



Instrument Transformers, Inc.

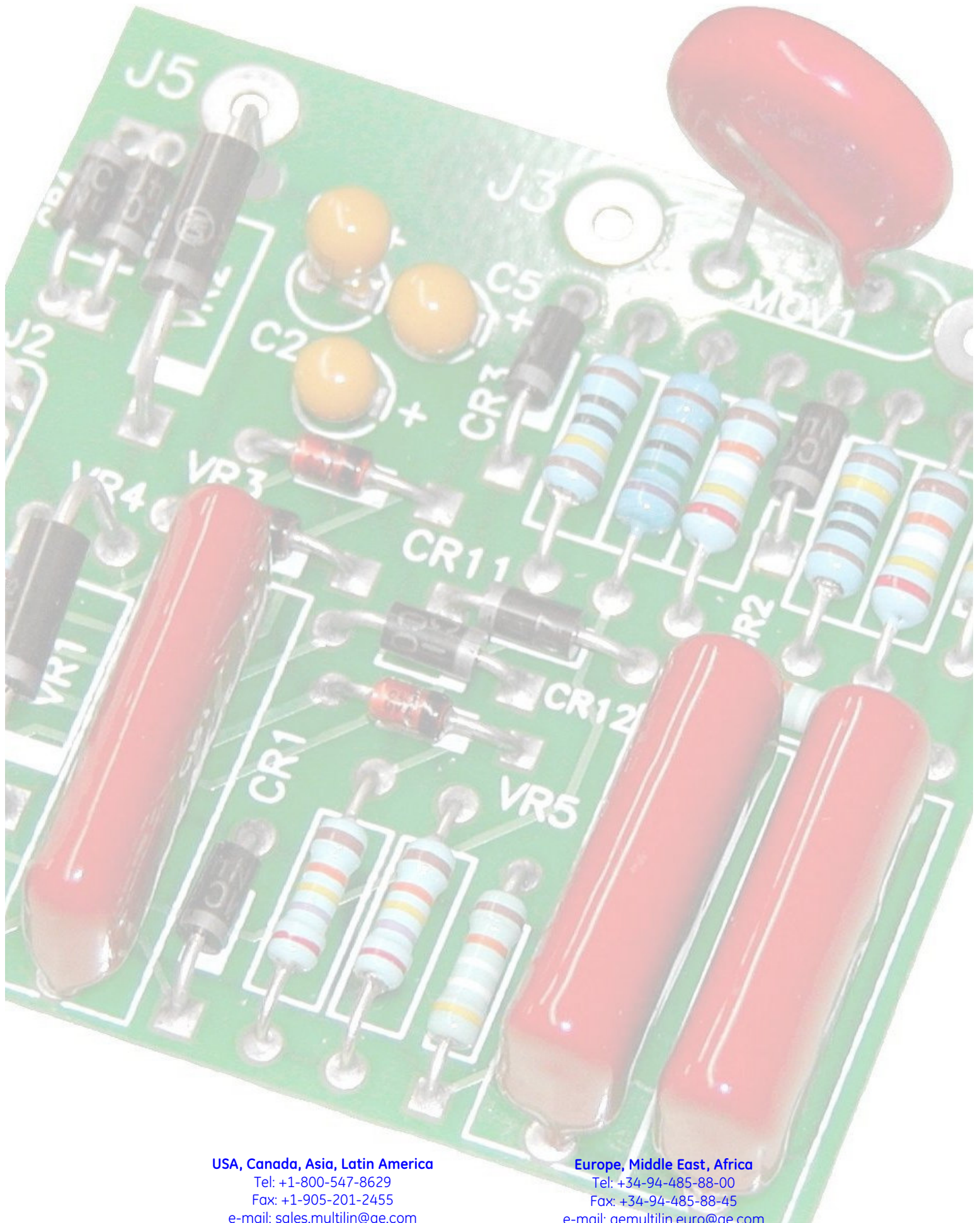
a division of GE Multilin



Electronic Products

Ground Fault Systems





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GROUND FAULT SYSTEMS

Model GFA Relays **Ground Fault Current Detection System Relay Page 1**
Self Powered, Fixed Response

Model GFA Sensors **Ground Fault Sensors Page 2**
10 to 75 Amp,
Windows from From 1.56" Dia.
to 7.1" x 8.0" Rectangle

Model GFM Relays **Ground Fault Current Detection System Relay Page 3**
Self Powered, Adjustable Response

Model GFM Sensors **Variable Ranges, Page 4**
Windows From 0.94" Dia.
to 8.0" x 14.1" Rectangle

Model BGFL Relay **Ground Fault Current Detection System Relay Page 7**
Suitable For NEC Service Entrance
Adjustable Pick - Up & Time Delay

Model GFL Sensors **Ranges: 5-60, 30-360, 100 - 1200 Amp Pages 9 & 10**
Windows Dimensions from 0.94" Dia.
to 10.1" x 36.0" Rectangle



THREE PHASE VOLTAGE MONITORING

Model SPVRA Phase Voltage Relay Page 13
 Usually Used On Service Entrance, Phase Loss ,
 Phase Unbalance , Phase Sequence, Undervoltage,
 Overvoltage

Model SPVRB Phase Voltage Relay Page 15
 Usually Used On Service Entrance, Phase Loss ,
 Phase Unbalance , Phase Sequence

Model LPVRB Phase Voltage Relay Page 17
 Phase Loss, Phase Unbalance, Phase Sequence,
 Undervoltage

Model APVR Phase Voltage Relay Page 19
 Phase Loss, Phase Windows, Phase Sequence

VOLTAGE TRANSDUCERS

**Model LLV &
 Model PNV** Voltage Transducer..... Page 21



CURRENT TRANSDUCERS

Model ACV AC Current Transducers Page 22

Input: 5, 10, 15, 20, 30, 50, 75, 100, 150, 200A ac
Output: 5 Vdc

Model 10ACV AC Current Transducers Page 23

Input: 5, 10, 15, 20, 30, 50, 75, 100, 150, 200A ac
Output: 10 Vdc

Model PCL AC Current Transducers Page 24

Input: 5, 10/15/20, 25/50/75 A ac
Output: 4-20 mA dc

Model PCL AC Current Transducers Page 25

Input: 0-600A ac
Output: 4-20 mA dc

Model PCM AC Current Transducers Page 26

Input: 5, 10, 20, 30, 50, 75, 100, 150, 200, 300A ac
Output: 4-20 mA dc
(Two Wire, Powered Externally With 24 Vdc)

OPEN CIRCUIT PROTECTOR

Model OCP Open Circuit Protector Page 28



CAPACITOR TRIP DEVICES

Model CTD-1&2 Capacitor Trip DevicePage 30
 Power: 330µF/1500mf

APPLICATION:
 ENERGY SOURCE FOR BREAKER &
 SWITCH TRIP COILS DURING LOSS OF CONTROL POWER

Model CTD-3 Capacitor Trip DevicePage 31
 Power: 330µF/1500mf

APPLICATION:
 ENERGY SOURCE FOR BREAKER &
 SWITCH TRIP COILS DURING LOSS OF CONTROL POWER

Model CTD-4 Capacitor Trip DevicePage 32
 Power: 4500 µF/990 µF

APPLICATION:
 ENERGY SOURCE FOR BREAKER &
 SWITCH TRIP COILS DURING LOSS OF CONTROL POWER

Model CTD-5 Capacitor Trip Device With AlarmPage 33
 Power: 4500 µF/990 µF

APPLICATION:
 ENERGY SOURCE FOR BREAKER &
 SWITCH TRIP COILS DURING LOSS OF CONTROL POWER

Model CTDA-6 Capacitor Trip Device Page 34
 Power: 4500 µF/990 µF

APPLICATION:
 ENERGY SOURCE FOR BREAKER &
 SWITCH TRIP COILS DURING LOSS OF CONTROL POWER

Model CTDB-6 Capacitor Trip DevicePage 35
 Power: 4500 µF/990 µF

APPLICATION:
 ENERGY SOURCE FOR BREAKER &
 SWITCH TRIP COILS DURING LOSS OF CONTROL POWER



Ground Fault Current Detection Systems

Model GFA (Relay)

10 to 75 Amp Trip Currents

OPERATING RANGE:

Trip currents of 10,15, 20 & 75 Amperes.
Time delay from 0.01 to 20 seconds.

INPUT POWER: Self powered.

FREQUENCY: 50/60 Hz.

AMBIENT TEMPERATURE RANGE:

-30°C to +60°C

SPDT contacts Form C, rated 10 Amps.
at 250 Volts ac, 1/4 H.P., 125 Vac.

Contacts shown with the relay in the tripped position.

Dielectric strength: GFA protectors withstand 1500 Volts 60 Hz for 60 seconds between all electrically isolated terminals.

Insulation Resistance:
Insulation resistance of GFA Protectors exceed 100 megohms when tested at 500 Vdc.

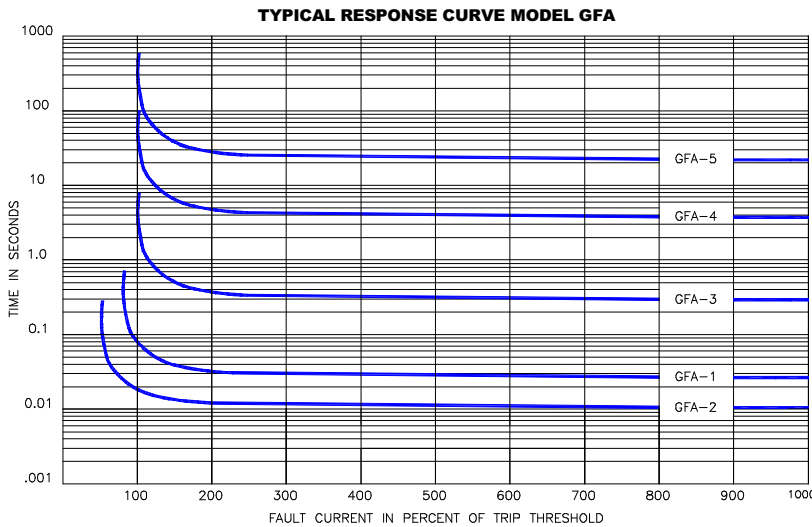
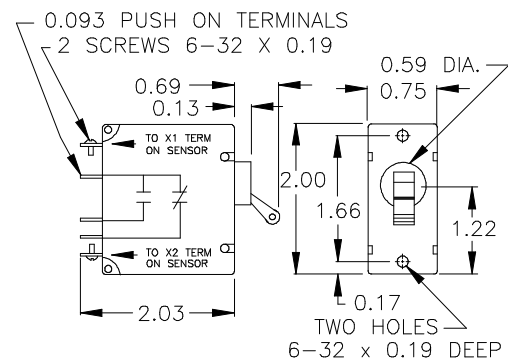
Only for use with GFA sensors.



REGULATORY AGENCY APPROVALS



LR26229



RELAY MODEL NUMBER	HANDLE COLOR	DELAY TYPE
GFA-1	WHITE	INSTANTANEOUS
GFA-2	RED	INSTANTANEOUS
GFA-3	YELLOW	SHORT DELAY
GFA-4	BLUE	MEDIUM DELAY
GFA-5	GREEN	LONG DELAY

Ground Fault Current Detection Systems

Model GFA (Sensor) 10 to 75 Amp Trip Currents

REGULATORY AGENCY APPROVALS



OPERATING RANGE:

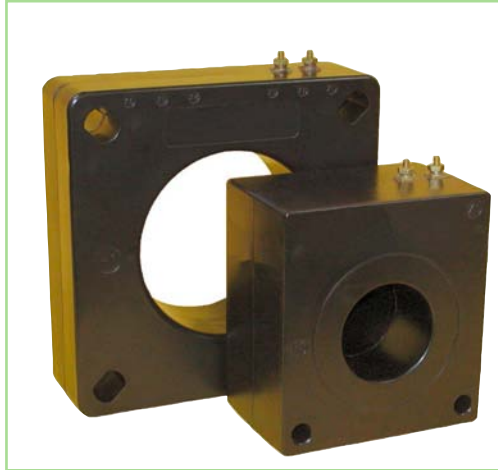
Trip currents of 10,15,20 & 75 Amperes.
Trip current tolerance is ± 20 percent.

FREQUENCY: 50/60 Hz.

INSULATION LEVEL:

600 Volt, 10 kV BIL full wave.
Terminals are brass studs
No. 8-32.

Only for use with GFA relay.

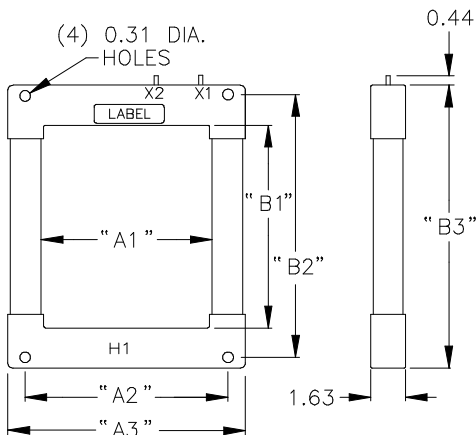
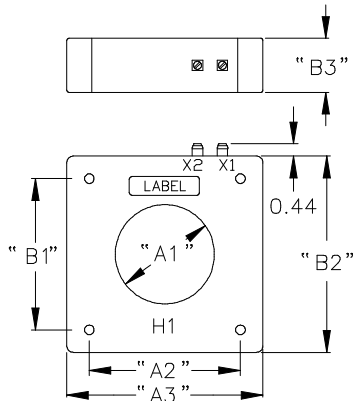


TOROIDAL SENSORS



RECTANGULAR SENSORS

- The Combination of any of the sensors below and the **GFA** relay offers low cost ground fault protection in a self-powered, reliable system. When ordering specify sensor model number and relay part number.
- Mounting bracket kits are available for all toroidal sensors except the **Model GFA 156** which has molded mounting feet.



TRIP CURRENT	MODEL NUMBER	"A1"	"A2"	"A3"	"B1"	"B2"	"B3"
10 AMP	GFA 200	2.00	3.75	4.63	N/A	5.10	3.00
15 AMP	GFA 400	4.00	5.62	7.00	5.62	7.00	2.17
20 AMP	GFA 156	1.56	N/A	4.08	N/A	4.56	2.10
20 AMP	GFA 213	2.13	3.50	4.50	N/A	4.88	2.19
20 AMP	GFA 425	4.25	5.44	6.73	5.43	6.73	1.28

TRIP CURRENT	MODEL NUMBER	"A1"	"A2"	"A3"	"B1"	"B2"	"B3"
75 AMP	GFA 041X 071	4.1	6.4	7.3	7.1	10.0	10.9
75 AMP	GFA 051X 071	5.1	7.2	8.3	7.1	10.0	10.9
75 AMP	GFA 058X 071	5.8	7.0	9.0	7.1	10.0	10.9
75 AMP	GFA 080X 071	8.0	9.5	11.1	7.1	10.0	10.9

MODEL	BRACKET KIT
GFA 200	0221B00541
GFA 400	0221B00185
GFA 213	0221B00777
GFA 425	0221B00187

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Ground Fault Current Detection Systems

Model GFM (Relay)

1.5 to 65 Amp Trip Currents



ADJUSTABLE OPERATING RANGE:

Trip currents from 1.5 to 65 Amperes.
Time delay from instantaneous to 36 cycles.

INPUT POWER: Self powered.

FREQUENCY: 50/60 Hz.

AMBIENT TEMPERATURE RANGE:

-30°C to +60°C
Positive "ON" (Green)
and "OFF" (Red) condition
indication, manual reset.

SPDT contacts:
Form C, rated 10 Amps
continuous, 23 Amps inrush,
250 volts ac.



Model GFM - 252 & Model 262

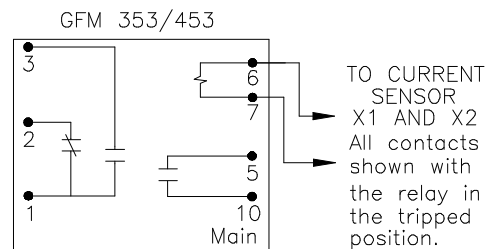
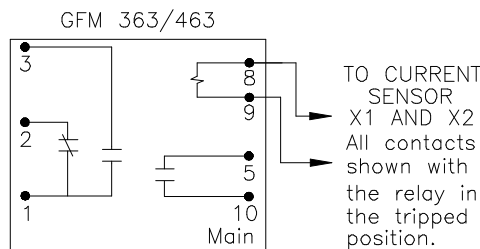
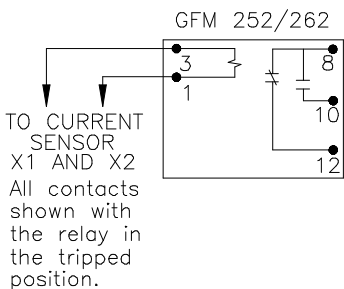
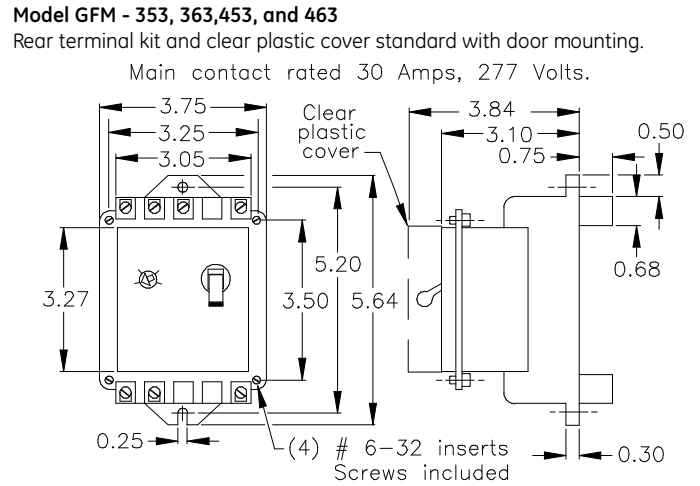
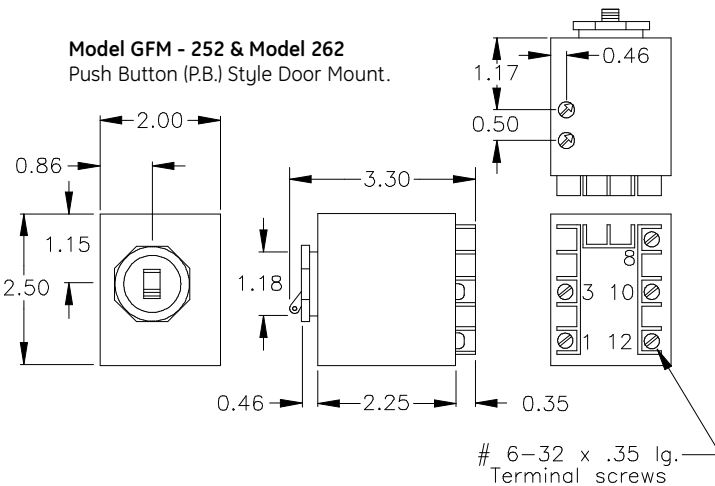


Model GFM - 353, 363, 453, and 463

Only for use with GFM sensors.

- The class 1 model GFM Ground Fault protection systems are designed to minimize damage or loss to equipment caused by destructive arcing ground faults. This GFM systems is designed for all polyphase applications and is ideally suited for motor control, motor control centers, and high voltage starters. System can be wye or delta, ground or resistance grounded. When the ground fault current exceed a pre-selected condition (current and time setting) the relay trips.

The relay contacts can be connected in the control circuit of a motor starter, to the shunt trip of a circuit breaker or similar disconnecting or alarm devices. The system has an inverse time characteristic to prevent nuisance tripping. The relay tripping current value is field adjustable over the trip current range of the sensor. The adjustable trip time delay relay is field settable up 36 cycle.



Ground Fault Model GFM (Sensor) 1.5 to 65 Amp Trip Currents

OPERATING RANGE:

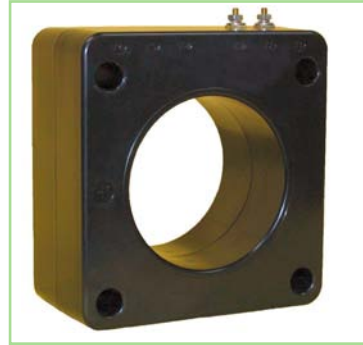
Trip currents from
1.5-7.5 to 15 - 65 Amperes.

INSULATION LEVEL:

600 Volt, 10 kV BIL full wave.
Terminals are brass studs
No. 8-32.

FREQUENCY: 50/60 Hz.

Only for use with GFM relays.



TOROIDAL SENSORS



RECTANGULAR SENSORS

- Ground Fault Current Sensors type **GFM**, are available in three different case styles, a variety of sizes and trip current ranges - to match the **GFM** Relay. The physical size of the sensor window should be carefully determined by the physical size and configuration of the power conductors. The Ground Fault Sensor will respond only to ground faults which occur between the position of the sensor and the load.

