

Multilin A60

Advanced Light & Pressure Arc Flash Detection System

An arc flash event is the sudden release of electrical energy through the air. The resulting forces can produce temperatures up to 35,000°F, causing copper to turn into plasma expanding by 67,000 times. With these type of extreme events, fast, reliable arc flash detection is critical to avoid significant damage to equipment.

The Multilin™ A60 Arc Flash System utilizes a unique sensing method that detects both light and pressurized sound signals that occur during an arc flash event, enabling more reliable and faster operating times to reduce the total arc energy generated. Utilizing a patented arc flash sensing method, the Multilin A60 is able to reliably detect an arc flash event in as fast as 1 msec (when compared to not having any arc flash detection device).

Key Benefits

- GE patented, dual input light and pressure wave sensors for fast, reliable arc flash detection
- Continuous health monitoring of optical sensors, fiber cables, and control unit to ensure reliable operation
- Direct connection to breaker trip circuit using solid state output relays, for increased operating speed
- Multi-stage detection for reduced nuisance tripping with optional external current supervision input
- Simplified installation and configuration with sensor auto-calibration and no requirement for additional setup software
- Multiple unit connectivity and transfer trip capability to ensure optimized coverage for large applications
- No requirement to install additional CT's reducing time and costs associated with installation and commissioning

Applications

- Arc flash detection system for medium voltage switchgear
- Suitable for new and existing medium voltage switchgear applications



Advanced Arc Flash Detection

- GE patented, high-speed arc flash system utilizing light and pressure wave detection technology
- Stand-alone unit providing continuous operation, 24/7
- Continuous self-supervision (health monitoring) of sensors, fiber cables, and arc flash relay with trouble indication
- Up to five arc flash sensors per relay for detection in multiple locations within switchgear

Reliable Operation

- External current supervision from IOC device
- Five solid state output relays for fast trip initiation
- Six digital inputs with transfer trip capability for cascading applications
- Arc flash sensor auto-calibration
- Operating temperature range from -40°C to +60°C

Easy to Use & Install

- DIN Rail mounting
- Slide switches and rotary dial for device setup
- No setup software required
- Local and remote reset capability
- Three LEDs for indication for Status, Trip, and Trouble



Overview

An arc flash event is the sudden release of electrical energy through the air. The resulting forces can produce temperatures up to 35,000°F, in less than one thousandths of a second, causing copper to turn into plasma expanding by 67,000 times. The arc event remains as long as there is enough power to maintain the short circuit. With these type of extreme events, fast, reliable arc flash detection is critical for the power and process industries in order to avoid significant damage to equipment and reduce the repair and replacement costs, as well as downtime of the power system.

In an arc flash event, the amount of energy generated is a direct function of time so, when considering arc flash detection or mitigation solutions, every millisecond counts.

The Multilin A60 Arc Flash System utilizes a unique sensing method that detects both light and pressurized sound signals that occur during an arc flash event, enabling more reliable and faster operating times to reduce the total arc energy generated. Utilizing a patented arc flash sensing method, the Multilin A60 is able to reliably detect an arc flash event in as fast as 1 msec (when compared to not having any arc flash detection device).

As an independent arc flash detection device, the Multilin A60 Arc Flash System provides wide-ranging, scalable arc flash detection for medium voltage switchgear and motor control center applications.

Advanced Sensor Technology

Light and pressure wave arc flash detection

The Multilin A60 Arc Flash System utilizes GE's patented light and pressure signal fiber sensor to ensure fast and reliable protection against arcing events.

Based on a known time relationship between the speed of light and sound, (pressure wave), GE's patented sensor is able to detect and issue a trigger signal to clear the fault in under 2 milliseconds – significantly reducing incident energy from an arc flash event.

