

### Technical Features

- › AC electro-hydraulic unit, easy-to-assemble, compact
- › Modularity offers many combinations of hydraulic circuits to suit various requirements
- › Main applications are in industrial automation such as machine tools, the food or textile industry or power engineering
- › 8 optional central block basic circuits see ZB06 (HA0010) data sheet
- › Possibility of building up an additional circuit in the form of vertical or horizontal stacking assembly
- › Three-phase motors with power ratings of up to 7.5 kW
- › Tank capacities from 10 to 250 l
- › Regulated and constant gear pump options
- › In the standard version, the steel basic block is phosphated, oil tank and cover are painted and steel plates are zinc-coated for 240 h protection acc. to ISO 9227

### Functional Description

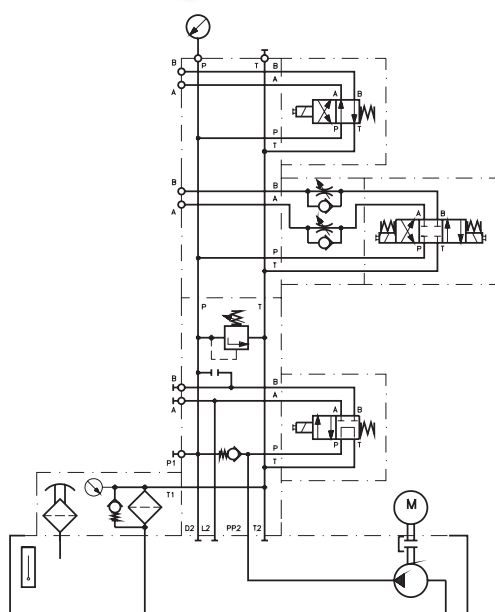
This technical information serves as a basic summary for configuring and building hydraulic power packs designed from standardized sub-assemblies.

Table 1 supports the selection of the required combination (tank capacity, pump type, flow rate, pressure, size of the electric motor, type of pressure control etc.).

If you cannot find the required solution using the components shown below, please consult with us. We can offer standard and special oil tanks, remote control of components, drives with double pumps, special component connections etc. On request, also the separate components can be delivered.

A questionnaire, which is enclosed with this information, also should help you specify your requirements. Please enclose also the respective circuit diagram, the required installation dimensions, as well as the size and orientation of the connecting ports.

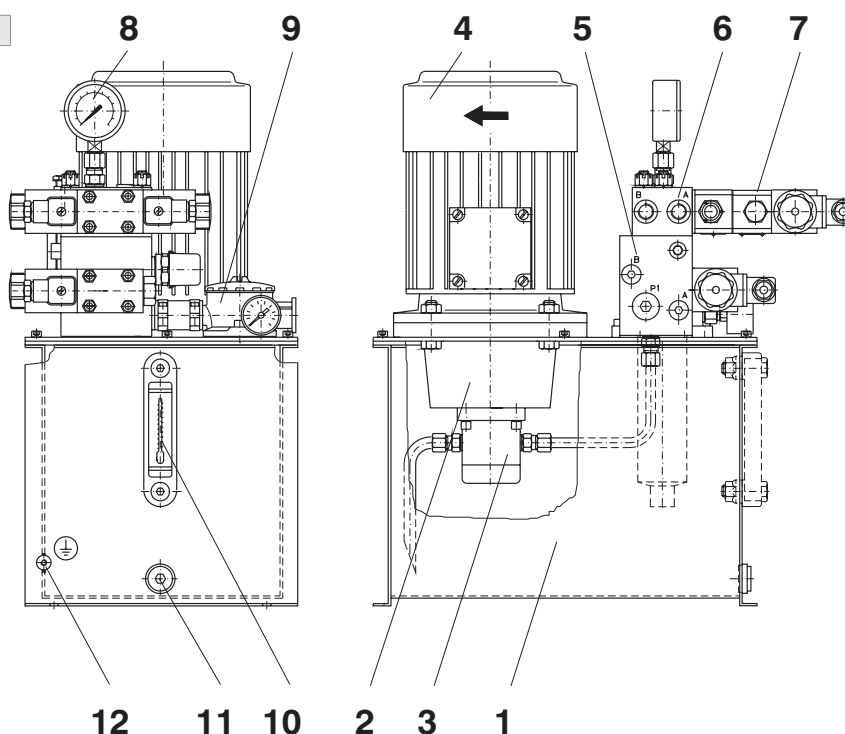
That we can offer you a power pack, which will comply completely with your requirements, we need exact information about your system.



