

This 'original instructions' document assumes that the operator carrying out any operation with this product is trained and competent to do so. This manual does not attempt to cover all details or variations in the equipment. Nor does this manual claim to provide for every possible contingency met in connection with the installation, operation, or maintenance thereof. Should further information be desired, or should a particular problem arise which is not covered in sufficient detail, the matter should be referred to Hi-Force.

OPERATING INSTRUCTION MANUAL

HEP1 SERIES | ELECTRIC DRIVEN TWO STAGE COMPACT PUMP



Hi-Force HEP1 Series Electric Driven Two Stage Compact Pumps are designed to operate high pressure hydraulic cylinders and tools with a maximum working pressure of 700Bar. This manual applies to the Hi-Force HEP1 Series, Electric Driven Two Stage Compact Pumps. It contains the latest product information available at the time of publication and approval. Hi-Force reserves the right to make changes to this document at any time without notice.

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NOTE: Images contained within this document are for illustrative purposes **ONLY**.

1.0 Inspection upon Receipt

Upon receipt of the product, visually inspect the item for any evidence of shipping damage. Please note: the warranty does not cover shipping damage. Notify the courier immediately if shipping damage is found and refrain from putting the product into service. The carrier is responsible for repair and replacement costs resulting from damage that occurred in transit.

2.0 Safety Precautions

2.1 Introduction



Read and follow all the instructions and safety warnings carefully before handling, installation or use of any hydraulic equipment. Failure to do so could lead to equipment damage, equipment failure, personal injury or even death. Hi-Force will not be held responsible for any damage to the equipment, injury or death resulting from the unsafe use of, lack of maintenance to, or incorrect operation of the product. If in doubt on the correct use of any Hi-Force equipment, contact your nearest Hi-Force office or distributor. Only qualified personnel should be allowed to operate hydraulic equipment. If an operator has not been trained on high-pressure hydraulic equipment and its safe usage, consult your local Hi-Force sales office or distributor who can offer training courses for operators.

2.2 Work Area Safety

- Keep work areas clean and well lit. Cluttered spaces and inadequate lighting can result in unnecessary accidents.
- Keep unauthorised persons at a safe distance from the task site.
- **NEVER** use the tools in the presence of inflammable liquids, gases or material.
- **DO NOT** use the tools in potentially explosive atmospheres (ATEX) this tool is **NOT** ATEX approved.

2.3 General Hydraulic System Safety Precautions



WARNING! Failure to observe and obey the following safety precautions could result in property damage, significant personal injury or death;



- When operating any hydraulic equipment, all operators should ensure that all necessary personal protective equipment (PPE) is worn, as specified by their employer. Steel toe-cap safety shoes, safety glasses/visor, and protective gloves should be worn at all times. All relevant risk assessments should be completed before the use of the equipment.
- Keep hydraulic equipment away from open flames and direct heat.
- **NEVER** handle a pressurised hydraulic hose. Hydraulic oil escaping under pressure from a ruptured hose can penetrate the skin and lead to a significant medical emergency, and in some cases, death. Should this incident occur, seek out medical attention immediately.
- The system operating pressure **MUST NOT** exceed the pressure rating of the lowest-rated component in the system. It is good practice to use a pressure gauge to monitor the entire system.
- Only use hydraulic tools/cylinders in a complete and tested, coupled system. **NEVER** attempt to use a tool/cylinder that is not correctly coupled to its operational pump. **NEVER** pressurise an uncoupled coupler/s.

- **NEVER** attempt to disconnect a hose from a hydraulic system until the systems pressure has been completely released. Doing so can result in that pressure becoming trapped within the system and relieving trapped pressure can be dangerous.
- **NEVER** try to relieve trapped hydraulic pressure in the system by loosening or attempting to remove the coupler. Trapped hydraulic pressure can cause a loosened coupler to dislodge unexpectedly with great force. This action could result in serious personal injury or death, as the coupler could become a projectile and hit operatives in the working area.
- Loosening a coupler under pressure can result in the escape of hydraulic oil at high pressure, which can penetrate the skin and cause significant injury or death.
- **NEVER** use a hammer and punch to unseat a coupler check valve that is under pressure. Doing so could result in the sudden, uncontrolled release of hydraulic oil at high pressure, which could cause significant injury or death.
- Immediately replace any worn or damaged parts using genuine Hi-Force parts only.
- **DO NOT** remove any labels from the product. Replace any damaged or unreadable label immediately.

