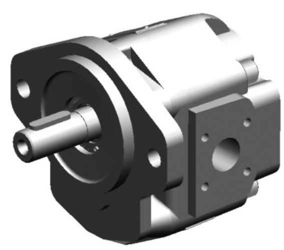
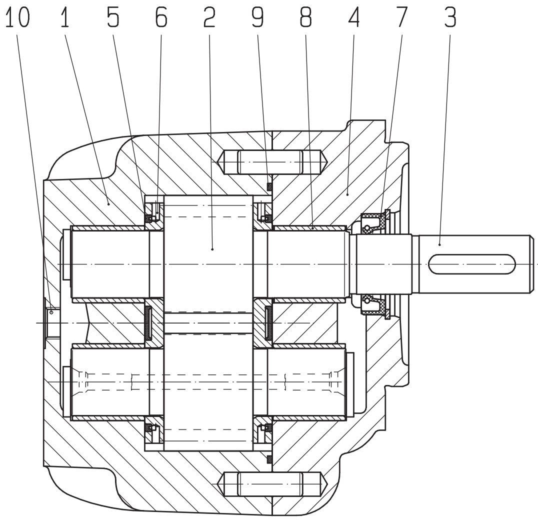
KRACHT



High Pressure Gear Motors

KM 2

Construction



1 Housing
2 Gearing
3 Drive shaft end
4 Flange cover
5 Pressure field sealing for axial clearance compensation
6 Sliding plates
7 Rotary shaft lip-type seal
8 Plain bearing
9 Sealing of the housing
10 Drain port

Function

The construction (design principle) and materials of the KRACHT KM 2 series external gear motors make them perfect for use under the most extreme operating conditions. The main components form the housing and flange cover (see sectional drawing). They can be dynamically highly loaded, making them insensitive to pressure peaks and continuous vibrations. Large-surface-dimensioned, PTFE-Pb coated, bronze plain bearings on steel backs in the housing and flanged cover support the micro-finish ground bearing journals of the gear, which comprises the driving shaft pinion and driven shaft pinion. To realise optimum running properties the tooth flanks of the gear, which are produced from case-hardened steel, are ground. The high number of teeth (z = 14) in combination with a tooth shape developed for the special requirements of the hydraulics as well as the optimal layout of the expansion slots in the trapped-oil area achieve a considerable reduction in the volume flow variation and thus the pressure pulsation.

This leads to significantly lower noise level values in the motors or even in whole systems and machines. This functioning of the indispensable active axial-tolerance-allowance compensation is implemented by the slide plates located beside the gears. They have hydraulically-loaded pressure-fields, through which a compensation of the axial tolerance allowance is guaranteed at every operating pressure. The slide plates are structured to implement viscosity-independent play-compensation. That ensures a high level of volumetric and mechanical efficiency at every operating point. PU or FKM seals can be used to meet comprehensive application requirements caused by the temperature and/or media. Multiple motor combinations are feasible.

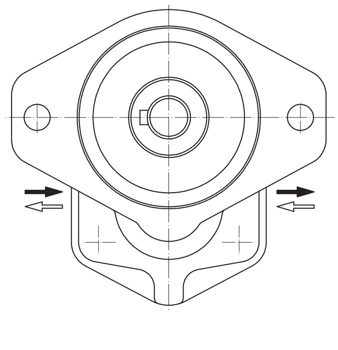
Notes:

1. External loads
Radial or axial loads acting on the shaft end impair the functions of the gland bearings. Radial loads can possibly be absorbed in dependence on the extent and the direction of the loads. Axial loads are NOT permissible. To absorb external loads the motor type with outboard bearing must be used.

2. Direction of rotation
Regarding the direction of rotation basically the following applies provided the view is directed toward the drive shaft end:

Drive shaft end rotating clockwise: Oil flow from left to right.

Drive shaft end rotating anticlockwise: Oil flow from right to left.



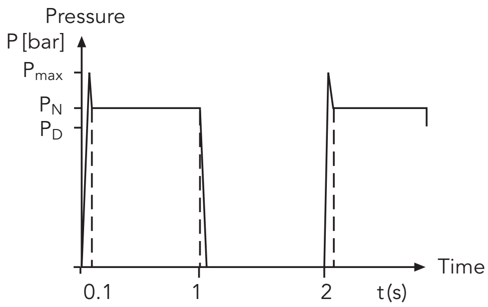
Materials

Housing	cast iron / spheroidal cast iron
Bearing	multi-compound plain bearing bushes
Journals and gears	case hardening steel acc. to DIN 17210 surface hardened and ground
Seals	NBR rotary shaft lip-type seal and PU-pressure field sealing $\vartheta \leq$ 90 °C FKM rotary shaft lip-type seal and FKM-pressure field sealing $\vartheta \leq$ 150 °C FKM rotary shaft lip-type seal and PU-pressure field sealing $\vartheta \leq$ 100 °C

Characteristics

Mounting		flange or foot-type
Pipe connection		flange-type
Direction of rotation		clockwise **and** anticlockwise
Weight		refer to dimensional sheet
Fitting position		optional
Ambient temperature	$\vartheta_{u\ min}$ $\vartheta_{u\ max}$	= – 20 °C = 60 °C
Working pressure input	p_{max}	= 350 bar (refer to technical data)
Drain pressure		5 bar max (n = 1000) 3 bar max (n = 2000)
Working pressure output	p_{max}	= 150 bar
Fluid temperature	$\vartheta_{m\ max}$ $\vartheta_{m\ max}$ $\vartheta_{m\ max}$	90 °C NBR rotary shaft lip-type seal and PU pressure field sealing 150 °C for FKM rotary shaft lip-type seal and FKM pressure field sealing 100 °C for FKM rotary shaft lip-type seal and PU pressure field sealing (Special No. 261)
Viscosity	ν_{min} ν_{max}	= 10 mm²/s = 1000 mm²/s
Recommended oil cleanliness		Class 19/16 to ISO/DIS 4406 ⇨ class 10 to NAS 1638
Recommended filtration		Filter with filtration quotient $\beta_{25} \geq 75$ for … 300 bar $\beta_{40} \geq 75$ for … 100 bar
Recommended Viscosity range	ν	= 30 … 45 mm²/s
Characteristic curves		refer to pages 7 – 10
Hydraulic fluids		Mineral oil acc. DIN 51524/25 Motor oil acc. DIN 51511 Flame resistant pressure fluids on request bio-oils of type „HEES“, can be used up to 70 °C , max. pressure must be reduced minus 20 % (use only on request)

Time / Pressure chart



Maximum pressure ≙ pressure peak
Rated pressure p_N < 6 s ≙ 50 % ED
see time / pressure chart
max. perm. working cycles: 30 / min
Pressures as specified are applicable
to $\nu \geqq 30$ mm²/s

Calculation Formulas for Hydraulic Pumps and Motors

Characteristic data, formula signs, units

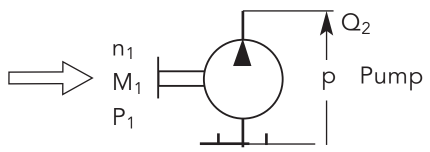
1.	Discharge flow / input flow	Q	l/min
2.	Pump / motor displacement	V_g	cm³/r
3.	Pressure	p	bar
4.	Speed	n	1/min
5.	Torque	M	Nm
6.	Power	P	kW
7.	Total efficiency	η_{tot}	—
8.	Volumetric efficiency	η_{vol}	—
9.	Hydr. / mech. efficiency	η_{hm}	—
10.	Flow velocity	v	m/s
11.	Piping diameter	d	mm

