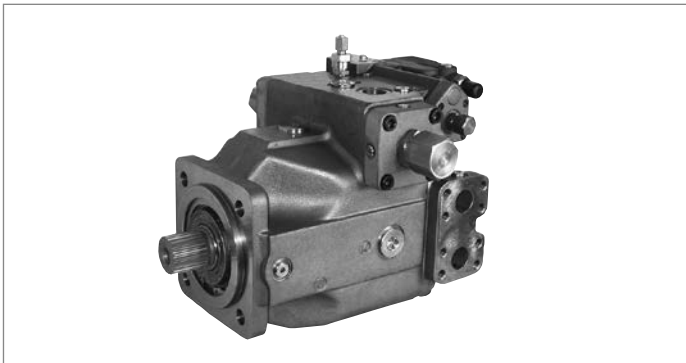


# Control devices HD



- ▶ For variable pump A4VSO series 1 and 3
- ▶ For variable pump A4VSG series 1 and 3
- ▶ For variable pump A4CSG series 3
- ▶ Open and closed circuit

## Features

- ▶ Control is pilot-pressure related
- ▶ Different pilot pressure ranges available
- ▶ Optional pressure control
- ▶ Optional hydraulic power control
- ▶ Optional electrical control of pilot pressure
- ▶ Mechanical  $V_{g \min}$  - and  $V_{g \max}$  - limitation
- ▶ Standard spring-centering of the stroking cylinder
- ▶ Resets to zero in the event of a signal failure
- ▶ The special version enables mooring, overcenter, and decompression via the pump

**Variable pump A4VSO, data sheet 92050**

**Variable pump A4VSG, data sheet 92100**

**Variable pump A4CSG, data sheet 92105**

## Contents

Type code	2
HD1/2/3 – Hydraulic control, pilot-pressure related	3
Dimensions	8
Pressure control	11
HD.A with pressure control on one side for port A	12
HD.GA with remote pressure control for port A	14
Dimensions	16
HD. B with pressure control on one side for port B	19
HD.GB with remote pressure control for port B	21
Dimensions	23
HD.D with pressure control on both sides for ports A and B	26
HD.G with remote pressure control on both sides for ports A and B	28
Dimensions	30
HD1P with power control	33
Dimensions	35
HD1T – with electrical control of pilot pressure	38
Dimensions	42
HD1U – with power control and electrical control of pilot pressure	45
Dimensions	46
Project planning notes	49
Safety instructions	50

## Type code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
	<b>A4...</b>		<b>HD.</b>			/		-						

### Hydraulic fluid

01	For details see data sheet 92050, 92100, 92105	
----	--	--

### Axial piston unit

02	Swashplate design, variable / pump, open circuit (see data sheet 92050)	<b>A4VSO</b>
	Swashplate design, variable / pump, closed circuit (see data sheet 92100)	<b>A4VSG</b>
	Compact unit swashplate design, variable / pump, closed circuit (see data sheet 92105)	<b>A4CSG</b>

### Size (NG)

03	Geometric displacement $V_{g \max}$ [cm <sup>3</sup> ]	<b>40</b>	<b>71</b>	<b>125</b>	<b>180</b>	<b>250</b>	<b>355</b>	<b>500</b>	<b>750</b>	<b>1000</b>
----	--	-----------	-----------	------------	------------	------------	------------	------------	------------	-------------

### Control device

04	<b>Hydraulic control, pilot-pressure related</b>										<b>HD</b>
	Pilot pressure characteristics 10...45 bar	•	•	•	•	•	•	•	•	•	<b>1</b>
	Pilot pressure characteristics 10...28 bar	•	•	•	•	•	•	•	•	•	<b>2</b>
	Pilot pressure characteristics 5.5...19 bar	•	•	•	•	•	•	•	•	•	<b>3</b>
05	<b>Pressure control</b>										
	without pressure control (without code)										
	with pressure control in <b>A</b>	•	•	•	•	•	•	•	•	•	<b>A<sup>1) 2)</sup></b>
	with remote pressure control in <b>A</b>	•	•	•	•	•	•	•	•	•	<b>GA<sup>1) 2)</sup></b>
	with pressure control in <b>B</b>	•	•	•	•	•	•	•	•	•	<b>B<sup>2)</sup></b>
	with remote pressure control in <b>B</b>	•	•	•	•	•	•	•	•	•	<b>GB<sup>2)</sup></b>
	with pressure control on both sides	•	•	•	•	•	•	•	•	•	<b>D<sup>1) 2)</sup></b>
	with remote pressure control on both sides	•	•	•	•	•	•	•	•	•	<b>G<sup>1) 2)</sup></b>
06	<b>Power control and electrical control of pilot pressure for HD1</b>										
	without power control and electrical control of pilot pressure (without code)										
	Power control with power limiting valve	•	•	•	•	•	•	•	•	•	<b>P</b>
	electrical control of pilot pressure	•	•	•	•	•	•	•	•	•	<b>T<sup>3)</sup></b>
	Power control and electrical control of pilot pressure	•	•	•	•	•	•	•	•	•	<b>U<sup>3)</sup></b>

### Series

07	A4VSO, A4VSG	•	•	-	-	-	-	-	-	-	<b>11</b>
	A4VSO, A4VSG	-	-	•	•	•	•	•	•	•	<b>30</b>
	A4CSG	-	-	-	-	•	•	•	•	-	<b>30</b>

### For details see data sheet 92050, 92100, 92105

08	Direction of rotation
09	Seal
10	Drive shaft
11	Mounting flange
12	Working line ports
13	Through drive
14	Valves
15	Filtration

• = Available    - = Not available

- 1) Not available for A4VSO
- 2) Bidirectional direction of rotation not possible
- 3) for operation with HF hydraulic fluid, please observe data sheet 29164 (prop. pressure relief valve type DBEP); for A4CSG, please contact us

## HD1/2/3 – Hydraulic control, pilot-pressure related

The HD1/2/3 control sets the displacement of the pump based on the pilot pressure.

A stroking chamber is continuously supplied with control pressure. The control spool is deflected by the differential pilot pressure  $X_1$ – $X_2$  and controls the hydraulic fluid supply of the other stroking chamber. A spring feedback returns the control stroke to the control spool.

The adjustable stroke can thus be controlled proportional to the specified setpoint value ( $X_1$ – $X_2$ ).

When dimensioning the pilot pressure, it must be ensured that the effective hydraulic control pressure setpoint value for the A4VSO is the difference between the control and case pressure, or for A4VSG and A4CSG, is the difference between  $X_1$  and  $X_2$ .

- ▶ Upon loss of pilot pressure, the spring feedback will return the control **to a defined central position**.
- ▶ Upon loss of control pressure, the spring centering of the stroking piston assists in the return to **a defined central position**.

Both features are standard.

### Notice

- ▶ The spring feedback in the controller and pump control spring centering are no safety devices. The controller can stick in an undefined position due to internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components). As a result, the flow in the axial piston unit will no longer respond correctly to the operator's specifications. Check whether the application on your machine requires additional safety measures to bring the driven consumer to a safe position (immediate stop).

The mechanical swivel angle limitation can be set at both sides on the control in the range from  $V_{g \max}$  to 50 %  $V_{g \max}$ , for size 500  $V_{g \max}$  to 70 %  $V_{g \max}$ .

For sizes 500...1000, it is possible to adjust the setting time on the control module. The long setting time is set as standard (see the setting time data table on page 4).

This is required for the power limiting valve LV06 for HD1P and HD1U.

**Three versions** are available:

- HD1 Pilot pressure range 10...45 bar
- HD2 Pilot pressure range 10...28 bar
- HD3 Pilot pressure range 5.5...19 bar

Version with inductive position transducer is available on request.

### Control pressure and pilot pressure supply

The minimum required control pressure must be externally connected at **P** for A4VSO and A4VSG and enables adjustment in zero stroke if the pump does not build up pressure itself. The high pressure in the pump supplies control pressure when  $p_A, p_B > p$ .

For **A4CSG** in standard version (boost pump "F") the control is supplied internally with the control pressure from the boost circuit. This saves the use of a separate control pressure pump, which means port **P** is already internally connected.

**Recommended setting value on the control pressure relief valve:** double boost pressure, additional +5 bar for NG 355

### Recommendation: separate control/pilot pressure pump

for sizes 40...250, an auxiliary pump with 8 cm<sup>3</sup>  
for sizes 355...1000, an auxiliary pump with 11 cm<sup>3</sup>  
Direct mounting on the through drive of the A4VSO/G or A4CSG possible, see data sheet of the respective variable pump.

4 **HD** | Control devices  
Type code

Size	NG	40	71	125	180	250	355	500	750	1000	
Pilot pressure <sup>1)</sup> (in <b>X1</b> , <b>X2</b> )	HD1	$p_{St}$	bar		10 <sup>2)</sup> – 45 <sup>3)</sup>						
	HD2	$p_{St}$	bar		10 <sup>2)</sup> – 28 <sup>3)</sup>						
	HD3	$p_{St}$	bar		5.5 <sup>2)</sup> – 19 <sup>3)</sup>						
Control pressure (in <b>P</b> )	$p_{min}$ <sup>5)6)</sup>	bar		2 × boost pressure however minimum 32 bar NG 355: 2 x boost pressure +5 bar							
	$p_{max}$ <sup>4)5)</sup>	bar		350							
Control stroke	$s_{max}$	mm	14.2	17.1	20.7	20.7	25.9	25.9	32.6	37	41.41
Control area	$A$	cm <sup>2</sup>	3.9	6.4	9	9	14.4	14.4	18.8	28.5	32.4
Control volume	$V_{Smax}$	cm <sup>3</sup>	5.5	11	18.7	18.7	37.3	37.3	61.4	105	134.1
Control time (at 200 bar high pressure)	$t$	s	0.08	0.09	0.10	0.10	0.15	0.15	0.75	1.0	1.5
Setting range of control time (at 200 bar high pressure)	$t$	s	–	–	–	–	–	–	0.15...	0.2...	0.3...
									0.75	1.0	1.5
Boost pressure	A4VSG	$p_{Sp\ min}$	bar		16						
		$p_{Sp\ max}$ <sup>6)</sup>	bar		30						
	A4CSG	$p_{Sp\ min}$	bar	–	–	–	–	16		–	
		$p_{Sp\ max}$	bar	–	–	–	–	20		–	
Weight approx. (A4VSO...HD. ...N00)		kg	42	59	98	112	200	220	333	476	606
Hysteresis							$\leq \pm 3\%$ of $V_{g\ max}$				
Repeat accuracy							$\leq 1\%$ of $V_{g\ max}$				

1) Pilot pressure characteristics, see page 5

2)  $\pm 0.5$  bar in an open circuit;  
 $\pm 1.5$  bar in a closed circuit

3)  $\pm 1.5$  bar in an open circuit;  
 $\pm 2$  bar in a closed circuit

4) With the pressure control lower than the pressure setting

5) With mounted DBEP6 (HD1T and HD1U) for all sizes limited to minimum 50 bar ...maximum 100 bar; with mounted power limiting valve (HD1P and HD1U) the set control pressure is lower than the beginning of control of the power characteristic

6) With version H06, the boost pressure is to be limited to maximum 25 bar since the control pressure is set at 50 bar

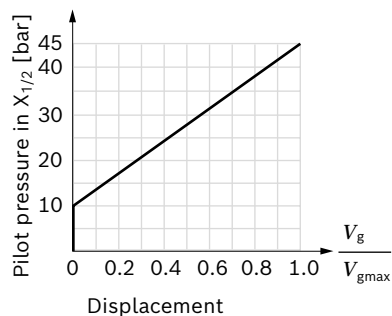
### Characteristic curves

#### A4VSO - open circuit

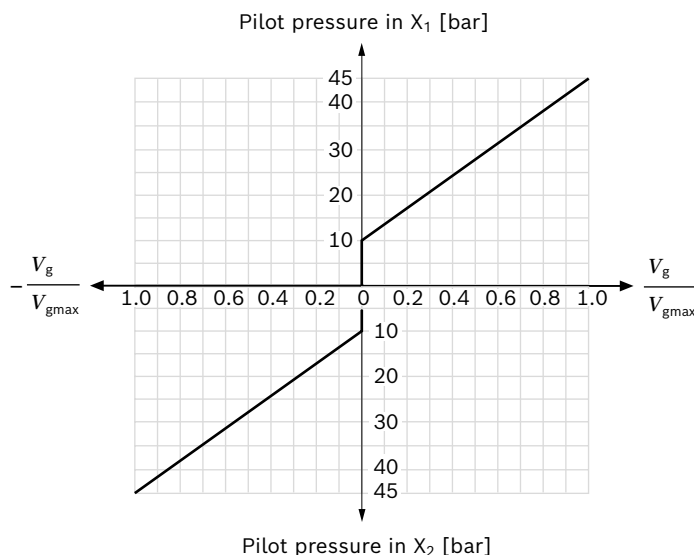
For the open circuit (one-sided swiveling) of the A4VSO, the  $V_{g \text{ min}}$  stop is set so that pump pressure reaches approx. 20 bar when port **B** is plugged.

Mooring or overcenter operation is available on request.

#### ▼ HD1 pilot pressure 10...45 bar



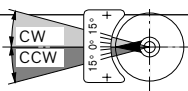
#### ▼ HD1 pilot pressure 10...45 bar



#### ▼ Flow direction

Direction of rotation	Pilot pressure	Swiveling range <sup>1)</sup>	Flow direction	High-pressure port
clockwise	in <b>X<sub>2</sub></b>	Counter-clockwise	<b>S to B</b>	<b>B</b>
Counter-clockwise	in <b>X<sub>1</sub></b>	clockwise	<b>S to B</b>	<b>B</b>

1) cf. swivel angle indicator



#### A4VSG and A4CSG – closed circuit

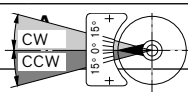
Stepless adjustment of the pump displacement according to the pilot pressure. The control is proportional to the specified pilot pressure setpoint value (difference between **X<sub>1</sub>**, **X<sub>2</sub>**).

► For information on spring feedback, see note on page 3.

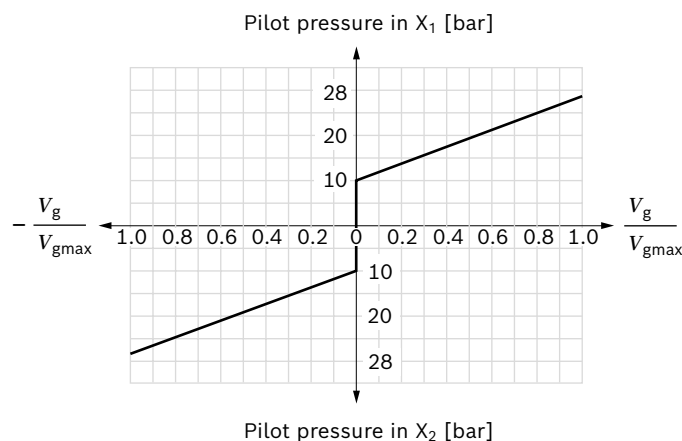
#### ▼ Flow direction

Direction of rotation	Pilot pressure	Swiveling range <sup>2)</sup>	Flow direction	High-pressure port
clockwise	in <b>X<sub>1</sub></b>	clockwise	<b>B to A</b>	<b>A</b>
	in <b>X<sub>2</sub></b>	Counter-clockwise	<b>A to B</b>	<b>B</b>
Counter-clockwise	in <b>X<sub>1</sub></b>	clockwise	<b>A to B</b>	<b>B</b>
	in <b>X<sub>2</sub></b>	Counter-clockwise	<b>B to A</b>	<b>A</b>

