ARC-FLASH PROTECTION

Rapidly detects developing Arc-Flash incidents and sends a trip signal to interrupt power before significant damage occurs.

D0920	Arc Detection Unit	74
PGR-8800 Series	Arc-Flash Relay	75
AF0500 Series	Arc-Flash Relay	77
AF0100 Series	Arc-Flash Relay	79
A0220 Series	Light Sensor	80
PGA-1100	Diode Logic	81

For More Information…
and to download our White Paper on Key Considerations for Selecting an Arc-Flash Relay or our Arc-Flash Energy Reduction Workbook, visit
Littelfuse.com/ArcFlash

D0920 ARC DETECTION UNIT

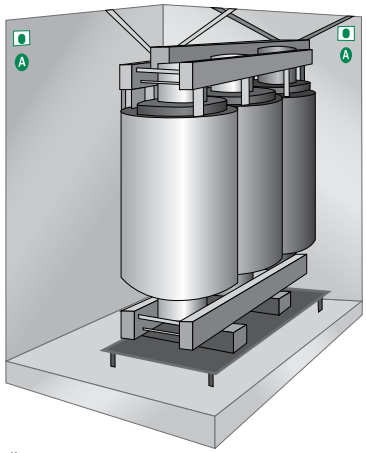
Arc Detection Unit

Description

The D0920 Arc-Flash relay provides a simple and cost effective solution for Arc-Flash monitoring. Two light sensors can be connected directly to one relay.

Light Sensors react to light and have a 180° detection zone. Sensors are supplied with 10 or 15 m of cable. 1-2 sensors are recommended per cubicle or drawer.

Installation Diagram



Install sensors in line of sight to possible arc faults.

Features & Benefits

FEATURES	BENEFITS
Compact module	Fits into wide range of Arc-Flash applications
Trip time <1 ms	Limits Arc-Flash damage and risk of injury
Two optical sensor cable lengths	Point sensors with 10 or 15 m of cable
Inputs for two sensors	Single Arc-Flash relay can monitor 2 sensors
Adjustable light sensitivity	Allows operation in bright environments and maximum sensitivity in dark environments
Service mode	Allows relay and sensor test without tripping system

Ordering Information

ORDERING NUMBER	DESCRIPTION
D0920.0060	230 V AC +15, -30%, remains powered on after trip, slide switch instead of key switch, electronic reset button instead of mechanical reset button, CCC approved

ACCESSORIES	REQUIREMENT
A0033.0010 Detector cable 2 x 0.25 mm² w/screen. 100 m	Optional
A0220.0010 Arc Detector V-Type; 10 m cable	Required: At least one sensor per monitored zone
A0220.0020 Arc Detector V-Type; 15 m cable	
PGA-1100/D1100 Diode Logic Unit	Optional

Accessories

A 

A0220 Light Sensors
Line-of-sight light sensor detects an arc as small as 3 kA within a 2-m half-sphere. Available with 10 or 15 m cable.

PGA-1100/D1100 Diode Logic Unit
For tripping one circuit breaker with multiple D0920 Relays

Specifications

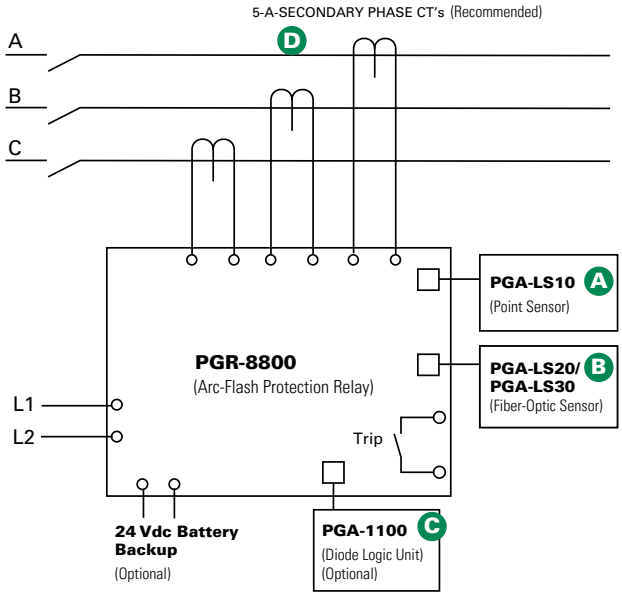
Supply Voltage	230 V AC +15,-30%
Thyristor Output	325 V DC from charged capacitor, nominal energy 3.5 J
Sensitivity	Adjustable 2 - 24 klux
Number of Sensors	Max. 2
Response Time	Less than 1 ms
Power Consumption	3.5 VA
Ambient Temperature	–25°C to 70°C
Dimensions	**H** 90 mm (3.5"); **W** 105 mm (4.1"); **D** 61 mm (2.4")
Certification	CE, CCC

5 ARC-FLASH PROTECTION

PGR-8800 SERIES (D1000)

Arc-Flash Relay

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.

