RE 92050-01-X-B2/2019-08-23
Replaces: 01.2017

rexroth
A Bosch Company

Axial piston variable pump A4VSO Series 10, 11 and 30

for explosive areas
II 2G Ex h IIC T4-T1 Gb X and
II 3G Ex h IIC T4-T1 Gc X

Part II of instruction manual in accordance with ATEX Directive 2014/34/EU data sheet

- Sizes 40 to 500
- Nominal pressure 350 bar
- Maximum pressure 400 bar
- Open circuit

Information on explosion protection

- Application per Directive 2014/34/EU (ATEX)
- Gas: II 2G Ex h IIC T4-T1 Gb X according to DIN EN ISO 80079-36 :2016, DIN EN ISO 80079-37 :2016
- Gas: II 3G Ex h IIC T4-T1 Gc X according to DIN EN ISO 80079-36 :2016, DIN EN ISO 80079-37 :2016

Features

Variable displacement pump with axial piston rotary group of swashplate design for hydrostatic drives in open circuit
Flow is proportional to drive speed and displacement.
Flow can be infinitely varied by controlling the swashplate angle.

- Excellent suction characteristics
- Low noise level
- Long service life
- Modular design
- Short control response times
- Variable through drive options
- Optical swivel angle indicator

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Type code

01	02	03	04	05		06	07		08	09	10	11	12
	A4VS	**O**			**/**			**–**				**25**	

Hydraulic fluid/type

		40	71	125	180	250	355	500	
01	Mineral oil (without code)	●	●	●	●	●	●	●	
	High-speed version	–	–	–	–	●	●	●	**H**

Axial piston unit

02	Swashplate design, variable, nominal pressure 350 bar, maximum pressure 400 bar	**A4VS**

Operating mode

03	Pump, open circuit	**O**

Sizes (NG)

		40	71	125	180	250	355	500
04	Geometric displacement, see table of values on page 6	**40**	**71**	**125**	**180**	**250**	**355**	**500**

Control devices

		Information on controller selection	40	71	125	180	250	355	500	
05	Without control		●	●	●	●	●	●	●	**OV**
	Pressure controller	See page 10 and data sheet 92060	●	●	●	●	●	●	●	**DR**
	Pressure controller for parallel operation		●	●	●	●	●	●	●	**DP**
	Flow controller		●	●	●	●	●	●	●	**FR..**
	Pressure and flow controller		●	●	●	●	●	●	●	**DFR.**
	Power controller with hyperbolic characteristic curve	See page 12, 13 and data sheet 92064	●	●	●	●	●	●	●	**LR2..**
	Power controller with remotely controllable power characteristics		●	●	●	●	●	●	●	**LR3..**
	Manual control	See page 14 Data sheet 92072	○	○	○	○	○	○	○	**MA**
	Rod system control (maximum working pressure 150 bar)		–	●	●	●	–	–	–	**GE**
	Hydraulic control, pressure-dependent HD.U and HD.T not available in ATEX	See page 13 and data sheet 92080	●	●	●	●	●	●	●	**HD...**

Series

		40	71	125	180	250	355	500	
06	Series 1, index 0	●	●	–	–	–	–	–	**10**
	Series 1, index 1 only for HD control	●	●	–	–	–	–	–	**11**
	Series 3, index 0	–	–	●	●	●	●	●	**30**

Directions of rotation

			40 ... 500	
07	Viewed on drive shaft	clockwise	●	**R**
		counter-clockwise	●	**L**

Seals and ATEX version

		40 ... 500	
08	FKM (fluoroelastomer) and ATEX version II 2G Ex h IIC T4-T1 Gb X	●	**R**
	FKM (fluoroelastomer) and ATEX version II 3G Ex h IIC T4-T1 Gc X	●	**A**

Drive shafts

		40 ... 500	
09	Parallel keyed shaft DIN 6885	●	**P**
	Splined shaft DIN 5480	●	**Z**

Mounting flange

			40	71	125	180	250	355	500	
10	In accordance with ISO 3019-2 (metric)	4-hole	●	●	●	●	●	●	–	**B**
		8-hole	–	–	–	–	–	–	●	**H**

Working port

				40 ... 500	
11	SAE flange ports, Fastening thread metric	B and S offset 90° to the side	2. Pressure port B1 opposite B, plugged with flange plate on delivery	●	**25**

● = Available ○ = On request – = Not available

01	02	03	04	05		06	07		08	09	10	11	12
	A4VS	**O**			**/**			**–**				**25**	

Through drives[1] (for mounting options, see page 41)

12	Flange ISO 3019-2 (metric) Diameter	Hub for splined shaft Diameter		For mounting of ATEX axial piston pump	**40**	**71**	**125**	**180**	**250**	**355**	**500**	
	without through drive and auxiliary pump				●	●	●	●	●	●	●	**N00**
	with through drive for mounting of an axial piston pump				●	●	–	–	–	–	●	**K...**
	Universal through drive[2]				–	–	●	●	●	●	–	**U...**
	125-4	32x2x14x9g[3]		A4VS NG40	●	●	●	●	●	●	●	**31**
	140-4	40x2x18x9g[3]		A4VS NG71	–	●	●	●	●	●	●	**33**
	160-4	50x2x24x9g[3]		A4VS NG125 and NG180	–	–	●	●	●	●	●	**34**
	224-4	60x2x28x9g[3]		A4VS NG250	–	–	–	–	●	●	●	**35**
		70x3x22x9g[3]		A4VS NG 355 and 500	–	–	–	–	–	●	●	**77**
	315-8	80x3x25x9g[3]		A4VS NG 500	–	–	–	–	–	–	●	**43**
	80-2	3/4 in	11T 16/32DP[4]	A10VSO 18/31	○	●	●	●	●	●	○	**B2**
	100-2	7/8 in	13T 16/32DP[4]	A10VSO 28/31	●	●	●	●	●	●	○	**B3**
	100-2	1 in	15T 16/32DP[4]	A10VSO 45/31	●	●	●	●	●	●	●	**B4**
	125-2	1 1/4 in	14T 12/24DP[4]	A10VSO 71/31	–	●	●	●	●	●	●	**B5**
	125-2	1 1/2 in	17T 12/24DP[4]	A10VSO 100/31	–	–	●	●	●	●	○	**B6**
	Prepared for through drive, with pressure-resistant plugged cover				●	●	●	●	●	●	●	**99**

● = Available ○ = On request – = Not available

Notices

- Note the project planning notes on page 45.
- In addition to the type code, please specify the relevant technical data when placing your order.

Features of the ATEX version

The ATEX version is an advanced development of the A4VSO for compliance with Directive 2014/34/EU (ATEX). External features distinguishing it from the standard pump 92050 are the ground terminal, the Ex marking and the CE marking on the name plate.

Temperature classes per DIN EN ISO 80079-36

Depending on the two temperature classes, T3 and T4, observe the maximum permissible temperatures (see "Hydraulic fluid" and "Operating data monitoring – X parameters").

Notices

- **ATEX classification:** When ordering, please state which equipment group, category, explosion group, temperature class and ignition protection type are required for your planned ATEX application.
- **Technical data:** Compared to the standard pump, restrictions apply in terms of temperature, case pressure and bearing flushing/installation position.
- **Painting/color selection:** In order to avoid mechanically generated sparks from contaminants made of aluminum with iron oxide and/or particles of rust of the surface[5], the pump is painted as standard with corrosion protecting. Please contact your Rexroth partner for available colors.
- **Bearing service life:** The service life of the bearings must be calculated. The load cycle forms the basis for this. Please contact us.
- **Potential equalization:** The pump must be grounded. For grounding points, see drawings starting on page 15.

1) All attachment pumps must match the ATEX classification for the application in question.
2) With through-drive shaft, without hub, without intermediate flange, closed on a functionally reliable basis with cover.
3) Splined hub according to DIN 5480
4) Hub for splined shaft according to ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
5) See DIN EN ISO 80079-36, 6.4.2.1

Hydraulic fluids

The A4VSO ATEX variable pump is designed for operation with HLP mineral oil according to DIN 51524.
See the following data sheets for application instructions and requirements for hydraulic fluids before the start of project planning:

- 90220: Hydraulic fluids based on mineral oils and related hydrocarbons

Information on the selection of hydraulic fluid
Selection of hydraulic fluid shall make sure that the operating viscosity in the operating temperature range is within the optimum range (v_{opt}; see selection diagram).
Please note
The leakage temperature which is influenced by pressure and rotational speed is always above the reservoir temperature.

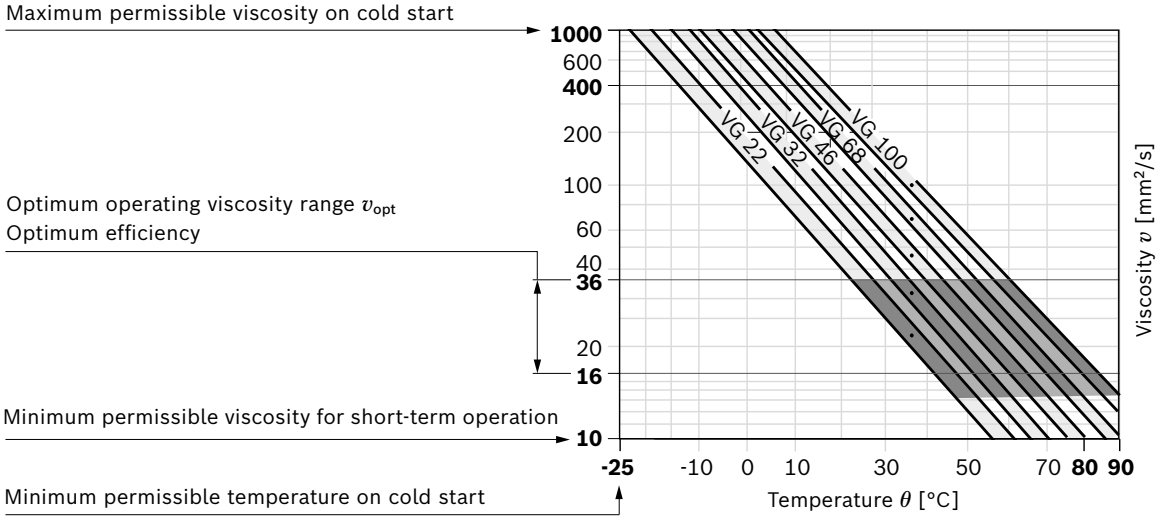
Temperature class T4 and T3 as to ATEX:
Safety instructions, see page 5

Ignition temperature of hydraulic fluid
The pump is approved for temperature class T4 to T1 according to DIN EN ISO 80079-36.
Under DIN EN ISO 80079-37, only hydraulic fluids with an ignition temperature at least 50 K above the maximum surface temperature of the approved temperature class should be used. Example: For the temperature class T4, the ignition temperature of the hydraulic fluid should be ≥ 185 °C.

Viscosity and temperature of hydraulic fluids

	Viscosity	Temperature	Comment
Cold start	v_{max} ≤ 1000 mm²/s	θ_{St} ≥ -20 °C	t ≤ 3 min, without load p ≤ 50 bar Maximum permissible temperature difference between axial piston unit and hydraulic fluid in the system maximum 25 K
Warm-up phase	v = 1000 to 100 mm²/s	θ ≥ -25 °C	For p_{nom}, 0.5 × n_{max} und t ≤ 15 min
Continuous operation	v = 100 to 16 mm²/s	**T3** θ = -20 °C to +90 °C **T4** θ = -20 °C to +80 °C	Measured at the drain port Observe the permissible temperature range of the shaft seal
	v_{opt} = 36 to 16 mm²/s		optimal operating viscosity and efficiency range
Short-term operation	v_{min} ≤ 16 to 10 mm²/s	θ_{max} = +90 °C	t < 3 min, p < 0.3 × p_{nom}

▼ **Selection diagram**



Operating data monitoring – X parameters

Safety instructions for temperature class T3–T1
ATEX category II 3G Ex h IIC T3–T1 Gc X
To observe the **maximum leakage temperature of 90 °C**, at least one of the following measures must be taken and checked regularly:

- Check the leakage temperature at port **T** or **R**(**L**) (maximum distance 30 cm)
- Check the maximum inlet temperature of 60 °C at the suction port
- Check a maximum inlet temperature that must be determined for the following operating points when commissioning:
  - Maximum working pressure and maximum possible flow
  - Maximum working pressure and minimum flow

Also monitor the reservoir level. Take appropriate action if the temperature exceeds limits.

ATEX category II 2G Ex h IIC T3–T1 Gb X
To observe the **maximum leakage temperature of 90 °C**, the following measures must be taken:

- Continuously monitor leakage temperature at each pump with a temperature sensor on ports **T** or **R(L)** (maximum distance to port 30 cm).
- Connect the temperature sensor with a switching-off for the system at the limit temperature of 90 °C.
- This shut-off function should be tested during commissioning; see Chapter 8.1.1 of the instruction manual.
- Reservoir level monitoring is also required.

Safety instructions for temperature class T4
ATEX category II 3G Ex h IIC T4 Gc X
To observe the **maximum leakage temperature of 80 °C**, at least one of the following measures must be taken and checked regularly:

- Check the leakage temperature at port **T** or **R**(**L**) (maximum distance 30 cm)
- Check the maximum inlet temperature of 50 °C at the suction port
- Check a maximum inlet temperature that must be determined for the following operating points when commissioning:
  - Maximum working pressure and maximum possible flow
  - Maximum working pressure and minimum flow

Also monitor the reservoir level. Take appropriate action if the temperature exceeds limits.

ATEX category II 2G Ex h IIC T4 Gb X
To observe the **maximum leakage temperature of 80 °C**, the following measures must be taken:

- Continuously monitor leakage temperature at each pump with a temperature sensor on ports **T** or **R(L)** (maximum distance to port 30 cm).
- Connect the temperature sensor with a switching-off for the system at the limit temperature of 80 °C.
- This shut-off function should be tested during commissioning; see Chapter 8.1.1 of the instruction manual.
- Reservoir level monitoring is also required.

Filtration of the hydraulic fluid

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

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

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

For example, the viscosity is 10 mm²/s at:

- HLP 32 a temperature of 73 °C
- HLP 46 a temperature of 85 °C

Bearing flushing

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

- When installed vertically (drive shaft up) for lubricating the front bearing and shaft seal
- When operated at temperature and viscosity limits when using mineral oil
- When installed above the reservoir

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

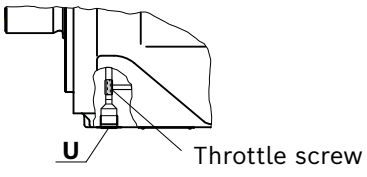
For the individual sizes, the following minimum flushing flows are necessary:

Size			**40**	**71**	**125**	**180**	**250**	**355**	**500**
Flushing flow	q_{sp}	l/min	3	4	5	7	10	15	20

For the flushing flows indicated, there is a pressure differential of approx. 2 bar (Series 10 and 11) or 3 bar (Series 30) between port **U** (including fitting) and the housing area.

