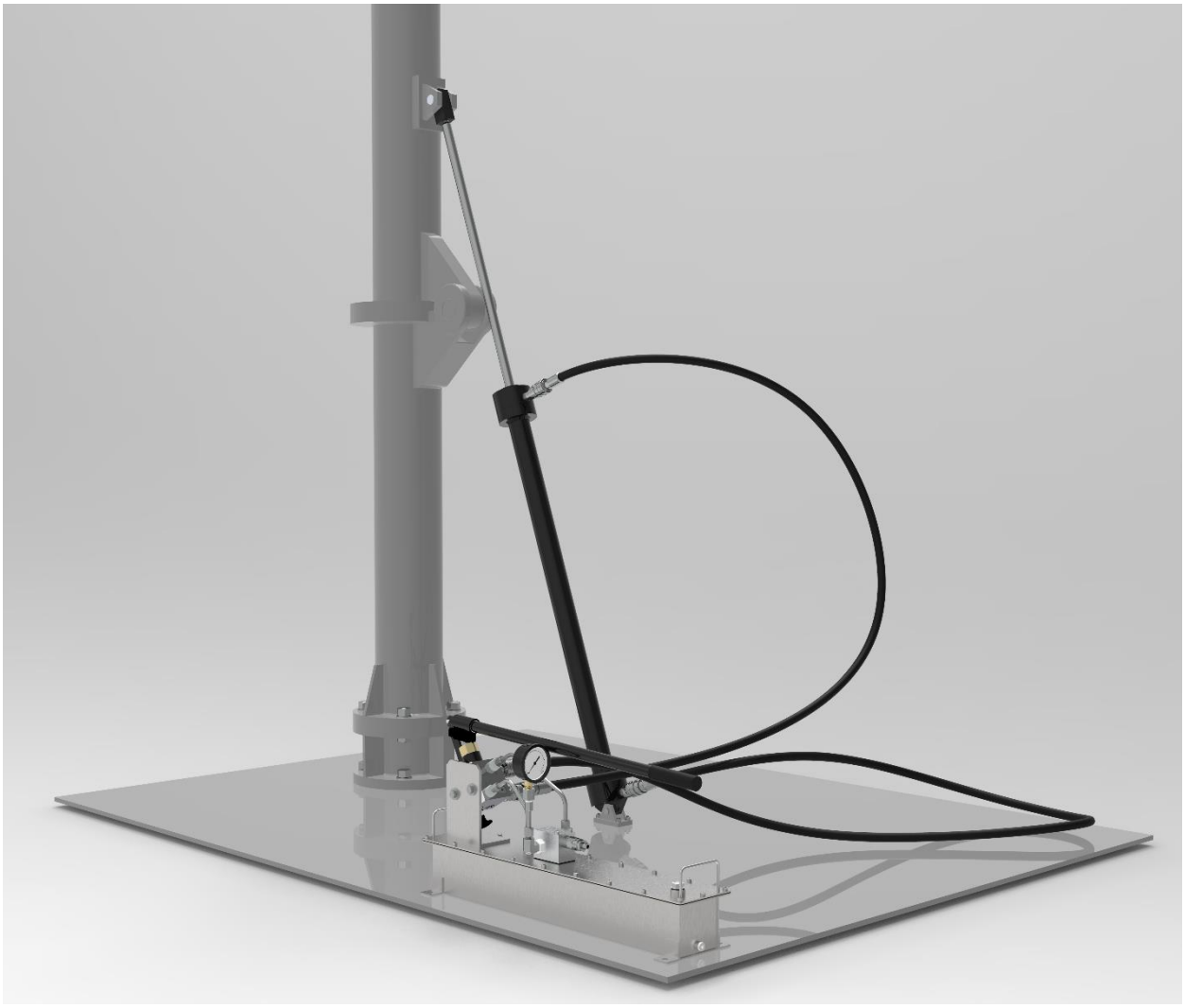
OWNER'S MANUAL

WIND TURBINE POLE

Hydraulic Linear Actuator

(Hand Pump & Lift Cylinder)



This document is for the purpose of the Synergie Fluidtechnik's Wind Turbine Pole Hydraulic Linear Actuator Owner's Manual provides general guidelines for basic operation, safety and maintenance of the system.

For warranty claims or service and replacement of original parts, please contact us at:

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The information in this manual is intended as a guide only.

The information in this manual is intended as a guide only. Read our Disclaimer on page 20. Always consult the valve manufacturers recommended maintenance procedures.

MADE IN Malaysia

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Introduction

Hydraulic Linear Actuator (Hand Pump & Lift Cylinder) - HLA®

The Hydraulic Linear Actuator is a manually hand operated high pressure pump that is rated to maximum 160 bar (2320 PSI) and operates in horizontal position.

Features include:

- Stainless steel tank and epoxy coated alloy steel parts for corrosion resistance
- Ease of handling and transport with tank handles.
- Tank mount foot provides stable base of operation and the option of permanent mounting
- Self-priming hydraulic action and a long handle makes manual operation simple.
- High pressure and good quality QRC (quick release coupling) ensure the safe and quick assembly and release of high pressure fittings between the hand pump and lift cylinder.
- QRC on cylinders holds in hydraulic oil prevents drop of load even after disconnecting QRC hoses at bore and rod sides.
- Hand pump's pilot operated check valves locks pressure and load at every pump cycle – prevents free falling loads.