 **CAUTION!** Failure to observe and obey the following safety precautions could result in property damage, equipment damage or minor/moderate personal injury;

- **NEVER** lift or carry any hydraulic components by the hose or hoses connected to them.
- Avoid damaging hydraulic hose. **ALWAYS** route hoses to ensure that they are free from sharp bends and kinks. Using a bent or kinked hose will result in severe back-pressure, which can lead to hose failure.
- **ALWAYS** operate the system under no-load conditions before the actual operation, to ensure there is no air trapped in the hydraulic circuit.
- Servicing of hydraulic equipment must only be undertaken by a qualified technician.



- **DO NOT** drop or place heavy objects on a hydraulic hose, as this may cause internal damage, which could result in rupture of the pressurised hose. A ruptured hose could cause significant damage to components and possible severe injury to personal operating nearby.

2.4 Hydraulic Pump Specific Safety Precautions

 **WARNING!** Failure to observe and obey the following safety precautions could result in property damage, serious personal injury or death;

- **NEVER** invert the pump or lay it on its side, either in use, in transport or in storage.
- **DO NOT** weld any items to the pump or modify it in any way from its delivered condition. Your warranty may be invalidated, and it could lead to serious personal injury.
- **NEVER** exceed the maximum rated capacity of any hydraulic cylinder/tool. Hi-Force manufactures its hydraulic pumps to operate at a maximum working pressure of 700 BAR (10,000 PSI). **DO NOT** connect a cylinder/tool with a lower pressure capacity rating to any Hi-Force pump of this model series.
- This pump is not suitable for work which takes place in explosive environments.



CAUTION!

Failure to observe and obey the following safety precautions could result in property damage, equipment damage or minor/moderate personal injury;

- **ALWAYS** stand the pump on a stable level surface during operation.
- **BEWARE** of hot surfaces on the motor. Do not obstruct the flow of cooling air around the motor.
- To protect your warranty, only use the hydraulic oil grade as specified in Section 5.2.

3.0 Declaration of Incorporation / Conformity

Hi-Force declares that this product has been tested and complies with the standards set out in the relevant EU directives. The EU Declaration of Incorporation / Conformity is included as Annex A to this instruction document and is supplied with all shipments of this product.

4.0 Component Identification

1	Hydraulic Oil Drain Plug	7	700 bar Pressure Gauge***
2	Hydraulic Oil Level Gauge	8	Adjustable Pressure Relief Valve***
3	Hydraulic Service Connections *	9	Motor
4	Oil Filler / Breather Plug	10	Motor Cover / Carrying Handle
5	Oil Reservoir	11	Electrical Enclosure
6	Directional Control Valve **	12	On/Off Switches

* One or two ports, depending on valve type.

