Pump technology

KRACHT®

KRACHT GmbH · Gewerbestrasse 20 · 58791 Werdohl, Germany
Phone +49 2392 935 0 · E-Mail info@kracht.eu · Web www.kracht.eu

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KRACHT®
FLUID TECHNOLOGY AND SYSTEMS

آتورصنعت
اعتباری ماندگار

Pump technology

High pressure gear pumps
KP 0

Construction

According to its design, the Kracht KP 0 external gear pump belongs to the type of so-called gland type pumps. The essential functional elements, gearing and bearing glands are located in an aluminium housing of high-strength extruded alloy, which is limited laterally by the the cover plate and flange cover.

The gearing, made of case hardened steel with surface hardening, consists of the drive shaft wheel and pin wheel. The highest manufacturing quality is guaranteed by shaving the tooth flanks.

The shaft journals are finely ground. Due to the high number of teeth (n = 12) and the special tooth shape, a considerable reduction in design-related volume flow fluctuation and the associated pressure pulsation is achieved.

The gland bearings located on both sides of the gearing carry the journals in heavyduty multicomponent plane bearing bushes and contain additionally those sealing elements which serve for the pressure field sealing to compensate the axial clearance.

Note

1. External loads

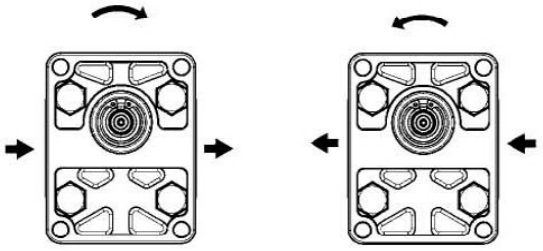
External forces acting on the drive shaft end have an influence on the operation of the bearing glands. Radial and axial forces are not permissible.
An end bearing must be used for the purpose of absorbing external forces.

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	Aluminium
Bearing	double-gland bearing with multicomponent plain bearing bushes
Shafts and gear wheels	surface hardened and ground case hardened steel acc. to DIN 17210
Seals	NBR (FKM on request)

Characteristics

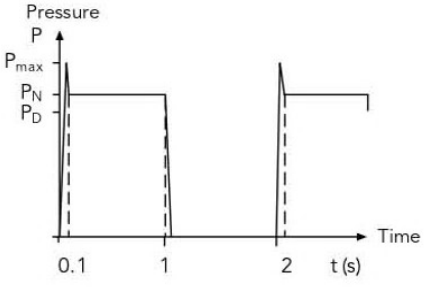
Mounting		flange mounting
Pipe connection		threaded connection
Direction of rotation		clockwise **or** anticlockwise
Fitting position		optional
Ambient temperature	$\vartheta_{u\,min}$ $\vartheta_{u\,max}$	= – 20 °C = 60 °C
Working pressure Inlet port Working pressure Short time	$p_{e\,min}$ $p_{e\,max}$	= – 0.3 bar (vacuum) = 2.5 bar
Working pressure Outlet port	$p_{e\,max}$	see technical data
Fluid temperature	$\vartheta_{m\,max}$	85 °C
Viscosity	ν_{min} ν_{max}	= 10 mm²/s = 1400 mm²/s
Recommended oil cleanliness		class 19/16 acc. to ISO/DIS 4406 ⇨ class 10 acc. to NAS 1638
Recommended filtration		filter with filtration quotient $\beta_{20} \geq 75$ for … 280 bar $\beta_{25} \geq 75$ for … 100 bar
Recommended viscosity range	ν	= 12 … 90 mm²/s
Discharge flow		see chart page 6
Input power		see chart page 6
Hydraulic fluids		mineral oil acc. to DIN 51524 bio-oils of type „HEES“ can be used up to 70 °C, max. pressure must be reduced minus 20 % (use only on request)

Technical Data

Nominal size	geom. displacement	max. pressure	Nominal pressure	Continuous working pressure	Speed	
	V_g cm³/rev	p_{max} bar	p_N bar	p_D bar	n_{max} rpm	n_{min} rpm
1	1.4	280	260	220	4000	700
2	1.9	280	260	220	4000	700
3	3.1	260	250	210	4000	700
4	4.4	260	250	210	4000	700
6	6.1	260	250	210	3000	700
8	7.9	200	180	160	3000	700

Maximum pressure = pressure peak
Nominal pressure pN < 6 s = 50 % ED
See time / pressure chart
max. permissible working cycles: 30 / min
Pressures as specified are applicable to $\nu \geq 30$ mm²/s

Time / pressure chart



Calculation Formulas for Hydraulic Pumps

Characteristic data, formula signs, units

1.	Discharge flow / input flow	Q	l/min
2.	Pump / motor displacement	V_g	cm³/rev
3.	Pressure	p	bar
4.	Speed	n	rpm
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.	Pipe diameter	d	mm

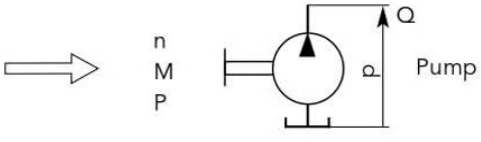
General

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

$M = 9549 \cdot \frac{P}{n}, \quad v = 21.22 \cdot \frac{Q}{d_2}$

Approximate values for KRACHT products in the nominal working point

KP 0	η_{tot}	η_{vol}
1 to 4	≈ 0.75	≈ 0.85
6 to 8	≈ 0.90	≈ 0.90



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]

Discharge Flow and Required Input Power

Discharge flow at n = 1495 rpm

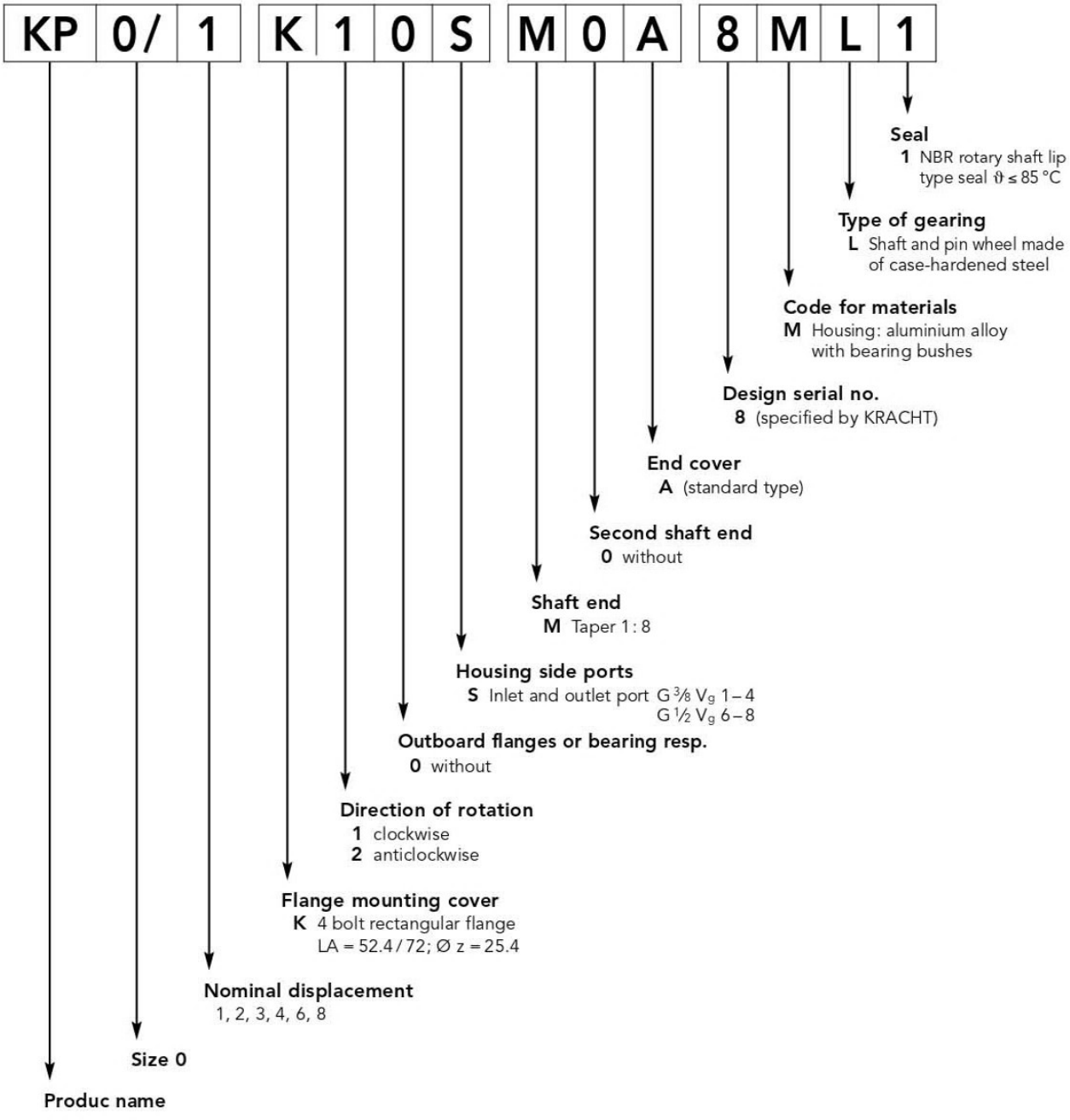
Nominal size	Discharge flow Q in l/min at 34 mm²/s Pressure p in bar						
	20	60	100	140	180	220	260
1	2.00	1.95	1.90	1.86	1.82	1.78	1.73
2	2.80	2.70	2.65	2.60	2.55	2.50	2.40
3	4.70	4.65	4.60	4.55	4.50	4.45	–
4	6.30	6.25	6.20	6.15	6.10	6.05	–
6	9.00	8.95	8.90	8.85	8.80	–	–
8	11.75	11.60	11.50	11.45	11.40	–	–

Required input power at n = 1495 rpm

Nominal size	Pressure p in bar						
	20	60	100	140	180	220	260
1	0.14	0.32	0.50	0.68	0.86	1.05	1.23
2	0.17	0.42	0.67	0.92	1.17	1.42	1.66
3	0.25	0.57	0.91	1.30	1.60	2.00	–
4	0.30	0.75	1.20	1.60	2.05	2.50	–
6	0.40	1.05	1.70	2.30	2.95	–	–
8	0.50	1.30	2.10	3.05	3.90	–	–

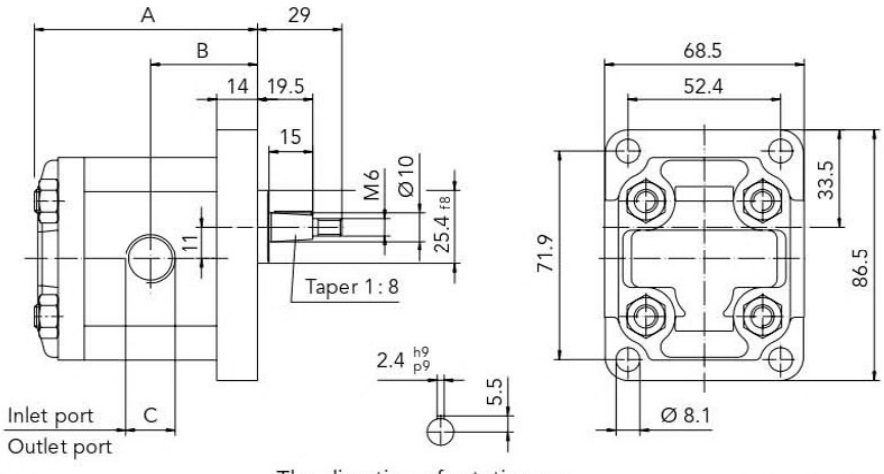
Type Key

Ordering example



Possible on request:
- Multiple pump combinations
- Motors
- Other shaft and flange types
- FKM rotary shaft lip typ seals (on request)

K-Flange, Tapered Shaft End



Ordering example:

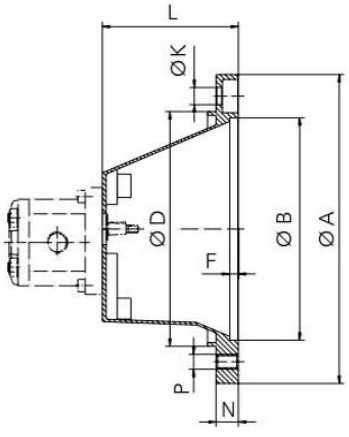
KP 0/1 K10S M0A 8ML1

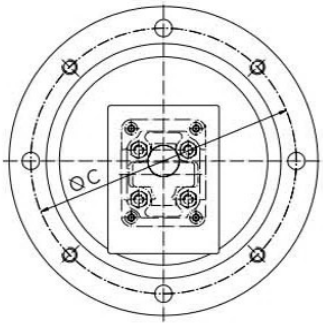
The direction of rotation as represented is clockwise
In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Taper 1:8

Nominal displacement	1	2	3	4	6	8
A	68.6	68.6	68.6	75.3	86.0	86.0
B	33.4	33.4	33.4	36.7	42.0	42.0
C	⅜" BSP				½" BSP	
Weight in kg	0.9	0.95	0.95	1.05	1.2	1.2

Bell Housing



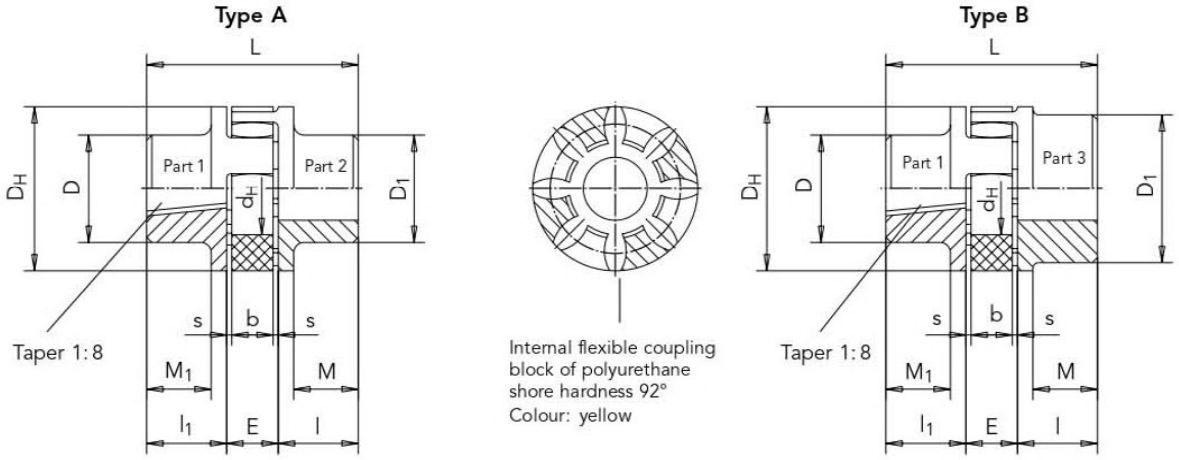


Bell housing with ventilation or leakage hole on request

Motor size	A	B	C	D	F	K	L	N	P	Bell housing Weight in kg	Coupling size
71	160	110	130	110	7	9	70	13	M8	0.5	RA19 -K16/10-Z25/14
80	200	130	165	145	7	11	90	16	M10	0.8	RA19 -K25/10-Z25/19
90	200	130	165	145	7	11	90	16	M10	0.8	RA19/24-K16/10-Z25/24
100/112	250	180	215	190	7	14	110	18	M12	2.0	RA24/28-K16/10-Z50/28

Dimensions in mm

Couplings



Coupling size	Length of the coupling hub and the hub bore pump sided	Length of the coupling hub and the hub bore motor sided Straight hub bore

Ordering example: RA 19 – K 16/10 – Z 25/14

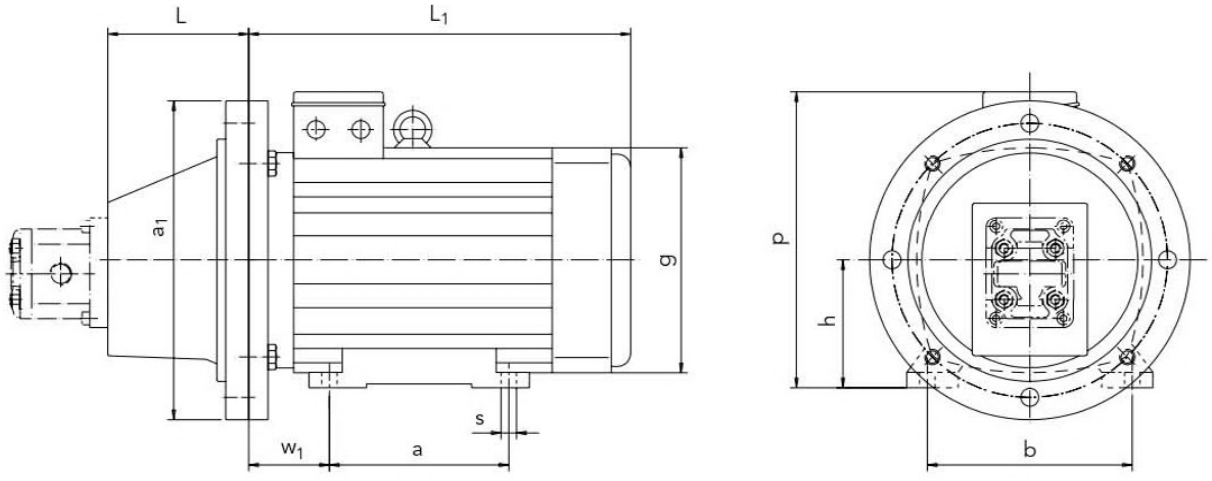
	Coupling size	Weight	Moment of inertia	Rough bore		Finished bore				Dimensions												Ordering code
				Part 2	Part 3	min. Part 2	min. Part 3	max. Part 2	max. Part 3	l	l_1	E	s	b	L	M	M_1	D_H	D	D_1	d_H	
		kg	kgm^2																			
Type A	19	0.12	0.00003	–	–	6	-	19	-	25	17	16	2	12	58	20	10	40	32	–	18	RA 19-K16/10-Z 25/14
											25											RA 19-K25/10-Z 25/19
Type B	19/24	0.13	0.0004	–	18	–	19	–	24	25	17	16	2	12	58	20	10	41	32	41	18	RA 19/24-K16/10-Z 25/24
	24/28	0.22	0.0001	-	20	–	22	–	28	50	17	18	2	14	85	–	10	55	23	55	27	RA 24/28-K16/10-Z 50/28

Working temperatur: – 40 °C to + 90 °C (short time temperature peaks up to + 120 °C are permissible)
Weights as well as moments of inertia relate to the max. bore dia. after final machining – but without key-way
Bore finish acc. to ISO-fit class H7; key-ways acc. to DIN 6885 / part 1

RA: Hub material Al

Dimensions in mm

Motor-Pump Assemblies



Nominal size	Motor 4-pole Power	Speed	Bell housing	Coupling size	Weight Motor 4-pole	Bell housing
	kW	rpm			kg	kg
71 M4A	0.25	1390	PT 160-A-025.4-70	RA 19 – K16/10 – Z25/14	7	0.6
71 M4B	0.37	1390			8	
80 M4A	0.55	1400	PT 200-A-025.4-90	RA 19 – K25/10 – Z25/19	10	0.9
80 M4B	0.75	1400			11	
90 S4A	1.1	1410	PT 200-A-025.4-90	RA 19/24 – K16/10 – Z25/24	13	1.0
90 L4A	1.5	1420			15	
100 L4A	2.2	1420	PT 250-A-025.4-110	RA 24/28 – K16/10 – Z50/28	21	1.7
100 L4B	3	1430			24	
112 M4B	4	1440			31	

Nominal size	Dimensions L	a_1	a	b	g	h	L_1	p	s	w_1
71	70	160	90	125	138	71	223	182	7	45
80	90	200	100	125	158	80	244	199	10	50
90 S	90	200	100	140	193	90	267	218	10	56
90 L	90	200	125	140	193	90	267	218	10	56
100	110	250	140	160	217	100	277	237	12	63
112	110	250	140	190	232	112	308	256	12	70

Motor frame sizes are based on Schäfer. Other manufactures motors can be supplied on request as IM B 35.

