GE Consumer & Industrial

GE Multilin Technical Note

239 Motor Management Relay DOs and DON'Ts

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DOs and DON'Ts

239 Grounding

Users are requested to ground the 239 relay to a solid ground, preferably directly to the main ground bus at terminals 13 and 14. Except for the communications circuitry and analog output circuitry (which will be discussed later!), all other internal circuitry in the 239 ties to the same ground at terminal 13. The benefits of proper grounding of the 239 are numerous; these include

- Elimination of nuisance tripping
- Elimination of internal hardware failures
- Reliable operation of the relay
- Higher MTBE (mean time between events)

Grounding of phase CTs and ground CT sensors

All phase CTs and ground sensor CT's must be grounded. The potential difference between the CT ground and the ground bus should be minimal (ideally zero).

It is highly recommended that, in addition to the solid grounding of the ground sensor CT as described above, a shielded twisted pair be employed especially when the GE Multilin 50:0.025 ground CT sensor is used. The reason being the 50:0.025 CT is usually used on high resistance grounded systems where faults are limited to 200 A or less, and the relay is set to trip instantaneously on low levels of ground current anywhere between 1 and 10 A. A primary current 1 to 10 A on the 50:0.025 CT translates into a very small signal (0.5 to 5 mA) on the secondary of that same CT, which is the signal that the 239 relay sees. Because we are calling upon the 239 relay to detect even the smallest of signals, we have to ensure that noise from any other source does not present itself to the relay's ground CT terminals.

RTDs

Ensure the following points are taken into consideration when using RTDs with the 239 Motor Management Relay.

- Use a three-wire twisted, shielded pair to connect the RTDs from the motor to the 239. The shields should be connected to the proper terminals on the back of the 239.
- The RTD shield is internally connected to the 239 ground (terminal 13) and must not be grounded anywhere else.

- RTD signals can be characterized as very small, sensitive signals. Therefore, cables carrying RTD signals should be routed as much away as possible from power carrying cables such as power supply and CT cables.
- If, after wiring the RTD leads to the 239, the RTD temperature displayed by the relay is incorrect, check for the following conditions:
  1. Shorted RTD.
  2. If the RTD hot and compensation leads are reversed; that is, if the hot lead is in compensation terminal and the compensation lead in hot terminal.
  3. Open circuit in RTD circuit.

Analog output

Ensure the following points are taken into consideration when using the analog outputs of the 239 Motor Management Relay.

- Use a three-wire twisted, shielded pair to connect the analog output to the 239. The shield should be connected to the proper terminal (terminal 20) on the back of the 239.
- 0 to 20 mA / 4 to 20 mA output: The load must be kept less than 600 ohms to maintain a 2% accuracy. The 239 can support a load up to 1200 ohms, but the 2% accuracy is not guaranteed. Beyond 1200 ohms, the output will not be able to reach 20 mA.
- 0 to 1mA output: The load must be kept less than 2400 ohms to maintain 2% accuracy. The 239 can support a load up to 12000 ohms, but the 2% accuracy is not guaranteed. Beyond 12000 ohms, the output will not be able to reach 1 mA.

RS485 communications port

The 239 can provide for direct or remote communications (via a modem). An RS232 to RS485 converter (such a the GE Multilin F485) is used to connect to a PC/PLC or DCS system. The 239 uses the Modicon Modbus RTU protocol to interface with PCs, PLCs and DCS systems.

Any interface could be attempted providing one of the following criteria is met. The first, and cleanest solution to an interface problem is a driver (module, or firmware) in the PLC/DCS that supports the Modbus RTU protocol (commands 03, 04, and 16) as a Master.

As a second solution, if the PLC/DCS has a BASIC module (or other programmable module) that allows total control of a communications port, a competent programmer could create a simple program to take care of communications.

RS485 communications was chosen for the 239 because it allows communications over long distances of up to 4000 ft. However, care must be taken for proper and trouble-free operation. The recommendations listed below must be followed to obtain reliable communications:

- A twisted, shielded pair (preferably a 24 gauge Belden 9841 type or 120 equivalent) must be used, and routed away from power carrying cables, such as power supply and CT cables.
- No more than 32 devices (239s, GE Multilin relays, or any other non-Multilin device using the same protocol) can co-exist on the same link. If however, more than 32 devices are daisy-chained together, a repeater must be used. Note that a repeater is just another RS232 to RS485 converter device. The shields of all 239 units should also be daisy-chained together and grounded at the Master (PC/PLC) only, since a potential difference between grounds might exist if shields are grounded at different points, which can result in placing one or more 239 transceiver chips (chip used for communications) in an unknown state (i.e. not receiving nor sending). As such, the corresponding 239 communications might be erroneous, intermittent or unsuccessful.