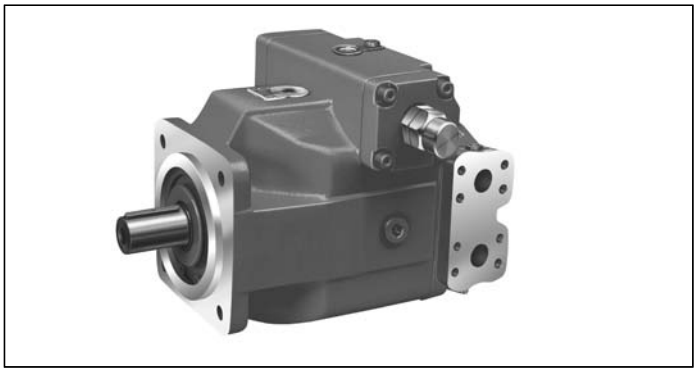
# Axial piston variable pump (A)A4VSG Series 1x and 3x

## Americas

**RE-A 92100**
Edition: 08.2018
Replaces: 12.2012



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

**Features**

- Robust pump with very long service life
- Reduced noise
- Through drive for mounting of further pumps up to same nominal size
- Flow direction changes smoothly when the swashplate is moved through the neutral position
- Axial and radial load capacity of the drive shaft
- Modular design
- Visual swivel angle indicator
- Short response times
- Operation on HF-fluids under reduced operational data possible
- Swashplate design

**Contents**

## Type code

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

**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 | | ● | ● | ● | ● | ● | ● | ● | – | – | **E** |

**Axial piston unit**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02 | Variable swashplate design, nominal pressure 350 bar, maximum pressure 400 bar | SAE | ● | ● | ● | ● | ● | ● | – | – | – | **AA4VS** |
| | | metric | – | – | – | – | – | – | ● | ● | ● | **A4VS** |

**Operating mode**

| | | |
|---|---|---|
| 03 | Pump, closed circuit | **G** |

**Size (NG)**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04 | Geometric displacement, see table of values on page 8 | $cm^3$/rev | **40** | **71** | **125** | **180** | **250** | **355** | **500** | **750** | **1000** |
| | | $in^3$/rev | **2.44** | **4.33** | **7.63** | **10.98** | **15.26** | **21.66** | **30.51** | **45.76** | **61.02** |

**Control device**

| | | Data sheet | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05 | Manual control | 92072 | ● | ● | ● | ● | ● | ● | ● | – | – | **MA** |
| | Electric motor control | | ● | ● | ● | ● | ● | ● | ● | – | – | **EM** |
| | Hydraulic control, control volume dependent | 92076 | ● | ● | ● | ● | ● | ● | ● | ● | ● | **HM..** |
| | Hydraulic closed loop control with servo/proportional valve | | ● | ● | ● | ● | ● | ● | ● | ● | ● | **HS..** |
| | Hydraulic closed loop control, with proportional valve | | ● | ● | ● | ● | ● | ● | ● | ● | ● | **EO..** |
| | Hydraulic control, pilot-pressure related | 92080 | ● | ● | ● | ● | ● | ● | ● | ● | ● | **HD..** |
| | Electrohydraulic control with proportional solenoid | 92084 | ● | ● | ● | ● | ● | ● | ● | ● | ○ | **EP..** |
| | Secondary closed loop rotational speed control | 92058 | ● | ● | ● | ● | ● | ● | ● | ● | ● | **DS2** |

**Series**

| | | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 | Series 1, index 0 (index 1) | | ● | ● | – | – | – | – | – | – | – | **10(11)**[2] |
| | Series 3, index 0 | | – | – | ● | ● | ▲ | ● | ▲ | ● | ● | **30** |
| | Series 3, index 3; efficiency-optimized rotary group and with sealing material FKM | | – | – | – | – | ● | ○ | ● | – | – | **33** |

**Direction of rotation** — **40 ... 1000**

| | | | |
|---|---|---|---|
| 07 | Viewed on drive shaft | clockwise | **R** |
| | | counter-clockwise | **L** |
| | | variable | **W**[1] |

**Sealing material** — **40 ... 1000**

| | | |
|---|---|---|
| 08 | NBR (nitrile rubber), FKM shaft seal | **P** |
| | FKM (fluoroelastomer) / HFD operation | **V** |

**Drive shaft** — **40 ... 1000**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 09 | Parallel keyed shaft ISO 3019-1 | ● | ● | ● | ● | ● | ● | – | – | – | **K** |
| | Splined shaft ISO 3019-1 | ● | ● | ● | ● | ● | – | – | – | – | **S** |
| | Splined shaft according to ISO 3019-1 | – | – | – | – | – | ● | – | – | – | **R** |
| | Parallel keyed shaft DIN 6885 | – | – | – | – | – | – | ● | ● | ● | **P** |
| | Splined shaft DIN 5480 | – | – | – | – | – | – | ● | ● | ● | **Z** |

**Mounting flange**

| | | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | According to ISO 3019-1 SAE | 4-hole | ● | ● | ● | ● | ● | ● | – | – | – | **D** |
| | According to ISO 3019-2 metric | 8-hole | – | – | – | – | – | – | ● | ● | ● | **H** |

**Working port**

| | | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | SAE flange ports **A** and **B**, located laterally on same side | UNC fastening thread | ● | ● | ● | ● | ● | ● | – | – | – | **60** |
| | | metric fastening thread | – | – | – | – | – | – | ● | ● | ● | **10** |

1) Only in combination with DS2
2) Version with HD- and EP-controls in series 11

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

**Through drives** (for mounting options, see page 47)

| 12 | Flange **ISO 3019-2** (metric) | | Hub for splined shaft | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diameter | Attachment[5] | Diameter | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| | Without through drive | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | **N00** |
| | 125, 4-hole | | 32x22x14x9g[3] | | – | – | – | – | – | – | ● | ● | ○ | **K31** |
| | 140, 4-hole | | 40x2x18x9g[3] | | – | – | – | – | – | – | ● | ● | ● | **K33** |
| | 160, -4-hole | | 50x2x24x9g[3] | | – | – | – | – | – | – | ● | ● | ● | **K34** |
| | 224, 4-hole | | 60x2x28x9g[3] | | – | – | – | – | – | – | ● | ● | ● | **K35** |
| | 224, 4-hole | | 70x3x22x9g[3] | | – | – | – | – | – | – | ● | ○ | ● | **K77** |
| | 315, 8-hole | | 80x3x25x9g[3] | | – | – | – | – | – | – | ● | ● | ● | **K43** |
| | 400, 8-hole | | 90x3x28x9g[3] | | – | – | – | – | – | – | – | ● | ● | **K76** |
| | 400, 8-hole | | 100x3x32x9g[3] | | – | – | – | – | – | – | – | – | ● | **K88** |
| | 80, 2-hole | | 3/4 in | 11T 16/32DP[4] | ○ | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | **KB2** |
| | 100, 2-hole | | 7/8 in | 13T 16/32DP[4] | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | **KB3** |
| | 100, 2-hole | | 1 in | 15T 16/32DP[4] | ○ | ● | ● | ● | ● | ● | ○ | ○ | ○ | **KB4** |
| | 125, 2-hole | | 1 1/4 in | 14T 12/24DP[4] | – | ● | ● | ● | ● | ● | ● | ○ | ○ | **KB5** |
| | 160, 4-hole | | 1 1/4 in | 14T 12/24DP[4] | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | **KB8** |
| | 125, 2-hole | | 1 1/2 in | 17T 12/24DP[4] | – | – | ● | ● | ● | ● | ● | ● | ○ | **KB6** |
| | 180, 4-hole | | 1 1/2 in | 17T 12/24DP[4] | – | – | ○ | ○ | ○ | ○ | ○ | ○ | ○ | **KB9** |
| | 180, 4-hole | | 1 3/4 in | 13T 8/16DP[4] | – | – | ● | ● | ● | ● | ● | ● | ○ | **KB7** |
| | Flange ISO **3019-1** (SAE) | | Hub for splined shaft | | | | | | | | | | | |
| | Diameter | Attachment[5] | Diameter | | | | | | | | | | | |
| | Through drive | | | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| | 82-2 (A) | | 5/8 in | 9T 16/32DP[4] | ● | ● | ● | ● | ● | ● | ● | ● | ○ | **K01** |
| | | | 3/4 in | 11T 16/32DP[4] | ○ | ● | ○ | ● | ○ | ● | ○ | ○ | ○ | **K52** |
| | 101-2 (B) | | 7/8 in | 13T 16/32DP[4] | ● | ● | ● | ● | ● | ● | ● | ● | ○ | **K68** |
| | | | 1 in | 15T 16/32DP[4] | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | **K04** |
| | 127-2 (C) | | 1 1/4 in | 14T 12/24DP[4] | – | ● | ● | ● | ● | ● | ● | ● | ● | **K07** |
| | | | 1 1/2 in | 17T 12/24DP[4] | – | – | ● | ● | ● | ● | ● | ● | ● | **K24** |
| | 127-4 (C) | | 1 1/4 in | 14T 12/24DP[4] | ● | ● | ● | ○ | ○ | ○ | – | – | – | **K15** |
| | | | 1 1/2 in | 17T 12/24DP | – | ● | ● | ● | ● | ● | – | – | – | **K16** |
| | 152-4 (D) | | 1 3/4 in | 13T 8/16DP[4] | – | – | ● | ● | ● | ● | ● | ● | ○ | **K17** |
| | | | 2 in | 15T 8/16DP | – | – | – | ● | ● | ● | ● | – | – | **K78** |
| | 165-4 (F) | | 2 in | 15T 8/16DP | – | – | – | – | ● | ● | ● | – | – | **K18** |
| | Prepared for through drive, with pressure-proof plugged cover | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | **K99** |
| | **Boost pump**[6] | | | | | | | | | | | | | |
| | A piped attachment pump for the boost circuit | | | | ● | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | ● | **H02** |
| | A shared piped attachment pump for the boost and control circuit (only for EO1 and EO1K) | | | | ● | ● | ● | – | – | – | – | ▲ | – | **H04** |
| | A separate piped attachment pump for the boost circuit and the control circuit (only for HD1T and HD1U) including pressure relief valve for the control circuit | | | | ● | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | ● | **H06** |

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

3) According to DIN 5480
4) According to ANSI B92.1a
5) Mounting hole pattern viewed on through drive with control at top.
6) For boost pump attachment NG250 to 750, please use A4CSG. (see data sheet 92105). An overview of the available boost pumps for the NG40 to 180 and 1000 can be found on page 50.

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

| **Valves** | | | **40** | **71** | **125** | **180** | **250** | **355** | **500** | **750** | **1000** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | Without valve block | | ● | ● | ● | ● | ● | ● | ● | ● | ● | **0** |
| | Valve block mounted **SDVB** | Data sheet 95533 | ▲ | ▲ | ▲ | ▲ | ▲[9)] | ▲[9)] | ▲[9)] | ▲[9)] | ● | **9** |
| | Valve block mounted **SDVB 16** (With direct-controlled flushing slide and pilot operated high-pressure relief valve) | in preparation | ● | ● | ● | ● | – | – | – | – | – | **4** |

| **Filtration** | | **40** | **71** | **125** | **180** | **250** | **355** | **500** | **750** | **1000** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Without filter | ● | ● | ● | ● | ● | ● | ● | ● | ● | **N** |
| | Filter mounted in boost circuit | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | **F**[7)] |
| | Intermediate plate filter (for HS- and DS-control, see data sheet 92076 and 92058) | ● | ● | ● | ● | ● | ● | ●[8)] | ● | ● | **Z** |
| | Filter mounted in boost circuit and intermediate plate filter for HS-controls | ● | ● | ● | ● | ● | ● | ●[8)] | – | – | **U** |

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

**Notices**

- Note the project planning notes on page 57.
- In addition to the type code, please specify the relevant technical data when placing your order.
- For details of the mounting situation of combination pumps, see page 48.

7) Filter in the boost circuit with visual-electrical contamination indicator in standard version for:
NG40, 71: LFBN/HC60G20D1.0/V-L24
NG125, 180: LFBN/HC110G20D1.0/V-L24
NG250, 355: LFBN/HC240G20D1.0/V-L24
NG500: LFBN/HC330G20D1.0/V-L24
NG750, 1000: LFBN/HC660G20D1.0/V-L24
Please contact us for more information on the filter.

8) For size 500, only available for DS control; for HS, see data sheet 92076

9) For valve block attachment NG250 to 750, please use (A)A4CSG. (see data sheet 92105).

## Hydraulic fluids

The (A)A4VSG 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:

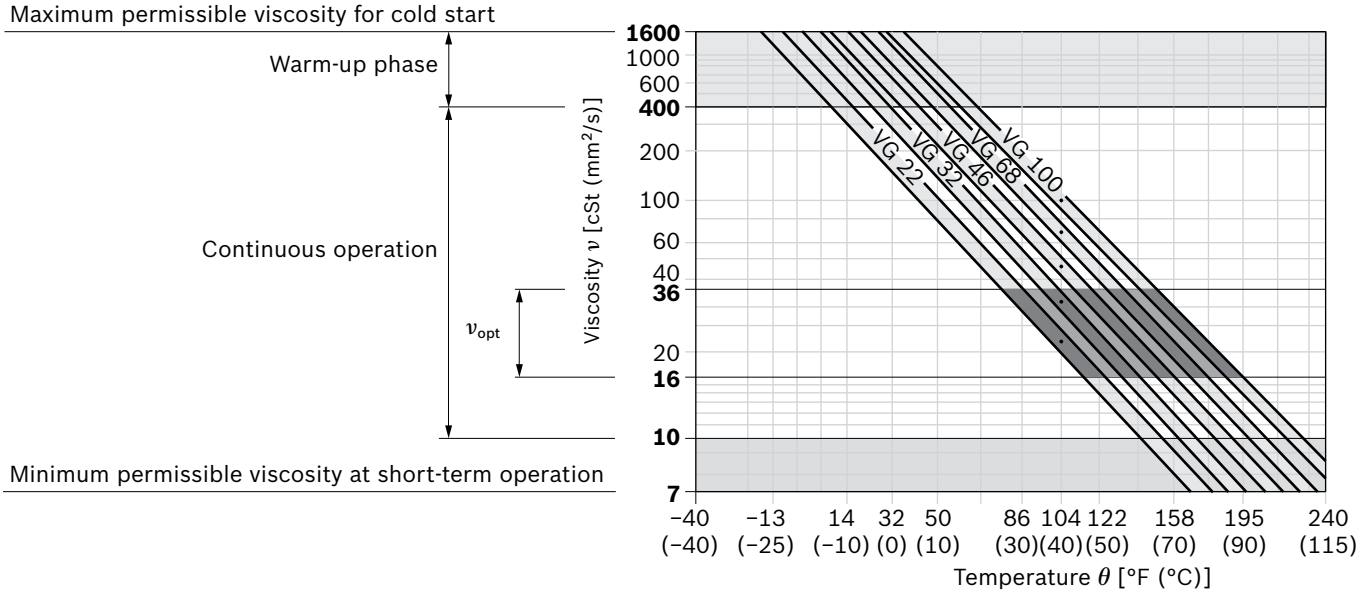
- 90220: Hydraulic fluids based on mineral oils and related hydrocarbons
- 90221: Environmentally acceptable hydraulic fluids
- 90222: Fire-resistant, water-free hydraulic fluids (HFDR/HFDU)

**Notes on selection of hydraulic fluid**
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 | $v_{max}$ ≤ 1600 cSt (mm²/s) | NBR[2] | $\theta_{St}$ ≥ −40 °F (−40 °C) | $t$ ≤ 3 min, without load ($p$ ≤ 725 psi), $n$ ≤ 1000 rpm |
| | | FKM | $\theta_{St}$ ≥ −13 °F (−25 °C) | Permissible temperature difference between axial piston unit and hydraulic fluid in the system maximum 25 K |
| Warm-up phase | $v$ = 1600 ... 400 cSt (mm²/s) | | | $t$ ≤ 15 min, $p$ ≤ 0.7 × $p_{nom}$ and $n$ ≤ 0.5 × $n_{nom}$ |
| Continuous operation | $v$ = 400 ... 10 cSt (mm²/s)[1] | NBR[2] | $\theta$ ≤ +185 °F (+85 °C) | measured at port **T** |
| | | FKM | $\theta$ ≤ +230 °F (+110 °C) | |
| | $v_{opt}$ = 36 ... 16 cSt (mm²/s) | | | Range of optimum operating viscosity and efficiency |
| Short-term operation | $v_{min}$ = 10 ... 7 cSt (mm²/s) | NBR[2] | $\theta$ ≤ +185 °F (+85 °C) | $t$ ≤ 3 min, $p$ ≤ 0.3 × $p_{nom}$ , measured at port **T** |
| | | FKM | $\theta$ ≤ +230 °F (+110 °C) | |

▼ **Selection diagram**




1) This corresponds, for example on VG 46, to a temperature range of 39.2 °F to +185 °F (+4 °C to +85 °C) (see selection diagram)

2) Special version, please contact us

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):

– at a temperature of 163 °F (73 °C) for HLP 32
– at a temperature of 185 °F (85 °C) for HLP 46

**Bearing flushing**

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

- Applications with water-containing special fluids due to limited lubricity and narrow operating temperature range
- Operation with borderline conditions for temperature and viscosity
- With vertical installation (drive shaft facing upwards) 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 case drain chamber (series 1x and series 3x, respectively).

**Notice regarding series 3x**

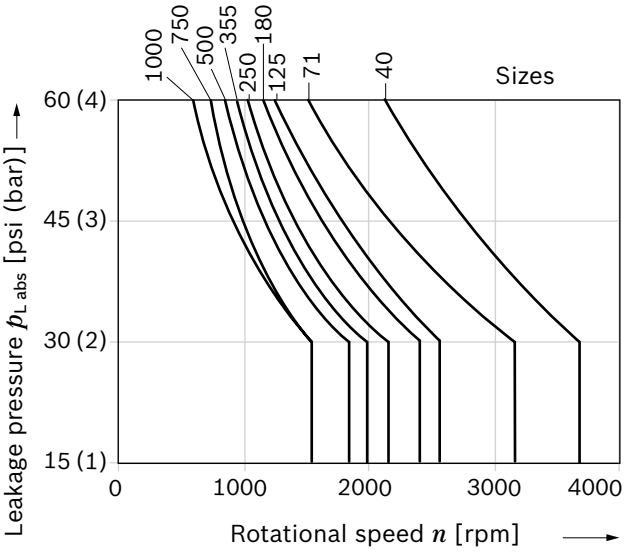
When using external bearing flushing, the throttle screw in port **U** must be turned to the stop.

**Shaft seal**

**Permissible pressure load**

The service life of the shaft seal ring is influenced by the rotational speed of the pump and the leakage pressure. It is recommended that the average, continuous leakage pressure of 30 psi (2 bar) absolute at operating temperature not be exceeded (maximum permissible leakage pressure 60 psi (4 bar) absolute at reduced rotational speed, see diagram). Short-term ($t$ < 0.1 s) pressure peaks of up to 145 psi (10 bar) absolute are permitted. The service life of the shaft seal ring decreases with an increase in the frequency of pressure peaks.

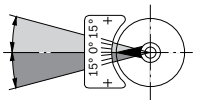
The case pressure must be equal to or greater than the external pressure on the shaft seal.




**Notice**

For details on the viscosity and temperatures of the hydraulic fluids, please see page 5.

