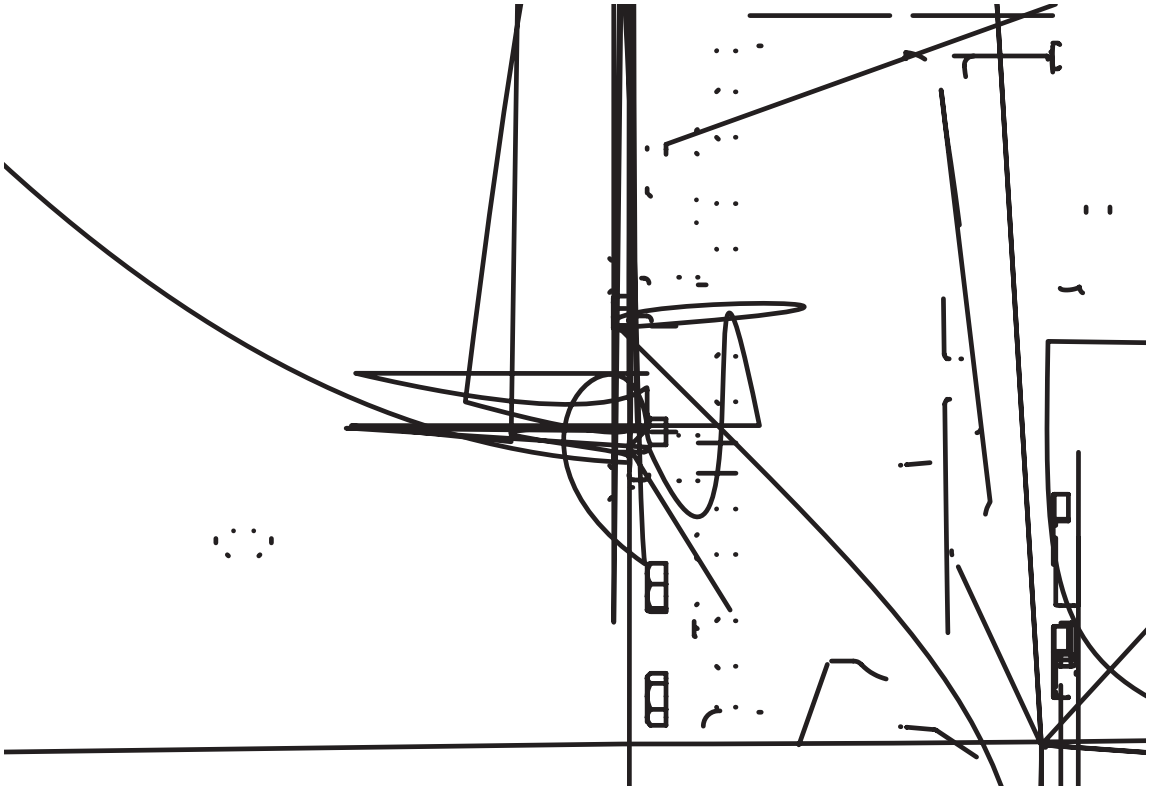


This manual contains important information about the installation, operation and safe use of this product. This information should be given to the owner/operator of this equipment.

Read and understand all warnings before installation or servicing pump.

Maximum Operating Pressure: See UL Listings for max pressure by model.

Maximum Operating Temperature: 150°F (66°C)

Pumps are not to be operated outside the operating envelope as stated on the nameplate and the maximum case working pressure as published in the product catalog for the relevant model. Shaft couplings are selected for the maximum power output of the driver, however, the pump is not to be operated outside its normal limits.

All pumps are designed to allow 1/16" for corrosion. Should this value be exceeded, the pump should be taken out of service.

The 1620F Pumps are not designed for use in potentially explosive atmospheres.

* See ASTM A126/ANSI B16.1 for pressure/temperature ratings of flanges.

PUMP LOCATION. You probably have spent considerable time planning where your pump will be located. However, you may have overlooked some factor that may affect pump operation or efficiency.

