

ENGINEERED PRODUCTS

INLINE 1100 PUMP & SPECPAK SYSTEMS



ENGINEERING SPECIFICATIONS

1.01 SINGLE SOURCE RESPONSIBILITY: The booster pump system shall come as a prepackaged unit with suction and discharge headers, pumps, isolation valves on the suction and discharge side of each pump, check valves on the discharge side of each pump, a pressure tank for use in maintaining stable pressure output control from the pumps, pressure gauges on the suction and discharge headers, a control panel with electrical disconnects, fusing, and a programmable logic control, and wiring from the pumps to the control. The unit shall be provided as a complete system by the pump manufacturer.

1.02 CERTIFICATIONS: The pumps used in the assembly must be certified to CSA 108 and UL 778 standards. The control panel shall be UL 508A labeled. The system shall be certified to NSF 372.

1.03 SERIAL NUMBER: Each package shall be given a unique serial number for tracking purposes and the unique number must be provided on a label supplied with the unit. The unique serial number must enable the supplier to identify the date code for assembly, the software version used in the HMI, and the material test reports for the stainless steel piping used in the assembly

2.01 SCOPE: Factory-assembled and tested booster pump package for use in potable water systems. System will include controls, isolation valves, check valves, drain valves, pressure gauges, pressure transducer, mounting frame, and booster pump hydro-pneumatic tank. The system to be equipped with the following attributes/capabilities:

- A. Modularity and Pump Arrangement: The system will be designed to permit the quick addition or deletion of pumping circuits allowing the system to be configured with two to four, equal sized, booster pumps.
- B. Site Connection Flexibility: The suction and discharge manifolds on the package will be configured in such a manner as to allow site piping connections on either end of each manifold.
- C. Manifold Connection Options: Connection capabilities on the manifolds to include both grooved or flanged (using an adapter kit) options.
- D. All Stainless Construction: All wetted components (other than seals, gaskets and O-rings) to be constructed using stainless steel materials. No brass, bronze, copper, or epoxy coated materials are permitted.
- E. Lock Out/Tag Out Ease of Maintenance: The system shall be constructed in a manner which allows the power to each pump to be locked out, thereby allowing the system to continue operation while a pump is being replaced or serviced.
- F. Remote Access: Control panel shall have the option of having remote accessibility through either a Modbus card or Ethernet card connection. The Ethernet connection shall permit access to view, monitor, and change the control parameters through the use of mobile app programs.
- G. Mounting: The package shall be constructed to be wall hung.
- H. System Drains: The package will be supplied with drain valves on both the suction and discharge headers to facilitate system start and maintenance activities.
- I. Pressure Relief Valve Port: A threaded connection port is to be provided to allow for the installation of a pressure relief valve by the installer.
- J. Quick Pump Electrical Connections: Each pump electrical connection to the control panel will be equipped with quick connection plugs to permit the pump to be electrically (power and control) connected or disconnected via a plug arrangement which does not require any tools or the need to open the electrical panel.
- K. Pressure rating: 150 psi

2.02 PUMP/MOTOR CONSTRUCTION:

- A. Outer Shell: Deep drawn 300 series stainless steel, 1.5 mm wall thickness, laser welded
- B. Suction/Discharge: 1.25" NPT threaded 304 stainless steel casting, with integrated face seals, and flange connections to allow for quick connection to an oval connection
- C. O-Rings: NBR – Nitrile Buna Rubber rated to 104 °F (40 °C)
- D. Floating Seal Ring: PTFE
- E. Pump Mechanical Seal: Carbide / Ceramic / Buna Rubber bellow seal



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- F. Internal Motor Seal: Silicon / Carbide / Buna Rubber bellow seal
- G. Pump Hydraulic Parts: 316 stainless steel and laser welded.
- H. Fasteners: 316 stainless steel
- I. Motor Construction Type: Integrated dry, air-cooled, immersed chamber
- J. Motor Insulation: Class F – IP68 rated for full submersion
- K. Motor Bearings: Ball bearing type rated to 104 °F (40 °C)
- L. Discharge End: 6202 double sealed
- M. Suction End: 6303 double sealed
- N. Motor Shaft and Coupling: 304 stainless steel
- O. Motor Lead/Washers and Cable Gland: 14 Ga SJ00W/Nitrile and CuZu Nickel plated brass
- P. Oil Chamber Motor Isolation Chamber: Medical grade white oil – Marcol 82
- Q. Heat Sink Cooling for VFD: Die cast aluminum
- R. VFD Enclosure: Polycarbonate (Flame Retardant, UL 94 V-0)
- S. Drive Gaskets: Close cell foam nitrile rubber
- T. Drive Fasteners: 304 stainless steel
- U. Mounting Base: 300 series stainless steel

2.03 PUMP PERFORMANCE/SPECIFICATION:

- A. Pump, motor, VFD control to provide at least 60 psi incremental boost to 10 gpm, 50 psi incremental boost to 25 gpm, and 20 psi incremental boost to 40 gpm.
- B. Pump Power Rating: 1.2 hp (0.9 kw)

