

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

Fire Pump Package Pumping Systems

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NOTE

The information contained in this manual is intended to assist operating personnel by providing information on the characteristics of the purchased equipment.

It does not relieve the user of their responsibility to adhere to local codes and ordinances as defined by the authority having jurisdiction.

Further information pertaining to the installation, operation, and maintenance can be found in the IOM's for the associated equipment provided.

Any further questions, contact A-C Fire Pump Systems, (847) 966-3700.

SECTION 1 – GENERAL

1.1 DESCRIPTION

Fire Pump Package systems are custom built to the requirements provided by the purchaser. The AC Fire Pump Package is a complete fire protection system. Packaged Fire Pump Systems are designed in accordance with NFPA 20. Packages are factory hydrotested to internal quality standards and NFPA 20 requirements.

1.2 PURPOSE OF MANUAL

1.2.1 This manual is furnished to acquaint you with some of the practical ways to install, operate, and maintain this unit. Read it carefully before doing any work on your unit and keep it handy for future reference. This manual provides general instructions for the installation and maintenance of skid mounted electric motor driven and diesel driven systems with or without enclosures. Fire pump systems consist of but are not limited to: pumps, drivers, controllers, interconnecting piping, fuel systems and fittings.

1.2.2 Equipment cannot operate well without proper care. To keep this unit at top efficiency, follow the recommended installation and servicing procedures outlined in this manual.

1.3 SAFETY INSTRUCTION

1.3.1 This safety alert symbol will be used in this manual and on the pump safety instruction decals to draw attention to safety related instructions. When used the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTION MAY RESULT IN A SAFETY HAZARD.**

1.3.2 Refer to the driver manufacturer's I.O.M. (Installation Operation Manual) for specific installation information.

1.3.3 Even when the pump is stopped, it should be considered "alive" as long as its controller is energized. Keep hands away from the output shaft until the pump has completely stopped and power is disconnected from the driver controller.



WARNING: Pump can start automatically. Keep hands away from output shaft until pump is completely stopped and input power is removed from the driver control panel. Lockout main power switch while working near the driver output shaft. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

1.3.4 Driver control equipment and electronic controls are connected to hazardous line voltages. When servicing electronic controls, there will be exposed components at or above line potential. Extreme care should be taken to protect against shock. Stand on an insulating pad and make it a habit to use only one hand when checking components. Always use accurate test meters when checking electrical components. Always work with another person in case of an emergency. Disconnect power when performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on electronic control or rotating equipment.



DANGER: Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**



DANGER: Internal combustion engines and gas appliances require adequate combustion air and ventilation. Refer to equipment manufacturers Instruction, Operation & Maintenance manual. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**



DANGER: Batteries emit explosive gases. Make electrical connections in a well-ventilated area. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

1.4 HANDLING & STORAGE

1.4.1 Care should be taken to prevent damage due to dropping or jolting when moving the package. Transportation damage should be brought to the carrier's attention immediately upon receipt.

1.4.2 The fire pump system should be unloaded and handled by qualified personnel.



WARNING: Falling Objects Hazard Eyebolts or lifting lugs, if provided, are for lifting only the components to which they are attached. Eyebolts on fire pump enclosures are used for factory assembly only and are not intended to lift the complete package. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

1.4.3 For periods of storage, the unit should be covered to prevent corrosion and contamination from dirt. It should be stored in a clean, dry location to prevent condensation as well as protected from freezing. After storage, again check that it is dry before applying power. Specific storage instructions must be followed in accordance with the respective equipment manufacturer's recommendations.


 **CAUTION:** Extreme temperatures are to be avoided (below 32°F and above 110°F). **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

1.5 **TEMPERATURE AND VENTILATION**

1.5.1 All electrical equipment is susceptible to failure if operated in ambient temperatures outside of its rating. Refer to respective equipment manufacturer's instructions for operating temperature range. The unit should not be operated outside these extremes.

1.6 **INPUT VOLTAGE**


1.6.1 The Fire Pump Package is specifically designed for a particular voltage. Refer to package specific wiring diagram for proper input voltage.

