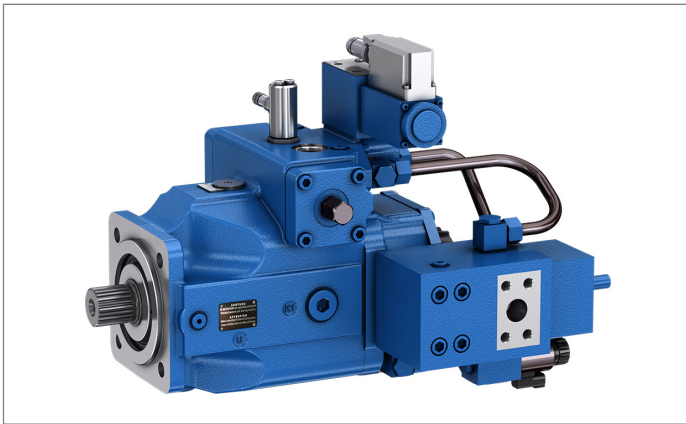


Axial piston units with secondary control DS3 A4VSO series 10 and 30



- ▶ 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 rotational 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

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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)																
04	Geometric displacement, see table of values on page 9							40	71	125	180	250	355	500	750	1000

Control device														
05	Secondary closed loop rotational speed control	with mounted control valve	•	•	•	•	•	•	•	•	•	•	•	DS3R
		with mounted servo valve	•	•	•	•	•	•	•	•	•	•	•	DS3S
		without valve	•	•	•	•	•	•	•	•	•	•	•	DS3E

Additional valve (see table Flow direction on page 5 onwards)													
06	Load-holding function with LS 1363 (without piping) ²⁾												L
	Without load-holding function												O

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 material³⁾											40	71	125	180	250	355	500	750	1000	
09	FKM (fluorocarbon rubber) 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 , shifted laterally 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: Without pressure limitation. (sales.industry.horb@boschrexroth.de).
3) For more information such as sealing material or temperature ranges 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
	Prepared for through drive, with pressure-proof plugged cover			●	●	●	●	●	●	●	●	●	99
	With mounted incremental encoder		1000 Imp/U	●	●	●	●	●	●	●	●	●	T03²⁾
	Prepared for incremental encoder, through drive plugged with cover			●	●	●	●	●	●	●	●	●	T10²⁾
	Special tachometer mounting			○	○	○	○	○	○	○	○	○	T99
	Prepared for special tachometer mounting, 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.	●	●	●	●	●	●	●	●	●	●	●	2³⁾

Filtration

15	Without filter	●	●	●	●	●	●	●	●	●	●	●	N
	Intermediate plate filter (Only with DS3S 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. (See also 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 (sales.industry.horb@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 closed loop 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.

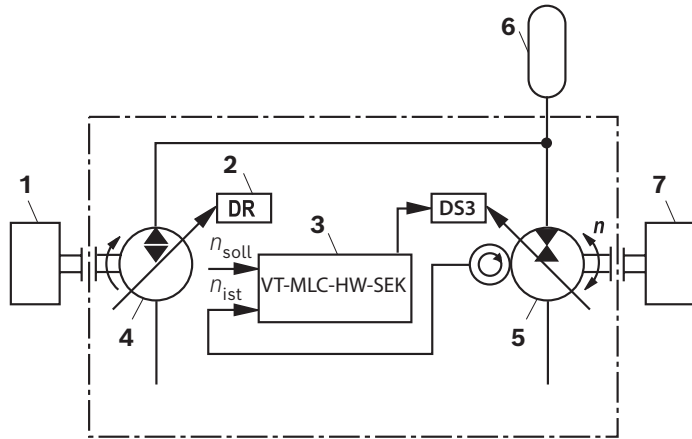
Any number of units operating as a motor or pump can thereby be arranged in parallel. Four-quadrant operation is possible, whereby the units for reversing the rotational speed or torque are swiveled over "zero".

This also reverses the direction of the flow.

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 closed loop 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.

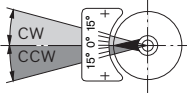


Associated electronics (see also page 15)

- ▶ Digital controller assembly group VT-MLC-HW-SEK
- ▶ 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

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

Flow direction

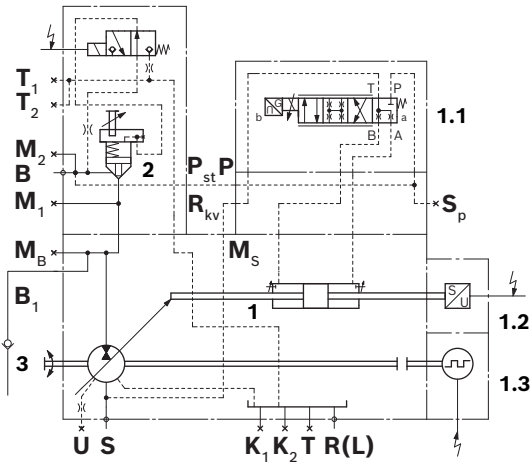
	Swiveling direction ¹⁾		Direction of rotation ²⁾		High pressure in	Operating mode
	Clockwise	Counter-clockwise	Clockwise	Counter-clockwise		
	Clockwise	Counter-clockwise	B to S	–	B	Motor
	Clockwise	Counter-clockwise	–	S to B	B	Pump
	Counter-clockwise	Clockwise	–	B to S	B	Motor
	Counter-clockwise	Clockwise	S to B	–	B	Pump

1) Cf. swivel angle indicator

2) Viewed on drive shaft

Circuit diagram DS3 size 40 to 71

▼ Circuit diagram standard A4VSO...DS3R/...W-... 25 T03...1N

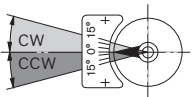






Ports	
B	Working pressure (high-pressure series)
B₁	Additional connection, working pressure (high-pressure series)
S	Suction pressure (high-pressure series)
M_B	Measuring working pressure
M_S	Control fluid return flow
M₁, M₂	Measuring working pressure
S_P	Control pressure
T	Fluid drain
T₁; T₂	Leakage/air bleeding
K₁; K₂	Flushing
R(L)	Control fluid return flow
U	Bearing flushing
P_{ST}	Control pressure
R_{KV}	Control fluid return flow
P	Control pressure

Secondary unit components

- | | |
|------------|--|
| 1 | Axial piston unit A4VSO size 40 bis 71 |
| 1.1 | 4-way control valve (see data sheet 29026)
4WRPH6 C3 B24L -2X/G24KO/M-750 |
| 1.2 | Swivel angle sensor AWAX (see page 13) |
| 1.3 | Incremental encoder GEL 293 (see page 12) |
| 2 | Electrically releasable check valve RVE
Ordering code:
Order item 14, type code 1
(see page 14) |
| 3 | Anti-cavitation valve, order separately (see page 14) |

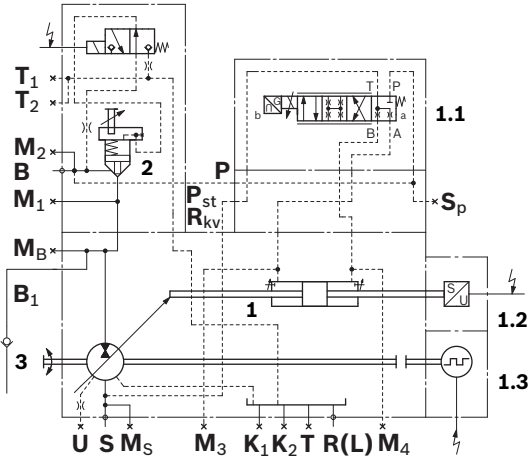
Flow direction

Size 40 to 71	Swivel direction ¹⁾	Direction of rotation ²⁾		High pressure in	Operating mode	Control valve 4WRPH		Sign Swivel angle Actual value
		Clockwise	Counter-clockwise			Part of control	Flow direction	
	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

