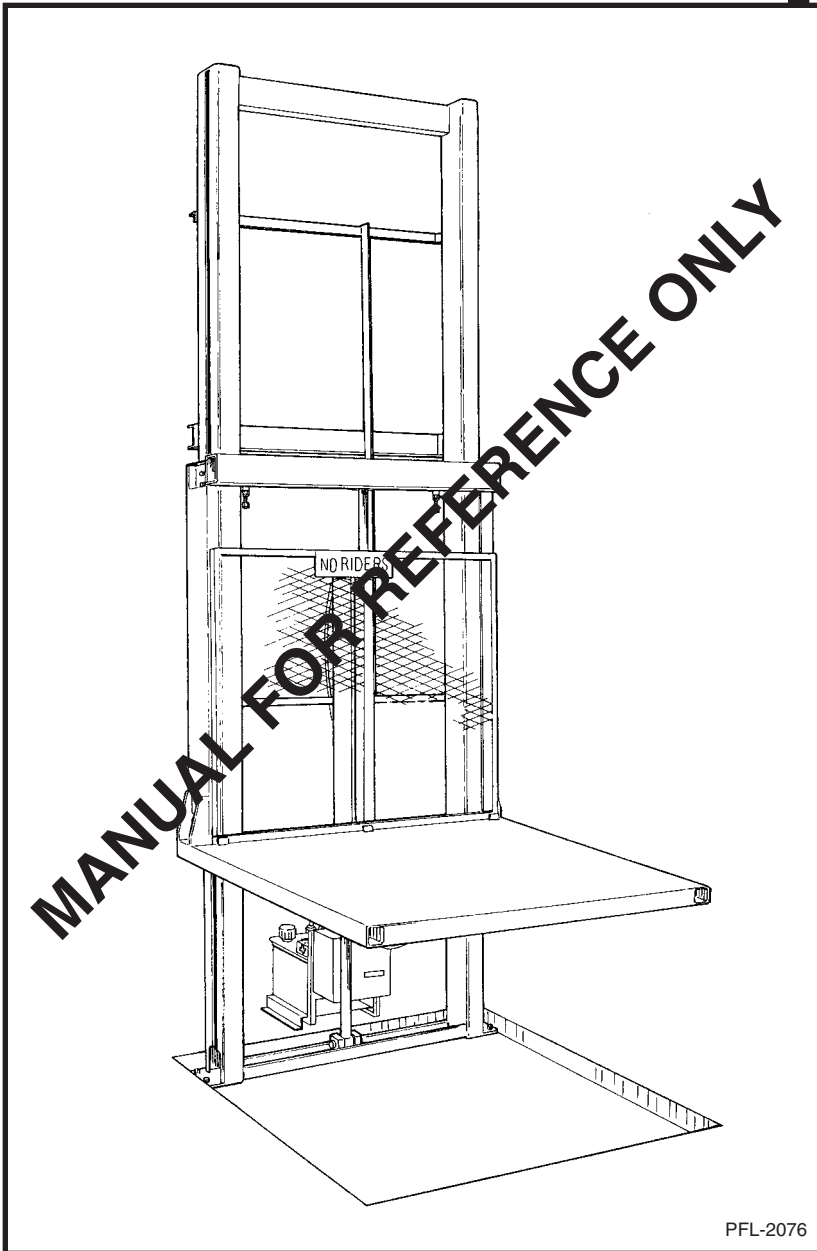


PFLOW VERTICAL LIFTS

The Nation's Largest Manufacturer of Vertical Lifts



PFL-2076

**THE ILLUSTRATIONS IN THIS MANUAL
ARE NOT TO SCALE OR DETAIL AND
ARE FOR REFERENCE ONLY**

OWNER'S MANUAL

SERIES D

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011703-DO

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INTRODUCTION

Thank you for purchasing a PFLOW INDUSTRIES, INC., Series D, Vertical Reciprocating Conveyor (VRC). As the nation's largest manufacturer of VRCs, we are confident that your unit will provide you with many years of reliable service.

CODE REQUIREMENTS - VRCs are NOT elevators. Your unit is designed for the movement of materials only, up to its rated capacity, from one level to the next. VRCs have their own national code (ANSI/ASME B20.1) and are specifically exempt from the National Elevator Code. All electrical designs and components are in accordance with National Electric Code (NEC) requirements. Local codes may require initial inspection of the installation and periodic inspection and testing of the unit.

Some states require special components and have specific guidelines regarding how the equipment must be installed, inspected, and tested. If we know in which state the equipment will be located, and if we are kept informed of state and local requirements, Pflow will incorporate the components into the order, as approved by the customer, and also provide any pertinent information, as called out on the general arrangement drawing, related to the installation of the equipment. We will not be on site for the testing, but we strongly advise that the installer be there.

If at any time you have questions about your state's requirements, please feel free to call.

NOTE

The information and illustrations in this manual are intended only as an aid to understanding the VRC's general installation. It does not cover every possible contingency or circumstance regarding non-standard options or site conditions.

If you have a problem, call Pflow at (414) 462-8810, between 8:30 A.M. and 5:00 P.M., CST, Monday through Friday. Ask for the Product Support Department and have your serial number ready.

Parts - Pflow Industries maintains a complete stock of, or has access to, all replacement components. We keep detailed records of all equipment sold. If something is damaged in shipment, is defective or missing, contact us immediately.

Service - Our Product Support Department is available to assist your maintenance personnel with any questions or problems they may have regarding the equipment.

Warranty - Our warranty procedures can be found in the back of this manual. Prior authorization must be obtained from Pflow before commencing work of any kind.

Feedback - Let us know how we are doing. A questionnaire is included in the installation manual. Please fill it out and return it to us. We can't prevent a problem if we are not aware of it.

PFLOW INDUSTRIES, INC.,
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D Series

SAFETY

To ensure your safety and the safety of those around you, it is important that you read, understand, and follow ALL the safety precautions relative to a particular task. Safety precautions in this manual are labeled with the alert symbol followed by the word DANGER, WARNING or CAUTION.

DANGER

When you see this symbol, it means that serious injury or death is likely to occur if the instructions are not followed carefully.

WARNING

When you see this symbol, it means that the potential for personal injury is high if directions are not followed carefully.

CAUTION

When you see this, it means that the potential for damage to the equipment is high if directions are not followed carefully.

NOTE

This term is used to provide additional information to help clarify instructions.

DANGER

HIGH VOLTAGE. Failure to follow proper procedures when performing electrical installation or service may result in serious injury or death.

DANGER

DO NOT ride this equipment. Riding may result in injury or death. VRCs ARE NOT ELEVATORS.

DANGER

DO NOT walk or work under a raised platform.

DANGER

If you can open a gate when the unit is not at that level, or the unit will operate with a gate open, a safety device is not working and could result in serious injury or death.

WARNING

DO NOT operate the unit if either the gates or interlocks are not functioning properly.

CAUTION

Paint overspray on cylinder rod will damage seals and void warranty.

CAUTION

DO NOT exceed rated capacity.

WARNING

When you have finished using the VRC, do not leave the carriage at the upper level.

Electrical Safety Precautions

DANGER

Always assume that a circuit is not safe until you are sure that it is dead. Make sure that it cannot be energized after you start working on it. Follow OSHA procedures for locking out the control panel ANYTIME maintenance or service is being performed on the unit. Put a lock and tag on disconnects, breakers, and/or pulled fuses.

- Use a voltage tester on circuits - **DO NOT USE YOUR FINGERS**. Use fuse pullers to change a fuse; **NEVER** use fingers, pliers or screwdrivers. Covers on exposed electrical devices or wires **MUST** be installed to protect personnel from injury or shock.
- **ALL** metal connection boxes, switch boxes, starting boxes, transformer shells, and motor frames must be grounded to prevent shock to personnel.
- When using a portable electric meter, **DO NOT** connect one wire and leave other wires dangling loose. Anyone touching it will receive a shock through the meter.
- Before powering a circuit on, make sure that all is clear. This is necessary in order to protect personnel from injury and to prevent damage to the equipment.
- Avoid accidental contact with equipment or conductors which are known to be live or are **NOT** known to be dead. If it is necessary to work on equipment while it is hot, extra care must be observed. Always test and repair equipment that indicates a warning of unsafe conditions by giving a nonfatal shock. **NEVER** assume that because the warning shock is nonfatal, the next shock will also be nonfatal.
- **TAKE TIME TO BE CAREFUL!** Following safety precautions and using common sense will prevent injury, mutilation, or death.

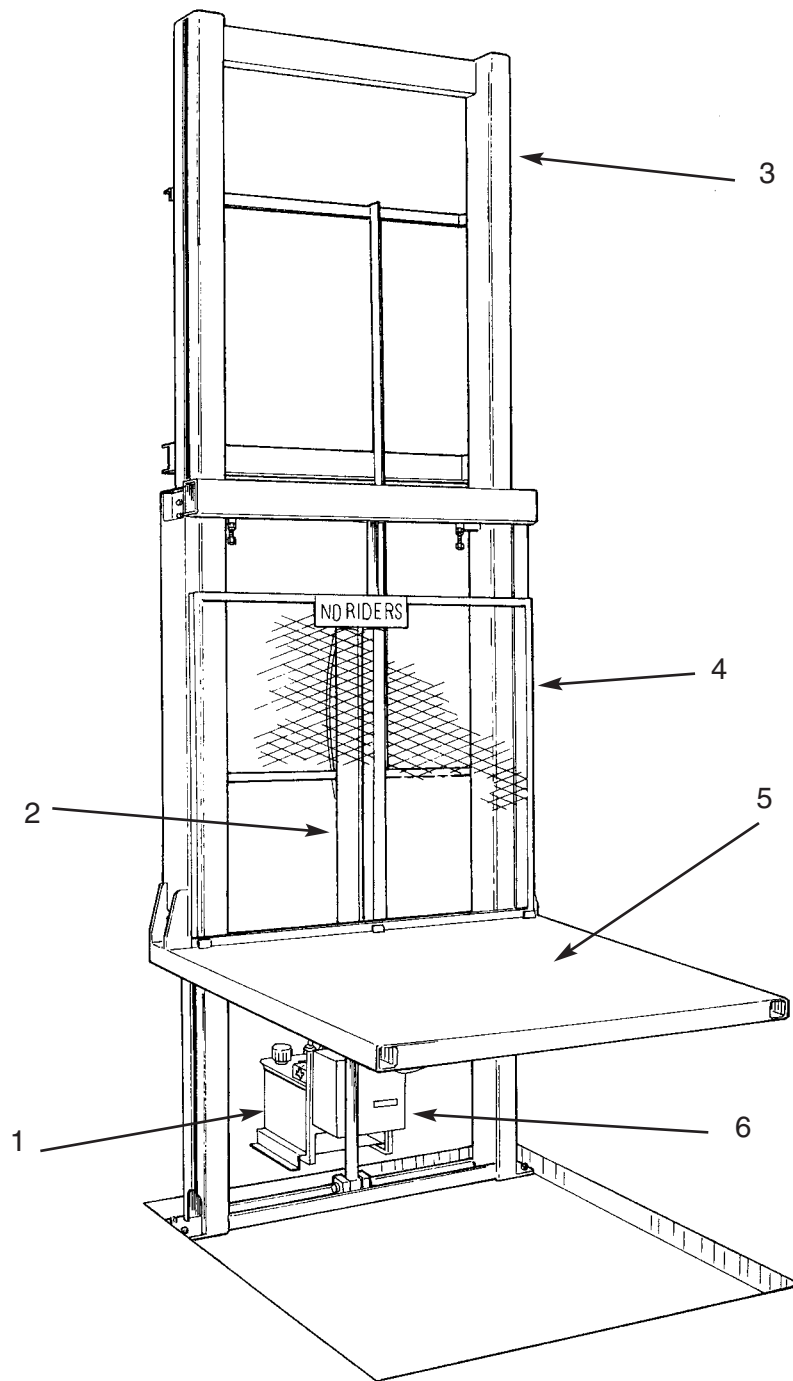
Safety Precautions When Working on Live Circuits or Equipment:

When electrical repair or maintenance work is required that prohibits de-energizing the circuits involved, extreme measures of safety must be used. The work should be accomplished only by well-supervised personnel who are fully aware of the dangers involved. Every care should be taken to protect the person performing the work and to use all practical safety measures. The following precautions **MUST** be taken:

- The person doing the work should not wear a wristwatch, rings, watch chain, metal articles, necklaces or loose clothing which might make accidental contact with live parts or throw some part of his body into contact with live parts.
- Clothing and shoes should be as dry as possible.
- Insulate the worker from ground by covering any adjacent grounded metal, with which he might come in contact, with insulating material. Suitable insulating materials are dry wood, rubber mats, dry canvas, dry phenolic material, or even heavy, dry paper in several thickness. Be sure that it has no holes and no conducting materials embedded in it. Cover sufficient area so that adequate space is permitted for worker movement.
- Cover working metal tools with an insulating rubber tape (not friction tape) as much as is practical.
- **DO NOT** stick a bare screwdriver or other tool into a hot fuse box.

