

GENERAL RECOMANDATIONS FOR THE APPLICATION OF SUBMERSIBLE MOTORS WITH VFD (INVERTER)

Motor configuration

- Rewindable waterfilled motors (MS series): only the motors with the PE+PA winding are suitable for the application under inverter
- Oil filled motors (CL series): all the threephase motors in the standard version are suitable for the application under inverter

Limits of the application frequency

- Max frequency: the maximal working frequency should never exceed the nominal frequency of the motor.
- Minimal frequency: the minimal frequency should be calculated in the way to guarantee always the necessary motor cooling. The water speed to be guaranteed depends on the its temperature and on the motor power but in all the cases it can be never lower than 0,1 m/s. In all the cases the minimal application frequency should be never lower than 30 Hz. The application of the motor at the frequency lower than 30 Hz can cause serious damages to the trust bearings, to the bushes, and to the winding of the same motor.

Specific functions for the pumps

- If the inverter has functions or macro specifications for the pumps (for example macro PFC), make them operative.

Start

- Starting ramp: a too short starting ramp can cause a water hammer on the plant, a too long ramp can cause damages to the motor. The ramp should last approximately 4 – 6 seconds (from the starting to reaching the minimal application frequency 30Hz)
- If available, make operative the function of torque boost.
- Number of starts per hour: respect the number of starts/ hour indicated in the technical documentation of the motor.

Voltage limits

- Max peak voltage: Phase/Phase: 850 V – Phase/ground: 850 V
- Max dU/dt: 550 V/μs

Frequency variations in a minute

- Max number of the frequency variations in a minute= 8

Stop

The stop can be effected in two ways:

- Taking off the power source from the motor and making the motor stop by inertia. This mode of making stop the motor safeguards the motor but can cause the appearance of the water hammers, depending on the characteristics of the plant.
- Setting up a stopping ramp: in this case are valid the indication already given for the starting ramp.

Switching frequency

- The switching frequency can be usually regulated between 2 and 12 kHz. A high switching frequency reduces the noise of the inverter but causes the elevated tension peaks that can damage the motor. It is suggested to set up the switching frequency on the values between 3 and 5 kHz.

Filters

- Filters and cable length: submersible motors applications can cause stress of the motor windings and insulation system, at distances much shorter than for applications where the motor cables are in air. therefore, the usual cable length tables in VFD's documentation are not valid for submersible motor applications.
- Sine wave du/dt filter: the filters du/dt limit the tension peaks in exit and in this way make longer the motor life. Their application is almost always necessary depending on the inverter (brand and type), on the cable length, on the feeding tension of the motor and on the other factors. Moreover these filters limit the capacitive leakage currents and the high frequency emissions of the motor cables. The filters must be of the sine wave type. Standard du/dt filters are not effective in submersible motor protection Please consult the supplier of the inverter for more information.

Position of the pressure transducer

- If the inverter is connected to a pressure transducer, the position of the transducer should make possible to assure the correct interpretation. Don't install the transducer next to the curves, connections and so on.