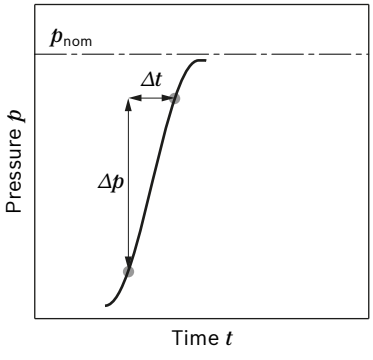
**Flow direction**

| Direction of rotation | | Swiveling range | |
|---|---|---|---|
| clockwise | counter-clockwise | | |
| **B** to **A** | **A** to **B** | clockwise |  |
| **A** to **B** | **B** to **A** | counter-clockwise | |

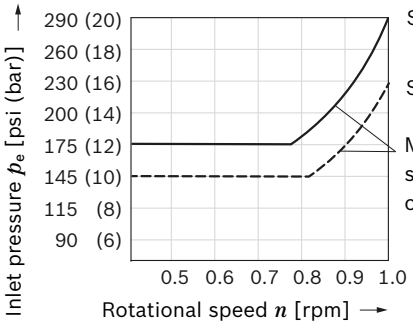
## Working pressure range

| **Pressure at working port A or 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. |
| Single operating period | 1 s | |
| Total operating period | 300 h | |
| Minimum pressure (High-pressure side) | 220 psi (15 bar) | Minimum pressure at the high-pressure side (**A** or **B**) which is required to prevent damage to the axial piston unit. |
| Minimum pressure (low-pressure side) | | Minimum pressure at the low-pressure side (**A** or **B**) which is required to prevent damage to the axial piston unit. The minimum pressure depends on the rotational speed and the feed pressure (see diagram). |
| Rate of pressure change $R_{A\,max}$ | 232000psi/s (16000 bar/s) | Maximum permissible speed of pressure build-up and reduction during a pressure change across the entire pressure range. |
| **Recommended boost pressure $p_{SP}$ (input)** (for boost pumps, see page 50) | | |
| Sizes 40 to 500 | | 230 psi (16 bar) |
| Sizes 750 to 1000 | | 365 psi (25 bar) |
| for a shared attachment pump for boost and control fluid circuit (EO1...H04) | | 365 psi (25 bar) |
| Maximum boost pressure - attachment pump $p_{S\,max}$ at control[1]: | | |
| MA, EM, HM, EO, DS | | 725 psi (50 bar) |
| HD, EP | | 365 psi (25 bar) |
| For information on the control pressure, see the respective data sheets on page 2 | | |
| **Case pressure at port $K_2$, $K_3$, R(L)** | | |
| Maximum static pressure $p_{L\,max}$ | 45 psi (3 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 |

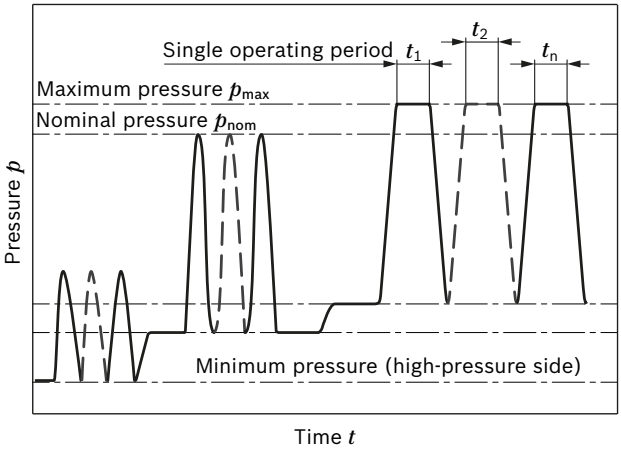
▼ **Rate of pressure change $R_{A\,max}$**




▼ **Minimum pressure, low-pressure side**




▼ **Pressure definition**




Operating period = $t_1 + t_2 + ... + t_n$

**Notice**

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

1) For permissible inlet pressure of the respective attachment pump, see the corresponding data sheet

## Technical data

| Size | | NG | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Displacement, geometric, per revolution | | $V_{g\,max}$ | in³ (cm³) | 2.44 (40) | 4.33 (71) | 7.63 (125) | 11.0 (180) | 15.26 (250) | 21.7 (355) | 30.51 (500) | 45.8 (750) | 61.2 (1000) |
| Rotational speed maximum[1] | at $V_{g\,max}$ | $n_{max}$ | rpm | 3700 | 3200 | 2600 | 2400 | 2200 | 2000 | 1800 | 1600 | 1600 |
| Flow | at $n_{max}$ and $V_{g\,max}$ | $q_v$ | gpm (l/min) | 39.1 (148) | 60.0 (227) | 85.9 (325) | 114.1 (432) | 145.3 (550) | 187.8 (710) | 237.8 (900) | 317.0 (1200) | 422.7 (1600) |
| | at 1200 rpm and $V_{g\,max}$ | | | 12.7 (48) | 22.5 (85) | 39.6 (150) | 57.0 (216) | 79.3 (300) | 112.5 (426) | 158.5 (600) | 237.8 (900) | 317.0 (1200) |
| | at 1800 rpm and $V_{g\,max}$ | | | 19.0 (72) | 33.7 (128) | 59.4 (225.9) | 85.6 (324) | 118.9 (450) | 168.8 (639) | 237.7 (900) | – | – |
| Power | at $n_{max}$, $V_{g\,max}$ and $\Delta p$ = 5100 psi (350 bar) | $P$ | HP (kW) | 115 (86) | 177 (132) | 255 (190) | 338 (252) | 431 (321) | 555 (414) | 704 (525) | 939 (700) | 1251 (933) |
| | at 1200 rpm and $V_{g\,max}$ | | | 37.8 (28) | 66.9 (50) | 117.8 (88) | 169.6 (126) | 236 (175) | 334.7 (248) | 471.6 (350) | 707.6 (525) | 943.2 (700) |
| | at 1800 rpm, $V_{g\,max}$ and $\Delta p$ = 5100 psi (350 bar) | | | 56.5 (42) | 100.3 (75) | 176.7 (131) | 254.7 (189) | 353.8 263) | 502.3 (373) | 707 (525) | – | – |
| Torque | at $V_{g\,max}$ and $\Delta p$ = 5100 psi (350 bar) | $M$ | lb-ft (Nm) | 165 (223) | 293 (395) | 516 (696) | 743 (1002) | 1032 (1391) | 1465 (1976) | 2064 (2783) | 3096 (4174) | 4127 (5565) |
| | at $V_{g\,max}$ and $\Delta p$ =1450 psi (100 bar) | | | 47 (64) | 83 (113) | 147 (199) | 212 (286) | 294 (398) | 417 (564) | 587 (795) | 881 (1193) | 1174 (1590) |
| Rotary stiffness of drive shaft | K | $c$ | klb-ft/rad (kNm/rad) | 57 (79) | 106 (146) | 175 (241) | 235 (323) | 322 (443) | 592 (814) | – | – | – |
| | S | $c$ | klb-ft/rad (kNm/rad) | 49 (67) | 92 (126) | 141 (194) | 202 (278) | 267 (368) | – | | | |
| | R | $c$ | klb-ft/rad (kNm/rad) | – | – | – | – | – | 345 (475) | – | – | – |
| | P | $c$ | klb-ft/rad (kNm/rad) | – | – | – | – | – | – | 832 (1145) | 1352 (1860) | 1985 (2730) |
| | Z | $c$ | klb-ft/rad (kNm/rad | – | – | – | – | – | – | 826 (1136) | 1317 (1812) | 2068 (2845) |
| Moment of inertia Rotary group | | $J_{TW}$ | lb-ft² (kgm²) | 0.116 (0.0049) | 0.287 (0.0121) | 0.712 (0.03) | 1.305 (0.055) | 2.276 (0.0959) | 4.509 (0.19) | 7.809 (0.3325) | 15.66 (0.66) | 28.47 (1.20) |
| Maximum angular acceleration[2] | | $\alpha$ | rad/s² | 17000 | 11000 | 8000 | 6800 | 4800 | 3600 | 2800 | 2000 | 1450 |
| Case volume | | $V$ | gal (l) | 0.5 (2) | 0.6 (2.5) | 1.3 (5) | 1.0 (4) | 2.6 (10) | 2.1 (8) | 3.7 (14) | 5.0 (19) | 7.13 (27) |
| Weight approx. | | $m$ | lbs (kg) | 93 (42) | 132 (60) | 236 (107) | 247 (112) | 485 (220) | 518 (235) | 739 (335) | 1102 (500) | 1420 (644) |

1) The values are applicable:
- for the optimum viscosity range from $\nu_{opt}$ = 36 to 16 cSt (mm²/s)
- with hydraulic fluid based on mineral oils

2) 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.

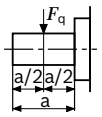
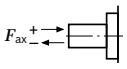
| **Determining the characteristics** | | | |
|---|---|---|---|
| Flow | $q_v = \frac{V_g \times n \times \eta_v}{231}$ | | [gpm] |
| | $q_v = \frac{V_g \times n \times \eta_v}{1000}$ | | [l/min] |
| Torque | $M = \frac{V_g \times \Delta p}{24 \times \pi \times \eta_{hm}}$ | | [lb-ft] |
| | $M = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{hm}}$ | | [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 [in³ (cm³)] |
| $\Delta p$ | = | Differential pressure [psi (bar)] |
| $n$ | = | Rotational speed [rpm] |
| $\eta_v$ | = | Volumetric efficiency |
| $\eta_{hm}$ | = | Hydraulic-mechanical efficiency |
| $\eta_t$ | = | 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.

### Permissible radial and axial forces of the drive shafts

| Size | | NG | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum radial force at distance a/2 |  | $F_{q\ max}$ | lb<br>(N) | 225<br>(1000) | 270<br>(1200) | 360<br>(1600) | 450<br>(2000) | 450<br>(2000) | 495<br>(2200) | 560<br>(2500) | 675<br>(3000) | 786<br>(3500) |
| Maximum axial force |  | $+ F_{ax\ max}$<br>$- F_{ax\ max}$ | lb<br>(N) | 135<br>(600) | 180<br>(800) | 225<br>(1000) | 315<br>(1400) | 405<br>(1800) | 450<br>(2000) | 450<br>(2000) | 495<br>(2200) | 495<br>(2200) |

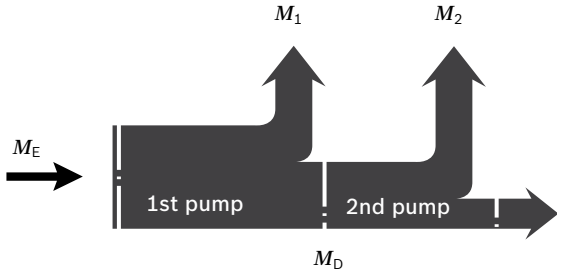
**Notices**

- Special requirements apply in the case of belt drives. Please contact us.
- Force-transfer direction of the permissible axial force
  + $F_{ax\ max}$ = Increase in bearing service life
  − $F_{ax\ max}$ = Reduction in bearing service life

### Permissible input and through-drive torques

| Size | | NG | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Torque at $V_{g\ max}$ and $\Delta p$ = 5100psi (350 bar)[1] | | $M_{max}$ | lb-ft<br>(Nm) | 164<br>(223) | 291<br>(395) | 513<br>(696) | 739<br>(1002) | 1026<br>(1391) | 1457<br>(1976) | 2052<br>(2783) | 3078<br>(4174) | 4104<br>(5565) |
| Maximum input torque at drive shaft[2] | | | | | | | | | | | | |
| | Splined shaft | $M_{E\ max}$ | lb-ft<br>(Nm) | 329<br>(446) | 583<br>(790) | 1027<br>(1392) | 1479<br>(2004) | 2052<br>(2782) | 2915<br>(3952) | 4105<br>(5566) | 6157<br>(8348) | 8209<br>(11130) |
| | Keyed shaft | $M_{E\ max}$ | lb-ft<br>(Nm) | 243<br>(380) | 516<br>(700) | 1027<br>(1392) | 1032<br>(1400) | 1696<br>(2300) | 2624<br>(3557) | 3835<br>(5200) | 5541<br>(7513) | 6965<br>(9444) |
| Maximum through-drive torque | | $M_{D\ max}$ | lb-ft<br>(Nm) | $M_{D\ max} = M_{E\ max}$ | | | | | | | | |

▼ **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 free of radial force

## Overview of control device

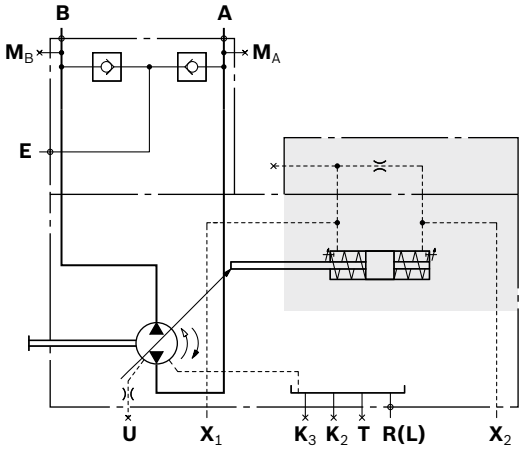
**Hydraulic control HM 1/2, volume dependent (see data sheet 92076)**

The pump displacement can be steplessly adjusted in relation to the pilot oil volume in ports $\mathbf{X_1}$ und $\mathbf{X_2}$.

Application:

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

▼ **HM1 NG125 schematic**




**Control system HS., HS5., with servo or proportional valve (see RE 92076)**

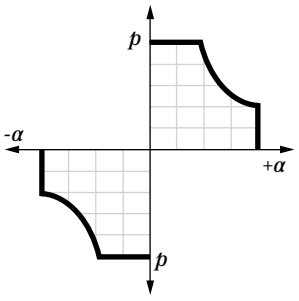
The stepless displacement control is accomplished by means of a servo or proportional valve and electrical feedback of the swivel angle.

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

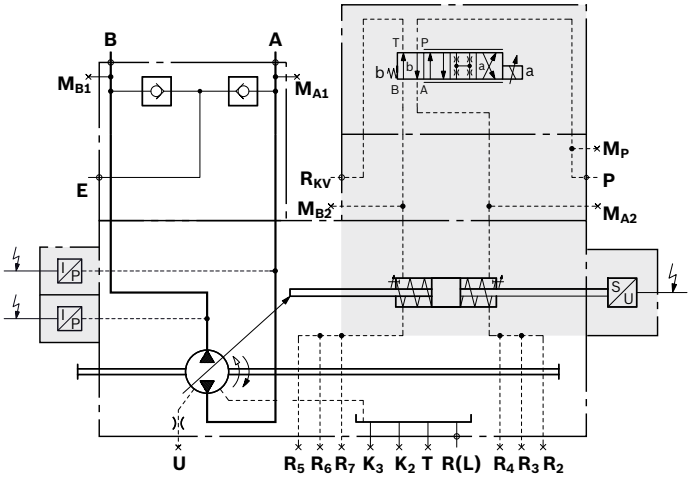
Optional:

- Servo valve (HS);
- Proportional valve (HS5)
- With integrated control pressure supply (HS5V);
- Control system with integrated digital electronics OBE (HS5E)
- Short circuit valve (HSK, HS5K, HS5KP);
- For oil-immersed use (HS5M)

▼ **Characteristic curve HS5P**




▼ **HS5P NG500 schematic**



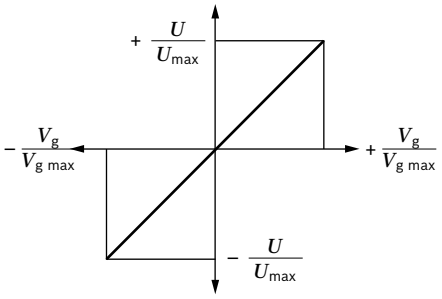
### Control system EO1/2 (see RE 92076)

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.

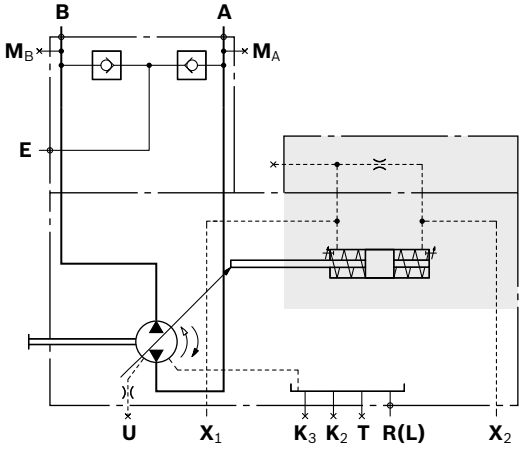
Optional:

- Control pressure range (EO1, EO2)
- Short circuit valve (EO1K, EO2K)

▼ **Characteristic curve EO**




▼ **HM1 NG125 schematic**



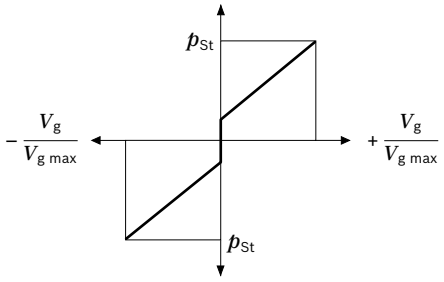

### Hydraulic control HD, pilot-pressure related (see data sheet 92080)

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).

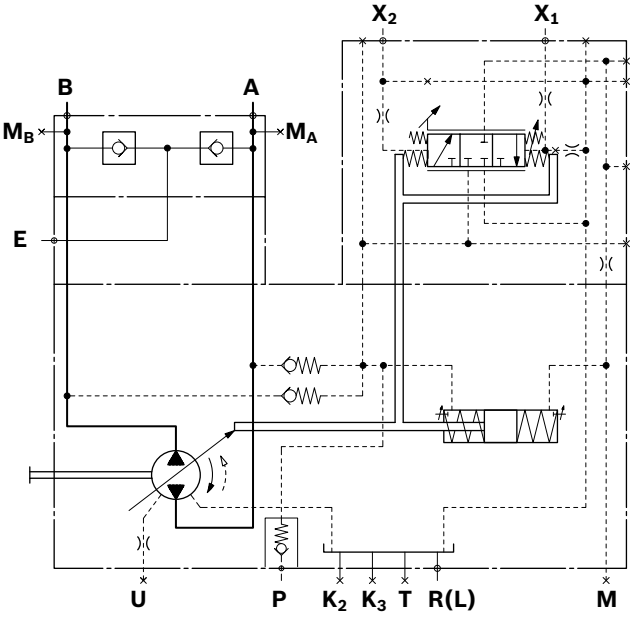
Optional:

- 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 HD**




▼ **Schematic HD**



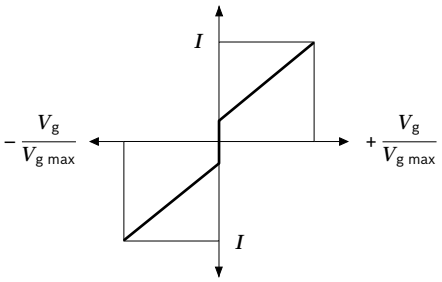
**Electrohydraulic control EP with proportional solenoid (see data sheet 92084)**

The EP control adjusts the pump displacement proportionally to the current at the solenoid. Current-regulated control units with pulse-width modulation are recommended for controlling the solenoids.

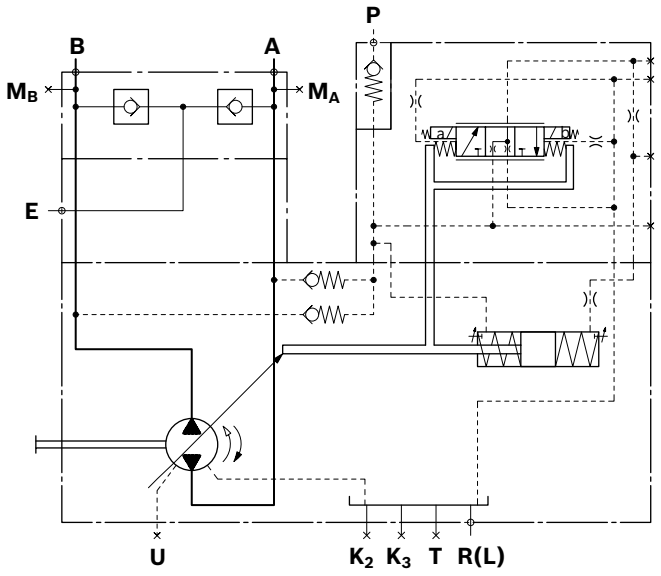
Optional:

- Pressure control (EPA, EPB, EPD)
- Remote pressure control (EPGA, EPGB, EPG)

▼ **Characteristic curve EP**



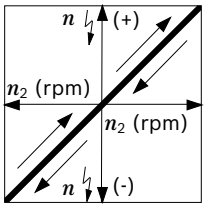

▼ **Circuit diagram EP**



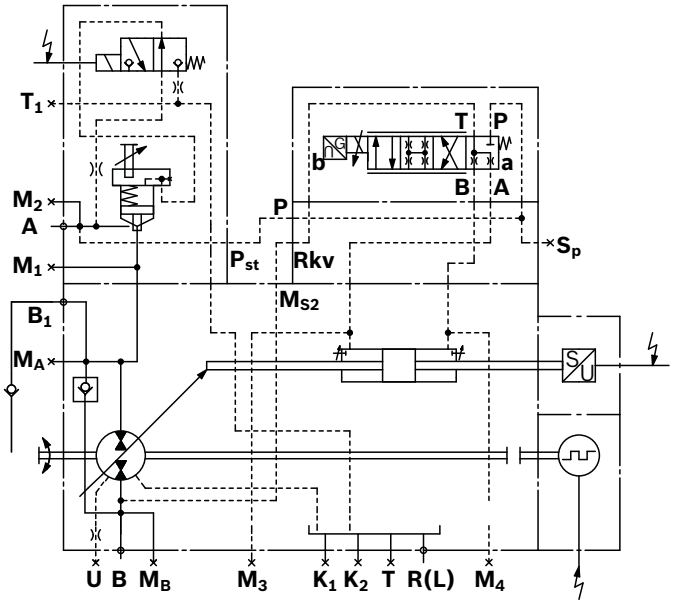
**DS2 secondary speed control**
**(see RE 92058)**

The speed control DS2 controls the secondary unit (motor) in such a manner, that this motor delivers sufficient torque to maintain the required rotational speed.
When connected to a constant pressure system, this torque is proportional to the displacement and thus also proportional to the swivel angle.

