

Operating Instructions
Rescue Tools

LUKAS

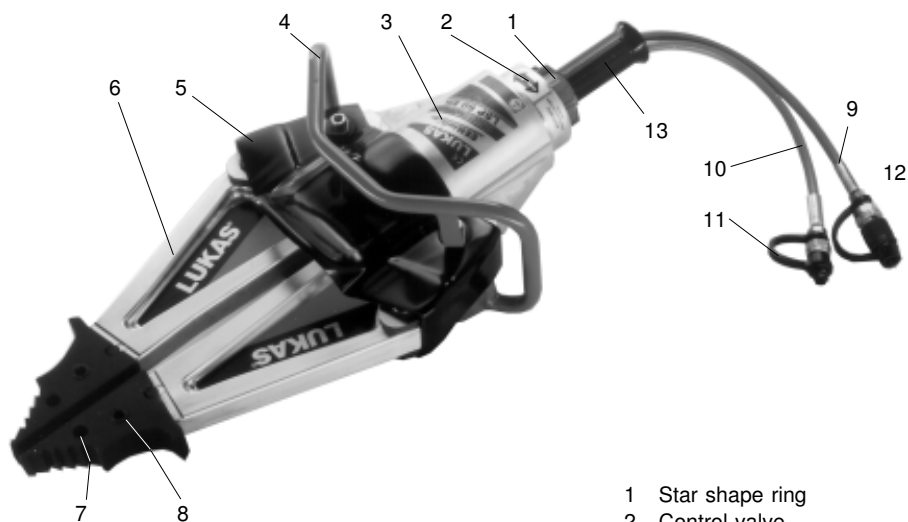


Spreader Series LSP

84150/0570-85 GB

Issue 04.2006

replaces 10.2005



- 1 Star shape ring
- 2 Control valve
- 3 Hydraulic cylinder
- 4 Handle
- 5 Protection boot
- 6 Spreader arm
- 7 Tip with bore for chain set
- 8 Tightening sleeve
- 9 Pressure hose
- 10 Return hose
- 11 Quick-connect plug
- 12 Quick-connect socket
- 13 Handle

1 Basic operation and designated use of the machine

1.1 The machine has been built in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine and to other material property.

1.2 The machine must only be used in technically perfect condition in accordance with its designated use and the instructions set out in the operation manual, and only by safety-conscious persons who are fully aware of the risks involved in operating the machine. Any functional disorders, especially those affecting the safety of the machine/plant, should therefore be rectified immediately!

1.3 The machine is exclusively designed for the use described in the operating manual. Using the machine for purposes other than those mentioned in the manual, such as driving and controlling other pneumatic systems, is considered contrary to its designated use. The manufacturer/supplier cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.

Operating the machine within the limits of its designated use also involves observing the instructions set out in the operating manual and complying with the inspection and maintenance directives.

2 Organizational measures

2.1 The operating manual must always be at hand at the place of use of the machine!

2.2 In addition to the operating instructions, observe and instruct the user in all other generally applicable legal and other mandatory regulations relevant to accident prevention and environmental protection.

This also applies for wearing protective clothing, helmet with visor or goggles and protective gloves.

2.3 In order to avoid injuries, the machine must only be operated by a specially trained operator who has undergone a safety training.

2.4 Observe all safety instructions and warnings attached to the machine. Make sure that safety instructions and warnings attached to the machine are always complete and perfectly legible.

2.5 Never make any modifications, additions or conversions which might affect safety without the supplier's approval. This also applies to the installation and adjustment of safety devices and valves.

2.6 Spare parts must comply with the technical requirements specified by the manufacturer. Spare parts from original equipment manufacturers can be relied to do so. It is only allowed to use original LUKAS spare parts of LUKAS system components.

2.8 Adhere to prescribed intervals or those specified in the operating manual for routine checks and inspections.

2.9 Make sure to dispose properly of packing material and dismantled parts!

3 General safety instructions

3.1 In the event of malfunctions, stop the machine immediately and lock it. Have any defects rectified immediately.

3.2 Before starting up or setting the machine in motion and during operation of the machine make sure that nobody is at risk.

