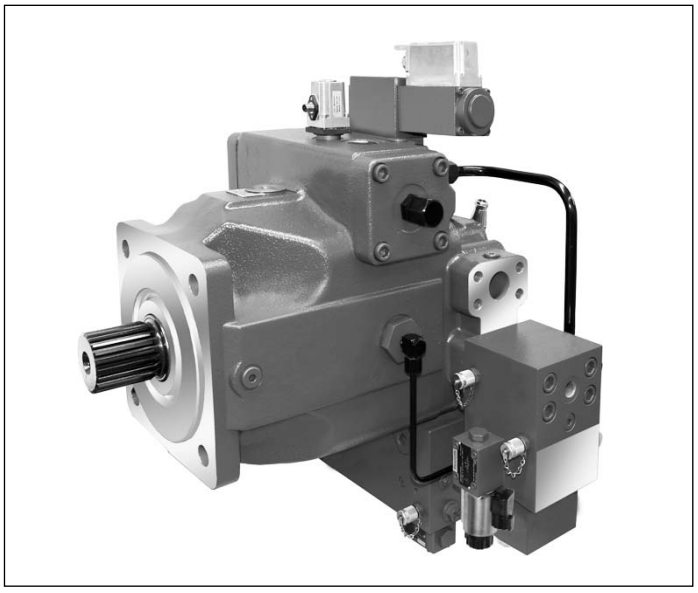
Axial piston units
with DS2 secondary control
A4VSG Series 10 and 3x

RE 92058
Edition: 11.2018
Replaces: 12.2017



- For highly dynamic applications
- Sizes 40 to 1000
- Nominal pressure 315 bar
- Maximum pressure 400 bar
- Closed circuit

Features

- Highly dynamic rotary drive
- Motor and generator operation for both directions of rotation
- With energy recovery and energy storage
- With speed, position, or torque control for high control performance and dynamics
- Throttle-free coupling and energy transmission of any number of independently operating axial piston units (motor or generator operation) on a common supply line with constant working pressure. Compact digital control electronics.

Contents

Type code

01	02	03	04	05	06		07	08		09	10	11	12	13	14	15
	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 315 bar, maximum pressure 400 bar	**A4VS**

Operating mode

03	Pump / motor, closed circuit	**G**

Size (NG)

		40	71	125	180	250	355	500	750	1000
04	Geometric displacement, see table of values on page 7	**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**

Control device

			40	71	125	180	250	355	500	750	1000	
05	Secondary speed control	with mounted control valve	●	●	●	●	●	●	●	●	●	**DS2R**
		with mounted servo valve	○	○	○	○	○	○	○	○	○	**DS2S**
		without valve	○	○	○	○	○	○	○	○	○	**DS2E**

Additional valve (see table “Flow direction” on page 8)

06	Load holding function with LS 1363	Clockwise swivel direction	**LR**
		Counter-clockwise swivel direction	**LL**
	Load holding function with LS 1363 not piped up (see page 32)		**LX**
	Without load holding function		**0**

Series

		40	71	125	180	250	355	500	750	1000	
07	Series 1, index 0	●	●	–	–	–	–	–	–	–	**10**
	Series 3, index 0	–	–	●	●	●	●	▲	●	●	**30**
	Series 3, index 3; efficiency-optimized rotary group	–	–	–	–	○	○	●	○	–	**33**

Direction of rotation

08	Viewed on drive shaft	alternating	**W**

Sealing material[1)]

		40	71	125	180	250	355	500	750	1000	
09	FKM (fluoroelastomer) according to ISO 1629	●	●	●	●	●	●	●	●	●	**V**

Drive shaft

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

Mounting flange

			40	71	125	180	250	355	500	750	1000	
11	According to ISO 3019-2 metric	4-hole	●	●	●	●	●	●	–	–	–	**B**
		8-hole	–	–	–	–	–	–	●	●	●	**H**

Working port

12	SAE flange ports **A** and **B**, located on same side, metric fastening thread	**10**

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

1) For more information about sealing material, see data sheet 92100

01	02	03	04	05	06		07	08		09	10	11	12	13	14	15
	A4VS	**G**				**/**			**–**				**10**			

Through drive (for mounting options and dimensions, see data sheet 92100)

	Flange **ISO 3019-1** (metric)		Hub for splined shaft[1]										
13	Diameter	Attachment	Diameter	**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**	
	Without through drive			●	●	●	●	●	●	●	●	●	**N00**
	125, 4-hole		32x22x14x9g	●	●	●	●	●	○	○	○	○	**K31**
	140, 4-hole		40x2x18x9g	–	●	●	●	●	●	●	○	●	**K33**
	160, -4-hole		50x2x24x9g	–	–	●	●	●	●	●	○	●	**K34**
	224, 4-hole		60x2x28x9g	–	–	–	–	●	●	●	●	●	**K35**
	224, 4-hole		70x3x22x9g	–	–	–	–	–	●	●	○	○	**K77**
	315, 8-hole		80x3x25x9g	–	–	–	–	–	–	●	○	○	**K43**
	400, 8-hole		90x3x28x9g	–	–	–	–	–	–	–	●	●	**K76**
	400, 8-hole		100x3x32x9g	–	–	–	–	–	–	–	–	●	**K88**
	With mounted incremental encoder 1000 pulses/rev.			●	●	●	●	●	●	●	●	●	**T03**[3]
	Prepared for mounted incremental encoder, through drive plugged with cover			●	●	●	●	●	●	●	●	●	**T10**[3]
	Special tachometer mounting			○	○	○	○	○	○	○	○	○	**T99**
	Prepared for mounting a special tachometer, plugged with cover			○	○	○	○	○	○	○	○	○	**T00**
	Prepared for through drive, with pressure-proof plugged cover			●	●	●	●	●	●	●	●	●	**K99**

Valves

14	Without valve block	●	●	●	●	●	●	●	●	●	**0**
	Mounted electrically releasable check valve RVE	●	●	●	●	●	●	●	●	●	**1**[2]
	Electrically releasable shut-off block for combination with load holding function LS 1363, type code L, without overload protection for deactivated isolating valve.	●	●	●	●	●	●	●	●	●	**2**[4]
	Electrically releasable shut-off block for combination with load holding function LS 1363, type code L, and block for manual overload protection MOPS	●	●	●	●	●	●	●	●	●	**3**

Filtration

15	Without filter	●	●	●	●	●	●	●	●	●	**N**
	Intermediate plate filter (see data sheet 92076)	●	●	●	●	●	●	●	●	●	**Z**

● = Available ○ = On request – = Not available

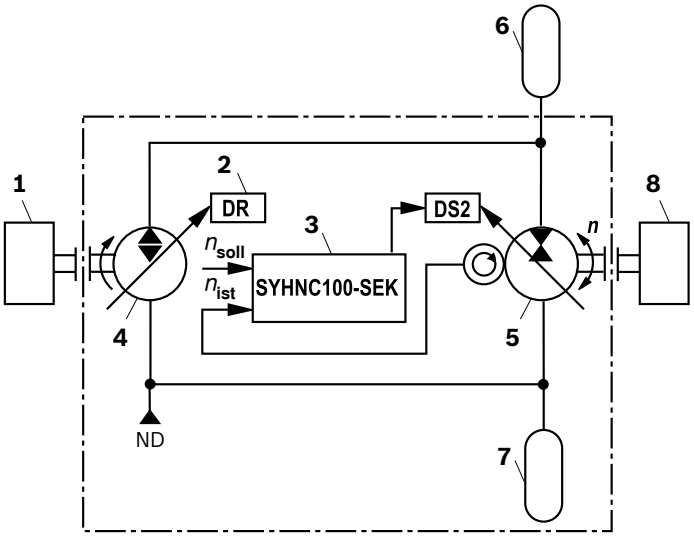
Notice

▶ In addition to the type code, please specify the relevant technical data when placing your order. (See also data sheet 92100)

1) Hub for splined shaft according to ANSI B92.1a
2) Combination with swivel direction (position 06) L or R not possible.
3) Preferred types
4) For more information see “A4VSG...DS2 for use in winch and crane applications” on page 32

Function

Secondary control is an energy-saving drive concept with high dynamics for the installation of closed loop rotational speed, position, or torque control with energy recovery.
The secondary controlled hydrostatic axial piston units operate on a supply network with constant high pressure and low pressure.
The power takeoff or return to the supply network is throttle-free and based on demand whereby the displacement of the axial piston units adapts to the respective load case.
Any number of units operating as a motor or pump can thereby be arranged in parallel. Four-quadrant operation is possible, whereby the units for reversing the speed or torque are swiveled over “zero”. This also reverses the direction of the flow.



1	Drive	**5**	Secondary unit
2	Pressure controller	**6**	HP accumulator
3	Control electronics	**7**	LP accumulator
4	Primary unit	**8**	Output

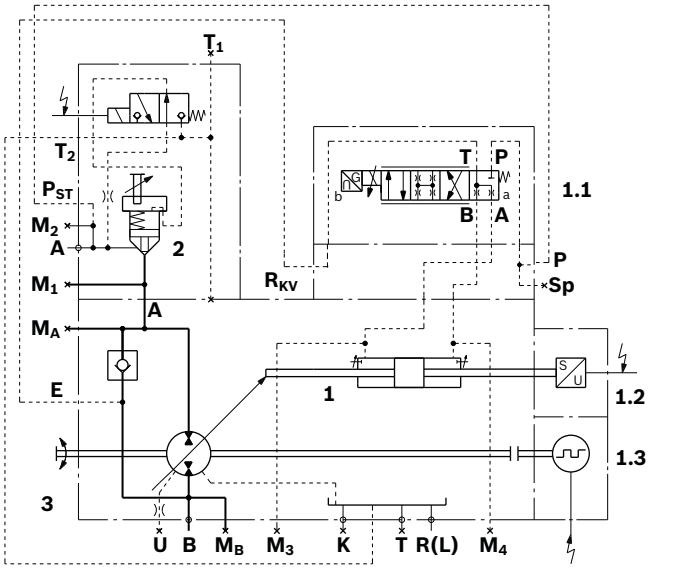
Associated electronics (see also page 13)

- Digital controller assembly group SYHNC100-SEK...3x
- Amplifier card VT-VRRA 1-527-20/V0 (for sizes 40 and 71)
- Amplifier card VT-VRRA 1-537-20/V0 (for sizes 125 to 1000)
- Card holder VT3002-1-2x/32F

An energy accumulator can be installed in the high and low pressure system between the primary and secondary units if necessary.
The flow peaks are covered by the accumulator. It is also used to store the recovered energy in the hydraulic network from the secondary unit if no other consumers are present.
Together with the pressure-controlled primary unit and the operating conditions of the secondary unit, the charge state of the accumulator and its pre-charge pressure determine the constant high pressure of the system.
The specific properties of the secondary control, such as the reduction in technical equipment in the primary area, the possibilities of energy recovery and the storage of braking energy, and the virtually load-independent rotational speed and positioning accuracy open up a wide field of applications.

