INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Model 7700A Pump Director

Electronic Controller for Pump Control Valves

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Manual Number 7700A-IOM-050620

WARNING: Cancer and Reproductive Harm – www.Prop65Warnings.ca.gov

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General Description

The Pump Director, Figure Number 7700-A, is a PLC based electronic controller used as the interface between a non-modulating pump control valve and the pump starter circuitry. The Pump Director provides the proper start-up and shut-down sequencing between the valve controls and the pump starter controls. In addition to controlling the proper start-up and shut-down sequencing between valve and pump, the Pump Director automatically recognizes common fault situations, provides emergency shut-down sequencing in such situations and provides both visual and electronic fault notification & diagnostics.

The Pump Director allows either local or remote control of the valve/pump operation, providing a constant monitoring of the valve/pump status by means of a local LCD screen as well as providing electronic status signals for remote monitoring.

System Installation Requirements

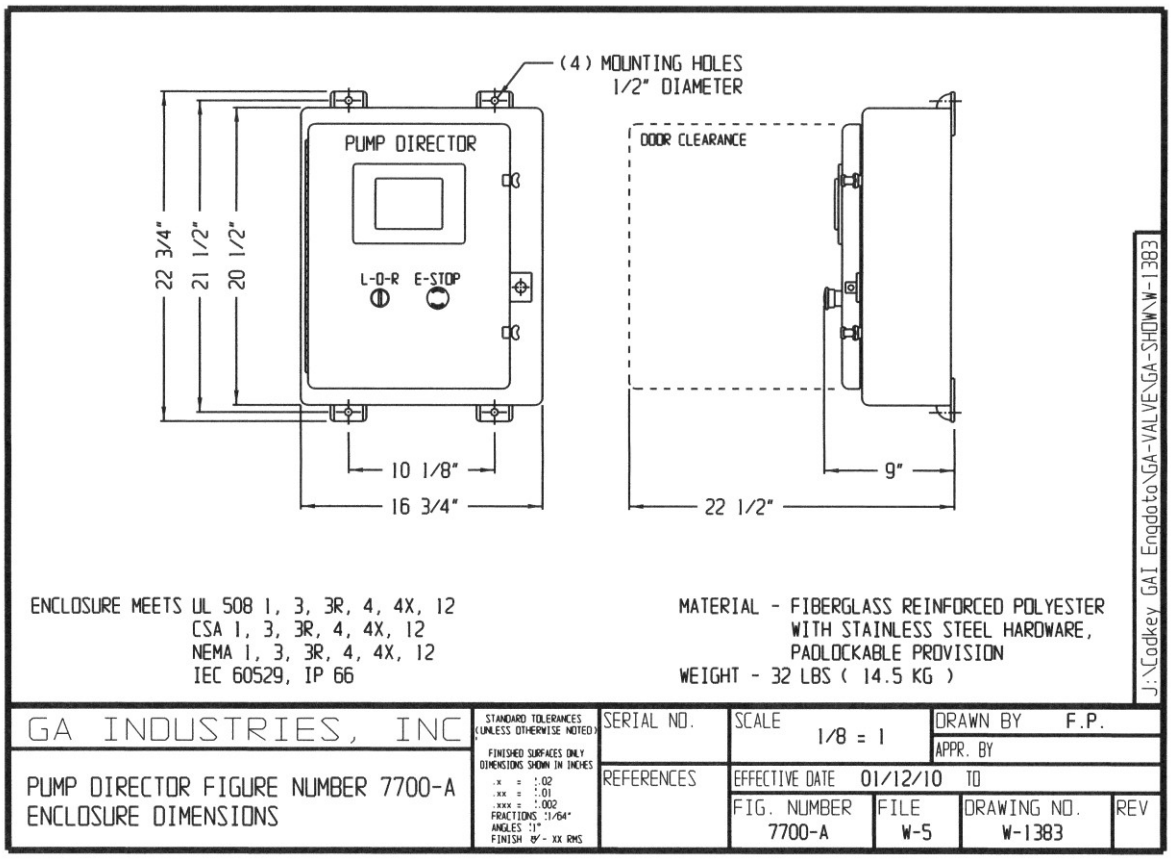
The Pump Director is furnished in a NEMA 4X fiberglass enclosure suitable for wall mounting, with mounting dimensions shown on drawing W-1383. The Pump Director is normally installed in proximity to the corresponding pump control valve and pump, although it is possible to install the Pump Director remotely from the valve and pump.

The recommended operation temperature range is 0 to 50° C (32 to 122° F). If the Pump Director is installed outdoors, it is recommended that it be housed in a shed or with a rain/sun shield in order to optimize viewing the LCD status screen. While the Pump Director enclosure and door-mounted hardware are rated NEMA 4X, comparably rated wiring/conduit connection(s) must be used in order to maintain this rating.

The Pump Director is normally powered by a 115/120 VAC, 50/60 Hz, single-phase power supply. The Pump Director includes a 5A circuit breaker however it is recommended that an external circuit breaker, 5A minimum rating, be used at the supply voltage source.

The Pump Director incorporates an internal power supply unit that can accept supply voltages ranging from 100 to 240 VAC, 50/60 Hz range however use of supply voltages other than the recommended 115/120 VAC will affect certain output signals. Consult the factory for additional information when using supply voltages other than 115/120 VAC, 50/60 Hz, single phase.

All wiring connections are made to upper and lower terminal strips within the enclosure. Terminal strip locations and terminal designations are shown on drawing W-1384 and W-1385. Refer to the section describing **Wiring Connections** for additional information. No wiring connections are made directly to the PLC or the PLC expansion modules. The terminal strips will accept wire sizes AWG 26 through AWG 12 (recommended wire size AWG 20 or 18).