The pump should be located as close to the liquid source as possible so that the suction line can be short and direct. It should be located in a clean, open area, where it is easily accessible for inspection, disassembly and repair. Pumps installed in dark, dirty areas or in cramped locations are often neglected, which can result in premature failure of both the pump and the driver.

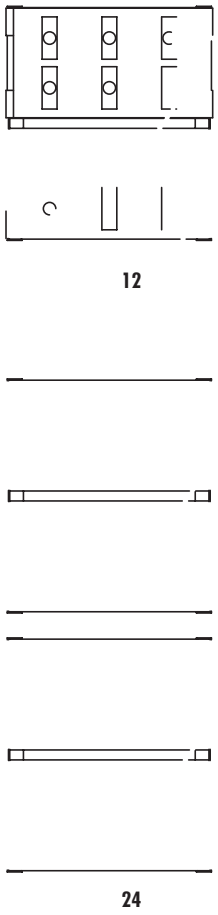
The Fairbanks Nijhuis must be installed horizontally. Install isolating valves on each side of pump so pump

FOUNDATION. The foundation for your pump must be sufficiently rigid to absorb any vibration and stress encountered during pump operation. A raised foundation of concrete is preferable for most floor mounted pumps. The raised foundation assures a satisfactory base, protects against flooding, simplifies moisture drainage, and facilitates keeping the area clean.

Your pump should be firmly bolted to the foundation, whether it is a raised concrete base, steelwork wall, or structural member. The mounting bolts or lag screws should be accurately located per the applicable Fairbanks Nijhuis dimension sheet.

INITIAL ALIGNMENT OF THE FLEXIBLE COUPLING. The pump and driver were accurately aligned at the factory. However, it is impossible to maintain this alignment during shipping and handling. Therefore it will be necessary for you to realign the pump and driver. Flexible couplings are not universal joints. They should not be used to compensate for misalignment of the pump and motor shafts. Their function is to transmit power from the driver to the pump while compensating for thermal expansion and shaft end movement. The coupling faces should be far enough apart so that they do not make contact when the motor shaft is forced to the limit of the bearing clearance toward the pump shaft.

In order to properly align the coupling, you will need a taper gauge or set of feeler gauges and a straight edge. There are two types of misalignment encountered with flexible couplings: angular misalignment, in which the shafts



ENGINE FLUIDS. Many diesel engines are shipped dry and must have lubricating oil and coolant added prior to start-up. It is the installer's responsibility to assure that all fluid levels are correct to avoid damage to the engine.

DIESEL ENGINE WIRING. The End Suction Fire Pump controller must be wired to the diesel engine's junction box. This is usually a simple matter of connecting like-numbered terminals of each with the correct wire gauge size. Refer to panel manufacturer's wiring diagram.

The electric solenoid valve in the diesel engine cooling loop piping must be wired to the engine junction box. Either red wire goes to terminal 1; the other red wire goes to terminal 11; the green wire is grounded to the engine block.

Engines may have 12-volt or 24-volt systems, but all batteries furnished are 12-volt. Since dual battery sets are required by N.F.P.A. 20, two batteries are furnished for 12-volt systems and four batteries are furnished for 24-volt systems.

Fairbanks Nijhuis's standard battery racks are designed to keep the batteries elevated off the floor for housekeeping purposes. They must be placed on a suitable level surface as close to the diesel engine as possible. Each rack holds two batteries; one rack is required for 12-volt systems and two racks for 24-volt systems. If two racks are used, they are to be placed side-by-side and not stacked.

Electrolyte is not furnished by Fairbanks Nijhuis; it must be procured locally (approximately 16 quarts per battery).

Electrolyte must be added and the batteries charged at a low rate for at least 24 hours prior to start-up. It is recommended for safety reasons that the batteries be filled with electrolyte only after being placed in their permanent positions in the pump room.