MODEL NUMBER	TRIP CURRENT	SENSOR DIMENSIONS					
		"A1"	"A2"	"A3"	"B1"	"B2"	"B3"
GFM 094	2.0 TO 8.5	0.94	N/A	2.67	N/A	2.75	2.38
GFM 125	2.7 TO 14	1.25	N/A	2.67	N/A	2.75	2.38
GFM 156	4.5 TO 18	1.56	N/A	3.53	N/A	3.77	2.15
GFM 200	3.5 TO 14.5	2.00	3.19	4.00	N/A	4.00	1.75
GFM 250	3.5 TO 11	2.50	3.75	4.63	N/A	5.10	3.00
GFM 350	4 TO 12	3.75	4.75	5.96	4.75	6.31	3.00
GFM 375D	*	3.75	4.75	5.96	4.75	6.31	3.00
GFM 425	5 TO 18	4.25	5.44	6.73	5.43	6.73	1.28
GFM 462	4 TO 12	4.62	5.75	7.00	5.75	7.12	4.00
GFM 813	4 TO 12	8.13	8.50	11.10	8.50	11.47	3.00

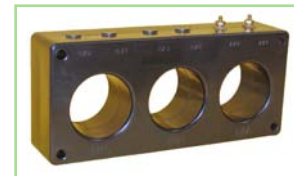
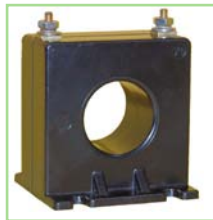
MODEL NUMBER	TRIP CURRENT	SENSOR DIMENSIONS					
		"A1"	"A2"	"A3"	"B1"	"B2"	"B3"
GFM 041 X 071	6 TO 30	4.1	6.4	7.3	7.1	10.0	10.9
* GFM 080 X 117SC	15 TO 65	8.0	9.5	11.1	11.7	14.5	15.4
GFM 080 X 141	9 TO 39	8.0	9.5	11.1	14.1	17.0	17.9

* Model **GFM 080 X 117SC** is split core (take-apart style) for assembly to existing electrical installations without the need for dismantling the primary bus or cables.

CAUTION:

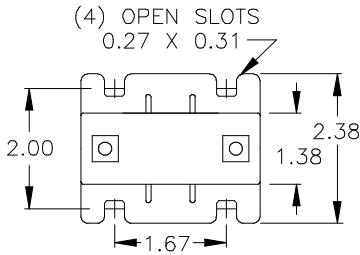
Proper safety precautions must be followed during installation by a trained electrician. It is recommended that the incoming power de-energized before installation. The sensor must have its secondary terminals short circuited or the relay connected, before energizing the primary circuit.

*Dual trip current ranges 3.5 to 11 and 10 to 36.

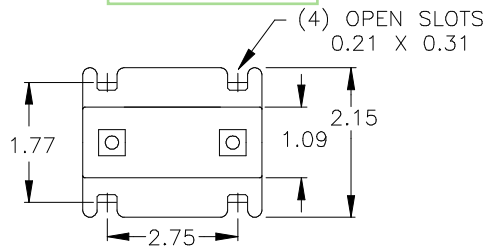


3 HOLE SENSORS

Mounting bracket kits are available for all toroidal sensors except the Model GFM 094, GFM 125, and GFM 156, which have molded mounting feet.

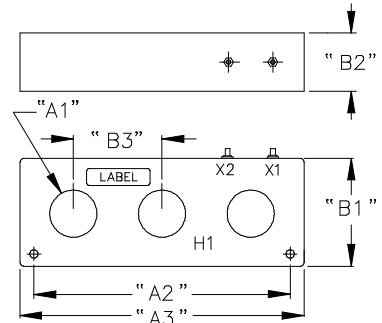


GFM 094
GFM 125



GFM 156

MODEL NUMBER	BRACKET KIT
GFM 200	0221B01976
GFM 250	0221B00541
GFM 375	0221B00259
GFM 375D	0221B00259
GFM 425	0221B00187
GFM 462	0221B01525
GFM 813	0221B00259



MODEL NUMBER	TRIP CURRENT	SENSOR DIMENSIONS					
		"A1"	"A2"	"A3"	"B1"	"B2"	"B3"
GFM 3P205 X 050	4.5 TO 16	*	7.60	8.50	3.70	2.00	2.75
GFM 3P208	5 TO 20	2.08	8.24	9.00	3.94	2.00	2.75
GFM 3P212	7 TO 25	2.12	11.72	12.80	4.87	2.63	4.00

* The Model GFM 3P205 X 050 has a rectangle window 2.05 " X 0.50".

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Pick-Up and Time Delay Characteristics

ITI GFM sensors are assigned a current range to indicate a pick-up current level.

The GFM relay has a range select from "A" to "D". "A" is the lowest current magnitude pick-up and "D" is the highest. The pick up level is dependent on the energy in a ground fault wave shape; therefore tripping initiation depends on the wave shape and regularity of the fault current.

In general, the relay will pick up before 150% of the low end of the sensor current range on the "A" setting with a sinusoidal signal, and will pick up before 150% of the high end of the sensor range on the "D" setting. The relay is adjustable continuously from "A" to "D" so that identical sensors can be coordinated.

The ITI GFM ground fault system has inverse time current trip characteristics. As the fault current increases, the trip time delay gets shorter. The GFM-252, GFM-353, GFM-453 relays do not have adjustable trip time delay, while the GFM-262, GFM-363, GFM-463 relays have adjustable trip time delay.

Trip time on Models with fixed time delay, may exceed a one second delay at the pick up threshold. Trip time on Models with adjustable time delay, may exceed a one second delay at the pick up threshold, however the inverse time curve can be modified to vary trip time at multiples of over current with an ordinal "1" to "4" is scale where "1" is faster and "4" is slower.

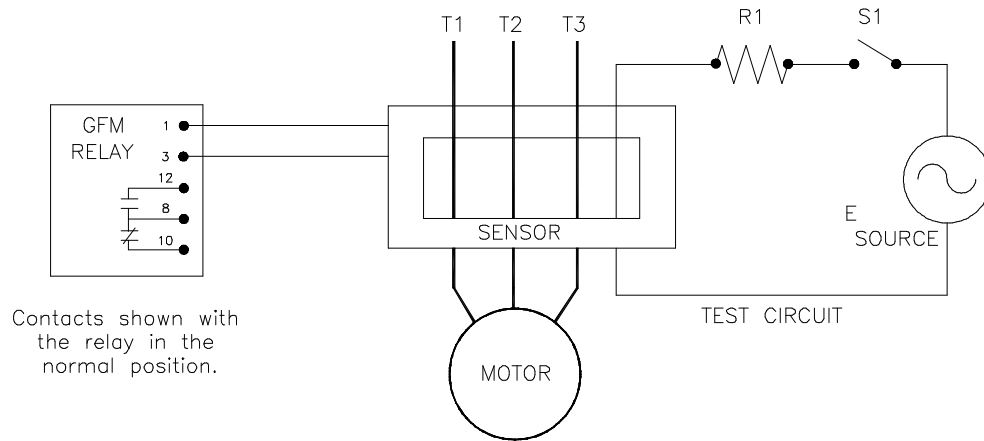
The pick up time delay on the fixed time delay relays can be as fast as 0.02 seconds on the "A" setting, and 0.1 seconds on the "D" setting at high fault currents.

For the adjustable time delay relays, a time delay of "1" in the "A" scale can produce a time delay of under 0.15 seconds at a 600% sinusoidal fault. A time delay setting of "4" will result in a time delay approximately 0.2 seconds slower than the "1" setting. Time delay will be greater for smaller fault current.

Similarly, a time delay setting of "1" in the "D" scale can produce a time delay of under 0.4 seconds at a 600% sinusoidal fault. A time delay setting of "4" will result in a time delay approximately 0.2 seconds slower than the "1" setting. Time delay will be greater for smaller fault current.

FIXED DELAY TYPES

GFM Test Procedure

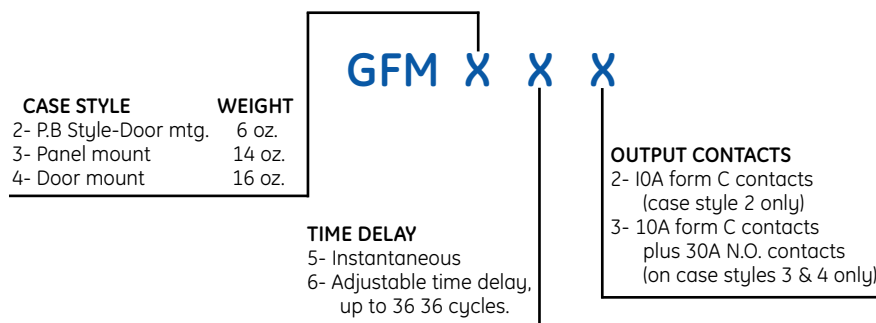


A Simulated fault current can be applied by the above test circuit.
An appropriate value of R1 should be selected to apply a minimum of 1.5 times maximum trip rating of the sensor.

1. Assure that the GFM relay is in " NORMAL " (reset) position.
2. Close switch S1, and check for reset for response. Relay handle will move to the tripped position.
3. Open S1, reset the relay and remove the test circuit from the system. System is now back to normal.

THE ABOVE TEST PROCEDURES SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

HOW TO ORDER RELAYS



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Please refer to our website www.GEMultilin.com for more detailed contact information



Ground Fault Current Detection Systems

Model BGFL (Relay)

Trip Currents 5- 60, 30- 360, or 100 -1200A



OPERATING RANGE:

Trip currents of 5-60, 30-360, or 100-1200A. Time delay from 0.10 to 1 second. (Adjustable)

INPUT POWER:

2 VA plus shunt coil requirements. Rated @ 120 Vac.

INPUT WITHSTAND:

200,000 Amperes RMS for 3 cycles, 50/60 Hz.

NOMINAL INPUT VOLTAGE:

120 Volts ac, 125 Volts dc, 24 Volts dc, 48 Volts dc.

FREQUENCY:

50/60 Hz.

AMBIENT TEMPERATURE RANGE:

-30°C to +60°C

Only for use with GFL sensors.

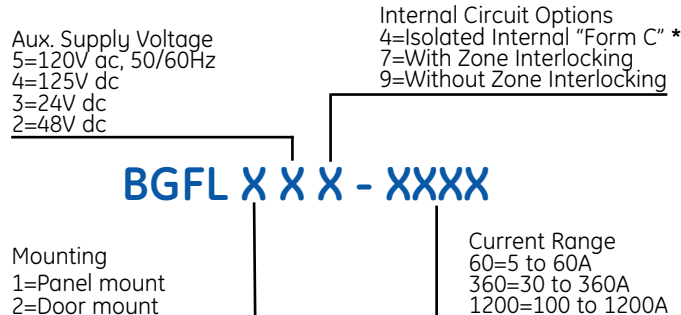
Approximate weight 1.5 lbs.

These Class 1 Model **BGFL** Ground Fault Relays and Sensors are designed to form a system for detecting a ground fault current on a ground ac power system. When a ground fault exceeds a pre-selected Current level and Time Delay setting, the relay initiates a trip signal for a shunt trip disconnect device to open and clear the fault. This **BGFL** system is designed to provide protection for electrical equipment, not protection for personnel.

- Meets NEC service entrance equipment standards.
- Available in three basic styles, "Standard", "Form C", or "Zone Interlocking" for coordination of single or multiple ground fault devices in system.
- Integral test panel with Push To Test and Shunt Trip Bypass pushing for ease in proper operational testing of the system, with or without tripping the protective device.
- "Power On" LED indicator in cover.
- Positive visual trip indicator, manual reset.
- Infinitely adjustable Time Delay.
- Discrete current threshold adjustment.
- Panel or door mounting.
- Rear terminal kit and clear plastic cover standard with door mounting.
- Electromechanical relay output, positive "ON" and "OFF".
- Operates with molded case and power circuit breakers, bolted pressure switches, fusible disconnect switches.

CONTACT RATING		
DEVICE INPUT POWER	INRUSH	CONT.
120 Volts ac	10 A	3 A
125 Volts dc	1 A	1 A
48 Volts dc	4 A	4 A
24 Volts dc	8 A	8 A

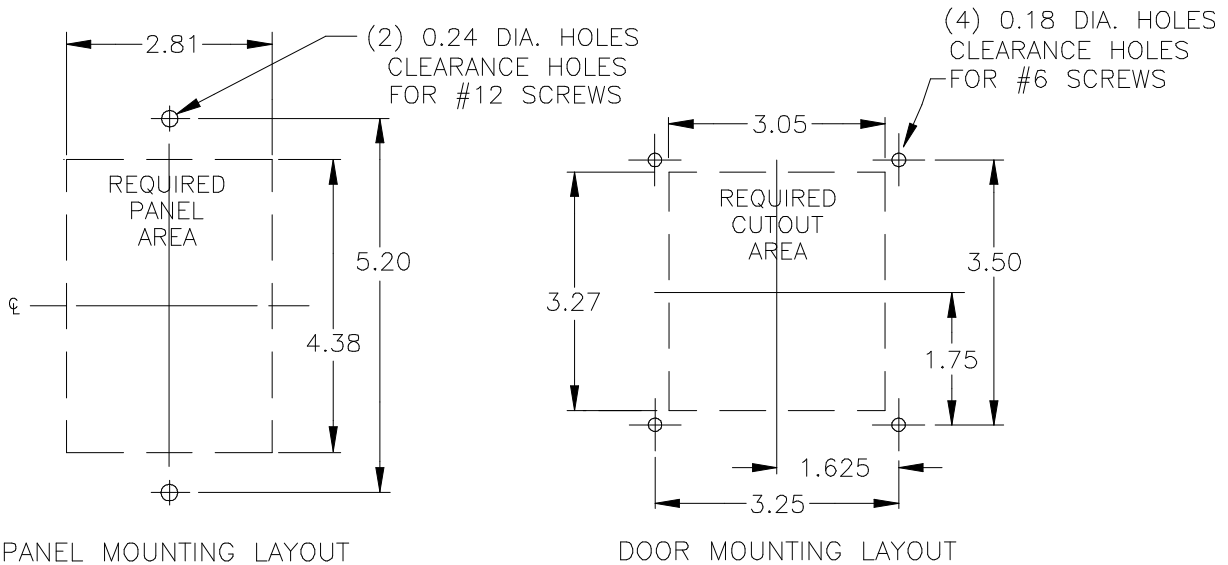
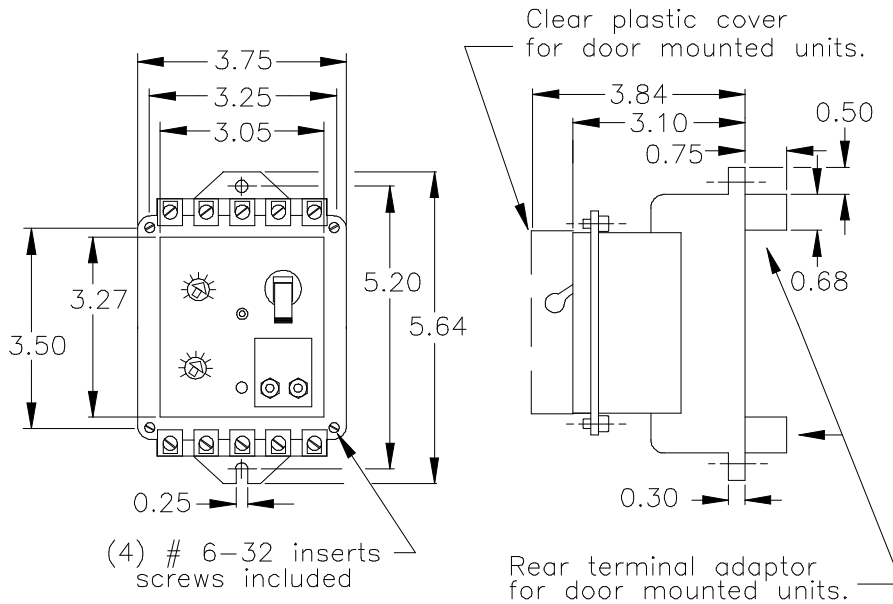
HOW TO ORDER RELAYS



* Not Available with zone Interlocking option

Ground Fault Current Detection Systems

Model BGFL (Outlines)



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Ground Fault Current Detection Systems

Model GFL (Sensor)

Trip Currents 5- 60, 30- 360, or 100 -1200A



110395



LR80793

Ground Fault Current Sensors, type GFL, are available in three different styles, a variety of sizes and current ranges - to match the BGFL relay ranges. The physical size of the sensor window should be carefully determined by the physical size and configuration of the power conductors. The Ground Fault Sensor will respond only to ground faults which occur between the position of the sensor and the load. Each sensor has two sets of windings one for test and one for normal operation.



Toroidal Sensors

OPERATING RANGE:

Trip currents from 5- 60,
30-360, or 100-1200A.
Trip current tolerance ± 15 percent.

FREQUENCY:

50/60 Hz.

INSULATION LEVEL:

600 Volt, 10 kV BIL full wave.

Terminals are brass studs No. 8-32.

Only for use with BGFL relays.

MODEL NUMBER	SENSOR DIMENSIONS					
	"A1"	"A2"	"A3"	"B1"	"B2"	"B3"

TRIP CURRENT 5-60 AMPS

GFL156T-1	1.56	*	3.53	*	3.77	2.15
GFL250T-1	2.50	*	4.56	*	4.71	2.13
GFL325T-1	3.25	4.70	5.73	4.70	5.73	1.15
GFL425T-1	4.25	4.86	5.92	**	6.17	1.15
GFL631T-1	6.31	6.75	8.50	6.75	8.50	1.28
GFL825T-1	8.25	8.50	10.48	8.50	10.48	1.53

TRIP CURRENT 30-360 AMPS

GFL156T-3	1.56	*	3.53	*	3.77	2.15
GFL250T-3	2.50	*	4.56	*	4.71	2.13
GFL325T-3	3.25	4.70	5.73	4.70	5.73	1.15
GFL425T-3	4.25	4.86	5.92	**	6.17	1.15
GFL631T-3	6.31	6.75	8.50	6.75	8.50	1.28
GFL825T-3	8.25	8.50	10.48	8.50	10.48	1.53

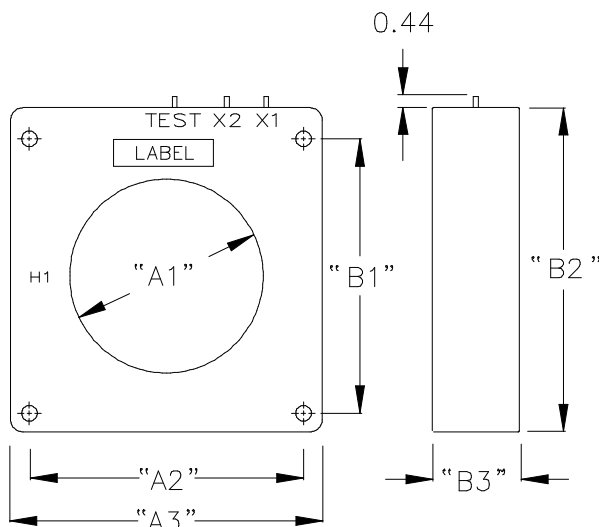
TRIP CURRENT 100-1200 AMPS

GFL325T-2	3.25	4.70	5.73	4.70	5.73	1.15
GFL425T-2	4.25	4.86	5.92	**	6.17	1.15
GFL631T-2	6.31	6.75	8.50	6.75	8.50	1.28
GFL825T-2	8.25	8.50	10.48	8.50	10.48	1.53

* The Model GFL156T-1, GFL156T-3, GFL250T-1, and GFL250T-3 have molded mounting feet.

** The Models GFL425T-1, GFL425T-2, and GFL425T-3 have no top mounting holes. Order the following mounting bracket kits:

MODEL NUMBER	BRACKET KIT
GFL 325T-1, -2 and -3	0221B00183
GFL 425T-1, -2 and -3	0221B00183
GFL 631T-1, -2 and -3	0221B00231
GFL 825T-1, -2 and -3	0221B01529



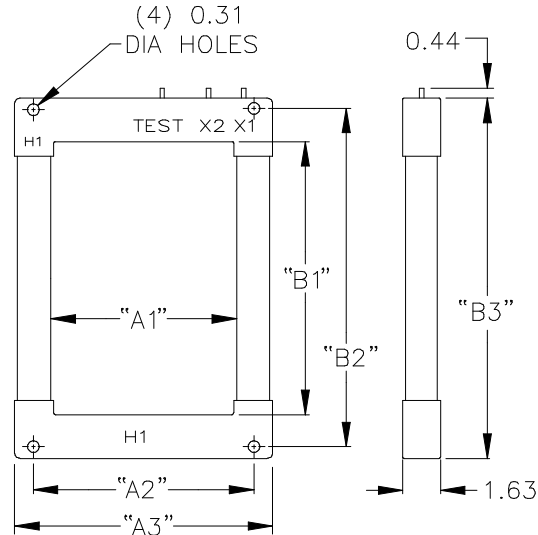
Ground Fault Current Detection Systems

Model GFL (Sensor)

Trip Currents 5-60, 30-360, or 100-1200A



Rectangular Sensors



RECTANGULAR SENSORS					
"A1"	"A2"	"A3"	"B1"	"B2"	"B3"
4.1	6.4	7.3	7.1	10.0	10.9
5.1	7.2	8.3	11.7	14.5	15.4
5.8	7.0	9.0	14.1	17.0	17.9
8.0	9.5	11.1	18.1	21.0	21.9
10.1	11.6	13.2	24.0	27.0	27.9
-	-	-	30.1	33.0	33.9
-	-	-	36.0	38.9	39.8

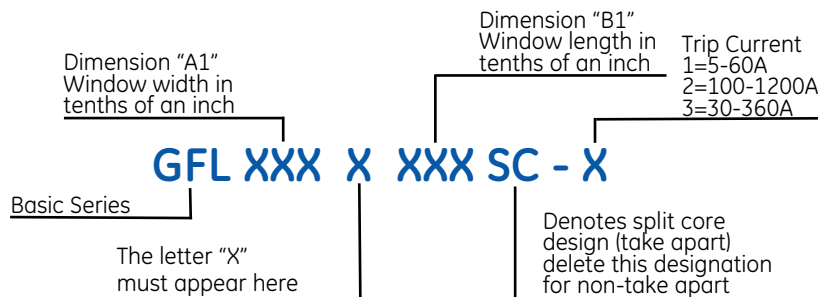
Rectangular sensors are available for the following trip currents: 5-60A, 30-360A and 100-1200A. The table above lists the available sensors sizes. Any window width (A1) may be combined with any window length. (B1)

Rectangular sensors are also available as a split core (take-apart) style for assembly to existing electrical installation without the need for dismantling the primary bus or cables.