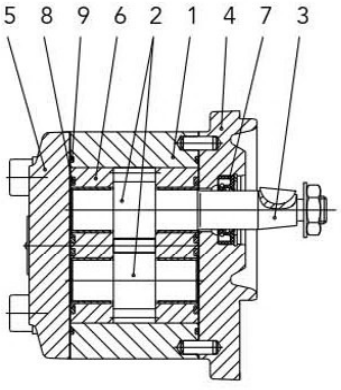
Dimensions in mm

KRACHT®
FLUID TECHNOLOGY AND SYSTEMS

Pump technology

High pressure gear pumps
KP 1

Construction



1 Housing
2 Gearing
3 Drive shaft end
4 Flange mounting cover
5 End cover
6 Double-gland bearing with special plane bearing bushes
7 Rotary shaft lip-type seals
8 Pressure field sealing for axial clearance compensation
9 Sealing of the housing

Function

Accordingly to its configuration – the Design Principle is illustrated by the Sectional Figure – the KRACHT external gear type pump series KP1 is to be classified into the category of the so-called gland type bearing pumps.

All essential functional parts as the gearing and the gland bearings are located in an aluminium housing (cast iron on request possible) manufactured of a high strength extrusion alloy which are closed on each side by an end cover or by a flange mounting cover respectively.

The gearing of case hardening steel in surface hardened condition consists of the driving shaft pinion and the driven shaft pinion.

Highest manufacturing quality is assured by grinding and honing of the tooth flanks. The surfaces of the journals are superfinished.

An important reduction of the type dependent deviation of the volumetric flow and of the pressure pulsation incident thereto was achieved on the basis of the great teeth number (z = 13) and of the specially shaped teeth.

The gland bearings located on both sides of the gearing carry the journals in heavyduty multicomponent plane bearing bushes and contain additionally those sealing elements which serve for the pressure field sealing to compensate the axial clearance.

If required the pumps can be supplied with a Pressure Relief Valve-Type DBD... – directly attached to the pump or with special valve arrangements assembled onto the pump instead of the end cover.

Manifold pump combinations are available as well.

Note

1. External loads

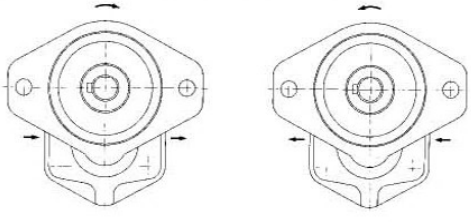
Loads acting on the drive shaft end from outside impair the functions of the doublegland bearing.
Radial loads can be absorbed in dependence on the extent and the direction of the loads. Axial loads are not permissible.
To absorb outer loads only those pump types shall be used which are equipped with 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	aluminium
Bearing	double-gland bearing with multicomponent plane bearing bushes
Journals and gears	case hardening steel acc. to DIN 17210 surface hardened and ground
Seals	NBR rotary shaft lip type seal $\vartheta \leq 90\,°C$ (PU-Seal for pressure field) FKM rotary shaft lip type seal $\vartheta \leq 100\,°C$ (PU-Seal for pressure field)

Characteristics

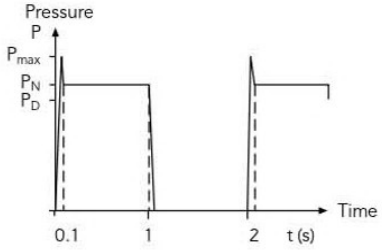
Mounting		flange and foot-type
Pipe connection		flange type, threaded flange on request
Direction of rotation		clockwise **or** anticlockwise
Fitting position		optional
Ambient temperature	$\vartheta_{u\,min}$ $\vartheta_{u\,max}$	= – 20 °C = 60 °C
Operating pressure Inlet port	$p_{e\,min}$ $p_{e\,max}$	= – 0.4 bar (vacuum) = 2 bar
Operating pressure Short time	$p_{e\,max}$	= 5 bar
Operating pressure Outlet port	$p_{e\,max}$	see technical data
Fluid temperature range	$\vartheta_{m\,max}$ $\vartheta_{m\,max}$	90 °C for NBR rotary shaft lip type seal 100 °C for FKM rotary shaft lip type seal
Viscosity	ν_{min} ν_{max}	= 10 mm^2/s = 600 mm^2/s
Recommended oil cleanliness		class 19/16 acc. to ISO/DIS 4406 ⇨ class 10 acc. 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 mm^2/s
Discharge flow		see chart page 6
Input power		see chart page 6
Hydraulic fluids		mineral oil acc. to DIN 51524/25 engine oil acc. to DIN 51511 bio-oils of type „HEES" can be used up to 70 °C, max. pressure must be reduced minus 20 % (use only on request)

Technical Data

Nominal displacement	Geom. displacement	max. pressure	Rated pressure	Continuous operating pressure	max. operating speed		Moment of inertia x 10^{-6}	Minimum speed					
	V_g cm^3/r	p_{max} bar	p_N bar	p_D bar	n_{max} 1/min		J $kg\ m^2$	at p = ... bar rpm					
					NBR	FKM		...100	...120	...150	...180	...200	...250
3	3	300	280	250	3000	4000	23.3	600	700	900	1200	1300	1400
4	4	300	280	250	3000	4000	28.4	600	700	900	1200	1300	1400
5.5	5.45	300	280	250	3000	4000	35.7	500	700	900	1000	1200	1400
6.3	6.28	300	280	250	3000	4000	39.9	500	700	900	1000	1200	1400
8	7.9	300	280	250	3000	4000	51.1	500	700	900	1000	1100	1400
11	10.9	300	280	250	3000	3500	62.9	500	700	900	1000	1100	1200
14	13.85	300	280	250	3000	3000	77.7	500	700	800	900	1000	1100
16	15.9	300	280	250	3000	3000	87.7	500	600	700	800	1000	1000
19	18.8	250	230	200	2800	2800	102.5	500	600	700	800	1000	–
22	22.3	200	180	150	2500	2500	119.6	500	600	700	800	–	–

Maximum pressure = pressure peak
Rated pressure pN < 6 s = 50 % ED
See time / pressure chart
max. permissible operating cycles: 30 / min
Pressures as specified are applicable to $\nu \geq 30\ mm^2/s$

Time / pressure chart



Calculation Formulas for Hydraulic Pumps

Characteristic data, formula signs, units

1.	Discharge flow / input flow	Q	l/min
2.	Pump / motor displacement	V_g	cm^3/r
3.	Pressure	p	bar
4.	Speed of rotation	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.	Pipe diameter	d	mm

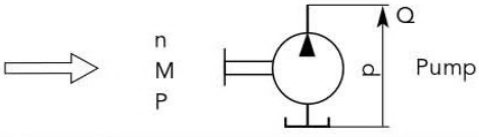
General

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

$M = 9549 \cdot \frac{P}{n},\ v = 21.22\ \frac{Q}{d_2}$

Approximate values for KRACHT products in the nominal operating point

	η_{tot}	η_{vol}
KP	≈ 0.90	≈ 0.90



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]

Discharge Flow and Required Input Power

Discharge flow at n = 1450 1/min

	Discharge flow Q in l/min at 34 mm²/s Pressure p in bar						
Nominal size	**20**	**60**	**100**	**140**	**180**	**220**	**260**
3	4.2	4.1	4.1	4.0	4.0	3.9	3.9
5.5	7.7	7.7	7.6	7.5	7.4	7.4	7.3
8	11.2	11.2	11.1	11.0	10.9	10.8	10.7
11	15.4	15.3	15.2	15.1	15.0	14.8	14.7
14	19.6	19.5	19.4	19.3	19.2	19.0	18.9
16	22.5	22.4	22.3	22.2	22.1	22.0	21.9
19	26.7	26.6	26.5	26.4	26.3	26.2	—
22	31.6	31.5	31.4	31.4	31.3	—	—

Required input power at n = 1450 rpm

	Pressure p in bar						
Nominal size	**20**	**60**	**100**	**140**	**180**	**220**	**260**
3	0.26	0.59	0.93	1.26	1.59	1.93	2.26
5.5	0.36	0.91	1.45	1.99	2.53	3.07	3.61
8	0.49	1.28	2.07	2.86	3.65	4.44	5.23
11	0.64	1.72	2.81	3.89	4.97	6.06	7.14
14	0.80	2.22	3.63	5.05	6.46	7.88	9.29
16	0.89	2.49	4.08	5.67	7.26	8.85	10.45
19	1.02	2.87	4.72	6.57	8.42	10.27	—
22	1.20	3.39	5.58	7.76	9.95	—	—

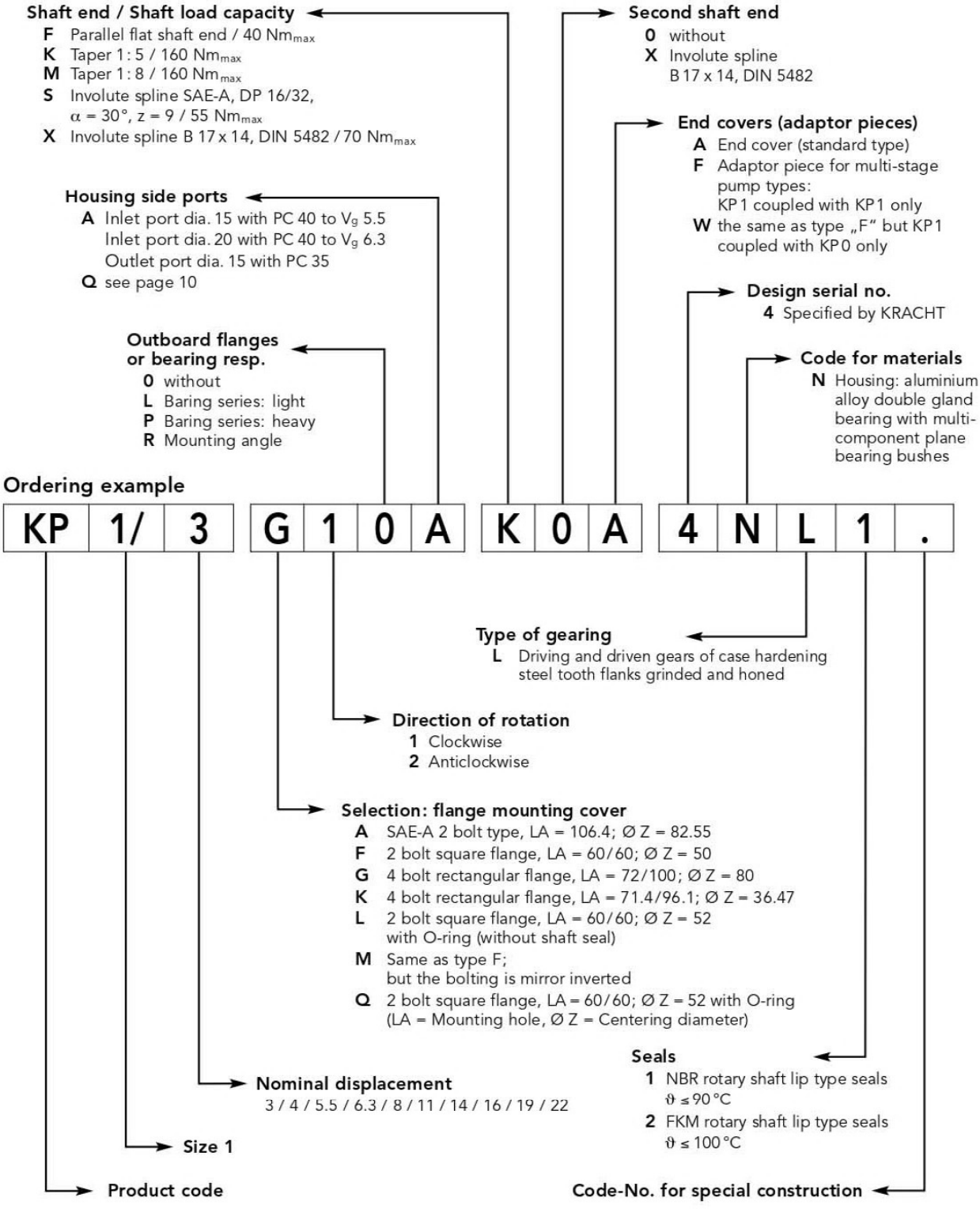
Discharge flow at n = 950 1/min

	Discharge flow Q in l/min at 34 mm²/s Pressure p in bar						
Nominal size	**20**	**60**	**100**	**140**	**180**	**220**	**260**
3	2.6	2.6	2.5	2.4	—	—	—
5.5	4.9	4.8	4.6	4.5	4.4	—	—
8	7.1	7.0	6.9	6.8	6.7	—	—
11	9.8	9.7	9.6	9.5	9.4	—	—
14	12.5	12.4	12.3	12.2	12.0	—	—
16	14.3	14.2	14.1	13.9	13.8	—	—
19	17.0	16.9	16.8	16.7	16.6	—	—
22	20.1	20.0	20.0	19.9	19.8	—	—

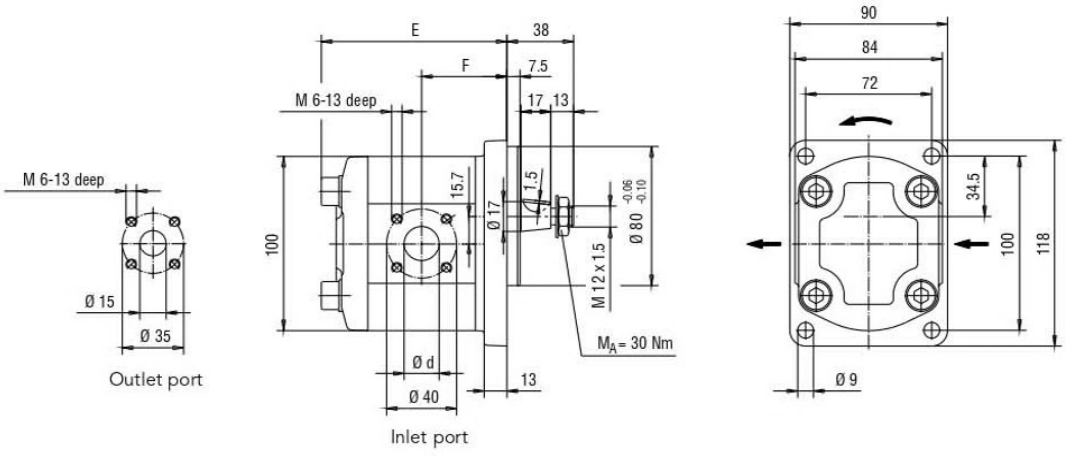
Required input power at n = 950 rpm

	Pressure p in bar						
Nominal size	**20**	**60**	**100**	**140**	**180**	**220**	**260**
3	0.18	0.39	0.60	0.82	—	—	—
5.5	0.25	0.60	0.96	1.32	1.68	—	—
8	0.33	0.85	1.37	1.89	2.40	—	—
11	0.42	1.13	1.84	2.55	3.26	—	—
14	0.52	1.41	2.31	3.20	4.09	—	—
16	0.58	1.61	2.64	3.66	4.69	—	—
19	0.68	1.89	3.11	4.33	5.55	—	—
22	0.78	2.21	3.64	5.07	6.50	—	—

Type Key


Shaft end / Shaft load capacity
F Parallel flat shaft end / 40 Nmmax
K Taper 1:5 / 160 Nmmax
M Taper 1:8 / 160 Nmmax
S Involute spline SAE-A, DP 16/32, α = 30°, z = 9 / 55 Nmmax
X Involute spline B 17 x 14, DIN 5482 / 70 Nmmax
Second shaft end
0 without
X Involute spline B 17 x 14, DIN 5482
End covers (adaptor pieces)
A End cover (standard type)
F Adaptor piece for multi-stage pump types: KP 1 coupled with KP 1 only
W the same as type „F" but KP 1 coupled with KP 0 only
Housing side ports
A Inlet port dia. 15 with PC 40 to Vg 5.5
Inlet port dia. 20 with PC 40 to Vg 6.3
Outlet port dia. 15 with PC 35
Q see page 10
Design serial no.
4 Specified by KRACHT
Code for materials
N Housing: aluminium alloy double gland bearing with multi-component plane bearing bushes
Outboard flanges or bearing resp.
0 without
L Baring series: light
P Baring series: heavy
R Mounting angle
Ordering example
KP 1/ 3 G 1 0 A K 0 A 4 N L 1 .
Type of gearing
L Driving and driven gears of case hardening steel tooth flanks grinded and honed
Direction of rotation
1 Clockwise
2 Anticlockwise
Selection: flange mounting cover
A SAE-A 2 bolt type, LA = 106.4; Ø Z = 82.55
F 2 bolt square flange, LA = 60/60; Ø Z = 50
G 4 bolt rectangular flange, LA = 72/100; Ø Z = 80
K 4 bolt rectangular flange, LA = 71.4/96.1; Ø Z = 36.47
L 2 bolt square flange, LA = 60/60; Ø Z = 52 with O-ring (without shaft seal)
M Same as type F; but the bolting is mirror inverted
Q 2 bolt square flange, LA = 60/60; Ø Z = 52 with O-ring (LA = Mounting hole, Ø Z = Centering diameter)
Seals
1 NBR rotary shaft lip type seals ϑ ≤ 90 °C
2 FKM rotary shaft lip type seals ϑ ≤ 100 °C
Nominal displacement
3 / 4 / 5.5 / 6.3 / 8 / 11 / 14 / 16 / 19 / 22
Size 1
Product code
Code-No. for special construction

