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DO's and DON'Ts 269/269 PLUS RELAY

DO'S

- **Properly ground the 269.**

Users are requested to ground the 269 Plus relay to ground, preferably directly to the main GROUND BUS at ONE TERMINAL ONLY, terminal #42. Except for the communications circuitry (which we will discuss later!), all other internal circuitry in the 269 Plus ties to the same ground at terminal #42. The benefits of proper grounding of the 269 Plus are numerous, e.g,

- Elimination of nuisance tripping
- Elimination of internal hardware failures
- Reliable operation of the relay
- Higher MTBF (Mean Time Between Failures)

It is recommended that a tinned copper braided shielding and bonding cable be used. A Belden 8660 cable or equivalent should be used as a minimum to connect the relay directly to the ground bus.

- **Grounding of Phase and Ground CTs**

- All phase and Ground CTs must be grounded. The potential difference between the CT's ground and the ground bus should be minimal (ideally zero).
- It is highly recommended that, in addition to the solid grounding of the ground CT as described above, a shielded twisted pair be employed especially when the Multilin 2000:1 Ground CT sensor is used. The reason being the 2000:1 CT is usually used on high resistance grounded systems where faults are limited to 200 Amps or less, and the relay is set to trip instantaneously on low levels of ground current anywhere between 1 and 10 Amps. 1 to 10 Amp primary current on the 2000:1 CT translate into very small signals (0.5 to 5 mA) on the secondary of that same CT, which is the signal that the 269 Plus relay sees. Because we are calling upon the 269 Plus relay to detect even the smallest of signals, we have to make sure that noise from any other source does not present itself to the relay's ground CT terminals.

- **RTDs**

Consult appendix C of the 269 Plus Instruction Manual for the full description of the 269 Plus RTD circuitry and the different RTD wiring schemes acceptable for the proper operation of the 269 Plus. However, for best results the following recommendations should be adhered to:

- a) Use a 3 wire twisted, shielded pair to connect the RTDs from the motor to the 269 Plus. The shields should be connected to the proper terminals on the back of the 269 Plus.
- b) RTD shields are internally connected to the 269 Plus ground (terminal #42) and **must not be grounded** anywhere else.
- c) 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.

d) If, after wiring the RTD leads to the 269 Plus, the RTD temperature displayed by the Relay is zero, then check for the following conditions:

- 1 - shorted RTD
- 2 - RTD hot and compensation leads are reversed, i.e. hot lead in compensation terminal and compensation lead in hot terminal.

- **Ensure that the 269 nominal phase current of 1 A or 5 A matches the secondary rating and the connections of the connected CTs.**

Unmatched CTs may result in equipment damage or inadequate protection.

- **RS485 Communications Port**

The 269 Plus can provide for direct or remote communications (via a modem). An RS232 to RS485 converter is used to tie it to a PC/PLC or DCS system. The 269 Plus uses the Modicon **MODBUS RTU** protocol (functions 03, 04, & 16) to interface with PC's, PLC's and DCS systems.

Following is a list of systems that have been proven to successfully interface with the 269 Plus:

- a) Modicon
- b) Allen Bradley
- c) Bailey Network
- d) Honeywell
- e) GE Fanuc
- f) Foxboro
- g) Square D (A modification is required for this interface. Contact the factory for more details)
- h) Siemens

Any interface not listed above 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 Modbus RTU protocol (commands 03, 04, & 16) as a MASTER. As a second solution, if the PLC/DCS has a BASIC Module or programmable Module that allows total control of a communications port, a competent programmer could write a simple program to take care of communications.

GE Multilin constantly works with PLC/DCS manufacturers, third party integrators and end users to develop ways of interfacing the 269 Plus with other PLC/DCS systems not listed above. Users are urged to contact the factory to obtain the most up to date list of all interfaces.

RS485 communications was chosen to be used with the 269 Plus because it allows communications over long distances of up to 4000 ft. However, care must be taken for it to operate properly and trouble free. The recommendations listed below must be followed to obtain reliable communications:

- a) A twisted, shielded pair (preferably a 24 gage Belden 9841 type or 120 equivalent) must be used, and routed away from power carrying cables, such as power supply and CT cables.
- b) **No more than 32 devices** (269 Plus's, PQM's, or any other non-Multilin device that communicates using the same protocol) can co-exist on the same link. If however, more than 32 devices should be daisy chained together, a REPEATER must be used. Note that a repeater is just another RS232 to RS485 converter device. The **shields** of all 269 Plus units should also be daisy chained together and **grounded at the MASTER** (PC/PLC) only. This is due to the fact that if shields are grounded at different points, a potential difference between grounds might exist, which can result in placing one or more 269 Plus transceiver chips (chip used for communications) in an unknown state, i.e.

not receiving nor sending, and the corresponding 269 Plus communications might be erroneous, intermittent or unsuccessful.

- c) **Two sets of 120Ω/0.5W resistor and 1nF/50V capacitor in series must** be used (value matches the characteristic impedance of the line). One set at the 269 Plus end, connected between the positive and negative terminals (#46 & #47 on 269 Plus) and the second at the other end of the communications link. This is to prevent reflections and ringing on the line. If a different value resistor is used, it runs the risk of over loading the line and communications might be erroneous, intermittent or totally unsuccessful.
- d) It is highly recommended that connection from the 269 Plus communication terminals be made directly to the interfacing Master Device (PC/PLC/DCS), without the use of stub lengths and/or terminal blocks. This is also to minimize ringing and reflections on the line.

DON'T

- **Grounding of the RTD's should not be done in two places.**

When grounding at the 269, only one Return lead need be grounded as all are hardwired together internally. No error will be introduced into the RTD reading by grounding in this manner. Running more than one RTD Return lead back will cause significant errors as two or more parallel paths for return have been created.

- **Apply direct voltage to the Digital Inputs**

There are 6 switch inputs (Spare Input; Differential Input; Speed Switch; Access; Emergency Restart; External Reset) that are designed for dry contact connections only. By applying direct voltage to the inputs, it may result in component damage to the digital input circuitry.