RE 92057/03.2019
Replaces: 12.2012

rexroth
A Bosch Company

Axial piston units with DS2 secondary control A4VSO Series 10 and 30

- For highly dynamic applications
- Sizes 40 to 1000
- Nominal pressure 315 bar
- Maximum pressure 400 bar
- Open 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.

Inhalt

Type code

01	02	03	04	05	06		07	08		09	10	11	12	13	14	15
	A4VS	**O**				**/**		**W**	**–**	**V**			**25**			

Hydraulic fluid

			40	71	125	180	250	355	500	750	1000	
01	Mineral oil and HFD hydraulic fluids[1] (no code)		●	●	●	●	●	●	●	●	●	

Axial piston unit

02	Swashplate design, variable, nominal pressure 315 bar, maximum pressure 400 bar	**A4VS**

Operating mode

03	Pump/motor, open circuit	**O**

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

05	Secondary speed control	with mounted control valve	●	●	●	●	●	●	●	●	●	**DS2R**
		with mounted servo valve[2]	●	●	●	●	●	●	●	●	●	**DS2S**
		without valve	●	●	●	●	●	●	●	●	●	**DS2E**

Additional valve (see table Flow direction on page 8)

06	Load holding function with LS 1363 (without piping)	**L**
	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**

Direction of rotation

08	Viewed on drive shaft	variable	**W**

Sealing material[3]

		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	In accordance with ISO 3019-2 metric	4-hole	●	●	●	●	●	●	–	–	–	**B**
		8-hole	–	–	–	–	–	–	●	●	●	**H**

Working port

12	SAE flange ports **B** and **S**, laterally offset 90°, metric fastening thread, **B1** plugged upon delivery	**25**

● = Available ○ = On request – = Not available

1) Other hydraulic fluids possible upon request
2) No standard, please contact us (documentation@boschrexroth.de)
3) For more information about sealing material, see data sheet 92050

01	02	03	04	05	06		07	08		09	10	11	12	13	14	15
	A4VS	**O**				**/**		**W**	**–**	**V**			**25**			

Through drives (for mounting options and dimensions see data sheet 92050)

13	Flange **ISO 3019-1** (metric)		Hub for splined shaft[1]									
	Diameter	Attachment	Diameter	**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**	
	Without through drive			●	●	●	●	●	●	●	●	●	**N00**
	With through drive without conversion option			●	●	–	–	–	–	●	●	●	**K..**
	With universal through drive, see data sheet 95581			–	–	●	●	●	●	–	–	–	**U..**
	125, 4-hole		32x2x14x9g	●	●	●	●	●	●	●	●	○	**31**
	140, 4-hole		40x2x18x9g	–	●	●	●	●	●	●	●	○	**33**
	160, -4-hole		50x2x24x9g	–	–	●	●	●	●	●	●	○	**34**
	224, 4-hole		60x2x28x9g	–	–	–	–	●	●	●	●	○	**35**
	224, 4-hole		70x3x22x9g	–	–	–	–	–	●	●	○	●	**77**
	315, 8-hole		80x3x25x9g	–	–	–	–	–	–	●	●	●	**43**
	400, 8-hole		90x3x28x9g	–	–	–	–	–	–	–	●	●	**76**
	400, 8-hole		100x3x32x9g	–	–	–	–	–	–	–	–	●	**88**
	Through drive-ready, plugged with pressure-resistant cover			●	●	●	●	●	●	●	●	●	**99**
	With mounted incremental encoder 1000 pulses/rev.			●	●	●	●	●	●	●	●	●	**T03**[2]
	Prepared for mounted incremental encoder, through drive plugged with cover			●	●	●	●	●	●	●	●	●	**T10**[2]
	Special tachometer mounting			○	○	○	○	○	○	○	○	○	**T99**
	Prepared for mounting a special tachometer, plugged with cover			○	○	○	○	○	○	○	○	○	**T00**

Valves

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

Filtration

15										
	without filter	●	●	●	●	●	●	●	●	●	**N**
	Intermediate plate filter (Only with DS2S order item 05)	●	●	●	●	●	●	●	●	●	**Z**

● = Available ○ = On request – = Not available

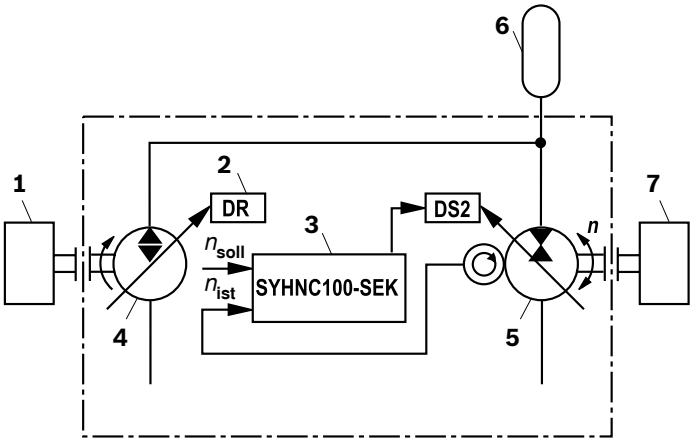
Notes

- In addition to the type code, please specify the relevant technical data when placing your order. (In this connection, please also refer to data sheet 92050)

1) Hub for splined shaft according to ANSI B92.1a
2) Preferred types
3) No standard. Please contact us for a technical explanation (documentation@boschrexroth.de).

Function

Secondary closed loop control is an energy-saving drive concept with high dynamics for the installation of closed loop rotational speed, position, or torque controls with energy recovery.
The secondary controlled hydrostatic axial piston units operate on a supply network with constant 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 rotational speed or torque are swiveled over "zero". This also reverses the direction of the flow.



1	Drive	**5**	Secondary unit
2	Pressure controller	**6**	Accumulator
3	Control electronics	**7**	Output drive
4	Primary unit		

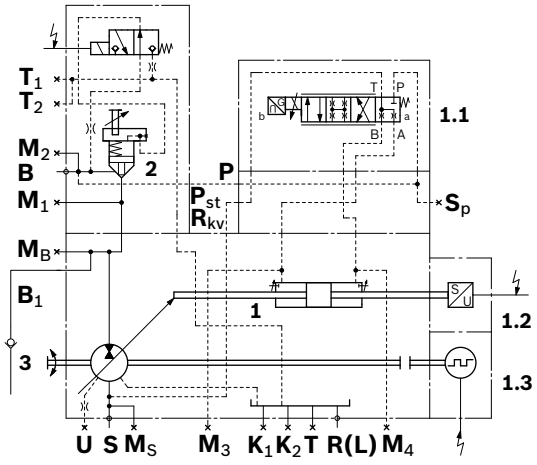
Associated electronics (see also page 13)

- 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 between the primary and secondary units if necessary.
The flow peaks are covered by the accumulator. It is also used to store the energy recovered 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 A4VSO...DS2R/...W-... 25 T03...1N**

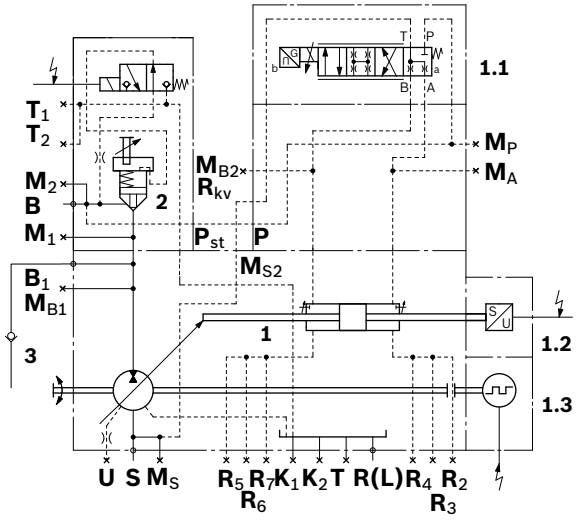


Secondary unit components		
1	Axial piston unit A4VSO, sizes 40 to 355	
1.1	4-way control valve (see data sheet 29026)	
	NG (A4VS)	**Type**
	40, 71	4WRPH6 C3 B24L -2X/G24KO/M-750
	125 to 355	4WRPH10 C3 B50L -2X/G24KO/M-750
1.2	Swivel angle sensor AWXF (see page 11)	
1.3	Incremental encoder GEL 293 (see 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	
B	Working pressure (high-pressure series)
S	Suction pressure (high-pressure series)
M_B; M_1	Working pressure measurement
M_S	Suction pressure measurement (from NG125 to 355)
M_2	Working pressure measurement
M_3; M_4	Control pressure measurement (from NG125 to 355)
S_P	external control pressure
T	Fluid drain
T_1; T_2	Leakage/air bleeding
K_1; K_2	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 A4VSO...DS2R/...W-... 25 T03...1N**



Secondary unit components		
1	Axial piston unit A4VSO size 500 bis 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)	