CAUTION:

Proper safety precautions must be followed during installation by a trained electrician. It is recommended that the incoming power de-energized before installation. The sensor must have its secondary terminals short circuited or the relay connected, before energizing the primary circuit.

HOW TO ORDER RECTANGULAR SENSORS



Example: To order a rectangular sensor with a 4.1 X 7.1 window and a 5-60A trip current, the catalog number would be GFL 041 X 071-1.

USA, Canada, Asia, Latin America

Tel: +1-800-547-8629

Fax: +1-905-201-2455

e-mail: sales.multilin@ge.com

Europe, Middle East, Africa

Tel: +34-94-485-88-00

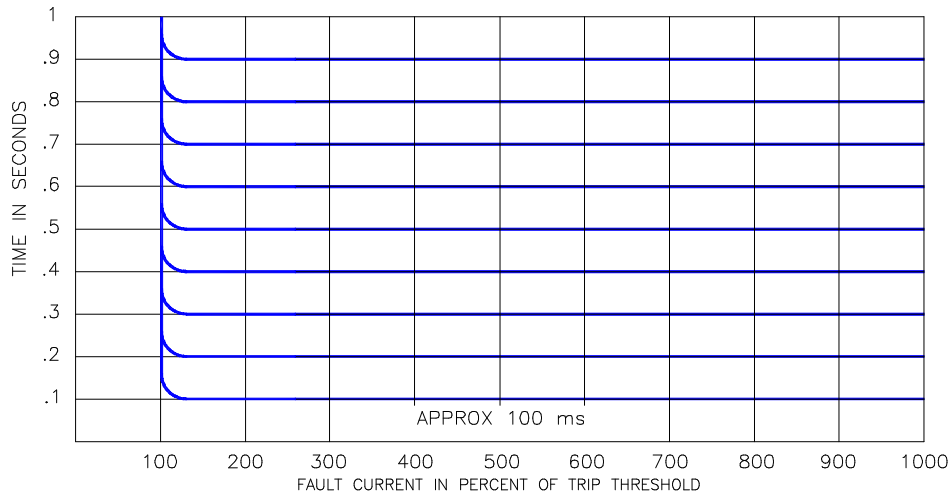
Fax: +34-94-485-88-45

e-mail: gmultilin.euro@ge.com

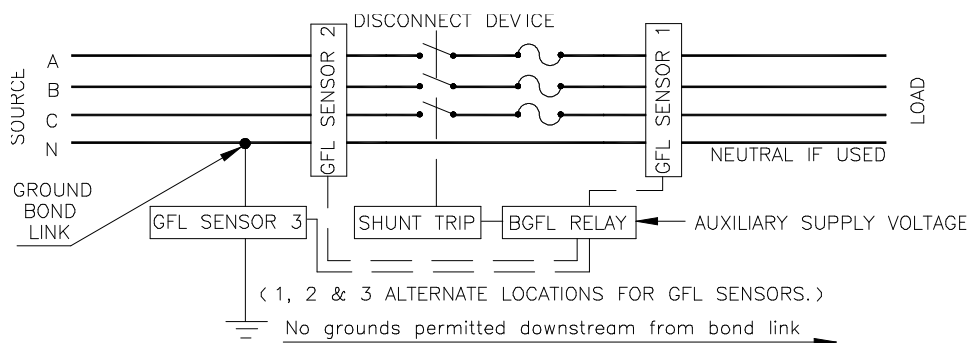
Typical Response Curves

Cardinal points are shown for clarity only.

The actual time delay adjustment is continuously variable between instantaneous and 1 second. The time delay tolerance is $\pm 15\%$ of setting.



Test Procedure



To determine if the neutral is grounded in only one place at the service entrance (in accordance with The National Electrical Code):

1. Disconnect power.
2. Remove ground bond link.
3. With a "megger", measure the resistance of each phase and neutral to ground. The resistance should be 1 megohm in accordance with NEC requirements. Reading as low as 100 ohms will pass a minimal current so as not to affect **BGFL** calibration on the 100 - 1200A relay. The 5-60A and 30-360A relay calibration will be affected if set at the lowest setting.
4. Reconnect bond link, reconnect power and check power LED for illumination.

To test the entire system including the disconnect device:

1. Check for control power, the LED should be illuminated.
2. Press the "Push To Test" switch on the relay. The trip indicator will go to the tripped position and disconnect device will open.
3. Reset the relay and the disconnect device. System is now back to normal.

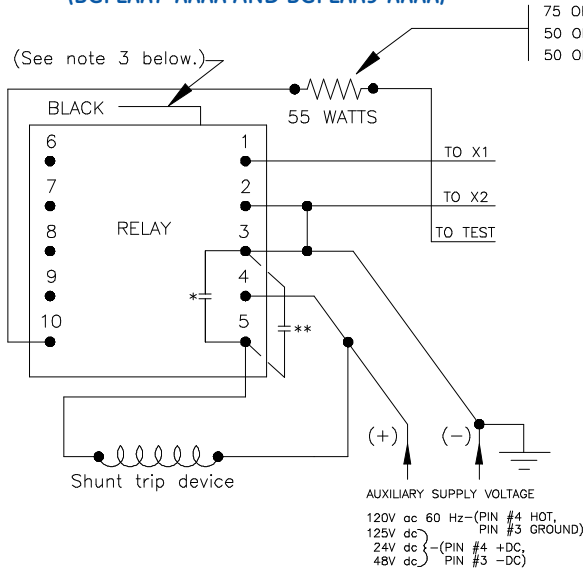
To test the ground Fault Relay and Sensor only (The sensor will trip the relay in this test).

1. Check for control power, the LED should be illuminated.
2. Press and HOLD the "Shunt Trip Bypass" switch on the relay.
3. Press the "Push To Test" switch. The Ground Fault Relay will trip.
4. Reset the relay, then release the "Shunt Trip Bypass" switch. System is now back to normal.

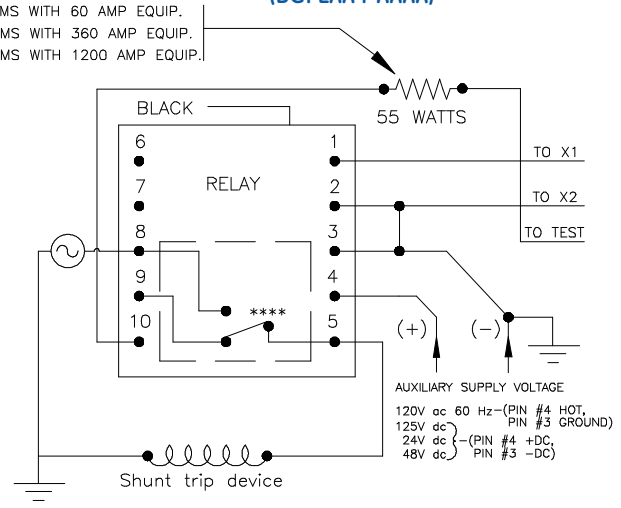
THE ABOVE TEST PROCEDURES SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

Typical Wiring Diagrams

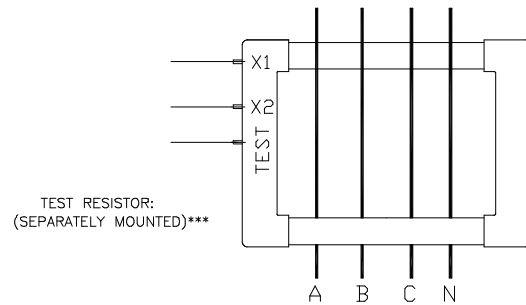
TYPICAL WIRING DIAGRAM FOR "STANDARD" AND "ZONE INTERLOCKING" CIRCUITRY (BGFLXX7-XXXX AND BGFLXX9-XXXX)



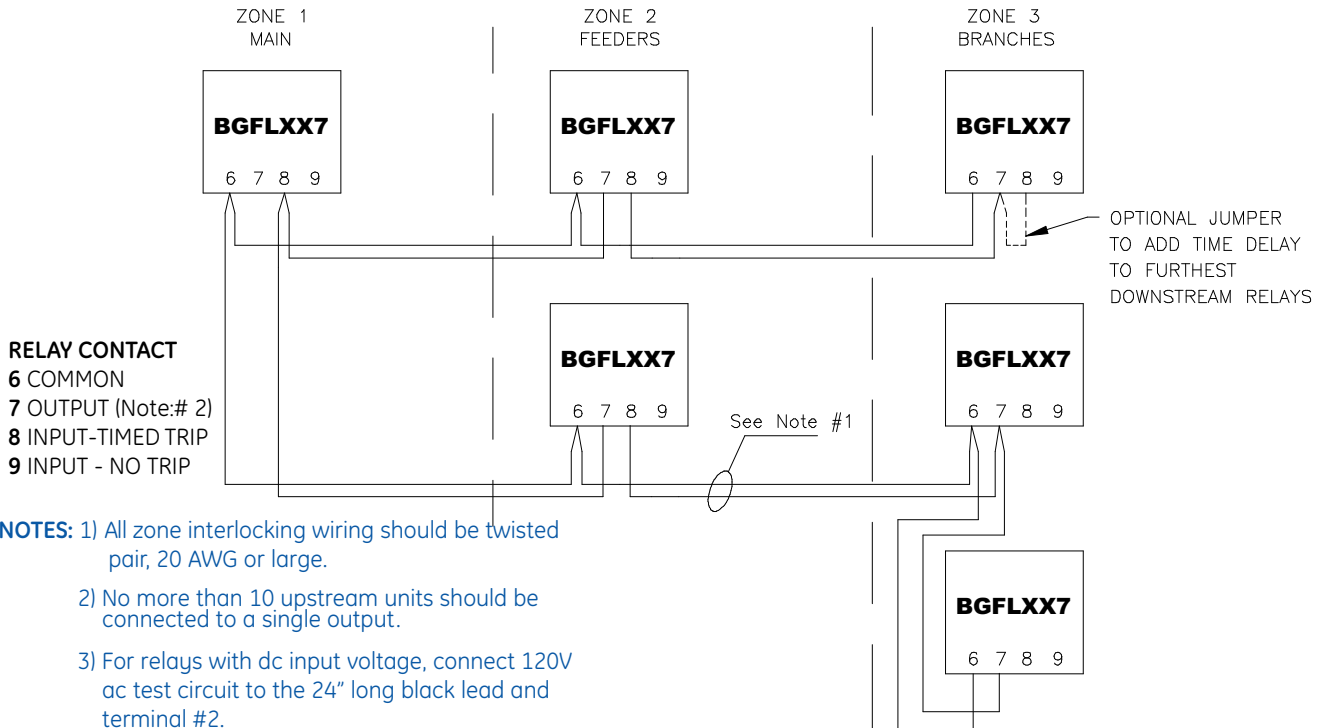
TYPICAL WIRING DIAGRAM FOR "FORM C" CIRCUITRY (BGFLXX4-XXXX)



- * Internal BGFL Relay Contact
- ** Additional Protective Device. "NO" isolated contacts can be connected in parallel across terminals 3 and 5.
- *** Mounting provision on rectangular GFL sensors with 11.1" & 13.2" widths.
- **** Internal "FORM C" contact indicated in the relay "ON" position.



Typical Wiring Diagram Zone Selective Interlocking



RELAY CONTACT
6 COMMON
7 OUTPUT (Note:# 2)
8 INPUT-TIMED TRIP
9 INPUT - NO TRIP

- NOTES:** 1) All zone interlocking wiring should be twisted pair, 20 AWG or large.
2) No more than 10 upstream units should be connected to a single output.
3) For relays with dc input voltage, connect 120V ac test circuit to the 24" long black lead and terminal #2.

USA, Canada, Asia, Latin America
Tel: +1-800-547-8629
Fax: +1-905-201-2455
e-mail: sales.multilin@ge.com

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Fax: +34-94-485-88-45
e-mail: gmultilin.euro@ge.com



Three Phase Voltage Monitor Model SPVRA



103039, CANADIAN



103039

STANDARD FEATURES

- Phase Unbalance: 8 %
- Adjustable Trip Delay 1 to 10 seconds after failure occurs.
- Output Relay: normally de-energized: Form C contacts for easy circuit configuration.
- Electro - Mechanical Indicator: retains memory of fault until manually reset.
- Door or Panel mounting.
- Status Indicator: bi-colored LED
Green: Output Relay De-energized (Normal Condition)
Red: Output Relay Energized (Fault Condition)
Dark: Output relay De-energized (Input Power Off).
- Single Phase, Phase Reversal, Phase Unbalance and Phase Loss Protection: Operates the output relay after a preselected time.
- Overvoltage and Undervoltage Protection: Operates when voltage exceeds 115% or goes below 80% after a preselected time.
- Automatic or Manual -
Automatic Reset to Normal: upon removal of fault conditions.
Manual Reset: Operations from a local pushbutton in cover or from a remote contact.

APPLICATION:

Protection of three phase electric equipment sensitive to damage from a phase loss or phase unbalance. Phase reversal, phase sequence, undervoltage & overvoltage protection.

NORMAL INPUT VOLTAGES:

120 to 600Vac, 60Hz., 380 to 415Vac, 50Hz.

AMBIENT TEMPERATURE RANGE:

Operation: - 30°C to +60°C.

Storage - 40°C to + 85°C.

Terminals screws are #6-32 nickel plated brass.

Shipping weight 2.0 lbs.

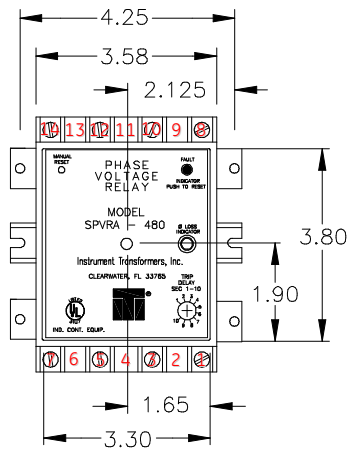
AVAILABLE MODELS

MODEL NUMBER	NOMINAL Vac	Hz.
SPVRA-120	120	60
SPVRA-208	208	60
SPVRA-240	240	60
SPVRA-480	480	60
SPVRA-575	575	60
SPVRA-380	380	50
SPVRA-415	415	50

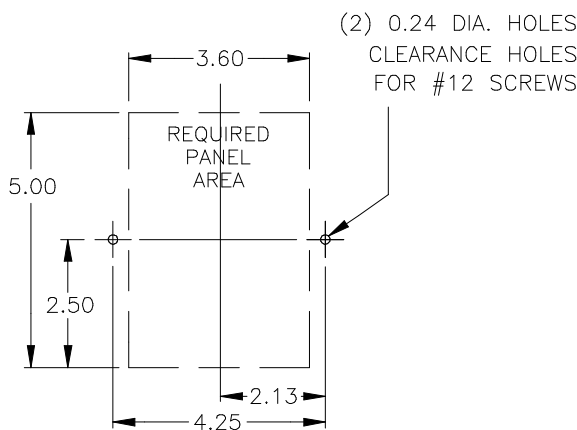
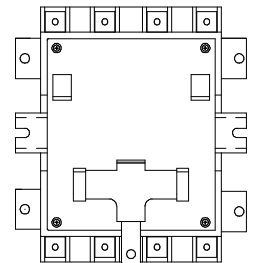
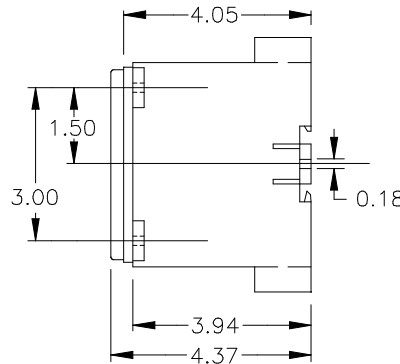
CONTACT RATING

10A, 1/3 H.P. AT 120 VAC
10A, 1/2 H.P. AT 240 VAC
3A, 1/2 H.P. AT 600 VAC

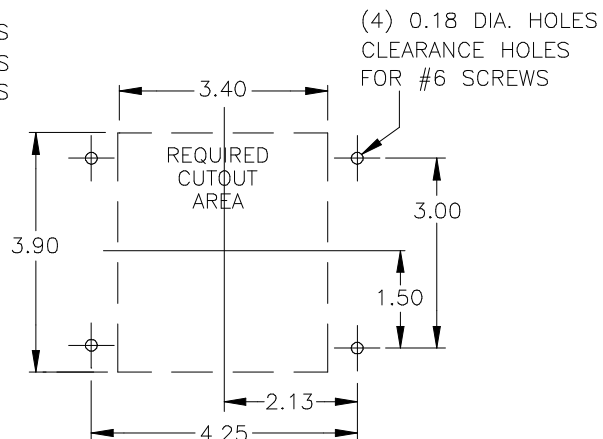
- The Model **SPVRA** Voltage Sensing Relay is designed to protect against single phase, phase loss, phase unbalance, phase reversal, and under or over voltage in a power system. The output contacts change their normal state only when a phase loss, phase unbalance, phase reversal, under or overvoltage occurs for longer than the preset trip delay. A total power loss de-energization of the **SPVRA** relay will not change the output contact position. Recommended for manually reset switches and breakers applications. The **SPVRA** is suitable for loss of phase with motor loads.



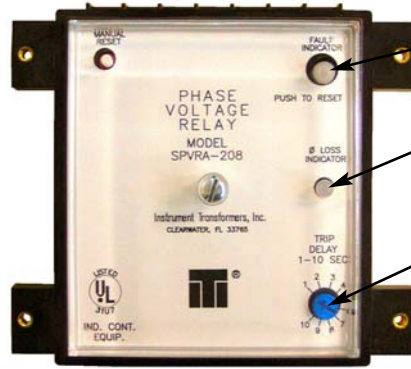
DOOR LAYOUT



PANEL MOUNTING LAYOUT



DOOR MOUNTING LAYOUT



1. **ELECTROMECHANICAL DIAGNOSTIC INDICATOR**
Phase Loss.
2. **BI-Colored LED INDICATOR**
Power system condition.
Normal (green)
Trip (red).
3. **ADJUSTABLE SYSTEM DELAY:**
Single phase.
Phase loss.
Phase unbalance
Phase reversal
Under & over voltage.

SPVRA Operation with Options

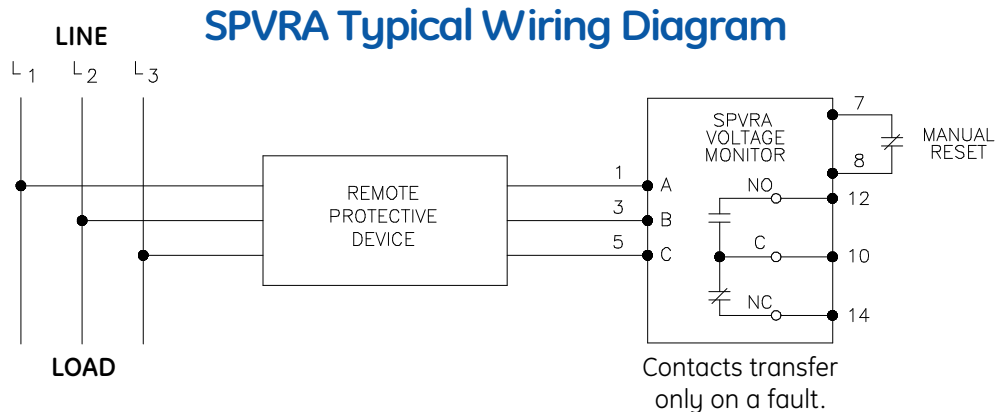
A correctly installed **SPVRA** Voltage Sensing Relay will protect a power system against damage due to single phase and phase loss, phase reversal, phase unbalance, and under and over voltage. When operating under normal power conditions, the bi-colored LED Relay Status will be green indicating the de-energized state of the output relay.

If a single phase, phase sequence, phase reversal, phase loss or unbalance of 8% occurs for longer than the preselected time delay of 1 to 10 seconds, the output relay is energized and changes state. If the voltage level dips below 80% but is above 60% after the preselected time, or if the voltage exceeds 115% for a preselected time the the output relay changes state. This output relay returns to its normal de-energized state when undervoltage returns to 90% or the overvoltage reduces to 107%. Whenever the output relay contacts are energized indicating a fault, the bi-colored LED "Relay Status" will be red.

With the manual reset, a local reset push-button is provided on the front of the relay. Two terminals provide can be used for a normally close remote reset button. When the main power is restored, the output relay is energized immediately if a reset button has not been operated.

The output relay has single Form C contact.

The **SPVRA** relay is package is in a high impact thermoplastic enclosed which can be either panel or door mounted. The terminal hardware is set for panel or door mounted. The terminal hardware is set for panel mounting but is easily reversed for door mounting. A clear cover is provided to prevent accidental mechanical indicator changes.



