

RECKMANN

operation manual

PP1 bis PP4
power pack



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1 Introduction

1.1.1 Packing list PP1 bis PP4

Type: PP1 bis
PP4 _____

Date _____

Customer _____

Dealer _____

Order number _____

Powerpack size PP1 PP2 PP3 PP4

Rated power: _____ kW
12V 24V

Pump capacity:
_____ x V= _____ ccm / U

_____ x V= _____ ccm / U

Volume of the tank: _____ l

Hydraulic functions:

Reckmann outhaul

No	function	Dir. valve	Pressure relief	Flow control
-	-	-	[bar]	[l/min]
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Additional equipment:

Packed by

1.1.2 How to use this manual

Read this manual carefully before assembly and operation of your Reckmann gear.

Points that need additional attention will be marked in the following way:



Note!

This sign marks points which need special attention.



Warning!

This sign marks the risk of injuries or other significant danger.



Tip

this triangle marks useful tips.



Note!

Improper use according to this manual of the furler may cause loss of warranty.
Consult a Reckmann service partner in any case of problems.

1.2 General information about working on hydraulics

Disconnect the power pack from the electric system and make the system pressure free before start working on the power pack. Take care that no dirt can pollute the hydraulic system. Before releasing clean all couplings. Close open couplings and ports with protection plugs. Do not use cleaning wool. Use a filter for filling oil into the tank.

**Warning!**

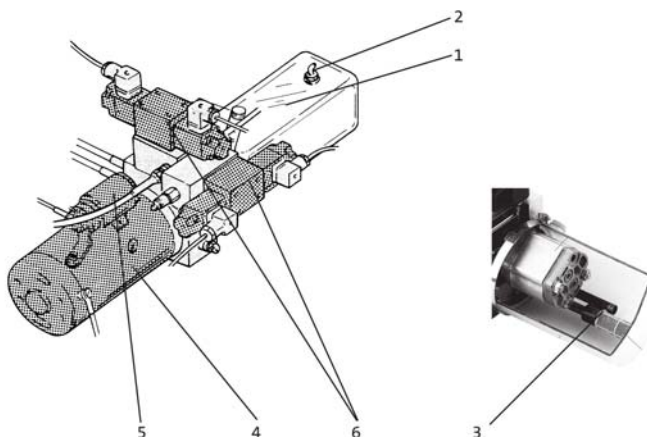
Make the entire system pressure free before beginning to work.

**Warning!**

Disconnect the power pack from the electric system before beginning to work.

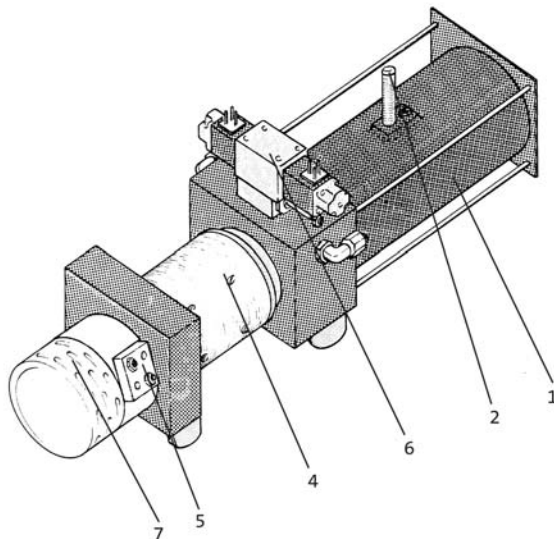
2 Product description

2.1 PP1 (1,5 kW / 2,0 kW)



Pos.	Part name	Typ	Ordernr. (Bosch)
1	Oilfilter	5l, Type D	1545410020
2	Airfilter		
3	Intakefilter		
4	Hydraulic pump (elec.)		
5	Relay		
6	Way valve		

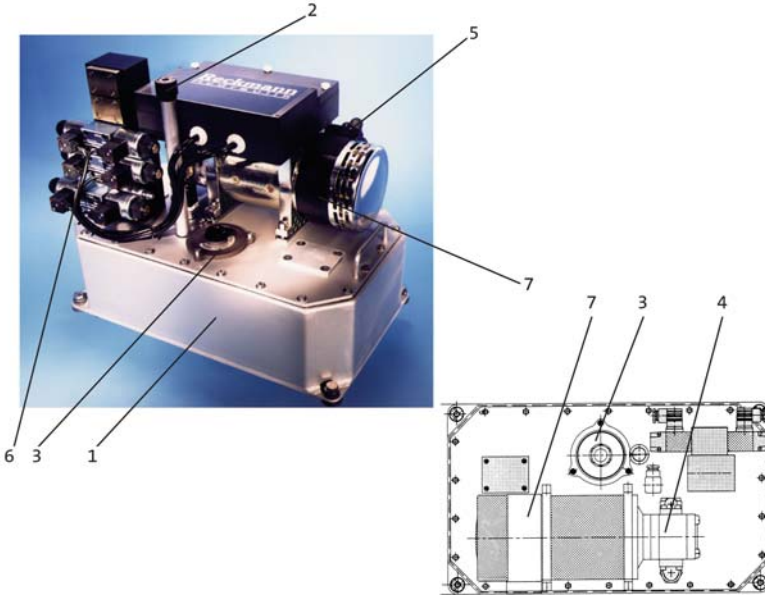
2.2 PP1 (3 kW)



