

Axial piston variable pump (A)A4VSO Serie 1X and 30

Americas



- ▶ Robust high-pressure pump for industrial applications
- ▶ Size 40 ... 1000
- ▶ Nominal pressure 5100 psi (350 bar)
- ▶ Maximum pressure 5800 psi (400 bar)
- ▶ Open circuit

Features

- ▶ Variable pump with axial piston rotary group of swash-plate 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 swash-plate angle.
- ▶ Excellent suction performance
- ▶ Low noise level
- ▶ Long service life
- ▶ Modular design
- ▶ Variable through drive options
- ▶ Visual swivel angle indicator
- ▶ Freely variable installation position
- ▶ Suitable for variable-speed drives
- ▶ HF mode for reduced data possible for HFC mode, special version available

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Supplementary information, see separate data sheets:

- 92053 (A4VSO for HFC hydraulic fluids)
- 92057 (DS2)
- 92060 (DR, DP, FR and DFR)
- 92064 (LR2.., LR3.., LR2..N and LR3..N)
- 92072 (EM and MA)
- 92076 (HM.., HS.., EO..)
- 92080 (HD..)
- 92088 (DFE1)

Type code

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

Hydraulic fluid		40	71	125	180	250	355	500	750	1000	
01	Mineral oil and HFD hydraulic fluids (no code)	●	●	●	●	●	●	●	●	●	
	HFA, HFB and HFC hydraulic fluids ¹⁾	●	-	-	-	-	-	●	-	-	E
	High-speed version	-	●	-	○	●	●	●	-	-	H

Axial piston unit		40	71	125	180	250	355	500	750	1000		
02	Swashplate design, variable, nominal pressure 5100 psi (350 bar), maximum pressure 5800 psi (400 bar)	SAE	●	●	●	●	●	●	-	-	-	AA4VS
		Metric	-	-	-	-	-	-	●	●	●	A4VS

Charge pump		40	71	125	180	250	355	500	750	1000	
03	without charge pump (without code)	●	●	●	●	●	●	●	●	●	
	With charge pump, only with connection plate 25 (see position 12)	-	-	-	-	-	-	-	●	-	L

Operating mode													
04	Pump, open circuit												O

Size (NG)		40	71	125	180	250	355	500	750	1000
05	Geometric displacement, see "Technical data" on page 9									

Control device		Data sheet	40	71	125	180	250	355	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, control volume dependent	92076	●	●	●	●	●	●	●	●	●	HM..
	Hydraulic control with servo/proportional valve		●	●	●	●	●	●	●	●	●	HS.. ²⁾
	Electronic control		●	●	●	●	●	●	●	●	●	EO.. ²⁾
	Hydraulic control, pressure dependent	92080	●	●	●	●	●	●	●	●	●	HD.. ²⁾
	Secondary closed loop pressure control	92057	●	●	●	●	●	●	●	●	●	DS.. ²⁾
	Electro-hydraulic control system DFE1	92088	●	●	●	●	●	●	-	-	-	DFE1.. ²⁾
System solution SYHDFEE	30035											

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

● = Available ○ = On request - = Not available

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 adjustments and/or fitted valves.

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

Directions of rotation										40 ... 1000			
08	Viewed on drive shaft	clockwise									R		
		counter-clockwise									L		

Sealing material										40 71 125 180 250 355 500 750 1000									
09	NBR (nitrile rubber), shaft seal made of FKM (fluoroelastomer)								●	●	●	●	●	●	●	●	●	●	P
	FKM (fluoroelastomer) / HFD operation								●	●	●	●	●	●	●	●	●	●	V
	Special version for HFC mode, see data sheet 92053								-	●	●	●	●	●	-	-	-	-	F.

Drive shaft										40 71 125 180 250 355 500 750 1000									
10	Parallel keyed shaft ISO 3019-1								●	●	●	●	●	-	-	-	-	-	K
	Splined shaft ANSI B92.1a								●	●	●	●	●	●	-	-	-	-	S
	Splined shaft similar to ANSI B92.1a								-	-	-	-	-	●	-	-	-	R	
	Parallel keyed shaft DIN 6885								-	-	-	-	-	-	●	●	●	P	
	Splined shaft DIN 5480								-	-	-	-	-	-	●	●	●	Z	

Mounting flange										40 71 125 180 250 355 500 750 1000									
11	According to ISO 3019-1 (SAE J744)	4-hole								●	●	●	●	●	-	-	-	-	D
	According to ISO 3019-2 (Metric)	8-hole								-	-	-	-	-	-	●	●	●	H







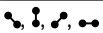
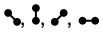



Working port										40 71 125 180 250 355 500 750 1000									
12	Connections B and S : Lateral SAE flange, offset 90°, (only orderable without through drive (N00) or with K.. through drives)	UNC fastening thread								●	●	●	●	●	-	-	-	-	63
	Connections B and S : Lateral SAE flange, offset 90°, 2 nd Pressure ports B ₁ , opposite B plugged with flange plate on delivery	UNC fastening thread								●	●	●	●	●	-	-	-	-	75
		Metric fastening thread								-	-	-	-	-	-	●	●	●	25

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4 **(A)A4VSO Serie 1X and 30** | Axial piston variable pump
Type code

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

Through drive (for mounting options, see page 65)

13	Flange ISO 3019-2 (metric)		Hub for splined shaft												
	Diameter	Attachment Diameter			40	71	125	180	250	355	500	750	1000		
	Without through drive				●	●	●	●	●	●	●	●	●	●	N00
	With through drive				●	●	-	-	-	-	●	●	●	●	K...
	Without conversion option				-	-	●	●	●	●	-	-	-	-	U...
	For universal through drive, see data sheet 95581				-	-	●	●	●	●	-	-	-	-	U...
	125, 4-hole		32x2x14x9g ³⁾		-	-	-	-	-	-	●	●	○	31	
	140, 4-hole		40x2x18x9g ³⁾		-	-	-	-	-	-	●	●	○	33	
	160, -4-hole		50x2x24x9g ³⁾		-	-	-	-	-	-	●	●	○	34	
	224, 4-hole		60x2x28x9g ³⁾		-	-	-	-	-	-	●	●	○	35	
			70x3x22x9g ³⁾		-	-	-	-	-	-	-	●	○	●	77
	315, 8-hole		80x3x25x9g ³⁾		-	-	-	-	-	-	●	●	●	43	
			90x3x28x9g ³⁾		-	-	-	-	-	-	-	-	●	●	76
			100x3x32x9g ³⁾		-	-	-	-	-	-	-	-	●	88	
	80, 2-hole		3/4 in	11T 16/32DP ⁴⁾	-	-	-	-	-	-	○	○	○	B2	
	100, 2-hole		7/8 in	13T 16/32DP ⁴⁾	-	-	-	-	-	-	○	○	○	B3	
			1 in	15T 16/32DP ⁴⁾	-	-	-	-	-	-	-	●	○	○	B4
	125, 4-hole		1 in	15T 16/3 2DP ⁴⁾	-	-	-	-	-	-	○	○	○	E1	
	125, 2-hole		1 1/4 in	14T 12/24DP ⁴⁾	-	-	-	-	-	-	●	○	○	B5	
			1 1/2 in	17T 12/24DP ⁴⁾⁾	-	-	-	-	-	-	-	○	○	○	B6
	160, 4-hole		1 1/4 in	14T 12/24DP ⁴⁾	-	-	-	-	-	-	○	○	○	B8	
	180, 4-hole		1 1/2 in	17T 12/24DP ⁴⁾	-	-	-	-	-	-	○	○	○	B9	
			1 3/4 in	13T 8/16DP ⁴⁾	-	-	-	-	-	-	-	○	○	○	B7
	Flange ISO 3019-1 (SAE)		Hub for splined shaft												
	Diameter		Attachment Diameter		40	71	125	180	250	355	500	750	1000		
	82-2 (A)		5/8 in	9T 16/32DP ⁴⁾	●	●	●	●	●	●	●	●	○	01	
			3/4 in	11T 16/32DP ⁴⁾	●	●	●	●	●	●	●	○	○	○	52
	101-2 (B)		7/8 in	13T 16/32DP ⁴⁾	●	●	●	●	●	●	●	●	○	68	
			1 in	15T 16/32DP ⁴⁾⁾	●	●	●	●	●	●	●	●	○	○	04
			1 1/4 in	14T 12/24DP ⁴⁾	-	●	○	○	○	○	○	○	○	○	06
	127-4 (C)		1 in	15T 16/32DP ⁴⁾	○	●	●	●	○	○	○	○	○	E2	
			1 1/4 in	14T 12/24DP ⁴⁾	-	●	●	●	●	●	●	●	○	○	15
	127-2 (C)		1 1/4 in	14T 12/24DP ⁴⁾	-	●	●	●	●	●	●	●	○	07	
			1 1/2 in	17T 12/24DP ⁴⁾	-	-	●	●	●	●	●	●	●	●	24
	152-4 (D)		1 1/2 in	17T 12/24DP ⁴⁾	-	-	●	●	●	●	○	○	○	96	
			1 3/4 in	13T 8/16DP ⁴⁾	-	-	●	●	●	●	●	●	○	17	
			2 in	15T 8/16DP ⁴⁾	-	-	-	●	●	●	-	-	-	78	
	165-4 (E)		2 in	15T 8/16DP ⁴⁾	-	-	-	-	●	●	-	-	-	18	
			N50x2x24x9g ³⁾		-	-	-	-	○	○	●	○	○	84	
	Ø 63, metr.4-hole		for keyed shaft Ø 25		●	●	●	●	●	●	○	○	○	57	
	Prepared for through drive, with pressure-resistant plugged cover				●	●	●	●	●	●	●	●	●	99	

● = Available ○ = On request - = Not available

- 3) Splined hub according to DIN 5480
- 4) Hub for splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
- 5) For size 500, only available with DS control; for HS, see data sheet 92076.

01	02	03	04	05	06	07	08	09	10	11	12	13	14
	(A)A4VS	0			/			-					

Filtration (parameter only with HS and DS control)

		40	71	125	180	250	355	500	750	1000	
14	Without filter	•	•	•	•	•	•	•	•	•	N
	Intermediate plate filter (for HS- and DS-control, see data sheet 92076 and 92057)	•	•	•	•	•	•	• ⁵⁾	-	-	Z

• = Available ◦ = On request - = Not available

Notice

- ▶ Observe the project planning notes (page 68).
- ▶ In addition to the type code, please specify the relevant technical data when placing your order.
- ▶ For notes on combination pumps, see page 65

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 fluids 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)
- ▶ 90235 Assessment of hydraulic fluids used in Rexroth hydraulic components (pumps and motors)
- ▶ 90245 Bosch Rexroth fluid rating list for Rexroth hydraulic components (pumps and motors)
- ▶ 90223: Fire-resistant, water-containing hydraulic fluids (HFAx, HFB, HCF)

Selection of hydraulic fluid

Bosch Rexroth evaluates hydraulic fluids using the Fluid Rating according to data sheet 90235.

Hydraulic fluids rated positive in the Fluid Rating can be found in the following data sheet:

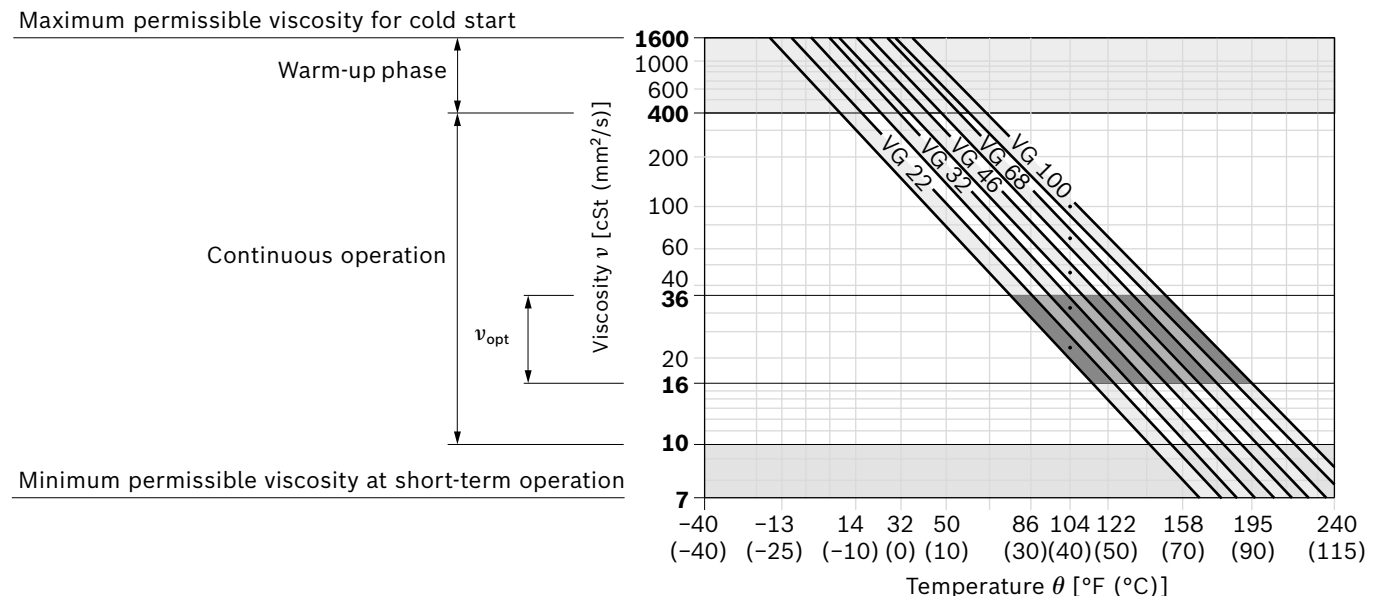
- ▶ 90245: Bosch Rexroth Fluid Rating List for Rexroth hydraulic components (pumps and motors)

The hydraulic fluid should be selected so 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 ³⁾	Comment
Cold start	$v_{max} \leq 1600 \text{ cSt (mm}^2/\text{s)}$	NBR ²⁾	$\theta_{St} \geq -40 \text{ }^\circ\text{F (-40 }^\circ\text{C)}$	$t \leq 3 \text{ min, without load (} p \leq 725 \text{ psi), } n \leq 1000 \text{ rpm}$ Permissible temperature difference between axial piston unit and hydraulic fluid in the system maximum 25 K
		FKM	$\theta_{St} \geq -13 \text{ }^\circ\text{F (-25 }^\circ\text{C)}$	
Warm-up phase	$v = 1600 \dots 400 \text{ cSt (mm}^2/\text{s)}$			$t \leq 15 \text{ min, } p \leq 0.7 \times p_{nom} \text{ and } n \leq 0.5 \times n_{nom}$
Continuous operation	$v = 400 \dots 10 \text{ cSt (mm}^2/\text{s})^1)$	NBR ²⁾	$\theta \leq +185 \text{ }^\circ\text{F (+85 }^\circ\text{C)}$	measured at port T
		FKM	$\theta \leq +230 \text{ }^\circ\text{F (+110 }^\circ\text{C)}$	
	$v_{opt} = 36 \dots 16 \text{ cSt (mm}^2/\text{s)}$			Range of optimum operating viscosity and efficiency
Short-term operation	$v_{min} = 10 \dots 7 \text{ cSt (mm}^2/\text{s)}$	NBR ²⁾	$\theta \leq +185 \text{ }^\circ\text{F (+85 }^\circ\text{C)}$	$t \leq 3 \text{ min, } p \leq 0.3 \times p_{nom}$, measured at port T
		FKM	$\theta \leq +230 \text{ }^\circ\text{F (+110 }^\circ\text{C)}$	

▼ Selection diagram



1) This corresponds, for example on VG 46, to a temperature range of +4 °C to +85 °C (see selection diagram)

2) Special Version please contact us.

Bosch Rexroth AG, RE-A 92050/2020-02-28

3) If the temperature at extreme operating parameters cannot be adhered to, 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 cSt (mm²/s) (e.g. due to high temperatures during short-time duty) at the drain port, a cleanliness level of at least 19/17/14 according to ISO 4406 is required.

For example, the viscosity corresponds to 10 cSt (mm²/s):

- HLP 32 a temperature of 163 °F (73 °C)
- HLP 46 a temperature of 185 °F (85 °C)

Bearing flushing

For the following operating conditions bearing flushing is required for a safe, continuous operation:

- Applications with special fluids (not mineral fluids) due to limited lubricity and narrow operating temperature range
- Operation with borderline conditions for temperature and viscosity during operation with 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:

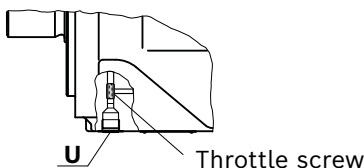
NG	40	71	125	180	250	355	500	750	1000
q_{Sp} gpm	0.8	1.0	1.3	1.8	2.6	4.0	5.3	7.9	10.6
q_{Sp} (l/min)	(3)	(4)	(5)	(7)	(10)	(15)	(20)	(30)	(40)

For the flushing flows stated, there is a pressure differential of about 30 or 45 psi (2 or 3 bar) between port **U** (including fitting) and the drain chamber (series 1x and series 3x, respectively).

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

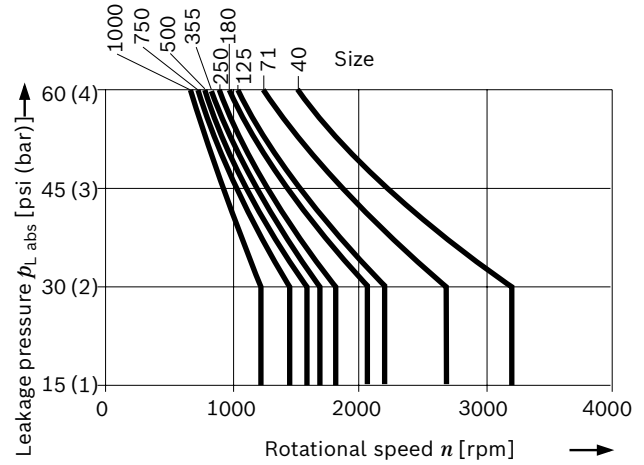
Notice regarding series 30

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



Leakage pressure

The permissible leakage pressure (case pressure) depends on the rotational speed (see diagram).



Maximum leakage pressure (case pressure)	
$p_{L, abs max}$	60 psi (4 bar) absolute

These data are guideline figures; a restriction may be necessary under certain operating conditions.

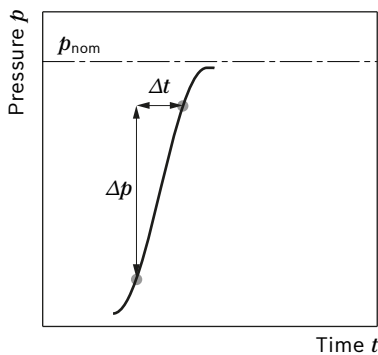
Flow direction

S to B

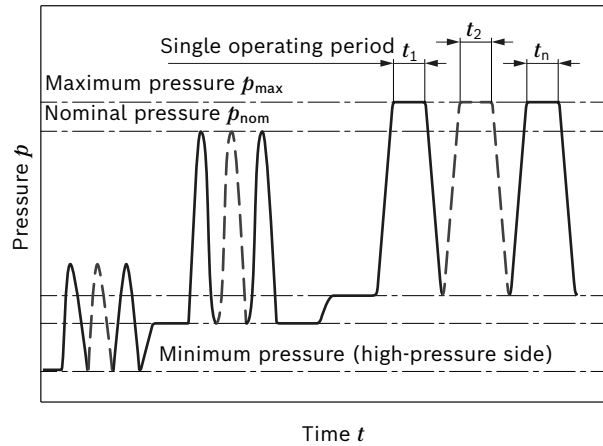
Working pressure range

Pressure at working port B		Definition
Nominal pressure p_{nom}	5100 psi (350 bar)	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}	5800 psi (400 bar)	The maximum pressure corresponds to the maximum working pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period (maximum number of cycles: approx. 1 million).
maximum Single operating period	1 s	
Total operating period	300 h	
Minimum pressure $p_{B abs}$ (High-pressure side)	220 psi (15 bar) ¹⁾	Minimum pressure on the high-pressure side (B) which is required in order to prevent damage to the axial piston unit. The minimum pressure depends on the rotational speed and the swivel angle.
Rate of pressure change $R_{A max}$	232000 psi /s (16000 bar/s)	Maximum permissible pressure build-up and reduction speed 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 required pressure is dependent on the rotational speed and displacement of the axial piston unit (see diagram "Maximum permissible speed" on page 11).
Minimum pressure $p_{S min}$	≥ 12 psi (0.8 bar) absolute	
Maximum pressure $p_{S max}$	≤ 435 psi (30 bar)	
Case pressure at port T, K ₁ , K ₂ , R(L)		
Maximum static pressure $p_{L max}$	60 psi (4 bar)	Maximum 17 psi (1.2 bar) higher than inlet pressure at port S, but not higher than $p_{L max}$. A drain line to the reservoir is required.
Pressure peaks $p_{L peak}$	90 psi (6 bar)	$t < 0.1$ s

▼ Rate of pressure change $R_{A max}$



▼ Pressure definition



$$\text{Total operating period} = t_1 + t_2 + \dots + t_n$$

1) Lower values on request

Technical data

Standard rotary group version

Size	NG		40	71	125	180	250	355	500	750	750 ⁵⁾	1000	
Geometric displacement per revolution	$V_{g \max}$	in ³	2.44	4.33	7.63	11.0	15.26	21.7	30.51	45.8	45.8	61.2	
		(cm ³)	(40)	(71)	(125)	(180)	(250)	(355)	(500)	(750)	(750)	(1000)	
Rotational speed maximum ¹⁾	at $V_{g \max}$ ²⁾	n_{nom}	rpm	2600	2200	1800	1800	1500	1500	1320	1200	1500	1000
		at $V_g \leq V_{g \max}$ ³⁾	n_{max}	rpm	3200	2700	2200	2100	1800	1700	1600	1500	1500
Flow	at n_{nom} and $V_{g \max}$	q_v	gpm	27.5	41.2	59.4	85.6	99	140	174	237.9	297.2	264.1
			(l/min)	(104)	(156)	(225)	(324)	(375)	(533)	(660)	(900)	(1125)	(1000)
Power	at n_{nom} , $V_{g \max}$ and $\Delta p = 5100$ psi (350 bar)	P	HP	81	122	176	254	294	417	518	708	885	781
			(kW)	(61)	(91)	(131)	(189)	(219)	(311)	(385)	(525)	(656)	(583)
Torque	at $V_{g \max}$ and $\Delta p = 5100$ psi (350 bar) ²⁾	M_{max}	lb-ft	165	292	516	744	1032	1467	2063	3097	3097	4104
			(Nm)	(223)	(395)	(696)	(1002)	(1391)	(1976)	(2783)	(4174)	(4174)	(5665)
	and $\Delta p = 1450$ psi (100 bar) ²⁾	M	lb-ft	47	83	147	211	294	417	586	880	880	1172
			(Nm)	(64)	(113)	(199)	(286)	(398)	(564)	(795)	(1193)	(1193)	(1590)
Rotary stiffness of drive shaft	Shaft end K	c	klb-ft/rad	57	106	175	235	322	592	-	-	-	-
			(kNm/rad)	(79)	(146)	(241)	(323)	(443)	(814)				
	Shaft end S	c	klb-ft/rad	49	92	141	202	267	-	-	-	-	-
			(kNm/rad)	(67)	(126)	(194)	(278)	(368)					
	Shaft end R	c	klb-ft/rad	-	-	-	-	-	345	-	-	-	-
(kNm/rad)								(475)					
Shaft end P	c	klb-ft/rad	-	-	-	-	-	-	832	1352	1352	1985	
		(kNm/rad)							(1145)	(1860)	(1860)	(2730)	
Shaft end Z	c	klb-ft/rad	-	-	-	-	-	-	826	1317	1317	2068	
		(kNm/rad)							(1136)	(1812)	(1812)	(2845)	
Moment of inertia	J_{TW}	lb-ft ²	0.116	0.287	0.712	1.305	2.276	4.509	7.809	15.66	15.66	28.47	
		(kgm ²)	(0.0049)	(0.0121)	(0.03)	(0.055)	(0.0959)	(0.19)	(0.3325)	(0.66)	(0.66)	(1.20)	
Maximum angular acceleration ⁴⁾	α	rad/s ²	17000	11000	8000	6800	4800	3600	2800	2000	2000	1450	
Case volume	V	gal	0.5	0.6	1.3	1.0	2.6	2.1	3.7	5.0	5.8	7.13	
		(l)	(2)	(2.5)	(5)	(4)	(10)	(8)	(14)	(19)	(22)	(27)	
Weight (without through drive) approx.	m	lbs	86	117	194	225	406	456	705	1014	1080	1333	
		(kg)	(39)	(53)	(88)	(102)	(184)	(207)	(320)	(460)	(490)	(605)	

1) The values are applicable:

- to the optimum viscosity range from $v_{\text{opt}} = 36$ to 16 cSt (mm²/s)
- with hydraulic fluid based on mineral oils

2) The values apply at absolute pressure $p_{\text{abs}} = 15$ psi (1 bar) at suction port **S**.

3) Maximum rotational speed (speed limit) when increasing the inlet pressure p_{abs} at suction port **S** and $V_g < V_{g \max}$, see diagram on page 11.

4) 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 connecting parts must be considered.

5) With charge pump (A4VSLO)

High-speed rotary group version

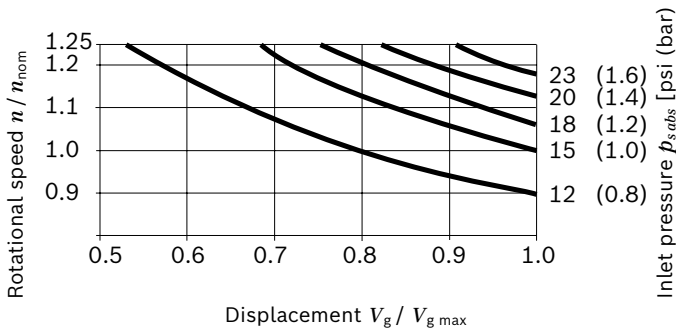
Size		NG	71	250	355	500	
Displacement, geometric, per revolution		$V_{g \max}$	in ³	4.33	15.26	21.7	30.51
			(cm ³)	(71)	(250)	(355)	(500)
Rotational speed maximum ¹⁾	at $V_{g \max}$	n_{nom}	rpm	3000 ²⁾⁵⁾⁶⁾	1900 ²⁾	1700 ²⁾	1500 ²⁾
	at $V_g \leq V_{g \max}$	n_{max}	rpm	–	2100 ³⁾	1900 ³⁾	1800 ³⁾
Flow	at n_{nom} and $V_{g \max}$	q_v	gpm	56 ⁵⁾⁶⁾	125	159	198
			(l/min)	(213) ⁵⁾⁶⁾	(475)	(604)	(750)
Power	at n_{nom} , $V_{g \max}$ and $\Delta p = 5100$ psi (350 bar)	P	HP	166	372	473	587
			(kW)	(124)	(277)	(352)	(437)
Torque	at $V_{g \max}$ and $\Delta p = 5100$ psi (350 bar)	M_{max}	lb-ft	291	1026 ²⁾	1457 ²⁾	2052 ²⁾
			(Nm)	(395)	(1391) ²⁾	(1976) ²⁾	(2783) ²⁾
Rotary stiffness of drive shaft	Shaft end K	c	klb-ft/rad	106	322	592	–
			(kNm/rad)	(146)	(443)	(814)	
	Shaft end S	c	klb-ft/rad	92	267	–	–
			(kNm/rad)	(126)	(368)		
	Shaft end R	c	klb-ft/rad	–	–	345	–
			(kNm/rad)			(475)	
	Shaft end P	c	klb-ft/rad	–	–	–	832
			(kNm/rad)				(1145)
	Shaft end Z	c	klb-ft/rad	–	–	–	826
			(kNm/rad)				(1136)
Moment of inertia		J_{TW}	lb-ft ²	0.287	2.276	4.509	7.809
			(kgm ²)	(0.0121)	(0.0959)	(0.19)	(0.3325)
Maximum angular acceleration ⁴⁾		α	rad/s ²	11000	4800	3600	2800
Case volume		V	gal	0.6	2.6	2.1	3.7
			(l)	(2.5)	(10)	(8)	(14)
Weight (without through drive) approx.		m	lbs	117	406	456	705
			(kg)	(53)	(184)	(207)	(320)

1) The values are applicable:
 – to the optimum viscosity range from $\nu_{\text{opt}} = 36$ to 16 cSt (mm²/s)
 – with hydraulic fluid based on mineral oils
 2) The values apply at absolute pressure $p_{\text{abs}} = 15$ psi (1 bar) at suction port **S**.
 3) Maximum rotational speed (speed limit) when increasing the inlet pressure p_{abs} at suction port **S** and $V_g < V_{g \max}$, see diagram on page 11.

