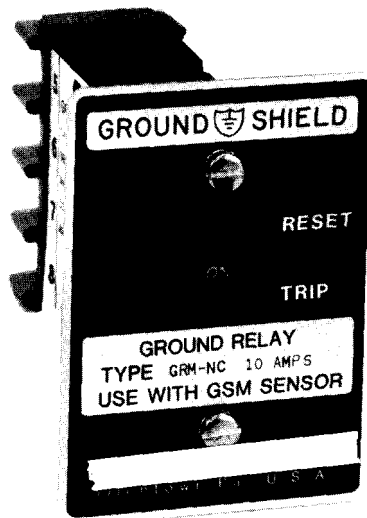




I N S T R U C T I O N S

Ground Fault Protection System

TYPE GRM GROUND FAULT RELAY
TYPE GSM GROUND FAULT SENSOR



APPLICATION

The ABB Ground-Shield™ Type GRM/GSM Ground Fault Relay System offers fast, sensitive, economical ground fault protection for individual loads. The system consists of a special small diameter current transformer (sensor), and a mechanically latched relay that operates instantaneously on a ground fault. The ground sensor encircles all phase conductors (and neutral if supplied), and provides an output to the ground relay when a ground fault occurs. The system has a sensitivity of approximately 10 amperes primary ground fault current. The sensor and relay system will withstand momentary fault currents of 25,000 amperes without damage.

Type GRM/GSM relay systems are intended primarily for protection of three-phase motors approximately 50HP and below in size, as shown in Figures 3 and 4. They can also be used to protect single-phase or three-phase ~~heater, lighting,~~ or similar loads against ground faults, with some typical arrangements shown in Figure 5.

Application to circuits is independent of circuit current rating. The sensor is selected by the physical opening necessary to accommodate the conductors. The relay is selected based on the type of output contact required. The Type GRM-NC provides a normally-closed contact which opens on a ground fault. This relay would typically be used with motor starters or contactors to open the holding coil circuit. The Type GRM-FC provides SPDT contacts. The normally-open contact would typically be used to actuate the shunt trip coil of a molded case circuit breaker.

Catalog Numbers: Type GRM-NC: 202E0413; Type GRM-FC: 202E0414.

For motors larger than 50 HP, a relay with adjustable pickup current and adjustable time delay, such as the Type GRC or Type GKC, is generally recommended.

RECEIVING, HANDLING, STORAGE

Upon receipt of the Ground-Shield system (when not included as part of a switchboard) examine for shipping damage. If damage or loss is evident, file a claim at once and also notify your ABB sales office. Use normal care in handling to avoid mechanical damage. Keep clean and dry.

INSTALLATION

Mounting:

Use only Type GSM sensors with Type GRM relays. Sensor dimensions are shown in Fig 1.

The sensor should be mounted so as to enclose all phase conductors and the insulated neutral conductor if present (but not the ground conductor). The sensor should be mounted in such a manner that will not put undue stress on the mounting bushings or mounting feet. Best performance is obtained when the conductors are bundled together and centered in the sensor window.

Phase and neutral conductors or loads must not be grounded on the load side of the ground sensor.

The secondary winding of the GSM ground sensor should be short circuited if the relay is not connected, for example during construction or maintenance periods. This will prevent the presence of high output voltages if a ground should occur on the system.

The relay should be mounted in a location where the reset handle is visible and can be reached safely by the operator. Relay mounting dimensions are shown in Figure 2 with the drilling for panel mounting. A metal handle-guard is provided with every relay, and should be used if the handle might be subjected to accidental bumping. An optional mounting bracket, part number 608826-T3 is available; see outline, Figure 8.