Description

The PGR-8800 Series 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.

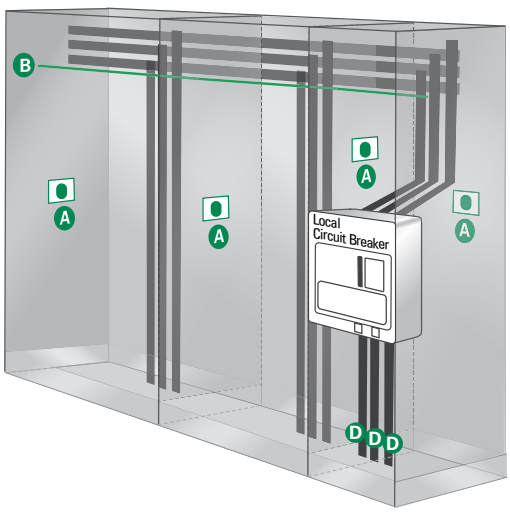
Optical Sensors

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).

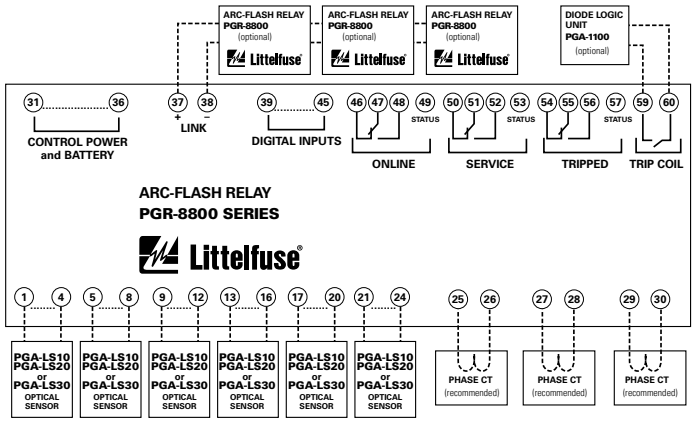


PGR-8800 SERIES (D1000)

Features & Benefits

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

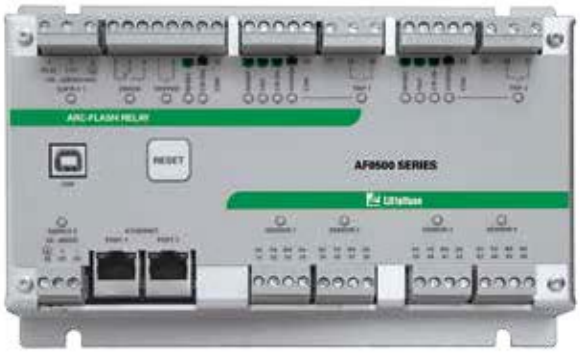
Specifications

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

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

AF0500 SERIES

Arc-Flash Relay



Features & Benefits

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

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® 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

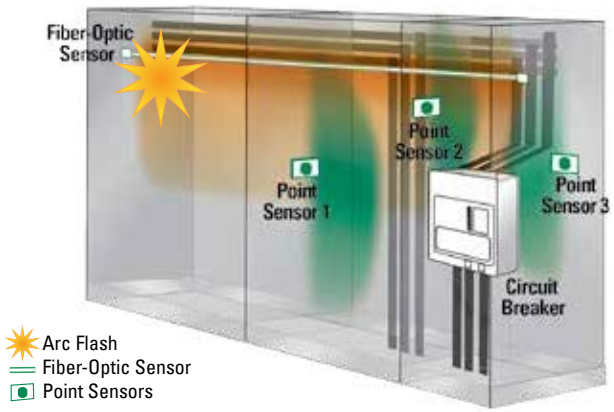
The AF0500 accepts both PGA-LS10 point sensors and PGA-LS20/PGA-LS30 fiber-optical sensors. Thus any combination of fiber or point sensors is supported.

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.