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

Circuit diagram DS3 size 125 to 355

▼ **Circuit diagram standard A4VSO...DS3R/...W... 25 T03...1N**



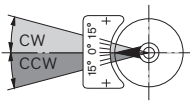
Ports	
B	Working pressure (high-pressure series)
B₁	Additional connection, working pressure (high-pressure series)
S	Suction pressure (high-pressure series)
M_B	Measuring working pressure
M_S	Control fluid return flow
M₁, M₂	Measuring control pressure
M₃, M₄	Measuring working pressure
S_P	Control pressure
T	Fluid drain
T₁; T₂	Leakage/air bleeding
K₁; K₂	Flushing
R(L)	Control fluid return flow
U	Bearing flushing
P_{ST}	Control pressure
R_{KV}	Control fluid return flow
P	Control pressure

Secondary unit components

- | | |
|------------|--|
| 1 | Axial piston unit A4VSO size 125 bis 355 |
| 1.1 | 4-way control valve (see data sheet 29026)
4WRPH10 C3 B50L -2X/G24KO/M-750 |
| 1.2 | Swivel angle sensor AWAX (see page 13) |
| 1.3 | Incremental encoder GEL 293 (see page 12) |
| 2 | Electrically releasable check valve RVE
Ordering code:
Order item 14, type code 1
(see page 14) |
| 3 | Anti-cavitation valve, order separately (see page 14) |

Flow direction

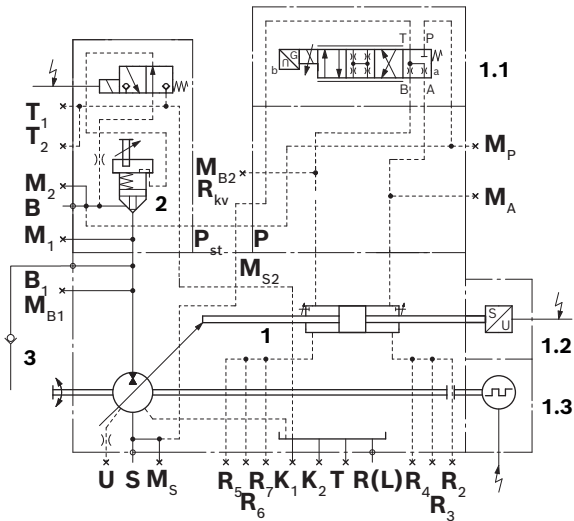
Size 125 to 355	Swivel direction ¹⁾	Direction of rotation ²⁾		High pressure in	Operating mode	Control valve 4WRPH		Sign Swivel angle Actual value
		Clockwise	Counter-clockwise			Part of control	Flow direction	
	Clockwise	B to S		B	Motor		P to B A to T	Positive
	Clockwise		S to B	B	Pump		P to B A to T	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

Circuit diagram DS3 size 500 to 1000

▼ Circuit diagram standard A4VSO...DS3R/...W-... 25 T03...1N



Ports	
B	Working pressure (high-pressure series)
S	Suction pressure (high-pressure series)
M_{B1}; M₁; M₂	Measuring working pressure
M_S, M_{S2} (Upon request)	Measuring suction pressure
M_{A2}	Measuring control pressure
M_{B2}	Measuring control pressure
M_P	external control pressure
T	Fluid drain
T₁; T₂	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

Secondary unit components

- | | |
|------------|--|
| 1 | Axial piston unit A4VSO size 500 bis 1000 |
| 1.1 | 4-way control valve (see data sheet 29026)
4WRPH10 C3 B50L -2X/G24KO/M-750 |
| 1.2 | Swivel angle sensor AWAX (see page 13) |
| 1.3 | Incremental encoder GEL 293 (see page 12) |
| 2 | Electrically releasable check valve RVE
Ordering code:
Order item 14, type code 1
(see page 14) |
| 3 | Anti-cavitation valve, order separately (see page 14) |

Flow direction

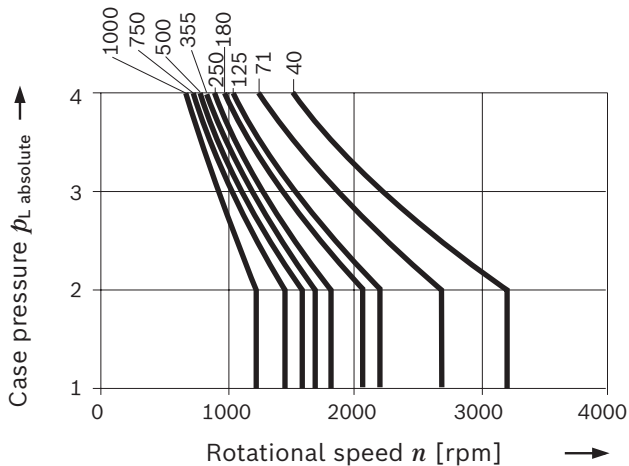
Size 500 to 1000	Swivel direction ¹⁾	Direction of rotation ²⁾		High pressure in	Operating mode	Control valve 4WRPH		Sign Swivel angle Actual value
		Clockwise	Counter-clockwise			Part of control	Flow direction	
	Clockwise	B to S		B	Motor		P to A B to T	Positive
	Clockwise		S to B	B	Pump		P to A B to 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

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

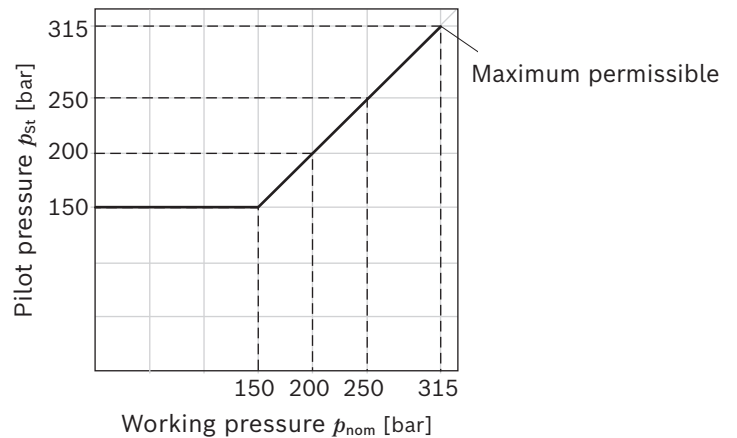
Working pressure range

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 within a single operating period. The sum of the single operating periods must not exceed the total operating period (maximum number of cycles: approx. 1 million).
Single operating period	1 s	
Total operating period	300 h	
Minimum pressure $p_{B abs}$ (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 speed of pressure build-up and reduction 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 depends on the rotational speed and displacement of the axial piston unit.
Minimum pressure $p_{S min}$	≥ 0.8 bar absolute	
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 (sales.industry.horb@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		$V_{g \max}$	cm ³	40	71	125	180	250	355	500	750	1000
Rotational speed maximum ¹⁾	with 1.0 $V_{g \max}$; $p_E \geq 15$ bar	n_{\max}	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	at n_{\max} , $V_{g \max}$ and $\Delta p = 300$ bar	P	kW	74	114	163	216	250	355	450	600	800
Torque	at $V_{g \max}$ and $\Delta p = 300$ bar	M	Nm	191	339	597	859	1194	1695	2387	3581	4775
Control volume	from 0 to $V_{g \max}$	$V_{S \max}$	cm ³	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
Own moment of inertia			kgm ²	0.0049	0.0121	0.0300	0.055	0.0959	0.19	0.3325	0.66	1.20
Required minimum total moment of inertia			kgm ²	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

$$\text{Flow } q_v = \frac{V_g \times n \times \eta_v}{1000} \quad [\text{l/min}]$$

$$\text{Torque } M = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{hm}} \quad [\text{Nm}]$$

$$\text{Power } P = \frac{2 \pi \times M \times n}{60000} = \frac{q_v \times \Delta p}{600 \times \eta_t} \quad [\text{kW}]$$

Key

V_g	=	Displacement per revolution [cm ³]
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. Bosch Rexroth recommends checking loads through tests or calculation/simulation and comparing them with the permissible values.