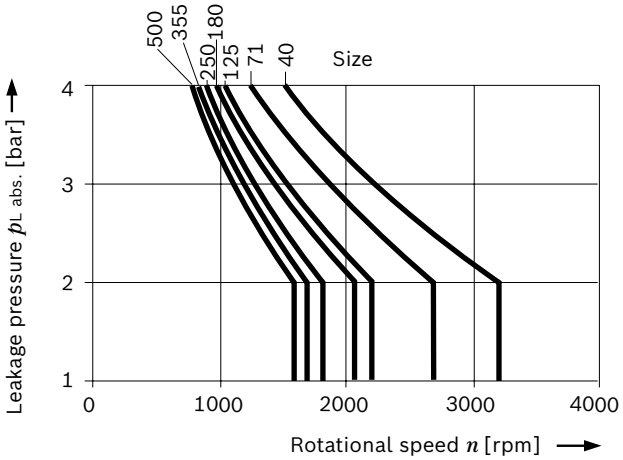
Notice regarding series 3x

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



Leakage pressure

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



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

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

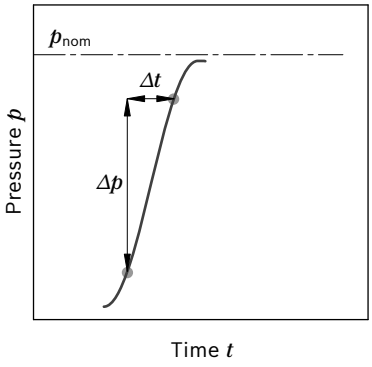
Flow direction

S to **B**

Working pressure range

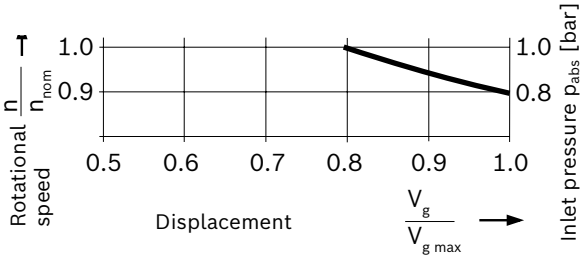
Pressure at working port B		**Definition**
Nominal pressure p_{nom}	350 bar abs.	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}	400 bar abs.	The maximum pressure corresponds to the maximum working pressure within a single operating period. The sum of the single operating periods must not exceed the total operating period (maximum number of cycles: approx. 1 million).
Single operating period	1 s	
Total operating period	300 h	
Minimum pressure (high-pressure side)	15 bar abs.	Minimum pressure on the high-pressure side (**B**) which is required in order to prevent damage to the axial piston unit. The minimum pressure depends on the rotational speed and the swivel angle.
Rate of pressure change $R_{A\,max}$	16000 bar/s	Maximum permissible pressure build-up and reduction speed during a pressure change across the entire pressure range.
Pressure at suction port S (inlet)		
Minimum pressure $p_{S\,min}$ **Standard**	0.8 bar abs.	Minimum pressure at suction port **S** (inlet) which is required to prevent damage to the axial piston unit. The minimum pressure depends on the rotational speed and displacement of the axial piston unit.
Maximum pressure $p_{S\,max}$	30 bar abs.	
Case pressure at port T, K_1, K_2, R(L)		
Maximum pressure $p_{L\,max}$	4 bar abs.	The permissible leakage pressure (case pressure) depends on the rotational speed. The parameters are reference values; under certain operating conditions, restrictions may be required.
Pressure peaks $p_{L\,peak}$	6 bar abs.	t < 0.1 s

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



▼ **Minimum pressure (inlet)**

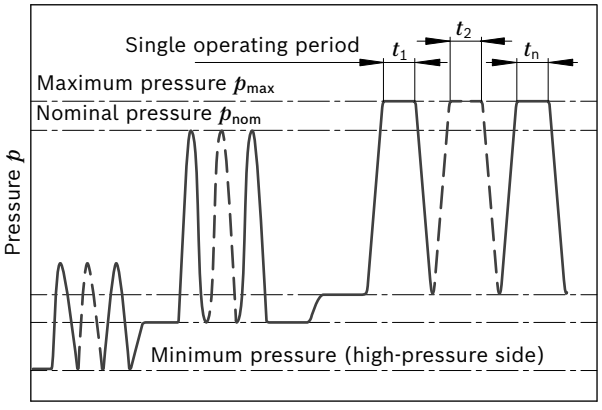
In order to avoid damage to the axial piston unit, a minimum pressure must be guaranteed at the suction port **S** (inlet).



The inlet pressure is the static supply pressure and the minimum dynamic value, respectively, e.g. in case of pre-charge pressure.

Maximum permissible rotational speed n_{nom}, see page 8.

▼ **Pressure definition**



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

Notice

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

Technical data

Size		NG		40	71	125	180	250	250 H[1)]	355	355 H[1)]	500	500 H[1)]
Displacement geometric, per revolution		$V_{g\,max}$	cm³	40	71	125	180	250	250	355	355	500	500
Rotational speed maximum[2)]	at $V_{g\,max}$	n_{nom}	rpm	2600	2200	1800	1800	1500	1800	1500	1700	1320	1500
Flow	at n_{nom} and $V_{g\,max}$	$q_{v\,max}$	l/min	104	156	225	324	375	450	533	604	660	750
	at n_E = 1500 rpm	$q_{vE\,max}$	l/min	60	107	186	270	375	375	533	533	–	750
Power	with n_{nom}, $V_{g\,max}$ and Δp = 350 bar	P	kW	61	91	131	189	219	262	311	352	385	437
	at n_E = 1500 rpm, $V_{g\,max}$ and Δp = 350 bar	$P_{E\,max}$	kW	35	62	109	158	219	219	311	311	–	437
Torque	at $V_{g\,max}$ and Δp = 350 bar	T_{max}	Nm	223	395	696	1002	1391	1391	1976	1976	2783	2783
	at $V_{g\,max}$ and Δp = 100 bar	T	Nm	64	113	199	286	398	398	564	564	795	795
Rotary stiffness Drive shaft	P	c	kNm/rad	80	146	260	328	527	527	800	800	1145	1145
	Z	c	kNm/rad	77	146	263	332	543	543	770	770	1136	1136
Moment of inertia of the rotary group		J_{TW}	kgm²	0.0049	0.0121	0.03	0.055	0.0959	0.0959	0.19	0.19	0.3325	0.3325
Maximum angular acceleration[3)]		α	rad/s²	17000	11000	8000	6800	4800	4800	3600	3600	2800	2800
Case volume		V	L	2	2.5	5	4	10	10	8	8	14	14
Weight without through drive (approx.)		m	kg	39	53	88	102	184	184	207	207	320	320

Determining the operating characteristics

Flow	$q_v = \frac{V_g \cdot n \cdot \eta_v}{1000}$	[l/min]
Torque	$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}}$	[Nm]
Power	$P = \frac{2\,\pi \cdot T \cdot n}{60000} = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t}$	[kW]

Key

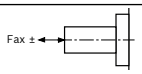
V_g	=	Displacement per revolution [cm³]
Δp	=	Differential pressure [bar]
n	=	Rotational speed [rpm]
η_v	=	Volumetric efficiency
η_{mh}	=	Mechanical-hydraulic efficiency
η_t	=	Total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Notice

- Theoretical values, without efficiency and tolerances; values rounded
- Exceeding the maximum or falling below the minimum permissible values can lead to a loss of function, a reduction in operational service life or total destruction of the axial piston unit and loss of explosion protection. We recommend testing the loads by means of experiment or calculation / simulation and comparison with the permissible values.

1) High-speed version
2) The values are applicable:
   – at an abs. pressure p_{abs} = 1 bar at the suction port **S**
   – for the optimum viscosity range from v_{opt} = 36 to 16 mm²/s
   – with hydraulic fluid on the basis of mineral oils
3) The data are valid for values between the minimum required and maximum permissible rotational speed. It applies for external stimuli (e.g. diesel engine 2 to 8 times rotary frequency, cardan shaft twice the rotary frequency). The limit value is only valid for a single pump. The load capacity of the connection parts must be considered.

Permissible radial and axial loading of the drive shaft

Size		NG		40	71	125	180	250	355	500
Maximum radial force at a/2		$\pm F_{q\,max}$	N	1000	1200	1600	2000	2000	2200	2500
Maximum axial force		$+ F_{ax\,max}$	N	600	800	1000	1400	1800	2000	2000

Notice

- The values given are maximum values and do not apply to continuous operation. For drives with radial loading (pinion, V-belt drives), please contact us!

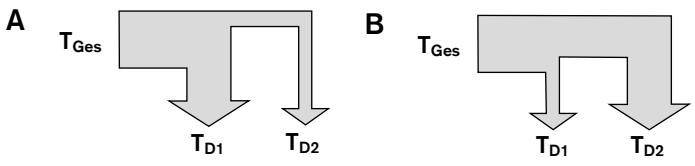
Permissible drive and through-drive torques

The axial piston unit can be delivered with a through drive, as shown in the type code on page 2.
The through drive version is identified by the code K/U 31...35.

It is advisable to couple no more than three single pumps in series.
All attachment pumps must match the ATEX classification for the application in question.

Size				40	71	125	180	250	355	500
Splined shaft										
Maximum permissible overall drive torque on shaft of pump 1 (pump 1 + pump 2)	$T_{tot\,max}$	Nm		446	790	1392	2004	2782	3952	5566
A Permissible through-drive torque	$T_{D1\,max}$	Nm		223	395	696	1002	1391	1976	2783
	$T_{D2\,max}$	Nm		223	395	696	1002	1391	1976	2783
B Permissible through-drive torque	$T_{D1\,max}$	Nm		223	395	696	1002	1391	1976	2783
	$T_{D2\,max}$	Nm		223	395	696	1002	1391	1976	2783
Shaft key										
Maximum permissible overall drive torque on shaft of pump 1 (pump 1 + pump 2)	$T_{tot\,max}$	Nm		380	700	1392	1400	2300	3557	5200
A Permissible through-drive torque	$T_{D1\,max}$	Nm		223	395	696	1002	1391	1976	2783
	$T_{D2\,max}$	Nm		157	305	696	398	909	1581	2417
B Permissible through-drive torque	$T_{D1\,max}$	Nm		157	305	696	398	909	1581	2417
	$T_{D2\,max}$	Nm		223	395	696	1002	1391	1976	2783

Distribution of torques



Single pump with through drive

If no further pumps are to be mounted at the factory, then the simple type designation is sufficient.

The scope of delivery includes:

- For all through drives: coupling, fixing screw, seal and if applicable an intermediate flange

Combination pumps

Independent circuits are available for the user when further pumps are built on.
If the combination pump comprises 2 Rexroth axial piston pumps and if this is supplied pre-assembled, the two type designations are to be linked with "+".

Order example:

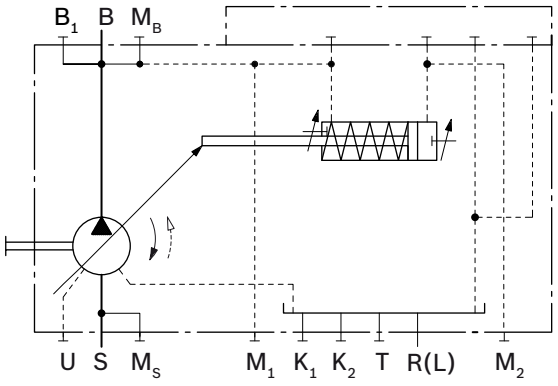
A4VSO125DR/30R–APB25U33 +
A4VSO71DR/10R–AZB25N00

Overview of control units

OV - Without control

At axial piston units without OV control, the stroking piston is based on DR control. The stroking piston is relieved to the tank. The $V_{g\ max}$ limitation can be adjusted from 50 to 100%. The axial piston unit without control acts like a fixed pump in operation.

▼ **Circuit diagram**



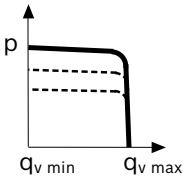
DR – Pressure controller
(see 92060)

The DR pressure controller limits the maximum pressure at the pump outlet within the control range of the pump. This maximum pressure level can be steplessly set at the control valve.

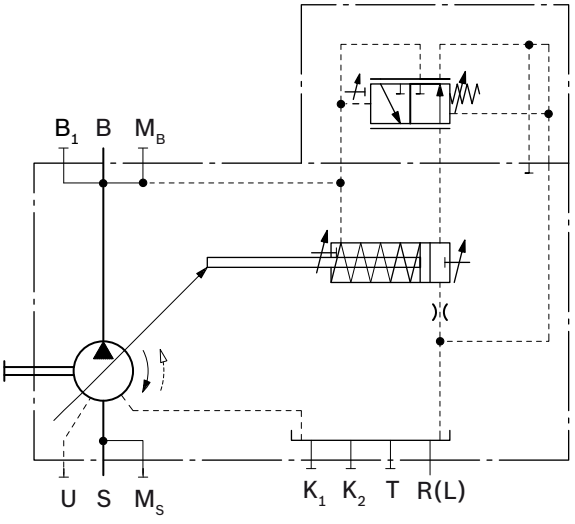
- Setting range 20...350 bar

Optional:
Remotely controllable (DRG)

▼ **Characteristic curve**



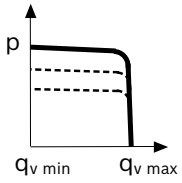
▼ **Circuit diagram**



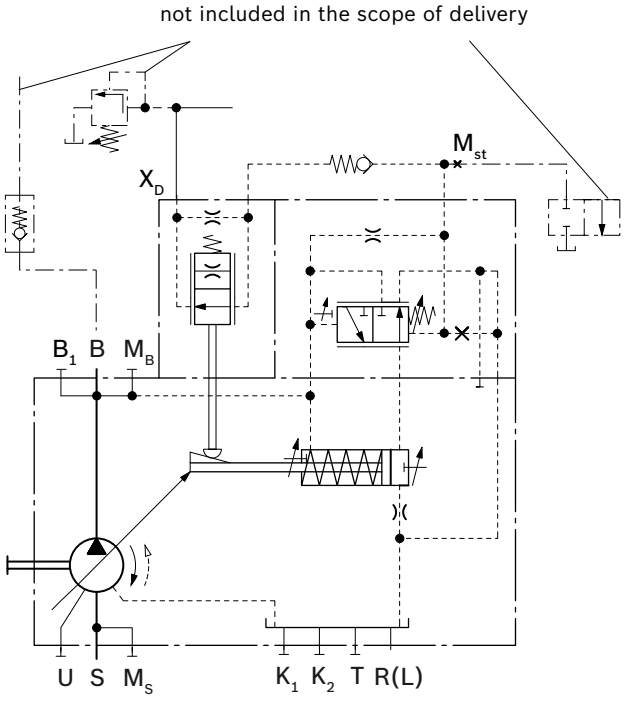
DP – Pressure controller for parallel operation (see 92060)

Suitable for pressure control of multiple A4VSO ATEX axial piston units in parallel operation.
Optional:
Flow control (DPF)

▼ **Characteristic curve**



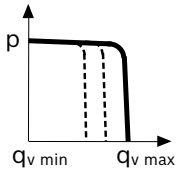
▼ **Circuit diagram**



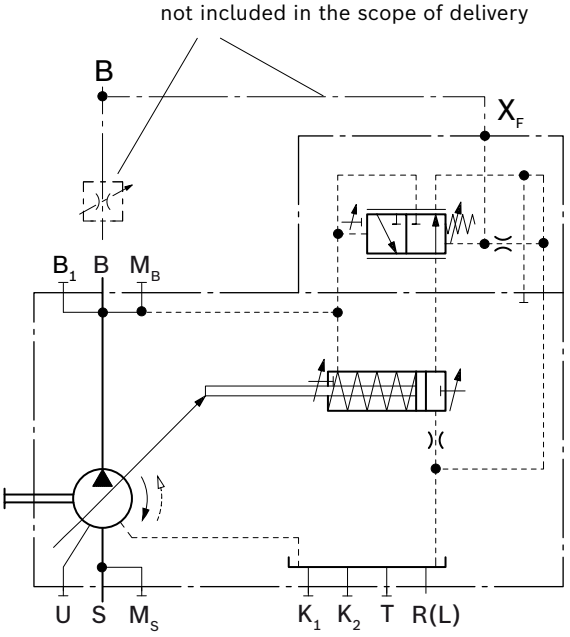
FR - Flow controller (see 92060)

Maintains a constant flow in a hydraulic system.
Optional:
Remotely controllable pressure control (FRG)
Connection from X_F to tank plugged
(FR1, FRG1)

▼ **Characteristic curve**



▼ **Circuit diagram**



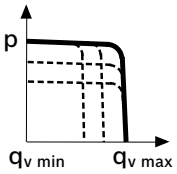
Notice

- All additional components from 92060 and 92064 must correspond to the ATEX classification for the application concerned.

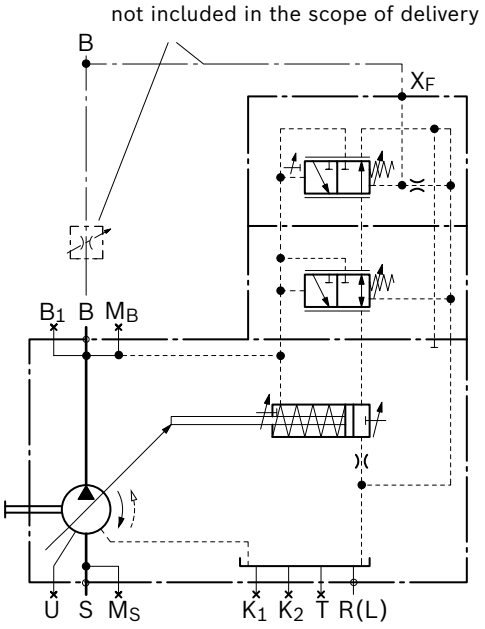
DFR - Pressure and flow controller
(see 92060)

This controller keeps the flow of the pump constant even under changing operating conditions.
The flow control is overlaid by a mechanically adjustable pressure controller.
Optional:
Connection from $\mathbf{X_F}$ to the tank plugged (DFR1)

▼ **Characteristic curve**



▼ **Circuit diagram**

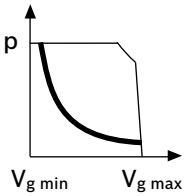


LR2 - Power controller with hyperbolic characteristic curve
(see 92064)

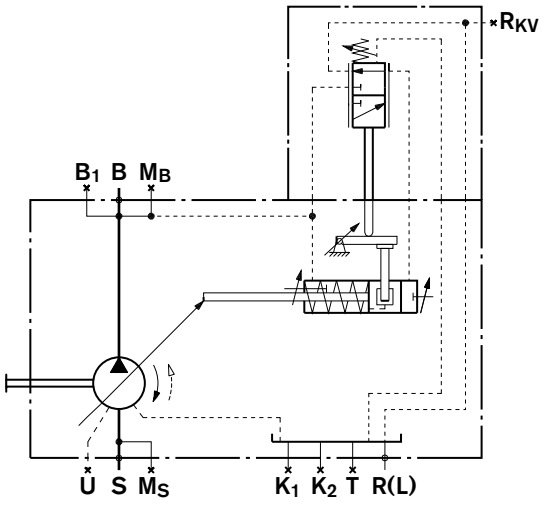
The hyperbolic power controller keeps the specified drive power constant at the same drive speed.
Optional:
Pressure control (LR2D), remotely controllable (LR2G);
Flow control (LR2F, LR2S);

Hydraulic two-point control (LR2Z)
Not available from RE 92064:
LR2.Y (electric relief valve)

▼ **Characteristic curve**



▼ **Circuit diagram**



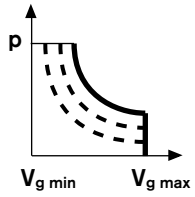
Notice

- All additional components from 92060 and 92064 must correspond to the ATEX classification for the application concerned.