HOW TO ORDER RELAYS

SPVRA - XXX

Input Voltage
120, 208, 240, or 575Vac (60 Hz)
380 or 415Vac (50 Hz)

USA, Canada, Asia, Latin America

Tel: +1-800-547-8629

Fax: +1-905-201-2455

e-mail: sales.multilin@ge.com

Europe, Middle East, Africa

Tel: +34-94-485-88-00

Fax: +34-94-485-88-45

e-mail: gmultilin.euro@ge.com

Please refer to our website www.GEMultilin.com for more detailed contact information

Electronic Products



Three Phase Voltage Monitor Model SPVRB



- Phase Unbalance: 8 %
- Adjustable Trip Delay 1 to 10 seconds after failure occurs.
- Output Relay: normally de-energized: Form C contacts for easy circuit configuration.
- Electro - Mechanical Indicator: retains memory of fault until manually reset.
- Door or Panel mounting.
- Status Indicator: bi-colored LED
Green: Output Relay De-energized (Normal Condition)
Red: Output Relay Energized (Fault Condition)
Dark: Output relay De-energized (Input Power Off).
- Single Phase, Phase Reversal, Phase Unbalance and Phase Loss Protection: Operates the output relay after a preselected time.
- Automatic or Manual mode:
Automatic mode: Upon removal of fault conditions, relay automatically resets to normal.
Manual mode: Upon removal of fault conditions, relay resets to normal after local or remote reset button has been pressed.

APPLICATION:

Protection of three phase electric equipment sensitive to damage from a phase loss or phase unbalance. Phase reversal, phase sequence.

NORMAL INPUT VOLTAGES:

120 to 600Vac, 60Hz., 380 to 415Vac, 50Hz.

AMBIENT TEMPERATURE RANGE:

Operation: - 30 °C to +60 °C.

Storage - 40 °C to + 85 °C.

Terminals screws are #6-32 nickel plated brass.

Shipping weight 2.0 lbs.

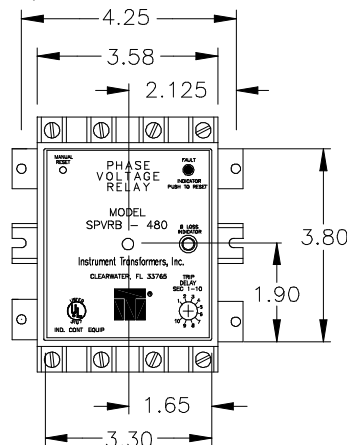
AVAILABLE MODELS

MODEL NUMBER	NOMINAL Vac	Hz.
SPVRB-120	120	60
SPVRB-208	208	60
SPVRB-240	240	60
SPVR B-480	480	60
SPVRB-575	575	60
SPVRB-380	380	50
SPVRB-415	415	50

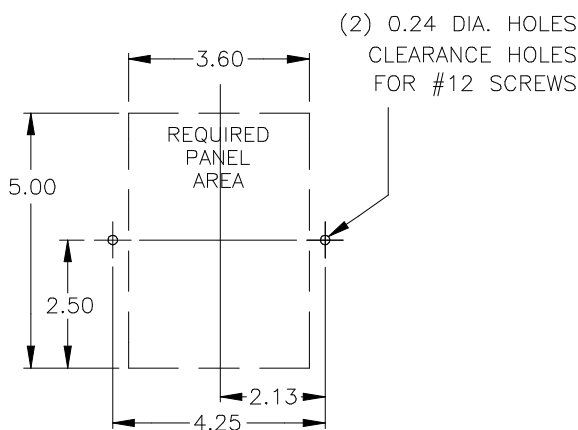
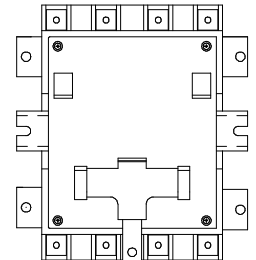
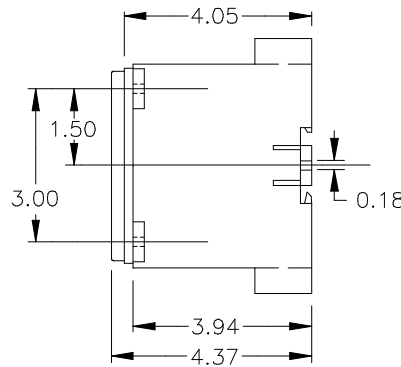
CONTACT RATING

10A, 1/3 H.P. AT 120 VAC
10A, 1/2 H.P. AT 240 VAC
3A, 1/2 H.P. AT 600 VAC

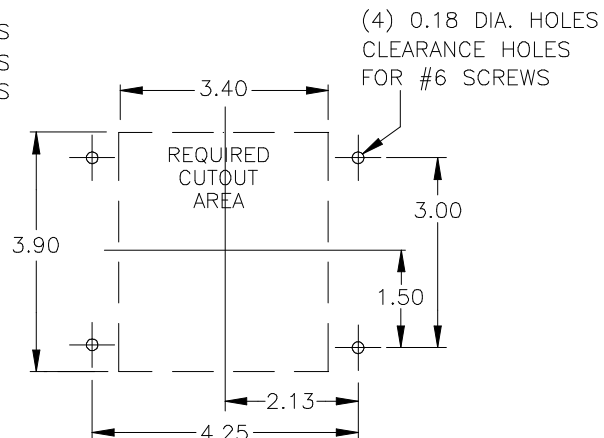
- The Model **SPVRB** Voltage Sensing Relay is designed to protect against single phase, phase loss, phase unbalance, phase reversal, in a power system. The output contacts change their normal state only when a single phase, phase loss, phase unbalance, phase reversal, occurs for longer than the preset trip delay. A total power loss de-energization of the **SPVRB** relay will not change the output contact position. Recommended for manually reset switches and breakers applications. The **SPVRB** is suitable for loss of phase with motor loads.



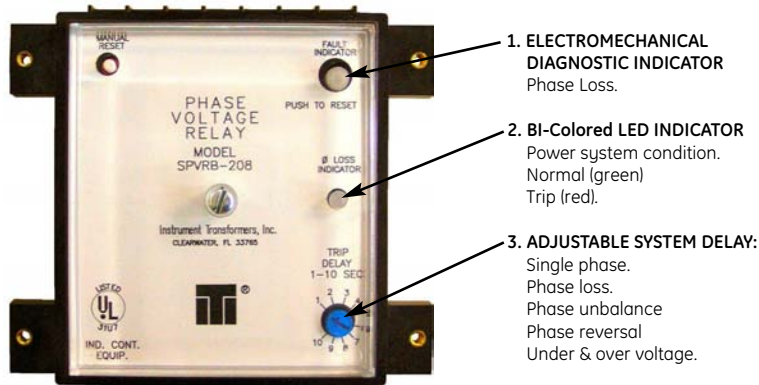
DOOR LAYOUT



PANEL MOUNTING LAYOUT



DOOR MOUNTING LAYOUT



SPVRB Operation with Options

A correctly installed **SPVRB** Voltage Sensing Relay will protect a power system against damage due to single phase and phase loss, phase reversal, phase unbalance. When operating under normal power conditions, the bi-colored LED "Relay Status" will be green indicating the de-energized state of the output relay.

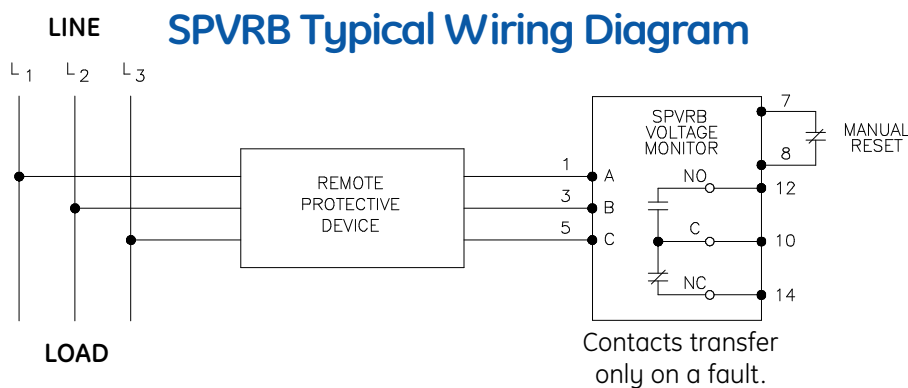
If a single phase, phase sequence, phase reversal, phase loss or unbalance of 8% occurs for longer than the preselected time delay of 1 to 10 seconds, the output relay is energized and changes state. Whenever the output relay contacts are energized indicating a fault, the bi-colored LED "Relay Status" will be red.

In automatic mode (no connection between 7 & 8), the relay automatically resets when power is restored.

In manual mode (jumper or N/C contact placed between 7 & 8) when power is restored, the relay does not reset until either the manual reset button has been pushed or the N/C contact has been opened and reclosed. The manual reset button is on the front of the relay.

The output relay has single Form C contact.

The **SPVRB** relay is package is in a high impact thermoplastic enclosed which can be either panel or door mounted. The terminal hardware is set for panel or door mounted. The terminal hardware is set for panel mounting but is easily reversed for door mounting. A clear cover is provided to prevent accidental mechanical indicator changes.



HOW TO ORDER RELAYS

SPVRB - XXX

Input Voltage
 120, 208, 240, or 575Vac (60 Hz)
 380 or 415Vac (50 Hz)

USA, Canada, Asia, Latin America

Tel: +1-800-547-8629

Fax: +1-905-201-2455

e-mail: sales.multilin@ge.com

Europe, Middle East, Africa

Tel: +34-94-485-88-00

Fax: +34-94-485-88-45

e-mail: gmultilin.euro@ge.com

Please refer to our website www.GEMultilin.com for more detailed contact information

Electronic Products



Three Phase Voltage Monitor Model LPVRB

Protects 3-power system loads from:

- Loss of any Phase
- Low Voltage
- High Voltage
- Voltage Unbalance
- Phase Reversal
- Rapid Cycling

Additional Features:

- Compact Design
- UL and cUL listed
- CE Compliant
- Finger Safe terminals
- Standard Surface or DIN Rail Mount
- Standard 1-500 Sec. Variable Restart Delay
- Standard 2-8% Variable Voltage Unbalance
- One 10 Amp General purpose Form C relay
- Standard 1-30% Variable Trip Delay
- Optional Manual Reset

Trip Delay Time:

- Low, high and Unbalance Voltage:
- 1-30 seconds adjustable
- * Note 50 Hz will increase all delay timers by 20%

Restart Delay Time:

- After fault - 1 - 500 seconds
- After a Complete Power loss (When manual reset pins are shorted)

Output Contact Rating:

- 10 A General purpose @240 VAC
- Pilot Duty 480VA @ 240 VAC, B300

Power Consumption:

6 Watts (max)

Enclosure:

Polycarbonate

Wire Type:

Stranded or solid 12-20 AWG, one per terminal

• The Model LPVRB is designed to protect 3-phase loads from damaging power conditions. Its wide operating range combined with UL and CE compliance insures worldwide acceptance.

Specifications:

- 3-phase Line Voltage: 190 - 480 VAC
- Frequency: 50* or 60Hz
- Low Voltage (% of set Point) *
- Trip: 90% ± 1%
- Reset: 93% ± 1%
- High Voltage (% of set Point)
- Trip: 110% ± 1%
- Reset: 107% ± 1%
- Voltage Unbalance (NEMA)
- Trip: 2-8%
- Reset: Trip setting minus 1% (5-8%)
Trip setting minus .5% (2-4%)

Standard Passed:

- Electrostatic Discharge (ESD)

Radio Frequency Immunity, Radiated:

- 150 MHz V/m, 10V/m

Fast Transient Burst:

- IEC 1000-4-5, Level 3, 3.5 kV input power & controls

Surge:

- IEC 1000-4-5, Level 3, 4kV line-to-line, Level 4, 4kV line-to-ground

Weight:

14 oz.

Terminal Torque:

6 in. lbs.

ANSI/IEEE:

- C62.41 Surge and Ring Wave

- Compliance to a level of 6kV line-to-line

Hi-Potential Test:

- Meets UL508 (2 x rated V +1000V for 1 minute)

Class Protection:

IP20, NEMA 1 (Finger Safe)

FEATURES

Four adjustment pots provide versatility for all kinds of applications.

Provides the versatility needed to handle global applications.

Diagnostic LEDs indicate trip status and provide simple trouble shooting.

Microcontroller based based circuitry provides better accuracy and higher than analog designs.

Transient protected to meet IEEE and IEC standards and operate under tough conditions.

Will detect single phase condition regardless of regenerated voltages.

Environmental:

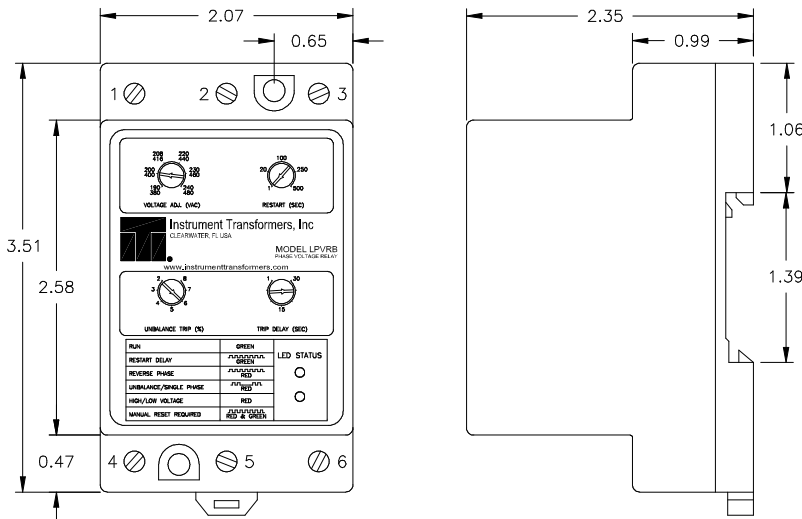
- Ambient Operating: -20°C to +70°C (-4 to +158 °F)
- Ambient Storage: -40°C to +85°C (-4 to +176 °F)
- Relative Humidity: 10-95%, non-condensing per IEC 2-3

Special Options:

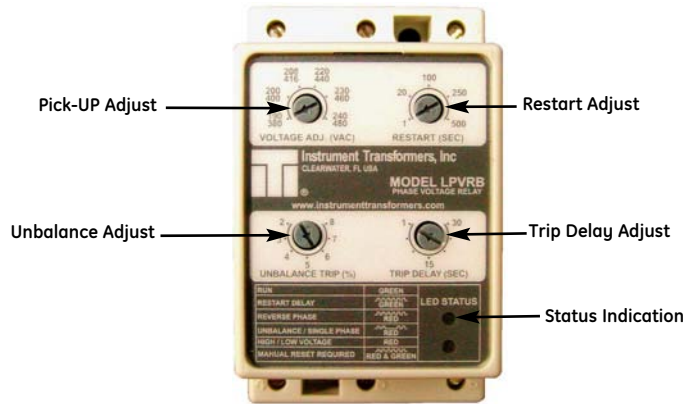
- Manual Reset: External momentary push button required

Safety Marks:

UL508, IEC 60947-6-2



For Complete information on warranty, liability terms, returns, and cancellations, please refer to the Instrument Transformers, Inc Standard Conditions of Sale.



MODEL NUMBER	NOMINAL Vac	Hz.
LPVRB	480V/120V	60
LPVRB	380V/416V	50
LPVRB-120	120V	60

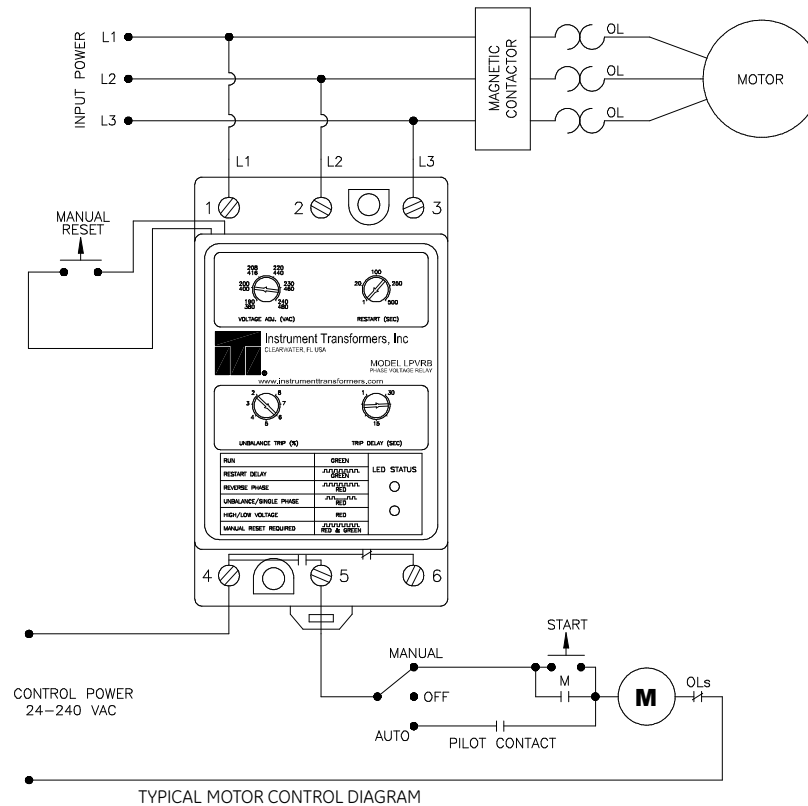
LPVRB Operation with Options

A unique microcontroller-based voltage and phase sensing circuit constantly monitors the three phase voltages to detect harmful power line conditions. When a harmful condition is detected, the LPVRB's 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) or after a manual reset. The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

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

Two LEDs indicate the status of the Model LPVRB; Run Light, Under Voltage, Over Voltage, Phasing Fault/Reverse Phase, and Manual Reset. The LPVRB ships with a jumper installed for automatic restart. A connector with 12" wires is included for manual reset switch.

LPVRB Typical Wiring Diagram



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Fax: +1-905-201-2455

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Fax: +34-94-485-88-45

e-mail: gemultilin.euro@ge.com



Phase Loss Phase Sequence Detection System Model APVR



103039, CANADIAN



103039

SPECIFICATIONS

- Failsafe: Trip free contacts will not operate if a fault is present.
- Automatic reset. (Configurable to manual reset, See applications notes.)
- Fixed undervoltage trip point: approx. 90% pick up, 80% dropout.
- Operates at 6% phase unbalance.
- Operates green LED indicator.
- Isolated Form "C" output contacts.
- Output contact rating: 250V ac, 5 amps, (general use).
- Input voltages up to 575V ac.
- 3 second drop-out delay to avoid nuisance tripping.

APPLICATION:

Protection of three phase electrical equipment sensitive to damage due to loss of phase, phase unbalance or improper phase sequence.

NOMINAL INPUT VOLTAGES: 120V, 208V, 240V, 380V, 415V, 480V, 575V

FREQUENCY: 50 Hz, 60 Hz.

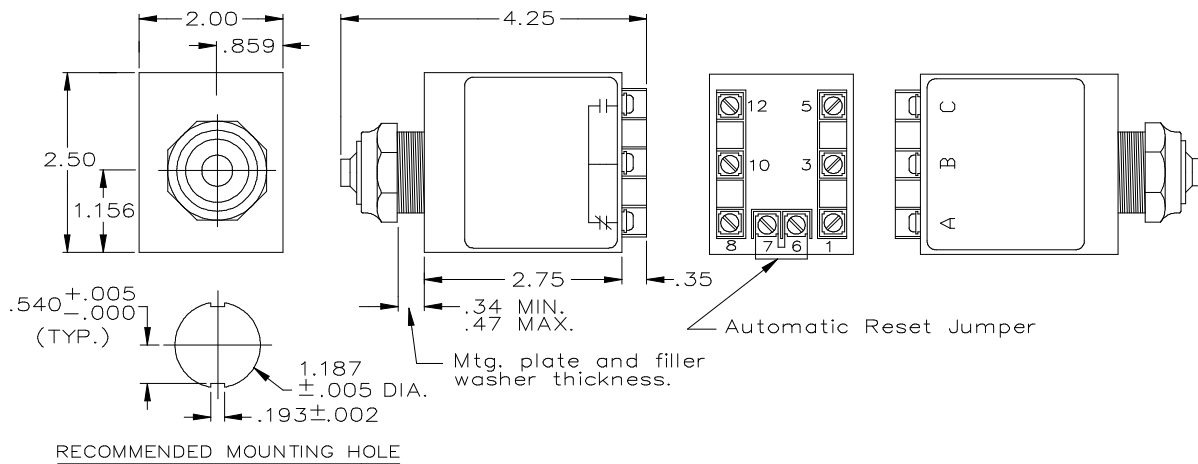
AMBIENT TEMPERATURE RANGE:

Operation: -30°C to +60°C

Storage: -55°C to +85°C

Terminal screws are #6-32 nickel plated brass.

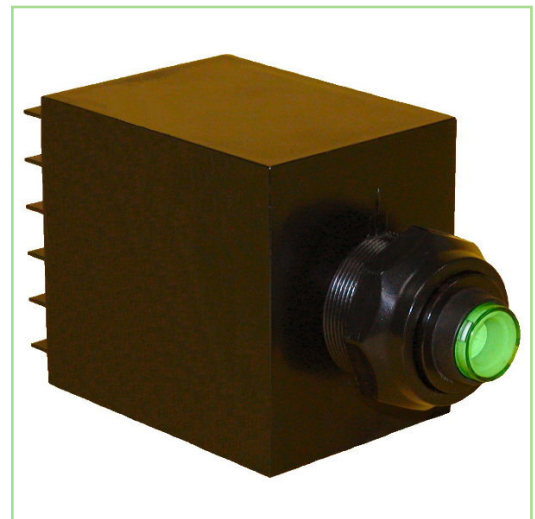
Shipping weight 0.6 lb.



