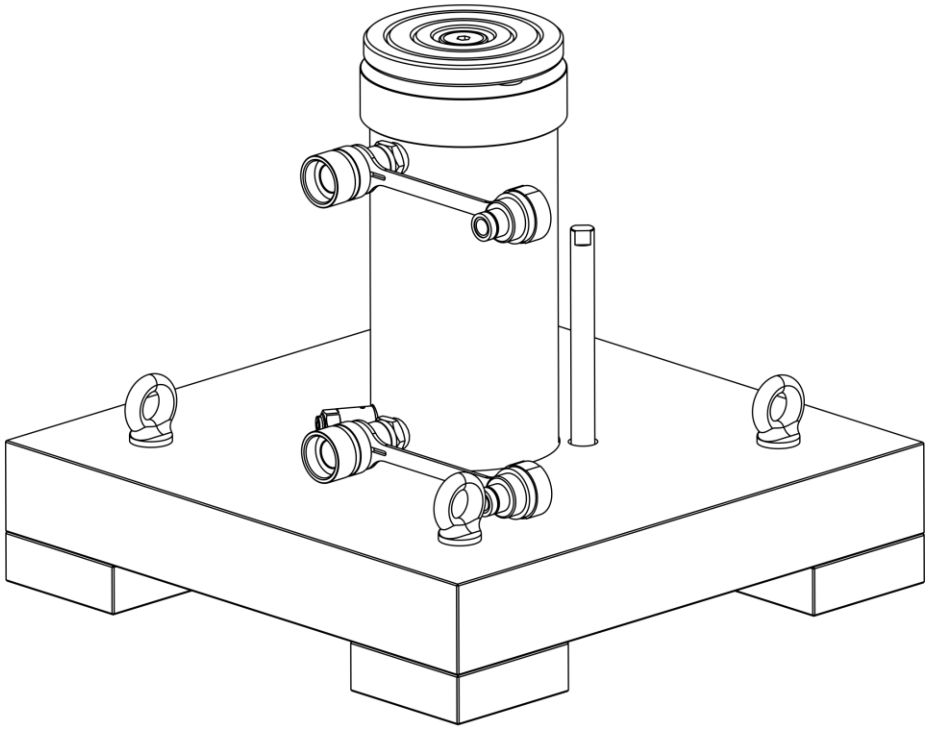
Operating Instruction Manual: OM-HCJ-01	For Serial Number: FROM ED6987

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

HCJ | DOUBLE-ACTING CLIMBING JACK



The Hi-Force HCJ Double-Acting climbing jacks, which have a maximum stroke of 152mm and a maximum lifting capacity ranging from 50 tonnes to 200 tonnes at a maximum working pressure of 700 bar. This manual applies to the Hi-Force HCJ Double-Acting climbing jacks only. It contains the latest product information available at the time of publication and approval.

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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.

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

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, ear protection and protective gloves should be always worn. 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.

- Inspect hoses regularly for damage and wear.

- Seek medical attention immediately if a hydraulic injection injury (no matter how minor) occurs.

- 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.

- **NEVER** attempt to connect or disconnect, hydraulic equipment while the system is under pressure.

- 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.

- **DO NOT** use any hydraulic equipment if you are under the influence of alcohol, drugs or medication. Lack of attention whilst operating high-pressure hydraulic tools can result in personal injury or death.

- **NEVER** over-stroke a cylinder that is not fitted with a piston stop ring. Equipment failure and injury can occur. For cylinder safety guidelines and operation refer to the cylinder operating instructions.

⚠ 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.

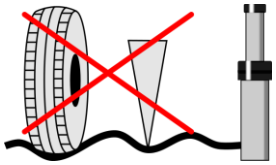
- Avoid damaging hydraulic hose. **ALWAYS** route hoses to ensure that they are free from sharp bends and kinks. Using a bent or kinked hose will result in severe backpressure, which can lead to hose failure.

- **ALWAYS** operate the system under no-load conditions before the actual operation, to ensure there is no air trapped in the hydraulic circuit.

- **NEVER** use a coupler/s to lift, carry or position a tool.

- Ensure that the lifting device/s are placed entirely under the load and that lifting is parallel.

- 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.

- The manufacturer rated load capacity and stroke length for cylinders represent the maximum safe limits. Good practice uses 80% of the rated figures, as the maximum values for load capacity and stroke length.

