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LUKAS

IDEX CORPORATION

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LUKAS

Operating Instructions

Rescue Tools

Motor Pumps

Series 6

84150/7601-85 GB
Issue 03.2000
replaces 8.97

P	G	A	W	S	T	R
Electric motor	Petrol engine	Alternate use of two tools (manual switch-over)	Alternate use of two tools (automatic switch-over by intelligent selector valve ISV)	Simultaneous use of two tools	Standard carry frame	Carry frame as per DIN 14751

GW-6R

PS-6T

(with optional quick couplers)

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 innjuries, 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.

2.7 Replace hydraulic hoses at the specified or adequate intervals, even if no defects are detected which might affect safety. This must be done after 10 years, at the latest!

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 dismounted 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**.

3.9 Do not stress hoses mechanically (pulling, buckling etc.).

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

All instructions as to safe use of hydraulic hoses can be found in the booklet HR 1495 35 219 delivered with the hoses.

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 A ; see diagrams)

7.1.1 The motor pump serves as hydraulic power supply. It includes a LUKAS radial piston pump (item 1) with:
- Low pressure circuit (up to 16 MPa) = LP.
- High pressure circuit (up to 63 MPa) = HP.

(10 bar = 1 MPa)

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 Necessary valves are integrated in the pump unit:

- 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).

7.1.4 The oil container (item 5) 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 so that either one can be installed easily.

7.2 Control unit and valve equipment (item B)

7.2.1 Power pack versions
A number of control valve versions is available to meet different operator's requirements and different local regulations in each user's country. It has to be made sure that only valve versions in accordance with such local regulations are used.

7.2.2 Control valve „alternate operation" (item 10), type "A"
Connection of **2 tools is possible;** by switching the hand lever the first **or** the second one can be operated in alternate mode (requirement as per DIN 14 751). With the hand lever **in middle position pressureless oil circuit** is provided (position "0").

7.2.3 Control valve „automatically selected operation" (item 11), type "W"
Connection of **2 tools** is possible; with this **patented LUKAS valve** two rescue devices can be operated alternately without any manual switch-over. The valve leads the oil flow to the rescue device just being operated whilst the other one becomes switched off **automatically** (requirements as per DIN 14 751 are therefore fulfilled).

Remark:
Below a minimum working pressure, i. e. when rescue devices are operated without load, it might be possible that both connected rescue devices are moving. This double movement will be interrupted in any case as soon as the first device starts actually working.

7.2.4 Control valve „simultaneous operation" (item 12A/12B), type "S"
Connection of **2 tools is possible;** by switching the hand levers **2 tools can be operated simultaneously** at a time. The control valve includes in this case also the function of a drain valve.

7.2.5 Upgrading kit with quick couplers
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.**

7.2.6 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 retainig 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.

7.6.1 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

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.

7.4.2 Carry frame type „T“
This frame is smaller than the „R“ version, but it also protects the power unit completely.

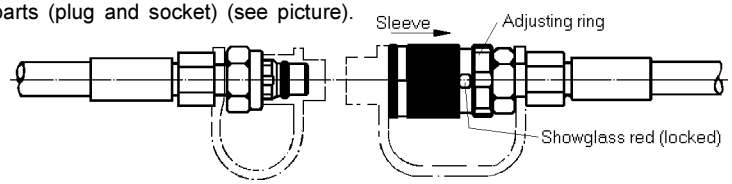
7.4.3 It is posiible to change an „R“ frame against a „T“ one and vice versa.

7.5 Hose reels

Accessory hose reels can be used when extra hose length is required. They can be mounted on the power package easily.
The double hose reel can be directly mounted on power units with frame shape „R“. For mounting on frame shape „T“ an additional mounting bow is necessary.

7.6 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 pump

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

8.1 Connections A and T on the valve block

Connections A and T always must be fitted with hoses first !

These connections are locked with yellow plastic caps serving for transport safety only. In any case the yellow caps must be removed first. Then the red hose has to be fixed at port A and the blue hose at port T. Tighten the retaining nut with a torque of 45 Nm.

8.2 Connections A1 and T1 on the valve block

These connections are locked with steel locking pieces which are tight even under full working pressure, i. e. they prevent oil spill when only one hose pair is mounted at the block. For connection of the second hose pair also the locking pieces must be removed. Then the yellow hose has to be fixed at port A1 and the blue hose at port T1. Tighten the retaining nut with a torque of 45 Nm.

9 Installation

9.1 *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!

9.2 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.
Remark: Pressureless oil circuit can be obtained through a separate drain valve (item 11A).

9.3 Hoses

If the power unit is equipped with quick couplers now the hoses have to be connected (see item 7.6): connect blue hose first and red hose second.
For connection of connection hose pairs see item 7.3.1

10 Operation

10.1 Hydraulic diagrams (see pull-out page at the end of the manual).

10.2 Motor pump

10.2.1 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.