2.04 SYSTEM CONSTRUCTION:

- A. Manifolds: Suction and discharge manifolds to be constructed using 3” diameter 304/304L stainless steel pipe. Both sides of each manifold to have grooves for connecting the site piping and manifold end cap assemblies. Adapter kits shall be available for sites preferring to use flanged connections with their site water piping.
- B. Pump Isolation Valves: Two-piece, full port, ball valves 304 stainless steel with PTFE seats shall be provided on the suction and discharge side of each pump.
- C. Backflow Prevention: Inline, spring-loaded check valves constructed of 304 stainless steel with PTFE seals and a PTFE cage shall be installed on the discharge side of each pump.
- D. Pressure Tank: A bladder type pressure tank shall be provided with the assembly to provide a smooth signal for pump control and have a max operating working pressure of at least 150 psi. The tank shall also come with an air fill valve to allow the pressure charge inside the tank to be changed.
- E. Pressure Sensors: 4 – 20ma pressure transducer with a range of 0 - 150 psi
- F. Pressure Gauges: 2.5” diameter, liquid filled stainless steel pressure gauges shall be installed on the suction and discharge headers.
- G. Nipples/Bushings: Shall be constructed with 304 stainless steel.
- H. Mounting Frame: The unit shall be equipped with mounting hardware to permit the unit to be wall hung in a vertical orientation. The frame is to be constructed with 304 stainless steel and permanently affixed to the package assembly.



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2.05 CONTROLS/ELECTRICAL:

- A. Panel: The control panel shall provide proper terminations for the incoming site power, a lockable disconnect switch, fuses to protect the incoming power supply, separate lockable fused disconnect switches on the power supply to each pump, a power supply unit (with fuse protection), and a color touch screen programmable logic controller.
- B. HMI: A 4.3" color touchscreen HMI equipped with at least (2) analog inputs, (12) digital inputs, (8) transistor or digital outputs. The controller shall have the optional capability of providing remote access via Modbus card or Ethernet.
- C. Package Control (consisting of the pump and the PLC control) must be capable of turning the pumps on and modulating the pump operating to meet an adjustable pressure set point. The package control must be equipped to sense and interrupt the pump operating in case of:
- Motor overload
 - Under voltage
 - Locked pump
 - Open motor circuit
 - Short circuit
 - Overheated drive,
 - Over temperature
 - Insufficient water supply
 - Turn package on and off, including each individual pump for calibration
 - Active/idle mode
 - Run hours for each pump, including time schedule for the system
- D. Variable Frequency Drive - NEMA 4 (IP56) rated enclosure, heat-sink cooled, with no external fan. Control should accept 230V single phase, 60 Hz input power, and supply three-phase output power at variable voltages and frequencies dependent on the applications pump flow and pressure requirements. Pump control should allow for external shut-off from a condition of over-heat generated by excessive fluid temperatures more than 140 °F. VFD to provision additional shut-off installed in a series connection to the over-temperature system based on application specific control devices. VFD to be controlled directly through digital on/off signal logic methodology to provide increased or decreased power output based on immediate usage demands.

3.01 INSTALLATION: Install package system according to manufacturer's written instructions and with access for periodic maintenance, including removing motors, impellers, couplings, and accessories.

3.02 COMMISSIONING: Verify that system controls have been set up correctly for the required application.

3.03 START UP: Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain pumps.

4.01 VARIABLE FREQUENCY DRIVE SPECIFICATION: NEMA 4 (IP56) rated enclosure, heat-sink cooled, with no external fan. Control should accept 230V single phase, 60 Hz input power, and supply three-phase output power at variable voltages and frequencies dependent on the applications pump flow and pressure requirements. Pump control should allow for external shut-off from a condition of over-heat generated by excessive fluid temperatures more than 140 °F. VFD to provision additional shut-off installed in a series connection to the over-temperature system based on application specific control devices. VFD to be controlled directly through digital on/off signal logic methodology to provide increased or decreased power output based on immediate usage demands.



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4.02 PLC CONTROLLER: The control panel shall provide proper terminations for the incoming site power, a lockable disconnect switch, fuses to protect the incoming power supply, separate lockable fused disconnect switches on the power supply to each pump, a power supply unit (with fuse protection), and a color touch screen programmable logic controller.

The package control (consisting of the pump and the PLC control) must be capable of turning the pumps on and modulating the pump operating to meet an adjustable pressure set point. The package control must be equipped to sense and interrupt the pump operation in case of:

- Motor overload
- Under voltage
- Locked pump
- Open motor circuit
- Short circuit
- Overheated drive
- Over temperature
- Insufficient water supply
- Turn package on and off, including each individual pump for calibration
- Active/idle mode
- Run hours for each pump, including time schedule for the system

PIPING SCHEMATIC