Circuit diagram DS.. Sizes 40 to 355

▼ **Circuit diagram standard A4VSG...DS2R/...W-... 10 T03...1N**



Secondary unit components	
1	Axial piston unit A4VSG, sizes 40 to 355
1.1	4-way control valve (see data sheet 29026)

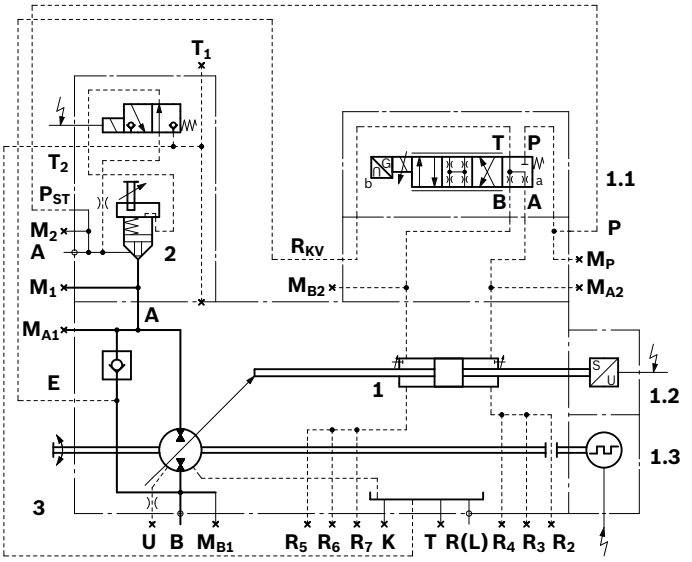
NG (A4VS)	**Type**
40, 71	4WRPH6 C3 B24L -2X/G24KO/M-750
125 to 355	4WRPH10 C3 B50L -2X/G24KO/M-750

1.2	Swivel angle sensor AWXF (see page 11)
1.3	Incremental encoder GEL 293 (see page 10)
2	Electrically releasable check valve RVE Ordering code: Order item 14, type code 1 (see page 12)
3	Anti-cavitation valve, order separately (see page 12)

Ports	
A	Working pressure (high-pressure series)
B	Low pressure (high-pressure series)
M_A; M_1	Measuring working pressure
M_B	Measuring low pressure
M_2	Measuring working pressure
M_3; M_4	Measuring control pressure (from NG125)
S_P	External control pressure
T	Fluid drain
T_1; T_2	Leakage/air bleeding
K	Flushing
R(L)	Control fluid return flow
U	Bearing flushing
P_{ST}	Pilot pressure
E	Boost pressure
R_{KV}	Control fluid return flow
P	Control pressure

Circuit diagram DS.. Sizes 500 to 1000

▼ **Circuit diagram standard A4VSG...DS2R/...W-... 10 T03...1N**



Secondary unit components	
1	Axial piston unit A4VSG, sizes 500 to 1000
1.1	4-way control valve (see data sheet 29026)

NG (A4VS)	**Type**
500 to 1000	4WRPH10 C3 B50L -2X/G24KO/M-750

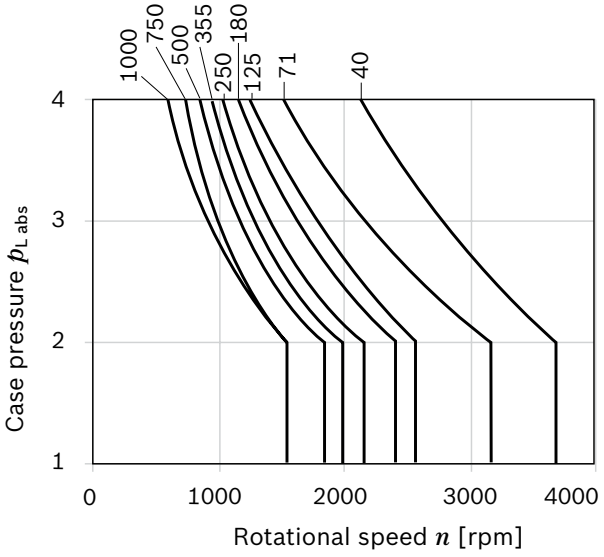
1.2	Swivel angle sensor AWXF (see page 11)
1.3	Incremental encoder GEL 293 (see page 10)
2	Electrically releasable check valve RVE Ordering code: Order item 14, type code 1 (see page 12)
3	Anti-cavitation valve, order separately (see page 12)

Ports	
A	Working pressure (high-pressure series)
B	Low pressure (high-pressure series)
M_{A1}; M_1; M_2	Measuring working pressure
M_{B1}	Measuring low pressure
M_{A2}	Measuring control pressure
M_{B2}	Measuring control pressure
M_P	External control pressure
T	Fluid drain
T_1; T_2	Leakage/air bleeding
K	Flushing
R(L)	Control fluid return flow
U	Bearing flushing
P_{ST}	Pilot pressure
E	Boost pressure
R_{KV}	Control fluid return flow
P	Control pressure
R2 - R7	Air bleeding the control

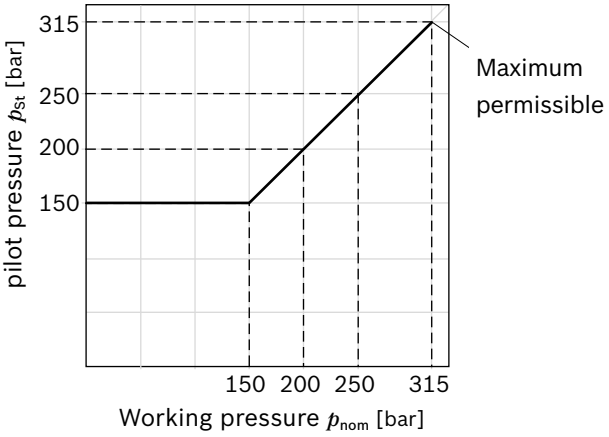
Working pressure range

Pressure at working port A		Definition
Nominal pressure[1] p_{nom}	315 bar	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure[2] p_{max}	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) 16 bar	see also data sheet 92100	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) 16 bar		Minimum pressure at the low-pressure side (**A** or **B**) which is required to prevent damage to the axial piston unit.
Boost pressure		
Maximum boost pressure $p_{E\ max}$	30 bar	
Recommended boost pressure $p_{S\ max}$	16 bar	
Auxiliary pump inlet pressure Suction pressure $p_{S\ min}$ (ν =10 to 300 mm²)	≥ 0.7 bar absolute	
Pilot pressure		
Maximum permissible pilot pressure[1] $p_{St\ max}$	315 bar	
Minimum required pilot pressure $p_{St\ max}$		Working pressure or 150 bar (see diagram)
Case pressure at port T, R(L), K_2, K_3		
Maximum static pressure $p_{L\ abs\ max}$	4 bar	A drain line to the reservoir is required.

▼ **Permissible shaft seal pressure load**



▼ **Required pilot pressure depending on the working pressure**



Notice
The table data are reference values (valid for mineral oil).
Specified pressures according to DIN 24312.
Please contact us for special operating conditions (documentation@boschrexroth.de).

1) Due to the permissible data of the control valve and other system components
2) Please contact us

Technical data

For a highly dynamic accurate drive system, a backlash-free minimum mass moment of inertia directly on the shaft of the secondary unit is required. Information on this can be found in the row “Required minimum total moment of inertia”. A higher moment of inertia improves the control behavior.

Size		**NG**		**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**
Displacement, geometric, per revolution		$V_{g\,max}$	cm³	40	71	125	180	250	355	500	750	1000
Maximum rotational speed[1)]	at 1.0 $V_{g\,max}$; $p_E \geq 15$ bar	n_{nom}	rpm	3700	3200	2600	2400	2000	2000	1800	1600	1600
	at 0.8 $V_{g\,max}$; $p_E \geq 15$ bar	n_{max}	rpm	4900	4100	3400	2900	2600	2200	2000	1800	1600
Power	at n_{nom}, $V_{g\,max}$ and Δp = 300 bar	P	kW	74	114	163	216	250	355	450	600	800
Torque	at $V_{g\,max}$ and Δp = 300 bar	T	Nm	191	339	597	859	1194	1695	2387	3581	4775
Control volume	from 0 to $V_{g\,max}$	$V_{S\,max}$	cm³	5.9	10.5	26.0	26.0	50.9	50.9	63.8	105	129
Actuating time	from 0 to $V_{g\,max}$	t_s	s	0.030	0.040	0.050	0.050	0.060	0.060	0.080	0.090	0.10
Moment of inertia			kgm²	0.0049	0.0121	0.0300	0.055	0.0959	0.19	0.3325	0.66	1.20
Required minimum total moment of inertia			kgm²	0.25	0.06	0.15	0.27	0.48	0.95	1.66	3.33	6
Weight (with RVE and incremental encoder) approx.		m	kg	67	83	126	140	225	248	381	523	630

Determining the characteristics for operation as a pump

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

Key

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

Determining the characteristics for operation as a motor

Displacement	$q_v = \frac{V_g \times n}{1000 \times \eta_v}$	[l/min]
Torque	$T = \frac{V_g \times \Delta p \times \eta_{hm}}{20 \times \pi}$	[Nm]
Output power	$P = \frac{2\,\pi \times T \times n}{60000} = \frac{q_v \times \Delta p \times \eta_t}{600}$	[kW]

Key

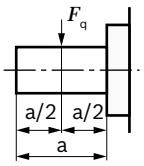
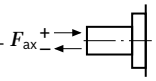
V_g	=	Displacement per revolution [cm³]
Δp	=	Differential pressure [bar]
n	=	Rotational speed [rpm]
η_v	=	Volumetric efficiency
η_{hm}	=	Hydraulic-mechanical efficiency
η_t	=	Total efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Notice

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

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

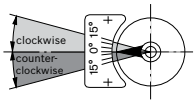
Permissible radial and axial loading of the drive shaft

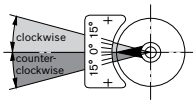
Size		NG		41	71	125	180	250	355	500	750	1000
Maximum radial force at a/2		$F_{q\,max}$	N	1200	1700	2500	3100	4000	4400	5000	6000	10000
Maximum axial force												
at case pressure p_{max} 1 bar absolute		± $F_{ax\,max}$	N	1000	1400	1900	2250	3000	3600	4000	5450	8000
at case pressure p_{max} 4 bar absolute		+ $F_{ax\,max}$	N	620	810	1050	1400	1850	2100	2500	3150	4700
		− $F_{ax\,max}$	N	1380	1950	2750	3050	4150	5050	5500	7800	11000

Notice

- The specified values are maximum values and do not apply to continuous operation. The drive with radial loading (pinion, V-belt) is not permissible!

Flow direction

Size 40 to 355	Swivel direction[1]	Direction of rotation[2] clockwise	Direction of rotation[2] counter-clockwise	Pressure in	Operating mode	Control valve 4WRPH Part of control	Control valve 4WRPH Flow direction	Sign Swivel angle Actual value
	clockwise	**B** to **A**		**A**	Pump		**P** to **A** **B** to **T**	positive
	clockwise		**A** to **B**	**A**	Motor		**P** to **A** **B** to **T**	positive
	counter-clockwise		**B** to **A**	**A**	Pump		**P** to **B** **A** to **T**	negative
	counter-clockwise	**A** to **B**		**A**	Motor		**P** to **B** **A** to **T**	negative

Size 500 to 1000	Swivel direction[1]	Direction of rotation[2] clockwise	Direction of rotation[2] counter-clockwise	Pressure in	Operating mode	Control valve 4WRPH Part of control	Control valve 4WRPH Flow direction	Sign Swivel angle Actual value
	clockwise	**B** to **A**		**A**	Pump		**P** to **B** **A** to **T**	negative
	clockwise		**A** to **B**	**A**	Motor		**P** to **B** **A** to **T**	negative
	counter-clockwise		**B** to **A**	**A**	Pump		**P** to **A** **B** to **T**	positive
	counter-clockwise	**A** to **B**		**A**	Motor		**P** to **A** **B** to **T**	positive

1) Vertical view of the optical swivel angle indicator
2) Viewed on drive shaft

DS2R speed control

Speed control is when the DS2 control device changes the swivel angle and thus the
displacement of the axial piston unit at a constant working pressure until the torque required to maintain the specified speed is built up.
In a supply network with constant working pressure, the torque is proportional to the swivel angle or the displacement of the axial piston unit. The displacement is sensed by an inductive position transducer, the speed by an incremental encoder.
A control valve controls the displacement. When higher requirements are placed on the dynamics of the drive system, the control valve can be replaced with a servo valve.
When the emergency shut-down is used, the electrically releasable check valve RVE (hydraulic connector) at the pressure port is brought to the locked position. This then prevents energy from being supplied to the secondary unit; only regenerative braking with energy recovery to the hydraulic network is possible.