Pos.	Benennung	Typ	Ordernr. (Bosch)
1	Oil tank		
2	Airfilter		
3	Intakefilter (in Tank)		
4	Gear pump		
5	Relay		
6	Way valve		
7	E-motor		

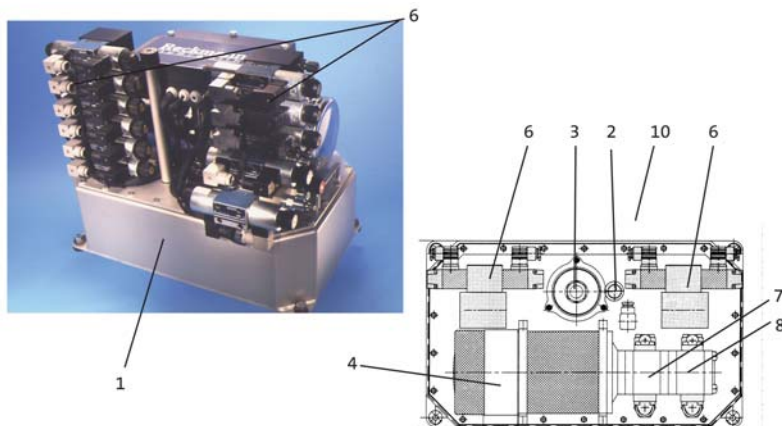
Product description

2.3 PP2



Pos.	Benennung	Typ	Bestellnummer (Bosch)
1	Oil tank		
2	Airfilter		
3	Intakefilter		
4	Gearpump		
5	Relay 24V		
6	Way valve		
7	E-motor		
8	Oil level gauge		

2.4 PP3



Pos.	Benennung	Typ	Ordernr. (Bosch)
1	Oil tank		
2	Airfilter		
3	Intakefilter		
4	E-motor		
5	Relay 24V		
6	Way valve		
7	Gearpump		
8	Gearpump		
9	Oil level gauge		
10	Level switch		

3 Assembly and commissioning

3.1 Installation of the power pack

The Reckmann hydraulic power pack unit should be installed in a dry and easy accessible area of the boat. The power pack has to be protected from dust and splash water. Take care that the foundation is strong enough to carry the load of the power pack. Do not paint the power pack and hydraulic hoses.



Note!

Risk of damage due to vibrations.
Install the power pack with sufficient vibration dampers.

3.2 Installation of the piping

Pipes, hoses and couplings have to fit the requirements regarding the pressure and have to be resistant against the hydraulic liquid. For piping do only take seamless steel pipes. Clean all components before installation.

Welded pipework has to

be pickled. Do not use cleaning wool. All pipes have to be fixed in short distances. Damaged pipes and hoses have to be replaced. Do not use steel reinforced hoses on deck.

The inner diameter of hoses and pipes depends on the length of the hose and the volume flow in the hose.

Please find technical specifications of the threads at the end of this manual.

Approved standards for hydraulic hoses:

SAE100R7, DIN24961-2KT, BS 4983 Typ I, ISO 3949-1.

Connect all hydraulic devices according to the attached plan to the power pack. The following table shows the required inner diameter against the volume flow of the hydraulic liquid and the expected drop in pressure.

Pressure drop in dp (bar) against inner pipe diameter for oil viscosity
According to ISO VG 36:

d (mm)	Q (l/min)						
	10	20	30	40	50	60	70
5	3,5	7,0	10,4	13,9	17,4	20,9	24,4
8	0,53	1,06	1,59	2,12	2,66	3,19	3,72
10	0,22	0,44	0,65	0,87	1,09	1,31	1,52
12	0,10	0,21	0,31	0,42	0,52	0,63	0,73
20	0,01	0,03	0,04	0,05	0,07	0,08	0,10
25	0,01	0,01	0,02	0,02	0,03	0,03	0,04

3.3 Installation of the electric system

Take care for sufficient wire diameters. Small diameters may cause fire and power loss. The current leakage between power pack and batteries should not exceed 1 Volt. Take care for a correct fuse protection of the electric circuits. Please find the electric wiring plan and details about the fuses in the corresponding chapter of this manual.