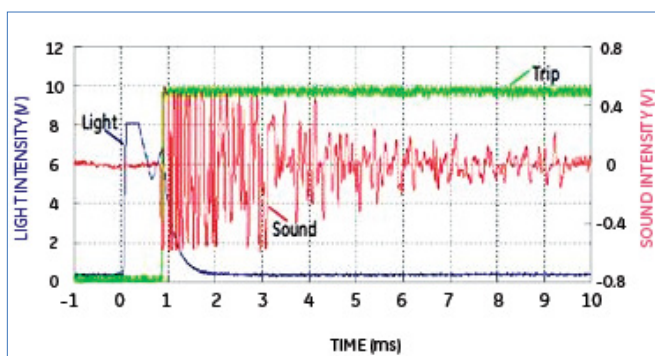


Figure 1: Arc Flash Quenching

Specifically, the sensor head detects these two key factors (light and pressure wave) using LEDs, bare fiber and a membrane.

The light fiber picks up the flash of light from the bare fiber in the sensor and transmits that to the Multilin A60. On a second fiber an LED emits light. This light is transported through the fiber and is reflected back by the diaphragm, and collected by the same fiber back to the main unit. During an arc flash event, the diaphragm vibrates due to the pressurized sound wave creating a signature which is recognized by the Multilin A60. It is this unique combination of light and pressure wave detection that ensures reliable and fast detection of an arc flash event.

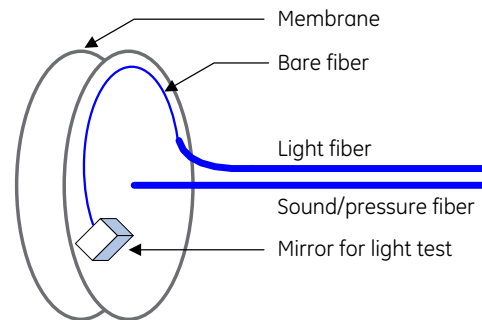


Figure 2: GE's Unique Light & Pressure Sensor Technology

To ensure optimal coverage, the Multilin A60 supports up to five sensors per unit providing optimal coverage in a typical two-high medium voltage switchgear section. To cover a larger area or for multi-section applications, Multilin A60's may be daisy chained together.

Inputs & Outputs

The Multilin A60 includes six isolated 24V dry inputs. Digital inputs are used for 'daisy chaining' multiple relays together or for remote control.

The Multilin A60 includes five solid state output relays which may be connected directly to a fast disconnect device, such as a circuit breaker or switch for trip initiation and/or to other devices for signaling purposes. Utilizing solid state output contacts, it ensures very fast response and operating times, reducing total arc flash energy. The Multilin A60 also includes one alarm output that provides remote indication of an arc flash event.

Easy to Install & Configure

Well suited for both new and existing applications

As a stand-alone unit, the Multilin A60 relay is DIN rail mountable and should be mounted inside the control cabinet of the medium voltage switchgear making it suitable for both new and retrofit applications.

With up to five arc flash sensors per unit, sensors should be mounted and installed in proper locations where there is a high probability of an arc flash occurring. Though application dependent, please refer to Figure 3: sensor placement in a two-high design switchgear, side view for suggested sensor placement. Sensor placement will vary depending on the specific application.

As the Multilin A60 utilizes both light and pressure to detect an arc flash condition, installation and wiring of external CT's is not required. An external current supervision from a separate Instantaneous Over Current (IOC) device may be used and connected as a contact input on the Multilin A60 for enhanced security and mitigation of nuisance tripping.

Calibration & Testing

The Multilin A60 provides an auto-calibration function for the sensors, reducing total commissioning and testing time. Once installed and powered, the device will first run in calibration mode. This mode sets the thresholds for both the light and pressurized sound, based on surrounding ambient conditions. As surrounding conditions may change, the Multilin A60 may be re-calibrated at anytime.

Enhanced Diagnostics

Constant self-monitoring and diagnostics to ensure reliable operation

The Multilin A60 has a built-in self-test feature that runs every second during normal operating mode. This unique feature monitors the health of the sensors, the full length of the fiber cables, and the unit itself, eliminating the need for periodic testing and additional test equipment.

An LED on the unit is used to indicate the health of the sensor and its connection to the unit. Using the alarm output relay, remote health status indication is also provided.