The following pages describe:

- The incremental encoder GEL 293 for sensing the speed
- The position transducer AWXF for sensing the swivel angle
- The electrically releasable RVE A4VS check valve
- The digital controller assembly group SYHNC100-SEK

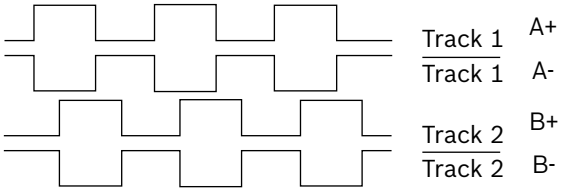
Information on pilot valve (DS2R) 4WRPH6/10..-750 can be found in data sheet 29026.

Incremental encoder GEL 293

Technical data (type code position 12 “T03”)	
Resolution	
T03	1000 increments/revolution
Type of protection according to EN 60529	IP 66 with installed and locked plug-in connector
Power consumption: $R_L = \infty$; U_B= 5 V	≤1.0 W
Ambient temperature	–20 °C to +80 °C

Signal pattern T

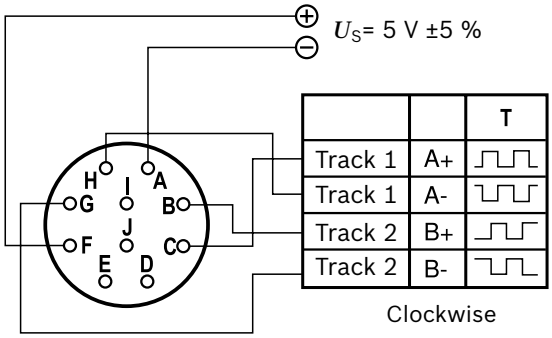
Supply voltage U_S = 5 V ± 5%; signal voltage U_{Si} = 5 V
Clockwise-rotating signal image viewed on drive shaft



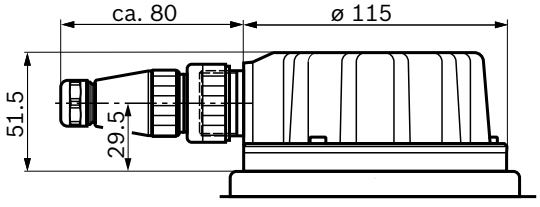
Electrical connection

Maximum cable lengths
Between the incremental encoder and the downstream electronics: earth the cable shield on one side of the receiver. The data specified are reference values and refer to the cable type LiYCY 6 (10) x 0.25 mm².

f	[kHz]	5	10	20	50	100	200
l_{max}	[m]	200	200	200	200	145	72



▼ **Dimensions** (in mm)



The plug-in connector is included in the scope of delivery. It is possible to use other speed sensing systems. In this case, please contact us (documentation@boschrexroth.de).

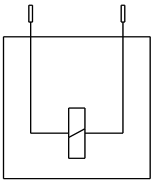
Connector for solenoids

DEUTSCH DT04-2P-EP04

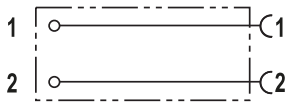
Molded, 2-pin, without bidirectional suppressor diode
The mounted mating connector has the following type of protection:

▶ IP67 (DIN/EN 60529)

▼ **Switching symbol**



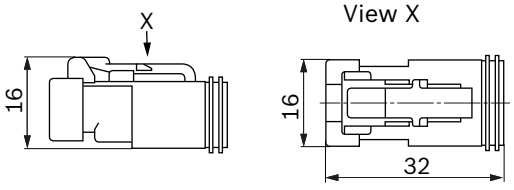
▼ **Circuit diagram pin image**



▼ **Plug-in connector directional valve with device connector K40 (DEUTSCH connector)**

Code 2P DT06 K40..	**Voltage** DC/AC U	**Current** I_{max}	**Color**	**Wire cross section** [mm²]	**Material number**
..AWG14	10...32 V	5 A	gray	AWG14-16 1.3..2.08	R900733451
..AWG16	10...32 V	5 A	gray	AWG16-18 0.83..1.3	R901017847

▼ **Dimensions** (in mm)



The mating connector is not included in the scope of delivery and must be ordered separately.
The following are required:

Load holding function LS1363	1 connector
Electrically releasable check valve	1 connector
Electrically releasable shut-off block	1 connector
Manual overload protection MOPS	2 connectors

Accessories (not included in the scope of delivery)

Crimping tool	Type HDT-4800, Deutsch

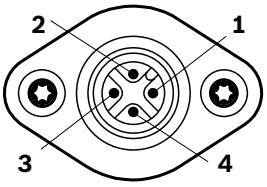
Notice

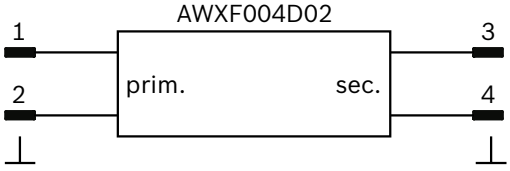
Connector with 10 m molded cable, GL classification, type of protection IP67, please contact us.
Further information in RE 08006 “Plug-in connectors and wiring harnesses for valves and sensors in hydraulic systems”.

Swivel angle indicator AWXF

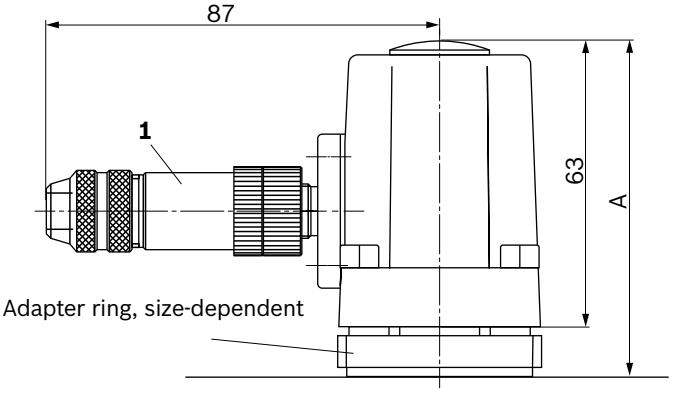
Technical data			
Measuring system			Differential transformer
Control stroke		mm	±4.5
Linearity tolerance		%	≤1.0
Carrier frequency		kHz	5
Coil resistance (at 20 °C)	Primary coil	Ω	120
	Each secondary coil	Ω	280
Electrical connection			Plug-in connection M12 × 1, 4-pin
Plug-in connection type of protection according to EN 60529			IP 67 with installed and locked plug-in connector
Ambient temperature			–20 °C to +80 °C

▼ **Electrical connection**





▼ **Dimensions** (in mm)



1 Plug-in connector is included in the scope of delivery.

▼ **Table of values dimension A**

Size								
40	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**
86	90	96	86	81	81	81	81	81

Electrically releasable check valve RVE

(Order item 13, type code 1)

Technical data		
Electric (see also directional seat valve M–3SED6, data sheet 22049)		
DC voltage	V	24
Power consumption	W	30
Duty cycle		Continuous operation
Type of protection according to EN 60529		IP 67 with installed and locked plug-in connector

Hydraulic (see also built-in valves type LC.., data sheet 21010)			
Size	Logic element	installed in the housing	maximum flow $q_{v\,max}$ in l/min at a pressure drop of 5 bar
40	LC16B40D-7X/	AGEV4-05701-AB/46	200
71	LC25B40D-7X/	AGEV4-05702-AB/46	400
125	LC32B40D-7X/	AGEV4-05703-AB/46	700
180	LC32B40D-7X/	AGEV4-05703-AB/46	700
250	LC32B40D-7X/	AGEV4-05704-AB/46	700
355	LC32B40D-7X/	AGEV4-05704-AB/46	700
500	LC40B40D-7X/	AGEV4-05705-AB/46	1200
750	LC40B40D-7X/	AGEV4-05705-AB/46	1200
1000	LC40B40D-7X/	AGEV4-05705-AB/46	1200

Anti-cavitation valve S...A

(Without order item, selection according to the following table)

Ordering code for A4VSG	
Size	Anti-cavitation valve
40	S10A1.0
71	S15A1.0
125	S20A1.0
180	S20A1.0
250	S25A1.0
355	S25A1.0
500	S30A1.0
750	S30A1.0
1000	S30A1.0

Notice

- For details of the anti-cavitation valve, see data sheet 20375.

Digital controller assembly group SYHNC100-SEK...-3x

(Without order item; selection according to data sheet 30162)

Features

The digital controller assembly group SYHNC100-SEK-...-3x is suitable for the speed and torque control, closed loop torque control and open loop torque control of secondary controlled axial piston units type A4VS..DS2.
It contains interfaces to measure the swivel angle position of single or tandem units as well as for speed return with incremental encoders. The software contains control and monitoring functions specifically designed for secondary control.

Additional features:

- Up to 2 modules for evaluating the signals from up to 4 LVDT swivel angle sensors
- Up to 2 incremental encoder inputs with monitoring function for speed sensing
- Up to 8 analog inputs (voltage or current) for the setpoint specification
- Up to 6 analog outputs for controlling downstream valve amplifiers
- Digital inputs and outputs for communication with a higher-level control
- Profibus DP or CANopen for communication with a higher-level control
- Layout of the master/slave applications via internal CAN interface
- Installation on a 35 mm top hat rail

Software functionality

The software basically contains the control types: speed control, closed loop torque control, and open loop torque control.
You can switch between the closed loop control types during operation without any hitches.
The configuration, parameterization and diagnosis of the SYHNC100-SEK-...-3x is done using the PC program WINPED. Only the “WIN-PED 6.6” version is used.
This can be downloaded from www.boschrexroth.com/hnc100 free of charge.
System-specific software extensions can be created on request.

Monitoring functions

- Cable break monitoring for incremental and SSI encoders
- Cable break monitoring for swivel angle sensor
- Acceleration too high
- Overspeed (max. rotational speed)
- Speed difference target / actual
- Swivel angle difference target / actual

Further information

Data sheet 30162 “Digital controller assembly group HNC100-SEK for the secondary control of axial piston units, type SYHNC100-SEK