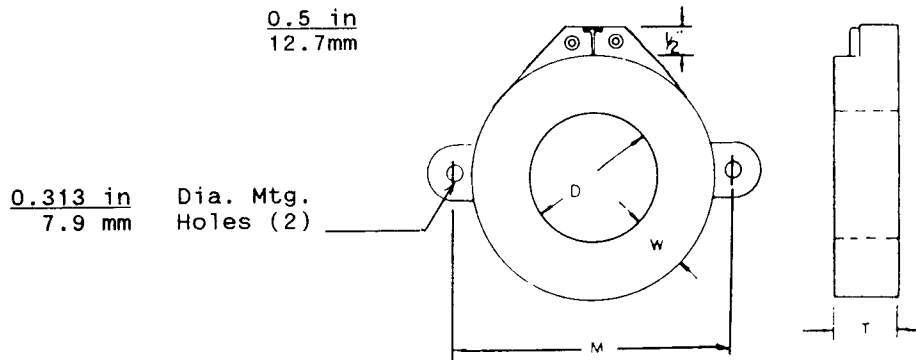
Shielded Cable: when mounting a ground sensor over shielded cable, certain precautions must be observed to insure proper relay operation on a ground fault. The shielding tape must be connected to ground at a point after it passes through the sensor window (on the motor side). If a ground wire is attached to the shield on the source side of the sensor, it must be brought back through the sensor window before being connected to the ground bus. See the diagram labelled "3 Phase Motor" in Figure 5.

Secondary and Control Connections:

Typical wiring diagrams for motor applications are given in Figures 3 and 4. Connections from the sensor to the relay should be at least #16 AWG wire and no more than 300 circuit feet in length. The jumper bar on the rear terminals of the relay must be positioned depending on the particular type GSM sensor being used - refer to note 2 under Figures 3 and 4 for details.

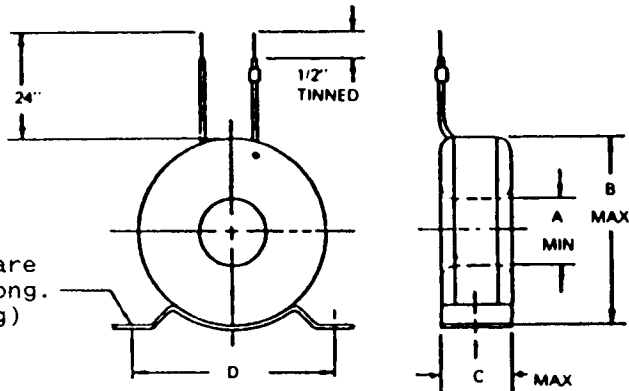
SPECIFICATIONS

Sensitivity: 10 Amperes rms (+/-25%); with GSM-3 sensor, 16 Amperes maximum.
 Operating Time: Instantaneous, no intentional delay. (0.016 sec @ 20A typical)
 Momentary Withstand: 25000 Amperes rms.
 Output Contact Ratings: At 250 Vac, 10 Amperes make and break.
 At 125 Vdc, 10 Amperes make, 0.3A break inductive.
 Operation Indicator: Provided by position of reset handle.
 Type GSM Sensor Ratio: 80:1



Type	Catalog Number	D		M		W		T	
		in	mm	in	mm	in	mm	in	mm
GSM-1	302C0200	2.125	54	5.063	128.6	1.125	29	1.875	47.6
GSM-2	302H0300	3.125	79	6.0	152.4	1.125	29	1.875	47.6
GSM-3	302C0400	4.125	105	7.5	190.5	1.125	29	1.875	47.6

Connection Leads are 24in. (610mm) long.
 Tinned ends are 0.5in. (13mm).



(2) Mounting feet holes are slots 0.25in x 0.375in long. (6.3mm x 9.5mm long)

Type	Catalog Number	A		B		C		D	
		in	mm	in	mm	in	mm	in	mm
GSM-4	302E0150	1.5	38	4.25	108	1.12	29	3.88	98.6
GSM-5	302E0250	2.5	63	5.31	135	1.38	35	3.88	98.6

Figure 1: Dimensions of Type GSM Ground Sensors

CAUTION: sensors are 600V class devices. Follow air and surface clearance requirements of electrical equipment designs.