Series D

COMPONENT LOCATION



PFL-2076

1. Motor/Pump Unit
2. Dual Pack Cylinder Assembly
3. Columns
4. Removable Rear Rail
5. Carriage
6. Control Panel

Figure 1

MECHANICAL OVERVIEW

Each Series D Vertical Reciprocating Conveyor (VRC) has a column weldment, hydraulic motor/pump unit, hydraulic actuating mechanism, a moving platform (commonly referred to as a carriage) with interlocked safety gates or doors, and enclosures (not shown).

The **COLUMN WELDMENT** consists of two vertical columns and a cross member at the top, middle, and bottom, all of which are pre-welded at the factory. See Figure 2.

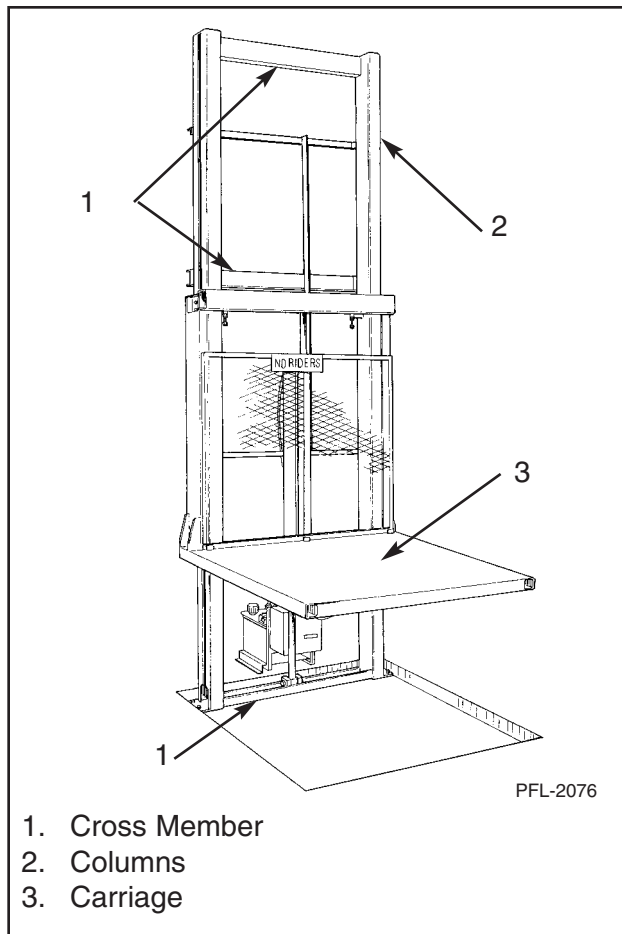


Figure 2

The **HYDRAULIC MOTOR/PUMP UNIT** consists of a motor, gear pump, flow control valve, pressure switch, reservoir, air (breather) cap and oil filter. (See Figure 3.) The exact location of items on the unit can be found in the Parts section of this manual. A detailed description of how they function is found in Sequence of Operation.

NOTE

For servicing and safety purposes, we recommend locating the pump unit outside of the enclosures.

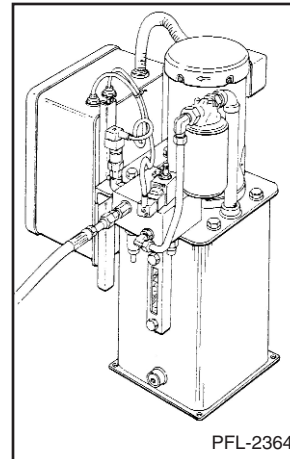
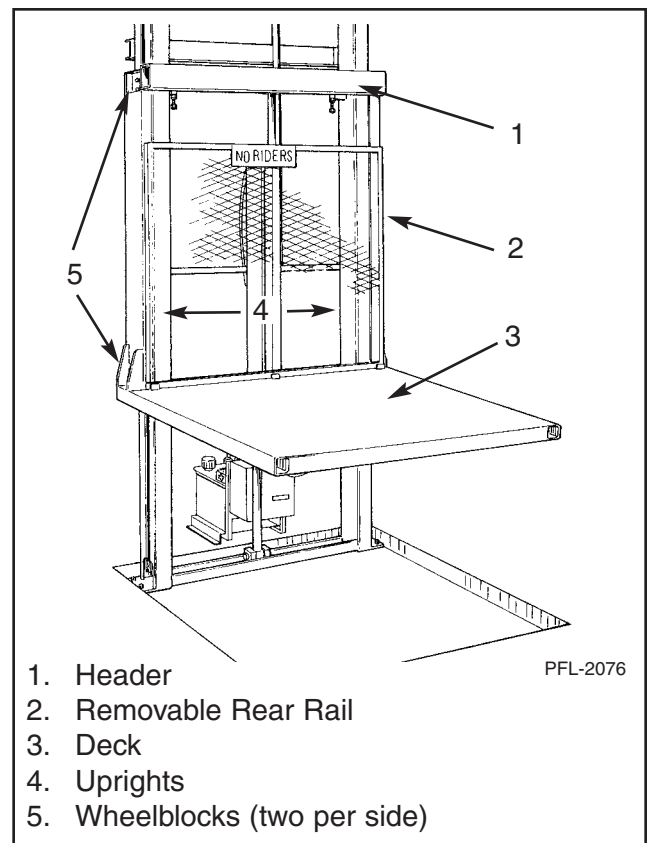


Figure 3

NOTE

The location of the pump unit may present a problem with the operation. Please consult our Product Support Department before making a change.

The **CARRIAGE** (platform) consists of a deck, uprights, header, removable rear rail, and four wheelblocks. See Figure 4.



D Series

The wheelblocks are bolted to the uprights. The wheels ride within the lift columns, and guide rollers keep the wheels and carriage the proper distance apart for smooth travel. See Figure 5.

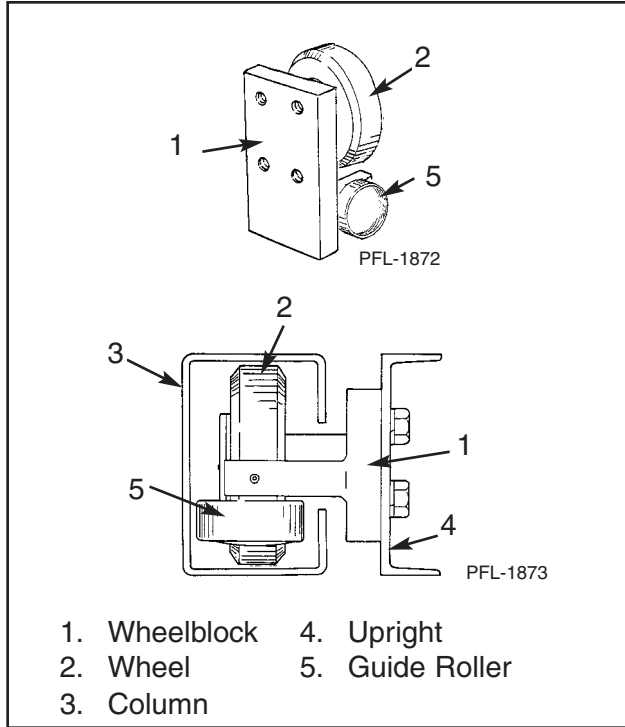


Figure 5

Upward travel of the carriage is limited by positive mechanical stops (jackscrew assembly) that ensure positive leveling with the upper deck. See Figure 6.

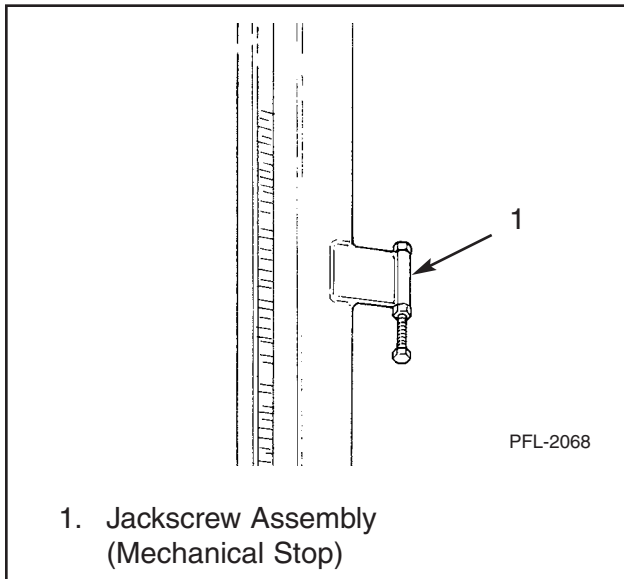


Figure 6

The **HYDRAULIC ACTUATING MECHANISM** is driven by a Dual-Pak cylinder. The Dual-Pak cylinder attaches to the bottom of the column weldment and to the top of the carriage. When the cylinder extends, it pushes the carriage up. The Sequence of Operation offers a detailed explanation of how this is accomplished. See Figure 7.

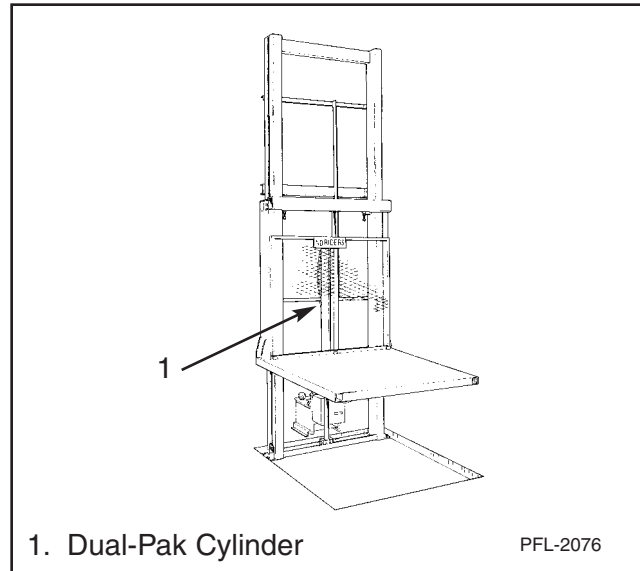


Figure 7

A velocity fuse prevents uncontrolled descent in the event of a hydraulic hose rupture. See Parts section for the exact location.

In accordance with ANSI/ASME B20.1, Pflow Industries supplies standard **ENCLOSURE PANELS** to be installed around the unit as required by site conditions. See Figure 8.

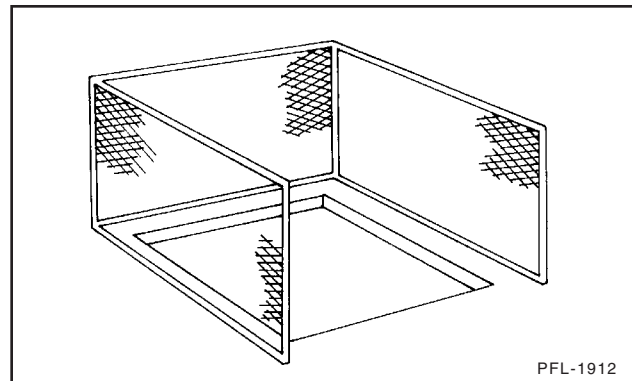


Figure 8

The panels are manufactured of 1-1/2" angle iron frames and 18-gauge flattened expanded metal which will reject a ball 1/2" in diameter. Our standard panels are 8' tall.

Mechanical Overview

A safety **GATE** or door must be provided at each opening in the lift area at each level. The gate must be interlocked both mechanically and electrically with the operation of the unit. This prevents movement of the platform when a gate is open and the opening of a gate when the lift is not present at that level. See Figure 9.

