

# INSTRUCTION MANUAL

## Gemini<sup>TM</sup> Dual Pump Kit



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## GEMINI™ DUAL PUMP KIT

### WHAT IS THE GEMINI DUAL PUMP KIT?

The kit allows the user to operate two Ace Pumps from one Selective Control Valve (SCV) or the Power Beyond hydraulic supply.

### TWO MODES OF OPERATION:

The oil flow and pump performance is regulated independently for each pump by one of two methods:

- Manual mode - independent on/off operation from the cab with independent manual flow adjustment at the hydraulic manifold
- Pulse Width Modulated (PWM) mode - independent pump activation and regulation with signal from PWM controller (not included)

### FOR USE WITH:

- Any combination of Ace Pumps using the 204 or 206 size motors.

### ON THESE HYDRAULIC SYSTEMS:

- Load Sensing Closed Center (LS Closed) also called Pressure and Flow Compensated (PFC)
  - Pressure Compensated Closed Center (PC Closed)
- Note:** Not for use on Open Center hydraulic systems.

### WHAT'S INCLUDED:

- Switch Box assembly for installation in the tractor cab. The assembly includes a mounting bracket, power connector wire with fuse kit, and wire harness to the tractor hitch.
- Implement Wire Harness – This runs from the implement hitch to the Valve Manifold
- Valve Manifold – The manifold includes (2) solenoid valves, (2) manual flow control valves, and JIC hose connection fittings.
- JIC Tee for return hoses and SAE-JIC adapter for Load Sense (LS) port (Power Beyond installations)
- An optional implement extension wire is available as Ace Part # DPK-EXT.

### REQUIRED BUT NOT SUPPLIED:

- Hydraulic hoses
- Tractor hydraulic couplers
- Valve Manifold mounting hardware
- Two Ace Pumps

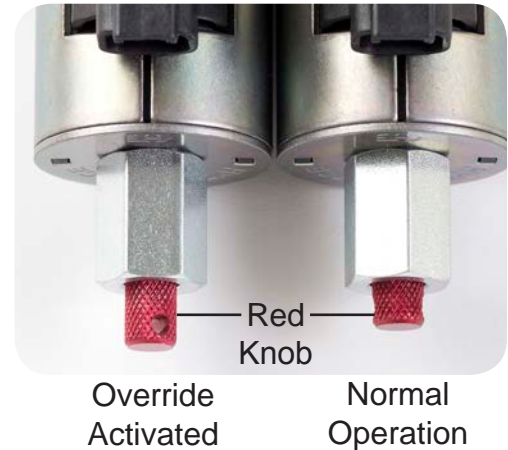
# WARNINGS

## AVOID HIGH PRESSURE FLUIDS

Escaping fluid under pressure may penetrate the skin causing serious injury. Tighten all connections before applying pressure and inspect hoses regularly for wear or damage. If an accident occurs, seek medical attention immediately. Any fluid injected into the skin must be surgically removed immediately or gangrene may result.

Avoid the hazard by relieving pressure before disconnecting hydraulic lines:

1. Refer to tractor owners manual for the correct method to relieve hydraulic pressure from the tractor supply.
2. Ensure that the Manual Control Valves are not fully closed. If closed, open manual valves by turning counterclockwise.
3. Activate manual overrides on solenoid valves by pushing red knob in, turning 180 degrees counterclockwise, and releasing.



## BREAK AWAY COUPLERS SHOULD BE USED ON ALL CONNECTIONS BETWEEN THE TRACTOR AND IMPLEMENT

The standard kit is designed for the Valve Manifold and Pumps to be mounted on the towed implement. In most cases, the breakaway couplers on the tractor remote, Low Pressure Return, or Power Beyond connections provide this safety function.

If the kit is mounted in any other configuration, breakaway couplers should be used for any hoses between the tractor and implement. Standard hydraulic couplings are not designed to breakaway. For proper function, breakaway clamps must be used with two way sleeve style female agricultural quick couplers to allow implement breakaway of the male tips.

## NEVER OPERATE MOTOR UNLESS ATTACHED TO PUMP

The motor should never be operated separate from the pump. The four bolts which attach the motor to the pump also provide the strength necessary to hold the motor together during operation. Operating the motor separate from the pump may cause the motor to break apart. The shaft seal may also be ejected when hydraulic pressure is applied. Motor damage and personal injury may result.