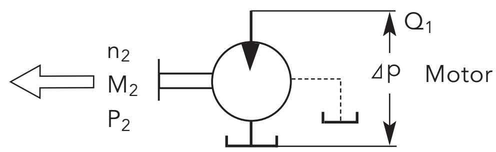
General

1 ≙ input, driven
2 ≙ output, driving

$Q_{th} = V_g \cdot n, \quad \eta_{tot} = \eta_{vol} \cdot \eta_{hm}$

$M = 9549 \cdot \frac{P}{n}, \quad v = 21.22 \frac{Q}{d^2}$





Characteristic data for:		Pump		Motor	
	Volumetric flow	Discharge flow	$Q_2 = \frac{V_g \cdot n_1 \cdot \eta_{vol}}{10^3} \left[\frac{l}{min}\right]$	Input flow	$Q_1 = \frac{V_g \cdot n_2}{10^3 \cdot \eta_{vol}} \left[\frac{l}{min}\right]$
	Torque	Drive torque	$M_1 = \frac{p \cdot V_g}{20 \cdot \pi \cdot \eta_{hm}}$ [Nm]	Output torque	$M_2 = \frac{\Delta p \cdot V_g \cdot \eta_{hm}}{20 \cdot \pi}$ [Nm]
	Power	Input power	$P_1 = \frac{p \cdot Q_2}{600 \cdot \eta_{tot}}$ [kW]	Output power	$P_2 = \frac{\Delta p \cdot Q_1 \cdot \eta_{tot}}{600}$ [kW]

Technical Data

KM 2 ... 4DL

Nominal motor displacement	Geom. motor displacement V_g cm³/r	Working pressure p_D bar	Rated pressure p_N bar	Peak pressure p_{max} bar	max. working speed N_{max} 1/min	Moment of inertia x 10^{-5} J kg m²	Lowest-Speed n_{min} 1/min
20	19.7	250	280	300	3000	34.3	300
25	24.6	250	280	300	3000	40.5	300
28	27.7	230	250	280	3000	44.3	300
32	31.5	230	250	280	3000	49.2	300
40	39.4	210	230	250	3000	59.0	300
50	49.2	210	230	250	3000	71.4	300
62	61.2	180	190	200	2200	86.5	300

KM 2 ... 4VL with PU Pressure field sealing*

Nominal motor displacement	Geom. motor displacement V_g cm³/r	Working pressure p_D bar	Rated pressure p_N bar	Peak pressure p_{max} bar	max. working speed N_{max} 1/min	Moment of inertia x 10^{-5} J kg m²	Lowest-Speed n_{min} 1/min
20	19.7	315	350	400	3000	34.3	300
25	24.6	315	350	400	3000	40.5	300
28	27.7	315	350	400	3000	44.3	300
32	31.5	315	350	400	3000	49.2	300
40	39.4	280	350	400	3000	59.0	300
50	49.2	280	350	400	3000	71.4	300

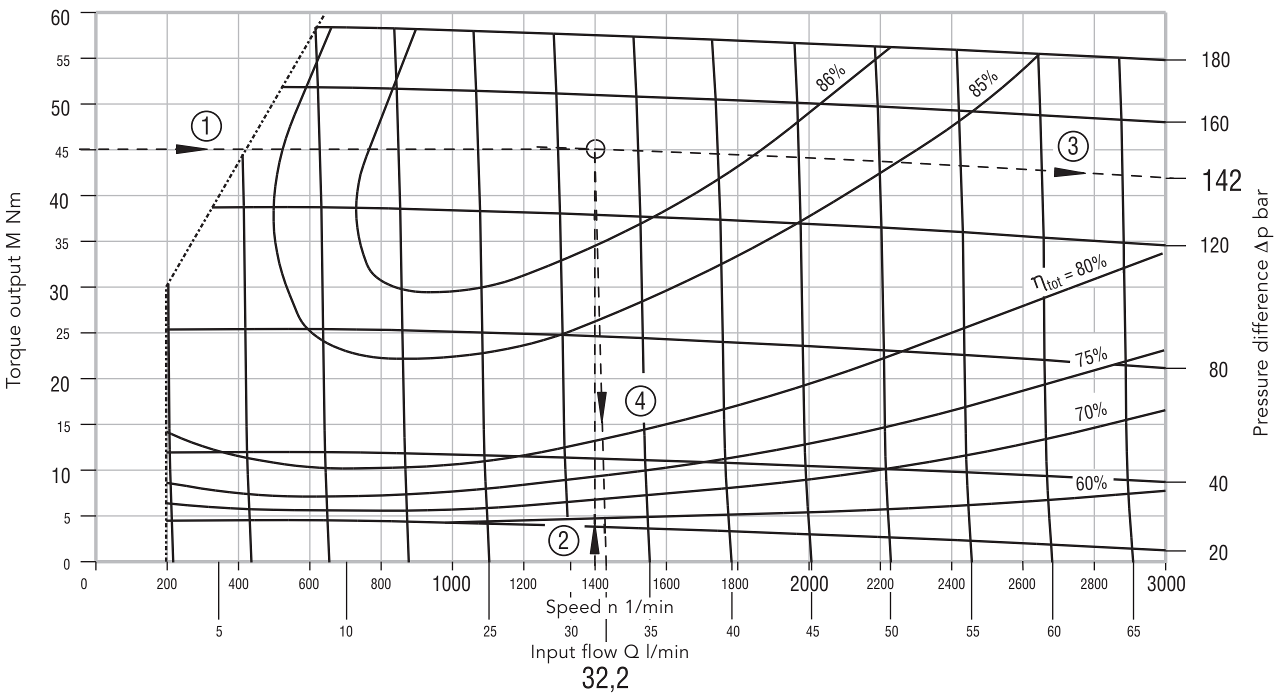
* NBR PU Pressure field sealing max 90 °C
FKM PU Pressure field sealing max 100 °C (Special No. 291)

Guidance for use of the Characteristic Curves

Required: Torqe output M at speed n
Unknown: Pressure difference Δp and the required Input flow Q