▼ **Characteristic curve DS2**

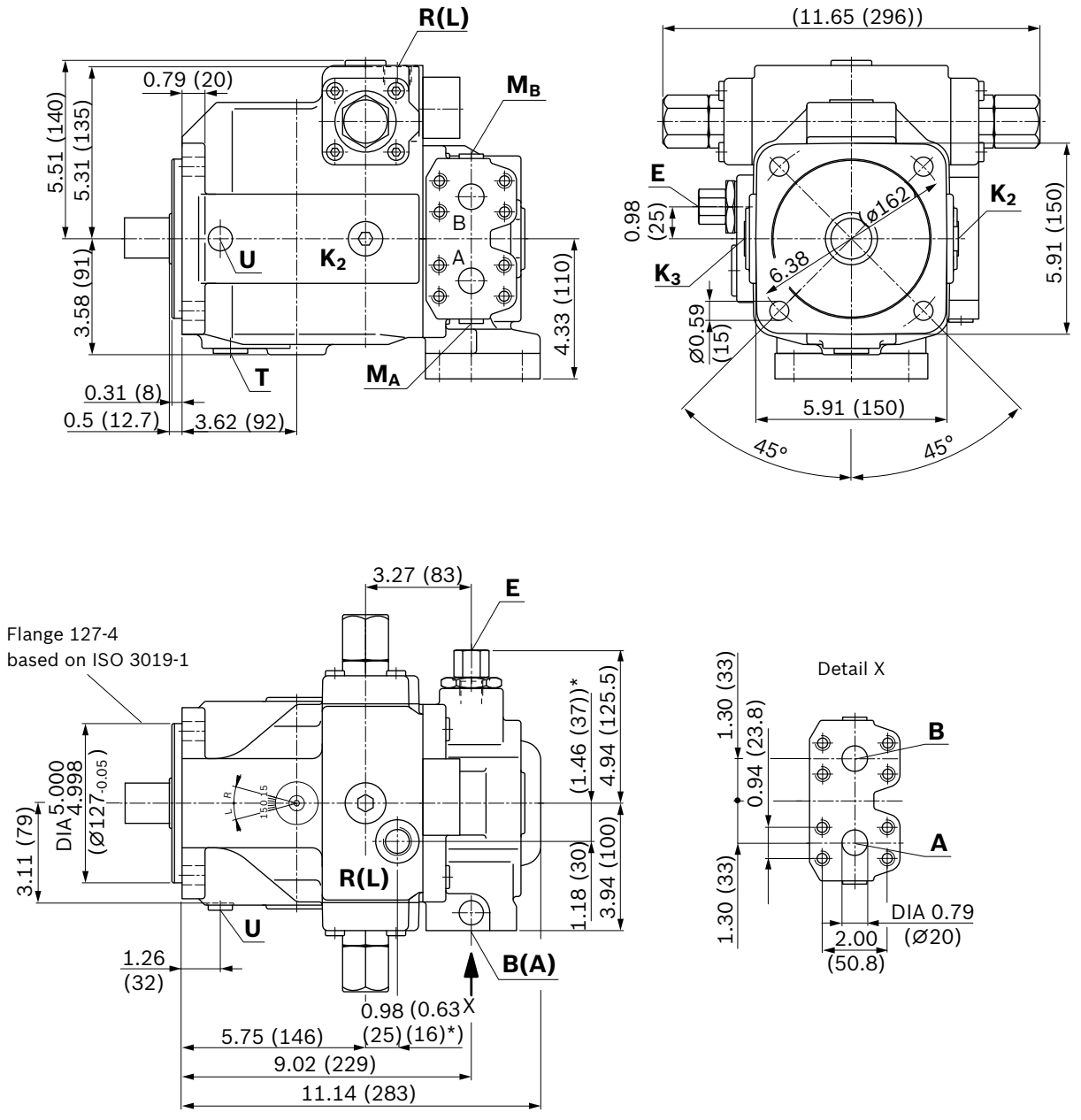



▼ **Circuit diagram DS2**



## Dimensions, size 40

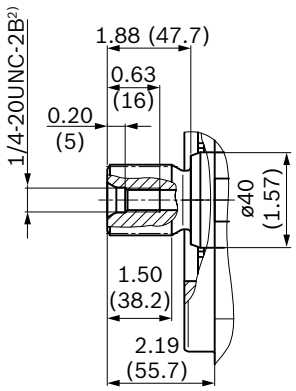
Example: **HM – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls




*) For HD and EP control

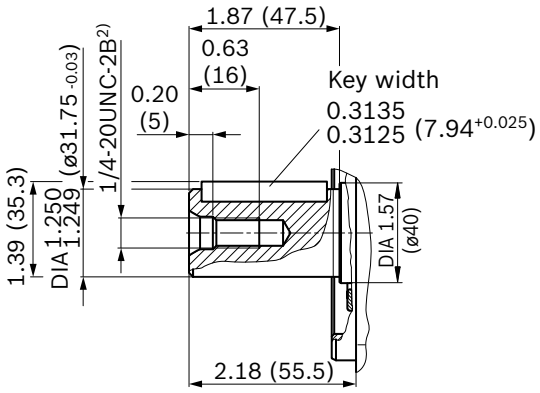
▼ **Splined shaft SAE J744, SAE C**

**S –** 1 1/4in 14T 12/24DP[1)]




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

**K –** 32-1

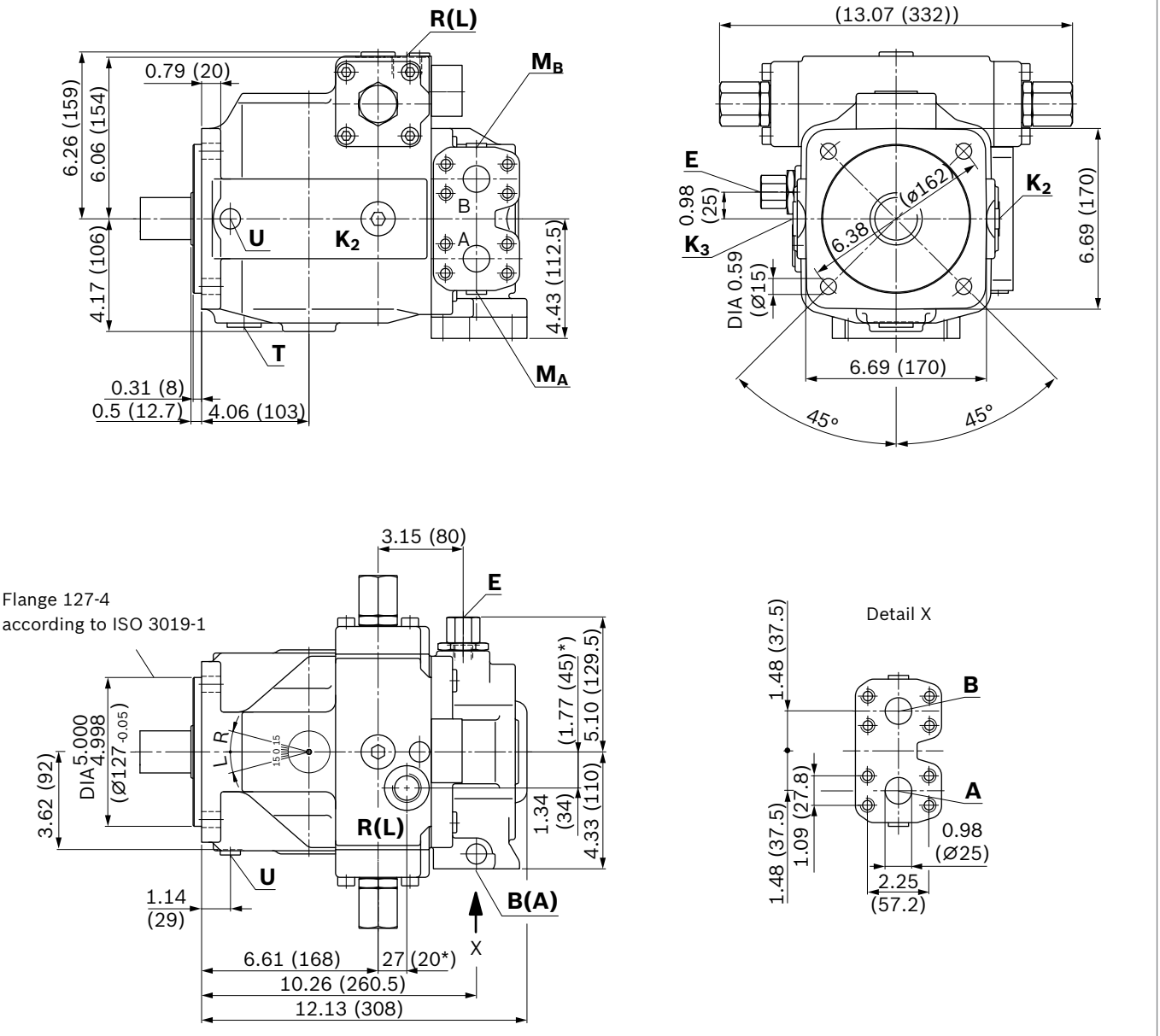



| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][3)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518<br>ASME B1.1 | 3/4 in<br>3/8-16UNC-2B; 0.83 (21) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | ISO 11926 | 7/16-20UNF-2B; 0.39 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | ISO 11926[4)] | 7/8-14UNF-2B; 0.67 (17) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | ISO 11926 | 3/4-16UNF-2B; 0.59 (15) deep | 725 (50) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 7/8-14UNF-2B; 0.67 (17) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | ISO 119262[4)] | 7/8-14UNF-2B; 0.67 (17) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | ISO 11926[4)] | 7/16-20UNF-2B; 0.39 (12) deep | 100 (7) | X |

1) Involute spline 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, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

## Dimensions, size 71

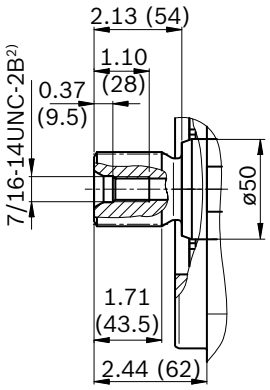
Example: **HM – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls




*) For HD and EP control

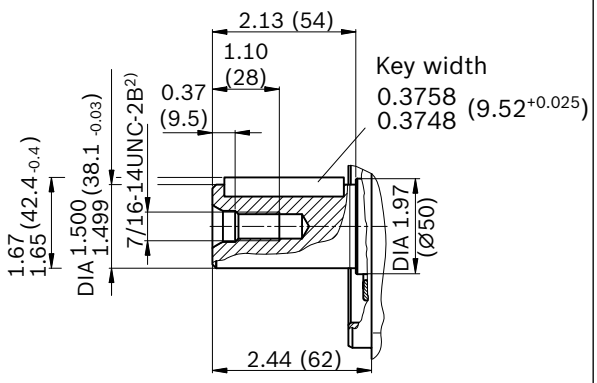
▼ **Splined shaft SAE J744, SAE C-C**

**S –** 1 1/2in 17T 12/24DP[1)]




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

**K –** 38-3

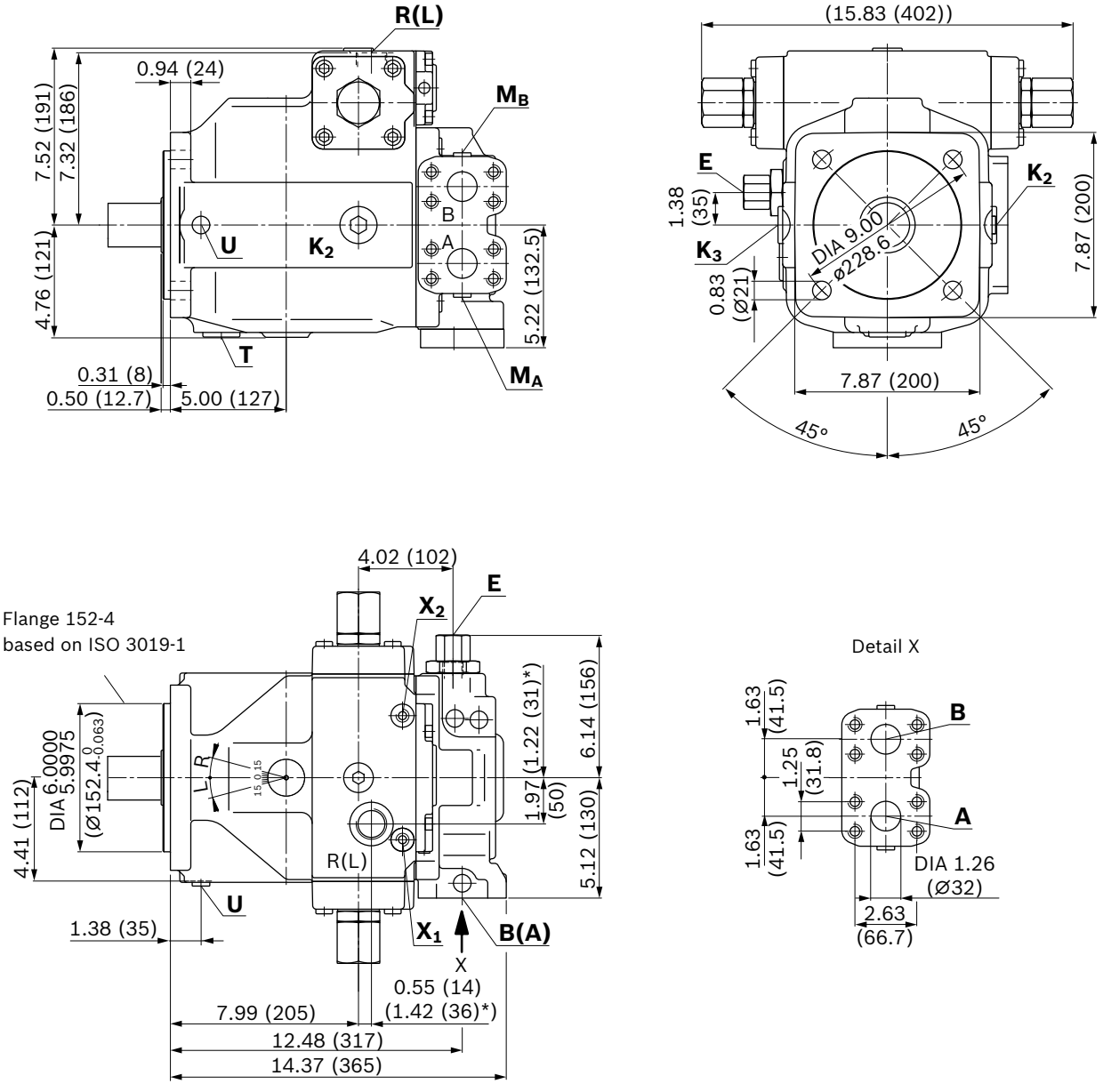



| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][3)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518<br>ASME B1.1 | 1 in<br>7/16-14UNC-2B; 0.87 (22) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | ISO 11926 | 7/16-20UNF-2B; 0.39 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | ISO 11926[4)] | 1 1/16-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | ISO 11926 | 3/4-16UNF-2B; 0.59 (15) deep | 725 (50) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 1/16-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 1/16-12UN-2B; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | ISO 11926[4)] | 7/16-20UNF-2B; 0.39 (12) deep | 100 (7) | X |

1) Involute spline 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, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

## Dimensions, size 125

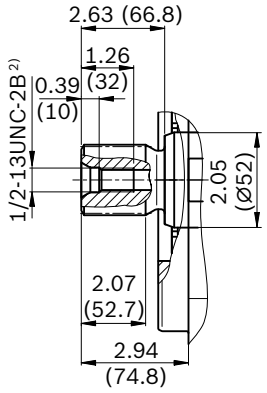
Example: **HM. – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls




*) For HM1, EO1, MA and EM control

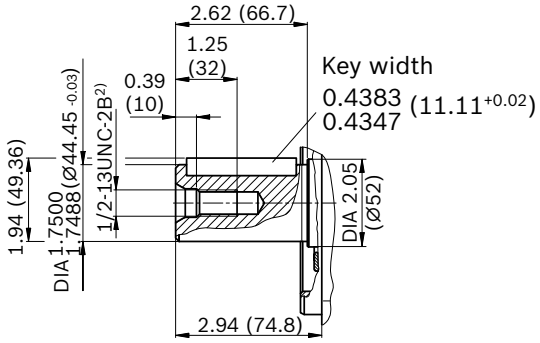
▼ **Splined shaft SAE J744, SAE D**

**S –** 1 3/4in 13T 8/16DP[1)]




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

**K –** 44-3

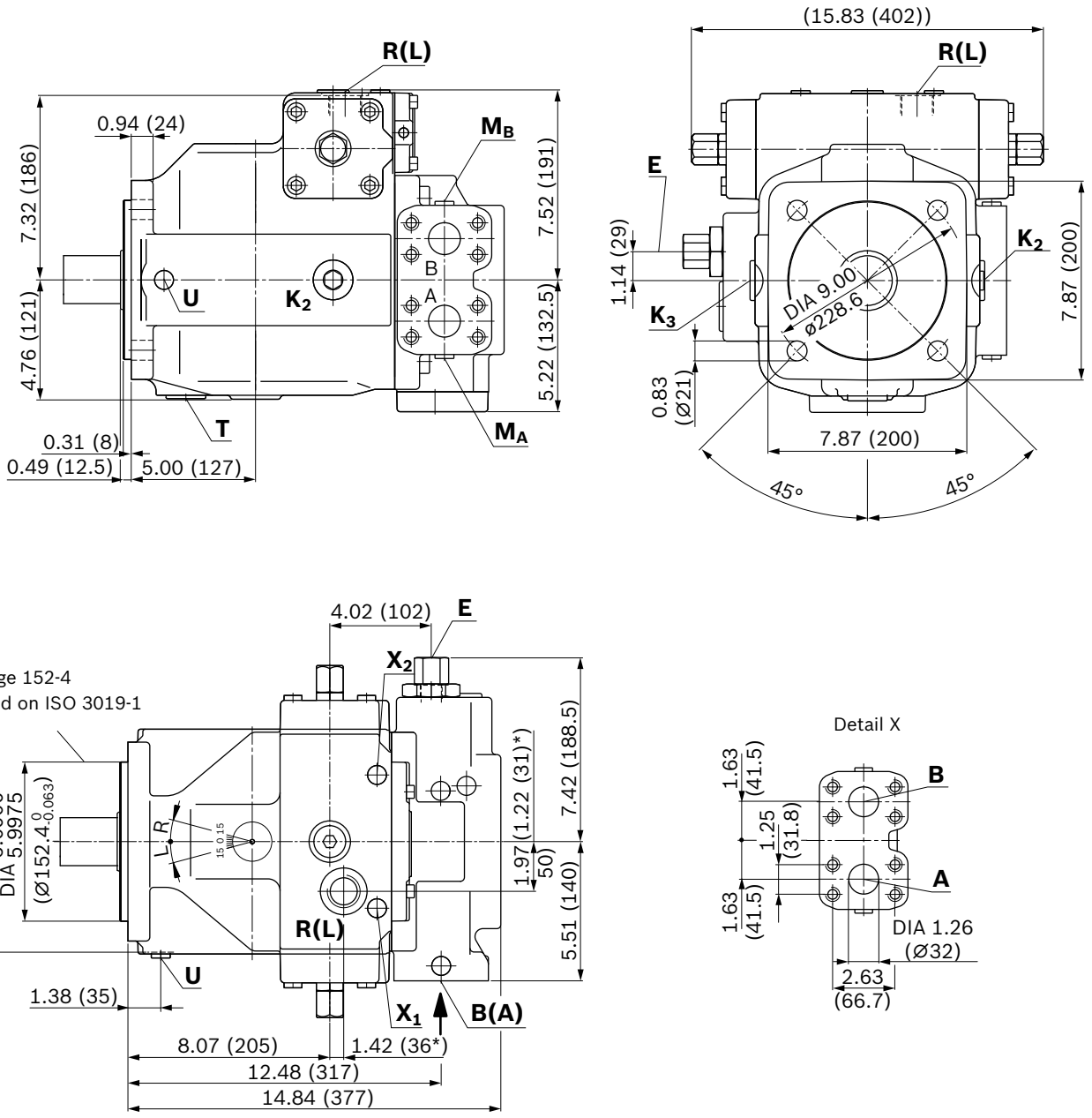



| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][3)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518<br>ASME B1.1 | 1 1/4 in<br>1/2-13UNC-2B; 0.75 (19) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | ISO 11986 | 7/16-20UNF-2B; 0.39 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | ISO 11986[4)] | 1 5/16-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | ISO 11986 | 7/8-14UNF-2B; 0.67 (17) deep | 725 (50) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM1) | ISO 11986 | 9/16-18UNF-2B; 0.51 (13) deep | 1450 (100) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM2) | ISO 11986 | 9/16-18UNF-2B; 0.51 (13) deep | 5100 (350) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | ISO 11986[4)] | 1 5/16-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | ISO 11986[4)] | 1 5/16-12UN-2B; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | ISO 11986[4)] | 7/16-20UNF-2B; 0.39 (12) deep | 100 (7) | X |

1) Involute spline 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, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

## Dimensions, size 180

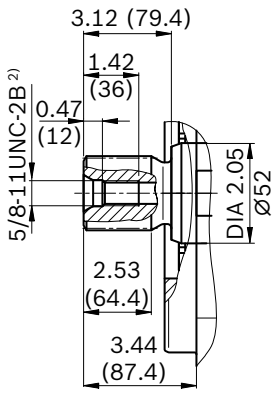
Example: **HM. – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls




*) For MA and EM control

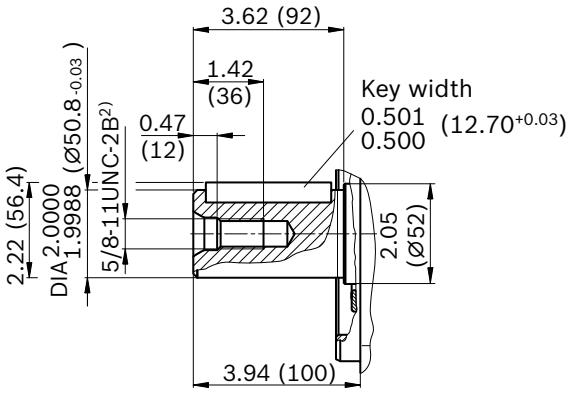
▼ **Splined shaft SAE J744, SAE F**

**S –** 2 in 15T 8/16DP[1)]




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

**K –** 50-4

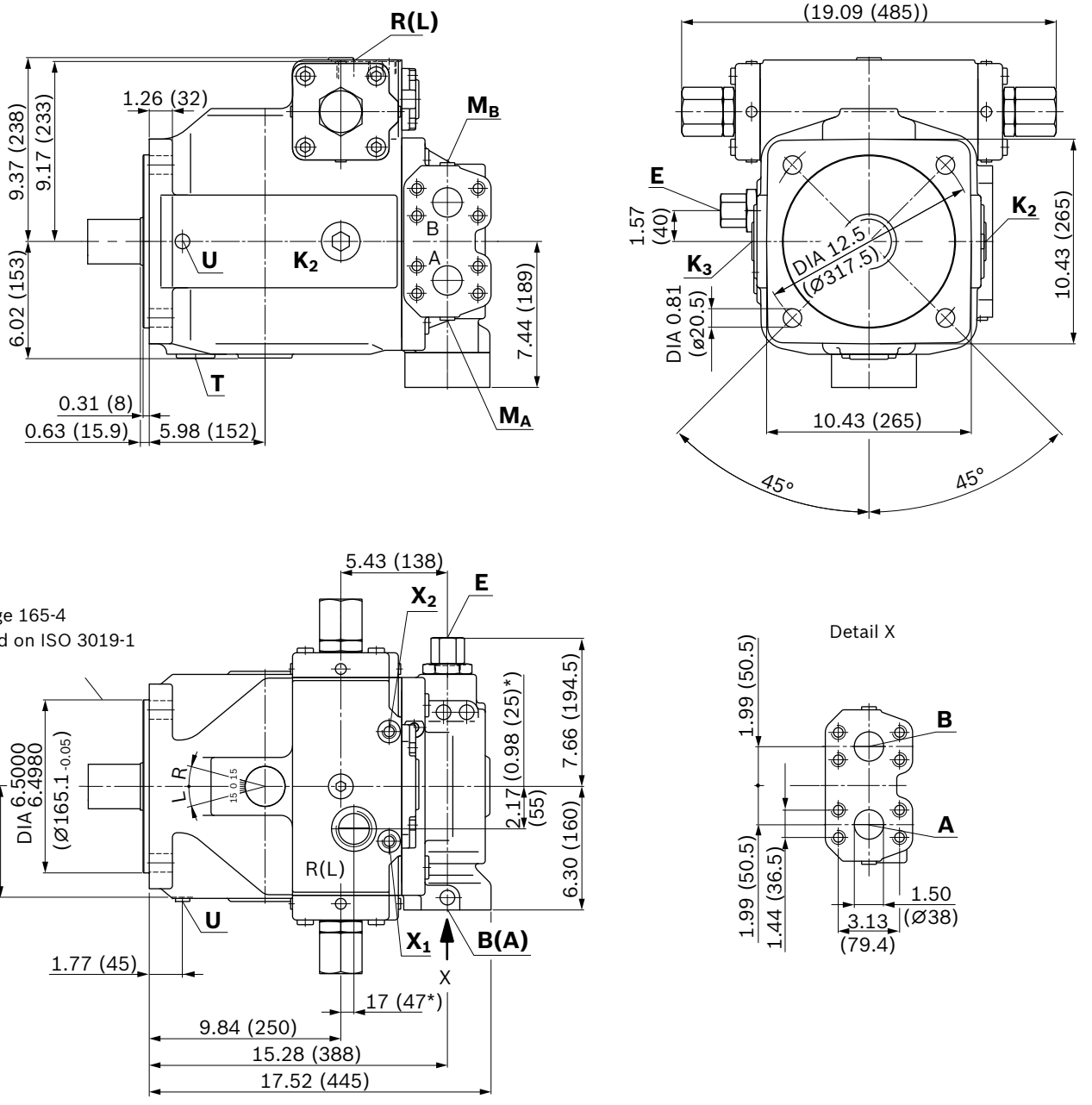



| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][3)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518<br>ASME B1.1 | 1 1/4 in<br>1/2-13UNC-2B; 1.06 (27) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | ISO 11926 | 7/16-20UNF-2B; 0.39 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | ISO 11926[4)] | 1 5/16-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | ISO 11926 | 7/8-14UNF-2B; 0.67 (17) deep | 725 (50) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM1) | ISO 11926 | 9/16-18UNF-2B; 0.51 (13) deep | 1450 (100) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM2) | ISO 11926 | 9/16-18UNF-2B; 0.51 (13) deep | 5100 (350) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 5/16-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 5/16-12UN-2B; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | ISO 11926[4)] | 7/16-20UNF-2B; 0.39 (12) deep | 100 (7) | X |

1) Involute spline 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, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

## Dimensions, size 250

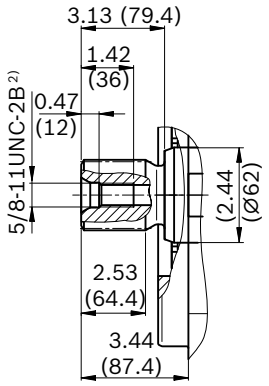
Example: **HM. – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls




*) For HM1, EO1, MA and EM control

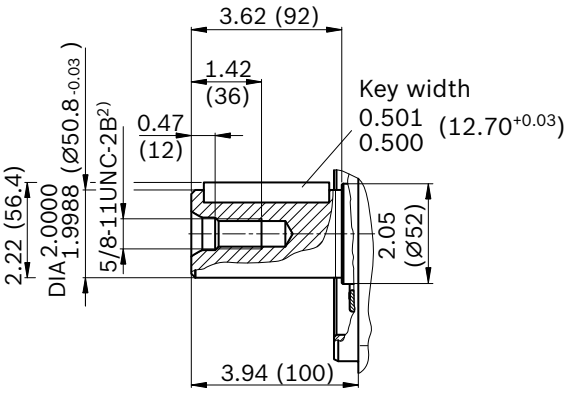
▼ **Splined shaft SAE J744, SAE F**

**S –** 2 in 15T 8/16DP[1)]




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

**K –** 50-4

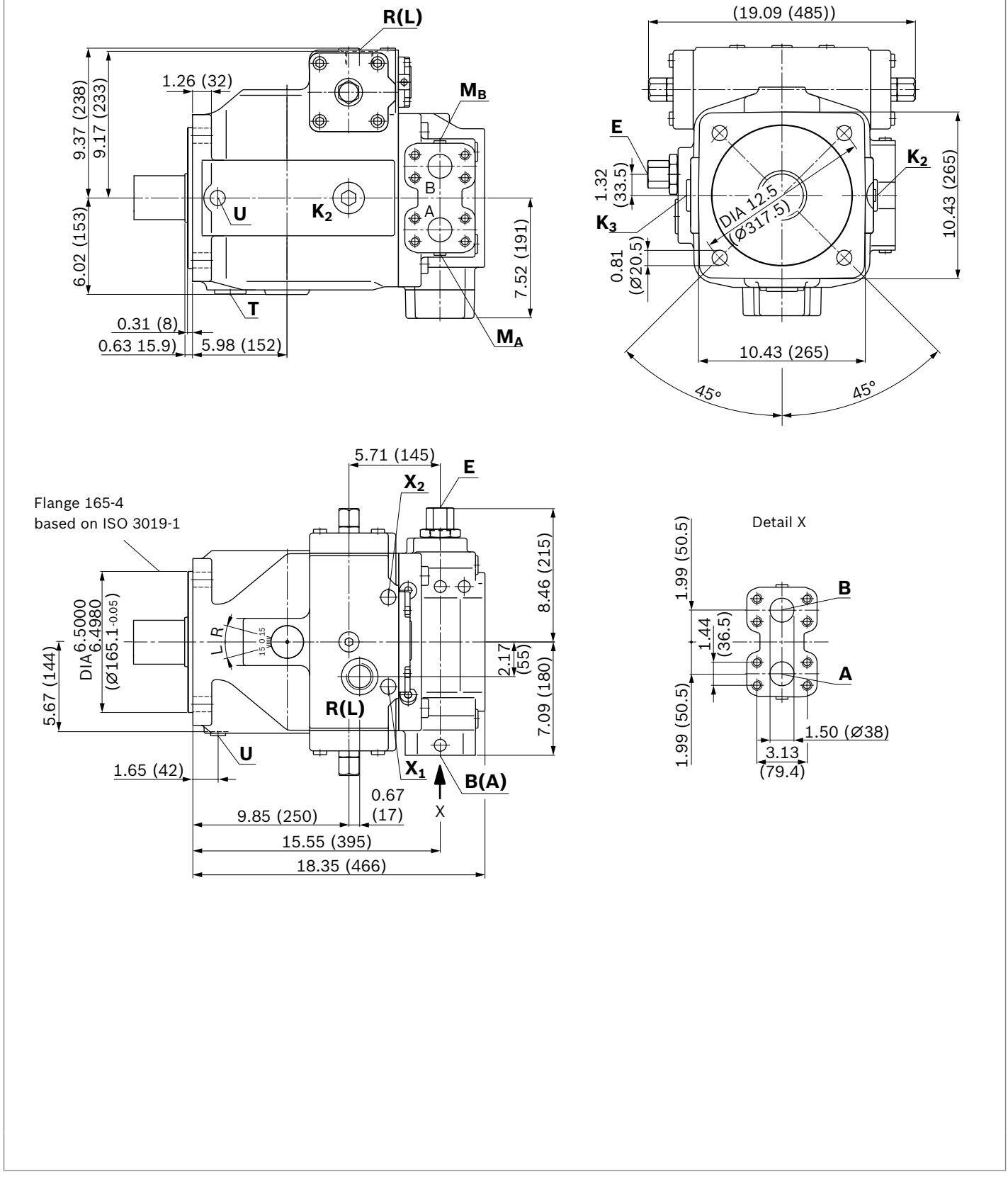



| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][3)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518<br>ASME B1.1 | 1 1/2 in<br>5/8-11UNC-2B; 1.14 (29) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | ISO 11926 | 7/16-20UNF-2B; 0.39 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | ISO 11926[4)] | 1 5/8-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | ISO 11926 | 1 5/16-12UN-2B; 0.79 (20) deep | 725 (50) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM1) | ISO 11926 | 3/4-16UNF-2B; 0.59 (15) deep | 1450 (100) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM2) | ISO 11926 | 3/4-16UNF-2B; 0.59 (15) deep | 5100 (350) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 5/8-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 5/8-12UN-2B; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | ISO 11926[4)] | 7/16-20UNF-2B; 0.39 (12) deep | 100 (7) | X |

1) Involute spline 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, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

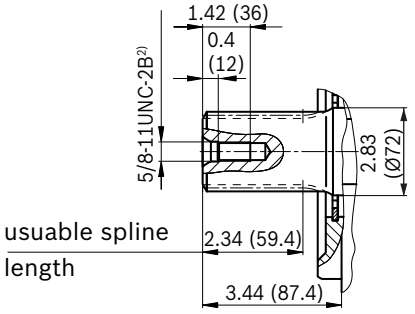
## Dimensions, size 355

Example: **HM. – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls



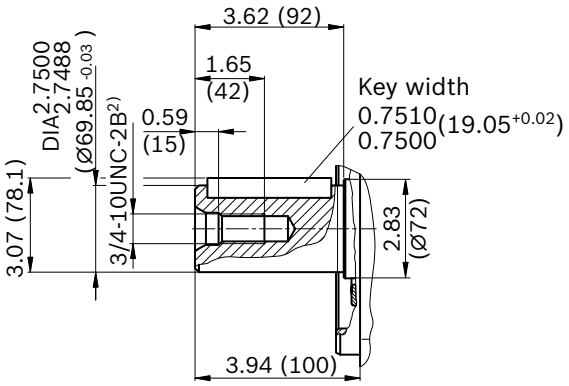
▼ **Splined shaft SAE J744, similar to SAE F**

**R –** 2in 15T 8/16DP[1)]




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

**K –** 50-4

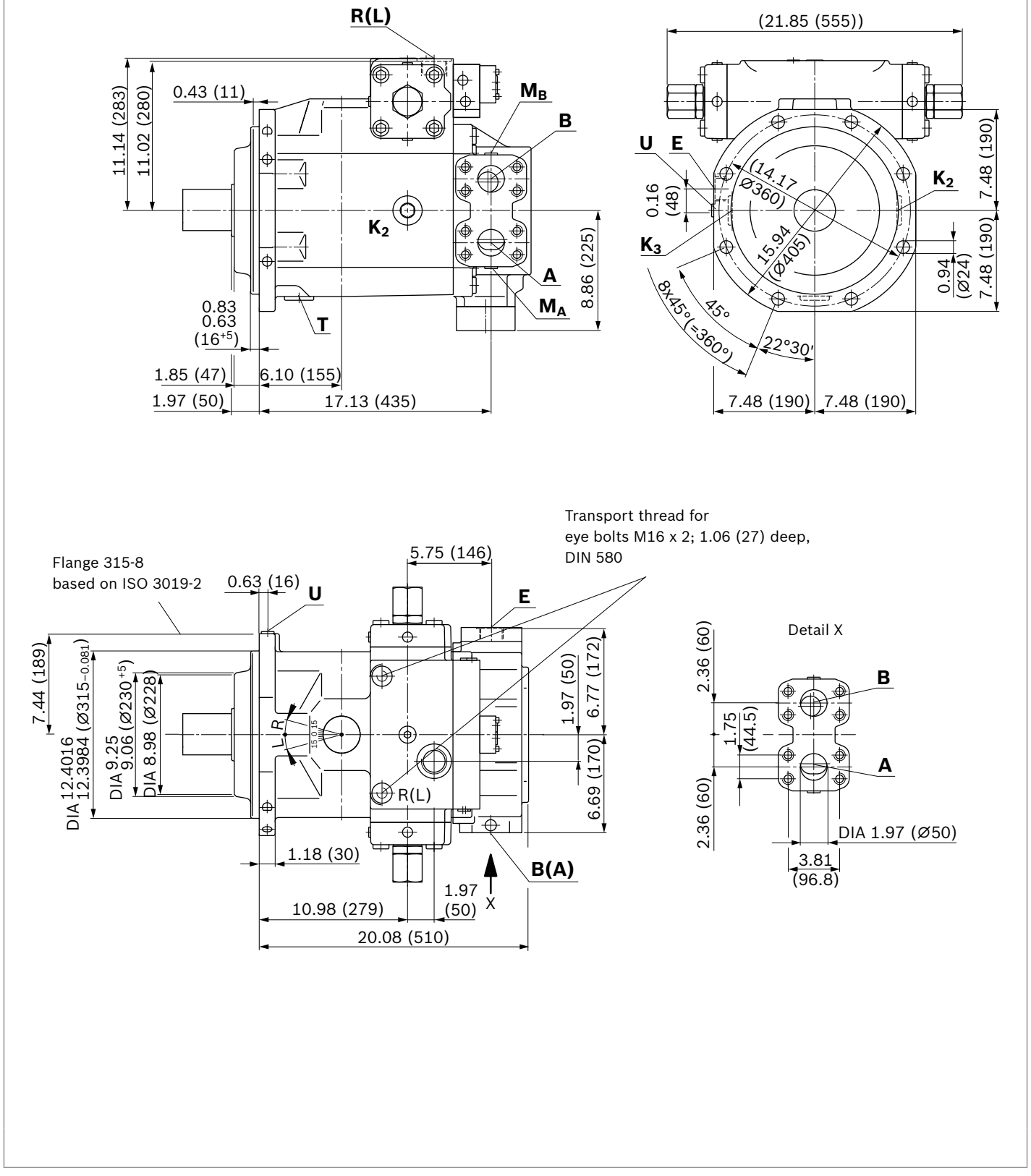



| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][3)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518<br>ASME B1.1 | 1 1/2 in<br>5/8-11UNC-2B; 1.14 (29) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | ISO 11926 | 7/16-20UNF-2B; 0.39 (10) deep | 5800 (400) | X |
| **T** | Fluid drain | ISO 11926[4)] | 1 5/8-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | ISO 11926 | 1 5/16-12UN-2B; 0.79 (20) deep | 725 (50) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM2) | ISO 11926 | 9/16-18UNF-2B; 0.51 (13) deep | 5100 (350) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 5/8-12UN-2B; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | ISO 11926[4)] | 1 5/8-12UN-2B; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | ISO 11926[4)] | 3/4-16UNF-2B; 0.59 (15) deep | 100 (7) | X |

1) Involute spline 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, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

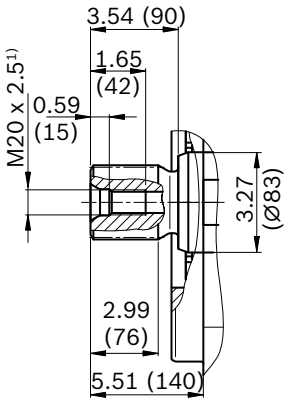
## Dimensions, size 500

Example: **HM. – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls



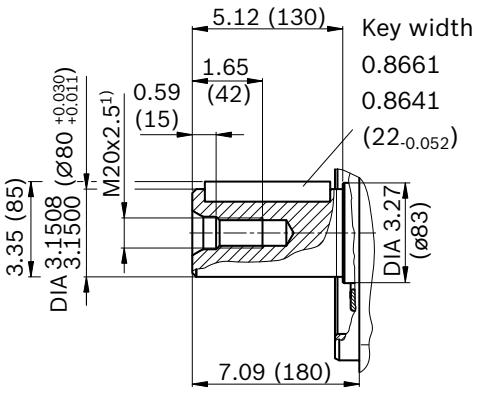
▼ **Splined shaft DIN 5480**

**Z –** W80x3x25x9g




▼ **Parallel keyed shaft DIN 6885**

**P –** AS22x14x125

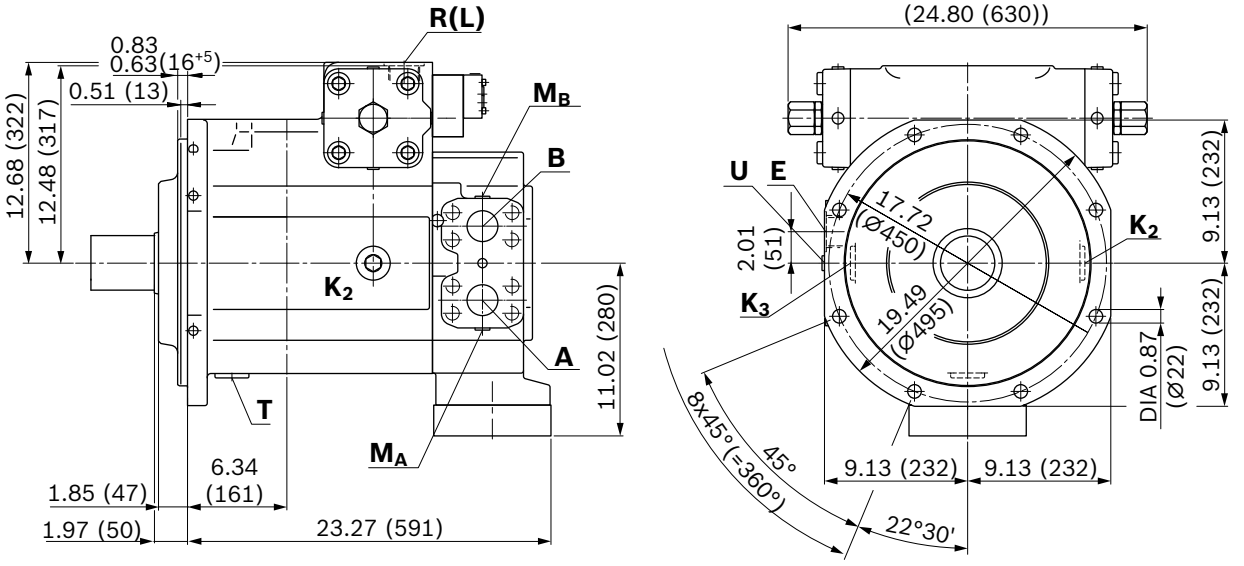



| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][2)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518[3)]<br>DIN 13 | 2 in<br>M20 × 2.5; 0.94 (24) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | DIN 3852 | M18 × 1.5; 0.47 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | DIN 3852 | M33 × 2; 0.71 (18) deep | 725 (50) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM2) | DIN 3852 | M27 × 2; 0.63 (16) deep | 5100 (350) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | DIN 3852[4)] | M18 × 1.5; 0.47 (12) deep | 100 (7) | X |

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
3) Metric fastening thread is a deviation from standard.
4) The countersink can be deeper than as specified in the standard.
5) Depending on the installation position, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

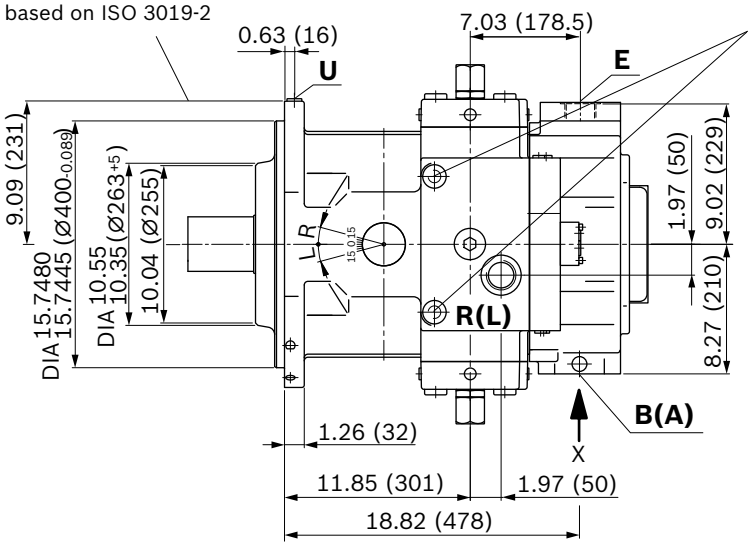
## Dimensions, size 750

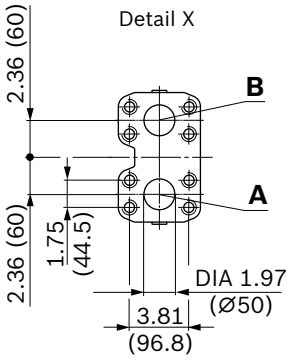
Example: **HM. – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls




Transport thread for
eye bolts M16 x 2; 1.06 (27) deep,
DIN 580

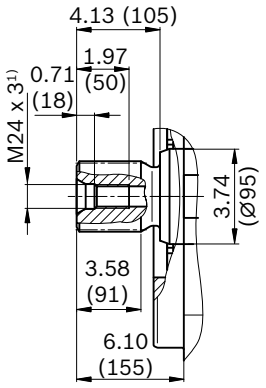
Flange 400-8
based on ISO 3019-2



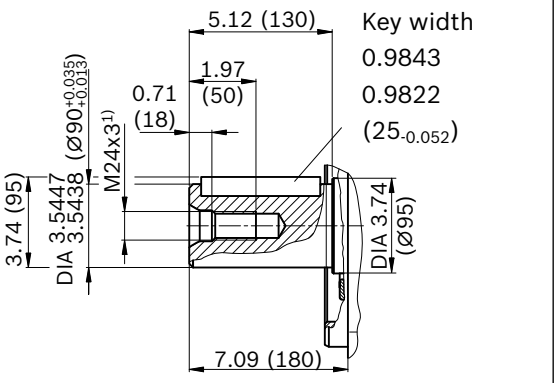
▼ **Splined shaft DIN 5480**

**Z –** W90x3x28x9g




▼ **Parallel keyed shaft DIN 6885**

**P –** AS25x14x125

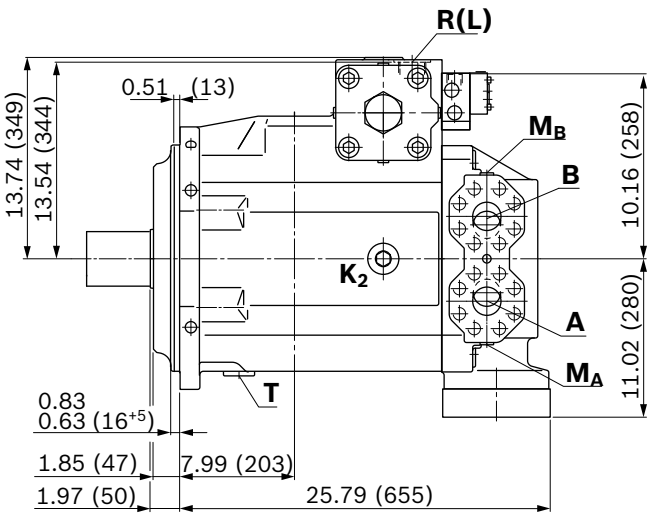


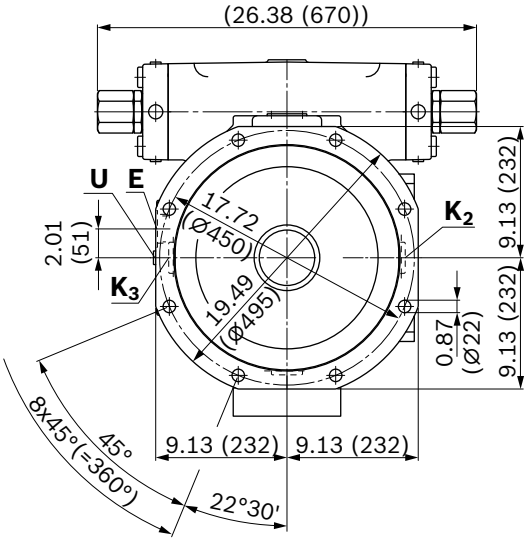

| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][2)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518[3)]<br>DIN 13 | 2 in<br>M20 × 2.5; 0.94 (24) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | DIN 3852 | M18 × 1.5; 0.74 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | DIN 3852 | M33 × 2; 0.71 (18) deep | 725 (50) | O |
| **$X_1$**, **$X_2$** | Control pressure (for HM2) | DIN 3852 | M27 × 2; 0.63 (16) deep | 5100 (350) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | DIN 3852[4)] | M18 × 1.5; 0.74 (12) deep | 100 (7) | X |

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
3) Metric fastening thread is a deviation from standard.
4) The countersink can be deeper than as specified in the standard.
5) Depending on the installation position, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

## Dimensions size 1000

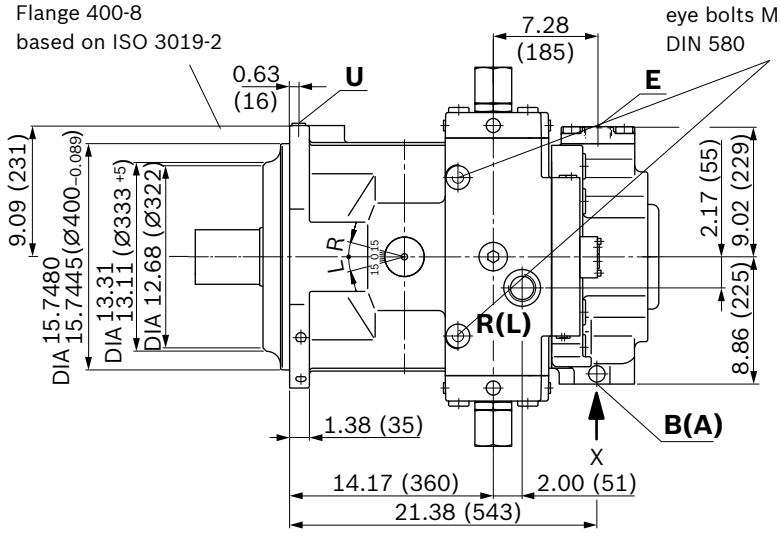
Example: **HM. – Hydraulic control, control volume dependent,** for additional dimensions, see data sheets for the controls



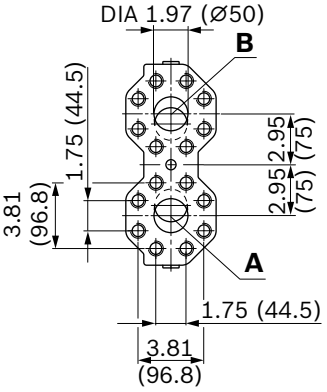




Flange 400-8
based on ISO 3019-2

Transport thread for
eye bolts M20 x 2.5; 1.18 (30) deep,
DIN 580

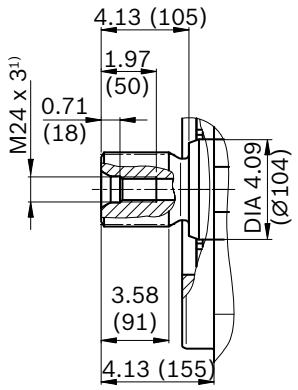



Detail X



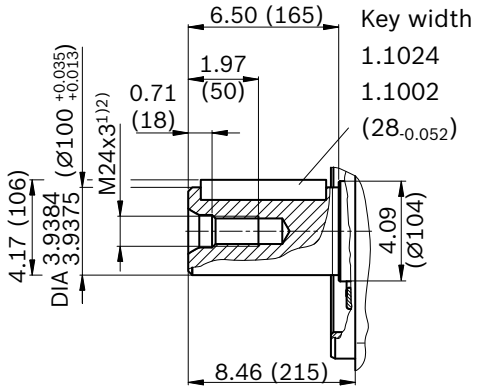
▼ **Splined shaft DIN 5480**

**Z –** W100x3x32x9g




▼ **Parallel keyed shaft DIN 6885**

**P –** AS28x16x160




| Ports | | Standard | Size | $p_{max\ abs}$ [psi (bar)][2)] | State[6)] |
|---|---|---|---|---|---|
| **A**, **B** | Working port (high-pressure series)<br>Fastening thread | SAE J518[3)]<br>DIN 13 | 2 in<br>M20 × 2.5; 1.18 (30) deep | 5800 (400) | O |
| **$M_A$**, **$M_B$** | Measuring working pressure A/B | DIN 3852 | M18 × 1.5; 0.47 (12) deep | 5800 (400) | X |
| **T** | Fluid drain | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | X[5)] |
| **E** | Boost pressure supply | DIN 3852 | M48 × 2; 0.79 (20) deep | 725 (50) | O |
| **$K_2$**, **$K_3$** | Filling – air bleeding, return flow (drain port) | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | X[5)] |
| **R(L)** | Filling – air bleeding, return flow (drain port) | DIN 3852[4)] | M48 × 2; 0.79 (20) deep | 60 (4) | O[5)] |
| **U** | Bearing flushing | DIN 3852[4)] | M18 × 1.5; 0.47 (12) deep | 100 (7) | X |

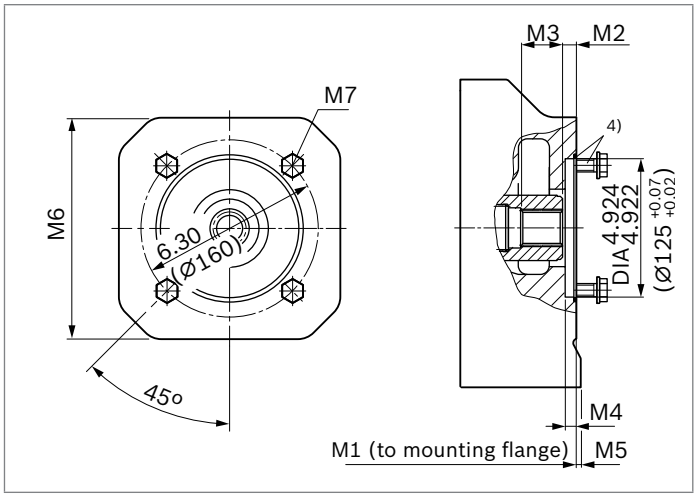
1) Center bore according to DIN 332 (thread according to DIN 13)
2) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
3) Metric fastening thread is a deviation from standard.
4) The countersink can be deeper than as specified in the standard.
5) Depending on the installation position, **$T_1$**, **$K_2$**, **$K_3$** or **R**(**L**) must be connected (see also installation instructions on pages 53 and 55).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

## Dimensions, through drives

| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 125-4 | ⌘ | N32 × 2 × 14 × 8H | – | – | – | – | – | – | ● | ● | ○ | K31 |
| 140-4 | ⌘ | N40 × 2 × 18 × 8H | – | – | – | – | – | – | ● | ○ | ● | K33 |

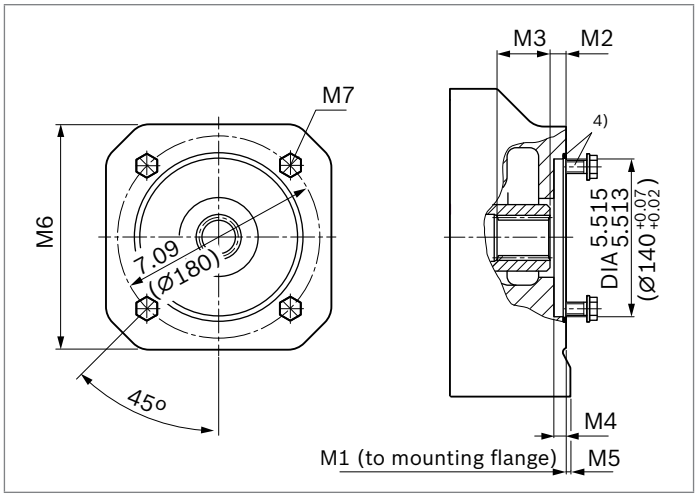
● = Available ○ = On request

▼ **125-4**




| K31 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
| 500 | 19.88 (505) | 0.49 (12.5) | 1.51 (38.5) | 0.39 (10) | – | – | M12; 0.71 (18) deep |
| 750 | 21.85 (555) | 0.49 (12.5) | 1.75 (44.5) | 0.35 (9) | 1.42 (36) | 9.84 (250) | M12; 0.71 (18) deep |

▼ **140-4**




| K33 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
| 500 | 19.88 (505) | 0.49 (12.5) | 1.73 (44) | 0.39 (10) | – | – | M12; 0.71 (18) deep |
| 750 | 21.85 (555) | 0.49 (12.5) | 1.75 (44.5) | 0.35 (9) | 1.42 (36) | 9.84 (250) | M12; 0.71 (18) deep |
| 1000 | 24.72 (628) | 0.49 (12.5) | 2.54 (64.5) | 0.39 (10) | 1.06 (27) | 11.02 (280) | M12; 0.71 (18) deep |

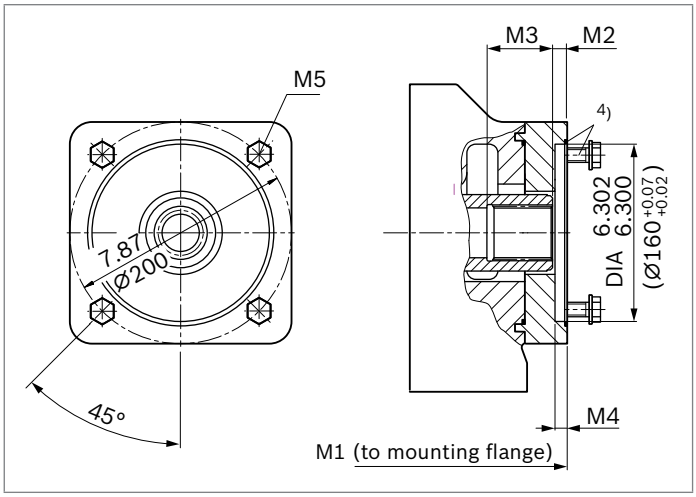
1) According to DIN 5480
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

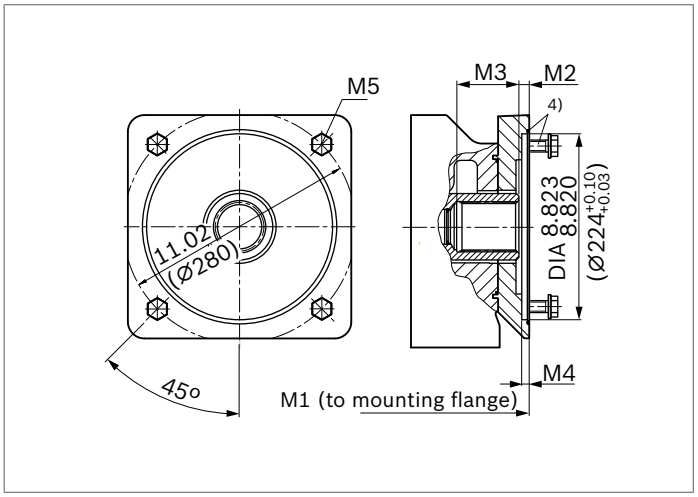
| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 160-4 | ⌘ | N50 × 2 × 24 × 8H | – | – | – | – | – | – | ● | ○ | ● | K34 |
| 224-4 | ⌘ | N60 × 2 × 28 × 8H | – | – | – | – | – | – | ● | ● | ● | K35 |

● = Available ○ = On request

▼ **160-4**




▼ **224-4**




| K34 | | | | | |
|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5[3] |
| 500 | 19.88<br>(505) | 0.53<br>(13.5) | 2.16<br>(55) | 0.39<br>(10) | M16; 0.94<br>(24) deep |
| 750 | 21.85<br>(555) | 0.53<br>(13.5) | 2.16<br>(55) | 0.39<br>(10) | M16; 0.94<br>(24) deep |
| 1000 | 24.72<br>(628) | 0.49<br>(12.5) | 2.16<br>(55) | 0.39<br>(10) | M16; 0.94<br>(24) deep |

| K35 | | | | | |
|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5[3] |
| 500 | 21.30<br>(541) | 0.49<br>(12.5) | 2.91<br>(74) | 0.35<br>(9) | M20; 1.42<br>(36) deep |
| 750 | 23.27<br>(591) | 0.49<br>(12.5) | 2.91<br>(74) | 0.35<br>(9) | M20; 1.42<br>(36) deep |
| 1000 | 26.14<br>(664) | 0.49<br>(12.5) | 2.74<br>(69.5) | 0.35<br>(9) | M20; 1.42<br>(36) deep |

1) According to DIN 5480
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

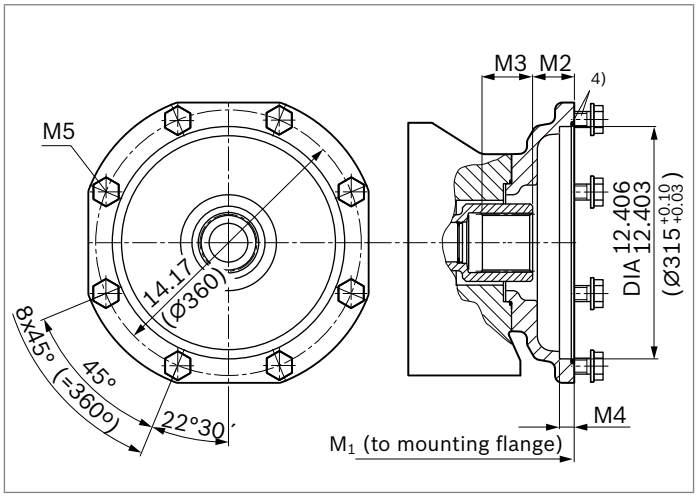
| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 224-4 |  | N70 × 3 × 22 × 8H | – | – | – | – | – | – | ● | ○ | ● | K77 |
| 315-8 |  | N80 × 3 × 25 × 8H | – | – | – | – | – | – | ● | ● | ● | K43 |

● = Available ○ = On request

▼ **224-4**




▼ **315-8**




| K77 | | | | | |
|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5[3] |
| 500 | 21.30<br>(541) | 0.49<br>(12.5) | 3.23<br>(82) | 0.35<br>(9) | M20; 1.42<br>(36) deep |
| 1000 | 26.14<br>(664) | 0.49<br>(12.5) | 3.23<br>(82) | 0.35<br>(9) | M20; 1.42<br>(36) deep |

| K43 | | | | | |
|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5[3] |
| 500 | 23.24<br>(590) | 2.11<br>(53.5) | 2.83<br>(71.9) | 0.75<br>(19) | M20; 1.02<br>(26) deep |
| 750 | 25.20<br>(640) | 2.11<br>(53.5) | 2.83<br>(71.9) | 0.75<br>(19) | M20; 1.02<br>(26) deep |
| 1000 | 28.07<br>(713) | 2.11<br>(53.5) | 2.80<br>(71) | 0.75<br>(19) | M20; 1.02<br>(26) deep |

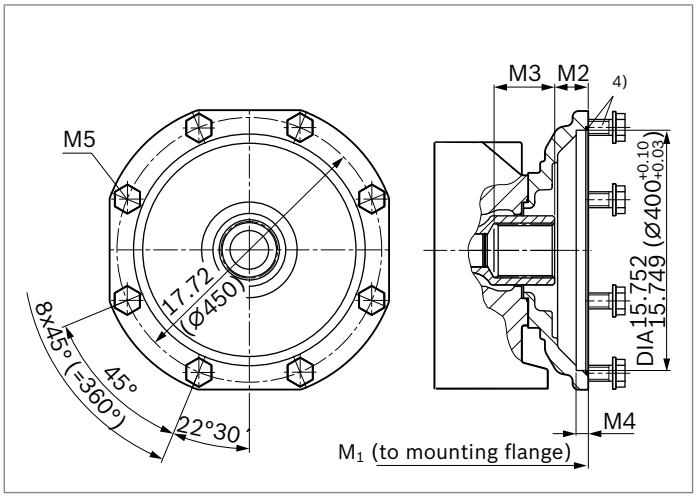
1) According to DIN 5480
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 400-8 | | N90 × 3 × 28 × 8H | – | – | – | – | – | – | – | ● | ● | K76 |
| 400-8 | | N100 × 3 × 32 × 8H | – | – | – | – | – | – | – | – | ● | K88 |

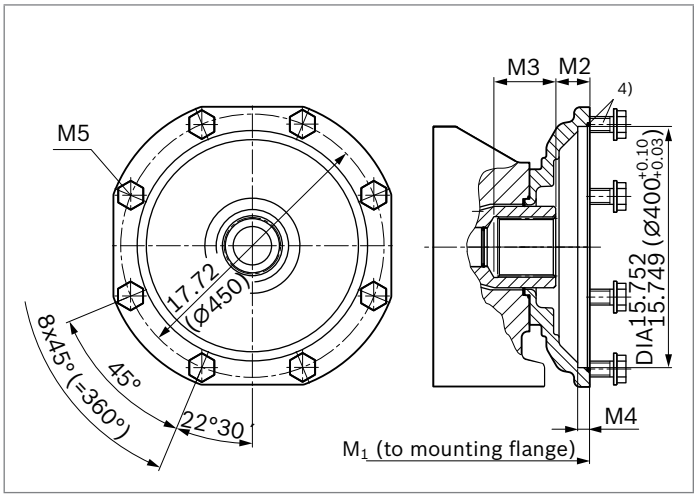
● = Available ○ = On request

▼ **400-8**




| K76 | | | | | |
|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5[3] |
| 750 | 25.79<br>(655) | 2.09<br>(53) | 4.09<br>(104) | 0.75<br>(19) | M20; 1.02<br>(26) deep |
| 1000 | 28.66<br>(728) | 2.09<br>(53) | 3.82<br>(97) | 0.75<br>(19) | M20; 1.02<br>(26) deep |

▼ **400-8**



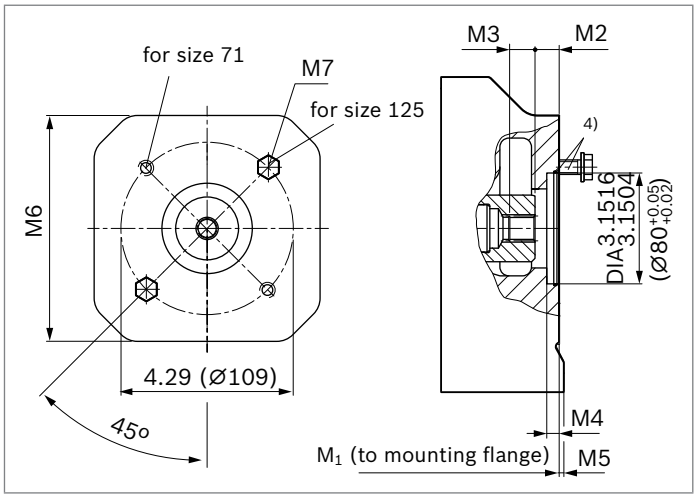

| K88 | | | | | |
|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5[3] |
| 1000 | 28.66<br>(728) | 2.09<br>(53) | 3.90<br>(99) | 0.75<br>(19) | M20; 1.02<br>(26) deep |