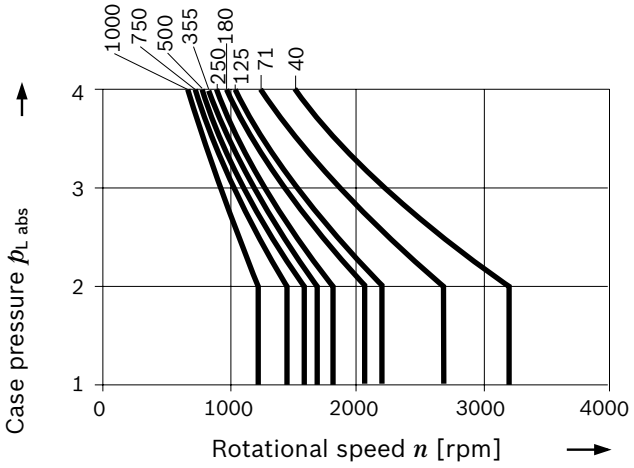
Ports	
B	Working pressure (high-pressure series)
S	Suction pressure (high-pressure series)
M_{B1}; M_1; M_2	Working pressure measurement
M_S, M_{S2} (Upon request)	Suction pressure measuring
M_{A2}	Control pressure measuring
M_{B2}	Control pressure measuring
M_P	external control pressure
T	Fluid drain
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

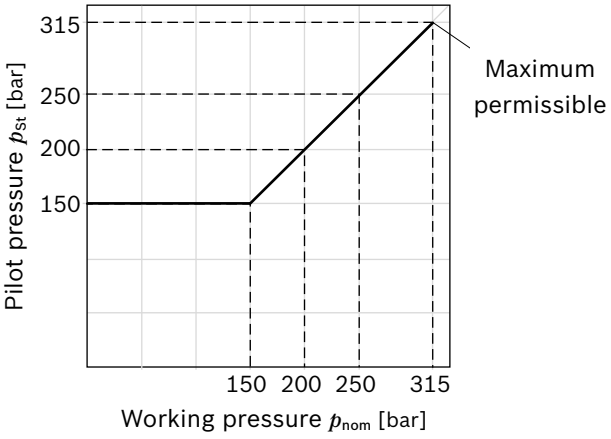
Pressure at working port B		**Definition**
Nominal pressure p_{nom}	315 bar	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}	400 bar	The maximum pressure corresponds to the maximum working pressure during a single operating period. The sum of the single operating 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 $p_{B\ abs}$ (High-pressure side)	15 bar[1)]	Minimum pressure on the high-pressure side (**B**) which is required in order to prevent damage to the axial piston unit. The minimum pressure depends on the rotational speed and the swivel angle.
Rate of pressure change $R_{A\ max}$	16000 bar/s	Maximum permissible pressure build-up and reduction speed during a pressure change across the entire pressure range.
Pressure at suction port S (inlet)		
Version without charge pump		Minimum pressure at suction port **S** (inlet) which is required to prevent damage to the axial piston unit. The minimum pressure is dependent on the rotational speed and displacement of the axial piston unit.
Minimum pressure $p_{S\ min}$	≥ 0.8 bar abs.	
Maximum pressure $p_{S\ max}$	≤ 30 bar	

Case pressure at port T, K_1, K_2, R(L)		
Max. static pressure $p_{L\ max}$	4 bar	Maximum 1.2 bar higher than inlet pressure at port **S**, but not higher than $p_{L\ max.}$ A drain line to the reservoir is required.
Pressure peaks $p_{L\ peak}$	6 bar	t < 0.1 s

▼ **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)]	with 1.0 $V_{g\,max}$; $p_E \geq 15$ bar	n_{nom}	rpm	3700	3200	2600	2400	2000	2000	1800	1600	1600
	with 0.8 $V_{g\,max}$; $p_E \geq 15$ bar	n_{max}	rpm	4900	4100	3400	2900	2600	2200	2000	1800	1600
	with 0.8 $V_{g\,max}$; $p_E \geq 1$ bar	n_{max}	rpm	3200	2700	2200	2100	1800	1700	1600	1450	1000
	with 1.0 $V_{g\,max}$; $p_E \geq 1$ bar	n_{max}	rpm	2600	2200	1800	1800	1500	1500	1320	1200	1000
Power	with n_{nom}, $V_{g\,max}$ and Δp = 300 bar	P	kW	74	114	163	216	250	355	450	600	800
Torque	with $V_{g\,max}$ and Δp = 300 bar	M	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
Intrinsic 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	0.025	0.06	0.15	0.27	0.48	0.95	1.66	3.33	6
Weight (with RVE and incremental encoder) approx.		m	kg	65	79	122	136	218	241	373	513	642

Determining the characteristics for operation as a pump

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

Key

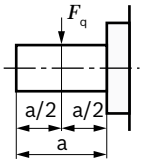
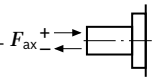
V_g	=	Displacement per revolution [cm³]
Δp	=	Differential pressure [bar]
n	=	Rotational speed [rpm]
η_v	=	Volumetric efficiency
η_{hm}	=	Hydraulic-mechanical efficiency
η_t	=	Total efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Notes

- Theoretical values, without efficiency and tolerances; values rounded
- Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. We recommend testing loads through experimentation or calculation/simulation and comparing them with the permissible values.

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

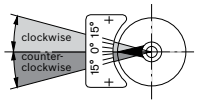
Permissible radial and axial loading of the drive shafts

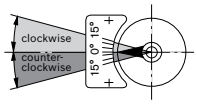
Size		NG		40	71	125	180	250	355	500	750	1000
Maximum radial force at a/2		$F_{q\,max}$	N	1200	1700	2500	3100	4000	4400	5000	6000	10000
Maximum axial force												
at case pressure p_{max} 1 bar abs.		$\pm F_{ax\,max}$	N	1000	1400	1900	2250	3000	3600	4000	5450	8000
at case pressure p_{max} 4 bar abs.		$+F_{ax\,max}$	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 values given are maximum values and do not apply to continuous operation. Special requirements apply in the case of belt drives. Please contact us.

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 **S**		**B**	Motor		**P** to **A** **B** to **T**	positive
	clockwise		**S** to **B**	**B**	Pump		**P** to **A** **B** to **T**	positive
	counter-clockwise		**B** to **S**	**B**	Motor		**P** to **B** **A** to **T**	negative
	counter-clockwise	**S** to **B**		**B**	Pump		**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 **S**		**B**	Motor		**P** to **B** **A** to **T**	positive
	clockwise		**S** to **B**	**B**	Pump		**P** to **B** **A** to **T**	positive
	counter-clockwise		**B** to **S**	**B**	Motor		**P** to **A** **B** to **T**	negative
	counter-clockwise	**S** to **B**		**B**	Pump		**P** to **A** **B** to **T**	negative

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 rotational 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 rotational 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.
In order to prevent cavitation damage during continued or terminating operation of the axial piston unit in case of an emergency off signal, anti-cavitation valves have been provided which have to be freely piped up at port $\mathbf{B_1}$. These check valves without spring are to be installed vertically and have to be ordered separately.

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

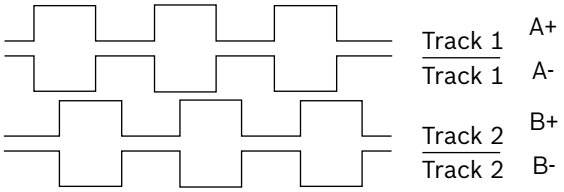
Information on pilot valve (DS2R) 4WRPH6/10..-750 can be found in data sheet 29026.

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= ∞; U_B= 5 V	≤1.0 W
Ambient temperature	–20 °C to +80 °C

Signal pattern T

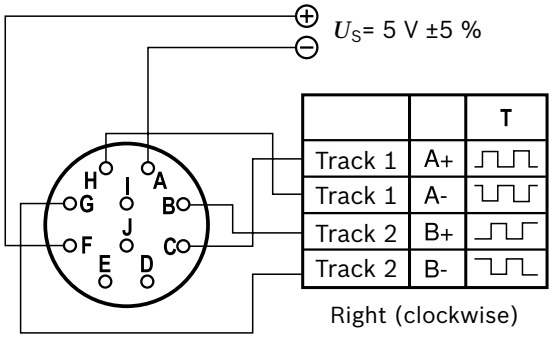
Supply voltage U_S= 5 V ±5%; signal voltage U_{Si}= 5 V
Clockwise-rotating signal image viewed on drive shaft



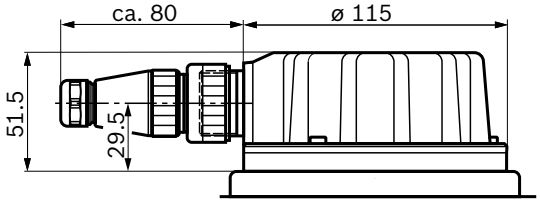
Electrical connection

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 rotational speed sensing systems. In this case, please contact us (documentation@boschrexroth.de).

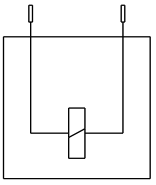
Connector for solenoids

DEUTSCH DT04-2P-EP04

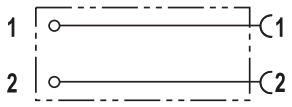
Molded, 2-pin, without bidirectional suppressor diode
The following type of protection ensues with the installed mating connector:

▶ IP67 (DIN/EN 60529)

▼ **Switching symbol**



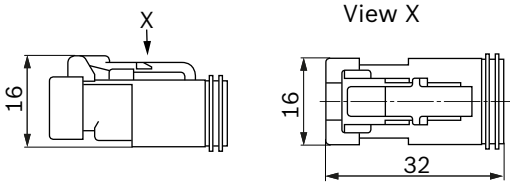
▼ **Circuit diagram pin image**



▼ **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

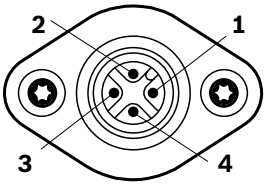
Notice

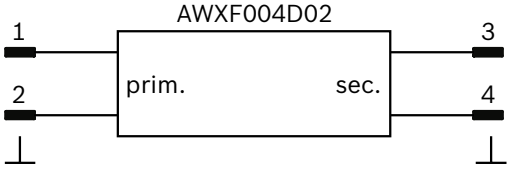
Connector with 10 m molded cable, GL classification, type of protection IP67, please contact us.
Further information in RE 08006 "Plug-in connectors and wiring harnesses for valves and sensors in hydraulic systems".