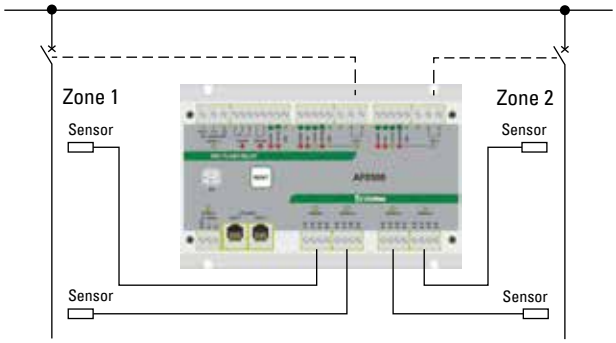


AF0500 SERIES

Applications

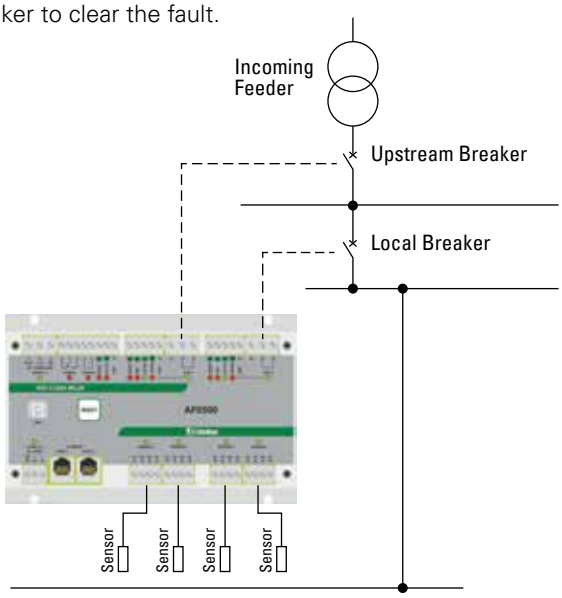
Zone Tripping

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



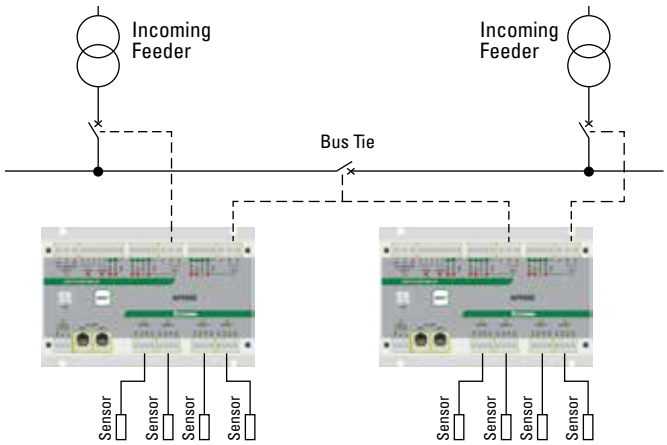
Upstream Breaker Tripping

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 Vac (+10%, -15%) 50/60 Hz, 20 VA, 110 to 250 Vdc (+10%, -20%) 8 W
Low Voltage	24 to 48 Vdc (+10%, -20%), 4 W
Sensor Inputs	4 light sensor inputs for PGA-LS10, PGA-LS20 and PGA-LS30 sensors
Trip Outputs	2 IGBT switches
UL Rating	120/240 Vac, 1800 VA, 0.75 A maximum continuous, 125/250 Vdc, 138 VA, 0.75 A maximum continuous

Supplemental Rating

Make/Carry	30 A for 0.2s
Voltage Rating	24 to 300 Vac, 24 to 300 Vdc
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)

AF0100 SERIES

Arc-Flash Relay

Description

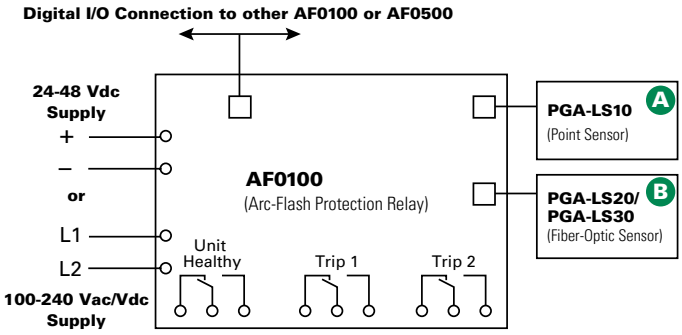
The AF0100 Series arc-flash relay is a cost-effective solution that reduces arc-fault damage by detecting the light from an arc flash and rapidly tripping. Two remote light sensors can be connected to one relay and multiple AF0100 and/or AF0500 relays can be connected to monitor additional sensors, providing 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



For dimensional drawing see: Appendix page 510, Figure 11.

