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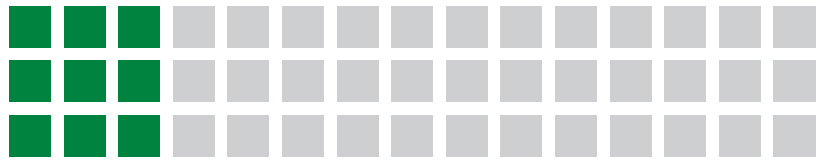


# PROTECTION RELAYS & CONTROLS CATALOG



**Encompass™  
Product Partner**

A ROCKWELL AUTOMATION PARTNER  
*Americas*



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# Protection Relays & Controls

## ARC-FLASH MONITORING

### AF0100 SERIES

#### Arc-Flash Relay



### Description

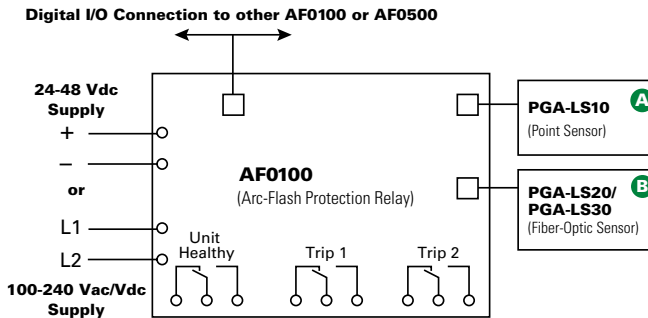
The AF0100 Series arc-flash relay is a cost-effective solution that reduces arc-fault damage by detecting the light from an arc flash and rapidly tripping. Two remote light sensors can be connected to one relay and multiple AF0100 and/or AF0500 relays can be connected to monitor additional sensors, providing complete coverage for a wide range of applications. The compact, DIN-rail or surface-mountable body makes this an ideal solution for equipment manufacturers.

Two isolated Form-C contacts are provided for applications with multiple devices that must be tripped. This is especially useful for generator applications where the generator and breaker need to be tripped in case of an arc flash.

The AF0100 accepts PGA-LS10 point sensors and PGA-LS20/PGA-LS30 fiber-optic sensors in any combination. Sensor health is continuously monitored to ensure fail-safe operation. A solid-state redundant trip circuit provides an internal fail-safe mechanism and fast arc-flash response during power up.

Front-panel and sensor LEDs indicate sensor health and fault location.

### Simplified Circuit Diagram



### Ordering Information

ORDERING NUMBER	DESCRIPTION
AF0100-00	Arc-Flash Relay, Universal Supply
AF0100-10	Arc-Flash Relay, 24-48 V dc

### Specifications

#### Input Voltage

**AF0100-00** 100-240 V ac/V dc, 24-48 V dc  
**AF0100-10** 24-48 V dc

#### Dimensions

**H** 90 mm (3.5"); **W** 128 mm (5.0");  
**D** 60 mm (2.4")

#### Trip, Error Relays

Form C, 250 V ac/30 V dc, 6 A resistive

#### Trip Time

5 ms (typical)

#### Sensitivity

10-25 klux programmable

#### Mounting

Surface, DIN rail

#### Operating Temperature

-40 °C to +70 °C (-40 °F to 158 °F)

#### Shipping Weight

1.0 kg (2.2 lb)

#### Certifications

UL Listed (UL 508), CE, RCM, FCC

#### Warranty

5 years

### Features & Benefits

FEATURES	BENEFITS
<b>Compact</b>	Fits into a wide range of arc-flash applications
<b>Two optical sensor types</b>	Point sensors or fiber-optic sensors can be used in any combination for coverage flexibility
<b>Dual sensor inputs</b>	One relay can monitor two arc-flash sensors
<b>Adjustable light sensitivity</b>	Allows for operation in bright environments and maximum sensitivity in dark environments
<b>Discrete wire networking</b>	Multiple AF0100 or AF0500 units can be interconnected to form a system
<b>Fail-safe system</b>	Continuous monitoring of optical sensors and inputs ensures protection
<b>USB interface</b>	Configuration software is easy to use with no drivers or software installation
<b>Unit health</b>	Ensures continuous protection with self diagnostic and remote unit-healthy indication
<b>LED Indication</b>	Trip and sensor status indication both on relay and sensors

### Accessories

**A**



#### PGA-LS10 Point Sensor

Line-of-sight light sensor detects an arc as small as 3 kA within a 2-m half-sphere. Includes sensor health and trip indication.

**B**



#### PGA-LS20/PGA-LS30 Fiber-Optic Sensor

360° light sensor to run along bus bars. Includes sensor health and trip indication.

### AF0500 SERIES Arc-Flash Relay



### Description

The AF0500 is a microprocessor-based arc-flash relay that limits arc-fault damage by detecting the light from an arc flash and rapidly tripping the feeder breaker. The unit is well suited for switchgear, transformer and power converter applications.

Sensors, inputs, and connections are health monitored to ensure fail-safe operation. A secondary solid-state trip circuit provides a redundant trip path. A USB port is used for configuration and access to event logs.

AF0500 includes an Ethernet interface and supports Modbus<sup>®</sup> TCP communication. Zone tripping, upstream breaker tripping and tie breaker tripping applications can be easily configured.

A number of control inputs allows interconnection of multiple AF0500 units to form a system.

### Optical Sensors

The AF0500 accepts both PGA-LS10 point sensors and PGA-LS20/PGA-LS30 fiber-optical sensors. Thus any combination of fiber or point sensors is supported.

For fast fault location, front-panel and sensor LEDs indicate sensor health and which sensor detected an arc fault.

### Sensor Placement

The AF0500 Arc-Flash Relay and sensors are easily installed in retrofit projects and new switchgear with little or no re-configuration. Simple applications work straight out of the box with no need of PC configuration. More complex systems with multiple power sources are configured using the relay's built-in USB interface software.

Generally, it is recommended to mount 1 or 2 sensors per cubicle to cover all horizontal and vertical bus bars, breaker compartments, drawers, and anywhere that there is a risk for an arc fault. Threading a fiber-optic sensor through the cabinets and in areas where point-sensor coverage is uncertain results in complete coverage and an added level of redundancy. Even if policy is to only work on de-energized systems, all maintenance areas should be monitored to prevent potential damage and additional cost.

### Features & Benefits

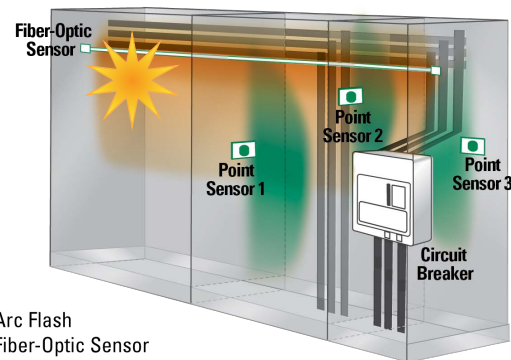
FEATURES	BENEFITS
<b>4 arc sensor inputs</b>	Supports both point and fiber sensors
<b>Arc-Flash trip time &lt;1ms</b>	Limits arc-flash damage and risk of injury
<b>2 IGBT high speed trip outputs</b>	Supports applications such as upstream breaker tripping or tie breaker tripping
<b>Universal Power Supply</b>	100-240 V ac, 24-48 V dc, or 110-250 V dc supply
<b>Fail-safe system</b>	Continuous monitoring of optical sensors and inputs ensures protection
<b>LED indication (on unit and each sensor)</b>	Trip and sensor status indicated both on relay and sensors
<b>Discrete wire networking</b>	Multiple AF0500 units can be interconnected to form a system
<b>USB interface</b>	Data logging and configuration software uses a USB interface with no drivers or software installation
<b>Data logging</b>	On-board event recorder for system diagnostics (2048 log lines)
<b>Ethernet interface</b>	Modbus <sup>®</sup> TCP communication

### Ordering Information

ORDERING NUMBER	DESCRIPTION
AF0500-00	Arc-Flash Relay
AF0500-00-CC	Arc-Flash Relay, Conformally Coated

ACCESSORIES	REQUIREMENT
PGA-LS10	Required*
PGA-LS20, PGA-LS30	Required*
PGA-1100	Optional



Arc Flash  
 Fiber-Optic Sensor  
 Point Sensors

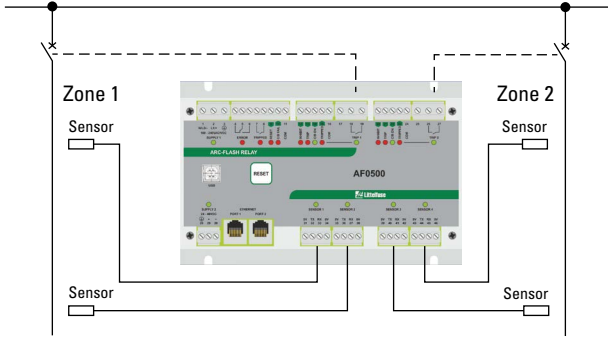
# Protection Relays & Controls

## ARC-FLASH MONITORING

### Applications

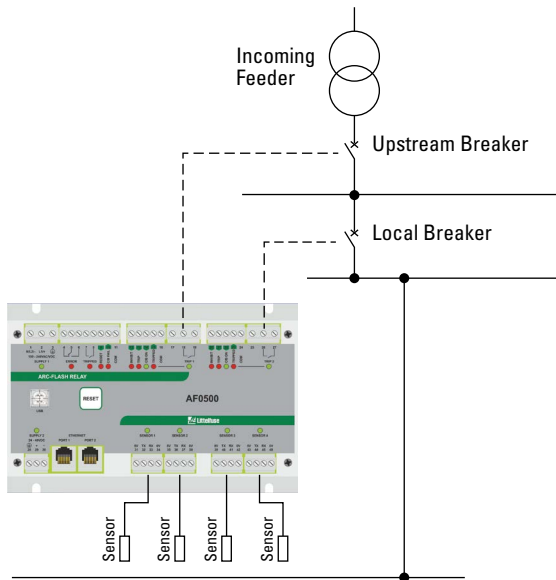
#### Zone Tripping

AF0500 can trip 2 separate zones. Sensors can be assigned to the zones individually through PC configuration.