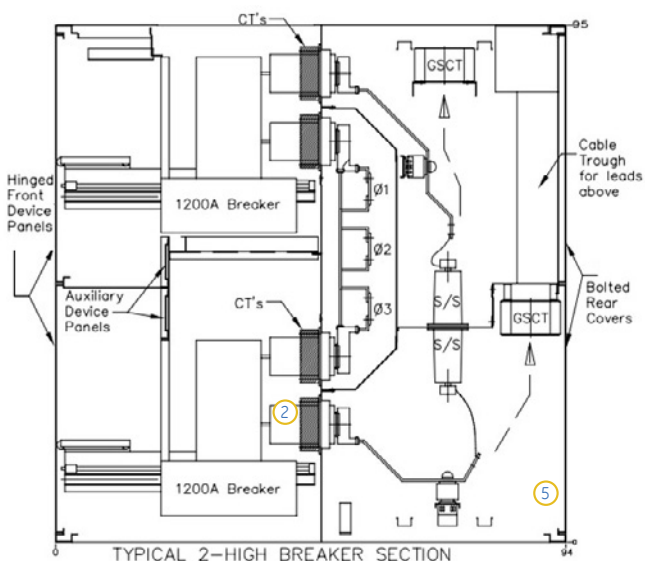


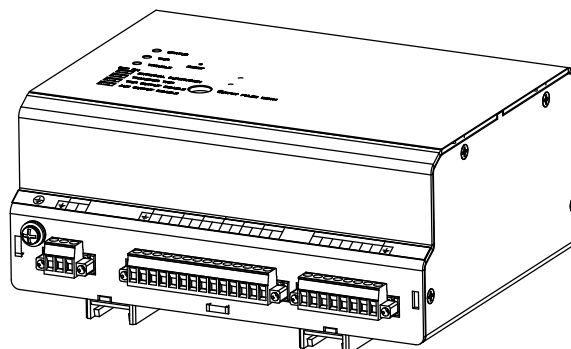
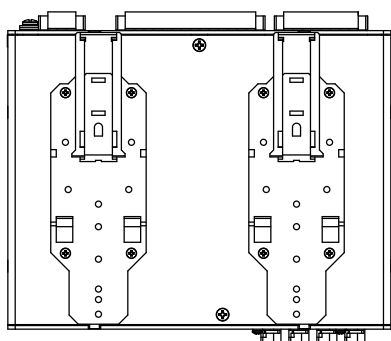
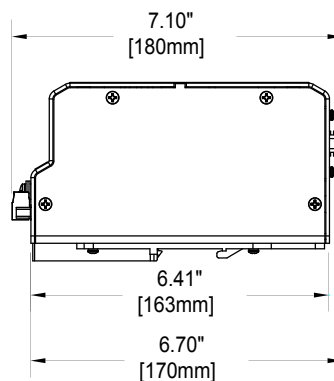
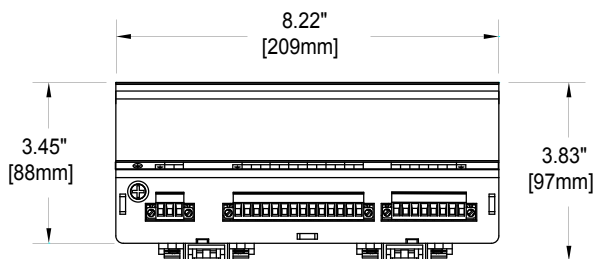
Figure 3: The above is a representation of a Two-High design with Arc-Flash Sensors

Legend:

- 1. Breaker 1 compartment
- 2. Breaker 2 compartment
- 3. Main bus bar section
- 4. Upper cable exit section
- 5. Lower cable exit section
- 6. Location of arc flash module in instrument compartment

Multilin A60 Arc Flash System Dimensional Information

Base unit is DIN rail mountable inside control cabinet/compartment for simplified installation



Control Panel Interface

The Multilin A60 faceplate provides easy device configuration and operating status through bright LED indicators, a pushbutton, slide switches and a rotary switch.

Three LEDs provide indication of Status (operating mode), Trip and Trouble.

Simple slide switches and a rotary switch provide all the required configuration for the Multilin A60, eliminating the need for separate setup software, simplifying and reducing total setup and commissioning time.