1) According to DIN 5480
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 80-2 | | 3/4in 11T 16/32DP | ○ | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | KB2 |

▼ **80-2**




| KB2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
| 71 | 11.54 (293) | 0.85 (21.5) | 0.75 (19) | 0.39 (10) | 0.59 (15) | 5.51 (140) | M10; 0.59 (15) deep |
| 125 | 15.00 (381) | 0.95 (24.2) | 0.81 (20.5) | 0.39 (10) | – | – | M10; 0.47 (12) deep |

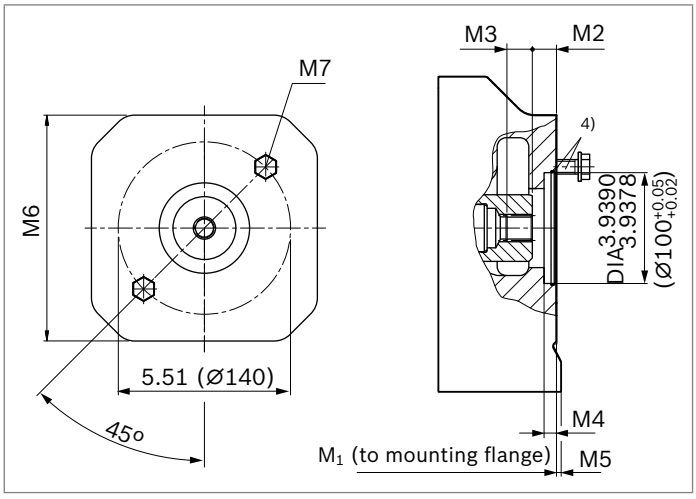
1) According to DIN 5480
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 100-2 | | 7/8in 13T 16/32DP | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | KB3 |
| 100-2 | | 1in 15T 16/32DP | ○ | ● | ● | ● | ● | ○ | ○ | ○ | ○ | KB4 |

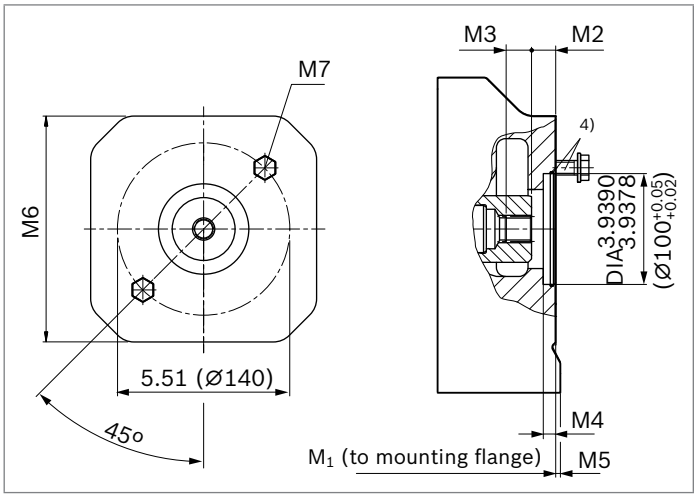
● = Available ○ = On request

▼ **100-2**




| KB3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
| 40 | 11.50 (290) | 0.80 (20.4) | 0.90 (23) | 0.39 (10) | – | – | M12; 0.71 (18) deep |
| 71 | 12.52 (318) | 0.80 (20.4) | 0.90 (23) | 0.35 (9) | – | – | M12; 0.71 (18) deep |
| 125 | 14.96 (380) | 0.80 (20.3) | 0.96 (24.5) | 0.39 (10) | – | – | M12; 0.94 (24) deep |
| 180 | 14.68 (373) | 0.81 (20.5) | 0.90 (23) | 0.39 (10) | – | – | M12; 0.59 (15) deep |
| 250 | 17.05 (433) | 0.81 (20.5) | 0.90 (23) | 0.39 (10) | 0.39 (10) | 7.87 (200) | M12; 0.71 (18) deep |
| 355 | 18.19 (462) | 0.81 (20.5) | 0-90 (23) | 0.39 (10) | – | – | M12; 0.71 (18) deep |

▼ **100-2**




| KB4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
| 71 | 12.52 (318) | 0.82 (20.8) | 1.08 (27.5) | 0.31 (8) | – | – | M12; 0.94 (24) deep |
| 125 | 14.96 (380) | 0.87 (22.2) | 1.14 (29) | 0.39 (10) | – | – | M12; 0.94 (24) deep |
| 180 | 14.68 (373) | 0.86 (21.8) | 1.10 (27.9) | 0.39 (10) | – | – | M12; 0.59 (15) deep |
| 250 | 17.05 (433) | 0.82 (20.9) | 1.08 (27.5) | 0.39 (10) | 0.39 (10) | 7.87 (200) | M12; 0.71 (18) deep |
| 355 | 18.19 (462) | 0.82 (20.9) | 1.08 (27.5) | 0.39 (10) | – | – | M12; 0.71 (18) deep |

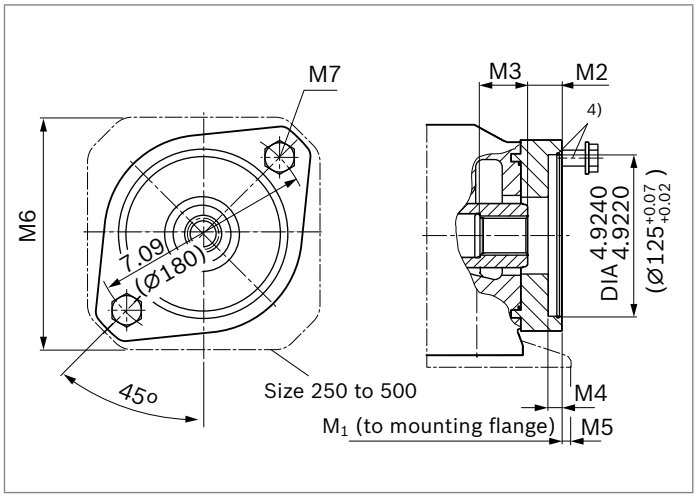
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

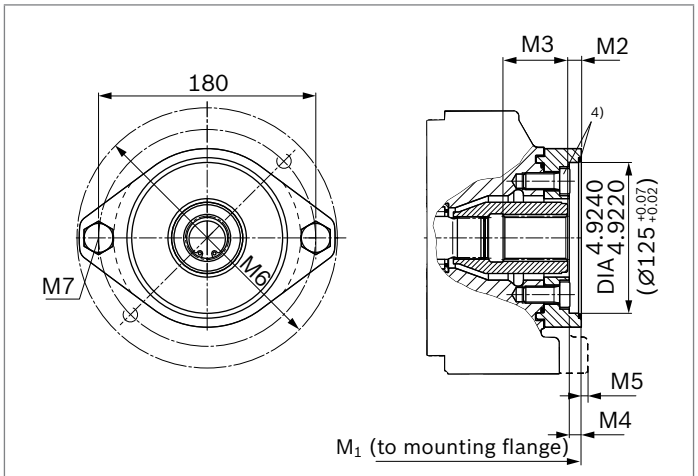
| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 125-2 | ⚷ | 1 1/4in 14T 12/24DP | – | ● | ● | ● | ● | ● | ● | ○ | ○ | KB5 |
| 125-2 | ⊷ | 1 1/2 in 17T 12/24DP | – | – | ● | ● | ● | ● | ● | ● | ○ | KB6 |

● = Available ○ = On request

▼ **125-2**




▼ **125-2**




| KB5 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
| 71 | 12.72 (323) | 0.91 (23.1) | 1.50 (38.1) | 0.39 (10) | – | – | M16; 1.14 (29) deep |
| 125 | 14.96 (380) | 0.93 (23.7) | 1.50 (38.1) | 0.37 (9.5) | – | – | M16; 0.94 (24) deep |
| 180 | 15.90 (404) | 0.93 (23.7) | 1.50 (38.1) | 0.37 (9.5) | – | – | M16; 0.94 (24) deep |
| 250 | 17.05 (433) | 0.87 (22) | 1.42 (36.1) | 0.39 (10) | 0.39 (10) | 7.87 (200) | M16; 0.79 (20) deep |
| 355 | 18.19 (462) | 0.87 (22) | 1.42 (36.1) | 0.39 (10) | – | – | M16; 0.94 (24) deep |
| 500 | 19.88 (505) | 0.76 (19.3) | 1.59 (40.4) | 0.39 (10) | – | – | M16; 0.94 (24) deep |

| KB6 | | | | | | | |
|---|---|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
| 125 | 14.96 (380) | 0.45 (11.4) | 2.13 (54) | 0.37 (9.5) | – | – | M16; 0.94 (24) deep |
| 180 | 15.90 (404) | 0.45 (11.4) | 2.13 (54) | 0.37 (9.5) | – | – | M16; 0.94 (24) deep |
| 250 | 17.83 (453) | 0.41 (10.4) | 2.16 (55) | 0.39 (10) | – | – | M16; 0.79 (20) deep |
| 355 | 18.98 (482) | 0.41 (10.4) | 2.16 (55) | 0.39 (10) | – | – | M16; 0.79 (20) deep |
| 500 | 19.88 (505) | 0.41 (10.3) | 2.20 (56) | 0.39 (10) | – | – | M16; 0.94 (24) deep |
| 750 | 21.85 (555) | 0.41 (10.3) | 2.20 (56) | 0.39 (10) | 1.42 (36) | 9.84 (250) | M16; 0.94 (24) deep |

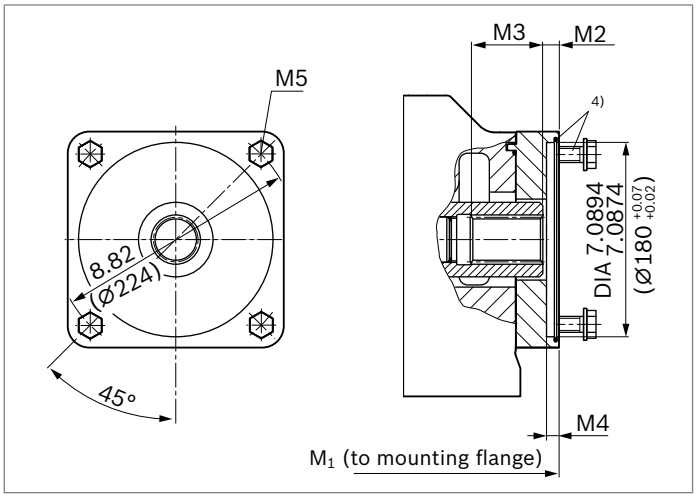
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

| Flange ISO 3019-2 (metric) | | Hub for splined shaft[1] | | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 180-4 | ⌘ | 1 3/4in | 13T 8/16DP | – | – | ● | ● | ● | ● | ● | ● | ○ | KB7 |

● = Available ○ = On request

▼ **180-4**




| KB7 | | | | | |
|---|---|---|---|---|---|
| NG | M1 | M2 | M3 | M4 | M5[3] |
| 125 | 15.63<br>(397) | 0.41<br>(10.5) | 1.77<br>(45) | 0.39<br>(10) | M16; 1.18<br>(30) deep |
| 180 | 16.57<br>(421) | 0.41<br>(10.5) | 1.77<br>(45) | 0.39<br>(10) | M16; 1.18<br>(30) deep |
| 250 | 18.54<br>(471) | 0.43<br>(10.8) | 2.64<br>(67) | 0.39<br>(10) | M16; 1.26<br>(32) deep |
| 355 | 19.68<br>(500) | 0.43<br>(10.8) | 2.64<br>(67) | 0.39<br>(10) | M16; 1.26<br>(32) deep |
| 500 | 20.87<br>(530) | 0.41<br>(10.4) | 2.48<br>(63) | 0.39<br>(10) | M16; 0.98<br>(25) deep |
| 750 | 22.83<br>(580) | 0.41<br>(10.4) | 2.48<br>(63) | 0.39<br>(10) | M16; 0.98<br>(25) deep |

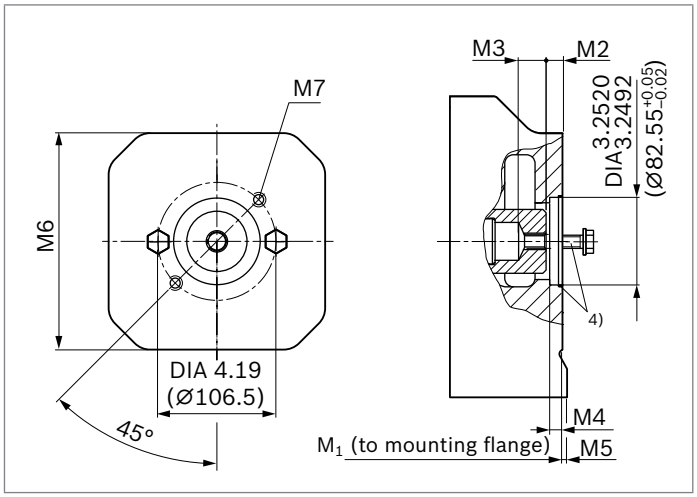
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

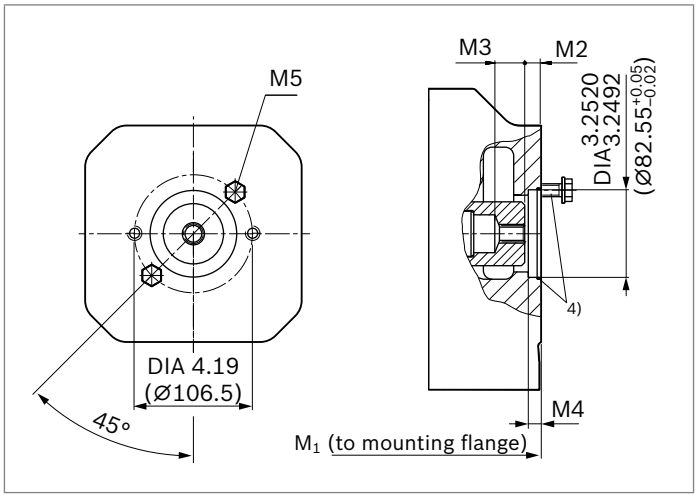
| Flange ISO 3019-1 (SAE J744) | | Hub for splined shaft[1] | | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 82-2 (A) | ⚷, ⊷ | 5/8in | 9T 16/32DP | ● | ● | ● | ● | ● | ● | ● | ● | ○ | K01 |
| 82-2 (A-B) | ⚷, ⊷ | 3/4in | 11T 16/32DP | ○ | ● | ○ | ● | ○ | ● | ○ | ○ | ○ | K52 |

● = Available ○ = On request

▼ **82-2**




▼ **82-2**




**K01** (16-4 (A))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 40 | 10.43 (265) | 0.41 (10.5) | 1.02 (25.8) | 0.39 (10) | 0.71 (18) | 5.12 (130) | M10; 0.59 (15) deep |
| 71 | 11.54 (293) | 0.41 (10.5) | 1.00 (25.4) | 0.39 (10) | 0.59 (15) | 5.51 (140) | M10; 0.59 (15) deep |
| 125 | 13.74 (349) | 0.40 (10.3) | 1.10 (28) | 0.39 (10) | 0.51 (13) | 5.91 (150) | M10; 0.59 (15) deep |
| 180 | 14.69 (373) | 0.40 (10.3) | 1.10 (28) | 0.39 (10) | – | – | M10; 0.59 (15) deep |
| 250 | 17.05 (433) | 0.41 (10.5) | 1.18 (30) | 0.39 (10) | 0.39 (10) | 7.87 (200) | M10; 0.59 (15) deep |
| 355 | 18.19 (462) | 0.41 (10.5) | 1.18 (30) | 0.39 (10) | – | – | M10; 0.59 (15) deep |
| 500 | 19.88 (505) | 0.40 (10.3) | 1.30 (33) | 0.39 (10) | – | – | M10; 0.59 (15) deep |
| 750 | 21.85 (555) | 0.40 (10.3) | 1.30 (33) | 0.39 (10) | 1.42 (36) | 9.84 (250) | M10; 0.59 (15) deep |

**K52** (19-4 (A-B))

| NG | M1 | M2 | M3 | M4 | M5[3] |
|---|---|---|---|---|---|
| 71 | 12.40 (315) | 0.85 (21.5) | 0.75 (19) | 0.39 (10) | M10; 0.79 (20) deep |
| 180 | 14.69 (373) | 0.84 (21.4) | 0.75 (19.1) | 0.39 (10) | M10; 0.59 (15) deep |
| 355 | 18.19 (462) | 0.84 (21.4) | 0.75 (19.1) | 0.39 (10) | M10; 0.59 (15) deep |

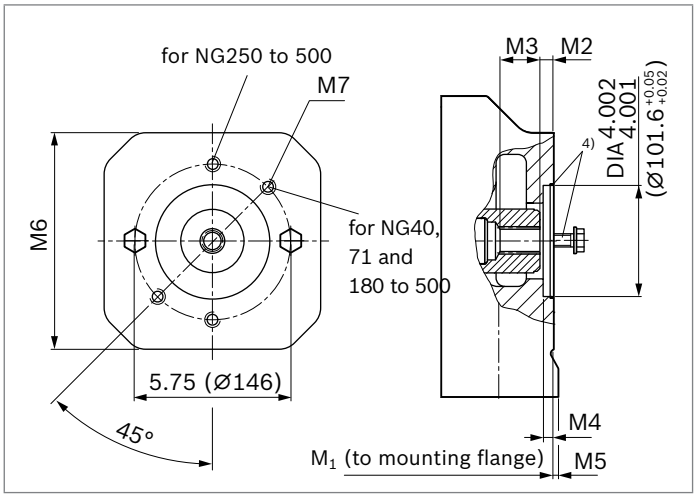
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

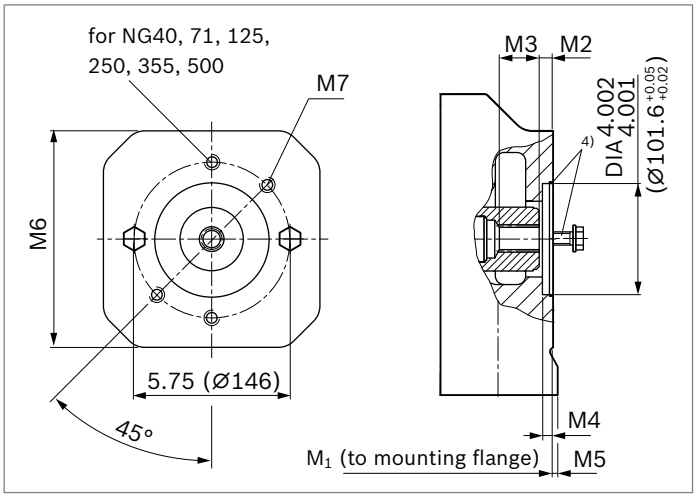
| Flange ISO 3019-1 (SAE J744) | | Hub for splined shaft[1] | | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 101-2 (B) | | 7/8in | 13T 16/32DP | ● | ● | ● | ● | ● | ● | ● | ● | ○ | K68 |
| 101-2 (B-B) | | 1in | 15T 16/32DP | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | K04 |

● = Available ○ = On request

▼ **101-2**




▼ **101-2**




**K68** (22-4 (B))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 40 | 11.50 (292) | 0.80 (20.4) | 0.91 (23) | 0.39 (10) | – | – | M12; 0.71 (18) deep |
| 71 | 12.76 (324) | 0.81 (20.5) | 0.91 (23) | 0.39 (10) | – | – | M12; 1.18 (30) deep |
| 125 | 13.74 (349) | 0.81 (20.5) | 0.91 (23) | 0.39 (10) | 0.63 (16) | 5.91 (150) | M12; 0.59 (15) deep |
| 180 | 14.68 (373) | 0.81 (20.5) | 0.91 (23) | 0.39 (10) | – | – | M12; 0.63 (16) deep |
| 250 | 17.05 (433) | 0.81 (20.5) | 0.91 (23) | 0.39 (10) | 0.39 (10) | 7.87 (200) | M12; 0.71 (18) deep |
| 355 | 18.19 (462) | 0.81 (20.5) | 0.91 (23) | 0.39 (10) | – | – | M12; 0.71 (18) deep |
| 500 | 19.88 (505) | 0.77 (19.5) | 0.98 (25) | 0.39 (10) | – | – | M12; 0.71 (18) deep |
| 750 | 21.85 (555) | 0.77 (19.5) | 0.98 (25) | 0.39 (10) | 1.42 (36) | 9.84 (259) | M12; 0.71 (18) deep |

**K04** (25-4 (B-B))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 40 | 11.50 (292) | 0.82 (20.8) | 1.08 (27.5) | 0.39 (10) | – | – | M12; 0.77 (20) deep |
| 71 | 12.76 (324) | 0.77 (20) | 1.16 (29.4) | 0.39 (10) | – | – | M12; 1.18 (30) deep |
| 125 | 15.00 (381) | 0.93 (23.7) | 1.14 (29) | 0.39 (10) | – | – | M12; 1.18 (30) deep |
| 180 | 14.68 (373) | 0.86 (21.8) | 1.10 (27.9) | 0.39 (10) | – | – | M12; 0.63 (16) deep |
| 250 | 17.05 (433) | 0.82 (20.9) | 1.08 (27.5) | 0.39 (10) | 0.39 (10) | 7.87 (200) | M12; 0.71 (18) deep |
| 355 | 18.19 (462) | 0.82 (20.9) | 1.08 (27.5) | 0.39 (10) | – | – | M12; 0.71 (18) deep |
| 500 | 19.88 (505) | 0.80 (20.4) | 1.14 (28.9) | 0.39 (10) | – | – | M12; 0.71 (18) deep |

