Ground Fault Protection

Detecting ground fault conditions and protecting sensitive equipment or personnel from harm are where AG Series sensors can help. A compact design eliminates two-piece solutions while options include factory-set or field-adjustable trip point; N.O. or N.C. latching or auto-reset relays, 24/120/240 V power supply and noise immunity.

Features:

- N.O./N.C. solid-state switch or mechanical relay outputs
- Field-selectable 5 mA, 10 mA or 30 mA setpoints
- Noise immunity option for EMI/RFI sensitive environments
- UL, CE approved

GROUND FAULT PROTECTION Selection Chart

SIZE OF WIRE BUNDLE OD

All current carrying conductors must pass through the sensing window.

Under 0.74"			Over 0.74" but under 1.875"		
AG SERIES GROUND FAULT RELAY p. 90 Contact trip point factory set between 5 and 950 mA	**AGT SERIES GROUND FAULT MEASUREMENT** p. 99 Analog signal proportional to fault current	**DG SERIES DC GROUND FAULT RELAY** p. 103 Factory set mechanical relay	**AGT-FD SERIES GROUND FAULT MEASUREMENT** p. 101 Analog signal proportional to fault current	**AGL SERIES GROUND FAULT RELAY** p. 94 Contact trip point factory set between 5 and 950 mA	**AGLD SERIES GROUND FAULT RELAY WITH DIGITAL DISPLAY** p. 97 Contact trip point adjustable from 5 to 950 mA, time delay adjustable 0–1 sec.

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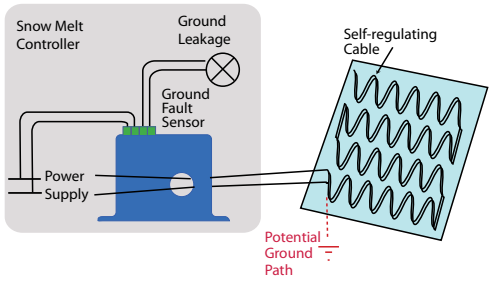
Earth Fault Detection Requirements

In North America, most people are familiar with ground fault circuit interrupters (GFCI) since they have been required by the National Electric Code (NEC) since the late 1960's. As the technology became more reliable, ground fault circuit interrupters were required in many more applications. The primary purpose was to reduce the number of deaths caused by electrical shock. Any place where a human body might become the best path to ground is a candidate for ground fault circuit protection. The number of fatalities reduced significantly.

GFCI receptacles and circuit breakers were a huge step forward. With the success in protecting people from shock the interest in ground fault protection increased. A GFCI is designed to disconnect a circuit if current to earth exceeds 6 mA at 120 VAC in locales where the NEC sets the standard for wiring practices. At this low level of fault current it may take a few seconds (UL943A states just under six seconds maximum) before the circuit is de-energized, but if the fault becomes more dangerous, at 20 mA or higher, the circuit is disconnected much faster.

Underwriters Laboratories has established standards under UL943 for personnel protection (avoiding shock to humans) and also for equipment protection at various fault levels and reaction time limits. The point of equipment protection is to keep a fault from damaging the machine more than protecting the operator. Circuits supplying heating loads (heat strips, heat trace and snow melting equipment) are usually not disconnected until the fault current exceeds 30 mA or more. Electric vehicle charging stations have GFCI protection required, but the fault level is somewhere between standard personnel protection and the various levels of equipment protection, and not specified in the NEC.



The NEC states the following:

NEC section 427.22. Ground-fault protection of equipment shall be provided for electric heat tracing and heating panels. This requirement shall not apply in industrial establishments where there is alarm indication of ground faults and the following conditions apply: (1) Conditions of maintenance and supervision ensure that only qualified persons service the installed systems. (2) Continued circuit operation is necessary for safe operation of equipment or processes.

NEC section 426.28. Ground-fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment.

NEC section 555.3. The over current protective devices that supply the marina, boat yards, and commercial and noncommercial docking facilities shall have ground-fault protection not exceeding 30 mA.

There is no stated fault current limit in section 427.22 for heating equipment or in 426.28 covering snow melt systems, but section 555.3 for protection at docks clearly shows that the monitored circuit must be disconnected from the load if there is a fault over 30 mA.

The NEC calls for ground fault protection for high current supplies too. Sections 215.10 and 230.95 deal with current of 1000 amps and voltages of 480 or higher. Section 517.17 stipulates where fault detection is required in hospitals and other health care facilities.

The importance of protecting an electrical system against faults to earth cannot be overstated. The NEC sections referred to above are just the beginning of equipment protection. This type of fault sensing is not over current detection, so fusing or circuit breakers will keep the conductors or their insulation from being damaged. There are a wide range of applications where ground fault detection is required, but if circuit size is reviewed, most personnel protection is needed for 15 or 20 amp circuits supplied at 120 volts. The requirements for equipment protection vary widely.

NK Technologies offers a ground fault sensor with simple installation and the lowest cost. Rather than combining a detector with a circuit interrupter, the sensor provides contacts to open or close when a fault is detected. The contacts can be used to energize a shunt trip accessory on a circuit breaker, de-energize a contactor coil, or trigger an alarm if the process being monitored should only be stopped in an orderly manner.

AG SERIES
Ground Fault (Earth Leakage) Relay

AG Series Ground Fault Detectors help protect people, products, and processes from damage by ground fault conditions by monitoring all current-carrying conductors in grounded single- and three-phase delta or wye systems.

Ground Fault Protection Applications

Personnel Protection (typically 5 mA)
- Detects sensitive ground fault conditions, which may be injurious to personnel and processes.
- Functions as sensor and alarm trigger when part of an overall ground fault protection system.

Equipment Protection (typically 10 mA or 30 mA)
- For applications where personal protection is not the primary concern, higher setpoint capability helps eliminate nuisance tripping while still providing adequate ground fault detection to protect machine electronics.

