 years

DIMENSIONS



Split-Core **Solid-Core**

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
CX42050	Solid-core current transducer, 0-50A, 4-20 mA output
CX420200	Solid-core current transducer, 0-200A, 4-20 mA output
SCX42050	Split-core current transducer, 0-50A, 4-20 mA output
SCX420200	Split-core current transducer, 0-200A, 4-20 mA output

POWER MONITORING & PROTECTION

AC CURRENT TRANSDUCERS WITH VOLTAGE OUTPUT

CX, SCX SERIES (VOLTAGE)

DESCRIPTION

The **Kele CX/SCX Series AC** Current Transducers with Voltage Output can be used to directly monitor up to 200A and output a 0-5 or 0-10 VDC signal. Available in a split-core design that allows for easy installation of the transducer on existing wiring or in a lower-cost solid-core version.

FEATURES

- ***May eliminate the need for a current transformer***
- ***Small size***
- ***No power supply needed***
- ***Split-core model easily installed over existing cable***
- ***UL listed, CE certified***

SCX05V50

CX05V50

SCX10V200

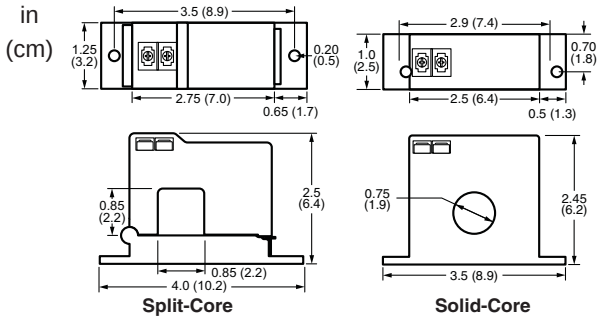
CX10V200

SPECIFICATIONS

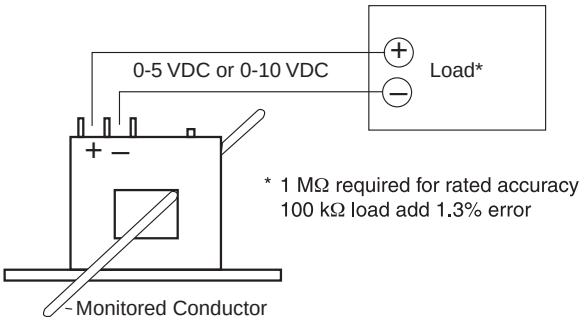
MODEL	RANGE (amps)	OUTPUT	JUMPER	MAX CONT (amps)
CX05V50	0-10		None	80
SCX05V50	0-20	0-5 VDC	Mid	120
	0-50		High	200
CX05V200	0-100		None	175
SCX05V200	0-150	0-5 VDC	Mid	300
	0-200		High	400
CX10V50	0-10		None	80
SCX10V50	0-20	0-10 VDC	Mid	120
	0-50		High	200
CX10V200	0-100		None	125
SCX10V200	0-150	0-10 VDC	Mid	300
	0-200		High	400

Frequency	50-60 Hz
Output	0-5 VDC or 0-10 VDC
Output Impedance	1 MΩ required for rated accuracy 100 kΩ load add 1.3% error
Isolation Rating	1270 VAC
Accuracy	±1% FS over 5% to 100% of range
Response Time	250 ms, 0-90%
Operating Temperature	-22° to 158°F (-30° to 70°C)
Materials Of Construction	Thermoplastic (meets UL flammability rating 94V-0)
Window Size	0.25 lb (0.11 kg)
Approvals	UL and ULC listed, File #E320368, CE
Warranty	5 years

DIMENSIONS



WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
CX05V50	Solid-core current transducer, 0-50A, 0-5 VDC output
CX05V200	Solid-core current transducer, 0-200A, 0-5 VDC output
CX10V50	Solid-core current transducer, 0-50A, 0-10 VDC output
CX10V200	Solid-core current transducer, 0-200A, 0-10 VDC output
SCX05V50	Split-core current transducer, 0-50A, 0-5 VDC output
SCX05V200	Split-core current transducer, 0-200A, 0-5 VDC output
SCX10V50	Split-core current transducer, 0-50A, 0-10 VDC output
SCX10V200	Split-core current transducer, 0-200A, 0-10 VDC output

POWER MONITORING & PROTECTION

CURRENT TRANSDUCERS

A/CT, A/SCT SERIES

DESCRIPTION

Current sensors monitor the current flowing to electrical equipment. The magnitude of the analog output signal is proportional to the current flow through the wire. The **A/CT** series offers solid-core sensors with 4-20mA, 0-5VDC, or 0-10VDC outputs. The **A/SCT** series offers split-core sensors for retrofit applications with the same available outputs. Sensors are available with various input current ranges from 5 to 250 amps. True RMS models make monitoring of VFD applications a snap.

A/CT

A/SCT

FEATURES

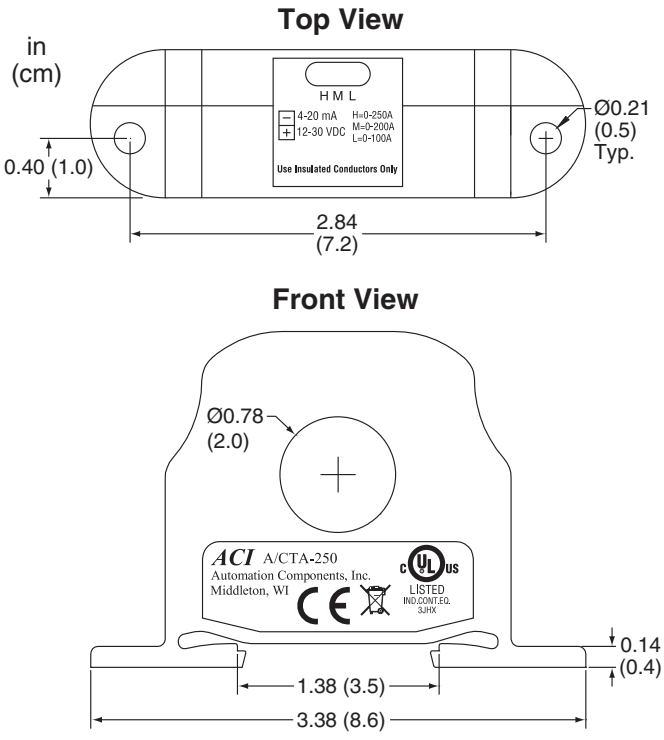
- ***Available in solid-core or split-core***
- ***5 VDC, 10 VDC or 4-20mA outputs***
- ***Voltage output models are self-powered***
- ***Integral DIN rail mount***
- ***True RMS versions for VFD applications***
- ***Enclosure rated UL94-5VB***

SPECIFICATIONS

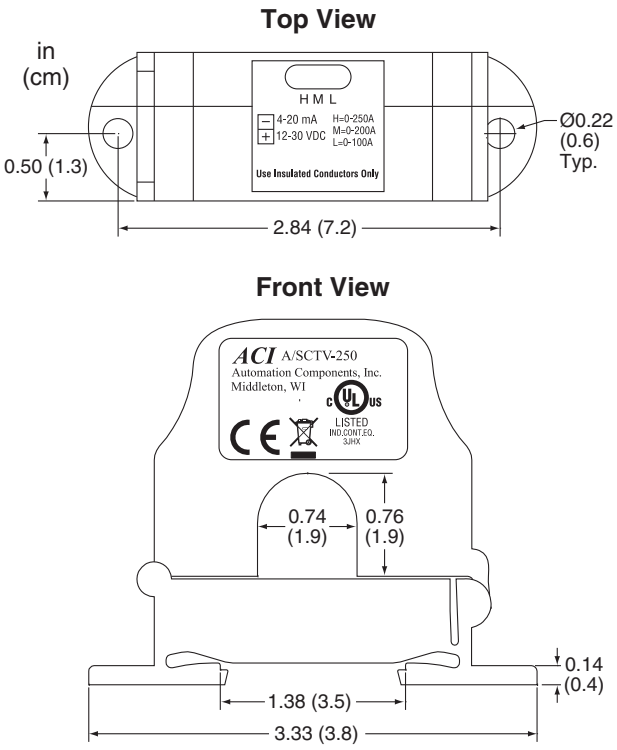
Supply Voltage	
A/CTA, A/SCTA	12 to 30 VDC
A/CTE, A/CTV, A/SCTE, A/SCTV	Induced from monitored conductor
Supply Current	
A/CTA, A/SCTA	36 mA maximum
Frequency	
A/CTA, A/SCTA	30 Hz to 1 kHz
A/CTE, A/CTV, A/SCTE, A/SCTV	50 to 600 Hz
Output	
A/CTA, A/SCTA	4-20 mA, 2-wire, loop-powered A/CTE, A/SCTE 0-5 VDC
A/CTV, A/SCTV	0-10 VDC
Output Impedance	
A/SCTA	700Ω@ 24 VDC
A/SCTA-VFD	650Ω @ 24 VDC
Insulation Class	600 VAC
Isolation Rating	1270 VAC

Accuracy	
A/CTA, A/SCTA	±0.5%
CTE, A/CTV, A/SCTE, A/SCTV	±1%
Operating Temperature	5° to 104°F (-15° to 40°C)
VFD Models	32° to 104°F (0° to 40°C)
Operating Humidity	0 to 95% (non-condensing)
Mounting	DIN rail size 35 mm
Window Size	0.75", accepts up to 350 MCM cables
Weight	0.24 lbs (0.109 kg)
Approvals	UL listed, file #E309723, CE
RoHS Statement	Yes
Warranty	5 years, limited
Enclosure Rating	UL94-5VB

DIMENSIONS



A/CTA, A/CTE, A/CTV



A/SCTA, A/SCTE, A/SCTV

ORDERING INFORMATION

MODEL	DESCRIPTION
A/CTA-5	Solid-core, loop-powered current sensor, 0-5A input, 4-20 mA output
A/CTA-50	Solid-core, loop-powered current sensor, 0-10/20/50A input, 4-20 mA output
A/CTA-250	Solid-core, loop-powered current sensor, 0-100/200/250A input, 4-20 mA output
A/CTA-5-VFD	Solid-core, loop-powered true RMS current sensor, 0-5A input, 4-20 mA output
A/CTA-50-VFD	Solid-core, loop-powered true RMS current sensor, 0-10/20/50A input, 4-20 mA output
A/CTA-250-VFD	Solid-core, loop-powered true RMS current sensor, 0-100/200/250A input, 4-20 mA output
A/SCTA-5	Split-core, loop-powered current sensor, 0-5A input, 4-20 mA output
A/SCTA-50	Split-core, loop-powered current sensor, 0-10/20/50A input, 4-20 mA output
A/SCTA-200	Split-core, loop-powered current sensor, 0-100/150/200A input, 4-20 mA output
A/SCTA-5-VFD	Split-core, loop-powered true RMS current sensor, 0-5A input, 4-20 mA output
A/SCTA-50-VFD	Split-core, loop-powered true RMS current sensor, 0-10/20/50A input, 4-20 mA output
A/SCTA-200-VFD	Split-core, loop-powered true RMS current sensor, 0-100/150/200A input, 4-20 mA output
A/CTE-50	Solid-core, self-powered current sensor, 0-10/20/50A input, 0-5 VDC output
A/CTE-250	Solid-core, self-powered current sensor, 0-100/200/250A input, 0-5 VDC output
A/CTV-50	Solid-core, self-powered current sensor, 0-10/20/50A input, 0-10 VDC output
A/CTV-250	Solid-core, self-powered current sensor, 0-100/200/250A input, 0-10 VDC output
A/SCTE-50	Split-core, self-powered current sensor, 0-10/20/50A input, 0-5 VDC output
A/SCTE-250	Split-core, self-powered current sensor, 0-100/200/250A input, 0-5 VDC output
A/SCTV-50	Split-core, self-powered current sensor, 0-10/20/50A input, 0-10 VDC output
A/SCTV-250	Split-core, self-powered current sensor, 0-100/200/250A input, 0-10 VDC output

POWER MONITORING & PROTECTION

CURRENT TRANSDUCER AND RELAY

RIBX-V SERIES

Functional Devices, Inc.