### SA4

Fig. 1

- 1 Tank
- 2 Drive / bell housing
- 3 Pump
- 4 Electric motor
- 5 Base block (safety block of the accumulator)
- 6 Horizontal stacking assembly
- 7 Vertical stacking assembly
- 8 Pressure gauge
- 9 Return filter with by-pass, integrated air breather / filler and clogging indicator
- 10 Continuous level gauge
- 11 Magnetic drain plug
- 12 Grounding point



Tab. 1

Type of the power pack	Tank capacity [l]	Type of the pump	Flow rate [l/min]	Working pressure [bar]	Size of the electric motor	Q/p Table No.	Type of the control
SA4-10C	10	gear pump	0.5 - 10.5	250	80, 90	3	14
SA4-20C	20	gear pump	0.5 - 21.8	250	80, 90, 100, 112	3	14, 16
SA4-30C	30	gear pump	1.9 - 23.6	250	80, 90, 100, 112	2 - 3	14, 15, 16
SA4-40C	40	gear pump	1.9 - 23.6	250	80, 90, 100, 112	2 - 3	14, 15, 16
SA4-45U	45	gear pump	1.9 - 23.6	250	80, 90, 100, 112	2 - 3	14, 15, 16
SA4-60H	60	gear pump	6 - 36	250	80, 90, 100, 112, 132	2 - 4	14, 15, 16, 18
SA4-60U	60	variable piston pump	up to 29			5	17
		gear pump	6 - 36	250	80, 90, 100, 112, 132	2 - 4	14, 15, 16, 18
SA4-100H	100	variable piston pump	up to 29			5	17
		gear pump	6 - 42	250	90, 100, 112, 132	2 - 4	14, 15, 16, 18
SA4-250H	250	variable piston pump	up to 50			5	17
		gear pump	up to 50	250	80, 90, 100, 112, 132	2 - 4	14, 15, 16, 18

## Design of the Power Pack from Standardized Sub-Assemblies

### 1 Location

Clear description of the working environment of the power pack.

### 2 Working conditions

Example of the power pack working cycle (service character).

### 3 Working pressure p [bar]

Working cycle description - time / pressure diagram.

### 4 Flow rate Q [l/min]

Flow rate, which is necessary to ensure the required velocities and revolutions.

### 5 Type of the pump

To be determined after evaluation of the points above.

The following pumps are available: - gear pumps  
- variable piston pumps

### 6 Pump displacement

See point 7.