Optical Arc Flash Sensor - Utilizing light and pressure detection technology in one sensor head



Arc Flash Sensor Inputs - Total of five per unit

LED Indicators

Status: Provides status indication of the mode of operation of the unit

Trip: Indication of a trip condition

Trouble: Provide indication of the health of the unit and all the sensors connected to the arc flash unit

Reset: Resets the arc flash relay and the state of the solid state output relays

Configuration Switches & Rotary Dial

External Supervision: Enabled when an external supervision input is desired

Transfer Trip: Enabled when multiple arc flash units are connected together

Trip Output Disable: Used to enable or disable the output relays

Aux Output Disable: Used for transfer trip to adjacent arc flash units



Power Supply connection Input and Output terminals



Power Supply - 110 - 250 Vdc/110 - 230 Vac

1 2 3 4 5
Trip from SSR 1/2/3/4/5

6 7 8 9 10 11 12
Transfer trip to other A60's

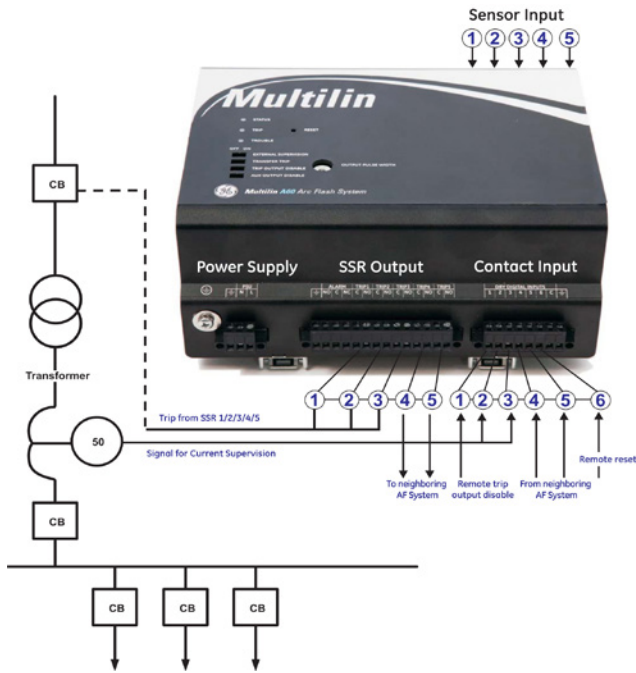
13 14 15 16 17 18
Remote trip output disable

19 20 21 22 23 24
Transfer trip from other A60s

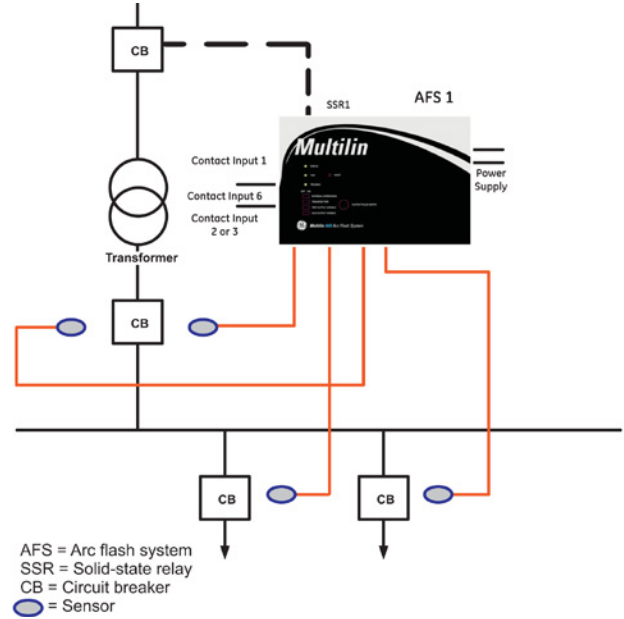
25 26 27 28 29 30
Optional IOC Supervision Remote reset