Determining the characteristics for operation as a motor

$$\text{Displacement } q_v = \frac{V_g \times n}{1000 \times \eta_v} \quad [\text{l/min}]$$

$$\text{Torque } M = \frac{V_g \times \Delta p \times \eta_{hm}}{20 \times \pi} \quad [\text{Nm}]$$

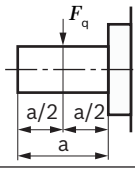
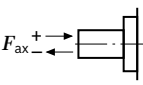
$$\text{Output power } P = \frac{2 \pi \times M \times n}{60000} = \frac{q_v \times \Delta p \times \eta_t}{600} \quad [\text{kW}]$$

Key

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

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

Permissible radial and axial loading of the drive shaft

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 absolute		$\pm F_{ax \max}$	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 values given are maximum values and do not apply to continuous operation. Special requirements apply in the case of belt drives. Please contact us.

Function based on a DS3R rotational speed control example

Speed control is when the DS3 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 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 **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 AWAX for sensing the swivel angle
 - ▶ The electrically releasable RVE A4VS check valve
 - ▶ Digital controller assembly group VT-MLC-HW-SEK
- Information on pilot valve (DS3R) 4WRPH6/10...-750 can be found in data sheet 29026.

Incremental encoder GEL 293

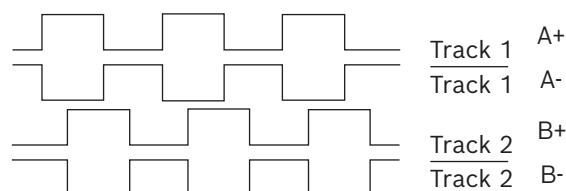
Technical data (type code position 12 "T03")	
Resolution	
T03	1000 increments/revolution
Type of protection according to EN 60529	IP 66 with installed and locked plug-in connector
Power consumption: $R_L = \infty$; $U_B = 5\text{ V}$	$\leq 1.3\text{ W}$
Ambient temperature	-20 °C to +85 °C

Signal pattern T

Supply voltage $U_S = 5\text{ V} \pm 5\%$; signal voltage $U_{Si} = 5\text{ V}$

- ▶ The 5 V supply voltage for the incremental encoder must be provided externally and is not included in the scope of delivery.

Clockwise-rotating signal image viewed on drive shaft

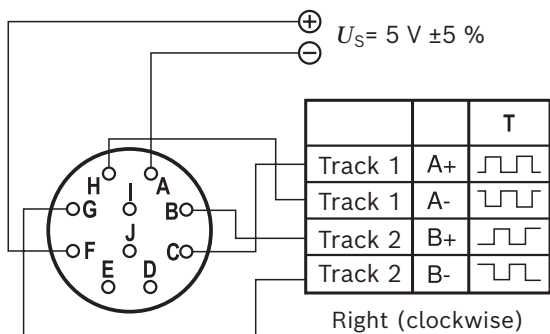


Electrical connection

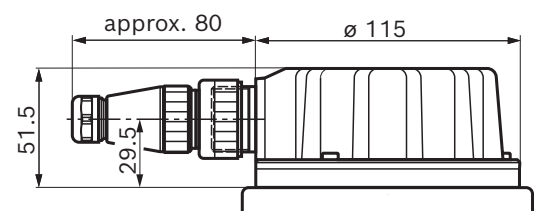
Maximum cable lengths

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

Connector for solenoids

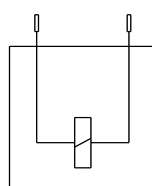
DEUTSCH DT04-2P-EP04

Molded, 2-pin, without bidirectional suppressor diode

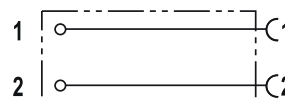
The following type of protection ensues with the mounted mating connector:

- ▶ IP66/IP67 (DIN/EN 60529)

Switching symbol



Circuit diagram pin image

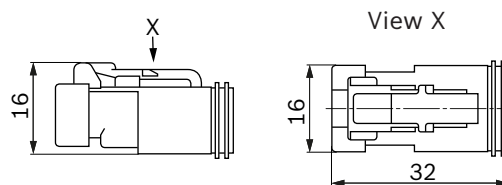


Plug-in connector

Directional valve with device connector K40 (DEUTSCH connector)

Code	Voltage	Current	Color	Wire cross section	Material number
2P DT06	DC/AC				
K40..	U	I_{max}		[mm ²]	
..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

Accessories (not included in the scope of delivery)

Crimping tool	Type HDT-4800, Deutsch
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Electrically releasable check valve RVE

(Order item 14, 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	IP66/IP67 with mounted and locked plug-in connector	

Hydraulic (see also cartridge 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		
Size	Anti-cavitation valve	
	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 **B₁**.
For details of the anti-cavitation valves,
see data sheet 20375.

Digital controller assembly group VT-MLC-HW-SEK



Features

The digital controller assembly group VT-MLC-HW-SEK is suitable for the closed loop rotational speed control, closed loop torque control and torque control of secondary controlled axial piston units type A4VS..DS3. 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 4 swivel angle sensor inputs
- ▶ Up to 2 incremental encoder inputs with monitoring functions for rotational speed sensing
- ▶ Analog inputs
- ▶ Analog outputs for controlling downstream valve amplifiers
- ▶ Digital inputs and outputs for communication with a higher-level control
- ▶ PROFINET for communication with a higher-level control
- ▶ Layout of the master/slave applications via internal communication interface
- ▶ Installation on a 35 mm mounting rail

Software functionality

The software basically contains the control types: closed loop rotational 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 VT-MLC-HW-SEK is done using the web browser by the web visualization implemented on the control.

System-specific software extensions can be created on request.

Monitoring functions

- ▶ Cable break monitoring for incremental encoder
- ▶ Cable break monitoring for swivel angle sensor
- ▶ Overspeed
- ▶ Rotational speed difference target / actual
- ▶ Swivel angle difference target / actual

Notice about the system structure

The secondary unit with ordering code 04 = "DS3R" with control valve additionally requires the following:

- ▶ Digital controller assembly group VT-MLC-HW-SEK material number R901545064 (includes the basic function rotational speed control, closed loop torque control and open loop torque control)
- ▶ Amplifier VT-VRRRA 1-527-20/V0 according to data sheet 30041 for A4VS NG40 and 71 Material number 0811405060
- ▶ Amplifier VT-VRRRA 1-537-20/V0 according to data sheet 30041 for A4VS NG125 to 1000 Material number 0811405061
- ▶ Card holder VT3002-1-2X/32F according to data sheet 29928 material number 1834486001