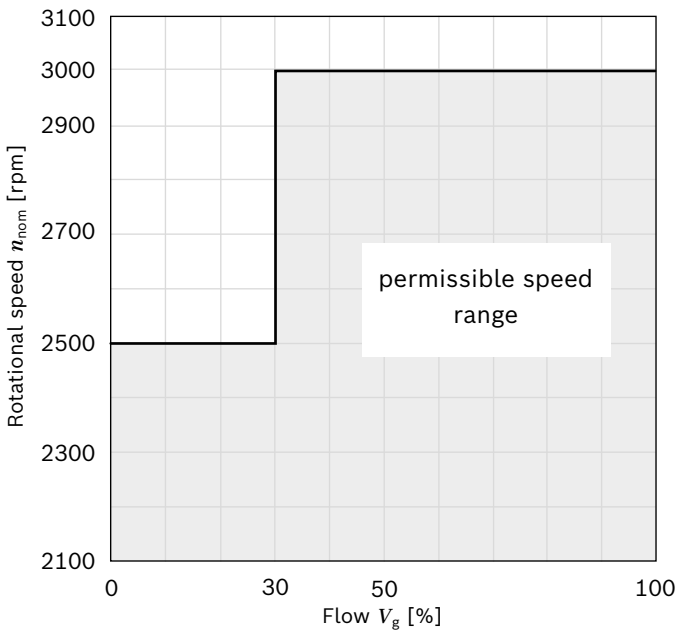
4) The data are valid for values between the minimum required and maximum permissible rotational speed. Valid for external excitation (e.g. diesel engine 2 to 8 times rotary frequency; cardan shaft twice the rotary frequency). The limit value is only valid for a single pump. The load capacity of the connecting parts must be considered.
 5) If $V_g > 30\%$ (depending on speed see diagram „Maximal permissible speed at High Speed NG71“)
 6) For suction pressure < 15psi (1 bar) see diagram Maximum rotational speed (speed limit) no rotational speed increase possible when the inlet pressure increases.

Maximum permissible speed (speed limit)

($p_{S abs}$ = Inlet pressure [bar])



Maximal permissible speed at High Speed size 71



Determining the characteristics		
Flow	$q_v = \frac{V_g \times n \times \eta_v}{231}$	[gpm]
	$q_v = \frac{V_g \times n \times \eta_v}{1000}$	[l/min]
Torque	$M = \frac{V_g \times \Delta p}{24 \times \pi \times \eta_{hm}}$	[lb-ft]
	$M = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{hm}}$	[Nm]
Power	$P = \frac{2 \pi \times M \times n}{33000} = \frac{q_v \times \Delta p}{1714 \times \eta_t}$	[HP]
	$P = \frac{2 \pi \times M \times n}{60000} = \frac{q_v \times \Delta p}{600 \times \eta_t}$	[kW]

Key

V_g	=	Displacement per revolution [in ³ (cm ³)]
Δp	=	Differential pressure [psi (bar)]
n	=	Rotational speed [rpm]
η_v	=	Volumetric efficiency
η_{hm}	=	Hydraulic-mechanical efficiency
η_t	=	Total efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Notices

- ▶ 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. We recommend 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 forces of the drive shafts

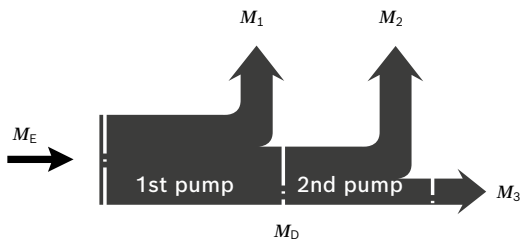
Size	NG	40	71	125	180	250	355	500	750 ¹⁾	1000	
Radial force, maximum	at X/2 $F_{q \max}$	lb	225	270	360	450	450	495	560	675	786
		(N)	(1000)	(1200)	(1600)	(2000)	(2000)	(2200)	(2500)	(3000)	(3500)
Maximum axial force	$\pm F_{ax \max}$	lb	135	180	225	315	405	450	450	495	495
		(N)	(600)	(800)	(1000)	(1400)	(1800)	(2000)	(2000)	(2200)	(2200)

1) Values also apply for the version with charge pump (A4VSO)

Permissible input and through-drive torques

Size	NG	40	71	125	180	250	355	500	750	1000	
Torque at $V_{g \max}$ and $\Delta p = 5100 \text{ psi (350 bar)}^1$	M_{\max}	lb-ft	164	291	513	739	1026	1457	2052	3078	4104
		(Nm)	(223)	(365)	(696)	(1002)	(1391)	(1976)	(2783)	(4174)	(5565)
Maximum input torque at drive shaft ²⁾											
Splined shaft	$M_{E \max}$	lb-ft	329	583	1027	1479	2052	2917	4105	6157	8209
		(Nm)	(446)	(790)	(1392)	(2004)	(2782)	(3952)	(5566)	(8348)	(11130)
Shaft key	$M_{E \max}$	lb-ft	243	516	1027	1032	1696	2624	3835	5541	6965
		(Nm)	(380)	(700)	(1392)	(1400)	(2300)	(3557)	(5200)	(7513)	(9444)
Maximum through-drive torque											
Splined shaft	$M_{D \max}$	lb-ft	164	291	513	739	1026	1457	2052	3078	4104
		(Nm)	(223)	(395)	(696)	(1002)	(1391)	(1976)	(2783)	(4174)	(5565)
Shaft key	$M_{D \max}$	lb-ft	116	225	513	293	670	1166	1783	2463	2861
		(Nm)	(157)	(305)	(696)	(398)	(909)	(1581)	(2417)	(3339)	(3879)

▼ **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) Efficiency not considered

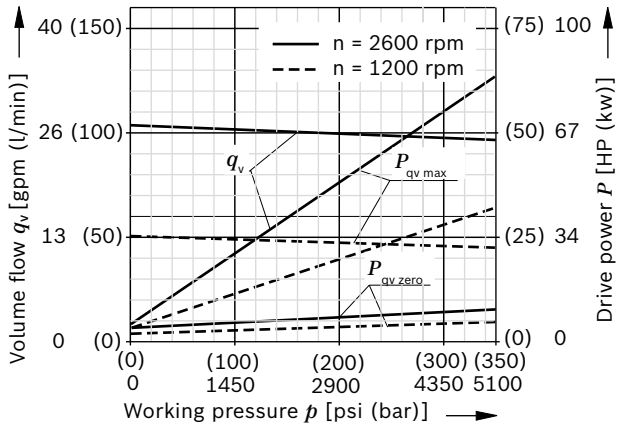
2) For drive shafts with no radial force

Characteristic curves

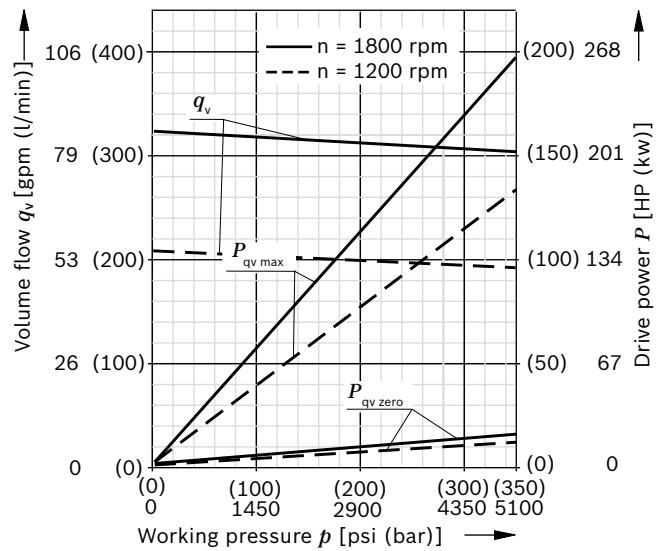
Drive power and flow

(Operating fluid: Hydraulic fluid ISO VG 46 DIN 51519,
 $t = 122^{\circ}\text{F}$ (50°C))

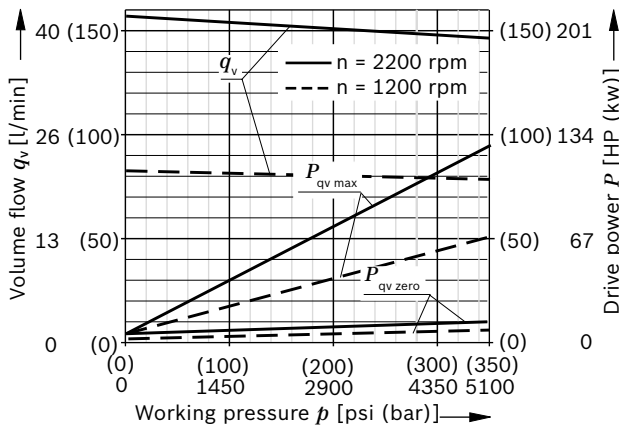
▼ Size 40



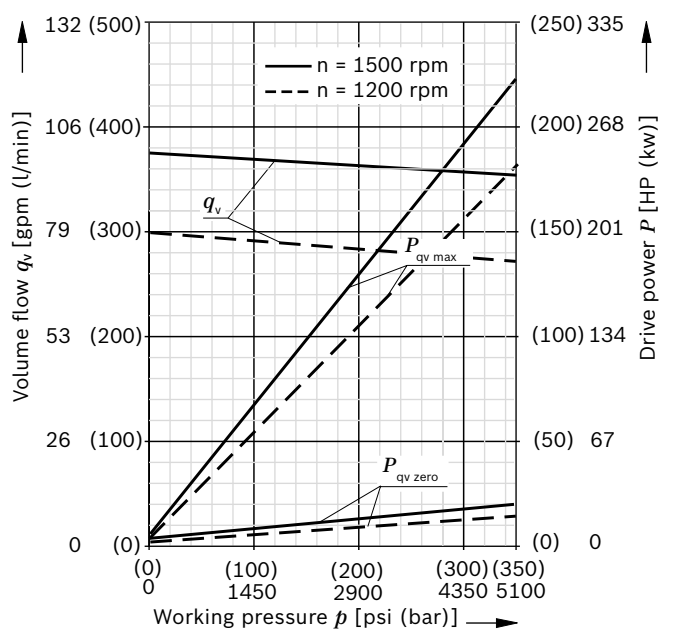
▼ Size 180



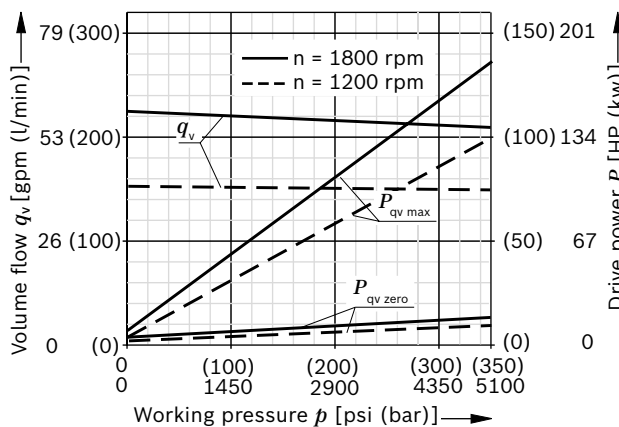
▼ Size 71



▼ Size 250



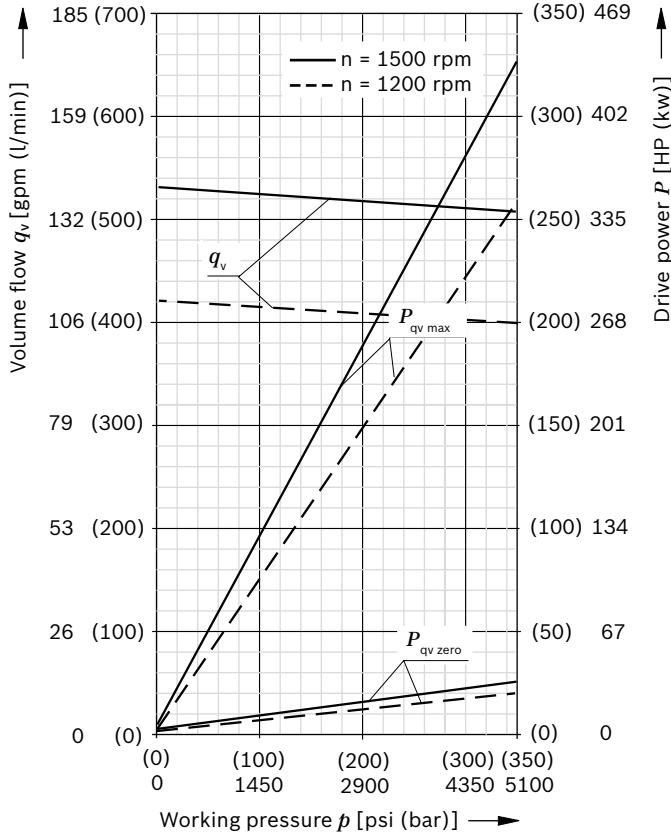
▼ Size 125



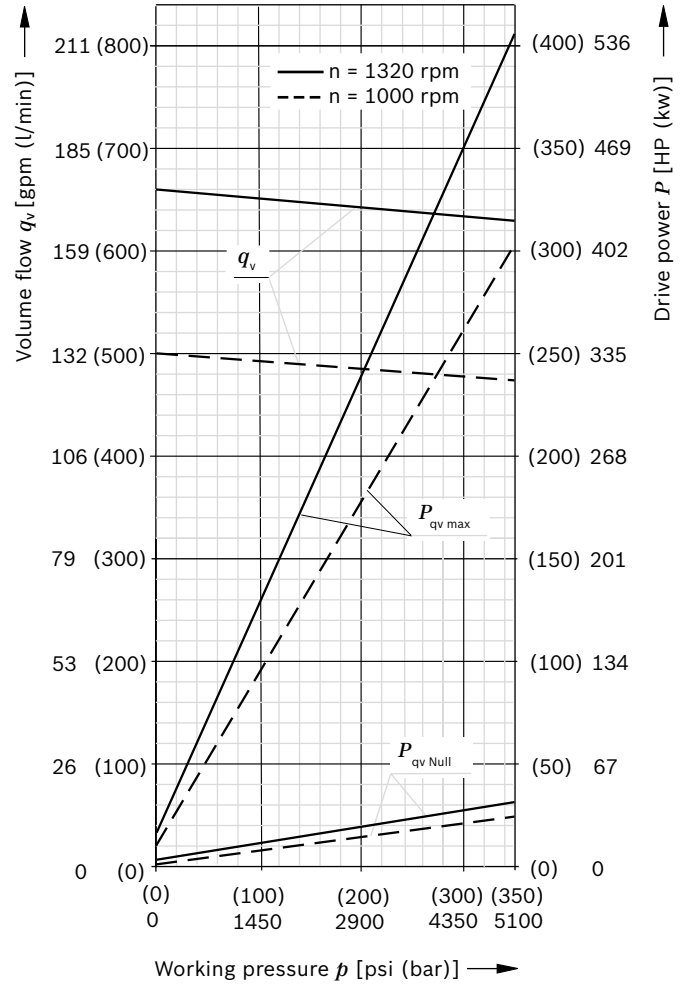
Drive power and flow

(Operating fluid: Hydraulic fluid ISO VG 46 DIN 51519,
 $t = 122^{\circ}\text{F}$ (50°C))

▼ **Size 355**



▼ **Size 500**



Total efficiency $n_t = \frac{q_v \times p}{P_{qv\ max} \times 1714}$

$q_v = \text{gpm}$
 $p = \text{psi}$
 $P = \text{HP}$

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

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

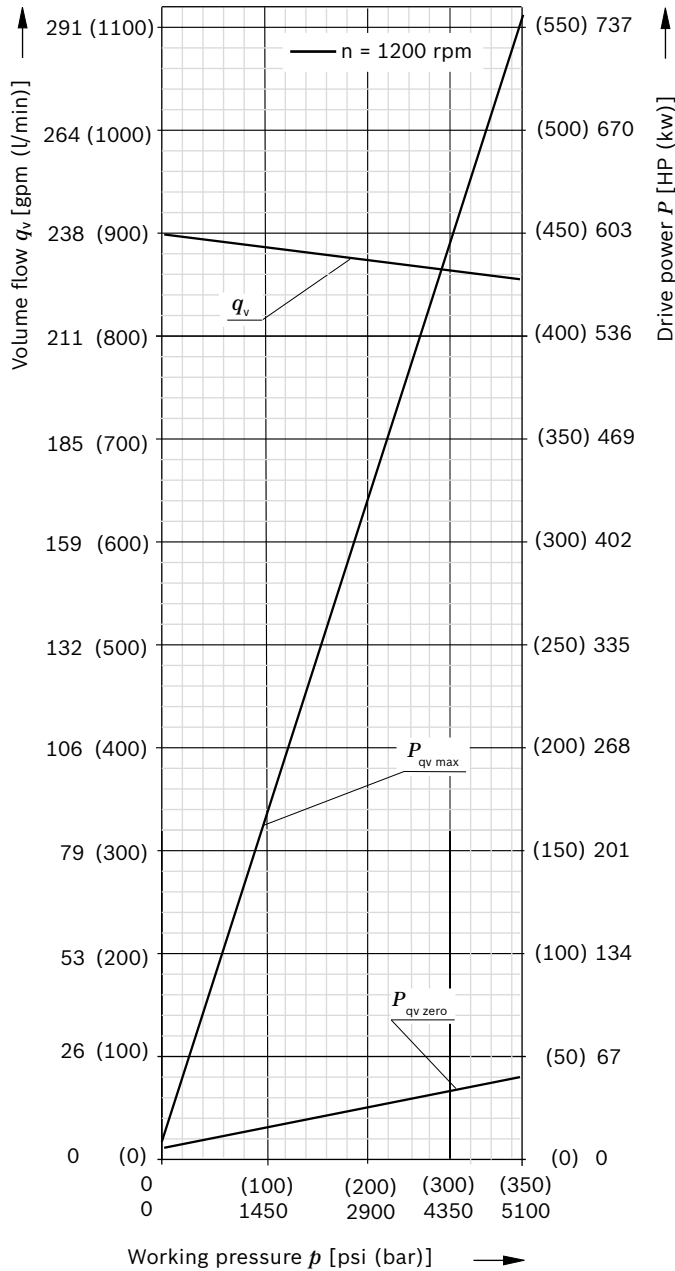
$q_v = \text{l/min}$
 $p = \text{bar}$
 $P = \text{kW}$

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

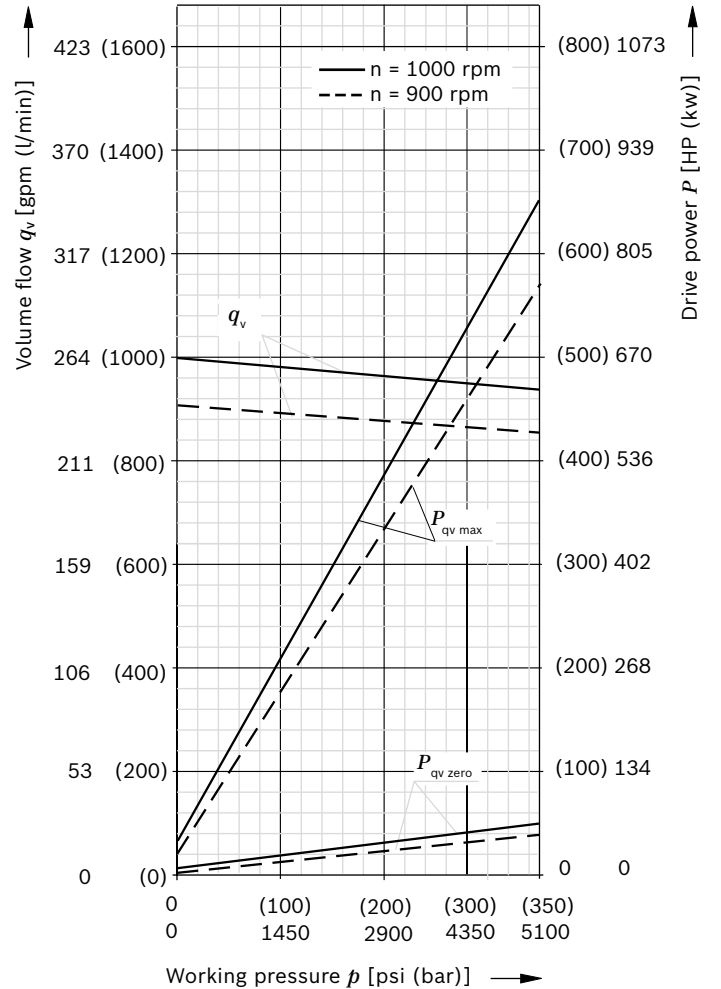
Drive power and flow

(Operating fluid: Hydraulic fluid ISO VG 46 DIN 51519,
 t = 122°F (50 °C))

▼ **Size 750**



▼ **Size 1000**



Total efficiency $n_t = \frac{q_v \times p}{P_{qv \max} \times 1714}$

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

q_v = gpm
 p = psi
 P = HP

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

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

q_v = l/min
 p = bar
 P = kW

Overview of control devices

Pressure controller DR

(for further information, see data sheet 92060)

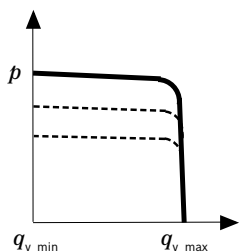
The pressure controller limits the maximum pressure at the pump outlet within the control range of the variable pump. The variable pump only supplies as much hydraulic fluid as is required by the consumers. If the working pressure exceeds the pressure command value at the pressure valve, the pump will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

- ▶ Initial position in depressurized state: $V_{g \max}$.
- ▶ Setting range for pressure control: 725 to 5100 psi (50 to 350 bar).
Standard is 5100 psi (350 bar).

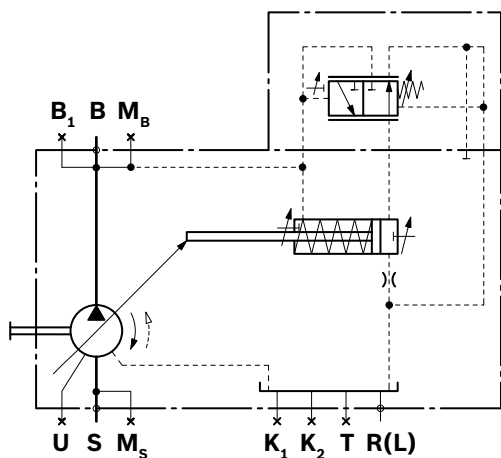
Optional:

- ▶ Pressure controller, remotely operated (DRG)

▼ Characteristic curve



▼ Circuit diagram



Pressure controller for parallel operation DP

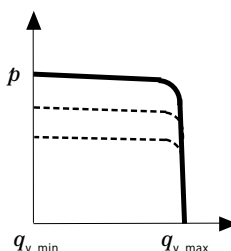
(for further information, see data sheet 92060)

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

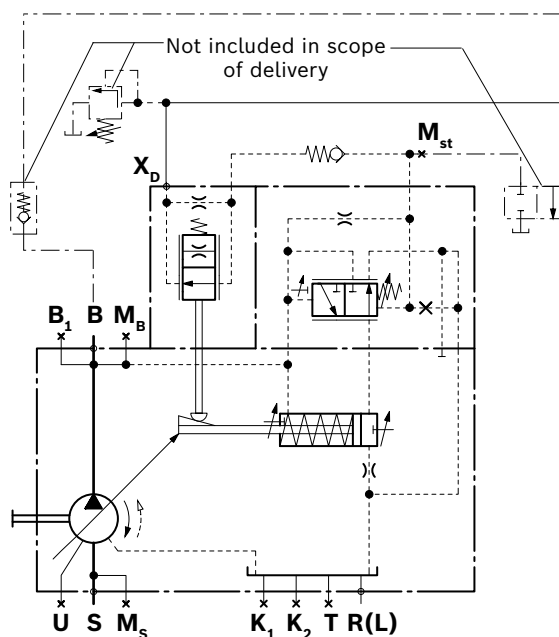
Optional:

- ▶ with flow control (DPF)

▼ Characteristic curve



▼ Circuit diagram



Flow controller FR
 (for further information, see data sheet 92060)

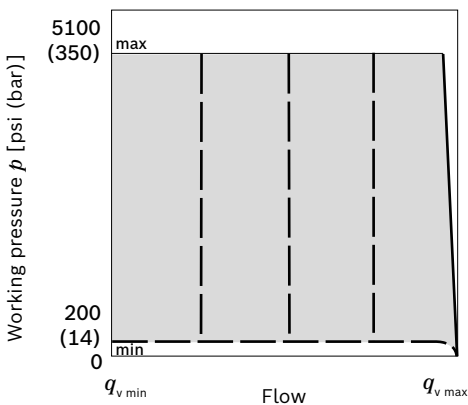
The flow controller adjusts the displacement of the pump to the volume required by the consumer. The flow of the pump is then dependent on the cross section of the external metering orifice (pos. 4), which is located between the pump and the consumer. The flow is nearly independent of the load pressure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

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

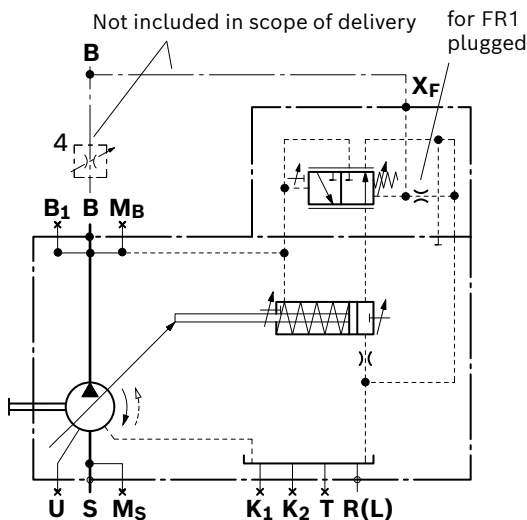
Mechanical minimum and maximum swivel angle limitation

- ▶ The $V_{g \min}$ stop is set so that a pressure of 220 to 290 psi (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 settings values in plain text (possible setting ranges $V_{g \max}$ to 50 % $V_{g \max}$).

