

Axial piston variable pump A4VSO series 1x and 30



- ▶ Robust high-pressure pump for industrial applications
- ▶ Size 40 ... 1000
- ▶ Nominal pressure 350 / 380 bar
- ▶ Maximum pressure 400 / 420 bar
- ▶ Open circuit

Features

- ▶ Variable displacement pump with axial piston rotary group of swashplate design for hydrostatic drives in open circuit
- ▶ Flow is proportional to the drive speed and displacement.
- ▶ The flow can be infinitely varied by adjusting the swashplate angle.
- ▶ Excellent suction characteristics
- ▶ Low noise level
- ▶ With pre compression volume for pressure pulsation reduction
- ▶ Nominal pressure 380 bar / maximum pressure 420 bar for selected control devices with working port 36.
- ▶ Long service life
- ▶ Modular design
- ▶ Variable through drive options
- ▶ Optical swivel angle indicator
- ▶ Any installation position possible
- ▶ Suitable for variable-speed drives
- ▶ HF operation with reduced data possible for HFC operation, special version available

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Type code

01	02	03	04	05	06	07	08	09	10	11	12	13	14
	A4VS		O			/		-					

Hydraulic fluid		40	71	125	180	250	260	355	370	500	750	1000	
01	Mineral oil and HFD hydraulic fluids (no code)	●	●	●	●	●	●	●	●	●	●	●	
	HFA, HFB and HFC hydraulic fluids ¹⁾ Only with sealing material NBR nitrile rubber and shaft seal PTFE. Please order with code P in position 09.	●	-	-	-	-	-	-	-	●	-	-	E
	High-speed version	-	●	-	●	●	●	●	●	●	-	-	H

Axial piston unit		
02	Swashplate design, variable, nominal pressure 350 bar, maximum pressure 400 bar	A4VS

Charge pump		40	71	125	180	250	260	355	370	500	750	1000	
03	Without charge pump (without code)	●	●	●	●	●	●	●	●	●	●	●	
	With charge pump, can only be ordered with port plate 25 (see item 12) and only in counter-clockwise rotation (see item 08).	-	-	-	-	-	-	-	-	-	●	-	L

Operating mode		
04	Pump, open circuit	O

Size (NG)		40	71	125	180	250	260	355	370	500	750	1000
05	Geometric displacement, see "Technical data" on page 10											

Control device		Data sheet	40	71	125	180	250	260	355	370	500	750	1000	
06	Pressure controller, one-sided swiveling	92060	●	●	●	●	▲	●	▲	●	●	●	●	DR..²⁾
	Pressure controller for parallel operation		●	●	●	●	▲	●	▲	●	●	●	●	DP..²⁾
	Flow controller		●	●	●	●	▲	●	▲	●	-	-	-	FR..
	Pressure and flow controller		●	●	●	●	▲	●	▲	●	-	-	-	DFR
	Power controller with hyperbolic characteristic curve	92064	●	●	●	●	▲	●	▲	●	●	●	●	LR..²⁾
	Manual control	92072	●	●	●	●	●	-	●	-	●	-	-	MA
	Electric motor control		●	●	●	●	●	-	●	-	●	-	-	EM
	Hydraulic control, depending on quantity	92076	●	●	●	●	▲	●	▲	●	●	●	●	HM..
	Digital electro-hydraulic pump control system		●	●	●	●	▲	●	▲	●	●	●	●	HS5..²⁾
	Analog electro-hydraulic pump control system		●	●	●	●	▲	●	▲	●	●	●	●	EO..²⁾
	Hydraulic control, pressure-dependent	92080	●	●	●	●	▲	●	▲	●	●	●	●	HD..²⁾
	Two-point control, electric	92084	○	○	○	○	-	○	-	○	○	○	○	EZ
	Pressure control, secondary controlled	92059	●	●	●	●	●	-	●	-	●	●	●	DS3²⁾
	Electro-hydraulic control system DFE1	92088	●	●	●	●	▲	●	●	○	-	-	-	DFE1..²⁾
	System solution SYHDFEE	30035	●	●	●	●	●	-	●	-	-	-	-	SYDFE

● = Available ○ = On request - = Not available ▲ = Not for new projects

1) For the enhanced-power special version in HFC mode, see data sheet 92053 and/or order position 09 For versions with HFA and HFB pressure media, see data sheet 90223

2) Observe the restrictions for operation with HF hydraulic fluids in the relevant data sheets for the controls and/or mounted valves.

01	02	03	04	05	06	07	08	09	10	11	12	13	14
	A4VS		O			/		-					

Series		40	71	125	180	250	260	355	370	500	750	1000	
07	Series 1, index 0 (series 1, index 1, only for control HD and EP)	●	●	-	-	-	-	-	-	-	-	-	10 (11)
	Series 3, index 0	-	-	●	●	●	●	●	●	●	●	●	30

Directions of rotation		40	71	125	180	250	260	355	370	500	750	1000	
08	Viewed on drive shaft clockwise	●	●	●	●	●	●	●	●	●	●	●	R
	counter-clockwise	●	●	●	●	●	○	●	○	●	●	●	L

Sealing material		40	71	125	180	250	260	355	370	500	750	1000	
09	FKM (fluorocarbon rubber) / HFD operation	●	●	●	●	●	●	●	●	●	●	●	V
	Special version for HFC mode, see data sheet 92053	-	●	●	●	●	-	●	-	-	-	-	F.

Drive shaft		40	71	125	180	250	260	355	370	500	750	1000	
10	Parallel keyed shaft DIN 6885	●	●	●	●	●	●	●	●	●	●	●	P
	Splined shaft DIN 5480	●	●	●	●	●	●	●	●	●	●	●	Z

Mounting flange		40	71	125	180	250	260	355	370	500	750	1000	
11	Based on ISO 3019-2 metric 4-hole	●	●	●	●	●	●	●	●	-	-	-	B
	8-hole	-	-	-	-	-	-	-	-	●	●	●	H

Working port		40	71	125	180	250	260	355	370	500	750	1000	
12	Standard version												
	Port B and S : SAE flange lateral, offset 90°, metric fastening thread (can only be ordered without through-drive (N00) or with K.. through-drives)	●	●	●	●	●	●	●	●	-	-	-	13
	Port B and S : SAE flange lateral, offset 90°, metric fastening thread 2nd pressure port B₁ , opposite B plugged with flange plate upon delivery	●	●	●	●	●	●	●	●	●	●	●	25
	High-speed version												
	Port B and S : SAE flange lateral, offset 90°, metric fastening thread (can only be ordered without through-drive (N00) or with K.. through-drives)	-	-	-	-	●	-	●	-	-	-	-	13
	Port B and S : SAE flange lateral, offset 90°, metric fastening thread 2nd pressure port B₁ , opposite B plugged with flange plate upon delivery	-	●	-	●	●	●	●	●	●	-	-	25
	Port B and S : SAE flange lateral, offset 90°, metric fastening thread. 2nd pressure port B₁ , opposite B plugged with flange plate upon delivery; with pulsation damping	-	-	-	-	-	●	-	●	-	-	-	36¹⁾²⁾

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- Nominal pressure 380 bar / maximum pressure 420 bar only possible for selected control devices and controllers with external control fluid supply.
- Reduced swivel dynamics for control with internal control fluid supply and pressures below 40 bar.

01	02	03	04	05	06	07	08	09	10	11	12	13	14
	A4VS	O			/			-					

Through-drive (for mounting options, see page 76)

13				40	71	125	180	250	260	355	370	500	750	1000	
Without through drive				●	●	●	●	●	●	●	●	●	●	●	N00
With through drive	Without conversion option			●	●	-	-	-	-	-	-	●	●	●	K...
	For universal through drive, see data sheet 95581			-	-	●	●	●	●	●	●	-	-	-	U...
Prepared for through drive, with pressure-resistant plugged cover				●	●	●	●	●	●	●	●	●	●	●	99
Flange ISO 3019-2 (metric)															
Hub for splined shaft															
Diameter	Mounting	Diameter		40	71	125	180	250	260	355	370	500	750	1000	
125, 4-hole		32x2x14x9g ¹⁾		●	●	●	●	●	●	●	●	●	●	○	31
140, 4-hole		40x2x18x9g ¹⁾		-	●	●	●	●	●	●	●	●	●	○	33
160, 4-hole		50x2x24x9g ¹⁾		-	-	●	●	●	●	●	●	●	●	○	34
224, 4-hole		60x2x28x9g ¹⁾		-	-	-	-	●	●	●	●	●	●	○	35
		70x3x22x9g ¹⁾		-	-	-	-	-	-	●	●	●	○	●	77
315, 8-hole		80x3x25x9g ¹⁾		-	-	-	-	-	-	-	-	●	●	●	43
400, 8-hole		90x3x28x9g ¹⁾		-	-	-	-	-	-	-	-	-	●	●	76
		100x3x32x9g ¹⁾		-	-	-	-	-	-	-	-	-	-	●	88
80, 2-hole		3/4 in	11T 16/32DP ²⁾	○	●	●	●	●	●	●	●	○	○	○	B2
100, 2-hole		7/8 in	13T 16/32DP ²⁾	●	●	●	●	●	●	●	●	○	○	○	B3
		1 in	15T 16/32DP ²⁾	●	●	●	●	●	●	●	●	●	○	○	B4
125, 4-hole		1 in	15T 16/3 2DP ²⁾	-	●	○	○	●	●	●	●	○	○	○	E1
125, 2-hole	 	1 1/4 in	14T 12/24DP ²⁾	-	●	●	●	●	●	●	●	●	○	○	B5
		1 1/2 in	17T 12/24DP ²⁾	-	-	●	●	●	●	●	●	○	○	○	B6
160, 4-hole		1 1/4 in	14T 12/24DP ²⁾	-	○	●	●	●	●	●	●	○	○	○	B8
180, 4-hole		1 1/2 in	17T 12/24DP ²⁾	-	-	○	○	○	○	○	○	○	○	○	B9
		1 3/4 in	13T 8/16DP ²⁾	-	-	-	●	●	●	●	●	○	○	○	B7

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¹⁾ Splined hub × 8H according to DIN 5480
²⁾ Hub for splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

01	02	03	04	05	06	07	08	09	10	11	12	13	14
	A4VS	O			/			-					

13	Flange ISO 3019-1 (SAE)		Hub for splined shaft														
	Diameter	Mounting	Diameter		40	71	125	180	250	260	355	370	500	750	1000		
	82-2 (A)		5/8 in	9T 16/32DP ¹⁾	●	●	●	●	●	●	●	●	●	●	○	01	
			3/4 in	11T 16/32DP ¹⁾	●	●	●	●	●	●	●	●	●	○	○	○	52
	101-2 (B)		7/8 in	13T 16/32DP ¹⁾	●	●	●	●	●	●	●	●	●	●	○	68	
			1 in	15T 16/32DP ¹⁾	●	●	●	●	●	●	●	●	●	○	○	04	
			1 1/4 in	14T 12/24DP ¹⁾	–	●	○	○	○	○	○	○	○	○	○	06	
	127-4 (C)		1 in	15T 16/32DP ¹⁾	○	●	●	●	○	○	○	○	○	○	○	E2	
			1 1/4 in	14T 12/24DP ¹⁾	●	●	●	●	●	●	●	●	●	○	○	15	
			1 1/2 in	17T 12/24DP ¹⁾	–	–	●	●	○	○	○	○	●	○	○	16	
	127-2 (C)		1 1/4 in	14T 12/24DP ¹⁾	–	●	●	●	●	●	●	●	●	●	○	07	
			1 1/2 in	17T 12/24DP ¹⁾	–	–	●	●	●	●	●	●	●	●	●	24	
	152-4 (D)		1 1/2 in	17T 12/24DP ¹⁾	–	–	●	●	●	●	●	●	●	○	○	○	96
			1 3/4 in	13T 8/16DP ¹⁾	–	–	●	●	●	●	●	●	●	●	○	17	
	165-4 (D)		N50x24x24x9g ²⁾		–	–	–	–	○	○	●	●	●	○	○	84	
	Ø 63, metr.4-hole		for keyed shaft Ø 25		●	●	●	●	●	●	●	●	○	○	○	57	

Filtration (specification only with DS.. Control)					40	71	125	180	250	260	355	370	500	750	1000	
14	Without filter				●	●	●	●	●	-	●	-	●	●	●	N
	Intermediate plate filter (for DS.. control, see data sheet 92057)				●	●	●	●	●	-	●	-	●	-	-	Z

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Notice

- Note the project planning notes on page 80.
- In addition to the type code, please specify the relevant technical data when placing your order.
- For information on combination pumps, see page 76

¹⁾ Hub for splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
²⁾ Splined hub × 8H according to DIN 5480

Hydraulic fluids

The A4VSO, A4VSLO variable pump is designed for operation with HLP mineral oil according to DIN 51524. Application instructions and requirements for hydraulic fluid selection, behavior during operation as well as disposal and environmental protection should be taken from the following data sheets before the start of project planning:

- ▶ 90220: Hydraulic fluids based on mineral oils and related hydrocarbons
- ▶ 90221: Environmentally acceptable hydraulic fluids
- ▶ 90222: Fire-resistant, water-free hydraulic fluids (HFDR/HFDU)
- ▶ 90223: Fire-resistant, water-containing hydraulic fluids (HFAx, HFB, HFC)

Selection of hydraulic fluid

Bosch Rexroth rates hydraulic fluids on the basis of the Fluid Rating according to technical data sheet 90235. Hydraulic fluids with positive evaluation in the Fluid Rating are listed in the following data sheet:

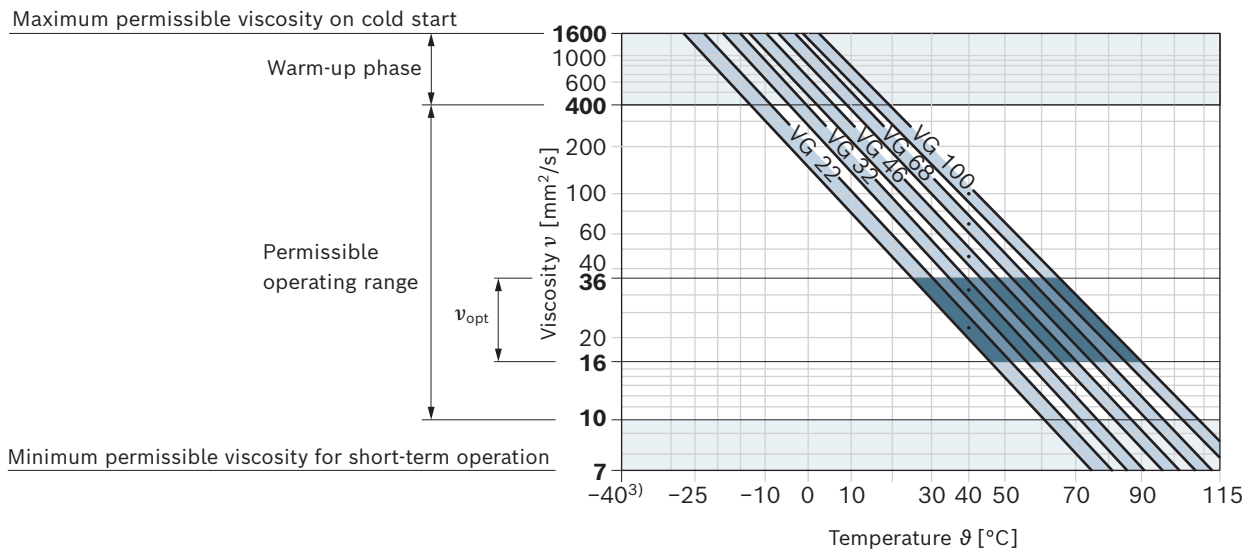
- ▶ 90245: Bosch Rexroth Fluid Rating List for Rexroth hydraulic components (pumps and motors)

Selection of hydraulic fluid shall make sure that the operating viscosity in the operating temperature range is within the optimum range (v_{opt} ; see selection diagram).

Viscosity and temperature of hydraulic fluids

	Viscosity	Shaft seal	Temperature ²⁾	Comment
Cold start	$v_{max} \leq 1600 \text{ mm}^2/\text{s}$	FKM	$\vartheta_{St} \geq -25^\circ\text{C}$	$t \leq 3 \text{ min}$, without load ($p \leq 50 \text{ bar}$) Permissible temperature difference between axial piston unit and hydraulic fluid in the system maximum 25 K
Warm-up phase	$v = 1600 \dots 400 \text{ mm}^2/\text{s}$			$t \leq 15 \text{ min}$, $p \leq 0,7 \times p_{nom}$ and $n \leq 0,5 \times n_{nom}$
Permissible operating range	$v = 400 \dots 10 \text{ mm}^2/\text{s}^{1)}$ $v_{opt} = 36 \dots 16 \text{ mm}^2/\text{s}$	FKM	$\vartheta_{St} \leq +110^\circ\text{C}$	measured at port T Optimal operating viscosity and efficiency range
Short-term operation	$v_{min} = 10 \text{ mm}^2/\text{s}$	FKM	$\vartheta_{St} \leq +110^\circ\text{C}$	$t \leq 3 \text{ min}$, $p \leq 0.3 \times p_{nom}$, measured at port T

▼ Selection diagram



1) This corresponds, e.g. at VG 46, to a temperature range of +4 °C to +85 °C (see selection diagram)

2) If the temperature at extreme operating parameters cannot be adhered to, please contact us.

3) For applications in the low-temperature range, please contact us.

Filtration of the hydraulic fluid

Finer filtration improves the cleanliness level of the hydraulic fluid, which increases the service life of the axial piston unit.

A cleanliness level of at least 20/18/15 is to be maintained according to ISO 4406.

At a hydraulic fluid viscosity of less than 10 mm²/s (e.g. due to high temperatures during short-term operation) at the drain port, a cleanliness level of at least 19/17/14 under ISO 4406 is required.

Examples of temperatures of hydraulic fluids at a viscosity of 10 mm²/s:

- 73 °C at HLP 32
- 85 °C at HLP 46

Bearing flushing

Bearing flushing is required for a safe, continuous operation under the following operating conditions:

- Applications with special fluids (not mineral fluids) due to limited lubricity and narrow operating temperature range
- When operated at temperature and viscosity limits when using mineral oil

With vertical installation (drive shaft facing upwards) bearing flushing is recommended for lubricating the front bearing and the shaft seal.

Bearing flushing is realized at port **U** in the area of the front flange of the variable pump. The flushing fluid flows through the front bearing and discharges with the pump drain at the drain port.

Depending on the individual sizes, the following flushing flows are recommended:

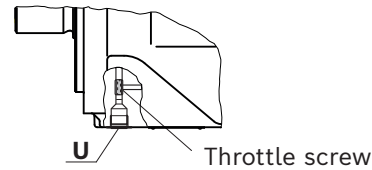
NG	40	71	125	180	250	355	500	750	1000
					260	370			
q_{Sp} l/min	3	4	5	7	10	15	20	30	40

For the flushing flows stated, there is a pressure differential of about 2 or 3 bar between port **U** (including fitting) and the housing area (series 1x and series 3x, respectively).

For version F (order position 09), the corresponding flushing flows in accordance with data sheet 92053 must be observed.

Notice regarding series 3x

When using external bearing flushing, the throttle screw in port **U** must be turned in to the end stop.



Case pressure for standard versions

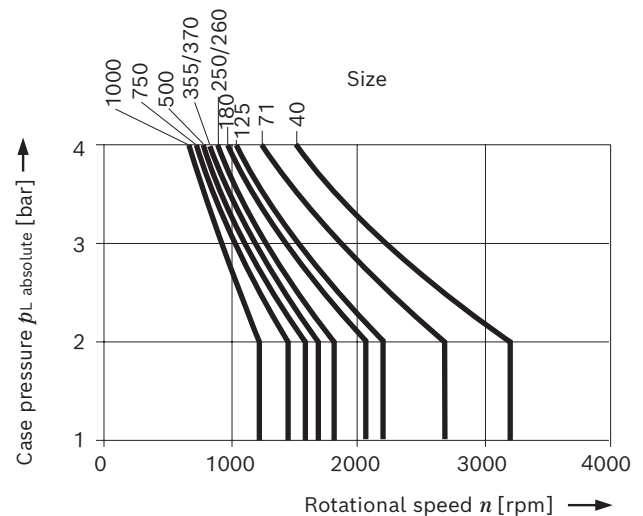
Permissible pressure load

The service life of the shaft seal is affected by the rotational speed of the axial piston unit and the case pressure. Momentary ($t < 0.1$ s) pressure peaks of up to 6 bar absolute are acceptable. The service life of the shaft seal decreases with increasing frequency of pressure peaks and increasing mean differential pressure. A slide ring seal is available for higher housing pressures. The pressure in the housing must be equal to or greater than the ambient pressure.

Maximum case pressure

$p_{L \text{ absolute max}}$ 4 bar absolute

The parameters are reference values; under certain operating conditions, restrictions may be required.



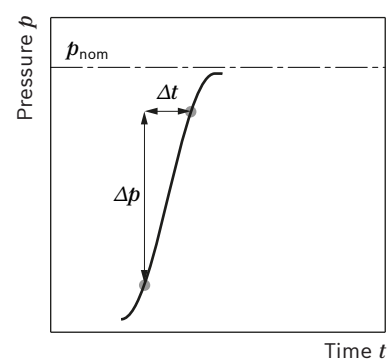
Flow direction

S to B

Working pressure range

Pressure at working port B			Definition
Nominal pressure p_{nom}	with working port 13, 25 and 36	350 bar	The nominal pressure corresponds to the maximum design pressure.
	with working port 36 ³⁾	380 bar	
Maximum pressure p_{max}	with working port 13, 25 and 36	400 bar	The maximum pressure corresponds to the maximum working pressure within a single operating period. The sum of the single operating periods must not exceed the total operating period (maximum number of cycles: approx. 1 million).
	with working port 36 ³⁾	420 bar	
	Single operating period	1 s	
	Total operating period	300 h	
Minimum pressure $p_{\text{B absolute}}$ (high-pressure side)		15 bar ¹⁾	Minimum pressure on the high-pressure side (B) required to prevent damage to the axial piston unit. The minimum pressure depends on the rotational speed and the swivel angle.
Rate of pressure change $R_{\text{A max}}$		16000 bar/s	Maximum permissible speed of pressure build-up and reduction during a pressure change across the entire pressure range.
Pressure at suction port S (inlet)			
Version without charge pump			Minimum pressure at suction port S (inlet) which is required to prevent damage to the axial piston unit. The minimum pressure is dependent on the rotational speed and displacement of the axial piston unit (see diagram "Maximum permissible rotational speed" on page 10).
Minimum pressure $p_{\text{S min}}$		≥ 0.8 bar absolute	
Maximum pressure $p_{\text{S max}}$		≤ 30 bar	
Case pressure at port T, K ₁ , K ₂ , R(L)			
Max. static pressure $p_{\text{L max}}$		4 bar absolute ²⁾	Maximum 1.2 bar higher than inlet pressure at port S , but not higher than $p_{\text{L max}}$. See also diagram "Case pressure" on page 7 A drain line to the reservoir is required.
Pressure peaks $p_{\text{L peak}}$		6 bar absolute	t<0.1 s

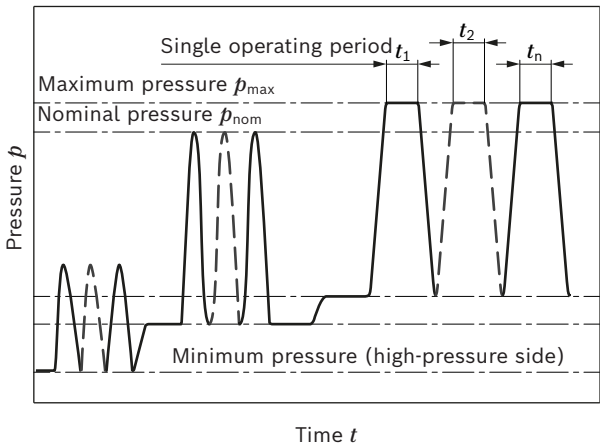
▼ Rate of pressure change $R_{A max}$



Notice

- ▶ Working pressure range applies when using hydraulic fluids based on mineral oils. Please contact us for values for other hydraulic fluids.

▼ Pressure definition



Total operating period = $t_1 + t_2 + \dots + t_n$

- 1) Lower values on request
- 2) For higher housing pressures up to 8 bar a slide ring seal is available, please contact us
- 3) The following control devices are possible for the increased pressure when used with working port 36: HM1, HM2, HM2C, HS5(P), HS5M, HS5E(P), EO1, EO2, EO2M.

Pre compression volume for pulsation reduction (PCV)

The PCV reduces the pressure pulsation applied to the system by the pump. Reducing the flow pulsation can lead to a reduction of pressure pulsation of up to 50% at the operating point and on the system side.

Depending on the mechanical design of the working machine, in our experience machine noise is reduced quite significantly.

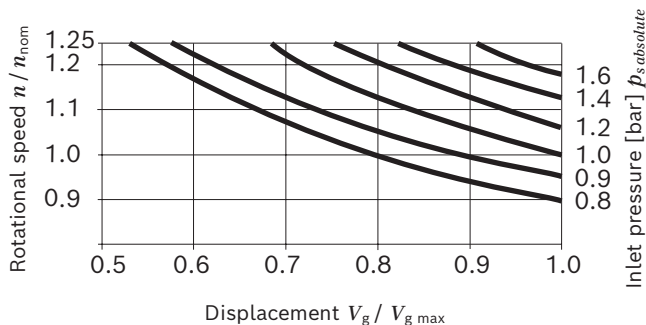
Technical data for sizes 40 to 1000

Standard rotary group version

Size		NG		40	71	125	180	250	260	355	370	500	750	750 ⁵⁾	1000
Geometric displacement, per revolution		$V_{g \max}$	cm ³	40	71	125	180	250	260	355	370	500	750	750	1000
Maximum rotational speed ¹⁾	at $V_{g \max}$ ²⁾	n_{nom}	rpm	2600	2200	1800	1800	1500	1500	1500	1500	1320	1200	1500	1000
	at $V_g < V_{g \max}$ ³⁾	n_{max}	rpm	3200	2700	2200	2100	1800	1800	1700	1700	1600	1500	1500	1200
Flow	at n_{nom} and $V_{g \max}$	q_v	l/min	104	156	225	324	375	390	532	555	660	900	1125	1000
Power	at n_{nom} , $V_{g \max}$ and $\Delta p = 350$ bar	P	kW	61	91	131	189	219	228	311	323	385	525	656	583
	at 1500 rpm	P	kW	35	62	109	158	219	228	311	323	339 ⁶⁾	449 ⁶⁾	656	–
	at 1800 rpm	P	kW	42	74	131	189	–	–	–	–	–	–	–	–
Torque	at $V_{g \max}$ and $\Delta p = 350$ bar ²⁾	M_{max}	Nm	223	395	696	1002	1391	1448	1976	2061	2783	4174	4174	5565
	and $\Delta p = 100$ bar ²⁾	M	Nm	64	113	199	286	398	414	564	589	795	1193	1193	1590
Rotary stiffness of drive shaft	Shaft end P	c	kNm/rad	80	146	260	328	527	527	800	800	1145	1860	1860	2730
	Shaft end Z	c	kNm/rad	77	146	263	332	543	543	770	770	1136	1812	1812	2845
Moment of inertia		J_{TW}	kgm ²	0.0049	0.0121	0.03	0.055	0.0959	0.0959	0.19	0.19	0.3325	0.66	0.66	1.20
Maximum angular acceleration ⁴⁾		α	rad/s ²	17000	11000	8000	6800	4800	4800	3600	3600	2800	2000	2000	1450
Case volume		V	l	2	2.5	5	4	10	10	8	8	14	19	22	27
Weight (without through drive) approx.		m	kg	39	53	88	102	184	184	207	207	320	460	490	605

Observe the notice and "Determination of characteristics" on page 12.