Warning!

Small cable diameters may cause fire.
Use cables with sufficient diameter.

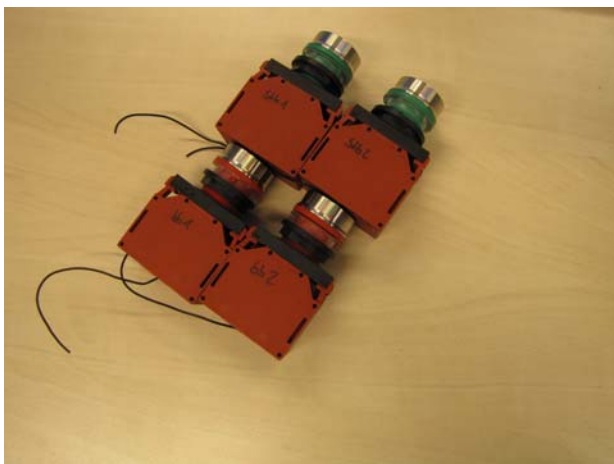
3.4 Reckmann wireless switch set (optional)

Reckmann offers a wireless switch set that works without batteries as an accessory to your powerpack. This set contains a receiver and any amount of emitters.



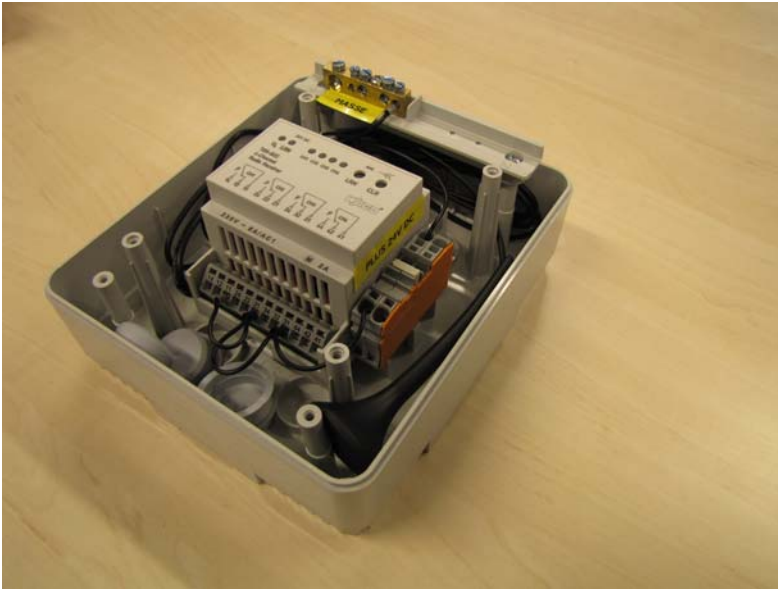
Receiver in a waterproof housing

The emitter consists of an actuator on top and a base-unit. The base-unit carries a piezo element, which produces electricity every time it is actuated. This electricity triggers a coded signal to the receiver. By default the emitter-top is a pushbutton



Two sets of wireless switches with red and green color-coding

The receiver comes preinstalled in a waterproof housing. Please make sure that you use fitting screw-connections to maintain water-proofness. By default the receiving antenna is contained in the housing. If the signal doesn't carry far enough that way, there are two possibilities for improving signal strength. Place the antenna outside the housing and/or fix the antenna to a metal item.



Open housing with antenna, circuit points and fixture for ground/earth and +24Vdc

By default any supplied pushbuttons are already taught to the receiver. If a new teaching or deleting is needed please follow the following procedure:

3.4.1 Teaching of an emitter



Warning!

During teaching no consumer may be connected to the receiver-box, for uncontrolled activation of consumers might occur in the process.

- Operating mode of receiver: LED "Us" is glowing, in addition LED "LRN" is flashing if no emitter is taught.
- To switch the receiver to teaching mode press the learn-button "LRN". When the device is in teaching mode the LED "LRN" is glowing and the LED "Kanal 1" is flashing.

- To select the channel to teach to press the button "LRN" till the desired channel-LED is flashing.
- Actuate the emitter by actuating the pushbutton you want to teach. The LED "Kanal" flashes for 4 seconds. The teaching process is accomplished.

To teach further emitters repeat the steps mentioned above.

Please note that it might be necessary to teach a emitter to several channels to get certain funtions.

During teaching signal strenght is limited to 5m.

3.4.2 Deleting of a select emitter

- Push the receiver- button "LRN". LED "LRN" is glowing, LED "Kanal 1" is flashing.
- Press button "LRN" to select the channel you want to delete.
- To delete the channel actuate the pushbutton.