▼ **Characteristic curve**



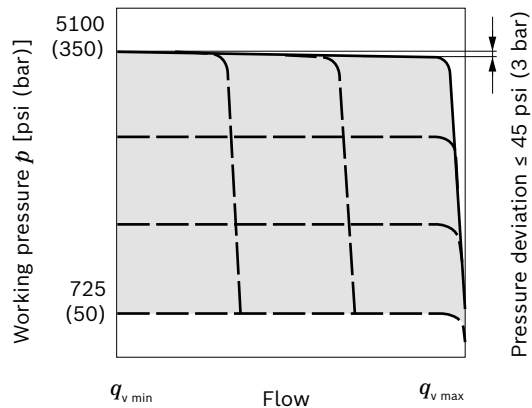
▼ **Schematic, example sizes 40 and 71**



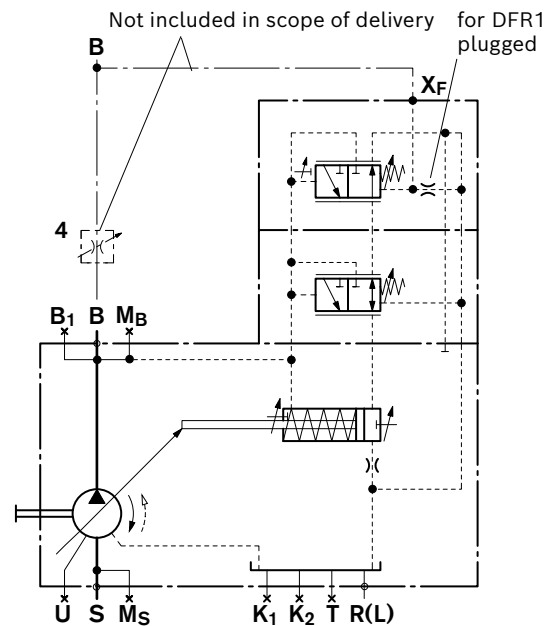
Pressure and flow controller DFR
 (for further information, see data sheet 92060)

The pressure and flow controller is a combination of the DR pressure controller and FR flow controller. Optional: FRG, FRG1 for remote pressure and flow.

▼ **Characteristic curve**



Schematic, example sizes 40 and 71



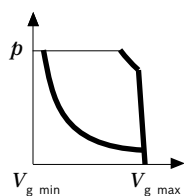
Power controller LR2 with hyperbolic characteristic curve (for further information, see data sheet 92064)

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

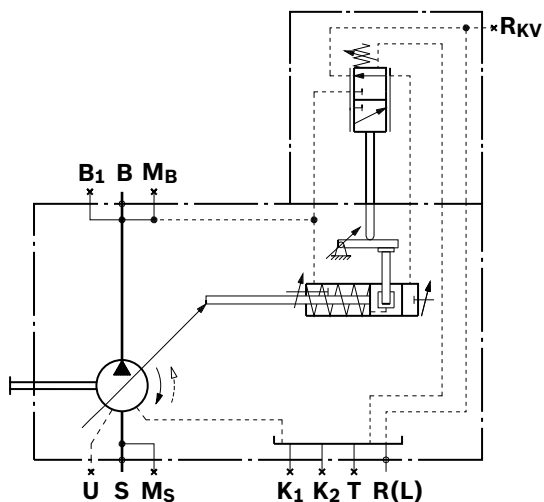
Optional:

- ▶ Pressure control (LR2D), remotely controllable (LR2G);
- ▶ Flow control (LR2F, LR2S);
- ▶ Hydraulic stroke limiter (LR2H);
- ▶ Mechanical stroke limiter (LR2Z);
- ▶ Hydraulic two-point control (LR2Z);
- ▶ With electric unloading valve as starting aid (LR2Y).

▼ **Characteristic curve**



▼ **Circuit diagram**



Power controller LR3 with remotely controllable power characteristic

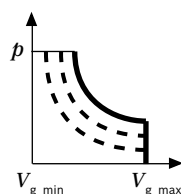
(for further information, see data sheet 92064)

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

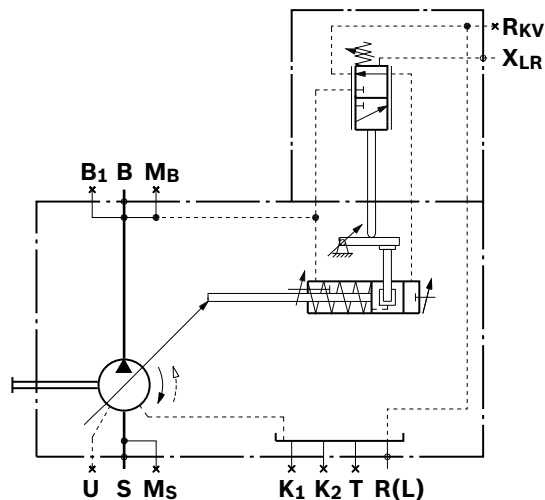
Optional:

- ▶ Pressure control (LR3D), remotely controllable (LR3G);
- ▶ Flow control (LR3F, LR3S);
- ▶ Hydraulic stroke limiter (LR3H);
- ▶ Mechanical stroke limiter (LR3Z);
- ▶ Hydraulic two-point control (LR3Z);
- ▶ With electric unloading valve as starting aid (LR3Y).

▼ **Characteristic curve**



▼ **Circuit diagram**



Hydraulic adjustment LR2N and LR3N pilot-pressure dependent, basic setting $V_{g \min}$

(for further information, see data sheet 92064)

With superimposed power control.

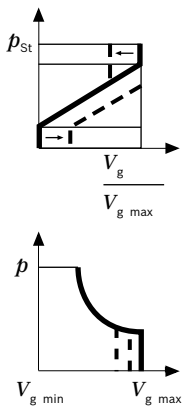
The displacement volume is adjusted proportionally to the pilot pressure in P_{St} .

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

Optional:

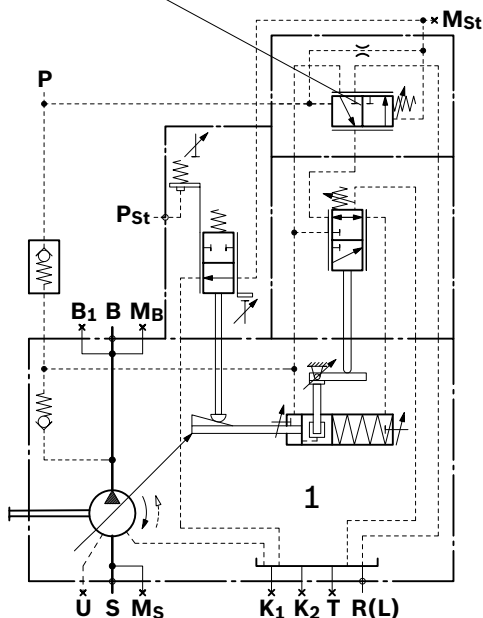
- ▶ Power characteristics, remotely controllable (LR3N)
- ▶ Pressure control (LR.DN),
- ▶ Remote pressure control (LR.GN)
- ▶ Electrical control of pilot pressure (LR, NT)

▼ **Characteristic curve**



▼ **Circuit diagram**

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

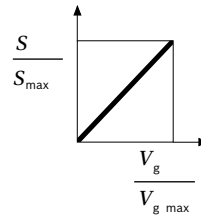


Manual control MA

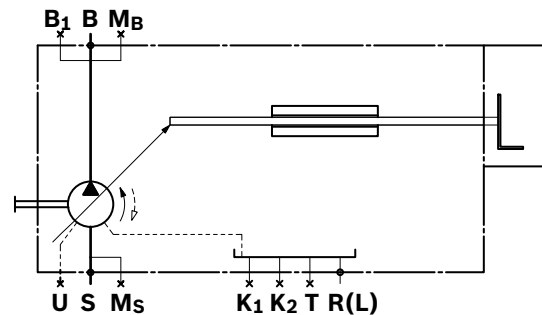
(for further information, see data sheet 92072)

Stepless adjustment of displacement volume by means of a handwheel.

▼ **Characteristic curve**



▼ **Circuit diagram**



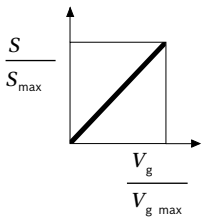
Electric motor control EM

(for further information, see data sheet 92072)

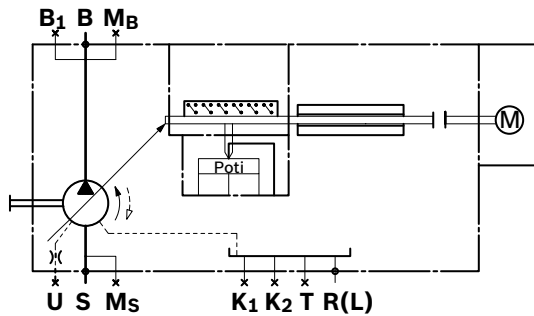
Stepless adjustment of displacement volume by means of the electric motor control EM.

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

▼ Characteristic curve



▼ Circuit diagram



Hydraulic adjustment HD, pilot-pressure dependent

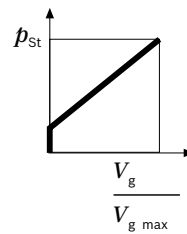
(for further information see data sheet 92080)

Stepless adjustment 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).

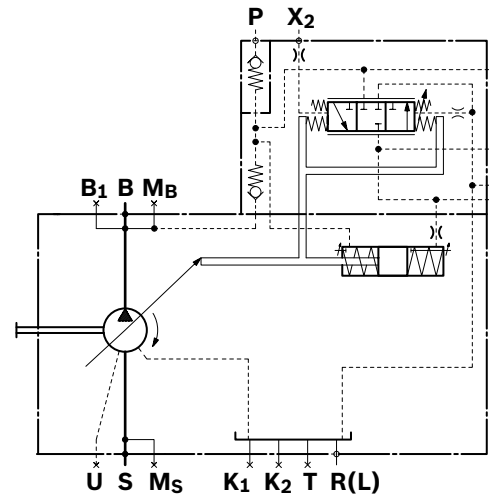
Optional:

- ▶ Control characteristics (HD1, HD2, HD3)
- ▶ Pressure control (HD.B),
- ▶ Remote pressure control (HD.GB)
- ▶ Power control (HD1P)
- ▶ Electrical control of pilot pressure (HD1T)

▼ Characteristic curve



▼ Circuit diagram

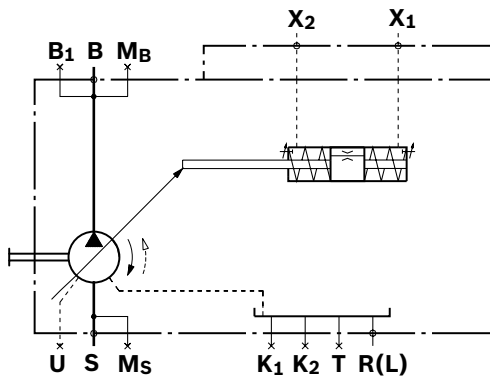


Hydraulic adjustment HM 1/2, quantity-dependent
 (for further information see data sheet 92076)

The pump displacement can be steplessly varied in relation to the control oil volume in ports **X₁** and **X₂**.
 Application:

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

▼ **Circuit diagram**



Control system HS, HS5, with servo or proportional valve
 (for further information, see data sheet 92076)

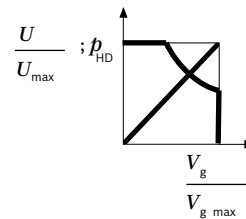
The stepless displacement control is accomplished by means of a servo or proportional valve and electrical feedback of the swivel angle.

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

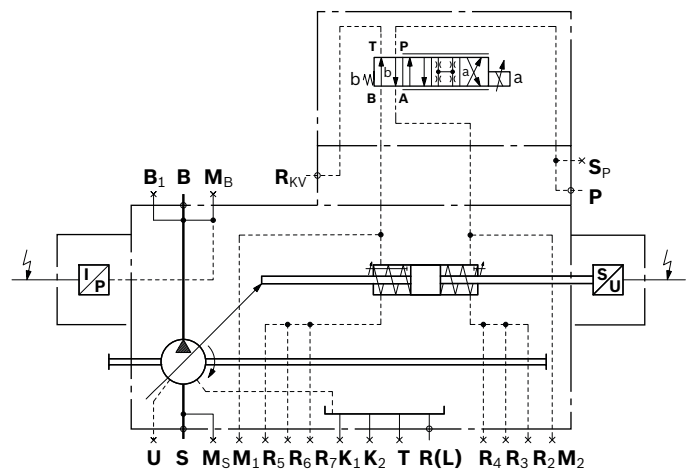
▼ **Optional:**

- ▶ Servo valve (HS);
- ▶ Proportional valve (HS5);
- ▶ Short circuit valve (HSK, HS5K, HS5KP);
- ▶ For the submerged oil insert (HS5M);
- ▶ With internal control pressure supply (HS5V);
- ▶ Control system with integrated **On Board Electronics** OBE (HS5E).

▼ **Characteristic curve**



▼ **Schematic NG 125 and 180 HS5P**



Control system EO

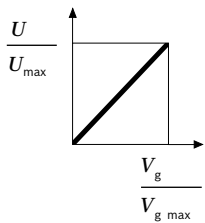
(for further information, see data sheet 92076)

The stepless 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.

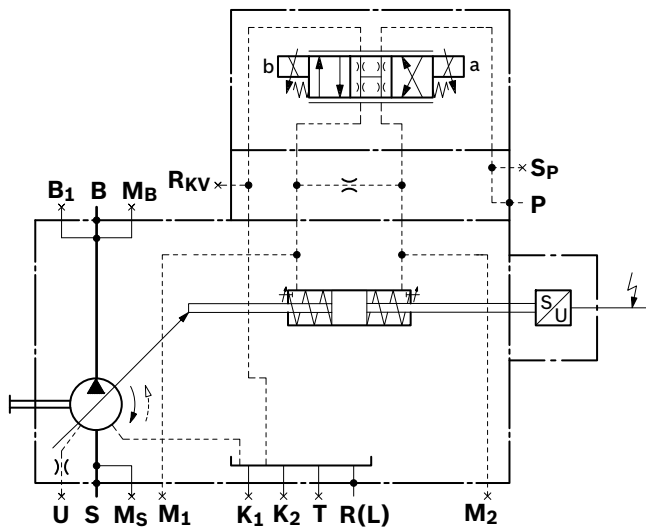
Optional:

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

▼ **Characteristic curve**



▼ **Circuit diagram**



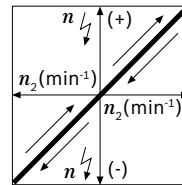
Speed control DS2, secondary-controlled

(for further information, see data sheet 92057)

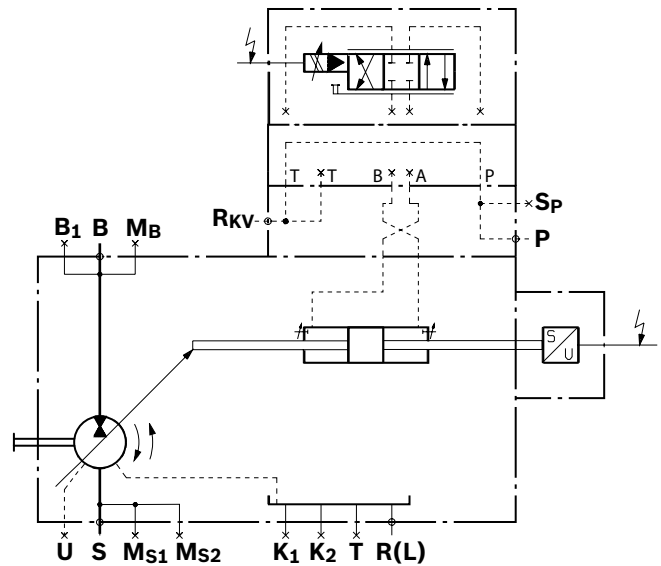
The speed control DS2 controls the secondary unit in such a manner, that this motor delivers sufficient torque to maintain the required rotational speed.

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

▼ **Characteristic curve**



▼ **Circuit diagram**



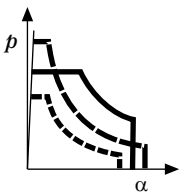
Electrohydraulic control system DFE1

(for further information, see data sheet 92088)

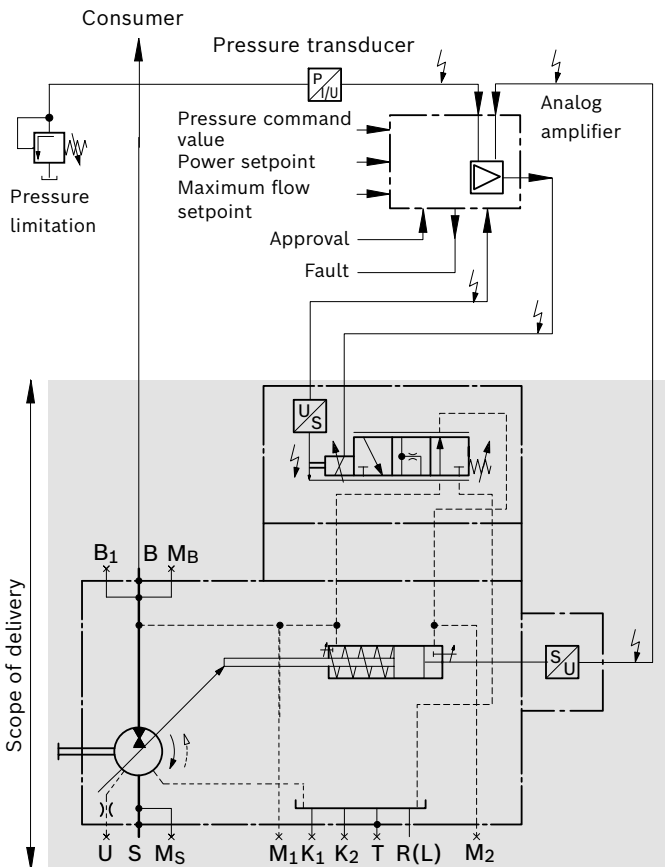
An electrically actuated proportional valve controls the power, pressure and swivel angle of the A4V.SO...DFE1 variable pump. The current at the proportional valve determines the position of the swashplate angle and thus the flow of the pump via the stroking piston and the position transducer.

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

▼ Characteristic curve

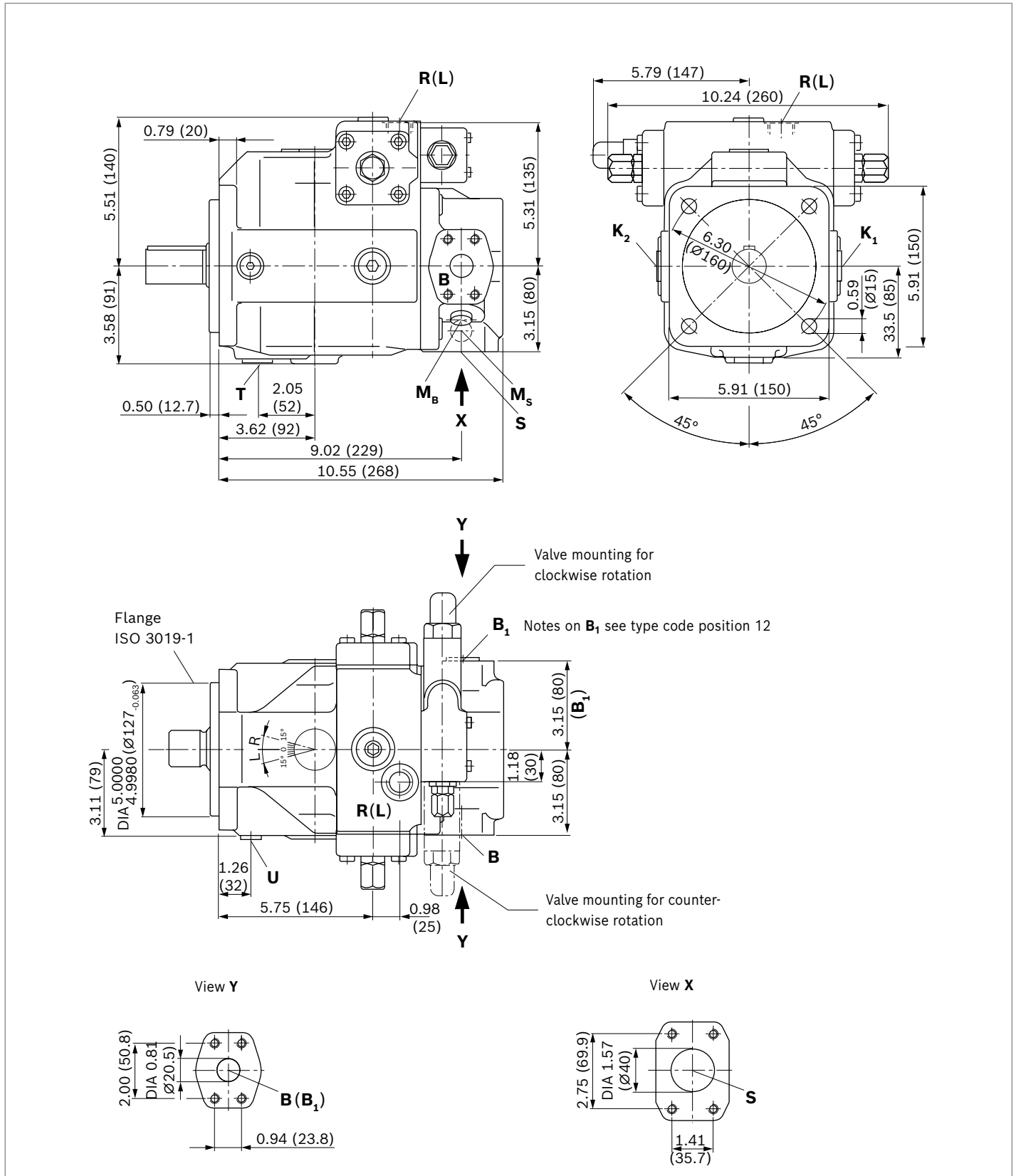


▼ Circuit diagram

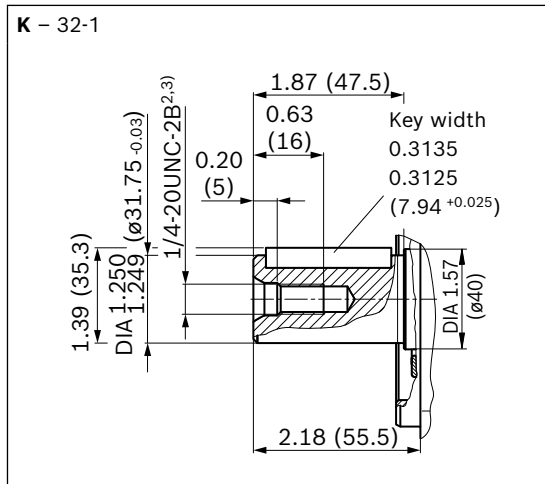


Dimensions, size 40

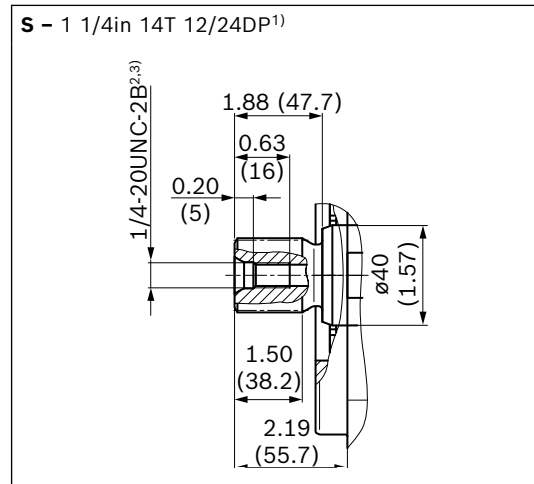
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft ISO 3019-1, SAE C



▼ Splined shaft (SAE J744), SAE C



Ports		Standard	Size	$p_{\max \text{ abs}}$ [psi (bar)] ³⁾	State ⁶⁾
S	Suction port (standard pressure series)	SAE J518 ⁶⁾	1 1/2 in	435 (30)	O
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 0.94 (24) deep		
For version port plate 63					
B	Pressure port (high-pressure series)	SAE J518	3/4 in	5800 (400)	O
	Fastening thread	ASME B1.1	3/8-16UNC-2B; 0.83 (21) deep		
B₁	Additional connection	ISO 11926	7/8-14UNF-2B; 0.67 (17) deep	5800 (400)	X
For version port plate 75					
B	Pressure port (high-pressure series)	SAE J518	3/4 in	5800 (400)	O
	Fastening thread	ASME B1.1	3/8-16UNC-2B; 0.83 (21) deep		
B₁	2nd working port (high-pressure series)	SAE J518	3/4 in	5800 (400)	X ⁷⁾
	Fastening thread	ASME B1.1	3/8-16UNC-2B; 0.83 (21) deep		
K₁, K₂	Flushing port	ISO 11926 ⁴⁾	7/8-14UNF-2B; 0.67 (17) deep	60 (4)	X ⁵⁾
T	Drain port	ISO 11926 ⁴⁾	7/8-14UNF-2B; 0.67 (17) deep	60 (4)	X ⁵⁾
M_B	Measuring port working pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	5800 (400)	X
M_S	Measuring port suction pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	435 (30)	X
R(L)	Drain port	ISO 11926 ⁴⁾	7/8-14UNF-2B; 0.67 (17) deep	60 (4)	O ⁵⁾
U	Flushing port	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	75 (5)	X

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

2) Thread according to ASME B1.1

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

4) The countersink can be deeper than as specified in the standard.

5) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)

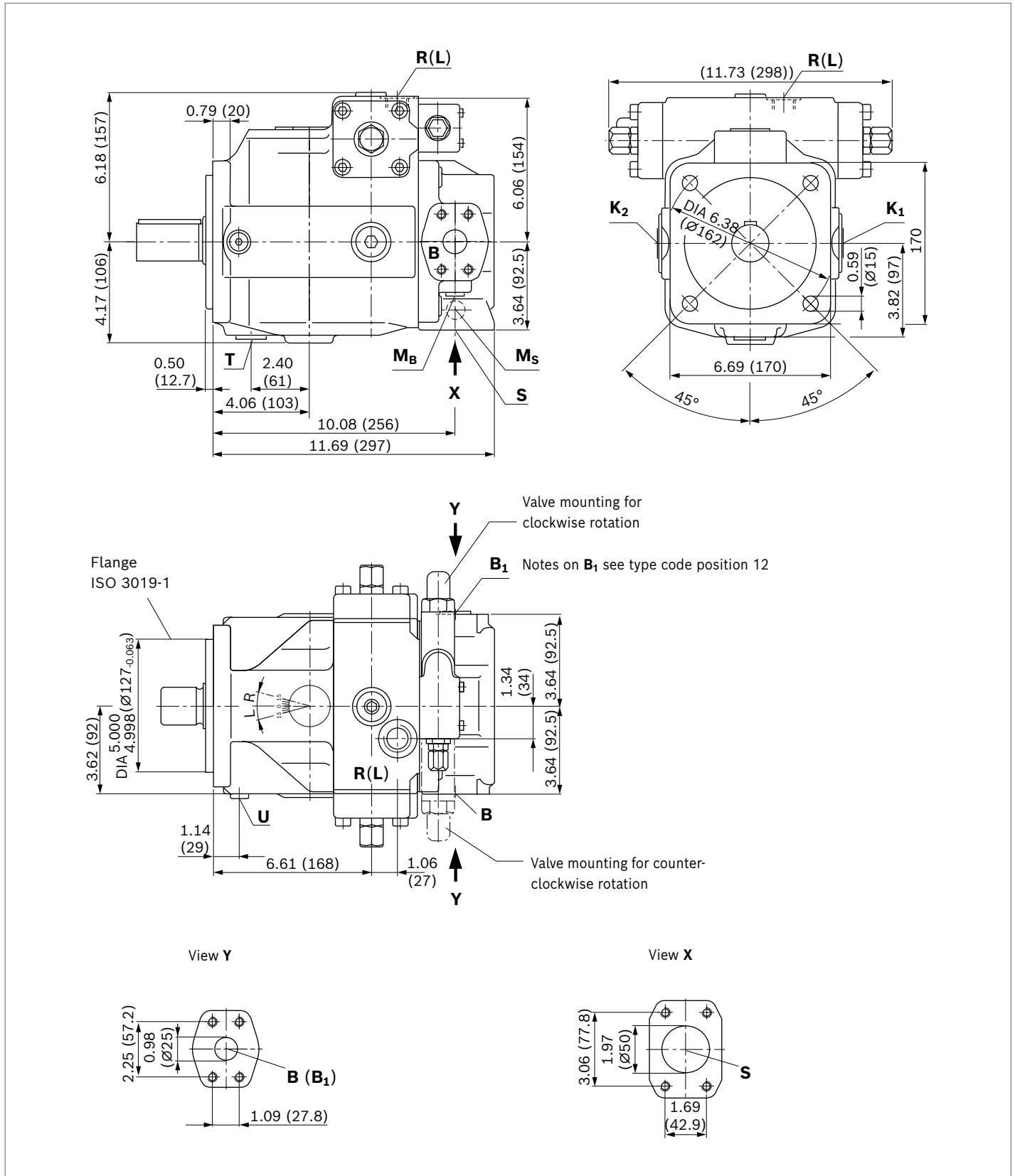
6) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

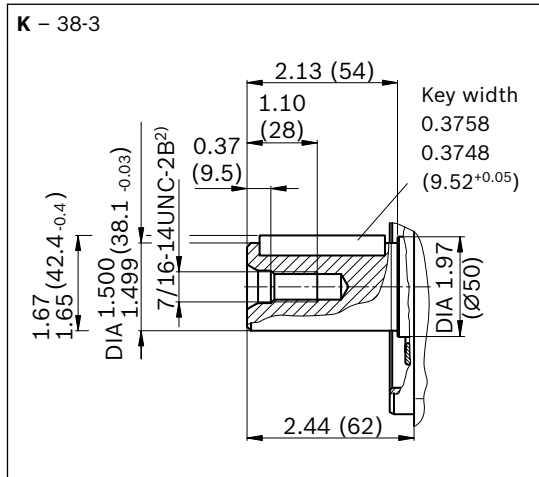
7) Plugged with flange plate

Dimensions, size 71

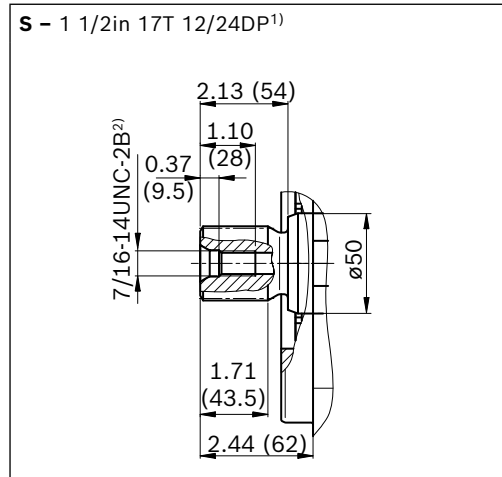
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft ISO 3019-1, SAE C-C



▼ Splined shaft SAE J744, SAE C-C



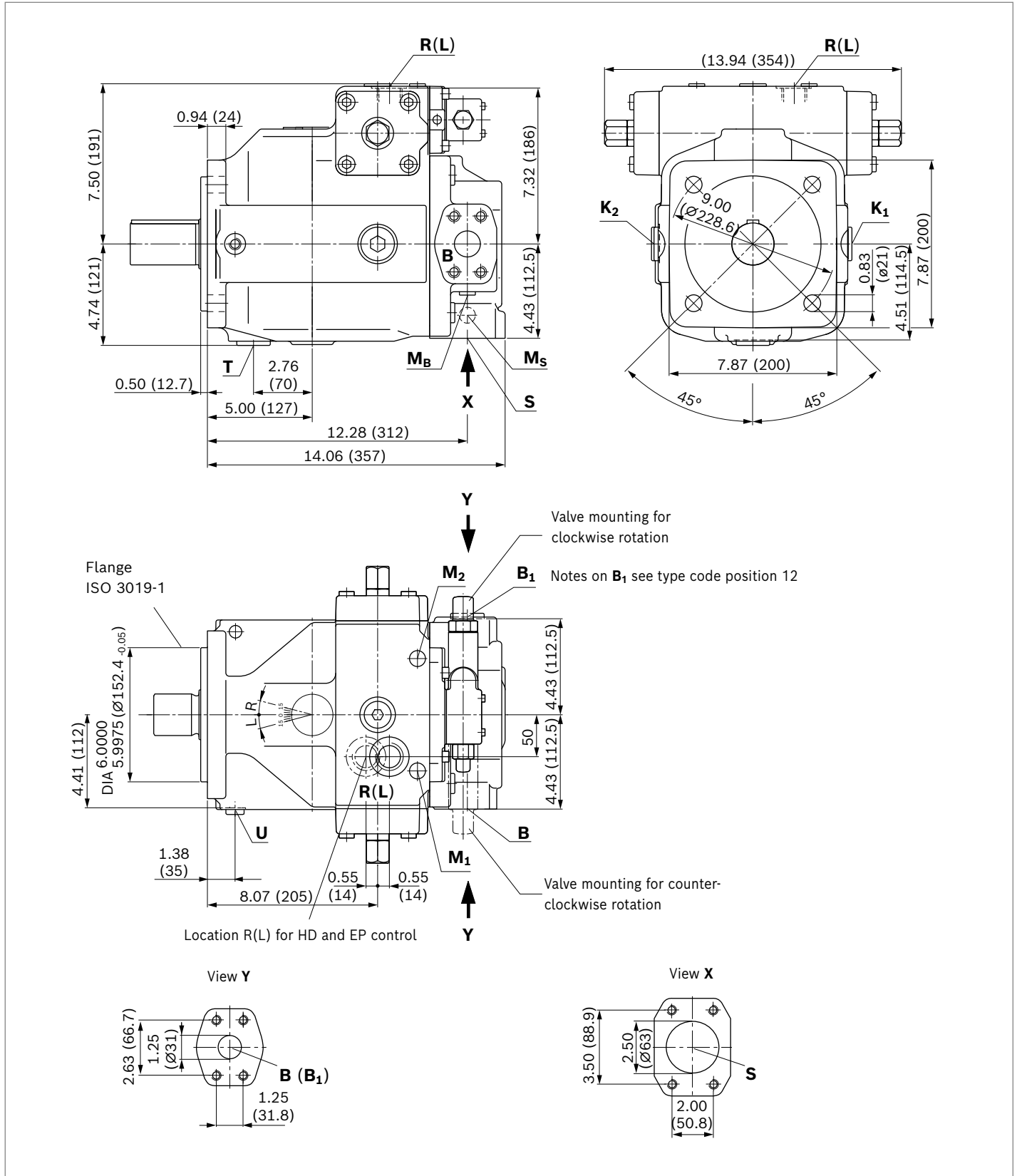
Ports	Standard	Size	$p_{\max \text{ abs}}$ [psi (bar)] ³⁾	State ⁶⁾	
S	Suction port (standard pressure series)	SAE J518	2 in	435 (30)	O
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 0.94 (24) deep		
For version port plate 63					
B	Pressure port (high-pressure series)	SAE J518	1 in	5800 (400)	O
	Fastening thread	ASME B1.1	7/16-14UNC-2B; 0.87 (22) deep		
B₁	Additional connection	ISO 11926	1 1/16-12UN-2B; 0.79 (20) deep	5800 (400)	X
For version port plate 75					
B	Pressure port (high-pressure series)	SAE J518	1 in	5800 (400)	O
	Fastening thread	ASME B1.1	7/16-14UNC-2B; 0.87 (22) deep		
B₁	2nd working port (high-pressure series)	SAE J518	1 in	5800 (400)	X ⁷⁾
	Fastening thread	ASME B1.1	7/16-14UNC-2B; 0.87 (22) deep		
K₁, K₂	Flushing port	ISO 11926 ⁴⁾	1 1/16-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
T	Drain port	ISO 11926 ⁴⁾	1 1/16-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
M_B	Measuring port working pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	5800 (400)	X
M_S	Measuring port suction pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	435 (30)	X
R(L)	Drain port	ISO 11926 ⁴⁾	1 1/16-12UN-2B; 0.79 (20) deep	60 (4)	O ⁵⁾
U	Flushing port	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	75 (5)	X

- Splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
- Thread according to ASME B1.1
- Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.

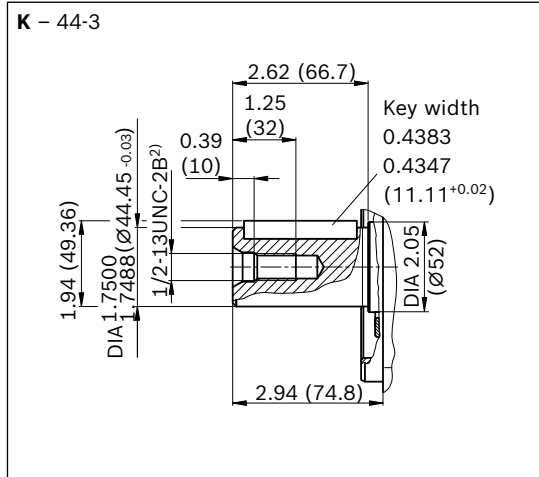
- The countersink can be deeper than as specified in the standard.
- Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)
- O = must be connected (plugged when delivered)
X = plugged (in normal operation)
- Plugged with flange plate

Dimensions, size 125

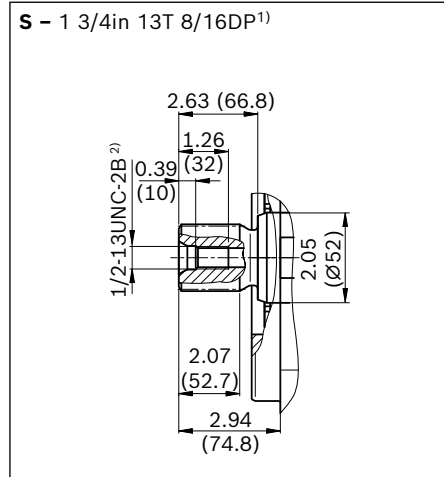
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ **Parallel keyed shaft, ISO 3019-1, SAE D**



▼ **Splined shaft SAE J744, SAE D**



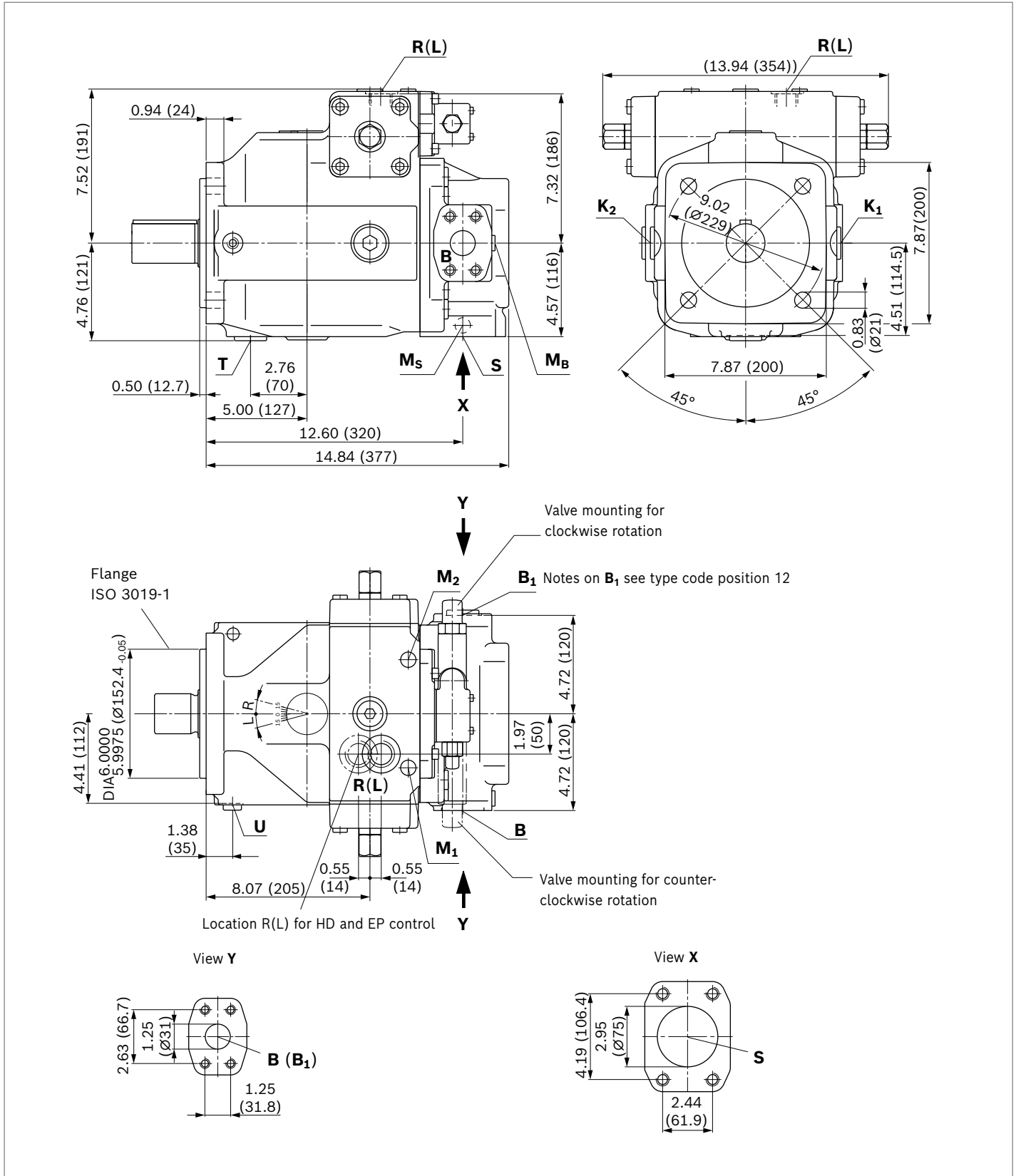
Ports	Standard	Size	$p_{max abs}$ [psi (bar)] ³⁾	State ⁶⁾	
S	Suction port (standard pressure series)	SAE J518	2 1/2 in	435 (30)	O
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 1.06 (27) deep		
For version port plate 63					
B	Pressure port (high-pressure series)	SAE J518	1 1/4 in	5800 (400)	O
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 1.06 (27) deep		
B₁	Additional connection	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep	5800 (400)	X
For version port plate 75					
B	Pressure port (high-pressure series)	SAE J518	1 1/4 in	5800 (400)	O
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 1.06 (27) deep		
B₁	2nd working port (high-pressure series)	SAE J518	1 1/4 in	5800 (400)	X ⁷⁾
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 1.06 (27) deep		
K₁, K₂	Flushing port	ISO 11926 ⁴⁾	1 5/16-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
T	Drain port	ISO 11926 ⁴⁾	1 5/16-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
M_B	Measuring port working pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	5800 (400)	X
M_S	Measuring port suction pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	435 (30)	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852	M14 × 1.5; 0.47 (12) deep	5800 (400)	X
R(L)	Drain port	ISO 11926 ⁴⁾	1 5/16-12UN-2B; 0.79 (20) deep	60 (4)	O ⁵⁾
U	Flushing port	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	75 (5)	X

1) Splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
 2) Thread according to ASME B1.1
 3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.

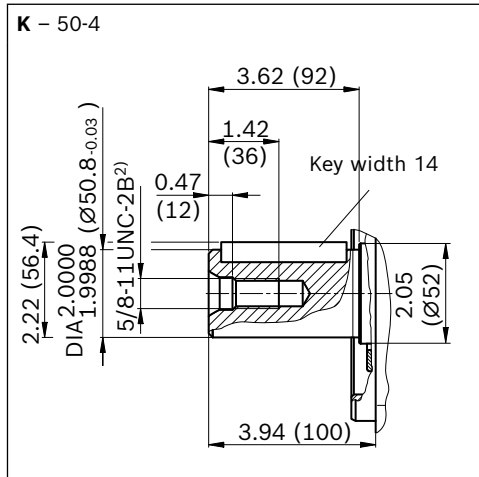
4) The countersink can be deeper than as specified in the standard.
 5) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)
 6) O = must be connected (plugged when delivered)
 X = plugged (in normal operation)
 7) Plugged with flange plate

Dimensions, size 180

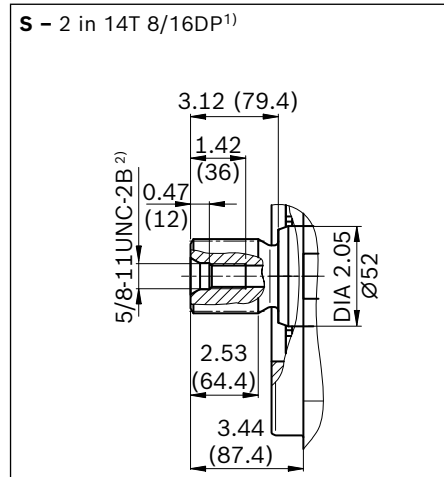
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft, ISO 3019-1, SAE F



▼ Splined shaft SAE J744, SAE F



Ports	Standard	Size ⁴⁾	$p_{\max \text{ abs}}$ [psi (bar)] ⁵⁾	State ⁹⁾	
S	Suction port (standard pressure series)	SAE J518 ⁶⁾	3 in	435 (30)	O
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
For version port plate 63					
B	Pressure port (high-pressure series)	SAE J518 ⁶⁾	1 1/4 in	5800 (400)	O
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 1.06 (27) deep		
B₁	Additional connection	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep	5800 (400)	X
For version port plate 75					
B	Pressure port (high-pressure series)	SAE J518 ⁶⁾	1 1/4 in	5800 (400)	O
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 1.06 (27) deep		
B₁	2nd working port (high-pressure series)	SAE J518 ⁶⁾	1 1/4 in	5800 (400)	X ¹⁰⁾
	Fastening thread	ASME B1.1	1/2-13UNC-2B; 1.06 (27) deep		
K₁, K₂	Flushing port	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep	60 (4)	X ⁸⁾
T	Drain port	ISO 11926 ⁷⁾	1 5/16-12UN-2B; 0.79 (20) deep	60 (4)	X ⁸⁾
M_B	Measuring port working pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	5800 (400)	X
M_S	Measuring port suction pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	435 (30)	X
R(L)	Drain port	ISO 11926 ⁷⁾	1 5/16-12UN-2B; 0.79 (20) deep	60 (4)	O ⁸⁾
U	Flushing port	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	75 (5)	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852	M14 × 1.5; 0.47 (12) deep	5800 (400)	X

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

2) Thread according to ASME B1.1

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

4) The countersink can be deeper than as specified in the standard.

5) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)

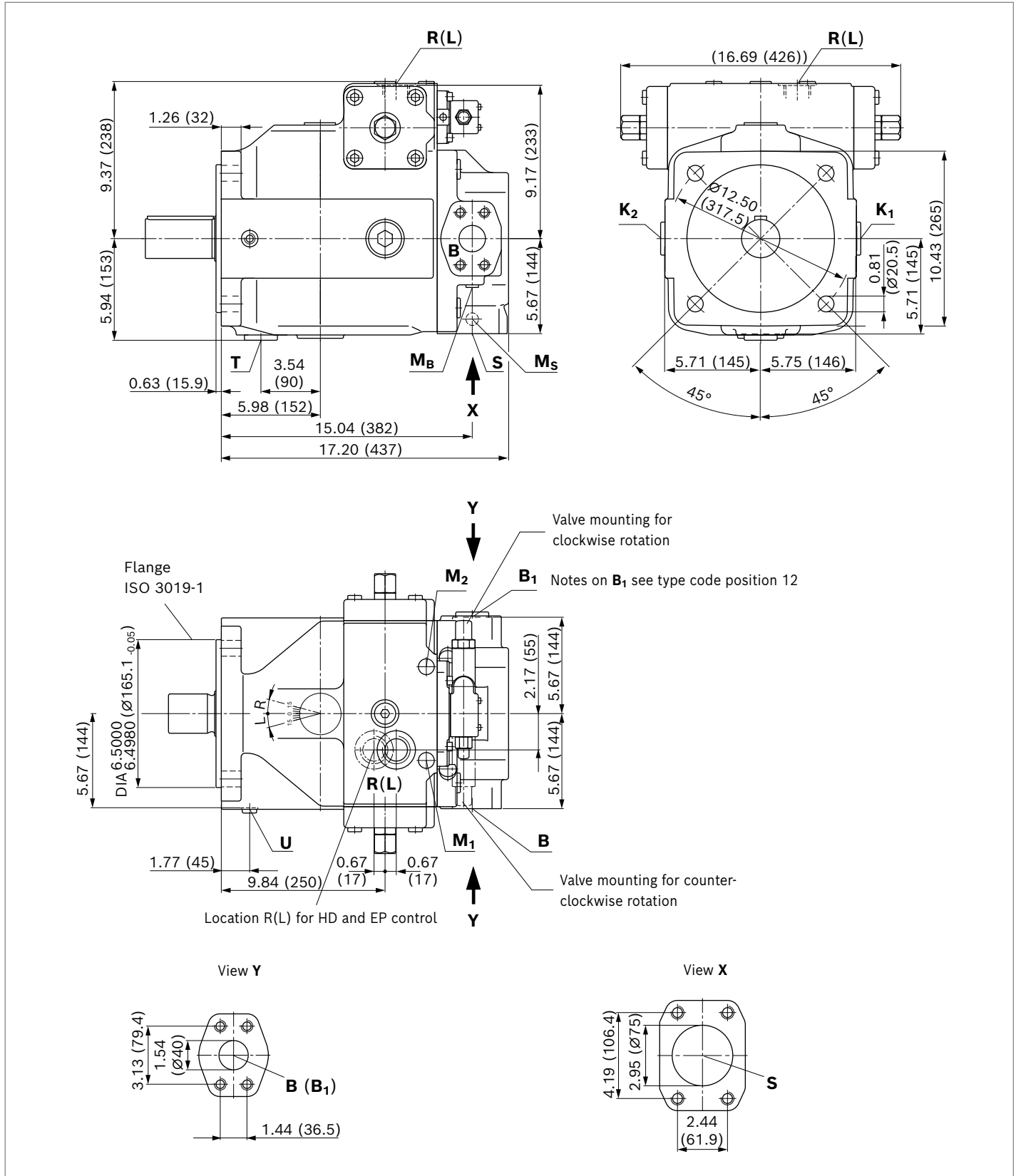
6) O = must be connected (plugged when delivered)

X = plugged (in normal operation)

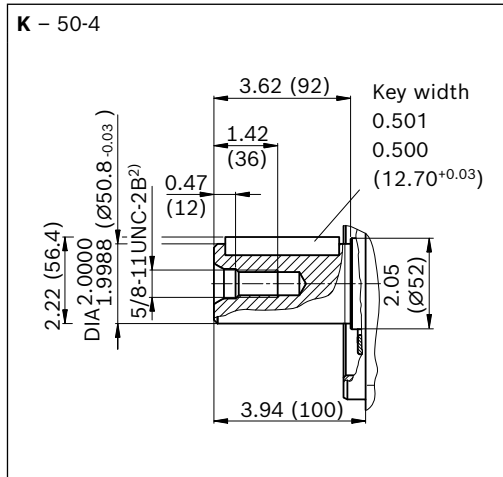
7) Plugged with flange plate

Dimensions, size 250

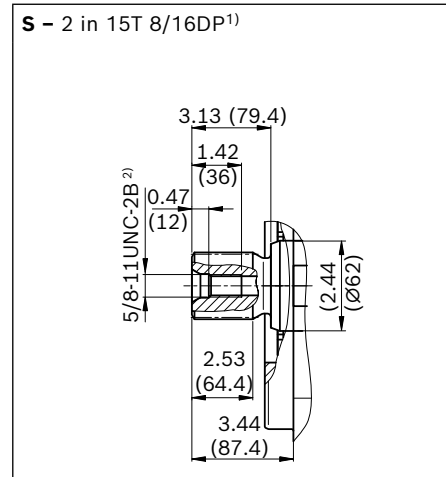
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft, ISO 3019-1, SAE F



▼ Splined shaft SAE J744, SAE F



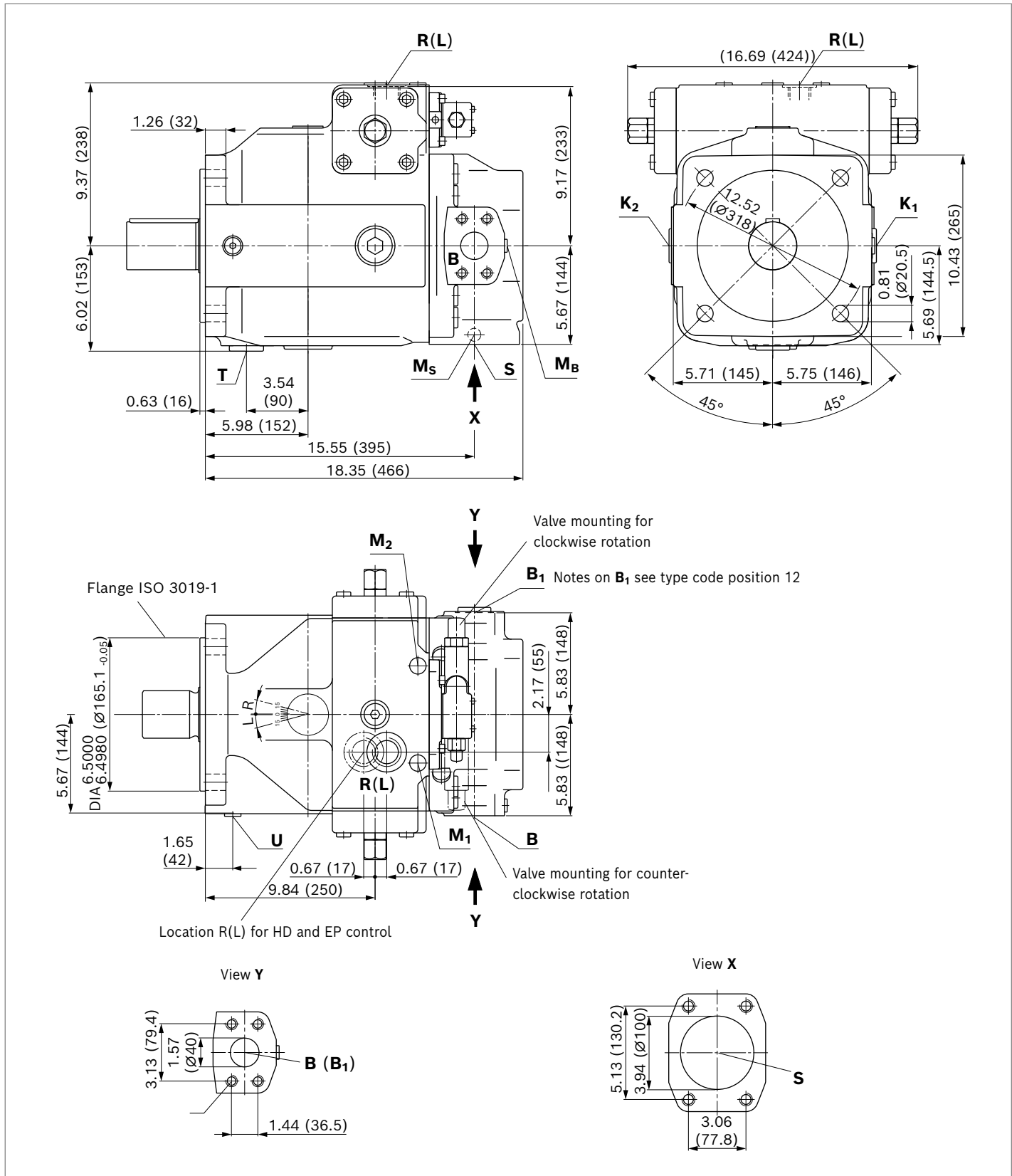
Ports		Standard	Size	$p_{\max \text{ abs}}$ [psi (bar)] ³⁾	State ⁶⁾
S	Suction port (standard pressure series)	SAE J518	3 in	435 (30)	O
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
For version port plate 63					
B	Pressure port (high-pressure series)	SAE J518	1 1/2 in	5800 (400)	O
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
B₁	Additional connection	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep	5800 (400)	X
For version port plate 75					
B	Pressure port (high-pressure series)	SAE J518	1 1/2 in	5800 (400)	O
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
B₁	2nd working port (high-pressure series)	SAE J518	1 1/2 in	5800 (400)	X ⁷⁾
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
K₁, K₂	Flushing port	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
T	Drain port	ISO 11926 ⁴⁾	1 5/8-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
M_B	Measuring port working pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	5800 (400)	X
M_S	Measuring port suction pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	435 (30)	X
R(L)	Drain port	ISO 11926 ⁴⁾	1 5/8-12UN-2B; 0.79 (20) deep	60 (4)	O ⁸⁾
U	Flushing port	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	75 (5)	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852	M18 × 1.5; 12 deep	5800 (400)	X

- Splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
- Thread according to ASME B1.1
- Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.