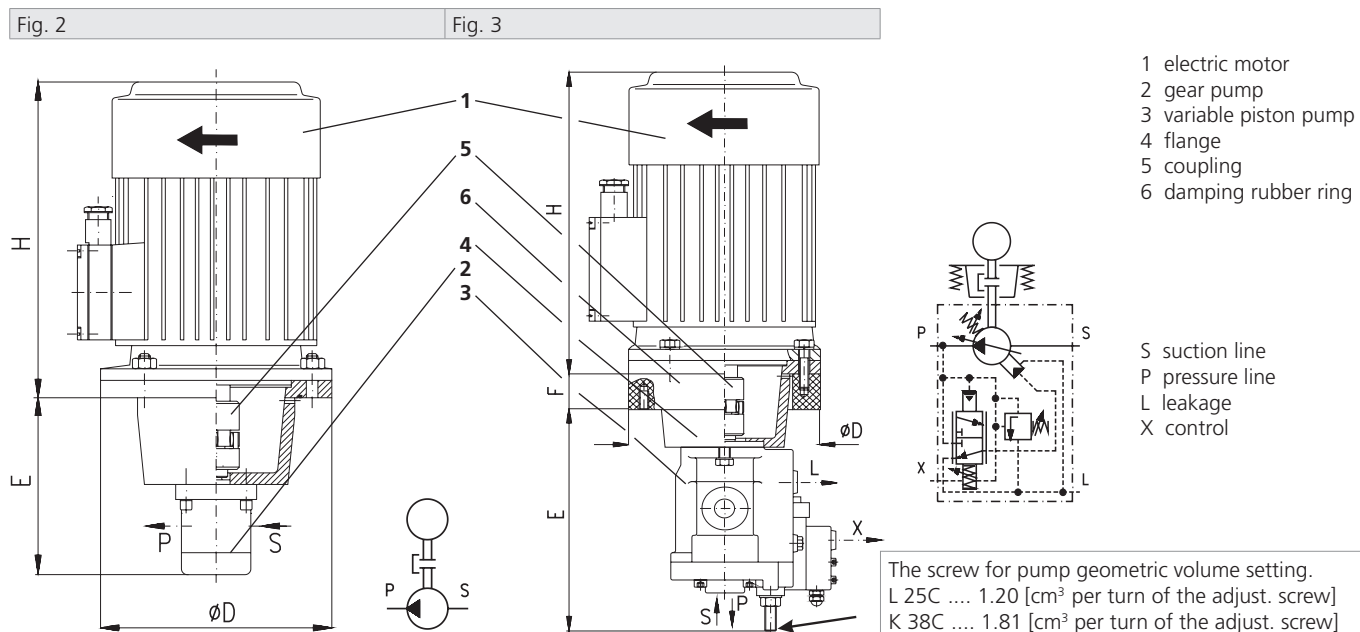
### 7 Electric motor

Using Tables 1 through 5 and the required flow rate and pressure, the respective displacement of the pump, as well as the power and revolutions of the electric motor are to be determined. These data are to be put down into the questionnaire, together with the information regarding the network voltage and frequency, type of enclosure, climatic endurance etc. The tables also include the basic drive dimensions - diameter of the flange and the total height of the electric motor including the flange thickness or the thickness of the damping ring (Fig. 2 and 3). The damping rubber ring is normally delivered with the drives with the variable piston pump. On request, it can also be delivered with the gear pumps.

### 8 Lay out of the drive

Vertical - with all types of gear pumps and with axial piston pumps with pressure control (Fig. 2 and 3).

Horizontal - only for special applications and after consultation with us.



**Tab. 2a Gear Pumps Size 1 - Series GP1**

Data of the electric motor			Displacement of the pump [cm³]												Dimension of the drive		
			0.8		1.2		1.6		2.1		2.5		3.3				
Size	rpm [1/min]	P [kW]	Q/p <sub>n</sub> [l/min] / [bar]												Ø D [mm]	H [mm]	E max [mm]
80	1395	0.55	1.1	200	1.6	170	2.1	125	2.8	95	3.3	80	4.4	60	200	270	174
80	1395	0.75			1.6	200	2.1	170	2.8	130	3.3	110	4.4	80	200	270	174
90	1410	1.10					2.1	200	2.8	190	3.3	160	4.4	120	200	310	174
90	1410	1.50							2.8	200	3.3	200	4.4	165	200	310	174
100	1420	2.20											4.4	200	250	360	192
100	1420	3.00															
71	2790	0.55	2.1	125	3.1	85	4.2	60	5.6	45	6.6	40	8.7	30	160	225	157
80	2850	0.75	2.2	165	3.2	110	4.3	85	5.7	65	6.8	55	8.9	40	200	270	174
80	2835	1.10	2.2	200	3.2	160	4.3	125	5.7	95	6.7	80	8.9	60	200	270	174
90	2860	1.50			3.2	200	4.3	165	5.7	125	6.8	105	9.0	80	200	310	174
90	2850	2.20					4.3	200	5.7	185	6.8	155	8.9	120	200	310	174
100	2895	3.00											9.1	160	250	360	192

**Tab. 2b Gear Pumps Size 1 - Series GP1**

Data of the electric motor			Displacement of the pump [cm³]												Dimension of the drive		
			3.6		4.4		4.8		5.8		6.2		7.9				
Size	rpm [1/min]	P [kW]	Q/p <sub>n</sub> [l/min] / [bar]												Ø D [mm]	H [mm]	E max [mm]
80	1395	0.55	4.8	55	5.8	45	6.4	40	7.7	35	8.2	30	10.5	25	200	270	174
80	1395	0.75	4.8	75	5.8	60	6.4	55	7.7	45	8.2	45	10.5	35	200	270	174
90	1410	1.10	4.8	110	5.9	90	6.4	80	7.8	70	8.3	65	10.6	50	200	310	174
90	1410	1.50	4.8	150	5.9	120	6.4	110	7.8	95	8.3	85	10.6	70	200	310	174
100	1420	2.20	4.8	200	5.9	180	6.5	165	7.8	135	8.4	125	10.7	100	250	360	192
100	1420	3.00			5.9	200	6.5	200	7.8	160	8.4	160	10.7	135	250	360	192
71	2790	0.55	9.5	30	11.7	25	12.7	20	15.4	20	16.4	15	20.9	15	160	225	157
80	2850	0.75	9.7	35	11.9	30	13.0	30	15.7	25	16.8	20	21.4	15	200	270	174
80	2835	1.10	9.7	55	11.9	45	12.9	40	15.6	35	16.7	30	21.3	25	200	270	174
90	2860	1.50	9.7	75	11.9	60	13.0	55	15.8	45	16.8	45	21.5	35	200	310	174
90	2850	2.20	9.7	110	11.9	90	13.0	80	15.7	65	16.8	65	21.4	50	200	310	174
100	2895	3.00	9.9	145	12.0	120	13.2	110	16.0	90	17.1	85	21.7	65	250	360	192