The positive battery terminal of each battery (or pair of batteries for 24-volt systems) is connected to one of the engine's starter contactors. The negative terminals are to be connected to the engine block or other suitable ground. Fairbanks Nijhuis's standard battery cable wire gauge sizes are selected for a maximum 10-foot circuit length (5-foot cables). Longer cables will require heavier gauge wire to be used.

Power wiring to the engine's jacket water heater must be completed only after it has been assured that there is sufficient coolant in the engine. Most heaters are continuously energized when wiring is connected and will burn out the heating element if no water is present. This failure is not covered by warranty. Refer to engine manufacturer's data sheet for correct voltage of the heater.

DIESEL ENGINE COOLING LOOP PIPING. The cooling loop system diverts a small amount of water from the pump discharge through the engine's heat exchanger to help control the operating temperature of the engine. Prior to start-up, it is recommended that this piping be checked for damage or displacement that might have occurred during shipment.

During normal operation, the top two valves of the cooling loop (in the by-pass line) are to be closed, and the lower two valves (in the pressure regulated line) are to be open. Failure to observe this may result in overpressurization of the heat exchanger when the pump is started, causing damage to the engine.

Piping from the engine's heat exchanger to a drain is to be provided by the installer. It is important to use the recommended size piping to reduce back pressure and avoid overpressurizing the heat exchanger.

A length of PVC tubing is provided by Fairbanks Nijhuis to be connected to the petcock in the cooling loop piping in order to vent the system and visually verify the flow of water through the heat exchanger.

DIESEL ENGINE FUEL SYSTEM. The fuel tank should be installed so that the supply outlet is at the same elevation as the engine's fuel pump. Since the unit base is usually elevated

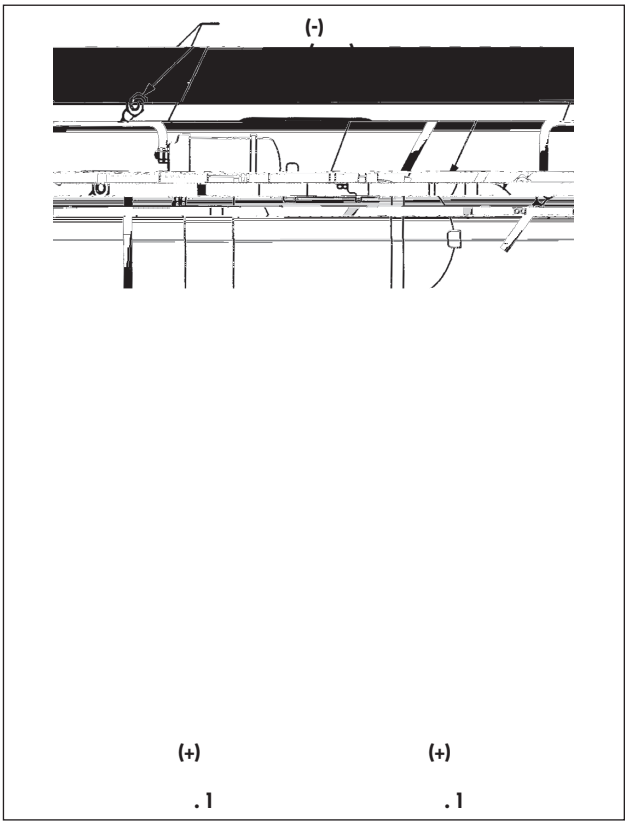


Figure 7. Starter and Contactor Connections.

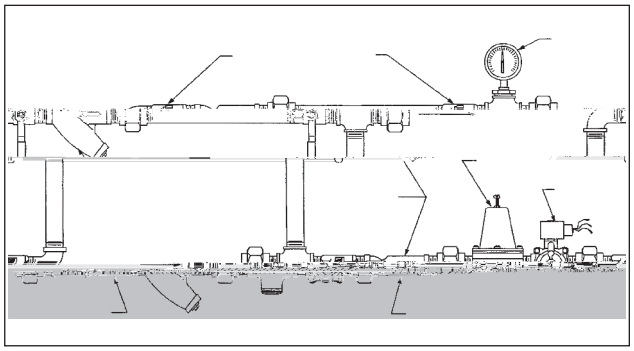


Figure 8. Cooling Loop Showing Normal Position of Valves.

as described earlier, this may require that the fuel tank is likewise elevated. The means of elevating the tank is the responsibility of the installer. Substituting the legs furnished with the tank with pipes of greater length is not a recommended method of elevating the tank.

