



EARTHING AND INDUCED LOADS WITH TECHSYS CORPORATION PUMPSTATIONS

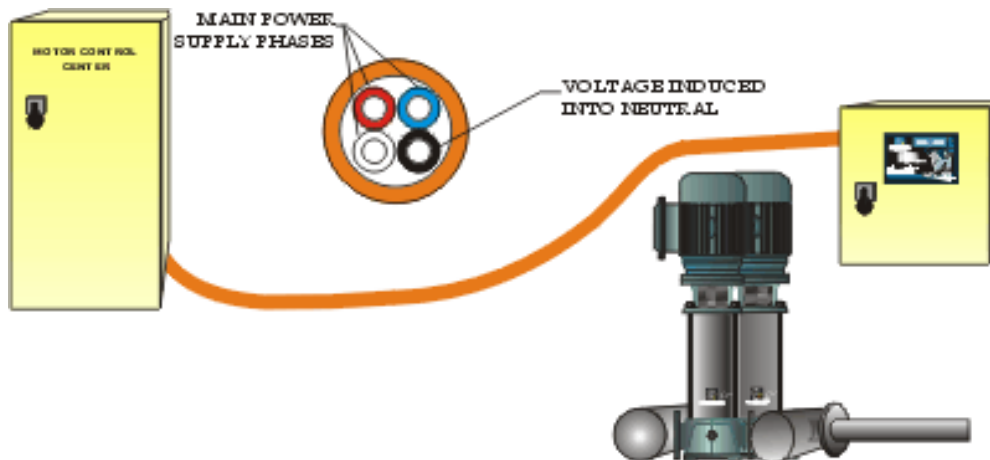
The Techsys Corporation control systems rely on the correct installation of the switchboard to prevent problems occurring due to incorrect installation.

The main problems that occur with installation are:

1. Induction related mains supply earthing problems
2. Voltage on the control inputs
3. Feedback from pump supply cables from the switchboard to the motors
4. RFI from poor shielding of the motor cables
5. Switchboard heating from external sources

This Applications Bulletin relates to the first 2 installation problems. See *Switchboardsiting* for further details on the remainder of the siting problems.

1. INDUCTION RELATED MAINS SUPPLY EARTHING PROBLEMS



When siting any electrical installation it is important to take account of the possibility of induction into “voltage free” cables such as earth and neutral cables. Most Techsys Corporation controllers use 240V supplied from the connection of one of the 3 phase 415VAC supply line and neutral. This requires that the neutral is in fact ZERO volts relative to true earth.

There are numerous situations where the pump switchboard is located a considerable distance from the main power supply and main MEN point. If the neutral is run in the same conduit or trench as the mains supply cables there is a distinct risk that the neutral will pick up a voltage and feed back a voltage where

there should be none. In some sites we have measure up to 250VAC induced voltage in both the earth and neutral when bundled with 415VAC mains supply. This is a very undesirable situation and will cause PCB and contactor failure if left unattended.

If there is a possibility of induced voltage the preferred design method is to provide a point when the induced voltage can bleed back to EARTH. Providing an earthing point at the switchboard location is the preferred option. The EARTH points can be tested by a continuity test and the reading between Earth and neutral should be no greater than 10 ohms. If the reading is above this figure then remedial action is required.

The other test required to determine the effectiveness of the earth and neutral lines is to test for any induced voltage when the system is operating. To do this set the system running and connect a multi meter on AC volts between the neutral and a local earth. A local earth is a bolt on the switchboard or a water pipe close by. If the voltage between neutral and the local is greater than 10VAC then there is a problem with induced voltage and a new earth stake is required adjacent to the switchboard. If the neutral to local earth voltage is in excess of 50VAC then a separate neutral needs to be run. This should be run so that no induced loads are possible.

i.e. with sufficient separation from High Voltage loads or in earthed shielded cable.

Each local electrical authority has specific rules as to the method of providing MEN points so consultation with you electrician and with you supply authority is required to resolve these situations.

2. INDUCTION RELATED CONTROL WIRING EARTHING PROBLEMS

When control wiring of different voltages are bundled together there is the possibility of induced voltage being transferred to wires carrying lower voltages. This can manifest itself in odd performance of the control system.

To reduce the possibility of induced related voltage on the control wiring side, follow these procedures:

- Always shield control wires and earth at only **ONE** end of the wire loom.
- Never bundle wires carrying different voltages or AC and DC voltages.
- Always make sure that the system earth is suitable to leak of any shield induced voltages.
- Always run pressure transducer 4-20mA wires in a separately shielded wire bundle. Do not earth on the transducer. Earth on the VFD control card.
- Any additional wiring from a different power source should be isolated from variable earthing problems. See section 1.



RFI CONSIDERATIONS

The requirements for RFI protection is very near the same situation as to reduce the possibility of induced voltage.

In any cubicle, a single low impedance earth point should be established, to which circuits are earthed independently and to which the incoming earth is connected. However the earth return in the drive's motor cable should be connected to the drive's earth point, not to the cubicle busbar.

In general, the essential objectives of good earthing are:

- To ensure that high frequency earth current flows through defined paths only.
- To minimize the area enclosed by these paths.
- To ensure that no sensitive circuit shares a path with these earth currents.
- Figure 1 shows a good earthing layout for a drive system. Note the following, with reference to the system:
- Use screened motor cable, with the screen terminated at the drive earth and on the motor. Use a metal cable gland in the gland plate, and avoid forming the screen into a "pig tail" for earthing.

There is a single connection of the drive's earth to the cubicle earth busbar, with no other equipment sharing the drive's earth connection.