3.4.3 Deleting of all emitters

By pressing the receiver-button "CLR" all emitters are getting deleted.

technical data of the receiver:

Volage:	24Vdc
Relay-outlets:	4
Receiver-inlets:	40 / 10 each channel
Output-current / channel:	8A

3.5 Initiation of the hydraulic system

When the power pack is fixed on the foundation and all hydraulic and electric wires are connected, the system can be put into operation. Check that all hydraulic and electric connections correspond to the wiring diagrams. Check the system for contaminations and damages. Take care that all filters are installed. Fill the tank with a hydraulic medium according to the chapter "hydraulic fluids". Take a filter for filling in the oil. Fill the pump with hydraulic fluid. Start the system with one function. When the system works properly on the one function it can be vented. The system has to run without any unusual noises. To vent the system start one function after the other in both directions until they are all running properly without any abnormal noises. After venting the system no oil foam can be in the oil tank. Fill the tank to the high level mark with oil. Check the system for fluid leakages. Leakages at the hydraulic couplings normally can be fixed by fastening the fitting. If necessary replace oil and filter.



Tip

Leakages at the hydraulic couplings normally can be fixed by fastening the fitting.



Note!

Pollution of the hydraulic oil normally occurs within the first hours of operation. Change the oil filter after the first few hours of operation.

4 Maintenance

4.1 Hydraulic fluid

Reckmann hydraulic components are made for a safe and long trouble-free operation. Therefore a regulary maintenance of the system is necessary. Most of the problems with hydraulic systems are caused by contaminations of the oil. Due to that fact this points needs special attention.

Level of hydraulic fluid:

Regularly during operation the level of the hydraulic oil has to be checked. If the gauge is under minimum level it may cause high fluid temperature and pump damages caused by cavitation.

temperature of hydraulic fluid:

We recommend a maximum temperature of 60°C for the hydraulic fluid. Higher temperatures causes faster aging of the hydraulic fluid, the hoses and other components of the system. The oil temperature in the tank should be checked permanent.

A rising oil temperature can be caused by mechanical abrasion. If the temperature rises spontaneously shut down and check the system

Possible failures and reasons:

Befund / diagnostic	Verunreinigung / pollution	mögliche Ursache / reason
Dunkelfärbung dark colour	Oxydationsprodukte products of oxydation	Überhitzung, versäuerter Ölwechsel high temperature, missed oil change
milchige Trübung milky haze	Wasser oder Schaum water or foam	Wassereintritt, Lufteintritt water- / air penetration
Wasserabscheidung water seperation	Wasser water	Wassereintritt water penetration
Luftbläschen air bubbles	Luft air	Lufteintritt durch Ölmenge oder Leck in Saugleitung air penetration due to oil deficiency
schwebende oder abgesetzte Verunreinigungen floating or discharged contamination	feste Fremdstoffe solid contaminants	Abrieb, Schmutz, Alterungsprodukte dirt, abrasion
Geruch nach verbranntem Öl smell of burned oil	Alterungsprodukte products of aging	Überhitzung high temperatures

4.1.1 Condition of the hydraulic fluid

Aging of the hydraulic medium depends on several factors like temperature, humidity and working pressure. The grade of aging can be determined by a visual inspection.

4.1.2 Changing the hydraulic fluid

The first change of the hydraulic medium has to be done directly after putting the system into operation. Further changes have to be done depending on the operating conditions every 1000 hours.

4.2 Checking and replacing the oil filters

The oil filter should be replaced directly after putting the system into service. Further replacements are depending on the operating conditions once in a season. Power packs from PPII up are equipped with a pollution indicator. Please see chapter "filters".

4.3 Additional inspections

By paying attention on the system permanently, trouble can be identified and eliminated on time.

Please be aware of:

- oil leakages
- pollution of the system
- damages of hoses and tubes
- noise of pumps, motors and suspensions
- correct operation of gauges
- condition of electric cables and contacts

Hydraulic fluids

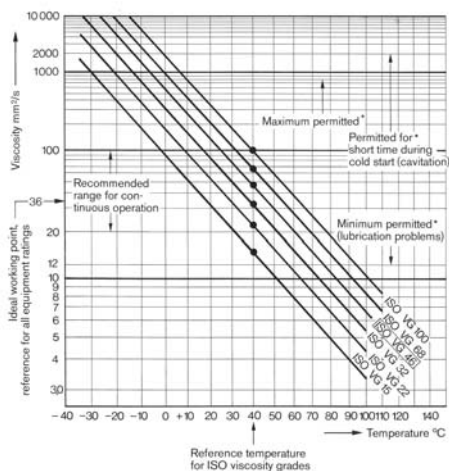
To achieve a trouble-free operation, a long life cycle and a safe operating, it is necessary to use an approved hydraulic fluid.