** Type will vary (3-way or 4-way)

*** If fitted

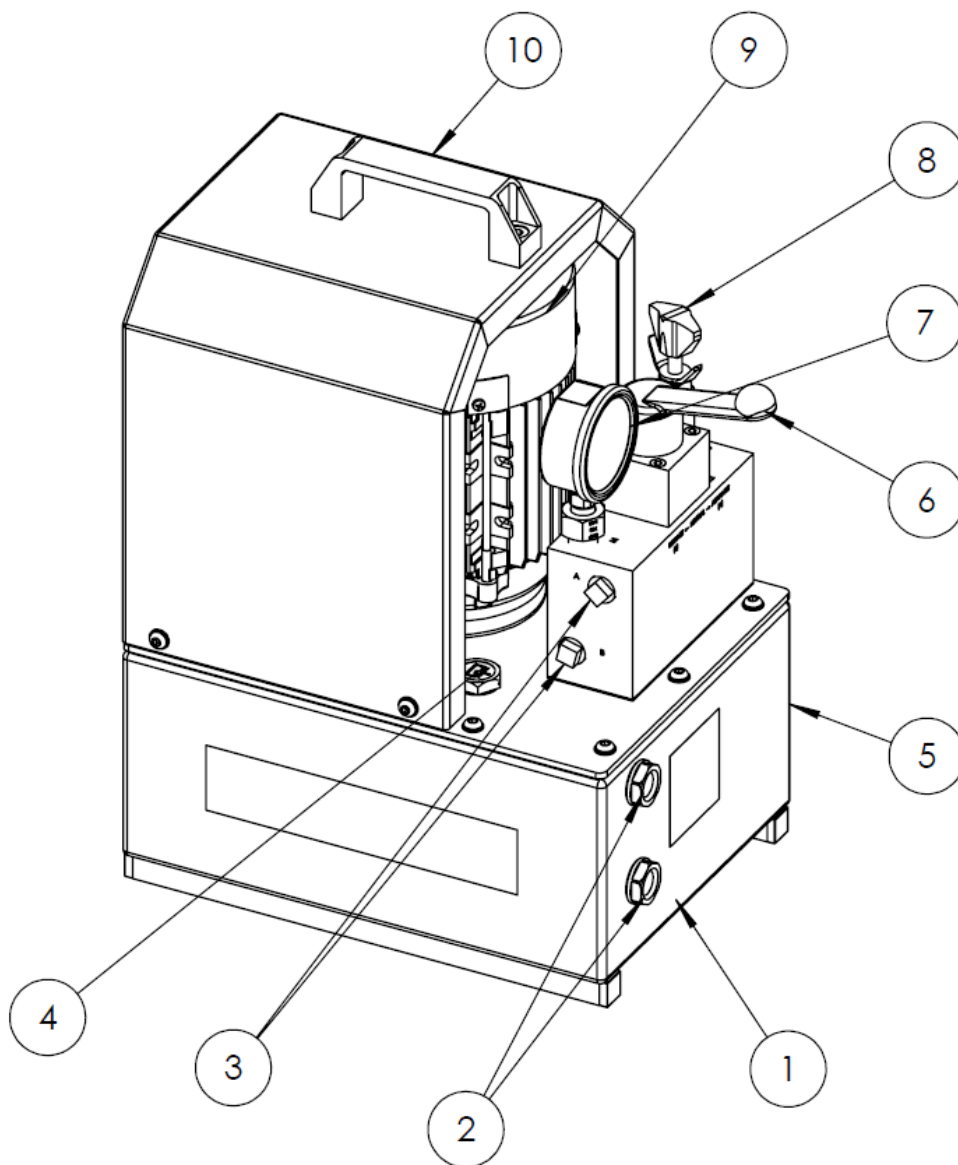


Figure 4.1: Component Identification

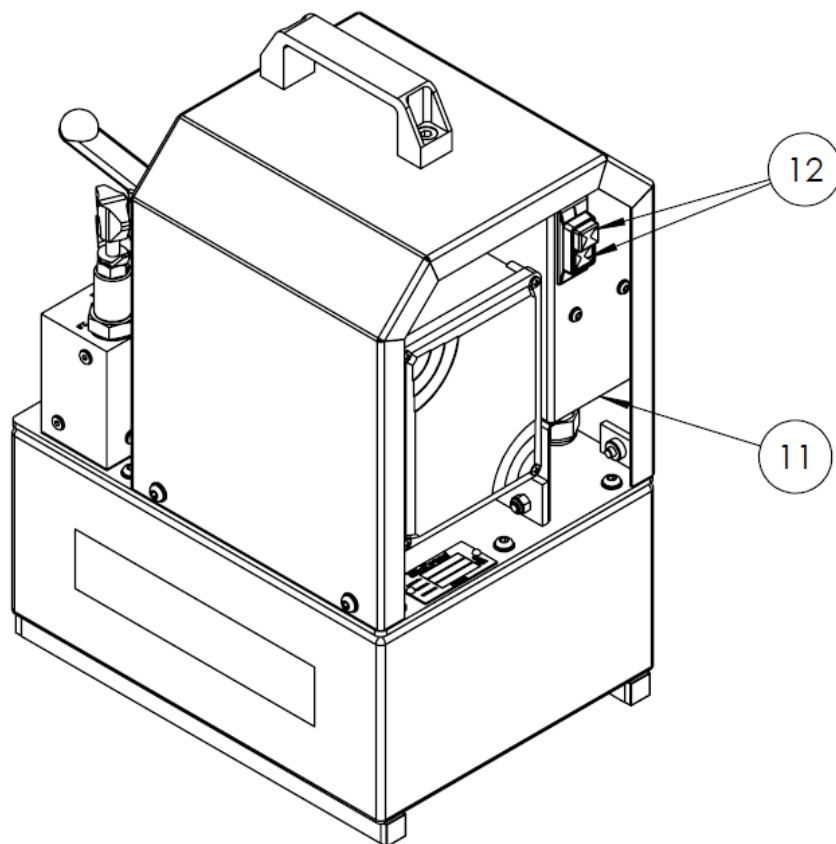


Figure 4.2: Component Identification

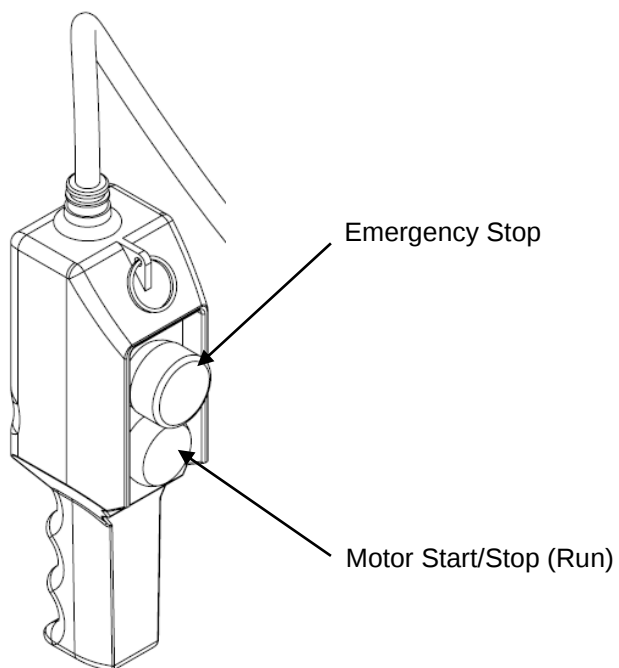


Figure 4.3: Hand Pendant Controls

5.0 Installation/Setup

5.1 Before First Use

1. Immediately after unpacking, examine the pump for signs of transit damage and if found contact the shipping company.
2. Remove the temporary transit filler plug and fit the oil filler/breather plug which is packed separately. (4)
3. Establish the oil level in the oil reservoir using the level gauges (2). Depending on the shipping method used, the reservoir may either be supplied full or empty. If the reservoir is empty it must be correctly filled before use (See section 5.2). If the pump was supplied full of oil, no further action is required.

IMPORTANT: Running the pump without oil will result in damage.

CAUTION: Ensure the oil level does not fall below the minimum level as shown by the lower indicator (2).

4. Remove the red plastic plugs and make hydraulic connections to the service port/s (3). These ports have a 3/8" NPT female thread and the corresponding male connections should be wrapped with PTFE tape or other suitable sealant.

NOTE: On a pump equipped with a 3-way valve there is only one service port.

5. Ensure the lever of the hydraulic directional control valve (6) is set to the neutral (central) position for models with a 4-way valve, or fully clockwise for models with a 3-way valve (labelled 'auto-retract').

NOTE: Where valves are remotely mounted, make sure they are adjusted such that pressure will not build up during the starting operation. See section 8 for applicable models.

6. Make sure that the voltage indicated on the motor rating plate corresponds with the available supply.
7. Connect the motor to required power source. (See section 5.3)
8. Check the direction of rotation of the motor by pressing the green 'ON' button (12), then briefly pressing then releasing the run button on the pendant. While doing this observe the motor fan. The motor should run in an anti-clockwise direction when viewed from above. If the motor turns clockwise, check the wiring of the electrical connector. Once finished press the red 'OFF' button (12).

CAUTION: Running the pump with the motor turning in the incorrect direction may damage the low-pressure pump unit.