The HLA® basic scope of supply includes:

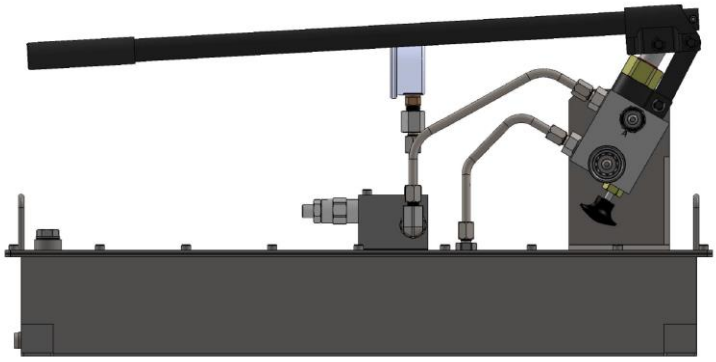
- 2 lengths of 2m long EATON high pressure hoses 207 bar (3000 PSI) with 3/8" QRC Coupler
- Hydraulic Linear Actuator (approx.. 12 kg in weight)
- 1 unit of high pressure 160 bar (2320 PSI) welded style hydraulic cylinder (approx.. 16 kg in weight)

Please refer to page 2 for Scope of Supply.

READ THIS MANUAL THOROUGHLY BEFORE OPERATING

Scope of Supply

EATON high pressure hoses 207 bar (3000 PSI) with 3/8" QRC (Quick Release Coupling)



Hydraulic Hand Pump

High pressure 160 bar (2320 PSI) welded style hydraulic cylinder

Safety Considerations

Hand Pump & Lift Cylinder

Synergie Fluidtechnik system are designed for field use. The following table outlines the maximum safe working pressure and force of the system.

Cylinder Operation	Description	Max. Safe Working Pressure	Max. Force
Lifting/ Pushing	Rod extending – bore end pressure	160 bar (2320 PSI)	20.1 kN (2 Tonne)
Lowering/ Pulling	Rod retracting - rod end pressure	160 bar (2320 PSI)	14 kN (1.4 Tonne)

WARNING: The new hand pump unit is factory set to pressure relieve at **170 bar**. The relief valve serves also as an over-pressure safety valve to protect the system from over pressure. **However, if the load exceeds 2.1 tonnes, the cylinder will retract. Therefore, it is not recommended to adjust the pressure relief factory set pressure.**

The unit should only be used by a **trained & qualified technician** who is familiar with the working principle, load and mechanical limitations & working pressures of this lifting system and the lifting structure.

When working with hand pump for lifting or pulling operation, uncontrolled loads & high pressure fluid are potential hazard to the operator. DO NOT operate the system when there are visible leakage(s) at the sealed joints of either hoses, pump & relief valve housings or cylinder. Rectify the leakage with correct spare parts prior to use.

CAUTION: DO NOT use a hammer or other objects to forcibly disconnect the quick release coupling from the fitting. Doing so may result in damage to the fitting which could cause serious personal injury or death.

WARNING: In the event where the internal checks in the quick release coupler under service fail, it will be very difficult or impossible to remove the coupling. Support the suspended load with the appropriate lock or lifting gear and reduce the pressure to zero gage pressure by pulling or pushing the hand pump's directional control valve before attempting to do repairs.

DANGER: Pressurized oil is locked within and after the hand pump valve, pressure relief, hoses, and lift cylinder during operation. **DO NOT** dismantle any fitting connected to the hand pump and cylinder during operation.

NEVER use a non-recommended oil to substitute good quality VG 68 oil. **RECOMMENDED** to use SHELL TELLUS SM68/ 68 hydraulic mineral oil. **FAILURE** to use the correct grade and type of oil is a potential **SAFETY ISSUE** that may result in premature seal failure of the piston pump, valve, and cylinder because of fluid corrosive chemical composition and lack of lubricity of recycled, used oil or incorrect oil.

NEVER operate the hand pump without a properly functioning pressure gauge or if the gauge shows signs of over pressurization and is in poor operating condition.

NEVER carry hand pump by its Handle (#1.5), always carry it by the tank handles (#2.3)

ALWAYS replace damaged or missing parts.

DO NOT remove nameplates or labels.

DO NOT use while tired or under the influence of alcohol, drugs or medications.

ALWAYS wear approved Personal Protective Equipment (PPE). Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing and gloves away from moving parts.

AT ALL TIMES, keep proper footing and balance, maintain a firm grip when using a pump, and do not over-reach.

Maintain a safe working environment. Keep a clean work site.

Ensure that you have proper lighting and that you have completed a Job Hazard Assessment (JHA).

Ensure that you have the proper work permits and that your fellow workers are aware of the procedures and scope of work that you are about to perform.

ALWAYS turn off your vehicle and work well down wind of all sources of spark or ignition.

Use only original equipment maker's replacement parts for hand pump, cylinder and hoses for reliable and safe operation of the system.

