INSTRUCTION FOR POWER UNIT SELECTION

Tables for power unit selection allow you to determine the characteristic of the pump-motor group according to the full load static pressure and the required car speed.
They are separated by type of jack (single stage, telescopic with mechanical or hydraulic synchronism), by current frequency (50 o 60 Hz) and by rotation speed of the motor (2 poles).

SELECTION OF PUMP FLOW

According to the requested car speed and to the type of jack the rated pump flow can be determined.
The speed value Vp, reported in the data sheet, refers to one direct acting jack

- 1 direct acting jack (1:1): Vc = Vp

For systems with indirect acting jack and/or with two jacks the following car speed are obtained:

- 1 indirect acting jack (2:1): Vc = 2·Vp
- 2 direct acting jacks (1:1): Vc = ½·Vp
- 2 indirect acting jacks (2:1): Vc = Vp

where Vp is the ram/s speed and Vc is the car speed in m/s.

SELECTION OF MOTOR POWER

The motor power is determined according to full load static pressure into the cylinder. The power rate reported in the power unit selection data sheets, already consider dynamic pressure loss up to a maximum of 7 bar.

$$pt + pm + pvc + \frac{\gamma \cdot H}{10} \leq 7 \text{ bar}$$

where:

γ = specific weight of the fluid = 0,88 daN/dm 3
pt = pressure losses into pipe line [bar]
pm = pressure losses due to mechanical friction (normally 1,5 bar)
pvc = pressure losses into the pipe rupture valve = 1,5 bar
H = piezometric height (between power unit outlet and cylinder top) [m]

For high traffic lifts (shopping center, hotels, hospitals and public buildings) we recommend:

- To carry out the thermal balance to verify if a fluid cooler is needed.
- To reduce the number of starting of the main motor using an auxiliary levelling device. (micro-leveling).
- To reduce the starting current (suggested for motor powers over 11kW) using star/delta starting, softstarter.
- Specify if the lift use generators to power supply.

SELECTION OF TANK SIZE

The useful capacity of the tank is calculated according to the necessary fluid volume for the complete extension of the ram. Consumptions (circulating fluid) and the fluid for fitting are reported in the jacks data sheets (section 3). We suggest to keep a margin of 10% more on the useful capacity of the tank.
If a cylinder emptying is requested for any reason, provide auxiliary tanks when needed or use bigger tank size for power unit if you like.

ATTENTION!!!

- For submerged motors power units, motor should be always covered by fluid.
- For dry motors power units, the pump filter should be always covered by fluid.
- Minimum fluid volumes to cover the motor/filter are reported in the power unit data sheets (section 4)

Table 1 - Pressure losses per meter of pipe line [bar/m]

	Rigid pipes		Hoses				
	ø 35 øi=30 mm	ø 42 øi=36 mm	¾" øi=19,0 mm	1" øi=25,4 mm	1" ¼ øi=31,8 mm	1" ½ øi=38,1 mm	2" øi=50,8 mm
[l/min]	Pump + Motor 2 Poles Threephase - 50Hz						
12			0,080				
15			0,100				
18			0,120				
20	0,021	0,010	0,133	0,042	0,017		
25	0,027	0,013	0,166	0,052	0,021	0,010	
30	0,032	0,015	0,200	0,063	0,025	0,012	
35	0,037	0,018	0,233	0,073	0,030	0,014	
43	0,046	0,022	0,286	0,090	0,036	0,018	
55	0,059	0,028	0,366	0,115	0,047	0,023	
75	0,080	0,039	0,499	0,156	0,064	0,031	0,010
100	0,107	0,052	0,666	0,208	0,085	0,041	0,013
125	0,134	0,065		0,261	0,106	0,051	0,016
150	0,161	0,077		0,313	0,127	0,062	0,020
180	0,193	0,093		0,375	0,153	0,074	0,023
210	0,225	0,108		0,438	0,178	0,086	0,027
250	0,268	0,129		0,521	0,212	0,103	0,033
300	0,321	0,155		0,625	0,255	0,179	0,039
360	0,386	0,186			0,305	0,124	0,047
430		0,222			0,365	0,177	0,056
500						0,206	0,065
600							0,078

[l/min]	Pump + Motor 2 Poles Threephase - 60Hz						
14			0,093				
18			0,120				
22			0,146				
24	0,026	0,012	0,160	0,050	0,020	0,010	
30	0,032	0,015	0,200	0,063	0,025	0,012	
36	0,039	0,019	0,240	0,075	0,031	0,015	
42	0,045	0,022	0,280	0,088	0,036	0,017	
52	0,056	0,027	0,346	0,108	0,044	0,021	
66	0,071	0,034	0,439	0,138	0,056	0,027	
90	0,096	0,046	0,599	0,188	0,076	0,037	0,012
120	0,129	0,062	0,799	0,250	0,102	0,049	0,016
150	0,161	0,077		0,313	0,127	0,062	0,020
180	0,193	0,093		0,375	0,153	0,074	0,023
216	0,231	0,112		0,450	0,183	0,089	0,028
252	0,270	0,130		0,525	0,214	0,104	0,033
300	0,321	0,155		0,625	0,255	0,124	0,039
360	0,386	0,186			0,305	0,148	0,047
432		0,223				0,178	0,052
516						0,212	0,067
600						0,406	0,078

OIL WITH KINEMATIC VISCOSITY OF 144 CST EQUIVALENT TO 19°

Table 2 - Permissible ram strokes according to tank size [m]

Tank dimensions (useful capacity)												
Tank	**HL DRY**	**HLC**	**HL HLV40**	**HL50 DRY**	**GL MRLT**	**MRLH**	**F1**	**GL DRY**	**F1 DRY**	**T2**	**T3**	**T4**
Fluid in circulation (useful) [l]	33	35	40	50	75	80	90	95	105	150	300	400