9. Pumps with part number ending with 'R' are fitted with an externally adjustable pressure relief valve (8) and 700 bar glycerine filled pressure gauge (7) to restrict and monitor the output pressure to any desired value, up to the maximum working pressure of the pump.

Check the adjustable pressure relief valve is working:

NOTE: Checking / setting the relief valve pressure is to be done with the hydraulic female couplers fitted to the service ports only.

- Press the green 'ON' button (12) and turn the directional control valve (6) to the advance position - lever fully anti-clockwise for the 4-way valves. For 3-way valves turn the lever fully clockwise ('auto-retract'). Press and hold the run button on the pendant.
- On the relief valve (8), release the locking feature and turn the control knob clockwise to increase the relief valve setting (the pressure reading on the gauge (7) should increase) and anti-clockwise to decrease the relief valve setting (the pressure reading on the gauge should decrease).

5.2 Filling the Pump with Oil

IMPORTANT: The HEP1 series of hydraulic pumps use **ISO46 Grade Hydraulic Oil**.

- Stand the pump on a firm, level surface.
- Remove the oil filler / breather plug (4).
- Fill the reservoir with clean, high quality ISO46 hydraulic oil via the filler plug hole until the oil level reaches the upper level indicator (2).
- Replace the filler / breather plug (4).

NOTE: To maintain a suitable air gap below the tank lid, **NEVER** fill more than the upper level indicator.

IMPORTANT: Only add oil to the reservoir when the connected cylinder/tool is fully retracted. Failure to do so will result in the system containing more oil than the reservoir can hold.

5.3 Electrical Connection

Before making an electrical connection, refer to the data plate located on the motor (9) for voltage and current requirements. Once satisfied the supply is suitable, an electrical connection can be made.

NOTE: Supply voltages vary from country to country. Hi-Force pumps will operate within the normal voltage tolerance ranges, but in extreme cases where they are operated for long periods at high pressures and in low voltage conditions, the motor may overheat and shut down.

NOTE: A common cause of pump failure is the use of long extension cables to connect the pump to the mains supply. The pump should be situated as close as possible to the wall outlet.