ENCLOSURE MEETS UL 508 1, 3, 3R, 4, 4X, 12
CSA 1, 3, 3R, 4, 4X, 12
NEMA 1, 3, 3R, 4, 4X, 12
IEC 60529, IP 66

MATERIAL - FIBERGLASS REINFORCED POLYESTER WITH STAINLESS STEEL HARDWARE, PADLOCKABLE PROVISION
WEIGHT - 32 LBS (14.5 KG)

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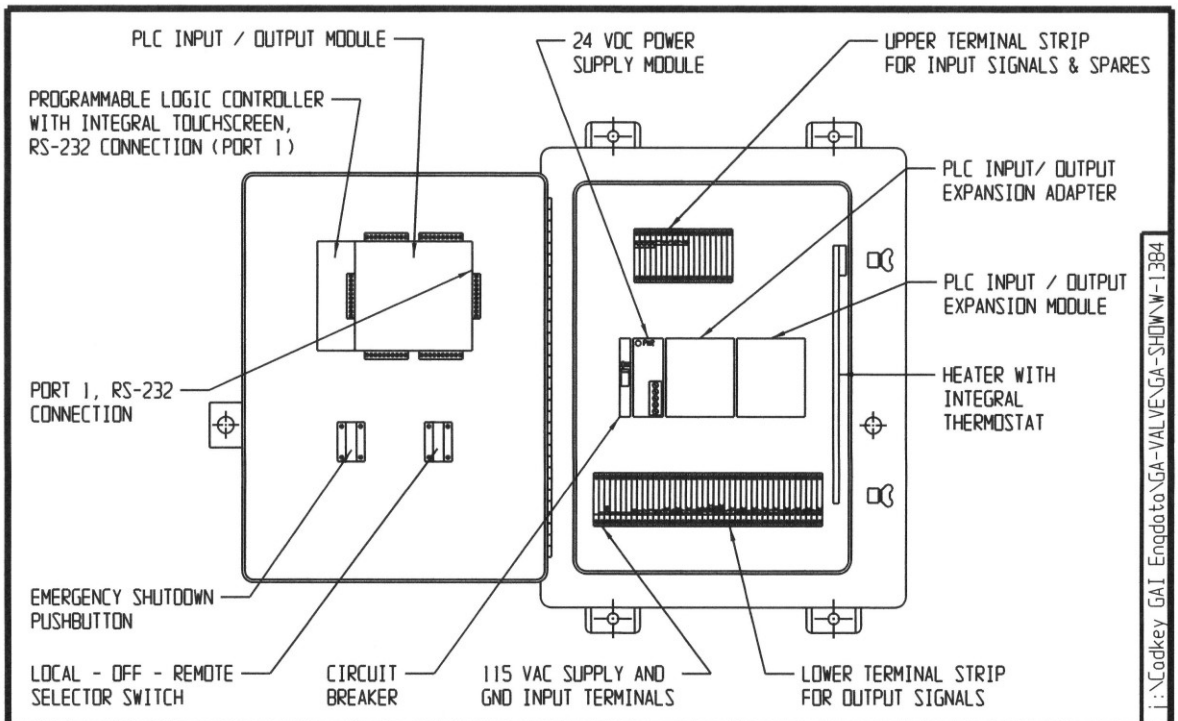
GA INDUSTRIES, INC	STANDARD TOLERANCES (UNLESS OTHERWISE NOTED) FINISHED SURFACES ONLY DIMENSIONS SHOWN IN INCHES .x = ±.02 .xx = ±.01 .xxx = ±.002 FRACTIONS ±1/64" ANGLES ±1° FINISH ✓ - xx RMS	SERIAL NO.	SCALE 1/8 = 1	DRAWN BY F.P.	
PUMP DIRECTOR FIGURE NUMBER 7700-A ENCLOSURE DIMENSIONS		REFERENCES	EFFECTIVE DATE 01/12/10 TO	APPR. BY	
			FIG. NUMBER 7700-A	FILE W-5	DRAWING NO. W-1383 REV



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GA INDUSTRIES, INC	STANDARD TOLERANCES (UNLESS OTHERWISE NOTED) FINISHED SURFACES ONLY DIMENSIONS SHOWN IN INCHES .x = ±.02 .xx = ±.01 .xxx = ±.002 FRACTIONS ±1/64" ANGLES ±1° FINISH ✓ - xx RMS	SERIAL NO.	SCALE NTS	DRAWN BY F.P.	
PUMP DIRECTOR FIGURE NUMBER 7700-A INTERIOR COMPONENT ARRANGEMENT		REFERENCES	EFFECTIVE DATE 01/12/10 TO	APPR. BY	
			FIG. NUMBER 7700-A	FILE W-5	DRAWING NO. W-1384 REV

UPPER TERMINAL STRIP	
+24	24 VDC SOURCE
+24	24 VDC SOURCE
+24	24 VDC SOURCE
+24	24 VDC SOURCE
I3	LIMIT SWITCH (NC)
I4	LIMIT SWITCH (NO)
I5	AUX SHUTDOWN (NC)
I6	PRESS SWITCH (NO)
I7	REMOTE START (NO)
I8	ALARM RESET (NC)
	SPARE
	SPARE
	SPARE
	SPARE
	SPARE
	SPARE
	SPARE
	SPARE

LOWER TERMINAL STRIP	
L	115 VAC INPUT (-)
N	115 VAC INPUT (+)
GND	GROUND
N	115 VAC OUTPUT (+)
N	115 VAC OUTPUT (+)
N	115 VAC OUTPUT (+)
N	115 VAC OUTPUT (+)
R0	PUMP STARTER (115 VAC)
R1	NORM OPEN (115 VAC)
R2	EMER CLOSE (115 VAC)
R3	NORM CLOSE (115 VAC)

LOWER TERMINAL STRIP	
R5	PUMP STARTER (NO)
R5C	PUMP STARTER (NO)
R6	NORM OPEN (NO)
R6C	NORM OPEN (NO)
R7	EMER CLOSE (NO)
R7C	EMER CLOSE (NO)
R8	NORM CLOSE (NO)
R8C	NORM CLOSE (NO)
LOC	LOCAL (NO)
LOCC	LOCAL (NO)
REM	REMOTE (NO)
REMC	REMOTE (NO)
ES	EMER SHUTDOWN (NO)
ESC	EMER SHUTDOWN (NO)
00	LOW PRESS STARTUP (NO)
00C	LOW PRESS STARTUP (NO)
01	VALVE FAIL STARTUP (NO)
01C	VALVE FAIL STARTUP (NO)
02	VALVE FAIL RUN (NO)
02C	VALVE FAIL RUN (NO)
03	LOW PRESS RUN (NO)
03C	LOW PRESS RUN (NO)
04	POWER FAIL DELAY (NO)
04C	POWER FAIL DELAY (NO)
05	VALVE NOT CLOSED (NO)
05C	VALVE NOT CLOSED (NO)
06	VALVE FAIL TO CLOSE (NO)
06C	VALVE FAIL TO CLOSE (NO)
07	AUX SHUTDOWN (NO)
07C	AUX SHUTDOWN (NO)

TERMINALS RATED FOR AWG 26 - 12 (RECOMMENDED AWG 20 - 18)
REFER TO INSTRUCTION MANUAL FOR ADDITIONAL INFORMATION ON CONNECTIONS

