E3 Rescue Tools
Daily Care & Preventative Maintenance

How to keep your LUKAS Tools in perfect condition

October 2023

Contents

Introduction

This booklet is written as a guideline on daily care and preventive maintenance for LUKAS E3 Rescue Tools. The intention of all inspections is:

- to eliminate minor problems by a visual check after each use,
- to detect eventual faults in a preventive manner before they can cause a failure of the whole tool in a rescue situation,
- To save money on spare parts, because faults identified at an early stage can be fixed easier and cheaper than those identified later, where the damage is normally more serious.

This booklet is not meant as a workshop or repair manual, because repairs to the hydraulic parts require experience and special workshop equipment. However, regular visual inspections can be carried out easily by each user. A regular check of the torque on the centre bolt for cutters and combi-tools will also prevent problems occurring.

Maintenance after use under water

- Remove the battery after use. Rinse the device and battery several times in fresh, clean water. Immerse the device completely in order to fill the housing with clean water. Lift the device out and let it drain completely. Depending on the type of water (mud, sludge, algae, etc.) in which the device was used, repeat these steps another 2-5 times.
- Wipe the device and the battery with a clean, dust-free and damp cloth in order to remove dirt and deposits.
- Leave the device and battery dry at room temperature in a well-ventilated location. 36-48 hours is recommended. During this drying time, the device is completely operational.
- Lubricate all exposed steel parts (blades etc.) with anti-corrosion agent, such as engine oil.
- Perform function test.

Maintenance for Spreaders

Introduction

The spreader operates according to a similar principle to all other Lukas tools. They, too, have been designed in such a way that a hydraulically operated piston activates mechanical joints symmetrically to open or close a set of two opposite spreader arms. This movement can then be used to spread open, squeeze or pull open objects, all whilst fully submersed.

Models	
SP555 E3 • 19.9 Kg operating weight • 730mm spreading distance • Max spreading force 658 kN • Max squeezing force 115 kN • Protection Class: IP58	
SP333 E3 • 17.1 kg operating weight • 600 mm spreading distance • Max Spreading force 836 kN • Max Squeezing Force 144 kN • Protection Class: IP58	

Visual & User check after each use

A visual & user check should be carried out after each use of the spreader. The spreader arms and body should be checked for the following:

Spreader arms and tips

- visible external damage
- condition of bearing bolts and securing rings
- serration of spreader tips clean and sharp
- fixing mechanism of spreader tips in sound condition

Spreader Body

- oil leakage on cylinder body or control valve
- protection cover for lever arms in good condition
- plastic body in good condition and no oil leaks
- control valve returns to centre position smoothly when released (dead man function)
- the area behind the protection cover should be checked and cleared of any debris, liquids and solutions

Stowage

- the tool should be stowed with the spreader tips slightly open (not under pressure)

Function and Load Test

It is recommended that a full function and load test is carried out every 3 years. This test should be carried out by LUKAS trained persons only. For a full service of Lukas rescue equipment contact PT Hydraulics.

Maintenance for Cutters

Introduction

The cutters and combi tools have been designed in such a way that a hydraulically operated piston activates mechanical joints symmetrically to open or close a set of two opposite blade arms, thus enabling objects to be cut. The E3 range of tools enables this to be done whilst fully submerged. The daily care and maintenance of cutters is the same irrespective of the model. A selection of the current range of cutters available is pictured below:

Model	
S789 E3 • Max Cutting Force: 1101 kN • Round Steel up to 42mm • Blade opening 205mm • 22.4 kg operating weight • Protection Class: IP58	
S378 E3 • Max Cutting Force: 760 kN • Round Steel up to 33mm • Blade opening 202mm • 18.4 kg operating weight • Protection Class: IP58	

Visual & User check after each use

A visual & user check should be carried out after each use of the cutter. The cutter blades, and body should be checked for the following:

Cutter blades

- condition of bearing bolts and securing rings
- tightening torque of the nut on the central bolt (see table 1 for torque settings)
- visible external damage
- condition of shim plates between cylinder body and cutter blades
- cutting edge clean and flat with no raised points

Note:
Seriously deformed blades must be changed. It is recommended that both blades are changed. Prior to mounting new blades treat sliding surfaces and all bolts with special mounting grease.