## HANDLE CHEMICAL PRODUCTS SAFELY

Direct exposure to hazardous chemicals may cause serious injury. Potentially hazardous chemicals used with Ace pumps are hydraulic fluid, fertilizers, and chemicals. A Safety Data Sheet (SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. Review the SDS before starting any job using a hazardous chemical.

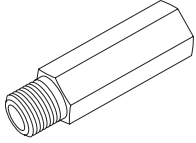
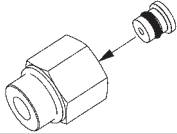
## HYDRAULIC SYSTEM CONNECTIONS

The following recommendations are important for efficient operation and extended motor seal life.

1. The return line should be connected to a low pressure return port if available. This connection returns oil directly to the reservoir at minimum pressure extending motor seal life and improving operating efficiency. Consult your tractor dealer for low pressure return options.
2. Hydraulic hoses must be sized to insure proper oil supply to the motor and minimize back pressure on the return side of the motor. See **Gemini Installation Instructions** for details.
3. If a low pressure return is not available, connect hydraulic hoses to the remote so the dual pumps operate with the lever in the “Lower/Retract” position. Turn off the hydraulic supply to the manifold by moving the lever to the “Float” position. This prevents damaging pressure spikes.

# INSTALLATION & SETUP INSTRUCTIONS

- 1 Install the kit and pumps on your tractor and implement following the supplied **Gemini™ Installation Instructions**.
- 2 Determine your tractor's hydraulic system type and verify that the following have been installed to prevent overspeeding:

HYDRAULIC SYSTEM TYPE	MOTOR SIZE	EXTERNAL FITTING	INSTALL IN INLET PORT "I"
LS Closed (LS or PFC) A flow limiter is optional but recommended for this system. (not included)	204	LS-204N	
	206	LS-206N	
PC Closed (PC) A restrictor orifice is required for this system. (supplied with each pump)	204	BAC-79-5 Insert	
	206	BAC-79-7 Insert	

Review **HYDRAULIC SYSTEM CONNECTIONS** on page 1 to ensure proper operation.

- 3 Verify that both Switch Box switches are in the off position and the pumps are filled with liquid. Running the pumps dry will damage the pump seals.
- 4 **MANUAL** Set the proper oil flow to PUMP 1 and PUMP 2.

This procedure sets the proper oil flow for each pump separately.

**Note:** Do not exceed the maximum rated Shut-Off pressure of the pump.

See the chart on page 3. Suggested shut-off pressure = spraying pressure + 20 psi

1. Adjust the tractor's hydraulic remote using the method listed below depending on your hydraulic supply. These same adjustments will be used throughout this section.

**Power Beyond Circuit:** Use the Flow Control Knobs on the Valve Manifold for all flow adjustments.

**Remote on LS Closed System:** Adjust using the remote's flow control. Start with a flow setting of 4 gpm. Refer to your tractor's manual to determine the correct flow setting.

**Remote on PC Closed System:** Adjust the tractor's hydraulic remote flow control (if equipped) to turtle (minimum flow).

2. Turn on PUMP 1 switch.
3. A. Adjust pump speed and pressure:
 

If the pump pressure is too low: Rotate the PUMP 1 Flow Control Knob counterclockwise to increase oil flow to the Ace pump.	If the pump pressure is too high: Rotate the PUMP 1 Flow Control Knob clockwise to reduce the hydraulic flow to the Ace pump.
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**Warning:** The flow control knobs may become hot enough during operation to cause burns. Wear thick work gloves or use a rag while adjusting to prevent burns.

**Note:** DO NOT USE A TOOL TO ADJUST THE KNOB. If difficult to rotate by hand, turn off the tractor remote (power beyond - turn off tractor engine) before adjusting the valve.

- B. If the pressure is still too low:  
Increase the tractor remote hydraulic flow and repeat 3A. Repeat until desired pump flow and pressure is achieved.
  - C. Lock the Flow Control Knob in place by screwing the locking knob down against the valve base.
4. Turn off PUMP 1 switch.