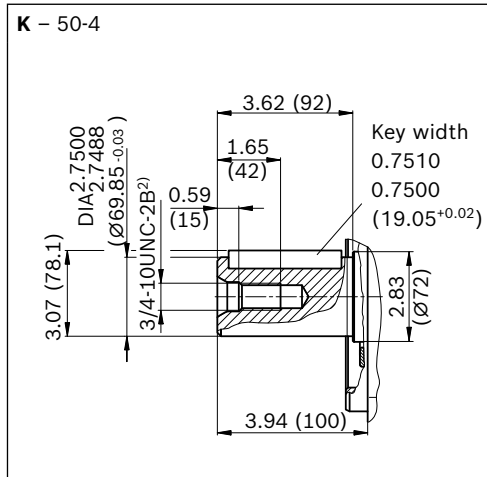
- The countersink can be deeper than as specified in the standard.
- Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)
- O = must be connected (plugged when delivered)
X = plugged (in normal operation)
- Plugged with flange plate

Dimensions, size 355

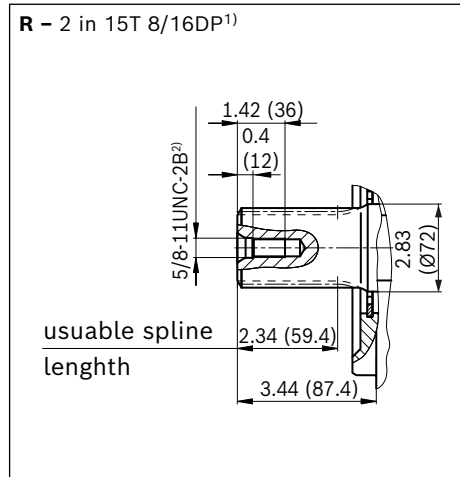
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft, ISO 3019-1, SAE F



▼ Splined shaft SAE J744, similar to SAE F



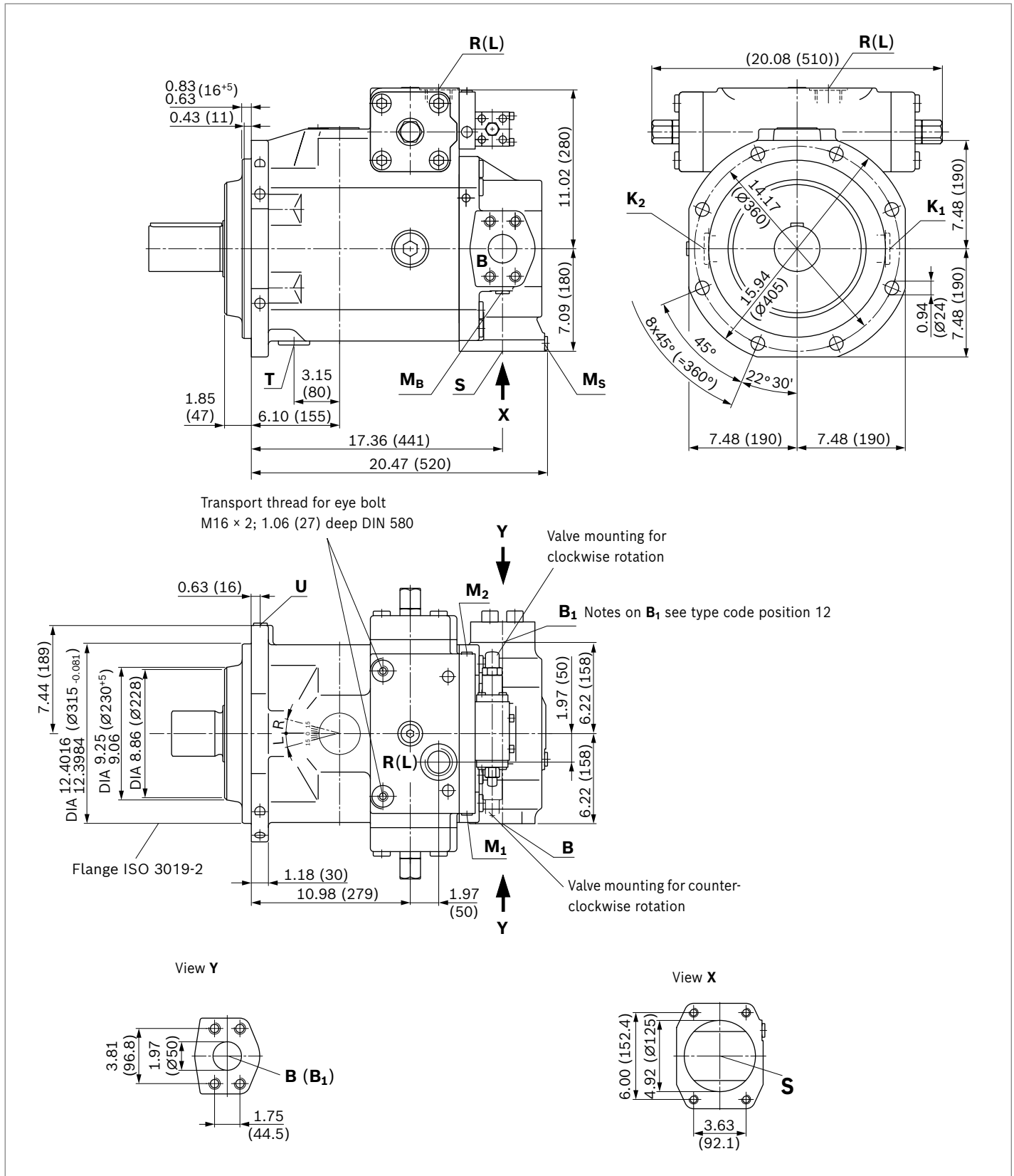
Ports		Standard	Size	$p_{\max \text{ abs}}$ [psi (bar)] ³⁾	State ⁶⁾
S	Suction port (standard pressure series)	SAE J518	4 in	435 (30)	O
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
For version port plate 63					
B	Pressure port (high-pressure series)	SAE J518	1 1/2 in	5800 (400)	O
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
B₁	Additional connection	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep	5800 (400)	X
For version port plate 75					
B	Pressure port (high-pressure series)	SAE J518	1 1/2 in	5800 (400)	O
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
B₁	2nd working port (high-pressure series)	SAE J518	1 1/2 in	5800 (400)	X ⁷⁾
	Fastening thread	ASME B1.1	5/8-11UNC-2B; 1.14 (29) deep		
K₁, K₂	Flushing port	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
T	Drain port	ISO 11926 ⁴⁾	1 5/8-12UN-2B; 0.79 (20) deep	60 (4)	X ⁵⁾
M_B	Measuring port working pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	5800 (400)	X
M_S	Measuring port suction pressure	ISO 11926	7/16-20UNF-2B; 0.39 (10) deep	435 (30)	X
R(L)	Drain port	ISO 11926 ⁴⁾	1 5/8-12UN-2B; 0.79 (20) deep	60 (4)	O ⁵⁾
U	Flushing port	ISO 11926	3/4-16UNF-2B; 0.59 (15) deep	75 (5)	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852	M18 × 1.5; 0.47 (12) deep	5800 (400)	X

- Splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
- Thread according to ASME B1.1
- Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.

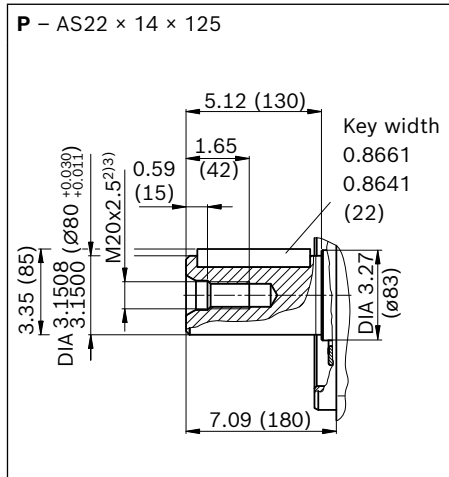
- The countersink can be deeper than as specified in the standard.
- Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)
- O = must be connected (plugged when delivered)
X = plugged (in normal operation)
- Plugged with flange plate

Dimensions, size 500

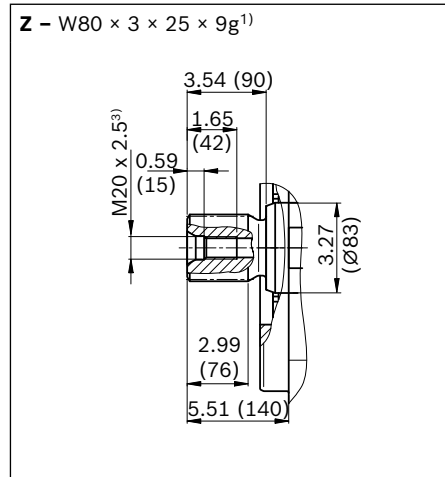
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft, DIN 6885



▼ Splined shaft (DIN 5480)



Ports		Standard	Size	$p_{\max \text{ abs}}$ [psi (bar)] ⁴⁾	State ⁸⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	5 in M16 × 2.5; 0.94 (24) deep	435 (30)	O
For version port plate 25					
B	Pressure port (high-pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	2 in M20 × 2.5; 0.98 (25) deep	5800 (400)	O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	2 in M20 × 2.5; 0.94 (24) deep	5800 (400)	X ⁹⁾
K₁, K₂	Flushing port	DIN 3852	M48 × 2; 0.87 (22) deep	60 (4)	X ⁷⁾
T	Drain port	DIN 3852 ⁶⁾	M48 × 2; 0.87 (22) deep	60 (4)	X ⁷⁾
M_B	Measuring port working pressure	DIN 3852	M18 × 1.5; 0.47 (12) deep	5800 (400)	X
M_S	Measuring port suction pressure	DIN 3852	M18 × 1.5; 0.47 (12) deep	435 (30)	X
R(L)	Drain port	DIN 3852 ⁶⁾	M48 × 2; 0.87 (22) deep	60 (4)	O ⁷⁾
U	Flushing port	DIN 3852	M18 × 1.5; 0.47 (12) deep	75 (5)	X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852	See data sheet adjusting devices	5800 (400)	X

1) Splined shaft according to DIN 5480

2) Center bore according to DIN 332

3) Thread according to DIN 13

4) Momentary pressure peaks may occur depending on the application.
Keep this in mind when selecting measuring devices and fittings.

5) Metric fastening thread is a deviation from standard.

6) The countersink can be deeper than as specified in the standard.

7) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)

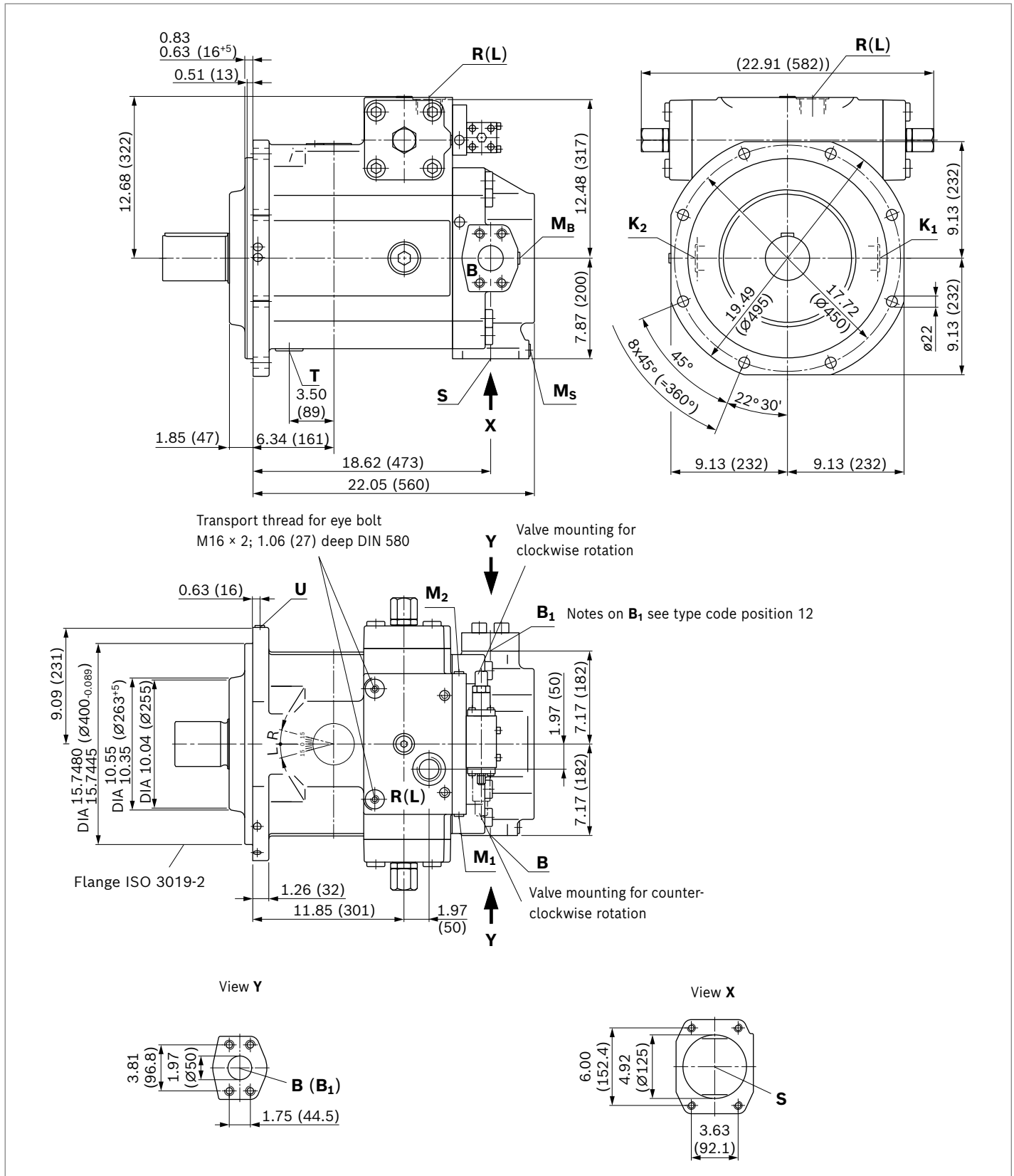
8) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

9) Plugged with flange plate

Dimensions, size 750¹⁾

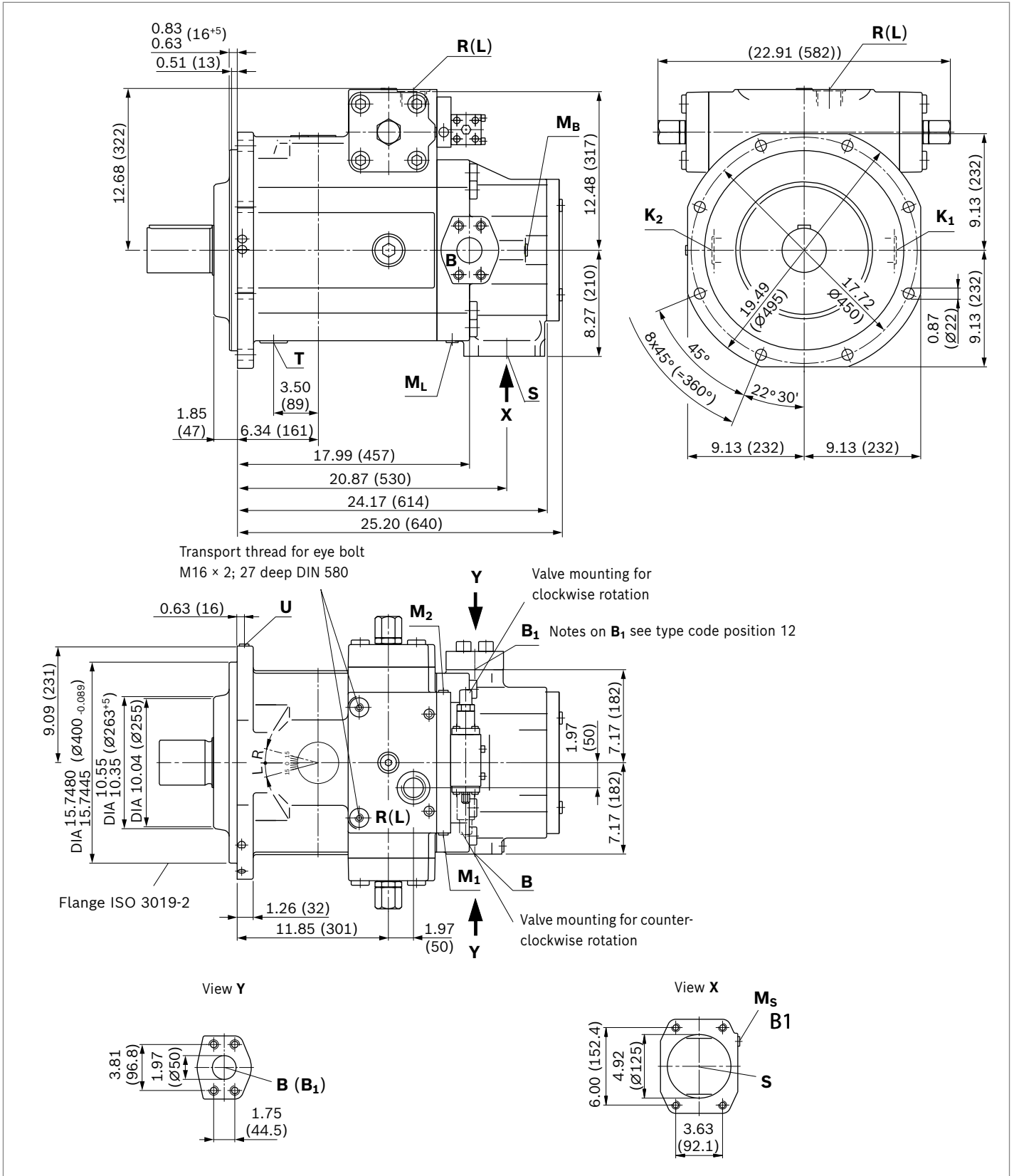
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



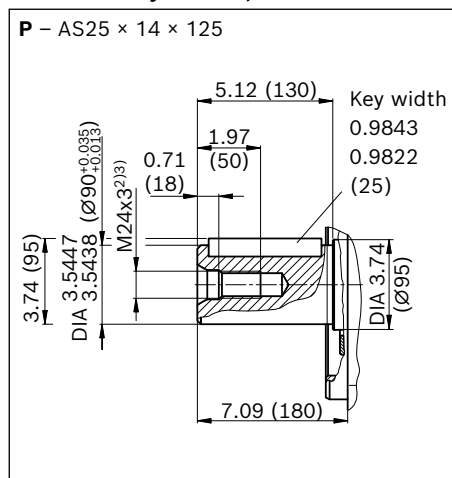
1) Ports and shaft ends see page 40

Dimensions of size 750 with charge pump (impeller)

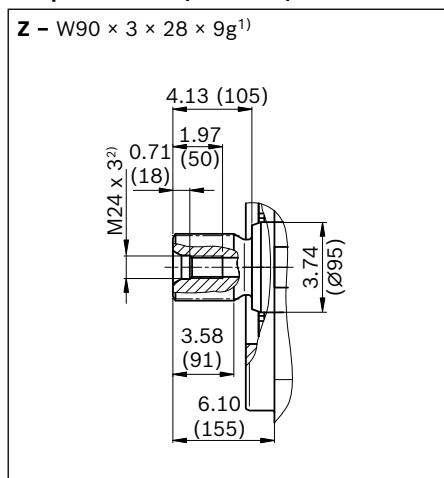
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft, DIN 6885



▼ Splined shaft (DIN 5480)



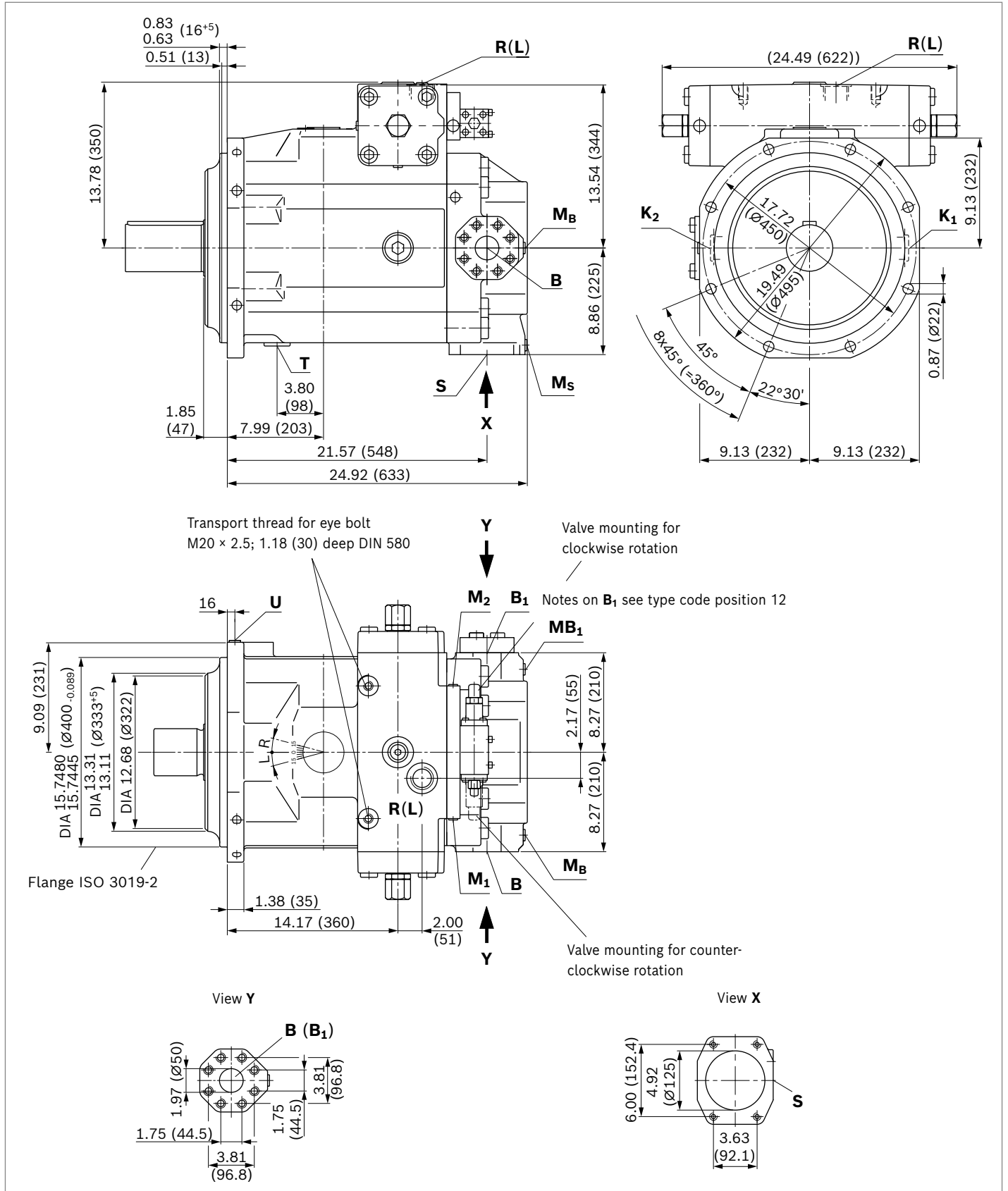
Ports	Standard	Size	$p_{\max \text{ abs}}$ [psi (bar)] ⁴⁾	State ⁸⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	5 in M16 × 2.5; 0.94 (24) deep	435 (30) O
For version port plate 25				
B	Pressure port (high-pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	2 in M20 × 2.5; 0.98 (25) deep	5800 (400) O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	2 in M20 × 2.5; 0-94 (24) deep	5800 (400) X ⁹⁾
K₁, K₂	Flushing port	DIN 3852	M48 × 2; 0.79 (20) deep	60 (4) X ⁷⁾
T	Drain port	DIN 3852 ⁶⁾	M48 × 2; 0.79 (20) deep	60 (4) X ⁷⁾
M_B	Measuring port working pressure	DIN 3852	M18 × 1.5; 0.47 (12) deep	5800 (400) X
M_S	Measuring port suction pressure	DIN 3852	M18 × 1.5; 0.47 (12) deep	435 (30) X
M_L	Measuring port charging pressure	DIN 3852	M18 × 1.5; 0.47 (12) deep	435 (30) X
R(L)	Drain port	DIN 3852 ⁶⁾	M48 × 2; 0.79 (20) deep	60 (4) O ⁷⁾
U	Flushing port	DIN 3852	M18 × 1.5; 0.57 (12) deep	75 (5) X
M₁, M₂	Measuring port (stroking chamber pressure) adjusting devices	DIN 3852	See data sheet	5800 (400) X

1) Splined shaft according to DIN 5480
2) Center bore according to DIN 332
3) Thread according to DIN 13
4) Momentary pressure peaks may occur depending on the application.
Keep this in mind when selecting measuring devices and fittings.

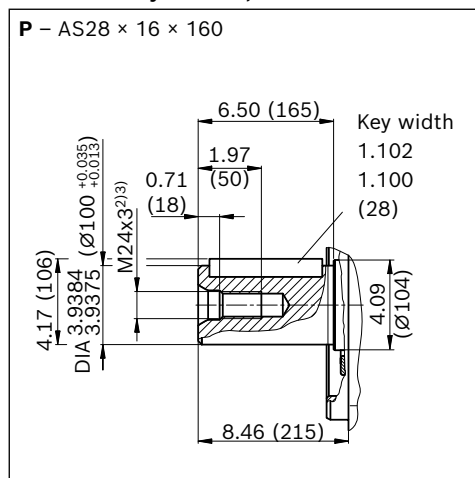
5) Metric fastening thread is a deviation from standard.
6) The countersink can be deeper than as specified in the standard.
7) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)
8) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)
9) Plugged with flange plate

Dimensions, size 1000

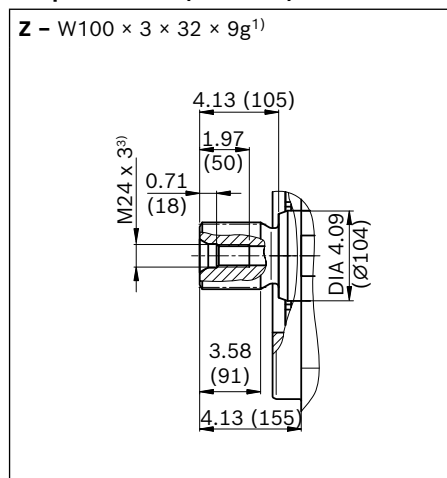
Main dimensions only for the basic unit, further dimensions are given in the relevant data sheets.