Swivel angle indicator AWXF

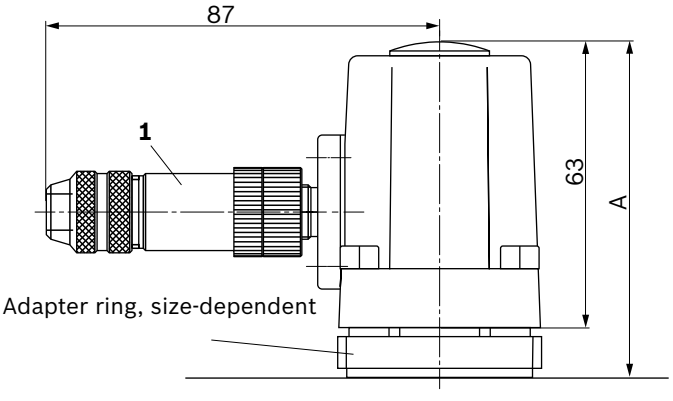
Technical data			
Measuring system			Differential transformer
Control stroke		mm	±4.5
Linearity tolerance		%	≤1.0
Carrier frequency		kHz	5
Coil resistance (at 20 °C)	Primary coil	Ω	120
	per secondary coil	Ω	280
Electrical connection			Plug-in connection M12 × 1, 4-pin
Plug-in connection type of protection 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)
Please order separately

Ordering code for A4VSO		
	Anti-cavitation valve	
Size	without boost pressure supply	with boost pressure supply
40	S10A0.0	S10A1.0
71	S15A0.0	S15A1.0
125	S20A0.0	S20A1.0
180	S20A0.0	S20A1.0
250	S25A0.0	S25A1.0
355	S25A0.0	S25A1.0
500	S30A0.0	S30A1.0
750	S30A0.0	S30A1.0
1000	S30A0.0	S30A1.0

Notice

- These anti-cavitation valves are piped up at port **B_1**. For details of the anti-cavitation valves, 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 control, closed loop torque control and 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 rotational speed return with incremental encoders. The software contains control and monitoring functions specifically designed for the 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 rotational 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)
- Rotational 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

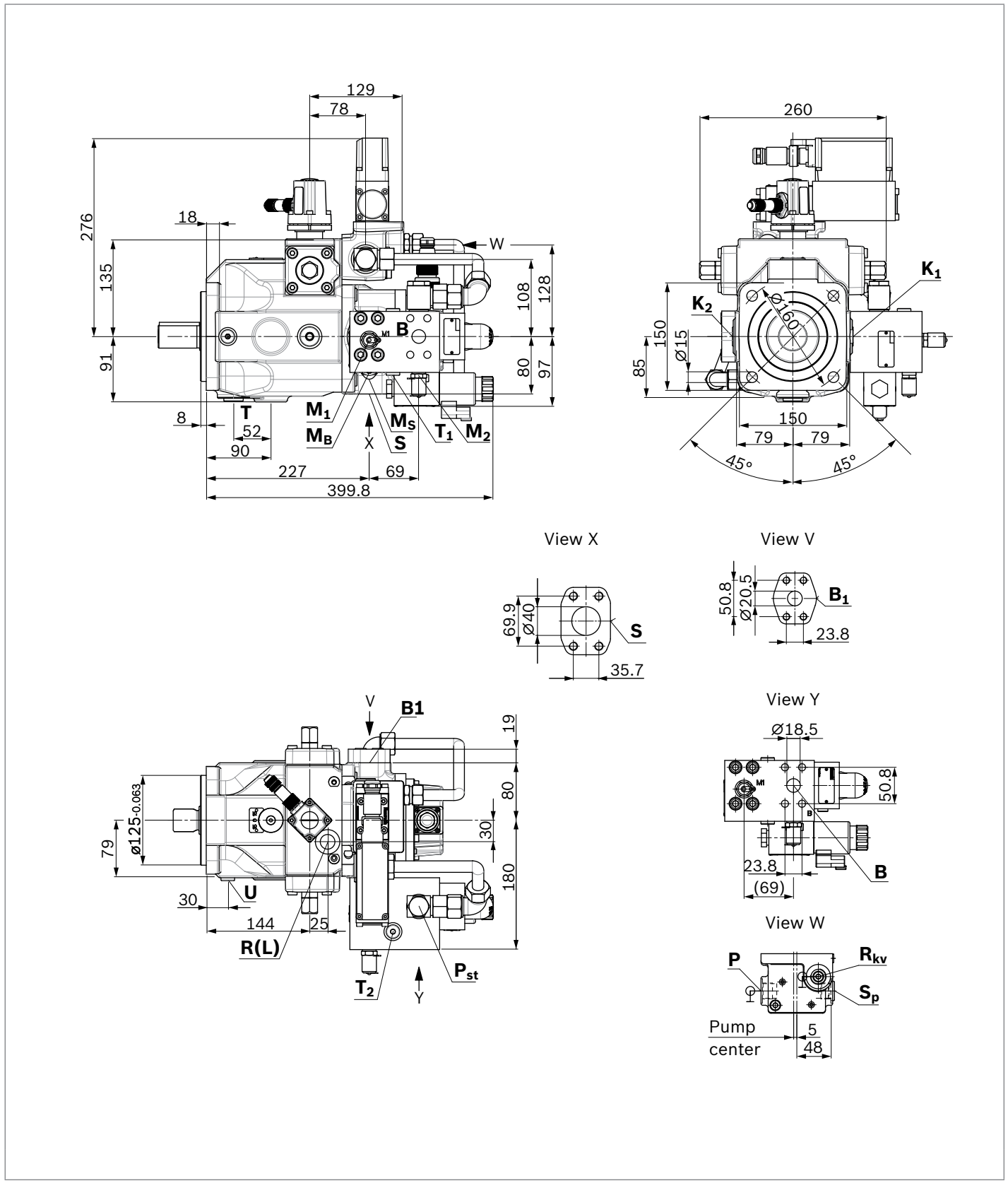
The secondary unit with ordering code 04 = "DS2R" (with control valve) additionally requires the following, which are not included in the scope of delivery:

- 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

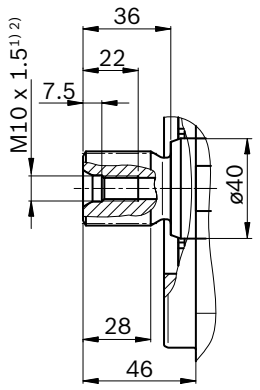
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