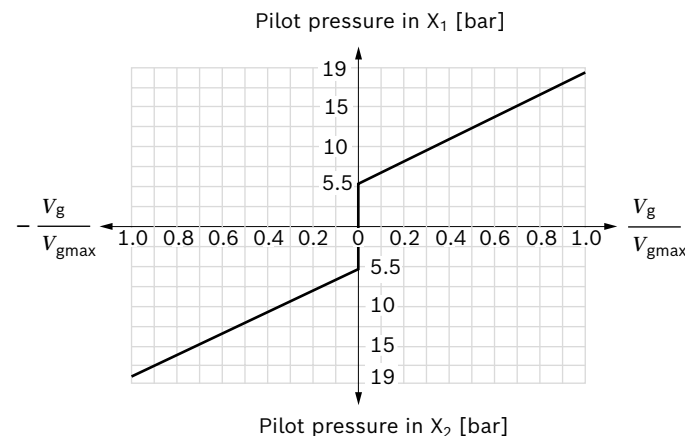
2) cf. swivel angle indicator



#### ▼ HD2 pilot pressure 10...28 bar



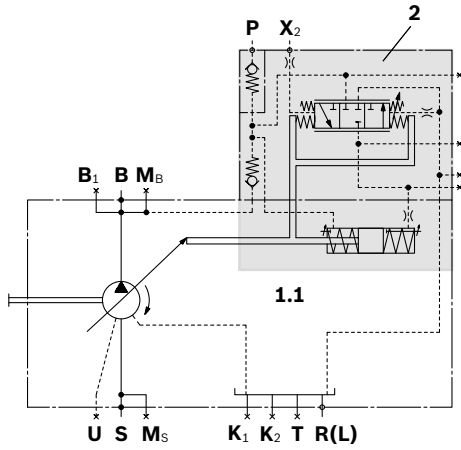
#### ▼ HD3 pilot pressure 5.5...19 bar



**Circuit diagrams**

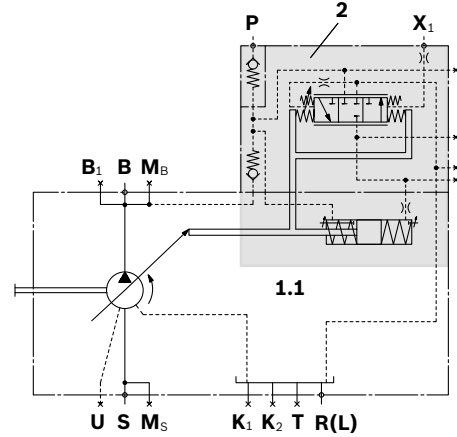
▼ **A4VSO, sizes 40 and 71**

Clockwise rotation



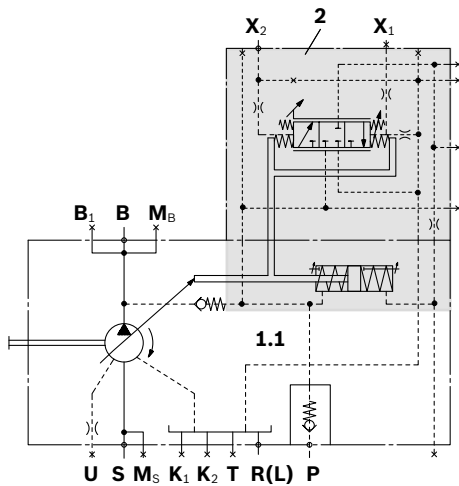
▼ **A4VSO, sizes 40 and 71**

Counter-clockwise rotation



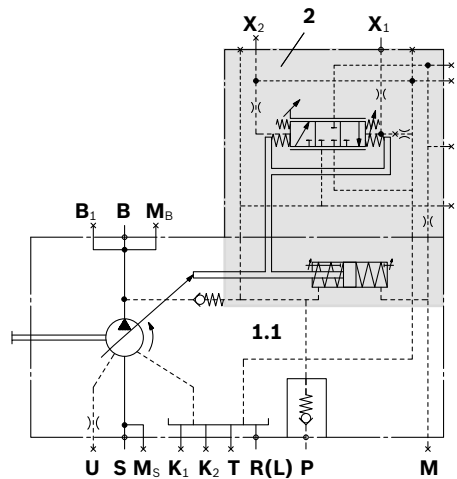
▼ **A4VSO, sizes 125 to 355**

Clockwise rotation



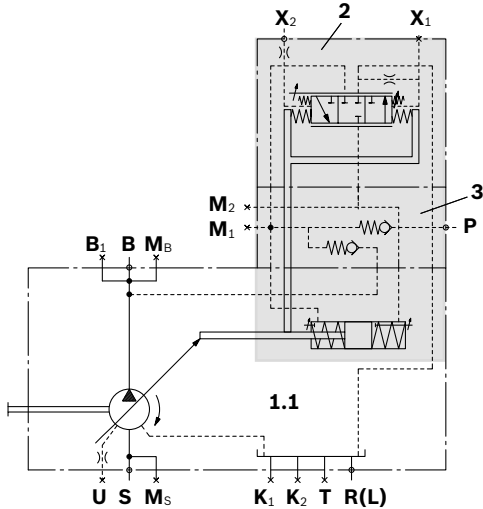
▼ **A4VSO, sizes 125 to 355**

Counter-clockwise rotation



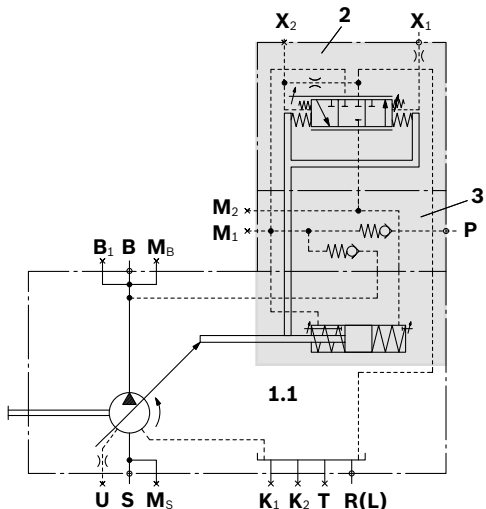
▼ **A4VSO, sizes 500 to 1000**

Clockwise rotation

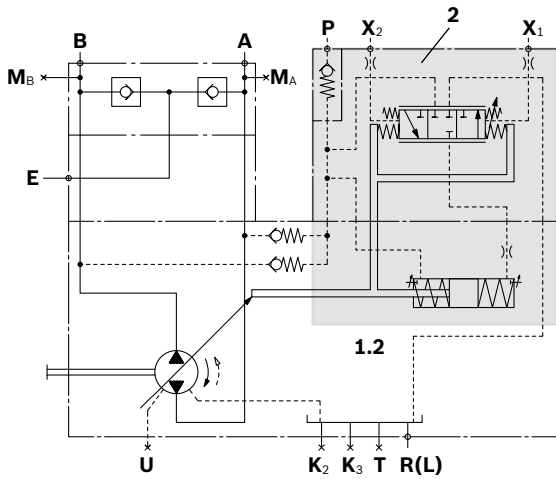


▼ **A4VSO, sizes 500 to 1000**

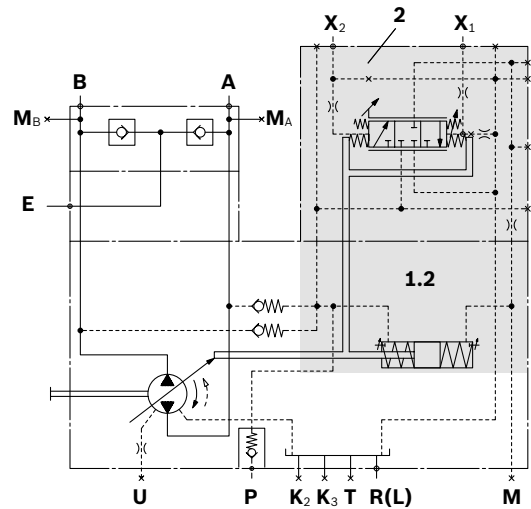
Counter-clockwise rotation



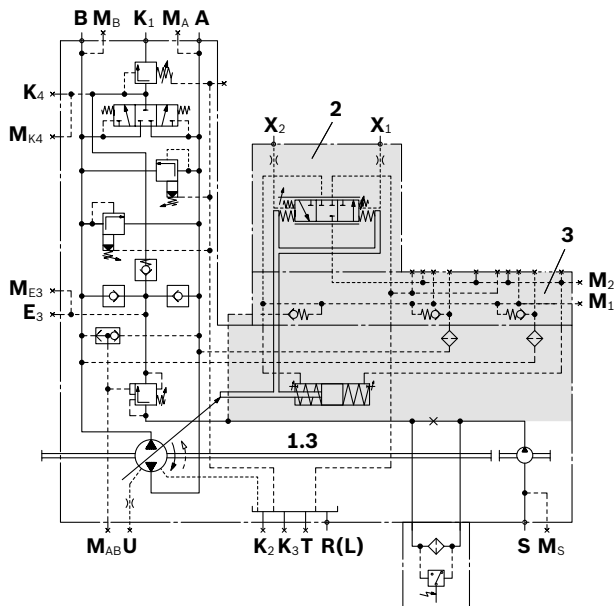
▼ A4VSG, sizes 40 and 71



▼ A4VSG, sizes 125 to 355



▼ A4CSG, sizes 500 to 1000



**Ports**

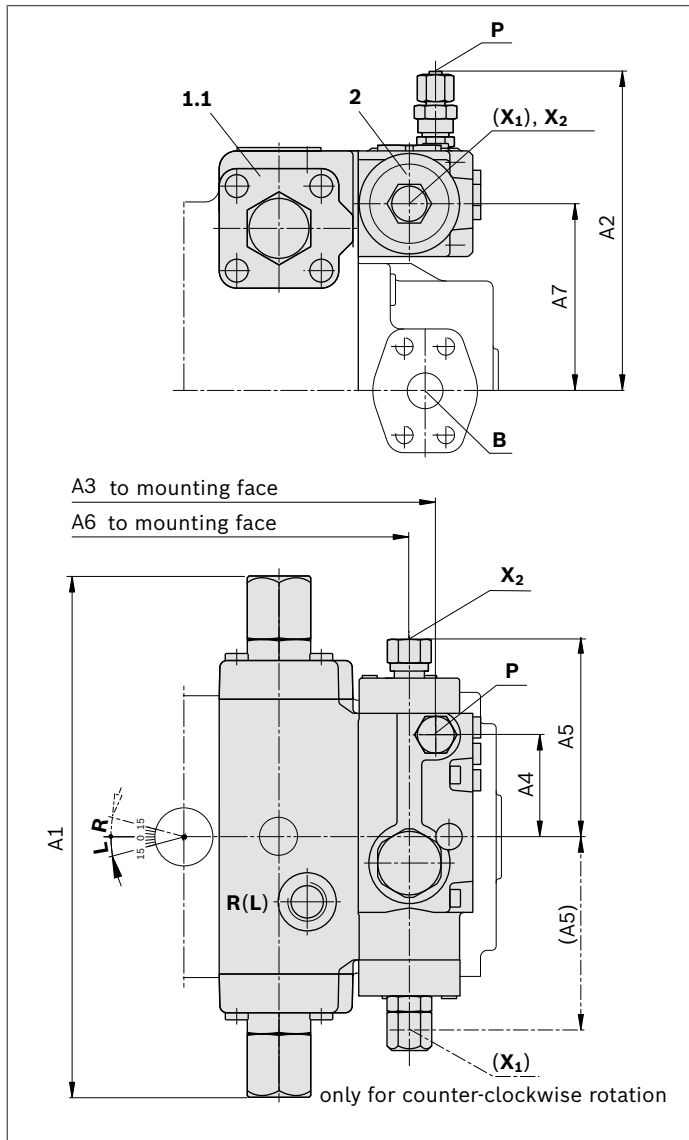
<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure port
<b>P</b>	Control pressure port
<b>M</b>	Measuring port stroking chamber pressure (NG 125 to 355)
<b>M<sub>1</sub></b>	Measuring port small stroking chamber (NG 500 to 1000)
<b>M<sub>2</sub></b>	Measuring port large stroking chamber (NG 500 to 1000)

**Components**

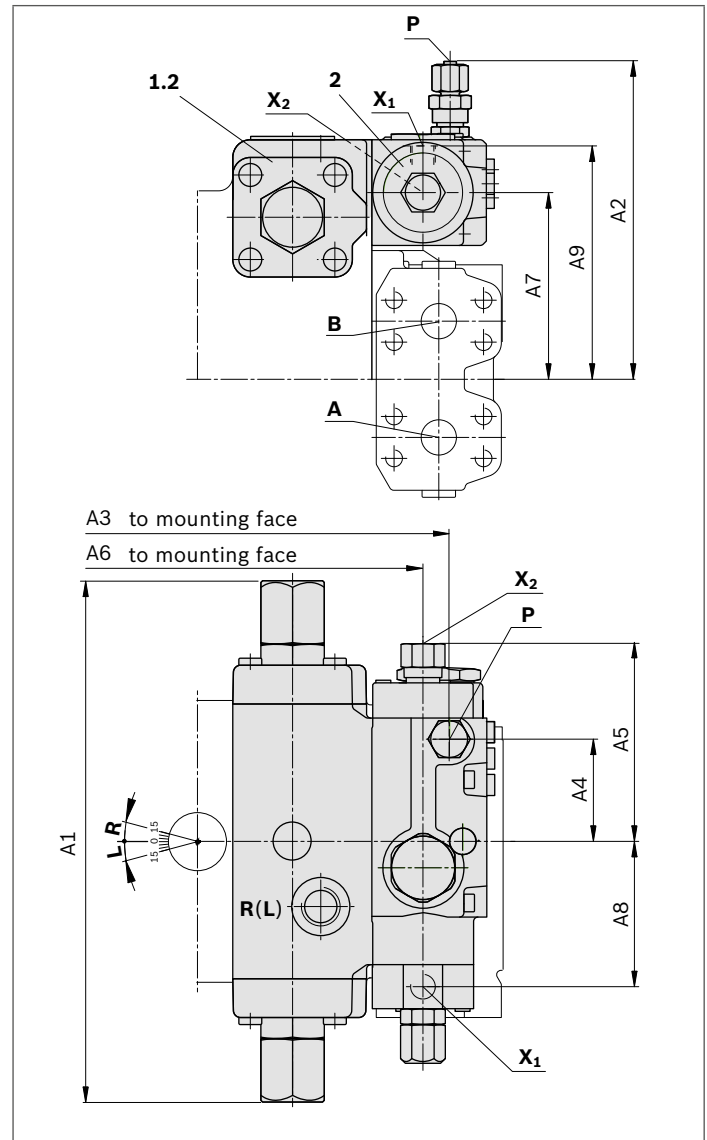
<b>1</b>	Pump with hydraulic control device
<b>1.1</b>	A4VSO (see data sheet 92050)
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>1.3</b>	A4CSG (see data sheet 92105)
<b>2</b>	Control module
<b>3</b>	Intermediate plate

**Dimensions**

▼ **A4VSO, sizes 40 and 71**



▼ **A4VSG, sizes 40 to 71**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	
40	296	193	233	58	113	218	106	82.5	132.5	For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100
71	332	209	260	58	113	245	122	82.5	148.5	

Port	Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>
<b>X<sub>1</sub>, X<sub>2</sub></b> <sup>1)</sup>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	O
<b>P</b>	Control pressure	DIN 3853	S8 form W	X

Components see page 7

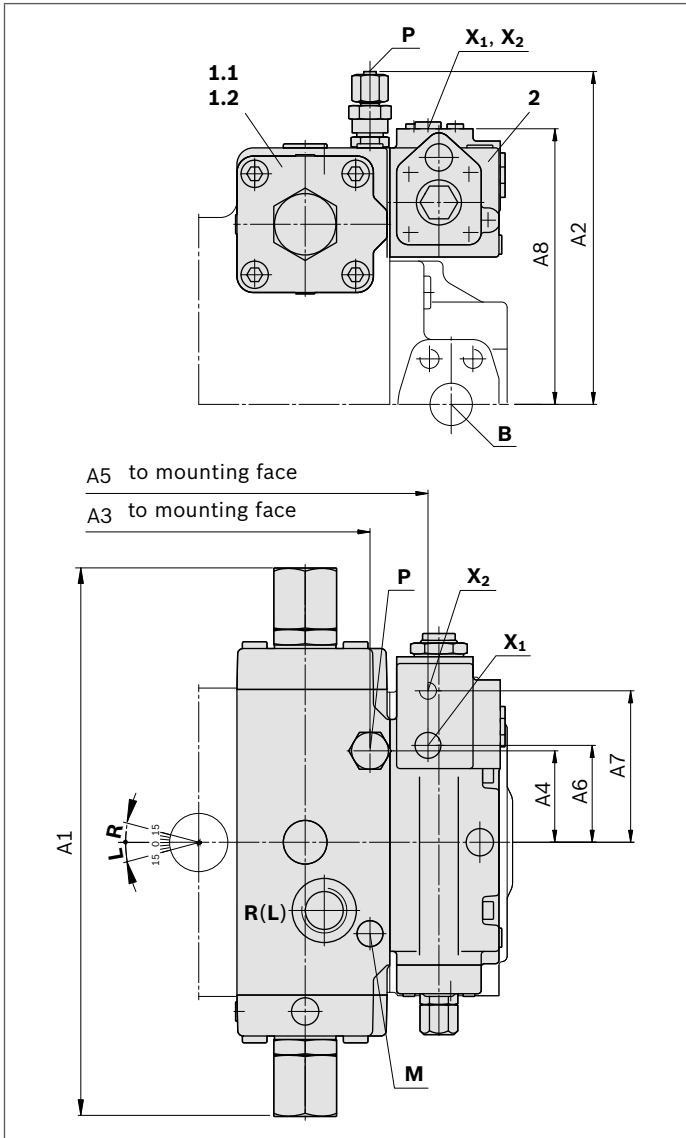
1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available  
2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
4) O = Must be connected (plugged on delivery)  
X = Plugged (in normal operation)



▼ **A4VSO, A4VSG, sizes 125 to 355**

**A4CSG**, in preparation, dimensions on request



Components	
<b>1</b>	Pump with hydraulic control device
<b>1.1</b>	A4VSO (see data sheet 92050)
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>2</b>	Control module
<b>3</b>	Intermediate plate (NG 500 to 1000)

NG	A1	A2	A3	A4	A5	A6	A7	A8
125	402	245	251	67	293	71	111	202
180	402	245	251	67	293	71	111	202
250	485	297.5	311	71	355	71	111	238
355	485	297.5	311	71	355	71	111	238

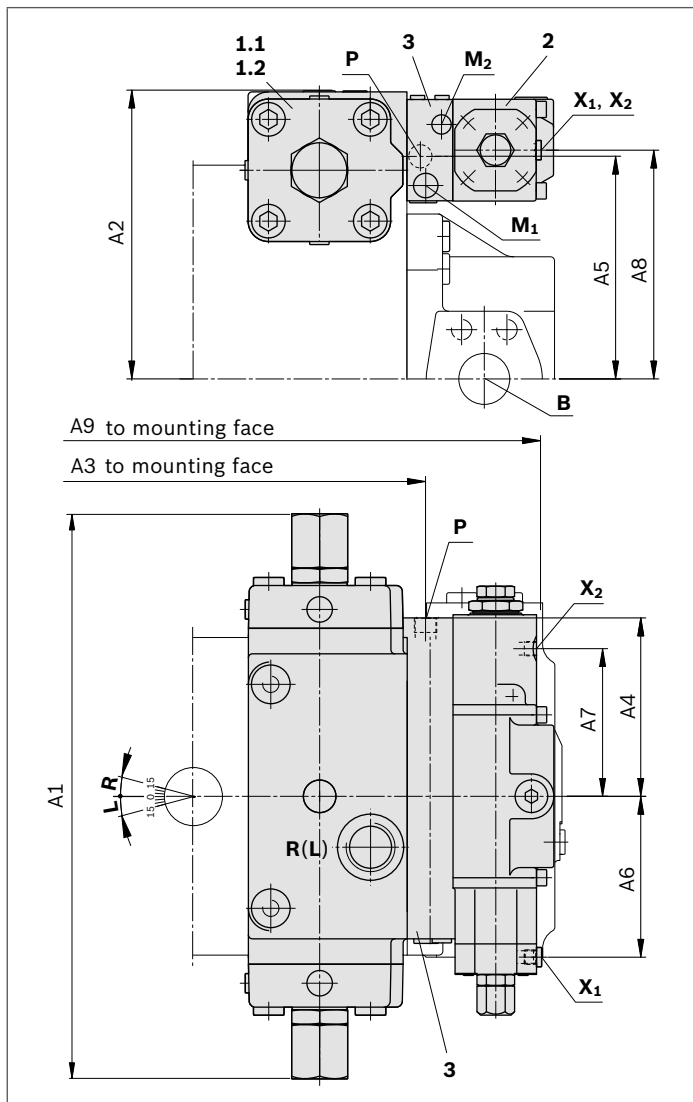
For detailed dimensions and technical data of the variable pump, see data sheet 92050 92100 or 92105

Port	Standard	Size <sup>2)</sup>	$p_{max abs}$ [bar] <sup>3)</sup>	State <sup>4)</sup>	
<b>X<sub>1</sub>, X<sub>2</sub></b> <sup>1)</sup>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure	DIN 3853	S8 form W	350	X
	Control pressure (NG 250 and 355)	DIN 3853	S12 Form W	350	X
<b>M</b>	Stroking chamber measurement (NG 125 and 180)	DIN 3852	M14 × 1.5; 12 deep	350	X
	Stroking chamber measuring (NG 250 and 355)	DIN 3852	M18 × 1.5; 12 deep	350	X

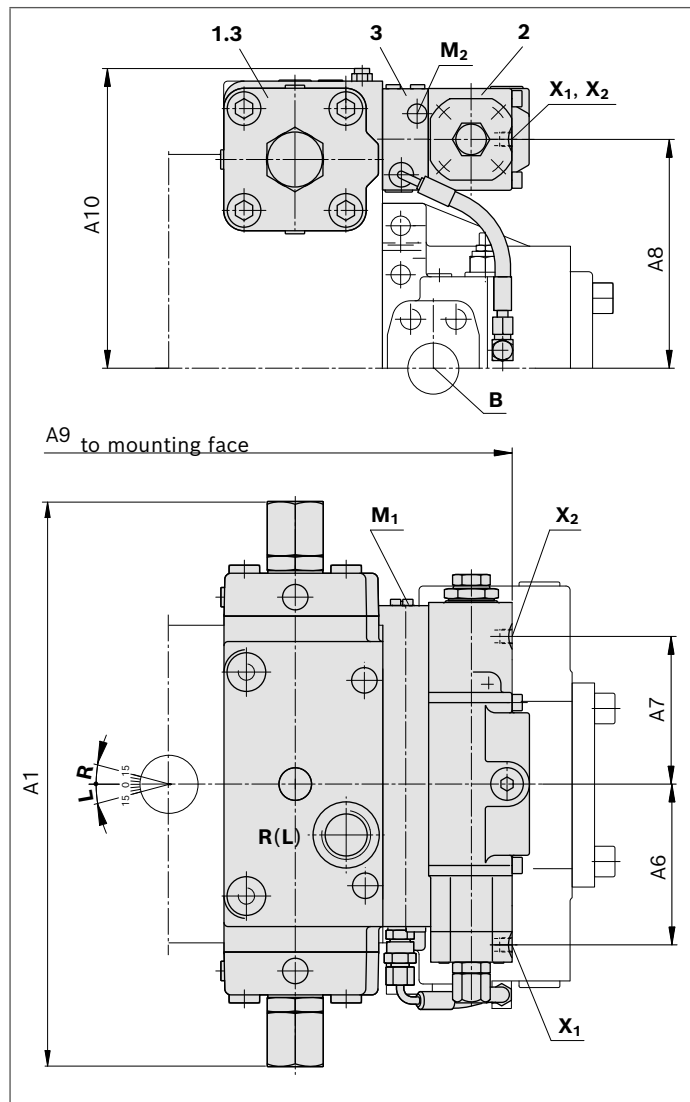
1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available  
 2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
 4) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

▼ **A4VSO, A4VSG, sizes 500 to 1000**



▼ **A4CSG, sizes 500 to 1000**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	
500	555	283	383	175	200	158	145	225	492	297	For detailed dimensions and technical data of the variable pump, see data sheet 92050 92100 or 92105
750	630	322	415	175	230	158	145	280	524	355	
1000	670	347	482	175	253	158	145	278	590	-	

Port		Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>
<b>X<sub>1</sub>, X<sub>2</sub></b> <sup>1)</sup>	Pilot pressure (A4VSO, A4VSG, A4CSG)	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure (A4VSO, A4VSG)	DIN 3852	M22 × 1.5; 14 × deep	350	O
<b>M<sub>1</sub></b>	Small stroking chamber measuring (A4VSO, A4VSG)	DIN 3852	M18 × 1.5; 12 deep	350	X
<b>M<sub>2</sub></b>	Small stroking chamber measuring (A4CSG)	DIN 3852	M22 × 1.5; 14 × deep	350	X
	Large stroking chamber measuring (A4VSO, A4VSG, A4CSG)	DIN 3852	M14 × 1.5; 12 deep	350	X

Components see page 9

- 1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available
- 2) For the maximum tightening torques the general instructions on page 49 must be observed.

- 3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.
- 4) O = Must be connected (plugged on delivery)  
X = Plugged (in normal operation)

## Pressure control

The pressure control is an additional function which controls the displacement of the pump as soon as the set pressure command value has been reached. If the pressure setting at the pressure control valve is exceeded, the pressure control valve opens and swivels the pump back until the set pressure is reached again. With control on both sides of center, it swivels over zero in operation as a motor for decompression.

The pressure control enables controlled deceleration during the decelerating of rotational drives with inertial mass.