▼ Parallel keyed shaft, DIN 6885



▼ Splined shaft (DIN 5480)



Ports	Standard	Size	$p_{\max \text{ abs}}$ [psi (bar)] ⁴⁾	State ⁸⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	5 in M16 × 2.5; 0.94 (24) deep	435 (30) O
For port plate version 25				
B	Pressure port (high-pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	2 in M20 × 2.5; 1.18 (30) deep	5800 (400) O
B₁	2nd working port (high-pressure series) Fastening thread	SAE J518 ⁵⁾ DIN 13	2 in M20 × 2.5; 1.18 (30) deep	5800 (400) X ⁹⁾
K₁, K₂	Flushing port	DIN 3852	M48 × 2; 0.79 (20) deep	60 (4) X ⁷⁾
T	Drain port	DIN 3852 ⁶⁾	M48 × 2; 0.79 (20) deep	60 (4) X ⁷⁾
M_B, M_{B1}	Measuring port working pressure	DIN 3852	M18 × 1.5; 0.47 (12) deep	5800 (400) X
M_S	Measuring port suction pressure	DIN 3852	M18 × 1.5; 0.47 (12) deep	435 (30) X
R(L)	Drain port	DIN 3852 ⁶⁾	M48 × 2; 0.79 (20) deep	60 (4) O ⁷⁾
U	Flushing port	DIN 3852	M18 × 1.5; 0.47 (12) deep	75 (5) X
M₁, M₂	Measuring port (stroking chamber pressure)	DIN 3852	See data sheet adjusting devices	5800 (400) X

1) Splined shaft according to DIN 5480
2) Center bore according to DIN 332
3) Thread according to DIN 13
4) Momentary pressure peaks may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
5) Metric fastening thread is a deviation from standard.

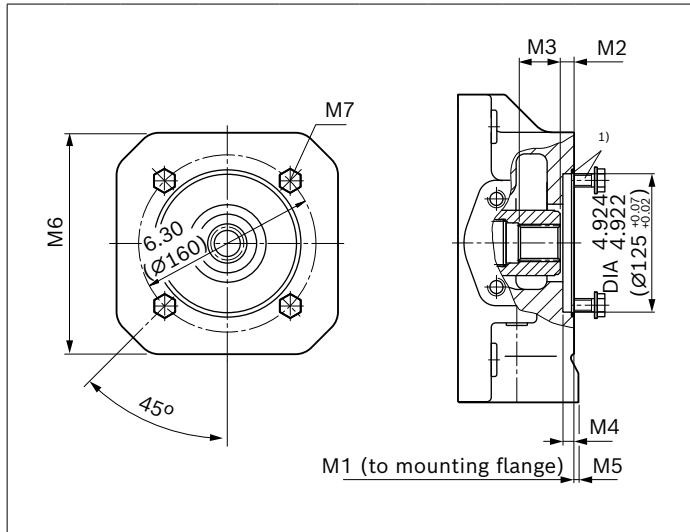
6) The countersink can be deeper than as specified in the standard.
7) Depending on the installation position **T**, **K₁**, **K₂** or **R(L)** must be connected (see also installation instructions on pages 66 and 67)
8) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)
9) Plugged with flange plate

Dimensions, through drive

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾	Availability over sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
125-4		N32×2×14×8H	-	-	-	-	-	-	●	●	-	○	K31
140-4		N40×2×18×8H	-	-	-	-	-	-	●	●	○	●	K33

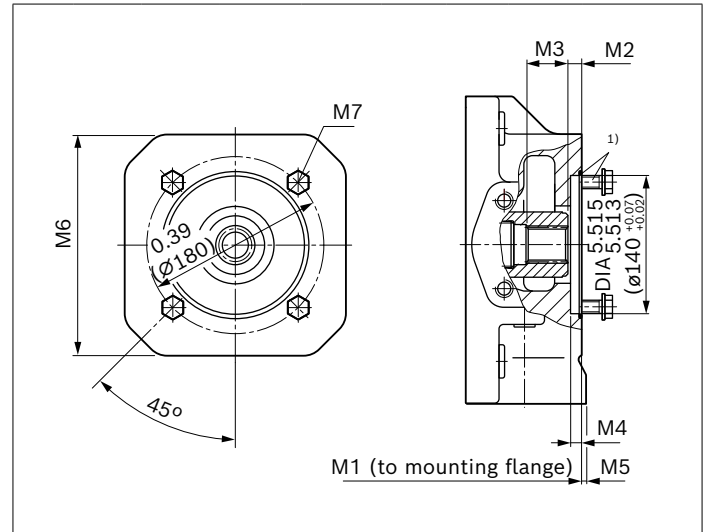
● = Available ○ = On request - = Not available

▼ 125-4



K31	NG	M1	M2	M3	M4	M5	M6	M7 ³⁾
500	19.88	0.49	1.52	0.35	0.59	9.44	M12; 0.71	
	(505)	(12.5)	(38.6)	(9)	(15)	(240)	(18) deep	
750	21.85	0.49	1.75	0.35	0.59	9.44	M12; 0.71	
	(555)	(12.5)	(44.5)	(9)	(15)	(240)	(18) deep	

▼ 140-4



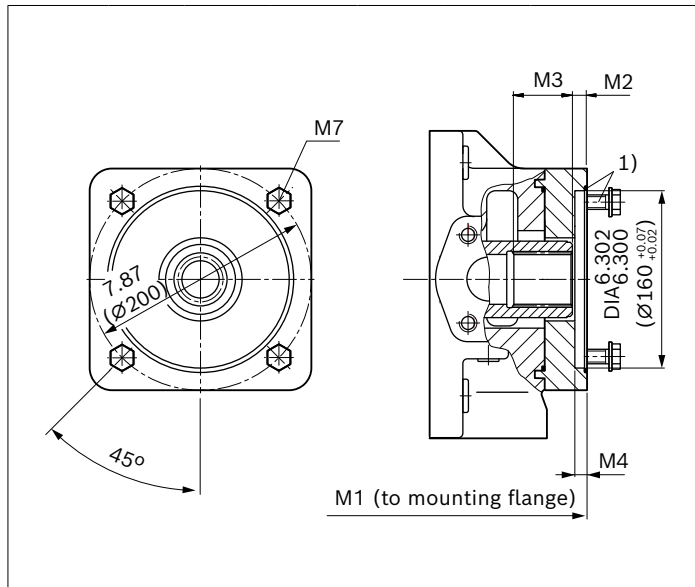
K33	NG	M1	M2	M3	M4	M5	M6	M7 ³⁾
500	19.88	0.49	2.24	0.35	-	-	M12; 0.71	
	(505)	(12.5)	(57)	(9)			(18) deep	
750	21.85	0.49	1.75	0.35	0.59	9.45	M12; 0.71	
	(555)	(12.5)	(44.5)	(9)	(15)	(240)	(18) deep	
1000	24.72	0.49	2.36	0.39	-	11.02	M12; 0.71	
	(628)	(12.5)	(60)	(10)		(280)	(18) deep	

- 1) Mounting bolts 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

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾											Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
160-4		N50×2×24×8H	-	-	-	-	-	-	●	●	○	○	K34
224-4		N60×2×28×8H	-	-	-	-	-	-	●	●	○	●	K35

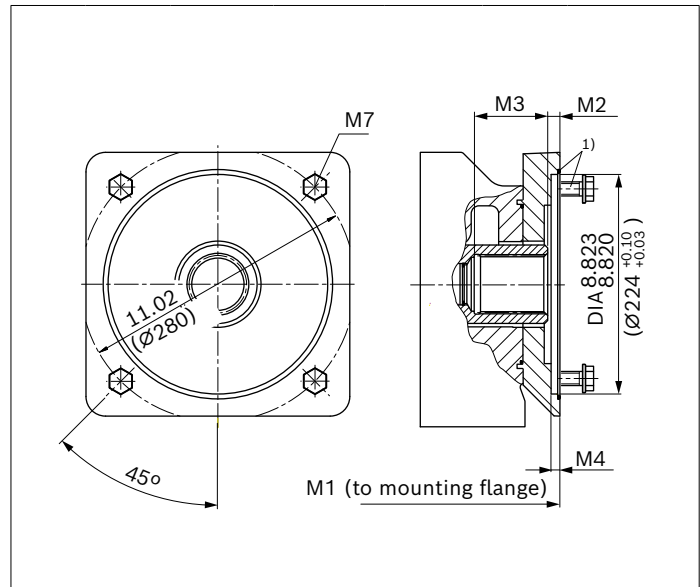
● = Available ○ = On request - = Not available

▼ 160-4



K34	NG	M1	M2	M3	M4	M7 ³⁾
500	19.88 (505)	0.53 (13.5)	2.15 (54.5)	0.39 (10)	M16; 0.94 (24) deep	
750	21.85 (555)	0.53 (13.5)	2.18 (55.5)	0.39 (10)	M16; 0.94 (24) deep	
1000	24.72 (628)	0.49 (12.5)	2.15 (54.5)	0.39 (10)	M16; 0.94 (24) deep	

▼ 224-4



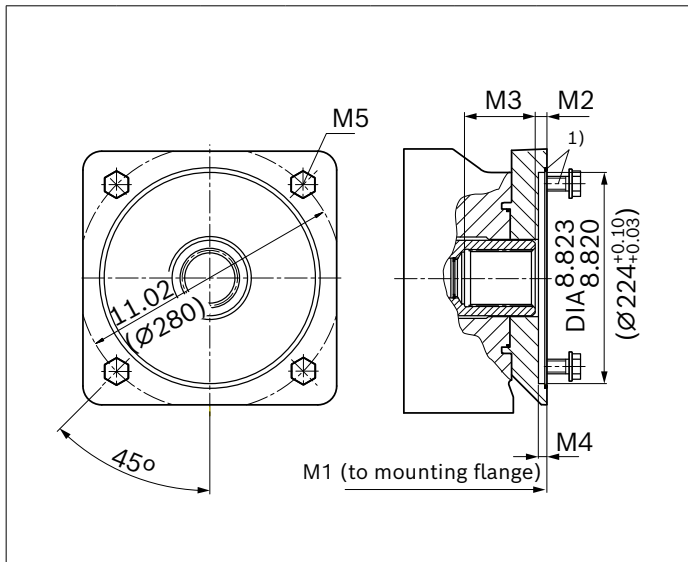
K35	NG	M1	M2	M3	M4	M7 ³⁾
500	21.30 (541)	0.49 (12.5)	2.91 (74)	0.35 (9)	M20; 1.42 (36) deep	
750	23.27 (591)	0.49 (12.5)	2.91 (74)	0.35 (9)	M20; 1.42 (36) deep	
1000	26.14 (664)	0.49 (12.5)	2.76 (70)	0.35 (9)	M20; 1.42 (36) deep	

- 1) Mounting bolts 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

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

● = Available ○ = On request - = Not available

▼ 224-4



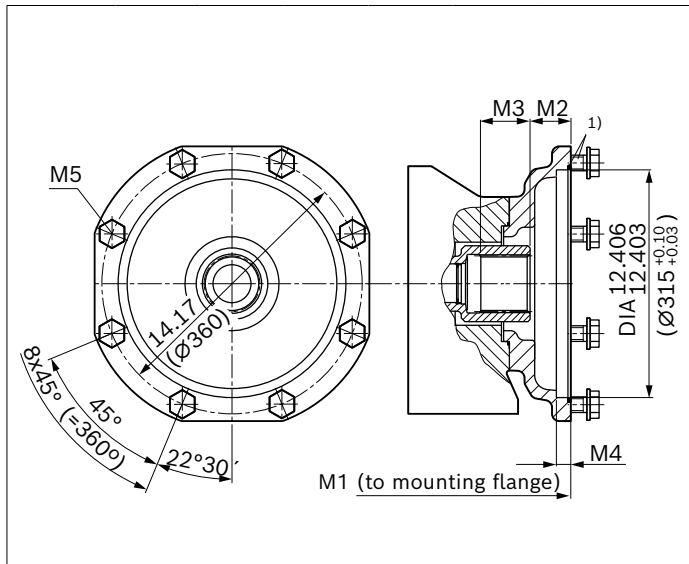
K77	NG	M1	M2	M3	M4	M7 ³⁾
500	21.30 (541)	0.49 (12.5)	3.23 (82)	0.35 (9)	M20; 1.42 (36) deep	
1000	26.14 (664)	0.49 (12.5)	3.23 (82)	0.35 (9)	M20; 1.42 (36) deep	

1) Mounting bolts and O-ring seal are included in the scope of delivery
 2) Splined hub according to DIN 5480
 3) Thread according to DIN 13.

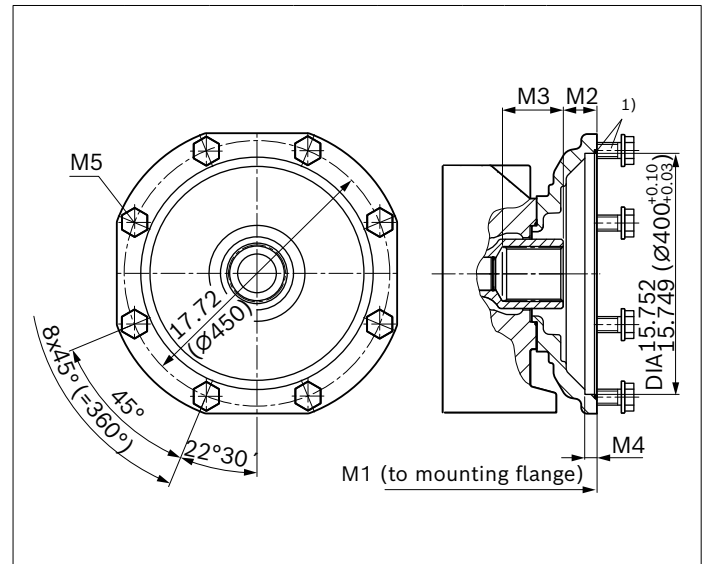
Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾											Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
315-8		N80×3×25×8H	-	-	-	-	-	-	●	●	○	●	K43
		N90×3×28×8H	-	-	-	-	-	-	-	●	●	●	K76

● = Available ○ = On request - = Not available

▼ 315-8



▼ 315-8



K43	NG	M1	M2	M3	M4	M7 ³⁾
500	23.23 (590)	2.11 (53.5)	2.83 (71.9)	0.75 (19)	M20; 1.02 (26) deep	
750	25.20 (640)	2.11 (53.5)	2.83 (71.9)	0.75 (19)	M20; 1.02 (26) deep	
1000	28.07 (713)	2.11 (53.5)	2.79 (71)	0.75 (19)	M20; 1.02 (26) deep	

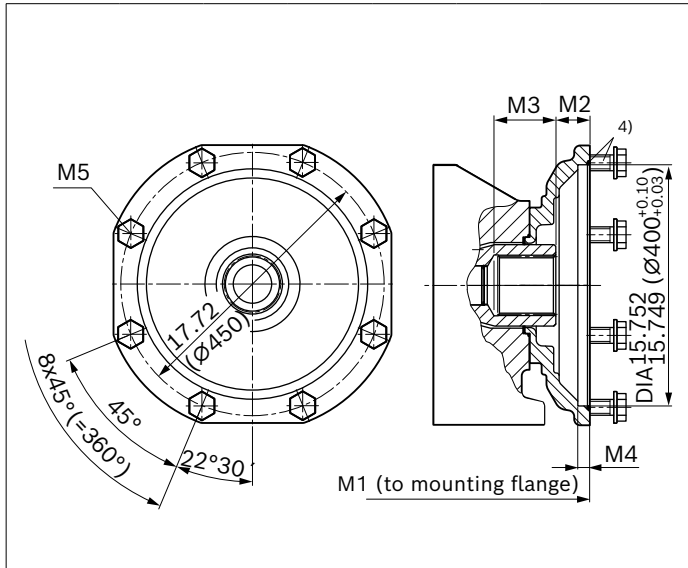
K76	NG	M1	M2	M3	M4	M7 ³⁾
750	25.79 (655)	2.09 (53)	4.09 (104)	0.75 (19)	M20; 1.02 (26) deep	
750 ⁴⁾	29.49 (749)	2.09 (53)	3.82 (97)	0.75 (19)	M20; 1.02 (26) deep	
1000	28.66 (728)	2.09 (53)	3.82 (97)	0.75 (19)	M20; 1.02 (26) deep	

- 1) Mounting bolts 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

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

● = Available ○ = On request - = Not available

▼ 400-8



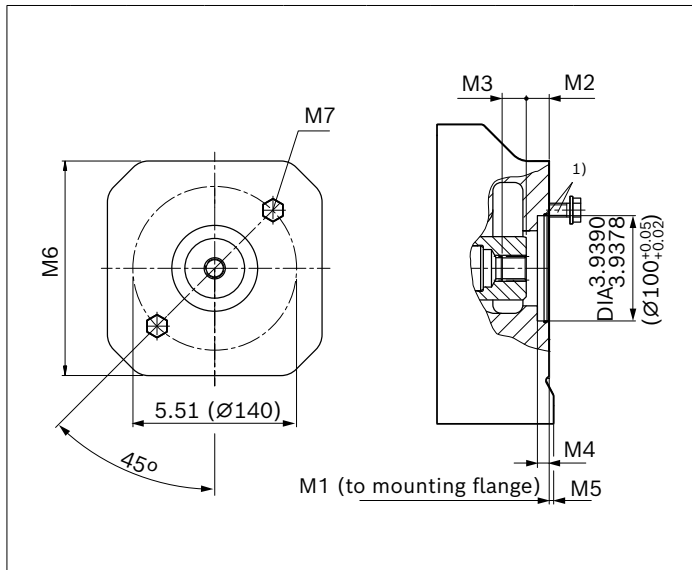
K88	NG	M1	M2	M3	M4	M7 ³⁾
	1000	28.66 (728)	2.09 (53)	3.90 (99)	0.75 (19)	M20; 1.02 (26) deep

1) Mounting bolts and O-ring seal are included in the scope of delivery
 2) Splined hub according to DIN 5480
 3) Thread according to DIN 13.

Flange ISO 3019-2 (metric)		Hub for splined shaft ²⁾											Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
100-2		1in 15T 16/32DP	-	-	-	-	-	-	●	○	-	○	KB4
125-2		1 1/4 in 14T 12/24DP	-	-	-	-	-	-	●	○	●	○	KB5

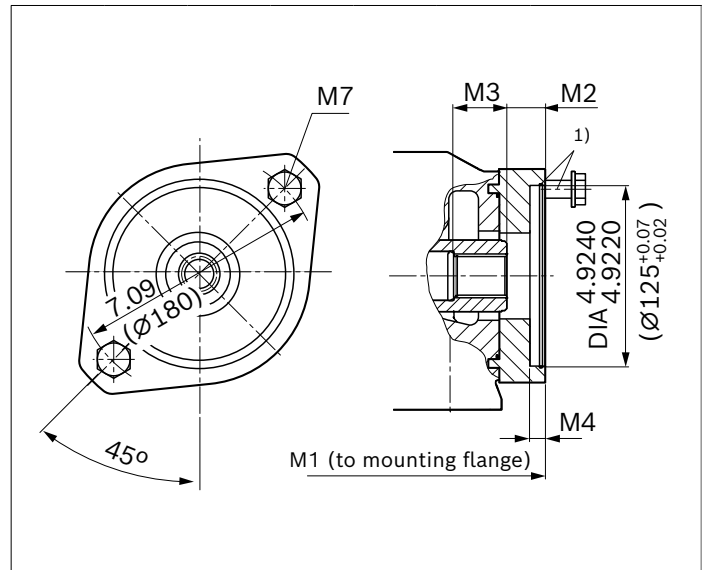
● = Available ○ = On request - = Not available

▼ 100-2



KB4	NG	M1	M2	M3	M4	M5	M6	M7 ³⁾
500	19.88 (505)	0.80 (20.4)	1.14 (28.9)	0.39 (10)	0.59 (15)	9.45 (240)	M12; 0.71 (18) deep	

▼ 125-2



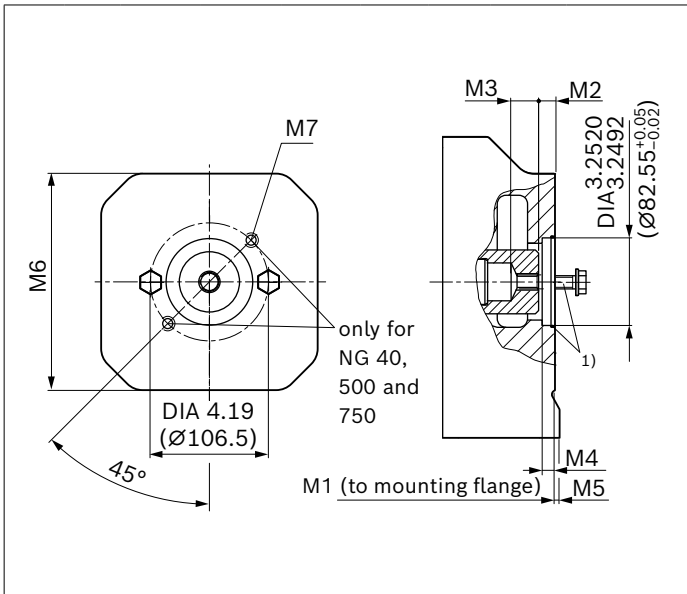
KB5	NG	M1	M2	M3	M4	M7 ³⁾
500	19.88 (505)	0.76 (19.3)	1.59 (40.4)	0.39 (10)	M16; 0.94 (24) deep	
750 ⁴⁾	25.55 (649)	0.76 (19.3)	1.59 (40.4)	0.39 (10)	M16; 0.79 (20) deep	

- 1) Mounting bolts 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

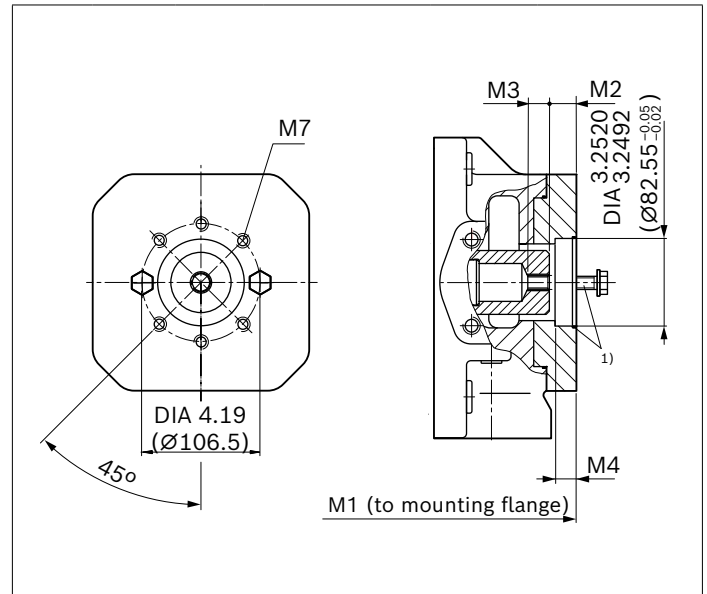
Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
82-2 (A)		5/8in 9T 16/32DP	●	●	-	-	-	-	●	●	○	○	K01
		5/8in 9T 16/32DP	-	-	●	●	●	●	-	-	-	-	U01

● = Available ○ = On request - = Not available

▼ 82-2



▼ 82-2



K01	NG	M1	M2	M3	M4	M5	M6	M7 ³⁾
	40	10.35 (263)	0.41 (10.3)	1.02 (25.9)	0.39 (10)	-	-	M10; 0.59 (15) deep
	71	11.46 (291)	0.41 (10.3)	0.97 (24.6)	0.39 (10)	0.08 (2)	5.51 (140)	M10; 0.59 (15) deep
	500	19.88 (505)	0.41 (10.3)	1.29 (32.7)	0.39 (10)	0.59 (15)	9.45 (240)	M10; 0.59 (15) deep
	750	21.85 (555)	0.41 (10.3)	1.29 (32.7)	0.39 (10)	-	-	M10; 0.59 (15) deep

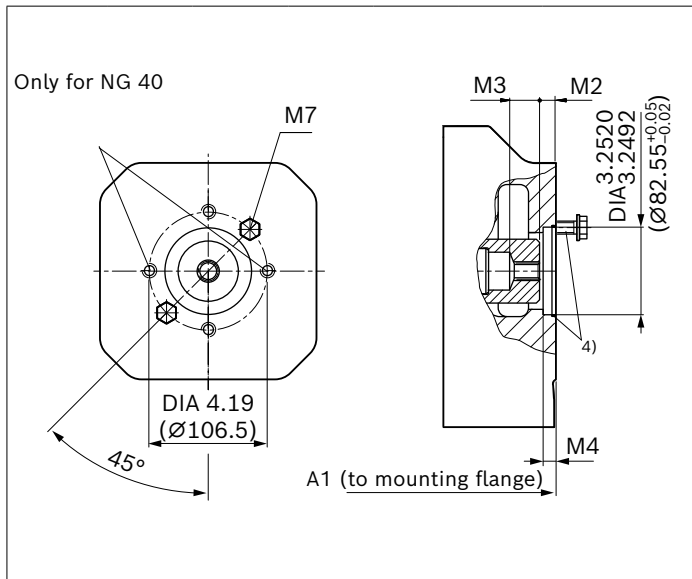
U01	NG	M1	M2	M3	M4	M7 ³⁾
	125	14.53 (369)	0.41 (10.3)	0.76 (19.4)	0.51 (13)	M10; 0.63 (16) deep
	180	15.47 (393)	0.41 (10.3)	0.76 (19.4)	0.51 (13)	M10; 0.63 (16) deep
	250	17.83 (453)	0.63 (16)	0.76 (19.4)	0.51 (13)	M10; 0.63 (16) deep
	355	18.98 (482)	0.63 (16)	0.76 (19.4)	0.51 (13)	M10; 0.63 (16) deep

- 1) Mounting bolts 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

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000	
82-2 (A)		3/4in 11T 16/32DP ⁴⁾	●	●	-	-	-	-	○	○	○	K52
		3/4in 11T 16/32DP	-	-	●	●	●	●	-	-	-	U52

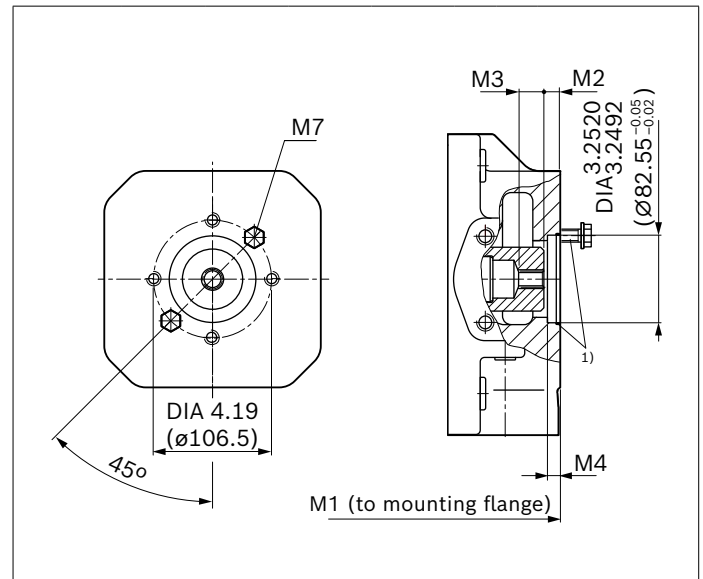
● = Available ○ = On request - = Not available

▼ 82-2



K52	NG	M1	M2	M3	M4	M7 ³⁾
	40	10.35 (263)	0.41 (10.5)	1.33 (33.8)	0.39 (10)	M10; 0.59 (15) deep
	71	12.30 (312.5)	0.85 (21.5)	0.75 (19)	0.39 (10)	M10; 0.59 (15) deep

▼ 82-2



U52	NG	M1	M2	M3	M4	M7 ³⁾
	125	14.53 (369)	0.76 (19.4)	0.83 (21.1)	0.39 (10)	M10, 0.63 (16) deep
	180	15.47 (393)	0.76 (19.4)	0.83 (21.1)	0.39 (10)	M10, 0.63 (16) deep
	250	17.83 (453)	0.77 (19.5)	0.94 (23.9)	0.39 (10)	M10, 0.63 (16) deep
	355	18.98 (482)	0.76 (19.4)	0.94 (23.9)	0.39 (10)	M10, 0.63 (16) deep

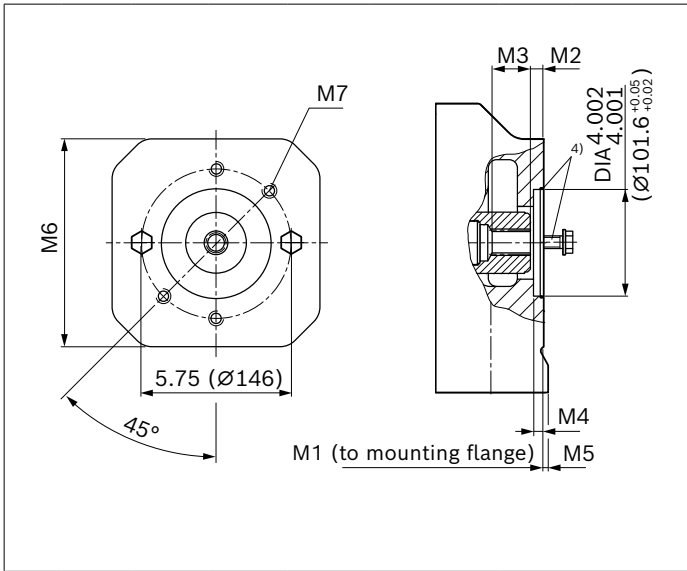
1) Mounting bolts and O-ring seal are included in the scope of delivery
 2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
 3) Thread according to DIN 13.