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GA INDUSTRIES, INC

PUMP DIRECTOR
FIGURE NUMBER 7700-A
TERMINAL CONNECTIONS

STANDARD TOLERANCES (UNLESS OTHERWISE NOTED)
FINISHED SURFACES ONLY
DIMENSIONS SHOWN IN INCHES
.x = ±.02
.xx = ±.01
.xxx = ±.002
FRACTIONS ±1/64"
ANGLES ±1°
FINISH ✓ - XX RMS

REFERENCES	SCALE	DRAWN BY	
	NTS	F.P.	
SERIAL NO.	EFFECTIVE DATE:	APPR. BY	
	01/12/10		
FIG. NO.	FILE	DRAWING NO.	REV
7700-A	W-5	W-1385	

System Installation Requirements - continued

The Pump Director's LCD display can be monitored from a remote computer terminal via an RS-232 connection. The RS-232 connection in the Pump Director is labeled "Port 1" on the PLC (see drawing W-1384 for location of Port 1 inside enclosure). To utilize the RS-232 communication option, it is necessary to install the "Remote Access Setup" program and load the "Remote Access Image Files" from the CD furnished with the Pump Director on the remote computer terminal (see section describing **Communications Via RS-232 Port** for additional details).

Wiring Connections (reference drawings W-1384, W-1385)

Caution: Do not touch live wires. Before making wiring connections to the Pump Director terminal strips, all power sources must be disconnected and locked out. All wiring connections must be made in accordance with project specifications, local, state, and national electrical codes. Unused terminals should not be connected; ignoring this directive may damage the device. Terminals will accept wire sizes AWG 26 - 12 (recommended wire size AWG 20 - 18).

Input Connections (upper terminal strip) - Input connections are made to the upper terminal strips. All input connections are powered by the Pump Director's internal 24 VDC power supply. **Do Not apply external voltages to the input connections**; failing to follow this directive may result in damage to the device. Terminals labeled **+24** are all common and can be used to connect to any of the input connections. All input connections are to be made to non-powered contacts from the following external devices:

I3, **+24** - Connect to valve limit switch, normally closed (NC) contacts (contacts are closed when valve is fully closed, contacts open when valve is not fully closed)

I4, **+24** - Connect to valve limit switch, normally open (NO) contacts (contacts are open when valve is fully closed, contacts close when valve is not fully closed)

Note - Both NO and NC limit switch connections to I3 and I4 are required.

I5, **+24** - Connect to auxiliary shut-down device(s) (e.g. - pump anti-plugging switch, low suction level switch, motor over-temperature switch, etc.)

If multiple shut-down devices are required, these devices should be wired in series so that open contacts from any of the devices shall open the circuit across terminals **I5** and **+24**

If no auxiliary shut-down devices are required, a jumper must be installed across terminals **I5** and **+24**

Open contacts across terminals **I5** and **+24** will prevent pump start-up and/or will cause an emergency shut-down of valve and pump

Input Connections (upper terminal strip) - continued

I6, **+24** - Connect to normally open contacts of pressure switch installed on pump discharge/valve inlet (contacts are open when pump is not developing adequate pressure, contacts close when pump develops adequate pressure to insure forward flow)

I7, **+24** - Connect to remote start signal device (contacts close to initiate a pump start sequence, contacts to remain closed during entire pump run cycle, contacts to open to initiate normal pump shut-down sequence)

I8, **+24** - Connect to remote alarm reset device (contacts only function when L-O-R Selector is in 'Remote' position; contacts normally open, contact closure will allow remote reset of alarm condition)

Power Supply Connection (lower terminal strip) - Connect the 115/120 VAC, 50/60 Hz, single phase power supply to the lower terminal strip; terminals labeled '**L**' (±), '**N**' (neutral), and '**Gnd**' (ground) located on the left hand side of the lower terminal strip. It is recommended that the power supply source include a minimum 5A rated circuit breaker.

Do Not apply power to these terminals until all wiring connections are complete.

Output Connections (lower terminal strip) - Output connections are made to the lower terminal strip. Output connections include powered (115/120 VAC outputs) and non-powered output connections, allowing the use of the Pump Director with a variety of Pump Control Valves.

NOTE - The Pump Director is configured to work in conjunction with a variety of different Pump Control Valves that may require different input/output signals. Not all output terminals will be connected. Refer to the instruction manual for the specific type of Pump Control Valve for details on specific input/output requirements required for valve operation. Unused output terminals should not be connected - ignoring this directive may damage the device.

Powered Output Connections (lower terminal strip):

Terminals labeled '**N**' are all common and can be used to connect to any of the powered output connections. The combined power consumption of all devices connected to powered output connections should not exceed 3 amps.

R0, N - Connect to pump motor starter. Terminals output 115/120 VAC to activate pump motor starter. Terminals become de-energized to de-activate pump motor starter.

R1, N - Connect to valve normal solenoid pilot or valve 'normal open' input. Terminals output 115/120 VAC to open valve. Terminals become de-energized to initiate normal close valve operation.

R2, N - Connect to valve emergency solenoid pilot or valve 'emergency close' input (if valve provided with 'emergency close' controls). Terminals output 115/120 VAC during normal valve operation. Terminals become de-energized to initiate emergency close valve operation.

Powered Output Connections (lower terminal strip) - continued

R3, N - Connect to valve 'normal close' input. Terminals output 115/120 VAC to initiate normal valve closure. Terminals become de-energized to initiate normal valve open operation.

Non-Powered Output Connections (lower terminal strip):

R5, R5C - Connect to pump motor starter. Terminals close to activate pump motor starter. Terminals open to de-activate pump motor starter.

R6, R6C - Connect to valve 'normal open' input. Terminals close to signal valve to open valve. Terminals open to initiate normal close valve operation.

R7, R7C - Connect to valve 'emergency close' input (if valve provided with 'emergency close' controls). Terminals close during normal valve operation. Terminals open to initiate emergency close valve operation.

R8, R8C - Connect to valve 'normal close' input. Terminals close to initiate normal valve closure. Terminals open to initiate normal valve open operation.

LOC, LOCC - Local/Off/Remote selector switch indication. Terminals close to indicate L/O/R selector switch In Local position. Terminals open to indicate L/O/R selector switch in Off or in Remote position.

REM, REMC - Local/Off/Remote selector switch indication. Terminals close to indicate L/O/R selector switch in Remote position. Terminals open to indicate L/O/R selector switch in Off or in Local position.

