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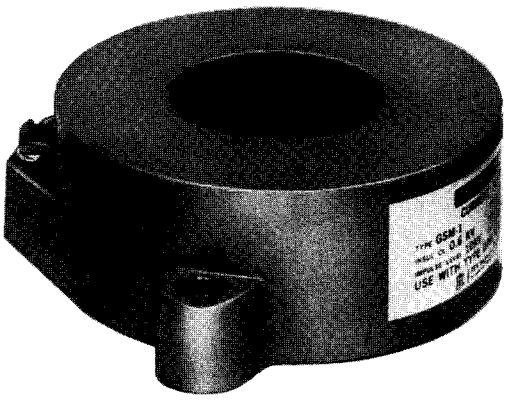
ISSUE B

GROUND PROTECTION SYSTEMS

INSTRUCTIONS

GROUND-SHIELD™
GROUND FAULT PROTECTIVE SYSTEM

TYPES GRM-NC AND GRM-FC (10 AMPERES)



I-T-E Imperial Corporation

INSTRUCTIONS FOR GROUND-SHIELD GROUND FAULT PROTECTIVE SYSTEM TYPES GRM-NC AND GRM-FC (10 AMPERES)

APPLICATION

The GRM-NC ground fault protective system provides fast sensitive protection against all ground faults on motor starter and contactor circuits in grounded electrical distribution systems. The system consists of a special current transformer which is called a ground sensor and an instantaneous ground relay. The ground sensor encircles all phase conductors, and provides an output to the ground relay when a ground fault occurs in the circuit. The normally closed contact of the ground relay opens the contactor holding coil circuit. The contactor drops out interrupting the fault.

The GRM-FC system provides fast sensitive protection against all ground faults on grounded electrical distribution systems using molded case circuit breakers (with shunt trip). The system consists of a ground sensor and an instantaneous ground relay. The ground sensor encircles all phase conductors and the neutral conductor if supplied, and provides an output to the ground relay when a ground fault takes place. The ground relay normally open contact closes to energize the shunt trip device on the breaker.

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 promptly notify the nearest I-T-E Imperial Corporation Sales Office. Use normal care in handling to avoid mechanical damage.

MAINTENANCE AND RENEWAL PARTS

No maintenance is required on the GROUND-SHIELD system. Should the relay be damaged physically or electrically due to improper connections or application, it is recommended that a new relay be ordered from the factory. When ordering the relay, state the type relay, catalog number, and serial number of the relay.

SIZE AND RATING

Application to circuits is independent of circuit current rating. Sensors are selected by physical opening necessary to accommodate conductors.

Relays are selected according to the application for the protection of starter-contactor circuits (normally closed contacts) or molded-case breaker circuits (normally open contacts).

The sensor and relay system operates with no intentional time delay for all ground fault currents above 10 amperes, primary. The sensor and relay system will withstand momentary fault currents of 25,000 asymmetrical amperes without damage.

OUTPUT CIRCUIT DUTY RATINGS

Relay Type	Contact Rating
GRM-NC	15 Amps - 250 Vac 50 Vdc
GRM-FC	10 Amps - 250 Vac 50 Vdc, Resistive

INSTALLATION

MOUNTING

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 not be mounted in a manner that would put undue stress on the mounting bushings.

Ground sensors should be short circuited during maintenance periods. This will prevent the presence of output voltages if a ground should occur during the maintenance period. The sensor mounting dimensions are shown in Figure 1.

The relay should be mounted in a location where the reset handle is accessible and can be reached at any time without danger to the operator. Relay mounting dimensions are shown in Figure 2.

When mounting a ground sensor over shielded cable or metal sheathed cable, certain precautions must be taken so that proper relay operation is assured.

Shielded Cable

On shielded cable, the shielding tape must be connected to ground at a point after it passes through the sensor window (motor side). If the ground wire is run from the shield before the shield is passed through the sensor window, the ground wire must be brought back through the sensor window before being connected to the ground bus.

Metal Sheathed Cable

When a ground sensor is applied over sheathed cable which is terminated at a pothead, the pothead mounting must be insulated from ground (600 volt insulation level) and the ground wire from the pothead body brought back through the sensor window before being connected to the ground bus.

CONNECTIONS

Wiring diagrams are given in Figures 3 and 4. Connections from the sensor to the relay should be at least #16 gauge wire and no more than 300 circuit feet in length.

