

LUKAS

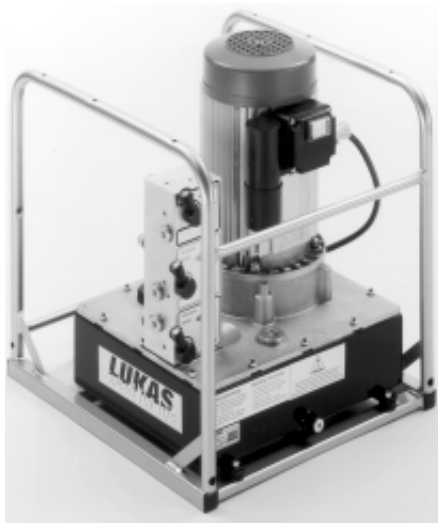
Operating Instructions

Rescue Tools

84150/7850-85 GB
Issue 09.2000

Motor Pumps

PT - 6 ... / GT - 6 ... „TRIMO”



PT - 6 ...



GT - 6 ...



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!

4.5 Work on the electrical system or equipment may only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such electrician and in accordance with the applicable electrical engineering rules.

4.6 The electrical equipment of machines is to be inspected and checked at regular intervals. Defects such as loose connections or scorched cables must be rectified immediately.

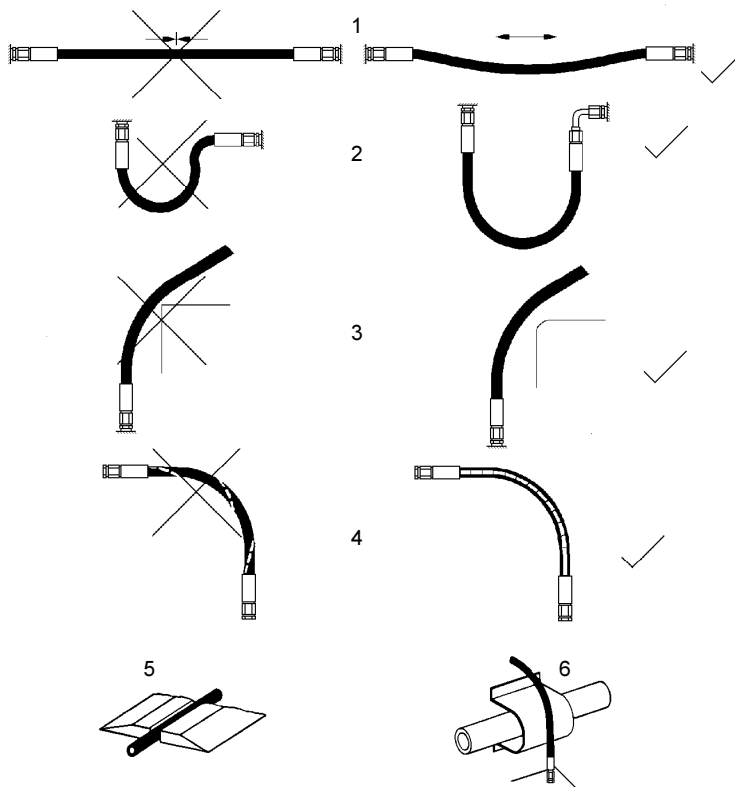
4.7 Aggressive material (acid, lye, solvent, vapour) can **damage** the machine. It is necessary to clean the whole machine if it must be **exceptionally** operated under such conditions or gets into touch with these materials. Additionally, the machine must be checked as described under 3.6.

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 (3") 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.
- never interline hose with that of a different manufacturer

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

The power packages as described below must be used **only in connection with LUKAS rescue devices**. The use with devices other than LUKAS is possible, but details of intended use must be discussed with and approved by LUKAS in each individual case.

7 Description

The LUKAS power packages serve as drive and control units for **genuine LUKAS rescue devices**. Each unit includes motor, pump and control valve block suitably mounted in a carry frame. A number of different drive and control versions is available to meet different requirements.

7.1 Drive system (item no. see diagram on the last page)

7.1.1 The motor pump serves as hydraulic power supply. It includes a LUKAS radial piston pump with 3 individual oil flows (items 1A - 1C). Each individual oil flow has two pressure circuits („2-speed“ feature):

- Low pressure circuit (up to 16 MPa) = LP.
 - High pressure circuit (up to 63 MPa) = HP.
(1 MPa = 10 bar)
- Switch-over from low to high pressure mode is made automatically by a pressure limiting valve (item 3).
 - The maximum working pressure is limited by a pressure relief valve set to 63 MPa (item 4).

7.1.2 Following drive motors are available:

- electric motors single-phase AC with voltage 115V / 230 V type identification letter "P".
- 4-stroke combustion engine type identification letter "G".