Regulatory
- Meets requirements as stipulated by governmental and industrial regulatory groups for ground fault sensing.

Ground Fault Protection Features

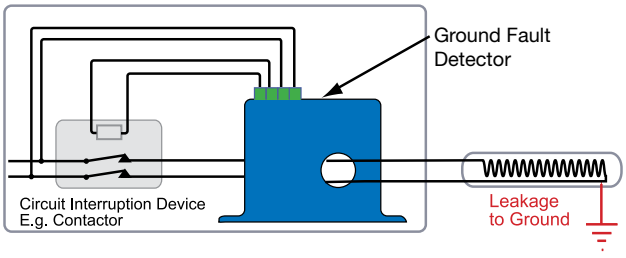
Broad Range of Options to Match Application Needs
- N.O./N.C. solid-state switch or mechanical relay outputs.
- Normally energized or normally de-energized contacts.
- Noise Immunity option for use in EMI/RFI sensitive environments.

Setpoint Options Maximize Ease-of-Use
- Field-selectable 5 mA, 10 mA or 30 mA setpoints on the AG3 "Tri-set" model makes user adjustments fast, sure and convenient.
- Single factory-calibrated setpoints available form 5 mA to 950 mA.

Compatible with Standard Equipment
- Applicable on single- and three-phase systems.
- Ideal for use with shunt trip breakers.
- Magnetically isolated from monitored circuit and control power.

UL/cUL and CE Approved
- Accepted worldwide.

Insulation Breakdown Monitoring



For additional Application Examples, go to www.nktechnologies.com/applications

"Zero Sum" Operating Principle:

In three-phase delta and wye systems, under normal conditions current in the 'hot' leg of a two-wire load is equal in magnitude but opposite in sign to the current in the neutral leg. As a result, the electromagnetic fields surrounding these two conductors cancel, producing a "zero sum current." As soon as current leaks to ground (fault condition) the two currents become imbalanced and a net magnetic field results. AG Series detectors monitor this field and trip alarm contacts when the leakage rises above setpoint.

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Solid-state Outputs

Mechanical Outputs

Output Tables

Normally Energized Models (-FS Option and -ENE Option)

Protection from faults and control power loss.

		Control Power Applied	
	No Power	**No Fault**	**Fault**
N.C. Normally Closed	closed	open	closed
N.O. Normally Open	open	closed	open

Normally De-energized Models (-NF and -DEN Options)

Protection from faults only when power is applied.

		Control Power Applied	
	No Power	**No Fault**	**Fault**
N.C. Normally Closed	closed	closed	open
N.O. Normally Open	open	open	closed

Available Models

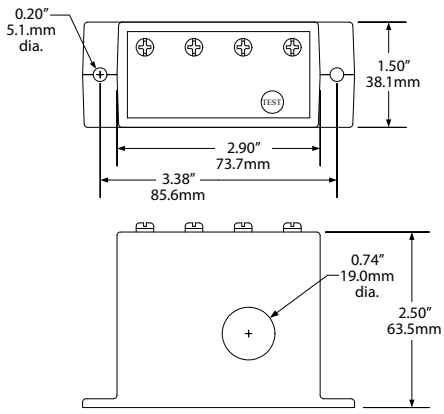
AG Series with Solid-state Outputs offer the benefit of reliable, long-lasting solid-state switches. Sold-state design provides unlimited switch operating life, superior resistance to shock and vibration, zero off-state leakage, high switch speeds and high input-output isolation. Available in solid-core case with screw terminals.

AG Series with Mechanical Outputs are available in solid-core cases with a choice between a N.O. or N.C. SPST latching relay and a SPDT Form C relay with auto-reset. All mechanical models can be ordered with factory-set, field-adjustable setpoint or with a "Tri-set" option, which provides three factory-set setpoints. A noise immunity option is available for applications in harsh EMI/RFI environments.

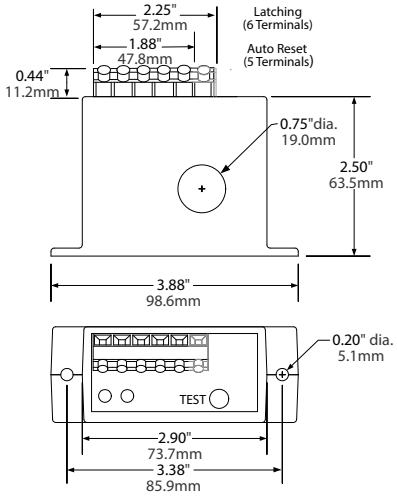
Latching Models (-LA Option) power up initially in the rest (normal) mode. If there is a fault condition or the test button is pushed, the output contacts will change state and latch. The output will remain latched regardless of whether the fault is cleared or control power is removed. To reset the output apply a momentary contact across "reset" terminals.

Ground Fault Protection Dimensions

Solid-State

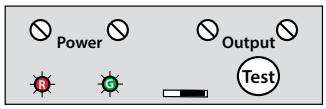


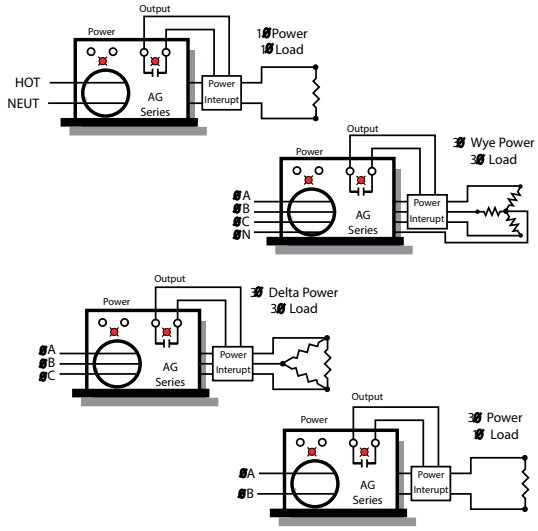
Mechanical



Connections

AG Series
Solid-State Switch

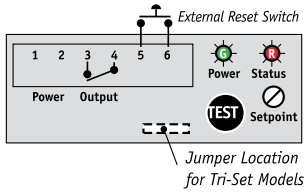




AG Series
Mechanical Relay

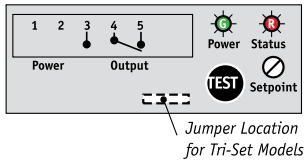
Latching Models (-LA)