 **WARNING:** Prevent electrical shocks. Disconnect the power supply before beginning installation. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

The voltage tolerance is +10/-10% and phase to phase voltage must not have an imbalance greater than 5 VAC.

1.7 **GROUND CONNECTIONS**

1.7.1 A grounding terminal is provided for a dedicated ground wire connection. All provisions of the National Electrical Code and local codes must be followed.

 **WARNING:** Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

1.8 **POWER WIRING**

1.8.1 Power wire types and sizes must be selected based upon conformance with the National Electrical Code and all local codes and restrictions. In addition, only copper (Cu) wire rated for 75°C (minimum) may be used for the power connections. Refer to the input current as listed on the nameplate on the panel door when sizing wire.


1.9 **FIELD CONNECTION DIAGRAMS**

1.9.1 Actual equipment manufacturers/models installed are system specific. Refer to specific manufacturers Installation, Operation & Maintenance Manuals for details unique to each component. The following instruction manual categories are supplied with the system (if applicable):

- Fire Pump
- Fire Pump Controller
- Electric Motor
- Diesel Engine
- Jockey Pump Unit
- Jockey Controller
- Jockey Pump Relief Valve
- Main Relief Valve
- Flow Meter
- Casing Relief Valve
- Tamper Switch
- Sprinkler Flow Switch
- Altitude Valve
- Back Flow Preventer
- Unit Heater
- AC Louver
- Exhaust Fan
- Boiler
- Eye Wash / Shower Station
- Package Enclosure

1.9.2 The following field connection diagrams should be reviewed prior to unit installation and operation.


Drawing #	Description
Job Specific Print(s)	Wiring Diagram
Job Specific Print(s)	Assembly Drawing

 **WARNING:** Prevent electrical shocks. Disconnect the power supply before beginning installation. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

SECTION 2 – INSTALLATION


2.1 LOCATION

- 2.1.1 Locate the pumping system in a clean, well ventilated and properly drained location. It is recommended that the location selected facilitates ease of inspection, maintenance and service. Outside installations require protection from freezing.

 **DANGER:** Heavy load, may drop if not lifted properly. Do not lift the entire unit by component eyebolts. Eyebolts on fire pump enclosures are used for factory assembly only and are not intended to lift the complete package. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

2.2 FOUNDATION

- 2.2.1 This unit is built to give you years of service; install it properly and provide a suitable foundation. A base of concrete weighing 2-1/2 times the weight of the unit is recommended. (Check the shipping ticket for unit weight.) Tie the concrete pad in with the finished floor. Use foundation bolts and larger pipe sleeves to give room for final bolt location.
- 2.2.2 Fire pump packages with electrical conduit below surface may require corrosion protection approved for the condition.

 **WARNING:** Electrical conduit installed below the surface may require a corrosion resistant protective coating to prevent conduit corrosion and electrical shock. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- 2.2.3 Place the unit on its concrete foundation, supporting it with steel wedges or shims. These wedges or shims should be put on both sides of each anchor-bolt and midway between bolts, to provide a means of leveling the base.

- 2.2.4 After the frame has been leveled and securely bolted to the pad, a good grade of grout should be installed beneath the base. A suggested mixture for grout is: one part Portland Cement and two or three parts plain, sharp sand mixed with water until it will pour easily. Commercial grout mixtures with suspended iron particles are available. Wet the concrete base before pouring grout. Build a strong form around the foundation to contain grout. Allow the grout to flow around wedges & shims and beneath the entire length of the base flange.

2.3 PIPING CONNECTIONS

- 2.3.1 Make all necessary system piping connections. Be sure to eliminate any pipe strain on the unit. Support all pipes independently by use of pipe hangers near the unit. Line up the vertical and horizontal piping so that the bolt holes of the flanges match. **DO NOT ATTEMPT TO SPRING THE SUCTION OR DISCHARGE LINES INTO POSITION.** Refer to assembly drawing for customer piping connections.
- 2.3.2 As a rule, ordinary wire or band hangers are not adequate to maintain alignment. It is very important to provide a strong, rigid support for the suction line. A saddle hanger is recommended.