These components are not included in the scope of delivery

For further information, please see the data sheets for

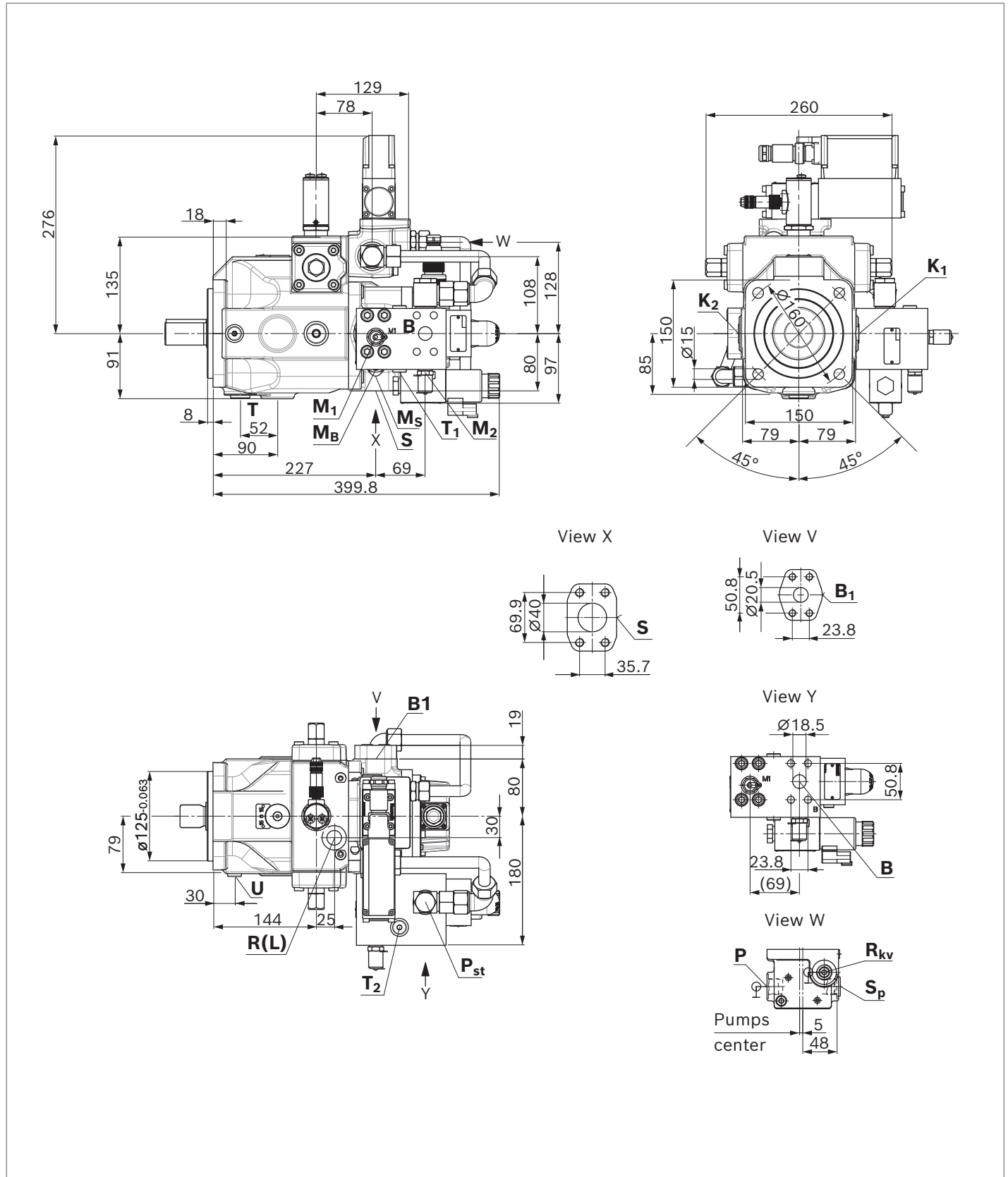
card holder VT 3002	29928
electrical amplifier VT-VRRRA1-5	30041

Functional description for MLC-SEK digital controller assembly group for secondary control of axial piston units	30246-FK
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Dimensions, size 40

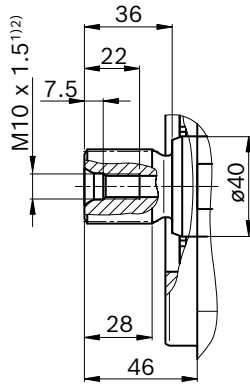
DS3 – secondary controlled unit with RVE check valve

Bidirectional direction of rotation

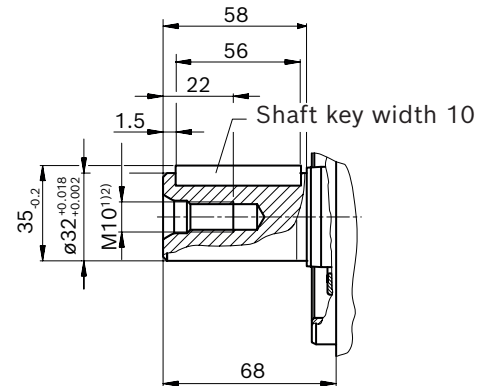


▼ **Splined shaft DIN 5480**

Z – W32x2x14x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø32 AS 10x8x56



Ports	Standard	Size ¹⁾	p_{\max} [bar] ³⁾	State ⁷⁾	
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M12 × 1.75; 20 deep	30	O
B; B₁	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	3/4 in M10 × 1.5; 17 deep	400	O
M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M₁; M₂	Measuring working pressure	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
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K₁; K₂	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	pipied up
R_{KV}	Control fluid return flow	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	100	pipied up
P	Control pressure	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	315	pipied up

1) Center bore according to DIN 332

2) Thread according to DIN 13

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** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

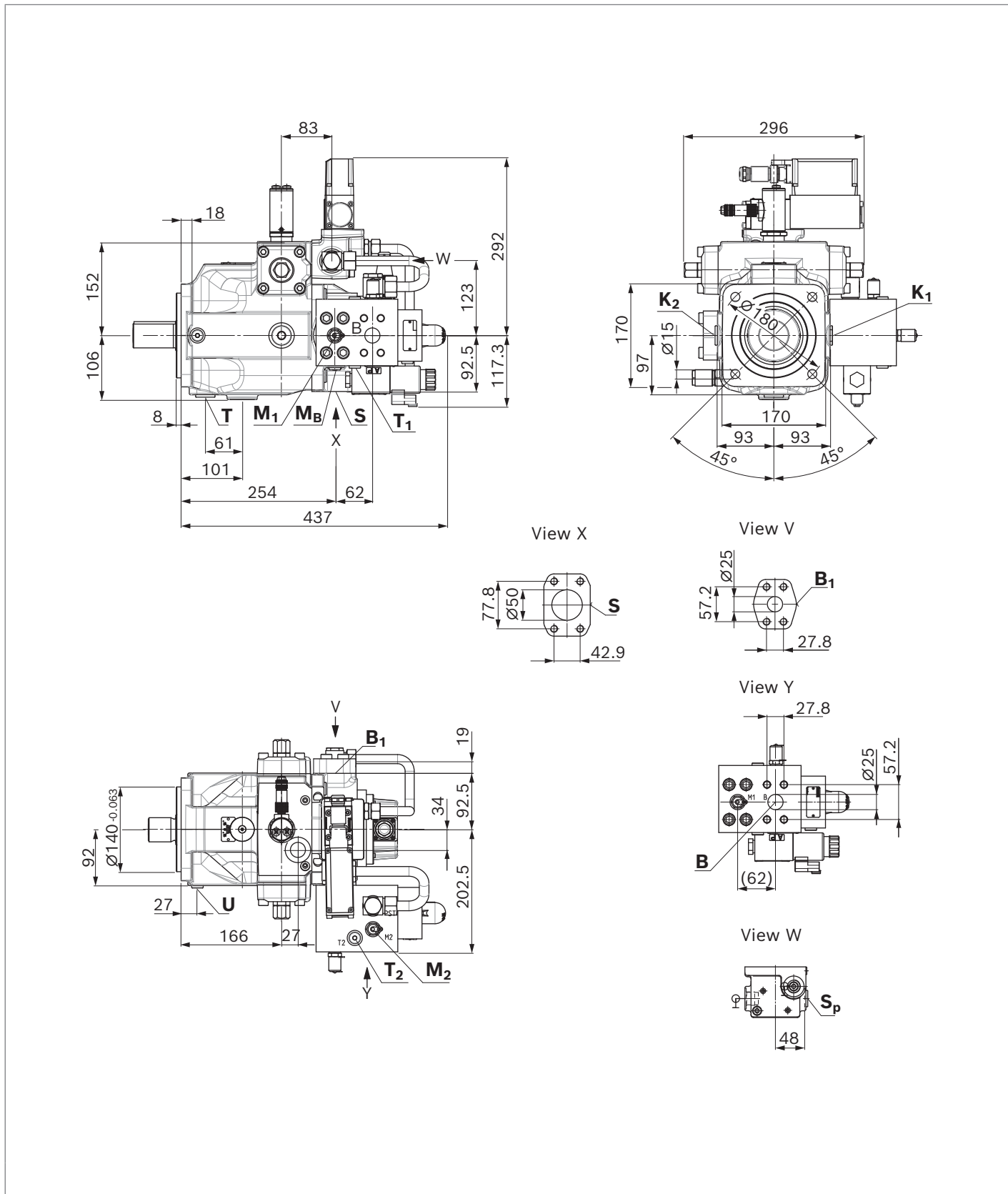
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions, size 71