G-Flange, Tapered Shaft End



Ordering example:

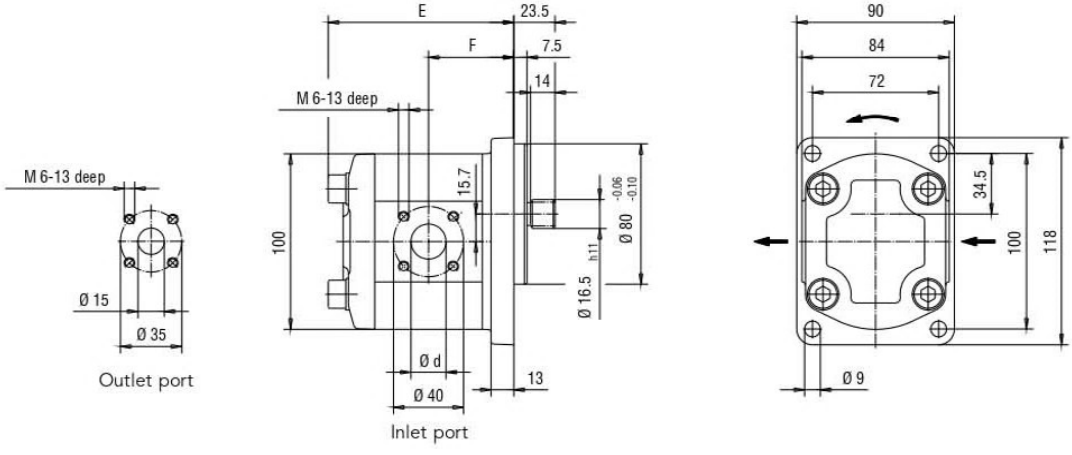
KP 1/4 G10A K0A 4NL1

The direction of rotation as represented is clockwise

In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Taper 1:5
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12 DIN 137
Woodruff key 3 x 6.5 DIN 6888

G-Flange, Involute Spline Shaft End



Ordering example:

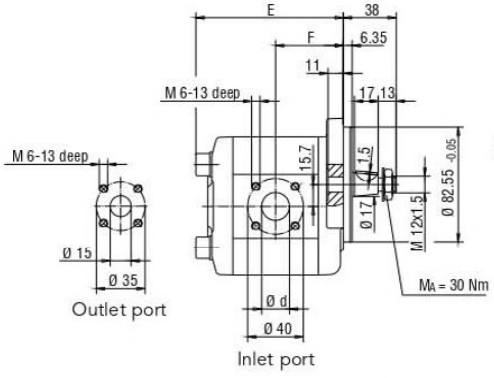
KP 1/4 G10A X0A 4NL1

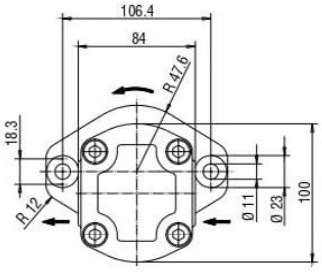
Shaft end: Involute spline
B 17 x 14 DIN 5482
but tooth thickness S_w = 3.206
Addendum modification = + 0.6

Nominal displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	15.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E	87.5	89.2	91.7	93.1	95.9	100.9	105.9	109.3	114.3	120.1
F	39.5	40.4	41.6	42.3	43.7	46.2	48.7	50.4	52.9	55.8
Weight kg	2.1	2.2	2.2	2.3	2.3	2.5	2.6	2.8	2.9	3.1

Dimensions in mm

SAE A-Flange, Tapered Shaft End





Shaft end: Taper 1:5
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12 DIN 137
Woodruff key 3 x 6,5 DIN 6888

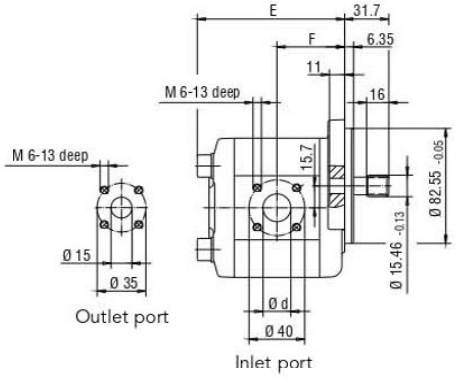
The direction of rotation as represented is clockwise

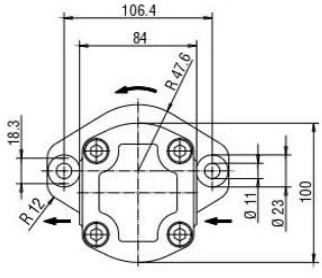
In case of anticlockwise rotation the inlet and outlet ports are opposite

Ordering example:

KP 1/4 A10A K0A 4NL1

SAE A-Flange, SAE A-Shaft



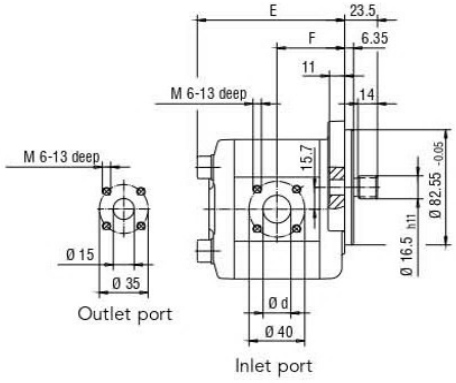


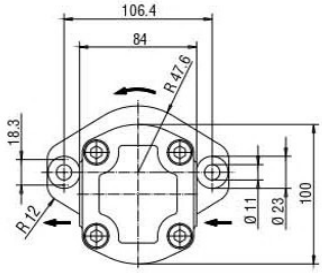
Shaft end: Involute spline
SAE-A $z = 9\,T$, DP 16/32; $\alpha = 30°$

Ordering example:

KP 1/4 A10A S0A 4NL1

SAE A-Flange, Involute Spline Shaft End





Shaft end: Involute spline
B 17 x 14 DIN 5482

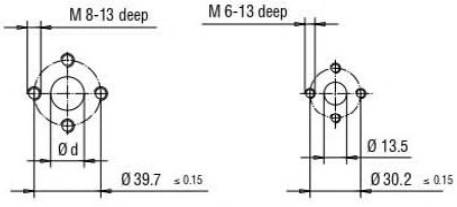
Ordering example:

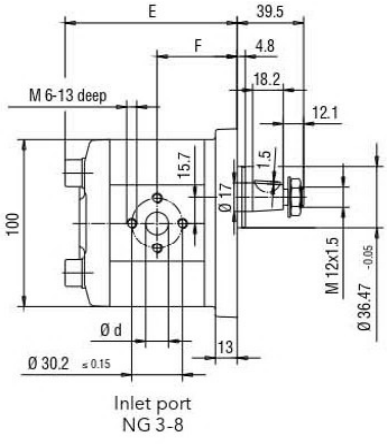
KP 1/4 A10A X0A 4NL1

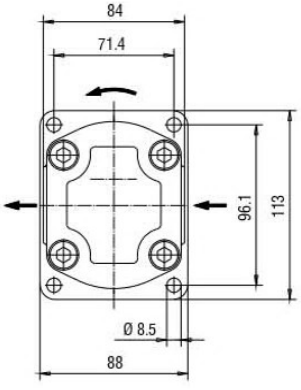
Nominal displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	15.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E	87.5	89.2	91.7	93.1	95.9	100.9	105.9	109.3	114.3	120.1
F	39.5	40.4	41.6	42.3	43.7	46.2	48.7	50.4	52.9	55.8
Weight kg	2.5	2.6	2.6	2.7	2.7	2.9	3.0	3.2	3.3	3.5

Dimensions in mm

K-Flange, Tapered Shaft End 1 : 8







Ordering example:

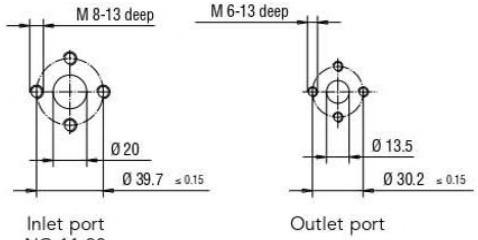
KP 1/4 K10Q M0A 4NL1

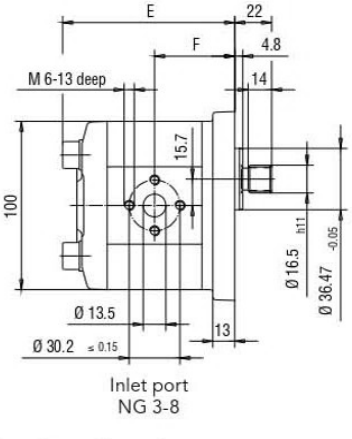
The direction of rotation as represented is clockwise

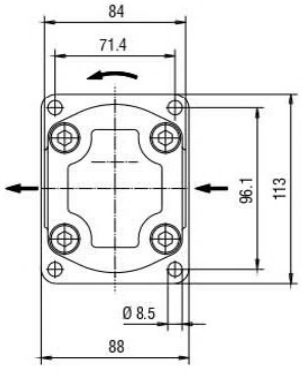
In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Taper 1 : 8
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12 DIN 137
Woodruff key 3 x 6.5 DIN 6888

K-Flange, Involute Spline Shaft End







Ordering example:

KP 1/4 K10Q X0A 4NL1

The direction of rotation as represented is clockwise

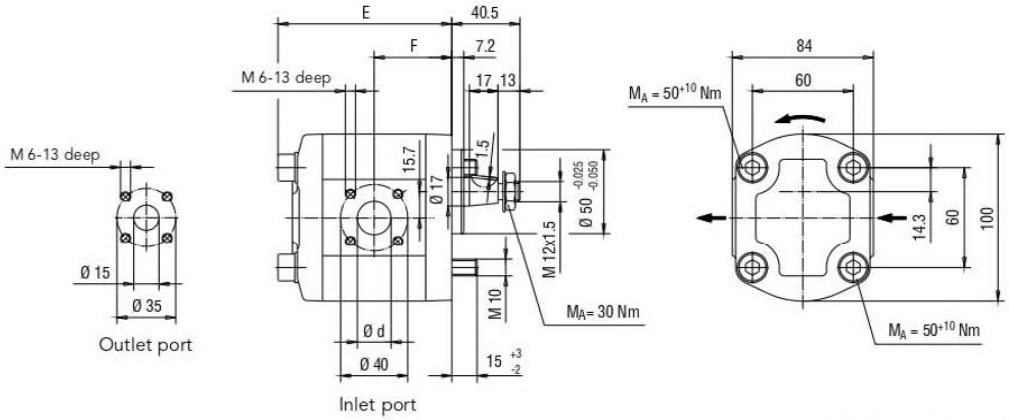
In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Involute spline
B 17 x 14 DIN 5482
but tooth thickness S_w = 3.206
Addendum modification = + 0.6

Nominal displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	13.5	13.5	13.5	13.5	13.5	20.0	20.0	20.0	20.0	20.0
E	89.0	90.7	93.2	94.6	97.4	102.4	107.4	110.8	115.8	121.6
F	41.0	41.85	43.1	43.8	45.2	47.7	50.2	51.9	54.4	57.3
Weight kg	2.1	2.2	2.2	2.3	2.3	2.5	2.6	2.8	2.9	3.1

Dimensions in mm

F-Flange, Tapered Shaft End



Ordering example:

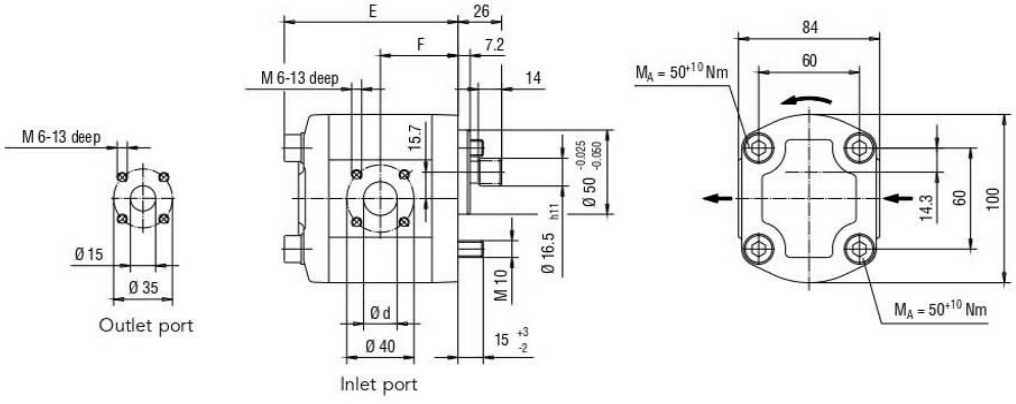
KP 1/4 F10A K0A 4NL1

The direction of rotation as represented is clockwise

In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Taper 1:5
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12
DIN 137
Woodruff key 3 x 6.5
DIN 6888

F-Flange, Involute Spline Shaft End



Ordering example:

KP 1/4 F10A X0A 4NL1

The direction of rotation as represented is clockwise

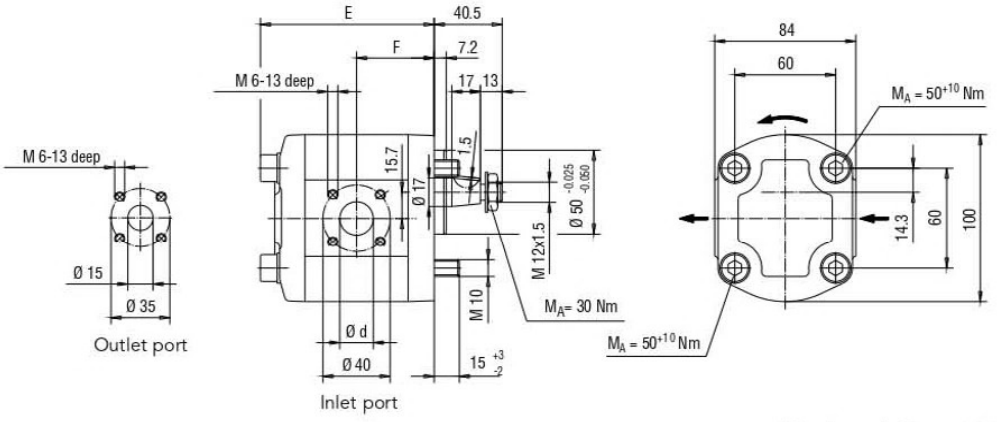
In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Involute spline
B 17 x 14 DIN 5482
but tooth thickness S_w = 3.206
Addendum modification = + 0.6

Nominal displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	15.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E	85.0	86.7	89.2	90.6	93.4	98.4	103.4	106.8	111.8	117.6
F	37.0	37.9	39.1	39.8	41.2	43.7	46.2	47.9	50.4	53.3
Weight kg	2.1	2.2	2.2	2.3	2.3	2.5	2.6	2.8	2.9	3.1

Dimensions in mm

M-Flange, Tapered Shaft End



Ordering example:

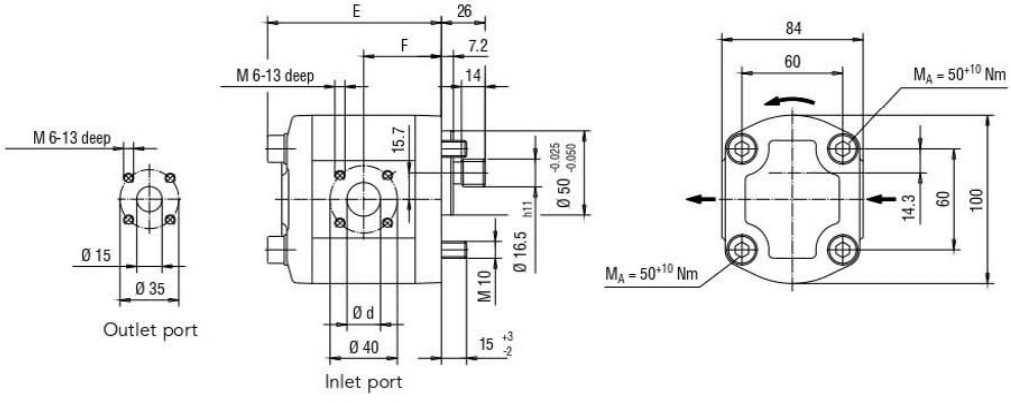
KP 1/4 M10A K0A 4NL1

The direction of rotation as represented is clockwise

In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Taper 1:5
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12
DIN 137
Woodruff key 3 x 6.5
DIN 6888

M-Flange, Involute Spline Shaft End



Ordering example:

KP 1/4 M10A X0A 4NL1

The direction of rotation as represented is clockwise

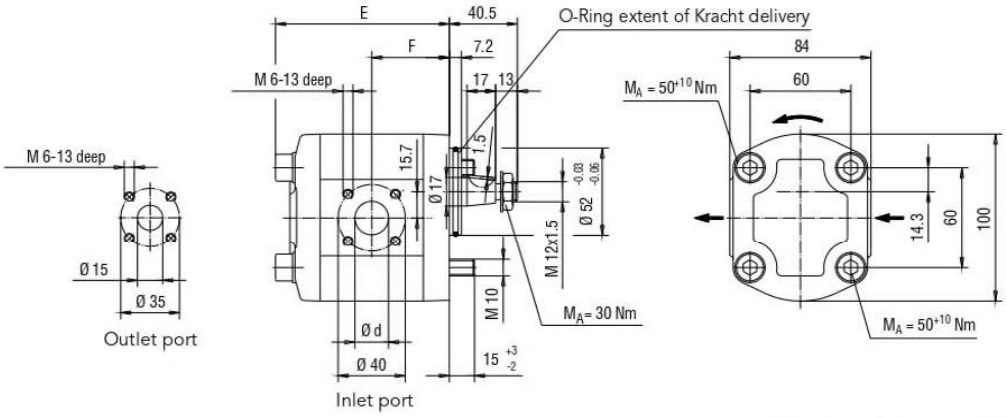
In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Involute spline
B 17 x 14 DIN 5482
but tooth thickness S_w = 3.206
Addendum modification = + 0.6