3.3 Before transporting the machine always check that the accessories have been safely stowed away.

3.4 Make sure that there is enough lighting during work.

3.5 Avoid any operation that might be a risk to machine stability.

3.6 Check the machine at least after every operation for obvious damage and defects. Report any changes (incl. changes in the machine's working behaviour) to the competent organization /person immediately. If necessary, stop the machine immediately and lock it. All lines, hoses and screwed connections have to be checked for leaks and obvious damage. Repair damage immediately. Splashed oil may cause injury and fire.

3.7 All safety equipment has to be checked for completeness and flawless condition:

- instruction markings and warning signs (safety instructions)
- check safety cover (e.g. motor-safety covers, heat protection etc.) if they are available and if they are in good condition.

3.8 Working under loads is not allowed if they are only lifted by hydraulic cylinders. If the work is indispensable sufficient mechanical supports are needed additionally.

4 Instructions for maintenance and service

4.1 For the execution of maintenance and service work, tools and workshop equipment adapted to the task on hand are absolutely indispensable. Work on the hydraulic system must be carried out only by personnel having special knowledge and experience with hydraulic equipment.

4.2 Before putting into operation clean the machine, especially connections and threaded unions, of any traces of oil, fuel or preservatives before carrying out maintenance/repair. Never use aggressive detergents. Use lint-free cleaning rags and pay attention that the components are meticulously clean during reassembling after repair.

4.3 During dismantling of machines it is necessary to collect the outrunning hydraulic liquids completely, so that they cannot reach the ground. They have to be disposed properly according to the instructions.

4.4 Always tighten any screwed and thread connections that have been loosened during maintenance and repair. Observe the stipulated torques.

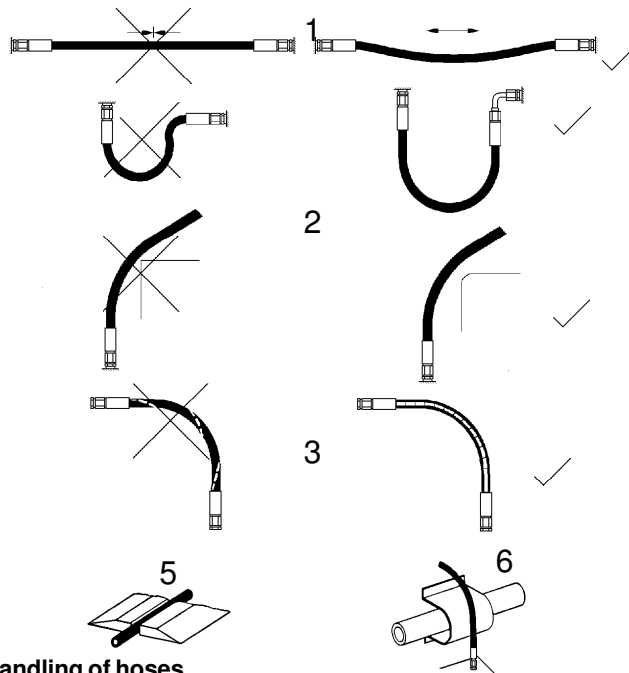
4.7 Aggressive material (acid, lye, solvent, vapour) can damage the machine. It is necessary to clean the whole machine if it must be exceptionally operated under such conditions or gets into touch with these materials. Additionally, the machine must be checked as described under 3.6.

5 Safety Instructions for Hydraulic Hoses

ATTENTION!

- **by no means the hose must be exposed to brake fluid** as this fluid will destroy outer layer of hose
- do not expose the hose to any of the following aggressive fluids:
 - acid, lye or solvent
 - alcohol and fuel
 - battery and automatic transmission fluid
 - phosphate ester

Clean hose immediately with water and detergent when it was exposed to such fluids.



5.1 Handling of hoses

- never exceed the permissible working pressure as stated on hose and/or literature
- avoid any tension (see figure 1) and do not hang any load onto the hose
- never exceed the minimum bend radius as resulting kink will cause failure of hose (see figure 2)
- do not allow hose to contact sharp edges or rough objects (see figure 3)
- avoid any twisting of hose (see figure 4)
- do not run over hose with any vehicle or equipment ! Hoses which are put on the surface of sidewalk or street have to be suitably protected (see figure 5)
- do not allow hose to contact areas of high temperature such as mufflers, exhaust manifold, heaters or burners. Protect the hose as shown in figure 6 or install it in sufficient distance from the source of heat.
- it is not allowed to attach weights to the hoses
- make sure that no objects fall on the hoses.