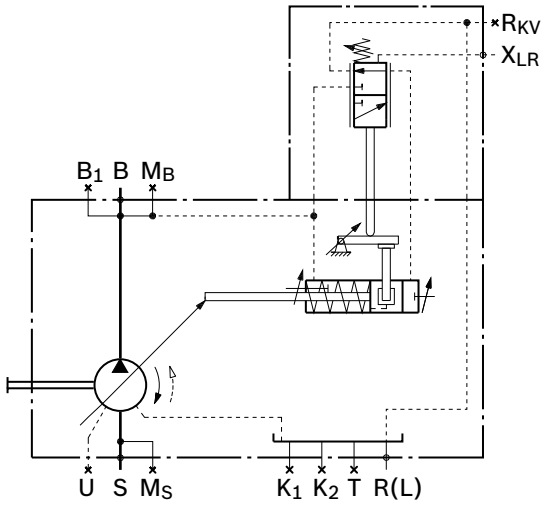
LR3 - Power control with remotely controllable power characteristic
(see 92064)

This hyperbolic power controller keeps the specified drive power constant, whereby the power characteristic is adjustable remotely.
Optional:
Pressure control (LR3D), remotely controllable (LR3G); Flow control (LR3F, LR3S); hydraulic two-point control (LR3Z)
Not available from RE 92064:
LR3.Y (electric relief valve)

▼ **Characteristic curve**



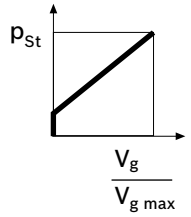
▼ **Circuit diagram**



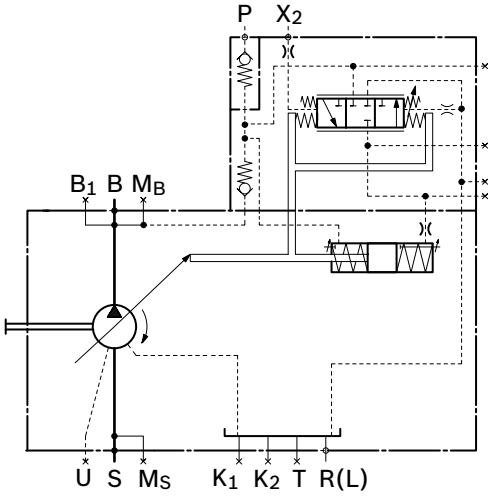
HD – Hydraulic control, pilot-pressure related
(see 92080)

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)
Not available from RE92080:
HD..T and HD..U (DBEP6 mounted)

▼ **Characteristic curve**



▼ **Circuit diagram**



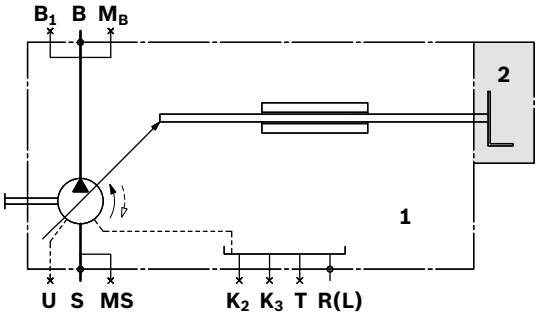
Notice

- ▶ All additional components from 92060 and 92064 must correspond to the ATEX classification for the application concerned.

MA – Manual control
(see 92072)

Manual control enables adjustment of the pump displacement by rotating the handwheel.
The change of displacement can be monitored via the swivel angle indicator.
The MA adjustment has a locking lever for fixing the displacement during operation.

▼ **Circuit diagram** (example using A4VSO)



Components

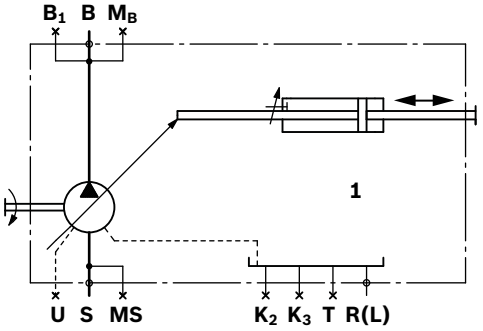
1 Axial Piston variable Pump A4VSO
2 Handwheel

GE – Rod system control

A stroke movement of the stroking piston is realized by means of directly connected control on the customer site with a direct connection to the rod system of the stroking piston. This leads to a change in displacement of the pump from $V_{g\,min}$ to $V_{g\,max}$ or vice versa.
The change of displacement can be monitored via the optical swivel angle indicator.

Maximum control force NG 71: 6000 N
Maximum control force NG 125, 180: 9000 N
Maximum permissible working pressure: 150 bar

Circuit diagram (example using A4VSO NG71)



Components

1 Axial Piston variable Pump A4VSO

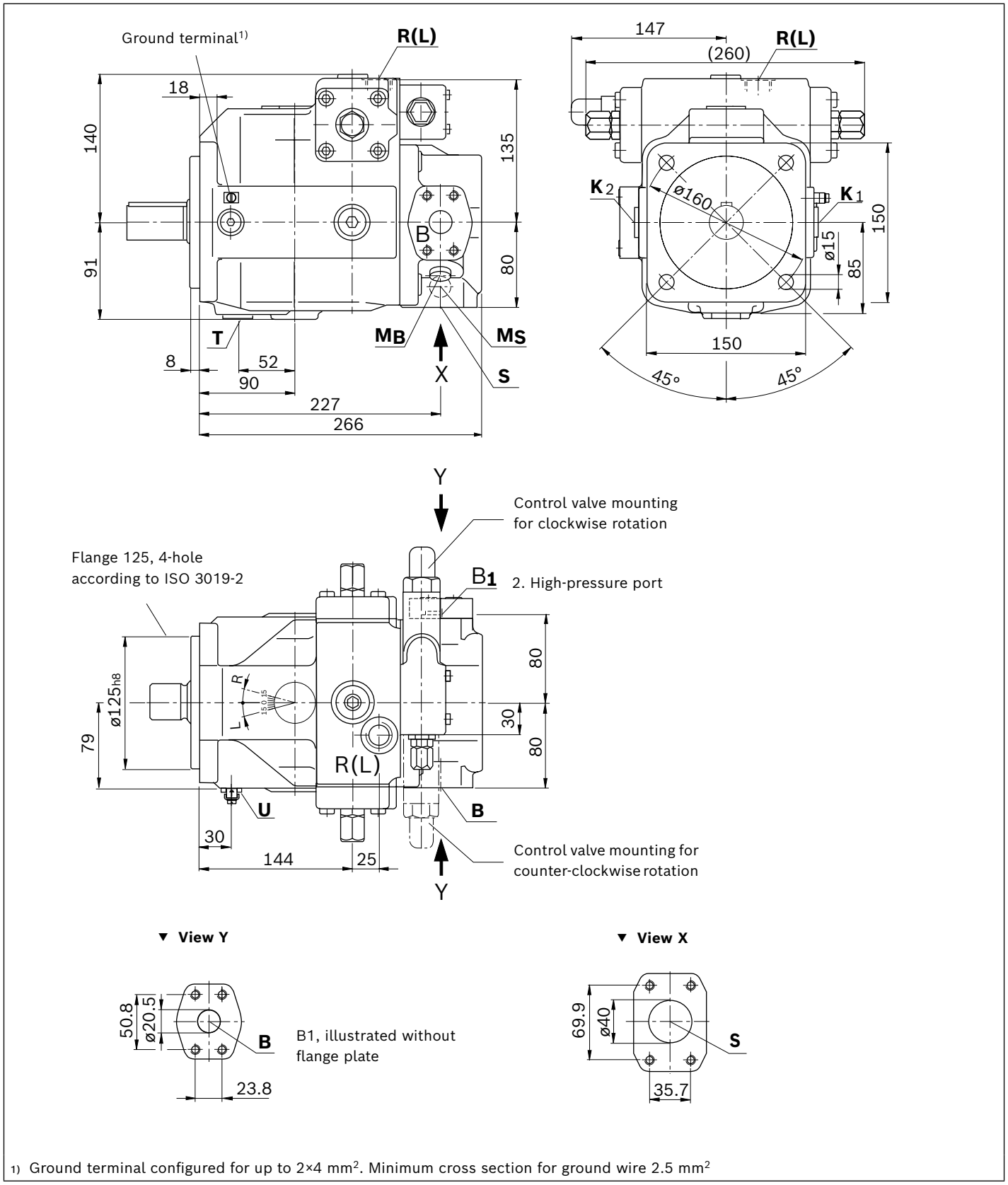
Flow direction

Drive direction viewed on drive shaft	Swivel direction	Flow
clockwise	counter-clockwise	B, B_1

Dimensions, size 40

DR – Pressure control; flange valve version metric

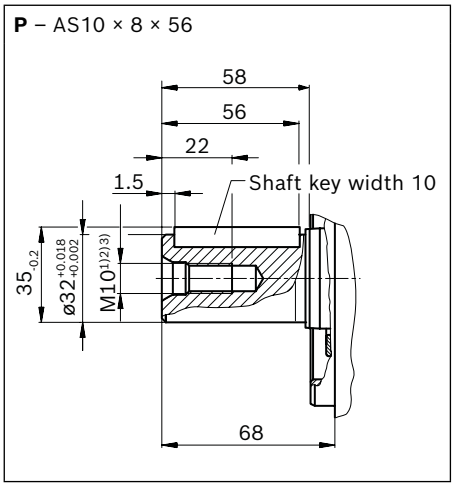
(for further dimensions of control units, please refer to the respective data sheets)



1) Ground terminal configured for up to 2×4 mm². Minimum cross section for ground wire 2.5 mm²

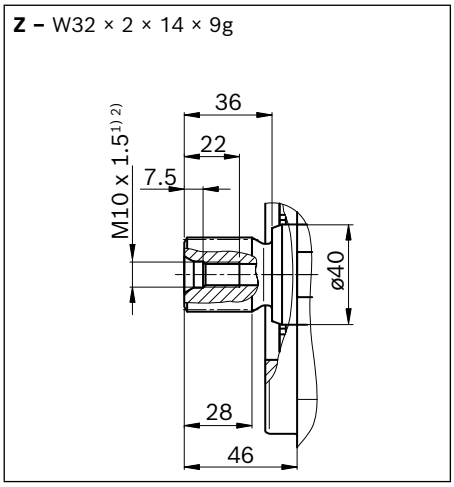
▼ **Cyl. shaft with shaft key (DIN 6885)**

P – AS10 × 8 × 56



▼ **Splined shaft (DIN 5480)**

Z – W32 × 2 × 14 × 9g



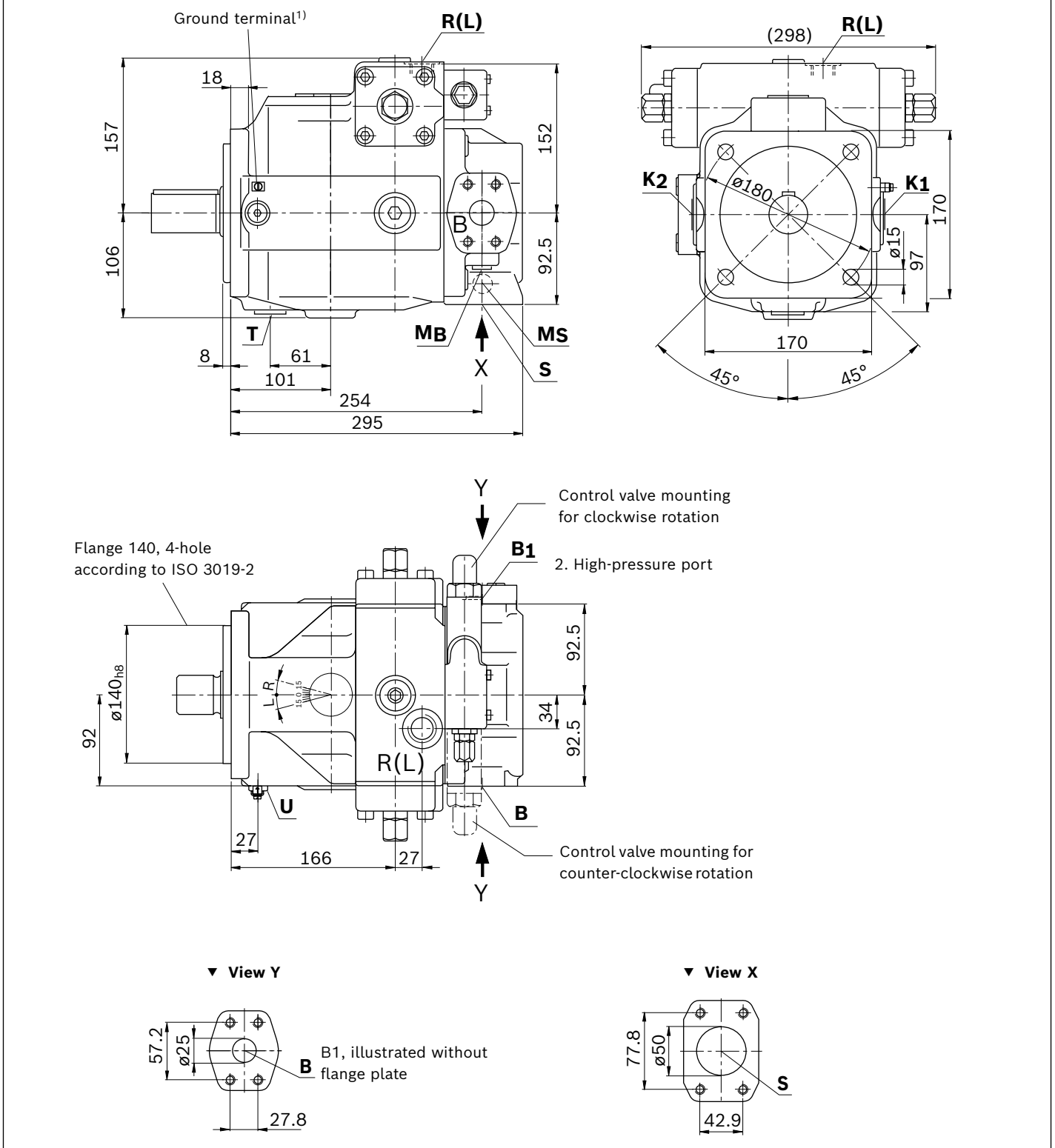
Ports		Standard	Size[3]	$p_{max\ abs}$ [bar][4]	State[9]
B	Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	3/4 in M10 × 1.5; 17 deep	400	O
B1	2. Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	3/4 in M10 × 1.5; 17 deep	400	X[8]
S	Suction port Fastening thread	SAE J518[6] DIN 13	1 1/2 in M12 × 1.75; 20 deep	30	O
K_1, K_2	Flushing port	DIN 3852[5]	M22 × 1.5; 14 deep	2	X
T	Fluid drain	DIN 3852[5]	M22 × 1.5; 14 deep	2	X
M_B	Measuring pressure **B**	DIN 3852[5]	M14 × 1.5; 12 deep	400	X
M_S	Measuring pressure **S**	DIN 3852[5]	M14 × 1.5; 12 deep	30	X
R(L)	Fluid filling and air bleeding (drain port)	DIN 3852[5]	M22 × 1.5; 12 deep	2	O
U	Flushing port	DIN 3852[5]	M14 × 1.5; 11.5 deep	5	X[7]