Nominal displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	15.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E	85.0	86.7	89.2	90.6	93.4	98.4	103.4	106.8	111.8	117.6
F	37.0	37.9	39.1	39.8	41.2	43.7	46.2	47.9	50.4	53.3
Weight kg	2.1	2.2	2.2	2.3	2.3	2.5	2.6	2.8	2.9	3.1

Dimensions in mm

Q-Flange, Tapered Shaft End



Ordering example:

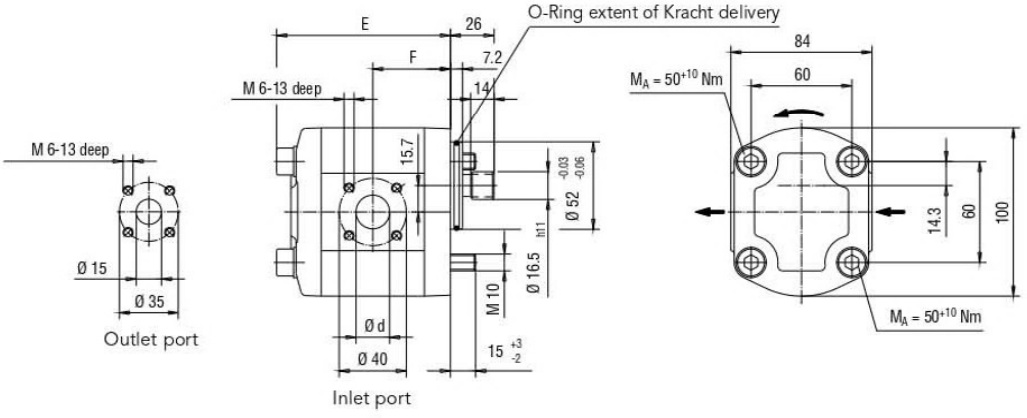
KP 1/4 Q10A K0A 4NL1

The direction of rotation as represented is clockwise

In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Taper 1:5
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12
DIN 137
Woodruff key 3 x 6.5
DIN 6888

Q-Flange, Involute Spline Shaft End



Ordering example:

KP 1/4 Q10A X0A 4NL1

The direction of rotation as represented is clockwise

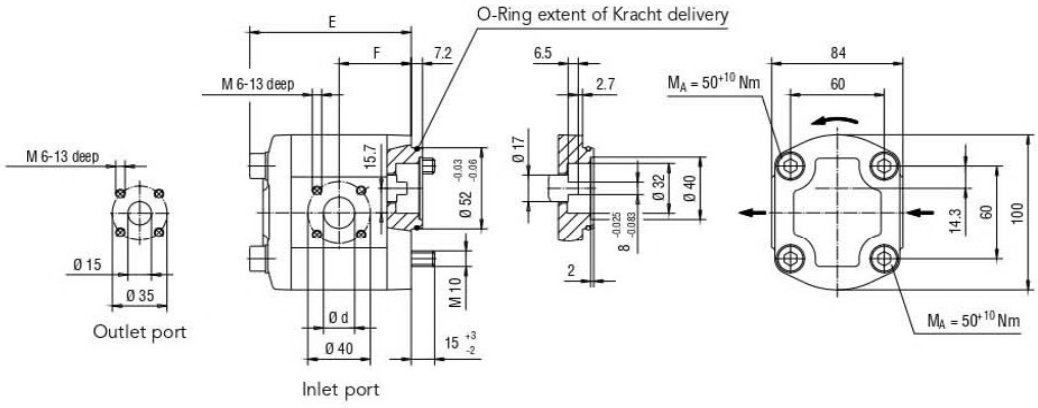
In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Involute spline
B 17 x 14 DIN 5482
but tooth thickness S_w = 3.206
Addendum modification = + 0.6

Nominal displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	15.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E	85.0	86.7	89.2	90.6	93.4	98.4	103.4	106.8	111.8	117.6
F	37.0	37.9	39.1	39.8	41.2	43.7	46.2	47.9	50.4	53.3
Weight kg	2.1	2.2	2.2	2.3	2.3	2.5	2.6	2.8	2.9	3.1

Dimensions in mm

L-Flange, Parallel Flat Shaft End



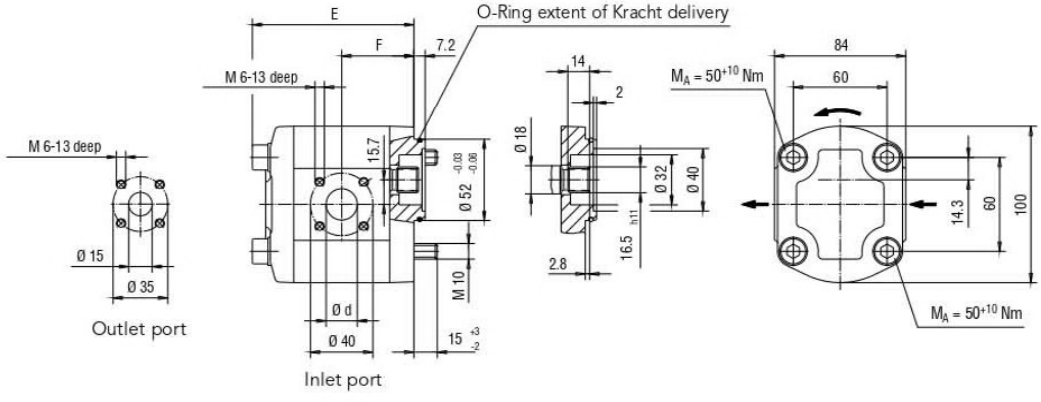
Ordering example:

KP 1/4 L10A F0A 4NL1

The direction of rotation as represented is clockwise

In case of anticlockwise rotation the inlet and outlet ports are opposite

L-Flange, Involute Spline Shaft End



Ordering example:

KP 1/4 L10A X0A 4NL1/204

The direction of rotation as represented is clockwise

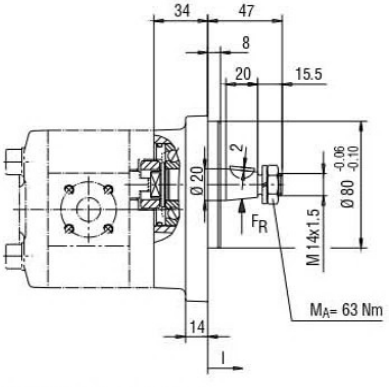
In case of anticlockwise rotation the inlet and outlet ports are opposite

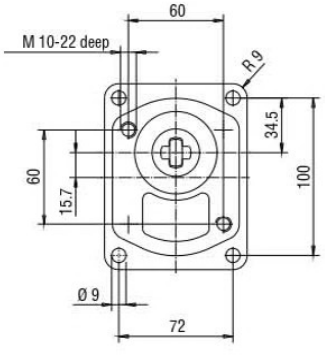
Shaft end: Involute spline
B 17 x 14 DIN 5482
but tooth thickness S_w = 3.206
Addendum modification = +0.6

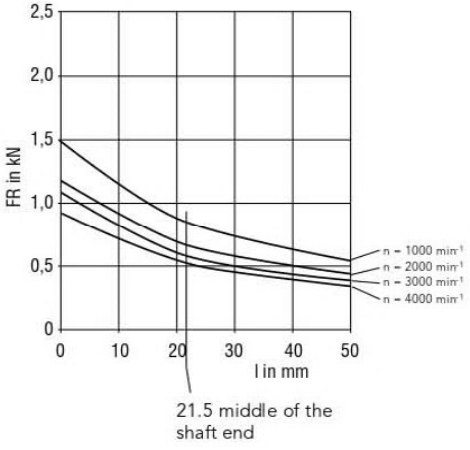
Nominal displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	15.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E	85.0	86.7	89.2	90.6	93.4	98.4	103.4	106.8	111.8	117.6
F	37.0	37.9	39.1	39.8	41.2	43.7	46.2	47.9	50.4	53.3
Weight kg	2.1	2.2	2.2	2.3	2.3	2.5	2.6	2.8	2.9	3.1

Dimensions in mm

Outboard Bearing Type L, Tapered Shaft End







Ordering example:

KP 1/4 L1LA F0A 4NL1

Weight of the outboard bearing = 1.0 kg

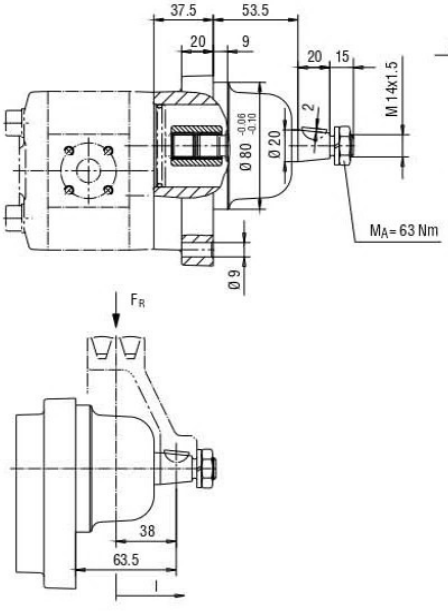
Outboard bearing L,
tapered shaft end KP 1/4 L1LA F0A 4NL1
parallel flat shaft end 40 Nm_{max}
alternativ KP 1/4 L1LA X0A 4NL1
Involute spline shaft end 70 Nm_{max}

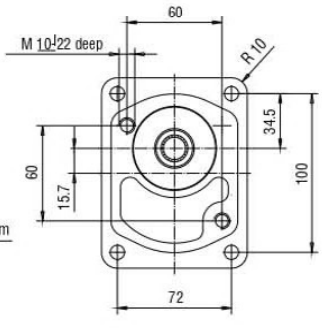
Pump dimensions and type see page 14

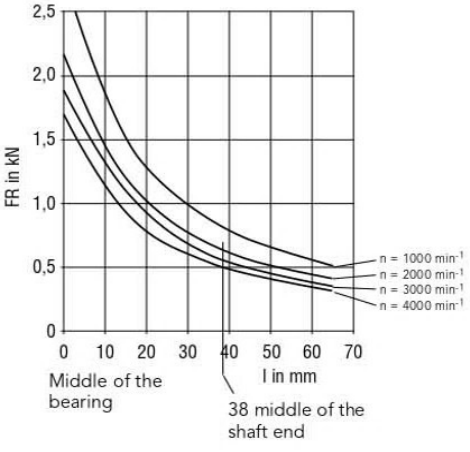
Shaft end: Taper 1:5
Hex. lock nut M 14 x 1.5
DIN EN 28675
Curved spring washer B 14
DIN 127
Woodruff key 4 x 6.5
DIN 6888

Permissible radial load F_R
as function of the supporting
distance l (for L_h = 10.000 h)
F_R = f(l)

Outboard Bearing Type P, Tapered Shaft End







Shaft end: Taper 1:5
Hex. lock nut M 14 x 1.5
DIN EN 28675
Curved spring washer B 14
DIN 127
Woodruff key 4 x 6.5
DIN 6888

Permissible radial load F_R
as function of the supporting
distance l (for L_h = 10.000 h)
F_R = f(l)

Ordering example:

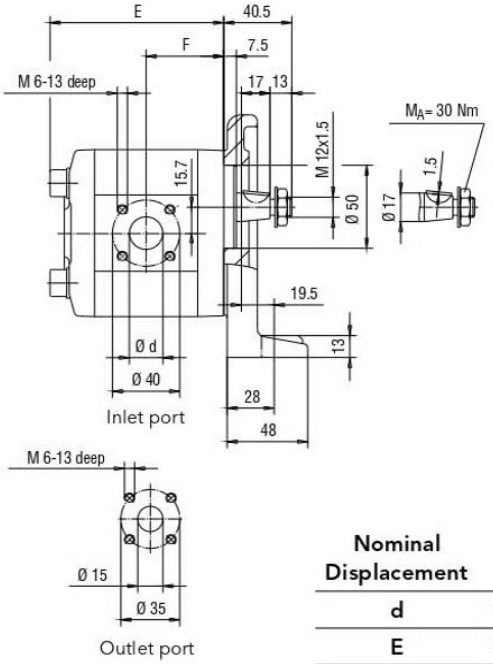
KP 1/4 Q1PA X0A 4NL1

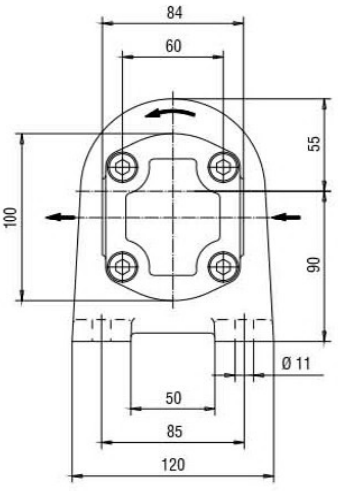
Pump dimensions and type see page 13

Weight of the outboard bearing = 3.5 kg

Dimensions in mm

Mounting Angle, Tapered Shaft End





Shaft end: Taper 1:5
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12
DIN 137
Woodruff key 3 x 6.5
DIN 6888

Ordering example:

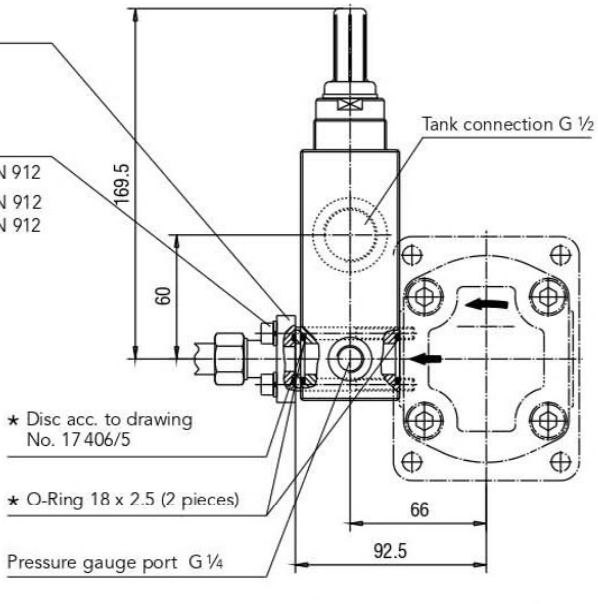
KP 1/4 F1RA K0A 4NL1

Nominal Displacement	3	4	5.5	6.3	8	11	14	16	19	22
d	15.0	15.0	15.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E	85.0	86.7	89.2	90.6	93.4	98.4	103.4	106.8	111.8	117.6
F	37.0	37.9	39.1	39.8	41.2	43.7	46.2	47.9	50.4	53.3
Weight kg	3.7	3.8	3.8	3.9	3.9	4.1	4.2	4.4	4.5	4.7

Pressure Relief Valve

a Straight flanged connection GDA 1/12 1/16
b Elbow flanged connection WDA 1/12 1/16

★ Fixing screws
a Straight flanged connection 4 pieces M 6 x 70 DIN 912
b Elbow flanged connection 2 pieces M 6 x 70 DIN 912
2 pieces M 6 x 85 DIN 912

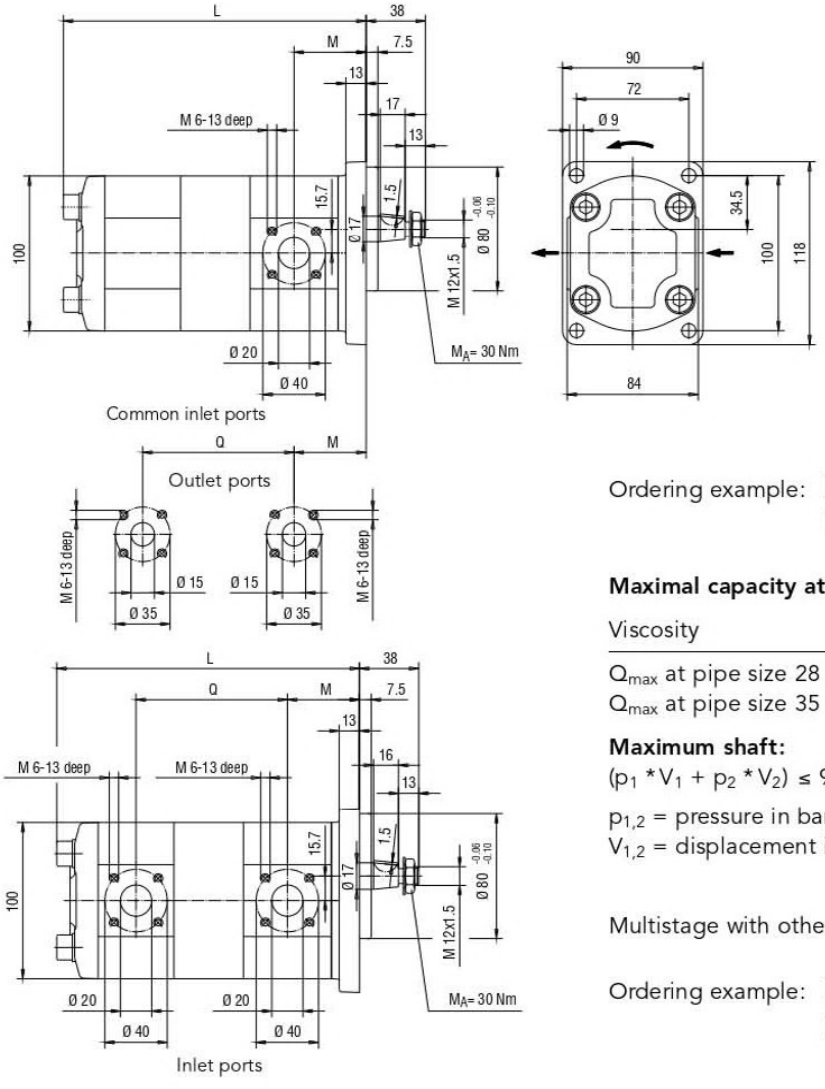


Ordering code	Set pressure P_{v1} bar	Set pressure P_{v2} bar	Discharge flow $Q_{1\ max}$ l/min	Discharge flow $Q_{2\ max}$ l/min
DBD 10 D 1 A 300	10	280	15	75
DBD 10 D 1 A 200	10	200	15	70
DBD 10 D 1 A 150	10	150	10	55
DBD 10 D 1 A 85	10	85	10	45
DBD 10 D 1 A 40	10	40	10	30
DBD 10 D 1 A 16	5	16	9	20