-NOR1 Output Option Shown, -NCR1 similar



Auto Reset Models

-ENE and -DEN



Ground Fault Protection Specifications

Power Supply	• 120 VAC (66–132 V) • 24 VAC/DC (19–29 V) • Green LED = Power On indication	
Power Consumption	2 VA max.	
Setpoint Range	Factory-calibrated models (specify when ordering): • AG1: 5–100 mA (005–100) • AG2: 80–950 mA (080–950)	
	TR3 "Tri-set" models (field jumper select): • AG3: 5, 10, or 30 mA	
	SOLID-STATE OUTPUT MODELS	MECHANICAL OUTPUT MODELS
Output	Isolated solid-state relay	Electromechanical SPDT relay
Output Rating	• Solid-state AC Switch 1 A @ 240 VAC • Solid-state DC Switch 0.15 A @ 30 VDC	• Auto Reset: SPDT Relay 1 A @ 125 VAC, 2 A @ 30 VDC • Latching: SPST Relay 1 A @ 125 VAC, 2 A @ 30 VDC
Off-state Leakage	• <10 micro A (N.O.) • <2.5 mA (N.C.)	none
Response Time	• 200 ms @ 5% above trip point • 60 ms @ 50% above trip point • 15 ms @ 500% above trip point	
Time Delay	None	
Isolation Voltage	UL listed to 1270 VAC, tested to 5 KV	
Frequency Range	50–400 Hz (monitored circuit)	
Noise Immunity	N/A	• EMI/RFI shielding • Power supply noise filtering
Case	UL94 V-0 Flammability Rated	
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing	
Listings	UL/cUL, CE	

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Ground Fault Protection Ordering Information

Solid-state Output Models

Sample Model Number: AG1-NOAC-120-FS-005

Ground fault detector with normally open solid-state contact output, 120 VAC power supply, 5 mA trip point, failsafe version.

(1)	(2)	(3)	(4)	(5)
AG –	–	–	–	

(1) Setpoint Range

1	5–100 mA factory set
2*	80–950 mA factory set
3	5/10/30 mA jumper set

*Not UL recognized in any configuration.

(2) Output Type

NOAC	Normally Open, 1 A @ 240 VAC
NCAC	Normally Closed, 1 A @ 240 VAC
NODC	Normally Open, 0.15 A @ 30 VDC
NCDC	Normally Closed, 0.15 A @ 30 VDC

(3) Power Supply

120	120 VAC
24U*	24 VAC/DC
240*	240 VAC

*Not UL recognized in any configuration.

(4) Options

FS	Normally energized
NF	Normally de-energized

(5) Setpoint

TR3	Tri-set
005 to 950	Factory set trip point in mA

Mechanical Output Models

Sample Model Number: AG1-NOR1-120-LA-005

Ground fault detector with normally open SPST latching relay output, 120 VAC power supply and 5 mA trip point.

(1)	(2)	(3)	(4)	(5)	(6)
AG –	–	–	–	–	

(1) Setpoint Range

1	5–100 mA factory set
2	80–950 mA factory set
3	5/10/30 mA jumper set

(2) Output Type

NCR1	Normally Closed SPST Relay Form B (Available only with -LA option)
NOR1	Normally Open SPST Relay Form A (Available only with -LA option)
SDT1	SPDT Relay (Form C) with auto-reset (Available only with -DEN and -ENE options)

(3) Power Supply

120	120 VAC
24U	24 VAC/DC

(4) Options

ENE	Normally energized, auto-reset (SDT1 output only)
DEN	Normally de-energized, auto-reset (SDT1 output only)
LA	Latching (NOR1 and NCR1)

(5) Setpoint

TR3	Tri-set
005 to 950	Factory set trip point in mA

(6) Noise Immunity

N	Noise immunity
	None (blank)

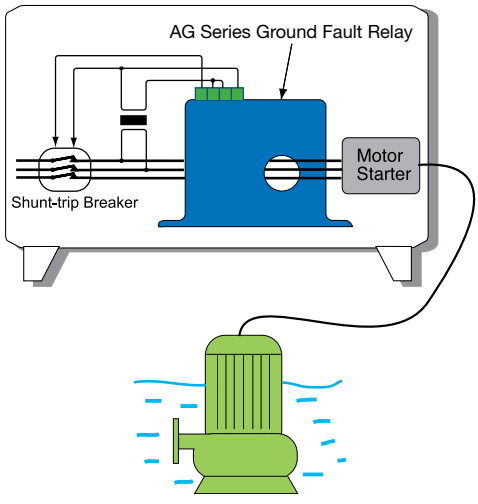
AGL SERIES
Large Aperture Ground Fault Relay

AGL Series Large Aperture Ground Fault Relays offer one of the largest aperture diameters in the industry while maintaining a compact overall profile. Intended for sensing earth leakage in applications up to 300 A, the AGL Series offers a choice of N.O. or N.C. latching relays or an SPDT Form C relay with auto-reset. Case features integral DIN rail mounting as standard and optional noise immunity coatings for applications in harsh EMI/RFI environments.