**Tab. 3a Gear Pumps Size 2 - Series GP2**

Data of the electric motor			Displacement of the pump [cm³]										Dimension of the drive		
			4		5		6.3		8		10				
Size	rpm [1/min]	P [kW]	Q/p <sub>n</sub> [l/min] / [bar]										Ø D [mm]	H [mm]	E max.[mm]
90	1410	1.1	5.4	100	6.7	80	8.5	65	10.8	50	13.5	40	200	310	222
90	1410	1.5	5.4	135	6.7	110	8.5	85	10.8	65	13.5	55	200	310	222
100	1420	2.2	5.4	195	6.7	155	8.5	125	10.8	100	13.5	80	250	360	228
100	1420	3.0	5.4	270	6.7	215	8.5	170	10.8	135	13.5	105	250	360	228
112	1440	4.0			6.8	270	8.6	225	11.0	175	13.8	140	250	348	228
132	1455	5.5							11.0	240	13.8	190	300	470	248
132	1455	7.5									13.8	250	300	470	248

**Tab. 3b Gear Pumps Size 2 - Series GP2**

Data of the electric motor			Displacement of the pump [cm³]								Dimension of the drive		
			12.5		16		20		25				
Size	rpm [1/min]	P [kW]	Q/p <sub>n</sub> [l/min] / [bar]								Ø D [mm]	H [mm]	E max. [mm]
90	1410	1.1	16.9	30	21.6	25	27.0	20	33.7	15	200	310	222
90	1410	1.5	16.9	45	21.6	35	27.0	25	33.7	20	200	310	222
100	1420	2.2	16.9	65	21.6	50	27.0	40	33.7	30	250	360	228
100	1420	3.0	16.9	85	21.6	65	27.5	55	33.7	45	250	360	228
112	1440	4.0	17.3	110	22.1	90	27.5	70	34.6	55	250	348	228
132	1455	5.5	17.3	155	22.1	120	27.5	95	34.6	75	300	470	248
132	1455	7.5	17.3	210	22.1	165	27.5	130	34.6	105	300	470	248

**Tab. 4 Gear Pumps Size 3 - Series GP3**

Data of the electric motor			Displacement of the pump [cm³]								Dimension of the drive [mm]		
			10		17		27		34				
Size	rpm [1/min]	P [kW]	Q/p <sub>n</sub> [l/min] / [bar]								Ø D	H	E max.
100	1420	3.0	13.5	105	22.9	65	36.9	40	45.9	30	250	360	255
112	1440	4.0	13.8	140	23.3	85	36.9	50	46.5	40	250	348	255
132	1455	5.5	13.8	190	23.5	110	37.3	70	47.0	55	300	470	275
132	1455	7.5			23.5	155	37.3	95	47.0	75	300	470	275

**Tab. 5 Variable Pistons Pumps**

Data of the electric motor			Maximum geometric volume of the pump [cm³]				Dimension of the drive [mm]			L25C	K38C
			L25C		K38C						
Size	rpm [1/min]	P [kW]	25*	38*			Ø D	H	F	E max. [mm]	E max. [mm]
			max. Q/p [l/min] / [bar]								
100	1420	2.2	33.7	35			250	360	45	296	
100	1420	3.0	33.7	50			250	360	45	296	
112	1440	4.0	34.1	65			250	348	45	296	
132	1455	5.5	34.4	90	52.5	55	300	470	50	296	313
132	1455	7.5	34.4	120	52.5	75	300	470	50	296	313

\*Maximum geometric volume of pump is adjusted with setting screw (see Fig. 3)

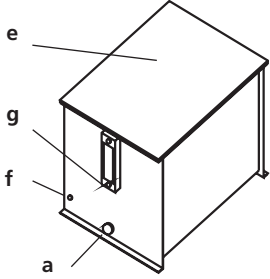
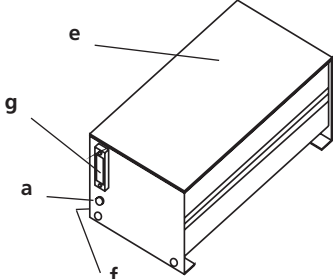
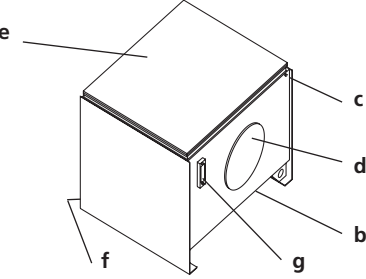
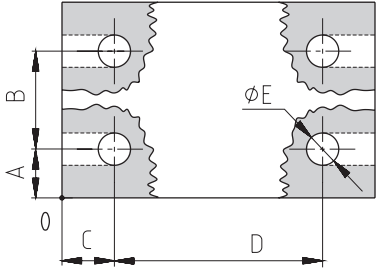
L 25C .... 1.20 [cm³ per turn of the adjustment screw], K 38C .... 1.81 [cm³ per turn of the adjustment screw]