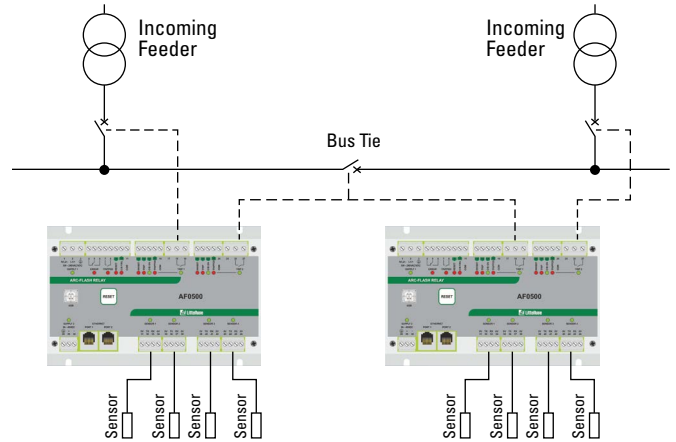
#### Upstream Breaker Tripping

In case of failure of the local circuit breaker to open, another trip command is sent after a short delay to an upstream breaker to clear the fault.



#### Tie Breaker Tripping

In case of an arc in one section of the switchboard, the AF0500 can trip both the incoming feeder and the tie breaker simultaneously. Thus the affected part of the switchboard is isolated from the non-affected part.



### Accessories



#### PGA-LS10 Point Sensor

Line-of-sight light sensor detects an arc as small as 3 kA within a 2-m half-sphere. Includes Sensor health and trip indication.



#### PGA-LS20/PGA-LS30 Fiber-Optic Sensor

360° light sensor to run along bus bars. Sensor health and trip indication.



#### PGA-1100 Diode Logic Unit

This module allows multiple arc-flash relays to trip a common breaker, for example a tie-breaker.

### Specifications

#### Power Supply

##### Universal

100 to 240 V ac (+10%, -15%) 50/60 Hz, 20 VA, 110 to 250 Vdc (+10%, -20%) 8 W

##### Low Voltage

#### Sensor Inputs

24 to 48 V dc (+10%, -20%), 4 W

4 light sensor inputs for PGA-LS10, PGA-LS20 and PGA-LS30 sensors

#### Trip Outputs

#### UL Rating

2 IGBT switches

120/240 V ac, 1800 VA, 0.75 A maximum continuous, 125/250 V dc, 138 VA, 0.75 A maximum continuous

#### Supplemental Rating

##### Make/Carry

30 A for 0.2s

##### Voltage Rating

24 to 300 V ac, 24 to 300 V dc

##### Current Rating

20 A for 2 s, 10 A for 5 s

#### Communication

Ethernet, 2 ports with internal Ethernet switch, Modbus® TCP

#### Dimensions

**H** 130 mm (5.1"); **W** 200 mm (7.9"); **D** 54 mm (2.1")

#### Shipping Weight

0.9 kg (2 lb)

#### Operating Temp.

-40 °C to +70 °C (-40 °F to 158 °F)

#### Approvals

UL Listed (UL508), CE, RCM, FCC, CSA

#### Warranty

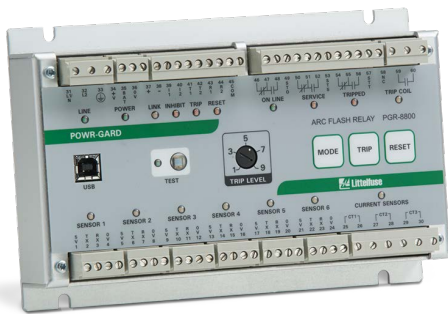
5 years

#### Mounting

Surface, DIN (with optional D0050 adapter clips)

### PGR-8800 SERIES (D1000)

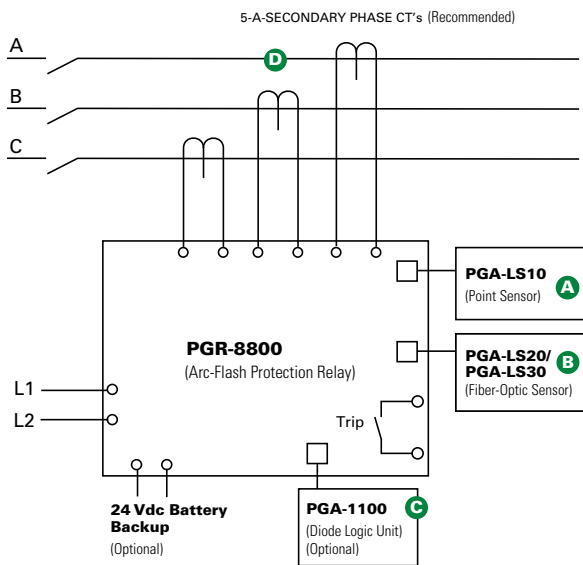
#### Arc-Flash Relay



### Description

The PGR-8800 is a microprocessor-based relay that limits arc-fault damage by detecting the light from an arc flash and rapidly tripping. Phase-current-transformer inputs are provided for current-constrained arc-flash protection and, when so equipped, a programmable definite-time overcurrent function can be enabled. An optical sensor on the PGR-8800 and adjustable trip level reduce the chance of nuisance tripping by setting a threshold for ambient light. Sensors, inputs, and connections are monitored to ensure fail-safe operation. A secondary solid-state trip circuit provides a redundant trip path. A USB port is used for configuration and access to event logs and graphs.

### Simplified Circuit Diagram



For detailed wiring diagram, see adjacent page.

### Ordering Information

ORDERING NUMBER	DESCRIPTION
PGR-8800-00 (UL, CE, CSA, RCM)	Arc-Flash Relay
PGR-8800-00-CC (UL, CE, CSA, RCM)	Arc-Flash Relay, Conformally Coated
ACCESSORIES	REQUIREMENT
PGA-LS10	Required*
PGA-LS20, PGA-LS30	Required*
PGA-1100	Optional
Current Transformer	Recommended

\*At least one sensor is required. However, the exact number of sensors for proper coverage depends on the application.

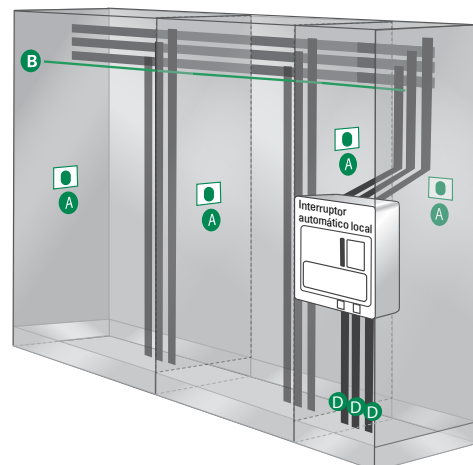
### Optical Sensors

The PGR-8800 accepts both PGA-LS10 and PGA-LS20/PGA-LS30 optical sensors, designed to collect light over a wide angle and with high sensitivity. For fast fault location, front-panel and sensor LED's indicate sensor health and which sensor detected an arc fault.

### Sensor Placement

The PGR-8800 Arc-Flash Relay and sensors are easily installed in retrofit projects and new switchgear with little or no re-configuration. Even elaborate systems with multiple power sources take minutes to configure using the relay's built-in USB interface software.

Generally, it is recommended to mount 1 or 2 sensors per cubicle to cover all horizontal and vertical bus bars, breaker compartments, drawers, and anywhere that there is potential for an arc-fault. Threading a fiber-optic sensor through the cabinets and in areas where point-sensor coverage is uncertain results in complete coverage and an added level of redundancy. Even if policy is to only work on de-energized systems, all maintenance areas should be monitored to prevent potential damage and additional cost. At least one sensor should have visibility of an arc fault if a person blocks the other sensor(s).



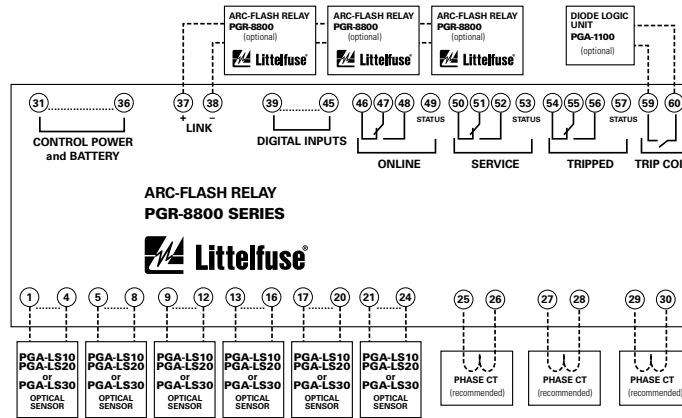
# Protection Relays & Controls

## ARC-FLASH MONITORING





### Features & Benefits

FEATURES	BENEFITS
<b>Arc-Flash trip time &lt;1 ms</b>	Limits arc-flash damage and risk of injury
<b>Multiple sensors (up to 24)</b>	Single module can monitor 6 sensors. Up to 4 PGR-8800 units can be linked into one system
<b>Fail-safe system</b>	Continuous monitoring of optical sensors and inputs ensures protection
<b>Redundant trip circuit</b>	Solid-state backup arc-detection circuit adds a second layer of safety
<b>Adjustable light sensitivity</b>	Allows for operation in bright environments and maximum sensitivity in dark environments
<b>LED indication (on unit and each sensor)</b>	18 LEDs provide at-a-glance status for module and I/O state
<b>Current detection</b>	Phase-CT inputs provide overcurrent protection and prevent nuisance trips
<b>Optical detection</b>	Point and fiber-optic sensors provide wide detection area with sensor health trip indication
<b>Digital inputs (6)</b>	Two each: remote trip, inhibit, and reset inputs
<b>Service mode</b>	Allows for system test without tripping
<b>Trip coil contact</b>	Solid-state 24-300 V dc/24-300 V ac IGBT
<b>Indication contacts</b>	Form C and status outputs
<b>USB interface</b>	Data logging and configuration software uses a USB interface with no drivers or software installation
<b>Built-in sensor</b>	Can be used in single-sensor systems, as a seventh sensor, and for calibration
<b>Universal power supply/Battery backup</b>	100-240 V ac, 14-48 V dc, or 110-250 V dc supply accepted. Ability to charge and run off an external, user-supplied 24 V dc battery.
<b>Data logging</b>	On-board event recorder helps with system diagnostics
<b>Modbus</b>	Remotely view measured values, event records & reset trips
<b>Upstream Tripping</b>	Ability to trip upstream device if the local breaker fails to clear the fault

### Wiring Diagram



### Accessories

- A**  **PGA-LS10 Point Sensor**  
Line-of-sight light sensor detects an arc as small as 3 kA within a 2-m half-sphere. Sensor health and trip indication. Dimensions: See PGR-8800 Manual
- B**  **PGA-LS20/PGA-LS30 Fiber-Optic Sensor**  
360° light sensor for tricky installations with many shadows or to run along bus bars. Sensor health and trip indication. Dimensions: See PGR-8800 Manual
- C**  **PGA-1100 Diode Logic Unit**  
This module allows multiple PGR-8800 relays to trip the same breaker, for example an upstream or a tie-breaker. Dimensions: **H** 80mm (3.15") **W** 20mm (0.79") **D** 70mm (2.76")
- D**  **Current Transformers**  
Eliminate nuisance arc-flash trips and use for overcurrent protection.

