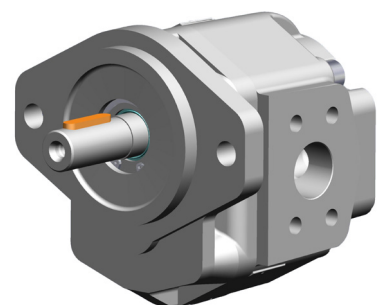
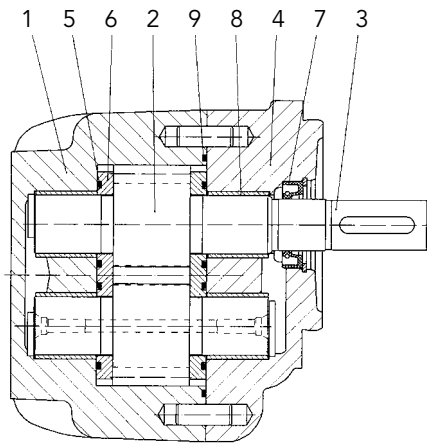


High pressure
gear pumps
KP 2 / KP 3



KRACHT®
FLUID TECHNOLOGY AND SYSTEMS

Construction



- 1 Housing
- 2 Gear
- 3 Drive shaft end
- 4 Flange mounting cover
- 5 Gasket for the pressure fields for axial and play compensation
- 6 Sliding plates
- 7 Single rotary shaft lip
- 8 Plain bearings
- 9 Sealing of the housing

Function

Due to the construction (design principle) and the materials used KRACHT series KP 2 / KP 3 external gear pumps are suitable for use under the most stringent operating conditions. The housing and the flange mounting cover (see the sectional drawing) – both made of gray cast iron – have high dynamic load capabilities and are therefore insensitive to peak pressures and permanent oscillations. Large-scale PTFE-Pb coated plain bronze bearings on steel backs in the housing and the flange mounting cover carry the extremely finely ground bearing pins of the gear, which consists of the driving shaft pinion.

The tooth profiles of the gear, which is made of case hardened steel, are ground to achieve the best running characteristics. A considerable reduction in the volume flow fluctuation and thus of the pressure pulsation is achieved through the high number of teeth ($z = 14$) and in combination with a tooth form shaped in accordance with the special requirements of hydraulics and the optimum ra-

ting of the expansion grooves in the quench oil area. This leads to much lower noise levels for the pumps, or for complete systems and machines.

The function of the axial play compensation that is essential for high pressure pumps is carried out by the sliding plates located at the side of the gear. These have hydraulic pressure fields that guarantee compensation of the axial play on all operating pressures.

The sliding plates are designed so that play is compensated independently of the viscosity. This ensures a high degree of volumetric and mechanical efficiency at every working point.

Depending on the temperature or the media, NBR or FKM sealing gaskets can be used to meet a wide range of application requirements. Multiple pump combinations of the same or different sizes are possible.

Note

1. External loads

Loads acting on the drive shaft end from outside impair the functions of the double-land bearing. Radial loads can be absorbed in dependence on the extent and the direction of the loads. Axial loads are not permissible.

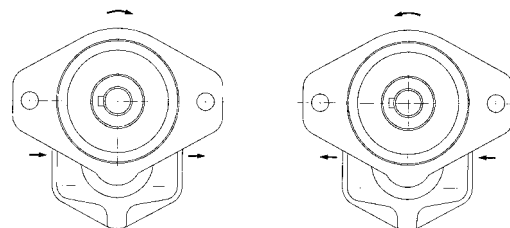
To absorb outer loads only those pump types shall be used which are equipped with an outboard bearing.

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:
Flow direction from left to right.

Drive shaft end rotating anticlockwise:
Flow direction from right to left.



Materials

Housing	grey cast iron
Bearing	composite plain bearing bushes
Journals and gears	case hardening steel acc. to DIN 17210 surface hardened and ground
Seals	NBR rotary shaft lip type seal ϑ 90 °C FKM rotary shaft lip type seal ϑ 150 °C

Characteristics

Mounting	flange type		
Pipe connection	flange		
Direction of rotation	clockwise or anticlockwise		
Weight	see dimension sheets		
Mounting position	optional		
Ambient temperature	$\vartheta_{u \min}$	=	- 20 °C
	$\vartheta_{u \max}$	=	60 °C
Operating pressure Inlet port	$p_{e \min}$	=	- 0.4 bar (vacuum)
	$p_{e \max}$	=	2 bar
Operating pressure Short time	$p_{e \max}$	=	5 bar
Operating pressure Outlet port	$p_{e \max}$	=	300 bar
Fluid temperature range	$\vartheta_{m \max}$	90 °C for NBR rotary shaft lip type seal	
	$\vartheta_{m \max}$	150 °C for FKM rotary shaft lip type seal	
Viscosity	$v_{\min}$	=	10 mm ² /s
	$v_{\max}$	=	600 mm ² /s
Recommended oil cleanliness	according to ISO 4406 : 1999 Code 21/19/16 ☐ according to NAS 1638 Class 10		
Recommended filtration	filter with filtration quotient β_{25} 75 for ... 300 bar β_{40} 75 for ... 100 bar		
Recommended viscosity range	v	=	30 ... 45 mm ² /s
Discharge flow	see chart page 7 and 8		
Input power	see chart page 7 and 8		
Hydraulic fluids	mineral oil acc. to DIN 51524/25 engine oil acc. to DIN 51511 flame-retardant hydraulic fluids on request bio-oils of typ „HEES“, can be used up to 70 °C, max. pressure must be reduced minus 20% (use only on request)		

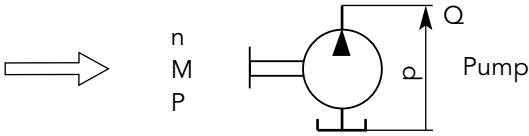
ATEX (KP2 only)

Products and media on request.