RECOMMENDED MOUNTING HOLE

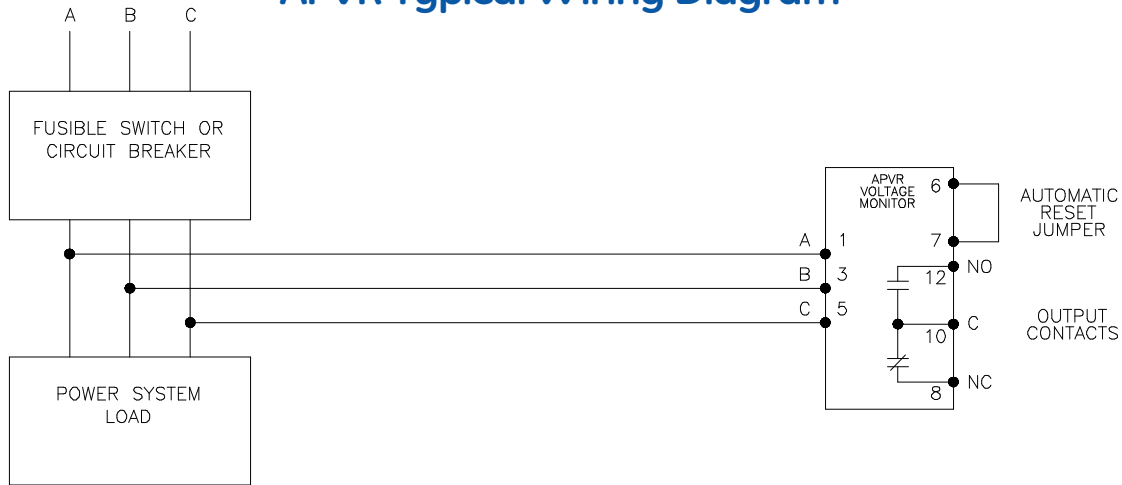
AVAILABLE FOR THE FOLLOWING 3 PHASE VOLTAGES

MODEL NUMBER	NOMINAL RATING	VOLTAGE RATING	FREQUENCY
APVR 120	120V	90 - 125	60 Hz
APVR 208	208V	165 - 234	60 Hz
APVR 240	240V	190 - 270	60 Hz
APVR 480	480V	380 - 530	60 Hz
APVR 575	575V	455 - 600	60 Hz
APVR 380	380V	300 - 425	50 Hz
APVR 415	415V	328 - 466	50 Hz



Model APVR

APVR Typical Wiring Diagram



UNBALANCE CALCULATION

$$\frac{\text{MAX DEVIATION FROM AVERAGE}}{\text{AVERAGE}} \times 100 = \% \text{ UNBALANCE}$$

EXAMPLE:

$\emptyset A - \emptyset B = 240V$; $\emptyset B - \emptyset C = 220V$; $\emptyset C - A = 215V$; AVERAGE = 225V

MAX DEVIATION FROM AVERAGE = $240 - 225 = 15V$

$$\% \text{ UNBALANCE} = \frac{15}{225} \times 100 = 6.67\%$$

Applications Notes

If the power conditions are normal, 3 seconds after power is supplied to the APVR the contacts will transfer, permitting operation. In normal applications, this power will already be applied to the APVR and there is no time delay in operating.

The correct phase sequence must be established upon initial installation for proper operation of the relay. Any subsequent change in phase will cause the relay to trip. If the relay is re-energized and the phase sequence is incorrect the relay will not operate.

The device is shipped from the factory in the automatic reset mode with a jumper on terminals 6 & 7. Operation can be changed from automatic reset to manual reset by removing the external jumper. Automatic reset means that upon fault removal the device reset automatically to perform is mounting function. For manual reset simply remove the jumper and connect a normally open pushbutton across terminals 6 and 7.

Upon application of power the green LED indicator will illuminate. If a fault exists the green LED will remain illuminated for these three seconds and then go out. This is normal and indicates that line power is present but a fault condition has been detected. The output contacts will remain in their de-energized failsafe state.

If no fault exists upon application of power the green LED indicator illuminates and three seconds later the relay contacts transfer. Upon detection of a fault, the green indicator light will go out and three seconds later the relay contacts revert to their de-energized state. This three second delay prevents nuisance tripping of the APVR.

In service the line voltage to the device may be interrupted on various occasions. In the automatic reset mode the device will resume its monitoring function approximately three seconds after power is restored. In the manual reset mode the reset pushbutton must be pressed.

"Failsafe" operation is achieved by the following features:

- 1) The relay is energized and the output contacts are transferred under "normal" conditions only.
- 2) Should the output relay itself fail or in the event of internal circuit failure, the relay will revert to the de-energized position.

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Voltage Transducers

Model LLV & PNV

APPLICATION: 3 Phase voltage measurement.

NOMINAL INPUT VOLTAGES:

120V, 240V, 277V, 480V

FREQUENCY: 50/60 Hz.

ACCURACY: ± 0.5% Full scale.

AMBIENT TEMPERATURE RANGE:

Effect on accuracy: ± 0.3% / °C.

Operating: -30°C to +60°C

Storage: -55°C to +85°C

Power supply: 24 V dc ± 10%

Max. continuous input voltage: 600V

Output: Load range: 0-600 ohms.

Load range: 4 to 20mA dc.

Ripple: <1%.

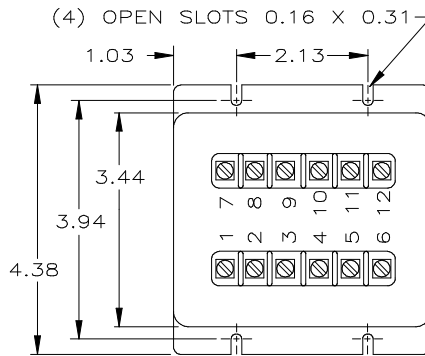
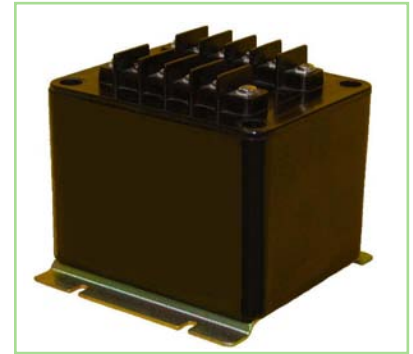
Response time: < 1.5 sec. (10% to 90%)

Approx. shipping weight 1.3 lbs.

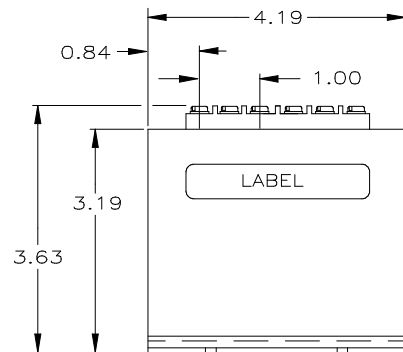
ORDERING INFORMATION

MODEL → XXX - XXX ← NOMINAL

LLV	120
PNV	277 [PNV Model only]
	480 [LLV [Dual Range] Model only]



TOP VIEW

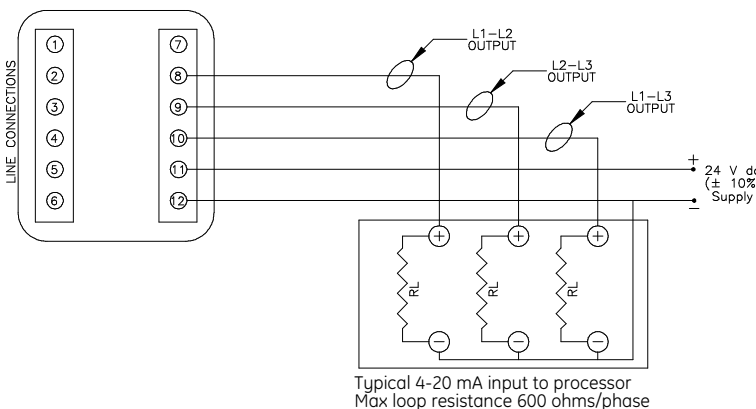


SIDE VIEW

	LINE-TO-LINE VOLTAGE			PHASE-TO-NEUTRAL VOLTAGE	
	LLV	LLV (Dual Range)		PNV	
Nominal Input Voltage	120V	240V	480V	120V	277V
Voltage Input Range	90V to 150V	180V to 300V	360V to 600V	90V to 150V	180V to 300V
Burden (Max.)	0.1VA at 120V	0.1VA at 265V	0.1VA at 530V	0.1VA at 150V	0.1VA at 300V
Ripple On Output	250 UA ac				
Dielectric Test (1Min)	1300 Volts	1600 Volts	2200 Volts	1300 Volts	1600 Volts
Transfer function $E_{IN} =$	(3.75) (mA out) +75	(7.5) (mA out) +150	(15) (mA out) +300	(3.75) (mA out) +75	(7.5) (mA out) +150

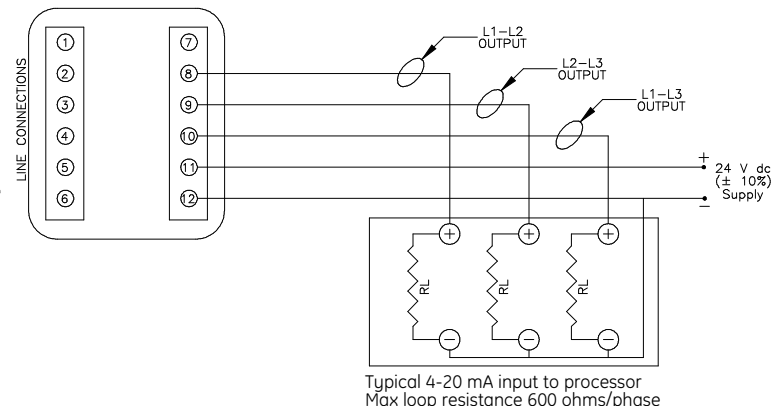
- The model LLV and PNV series of voltage transformers are expanded scale instruments which are designed to accurately measure voltages on three phase systems. The LLV series is designed to meter line to line voltages and the PNV series is designed to meter phase to neutral voltages. The transducers provide three discrete 4 to 20mA outputs that are proportional to the three phase input voltages. The input voltages scale does not meter down to zero Volts, instead it is limited to the normal useful range of input voltages for a particular system. For example: The model PNV-120 has an input signal range from 90 to 150 V ac and will yield an output of 4 to 20 mA dc for that range. The output is true constant current driver and is unaffected by resistance variations from 0-600 ohms in the output loop. An external 24Vdc supply is needed to provide power for the internal solid state circuitry. The power supply input has reverse polarity protection to prevent damage from an accidental miswire. The high accuracy solid state circuitry is average responding calibrated to read RMS. This device is an ANSI/ISO 50.1 Class L3 transmitter.

LLV (Line-To-Line) Connection Diagram



Typical 4-20 mA input to processor
Max loop resistance 600 ohms/phase

PNV (Phase-To-Neutral) Connection Diagram



Typical 4-20 mA input to processor
Max loop resistance 600 ohms/phase

It is recommended that the installation conform to NEC and any local codes.



AC Current Transducer Model ACV 0-200A to produce 0-5 Volts dc

OPERATING RANGE:

Primary: 5 to 200 Amps ac.
Secondary: 0 to 5 Volts dc.

FREQUENCY: 50/60 Hz.

INSULATION LEVEL:

600 Volts, 10 kV BIL full wave.

RESPONSE TIME: 0.25 Seconds.

AMBIENT TEMPERATURE RANGE:

-30°C to +60°C

1% max. peak ripple on output at 1 megohm or greater.

Secondary terminals are brass screws No. 8-32 with one flatwasher and lockwasher.

Approximate weight 1.5 lbs.

MODEL NUMBER	PRIMARY AMPS	ACCURACY % F.S.*
ACV - 5	0 - 5	1.0
ACV - 10	0 - 10	0.75
ACV - 15	0 - 15	0.75
ACV - 20	0 - 20	0.5
ACV - 30	0 - 30	0.5
ACV - 50	0 - 50	0.5
ACV - 75	0 - 75	0.5
ACV - 100	0 - 100	0.5
ACV - 150	0 - 150	0.5
ACV - 200	0 - 200	0.5

* For loads greater than 1 megohm.



DESCRIPTION: The model ACV series of current transducers will produce a 0-5V dc output signal that is directly proportional to the input current. The transducers internal circuitry is average sensing, calibrated for RMS.

APPLICATION:

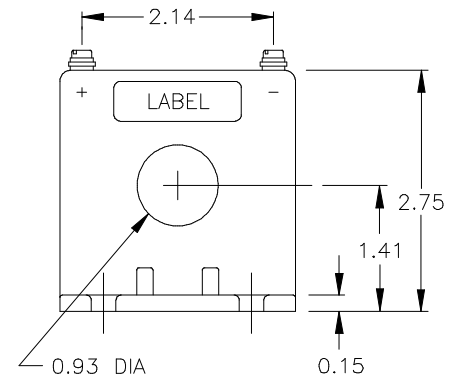
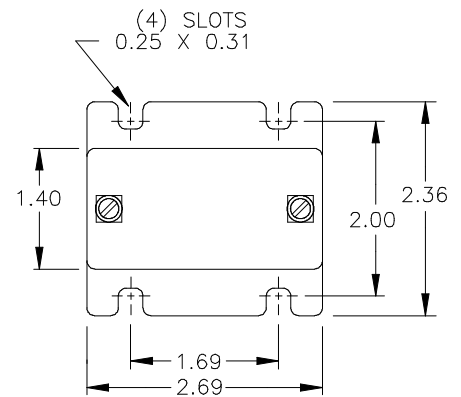
These transducers are intended for use with process control or industrial measuring equipment. The D.C. output signal can be connected directly to high impedance A/D input of a computer without any additional signal conditioning basis.

These transducers can accurately measure up to 200% of full scale on a short time basis (1min. or less), and 150%, on a continuous basis.

To protect external circuits from damage caused by a short circuit or motor inrush current the output is limited to approx.16 V. If its necessary to accurately measure motor overload currents then a model must be selected so that the expected overload will fall within the transducer's 200% accuracy range.

Example: A Motor with FLA of 6A

During lock rotor condition the current could rise to 36A. In order to accurately measure the 36A inrush current a model ACV-20 should be used. The ACV-20 will accurately measure up to and including 40 Amps.



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AC Current Transducer

Model 10ACV 0-200Amps to produce 0-10 Volts dc

OPERATING RANGE:

Primary: 5 to 200 Amps ac.
Secondary: 0 to 10 Volts dc.

FREQUENCY: 50/60 Hz.

INSULATION LEVEL:

600 Volts, 10 kV BIL full wave.

RESPONSE TIME: 0.25 Seconds.

AMBIENT TEMPERATURE RANGE:

-30°C to +60°C
1% max. peak ripple on output at 150 K ohms or greater.

Secondary terminal are brass screws No. 8-32 with one flatwasher and lockwasher.

Approximate weight 1.5 lbs.

DESCRIPTION: The Model 10ACV series of current transducers will produce a 0-10V dc output signal that is directly proportional to the input current. The transducers's internal circuitry is average sensing, calibrated for RMS.

Application:

These transducers are intended for use with process control or industrial measuring equipment. The D.C. output signal can be connected directed to a high impedance A/D input of a computer with out any additional conditioning components.

These transducers can accurate measure up to 200% of full scale on a short time basic (1min. or less), and 150% on a continuous basis.

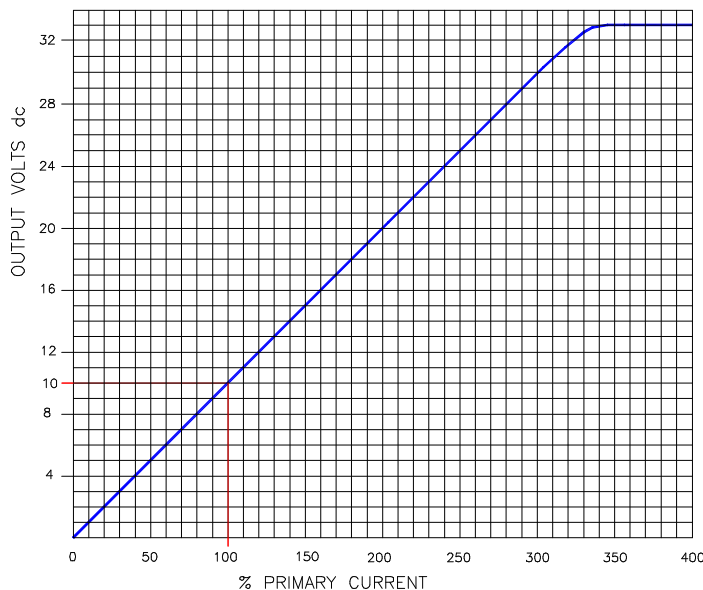
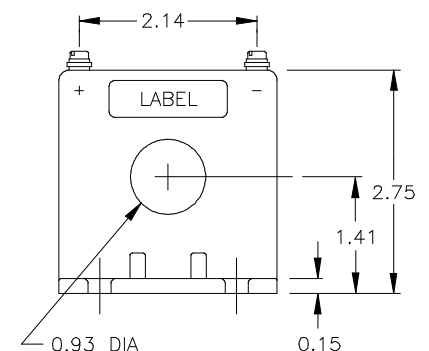
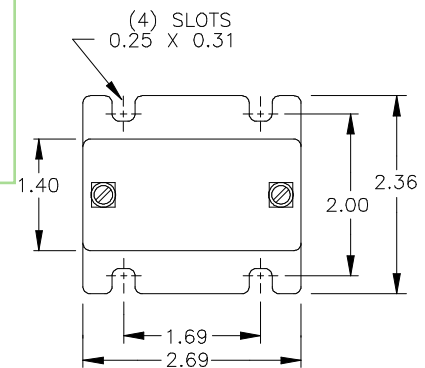
To protect external circuits from damage caused by a short circuit or motor inrush current the output is limited to approx. 33V. If it is necessary to accurately measure motor overload currents then a model must be selected as that the expected overload will fall within the transducers's 200% accuracy range.

EXAMPLE:

A Motor with FLA of 6A
During lock rotor condition that current could rise to 36A. In order to accurately measure the 36A inrush current a model 10ACV-20 should be used. The 10ACV-20 will accurately measure up to and including 40 Amps.

MODEL NUMBER	PRIMARY AMPS	ACCURACY % F.S. *
10ACV - 5	0 - 5	1.0
10ACV - 10	0 - 10	0.75
10ACV - 15	0 - 15	0.75
10ACV - 20	0 - 20	0.5
10ACV - 30	0 - 30	0.5
10ACV - 50	0 - 50	0.5
10ACV - 75	0 - 75	0.5
10ACV - 100	0 - 100	0.5
10ACV - 150	0 - 150	0.5
10ACV - 200	0 - 200	0.5

* FOR LOADS GREATER THAN 150 K OHMS





AC Current Transducer

Model PCL 0-75 Amps ac to produce 4-20mA dc

MODEL	INPUT CURRENT
PCL 5	0 - 5
* PCL 20	0 - 10, 0 - 15, 0 - 20
* PCL 75	0 - 25, 0 - 50, 0 - 75
See Next Page for 0-100 thru 0-600	

* Switch selectable current ranges.

OPERATING RANGE:

Input 5 thru 75 Amps ac.
Output: 4-20 mA dc.



142298, CANADIAN



142298

FREQUENCY: 50/60 Hz.

AMBIENT TEMPERATURE RANGE:

Effect on accuracy $\pm 0.02\%/^{\circ}\text{C}$
Operating: -30°C to $+60^{\circ}\text{C}$
Storage: -55°C to $+85^{\circ}\text{C}$

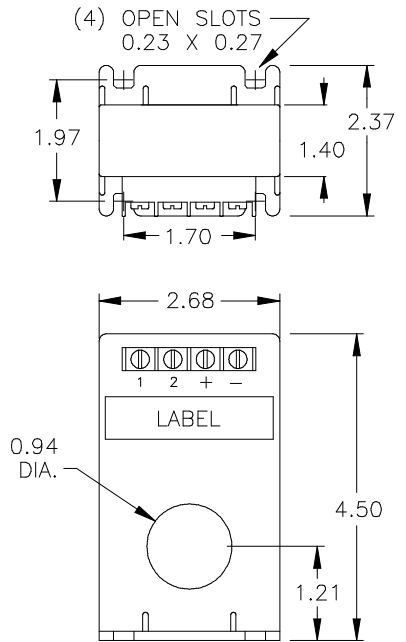
INSULATION LEVEL:

600 Volts, 10 kV BIL full wave.

ACCURACY: $\pm 0.5\%$ F.S. maximum.

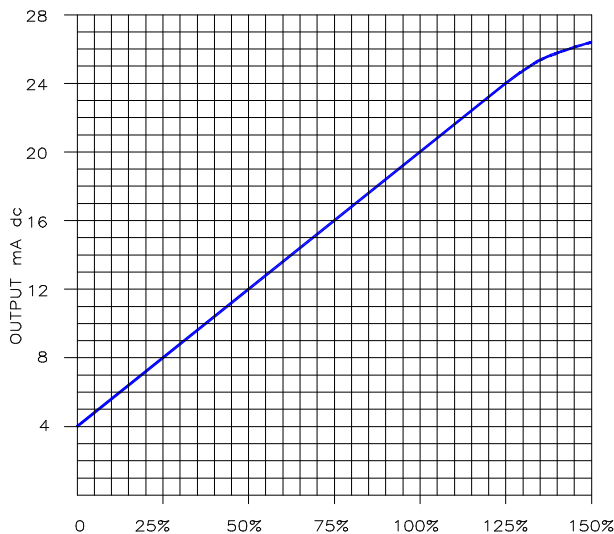
1% max. peak ripple on output.
Response Time: $<150\text{ms}$ (10% to 90%)
Output load (R_L): 0-1000 ohms.
Maximum output: 30 mA dc.
Supply Voltage Range: 120 Vac $\pm 10\%$.
Terminal are brass screws No. 10-32 with one flatwasher, lockwasher and regular nut.

Approximate weight 1.0 lbs.