DESCRIPTION

The Relay In a Box **RIBX-V Series** provides a unique and cost-effective solution to on/off motor control and analog current sensing. Combined in a single, convenient junction box with high- and low-voltage separation are a control relay and a current sensing transducer that outputs 0-5 VDC or 0-10 VDC. A three-position closed/open/auto switch is available to override the output of the relay. This versatile product allows both control and analog current sensing of electrical loads by a building automation system, all in a self-contained, easy-to-install housing.

RIBX-V

FEATURES

- ***Cost-effective analog current sensing with a control relay***
- ***Self-contained housing with high- and low-voltage separation***
- ***LED indication of relay***
- ***Optional relay contact override switch***
- ***Plenum-rated housing***
- ***UL and ULC listed for UL 916 Energy Management and UL 864 Fire***

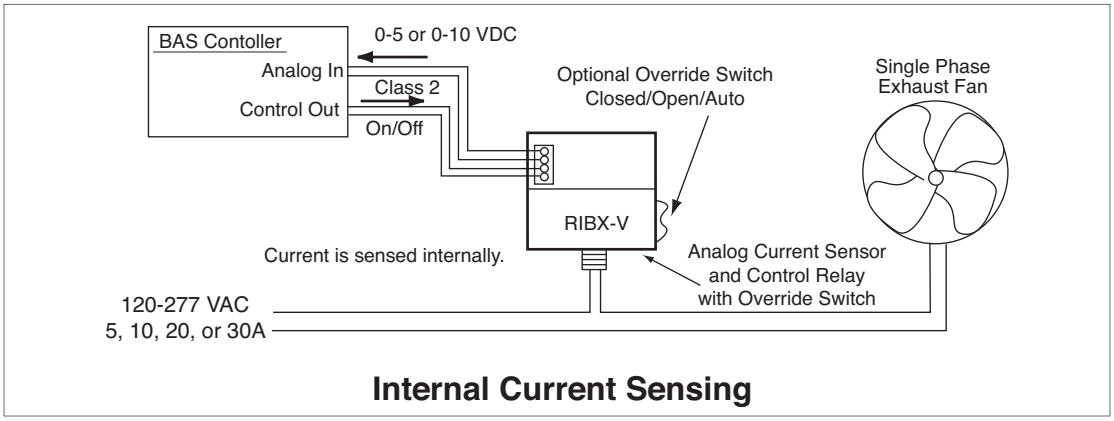
RoHS

c UL us

APPLICATION

Internal Current Sensing

The **RIBX-V Series** with internal current sensing is great for direct control and analog current sensing of exhaust fans, pumps, and other single-phase electrical loads up to 20A. The control relay contacts of these models wire directly in series with single-phase motors using the wires that exit the housing through the 1/2" conduit hub. The current of the load is sensed within the housing. Low-voltage wiring from the controller for the control relay coil and analog current signal enter the separate Class 2 wiring compartment in the housing through star bushings or conduit and are connected to screw terminals.



Internal Current Sensing

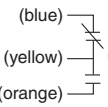
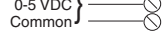
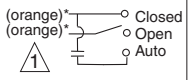
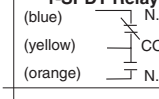
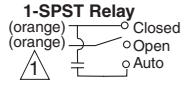
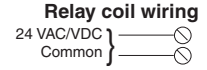
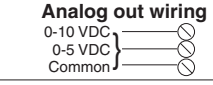
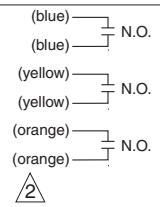
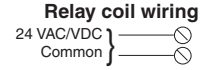
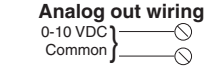
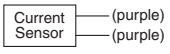
CURRENT TRANSDUCER AND RELAY

RIBX-V SERIES

SPECIFICATIONS

Frequency	50/60 Hz
Output	0-5 VDC or 0-10 VDC, proportional to current sensing range
Output Impedance	30 kΩ minimum
LED Indication	LED on = relay activated
Relay	
Life Rating	10 million cycles minimum mechanical
Pull In Voltage	
10-30 VAC/VDC models	9 VAC, 10 VDC
24 VAC/VDC models	18 VAC, 22 VDC
Drop Out Voltage	
10-30 VAC/VDC models	2.1 VAC, 2.8 VDC
24 VAC/VDC models	3 VAC, 3.8 VDC
Accuracy	±1% FS
Lead Wires	16" (40.6 cm)
Operating Temperature	-30° to 140°F (-34° to 60°C)
Operating Humidity	5% to 95% (non-condensing)
Dimensions	4"H x 4"W x 1.8"D (10.2 x 10.2 x 4.6 cm), NEMA 1 th 1/2" NPT
Weight	Approximately 1 lb (0.45 kg)
Approvals	UL and cUL listed, file #E68805 (UL 916) and #S7312 (UL 864)
RoHS Statement	Yes
Warranty	1 year

ORDERING INFORMATION

MODEL	CURRENT SENSING	CURRENT SENSING RANGE (amps)	OVER SW	RELAY CONTACT RATINGS	RELAY CONTACT WIRING	RELAY COIL AND ANALOG OUTPUT
RIBXLCEV	Internal	0-5	–	5A resistive 277 VAC 345 VA pilot duty 120/240 VAC N.O. 211 VA pilot duty 120/240 VAC N.C. 268 VA pilot duty 277 VAC N.O. 175 VA pilot duty 277 VAC N.C. 1/3 hp for N.O. 120/240 VAC 1/6 hp for N.C. 120/240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	**RIBXLCEV, RIBXLCV 1-SPDT Relay**  	**Relay input current** 30 mA @ 10 VAC 12 mA @ 10 VDC 32 mA @ 12 VAC 14 mA @ 12 VDC 42 mA @ 24 VAC 16 mA @ 24 VDC 50 mA @ 30 VAC 18 mA @ 30 VDC **Relay coil wiring**  **Analog out wiring** 
RIBXLSEV			Yes			
RIBXLCV	Internal	0-10	–	10A resistive 120/240/277 VAC - 28 VDC 480 VA pilot duty 240/277 VAC 480 VA ballast 277 VAC 600W tungsten 120 VAC N.O 240W tungsten 120 VAC N.C. 1/3 hp for N.O. 120/240 VAC 1/6 hp for N.C. 120/240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	**RIBXLSEV, RIBXLSV 1-SPST Relay**  *Gray wire on RIBXLSEV	
RIBXLSV			Yes			
RIBX24BV	Internal	0-20	–	20A resistive 277 VAC 1110 VA pilot duty 277 VAC 240W tungsten N.C. 120 VAC 770 VA pilot duty 120 VAC 1 hp 120 VAC 2 hp 277 VAC 20A ballast N.O. 277 VAC 10A ballast N.C. 277 VAC 10A tungsten N.O. 120 VAC	**1-SPDT Relay**  **1-SPST Relay**  	**Relay input current** 75 mA @ 24 VAC, 32 mA @ 24 VDC **Relay coil wiring**  **Analog out wiring** 
RIBX24SBV			Yes			
RIBX243PV	Internal	0-20	–	20A resistive 300 VAC 20A resistive 28 VDC 15A resistive 600 VAC 1 hp 120 VAC, 1 Ph 2 hp 240-277 VAC, 1 Ph 3 hp 480-600 VAC, 1 Ph 5 hp 240 VAC, 3 Ph 7.5 hp 480 VAC, 3 Ph 20A ballast 277-480 VAC	 	**Relay input current** 190 mA @ 24 VAC **Relay coil wiring**  **Analog out wiring** 
RIBXV	Internal	0-30	–	Current transducer only, 0-30A	**Current Sensor Wiring**  	**Analog out wiring** 

Note: 1 Internal yellow jumper determines if SPST contacts are N.O. or N.C. 2 Order N.C. by adding **-NC** after model number.

POWER MONITORING & PROTECTION

HIGH AC CURRENT TRANSDUCERS WITH CURRENT OUTPUT

SENTRY 200-A SERIES

DESCRIPTION

The Sentry **200-A Series** High AC Current Transducers with Current Output can be used to directly monitor up to 2000A without requiring an additional current transformer. The output from these transducers is a 4-20 mA signal.

FEATURES

- ***Eliminates the need for a current transformer***
- ***Large aperture to accommodate large conductors or wire bundles***
- ***Loop powered 4-20 mA output***
- ***Multi-range input eliminates zero and span adjustments***
- ***Easy installation with integral mounting brackets***

200-3-A

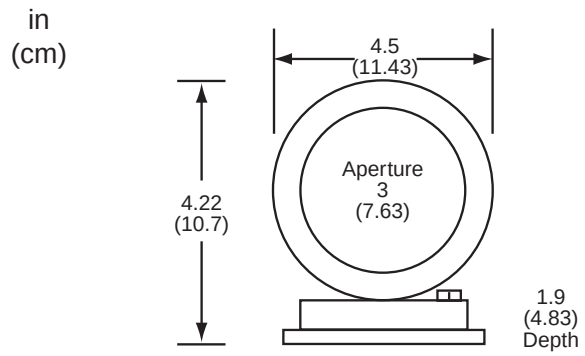
SPECIFICATIONS

MODEL	RANGE	SWITCH POSITION	MAX CONT	MAX FOR 6 SEC	MAX FOR 1 SEC
			(amps)		
200-3-A	0-375 0-500 0-750	375 500 750	750	1500	3750
200-4-A	0-1000 0-1333 0-2000	1000 1333 2000	2000	4000	10,000

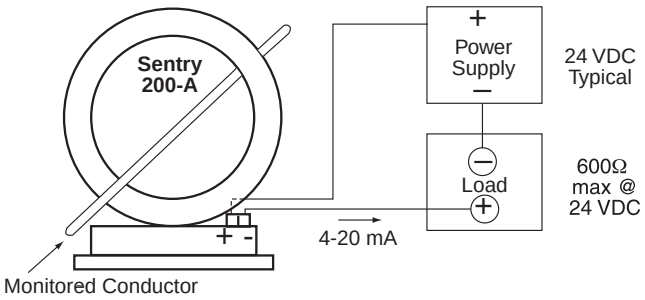
Supply Voltage	24 - 40 VDC
Frequency	50 - 60 Hz
V Models	10 - 400 Hz
Output	4 - 20 mA, loop-powered
Output Impedance	600Ω max @ 24 VDC
Insulation Class	600 VAC
Accuracy	1.0% FS
Response Time	500 ms to 90% of step change
Overrange Limit	Sensor self-limits to 25 mA output
Terminations	Screw terminals
Materials Of Construction	UL 94 flammability rated thermoplastic
Weight	1.3 lb (0.6 kg)
Approvals	UL and ULC listed, File # E129625, CE certified
Warranty	5 years

Note: The standard models are average responding. Also available are variable frequency integration models for monitoring the load side of a VFD.