Calculation Formulas for Hydraulic Pumps

Characteristic data, formula signs, units

Discharge flow / input flow	Q	l/min
Pump / motor displacement	V _g	cm ³ /r
Pressure	p	bar
Speed of rotation	n	1/min
Torque	M	Nm
Power	P	kW
Total efficiency	η _{tot}	–
Volumetric efficiency	η _{vol}	–
Hydr./mech. efficiency	η _{hm}	–
Flow velocity	v	m/s
Pipe diameter	d	mm

		
Characteristic data for:	Volumetric flow	Discharge flow $Q = \frac{V_g \cdot n \cdot \eta_{vol}}{10^3} \left[\frac{l}{min} \right]$
	Torque	Drive torque $M = \frac{p \cdot V_g}{20 \cdot \pi \cdot \eta_{hm}} [Nm]$
	Power	Input power $P = \frac{p \cdot Q}{600 \cdot \eta_{tot}} [kW]$

General

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

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

Approximate values for KRACHT products
in the nominal operating point

	η _{tot}	η _{vol}
KP	0.90	0.95

Technical Data KP2

Displace- ment Nominal size	Geom. displace- ment	Max. operating pressure	Peak pressure	Max. speed	Moment of inertia $\times 10^{-5}$	Minimum speed				
	V_g cm^3/r	p_b bar 1)	p_{max} bar	n_{max} 1/min 2) 3)	J kg m^2	at $p = \dots$ bar 1/min				
						...100	...120	...150	...180	≥ 200
20	19.7	250	300	3000 2800	34.3	700	700	800	900	1000
25	24.6	250	300	3000 2800	40.5	600	600	700	800	900
28	27.7	230	280	2800 2500	44.3	600	600	700	800	900
32	31.5	230	280	2600 2500	49.2	500	600	700	800	900
40	39.4	210	250	2800 2200	59.0	500	600	700	800	800
50	49.2	210	250	2600 2000	71.4	500	600	700	800	800
62	61.2	180	200	2200 —	86.5	500	600	700	800	—

1) S1 or S3 mode (50% operating factor 30 1/min)
Pressure data applies for $v \geq 30 \text{ mm}^2/\text{s}$ and $n \geq 1000 \text{ 1/min}$

2) For housing with SAE connection $\varnothing 32 / \varnothing 40$

3) For housing with connection $\varnothing 26$

Technical Data KP3

Displace- ment Nominal size	Geom. displace- ment	Max. operating pressure	Peak pressure	Max. speed	Moment of inertia $\times 10^{-5}$	Minimum speed				
	V_g cm^3/r	p_b bar	p_{max} bar	n_{max} 1/min	J kg m^2	at $p = \dots$ bar 1/min				
						...100	...120	...150	...180	≥ 200
63	62.5	230	280	2600	169	800	800	900	1000	1000
71	70.6	230	280	2500	187	700	700	800	900	900
82	81.0	210	250	2600	210	500	600	700	800	800
100	99.5	210	250	2500	252	500	600	700	800	800
112	111.1	200	230	2400	277	500	600	700	800	800
125	123.8	200	230	2300	306	500	600	700	800	800

Discharge Flow and Required Input Power KP3

Discharge flow at n = 1450 1/min

Nominal size	Discharge flow Q in l/min at 34 mm ² /s							
	Pressure p in bar							
	20	60	100	140	180	200	210	250
63	88.5	87.8	87.0	86.2	85.4	84.9	84.7	83.8
71	100.1	99.4	98.7	98.0	97.2	96.8	96.6	96.2
82	114.8	114.2	113.6	112.9	112.1	111.8	111.6	–
100	141.2	140.7	140.1	139.6	139.0	138.7	138.5	–
112	157.8	157.5	157.1	156.8	156.4	156.3	–	–
125	175.8	175.5	175.1	174.7	174.3	174.1	–	–

Required input power P in kW at n = 1450 1/min

Nominal size	Pressure p in bar							
	20	60	100	140	180	200	210	250
63	3.65	10.31	16.97	23.62	30.28	33.61	35.28	41.93
71	4.10	11.63	19.15	26.68	34.20	37.96	39.84	43.61
82	4.67	13.31	21.94	30.57	39.21	43.52	45.68	–
100	5.63	16.13	26.63	37.13	47.63	52.87	55.50	–
112	6.20	17.79	29.39	40.98	52.58	58.38	–	–
125	6.81	19.60	32.39	45.17	57.96	64.35	–	–

Discharge flow at n = 950 1/min

Nominal size	Discharge flow Q in l/min at 34 mm ² /s							
	Pressure p in bar							
	20	60	100	140	180	200	210	250
63	57.3	56.6	55.8	55.0	54.1	–	–	–
71	64.8	64.1	63.4	62.7	61.9	61.5	61.3	60.9
82	74.3	73.7	73.1	72.4	71.6	71.3	71.1	–
100	91.4	90.9	90.4	89.8	89.2	88.9	88.8	–
112	102.2	101.9	101.6	101.2	100.9	100.7	–	–
125	113.9	113.6	113.2	112.8	112.4	112.2	–	–