2.4 SWITCH / ALARM CONNECTIONS

- 2.4.1 Wire tamper switches, if applicable, to control center. Refer to tamper switch manufacturers installation instructions.
- 2.4.2 Wire sprinkler line water flow alarm switch, if applicable. Refer to switch manufacturer installation instructions.
- 2.4.3 Refer to fire pump panel and jockey pump panel wiring diagrams for additional switch/alarm connections.


2.5 MISCELLANEOUS CONNECTIONS

- 2.5.1 Certain items are shipped loose and are intended to be field installed. Items that may be shipped loose are: hose header and valves, muffler, 10ft fuel tank vent pipe, ball drip valve. If applicable these items are to be installed per the requirements of NFPA 20 and equipment manufacturer instructions.


SECTION 3 – OPERATION

3.1 PREPARATION

- 3.1.1 After package is installed and foundation bolts are tightened, check pump alignment. Refer to specific pump Installation, Operation & Maintenance manual for alignment procedures.
- 3.1.2 On packages with enclosures, inspect doors for proper alignment. Doors may become misaligned during shipping, handling and/or installation. Realign doors to provide an even 1/8" clearance between door and frame.


 **CAUTION:** Failure to maintain a proper clearance will cause an interference and/or hardware misalignment. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

- 3.1.3 Inspect all piping connections. Some joints may have been loosened and not retightened after completion of factory hydrotest to facilitate system drainage. Joints may also become loose during transit due to vibration and shock. All joints are to be checked for tightness. Flanged joints should be checked for proper torque of all flange bolts prior to filling the system with fluid.

 **CAUTION:** Failure to check all joints for tightness and flange bolts for proper torque could result in leaks and/or flooding. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

- 3.1.4 Before starting all pumps and drivers should be checked for proper lubrication.
- 3.1.5 Piping should be clean and flushed prior to operation.
- 3.1.6 Refer to specific electrical and mechanical equipment manuals for start up instructions.
- 3.1.7 On electric driven units check all connections to motors and starting devices with wiring diagram.
- 3.1.8 On diesel driven units check all connections between engine terminal block and control panel.


- 3.1.9 On diesel driven units, prior to filling the fuel tank, inspect fuel line piping connections. Joints may become loose during transit due to vibration and shock. All joints are to be checked for tightness. After filling the fuel tank, inspect the fuel line for leaks. Tighten any joints as required.


 **CAUTION:** Failure to check all joints could result in leaks and/or environmental hazard. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

- 3.1.10 Prior to start up, ensure valve to hose header and valves on outside of hose header are closed.

3.2 START-UP

- 3.2.1 The following procedure is suggested for initial start-up.
- 3.2.2 Fill the system with fluid.
- 3.2.3 Vent all the high points in the piping system to remove trapped air. Threaded connections are supplied on bypass loops, flow meter loops and pressure sensing lines for venting.

 **CAUTION:** Stuffing Box Damage may occur. Do not run pumps dry. Fill and vent the pump volute prior to operation. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

 **DANGER:** High voltage 3 phase power can kill. Disconnect and lockout power prior to servicing unit. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

3.2.4 PUMP ROTATION, 3 PHASE MOTORS ONLY. Check rotation of electric driven fire pump and jockey pump; refer to appropriate pump, driver and controller instruction manuals.



WARNING: Rotating shafts can catch loose clothing. Do not operate the pump without all guards in place. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

3.2.5 Relief valves are designed to protect the water system from damage resulting from excess system pressure. The relief valve is intended to be field adjusted for operating pressure by the owner/operator and it is the responsibility of the owner/operator to make final opening pressure adjustments on the system.



WARNING: Properly adjust relief valves to manufacturer's instructions. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

3.2.6 On electric driven pumps, adjust casing relief valve to desired flow at shut off head.

3.2.7 On diesel driven pumps it is desirable to adjust the main relief valve to 'crack open' at shut off head. This affords the valve an opportunity to function, with minimum leakage, weekly during the unit test.