DIMENSIONS



WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
200-3-A	Solid-core high current transducer, 0-750A, 4-20 mA output
200-3-A-V	Solid-core high current transducer, 0-750A, 4-20 mA output (10 - 400 Hz)
200-4-A	Solid-core high current transducer, 0-2000A, 4-20 mA output
200-4-A-V	Solid-core high current transducer, 0-2000A, 4-20 mA output (10 -400 Hz)

POWER MONITORING & PROTECTION

MISCELLANEOUS TRANSFORMERS

MODELS 189, 190XSUM, 3PT3, CTW3, 468

MODEL 189 ISOLATION CURRENT TRANSFORMER

MODEL	DESCRIPTION
189-005	5:5 Ratio CT secondary isolation transformer

189

MODEL 190XSUM SUMMING CURRENT TRANSFORMER

MODEL	DESCRIPTION
190XSUM2	Summing transformer for 2 CT's 0-5A output
190XSUM3	Summing transformer for 3 CT's 0-5A output
190XSUM4	Summing transformer for 4 CT's 0-5A output
190XSUM5	Summing transformer for 5 CT's 0-5A output

190XSUM

MODEL 3PT3 POTENTIAL TRANSFORMER

MODEL	DESCRIPTION
3PT3-60-242	5kV 3-phase potential transformer 2400:120V
3PT3-60-422	5kV 3-phase potential transformer 4200:120V
3PT3-60-482	5kV 3-phase potential transformer 4800:120V

3PT3

MODEL CTW3 CURRENT TRANSFORMER

MODEL	DESCRIPTION
CTW3-60-T50-100	5kV single phase current transformer 10:5A
CTW3-60-T50-200	5kV single phase current transformer 20:5A
CTW3-60-T50-500	5kV single phase curretn transformer 50:5A
CTW3-60-T50-101	5kV single phase current transformer 100:5A
CTW3-60-T50-201	5kV single phase current transformer 200:5A
CTW3-60-T50-301	5kV single phase current transformer 300:5A
CTW3-60-T50-401	5kV single phase current transformer 400:5A
CTW3-60-T50-501	5kV single phase current transformer 500:5A

CTW3

MODEL 468 POTENTIAL TRANSFORMERS

MODEL	DESCRIPTION
468-208	600V single phase potential transformer 208:120V
468-240	600V single phase potential transformer 240:120V
468-288	600V single phase potential transformer 288:120V
468-480	600V single phase potential transformer 480:120V
468-600	600V single phase potential transformer 600:120V

468

POWER MONITORING & PROTECTION

THREE-PHASE VOLTAGE MONITORS

258, 269

DESCRIPTION

Models 258 and **269** continuously monitor three-phase power lines for phase loss, phase reversal, and low voltage. **Model 269** also monitors for high voltage. **Models 258** and **269** do not require a neutral connection and can be used with any Wye or Delta systems. When correct voltage and phase rotation are applied, the internal relay will energize. A fault condition will de-energize the relay. When the fault is corrected, the monitor will automatically reset.

258

269

SPECIFICATIONS

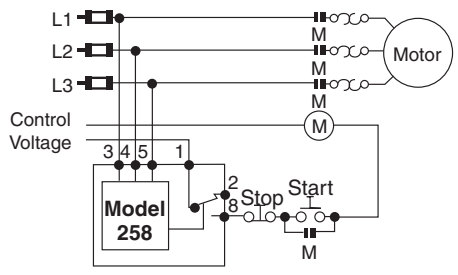
	B258B	258B	A258B	A269	B269	C269
Nominal AC Voltage (VAC phase to phase)	120	208/240	480	120	208/240	480
Adjustment Range (VAC)	85-120	160-240	380-480	110-145 80-115	210-280 170-240	400-540 380-460
Frequency (Hz)	60	60	60	60	60	60
Power Consumption (W)	0.75	1.5	4.5	1.5	3.0	6.0
Response Time	50ms	50ms	50ms	Adj. 1-10 sec	Adj. 1-10 sec	Adj. 1-10 sec
Reset Time	50ms	50ms	50ms	0.25 sec	0.25 sec	0.25 sec
Mounting	RB08-PC	RB08-PC	RB08-PC	Surface	Surface	Surface
Weight oz (g)	5 (141.7)	5 (141.7)	5 (141.7)	9 (255.1)	9 (255.1)	9 (255.1)
Agency Approvals (UL file #E60400)	UR, CSA	UR, CSA	UR*, CSA	UL, CSA	UL, CSA	UL, CSA

Repeat Accuracy ±0.1% of setpoint (fixed conditions)
Reset Type Automatic
Deadband Approx 2%
Output Contacts SPDT
Contact Rating 10A @ 240 VAC, resistive

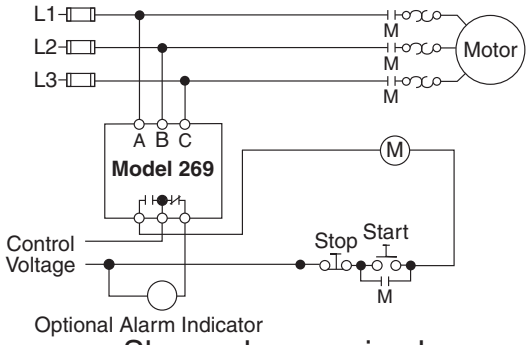
* Condition of acceptability: **A258B** must be used with the **RB08-PC** socket.

Operating temp -40° to 131°F (-40° to 55°C)
Humidity 97% noncondensing
Dimensions
258 1.95"H x 1.95"W x 3.25"D (4.96 x 4.96 x 8.25 cm)
RB08-PC 2.25"H x 2.0"W x 0.625"D (5.7 x 5.1 x 1.6 cm)
269 6.06"H x 3.88"W x 2.82"D (15.4 x 9.9 x 7.1 cm)
Warranty 5 years

WIRING



Shown de-energized
258



Shown de-energized
269

ORDERING INFORMATION

MODEL	DESCRIPTION
A258B	Three-phase voltage monitor, 480 VAC
258B	Three-phase voltage monitor, 208/240 VAC
B258B	Three-phase voltage monitor, 120 VAC (use with Model 3PT3 potential transformer)
RB08-PC	600V/10A socket (required with each 258 voltage monitor)
A269	Three-phase voltage monitor, 120 VAC (use with Model 3PT3 potential transformer)
B269	Three-phase voltage monitor, 208/240 VAC
C269	Three-phase voltage monitor, 480 VAC

POWER MONITORING & PROTECTION

MOTORSAVER™ THREE-PHASE VOLTAGE MONITOR
201A

DESCRIPTION

The MotorSaver™ **201A** Three-Phase Voltage Monitor is an autoranging plug-in voltage monitor designed to protect three-phase motors regardless of size. It is used on 190-480 VAC 50/60 Hz motors to prevent damage caused by single phasing, low voltage, phase reversal, or voltage unbalance. To detect harmful power line conditions, the unique microprocessor-based voltage and phase sensing circuit constantly monitors the three-phase voltages. When a harmful condition is detected, the **Model 201A** MotorSaver's output relay is deactivated after a fixed trip-delay time period. The output relay reactivates after power line conditions return to an acceptable level for a fixed restart delay time. The trip delay prevents nuisance tripping due to rapidly fluctuating power line conditions.

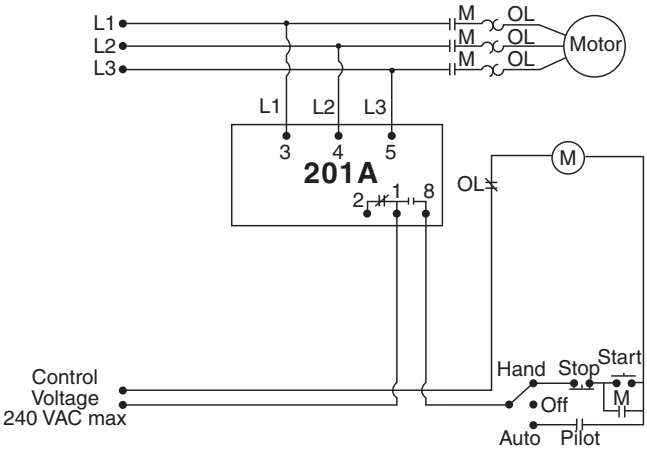
201A

OT08PC

FEATURES

- ***Protection of three-phase motors against single phasing, low voltage, phase reversal, and voltage unbalance***
- ***DIN rail- or surface-mounted socket***
- ***UL and ULC listed, CE certified***
- ***Bicolor LED indication of normal and fault conditions***
- ***Single-phase condition detection regardless of regenerated voltages***

WIRING



Shown de-energized
Model 201A

SPECIFICATIONS

Supply Watts	5W
Frequency	50* or 60 Hz
Transient Protection	2500V for 10 ms
Line Voltage Monitored	Three-phase, 190-480 VAC, adjustable
Low Voltage Trip	90% of setpoint
Low Voltage Reset	93% of setpoint
Reset Delay Time after Fault	2 seconds
Reset Delay Time after Power Loss	2 seconds
Trip Delay Time Low Voltage	4 seconds
Trip Delay Time Phase Fault	2 seconds
Trip Delay Time Unbalance	2 seconds
Voltage Unbalance Reset	4.5%
Voltage Unbalance Trip	6%
Dimensions	2.37"W x 1.75"H x 4.25"L (6.0 x 4.4 x 10.8cm)
Weight	0.56 lb (0.25 kg)
Approvals	UL Listed, File #E68520, CE certified
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

ORDERING INFORMATION

MODEL	DESCRIPTION
201A	MotorSaver three-phase voltage monitor
OT08PC	Socket, 600 VAC, DIN rail or surface mount

POWER MONITORING & PROTECTION

MOTORSAVER™ THREE-PHASE VOLTAGE MONITOR

250A

DESCRIPTION

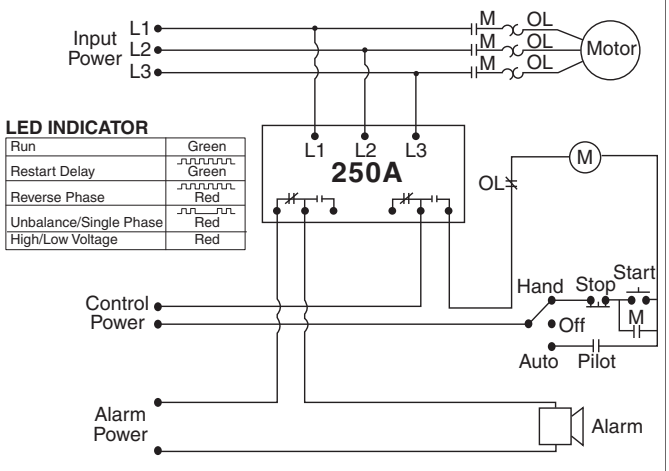
The **MotorSaver™ 250A** Three-Phase Voltage Monitor is an autoranging voltage monitor designed to protect three-phase motors regardless of size. It is used on 190-480 VAC, 50/60 Hz motors to prevent damage caused by single phasing, low voltage, phase reversal, voltage unbalance, and high voltage. Added features include DPDT contacts and an adjustable restart time-delay setting. The unique microprocessor-based voltage and phase-sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions. When a harmful condition is detected, the **Model 250A's** output relays are deactivated after a fixed trip-delay time period. The output relay reactivates after power line conditions return to an acceptable level for an adjustable restart delay time. The trip and reset delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