NOTE (1) - Contact Littelfuse for trip coil voltages higher than 300 Vdc/Vac.

Littelfuse reserves the right to make product changes, without notice. Material in this document is as accurate as known at the time of publication. Visit Littelfuse.com for the most up-to-date information.

### Specifications

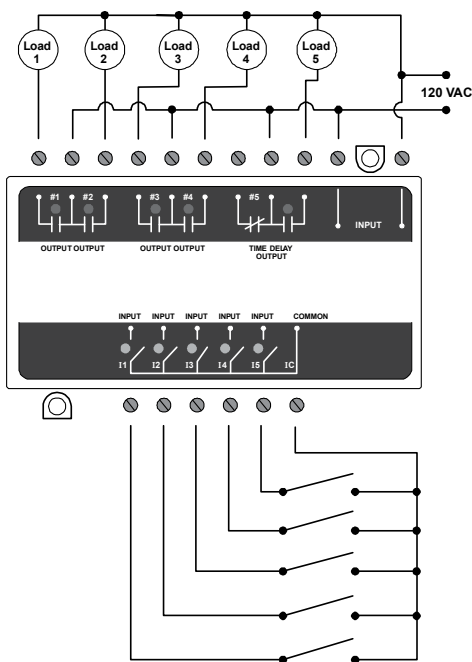
<b>IEEE Device Numbers</b>	Overcurrent (50), Arc Flash (AFD)
<b>Input Voltage</b>	100-240 V ac, 14-48 V dc, and 110-250 V dc
<b>Dimensions</b>	<b>H</b> 130 mm (5.1"), <b>W</b> 200 mm (7.9"), <b>D</b> 54 mm (2.1")
<b>Optical Trip Settings</b>	9-25 klux, 800 μs-20 s
<b>Current Trip Setting (A)</b>	Programmable
<b>Indication Contact Mode</b>	Fail-safe
<b>Trip Coil Voltage<sup>(1)</sup></b>	24-300 Vdc, 24-300 Vac
<b>Trip Coil Contact Mode</b>	Selectable fail-safe or non-fail-safe
<b>Redundant Trip Circuit</b>	Standard feature
<b>Input Monitoring</b>	Standard feature
<b>USB Interface</b>	Standard feature
<b>Trip, Reset, Service Buttons</b>	Standard feature
<b>Expandable System</b>	Link up to 4 PGR-8800 units
<b>Warranty</b>	5 years
<b>Mounting</b>	Surface, DIN (with D0050 adapter clips)
<b>Approvals</b>	UL, CE, CSA, RCM, FCC, DNV type approval, ABS type approval

### PC-105 SERIES

Pump controller with duplex, triplex or quadplex functionality or 5-channel relay



### Wiring Diagram



### Description

The PC-105 is a 5-channel pump controller designed to handle multiple pump applications. Alternatively, it can operate as a 5-channel switch.

The PC-105's control functions support all of the popular industry-standard multi-pump, pump-up and pump-down configurations.

It can indicate low, high and out-of-sequence alarms and use alternating and non-alternating pump control. The non-alternating pump can be used as a jockey pump or emergency pump.

Using the built-in DIP switches, individual pumps can be disabled when taken out of service for repair or maintenance.

### Features

- Compact design
- Low, high and out-of-sequence alarms
- Variable time delay/lag pump delay from 2-255 seconds
- Duplex SPS (separate pump stop) pump control
- Duplex, triplex or quadplex pump control
- Pump-up or pump-down functions
- External silence, reset and alternation configuration
- Five-channel relay configuration
- DIN rail or surface mountable

### Specifications

#### Input Characteristics

**Supply Voltage** 120 V ac  
**Frequency** 50\*/60Hz

#### Functional Characteristics

**Probe Sense Voltage** 5 V dc continuous

#### Output Characteristics

**Relay Output Rating:**  
**Pilot Duty** 480 VA @ 240 V ac, B300  
**General Purpose** 7A @ 240 V ac

#### General Characteristics

**Temperature Range** -20 °C to 55 °C (-4 °F to 131 °F)  
**Maximum Input Power** 4 W  
**Wire range** 12 to 20 AWG  
**Terminal Torque** 4.5 in.-lbs. (max.)  
**Pump In-rush delay** 2 seconds

#### Standards Passed

**Electrostatic Discharge (ESD)** IEC 61000-4-2, Level 3, 6kV contact, 8kV air.  
**Radio Frequency Immunity (RFI)** IEC 61000-4-3, Level 3, 10V/m  
**Fast Transients** IEC 61000-4-4, Level 3, 4kV input power 2kV inputs/outputs

#### Safety Marks

**UL** UL508 (File #E68520)

#### Dimensions

**H** 94.06 mm (3.703"); **W** 127.64 mm (5.025");  
**D** 59.69 mm (2.35")

#### Weight

1.2 lbs. (19.2 oz., 544.31 g)

#### Mounting Method

35 mm DIN rail or Surface Mount (#6 or #8 screws)

\*Note: 50Hz will increase all delay timers by 20%.

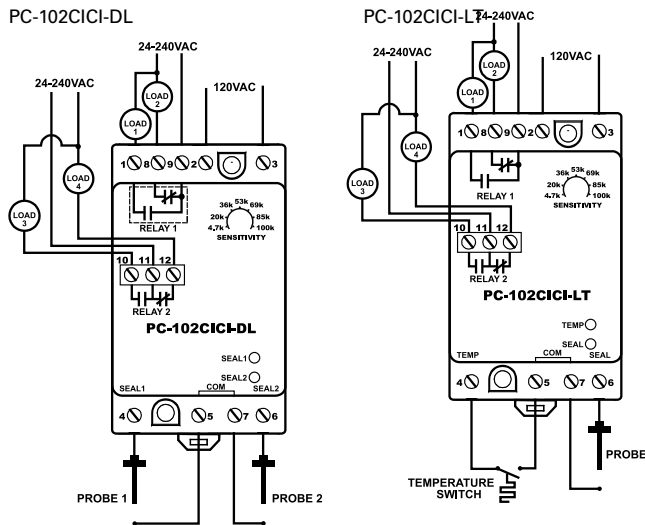


### PC-102 SERIES

Dual seal-leak detector or seal-leak & over-temperature detector



### Wiring Diagram



### Ordering Information

MODEL	LINE VOLTAGE	DESCRIPTION
PC-102CICI-DL	120 V ac nominal	Dual seal-leak detector uses inputs to sense seal failures and energize the output relay. Input logic direct or inverted is DIP switch selectable
PC-102CICI-LT	120 V ac nominal	Seal-leak and over-temperature detector uses one input to sense seal failures and the temperature input to detect motor overheating. Configurable to suit various probes. Seal input logic direct or inverted, plus over-temperature trip reset automatic or manual, is DIP switch selectable



### Description

The PC-102 is a dual-channel switch that provides dual protection against seal failures and over-temperature in submersible pumping applications.

Both units have two form-C isolated output relays and two LEDs, which illuminate when each associated output relay is energized.

The sensitivity adjustment (4.7k-100kOhms) allows you to define the input impedance at which the output relays will change state. The sensitivity for the over-temperature detector can be set to 4k Ohms with use of the DIP switches.

**This unit may not be compatible with Flygt pumps.**

### Features & Benefits

FEATURES	BENEFITS
<b>Finger-safe terminals</b>	Meets IEC 61000 safety requirements
<b>Compact design for DIN rail or surface mount</b>	Allows flexibility in panel installation
<b>LED status indicator</b>	Visual indication of relay engagement
<b>Two input channels</b>	Flexibility for pump-up/pump-down or two-channel switch applications

### Specifications

#### Input Characteristics

**Frequency** 50/60 Hz

#### Functional Characteristics

#### Probe Sense Voltage

5 V dc pulsed

#### Sensitivity

4.7k-100kΩ

#### Sensitivity (for temp)

Selectable 4kΩ with DIP switches

#### Input Logic

Direct or inverted

#### Debounce Time Delay

0.5 or 2 seconds

#### Output Characteristics

#### Relay Output Rating

(2 Form C isolated)

#### Pilot Duty

180 VA @ 120 V ac, C150

#### General Purpose

5A @ 240 V ac

#### General Characteristics

#### Temperature Range

-20 °C to 55 °C (-4 °F to 131 °F)

#### Maximum Input Power

2 W

#### Depluggable Connector

Phoenix Contact-Series MSTB plugs

#### Output Relay

LEDs

#### Status Indicators

4.5 in.-lbs.

#### Terminal Torque

12-20 AWG

#### Wire range

Standards Passed

#### Electrostatic Discharge (ESD)

IEC 61000-4-2, Level 3, 6 kV contact, 8 kV air.

IEC 61000-4-3, Level 3, 10V/m

IEC 61000-4-4, Level 3, 4 kV input power 2kV inputs/outputs

#### Safety Marks

UL

#### Dimensions

UL508 (File #E68520)

**H** 88.9 mm (3.5"); **W** 52.93 mm (2.08");

**D** 59.69 mm (2.35")

0.9 lb. (14.4 oz., 408.23 g)

35mm DIN rail or Surface Mount

(#6 or #8 screws)

#### Weight

#### Mounting Method

### 460-15-100-LLS Single-Channel Liquid Level Sensor

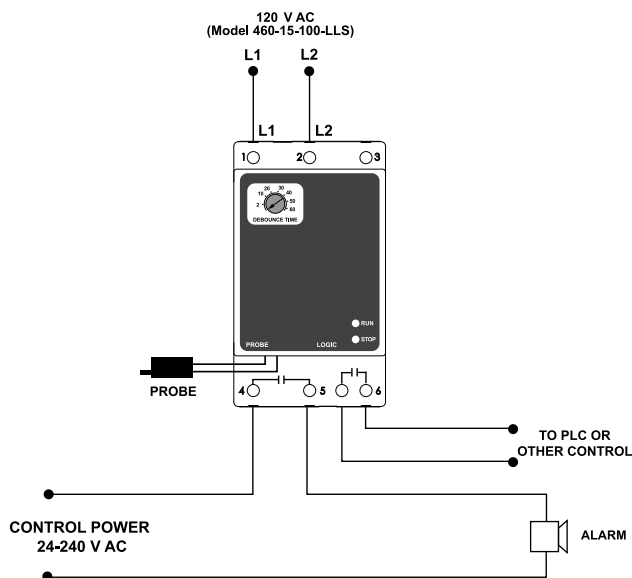


### Description

The 460-15-100-LLS is a liquid level sensor to detect the presence of conductive liquids. A probe is mounted at the desired tank level and connected to the PumpSaver®. When the probe is submersed, the relay's output contacts will change state as soon as the debounce time expires. The adjustable debounce timer is intended to prevent nuisance actuating due to waves or splashing in the tank.

