

INSTALLATION, OPERATION AND FIELD WIRING INSTRUCTIONS

Model 7600 Pump Director

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DESCRIPTION



The GA Industries, Inc. Model 7600 Pump Director is a simple, pre-wired, relay-based electrical control panel that can be used to sequence the operation of the pump motor with the operation of any GA Industries, Inc. hydraulically actuated pump control valve.

The Pump Director can be used on pumps employing soft starts as well as constant or variable speed drives. A good understanding of the Pump Director functions and how it interfaces with the

pump/motor control system is critical for successful integration with the overall control system.

BASIC FUNCTIONS

Pump Start

At pump start, the Pump Director accepts a pump start/run command, engages the pump motor starter, confirms the pump is developing sufficient pressure, signals the pump control valve to open and confirms the valve has opened.

- At pump start, if the pump fails to make sufficient pressure within the allotted time, the Pump Director will disengage the pump motor and not open the pump control valve and indicate a “fault.”
- At pump start, if the pump control valve fails to open within the allotted time, the Pump Director will disengage the pump motor and indicate a “fault.”

Pump Operating

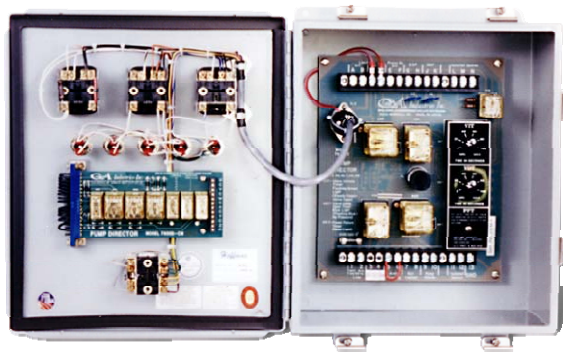
The Pump Director monitors the pumping operation, recognizes certain “fault” conditions and initiates action as follows:

- If the pump fails to make sufficient pressure while the pump motor is running and the pump control valve is open, the Pump Director disengages the pump motor, closes the pump control valve at a faster than normal “emergency” speed and indicates a “fault.”
- If the pump control valve closes while the pump motor has a “run” command the Pump Director will disengage the pump motor and indicate a “fault.”
- If there is even a momentary a loss of power to the pump motor while the pump is operating and the pump control valve is open, the pump control valve will close at “emergency” speed to minimize flow reversal
 - The Pump Director’s “power failure timer” precludes pump motor restart for five minutes after resumption of power

Pump Shutdown

At a “normal” (intentional) pump shutdown, the Pump Director accepts a pump stop command, initiates pump control valve closure and disengages the pump motor starter when the valve is closed.

WIRING CONNECTIONS



Motor Control Center (MCC) Connections

Field connections between the Motor Control Center and the bottom terminal strip inside the Pump Director:

- 1 & 2 120VAC/1Ph/60Hz power supply
 - Must be from the same power buss as the pump motor
 - When there is a power failure to the pump motor it must un-power the Pump Director.
 - The Pump Director must remain powered when power is available even if its pump motor is not operating

- 3 & 4 DO NOT USE

- 5 & 6 Anti-plugging switch
 - Terminals are jumpered at the factory, remove if anti-rotation switch is employed
 - If anti-rotation switch is used, wire to NC contacts in switch that are open whenever the pump is rotating in REVERSE.
 - Prevents pump start if pump is rotating in reverse to avoid damage

- 7 & 8 Remote Auto Control (H-O-A in Auto)
 - Dry, NO contacts
 - Close contacts to initiate pump start sequence
 - Contacts must be maintained closed for sequence to continue
 - Open contacts to initiate “normal” pump shutdown sequence

- 9 & 10 Pump Motor Starter
 - Dry, NO contacts
 - Closed by Pump Director to engage pump motor starter
 - Maintained closed while pump motor is operating
 - Contacts opened by Pump Director to disengage pump motor starter
 - The Pump Director must engage and disengage the motor starter for ALL pump motor start and normal stop commands. There cannot be any other method to start or normally stop a pump motor or the Pump Director’s function is defeated

- 11 & 12 Isolated spares

- 13 Ground

Valve Connections

Field connections between the pump control valve and the upper terminal strip inside the Pump Director:

- A & B Normally closed limit switch contacts
 - Wired to valve mounted limit switch contacts that electrically CLOSE when the valve is about 95% closed.
 - Used as a “permissive” to ensure actuator is holding valve closed before pump start sequence can initiate.
 - Limit switch contacts must be electrically closed to allow pump start
 - These limit switch contacts electrically open when valve travels open past the point at which the contacts closed during closing