With Reckmann hydraulic systems only mineral oil based fluids are approved. Depending on the operation conditions the oil viscosity should be between ISO-VG 30 and ISO-VG 60. We recommend a viscosity of ISO-VG 32. Please consult the diagram below:

Hersteller	Markenname	ISO VG mm ² /s
Shell	Tellus 32	32
	Tellus 46	46
Esso	HLP 46	48
	HLPD 32	32
	Nuto H 32	32
Mobil	DTE 24	39

Please consult your local Reckmann Dealer for further information. We recommend an oil temperature below 60°. Higher temperatures are causing faster aging of the hydraulic fluid.

Check and replace hydraulic filters regularly.



5 Overhauling

Repairing a hydraulic system consists of debugging and repairing. Usually you repair a system by replacing the not working components. This has to be done by a Reckmann service partner.

5.1 Troubleshooting

Troubles with a hydraulic system are often caused by small irregularities which can be checked with simple methods. Most troubles are caused by electric failures or hydraulic leakages. To locate the mistake you will need the electric and hydraulic wiring plan in the referring chapter. For further details of filters and direction valves see the corresponding chapters.

5.2 Changing the filters

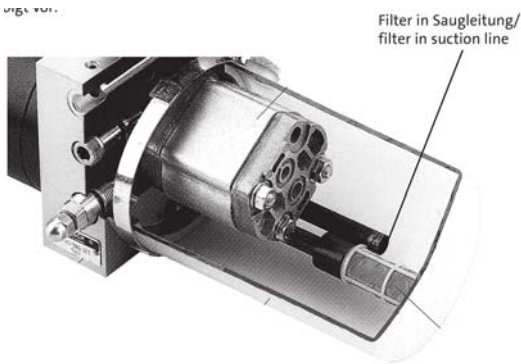
Most of the troubles with hydraulic systems are caused by contaminated hydraulic fluids. To avoid these problems a hydraulic filter is installed. It is important to check and replace hydraulic filters regular. The tank is equipped with an additional air filter. Both filters may only be replaced by original Bosch filters. Please find the Rexroth number of the spare parts in the list at the beginning of this manual. Some filters are equipped with an optical filter pollution indicator.

5.2.1 Changing the filters PP I

At size I power packs you can find the oil filter unit in the suction line to the pump. Do only use original Bosch filters.

Please find the part number of the filter in the chapter “product description” at the beginning of the manual. Notice the following steps to replace the oil filter:

- release the pressure from the system
- disconnect the system from the electric system
- clean the power pack, especially the area of the tank
- disassemble the power pack from the foundation
- drain the oil from the tank
- disassemble the tank from the manifold
- replace the oil filter
- reassemble the tank ind the opposite direction
- refill the oil tank with new oil



5.2.2 Changing the filters PP II to IV

Reckmann power packs from size 2 up are equipped with a separate oil filter unit. Please find location and identification of the filters in the chapter “product description” at the beginning of this manual. The following steps are necessary to replace the oil filter:

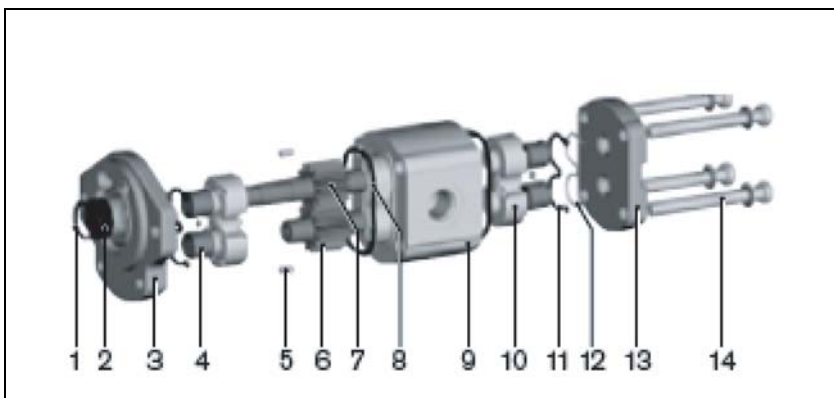
- release all pressure from the system
- disconnect the system from the electric circuit
- clean the area around the filter from dust
- screw the filter bracket out
- pull the filter bracket out of the tank
- replace the filter
- assemble the system in opposite direction
- restart the system and check the filter bracket for leakages

The air filter is situated in the oil filler cap. It can be replaced by a Bosch spare part.