5.4 Hydraulic Connections

Connect the hydraulic hose/s between the cylinder/tool and the pump, ensuring that the coupling/s (if fitted) are **fully hand-tightened only**. **NEVER** use wrenches in an attempt to connect the couplings. Incorrectly connected couplings are one of the most common causes of faulty operation.

IMPORTANT: Make sure that all coupler threads are fully engaged.

5.5 Bleeding Trapped Air from the System

 **WARNING!** The bleeding of trapped air from a hydraulic system must only be performed by qualified personnel who have been trained and are competent to do so.

Cylinders, tools and hoses are not always completely filled with oil when new. For safe and efficient operation, trapped air must be removed from the system. The following procedure must be carried out with the cylinder/tool connected to the pump, but not operating under load.

To remove air from the system, proceed as detailed below:

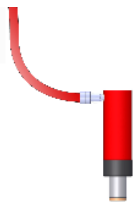


Figure 5.1

- Make sure the oil filler/breather plug (4) is fitted.
- With all hydraulic connections made, position the cylinder/tool below the level of the hydraulic pump.

Single-Acting: With smaller single-acting cylinders, position them with the piston facing downward, as illustrated in figure 5.1



Figure 5.2

Double-Acting: If possible, position double-acting cylinders on their side with the couplers facing upward, as illustrated in figure 5.2

- Using the pump, fully advance and retract the cylinder/tool piston several times until the operation is smooth. (See section 6 for details of pump operation).

NOTE: When longer hoses are used (especially in the case of smaller capacity cylinders), the above procedure may not remove all the air from the system. In these cases, contact your Hi-Force representative for advice on pre-filling hoses with hydraulic oil.

6.0 Operation

Hi-Force will not always be aware of what equipment this pump will be used to power. It is the responsibility of the owner and all operators to read, understand and comply with all appropriate safety warnings and operating instructions relating to the equipment being used.

6.1 Setting the Adjustable Pressure Relief Valve (where fitted)

NOTE: Setting the relief valve pressure is to be done with hydraulic female couplers fitted to the service ports only. i.e. No hoses or cylinders/tools fitted.

The procedure for setting the relief valve pressure is as follows:

- On the adjustable relief valve (8), release the locking feature and turn the control knob fully anti-clockwise to zero the pressure if not already
- Turn the pump on by pressing the green 'ON' button (12)
- Place the pump in advance mode using the directional control valve (6).

For 3-way valves, turn the level fully clockwise - "auto retract" (See figure 6.1).

For 4-way valves, turn the lever fully anti-clockwise – "advance (A)" (See figure 6.2).

- Press and hold the 'run' button on the pendant.

Increasing the Pressure Setting

- Release the locking feature and turn the control knob slowly (8) clockwise until the required pressure is read on the pressure gauge (7).
- Engage the locking feature to lock the relief valve at the desired pressure.

Decreasing the Pressure Setting

- Release the locking feature and turn the control knob (8) anti-clockwise until a pressure value lower than the required pressure is read on the gauge (7).
- Turn the control knob slowly clockwise until the required pressure is read on the gauge.
- Engage the locking feature to lock the relief valve at the required pressure.

NOTE: ALWAYS adjust up to the desired pressure and **NEVER** down. When setting the pump to a lower pressure, reduce the pressure below the desired value (anti-clockwise) and then increase back up to the desired pressure (clockwise) as read on the gauge.

NOTE: It's good practice to zero the pressure before storing away. Turn the control knob anti-clockwise until the pressure gauge reads zero.

6.2 Pumps with 3-Way Valves

The 3-way valve is a dual purpose valve with 'advance/auto retract' function for crimping and cutting, and 'advance/hold/retract' function for lifting applications.

1. Set the adjustable pressure relief valve (8) if required. See section 6.1 for details.
2. With all hydraulic connections and an electrical connection made turn the pump on by pressing the green 'ON' button (12).
3. Operate the directional control valve (6) to control the cylinder/s or tool/s in use. Turn the lever fully clockwise for 'auto retract' and fully anti-clockwise for 'hold' functions. (See figure 6.1)

'Advance/Auto Retract' (lever fully clockwise) - Oil is delivered to the service port when the pendant 'run' button is pressed. Press and hold the pendant button to advance the cylinder/tool. When the pendant button is released the cylinder/tool will retract automatically (i.e. no load-holding).

'Advance/Hold/Retract' (lever fully anti-clockwise) - Oil is delivered to the service port when the pendant 'run' button is pressed. Press and hold the pendant button to advance the cylinder/tool. When the pendant button is released the cylinder/tool will automatically hold its position (load-holding). To retract the cylinder/tool, the lever must be turned fully clockwise (auto retract position). Some resistance will be felt depending on the pressure locked in the system.