1) Center bore according to DIN 332
2) Thread according to DIN 13
3) Observe the instructions in Part I (product-specific and general instructions) concerning the maximum tightening torques.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink may be deeper than specified in the standard.
6) Metric fastening thread is a deviation from standard.
7) For above-reservoir installation and for all installation positions with "drive shaft up" a bearing flushing must be installed.
8) Plugged and high-pressure-proof with flange plate. Depending on application, **B** and/or **B_1** must be connected. The unused port must be plugged with a flange plate.
9) O = Must be connected (comes plugged)
X = Plugged (in normal operation)

Dimensions, size 71

DR – Pressure control; flange valve version metric

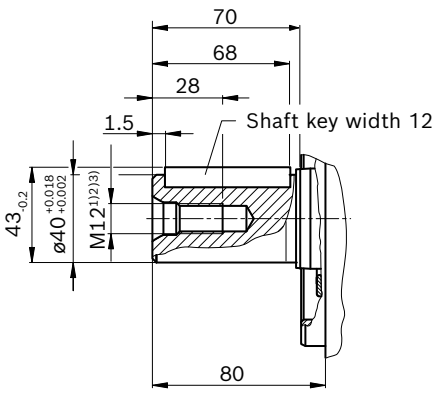
(for further dimensions of control units, please refer to the respective data sheets)



1) Ground terminal configured for up to 2×4 mm². Minimum cross section for ground wire 2.5 mm²

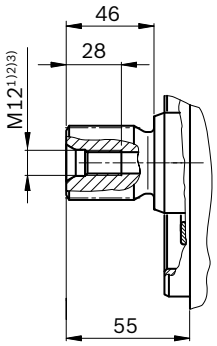
▼ **Parallel keyed shaft DIN 6885**

P – Ø40 AS 12×8×68



▼ **Splined shaft DIN 5480**

Z – W40×2×18×9g



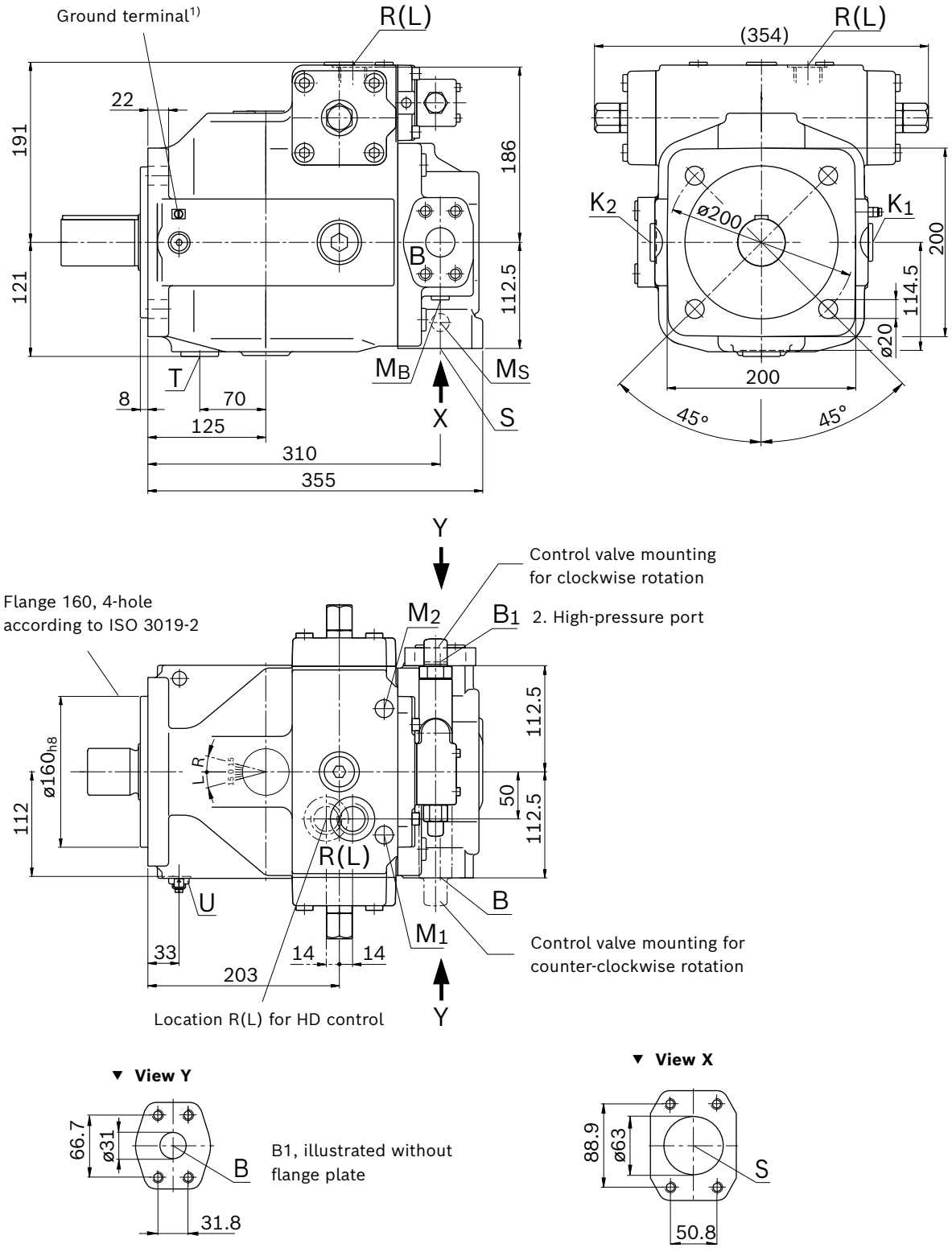
Ports		Standard	Size[3]	$p_{max\ abs}$ [bar][4]	State[9]
B	Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	1 in M12 × 1.75; 20 deep	400	O
B1	2. Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	1 in M12 × 1.75; 20 deep	400	X[8]
S	Suction port	SAE J518[6] DIN 13	2 in M12 × 1.75; 20 deep	30	O
K_1, K_2	Flushing port	DIN 3852[5]	M27 × 2; 16 deep	2	X
T	Fluid drain	DIN 3852[5]	M27 × 2; 16 deep	2	X
M_B	Measuring pressure **B**	DIN 3852[5]	M14 × 1.5; 12 deep	400	X
M_S	Measuring pressure **S**	DIN 3852[5]	M14 × 1.5; 12 deep	30	X
R(L)	Fluid filling and air bleeding (drain port)	DIN 3852[5]	M27 × 2; 16 deep	2	O
U	Flushing port	DIN 3852[5]	M14 × 1.5; 12 deep	5	X[7]

1) Center bore according to DIN 332
2) Thread according to DIN 13
3) Observe the instructions in Part I (product-specific and general instructions) concerning the maximum tightening torques.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink may be deeper than specified in the standard.
6) Metric fastening thread is a deviation from standard.
7) For above-reservoir installation and for all installation positions with "drive shaft up" a bearing flushing must be installed.
8) Plugged and high-pressure-proof with flange plate. Depending on application, **B** and/or **B_1** must be connected. The unused port must be plugged with a flange plate.
9) O = Must be connected (comes plugged)
X = Plugged (in normal operation)

Dimensions, size 125

DR – Pressure control; flange valve version metric

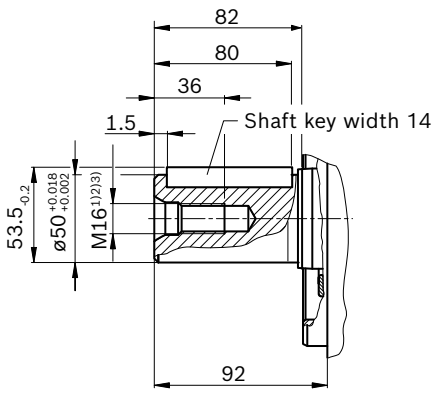
(for further dimensions of control units, please refer to the respective data sheets)



1) Ground terminal configured for up to 2×4 mm². Minimum cross section for ground wire 2.5 mm²

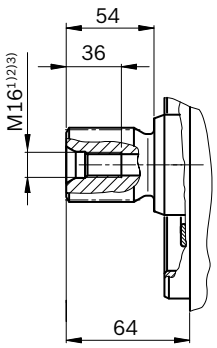
▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14×9×80



▼ **Splined shaft DIN 5480**

Z – W50×2×24×9g



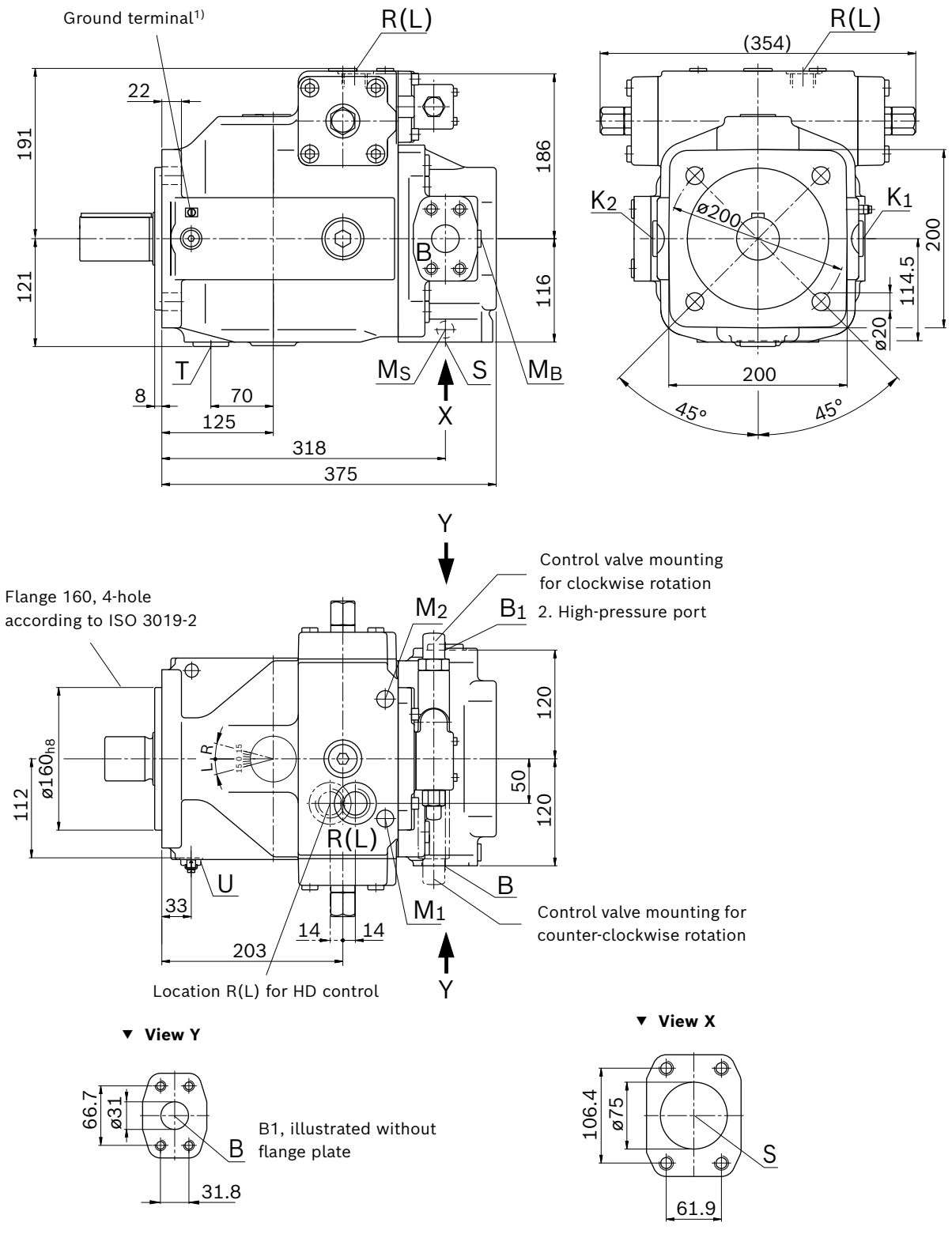
Ports		Standard	Size[3]	$p_{max\ abs}$ [bar][4]	State[9]
B	Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
B1	2. Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	1 1/4 in M14 × 2; 19 deep	400	X[8]
S	Suction port	SAE J518[6] DIN 13	2 1/2 in M12 × 1.75; 18 deep	30	O
K_1, K_2	Flushing port	DIN 3852[5]	M33 × 2; 18 deep	2	X
T	Fluid drain	DIN 3852[5]	M33 × 2; 18 deep	2	X
M_B	Measuring pressure **B**	DIN 3852[5]	M14 × 1.5; 12 deep	400	X
M_S	Measuring pressure **S**	DIN 3852[5]	M14 × 1.5; 12 deep	30	X
R(L)	Fluid filling and air bleeding (drain port)	DIN 3852[5]	M33 × 2; 18 deep	2	O
U	Flushing port	DIN 3852[5]	M14 × 1.5; 12 deep	5	X[7]
M_1, M_2	Control pressure measuring	DIN 3852[5]	M14 × 1.5; 12 deep	400	X

1) Center bore according to DIN 332
2) Thread according to DIN 13
3) Observe the instructions in Part I (product-specific and general instructions) concerning the maximum tightening torques.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink may be deeper than specified in the standard.
6) Metric fastening thread is a deviation from standard.
7) For above-reservoir installation and for all installation positions with "drive shaft up" a bearing flushing must be installed.
8) Plugged and high-pressure-proof with flange plate. Depending on application, **B** and/or **B_1** must be connected. The unused port must be plugged with a flange plate.
9) O = Must be connected (comes plugged)
X = Plugged (in normal operation)

Dimensions, size 180

DR – Pressure control; flange valve version metric

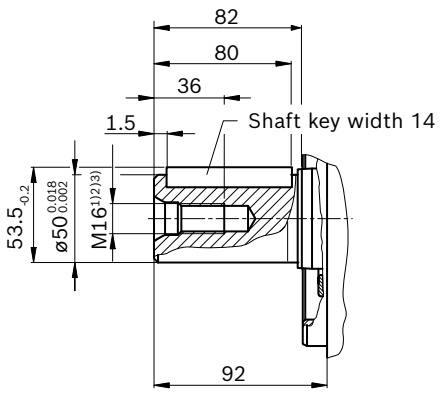
(for further dimensions of control units, please refer to the respective data sheets)



1) Ground terminal configured for up to 2×4 mm². Minimum cross section for ground wire 2.5 mm²

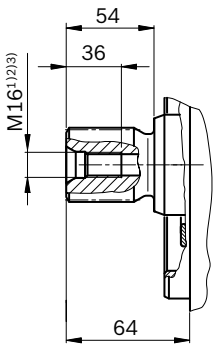
▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14×9×80