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

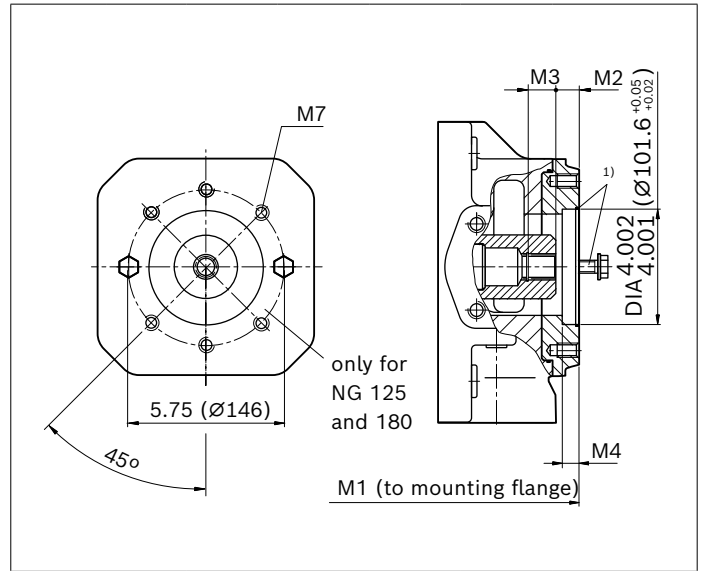
Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾ Diameter	Availability over sizes											Code
Diameter	Symbol		40	71	125	180	250	355	500	750	750 ⁴⁾	1000		
101-2 (B)		7/8in 13T 16/32DP	●	●	-	-	-	-	●	●	●	○	K68	
		7/8in 13T 16/32DP	-	-	●	●	●	●	-	-	-	-	U68	

● = Available ○ = On request - = Not available

▼ 101-2



▼ 101-2



K68	NG	M1	M2	M3	M4	M5	M6	M7 ³⁾
40		11.42 (290)	0.80 (20.4)	0.91 (23.1)	0.39 (10)	-	-	M12; 0.71 (18) deep
71		12.68 (322)	0.81 (20.5)	0.91 (23.1)	0.39 (10)	-	-	M12; 1.18 (30) deep
500		19.88 (505)	0.77 (19.5)	0.98 (25)	0.39 (10)	0.59 (15)	9.45 (240)	M12; 0.71 (18) deep
750		21.85 (555)	0.77 (19.5)	0.98 (25)	0.39 (10)	-	-	M12; 0.71 (18) deep
750 ⁴⁾		25.55 (649)	0.77 (19.5)	0.98 (25)	0.39 (10)	-	-	M12; 0.71 (18) deep

U68	NG	M1	M2	M3	M4	M7 ³⁾
	125	14.53 (369)	1.10 (28)	0.98 (25)	0.51 (13)	M12; 0.87 (22) deep
	180	15.47 (393)	1.10 (28)	0.98 (25)	0.51 (13)	M12; 0.87 (22) deep
	250	17.83 (453)	0.76 (19.5)	0.91 (23.1)	0.51 (13)	M12; 0.71 (18) deep
	355	18.97 (482)	0.76 (19.5)	0.91 (23.1)	0.51 (13)	M12; 0.71 (18) deep

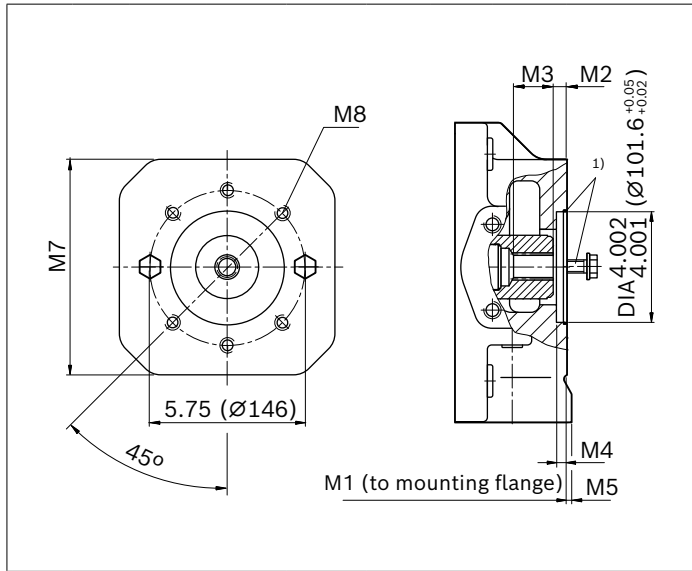
1) Mounting bolts and O-ring seal are included in the scope of delivery
 2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
 3) Thread according to DIN 13.

4) With charge pump

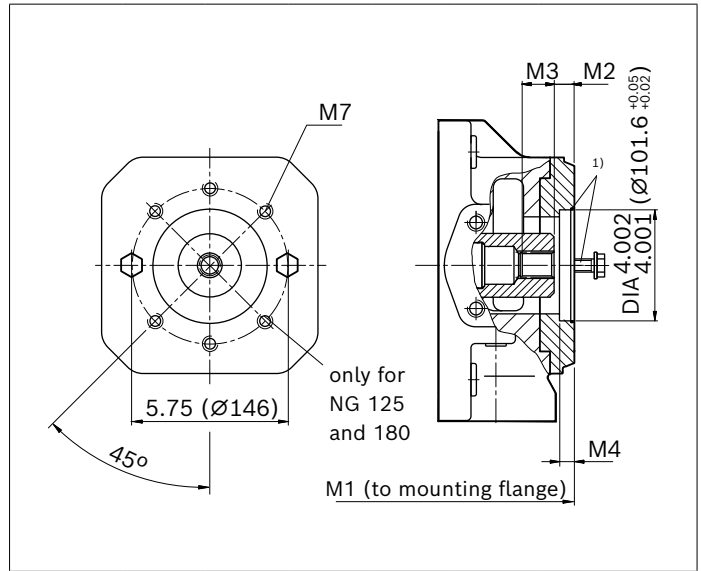
Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000		
101-2 (B)		1in 15T 16/32DP	●	●	-	-	-	-	●	○	○	K04	
		1in 15T 16/32DP	-	-	●	●	●	●	-	-	-	U04	

● = Available ○ = On request - = Not available

▼ 101-2



▼ 101-2



K04	NG	M1	M2	M3	M4	M5	M7	M8 ³⁾
40	11.42 (290)	0.82 (20.8)	1.08 (27.5)	0.39 (10)	-	-	-	M12; 0.79 (20) deep
71	12.68 (322)	0.79 (20)	1.16 (29.4)	0.39 (10)	-	-	-	M12; 1.18 (30) deep
500	19.88 (505)	0.80 (20.4)	1.14 (28.9)	0.39 (10)	0.59 (15)	9.45 (240)	-	M12; 0.71 (18) deep

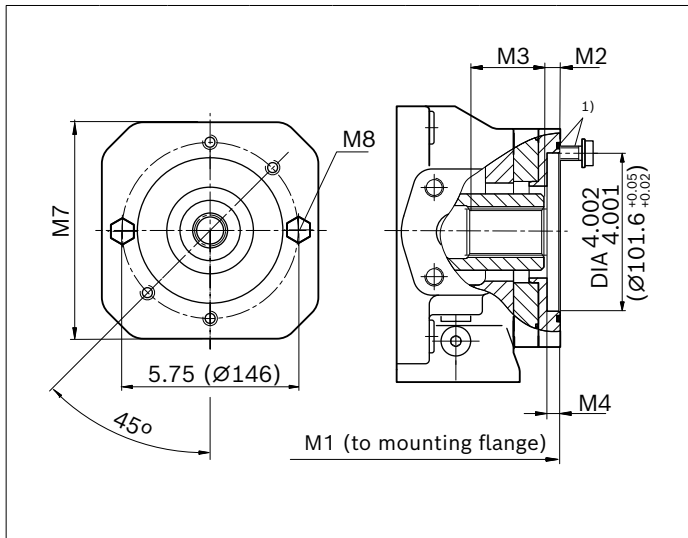
U04	NG	M1	M2	M3	M4	M7 ³⁾
125	14.53 (369)	0.74 (18.9)	1.16 (29.4)	0.51 (13)	-	M12; 0.87 (22) deep
180	15.47 (393)	0.74 (18.9)	1.16 (29.4)	0.51 (13)	-	M12; 0.87 (22) deep
250	17.83 (453)	0.74 (18.9)	1.16 (29.4)	0.51 (13)	-	M12; 0.71 (18) deep
355	18.98 (482)	0.74 (18.9)	1.16 (29.4)	0.51 (13)	-	M12; 0.71 (18) deep

1) Mounting bolts 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.

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	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⁾



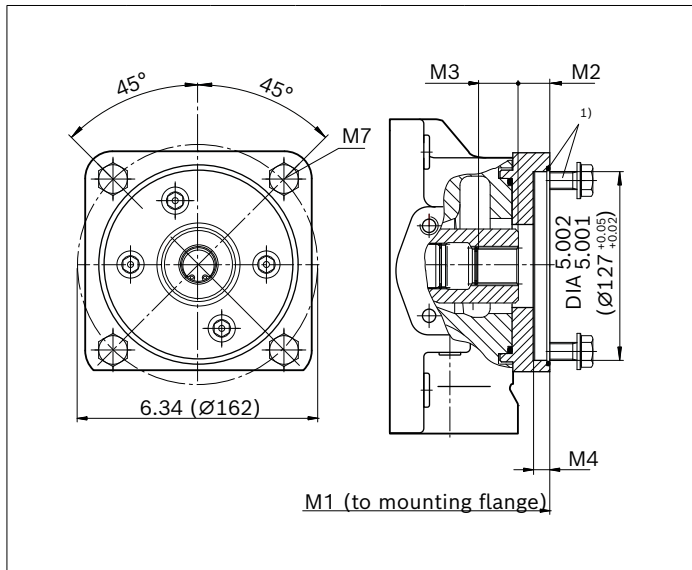
K06	NG	M1	M2	M3	M4	M7	M8 ³⁾
71	12.68 (322)	0.82 (20.8)	1.50 (38)	0.39 (10)	5.51 (140)	M12; 1.18 (30)	deep

1) Mounting bolts 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/NG63

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000	
127-4 (C)		1in 15T 16/32 DP	○	●	-	-	-	-	○	○	○	KE2
		1in 15T 16/32 DP	-	-	●	●	○	○	-	-	-	UE2

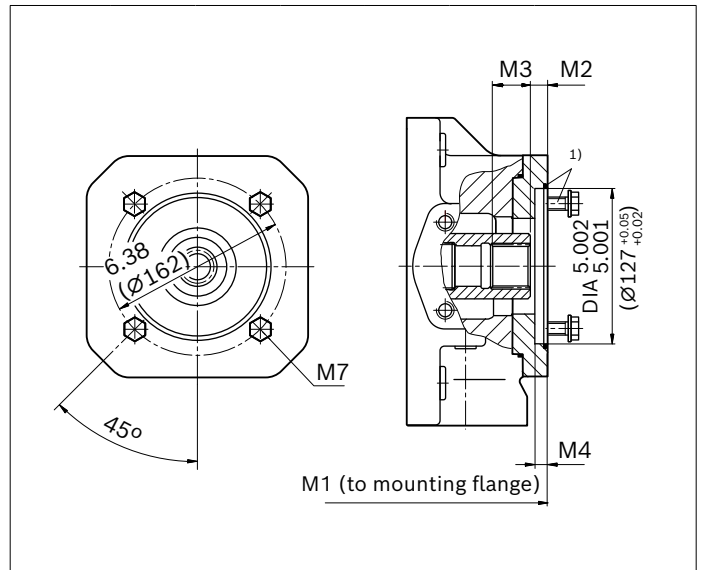
● = Available ○ = On request - = Not available

▼ 127-4⁴⁾




KE2	NG	M1	M2	M3	M4	M7 ³⁾
	71	12.64 (321)	0.75 (19)	1.16 (29.4)	0.51 (13)	M12; 1.18 (30) deep

▼ 127-4



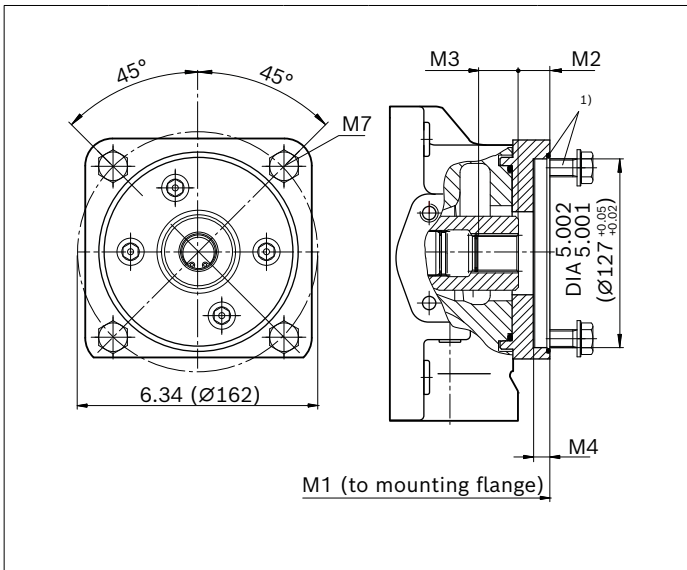
UE2	NG	M1	M2	M3	M4	M7 ³⁾
	125	14.53 (369)	0.78 (19.9)	1.16 (29.5)	0.51 (13)	M12; 0.87 (22) deep
	180	15.47 (393)	0.78 (19.9)	1.16 (29.5)	0.51 (13)	M12; 0.87 (22) deep

- 1) Mounting bolts 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

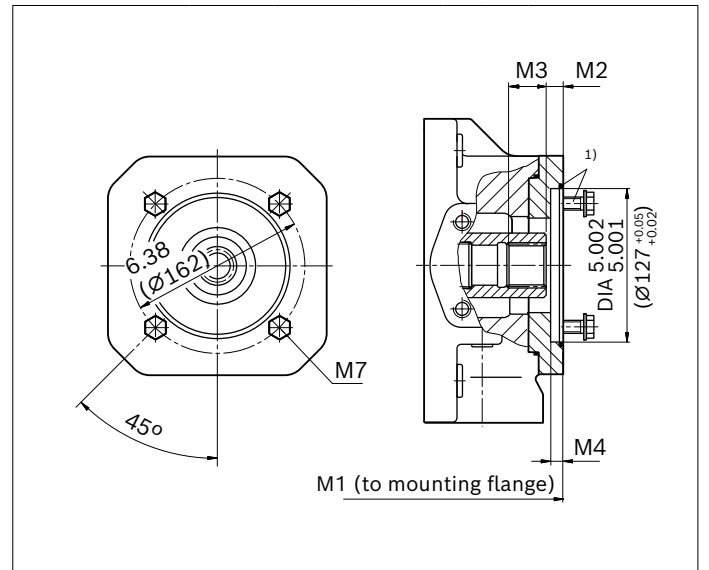
Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000		
127-4 (C)		1 1/4in 14T 12/24 DP	-	●	-	-	-	-	●	○	○	K15	
		1 1/4in 14T 12/24 DP	-	-	●	●	●	●	-	-	-	U15	

● = Available ○ = On request - = Not available

▼ 127-4⁴⁾



▼ 127-4



K15	NG	M1	M2	M3	M4	M7 ³⁾
71	12.64 (321)	0.90 (23)	1.50 (38)	0.51 (13)	M12; 1.18 (30) deep	
500	19.88 (505)	0.76 (19.3)	1.57 (40)	0.51 (13)	M12; 0.71 (18) deep	

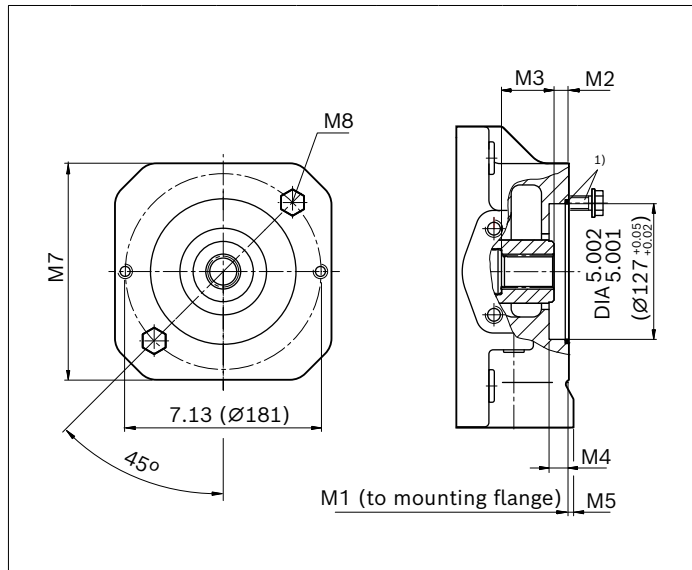
U15	NG	M1	M2	M3	M4	M7 ³⁾
125	14.53 (369)	0.79 (20)	1.50 (38)	0.51 (13)	M12; 0.87 (22) deep	
180	15.47 (393)	0.79 (20)	1.50 (38)	0.51 (13)	M12; 0.87 (22) deep	
250	17.83 (453)	0.82 (20.9)	1.50 (38)	0.51 (13)	M12; 0.87 (22) deep	
355	18.98 (482)	0.82 (20.9)	1.50 (38)	0.51 (13)	M12; 0.87 (22) deep	

1) Mounting bolts 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

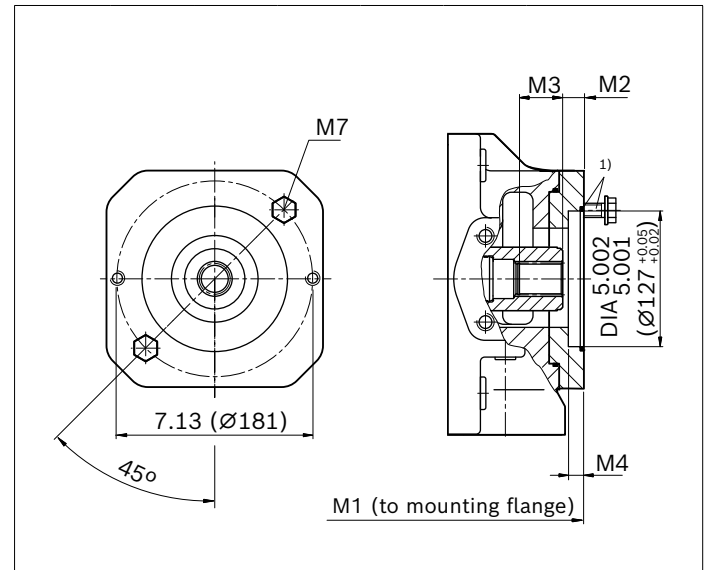
Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾											Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	750 ⁴⁾	1000	
127-2 (C)		1 1/4in 14T 12/24 DP	-	●	-	-	-	-	●	●	●	○	K07
		1 1/4in 14T 12/24 DP	-	-	●	●	●	●	-	-	-	-	U07

● = Available ○ = On request - = Not available

▼ 127-2



▼ 127-2



K07	NG	M1	M2	M3	M4	M5	M7	M8 ³⁾
71		12.64 (321)	0.91 (23)	1.50 (38)	0.51 (13)	-	-	M16; 1.18 (30) deep
500		19.88 (505)	0.76 (19.3)	1.59 (40.4)	0.51 (13)	0.59 (15)	9.45 (240)	M16; 0.94 (24) deep
750		21.85 (555)	0.76 (19.3)	1.59 (40.4)	0.51 (13)	-	10.24 (260)	M16; 0.94 (24) deep
750 ⁴⁾		25.55 (649)	0.76 (19.3)	1.59 (40.4)	0.51 (13)	-	-	M16; 0.94 (24) deep

U07	NG	M1	M2	M3	M4	M7 ³⁾
125		14.53 (369)	0.82 (20.9)	1.49 (37.9)	0.51 (13)	M16; 0.87 (22) deep
180		15.47 (393)	0.82 (20.9)	1.49 (37.9)	0.51 (13)	M16; 0.87 (22) deep
250		17.83 (453)	0.82 (20.9)	1.49 (37.9)	0.51 (13)	M16; 0.87 (22) deep
355		18.98 (482)	0.82 (20.9)	1.49 (37.9)	0.51 (13)	M16; 0.87 (22) deep

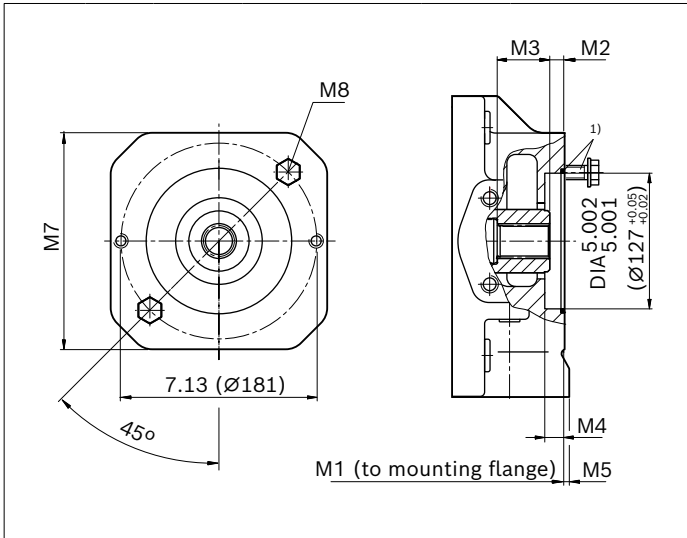
1) Mounting bolts and O-ring seal are included in the scope of delivery
 2) Involute spline according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
 3) Thread according to DIN 13.

4) With charge pump

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000	
127-2 (C)		1 1/2in 17T 12/24 DP	-	-	-	-	-	-	●	●	●	K24
		1 1/2in 17T 12/24 DP	-	-	●	●	●	●	-	-	-	U24

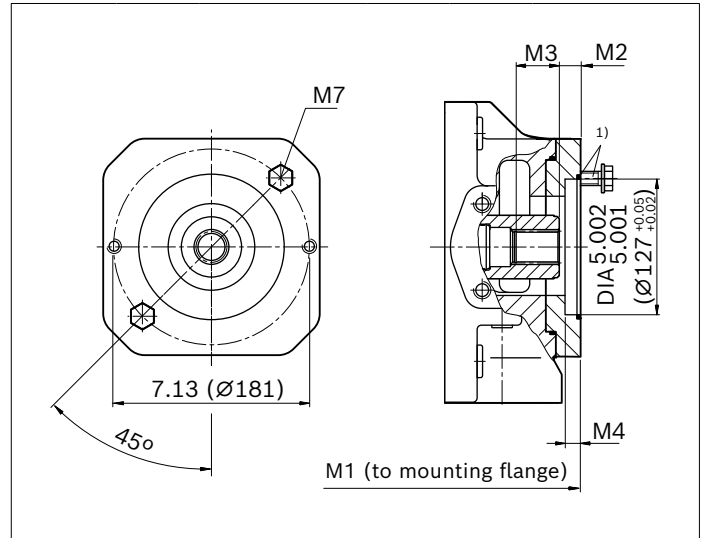
● = Available ○ = On request - = Not available

▼ 127-2




K24	NG	M1	M2	M3	M4	M7 ³⁾
500	19.88 (505)	0.40 (10.3)	2.23 (56.7)	0.51 (13)	M16; 0.94 (24) deep	
750	21.85 (555)	0.40 (10.3)	2.23 (56.7)	0.51 (13)	M16; 0.94 (24) deep	
1000	24.72 (628)	0.41 (10.4)	2.22 (56.6)	0.51 (13)	M16; 1.26 (32) deep	

▼ 127-2



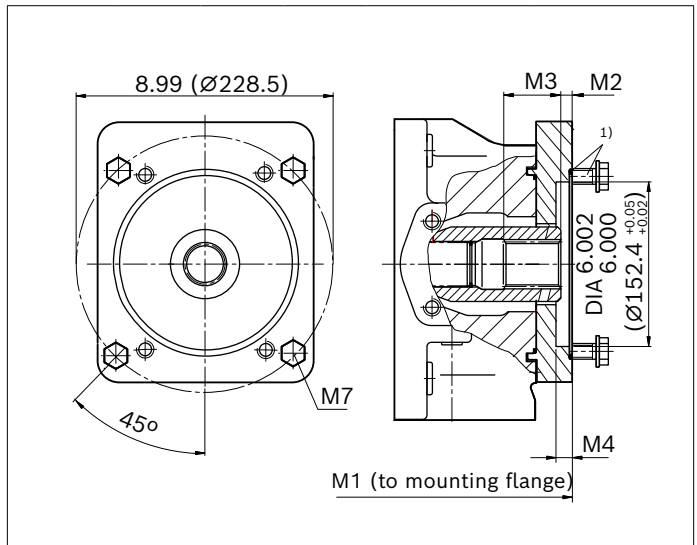
U24	NG	M1	M2	M3	M4	M7 ³⁾
125	14.53 (369)	0.41 (10.4)	1.97 (50)	0.51 (13)	M16; 0.87 (22) deep	
180	15.47 (393)	0.41 (10.4)	1.97 (50)	0.51 (13)	M16; 0.87 (22) deep	
250	17.83 (453)	0.49 (12.4)	2.16 (55)	0.51 (13)	M16; 0.87 (22) deep	
355	18.98 (482)	0.49 (12.4)	2.16 (55)	0.51 (13)	M16; 0.87 (22) deep	

1) Mounting bolts 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.

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000	
152-4 (D)		1 1/2 in 17T 12/24DP	-	-	-	-	-	-	o	o	o	K96
		1 1/2 in 17T 12/24DP	-	-	•	•	•	•	-	-	-	U96

• = Available o = On request - = Not available

▼ 152-4



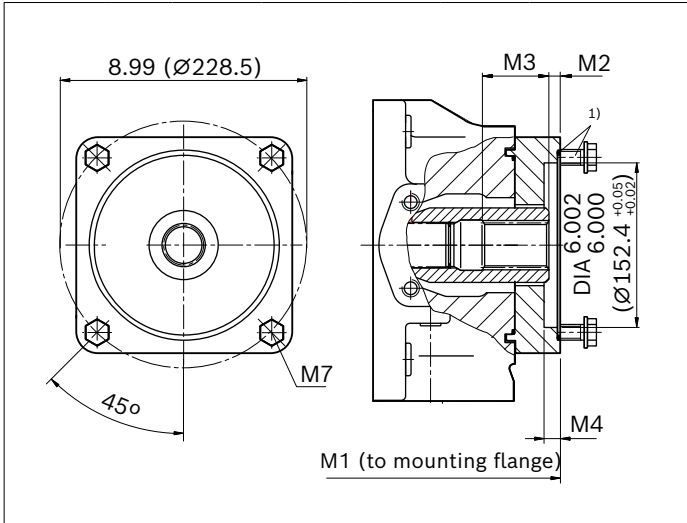
U96	NG	M1	M2	M3	M4	M7 ³⁾
	125	14.53 (369)	0.41 (10.4)	2.05 (52)	0.51 (13)	M16; 0.87 (22) deep
	180	15.47 (393)	0.41 (10.4)	2.05 (52)	0.51 (13)	M16; 0.87 (22) deep
	250	17.83 (453)	0.49 (12.4)	2.16 (55)	0.51 (13)	M16; 0.87 (22) deep
	355	18.98 (482)	0.49 (12.4)	2.16 (55)	0.51 (13)	M16; 0.87 (22) deep

1) Mounting bolts 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.