All fuel fittings shown in Figure 9 are shipped loose for field installation. They are to be assembled as shown in Figure 9 to be consistent with Figure A-8-4.6 of N.F.P.A. Pamphlet 20. Installation may vary at the discretion of the installer with the approval of the local authority having jurisdiction. Note that some sections of common piping needed to complete this installation are not furnished by Fairbanks Nijhuis and must be procured locally.

Tube fittings are provided to allow the use of 5/8" O.D. tubing for the fuel supply and return lines (the tubing itself is NOT furnished by Fairbanks Nijhuis). If hard piping is used, these tube fittings are simply to be discarded.

Diesel fuel is not furnished by Fairbanks Nijhuis and must be procured locally prior to start-up.

DIESEL MUFFLER AND EXHAUST SYSTEM. A commercial grade muffler and flexible connector are furnished as standard on diesel End Suction Fire Pumps. If necessary, additional fittings needed for connecting these to the engine are also provided.

Commercial grade mufflers have NPT connections on 3" and 3-1/2" sizes, slip-on (automotive type) connectors for 4", 5" and 6" sizes, and 125# ANSI flanged connections for larger sizes.

Optional residential grade mufflers have NPT connections on 3" and 3-1/2" sizes; ANSI 125# flanges on 4" and larger sizes.

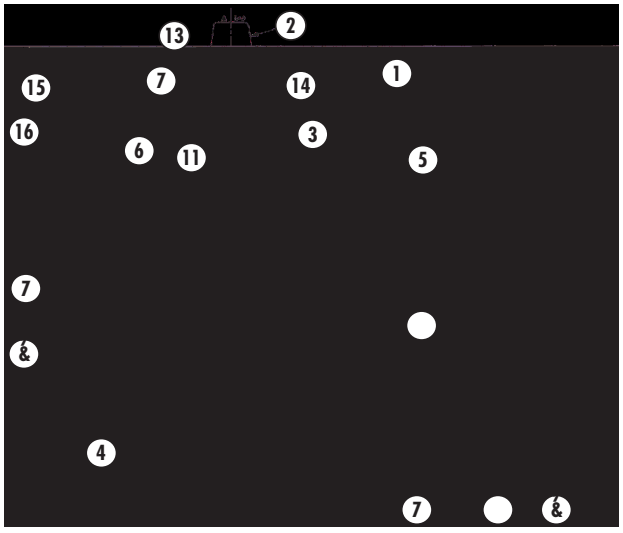
Piping, elbows and other components required to route the exhaust to the outside are not provided by Fairbanks Nijhuis. It is suggested that the building contractor or on-site engineers design and install the remainder of the exhaust system.

After the installation is complete and the End Suction Fire Pump system is pressurized and checked by the contractor, the following items must be verified:

1. Coupling has been properly aligned.
2. Motor has been “bumped” to check for proper rotation.
3. Diesel engine (where applicable) has been properly serviced, necessary fluids added, batteries filled and charged, jacket water heater operating.

INITIAL TEST. The following steps are basic for an initial test of the End Suction Fire Pump system:

1. Close the valves on all discharge outlets.
2. Open the suction valve.
3. Having read the controller manual and gained an understanding of its operation, set the End Suction Fire Pump controller to “manual”. The Jockey pump panel should be set to the “off’ position.
4. With the controller door closed, start the End Suction Fire Pump.
5. Adjust the packing to allow approximately 60 drops per minute to flow from each packing box. Further adjustment may be required later, so a recheck upon completion of the test is advised.
6. Close the relief valve completely for a brief period to verify that the shut-off pressure agrees with that on the certified factory test curve.