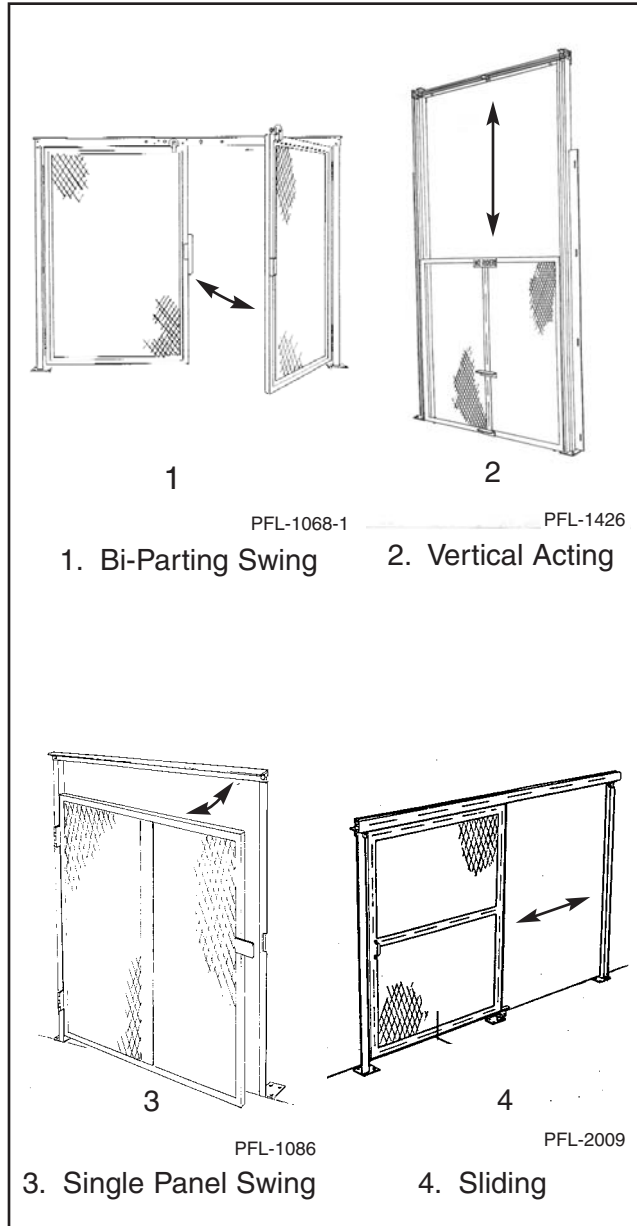


Figure 9

Pflow Industries uses various styles of interlocks depending upon the gate type and application. The Parts section of this manual contains views with part numbers. See Figure 10.

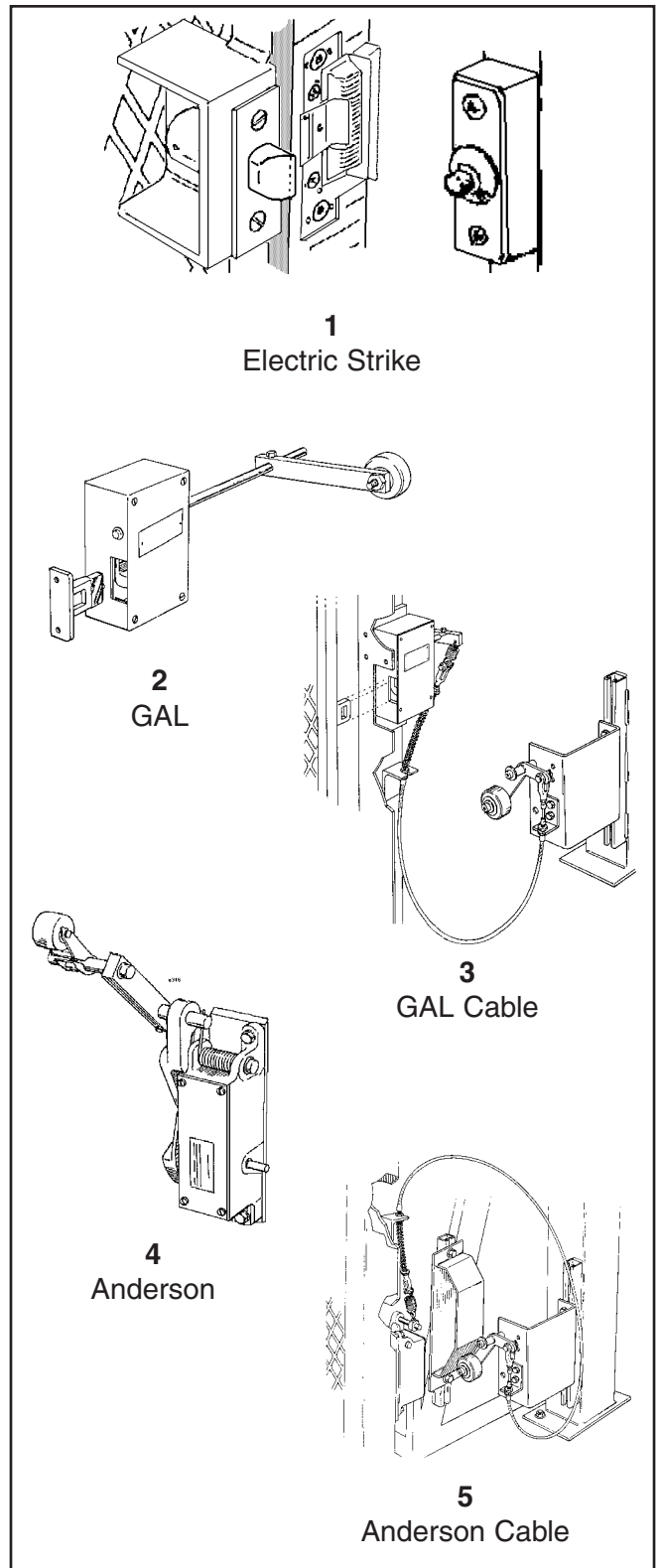


Figure 10

D Series

ELECTRICAL OVERVIEW

NOTE

The following is a standard description of the electrical wiring of the VRC ONLY. It DOES NOT include specifics on options available or ordered. A copy of the schematic can be found in a manila envelope in the parts crate.

All electrical devices are tied into the **MAIN CONTROL PANEL**. It contains a fused transformer, which reduces the high voltage needed for the motor down to the voltage required to operate the control circuit, motor starter and push button stations. Overload heaters are provided to protect the motor should excessive current draw cause overheating. The fixed timing relay is used to time the solenoid to lower the lift to the first level. See Figure 11.

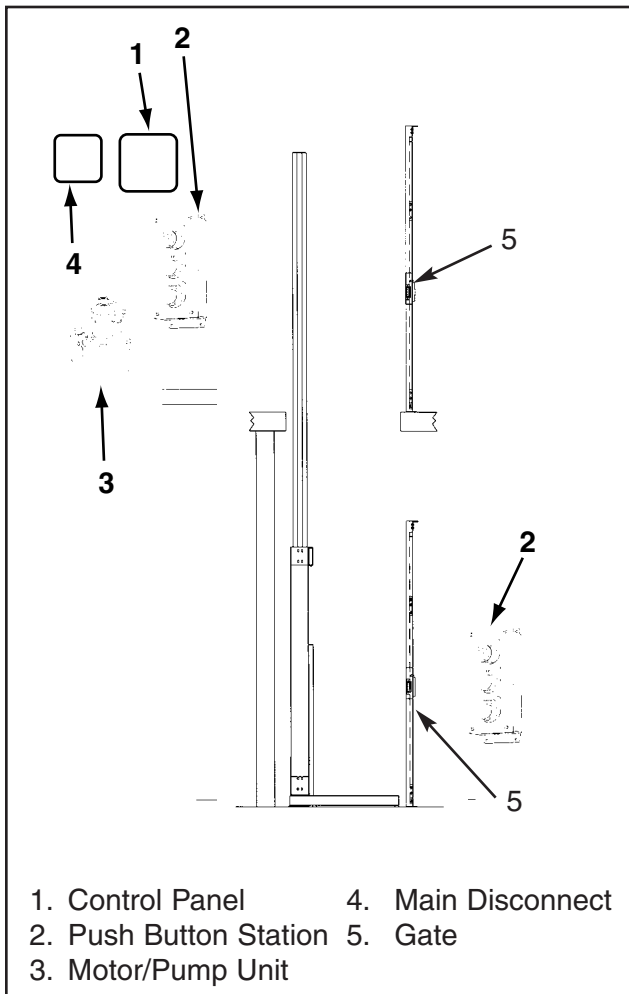


Figure 11

PUSH BUTTON STATIONS. One station is normally supplied for each level. ANSI/ASME B20.1 code requires that they be remotely located so they cannot be activated by someone standing on the carriage. Each station has an UP, DOWN, and EMERGENCY STOP button.

The UP and DOWN switches are momentary contact. This allows the operator to depress the button and let go. The EMERGENCY STOP button is pushed to activate but will stay in and must be pulled back out for the unit to operate.

Required by NEC code, the **MAIN DISCONNECT** should be fused, lockable, and located within line of sight of the control panel. (Not supplied by Pflow.)

The **MOTOR/PUMP** unit has three electrical components: a motor, a pressure switch, and an electrically actuated valve. The control panel and motor pump will be pre-mounted to a stand that must be located within 15 feet of the unit.

⚠ WARNING

All gates or doors accessing the lift area must be electro-mechanically INTERLOCKED. This requires electrical contacts to prevent the lift from operating if a gate is open when the carriage is at that level and mechanical locks to lock the gate until the carriage is at that landing.

Different types and styles of interlocks are supplied depending upon the type of gate and on-site conditions. Standard styles incorporate from one to four electrical components per gate.

SEQUENCE OF OPERATION

NOTE

For the unit to operate:

- All gates must be closed.
- Loads cannot hang over the edge or sides of the carriage.
- The load must be within the specified limit.

1. When the UP button at the push button station is pressed (Figure 12), the control circuit to the motor starter (motor contactor) is completed. The coil of the motor starter (Figure 13) magnetically closes the high voltage contacts completing the power circuit to the motor.

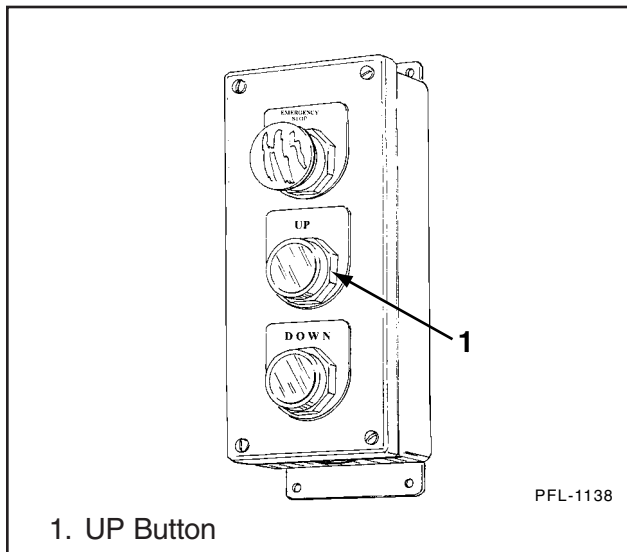


Figure 12

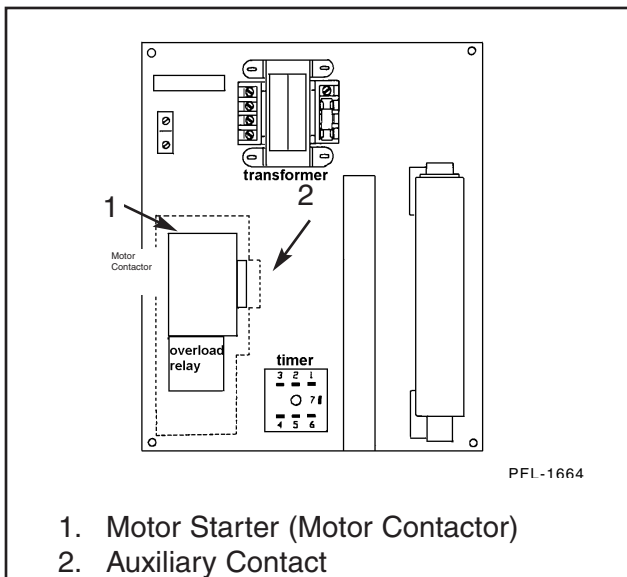


Figure 13

2. The motor then rotates, and the two enmeshed gears in the gear pump interact to lift the hydraulic fluid from the reservoir and force it past a line check valve into the hydraulic system where the fluid is now pressurized. See Figure 14.