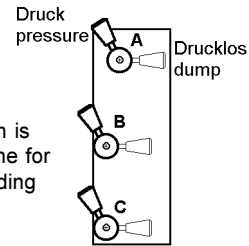
7.1.3 The oil container (item 4) is normally filled with 5 l of hydraulic oil. If required it can be filled up to a total volume of 7.5 l (e. g. when several rescue devices with high oil consumption shall be operated). The oil level can be checked with a dipstick. Hydraulic oil can be drained through a drain screw on the bottom of the oil reservoir.

The oil container lid carries both the drive motor and the hydraulic pump. Suitable threaded bores for both electric and petrol motor are provided in the lid.

7.2 Control unit and valve equipment

7.2.1 Valve block

Three LUKAS rescue tools can be connected to the valve block which is sitting on top of the oil container. The valve block has three levers - one for each oil flow (item 5A - 5C). By switching the lever(s), the corresponding rescue tool is either supplied with pressure or „switched off“ (pressureless oil circuit).



7.2.2 Hose connection

All power units are equipped with fittings for permanent screw connection of hydraulic hoses (as per DIN 14751 only this permanent connection is permissible).

Where permissible as per other local regulations the power units can be upgraded with **genuine LUKAS coupling sets**.

7.2.3 Operation of several tools

When using the power package make sure that the oil container **filling volume** is sufficient for reliable operation of all rescue devices connected (see item 16). Consider even the „**worst case**“ that one device stays in fully opened position whilst a second (or third) one shall be also operated. The oil consumption of each rescue device can be found in its individual operating manual.

7.3 Hydraulic hoses

7.3.1 Connection hose pairs

LUKAS connection hose pairs are on one side fitted with retaining nut to be mounted nipples on the valve block. On the other side they have quick couplers for connection of a LUKAS rescue device.

The „P“ connection is equipped with plug type StNi61 (colour silver) which prevents oil spill out of the hose line should the pump be running without a rescue device connected. Pressure can be released from the hose by switching the drain valve on the power unit.

7.3.2 Extension hose pairs

LUKAS extension hose pairs are connected to the valve block by quick couplers, i. e. they are on both ends equipped with quick couplers.

The „P“ connector is in this case a quick connect plug with **overload safety function** (plug type StNi61-D, colour yellow). This plug seals the hose line up to a pressure of 2.5 ... 3 MPa. Should this pressure be exceeded (e. g. by temperature increase while the hose is uncoupled) pressure would be released through the plug. This is to make sure that the quick coupler stays connectable at all times.

7.3.3 Colour marking fo hoses

All hoses are colour coded so that they cannot be mixed up:

With **one** hose pair:

P = high pressure (resp. low pressure)

--> red

R = return

--> blue

With **two** hose pairs:

P1 = high pressure (resp. low pressure) for device 1

--> red

R = return

--> blue

P2 = high pressure (resp. low pressure) for device 2

--> yellow

R = return

--> blue

With **three** hose pairs:

P1 = high pressure (resp. low pressure) for device 1

--> red

R = return

--> blue

P2 = high pressure (resp. low pressure) for device 2

--> yellow

R = return

--> blue

P3 = high pressure (resp. low pressure) for device 3

--> black

R = return

--> blue

7.4 Frames

7.4.1 Carry frame type „R“

Dimensions and mounting threads of this frame are in accordance with DIN 14751, i. e. the actual power unit at no point is exceeding the frame dimensions.

Following motor pumps are equipped with the frame "R":

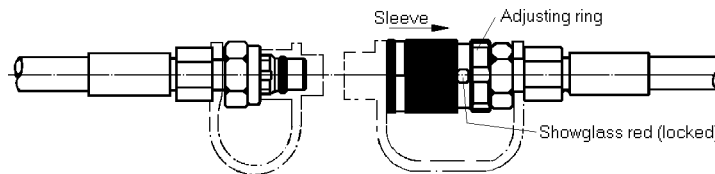
- PT-6R (driven by electric motor, without hose reel)
- GT-6R (driven by petrol engine, without hose reel)
- PT-6R-SH (driven by electric motor, mounted with a double- and a single hose reel)

7.4.2 Carry frame type „T“

This version (not in compliance with DIN 14751) is used with motor pump GT-6T-SH (=driven by petrol engine, mounted with a double- and a single hose reel)

7.5 Quick couplers

The rescue device is connected to the connection hose pairs via non-interchangeable coupling counterparts (plug and socket) (see picture).



Unlock prior to coupling/uncoupling and before removing the dust protection covers (red not visible). Retract sleeve and connect plug and socket, then release sleeve and set showglass to red using the adjusting ring. Now the connection has been made and locked.

Attention!