10.2.2 General operation (see pull-out page at the end of the manual).
Remark:
Before starting the motor it has to be made sure that that the hydraulic circuit is **pressureless:**
- With valve types **"S", "W"** set levers II to "horizontal".
- With valve type **"A"** switch to middle position (hand lever vertical).

Starting the motor:
--> Petrol engine: see separate operating manual. Open the petrol cock and start the motor.
--> Electric motor: connect the power unit to the electric power supply. Observe correct voltage!

10.2.3 Operation of control valves (see pull-out page at the end of the manual).
Type **"A"**: Switch to either tool one or tool two (see colour markings).
Type **"S"**: Close drain valve(s) (set lever upright).
Type **"W"**: Close drain valve (set lever II upright).

With valve type **„W"** (Intelligent selector valve) following cases are possible:

10.2.3.1 Case 1: Two hose pairs mounted at ISV
Normally two hose pairs are connected with the valve. Switch-over between these tools is made automatically.

Switch lever I to position „2" (see marking on the valve block); „2" means „two" - tool operation.
Switch lever II to position „A" (see marking on the valve block) to build up pressure.
For pressure release switch lever II to position „T" (see marking on the valve block).

10.2.3.2 Case 2: One hose pair mounted at ISV
Should only one hose pair be connected observe the following:
Make sure that the hose pair is mounted at outlets A and T and that outlets A1 and T1 are locked (see item 8).
Lever I must be set to position „1" (means „one" tool operation). For pressure build-up and pressure release see item 10.2.3.1

10.2.4 Whenever rescue devices are not actually working in a rescue situation, but the pump is still running, open the drain valve and close it only when the devices have to work again.

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 10.2.1.

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 (mm^2/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 10.2.1)

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.

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; Kundendients-Tel.: +49 / 91 31 / 6 98 - 3 38; 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 Spare parts lists

15.1 Power packages

PA-6T, PS-6T, PW-6T
PA-6R, PS-6R, PW-6R 84150/7601-88

GA-6T, GS-6T, GW-6T
GA-6R, GS-6R, GW-6R 84150/7621-88

PA-6., PS-6., PW-6.
230V/60Hz, 115V/50Hz, 115V/60Hz 84150/7606-88

16 Technical data

Description	Type of frame	Dimensions L x W x H (mm)	Weight (kg)
P.-6T 230V/50Hz ~	Standard	380 x 474 x 478	39,6
P.-6T 230V/60Hz ~			37,1
P.-6T 115V/50Hz ~			
P.-6T 115V/60Hz ~			
G.-6T			35,0
P.-6R 230V/50Hz ~	DIN 14751	488 x 440 x 478	43,0
P.-6R 230V/60Hz ~			40,5
P.-6R 115V/50Hz ~			
P.-6R 115V/60Hz ~			
G.-6R			38,4

Type of power pack	Motor	Motor power nominal values	Oil delivery nominal values (l/min)	Oil capacity Usable oil cap.
PA-6. / PW-6. 230V/50Hz ~	Electric motor	1,5 kW at 3000 rpm	LP 4,4 HP 1,4	7,5 l / 5,0 l 6,3 l / 3,8 l
PA-6. / PW-6. 230V/60Hz ~		1,26 kW at 3600 rpm	LP 3,6 HP 1,06	
PA-6. / PW-6. 115V/50Hz ~		1,1 kW at 3000 rpm	LP 3,0 HP 0,9	
PA-6. / PW-6. 115V/60Hz ~		1,26 kW at 3600 rpm	LP 3,6 HP 1,06	
PS-6. 230V/50Hz ~		1,5 kW at 3000 rpm	LP 2x2,2 HP 2x0,7	
PS-6. 230V/60Hz ~		1,26 kW at 3600 rpm	LP 2x1,8 HP 2x0,53	
PS-6. 115V/50Hz ~		1,1 kW at 3000 rpm	LP 2x1,5 HP 2x0,45	
PS-6. 115V/60Hz ~		1,26 kW at 3600 rpm	LP 2x1,8 HP 2x0,53	
GA-6.	4-stroke gasoline engine	2,6 kW at 3200 rpm	LP 4,7 HP 1,45	
GW-6				
GS-6			LP 2x2,35 HP 2x0,7	

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

16.1 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)	

