



Hydrovar - Control Wiring Guide



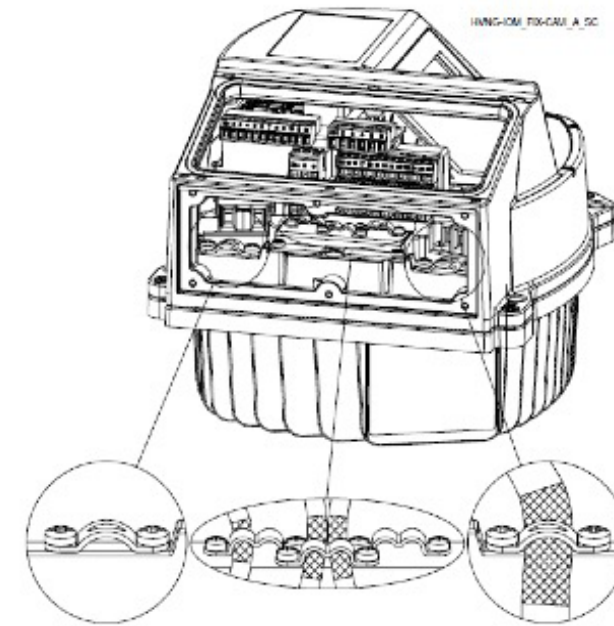
With using the Hydrovar, there are some considerations that need to be made when installing and commissioning of the system. One of the biggest considerations that need to be made is the power supply (line / load), control, ground, communication, and control wiring techniques needed to maintain proper operation, prolong the life of the system, and reduce the EMI (Electromagnetic Interference) that can be caused when introducing the VFD to the system.

Unshielded VFD cables can radiate more than 80V of noise to other unshielded communication wires and cables and more than 10V of noise to shielded instrumentation cables. When VFD cables are installed close to low-level communications cables and other susceptible devices, it is necessary to ensure that shielding is present in the VFD cable.

The use of unshielded cables in conduits around a VFD setup should be limited or eliminated completely, since the conduit is an uncontrolled path to ground for the noise it captures. If radiated noise is an issue in an existing VFD installation, consider how the instrumentation and control cables are routed and their location related to other cables and machines.

Control Wiring

- Control wiring (V dc or mA) must be separate from power supply cables...minimum clearance of 200 mm (8 inches). For short cable distances, similar to wiring applied within Xylem assembled booster packages have been verified for proper functionality.
- If control wiring is installed using conduit, multiple signal / control wires can be run in single conduit if necessary.
- All control cables that are connected to the Hydrovar control board must be screened (shielded).
- Type of signal / control cable to use, there are many options depending on the size requirements; preferred MTW Wire is machine tool wire that features a stranded, bare copper conductor that is insulated with polyvinylchloride (PVC). MTW cable is moisture resistant and passes the VW-1 flame test. Shielded twisted pair cables will provide protection for EMI. Some communication protocols have their own cabling standard that should be followed.
- Using shielded cable, connect the shield to ground on one end only (to prevent ground loops), preferably to HYDROVAR GND using the pre-mounted cable-clips; to connect a shield with lowest impedance to ground, remove the insulation from the signal cable and connect the shield to ground. Do not terminate the ground through the pigtail connections or on the other end of the cable, or it will increase the high frequency impedance and remove the effects of the shield.
- If crossing over any high voltage cables, it is suggested that it crosses at a 90° angle to prevent noise transmitting onto the signal / control wires.
- Sizing of the control wire is based off the current load and voltage that will be on them, but it is suggested that it is rated for 600V. Typical installation to differentiate control wiring is to use 20 AWG shield cable when running analog signals, 14 AWG for relays, and 16AWG for any other control wires.



NOTICE:

Signal cables must be installed separate both from motor cable and power supply cable. If signal cables are installed in parallel to power supply cable or to motor cable for a long distance, the distance between these cables should be more than 200mm. Do not cross power cables and control cables - if this is not possible, cross them only in an angle of 90°. Wiring applied within Xylem assembled booster packages have been verified for proper functionality.

Communication Wiring

- Depending on the communication protocol used, it will determine in many cases the type of cable to use along with its connectors. Refer to the Building Management System (BMS) integrator for wiring procedures.
- The communication wiring should be separated from any high voltage wiring (above 50Vdc) and, if it should cross any high voltage wires (above 50Vdc), at a 90° angle. When running parallel with any high voltage wires, they should be spaced as far away as it is permitted to prevent any EMI interference.
- Shielded twisted pair cable is suggested with the shield terminated on one end and will provide the best defense against EMI in the system.

Common VFD Electrical Terms

Cable noise:

Electromagnetic interference emitting from a motor cable. It occurs as the cable begins to act like a radio antenna when voltage reflections causing voltage spikes are present in the cable.

Corona discharge:

Electric arcing or sparking between a cable's conductors or motor windings. This takes place when the voltage between two points become great enough to finally break down the air or insulation separating them, causing a burst of current to jump between conductors to relieve the potential difference.

Ground loop:

An unintended path through an electrical interconnection system in which potentials (voltages) measured with respect to ground at either end of the path differ from each other. Given even a small offset in potentials, extraneous currents can flow through the grounding system. To avoid this potentially damaging current, all grounding points must be tied to the same potential.

Voltage reflection:

When the impedance of a cable and the motor it is connected to are not the same, part of the voltage waveform sent from the VFD will be rejected and pushed back into the cable. The situation is analogous to trying to force water under pressure from a garden hose into a straw adapted to the end of the hose. Some of the pressure will be fed back into the hose.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

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