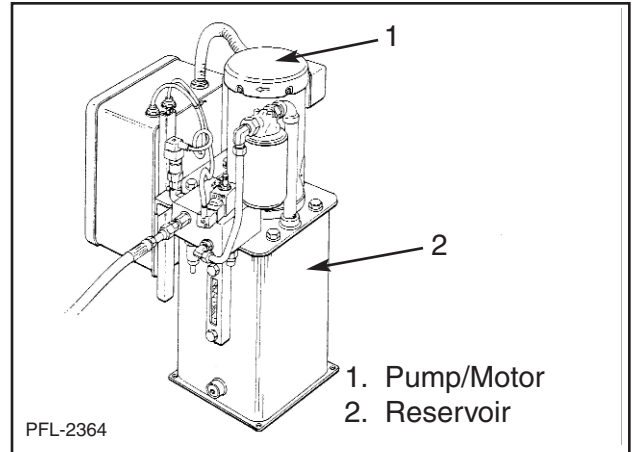


Figure 14

3. Hydraulic fluid travels through a flexible supply hose to the supply port on the Dual-Pak cylinder. See Figure 15.

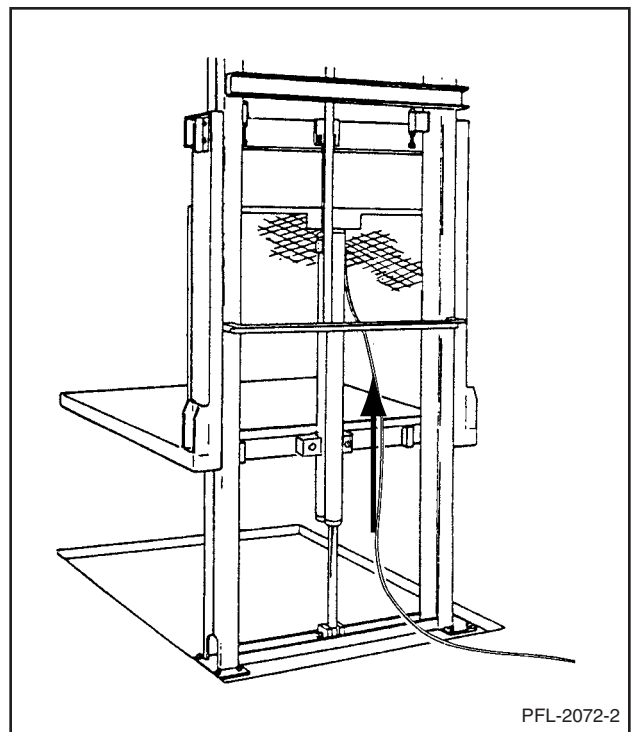
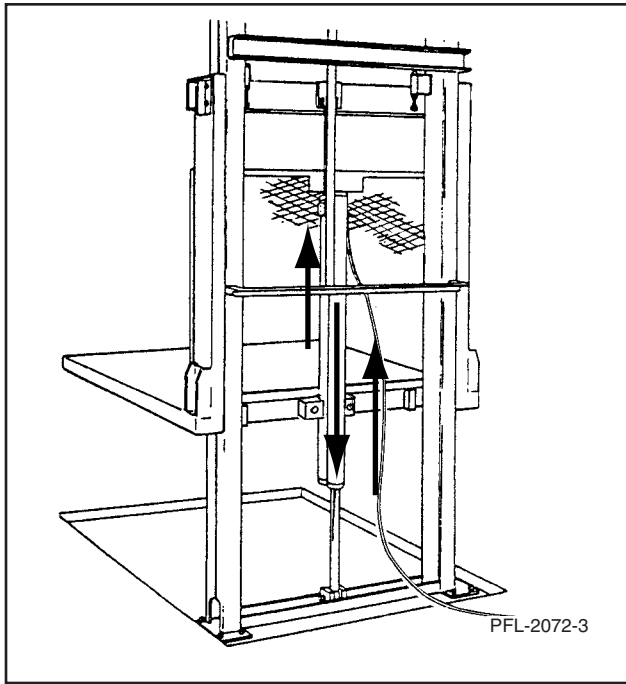


Figure 15

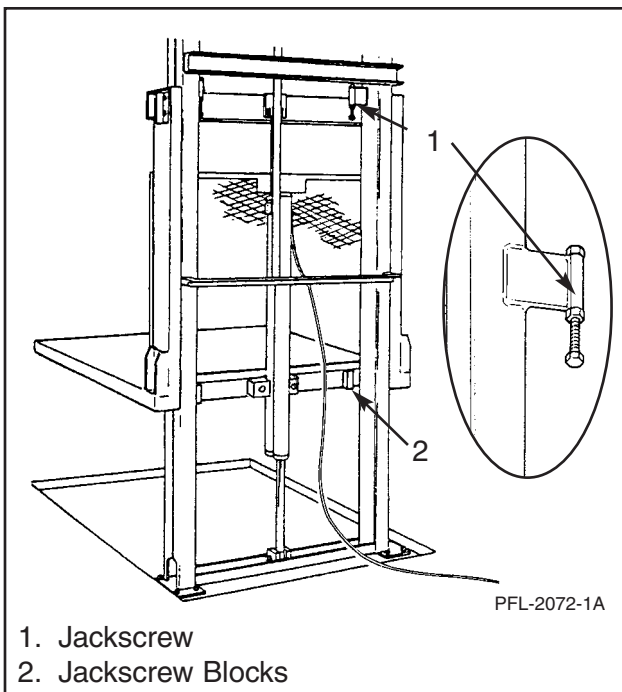
Series D

- Fluid enters the Dual-Pak cylinder and acts against the rod causing it to extend and lift the carriage. See Figure 16.



Item 16

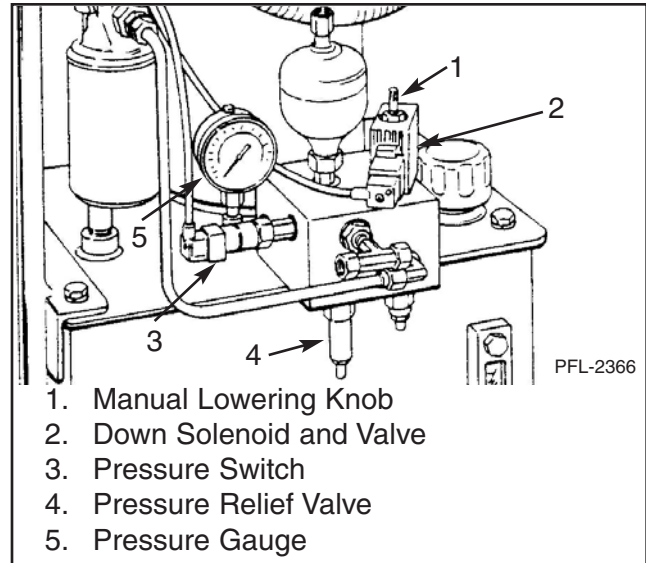
- When the jackscrew blocks contact the stops, an increase in hydraulic pressure occurs in the cylinder and the supply line. See Figure 17.



- Jackscrew
- Jackscrew Blocks

Figure 17

- This increase in pressure is sensed by the pressure switch and is shown on the pressure gauge. The switch activates, interrupting the control circuit to the motor starter, shutting down the hydraulic pump unit. See Figure 18.



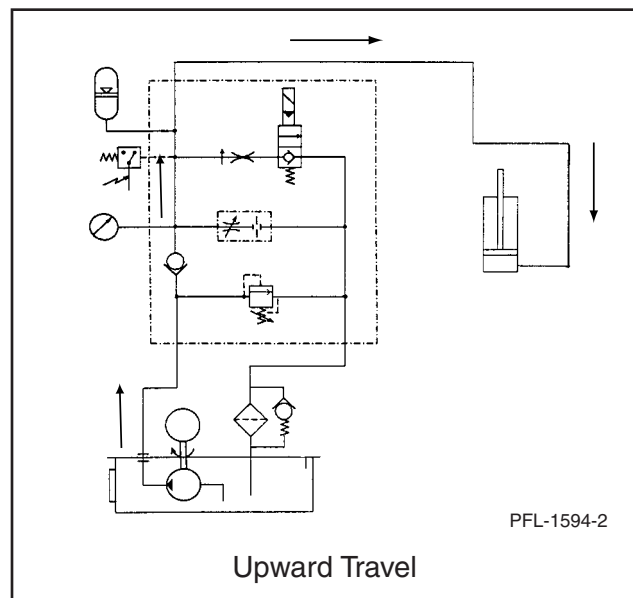
- Manual Lowering Knob
- Down Solenoid and Valve
- Pressure Switch
- Pressure Relief Valve
- Pressure Gauge

Figure 18

- When the pump stops, the line check valve closes capturing the fluid behind it in the lines and cylinders. This holds the carriage at the second level. See Figure 19.

NOTE

When the EMERGENCY STOP button is depressed, the system will respond as in Step 7.



Upward Travel

Figure 19

- When the DOWN button is pressed, a solenoid on the dump valve energizes actuating the dump valve to allow the hydraulic fluid in the supply line and cylinder to return to the reservoir through the oil filter. See Figure 20.

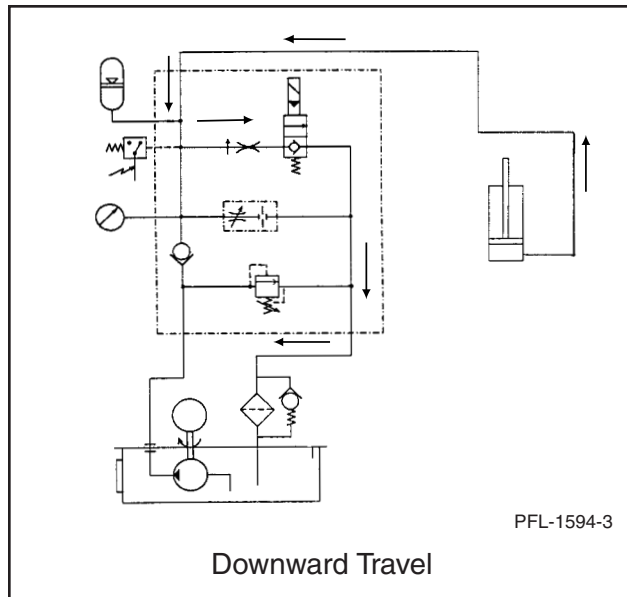


Figure 20

- As the oil leaves the cylinder, the weight of the carriage retracts the rod, lowering the carriage. The return fluid passes through the flow control orifice which correctly restricts the fluid movement to control the carriage down speed.
- The timing relay found in the control panel (Figure 13) is activated, holding the dump valve open. This timer is pre-set to allow enough time for the carriage to descend to the first level. The dump valve closes when either the timer “times out” or the next time the UP button is pressed. This completes one full cycle of operation.

D Series

OPERATION

BEFORE OPERATING THE LIFT, PLEASE READ, UNDERSTAND AND FOLLOW ALL THE SAFETY PRECAUTIONS LISTED BELOW.

⚠ DANGER

Malfunctioning interlocks may allow the door to be opened when the carriage is not present. **YOU MUST MAKE SURE CARRIAGE IS PRESENT BEFORE WALKING THROUGH DOORWAY.** If the carriage is not present, you could fall into the empty shaftway and be seriously injured or die!

⚠ DANGER

Door must be closed and locked unless carriage is present. Door interlock must be operational. It prevents door from being opened when carriage is not present. Door restricts personnel from falling into opening or from being struck by moving parts that could result in serious injury or death!

⚠ DANGER

DO NOT ride this equipment. Riding may result in serious injury or death! VRCs ARE NOT ELEVATORS.

⚠ DANGER

DO NOT walk or work under a raised platform.

⚠ WARNING

Only trained persons shall be permitted to operate or maintain this equipment. Improper operation or maintenance may cause serious injury or death!

⚠ WARNING

If at any time proper operation or performance of your Pflow VRC is in question, DO NOT USE IT! Notify your supervisor or the proper maintenance people immediately.

⚠ WARNING

Always return the carriage to the lowest level when the VRC is not in use.

CAUTION

DO NOT allow loads to overhang the sides of the carriage. This will result in damage to the equipment and merchandise.

CAUTION

DO NOT exceed the rated capacity.

TO OPERATE LIFT

- Close gate.
- Depress and release the appropriate push button to move the carriage to the desired floor. The carriage will stop when it reaches the appropriate level.
- When the unit has arrived at the appropriate level and comes to a complete stop, open the gate.
- If an emergency occurs when the carriage is moving, push the EMERGENCY STOP button. The button will keep the lift inoperative until the button is pulled back out. See Figure 21.

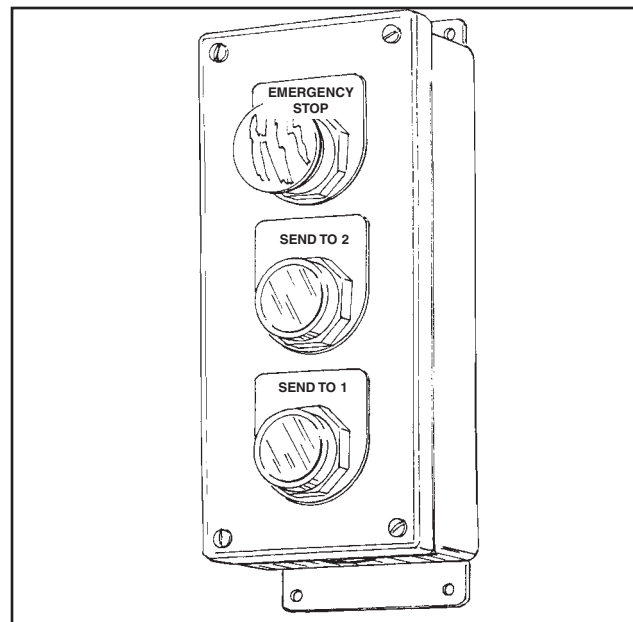


Figure 21

NOTE

Service must be performed by authorized personnel only. Read the Owner's Manual before operating the equipment. For service, contact your local representative.