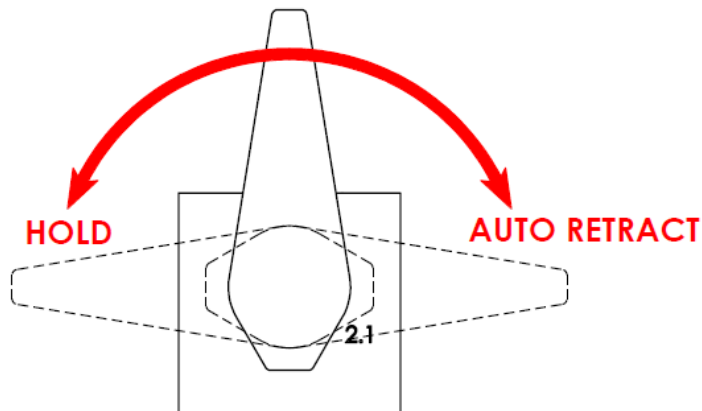


Figure 6.1: 3-Way Directional Control Valve

IMPORTANT: ALWAYS fully retract the cylinder/tool at the end a job/operation before any disconnections are made.

6.3 Pumps with 4-Way Valves

The 4-way valve has three positions:

Neutral Position (lever central):

Can be used to test operation of pump without generating any pressure (P to T connected) A and B ports blocked.

Advance Position (lever anti-clockwise):

Cylinder will advance when pendant button pressed with load-holding when button is released.

Retract Position (lever clockwise):

Cylinder will retract when pendant button is pressed. N.B. No load-holding in retract position.

A degree of controlled lowering under load can be achieved with the valve lever in-between the advance and neutral positions (without pump operating).

1. Set the adjustable pressure relief valve (8) if required. See section 6.1 for details.
2. Connect 'advance' hose to service port 'A' (top) and the 'retract hose' to service port 'B' (bottom). With all hydraulic connections and an electrical connection made, turn the pump on by pressing the green 'ON' button (12).
3. Operate the directional control valve (6) to control the cylinder/s or tool/s in use. Turn the lever fully clockwise for "retract" and fully anti-clockwise for "advance" functions. (See figure 6.2)

'Advance' – Oil is delivered to service port 'A' when the pendant 'run' button is pressed. Press and hold the pendant button to advance the cylinder/tool. Release the button once the cylinder/tool has been advanced the desired amount. The cylinder/tool will remain in the load holding position when the button is released.

'Retract' – Oil is delivered to service port 'B' when the pendant 'run' button is pressed. Press and hold the pendant button to retract the cylinder/tool. Release the button once the cylinder/tool has been retracted.

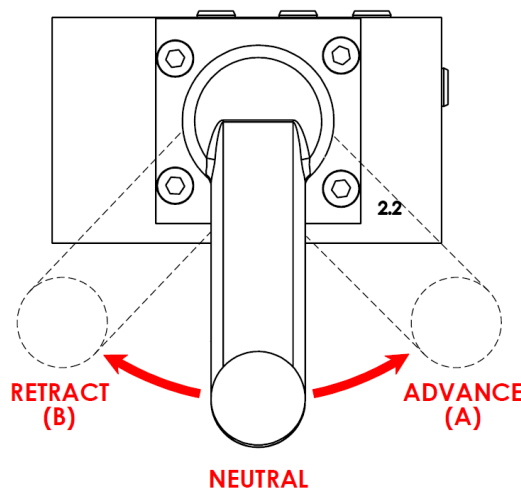


Figure 6.2: 4-Way Directional Control Valve

IMPORTANT: ALWAYS fully retract the cylinder/tool at the end a job/operation before any disconnections are made.

7.0 Maintenance and Storage

- Inspect the pump for damage after each use.
- Change the oil every 500 working hours using high quality ISO46 hydraulic oil.
- Zero the pump pressure before storing.
- Have the pump serviced regularly by a Hi-Force authorised repair centre.

8.0 Specifications

An average A-weighted emission sound pressure level (L_{pA}) of 75dB at no-load and 79dB at full load (700bar) was measured for undefined workstations, as per EU Directive 2006/42/EC Section 1.7.4.2 (u) with values obtained in accordance with ISO 3746:2010. Sound level varies depending on pump speed and load.

The HEP1 Series Electric Driven Two Stage Compact Pumps have been ingress protection tested to IP55 (category 1)

8.1 HEP1 Pump Specifications

Refer to the nameplate on the pump for model identification.