- Select cylinders with sufficient over-capacity. See the guidance above.

  For multi-cylinder lifting operations, 50% of the total number of cylinders used should be able to withstand the full weight of the load being lifted / lowered. I.e. The system capacity should be at least twice that of the load being lifted / lowered.

- **DO NOT** let familiarity gained with any hydraulic tools allow you to become complacent. Complacency with any tooling can result in a lack of discipline toward working guidelines and safety principles.

- Avoid loose clothing and jewellery that could get caught in moving parts, tie back long hair.

2.4 Hydraulic Cylinder Specific Safety Precautions

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

- **DO NOT** work under or near a load supported only by hydraulic means. A cylinder, when used as a lifting device, should not be used as a load-holding device. Once lifted, all loads should be supported using rigid mechanical structures.

- **NEVER** exceed the maximum rated pressure or load capacity of any hydraulic cylinder. Hi-Force manufactures its hydraulic cylinders to operate at a maximum working pressure of 700 bar. **DO NOT** connect a pump with a higher-pressure capacity rating to any Hi-Force cylinder of this model series.

- **DO NOT** adjust or remove the external pressure relief valve on any Hi-Force product.

- **ALWAYS** place lifting cylinders on a flat, even surface that can support the load to be applied.

  Where applicable, use an additional cylinder support base to assist in supporting the load to be lifted.

- Avoid lifting loads that are not central to the lifting piston. Avoid offset loading as this can damage the cylinder bores and piston rods, and lead to unstable load lifting.

- **DO NOT** weld any items to the cylinder or modify it in any way from its delivered condition. Your warranty may be invalidated, and it could lead to serious personal injury.

- Only use hydraulic cylinders in a complete and tested, coupled system. **NEVER** attempt to use a cylinder that is not correctly coupled to its operational pump.

- Overloading hydraulic cylinders can result in component failure and possible serious personal injury.

- Keep hands and feet away from the cylinder during operation.

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

- To protect your warranty, only use hydraulic oil grades as specified in section 8.1.

3.0 Declaration of Incorporation / Conformity

Hi-Force declares that this product has been tested and complies with the standards set out in 2006/42/EC - The Machinery Directive. The 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

4.1 HCJ Component Identification

1	Cylinder Body	**7**	Eyebolts
2	Saddle	**8**	Lifting Frame
3	Retract Coupler	**9**	End Plate
4	Advance Coupler	**10**	Anti Rotation Rod
5	Dust Cap/s	**11**	Saddle Adaptor
6	Overload Protection Valve	**-**	