7. Adjust the casing relief valve (electric-driven units only) to allow enough flow to keep the pump cool.

8. Stop the End Suction Fire Pump.

9. Set the End Suction Fire Pump controller to the “automatic” position.

10. Slowly lower the system pressure with the control valve. The End Suction Fire Pump should start. Observe this starting pressure and adjust if necessary. (Adjustment procedure varies with controller manufacturer.) Stop the End Suction Fire Pump.

FIELD ACCEPTANCE TEST. Personnel on hand for the End Suction Fire Pump field acceptance test should include the controller representative, diesel engine service technician (if applicable), representatives of the insuring agency and local fire authority, as well as those responsible for building maintenance and supervision.

Equipment needed for the field acceptance test includes:

1. Calibrated ammeter.

2. Volt meter.

3. Tachometer.

4. Pitot tube and gauge.

5. Calibrated suction and discharge gauges with 1/4% accuracy. (Gauges furnished with the pump are 2%–3% accurate and could be troublesome for the field acceptance test.)

6. 50 feet of 2-1/2" hose for each connection on the hose manifold.

7. Play pipe with suitable nozzle for each hose.

While field acceptance tests vary by location, the following steps are usually taken. Additional operations may be required depending on the special needs in some territories.

1. A hose and play pipe are connected to each valve on the hose manifold.

2. The discharge valve leading to the building’s fire system is closed.

3. The discharge valve leading to the hose manifold (or “test header”) is opened.

4. The suction valve is opened.

5. All relief valves are closed.

6. One hose valve on the hose manifold is opened.

7. With the End Suction Fire Pump operating, the hose valve is adjusted for a flow of 500 GPM at the play pipe as indicated by the pitot tube.

10	100	130	160	195	235	285
20	160	203	245	290	348	410
30	206	254	308	366	430	498
35	222	275	332	395	464	538
40	238	294	355	423	496	575
45	252	311	377	448	525	610
50	266	328	397	473	555	643
55	279	344	417	496	582	

In dry locations, each bearing will need lubrication at least every 4,000 hours of running time or every 6 to 12 months, whichever is more frequent. In wet locations (exposed to dripping water, to the weather, or to heavy condensation such as is found in unheated and poorly ventilated underground locations) the bearings should be lubricated at least after every 2,000 hours of running time or every 4 to 6 months, whichever is more frequent.

Use Chevron SRI, NLGI2.

Lubricate motor per motor manufacturer’s instructions.

1. Keep this pump and motor properly lubricated.

2. Inspect the pump regularly for leaky seals of gaskets and loose or damaged components. Replace or repair as required.

ELECTRICAL WIRING. Normally, your pump will be supplied with an attached drive motor. The motor should be wired in accordance with the wiring diagram found on the motor nameplate. Be sure the voltage, frequency, and phase of your power supply corresponds with the nameplate data. It is advisable to provide a separate switch and overload protection for your pump motor to protect against power failure in some other area. Conversely, if the pump motor develops electrical problems, it will be isolated from other equipment.

PRESTARTING INSTRUCTION. The coupling halves should be connected. Prior to connection, however, the drive motor should be started to make sure the direction of rotation is eleshould ba equu9irrection of rotir4ction of rotRyIy6Normally, cy a

1. Ensure the electrical power is locked out, the system pressure has been lowered to 0 psi and temperature of the unit is at a safe level before beginning any disassembly of the pump.

2. Isolate the pump from the system by closing the valves that should be located on both the suction and discharge of the pump. Loosen the drain plug at the bottom of the casing and drain the pump. The flush line assembly (optional 1, 3, 2 and 75) should be removed at this time.