Relay logic can be inverted so the relay's output contacts change state when the probe is no longer submersed. This makes the unit versatile for use in pump-up and pump-down applications.

### Wiring Diagram



### Features & Benefits

FEATURES	BENEFITS
<b>Unique probe protection logic</b>	Probes are protected from scale build up through pulsed dc signal between the probes
<b>Invertible relay logic</b>	Allows flexibility to be used in pump-up and pump-down applications
<b>Adjustable debounce timer</b>	Prevents nuisance actuating caused by waves or splashing in the tank
<b>LED status indicators</b>	Provides visual indication of the relay status

### Specifications

#### Input Characteristics

##### Control Voltage

110/120 V ac nominal

##### Frequency

50/60 Hz (*Note: 50 Hz will increase all delay timers by 20%*)

##### Sensitivity

100 kΩ

#### Functional Characteristics

##### Probe Sense Voltage

5 V dc pulsed

##### Debounce Time Delay

2-60 seconds

#### Output Characteristics

##### Output contact Rating

– (Two Form A - SPST)

##### Pilot Duty

360 VA @ 240 V ac

##### General Purpose

8 A @ 240 V ac

#### General Characteristics

##### Ambient Temperature Range

-40 °C to 70 °C (-40 °F to 158 °F)

##### Operating

-40 °C to 80 °C (-40 °F to 176 °F)

##### Storage

-40 °C to 80 °C (-40 °F to 176 °F)

##### Maximum Input Power

2 W

##### Class of Protection

IP20, NEMA 1 (finger safe)

##### Relative Humidity

10-95 %, non-condensing per IEC 68-2-3

##### Terminal Torque

4.5 in.-lbs.

##### Wire

12-20 AWG

#### Standards Passed

##### Electrostatic Discharge (ESD)

IEC 61000-4-2, Level 3, 6 kV contact, 8 kV air

##### Radio Frequency

##### Immunity, Radiated

150 MHz, 10 V/m

##### Fast Transient Burst

IEC 61000-4-4, Level 3, 3.5 kV input power and controls

#### Surge

##### IEC

IEC 61000-4-5, Level 3, 4 kV line-to-line; Level 4, 4 kV line-to-ground

##### ANSI/IEEE

C62.41 Surge and Ring Wave Compliance to a level of 6 kV line-to-line  
Meets UL 508 (2 x rated V + 1000 V for 1 min.)

##### Hi-Potential Test

##### Safety Marks

##### UL

UL 508 (File #E68520)

##### Enclosure

Polycarbonate

##### Dimensions

**H** 88.9 mm (3.5"); **W** 52.93 mm (2.08");

**D** 59.69mm (2.35")

##### Weight

1 lb. (16 oz., 453.59 g)

##### Mounting Method

35 mm DIN rail or Surface Mount

(#6 or #8 screws)

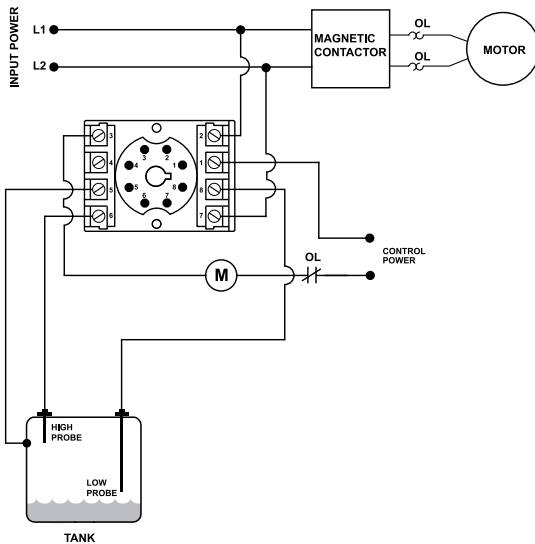
### PC-XXX-LLC-CZ / PC-XXX-LLC-GM SERIES

#### Liquid level control

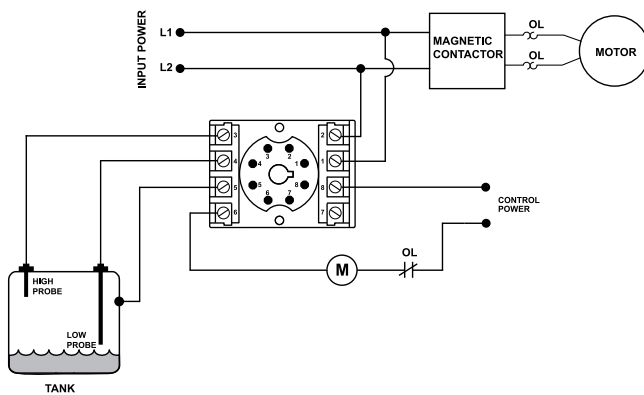


### Wiring Diagram

TYPICAL WIRING DIAGRAM FOR PC-XXX-LLC-CZ



TYPICAL WIRING DIAGRAM FOR PC-XXX-LLC-GM



### Description

The PC-xxx-LLC-CZ and PC-xxx-LLC-GM series are liquid level control relays used to control conductive liquid pumping operations in a pump-up or pump-down application. The units come in two different voltage ranges (see specs below).

The units have an adjustable sensitivity knob (4.7 k to 100 k ohms) that is set according to the resistance level at which you want the probes (sold separately) to sense the conductive liquid. The units have a built-in debounce time delay that prevents the relay from energizing if the probe resistance momentarily goes above or below the sensitivity setpoint (due to liquid splashing in the tank).

The units operate their internal relay based on inputs from a high and low probe and a common reference (when a conductive tank is used) or common probe (when a non-conductive tank is used).

#### PC-xxx-LLC-CZ

- Compatible with Crouzet's PNR & PNRU series liquid level control

#### PC-xxx-LLC-GM

- Compatible with Gems' Series 16M general purpose control

#### Must use Model OT08PC or P1011-6 socket for UL Rating!

Note: Manufacturer's recommended screw terminal torque for the OT Series Octal Sockets is 12 in.-lbs.

### Features & Benefits

FEATURES	BENEFITS
<b>Debounce time delay (2 seconds)</b>	Prevents rapid cycling of the pump due to turbulence in the tank
<b>Adjustable sensitivity (4.7 to 100 K ohms)</b>	Allows user to fine tune the sensing resistance to prevent false tripping due to foam or debris
<b>Dual probe design (plus a common)</b>	Allows user the ability to set the level differential required

### Ordering Information

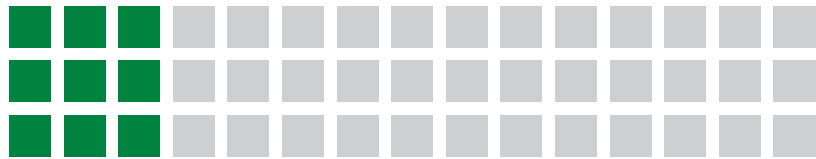
MODEL	LINE VOLTAGE	DESCRIPTION
PC-100-LLC-CZ	95-120 V ac	Compatible with Crouzet's PNR & PNRU series liquid level control
PC-200-LLC-CZ	190-240 V ac	Compatible with Crouzet's PNR & PNRU series liquid level control
PC-100-LLC-GM	95-120 V ac	Compatible with Gems' series 16M liquid level control
PC-200-LLC-GM	190-240 V ac	Compatible with Gems' series 16M liquid level control

### Accessories



#### OT08PC 8-pin Octal Socket

Octal Socket for plug-in units. 8-pin surface & DIN-rail mountable. Rated for 10 A @ 600 V ac.



### Specifications

#### Input Characteristics

<b>Supply Voltage</b>	
<b>PC-100-LLC-CZ</b>	95-120 V ac
<b>PC-100-LLC-GM</b>	95-120 V ac
<b>PC-200-LLC-CZ</b>	190-240 V ac
<b>PC-200-LLC-GM</b>	190-240 V ac
<b>Frequency</b>	50/60 Hz

#### Functional Characteristics

<b>Probe Sense Voltage</b>	5 V dc pulsed
<b>Debounce Time Delay</b>	2 seconds
<b>Probe Sensitivity</b>	4.7 k to 100 k adjustable

#### Output Characteristics

<b>Output Contact Rating</b>	
<b>Pilot Duty</b>	480 VA @ 240 V ac
<b>General Purpose</b>	10 A @ 240 V ac

#### General Characteristics

<b>Temperature Range</b>	-40 °C to 70 °C (-40 °F to 158 °F)
<b>Maximum Input Power</b>	5 W

#### Standards Passed

<b>Electrostatic Discharge (ESD)</b>	IEC 61000-4-2, Level 3, 6 kV contact, 8 kV air.
<b>Radio Frequency Immunity (RFI)</b>	150 MHz, 10 V/m
<b>Fast Transients</b>	IEC 61000-4-4, Level 3, 2 kV input power and controls

#### Safety Marks

<b>UL (OT08PC octal socket required)</b>	UL 508 (File #E68520)
--	-----------------------

#### Dimensions

**H** 44.45 mm (1.75"); **W** 60.33 mm (2.375");  
**D** 104.78 mm (4.125")

#### Weight

0.65 lb. (10.4 oz., 294.84 g)

#### Mounting Method

DIN rail or surface mount  
 (plug into OT08PC socket)

#### Socket Available

Model OT08PC (UL Rating 600 V)

The 600 V socket can be surface mounted or installed on DIN Rail.

### 201-100-SLD Single-Channel Seal-Leak Detector



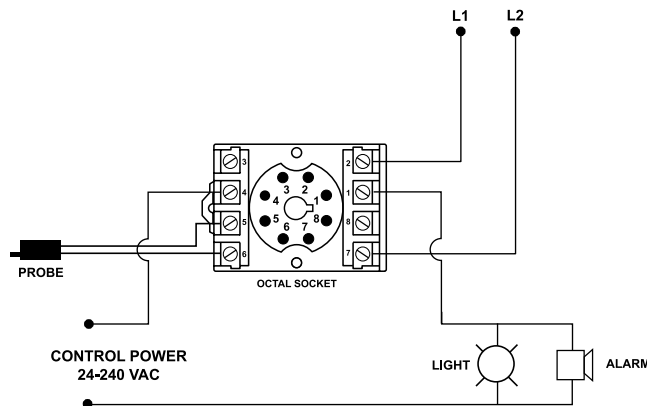
### Description

The model 201-100-SLD is an 8-pin plug-in style seal-leak detector to sense seal failures on submersible pumps. A microcontroller-based relay that monitors the shaft seal of a submersible pump motor. A resistive probe is installed in the seal cavity. If water leaks into the pump, the resistance measured by the probe decreases. When the resistance drops below the sensitivity setpoint, the unit will trip and the relay contacts will change state. The unit will automatically reset when a fault is cleared.