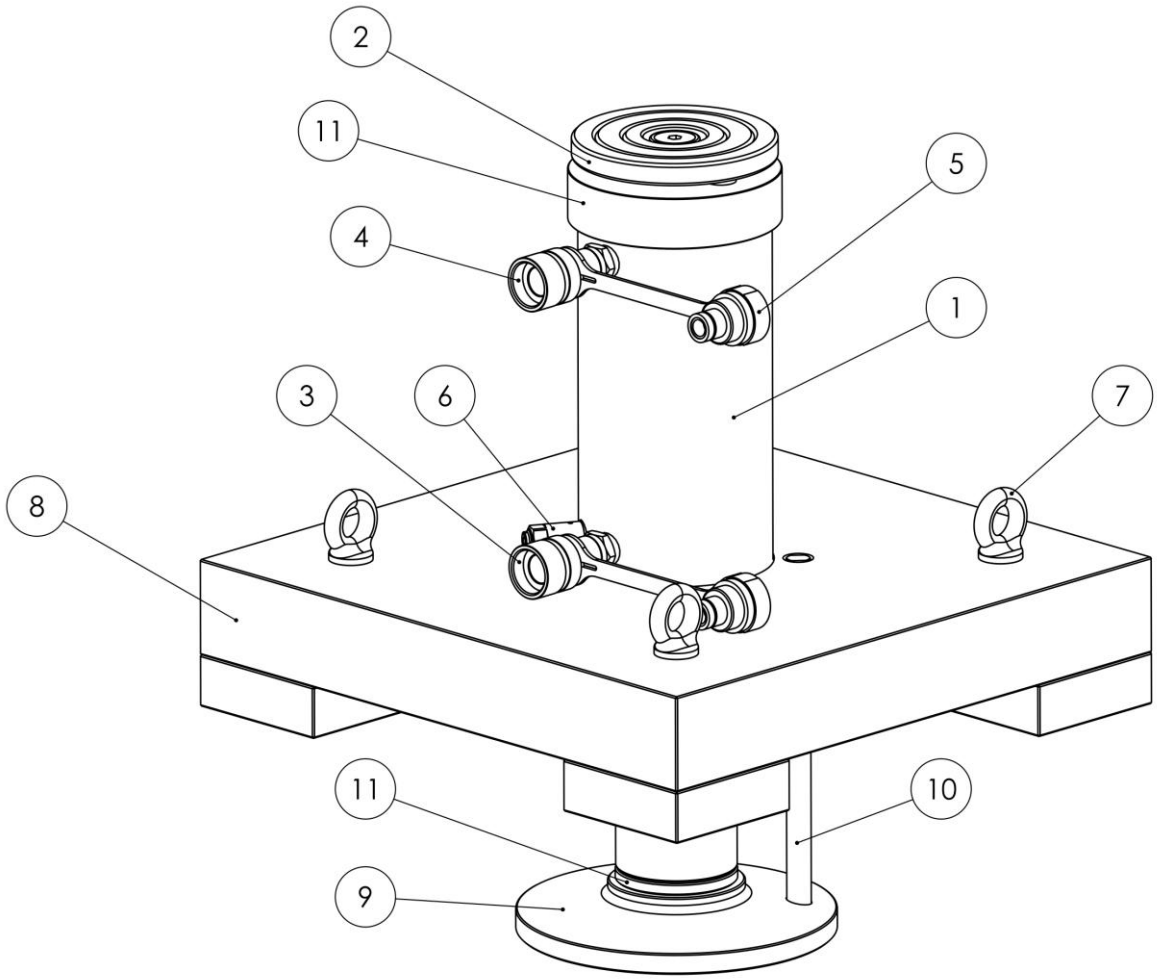


Figure 4.1: HCJ Component Identification

4.2 HCJ Climbing Jack with SLF/SLV Mounting Kit and Displacement Sensor Component Identification

12	Mounting Plate Saddle	**14**	Displacement Sensor
13	Sensor Mounting Plate	**15**	Sensor Rod

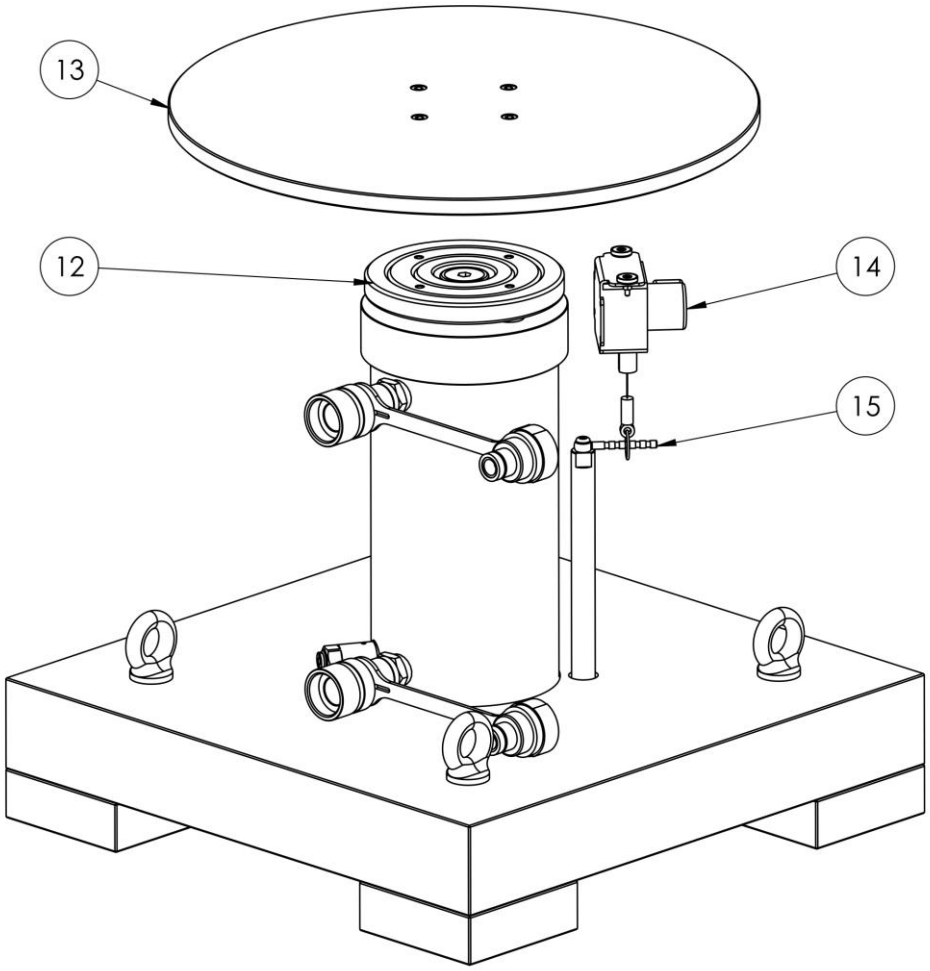


Figure 4.1: HCJ Climbing Jack with SLF/SLV Mounting Kit and Displacement Sensor Component Identification

NOTE:

- Items 12, 13 and 15 along with mounting magnets and all retaining screws, are available within the climbing jack SLF/SLV mounting kit SLMK-34.
- Item 14 (displacement sensor) is only available as an individual part and is not included within the mounting kit.
- For operating synchronous lift systems with displacement sensors refer to the relevant operating manual (OM-SLF-01 and OM-SLV-02).

5.0 Installation/Setup

5.1 Pump Requirements

Ensure that the hydraulic pump to be used is suitable for the cylinder/s to which it will connect. For a double-acting cylinder (two pressure coupling connections), a double-acting hydraulic pump fitted with a 4-way valve and two correctly rated hoses, must be used.

5.2 Hydraulic Connections

Connect the hydraulic hose/s between the cylinder/s and the pump, ensuring that the coupler/s are **fully hand tightened ONLY**. To do so: [1] Press the male coupler into the female coupler, [2] then turn the threaded collar clockwise (by hand) until the threads are fully engaged.

⚠ **CAUTION!** **NEVER** use wrenches to connect the coupling/s. Incorrectly connected coupling/s are one of the most common causes of faulty operation.

IMPORTANT: Make sure that all coupler threads are fully engaged. (See figure 5.1, panel 3)