High Pressure Hoses

NEVER carry the Hydraulic Hand Pump by the high pressure hose.

Hose life is reduced by factors that include:

- **Environment** - Temperature extremes, UV light, chemicals, ozone, etc. will degrade the rubber used in hydraulic hoses.
- **Abrasion and Cuts** - Wear against other hoses or objects will wear off the outer cover and lead to corrosion of the reinforcing mesh.

- **Extreme Pressure Fluctuations** - Pressure surges above the hose's working pressure will damage hose components.

- **Improper Length/Routing** - Excessive bending of the high pressure hose causes high stresses in the hoses components that may also reduce pressure capacity (avoid multi-plane bending, small bend radii, tension in hose, etc.). Hose life can be reduced by 90% when subject to these type of stresses.

Operating Instructions

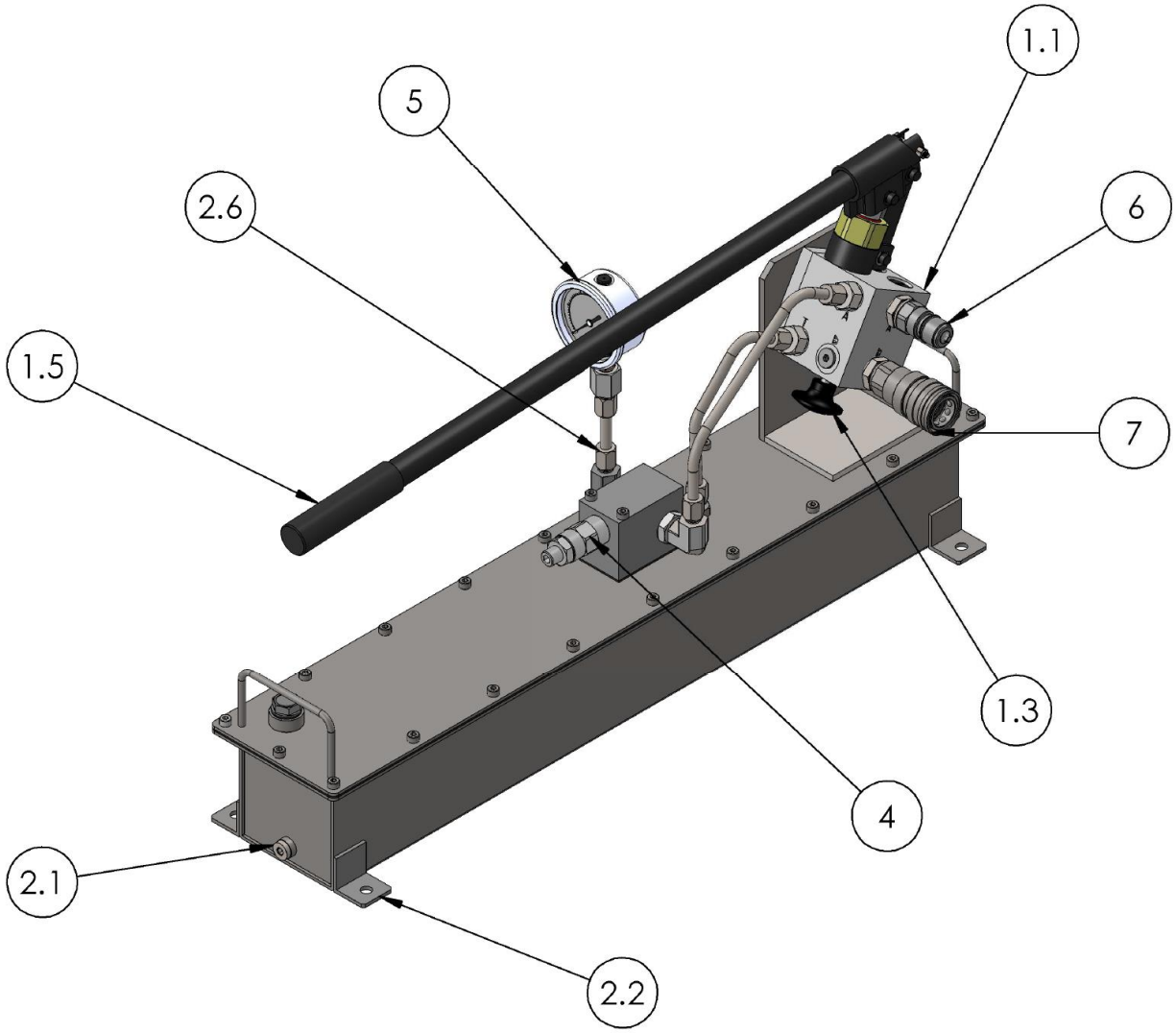
How to Operate the Hydraulic Hand Pump

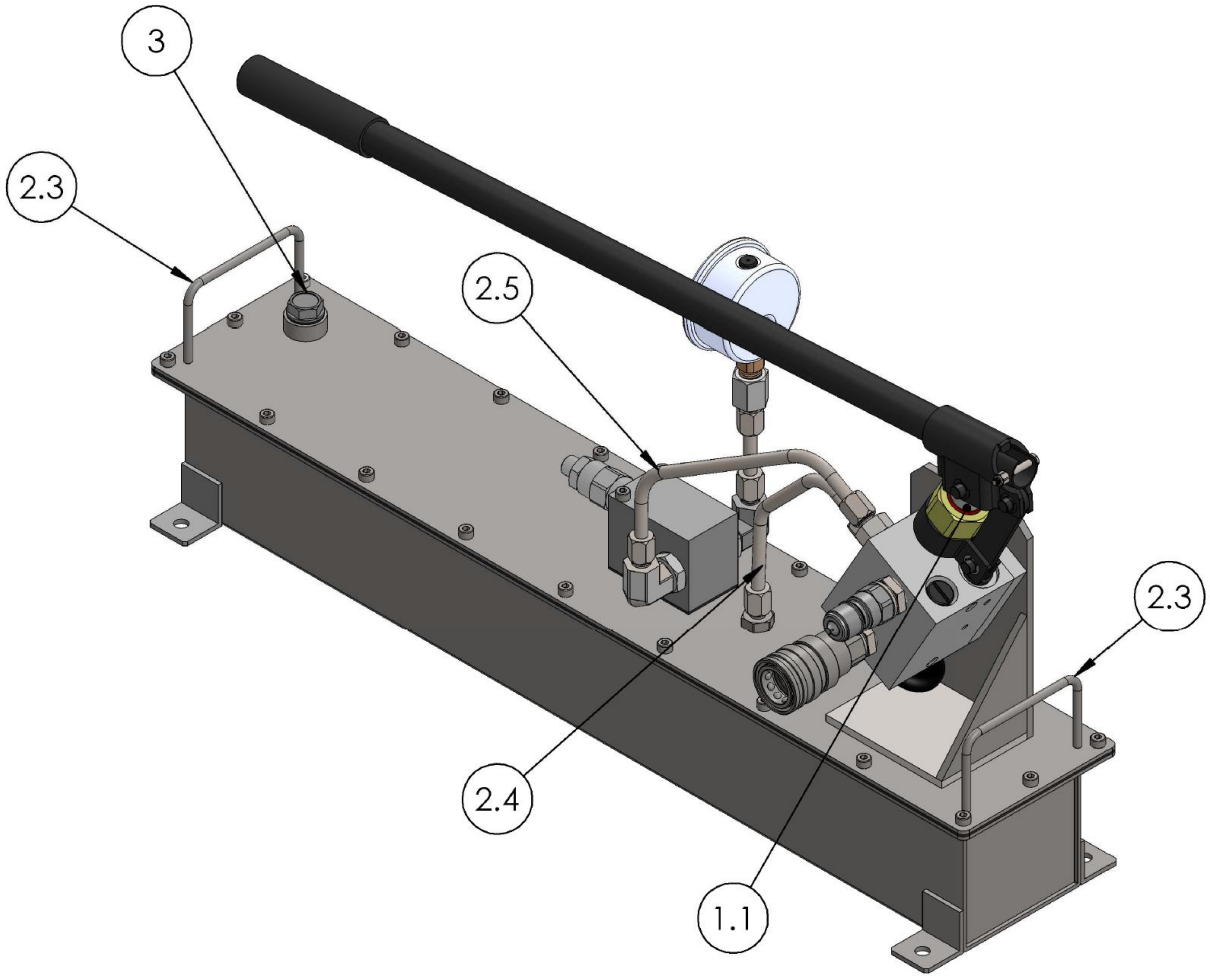
Before operating the Hydraulic Hand Pump read and remember the “Basic Rules” listed in page 10, “Care and Maintenance” section of this manual.

- NOTE: If at any time you feel the Hydraulic Hand Pump is not operating as expected see “Troubleshooting” in pages 14 to 19. The Hydraulic Hand Pump operator should be familiar with its working principles and the mechanical limitations

IMPORTANT: Be sure you have read and understand the “Safety Considerations” section in page 3 to 5 of this manual before operating this pump.

Please cross-refer to the illustrations below in order to operate new Hydraulic Hand Pump





Hand Pump Setup Procedure

1. Open the breather cap and fill in SHELL Tellus SM 68/ 68 hydraulic to two-thirds (2/3) of the tank height. Check the oil level dip stick at the breather cap (#3).
2. Connect the supplied QRC hoses to the hand pump valve and to the Lift Cylinder
3. Ensure that the Lift Cylinder must be in fully retracted position.
4. Check that all QRC and fittings that they are properly tightened before operation with hand tools.
5. Push the directional control valve knob (#1.3) located below the hand pump valve to switch flow to flow into the hose and at the bore end of the cylinder.
6. Manually pump until the oil level in the tank drops to one-third (1/3) of the two-thirds (2/3) of tank height
7. Continue to refill up to 2/3 of the level if necessary and pump again until there is a slight rod extension of the cylinder.
8. Once there is a slight cylinder rod extension you may need to refill the oil to two-thirds (2/3) of the tank height. The setup is now complete.