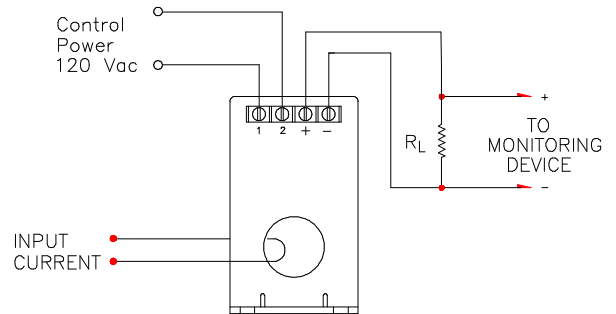
- The PCL transducer accurately converts a sinusoidal ac input current to a proportional dc output current. The high performance integrated circuit amplifiers achieve a constant current output, insensitive to a variable impedance load. This allows the PCL to be easily applied to remote instrumentation, motor control and energy management installations. The output signal (4 to 20mA dc) can be transmitted over long distances with no loss in accuracy. Model numbers PCL 20 and PCL 75 have been provided with a range selector switch for customer selectable current ranges. The input circuit is average responding. The output is calibrated to read true RMS for a pure sinus waveform.

TYPICAL CHARACTERISTICS



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Typical Connection Diagram



Application

Calculating $I_m = \text{ac Amps measured}$
 $I_o = \text{mA dc out of PCL}$
 Rated Input CT primary Rating (when monitoring a CT)
 Rated Input PCL Primary Rating (when monitoring direct)

Where: $I_m = \text{Rated input} \times \left(\frac{I_o - 4}{16} \right)$

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AC Current Transducer

Model PCL

0-600 Amps ac to produce 4-20 mA dc

OPERATING RANGE:

Input 0 to 100 thru 600 Amps ac.
Output: 4-20 mA dc.

FREQUENCY: 50/60 Hz.

AMBIENT TEMPERATURE RANGE:

Effect on accuracy $\pm 0.02\%/^{\circ}\text{C}$
Operating: -30°C to $+60^{\circ}\text{C}$
Storage: -55°C to $+85^{\circ}\text{C}$

INSULATION LEVEL:

600 Volts, 10 kV BIL full wave.

ACCURACY:

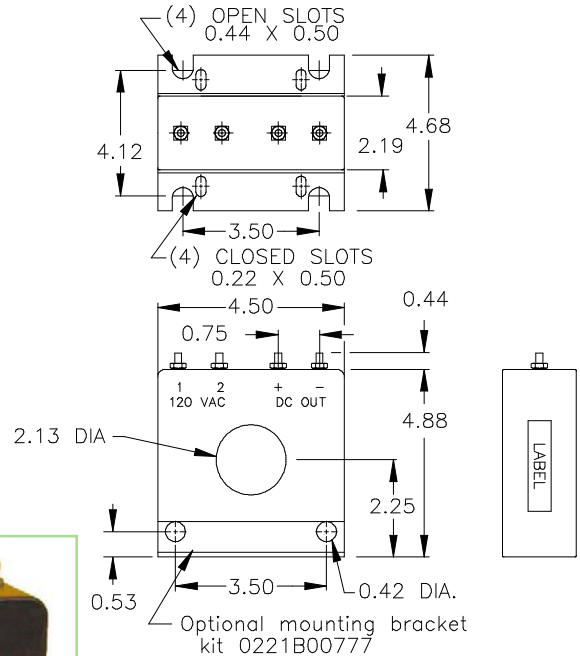
$\pm 0.05\%$ F.S. maximum.

1% max. peak ripple on output.
Response Time: $<150\text{ms}$ (10% to 90%)
Output load (R_L): 0-1000 ohms.
Maximum output: 30 mA dc.
Supply Voltage Range: 120 Vac $\pm 10\%$.
Terminal are brass studs No. 8-32 with one flatwasher, lockwasher and regular nut.

Approximate weight 3.0 lbs.

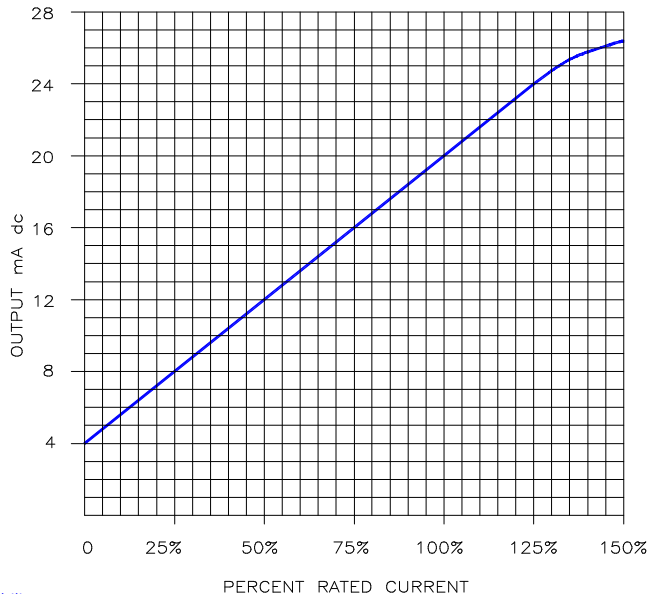
MODEL NUMBER	INPUT CURRENT RANGE
Previous for 0-5 thru 0-75	
PCL 100	0-100
PCL 150	0-150
PCL 200	0-200
PCL 300	0-300
PCL 400	0-400
PCL 600	0-600
0221B00777	Mtg. Bracket Kit

For load currents which are greater than 600A the PCL-5 may be used in conjunction with separate higher ratio C.T.'s having a rated 5A secondary.

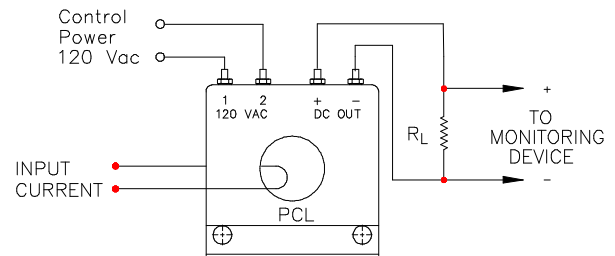


- The PCL transducers accurately converts a sinusoidal ac input current to a proportional dc output current. The high performance integrated circuit amplifiers achieve a content current output, insensitive to a variable impedance load. This allows the PCL to be easily applied to remote instrumentation, motor control and energy management installations. The output signal (4 to 20mA dc) can be transmitted over long distances with no loss accuracy.

TYPICAL CHARACTERISTICS



Typical Connection Diagram



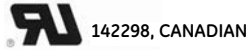
Application

- Calculating I_m = ac Amps measured
 I_o = mA dc out of PCL
 Rated Input CT primary Rating (when monitoring a CT)
 Rated Input PCL Primary Rating (when monitoring direct)

Where: $I_m = \text{Rated input} \times \left(\frac{I_o - 4}{16} \right)$



AC Current Transducer Model PCM 0-300 Amps ac to produce 4-20 mA dc



OPERATING RANGE:

Input 0-5 thru 300 Amps ac.
Output: 4-20 mA dc.

FREQUENCY: 50/60Hz.

AMBIENT TEMPERATURE RANGE:

Effect on accuracy $\pm 0.04\%/^{\circ}\text{C}$
Operating: -30°C to $+60^{\circ}\text{C}$
Storage: -55°C to $+85^{\circ}\text{C}$

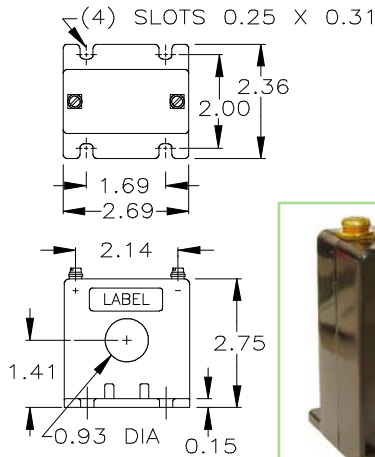
INSULATION LEVEL:

600 Volts, 10 kV BIL full wave.

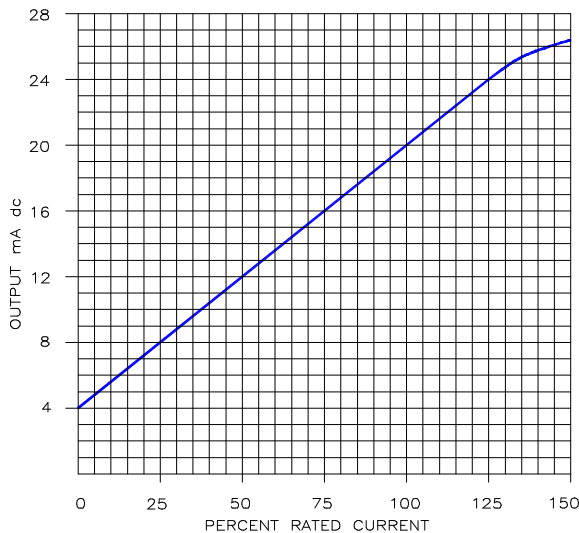
CONTINUOUS THERMAL CURRENT RATING FACTOR:

1.33 at 30°C ambient.*
* 6.00 times rated current for 30 seconds.

- The PCM transducer accurately converts a sinusoidal ac input to a proportional dc current. The high performance integrated circuit amplifiers achieve a constant current output, insensitive to a variable impedance load. This allows the PCM to be easily applied to remote instrumentation, motor control, and energy management installations. The input circuit is average responding.

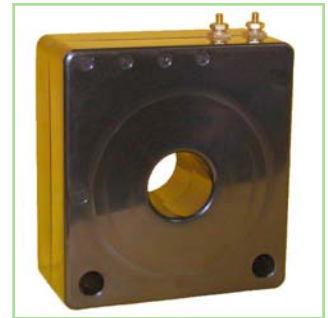
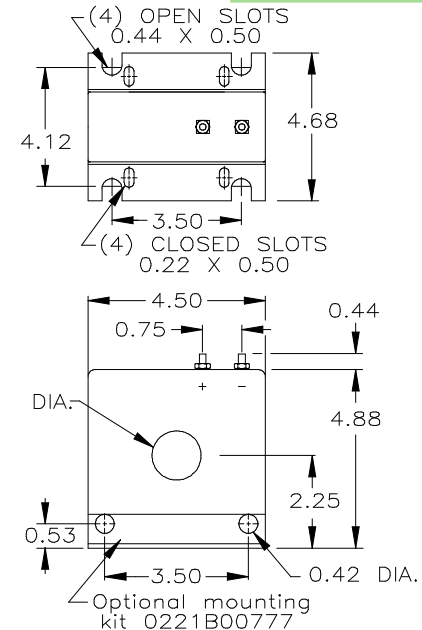


TYPICAL CHARACTERISTICS



MODEL NUMBER	INPUT CURRENT RANGE
PCM 5	0 - 5
PCM 10	0 - 10
PCM 20	0 - 20
PCM 30	0 - 30
PCM 50	0 - 50
PCM 75	0 - 75
PCM 100	0 - 100
PCM 150	0 - 150
PCM 200	0 - 200
PCM 300	0 - 300

For load currents which are greater than 300A the 5 unit may be used in conjunction with separate higher ratio C.T.'s having a rated 5A secondary.



The output require 24V dc to be applied between the (+) terminal and ground. The output load may be inserted in either the (-) line for a negative ground system. Power supply polarity is critical for correct operation, but an accidental reverse polarity connection will not damage the output. Several transducers can be operated from a single power supply with the only limitation being the maximum current available from the supply itself.

(Example: a one Amp supply will support 50 transducers operating at 20mA dc output.) The maximum output is limited to 30mA dc to prevent damage to external components.

CAUTION:

Some consideration should be given to the ripple content of the external power supply. Any ripple introduced by the power supply will appear at the load resistor.

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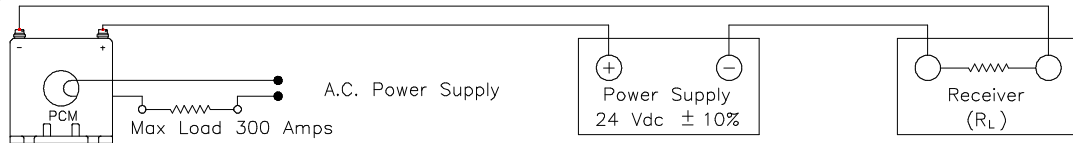
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Fax: +34-94-485-88-45

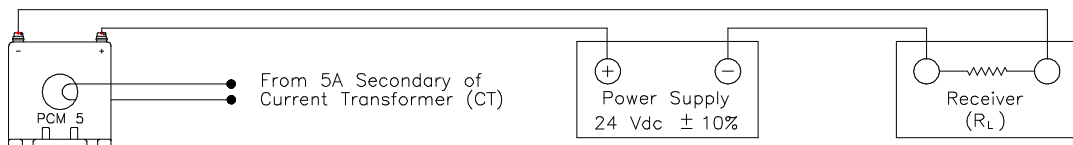
e-mail: gmultilin.euro@ge.com

Applications Notes

Application #1 Monitoring Loads 300 Amps or Less



Application #2 Monitoring Loads from a Current Transformer Secondary

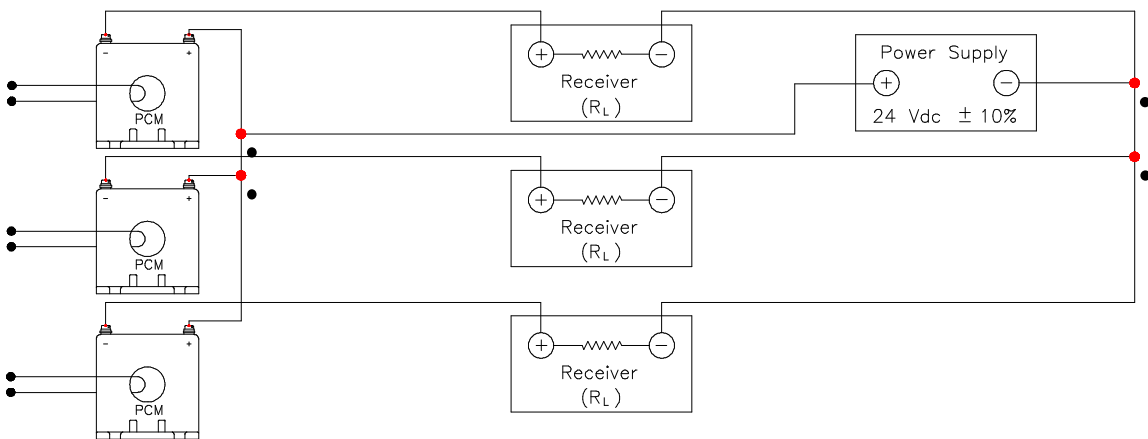


Example

$$\text{When used with a } 2000:5 \text{ CT } I_{in} = 2000 \times \left(\frac{I_o - 4}{16} \right)$$

$$\text{If } I_o = 10\text{mA then } I_{in} = 2000 \times \left(\frac{10 - 4}{16} \right) = 750 \text{ amps}$$

Application #3 Energizing multiple transducers from a single power supply



Application

Calculating	$I_{in} = \text{ac Amps measured}$
	$I_o = \text{mA dc out of PCL}$
Rated Input	CT Primary Rating (when monitoring a CT)
Rated Input	PCL Primary Rating (when monitoring direct)
Where:	$I_{in} = \text{Rated input} \times \left(\frac{I_o - 4}{16} \right)$

NOTE: Output current of each PCM is limited to 30mA max. From this the required by using capacity of the D.C. supply can be calculated by multiplying the total number of PCM's times 0.03A to find the maximum requirement output capacity of the supply.

It is possible to achieve an output close to full scale increase output resolution by using multiple turns through the window of the PCM. The following equation would apply:

$$I_{in} = \frac{\text{Rated input Amps}}{\text{No. of Turns}} \times \left(\frac{I_o - 4}{16} \right)$$

EXAMPLE: A PCM 5 is used with two turns and is monitoring a 2A load.

$$\text{If } I_o = 16.8 \text{ mA then } I_{in} = \frac{5}{2} \times \left(\frac{16.8 - 4}{16} \right) = 2 \text{ Amps}$$



Open Circuit Protectors

Model OCP



LISTED
IND. CONT. EQUIP.



FILE NO.
E103039

APPLICATION:

Open circuit protection for relay classes through C800 and all classes through C800 and metering classes.

FREQUENCY:

50-400 Hz.

AMBIENT TEMPERATURE RANGE:

-30°C to +55°C

NORMAL SECONDARY CURRENT:

5 Amps. ac.

SHORT TIME OVERCURRENT:

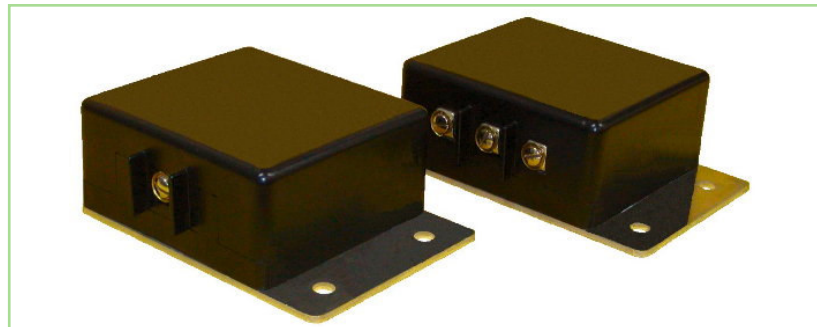
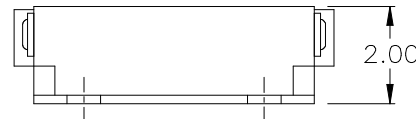
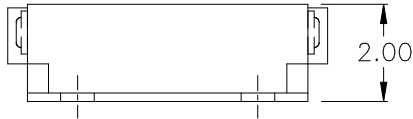
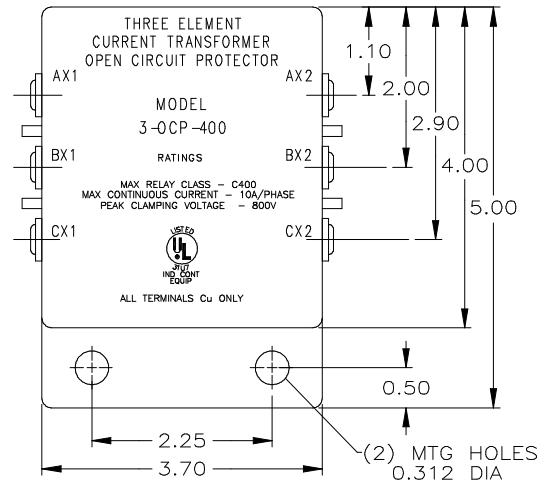
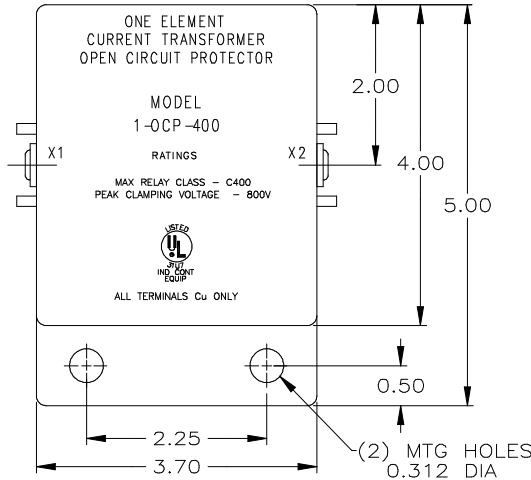
100 Amps for 2 Sec.

MAX. CONTINUOUS CURRENT:

10 Amps through one element or 7.5 Amps through all three independent elements.

TERMINALS: Copper with brass slotted pan head screws, No.8-32 x 1/4, with cupped washers.

Weight 1.2 lbs.



1 ELEMENT OPEN CIRCUIT PROTECTOR			
MODEL NUMBER	RECOMMENDED CT RELAYING CLASS	CLAMPING PEAK VOLTAGE LIMIT (V peak nom)	STANDARD RELAY BURDEN (OHM)
1-OCP-100	THRU C100	200	1
1-OCP-200	C200	400	2
1-OCP-400	C400	800	3
* 1-OCP-800	C800	1500	8

* NOT U.L. LISTED, SINGLE ELEMENT ONLY

1 ELEMENT OPEN CIRCUIT PROTECTOR			
MODEL NUMBER	RECOMMENDED CT RELAYING CLASS	CLAMPING PEAK VOLTAGE LIMIT (V peak nom)	STANDARD RELAY BURDEN (OHM)
3-OCP-100	THRU C100	200	1
3-OCP-200	C200	400	2
3-OCP-400	C400	800	4

USA, Canada, Asia, Latin America

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Fax: +1-905-201-2455

e-mail: sales.multilin@ge.com

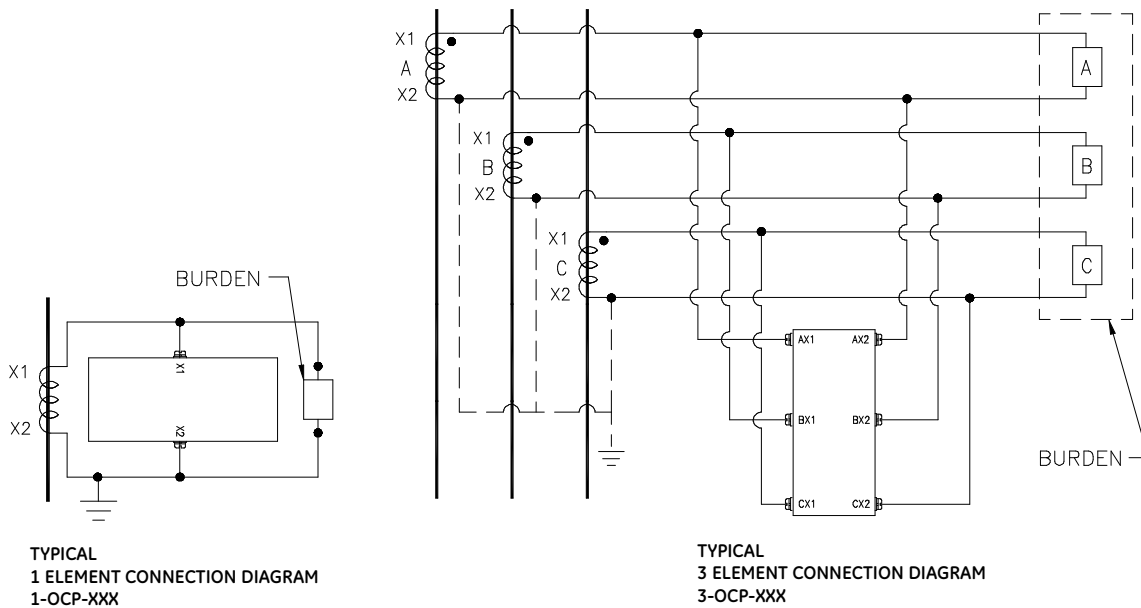
Europe, Middle East, Africa

Tel: +34-94-485-88-00

Fax: +34-94-485-88-45

e-mail: gmultilin.euro@ge.com

Model OCP



A Current Transformer secondary should never be open circuited while the Current Transformer primary circuit is energized. If this situation should occur there is a possibility of developing extremely high voltages which could be dangerous to personnel or cause an insulation breakdown.