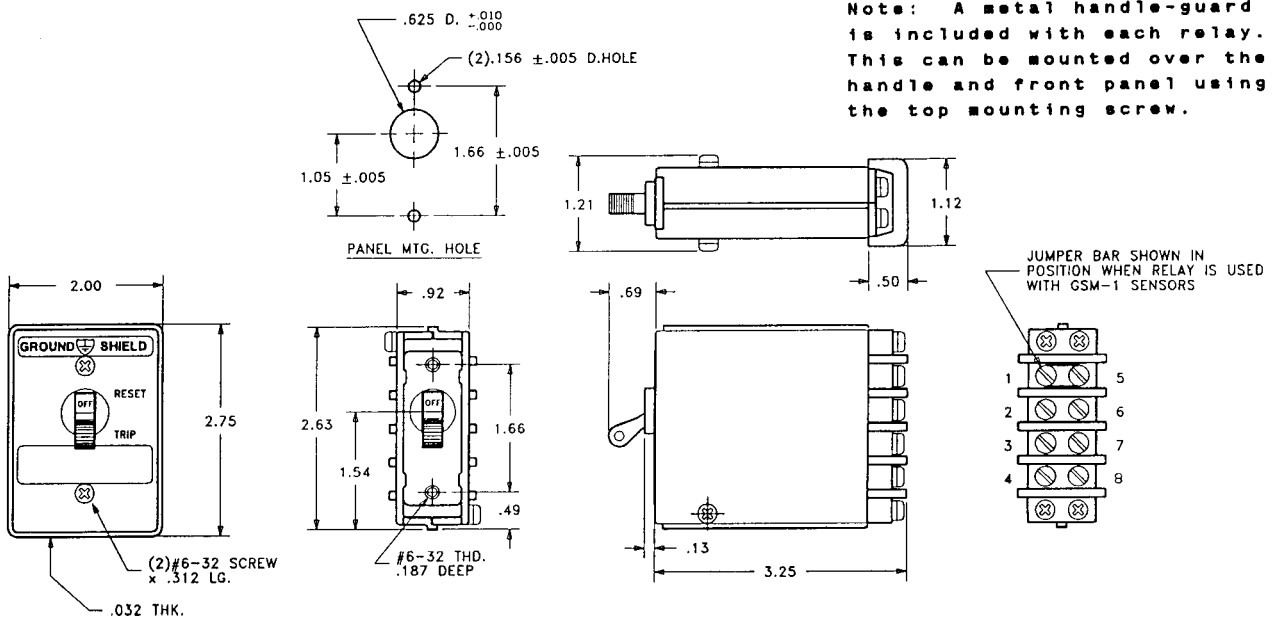


Figure 2: Relay Outline and Panel Drilling - Type GRM

Note: Dimensions shown are in inches. A metric conversion table for this figure is given on page 7.

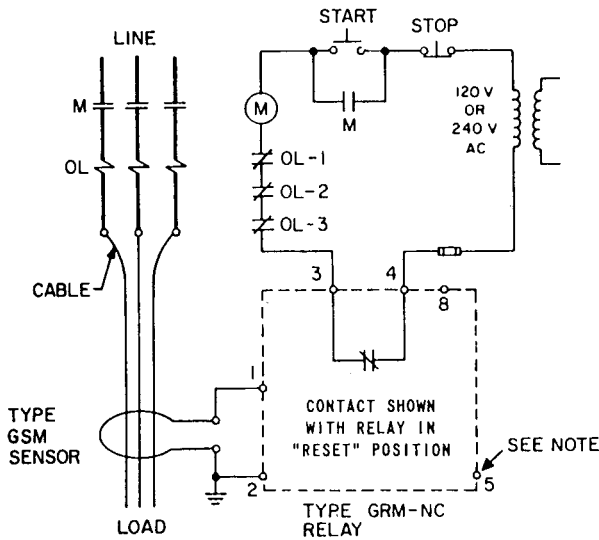


Figure 3: Typical Connections

Type GRM-NC Applied to a Motor Starter

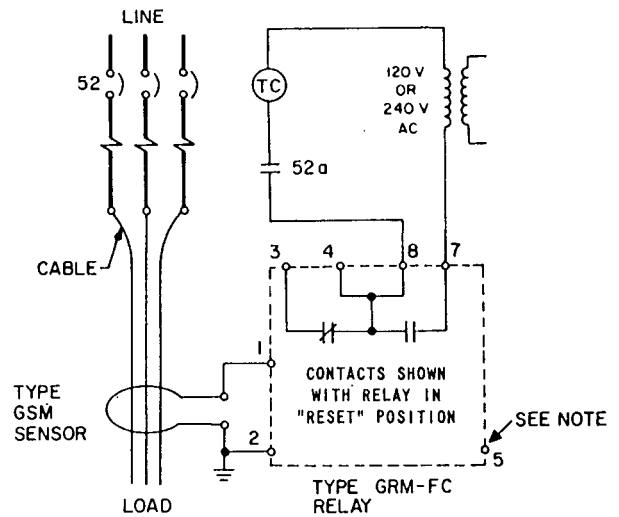


Figure 4: Typical Connections

Type GRM-FC Applied to Trip a Circuit Breaker

Important Notes:

1. Use Type GRM relays only with Type GSM sensors.
2. Jumper bar on rear terminals of the relay must be connected across terminals 1 and 5 when the type GSM-1 sensor is used. For all other sensors, the bar should be placed across terminals 4 and 8.
3. Phase and neutral conductors must not be grounded on the load side of the ground sensor.

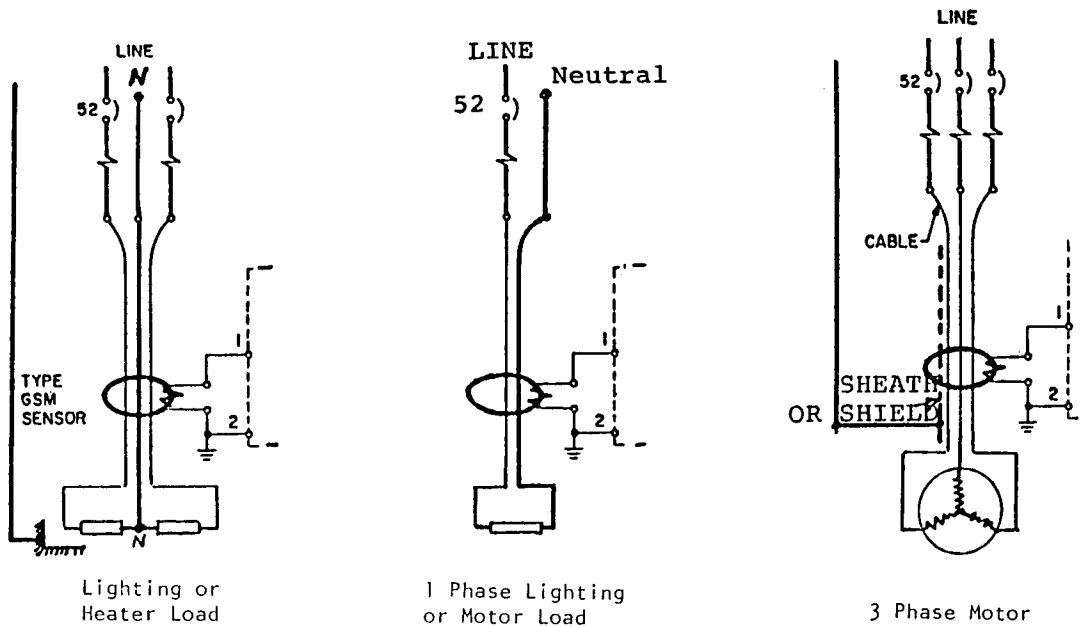
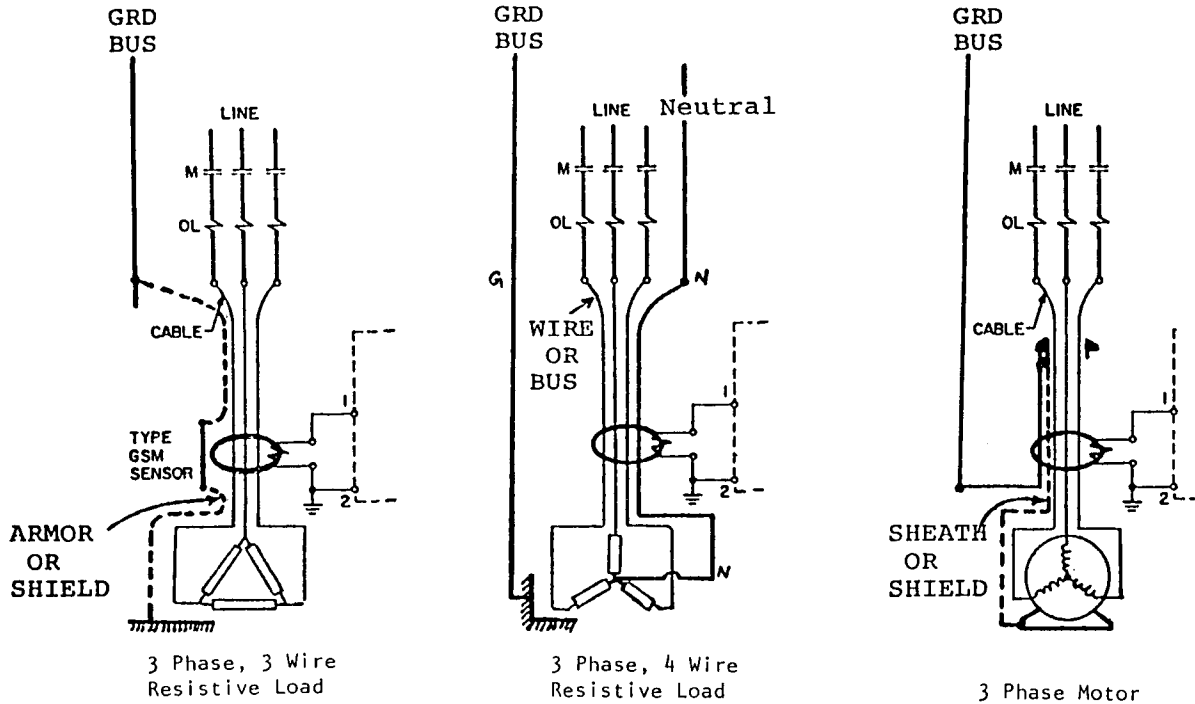


