DeZURIK

INTRODUCTION

This specification covers the design, manufacture, and testing of the DeZURIK Pump & Control Valve Interface for Electric Motor Operated Pump Control Valves, Model ECB-CEM

PART 1 - GENERAL

1. Standard products - use the same manufacturer for multiple units of same type.

PART 2 - PRODUCTS

2.01 DeZURIK PUMP & CONTROL VALVE INTERFACE FOR ELECTRIC MOTOR OPERATED PUMP CONTROL VALVES, MODEL ECB-CEM

A. GENERAL FUNCTION

The DeZURIK ECB-CEM shall provide control interface between the pump control valve and the pump, to minimize pressure surges in the system when the pump starts or stops. The DeZURIK ECB-CEM shall properly sequence and control the pump and pump control valve start-up and shut-down procedure, providing both visual and electronic status outputs for operating personnel. The DeZURIK ECB-CEM shall protect the pumping system from damage due to mechanical, hydraulic or power failure. The DeZURIK ECB-CEM shall be pre-wired and include an integral programmable valve controller to sequence the pump and pump control valve during all modes of operation. The DeZURIK ECB-CEM shall be pre-programmed for most common pump control applications. The DeZURIK ECB-CEM shall be easy to wire and adjust. The DeZURIK ECB-CEM shall include the following features:

- Sequence timers
- Local visual indication of pump and control valve status.
- Visual and Electronic System Failure Diagnostics
- Displays time for system to build pressure and for valve to open
- Contacts for remote or automatic start signal
- Local pump start & pump stop buttons
- Local emergency stop button
- Automatic shutdown of pump in emergency situations
- Terminal block connections for electric motor operator controls, valve limit switch, pump starter relay, remote automatic contact, pressure switch
- LOR switch for remote or local operation

The DeZURIK ECB-CEM shall include automatic recognition of common fault conditions and shall provide proper fault response sequencing to the pump control valve and pump starter as well as visual and electronic diagnostic fault notification to operating personnel.

The integral programmable valve controller shall be housed in a NEMA 4X fiberglass enclosure with polycarbonate window, gasketed door, continuous stainless steel hinge, stainless steel twist/latch door fasteners and a padlockable door hasp.

The DeZURIK ECB-CEM shall include alarms, adjustable timers, system indicators, providing local visual indicators for both normal operation and alarm conditions.

The DeZURIK ECB-CEM shall include an externally mounted three position “Local-Off-Remote” switch to provide local or remote pump start/stop operation. Externally mounted pump start and pump start buttons shall be provided for local operation. The DeZURIK ECB-CEM shall be supplied with contacts for remote start, a pressure switch and a valve limit switch.

The DeZURIK ECB-CEM shall include a terminal block to minimize and simplify field wiring.

B. ELECTRIC MOTOR OPERATED (EMO) PUMP CONTROL VALVE

Upon receipt of a local or remote pump start command, the ECB-CEM sends pump start output. The pump starts and pressure builds against a closed pump control valve. Once system pressure has been made, the EMO is signaled by the DeZURIK ECB-CEM and the pump control valve begins to slowly open. The opening rate of speed shall be controlled by an adjustable pulsing timer in the EMO. Line pressure is gradually increased to full pumping head.

When the pump is commanded to shut-off, the EMO is signaled by the ECB-CEM to close, and the pump control valve begins to close slowly, at a rate controlled by the adjustable pulsing timer. Flow is gradually reduced while the pump continues to run. When the pump control valve is nearing the fully closed position, a limit switch assembly affixed to the cover of the pump control valve indicates the valve is fully closed and the pump shuts off.

The EMO will fail in last position upon power failure. If the pump control valve is of the type that includes an automatic mechanical check valve feature, the valve will continue operating as a check valve and will close when flow stops. Upon restoration of power, and prior to a pump restart, the ECB-CEM will signal the EMO to close. The pump will not be able to be restarted until the EMO’s closed limit switch contact is made and the Power Failure Delay Timer expires.

Should Mode Failure 1-4 (as listed below) occur, the ECB-CEM will power the EMO to the closed position and the pump run command will be taken away to insure the pump is off. A manual reset via the Emergency Stop button is required to restart the pump. If the pump control valve is of the type that includes an automatic mechanical check feature, the valve will operate as check valve and will close as the flow stops.