### Features & Benefits

- LED status indicator
- Compact plug-in design
- DIN rail or surface mountable via octal base

### Wiring Diagram



Note: Manufacturer's recommended screw terminal torque for the RB Series and OT Series Octal Sockets is 12 in.-lbs.

### Accessories



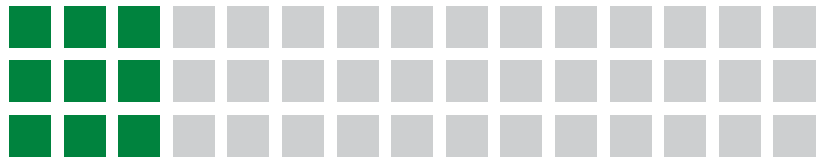
#### OT08PC 8-pin Octal Socket

Octal Socket for plug-in units. 8-pin surface & DIN rail mountable. Rated for 10A @ 600 V ac.

### Specifications

<b>Control Voltage</b>	110/120 V ac nominal
<b>Frequency</b>	50/60 Hz
<b>Sensitivity</b>	4.7k-100 kΩ
<b>Probe Sense Voltage</b>	5 V dc pulsed
<b>Output contact Rating</b>	SPDT
<b>Pilot Duty</b>	480 VA @ 240 V ac
<b>General Purpose</b>	10A @ 240 V ac
<b>Operating Temperature</b>	-40 °C to 70 °C (-40 °F to 158 °F)
<b>Storage</b>	-40 °C to 80 °C (-40 °F to 176 °F)
<b>Maximum Input Power</b>	5 W
<b>Relative Humidity</b>	10-95%, non-condensing per IEC 68-2-3
<b>Electrostatic Discharge (ESD)</b>	IEC 61000-4-2, Level 3, 6 kV contact, 8 kV air
<b>Radio Frequency Immunity, Radiated</b>	150MHz, 10V/m
<b>Fast Transient Burst</b>	IEC 61000-4-4, Level 3, 3.5 kV input power and controls
<b>IEC</b>	IEC 61000-4-5, Level 3, 4 kV line-to-line; level 4, 4 kV line-to-ground
<b>ANSI/IEEE</b>	C62.41 Surge and Ring Wave Compliance to a level of 6 kV line-to-line
<b>Hi-Potential Test</b>	Meets UL508 (2 x rated V + 1000V for 1 min.)
<b>UL*</b>	UL508 (File #E68520)
<b>Enclosure</b>	Polycarbonate
<b>Dimensions</b>	<b>H</b> 44.45 mm (1.75"); <b>W</b> 60.325 mm (2.375"); <b>D</b> (with socket) 104.78 mm (4.125")
<b>Weight</b>	0.7 lb. (11.2 oz., 317.51 g)
<b>Mounting Method</b>	DIN rail or surface mount (plug into OT08PC socket)
<b>Socket Available</b>	Model OT08PC (UL Rating 600V)
<b>Approvals</b>	UL, CE

\*Must use Model OT08PC socket for UL Rating!  
The 600 V socket can be surface mounted or installed on DIN Rail.

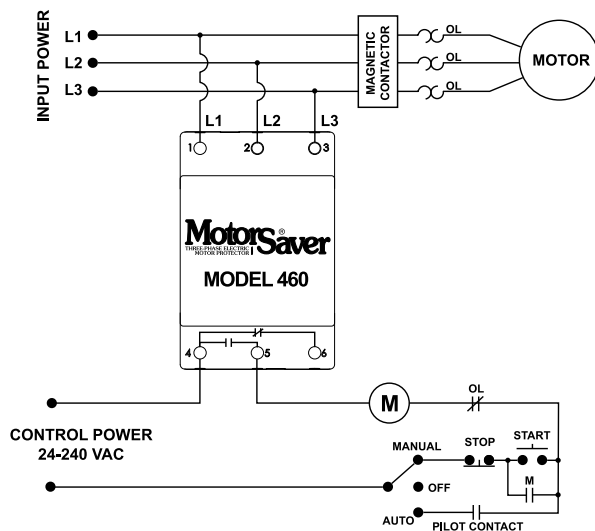


### 460 SERIES 3-Phase Voltage Monitor



### Wiring Diagram

TYPICAL WIRING DIAGRAM FOR MODEL 460 WITH MOTOR CONTROL



### Description

The 460 is a 3-phase voltage monitor that protects 190-480 V ac or 475-600 V, 50/60 Hz motors regardless of size. The product provides a user selectable nominal voltage setpoint and the voltage monitor automatically senses line voltage.

This unique microcontroller-based voltage and phase-sensing device constantly monitors the 3-phase voltages to detect harmful power line conditions such as low, high, and unbalanced voltage, loss of any phase, and phase reversal. When a harmful condition is detected, the MotorSaver® output relay is deactivated after a specified trip delay. The output relay reactivates after power line conditions return to an acceptable level for a specified amount of time (restart delay). The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

All 460 models feature adjustable 1-30 second trip delay, 1-500 second restart delay, 2-8 % voltage unbalance trip point, and one form C contact except where noted below.

### Features & Benefits

FEATURES	BENEFITS
<b>Auto-sensing wide voltage range</b>	Automatically senses system voltage between 190 - 480VAC or 475-600VAC. Saves set-up time
<b>Adjustable trip &amp; restart delay settings</b>	Prevent nuisance tripping due to rapidly fluctuating power line conditions
<b>Microcontroller based circuitry</b>	Improved accuracy and higher reliability
<b>Advanced LED diagnostics</b>	Quick visual indicator for cause of trip and relay status
<b>Adjustable voltage unbalance trip setting</b>	Provides reliable protection when regenerative voltage is present

### Ordering Information

MODEL	VOLTAGE	DESCRIPTION
460	190-480 V ac	Automatically senses line voltage, adjustable 1-30 second trip delay, 1-500 second restart delay, and 2-8 % voltage unbalance trip point
460-L	190-480 V ac	Fixed 4 second trip delay and 1 second for single-phase faults, and fixed 6% voltage unbalance trip point
460-14	190-480 V ac	Equipped with 2 sets of contacts: Form A (NO) and Form B (NC). Used for applications requiring 2 different voltages such as 5 V dc for a PLC input and 115 V ac for an alarm
460-575	475-600 V ac	Commonly used in Eastern Canada and on generator units that generate 600 V ac power
460-575-14	475-600 V ac	Commonly used in Eastern Canada and on generator units that generate 600 V ac power. Equipped with 2 sets of contacts: Form A and Form B
460-15	190-480 V ac	Equipped with 2 sets of Form A (NO) contacts. Used on applications where two different units are to be controlled at once such as a unit that has separate contacts for a compressor and a fan
460-MR	190-480 V ac	Equipped with a 2-prong connection for a normally open push button mounted outside the panel. Used in applications requiring an external manual reset button
460-VBM	190-480 V ac	Fixed 6% voltage unbalance trip point. User adjustable low and high voltage trip points
460-400HZ	190-480 V ac	For use with 400Hz power supply
460-OEM	190-480 V ac	Bulk package of 460, 20 units
460L-OEM	190-480 V ac	Bulk package of 460-L, 20 units

# Protection Relays & Controls

## VOLTAGE MONITORING RELAYS

### Specifications

<b>Frequency</b>	50/60Hz
<b>Low Voltage (% of setpoint)</b>	
<b>Trip</b>	90% ±1%
<b>Reset</b>	93% ±1%
<b>High Voltage (% of setpoint)</b>	
<b>Trip</b>	110% ±1%
<b>Reset</b>	107% ±1%
<b>Voltage Unbalance (NEMA)</b>	
<b>Trip</b>	2-8% adjustable
<b>Reset</b>	Trip setting minus 1% (5-8%) Trip setting minus 0.5% (2-4%) 6% UB fixed (4.5% reset)
<b>460L</b>	
<b>Trip Delay Time</b>	
<b>Low, High and Unbalanced Voltage 460L</b>	1-30 seconds adjustable 4 seconds fixed
<b>Single-Phase Faults (&gt;15% UB)</b>	1 second fixed
<b>Restart Delay Time</b>	
<b>After a Fault</b>	1-500 seconds adjustable
<b>After a Complete Power Loss</b>	1-500 seconds adjustable
<b>Output Contact Rating</b>	
<b>Form C</b>	
<b>Pilot Duty</b>	480VA @ 240 V ac, B300
<b>General Purpose</b>	10A @ 240 V ac
<b>Form A &amp; Form B</b>	
<b>Pilot Duty</b>	360VA @ 240 V ac, B300
<b>General Purpose</b>	8A @ 240 V ac

### Ambient Temperature Range

<b>Operating</b>	-20 °C to 70 °C (-4 °F to 158 °F)
<b>Storage</b>	-40 °C to 80 °C (-40 °F to 176 °F)
<b>Maximum Input Power</b>	6 W
<b>Class of Protection</b>	IP20, NEMA 1 (finger safe)
<b>Relative Humidity</b>	10-95 %, non-condensing per IEC 68-2-3
<b>Terminal Torque</b>	4.5 in.-lbs.
<b>Wire Type</b>	Stranded or solid 12-20 AWG, one per terminal

### Standards Passed

<b>Electrostatic Discharge (ESD)</b>	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
<b>RFI, Radiated</b>	150 MHz, 10V/m
<b>Fast Transient Burst</b>	IEC 61000-4-4, Level 3, 3.5kV input power and controls

### Surge

<b>IEC</b>	IEC 61000-4-5, Level 3, 4kV line-to-line; Level 4, 4kV line-to-ground
<b>ANSI/IEEE</b>	C62.41 Surge and Ring Wave
<b>Hi-potential Test</b>	Compliance to a level of 6kV line-to-line Meets UL508 (2 x rated V +1000V for 1 minute)

### Safety Marks

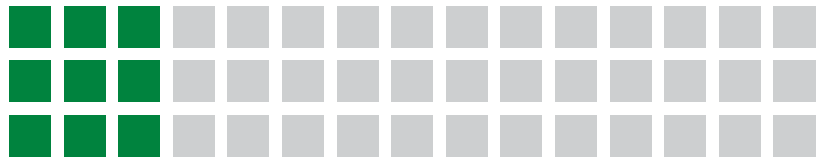
<b>UL</b>	UL508 (File #E68520)
<b>CE</b>	IEC 60947-6-2
<b>Enclosure</b>	Polycarbonate
<b>Dimensions</b>	<b>H</b> 88.9 mm (3.5"); <b>W</b> 52.9 mm (2.08"); <b>D</b> 59.69 mm (2.35")

### Weight

<b>Mounting Method</b>	0.7 lb. (11.2 oz., 317.51 g) 35 mm DIN rail or Surface Mount (#6 or #8 screws)
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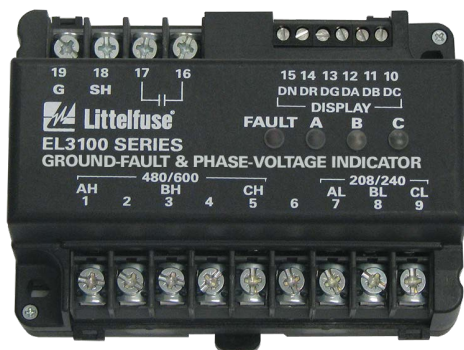
### 460-MR (manual reset)

External NO pushbutton required.