- ▶ The pressure control is optionally available:
  - HD.A on one side in port A
  - HD.B on one side in port B
  - HD.D on both sides in ports A and B

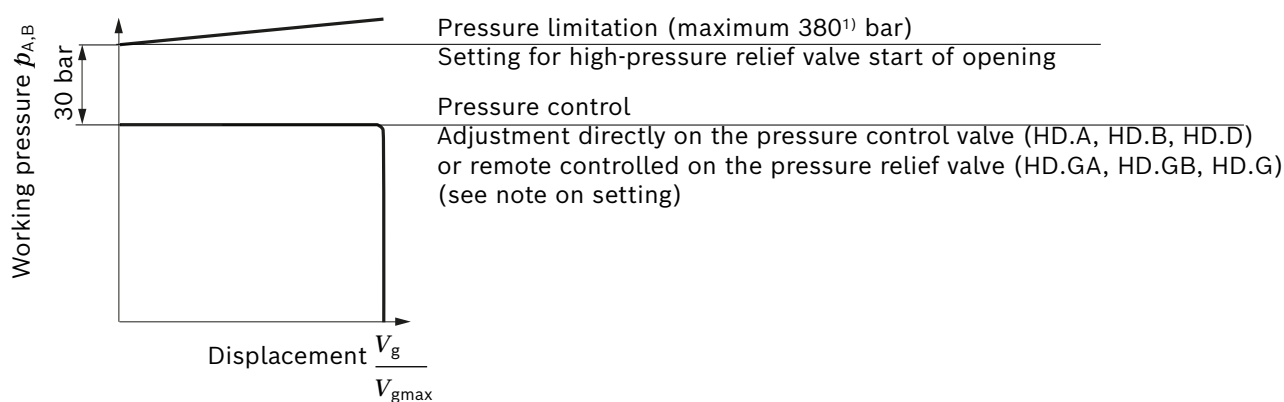
- ▶ Setting range 50 to 350 bar

350 bar is the standard setting. When ordering, please state other values in plain text.

The setting values, however, must be 30 bar lower than the high-pressure relief valve setting (A4CSG or A4VSG with SDVB attachment) since the occurring pressure peaks and the maximum pressure are safeguarded by these.

The **setting value** must also be **higher than** the applied **control pressure**.

### ▶ Characteristic curve



1) only valid in combination with pressure control - without pressure control, pressure limitation at 350 bar

### Remote pressure control

The pressure control is remote controlled via the port **XA** or **XB**.

The external pressure relief valves are not included in the scope of delivery.

Recommendation DBD 6 (RE 25 402)

The maximum line length should not exceed 2 m.

The differential pressure at the pressure control valve is set as standard to 30 bar. The pilot oil consumption then lies at approx. 2 l/min. If a different setting (range 14 – 50 bar) is required, please state in plain text.

Note for setting the remote pressure control:

The setting value for the external pressure relief valve plus the differential pressure value at the pressure control valve determines the level of the pressure control.

Example: external pressure relief valve 320 bar

Differential pressure at pressure control valve  
30 bar

resulting pressure control of 320 + 30 = 350 bar

- ▶ Optional remote pressure control:

- HD.GA on one side in port A
- HD.GB on one side in port B
- HD.G on both sides in ports A and B

## HD.A with pressure control on one side for port A

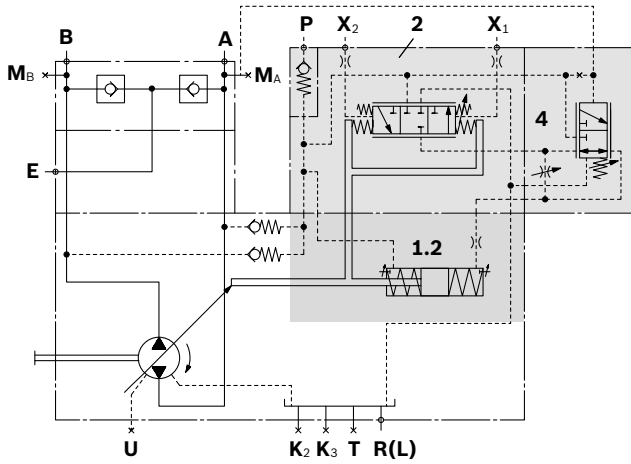
The pressure control valve controls the pressure in port **A**.

Not available for A4VSO.

Bidirectional direction of rotation not possible.

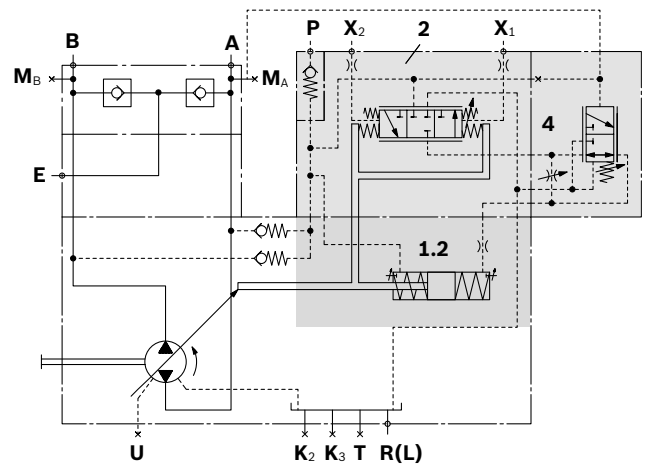
### ▼ A4VSG, sizes 40 and 71

Clockwise rotation



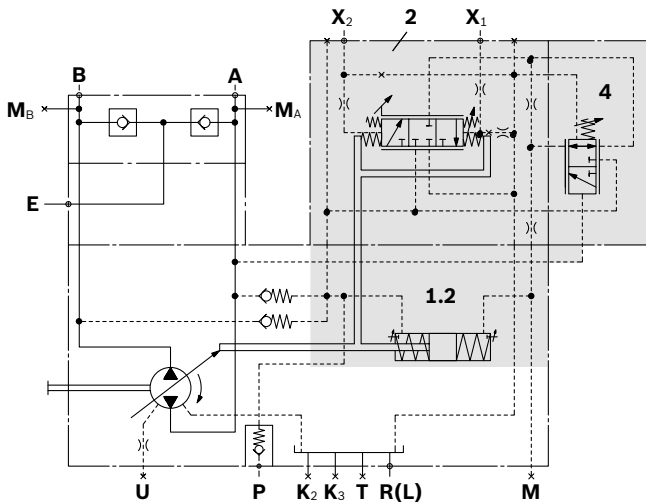
### ▼ A4VSG, sizes 40 and 71

Counter-clockwise rotation



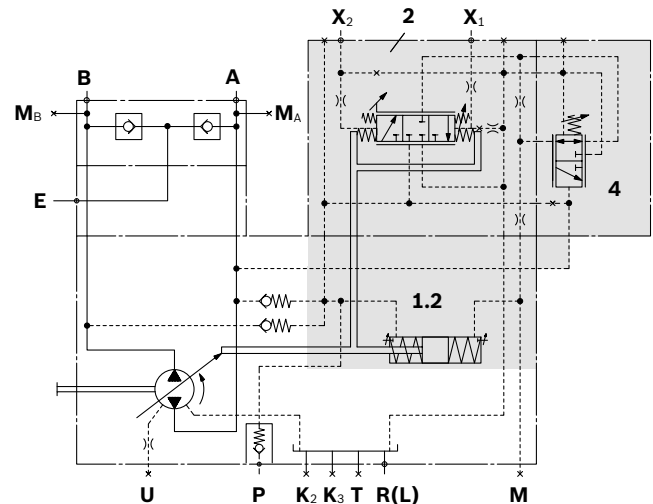
### ▼ A4VSG, sizes 125 to 355

Clockwise rotation



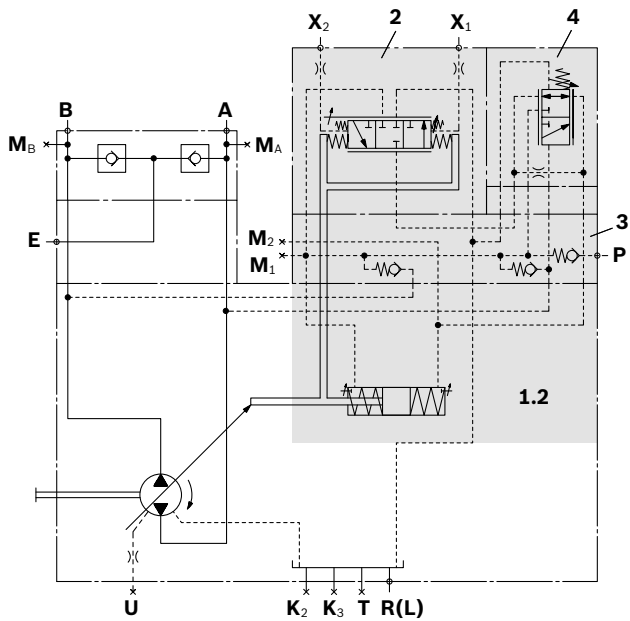
### ▼ A4VSG, sizes 125 to 355

Counter-clockwise rotation



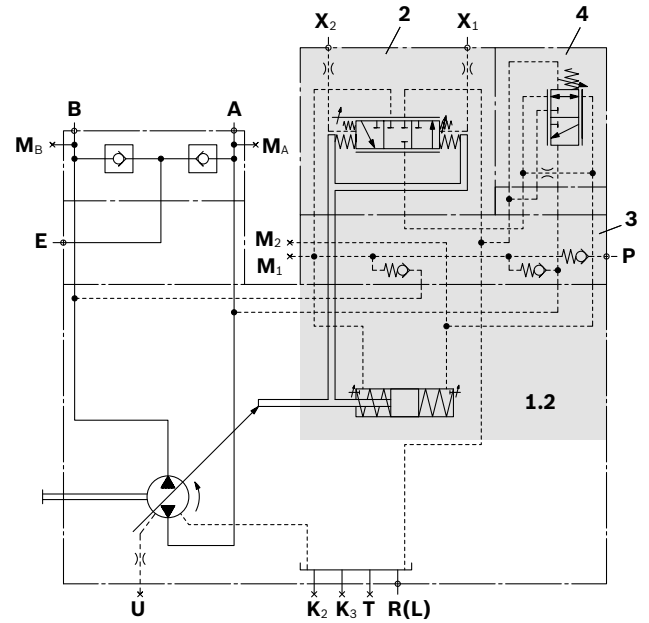
▼ **A4VSG, sizes 500 to 1000**

Clockwise rotation



▼ **A4VSG, sizes 500 to 1000**

Counter-clockwise rotation



**Components**

<b>1</b>	Pump with hydraulic control device
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>2</b>	Control module
<b>3</b>	Intermediate plate
<b>4</b>	Pressure control valve for port <b>A</b>

**Ports**

<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure port
<b>P</b>	Control pressure port
<b>M</b>	Measuring port stroking chamber pressure (NG 125 to 355)
<b>M<sub>1</sub></b>	Measuring port small stroking chamber (NG 500 to 1000)
<b>M<sub>2</sub></b>	Measuring port large stroking chamber (NG 500 to 1000)

## HD.GA with remote pressure control for port A

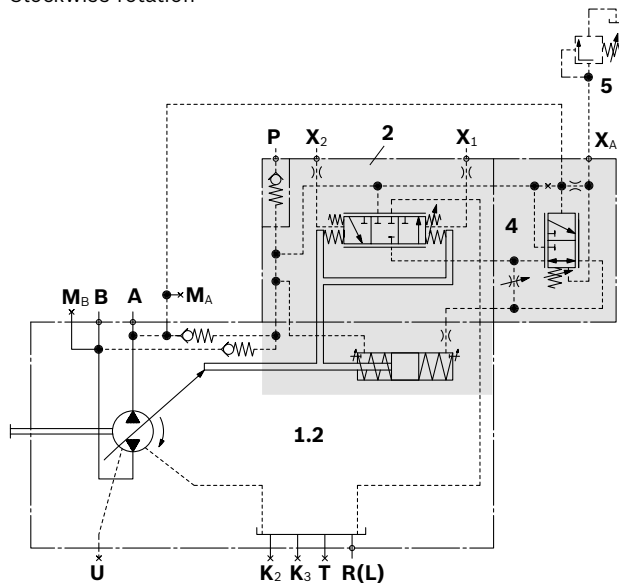
The pressure control is remote controlled via the port  $X_A$ .  
 The external pressure relief valve (pos. 5) is not included in the scope of delivery.

Not available for A4VSO.

Bidirectional rotation is not possible.

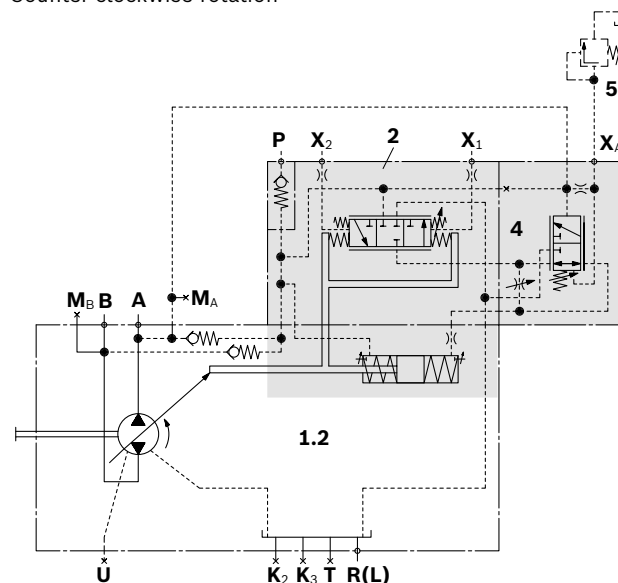
### ▼ A4VSO, sizes 40 and 71

Clockwise rotation



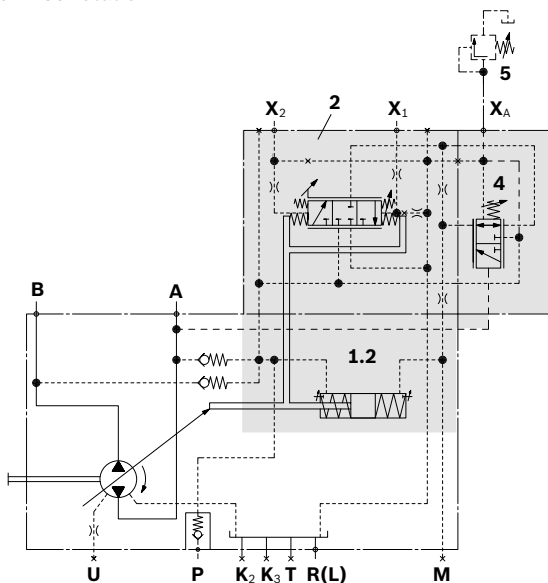
### ▼ A4VSO, sizes 40 and 71

Counter-clockwise rotation



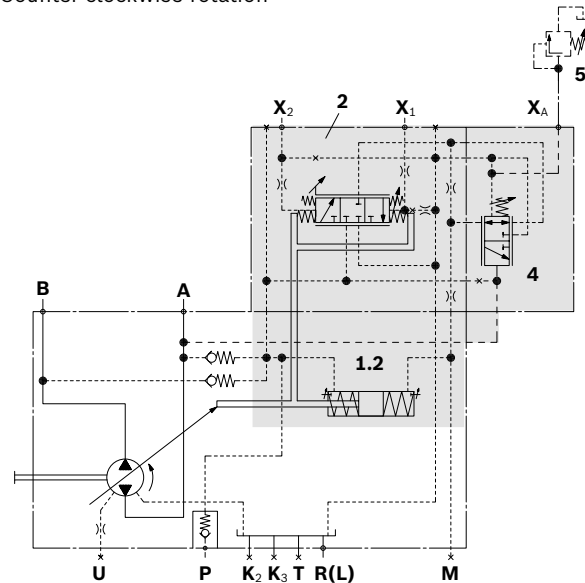
### ▼ A4VSO, sizes 125 to 355

Clockwise rotation

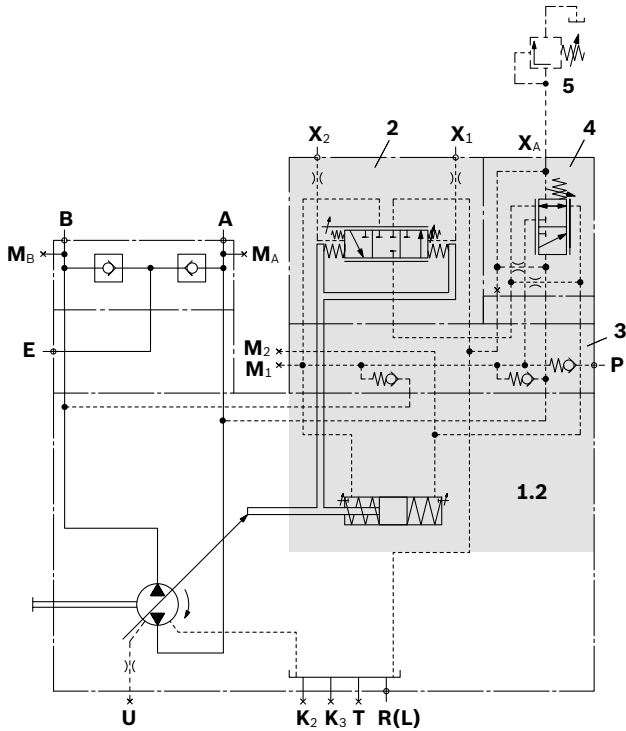


### ▼ A4VSO, sizes 125 to 355

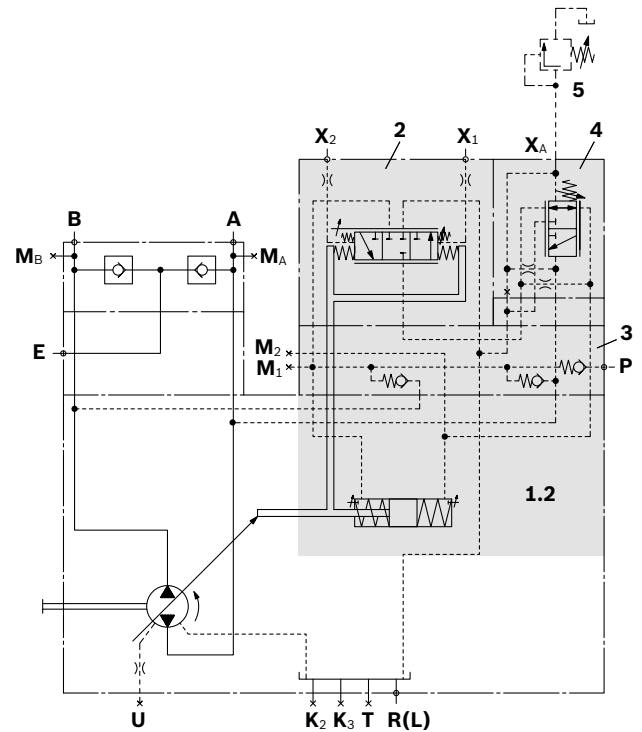
Counter-clockwise rotation



▼ **A4VSG, sizes 500 to 1000**  
 Clockwise rotation



▼ **A4VSG, sizes 500 to 1000**  
 Counter-clockwise rotation

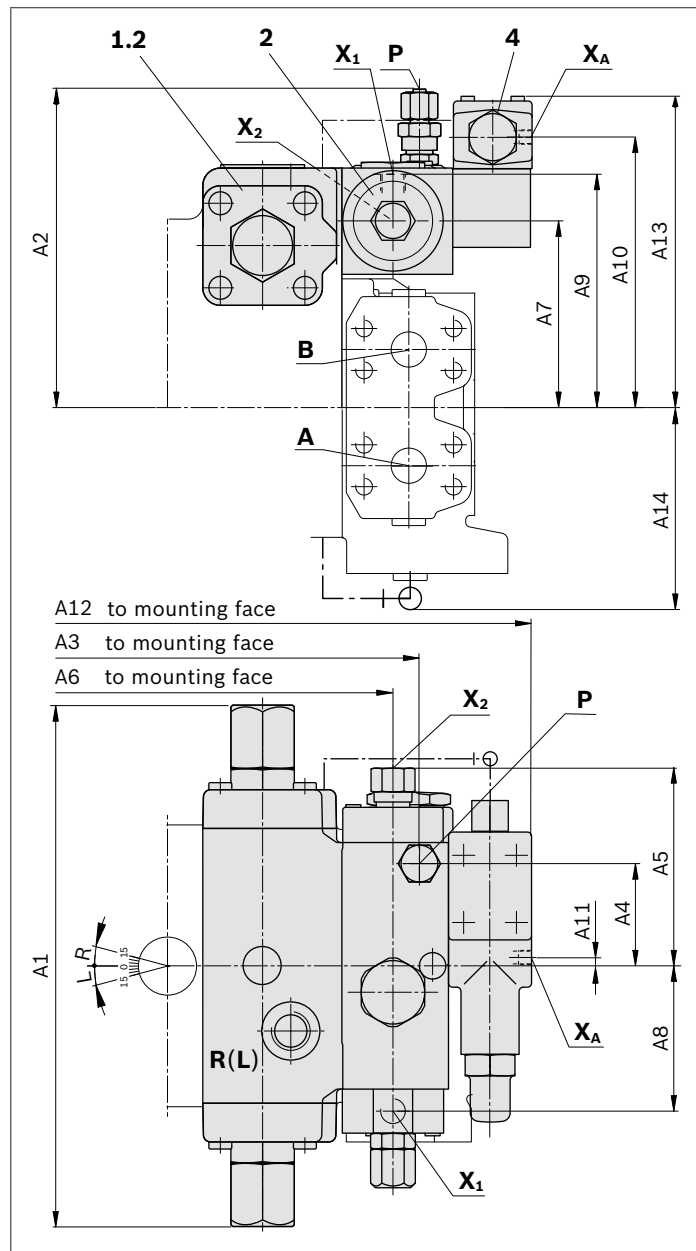


Components	
1	Pump with hydraulic control device
1.2	A4VSG (see data sheet 92100)
2	Control module
4	Pressure control valve for port <b>A</b>
5	External pressure relief valve (not included in the scope of delivery)

Ports	
<b>X<sub>A</sub></b>	Pilot pressure port, remote control pressure control <b>A</b>
<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure port
<b>P</b>	Control pressure port
<b>M</b>	Measuring port stroking chamber pressure (NG 125 to 355)
<b>M<sub>1</sub></b>	Measuring port small stroking chamber (NG 500 to 1000)
<b>M<sub>2</sub></b>	Measuring port large stroking chamber (NG 500 to 1000)

**Dimensions**

▼ **A4VSG, sizes 40 to 71**



A12 to mounting face  
A3 to mounting face  
A6 to mounting face

**Components**

- 1** Pump with hydraulic control device
- 1.2** A4VSG (see data sheet 92100)
- 2** Control module
- 4** Pressure control valve for port **A**

NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
40	296	193	233	58	113	218	106	82.5	132.5	163	4	299	189	136
71	332	209	260	58	113	245	122	82.5	148.5	179	4	326	205	139

For detailed dimensions and technical data of the variable pump, see data sheet 92100

Port		Standard	Size <sup>1)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>2)</sup>	State <sup>3)</sup>
<b>X<sub>A</sub></b>	Pilot pressure remote control pressure control <b>A</b> (plugged for HDA)	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure	DIN 3853	S8 form W	350	X

1) For the maximum tightening torques the general instructions on page 49 must be observed.