Maximum permissible rotational speed (speed limit) NG40 to 1000 standard



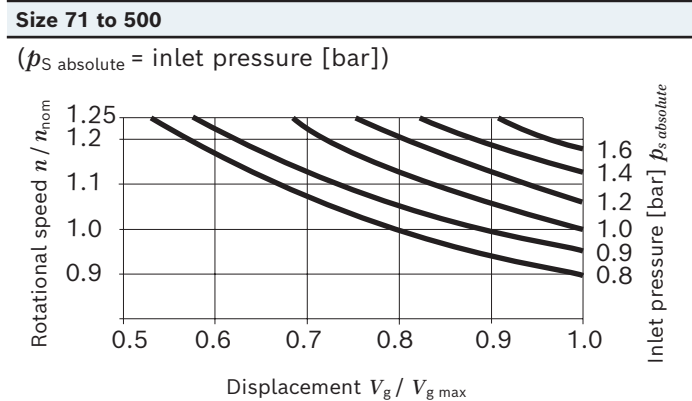
- The values are applicable:
 - for the optimum viscosity range from $\nu_{\text{opt}} = 36$ to $16 \text{ mm}^2/\text{s}$
 - with hydraulic fluid based on mineral oils
- The values apply at absolute pressure $p_{\text{abs}} = 1$ bar at suction port **S**.
- Maximum rotational speed (speed limit) for increased inlet pressure p_{absolute} at suction port **S** and $V_g < V_{g \max}$, see diagram on page 10.
- The data are valid for values between the minimum required and maximum permissible rotational speed. Valid for external excitation (e.g. diesel engine 2 to 8 times rotary frequency; cardan shaft twice the rotary frequency). The limit value is only valid for a single pump. The load capacity of the connection parts must be considered.
- With charge pump (A4VSLO)
- At $V_g < V_{g \max}$

Technical data for sizes 71, 180, 250, 260, 355, 370 and 500

High-speed rotary group version

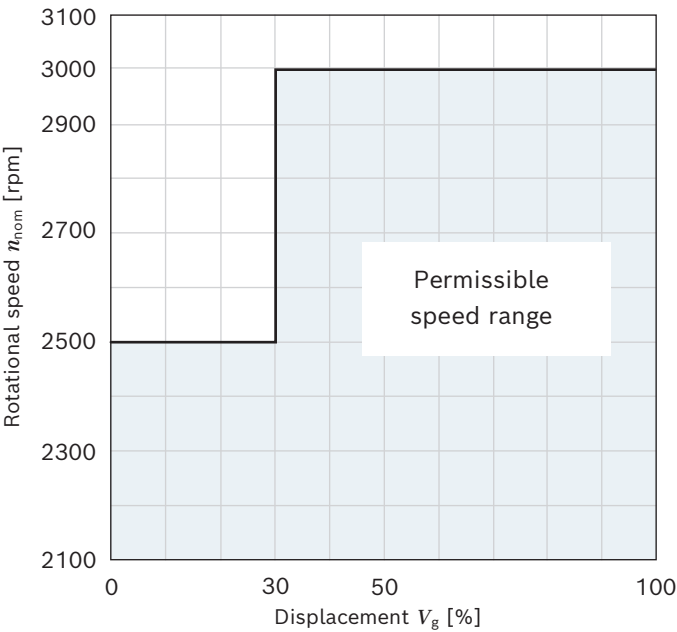
Size			NG	71	180	250	260	355	370	500
Geometric displacement, per revolution			$V_{\text{g max}}$ cm ³	71	180	250	260	355	370	500
Maximum rotational speed ¹⁾	at $V_{\text{g max}}^{2)}$	n_{nom} rpm	3000 ⁵⁾⁶⁾	2200	1900	1860 1900 ⁷⁾	1700	1660 1700 ⁷⁾	1500	
	at $V_{\text{g}} < V_{\text{g max}}$ and $\Delta p = 350$ bar	n_{max} rpm	3000 ⁵⁾⁶⁾	2200	2100 ³⁾	2100 ³⁾	1900 ³⁾	1900 ³⁾	1800 ³⁾	
Flow	at n_{nom} and $V_{\text{g max}}$	q_v l/min	213 ⁵⁾	396	475	484 494 ⁷⁾	603	614 629 ⁷⁾	750	
Power	at n_{nom} , $V_{\text{g max}}$ and $\Delta p = 350$ bar	P kW	124	231	277	282 288 ⁷⁾	352	358 367 ⁷⁾	437	
	at n_{nom} , $V_{\text{g max}}$ and $\Delta p = 380$ bar	P kW	–	–	–	313 ⁷⁾	–	398 ⁷⁾	–	
Torque	at $V_{\text{g max}}$ and $\Delta p = 350$ bar	M_{max} Nm	395	1002	1391 ²⁾	1448 ²⁾	1976 ²⁾	2061 ²⁾	2783 ²⁾	
	at $V_{\text{g max}}$ and $\Delta p = 380$ bar	M_{max} Nm	–	–	–	1572 ²⁾⁷⁾	–	2238 ⁷⁾	–	
	at $V_{\text{g max}}$ and $\Delta p = 100$ bar	M_{max} Nm	113	286	398	414	564	589	795	
Rotary stiffness of drive shaft	Shaft end P	c kNm/rad	146	328	527	527	800	800	1145	
	Shaft end Z	c kNm/rad	146	332	543	543	770	770	1136	
Moment of inertia			J_{TW} kgm ²	0.0121	0.055	0.0959	0.0959	0.19	0.19	0.3325
Maximum angular acceleration ⁴⁾			α rad/s ²	11000	6800	4800	4800	3600	3600	2800
Case volume			V l	2.5	4	10	10	8	8	14
Weight (without through-drive) approx.			m kg	53	102	184	184	207	207	320

Maximum permissible rotational speed (speed limit)



- The values are applicable:
 - for the optimum viscosity range from $\nu_{\text{opt}} = 36$ to $16 \text{ mm}^2/\text{s}$
 - with hydraulic fluid based on mineral oils
- The values apply at absolute pressure $p_{\text{abs}} = 1$ bar at suction port **S**.
- Maximum rotational speed (speed limit) for increased inlet pressure p_{absolute} at suction port **S** and $V_g < V_{g \max}$, see diagrams for sizes 71 to 500.
- The data are valid for values between the minimum required and maximum permissible rotational speed. Valid for external excitation (e.g. diesel engine 2 to 8 times rotary frequency; cardan shaft twice the rotary frequency). The limit value is only valid for a single pump. The load capacity of the connection parts must be considered.
- If $V_g > 30\%$ (depending on the rotational speed see diagram "Maximum permissible rotational speed High Speed NG71" on page 12)
- At suction pressure < 1 bar see diagram Maximum rotational speed (speed limit) size 71, no speed increase possible with increase in the inlet pressure.
- With working port 36.

**Maximum permissible rotational speed for high-speed
NG 71**

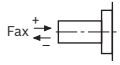


Determination of the characteristics		
Flow	$q_v = \frac{V_g \times n \times \eta_v}{1000}$	[l/min]
Torque	$M = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{hm}}$	[Nm]
Power	$P = \frac{2 \times \pi \times M \times n}{60000} = \frac{q_v \times \Delta p}{600 \times \eta_t}$	[kW]
Key		
V_g	=	Displacement per revolution [cm ³]
Δp	=	Differential pressure [bar]
n	=	Rotational speed [rpm]
η_v	=	Volumetric efficiency
η_{hm}	=	Hydraulic-mechanical efficiency
η_t	=	Total efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Notes

- Theoretical values, without efficiency and tolerances; values rounded
- Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Bosch Rexroth recommends testing the loads by means of experiment or calculation / simulation and comparison with the permissible values.
- Special requirements apply in the case of belt drives. Please contact us.

Permissible radial and axial loading on the drive shafts

Size		NG	40	71	125	180	250	260	355	370	500	750 ¹⁾	1000	
Radial force, maximum	 at X/2	$F_{q \max}$	N	1000	1200	1600	2000	2000	2000	2200	2200	2500	3000	3500
Maximum axial force		$\pm F_{ax \max}$	N	600	800	1000	1400	1800	1800	2000	2000	2000	2200	2200

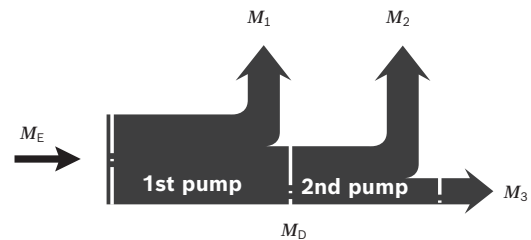
Permissible input and through-drive torques

Size	NG		40	71	125	180	250	260	355	370	500	750	1000	
Torque at $V_{g \max}$ and $\Delta p = 350 \text{ bar}^{2)}$	$M_{\max}$	Nm	223	395	696	1002	1391	1448	1976	2061	2783	4174	5565	
Torque at $V_{g \max}$ and $\Delta p = 380 \text{ bar}^{2)}$	$M_{\max}$	Nm	–	–	–	–	–	1572	–	2238	–	–	–	
Max. input torque on drive shaft ³⁾														
	Splined shaft Z	$M_{E \max}$	Nm	446	790	1392	2004	2782	2963	3952	4214	5566	8348	11130
	Shaft key P	$M_{E \max}$	Nm	380	700	1392	1400	2300	2300	3557	3557	5200	7513	9444
Maximum through-drive torque	$M_{D \max}$	Nm	223	395	696	1002	1391	1391	1976	1976	2783	4174	5565	

Notes

- In case of through drive pumps as well as in case of bi-directional torque loads, the use of a splined shaft is recommended.
- The through-drive torques apply to the through-drive shaft without hub:
Prepared for through drive, with pressure-resistant plugged cover – order code K/U99.
- The permissible output torques of the supplied hub depend on the drive torques of the attachment pumps from the table:
Overview of mounting options on page 74

▼ Distribution of torques



Torque at 1st pump	M_1
Torque at 2nd pump	M_2
Torque at 3rd pump	M_3
Input torque	$M_E = M_1 + M_2 + M_3$
	$M_E < M_{E \max}$
Through-drive torque	$M_D = M_2 + M_3$
	$M_D < M_{D \max}$

¹⁾ Values also apply for the version with charge pump (A4VSLO)

²⁾ Efficiency not considered

³⁾ For drive shafts with no radial force

Characteristic curves

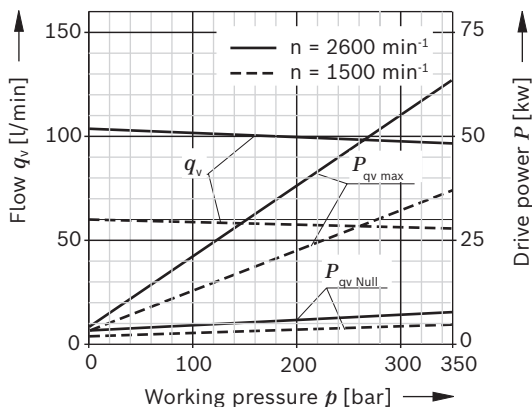
Drive power and flow

(Operating fluid: hydraulic fluid ISO VG 46 DIN 51519,
 $t = 50\text{ }^{\circ}\text{C}$)

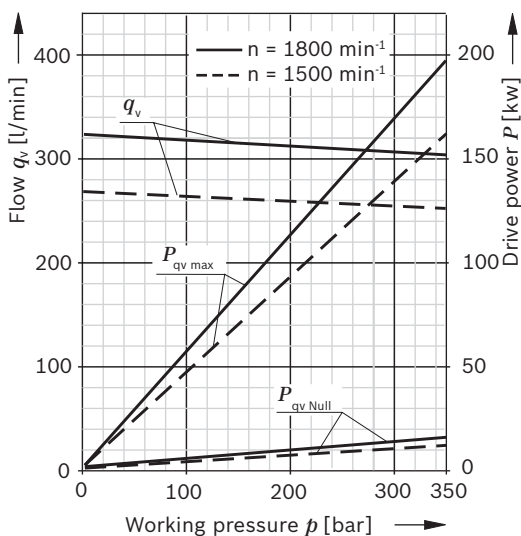
Total efficiency
$$\eta_t = \frac{q_v \times p}{P_{qv \max} \times 600}$$

Volumetric efficiency
$$\eta_v = \frac{q_v}{q_{v \text{ theor}}}$$

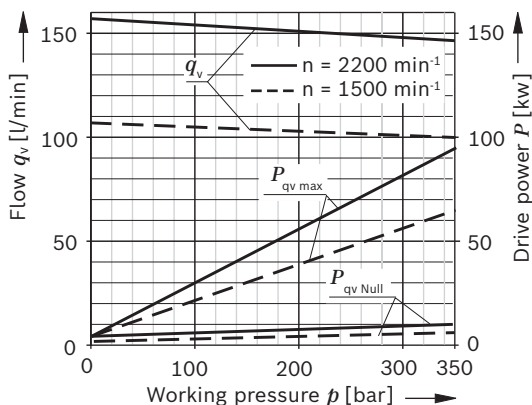
▼ Size 40



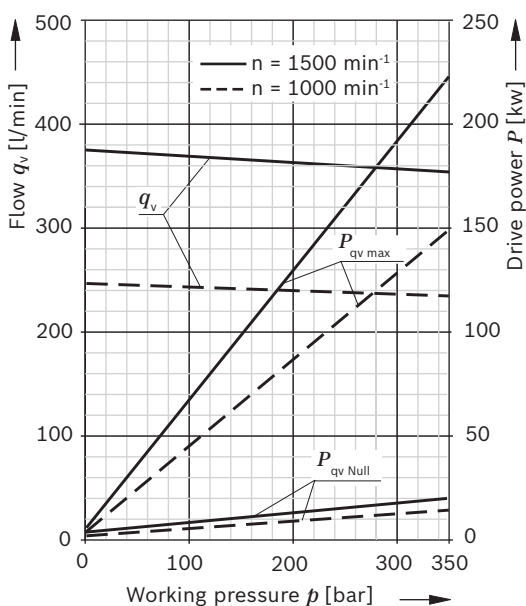
▼ Size 180



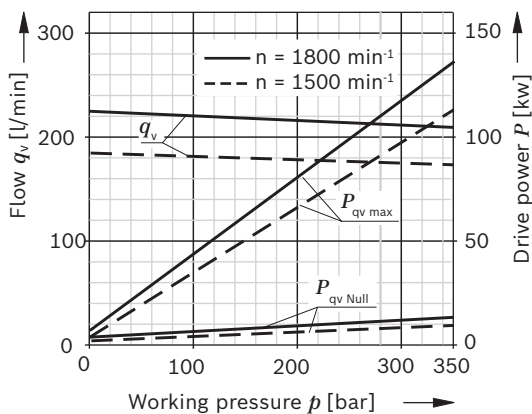
▼ Size 71



▼ Size 250



▼ Size 125



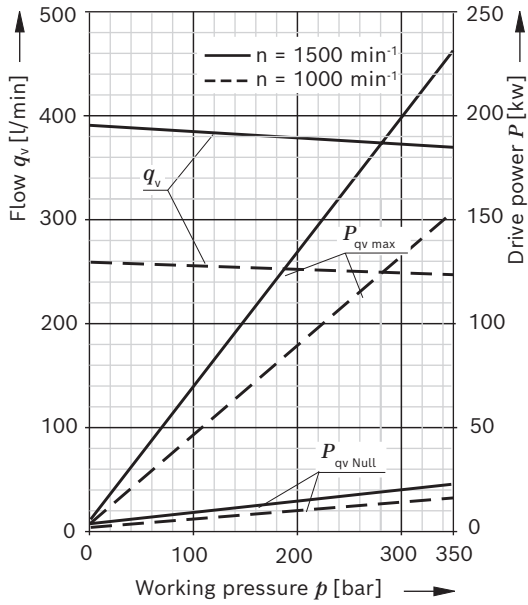
Drive power and flow

(Operating fluid: hydraulic fluid ISO VG 46 DIN 51519,
 $t = 50\text{ °C}$)

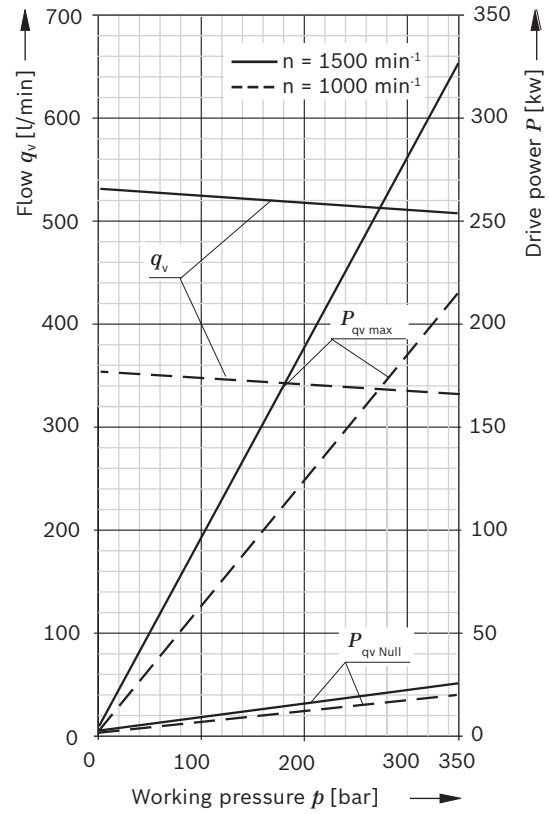
Total efficiency
$$\eta_t = \frac{q_v \times p}{P_{qv \max} \times 600}$$

Volumetric efficiency
$$\eta_v = \frac{q_v}{q_{v \text{ theor}}}$$

▼ Size 260



▼ Size 355



Drive power and flow

(Operating fluid: hydraulic fluid ISO VG 46 DIN 51519,
 $t = 50\text{ °C}$)

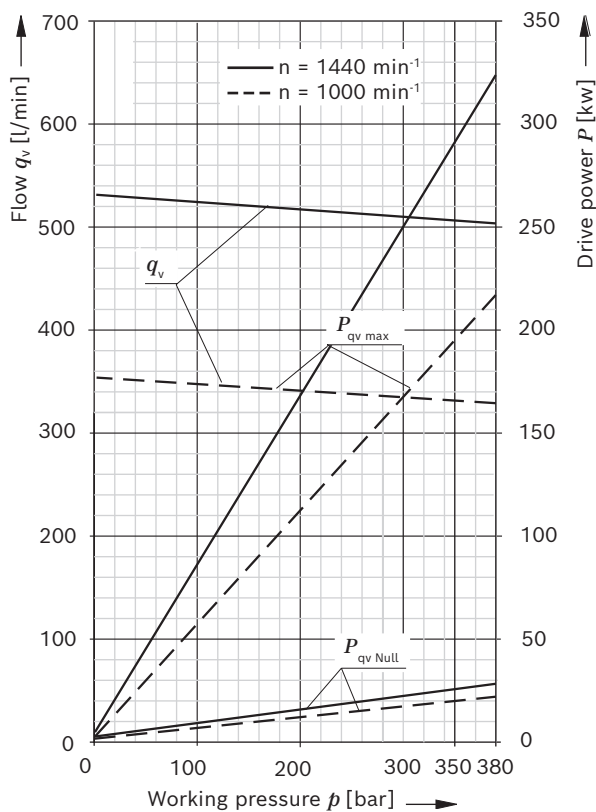
Total efficiency

$$\eta_t = \frac{q_v \times p}{P_{qv \max} \times 600}$$

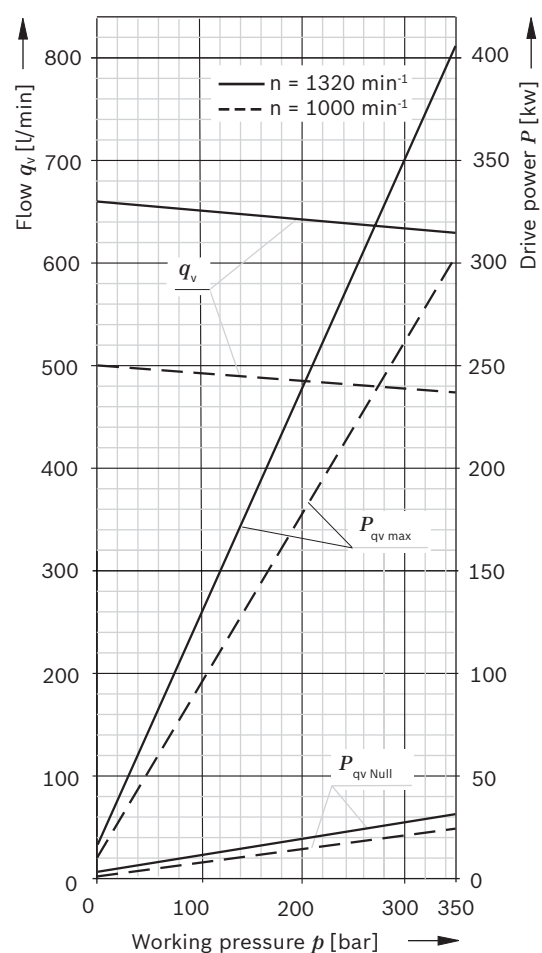
Volumetric efficiency

$$\eta_v = \frac{q_v}{q_{v \text{ theor}}}$$

▼ Size 370



▼ Size 500



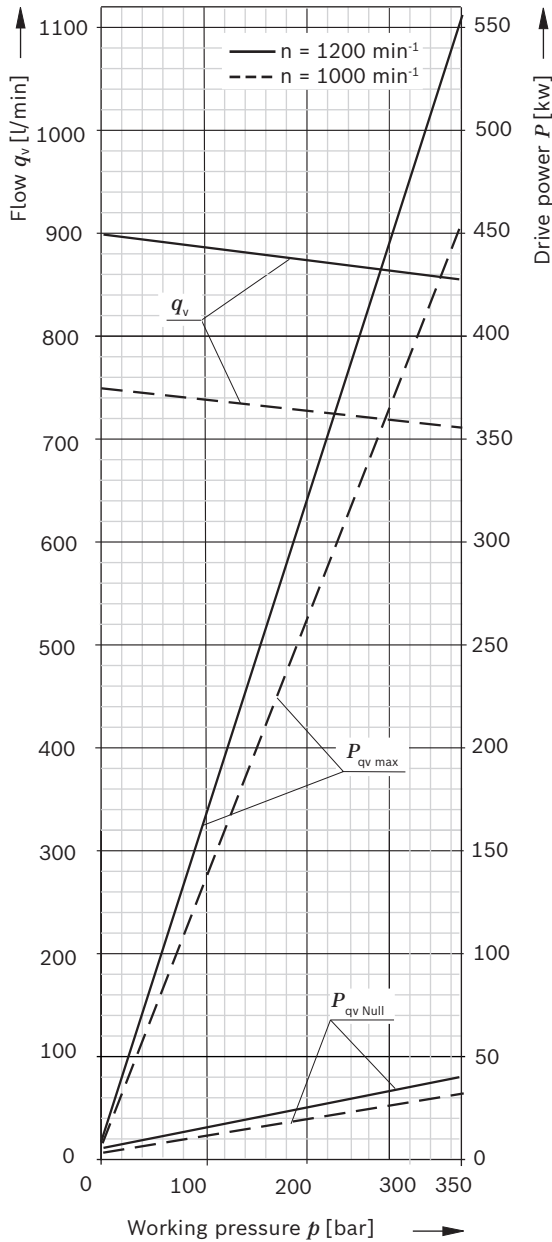
Drive power and flow

(Operating fluid: hydraulic fluid ISO VG 46 DIN 51519,
 $t = 50\text{ °C}$)

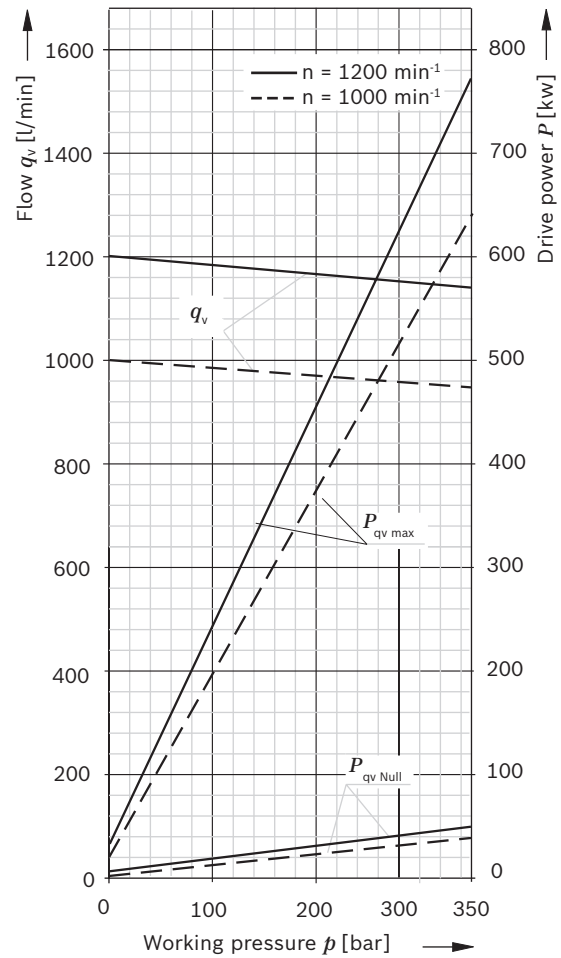
Total efficiency $n_t = \frac{q_v \times p}{P_{qv \max} \times 600}$

Volumetric efficiency $n_v = \frac{q_v}{q_{v \text{ theor}}}$

▼ Size 750



▼ Size 1000



Overview of control devices

Pressure controller DR

(for further information, see data sheet 92060)

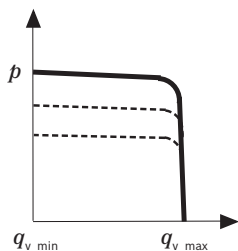
The pressure controller limits the maximum pressure at the pump outlet within the control range of the variable pump. The variable pump only supplies as much hydraulic fluid as is required by the consumers. If the working pressure exceeds the pressure command value at the pressure valve, the pump will regulate to a smaller displacement to reduce the control differential.

- Basic position in depressurized state: $V_{g \max}$.
- Setting range for pressure control: 50 to 350 bar. Standard is 350 bar.

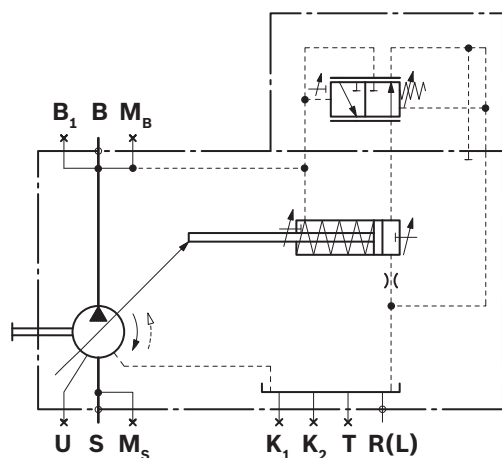
Optional:

- Remote controlled pressure regulator (DRG)

▼ Characteristic curve



▼ Circuit diagram



Pressure controller for parallel operation DP

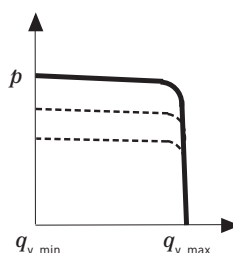
(for further information, see data sheet 92060)

Suitable for pressure control of multiple axial piston units A4VSO in parallel operation.

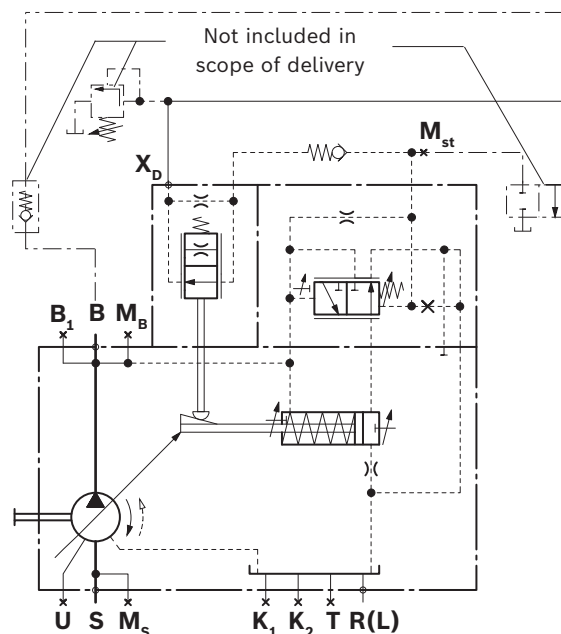
Optional:

- with flow control (DPF)

▼ Characteristic curve



▼ Circuit diagram



Flow controller FR

(for further information, see data sheet 92060)

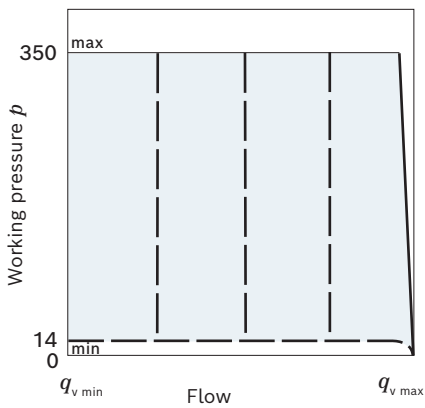
The flow controller adjusts the displacement of the pump to the volume required by the consumer. The flow of the pump is then dependent on the cross section of the external metering orifice (item **4**), which is located between the pump and the consumer. The flow is nearly independent of the load pressure within the control range of the pump.