Required input power P in kW at n = 950 1/min

Nominal size	Pressure p in bar							
	20	60	100	140	180	200	210	250
63	2.39	6.75	11.11	15.48	19.84	–	–	–
71	2.68	7.61	12.54	17.47	22.40	24.87	26.10	28.57
82	3.06	8.71	14.37	20.03	25.68	28.51	29.93	–
100	3.69	10.57	17.44	24.32	31.20	34.64	36.36	–
112	4.06	11.65	19.25	26.85	34.44	38.24	–	–
125	4.46	12.83	21.21	29.59	37.97	42.16	–	–

The ratings are based on a viscosity of 34 mm²/s

The output of the drive motor must be chosen 20% higher than the table value P

Type Key

Housing connection

- A** Suction and pressure connection Ø 26 with LK 55 to V_g 50
- F** Suction side 1 1/4" SAE connection (Ø 32) to V_g size 32
Pressure side 1" SAE connection (Ø 25) to V_g size 32
- G** Suction side 1 1/2" SAE connection (Ø 40) from V_g size 40 to V_g 71
Pressure side 1 1/4" SAE connection (Ø 32) from V_g size 40 to V_g 71
- J** Suction side 2" SAE connection (Ø 50) from V_g size 82
Pressure side 1 1/4" SAE connection (Ø 32) from V_g size 82
- V** as A housing;
for multi-stage pump version
- Y** as F housing;
for multi-stage pump version
- Z** as G housing;
for multi-stage pump version
- X** as J housing;
for multi-stage pump version

Shaft end / Shaft load capacity

- B** External spline W 35 x 2; DIN 5480 from V_g 82; 800 Nm_{max}
- K** Cone 1 : 5; 500 Nm_{max}
- U** External spline SAE-B; Z = 13; DP 16/32; α = 30°; 180 Nm_{max}
- Y** Cylindrical shaft Ø 24; 230 Nm_{max} KP 2; Ø 32; 550 Nm_{max} KP 3
- W** External spline B 28 x 25; DIN 5482; Z = 15; m = 1.75; 450 Nm_{max}
- Q** External spline SAE C; Z = 14; DP 12/24; α = 30°; 500 Nm_{max}