5. Repeat steps 1 - 4 for PUMP 2.
6. Turn on PUMP 1 and PUMP 2 switches. Cycle each pump off one at a time and observe the pump discharge pressure.
7. If the pressure in either PUMP 1 or PUMP 2 is low or unstable:  
Increase the flow of the tractor remote until both pump pressures become stable.
8. The tractor remote and Ace pumps are now setup and ready for operation.

## SHUT-OFF PRESSURE

Shut-off pressure is the liquid pressure at the pump discharge with all flow turned off. This means closing the boom, agitation, and any by-pass valves. It is the highest pressure a centrifugal pump will achieve for a given RPM and relates directly to the flow of hydraulic oil. A pressure gauge must be located between the pump discharge and the shut off valves.

### Maximum Shutoff Pressure:

FMC-75-HYD	100 PSI	FMC-150FS-HYD	120 PSI
FMC-HYD	100 PSI	FMC-150SP-HYD	120 PSI
FMC-150-HYD	120 PSI	FMC-150F-HYD	120 PSI

- 4** **PWM** Consult your PWM controller documentation for the proper setup procedure.

A PWM Technical File is also available on our website download page which lists recommended settings for controllers tested by Ace. Scan the QR code to access this file on your mobile device.



### Valve Specifications:

Type.....Proportional Solenoid  
Normally closed  
Solenoid.....10 Volt  
Socket.....Deutsch DT04-2P  
Override.....Manual

Valve Type.....Select "PWM Close"  
Valve Cal.....43  
PWM Frequency....122 Hz  
Min PWM.....Set at minimum required  
pump discharge pressure  
for application  
Max PWM.....Set at maximum Shut-Off  
pressure per chart above

### Suggested settings:

1. Open the manual flow control valves fully by turning counterclockwise.
2. Determine the total flow needed for your combination of pumps.  
The flow needed will depend on the motor combination in use. The motor size is typically listed in the pump part number or stamped on the end of the motor.  
204 + 204 = 8 GPM                      204 + 206 = 11 GPM                      206 + 206 = 14 GPM
3. Set the tractor oil flow to the total listed for your motor combination. Use the method listed below to adjust the hydraulic flow.  
**Power Beyond Circuit:** There is no flow adjustment on this supply. All adjustments are made in the PWM Controller settings. Insure proper fittings are installed per Step 2.  
**Remote on LS Closed System:** Adjust using the remote's flow control. Refer to your tractor's manual to determine the correct flow setting.  
**Remote on PC Closed System:** Adjust the tractor's hydraulic remote flow control (if equipped) to turtle (minimum flow). Restrictor orifices must be installed in each pump per Step 2.
4. Follow your PWM controller instructions to setup the system.



# TROUBLESHOOTING

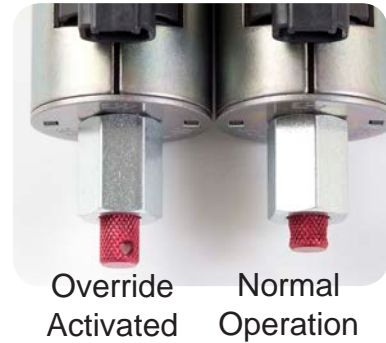
Here are some simple steps to troubleshoot the dual pump kit. In most cases, there is a single problem that is preventing the valve from working correctly.

First, you need to determine if the valve is not working correctly due to an electrical issue or hydraulic issue. The most common problems involve electrical operation of the valve so we suggest that you start with the electrical components then move on the hydraulic system. The electrical system is easy and safe to troubleshoot and can be quickly diagnosed.

Here is one simple test to determine if it is an electrical or hydraulic problem. Turn off the Switch Box. Activate the manual overrides on the Solenoid valves by 1) pushing red knob in, 2) turning 180 degrees counterclockwise, and 3) releasing. Turn on the tractor remote.

- ➡ If the pumps operate correctly the problem is electrical.
- ➡ If they do not operate correctly it is a hydraulic problem.

Turn off the tractor remote and reset the Solenoid valve overrides by 1) pushing red knob in, 2) turning 180 degrees clockwise, and 3) releasing.