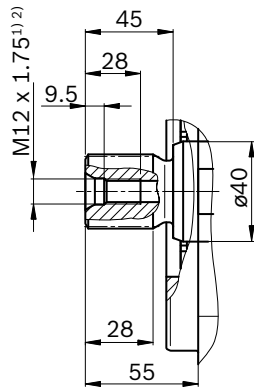
DS3 – secondary controlled unit with RVE check valve

Bidirectional direction of rotation

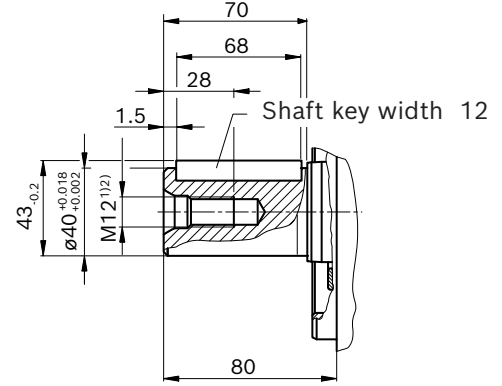


▼ **Splined shaft DIN 5480**

Z – W40x2x18x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø40 AS 12x8x58



Ports	Standard	Size ¹⁾	p_{\max} [bar] ³⁾	State ⁷⁾	
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M12 × 1.75; 20 deep	30	O
B; B₁	Working port (high-pressure series)	SAE J518 ⁴⁾	1 in	400	O
B	Fastening thread	DIN 13	M12 × 1.75; 17 deep		
B₁	Fastening thread	DIN 13	M12 × 1.75; 20 deep		
M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M₁; M₂	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
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K₁; K₂	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	pipied up
R_{KV}	Control fluid return flow	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	100	pipied up
P	Control pressure	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	315	pipied up

1) Center bore according to DIN 332

2) Thread according to DIN 13.

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** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

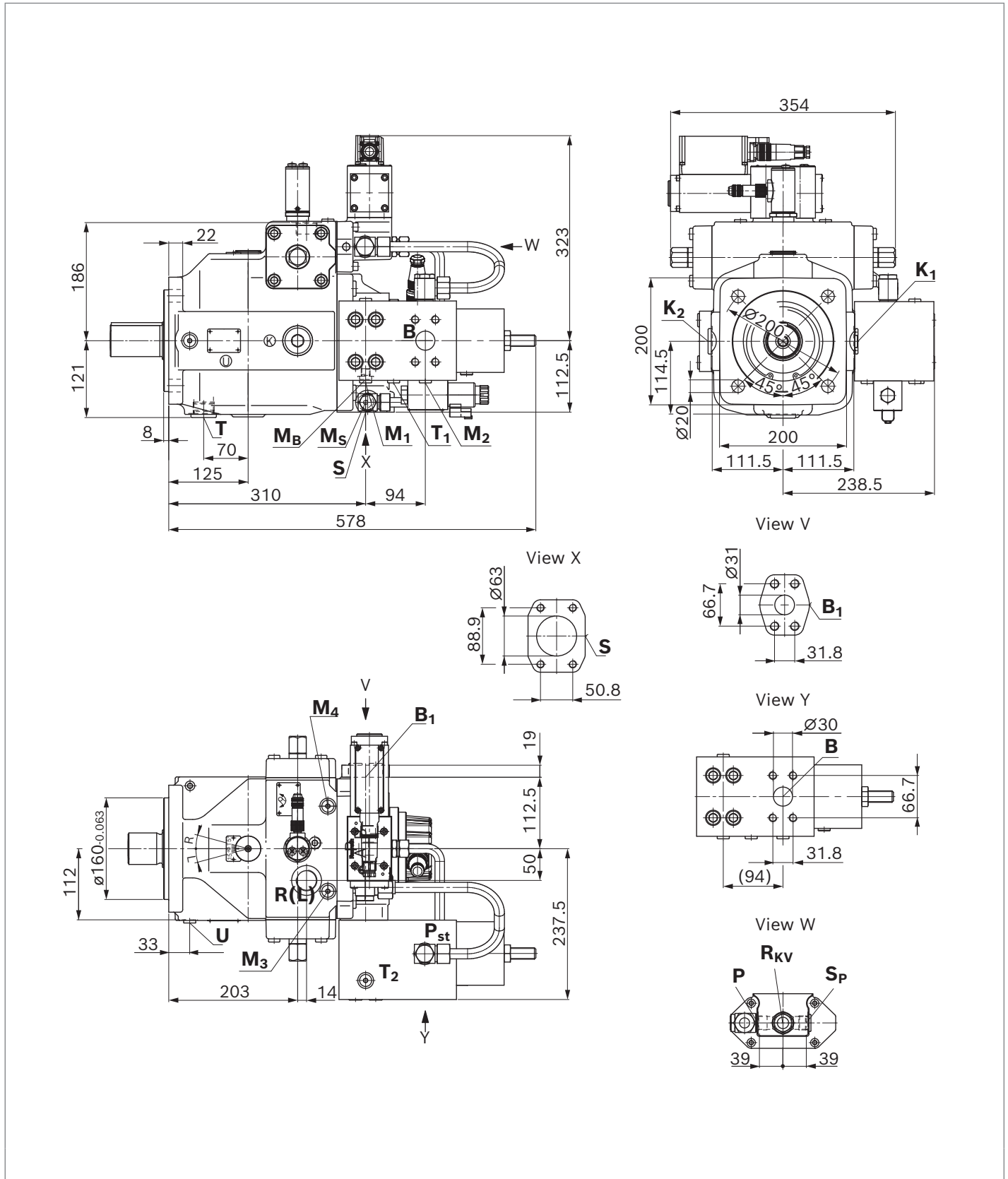
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions, size 125

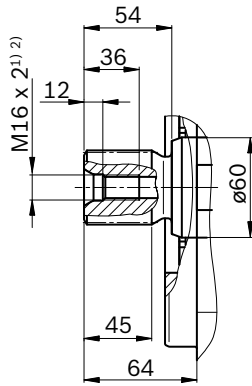
DS3 – secondary controlled unit with RVE check valve

Bidirectional direction of rotation

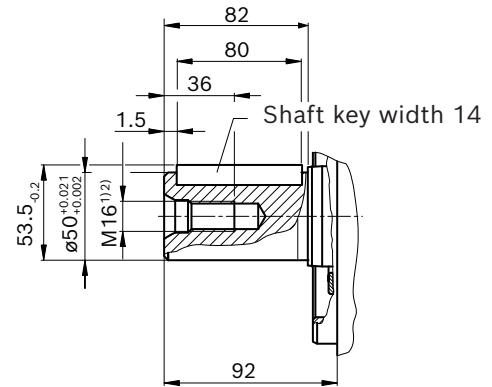


▼ **Splined shaft DIN 5480**

Z – W50x2x24x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14x9x80



Ports	Standard	Size ¹⁾	p_{\max} [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 1/2 in M12 × 1.75; 17 deep	30 O
B; B₁	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 22 deep	400 O
B₁	Fastening thread	DIN 13	M14 × 2; 19 deep	
M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400 X
M₁; M₂	Measuring working pressure	DIN 3852	G 1/4 in; 12 deep	400 X
M_S	Measuring suction pressure	DIN 3852	M14 × 1.5; 12 deep	30 X
M₃; M₄	Measuring control 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
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4 X
K₁; K₂	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

2) Thread according to DIN 13.

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.