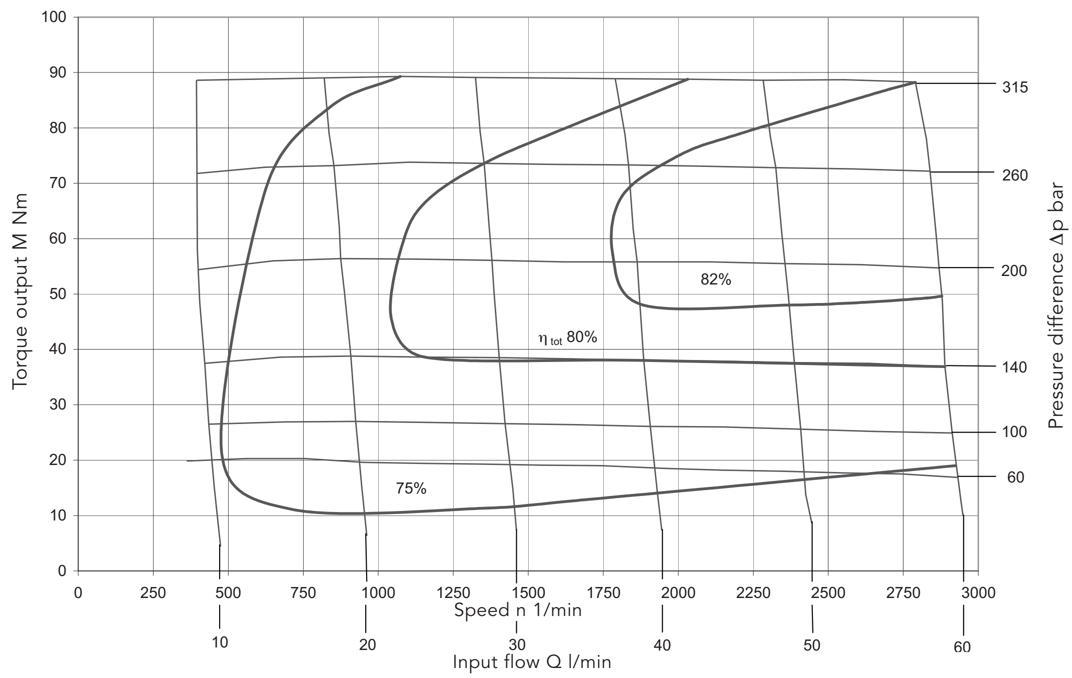
Example: M = 45 Nm → ①
n = 1400 1/min ↑ ②

The Intersection of ① and ② is the motor working point with:
Δp = 142 bar → ③
Q = 32.2 l/min ↓ ④



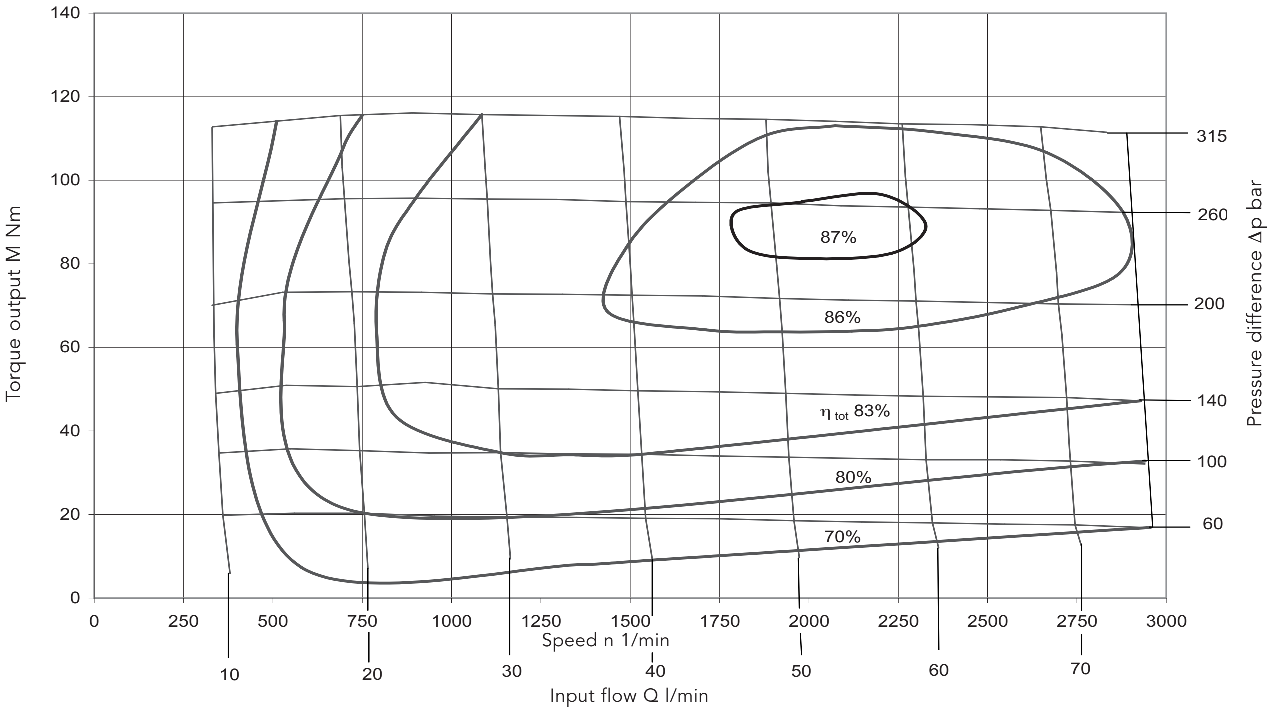
Characteristic Curves for KM 2/20 ... 4.L.

Characteristic values applicable to viscosity ν = 34 mm²/s · Dispersion of the speed values n = ± 75 1/min
Dispersion of the torque output M = ± 3.0 Nm at Δp = constant and Q = constant



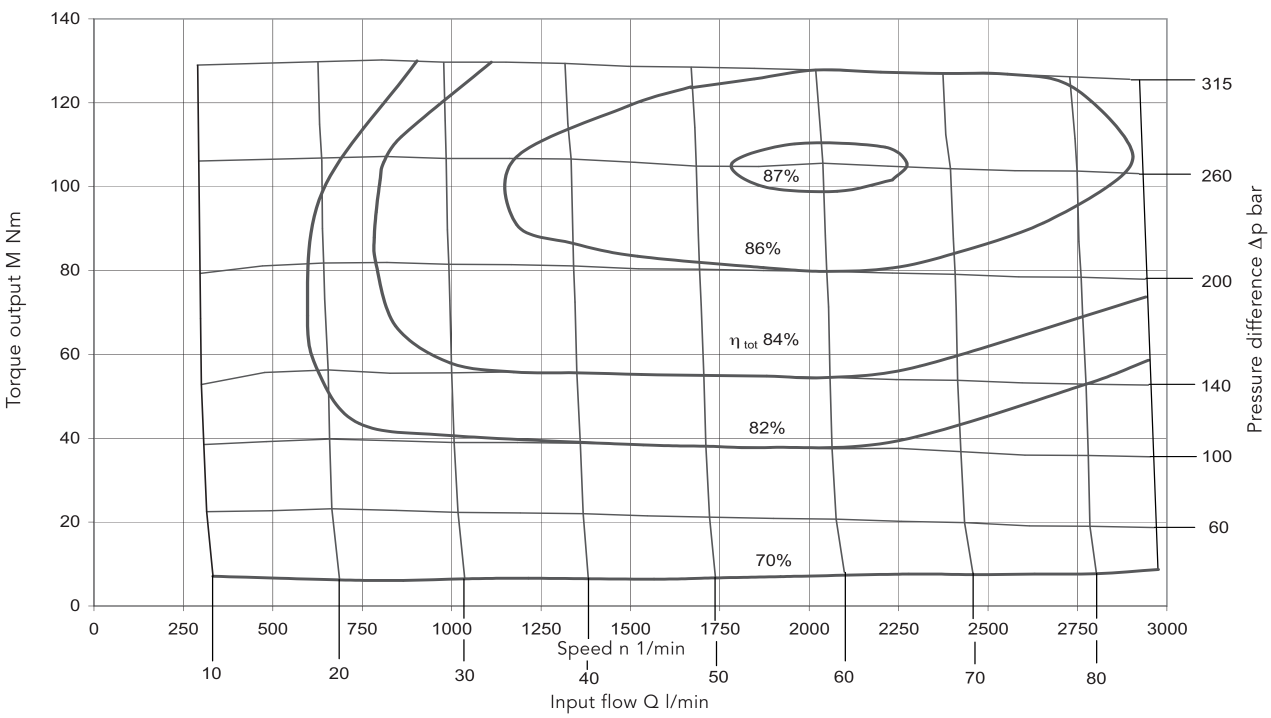
Characteristic Curves for KM 2/25 … 4.L.