Typical Wiring Diagrams & Application Examples

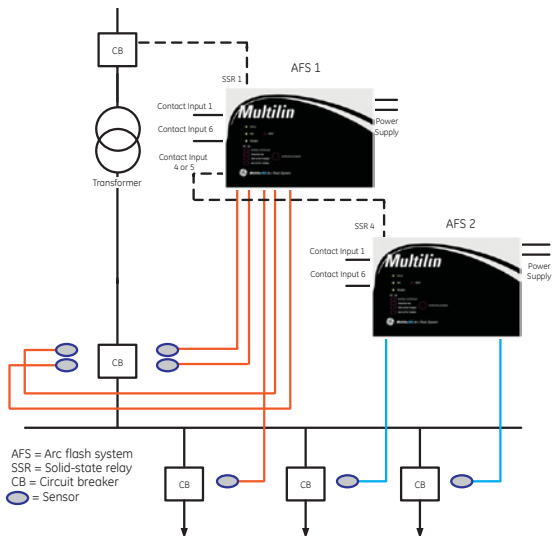
The figure below shows the typical wiring diagram of the Multilin A60 Arc Flash System. The typical wiring diagram shows the connection of the input and output relays and the connected sources. The wiring diagram also shows the connection of the supervisory circuit (option) to the A60 unit.



The figure below illustrates an application of the Multilin A60 Arc Flash System. It shows how the unit is set up to detect an arc flash event in a MV (medium voltage) switchgear application. Arc flash sensors from the Multilin A60 can be installed in either different compartments or in a single compartment, depending on the size of the compartment to be monitored. If an arc flash condition is detected in a location where an arc flash sensor is installed, the unit will trip the corresponding breaker to which the output relay on the Multilin A60 is connected.

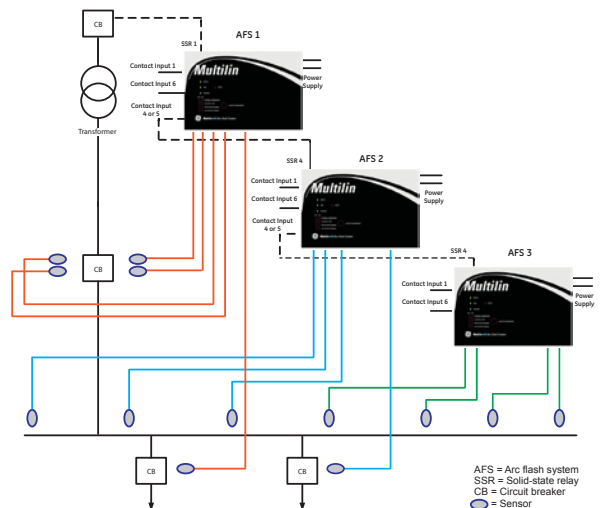


This figure describes how a cascading of multiple Multilin arc flash systems (AFS) using the transfer trip feature can be implemented. In the figure, the AFS 1 unit protects a large incoming circuit breaker compartment, and the AFS 2 sensors are connected to the outgoing feeder compartments. The Solid State Relay (SSR) 4 or 5 of the AFS 2 unit is connected to contact input 4 or 5 in order to transfer trip from the AFS 2 unit to the main circuit breaker through the AFS 1 unit. With this implementation, there is no need to extend many trip signals to the main circuit breaker. The trip signal from AFS 2 is connected to the transfer trip inputs (contact inputs 4 or 5) of the AFS 1 unit, so the transfer trip slide switch should be set to "ON" in the AFS 1 unit. This allows transfer of the AFS 2 trip to the main circuit breaker.



The figure below is an application example that describes the ability of the Multilin A60 AFS to be deployed in a cascading configuration across multiple MV switchgear sections and compartments, including through a substation bus bar vault. The Multilin A60 sensors should be installed at a certain distance from each other to ensure coverage of the entire bus bar. Refer to the Sensor coverage section in the Multilin A60 Instruction Manual for further information about the number of sensors required per compartment, and to cover the entire bus bar vault.

By connecting devices together using the transfer trip input/output, individual Multilin A60 devices may receive a transfer trip signal from an upstream or downstream device, ensuring fast, reliable detection of an arc flash event in large MV switchgear applications.