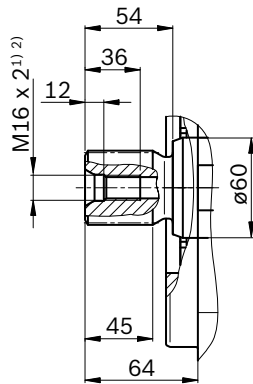
6) Depending on the installation position, **K** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

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

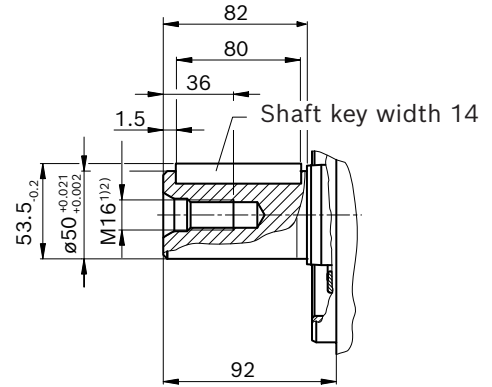
X = Plugged (in normal operation)

▼ **Splined shaft DIN 5480**

Z – W50x2x24x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø50 AS 14x9x80



Ports	Standard	Size ¹⁾	p_{\max} [bar] ³⁾	State ⁷⁾	
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	3 in M16 × 2; 24 deep	30	O
B; B₁	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/4 in M14 × 2; 19 deep	400	O
M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M₁; M₂	Measuring working pressure	DIN 3852	G 1/4 in; 12 deep	400	X
M_S	Measuring suction pressure	DIN 3852	M14 × 1.5; 12 deep	30	X
M₃; M₄	Measuring control pressure	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
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K₁; K₂	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	pipied up
R_{KV}	Control fluid return flow	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	100	pipied up
M_{S2}	Control fluid return flow	DIN 3852 ⁵⁾	G 1/2; 15 deep	100	pipied up
P	Control pressure	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	315	pipied up

1) Center bore according to DIN 332

2) Thread according to DIN 13.

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** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

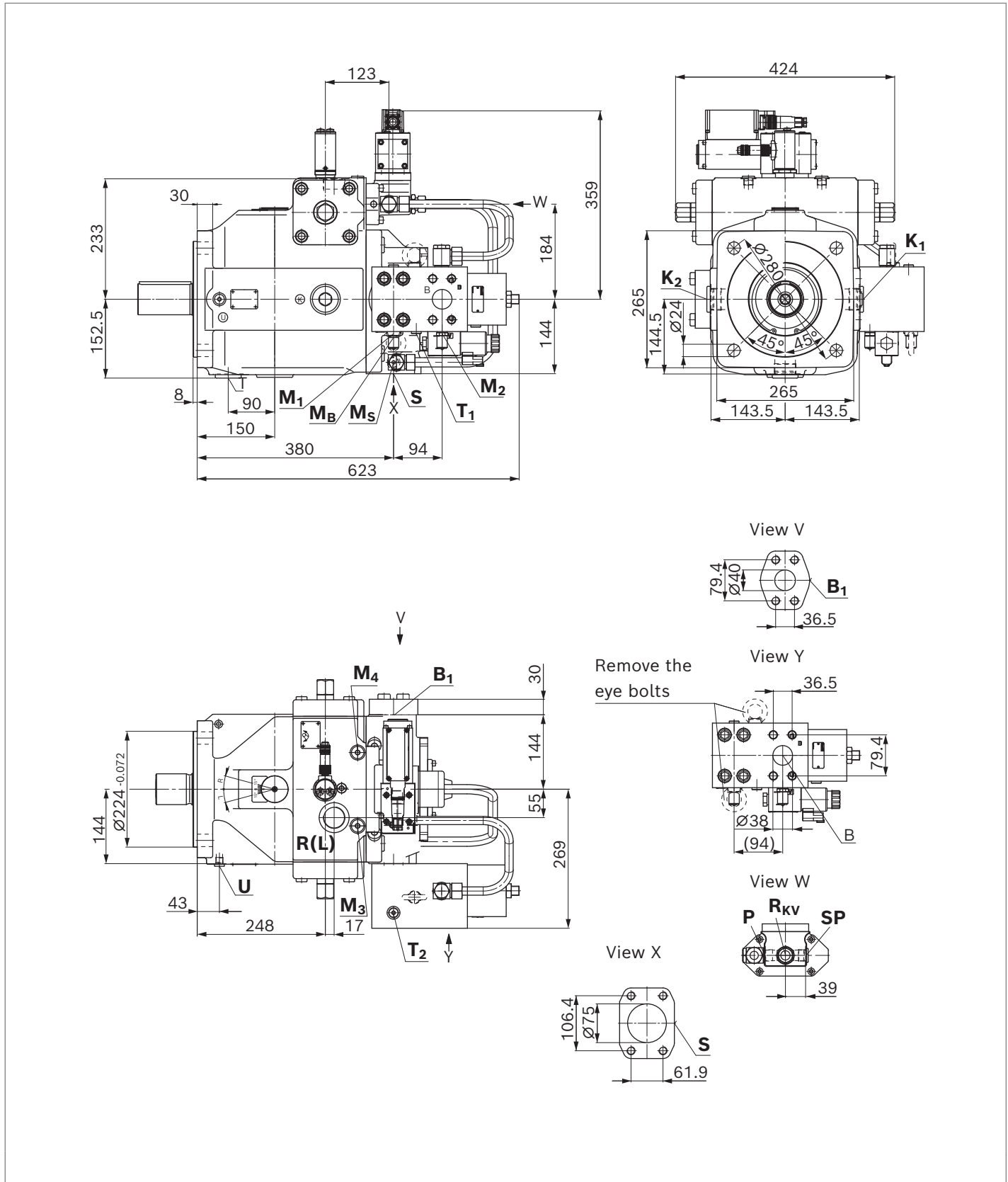
7) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions, size 250

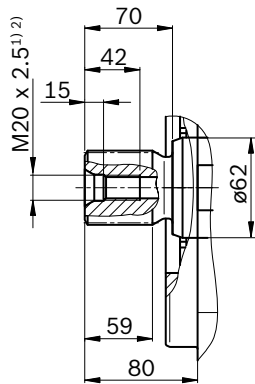
DS3 – secondary controlled unit with RVE check valve

Bidirectional direction of rotation

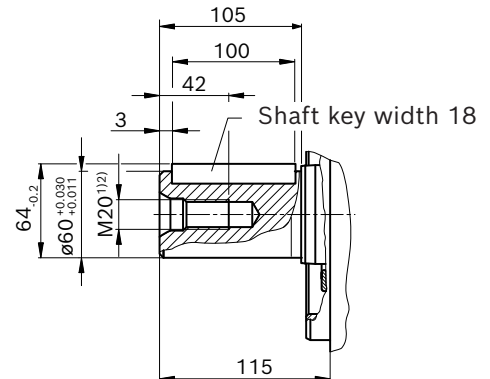


▼ **Splined shaft DIN 5480**

Z – W60x2x28x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø60 AS 18x11x100



Ports	Standard	Size ¹⁾	p_{max} [bar] ²⁾	State ⁶⁾	
S	Suction port (standard pressure series) Fastening thread	SAE J518 ³⁾ DIN 13	3 in M16 × 2; 24 deep	400	O
B; B₁	Working port (high-pressure series)	SAE J518 ³⁾	1 1/2 in	400	O
B	Fastening thread	DIN 13	M16 × 2; 23 deep		
B₁	Fastening thread	DIN 13	M16 × 2; 21 deep		
M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M₁; M₂	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
M_S	Measuring suction pressure	DIN 3852	M14 × 1.5; 12 deep	30	X
M₃; M₄	Measuring control pressure	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
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K₁; K₂	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

2) Thread according to DIN 13.

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.