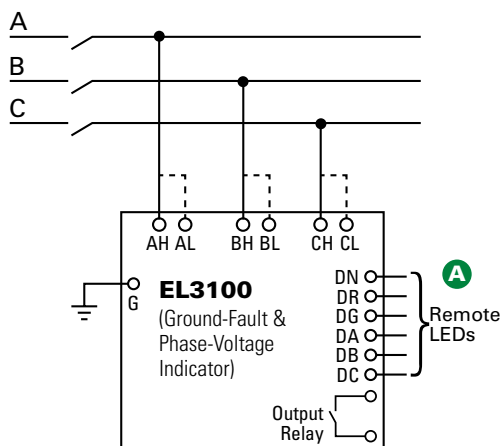


### EL3100 SERIES

#### Ground-Fault & Phase-Voltage Indicator



### Simplified Circuit Diagram



### Ordering Information

ORDERING NUMBER	MOUNTING
EL3100-00	DIN, Surface

ACCESSORIES	REQUIREMENT
RK-310X-0Y	Optional

Note: X=R for red LED and G for green LED  
Y=0 for no label and 1 for a ground-fault label

### Description

The EL3100 is a self-powered ground-fault and phase-voltage indication system for 3-phase systems. The EL3100 meets the National Electrical Code (NEC) and the Canadian Electrical Code (CEC) requirements for ground detectors for ungrounded alternating-current systems. Voltage connections are provided on the EL3100 for 208, 240, 480, and 600-V systems. Three green LED's on the EL3100 indicate the presence of phase-to-ground voltage and one red LED indicates a ground fault. The EL3100 can operate stand-alone or with up to five remote LED indicators. A solid-state relay output provides indication of a ground fault. The output relay is closed when the 3-phase neutral voltage shifts as the result of ground leakage.

### Features & Benefits

FEATURES	BENEFITS
<b>NEC and CEC Code compliant</b>	Meets National Electrical Code (NEC) Article 250.21 and Canadian Electrical Code Part 1, Section 10-400 requirements for ungrounded systems
<b>Low-voltage remote LEDs</b>	System voltage is not present at the remote LED location
<b>Phase-voltage indication</b>	Indicates the presence of voltage on both grounded and ungrounded systems
<b>Output relay</b>	Allows for remote ground-fault indication

### Accessories



**Remote LEDs**  
High-intensity 16-mm IP67 LED lamps available in red and green colors.

### Specifications

<b>Input Voltage</b>	Input L: 208/240 V ac Input H: 480/600 V ac
<b>Dimensions</b>	<b>H</b> 87.0 mm (3.43") <b>W</b> 112.5 mm (4.43") <b>D</b> 56.0 mm (2.2")
<b>Approvals</b>	CSA certified, UL Listed (E340889), RCM (Australia)
<b>Conformally Coated</b>	Standard feature
<b>Warranty</b>	5 years
<b>Mounting</b>	DIN, Surface





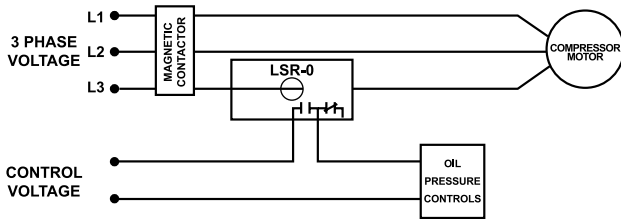
### LSR-0

Self-powered load sensor/low-cost proof relay

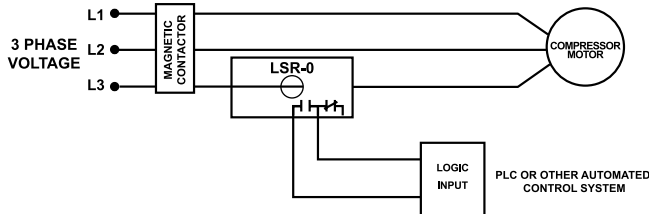


### Wiring Diagram

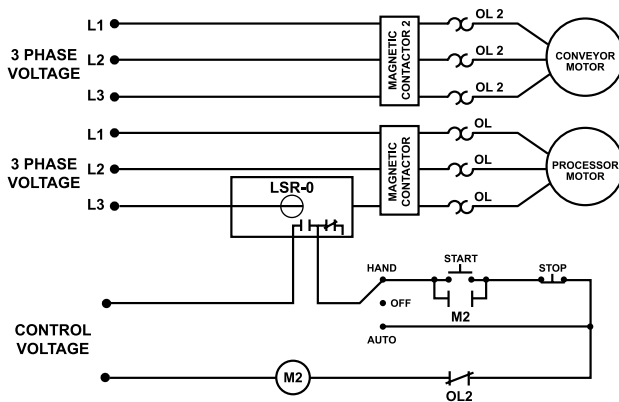
TYPICAL WIRING DIAGRAM FOR REFRIGERATION AND OIL FAILURE CONTROL



TYPICAL WIRING DIAGRAM FOR BUILDING AUTOMATION



TYPICAL WIRING DIAGRAM FOR BUILDING AUTOMATION



### Description

The LSR-0 is a self-powered load sensor intended for use as a proof relay. It is used to verify that current is flowing as intended. It has a guaranteed 15A pull-in current and 2.5A drop-out current. Proof relays are typically used to interlock fans, compressors, motors, heating elements and other devices. The LSR-0 is self-powered, that is, it draws its power from the wire being monitored so it does not require separate control power wiring.

### Features

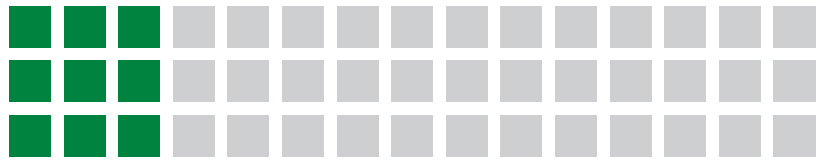
- Self-powered
- Low cost proof relay
- Can monitor up to 135A loads

### Specifications

<b>Max Current Ratings</b>	135A continuous
<b>Functional Characteristics</b>	
<b>Turn-on Threshold</b>	Fixed, 15A (max.)*
<b>Turn-off Threshold</b>	2.5A (min.)
<b>Power</b>	Induced from conductor
<b>Isolation</b>	600 V ac rms
<b>Output Characteristics</b>	
<b>Relay Output Rating:</b>	
<b>Pilot Duty</b>	480 VA @ 240 V ac
<b>General Purpose</b>	10A
<b>General Characteristics</b>	
<b>Temperature Range</b>	-20 °C to 70 °C (-4 °F to 158 °F)
<b>Wire Size</b>	#12-24AWG
<b>Hole Size</b>	0.725" diameter
<b>Terminal Torque</b>	7 in.-lbs.
<b>Safety Marks</b>	
<b>CSA, CSA-NRTL/C</b>	(File #46510)
<b>Dimensions</b>	<b>H</b> 42.42 mm (1.67"); <b>W</b> 58.42 mm (2.3"); <b>D</b> 90.43 mm (3.56")
<b>Weight</b>	0.35 lb. (5.6 oz., 158.76 g)
<b>Mounting Method</b>	Four #6 screws 3/4" in length

\*Conductors may be looped for smaller motor applications.

**Caution:** This product should not be relied upon solely for safety of life or safety applications.

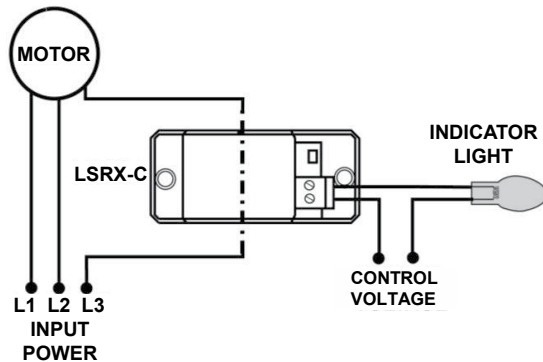


### LSRX / LSRX-C SERIES

Self-powered load sensor, low-cost proof relay



### Wiring Diagram



### Ordering Information

MODEL	DESCRIPTION
LSRX	Fast-on terminal
LSRX-C	Depluggable screw terminals
LSRX-OEM	Fast-on terminals, 10 pack

### Description

The LSRX/LSRX-C Series are AC current sensors designed to energize the output contact whenever 4.5 Amps or greater is present. The LSRX/LSRX-C Series is used commonly as an AC current proof relay to indicate if a motor is operating. It can also be used to interlock fans, compressors and motors; to indicate equipment status such as feed rates, tool wear, loss of prime on pumps, mixer viscosity and all types of current sensing conditions or to stage pump motors, chillers, or other machinery.

This device combines a current transformer (CT), transducer and high current output relay together to switch alarm circuits, contactors and most resistive or inductive loads. The LSRX/LSRX-C Series can perform the function of an auxiliary contact, yet has the advantages of universal application and isolation.

### Features & Benefits

FEATURES	BENEFITS
<b>Self-powered</b>	Eliminates need for separate control voltage. Draws power from wire being monitored
<b>Quick-connect terminals</b>	Saves time at installation
<b>LED indication</b>	Visual indication of relay status
<b>Built in current sensor will monitor up to 200A loads</b>	Eliminates the need for a stand alone current transformer and also provides isolation between the monitored and control circuits

### Accessories



#### Informer IR Kit-36 (36" infrared adapter cable)

Attaches to the face of the unit to provide remote diagnostics without opening the panel.

### Specifications

#### Input Characteristics

<b>Operating Current</b>	5-200 A Continuous
<b>Minimum Pull-in Current</b>	4.5A (typical), 7.0A (max)*
<b>Power</b>	Induced from AC conductor

#### Output Characteristics

<b>Relay Output Rating (SPST - Form A)</b>	
<b>Pilot Duty</b>	480 VA @ 240 V ac, B300
<b>General Purpose</b>	5 A @ 240 V ac
<b>Electrical Life</b>	1x10 <sup>5</sup>
<b>Mechanical Life</b>	1x10 <sup>7</sup>
<b>Maximum Conductor Diameter</b>	0.7 in.
<b>Output Terminals</b>	
<b>LSRX</b>	0.25" quick-connect fast-ons
<b>LSRX-C</b>	depluggable screw terminals
<b>Torque Rating</b>	3.0 in.-lbs.