SERVICE

Maintenance and Troubleshooting of Pump Unit

NOTE

The life of the hydraulic components is directly proportional to system cleanliness. If the oil is kept clean, is in good chemical condition, and its viscosity meets the operating temperature range, it should be left in the unit.

MAINTENANCE CHECK

1. Reservoir - Check the fluid level and make sure it is up to the full mark.
2. Inlet Line - Check for frays and kinks. Make sure the connections are secure and leak-proof.
3. Oil Viscosity - Do not use fluid that is too thick. Heat, high pressure, and contamination all speed up oxidation which results in gum, sludge, plugged valves, and excessive wear on the components.
4. Fluid - If it is cloudy, off-color, contains suspended sediment, or liquid layers, then changing the fluid is recommended.
5. Check and/or change the oil filter. Ten microns or less is recommended.

FILLING THE RESERVOIR

NOTE

Hydraulic oil with a Saybolt viscosity of between 100 and 150 SSU or ISO 32 at operating temperatures with a non-foaming additive should be used.

Extreme temperatures below 32°F or above 100°F and corrosive atmosphere may affect oil requirements. Consult Pflow Industries for assistance.

1. Wipe off the fill plug and the filler nozzle with a clean, lint-free cloth.
2. Watch for metallic chips, bits of waste, and other contaminants that may cause damage to the system.

3. Use a ten micron filter on the filler nozzle when adding oil.
4. The reservoir should be tightly closed after filling the system.

CLEANING THE RESERVOIR

NOTE

The reservoir is a settling basin for any contamination. It is important to remove all accumulated sediment from the bottom. Wipe down the interior to remove any further impurities. The inside cover of the reservoir should also be checked. Large reservoirs can be a source of rust contamination due to condensation. The vibration of the pump unit results in the rust flaking off into the fluid.

Maintenance Schedule

Your VRC requires consistent minimal and basic periodic attention. It is recommended that you keep a record during inspection and make a periodic evaluation of lubricating needs to reflect any increase in service that may be required. Problems must be addressed immediately as they may affect the safety devices.

NOTE

Observe cycle day's schedule based on whichever comes first. High usage and corrosive environments will require more frequent maintenance and possibly different lubricants. (Check with your lubrication supplier for your particular needs.) Additional options, as ordered by the customer, may require maintenance and are not included in the above information.

If you have any questions or problems, please feel free to contact either your local service representative or our Product Support Department for assistance.

D Series

INSPECT	NO. OF CYCLES/DAYS	ITEM	ACTION	REFERENCE
	1000/90	Bolts	Check for any loose bolts and tighten	Parts
	1000/90	Interlocks	Inspect and test	Parts
	2000/90	Cylinder Fittings/ Hoses	Inspect for leaks	Parts
	2000/90	Wheelblock Wheels	Inspect for wear and rotation interference	Parts
	2000/90	Guide Wheels	Inspect for wear and rotation interference	Parts
	2000/90 6000/360	Hydraulic Oil Filter	Change after first 1000/30 then 6000/360 thereafter	Parts
	1 year	Reservoir	Drain and clean tank; Change oil and filter	Flushing Hydraulic System
	1000/90	Gates/Interlocks	Inspect for proper operation	

Manual Release Valve

CAUTION

For Emergency Use Only!

The down solenoid, also referred to as a dump valve, is equipped with a manual release valve. See Figure 22. This is to be used only in emergency situations when a load is stuck in upward mid-travel and the only way to free the load is to bring the unit down.

WARNING

Make sure that NO ONE is present in the enclosed area beneath the lift when operating this valve.

1. To open or operate the manual release valve, turn it counterclockwise. This will allow the unit to descend.
2. Once the platform has reached the floor, turn the valve clockwise and close snugly.

If you have any questions or problems, please contact our Product Support Department for assistance.

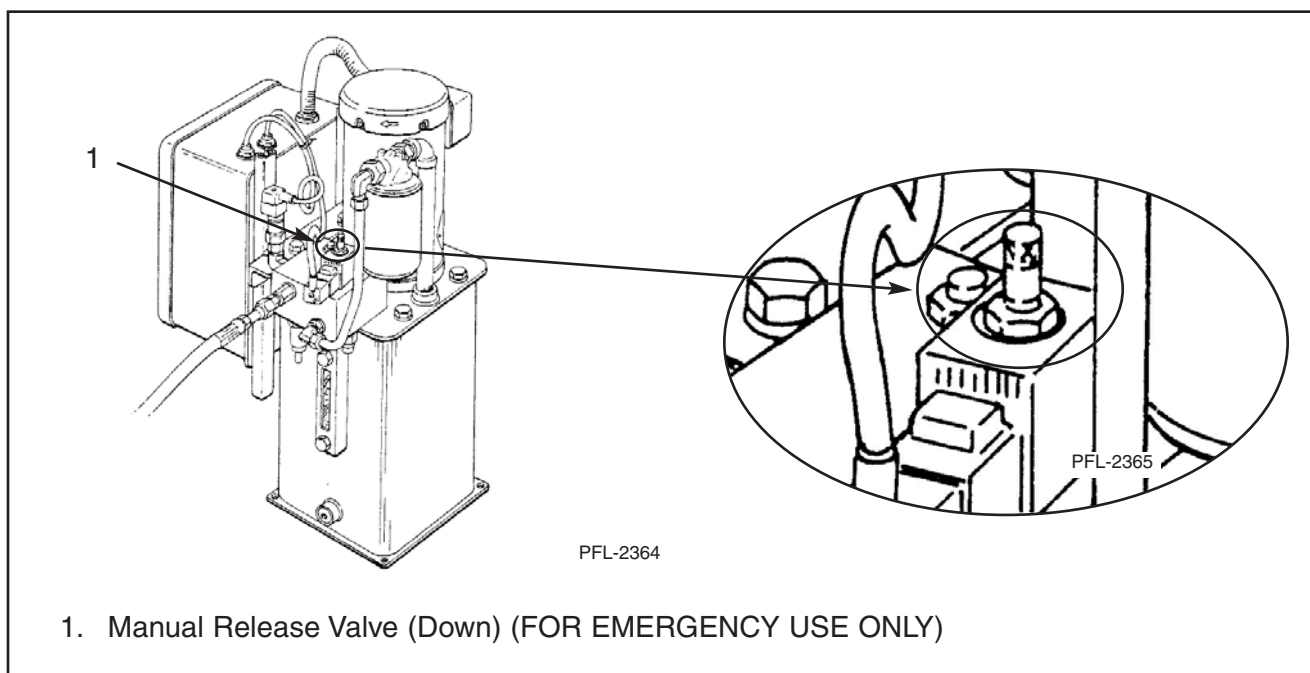


Figure 22

Flushing Hydraulic System

NOTE

For prolonged service life, contamination must be periodically removed from hydraulic systems. Taking steps during the installation and daily operations to prevent contaminants from entering the system will help to prevent component failure and system down time.

If contamination is evident in fluid samples, there is a good chance that accumulation has occurred somewhere within the system "plumbing." These deposits interfere with the operation of the unit and must be flushed with a light viscosity oil containing a rust inhibitor to protect the metal surfaces from rust formation after the hot flushing oil has been drained out.

1. Lower the carriage to the floor. Make sure the cylinders are fully extended.
2. Turn off power and lock out the disconnect.
3. Drain the system by removing plug near bottom of reservoir. See Figure 23. When draining the system, it is desirable to remove ALL of the used oil. Allow sufficient time for thorough draining so that a minimum of the old oil remains in the system. In most cases, bleeding at the lowest point in the system will help. It is also advisable to drain only after the oil is

fully warmed up (about 150°F). By doing this, oil impurities do not have a chance to settle and can be removed with the drained oil. The fluid should then be drained while it is hot.

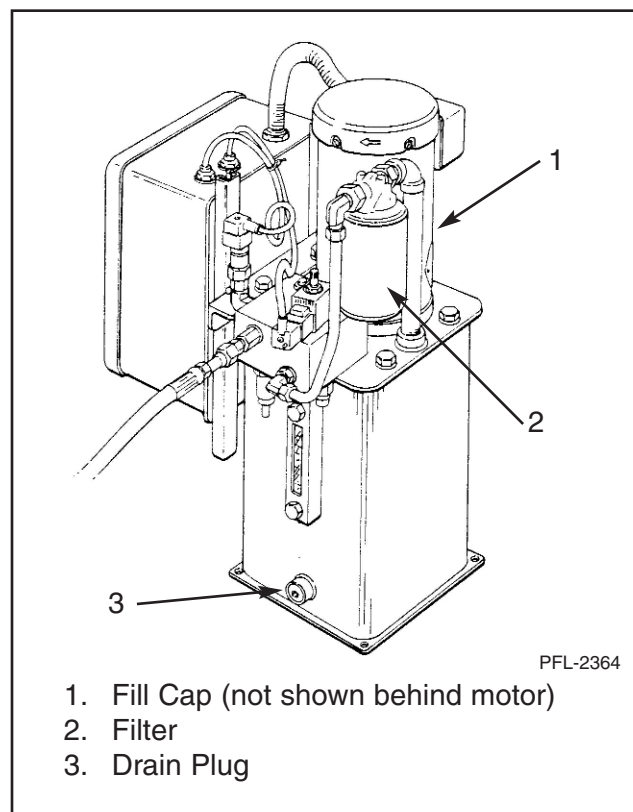


Figure 23

D Series

4. Clean out the reservoir.
5. Refill the unit with oil. Before removing the filler cap to add oil to the hydraulic system, wipe off the fill plug and the filler nozzle with a clean, lint-free cloth. The safest way to pour oil from a container into a reservoir is to use a 10-micron filter on the filler nozzle. It is especially important to watch for metallic chips, bits of waste and other contaminants that may cause damage to the hydraulic system. The reservoir should be tightly closed after filling the system.
6. Remove lock and restore power.
7. Flush system. This is done by circulating a small percentage of special petroleum solvent cleaner with the fluid charge long enough to loosen and remove the deposits (10 to 50 hours depending on the condition). A careful watch on the filters will indicate when the system is clean.

NOTE

Hydraulic oil with a Saybolt viscosity of 150 SSU or ISO 32 at operating temperatures with a non-foaming additive should be used.

- Solvents - Fluid suppliers are the best source for solvents. Solvents such as alcohol, kerosene, and carbon tetrachloride are low in viscosity and tend to: a) reduce the viscosity of the new fluid, b) may not hold the washed out contaminants in suspension and may deposit them in another part of the system.
8. Repeat steps 1 to 5.
 9. Replace the oil filter.
 10. Take all necessary steps to put the unit back into operation.

If you have any questions or problems, contact our Product Support Department for further assistance.

TROUBLESHOOTING

Before troubleshooting please observe all of the precautions in the Safety section at the front of this manual.

The following is a list of common problems and solutions:

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Lift doesn't operate when controls (push buttons) are activated.	Gate of door is open or ajar.	Check all gates/doors to make sure they are closed.	Mechanical Overview
	Down solenoid bad.	Inspect; replace solenoid.	
	Main disconnect is off.	Check to see if there is a reason before turning back on.	
	Pressure switch activated.	Inspect; replace pressure switch.	
	Thermal overload has tripped.	Press reset button. If it trips again, determine cause. Motor is overheating.	
	Control fuse is blown.	Replace fuse after determining cause.	
	Power circuit between disconnect and starter is dead.	Use a voltmeter to check voltage. Repair as needed.	
Motor starts and carriage raises, but motor stops before second level.	Safety gate has been opened.	Close gate. Check to see why this has happened.	Mechanical Overview
	Object encountered.	Identify the problem. Remove or repair as needed.	
	Piston (cylinder) interference.	Remove object. Repair if needed.	
	Thermal overload has tripped.	Check for pump binding.	
	Pressure switch has activated.	Pressure switch setting is too low. Lower lift and restart reading gauge for 1,500-PSI maximum. Readjust if it stops at a lower PSI.	Parts
	Carriage is overloaded.	Lower and remove excess weight.	
Motor/pump runs but carriage does not raise, and there is no pressure shown on gauge.	Oil in reservoir is less than 3/4 full.	Add oil to proper level.	Maintenance and Troubleshooting of Pump Unit
	Motor rotation is incorrect.	Contact your electrician.	
	Relief valve setting is too low.	Increase spring pressure by turning stem clockwise a few times. DO NOT OVER or FULLY TIGHTEN. Damage will result. A few turns should show pressure on the gauge.	
	Pump is cavitating.	Oil supply is low; fill reservoir. Oil is too heavy; change to proper viscosity oil.	
	Contamination/pickup tube is plugged.	Open reservoir; inspect pickup tube, clean if required.	