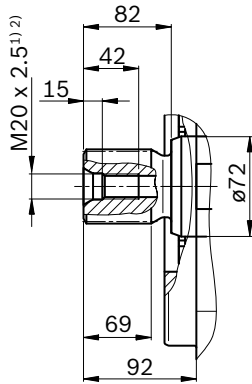
6) Depending on the installation position, **K** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

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

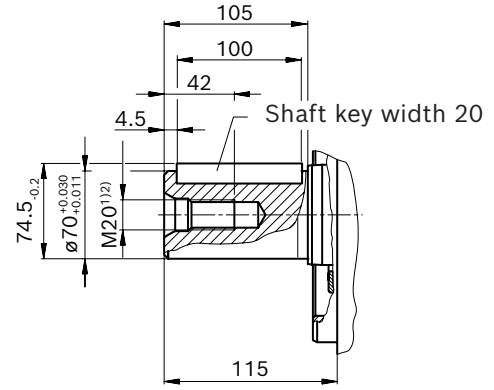
X = Plugged (in normal operation)

▼ **Splined shaft DIN 5480**

Z – W70x3x22x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø76 AS 20x12x100



Ports	Standard	Size	p_{\max} [bar] ³⁾	State ⁷⁾	
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	4 in M16 × 2; 21 deep	30	O
B, B₁	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	1 1/2 in M16 × 2; 23 deep	400	O
B₁	Fastening thread	DIN 13	M16 × 2; 25 deep		
M_B	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M₁; M₂	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
M_S	Measuring suction pressure	DIN 3852	M14 × 1.5; 12 deep	30	X
M₃; M₄	Measuring control 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
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K₁; K₂	Flushing	DIN 3852 ⁵⁾	M42 × 2; 20 deep	4	O ⁶⁾
R(L)	Control fluid return flow	DIN 3852 ⁵⁾	M42 × 2; 20 deep	4	O ⁶⁾
U	Bearing flushing	DIN 3852	M18 × 1.5; 12 deep	7	X
P_{ST}	Pilot pressure	ISO 228	G 1/2; 15 deep	315	pipied up
R_{KV}	Control fluid return flow	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	100	pipied up
M_{S2}	Control fluid return flow	DIN 3852 ⁵⁾	G 1/2; 15 deep	100	pipied up
P	Control pressure	DIN 3852 ⁵⁾	M22 × 1.5; 14 deep	315	pipied up

1) Center bore according to DIN 332

2) Thread according to DIN 13.

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.

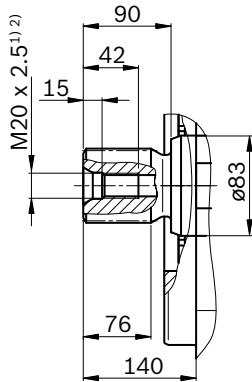
6) Depending on the installation position, **K** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

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

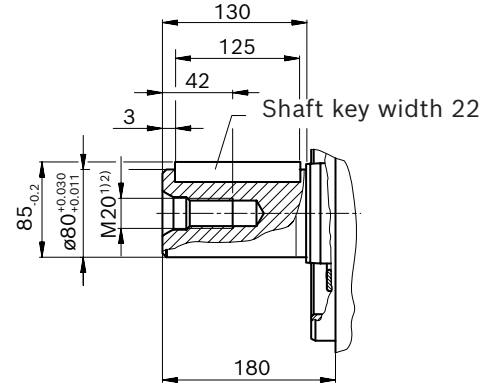
X = Plugged (in normal operation)

▼ **Splined shaft DIN 5480**

Z – W80x3x25x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø80 AS 22x14x125



Ports		Standard	Size	p_{\max} [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	5 in M16 × 2; 24 deep	30	O
B; B₁	Working port (high-pressure series)	SAE J518 ⁴⁾	2 in	400	O
B	Fastening thread	DIN 13	M20 × 2.5; 23 deep		
B₁	Fastening thread	DIN 13	M20 × 2.5; 24 deep		
M_{B1}	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
M_A; M_{B2}	Measuring control pressure	DIN 3852	M14 × 1.5; 12 deep	315	X
M_{B1}	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
M_S	Measuring suction pressure	DIN 3852	M18 × 1.5; 12 deep	30	X
M₁; M₂	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
T	Fluid drain	DIN 3852	M48 × 2; 20 deep	4	X
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K₁; K₂	Flushing	DIN 3852 ⁵⁾	M48 × 2; 20 deep	4	O ⁶⁾
R(L)	Control fluid return flow	DIN 3852 ⁵⁾	M48 × 2; 20 deep	4	O ⁶⁾
R₂ to R₇	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	pipied up
R_{KV}	Control fluid return flow	DIN 3852 ⁵⁾	M27 × 2; 16 deep	100	pipied up
M_{S2}	Control fluid return flow	DIN 3852 ⁵⁾	M27 × 2; 16 deep	100	pipied up
P	Control pressure	DIN 3852 ⁵⁾	M27 × 2; 16 deep	315	pipied up

1) Center bore according to DIN 332

2) Thread according to DIN 13

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** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

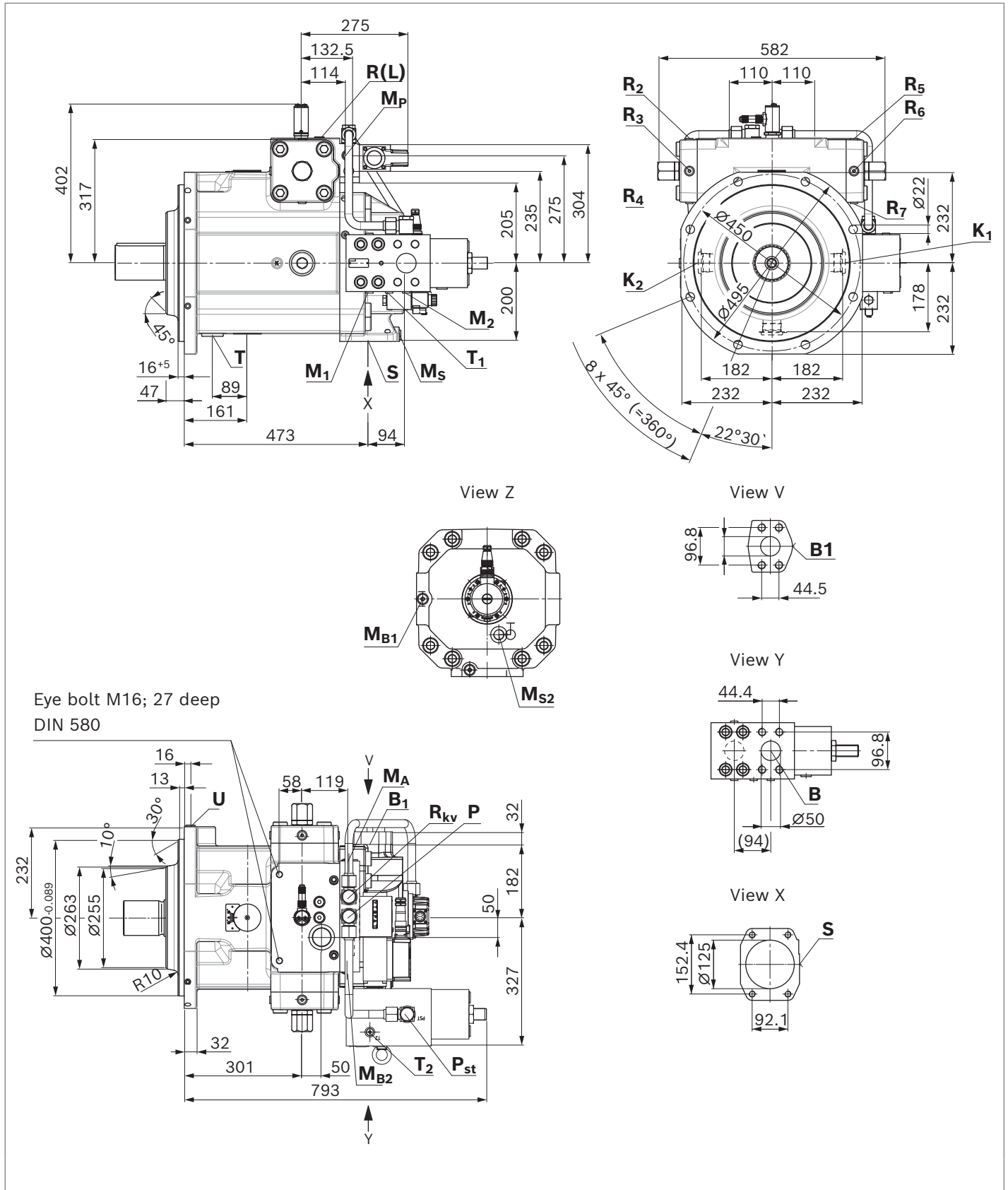
7) O = Must be connected (plugged on delivery)