## Troubleshooting the electrical system:

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Switch indicator and Ace pump do not turn ON.	Tractor accessory breaker tripped. In-line fuse is blown. Broken switch. Switch Box does not have proper voltage. Switch Box power wires are incorrectly connected.	Reset breaker. Replace in-line fuse. Replace Switch Box. Verify the power connection has proper 12VDC rated for 10A. Verify the RED wire connects to 12VDC and the BLACK wire connects to ground.
Switch indicator does not turn ON but the Ace pump operates correctly.	LED indicator(s) are burned out.	Replace Switch Box.
Pump indicator turns ON but the Ace pump does not operate.	Valve coils do not have power.*	Verify all electrical connections are correctly mated. Verify the electrical cable is not pinched or cut.
Pump indicator turns ON but the pump does not operate and there is magnetism at the coil.	Valve coil does not have proper voltage.	Verify the voltage at the Solenoid valve coil is at least 10VDC.**

\*To determine if a coil is energizing, touch a screwdriver or a pair of pliers to the top of the suspect coil. If you feel a gentle pull of magnetism then the coil is energizing. You may also remove the coil from the cartridge and insert the screwdriver inside the coil. The magnetism inside the coil will be stronger.

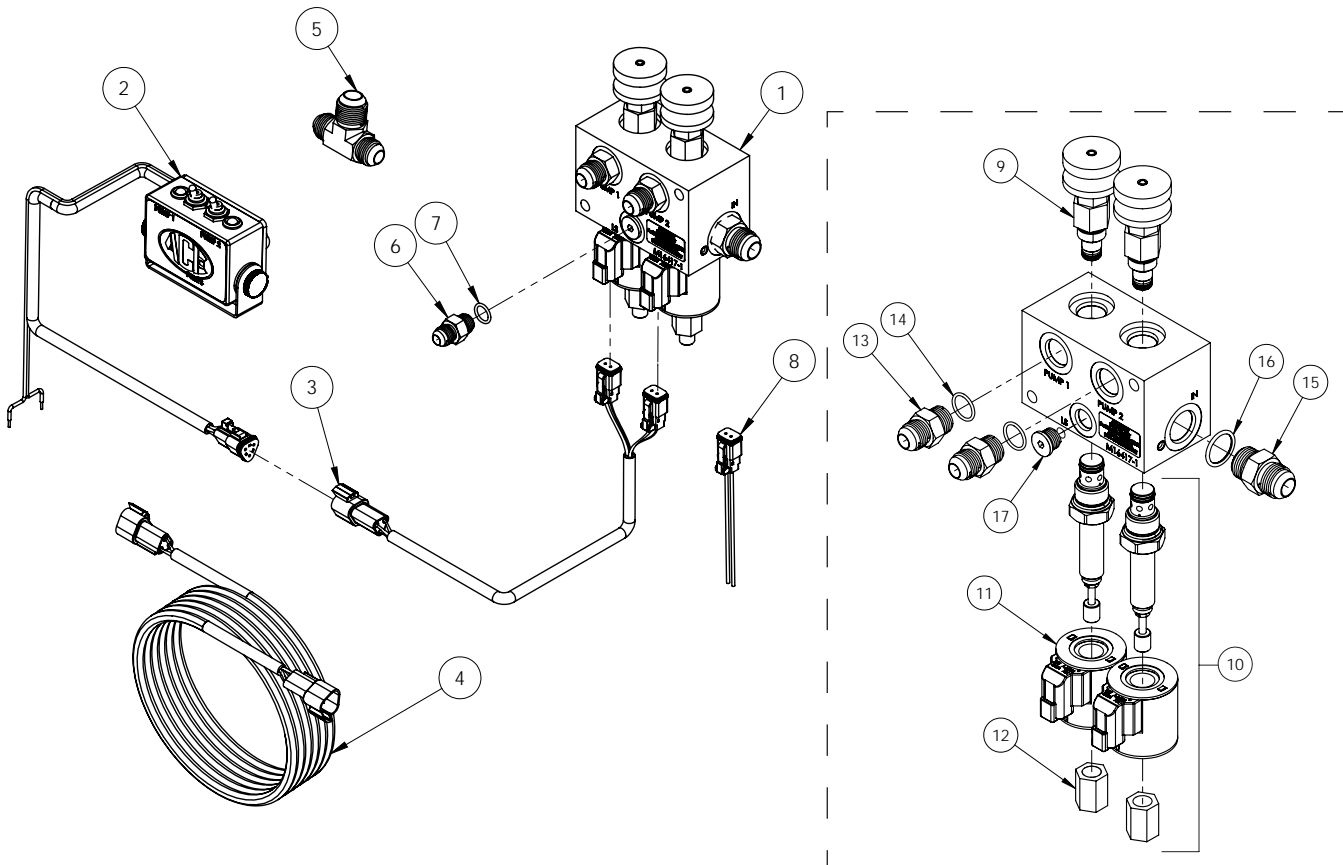
\*\* To determine the voltage at the coil, disconnect the gray 2 pin connector at the suspect coil and use a multi-meter to test voltage. Insert the red multi-meter lead into the 1-pin location and the black multi-meter lead into the 2-pin location on the gray connector. This process confirms that the 1-pin location has power and the 2-pin location is grounded correctly. **Note:** Do not touch the black lead of the multi-meter to chassis ground or other metal because it does not confirm that the coil ground wire is correctly working.