2. Shaft end

- 0** None
- W** External spline B 28 x 25; DIN 5482; Z = 15; m = 1.75

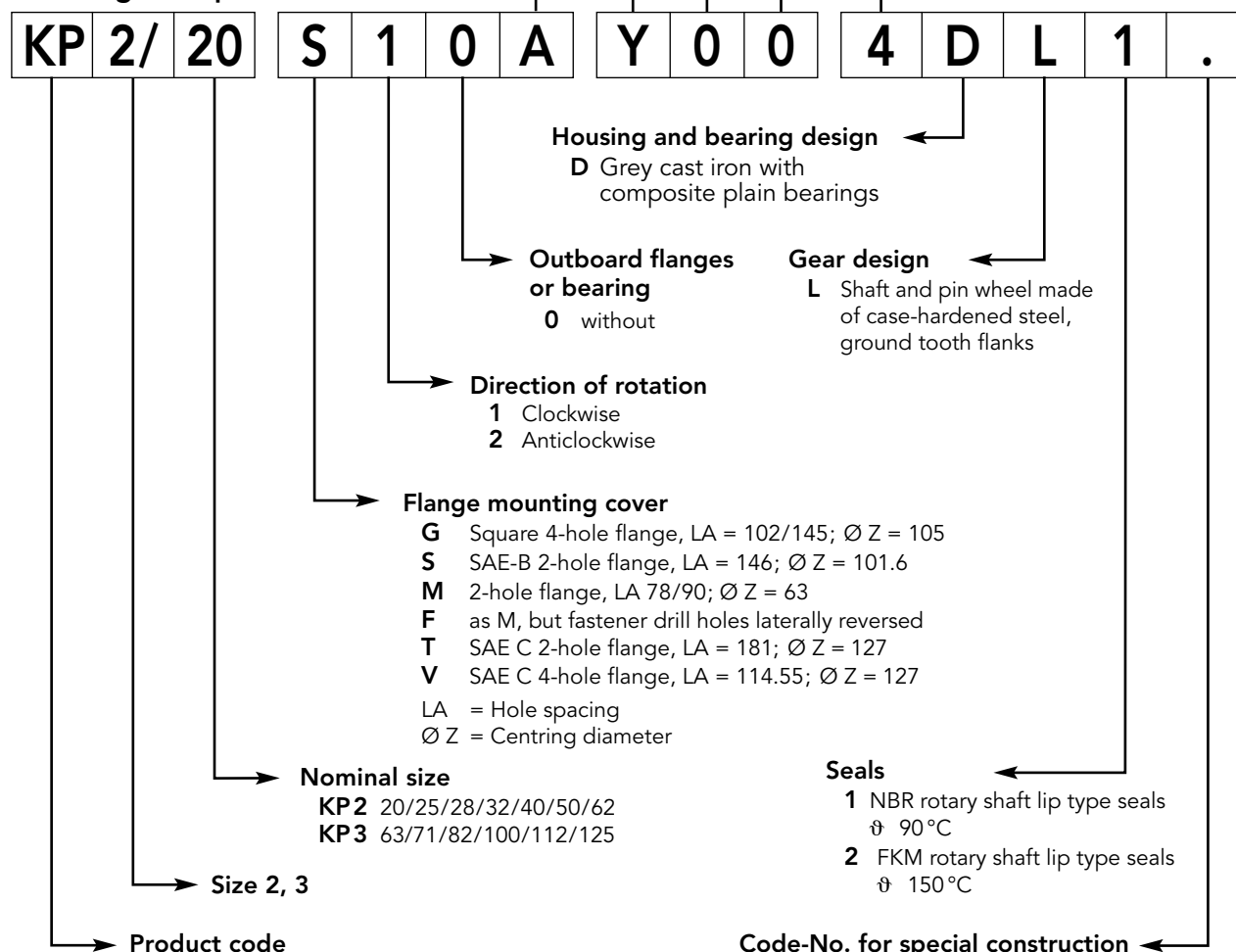
Transition piece

- G** Transition piece for multi-stage design KP 2 with KP 1
- H** Transition piece for multi-stage design KP 2 with KP 2
- 0** Standard design (1-stage pump)
- J** KP 3 with KP 1
- L** KP 3 with KP 2 and KP 3 with KP 3

Design code

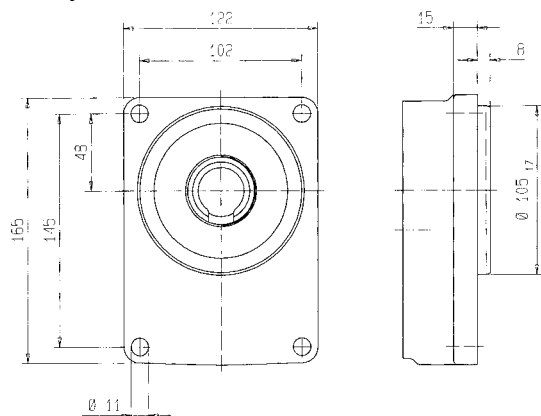
- 4** KP 2 (specified by KRACHT)
- 6** KP 3 (specified by KRACHT)