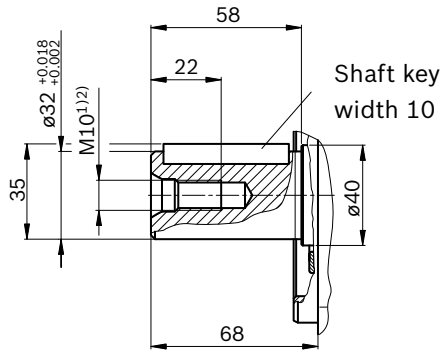
▼ **Splined shaft DIN 5480**

Z – W32x2x14x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø32 AS 10x8x56



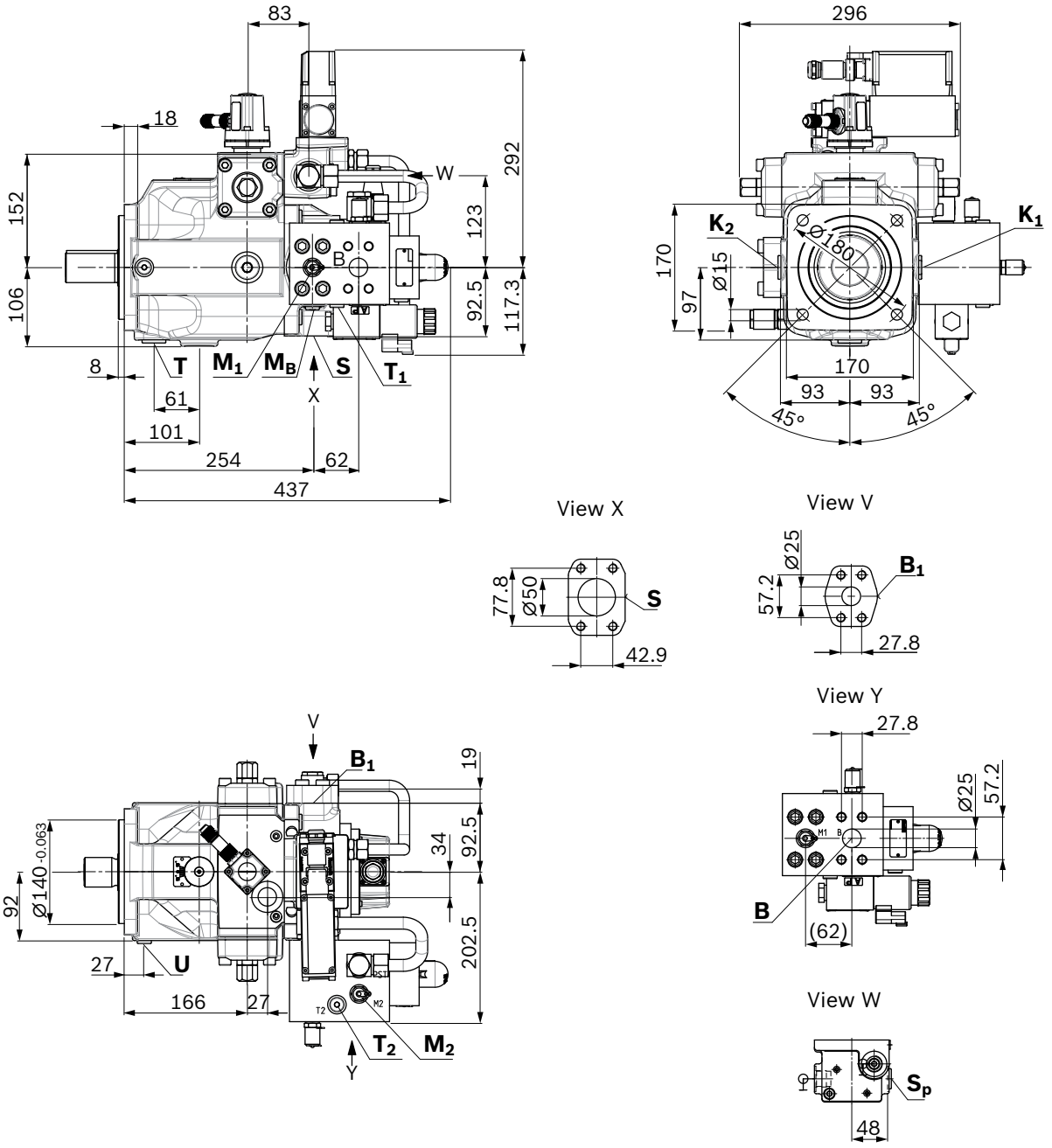
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][3)]	State[7)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[4)] DIN 13	1 1/2 inch M12 × 1.75; 20 deep	30	O
B; B_1	Working port (high-pressure series) Fastening thread	SAE J518[4)] DIN 13	3/4 inch M10 × 1.5; 17 deep	400	O
M_B	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Working pressure measurement	DIN 3852	G 1/4 in; 12 deep	400	X
M_S	Control fluid return flow	DIN 3852	M18 × 1.5; 12 deep	100	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_1; K_2	Flushing	DIN 3852[5)]	M22 × 1.5; 14 deep	4	O[6)]
R(L)	Control fluid return flow	DIN 3852[5)]	M22 × 1.5; 14 deep	4	O[6)]
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
R_{KV}	Control fluid return flow	DIN 3852[5)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[5)]	M22 × 1.5; 14 deep	315	piped up

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the notes in the instruction manual concerning the maximum tightening torques.
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
4) Metric fastening thread is a deviation from standard.
5) The countersink may be deeper than specified in the standard.
6) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
7) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 71

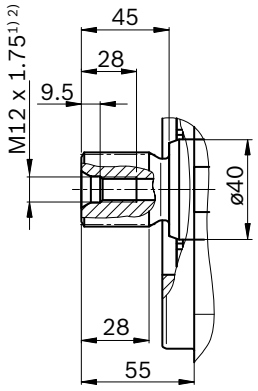
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



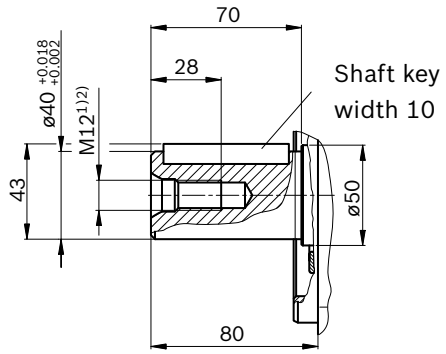
▼ **Splined shaft DIN 5480**

Z – W40x2x18x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø40 AS 12x8x58



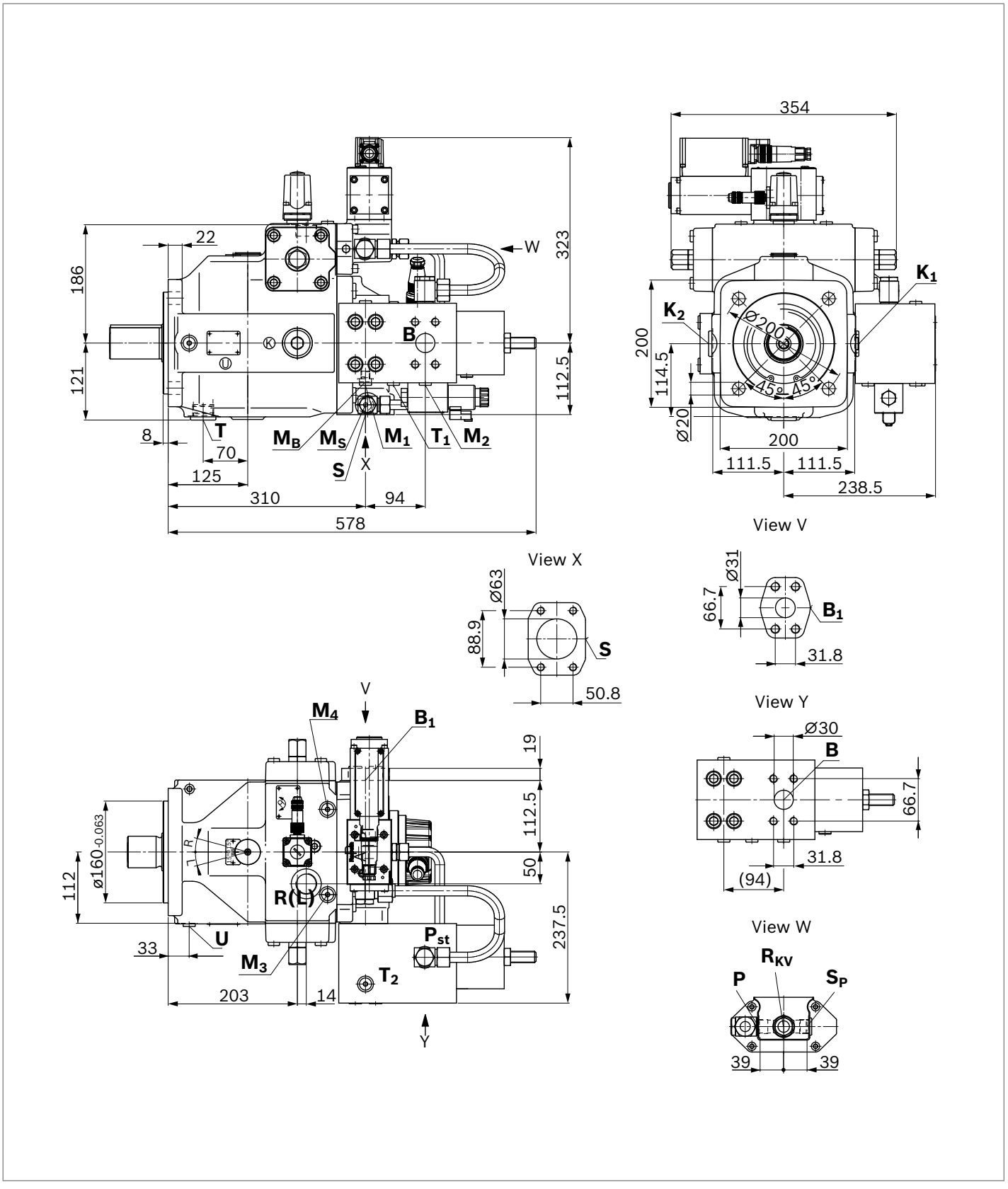
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][3)]	State[7)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[4)] DIN 13	2 inch M12 × 1.75; 20 deep	30	O
B; B_1 **B** **B_1**	Working port (high-pressure series) Fastening thread Fastening thread	SAE J518[4)] DIN 13 DIN 13	1 inch M12 × 1.75; 17 deep M12 × 1.75; 20 deep	400	O
M_B	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Working pressure measurement	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_1; K_2	Flushing	DIN 3852[5)]	M27 × 2; 14 deep	4	O[6)]
R(L)	Control fluid return flow	DIN 3852[5)]	M27 × 2; 16 deep	4	O[6)]
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
R_{KV}	Control fluid return flow	DIN 3852[5)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[5)]	M22 × 1.5; 14 deep	315	piped up

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the notes in the instruction manual concerning the maximum tightening torques.
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
4) Metric fastening thread is a deviation from standard.
5) The countersink may be deeper than specified in the standard.
6) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
7) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 125

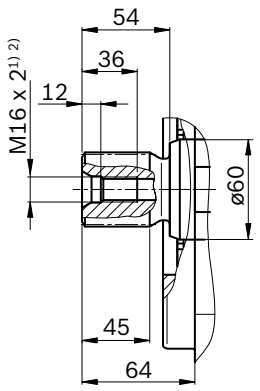
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