5.2 Protection of the working area in case of breakdown of hoses

Hoses have to be installed or protected in such a way that dangers are prevented, if possible, in case of breakdown of the hoses.

Danger can be caused by:

- Uncontrolled hose movement after a hose rupture caused e.g. by external influence.
- Emerging of the pressure medium under pressure.
- Inflammation of pressure medium near igniting sources

Dangers can be prevented by e.g. protective coverings or shieldings

5.2.1 Do not go near leaks!

- High pressure oil easily punctures skin causing **serious injury**, gangrene or death!
- If injured, **seek emergency medical help!** Immediate surgery is required to remove oil!
- Do not use finger or skin to check for leaks!
- Lower load or relieve hydraulic pressure before loosening fittings!



5.3 Storage of hoses

- Hoses are subject to a natural aging even if they are stored correctly. Therefore, their storage and service time is limited.

When storing the hoses please observe the following:

- Store them cool, dry and dustless (eventually wrapped with plastics sheeting); prevent direct solar radiation and UV rays; shield heat sources which are near the hoses.
- Do not use any ozone producing lamps (e.g. fluorescent light sources, mercury-vapor lamp) or electrical devices next to the hoses.
- Hoses have to be stored freely of tension and in a horizontal position. If they are stored in rings the smallest bending radius determined by the manufacturer must not fall below.

5.4 Marking of hoses

- The hose is marked with the manufacturer's name and quarter/year of production.
- The max. allowable pressure and month/year of production is indicated on the hose end fitting.

5.5 Inspection and replacement intervals of hoses

- **After each operation the hoses have to be checked for external damages, cracks, kinks and bubbles!**
- The operator has to replace the hoses in appropriate period of times, even if there are no visible security defects on the hoses.
- **The hoses have to be replaced 10 years as from date of manufacture at the latest (see marking on the hose)!**
Hoses are subject to a natural aging even if they are stored correctly. Therefore, their storage and service time is limited.
- **Hoses have to be checked by a skilled person before the first putting into operation of the technical device and afterwards at least once a year for their safe working condition.**

A skilled person is somebody having sufficient knowledge concerning hydraulic hoses due to his special training and knowledge. He/she must be acquainted with the local safety working conditions, accident prevention regulations, technical regulations and approved standards (e.g. DIN-Standards), so that he/she is capable to estimate the safety working conditions of the hydraulic hoses.

5.6 Examples for possible defects of hoses

- Damages of the surface and the interior (e.g. chafe marks, cuts or fissures).
- Embrittlement of the surface (fissuration of the hose material).
- Deformations, which are not in accordance with the natural shape of the hoses, in pressureless condition or under pressure or in case of bendings, e.g. separation of material layers, blister formation, squeezing or break spots.
- Leakage points.
- Instructions for installation were not observed.
- Emerging of the hose from the end fittings.
- Damages or deformations of the end fittings which deteriorate the function and stability of the end fittings or the connection between hose and end fitting.
- Corrosion of the end fittings or the metal inlets, which deteriorates the function and stability.
- Storage and operation periods were exceeded.

6 Intended use

6.1 General

This spreader has been specially designed for rescue purposes. Its main purpose is to free injured people after traffic accidents by spreading open the car doors or pulling up the steering pillar using a chain set.

In general, objects can be pulled, spreaded or moved. In any case the objects to be manipulated must be secured with massive prop-ups and supports.

The spreader is suitable for submerged operation in **water up to a depth of 40 m**.

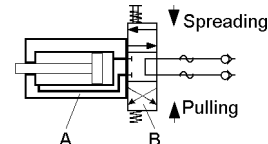
7 Function and performance

7.1 Description

The devices are designed in such a way that a hydraulically actuated piston via mechanical joints symmetrically closes two identical spreader arms positioned opposite each other. Opening of the arms is also effected by hydraulic-mechanical means.

7.2 Hydraulic diagram

For your better understanding the hydraulic diagram is showing in simplified manner the spreader's hydraulic cylinder (A) with control valve (B).



7.3 Control of movements in operation

The arm movement is controlled by the firmly mounted star grip control valve (see cover page item 1).