Characteristic values applicable to viscosity ν = 34 mm^2/s · Dispersion of the speed values n = ± 75 1/min
Dispersion of the torque output M = ± 4.5 Nm at Δp = constant and Q = constant



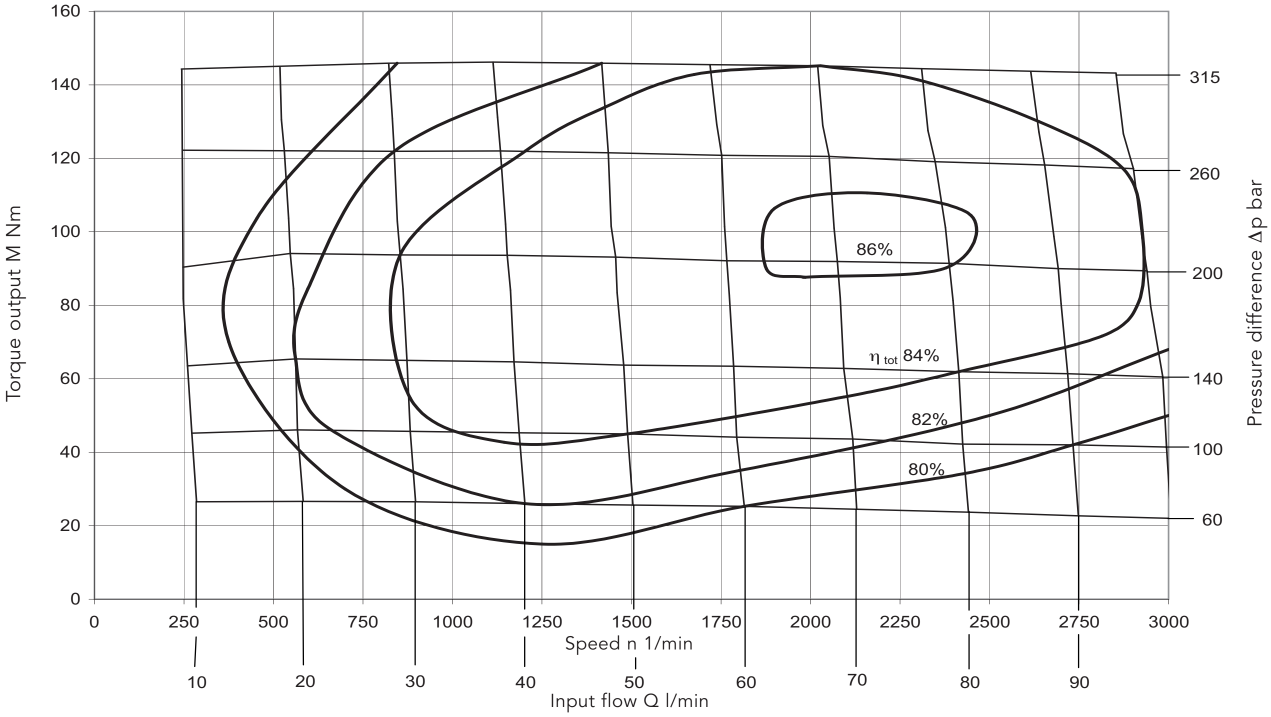
Characteristic Curves for KM 2/28 … 4.L.

Characteristic values applicable to viscosity ν = 34 mm^2/s · Dispersion of the speed values n = ± 75 1/min
Dispersion of the torque output M = ± 5.0 Nm at Δp = constant and Q = constant



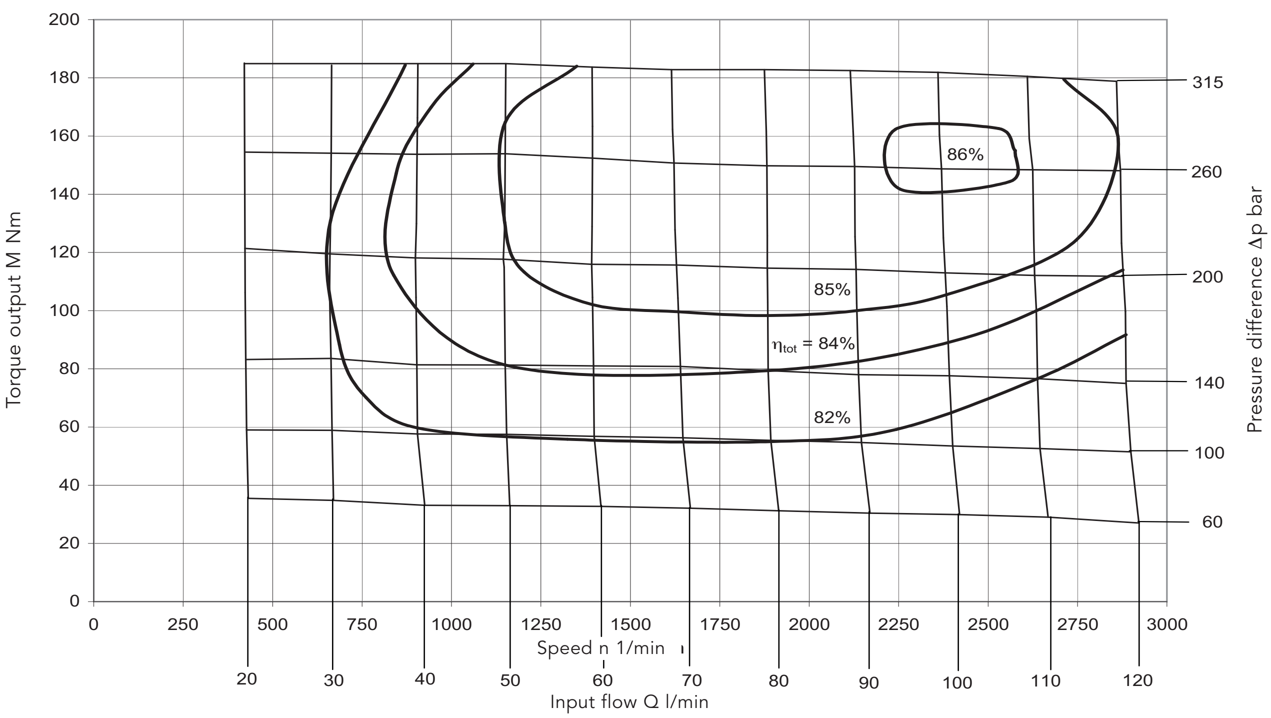
Characteristic Curves for KM 2/32 … 4.L.

Characteristic values applicable to viscosity ν = 34 mm²/s · Dispersion of the speed values n = ± 75 1/min
Dispersion of the torque output M = ± 5.5 Nm at Δp = constant and Q = constant



Characteristic Curves for KM 2/40 … 4.L.