SL	Jacks – 1 Stage											
60	8,5											
70	8,6	9,1	9,5									
80	6,6	7,0	8,0	9,9	10,3							
90	5,2	5,5	6,3	7,8	11,0							
100					9,5	10,2	11,4	11,8				
110					7,9	8,4	9,5	10,0	11,1	12,5		

STD	Jacks – 1 Stage											
120					6,6	7,1	8,0	8,4	9,3	12,8		
130					5,6	6,0	6,8	7,1	7,9	11,3	13,8	
140					4,9	5,2	5,8	6,2	6,8	9,7	14,3	
150					4,2	4,5	5,1	5,4	5,9	8,4	16,0	16,0
160					3,7	4,0	4,5	4,7	5,2	7,5	14,9	16,0
180						3,1	3,5	3,7	4,1	5,8	11,8	
200									3,3	4,8	9,6	
238										3,4	6,7	

HL	Jacks – 1 Stage
55 - 65 - 75	6,5

2 Stages (C2)	Jacks - Telescopics – Hydraulic synchronization											
63	8,0	7,5	9,1	11,4*	17,0*	18,2	20,5					
70	5,8	5,5	6,7	8,3	12,5*	13,3	15,0	15,8*	17,5			
85	4,1	3,9	4,7	5,9	8,8	9,4	10,6	11,2*	12,4	17,6		
100			3,5	4,2	6,6	6,8	7,6	8,1	8,9	12,7		
2 Stages (C3)												
50	7,4	7,0	8,5	10,6*	16,0*	17,0	19,1					
63	5,2	4,9	6,0	7,5	11,2*	11,9	13,4	14,2*	15,7	22,4		
70	3,8	3,6	4,3	5,4	8,2	8,7	9,8	10,3	11,4	16,3		
85				3,8	5,7	6,1	6,8	7,2	8,0	11,4	22,7	
100					4,0	4,3	4,8	5,1	5,6	8,0	16,0	21,4

TCS, EC: 2N, 2Y	Jacks - Telescopics – Mechanical synchronization											
60	9,5	9,0										
75	6,4	6,1	7,3	9,2	13,8*	14,7	16,5	17,4*	18,5			
90	4,6	4,3	5,3	6,6	9,9	10,5	11,9	14,5*	13,8	19,8		
105			4,0	5,0	7,4	7,9	8,9	9,4	10,4	14,9		
120				3,9	5,8	6,2	6,9	7,4	8,1	11,6		
TCS, EC: 3Y												
60	7,6	7,2	8,7	10,9*	16,3*	17,4	19,6					
75	5,3	5,0	6,1	7,6	11,5*	12,2	13,7	14,5*	16,0	22,9		
90	4,0	3,7	4,5	5,6	8,5	9,0	10,2	10,7	11,9	16,9		
105			3,5	4,3	6,5	6,9	7,8	8,2	9,1	13,0		
TCS, EC: 4Y												
60					13,3*	14,2	16,0	16,9*	18,7			
75					9,7	10,3	11,6	12,2*	13,5	19,3		
90					7,3	7,8	8,8	9,3	10,2	14,6		

* If the piston is used on Home Lifty systems (HL powerl units) or GLF systems (GL and MRL power units), the maximum usable ram stroke is less than the value shown in the data sheet, because the maximum certified car travel for the system cannot be exceeded.

NOTES:

- Data refer to fluid with 46 cSt kinematic viscosity
- If the total pressure losses of the pipe line are greater than 4 bar, choose the larger pipe or duplicate the pipe line.
- For each 90° elbow fitting consider a pressure loss corresponding to 1 meter of pipe
- Permissible ram strokes refer to one stroke and one tank.
- For systems with 2 or more jacks divide the stroke by the number of jacks

EXAMPLES

DATA FOR POWER UNIT SELECTION

- jack type 1008 - Ø110x5 total stroke (Lp) = 500 cm - fluid inlet at top
- static pressures: full load (pstat) = 30,27 =~ 31 bar, empty car =~ 17 bar
- requested car speed = 0,70 m/s
- frequency 50 Hz - 2 poles three phases motor
- steel pipe Ø35 - L = 5,0 m; hose 1"1/4 - L = 5,0 m

SELECTION OF THE PUMP FLOW

The upper part of the control unit selection data sheet gives the speed values referred to a single direct acting jack. The speed Vp of the Ø110 ram to be searched is:

$$Vp = ½\ Vc = \frac{Vc}{2} = 0{,}35 \text{ m/s}$$

The closer value of Vp in the data sheet is 0.36 m/s which corresponds to a rated pump flow of 210 l/min. The car speed will be:

$$Vc = Vp \cdot 2 = 0{,}36 \cdot 2 = 0{,}72 \text{ m/s}$$

SLECTION OF THE POWER OF THE MOTOR

The lower part of the data sheet gives the maximum static pressure values within which a specific combination of motor and pump can be used. For a maximum static pressure of 31 bar and a pump with a 210 l / min rated flow, the corresponding power of the motor is 14,7 kW (20 HP).

Check the maximum pressure loss

γ = specific weight of the fluid= 0,88 daN/dm 3
pt = pressure losses into the pipe line (table 1) = 2,02 bar
pm = pressure losses due to mechanical friction = 1,5 bar
pvc = pressure losses into the rupture valve = 1,5 bar
H = piezometric height = 7,7 m

$$pt + pm + pvc + \frac{\gamma \cdot H}{10} \leq 7 \text{ bar}$$

For values not included in this table, ask to GMV