Ordering example

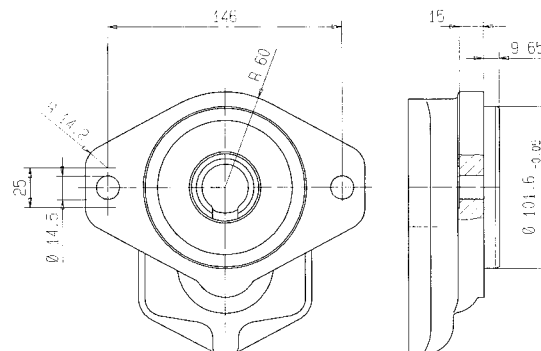


Flange Types

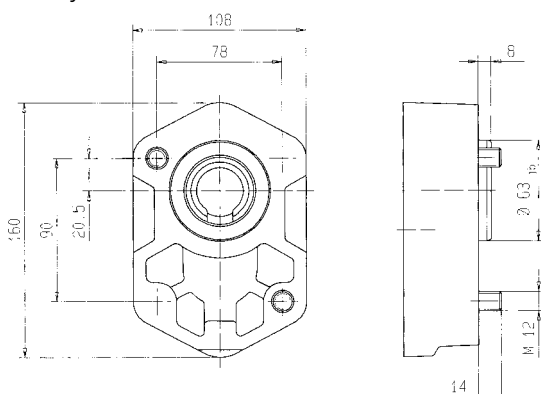
Square 4-hole flange G
KP 2 only



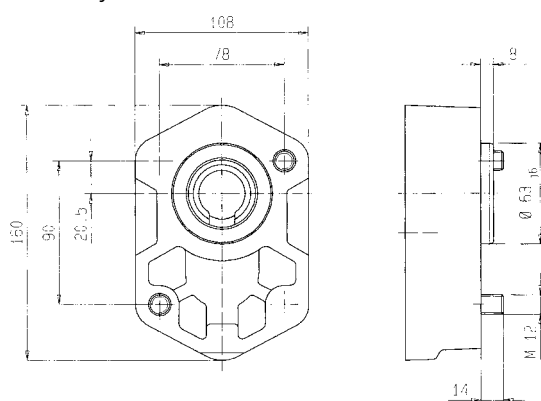
SAE B 2-hole flange S



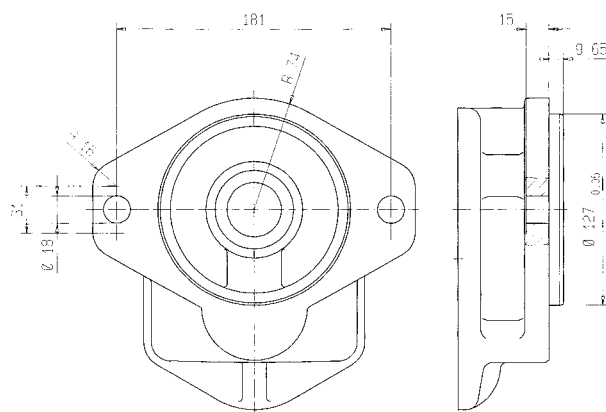
2-hole flange F
KP 2 only



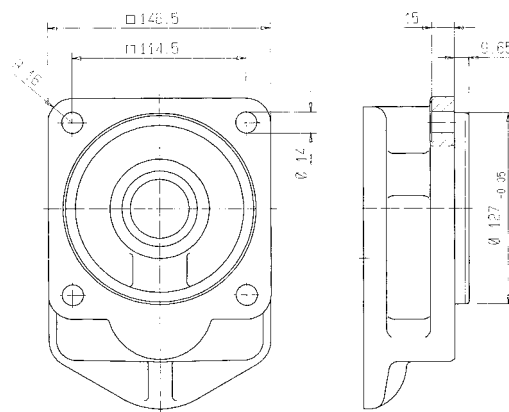
2-hole flange M
KP 2 only



SAE C 2-hole flange T
KP 3 only

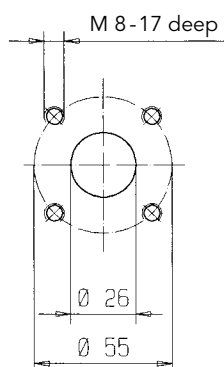


SAE C 4-hole flange V
KP 3 only

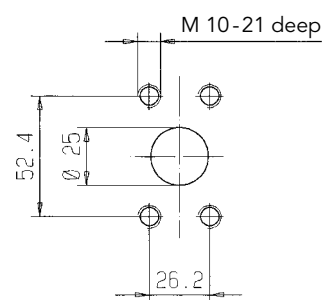
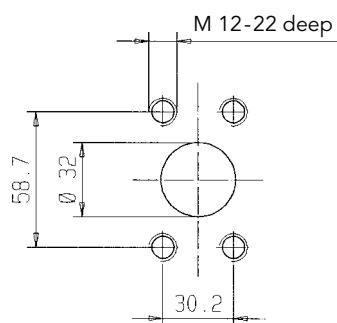


Connections

Housing connection A
Displacement nominal size
KP 2: 20 – 50
Inlet and outlet ports same dimensions

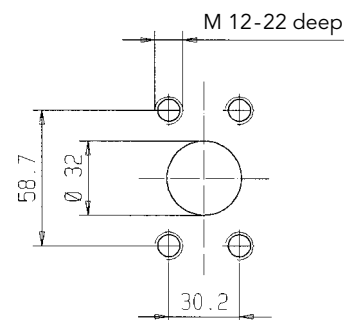
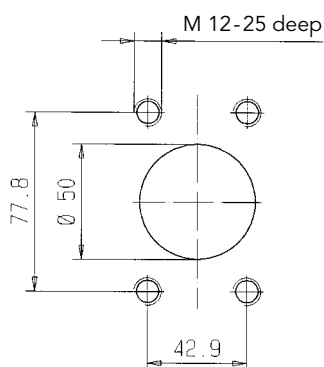
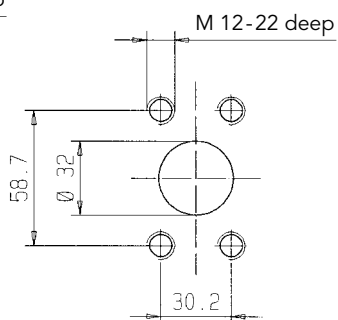
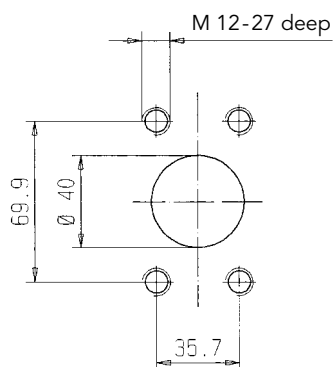


Housing connection F
Displacement nominal size
KP 2: 20, 25, 28, 32
Inlet port SAE 1¼ Outlet port SAE 1

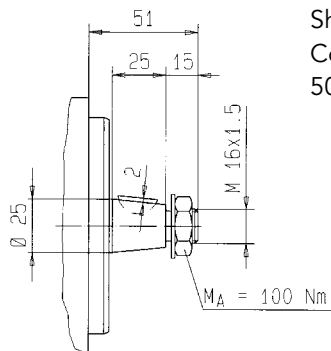


Housing connection G
Displacement nominal size
KP2: 40, 50, 62
KP3: 63-71
Inlet port SAE 1½ Outlet port SAE 1¼

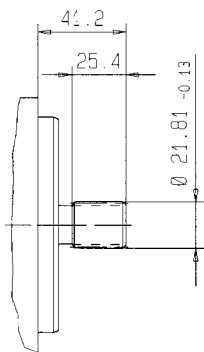
Housing connection J
Displacement nominal size
KP3: 82, 100, 112, 125
Inlet port SAE 2 Outlet port SAE 1¼



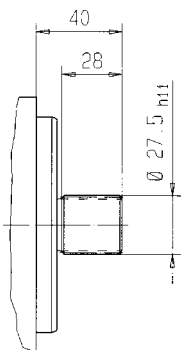
Shaft Ends KP 2



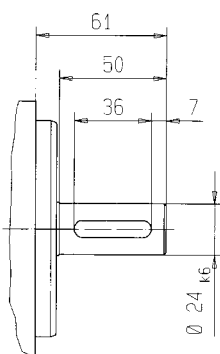
Shaft end K
Cone 1:5
500 Nm_{max}



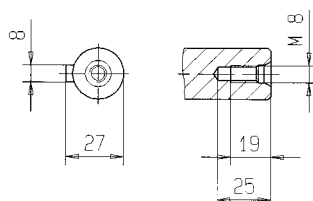
Shaft end U
External spline SAE-B
z = 13 DP 16/32, α = 30°
180 Nm_{max}



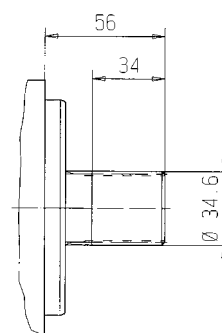
Shaft end W
External spline B 28x25
DIN 5482
z = 15, m = 1.75
450 Nm_{max}