Ground Fault Relay Applications

- Replace bulky two-piece sensor solutions which require separate CTs or relay modules.
- Use with shunt trip breakers to provide total ground fault protection to sensitive machine electronics.
- Detect ground faults in resistance/impedance heating, industrial automation and control, theatrical lighting, portable power distribution, and snow melt/heat trace applications.
- Sense progressive levels of ground fault in motors or heating systems to detect deterioration prior to catastrophic failure.

Moisture Ingress on a Submersible Pump Motor



For additional Application Examples, go to www.nktechnologies.com/applications

Ground Fault Relay Features

- Integral DIN rail mount with spring loaded mounting clips.*
- Setpoint options include factory-adjustable setpoint from 5 mA –100 mA or "TR3 Tri-Set" models with field-selectable 5/10/30 mA settings.
- Finger-safe terminals for worry-free installation and operation.
- Aperture orientation is perpendicular to DIN rail, allowing for clean and efficient wiring and minimizing space between multiple components.
- Choice of dependable latching SPST or SPDT (form C) electromechanical relay outputs.
- Uses "Zero Sum" operating principle to reliably sense imbalance in magnetic fields associated with current leakage to ground.
- Typical response times from 15 ms to 200 ms.
- Integral "push-to-test" button with LED indication of contact status.
- UL/cUL and CE Approved. Accepted worldwide.

*For information on the DIN rail accessories kit, see page 140.

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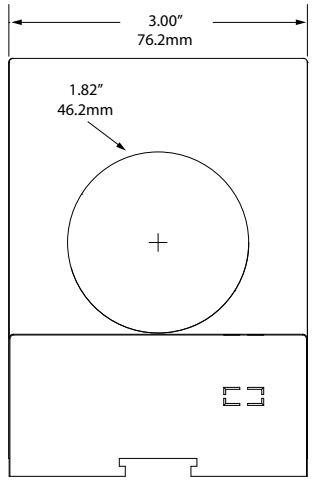
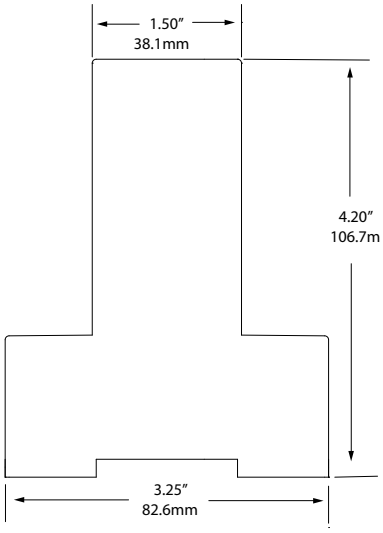
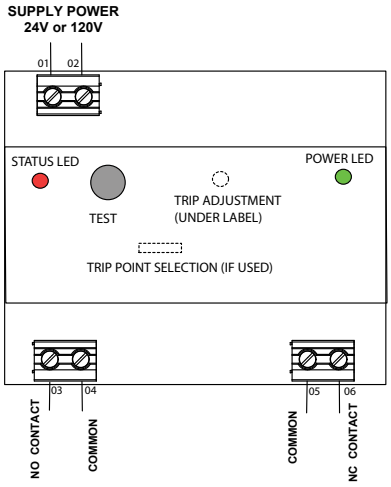
Ground Fault Relay Dimensions



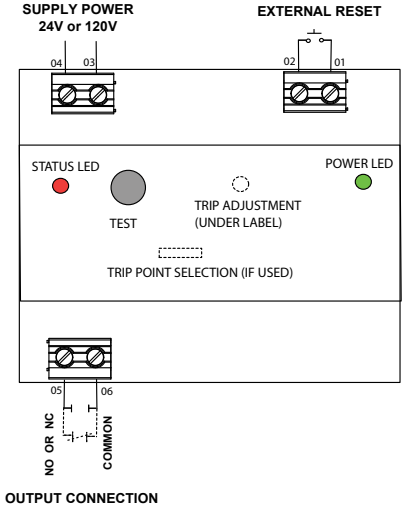


Ground Fault Relay Connections

Auto-Reset



Latching



Ground Fault Relay Specifications

Power Supply	• 120 VAC (66–132 V) • 24 VAC (19–29 V)
Power Consumption	<2 VA
Setpoint Range	Factory-calibrated models (specify when ordering): • AGL1: 5–100 mA (005–100) • AGL2: 80–950 mA (080–950)
	TR3 "Tri-set" models (field jumper select): • AG3: 5, 10, or 30 mA
Output	Electromechanical SPDT relay
Output Rating	1 A @ 125 VAC, 2 A @ 30 VDC
LED Display	• Green LED = Power On indication • Red LED = Tripped Output Relay indication
Response Time	• 200 ms @ 5% above trip point • 60 ms @ 50% above trip point • 15 ms @ 500% above trip point
Time Delay	None
Noise Immunity	• EMI/RFI Shielding • Power supply noise filtering
Isolation Voltage	UL listed to 1270 VAC, tested to 5 KV
Frequency Range	50–60 Hz (monitored circuit)
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL/cUL, CE

Ground Fault Relay Output Tables

Normally Energized Models (-ENE Option)

Protection from faults and control power loss.

		Control Power Applied	
	No Power	**No Fault**	**Fault**
N.C. Normally Closed	closed	open	closed
N.O. Normally Open	open	closed	open

Normally De-energized Models (-DEN Options)

Protection from faults only when power is applied.

		Control Power Applied	
	No Power	**No Fault**	**Fault**
N.C. Normally Closed	closed	closed	open
N.O. Normally Open	open	open	closed

Ground Fault Relay Ordering Information

Sample Model Number: AGL1-NOR-120-LA-005

Ground fault relay with normally open SPST latching relay output, 120 VAC power supply and 5 mA trip point.