# Protection Relays & Controls

## CURRENT MONITORING RELAYS & TRANSDUCERS

### General Characteristics

<b>Temperature Range:</b>	
<b>Operating</b>	-20 °C to 70°C (-4 °F to 158 °F)
<b>Storage</b>	-40 °C to 80 °C (-40 °F to 176 °F)
<b>Hole Size</b>	0.72" diameter
<b>Wire Size</b>	12-26 AWG
<b>Output Relay Status Indicator</b>	LED
<b>Relative Humidity</b>	10-95%, non-condensing per IEC 68-2-3
<b>Standards Passed</b>	
<b>Electrostatic Discharge (ESD)</b>	IEC 61000-4-2, Level 2, 4kV contact, 4kV air
<b>Fast Transient Burst</b>	IEC 61000-4-4, Level 3, 2kV power, 1kV input/output
<b>Surge</b>	
<b>IEC</b>	61000-4-5, Level 3, 2kV line-to-line; 2kV line-to-ground
<b>Safety Marks</b>	
<b>UL</b>	UL508 Recognized (File #E68520)
<b>Dimensions</b>	<b>H</b> 68.58 mm (2.7"); <b>W</b> 28.7 mm (1.13"); <b>D</b> 63.5 mm (2.5")
<b>Weight</b>	0.3 lb. (4.8 oz., 136.08 g)
<b>Mounting Method</b>	Surface Mount

\*Conductors may be looped for smaller motor applications.

# Protection Relays & Controls

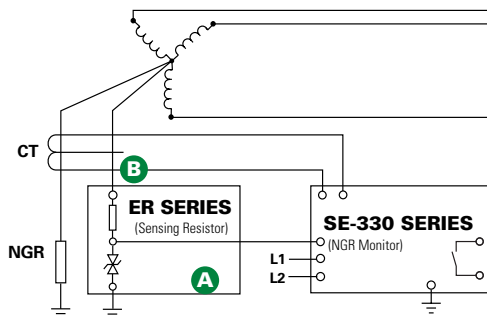
## NEUTRAL-GROUNDING-RESISTOR MONITORING

### SE-330, SE-330HV SERIES

#### Neutral-Grounding-Resistor Monitor



### Simplified Circuit Diagram



For detailed wiring diagram, see adjacent page.

### Ordering Information

ORDERING NUMBER	POWER SUPPLY	COMM		K4 UNIT HEALTHY CONTACT
SE-330	X	X	-	0 X
SE-330 for applications 35 kV or less	0=120/240 Vac/Vdc	0=USB Only 1=DeviceNet 3=EtherNet (Dual RJ45) 4=EtherNet (SC Fiber & RJ45) 5=EtherNet (Dual SC Fiber) 6=IEC61850 (Dual RJ45) 7=IEC61850 (SC Fiber & RJ45) 8=IEC61850 (Dual SC Fiber)		0=Normally Open 1=Normally Closed
SE-330HV for 72 kV applications	2=48 Vdc			

NOTE: For Australian applications, see the SE-330AU.

REQUIRED ACCESSORIES	OPTIONAL ACCESSORIES
ER Series Sensing Resistor	SE-IP65CVR-G
Current Transformer	SE-MRE-600
	RK-332
	NGRM-ENC
	PGA-0520
	SE-330-SMA

### Description

The SE-330 is an advanced ground-fault and neutral-grounding-resistor monitoring relay that is compliant with Rule 10-302 of the 2018 Canadian Electrical Code Part I (CE Code). It measures neutral current, neutral-to-ground voltage, and neutral-to-ground resistance. It provides continuous monitoring of the neutral-to-ground path to verify that the neutral-grounding resistor (NGR) is intact and that it has not been bypassed or shorted. An open NGR renders current-sensing ground-fault protection inoperative and could result in a false belief that the system is functioning properly. A shorted NGR results in higher-than-expected ground-fault current. The SE-330 can be used with low- and medium-voltage transformers and generators with low- or high-resistance grounding used in processing, manufacturing, chemical, pulp and paper, petroleum, and water-treatment facilities. For high-voltage applications, use the SE-330HV. For applications that require conformance to Australian standards, use the SE-330AU.

### Resistor Monitoring

The SE-330 combines the measured values of resistance, current, and voltage to continuously determine that an NGR is intact. It is able to detect an open or shorted resistor with or without a ground fault present. Sensing resistors are matched to the system voltage and are used to monitor NGRs on systems up to 72 kV.

### Ground-Fault Monitoring

The SE-330 uses an application-appropriate current transformer to reliably detect ground-fault currents as small as 100 mA. Discrete-Fourier Transform (DFT) filtering ensures that false trips due to harmonic noise from adjustable-speed drives do not occur. Should the resistor open and a ground fault subsequently occur, the SE-330 will detect the fault through voltage measurement, while other current-only sensing relays would be ineffective.

### Pulsing Ground-Fault Location

The SE-330 is capable of controlling a pulsing contactor, which is used to switch the NGR resistance in a pulsing-compatible NGR package. The resulting ground-fault current is distinguishable from charging currents and noise and will only appear upstream of the ground fault, making fault location fast and easy, even without isolating feeders or interrupting loads.

### Accessories



#### ER Series Sensing Resistor

Required interface between the power system and the SE-330/SE-330HV. Eliminates hazardous voltage levels at the relay.



#### ELCT5 Series Ground-Fault Current Transformer

Sensitive ground-fault current detection (5 A primary).



#### ELCT30 Series Ground-Fault Current Transformer

Sensitive ground-fault current detection (30 A primary).

#### Other Current Transformer

For low-resistance NGRs choose a CT primary approximately equal to the NGR rating. Inputs are provided for 1- and 5- A- secondary CTs.



#### SE-IP65CVR-G Hinged Transparent Cover

Watertight cover, tamper resistant, IP65 protection.

Littelfuse reserves the right to make product changes, without notice. Material in this document is as accurate as known at the time of publication. Visit Littelfuse.com for the most up-to-date information.

# Protection Relays & Controls

## NEUTRAL-GROUNDING-RESISTOR MONITORING

### Features & Benefits

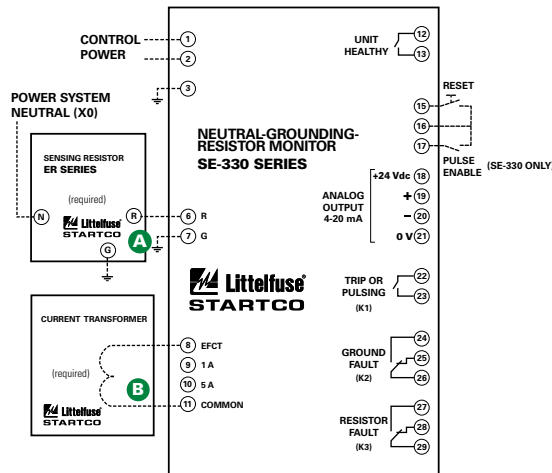
FEATURES	IEEE #	BENEFITS
<b>Continuous NGR monitoring</b>	3	Detects resistor failure within seconds, reduces transient-overvoltage risk, removes risk of ground-fault-detection failure
<b>Shorted NGR detection</b>	3	Detects a ground fault on the neutral that could bypass the resistor, ensures fault current is not higher than expected
<b>Ground-fault detection</b>	50G/N, 51G/N, 59N	Main or backup protection to detect a ground fault anywhere on the monitored system
<b>Adjustable pickup (2-100%)</b>		Select greatest sensitivity without false operation, adjustable in 1% increments (MEM setting)
<b>Adjustable time delay (0.1-10 s)</b>		Adjustable trip delay allows quick protection and system coordination
<b>Universal CT compatibility</b>		Allows the use of a CT that gives required ground-fault settings
<b>Programmable output contacts</b>		Two programmable Form C and One programmable Form A (Ground Fault, Resistor Fault, Unit Health)
<b>Selectable contact operating mode</b>		Selectable fail-safe or non-fail-safe operating modes allows connection to shunt or undervoltage breaker coil or alarm circuit (K1, K2, and K3 output contacts)
<b>Analog output (4-20 mA)</b>		Connect an optional PGA-0520 meter or control system
<b>Pulsing output (SE-330 only)</b>		Control the operation of a pulsing ground-fault-location circuit
<b>Trip records</b>		On-board 100-event (with date and time) recorder helps with system diagnostics
<b>Harmonic filtering (DFT)</b>		Eliminate false trips due to harmonic noise from ASDs
<b>Local communications</b>		Mini USB port to view measured values, configure settings, and check event records
<b>Data logging</b>		On-board microSD card (included) can be used for long-term data logging
<b>Network communications</b>		Remotely view measured values and event records, reset trips, and cause a remote trip Available Protocol Options: <b>IEC 61850</b> - with dual RJ45, SC Fiber and RJ45, or Dual SC Fiber Interface <b>Modbus TCP and Ethernet/IP</b> - with dual RJ45, SC Fiber and RJ45, or Dual SC Fiber Interface <b>DeviceNet</b> - with CAN interface
<b>Software</b>		PC-interface software (SE-MON330) is available at Littelfuse.com/RelaySoftware
<b>Selectable reset mode</b>		Selectable latching or auto-reset operation
<b>Unit-healthy output</b>		Verifies SE-330 is operating correctly, available as Form A or Form B output contact
<b>Conformal coating</b>		Internal circuits are conformally coated to protect against corrosion and moisture

### Typical Values

SYSTEM VOLTAGE (VOLTS)	NEUTRAL-GROUNDING RESISTOR		SENSING RESISTOR		GROUND-FAULT PICKUP LEVEL (AMPERES)	V <sub>N</sub> PICKUP LEVEL (VOLTS)
	CURRENT (AMPERES)	RESISTANCE (OHMS)	MODEL	RESISTANCE (SWITCH S5 SETTING)		
480	5	55	ER-600VC	20 kΩ	2.5	170
600	5	69	ER-600VC	20 kΩ	2.5	200
2,400	5	277	ER-5KV	20 kΩ	2.5	800
4,160	5	480	ER-5KV	20 kΩ	3	1,700
7,200	10	416	ER-15KV	100 kΩ	2	170 x 5 = 850
14,400	15	554	ER-15KV	100 kΩ	3	340 x 5 = 1,700

DISCLAIMER: The above table is for illustrative purposes only. Actual values may differ based on a variety of individual system considerations, such as capacitive charging current and coordination study results.

### Wiring Diagram



NOTE (1) - The Profibus option has been discontinued. Please see the SE-330 PCN document.