Figure 5: Typical Ground Fault Protection Schemes

Notes:

1. System neutral-to-ground connection must be on source side of ground sensor.
2. Equipment grounding conductors shall not be run through the sensor.
3. Use only Type GSM sensors with the Type GRM ground fault relay.
4. Sensors are 600v class devices. Follow air and surface clearance requirements of electrical equipment designs.

TESTING

1. MAINTENANCE AND RENEWAL PARTS

No maintenance is possible on the Type GRM relay system. Periodic tests are recommended to confirm proper operation. Should a relay be found to be inoperative it should be replaced.

CAUTION: since testing and troubleshooting entails working with energized equipment, caution should be taken to avoid personal shock. Only competent technicians familiar with good safety practices should service these devices.

2. OPERATION INDICATOR

The reset handle of the Type GRM relay also serves as an operation indicator. To reset after a ground fault trip, move the switch handle to the upward position.

3. OPERATIONAL TESTS

Periodic tests are recommended to confirm the proper functioning of the system. One of the following procedures can be used.

Mounted in Switchgear:

Tests should be made with the main circuit de-energized.

1. Move the relay handle to the reset position.
2. Insert a test wire through the current sensor window.
3. Apply control power to the contactor holding-coil circuit or the circuit breaker trip circuit.
4. Apply 20 amperes through the test wire. The relay should operate to drop out the contactor or to trip the circuit breaker. Immediately return the test current to zero after a trip operation.

If no trip operation takes place, interrupt the test current immediately and then check the wiring between the sensor and the relay.

If the relay operated but did not trip the contactor or circuit breaker, check the control circuit wiring.

5. Reset the relay handle before repeating a test.

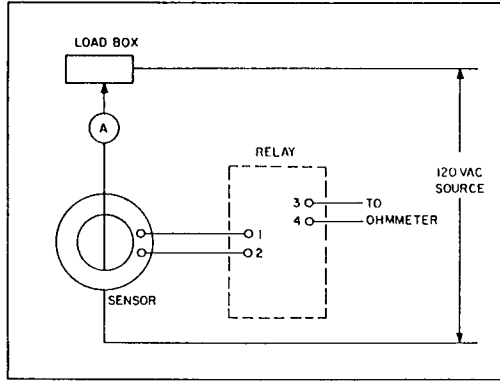
Bench Testing - (without contactor or circuit breaker):

1. Connect relay and sensor as shown in Fig. 6 (GRM-NC), or Fig. 7 (GRM-FC).
2. Move relay handle to the reset position.
3. Increase the primary test current until the relay operates. The current to cause operation should be 7.5-12.5 amperes (except if sensor GSM-3 catalog 302C0400 is used, in which case the maximum value is 16 amperes).