▼ **Splined shaft DIN 5480**

Z – W50×2×24×9g



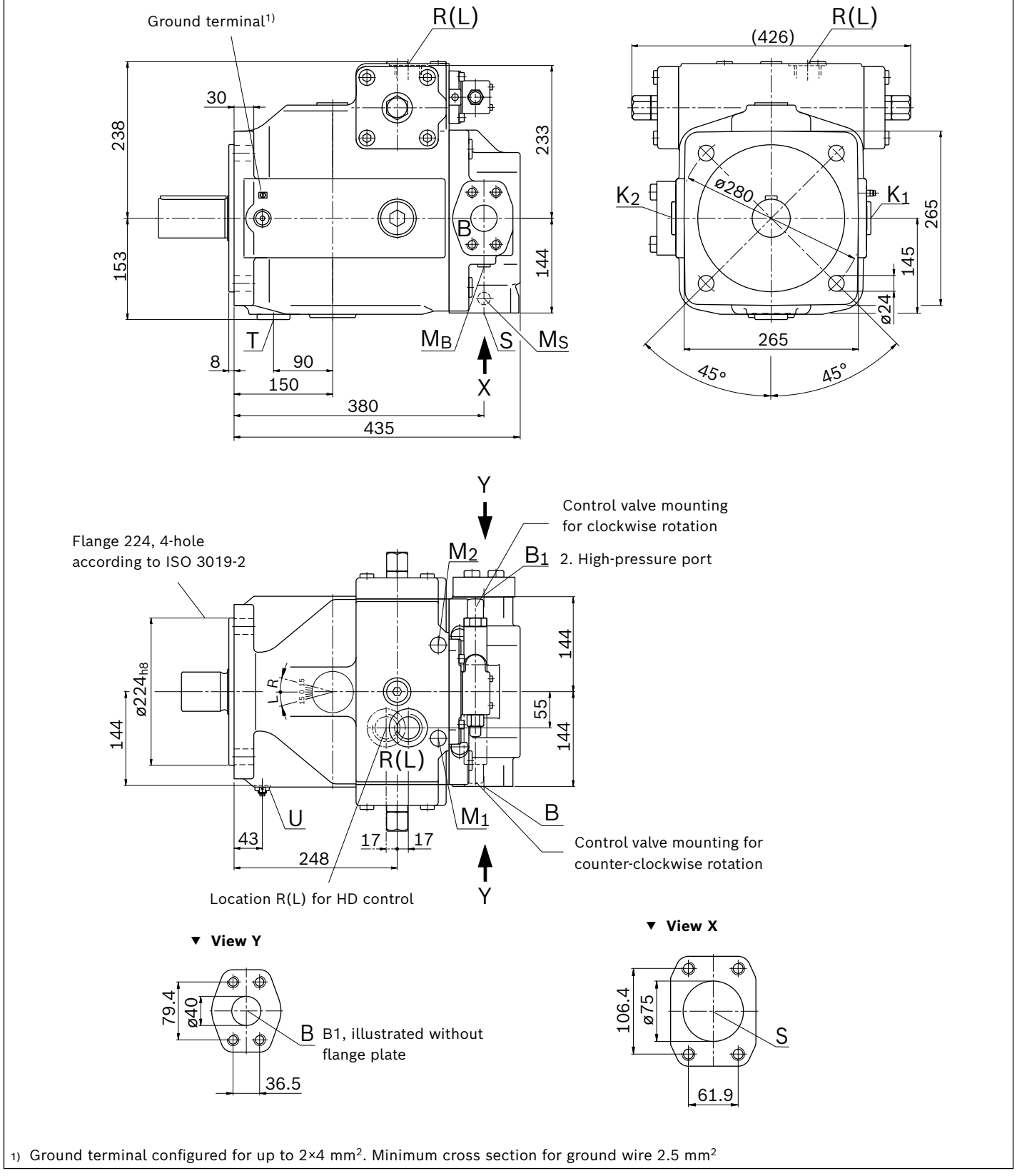
Ports		Standard	Size[3)]	$p_{max\ abs}$ [bar][4)]	State[9)]
B	Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
B1	2. Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	1 1/4 in M14 × 2; 19 deep	400	X[8)]
S	Suction port	SAE J518[6)] DIN 13	3 in M16 × 2; 24 deep	30	O
K_1, K_2	Flushing port	DIN 3852[5)]	M33 × 2; 18 deep	2	X
T	Fluid drain	DIN 3852[5)]	M33 × 2; 18 deep	2	X
M_B	Measuring pressure **B**	DIN 3852[5)]	M14 × 1.5; 12 deep	400	X
M_S	Measuring pressure **S**	DIN 3852[5)]	M14 × 1.5; 12 deep	30	X
R(L)	Fluid filling and air bleeding (drain port)	DIN 3852[5)]	M33 × 2; 18 deep	2	O
U	Flushing port	DIN 3852[5)]	M14 × 1.5; 12 deep	5	X[7)]
M_1, M_2	Control pressure measuring	DIN 3852[5)]	M14 × 1.5; 12 deep	400	X

1) Center bore according to DIN 332
2) Thread according to DIN 13
3) Observe the instructions in Part I (product-specific and general instructions) concerning the maximum tightening torques.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink may be deeper than specified in the standard.
6) Metric fastening thread is a deviation from standard.
7) For above-reservoir installation and for all installation positions with "drive shaft up" a bearing flushing must be installed.
8) Plugged and high-pressure-proof with flange plate. Depending on application, **B** and/or **B_1** must be connected. The unused port must be plugged with a flange plate.
9) O = Must be connected (comes plugged)
X = Plugged (in normal operation)

Dimensions, size 250

DR – Pressure control; flange valve version metric

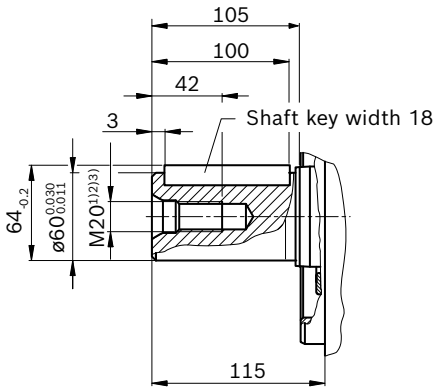
(for further dimensions of control units, please refer to the respective data sheets)



1) Ground terminal configured for up to 2×4 mm². Minimum cross section for ground wire 2.5 mm²

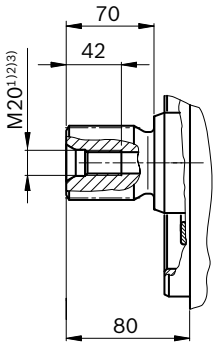
▼ **Parallel keyed shaft DIN 6885**

P – Ø60 AS 18×11×100



▼ **Splined shaft DIN 5480**

Z – W60×2×28×9g



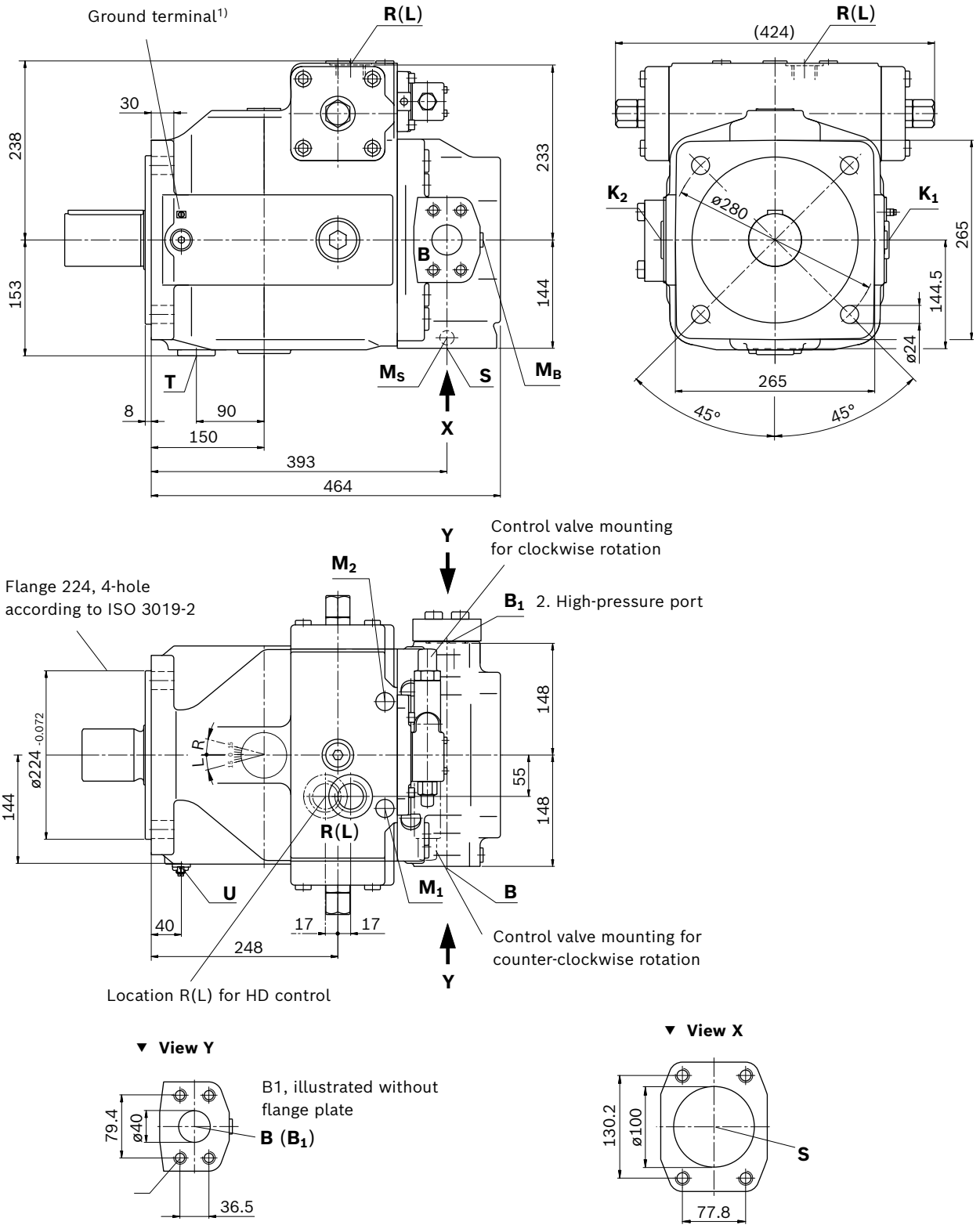
Ports		Standard	Size[3)]	$p_{max\ abs}$ [bar][4)]	State[9)]
B	Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	1 1/2 in M16 × 2; 25 deep	400	O
B1	2. Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	1 1/2 in M16 × 2; 25 deep	400	X[8)]
S	Suction port	SAE J518[6)] DIN 13	3 in M16 × 2; 24 deep	30	O
K_1, K_2	Flushing port	DIN 3852[5)]	M42 × 2; 20 deep	2	X
T	Fluid drain	DIN 3852[5)]	M42 × 2; 20 deep	2	X
M_B	Measuring pressure **B**	DIN 3852[5)]	M14 × 1.5; 12 deep	400	X
M_S	Measuring pressure **S**	DIN 3852[5)]	M14 × 1.5; 12 deep	30	X
R(L)	Fluid filling and air bleeding (drain port)	DIN 3852[5)]	M42 × 2; 20 deep	2	O
U	Flushing port	DIN 3852[5)]	M14 × 1.5; 12 deep	5	X[7)]
M_1, M_2	Control pressure measuring	DIN 3852[5)]	M14 × 1.5; 12 deep	400	X

1) Center bore according to DIN 332
2) Thread according to DIN 13
3) Observe the instructions in Part I (product-specific and general instructions) concerning the maximum tightening torques.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink may be deeper than specified in the standard.
6) Metric fastening thread is a deviation from standard.
7) For above-reservoir installation and for all installation positions with "drive shaft up" a bearing flushing must be installed.
8) Plugged and high-pressure-proof with flange plate. Depending on application, **B** and/or **B_1** must be connected. The unused port must be plugged with a flange plate.
9) O = Must be connected (comes plugged)
X = Plugged (in normal operation)

Dimensions, size 355

DR – Pressure control; flange valve version metric

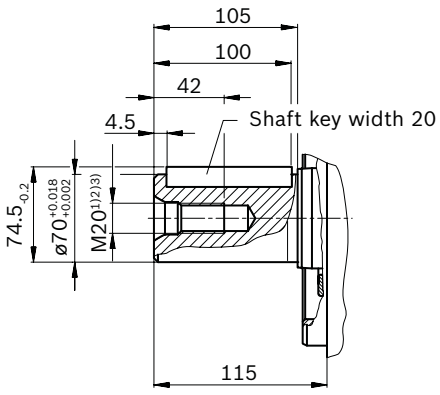
(for further dimensions of control units, please refer to the respective data sheets)



1) Ground terminal configured for up to 2×4 mm². Minimum cross section for ground wire 2.5 mm²

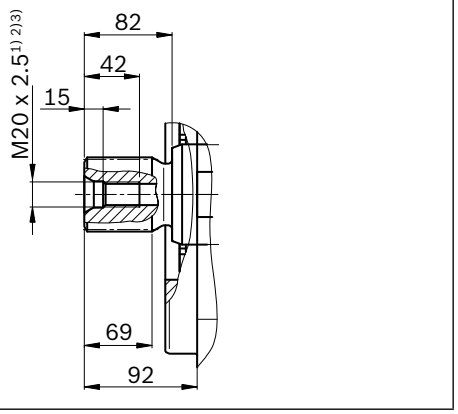
▼ **Parallel keyed shaft DIN 6885**

P – Ø70 AS 20×12×100



▼ **Splined shaft DIN 5480**

Z – W70×3×22×9g



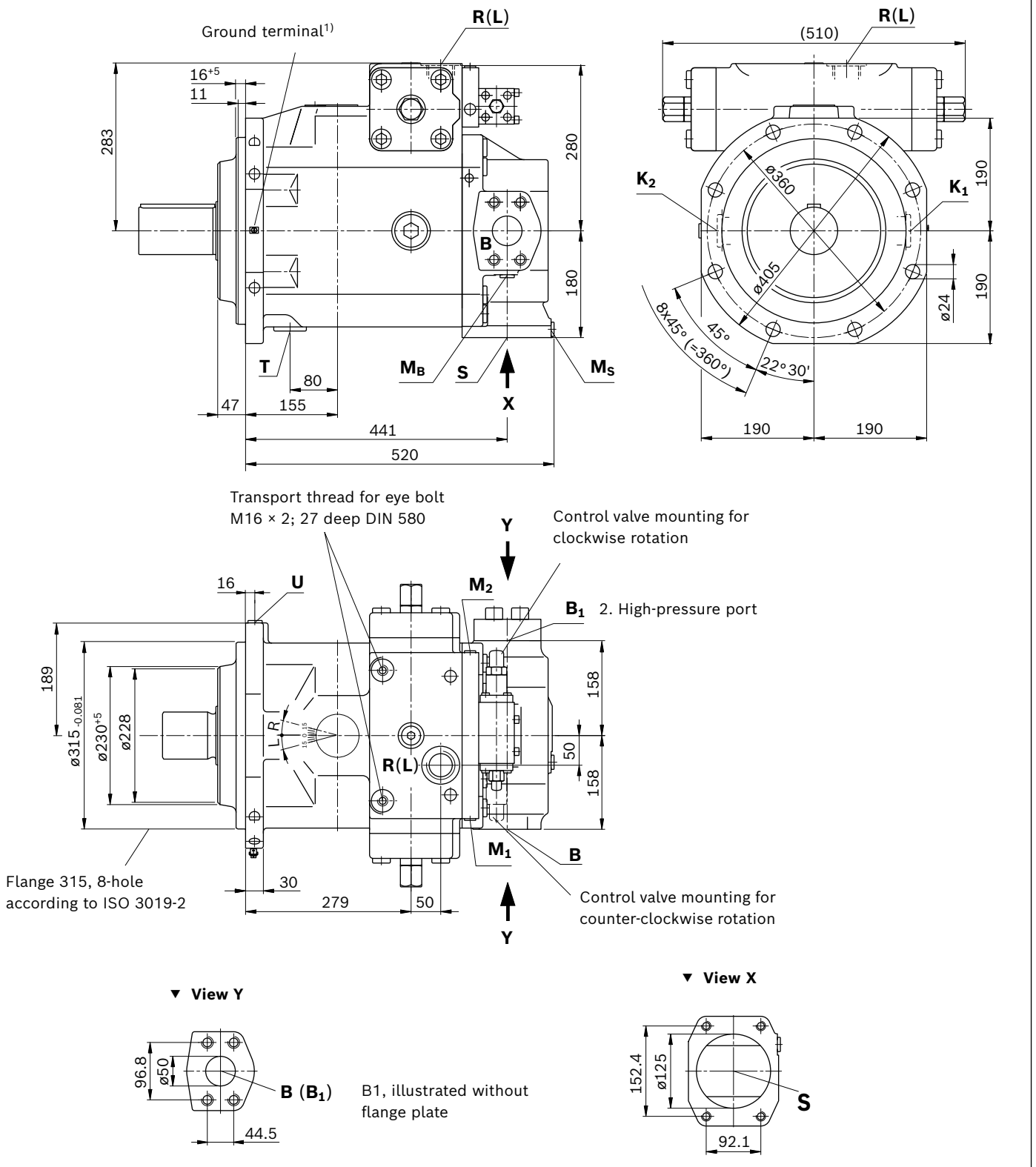
Ports		Standard	Size[3]	$p_{max\ abs}$ [bar][4]	State[9]
B	Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	1 1/2 in M16 × 2; 25 deep	400	O
B1	2. Working port (high-pressure series) Fastening thread	SAE J518[6] DIN 13	1 1/2 in M16 × 2; 25 deep	400	X[8]
S	Suction port	SAE J518[6] DIN 13	4 in M16 × 2; 24 deep	30	O
K_1, K_2	Flushing port	DIN 3852[5]	M42 × 2; 20 deep	2	X
T	Fluid drain	DIN 3852[5]	M42 × 2; 20 deep	2	X
M_B	Measuring pressure **B**	DIN 3852[5]	M14 × 1.5; 12 deep	400	X
M_S	Measuring pressure **S**	DIN 3852[5]	M14 × 1.5; 12 deep	30	X
R(L)	Fluid filling and air bleeding (drain port)	DIN 3852[5]	M42 × 2; 20 deep	2	O
U	Flushing port	DIN 3852[5]	M18 × 1.5; 12 deep	5	X[7]
M_1, M_2	Control pressure measuring	DIN 3852[5]	M18 × 1.5; 12 deep	400	X

1) Center bore according to DIN 332
2) Thread according to DIN 13
3) Observe the instructions in Part I (product-specific and general instructions) concerning the maximum tightening torques.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink may be deeper than specified in the standard.
6) Metric fastening thread is a deviation from standard.
7) For above-reservoir installation and for all installation positions with "drive shaft up" a bearing flushing must be installed.
8) Plugged and high-pressure-proof with flange plate. Depending on application, **B** and/or **B_1** must be connected. The unused port must be plugged with a flange plate.
9) O = Must be connected (comes plugged)
X = Plugged (in normal operation)