250A

FEATURES

- ***Protection of three-phase motors from single phasing, low-voltage, phase reversal, voltage unbalance, and high voltage***
- ***Adjustable restart delay***
- ***DPDT contacts***
- ***UL and CUL listed***
- ***Bicolor LED indication of normal and fault conditions***
- ***Detection of single-phase conditions regardless of regenerated voltages***

WIRING



shown de-energized
Motor Protection with Local Alarm

SPECIFICATIONS

Supply Watts	5W
Frequency	50* or 60 Hz
Contact Rating	DPDT, pilot duty 480 VA @ 240 VAC General-purpose 10A @ 240 VAC
Transient Protection	IEC 1000-4-5
Line Voltage Monitored	190-480 VAC, adjustable
Low Voltage Trip	90% of setpoint
Low Voltage Reset	93% of setpoint
Reset Delay Time after Fault	Manual or 2-300 seconds
Reset Delay Time after Power Loss	Manual or 2-300 seconds
Trip Delay Time High Voltage	4 seconds
Trip Delay Time Low Voltage	4 seconds
Trip Delay Time Phase Fault	2 seconds
Trip Delay Time Unbalance	2 seconds
Voltage Unbalance Reset	4.5%
Voltage Unbalance Trip	6%
Operating Temperature	-40° to 158°F (-40° to 70°C)
Dimensions	5.25"W x 2.9"H x 2.92"D (13.3 x 7.4 x 7.4 cm)
Weight	0.875 lb (0.396 kg)
Approvals	UL and cUL listed, File #E68520
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

ORDERING INFORMATION

MODEL	DESCRIPTION
250A	MotorSaver three-phase voltage monitor

POWER MONITORING & PROTECTION

MOTORSAVER™ THREE-PHASE VOLTAGE MONITOR

355 SERIES

DESCRIPTION

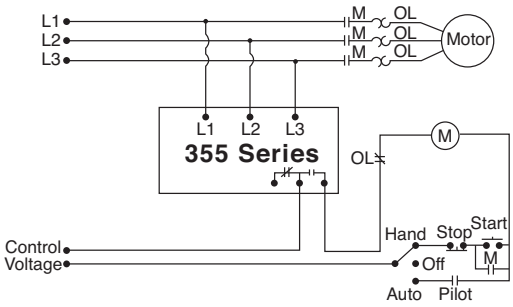
MotorSaver™ **355 Series** Three-Phase Voltage Monitors are designed to protect three-phase motors regardless of size. The **355-200** model monitors 190-240 VAC input voltages, the **355-400** model monitors 380-480 VAC input voltages, and the **355-600** model monitors 575-600 VAC input voltages. The unique microprocessor-based voltage and phase-sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions, including single phasing, low-voltage, phase reversal, voltage unbalance, and high voltage. When a harmful condition is detected, the **355 Series** output relays are deactivated after an adjustable trip-delay time period. The output relay reactivates after power line conditions return to an acceptable level for an adjustable restart delay time. The trip and reset delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

355-400

FEATURES

- ***Protection of three-phase motors from loss of any phase, low-voltage, phase reversal, voltage unbalance, and high voltage***
- ***Adjustable restart delay***
- ***Adjustable trip delay***
- ***Adjustable voltage-unbalance trip point***
- ***Four diagnostic LEDs show overvoltage, undervoltage, voltage unbalance, reverse-phase and normal conditions***
- ***UL and ULC listed***
- ***Single-phase condition detection regardless of regenerated voltages***

WIRING



Shown de-energized

SPECIFICATIONS

Supply Watts	6W maximum
Frequency	50*/60 Hz
Contact Rating	SPDT, pilot duty 470 VA @ 600 VAC (400 or 600V range) General-purpose 10A @ 240 VAC (200V range)
Transient Protection	2500V for 10 ms
Line Voltage Monitored	190-240, 380-480, or 575-600 VAC
Low Voltage Trip	90% of setpoint (±1%)
Low Voltage Reset	93% of setpoint (±1%)
Reset Delay Time after Fault	Manual or 2-300 seconds
Reset Delay Time after Power Loss	Manual or 2-300 seconds
Trip Delay Time High Voltage	2-30 seconds, adjustable
Trip Delay Time Low Voltage	2-30 seconds, adjustable
Trip Delay Time Phase Fault	0.5 seconds
Trip Delay Time Unbalance	2-30 seconds, adjustable
Voltage Unbalance Reset	Trip setting minus 1%
Voltage Unbalance Trip	2% to 8%, adjustable
Dimensions	2.9"H x 5.25"W x 2.9"D (7.4 x 13.3 x 7.4 cm)
Weight	1.0 lb (0.45 kg)
Approvals	UL and cUL listed, File #E68520
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

ORDERING INFORMATION

MODEL	DESCRIPTION
355-200	Three-phase voltage monitor, 190-240 VAC
355-400	Three-phase voltage monitor, 380-480 VAC
355-600	Three-phase voltage monitor, 575-600 VAC

POWER MONITORING & PROTECTION

MOTORSAVER™ THREE-PHASE VOLTAGE MONITOR

455 SERIES

DESCRIPTION

The **Model 455** three-phase voltage monitor combines load and line-side monitoring to alert the user of contact failure or impending contact failure. The line-side monitoring will protect the motor from damaging line-side conditions prior to the motor starting. With the **Model 455**, your motor is fully protected at all times. The motor will not start if a power problem is present.

The monitor is equipped with an infrared LED to communicate with the handheld diagnostic tool, the Informer-MS, to display MotorSaver® data to assist in monitoring and troubleshooting the system. Motor run hours, displayed by the Informer-MS can now be reset on the **Model 455**.

FEATURES

- ***The 455's universal range from 190-480VAC 50/60 Hz provides the versatility needed to handle global applications.***
- ***Four adjustment pots provide versatility for a variety of applications.***
- ***Load and line-side monitoring provides contactor protection.***
- ***Diagnostic LEDs indicate trip status and provide simple troubleshooting.***
- ***Microcontroller-based circuitry for better accuracy and higher reliability.***

Model 455

- ***Single-phase conditions are detected regardless of regenerated voltages.***
- ***Transient protection meets IEEE and IEC standards and permits operation under tough conditions.***

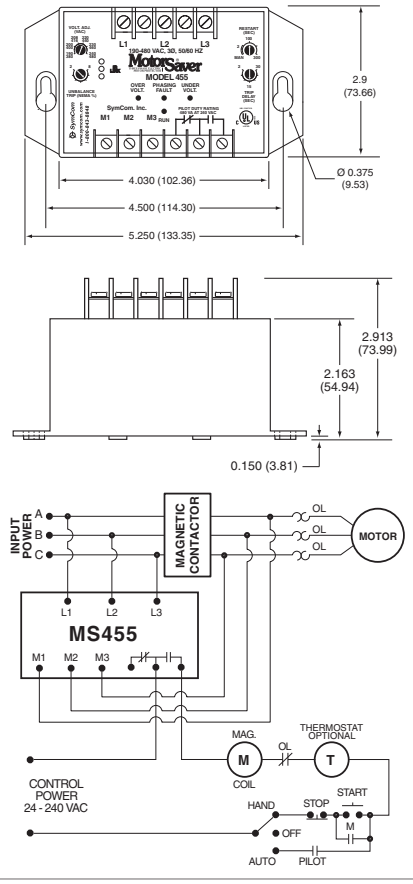
SPECIFICATIONS

Supply Watts	6W maximum
Frequency	50*/60 Hz
Contact Rating	SPDT 480 VA @ 240 VAC pilot duty 10A general purpose SPDT high voltage relay (-480R) 470 VA @ 600 VAC pilot duty
Transient Protection	IEC 1000-4-5; 1995 ± 6K1
Line Voltage Monitored	
455	190 - 480 VAC
455 - 575	475 - 600 VAC
455 - 480R	380 - 480 VAC
Low Voltage Trip	90% of setpoint (±1%)
Low Voltage Reset	93% of setpoint (±1%)
Reset Delay Time after Fault	Manual or 2-300 seconds
Reset Delay Time after Power Loss	Manual or 2-300 seconds
Trip Delay Time High Voltage	2-30 seconds, adjustable
Trip Delay Time Low Voltage	2-30 seconds, adjustable
Trip Delay Time Phase Fault	0.5 seconds
Trip Delay Time Unbalance	2-30 seconds, adjustable
Voltage Unbalance Reset	Trip setting minus 1%
Voltage Unbalance Trip	2% to 8%, adjustable
Dimensions	2.9"H x 5.25"W x 2.9"D (7.4 x 13.3 x 7.4 cm)
Weight	0.88 lb (0.396 kg)
Approvals	UL and cUL listed, #E68520, CS1, C1, CE
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

WIRING

in
(cm)



ORDERING INFORMATION

MODEL	DESCRIPTION
455	Three-phase voltage monitor, 190-240 VAC
455-480R	Three-phase voltage monitor, 380-480 VAC
455-575	Three-phase voltage monitor, 575-600 VAC
INFORMER-MS	Hand held diagnostic/trouble shooting tool

POWER MONITORING & PROTECTION

MOTORSAVER™ THREE-PHASE VOLTAGE MONITOR
460

DESCRIPTION

The MotorSaver™ **Model 460** microcontroller-based voltage and phase sensing circuit constantly monitors the three phase voltage to detect harmful power line conditions. When a harmful condition is detected, the **Model 460** output relay is deactivated after an adjustable trip delay time. The output relay reactivates after power line conditions return to an acceptable level for an adjustable restart delay time. If equipped with the manual reset option, an external normally open momentary reset switch must be closed to reactivate the output relay. The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

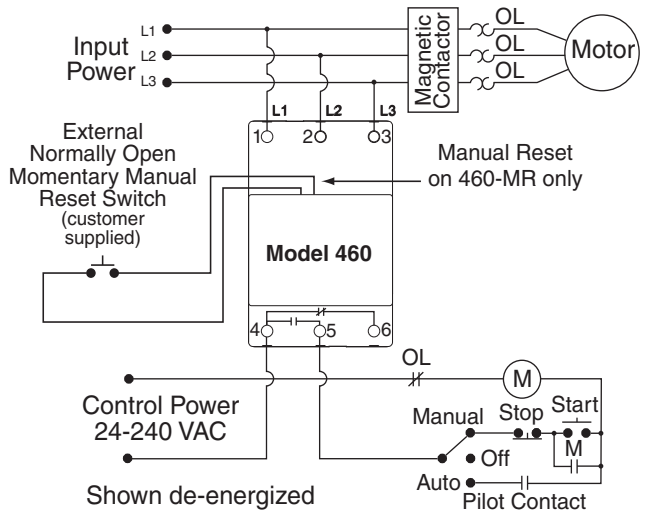
The **Model 460** automatically senses whether it is connected to a 190-240V 60 Hz system, a 440-480V 60 Hz system, or a 380-416V 50 Hz system. An adjustment is provided to set the nominal line voltage from 190-240 or 380-480 VAC. Other adjustments include a 1-30 second trip delay, a 1-500 second restart delay, and a 2% to 8% voltage-unbalance trip point adjustment.