2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.

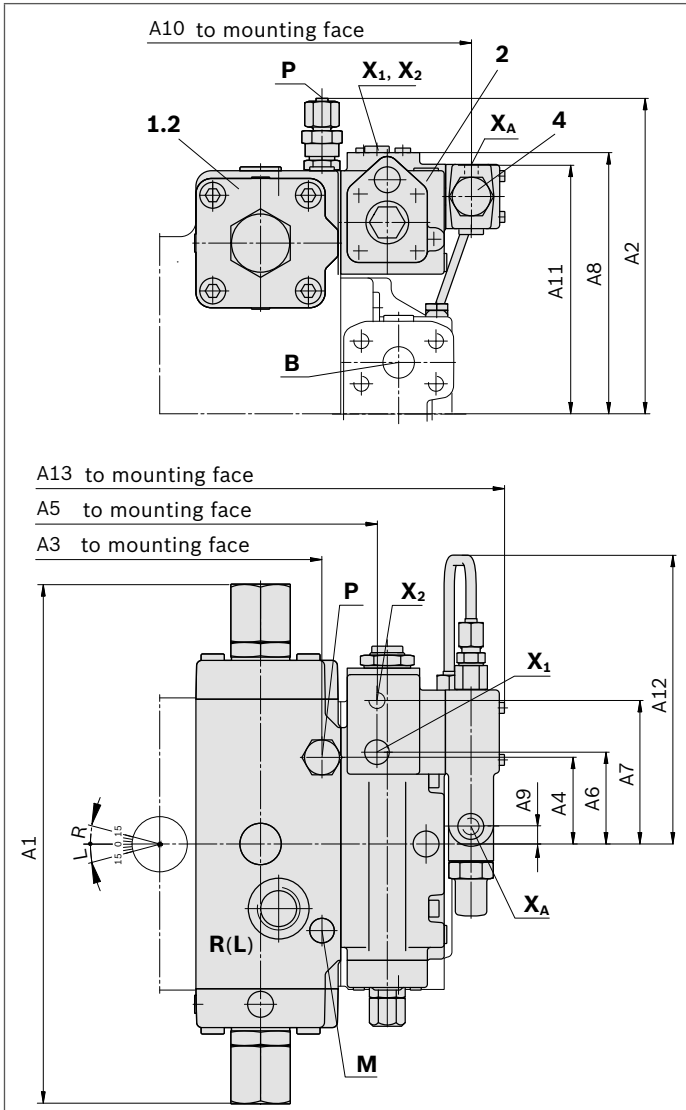
3) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)



▼ **A4VSG, sizes 125 to 355**

▼ **A4CSG, in preparation, dimensions on request**



Components	
<b>1</b>	Pump with hydraulic control device
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>2</b>	Control module
<b>3</b>	Intermediate plate (NG 500 to 1000)
<b>4</b>	Pressure control valve for port <b>A</b>

NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	
125	402	245	251	67	293	71	111	202	13	366	192	224	392	For detailed dimensions and technical data of the variable pump, see data sheet 92100 or 92105
180	402	245	251	67	293	71	111	202	13	366	192	224	394	
250	485	297.5	311	71	355	71	111	238	13	428	228	224	454	
355	485	297.5	311	71	355	71	111	238	13	428	228	224	454	

Port		Standard	Size <sup>1)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>2)</sup>	State <sup>3)</sup>
<b>X<sub>A</sub></b>	Pilot pressure remote control pressure control <b>A</b> (plugged for HDA)	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>X<sub>1</sub>, X<sub>2</sub></b>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure (NG 125 and 180)	DIN 3853	S8 form W	350	X
	Control pressure (NG 250 and 355)	DIN 3853	S12 Form W	350	X
<b>M</b>	Stroking chamber measurement (NG 125 and 180)	DIN 3852	M14 × 1.5; 12 deep	350	X
	Stroking chamber measuring (NG 250 and 355)	DIN 3852	M18 × 1.5; 12 deep	350	X

1) For the maximum tightening torques the general instructions on page 49 must be observed.

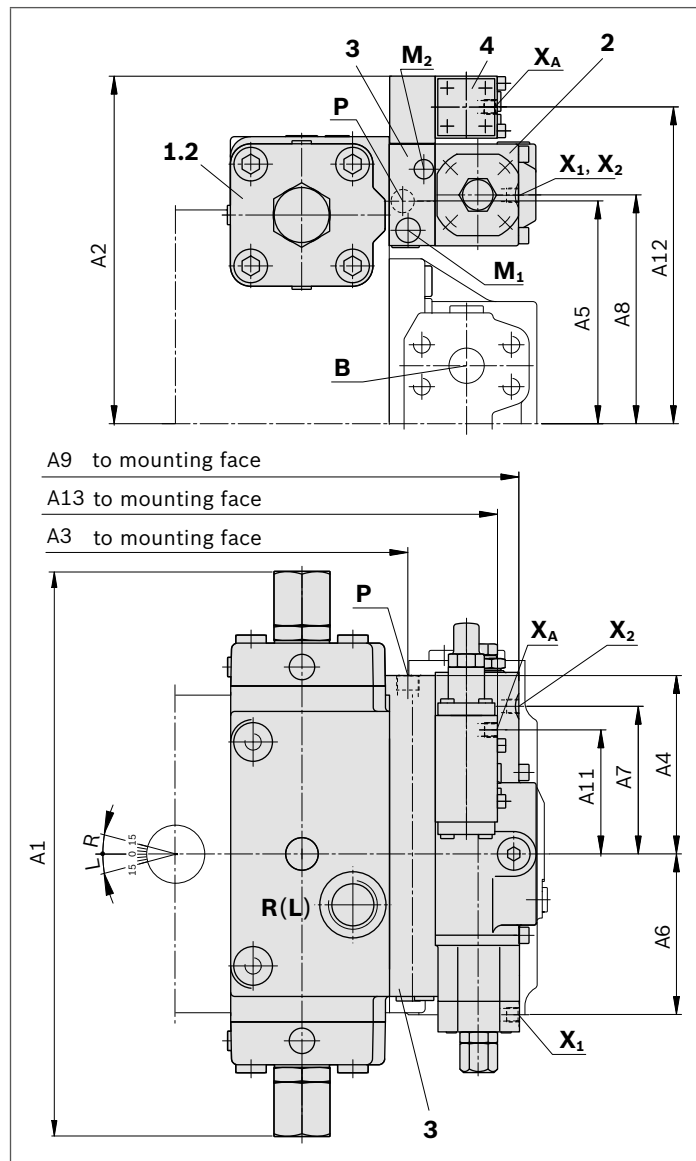
2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.

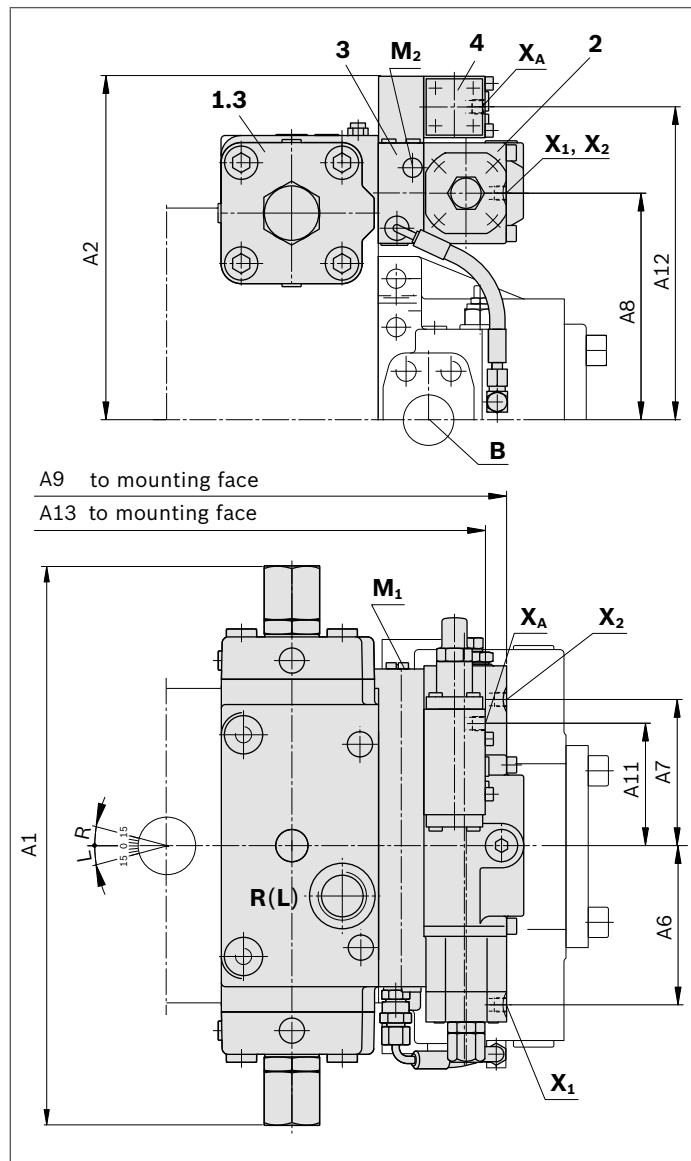
3) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

▼ **A4VSG, sizes 500 to 1000**



▼ **A4CSG, sizes 500 to 1000**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A11	A12	A13
500	555	342	383	175	200	158	145	225	492	136	315	469
750	630	371	415	175	230	158	145	280	524	136	345	501
1000	670	394	481	175	253	158	145	278	590	136	368	567

For detailed dimensions and technical data of the variable pump, see data sheet 92100 or 92105

Port		Standard	Size <sup>1)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>2)</sup>	State <sup>3)</sup>
X <sub>A</sub>	Pilot pressure remote control pressure control A (plugged for HDA)	DIN 3852	M14 × 1.5; 12 deep	45	O
X <sub>1</sub> , X <sub>2</sub>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
P	Control pressure (only with A4VSG)	DIN 3853	M22 × 1.5; 14 deep	350	X
M <sub>1</sub>	Stroking chamber measurement (A4VSG)	DIN 3852	M18 × 1.5; 12 deep	350	X
	Stroking chamber measurement (A4CSG)	DIN 3852	M22 × 1.5; 14 deep	350	X
M <sub>2</sub>	Stroking chamber measuring (NG 250 and 355)	DIN 3852	M14 × 1.5; 12 deep	350	X

1) For the maximum tightening torques the general instructions on page 49 must be observed.

2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.

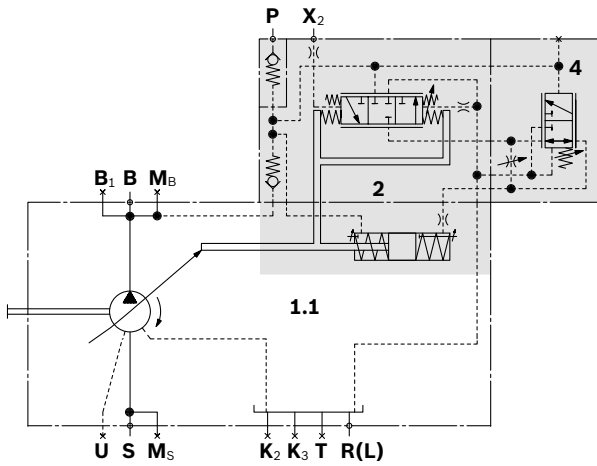
3) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

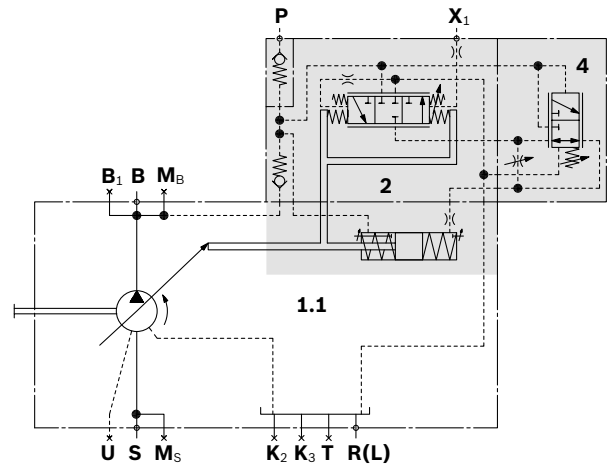
### HD. B with pressure control on one side for port B

The pressure control valve controls the pressure in port B.  
 Bidirectional direction of rotation not possible.

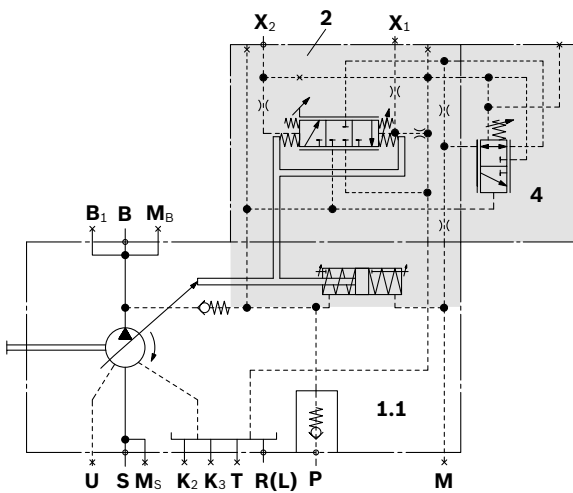
▼ **A4VSO, sizes 40 and 71**  
 Clockwise rotation



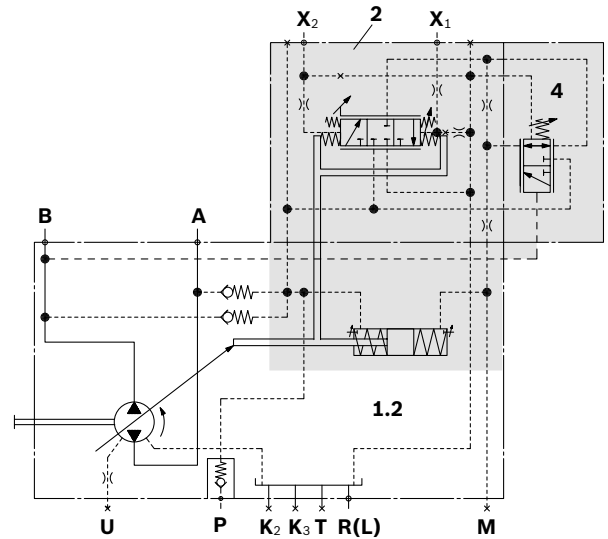
▼ **A4VSO, sizes 40 and 71**  
 Counter-clockwise rotation



▼ **A4VSO, sizes 125 to 355**  
 Clockwise rotation



▼ **A4VSG, sizes 125 to 355**  
 Counter-clockwise rotation



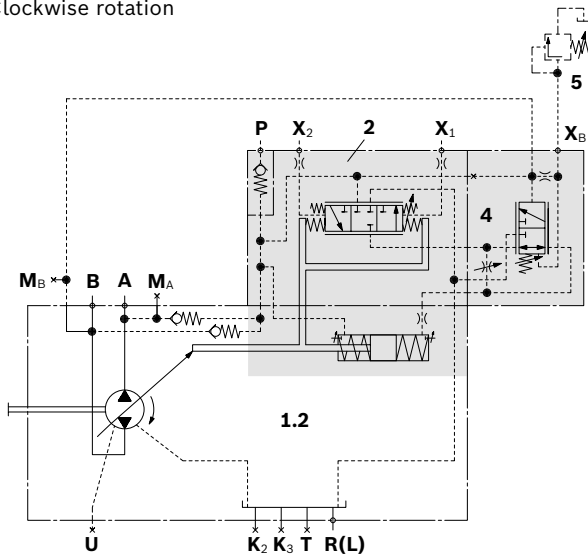


## HD.GB with remote pressure control for port B

The pressure control is remote controlled via the port  $X_B$ .  
 The external pressure relief valve (pos. 5) is not included in the scope of delivery.  
 Bidirectional of rotation not is possible.