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾ Diameter	Availability over sizes									Code
Diameter	Symbol		40	71	125	180	250	355	500	750	1000	
152-4		1 3/4in 13T 8/16DP	-	-	-	-	-	-	●	●	○	K17
		1 3/4in 13T 8/16DP	-	-	●	●	●	●	-	-	-	U17
		2 in 15T 8/16DP	-	-	-	●	●	●	-	-	-	U78

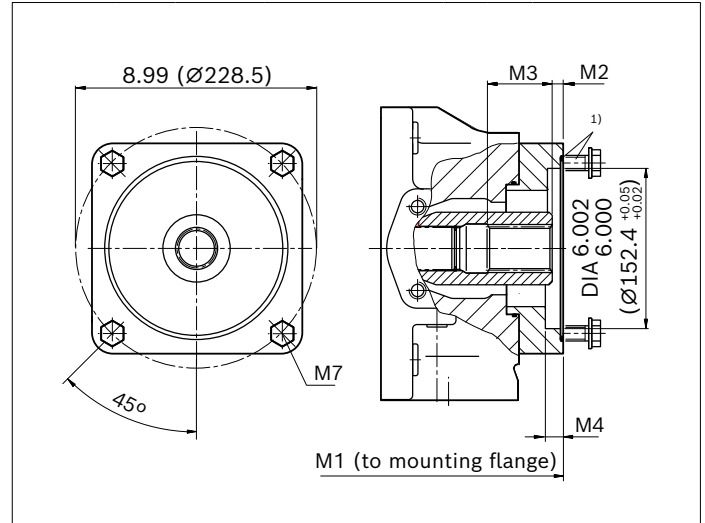
● = Available ○ = On request - = Not available

▼ 152-4



K17	NG	M1	M2	M3	M4	M7 ³⁾
500	20.87 (530)	0.41 (10.4)	2.35 (59.6)	0.51 (13)	M16; 0.98 (25) deep	
750	22.83 (580)	0.41 (10.4)	2.35 (59.6)	0.51 (13)	M16; 0.98 (25) deep	

▼ 152-4



U17	NG	M1	M2	M3	M4	M7 ³⁾
125	15.04 (382)	0.41 (10.4)	2.44 (62)	0.51 (13)	M16; 1.38 (35) deep	
180	15.98 (406)	0.41 (10.4)	2.44 (62)	0.51 (13)	M16; 1.38 (35) deep	
250	17.83 (453)	0.42 (10.6)	2.44 (62)	0.51 (13)	M16; 0.87 (22) deep	
355	18.98 (482)	0.42 (10.6)	2.44 (62)	0.51 (13)	M16; 0.87 (22) deep	

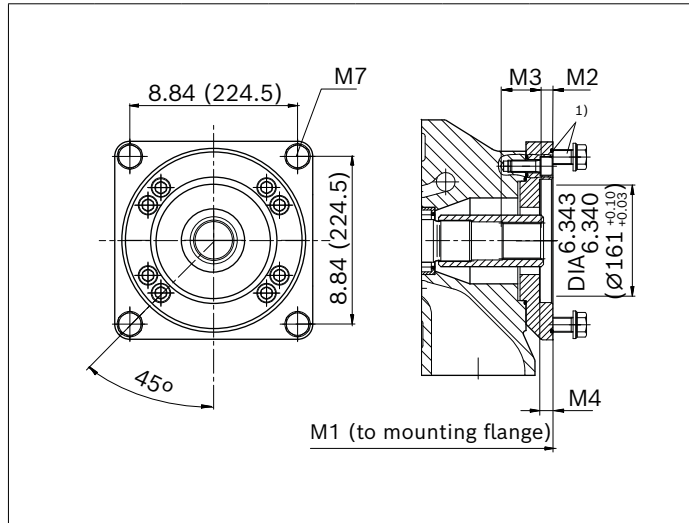
U78	NG	M1	M2	M3	M4	M7 ³⁾
180	17.05 (433)	0.41 (10.4)	3.39 (86.1)	0.51 (13)	M16; 1.38 (35) deep	
250	18.94 (481)	1.20 (30.4)	2.33 (59.1)	0.51 (13)	M16; 1.38 (35) deep	
355	20.08 (510)	1.20 (30.4)	2.33 (59.1)	0.51 (13)	M16; 0.87 (22) deep	

1) Mounting bolts 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, see instruction manual for maximum tightening torques.

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes								Code	
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000	
165-4 (E)		2 in 15T 8/16DP	-	-	-	-	•	•	-	-	-	U18


• = Available - = Not available

▼ 165-4



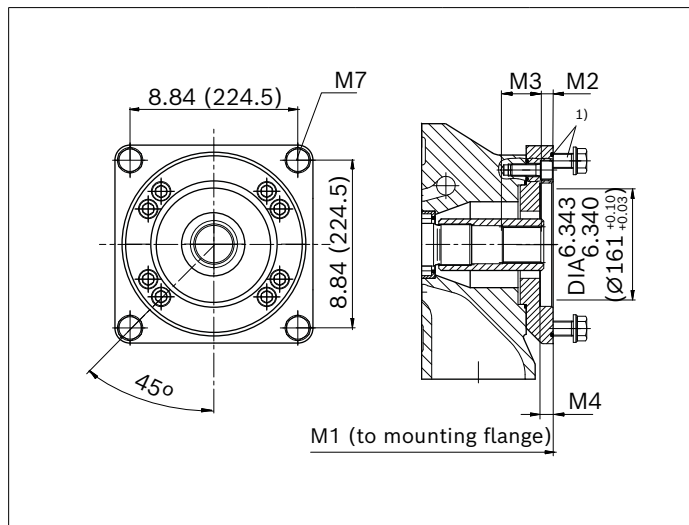
U18	NG	M1	M2	M3	M4 ²⁾	M7
	250	18.94 (481)	1.20 (30.4)	2.33 (59.3)	0.67 (17)	M20; 1.42 (36) deep
	355	20.09 (510)	1.20 (30.4)	2.34 (59.4)	0.67 (17)	M20; 1.42 (36) deep

- 1) Mounting bolts 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, see instruction manual for maximum tightening torques.

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes										Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000		
165-4 (E)		N50×2×24×8H	-	-	-	-	-	-	●	○	○	K84	
		N50×2×24×8H	-	-	-	-	○	○	-	-	-	U84	

● = Available - = Not available

▼ 165-4

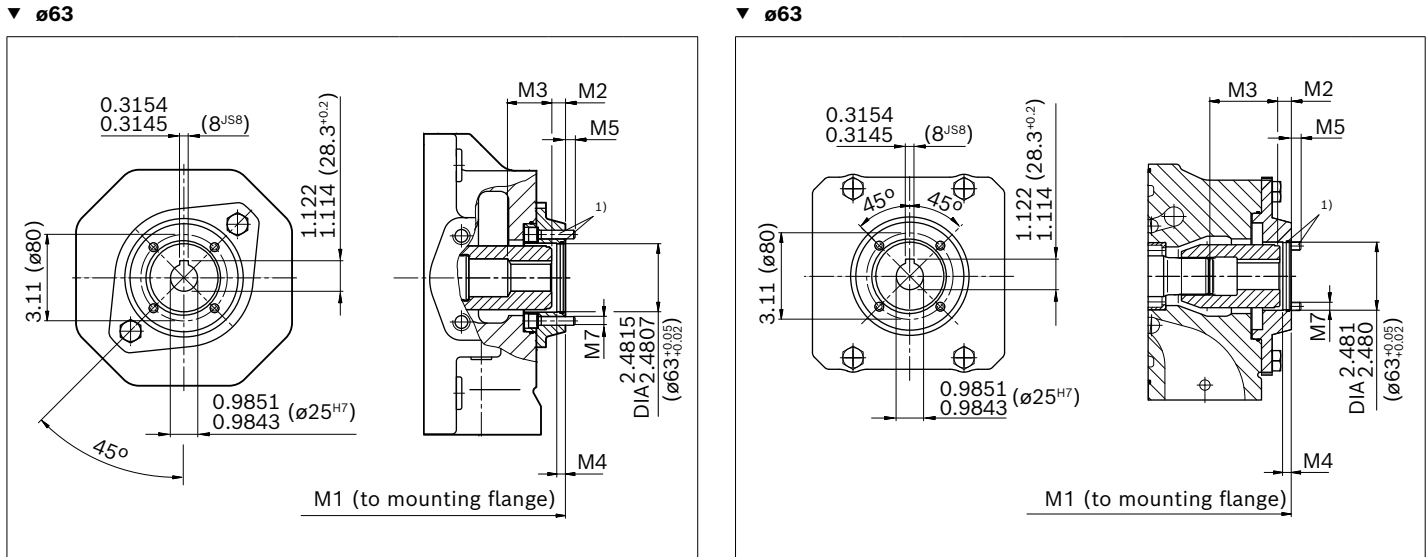


K84	NG	M1	M2	M3	M4 ²⁾	M7
	500	21.30 (541)	0.49 (12.5)	2.19 (55.5)	0.71 (18)	M20; 1.42 (36) deep

1) Mounting bolts and O-ring seal are included in the scope of delivery
 2) Splined hub according to DIN 5480
 3) Thread according to DIN 13, see instruction manual for maximum tightening torques.

Flange ISO 3019-1 (SAE J744)		Hub for splined shaft ²⁾	Availability over sizes									Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	750	1000	
ø63		Shaft key ø25	●	●	-	-	-	-	○	○	○	K57
		Shaft key ø25	-	-	●	●	●	●	-	-	-	U57

● = Available ○ = On request - = Not available



K57	NG	M1	M2	M3	M4	M5	M7 ²⁾
40	11.34 (288)	0.43 (11)	2.20 (56)	0.35 (9)	0.35 (9)	M8	
71	12.56 (319)	0.43 (10.9)	1.65 (42)	0.31 (8)	0.35 (9)	M8	

U57	NG	M1	M2	M3	M4	M5	M7 ²⁾
125	14.76 (375)	0.42 (10.8)	1.57 (40)	0.31 (8)	0.35 (9)	M8	
180	15.71 (399)	0.42 (10.8)	1.57 (40)	0.31 (8)	0.35 (9)	M8	
250	18.07 (459)	0.42 (10.8)	1.68 (42.6)	0.31 (8)	0.35 (9)	M8	
355	19.21 (488)	0.42 (10.8)	1.68 (42.6)	0.31 (8)	0.35 (9)	M8	

1) Mounting bolts and O-ring seal are included in the scope of delivery
 2) Thread according to DIN 13.

Overview of mounting options

Through drive ¹⁾			Mounting options – 2nd pump						
Flange	Hub for splined shaft	Code	(A)A4VSO/G NG (shaft)	(A)A4CSG NG (shaft)	A10V(S)O/3x ⁵⁾ 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⁾	KB2	–	–	18 (S)/31	10 (S)/52	–	–	–
100-2	7/8 in ³⁾	KB3	–	–	28 (S)/31	–	–	–	–
	1 in ³⁾	KB4	–	–	45 (S)/31	–	–	–	–
125-2	1 1/4 in ³⁾	KB5	–	–	71/88 (S)/31	–	–	–	–
	1 1/2 in ³⁾	KB6	–	–	100 (S)/31	–	–	–	–
125-4	1 in ³⁾	KE1	–	–	45 (S)/32	–	–	–	–
	W32 ²⁾	K31	40 (Z)	–	–	–	–	–	–
140-4	W40 ²⁾	K33	71 (Z)	–	–	–	–	–	–
160-4	W50 ²⁾	K34	125 (Z)	–	–	–	–	–	–
	W50 ²⁾	K34	180 (Z)	–	–	–	–	–	–
	1 1/4 in ³⁾	KB8	–	–	71/88 (S)/31	–	–	–	–
180-4	1 3/4 in ³⁾	KB7	–	–	140/180 (S)/31/32	–	–	–	–
	1 1/2 in ³⁾	KB9	–	–	100 (S)/32	–	–	–	–
224-4	W60 ²⁾	K35	250 (Z)	250 (Z)	–	–	–	–	–
	W70 ²⁾	K77	355 (Z)	355 (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)/31	10/18 (S)	3...10 (S) 11...18 (R)	3...10 (S) 18 (R)	–
101-2 (B) ¹⁾	7/8 in ³⁾	K/U 68	–	–	28 (S)/31	28 (S)	21...28 (R)	28 (R)	N NG 020 to 032 ⁴⁾
	1 in ³⁾	K/U 04	–	–	45 (S)/31	45 (S)	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	–
152-4 (D) ¹⁾	1 3/4 in ³⁾	K/U 17	–	–	140/180 (S)/31/32	–	–	140/180 (S)	–
	1 1/2 in ³⁾	K/U 96	–	–	100 (S)/32	–	–	100 (S)	–
	2 in ³⁾	U78	180 (S)	180 (S)	–	–	–	–	–
165-4 (E)	2 in ³⁾	U18	250 (S), 355 (R)	250 (S), 355 (R)	–	–	–	–	–
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

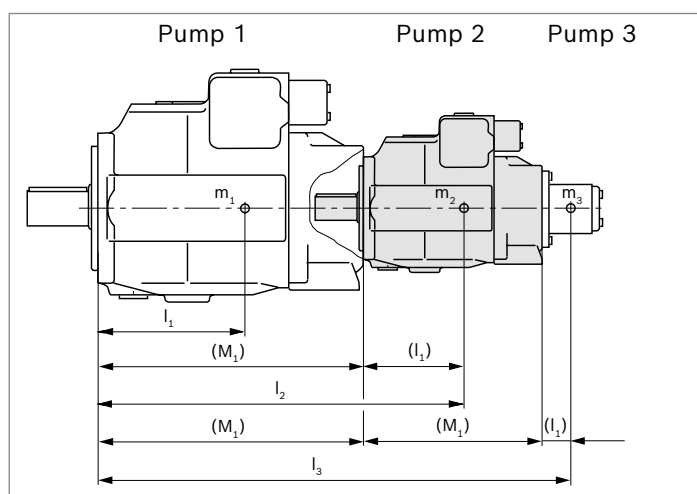
4) Bosch Rexroth recommends special versions of the external gear pumps. Please contact us.

5) If a through drive for an A10V(S)O with R-shaft is desired, please contact us.

Permissible mass torque

Based on mounting flange on primary pump

Size		40	71	125	180	250	355	500	750	1000	
Permissible moment of inertia	$T_{m \text{ perm.}}$	lb-ft	1327	1475	3098	3098	6859	6859	11506	14382	14382
		(Nm)	(1800)	(2000)	(4200)	(4200)	(9300)	(9300)	(15600)	(19500)	(19500)
Permissible moment of inertia for dynamic mass acceleration 10 g (= 98.1 m/s ²)	$T_{m \text{ perm.}}$	lb-ft	132	148	310	310	686	686	1151	1438	1438
		(Nm)	(180)	(200)	(420)	(420)	(930)	(930)	(1560)	(1950)	(1950)
Weight (A4VSO...DR)	m	lbs	86	117	194	225	406	456	705	1014	1333
		(kg)	(39)	(53)	(88)	(102)	(184)	(207)	(320)	(460)	(605)
Distance from center of gravity	l_1	inch	4.72	5.51	6.69	7.09	8.27	8.66	9.06	10.24	11.42
		(mm)	(120)	(140)	(170)	(180)	(210)	(220)	(230)	(260)	(290)



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

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

Calculation for multiple pumps

l_1 = distance, center of gravity, front pump

(value from "Permissible mass moment of inertia" table)

l_2 = mass " M_1 " from through drive drawings (from page 43)

+ l_1 of the 2nd pump

l_3 = mass " M_1 " from through drive drawings (from page 43)

of the 1st Pump + " M_1 " of the 2nd pump + l_1 of the 3rd pump

Combination pumps (A)A4VSO + (A)A4VSO**Total length A**

(A)A4VSO (1. pump)	(A)A4VSO...DR...NOO (2. pump)								
	NG 40	NG 71	NG 125	NG 180	NG 250	NG 355	NG 500	NG 750	NG 1000
NG 40	21.81 (554)	–	–	–	–	–	–	–	–
NG 71	22.91 (582)	24.06 (611)	–	–	–	–	–	–	–
NG 125	25.00 (635)	26.14 (664)	28.50 (724)	–	–	–	–	–	–
NG 180	25.94 (659)	27.09 (688)	29.45 (748)	30.24 (768)	–	–	–	–	–
NG 250	28.31 (719)	29.45 (748)	31.81 (808)	32.60 (828)	35.59 (904)	–	–	–	–
NG 355	29.45 (748)	30.59 (777)	32.95 (837)	33.74 (857)	36.73 (933)	37.87 (962)	–	–	–
NG 500	30.35 (771)	31.50 (800)	33.86 (860)	34.65 (880)	38.43 (976)	39.57 (1005)	43.70 (1110)	–	–
NG 750	32.32 (821)	33.46 (850)	35.83 (910)	36.41 (930)	40.39 (1026)	41.54 (1055)	45.67 (1160)	47.79 (1214)	–
NG 1000	o	36.34 (923)	38.70 (983)	39.49 (1003)	43.27 (1099)	44.41 (1128)	48.54 (1233)	50.71 (1288)	53.86 (1368)

o = On request

By using combination pumps, it is possible to have independent circuits without the need for splitter gearboxes. When ordering combination pumps, the type designations of the 1st and 2nd pumps must be connected with a “+” and are combined in one part number. When ordering, the single pumps should be ordered according to type code.

Notice

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

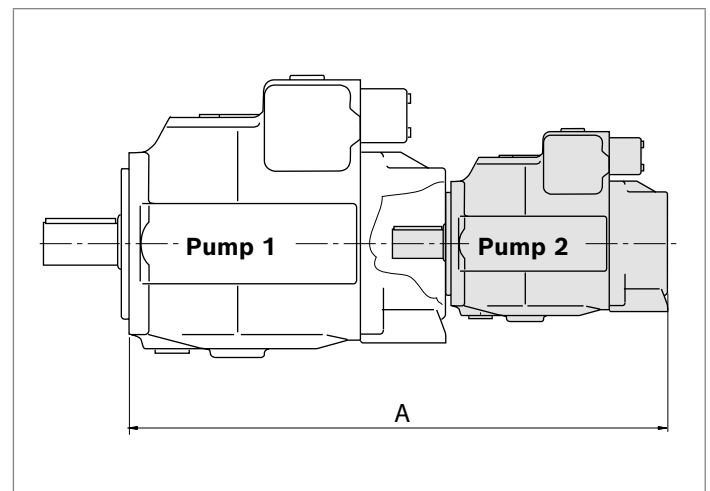
Example:**AA4VSO 250LR2D/30R+AA4VSO 250LR2D/30R**

- ▶ Each through drive is plugged with a **non-pressure resistant** cover. Before commissioning the units, they must therefore be equipped with pressure-resistant covers. Through drives can also be ordered with a pressure-resistant cover. Please specify in plain text.

Order example:**AA4VSO 250LR2D/30R-PZB25U35****AA4VSO 250LR2D/30R-PZB25N00**

It is permissible to use a combination of two single pumps of the same size (tandem pump), considering a dynamic mass acceleration of maximum 10 g (= 98.1 m/s²) without additional support brackets.

For combination pumps consisting of more than two pumps, the mounting flange must be rated for the permissible moment of inertia.



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 shutdown as the axial piston unit may empty via the hydraulic lines.

Particularly in the installation position “drive shaft upwards”, filling and air bleeding must be carried out completely as there is, for example, 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(T)**).

For combination pumps, the leakage must be drained off at each pump.

If a shared drain line is used for several units, make sure that the case pressure in each unit is not exceeded. The shared drain line must be sized to ensure that the maximum permissible case pressure of all connected units is not exceeded in any operating conditions, particularly on cold start. If this is not possible, lay separate drain lines, if necessary.

To achieve favorable noise values, decouple all connecting lines using elastic elements and avoid above-reservoir installation.

In all operating conditions, the suction line and drain line 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 $h_{s\ max} = 31.50$ inch (800 mm). The minimum suction pressure at port **S** must also not fall below 12 psi (0.8 bar) absolute (without charge pump) or 10 psi (0.7 bar) absolute (with charge pump) during operation and during a cold start.

When designing the reservoir, ensure adequate distance between the suction line and the case drain line. This prevents the heated, and possible foaming return flow from being drawn directly back into the suction line.

Notice

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

Installation position

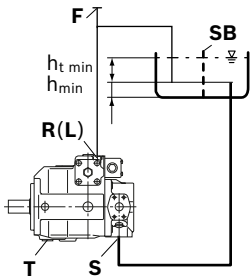
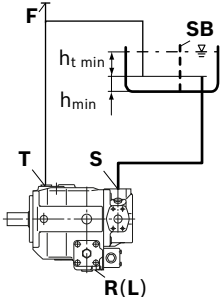
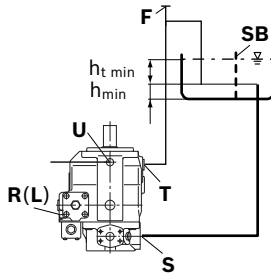
See the following examples **1** up to **7**.

Further installation positions are available upon request.

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

Below-reservoir installation (standard)

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

Installation position	Air bleed	Filling
1 	R(L) + F	S + R(L)
2 	T + F	S + T
3 	T + F	S + T + U

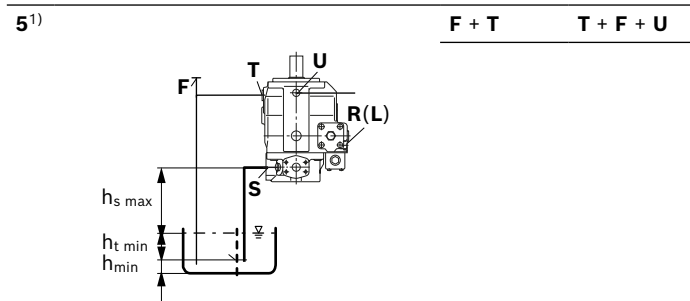
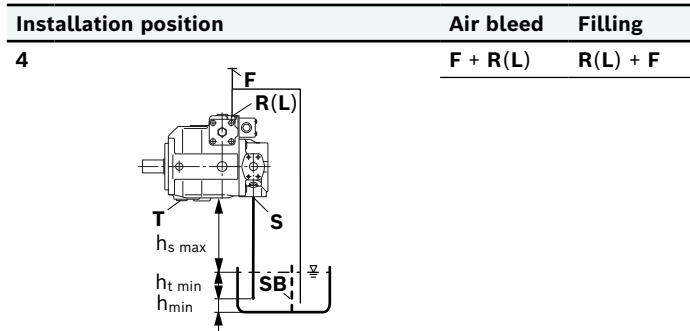
For key, see page 67

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

$h_{S \max} = 31.50 \text{ inch (800 mm)}$.

The above reservoir installation is not recommended for sizes 180 to 1000 and is not permissible for units with charge pump (A4VSL0).



Key	
R(L)	Filling/air bleeding
S	Suction port
T	Drain port
U	Flushing port
K ₁ , K ₂	Flushing port
SB	Baffle (baffle plate)
$h_{t \min}$	Minimum required immersion depth (7.87 inch (200 mm))
h_{\min}	Minimum required distance to reservoir bottom (3.94 inch (100 mm))
$h_{S \max}$	Maximum permissible suction height (31.50 inch (800 mm))

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

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".

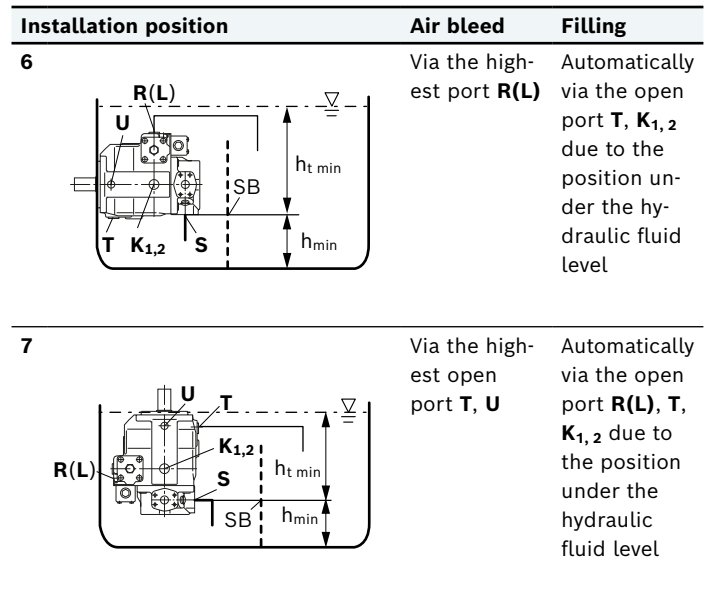
Axial piston units with electrical components (e.g., electric control, sensors) may not be installed in a reservoir below the fluid level.

The exception is adjustment HS5M

The proportional valve can be positioned separately and the piping installed at the connections X₁ and X₂ of the pump.

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

Approved for HLP fluids DIN 51524.



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

Project planning notes

- ▶ The (A)A4VSO axial piston variable pump is designed to be used in open circuit.
- ▶ The project planning, installation and commissioning of the axial piston unit requires the involvement of qualified skilled personnel.
- ▶ Before using the axial piston unit, please read the corresponding instruction manual 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 must be observed. More information on the products can be found in the data sheets on page 1.
- ▶ 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 preservative protection for a maximum of 12 months. If longer preservative protection is required (maximum 24 months), please specify this in plain text when placing your order. The preservation periods apply under optimal storage conditions, details of which can be found in the data sheet 90312 or in the instruction manual.
- ▶ Not all versions of the product are approved for use in safety functions according to ISO 13849. Please consult the responsible contact person 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. Use of the recommended direct current (DC) on the electromagnet does not produce any electromagnetic interference (EMI), nor is the electromagnet influenced by EMI. Potential electromagnetic interference (EMI) exists if the solenoid is energized with a modulated direct current (e.g. PWM signal). The machine manufacturer should conduct appropriate tests and take appropriate measures to ensure that other components or operators (e.g. with a pacemaker) are not affected by the potentiality.
- ▶ Pressure controllers are not safeguards against pressure overload. Be sure to add a pressure relief valve to the hydraulic system.
- ▶ For drives that are operated for a long period with constant rotational speed, the natural frequency of the hydraulic system can be stimulated by the excitation frequency of the pump (rotational speed frequency $\times 9$). This can be prevented with suitably designed hydraulic lines.
- ▶ Please note the details regarding the tightening torques of port threads and other threaded joints in the instruction manual.
- ▶ Working ports:
 - The ports and fastening threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified application conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.
 - The working ports and function ports are only intended to accommodate hydraulic lines.

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 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. impure 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 meet 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 set the consumer being driven to a safe position (e.g. safe stop) and if necessary to ensure it is properly implemented.

Bosch Rexroth Corporation
8 Southchase Court
Fountain Inn, SC 29644-9018
USA
Telephone (864) 967-2777
Facsimile (864) 967-8900
www.boschrexroth-us.com

Bosch Rexroth Corporation
2315 City Line Road
Bethlehem, PA 18017-2131,
USA
Telephone (610) 694-8300
Facsimile (610) 694-8467
www.boschrexroth-us.com

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