## 9 Tank capacity

The following are our recommendations for a suitable tank capacity:

- hydraulic circuits with fixed pumps - from 3 up to 6 multiple of the pump flow rate [l/min].
- hydraulic circuits with variable pumps - from 2 up to 4 multiple of the pump flow rate [l/min]

Tanks normally delivered:

Fig. 4	Fig. 5	Fig. 6
Tank models 10C, 20C, 30C, 40C	Tank models 45U, 60U	Tank models 60H, 100H, 250H
		
<p>Parts delivered with a tank (Fig.4, 5, 6):</p> <p>a) Drain plug on the front side of the tank - with capacities 10H, 20H, 30H, 40H, 45U, 60U</p> <p>b) Drain plug on the bottom of the tank - with capacities 60H, 100H, 250H</p> <p>c) Leakage drain plug on the through collector at the upper side of the tank - with capacities 60H, 100H, 250H</p> <p>d) Cleaning cover on the side of the tank - with capacities 60H, 100H, 250H</p> <p>e) Bolt mounted cover sealad against dust penetration</p> <p>f) Grounding bolt</p> <p>g) Continuous level gauge</p>		<p>Fig. 7</p> 

Tank designation	Tank capacity [l]	Tank dimension Length x width x height [mm]	Dimension of fix slots [mm] (Fig. 7)				
			A	B	C	D	Ø E
10C	10	400 x 280 x 186	30	220	6	388	9 (slot)
20C	20	400 x 280 x 274	30	220	6	388	9 (slot)
30C	30	500 x 320 x 285	30	260	10.5	479	11 (slot)
40C	40	500 x 320 x 364	30	260	10.5	479	11 (slot)
45U	45	700 x 370 x 329	35	300	25	650	11
60U	60	700 x 370 x 394	35	300	25	650	11
60H	60	600 x 470 x 485	35	400	30	540	14
100H	100	700 x 550 x 565	25	500	30	640	14
250H	250	1006 x 610 x 680	20	570	47	912	14

## 10 Painting

The following are the standard paintings of the outside surface of the tank:

- top coat - RAL 7030 KOMAXIT (stone gray)
  - aluminum parts - without surface treatment
  - hydraulic components - manufacturer's standard painting
- Other paints or special surface treatment on request.

## Component assembly on the tank cover

In addition to drive unit, also the base block and filtering unit are usually situated on the tank cover. The base block is connected to the pump output. It comprises a check valve and pressure valve (or some other components) according to the pressure control system used (see the circuit diagrams in Fig. 14 to 18). It also enables other components of the hydraulic circuit to be connected, e.g.:

- oil filter
- subplates or connecting plates with the respective components
- accumulator

## 11 Pressure control

- Pressure relief valve VT (Fig. 14) - used with all types of gear pumps.
- Unloading valve VO (Fig. 15) - used in combination with a gear pump, an accumulator and a check valve. When the pressure set at the unloading valve is reached, the valve loads the pump. The accumulator provides for holding the pressure in the circuit behind the check valve. The pressure valve VP works as the safety valve of the accumulator.
- Switching (Fig. 16) - used in combination with a gear pump, an accumulator, a check valve and a pressure switch TS. When the pressure in the system reaches the pressure set at the pressure switch, the respective circuit switches off the electric motor. The accumulator holds the pressure in the circuit behind the check valve. The pressure valve VP works as the safety valve of the accumulator.
- Remote control with the pressure relief valve VT (Fig. 17) - used only with piston pumps with pressure control. The pressure valve VP protects the circuits against pressure peaks.
- Pressure valve on the pump - used with piston pumps with pressure control. The pressure is adjusted by the screw which is fixed to the pump. The pressure valve VP protects the circuit against pressure peaks.

## 12 Oil filtration

Preferably the return line filters with visual (Fig. 8) or electric (Fig. 9) clogging indication are used. These filters can also be used (after removing the cover) as the filling filters. They usually also comprise an integrated air breather.