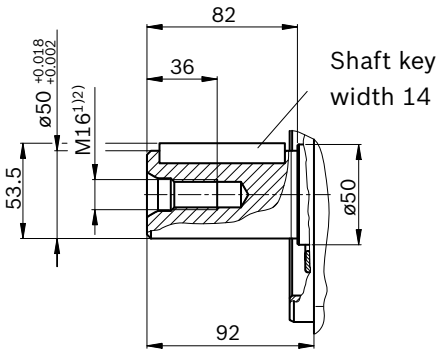
▼ **Splined shaft DIN 5480**

Z – W50x2x24x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14x9x80



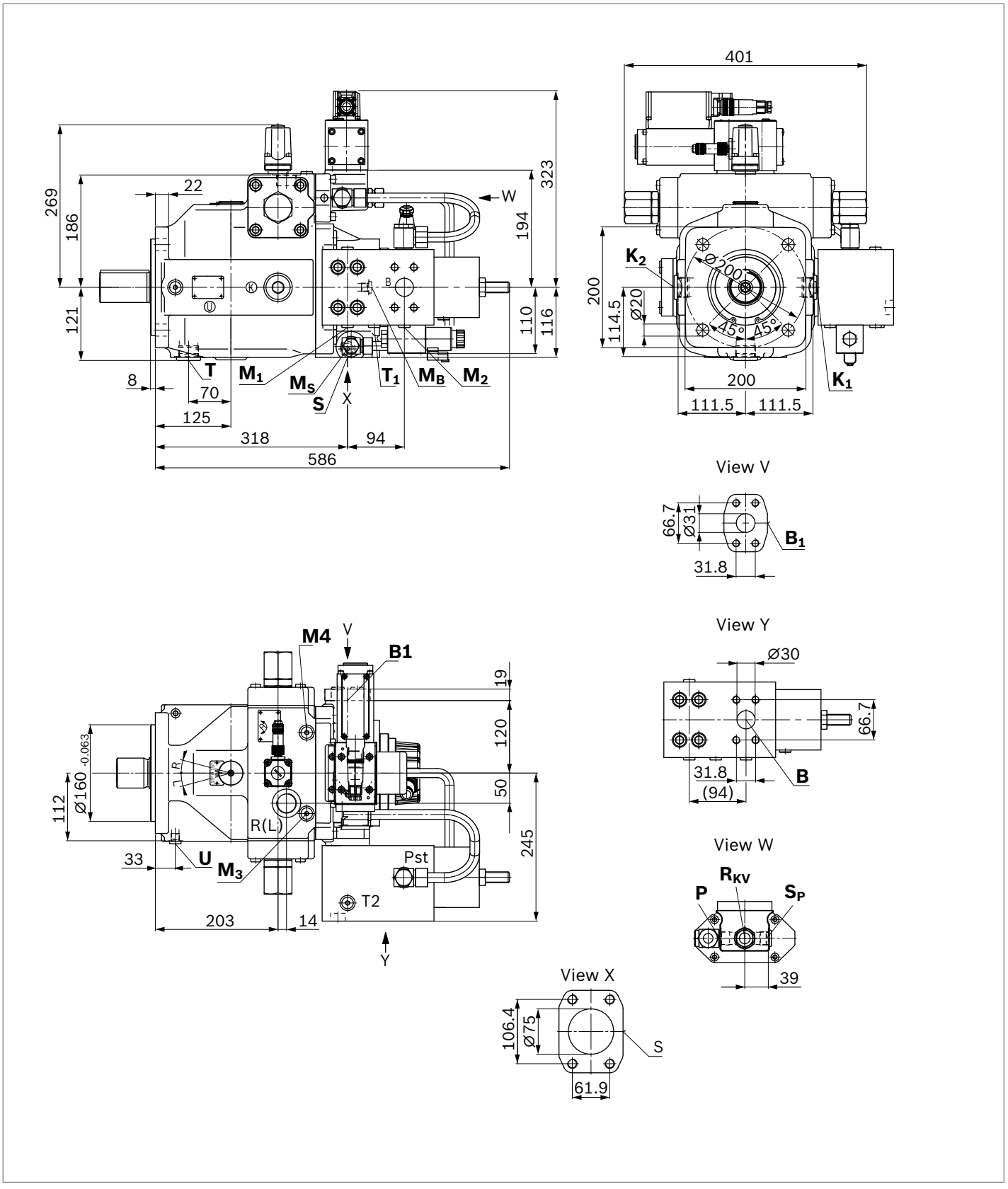
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][3)]	State[7)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[4)] DIN 13	2 1/2 inch M12 × 1.75; 17 deep	30	O
B; B_1 **B** **B_1**	Working port (high-pressure series) Fastening thread Fastening thread	SAE J518[4)] DIN 13 DIN 13	1 1/4 inch M14 × 2; 22 deep M14 × 2; 19 deep	400	O
M_B	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Working pressure measurement	DIN 3852	G 1/4 in; 12 deep	400	X
M_S	Suction pressure measuring	DIN 3852	M14 × 1.5; 12 deep	30	X
M_3; M_4	Control pressure measuring	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_1; K_2	Flushing	DIN 3852[5)]	M33 × 2; 18 deep	4	O[6)]
R(L)	Control fluid return flow	DIN 3852[5)]	M33 × 2; 18 deep	4	O[6)]
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
R_{KV}	Control fluid return flow	DIN 3852[5)]	M22 × 1.5; 14 deep	100	piped up
P	Control pressure	DIN 3852[5)]	M22 × 1.5; 14 deep	315	piped up

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the notes in the instruction manual concerning the maximum tightening torques.
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
4) Metric fastening thread is a deviation from standard.
5) The countersink may be deeper than specified in the standard.
6) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
7) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 180

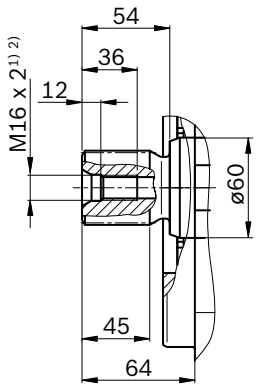
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



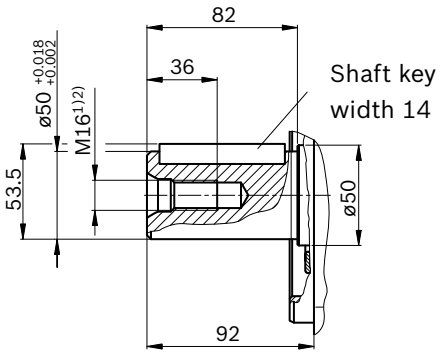
▼ **Splined shaft DIN 5480**

Z – W50x2x24x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14x9x80



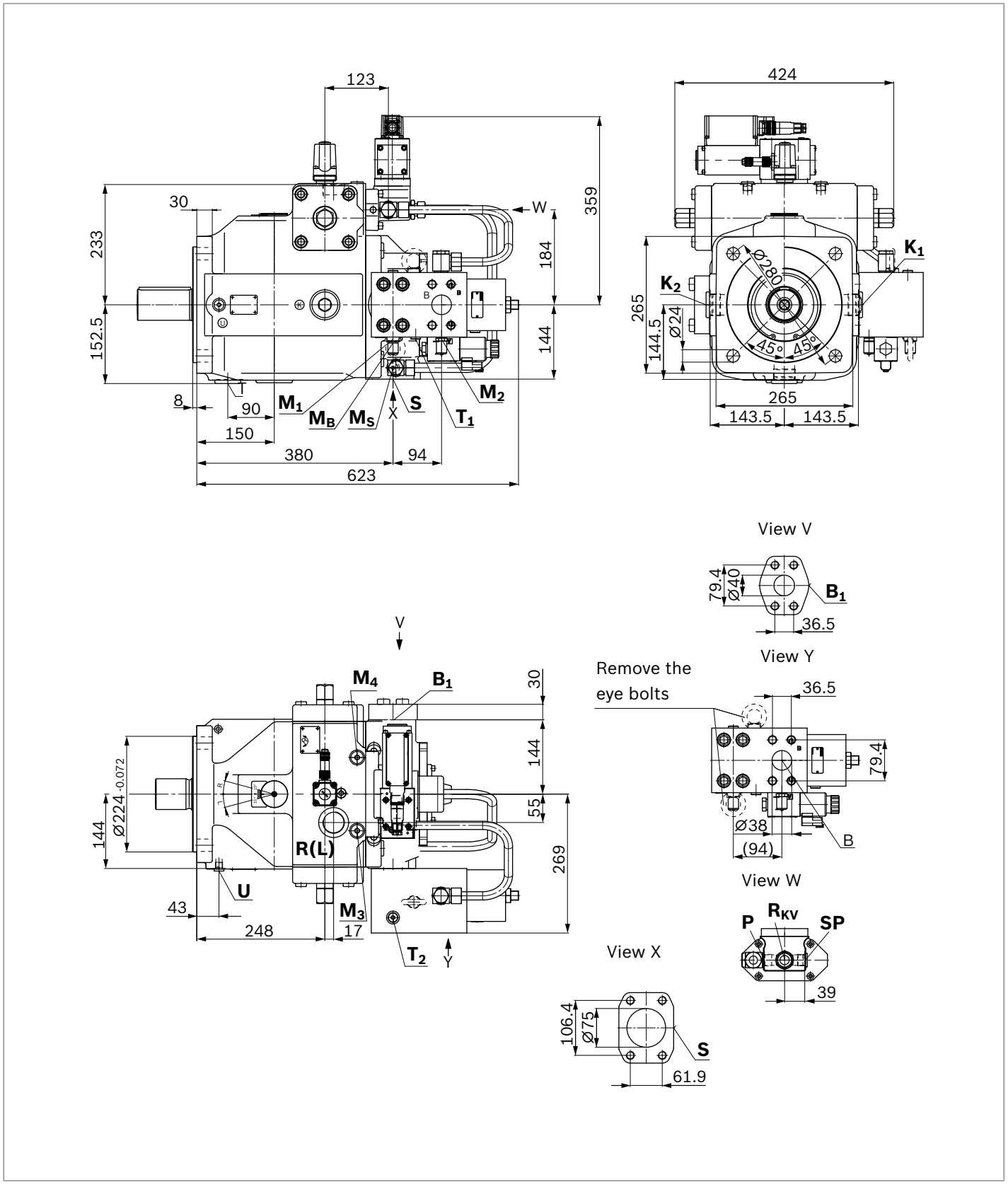
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][3)]	State[7)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[4)] DIN 13	3 inch M16 × 2; 24 deep	30	O
B; B_1	Working port (high-pressure series) Fastening thread	SAE J518[4)] DIN 13	1 1/4 inch M14 × 2; 19 deep	400	O
M_B	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Working pressure measurement	DIN 3852	G 1/4 in; 12 deep	400	X
M_S	Suction pressure measuring	DIN 3852	M14 × 1.5; 12 deep	30	X
M_3; M_4	Control pressure measuring	DIN 3852	M14 × 1.5; 12 deep	315	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_1; K_2	Flushing	DIN 3852[5)]	M33 × 2; 18 deep	4	O[6)]
R(L)	Control fluid return flow	DIN 3852[5)]	M33 × 2; 18 deep	4	O[6)]
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
R_{KV}	Control fluid return flow	DIN 3852[5)]	M22 × 1.5; 14 deep	100	piped up
M_{S2}	Control fluid return flow	DIN 3852[5)]	G 1/2; 15 deep	100	piped up
P	Control pressure	DIN 3852[5)]	M22 × 1.5; 14 deep	315	piped up