Notice about the system structure

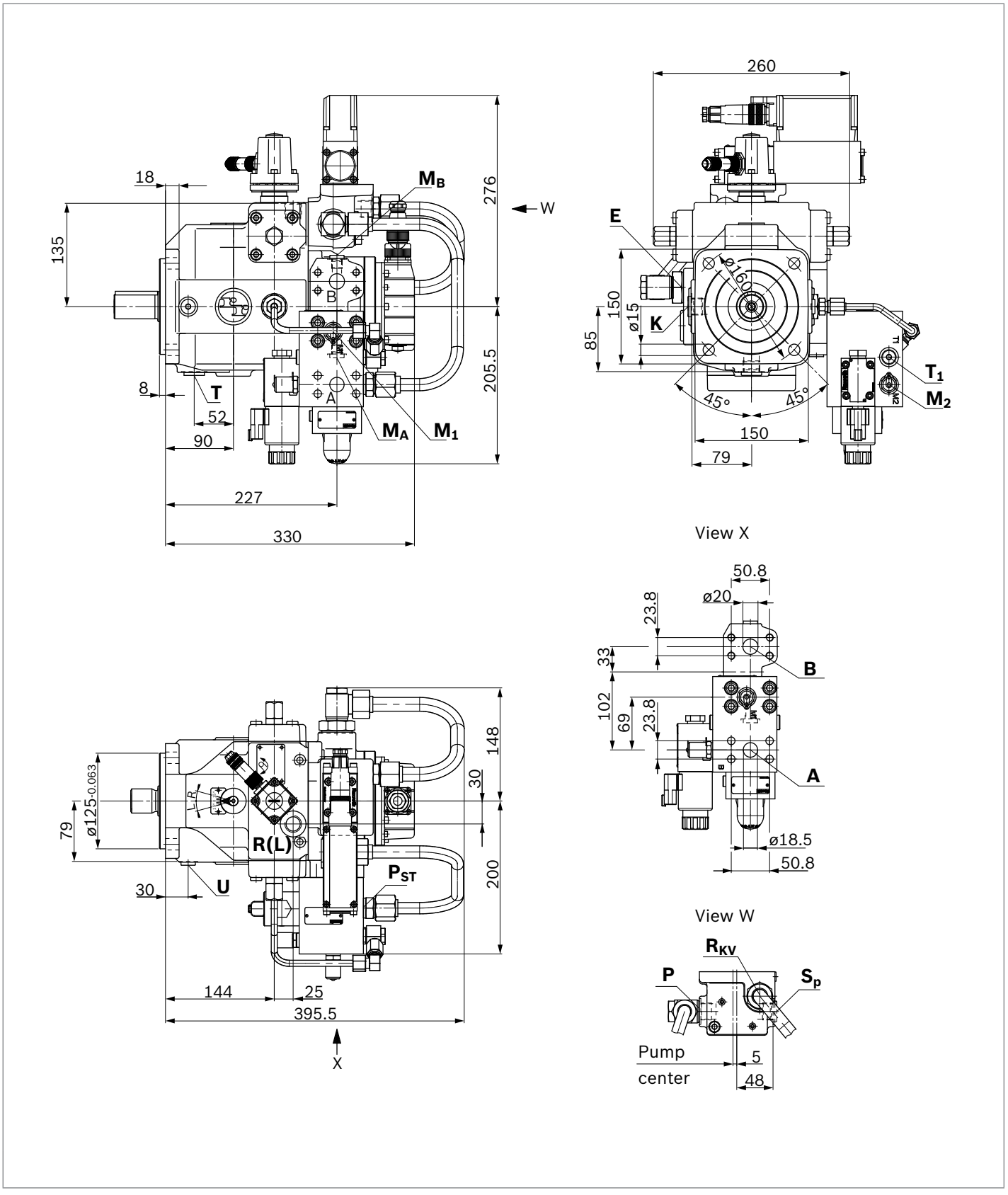
The secondary unit with ordering code 04 = “DS2R” (with control valve) additionally requires the following, which are not included in the scope of delivery:

- Digital controller assembly group SYHNC100-SEK-...-3x according to data sheet 30162
- Amplifier VT-VRRA 1-527-20/V0 according to data sheet 30041 (for A4VS sizes 40 and 71)
  or
  amplifier VT-VRRA 1-537-20/V0 according to data sheet 30041 (for A4VS sizes 125 to 1000)
- Card holder VT3002-1-2X/32F, material number 1834486001, according to data sheet 29928

Dimensions, size 40

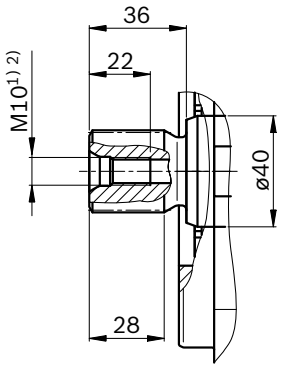
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



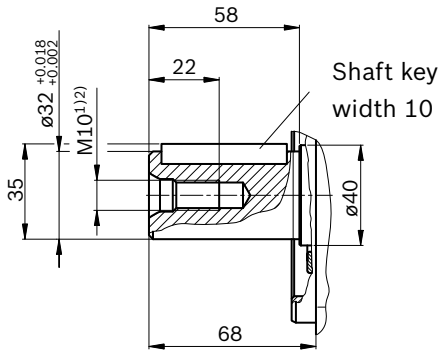
▼ **Splined shaft DIN 5480**

Z – W32x2x14x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø32 AS 10x8x56



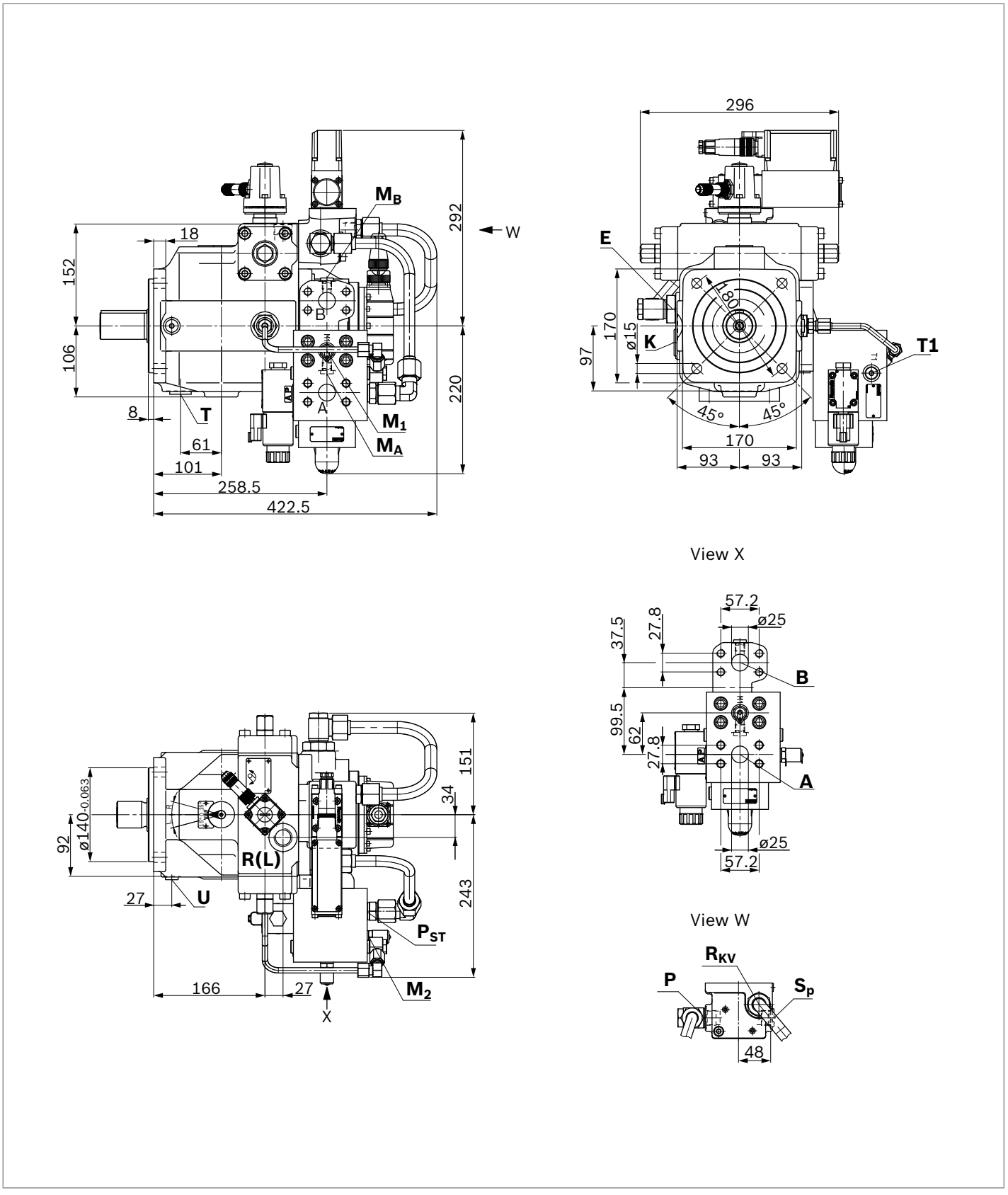
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	3/4 in M10 × 1.5; 17 deep	400	O
M_A; M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4 in; 12 deep	400	X
S_P	Control pressure	DIN 3852	M22 × 1.5; 14 deep	315	O
T	Fluid drain	DIN 3852	M22 × 1.5; 14 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M22 × 1.5; 14 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M14 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 1/2; 15 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M22 × 1.5; 20 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	315	piped up

1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
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, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 71

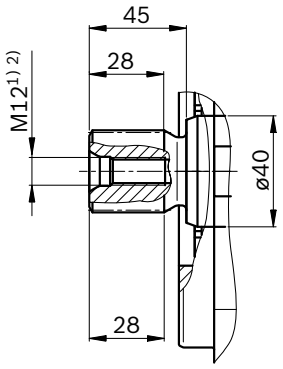
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



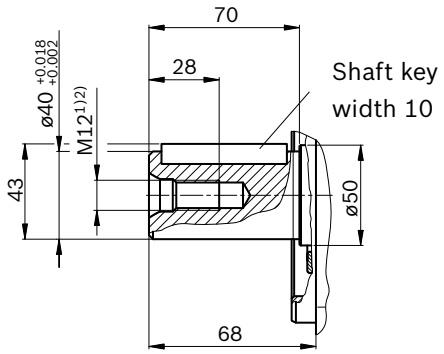
▼ **Splined shaft DIN 5480**

Z – W40x2x18x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø40 AS 12x8x58



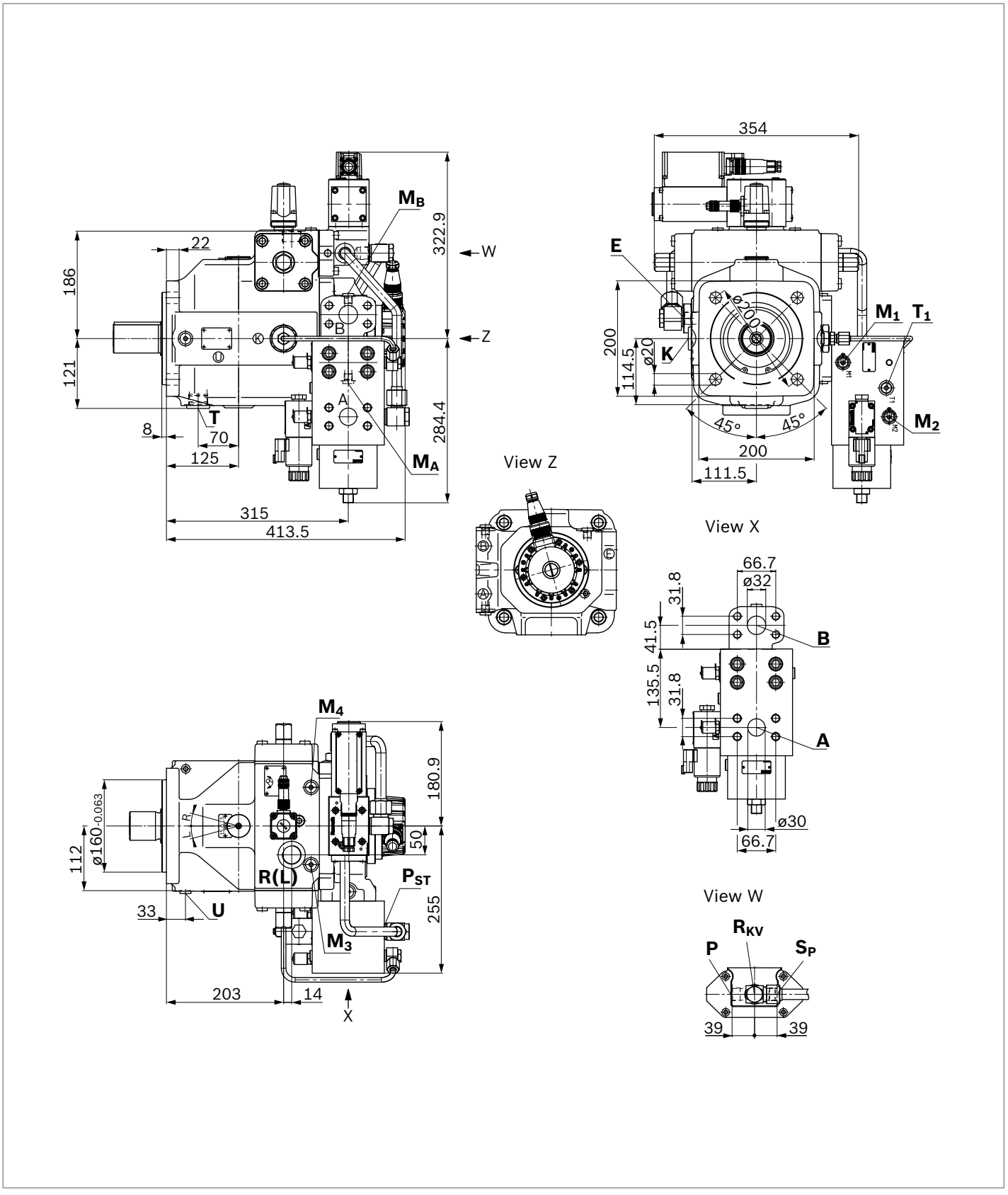
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	1 in M12 × 1.75; 17 deep	400	O
M_A; M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4 in; 12 deep	400	X
S_P	Control pressure	DIN 3852	M22 × 1.5; 14 deep	315	O
T	Fluid drain	DIN 3852	M27 × 2; 12 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M27 × 2; 14 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M27 × 2; 16 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M14 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 1/2; 15 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M22 × 1.5; 20 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	315	piped up