Type of the filter	Type of the insert	Flow rate [l/min]	By-pass $\Delta p$ [bar]	Absolute filtration [ $\mu m$ ]
FR 043 - 166	V3 . 0510 - 56	25	2.5	10
FR 072 - 166	V3 . 0520 - 56	50	2.5	10
E 103 - 676	V3 . 0620 - 56	80	2.5	10

Fig. 8

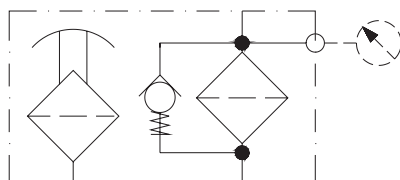
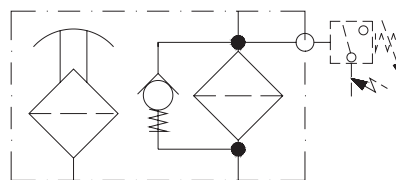


Fig. 9



## 13 Size of the components

The hydraulic components are assembled into a hydraulic circuit by means of connecting or modular plates PD06 (catalogue HA 0006). These plates support the build-up of hydraulic systems as horizontal or vertical stacking assemblies resulting in a compact system without connecting pipes or hoses. Up to 8 section can be connected in a horizontal stacking assembly. The installation dimension of the components size 06 correspond with ISO 4401- Ab-03-4 and DIN 24340-A6. The working ports are provided with pipe threads as follows:

- a) base block type ZB 06 x - xx  
A, B - G3/8"  
P, P1, T - G1/2"
- b) in-line modular plates PD 06 xx - AL  
A, B, P - G3/8"  
T - G1/2"

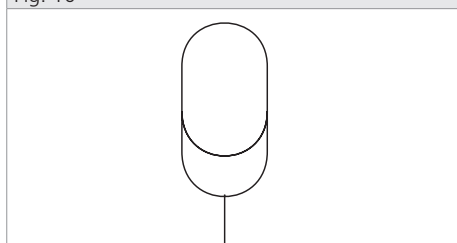
#### 14 Control voltage

The control voltage of the electro-hydraulic components must be determined with regard to the safety and health protection. On request, the components with the following DC control voltages can be delivered: 12, 14, 21, 24, 42, 48, 60, 102 and 205 V. The available AC voltages are 24, 115 and 230 V / 50 (60) Hz.

#### 15 Accumulators

The gas bladder or membrane accumulators are being used (Fig. 10). The required capacity in liters is to be determined. Preferably the accumulators from suppliers who can ensure the international certification (at least the certification from the German Testing Laboratory TÜV) are used. When filling in the form, please indicate the country in which your machine with our power pack is going to be used. The accumulator is a pressure tank which must comply with work safety regulations. These regulations differ from country to country. The accumulator must be provided with the certificate of the respective country it is going to be used in! Smaller accumulators (up to 4 l) are mounted directly onto the cover of the tank or onto a short block (max. with 2 section of control components above the base block). Larger accumulators are mounted only onto the tank cover. Together with an accumulator also the filling and checking equipment can be delivered (including the pressure gauge for filling the accumulator with nitrogen). We recommend the use of an accumulator to be discussed with our technicians.

Fig. 10



#### 16 Accumulator block

The function of the safety block is provided by the base block (see Fig. 15 and 16). The use of another block is to be discussed with us.

#### 17, 18 Thermometer, thermostat, oil level transducer

These instruments can be mounted onto the tank cover. The thermometer (Fig. 11) and the thermostat (Fig. 12) check the oil temperature. The oil level transducer (Fig. 13) indicates the oil level in the tank.

Fig. 11

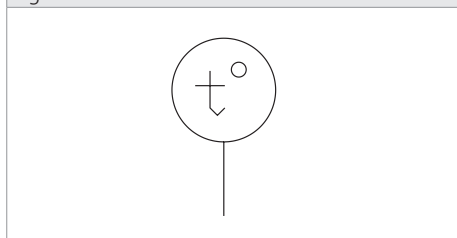


Fig. 12

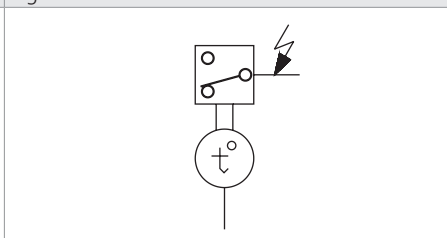
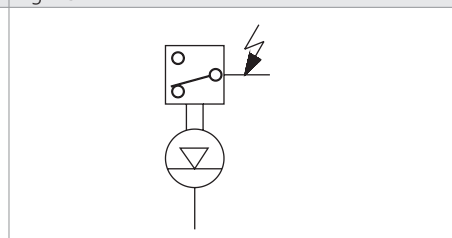


Fig. 13



#### 19 Electric equipment

Power packs delivered without electric equipment are standard. The electric circuit diagram of the electric motor is on the lower side of the cover of the motor terminal box. On request, the electric boxes (including terminals, circuits breakers etc.) can be delivered.