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TESTING

OPERATION INDICATOR

The switch handle serves the purpose of an operation indicator. To reset after a trip operation move the switch handle to the upward position.

OPERATIONAL TESTS

It is not necessary to schedule periodic maintenance and testing of this ground protection system. However, if tests are desired to confirm the proper functioning of the system, one of the following procedures can be used.

A. Mounted in Switchgear

Tests should be made on a de-energized circuit. If tests are to be made on an energized circuit, be sure to take all necessary precautions.

1. Move relay handle to reset position.
2. Insert a test wire through sensor (CT) window.
3. Apply control power to the contactor holding coil circuit or circuit breaker trip circuit.
4. Apply 12 amperes through test wire, the relay will drop out the contactor or trip the molded case breaker. Immediately return the test current to zero after trip operation.
5. If no trip operation takes place, interrupt the input circuit immediately, then check continuity of the control circuit external to the ground relay.

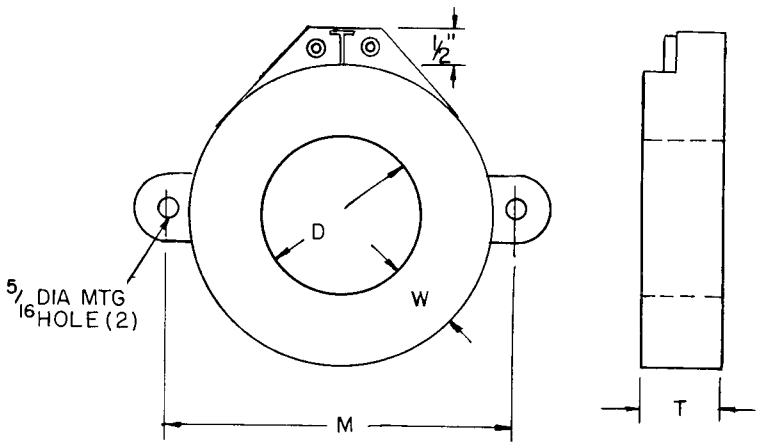
On the GRM-NC system, this can be done by disconnecting the wire attached to terminal 3 of the ground relay (the contactor should drop out).

On the GRM-FC system, short out terminals 7 and 8 (the breaker should trip).

6. Reset relay handle before repeating test.

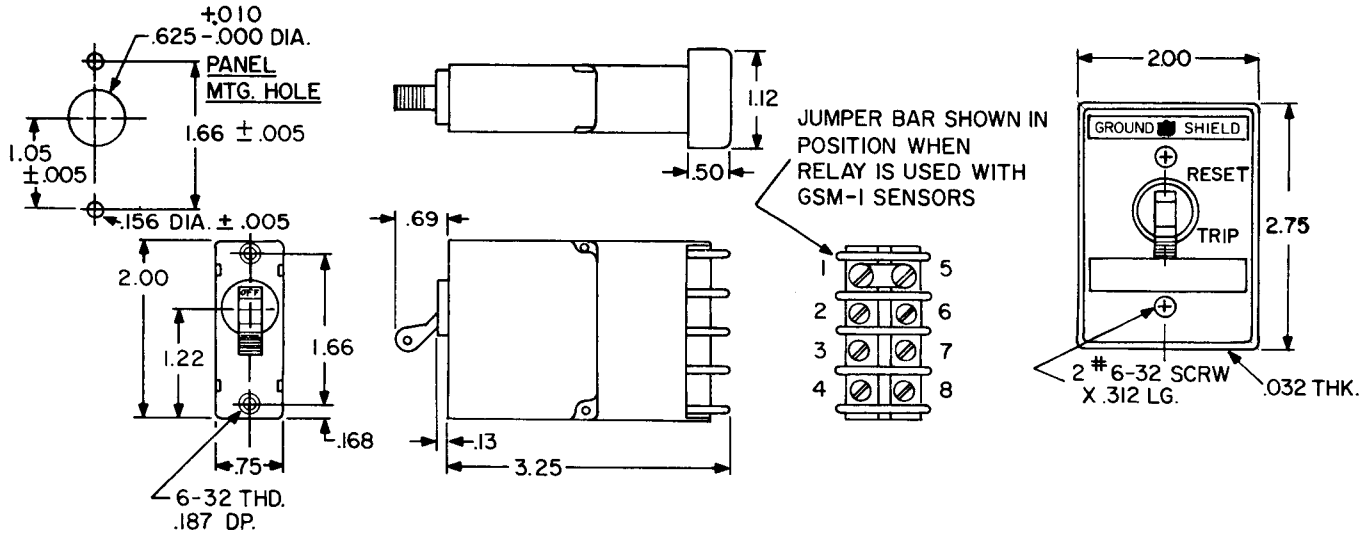
B. Bench Tests—(Without Contactor or Circuit Breaker)

