

APPENDIX 3

Training Manual Excerpt - Raw Sewage Pump M150-P5

C.5 RAW SEWAGE PUMP M150-P5

Pump M150-P5 is a 448 kW (600 hp) two speed pump which can operate at either 506 or 446 rpm. It has a pumping capacity of either 195 or 150 ML/d, depending upon the speed. The control for this pump is found at FDP-M and is identical to that of the other constant speed pumps already discussed, except that it now allows for two speed control by means of a switch. High/low speed indication is also available at FDP-M. An operator can select "HAND" or "COMP" control and monitor pump status. Several pump and motor operating characteristics can also be monitored here. A locally mounted "LOCK-OFF-STOP" pushbutton allows for emergency shutdown (see Figure M305).

Two valves are associated with this pump: Suction Valve M151-FV and Siphon Break Valve M152-PV. The operator has control and monitoring capability from FDP-M of M151-FV similar to that of Discharge Valve M112-FV (see Section C.2). The Siphon Break Valve, M152-PV, has the same status monitoring at FDP-M as that of M113-PV (also see Section C.2).

Figure M324 shows all the devices located on FDP-M that are part of the control system for this pump.

The suction valve, M151-FV, has a different type of actuator from that of the valves for the other five pumps due to the fact that M150-P5 is a two-speed pump. However, the control of the valve is identical to the other valves. A local panel mounted near the actuator provides valve control independent of FDP-M. From here an operator can turn to "LOCAL" control to open or close the valve. Valve position indication is also provided. The locations of the pump and suction valve are shown in Figure M305. A detail of the local suction valve control is given in Figure M325.

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Raw sewage pump M150-P5 is equipped with a two-speed motor and thus, can be started in one of two speeds. The pump must be shut down before the speed can be changed. The PLC will not allow the motor to change speed until it has been shut down for three minutes. The three minute span enables the motor to come to a full stop and clear the post-purge cycle.

To start pump M150-P5 manually:

1. For valve M151-FV ensure that the local "LOCAL/REMOTE" switch is in the "REMOTE" position and that the "HAND/COMP" switch at FDP-M is in the "COMP" position;
2. Turn the "HAND/COMP" switch at FDP-M for M150-P5 to "HAND";
3. Select a pump speed ("HIGH/LOW") and press the "START" pushbutton for M150-P5 at FDP-M. The PLC will open the suction valve and close the siphon break valve;
4. The PLC then initiates the pre-purge cycle. The seal water solenoid opens and seal water flows. The seal water is verified and after 30 seconds time delay the pump starts. During the pre-purge cycle the pump green stoplight will flash;
5. 60 seconds after the pump starts, the PLC closes the siphon break valve and the pump red run light comes on continuously.

To stop the pump manually:

1. Same as No. 1 for manual start;
2. Same as No. 2 for manual start;
3. Press the pump "STOP" pushbutton at FDP-M;
4. The PLC initiates the post-purge cycle. Seal water flow will be maintained for 60 seconds. During the post-purge cycle, the pump green stop light will flash;
5. The PLC will open the siphon break valve. After a short time delay the pump slowly decelerates to a stop. The pump green stop light is now on continuously. After a further time delay the PLC will shut off the seal water.

To start or stop the pump automatically:

1. Same as No. 1 for manual start;
2. Turn the pump "HAND/COMP" switch at FDP-M to "COMP";
3. To start the pump, first select either high or low speed and then issue a start command from a Bailey Net 90 OIU. To stop the pump simply issue a stop command from an OIU;
4. Same as No. 4 for manual start or stop;
5. Same as No. 5 for manual start or stop;

Cross references between the control of all these devices and the Net 90 can be found in Bridging Table M100. Equipment/Instrument Summary Table M308 identifies all the monitoring, control, and alarm indicating devices associated with pump M150-P5 and its valves. A listing of all alarms can be found in Main Building Process Alarms Table M101. Further control information can be found in the Process and Instrumentation Diagram found in Figure M326.

C.6 EMERGENCY SHUT-DOWN

In the event of an emergency, any pump can be shutdown in one of two ways. The first is to press the "LOCK-OUT-STOP" pushbutton located near each of the pumps (see Figure M305). This will immediately stop the pump, lock-out the pump motor, and close the suction valve. The other method of shut-down is to press the "EMERGENCY CLOSE SUCTION VALVE" button at FDP-M (see panel layout in Figure M327). This action will close the valve, stop the pump, and lock-out the pump motor.

To start the pump again, reset the lock-out circuit at the motor starter in the Electrical Room (see Figure M1506). The pump can now be started as described in Sections C.2 - C.5.

M320

5. Pump - M150-P5
Location: Pump Well #1
Manufacturer: Pump - Morris, 150/195 ML/d (33/43 MIGD)
Motor - Reliance, 450/340 kW (600/450 hp),
506/450 rpm, 95/84 FLA, two speed
6. Pump - M160-P6
Location: Pump Well #1
Manufacturer: Pump - Babcock-Wilcox and Goldie-McCulloch, 188
ML/d (41.5 MIGD)
Motor - Westinghouse, 525 kW (700 hp), 505 rpm,
4160 V, 92.0 FLA, constant speed
7. Hydraulic Suction Valve - M111-FV
Location: M110--P1
Manufacturer: Jenkins, 30" gate valve, 120 psig, c/w 125
flange Operator - Jenkins Hydraulic two-way
cylinder
8. Motorized Suction Valves - M121-FV, M131-FV, M141-FV & M161-FV
Location: M120-P2, M130-P3, M140-P4, & M160-P6
respectively
Manufacturer: Valve - Jenkins 36" gate valves, 120
psig, c/w 125 flange
Motor - Limitorque, 5.3 hp, 550 V, 7.5
FLA
9. Motorized Suction Valve - M151-FV
Location: M150-P5
Manufacturer: Valve - Jenkins 36: gate valve, c/w
150 flange
Motor - Rotork, 3.4 hp, 575 volts, 58
rpm