Wind Turbine Pole Lift & Lower Operation

WARNING: The new hand pump unit is factory set to pressure relieve at **170 bar**. The relief valve serves also as an over-pressure safety valve to protect the system from over pressure. **However, if the load exceeds 2.1 tonnes, the cylinder will retract. Therefore, do not adjust the pressure relief factory set pressure and do not exceed 2 Tonnes of total weight including the weight of mechanism structure!**

1. After completing Hand Pump Setup Procedure, for **wind turbine pole lifting operation**:
    i. Connect hoses to the hand pump and cylinder when the pole is in horizontal position and is supported by the cylinder itself.
    ii. **Push the directional control valve knob (#1.3)** for cylinder extension.
    iii. Use the hand pump's pump handle to actuate the pump by pushing downwards and pulling upwards motion. **NOTE:** Ensure that the pump is placed on flat surface and at horizontal position before operation.
    iv. Manually pump until the cylinder is fully extended
    v. Secure the pole

IMPORTANT: When the cylinder is fully extended mechanically, stop operating the pump. Secure safely the structure/ mechanism that carry the load.

DANGER: During lifting, DO NOT PULL the hand pump's direction control valve knob (#1.3) without 1st securing the load. Failing to do so will result in uncontrolled load movement that will lead to potential serious injury, fatality and/or equipment damage.

2. After completing Hand Pump Setup Procedure, for **wind turbine pole lowering operation**:
    i. Disengage the pole
    ii. **Pull the directional control valve knob (#1.3)** for cylinder extension.
    iii. Use the hand pump's pump handle to actuate the pump by pushing downwards and pulling upwards motion. **NOTE:** Ensure that the pump is placed on flat surface and at horizontal position before operation.
    iv. Manually pump until the cylinder is fully retracted.

IMPORTANT: When the cylinder is fully retracted mechanically, stop operating the pump. Secure safely the structure/ mechanism that carry the load.

DANGER: During lowering, DO NOT PUSH the hand pump's direction control valve knob (#1.3) without 1st securing the load. Failing to do so will result in uncontrolled load movement that will lead to potential serious injury, fatality and/or equipment damage.

Care & Maintenance

By following these five (4) easy steps the Hydraulic Hand Pump will operate for many years without requiring any further maintenance in the following:

1. Carefully follow all “Operating Instructions” and the “Basic Rules” provided.
2. Keep all threaded connections tight.
3. Use mineral oil like diesel, a clean cloth and clean compressed air to keep the Hydraulic Hand Pump clean.
4. Replace or repair any leaking or failed components.

Basic Rules

Following these basic rules will help increase the life of the Hydraulic Hand Pump.

1. **NEVER** carry the Hydraulic Hand Pump by the Pump Handle (#1.5) unless it is secured by the latch or a chain.
   - Carrying the Hydraulic Hand Pump by the Handle (#1.5) without it being secured will result in the Pump Piston (#1.1) and the Linkage Assembly bending. The degree of bend will affect the force required to stroke the Handle (#1.5). If bent badly enough the Hydraulic Hand Pump will not operate as expected, or not at all, and will require replacing the Pump Piston (#1.1) , Hydraulic Piston Cylinder #5 and Linkage Assembly.

2. **NEVER** carry the Hydraulic Hand Pump by the Hydraulic Hose Assembly.
   - Carrying the Hydraulic Hand Pump by the hose causes unnecessary stress to the hose and fittings.

3. **NEVER** pull sideways or twist the Handle (#1.5) on the Hydraulic Hand Pump.
   - This will damage the Pump Piston (#1.1) and the Linkage Assembly holding the Fulcrum Assembly to the Hydraulic Hand Pump.

4. **PERIODICALLY** do inspection to:
   - Keep clean the Hydraulic Hand Pump and particularly its piston rod (#1.1). Dirt, sand or other debris can easily attach to piston rod surface can cause premature wear of pump wiper seals and then the rod seals. Once the rod seals suffers leakage, pump performance is reduced and wear occurs at the piston rod.
   - Check oil level when cylinder is fully retracted or extended. Ensure a minimum of one-third (1/3) of oil level from tank height.

5. **DO NOT** continue to manually pump when the oil level is less than one-third (1/3) of the oil level.
   - Pump damage from premature wear-and-tear from poor lubrication
   - Introducing air bubbles into the system which can cause cylinder movement to move erratically and pump damage by cavitation.

6. **PROTECT** the the pressure gauge (#5).
   - NEVER use a high pressure hand pump without a properly working pressure gauge. This pump equipment can produce extreme pressures very quickly.

7. **NEVER** adjust the pressure relief valve while lifting or lower load. Adjust the pressure setting during a safe and controlled load test or based on known set values.

8. **ALWAYS** check the quick release coupling is clean before attaching to a fitting.
   - Dirt, sand or other debris can easily contaminate the system and may cause pump, cylinder, and quick release coupling damage.

9. **CAUTION: NEVER** detach the quick release coupling when its under pressure.
   - This can result in damage to the fitting or quick release coupling - which could cause serious property and personal injury.

10. **CAUTION: NEVER** bang on the quick release coupling with a hammer or other object to attach or remove the coupler from a fitting.

11. **NEVER** clean the hand pump, cylinder fittings and quick release coupling with corrosive solvents or detergents.
    - Seal damage within cylinder, tank and valve
    - Piston hard chrome corrosion
    - Cleaning detergent residue will cross-contaminate the hydraulic oil causing irreversible oil additive damage.