ES, ESC - **Emergency pump shutdown pushbutton alarm**. Terminals close to indicate ES pushbutton activated. Terminals open to indicate ES pushbutton not activated.

00, 00C - **Insufficient pressure on start-up alarm**. Terminals close to indicate Alarm condition.

01, 01C - **Valve fail to open within VIT time setting alarm**. Terminals close to indicate alarm condition.

02, 02C - **Valve closed without command alarm**. Terminals close to indicate alarm condition.

03, 03C - **Loss of pumping pressure alarm**. Terminals close to indicate alarm condition.

04, 04C - **Power failure delay restart alarm**. Terminals close to indicate power failure restart delay timer (PFT) operating (if 'Auto Restart Enable' option selected from set-up screen) or terminals close to indicate that restart prevented due to power failure (if 'No Auto Restart' option selected from set-up screen).

Non-Powered Output Connections - continued

05, 05C - **Valve not closed, preventing start-up alarm**. Terminals close to indicate alarm condition.

06, 06C - **Valve failed to close within VCD time setting alarm**. Terminals close to indicate alarm condition.

07, 07C - **Auxiliary shut-down alarm**. Terminals close to indicate alarm condition.

If a common alarm output is desired, terminals ES, 00, 01, 02, 03, 04, 05, 06, and 07 can be jumped together and terminals ESC, 00C, 01C, 02C, 03C, 04C, 05C, 06C, and 07C can be jumped together. The remote signal can then be connected to any pair of alarm terminals to provide a single alarm output signal for any alarm condition.

Controls

Local (RS-232) - Off - Remote Selector Switch - Three position selector switch (L-O-R) located on enclosure door. The L-O-R switch position determines the operating mode of the Pump Director.

With **L-O-R switch in Off Position**, the Pump Director is in 'stand-by' mode and will not respond to local or remote pump start signals. Note that the Pump Director is fully powered when the L-O-R switch is in the Off position. **Do Not touch any terminals when the L-O-R switch is in the Off position since some terminals may be powered**. The Pump Director Set-Up Screen is accessible when the L-O-R switch is in the Off position to permit adjustment of the various timers and operation options (see section describing **Set-Up Screen** for additional details.)

If the L-O-R switch is turned to the Off position during a normal pump run sequence (pump running, check valve open), a normal pump shut-down sequence will be initiated (see page 15 for additional information). After the valve has closed and the pump turned off, the Pump Director will return to the 'stand-by' mode as described in the preceding paragraph.

With **L-O-R switch in Local (RS-232) Position**, the Pump Director will respond to pump start and pump stop signals input through the LCD touchscreen controls. When in Local (RS-232) position the Pump Director will ignore remote pump start, pump stop, and alarm reset signals input through the terminal strip inputs (terminals **I7, +24** and **I8, +24**). The Pump Director Set-Up Screen is accessible when the L-O-R switch is in the Local (RS-232) position to permit adjustment of the various timers and operation options (see section describing **Set-Up Screen** for additional details.)

When the **L-O-R switch is in the Local (RS-232) position** it is possible to view the LCD touchscreen from a remote computer terminal through the RS-232 connection (Port 1). It is also possible to activate the inputs shown on the LCD touchscreen from a remote computer terminal through the RS-232 connection (Port 1). To utilize the RS-232 communication option, it is necessary to install the "Remote Access Setup" program and load the "Remote Access Image Files" from the CD furnished with the Pump Director on the remote computer terminal (see section describing **Communications Via RS-232 Port** for additional details).

Local (RS-232) - Off - Remote Selector Switch - continued

With **L-O-R switch in Remote Position**, the Pump Director will respond to pump start, pump stop, and alarm reset signals input through the terminal strip inputs (terminals **I7, +24** and **I8, +24**). The Pump Director Set-Up Screen is accessible when the L-O-R switch is in the Remote position to permit adjustment of the various timers and operation options (see section describing **Set-Up Screen** for additional details.)

When the L-O-R switch is in the Remote position it is possible to view the LCD touchscreen from a remote computer terminal through the RS-232 connection (Port 1). To utilize the RS-232 communication option, it is necessary to install the "Remote Access Setup" program and load the "Remote Access Image Files" from the CD furnished with the Pump Director on the remote computer terminal (see section describing **Communications Via RS-232 Port** for additional details).

Emergency Shutdown Pushbutton - A manually activated, locking type pushbutton switch located on the enclosure door. The Emergency Shutdown Pushbutton will override all pump start and pump stop signals input through the LCD touchscreen controls, RS-232 remote computer terminal inputs, and/or remote terminal inputs (terminals **I7, +24** and **I8, +24**) regardless of the position of the L-O-R selector switch. Depressing the Emergency Shutdown Pushbutton will immediately and simultaneously issue the following outputs:

- Issue 'Pump Stop' output signal (de-energize terminals **R0, N**; open terminals **R5, R5C**).
- Issue 'Valve Normal Close' output signal (de-energize terminals **R1, N**; energize terminals **R3, N**; open terminals **R6, R6C**; close terminals **R8, R8C**)
- Issue 'Valve Emergency Close' output signal (de-energize terminals **R2, N**; open terminals **R7, R7C**)
- Issue 'Emergency Shut-Down Alarm' output signal (close terminals **ES, ESC**)

Caution: Depressing the Emergency Shutdown Pushbutton does not interrupt electrical power to the Pump Director, pump motor control center, pump motor (except as a result of issuing the above output commands) or valve electric motor operator (if valve provided with EMO).

To override the Emergency Shutdown Pushbutton after being depressed, the pushbutton must be manually rotated clockwise to release the locking spring mechanism.

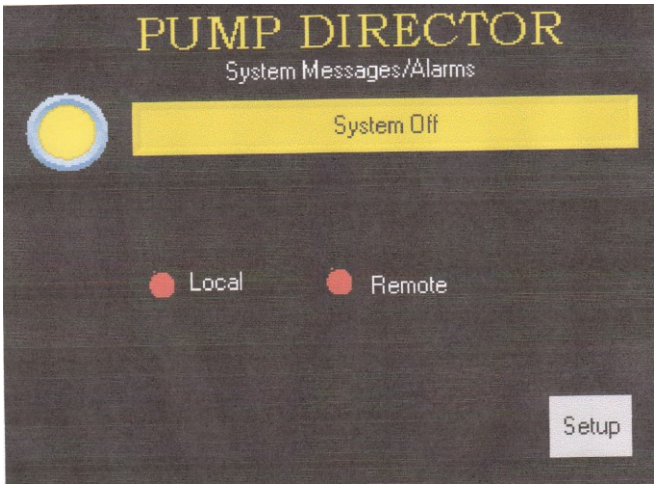
Circuit Breaker - A 5 amp circuit breaker is provided with the Pump Director to protect the internal 24 VDC power supply and PLC from voltage surges. Opening the circuit breaker using the manual On (Reset) / Off switch will interrupt electric power to the Pump Director's power supply, PLC, screen, expansion adapter, heater, terminals marked N and terminals R0 thru R3 (lower terminal strip), terminals marked +24 and terminals I3 thru I8 (upper terminal strip).