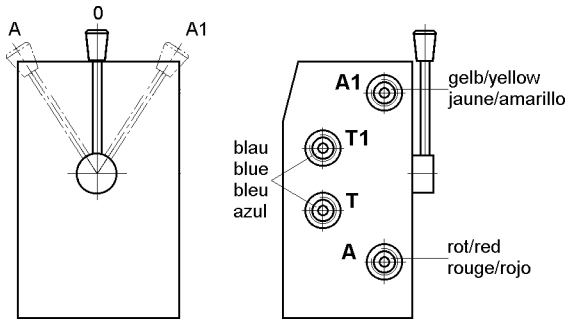
16.2 Others

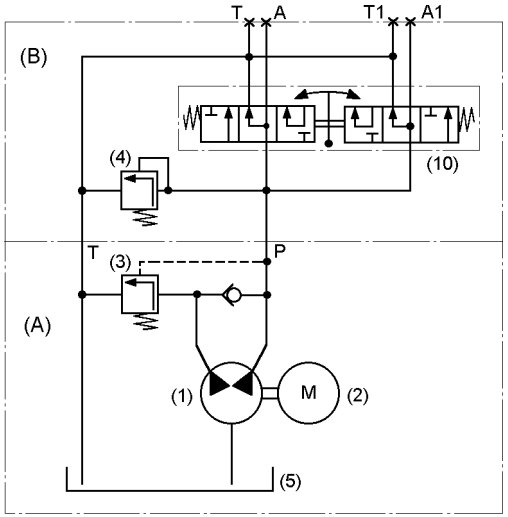
Working temperature	-20 .... +55°C
Ambient temperature (power pack in operation)	-24 .... +45°C
Storage temperature (power pack not in operation)	-30 .... +60°C

16.3 Permissible length of hoses between motor pump and rescue tool.

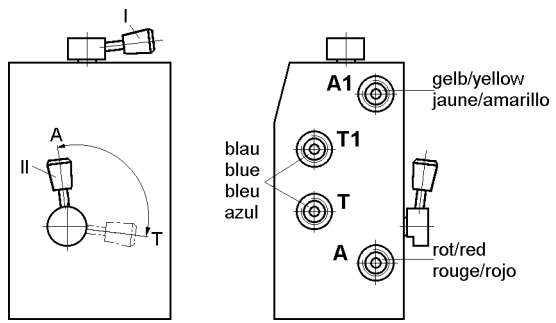
Type of power pack	Hose length (m)
PA - 6. / GA - 6 .	0,5 - 40
PW - 6. / GW - 6 .	0,5 - 20
PS - 6 . / GS - 6 .	0,5 - 50

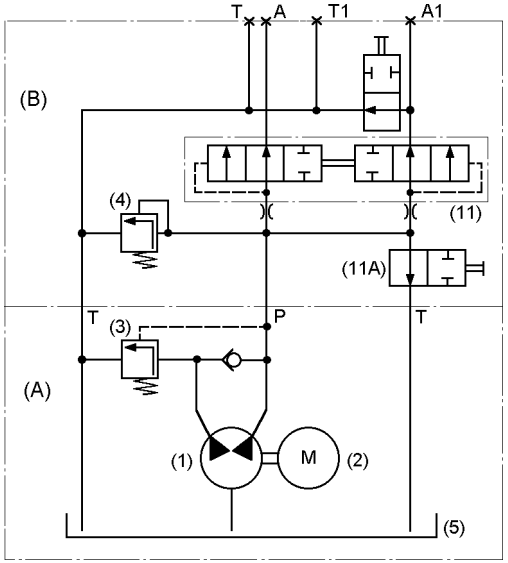
Ventil "A" • Valve "A" •
Soupape "A" • Válvula "A"



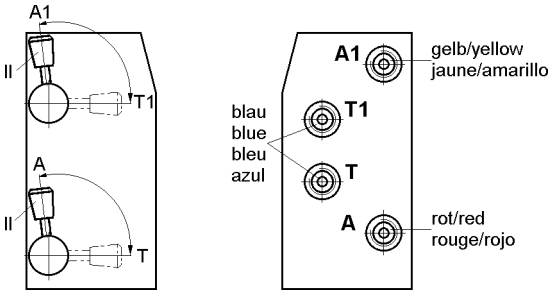


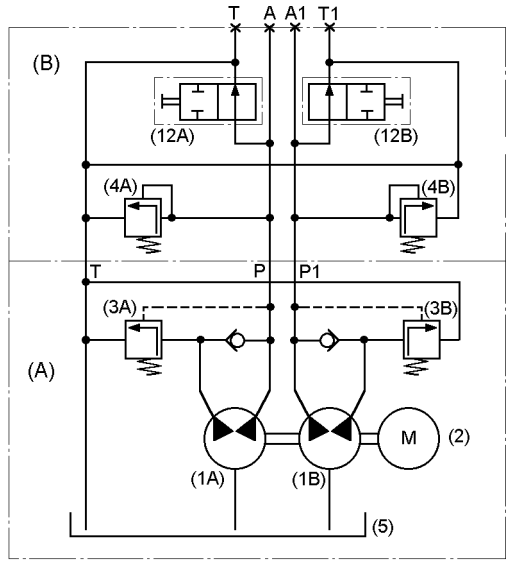
Ventil "W" • Valve "W" •
Soupape "W" • Válvula "W"





Ventil "S" • Valve "S" •
Soupape "S" • Válvula "S"





P = Pumpe / pump / pompe / bomba
T/T1 = Ölbehälter / oil container / réservoir à huile / depósito de aceite
(Druckentlastung / pressure release / décompression/ descompresión)
A = Gerät an A / device at A / appareil sur A / máquina en A
A1 = Gerät an A1 / device at A1 / appareil sur A1 / máquina en A1