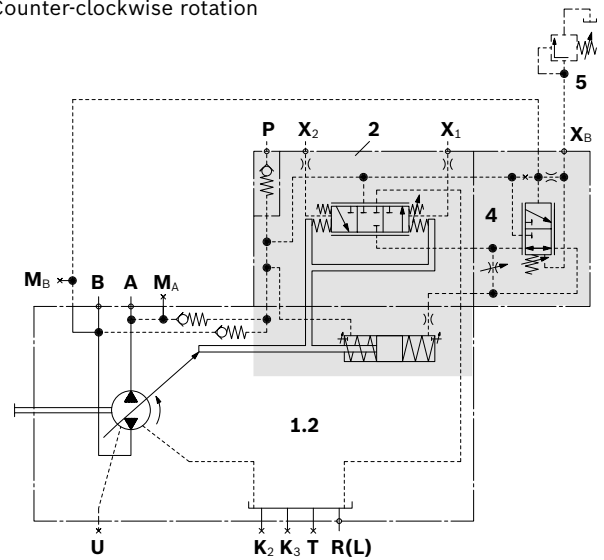
### ▼ A4VSG, sizes 40 and 71

Clockwise rotation



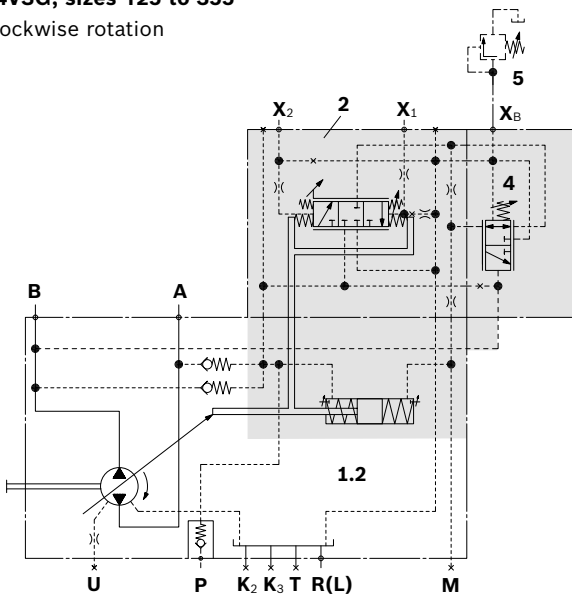
### ▼ A4VSG, sizes 40 and 71

Counter-clockwise rotation



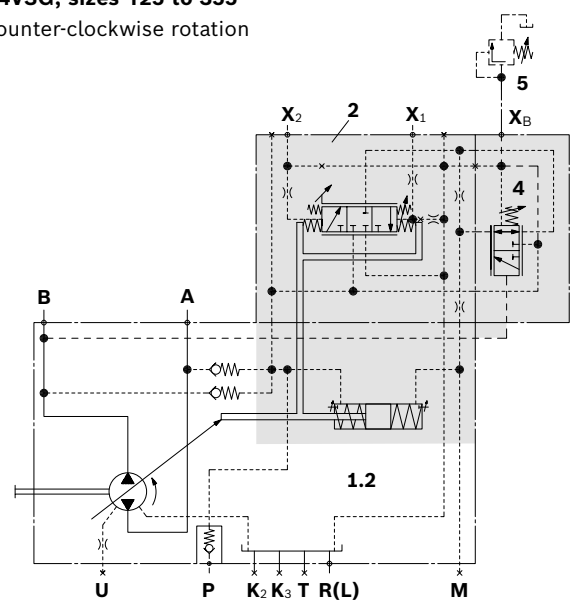
### ▼ A4VSG, sizes 125 to 355

Clockwise rotation



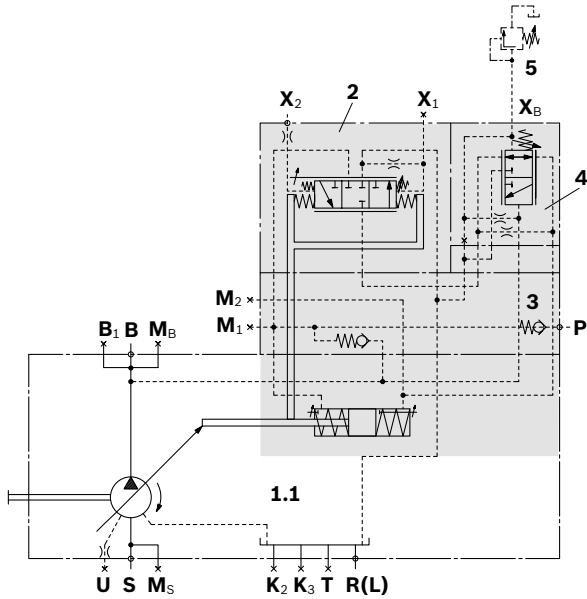
### ▼ A4VSG, sizes 125 to 355

Counter-clockwise rotation



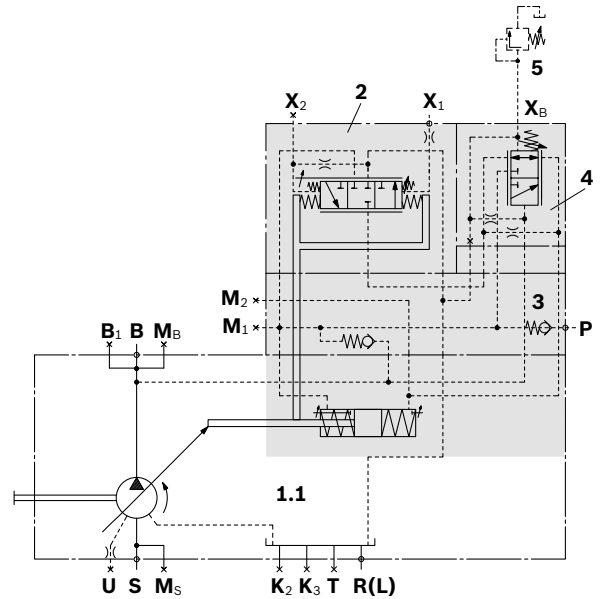
▼ **A4VSO, sizes 500 to 1000**

Clockwise rotation



▼ **A4VSO, sizes 500 to 1000**

Counter-clockwise rotation

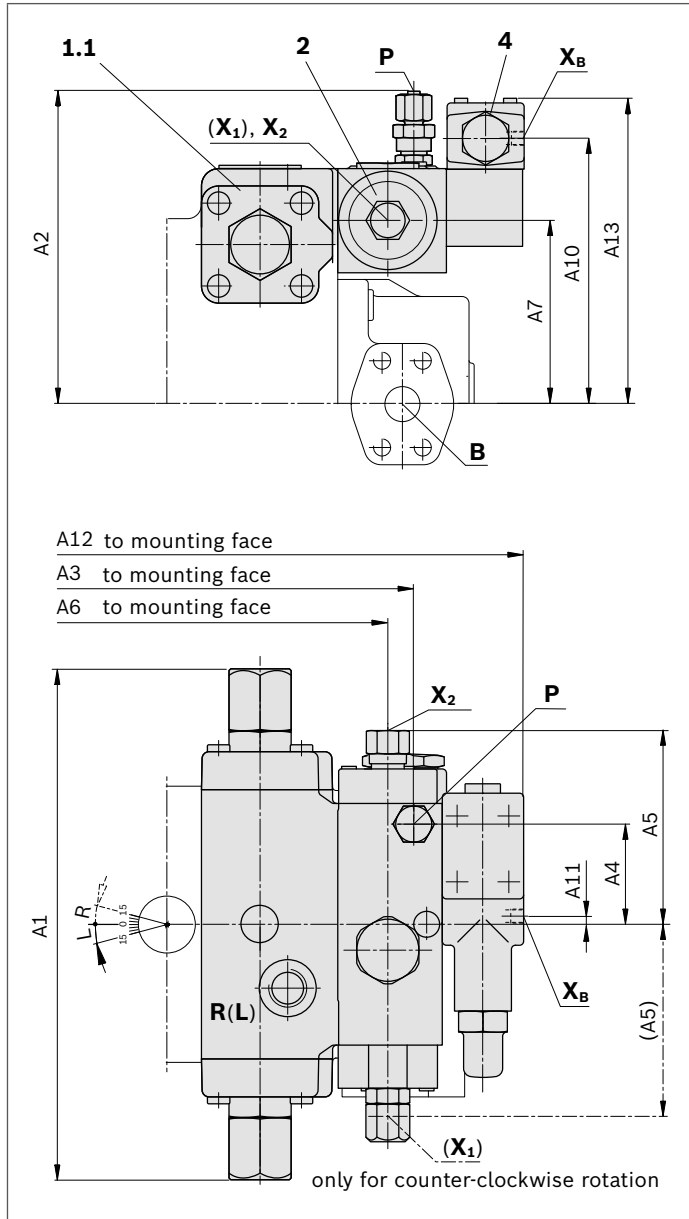


Components	
<b>1</b>	Pump with hydraulic control device
<b>1.1</b>	A4VSO (see data sheet 92050)
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>2</b>	Control module
<b>4</b>	Pressure control valve for port <b>B</b>
<b>5</b>	External pressure relief valve (not included in the scope of delivery)

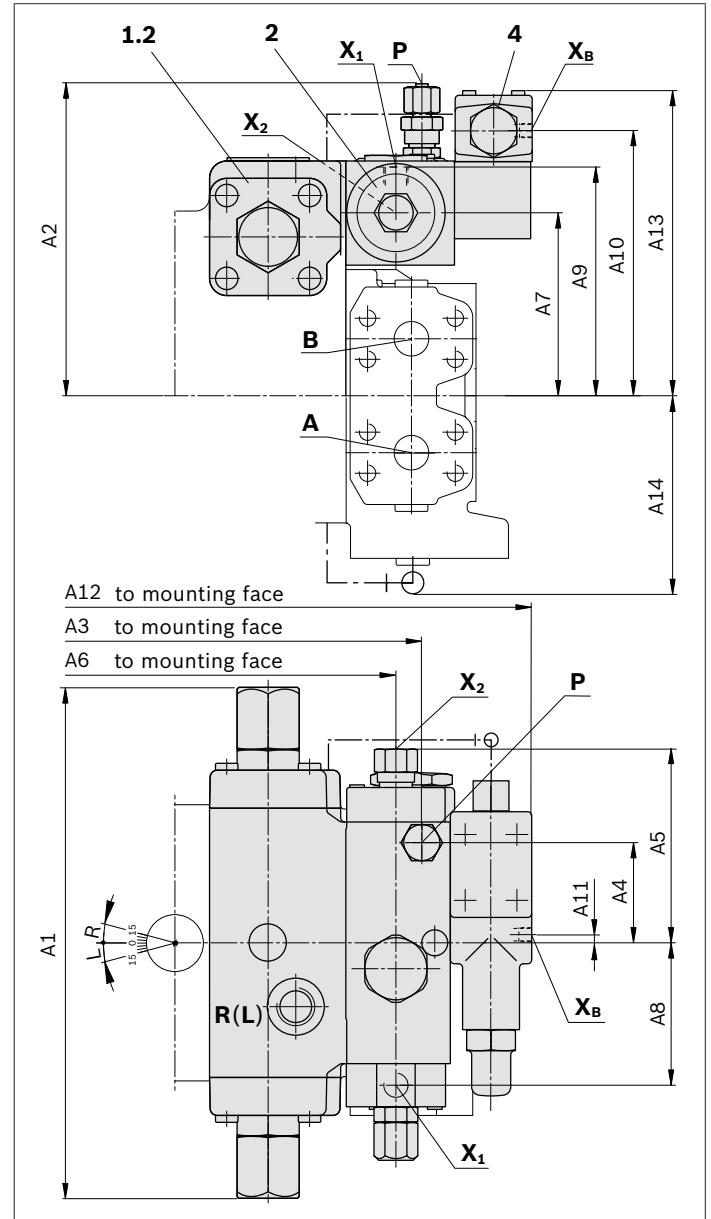
Ports	
<b>X<sub>B</sub></b>	Pilot pressure port, remote control pressure control <b>B</b>
<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure port
<b>P</b>	Control pressure port
<b>M</b>	Measuring port stroking chamber pressure (NG 125 to 355)
<b>M<sub>1</sub></b>	Measuring port small stroking chamber (NG 500 to 1000)
<b>M<sub>2</sub></b>	Measuring port large stroking chamber (NG 500 to 1000)

**Dimensions**

▼ **A4VSO, sizes 40 and 71**



▼ **A4CSG, sizes 40 and 71**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	
40	296	193	233	58	113	218	106	82.5	132.5	163	4	299	189	136	For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100
71	332	209	260	58	113	245	122	82.5	148.5	179	4	326	205	139	

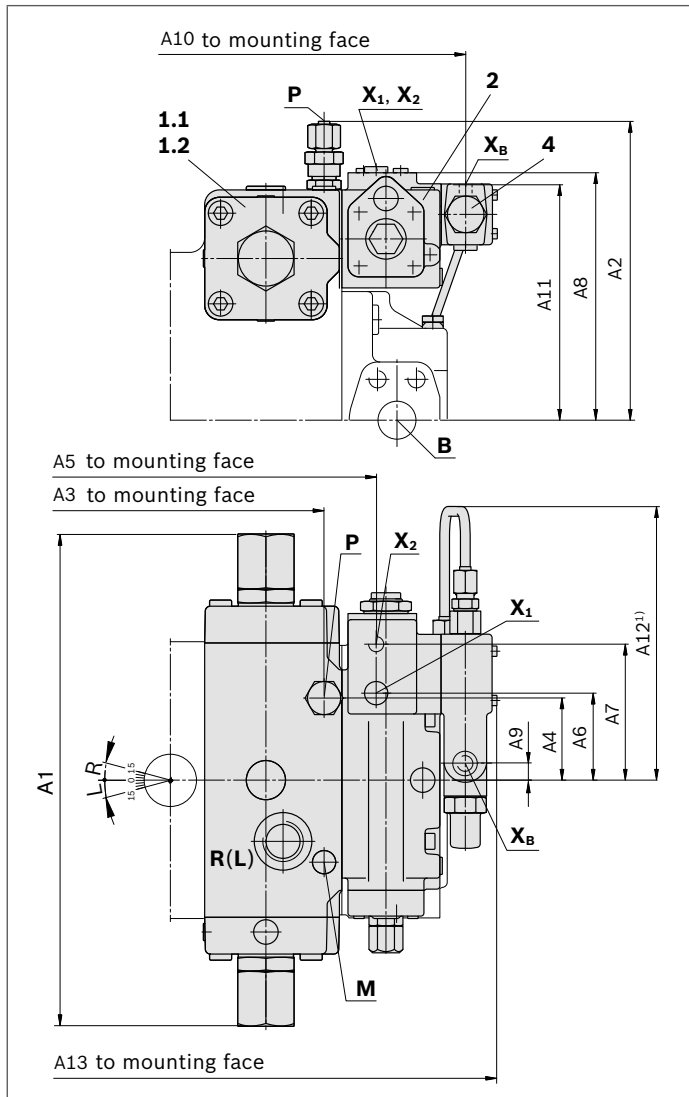
Port		Standard	Size <sup>2)</sup>	$p_{max abs}$ [bar] <sup>3)</sup>	State <sup>4)</sup>
$X_B$	Pilot pressure remote control pressure control <b>B</b> (plugged for HDB)	DIN 3852	M14 × 1.5; 12 deep	45	O
$X_1, X_2$ <sup>1)</sup>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure	DIN 3853	S8 form W	350	X

1) For A4VSO clockwise rotation only  $X_2$  is available; for A4VSO counter-clockwise rotation only  $X_1$  is available  
 2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
 4) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

▼ **A4VSO, A4VSG, sizes 125 to 355**

▼ **A4CSG, in preparation, dimensions on request**



Components	
<b>1</b>	Pump with hydraulic control device
<b>1.1</b>	A4VSO (see data sheet 92050)
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>1.3</b>	A4CSG (see data sheet 92105)
<b>2</b>	Control module
<b>3</b>	Intermediate plate (NG 500 to 1000)
<b>4</b>	Pressure control valve for port B

NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12 <sup>1)</sup>	A13	
125	402	245	251	67	293	71	111	202	13	366	192	224	392	For detailed dimensions and technical data of the variable pump, see data sheet 92050 92100 or 92105
180	402	245	251	67	293	71	111	202	13	366	192	224	392	
250	485	297.5	311	71	355	71	111	238	13	428	228	224	454	
355	485	297.5	311	71	355	71	111	238	13	428	228	224	454	

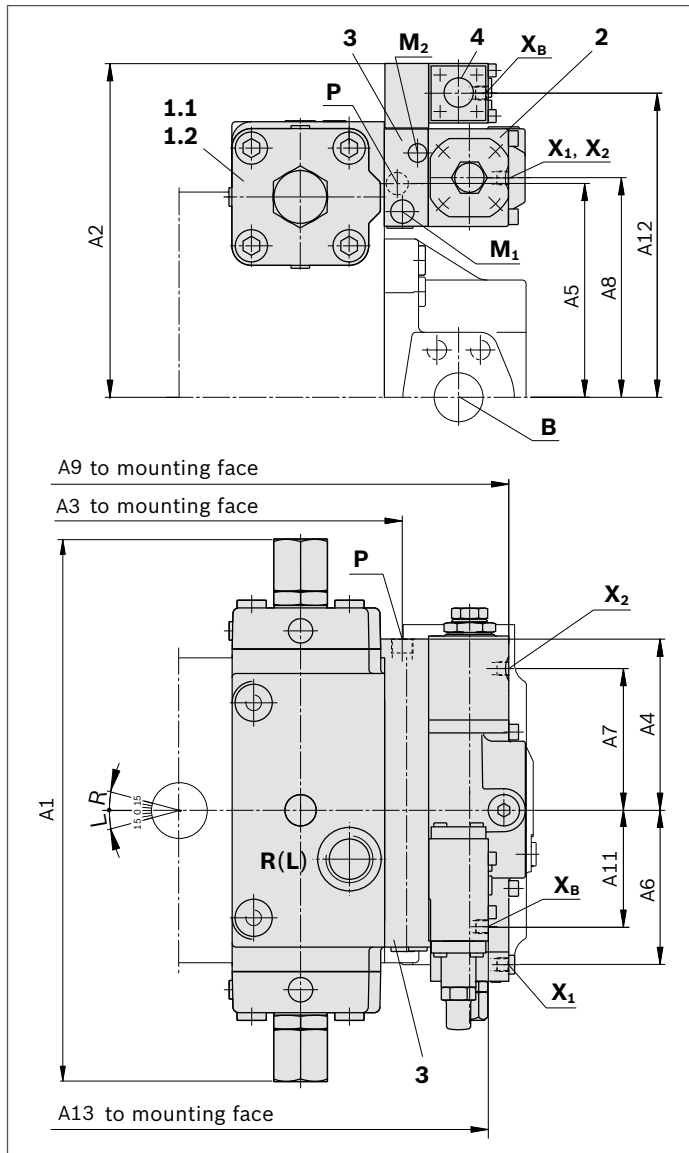
Port		Standard	Size <sup>3)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>4)</sup>	State <sup>5)</sup>
<b>X<sub>B</sub></b>	Pilot pressure remote control pressure control <b>B</b> (plugged for HDB)	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>X<sub>1</sub>, X<sub>2</sub><sup>2)</sup></b>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure (NG 125 and 180)	DIN 3853	S8 form W	350	X
	Control pressure (NG 250 and 355)	DIN 3853	S12 Form W	350	X
<b>M</b>	Stroking chamber measurement (NG 125 and 180)	DIN 3852	M14 × 1.5; 12 deep	350	X
	Stroking chamber measuring (NG 250 and 355)	DIN 3852	M18 × 1.5; 12 deep	350	X

1) Piping only available for A4VSO  
 2) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available  
 3) For the maximum tightening torques the general instructions on page 49 must be observed.

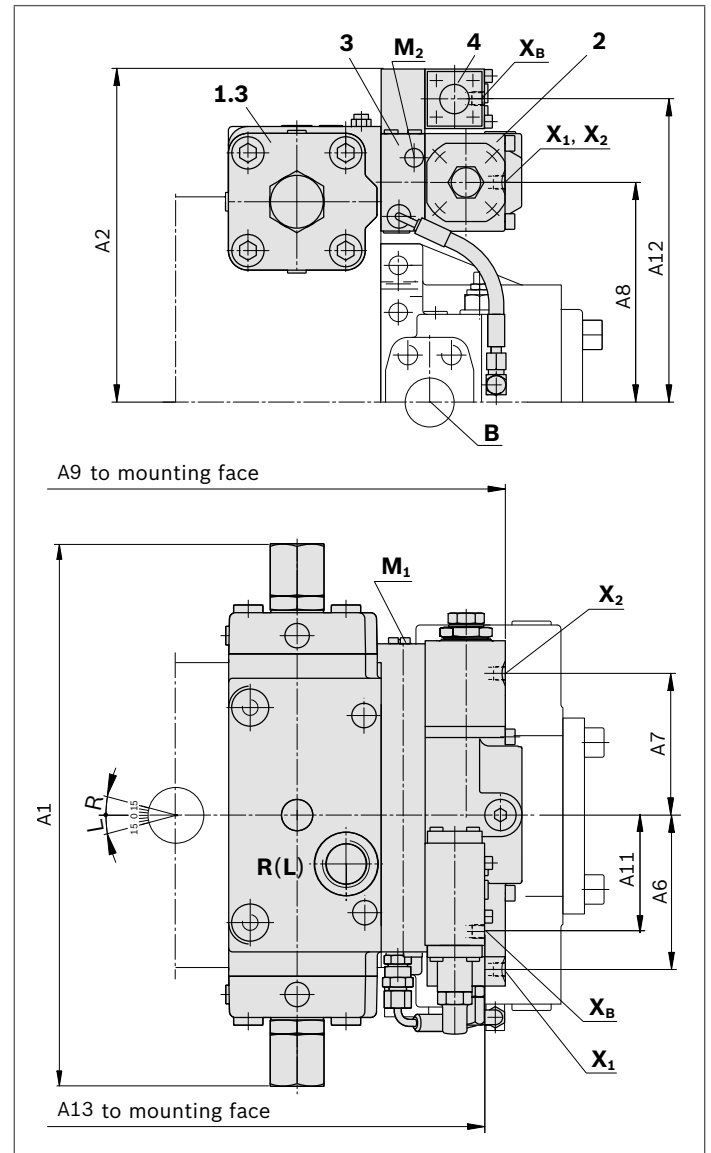
4) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
 5) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)



▼ **A4VSO, A4CSG, sizes 500 to 1000**



▼ **A4CSG, sizes 500 to 1000**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A11	A12	A13
500	555	342	383	175	200	158	145	225	492	136	304	469
750	630	371	415	175	230	158	145	280	524	136	334	501
1000	670	394	481	175	253	158	145	278	590	136	357	567

For detailed dimensions and technical data of the variable pump, see data sheet 92050 92100 or 92105

Port		Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>
<b>X<sub>B</sub></b>	Pilot pressure remote control pressure control <b>B</b> (plugged for HDB)	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>X<sub>1</sub>; X<sub>2</sub></b> <sup>1)</sup>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure (only with A4VSG)	DIN 3853	M22 × 1.5; 14 deep	350	X
<b>M<sub>1</sub></b>	Stroking chamber measurement (A4VSG)	DIN 3852	M18 × 1.5; 12 deep	350	X
	Stroking chamber measurement (A4CSG)	DIN 3852	M22 × 1.5; 14 deep	350	X
<b>M<sub>2</sub></b>	Stroking chamber measurement	DIN 3852	M14 × 1.5; 12 deep	350	X

1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available  
 2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
 4) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

## HD.D with pressure control on both sides for ports A and B

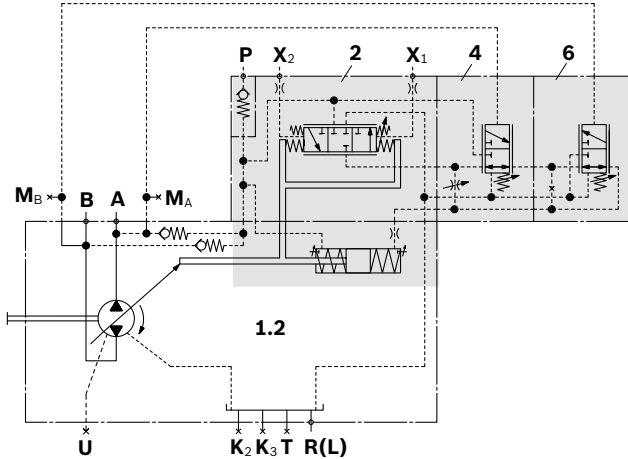
Two pressure control valves control the respective pressure in the ports **A** or **B** independently of each other.

Not available for A4VSO.

Bidirectional direction of rotation not possible.