Initial position in depressurized state: $V_{g \max}$

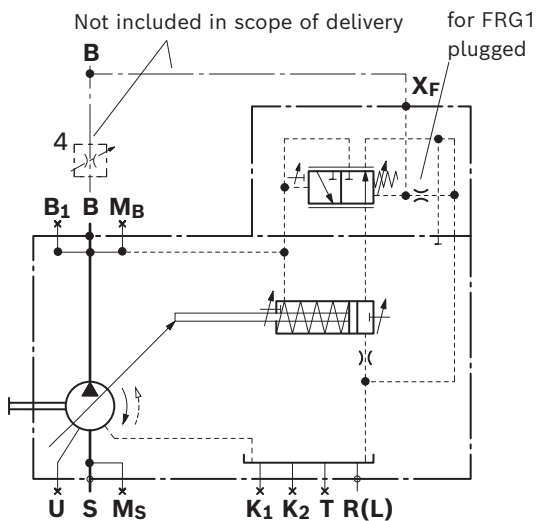
Mechanical minimum and maximum swivel angle limitation

- The $V_{g \min}$ stop is set so that a pressure of 15 to 20 bar is set when port **B** is plugged.
- The $V_{g \max}$ stop is set to nominal $V_{g \max}$. When ordering, please state other setting values in plain text (possible setting ranges $V_{g \max}$ to 50% $V_{g \max}$).

▼ Characteristic curve



▼ Circuit diagram, sample sizes 40 and 71

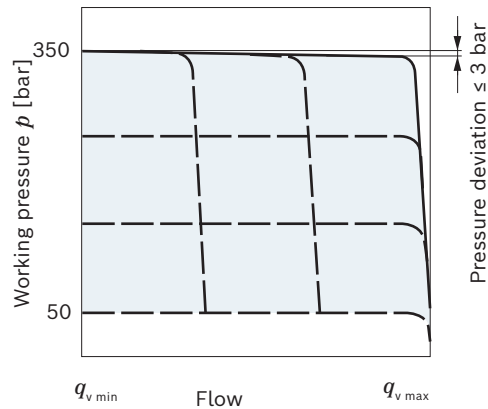


Pressure and flow controller DFR

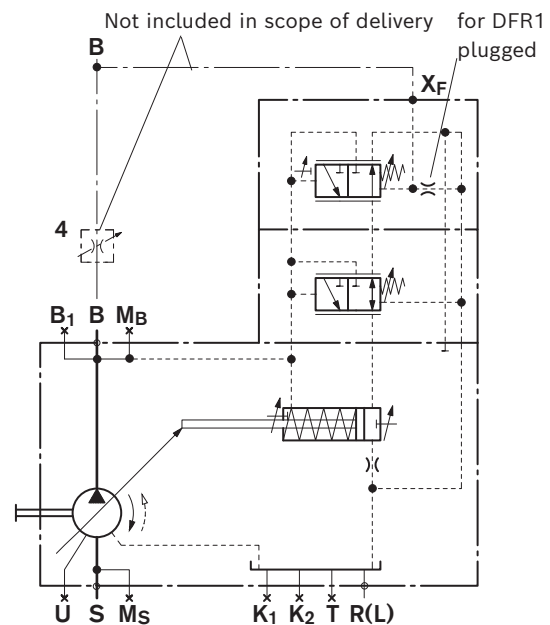
(for further information, see data sheet 92060)

The pressure and flow controller is a combination of the DR pressure controller and FR flow controller.

▼ Characteristic curve



Circuit diagram, sample sizes 40 and 71



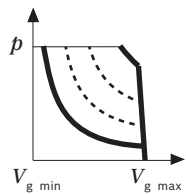
Power controller LR2 with hyperbolic characteristic curve
(for further information, see data sheet 92064)

The hyperbolic power controller keeps the specified drive power constant at the same drive speed.

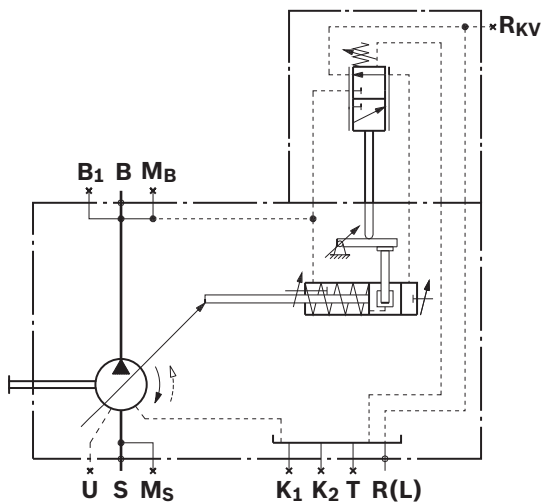
Optional:

- ▶ Pressure control (LR2D), remotely controllable (LR2G);
- ▶ Flow control (LR2F, LR2S)
- ▶ Hydraulic stroke limiter (LR2H);
- ▶ Mechanical stroke limiter (LR2M);
- ▶ Hydraulic two-point control (LR2Z¹⁾);
- ▶ With electric unloading valve as starting aid (LR2Y).

▼ **Characteristic curve**



▼ **Circuit diagram**



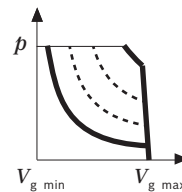
Power controller LR3 with remotely controllable power characteristic
(for further information, see data sheet 92064)

This hyperbolic power controller keeps the specified drive power constant, whereby the power characteristic is adjustable remotely.

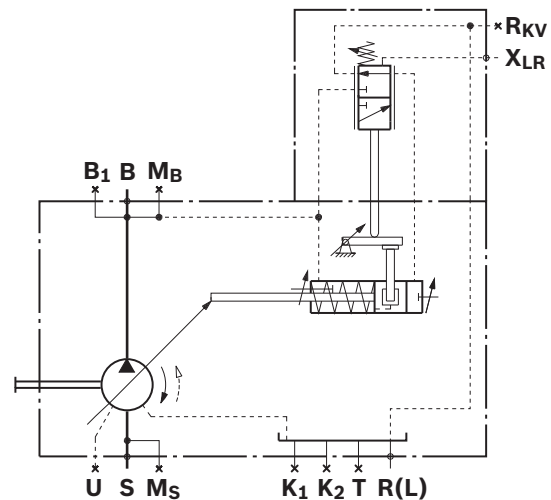
Optional:

- ▶ Pressure control (LR3D), remotely controllable (LR3G);
- ▶ Flow control (LR3F, LR3S)
- ▶ Hydraulic stroke limiter (LR3H);
- ▶ Mechanical stroke limiter (LR3M);
- ▶ Hydraulic two-point control (LR3Z¹⁾);
- ▶ With electric unloading valve as starting aid (LR3Y).

▼ **Characteristic curve**



▼ **Circuit diagram**



1) Minimum working pressure in combination with working port 36:
- NG 260 from 25 bar
- NG 370 from 30 bar

Hydraulic control LR2N and LR3N pilot-pressure related, basic setting $V_{g \min}$
(for further information, see data sheet 92064)

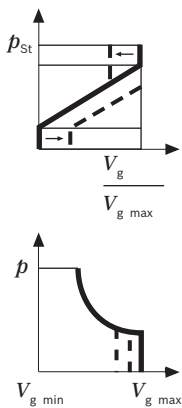
The displacement is adjusted proportionally to the pilot pressure in P_{St} .

The additional hyperbola power controller is superimposed on the pilot pressure signal and keeps the specified drive power constant.

Optional:

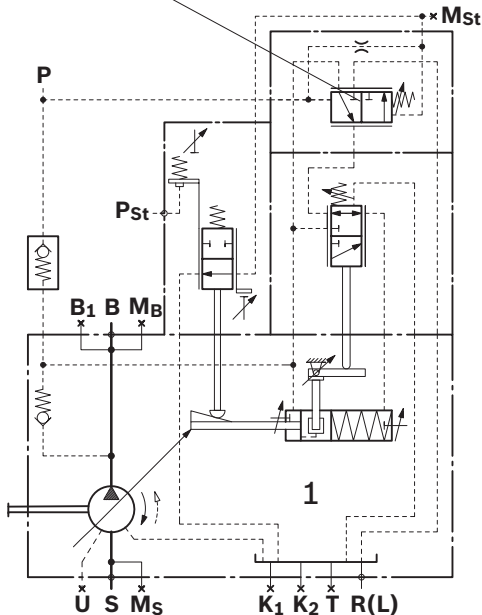
- ▶ Power characteristics, remotely controllable (LR3N)
- ▶ Pressure control (LR.DN),
- ▶ Remote pressure control (LR.GN)
- ▶ Electrical control of pilot pressure (LR, NT)

▼ **Characteristic curve**



▼ **Circuit diagram**

Shown in switched position, i.e. **P** pressurized



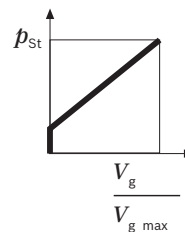
Hydraulic control HD, pilot-pressure related
(for further information, see data sheet 92080)

Stepless setting of the pump displacement according to the pilot pressure. The control is proportional to the specified pilot pressure (difference between pilot pressure and case pressure).

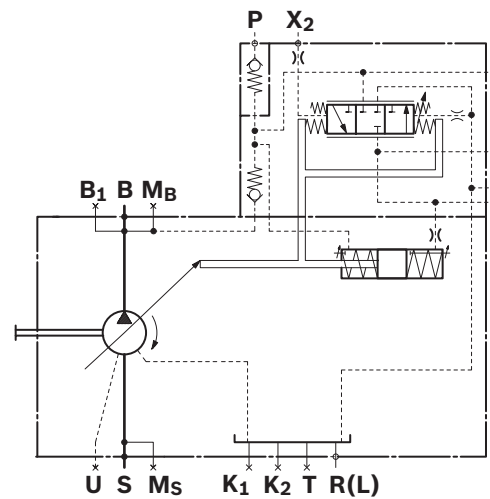
Optional:

- ▶ Control characteristics (HD1, HD3)
- ▶ Pressure control (HD.B),
- ▶ Remote pressure control (HD.GB)
- ▶ Power control (HD1P)
- ▶ Electrical control of pilot pressure (HD1T)

▼ **Characteristic curve**



▼ **Circuit diagram**



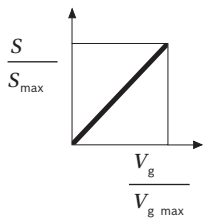
Electric motor control EM

(for further information, see data sheet 92072)

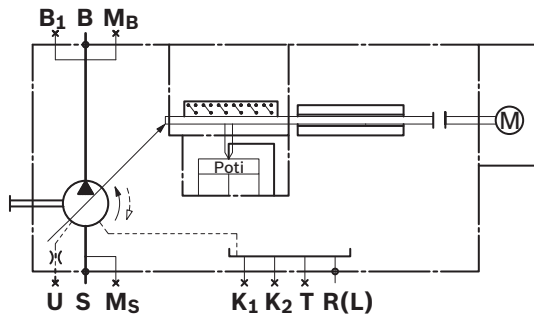
Stepless adjustment of displacement volume by means of the electric motor control EM.

Various intermediate displacement values can be selected with a programmed sequence control by means of built on limit switches and an optional potentiometer for feedback of the swivel angle.

▼ Characteristic curve



▼ Circuit diagram

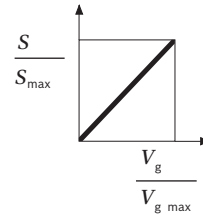


Manual control MA

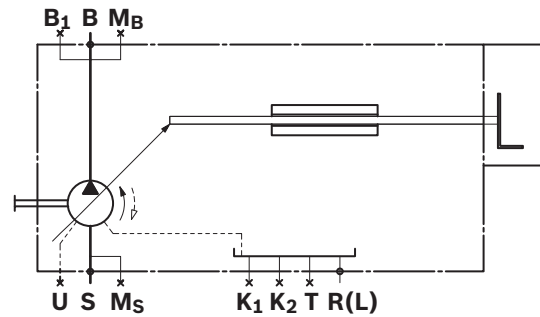
(for further information, see data sheet 92072)

Continuous control of displacement volume by means of a handwheel.

▼ Characteristic curve



▼ Circuit diagram

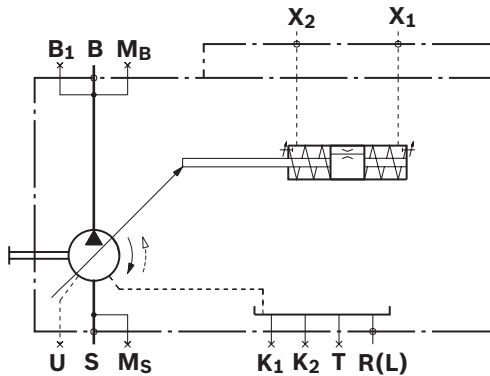


Hydraulic control HM 1/2, volume-dependent (for further information, see data sheet 92076)¹⁾

The pump displacement is continuously adjustable depending on the control fluid quantity in ports **X1** and **X2**.
Application:

- 2-point control
- Base device for servo or proportional controls

▼ Circuit diagram



Digital electro-hydraulic pump control system HS5. (for detailed information see data sheet 92076)

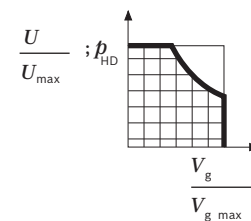
The continuous displacement control is accomplished by means of a proportional valve and electrical feedback of the swivel angle.

The HS5P control system is equipped with a mounted pressure transducer, which means that it can be used for electric pressure and power control.

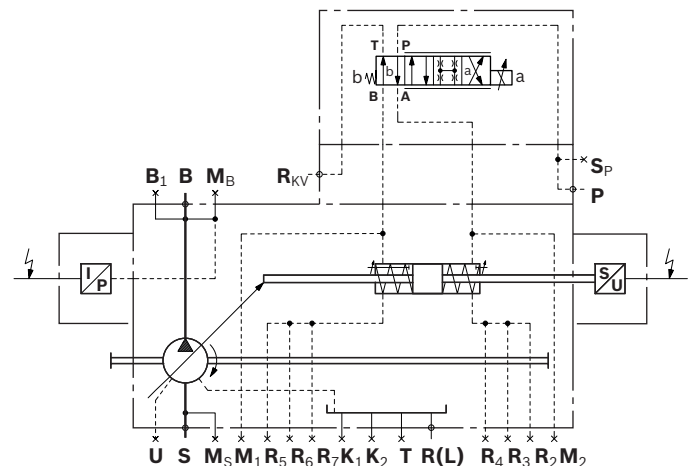
Optional:

- Proportional valve (HS5);
- Short circuit valve (HSK, HS5K, HS5KP);
- For the under oil application (HS5M);
- With internal control pressure supply (HS5(E)V¹⁾);
- Control system with integrated digital **On Board Electronics** OBE (HS5E).

▼ Characteristic curve



▼ Circuit diagram NG 125 and 180 HS5P



¹⁾ HM1 in combination with working port 36 requires a minimum working pressure of 50 bar.

¹⁾ For NG 370 in combination with working port 36, a minimum working pressure of 40 bar is required.

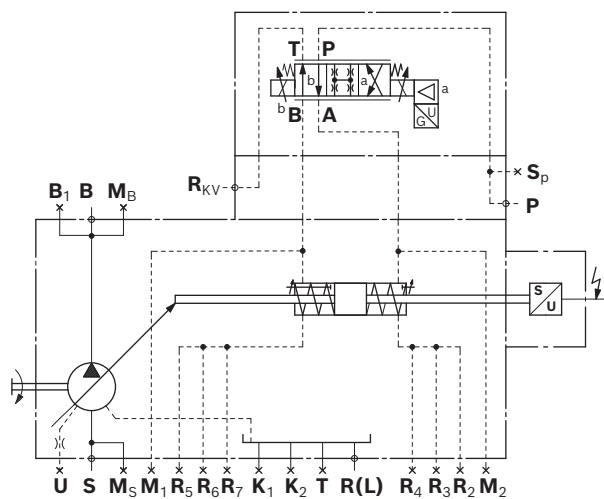
Customer solution with proportional valve, position transducer HM2C

(for further information, see data sheet 92076)

The HM2C customer solution provides the base unit, sensors and actuators required for a control system. This means that a pump control system can be built up by the end users themselves for electronic volume, pressure and power control.

The HM2C can be integrated freely in the control architecture of the plant operator machine with defined standard interfaces.

▼ Circuit diagram



Analog electro-hydraulic pump control system EO.

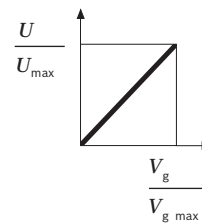
(for further information, see data sheet 92076)

The continuous control of the displacement flow is accomplished by means of a proportional valve and electrical feedback of the swivel angle. Thus, the control can be used as an electric displacement control.

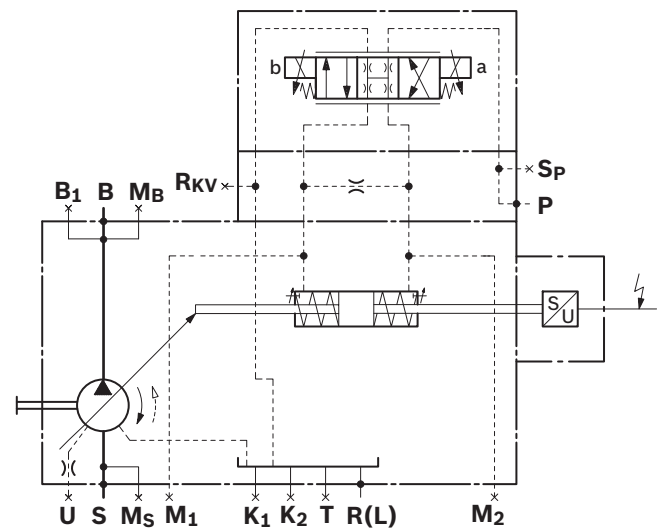
Optional:

- Control pressure range (EO1, EO2)
- Short circuit valve (EO1K, EO2K)
- Without valves (EO1E, EO2E)

▼ Characteristic curve



▼ Circuit diagram

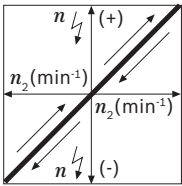


Secondary controlled rotational speed control DS (for further information, see data sheet 92059)

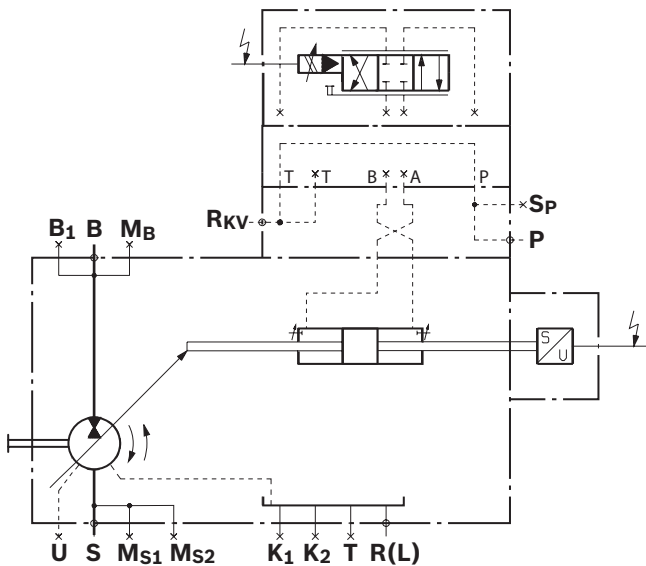
The rotational speed control DS3 controls the secondary unit in such a manner, that this motor delivers sufficient torque to maintain the required rotational speed.

- This torque is
 - in the network with constant pressure
 - proportional to the displacement volume and therefore proportional to the swivel angle.

▼ Characteristic curve



▼ Circuit diagram

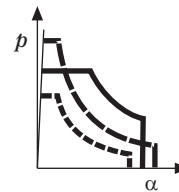


Electrohydraulic control system DFE1¹⁾ (for further information, see data sheet 92088)

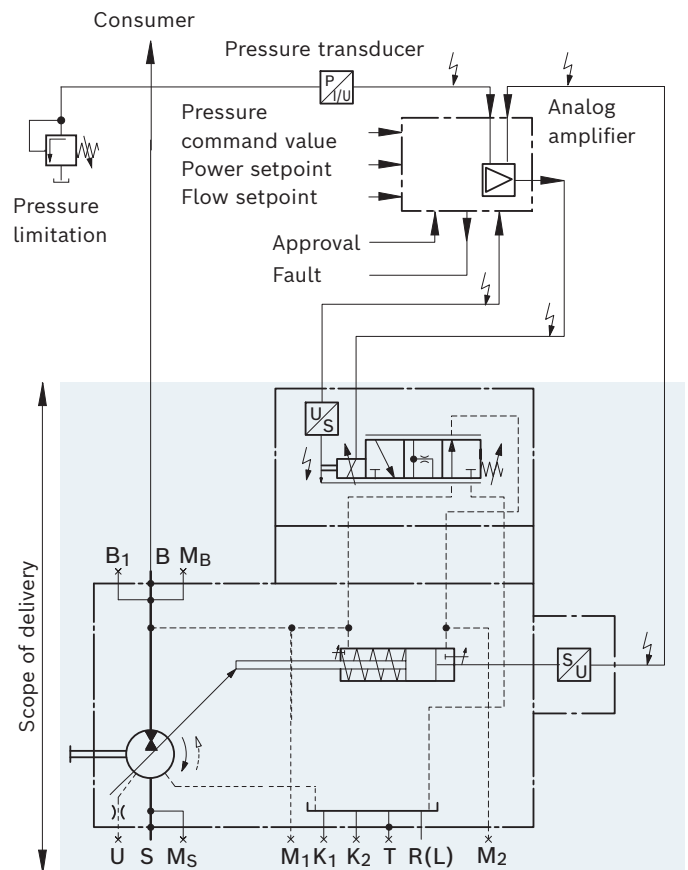
An electrically actuated proportional valve controls the power, pressure and swivel angle of the A4VSO...DFE1 variable pump. The current at the proportional valve determines the position of the swashplate angle and thus the flow of the pump via the stroking piston and the position transducer.

With the electric motor switched off and actuator system depressurized, the pump swivels to maximum displacement ($V_{g \max}$) through spring force.

▼ Characteristic curve



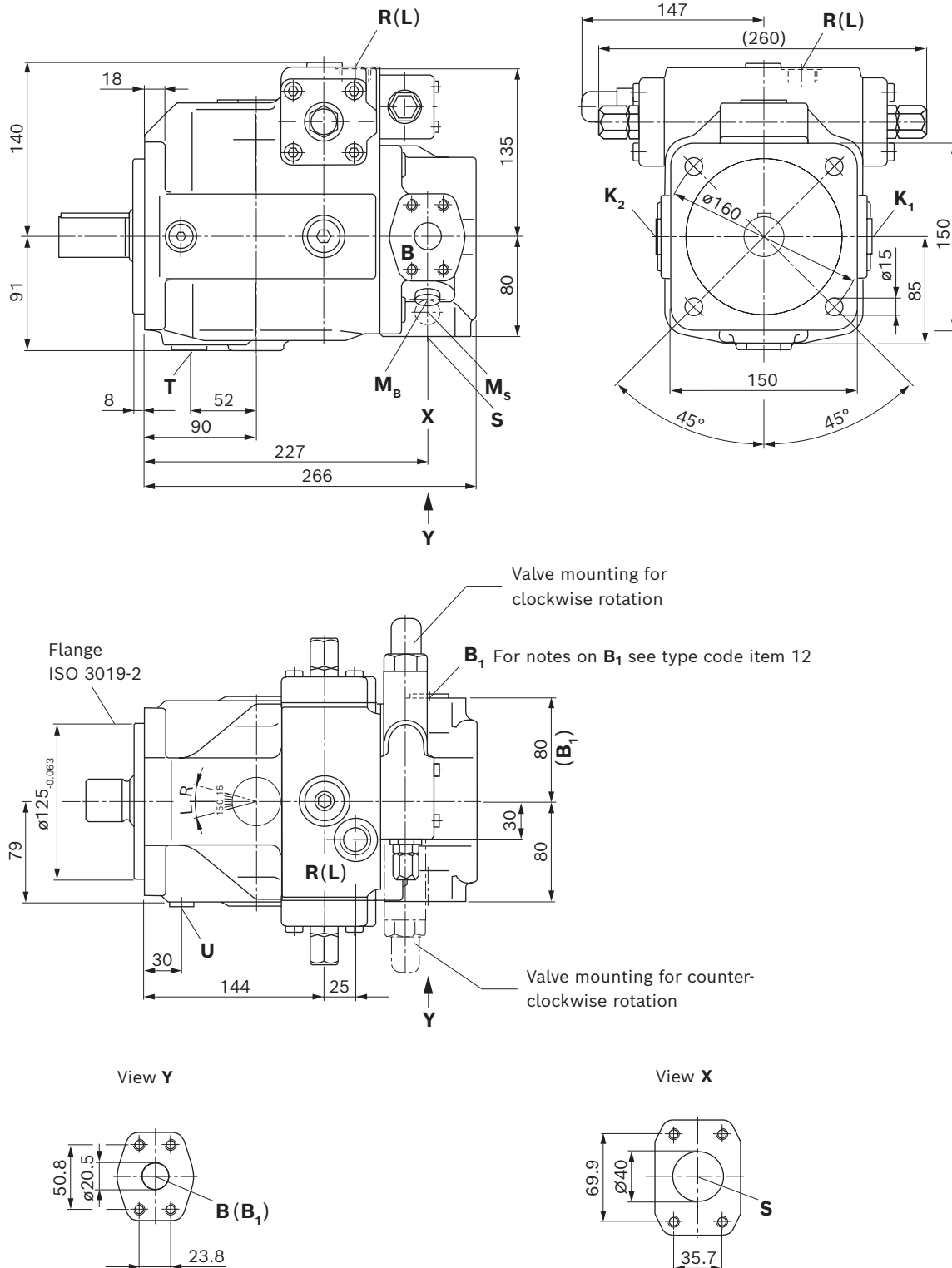
▼ Circuit diagram



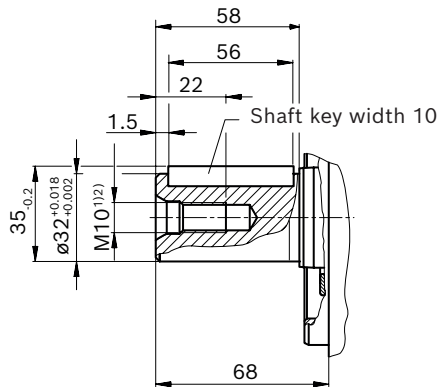
1) For NG 370 in combination with working port 36, a minimum working pressure of 40 bar is required.

Dimensions, size 40

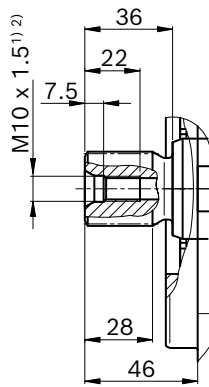
Main dimensions only for the basic unit, further dimensions for the controls are given in the relevant data sheets.