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the notes in the instruction manual concerning the maximum tightening torques.
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
4) Metric fastening thread is a deviation from standard.
5) The countersink may be deeper than specified in the standard.
6) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
7) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 250

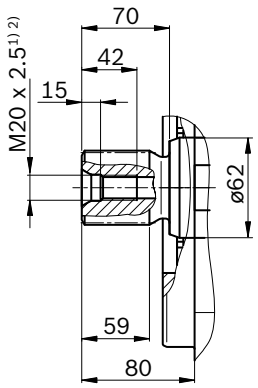
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



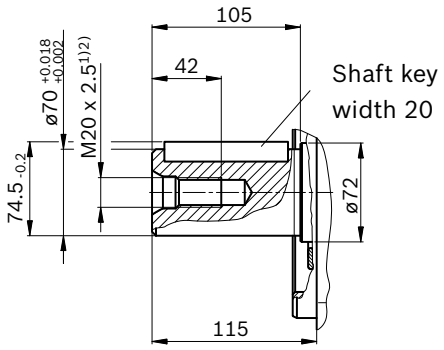
▼ **Splined shaft DIN 5480**

Z – W60x2x28x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø60 AS 20x12x100



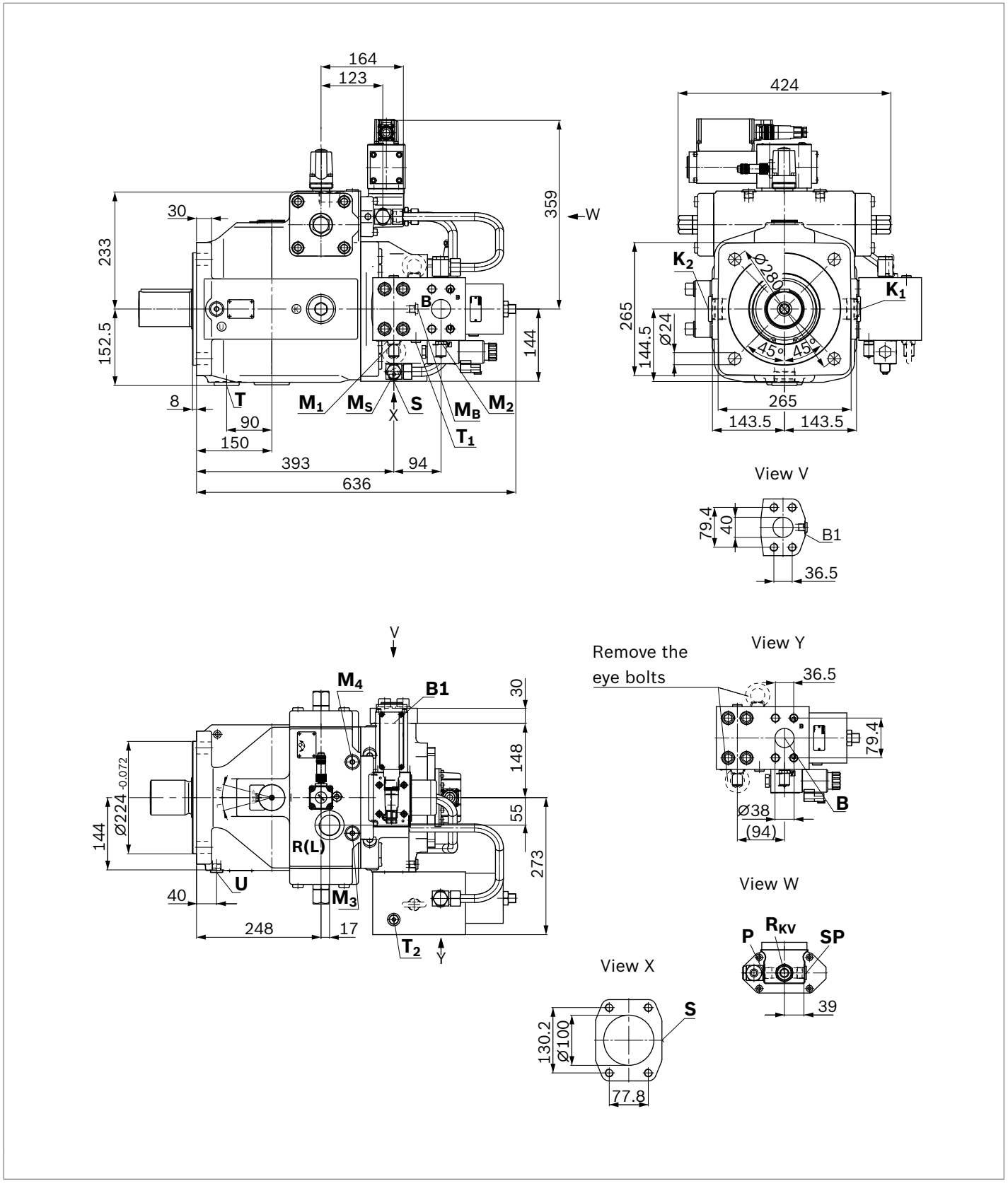
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[3)] DIN 13	3 inch M16 × 2; 24 deep	400	O
B; B_1 **B** **B_1**	Working port (high-pressure series) Fastening thread Fastening thread	SAE J518[3)] DIN 13 DIN 13	1 1/2 inch M16 × 2; 23 deep M16 × 2; 21 deep	400	O
M_B	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Working pressure measurement	DIN 3852	G 1/4; 12 deep	400	X
M_S	Suction pressure measuring	DIN 3852	M14 × 1.5; 12 deep	30	X
M_3; M_4	Control pressure measuring	DIN 3852	M18 × 1.5; 12 deep	315	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_1; K_2	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
R_{KV}	Control fluid return flow	DIN 3852[4)]	M22 × 1.5; 14 deep	100	piped up
M_{S2}	Control fluid return flow	DIN 3852[4)]	G 1/2; 14 deep	100	piped up
P	Control pressure	DIN 3852[4)]	M22 × 1.5; 14 deep	315	piped up

1) Center bore according to DIN 332 (thread according to DIN 13)
2) Observe the notes in the instruction manual concerning the maximum tightening torques.
3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
4) Metric fastening thread is a deviation from standard.
5) The countersink may be deeper than specified in the standard.
6) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
7) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 355

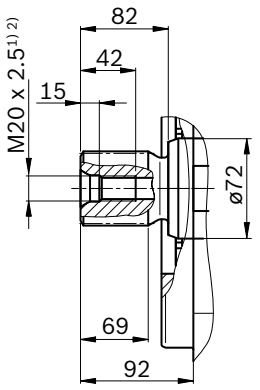
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



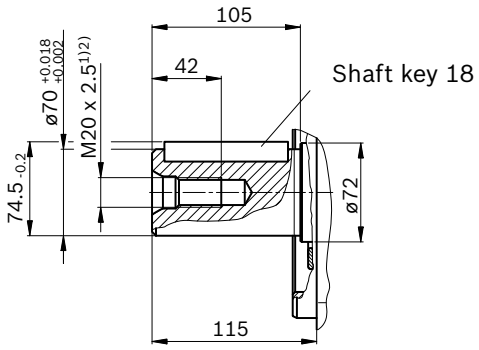
▼ **Splined shaft DIN 5480**

Z – W70x3x22x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø76 AS 20x12x100