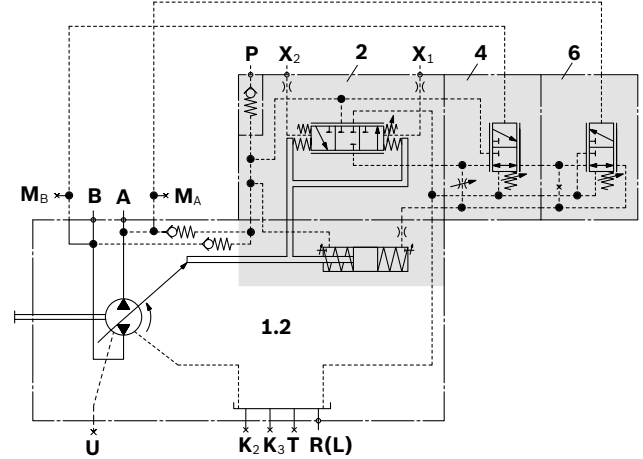
### ▼ A4VSG, sizes 40 and 71

Clockwise rotation



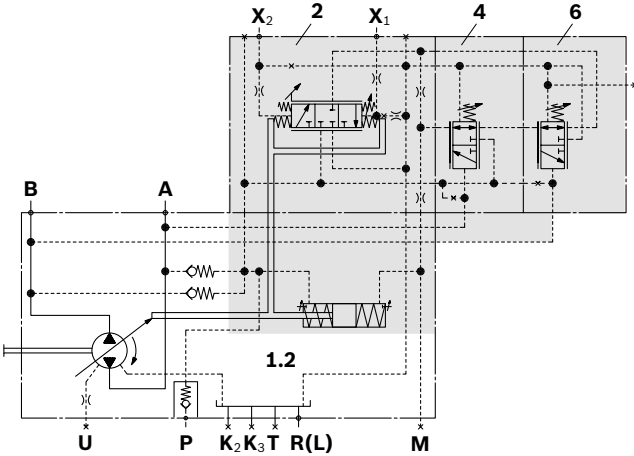
### ▼ A4VSG, sizes 40 and 71

Counter-clockwise rotation



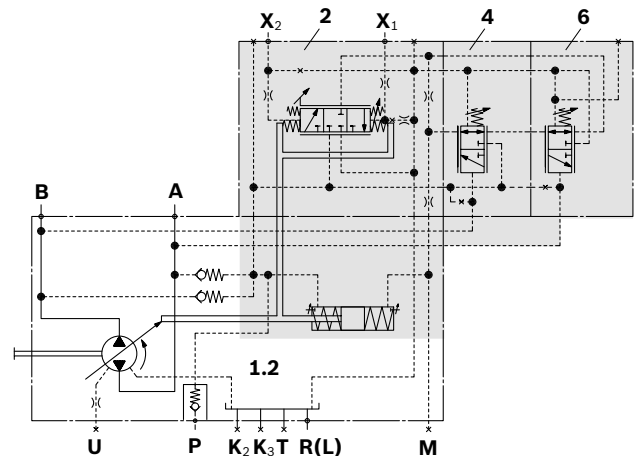
### ▼ A4VSG, sizes 125 to 355

Clockwise rotation



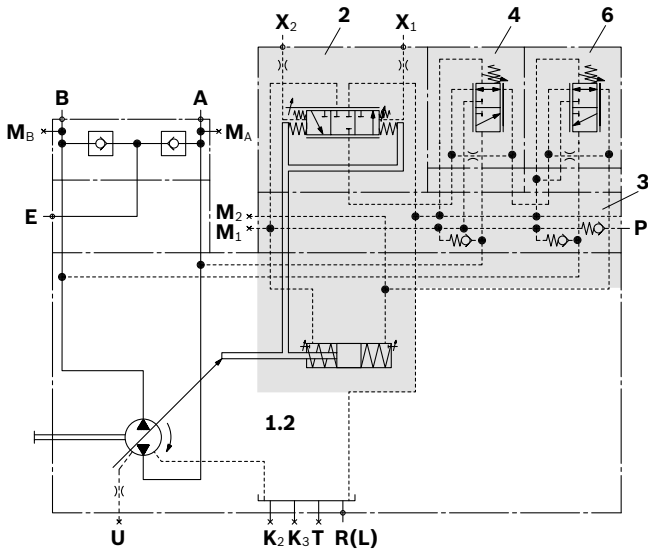
### ▼ A4VSG, sizes 125 to 355

Counter-clockwise rotation



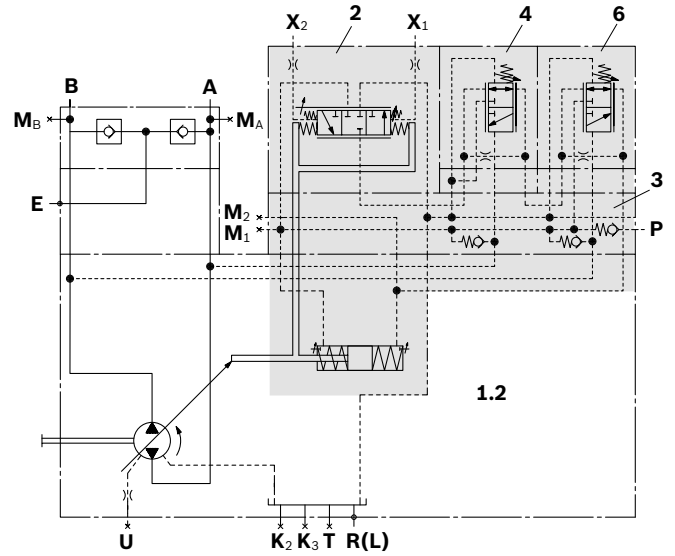
▼ **A4VSG, sizes 500 to 1000**

Clockwise rotation



▼ **A4VSG, sizes 500 to 1000**

Counter-clockwise rotation



**Components**

- |            |  |
|------------|--|
| <b>1</b>   | Pump with hydraulic control device   |
| <b>1.2</b> | A4VSG (see data sheet 92100)   |
| <b>2</b>   | Control module   |
| <b>4</b>   | Pressure control valve for port <b>A</b><br>(for port <b>B</b> counter-clockwise rotation) |
| <b>6</b>   | Pressure control valve for port <b>B</b><br>(for port <b>A</b> counter-clockwise rotation) |

**Ports**

- |                                     |  |
|-------------------------------------|--|
| <b>X<sub>1</sub>; X<sub>2</sub></b> | Pilot pressure port                                      |
| <b>P</b>                            | Control pressure port                                    |
| <b>M</b>                            | Measuring port stroking chamber pressure (NG 125 to 355) |
| <b>M<sub>1</sub></b>                | Measuring port small stroking chamber (NG 500 to 1000)   |
| <b>M<sub>2</sub></b>                | Measuring port large stroking chamber (NG 500 to 1000)   |

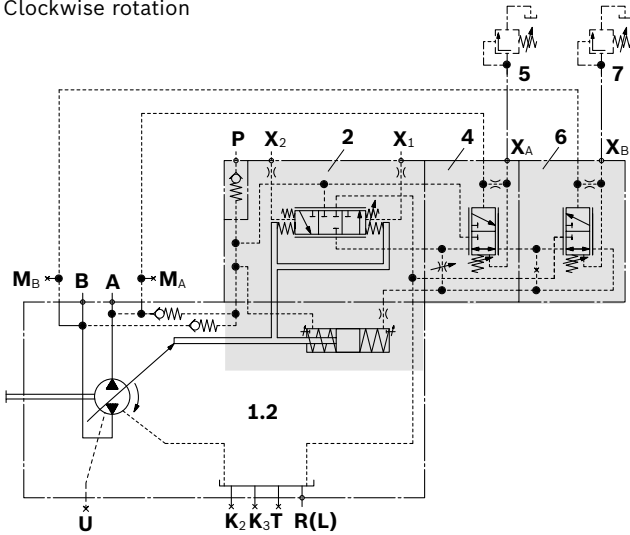
## HD.G with remote pressure control on both sides for ports A and B

The pressure control valves are remote controlled via the ports **X<sub>A</sub>** or **X<sub>B</sub>**. The external pressure relief valves (pos. **5** and **7**) are not included in the scope of delivery. Not available for A4VSO.

Bidirectional direction of rotation not possible.

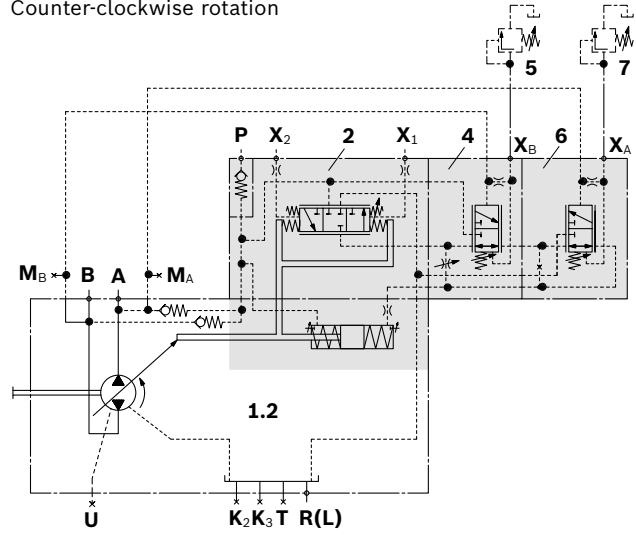
### ▼ A4VSG, sizes 40 and 71

Clockwise rotation



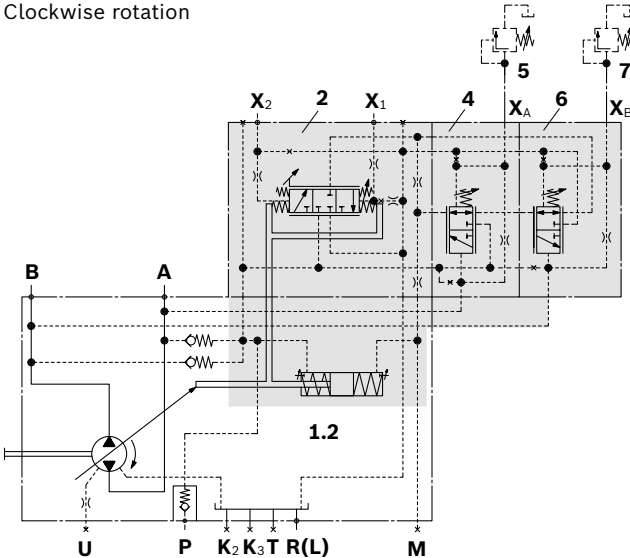
### ▼ A4VSG, sizes 40 and 71

Counter-clockwise rotation



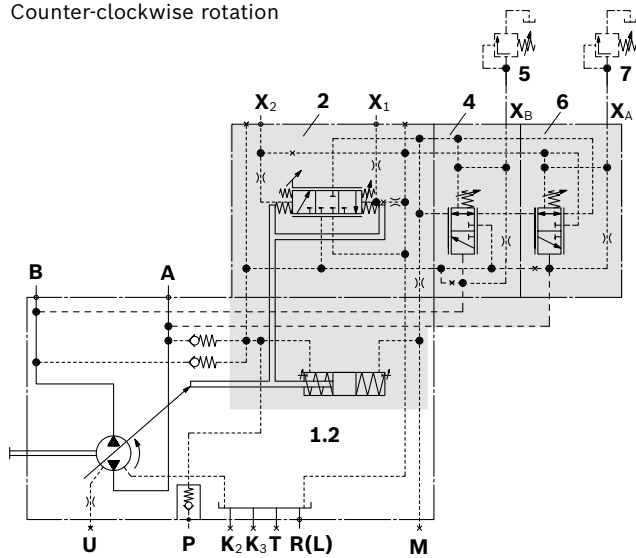
### ▼ A4VSG, sizes 125 to 355

Clockwise rotation



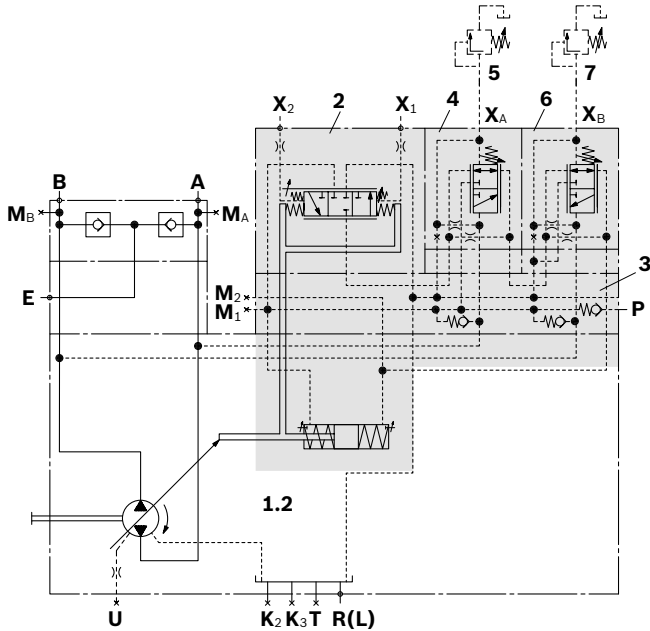
### ▼ A4VSG, sizes 125 to 355

Counter-clockwise rotation



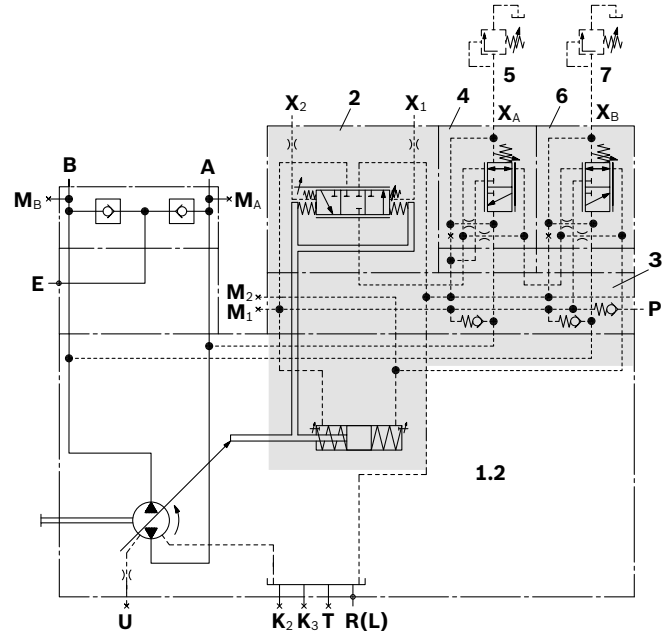
▼ **A4VSG, sizes 500 to 1000**

Clockwise rotation



▼ **A4VSG, sizes 500 to 1000**

Counter-clockwise rotation

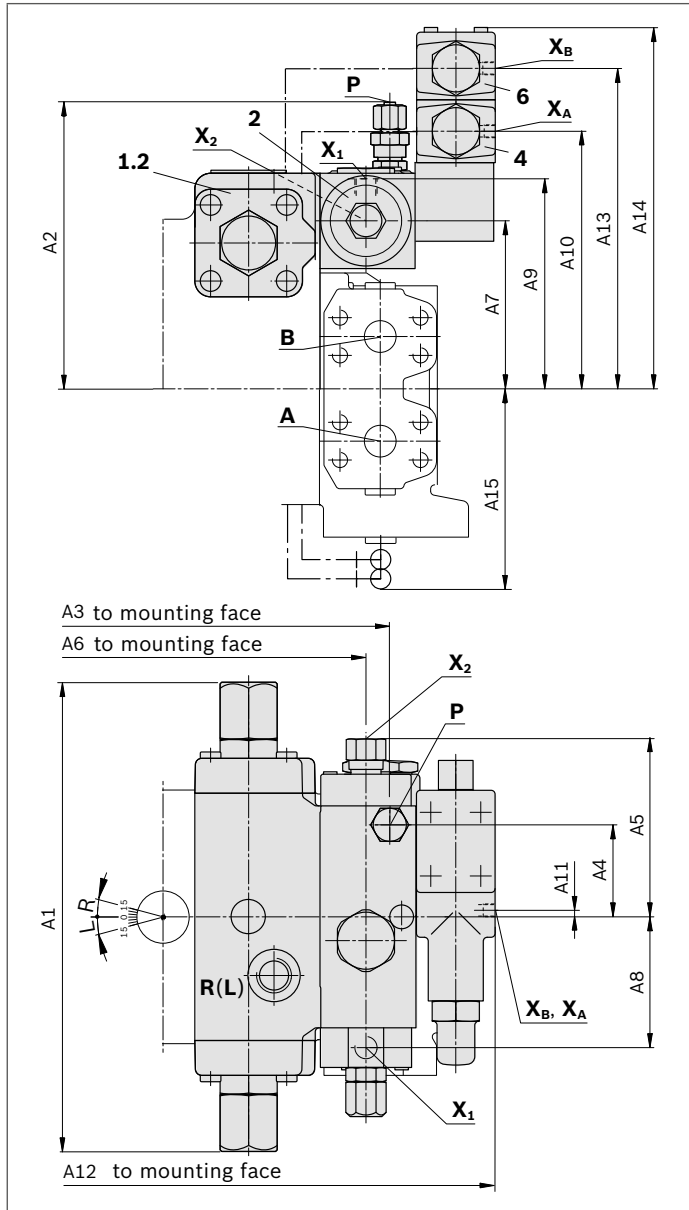


Components	
1	Pump with hydraulic control device
1.2	A4VSG (see data sheet 92100)
2	Control module
3	Intermediate plate
4	Pressure control valve for port <b>A</b>
5; 7	External pressure relief valves (not included in the scope of delivery)
6	Pressure control valve for port <b>B</b>

Ports	
<b>X<sub>A</sub>; X<sub>B</sub></b>	Pilot pressure port, remote control pressure control
<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure port
<b>P</b>	Control pressure port
<b>M</b>	Measuring port stroking chamber pressure (NG 125 to 355)
<b>M<sub>1</sub></b>	Measuring port small stroking chamber (NG 500 to 1000)
<b>M<sub>2</sub></b>	Measuring port large stroking chamber (NG 500 to 1000)

**Dimensions**

▼ **A4VSG, sizes 40 to 71**



Components	
<b>1</b>	Pump with hydraulic control device
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>1.3</b>	A4CSG (see data sheet 92105)
<b>2</b>	Control module
<b>3</b>	Intermediate plate (NG 500 to 1000)
<b>4</b>	Pressure control valve for port <b>A</b> (for port <b>B</b> counter-clockwise rotation NG 40 bis 355)
<b>6</b>	Pressure control valve for port <b>B</b> (for port <b>A</b> counter-clockwise rotation NG 40 bis 355)

NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
40	296	193	233	58	113	218	106	82.5	132.5	163	4	299	203	229	165
71	332	209	20	58	113	246	122	82.5	148.5	179	4	326	219	245	168

For detailed dimensions and technical data of the variable pump, see data sheet 92100

Port		Standard	Size <sup>1)</sup>	$p_{max\ abs}$ [bar] <sup>2)</sup>	State <sup>3)</sup>
<b>X<sub>A</sub>, X<sub>B</sub></b>	Pilot pressure remote control pressure control (plugged for HDD)	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>X<sub>1</sub>, X<sub>2</sub></b>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure	DIN 3853	S8 form W	350	X

1) For the maximum tightening torques the general instructions on page 49 must be observed.

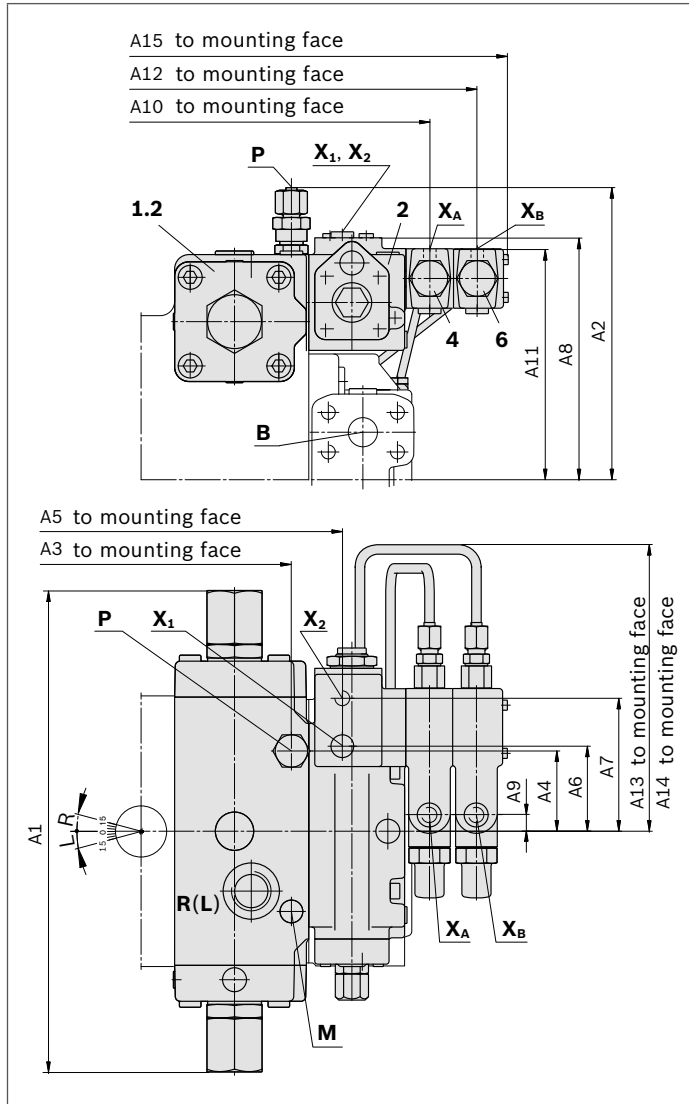
2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.