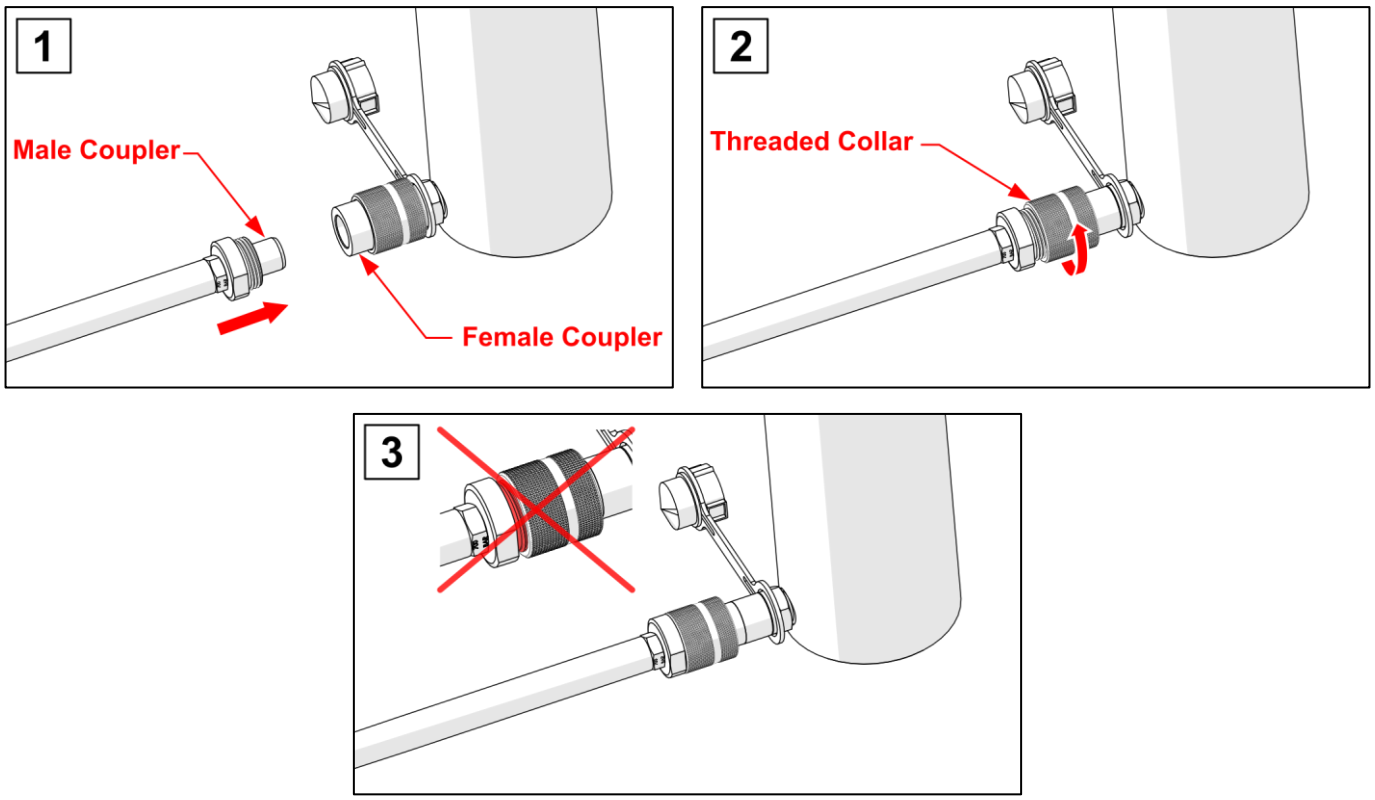


Figure 5.1: Hydraulic Connection

5.3 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.

Cylinder and hoses are not always 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/s connected to the pump, but not operating under load.

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

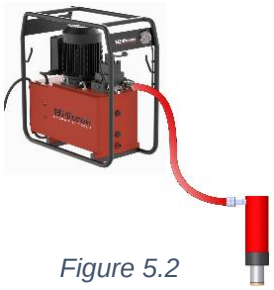


Figure 5.2

- Make sure the pumps oil filler breather cap is fitted. (if applicable)
- With all hydraulic connections made, position the cylinder/s below the level of the hydraulic pump, as illustrated in figure 5.2.

  Double-Acting: If possible, position double-acting cylinders on their side with the couplers facing upward, as illustrated in figure 5.3.
- Using the pump, fully advance and retract the cylinder/tool piston several times until the operation is smooth. (Refer to the pumps operating manual for details of pump operation).

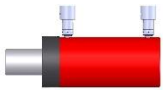


Figure 5.3

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

A hydraulic pump is required to operate the cylinder range covered in these instructions. Please refer to the relevant 'Hi-Force hydraulic pump operating instructions' for full details of the chosen pumps applicable operating instructions.

⚠ CAUTION!

