Product description

Hydraulic pumps of HG type are axial piston hydraulic units of bent axis type. They have fixed displacement and are designed for hydraulic systems of mobile and stationary machines. They can operate both in open and closed circuits. They are unidirectional, the rotation is either in CW or ACW direction.

Technical data

Bent axis angle of standard pumps is 25° or 27°. Suction pressure is in standard operating conditions -10kPa and for a short period e.g. upon cold start -25 kPa.

Parameter	HG 12	HG 16	HG 28	HG 56	Unit
Displacement	12,5	16	28,5	56	$m^3.10^{-6}$
Operating pressure: nominal	25	25	25	25	MPa
maximum	35	35	35	35	MPa
peak	40	40	40	40	MPa
Permissible case pressure	350	350	350	350	kPa
Inertia moment at drive axis	0,456	0,688	1,80	5,54	$kg.m^2.10^{-3}$
Speed: nominal	32	32	32	25	s^{-1}
maximum for open circuit	45	45	45	33	s^{-1}
maximum	100	100	80	60	s^{-1}
Flow: nominal	0,38	0,49	0,88	1,34	$m^3s^{-1}.10^{-3}$
maximum	1,17	1,50	2,14	3,16	$m^3s^{-1}.10^{-3}$
Power: nominal	10,5	13,6	24,0	36,8	kW
maximum	46,5	60,2	84,9	125	kW
Port dimensions: inlet (suction)	20	25	25	32	mm
outlet	13	13	16	20	mm
leakage	8	10	10	10	mm
Mass	6,5	10,1	12,5	23,5	kg

Use

Sources of pressure energy for hydrostatic drives of mobile machines and their auxiliary equipment such as conveyor drives, winches, cutter bars, technology pumps of special trucks and trailers, locomotive cooling fan drives and drives for a variety of stationary machinery and equipment.

Operating conditions

Pressure Fluids:

Hydraulic mineral oils viscosity classes ISO VG 32, 46, 68
- HM, ISO-L-HM to ISO 6743), HLP to DIN 51524-2
- HV, ISO-L-HV to ISO 6743), HVLP to DIN 51524-3

The standard units may operate with HFA fluids when maximum pressure and speed are partially limited (consultation with the manufacturer is recommended). HFC and HFD fluids have to be used with adequate sealing materials.

Viscosity:

The recommended optimum viscosity range is $25 \div 60.10^{-6}$ $m^2.s^{-1}$, i.e. the fluid should be selected so that within the operating temperature range the viscosity lies within the optimum range. The maximum viscosity of 1000.10^{-6} $m^2.s^{-1}$ is permitted for a short period upon cold start, the minimum viscosity being 10.10^{-6} $m^2.s^{-1}$ for a short-time increase of fluid temperature. In open circuits the fluid temperature means the fluid temperature in the tank, in closed circuits it means the main circuit temperature. If an option between fluids of two adjoining viscosity grades is possible, the fluid with higher viscosity is preferred.

The leakage fluid temperature is always higher than the average fluid temperature in the circuit. If the leakage fluid temperature is coming up to or exceeds 90° C, it is necessary to flush the pump case with a cooler fluid.

Filtration:

The recommended fluid purity class is 16/13/10, for less demanding operation and pressure lower than 25 MPa up to 18/15/11 according to ISO 4406:1999. In open circuits the filtering of full flow 40 μm in return line should be supplemented by 10 μm by-pass filtration of at least 10% of total flow. In closed circuits 10 μm boost flow filtration is suitable.

Speed:

The maximum pump speed in dependence on its size is stated in technical parameters. The highest value holds for pumps operating in closed hydraulic circuits or for the supercharged ones. Maximum speed in the open circuit requires the maximum inlet underpressure of 10 kPa, possibly, in case of short-time cold start, 25 kPa are permissible. Minimum recommended speed is 7 s^{-1}; operation below this value is permissible, it is however necessary to realise that lower speed causes greater pulsations of output flow.

Mounting

Pump mounting position is arbitrary. Alignment of the driven shaft and the pump shaft and the perpendicularity of the mounting flange face is given in CSN 01 4405, Tables 3 and 4, Accuracy Class 7, i.e. relative misalignment of the shafts max. 12,5 μm, total face run-out of mounting flange max. 25 μm.

Before starting the operation, the pump case must be entirely filled with fluid. The fluid inside the pump serves for lubricating the bearings and other interacting parts. To prevent spontaneous outflow of the fluid from the pump case, the leakage line must be connected with the upper leakage port. End of the leakage line in the tank ought to be under the minimum oil level.

