Product description

Hydraulic motors HM are axial piston units of bent axis type. They have fixed displacement and are designed for hydrostatic systems of mobile and stationary machines. They can operate both in open and closed circuits.

Technical data

Bent axis angle of standard motors is 25° or 27°. The sum of pressures acting simultaneously in both ports must not exceed 45 MPa

Parameter	HM 12	HM 16	HM 28	HM 56	HM 105	Unit
Displacement	12,5	16	28,5	56	105	$m^3.10^{-6}$
Operating pressure: nominal	25	25	25	25	25	MPa
maximal	35	35	35	35	35	MPa
peak	40	40	40	40	40	MPa
Permissible case pressure	350	350	350	350	350	kPa
Specific torque	1,99	2,55	4,54	8,91	16,71	$Nm.MPa^{-1}$
Inertia moment at drive axis	0,456	0,688	1,80	5,54	15,8	$kg.m^2.10^{-3}$
Speed: nominal	32	32	32	25	25	s^{-1}
maximal	100	100	80	60	50	s^{-1}
Torque: nominal	47	60	108	209	397	Nm
maximal	65	85	149	293	550	Nm
Port dimension: inlet	13	13	16	20	25	mm
outlet	13	13	16	20	25	mm
leakage	8	10	10	10	10	mm
Mass	6,5	10,1	12,5	23,5	42,5	kg

Use

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, drives for a variety of stationary machinery and equipment.

Operating conditions

Pressure Fluids:

Hydraulic mineral oils viscosity classes VG 32, VG 46, VG 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 motor case with a cooler fluid.

Filtration:

The recommended fluid purity class is 16/13/10; for less demanding operation and pressures 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 motor speed in dependence on its size is stated in technical parameters. The highest value holds for motors 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, underpressure of 25 kPa is permissible. Minimum recommended speed is 7 s^{-1}; operation below this value is permissible, however it is necessary to realise that lower speed causes greater pulsations of output flow.

Mounting

Motor mounting position is arbitrary. Alignment of the driven shaft and the motor shaft and the perpendicularity of the mounting flange face is given in CSN 01 4405, Tables 4 and 5, 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 motor case must be entirely filled with fluid. The fluid inside the motor serves for lubricating the bearings and other interacting parts. To prevent spontaneous outflow of the fluid from the motor 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 motor to a gearbox etc.), the data of leakage pressure hold as a pressure difference.

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]
HM 12; 16	Fa = 0,2 + 0,13 p	0,2	0,8
HM 28	Fa = 0,3 + 0,23 p	0,3	1,2
HM 56	Fa = 0,4 + 0,30 p	0,4	2,0
HM 105	Fa = 0,5 ÷ 0,52 p	0,5	2,5