★ Extent of KRACHT delivery

Dimensions in mm

Tandem Pump, Tapered Shaft End



The direction of rotation as represented is clockwise

In case of anticlockwise rotation the inlet and outlet ports are opposite

Shaft end: Taper 1 : 5
Hex. lock nut M 12 x 1.5
DIN EN 28675
Curved spring washer B 12
DIN 137
Woodruff key 3 x 6.5
DIN 6888

Ordering example: **KP 1/4 G10A KXF 4NL1/271 + KP 1/4 010U X0A 4NL1/271**

Maximal capacity at npsh = 1 m

Viscosity	ν = 120 mm²/s	34 mm²/s
Q_{max} at pipe size 28 L	65 l/min	90 l/min
Q_{max} at pipe size 35 L	85 l/min	110 l/min

Maximum shaft:
$(p_1 * V_1 + p_2 * V_2) \leq 9000$

$p_{1,2}$ = pressure in bar
$V_{1,2}$ = displacement in cm³

Multistage with other flanges and shaft possible

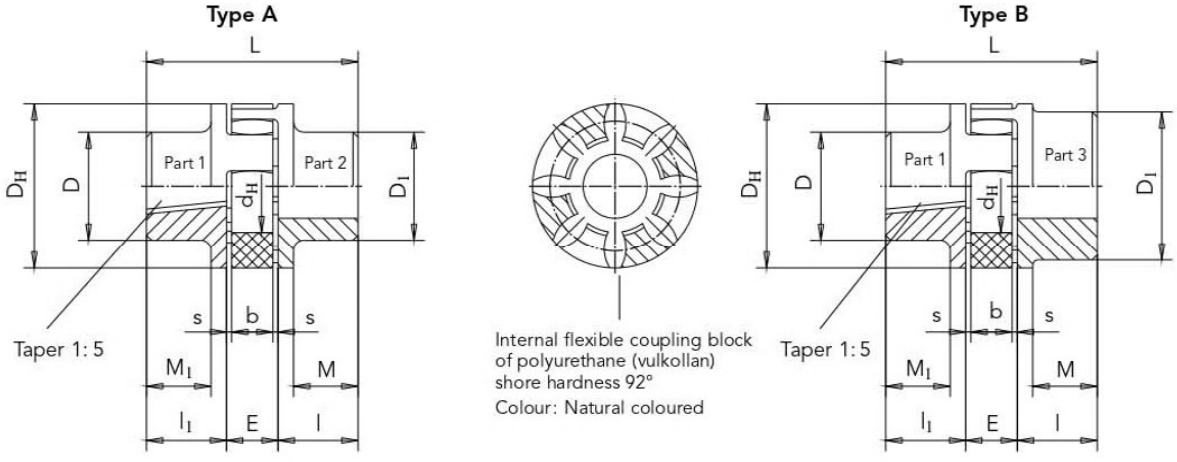
Ordering example: **KP 1/4 G10A KXF 4NL1/271 + KP 1/4 010A X0A 4NL1/271**

Nom. displ.	M	Nominal displacememt		1. stage 22 Q	22 L	19 Q	19 L	16 Q	16 L	14 Q	14 L	11 Q	11 L	8 Q	8 L	6.3 Q	6.3 L	5.5 Q	5.5 L	4 Q	4 L	3 Q	3 L
3	39.5		**3**	103.8	207.6	100.9	201.8	98.4	196.8	96.7	193.4	94.2	188.4	91.7	183.4	90.3	180.6	89.6	179.2	88.4	176.7	87.5	175.0
4	40.4		**4**	104.7	209.3	101.7	203.5	99.2	198.5	97.6	195.1	95.0	190.1	92.6	185.1	91.2	182.3	90.5	180.9	89.2	178.5		
5.5	41.6		**5.5**	105.9	212.1	103.0	206.0	100.5	201.0	98.8	197.6	96.3	192.6	93.8	187.6	92.4	184.8	91.7	183.4				
6.3	42.3		**6.3**	106.6	213.2	103.7	207.4	101.2	202.4	99.5	199.0	97.0	194.0	94.5	189.0	93.1	186.1						
8	43.7	**2. stage**	**8**	108.0	216.0	105.1	210.2	102.6	205.2	100.9	201.8	98.4	196.8	95.9	191.8								
11	46.2		**11**	110.5	221.0	107.6	215.2	105.1	210.2	103.4	206.8	100.9	201.8										
14	48.7		**14**	113.0	226.0	110.1	220.2	107.6	215.2	105.9	211.8												
16	50.4		**16**	114.7	229.4	111.8	223.6	109.3	218.6														
19	52.9		**19**	117.2	234.4	114.3	228.6																
22	55.8		**22**	120.1	240.2																		

Note: Handling of different media / fluids with type / 271 not possible
Single media / fluids on request

Dimensions in mm

Couplings and Accessories



Coupling size	Length of the coupling hub and the hub bore pump sided	Length of the coupling hub and the hub bore motor sided Straight hub bore

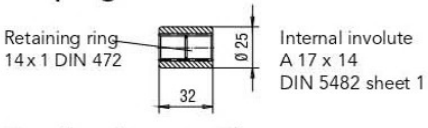
Ordering example: RA 38 – K 18/17 – Z 45/38

	Coupling size	Weight	Moment of inertia	Rough bore		Finished bore				Dimensions												Ordering code
				Part	Part	min. Part	min. Part	max. Part	max. Part													
		kg	kgm²	2	3	2	3	2	3	l	l_1	E	s	b	L	M	M_1	D_H	D	D_1	d_H	
Type A	24	0.2	0.00008	–	–	9	–	24	–	30	18.5	18	2	14	66.5	24	12.5	55	40	–	27	RA 24-K18/17-Z 30/...
	28	0.35	0.0002	–	–	10	–	28	–	35	18.5	20	2.5	15	73.5	28	11.5	65	48	–	30	RA 28-K18/17-Z 35/...
	38	0.75	0.0007	–	–	12	–	38	–	45	18.5	24	3	18	87.5	37	10.5	80	66	–	38	RA 38-K18/17-Z 45/...
	42	1.15	0.0014	25	–	28	–	42	–	50	18.5	26	3	20	94.5	40	8.5	95	75	–	46	RA 42-K18/17-Z 50/...
Type B	24/28	0.22	0.0001	–	20	–	22	–	28	30	18.5	18	2	14	66.5	24	12.5	55	40	56	27	RA 24/28-K18/17-Z 30/...
	28/38	0.42	0.0003	–	23	–	28	–	38	35	18.5	20	2.5	15	73.5	28	11.5	65	48	67	30	RA 28/38-K18/17-Z 35/...
	38/45	0.82	0.0008	–	36	–	38	–	45	45	18.5	24	3	18	87.5	37	10.5	80	66	77	38	RA 38/45-K18/17-Z 45/...
	38/45	2.5	0.0020	–	–	–	38	–	45	70	18.5	24	3	18	112.5	62	10.5	80	66	78	38	RG 38/45-K18/17-Z 70/...
	42/55	1.29	0.0018	–	25	–	42	–	55	50	18.5	26	3	20	94.5	40	8.5	95	75	94	46	RG 42/55-K18/17-Z 50/...

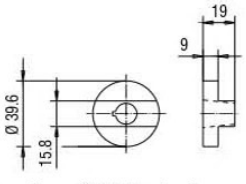
Operating temperatur: – 40 °C to + 90 °C (short time temperature peaks up to + 120 °C are permissible)
Weights as well as moments of inertia relate to the max. bore dia. after final machining – but without key-way
Bore finish acc. to ISO-fit class H7; key-ways acc. to DIN 6885 / part 1

RA: Hub material Al
RG: Hub material part 2 and 3 GG

Coupling sleeve

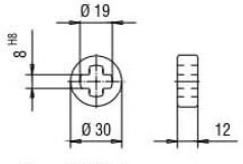


Coupling sleeve part 1
Partnumber: B.0079020001



Coupling KP 1 K-shaft
Partnumber: E.0187220001

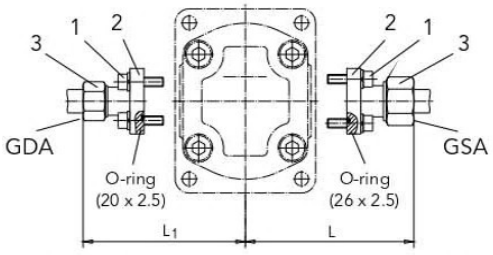
Coupling



Coupling KP 1 L
Partnumber: E.0104040001

Dimensions in mm

Straight Flanged Connector

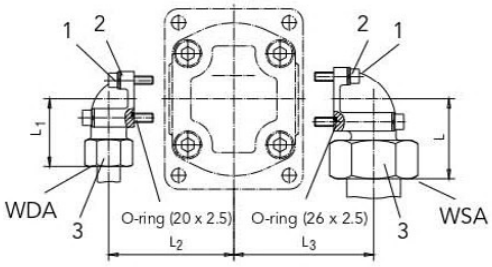


1 Hex. socket head cap screw (DIN 912 – 8.8)
2 Single coil spring lock washer (A6 DIN 127)
3 Covering nut with cutting ring (SW)

Inlet port Pipe externa dia. mm	Ordering code	Discharge flow Q in l/min at 34 mm²/s	Dimensions L	SW	Cap screws	Weight kg
22	GSA 1/22	45	86	36	4 x M6 x 22	0.23
18	GSA 1/18	30	86	32	4 x M6 x 22	0.22
15	GSA 1/15	12	85	27	4 x M6 x 22	0.19

Outlet port Pipe externa dia. mm	Ordering code	Rated pressure P_N in bar	Dimensions L_1	SW	Cap screws	Weight kg
16	GDA 1/16	315	82	30	4 x M6 x 22	0.18
15	GDA 1/15	250	81	27	4 x M6 x 22	0.17
12	GDA 1/12	315	81	22	4 x M6 x 22	0.16

Elbow Flanged Connector



Ordering Code of a complete connection:

For the inlet port:
Straight flanged connector **GSA 1/22**

For the outlet port:
Elbow flanged connector **WDA 1/20**

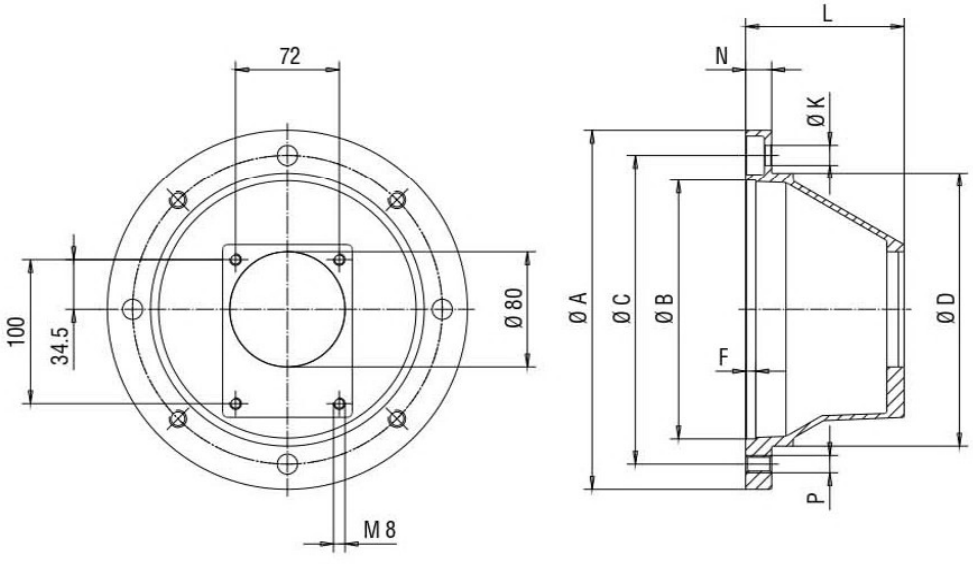
Extend of Kracht delivery: Hex. socket head cap screw acc. to DIN 912 as well as single coil spring lock washers and O-rings.

Inlet port Pipe externa dia. mm	Ordering code	Discharge flow Q in l/min at 34 mm²/s	Dimensions L	L_3	SW	Cap screws	Weight kg
35	WSA 1/35	65	52	74	50	2 x M6 x 60 2 x M6 x 22	0.55
28	WSA 1/28	45	49	70	41	2 x M6 x 50 2 x M6 x 20	0.38
22	WSA 1/22	25	47	64.5	36	4 x M6 x 22	0.27
18	WSA 1/18	18	47	64.5	32	4 x M6 x 22	0.25
15	WSA 1/15	12	46	64.5	27	4 x M6 x 22	0.23

Outlet port Pipe externa dia. mm	Ordering code	Rated pressure P_N in bar	Dimensions L_1	L_2	SW	Cap screws	Weight kg
20	WDA 1/20	315	56	67	36	2 x M6 x 45 2 x M6 x 22	0.40
16	WDA 1/16	315	48	62	30	2 x M6 x 40 2 x M6 x 22	0.28
15	WDA 1/15	250	46	58.5	27	2 x M6 x 35 2 x M6 x 22	0.22
12	WDA 1/12	315	47	58.5	22	2 x M6 x 35 2 x M6 x 22	0.20

Dimensions in mm

Aluminium Bell Housing for KP 1/..G..-Type



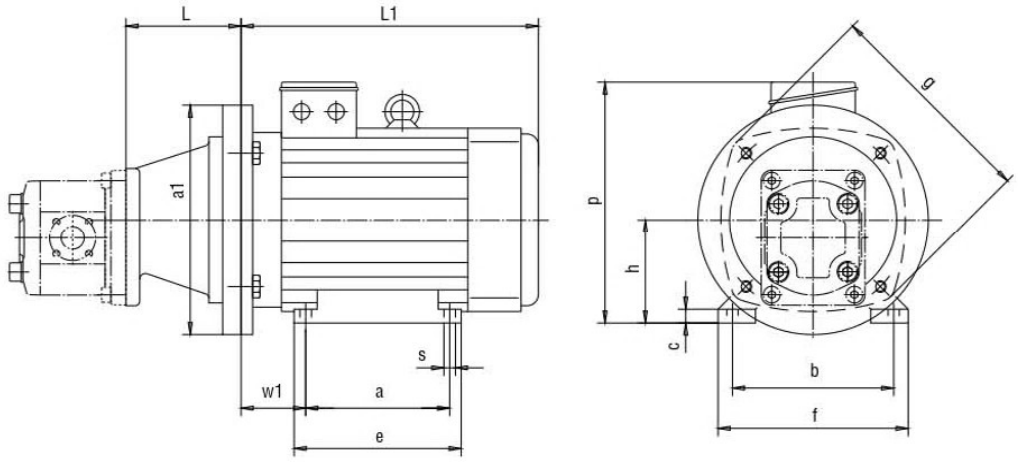
Type	Motor size										Adaptor flange weight	Coupling size	
	E-motor	A	B	C	D	F	K	L	N	P	kg		
* Z1/160/110	71	160	110	130	110	7	9	110	13	9	0.8	RS24	-K18/17-Z50/14
* Z1/200/100	80	200	130	165	145	7	11	100	16	M10	0.9	RA24	-K30/17-Z30/19
* Z1/200/100	90	200	130	165	145	7	11	100	16	M10	1.0	RA24	-K18/17-Z30/24
Z1/250/110	100/112	250	180	215	190	7	14	110	18	M12	1.5	RA24/28	-K18/17-Z30/28
Z1/300/132	132	300	230	265	234	7	14	132	20	M12	2.1	RA38	-K18/17-Z45/38
Z1/350/171	160	350	250	300	260	7	18	171	25	M16	3.1	RG38/45	-K18/17-Z70/42

Those adaptor flanges marked by * are not suitable for installations into reservoirs because the pump flange dia. is larger than the centering dia. of the adaptor flange.

Bell housing with vent hole or leakage oil-hole on request.

Dimensions in mm

Motor-Pump Assemblies KP 1/.G.0A K0A 4NL.



Nominal size	Power Motor 6-pole kW	Operating speed rpm	Power Motor 4-pole kW	Operating speed rpm	Bell-housing	Coupling	Weight E-motor kg 6-pole	4-pole	Bell-housing kg
80 S	0.37	920	0.55	1400	Z1/200/100-K	RA 24-K30/17-Z30/19	11	10	0.9
80	0.55	910	0.75	1400			12	11	
90 S	0.75	925	1.1	1410	Z1/200/100-K	RA 24-K18/17-Z30/24	13	13	1.0
90 L	1.1	935	1.5	1420			17	15	
100 LS	—	—	2.2	1420			—	21	
100 L	1.5	940	3	1430	Z1/250/110-K	RA 24/28-K18/17-Z30/28	20	24	1.5
112 M	2.2	945	4	1440			29	31	
132 S	3	955	5.5	1445	Z1/300/132-K	RA 28/38-K18/17-Z35/38	36	39	2.1
132 M	4	960	7.5	1450			63	60	
160 M	7.5	960	11	1450	Z1/350/171-K	RG 38/45-K18/17-Z70/42	76	76	3.1
160 L	11	960	15	1450			94	90	

Nominal size	Dimensions in mm L	a_1	a	b	c	e	g	h	L_1	p	s	w_1
80 S	100	200	100	125	5	120	156	80	244	199	10	50
80	100	200	100	125	5	120	156	80	244	199	10	50
90 S	100	200	100	140	12	158	190	90	258	210	9	56
90 L	100	200	125	140	12	158	190	90	258	210	10	56
100 LS	110	250	140	160	12	172	213	100	298	232	12	63
100 L	110	250	140	160	12	172	213	100	298	232	12	63
112 M	110	250	140	190	12	172	234	112	325	252	12	70
132 S	132	300	140	216	12	187	265	132	358	283	12	89
132 M	132	300	178	216	12	218	298	132	399	303	12	89
160 M	171	350	210	254	16	306	323	160	476	341	15	108
160 L	171	350	254	254	16	306	323	160	476	341	15	108

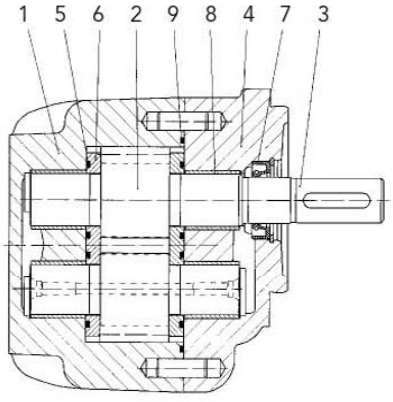
Motor frame sizes are based on Schäfer. Other manufactures motors can be supplied on request as IM B 35.