Inspect removed parts at disassembly to determine if they can be reused. Ball bearings that turn roughly or show wear should be replaced. Cracked castings should never be reused. Scored or worn pump shafts should be replaced. Gaskets should be replaced at reassembly simply as a matter of economy. They are much less expensive to replace routinely than to replace singly as the need arises.

a. Remove capscrews (65), gland lamps (22) and gland halves (23).

b. Use a flexible Packing Tool* with a hook attachment for removal of the packing, and a wood screw attachment for removal of the lantern ring. The lantern ring contains several holes for the packing tool.

* The Packing Tool can be purchased from industrial supply, or hardware stores. It is not considered a special tool.

c. Thoroughly clean the shaft sleeve (25) and packing cover (26) seal cavity. Thoroughly inspect the bore of the

Fairbanks Nijhuad.

1. Replace the shaft sleeve (25) or packing cover (26) if there is evidence of surface damage like pitting, corrosion, nicks or scratches.

2. Replace wear ring(s) (7 & 16) in casing (6) and cover (26). Rings should not be hammered into place. Use a press or clamp the parts in a bench vice using wooden blocks to protect the rings.

3. Place one ring of packing (28) into the packing cover (26). On successive rings of packing stagger the packing joints to prevent excessive leakage through the packing box. If a lantern ring (29) is used, place a second ring of packing (28) into the cover before installing lantern ring. .

4. Slide the shaft sleeve (25) through the packing. Proceed to next step if only replacing packing.

5. Replace gland halves (23) and place capscrews (65) through gland clamps (22). Tighten capscrews (65) finger tight into either cover assembly (26).

6. Slide Packing Cover Assembly onto shaft.

   NOTE: The slots in gland halves (23) should be diagonal to pump horizontal center line.

7. Install O-ring (10).

8. Install a new impeller key (12).

9. Install impeller, impeller washer (9A), new impeller washer gasket (9B), capscrew seal and capscrew (9). Tighten capscrew per torque chart .

10. Install new casing gasket (8). Then install the pump assembly into the volute.

11. Tighten volute capscrews (5) per torque chart

12. Install foot support capscrews (62) and tighten per torque chart

13.

16. Reinstall the coupling guard.
17. Open isolation valves and inspect pump for leaks.
18. Return pump to service.

Do not start pump until all air and vapor has been bled and until making sure that there is liquid in the pump to provide the necessary lubrication for the packing.

When the pump is returned to service, additional care must be given to packing box to ensure a proper packing life. It is necessary to allow 60–120 drops leakage per minute through the packing for lubrication purposes. If the flow rate is other than this, the capscrews should be either loosened or tightened one quarter turn at a time to acquire the correct leakage (both capscrews must be turned equally to prevent cocking of the gland). It will take approximately ten minutes at any one gland setting before the leakage rate will stabilize. When in doubt, choose the greater leakage rate since overly tight packing will ruin not only the packing, but the sleeve as well.

Follow steps 1 – 14 from main pump disassembly procedure.

15. Remove the power frame capscrews and bearing/shaft assembly from the packing cover. If replacing the shaft, continue to Step 16.
16. Remove the grease fittings (43) from the power frame.
17. Unscrew capscrews (48) and remove bearing cap (49). Remove O-ring (oil lubed only) and retainer ring (52).
18. Slide out shaft (55) and bearings (53 and 54). Since bearings (53 and 54) are press fitted on the shaft, they will have to be pulled or pressed off the shaft. Remove grease seals (51) from frame (57) and bearing cap (49).
19. Thoroughly clean the shaft (55), removing any oil or dirt.

Reassembly will generally be in reverse order of disassembly. If disassembly was not complete, use only those steps related to your particular repair program.

1. Press grease seals (51/51A) into frame (57), and bearing cap (49).
2. Press bearings (53 and 54) onto shaft (55). Snap retainer ring (52) into place.
3. Slide shaft (55) and bearings (53 and 54) into frame (57).

4. Fasten bearing cap (49) in position with capscrews (48). Position slingers (47) on the shaft.

5. Position bracket (35) on the frame (57) and secure with capscrews (5A). Tig6p01and secure c≤EFF000la9>to asspsc234

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