### Specifications

#### IEEE Device Numbers

Ground Fault (50G/N, 51G/N, 59N),  
Checking Relay (3), Lockout Relay (86)

#### Input Voltage

See ordering information

#### Dimensions

H 213 mm (8.4"); W 98 mm (3.9"); D 132 mm (5.2")

#### GF Trip-Level Settings

2-100% of CT-Primary Rating in 1% increments

#### GF Trip-Time Settings

0.1-10 s

#### V<sub>n</sub> Trip-Level Settings

20-2,000 Vac (≤5 kV systems) 100-10,000

#### Contact Operating Mode

Vac (>5 kV systems)

#### Reset Button

Selectable fail-safe or non-fail-safe (K1)

#### Output Contacts

Standard feature

#### Pulsing Circuit

Standard feature

#### Approvals

Two Form A and two Form C

#### Communications

1.0-3.0 s in 0.2 s increments (SE-330 only)

#### Analog Output

CSA certified, UL Listed (E340889), CE (European Union), RCM (Australian)

#### Conformally Coated

Mini USB (standard); DeviceNet (optional),

#### Warranty

IEC 61850 (optional), Modbus TCP and

#### Mounting

EtherNet/IP (optional)

4-20 mA, self or loop powered

Standard feature

5 years

Panel and Surface

# Protection Relays & Controls

## INDUSTRIAL SHOCK-BLOCK

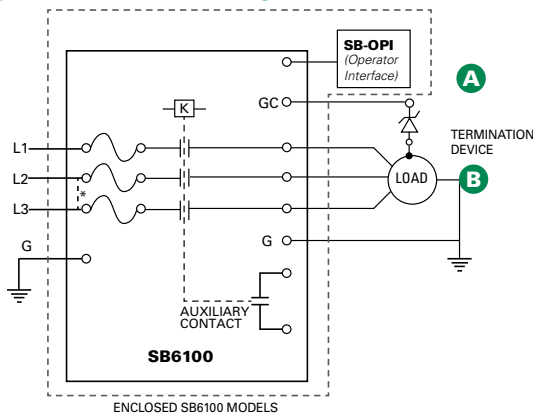
### SB6000 SERIES



\*Patented

Operator Interface\*

### Simplified Circuit Diagram



### Ordering Information

ORDERING NUMBER	VOLTAGE (V)	TRIP LEVEL (MA)	UL CATEGORY/CLASS
SB6100-00x-0	208	20 (Fixed)	UL 943C Class C special-purpose GFCI
SB6100-10x-0	240		
SB6100-20x-0	480		
SB6100-30x-0	600		UL 943C Class D special-purpose GFCI
SB6100-01x-0	208	6, 10–100 in increments of 10	UL 943/UL 1053 Equipment ground-fault protective device (EGFPD)
SB6100-11x-0	240		
SB6100-21x-0	480		
SB6100-31x-0	600		
SB6100-02x-0	208	6 (Fixed)	UL 943 Class A GFCI

Note: x=0 for open-chassis models and 1 for enclosed models



### Description

#### Special-Purpose Ground-Fault Circuit Interrupter (GFCI), Class C and Class D

Industrial Shock Block (ISB) is a personnel protection device designed to meet the requirements for special-purpose GFCIs defined by UL 943C. This standard outlines GFCI classes specifically designed for use in industrial facilities. Class C GFCIs are intended to be used on three-phase systems where the line-to-line voltage is 480 V or less with a trip level of 20 mA, while Class D GFCIs are intended to be used on 600 V systems. The Industrial Shock Block includes an automatic self-test feature and is compliant to the UL 1998 Software in Programmable Components standard.

#### Ground-Fault Circuit Interrupter (GFCI), Class A

The Shock Block is available as a Class A GFCI, allowing commercial kitchens and commercial establishments with wet areas to meet NEC 210.8(B) for their 3-phase loads up to 100 A.

#### Equipment Ground-Fault Protective Device (EGFPD)

Industrial Shock Block is also available with adjustable protection settings as an EGFPD. The EGFPD models can be set to trip at 6 mA or from 10-100 mA in increments of 10 mA. This offers more flexibility since GFCI devices are not allowed to have an adjustable trip level.

#### Rating and Models

Industrial Shock Block (GFCI & EGFPD) is available for three-phase voltages from 208 to 600 V with a maximum full load current of 100 A, and a built-in overcurrent protection supplied by Littelfuse Class T fuses. The load must be 3-phase, however, cannot have a neutral. The power system can either be solidly-grounded or high-resistance grounded.

Two options for enclosures are available: UL-recognized open-chassis models are available for installation in existing electrical enclosures and UL-listed enclosed models include a NEMA-4X enclosure for stand-alone installations.

#### Ground Wire (Load-Ground) Monitor

The Industrial Shock Block also monitors the ground wire (load-ground) connection between the Industrial Shock Block and load. This is a required feature for Class C and D GFCI devices and is recommended for Class A and EGFPD devices. If the connection is broken, the Industrial Shock Block will trip and provide an alarm by changing the state of the alarm contacts. This monitoring circuit includes an extra wire (pilot wire) between the Industrial Shock Block and load (since the monitoring current is low, only a small wire is required). At the load, the pilot wire is connected to a termination device. The other end of the termination device is connected to the load ground (typically the enclosure).

### Features & Benefits

FEATURES	BENEFITS
<b>UL 943 inverse time trip curve</b>	Detects and interrupts to protect people and reduce the probability of nuisance tripping
<b>Minimum trip time &lt; 20 msec</b>	Reduces the risk of ventricular fibrillation for leakage current of 250 mA and above
<b>Fixed 6 mA (UL 943) or 20 mA (UL 943C) trip level</b>	Personnel protection for industrial and commercial systems on loads up to 100 A
<b>Selectable trip levels (EGFPD)</b>	Provides extra safety when a customer is able to operate with a setting below 20 mA (GFCI) and the settings above 20 mA can reduce nuisance tripping on systems with high leakage current
<b>UL 943C ground monitor/interrupt</b>	Protects from shock by tripping if continuity of ground wire between Industrial Shock Block and load is broken
<b>Undervoltage, brownout, chatter detection</b>	Ensures proper operation and prolongs the internal contactor lifetime
<b>3 x Class T, 600 V incoming fuses</b>	The fuses provide overcurrent protection for a 100 A circuit and a higher short-circuit current rating (SCCR) of 50 kA
<b>Conformal coating</b>	Internal circuits are conformally coated to protect against corrosion and moisture, yet still repairable
<b>Operator interface</b>	Shows unit status, alarm types, percentage of leakage current, and allows for Test and Reset capabilities
<b>Auxiliary contact</b>	Provides a normally-open contact for remote indication
<b>Automatic self-test</b>	All units include an automatic self-test feature include an automatic self-test feature
<b>Motor starter</b>	Allows the user to start and stop the motor from the interface

# Protection Relays & Controls

## INDUSTRIAL SHOCK-BLOCK

### Accessories



**Operator Interface (AC6000-OPI-00)**



**1N5339B - Termination Device**  
Axial-lead ground-check termination, included with SB6000 series



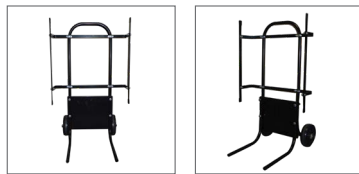
**SE-TA6 - Termination Assembly**  
Optional termination assembly with terminals and mounting holes



**SE-TA6-SM Stud-Mount Termination Assembly**  
Optional ground-check termination for submersible pumps



**AC6000-CART-00 Two-wheeled Cart**  
Optional for mounting ISB to allow for moving the unit while power is off



**AC6000-MNT-00 Mounting Frame**  
Optional for mounting ISB to a cart or other surface. Included with the AC6000-CART-00.

### Ordering Information - Accessories

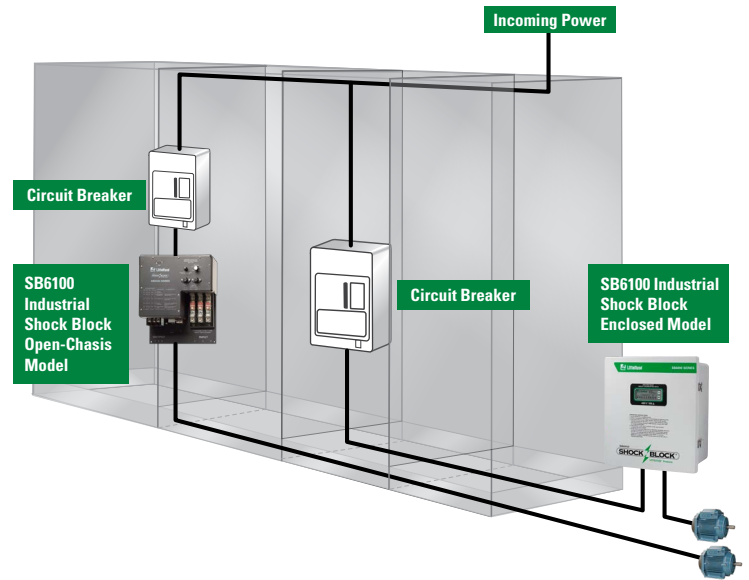
ACCESSORIES	REQUIREMENT	PAGE*
AC6000-OPI-00	Included	N/A
1N5339B	Included	120
SE-TA6	Optional	120
SE-TA6-SM	Optional	120
SE-TA6ASF-WL	Optional	120
AC6000-CART-00	Optional	N/A
AC6000-MNT-00	Optional	N/A

\* Page in Protection Relay & Controls Catalog

### Connection Diagram

The SB6100 is installed in-line between incoming power or existing overcurrent protection device and the load.

The open-chassis SB6100 can be installed in electrical equipment and the enclosed version is typically wall-mounted.



### Specifications

<b>Voltage Rating</b>	See ordering information
<b>Current Rating</b>	100 A (continuous)
<b>System Type</b>	3-phase, 3-wire (no neutral), 60 Hz
<b>Short-Circuit Current Rating</b>	50,000 A
<b>Trip Level Settings</b>	Selectable (6, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 mA), fixed at 6 mA, or fixed at 20 mA
<b>Trip Time Setting</b>	Inverse time trip curve
<b>Enclosure</b>	NEMA 4X, Polyester, Lockable
<b>Operating Temperature</b>	-35 °C (-31 °F) to +40 °C (104 °F), up to +66 °C (151 °F) with derating
<b>Wiring Requirements</b>	2/0 AWG (maximum)
<b>Approval</b>	GFCl: UL Listed (enclosed models) and UL Recognized Component (open-chassis models) EGFPD: cULus Listed (enclosed models) and cURus Recognized Component (open-chassis models); UL1998 Compliant (revision 01 or higher); All models except SB6100-02x-0 CSA Certified
<b>Dimensions</b>	<b>Enclosed:</b> H 453.8 mm (17.9"); W 406.2 mm (16.0"); D 223.3 mm (8.8") <b>Open-chassis:</b> H 455.0 mm (17.9"); W 340.7 mm (13.4"); D 174.9 mm (6.8")
<b>Warranty</b>	1 year



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