

Determination

Hydraulic system HA 1.5 is designed to adjust a positioning table which is used for transport in ambulance cars. It is used for step-less lifting and lowering of the table and adjusting a head position. The table is hydraulically spring-cushioned but the hydraulic system enables also blocking in any table position. Blocked position can be either spring-cushioned or fixed.

Description

Hydraulic system of positioning table (see hydraulic diagram on Fig.1) consists of power unit HA 1.5, hydraulic cylinder I with safety valve 14, hydraulic cylinder II, unloading valve 4 and accumulator 12. Cylinder II is connected to the power unit ports A, B with hoses H1, H2. Unloading valve 4 is connected to the power unit ports P, R with hoses H3. Cylinder I is connected to the power unit port C with hose H5 and accumulator 12 to port D with hose H4.

Hydraulic power unit H 1.5

The power unit consists of gear pump 7 driven by DC electromotor, solenoid two-way two-position valves 1, 2, 3, 5 and 6, pressure relief valve 8, throttle valve 9, one-way throttling check valve 10 and check valve 11. A suction filter is installed in the pump suction line, on the tank cover is a breather combined with a filling port.

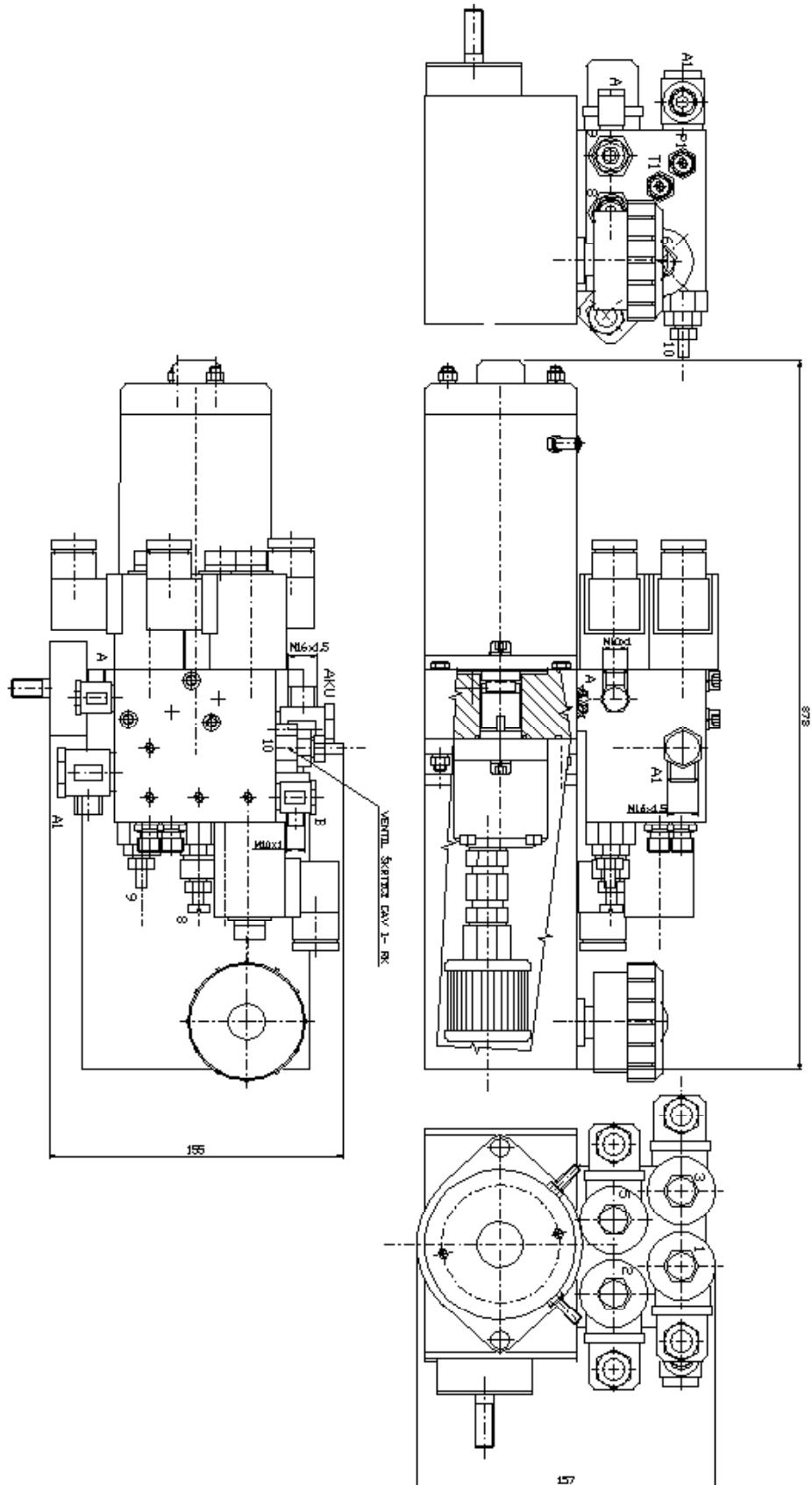
Function

By pressing push button "UP" electromotor is switched on, valve 2 is energized and shifts to position "a". Pump 7 delivers fluid to cylinder I and the table lifts up. After the push button is released, electromotor stops, valve 2 returns to its basic position and the table is held in the reached position by means of valve 11 (the valve is closed). The table lowers with unenergized electromotor by pressing push button "DOWN" and by energizing valve 1 which shifts to position "a". Lowering speed can be controlled by setting valve 9. In any set position the table is hydro-pneumatically spring-cushioned by means of accumulator 12. Table springing is dumped by means of throttling the flow over valve 10. By switching the switch "BLOCKING", valve 3 shifts to position "a" and blocks the flow from cylinder I to accumulator 12. Safety valve 14, assembled with the cylinder I input, serves for blocking the fluid flow from cylinder in case of hose 5 bursting; it prevents an uncontrolled lowering the table.