Dimensions, size 500

DR – Pressure control; flange valve version metric

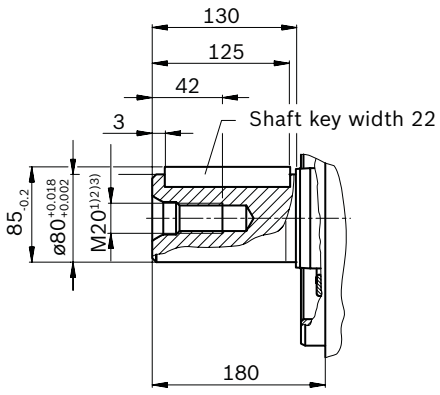
(for further dimensions of control units, please refer to the respective data sheets)



1) Ground terminal configured for up to 2×4 mm². Minimum cross section for ground wire 2.5 mm²

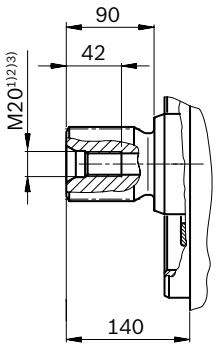
▼ **Parallel keyed shaft DIN 6885**

P – Ø80 AS 22×14×125



▼ **Splined shaft DIN 5480**

Z – W80×3×25×9g

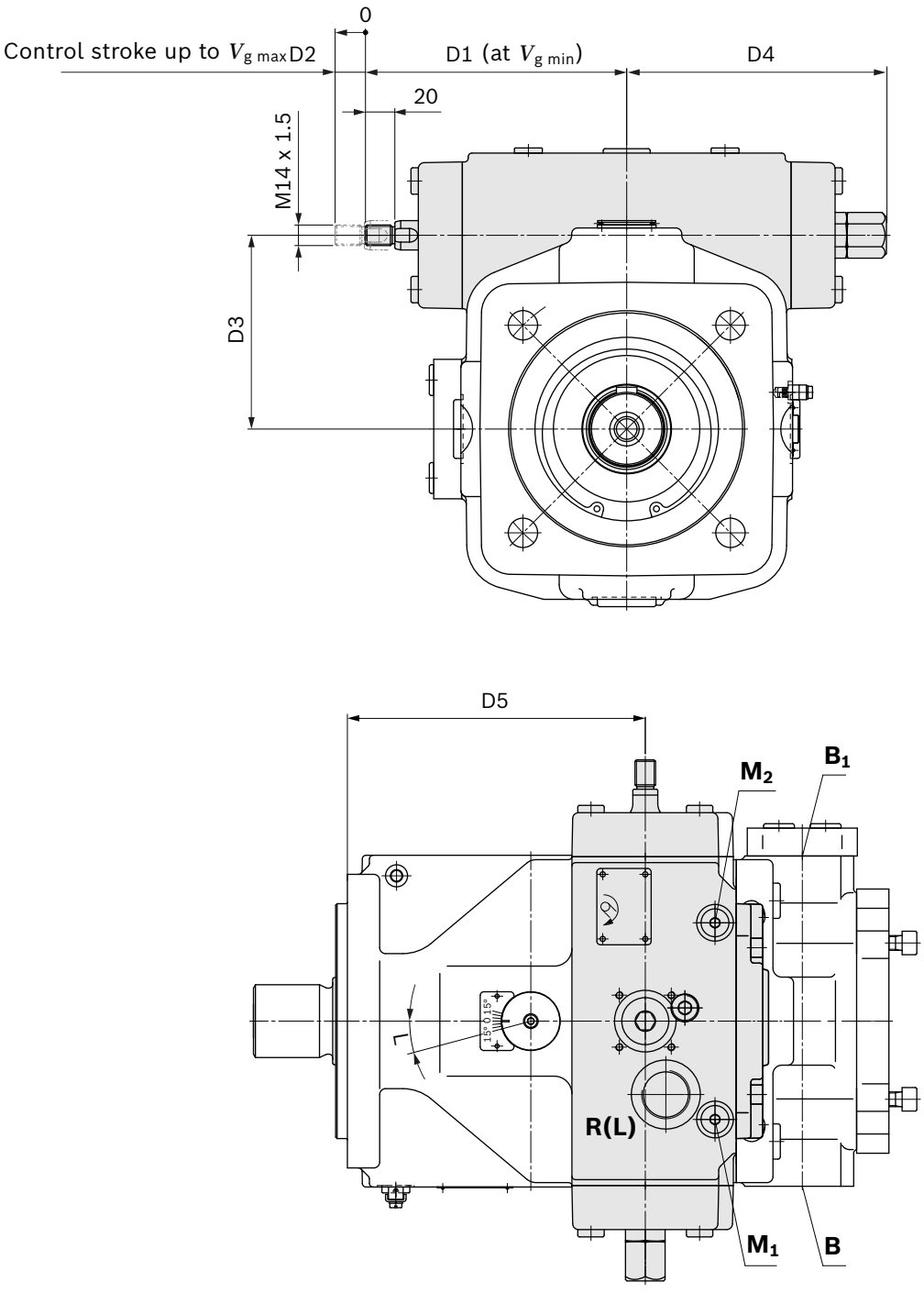


Ports		Standard	Size[3)]	$p_{max\ abs}$ [bar][4)]	State[9)]
B	Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	2 in M20 × 2; 25 deep	400	O
B1	2. Working port (high-pressure series) Fastening thread	SAE J518[6)] DIN 13	2 in M20 × 2; 25 deep	400	X[8)]
S	Suction port	SAE J518[6)] DIN 13	5 in M16 × 2.5; 24 deep	30	O
K_1, K_2	Flushing port	DIN 3852[5)]	M48 × 2; 22 deep	2	X
T	Fluid drain	DIN 3852[5)]	M48 × 2; 22 deep	2	X
M_B	Measuring pressure **B**	DIN 3852[5)]	M18 × 1.5; 12 deep	400	X
M_S	Measuring pressure **S**	DIN 3852[5)]	M18 × 1.5; 12 deep	30	X
R(L)	Fluid filling and air bleeding (drain port)	DIN 3852[5)]	M48 × 2; 22 deep	2	O
U	Flushing port	DIN 3852[5)]	M18 × 1.5; 12 deep	5	X[7)]
M_1, M_2	Control pressure measuring	DIN 3852[5)]	see data sheet of control units	400	X

1) Center bore according to DIN 332
2) Thread according to DIN 13
3) Observe the instructions in Part I (product-specific and general instructions) concerning the maximum tightening torques.
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
5) The countersink may be deeper than specified in the standard.
6) Metric fastening thread is a deviation from standard.
7) For above-reservoir installation and for all installation positions with "drive shaft up" a bearing flushing must be installed.
8) Plugged and high-pressure-proof with flange plate. Depending on application, **B** and/or **B_1** must be connected. The unused port must be plugged with a flange plate.
9) O = Must be connected (comes plugged)
X = Plugged (in normal operation)

Dimensions, GE control, NG 71, 125 and 180

GE – Rod system control (clockwise rotation, counter-clockwise swivel direction)



Further dimensions and ports in respective sizes can be found in this manual.

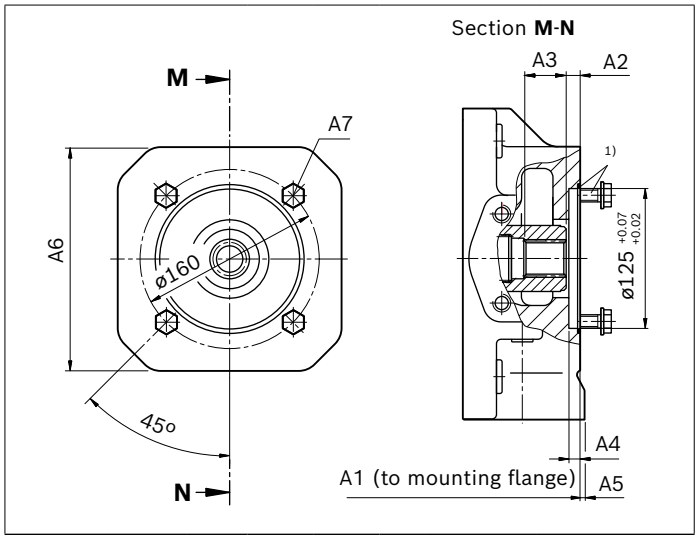
Size	D1	D2	D3	D4	D5	Ports M_1 and M_2	State
71	180	17.1	108	149	166	–	–
125	178	20.7	132	177	203	M14 × 1.5	plugged
180	178	20.7	132	177	203	M14 × 1.5	plugged

Dimensions, through drive

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

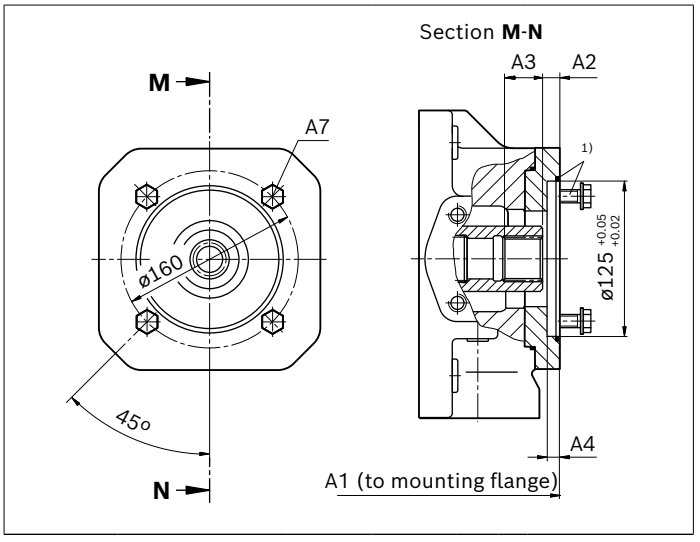
● = Available o = On request – = Not available

▼ **125-4**



K31	NG	A1	A2	A3	A4	A5	A6	A7[3]
	40	288	12.5	40	9	–	–	M12; 24 deep
	71	316	12.5	33.6	9	–	–	M12; 24 deep
	500	505	12.5	38.5	9	15	240	M12; 18 deep

▼ **125-4**



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

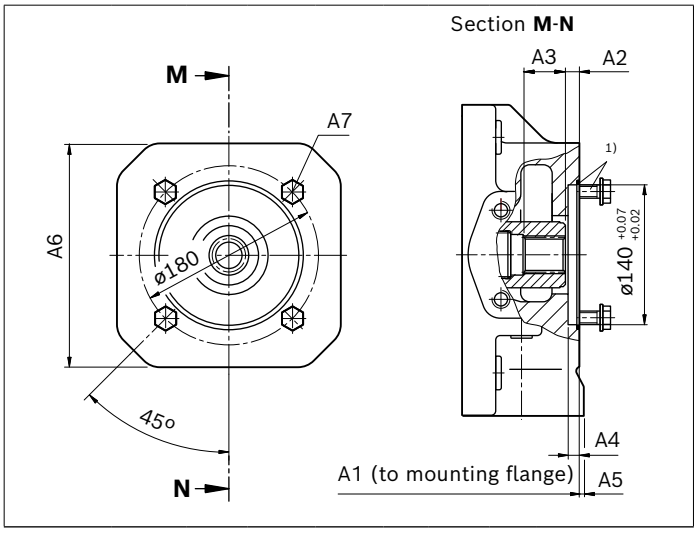
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

Flange ISO 3019-2 (metric)		Hub for splined shaft[2]								Code
Diameter	**Symbol**	**Diameter**	**40**	**71**	**125**	**180**	**250**	**355**	**500**	
140-4		N40×2×18×8H	–	●	–	–	–	–	●	K33
		N40×2×18×8H	–	–	●	●	●	●	–	U33

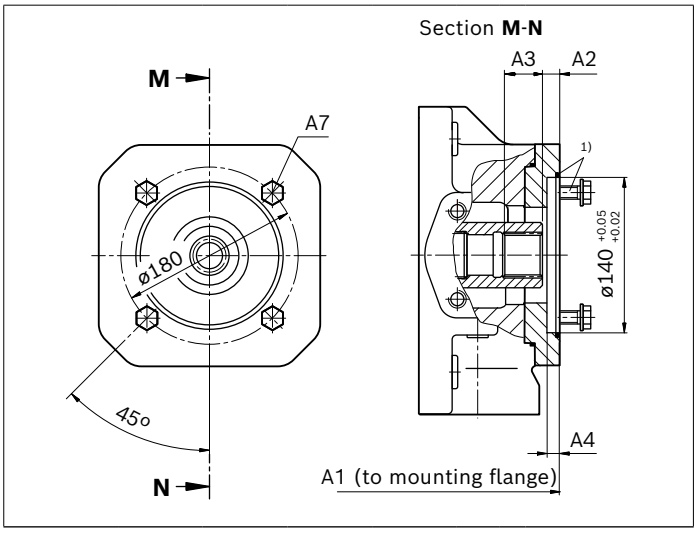
● = Available o = On request – = Not available

▼ **140-4**



K33	NG	A1	A2	A3	A4	A5	A6	A7[3]
	71	316	11.5	42.8	9	–	–	M12; 24 deep
	500	505	12.5	57	9	–	–	M12; 18 deep

▼ **140-4**



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

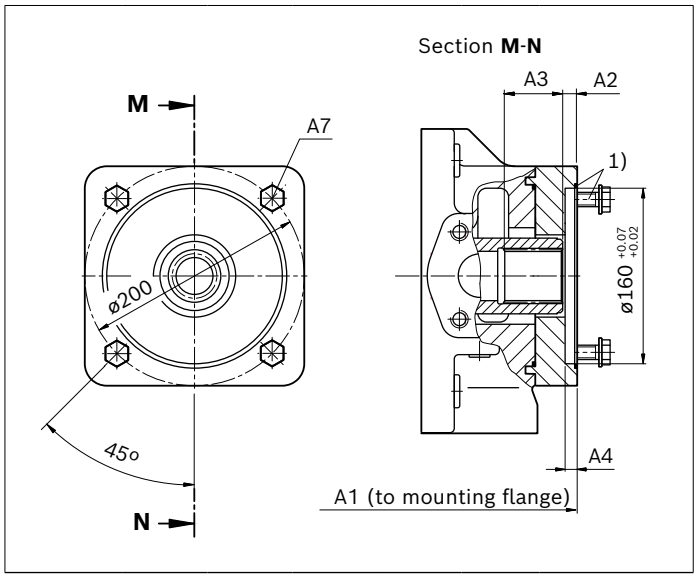
Notice
All attachment pumps must match the ATEX classification for the application in question.

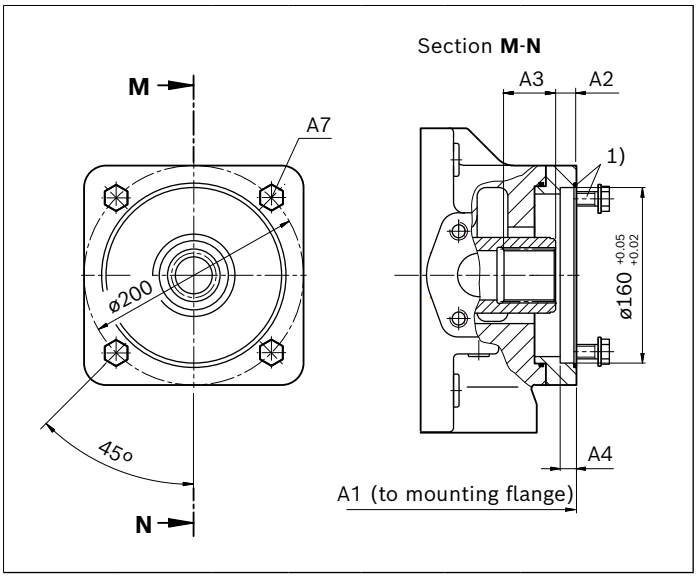
1) Mounting bolts and O-ring seal are included in the scope of delivery
2) Splined hub according to DIN 5480
3) Thread according to DIN 13, see Part I for maximum tightening torques.