1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
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, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 125

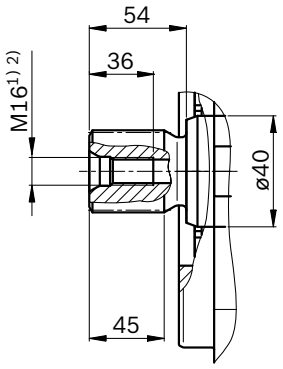
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



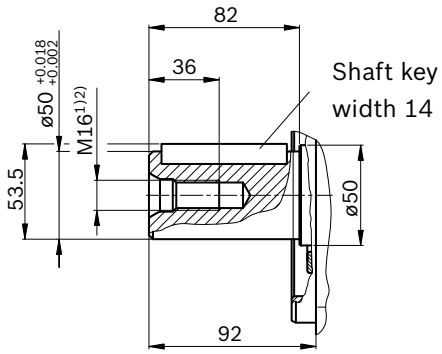
▼ **Splined shaft DIN 5480**

Z – W50x2x24x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14x9x80



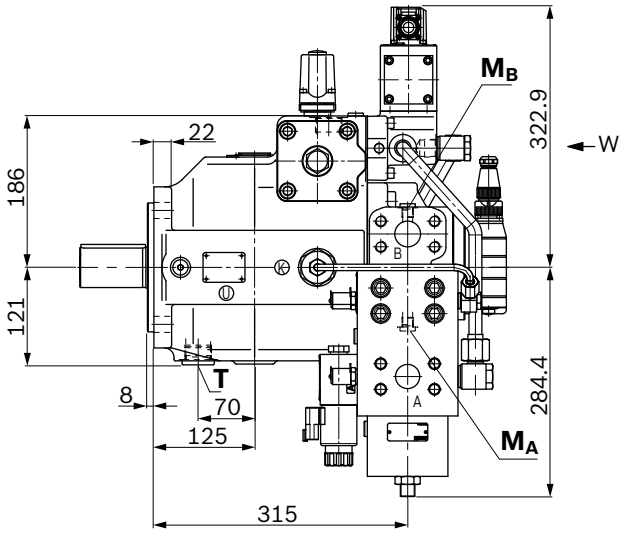
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
M_A; M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_3; M_4	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
S_P	Control pressure	DIN 3852	M22 × 1.5; 14 deep	315	O
T	Fluid drain	DIN 3852	M33 × 2; 18 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M33 × 2; 18 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M33 × 2; 18 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M14 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 1/2; 15 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	315	piped up

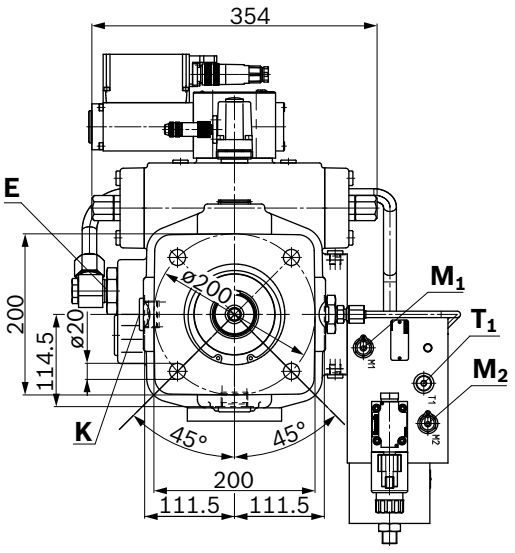
1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
2) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
3) Metric fastening thread is a deviation from standard.
4) The countersink can be deeper than as specified in the standard.
5) Depending on the installation position, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 180

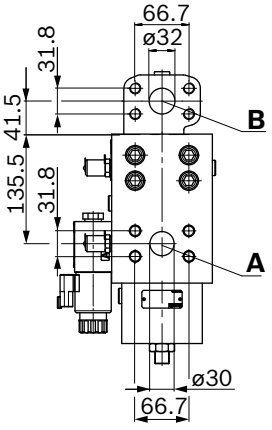
DS2 – secondary controlled unit with RVE check valve

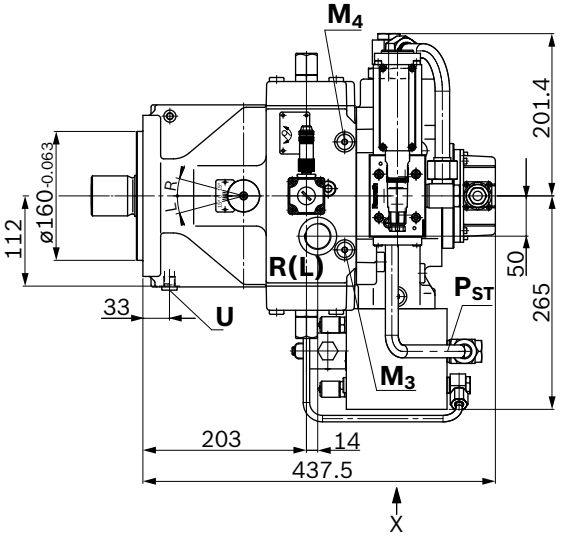
Alternating direction of rotation



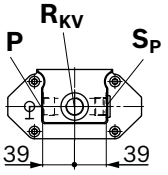


View X



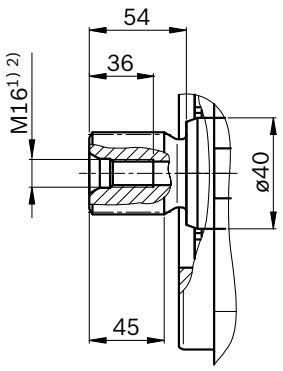


View W



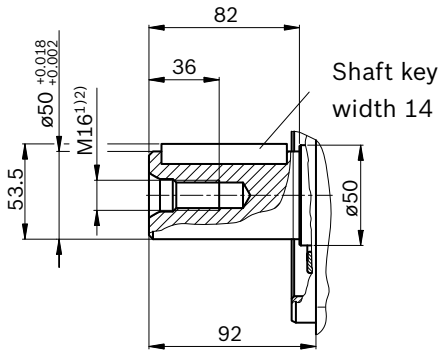
▼ **Splined shaft DIN 5480**

Z – W50x2x24x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14x9x80



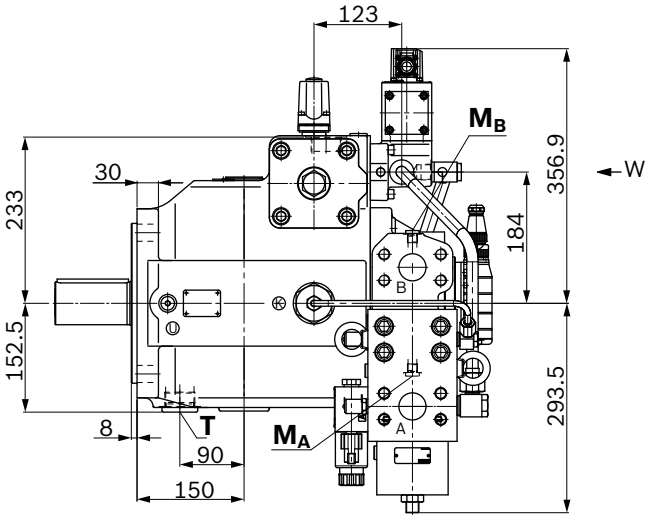
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
M_A; M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4 in; 12 deep	400	X
S_P	Control pressure	DIN 3852	M22 × 1.5; 14 deep	315	O
T	Fluid drain	DIN 3852	M33 × 2; 18 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M33 × 2; 18 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M33 × 2; 18 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M14 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 1/2; 15 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	315	piped up

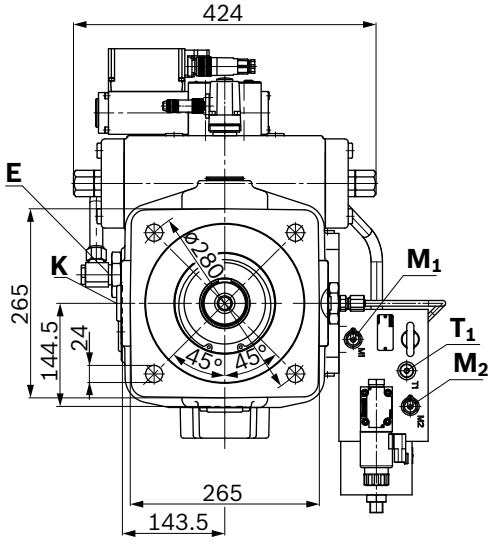
1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
2) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
3) Metric fastening thread is a deviation from standard.
4) The countersink can be deeper than as specified in the standard.
5) Depending on the installation position, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 250

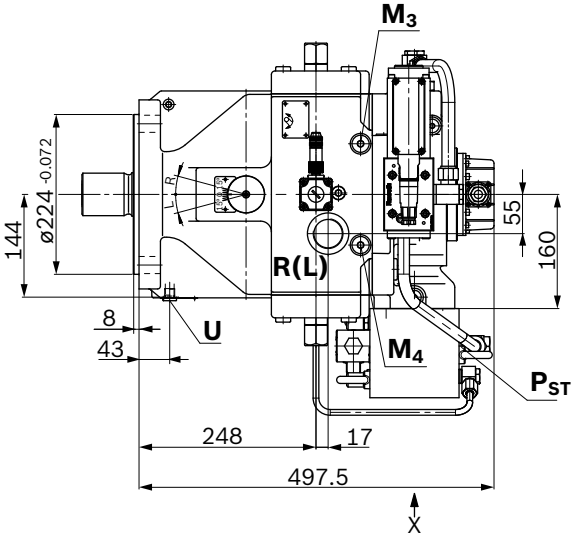
DS2 – secondary controlled unit with RVE check valve

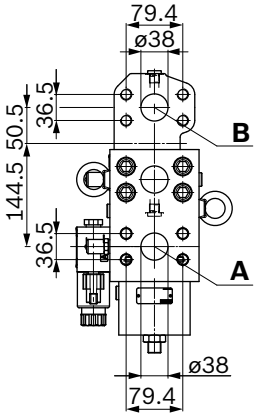
Alternating direction of rotation



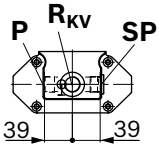


View X



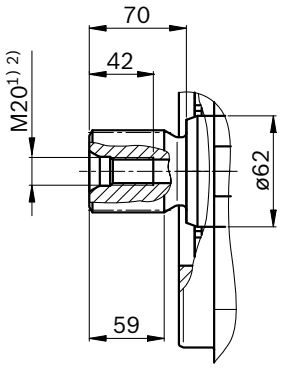


View W



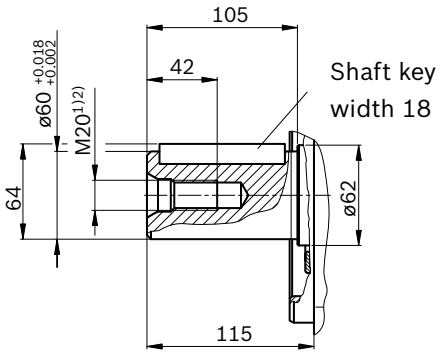
▼ **Splined shaft DIN 5480**

Z – W60x2x28x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø60 AS 18x11x100