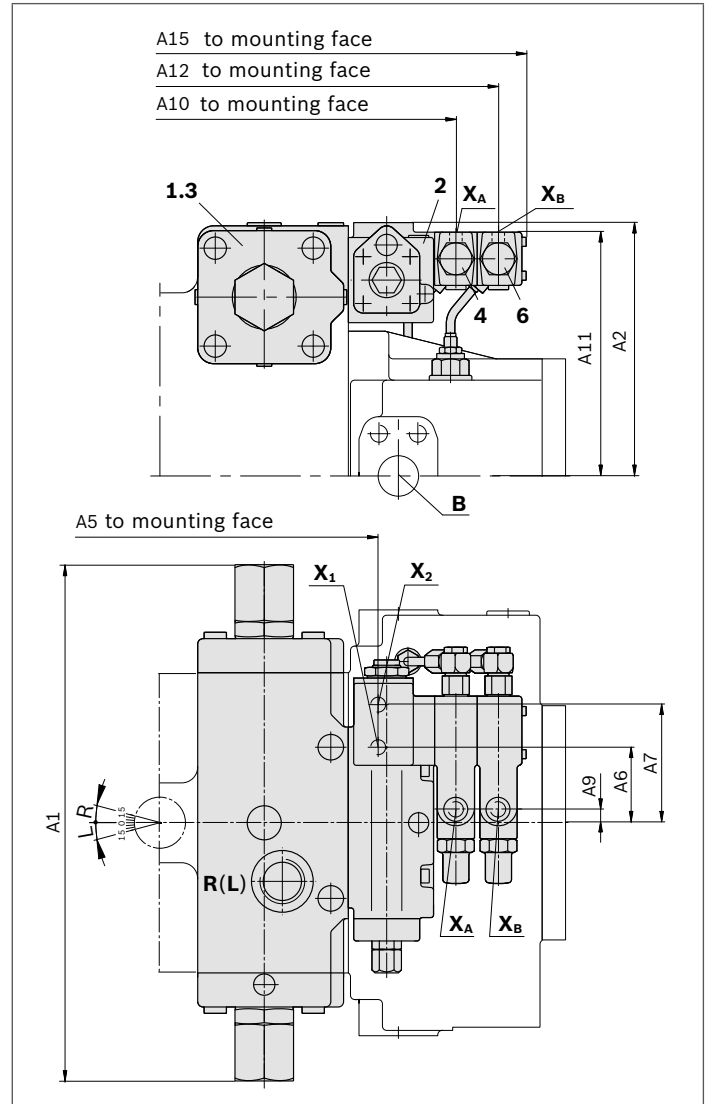
3) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

▼ **A4VSG, sizes 125 to 355**



▼ **A4CSG, sizes 125 to 355**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
125	402	245	251	67	293	71	111	202	13	366	192	406	239	224	432
180	402	245	251	67	293	71	111	202	13	366	192	406	239	224	432
250	485	297.5	311	71	355	71	111	238	13	428	228	468	239	224	494
355	485	297.5	311	71	355	71	111	238	13	428	228	468	239	224	494

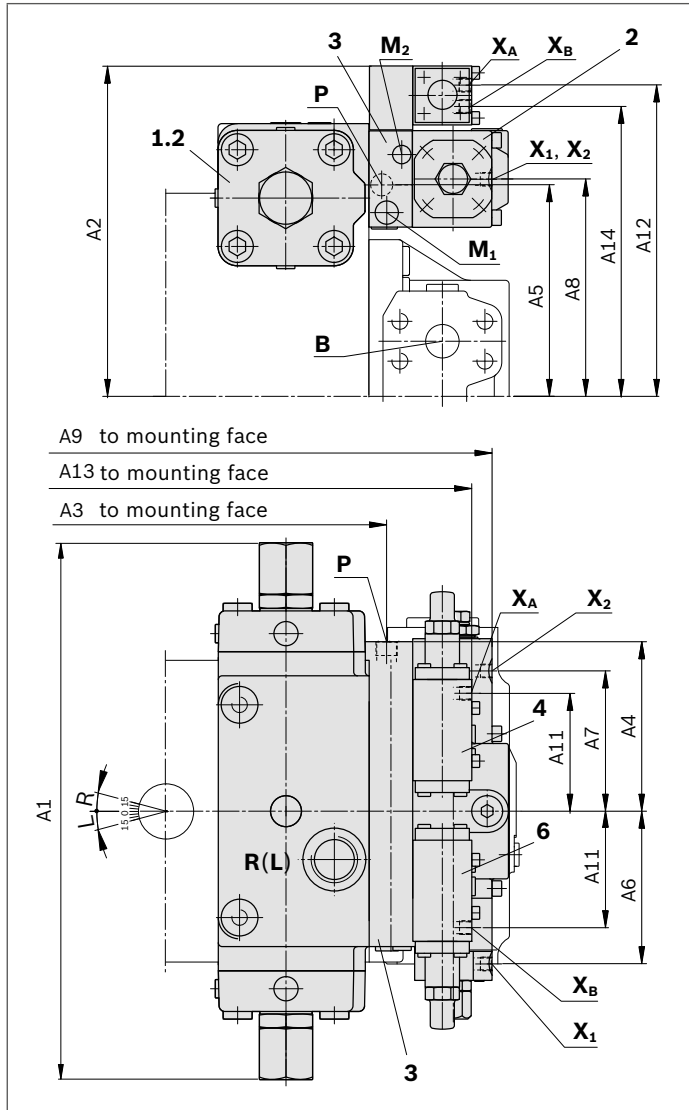
For detailed dimensions and technical data of the variable pump, see data sheet 92100 and/or 92105

Port	Standard	Size <sup>1)</sup>	$p_{max abs}$ [bar] <sup>2)</sup>	State <sup>3)</sup>	
<b>X<sub>A</sub>, X<sub>B</sub></b>	Pilot pressure, remote control pressure control (plugged for HDD)	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>X<sub>1</sub>, X<sub>2</sub></b>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure	DIN 3853	S8 Form W (NG 125 and 180)	350	X
	(only with A4VSG)	DIN 3853	S12 Form W (NG 250 and 355)	350	X
<b>M</b>	Stroke chamber measurement	DIN 3852	M14 × 1.5; 12 deep (NG 125 and 180)	350	X
		DIN 3852	M18 × 1.5; 12 deep (NG 250 and 355)	350	X

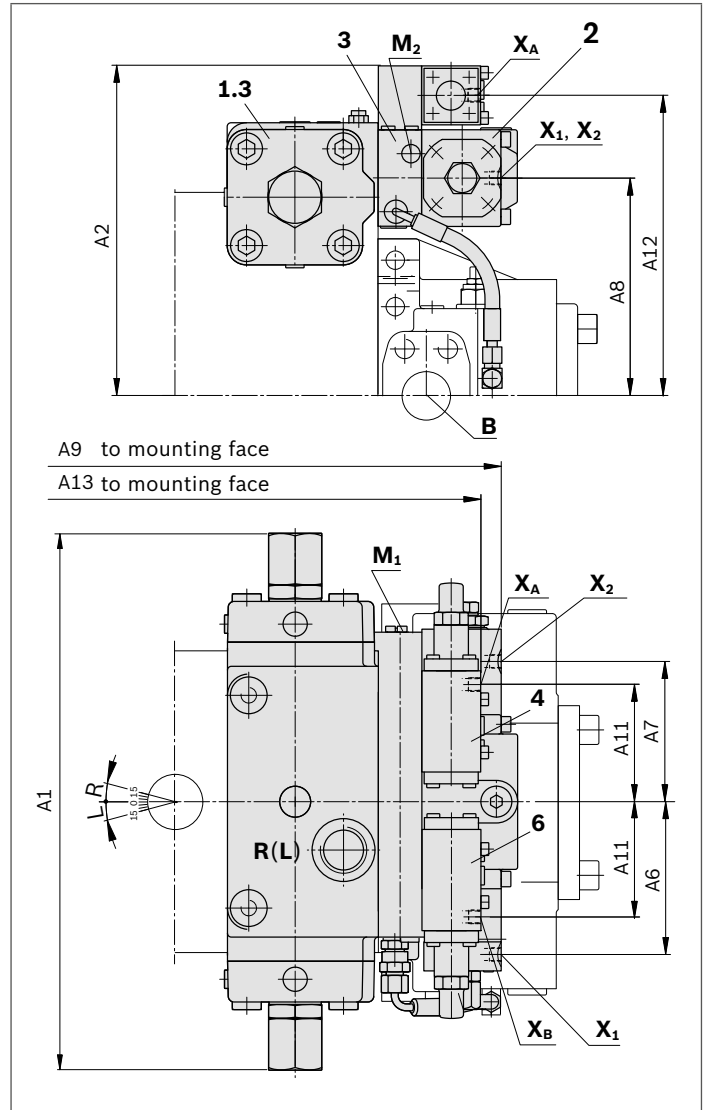
1) For the maximum tightening torques the general instructions on page 49 must be observed.  
 2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.  
 3) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

▼ **A4VSG, sizes 500 to 1000**



▼ **A4CSG, sizes 500 to 1000**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A11	A12	A13	A14	
500	555	342	383	175	200	158	145	225	492	136	315	469	304	For detailed dimensions and technical data of the variable pump, see data sheet 92100 or 92105
750	630	371	415	175	230	158	145	280	524	136	345	501	334	
1000	670	394	481	175	253	158	145	278	590	136	368	567	357	

Port	Standard	Size <sup>1)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>2)</sup>	State <sup>3)</sup>
X <sub>A</sub> , X <sub>B</sub>	Pilot pressure, remote control pressure control (plugged for HDD)	DIN 3852 M14 × 1.5; 12 deep	45	O
X <sub>1</sub> , X <sub>2</sub>	Pilot pressure	DIN 3852 M14 × 1.5; 12 deep	45	O
P	Control pressure	DIN 3852 M22 × 1.5; 14 deep (A4VSG)	350	X
M <sub>1</sub>	Small stroking chamber measurement	DIN 3852 M18 × 1.5; 12 deep (A4VSG)	350	X
		DIN 3852 M22 × 1.5; 14 deep (A4CSG)	350	X
M <sub>2</sub>	Stroking chamber measurement	DIN 3852 M14 × 1.5; 12 deep	350	X

1) For the maximum tightening torques the general instructions on page 49 must be observed.

2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.

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

X = Plugged (in normal operation)



## HD1P with power control

With increasing working pressure, the pilot pressure (i.e. the setpoint value of the HD) is reduced by the power limiting valve LV 06. The displacement of the pump is thereby changed so that a certain specified drive torque is not exceeded.

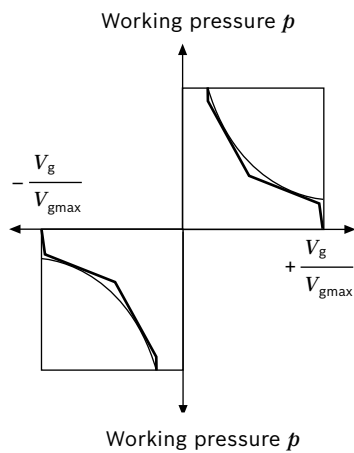
For **combination pumps** in tandem design **A4 + A4**, some combinations may result in some restrictions when mounting the power limiting valve.

In the following cases, we recommend that the power limiting valve be mounted on the rear pump or that you contact us:

NG 40 + NG 40

NG 71 with pressure control + NG 71

### ▼ Characteristic curve



### Technical data

Minimum beginning of control must be higher than the set control pressure at **P** or on the control pressure relief valve of the A4CSG.

The power characteristic is set at the factory.

Please state in plain text when ordering

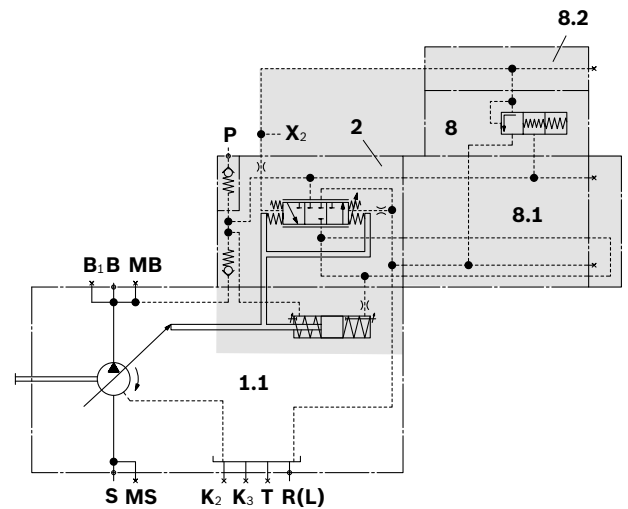
e.g. 55 kW at 1500 rpm.

For power characteristic examples, see data sheet 95546.

The power is approximated to the theoretical hyperbola by two springs plus stop.

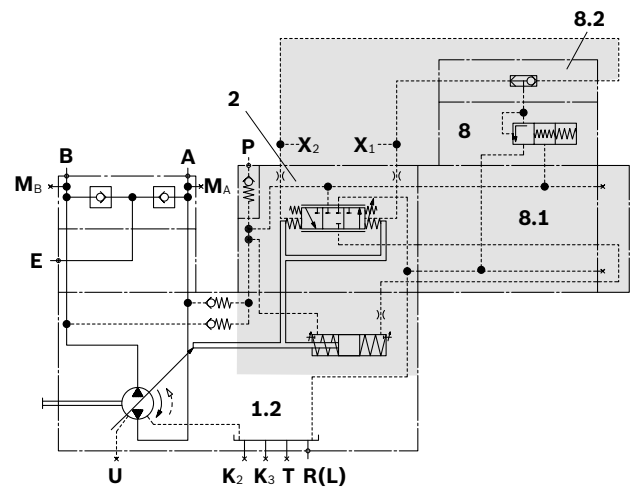
### ▼ A4VSO, sizes 40 and 71

Clockwise rotation<sup>1)</sup>



### ▼ A4VSG, sizes 40 and 71

Clockwise or counter-clockwise rotation

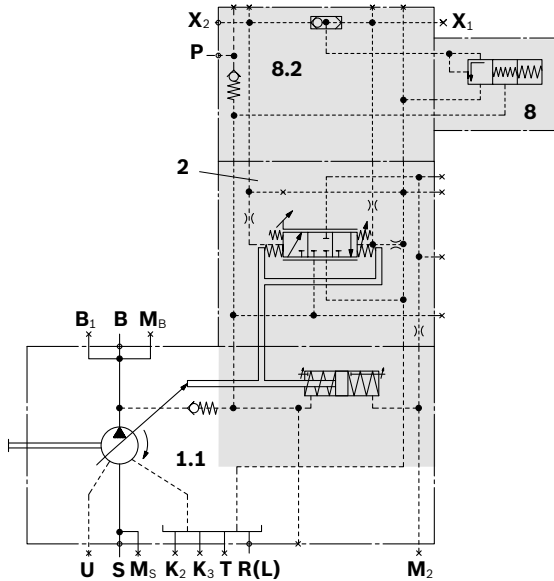


<sup>1)</sup> For A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available and is connected to the power limiting valve.

**Circuit diagrams**

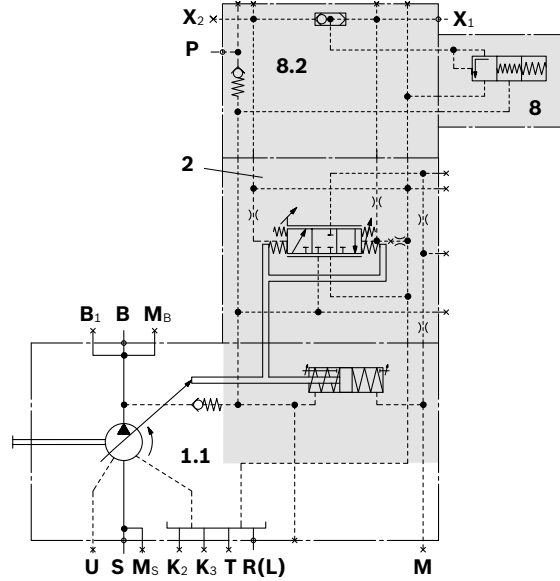
▼ **A4VSO, sizes 125 to 355<sup>1)</sup>**

Clockwise rotation



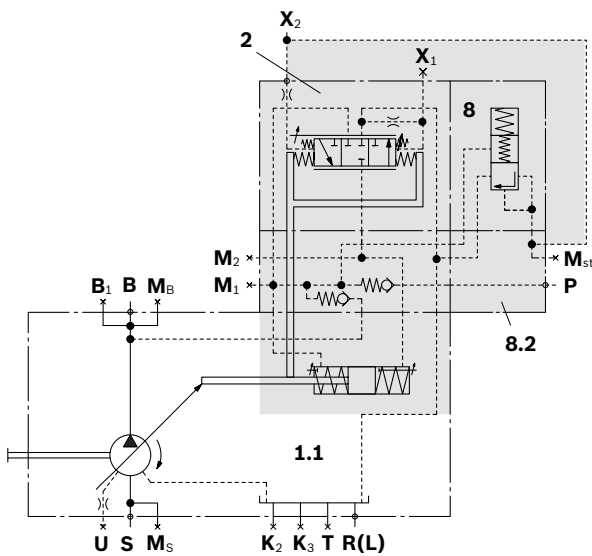
▼ **A4VSO, sizes 125 to 355<sup>1)</sup>**

Counter-clockwise rotation



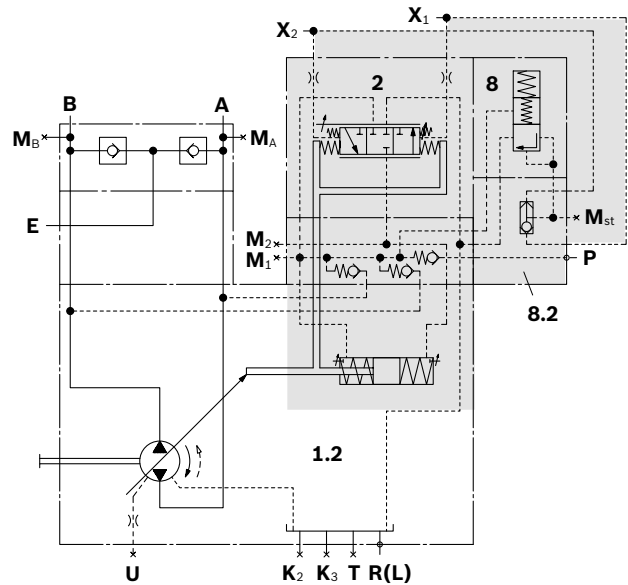
▼ **A4VSO, sizes 500 to 1000<sup>1)</sup>**

Clockwise rotation



▼ **A4VSG, sizes 500 to 1000<sup>2)</sup>**

Clockwise or counter-clockwise rotation



Components	
1.1	A4VSO
1.2	A4VSG
2	Control module
8	Power limiting valve LV 06 405 (for NG 40 and 71)
8.1	Intermediate plate for mounting power limiting valve (for NG 40 and 71)
8.2	Control valve with shuttle valve (for A4VSG)

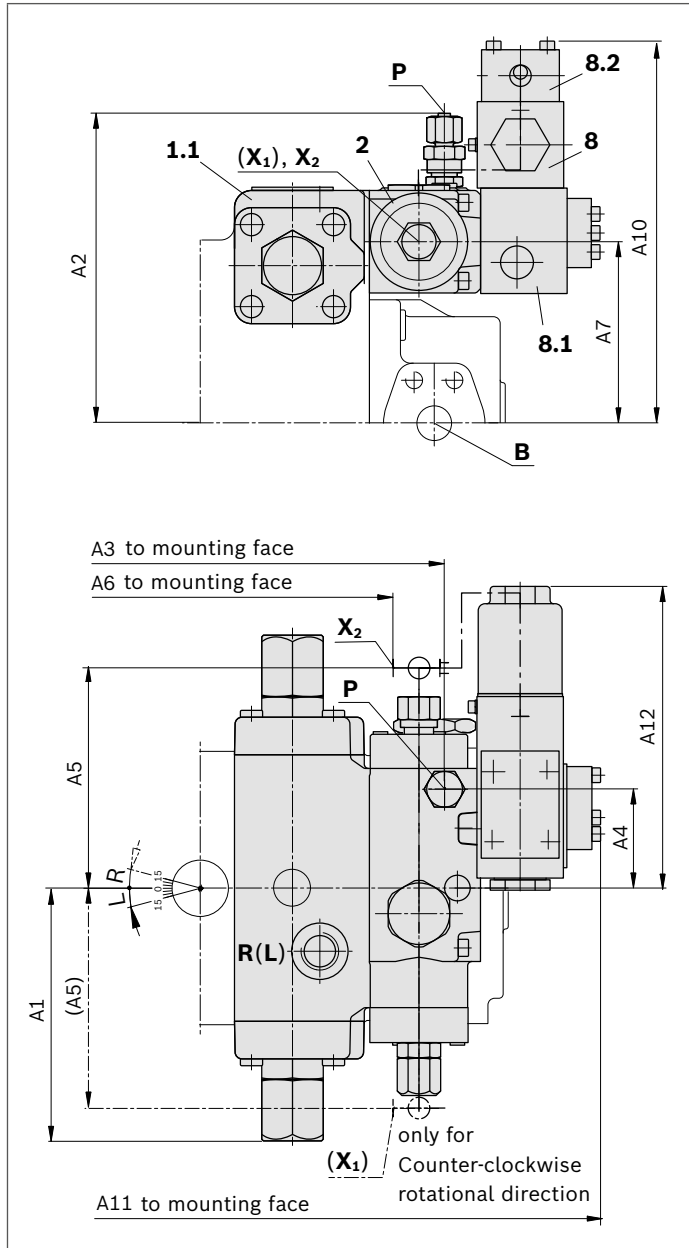
1) For **A4VSO clockwise rotation** only **X<sub>2</sub>**, **counter-clockwise rotation** only **X<sub>1</sub>**, is connected to the power limiting valve and **open**.