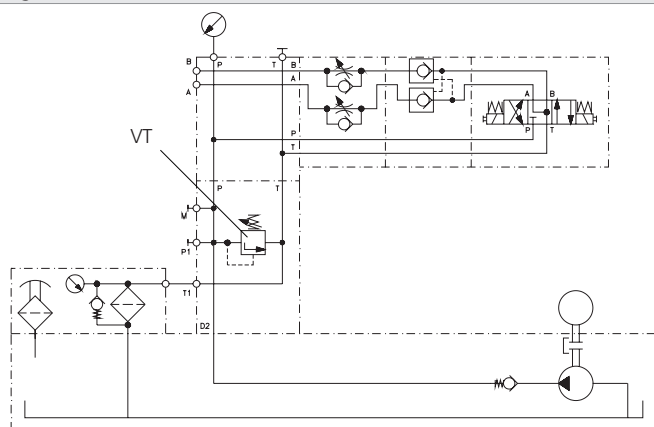
#### 20 Hydraulic fluid

The hydraulic power packs are designed to operate with mineral oils of the power classes HM and HV according to the European specification CETOP-RP 91 H and with the bio-degradable hydraulic fluids of the groups HTG and HE according to DIN-proposal.

#### 21 Special equipment

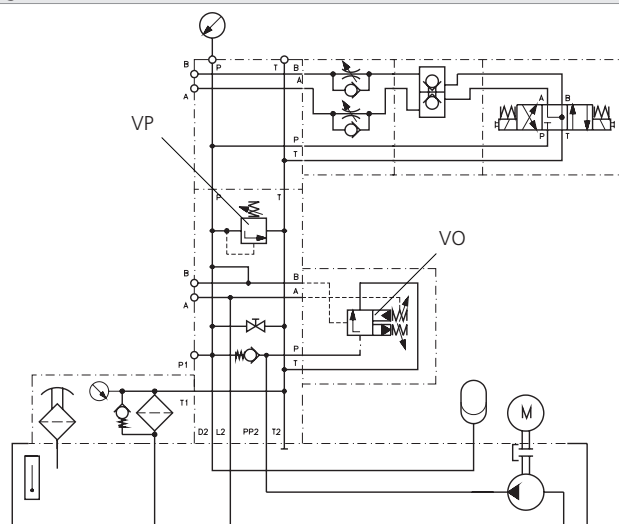
Special requirements regarding the power pack equipment, such as oil cooling and heating, power pack covering etc., are to be consulted with our technicians.

Fig. 14



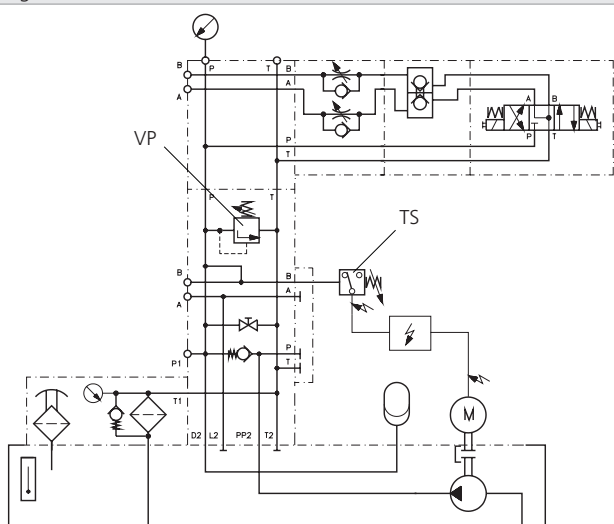
Power pack with gear pump - pressure in hydraulic system is controlled by pressure relief valve VT.  
(usable with tank capacities)