7.4 Hydraulic oil supply

LUKAS motor/engine pump or hand pump is used for operating the devices.

If the power pack comes from a manufacturer other than LUKAS, it must be ensured that it fulfils the LUKAS specifications, as otherwise dangers may occur for which LUKAS cannot be held liable. Especially it has to be made sure that the permissible working pressure of 63 MPa (630 bar) is not exceeded.

7.5 Hoses

The connection between motor pump and spreader unit is normally effected with hoses. If pipes are to be used, please contact LUKAS.

8 Connection of the tool

8.1 Hydraulic

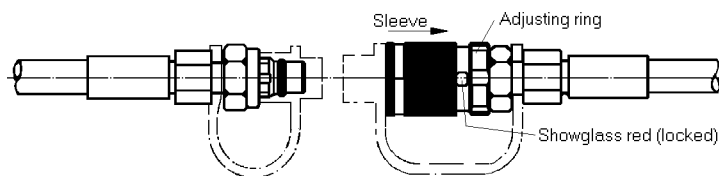
Two short hoses (each 0.5 m long) are fitted to the tool; they are connected with the motor pump via a hose pair (5 m / 10 m / 20 m, as is necessary). All hoses are colour marked and have quick-connect couplings so that they can be connected without the risk of mix-up:

HP = High pressure

R = reflux

8.2 Connection of the plug-in coupling counterparts for HP and R hoses

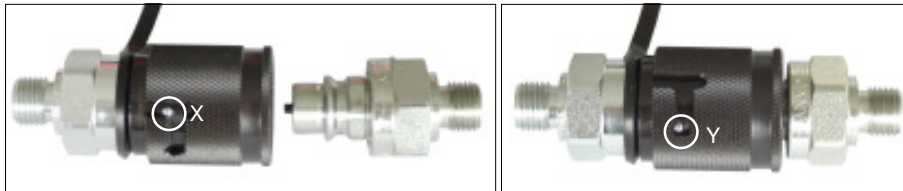
The device is connected to the hydraulic pump with the plug-in coupling counterparts (plug and socket), there being no risk of mix-up.



Before coupling, remove the dust protection covers and unlock the connect socket with adjusting ring by turning it. Withdraw the sleeve and connect plug and socket while holding the sleeve in this position. Release the sleeve and set the showglass to „red“ with the adjusting ring. Now the parts are connected and locked. Decoupling is done in the reverse order.

Note regarding the modified release mechanism as of June 2004

When connecting the hoses, be aware of the following basic functions of the quick couplers:



Before coupling unlock the connect socket by turning the sleeve into position X. Retract sleeve and connect plug and socket. Release sleeve and turn it into position Y.

Now the connection has been made and locked. Uncoupling is done in the reverse order.

Connection of the hoses is possible only, when they are **depressurized**.

In order to prevent contamination of the tool lines protect the couplings with delivered dust caps.

Attention!

Quick couplers partly have special functions. Therefore it is **not allowed screwing them off** from the hoses or **to exchange them**.

9 Operation

9.1 Preparatory measures

9.1.1 Initial start-up

Before initial start-up and after repairs, the device must be vented:

- Connect the device to the hydraulic pump (see item 8).
- Fully open and close the device at least twice without load (see item 9.2).

9.1.2 Inspection of the pump power pack

—> See separate Operating Instructions of the power pack (or manual pump) in question.

Note:

Before working on the motor pump or for coupling/decoupling the hoses, make sure that the motor pump is switched off (electric connection) or disconnected from the mains and that the lines are unpressurized.

9.2 Operating of the star grip 1

Opening of the arms:

Rotate star shape ring 1 to the right hand side and hold it in this position.

Closing of the arms:

Rotate star shape ring 1 to the left hand side and hold it in this position.

Load sustain function:

If released, the star shape ring 1 returns automatically to center position, maintaining fully the load sustain function.

10 Spreading and Pulling

10.1 Safety advise

Before the rescue operation begins, the object to be worked upon must be stabilized. In each country, the country-specific safety regulations must be regarded.

When working in an environment which involves a risk of explosions, do not use motor/engine powered pumps. Instead, use hand pumps.

When operating rescue devices, wear

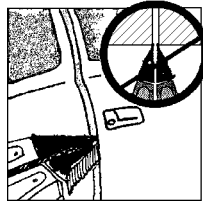
- protective clothing
- helmet with visor or goggles
- protective gloves.