Caution - **Even if the circuit breaker is opened** (due to over-voltage or manually) **foreign voltages may still be present** on terminals L and/or N, and all remaining terminals not named in the preceding paragraph. When servicing, open the 5 amp circuit breaker by adjusting the On (Reset) / Off switch to the Off position. Then, all terminals must be checked for foreign voltages. If foreign voltages are present, they must be interrupted and locked-out at the external voltage source.

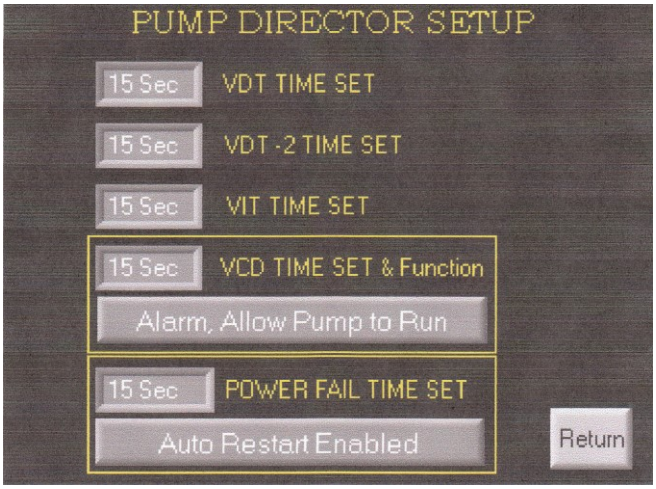
LCD Display and Virtual Touchscreen

The LCD display and virtual touchscreen provides a real time display of the status of the Pump Director in all operating modes. All timer settings and operating options are available and set through the LCD set-up screen.

Standby Screen is displayed when the L-O-R selector switch is in the 'Off' position:



When the Standby Screen is visible, only the **Setup Pushbutton** is available. Pressing the **Setup Pushbutton** will cause the **Setup Screen** to become visible:



Setup Screen - From the Setup Screen, the five (5) timers can be set. Touching the appropriate timer setting will cause a numeric keypad to be displayed, allowing a different time setting to be entered (press the return arrow on the keypad to return to the Setup Screen). The function of the timer settings are described as follows:

LCD Display and Virtual Touchscreen; Set-Up Screen - continued

VDT Timer - Determines waiting period for pump to develop sufficient pressure to satisfy the pressure switch setting after receiving a pump start command. Failure of the pump to develop adequate pressure within this time period will cause the pump to be turned off and an alarm condition to be displayed.

VDT-2 Timer - After adequate pressure is developed on pump start-up, valve opening will be delayed for this time period (often used to permit sufficient time for air to be discharged from deep well columns or riser piping of vertical turbine pumps). When the VDT-2 Timer has expired, a valve open command will be issued.

VIT Timer - Determines waiting period for valve to begin opening after VDT-2 timer has expired. Failure of the valve to begin opening within this time period will cause the pump to be turned off, a valve close command to be issued, and an alarm condition to be displayed.

VCD Timer - Determines waiting period for valve to fully close after receiving a pump shut-down command. Failure of the valve to fully close within this time period will activate an alarm. Two possible actions are possible (selectable by pressing the pushbutton immediately under the VCD timer) if the VDC timer expires and the valve has not fully closed:

- Allow the pump to continue to run and display an alarm condition.

- Or -

- Initiate an emergency pump shut-down and emergency valve closure (if valve is equipped with emergency shut-down controls) and display an alarm condition.

PFT Timer - Determines waiting period following a power failure and restoration of power should a power failure occur during a pump start or a pump run sequence. Two possible actions are possible (selectable by pressing the pushbutton immediately under the PFT timer) after power has been restored and after the PFT timer has expired:

- Display an alarm condition while the PFT timer is running and allow an automatic restart of the pump to occur after the PFT timer expires (provided a pump shut-down command has not been received).

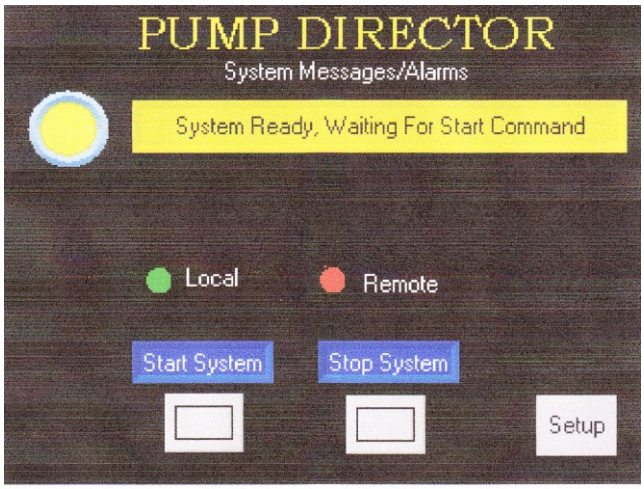
- Or -

- Display an alarm condition. Do not allow an automatic restart of the pump to occur without a reset of the alarm condition.

Return Pushbutton - Pressing the Return Pushbutton will exit the set-up screen and return the LCD to the display that was exhibited prior to the set-up screen

LCD Display and Virtual Touchscreen - continued

Local Status Screen - When the L-O-R selector switch is in the Local position, the status of the Pump Director is displayed. Local pump start, pump stop, and alarm reset commands can be issued directly through the virtual touchscreen controls on the Local Status Screen:



The upper message bar displays the current status/operating condition of the Pump Director.