1. Move relay handle to reset position.
2. Connect relay and sensor as shown in Figures 5 and 6.
3. Increase primary current so that approximately 12 amperes pass through the sensor primary. The GRM relay will operate. Immediately return the test current to zero after relay operates. The contacts, terminals 3 and 4, of the GRM-NC (normally closed relay) will open. The contacts, terminals 7 and 8 of the GRM-FC (normally open relay) will close. An ohmmeter can be used to check the contact operation, as shown in Figures 5 and 6.
4. Reset relay handle before repeating test.



Type	Catalog Number	D	M	W	T
GSM-1	302C0200	2-1/8	5-1/16	1-1/8	1-7/8
GSM-2	302H0300	3-1/8	6	1-1/8	1-7/8

Fig. 1 — Ground Sensors — Outline



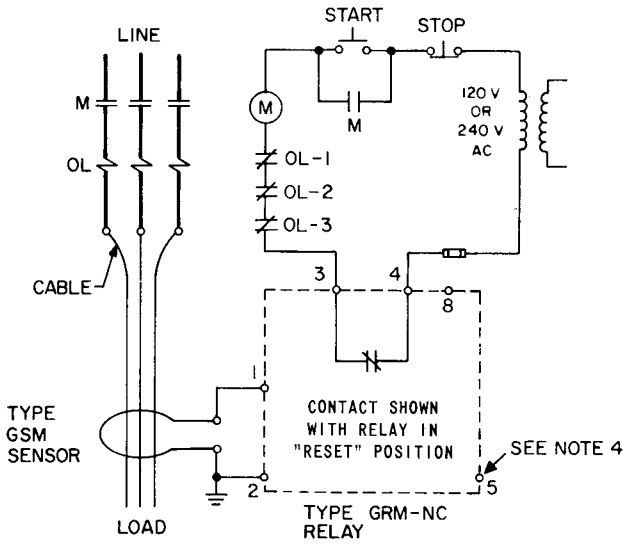
SYSTEM	SENSOR	RELAY
FOR CONTACTORS 2-1/8" WINDOW	TYPE GSM-1	TYPE GRM-NC
FOR CONTACTORS 3-1/8" WINDOW	TYPE GSM-2	TYPE GRM-NC
FOR BREAKERS 2-1/8" WINDOW	TYPE GSM-1	TYPE GRM-FC
FOR BREAKERS 3-1/8" WINDOW	TYPE GSM-2	TYPE GRM-FC

NOTE: WHEN RELAY IS TO BE USED WITH GSM-1 SENSOR, JUMPER BAR ON TERMINAL BLOCK IS ACROSS TERMINALS 1 AND 5. WHEN RELAY IS TO BE USED WITH GSM-2 SENSORS, JUMPER IS REMOVED FROM TERMINALS 1 AND 5 AND RE-CONNECTED ACROSS TERMINALS 4 AND 8.

Fig. 2 — GRM Relay — Outline and Drilling

NOTE: All dimensions are in inches.

WIRING DIAGRAMS



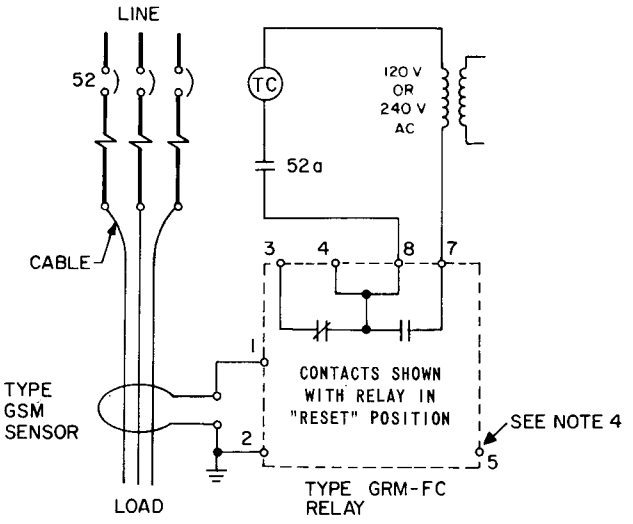
SENSOR

TYPE GSM-1	2-1/8" DIA. WINDOW
TYPE GSM-2	3-1/8" DIA. WINDOW

RELAY TYPE GRM-NC (NORMALLY CLOSED CONTACT)