**Troubleshooting the hydraulic system:**

Please review the **WARNINGS** on page 1 of this manual prior to troubleshooting the hydraulic system.

<b>SYMPTOM</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>
Pump indicator turns ON but the pumps do not operate.	Tractor remote is off. Pressure and Return lines are reversed. Flow Control Valve is closed. Valve is bent or damaged. The Ace pump hoses are not correctly connected to the valve. The tractor supply hoses are not correctly connected to the tractor.	Turn on the tractor remote. Swap the Pressure and Return lines on the tractor remote. Open the flow control valve to the desired flow rate. Replace the valve. Verify all hoses are correctly installed per the Installation Instructions. Verify the supply hoses are connected to the tractor.
Pump runs when switch is OFF.	Cartridge seals are damaged. Manual override knob is engaged.	Replace cartridge seals. Disengage the manual override on the cartridge.
Pump gradually changes speed over time.	Oil is cold at start-up and warms up over time. Flow control locking nut is loose.	Allow the oil to warm up to operating temperature before using system. Tighten the locking nut on the flow control.
Unstable pump flow or pressure	Restrictor orifice not installed in each pump on a PC Closed hydraulic system. Inadequate oil flow to the manifold. Manual valves are not set properly.	Install restrictor orifices per Step ② on page 2. (PC Systems only) Increase oil flow to manifold using Setup Instructions Step ④. Follow Setup Instructions (MANUAL) Step ④ on page 2.

# PARTS LISTING



REF. #	PART NUMBER	EDP #	DESCRIPTION	REQ.
1	DPK-1	74005	Manifold assembly, Includes Items 9-17	1
2	DPK-2	74015	Switch box assembly with 15' cable	1
3	DPK-3	74020	Cable, 12' implement	1
4	DPK-EXT	74010	Cable, 22' implement extension (optional)	1
5	44044	44044	Tee, return, 08-08-10 JIC	1
6	44092	44092	Adapter, load sense 06 ORB - JIC	1
7	41876	41876	O-ring, 44092 adapter or 41104 plug	1
8	74045	74045	Connector, 2 pin Deutsch with 8" pig tail	2
9	DPK-18-MAN-7	74025	Valve, manual flow control	2
10	DPK-18-PRO-7	74040	Valve assembly, proportional	2
11	74030	74030	Solenoid, proportional valve, 10VDC	2
12	74035	74035	Nut, solenoid	2
13	44096	44096	Adapter, outlet 08 ORB - JIC	2
14	41875	41875	O-ring, adapter outlet	2
15	44098	44098	Adapter, inlet 10 ORB - JIC	1
16	41445	41445	O-ring, adapter inlet	1
17	41104	41104	Plug, load sense port 06 ORB	1
#	RK-DPK	74050	Repair kit, manifold cartridge valves	1

# The repair kit includes replacement seals for all valves including: two Manual Control Valves (#9), two Solenoid Valves (#10), and two Check Valves (not shown).