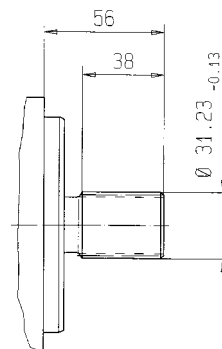
Shaft end Y
Cylindrical shaft
230 Nm_{max}



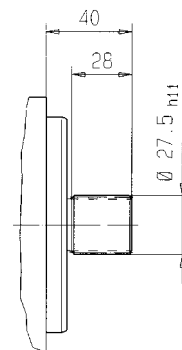
Shaft Ends KP 3



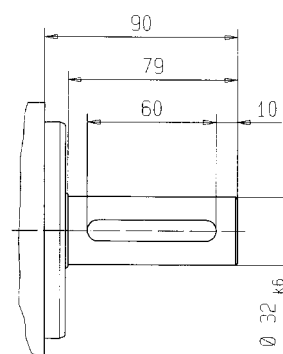
Shaft end B
External spline W 35x2
DIN 5480 from V_g 82
800 Nm_{max}



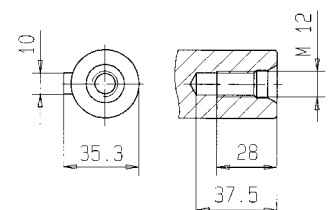
Shaft end Q
External spline SAE-C
z = 14 DP 12/24, α = 30°
500 Nm_{max}



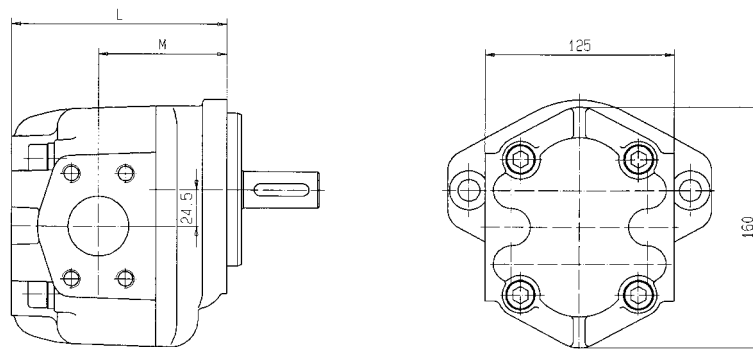
Shaft end W
External spline B 28x25
DIN 5482
z = 15, m = 1.75
450 Nm_{max}



Shaft end Y
Cylindrical shaft
550 Nm_{max}

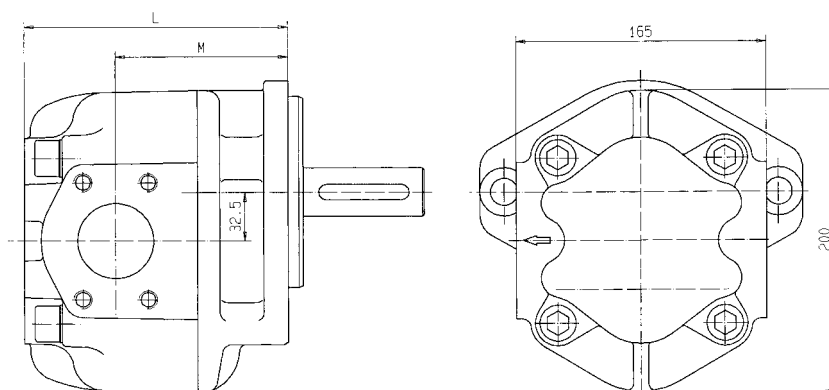


Dimensions, Weight KP 2



Displacement Nominal size	L	M	Weight		
			Design G flange	Design S flange	Design F/M flange
20	129	75	11	10	9
25			11.5	10.5	9.5
28			12	11	10
32			12.5	11.5	10.5
40	142	85	13	12.5	11.5
50			13.5	13	12
62	152		15	14	13

Dimensions, Weight KP 3

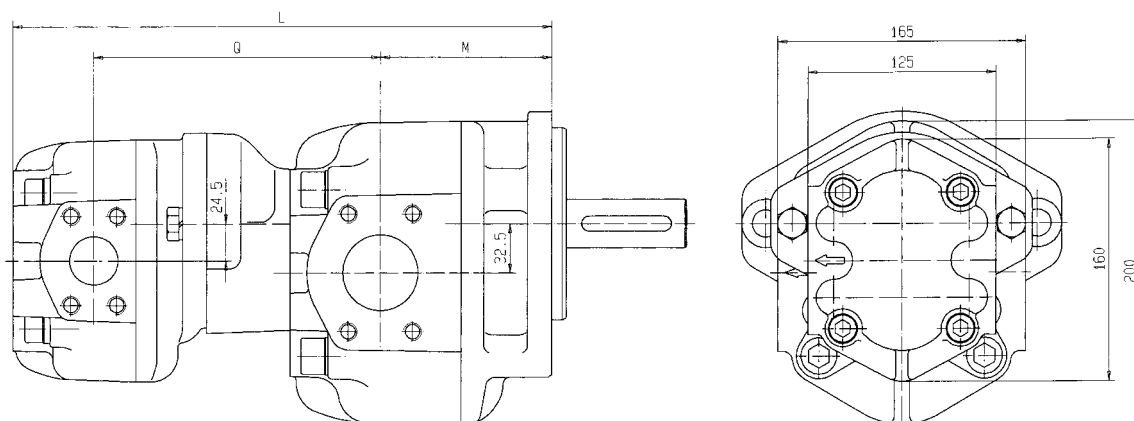


Displacement Nominal size	L	M	Weight		
			Design S flange	Design T flange	Design V flange
63	162	102	23.5	24.0	24.5
71			23	23.5	24
82	174	114	24.5	25	25.5
100			26	26.5	27
112	185	125	27	27.5	28
125			29	29.5	30

Tandem Version SAE-C Flange, Cylindrical Shaft

The pump stages shown here can work in hydraulically separated circuits or with different media

Direction of rotation: clockwise
With anticlockwise rotation the inlet and outlet ports are opposite



The drive should be by means of a compensating coupling!
Important: Unbalanced states and/or axial loads must not occur.