The maximum pressure within the case is stated in technical parameters and is determined particularly with respect to pressure load on the shaft seal. The pressure in the case should be always higher than the pressure on the outside of this seal. Therefore, in applications where the pressure on the outside of the shaft seal is higher than the atmospheric pressure (e.g. mounting the pump to a gearbox etc.), the data of leakage pressure hold as a pressure difference.

The value of torsional vibrations transmitted from the drive to the pump shaft is limited. Therefore, in this type of the drive (e.g. combustion engine), the unit must be driven over a suitable damping element. Maximum permissible deviation of speed for the torsional vibrations is Δn - see Table 2.

Maximum non-uniformity of rotation is: $\delta = \frac{\Delta n}{n}$, where n [$s^{-1}$] .... speed.

Maximum angular acceleration arising from the standstill is 800 s^{-2} .

Dimensioning of the shaft support allows the effect of external radial force of the value current in standard operating conditions. Recommended limitations of the shaft radial loading in dependence on the force direction are indicated in Fig.1 . Position of force application is supposed to be at the half of the shaft end length. Percentage change of permissible radial force in case of acting in other position is in Fig. 2.

Permissible axial load is a function of outlet pressure p [MPa] and can be derived from the relations stated in Table 2. Maximum axial force acting inwards during the assembly is equal to the stationary axial force.

Table 2

Size	Axial load acting inwards when in operation [kN]	Axial force acting inwards when at rest [kN]	Axial force acting outwards [kN]	Max. permissible speed deviation Δn [s^{-1}]
HG 12; 16	Fa = 0,2 + 0,13 p	0,2	0,8	1,35
HG 28	Fa = 0,3 + 0,23 p	0,3	1,2	1,17
HG 56	Fa = 0,4 + 0,30 p	0,4	2,0	1,00