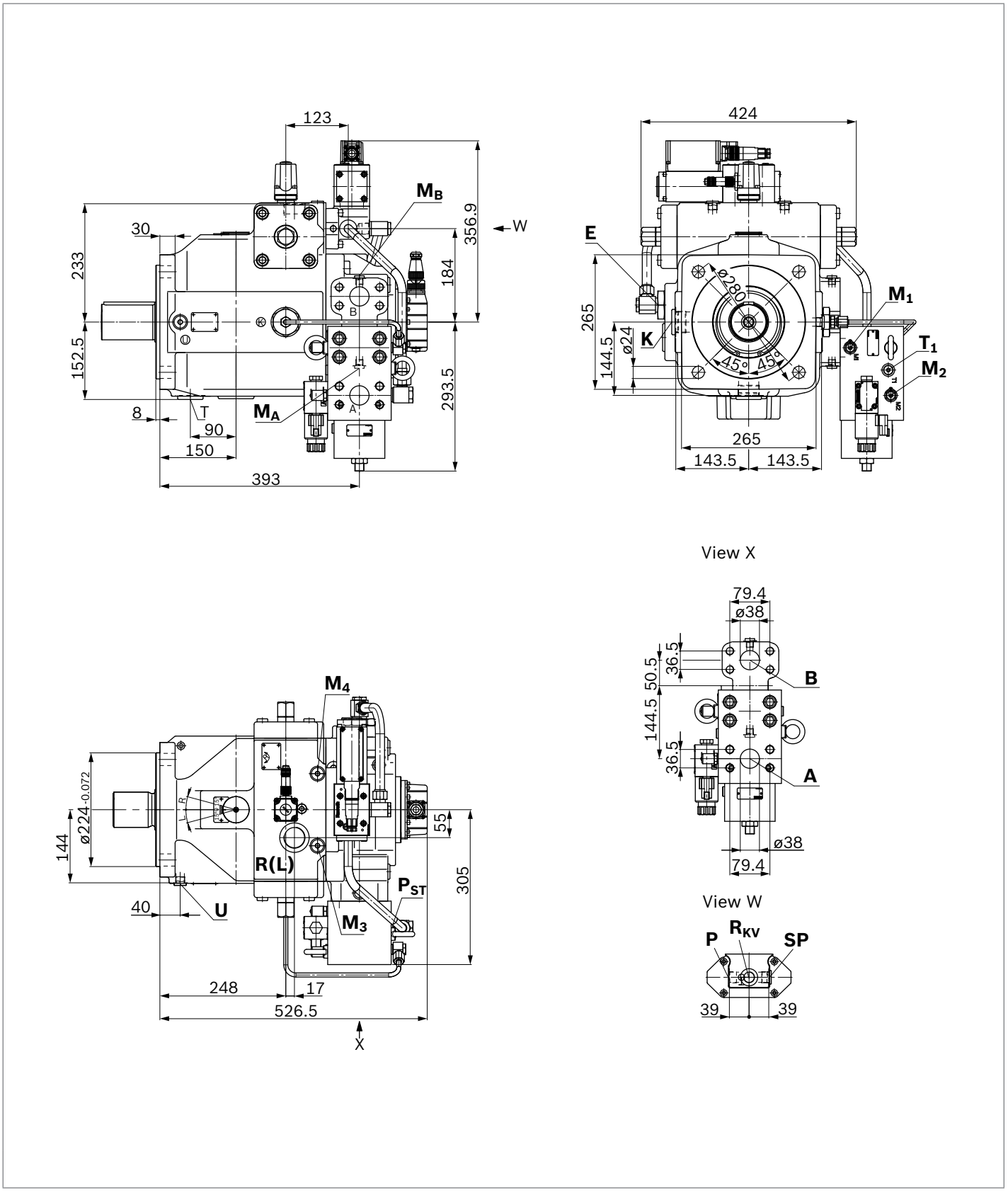
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	1 1/2 in M16 × 2; 21 deep	400	O
M_A; M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
S_P	Control pressure	DIN 3852	M22 × 1.5; 14 deep	315	O
T	Fluid drain	DIN 3852	M42 × 2; 20 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M42 × 2; 20 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M42 × 2; 20 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M14 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 1/2; 15 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	315	piped up

1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
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, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 355

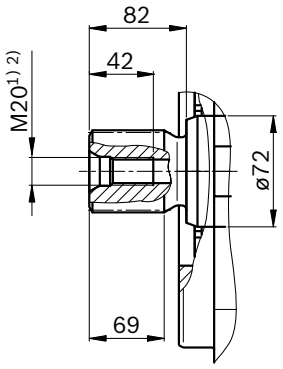
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



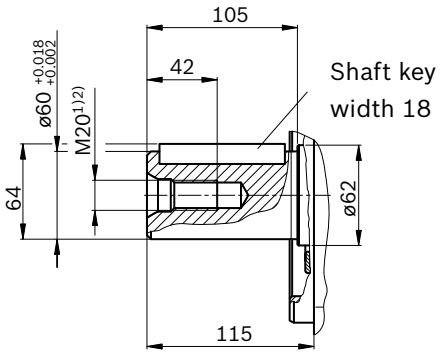
▼ **Splined shaft DIN 5480**

Z – W70x3x22x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø76 AS 20x12x100



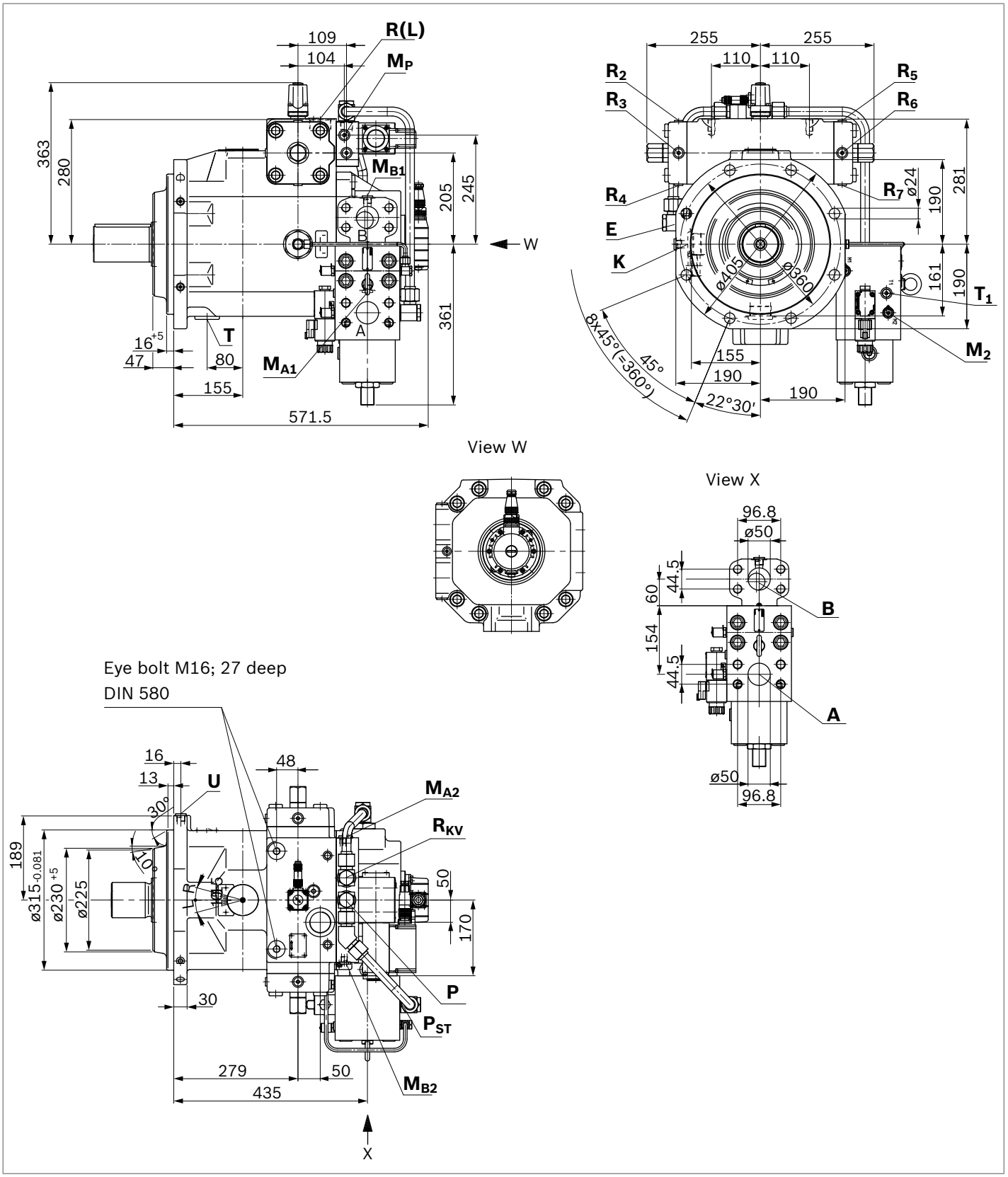
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	1 1/2 in M16 × 2; 21 deep	400	O
M_A; M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
M_3; M_4	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
S_P	Control pressure	DIN 3852	M22 × 1.5; 14 deep	315	O
T	Fluid drain	DIN 3852	M42 × 2; 20 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M42 × 2; 20 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M42 × 2; 20 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M18 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 1/2; 15 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	315	piped up

1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
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, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 500

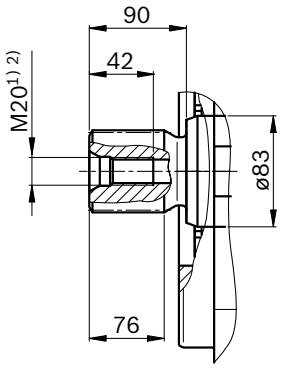
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



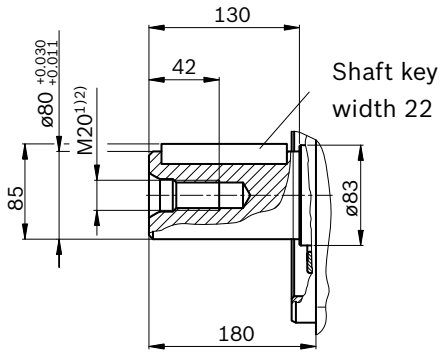
▼ **Splined shaft DIN 5480**

Z – W80x3x25x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø80 AS 22x14x125