FEATURES

- ***Protection of three-phase motors from loss of any phase, low-voltage, phase reversal, voltage unbalance, and high voltage***
- ***Adjustable restart delay***
- ***Adjustable trip delay***
- ***Adjustable voltage unbalance trip point***
- ***Optional manual reset***
- ***Diagnostic LEDs for indication of trip status***
- ***Single-phase condition detection regardless of regenerated voltages***
- ***Surface or DIN rail mounting***

460

WIRING



SPECIFICATIONS

Supply Watts	6W maximum
Frequency	50*/60 Hz
Contact Rating	SPDT, pilot duty 480 VA @ 240 VAC General-purpose 10A @ 240 VAC
Transient Protection	IEC 1000-4-5, ANSI/IEEE C62.41, UL508
Line Voltage Monitored	190-480
Low Voltage Trip	90% of setpoint (±1%)
Low Voltage Reset	93% of setpoint (±1%)
Reset Delay Time after Fault	1-500 second adjustable
Reset Delay Time after Power Loss	1-500 second adjustable
Trip Delay Time High Voltage	1-30 second adjustable
Trip Delay Time Low Voltage	1-30 second adjustable
Trip Delay Time Phase Fault	1 second fixed
Trip Delay Time Unbalance	1-30 second adjustable
Voltage Unbalance Reset	Trip setting minus 1% (5-8%) Trip setting minus 0.5% (2-4%)
Voltage Unbalance Trip	2% to 8%, adjustable
Operating Temperature	-4° to 158°F (-20° to 70°C)
Dimensions	3.5"H x 2.1"W x 2.4"D (8.9 x 5.3 x 6.1 cm)
Weight	1.0 lb (0.45 kg)
Approvals	UL and cUL listed, File #E68520, CE
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

ORDERING INFORMATION

MODEL	DESCRIPTION
460	Three-phase voltage monitor, 190-480 VAC
460-MR	Three-phase voltage monitor, 190-480 VAC with manual reset

POWER MONITORING & PROTECTION

MOTORSAVER™ SINGLE-PHASE VOLTAGE MONITOR

50R SERIES

DESCRIPTION

The MotorSaver™ **50R Series** Single-Phase Voltage Monitor voltage sensing circuit constantly monitors the single-phase power for a low voltage condition. When a harmful condition is detected, the **50R Series** output relay is deactivated after a fixed trip delay time. The output relay reactivates after power line conditions return to an acceptable level for a fixed restart time delay period. The trip delay prevents nuisance tripping due to rapidly fluctuating power line conditions. Single-phase motors on fans, compressors, air conditioners, heat pumps, water pumps, and small conveyor motors can be protected by the **50R Series**.

FEATURES

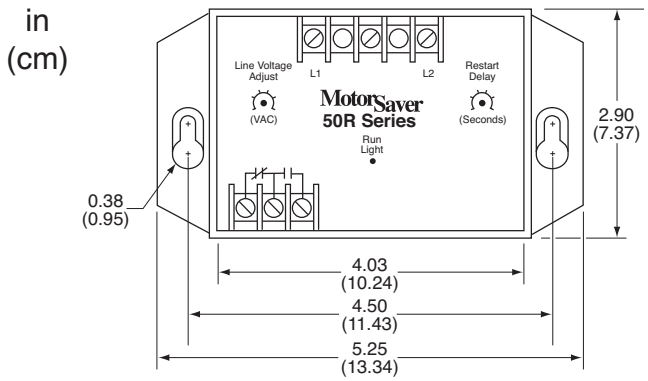
- ***Single-phase motor protection from low voltage conditions***
- ***Two-color LED for normal and fault condition indication***
- ***General-purpose relay for switching loads up to 10A at 240 VAC***
- ***UL and ULC listed***

SPECIFICATIONS

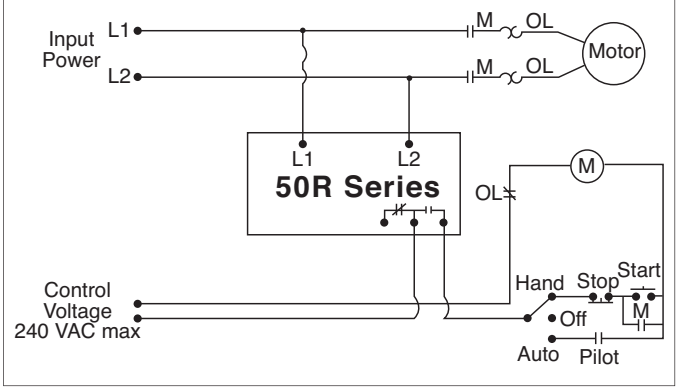
Frequency	50* or 60 Hz
Contact Rating	SPDT, 10A general-purpose or 480 VA @ 240 VAC
Line Voltage Monitored	
50R-100	95-120 VAC
50R-200	190-240 VAC
Low Voltage Trip	90% of set point
Low Voltage Reset	93% of set point
Reset Delay Time after Power Loss	2 seconds
Trip Delay Time Low Voltage	2 seconds
Weight	1.0 lb (0.45 kg)
Approvals	UL and cUL listed, file #E68520
Warranty	5 years

* 50 Hz will increase all delay times by 20%.

DIMENSIONS



WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
50R-100	MotorSaver Single-Phase Voltage Monitor, 95-120 VAC
50R-200	MotorSaver Single-Phase Voltage Monitor, 190-240 VAC

POWER MONITORING & PROTECTION

SURGE PROTECTION CHART

SURGE PROTECTION CHART

	SURGE PROTECTION		POWER AC/DC							DDC POINTS				COMMUNICATON						
Device	Technology 1st/2nd/3rd/4th Stage	Clamp Level	5V	12V	24V	36	48	75	120V	DI	AI/AO	DO-24V Fltg Ctrl	DO-120V	RS 232	RS 422	485	Phone	Ethernet	Arcnet	Modem Short Haul
DTK-120SR	TP MOV, LC, Fused MOV	160V							X				X							
HSP-121BT1RU	MOV, F, LC, MOV	315V							X				X							
FAS-TEL	AD, F	300V															X-> (model dial in w/ring)			
PC642C-008	GT, AD, PTC	8V													X	X				
PC642C-012	GT, AD, PTC	12V								X								X		
PC642C-015	GT, AD, PTC	15V								X										X
PC642C-030	GT, AD, PTC	30V									X	X		X					X	
DTK-2MHLP5BWB	AD, GT, F	6.8	X							X	X				X	X		X		
DTK-2MHLP12BWB	AD, GT, F	21.6		X						X	X			X				X		
DTK-2MHLP24BWB	AD, GT, F	39			X					X	X	X							X	
DTK-2MHLP36BWB	AD, GT, F	57				X				X	X									
DTK-2MHLP48BWB	AD, GT, F	76					X			X	X									
DTK-2MHLP75BWB	AD, GT, F	108						X		X	X									
392-SVSR2	Dual GT	300-750V	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X
DTK-RJ11	MOV, F	184-224V															X-> (no ring direct connect)			
DTK-2LVLP	MOV	15V or 27V													X	X		X	X	X
DTK-120HW	MOV	130V							X				X							
V130LA1	MOV	130V							X				X							
V39ZA1 / V47ZA1	MOV	25V			X					X	X	X								
1.5KE56CA	Transzorb (AD)	56V								X	X	X								
DRS-008	GT, AD, PTC	8V													X	X				
DRS-015	GT, AD, PTC	15V								X								X		X
DRS-030	GT, AD, PTC	30V									X	X		X					X	
DRS-036	GT, AD, PTC	36V									X	X		X					X	

SURGE PROTECTION TECHNOLOGIES

Device Technology

Fuse (F) Fuses are used to suppress high currents by failing open to the protected circuit if other surge devices fail. Response time is less than one second.

LC Inductive/Capacitive LC passive filter @ 60 Hz.

Thermal Fuse Thermal fuses are used to cut out on high temperatures by failing open to the protected circuit. Response time is several seconds.

Gas Tube (GT) Gas tubes are used to shunt to ground very high voltages (>300V), such as lightning. Response time is about 150 milliseconds.

MOV or Varistor Metal oxide varistors (MOV) are used to shunt to ground low to medium voltages (15-130V) at low current. Typical response time is five nanoseconds.

Zener Diode Zener diodes are used to clip and shunt to ground medium voltages (200V). Typical response time is less than one nanosecond.

PTC Positive temperature coefficient (PTC) thermistors open the circuit during a surge and suppress low voltages (8-30V). Typical response time is less than one second.

Avalanche Diode (AD) or Transorb Silicon avalanche suppression diodes are used to clip and shunt to ground low to medium voltages (8-30V). Typical response time is less than five nanoseconds.

TP MOV Thermal Protected MOV

Types of Surges

Lightning Typical rise time of 1-20 microseconds, surge currents 20 kA (20,000A) to 250 kA

Power Fluctuations Typically occur in 20-300 microseconds.

SURGE PROTECTION CHART & TECHNOLOGIES

1. Select a surge protector with a clamping voltage that is higher than the system voltage that is being protected.
2. Apply the "Protection Zone Concept," and keep all grounds inside the protection zone at the same potential. If different ground potentials are present on electronic equipment, damage will occur regardless of the suppression used.
3. Protect all electrical and data circuits entering or leaving the protection zone at the protection zone ground window. Doing this keeps circuits at a safe voltage with respect to the ground window. This safe voltage is the clamp voltage (let-through voltage) of the respective suppressors.

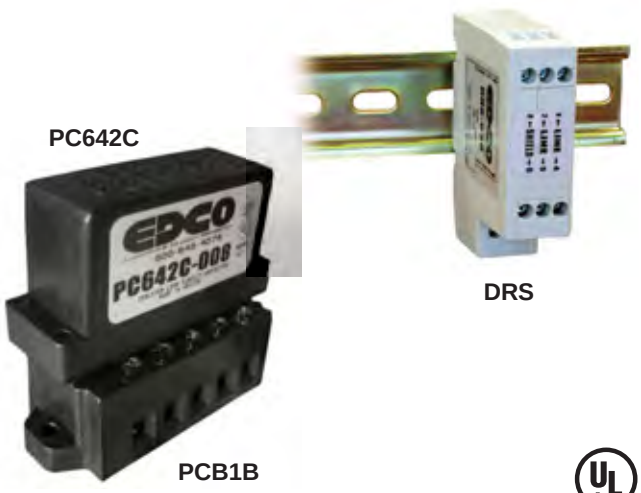
POWER MONITORING & PROTECTION

DATA LINE SURGE PROTECTOR

DRS, PC642C SERIES

DESCRIPTION

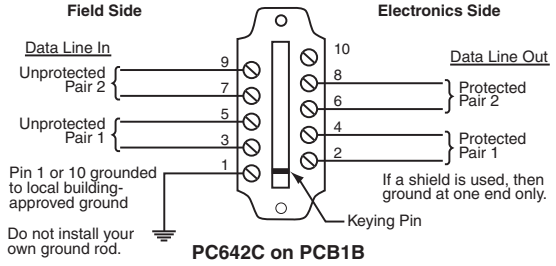
The **Model PC642C Series** surge suppressor is a dual-pair (four wire) and the **DRS Series** is a single pair (two-wire) DIN rail mount module implementing three-stage hybrid technology. These modules protect against over-voltage transients with gas tubes and silicon avalanche components. In addition, sneak and fault currents are mitigated with automatic resetting fuses (PTCs). The PTCs increase resistance several orders of magnitude when over currents are present and return to normal when over-currents are removed. The ability to self-restore in this manner significantly increases suppressor performance and survivability.