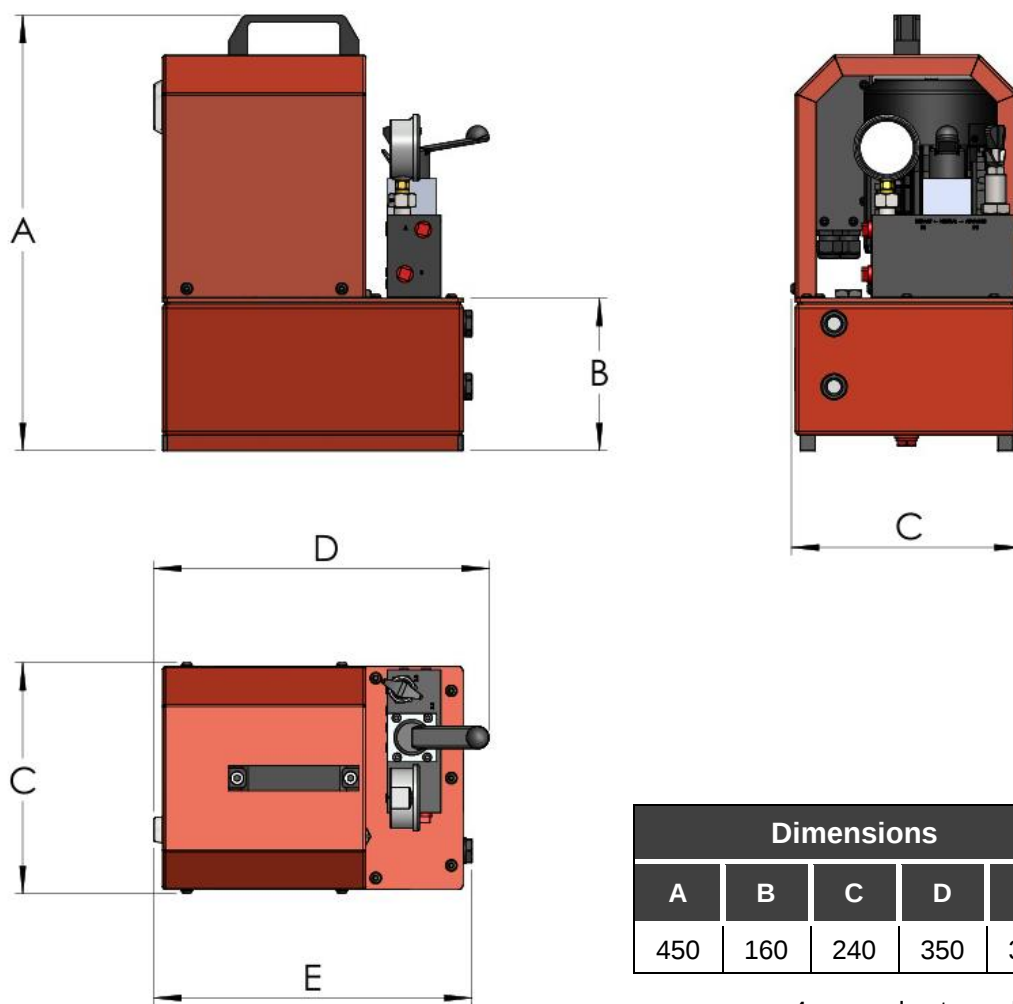
Refer to section 8.2 for motor electrical characteristics.

HEP1 ELECTRIC DRIVEN TWO STAGE COMPACT PUMP						
Model Number	Valve Type	Usable Oil Capacity*	Maximum Flow Rate (litres/minute)		Motor Voltage	Weight**
		(litres)	1 st Stage	2 nd Stage		(kg)
HEP1341	3-way	4	2.6	0.36	110V 50 Hz-1Ph	24.5
HEP1341R	3-way with RV	4	2.6	0.36	110V 50 Hz-1Ph	25.5
HEP1342	3-way	4	2.6	0.36	230V 50 Hz-1Ph	24.5
HEP1342R	3-way with RV	4	2.6	0.36	230V 50 Hz-1Ph	25.5
HEP1341H	3-way	4	3.3	0.45	120V 60 Hz-1Ph	24.5
HEP1341HR	3-way with RV	4	3.3	0.45	120V 60 Hz-1Ph	25.5
HEP1342H	3-way	4	3.3	0.45	220V 60 Hz-1Ph	24.5
HEP1342HR	3-way with RV	4	3.3	0.45	220V 60 Hz-1Ph	25.5
HEP1441	4-way	4	2.6	0.36	110V 50 Hz-1Ph	25.0
HEP1441R	4-way with RV	4	2.6	0.36	110V 50 Hz-1Ph	26.0
HEP1442	4-way	4	2.6	0.36	230V 50 Hz-1Ph	25.0
HEP1442R	4-way with RV	4	2.6	0.36	230V 50 Hz-1Ph	26.0
HEP1441H	4-way	4	3.3	0.45	120V 60 Hz-1Ph	25.0
HEP1441HR	4-way with RV	4	3.3	0.45	120V 60 Hz-1Ph	26.0
HEP1442H	4-way	4	3.3	0.45	220V 60 Hz-1Ph	25.0
HEP1442HR	4-way with RV	4	3.3	0.45	220V 60 Hz-1Ph	26.0

* Total oil reservoir capacity = 7 litres (approx.)