▼ Parallel keyed shaft DIN 6885

P – AS10 × 8 × 56

▼ Splined shaft DIN 5480

Z – W32 × 2 × 14 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M12 × 1.75; 20 deep	30	O
For port plate version 13					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	3/4 in M10 × 1.5; 17 deep	400	O
B₁	2nd working port	DIN 3852	M22 × 1.5; 14 deep	400	X
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	3/4 in M10 × 1.5; 17 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	3/4 in M10 × 1.5; 17 deep	400	X ⁸⁾
K₁, K₂	Drain port	ISO 6149	M22 × 1.5; 14 deep	6 absolute	X ⁶⁾
T	Flushing port	ISO 6149 ⁵⁾	M22 × 1.5; 14 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852	M14 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852	M14 × 1.5; 12 deep	30	X
R(L)	Drain port	ISO 6149 ⁵⁾	M22 × 1.5; 14 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852	M14 × 1.5; 12 deep	6 absolute	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

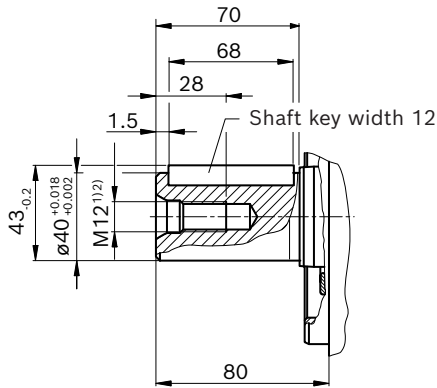
6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 77 and 79)

7) O = Must be connected (plugged on delivery)

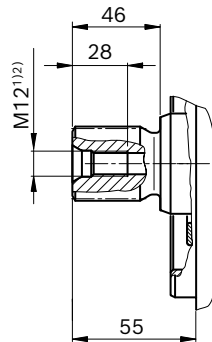
X = Plugged (in normal operation)

8) Plugged with flange plate

▼ Parallel keyed shaft DIN 6885

P – AS12 × 8 × 68

▼ Splined shaft DIN 5480

Z – W40 × 2 × 18 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M12 × 1.75; 20 deep	30	O
For port plate version 13					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 in M12 × 1.75; 20 deep	400	O
B₁	2nd working port	DIN 3852	M27 × 2; 16 deep	400	X
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 in M12 × 1.75; 20 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 in M12 × 1.75; 20 deep	400	X ⁸⁾
K₁, K₂	Drain port	ISO 6149 ⁵⁾	M27 × 2; 16 deep	6 absolute	X ⁶⁾
T	Flushing port	ISO 6149 ⁵⁾	M27 × 2; 16 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	30	X
R(L)	Drain port	ISO 6149 ⁵⁾	M27 × 2; 16 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	6 absolute	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 77 and 79)

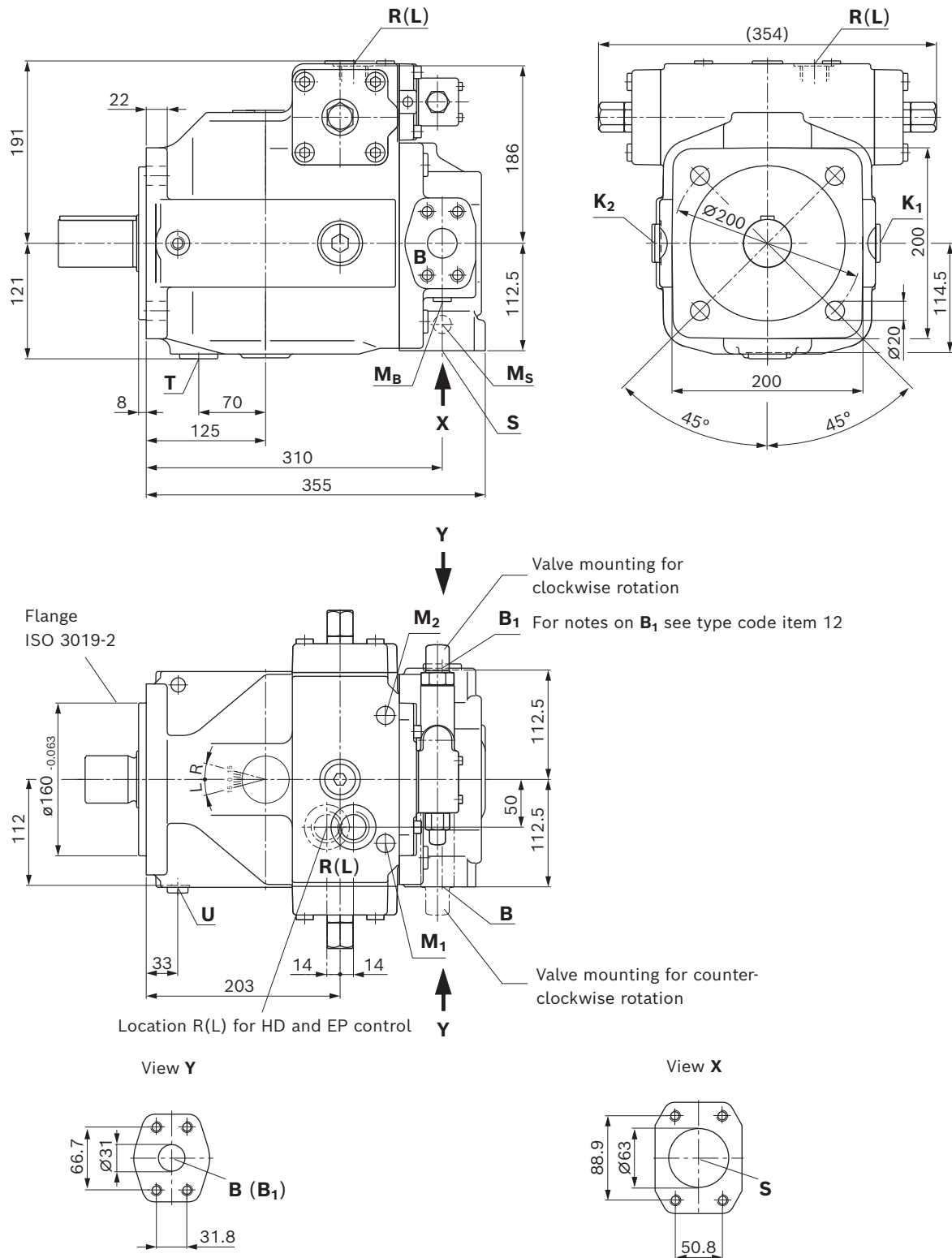
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

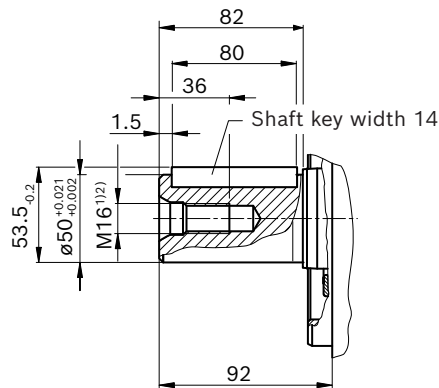
8) Plugged with flange plate

Dimensions, size 125

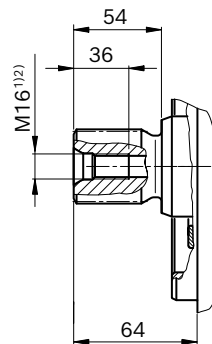
Main dimensions only for the basic unit, further dimensions for the controls are given in the relevant data sheets.



▼ Parallel keyed shaft DIN 6885

P – AS14 × 9 × 80

▼ Splined shaft DIN 5480

Z – W50 × 2 × 24 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 1/2 in M12 × 1.75; 18 deep	30	O
For port plate version 13					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
B₁	2nd working port	DIN 3852	M33 × 2; 18 deep	400	X
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 19 deep	400	X ⁸⁾
K₁, K₂	Drain port	ISO 6149 ⁵⁾	M33 × 2; 18 deep	6 absolute	X ⁶⁾
T	Flushing port	ISO 6149 ⁵⁾	M33 × 2; 18 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	30	X
R(L)	Drain port	ISO 6149 ⁵⁾	M33 × 2; 18 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	6 absolute	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

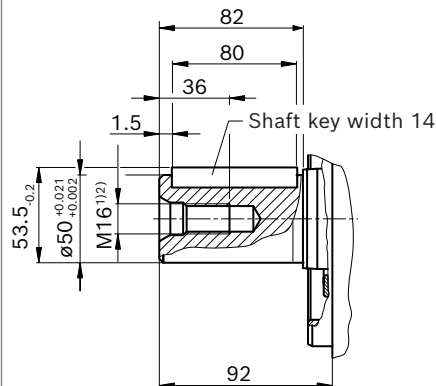
6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 77 and 79)

7) O = Must be connected (plugged on delivery)

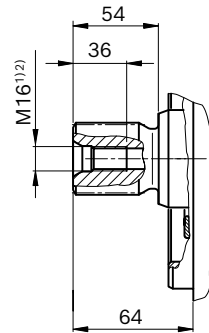
X = Plugged (in normal operation)

8) Plugged with flange plate

▼ Parallel keyed shaft, DIN 6885

P – AS14 × 9 × 80

▼ Splined shaft DIN 5480

Z – W50 × 2 × 24 × 9

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	3 in M16 × 2; 24 deep	30	O
For port plate version 13					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
B₁	2nd working port	DIN 3852	M33 × 2; 18 deep	400	X
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 19 deep	400	X ⁸⁾
K₁, K₂	Drain port	ISO 6149 ⁵⁾	M33 × 2; 18 deep	6 absolute	X ⁶⁾
T	Flushing port	ISO 6149 ⁵⁾	M33 × 2; 18 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	30	X
R(L)	Drain port	ISO 6149 ⁵⁾	M33 × 2; 18 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	6 absolute	X
M₁, M₂	Measuring port stroking pressure	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	400	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

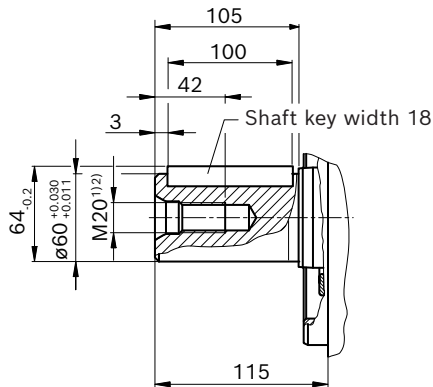
6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 77 and 79)

7) O = Must be connected (plugged on delivery)

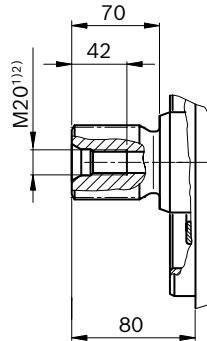
X = Plugged (in normal operation)

8) Plugged with flange plate

▼ Parallel keyed shaft, DIN 6885

P – AS18 × 11 × 100

▼ Splined shaft DIN 5480

Z – W60 × 2 × 28 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	3 in M16 × 2; 24 deep	30	O
For port plate version 13					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	400	O
B₁	2nd working port	DIN 3852	M42 × 2; 20 deep	400	X
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	400	X ⁸⁾
For port plate version 36					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	420	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	420	X ⁸⁾
K₁, K₂	Drain port	ISO 6149 ⁵⁾	M42 × 2; 20 deep	6 absolute	X ⁶⁾
T	Flushing port	ISO 6149 ⁵⁾	M42 × 2; 20 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	400	X
M_{B1}	only available for through-drives Measuring port working pressure B₁	ISO 228-1 ⁵⁾	G 1/4; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	30	X
R(L)	Drain port	ISO 6149 ⁵⁾	M42 × 2; 20 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	6 absolute	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	400	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 77 and 79)

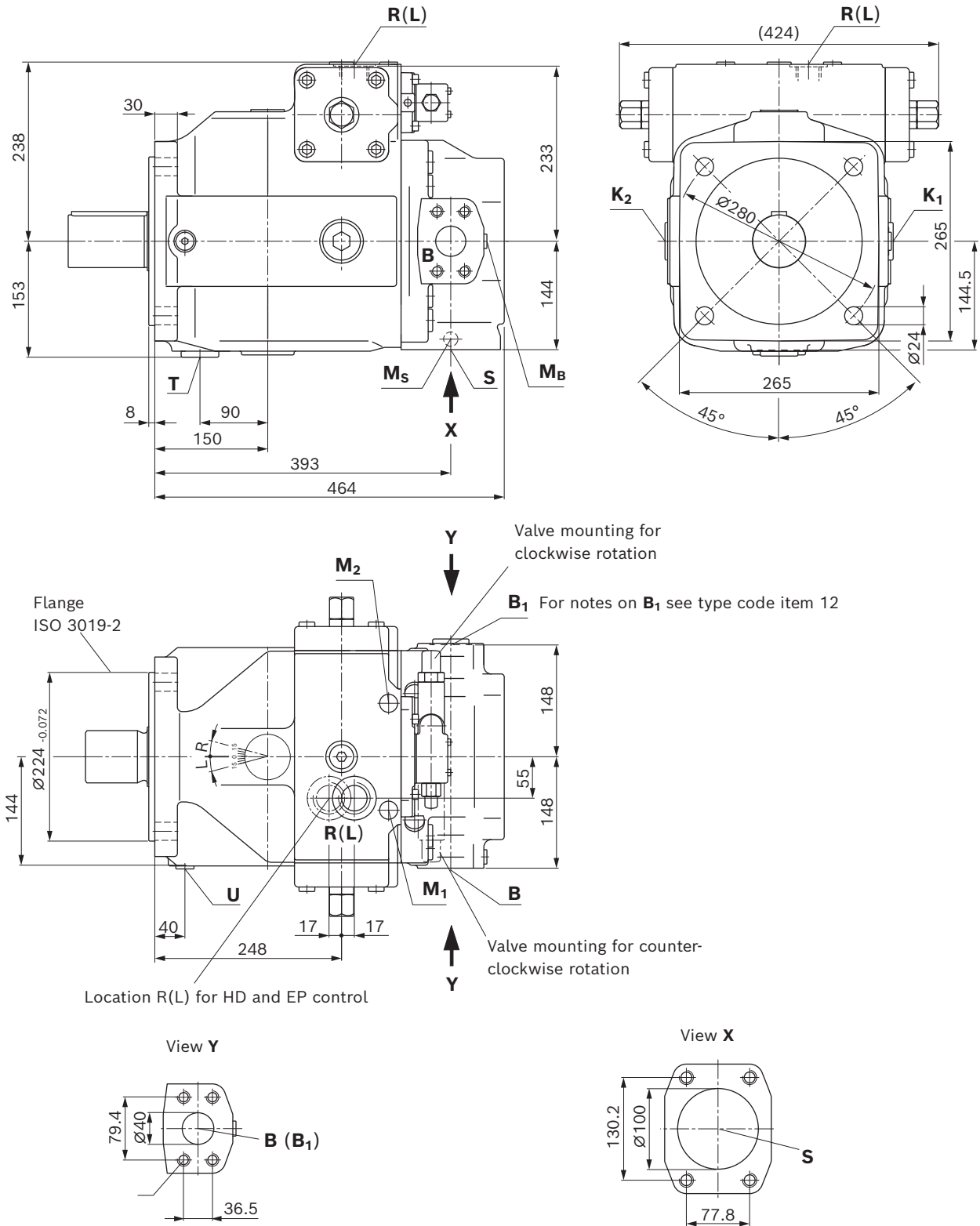
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

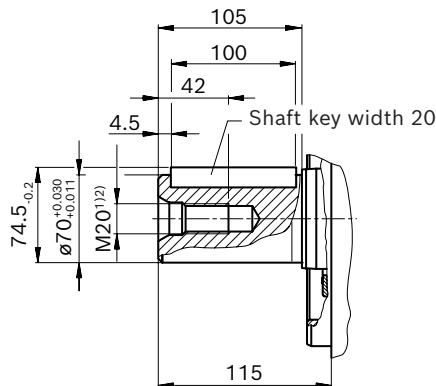
8) Plugged with flange plate

Dimensions size 355 and size 370

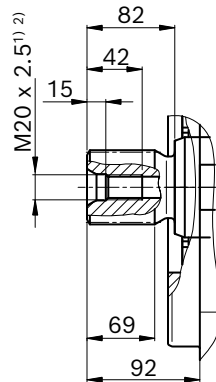
Main dimensions only for the basic unit, further dimensions for the controls are given in the relevant data sheets.



▼ Parallel keyed shaft DIN 6885

P – AS20 × 12 × 100

▼ Splined shaft DIN 5480

Z – W70 × 3 × 22 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	4 in M16 × 2; 24 deep	30	O
For port plate version 13					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	400	O
B₁	2nd working port	DIN 3852	M42 × 2; 20 deep	400	X
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	400	X ⁸⁾
For port plate version 36					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	420	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 25 deep	420	X ⁸⁾
K₁, K₂	Drain port	DIN 3852 ⁵⁾	M42 × 2; 20 deep	6 absolute	X ⁶⁾
T	Flushing port	DIN 3852 ⁵⁾	M42 × 2; 20 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	400	X
M_{B1}	only available for through-drives Measuring port working pressure B₁	ISO 228-1 ⁵⁾⁵⁾	G 1/4; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852 ⁵⁾	M14 × 1.5; 12 deep	30	X
R(L)	Drain port	DIN 3852 ⁵⁾	M42 × 2; 20 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	6 absolute	X
M₁, M₂	Measuring port stroking pressure	DIN 3852	M18 × 1.5; 12 deep	400	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

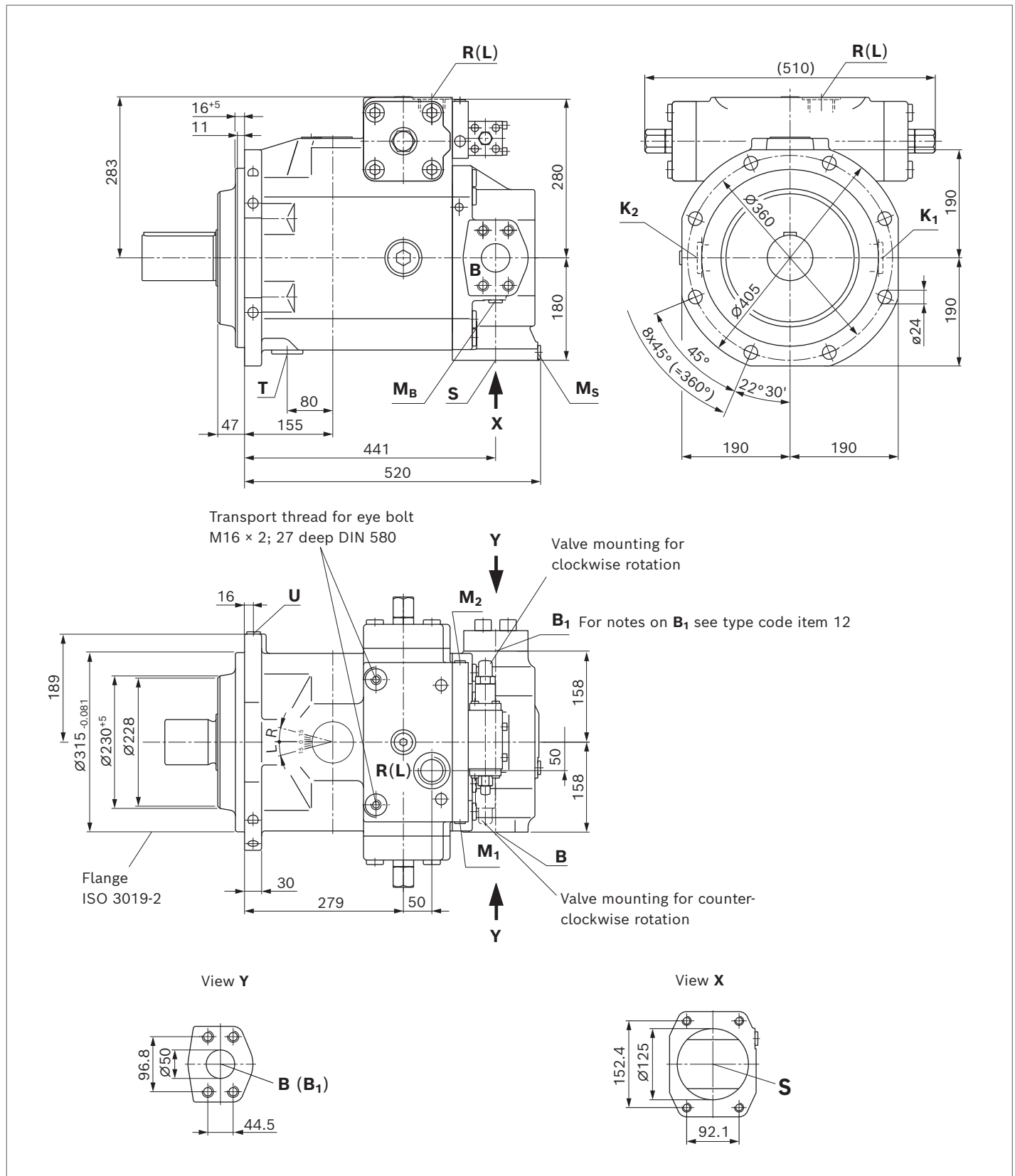
5) The countersink may be deeper than specified in the standard.

6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 77 and 79)

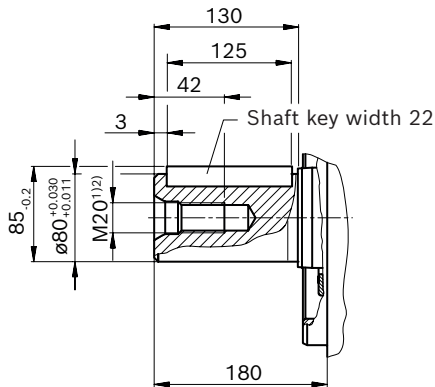
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

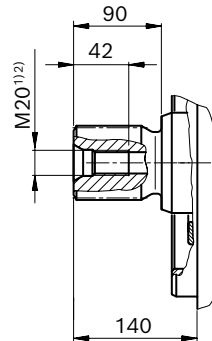
8) Plugged with flange plate



▼ Parallel keyed shaft DIN 6885

P – AS22 × 14 × 125

▼ Splined shaft DIN 5480

Z – W80 × 3 × 25 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	5 in M16 × 2; 24 deep	30	O
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 25 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 24 deep	400	X ⁸⁾
K₁, K₂	Drain port	DIN 3852	M48 × 2; 22 deep	6 absolute	X ⁶⁾
T	Flushing port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852	M18 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852	M18 × 1.5; 12 deep	30	X
R(L)	Drain port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852	M18 × 1.5; 12 deep	6 absolute	X
M₁, M₂	Measuring port stroking pressure	DIN 3852	See data sheet of the respective control devices	400	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be
connected (see also installation instructions on pages 77 and 79)

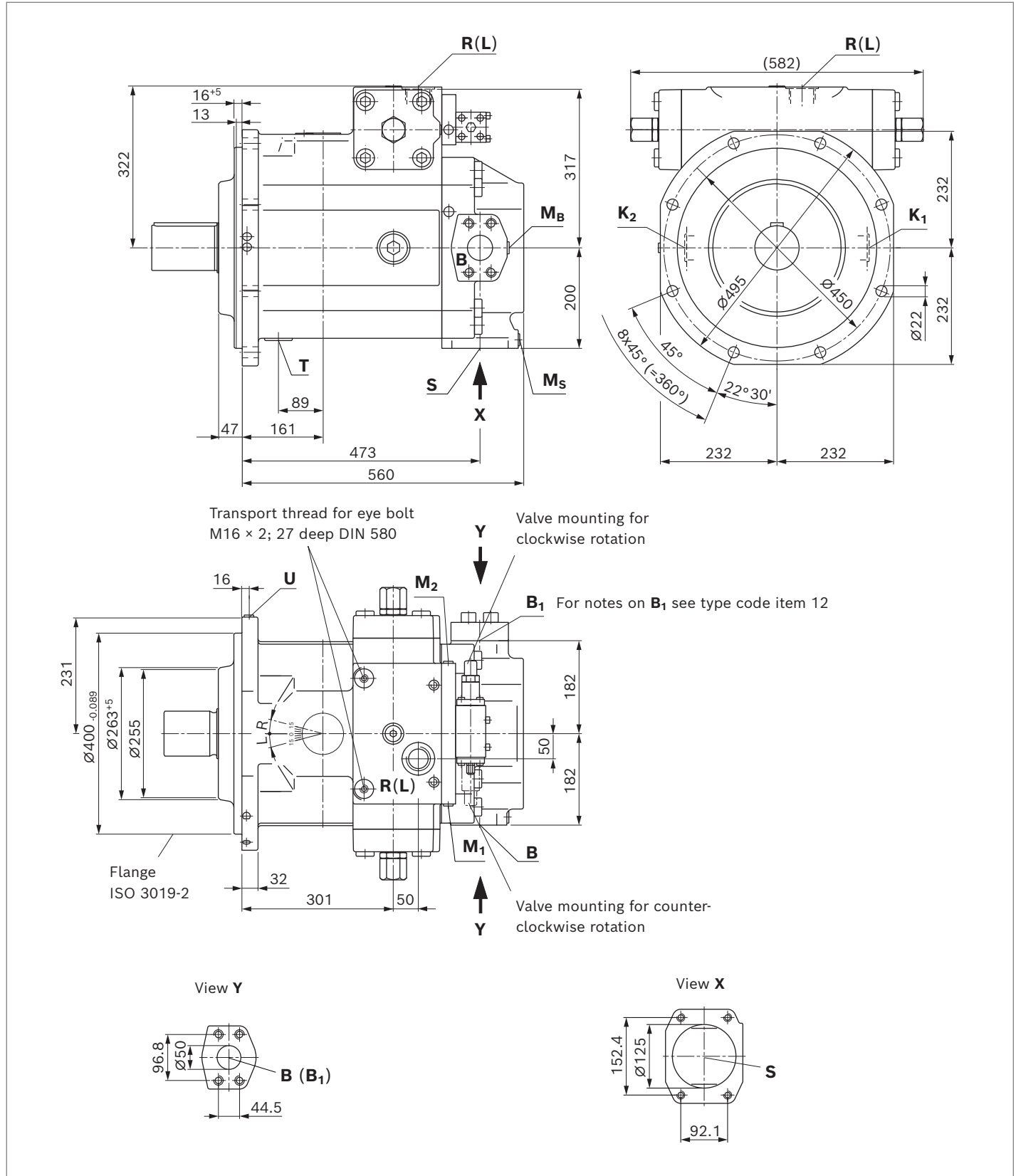
7) O = Must be connected (plugged on delivery)

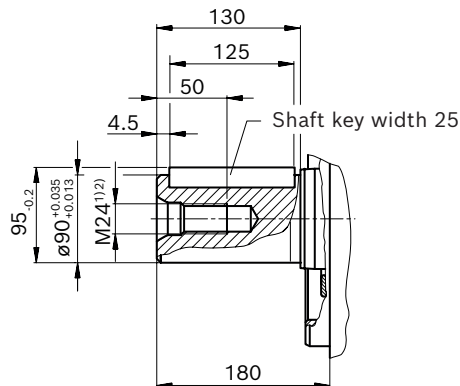
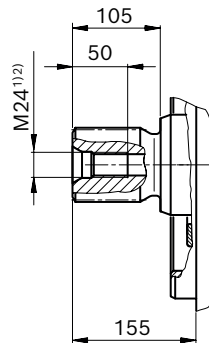
X = Plugged (in normal operation)

8) Plugged with flange plate

Dimensions, size 750

Main dimensions only for the basic unit, further dimensions for the controls are given in the relevant data sheets.



▼ **Parallel keyed shaft DIN 6885****P** – AS25 × 14 × 125▼ **Splined shaft DIN 5480****Z** – W90 × 3 × 28 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	5 in M16 × 2; 24 deep	30	O
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 25 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 24 deep	400	X ⁸⁾
K₁, K₂	Drain port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	X ⁶⁾
T	Flushing port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	30	X
R(L)	Drain port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	6 absolute	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852 ⁵⁾	See data sheet of the respective control devices	400	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be
connected (see also installation instructions on pages 77 and 79)

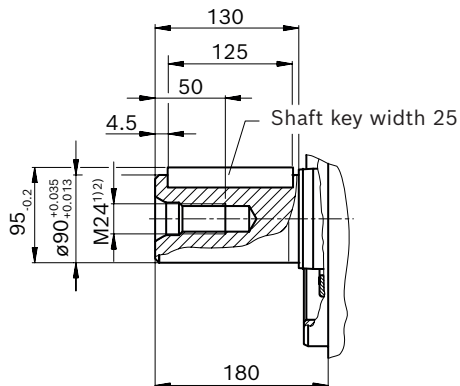
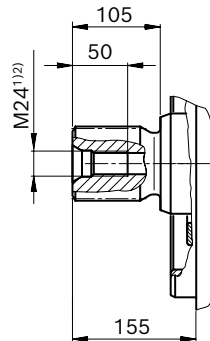
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

8) Plugged with flange plate

Main dimensions only for the basic unit, further dimensions for the controls are given in the relevant data sheets.



▼ **Parallel keyed shaft DIN 6885****P** – AS25 × 14 × 125▼ **Splined shaft DIN 5480****Z** – W90 × 3 × 28 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	5 in M16 × 2; 24 deep	30	O
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 25 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 24 deep	400	X ⁸⁾
K₁, K₂	Drain port	DIN 3852	M48 × 2; 22 deep	6 absolute	X ⁶⁾
T	Flushing port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	X ⁶⁾
M_B	Measuring port working pressure B	DIN 3852	M18 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852	M18 × 1.5; 12 deep	30	X
M_L	Measuring port charging pressure	DIN 3852	M18 × 1.5; 12 deep	30	X
R(L)	Drain port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852	M18 × 1.5; 12 deep	6 absolute	X
M₁, M₂	Measuring port stroking pressure	DIN 3852	See data sheet of the respective control devices	400	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be
connected (see also installation instructions on pages 77 and 79)

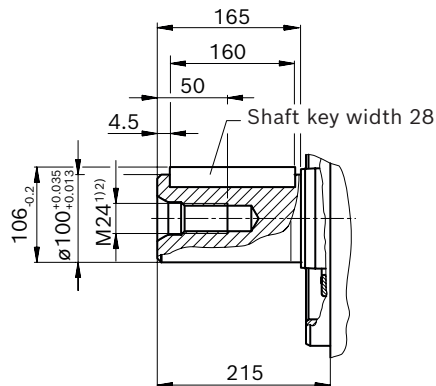
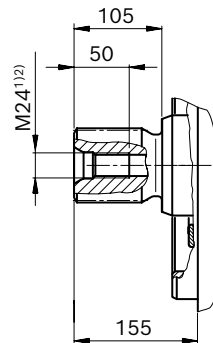
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

8) Plugged with flange plate

Main dimensions only for the basic unit, further dimensions for the controls are given in the relevant data sheets.