The **OCP** series of Open Protectors are voltage sensing devices using high shunting SCR switches. When the secondary peak voltages exceeds the clamping voltage value, the SCR operates, shorting the C.T. secondary and reducing the voltage to about 2 volts in less than 1/4 cycle. This process repeats each current polarity reversal. The protection is activated each half cycle.

The three element Open Circuit Protector is Protector is provided with six terminals for connection across the secondary of the C.T.'s and parallel with burden. It can also be connected across the current terminals of a protective relay, meter, or other current operated device without affecting the operation of the device. Secondary polarity of the C.T.'s is not critical to the OCP.

The **OCP** also provides protection against high secondary voltage transients, which may damage the burden or secondary winding. If the transient voltage exceeds the voltage clamping limit, the Open Circuit Protector will trigger. After triggering, the voltage will fall to about 2 volts and remain there until the next zero crossing of the current, waveform at which time the device resets and the cycle repeats as necessary. In the transient mode of protection, triggering will occur only on the half cycle where the transient appears. The leakage current of the OCP is insignificant and will not cause a ratio or phase angle error in the Current Transformer accuracy.

Metering class C.T.'s with a rating factor of 2 could operate up to 10 amps on a continuous basis. Relaying class C.T.'s are designed to withstand short time overloads up to 20 times normal (100 amps RMS) for 2 seconds. The **OCP** is designed to tolerate both of these conditions if the burden accidentally opens.

HOW TO ORDER OPEN CIRCUIT PROTECTORS

X - OCP - XXX

Elements
1 =One Elements
3 =Three Elements

Relay Class Protection
100 = C10 Thru C100
200 = C100 Thru C200
400 = C200 Thru C400
800 = C400 Thru C800 (One Element Only)



Capacitor Trip Device Model CTD-1 & CTD-2



LISTED
IND. CONT. EQUIP.



FILE NO.
E103039

APPLICATION:

Provides a source of energy for circuit breaker and switch trip coil operation during a loss of AC control voltage.

NORMAL INPUT:

120 Volts ac,
125 Volts dc.

FREQUENCY:

DC to 400Hz.

Specifications

Max. Input Voltage:
140 Vac, 125 Vdc surge protected.

Capacitance:
330 uF, CTD-1 ± 20% @ 25°C
1500 uF, CTD-2 ± 20% @ 25°C

Available Energy (**)
4.72 joules, CTD-1
± 20% @ 25°C.

21.5 joules, CTD-2
± 20% @ 25°C.

Normal Output Voltage(**)
170 Vdc (120 Vac input)
125 Vdc (125 Vac input)

Normal Charge Time (*)
170 mSec. CTD-1
440 mSec. CTD-2

Operating Temperature Range:
-30 C to 60 C

Storage Temp Range:
-50 C to 80 C

Short Circuit Protection:
Continuous

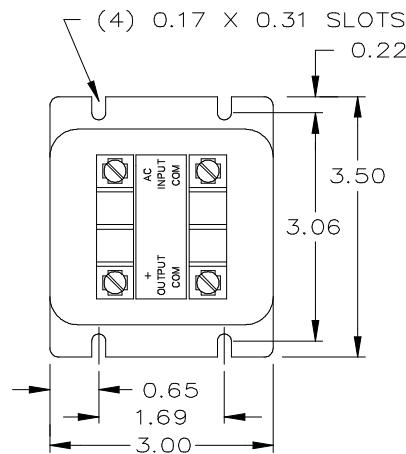
Mounting:
Vertical or horizontal

Input Surge Protection:
MOV protected to 65 joules pulse surge

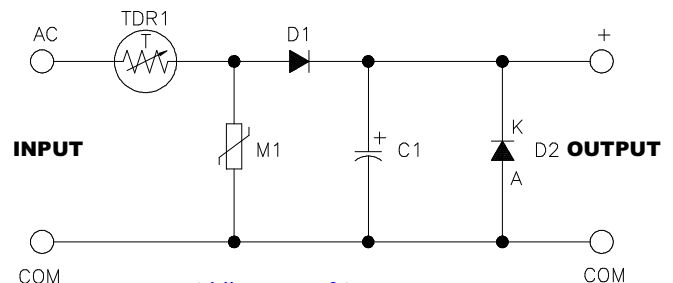
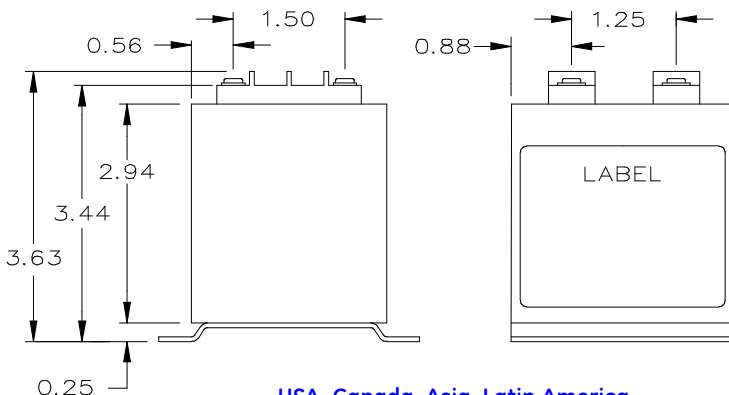
- These devices are protected against inadvertent output short circuit, inductive kickback from the trip coil, and input line voltage surges.

Nominal 120 Volts ac, or 125 Volts dc is applied between the 'AC' and 'COM' terminals. This voltage is half wave rectified and applied across the trip capacitor, giving an output trip voltage. The charge stored in this capacitor (330 uF or 1500 uF) is available between the '+' and 'COM' terminals for breaker trip coil operation. The half wave rectification circuitry provides the advantage of maintaining a common neutral connection from input while still maintaining the charge in the the trip capacitor after control power is lost.

The capacitor is continuously charged when control power is available, providing energy for normal trip coil operation. Because mechanical relays are not involved, energy for the trip coil operation is immediately available with the loss of control power. When the control power returns, the capacitor automatically charges to supply energy for the next trip coil.



- * Charge time from full discharge to 90% of max. capacitor voltage at 25°C.
- ** Trip capacitor fully charged to nominal ac input voltage.



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Capacitor Trip Device Model CTD-3



LISTED
IND. CONT. EQUIP.



FILE NO.
E103039

APPLICATION:

Provides a source of energy for circuit breaker and switch trip coil operation during a loss of AC control voltage.

NORMAL INPUT:

240 Volts ac

AMBIENT TEMPERATURE RANGE:

-30°C to +60°C

FREQUENCY:

DC to 400Hz.

Specifications

Normal Input Voltage: 240 V

Max. Input Voltage:
280 Vac

Capacitance:
330 uF ± 20% @ 25°C

Temp. Influence on cap.:
-10% @ -30°C / +5% @ +60°C

Available energy trip capacitor fully
charged at normal input voltage:
19 joules ± 20% @ 25°C

Normal Output Voltage:
338 Volts DC

Approx charge time to 90% at 60 Hz. / 25°C:
350mS

Operating Temperature Range:
-30°C to 60°C

Storage Temp Range:
-50°C to 80°C

Short Circuit Protection:
Continuous

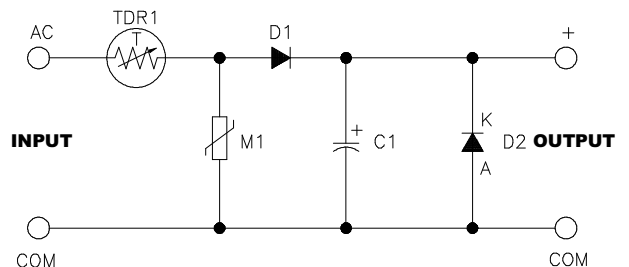
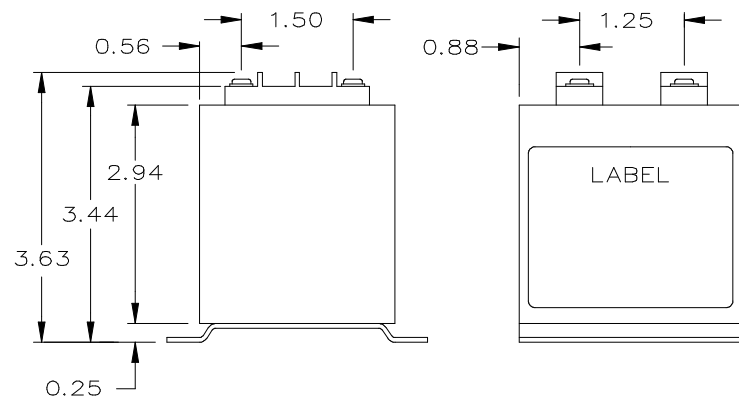
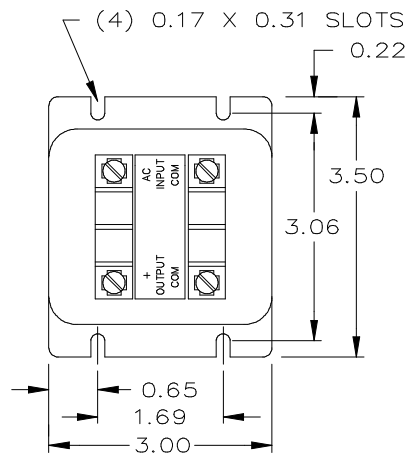
Mounting:
Vertical or horizontal

Input Surge Protection:
MOV protected to 65 joules pulse surge

- These devices are protected against inadvertent output short circuit, inductive kickback from the trip coil, and input line voltage surges. Nominal 240 Volts ac, is applied between the 'AC' and 'COM' terminals.

This voltage is half wave rectified and applied across the trip capacitor, giving an output trip voltage. The charge stored in this capacitor is available between the '+' and 'COM' terminals for breaker trip coil operation. The half wave rectification circuitry provides the advantage of maintaining a common neutral connection from input while still maintaining the charge in the trip capacitor after control power is lost.

The capacitor is continuously charged when control power is available, providing energy for normal trip coil operation. Because mechanical relays are not involved, energy for the trip coil operation is immediately available with the loss of control power. When the control power returns, the capacitor automatically charges to supply energy for the next trip coil.





Capacitor Trip Device Model CTD-4



LISTED
IND. CONT. EQUIP.



FILE NO.
E103039

APPLICATION:

Provides a source of energy for circuit breaker and switch trip coil operation during a loss of AC control voltage.

NORMAL INPUT:

120 VAC or 240 VAC

FREQUENCY:

DC to 400Hz.

Specifications

Normal Output Voltage:

CTD-4-120: 120 V,
CTD-4-240: 240 V

Max. Input Voltage:

CTD-4-120: 140Vac, CTD-4-240: 280Vac

Available energy trip capacitor fully charged at normal input voltage:

CTD-4-120: 64 joules ± 20% @ 25°C
CTD-4-240: 57 joules ± 20% @ 25°C

Normal Output Voltage:

CTD-4-120: 169 Volts DC,
CTD-4-240: 338 Volts DC

Approx charge time to 90% at 25°C

CTD-4-120: 1.4S, CTD-4-240: 570mS

Capacitance:

CTD-4-120: 4500 uF ±20% @ 25°C
CTD-4-240: 990 uF ± 20% @ 25°C

Temp. influence on cap.:

-10% @ -30°C / +5% @ +60°C

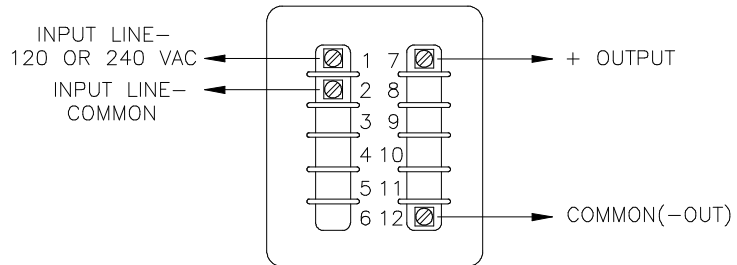
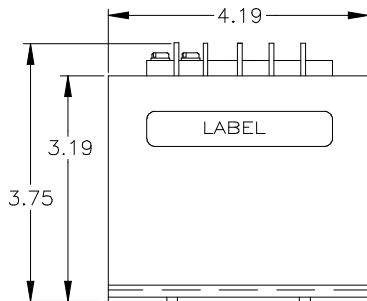
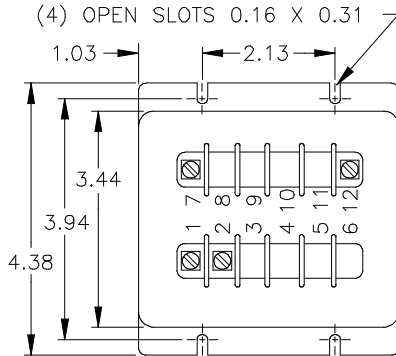
Operating temperature range:
-30°C to 60°C

Storage temp range:
-50°C to 80°C

Short Circuit Protection:
Continuous

Mounting:
Vertical or horizontal

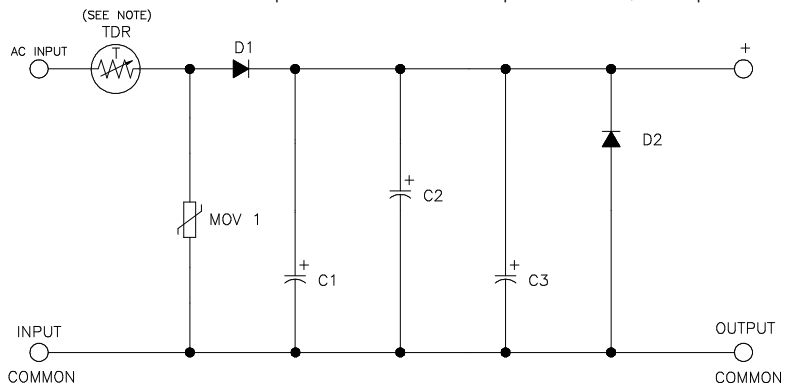
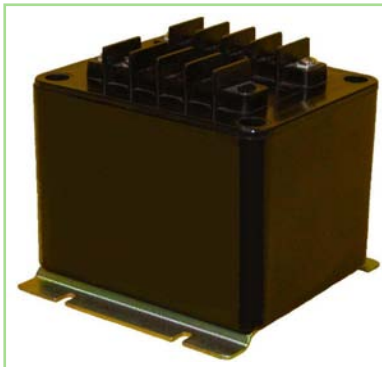
Input Surge Protection:
MOV protected to 65 joules pulse surge



- These devices are protected against inadvertent output short circuit, inductive kickback from the trip coil, and input line voltage surges.

Nominal 120 Volts ac, or 240 Volts ac is applied between the "INPUT" and "COMMON" terminals. This voltage is half wave rectified and applied across the trip capacitor, giving an output trip voltage. The charge stored in these capacitors is available between the '+' and "COMMON" terminals for breaker trip coil operation. The half wave rectification circuitry provides the advantage of maintaining a common neutral connection from input while still maintaining the charge in the the trip capacitor after control power is lost.

The capacitor is continuously charged when control power is available, providing energy for normal trip coil operation. Because mechanical relays are not involved, energy for the trip coil operation is immediately available with the loss of control power. When the control power returns, the capacitor automatically charges to supply energy for the next trip coil.



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Capacitor Trip Device Model CTD-5

APPLICATION:

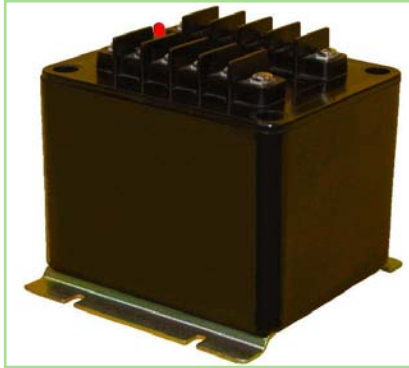
Provides a source of energy for circuit breaker and switch trip coil operation during a loss of AC control voltage.

NORMAL INPUT:

120/240 Volts ac.

FREQUENCY:

DC to 400Hz.



Specifications

Normal Output Voltage:

CTD-5-120: 120 V,
CTD-5-240: 240 V

Max. Input Voltage:

CTD-5-120: 132 Vac,
CTD-5-240: 264 Vac

Available Energy:

CTD-5-120: 64 joules
CTD-5-240: 57 joules

Normal Output Voltage:

CTD-5-120: 169 Volts DC,
CTD-5-240: 338 Volts DC

Approx charge time to 90% at 25°C

CTD-5-120: 1.4S,
CTD-5-240: 570ms

Capacitance:

CTD-5-120: 4500 uF ± 20% @ 25°C
CTD-5-240: 990 uF ± 20% @ 25°C

Temp. influence on cap.:

-10% @ -30°C / +5% @ +60°C

Operating temperature range:

-30°C to 60°C

Storage temp range:

-50°C to 80°C

Short Circuit Protection:

Continuous

Mounting:

Vertical or horizontal

Input Surge Protection:

MOV protected to 65 joules pulse surge

Output contact rating:

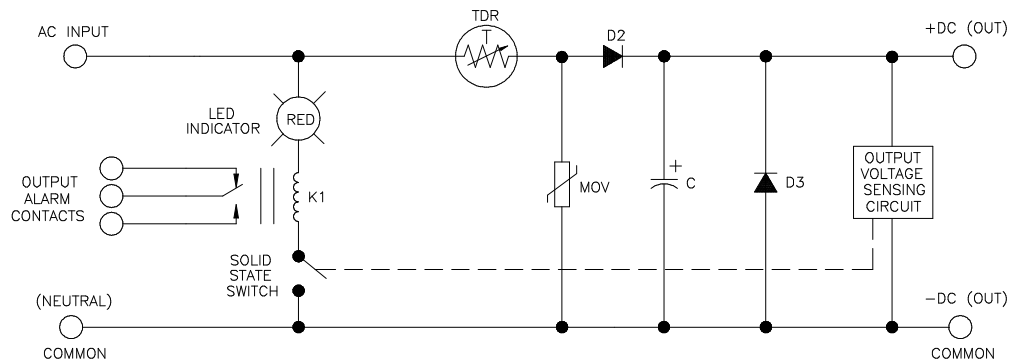
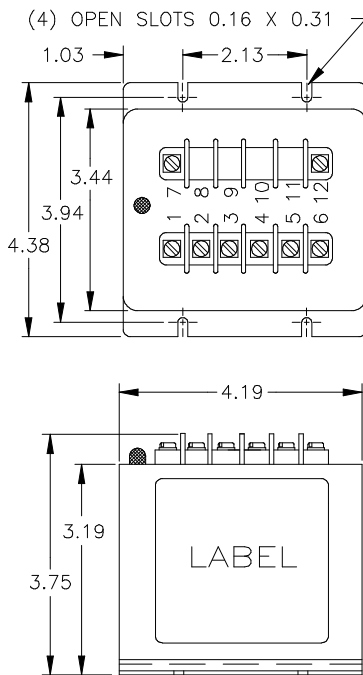
Resistive: 5A, 250VAC 5A, 30VDC

Inductive:

2A, 250VAC 3A, 30VDC

1/6HP 120 VAC,

1/3HP, 240VAC



- These devices are protected against inadvertent output short circuit, inductive kickback from the trip coil, and input line voltage surges.

Nominal 120 Volts ac , or 240 Volts ac is applied between the " INPUT " and " COMMON " terminals. This voltage is half wave rectified and applied across the trip capacitor, giving an output trip voltage. The charge stored in these capacitors is available between the '+' and " COMMON " terminals for breaker trip coil operation. The half wave rectification circuitry provides the advantage of maintaining a common neutral connection from input while still maintaining the charge in the the trip capacitor after control power is lost.

The capacitor is continuously charged when control power is available, providing energy for normal trip coil operation. Energy for the trip coil operation is immediately available with the loss of control power. When the control power returns, the capacitor automatically charges to supply energy for the next trip coil.