AGL (1) – (2) – (3) – (4) – (5) – (6)

(1) Setpoint Range

1	5–100 mA factory set
2	80–950 mA factory set
3	5/10/30 mA jumper set

(2) Output Type

NCR1	Normally Closed SPST Relay Form B (Available only with -LA option)
NOR1	Normally Open SPST Relay Form A (Available only with -LA option)
SDT1	SPDT Relay (Form C) with auto-reset (Available only with -DEN and -ENE options)

(3) Power Supply

120	120 VAC
24U	24 VAC/DC

(4) Options

ENE	Normally energized, auto-reset (SDT1 output only)
DEN	Normally de-energized, auto-reset (SDT1 output only)
LA	Latching (NOR1 and NCR1)

(5) Setpoint

TR3	Tri-set
005 to 950	Factory set trip point in mA

(6) Noise Immunity

N	Noise immunity
	None (blank)

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AGLD SERIES

Ground Fault Relay with Digital Display

AGLD Series Ground Fault Sensors keep machinery and their operators safe from accidental shocks. The large, one piece solid-core design allows for installation over wires feeding heavy loads. The output relay will change state at any point between 5 and 100 mA, or 80 and 950 mA. A delay can be set to allow down stream protection to activate before this sensor, keeping the main circuit protection hot and the equipment energized while the smaller faults are cleared. The large LED display shows the precise trip point and the extra delay clearly, in any light condition. The display flashes when there is current sensed over the trip point.

Ground Fault Relay Applications

Monitor Large Machines

- Detect fault currents before damage can occur. Connect the output to a shunt trip breaker operating solenoid or to the circuit powering a connector coil.

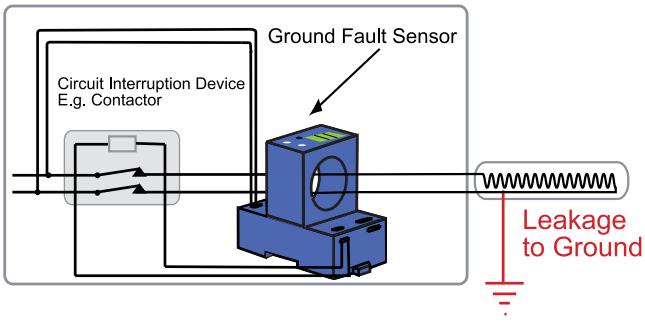
Water Delivery and Treatment

- Detect moisture ingress in submersible pumps.

Heating Processes

- If an element shorts to ground, the sensor will activate to de-energize the circuit, keeping safety at the forefront.

Insulation Breakdown



Ground Fault Relay Features

Electromechanical Relay Output

- Provides both normally open and normally closed contacts.
- Compatible with most automation and control systems.

Externally Powered

- A choice of fail safe or standard operation.

Simple Field Setpoint Adjustment

- Single turn potentiometer with setpoint shown on display.
- Adjustable delay shown when knob is turned.

Large Solid-core Case

- Large sensing window provides ample space for multiple conductors.

DIN Rail Mount*

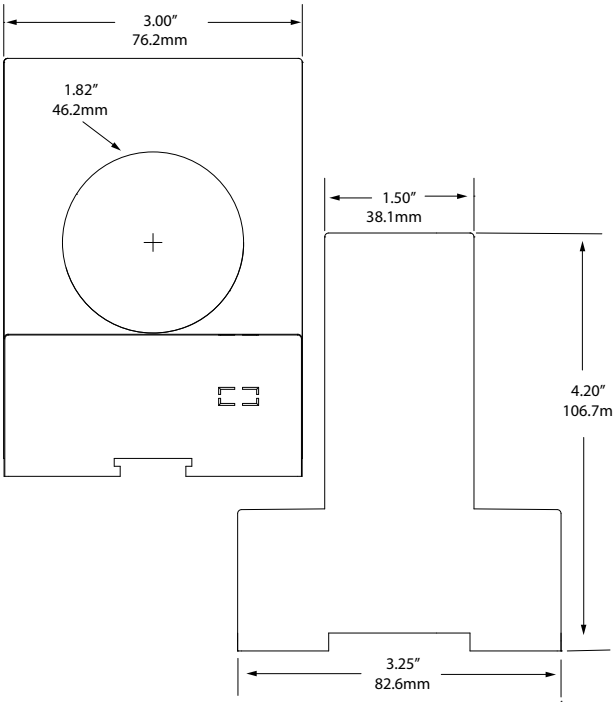
- Simple snap onto DIN rail.

UL/cUL Approved, CE Pending

- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 140.

Ground Fault Relay Dimensions

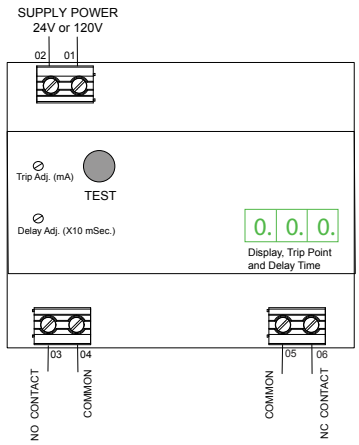


Ground Fault Relay Specifications

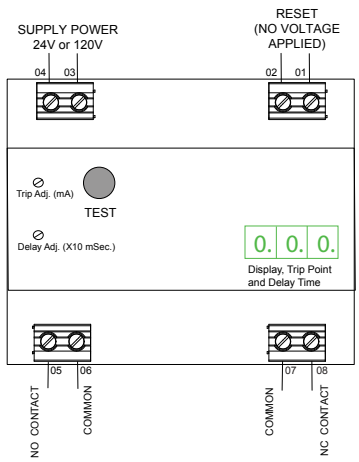
Power Supply	• 120 VAC (108–132 V) • 24 VAC/DC (22–36 V)
Power Consumption	<4 VA
Setpoint Range	AGLD1: 5–100 mA AGLD2: 80–950 mA
Output	Electromechanical SPDT relay
Output Rating	1 A @ 120 VAC, 2 A @ 30 VDC max.
LED Display	• Displays trip point in mA • Displays delay period when adjusted (ms X10) • Off: Power off
Response Time	120 ms
Output Operation	Normally energized or normally de-energized
Time Delay	10 sec. (adjustable after startup)
Isolation Voltage	Tested to 5 KV
Frequency Range	50–60 Hz (monitored circuit)
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL/cUL, CE pending