5.3 Gear type pumps

The external gear pump consists essentially of a pair of gears supported in bearing bushings and the case with a front and a rear cover. The drive shaft protrudes from the front cover where it is sealed by the shaft seal ring. The bearing forces are absorbed by special bearing bushings with sufficient elasticity to produce surface contact instead of line contact. They also ensure excellent resistance to galling – especially at low speed. The gears have 12 teeth. This keeps both flow pulsation and noise emission to a minimum. The pumps are working maintenance-free.

The following picture shows an example:

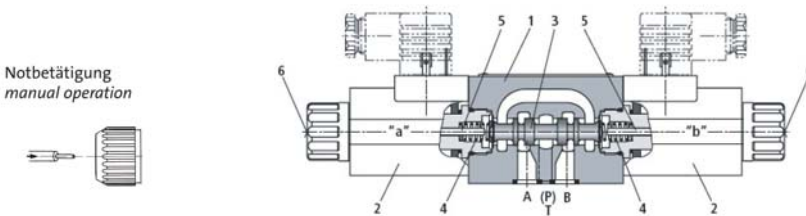


1	Retaining ring	8	Case seal
2	Shaft seal ring	9	Pump case
3	Front cover	10	Bearing
4	Slide bearing	11	Axial zone seal
5	Centering pin	12	Support
6	Gear	13	End cover
7	Gear (frictional)	14	Fixing screws

5.4 Directional control valves NG6 series D

Directional valves of type WE are solenoid-operated directional spool valves. They control the start, stop and direction of a flow. These directional valves basically consist of housing (1), one or two solenoids (2), control spool (3), as well as one or two return springs (4). In the non-operated condition, control spool (3) is held by return springs (4) in the central or in the initial position. Control spool (3) is actuated via wet-pin solenoids (2). The force provided by solenoid (2) acts via plunger (5) on control spool (3) and shifts the latter from its rest position to the desired final position. This enables the required direction of flow depending on the spool symbol. When solenoid (2) is de-energized, control spool (3) is pushed by return spring (4) back to its rest position. Manual override (6) allows control spool (3) to be shifted without energisation of the solenoid.

The following picture shows an example:



Note!

To ensure proper operation, make sure that the solenoid is filled with oil.



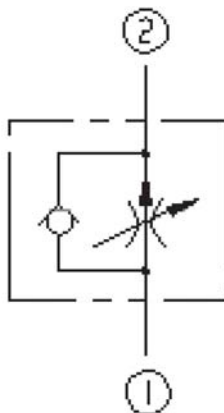
Note!

The manual override may only be operated using a rounded-off tool (dia 3 mm).

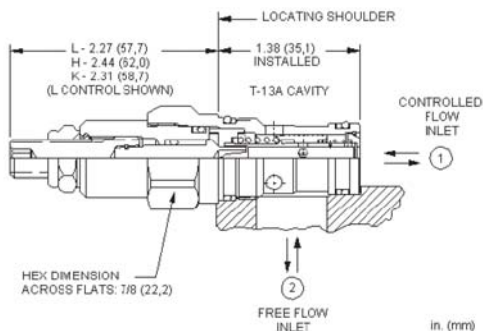
5.5 Flow control cartridge FDBA-LAN or similar

Fully adjustable, pressure-compensated flow controls with reverse-flow check provide precise flow regulation for meter-in or meter-out applications where there may be wide pressure fluctuations. They are infinitely adjustable from nearly closed up to the maximum flow. An integral high-capacity check valve provides unrestricted flow from port 2 to port 1.

Adjustment range: 0...23 l/min



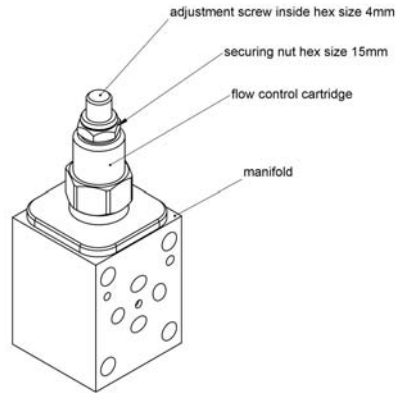
Sectional view off he flow control valve:



Adjusting the oil flow:

Follow the steps mentioned below or oil flow adjustment:

1. release the securing nut
2. fasten the adjustment screw totally (clockwise)
3. start the hydraulic function
4. increase the oil flow by releasing the adjustment screw up to the required value (anti-clockwise).
5. secure the adjustment by fastening the securing nut



6 Specifications

6.1 PP1 1,5 kW and 2 kW

Ölbehältervolumen / oil capacity	3 l
Betriebsdruck / rated pressure	140 bar
max. Betriebsdruck / max. pressure	160 bar
max. Volumenstrom* / max. oil flow*	9,8 l/min
Volumenstrom bei 100bar* / oil flow @ 100 bar*	7,2 l/min
Volumenstrom bei 140 bar* / oil flow @ 140 bar*	6,5 l/min
Schlauchanschluß / hose connector	R1/4" female