▼ **Parallel keyed shaft DIN 6885****P** – AS28 × 16 × 160▼ **Splined shaft DIN 5480****Z** – W100 × 3 × 32 × 9g

Ports		Standard	Size	$p_{\max}$ [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	5 in M16 × 2; 24 deep	30	O
For port plate version 25					
B	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 30 deep	400	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 30 deep	400	X ⁸⁾
K₁, K₂	Drain port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	X ⁶⁾
T	Flushing port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	X ⁶⁾
M_B, M_{B1}	Measuring port working pressure B	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	400	X
M_S	Measuring port suction pressure	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	30	X
R(L)	Drain port	DIN 3852 ⁵⁾	M48 × 2; 22 deep	6 absolute	O ⁶⁾
U	Flushing port bearing flushing	DIN 3852 ⁵⁾	M18 × 1.5; 12 deep	6 absolute	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852 ⁵⁾	See data sheet of the respective control devices	400	X

1) Center bore according to DIN 332

2) Thread according to DIN 13

3) Depending on the application, momentary pressure peaks can occur.
Keep this in mind when selecting measuring devices and fittings.

4) Metric fastening thread is a deviation from standard.

5) The countersink may be deeper than specified in the standard.

6) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be
connected (see also installation instructions on pages 77 and 79)

7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

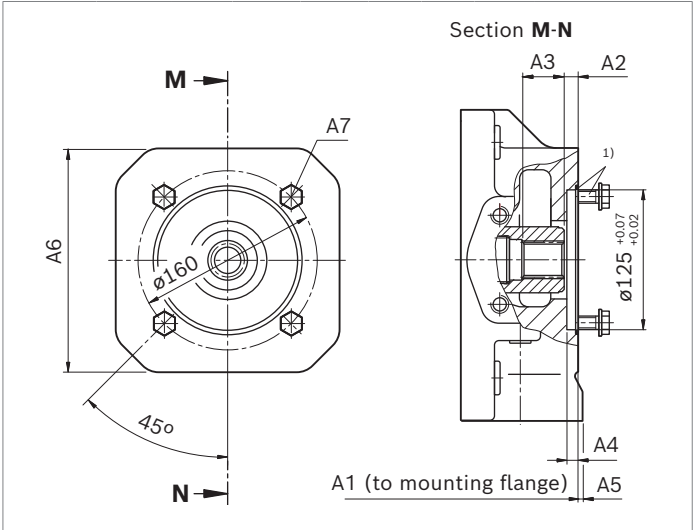
8) Plugged with flange plate

Dimensions of through-drive

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾	Availability across sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
125-4		N32×2×14×8H	●	●	–	–	–	–	●	●	○	K31
		N32×2×14×8H	–	–	●	●	●	●	–	–	–	U31

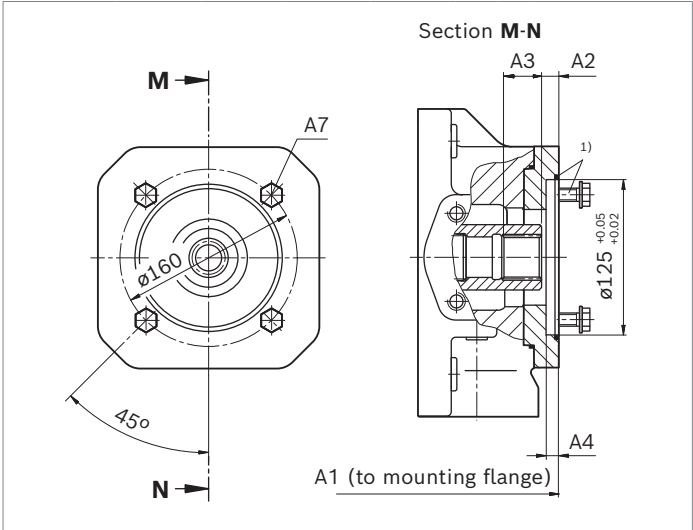
● = Available ○ = On request – = Not available

▼ 125-4



K31	NG	A1	A2	A3	A4	A5	A6	A7 ³⁾⁴⁾
	40	288	12.5	40	9	–	–	M12; 24 deep
	71	316	12.5	33.6	9	–	–	M12; 24 deep
	500	505	12.5	38.6	9	15	240	M12; 18 deep
	750	555	12.5	44.5	9	15	240	M12; 18 deep

▼ 125-4



U31	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	12.5	35.6	9	M12; 22 deep
	180	393	12.5	35.6	9	M12; 22 deep
	250 260	453	12.5	38.0	9	M12; 15 deep
	355 370	482	12.5	38.0	9	M12; 15 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Splined hub according to DIN 5480

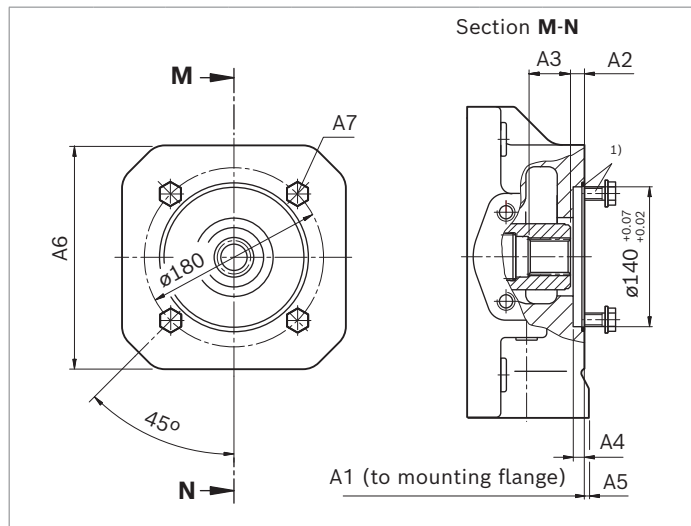
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾											Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	750 ⁴⁾	1000	
140-4		N40×2×18×8H	-	●	-	-	-	-	●	●	○	●	K33
		N40×2×18×8H	-	-	●	●	●	●	-	-	-	-	U33

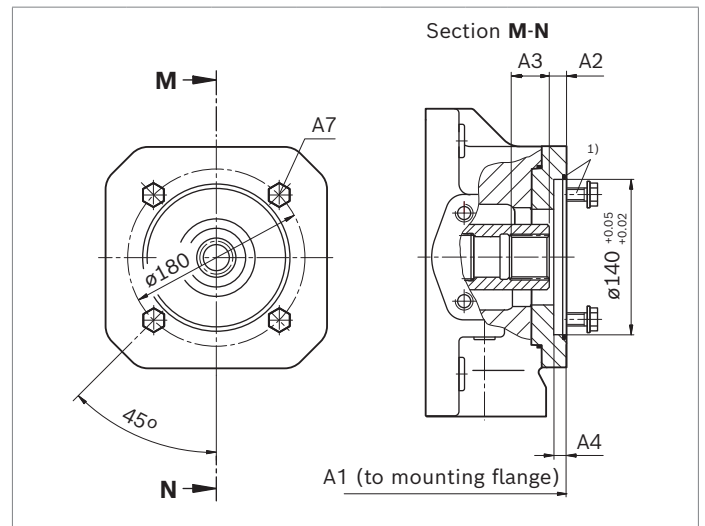
● = Available ○ = On request - = Not available

▼ 140-4



K33	NG	A1	A2	A3	A4	A5	A6	A7 ³⁾⁵⁾
	71	316	11.5	42.8	9	-	-	M12; 24 deep
	500	505	12.5	57	9	-	-	M12; 18 deep
	750	555	12.5	44.5	9	15	240	M12; 18 deep
	1000	628	12.5	60	10	-	280	M12; 18 deep

▼ 140-4



U33	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	12.5	43.8	9	M12; 22 deep
	180	393	12.5	43.8	9	M12; 22 deep
	250 260	453	12.5	48.9	9	M12; 22 deep
	355 370	482	12.5	48.0	9	M12; 22 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Splined hub according to DIN 5480

3) Thread according to DIN 13

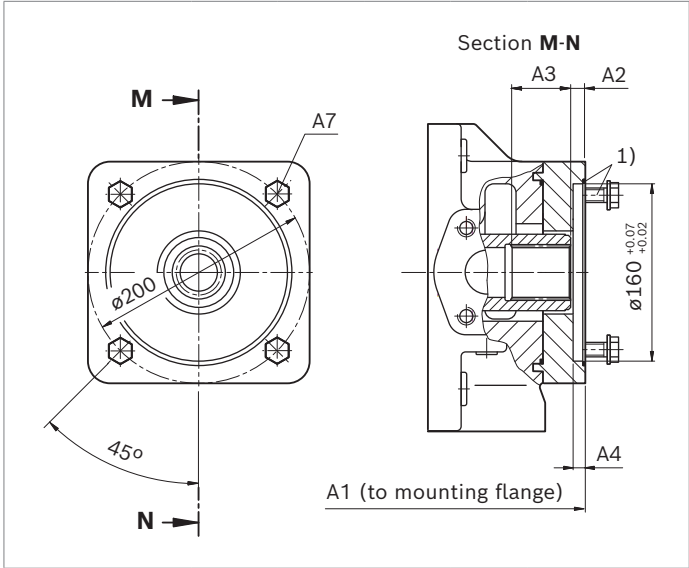
4) With charge pump

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾											Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	750 ⁴⁾	1000	
160-4		N50×2×24×8H	—	—	—	—	—	—	●	●	○	○	K34
		N50×2×24×8H	—	—	●	●	●	●	—	—	—	—	U34

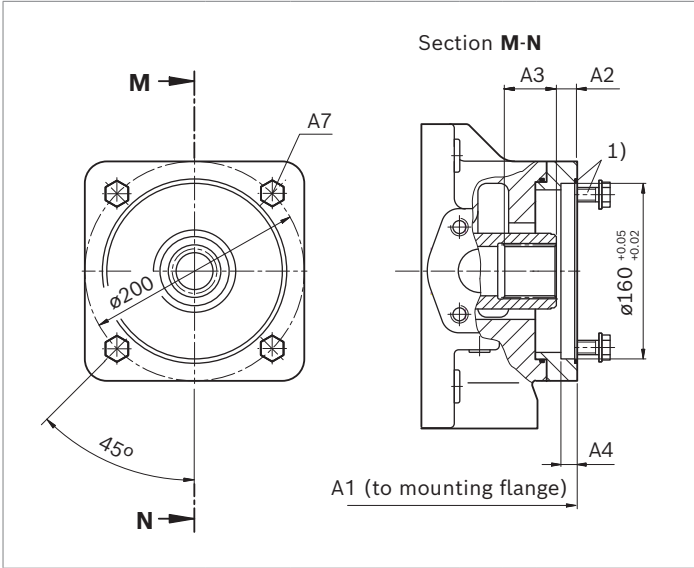
● = Available ○ = On request - = Not available

▼ 160-4



K34	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	500	505	13.5	54.5	10	M16; 24 deep
	750	555	13.5	55.5	10	M16; 24 deep
	1000	628	12.5	54.5	10	M16; 24 deep

▼ 160-4



U34	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	12.5	51.6	9	M16; 22 deep
	180	393	12.5	51.6	9	M16; 22 deep
	250	453	12.5	54.0	9	M16; 22 deep
	260					
	355	482	12.5	54.0	9	M16; 22 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Splined hub according to DIN 5480

3) Thread according to DIN 13

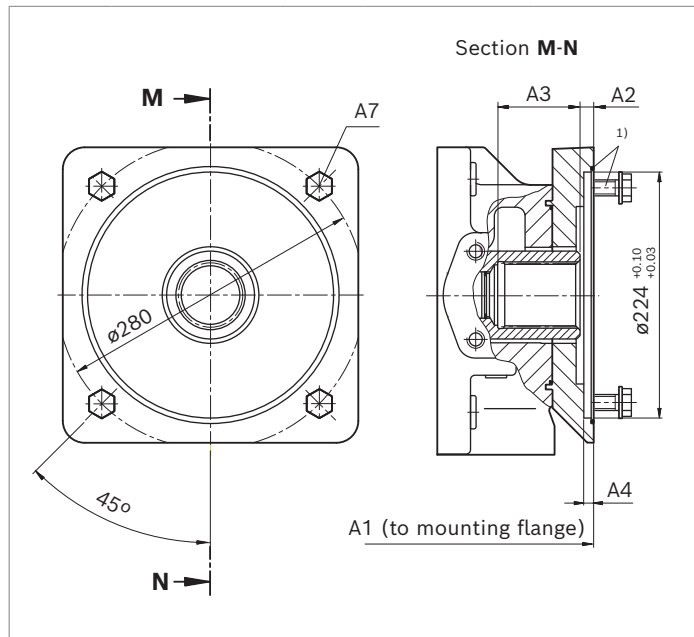
4) With charge pump

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾											Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	750 ⁴⁾	1000	
224-4		N60×2×28×8H	-	-	-	-	-	-	•	•	○	•	K35
		N60×2×28×8H	-	-	-	-	•	•	-	-	-	-	U35

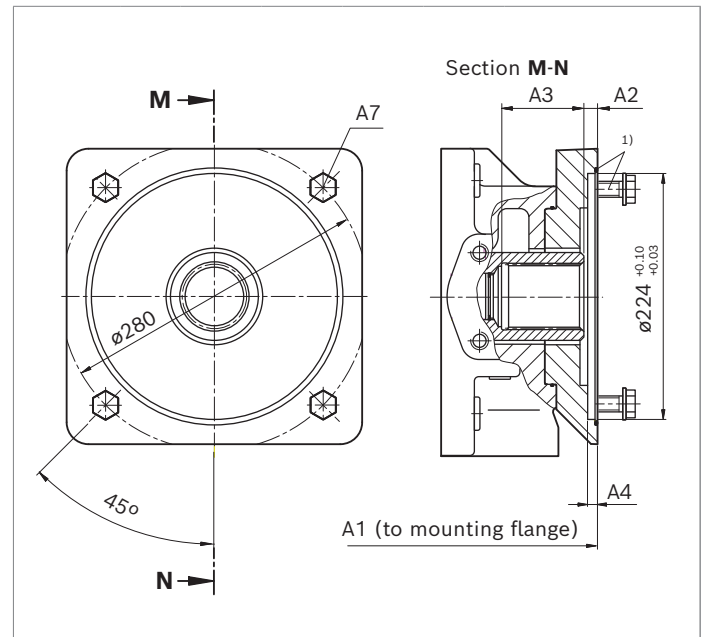
• = Available ○ = On request - = Not available

▼ 224-4



K35	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	500	541	12.5	74	9	M20; 36 deep
	750	591	12.5	74	9	M20; 36 deep
	1000	664	12.5	70	9	M20; 36 deep

▼ 224-4



U35	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	250	469	12.5	75	9	M20; 37 deep
	260					
	355	498	12.5	75	9	M20; 37 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Splined hub according to DIN 5480

3) Thread according to DIN 13

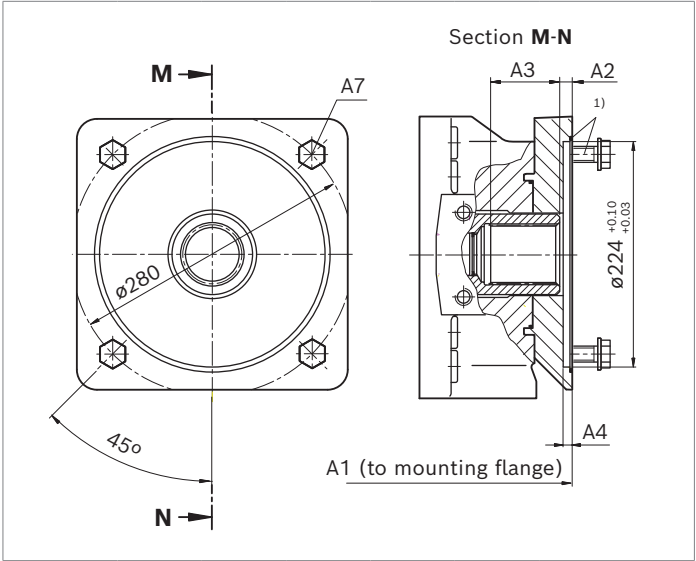
4) With charge pump

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾	250 355									Code
Diameter	Symbol	Diameter	40	71	125	180	260	370	500	750	1000	
224-4		N70×3×22×8H	—	—	—	—	—	—	●	○	●	K77
		N70×3×22×8H	—	—	—	—	—	●	—	—	—	U77

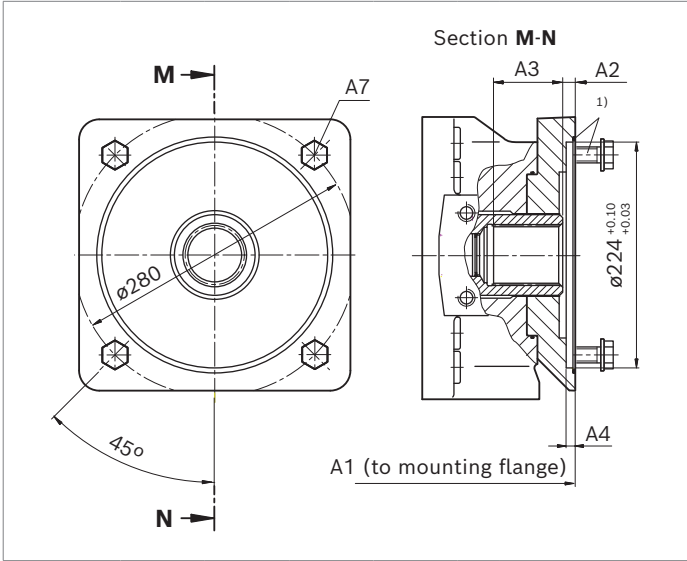
● = Available ○ = On request - = Not available

▼ 224-4



K77	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	500	541	12.5	82	9	M20; 36 deep
	1000	664	12.5	82	9	M20; 36 deep

▼ 224-4



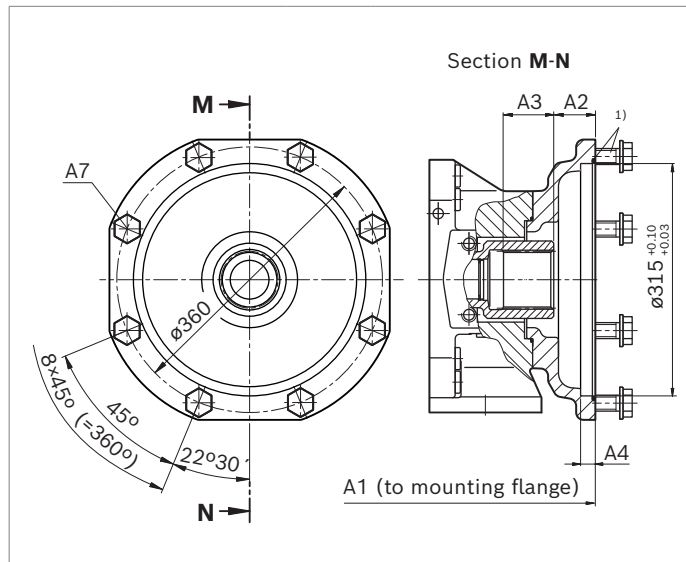
U77	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	355	498	12.5	75	9	M20; 37 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery
 2) Splined hub according to DIN 5480
 3) Thread according to DIN 13
 4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾	250 355 40 71 125 180 260 370 500 750 750 ⁴⁾ 1000										Code
Diameter	Symbol	Diameter	40	71	125	180	260	370	500	750	750 ⁴⁾	1000	
315-8		N80×3×25×8H	-	-	-	-	-	-	•	•	○	•	K43
		N90×3×28×8H	-	-	-	-	-	-	-	•	•	•	K76

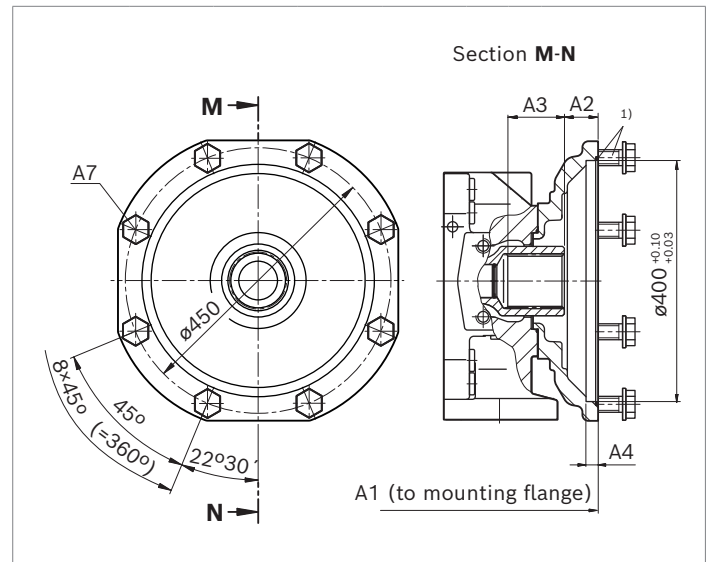
• = Available ○ = On request - = Not available

▼ 315-8



K43	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	500	590	53.5	71.9	19	M20; 26 deep
	750	640	53.5	71.9	19	M20; 26 deep
	1000	713	53.5	71	19	M20; 26 deep

▼ 315-8



K76	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	750	655	53	104	19	M20; 26 deep
	750 ⁴⁾	749	53	97	19	M20; 26 deep
	1000	728	53	97	19	M20; 26 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Splined hub according to DIN 5480

3) Thread according to DIN 13

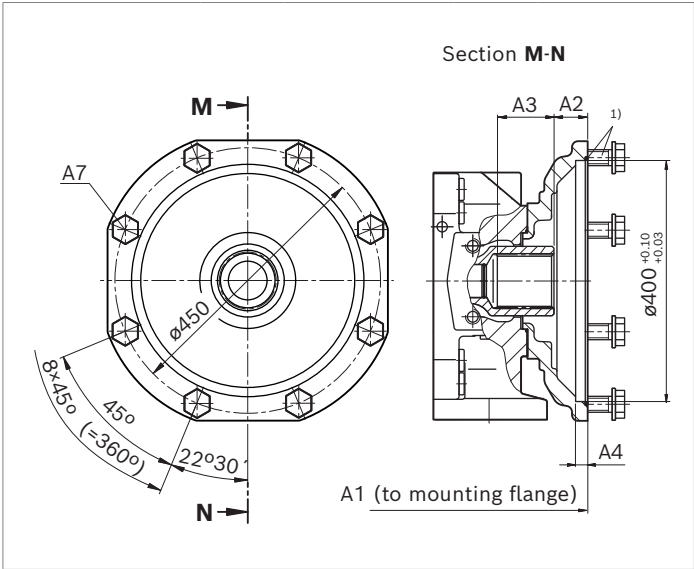
4) With charge pump

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾	250 355									Code
Diameter	Symbol	Diameter	40	71	125	180	260	370	500	750	1000	
400-8		N100×3×32×8H	—	—	—	—	—	—	—	—	●	K88

● = Available ○ = On request - = Not available

▼ 400-8



K88	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	1000	728	53	99	19	M20; 26 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Splined hub according to DIN 5480

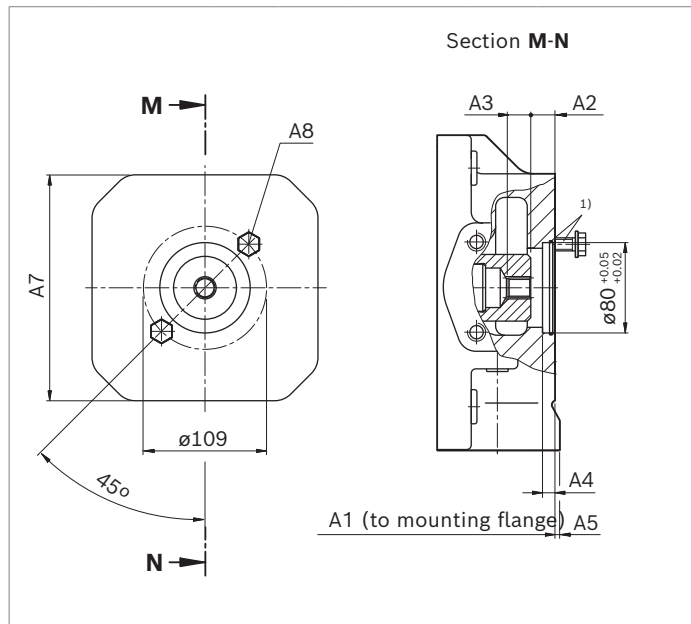
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
80-2		3/4 in 11T 16/32DP	○	●	—	—	—	—	○	○	○	KB2
		3/4 in 11T 16/32DP	—	—	●	●	●	●	—	—	—	UB2

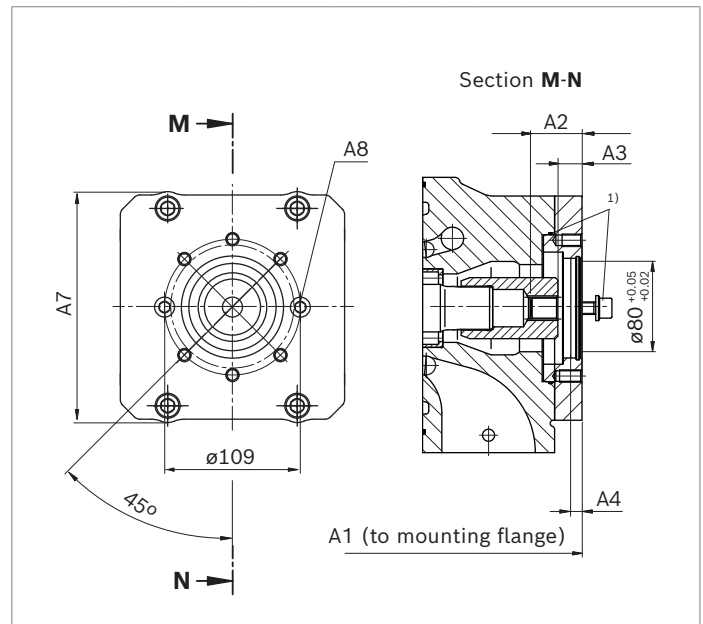
● = Available ○ = On request — = Not available

▼ 80-2



WH2	NG	A1	A2	A3	A4	A5	A7	A8 ³⁾⁴⁾
	71	291	21.5	19	10	2	140	M10; 15 deep

▼ 80-2



UB2	NG	A1	A2	A3	A4	A7	A8 ³⁾⁴⁾
	125	367	40.5	19.4	9	180	M10; 16 deep
	180	393	40.5	19.4	9	180	M10; 16 deep
	250 260	453	40.5	19	9	200	M10; 16 deep
	355 370	482	40.4	19	9	200	M10; 16 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

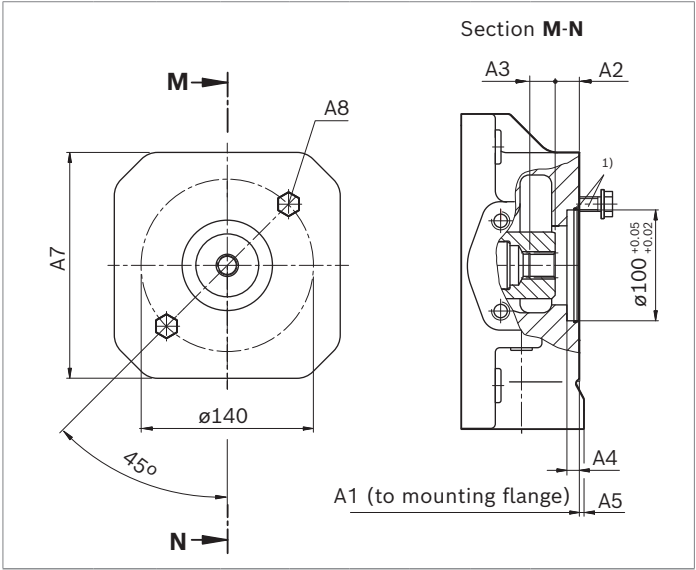
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
100-2		7/8 in 13T 16/32DP	●	●	–	–	–	–	○	○	○	KB3
		7/8 in 13T 16/32DP	–	–	●	●	●	●	–	–	–	UB3

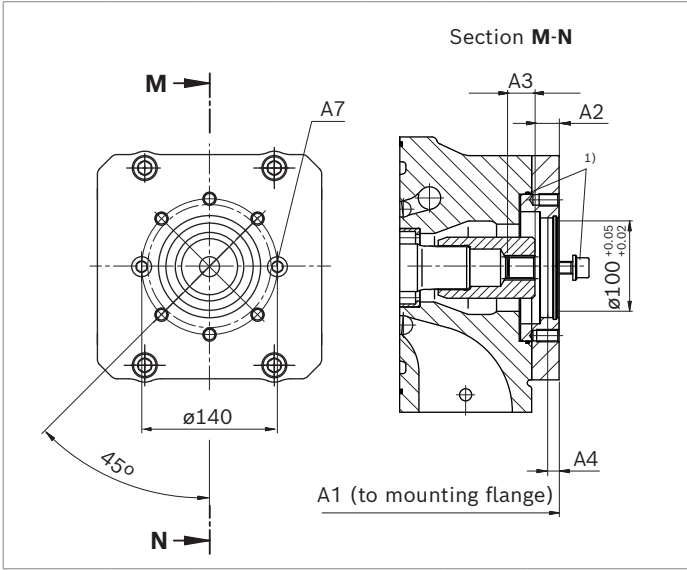
● = Available ○ = On request - = Not available