Ordering Information

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

Specifications

Input Voltage	
AF0100-00	100-240 Vac/Vdc, 24-48 Vdc
AF0100-10	24-48 Vdc
Dimensions	**H** 90 mm (3.5"); **W** 128 mm (5.0"); **D** 60 mm (2.4")
Trip, Error Relays	Form C, 250 Vac/30 Vdc, 6 A resistive
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	Contact factory
Warranty	2 years

Features & Benefits

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

A0220 SERIES

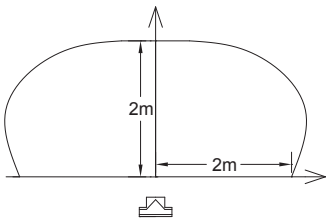
Arc Detecting Point Sensor

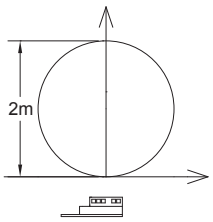
Description

The A0220 Arc Detector is a photo electric sensor. It has a sensitive area of 180°. Sensor signal is a mA current signal of 0.5 mA/klux. The sensor includes 10 m of shielded two-wire electrical cable which can easily be shortened or extended to a maximum of 50 m. Use Belden 85240 or equivalent cable (2 x 0.50 mm^2).

The sensor is compatible with the D0920, D1000 and PGR-8800 Littelfuse Arc Flash Relays.

Detection range for a 3kA fault





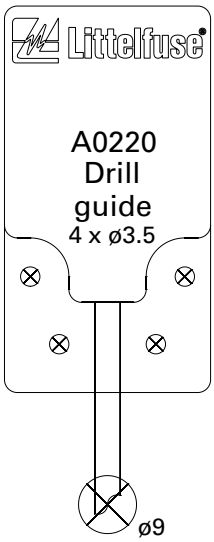
A0220 Sensor Installation

The sensors include an adhesive-backed drill template for easy surface or panel-mount installation. All dimensions are shown in millimetres.

Affix the drill template where the sensor is to be mounted. Either M4 or M5 screws or pop rivets (4 mm or 5 mm) can be used.

Mounting screws are M4 for the top holes. This template matches the mounting dimensions for the A1000 or PGA-LS10 sensor.

The bottom mounting holes are either for 5mm self-drilling screws (3.5mm drill) or for M5 (4.2 mm drill). This template matches the mounting dimensions for the A0200 and A0300 sensors.



For placement of sensors please refer to the relay manual.

Ordering Information

ORDERING NUMBER	CONTROL POWER
A0220.0010	Arc Detector type V, 10 m
A0220.0020	Arc Detector type V, 15 m
A0220.0030	Arc Detector type V, 10 m, CCC approved
A0220.0040	Arc Detector type V, 15 m, CCC approved

Specifications

Sensitivity	0.5 mA/ klux
Range for D0920	2 klux to 30 klux
Range for PGR-8800	10 klux to 30 klux
Ambient temperature	-25˚C to +70˚C
Degree of protection	IP65

Type Selection Table:
A0220 Arc Detector includes 10m cable

Connection to D0920 relay

SENSOR WIRE	TERMINAL
Red	1
Green	2
Screen	3

Connection to PGR-8800 relay

SENSOR WIRE	SENSOR 1 TERMINAL	SENSOR 2 TERMINAL	SENSOR 3 TERMINAL	SENSOR 4 TERMINAL	SENSOR 5 TERMINAL	SENSOR 6 TERMINAL
Green	4	8	12	16	20	24
Red	3	7	11	15	19	23
Screen	Chassis	Chassis	Chassis	Chassis	Chassis	Chassis

PGA-1100 (D1100)

Diode Logic

CE

Description

The PGA-1100 Diode Logic module is an optional accessory for the Littelfuse Arc-Flash Relays.

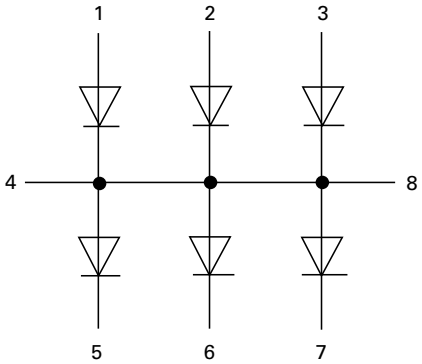
It is used in installations with more than one breaker and more than one Arc-Flash Relay. Purpose of the unit is to separate the trip paths, so the breakers can be tripped independently from each other.

Typical applications are a switchboards with two incoming feeders and one tie breaker or switchboards with several protected zones and tripping of a common upstream circuit breaker.

The unit has three input diodes to handle the outputs of three Arc-Flash relays and three output diodes to handle the trip coils of three circuit breakers. If more than three relays/ circuit breakers are needed, more units can be added by connecting terminal 8 of one box to terminal 4 of the next one, thus increasing the number of inputs and outputs with multiples of three.

For more application information please refer to the arc-flash relay manuals.

Simplified Circuit Diagram



Specifications

Diodes	1000V reverse voltage, 3A continuous, 25A for 1 second
Certification	CE
Dimensions	**H** 70 mm (2.76"); **W** 20 mm (0.79"); **D** 80 mm (3.15")

Ordering Information

ORDERING NUMBER	DESCRIPTION
PGA-1100.0010	Diode logic unit