During operation of the spreader, parts of the object worked on may break away and endanger people standing nearby. Onlookers must be kept at a **safety clearance** of at least 5 m.

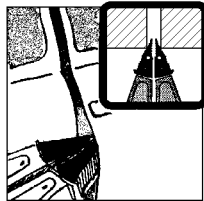
10.2 Spreading

Use the tips only for widening the gap. When approximately half of the grooved area is used, the full spreading power may be applied. Maximum force is exerted in the rear section of the tip. Its special shape protects the spreader arms.

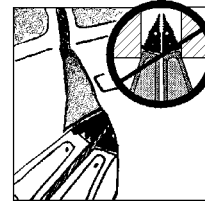
The light metal alloy arms must not be damaged.



Grip area too small. Tips may break away.



Safe grip.



Use tips only, do not damage the arms!

10.2.1 Warnings

Before any operation of the spreader make sure that the movement of the arms does not constitute a risk to persons (involved or uninvolved) or that the arms or cut-off parts jerking away cannot damage property.

Do not reach between the spreader arms!

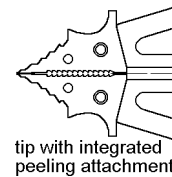
10.3 Pulling

- The chains may only be used for pulling with the rescue device.
- When pulling using a chain, make sure that bolt and hook are properly accommodated, so that the chain does not slip off..
- Use only flawless chain sets.
- Have an expert check the chains at least once a year.

Refer to the separate operating manuals

10.4 Peeling

The integrated peeling attachment at the tips LSP 40 EN, LSP 60 EN, LSP 60 F, LSP 80 EN and LSP 100 may be used to peel open steel sheets up to a gauge of t (see 15.1) If unusually tough material is processed, the tips may jerk away uncontrollably. Watch your safety clearance!



10.5 Squeezing

In general, it is only allowed to squeeze in the area of the tips. For the spreader LSP 40B, LSP 40EN a squeezing device is offered as an accessory (Ref. no. 84150/9150).

The squeezing process is executed between the spreader arms with this device (see instructions 84150/9150-82).

11 Dismantling of the device / Stop after operation

11.1 Spreader unit

After operation, close the spreader arms to a **tip distance of a few mm**. This relaxes the unit hydraulically and mechanically.

11.2 Hydraulic power pack

Stop the hydraulic power pack after operation.

11.3 Hoses

Uncouple the pressure hose first and the blue return hose second as described under 8.2. Put dust caps over the couplings.

12 Maintenance

12.1 Spreader unit

After each operation a visual check has to be accomplished, at least once per annum. Every 3 years or if there are doubts about security or reliability, an additional functional test has to be accomplished. (clean them first if necessary)

Visual inspection

Spreader arms

- Spreader arms and tips without fissures
- bolt and securing rings of the spreader arms are in the right position and orderly
- Corrugation of the tips clean and edged without fissures

Spreader

- Distance between the arms on the tips (see item 15)
- No leakages
- Easy operation of the star grip
- Handle existing and fast
- Identification plate and position plates legible
- Protection boot undamaged
- Quick connect couplings can be connected easily
- Dust covers in the right position

Hoses

- check according safety instructions for hoses (see item 5)
- Check for oil leakage

Function testing

- Perfect opening and closing with star grip standard version resp. pump-mounted control valves

12.2 Covers

- Inspection of safety devices at / around spreader unit.

13 Repairs

13.1 General

Servicing must be carried out only by the device manufacturer or by personnel trained by the manufacturer or the authorised LUKAS dealers.

For replacement on all components, use only genuine LUKAS spare parts as specified in the spare parts list, as here possibly required special tools, mounting information, safety aspects, testing must absolutely be taken into account. See Section 4.

Protection of the device against hydraulic overload

(only for DIN version with yellow quick coupler on the blue return hose)

If the short hoses of the tool are not connected with the power pack, pressure can be built up unintentionally in the cylinder due to temperature increase. Therefore, the return hose (0,5 m / blue) of the tool is equipped with a safety coupling (quick connect plug, colour yellow). Unintentional overpressure (approx. 1.5 MPa) is released through this plug: oil comes out.