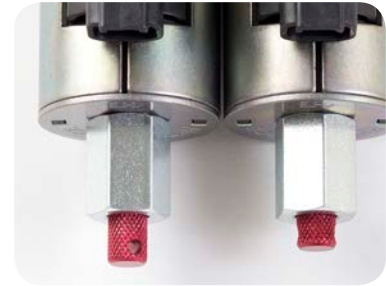
# REPAIR INSTRUCTIONS

## WARNING AVOID HIGH PRESSURE FLUIDS

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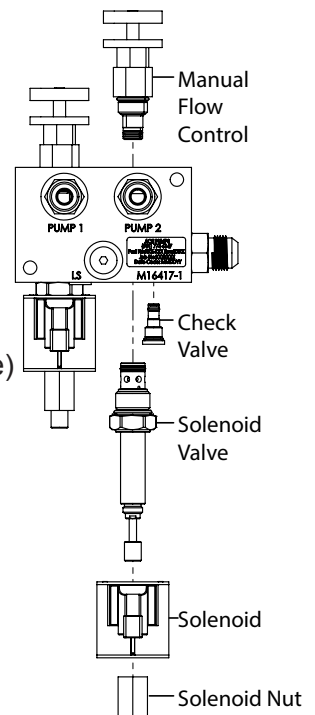


Override Activated

Normal Operation

The following instructions may be used for valve service or replacement.

1. Clean the valve manifold and area prior to service to prevent contamination.
2. Review the WARNING above and ensure that all trapped pressure is relieved.
3. Skip to step 4 for the Manual Control Valve. Remove the Solenoid Nut (3/4" wrench) and Solenoid to access the Solenoid Valve and Check Valve.
4. Remove the valve cartridge by using a wrench (see table for wrench size) and turn counterclockwise.
5. Inspect the valve for contamination. If replacing seals, remove the O-rings and Backup Ring.
6. Replace the O-rings and Backup Ring per the Seal Installation Diagram in the table below.
7. Reinstall the valves into the manifold and torque per the table below.
8. Reinstall the Solenoid with "HYDRAFORCE" visible, install the Solenoid Nut, and torque (5 to 7 ft lb).
9. Repeat these steps until all valve seals have been serviced.



Valve	Wrench Size	Torque	Seal Pack	Seal Installation
Manual Flow Control	7/8"	20 to 25 ft lb	SK08-2N-T	<p><b>Installation Type B</b> O-Ring installed toward bottom of cavity</p>
Solenoid Valve	1"	60 to 65 ft lb	HSK10-2U-0	<p><b>Installation Type O</b> O-Ring only; no back-ups</p>
Check Valve	3/16" Allen	12 to 14 ft lb	SK04-2N-T	<p><b>Installation Type T</b> O-Ring installed toward top of cavity</p>



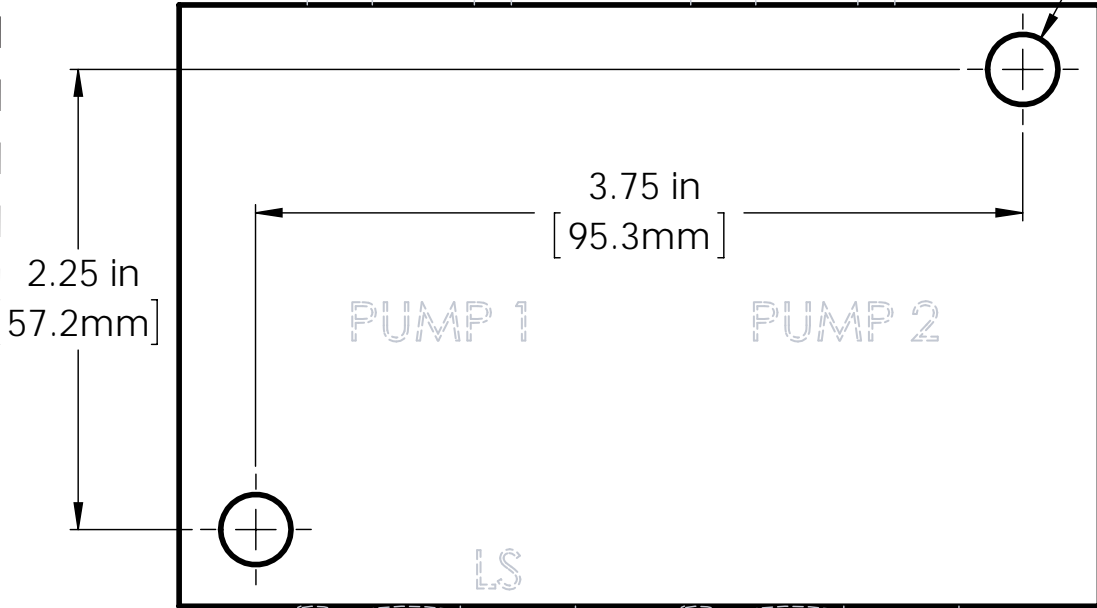


# MOUNTING TEMPLATES

Ensure the implement frame does not interfere with adjustment of the flow control knobs.