Cutter Body

- oil leakage on cylinder body or control valve
- protection cover for lever arms in good condition
- plastic body in good condition and no oil leaks
- control valve returns to centre position smoothly when released (dead man function)
- the area behind the protection cover should be checked and cleared of any debris, liquids and solutions

Tensioning the Centre Bolt

The centre bolt should be tensioned on a regular basis to ensure the correct operation of the cutter. The actual frequency of checking the tension is dependent on use. For normal road crash rescue operations and training the torque setting should be checked every 3 months. Where the tool has been subject to heavy operational use they should be checked on completion of the work

Method for Checking Centre Bolt Tension

- Visually inspect nut and bolt for damage
- Loosen nut by 1/4 of turn
- Adjust torque wrench to correct setting and tighten nut
- Torque settings for all tools are listed in the Table 1 (Page 8)

Stowage

- The tool should be stowed with the cutter tips slightly overlapping

Function and Load Test

It is recommended that a full function and load test is carried out every 3 years. This test should be carried out by LUKAS trained persons only. For a full service of Lukas rescue equipment contact PT Hydraulics.

Maintenance for Combination Tools

Introduction

The daily care and maintenance of Combi-tools is the same irrespective of the model. A selection of the current range of Combi-tools available is pictured below:

Model	
SC758 E3 • Cutting Force up to 885 kN • Round steel up to 40 mm • Spreading force 1500 kN • Spreading distance 475 mm • Weight 24 kg • Protection Class: IP58	
SC358 E3 • Cutting force up to 492 kN • Round steel up to 35mm • Spreading force 1500 kN • Spreading distance 368 mm • Weight 18.4 Kg • Protection Class: IP58	

The combination tool is a combination of a spreader and a cutter. Carry out the visual and user checks as described above for the spreader and cutter. The torque settings for the combination tool centre bolt can be found in Table 1 (pg.8).

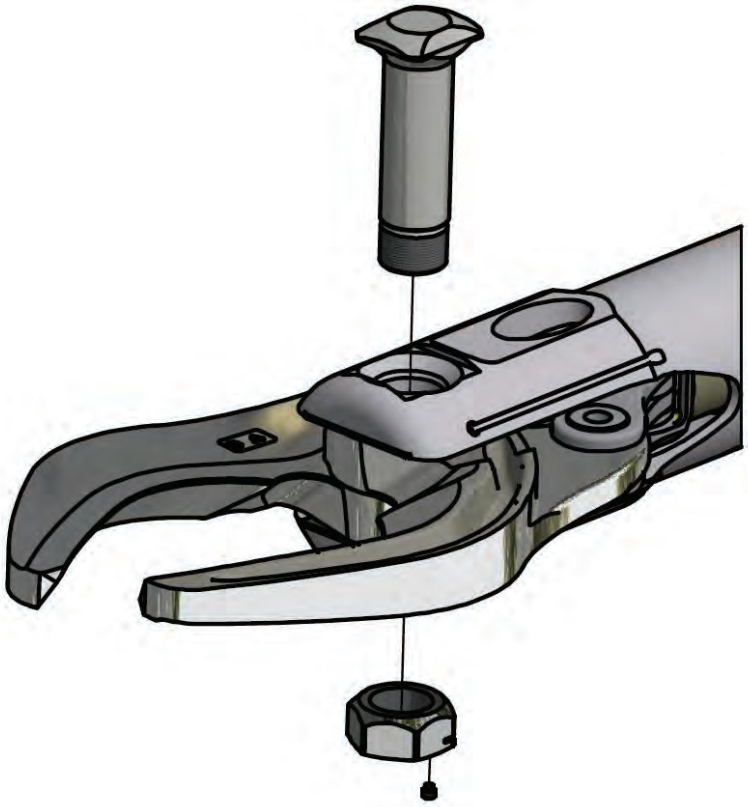
Stowage

- The tool should be stowed with the tips slightly open (not under pressure)

Table 1: Tightening torques for centre bolts on E3 cutters and combination tools

Model No.	Torque Setting
S378 E3	MA = 130 +10 Nm
S789 E3	MA = 150 +10 Nm
S799 E3	MA = 230 +10 Nm
SC258 E3	MA = 130 +10 Nm
SC358 E3	MA = 130 +10 Nm
SC758 E3	MA = 160 +10 Nm

* Where grub screw on centre bolt nut is present, torque setting for grub screw is MA = 6 Nm



Maintenance for Rescue Rams

Introduction

The rescue rams are double-acting hydraulic cylinders. Extension and retraction takes place hydraulically.

The daily care and maintenance of Rams is the same irrespective of the model.

Model	
CR522 E3 • Extended length: 1533 mm (1800mm with extension) • Retracted length: 657 mm • Total Stroke 876 mm • Weight 20.4 kg • Protection Class: IP58	
R521 E3 • Extended length: 1359 mm • Retracted length: 579 mm • Total Stroke 780 mm • Weight 19 kg • Protection Class: IP58	
R320 E3 • Extended length: 640 mm • Retracted length: 340 mm • Total Stroke 300 mm • Weight 14.8 kg • Protection Class: IP58	

Visual & User check after each use

A visual & user check should be carried out after each use of the ram. The ram claws, body and cylinder piston should be checked for the following:

Claws on cylinder bottom and piston

- Visible external damage
- Gripping edges clean and sharp
- Piston clean with no score mark or dents

Rescue Ram body

- oil leakage on cylinder body or control valve
- plastic body in good condition and no oil leaks
- control valve returns to centre position smoothly when released (dead man function)

Function and Load Test

It is recommended that a full function and load test is carried out every 3 years. This test should be carried out by LUKAS trained persons only. For a full service of Lukas rescue equipment contact PT Hydraulics.