Cylinder II serves for tilting the table in both directions, i.e. with head or feet down. By pressing push button "HEAD UP" electromotor with pump 7 and valve 5 are switched on and piston of cylinder II shifts out. By pressing push button "HEAD DOWN" electromotor is switched on again, so is valve 6. Cylinder II is now connected over port B with tank and cylinder piston shifts in. Algorithm of individual functions is shown in the table below. Pressure in the system is limited by pressure relief valve 8. Unloading manually controlled valve 4 makes possible to lower the table to its bottom position in case of power or other failure.

Technical parameters

Pressure (bar)	- nominal	140		
	- maximum	180		
Flow at pressure (bar)		100	140	180
	(dm ³ /min ⁻¹)	1,9	1,7	1,5
Electromotor:				
	Voltage		12 V ss ±	
	Current (A)	65	88	110
	Max. time for permanent run s ₂ (min.)	3,5	2,3	1,6
	Duty cycle s ₃ (%)	12	8	6
	Enclosure type to EN 60 529		IP 42	
	Insulation class		B	
Solenoid valves:				
	Voltage		12 V ss ± 10%	
	Nominal current		1,2 A	
	Enclosure type to EN 60 529		IP 65	
	Insulation class		F	
	Max. switching frequency		2 000 ^{h-1}	
	Connector connection		pole 1.2 power; pole PE earthling	
Operational conditions:				
	Fluid	mineral oil OH HM, OH HD, class 22		
	Temperature - fluid	-10 to + 50 °C		
	- ambient	10 to + 40 °C		
	Viscosity - recommended range	(25 to 50) ·10 ⁻⁶ m ² s ⁻¹		



Hydraulic system of positioning table

Legend:

HA 1,5	hydraulic power unit
I	hydraulic cylinder for lifting HMP 1-32
II	hydraulic cylinder for tilting HMP 2-50
1,2,3,5,6	cartridge solenoid valves
4	unloading valve
7	pump with electromotor
8	pressure relief valve
9	throttle valve
10	one-way throttling check valve
11	check valve
12	accumulator
13	suction filter
14	safety valve
H1÷H5	hoses

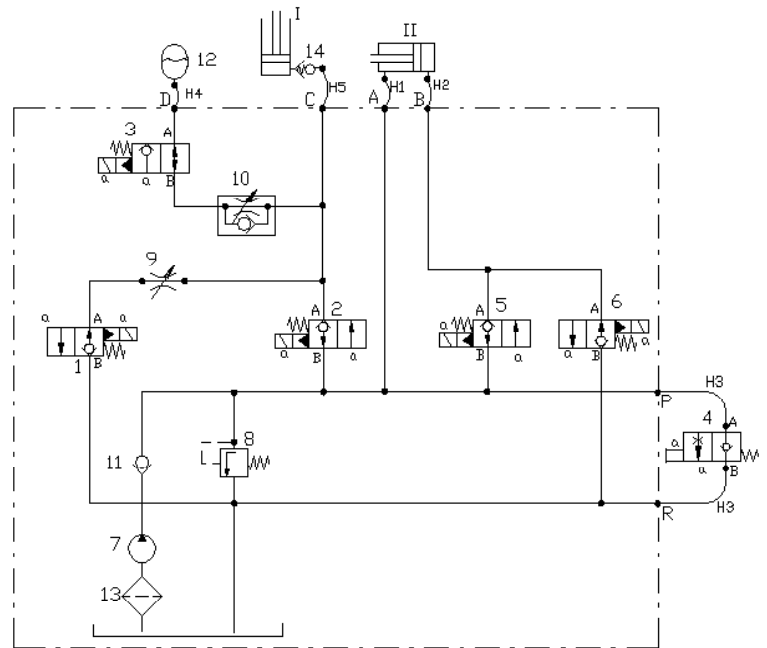


Fig.1 Hydraulic diagram

Algorithm of functions

Function	Switch	Cylinders		Valves						Electromotor
		I	II	1	2	3	4	5	6	
Table up	T 1	1	0	0	1	0	0	0	0	1
Table down	T 2	1	0	1	0	0	0	0	0	0
Blocking	SP	0	0	0	0	1	0	0	0	0
Head up	T 5	0	1	0	0	0	0	1	0	1
Head down	T 6	0	1	0	0	0	0	0	1	1
Emergency lowering to bottom position	manually V4	1	1	0	0	0	1	0	0	0

T 1 – push button “UP”

T 2 – push button “DOWN”

SP – switch “BLOCKING”

T 5 – push button “HEAD UP”

T 6 – push button “HEAD DOWN”

Valve 4 is controlled manually by red push button on the valve

value 1 – component on

value 0 – component off