Ground Fault Relay Connections

Auto Reset



Latching



Ground Fault Relay Ordering Information

Sample Model Number: AGLD1-SDT1-24U-ENE-ADJ

AC ground fault sensor, 5–100 mA range, SPDT relay output, 24 VAC/DC powered, large case, DIN rail mounting.

	(1)		(2)				(3)				(4)				(5)		
AGLD		–	**S**	**D**	**T**	**1**	–				–				–	**A**	**D**	**J**

(1) Model

1	5–100 mA
2	80–950 mA

(2) Output Type

SDT1	Single pole, double throw relay

(3) Power Supply

24U	24 VAC/DC
120	120 VAC

(4) Contact Action

DEN	Normally de-energized
ENE	Normally energized
LA	Latching output

(5) Setpoint

ADJ	Adjustable setpoint

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AGT SERIES
Ground Fault Measurement

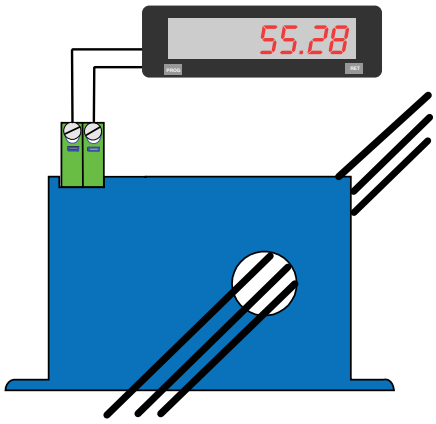
AGT Series Ground Fault Indicators combine a current transformer and a True RMS signal conditioner into a single package. The AGT Series is designed to produce an analog 4–20 mA signal proportional to earth or ground fault current, or any low consumption AC load. Available in a solid-core case. When connected to a controller or data logger, NEC requirements for alarm can be met.

Ground Fault Protection Applications

Current Leakage Detection
- Monitor heating or other loads to detect increasing leakage current.
- Pass all current carrying conductors through aperture to sense zero-sum current.

Very Light Loads
- Accurate measurement of very small but critical loads.
- Current measurement gives faster response than temperature measurement.

Ground Fault Currents



For additional Application Examples, go to www.nktechnologies.com/applications

Ground Fault Protection Features

True RMS Output
- True RMS technology is accurate on distorted waveforms like VFD or SCR outputs.

Single Range
- No chance of field range selection errors.
- Eliminates zero and span pots.

Isolation
- Output is magnetically isolated from the input for safety.
- Eliminates insertion loss (voltage drop).

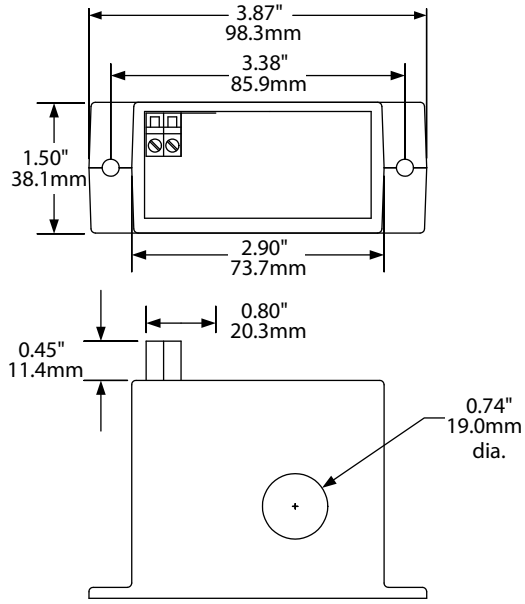
UL/cUL Approved
- Accepted worldwide.

Selecting the right ground fault detector:

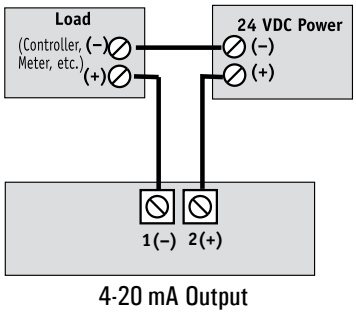
NEC Article 427-22 requires that fault currents be monitored on industrial equipment. However, where maintenance and supervision ensure that only qualified persons will service the equipment and continued circuit operation is necessary for safe operation and processes, alarm indication is also required. A fault current transducer can send a signal to a panel meter with alarm contacts or a controller. As an example, the alarm points can be configured so one alarm is initiated when fault current reaches 30 mA, and another when it rises above 70 mA. Ground fault protection is required in many applications, and NK Technologies has a sensor that can be coupled with your control system to provide this needed alarm or circuit disconnection.

Ground Fault Protection Dimensions

FL Case



Ground Fault Protection Connections



4-20 mA Output

Notes:
Finger safe captive screw terminals.
12–22 AWG solid or stranded.
Observe polarity.

Ground Fault Protection Specifications

Power Supply	24 VDC loop-powered (12–40 V)
Power Consumption	<2 VA
Output	4–20 mA, loop-powered, True RMS
Output Limit	23 mA
Response Time	600 ms (to 90% step change)
Input Range	Single range of 0–50 or 0–100 mA; custom ranges available; consult factory.
Isolation Voltage	UL listed to 1270 VAC, tested to 5 KV
Frequency Range	40–400 Hz
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL/cUL

Ground Fault Protection Ordering Information

Sample Model Number: AGT2-420-24L-FL
True RMS AC ground fault indicator, 100 mA ranges, 4–20 mA output, 24 VDC loop-powered in a solid-core case.