Fig. 1

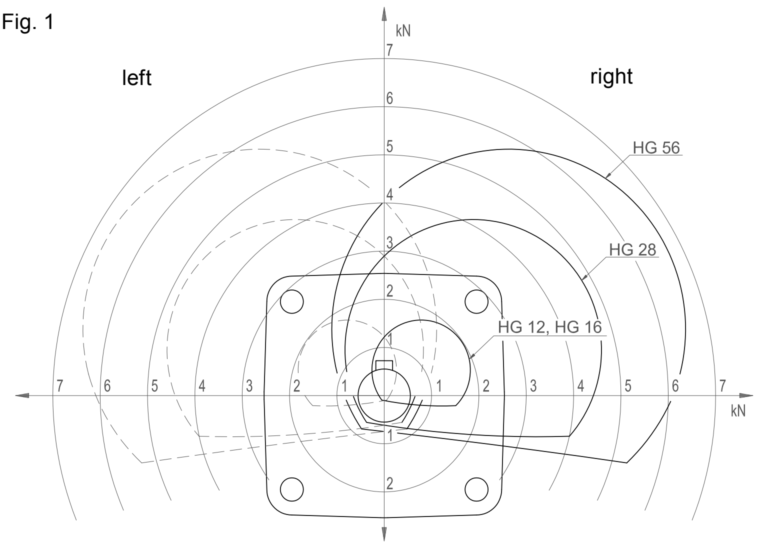
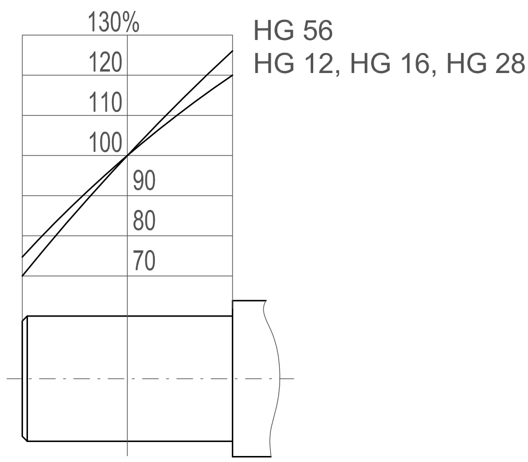
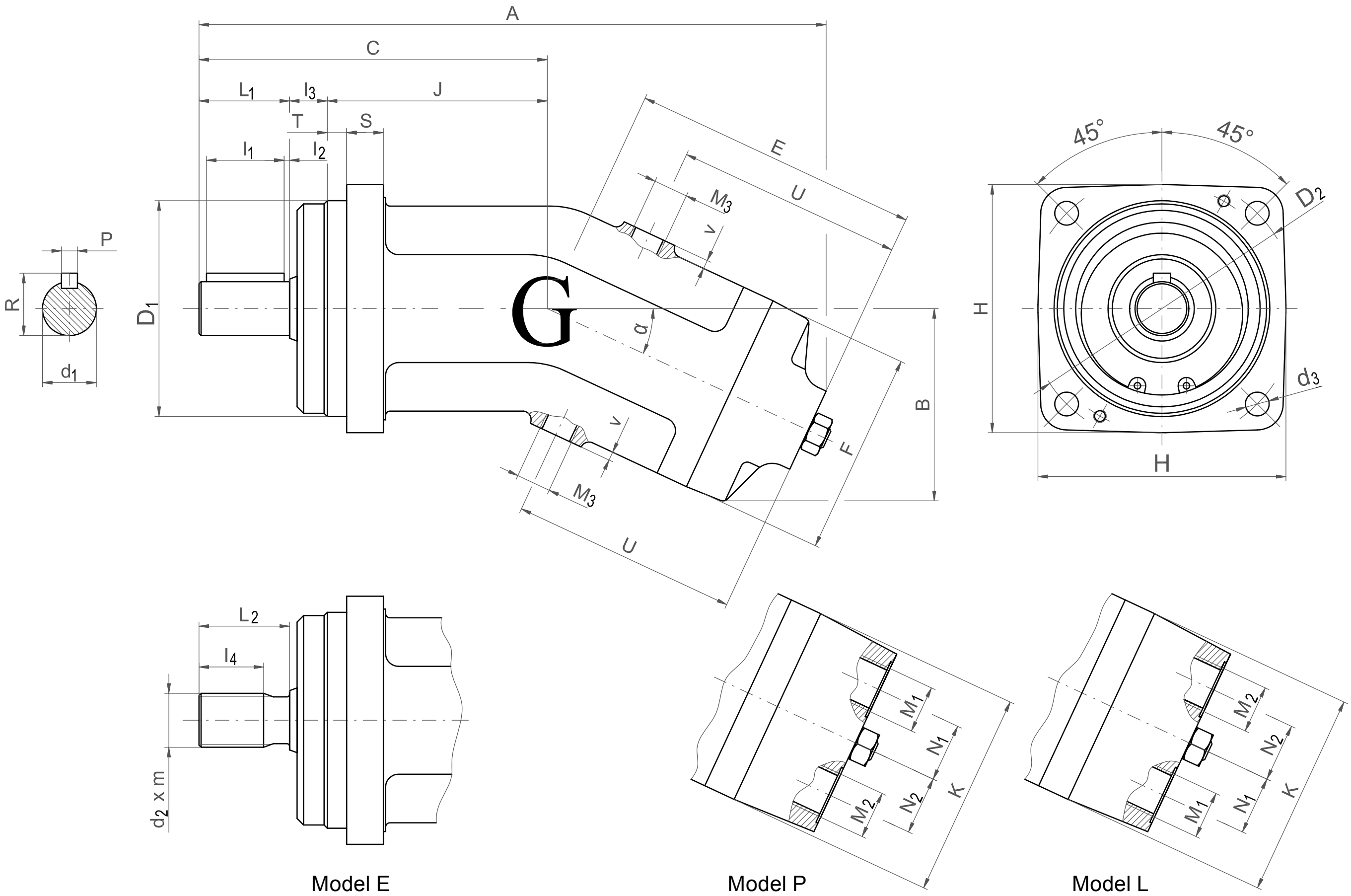


Fig. 2



Dimensioned sketch



Model E Model P Model L

Table 3

Size	A	B	C	ØD$_1$f8	ØD$_2$±0,2	Ød$_1$h6	Ød$_2$m.9 g	Ød$_3$	E	F	G	H	J	K
HG12	250	75	135	80	103	20	20x1,25	9	105	80	80	95	79	80
HG16	280	90	150	100	125	20	20x1,25	11	122	82	90	115	89	82
HG28	300	90	160	100	125	25	25x1,25	11	133	95	95	118	93	95
HG56	356	113	198	125	160	32	30x2,00	14	163	125	125	150	108	125

L_1	L_2	l_1	l_2	l_3	U	M_1	M_2	M_3	N_1	N_2	Ph9	R	S	T	U	V
36	34	28	3	20	22	M 22x1,5	M 22x1,5	M 14x1,5	24	24	6	22,5	14	7	82	3
36	34	30	3	25	22	M 27x2,0	M 22x1,5	M 16x1,5	27	24	6	22,5	14	9	102	3
42	42	36	2,5	25	30	M 27x2,0	M 22x1,5	M 16x1,5	29,5	27	8	27,9	17	9	105	3
58	35	50	4	32	27,5	M 33x2	M 27x2	M 16x1,5	39	39	10	35,3	20	9	125	3

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