Should the tool have been equipped with couplers of different brand which do not have this safety function, overpressure would be released through another safety valve (adjusted to approx. 30 MPa) included with the control valve block. In this case oil spill would be observed in the star grip area. As soon as sufficient pressure is released the valve becomes tight again. Should further constant leakage occur, please have the tool inspected by LUKAS personnel.

On repair, protective clothing is mandatory (see Section 1), as the spreaders can be pressurized also in unoperated state.

13.2 Preventive maintenance

13.2.1 Maintenance advice

To protect the device against external corrosion clean its surface from time to time and slightly grease it with oil.

13.2.2 Function and load test

If there is any doubt as to the safety and reliability of the equipment, carry out an additional function and load test. For this purpose, LUKAS offers a test kit as appropriate equipment.

13.2.3 Change of hydraulic oil

- after 200 uses, latest after 2 years, the hydraulic oil has to be changed.
- in any case if the oil of the pump (motor / hand pump) which belongs to the unit is changed. By changing the used oil, it should be avoided that the new oil is polluted by the used oil of the rescue tool.

Procedure:

The rescue tool is in closed (retracted) position • Change of oil has to be effected at the pump. Screw off the return hose at the pump:

- **in case of hose connection:** screw off the connecting piece of the blue return hose.
- **in case of quick connect couplings:** screw off totally the coupling nut of the quick connect coupling of the blue return hose.

Extend pump with tool slowly • Collect the used oil at the piston rod side in a separate tank and dispose of the used oil (as the used oil of the pump) • Do not operate the pump any longer.

Connect the return hose again to the pump:

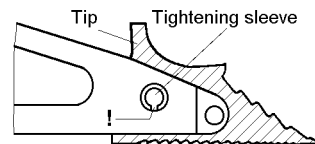
- Tighten the coupling nut of the quick connect coupling according to 13.3.6
- Screw the hose nipple into the valve bloc with $M_A = 45 \text{ Nm}$
- Ventilate the tool according to 9.1.1.

13.3 Repairs

13.3.1 Tip Replacement

Procedure:

- use a mandrel to drive out the tightening sleeve
- replace tip
- drive in new tightening sleeve - **Attention !** Observe mounting position!



The tightening sleeve comes with the tip.

Attention: prior to mounting all sliding surfaces have to be carefully cleaned and greased with LUKAS special grease.

13.3.2 Oil spill out of the control valve handle (see cover page item 13)

Pressure or return hose are not tightened properly.

Procedure:

Loosen the 2 allen screws (SW5) inside the handle sleeve and remove them together with the short plastic isolation sleeves. Pull handle sleeve backwards until the hose connection points become visible and retighten the retaining nut. Change hose connection sealing rings if necessary. Place handle sleeve again and tighten it with the 2 allen screws. Make sure that the plastic isolation sleeves are placed properly on the allen screws before mounting.

13.3.3 Change protection boot (see cover page item 5)

The protection boot shall protect the operator against injuries caused by the moving levers. If the protection boot is damaged it has to be replaced.

Procedure:

Remove the carrying handle • Change protection boot(s) • Mount and tighten carrying handle.

13.3.4 Carrying handle (see cover page item 4)

Damaged carrying handles have to be replaced immediately.

Procedure:

Remove the handle (held by 2 screws) and change it against a new one • Change screws and disks if necessary.

13.3.5 Labels

All damaged or illegible identification stickers (Safety instructions, type label a.s.o) have to be replaced.

Procedure:

Remove damaged stickers and clean surface with acetone • Put on new stickers.

13.3.6 Quick couplers

Quick couplers on the 0,5m hoses have to be replaced when

- external damage can be observed
- the locking sleeve doesn't work any more
- oil spill occurs even when the coupling is properly connected

Remark: Faulty couplers have to be changed completely against genuine LUKAS spares, i.e. it is not permissible to make any repair work.

The retaining nut on the hoses has to be tightened with a torque of $M_A = 45 \text{ Nm}$

13.3.7 Hood of the valve block

If the hood is damaged so seriously that the star grip doesn't return any more to zero position automatically the valve has to be replaced completely or the hood has to be replaced by a authorized LUKAS dealer or the LUKAS service department.