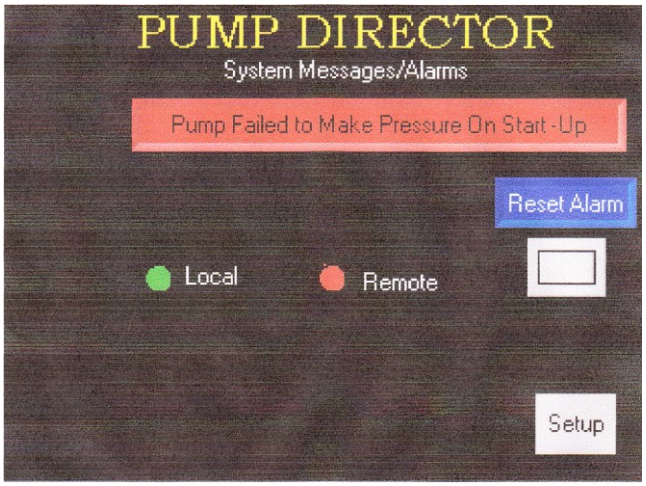
Depressing the **Start System Pushbutton** will initiate the normal pump start, valve open operating sequence. The upper message bar will display the operating status as the Pump Director proceeds through the entire pump start, valve open sequence, including the status of all timers that become active during the sequence.

Depressing the **Stop System Pushbutton** will initiate a normal valve close, pump shut-down sequence. The upper message bar will display the operating status as the Pump Director proceeds through the entire valve close, pump shut-down sequence, including the status of all timers that become active during the sequence.

Depressing the **Setup Pushbutton** will cause the Setup Screen to become visible (see section describing **Setup Screen** for additional details).

LCD Display and Virtual Touchscreen ; Local Status Screen - continued

If the Pump Director encounters an alarm condition, the upper message bar will display the alarm specifics:



The alarm condition will remain 'locked in' until the **Alarm Reset Pushbutton** is depressed or a remote alarm reset input signal (momentary dry contact closure) is received on terminals I8 and +24 (remote alarm reset only permitted with L-O-R switch on the Pump Director Door is in the Remote position). Note that turning the L-O-R switch to the Off position will not reset an alarm condition.

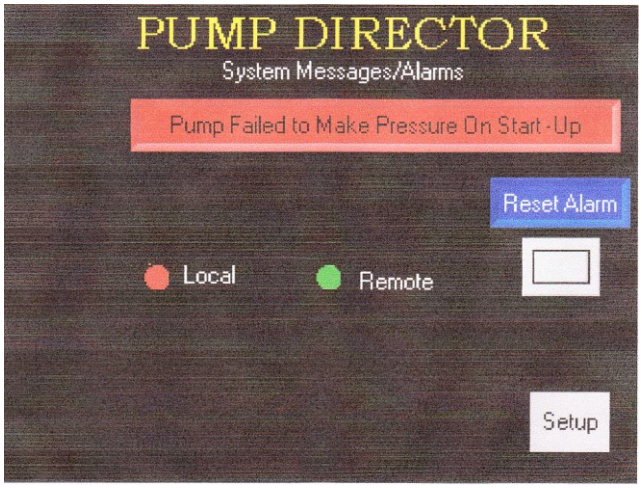
Remote Status Screen - When the L-O-R selector switch is in the Remote position, the status of the Pump Director is displayed:

The upper message bar displays the current status/operating condition of the Pump Director.

Depressing the **Setup Pushbutton** will cause the Setup Screen to become visible (see section describing **Setup Screen** for additional details).

LCD Display and Virtual Touchscreen ; Remote Status Screen - continued

If the Pump Director encounters an alarm condition, the upper message bar will display the alarm specifics:



The alarm condition will remain 'locked in' until the **Alarm Reset Pushbutton** is depressed or the alarm is reset by remote alarm reset input signal.

Communications Via RS-232 Port

Remote monitoring of the LCD Display on a remote computer screen is possible by communication via the **RS232 port connection** provided with the processor (Port 1 connection located on side of the programmable logic controller mounted on the enclosure door, see drawing no. W-1384). The serial port on the Pump Director's PLC is type RJ-11. The RS232 connection to the remote computer has the following pinouts:

Pin#1 - DTR signal; Pin#2 - 0V reference; Pin#3 - TXD signal; Pin #4 - RXD signal
Pin#5 - 0V reference; Pin #6 - DSR signal

In order to view the LCD Display on a remote computer screen, "Remote Access Setup" program must be loaded on the remote computer. After loading the "Remote Access Setup" program, the "Remote Access Image Files" must be loaded using the "Remote Access Setup" program. The "Remote Access Setup" program and the "Remote Access Image Files" are located on a CD provided with the Pump Director. To load the program and files, the following procedure should be followed:

1. On the computer that will be used to monitor the Pump Director LCD Display, run the file RemoteAccessSetup_8_0_2.exe from the CD.
2. Open the Remote Access Program and under the Configuration Tab choose "Select Fonts and Images file (*urc)"
3. Select the file RemoteAccessImages.urc from the CD to load the images.
4. Click the On Line Tab to monitor the Pump Director's LCD Display on the computer.

Communications Via RS-232 Port - continued

Using the Remote Access Program, the LCD display can be viewed on a remote computer monitor when in all operating modes of the Pump Director (i.e. - the LCD display will be shown on the remote computer monitor with the L-O-R selector switch in any position).

Remote control of the LCD Display and Touchscreen from a remote computer screen is possible by communication via the **RS232 port connection** provided with the processor (Port 1 connection located on side of the programmable logic controller mounted on the enclosure door, see drawing no. W-1384).

Follow the instructions for loading the "Remote Access Program" and "Remote Access Image Files" described in the preceding section of these instructions. In order to display the "Start" and Stop" pushbuttons on the remote computer screen, the L-O-R Selector Switch must be placed in the Local (RS-232) position. From the remote computer screen, right-clicking on any of the available pushbuttons on the Pump Director Display will activate the pushbutton and allow the Pump Director to be controlled from the remote computer screen.

Pump Director Functions and Operating Sequence

FUNCTION - Normal Pump Start-Up

The Pump Director shall control operation of the pump and pump control valve by a local input when the L-O-R selector is in the Local position, or remote input when the L-O-R selector is in the Remote position. A message shall be displayed indicating if the Pump Director is off-line (L-O-R switch is in the Off position) or if the Pump Director is on-line, waiting for a "pump start" command signal to be issued with virtual yellow status light displayed on the touchscreen.

Upon receipt of a local or remote "pump start" command signal, the pump start outputs shall be activated and the VDT timer shall be activated while waiting for the pump to develop pressure. A message shall be displayed indicating that the pump has been started and waiting for pressure; a virtual flashing-blue status light shall be displayed; the VDT timer shall also be displayed.