Flange ISO 3019-2 (metric)		Hub for splined shaft[2]							Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	
160-4	⌘	N50×2×24×8H	–	–	–	–	–	–	●	K34
		N50×2×24×8H	–	–	●	●	●	●	–	U34

● = Available o = On request – = Not available

▼ **160-4**





K34	NG	A1	A2	A3	A4	A7[3]
	500	505	13.5	54.6	10	M16; 24 deep

U34	NG	A1	A2	A3	A4	A7[3]
	125	369	12.5	51.6	9	M16; 22 deep
	180	393	12.5	51.6	9	M16; 22 deep
	250	453	12.5	54.0	9	M16; 22 deep
	355	482	12.5	54.0	9	M15; 22 deep

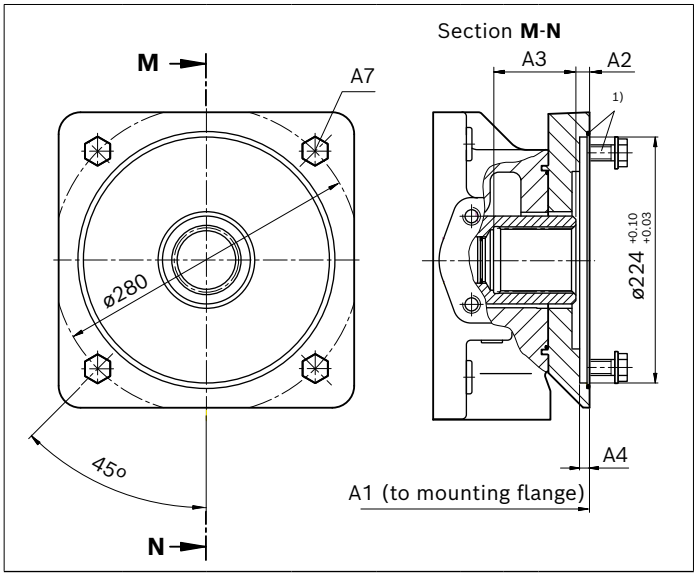
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

Flange ISO 3019-2 (metric)		Hub for splined shaft[2]							Code
Diameter	**Symbol**	**Diameter**	**40**	**71**	**125**	**180**	**250**	**355**	**500**	
224-4	⌘	N60×2×28×8H	–	–	–	–	–	–	●	K35
		N60×2×28×8H	–	–	–	–	●	●	–	U35

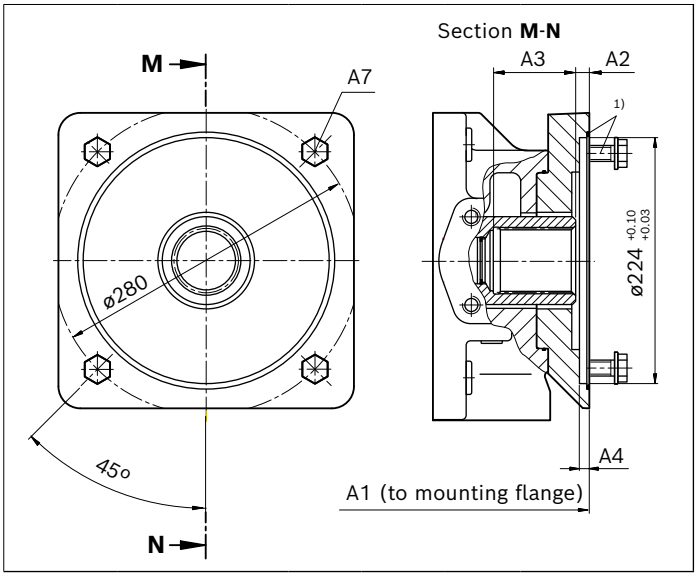
● = Available o = On request – = Not available

▼ **224-4**



K35	NG	A1	A2	A3	A4	A7[3]
	500	541	12.5	74	9	M20; 36 deep

▼ **224-4**



U35	NG	A1	A2	A3	A4	A7[3]
	250	469	12.5	75	9	M20; 37 deep
	355	498	12.5	75	9	M20; 37 deep

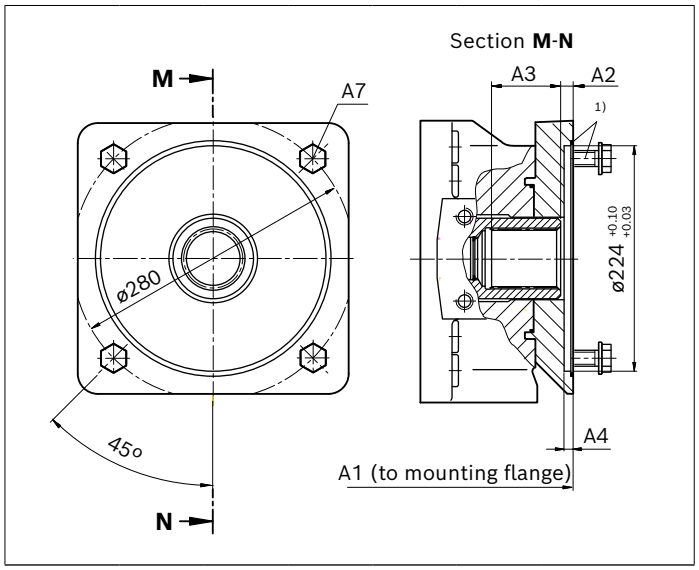
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

Flange ISO 3019-2 (metric)		Hub for splined shaft[2]							Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	
224-4	⌘	N70×3×22×8H	–	–	–	–	–	–	●	K77
		N70×3×22×8H	–	–	–	–	–	●	–	U77

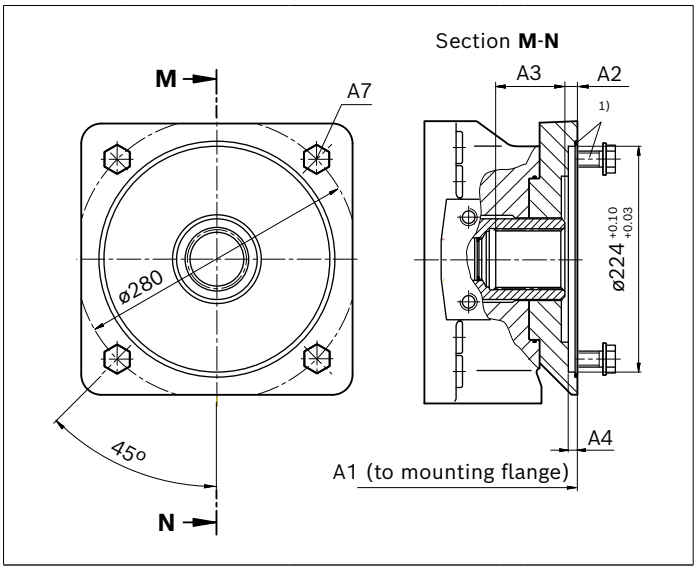
● = Available o = On request – = Not available

▼ **224-4**



K77	NG	A1	A2	A3	A4	A7[3]
	500	541	12.5	82	9	M20; 36 deep

▼ **224-4**



U77	NG	A1	A2	A3	A4	A7[3]
	355	498	12.5	75	9	M20; 37 deep

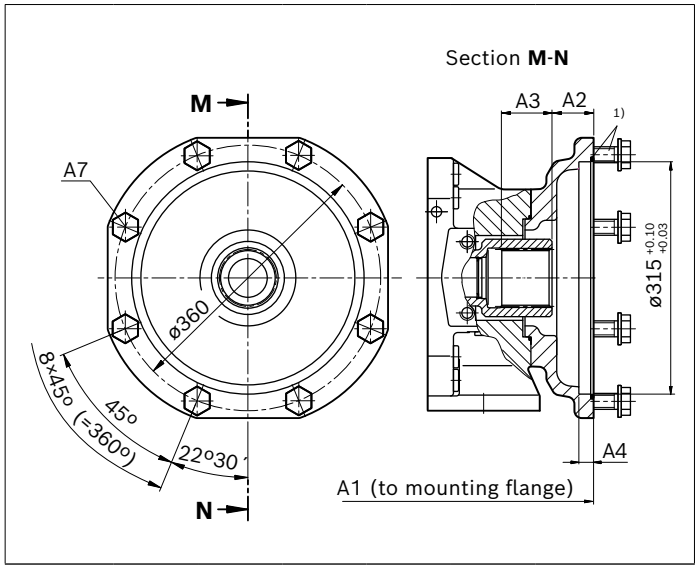
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

Flange ISO 3019-2 (metric)		Hub for splined shaft[2]								Code
Diameter	Symbol	Diameter	40	71	125	180	250	355	500	
315-8	⌬	N80×3×25×8H	–	–	–	–	–	–	●	K43

● = Available ○ = On request – = Not available

▼ **315-8**



K43	NG	A1	A2	A3	A4	A7[3]
	500	590	53.5	71.9	19	M20; 26 deep

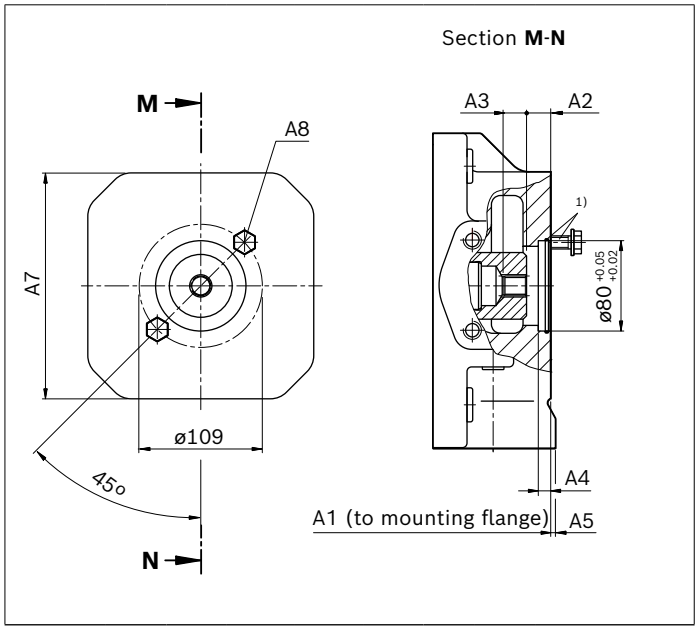
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

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

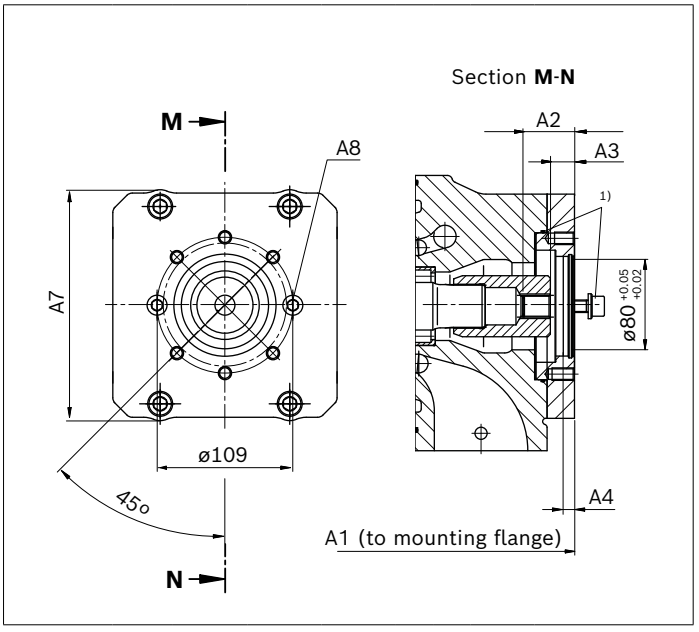
● = Available ○ = On request – = Not available

▼ **80-2**



KB2	NG	A1	A2	A3	A4	A5	A7	A8[3]
	71	291	21.5	19	10	2	140	M10; 15 deep

▼ **80-2**



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

Notice

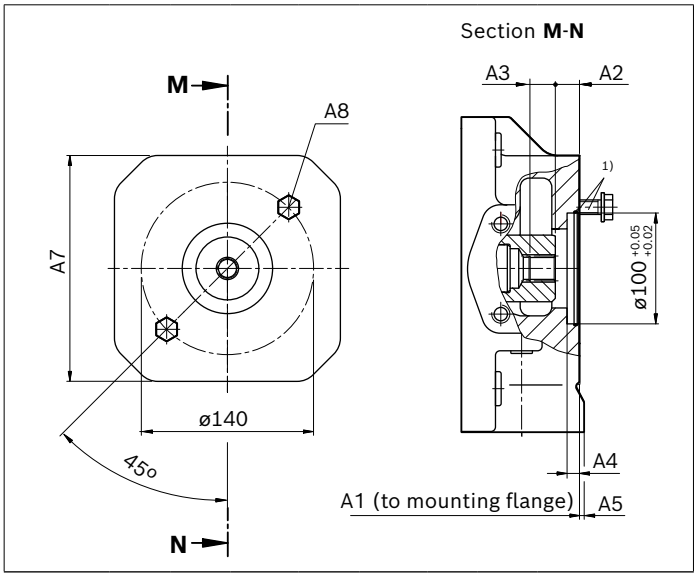
All attachment pumps must match the ATEX classification for the application in question.

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

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

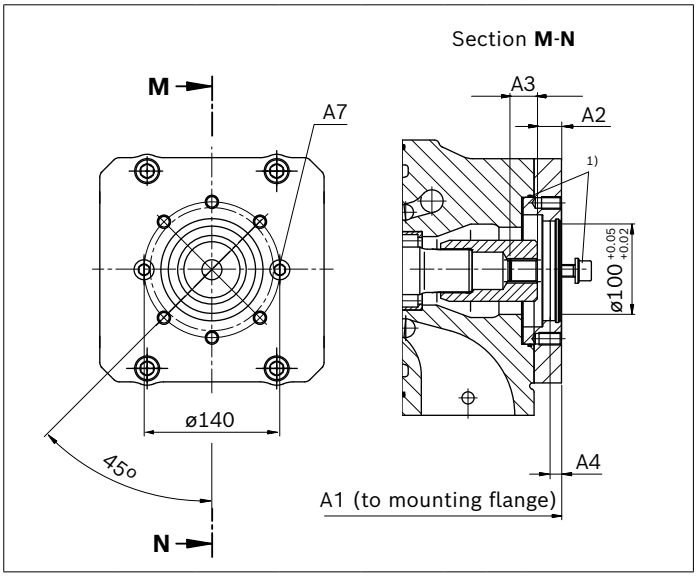
● = Available ○ = On request – = Not available

▼ **100-2**



KB3	NG	A1	A2	A3	A4	A5	A7[3]	A8
	40	290	20.3	23	10	–	–	M12; 18 deep
	71	291	20.4	23	10	2	140	M12; 18 deep

▼ **100-2**



UB3	NG	A1	A2	A3	A4	A7[3]
	125	369	20.5	24.9	10	M12; 22 deep
	180	393	20.5	24.9	10	M12; 22 deep
	250	453	19.5	23	10	M12; 18 deep
	355	482	19.5	23	10	M12; 18 deep

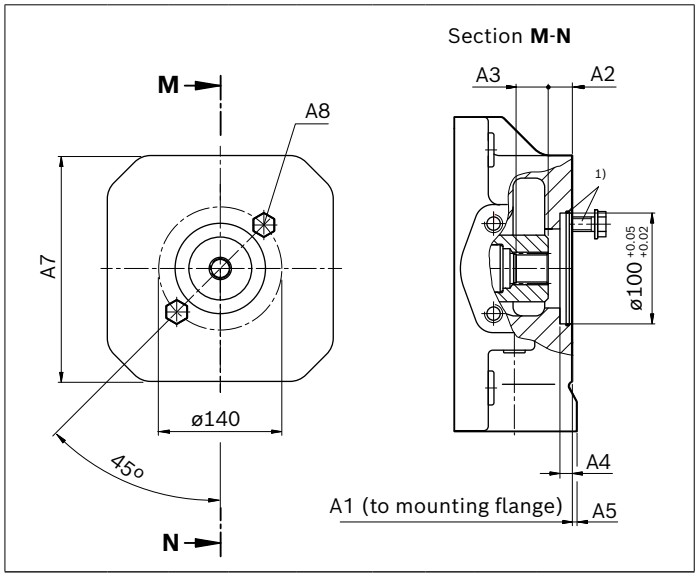
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

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

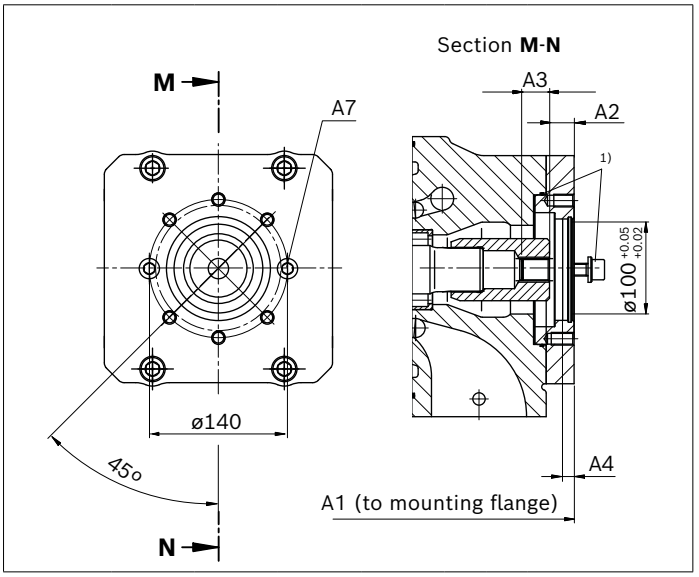
● = Available o = On request – = Not available