KRACHT®
FLUID TECHNOLOGY AND SYSTEMS

Pump technology

High pressure gear pumps
KP 2 / KP 3

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 from shaped in accordance with the special requirements of hydraulics and the optimum rating 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 inde-pendently 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

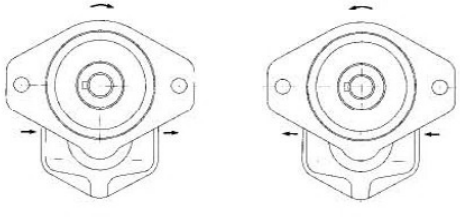
Loads acting on the drive shaft end from outside impair the functions of the doublegland bearing.
Radial loads can be absorbed in dependence on the extent and the direction of the loads. Axial loads are not permissible.
To absorb outer loads only those pump types shall be used which are equipped with 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

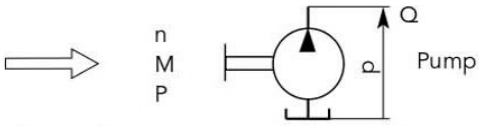
Mounting		flange type
Pipe connection		flange
Direction of rotation		clockwise **or** anticlockwise
Weight		see dimension sheets
Mounting position		optional
Ambient temperature	$\vartheta_{u\ min}$ $\vartheta_{u\ max}$	= – 20 °C = 60 °C
Operating pressure Inlet port	$p_{e\ min}$ $p_{e\ max}$	= – 0.4 bar (vacuum) = 2 bar
Operating pressure Short time	$p_{e\ max}$	= 5 bar
Operating pressure Outlet port	$p_{e\ max}$	= 300 bar
Fluid temperature range	$\vartheta_{m\ max}$ $\vartheta_{m\ max}$	90 °C for NBR rotary shaft lip type seal 150 °C for FKM rotary shaft lip type seal
Viscosity	ν_{min} ν_{max}	= 10 mm²/s = 600 mm²/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	ν	= 30 … 45 mm²/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 (KP 2 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 KP 2

Displacement Nominal size	Geom. displacement	Max. operating pressure	Peak pressure	Max. speed		Moment of inertia x 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 = ... 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 ν ≧ 30 mm^2/s and n ≧ 1000 1/min

[2] For housing with SAE connection Ø 32 / Ø 40

[3] For housing with connection Ø 26

Technical Data KP 3

Displacement Nominal size	Geom. displacement	Max. operating pressure	Peak pressure	Max. speed	Moment of inertia x 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 = ... 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 KP2

Discharge flow at n = 1450 1/min

Nominal size	Discharge flow Q in l/min at 34 mm²/s Pressure p in bar							
	20	60	100	140	180	200	230	250
20	27.9	27.6	27.4	27.1	26.8	26.6	26.4	26.2
25	34.8	34.5	34.2	33.8	33.4	33.2	33.0	32.8
28	39.2	38.9	38.6	38.2	37.9	37.7	37.4	–
32	44.6	44.3	43.9	43.5	43.1	42.8	42.5	–
40	55.8	55.4	54.9	54.4	53.9	53.6	–	–
50	69.7	69.2	68.6	67.9	67.3	67.0	–	–
62	86.8	86.4	86.0	85.6	85.2	–	–	–

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

Nominal size	Pressure p in bar							
	20	60	100	140	180	200	230	250
20	1.39	3.57	5.75	7.92	10.10	11.19	12.82	13.91
25	1.65	4.31	6.98	9.64	12.30	13.63	15.63	16.96
28	1.82	4.79	7.75	10.72	13.69	15.17	17.39	–
32	2.02	5.36	8.70	12.04	15.38	17.05	19.55	–
40	2.45	6.58	10.71	14.85	18.98	21.04	–	–
50	2.96	8.07	13.19	18.30	23.41	25.97	–	–
62	3.54	9.74	15.93	22.13	28.33	–	–	–

Discharge flow at n = 950 1/min

Nominal size	Discharge flow Q in l/min at 34 mm²/s Pressure p in bar							
	20	60	100	140	180	200	230	250
20	18.0	17.8	17.5	17.2	16.9	–	–	–
25	22.5	22.2	21.9	21.5	21.1	20.9	20.7	20.5
28	25.4	25.1	24.7	24.4	24.0	23.8	23.5	–
32	28.9	28.5	28.1	27.7	27.3	27.1	26.8	–
40	36.1	35.7	35.2	34.7	34.2	33.9	–	–
50	45.1	44.6	44.0	43.3	42.7	42.4	–	–
62	56.2	55.8	55.4	55.0	54.6	–	–	–

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

Nominal size	Pressure p in bar							
	20	60	100	140	180	200	230	250
20	0.91	2.34	3.76	5.19	6.61	–	–	–
25	1.08	2.82	4.57	6.31	8.06	8.93	10.24	11.11
28	1.19	3.13	5.08	7.02	8.96	9.94	11.39	–
32	1.32	3.51	5.70	7.89	10.07	11.17	12.81	–
40	1.60	4.31	7.02	9.72	12.43	13.78	–	–
50	1.93	5.28	8.63	11.98	15.33	17.01	–	–
62	2.31	6.37	10.43	14.49	18.56	–	–	–

The ratings are based on a viscosity of 34 mm²
The output of the drive motor must be chosen 20% higher than the table value P

Discharge Flow and Required Input Power KP3

Discharge flow at n = 1450 1/min

Nominal size	Discharge flow Q in l/min at 34 mm²/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 mm²/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 1¼"-SAE connection (Ø 32) to V_g size 32
  Pressure side 1" SAE connection (Ø 25) to V_g size 32
- **G** Suction side 1½" SAE connection (Ø 40) from V_g size 40 to V_g 71
  Pressure side 1¼" 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 1¼" 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

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

Housing and bearing design

- **D** Grey cast iron with composite plain bearings

Outboard flanges or bearing

- **0** without

Gear design

- **L** Shaft and pin wheel made of case-hardened steel, ground tooth flanks

Direction of rotation

- **1** Clockwise
- **2** Anticlockwise

Flange mounting cover

- **G** Square 4-hole flange, LA = 102/145; Ø Z = 105
- **S** SAE-B 2-hole flange, LA = 146; Ø Z = 101.6
- **M** 2-hole flange, LA 78/90; Ø Z = 63
- **F** as M, but fastener drill holes laterally reversed
- **T** SAE C 2-hole flange, LA = 181; Ø Z = 127
- **V** SAE C 4-hole flange, LA = 114.55; Ø Z = 127

LA = Hole spacing
Ø Z = Centring diameter

Nominal size

KP 2 20/25/28/32/40/50/62
KP 3 63/71/82/100/112/125

Seals

- **1** NBR rotary shaft lip type seals ϑ 90 °C
- **2** FKM rotary shaft lip type seals ϑ 150 °C

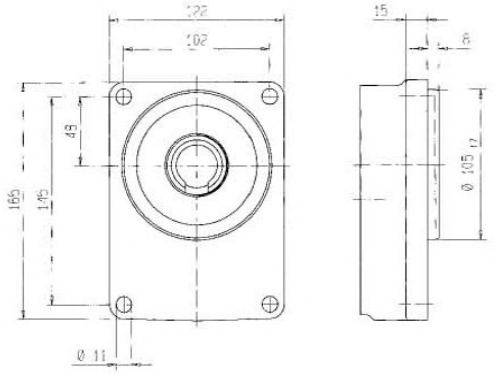
Size 2, 3

Product code

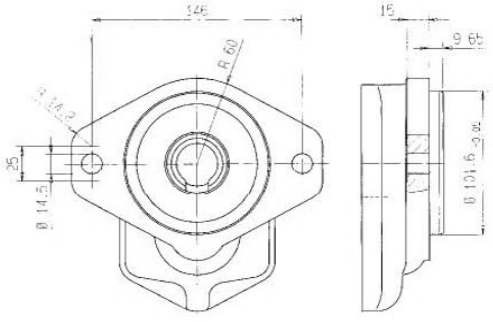
Code-No. for special construction

Flange Types

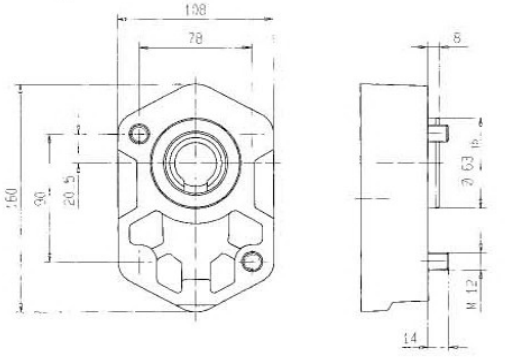
Square 4-hole flange G
KP 2 only



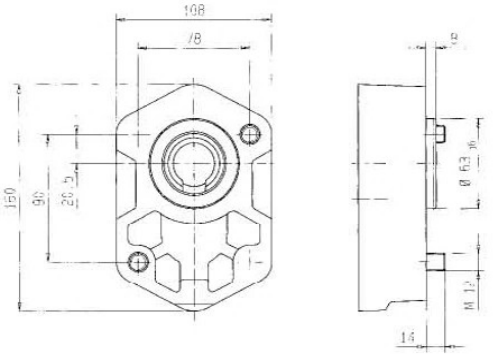
SAE B 2-hole flange S



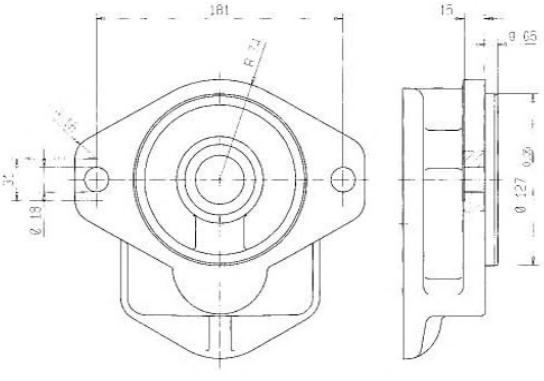
2-hole flange F
KP 2 only



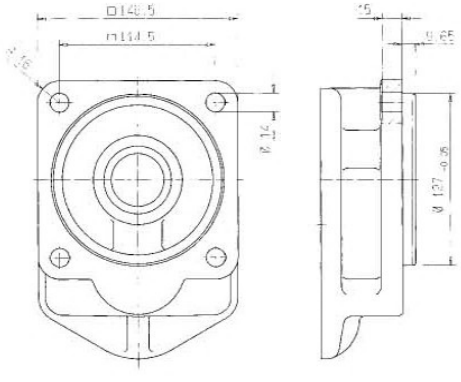
2-hole flange M
KP 2 only



SAE C 2-hole flange T
KP 3 only



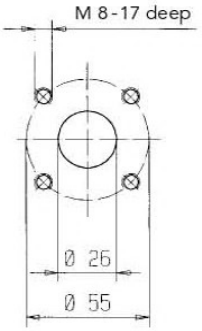
SAE C 4-hole flange V
KP 3 only



Dimensions in mm

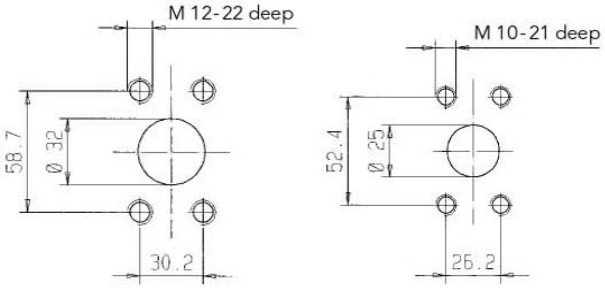
Connections

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



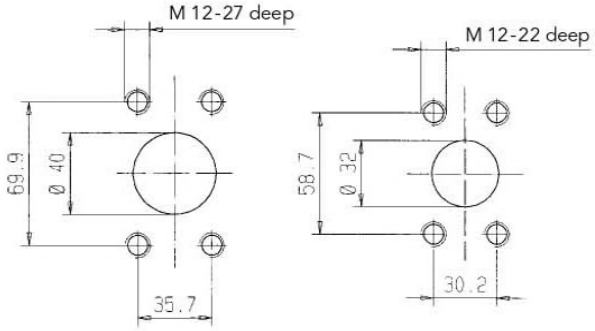
Housing connection F
Displacement nominal size
KP 2: 20, 25, 28, 32

Inlet port	Outlet port
SAE 1¼	SAE 1



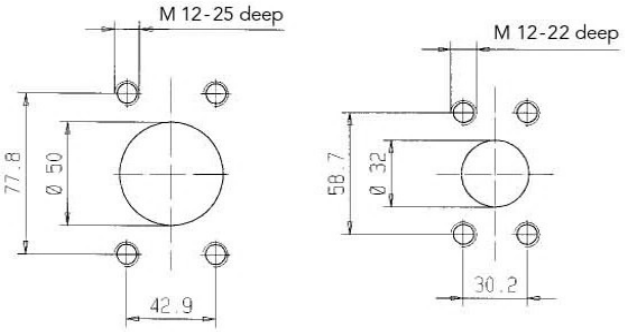
Housing connection G
Displacement nominal size
KP2: 40, 50, 62
KP3: 63-71

Inlet port	Outlet port
SAE 1½	SAE 1¼



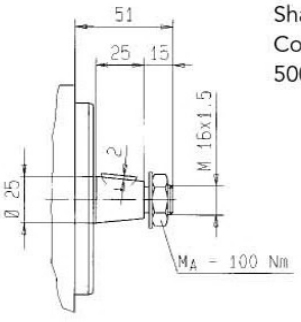
Housing connection J
Displacement nominal size
KP3: 82, 100, 112, 125

Inlet port	Outlet port
SAE 2	SAE 1¼

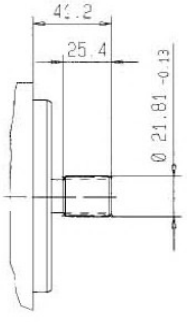


Dimensions in mm

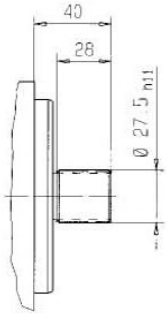
Shaft Ends KP 2



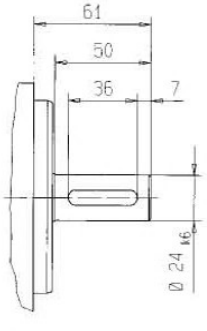
Shaft end K
Cone 1 : 5
500 Nm_{max}

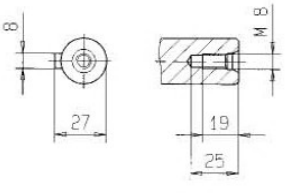


Shaft end U
External spline SAE-B
z = 13 DP 16/32, α = 30°
180 Nm_{max}



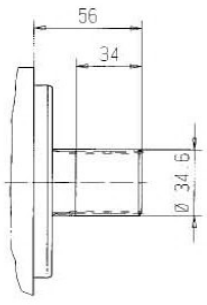
Shaft end W
External spline B 28 x 25
DIN 5482
z = 15, m = 1.75
450 Nm_{max}



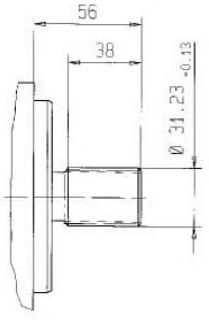


Shaft end Y
Cylindrical shaft
230 Nm_{max}

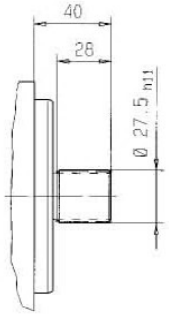
Shaft Ends KP 3



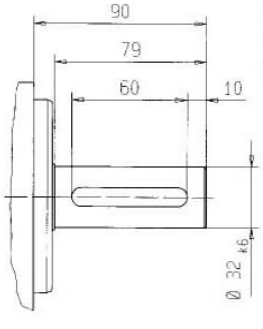
Shaft end B
External spline W 35 x 2
DIN 5480 from V_g 82
800 Nm_{max}