Fig. 15



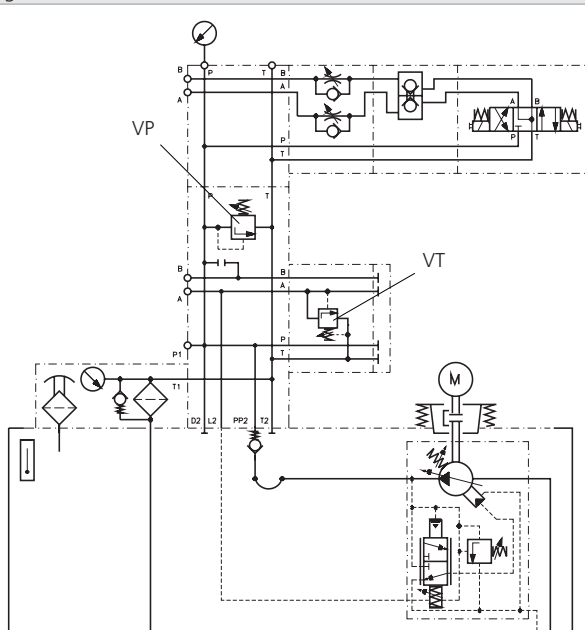
Power pack with gear pump - pressure in the system held by accumulator and check valve, pump pressure unloaded through unloading valve VO. Pressure relief valve VP works as the safety valve of the accumulator (for tank capacities from 40 up to 250 l and accumulators capacities from 2.5 up to 10 l).

Fig. 16



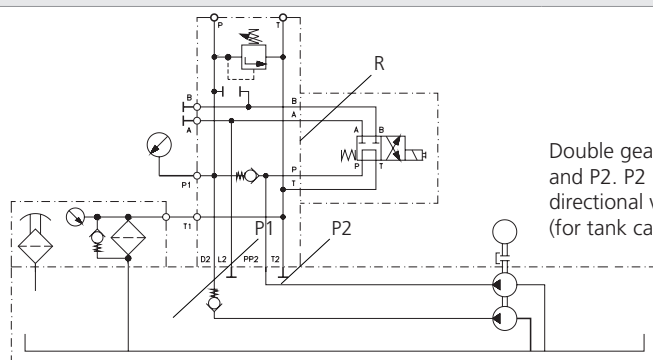
Power pack with gear pump and pressure switch TS controlling the switching-off of the electric motor. Pressure relief valve VP works as the safety valve of the accumulator (for tank capacities from 20 up to 60 l and accumulators capacities from 2.5 up to 10 l).

Fig. 17



Power pack with piston pump with pressure control - remote pressure control through pressure relief valve VT. Pressure relief valve VP protects the system against pressure peaks (for tank capacities from 60 up to 250 l).

Fig. 18



Double gear pump hydraulic power unit with two pressure ports P1 and P2. P2 pressure port is unloaded by 4/2 solenoid operated directional valve R.  
(for tank capacities from 40 up to 250 l).

# Questionnaire - Hydraulic power pack modular system

1 Location	Productional hall		Protected against weather		Outside		Explosive				
	Other:										
2 Working condition	Uninterrupted			With pauses in min.			Occasionally				
	Other:										
3 Working pressure / peak pressure [bar]	/										
4 Flow [l/min]	Constant:			Variable min.:			max.:				
5 Type of the pompe	Gear							Variable piston pump			
6 Displacement of the pump [cm³]	0.8	1.2	1.6	2.1	2.5	3.3	3.6	4.4	4.8	25	
	5.8	6.2	7.9	4.0	5.0	6.3	8.0	10.0	12.5	38	
	16	17	20	25	27	34				Other:	
	Other:			Flow rate required [l/min]:							
7 Electric motor	[kW]:			[V]:			[Hz]:			[rev/min]:	
	Other information:										
8 Lay out of the drive	Vertical on the tank										
	Other (after consultation with us)										
9 Tank capacity [l]	2.6	5.3	7.9	10.6	11.9	15.9	26.5	66			
	Other:			Continuos level gauge				Other:			
10 Painting	Top coat - standard RAL 7030 KOMAXIT (stone gray)										
	Other top coat:										
11 Pressure control											
12 Filtration	In return line			In pressure line			In suction line			[µm]:	
Clogging indication	Visual			Electric			Other:				
13 Size of the components	06			04 (after consultation)			Other:			Number of section:	
14 Control voltage	12 V DC			14 V DC		21 V DC		24 V DC		42 V DC	48 V DC
	60 V DC			102 V DC		205 V DC					
	24 V AC / 50 (60) Hz				115 V AC / 50 (60) Hz				230V AC / 50 (60) Hz		
15 Accumulator [l]	No	Membrane accumulator						0.32	0.75	1.00	1.40
		Bladder accumulator						2.50	4.00	6.00	10.0
	Other:										
16 Accumulator block	No		ZB06					Other:			
17 Thermometer, thermostat	No		Contact thermometer					TH143			
	Other:										
18 Oil level transducer	No			One - point			Two - point		Continuous		
19 Electric equipment											
20 Hydraulic fluid	Mineral oil						Ecological fluid - type				
21 Special equipment											

The required specifications should be marked with a cross (X) or described with text!