C. PANEL TECHNICAL INFORMATION AND CONSTRUCTION:

Visual Indications:

1. Pump Status - White = Pump Off, Amber = Pump On
2. Pressure Switch Status – Flashing Blue = Below Minimum, Steady Blue = Pressure OK
3. Valve Status - Red = Valve Closed, Flashing Green = Normal Energized, Valve is Opening, Steady Green = Normal Energized, Valve Fully Open
4. Emergency Stop Status - Emergency stop enabled when displayed
5. System Failure Diagnostics - Indicates a system failure when displayed
    a. Mode 1 = Insufficient Pump Pressure on Start-up
    b. Mode 2 = Valve did not Open on Start-up
    c. Mode 3 = Loss of Pressure to Pressure Switch
    d. Mode 4 = Valve Closed Without Command
    e. Mode 5 = Power Failure Delay
6. Time for Pump to build Pressure - Displays setting and countdown time in seconds
7. Time for Valve to Open - Displays setting and countdown time in seconds

D. **CONSTRUCTION**:

The DeZURIK ECB-CEM shall have remote communication capabilities. The controller shall include six (6) configurable 4-20mA analog inputs; six (6) dry contact digital inputs; four (4) 4-20mA analog outputs; two (2) solid-state relays and two (2) mechanical relays. All inputs and outputs shall have a configuration menu which programs signal name, scaling, engineering units, precision, & filtering.

The DeZURIK ECB-CEM shall have a maximum of four (4) PID loops for use with any pump control Valve. Each loop shall have the ability to be broken into (4) different control zones with customizable PID parameters in each. Each PID loop shall have an independent output limiting feature which limits the duration an EMO can remain energized, providing ultimate valve protection.

Optional – Specify if required. An optional heater with integral thermostat shall be provided. A gasketed emergency shut-down pushbutton shall be provided (locking type, with manual reset). Labeled, screw-type terminal blocks shall be provided for all input and output connections and supply voltage connection. A minimum of (8) spare terminal blocks shall be provided.

The DeZURIK ECB-CEM shall have relay outputs capable of Alarm indication to SCADA and shall be capable of generating and sending signal loss warnings and other configurable control actions. Actions (alarm) can include system failures.

The DeZURIK ECB-CEM shall have a high speed logging feature which captures all I/O at a maximum sample rate of 1Hz. Captured data shall be downloadable in .csv file format to a portable memory device such as a USB drive or FTP server.

The integral controller in the DeZURIK ECB-CEM shall have a color TFT screen to graphically display the valve application with real-time system information. The controller display shall have the ability to show all I/O signal readings, PID settings, I/O configuration settings, along with pump status, pressure switch status, valve status, EMO status, emergency stop status, system failures, & timers/timer settings.

Security key codes shall be provided to protect against unauthorized changes. An IP-68 rated enclosure shall be provided to house the controller for environmental protection.

Sufficient clearance around the DeZURIK ECB-CEM shall be made for adequate access/wiring.

Field Wiring is to be provided by others. Considerations should be given to safety and compliance with all local codes, standards and best practices.

INPUTS:
The Pump Control Panel shall be capable of monitoring the following inputs:

- Remote Start Command
- Valve Limit Switch Signal
- Discharge Pressure Switch Signal
- Local Start Pump Command
- Local Stop Pump Command
- Emergency Stop Command

Local inputs shall be entered by means of the integral controller and shall include set-up screen for setting of timers and user-selectable options. If a pressure switch is not used, a jumper can be inserted across its contacts.

OUTPUTS:
The DeZURIK ECB-CEM shall provide the following powered outputs:

- (1) Pump Start Command
- Electric Motor Operator
- Up to (5) Alarms

The pump start command is a non-powered dry contact normally open signal with maximum amperage of 10 amps across the relay contact. The valve EMO outputs are powered by the incoming VAC supply voltage and protected by a 5 amp circuit breaker. The alarm outputs 4-20 ma with 4 ma indicating alarm off, and 20 ma indication alarm on.

E MODBUS COMMUNICATIONS

The DeZURIK ECB-CEM shall come standard with Modbus protocol. This protocol defines a message structure that PLC's will recognize and use, regardless of the type of networks over which they communicate. The valve controller can be configured to communicate on standard Modbus networks using either of two transmission modes: TCP/IP or RTU. Users shall have the ability to select the desired mode, along with communication parameters (IP address, subnet mask, baud rate, etc.). The electronic valve controller shall have a built in VNC server. A viewer/client uses TCP port 5900 to connect to a server (or 5800 for browser access), but can also be set to use any other port.

F. MANUFACTURE

1. Each DeZURIK ECB-CEM shall be factory assembled and pre-programmed by the control valve manufacturer.
2. Each DeZURIK ECB-CEM shall be provided with an identifying nameplate
3. Each DeZURIK ECB-CEM shall undergo full factory functional and operational testing.

G. PRODUCT DATA

1. DeZURIK ECB-CEM manufacturer's technical product data shall be provided.

Manufacturer shall warrant the controller to be free of defects in material and workmanship for a period of two years from date of shipment, provided the control panel is installed and used in accordance with all applicable instructions.

The **Pump & Control Valve Interface for Electric Motor Operated Pump Control Valves** shall be **DeZURIK ECB-CEM**, as manufactured by DeZURIK, Inc. 250 Riverside Ave, N. Sartell, Minnesota 56377.

END OF SECTION