

POSITIONING OF VFD PUMP CONTROL PANELS

There are some considerations when siting the location of a pump control panel that will alleviate many of the site related problems that can occur.

The main design considerations are:

- Heat
- Electrical interference
- RFI emissions

HEAT

The switchboards are designed to accommodate ambient temperatures at 45 degC and remain fully functional. If the site temperatures are expected to be in excess of this then switchboard cooling is required.

Positioning of the switchboard is very important to minimize heat input into the switchboard and premature shut down of the VFD. If possible it should always be placed in a shaded area away from external heat sources. The sun will increase the internal temperatures within the switchboard by a considerable amount even in low ambient temperatures.

e.g. A switchboard located in direct sunlight with an ambient temp of 25 degC was measured to obtain internal temperatures of 60 degC after 15 minutes without the cooling fans operational. (Measured in Australia during summer) With cooling fans operational and full pump demand the internal temperature rose to 50 degC.

General rules:

- Always site out of direct sunlight
- Always site away from external heat source
- Always be wary of induction related heating.

If the unit requires outside operation the system should be fitted with a cooling system and a sun shade. See Switchboard Cooling Application Bulletin for further information.

ELECTRICAL INTERFERENCE

As with all electronic devices the signal from the feedback is important to be free from "NOISE". This is the inductive pickup that low voltage cables can attract which fouls the main information signal.

The golden rules in for signal wiring :

Never lay signal cables in the same tray or conduit as high voltage cables.

Always use shielded cable for signal wires

Always earth only one end of the shielded cable

Signs of interference are:

System pressure (flow, level or temp) reading fluctuate wildly when the actual system is stable.

The system pressure (flow, level or temp) varies when the system is at rest.

The system shuts down on high pressure(flow, level or temp) when the system is stable.

It must be noted that the pressure control option will be more reliable if the control pressure is brought to the switchboard via pressure tubes rather than control cable. In some other applications it is not always possible so the best alternative is to site the switchboard close to the meter so that the run length is relatively short. Some sensors have a maximum run distance of only 5m so always check what the capacity of your sensor is prior to operation.

RFI EMISSIONS

RFI or Radio Frequency Interference is the transferring of high frequency radiation from one source to another. It can create disturbances to other appliances and cause general disruption if left unchecked. The following items detail how to

The motor cable. A screened cable to the motor is highly recommended, and is essential for cable lengths exceeding 1 meter. The recommended cable is three-core plus neutral screen, or steel wire armoured, with the screen earthed at both ends. This screen doubles as a safety earth. There should be no breaks in the screen between drive and motor. Steel conduit or steel cable guards will suffice for this requirement.

The motor frame.

Normally the motor frame is a solid effective RFI screen, earthed to the drive via the screen on the motor cable.

The three screens - cabinet, cable screen and motor frame - must be bonded together to form one screen and joined together on the VFD earth point.

What about earthing?

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.

Ensure the motor frame is well earthed to the drive, via the cable screen. Failing this, the motor frame may itself become a source of RFI, coupling capacitively into the local metalwork and the earthing system.

No sensitive equipment is to be mounted within 300 mm of the drive and its input and output cables.

The "0V" connection on the control system is earthed, at one point only.
Note that an extra filter is shown on the input of the drive. If the drive is not supplied with adequate input filtering, this filter may be needed.

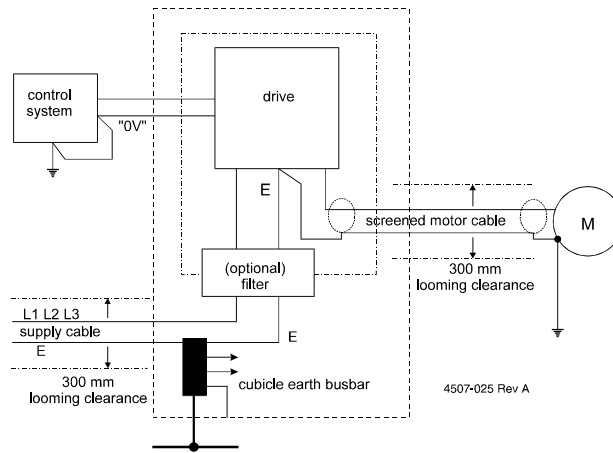


Figure 1: Earthing Layout for Drive System

Please refer to RFI APPLICATIONS BULLETIN for full details