Characteristic values applicable to viscosity ν = 34 mm²/s · Dispersion of the speed values n = ± 75 1/min
Dispersion of the torque output M = ± 6.0 Nm at Δp = constant and Q = constant



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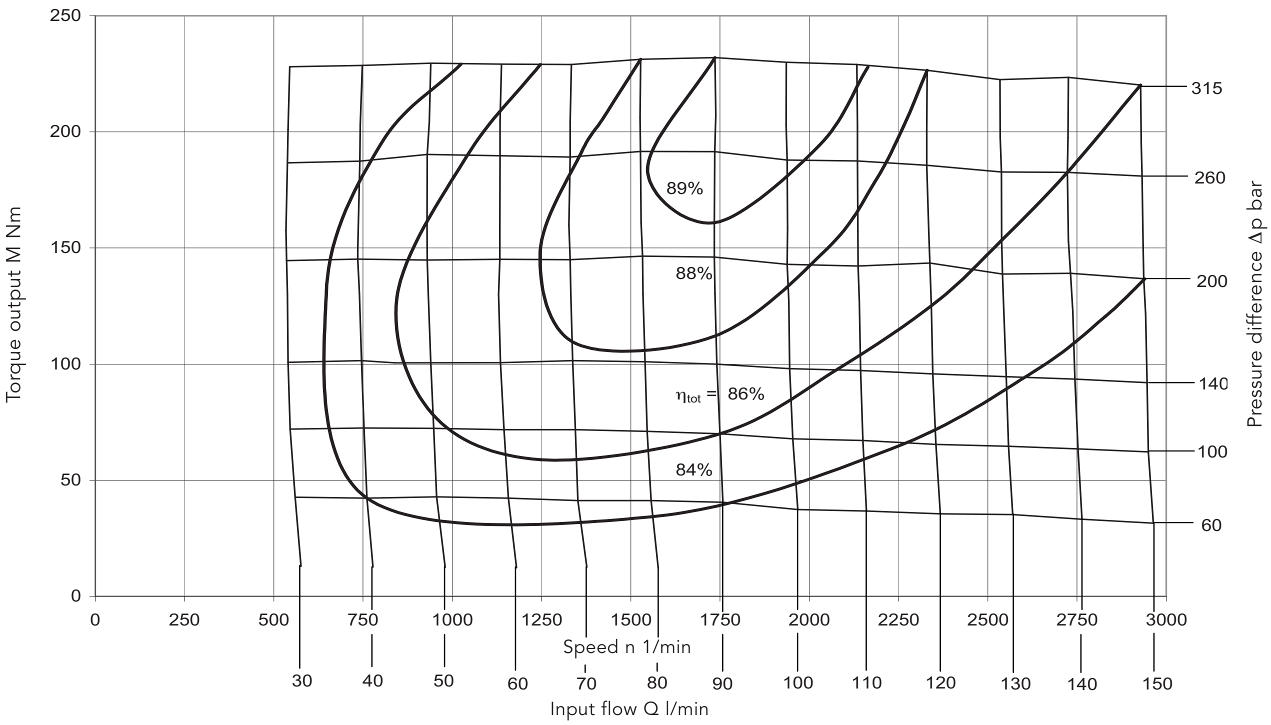
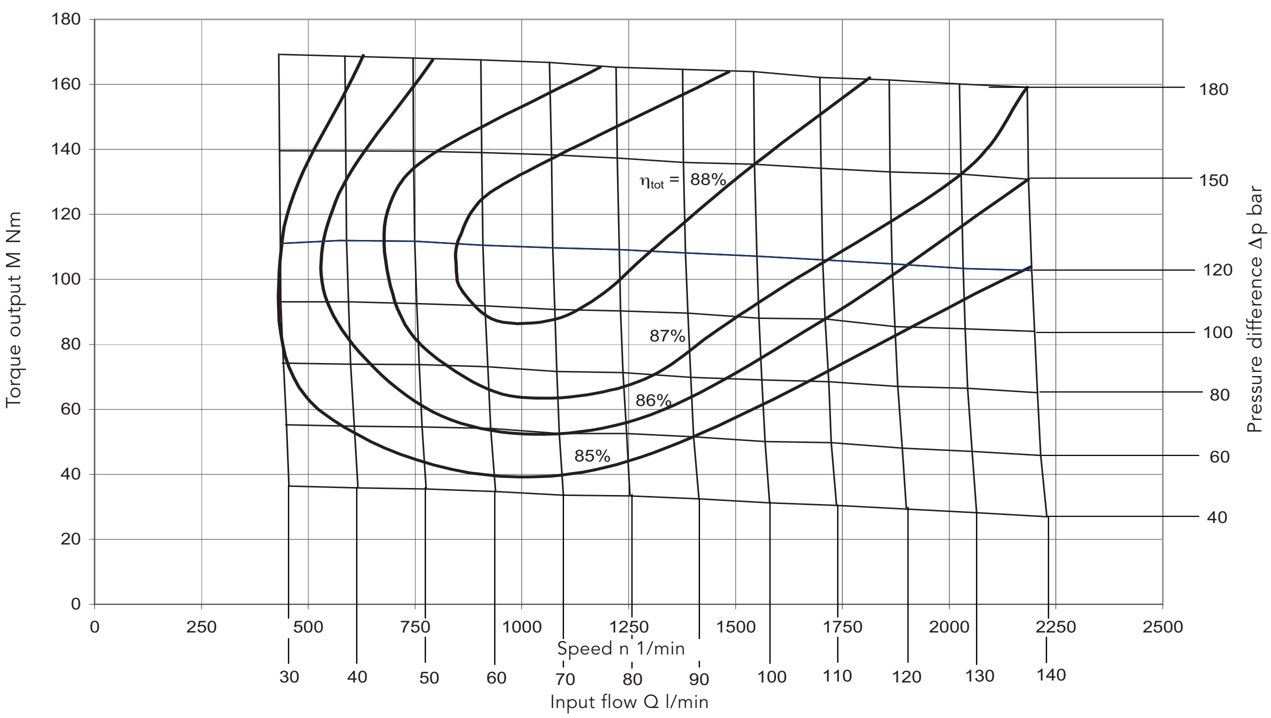
Characteristic Curves for KM 2/50 … 4.L.

Characteristic values applicable to viscosity ν = 34 mm²/s · Dispersion of the speed values n = ± 75 1/min
Dispersion of the torque output M = ± 7.5 Nm at Δp = constant and Q = constant



Characteristic Curves for KM 2/62 … 4.L.

Characteristic values applicable to viscosity ν = 34 mm²/s · Dispersion of the speed values n = ± 75 1/min
Dispersion of the torque output M = ± 8.0 Nm at Δp = constant and Q = constant



Type Key

Shaft ends
- **K** Taper 1 : 5; 500 Nm_{max}
- **U** Involute spline SAE-B; Z = 13; DP 16/32; α = 30°; 180 Nm_{max}
- **Y** cylindrical shaft Ø 24; 230 Nm_{max}
- **W** Involute spline B 28 x 25; DIN 5482; Z = 15; m = 1,75; 450 Nm_{max}

Second shaft end
- **0** without

End cover (adaptor pieces)
- **0** Standard version (without)

Housing ports
- **A** Ø 26 with LK 55
- **F** to VG 50 SAE 1" Standard 4DL
  to VG 50 SAE 1" 6000 psi
- **D** Thread G 1
- **J** Thread 1 1/16-12 UNF

Design serial no.
- **4** (Specified by Kracht))

Housing and bearing version
- **D** cast iron housing with multicomponent plane bearing bush
- **V** spheroidal cast iron housing with reinforced plain bearing bush

Outboard flanges or bearing resp.
- **0** without
- **L** with

Ordering example

KM	2/	20	S	3	0	A	Y	0	0	4	D	L	1	/...

