

**UNITED STATES DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE**

**CONSTRUCTION SPECIFICATION  
CS-71: "VARIABLE FREQUENCY DRIVE"**

71.1 SCOPE

The contractor shall furnish, and install a pump control system designed to operate one pump using Variable Frequency Drive (VFDs) as described herein. The control system shall be designed utilizing proven technology in control design for constant pressure, constant flow rate, or a combination of flow and pressure ranges to provide the desired operating conditions of the pumping system. The control system shall be operator and maintenance friendly to ensure ease of system set up and to limit down time.

The pump control system shall be capable of operating one electric pump motor.

Manufactured by: \_\_\_\_\_

Model: \_\_\_\_\_ Horsepower: \_\_\_\_\_

Full-load Amps (FLA): \_\_\_\_\_ Incoming power – Volts AC: Phase : ( 1 / 3 )  
Circle one

The desired operating ranges for pump output pressures and flow-rates are:

- Minimum Pressure (psi): \_\_\_\_\_
- Maximum Pressure (psi): \_\_\_\_\_
- Minimum Flow (gpm): \_\_\_\_\_
- Maximum Flow (gpm): \_\_\_\_\_

The control system shall use a pressure transmitter ( yes / no ) and/or flow meter ( yes / no ) connected to the discharge piping of the pump.

71.2 MATERIALS

Electrical equipment, materials and workmanship shall comply with all applicable codes, safety and fire law regulations at the location of the work and shall conform to applicable codes and standards of the organizations listed below.

1. National Electric Code (NEC)
2. National Electrical Manufacturers Association (NEMA)
3. American National Standards Institute (ANSI)
4. Underwriters Laboratories (UL 508)
5. International Electrotechnical Commission (IEC)

71.3 COMPONENTS

*Component Standards*

All equipment and materials shall be new and shall bear the manufacturer's name and trade name. In cases where a standard has been established for the particular material, the material shall be so labeled. The equipment to be furnished shall essentially be the standard product of a manufacturer regularly engaged in the production of the required type of equipment for this type of work and shall be the manufacturers latest approved design.

*Variable Frequency Drive*

The VFD shall monitor the sensor (pressure or flow rate) signal (4-20mA loop powered signal) and control the pump speed using the factory pre-programmed in order to maintain the desired operating condition. The VFD shall also be capable of having an acceleration or deceleration time, adjustable 3 to 1800 seconds with override circuit to prevent nuisance trips if the deceleration time is set too short.

The VFD shall be sized to the pump motor supplied by the Contractor or the existing pump and it shall be compatible with all equipment utilized at the pump station.

*Keypad / operation*

The VFD shall be equipped with an interface keypad with START/STOP buttons and a display for the visualization of process and alarm status. The main screen shall display the set-pressure/flow rate, the actual pressure/flow rate (in psi/gpm), the motor current (in Amps), and the motor speed in (Hz) simultaneously. The keypad shall allow the user to navigate through the configuration menus and adjust set point values via the front keypad. The VFD setup shall be simple and shall not require the use of a laptop computer. The VFD shall be factory configured and tested to minimize field programming and start up time.

The VFD shall be provided with a 12-month standard warranty against defects in workmanship and materials under normal use operation and service from the date of startup.

71.4 ITEMS OF WORK AND CONSTRUCTION DETAILS FOR THIS PROJECT

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