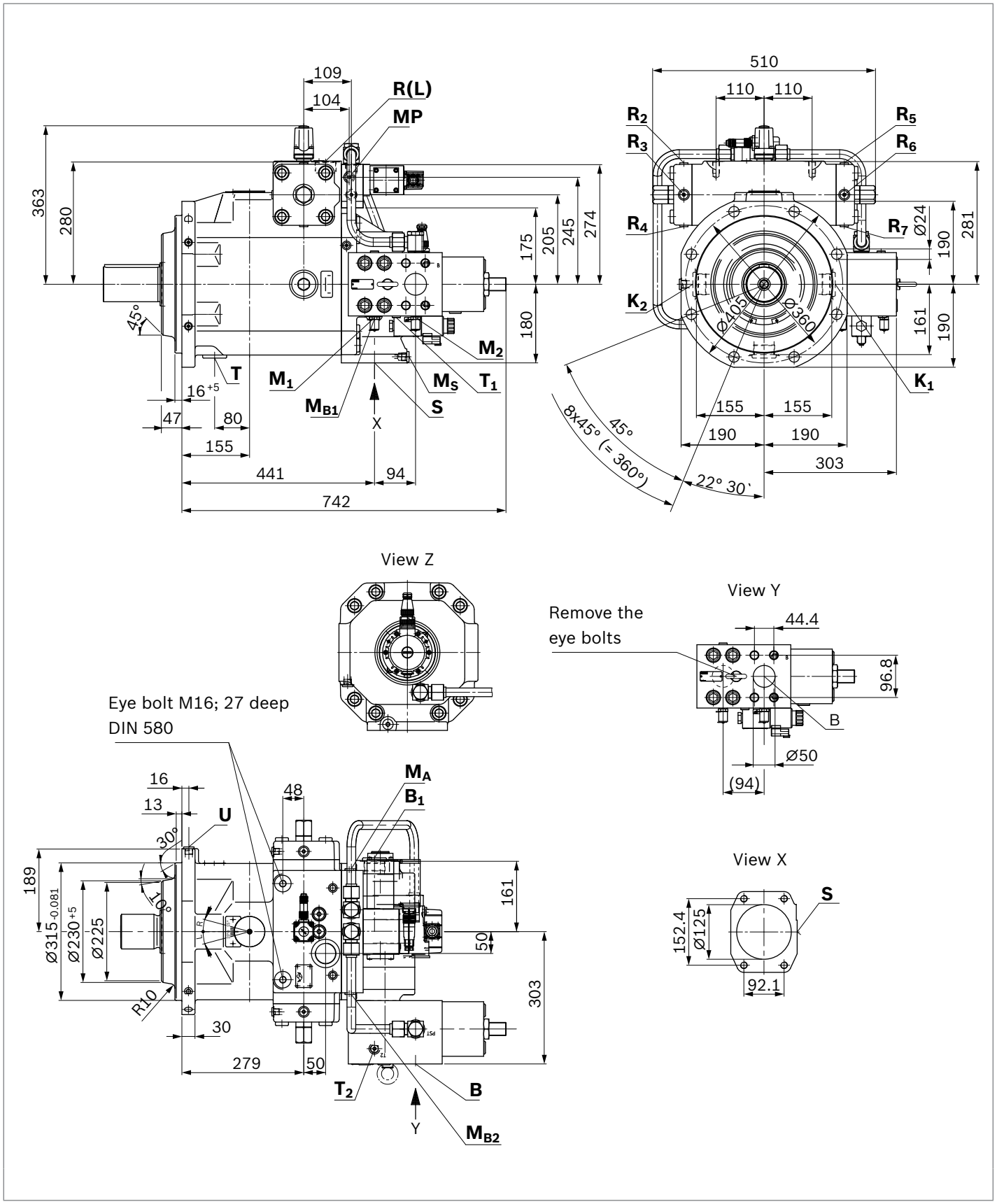
Ports		Standard	Size[1]	$p_{max\ abs}$ [bar][2]	State[6]
S	Suction port (standard pressure series) Fastening thread	SAE J518[3] DIN 13	4 inch M16 × 2; 21 deep	30	O
B, B_1 **B** **B_1**	Working port (high-pressure series) Fastening thread Fastening thread	SAE J518[3] DIN 13 DIN 13	1 1/2 inch M16 × 2; 23 deep M16 × 2; 25 deep	400	O
M_B	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Working pressure measurement	DIN 3852	G 1/4; 12 deep	400	X
M_S	Suction pressure measuring	DIN 3852	M14 × 1.5; 12 deep	30	X
M_3; M_4	Control pressure measuring	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_1; K_2	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
R_{KV}	Control fluid return flow	DIN 3852[4]	M22 × 1.5; 14 deep	100	piped up
M_{S2}	Control fluid return flow	DIN 3852[4]	G 1/2; 15 deep	100	piped up
P	Control pressure	DIN 3852[4]	M22 × 1.5; 14 deep	315	piped up

1) Observe the notes 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 may be deeper than specified in the standard.
5) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
6) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 500

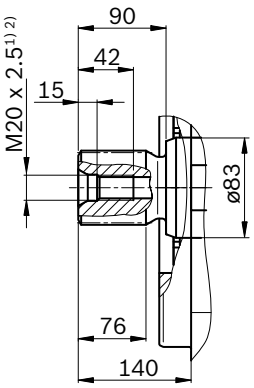
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



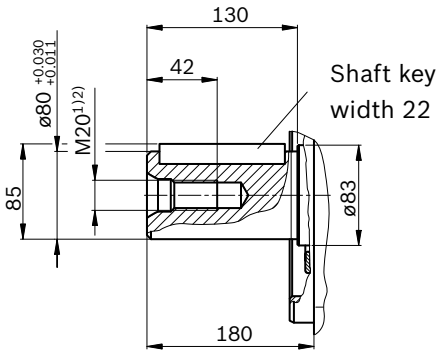
▼ **Splined shaft DIN 5480**

Z – W80x3x25x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø80 AS 22x14x125



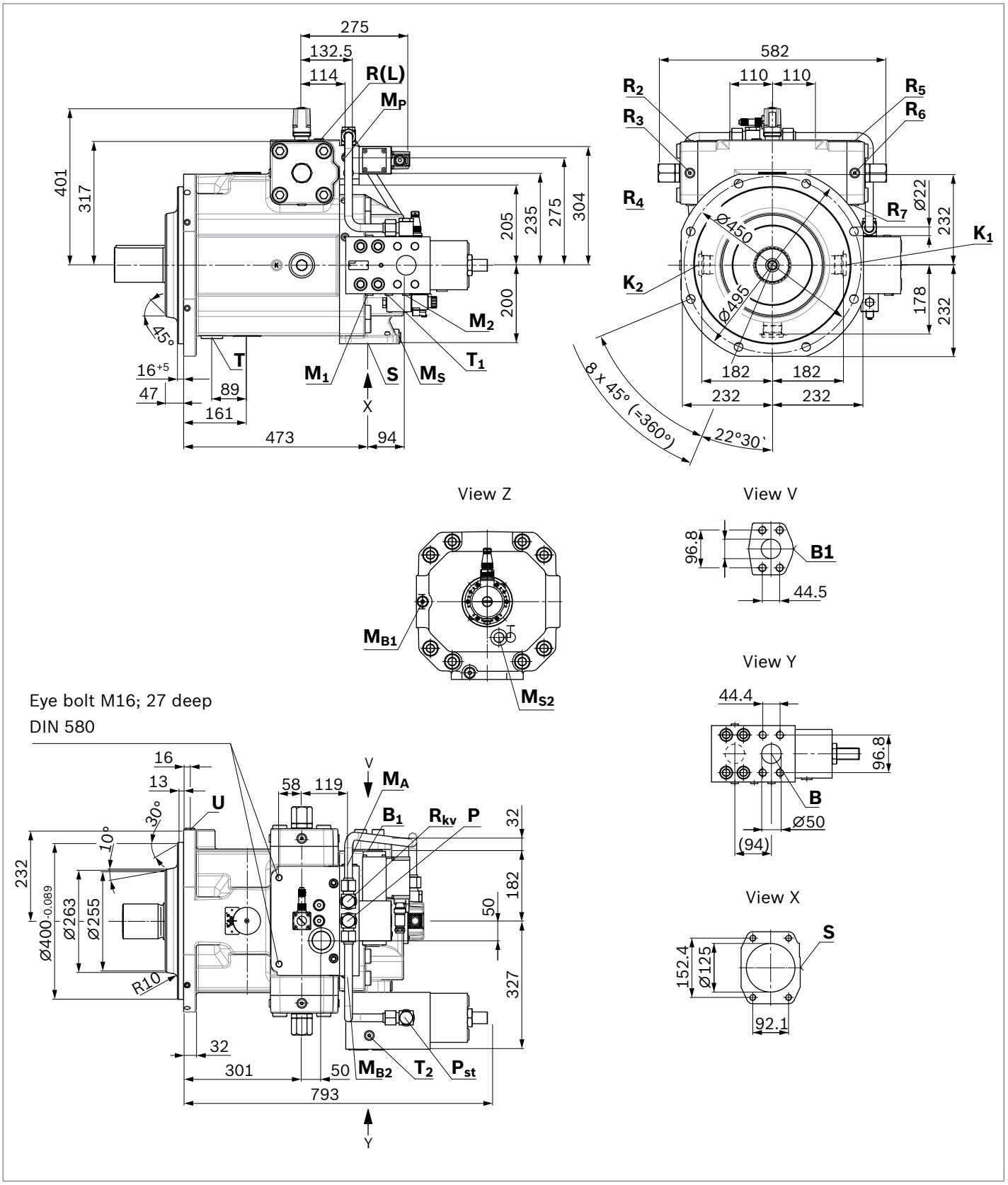
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[3)] DIN 13	5 inch M16 × 2; 24 deep	30	O
B; B_1 **B** **B_1**	Working port (high-pressure series) Fastening thread Fastening thread	SAE J518[3)] DIN 13 DIN 13	2 inch M20 × 2.5; 23 deep M20 × 2.5; 24 deep	400	O
M_{B1}	Working pressure measurement	DIN 3852	M18 × 1.5; 12 deep	400	X
M_A; M_{B2}	Control pressure measuring	DIN 3852	M14 × 1.5; 12 deep	315	X
M_{B1}	Working pressure measurement	DIN 3852	M18 × 1.5; 12 deep	400	X
M_S	Suction pressure measuring	DIN 3852	M18 × 1.5; 12 deep	30	X
M_1; M_2	Working pressure measurement	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_1; K_2	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
R_{KV}	Control fluid return flow	DIN 3852[4)]	M27 × 2; 16 deep	100	piped up
M_{S2}	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 notes 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 may be deeper than specified in the standard.
5) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
6) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 750