▼ 100-2



WH3	NG	A1	A2	A3	A4	A5	A7	A8 ³⁾⁴⁾
	40	290	20.3	23	10	-	-	M12; 18 deep
	71	291	20.4	23	10	2	140	M12; 18 deep

▼ 100-2



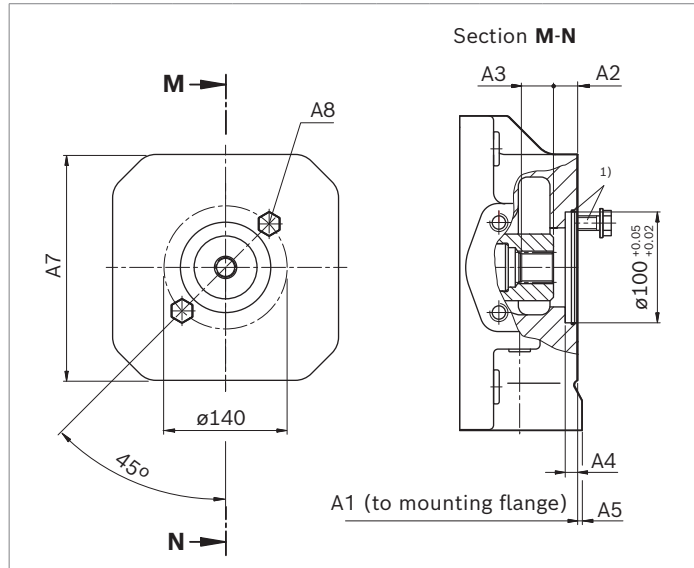
UB3	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	18.5	24.9	10	M12; 22 deep
	180	393	18.5	24.9	10	M12; 22 deep
	250 260	453	19.5	23	10	M12; 18 deep
	355 370	482	19.5	23	10	M12; 18 deep

1) Fixing screws and O-ring seal are included in the scope of delivery
2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
3) Thread according to DIN 13
4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
100-2		1 in 15T 16/32DP	●	●	-	-	-	-	●	○	○	KB4
		1 in 15T 16/32DP	-	-	●	●	●	●	-	-	-	UB4

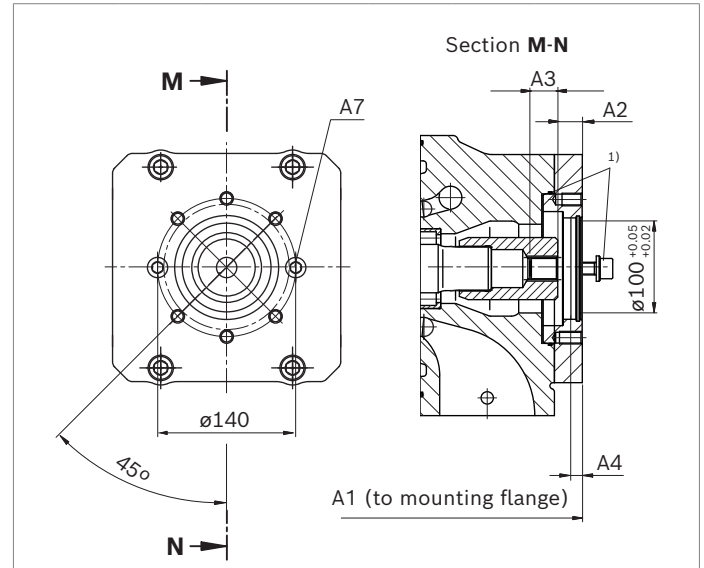
● = Available ○ = On request - = Not available

▼ 100-2



WH4	NG	A1	A2	A3	A4	A5	A7	A8 ³⁾⁴⁾
	40	290	20.8	27.5	10	-	-	M12; 18 deep
	71	316	20.8	27.5	8	-	-	M12; 24 deep
	500	505	20.4	28.9	10	15	240	M12; 18 deep

▼ 100-2



UB4	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	18.9	29.5	10	M12; 22 deep
	180	393	18.9	29.5	10	M12; 22 deep
	250 260	453	18.9	29.5	10	M12; 18 deep
	355 370	482	18.9	29.5	10	M12; 18 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

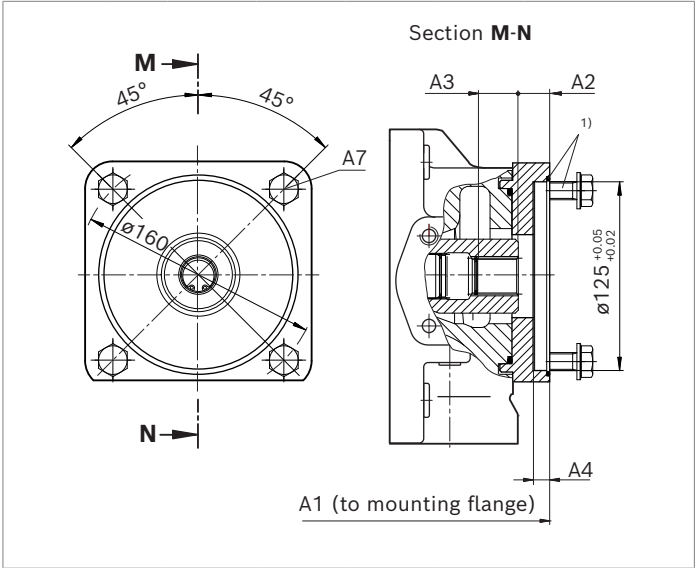
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
125-4		1 in 15T 16/32DP	-	●	-	-	-	-	○	○	○	KE1
		1 in 15T 16/32DP	-	-	○	○	●	●	-	-	-	UE1

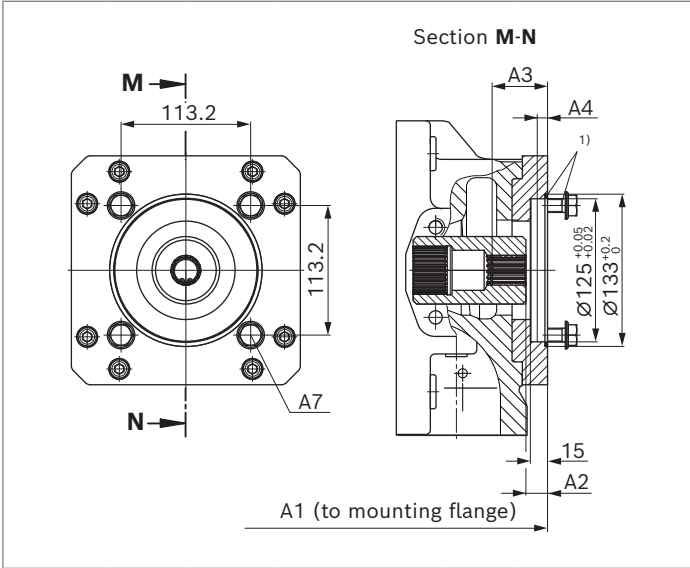
● = Available ○ = On request - = Not available

▼ 125-4



KE1	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	71	316	20.8	27.5	10	M12; 24 deep

▼ 125-4



UE1	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	250 260	453	18.9	48.4	9	M12; 15 deep
	355 370	482	18.9	48.4	9	M12; 15 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

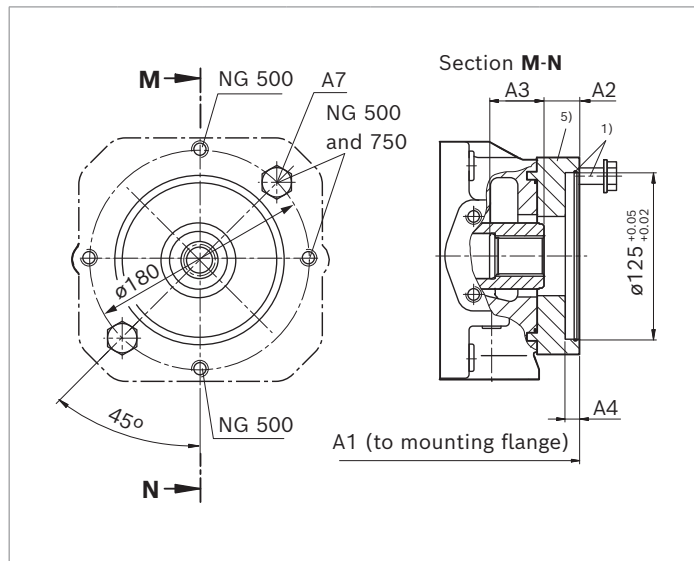
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾											Code
Diameter	Symbol		Diameter	40	71	125	180	250 260	355 370	500	750	750 ⁴⁾	
125-2		1 1/4 in 14T 12/24DP	—	●	—	—	—	—	●	○	●	○	KB5
		1 1/4 in 14T 12/24DP	—	—	●	●	●	●	—	—	—	—	UB5

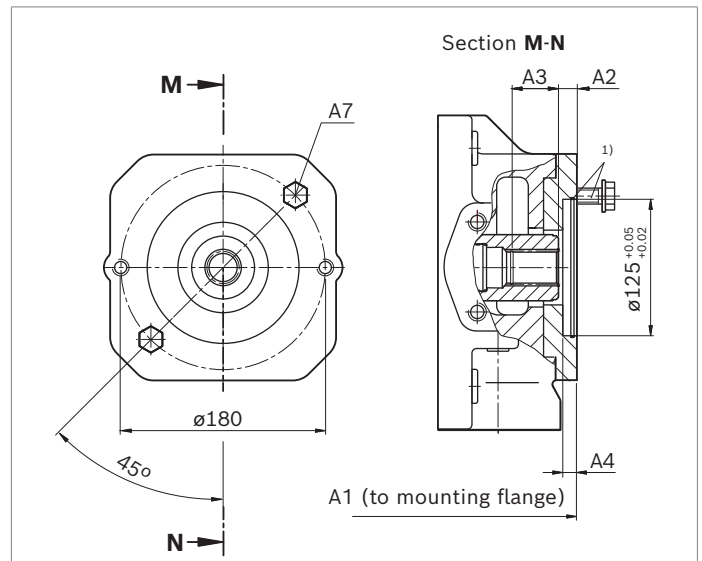
• = Available ○ = On request - = Not available

▼ 125-2



WH5	NG	A1	A2	A3	A4	A7 ³⁾⁶⁾
	71	321	23	38	10	M16; 29 deep
	500	505	19.3	40.4	10	M16; 24 deep
	750 ⁴⁾	649	19.3	40.4	10	M16; 20 deep

▼ 125-2



UB5	NG	A1	A2	A3	A4	A7 ³⁾⁶⁾
	125	369	20	38	9	M16; 22 deep
	180	393	20	38	9	M16; 22 deep
	250	453	20.9	37.9	9	M16; 22 deep
	260					
	355	482	20.9	37.9	9	M16; 22 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

3) Thread according to DIN 13

4) With charge pump

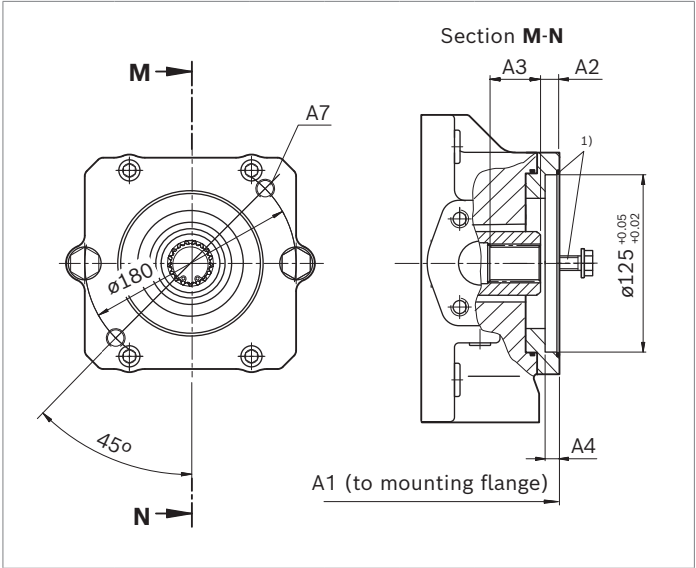
5) For NG71 with intermediate plate

6) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
125-2		1 1/2 in 17T 12/24DP	-	-	-	-	-	-	o	o	o	KB6
		1 1/2 in 17T 12/24DP	-	-	•	•	•	•	-	-	-	UB6
160-4		1 1/4 in 14T 12/24DP	-	o	-	-	-	-	o	o	o	KB8
		1 1/4 in 14T 12/24DP	-	-	•	•	•	•	-	-	-	UB8

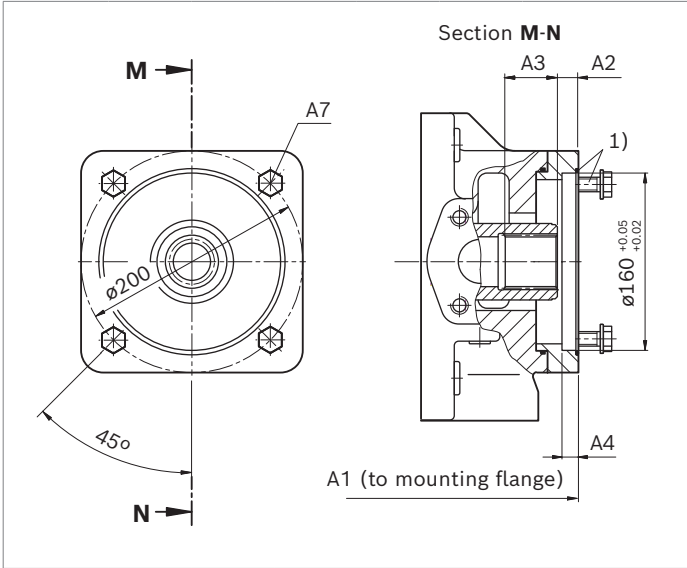
• = Available o = On request - = Not available

▼ 125-2



UB6	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	10.4	50	9	M16; 22 deep
	180	393	10.4	50	9	M16; 22 deep
	250 260	453	12.5	55	9	M16; 22 deep
	355 370	482	12.5	55	9	M16; 22 deep

▼ 160-4



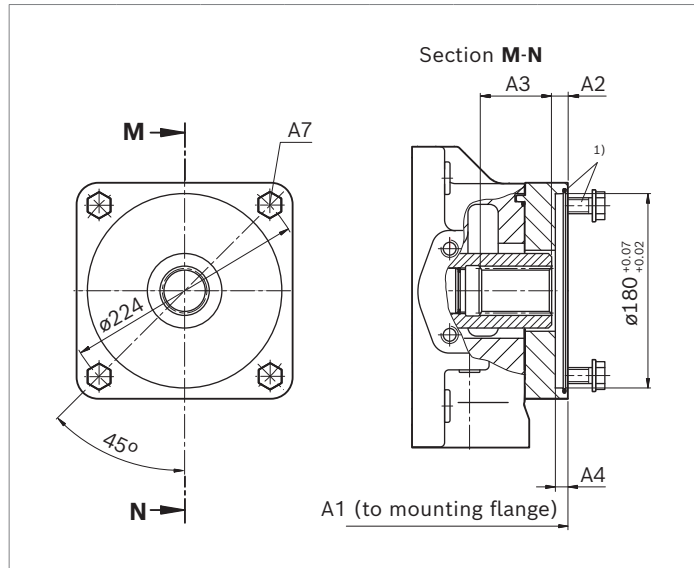
UB8	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	20	38	9	M16; 22 deep
	180	393	20	38	9	M16; 22 deep
	250 260	453	20.9	38	9	M16; 22 deep
	355 370	482	20.9	38	9	M16; 22 deep

1) Fixing screws and O-ring seal are included in the scope of delivery
2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
3) Thread according to DIN 13
4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
180-4		1 3/4in 13T 8/16DP	–	–	–	–	–	–	○	○	○	KB7
		1 3/4in 13T 8/16DP	–	–	–	●	●	●	–	–	–	UB7

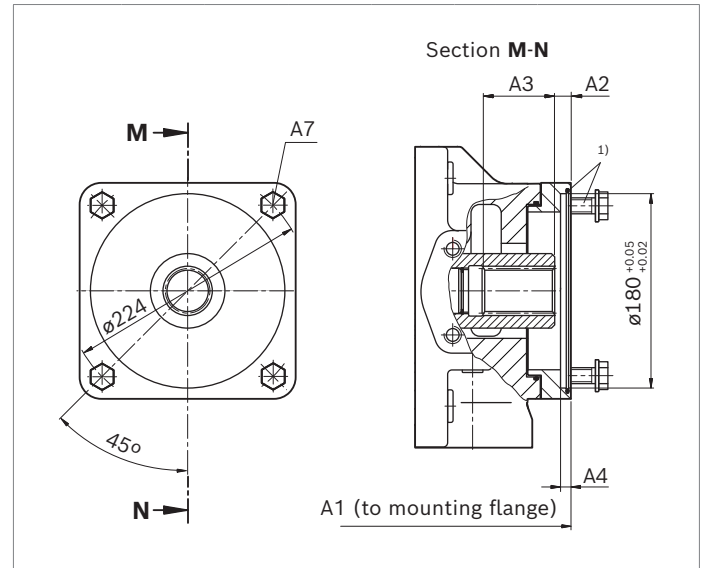
• = Available o = On request - = Not available

▼ 180-4



WH7	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	500	530	10.4	63.6	10	M16; 25 deep
	750	580	10.4	63.6	10	M16; 25 deep

▼ 180-4



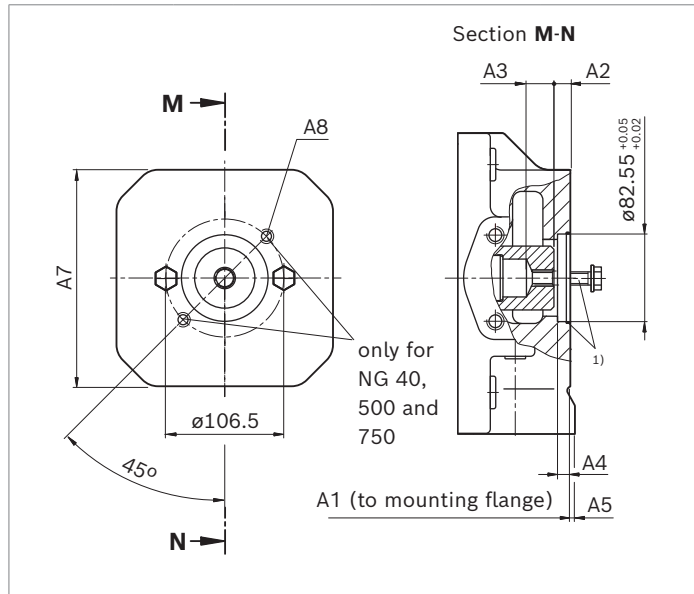
UB7	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	180	406	10.6	62	9	M16; 34 deep
	250 260	453	10.6	64	9	M16; 22 deep
	355 370	482	10.6	64	9	M16; 22 deep

- 1) Fixing screws and O-ring seal are included in the scope of delivery
2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
3) Thread according to DIN 13
4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	750 ⁴⁾	1000	
82-2 (A)		5/8in 9T 16/32DP	●	●	–	–	–	–	●	●	○	○	K01
		5/8in 9T 16/32DP	–	–	●	●	●	●	–	–	–	–	U01

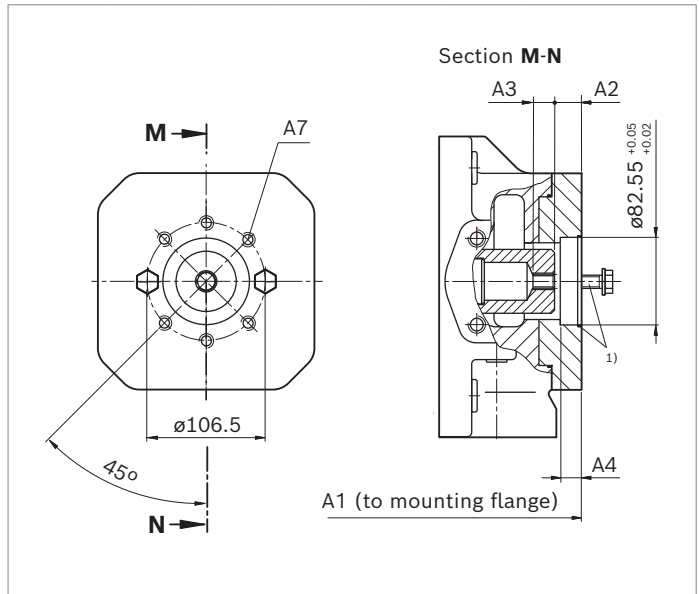
● = Available ○ = On request – = Not available

▼ 82-2



K01	NG	A1	A2	A3	A4	A5	A7	A8 ³⁾⁵⁾
	40	263	10.4	25.9	10	–	–	M10; 15 deep
	71	291	10.3	24.6	10	2	140	M10; 15 deep
	500	505	10.3	32.7	10	15	240	M10; 15 deep
	750	555	10.3	32.7	10	–	–	M10; 15 deep

▼ 82-2



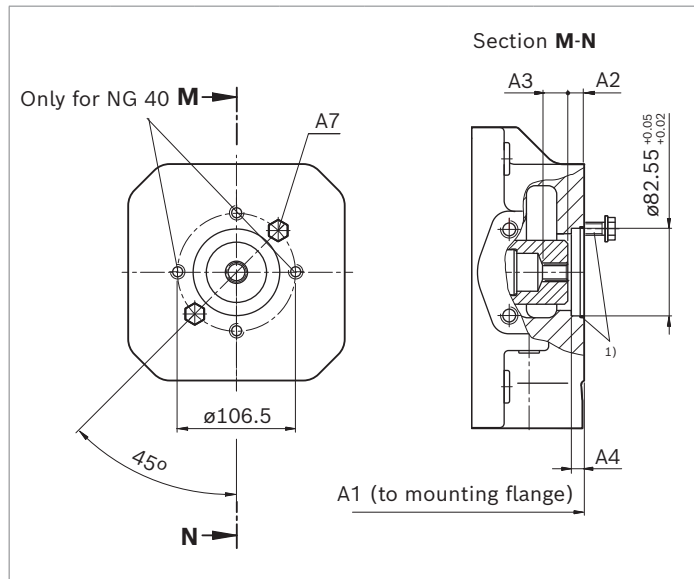
U01	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	10.3	19.4	13	M10; 16 deep
	180	393	10.3	19.4	13	M10; 16 deep
	250 260	453	16	19.4	13	M10; 16 deep
	355 370	482	16	19.4	13	M10; 16 deep

- 1) Fixing screws and O-ring seal are included in the scope of delivery
- 2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
- 3) Thread according to DIN 13
- 4) With charge pump
- 5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000		
82-2 (A)		3/4in 11T 16/32DP ⁴⁾	●	●	—	—	—	—	○	○	○	K52	
		3/4 in 11T 16/32DP	—	—	●	●	●	●	—	—	—	U52	

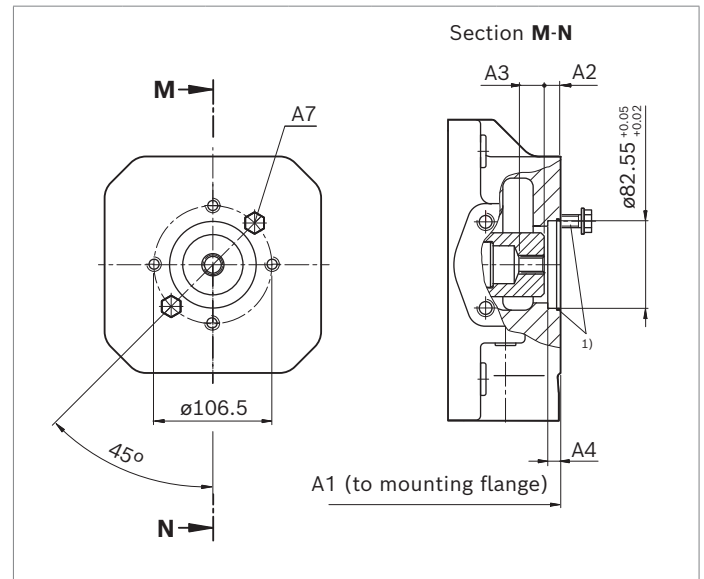
● = Available ○ = On request — = Not available

▼ 82-2



K52	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	40	263	19.5	21	10	M10; 15 deep
	71	312.5	21.5	19	10	M10; 20 deep

▼ 82-2



U52	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	19.4	21.1	10	M10; 16 deep
	180	393	19.4	21.1	10	M10; 16 deep
	250	453	19.5	23.9	10	M10; 16 deep
	260					
	355	482	19.4	23.9	10	M10; 16 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

3) Thread according to DIN 13

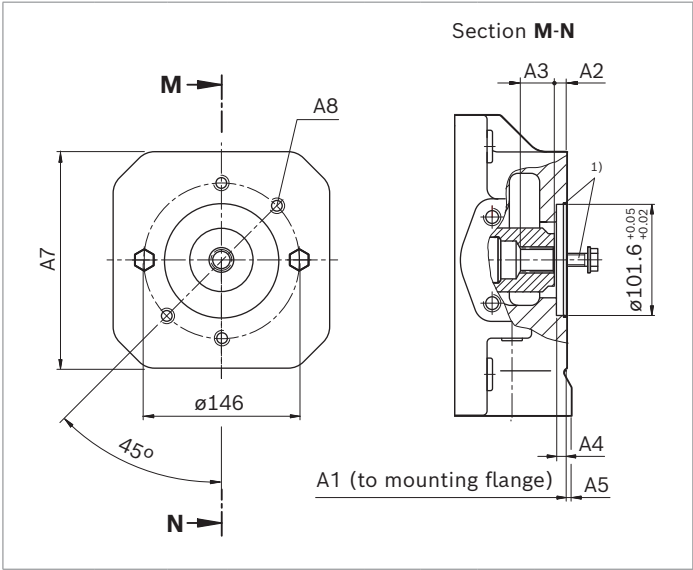
4) If an attachment pump with "R" shaft is to be mounted, please contact us.