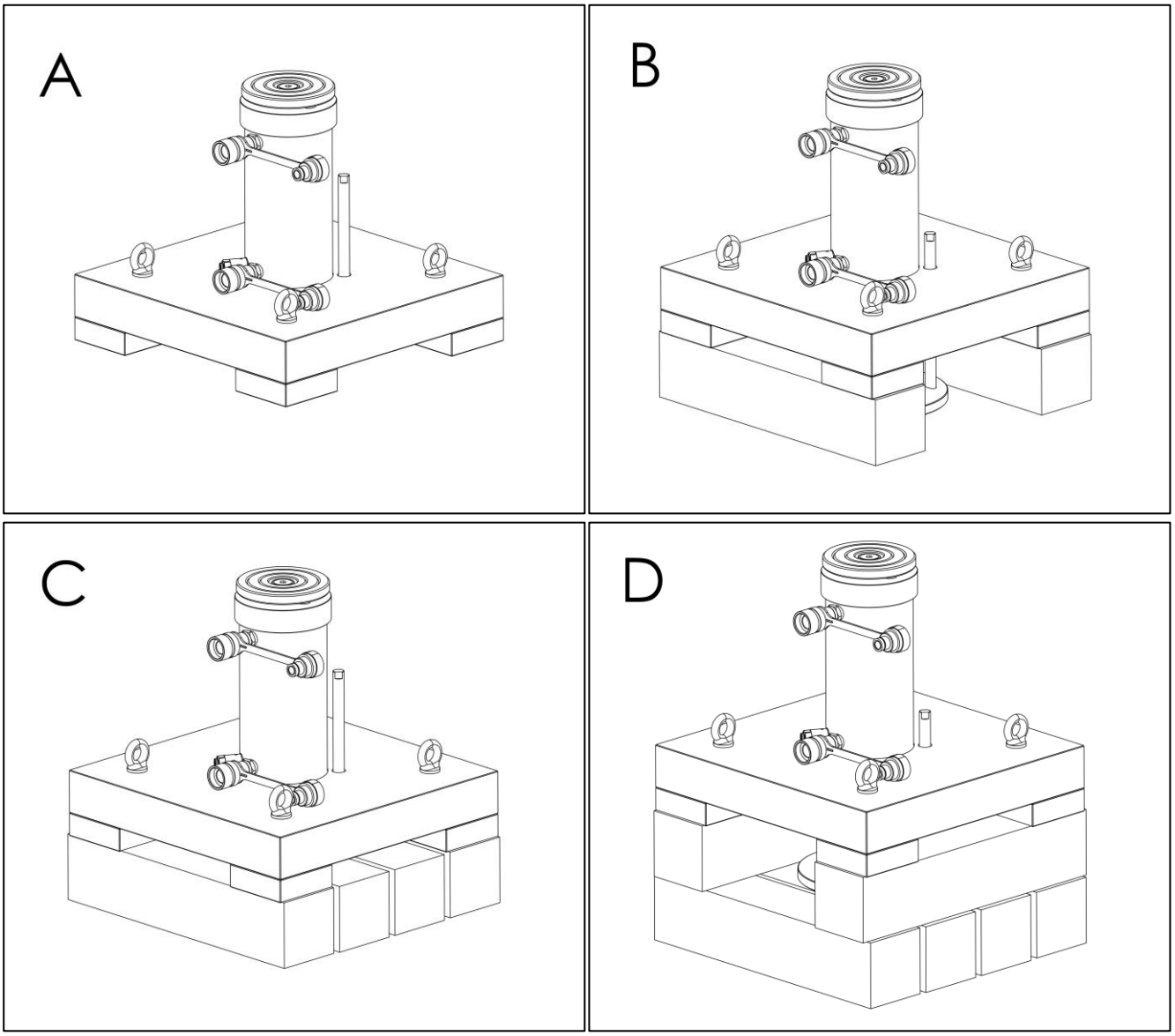
- **ALWAYS** ensure the cylinder's piston contacts the load to be lifted as squarely as possible.
- Before lifting, make sure the load to be lifted is stable. Should the load shift or become unstable during lifting, stop the lift immediately. Secure the load and reposition the cylinder before continuing the lift.
- Cribbing blocks used must be of the correct strength, material, and size for the lift.

  NOTE: Ensure sufficient cribbing blocks are used to support the load being lifted.

6.1 Lifting/Lowering the Load

1. Place the jacks under the load at each of the designated lifting points. Refer to the images on the following page.
2. Extend the cylinders allowing enough clearance for the cribbing blocks to be positioned. Insert the two outer cribbing blocks under the lifting frame shown in image B.
3. Retract the cylinder pistons so that the frame is fully supported by the cribbing blocks and insert the inner two cribbing blocks as shown in image C.
4. Extend the cylinders allowing enough clearance for the next set of outer cribbing blocks to be inserted. Ensure that each set of cribbing blocks are placed perpendicular to form a stable base as shown in image D.
5. Retract the piston so that the next set of inner cribbing blocks can be inserted.
6. Repeat the previous steps as required until the desired height is achieved.

   NOTE: Ensure sufficient cribbing blocks are used to support the load being lifted.



To lower the load, begin by retracting the piston until the frame is fully supported on the outer feet. Once stable, remove the inner cribbing blocks. With the frame still resting securely on the feet, extend the piston downward to engage the lower tier, lifting the frame clear of the outer blocks. Remove the outer cribbing blocks, then retract the piston again until the frame is fully supported. Repeat this process for each remaining tier of cribbing blocks.

NOTE: Ensure sufficient cribbing blocks are used to support the load being lifted.

7.0 Maintenance and Storage

- **ALWAYS** use Hi-Force specified hydraulic oil grades with the cylinders. The use of other fluids may invalidate your warranty.
- After use, **ALWAYS** retract the pistons fully before disconnecting the hoses.
- Fit dust caps to the couplers, every time disconnections are made.
- Keep cylinders clean to prolong their life.
- Routinely perform a visual inspection of the cylinders for signs of general damage.
- Store in clean and dry conditions.