Type of gearing
- **L** Driving shaft and driven shaft of case hardening steel (tooth flanks grinded and hones)

Direction of rotation
- **3** clockwise and anticlockwise

Flange cover version
- **G** 4 bolt rectangular flange, LA = 102/145; Ø Z = 105
- **S** SAE-B-2-bolt flange, LA = 146; Ø Z = 101.6
- **M** 2-bolt flange, LA 78/90; Ø Z = 63
- **F** same as type M; but the bolting is mirror inverted

LA = mounting hole distance
Ø Z = centering diameter

Seals
- **1** NBR rotary shaft lip type seals $\vartheta \leq 90$ °C
- **2** FKM rotary shaft lip type seals $\vartheta \leq 150$ °C
- **3** FKM rotary shaft lip type seals and PU pressure field sealing ≥ 100 °C (Special no. ./261)

Nominal motor displacement
20 / 25 / 28 / 32 / 40 / 50 / 62

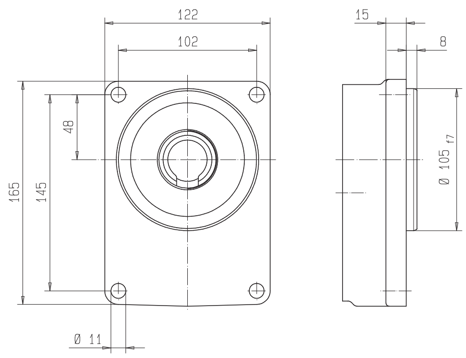
Size 1

Product name

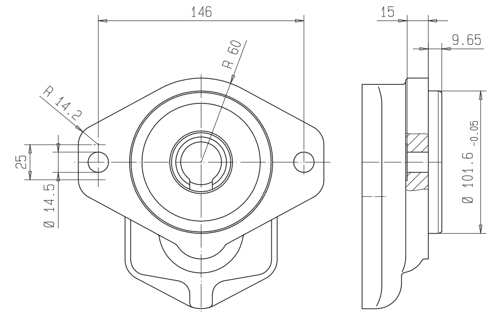
Code no. for special construction

Flange type

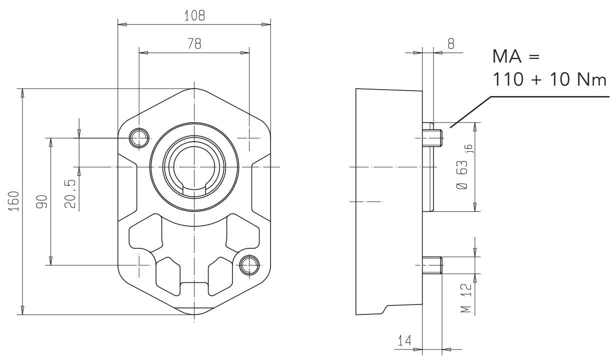
4 bolt rectangular flange G



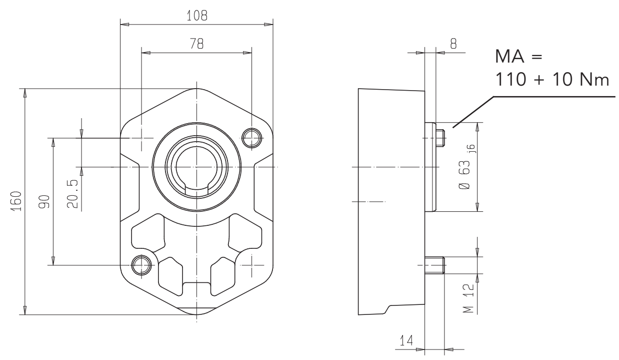
SAE-B-2-bolt flange S



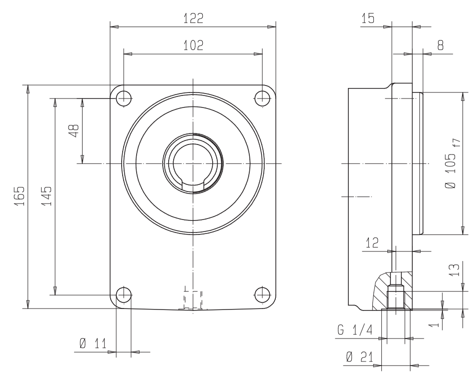
2-bolt flange F



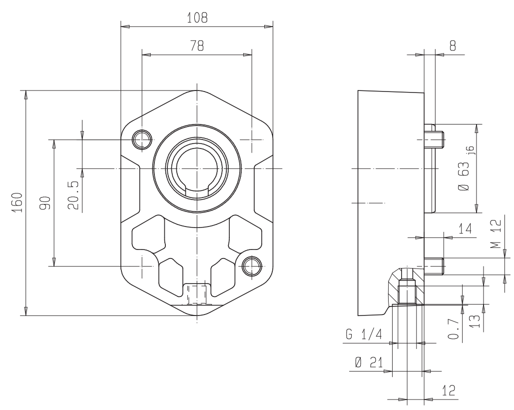
2-bolt flange M



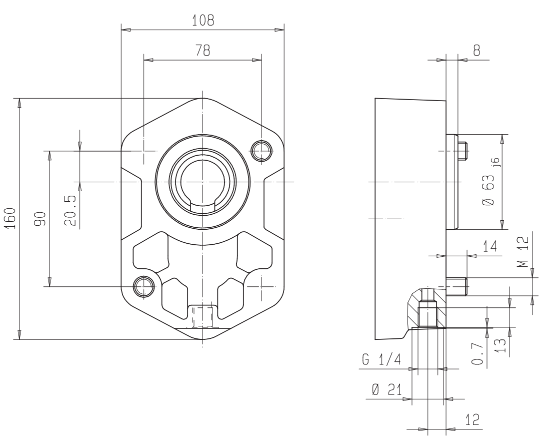
4 bolt rectangular flange G with drain port front / Special no. /04