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes										Code
Diameter	Symbol		40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
101-2 (B)		7/8 in 13T 16/32DP	●	●	–	–	–	–	●	●	●	○	K68
		7/8 in 13T 16/32DP	–	–	●	●	●	●	–	–	–	–	U68

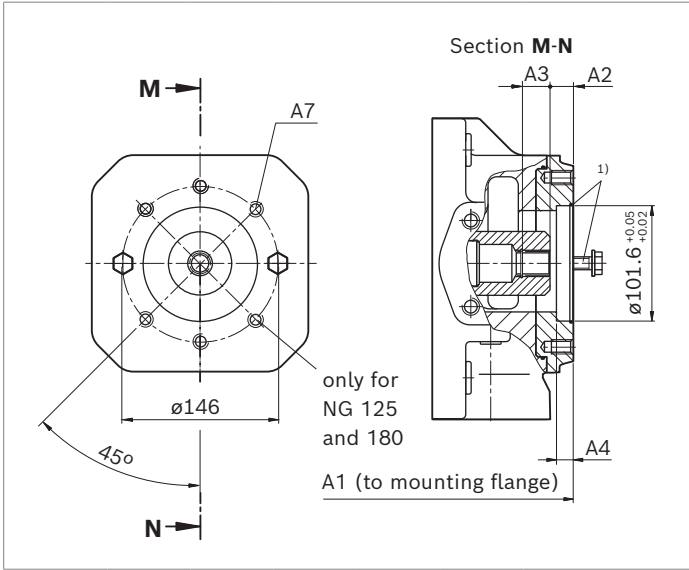
● = Available ○ = On request – = Not available

▼ 101-2



K68	NG	A1	A2	A3	A4	A5	A7	A8 ³⁾⁵⁾
	40	290	20.4	23.1	10	–	–	M12; 18 deep
	71	322	20.5	23.1	10	–	–	M12; 30 deep
	500	505	19.5	25	10	15	240	M12; 18 deep
	750	555	19.5	25	10	–	–	M12; 18 deep
	750 ⁴⁾	649	19.5	25	10	–	–	M12; 18 deep

▼ 101-2



U68	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	18.5	25	13	M12; 22 deep
	180	393	18.5	25	13	M12; 22 deep
	250	453	19.5	23.1	13	M12; 18 deep
	260					
	355	482	19.5	23.1	13	M12; 18 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

3) Thread according to DIN 13

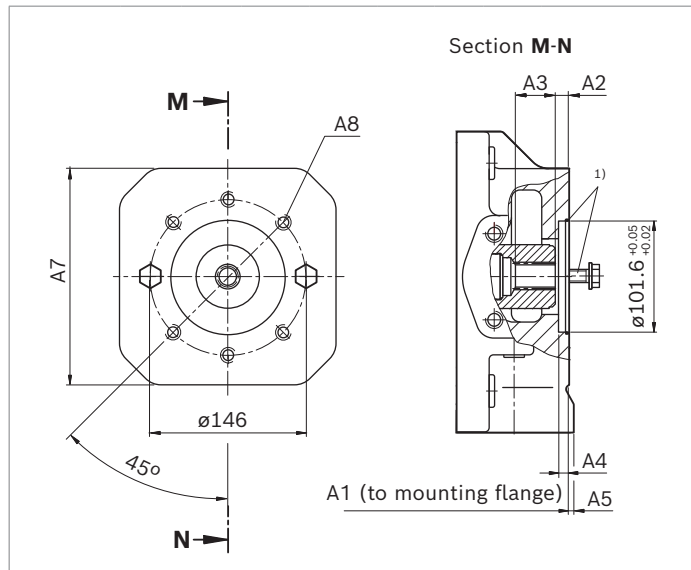
4) With charge pump

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
101-2 (B)		1 in 15T 16/32DP	●	●	—	—	—	—	●	○	○	K04
		1 in 15T 16/32DP	—	—	●	●	●	●	—	—	—	U04

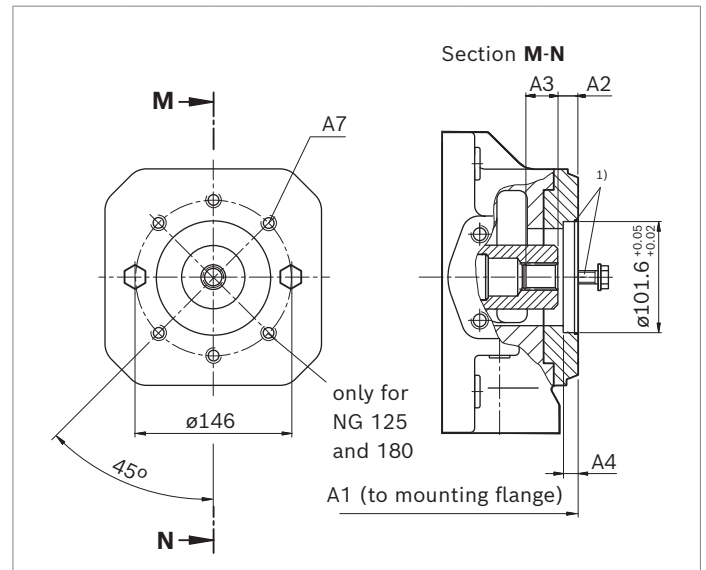
● = Available ○ = On request - = Not available

▼ 101-2



K04	NG	A1	A2	A3	A4	A5	A7	A8 ³⁾⁴⁾
	40	290	20.8	27.5	10	-	-	M12; 20 deep
	71	322	20	29.4	10	-	-	M12; 30 deep
	500	505	20.4	28.9	10	15	240	M12; 18 deep

▼ 101-2



U04	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	18.9	29.4	13	M12; 22 deep
	180	393	18.9	29.4	13	M12; 22 deep
	250 260	453	18.9	29.4	13	M12; 18 deep
	355 370	482	18.9	29.4	13	M12; 18 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

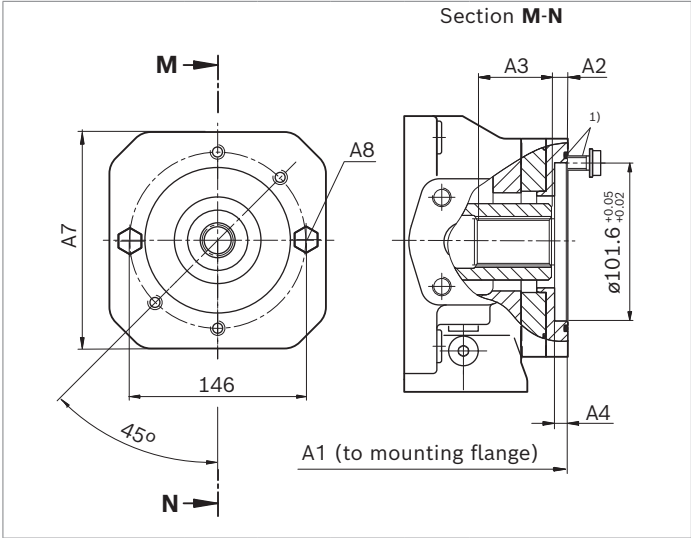
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
101-2 (B)	⚙️, ⚙️, ⚙️	1 1/4in 14T 12/24 DP	–	●	–	–	–	–	○	○	○	K06
		1 1/4in 14T 12/24 DP	–	–	○	○	○	○	–	–	–	U06

● = Available ○ = On request – = Not available

▼ 101-2⁴⁾



K06	NG	A1	A2	A3	A4	A7	A8 ³⁾⁵⁾
	71	322	20.8	38	10	140	M12; 30 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

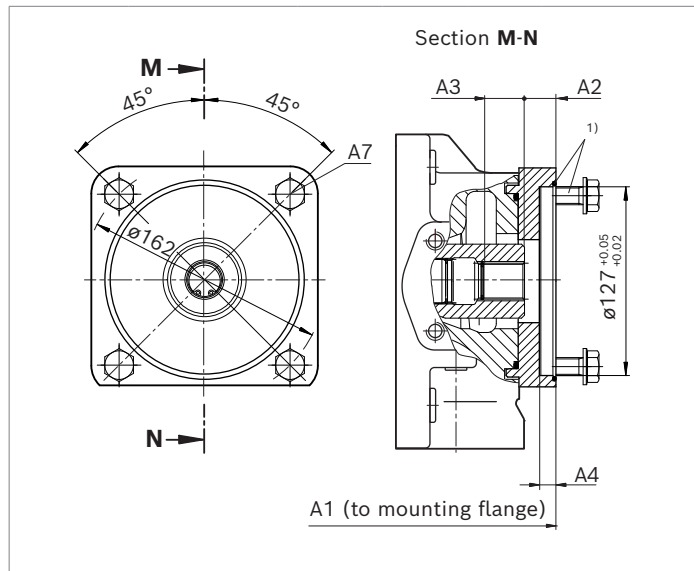
3) Thread according to DIN 13

4) For attaching A10FZO/G63

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

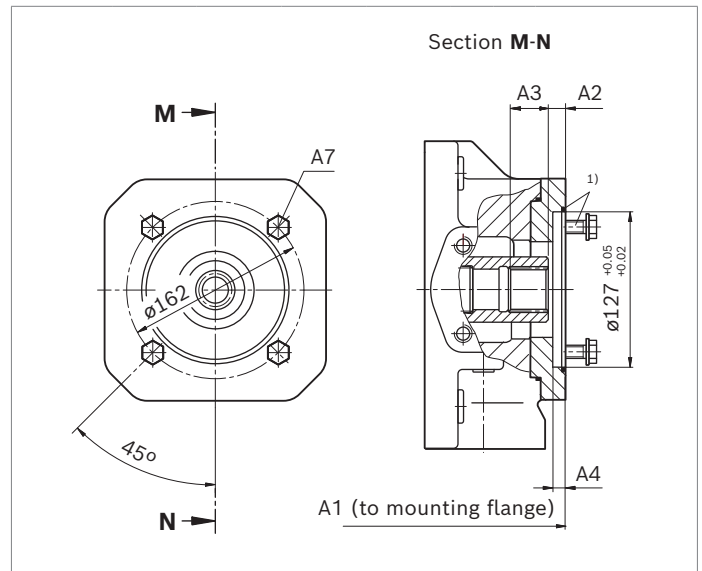
Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
127-4 (C)		1in 15T 16/32 DP	○	●	—	—	—	—	○	○	○	KE2
		1in 15T 16/32 DP	—	—	●	●	○	○	—	—	—	UE2

● = Available ○ = On request — = Not available

▼ 127-4⁴⁾

KE2	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	71	321	19	29.4	13	M12; 30 deep

▼ 127-4



UE2	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	19.9	29.5	13	M12; 22 deep
	180	393	19.9	29.5	13	M12; 22 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

3) Thread according to DIN 13

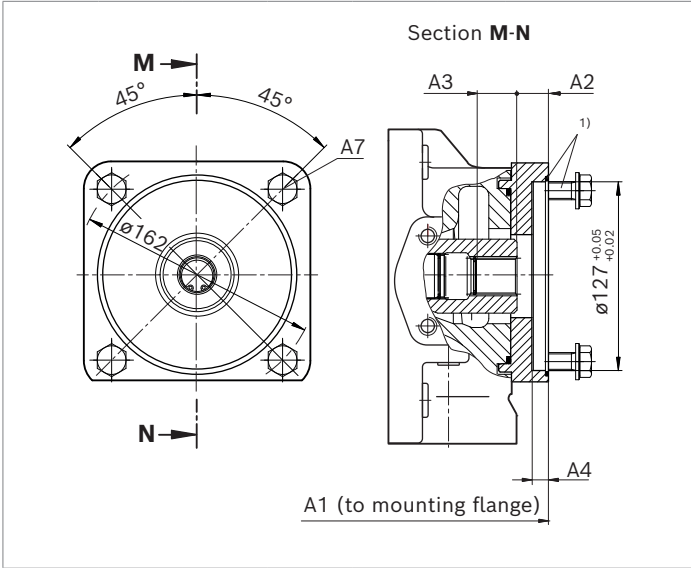
4) For fitting an A10VZO45

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
127-4 (C)		1 1/4in 14T 12/24 DP	●	●	–	–	–	–	●	○	○	K15
		1 1/4in 14T 12/24 DP	–	–	●	●	●	●	–	–	–	U15

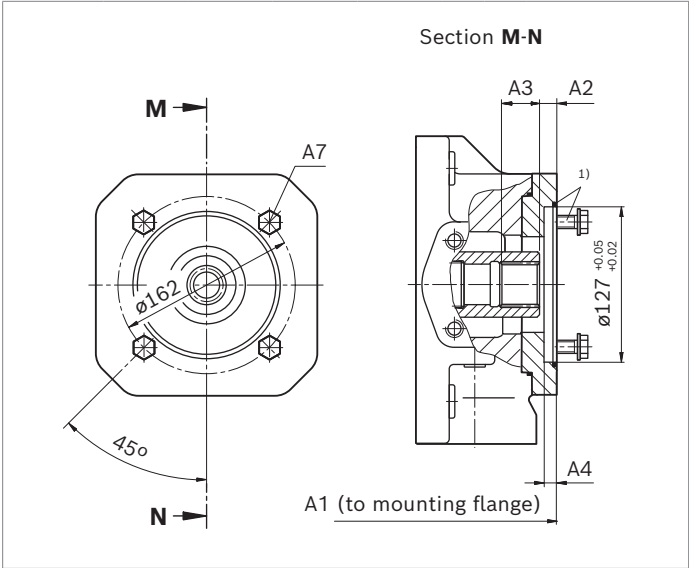
● = Available ○ = On request - = Not available

▼ 127-4⁴⁾



K15	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	40	293	13.4	44.2	13	M12; 29.5 deep
	71	321	23	38	13	M12; 30 deep
	500	505	19.3	40	13	M12; 18 deep

▼ 127-4



U15	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	20	38	13	M12; 22 deep
	180	393	20	38	13	M12; 22 deep
	250 260	453	20.9	38	13	M12; 22 deep
	355 370	482	20.9	38	13	M12; 22 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

3) Thread according to DIN 13

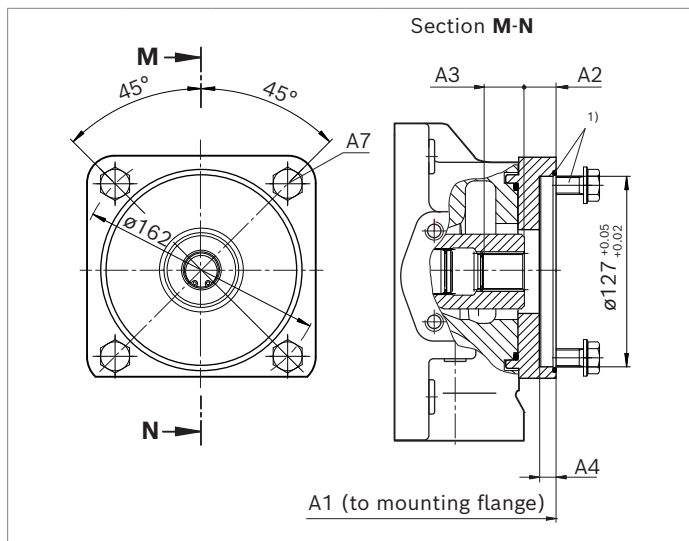
4) For fitting an A10VZO71

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes									Code
Diameter	Symbol		Diameter	40	71	125	180	250 260	355 370	500	750	
127-4 (C)		1 1/2 in 17T 12/24 DP	–	●	–	–	–	–	●	○	○	K16
		1 1/2 in 17T 12/24 DP	–	–	●	●	○	○	–	–	–	U16

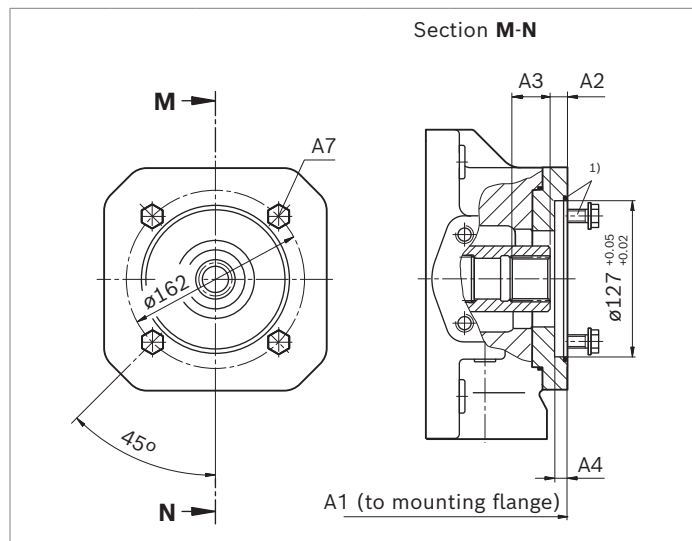
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▼ 127-4



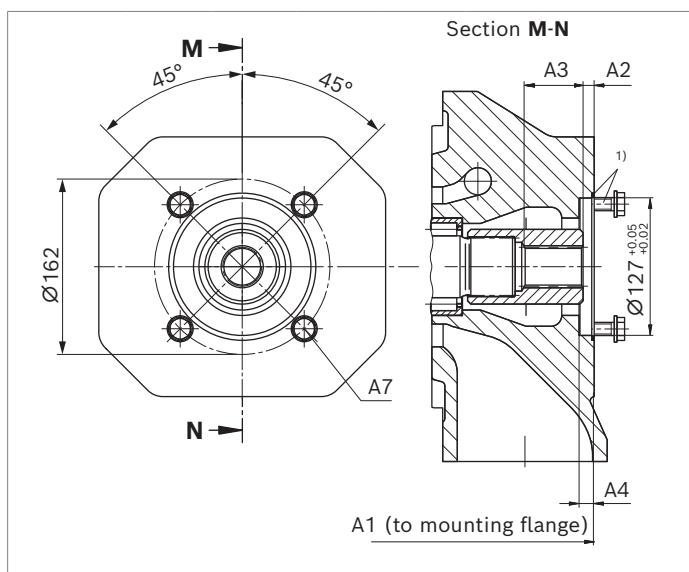
K16	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	71	325	10.4	52.1	13	M12; 30 deep

▼ 127-4



U16	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	10.4	50	13	M12; 22 deep
	180	393	10.4	50	13	M12; 22 deep

▼ 127-4



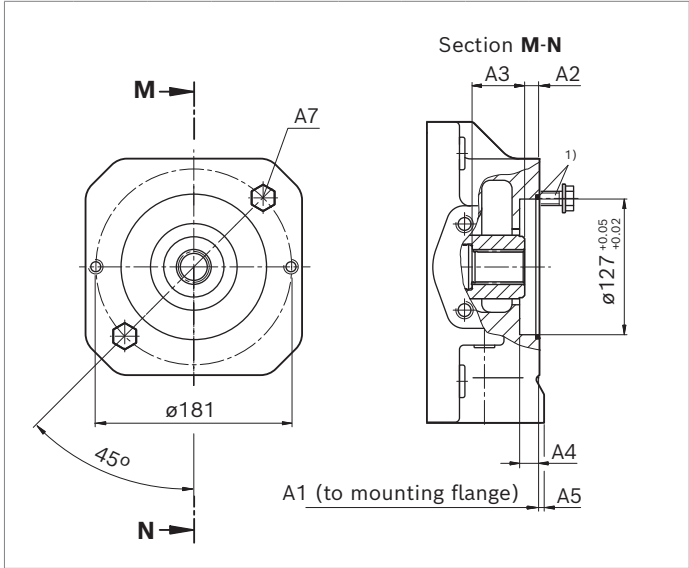
K16	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	500	507	10.3	56.7	13	M12; 18 deep

- 1) Fixing screws and O-ring seal are included in the scope of delivery
- 2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
- 3) Thread according to DIN 13
- 4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes										Code
Diameter	Symbol		40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
127-2 (C)		1 1/4in 14T 12/24 DP	-	•	-	-	-	-	•	•	•	○	K07
		1 1/4in 14T 12/24 DP	-	-	•	•	•	•	-	-	-	-	U07

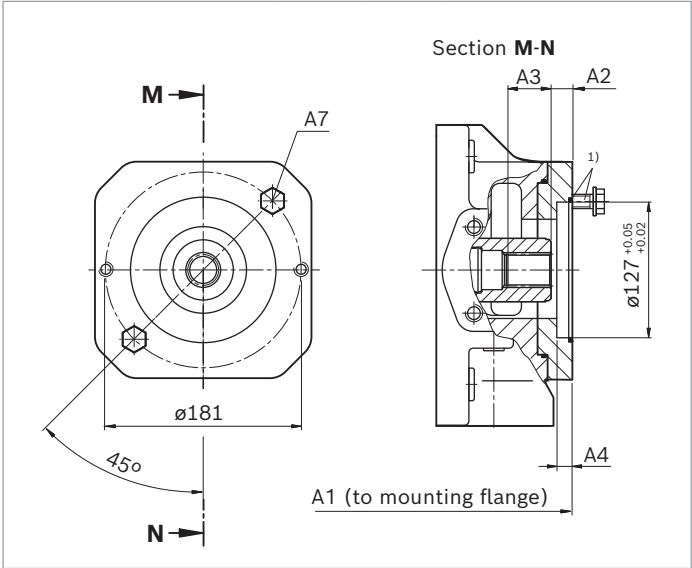
• = Available ○ = On request - = Not available

▼ 127-2



K07	NG	A1	A2	A3	A4	A5	A7	A8 ³⁾⁵⁾
	71	321	23	38	13	-	-	M16; 30 deep
	500	505	19.3	40.4	13	15	240	M16; 24 deep
	750	555	19.3	40.4	13	-	260	M16; 24 deep
	750 ⁴⁾	649	19.3	40.4	13	-	-	M16; 24 deep

▼ 127-2



U07	NG	A1	A2	A3	A4	A7 ³⁾⁵⁾
	125	369	20.9	37.9	13	M16; 22 deep
	180	393	20.9	37.9	13	M16; 22 deep
	250	453	20.9	37.9	13	M16; 22 deep
	260					
	355	482	20.9	37.9	13	M16; 22 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

3) Thread according to DIN 13

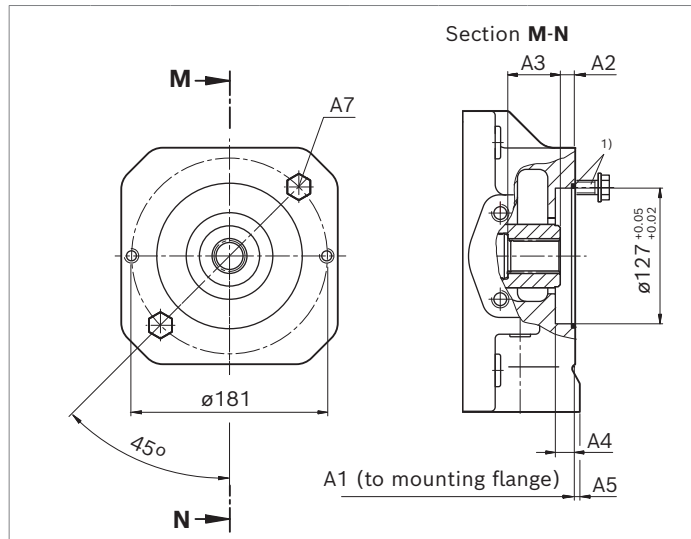
4) With charge pump

5) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
127-2 (C)		1 1/2in 17T 12/24 DP	–	–	–	–	–	–	●	●	●	K24
		1 1/2in 17T 12/24 DP	–	–	●	●	●	●	–	–	–	U24

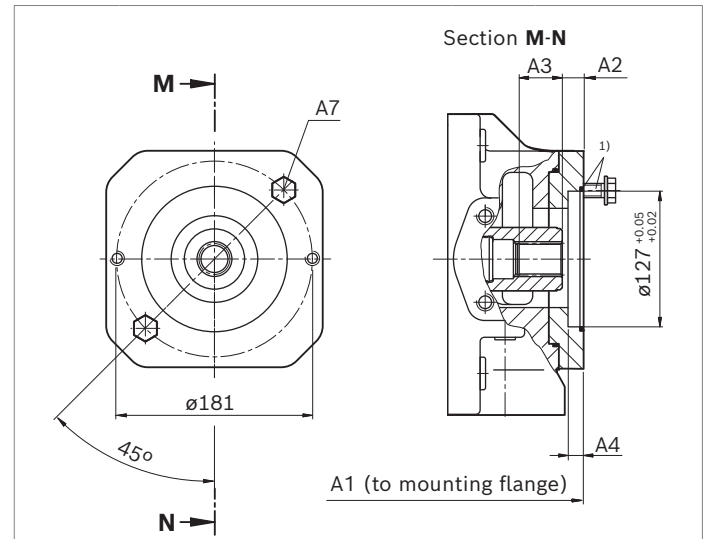
• = Available ◦ = On request - = Not available

▼ 127-2



K24	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	500	505	10.3	56.7	13	M16; 24 deep
	750	555	10.3	56.7	13	M16; 24 deep
	1000	628	10.4	56.6	13	M16; 32 deep

▼ 127-2



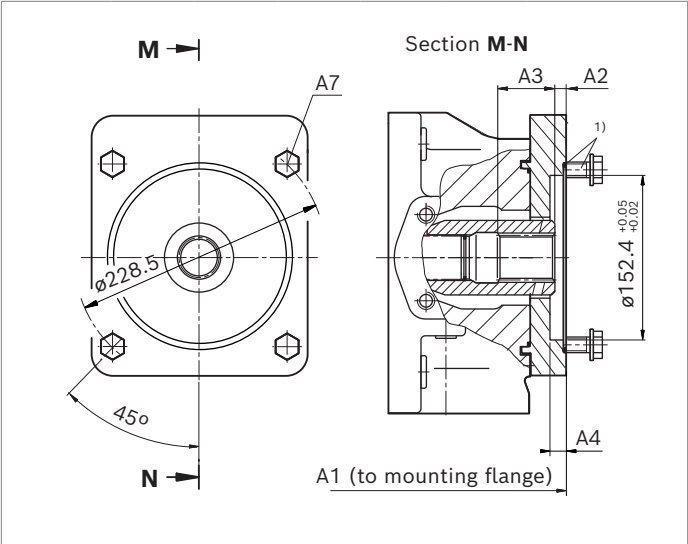
U24	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	10.4	50	13	M16; 22 deep
	180	393	10.4	50	13	M16; 22 deep
	250 260	453	12.4	55	13	M16; 22 deep
	355 370	482	12.4	55	13	M16; 22 deep

- 1) Fixing screws and O-ring seal are included in the scope of delivery
2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
3) Thread according to DIN 13
4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
152-4 (D)		1 1/2 in 17T 12/24DP	–	–	–	–	–	–	○	○	○	K96
		1 1/2 in 17T 12/24DP	–	–	●	●	●	●	–	–	–	U96

• = Available o = On request - = Not available

▼ 152-4



U96	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	369	10.4	52	13	M16; 22 deep
	180	393	10.4	52	13	M16; 22 deep
	250 260	453	12.4	55	13	M16; 22 deep
	355 370	482	12.4	55	13	M16; 22 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

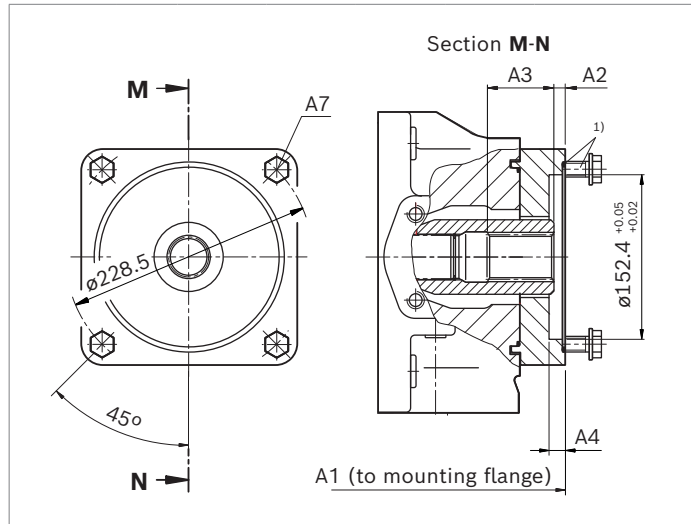
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000		
152-4 (D)		1 3/4in 13T 8/16DP	-	-	-	-	-	-	•	•	○		K17
		1 3/4in 13T 8/16DP	-	-	•	•	•	•	-	-	-		U17

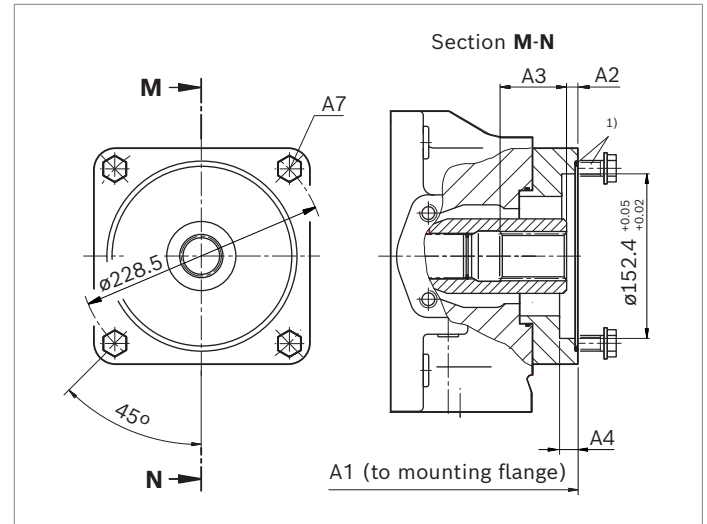
• = Available ○ = On request - = Not available

▼ 152-4



K17	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	500	530	10.4	59.6	13	M16; 25 deep
	750	580	10.4	59.6	13	M16; 25 deep

▼ 152-4



U17	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	125	382	10.4	62	13	M16; 35 deep
	180	406	10.4	62	13	M16; 35 deep
	250	453	10.6	62	13	M16; 22 deep
	260					
	355	482	10.6	62	13	M16; 22 deep
	370					

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

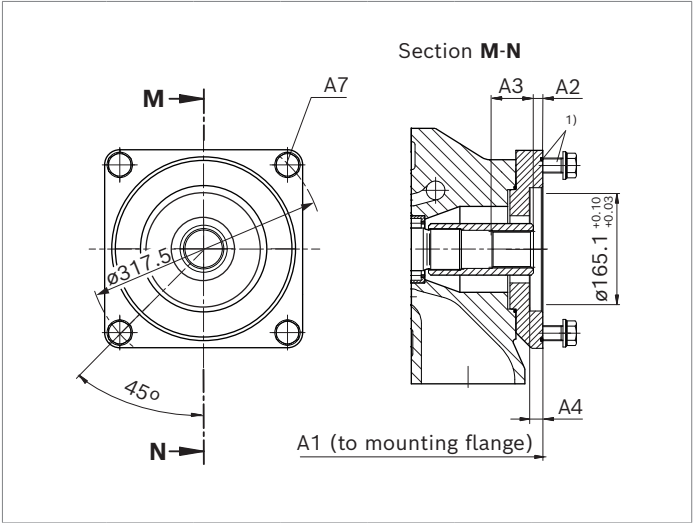
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
165-4 (D)		N50×2×24×8H	–	–	–	–	–	–	●	○	○	K84
		N50×2×24×8H	–	–	–	–	○	●	–	–	–	U84

● = Available ○ = On request – = Not available

▼ 165-4



U84	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	355/ 370	508	24.2	44.9	17	M20; 47 deep