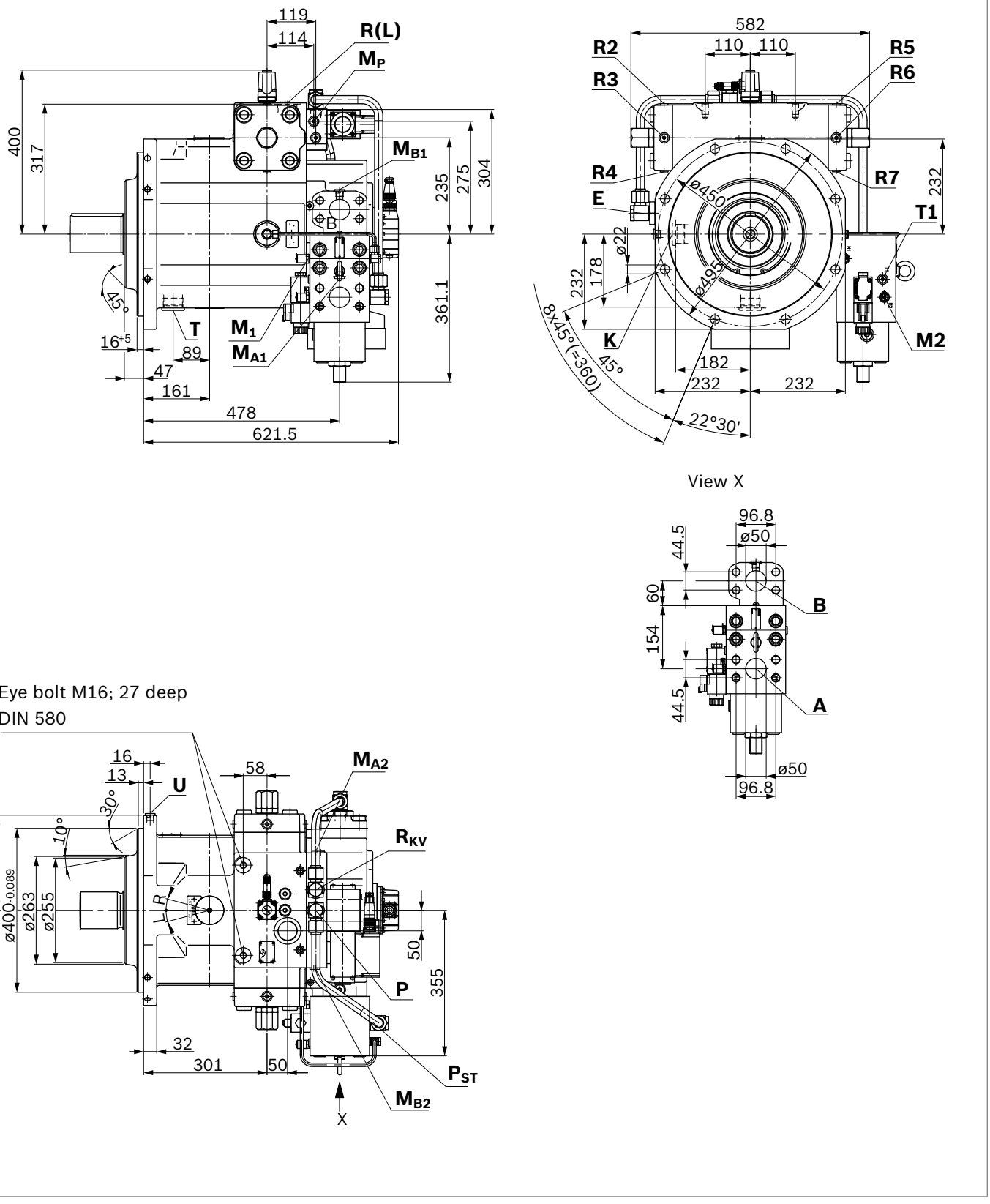
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	2 in M20 × 2.5; 24 deep	400	O
M_{A1}; M_{B1}	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
M_{A2}; M_{B2}, M_P	Measuring control pressure	DIN 3852	M14 × 1.5; 12 deep	315	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
T	Fluid drain	DIN 3852	M48 × 2; 20 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M48 × 2; 20 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M48 × 2; 20 deep	4	O[5)]
R_2 to **R_7**	Air bleeding the control	DIN 3852	M14 × 1.5; 12 deep	315	X
U	Bearing flushing	DIN 3852	M18 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 3/4; 17 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M27 × 2; 20 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M27 × 2; 16 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M27 × 2; 16 deep	315	piped up

1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
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, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

Dimensions, size 750

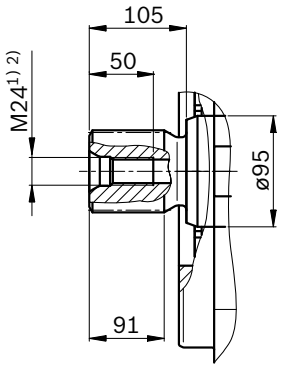
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



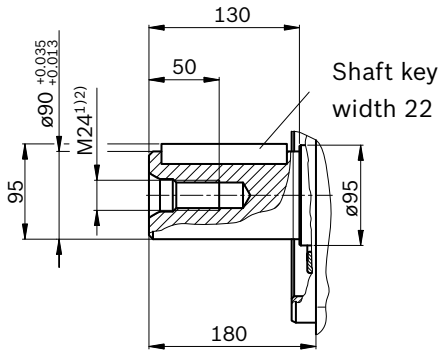
▼ **Splined shaft DIN 5480**

Z – W90x3x28x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø90 AS 25x14x125



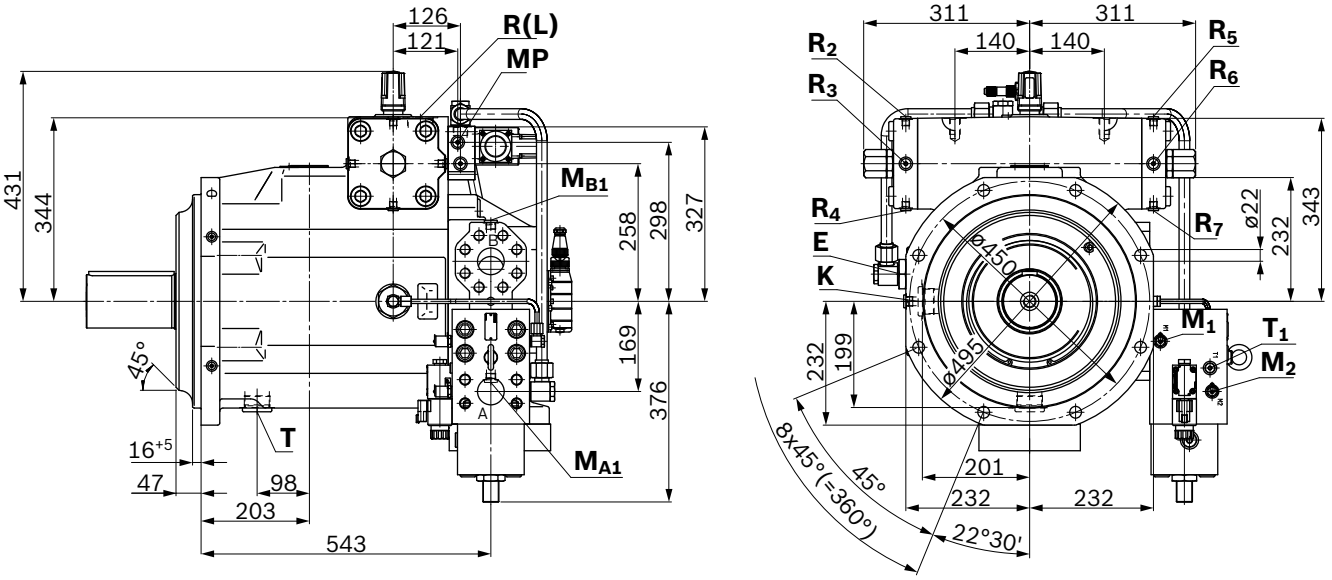
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	2 in M20 × 2.5; 28 deep	400	O
M_{A1}; M_{B1}	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
M_{A2}; M_{B2}:M_P	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
R_2 to R_7	Air bleeding the control	DIN 3852	M14 × 1.5; 12 deep	315	X
T	Fluid drain	DIN 3852	M48 × 2; 20 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M48 × 2; 20 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M48 × 2; 20 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M18 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 3/4; 17 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M27 × 2; 20 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M27 × 2; 16 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M27 × 2; 16 deep	315	piped up

1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
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, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

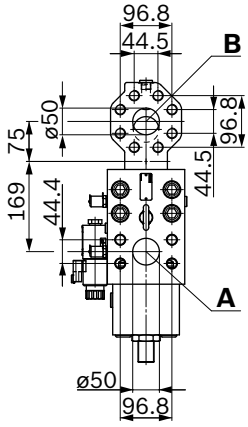
Dimensions, size 1000

DS2 – secondary controlled unit with RVE check valve

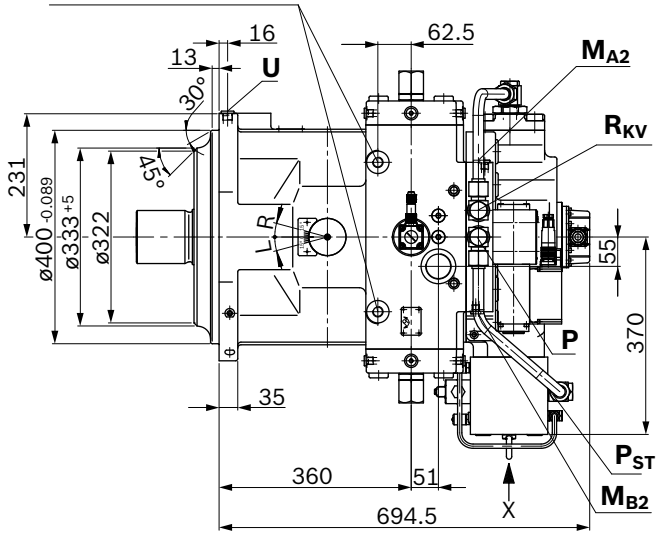
Alternating direction of rotation



View X

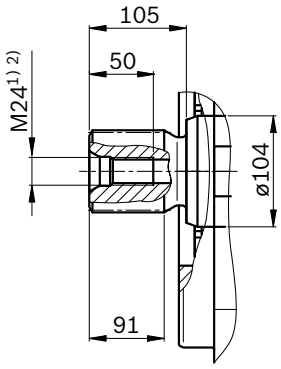


Eye bolt M16; 27 deep
DIN 580



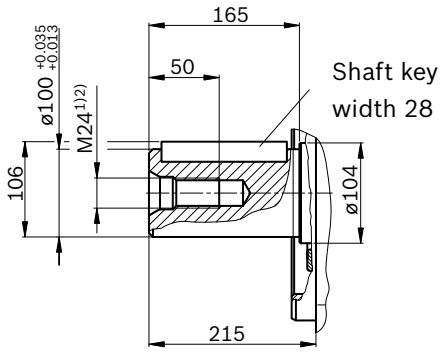
▼ **Splined shaft DIN 5480**

Z – W100x3x32x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø100 AS 28x16x160



Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
A, B	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	2 in M20 × 2.5; 24 deep	400	O
M_{A1}; M_{B1}	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
M_{A2}; M_{B2}:M_P	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
R_2 to R_7	Air bleeding the control	DIN 3852	M14 × 1.5; 12 deep	315	X
T	Fluid drain	DIN 3852	M48 × 2; 20 deep	4	X
T_1; T_2	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852[4)]	M48 × 2; 20 deep	4	O[5)]
R(L)	Control fluid return flow	DIN 3852[4)]	M48 × 2; 20 deep	4	O[5)]
U	Bearing flushing	DIN 3852	M18 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 3/4; 17 deep	315	piped up
E	Boost pressure	DIN 3852[4)]	M27 × 2; 20 deep	50	O
R_{KV}	Control fluid return flow	DIN 3852[4)]	M27 × 2; 16 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M27 × 2; 16 deep	315	piped up

1) Observe the instructions in the instruction manual concerning the maximum tightening torques.
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, **K** or **R**(**L**) must be connected (also see installation instructions in data sheet 92100).
6) O = Must be connected (plugged when delivered)
X = Plugged (in normal operation)

A4VSG...DS2 for use in winch and crane applications

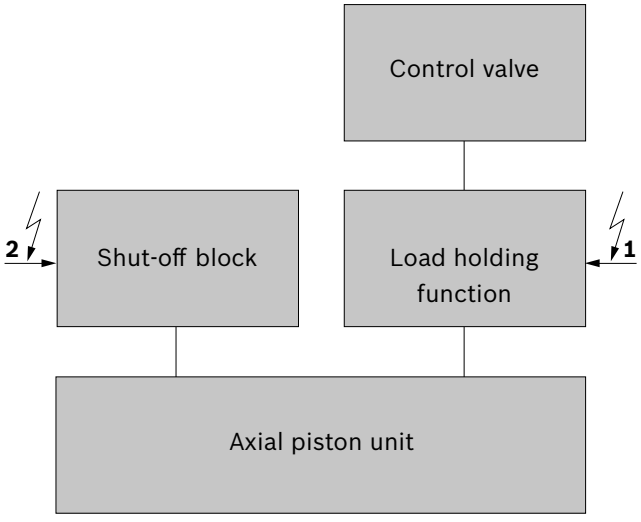
For use in cranes and winches, specifically in the marine and offshore sectors, safety functions are required to comply with the specifications of the classification societies. For this purpose control blocks are available, which guarantee the required emergency functions such as holding the load in the event of a hydraulic system failure, emergency lifting and lowering, or the emergency jettisoning of a load in the event of a system failure.