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

To avoid pollution, the dust caps must be put on plug and socket if the couplings are not connected. With the coupling in connected condition the dust caps must be also connected to each other.

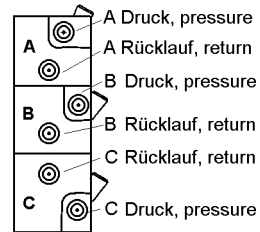
8 Mounting of connection hose pairs on the motor pumps PT-6R and GT-6R

Prior to initial commissioning the separately delivered hoses have to be mounted in following order:

8.1 Black / blue hose pair to connection „A”. Connection „pressure” is for the black hose, connection „return” is for the blue hose.

8.2 Yellow / blue hose pair to connection „B”. Connection „pressure” is for the yellow hose, connection „return” is for the blue hose.

8.3 Red / blue hose pair to connection „C”. Connection „pressure” is for the red hose, connection „return” is for the blue hose.



9 Initial commissioning of the motor pump

9.1 Initial commissioning and venting

Prior to initial commissioning the oil container must be filled with hydraulic oil and the pump must be vented as follows:

- Remove oil filler cap completely.
- Slowly fill the oil container with hydraulic oil and check the correct oil level with the dipstick.
- While filling the oil air is displaced from the container.
- With petrol motor: do not start the motor immediately, but remove the ignition plug and slowly pull the starter cable without starting the motor. Fix the ignition plug again.
- With electric motor: switch the motor on and immediately off again before it reaches a high speed. Make sure that motor stands still before it is started again.

As the pump rotates slowly, air bubbles are reliably displaced out of the system. After venting fix the filler cap again.

The oil container is equipped with an automatic venting mechanism so that during operation no further venting is necessary.

10 Operation

10.1 Installation

10.1.1 Safety remark

Do not use motor/engine driven pumps in an environment where explosions might occur. Do not use pumps with internal combustion engines in enclosed areas!

Make sure that no petrol is spilled during refilling! Avoid to refill petrol as long as the engine is hot! If refilling with hot motor is necessary, be extremely careful due to the risk of fire! Keep a fire extinguisher ready!

10.1.2 Power package

Put the power package on a suitable place (safe position/level surface/sufficient distance from vehicles or loads). LUKAS power packages are working reliably up to a tilting angle of 30°. They should be however preferably in horizontal position for maximum safety and for making sure that the whole hydraulic oil quantity can be delivered to the rescue devices.

10.2 Set the levers on connection A, B and C of the valve block to position „Dump”

10.3 Connect the rescue tools with the hoses coming from the motor pump as described under 7.5

10.4 Starting the motor

- Petrol engine: see separate operating manual.
- Electric motor: connect the power unit to the electric power supply.

10.5 Set the levers on connections A, B and C of the valve block to position „pressure”

Remark: When less than three rescue tools are connected, the lever of each free connection should be set to position „Dump”.

11 Dismantling of components

11.1 Power package

For dismantling reverse the installation sequence:

- Make sure that all devices and loads are in stable position.
- Close the arms of rescue devices to a few mm's gap (do not fully close the arms, otherwise the device could stay pressurized).
- Switch the motor off and unplug the electric cable (with electric motors), close the petrol cock (with petrol motors).
- Open the drain valve on the power unit.
- Disconnect red hose first and put on dust caps.
- Disconnect blue hose and put on dust caps.

11.2 General

Only with petrol engine:

Refill the tank with petrol so as to make it ready for the next operation.

12 Maintenance

12.1 Power package

After each operation check all components on proper function (clean them first if necessary):

- Check whether hydraulic fittings and couplers are tightened; tighten them if necessary.
- Check power package, control valve(s), mechanical parts of the rescue device and hoses visually on damage.
- Check whether all signs, warning labels and switching symbols are complete and legible.
- Check whether all safety covers (engine: protective cover, exhaust cover) are in perfect condition.
- Check hydraulic oil level (see 12.3).

12.2 Hydraulic tightness

- Check devices on oil leakage and replace defective seals if necessary.

12.3 Checking/changing hydraulic oil

Attention:

Carry out the following procedure over a oil pan and dispose of used oil according to local regulations and laws!

- Check oil level in the reservoir after each operation; refill oil if necessary (observe LUKAS oil recommendation 12.4).
- Change hydraulic oil after approx. 50 operations, however after 2 years at the latest.

Remark:

Select type of hydraulic oil according to prevailing ambient temperature conditions (see LUKAS oil recommendation).

- For draining the hydraulic oil open the drain screw on the container bottom, tilt the reservoir until all oil is drained (the oil should preferably be warm when it is changed). Fill approx. 1/2 liter of fresh hydraulic oil, flush the reservoir thoroughly and drain the oil again. Every 4 years approx. the inner surface of the reservoir should be additionally cleaned with a clean dustfree cloth and be inspected on corrosion. For this purpose the oil container must be taken off by removing 12 nuts M6. Seriously corroded reservoirs must be replaced.
Vent the pump after each oil change as per 9.1.