* Volumenstrom auf Druckseite der Pumpe / flow rate at pressure side of pump

elektrische Daten / electric specifications

Leistung bei 12V / power @12V	1,3 kW
Leistung bei 24V / power @ 24V	1,5 kW

erforderliche Absicherung des E-Motors /
recommended fuse protection for the electric motor

bei 12V / @ 12V	250 A
bei 24V / @ 12V	180 A

erforderliche Absicherung des Steuerstromkreises /
recommended fuse for the control circuit

	6 A
--	-----

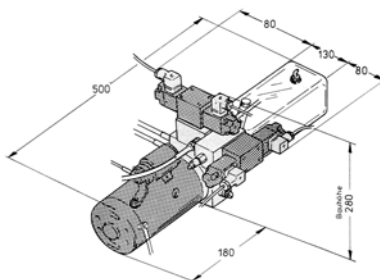
Erforderlicher Kabelquerschnitt in Abhängigkeit der
Kabellänge (Weg: Batt-Aggr.-Batt)

recommended wire cross section depending on wire
length (batt. - pp.- batt.)

Bis / up to 5m @ 12V	70 mm ²
Bis / up to 5m @ 24V	50 mm ²
Bis / up to 10m @ 12V	120 mm ²
Bis / up to 10m @ 24V	70 mm ²
Bis / up to 12,5m @ 12V	185 mm ²
Bis / up to 12,5m @ 24V	95 mm ²

Measurements and weight:

Weight = 14 kg



6.2 PP1 3 kW

Ölbehältervolumen / oil tank capacity	6 l
Betriebsdruck / rated pressure	150 bar
max. Betriebsdruck / max. pressure	160 bar
max. Volumenstrom* / max. oil flow*	20-26,5** l/min
Volumenstrom bei 100bar* / oil flow @ 100 bar*	11,2-14,4** l/min
Volumenstrom bei 140 bar* / oil flow @ 140 bar*	9,6-12,2** l/min
Schlauchanschluß / hose connector	R1/4" female

* Volumenstrom auf Druckseite der Pumpe / flow rate at pressure side of pump
 ** Abhängig vom Pumpentyp / depends on type of pump

elektrische Daten / electric specifications

Leistung bei 24V / power @ 24V	3 kW
erforderliche Absicherung des E-Motors / recommended fuse protection for the electric motor	180 A

erforderliche Absicherung des Steuerstromkreises / recommended fuse for the control circuit **6 A**
 Erforderlicher Kabelquerschnitt in Abhängigkeit der Kabellänge (Weg: Batt-Aggr.-Batt)

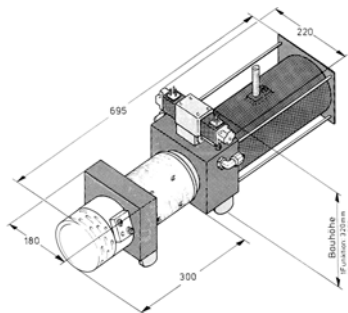
recommended wire cross section depending on wire length (batt. - pp.- batt.)

Bis / up to 5m @ 24V	50 mm ²
Bis / up to 10m @ 24V	70 mm ²
Bis / up to 12,5m @ 24V	95 mm ²

Measurements and weight:

Weight = 37 kg

@ two funtions



6.3 PP2

Ölbehältervolumen / oil tank capacity	30 l
Betriebsdruck / rated pressure	150 bar
max. Betriebsdruck / max. pressure	160 bar
max. Volumenstrom* / max. oil flow*	20-26,5** l/min
Volumenstrom bei 100bar* / oil flow @ 100 bar*	11,2-14,4** l/min
Volumenstrom bei 140 bar* / oil flow @ 140 bar*	9,6-12,2** l/min
Schlauchanschluß / hose connector	R3/8" female

* Volumenstrom auf Druckseite der Pumpe / flow rate at pressure side of pump

** Abhängig vom Pumpentyp / depends on type of pump

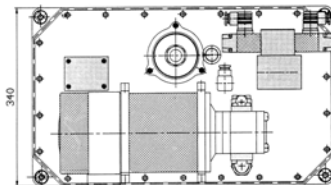
elektrische Daten / electric specifications