K84	NG	A1	A2	A3	A4	A7 ³⁾⁴⁾
	500	541	12.5	55.5	18	M20; 36 deep

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

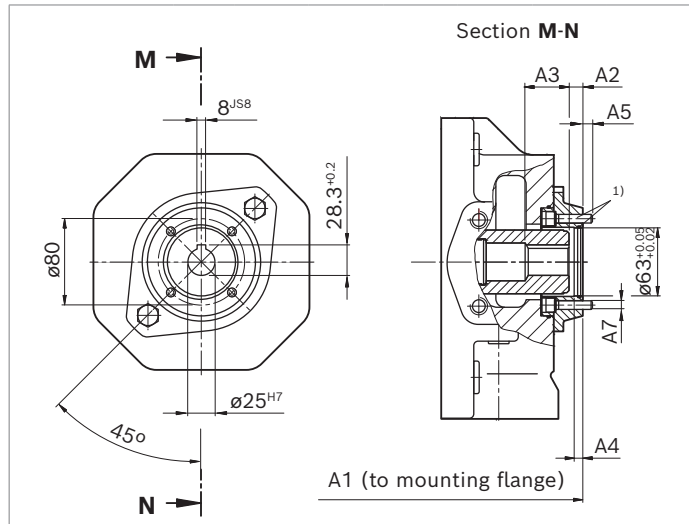
3) Thread according to DIN 13

4) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Flange ISO 3019-1 (SAE)		Hub for splined shaft ²⁾	Availability across sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250 260	355 370	500	750	1000	
ø63		shaft key ø25	●	●	—	—	—	—	○	○	○	K57
		shaft key ø25	—	—	●	●	●	●	—	—	—	U57

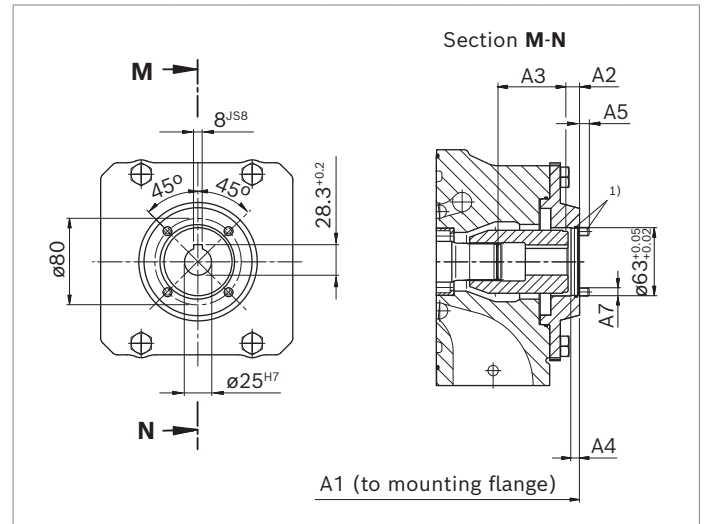
● = Available ○ = On request — = Not available

▼ ø63



K57	NG	A1	A2	A3	A4	A5	A7 ²⁾³⁾
	40	288	11	56	9	9	M8
	71	319	10.9	42	8	9	M8

▼ ø63



U57	NG	A1	A2	A3	A4	A5	A7 ²⁾³⁾
	125	375	10.8	40	8	9	M8
	180	399	10.8	40	8	9	M8
	250	459	10.8	42.6	8	9	M8
	260						
	355/ 370	488	10.8	42.6	8	9	M8

1) Fixing screws and O-ring seal are included in the scope of delivery

2) Thread according to DIN 13

3) Design recommended according to VDI 2230, screw quality 8.8 according to ISO 898-1

Overview of mounting options

Through-drive ¹⁾			Mounting options – 2nd pump						
Flange	Hub for splined shaft	Code	A4VSO/G NG (shaft)	A4CSG NG (shaft)	A10V(S)O/3x NG (shaft)	A10V(S)O/5x NG (shaft)	A10FZO/G NG (shaft)	A10VZO/G NG (shaft)	External/ internal gear pump
Flange ISO 3019-2 (metric)									
80-2	3/4 in ³⁾	K/U B2	–	–	18 (S, R)/31	10 (S)/52	–	–	–
100-2	7/8 in ³⁾	K/U B3	–	–	28 (S, R)/31	–	–	–	–
	1 in ³⁾	K/U B4	–	–	45 (S, R)/31	–	–	–	–
125-2	1 1/4 in ³⁾	K/U B5	–	–	71/88 (S, R)/31	–	–	–	–
	1 1/2 in ³⁾	K/U B6	–	–	100 (S)/31	–	–	–	–
125-4	1 in ³⁾	K/U E1	–	–	45 (S, R)/32	–	–	–	–
	W32 ²⁾	K/U 31	40 (Z)	–	–	–	–	–	–
140-4	W40 ²⁾	K/U 33	71 (Z)	–	–	–	–	–	–
160-4	W50 ²⁾	K/U 34	125 (Z)	–	–	–	–	–	–
	W50 ²⁾	K/U 34	180 (Z)	–	–	–	–	–	–
	1 1/4 in ³⁾	K/U B8	–	–	71 (S, R)/32	–	–	–	–
180-4	1 3/4 in ³⁾	K/U B7	–	–	140 (S)/ 32 180 (S)/ 32	–	–	–	–
	1 1/2 in ³⁾	K/U B9	–	–	100 (S)/32	–	–	–	–
224-4	W60 ²⁾	K/U 35	250/260 (Z)	250/260 (Z)	–	–	–	–	–
	W70 ²⁾	K/U 77	355 (Z) 370 (Z)	355 (Z) 370 (Z)	–	–	–	–	–
315-8	W80 ²⁾	K43	500 (Z)	500 (Z)	–	–	–	–	–
400-8	W90 ²⁾	K76	750 (Z)	750 (Z)	–	–	–	–	–
	W100 ²⁾	K88	1000 (Z)	–	–	–	–	–	–
Flange SAE J 744 (ISO 3019-1)									
82-2 (A) ¹⁾	5/8 in ³⁾	K/U 01	–	–	–	–	–	–	F NG 004 to 022 ⁴⁾
	3/4 in ³⁾	K/U 52	–	–	18 (S, R)/31	10/18 (S, R)	3...10 (S) 11...18 (R)	3...10 (S) 18 (R)	–
101-2 (B) ¹⁾	7/8 in ³⁾	K/U 68	–	–	28 (S, R)/31	28 (S, R)	21...28 (R)	28 (R)	N NG 020 to 032 ⁴⁾
	1 in ³⁾	K/U 04	–	–	45 (S)/31	45 (S, R)	37...45 (R)	45 (R)	PGH4
	1 1/4 in ³⁾	K/U 06	–	–	–	–	63 (R)/10	–	–
127-2 (C) ¹⁾	1 1/4 in ³⁾	K/U 07	–	–	71/88 (S)/31	–	–	–	–
	1 1/2 in ³⁾	K/U 24	–	–	100 (S)/31	85/100 (S)	–	–	PGH5
127-4 (C) ¹⁾	1 in ³⁾	K/U E2	–	–	–	–	–	45 (R)/10	–
	1 1/4 in ³⁾	K/U 15	–	–	–	60/63/72 (S)	–	71 (R)/10	–
	1 1/2 in	K/U 16	71 (S)	–	–	–	–	–	–
152-4 (D) ¹⁾	1 3/4 in ³⁾	K/U 17	–	–	140 (S)/ 32 180 (S)/ 32	–	–	140/180 (S)	–
	1 1/2 in ³⁾	K/U 96	–	–	100 (S)/32	–	–	100 (S)	–
ø63-4, metr.	shaft key ø25	K/U 57	–	–	–	–	–	–	R4

¹⁾ Additional through drives are available on request

²⁾ According to DIN 5480

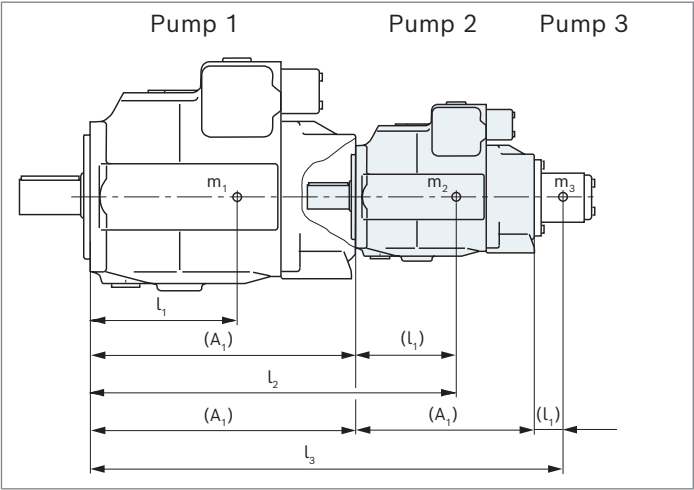
³⁾ Splined shaft in accordance with SAE J744

⁴⁾ Bosch Rexroth recommends special versions of the external gear pumps. Please contact us.

Permissible mass moment of inertia

Based on mounting flange on primary pump

Size			40	71	125	180	250	260	355	370	500	750	1000
Permissible moment of inertia	$M_{m \text{ perm.}}$	Nm	1800	2000	4200	4200	9300	9300	9300	9300	15600	19500	19500
Permissible moment of inertia for dynamic mass acceleration 10 g (= 98.1 m/s ²)	$M_{m \text{ perm.}}$	Nm	180	200	420	420	930	930	930	930	1560	1950	1950
Weight (A4VSO...DR)	m	kg	39	53	88	102	184	184	207	207	320	460	605
Distance from center of gravity	l_1	mm	120	140	170	180	210	210	220	220	230	260	290



m_1, m_2, m_3	Weight of pump	[kg]
l_1, l_2, l_3	Distance from center of gravity	[mm]

$$M_m = (m_1 \times l_1 + m_2 \times l_2 + m_3 \times l_3) \times \frac{1}{102} \text{ [Nm]}$$

Calculation for multiple pumps	
l_1	front pump distance from center of gravity (value from "Permissible moment of inertia" table)
l_2	dimension "A ₁ " from through-drive drawings (from page 46) + l_1 of the 2nd pump
l_3	dimension "A ₁ " from through-drive drawings (from page 46) of the 1st pump + "A ₁ " of the 2nd pump + l_1 of the 3rd pump

Combination pumps A4VSO + A4VSO

Total length A

A4VSO (1st pump)	A4VSO...DR...N00 (2nd pump)										
	NG 40	NG 71	NG 125	NG 180	NG 250	NG260	NG 355	NG 370	NG 500	NG 750	NG 1000
NG 40	554	–	–	–	–	–	–	–	–	–	–
NG 71	582	611	–	–	–	–	–	–	–	–	–
NG 125	635	664	724	–	–	–	–	–	–	–	–
NG 180	659	688	748	768	–	–	–	–	–	–	–
NG 250	719	748	808	828	904	–	–	–	–	–	–
NG 260	719	748	808	828	904	904	–	–	–	–	–
NG 355	748	777	837	857	933	933	962	–	–	–	–
NG 370	748	777	837	857	933	933	962	962	–	–	–
NG 500	771	800	860	880	976	976	1005	1005	1110	–	–
NG 750	821	850	910	930	1026	1026	1055	1055	1160	1214	–
NG 1000	o	923	983	1003	1099	1099	1128	1128	1233	1288	1368

o = On request

By using combination pumps, the user can also gain access to independent circuits without the need for splitter gearboxes.

When ordering combination pumps the type designations for the 1st and 2nd pump must be joined by a "+" and are combined into one part number. Each single pump should be ordered according to type code.

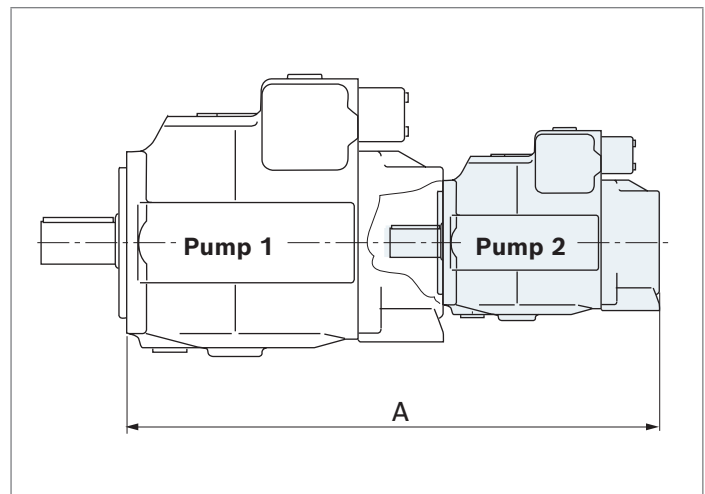
Example:

A4VSO 180DFR/30R-VPD25UB7+

A4VSO 180DR/30R-VPD25N00

A tandem pump, with two pumps of equal size, is permissible without additional supports, assuming that the dynamic mass acceleration does not exceed the maximum of 10 g (= 98.1 m/s²).

For combination pumps consisting of more than two pumps, the mounting flange must be calculated for the permissible mass torque and support if necessary.



Notice

- The combination pump type code is shown in shortened form in the order confirmation.

Example:

A4VSO 250LR2D/30R+A4VSO 250LR2D/30R

- Each through-drive is plugged with a **non-pressure-resistant** cover. Therefore, the units must be fitted with a pressure-resistant cover or a specified attachment pump before commissioning.

Installation instructions

General

The axial piston unit must be filled with hydraulic fluid and air bled during commissioning and operation. This must also be observed following a longer standstill as the axial piston unit may empty via the hydraulic lines. Filling and air bleeding must be carried out completely, particularly in the installation position "drive shaft upwards," as there is e.g. a danger of dry running. The leakage in the housing area must be directed to the reservoir via the highest drain port (**T**, **K₁**, **K₂**, **R(L)**). For combination pumps, the leakage must be drained off at each single pump.

If a shared drain line is used for several units, make sure that the respective case pressure in each unit is not exceeded. The shared drain line must be dimensioned to ensure that the maximum permissible case pressure of all connected units is not exceeded in any operating condition, particularly at cold start. If this is not possible, separate drain line must be laid.

To prevent the transmission of structure-borne noise, use elastic elements to decouple all connecting lines from all vibration-capable components (e.g. reservoir, frame parts). Under all operating conditions, the suction lines and the drain lines must flow into the reservoir below the minimum fluid level. The permissible suction height h_s results from the total pressure loss. However, it must not be higher than $h_{s \max} = 800 \text{ mm}$ sein. The minimum suction pressure at port **S** must also not fall below 0.8 bar absolute (without charge pump) or 0.7 bar absolute (with charge pump) during operation and during a cold start.

When designing the reservoir, ensure that there is adequate distance between the suction line and the drain line. We recommend using a baffle (baffle plate) between suction line and drain line. A baffle improves the air separation ability as it gives the hydraulic fluid more time for desorption. Apart from that, this prevents the heated return flow from being drawn directly back into the suction line. The suction port must be supplied with air-free, calmed and cooled hydraulic fluid.

Notice

In certain installation positions, an influence on the adjustment or control can be expected. Gravity, dead weight and case pressure can cause minor characteristic shifts and changes in actuating time.

Installation position

See the following examples **1** to **7**.

Further installation positions are available upon request.

Recommended installation position: **1** and **2**

Key	
R(L) (F)	Filling / air bleeding
S	Suction port
T	Drain port
U	Flushing port
K₁, K₂	Drain port
SB	Baffle (baffle plate)
$h_{t \min}$	Minimum required immersion depth (200 mm)
$h_{\min}$	Minimum required distance to reservoir bottom (100 mm)
$h_{s \max}$	Maximum permissible suction height (800 mm)

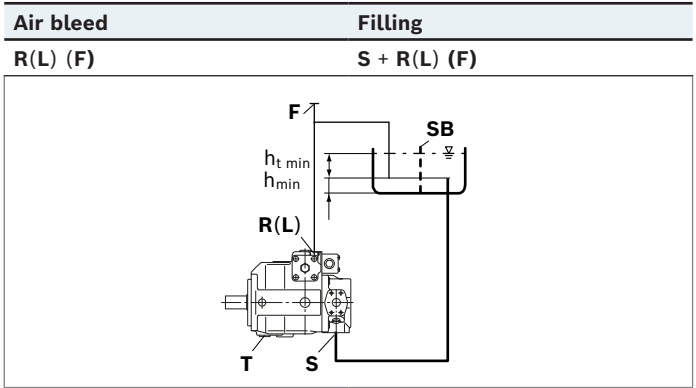
Notice

Port **F** is part of the external piping and must be provided on the customer side to make filling and air bleeding easier.

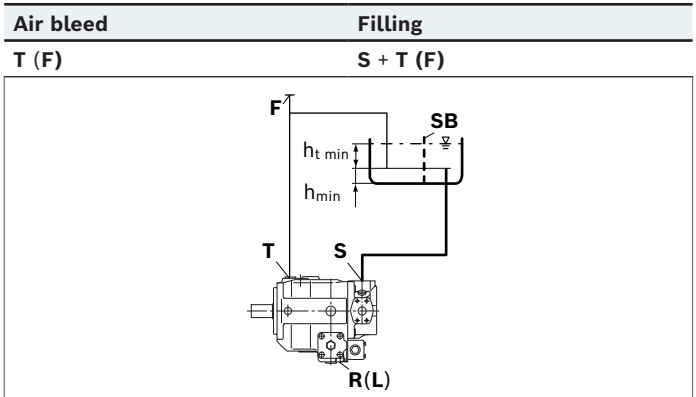
Below-reservoir installation (standard)

Below-reservoir installation means that the axial piston unit is installed outside of the reservoir below the minimum fluid level.

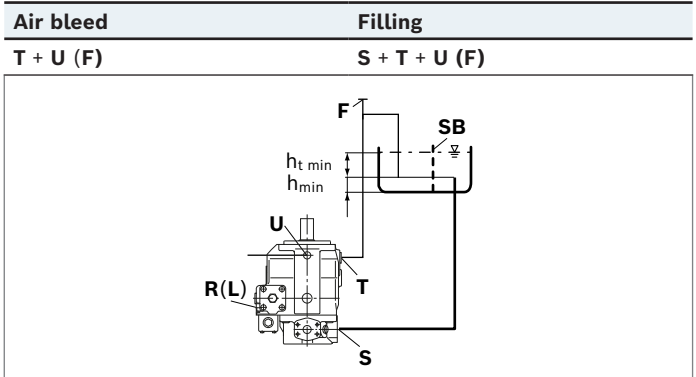
▼ Installation position 1



▼ Installation position 2



▼ Installation position 3



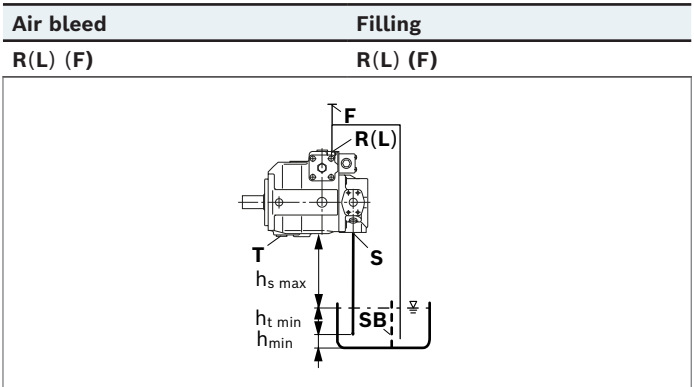
For key, see page 77

Above-reservoir installation

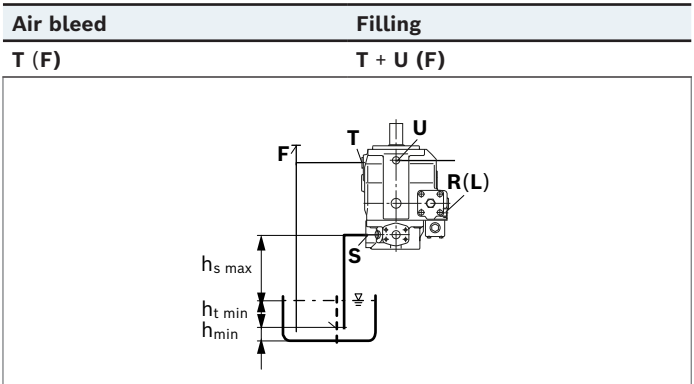
Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir. Observe the maximum permissible suction height $h_{s\ max} = 800\ mm$.

The above-reservoir installation is not recommended for sizes 180 to 1000 and is not permissible for units with charge pump (A4VSLO).

▼ Installation position 4



▼ Installation position 5



Inside-reservoir installation

Inside-reservoir installation is when the axial piston unit is installed in the reservoir below the minimum fluid level. The axial piston unit is completely below the hydraulic fluid if the minimum fluid level is equal to or below the upper edge of the pump, see chapter "**Above-reservoir installation**".

Axial piston units with electric components (e.g. electric controls, sensors) must not be installed in a reservoir below the fluid level.

The exception is control HS5M

The proportional valve which is not included in scope of delivery can be positioned outside the reservoir in the system and piped up via the provided ports **X₁** and **X₂** of the pump.

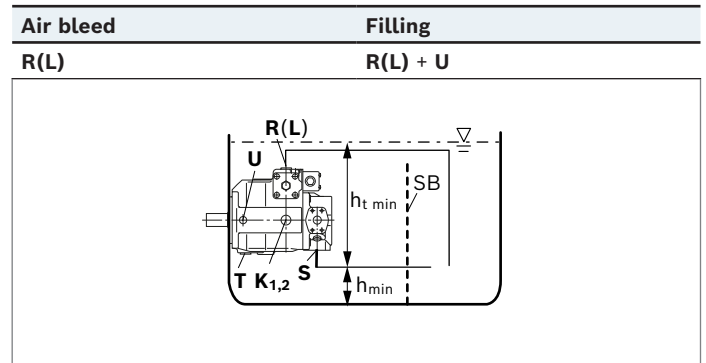
The unit can be installed in the reservoir together with the position transducer mounted at the pump.

Approved for HLP fluids according to DIN 51524 only.

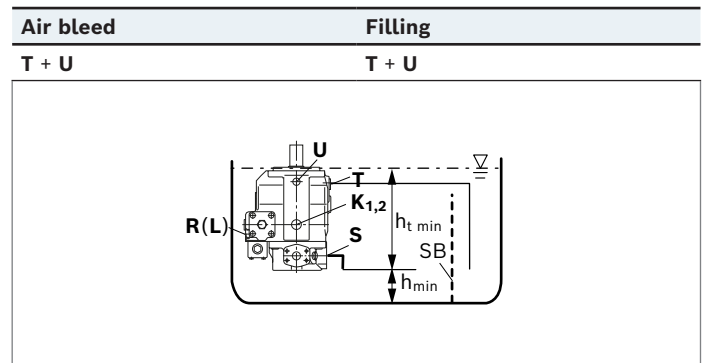
Notice

- We recommend to provide the suction port **S** with a suction pipe and for the drain port **T** or **R(L)** to be piped. In this case, the other drain port must be plugged. The housing of the axial piston unit is to be filled via **R(L)** or **T** (see installation position 7 to 9) before the pipework is fitted and the reservoir is filled with hydraulic fluid.

▼ Installation position 6



▼ Installation position 7



For key, see page 77

1) For the high-speed version, **P_{HD}** must be filled.

Project planning notes

- ▶ The axial piston variable pump A4VSO is intended to be used in an open circuit.
- ▶ The project planning, installation and commissioning of the axial piston unit requires the involvement of skilled personnel.
- ▶ Before using the axial piston unit, please read the corresponding operating instructions completely and thoroughly. If necessary, this can be requested from Bosch Rexroth.
- ▶ Before finalizing your design, please request a binding installation drawing.
- ▶ The specified data and notes contained herein must be observed.
- ▶ Depending on the operating conditions of the axial piston unit (working pressure, fluid temperature), the characteristic curve may shift.
- ▶ The characteristic curve may also shift due to the dither frequency or control electronics.
- ▶ Preservation: Our axial piston units are supplied as standard with preservation protection for a maximum of 12 months. If longer preservation protection is required (maximum 24 months), please contact us. The preservation periods apply under optimal storage conditions, details of which can be found in the data sheet 90312 or the operating instructions.
- ▶ Not all configuration variants of the product are approved for use in a safety function according to ISO 13849. Please consult the responsible contact at Bosch Rexroth if you require reliability parameters (e.g., $MTTF_d$) for functional safety.
- ▶ Depending on the type of control used, electromagnetic effects can be produced when using solenoids. Applying a direct voltage signal (DC) to solenoids does not create electromagnetic interference (EMI) nor is the solenoid affected by EMI. Electromagnetic interference (EMI) potential exists when operating and controlling a solenoid with a modulated direct voltage signal (e.g. PWM signal). Appropriate testing and measures should be taken by the machine manufacturer to ensure other components or operators (e.g. with pacemaker) are not affected by this potential.
- ▶ Pressure control (hydraulic or electronic) is not an adequate safeguard against pressure overload. A pressure relief valve should therefore be provided in the hydraulic system. In this connection, observe the technical limits of the pressure relief valve.
- ▶ For controllers requiring external pilot pressure, sufficient control fluid must be provided to the associated ports to ensure the required pilot pressures for the respective controller function. These controllers are subject to leakage due to their design. An increase in control fluid demand has to be anticipated over the total operating time. The design of the control fluid supply must thus be sufficiently large. If the control fluid is too low, the respective controller function may be impaired and undesired system behavior may result.
- ▶ For drives that are operated for a long period of time with constant rotational speed, the natural frequency of the hydraulic system can be stimulated by the excitation frequency of the pump (rotational speed frequency x9). This can be prevented with suitably designed hydraulic lines.
- ▶ Please note the information regarding the tightening torques of port threads and other screw connections in the operating instructions.
- ▶ The ports and fastening threads are designed for the p_{max} permissible pressures of the respective ports, see the connection tables. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified conditions of use (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.
- ▶ The service ports and function ports are only intended to accommodate hydraulic lines.
- ▶ Abrupt closing of valves in the hydraulic system may cause pressure surges in pressure lines and/or control lines (water hammer effect). These pressure surges may reduce the service life of the pump already above a pressure in the working line of p_{max} 380 bar. In this case, please contact us.

Safety instructions

- ▶ During and shortly after operation, there is a risk of getting burnt on the axial piston unit and especially on the solenoids. Take the appropriate safety measures (e.g. by wearing protective clothing).
- ▶ Moving parts in control equipment (e.g. valve spools) can, under certain circumstances, get stuck in position as a result of contamination (e.g. contaminated hydraulic fluid, abrasion, or residual dirt from components). As a result, the hydraulic fluid flow and the build-up of torque in the axial piston unit can no longer respond correctly to the operator's specifications. Even the use of various filter elements (external or internal flow filtration) will not rule out a fault but merely reduce the risk. The machine/system manufacturer must test whether remedial measures are needed on the machine for the application concerned in order to bring the driven consumer into a safe position (e.g. safe stop) and ensure any measures are properly implemented.

Related documentation

Product-specific documentation

Document type	Title	Document number
Data sheet	Axial piston variable pump A4VSO series 1X and 30 for HFC hydraulic fluids	92053
	Axial piston units with DS2 secondary control A4VSO series 10 and 30	92057
	Axial piston units with DS3 secondary control A4VSO series 10 and 30	92059
	Control systems DR, DP, FR and DFR for axial piston variable pump A4VSO	92060
	A4VSO, A4VBO power controller LR2, LR3 and LR2N, LR3N	92064
	Control systems MA and EMA... for axial piston variable pump A4VSO and A4VSG	92072
	Control devices HM, HS5 and EO series 1x and 30	92076
	Control devices HD	92080
	Electrohydraulic control A4VSG, A4CSG with proportional solenoid EP and A4VSO with electrical two point control EZ and EZZ	92084 in peperation
	Electrohydraulic control system DFE1x for axial piston variable pumps A4VSO and A4VBO series 1x und 3x	92088
	Pressure and flow control system Type SYHDFEE, SYHDFED, SYHDFEF	30035
	Universal through drive for axial piston variable pumps A10VSO, A10VO, A10VZO, A4VSO, A4VBO, A15VSO/A15VLO and A15V(L)O	95581
	Storage and preservation of axial piston units	90312
Operating instructions	Axial piston variable pump A4VSO Series 1, 2 and 3	92050-01-B

Documentation for hydraulic fluids

Document type	Title	Document number
Data sheet	Hydraulic fluids based on mineral oils and related hydrocarbons	90220
	Environmentally acceptable hydraulic fluids	90221
	Fire-resistant, water-free hydraulic fluids (HFDR/HF DU)	90222
	Fire-resistant, water-containing hydraulic fluids (HFAX, HFB, HFC)	90223
	Rating of hydraulic fluids used in Rexroth hydraulic components (pumps and motors)	90235
	Bosch Rexroth Fluid Rating List for Rexroth hydraulic components (pumps and motors)	90245