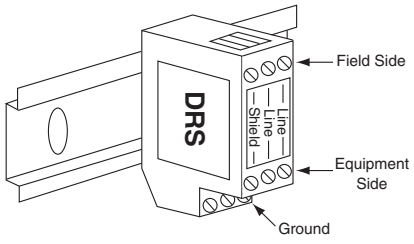
FEATURES

- ***Lightning protection for low voltage signal lines***
- ***Three-stage protection***
- ***Plug-in and DIN rail mount modules***
- ***Automatic recovery***
- ***Nanosecond response time***

WIRING



PC642C on PCB1B



SPECIFICATIONS

Voltage Clamp	(±10%) 8, 15, 30, or 36V
Response Time	<1 ns
Peak Surge Current	<10 kA (8 x 20 µs)
Life Expectancy	>100 occurrences @ 2000A, 8 x 20 µs
Series Resistance	5Ω nominal
Operating Temperature	-40° to 185°F (-40° to 85°C)
Dimensions	
PC642C, PCB1B	2.4"H x 1.0"W x 2.0"D (6.1 x 2.5 x 5.1 cm)
DRS	2.95"H x 0.8"W x 2.35"D (7.5 x 2.0 x 6.0 cm)

Capacitance	1500 pF; PC642 w/ LC option: 50 pF
Operational Current	Maximum 150 mA @ clamp voltage
Protector	
Primary	Three-element gas tube
Secondary	Rugged solid-state avalanche diode
Third	Positive temp coefficient device (PTC)
Approvals	UL497B, File #E175287
Weight	0.5 lb (0.23 kg)
Warranty	1 year

ORDERING INFORMATION

MODEL	DESCRIPTION	
PC642C	Dual-pair (four-wire) surge protector, base mount (PCB1B required)	
DRS	Single-pair (two-wire) surge protector, DIN rail mount	
	-008	Clamp voltage, 8V
	-015	Clamp voltage, 15V
	-030	Clamp voltage, 30V
	-036	Clamp voltage, 36V
		-LC Low capacitance option (PC642C only)
PCB1B	Mounting/connector base for PC642C	

POWER MONITORING & PROTECTION

SURGE PROTECTORS
DTK SERIES

DESCRIPTION

The **DTK Series** products are general-purpose MOV based power line, telephone line, and data line surge protectors. They are designed to protect electronic equipment from surges and spikes that may be present on power inputs, communications, or data lines.

FEATURES

- ***Metal-Oxide Varistor (MOV) technology***
- ***Self-restoring after each surge within ratings***
- ***Nanosecond response time***
- ***UL listed***

DTK-RJ11

DTK-120HW


DTK-2LVLP

SPECIFICATIONS

DTK-RJ11 Data/Phone Line Protection

Service Voltage	130 VRMS
Let Through Voltage	184-224V
Continuous Current	150 mA
Protection	RJ11/RJ14/RJ45 female to ground
Energy Dissipation	76 joules
Surge Current	9000 amps/pair
Response Time	<5 ns
Connections	RJ11/RJ14/RJ45 female in/out + ground wire
Operating Temperature	-40° to 158°F (-40° to 70°C)
Operating Humidity	Maximum 95% (non-condensing)
Dimensions	1.7"H x 3.0"W x 1.2"D (6.9 x 7.8 x 2.9 cm)
Weight	0.25 lb (0.11 kg)
Approvals	UL 497A, File #E163310
Warranty	1 year

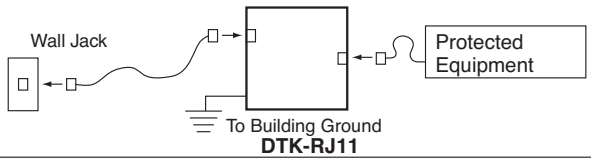
DTK-2LVLP Low-Voltage Data Line Protection

Let Through Voltage	**X:** 15 VRMS, **LV:** 27 VRMS
Continuous Current	Unlimited
Accuracy	**X:** 15 VRMS, **LV:** 27 VRMS
Protection	L-G (all lines protected)
Energy Dissipation	**X:** 8 joules/pair **LV:** 17 joules/pair
Surge Current	2000 amps/pair
Response Time	<5 ns
Connections	Screw terminals 22-16 AWG wire
Dimensions	1.6"H x 3.0"W x 1.6"D (4.1 x 7.6 x 4.1 cm)
Weight	0.25 lb (0.11 kg)
Approvals	UL 497B, File #E163310
Warranty	1 year

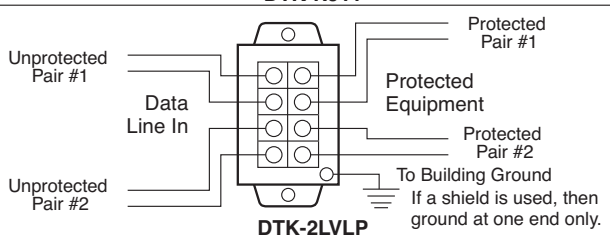
DTK-120HW AC Hard-Wired Surge Protection

Service Voltage	110/125 VAC
Frequency	50/60 Hz
Filtering	RFI/EMI noise
Continuous Current	Unlimited
Protection	L-N, L-G, N-G
Energy Dissipation	255 Joules
Clamping Level	130 VRMS/185V peak
Surge Current	19,500A
Response Time	<5 ns
Connections	3/4" hub-mount 3-12 AWG leads
Dimensions	2.9"H x 2.8"W x 1.6"D (7.3 x 7.1 x 4.0 cm)
Weight	0.5 lb (0.22 kg)
Approvals	UL 1449 3rd Edition, cUL 1449, IEEE C62.41B, File #E136659
Warranty	10 years

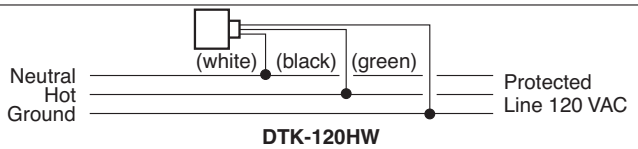
WIRING



DTK-RJ11



DTK-2LVLP



DTK-120HW

ORDERING INFORMATION

MODEL	DESCRIPTION
DTK-120HW	120V inline surge protector
DTK-RJ11	130V telephone line surge protector
DTK-2LVLPX	15V four-wire data line surge protector
DTK-2LVLPLV	27V four-wire data line surge protector

Note: Other models and voltage levels available on a special order basis. Contact Kele for more details.

POWER MONITORING & PROTECTION

POWER/DATA SURGE PROTECTOR

DTK-120SR, DTK-2MHLP

DESCRIPTION

The new **Model DTK-120SR** is an in-line, four-stage, power-line surge protector with EMI/RFI filtering. It is designed for mounting in an enclosure or control panel. Series installation eliminates the need to dedicate a circuit breaker for surge protection while allowing for installation flexibility. The 120SR meets stringent government and military specs for fire panel applications and is suitable for use on critical 20 Amp loads.

The **Model DTK-2MHLP** series of signal, data and loop circuit surge protectors provide robust protection in a compact package. Designed for ease of installation with convenient field-replaceable modules. The 2MHLP protects two circuit pairs per module. Applications include protection of 4-20mA current loops, alarm pane NAC, SLC and IDC loops, and burglar alarm panels.

NEW!

DTK-120SR

DTK-2MHLP

FEATURES

DTK-120SR

- ***Series design for fast response and best protection***
- ***Four-stage hybrid circuit design***
- ***User replaceable fusing***
- ***EMI/RFI filtering***
- ***Compact design***
- ***Screw terminals w/safety cover***
- ***LED's for protection status, ground presence, ground fault indication and fuse status***

DTK-2MHLPWB

- ***Multi-stage, SAD technology, hybrid design***
- ***Hard-wire mounting base***
- ***Field replaceable, hot swappable, modular edge card connection design***
- ***Multiple voltage levels for variety of voice/data applications***
- ***Two pairs protected per module, can be extended to ten pairs using a common ground using DTK-MB base***

SPECIFICATIONS

DTK-120SR

Service Voltage	120V
MCOV	150V
Suppressed Voltage Rating	600V
Continuous Current	20A
EMI/RFI Attenuation	Up to 35dB, 100kHz-100MHz
Surge Current	54,000 amps
Protection	L-N, L-G, N-G
Operating Temperature	32° to 104°F (0° to 40°C)
Dimensions	6.87"W x 3.50"H x 2.50"D (17.45 x 9.06 x 6.35 cm)
Weight	0.76 lb (0.45 kg)
Approvals	UL1449, 3rd Edition
Warranty	10-year limited

DTK-2MHLPWB

Service voltage			
5B	0-5 VDC	**36B**	36 VDC
12B	12 VDC	**48B**	48 VDC
24B	24 VDC	**75B**	75 VDC
MCOV/Let-Through Voltage			
5B	5/6.8 VDC	**36B**	48/57 VDC
12B	18/21.6 VDC	**48B**	64/76 VDC
24B	33/39 VDC	**75B**	90/108 VDC

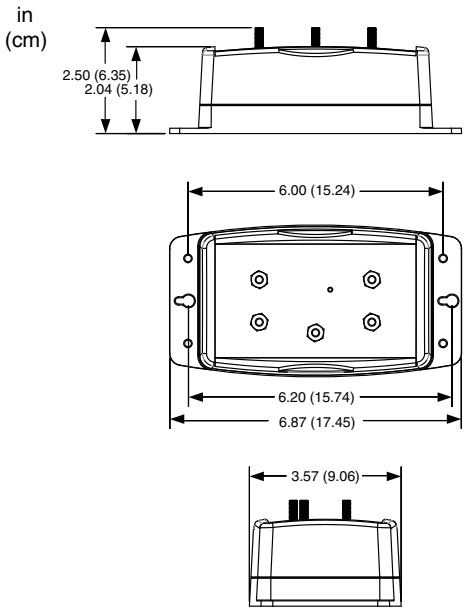
Continuous Current	5A
Surge Current	20kA
Data Rate	200kbps (5V) to 2Mbps (130V)
Protection	L-G (all lines protected)
Connections	Edge card into DTK-MB mounting base
Operating Temperature	-40° to 158°F (-40° to 70°C)
Dimensions	4.5"W x 1.75"H x 3.0"D (11.5 x 4.5 x 7.6 cm)
Weight	0.078 lb (0.036 kg) - with base
Approvals	UL 497B, DTK-120SR Recognition, File # E328921, DTK-2MHLP UL File #E14557
Warranty	10-year limited

NEW!