Pump Maintenance

In most cases where the Hydraulic Hand Pump is not working properly it is because of a problem with the hydraulic fluid level.

Recommended to use Shell Tellus SM68/ 68 hydraulic fluid or equivalent grade, but DO NOT MIX different types of hydraulic fluid together in the system and do not reuse any hydraulic fluid. Always use new and clean hydraulic oil. Ensure that the oil funnel or hose used to refill is thoroughly clean from dust and dirt.

Periodically inspect the hand pump for leaks. Rectify the external leaks by replacing fitting with good quality Nitrile seals or O-rings.

Periodically clean the hand pump's piston rod (#1.1) with a clean cloth from dust, sand or debris to prolong the life of its wiper seal. The wiper seals serves to clean the piston rod from solid contamination from damaging the piston rod's hard chrome coating & internal high pressure piston seal.

ALWAYS wear Personal Protective Equipment when working with hydraulic fluids.

NOTICE: PARKER 172 Bar hand pump is a non-serviceable compact hand pump unit. The manufacturer's does not recommend the end-user to repair the unit's internal components ie., valves and piston rod for warranty and safety reasons. Please consult with Synergie Fluidtechnik for a complete replacement or possible service solution.

Cylinder Maintenance

Cleanliness

Hydraulic cylinder damage is caused by internal and/or external seal leakages that occurs when the oil being pump and pressurized is contaminated is solid contaminants. Dirty oil, poor cleanliness of the hand pump and the quick coupling fittings are the major factors of ingress of dirt into the cylinder.

Inspection & Test Procedure

1. Periodically clean the cylinder's exposed rod with a clean cloth, and inspect for excessive scratches. Excessive scratches on the cylinder's rod is always accompanied with rod seal oil leakage. Recommended to replace the rod seal within the cylinder's gland.

2. Perform pressure leak test on the cylinder.
   - Assemble a G /8" high pressure (315 bar) hydraulic ball valve with G 3/8" Adapter on each cylinder port
   - Assemble the existing 3/8" quick release coupling to each ball valve's adapter fitting
   - Switch the hand pump directional control valve. Manual pump to either fully extend or retract the cylinder to 170 bar. Close the ball valve on the pressurized side of the cylinder but ensure the other ball valve remains fully open.
   - Hold the pressure for 2 minutes.
   - Check for pressure drop on the pressurized side of the cylinder from hand pump pressure gage. If there is pressure loss within 2 minutes, then the piston seal is worn and is recommended to be replaced.

Overhaul and Repair

1. **Disassemble both quick release coupling and fittings.**
2. Dismantle all the socket cap screws at cylinder gland – rod end.
3. Slide and pull out the cylinder gland and piston rod from the barrel
4. Slide and pull out the cylinder gland.
5. Dismantle the barrel end clevis socket cap screws and remove the clevis.

6. Remove the gland back-up ring , o-ring, wiper, rod seal, and wear ring seal using a seal pick tool. **CAUTION:** Be careful not the scratch any of the piston seal surface using a pick tool as it will damage the surface for effective sealing.
7. Disassemble the piston from the cylinder rod. Remove the cylinder rod-end o-ring and piston seals.
8. Remove the back-up ring and o-ring at barrel end clevis block.
9. Replace all the worn and damaged seals with the recommended OEM seals. Ensure that the seals are assembled in the correct arrangement. Failure to do so will adversely affect the performance or caused leakage of the cylinder **NOTE**: Please contact Synergie Fluidtechnik for original spares or request for our qualified technician to service the cylinder.
10. Assemble back the barrel end clevis block and tighten the socket cap screws equally.
11. Apply ample amount of grease around the piston seals and carefully slide in the rod and piston assembly. Slide in until its fully retracted. Take extra care to ensure that piston U-seals are not damaged during this assembly.
12. Assemble the cylinder gland and tighten the socket screws equally.
13. Perform pressure test as recommended by the “Inspection & Test Procedure” to verify that the cylinder is safe and fit-for-use.

IMPORTANT: It is recommended that all hydraulic fluid system instructions be performed in a clean workshop environment to reduce the risk of contamination and spills.

Parts Guide

Parts can be identified by referring to the illustration number. You can then cross reference the illustration number with the part number using the Parts List provided above. Ordering parts by the part number is the best way to ensure you will receive the required part. Please contact the Synergie FluidTechnik Sdn Bhd for original spares.