  If storage is to be for a prolonged period, it is advisable to apply a rust inhibitor to exposed metal surfaces.
- **NEVER** store, transport, or lift a cylinder with its piston in the extended position.

Long Term Storage:

- Before placing cylinders into long term storage, perform one full extension and retraction of the piston. Then, store the cylinder upside-down to help prevent corrosion.

⚠ CAUTION! A double-acting cylinder will become pressurised in storage if it is subjected to a temperature rise. Approximately 10 bars for every 1°C rise. This can cause difficulty when reconnecting couplers.

8.0 Specifications

8.1 Oil Specifications

Hi-Force cylinders/tools will use 1 of 2 grades of oil, dependant on the pump used. The tools are designed to operate at temperatures between -20°C and 80°C. Details of the oil used can be found in the pumps operating instruction manual, in the section: **FILLING OF PUMP WITH OIL.**

Hi-Force Model Number	ISO Hydraulic Oil Grade	Temperature Range: Degrees Celcius (°C)	
		From:	To:
HFO15	ISO15	-23	44
HFO46	ISO46	-2	73

8.2 Cylinder Specifications

Refer to the etched detail on the cylinder for model identification.

Model Number	Capacity (tonnes) Push	Stroke (mm)	Oil Capacity (litres)	Cylinder Eff. Area (cm^2)	Weight (kg)
HCJ506	50	152	1.08	71.3	144
HCJ1006	109	152	2.33	153.3	222
HCJ1506	152	152	3.26	214.2	337
HCJ2006	200	152	4.33	285.2	410

MAXIMUM OPERATING PRESSURE: 700 bar

9.0 System Components / Accessories

(*Refer to the Hi-force website or latest Hi-Force catalogue, for further details*)

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

10.0 Troubleshooting

Hi-Force HCJ hydraulic cylinders 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. Piston will not advance.	a. Pump release valve open.	Close pump release valve.
	b. Coupler not fully engaged.	Check coupler engagement. (See section 5.3)
	c. Oil level in pump is low.	Add oil to pump reservoir. (See pump manual)
	d. Pump malfunction.	Contact your local Hi-Force office/distributor.
	e. Pump's pressure relief valve set too low.	See pump manual.
	f. Load is too heavy for cylinder.	Use correctly rated cylinder for load.
	g. Cylinder seals leaking.	Contact your local Hi-Force office/distributor.
2. Cylinder advances part way.	a. Oil level in pump is low.	Add oil to pump reservoir. (See pump manual)
	b. Insufficient oil capacity in pump.	Check pumps oil capacity.
	c. Coupler not fully engaged.	Check coupler engagement. (See section 5.3)
	d. Cylinder piston binding.	Contact your local Hi-Force office/distributor.
	e. External obstruction.	Retract cylinder and clear obstruction.
3. Cylinder advances in spurts.	a. Air in hydraulic system.	Bleed air from system. (See section 5.4)
	b. Cylinder piston binding.	Contact your local Hi-Force office/distributor.
4. Cylinder advances slower than normal.	a. Leaking connection.	Replace faulty component.
	b. Pump malfunction.	Contact your local Hi-Force office/distributor.
5. Cylinder advances but will not hold.	a. Pump malfunction.	Contact your local Hi-Force office/distributor.
	b. Leaking connection.	Replace faulty component.
	c. Incorrect system setup.	Check system setup.
	d. Cylinder seals leaking.	Contact your local Hi-Force office/distributor.
6. Cylinder leaks oil.	a. Worn or damaged seals.	Contact your local Hi-Force office/distributor.
	b. Internal cylinder damage.	Contact your local Hi-Force office/distributor.
	c. Loose connection.	Tighten or repair connection.
7. Cylinder will not retract or retracts slower than normal.	a. Pump release valve is closed.	Open pump release valve.
	b. Retract coupler not fully engaged.	Check coupler engagement. (See section 5.3)
	c. Pump reservoir over-filled.	Drain excess oil from pump reservoir.
	d. Internal cylinder damage.	Contact your local Hi-Force office/distributor.
8. Overload protection valve leaking.	a. Coupler not fully engaged.	Check coupler engagement. (See section 5.3)
	b. Faulty Valve.	Contact your local Hi-Force office/distributor.

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