The following combinations are available:

- Holding the load in the event of a hydraulic system failure
- Holding the load in the event of a hydraulic system failure and manual overload protection MOPS (**M**anual **O**verload **P**rotection **S**ystem)
- Emergency lifting and lowering in the event of a system failure

Holding the load in the event of a hydraulic system failure
Order item 2:
Electrically releasable shut-off block for combination with load holding function LS 1363
Type code LL/LR

▼ **Setup schematic diagram**



1 Load holding function

- **0 V** = load holding function **on**, winch drive **off**.
- **24 V** = load holding function **off**, winch drive **on**.

2 Shut-off block

- **0 V** = Enable axial piston unit **inactive**
- **24 V** = Enable axial piston unit **active**.

The load holding function with LS 1363 is mounted between the control valve and the secondary unit and allows the secondary unit to swivel into a predefined end stop in an emergency. This function ensures that when the shut-off block is closed, the load is held with maximum torque and no high pressure without the use of any external closed loop control or PLC.
The clockwise (LR) / counter-clockwise (LL) swivel parameter is necessary to determine the correct effective direction of the holding torque.
For LX, the load holding function LS 1363 is not piped up when delivered and can thus be piped up to adapt to the swivel direction. The end user is then responsible for the piping.

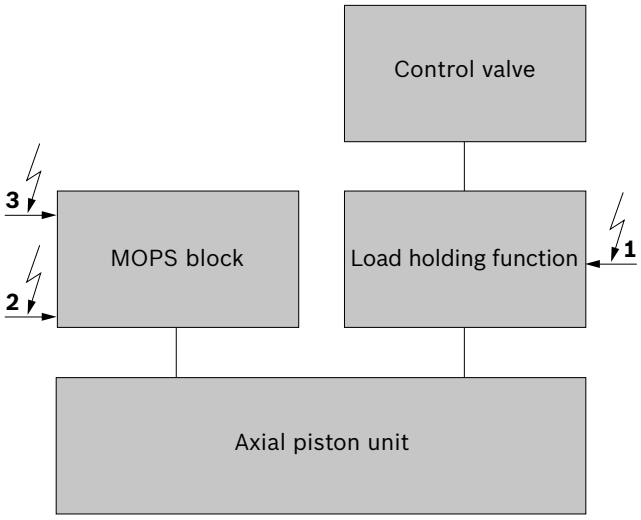
In the secondary controlled winch drive, the LS1363 is switched on with 24 V and is inactive. The emergency function is activated when the valve is switched off.
The winch drive can no longer be controlled.

Notice
This order item 2 does not have integrated maximum pressure limitation as standard. This must be provided externally or as a mounting block. Please contact us for a technical explanation (documentation@boschrexroth.de).

Holding the load in the event of a hydraulic system failure and manual overload protection MOPS

Order item 3:
Electrically releasable shut-off block for combination with load holding function LS 1363, type code LL/LR, and manual overload protection MOPS

▼ **Setup schematic diagram**



1 Load holding function
- **0 V** = load holding function **on**, winch drive **off**.
- **24 V** = load holding function **off**, winch drive **on**.

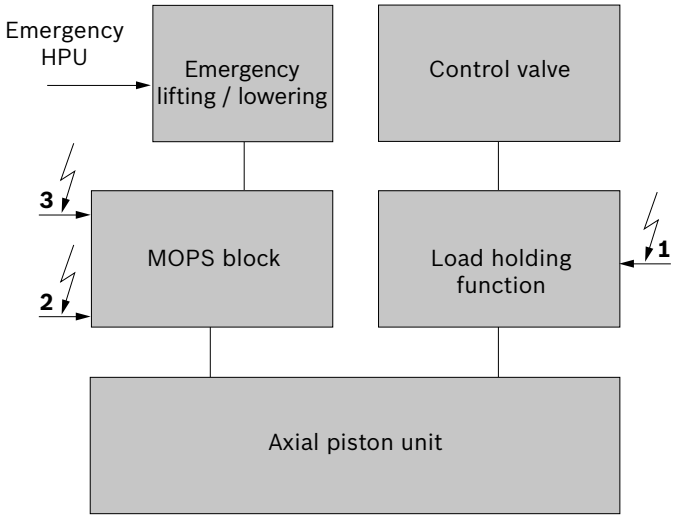
2 MOPS block shut-off function
- **0 V** = Enable axial piston unit **inactive**
- **24 V** = Enable axial piston unit **active**

3 MOPS block pressure limitation
- **0 V** = System pressure p_{HD} **on**, MOPS function **off**
- **24 V** = System pressure p_{HD} **off**, MOPS function **on**

In addition to holding the load with maximum torque and no high pressure, this block combination also enables the “manual overload protection” function, which can be used to drop the load in the event of an emergency in order to secure the crane and the crew. The function of the load holding function with LS1363 is described on page 32.

▼ **Setup schematic diagram for emergency lifting and lowering**

In the event of a system failure, this function and an emergency HPU can be used to lift the suspended load on board again or to lower it to the bottom of the sea with limited function.



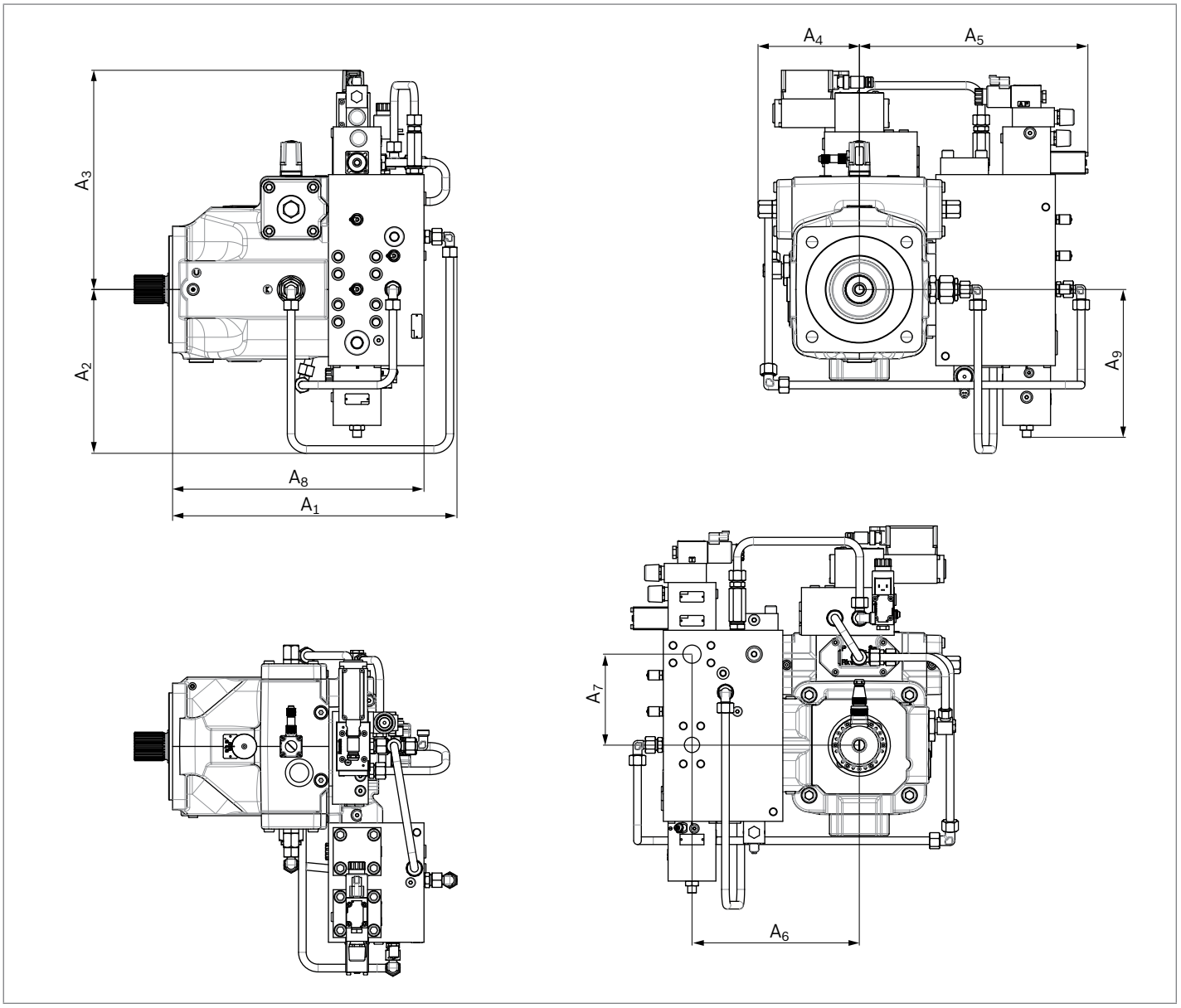
The load holding function, MOPS block shut-off function and MOPS block pressure limitation are controlled as described under order item 3 on the left

Emergency lifting and lowering

Notice
The emergency lifting and lowering function must be designed specifically for the project. Please contact us for a technical explanation (documentation@boschrexroth.de).

Dimensions of all valve block attachments

DS2 – Secondary controlled unit with all valve block attachments (order item 14, type code 3)
Alternating direction of rotation



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9
40	401	260	365	130	342	225	83	332	227
71	433	265	360	158	357	240	88	364	232
125	519	340	441	177	426	305	115	450	307
180	519	340	441	177	436	315	115	450	307
250	595	343	459	212	478	350	191	526	310
355	602	344	447	212	498	370	190	533	311
500	674	469	447	254	545	410	165	605	436
750	717	469	447	292	585	450	165	648	436
1000	782	484	462	309	600	465	180	713	451

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. Use of the recommended direct current (DC) on the electromagnet does not produce any electromagnetic interference (EMI), nor is the electromagnet influenced by EMI. Potential electromagnetic interference (EMI) exists if the solenoid is energized with a modulated direct current (e.g. PWM signal). The machine manufacturer should conduct appropriate tests and take appropriate measures to ensure that other components or operators (e.g. with a pacemaker) are not affected by the potentiality.
- Pressure controllers are not safeguards against pressure overload. Be sure to add a pressure relief valve to the hydraulic system.
- Working ports:
  - The ports and fastening threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified application conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.
  - The working ports and function ports are only intended to accommodate hydraulic lines.

Safety instructions

- During and shortly after operation, there is a risk of getting burnt on the axial piston unit and especially on the solenoids. Take 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.

Bosch Rexroth AG
An den Kelterwiesen 14
72160 Horb a.N., Germany
Tel. +49 7451 92-0
info.ma@boschrexroth.de
www.boschrexroth.com

Bosch Rexroth AG
Zum Eisengießer 1
97816 Lohr am Main, Germany
Tel. +49 (0)9352 18-0
documentation@boschrexroth.de
www.boschrexroth.com