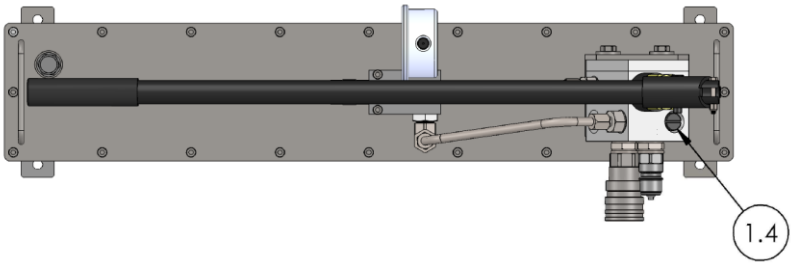
Spare Parts

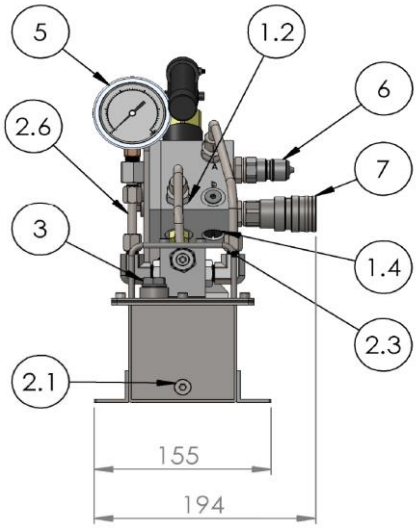
#	Description	Make	Qty
1	Hand pump 172 bar	PARKER	1
1.1	Piston pump	PARKER	1
1.2	Check valve	PARKER	1
1.3	Directional control Valve, knob operated	PARKER	1
1.4	Pilot operated check valve	PARKER	2
1.5	Pump Handle	SYNERGIE FLUIDTECHNIK	1
2, 2.4, 2.5, 2.6	Oil Tank (5 Liters) w/ tubings and fittings	SYNERGIE FLUIDTECHNIK	1 Lot
2.1	1/4" Drain plug	SYNERGIE FLUIDTECHNIK	1
2.2	Tank mounting feet	SYNERGIE FLUIDTECHNIK	4
3	Breather cap w/ dip stick	SYNERGIE FLUIDTECHNIK	1
4	Adjustable pressure relief valve c/w housing - factory set to max. 170 bar	LUEN	1
5	2.5” Pressure Gage, 0-180 Bar	WIKA	1
6	High pressure quick release coupler, 3/8” Plug	OEM	2
7	High pressure quick release coupler, 3/8” Socket	OEM	2
8	Hydraulic hose, 3000 PSI w/ quick release coupler 3/8” Sockets	EATON	1 set
9	Hydraulic hose, 3000 PSI w/ quick release coupler 3/8” Plugs	EATON	1 set
10	Lift cylinder 40x22x556mm	SYNERGIE FLUIDTECHNIK	1

Troubleshooting

To understand the troubleshooting guide, please familiarize the Part Identification Illustrations below. The troubleshooting guide shows the possible cause and the affected part(s) plus the solution to the specific malfunction.

Part Identification Number (#)





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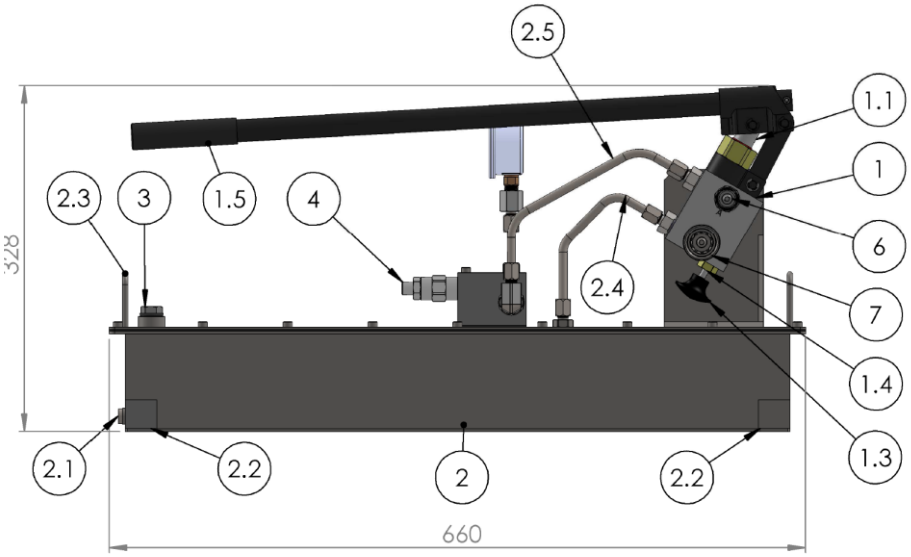

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Troubleshooting Guide

No.	Malfunction	Possible cause	Affected part(s)	Troubleshoot/ Solution
1	No pressure build-up OR Pressure cannot increase	Hand pump piston seal excessive external leak because seal worn or piston rod chrome coating damage	Piston seal or piston rod (#1.1)	- Replace seals or hard chrome piston rod. Consult with Synergie Fluidtechnik for further advice.
		Leakage at hand pump's check valve during pressure stroke	Check valve (#1.2)	- Replace faulty check valve. Consult with Synergie Fluidtechnik for further advice.
		Pressure loss from high internal leakage of hand pump's directional control valve.	Directional control valve (#1.3)	- Replace faulty valve. Consult with Synergie Fluidtechnik for further advice.
		Clogged breather cap	Breather cap (#3)	- Remove breather and operate to test the hand pump. Do not connect hoses during test. - Check if pressure increase from pressure gauge. If pressure increases
		Pressure relief valve bypass caused by internal leak or valve NBR/ VITON seal damage	Pressure relief valve (#4)	- To test operate pump till maximum rated or set pressure to verify pressure relief valve function. - If faulty replace the valve NBR / Viton seals or the whole valve if seals replacement did not resolve the leakage.