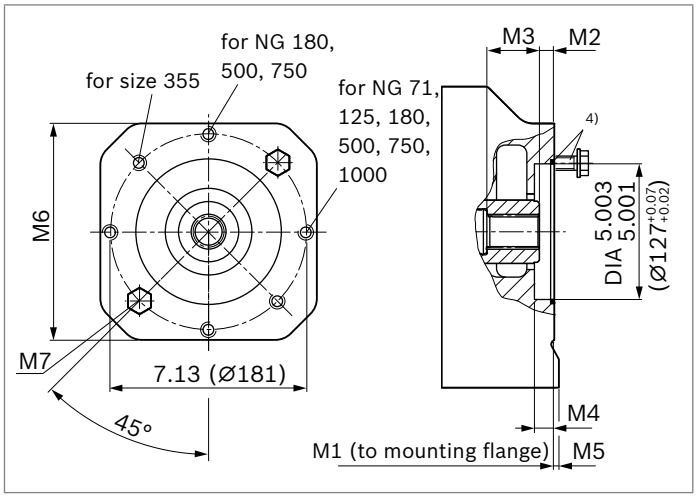
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

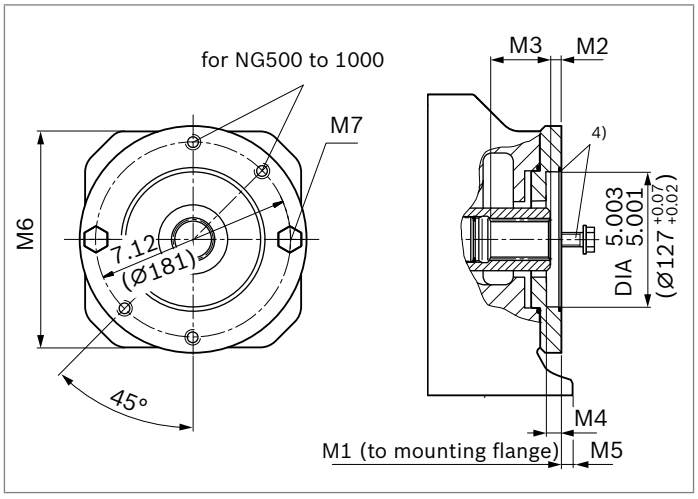
| Flange ISO 3019-1 (SAE J744) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 127-2 (C) | | 1 1/4in 14T 12/24DP | – | ● | ● | ● | ● | ● | ● | ● | ● | K07 |
| 127-2 (C-C) | | 1 1/2 in 17T 12/24DP | – | – | ● | ● | ● | ● | ● | ● | ● | K24 |

● = Available ○ = On request

▼ **127-2**




▼ **127-2**




**K07** (32-4 (C))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 71 | 12.72 (323) | 0.91 (23) | 1.50 (38) | 0.51 (13) | – | – | M16; 11.81 (30) deep |
| 125 | 14.92 (379) | 0.89 (22.7) | 1.48 (37.5) | 0.51 (13) | – | – | M16; 1.10 (28) deep |
| 180 | 15.87 (403) | 0.89 (22.7) | 1.48 (37.5) | 0.51 (13) | – | – | M16; 1.10 (28) deep |
| 250 | 17.05 (433) | 0.87 (22) | 1.42 (36) | 0.51 (13) | 0.39 (10) | 7.87 (200) | M16; 0.78 (20) deep |
| 355 | 18.19 (462) | 0.87 (22) | 1.42 (36) | 0.51 (13) | – | – | M16; 0.94 (24) deep |
| 500 | 19.88 (505) | 0.76 (19.3) | 1.59 (40.4) | 0.51 (13) | – | – | M16; 0.94 (24) deep |
| 750 | 21.85 (555) | 0.76 (19.3) | 1.59 (40.4) | 0.51 (13) | 1.42 (36) | 9.84 (250) | M16; 0.94 (24) deep |
| 1000 | 24.72 (628) | 0.76 (19.3) | 1.50 (38) | 0.51 (13) | 1.06 (27) | 11.02 (280) | M16; 1.26 (32) deep |

**K24** (38-4 (C-C))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 125 | 14.92 (379) | 0.41 (10.4) | 2.12 (54) | 0.51 (13) | – | – | M16; 1.10 (28) deep |
| 180 | 15.87 (403) | 0.41 (10.4) | 2.12 (54) | 0.51 (13) | – | – | M16; 1.10 (28) deep |
| 250 | 17.83 (453) | 0.41 (10.4) | 2.27 (57.6) | 0.51 (13) | – | – | M16; 0.78 (20) deep |
| 355 | 18.98 (482) | 0.41 (10.4) | 2.27 (57.6) | 0.51 (13) | – | – | M16; 0.78 (20) deep |
| 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) | 1.42 (36) | 9.84 (250) | M16; 0.94 (24) deep |
| 1000 | 24.72 (628) | 0.41 (10.4) | 2.22 (56.6) | 0.51 (13) | 1.06 (27) | 11.02 (280) | M16; 1.26 (32) deep |

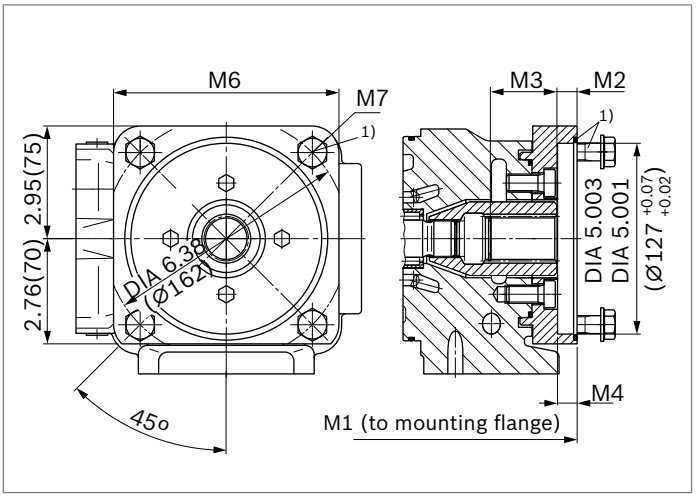
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

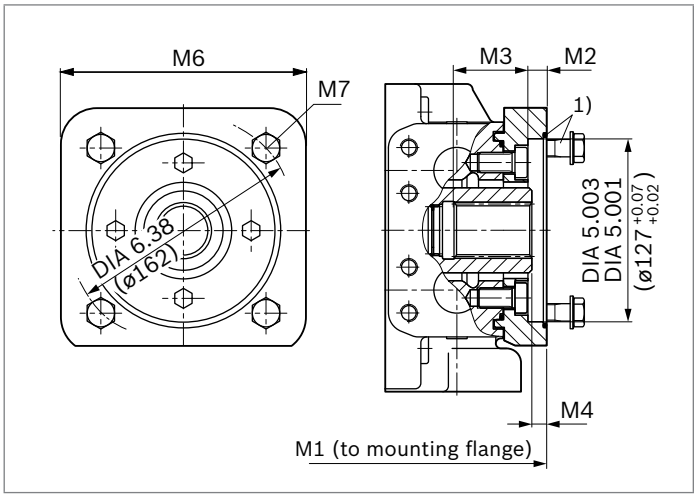
| Flange ISO 3019-1 (SAE J744) | | Hub for splined shaft[1] | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 127-4 (C) | ⌘ | 1 1/4in 14T 12/24DP | ● | ● | ● | ○ | ○ | ○ | – | – | – | K15 |
| | | 1 1/2 in 17T 12/24DP | – | ● | ● | ● | ● | ● | – | – | – | K16 |

● = Available ○ = On request

▼ **127-4**




▼ **127-4**




**K15** (32-4 (C))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 40 | 11.61 (295) | 0.53 (13.4) | 1.74 (44.3) | 0.51 (13) | – | 5.91 (150) | M12; 1.18 (30) deep |
| 71 | 12.72 (323) | 0.90 (23) | 1.50 (38) | 0.51 (13) | – | 6.69 (170) | M12; 1.18 (30) deep |
| 125 | 14.92 (379) | 0.85 (21.7) | 1.48 (37.5) | 0.51 (13) | – | 6.69 (170) | M12; 1.18 (30) deep |

**K16** (38-4 (C-C))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 71 | 12.72 (323) | 0.41 (10.4) | 2.05 (52) | 0.51 (13) | – | 6.69 (170) | M12; 1.18 (30) deep |
| 125 | 14.92 (379) | 0.41 (10.4) | 2.05 (52) | 0.51 (13) | – | 6.69 (170) | M12; 1.18 (30) deep |
| 180 | 15.87 (403) | 0.41 (10.4) | 2.05 (52) | 0.51 (13) | – | 6.69 (170) | M12; 1.18 (30) deep |
| 250 | 17.83 (453) | 0.41 (10.4) | 2.17 (55) | 0.51 (13) | – | 6.69 (170) | M12; 1.18 (30) deep |
| 355 | 18.98 (482) | 0.41 (10.4) | 2.17 (55) | 0.51 (13) | – | 6.69 (170) | M12; 1.18 (30) deep |

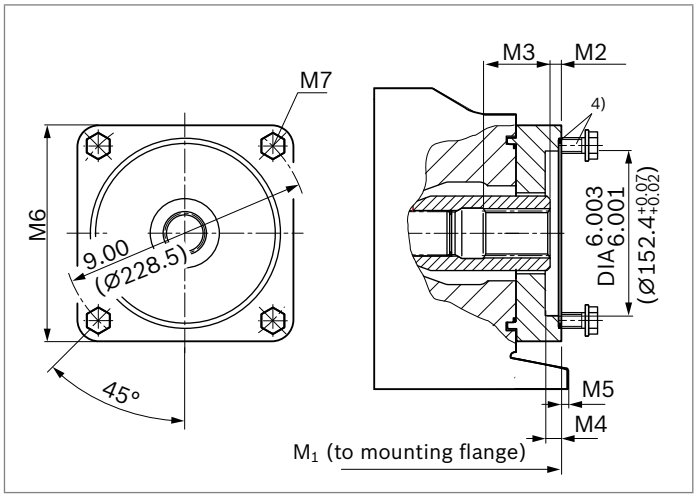
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

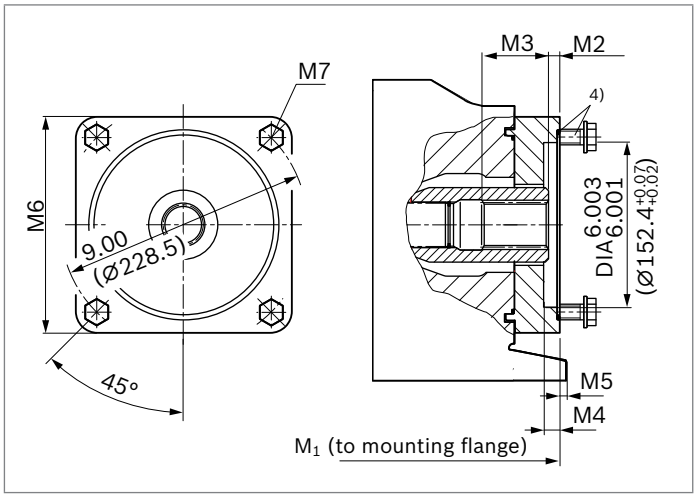
| Flange ISO 3019-1 (SAE J744) | | Hub for splined shaft[1] | | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 152-4 (B) | ⌘ | 1 3/4in | 13T 8/16DP | – | – | ● | ● | ● | ● | ● | ● | ○ | K17 |
| | | 2 in | 15T 8/16DP | – | – | – | ○ | ○ | ○ | ● | – | – | K78 |

● = Available ○ = On request

▼ **152-4**




▼ **152-4**




**K17** (44-4 (D))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 125 | 15.12 (384) | 0.41 (10.4) | 2.44 (62) | 0.51 (13) | – | – | M16; 1.18 (30) deep |
| 180 | 16.06 (408) | 0.41 (10.4) | 2.44 (62) | 0.51 (13) | – | – | M16; 1.18 (30) deep |
| 250 | 18.70 (475) | 0.41 (10.4) | 2.44 (62) | 0.51 (13) | – | – | M16; 1.26 (32) deep |
| 355 | 19.84 (504) | 0.41 (10.4) | 2.44 (62) | 0.51 (13) | – | – | M16; 1.26 (32) deep |
| 500 | 20.87 (530) | 0.41 (10.4) | 2.50 (63.6) | 0.51 (13) | – | – | M16; 0.98 (25) deep |
| 750 | 22.83 (580) | 0.41 (10.4) | 2.50 (63.6) | 0.51 (13) | 0.43 (11) | 9.84 (250) | M16; 0.98 (25) deep |

**K78** (44-4 (D))

| NG | M1 | M2 | M3 | M4 | M5 | M6 | M7[3] |
|---|---|---|---|---|---|---|---|
| 500 | 20.87 (530) | 0.77 (19.5) | 2.52 (64) | 0.51 (13) | – | – | M16; 0.98 (25) deep |

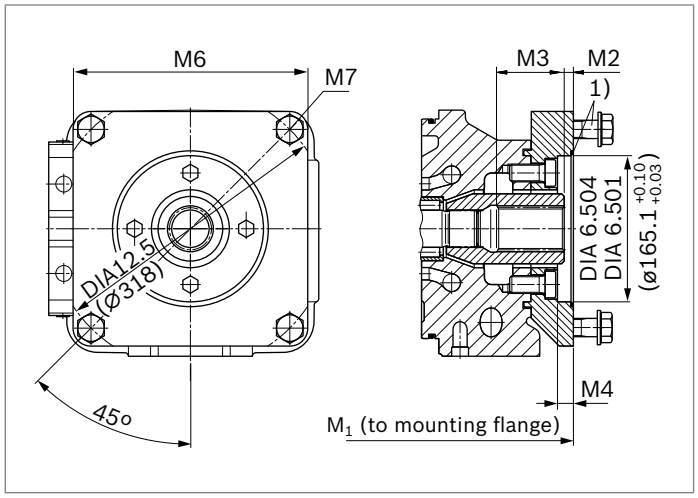
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Dimensions, through drives

| Flange ISO 3019-1 (SAE J744) | | Hub for splined shaft[1] | | Availability over sizes | | | | | | | | | Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter | Attachment[2] | Diameter | | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 | |
| 165-4 (F) | ⌘ | 2in | 15T 8/16DP | – | – | – | – | ● | ● | ● | – | – | K18 |

● = Available ○ = On request

▼ **165-4**




| **K18** (50-4 (F)) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **NG** | **M1** | **M2** | **M3** | **M4** | **M5** | **M6** | **M7**[3] |
| 250 | 18.94 (481) | 1.19 (30.4) | 2.33 (59.3) | 0.71 (18) | – | 10.43 (265) | M20; 1.38 (35) deep |
| 355 | 20.08 (510) | 1.19 (30.4) | 2.33 (59.3) | 0.71 (18) | – | 10.43 (265) | M20; 1.38 (35) deep |
| 500 | 21.30 (541) | 1.20 (30.5) | 2.33 (59.3) | 0.71 (18) | – | 10.43 (265) | M20; 1.38 (35) deep |

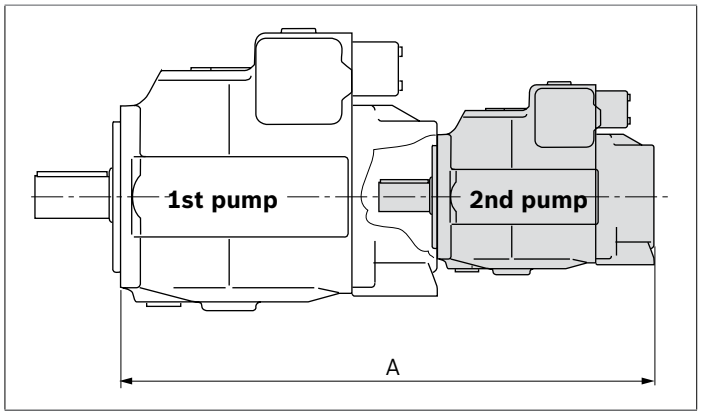
1) According to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
2) Mounting holes pattern viewed on through drive with control at top
3) Thread according to DIN 13.
4) O-ring and mounting bolts are included in the scope of delivery

## Overview of mounting options

| **Through drive**[1] | | | **Mounting options – 2nd pump** | | | | |
|---|---|---|---|---|---|---|---|
| **Flange ISO 3019-2 (metric)** | **Hub for splined shaft** | **Code** | **A4VSO A4VSG NG (shaft)** | **A4CSG NG (shaft)** | **A10V(S)O/3x NG (shaft)** | **A10V(S)O/5x NG (shaft)** | **External gear pump** |
| 80-2 | 3/4 in | KB2 | – | – | 18 (S) | 10 (S) | – |
| 100-2 | 7/8 in | KB3 | – | – | 28 (S) | – | – |
| | 1 in | KB4 | – | – | 45 (S) | – | – |
| 125-2 | 1 1/4 in | KB5 | – | – | 71, 88 (S) | – | – |
| | 1 1/2 in | KB6 | – | – | 100 (S) | – | – |
| 125-4 | W32x2x14x9g | K31 | 40 (Z) | – | – | – | – |
| 140-4 | W40x2x18x9g | K33 | 71 (Z) | – | – | – | – |
| 160-4 | W50x2x24x9g | K34 | 125 (Z)<br>180 (Z) | – | – | – | – |
| | 1 1/4 in | KB8 | – | – | 71, 88 (S) | – | – |
| 180-4 | 1 3/4 in | KB7 | – | – | 140, 180 (S) | – | – |
| | 1 1/2 in | KB9 | – | – | 100 (S) | – | – |
| 224-4 | W60x2x28x9g | K35 | 250 (Z) | 250 (Z) | – | – | – |
| | W70x3x22x0g | K77 | 355 (Z) | 355 (Z) | – | – | – |
| 315-8 | W80x3x25x9g | K43 | 500 (Z) | 500 (Z) | – | – | – |
| 400-8 | W90x3x28x9g | K76 | 750 (Z) | 750 (Z) | – | – | – |
| | W100x3x32x9g | K88 | 1000 (Z) | – | – | – | – |
| **Flange ISO 3019-1 (SAE J744)** | **Hub for splined shaft** | **Code** | **(A)A4VSO (A)A4VSG NG (shaft)** | **(A)A4CSG NG (shaft)** | **A10V(S)O/3x NG (shaft)** | **A10V(S)O/5x NG (shaft)** | **External gear pump** |
| 82-2 (A) | 5/8 in | K01 | – | – | – | | Series F[2] |
| | 3/4 in | K52 | – | – | 18 (S) | 10, 18 (U) | – |
| 101-2 (B) | 7/8 in | K68 | – | – | 28 (S) | 28 (S) | Series N[2] |
| | 1 in | K04 | – | – | 45 (S) | 45 (S) | PGH 4 |
| 127-2 (C) | 1 1/4 in | K07 | – | – | 71, 88 (S) | – | – |
| | 1 1/2 in | K24 | – | – | 100 (S) | 85 (S) | PGH 5 |
| 127-4 (C) | 1 1/4 in | K15 | 40 (S) | – | 71 (S) | | |
| | 1 1/2 in | K16 | 71 (S) | – | – | – | – |
| 152-4 (D) | 1 3/4 in | K17 | 125 (S) | – | 140, 180 (S) | – | – |
| | 2 in | K78 | 125 (S) | – | 140, 180 (S) | – | – |
| 165-4 (E) | 2 in | K18 | 250 (S), 355 (R) | 250 (S), 355 (R) | – | – | – |

1) Additional through drives are available on request
2) Bosch Rexroth recommends special versions of the external gear pumps. Please contact us.