1. USE ONLY WITH GSM CURRENT SENSORS.
2. OUTPUT CONTACT RATING 15 AMPERES CONTINUOUS AT 250 VOLTS AC.
3. RESET HANDLE INDICATES TRIP OPERATION.
4. CONNECT JUMPER BAR FROM TERMINALS 1 TO 5 ON TERMINAL BLOCK WHEN TYPE GSM-1 SENSOR IS USED.
   CONNECT JUMPER BAR FROM TERMINALS 4 TO 8 ON TERMINAL BLOCK WHEN TYPE GSM-2 SENSOR IS USED.

Fig. 3 — Type GRM-NC Relay



SENSOR

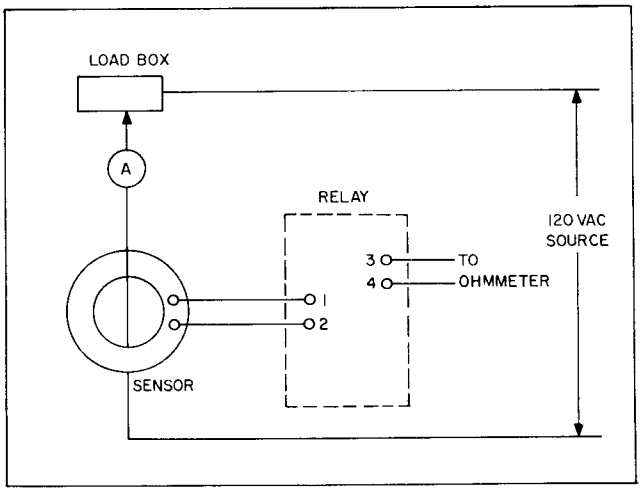
TYPE GSM-1	2-1/8" DIA. WINDOW
TYPE GSM-2	3-1/8" DIA. WINDOW

RELAY TYPE GRM-FC (FORM C CONTACT)

1. USE ONLY WITH GSM CURRENT SENSORS.
2. OUTPUT CONTACT RATING 10 AMPERES, 250 VOLTS AC, RESISTIVE.
3. RESET HANDLE INDICATES TRIP OPERATION.
4. CONNECT JUMPER BAR FROM TERMINALS 1 TO 5 ON TERMINAL BLOCK WHEN TYPE GSM-1 SENSOR IS USED.
   CONNECT JUMPER BAR FROM TERMINALS 4 TO 8 ON TERMINAL BLOCK WHEN TYPE GSM-2 SENSOR IS USED.
5. USE TERMINALS 3 & 4 FOR CONTACTOR OR STARTER APPLICATION. (RECOMMEND USE OF TYPE GRM-NC BECAUSE OF HIGHER CONTACT RATING.)

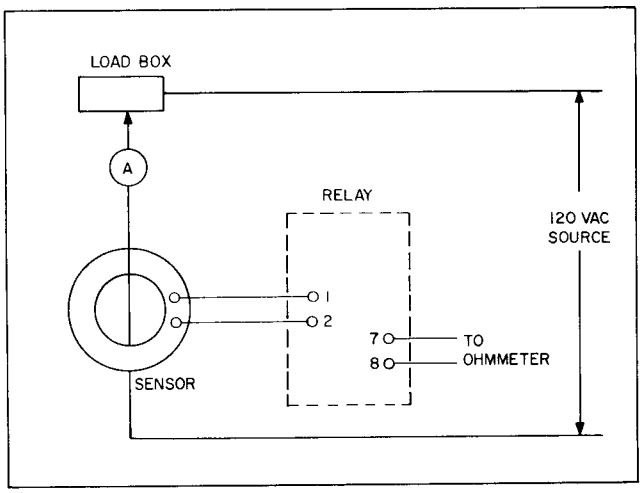
Fig. 4 — Type GRM-FC Relay

OPERATION TEST CONNECTIONS



RELAY HANDLE POSITION	CONTACT 3-4
RESET	CLOSED
TRIP	OPEN

Fig. 5 — Type GRM-NC Relay



RELAY HANDLE POSITION	CONTACT 7-8
RESET	OPEN
TRIP	CLOSED

Fig. 6 — Type GRM-FC Relay

NOTES