D Series

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Motor/pump runs, but carriage does not raise, and there is erratic or low pressure shown on gauge.	Oil is foaming.	Air is leaking into suction line because of loose fittings. Check all fittings. Water or incompatible oils causing foaming. Drain and replace with proper type oil.	Maintenance and Troubleshooting of Pump Unit
	Low oil level.	Add to proper level.	
Carriage raises, but will not lower.	Mechanical interference.	Identify the problem. Remove and repair as needed.	
	Dump valve not actuating.	Depress the DOWN button and listen carefully. If it does not click, it is not operating. Then proceed with: 1. Using a voltmeter, determine that the solenoid is receiving current when the button is pressed. If it is not, check the operation of the timing relay and then the motor starter (contacts in the control circuit). 2. If the solenoid is receiving current, check the end of the solenoid coil with a screwdriver. When energized, there will be a magnetic pull. If no magnetic pull is present, replace the solenoid.	
	Velocity fuse triggered.	Check for hose break or fitting leak. If none found, attempt to increase pressure in cylinders by pressing UP button.	Parts-Hydraulic Layout
Motor/pump keeps running after pressure reaches the relief valve setting.	Relief valve set too low.	Readjust relief valve. Consult Product Support Department for instructions.	Parts
	Pressure switch set too high.	Readjust.	
	Bad pressure switch.	Replace switch.	
Carriage drifts down from raised position. (NOTE: 3-4 inches overnight is normal.)	Internal leakage.	Contamination is keeping the dump valve from seating. Remove solenoid coil and valve spool. Clean spool and seat with the recommended solvent or cleaner. Dry with a lint-free cloth. Replace coil and spool. Test. Inspect oil in reservoir.	Maintenance and Troubleshooting of Pump Unit
		Oil is bypassing the piston seals. Remove and clean seals. If worn, replace. Inspect breather for leakage.	
Carriage is spongy or bouncy.	Air in cylinders.	Cycle lift numerous times to remove air from cylinder.	
		Relieve air from cylinder with bleeder plug. If the problem does not resolve itself, call our Product Support Department.	

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Carriage lowers but stops early.	Debris in the pit.	Clean out pit.	Maintenance and Troubleshooting of Pump Unit
	Dump valve not working properly.	See "Carriage raises but it will not lower" for instructions.	
Rough or noisy operation.	Travel interference.	Identify. Remove or repair as needed.	
	Drive component interference.	Identify. Remove or repair as needed.	
	Wheel guide rollers worn.	Inspect, lubricate, and replace as needed. Determine why they wore out.	Parts
	Carriage is not level.	Determine cause and correct.	
Pump stops suddenly.	Major internal pump has failed.	Examine the pump and rebuild or replace as necessary.	Maintenance and Troubleshooting of Pump Unit
Excessive pump noise.	Damaged or worn pump.	Contact Product Support Department, Pflow Industries.	
	Cavitation*	Add hydraulic fluid to reservoir.	
	Aeration**	Add hydraulic fluid to reservoir.	

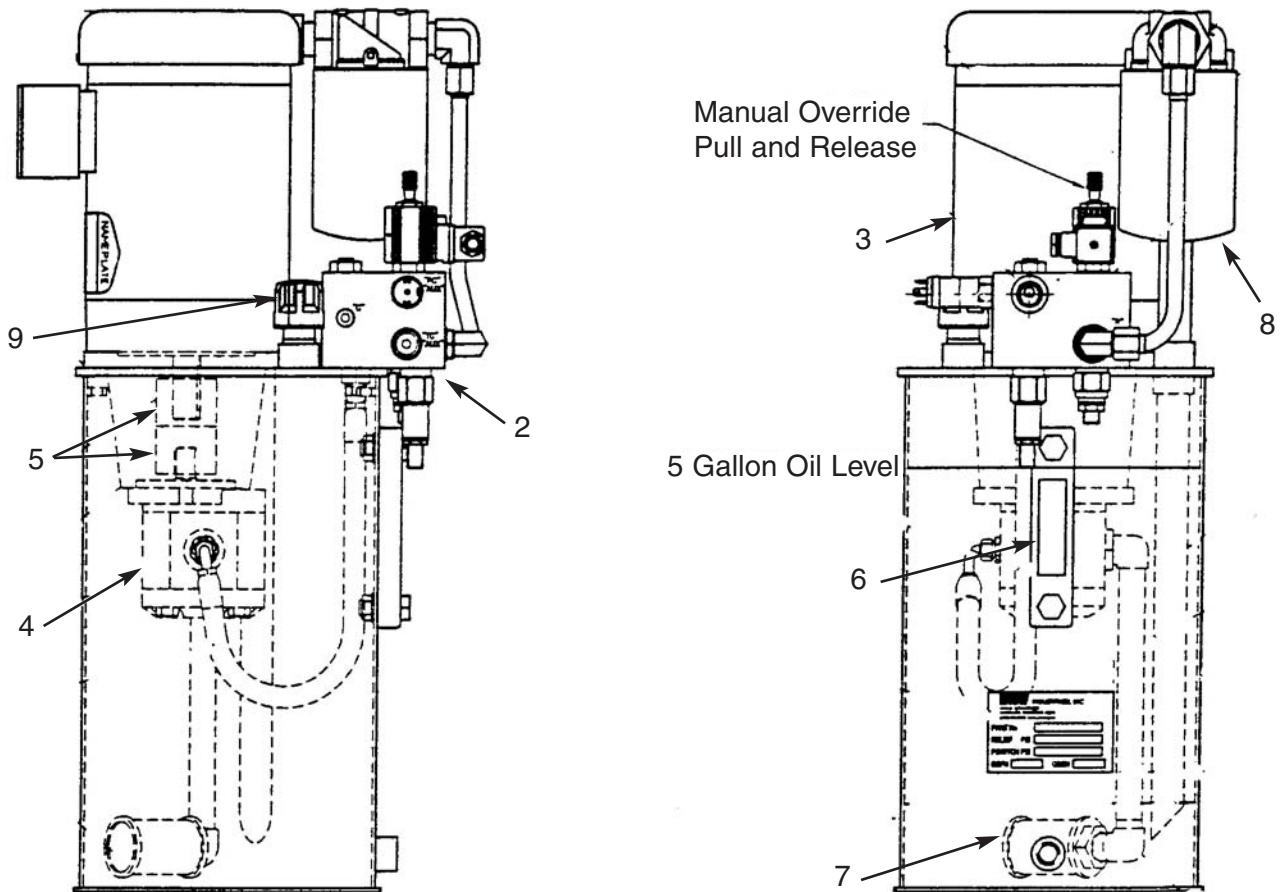
* **Cavitation** is a vacuum in the fluid caused by a restricted or sharp bend in the inlet line, a clogged filter, or by fluid that is too high in viscosity. The characteristic sound of cavitation is a high-pitched "scream." The noise increases with the degree of cavitation and with increased operating pressure.

** **Aeration** is the presence of excessive air, usually in the form of bubbles, disbursed through the fluid caused by a damaged inlet or return line; a loose or defective fitting(s) or seal(s); damaged or worn cylinder rod, packing, or seals; cracked junction blocks, tees, or piping; fluid level too low; air trapped in filter or excessive air trapped after adding fluid. Overheating or jerky and uneven movement in the pump or cylinders are the obvious symptoms of aeration.

If you need further assistance, please call the Product Support Department of PFLOW INDUSTRIES, INC.; (414) 462-8810.

D Series

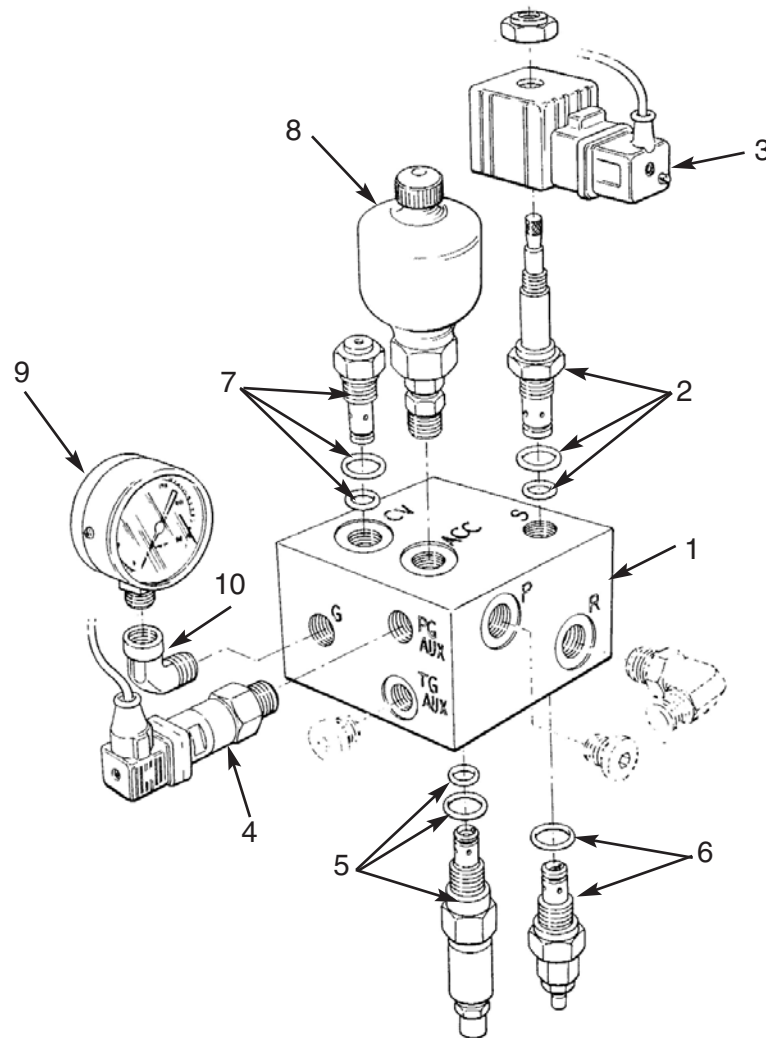
PARTS Hydraulic Pump and Motor Assembly



PFL-2362

Item	Qty.	Part No.	Description
1	1	Contact Factory	Hydraulic Pump and Motor Assembly
2	1	11078-0016	Manifold Block Assembly
3	1	Contact Factory	Motor Assembly, Pump
4	1	Contact Factory	Pump Assembly, Hydraulic
5	1	11078-0017	Coupling, Motor Half
		11078-0018	Coupling, Pump Half
		11078-0019	Insert, Coupling
6	1	11078-0013	Gauge, Oil Sight
7	1	11078-0012	Strainer, Hydraulic Oil
8	1	11078-0011	Filter, Hydraulic Oil
9	1	11078-0008	Breather, Oil Fill

Parts Manifold Block Assembly



PFL-2372-1

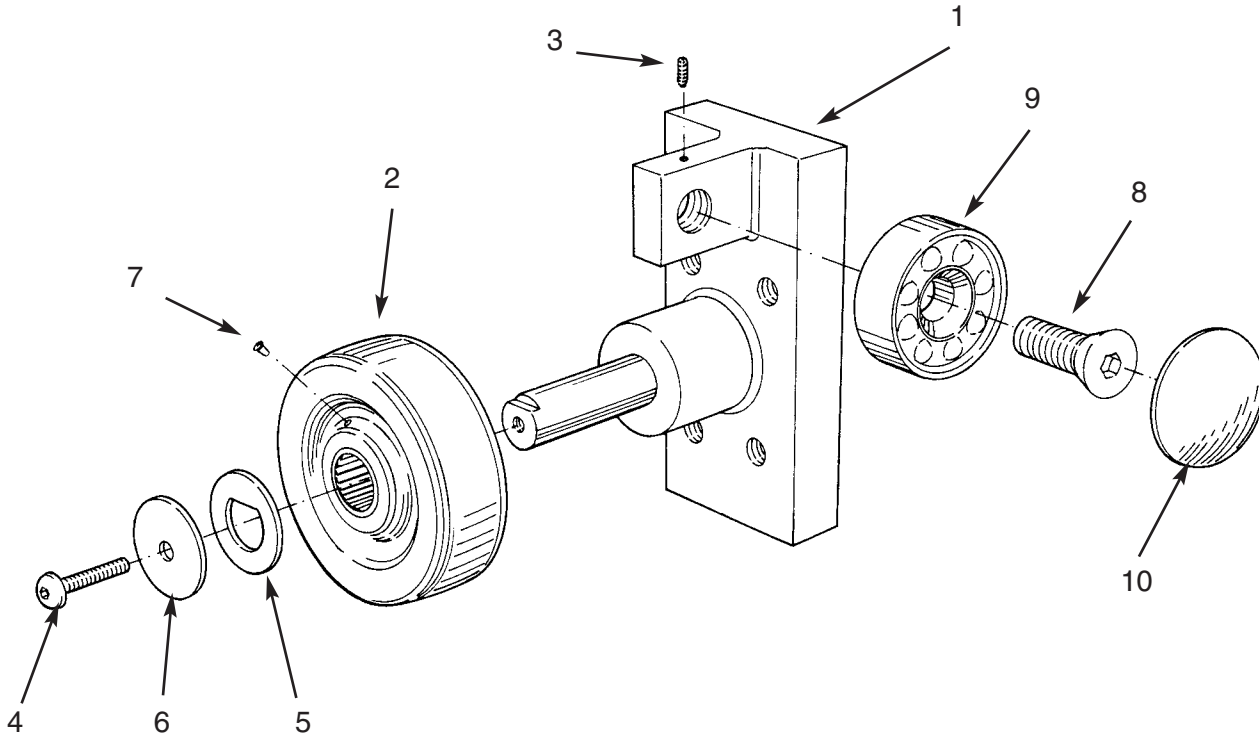
Item	Qty.	Part No.	Description
1	1	11078-0016	Manifold Block Assembly
2	1	11078-0002	Valve, Down with Manual Release
3	1	11078-0005	Coil, Down Valve - 24 V
4	1	11078-0006	Switch, Pressure
5	1	11078-0004	Valve, Relief
6	1	11078-0001	Valve, Flow Control
7	1	11078-0003	Valve, Check
8	1	11078-0014	Accumulator (Optional)
9	1	11078-0015	Gauge, Pressure (Optional)
10	1	Local Item	Elbow, 1/4" NPT Street