	(1)		(2)				(3)				(4)	
AGT		–	**4**	**2**	**0**	–	**2**	**4**	**L**	–	**F**	**L**

(1) Full Scale Range

1	0–50 mA
2	0–100 mA

(2) Output Signal

420	4–20 mA

(3) Power Supply

24L	24 VDC loop-powered (4–20 mA output ONLY)

(4) Case Style

FL	Solid-core, top terminal

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AGT-FD SERIES

Ground Fault Measurement - Analog Output

AGT-FD Series ground fault sensors detect faults to earth from 0 mA to 100 mA and produce an output signal of 0–10 VDC in proportion to the amount of current passing to ground. The output is equal to the RMS value of the earth leakage. The AGT-FD can also be used to measure and monitor any low value AC circuit current by passing just one of the conductors through the sensing window.

Ground Fault Sensor Applications

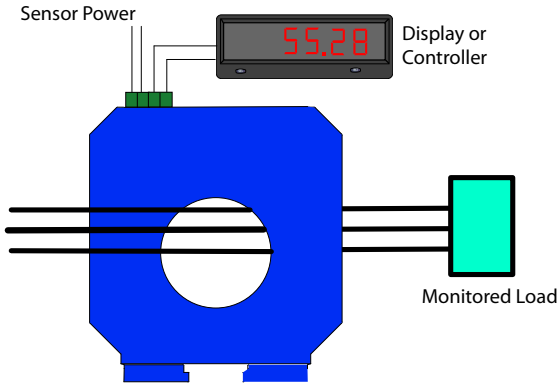
Current Leakage

- Monitor residual (earth leakage) current by passing all of the current carrying conductors through the sensing aperture.

Very Light Loads

- Monitor circuits of varying frequencies or distorted wave shapes, but very low current usage.

Display Shows Amount of Fault Current Present



Ground Fault Sensor Features

Analog Output Signal

- 0–5 or 0–10 VDC proportional to 0–100 mA.
- Sensing window large enough to monitor 100 amp circuits.

Externally Powered

- Low power consumption (< 2 VA).
- 24 Volt AC or DC (20–30 V).

Factory Calibrated

- Warranted to stay accurate for five years minimum.
- Compatible with most PLCs, panel meters and other controllers.

Large Solid-core Case

- Large sensing window provides ample space for multiple conductors.

DIN Rail* or Panel Mount

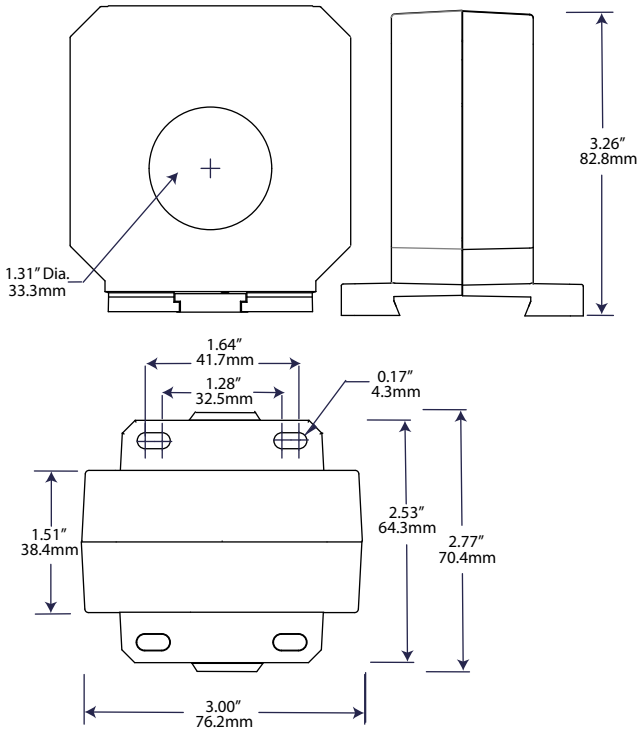
- Simple snap onto DIN rail.

UL, cUL Approved, CE Pending

- Accepted worldwide.

*For information on the DIN rail accessories kit, see page 140.

Ground Fault Sensor Dimensions



Ground Fault Sensor Specifications

Power Supply	24 VAC or DC (20–30 V)
Power Consumption	<2 VA
Output	0–5 VDC or 0–10 VDC
Input Range	0–100 mA
Response Time	250 ms (to 90% step change)
Isolation Voltage	UL listed to 1270 VAC, tested to 5 KV
Frequency Range	50–400 Hz
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	UL, cUL, CE pending

Ordering Information

Sample Model Number: AGT2-010-24U-FD

Ground fault sensor, output 0–10 VDC proportional to AC current, 24 VAC/DC powered, DIN rail or panel mounted.

	(1)		(2)				(3)				(4)	
AGT	2	-				-	2	4	U	-	F	D

(1) Model

2	0–100 mA

(2) Output Type

005	0–5 VDC proportional to AC current
010	0–10 VDC proportional to AC current

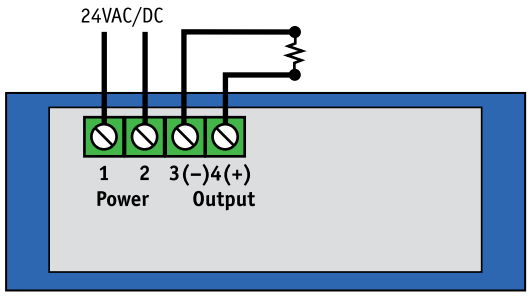
(3) Power Supply

24U	24 VAC or DC

(4) Case

FD	Solid-core, DIN rail or panel mounting

Ground Fault Sensor Connections



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DG SERIES
DC Ground Fault Relay

DG Series Ground Fault Sensors keep machinery and their operators safe from accidental shocks. The one-piece, solid-core design allows for installation over wires feeding loads to about fifty amps. The output relay will change state at factory setpoint between 5 and 50 mA of DC current to earth.