12.4 Oil for LUKAS hydraulic units mineral oil DIN 51524 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 - E15	biodegradable

Recommended viscosity range: 10..200 (mm²/s).

13 Problems / trouble shooting

Index: P = problem S = symptom C = check

P: Pump fails to deliver oil:

S: Rescue device doesn't move.

C: Hoses and quick couplers properly connected? pump system properly vented ? (see 9.1)

P: System pressure is not reached:

C: Check with a testing pressure gauge.

-->Spring of the pressure relief valve (item 4) needs readjustment.

--> Must be carried out by authorized dealer.

P: Hose couplings cannot be connected (only with **connection** hose pairs):

S: Red hose of the hose pair is pressurized

--> Switch drain valve on the power unit to idle circuit.

Set the lever on the valve block to „Dump“.

P: Oil spill out of the plug on the high pressure hose when pump is running (only with **extension** hose pairs):

S: Hose is pressurized without a rescue tool connected. The overload valve in the plug (yellow) is working in order to release the pressure.
 --> Switch drain valve on the power unit to idle circuit.

If the defects cannot be repaired, contact an authorized LUKAS dealer or the LUKAS service department. The address: **LUKAS Hydraulik GmbH & Co. KG**, Weinstraße 39, 91058 Erlangen; P.O.B. 2560, 91013 Erlangen Germany; Kundendienst-Tel.: +49 / 91 31 / 6 98 - 3 48; Fax: +49 / 91 31 / 6 98 - 3 53.

14 Repair

In all system components only genuine **LUKAS spare parts** as listed in the spare parts list may be used, since it is absolutely necessary to consider for this purpose special tools, safety aspects and checks that might be required (see item 4).

15 Technical data

Description	Type of frame	Dimensions L x W x H (mm)	Weight (kg)
PT-6R 230V/50Hz ~	DIN 14751	488 x 440 x 484	47
GT-6R		488 x 440 x 478	44
PT-6R-SH115V/50Hz ~		766 x 600 x 484	108
GT-6R-SH	Standard	840 x 706 x 495	108

Type of power pack	Motor	Motor power nominal values	Oil delivery nominal values (l/min)	Oil capacity Usable oil cap.
PT-6R 230V/50Hz ~	Electric motor	2,2 kW at 3000 rpm	ND 3 x 2,2 HD 3 x 0,7	7,5 l / 5,0 l 6,3 l / 3,8 l
GT-6.	4-stroke gasoline engine	3,4 kW bei 3200 rpm	ND 3 x 2,35 HD 3 x 0,7	

LP = low pressure 16 MPa; HP = High pressure 63 MPa
 Oil specifications: delivered with mineral oil **HLP 22/DIN 51524** normal filling.

15.1 Noise emission

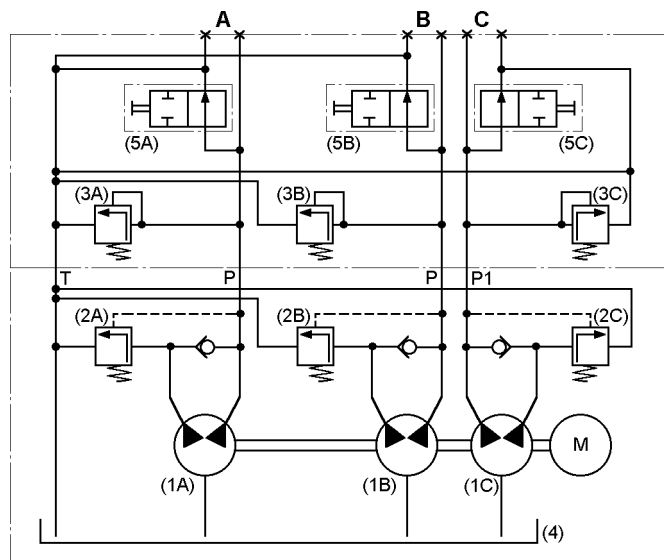
following the regulations of EN ISO 3744: measuring distance above ground level 1,5 m			
Measuring distance 5 m:	no load	full load	
Electric motor	65 (67)	69 (71,5) dB(A)	with standard / (DIN-) frame
Gasoline engine	82 (82)	85 (85) dB(A)	
Measuring distance 1 m:	no load	full load	
Electric motor	73 (73)	78 (80,5) dB(A)	with standard / (DIN-) frame
Gasoline engine	85 (85)	89 (89) dB(A)	

15.2 LUKAS Hoses

Bending radius	R _{min} = 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

15.3 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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