No.	Malfunction	Possible cause	Affected part(s)	Troubleshoot/ Solution
1	No pressure build-up OR Pressure cannot increase	Leakage at hand pump, valve, hose(s) tubing(s) & fittings	Check for leaks at: - pump piston seal (#1.1) - directional control valve knob rod (#1.4) - hand pump valve plugs (#1), - pressure relief tubing & fittings (#2.5), - hose ferrule & QRC (#6, #7, #8, #9) - pressure gage tubing & fittings (#2.6)	Visual check for leaks and replace afftected fitting or seal(s)
		Cylinder piston seals, rod seals or both.	Cylinder (#10)	- Perform cylinder pressure test as in page 12 to verify internal or external leakage. - Replace damaged seals and perform pressure test again as acceptance test.
2	Cylinder cannot move	Quick coupler valve blocked with dirt OR valve jammed.	Quick coupler(s) & hose(s) (#6,#7,#8, #9)	-Push the valve and clean internally with clean mineral-based oil and blow clean with compressed air. - OR replace new hose or quick coupler if valve mechanism is jammed.

No.	Malfunction	Possible cause	Affected part(s)	Troubleshoot/ Solution
2	Cylinder cannot move	Faulty pressure relief valve	Pressure relief valve (#4)	- To test operate pump till maximum rated or set pressure to verify pressure relief valve function. - If faulty replace the valve NBR / Viton seals or the whole valve if seals replacement did not resolve the leakage.
		- Check valve at suction cannot open - Check valve internal leakage	Check valve (#1.2)	Replace faulty check valve. Consult with Synergie Fluidtechnik.
		- Either one or both hand pump's pilot-to-open check valve did not open.	Pilot Operated Check Valve (#1.4)	- Dismantle, clean with clean mineral-based oil and blow with compressed air. Assemble and test. Consult with Synergie Fluidtechnik
		Piston seal internal leakage	Cylinder piston seal (#10)	- Perform cylinder "Inspection & Test Procedure" as in page 12 to verify internal or external leakage. - Replace damaged seals and perform pressure test again as acceptance test.
3	Cylinder movement not smooth	Air bubbles within cylinder	Suction fitting at hand pump valve leaking (#2.4)	- Tighten suction line fitting. - Extend and retract cylinder without being assembled to the load and at low pressure for at least 5 times to dispel air bubbles - or extend and retract the unit until cylinder movement is smooth without stick-and-slip motion.

No.	Malfunction	Possible cause	Affected part(s)	Troubleshoot/ Solution
3	Cylinder movement not smooth	Leakage at hand pump, valve, hose(s) tubing(s) & fittings	Check for leaks at: - pump piston seal (#1.1) - directional control valve knob rod (#1.4) - hand pump valve plugs (#1), - pressure relief tubing & fittings (#2.5), - hose ferrule & QRC (#6, #7, #8, #9) - pressure gage tubing & fittings (#2.6)	If there are leakages, check for seal damage and replace seals where required. OR tighten lose plugs and fittings.
4	Cylinder lowers (retracts) down without any control	Faulty pressure relief valve	Pressure relief valve (#4)	- To test operate pump till maximum rated or set pressure to verify pressure relief valve function. - If faulty replace the valve NBR / Viton seals or the whole valve if seals replacement did not resolve the leakage.
		Piston seal internal leakage	Cylinder piston seal (#10)	- Perform cylinder pressure test as in page 12 to verify internal or external leakage. - Replace damaged seals and perform pressure test again as acceptance test.

No.	Malfunction	Possible cause	Affected part(s)	Troubleshoot/ Solution
4	Cylinder lowers (retracts) down without any control	- Hand pump's Pilot operated check valve cannot close - Hand pump's Pilot operated check valve internal leakage	Pilot Operated Check Valve (#1.4)	- Dismantle, clean with clean mineral-based oil and blow with compressed air. Assemble and test. - After servicing the valve, there is still the issue of cylinder movement there is a possibility of valve internal leakage. Replace faulty valve. Consult with Synergie Fluidtechnik

Warranty

Hydraulic Hand Pump, Cylinder & Hose Warranty

Synergie Fluidtechnik Sdn. Bhd. warrants its products only against defects in materials and workmanship.

Synergie Fluidtechnik Sdn. Bhd. 's liability and customer's exclusive remedy under this warranty extends for a period of one (1) year from the date of Synergie Fluidtechnik Sdn. Bhd.'s shipment and is expressly limited to repayment of purchase price, repair or replacement, at Synergie Fluidtechnik Sdn. Bhd. 's option, during said period, upon proof satisfactory to Synergie Fluidtechnik Sdn. Bhd., and upon customers returning and prepaying all charges on such products to factory or warehouse designated by Synergie Fluidtechnik Sdn. Bhd.. Warranty excludes normal wear items such as rubber, polymeric seals and filters. Also excluded is equipment subject to corrosion, contamination, negligence, accident, or units, which have been altered in any way.

This warranty is made expressly in lieu of all other warranties, express, implied or statutory, with respect to quality, merchantability, or fitness for a particular purpose.

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