E3 Battery & Power Supply Maintenance

Caring for your Lithium-ion Battery

The E3 Rescue Tools are powered by Lithium-ion batteries, it is important to know how best to care for them so you have the power when you need it most.

Lithium-ion is superior to nickel and lead-based batteries and the applications for lithium-ion batteries are growing as a result. A typical Lithium-ion battery provides 500 discharge/charge cycles. The battery prefers a partial rather than a full discharge. Frequent full discharges should be avoided when possible. Instead, charge the battery more often. There is no concern of battery memory when applying unscheduled charges.

Although lithium-ion is memory-free, batteries with fuel gauges exhibit what engineers refer to as "digital memory". Here is the reason: Short discharges with subsequent recharges do not provide the periodic calibration needed to synchronize the fuel gauge with the battery's state-of-charge. A deliberate full discharge and recharge every 30 charges corrects this problem. Letting the battery run down to the cut-off point in the equipment will do this. If ignored, the fuel gauge will become increasingly less accurate.

Once the batteries have been charged they remain ready for use for a period of many months. Lithium ion batteries have a very low self-discharge rate.

Each 9Ah battery will give an approximate working time of 120 minutes under normal rescue conditions. Time to recharge 0% to 100% is 150 minutes.

Caring for your Power supply

The power supply permits unlimited operation for the E3 tools and can be run from 230V supply.

When in use care should be taken not to damage the power lead and a visual inspection of all parts should be carried out after each use.

Accessories

Batteries

Only LUKAS lithium-ion rechargeable batteries are provided for operating E3 tools. The E3 batteries have an IP 68 rating and can be fully submerged underwater, the blue Saltwater Battery can be submerged in saltwater.

High Capacity 9Ah E3 Battery

- Weight: 1.6 kg
- DC Votage: 25.2V
- Amp Hour Rating: 9 Ah
- Potential Energy (Watt Hour Rating): 227 Wh
- Chemical Composition: Lithium Ion Manganese Oxide
- Protection Class: IP68

High Capacity 9Ah E3 Saltwater Battery

- Weight: 1.6 kg
- DC Votage: 25.2V
- Amp Hour Rating: 9 Ah
- Potential Energy (Watt Hour Rating): 227 Wh
- Chemical Composition: Lithium Ion Manganese Oxide
- Protection Class: IP68

Battery Charger

Only the E3 Charger may be used for the E3 lithium-ion batteries

Power Supply

The E3 tools have a unique power supply with integrated electronics, allowing the devices to be operated for an almost unlimited time by connecting them to an external power source. The power supply converts the voltage of the external power source in such a way that it may be used instead of a battery.

Troubleshooting

Trouble	Control	Cause	Solution
Blades, spreader arms or cylinder pistons move slowly or jerkily when operated	Battery fully charged?	Battery flat	Charge battery
		Battery defective	Replace battery
		Air in the hydraulic system	Repair of fault by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
	Power supply cable connected?	Power supply not properly connected to the eDRAULIC device (not automatically locked).	Reinsert power supply into the connection slot.
		Power supply cable not properly connected to the external power supply.	Reconnect external power supply.
		Power supply or power supply cable defective.	Replace power supply or power supply cable.
		External power source defective.	Use other external power source
Blades, spreader arms or cylinder pistons do not move when operated.	Battery fully charged?	Battery flat	Charge battery
		Battery defective	Replace battery
	Power supply cable connected?	Power supply cable defective	Replace power supply cable
		Device defective	Repair of fault by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
Device doesn't perform at its given power		Device defective	Repair of fault by authorised dealer, staff specially trained by LUKAS or directly by LUKAS

Trouble	Control	Cause	Solution
Following release, the star grip doesn't return to the central position	Casing damaged or star grip operation does not work smoothly?	Damage to the torsion spring for reset	Repair of fault by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
		Soiled valve or star grip	
		Defective valve	
		Other mechanical damage (e. g. star grip)	
Hydraulic fluid leaks on the piston rod		Defective rod seal	Repair of fault by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
		Damage to the piston	
The useful operating time between the individual charging cycles is less than 5 minutes, despite charging the batteries according to the instructions.		Battery defective	Replace battery