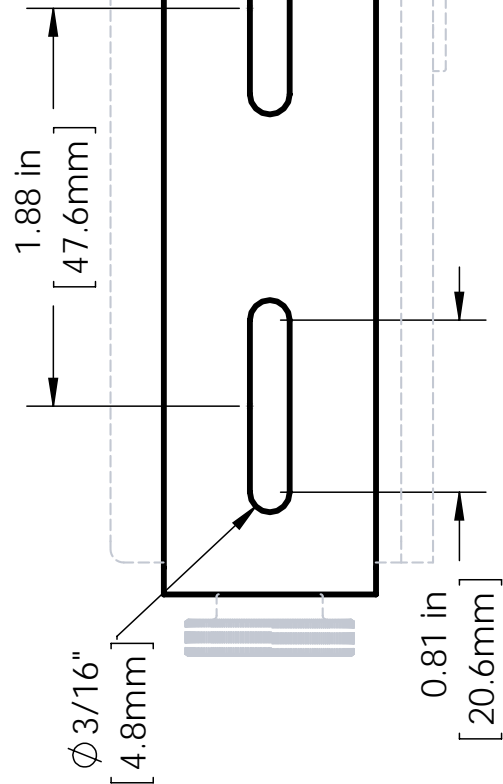
## VALVE MANIFOLD

$\phi 11/32"$   
[9mm]



## SWITCH BOX

Ensure there is room to remove the Solenoids for service.



Ensure there is room to activate the manual overrides.



9

## **STANDARD WARRANTY**

Ace pumps and valves are guaranteed against defects in material and workmanship for a period of one year from date of installation. Products or parts found to be defective upon inspection at the factory will be repaired or replaced at our discretion.

Ace Pump Corporation shall not be held liable for damages caused by abuse or misuse of the product or parts. No claim for labor in repairing or replacing such products will be allowed nor will loss of time or inconvenience be considered warranty obligations.

**IMPORTANT:** Pumps or valves returned for warranty consideration which are tested and found to perform within specifications are subject to an inspection charge.

### **PLEASE NOTE EXCEPTIONS**

1. All seals are covered against defects in materials or workmanship. Seal failures resulting from application related conditions are not covered. Most seal failures are due to application conditions such as: (1) abrasive solution scratching the polished seal faces; (2) chemical attack on elastomer or glue; (3) thermal shock from running pump dry or improper priming; (4) failure to flush chemical from pump after use.
2. Gasoline engines are covered by the engine manufacturer's warranty. Engines submitted for warranty consideration should be returned to the nearest authorized engine repair station. **DO NOT RETURN ENGINE TO ACE PUMP CORPORATION.** If unable to locate nearest engine repair station, consult Ace for referral.
3. On Ace belt driven centrifugal pumps, belt alignment is not to be considered as covered by warranty. Misalignment can occur in transit and is easily corrected at point of installation.
4. Repair requests under the above categories will not be considered warranty, and current repair and transportation charges will apply.

### **PROCEDURE**

To return a pump, valve, or part for warranty consideration, please call Ace Pump and request a Returned Goods Authorization (RGA) number (800-843-2293). Please request one RGA number for each pump or valve. Provide the part number of the item being returned along with the reason for return. Be specific when describing the nature of the defect. Include this information in the box along with a customer contact name, phone number, and return address. Ship pump prepaid freight. Package pump in original packaging or similar to prevent damage in shipment. Warranty determinations will be made after the product has been received and inspected.

This warranty is in lieu of all other warranties, express or implied, and Ace Pump Corporation does not authorize any other person to assume for it any obligation or liability in connection with the sale of said pumps, valves, or any parts thereof.

**WARNING:** Pumps returned to Ace must be free of chemical hazard. Chemicals must be neutralized and thoroughly rinsed. Pumps with indications of active chemical will not be considered for repair or warranty.

**Ace Pump Corporation • P.O. Box 13187 - 1650 Channel Avenue • Memphis, TN 38113  
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