Ordering example

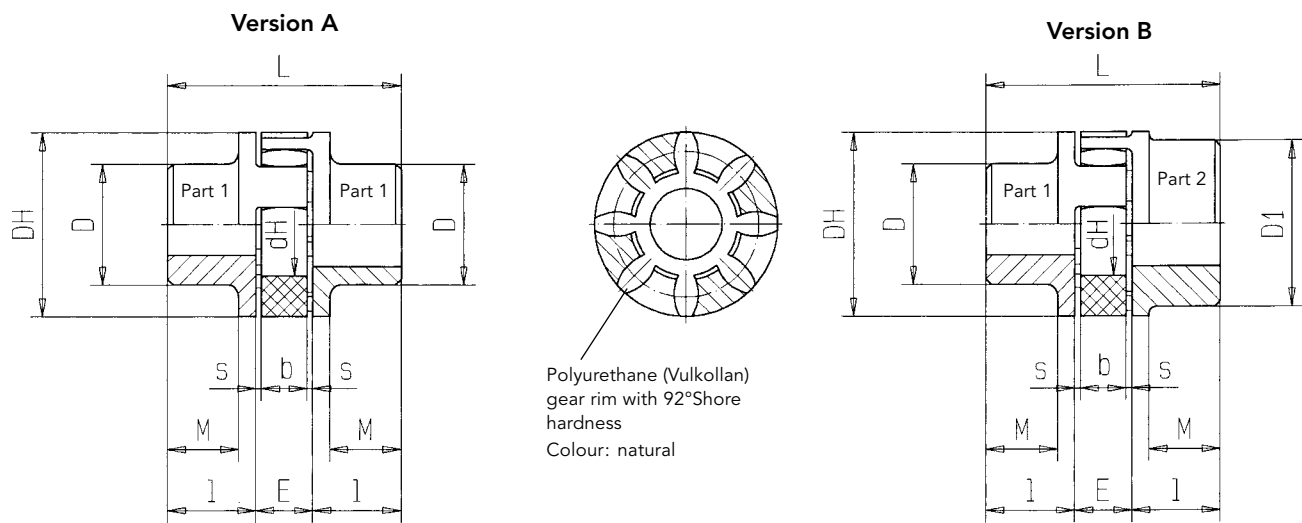
KP 3/100 T10X YWL 6DL1 + KP 2/32 S10F W00 4DL1

Displacement Nominal size 2 nd stage	Displacement Nominal size											
	63-71			1. stage 82-100			112-125					
	Q	L	M	Q	L	M	Q	L	M			
20	191	347	102	191	359	114	191	370	125			
25												
28												
32												
40	201	360		201	372		201	383				
50												
62	201	370		201	382		201	393				

Along with the versions shown here, the following are available on request:

- other pump combinations (KP 3, KP 2, KP 1)
- other flange mounting cover and shaft version for the 1st stage
- three-stage pumps

Accessory – Couplings



Ordering example:

R^A_G 38 – **Z 45/ ²⁴/₃₂** – **Z 45/38**

	Hub material
A	AL
G	GG

Coupling size

Coupling hub length
and hub drill hole on
pump side cylindrical
KP2: Ø 24; KP3: Ø 32