When the pressure switch input verifies that the pump has developed adequate pressure, the emergency close outputs shall be de-activated and the VDT-2 timer shall be activated to delay valve opening for the duration of the VDT-2 timer (to allow air in the pump column to be purged). A message shall be displayed indicating that pressure has been developed and the valve opening is being delayed; a virtual steady-blue light shall be displayed; the VDT-2 timer shall also be displayed.

When the VDT-2 timer has expired, the normal valve open outputs shall be activated, the normal valve close outputs shall be de-activated, and the VIT timer shall be activated. A message shall be displayed indicating that the valve has been signaled to open; a virtual flashing-green light shall be displayed; the VIT timer shall also be displayed.

When the limit switch inputs verify that the valve is no longer closed, the VIT timer shall no longer be displayed. A message indicating that the pump is running, valve is open, pressure is present shall be displayed; a virtual steady green light shall be displayed.

Pump Director Functions and Operating Sequence - continued

FUNCTION - Normal Pump Shut-Down

Upon receipt of a "pump shut-down" signal, the normal valve open outputs shall be de-activated, the normal valve close outputs shall be activated, and the VCD timer shall be activated. A message indicating that a pump shut-down has been signaled, waiting for valve to close shall be displayed; a virtual flashing-green light shall be displayed, the VCD timer shall be displayed.

When the limit switch inputs verify that the valve is fully closed, the pump start outputs shall be de-activated, the emergency valve close outputs shall be activated, the VCD timer shall no longer be displayed. A message indicating that the Pump Director is on-line, waiting for a "pump start" command signal to be issued shall be displayed; a virtual yellow light shall be displayed.

FUNCTION- Emergency Shut-Down Conditions, Fault Diagnostics and Alarms

Upon receipt of a local or remote "pump start" command, if the valve is not fully closed when the "pump start" command is received, an alarm message **"Valve Not Fully Closed, Preventing Start-Up"** shall be displayed and corresponding output alarm signal shall be issued. The pump start outputs shall not be activated. A reset of the alarm shall be required to attempt to re-start the pump.

Upon receipt of a local or remote "pump start" command, if the auxiliary system override/shutdown input signal is present, an alarm message **"Auxiliary System Override Shutdown"** message shall be displayed and a corresponding output alarm signal shall be issued. The pump start outputs shall not be activated. A reset of the alarm shall be required to attempt to re-start the pump.

Failure of the pump to develop pressure before the VDT timer expires shall cause the pump start outputs to be de-activated. An alarm message **"Insufficient Pressure On Start-Up"** shall be displayed, and corresponding output alarm signal shall be issued. A reset of the alarm shall be required to re-start the pump.

Failure of the valve to begin opening before the VIT timer expires shall cause the pump start outputs to be de-activated, the normal valve open outputs shall be de-activated, the normal valve close outputs shall be activated the emergency valve close outputs shall be activated. An alarm message **"Valve Failed To Open On Start-Up"** shall be displayed and corresponding output alarm signal shall be issued. A reset of the alarm shall be required to re-start the pump.

While pumping, if the pressure switch input indicates a loss of pumping pressure, the pump start outputs shall be de-activated, the normal valve open outputs shall be de-activated, the normal valve close outputs shall be activated, and the emergency valve close outputs shall be activated. An alarm message **"Loss Of Pressure While Pumping"** shall be displayed and corresponding output alarm signal shall be issued. A reset of the alarm shall be required to re-start the pump.

Pump Director Functions and Operating Sequence; Emergency Shut-Down Conditions, Fault Diagnostics and Alarms - continued

While pumping, if either of the limit switch inputs indicate the valve has closed without a "pump stop" command signal being received, the pump start outputs shall be de-activated, the normal valve open outputs shall be de-activated, the normal valve close outputs shall be activated, and the emergency valve close outputs shall be activated. An alarm message **"Valve Closed Without Command"** shall be displayed and corresponding output alarm signal shall be issued. A reset of the alarm shall be required to re-start the pump.

Upon receipt of a "pump stop" command, failure of the valve to close before the VCD timer expires shall cause an alarm message **"Valve Failed To Close After Shutdown Command"** to be displayed.

- If the set-up option "Alarm, Allow Pump To Run" option was selected from the set-up screen, a corresponding output alarm signal shall be issued, the pump start outputs will remain activated, normal valve open outputs shall remain de-activated, normal valve close outputs shall remain activated, and the emergency close outputs shall remain de-activated (pump will be allowed to continue to run).

- If the set-up option "Alarm, Emergency Shut-Down" was selected from the set-up screen, a corresponding output alarm signal shall be issued, the pump start outputs shall be de-activated, normal valve open outputs shall remain de-activated, normal valve close outputs shall remain activated, and the emergency valve close outputs shall activated (emergency shutdown of valve and pump).

- A reset of the alarm shall be required to re-start the pump.

If the emergency shut-down pushbutton is depressed, the pump start outputs shall be de-activated, the normal valve open outputs shall be de-activated, the normal valve close outputs shall be activated, the emergency valve close outputs shall be activated. An alarm message **"Emergency Stop Button Activated"** shall be displayed and a corresponding output alarm signal shall be issued. A reset of the emergency shut-down pushbutton shall be required to re-start the pump.

If a power failure should occur during a pump run sequence, the pump start outputs shall be de-activated, the normal valve open outputs shall be de-activated, the normal valve close outputs shall be activated (note - 115/120 VAC normal valve close output from terminals N & R3 cannot output 115/120 VAC until power is restored to Pump Director), and the emergency valve close outputs shall be activated.

- If the set-up option "No Auto Restart" was selected from the set-up screen, an alarm message **"Power Failure"** shall be displayed and a corresponding output alarm signal shall be issued. A reset of the alarm shall be required to re-start the pump.

- If the set-up option "Auto Restart Enabled" option was selected from the set-up screen, after power is restored to the Pump Director an alarm message **"Power Failure"** shall be displayed, a corresponding output alarm signal shall be issued, the PFT timer shall be activated and displayed. When the PFT timer expires and if the "pump start" command is still present, an automatic pump start sequence shall be initiated without requiring a reset of the power failure alarm.

Battery Back-up

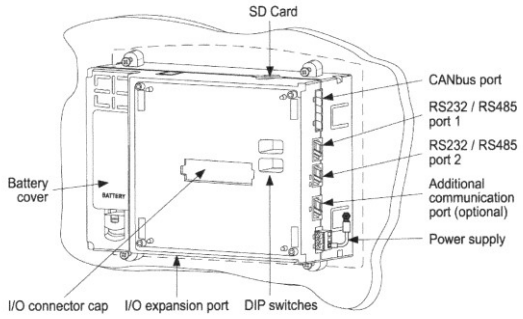
The programmable logic controller (see location on page 2) is equipped with a battery back-up that preserves the program data in case of a power loss. The battery should be replaced every 5 - 7 years.