Fig. 1

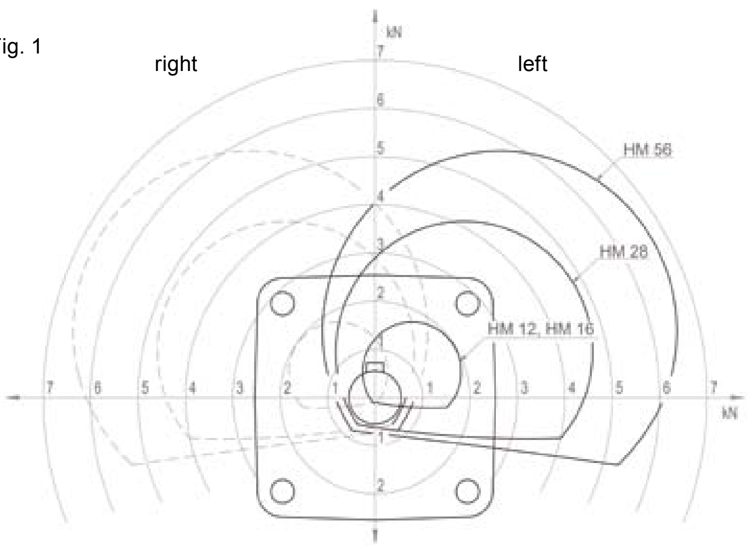
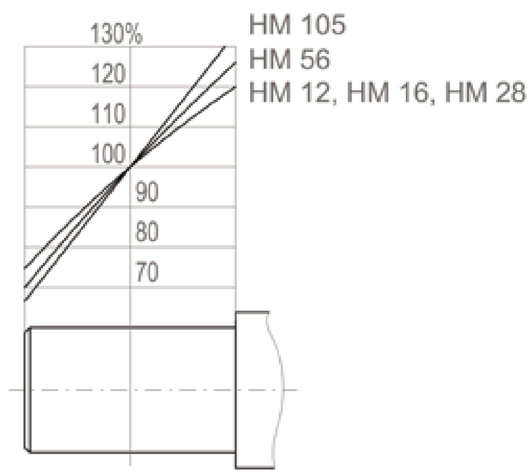
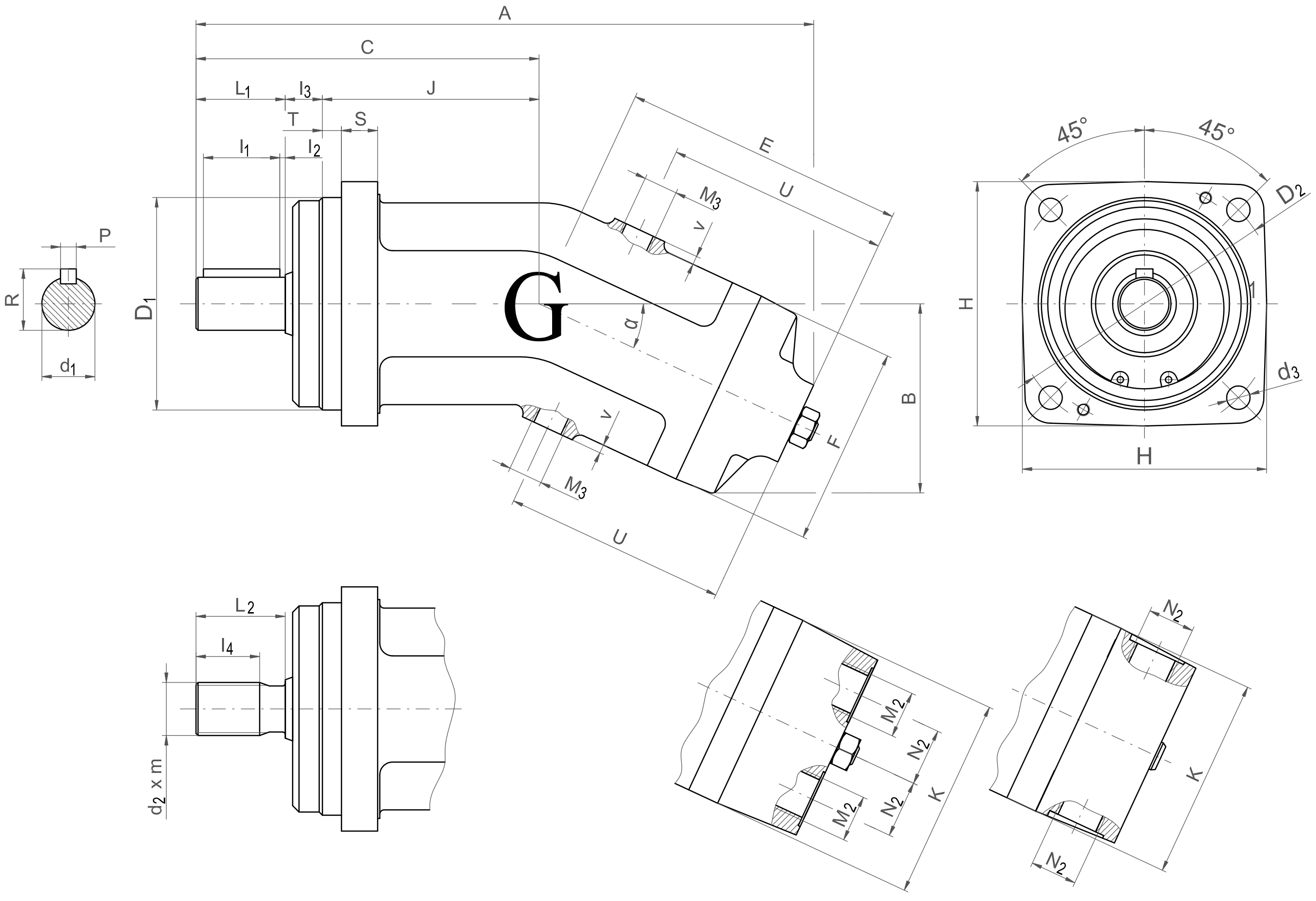


Fig. 2



Dimensioned sketch



Model E Model A Model B

Table 4

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
HM12	250	75	135	80	103	20	20x1,25	9	105	80	80	95	79	80
HM16	280	90	150	100	125	20	20x1,25	11	122	82	90	115	89	82
HM28	300	90	160	100	125	25	25x1,25	11	133	95	95	118	93	95
HM56	356	113	198	125	160	32	30x2,00	14	163	125	125	150	108	125
HM105	437	139	242	160	200	40	40x2,00	18	196	150	150	180	120	150

L$_1$	L$_2$	l$_1$	l$_2$	l$_3$	L$_4$	M$_2$	M$_3$	N$_2$	Ph9	R	S	T	U	V
36	34	28	3	20	22	M 22x1,5	M 14x1,5	24	6	22,5	14	7	82	3
36	34	30	3	25	22	M 22x1,5	M 16x1,5	24	6	22,5	14	9	102	3
42	42	36	2,5	25	30	M 22x1,5	M 16x1,5	27	8	27,9	17	9	105	3
58	35	50	4	32	27,5	M 27x2	M 16x1,5	39	10	35,3	20	9	125	3
82	45	70	6	40	37,5	M 33x2	M 16x1,5	44	12	43,1	23	9	158	3

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