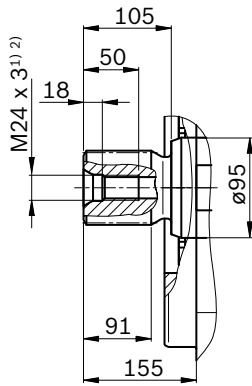
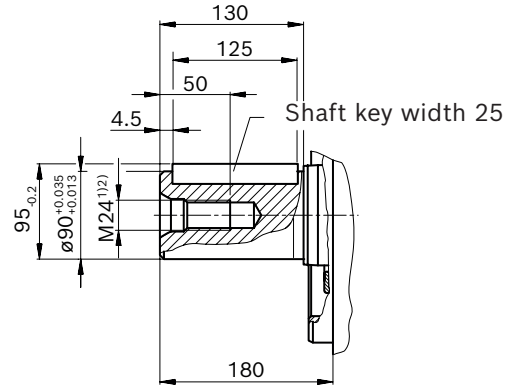
X = Plugged (in normal operation)

Dimensions, size 750

DS3 – secondary controlled unit with RVE check valve

Bidirectional direction of rotation



▼ **Splined shaft DIN 5480****Z** – W90x3x28x9g▼ **Parallel keyed shaft DIN 6885****P** – Ø90 AS 25x14x125

Ports		Standard	Size	p_{max} [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	5 in M16 × 2; 24 deep	30	O
B, B₁	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 24 deep	400	O
M_{B1}	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
M_A; M_{B2}	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M_S	Measuring suction pressure	DIN 3852	M18 × 1.5; 12 deep	30	X
M_P	Measuring external pilot pressure	DIN 3852	M14 × 1.5; 12 deep	315	X
M₁; M₂	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
R₂ to R₇	Air bleeding the control	DIN 3852	M14 × 1.5; 12 deep	315	X
T	Fluid drain	DIN 3852	M48 × 2; 20 deep	4	X
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852 ⁵⁾	M48 × 2; 20 deep	4	O ⁶⁾
R(L)	Control fluid return flow	DIN 3852 ⁵⁾	M48 × 2; 20 deep	4	O ⁶⁾
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 ⁵⁾	M27 × 2; 16 deep	100	piped up
M_{S2}	Control fluid return flow	DIN 3852 ⁵⁾	M27 × 2; 16 deep	100	piped up
P	Control pressure	DIN 3852 ⁵⁾	M27 × 2; 16 deep	315	piped up

1) Center bore according to DIN 332

2) Thread according to DIN 13.

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.

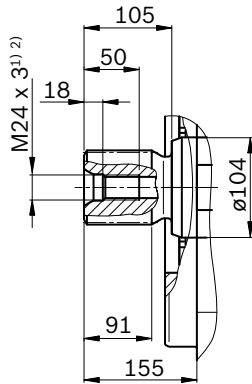
6) Depending on the installation position, **K** or **R(L)** must be connected (also see installation instructions in data sheet 92050).

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

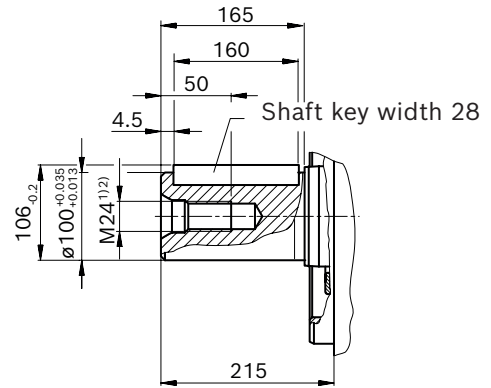
X = Plugged (in normal operation)

▼ **Splined shaft DIN 5480**

Z – W100x3x32x9g

▼ **Parallel keyed shaft DIN 6885**

P – Ø100 AS 28x16x160



Ports		Standard	Size	p_{\max} [bar] ³⁾	State ⁷⁾
S	Suction port (standard pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	5 in M16 × 2; 24 deep	30	O
B, B₁	Working port (high-pressure series) Fastening thread	SAE J518 ⁴⁾ DIN 13	2 in M20 × 2.5; 24 deep	400	O
M_B; M_{B1}	Measuring working pressure	DIN 3852	M18 × 1.5; 12 deep	400	X
M_A; M_{B2}	Measuring working pressure	DIN 3852	M14 × 1.5; 12 deep	400	X
M₁; M₂	Measuring working pressure	DIN 3852	G 1/4; 12 deep	400	X
M_S	Measuring suction pressure	DIN 3852	M18 × 1.5; 12 deep	30	X
M_P	Measuring external pilot pressure	DIN 3852	M14 × 1.5; 12 deep	315	X
R₂ to R₇	Air bleeding the control	DIN 3852	M14 × 1.5; 12 deep	315	X
T	Fluid drain	DIN 3852	M48 × 2; 20 deep	4	X
T₁; T₂	Leakage/air bleeding	DIN 3852	G 1/4 in; 12 deep	4	X
K	Flushing	DIN 3852 ⁵⁾	M48 × 2; 20 deep	4	O ⁶⁾
R(L)	Control fluid return flow	DIN 3852 ⁵⁾	M48 × 2; 20 deep	4	O ⁶⁾
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 ⁵⁾	M27 × 2; 16 deep	100	piped up
M_{S2}	Control fluid return flow	DIN 3852 ⁵⁾	M27 × 2; 16 deep	100	piped up
P	Control pressure	DIN 3852 ⁵⁾	M27 × 2; 16 deep	315	piped up

1) Center bore according to DIN 332

2) Thread according to DIN 13

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** or **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)

Project planning notes

- ▶ The A4VSO axial piston variable pump is designed to be used in open circuit.
- ▶ Project planning, installation and commissioning of the axial piston units requires the involvement of 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 preservation protection for a maximum of 12 months. If longer preservation 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 the instruction manual.
- ▶ Not all configuration variants 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. Applying a direct voltage signal (DC) to solenoids does not create electromagnetic interference (EMI) nor is the solenoid affected by EMI. Electromagnetic interference (EMI) potential exists when operating and controlling a solenoid with a modulated direct voltage signal (e.g. PWM signal) Appropriate testing and measures should be taken by the machine manufacturer to ensure other components or operators (e.g. with pacemaker) are not affected by this potential.
- ▶ Pressure controllers are not safeguards against pressure overload. Be sure to add a pressure relief valve to the hydraulic system.
- ▶ For controllers requiring external pilot pressure, sufficient control fluid must be provided to the associated ports to ensure the required pilot pressures for the respective controller function. These controllers are subject to leakage due to their design. An increase in control fluid demand has to be anticipated over the total operating time. The design of the control fluid supply must thus be sufficiently large. If the control fluid is too low, the respective controller function may be impaired and undesired system behavior may result.
- ▶ For drives that are operated for a long period of time with constant rotational speed, the natural frequency of the hydraulic system can be stimulated by the excitation frequency of the pump (rotational speed frequency x 9). This can be prevented with suitably designed hydraulic lines.
- ▶ Please note the details regarding the tightening torques of port threads and other threaded joints in the instruction manual.
- ▶ The ports and fastening threads are designed for the p_{max} permissible pressures of the respective ports, see the connection tables. 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 service ports and function ports are only designed to accommodate hydraulic lines.

Safety instructions

- ▶ During and shortly after operation, there is a risk of burning on the axial piston unit and especially on the solenoids. Take the appropriate safety measures (e.g. by wearing protective clothing).
- ▶ Moving parts in control equipment (e.g. valve spools) can, under certain circumstances, get stuck in position as a result of contamination (e.g. contaminated hydraulic fluid, abrasion, or residual dirt from components). As a result, the hydraulic fluid flow and the build-up of torque in the axial piston unit can no longer respond correctly to the operator's specifications. Even the use of various filter elements (external or internal flow filtration) will not rule out a fault but merely reduce the risk. The machine/system manufacturer 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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