## Combination pumps (A)A4VSG + (A)A4VSG




**Total length A**

| **(A)A4VSG** (**1st** pump) | **(A)A4VSG** (**2nd** pump) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **NG40** | **NG71** | **NG125** | **NG180** | **NG250** | **NG355** | **NG500** | **NG750** | **NG1000** |
| NG40 | 22.76 (578) | – | – | – | – | – | – | – | – |
| NG71 | 23.86 (606) | 24.84 (631) | – | – | – | – | – | – | – |
| NG125 | 26.06 (662) | 27.05 (687) | 29.49 (749) | – | – | – | – | – | – |
| NG180 | 27.00 (686) | 27.99 (711) | 30.43 (773) | 30.63 (778) | – | – | – | – | – |
| NG250 | 28.19 (716) | 29.96 (761) | 33.07 (840) | 33.78 (858) | 36.44 (926) | – | – | – | – |
| NG355 | On request | 31.10 (790) | 34.21 (869) | 34.37 (873) | 37.58 (955) | 38.43 (976) | – | – | – |
| NG500 | 30.98 (787) | 31.93 (811) | 34.17 (868) | 34.65 (880) | 38.74 (984) | 39.57 (1005) | 43.41 (1100) | – | – |
| NG750 | On request | On request | On request | On request | 40.71 (1034) | On request | On request | 49.06 (1246) | – |
| NG1000 | On request | 36.77 (934) | 39.02 (991) | 39.49 (1003) | 43.58 (1107) | On request | 48.15 (1223) | 51.93 (1319) | 54.45 (1383) |

## Combination pumps (A)A4VSG + (A)A4VSO

**Total length A**

| **(A)A4VSG** (**1st** pump) | **(A)A4VSO** (**2nd** pump) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **NG40** | **NG71** | **NG125** | **NG180** | **NG250** | **NG355** | **NG500** | **NG750** | **NG1000** |
| NG40 | 22.17 (563) | – | – | – | – | – | – | – | – |
| NG71 | 23.27 (591) | 24.41 (620) | – | – | – | – | – | – | – |
| NG125 | 25.47 (647) | 26.61 (676) | 29.17 (741) | – | – | – | – | – | – |
| NG180 | 26.42 (671) | 27.56 (700) | 30.12 (765) | 30.63 (778) | – | – | – | – | – |
| NG250 | 27.60 (701) | 29.53 (750) | 32.76 (832) | 33.78 (858) | 36.14 (918) | – | – | – | – |
| NG355 | On request | 30.67 (779) | 33.90 (861) | 34.37 (873) | 37.28 (947) | 38.50 (978) | – | – | – |
| NG500 | 30.35 (771) | 31.50 (800) | 33.86 (860) | 34.65 (880) | 38.43 (976) | 39.57 (1005) | 43.70 (1110) | – | – |
| NG750 | On request | On request | On request | On request | 40.39 (1026) | On request | On request | 47.83 (1215) | – |
| NG1000 | On request | 36.34 (923) | 38.70 (983) | 39.49 (1003) | 43.27 (1099) | 44.41 (1128) | 48.54 (1233) | 50.71 (1288) | 53.58 (1361) |

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**

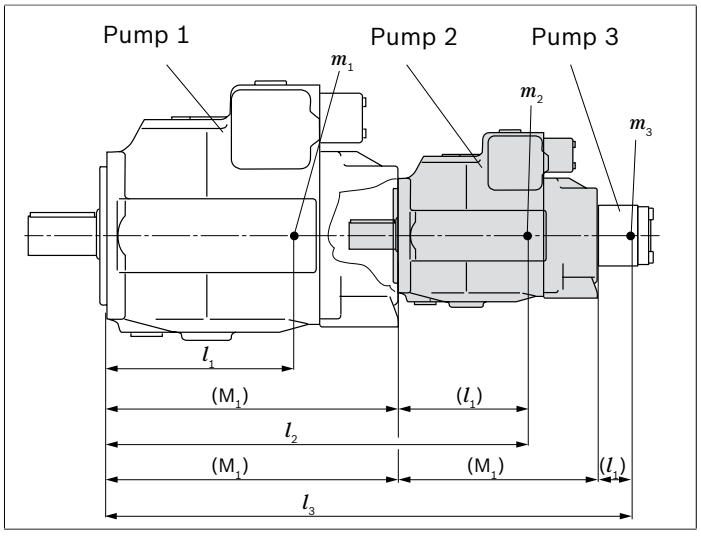
- The combination pump type code is shown in shortened form in the order of confirmation.
  **Example:**
  **AA4VSG 125 EO1/30R+AA4VSG 71 HM1/10R**
- Each through drive is plugged with a **non-pressure resistant** cover. Before commissioning the units, they must therefore be equipped with pressure-resistant covers. Through drives can also be ordered with a pressure-resistant cover. Please specify in plain text.

**Order example:**
**AA4VSG 125 EO1/30R-PKD60K339F**
**AA4VSG 71 HM1/10R-PSD60N00N**
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 mass torque.

**Notices**

- When adjusting combination pumps, there may be dimensional collisions with another attachment pump. Please check this using the respective data sheets of the individual pumps and controls, or please contact us.

Details on the piping of the combination pumps can be found on page 50.




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

$$T_m = (m_1 \bullet l_1 + m_2 \bullet l_2 + m_3 \bullet l_3) \bullet \frac{1}{12}$$ [lb-ft]

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

| **Calculation for multiple pumps** | | |
|---|---|---|
| $l_1$ | = | Distance, center of gravity, front pump (value from "Permissible mass moment of inertia" table) |
| $l_2$ | = | Dimension "M1" from through drive drawings (page 33 to 45) + $l_1$ of the 2nd pump |
| $l_3$ | = | Dimension "M1" from through drive drawings (page 33 to 45) of the 1st pump + "M1" of the 2nd pump + $l_1$ of the 3rd pump |

**Permissible mass moment of inertia**

| **Size** | | | | **40** | **71** | **125** | **180** | **250** | **355** | **500** | **750** | **1000** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | static | $T_m$ | lb-ft | 1327 | 1475 | 3098 | 3098 | 6859 | 6859 | 11506 | 14382 | 14382 |
| | | | (Nm) | (1800) | (2000) | (4200) | (4200) | (9300) | (9300) | (15600) | (19500) | (19500) |
| | dynamic at 10 $g$ (98.1 m/s²) | $T_m$ | lb-ft | 132 | 148 | 310 | 310 | 686 | 686 | 1151 | 1438 | 1438 |
| | | | (Nm) | (180) | (200) | (420) | (420) | (930) | (930) | (1560) | (1950) | (1950) |
| Weight | | $m$ | lbs | 103 | 132 | 220 | 251 | 472 | 523 | 772 | 1102 | 1389 |
| | | | (kg) | (47) | (60) | (100) | (114) | (214) | (237) | (350) | (500) | (630) |
| 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) |

## Attachment of boost and control circuit pumps
Order code: H02, H04 and H06

As standard, we offer the following external gear pumps as boost and control circuit pumps for attachment:

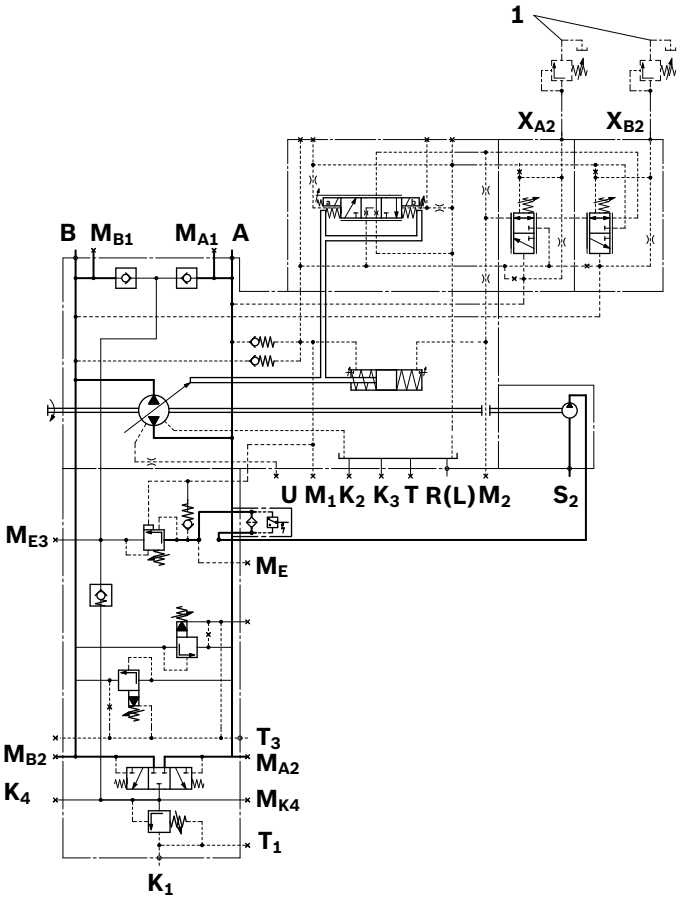
| Code | Piped up attachment pump for NG | 40 | 71 | 125 | 180 | 250 | 355 | 500 | 750 | 1000 |
|---|---|---|---|---|---|---|---|---|---|---|
| **H02** | the boost circuit | | | | | | | | | |
| | Design / type | F | | N | | – | – | – | | PGH5 |
| | Size | 11 | 16 | 25 | 32 | – | – | | – | 200 |
| **H04** | shared boost and control circuit (only EO1 and EO1K) | | | | | | | | | |
| | Design / type | F | | N | | – | – | – | – | – |
| | Size | – | 16 | 25 | – | – | – | – | – | – |
| **H06** | shared boost and control circuit including pressure relief valve: DB 10 K2-4x/50YV to 50 bar (only HD1T and HD1U) | | | | | | | | | |
| | **Boost circuit** | | | | | | | | | |
| | Design / type | F | | N | | – | – | – | – | PGH5 |
| | Size | 11 | 16 | 25 | 32 | – | – | – | – | 200 |
| | **Control circuit** | | | | | | | | | |
| | Design / type | F | | | | – | – | – | – | PGF2 |
| | Size | 08 | | | | – | – | – | – | 11 |

**Notice**

- The shaft and flange of the external gear pumps AZP with the design F, N and G are adjusted for attachment on axial piston units and therefore special versions. More information on the dimensions and connection options as well as the operating conditions can be found in the data sheets:
  AZPF: 10089
  AZPN: 10091
  AZPG: 10093
  PGF2: 10213
  PGH4 and PGH5: 10223
- The leakage of the external gear pumps at different rotational speeds must be noted.

## **H024 – A4VSG** with an attachment pump for the boost circuit, valve block with filter

▶ Schematic H02
Example: H024N with EPG
NG 40 to 180

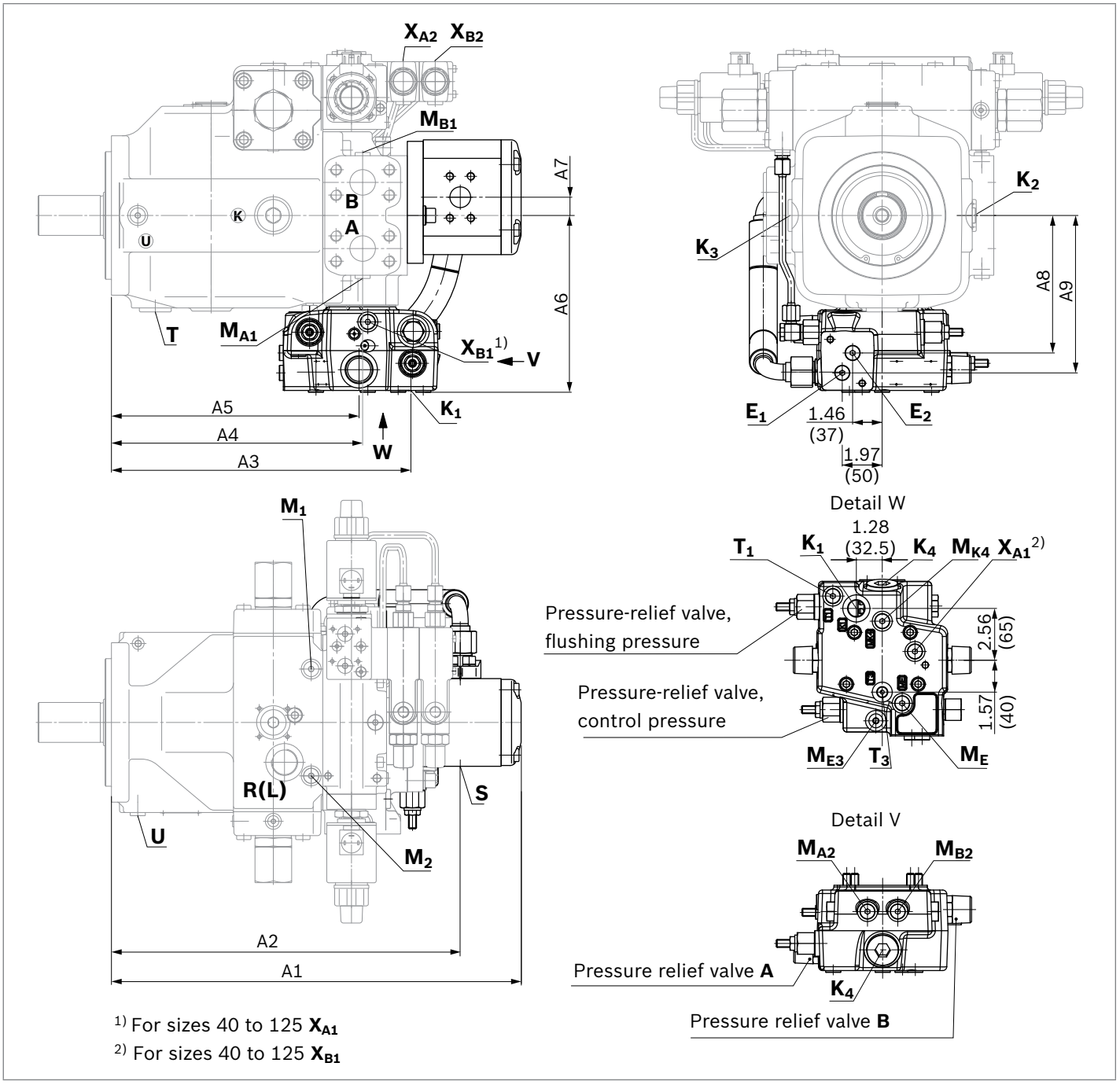



**1** Not included in the scope of delivery

| Ports for | | State[1)] |
|---|---|---|
| **A, B** | Working line (pressure port) | O |
| **S** | Suction line attachment pump | piped up |
| **R(L)** | Fill and air bleeding (drain port) | O |
| **$K_1$** | Fill and air bleeding (drain port) | X |
| **$K_2$, $K_3$** | Fill and air bleeding (drain port) | X |
| **$K_4$** | Accumulator port | X |
| **T** | Fluid drain | X |
| **$T_1$** | Air bleed port pressure relief valve | O |
| **$T_3$** | Air bleed port pressure relief valve | X |
| **$E_1$** | Filter, supply | X |
| **$E_2$** | Filter, return | X |
| **$X_{A2}$, $X_{B2}$** | Pilot pressure port for pressure controller | O |
| **$M_{E3}$** | Measuring boost pressure | X |
| **$M_E$** | Measuring boost pressure supply | X |
| **$M_{K4}$** | Measuring boost pressure | X |
| **$M_{A1}$, $M_{B1}$** | Measuring working pressure | X |
| **$M_{A2}$, $M_{B2}$** | Measuring working pressure | X |
| **$M_1$, $M_2$** | Measuring control pressure | X |
| **U** | Bearing flushing | X |

1) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

## Example: A4VSG 180....H024N




[1] For sizes 40 to 125 $X_{A1}$

[2] For sizes 40 to 125 $X_{B1}$

| NG | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 |
|---|---|---|---|---|---|---|---|---|---|
| 40 | 14.13 (359) | 12.28 (312) | 11.77 (299) | 9.02 (229) | On request | 7.65 (194.3) | 0.74 (18.8) | 5.91 (150) | 6.89 (175) |
| 71 | 15.63 (397) | 13.38 (340) | 12.76 (324) | 10.26 (260.5) | 10.20 (259) | 7.75 (196.8) | 0.73 (18.7) | On request | On request |
| 125 | 18.31 (465) | 15.90 (404) | 14.88 (378) | 12.48 (317) | 12.32 (313) | 8.54 (217) | 0.90 (22.9) | 6.79 (172.5) | 7.78 (197.5) |
| 180 | 19,57 (497) | 17.00 (432) | 14.86 (377.5) | 12.48 (317) | 12.30 (312.5) | 8.73 (221.8) | 0.90 (22.9) | 6.79 (172.5) | 7.78 (197.5) |

## Installation instructions

**General**

The axial piston unit must be filled with hydraulic fluid and air bled during commissioning and operation. This must also be observed following a longer standstill as the axial piston unit may empty via the hydraulic lines.

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 case drain fluid in the housing area must be directed to the reservoir via the highest available drain port (**T**, **R(L)**, **$K_2$**, **$K_3$**).

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 respective case pressure is not exceeded. The shared drain line must be dimensioned to ensure that the maximum permissible case pressure of all connected units is not exceeded in any operating conditions, particularly on cold start. If this is not possible, separate drain lines must be laid, 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 during operation and during cold start.

**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**

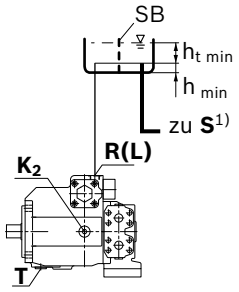
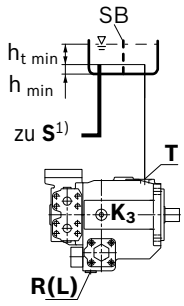
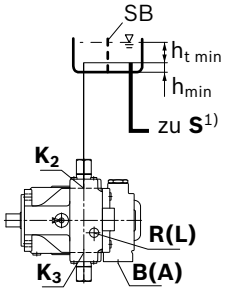
See the following examples **1** to **12** on the next pages. Further installation positions are available upon request.

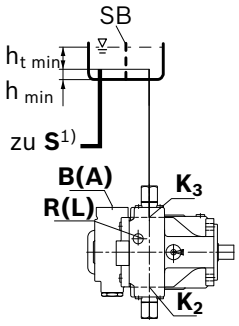
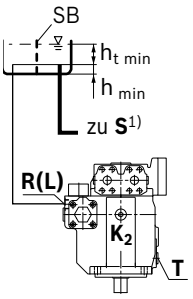
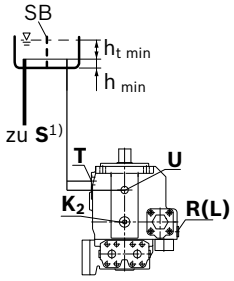
Recommended installation position: **1** and **2**

## Installation instructions

### 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)** | **R(L)** |
| **2**  | **T** | **T** |
| **3**  | **$K_2$** | **$K_2$** |

| Installation position | Air bleed | Filling |
|---|---|---|
| **4**  | **$K_3$** | **$K_3$** |
| **5**  | **R(L)** | **R(L)** |
| **6**  | **T** | **T**<br>Bearing flushing at **U** port required.<br>For details, see page 6 |

| Key | |
|---|---|
| **R(L)** | Filling/air bleeding |
| **S** | Suction port |
| **T, $K_2$, $K_3$** | Drain 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)) |
| $h_{ES\ min}$ | Minimum necessary height required to protect the axial piston unit from draining (0.98 inch (25 mm)) |
| $h_{S\ max}$ | Maximum permissible suction height (31.50 inch (800 mm)) |

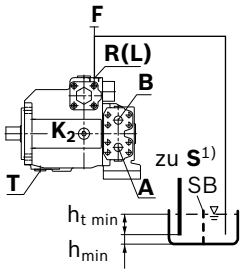
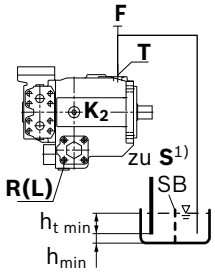
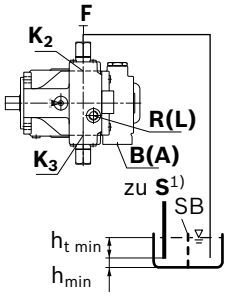
1) Information on the attachment pump can be found in the respective data sheets (see page 50)

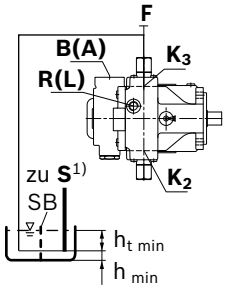
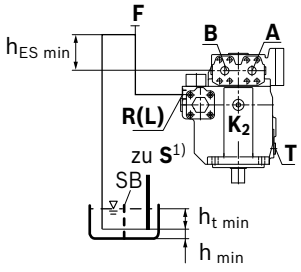
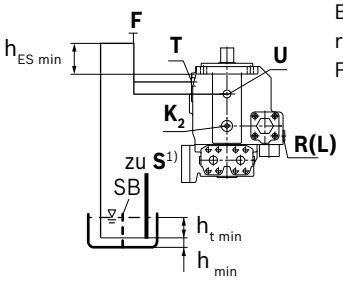
**Above-reservoir installation**

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir. To prevent the axial piston unit from draining, a height difference $h_{ES\ min}$ of at least 0.98 inch (25 mm) at port **R(L)**, **T** is required in position 12. Observe the maximum permissible suction height $h_{S\ max}$ = 31.50 inch (800 mm).

**Notice**

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

| Installation position | Air bleed | Filling |
|---|---|---|
| **7**   | **R(L)** | **R(L)** (F) |
| **8**   | **T** | **T** (F) |
| **9**   | $K_2$ | $K_2$ (F) |

| Installation position | Air bleed | Filling |
|---|---|---|
| **10**   | $K_3$ | $K_3$ (F) |
| **11**   | **R(L)** | **R(L)** (F) |
| **12**   | **T** | **T** (F)<br>Bearing flushing at **U** port required.<br>For details, see page 6 |

1) Information on the attachment pump can be found in the respective data sheets (see page 50)

## Project planning notes

- The A4VSG axial piston variable pump is designed to be used in closed 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 contained herein must be observed.
- Depending on the operating conditions of the axial piston unit (working pressure, fluid temperature), the characteristic curve may shift.
- The characteristic curve may also shift due to the dither frequency or control electronics.
- Preservation: Our axial piston units are supplied as standard with 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 a safety function 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. Applying the recommended direct voltage signal (DC) to solenoids does not create electromagnetic interference (EMI) nor is the solenoid affected by EMI. Electromagnetic interference (EMI) potential exists when operating and controlling a solenoid with a modulated direct voltage signal (e.g. PWM signal). Appropriate testing and measures should be taken by the machine manufacturer to ensure other components or operators (e.g. with pacemaker) are not affected by this potential.
- Pressure cut-off/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 ×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 burning on the axial piston unit and especially on the solenoids. Take the appropriate safety measures (e.g. by wearing protective clothing).
- Moving parts in control equipment (e.g. valve spools) can, under certain circumstances, get stuck in position as a result of contamination (e.g. contaminated hydraulic fluid, abrasion, or residual dirt from components). As a result, the hydraulic fluid flow and the build-up of torque in the axial piston unit can no longer respond correctly to the operator's specifications. Even the use of various filter elements (external or internal flow filtration) will not rule out a fault but merely reduce the risk. The machine/system manufacturer must test whether additional measures are required on the machine for the relevant application in order to bring the driven consumer into a safe position (e.g. safe stop) and ensure any measures are properly implemented.
- In certain conditions, moving parts in high pressure relief valves might get stuck in an undefined position due to contamination (e.g. contaminated hydraulic fluid). This can result in restriction or loss of load holding functions in lifting winches. Therefore it is the machine and/or system manufacturers responsibility to make sure that the load can always be put in a safe mode if needed. Also, he needs to ensure that these measures are properly implemented.

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