14 Troubleshooting

Trouble	Check	Cause	Remedy
Hoses cannot be coupled		Pressurized	Relieve pump pressure
On actuating blades move slowly or by jerks pack operating	Hoses correctly connected power	Air in the hydraulic system	Thoroughly vent pump unit: see 9.1.1
No pressure build-up	resp. motor pump. Vent pumpe after changing oil	Not enough oil in hand system (see operating instruction 9.1.1)	Refill oil and vent the
Star grip doesn't return to center position when released	mechanism is dirty	Return spring is damaged or return for repair	Ask authorized dealer or LUKAS themselves
Oil leakage out of hoses or hose fittings		Untightness, eventually damages	Replace hoses
Surface of hydraulic hoses is dissolved		Contact with aggressive fluids	Change hoses
Leakages on the piston rod	rod	Seal defective piston by authorized dealer or LUKAS themselves	Replacement of seals

If the defects cannot be repaired, contact an authorized LUKAS dealer or the LUKAS service department. The address:

LUKAS Hydraulik GmbH, Weinstraße 39, D-91058 Erlangen, Pf 2560, D-91013 Erlangen, service phone 09131/698 348; fax 09131/698 353.

15 Technical data

Type	LSP 40 B	LSP 40 EN	LSP 60 EN	LSP 60 F
Ref. no.	84150/0890	84150/0895	84150/0547	84150/0560
Spreading force (kN) in all operating ranges	40 ... 120	41.5 ... 230	62 ... 230	62 ... 230
Spreading distance min. (mm)	620	720	800	800
Pulling force (kN)	28 ... 61	26 ... 46	39...58 w. KSV 11	45...65 w. KSV 13
Pulling distance (mm) with chain set KSV 11	487	575	665	--
with chain set KSV 13	--	--	--	668
with chain set KSS 20	520	--	710	710
Dimensions l x w x h (mm)	774x299x170	790x299x180	880x378x212	880x378x212
Weight incl. oil filling (kg)	18	19.6	25	25.8
Operating pressure (MPa)	max. 63*			
Necessary oil quantity (l) ¹	0.13	0.25	0.42	0.34
TÜV (DIN)	SP29-93-TP18	SP42-99-TP18	SP43-99-TP18	--
French Standard NFS 61571	120.33.93: EH40-40			EH 60-60
prEN 13204		LHS 40	MHS 60	--

Type	LSP 80 EN
Ref. no.	84150/0570
Spreading force (kN) in all operating ranges	84 ... 540
Spreading distance min. (mm)	610
Pulling force max. (kN)	99
Pulling distance (mm) with chain set KSV 13/100	437
Dimensions l x w x h (mm)	770x380x216
Weight incl. oil filling (kg)	25.9
Operating pressure (MPa)	max. 63*
Necessary oil quantity (l) ¹	0.34
TÜV (DIN)	
French Standard NFS 61571	
EN 13204	CS84/610-26

* 1MPa = 10 bar

¹ Necessary oil quantity in the hydraulic power pack for operating the tool
(Difference in quantity piston / rode side)

15.1 Peeling

Type	LSP 40 B	LSP 40 EN	LSP 60 EN	LSP 60 F	LSP 80 EN
Max. thickness of steel plate t (mm)	4	4	5	5	5
Max. opening (mm x mm)	500 x 500	520 x 520	650 x 650	650 x 650	500 x 500

15.2 Oil recommendations

For LUKAS hydraulic devices, use mineral oil in accordance with DIN 51 524 and others

	Range of oil temperature	Viscosity rating	Remarks
A	- 24 ... + 30 °C	HL 5	
B	- 18 ... + 50 °C	HLP 10	
C	- 8 ... + 75 °C	HLP 22	
D	+ 5 ... + 80 °C	HLP 32	
E	- 8 ... + 70 °C	HF - E 15	biodegradable

Recommended viscosity range: 10 ... 200 mm²/s,
delivered with HLP 22 to DIN 51 524

15.3 LUKAS Hoses

Bending radius	Rmin = 38 mm
Burst resistance	safety factor: burst pressure / max. operating pressure, min. 4 : 1
Temperature resistance	- 40°C ... + 100°C
Operating medium	Mineral oil according to DIN 51524

15.4 Others

Working temperature	-20 ... +55°C
Ambient temperature (power pack in operation)	-24 ... +45°C
Storage temperature (power pack not in operation)	-30 ... +60°C

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