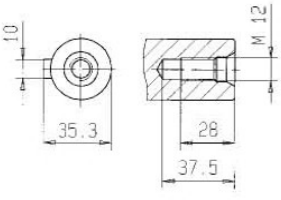


Shaft end Q
External spline SAE-C
z = 14 DP 12/24, α = 30°
500 Nm_{max}



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

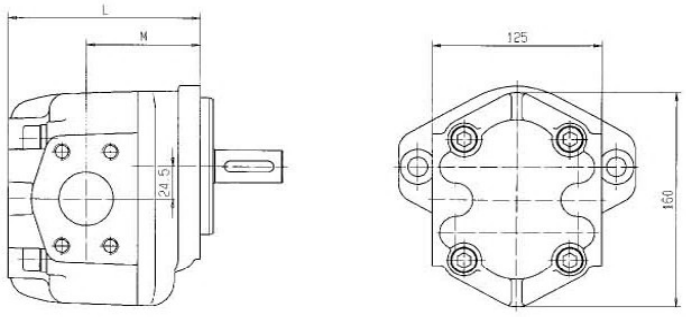




Shaft end Y
Cylindrical shaft
550 Nm_{max}

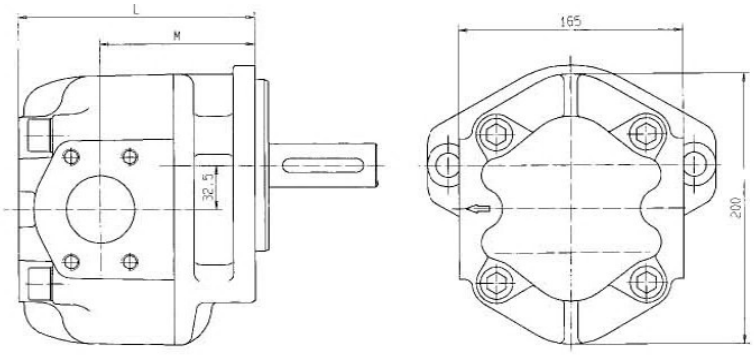
Dimensions in mm

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



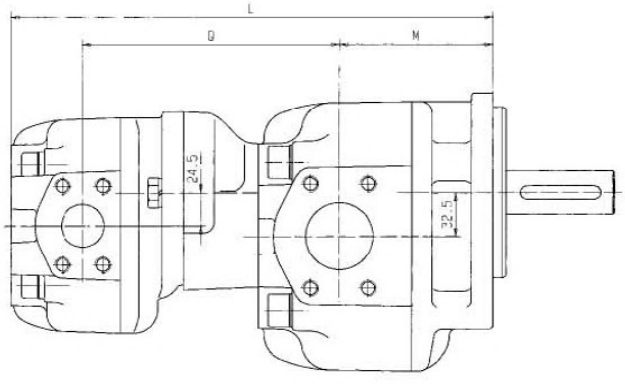
Displacement Nominal size	L	M	Weight Design S flange	Design T flange	Design V flange
63	162	102	23.5	24.0	24.5
71			23	23.5	24
82	174	114	24.5	25	25.5
100			26	26.5	27
112	185	125	27	27.5	28
125			29	29.5	30

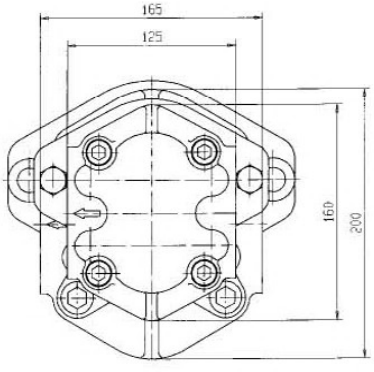
Dimensions in mm

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

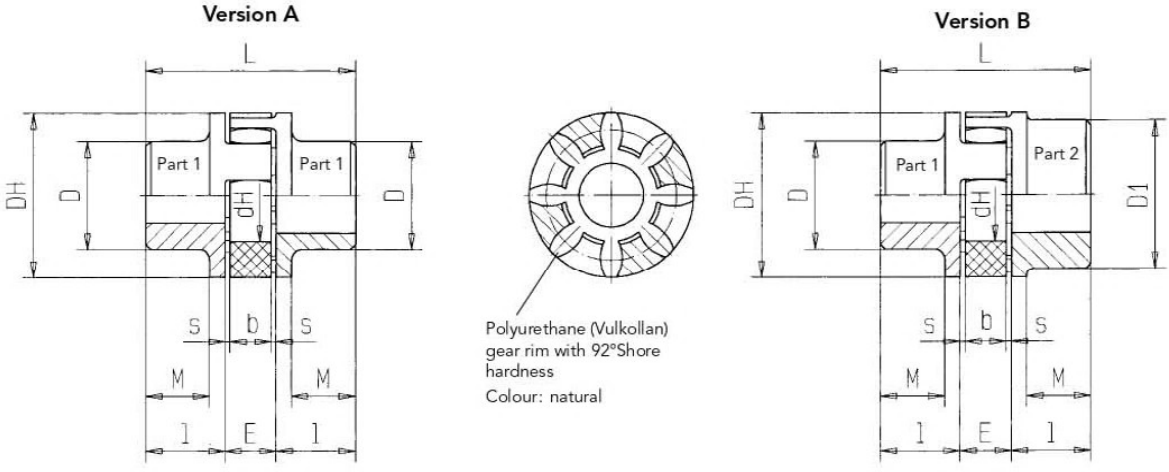
KP 3/100	T10X	YWL	6DL1	+	KP 2/32	S10F	W00	4DL1

Displacement Nominal size 2nd stage	Displacement Nominal size 1. stage								
	63-71			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

Dimensions in mm

Accessory – Couplings



Ordering example: R A/G 38 – Z 45/ 24/32 – Z 45/38

	Hub material
A	AL
G	GG

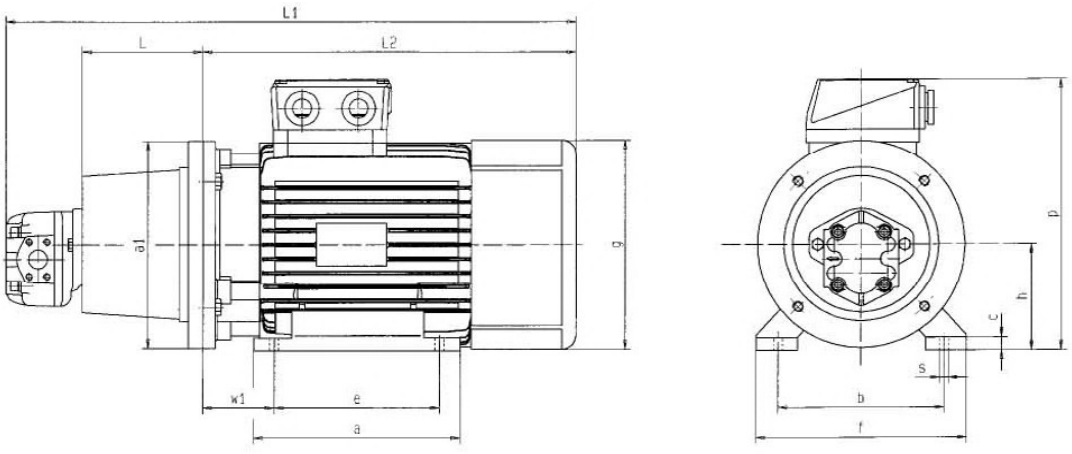
- R A/G 38 – Coupling size
- Z 45/ 24/32 – Coupling hub length and hub drill hole on pump side cylindrical KP2: Ø 24; KP3: Ø 32
- Z 45/38 – Coupling hub length and hub drill hole on motor side cylindrical

	Coupling size	Hub material: Aluminium		Pilot hole		Finished bore				Dimensions										Ordering example
		Weight	Moment of inertia	l		min.	min.	max.	max.											
		Kg	Kgm²	Part 1	Part 2	Part 1	Part 2	Part 1	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/..-Z65/..
	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

Dimensions in mm

Motor with Pump KP 2/. S.0. Y00 4DL.



KP 2

Size	Motor 6-pole Power kW	Motor 6-pole Speed 1/min	Motor 4-pole Power kW	Motor 4-pole Speed 1/min	Bell housing	Coupling
100 LA	1.5	940	2.2	1420	Z2/250/135	RA 24/28 – Z30/24 – Z30/28
100 LB	–	–	3.0	1420		
112 M	2.2	940	4.0	1440		
132 S	3.0	960	5.5	1440	Z2/300/168	RA 28/38 – Z35/24 – Z35/38
132 M	5.5	960	7.5	1440		
160 M	7.5	970	11.0	1460	Z2/350/188	RA 38/45 – Z45/24 – Z45/42
160 L	11.0	970	15.0	1470		
180 M	–	–	18.5	1470	Z2/350/204	RA 42/55 – Z50/24 – Z50/48
180 L	15.0	970	22.0	1480		
200 L	22.0	970	30.0	1480	Z2/400/204	RA 42/55 – Z50/24 – Z50/55

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

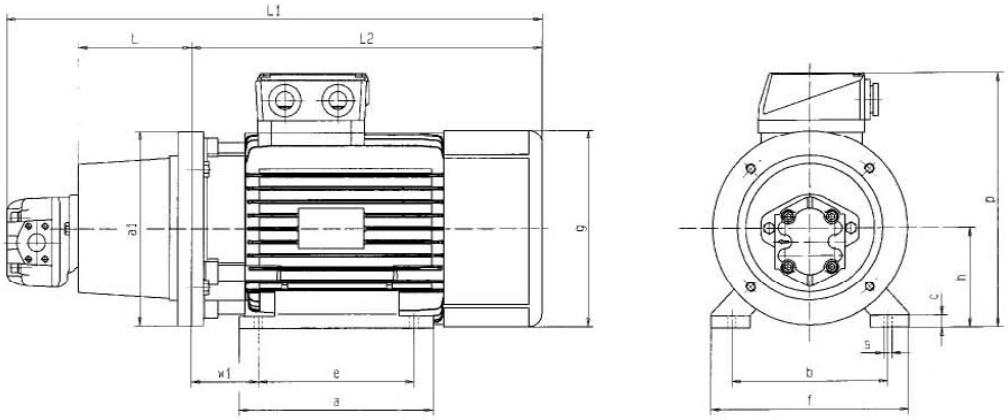
KP 2

Size	20-32 L_1	40-50 L_1	62 L_1	20-62 L	a_1	a	b	c	e	f	g	h	L_2	p	s	w_1
100 L	589	602	612	135	250	150	160	11	140	205	187	100	325	260	12	63
112 M	604	617	627	135	250	180	190	12	140	230	210	112	340	290	12	70
132 S	700	713	723	168	300	190	216	15	140	270	248	132	403	338	12	89
132 M	727	740	750	168	300	190	216	15	178	270	248	132	430	338	12	89
160 M	822	835	845	188	350	260	254	20	210	320	312	160	505	422	15	108
160 L	877	890	900	188	350	304	254	20	254	320	312	160	560	422	15	108
180 M	923	936	946	204	350	311	279	22	241	355	354	180	590	458	15	121
180 L	963	976	986	204	350	349	279	22	279	355	354	180	630	458	15	121
200 L	993	1006	1016	204	400	370	318	25	305	395	396	200	660	525	19	133

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

Dimensions in mm

Motor with Pump KP 3/. T.0. Y00 6DL.



KP 3

Size	Motor 6-pole Power kW	Motor 6-pole Speed 1/min	Motor 4-pole Power kW	Motor 4-pole Speed 1/min	Bell housing	Coupling
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		
180 M	–	–	18.5	1470		RA 42/55 – Z50/32 – Z50/48
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

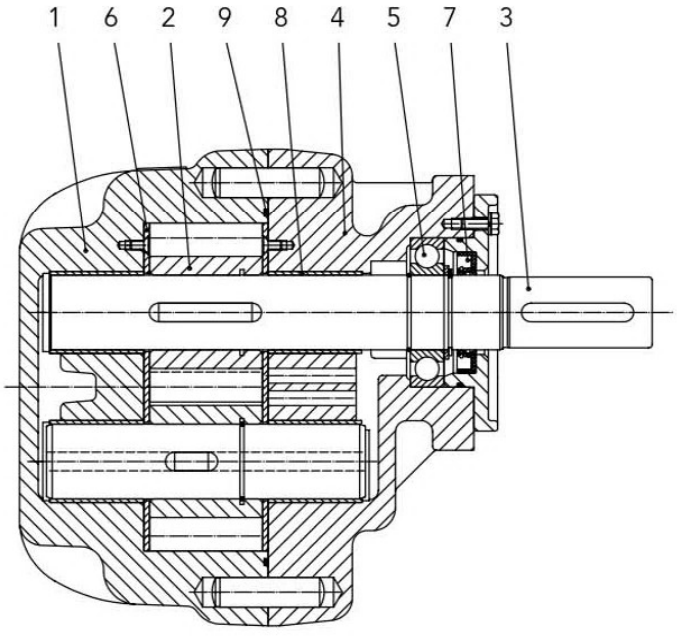
Dimensions in mm

KRACHT®
FLUID TECHNOLOGY AND SYSTEMS

Pump technology

High pressure gear pumps
KP 5

Construction



1 Housing
2 Gearing
3 Drive shaft end
4 Flange cover
5 Roller bearing
6 Sliding plates
7 Lip-type shaft seal
8 Plain bearing
9 Housing gasket

Description

KP series high pressure gear pumps are mainly used in oil-hydraulic plants. They are suitable both for hydraulic fluids as well as mineral oil bases (DIN 51524/25) and engine oils (DIN 51511).

The housing components are made from high-grade cast iron, the shaft and gears from hardened and ground case-hardening steel.

The shafts are supported in multi-layer bearings that have excellent antifriction properties. The seals in the drive shaft ends are made using solely NBR or FKM shaft seals.

An outboard bearing is placed on the shaft end to handle radial and axial forces.

The use of fine-meshed filters significantly increases the gear pump service life. Careful maintenance is the prerequisite.

Technical Information

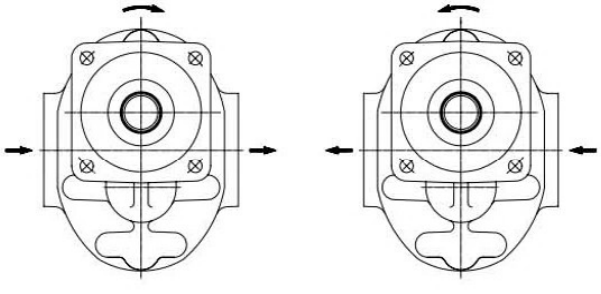
1. External loads

The robust design facilitates handling external radial forces, depending on the size and direction of application.

2. Direction of rotation

The following stipulations apply to the direction of rotation when looking at the drive shaft end:

Shaft rotation clockwise:	direction of conveyance from left to right
Shaft rotation counter clockwise:	direction of conveyance from right to left



General Characteristics

Fixing type	Flange type
Pipe connection	Flange; Dimensions, page 8
Drive shafts	Dimensions, page 8
Direction of rotation	clockwise **or** anticlockwise
Weight	Page 7
Mounting position	optional
Ambient temperature	$\vartheta_{u\,min}$ = – 20 °C $\vartheta_{u\,max}$ = + 60 °C

Operating Characteristics

Operating pressure	
Inlet port	$p_{e\,min}$ = – 0.4 bar (underpressure) $p_{e\,max}$ = 2.0 bar
Outlet port	p_{max} = Table, page 5
Fluid temperature	$\vartheta_{m\,min}$ = – 20 °C $\vartheta_{m\,max}$ = + 80 °C for NBR-Lip-type shaft seal + 120 °C for FKM-Lip-type shaft seal
Viscosity	ν_{min} = 13 mm²/s (cSt) ν_{max} = 600 mm²/s (cSt)
Recommended viscosity range	ν = 16 ... 90 mm²/s (cSt)
Discharge flow	Page 5
Input power	Page 5
Filter fineness	Return line filter ≤ 0.060 mm mesh size
Hydraulic fluids	Mineral oil based on DIN 51524/25 Motor oil based on DIN 51511 flameproof hydraulic fluids on request

ATEX

Products and media on request

Accessories

Straight flange connection, hole pattern based on SAE standard. Differential coupling for cyl. shaft end. Intermediate flange to standard motors with fastening flange according to DIN 42948.

Calculation Formulas for Hydropumps

Characteristics, formula signs, units

1	Discharge / displacement flow	Q	l/min
2	geom. discharge / displ. flow	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

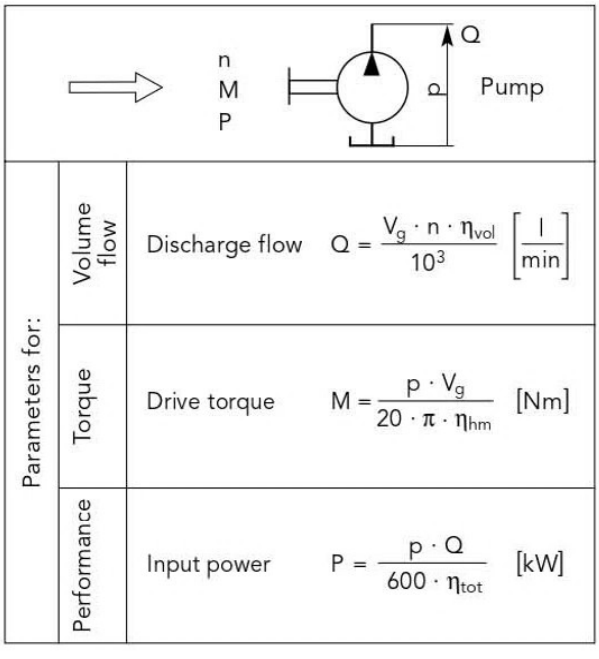
General:

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

$$M = 9549 \cdot \frac{P}{n} \quad P = \frac{M \cdot n}{9549} \quad v = 21{,}22 \cdot \frac{Q}{d_2}$$

Recommended values for KRACHT products at the nominal operating pressure

	η_{tot}	η_{vol}
KP 5	≈ 0.85	≈ 0.95



Parameters for:			
	Volume 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]
	Performance	Input power	$P = \frac{p \cdot Q}{600 \cdot \eta_{tot}}$ [kW]

Displacement / Nominal Size

Displacement Nominal size	geom. displacement V_g cm^3/r	max. operating pressure p_b bar	Speed range 1/min n_{min}	n_{max}	Torque M_{max} Nm	Permitted torques in N middle at shaft ends (n = 1450 1/min) axial	radial	Mass inertia torque x 10^{-3} J kg/m^2
160	160	100	800	2000	560	400	1500	3.77
200	200	100	800	1800				4.57
250	250	100	800	1600				5.87
300	300	80	800	1500				6.50

Discharge Flow and Required Input Power

Discharge flow at n = 950 1/min

Nominal size	Discharge flow Q in 1/min at 34 mm²/s Pressure p in bar					
	10	20	40	60	80	100
160	150	149	147	146	144	143
200	190	189	187	185	183	181
250	239	238	236	234	232	230
300	286	285	284	283	281	–

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

Nominal size	Pressure p in bar					
	10	20	40	60	80	100
160	3.5	6.5	12	17.5	23	29
200	4	8	14.5	22	29	36
250	5	9.5	18	26.5	35	43.5
300	6	11.5	21.5	32	42.5	–

Discharge flow at n = 1450 1/min

Nominal size	Discharge flow Q in 1/min at 34 mm²/s Pressure p in bar					
	10	20	40	60	80	100
160	227	225	223	221	219	216
200	285	284	282	280	278	276
250	358	356	354	352	349	346
300	429	428	426	424	422	–