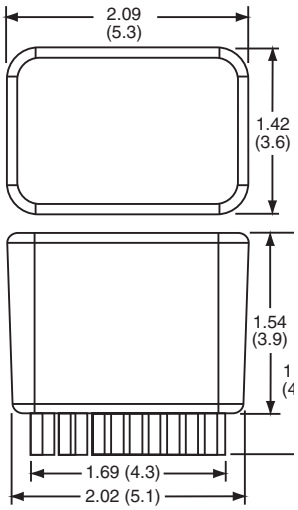
POWER/DATA SURGE PROTECTOR

DTK-120SR, DTK-2MHLP

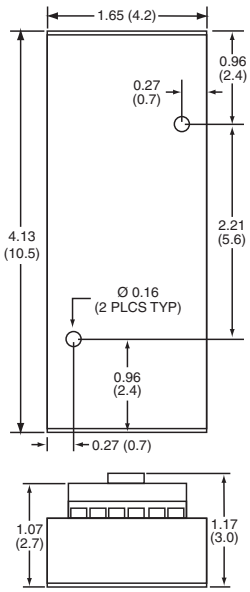
DIMENSIONS



DTK-120SR

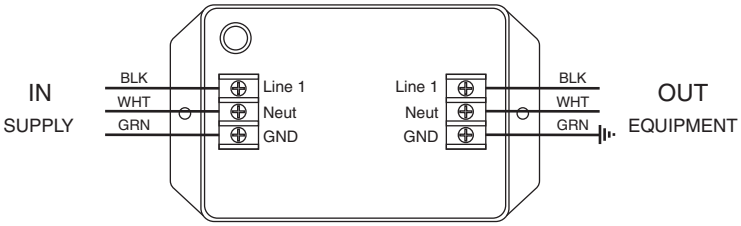


DTK-2MHLP



DTK-MB

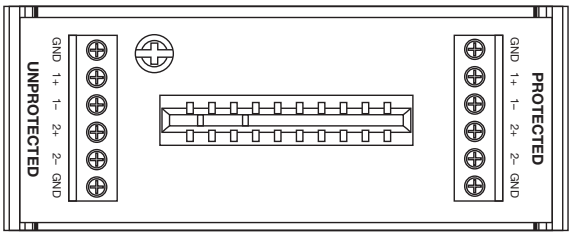
WIRING



DTK-120SR

Expected System Voltages			
120 VAC	L-N	L-G	N-G
Voltages	120	120	0

Note: If the DTK-120S15A is not installed inside the control panel/cabinet, provide an appropriate enclosure per NEC, NFPA, and all applicable codes.



DTK-MB

ORDERING INFORMATION

MODEL	DESCRIPTION
DTK-2MHLP5BWB	Surge protector, 5 VDC data line with base
DTK-2MHLP12BWB	Surge protector, 12 VDC data line with base
DTK-2MHLP24BWB	Surge protector, 24 VDC data line with base
DTK-120SR	Surge protector, 120 VAC in-line, 20A continuous

NEW!

POWER MONITORING & PROTECTION

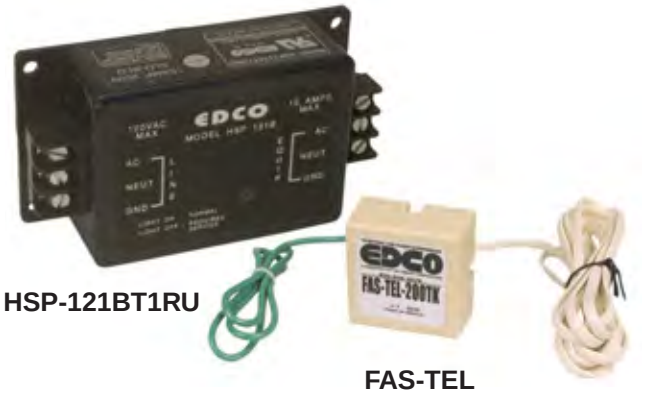
POWER & DATA LINE SURGE PROTECTOR

FAS-TEL, HSP-121BT1RU

DESCRIPTION

The **HSP-121BT1RU** is an advanced, three-stage, hybrid solid-state power line protector. It is an in-line style surge protector designed for mounting in an enclosure or control panel to protect sensitive electronic controls from noise, surges, and spikes that are present on the power lines. The **HSP-121** is UL recognized.

The **FAS-TEL** is an advanced two-stage hybrid, solid-state phone and data line surge protector. It is designed to protect electronic equipment from unwanted surges and transients that may be present on the phone line or communications data lines. The **FAS-TEL** is UL Listed.



HSP-121BT1RU

FAS-TEL

FEATURES

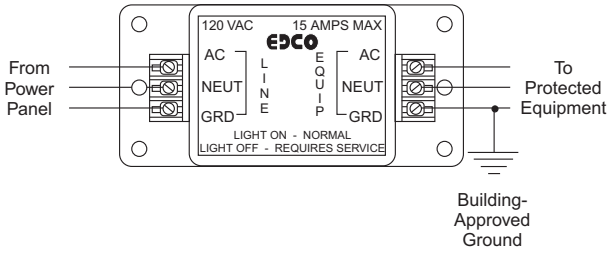
- ***Protection from overvoltage transients***
- ***Three-stage hybrid technology***
- ***Automatic recovery***
- ***Fast response time***

SPECIFICATIONS

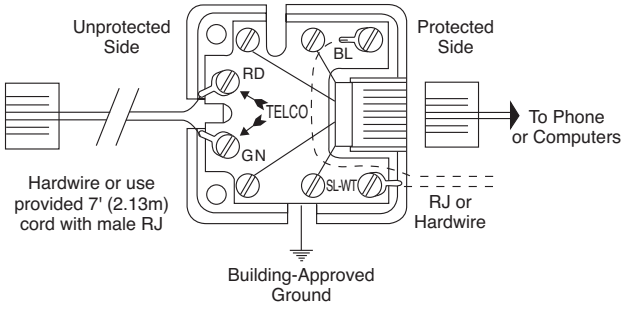
HSP-121BT1RU	
Supply Voltage	120 VAC, 60 Hz
Supply Current	15A
LED Indication	Extinguishes on overload or internal protection failure
Clamping Level	Maximum 315V L-N, 350V L-G
Clamping Category	330V L-N, 400V L-G ANSI/IEEE C62.41 1991-CAT.C1/B3
Surge Current	Maximum 10,000A
Fusing	15A slowblow (GF-15S) Blown fuse will disconnect load from power source.
Response Time	<5 ns
Connections	Terminals
Operating Temperature	-3° to 186°F (-20° to 85°C)
Dimensions	2.95"H x 5.25"W x 2.0"D (7.5 x 13.3 x 5.1 cm)
Weight	0.83 lb (0.38 kg)
Approvals	UL 1449A recognized component, File# E324279
Warranty	1 year

FAS-TEL	
Signal Voltage	220V Peak
Continuous Current	Unlimited
Nominal Breakdown Voltage	270V
Protection	Between TIP/RING/GND
Capacitance	50 pF
Series Resistance	8Ω
Surge Current	Maximum 100A, 10 x 1000 µs
Response Time	<1 ns
Connections	1 female, 1 male RJ11 jacks
Operating Temperature	-40° to 149°F(-40° to 65°C)
Dimensions	2.0" H x 2.0" W x 1.0" D (5.1 x 5.1 x 2.5 cm)
Weight	0.5 lb (0.22 kg)
Approvals	UL 1449 listed, File #E118759
Warranty	1 year

WIRING



HSP-121BT1RU



FAS-TEL

ORDERING INFORMATION

MODEL	DESCRIPTION
HSP-121BT1RU	120 VAC inline surge protector with terminal block
FAS-TEL	Data line/telephone line protector

001-901-382-6084 International | 888-397-5353 USA | kele.com

POWER MONITORING & PROTECTION

LIGHTNING ARRESTER
392-SVSR2

DESCRIPTION

The **Model 392-SVSR2** is a two-pair gas tube lightning arrester in a plastic outdoor enclosure. It protects the communication lines that run between buildings against high voltage transients caused by motors, transmitters, lightning, etc.

Transients can be harmful and even capable of destroying building automation systems. It is recommended that the **Model 392-SVSR2** be used at all points where communication cables exit or enter a building. To protect low voltage communication inputs on Building Automation Systems, this device should be used in conjunction with an appropriate voltage level surge protector such as a Model DTK-2LVLP.

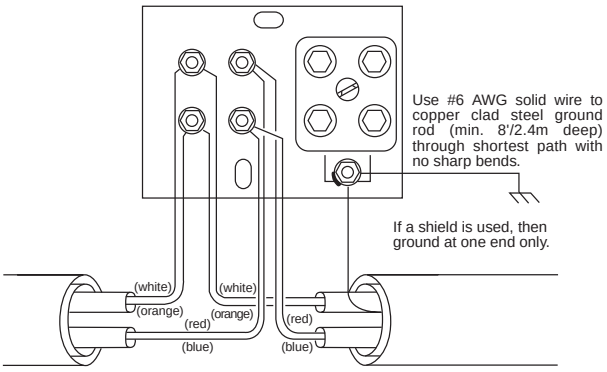
392-SVSR2

SPECIFICATIONS

Impulse Breakdown	
@100/V/µsec	300-750V
DC Holder	150 VDC extinguishing in less than 150 ms
Insulation Resistance	
(initial)	<100 MΩ
Capacitance	5 pF
Impulse Life Specification Rated Heavy-Duty	
	80% survival to 400 surges of 500A
AC Discharge	
Current	65A, 11 cycle, 60 Hz
End-Of-Life Limits	
Insulation Resistance	<1 MΩ
DC Breakdown Voltage	<180V
Impulse Breakdown Voltage	<900V
Vented (back-up)	
DC Breakdown Voltage	<1600V (100-200 avg)
Max Single	
Impulse Discharge Current	10 kA, 8 x 20 µsec surge
Dimensions	3.5"H x 3.75"W x 2.5"D (8.9 x 9.5 x 6.4 cm)
Weight	0.85 lb (0.39 kg)
Approvals	UL listed File #E2332

WIRING

392-SVSR2



Notes: To protect low-voltage communication circuits, this device should be used in conjunction with an appropriate voltage level surge protector such as the Model DTK-2LVLP.

When applying surge protectors, use of the protection zone concept is recommended.

ORDERING INFORMATION

MODEL	DESCRIPTION
392-SVSR2	Lightning arrester

POWER MONITORING & PROTECTION

METAL OXIDE VARISTOR, TRANSZORB

V130LA1, V39ZA1, V47ZA1, 1.5KE56CA

DESCRIPTION

Metal Oxide Varistor (MOV) and **Transzorb Voltage Transient Suppressors** reduce high voltage spikes that could damage or confuse sensitive electronic circuits. Voltage spikes often will cause digital logic circuits to select an incorrect logic state or lock up entirely.

CAUSES OF VOLTAGE SPIKES

Voltage spikes appear in the user's circuit in three main ways:

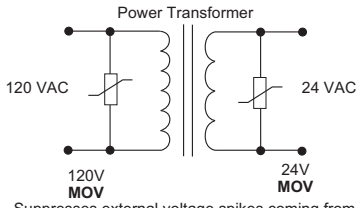
1. Voltage spikes come in on the power distribution bus and are coupled to the user's circuits by the winding-to-winding capacitance of the user's power transformers.
2. Voltage spikes are generated in the power transformer secondary when the power transformer primary is turned off and the transformer's magnetic field collapses.
3. Voltage spikes are generated within the user's circuits when an inductive load is switched off and the load's magnetic field collapses. Voltage noise is also generated at the switched contacts and is radiated to the wires leading to the user's microprocessor.

OPERATION

When a voltage at or below the suppressor's nominal voltage is applied, the suppressor acts essentially like an open circuit. When a high-voltage spike appears across the suppressor the suppressor conducts or turns on, shunting the excess energy to the circuit return path, thereby reducing the amplitude of the voltage spike. When the voltage spike subsides, the suppressor reverts back to its open circuit state. **MOV** suppressors are bi-directional and can be used to protect both AC and DC circuits. They provide a somewhat soft clamping action in that the amplitude of the reduced voltage spike rises noticeably with the amount of energy contained in the spike. **Transzorb** suppressors come in unidirectional and bi-directional versions. The uni-directional versions are polarity-sensitive and can only be used in DC applications. The bi-directional versions may be used in both AC and DC circuits just like the **MOV. Transzorbs** have a faster response time and a much harder clamping action than **MOVs** because voltage spikes are clipped at a more consistent level independent of their energy content. The **Transzorb** sold by Kele is a bi-directional version.