** Weight, filled with oil to max level

Pumps with a suffix 'R' in the model number are fitted with an externally adjustable pressure relief valve (RV) and 700 bar glycerine filled pressure gauge.



8.2 HEP1 Pump Electrical Characteristics

Refer to the nameplate on the pump for model identification.

Motor Voltage	Motor Frequency	Motor Current	Motor Output
110V-1Ph	50 Hz	6.6 A	0.37 kW
230V-1Ph	50 Hz	3.3 A	0.37 kW
120V-1Ph	60 Hz	7.8 A	0.37 kW
220V-1Ph	60 Hz	4.0 A	0.37 kW

9.0 System Components / Accessories

(Refer to the Hi-force website or latest Hi-Force catalogue, Section: System Components for further details)

- High Pressure Hydraulic Hoses
- Manifolds and Manifold Assemblies.
- Flow Control Valve
- Pressure Gauges and Gauge Mounting Blocks
- High-Pressure Couplings and Fittings

10.0 Troubleshooting

Hi-Force HEP1 electric driven two stage compact pumps should be serviced and repaired only by authorised Hi-Force repair centres. The following table gives possible causes and solutions for common problems.

TROUBLESHOOTING GUIDE		
Problem	Possible Cause	Solution
1. Pump will not start.	a. Not connected to the power supply	Connect to the power supply.
	b. Damaged power cord.	Repair or replace power cord.
	c. Faulty control pendant.	Contact your local Hi-Force office/distributor.
	d. "Emergency Stop" button pressed.	Twist the "Stop" button clockwise to ensure it is released
	e. Motor is damaged, seized or worn.	Contact your local Hi-Force office/distributor
	f. Electrical Fault.	Contact your local Hi-Force office/distributor.
2. Motor stalls before full operating pressure is reached.	a. Low supply voltage.	i. Use heavier gauge extension cord. ii. Turn off excess electrical loads.
3. Pump runs but will not build up to full operating pressure.	a. Reservoir breather plug has not been installed.	Remove transit plug and install reservoir breather plug as per section 5.1
	b. Low oil level.	Add oil as per section 5.2.
	c. Adjustable relief valve incorrectly set.	Adjust relief valve pressure as per section 6.1.
	d. External oil leak in system.	Contact your local Hi-Force office/distributor.
4. Noisy Operation	a. Air trapped in the system.	Bleed air from the system as per section 5.5
	b. Low oil level	Add oil as per section 5.2
	c. Reservoir breather plug has not been installed.	Remove transit plug and install reservoir breather plug as per section 5.1
5. Pump builds to full pressure, but cylinder/tool does not advance/operate.	a. Advance or return flow line to cylinder/tool restricted or blocked.	Check couplers for full engagement.
6. Pump running hot.	a. Low oil level.	Add oil as per section 5.2.
	b. Advance or retract flow restricted.	Check couplers for full engagement.
	c. High pressure leakage at pump.	Contact your local Hi-Force office/distributor.
7. Pump stops working after prolonged use	a. Oil overheated.	Allow time for oil to cool.

TROUBLESHOOTING GUIDE (continued...)

Problem	Possible Cause	Solution
8. Cylinder/tool not functioning correctly.	a. Cylinder/tool incorrectly connected to pump.	Check for correct system setup. Check couplers for full engagement
	b. Cylinder/tool fault.	See cylinder/tool's troubleshooting guide or contact your local Hi-Force office/distributor.
	c. Low oil level	Add oil as per section 5.2.
	d. Air trapped in the system	Bleed air from the system as per section 5.5
9. Cylinder/tool will not retract.	a. Valve malfunction.	Contact your local Hi-Force office/distributor.
	b. Return flow line restricted or blocked.	i. Check couplers for full engagement. ii. Run motor while retracting cylinder/tool.
10. Pressure gauge does not read zero when pump motor is stopped.	a. Pressure not relieved from system.	Turn the adjustable pressure relief valve (8) fully anti-clockwise to release the pressure.
11. Gauge displays no pressure reading.	a. Faulty gauge.	Contact your local Hi-Force office/distributor
	b. Pump will not build pressure.	See problem 3 above.

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