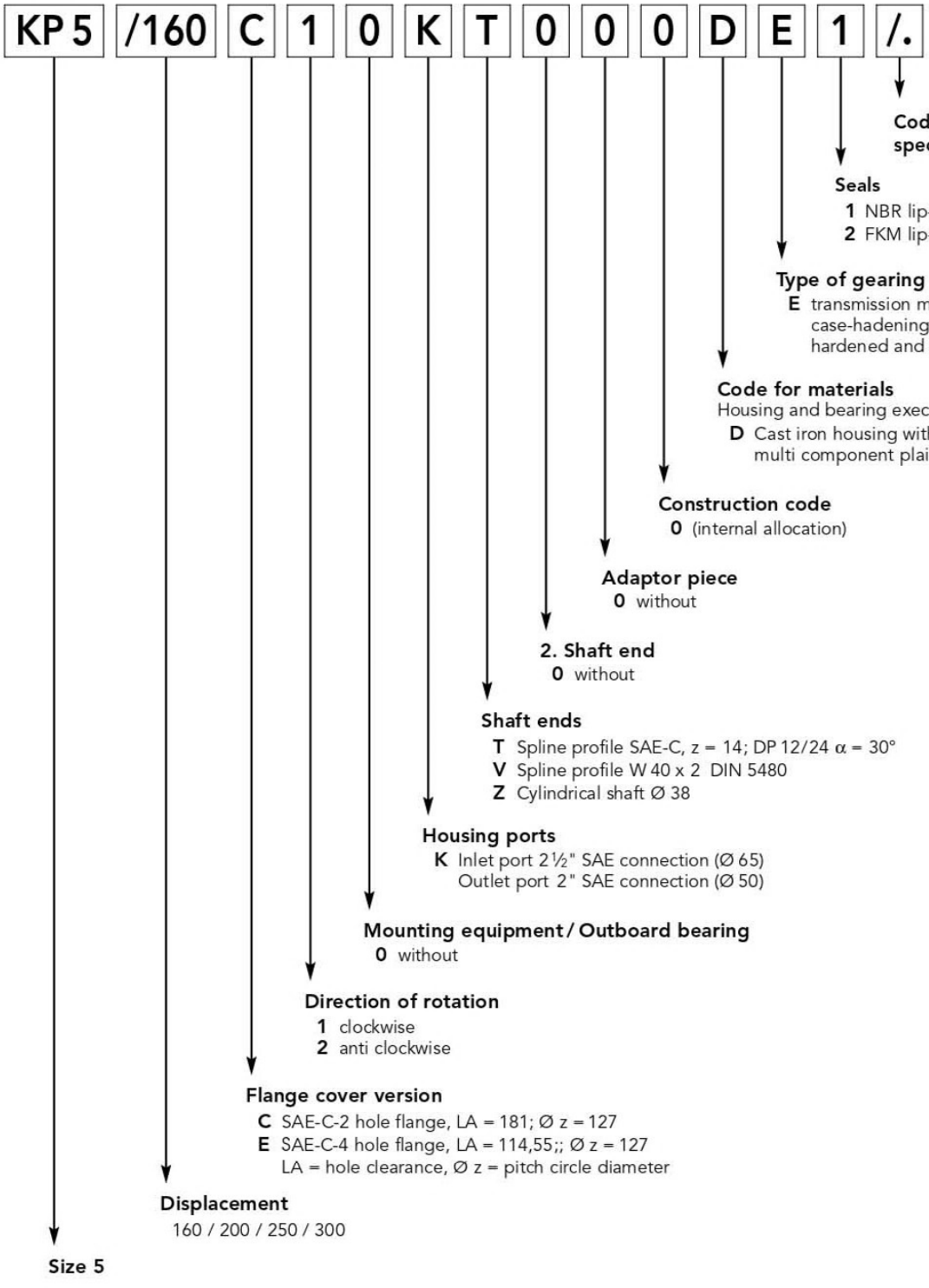
Required input power P in kW at n = 1450 1/min

Nominal size	Pressure p in bar					
	10	20	40	60	80	100
160	5.5	10	18.5	27	36	44.5
200	6.5	12	23	33.5	43.5	54
250	8.0	14	27.5	41	54	67
300	9.5	17.5	33	49	64.5	–

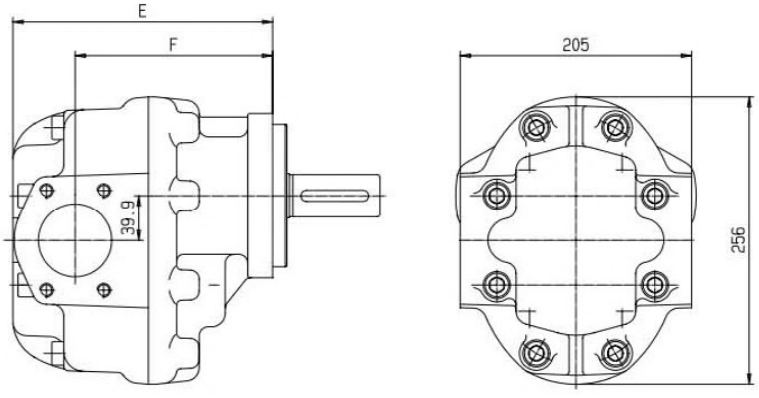
Tolerance zone of the discharge flow: – 5 % of table value Q.
Select the delivery power of each drive motor approx. 20 % greater than table value P.
If the viscosity is less than 30 mm²/s (cSt), reduce discharge flow Q
If the viscosity is more than 75 mm²/s (cSt), consider the addition to the input power,
if over 300 mm²/s (cSt), reduction of the speed.

Type Key

Ordering example



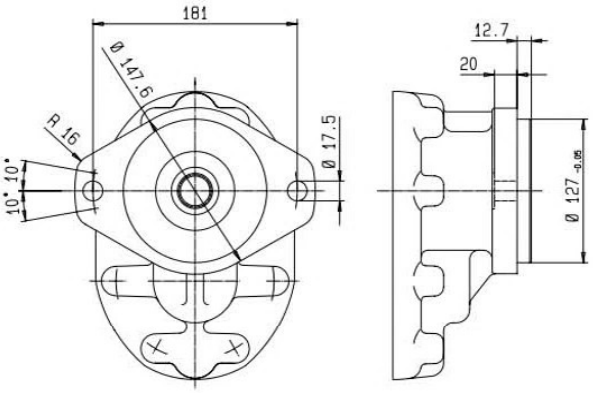
Dimensions



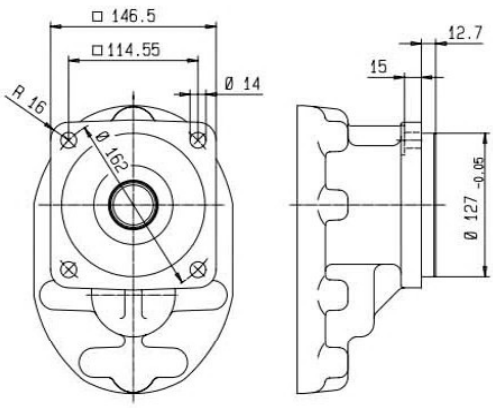
Displacement Nominal size	E	F	Weight in kg	
			Version C flange	Version E flange
160	225	170	42	43
200	230	175	44	45
250	243	188	48	49
300	255	200	52	53

Flange Type

SAE-C-2 hole flange C,
LA = 181; Ø z = 127



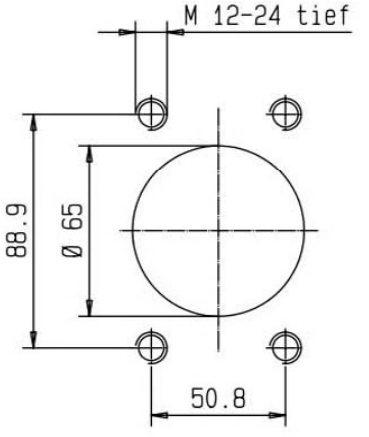
SAE-C-4 hole flange E,
LA = 114.55; Ø z = 127



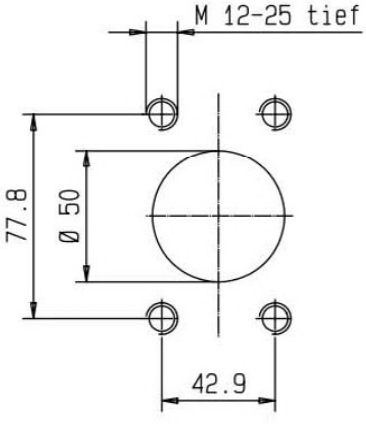
Abmessungen in mm

Connections

Housing side ports
Inlet port 2 ½" SAE connection (Ø 65)

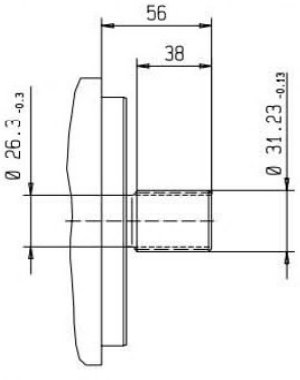


Housing side ports
Outlet port 2" SAE connection (Ø 50)

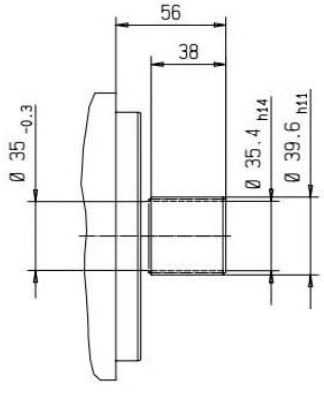


Shaft Ends

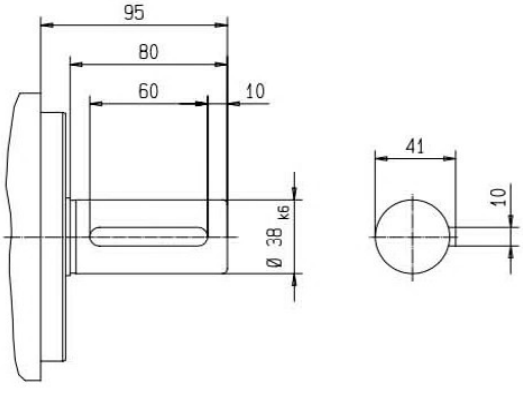
Shaft end T
Spline profile SAE-C
Z = 14; DP 12/24, α = 30°



Shaft end V
Spline profile W 40 x 2, DIN 5480



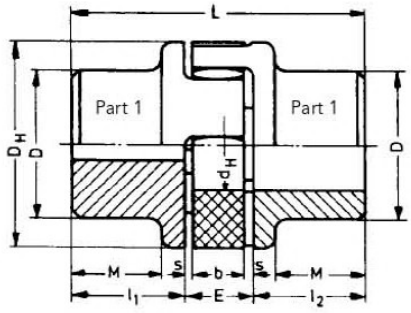
Shaft end Z
Cylindrical shaft Ø 38

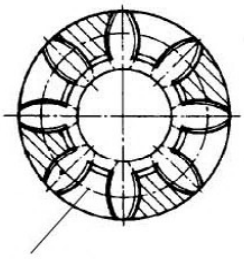


Abmessungen in mm

Accessory, Couplings

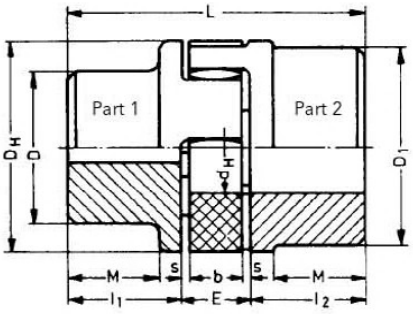
Version A





Gear rim off
Polyurethane (Vulkollan)
with 92° shore hardness
Colour: natural

Version B



Ordering code

RA / RG 38	–	Z 45/38	–	Z 45/38
Coupling size in Al (aluminium) in GG (cast iron)		Coupling hub length and hub bore Pump side cylindrical		Coupling hub length and hub bore Motor side zylindrical

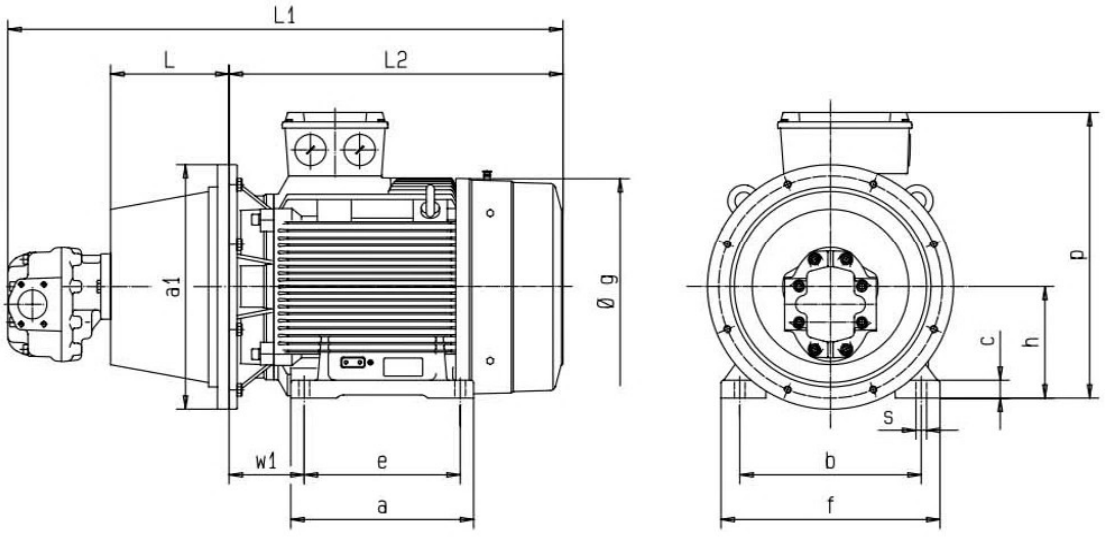
	Hub material
A	AL
G	GG

	Coupling size	Hub material Al Weight Kg	Hub material Al Mass moment of inertia Kgm²	Hub material GG Weight Kg	Hub material GG Mass moment of inertia Kgm²	Lead bore Part 1	Lead bore Part 2	Finished bore min. Part 1	Finished bore min. Part 2	Finished bore max. Part 1	Finished bore max. Part 2	Dimensions l_1; l_2	E	s	b	L	M	D_H	D Al	D GG	D_1	d_H	Ordering code
Version A	38	0.82	0.0007	2.08	0.002	10	–	12	–	38	–	45	24	3	18	114	37	80	66	66	–	38	R.38-Z45/..-Z45/..
	42	1.25	0.0014	3.21	0.004	12	–	14	–	42	–	50	26	3	20	126	40	95	75	75	–	46	R.42-Z50/..-Z50/..
	48	1.71	0.0024	4.41	0.006	13	–	15	–	48	–	56	28	3,5	21	140	45	105	85	85	–	51	R.48-Z56/..-Z56/..
Version B	38/45	0.89	0,0008	2.27	0.002	10	36	12	38	38	45	45	24	3	18	114	37	80	66	66	76	38	R.38/45-Z45/..-Z45/..
	42/55	1.39	0.0018	3.57	0.005	12	40	14	42	42	55	50	26	3	20	126	40	95	75	75	94	46	R.42/55-Z50/..-Z50/..
	48/60	1.86	0.0030	4.8	0.008	13	46	15	48	48	60	56	28	3.5	21	140	45	105	85	85	102	51	R.48/60-Z56/..-Z56/..
	55/70	–	–	7.37	0.016	18	52	20	55	55	70	65	30	4	22	160	52	120	–	98	120	60	R.55/70-Z65/..-Z65/..
	65/75	–	–	10.9	0.031	20	63	22	65	65	75	75	35	4.5	26	185	61	135	–	115	135	68	R.65/70-Z75/..-Z75/..
	75/90	–	–	17.7	0.068	28	73	30	75	75	90	85	40	5	30	210	69	160	–	135	160	80	R.75/90-Z85/..-Z85/..

Medium temperature: – 10 °C up to + 80 °C (intermittent temperature peaks up to + 120 °C are permissible)
Weights and mass inertial torque are related to max. finished bore without groove
Finished bore based on ISO alignment H7; Keyway according to DIN 6885 Sheet 1

Abmessungen in mm

Motor with Pump KP 5 /. C.0. Z00 0DE.



Size	Motor 4-pole Power kW	Motor 4-pole Speed 1/min	Motor 6-pole Power kW	Motor 6-pole Speed 1/min	Bell housing	Coupling
160 M 160 L	11 15	1465 1465	7.5 11	960 960	PK 350/10/19	**RA 38/45 – Z45/38 – Z45/42**
180 M 180 L	18.5 22	1470 1470	– 15	– 970	PK 350/10/19	**RA 42/55 – Z50/38 – Z50/48**
200 LK	30	1470	18.5/22	975/975	PK 400/5/7	**RA 42/55 – Z50/38 – Z50/55**
225 S 225 M	37 45	1480 1480	– 30	– 980	PK 450/3/23	**RA 48/60 – Z56/38 – Z56/60**
250 M 280 S	55 75	1480 1485	37 45	980 985	PL 550/1/9 PK 550/3/9	**RG 55/70 – Z65/38 – Z65/65** **RG 65/75 – Z75/38 – Z75/75**

All motor dimensions and information refer to the ADDA motor make, other motor makes on request. Motor mounting IMB 35

Size	160 L_1	200 L_1	250 L_1	300 L_1	160-300 L	a_1	a	b	c	e	f	Øg	h	L_2	p	s	w_1
160 MT	913	918	931	943	228	350	250	254	18	210	292	290	160	460	375	14	108
160 L	993	998	1011	1023	228	350	332	254	20	254	315	325	160	540	405	14	108
180 M	1033	1038	1051	1063	228	350	320	279	22	241	350	340	180	580	425	14	121
180 L	1033	1038	1051	1063	228	350	320	279	22	279	350	340	180	580	425	14	121
200 L	1093	1098	1111	1123	228	400	365	318	24	305	395	380	200	640	475	18	133
225 S	1177	1182	1195	1221	262	450	370	356	30	286	436	420	225	690	515	18	149
225 M	1177	1182	1195	1221	262	450	370	356	30	311	436	420	225	690	515	18	149
250 M	1255	1260	1273	1285	265	550	410	406	32	349	476	480	250	765	580	22	168
280 S	1390	1395	1408	1420	275	550	480	457	35	368	534	535	280	890	680	22	190

All pump and motor sizes can be combined with each other

Abmessungen in mm