D Series

Wheelblock Assemblies

NOTE

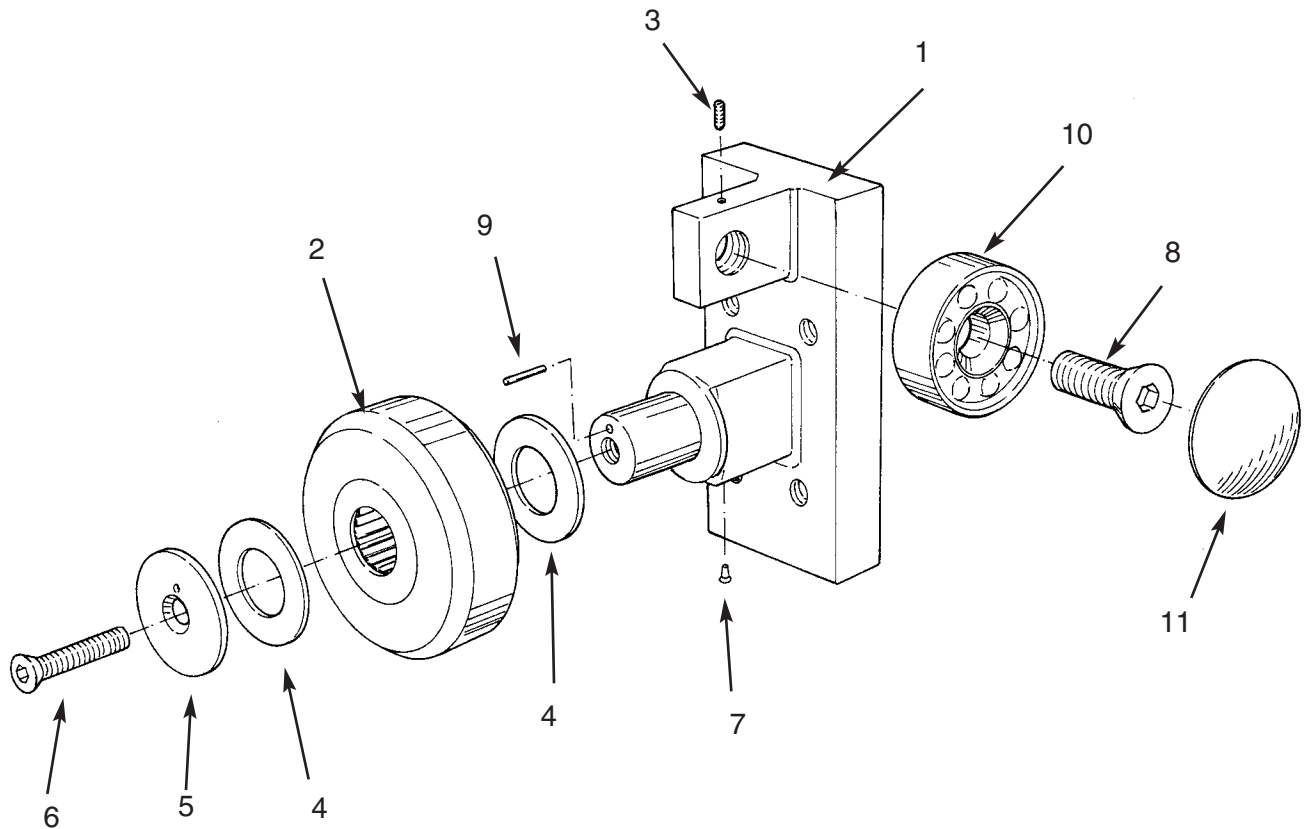
For complete assemblies - consult factory.



PFL-1868

Phenolic

Item	Qty.	Part No.	Description
1	1	10037-0000	Wheelblock Weldment
2	1	2591-0001	Wheel, Phenolic 5-1/4
3	1	6759-0008	Screw, 1/4-20 x 5/8" lg.
4	1	2888-0010	Screw, 1/4-20 x 5/8" lg.
5	1	8774-0000	D-Washer
6	1	5222-0000	Washer, Flat
7	1	9975-0006	Plug/Cap
8	1	9698-0000	Screw, 1-8 x 2" lg.
9	1	7954-0000	Trolley Wheel, 4"
10	1	7633-0000	Cap, 4" Trolley Wheel



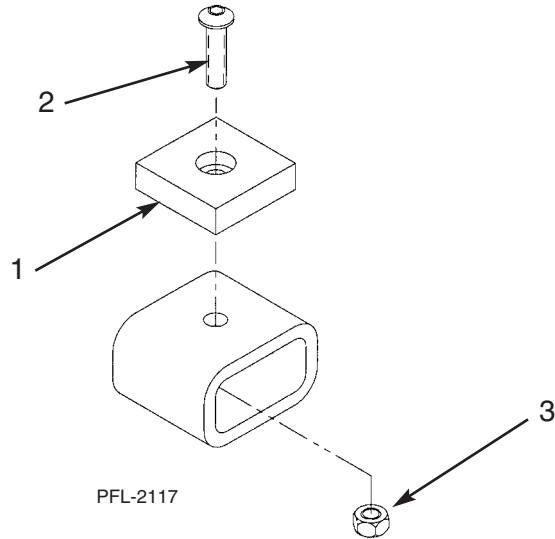
PFL-1869

5-1/4 Steel With Roller Bearing

Item	Qty.	Part No.	Description
1	1	10076-0000	Wheelblock Weldment
2	1	6381-0001	Wheel, Steel 5-1/4 w/seals
3	1	6759-0008	Screw, 1/4-20 x 5/8" lg.
4	2	3622-0000	Washer, Thrust
5	1	3629-0000	Washer, Retainer
6	1	4299-0016	Screw, FHSC 1/2-13
7	1	9975-0006	Plug/Cap
8	1	9698-0000	Screw, FHSC 1-8 x 2" lg.
9	1	5209-0012	Pin, Roll, 3/16 x 3/4" lg.
10	1	7954-0000	Trolley Wheel, 4"
11	1	7633-0000	Cap, 4" Trolley Wheel

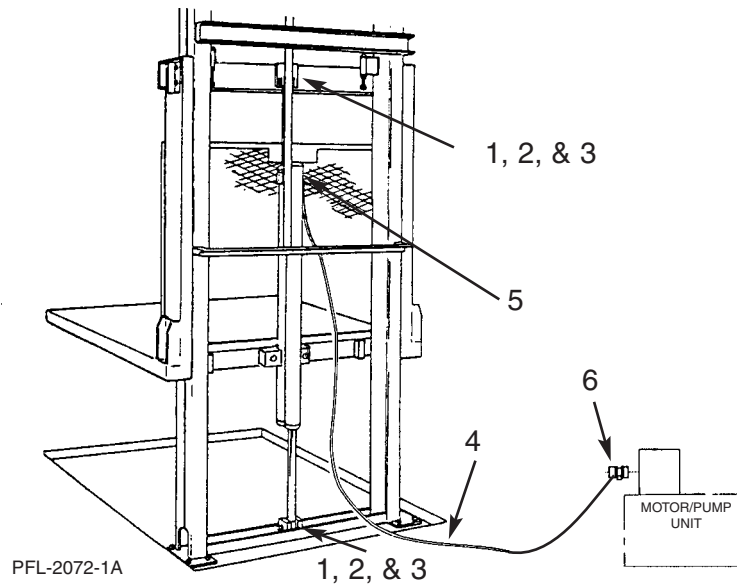
D Series

Carriage Stop



Item	Qty.	Part No.	Description
1	1	8272-0000	Pad, UHMW, Hydraulic Carriage Mounting
2	1	6709-0020	Screw, BHSC, 5/16-18 x 1 1/4" LG
3	1	6708-0010	Nut, Lock, Nylon, 5/16-18 UNC

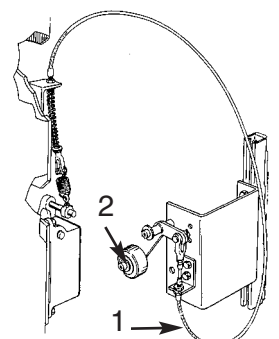
Dual Pak Cylinder Assembly and Hydraulic Components



Item	Qty.	Part No.	Description
1	4	2522-0000	Pin, Cotter, 5/32 x 1 1/4 LG
2	2	8829-0000	Pin, Clevis, 1" Dia.
3	4	6296-0021	Washer, Flat, Std. 1"
4	1	8625-0024	Hose Assembly
5	1	8889-0006	Velocity Fuse
6	1	9859-0000	Fitting, #8 SAE O-ring to #8 ORFS

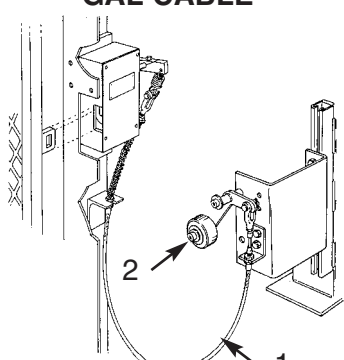
The **INTERLOCK** is a device used to mechanically prevent the gate from opening. Below are the standard types of interlocks supplied. As this is a safety device, replacement components are only available as shown below. Some configurations may vary by application.

ANDERSON CABLE



PFL-1885-6A

GAL CABLE

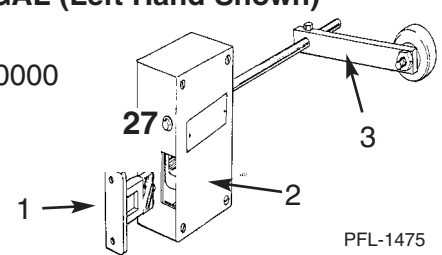


PFL-1885-7A

1. Control Cable Assembly
10' - #9292-0120
15' - #9292-0180
25' - #9292-0300
30' - #9292-0360
2. Roller Arm Assembly #9280-0000
Wheel Only #9284-0040

GAL (Left Hand Shown)

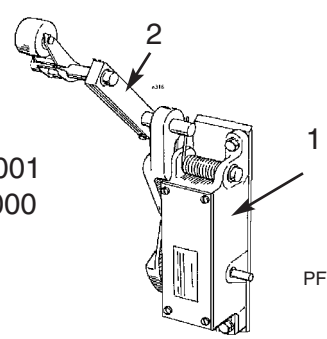
RH #2690-0000
LH #2691-



PFL-1475

1. Keeper #3838-0000
2. Contact Block (inside) #3832-0000
3. Arm w/Roller #4342-0000

ANDERSON (Right Hand Shown)

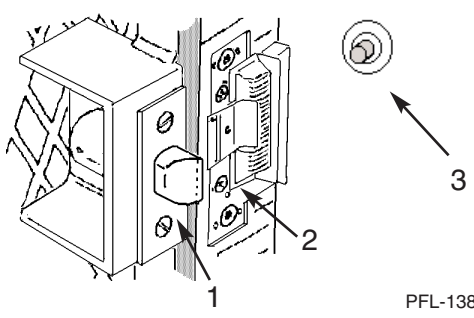


RH #2678-0001
LH #2678-0000

PFL-1368

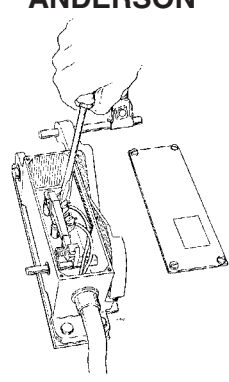
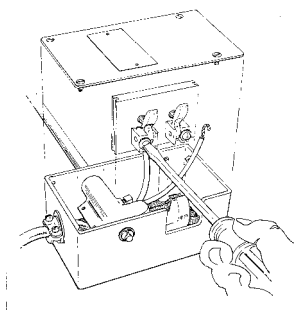
1. Contact Block (inside)
2. Arm #6950-0000

ELECTRIC STRIKE



PFL-1389

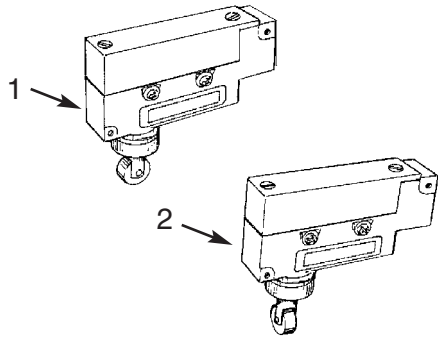
1. Spring Latch #7566-0000
2. Strike #9169-0000
3. Button #9096-0000

<p>ANDERSON</p>  <p style="text-align: right;">PFL-1401</p>	<p>GAL</p>  <p style="text-align: right;">PFL-1250</p>
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See schematic for proper wiring instructions.