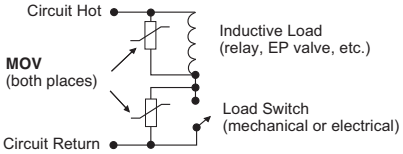
Note: Kele carries the varistors and transzorbs most often specified by the BAS manufacturers. They are general-purpose in nature and should cover most applications at the recommended voltage.

WIRING



Suppresses external voltage spikes coming from the power distribution bus and the spikes from switching the power transformer off.

Transformer Installation



Reduces mechanical switch arcs and electronic switch over-voltage breakdown. MOV voltage should match load circuit voltage.

Coil and Switch Installation

AGENCY APPROVALS

V130LA	**UL-recognized component, File #E75961 and E56529**
V39ZA1/V47ZA1	**UL-recognized component, File #E135010**
1.5KE56CA	**UL-recognized component, File #E116110**

ORDERING INFORMATION

MODEL	DESCRIPTION
V130LA1	130 VAC/175 VDC varistor voltage transient suppressor
V39ZA1	25 VAC/31 VDC varistor voltage transient suppressor
V47ZA1	30 VAC/38 VDC varistor voltage transient suppressor
1.5KE56CA	24 VAC/VDC transzorb voltage transient suppressor

SINGLE-PHASE VOLTAGE DROP

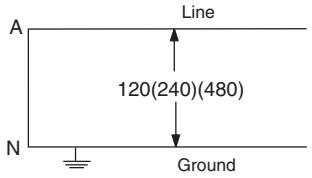
$$\Delta V = \frac{\text{amps x (length of circuit in ft) x 2* x (ohms per 1000 ft)}}{1000}$$

$$\Delta V = \frac{I \times L \times 2^* \times R}{}$$

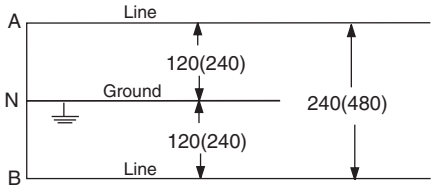
* Change to 1.73 for three-phase

Wire Size AWG (Stranded)	ohms/1000 ft (@ 77°F)
24	25.67
22	16.46
20	10.35
18	6.512
16	4.095
14	2.576
12	1.620

SINGLE-PHASE (VAC)

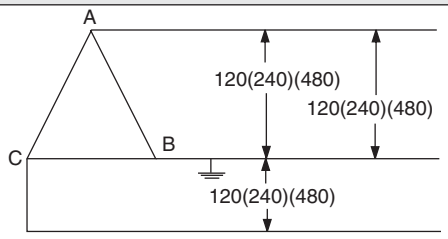


Two-wire

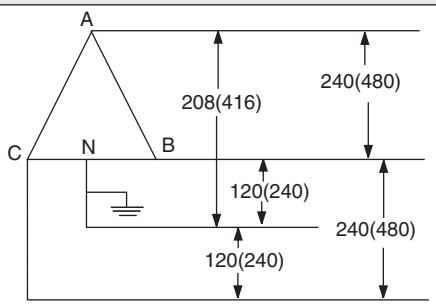


Three-wire

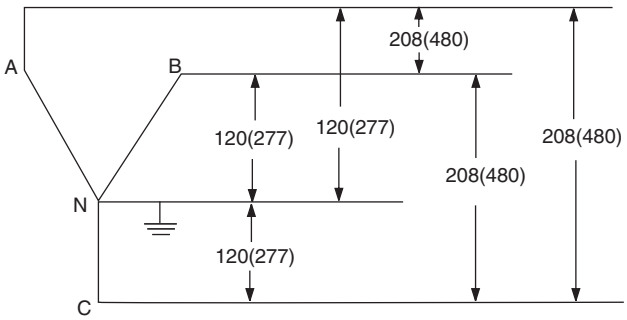
POLYPHASE (VAC)



Three-phase Three-wire



Three-phase Four-wire Delta



Three-phase Four-wire Wye

POWER MONITORING & PROTECTION

CURRENT TRANSFORMER SELECTION GUIDE

DETERMINE MONITORING POINT IN SYSTEM

Can conductor be disconnected to slide into a solid-core (one-piece) CT?

YES / NO

DETERMINE CT STYLE

SOLID CORE (5A Secondary)

Model	Description
RL or **AL**	Round
SFT	Square with base*
SHT	Square without base*

* Non-stock items

MEASURE LARGEST DIAMETER OF CONDUCTOR OR BUS

Use Model	If diameter is **less than** in (cm)
2	0.7 (1.8)
5	1.00 (2.5)
7	1.8 (4.6)
8	2.3 (5.8)
Call Kele	over 2.75 (77.0)

SPLIT CORE 500, 501, 600, 601, SCT

5A Secondary **500, 501, 600, 601**

0.333V Secondary **SCT Series**

MEASURE LARGEST DIAMETER OF CONDUCTOR OR BUS

Use Model	If diameter is **less than** in (cm)
600	1.5 x 5 (3.8 x 12.7)
601	4 x 4 (10.2 x 10.2)
500	3.5 x 6.5 (8.9 x 16.5)
501	3.5 x 11 (8.9 x 28.0)

Note: Bus bar may fit diagonally

Use Model	If diameter is **less than** in (cm)
SCT-0400	0.4 x 0.4 (1 x 1)
SCT-0750	0.75 x 0.75 (1.9 x 1.9)
SCT-1250	1.25 x 1.25 (3.2 x 3.2)
SCT-2000	2 x 2 (5.1 x 5.1)

Note: Bus bar may fit diagonally

NOTE: Except for **SCT Series**, the above dimensions are approximately 0.5" less than the CT hole size for ease of installation.

DETERMINE CT RATING

DETERMINE MAXIMUM AMPS BY

1. Size of upstream breaker,
2. Size of upstream fuse, or
3. Maximum current conductor can carry.
   (Refer to National Electrical Code Tables: 310-16 through 310-19)
   Use 80% of the above value in selecting the CT ratio primary amps.
4. Analysis of last 12 months demand billing can be used to determine maximum kW (consider possible load growth)

SELECT THE RATIO

CT ratio = maximum primary amps followed by the secondary amps
Example: 500:5 = 500 maximum primary amps and 5 secondary amps
Select the ratio code from the catalog page of the selected style (round up if between two sizes).

TO USE MORE READILY AVAILABLE CTs

CT sizing can be changed by looping the monitored conductor through multiple times. ***Example:*** A 200:5 CT with conductor doubled becomes a 100:5 or with conductor through four times becomes a 50:5 (limited to #8 wire or smaller)

Note: The burden in VA is the allowable load on the secondary of the CT. This consists of the sum total of the wiring and all connected devices. For a long secondary cable runs or to make burden calculations, contact Kele or visit www.kele.com.

DETERMINING BURDEN FOR CURRENT TRANSFORMERS

If a current transformer (CT) reads low, then the secondary is probably overloaded. Burden is the load which may be imposed on a transformer secondary by cables and connected devices without causing an error greater than the stated accuracy classification. Lower burden and proper sizing can improve the accuracy of the CT. It is a good idea to check your CT burden if the CT primary rating is under 200A.

Burden is expressed in ohms impedance or volt-amperes for current transformers. The standard burden limits are defined by ANSI C57.13.

CURRENT TRANSFORMERS

CTs carry an ANSI burden designation "B" followed by the ohms limit (e.g., B0.1). Below is a typical CT specification in our catalog:

Model #	Current Ratio	ANSI Meter Class at 60 Hz		
		B0.1 2.5 VA	B0.2 5 VA	B0.5 12.5 VA
600T-122	1200:5	0.6	1.2	1.2

Allowable burden in ohms (0.5Ω max)

Allowable burden in volt-amperes (12.5 VA max)

Accuracy at burden above (e.g., ±1.2%)

CT primary to secondary ratio

You can see from the above example that if the total burden (wire plus device) is only 2.5 VA, the accuracy of the reading will be ±0.6%. If a higher burden (up to 12.5 VA) is used, the accuracy will be ±1.2%.

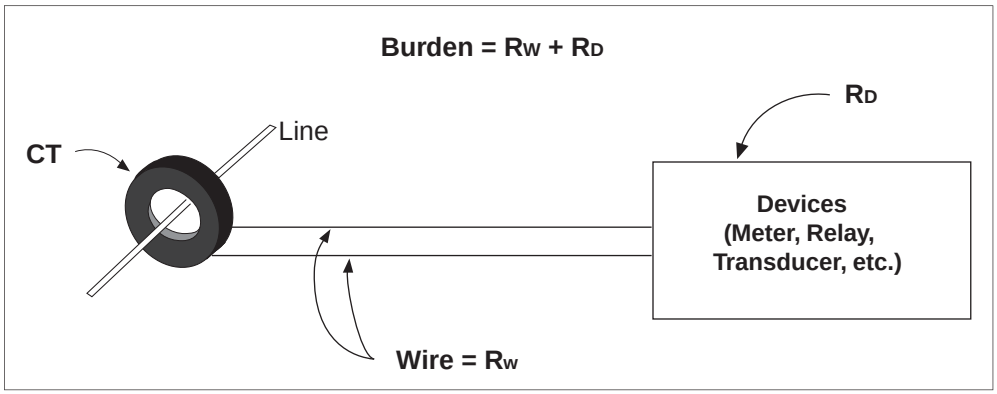
For lower-line currents, the accuracy at 10% of the CT rating (120A through a 1200:5 CT) is double the published value. On the above example, at 2.5 VA burden, the accuracy would be ±1.2%. At a 12.5 VA burden, the accuracy would be ±2.4%.

BURDEN CALCULATION

STEP 1: Determine the burden of the connected device in VA or ohms impedance. This should be on the device data sheet.

STEP 2: Add impedance of the secondary wire run. Measure the length of the wire run between current transformer and the burden (e.g., meter, relay, transducer, etc.). Refer to Nomogram No. 2 and determine the resistance, in ohms, of the wires that connect the secondary of the current transformer to the devices. The Nomogram makes allowances for the return wire. Add this resistance from Nomogram No. 2 to the impedance of the connected burdens. Nomogram No.1 will help convert ohms to VA.

STEP 3: Make sure the total burden does not exceed the specified limits for the chosen CT.



POWER MONITORING & PROTECTION

DETERMINING BURDEN FOR CURRENT TRANSFORMERS

CT SECONDARY WIRE SIZING EXAMPLE

A PT-9500 Watt Transducer (0.75 VA burden) is to be used with three 600T-122 1200:5 current transformers. The CT secondary is 30' one way. To maintain the maximum CT accuracy (0.6%), the total burden must be kept below 2.5 VA as seen on the current transformer catalog page.

If 2.5 VA total is available then 2.5 - 0.75 = 1.75 VA is available for the wire. Assuming the maximum 5A secondary current, on Nomogram No. 1 align a straightedge on 5A (left hand column) and 1.75 VA (center column). Read the impedance in ohms (right hand column). This should read 0.07_.

Now go to Nomogram No. 2. Place a straightedge on 0.07_ (center column) and 30' cable length one way (right hand column). Read the cable size (left hand column), which should read 10 AWG copper cable or larger.

With the above conditions, #10 wire or larger will keep the current transformer within its best accuracy limit. Smaller cable could be used if 1.2% accuracy could be tolerated.