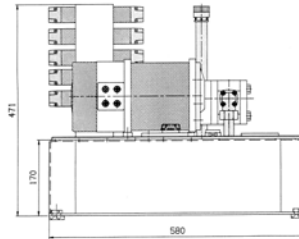
Leistung bei 24V / power @ 24V	3 kW
erforderliche Absicherung des E-Motors / recommended fuse protection for the electric motor	180 A
erforderliche Absicherung des Steuerstromkreises / recommended fuse for the control circuit	6 A
Erforderlicher Kabelquerschnitt in Abhängigkeit der Kabellänge (Weg: Batt-Aggr.-Batt) recommended wire cross section depending on wire length (batt. - pp.- batt.)	
Bis / up to 5m @ 24V	50 mm ²
Bis / up to 10m @ 24V	70 mm ²
Bis / up to 12,5m @ 24V	95 mm ²

Measurements and weight:

Weight = 48 kg

@ 5 funktions





6.4 PP3

Ölbehältervolumen / oil tank capacity	30 l
Betriebsdruck / rated pressure	150 bar
max. Betriebsdruck / max. pressure	160 bar
max. Volumenstrom* / max. oil flow*	47,5 l/min
Volumenstrom bei 100bar* / oil flow @ 100 bar*	25,6 l/min
Volumenstrom bei 140 bar* / oil flow @ 140 bar*	9,6-12,2** l/min
Schlauchanschluß / hose connector	R3/8" female

* Volumenstrom auf Druckseite der Pumpe / flow rate at pressure side of pump

** Abhängig vom Pumpentyp / depends on type of pump

elektrische Daten / electric specifications

Leistung bei 24V / power @ 24V	3 kW
--------------------------------	------

erforderliche Absicherung des E-Motors /
recommended fuse protection for the electric motor

	180 A
--	-------

erforderliche Absicherung des Steuerstromkreises /
recommended fuse for the control circuit

	6 A
--	-----

Erforderlicher Kabelquerschnitt in Abhängigkeit der

Kabellänge (Weg: Batt-Aggr.-Batt)
recommended wire cross section depending on wire
length (batt. - pp.- batt.)

Bis / up to 5m @ 24V	50 mm ²
----------------------	--------------------

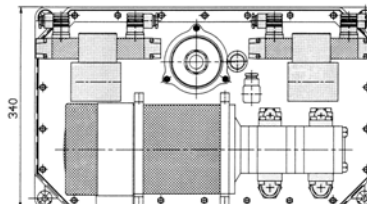
Bis / up to 10m @ 24V	70 mm ²
-----------------------	--------------------

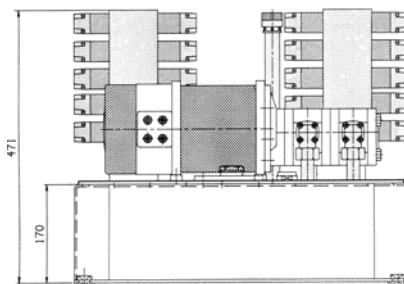
Bis / up to 12,5m @ 24V	95 mm ²
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Measurements and weight:

Weight = 55 kg

@ 10 functions.





6.5 PP4

Ölbehältervolumen / oil tank capacity	60 l
Betriebsdruck Pumpe 2+3 / rated pressure pump 2+3	100 bar
Betriebsdruck Pumpe 1+4 / rated pressure pump 1+4	150 bar
max. Betriebsdruck / maximum pressure	160 bar
max. Volumenstrom* / max. oil flow	95 l/min
Volumenstrom bei 100bar* / oil flow @ 100 bar	51,2 l/min
Volumenstrom bei 140 bar* / oil flow @ 140 bar	23,6 l/min
Schlauchanschluß / hose connector	R3/8" female

* Volumenstrom auf Druckseite der Pumpe / flow rate at pressure side of pump

elektrische Daten / electric specifications

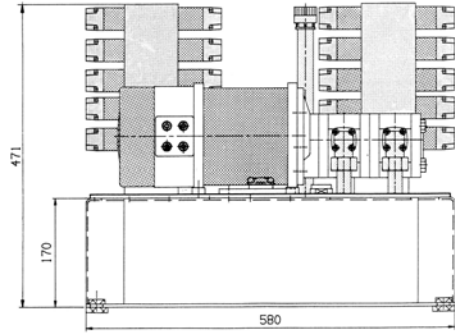
Leistung bei 24V / power @ 24V	6 kW
erforderliche Absicherung je E-Motor / recommended fuse protection per electric motor	180 A
erforderliche Absicherung des Steuerstromkreises / recommended fuse for the control circuit	6 A
Erforderlicher Kabelquerschnitt in Abhängigkeit der Kabellänge (Weg: Batt-Aggr.-Batt) recommended wire cross section depending on wire length (batt. - pp.- batt.)	
Bis / up to 5m @ 24V	50 mm ²
Bis / up to 10m @ 24V	70 mm ²
Bis / up to 12,5m @ 24V	95 mm ²

Specifications

Dimensions and weight:

Weight = 79 kg

For 10 functions.



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