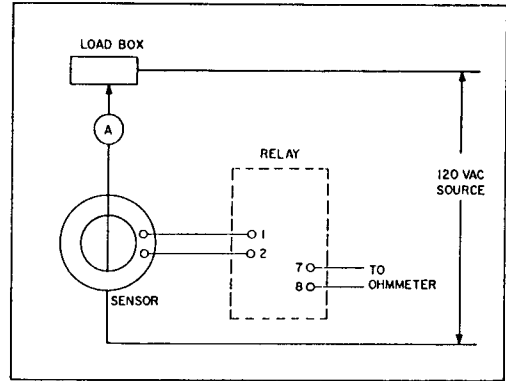
Immediately interrupt the test current upon relay operation.

Output contact change of state should be monitored with an ohmmeter.

4. Reset relay handle before repeating a test.



RELAY HANDLE POSITION
RESET
TRIP
CONTACT 3-4
CLOSED
OPEN



RELAY HANDLE POSITION
RESET
TRIP
CONTACT 7-8
OPEN
CLOSED

Figure 6: Typical Test Connections
Type GRM-NC Relay and GSM Sensor

Figure 7: Typical Test Connections
Type GRM-FC Relay and GSM Sensor

Metric Conversions for Figure 2:

inches	mm	inches	mm	inches	mm	inches	mm
.032	0.8	.49	12.5	1.05	26.7	2.00	50.8
.13	3.3	.50	12.7	1.12	28.5	2.63	66.8
.156	4.0	.625	15.9	1.21	30.7	2.75	69.9
.187	4.8	.69	17.5	1.54	39.1	3.25	82.6
.312	7.9	.92	23.4	1.66	42.2		

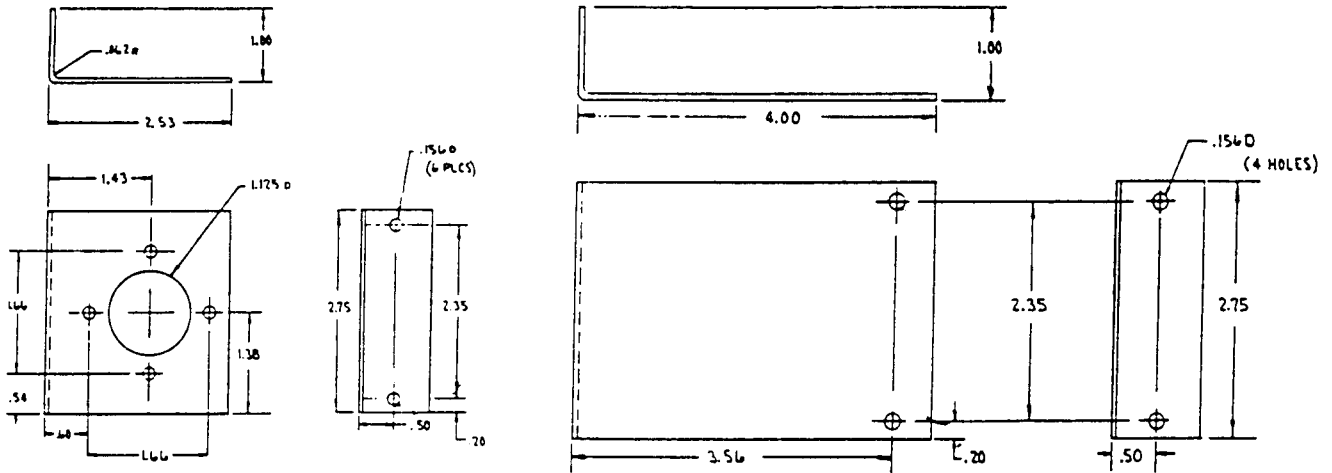


Figure 8: Outline - Optional Mounting Bracket for Type GRM

Note: this mounting bracket is available for use when the GRM relay will not be panel mounted. Order part number 608826-T3.

Metric conversions for Figure 8:

inches	mm	inches	mm	inches	mm	inches	mm
.156	4.0	.60	15.2	1.38	35.1	2.75	69.9
.20	5.1	.62	15.7	1.43	36.3	3.56	90.4
.50	12.7	1.00	15.4	1.66	42.2	4.00	101.6
.54	13.7	1.125	28.6	2.35	59.7		