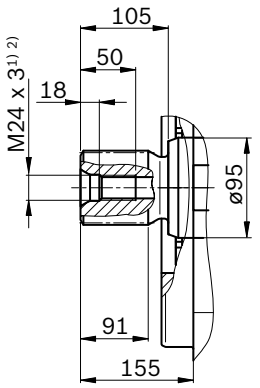
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



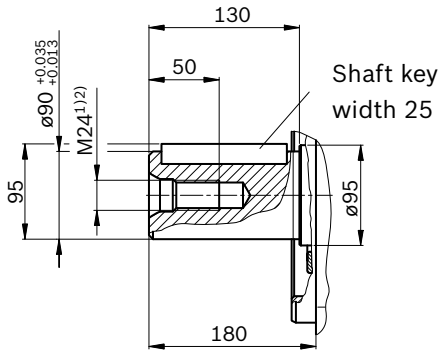
▼ **Splined shaft DIN 5480**

Z – W90x3x28x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø90 AS 25x14x125



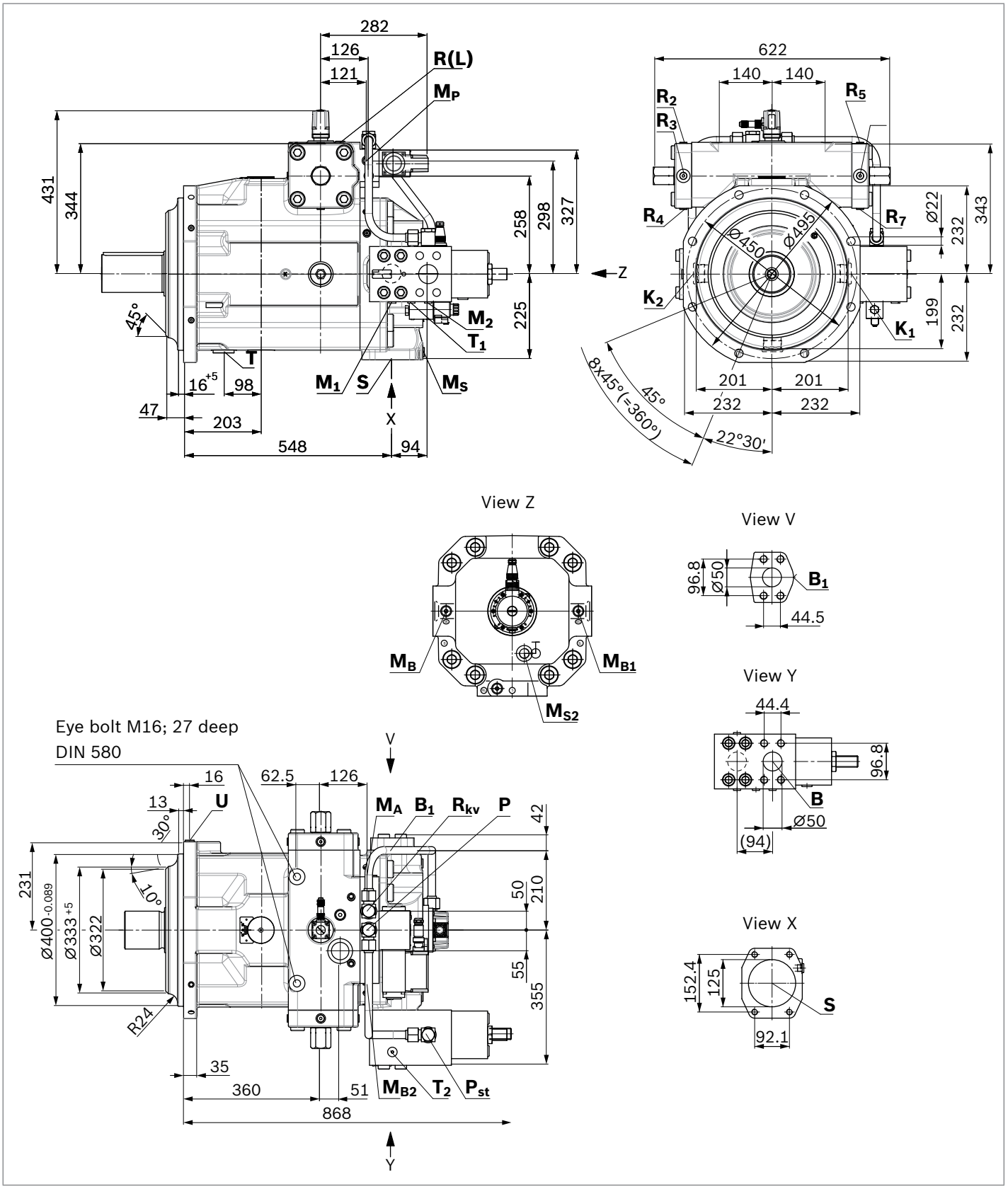
Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[3)] DIN 13	5 inch M16 × 2; 24 deep	30	O
B, B_1	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	2 inch M20 × 2.5; 24 deep	400	O
M_{B1}	Working pressure measurement	DIN 3852	M18 × 1.5; 12 deep	400	X
M_A; M_{B2}	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_S	Suction pressure measuring	DIN 3852	M18 × 1.5; 12 deep	30	X
M_P	External pilot pressure measurement	DIN 3852	M14 × 1.5; 12 deep	315	X
M_1; M_2	Working pressure measurement	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
R_{KV}	Control fluid return flow	DIN 3852[4)]	M27 × 2; 16 deep	100	piped up
M_{S2}	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 notes 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 may be deeper than specified in the standard.
5) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
6) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions, size 1000

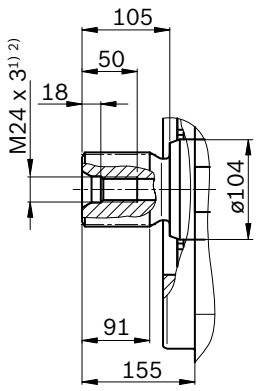
DS2 – secondary controlled unit with RVE check valve

Alternating direction of rotation



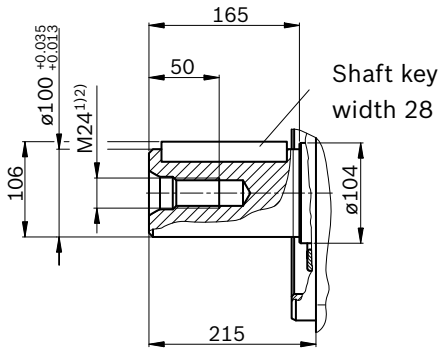
▼ **Splined shaft DIN 5480**

Z – W100x3x32x9g



▼ **Parallel keyed shaft DIN 6885**

P – Ø100 AS 28x16x160



Ports		Standard	Size[1)]	$p_{max\ abs}$ [bar][2)]	State[6)]
S	Suction port (standard pressure series) Fastening thread	SAE J518[3)] DIN 13	5 inch M16 × 2; 24 deep	30	O
B, B_1	Working port (high-pressure series) Fastening thread	SAE J518[3)] DIN 13	2 inch M20 × 2.5; 24 deep	400	O
M_B; M_{B1}	Working pressure measurement	DIN 3852	M18 × 1.5; 12 deep	400	X
M_A; M_{B2}	Working pressure measurement	DIN 3852	M14 × 1.5; 12 deep	400	X
M_1; M_2	Working pressure measurement	DIN 3852	G 1/4; 12 deep	400	X
M_S	Suction pressure measuring	DIN 3852	M18 × 1.5; 12 deep	30	X
M_P	External pilot pressure measurement	DIN 3852	M14 × 1.5; 12 deep	315	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
R_{KV}	Control fluid return flow	DIN 3852[4)]	M27 × 2; 16 deep	100	piped up
M_{S2}	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 notes 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 may be deeper than specified in the standard.
5) Depending on the installation position, **K** oder **R**(**L**) must be connected (also see installation instructions in data sheet 92050).
6) O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Project planning notes

- The A4VSO axial piston unit 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 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 preservation is required (maximum 24 months), please specify this in plain text when placing your order. The preservation periods apply under optimal storage conditions, which can be found in 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 proper contact at Bosch Rexroth if you require reliability parameters (e.g. $MTTF_d$) for functional safety.
- Depending on the type of control used, electromagnetic effects can be produced when using solenoids. 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 this potentiality.
- Pressure controllers are not safeguards against pressure overload. A pressure relief valve is to be fitted in the hydraulic system.
- 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, especially on the solenoids. Take the appropriate safety measures (e.g. by wearing protective clothing).
- Under certain circumstances, moving parts in control equipment (e.g. valve spools) can 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 should 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 make sure any measures are properly implemented.

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