Ground Fault Relay Applications

Monitor Photovoltaic Panels
- Detect fault currents before damage can occur. Connect the output to a shunt trip breaker operating solenoid or to the circuit powering a contactor coil.

Water Delivery and Treatment
- Detect moisture ingress in submersible pumps .

Heating Processes
- If an element shorts to ground, the sensor will activate to de-energize the circuit, keeping safety at the forefront.

Communications Towers
- Notification if a battery powered supply is allowing current to earth.

Ground Fault Relay Features

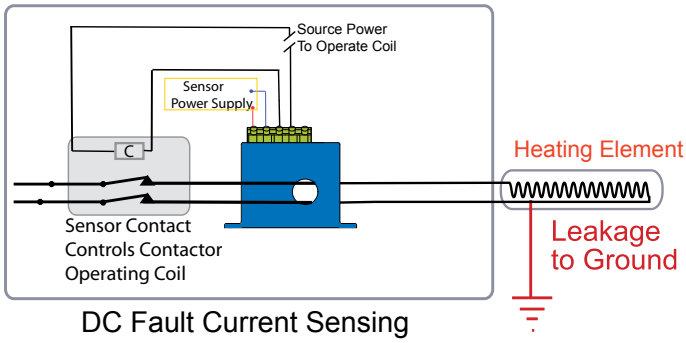
Electromechanical Relay Output
- Auto reset models have both normally open and normally closed contacts.
- Latching models have one normally open and one normally closed contact.
- Compatible with most automation and control systems.

Externally Powered
- A choice of fail safe or standard auto reset operation, or latching contact.

Solid-core Case
- Sensing window provides ample space for multiple conductors.

Designed for UL, CUL and CE Approval
- Accepted worldwide.

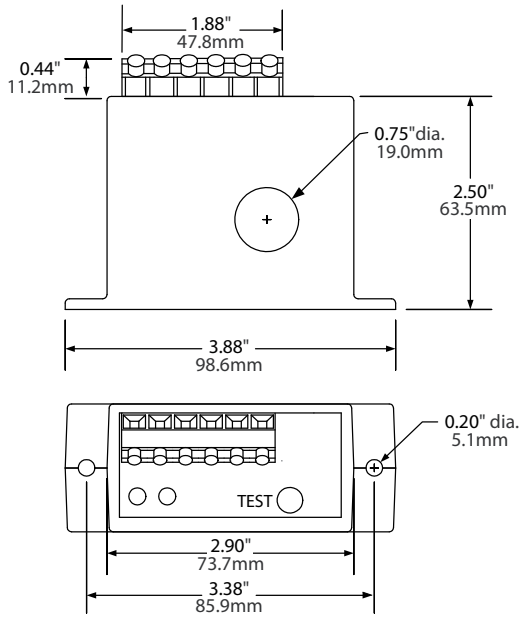
DC Fault Current Sensing



DC Fault Current Sensing

OEMs **Test & Evaluation Units for OEMs**
Free program expedites evaluation process. See page 3 for details.

Ground Fault Relay Dimensions

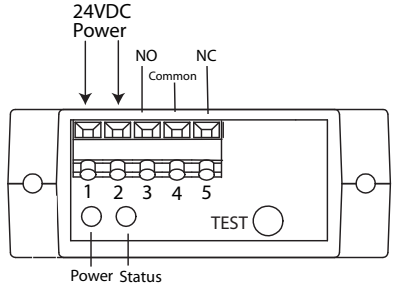


Ground Fault Relay Specifications

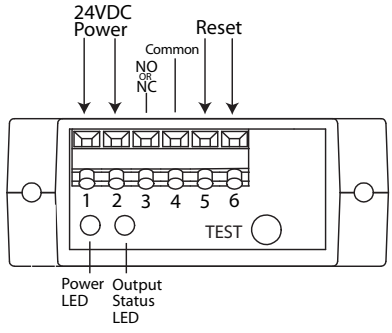
Power Supply	24 VDC (20–26 V)
Power Consumption	<4VA
Output	Electromechanical relay 1 A @ 120 VAC, 2 A @ 30V DC Max.
Output Operation	Normally energized
	Normally de-energized
	Latching
Output Range	5–50 mA
Response Time	55 ms maximum
Input Range	Up to 1500 VDC (monitored circuit)
Isolation Voltage	tested to 5000 V
Frequency Range	DC
Case	UL94 V-0 Flammability Rated
Environmental	-4 to 122°F (-20 to 50°C) 0–95% RH, non-condensing
Listings	Designed to meet UL/cUL and CE

Ground Fault Relay Connections

Auto Reset Connection



Latching Connection



Ordering Information

Sample Model Number: DG1-SDT-24D-ENE-010

DC ground fault sensor, output 5–50 mA SPDT relay output, 24 VDC powered, normally energized, 010 factory set trip point.

	(1)		(2)			(3)			(4)			(5)		
DG	1	-				2	4	D						

(1) Range

1	5–50 mA

(2) Output Type

SDT	Single pole, double throw relay (Auto Reset Only)
NCR	Normally Closed, latching model only
NOR	Normally Open, latching model only

(3) Power Supply

24D	24 VDC

(4) Contact Action

DEN	Normally de-energized ouput
ENE	Normally energized oupt
LA	Latching output

(5) Trip Point

005–050	Factory set trip point

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