3.2.8 On Jockey pump piping systems with relief valve, adjust relief valve to desired flow at shut off head.

3.2.9 Pump packing glands should be adjusted, as necessary, to assure an appropriate leak at each stuffing box for adequate lubrication and cooling.



WARNING: Keep fingers and foreign objects away from rotating shafts. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**


3.2.10 If the system is a diesel driven package with enclosure, check and adjust DC louver to ensure smooth operation. A foundation that is not level will cause the linkage to bind and will require adjustment prior to putting the unit into operation.

3.3 MAINTENANCE


3.3.1 Refer to specific component IOM for maintenance information.

APPENDIX A GENERAL – FINAL CHECK LIST

- ___ 1. Is the unit base properly leveled, grouted and secured?
- ___ 2. Are all lubrication points properly lubricated?
- ___ 4. Is the shut-off valve to the pump suction open?
- ___ 5. Is the shut-off valve on the discharge line open?
- ___ 6. Is the piping properly supported so as to prevent strains on unit?
- ___ 7. Is the distribution system purged of debris and air? Is the system filled?

 **CAUTION:** Stuffing Box Damage may occur. Do not run pumps dry. Fill and vent the pump volute prior to operation. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

- ___ 8. Are the pump and driver shafts properly aligned?

 **WARNING:** Rotating shafts can catch loose clothing. Do not operate the pump without all guards in place. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- ___ 9. Is the pump rotation correct?
- ___ 10. Is there adequate ventilation and air circulation?
- ___ 11. Have all piping connections been made? Have all flanged joints been checked for tightness?
- ___ 12. Has an automatic air release valve been installed on the top of the casing of each horizontal split case pump?
- ___ 13. Are remote alarm and control panels connected and in operation as required by NFPA 20?
- ___ 14. Are pump bearings properly lubricated?
- ___ 15. Is coupling properly lubricated, if required?


DIESEL INSTALLATION – FINAL CHECK LIST

- ___ 1. Have all electrical connections been made between engine terminal block and the controller?
- ___ 2. Has engine cooling system been filled with 50% water and 50% antifreeze solution?
- ___ 3. Has diesel fuel supply tank been properly installed in accordance with the requirements of NFPA 20? Has vent pipe been installed?
- ___ 4. Have both fuel 'supply' and 'return' connections been made to fuel tank?
- ___ 5. Has fuel tank been filled with No. 2 diesel fuel?
- ___ 6. Has oil been added to the engine crankcase as per diesel manufacturer's recommendations?
- ___ 7. Does air cleaner require servicing?
- ___ 8. Has proper power been supplied to the diesel controller of adequate amperage as recommended by the controller manufacturer?

- ___ 9. Have batteries been installed, serviced and cables connected? Are the batteries fully charged?

 **DANGER:** Charge batteries in a well-ventilated area. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- ___ 10. Has proper power been supplied to the diesel water jacket heater of adequate amperage and voltage as recommended by the diesel manufacturer?

 **CAUTION:** Do not connect power until diesel engine is filled with coolant or the heater may burnout. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**


ELECTRIC DRIVEN INSTALLATION – FINAL CHECK LIST

- ___ 1. Has the casing relief valve been installed between the pump discharge and check valve?
- ___ 2. Are proper electrical connections made to the control panel and motor (proper voltage and adequate size)?


APPENDIX B

ELECTRICAL WIRING AND CONTROL SETTINGS – FINAL CHECK LIST


- ___ 1. Does the feeder line voltage correspond to the unit voltage? Check the unit nameplate or motor terminal connection.

 **WARNING:** Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- ___ 2. Are the feeder wires correctly sized for the load?
- ___ 3. Is the unit properly grounded?

 **WARNING:** Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- ___ 4. Have all the power terminals in the control panel been checked for tightness? This is imperative since stranded wires tend to "flow" and become loose after initial installation.

 **DANGER:** High voltage 3 phase power can kill. Disconnect and lock out power prior to servicing unit. **FAILURE TO FOLLOW THESE INSTRUCTIONS WILL RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're 12,500 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to www.xyleminc.com



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