▼ **100-2**



KB4	NG	A1	A2	A3	A4	A5	A7[3]	A8
	40	290	20.8	27.5	10	–	–	M12; 18 deep
	71	316	20.8	27.5	8	–	–	M12; 24 deep
	500	505	20.4	28.9	10	15	240	M12; 18 deep

▼ **100-2**



UB4	NG	A1	A2	A3	A4	A7[3]
	125	369	18.9	29.5	10	M12; 22 deep
	180	393	18.9	29.5	10	M12; 22 deep
	250	453	20.9	29.5	10	M12; 18 deep
	355	482	20.9	29.5	10	M12; 18 deep

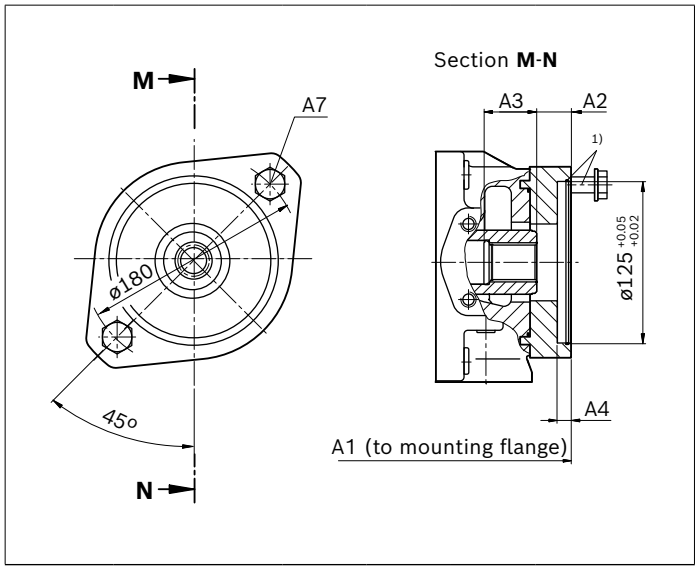
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

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

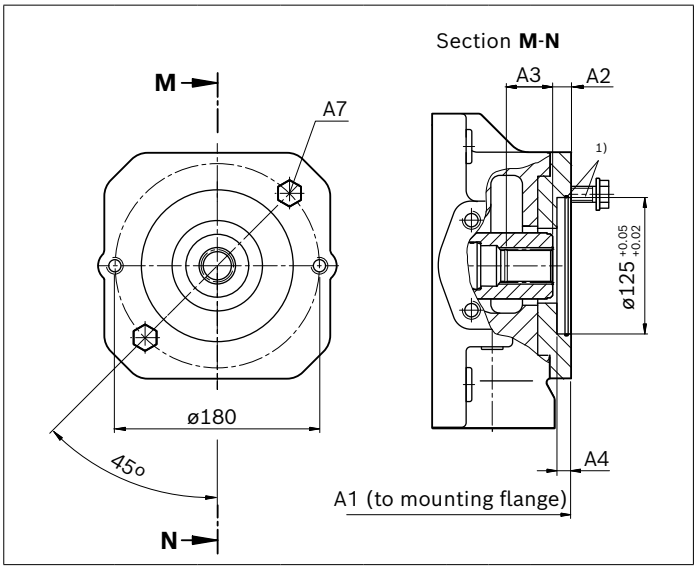
● = Available ○ = On request – = Not available

▼ **125-2**



KB5	NG	A1	A2	A3	A4	A7[3]
	71	321	23	38	10	M16; 29 deep
	500	505	19.3	40.4	10	M16; 20 deep

▼ **125-2**



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

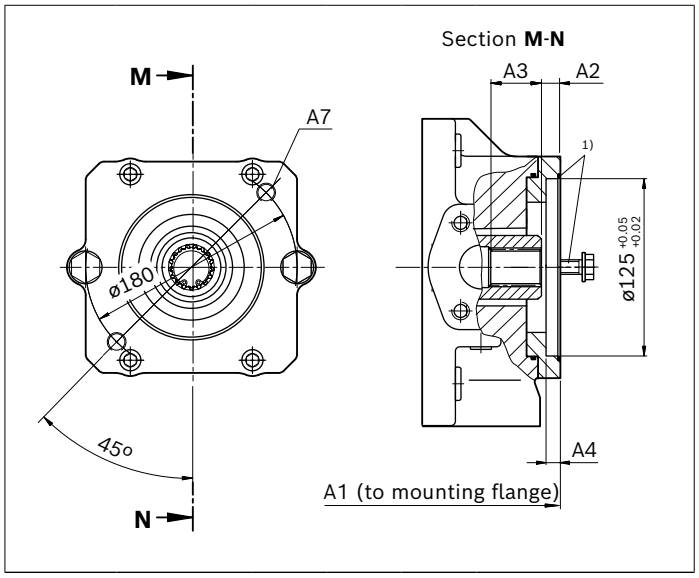
Notice
All attachment pumps must match the ATEX classification for the application in question.

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

Flange ISO 3019-2 (metric)		Hub for splined shaft[2]									Code
Diameter	**Symbol**	**Diameter**	**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**	
125-2		1 1/2 in 17T 12/24DP	–	–	●	●	●	●	–	–	–	UB6

● = Available o = On request – = Not available

▼ **125-2**



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

Notice
All attachment pumps must match the ATEX classification for the application in question.

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

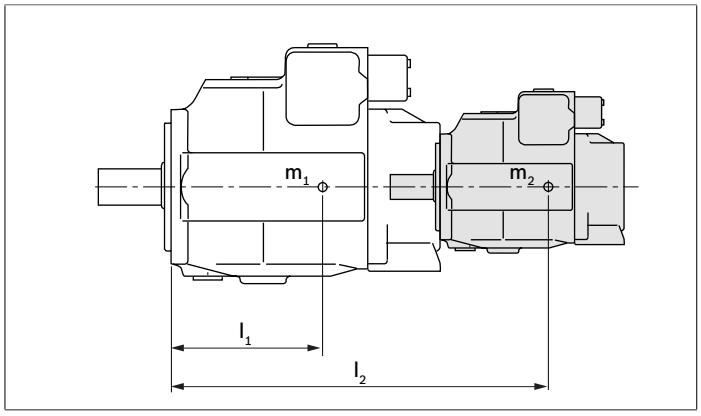
Overview of mounting options

Through drive			**Mounting options – 2nd Pump**
Flange ISO 3019-2	**Hub for splined shaft**	**Short designation**	**A4VSO ATEX NG (shaft)**
125–4	N32×2×14×9g	K31; U31	40 (Z)
140–4	N40×2×18×9g	K33; U33	71 (Z)
160–4	N50×2×24×9g	U34	125, 180 (Z)
224–4	N60×2×28×9g	U35	250 (Z)
	N70×3×22×8H	K77; U77	355 (Z)
315-8	N80×3×25×8H	K43	500 (Z)
Flange ISO 3019-2	**Hub for splined shaft**	**Short designation**	**A10VSO ATEX NG (shaft)**
80-2	3/4 in 11T 16/32DP	KB2; UB2	18 (S, R)
100-2	7/8 in 13T 16/32DP	KB3; UB3	28 (S, R)
	1 in 15T 16/32DP	KB4; UB4	45 (S, R)
125-2	1 1/4 in 14T 12/24DP	KB5; UB5	71 (S, R)
	1 1/2 in 17T 12/24DP	KB6; UB6	100 (S)

Combination pumps A4VSO + A4VSO (A4VSO + A10VSO)

A tandem pump, with two pumps of equal size, is permissible without additional supports, assuming that the dynamic mass acceleration does not exceed maximum 10 g (= 98.1 m/s^2).
For combination pumps consisting of more than two pumps, the mounting flange must be rated for the permissible mass torque (please contact us).

Notice
All attachment pumps must match the ATEX classification for the application in question.



m_1, m_2	Weight of pump	[kg]
l_1, l_2	Distance from center of gravity	[mm]
$T_m = (m_1 \times l_1 + m_2 \bullet l_2) \times \frac{1}{102}$		[Nm]

Permissible mass moment of inertia A4VSO

NG				**40**	**71**	**125**	**180**	**250**	**355**	**500**
static	T_m	Nm		1800	2000	4200	4200	9300	9300	15600
dynamic at 10 g (98.1 m/s^2)	T_m	Nm		180	200	420	420	930	930	1560
Weight	m	kg		39	53	88	102	184	207	320
Distance from center of gravity	l_1	mm		120	140	170	180	210	220	230

Permissible mass moment of inertia A10VSO

NG			**18**	**28**	**45**	**71**	**100**
static	T_m	Nm	500	880	1370	2160	3000
dynamic at 10 g (98.1 m/s^2)	T_m	Nm	50	88	137	216	300
Weight with through-drive plate	m	kg	14	19	25	39	54
Weight without through-drive plate			12	15	21	33	45
Distance from center of gravity	l_1	mm	90	110	130	150	160

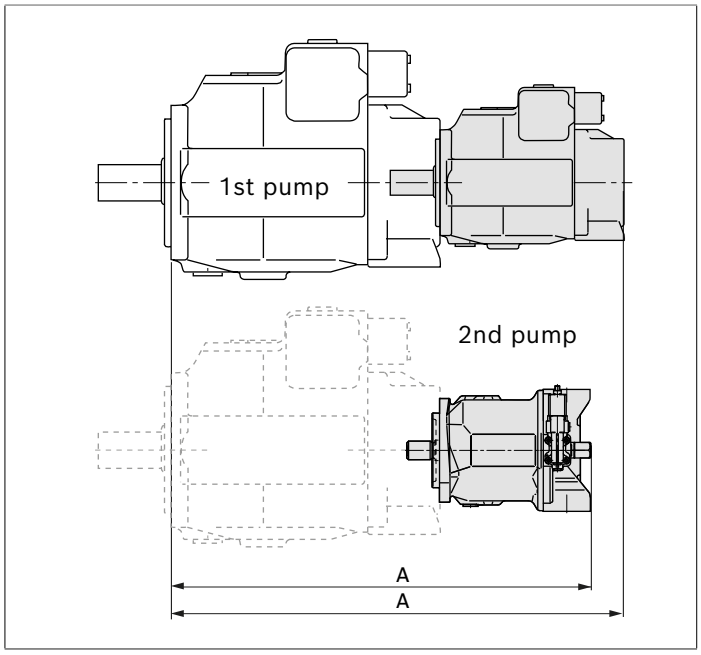
Dimensions of combination pumps made up of two A4VSO ATEX

Total length "A" with attachment pump A4VSO

Pump 1 sizes	**Pump 2 sizes**						
	40	**71**	**125**	**180**	**250**	**355**	**500**
40	554	–	–	–	–	–	–
71	582	611	–	–	–	–	–
125	635	664	724	–	–	–	–
180	659	688	748	768	–	–	–
250	719	748	808	828	904	–	–
355	748	777	837	857	933	962	–
500	771	800	860	880	976	1005	1110

Total length "A" with attachment pump A10VSO

Pump 1 sizes	**Pump 2** sizes				
	18	**28**	**45**	**71**	**100**
40	458	496	514	–	–
71	486	497	540	548	–
125	564	575	593	*626*	*698*
180	588	599	617	650	722
250	648	659	677	710	782
355	677	688	706	741	811
500	700	711	729	764	857



Notice
All attachment pumps must match the ATEX classification for the application in question.

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 leakage in the housing area must be directed to the reservoir via the highest drain port (**T**, **K**$_1$, **K**$_2$, **R**(**T**)).
For combination pumps, the leakage must be drained off at each single pump.
If a shared drain line is used for several units, make sure that the respective case pressure in each unit is not exceeded. The shared drain line must be dimensioned to ensure that the maximum permissible case pressure of all connected units is not exceeded in any operating conditions, particularly at cold start. If this is not possible, separate drain line 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 and drain lines must flow into the reservoir below the minimum fluid level.
The permissible suction height h_S results from the total pressure loss. However, it must not be higher than $h_{S\ max}$ = 800 mm. The minimum suction pressure at port **S** must also not fall below 0.8 bar abs. during operation and during a cold start.
Make sure to provide adequate distance between suction line and drain line for the reservoir design. This prevents the heated, and possible foaming return flow from being drawn directly back into the suction line.

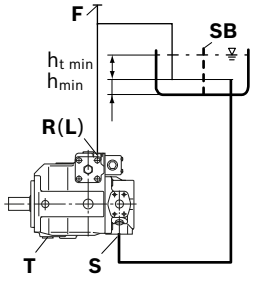
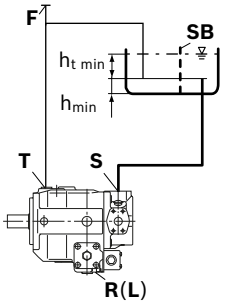
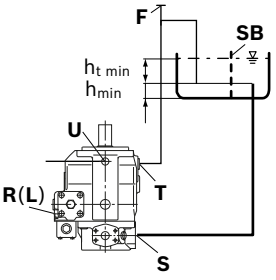
Notice
In certain installation positions, an influence on the adjustment or control can be expected. Gravity, dead weight and case pressure can cause minor characteristic shifts and changes in actuating time.

Installation position

See the following examples **1** to **7**.
Further installation positions are available upon request.
Recommended installation position: **1** and **2**

Below-reservoir installation (standard)

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

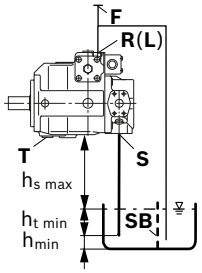
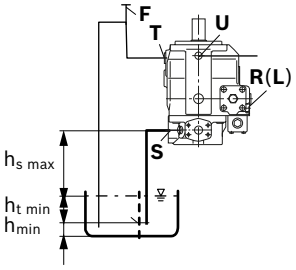
Installation position	Air bleed	Filling
1 	R(L) + F	S + R(L)
2 	T + F	S + T
3 	T + F	S + T + U

For key, see page 44.

Above-reservoir installation

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

Above-reservoir installation is not recommended for sizes 180 to 500.

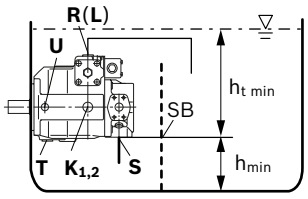
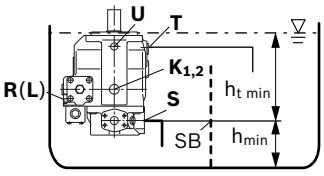
Installation position	Air bleed	Filling
4 	**F** + **R(L)**	**R(L)** + **F**
5[1] 	**F** + **T**	**T** + **F** + **U**

Key	
R(L)	Filling / Air bleeding
S	Suction port
T	Drain port
U	Flushing port
K_1, K_2	Flushing port
SB	Baffle (baffle plate)
$h_{t\ min}$	Minimum required immersion depth (200 mm)
h_{min}	Minimum required distance to reservoir bottom (100 mm)
$h_{S\ max}$	Maximum permissible suction height (800 mm)

Inside-reservoir installation

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

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

Installation position	Air bleed	Filling
6 	Via the highest port **R(L)**	Automatically via the open port **T**, **$K_{1,2}$** due to the position under the hydraulic fluid level
7 	Via the highest open port **T**, **U**	Automatically via the open port **R(L)**, **T**, **$K_{1,2}$** due to the position under the hydraulic fluid level

Notice

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

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

Project planning notes

- The A4VSO ATEX pump is designed to be used in open circuits.
- The project planning, assembly and commissioning of the axial piston unit require the involvement of qualified skilled persons.
- Before using the axial piston unit, please read the instruction manual (parts I and II) 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.
- Pressure controllers are not safeguards against pressure overload. A separate pressure relief valve is to be provided in the hydraulic system.
- Depending on the operating conditions of the axial piston unit (working pressure, fluid temperature), the characteristic curve may shift.
- Not all versions of the product are approved for use in a safety function according to ISO 13849. Please consult the proper contact at Bosch Rexroth if you require reliability parameters (e.g. $MTTF_d$) for functional safety.
- Working ports:
  - The ports and fastening threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure 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. 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 an undefined position due to contamination (e.g. impure hydraulic fluid, abrasion or residual dirt from components). As a result, the hydraulic fluid flow and the build-up of torque in the axial piston unit can no longer respond correctly to the operator's specifications. Even the use of various filter elements (external or internal flow filtration) will not rule out a fault but merely reduce the risk. The machine/system manufacturer must test whether remedial measures are needed on the machine for the application concerned in order to bring the driven consumer into a safe position (e.g. safe stop) and ensure any measures are appropriately implemented.

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