Technical Specifications

POWER SUPPLY	
NOMINAL	
<ul style="list-style-type: none"> 100 VAC to 240 VAC 50/60 Hz 125 VDC to 250 VDC 	
RANGE	
<ul style="list-style-type: none"> 100 VDC to 300 VDC 50/60 Hz 	
POWER CONSUMPTION	
Maximum Consumption:	10 W
RELAY OUTPUTS	
SOLID STATE RELAY OUTPUTS	
Maximum continuous current:	6 A
Operate time :	60 μs
Make and carry for 0.2s:	30 A per ANSI C37.90
SSR BREAKING CAPACITY	
AC Resistive, 120 VAC:	6 A
AC Resistive, 240 VAC:	6 A
AC Inductive, PF=0.4 pilot duty:	2 A
DC Resistive, 30 VDC:	6 A
FORM-C (ALARM OUTPUT)	
AC Resistive, 120 V AC:	6A normally open, 5A normally closed
AC Resistive, 240 V AC:	6A normally open, 6A normally closed
AC Inductive, PF = 0.4 pilot duty:	2.5 A
DC Resistive, 30 V dc:	6 A

DIGITAL INPUTS	
Total six 24 V dry inputs	
Isolated	
Current Draw @ Rated Voltage:	10 mA @ 24 V
Input Impedance:	1 MΩ
Type:	Dry contacts

SENSOR INPUTS	
Five self-monitored inputs	
SMI to SMI (Small Media Interface), Duplex, 2.20 mm, Plastic Optical Fiber	
Bend radius of 25mm max	

ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature	-40 °C to +60 °C
Humidity	Operating up to 95% (non condensing) @ 55 °C (per IEC60068-2-30 Variant 2, 6 days)
Altitude	2000 m (max.)
Overvoltage Category	II
Ingress Protection	IP40
Environmental rating	60 °C surrounding air
Pollution Degree	II
Type 1	
NOTE: Final installation must not exceed IP40.	

Industrial Test Certifications

Compliance

TEST	REFERENCE STANDARD	TEST LEVEL
Dielectric Voltage Withstand	EN60255-5	2.3KV
Impulse Voltage Withstand	EN60255-5	5KV
Insulation Resistance Test	EN60255-5	500 VDC
Damped Oscillatory	IEC61000-4-18/IEC60255-22-1	2.5KV CM, 1KV DM
Electrostatic Discharge	EN61000-4-2/IEC60255-22-2	Level 4
RF Immunity	EN61000-4-3/IEC60255-22-3	Level 3
Fast Transient Disturbance	EN61000-4-4/IEC60255-22-4	Class A and B
Surge Immunity	EN61000-4-5/IEC60255-22-5	Level 3 & 4
Conducted RF Immunity	EN61000-4-6/IEC60255-22-6	Level 3
Radiated & Conducted Emissions	CISPR11/CISPR22/IEC60255-25	Class A

TEST	REFERENCE STANDARD	TEST LEVEL
Sinusoidal Vibration	IEC60255-21-1	Class 1
Shock & Bump	IEC60255-21-2	Class 1
Siesmic	IEC60255-21-3	Class 2
Power Magnetic Immunity	IEC61000-4-8	Level 5
Voltage Dip & interruption	IEC61000-4-11	0, 40, 70, 80% dips, 250/300 cycle interrupts
Environmental (Cold)	IEC60068-2-1	-20C 16 hrs
Environmental (Cold Storage)	IEC60068-2-1	-40C 16 hrs
Environmental (Dry heat)	IEC60068-2-2	85C 16hrs
Relative Humidity Cyclic	IEC60068-2-30	6day variant 2
RF Immunity	IEEE/ANSIC37.90.2	20V/m 80-1Ghz

Approvals

	APPLICABLE COUNCIL DIRECTIVE	ACCORDING TO
CE compliance	Low voltage directive EMC Directive	EN60255-5/EN60255-27 EN61000-6-2/6-4
ISO	Manufactured under a registered quality program	ISO9001

Ordering

A60	E	H	*	*	*	Description
Language	E					English
Power Supply		H				125 - 250V DC / 100 - 240V AC, 50/60 Hz
Sensors			X			Qty 0 to 5 - 6ft Sensors
				X		Qty 0 to 5 - 12ft Sensors
					X	Qty 0 to 5 - 18ft Sensors

NOTE: Qty 5 sensors maximum per Multilin A60, minimum 1 sensor required

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