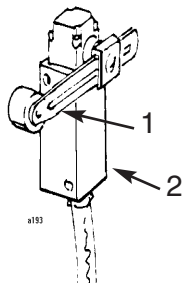
D Series

A **GATE STATUS SWITCH** is supplied when the contacts are not being used. If required, it will be mounted to the gate post or header. Normally the GAL and Anderson interlocks do not use this switch. Specific order requirements may dictate otherwise.



PFL-1293

1. Roller Plunger (parallel) #6220-0000
2. Roller Plunger (perpendicular) #6216-0000



PFL-1205

1. Adjustable Roller Arm #2891-0005
2. Switch #2893-0005

RECOMMENDED STORAGE REQUIREMENTS

ENVIRONMENT

All components should be stored indoors. The area of storage should be kept at a constant temperature above 55 degrees and relative humidity of approximately 40%, free from heavy dust and contaminants. Outdoor storage is NOT recommended.

STACKING

Except for placing the parts container and bracing on the empty carriage, stacking of the various gate components is strictly forbidden. Enclosure and gate panels will warp. Objects on top of the columns may cause severe damage.

LONG-TERM STORAGE, more than two months after shipment, will require that the following maintenance procedures be performed every sixty days from date of shipment:

1. SAFETY CAMS are a part of the WHEEL-BLOCK ASSEMBLY and should be lubricated with a non-detergent oil and rotated to ensure free operation.
2. The MOTOR PUMP UNIT ships full of oil and must remain in this condition to prevent the reservoir from rusting.
3. CYLINDERS must be stored horizontally in a constant environment with all ends and ports capped and rotated 180 degrees every two months.
4. ELECTRICAL COMPONENTS should be plugged to prevent moisture and other contaminants from entering them. Store in a dry place to prevent corrosion.
5. PARTS CRATE must remain sealed and dry.

For units stored longer than six months, it is recommended that you contact the Product Support Department of Pflow Industries for additional information that may be available prior to starting up your unit.

Our warranty policy does not cover damage as a result of improper storage.

D Series

ELECTRICAL TERMINOLOGY AND APPLICATIONS

Ruling Bodies:

NEMA - National Electrical Manufacturers Association - (National testing and manufacturing standards body of electrical apparatus.)

UL - Underwriters Laboratories, Inc. - (Independent testing laboratory - some cities require UL control panels and electrical apparatus.)

JIC - Joint Industry Council - (Advisory group to provide standards for production equipment, safety and dependability.)

NFPA - National Fire Protection Association - (Ruling board of NEC - sets national fire/safety standards for equipment/plants.)

CSA - Canadian Standards Association - (Regulatory agency of Canada - CSA required stamp on electrical devices in Canada.)

ANSI - American National Standards Institute - (Adopts code; sets committees.)

ASME - American Society of Mechanical Engineers - (Writes codes - Secretariat for ANSI.)

NEC - National Electrical Code - (Advisory board to NFPA - their recommendation/codes are usually adopted throughout the USA.)

OTHERS - GM, Ford, Dupont, etc.
Customers may have special plant specifications incorporating several ruling bodies or their own electrical code specifications.

Pflow's Standard

NEMA type 1 classification is a general purpose, indoor only, usage. Only COMMERCIAL users generally accept this type: i.e., retail stores, mini storage, warehouses, etc.

NOTE

INDUSTRY does not accept (this NEMA type 1): i.e., auto manufacturing, chemical manufacturing, and paper manufacturing.

All other Pflow units are NEMA 12 classification in regard to the controls, push button stations, and electrical design built under the following standards:

JIC: EMP-1 Electrical standards for mass production equipment.

JIC: Electrical standards for general purpose machine tools.

NFPA 79: Electrical standard for industrial machinery

NEMA type 12 classification is an indoor only usage with gasket protection from dust, dirt, fiber flyings, dripping water, and external condensation of non-corrosive liquids.

NOTE

If JIC is to be strictly adhered to, they require that all devices be minimum NEMA 12, rigid conduit, specific wire coloring, etc. (controls and field wiring).

NOTE

You should note that the NEMA rating of equipment is based on the electrical device(s) with the lowest NEMA type.

EXAMPLES: 1) If we provide a JIC NEMA 12 standard control package with an Anderson or VA gate interlock, our NEMA rating goes to NEMA type 1; and we lose our JIC rating. 2) If we provide a GAL interlock, which has exposed electrical contacts, we rate no NEMA rating and lose our JIC rating. 3) If we provide EMT conduit or don't provide the proper JIC electrical field wiring techniques, we lose our JIC rating.

Outdoor Application

Outdoor units or electrical devices exposed to severe weather conditions should not be rated less than NEMA type 4. This is a watertight, dust-tight indoor-outdoor classification that will provide protection against splashing water, seepage of water, falling or hose-directed water, and severe external condensation.

Corrosive Application

The Chemical Industry on the whole usually specifies a minimum NEMA type 4X. A NEMA 4X rating is similar to a NEMA 4 with added corrosion resistance.

Hazardous Locations

Hazardous locations are an extremely specialized electrical classification. Few electrical experts exist in this field. All explosion-proof hazardous locations must be handled on an individual job site condition.

The NEC has three classes (I, II, III), - two divisions, (1 and 2) and seven group designations (A, B, C, D, E, F, and G).

Class Definitions:

CLASS I Locations: Those in which flammable gasses or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

CLASS II Locations: Those where the presence of combustible dust presents a fire or explosion hazard.

CLASS III Locations: Those where easily ignitable fibers or flyings are present but not likely to be suspended in the air in quantities sufficient to produce ignitable mixtures.

Division Definitions:

DIVISION 1 is an extremely dangerous explosive condition that exists normally.

DIVISION 2 is a dangerous explosive condition that could exist but usually does not.

GROUP designations are given by the NFPA, State Fire Marshals, insurance companies or consulting engineering firms according to the gasses/dust, etc. in the area and the spark or temperature needed to produce an explosion.

Currently, in order to provide competitive pricing in the hazardous location area, we are producing "intrinsically safe" control packages. Intrinsically safe is defined as: electrical devices provided cannot produce a spark or temperature hot enough to ignite the surrounding gasses/dust, etc.

Optional Control Packages and Devices for Hazardous Locations

NEMA type 7, Class I, Division 1 and 2, Group A, B, C, or D enclosures shall be capable of withstanding the pressures resulting from an internal explosion of specified gas and shall contain such an explosion sufficiently so that an explosive gas mixture existing in the atmosphere will not be ignited.

NEMA type 9 is similar to NEMA type 7 but is rated for dust ignition-proof - Class II, Division 1 and 2, Groups E, F, or G.

Warranty

PARTS	
Structure	Lifetime
Manufactured Components.....	One Year
Purchased Components	One Year

LABOR	
Structure	Lifetime
Manufactured Components	One Year
Purchased Components	90 Days

The Small Print

The warranty period begins 30 days after shipment. All warranty work must be pre-authorized by Pflow Industries' Product Support Department prior to starting work. All billing must be in accordance with our Warranty Procedures. Replacement of defective parts will be handled in accordance with Pflow's Return Goods Authorization policy. If Pflow Industries determines that equipment failures were caused by abuse, improper installation, or lack of maintenance, they will not be covered. Pflow Industries will not accept consequential losses (missed production, etc.), premium time labor, or air freight charges. Manufactured items are defined as those components manufactured and/or assembled by Pflow. Structure is defined as columns and carriage (excluding carriage side guards). Purchased items are those components that are used as supplied by vendors. Gates and enclosures are excluded and covered for 90 days parts and labor. This warranty applies to all models and may not be modified or extended except by written authorization from Pflow Industries, Inc.

We, the manufacturer, sincerely hope that you do not experience problems with the equipment. If you do, the following procedures should be followed:

Pre-Authorization

Pflow Industries must be notified of the problem before we can authorize the repair. We need to determine the cause of the problem, who should be doing the work, and what is involved. If it is our decision to have your organization or your subcontractor do the work, you will be given an authorization number which must be referenced on all subsequent paperwork. During our non-working hours, we ask that you notify us by phone or FAX during the next business day.

Issuance of an authorization number does not guarantee approval and/or payment.

Invoices

1. You have 30 days from the date the work was completed to submit an invoice for approval. If approved, payment is made 30 days from the date of approval.
2. A deduction from outstanding payments to Pflow for warranty is NEVER authorized and will result in a 10% processing fee.
3. Invoices received without sufficient information will be returned. They will be reconsidered for approval when complete documentation is received. All invoices must include, in detail, the following:
 - Description of problem;
 - Pflow serial number;
 - Labor hours per problem;
 - Rate per hour;
 - Travel time incurred;
 - Date work was performed;
 - Copies of receipts for materials purchased locally or labor subcontracted.

Comments

Pflow Industries is not responsible for payment made on claims prior to our approval.

Local purchase of components must be pre-authorized.

Where distance and/or experience may be more cost-effective, Pflow Industries reserves the right to use alternate organizations.

Labor is defined as a maximum of two hours travel per call, plus reasonable on-site repair time as determined by Pflow Industries.

Installation Questionnaire

We want to provide equipment that is built correctly and shipped complete. To achieve that, we need to know what errors are being made or what field problems you are experiencing. Please answer the following questions and return this form to the Product Support Department at Pflow Industries, Inc. If more space is required for comments, please use the reverse side.

1. Was the unit received in good condition? Yes / No

If not, please describe damage: _____

2. Was the unit received complete? Yes / No

If not, what was missing? _____

3. Was the lift manufactured correctly? (Did it match the GA drawing?) Yes / No

If not, please describe the errors: _____

4. Did the unit (i.e., lift, gates, enclosures) fit? Yes / No

If not, please describe in detail the problem areas: _____

5. Did you return after the electrical was completed for final adjustments, testing, and training?

Yes / No

If No, were you able to hook up temporary power to test the unit and make all final adjustments?

Yes / No

If Yes, were there electrical problems that you were aware of?

Was there a problem with the components? Yes / No

If yes, please describe: _____

Was there a problem with the field wiring? Yes / No

If yes, please describe: _____

6. Did you test the unit to full capacity? Yes / No

7. Did you test all gates to make sure that the unit does NOT operate if they are open? Yes / No

8. At each level, when the carriage is NOT present, can you open the gate? Yes / No

Comments: _____

Pflow Job #: _____ Customer/User: _____

Questionnaire Completed By: _____ Date: _____

Company: _____ Phone: _____

PFLOW INDUSTRIES, INC., 5045 N. 35th Street, Milwaukee, WI 53209

Phone (414) 462-8810; Fax (414) 462-2673; 040199

Acceptance Certification

We accept this equipment as being properly installed, tested, and performing to our satisfaction. This form covers both the mechanical and electrical installation of the equipment and is for the purpose of quality assurance by Pflow Industries, and in no way releases either Pflow Industries, Inc. or the installing contractor(s) of their warranty obligations. If there are any exceptions or unresolved items, please note.

JOB NO.: _____ **JOB NAME:** _____

Site Mailing Address: _____

City, State, Zip Code: _____

On-Site Contact for future follow-up:

Name: _____ Title: _____

Phone: (____) _____ - _____ Ext. _____

Tests Successfully Performed: _____ Load test at _____ % of capacity _____ Operation
_____ Gate/Interlock Operation Other: _____

Personnel Instructed on the Operation:

Name: _____ Company: _____

Name: _____ Company: _____

ACCEPTED BY:

Date: _____ Date: _____

Name: _____ Name: _____

Title: _____ Title: _____

Company: _____ Company: _____

Phone: _____ Phone: _____

PFLOW PERSONNEL / REPRESENTATIVE / INSTALLER PRESENT:

Date: _____

Name: _____ Company: _____

Please return a copy of this form to the Product Support Department.

PFLOW INDUSTRIES, INC., 5045 N. 35th Street, Milwaukee, WI 53209
Phone (414) 462-8810; Fax (414) 462-2673; 040199