2 bolt flange F with drain port front / Special no. /04

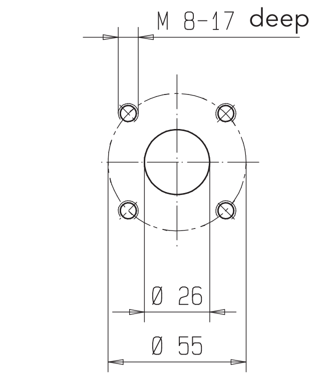


2 bolt flange M with drain port front / Special no. /04



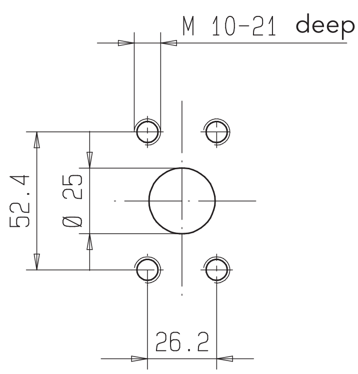
Side ports

Housing Side Ports A

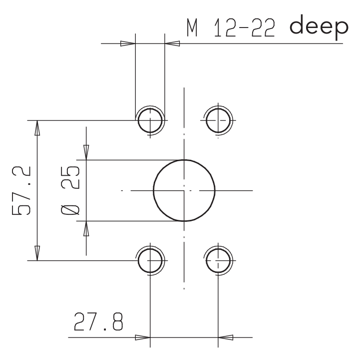


Housing Side Ports F
Displacement / motor displacement 20… 50

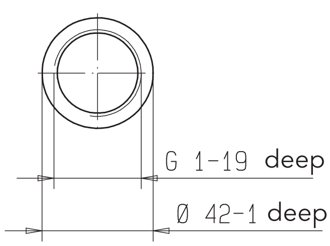
SAE 1 Standard KM 2 … 4DL



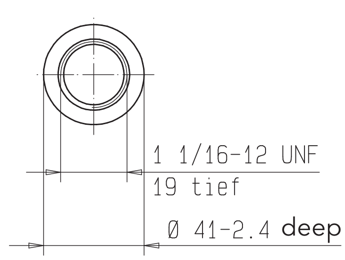
SAE 1 6000 psi … KM 2… 4VL



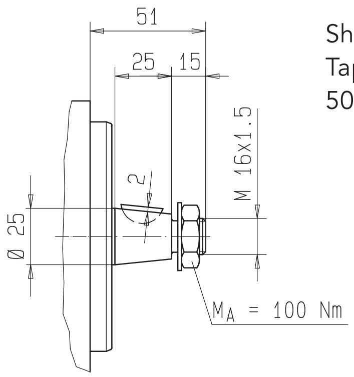
Housing Side Ports D
G 1"



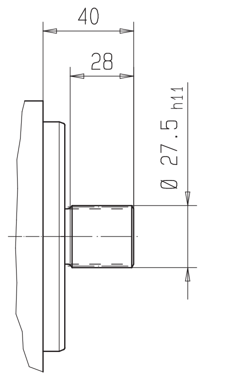
Housing Side Ports J
1 1/16-12 UNF



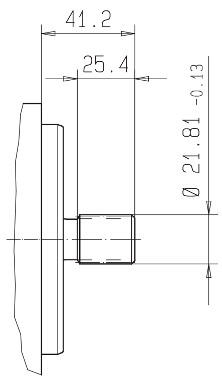
Shaft end



Shaft end K
Taper 1 : 5
500 Nm_{max}

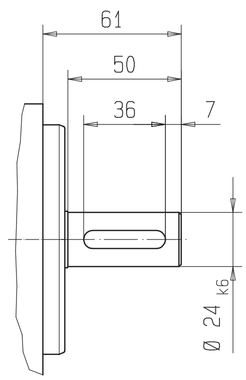


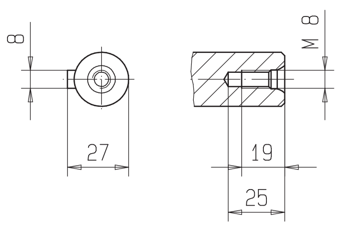
Shaft end W
involute spline B 28 x 25
DIN 5482
z = 15 m = 1.75
450 Nm_{max}



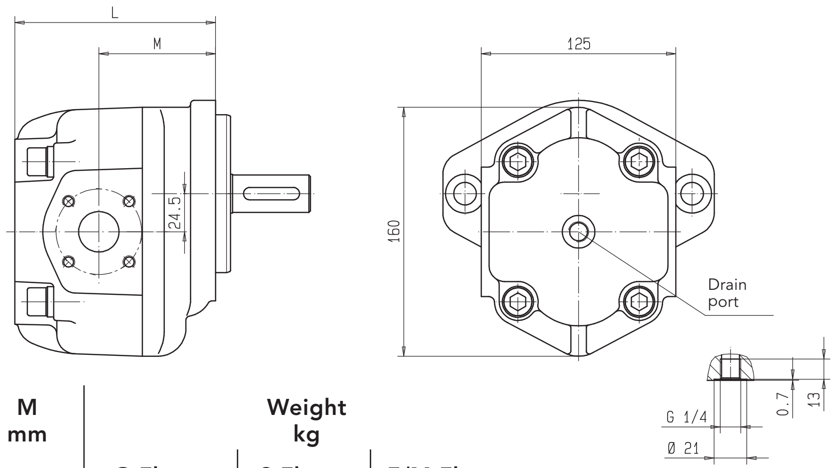
Shaft end U
involute spline SAE-B
z = 13 DP 16 / 32, α = 30°
180 Nm_{max}

Shaft end Y
Cylindrical shaft
230 Nm_{max}





Dimensions, weight

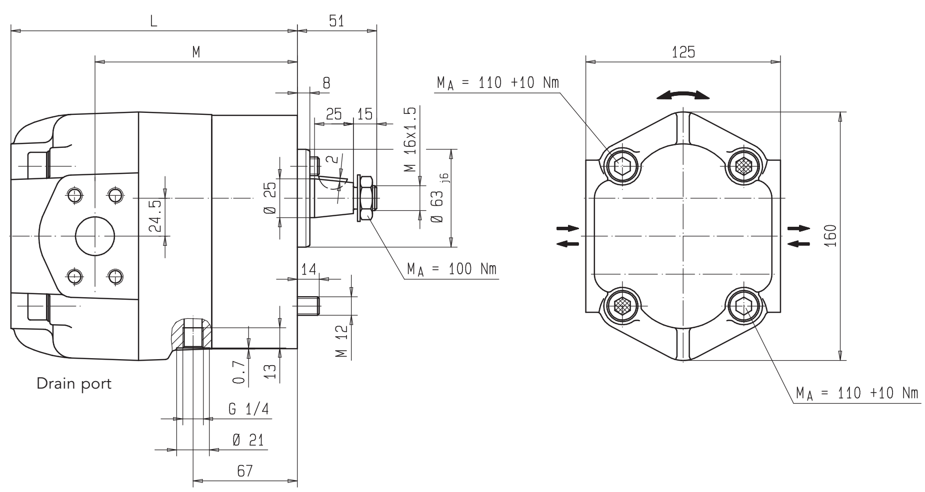


Nominal motor displacement	L mm	M mm	Weight kg		
			G-Flange	S-Flange	F/M-Flange
20	129	75	11.0	10.0	9.0
25			11.5	10.5	9.5
28			12.0	11.0	10.0
32			12.5	11.5	10.5
40	142	85	13.0	12.5	11.5
50			13.5	13.0	12.0
62	152		15	14.0	13.0

Ordering example:

KM 2/20 S30A Y00 4DL1

Dimensions, weight with outboard bearing



Nominal motor displacement	L mm	M mm	Weight kg
20	184	130	12.0
25			12.5
28			13.0
32			13.5
40	197	140	14.5
50			15.0
62	207		16.0

Ordering example:

KM 2/20 M3LF K00 4DL1/410

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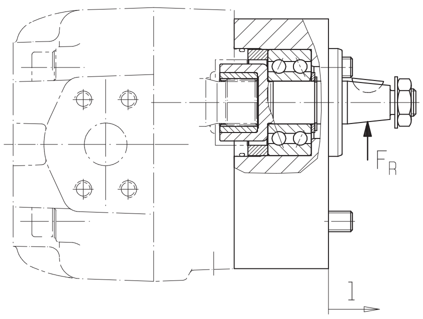
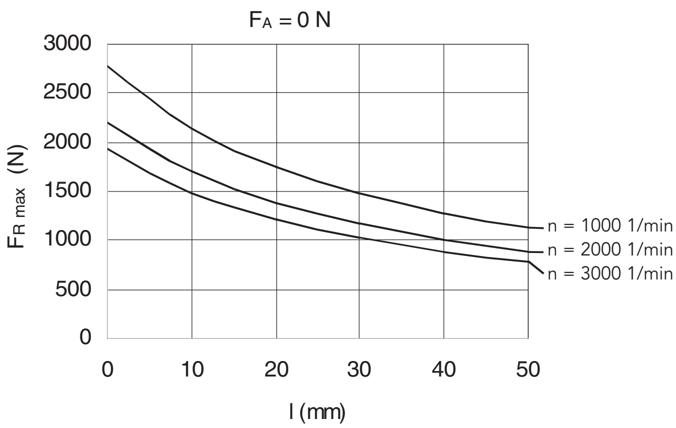
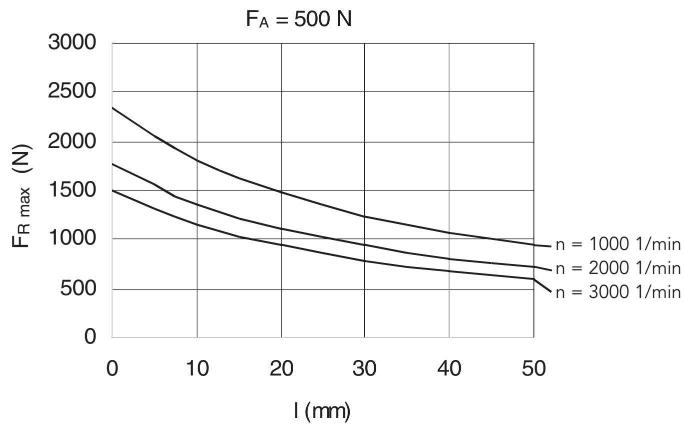
Permissible Load – Outboard Bearing …/410, Tapered Shaft End

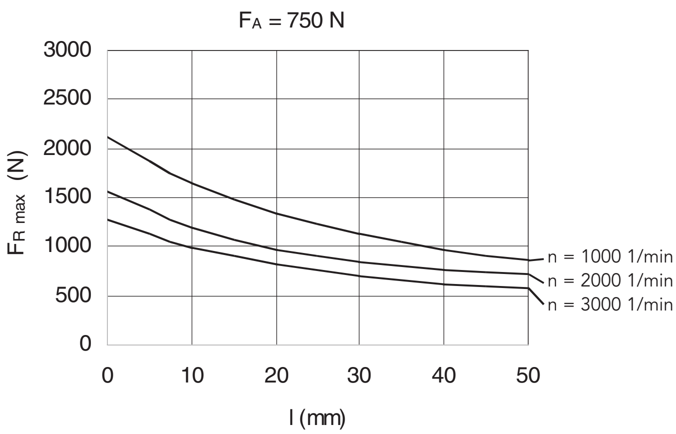


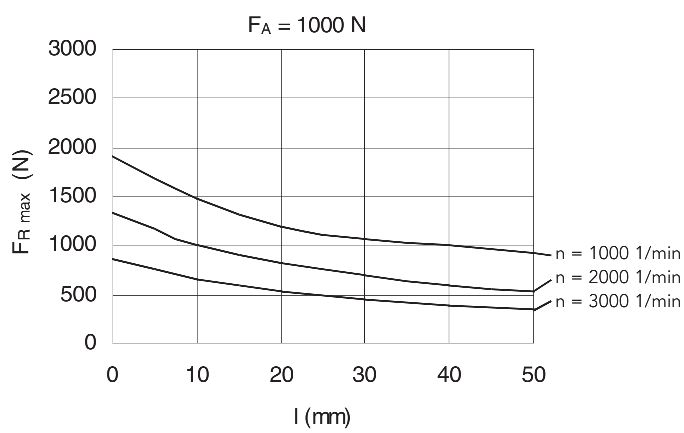
Permissible radial load $F_{R\ max}$ as function of the supporting distance l for a given axial force

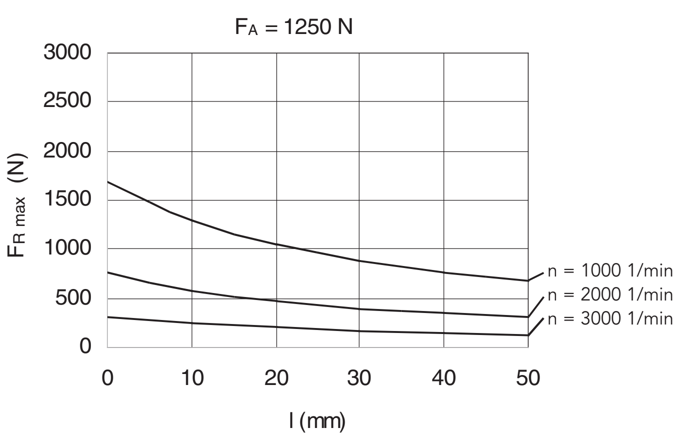
F_A (for L_h = 10.000 h), medium wave at l = 22.8 mm

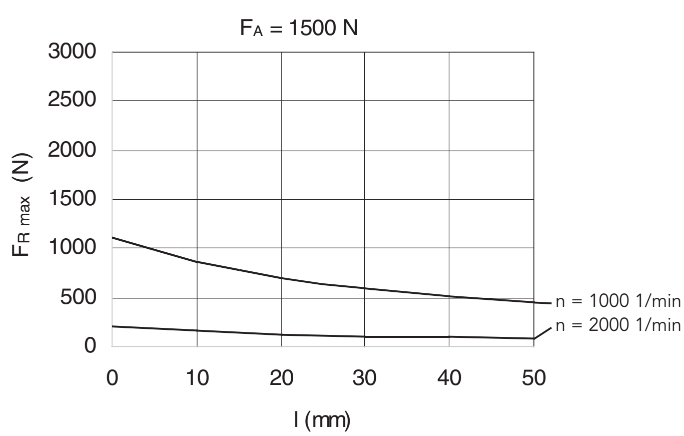












Product Portfolio

Gear Pumps

Gear pumps for lubricating oil supply equipment, low pressure filling and feed systems, dosing and mixing systems.

Mobile Hydraulics

Single and multistage high pressure gear pumps, hydraulic motors and valves for construction machinery, vehicle-mounted machines.

Flow Measurement

Gear, turbine and screw type flow meters and electronics for volume and flow metering technology in hydraulics, processing and laquering technology.

Industrial Hydraulics / Test Bench Construction

Cetop directional control and proportional valves, hydraulic cylinders, pressure, quantity and stop valves for pipe and slab construction, hydraulic accessories for industrial hydraulics (mobile and stationary use).

Technology Test benches / Fluid Test benches.

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