The battery used is a 3 Volt battery, model number CR2450N.

When replacing the battery, the normal power supply to the PLC should be on and the circuit breaker should be in the normal 'On' position to ensure that the PLC remains powered during battery replacement. This will ensure that the PLC program data is not lost during battery replacement.

The battery replacement procedure is as follows:

1. Remove the battery cover (shown on the diagram shown below). The polarity (+) is marked on the battery holder and on the battery.



2. Remove the old battery and insert the new battery, ensuring that the polarity symbol on the battery is:

   - facing up
   - aligned with the symbol on the holder

3. Replace the battery cover.

Troubleshooting a Blank Screen

The touchscreen on the door of the Pump Director should automatically turn on and display the normal start-up screen as soon as power is applied to the PLC.

If the display is blank, first check to ensure that electrical power (115 - 120 VAC) is being applied to Pump Director terminals 'L' and 'N' on the lower terminal strip. If power is applied to terminals 'L' and 'N', check the circuit breaker to ensure that the circuit breaker is in the normal 'On' position, powering the PLC.

Troubleshooting a Blank Screen - continued

If electric power is present and the circuit breaker is in the normal 'On' position (applying power to the PLC) and the screen remains blank, the PLC program can be restarted by the following steps:

1) Press with finger and hold down anywhere on touch screen for approx. 5 seconds and wait till "Info Mode" screen becomes active

2) Press "Enter Info Mode" button

3) Enter password 1111 and press enter button

4) Press "Working Mode" button

5) Press "Run" button

6) Press "Reset" button

7) When the message "Are you sure you want to reset the plc?" message Appears, press the "Yes" button

8) The PLC should start normally

SPECIFICATION FOR PUMP DIRECTOR, MODEL 7700-A
Electronic Controller For Pump Control Valves

GENERAL

The Pump Director controller shall function as the interface between the pump control valve and the pump starter. The Pump Director shall properly sequence and control the pump start-up and pump shut-down procedure, providing both visual and electronic status outputs for operating personnel. The Pump Director 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 fault notification to operating personnel.

CONSTRUCTION

The Pump Director shall include a solid-state processor capable of monitoring a minimum of (10) digital input signals, and providing a minimum of (4) powered output signals and (15) digital output signals. The processor shall have a minimum of 2 MB logic memory, minimum 120 K database memory, and 9 µsec scan time.

Local operator status shall be provided by illuminated LCD touchscreen panel, minimum 5.7" screen size, 256 color. Data input shall be possible by virtual keypad via the touchscreen panel.

In addition to the powered outputs, digital outputs, and LCD touchscreen panel, remote communication and status monitoring shall be provided by means of an RS232 port connection.

A regulated power supply shall be provided, suitable for 115 to 120 VAC single phase supply voltage, 50/60 hz, with maximum 30 amp surge current rating. Output voltage shall be regulated 24 VDC ± 5%, 0.7 amp rated with 0.735 amp over-current protection. A separate 5 amp circuit breaker shall be provided on the incoming supply voltage connection.

The Pump Director shall be housed in a NEMA 4X fiberglass enclosure with gasketed door, gasketed touchscreen panel, continuous stainless steel hinge, stainless steel twist/latch door fasteners, and padlockable door hasp.

The enclosure shall include a minimum 120 watt heater with integral thermostat. A gasketed Local-Off-Remote (L-O-R) selector switch 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.

INPUTS

The Pump Director shall be capable of monitoring the following inputs: presence of supply voltage, status of L-O-R selector switch, status of Emergency Shutdown pushbutton, digital remote pump start/stop command signal, two (2) digital valve closed/not closed signals, digital pump discharge pressure switch signal, digital auxiliary system override/shutdown signal, digital remote alarm reset signal. All digital inputs shall be dry contact type and shall be powered by the Pump Director 24 VDC power supply. Local inputs shall be entered by means of the LCD touchscreen panel and shall include: set-up screen for setting of timers and user-selectable options, local pump start command, local pump stop command, local alarm override command.

OUTPUTS

The Pump Director shall provide the following powered outputs: motor start signal, normal solenoid pilot/valve open signal, emergency solenoid pilot, valve close signal. Powered outputs shall be powered by the incoming VAC supply voltage and protected by the 5 amp circuit breaker.

The Pump Director shall provide the following non-powered digital outputs: motor start signal, normal solenoid pilot/valve open signal, emergency solenoid pilot signal, valve close signal, L-O-R switch in Local signal, L-O-R switch in Remote signal, valve not fully closed alarm, auxiliary system override/shutdown alarm, insufficient pressure on start-up alarm, valve failed to open on start-up alarm, loss of pressure while pumping alarm, valve closed without command alarm, valve failed to close after shut-down command alarm, emergency shut-down button activated alarm, power failure alarm. Non-powered outputs shall be dry contact, isolated relay type rated for 230 VAC / 30 VDC with maximum allowable 3 amp rating (resistive load).

Remote monitoring of the Pump Director status shall be possible by communication via the RS232 port connection provided with the processor.

TIMERS AND SETTINGS

The Pump Director shall include the following timers and settings, programmable from a set-up screen and virtual keypad:

VDT Timer - Allowable time for pump to develop pressure on start-up.
VDT-2 Timer - Delay valve opening after pressure developed on start-up.
VIT Timer- Allowable time for valve to begin opening.
VCD Timer - Allowable time for valve to close.
PFT Timer - Delay time for automatic pump re-start following power failure.

If valve fails to close within VCD timer setting, Pump Director can be set to allow pump to continue to run or to initiate an emergency shut-down sequence of valve and pump.

Following a power failure, upon restoration of power, Pump Director can be set to require a reset of the power failure alarm or to permit an automatic restart of the pump upon restoration of power and expiration of the PFT timer setting.

The controller shall be the GA Industries Model 7700A "Pump Director" as built by VAG USA. LLC, Mars., PA

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The GA Industries Pump Director is a product of VAG USA, LLC, a worldwide manufacturer of automatic control valves and associated controls used in the water and wastewater industries for over 100 years.

For more information regarding GA Industries Products, please contact your local GA Industries sales and service representative or contact VAG USA, LLC corporate headquarters located at:

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234 Clay Avenue
Mars, PA 16046
USA

Tel: 724-776-1020
Fax: 724-776-1254
Email: info-ga@vag-group.com
Website: www.gaindustries.com

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