- C & D Normally open limit switch contacts
 - Wired to external limit switch contacts that electrically OPEN when the pump control valve is closed
 - Pump motor disengages when these contacts open at end of shutdown sequence
 - These limit switch contacts are maintained electrically OPEN between 95% and 100% closed
 - During the pump start sequence, these switch contacts close and are maintained electrically CLOSED between 5% open and 100% open.
 - Used to confirm the valve has opened

- E & F Pressure switch contacts
- Wire to normally open contacts in valve mounted pressure switch supplied with Pump Director.
 - Contacts close on rising pressure
 - Used as permissive to continue pump start sequence (confirms pump is making sufficient pressure)
 - Pressure switch contacts must be maintained closed for the pump motor to continue to operate
- G & H Emergency Solenoid Pilot (ESP)
- Outputs 110-120VAC to ESP
 - ESP is energized whenever pump motor starter is engaged
 - De-energizing ESP initiates faster than normal “emergency” valve closure
- J & K Normal Solenoid Pilot (NSP)
- Outputs 110-120VAC to NSP
 - With ESP energized, energizing NSP initiates pump control valve opening
 - With ESP energized, de-energizing NSP initiates normal speed pump control valve closure

Fault Connections – Dry NO Contacts

Terminals Functions

- U & C Valve Fault – Valve Closed Without Command
- V & C Power Failure Delay
- W & C Power Failure
- X & C Pump Fault – Insufficient Pressure on Start-Up
- Y & C Valve Fault – Valve Did Not Open on Start-Up
- X & C Pump Fault – Loss of Pressure to Pressure Switch

When wired individually, the Pump Director outputs discrete faults for remote indication. A common fault is output if all terminals are wired in parallel.

INTERNAL COMPONENTS

VDT Valve Delay Timer

- Time allowed for pump to develop sufficient pressure to close pressure switch contacts
- Adjustable 0 to 100 seconds
- Timer initiated at when H-O-A moved to “Hand” or remote pump start signal is received in “Auto.”

VIT Valve Initiation Timer

- Time allowed for valve to open sufficiently to close external limit switch contacts
- Adjustable 0 to 100 seconds
- Timer initiated when power is applied to terminals J & K to open valve

PFT Power Failure Timer

- Delays pump restart upon resumption of 120VAC power to Pump Director
- Non-adjustable 300 second delay
- Pump start sequence will automatically initiate when timer expires if there is a “run” command (H-O-A in “Hand” or 7 & 8 closed in “Auto”)
- Delay time is *changeable* based on value of resistor wired across terminals on back of H-O-A switch
 - Remove resistor for infinite delay (requires manual reset to start pump)
 - Replace resistor with jumper for 6 second delay (pump start-up initiates 6 seconds after power resumption if “run” command)

ENCLOSURE DOOR

Selector Switch - Hand-Off-Auto

- Move to Hand to immediately initiate a pump start sequence
- Move to Off to immediately initiate a normal pump shutdown sequence
- Place in Auto to start/stop pumps via remote signal
- If pump was started in Auto it can be shut down by moving to Off
- If pump was started in Hand it can only be shut down by moving to Off

Status Lights

AMBER

- Illuminated when there is power to the Pump Director

BLUE

- Flashes at pump start up when VDT initiates (waiting for pressure)
- Steady for duration of VDT setting then goes out

GREEN

- Flashes when VIT initiates (waiting for valve to open)
- Steady when valve opens and remains steady during pumping operation

Fault Lights

Fault #1 – Power Failure

- Amber lamp extinguishes

Fault #2 - Power Failure Delay

- Glows “neon” upon resumption of power for duration of PFT (normally 5 minutes)

Fault #3 – Insufficient Pressure on Start-Up

- Flashes RED if VDT timer expires before pressure switch contacts close (pump failed to make pressure)

Fault #4 – Valve Did Not Open on Start-up

- Flashes RED if VIT timer expires before external limit switch contacts close (valve failed to open)

Fault #5 – Valve Closed Without Command

- Flashes RED if external limit switch contacts open while there is still a “run” command (selector switch in Hand or 7 & 8 closed)

Fault #6 – Loss of Pressure While Pumping

- Flashes RED if pressure switch contacts open while there is a “run” command

NOTES with regard to fault conditions:

- Faults are “reset” by moving selector switch to “OFF” for 6 seconds.
 - Flashing lights extinguish and corresponding dry contacts open
- If selector switch is in “Auto” faults will reset if “run” command is removed for 6 seconds
- Power failure delay can be overridden by moving selector switch to “OFF” for 6 seconds
- Power failure delay lamp will continue to glow and pump will not start if normally closed limit switch contacts (terminals A & B) are NOT closed
- All six sets of “fault” contacts can be wired in parallel to provide a common remote “fault” indication.

For more information...

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