An alarm relay is incorporated to continuously monitor the input and output condition of the device. The relay is normally energy when both input and output voltage are present. If either the input voltage is lost or the output voltage falls below 85% of the normal output level the output alarm contacts transfer to their de-energized status state. LED indicates normal operation. The LED goes out when the alarm contacts transfer to their de-energized state.

NOTES:

1. The output contacts are shown in the de-energized condition. Contacts will pick up when input and output voltage is present. If the output DC voltage drops below 85% of the expected operating level or the input voltage is lost, then the contacts will change state and the LED inductor will no longer illuminate.
2. TDR is temperature dependent resistor.



Capacitor Trip Device Model CTDA-6

APPLICATION:

Provides a source of energy for circuit breaker in the event of a power loss.

Tripping power is available immediately upon energization before capacitors charged.

NORMAL INPUT:

120/240 Volts ac.



Specifications

Max. Input Voltage:
2 Va burden continuous
2 Va burden continuous

Available Energy:
CTDA-6-120: 64 joules
CTDA-6-240: 57 joules

Normal Output Voltage:
CTDA-6-120: 169 Vdc
CTDA-6-240: 340Vdc

Capacitance:
CTDA-6-120: 4500 uF ± 20%
CTDA-6-240: 990 uF ± 20%

Approx charge time to 90% at 60Hz. is 8 seconds.

Operating temperature range:
-30°C to 60°C

Storage temp range:
-50°C to 80°C

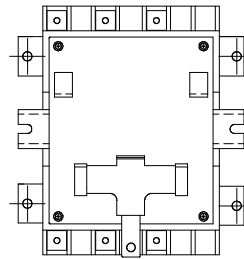
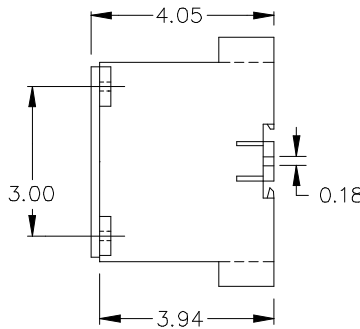
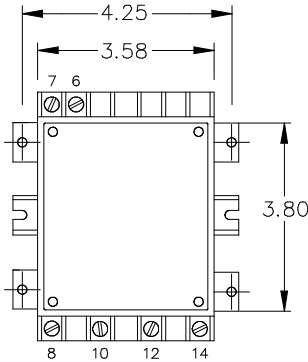
Short Circuit Protection:
Continuous

Mounting:
Vertical or horizontal

Input Surge Protection:
MOV protected to 65 joules pulse surge

• The Capacitor Trip Device (CTDA-6) is used to trip circuit breakers and lock out relay when a battery standby source is not available to provide circuit breaker trip power. The CTDA-6 converts ac buss voltage to dc voltage and stores enough energy to operate a lock out relay or trip a circuit breaker. Voltage is available from the ac power supply for tripping immediately upon ac power up. The capacitors charge time is approximately 8 seconds, but full wave bridge rectifier power from the ac line is available immediately for use. Capacitor charge current is limited to protect the control power system from a large current in rush. This feature allows the use of many CTDA-6 units from the same control power voltage source without coordination problems. Additionally, the CTDA-6 is self-protected from short circuit damage on the output. Nominal ac voltage is applied across terminals #8 and # 10. This voltage is full wave bridge rectified and applied across the trip capacitors producing a steady state output trip voltage. The charge stored in these capacitors is available across terminals #12 (positive) and # 14 (negative). Charging time: 8 seconds, 0 to 90% of nominal output voltage, 60 hertz. Operating temperature: -30 deg C to +60 deg C * Electrical specifications are 25 deg C.

Notice: Ac power must be applied continually for minimum of 2 hours before the CTDA-6 is capable of developing full charge on the output capacitors with sustained interruption in ac input. The CTDA-6 capacitor trip device is not intended for ac dc power supply. The self-protecting feature of the unit will severely limit the continuous output current and voltage.

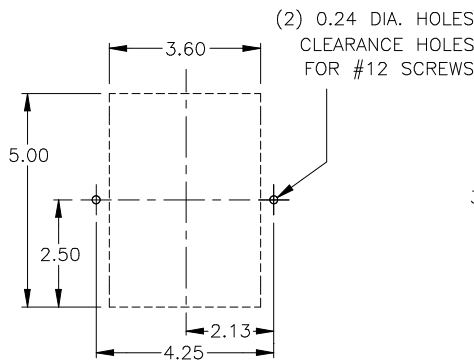


Servicing:

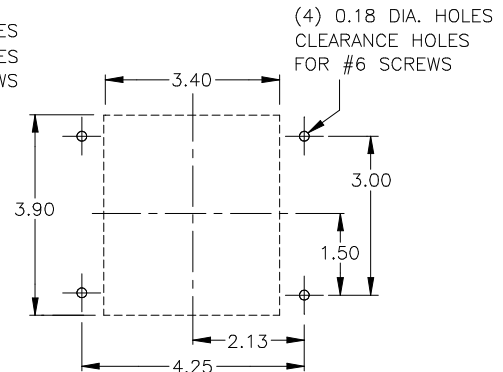
1. Remove the AC control voltage.
2. Discharge the Capacitor trip device. (A5-watt resistor of approximately 1000 ohms across Terminal #12 and #14 can be used for this purpose).

Danger!

Lethal voltages are present qualified persons should install, operate, and service this device.



PANEL MOUNTING LAYOUT



DOOR MOUNTING LAYOUT

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Capacitor Trip Device With Battery Back-Up Model CTDB-6



LISTED
IND. CONT. EQUIP.



FILE NO.
E103039

APPLICATION:

Provides a source of energy for circuit breaker and switch trip coil operation during a loss of AC control voltage.

Tripping power is available immediately upon energization before capacitors charged.

FREQUENCY:

50/ 60 Hz.o 400Hz.

NORMAL INPUT:

120/240 Volts ac.



Specifications

Max. Input Voltage:
2 Va burden continuous
2 Va burden continuous

Available Energy:
CTDB-6-120: 64 joules
CTDB-6-240: 57 joules

Normal Output Voltage:
CTDB-6-120: 169 Vdc
CTD-6-240: 340Vdc

Capacitance:
CTDB-6-120: 4500 uF ± 20%
CTDB-6-240: 990 uF± 20%

Operating temperature range:
-30°C to 60°C

Storage temp range:
-50°C to 80°C

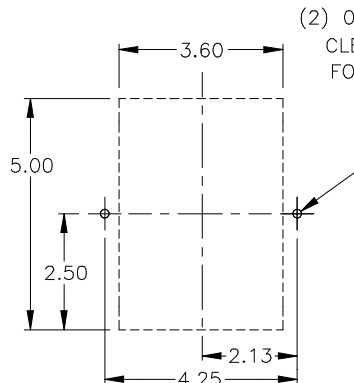
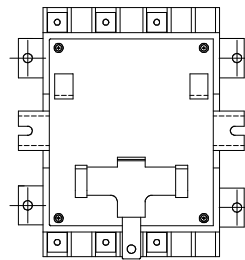
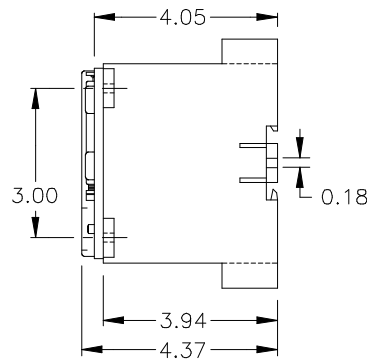
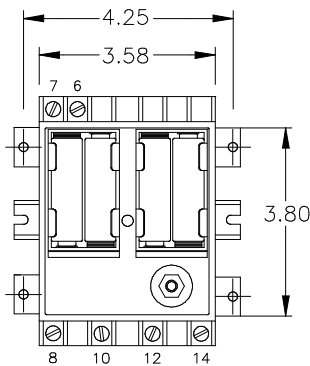
Short Circuit Protection:
Continuous

Mounting:
Vertical or horizontal

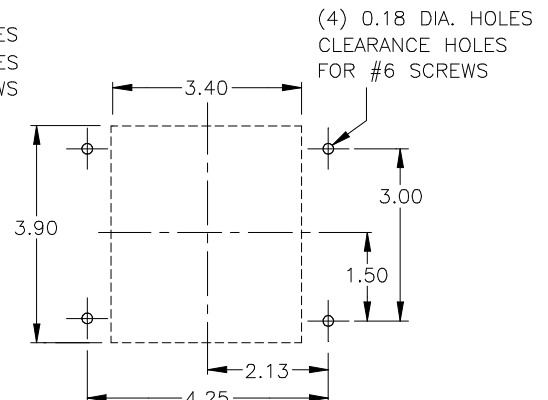
Input Surge Protection:
MOV protected to 65 joules pulse surge

• The Automatic Charging Trip Device (CTDB-6) is used to trip circuit breakers and lock out relay when a battery or standby source is not available to provide circuit breaker trip power. The CTDB-6 converts ac bus voltage to dc voltage and stores enough energy to operate a lock out relay or trip a circuit breaker, often more than once. The CTDB-6, when fully charged, will maintain a charge for a minimum of 3 days after the ac power has been interrupted. In normal operation, the batteries are trickle charged from the ac voltage source. Voltage is available from the ac power supply for tripping immediately upon ac voltage power up. Capacitors do not need to be charged to have tripping voltage available on the output of the device, this is because the output is automatically fed from the full wave bridge rectified ac signal or the charged capacitors, which ever is greater. Capacitor charge current is limited to protect the control power system from a large current in-rush. this feature allows the use of many CTDB-6 units from the same control power voltage source without coordination problems. Additionally, the CTDB-6 is self-protected from short circuit damage on the output. Batteries: 4 - rechargeable 1.2 volt Ni-Cad Cells * Electrical specifications are at 25 deg C

Notice: Ac power must be applied continually for minimum of 2 hours before the CTDB-6 is capable of developing full charge on the capacitors with a sustained interruption in ac input. It is highly recommended that batteries be fully charged before installing into the CTDB-6. The CTDB-6 is designed to trickle charge the batteries to hold a charge indefinitely, but the CTDB-6 trickle charge circuit can take as long as 48 hours to charge batteries that are completely discharged. The CTDB-6 capacitor trip device is not intended for use as a dc power supply. The self protecting feature of the unit will severely limit the continuous output current and voltage.



PANEL MOUNTING LAYOUT



DOOR MOUNTING LAYOUT

Servicing: See Next Page

Danger!
Lethal voltages are present qualified persons should install, operate, and service this device.

Operation:

Nominal ac volts is applied across terminals #8 and #10. This voltage is full wave bridge rectified and applied across the trip capacitors producing a steady state output trip voltage. The charge stored in these capacitor is available across terminals # 12 (positive) and #14 (negative).

A battery operated oscillator circuit will maintain the charge on the capacitors for a minimum period of 3 days provided that terminals #6 is connected to terminal #7 and the batteries are fully charged. Terminals #6 and #7 can be connected with a normally open relay contact operated by the ac power supply so that the oscillator is activated upon power failure. The batteries charge continuously when power applied to the circuit. Since batteries can take up to 48 hours to charge while installed in the CTDB-6, we recommended that fully charged batteries be installed in the CTDB-6 unit prior to putting the unit into service.

A push button and led indicator are used to determine if the CTDB-6 is operationally ready. When the button on the front panel is pushed, the LED will illuminate if the Capacitor has minimum charge of 90 Vdc for the CTDB-6-120, and 200 Vdc for the CTDB-6-240. The push button should only be pressed long enough to observe the illumination of the LED. The push button and LED does not indicate the present of ac voltage.

Servicing:

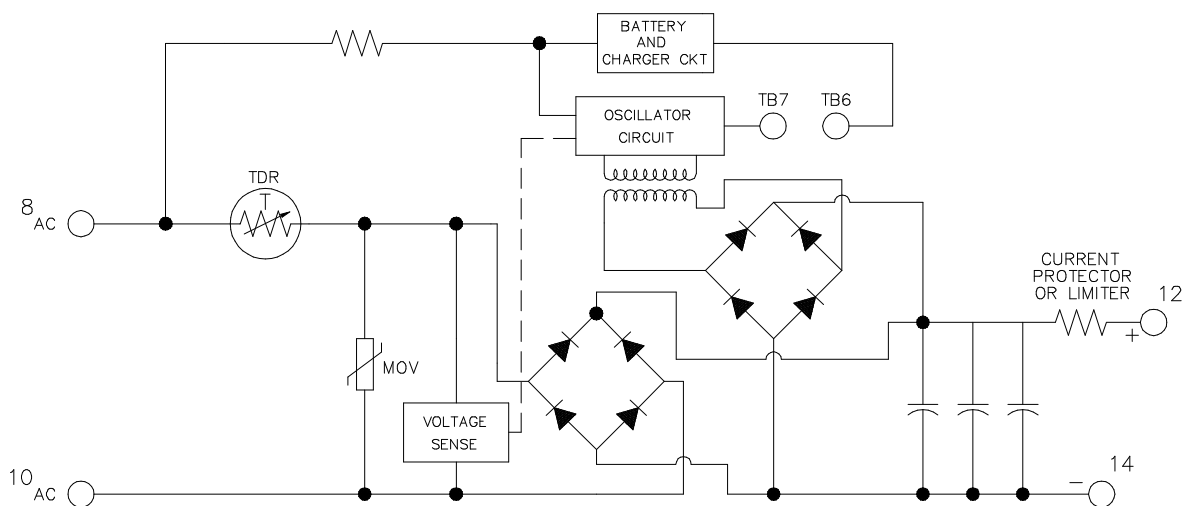
Never remove the clear plastic cover without this discharge procedure:

1. Remove the 120 Vac control power.
2. Remove the jumper, or open the relay contact, across terminals #6 and #7.
3. Discharge the capacitor trip device. (A 5 watt resistor of approximately 500 ohms across Terminal #12 and #14 can be used for this purpose)

Replace the 4 rechargeable 1.2 Volt Ni-Cad Cells according the battery manufactures recommended schedule. Never attempt to change batteries without following the discharge produce. Battery terminals voltages are not isolated from the control and trip power.

The CTDB-6 unit will recharge itself if terminals #6 and #7 remain shorted! Follow the discharge procedure prior to any service or maintenance of the CTDB-6 unit or trip system.

CTDB-6 Panel Layout



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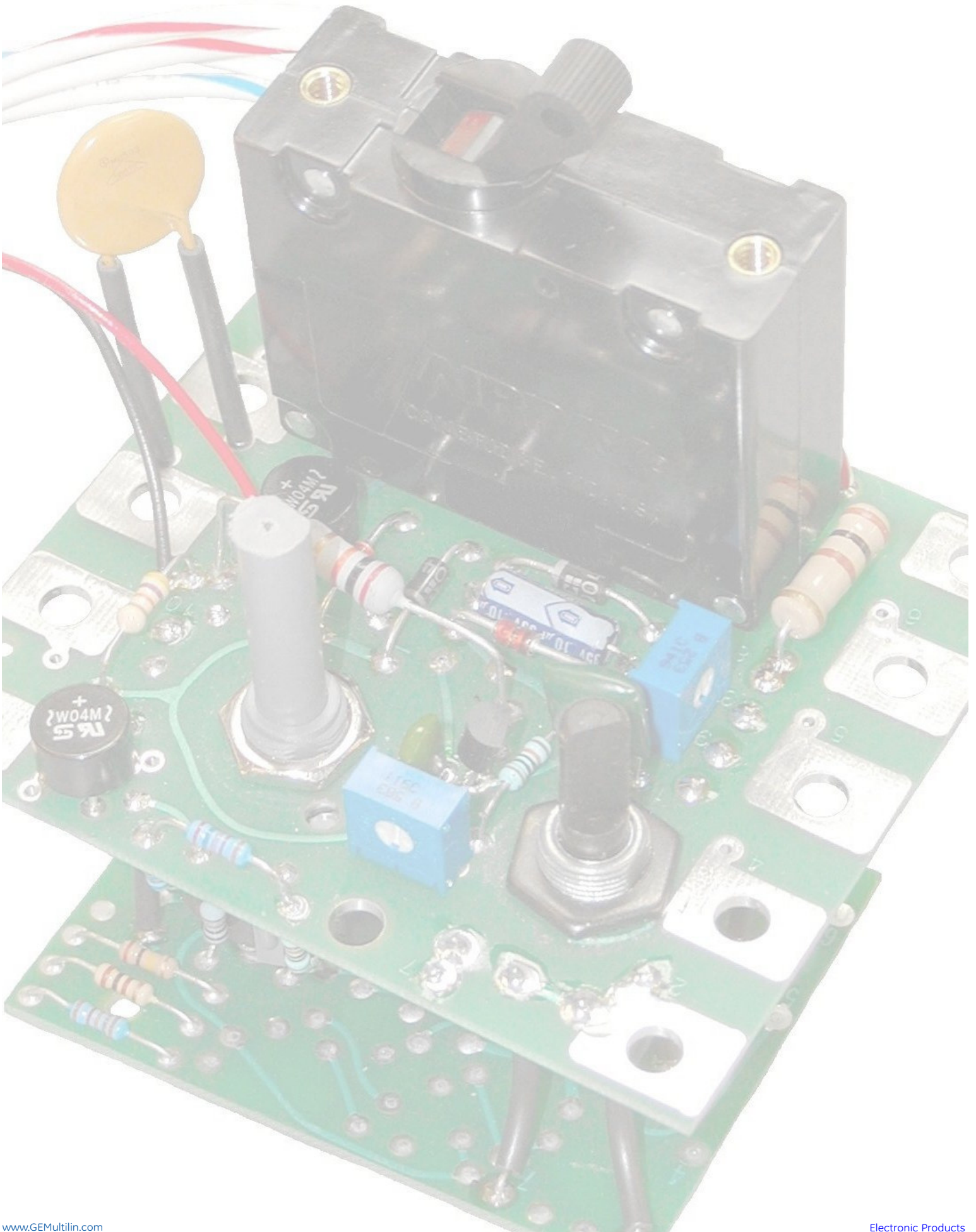
e-mail: sales.multilin@ge.com

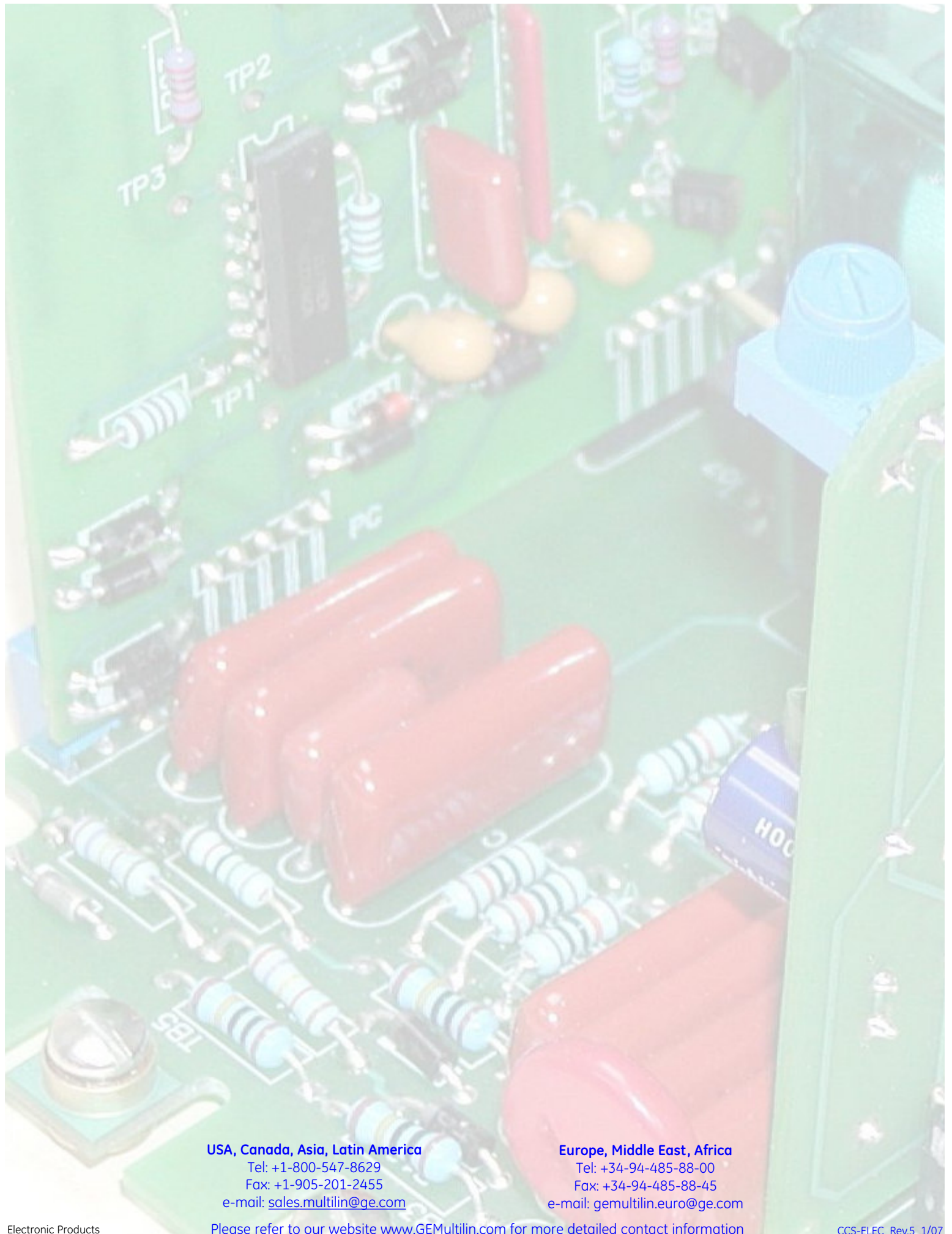
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