Coupling hub length
and hub drill hole on
motor side cylindrical

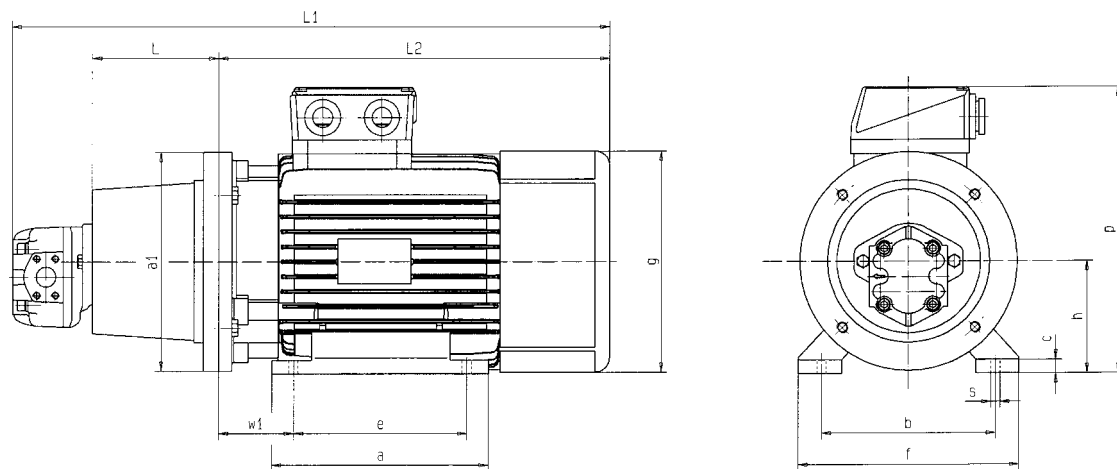
	Coupling size	Hub material: Aluminium		Pilot hole		Finished bore				Dimensions										Ordering example
		Weight Kg	Moment of inertia Kgm ²	Part 1	Part 2	min. Part 1	min. Part 2	max. Part 1	max. Part 2	l	E	s	b	L	M	D _H	D	D ₁	d _h	
Version A	28	0.39	0.0002	8	–	10	–	28	–	35	20	2.5	15	90	28	65	48	–	30	RA 28-Z 35/..-Z 35/..
	38	0.82	0.0007	10	–	12	–	38	–	45	24	3	18	114	37	80	66	–	38	RA 38-Z 45/..-Z 45/..
	42	1.25	0.0014	12	–	14	–	42	–	50	26	3	20	126	40	95	75	–	46	RA 42-Z 50/..-Z 50/..
	48	1.71	0.0024	13	–	15	–	48	–	56	28	3.5	21	140	45	105	85	–	51	RA 48-Z 56/..-Z 56/..
	55	6.64	0.012	18	–	20	–	55	–	65	30	4	22	160	52	120	98	–	60	RG 55-Z 65/..-Z 65/..
Version B	24/28	0.26	0.0001	6	22	8	24	24	28	30	18	2	14	78	24	55	40	48	27	RA 24/28-Z 30/..-Z 30/..
	28/38	0.46	0.0003	8	26	10	28	28	38	35	20	2.5	15	90	28	65	48	65	30	RA 28/38-Z 35/..-Z 35/..
	38/45	0.89	0.0008	10	36	12	38	38	45	45	24	3	18	114	37	80	66	76	38	RA 38/45-Z 45/..-Z 45/..
	42/55	1.39	0.0018	12	40	14	42	42	55	50	26	3	20	126	40	95	75	94	46	RA 42/55-Z 50/..-Z 50/..
	48/60	1.86	0.0030	13	46	15	48	48	60	56	28	3.5	21	140	45	105	85	102	51	RA 48/60-Z 56/..-Z 56/..
	55/70	7.37	0.016	18	52	20	55	55	70	65	30	4	22	160	–	120	98	120	60	RG 55/70-Z 65/..-Z 65/..
	65/70	10.89	0.031	20	63	22	65	65	75	75	35	4.5	26	185	–	135	115	135	68	RG 65/75-Z 75/..-Z 75/..

Operating temperature: - 10 °C to + 80 °C (short-term temperature peaks up to + 120 °C are permissible)

Weights and moments of inertia refer to max. finished bore without groove

Finished bore in accordance with ISO fit H7; parallel keys in accordance with DIN 6885 sheet 1

Motor with Pump KP 3/. T.O. Y00 6DL.



KP 3

Size	Motor 6-pole		Motor 4-pole		Bell housing	Coupling
	Power kW	Speed 1/min	Power kW	Speed 1/min		
100 LA	1.5	940	2.2	1420	Z3/250/175	RA 28/38 – Z35/32 – Z35/28
100 LB	–	–	3.0	1420		
112 M	2.2	940	4.0	1440		
132 S	3.0	960	5.5	1440	Z3/300/196	RA 28/38 – Z35/32 – Z35/38
132 M	5.5	960	7.5	1440		
160 M	7.5	970	11.0	1460	Z3/350/228	RA 38/45 – Z45/32 – Z45/42
160 L	11.0	970	15.0	1470		RA 42/55 – Z50/32 – Z50/48
180 M	–	–	18.5	1470		
180 L	15.0	970	22.0	1480		
200 L	22.0	970	30.0	1480	Z3/400/228	RA 42/55 – Z50/32 – Z50/55
225 S	–	–	37.0	1480	Z3/450/262	RA 48/60 – Z56/32 – Z56/60
225 M	30.0	980	45.0	1480		
250 M	37.0	980	55.0	1480	Z3/550/265	RG 55/70 – Z65/32 – Z65/65
280 S	45.0	980	75.0	1480	Z3/550/265	RGS 65 – Z75/32 – Z75/75

All motor dimensions and date refer to AC motors; other motor makes on enquiry. Motor type IMB35

KP 3

Size	63-71 L ₁	82-100 L ₁	112-125 L ₁	71-125												
	L	a ₁	a	b	c	e	f	g	h	L ₂	p	s	w ₁			
100 L	662	674	685	175	250	150	160	11	140	205	187	100	325	260	12	63
112 M	677	689	700	175	250	180	190	12	140	230	210	112	340	290	12	70
132 S	761	773	784	196	300	190	216	15	140	270	248	132	403	338	12	89
132 M	788	800	811	196	300	190	216	15	178	270	248	132	430	338	12	89
160 M	895	907	918	228	350	260	254	20	210	320	312	160	505	422	15	108
160 L	950	962	973	228	350	304	254	20	254	320	312	160	560	422	15	108
180 M	980	992	1003	228	350	311	279	22	241	355	354	180	590	458	15	121
180 L	1020	1032	1043	228	350	349	279	22	279	355	354	180	630	458	15	121
200 L	1050	1062	1073	228	400	370	318	25	305	395	396	200	660	525	19	133
225 S	1099	1111	1122	262	450	368	356	28	286	435	450	225	675	574	19	149
225 M	1129	1141	1152	262	450	395	356	28	311	435	450	225	705	574	19	149
250 M	1197	1209	1220	265	550	445	406	30	349	490	490	250	770	635	24	168
280 S	1272	1284	1295	265	550	485	457	35	368	550	550	280	845	693	24	190

All pump nominal sizes and motor sizes can be combined with each other

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