Ports	
<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure port
<b>P</b>	Control pressure port
<b>M</b>	Measuring port stroking chamber pressure (NG 125 to 355)
<b>M<sub>1</sub></b>	Measuring port small stroking chamber (NG 500 to 1000)
<b>M<sub>2</sub></b>	Measuring port large stroking chamber (NG 500 to 1000)
<b>M<sub>st</sub></b>	Measuring port pilot pressure (NG 500 to 1000)

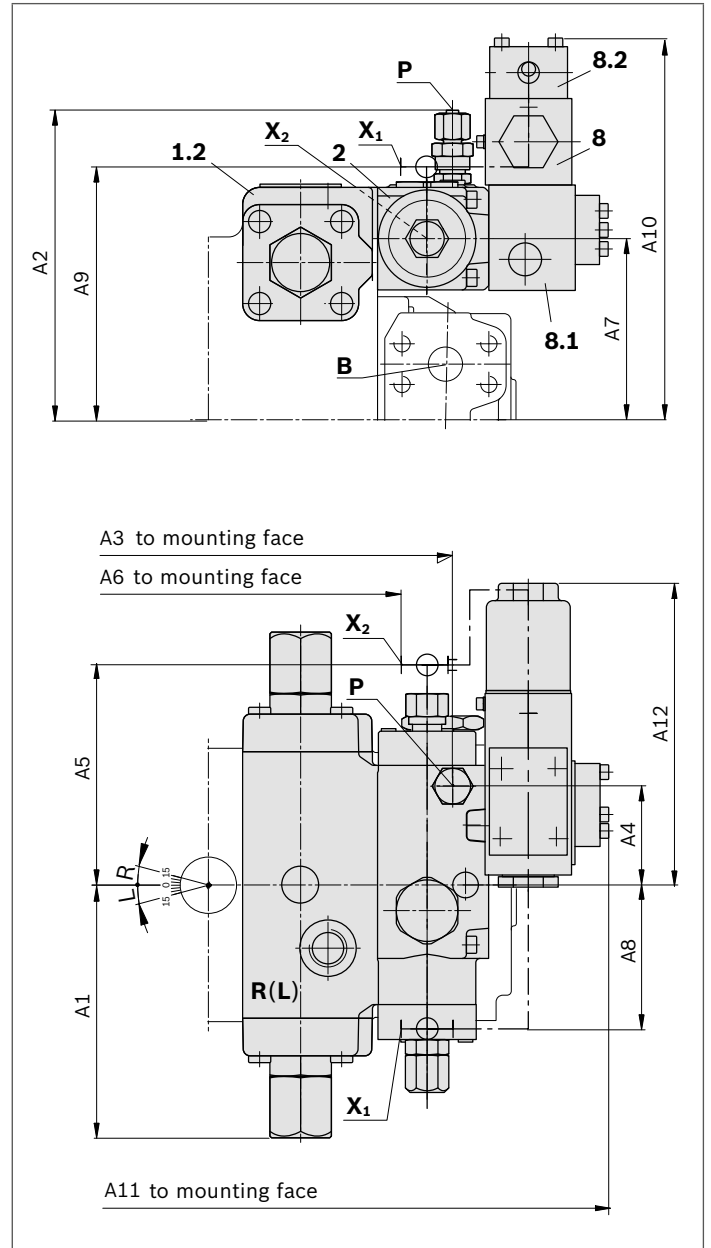
2) For **A4VSG** and **A4CSG**, **both the ports X<sub>1</sub> and X<sub>2</sub>** are connected to the shuttle valve (either internally or via the T fitting) and **open**.

**Dimensions**

▼ **A4VSO, sizes 40 and 71**



▼ **A4VSG, sizes 40 and 71**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
40	148	222	233	58	128	203	106	82.5	147.5	222	323	175
71	166	240	260	58	128	203	122	82.5	147.5	238	350	175

For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

Port	Standard	Size <sup>2)</sup>	$p_{max abs}$ [bar] <sup>3)</sup>	State <sup>4)</sup>	
X <sub>1</sub> ; X <sub>2</sub> <sup>1)</sup>	Pilot pressure	DIN 3853	S8 form W	45	O
P	Control pressure	DIN 3853	S8 form W	350	X

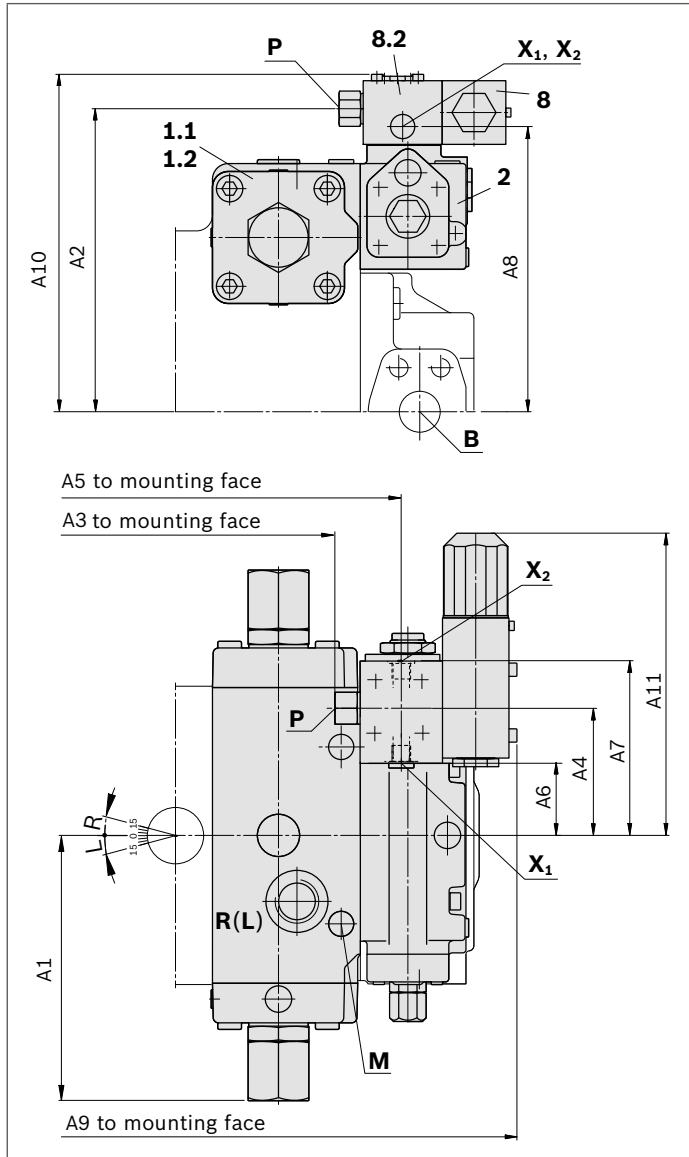
1) For A4VSO clockwise rotation only X<sub>2</sub> is available; for A4VSO counter-clockwise rotation only X<sub>1</sub> is available  
 2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
 4) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

**Dimensions**

▼ **A4VSO, A4VSG, sizes 125 and 355**

▼ **A4CSG, in preparation, dimensions on request**



Components	
<b>1</b>	Pump with hydraulic control device
<b>1.1</b>	A4VSO (see data sheet 92050)
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>2</b>	Control module
<b>8</b>	Power limiting valve (see data sheet 95546) LV 06 405 ( NG 40 and 71) LV 06 205 ( NG 125 to 1000)
<b>8.1</b>	Intermediate plate for mounting the power limiting valve (NG 40 and 71)
<b>8.2</b>	Control valve with shuttle valve (A4VSG and A4CSG)

NG	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11
125	201	230	247	95.5	297	55.5	129.5	216	384	257	227
180	201	230	247	95.5	297	55.5	129.5	216	384	257	227
250	243	266	309	95.5	359	55.5	129.5	252	446	293	227
355	243	266	309	95.5	359	55.5	129.5	252	446	293	227

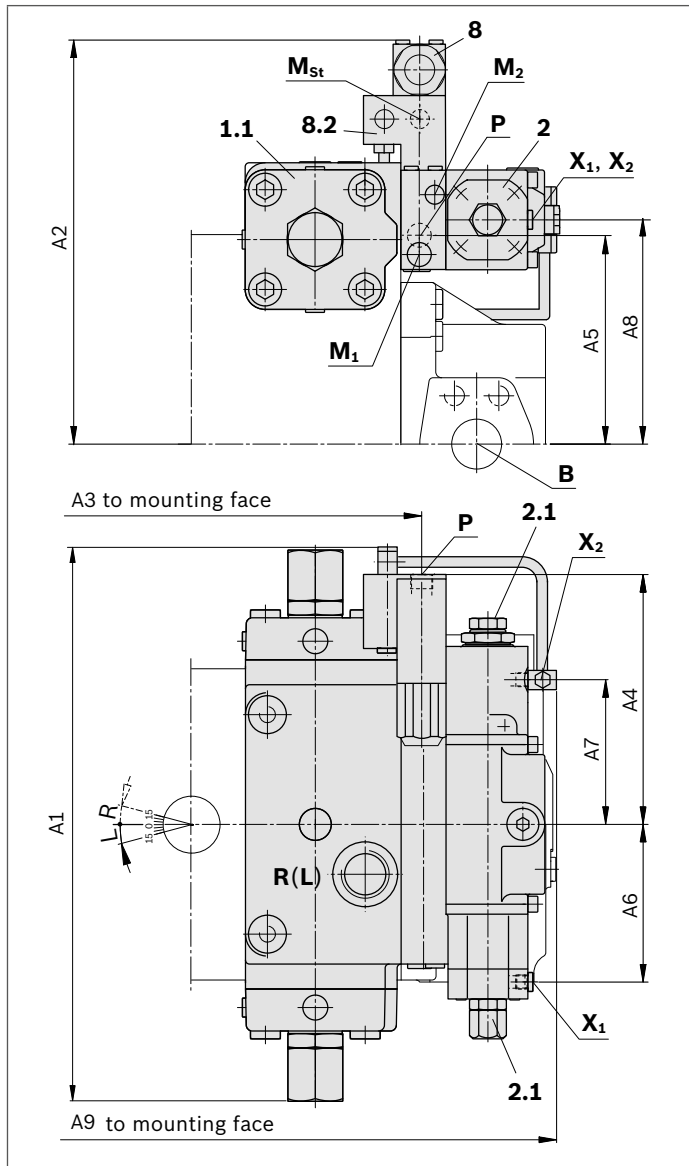
For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

Port	Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>	
<b>X<sub>1</sub>, X<sub>2</sub></b> <sup>1)</sup>	Pilot pressure	DIN 3852	M14 × 1.5; 12 deep	45	O
<b>P</b>	Control pressure	DIN 3852	M18 × 1.5; 12 deep	350	X
<b>M</b>	Stroking chamber measurement	DIN 3852	M14 × 1.5; 12 deep (NG 125 and 180)	350	X
		DIN 3852	M18 × 1.5; 12 deep (NG 250 and 355)	350	X

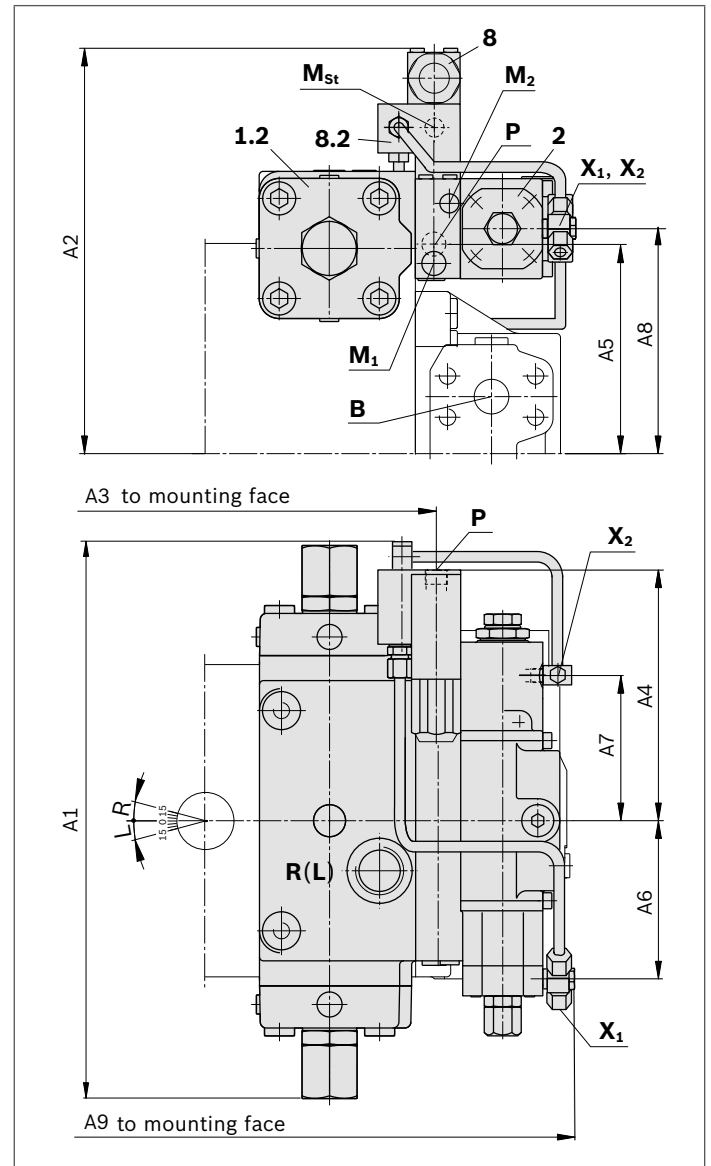
1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available  
2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
4) O = Must be connected (plugged on delivery)  
X = Plugged (in normal operation)

▼ **A4VSO, sizes 500 to 1000**



▼ **A4CSG, sizes 500 to 1000 (A4CSG on request)**



NG	A1	A2	A3	A4	A5	A6	A7	A8	A9
500	555	406	383	251	206	158	145	225	521
750	630	430	415	251	236	158	145	280	553
1000	670	459	481	251	259	140	140	278	619

For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

Port	Standard	Size <sup>2)</sup>	$p_{max abs}$ [bar] <sup>3)</sup>	State <sup>4)</sup>	
<b>X<sub>1</sub>, X<sub>2</sub></b> <sup>1)</sup>	Pilot pressure	DIN 3853	S8 form W	45	O
<b>P</b>	Control pressure	DIN 3852	M22 × 1.5; 14 deep	350	X
<b>M<sub>St</sub></b>	Pilot pressure measuring	DIN 3852	M14 × 1.5; 12 deep	350	X
<b>M<sub>1</sub></b>	Small stroking chamber measurement	DIN 3852	M18 × 1.5; 12 deep	350	X
<b>M<sub>2</sub></b>	Stroking chamber measurement	DIN 3852	M14 × 1.5; 12 deep	350	X

1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available (M14 × 1.5)  
 2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
 4) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

## HD1T – with electrical control of pilot pressure

The corresponding control chamber **X<sub>1</sub>** or **X<sub>2</sub>** is supplied with pilot pressure proportional to the current applied to the solenoids **a** or **b** on the proportional valve DBEP6 (data sheet 29164).

The solenoid current limits the hydraulic pilot pressure. In a closed circuit, each swivel direction is assigned a proportional solenoid. In an open circuit, only 1 solenoid is accordingly available.

Control by means of an electric setpoint value.

Current control by means of pulse width modulation.

Analog or digital amplifiers can be used to control the solenoids, e.g. proportional amplifier VT 3000 with 170 Hz (see data sheet 29935). Please order separately.

For more information on the selection of the control electronics and hydraulic fluid, description of the function, emergency manual actuation, and other technical data, please consult data sheet 29164.

### Technical data – electric

Operating voltage	24 V
Nominal current per solenoid	700 mA
Control current	
Beginning of control at $V_{g0}$ and 10 bar pilot pressure	300 mA
Beginning of control at $V_{gmax}$ and 45 bar pilot pressure	700 mA
Nominal resistance at 20 °C ( $R_{20}$ )	19.5 $\Omega$
Maximum duty cycle	100 % (S1)
Device connector	DIN EN 175 301-803/ISO 4400 with line screw fitting M16 $\times$ 1.5 for cable $\varnothing$ 4.5...10 mm
Type of protection according to DIN/EN 60529	IP 65
emergency manual actuation	available, see data sheet 29164
Operating temperature coils	up to 150 °C

#### Attention! Risk of burning:

During and shortly after operation, the pump and the solenoids in particular are hot!  
 Always wear suitable protective clothing.

#### Calculation formula for resistor

at  $T > 20$  °C

$$R_W = \frac{R_{20} \times (235+T)}{255}$$

### Technical data – hydraulic

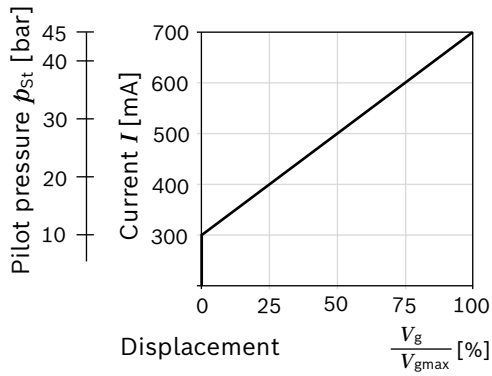
Control pressure (in <b>P</b> )	$p_{min}$	bar	50
	$p_{max}$	bar	100
Hysteresis	$\leq \pm 4$ % of $V_{gmax}$		
Repeat accuracy	$\leq 2$ % of $V_{gmax}$		

Due to the restrictions in data sheet 29164, the control pressure in **P** is limited to 50...100 bar for HD1T and HD1U. Losses in the proportional valve (e.g. 4 l/min per de-energized solenoid at  $p = 50$  bar) should be taken into account when dimensioning the inlet flow in **P**.

**A4VSO - open circuit**

DBEP 6, version B or A

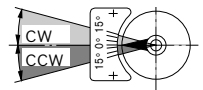
▼ **Characteristic curve**



▼ **Flow direction**

Direction of rotation	Swiveling range <sup>1)</sup>	Flow direction	High-pressure port
clockwise	counter-clockwise	<b>S to B</b>	<b>B</b>
counter-clockwise	clockwise	<b>S to B</b>	<b>B</b>

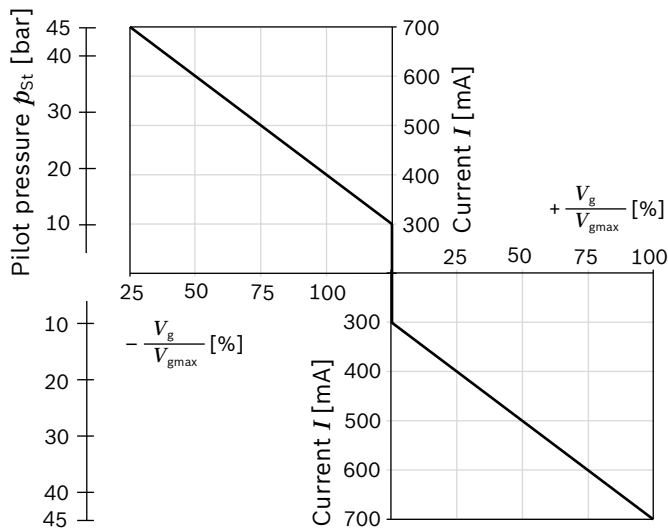
1) cf. swivel angle indicator



**A4VSG - closed circuit**

DBEP 6, version C

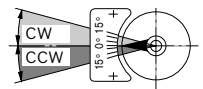
▼ **Characteristic curve**



▼ **Flow direction**

Direction of rotation	Solenoid actuation	Swiveling range <sup>2)</sup>	Flow direction	High-pressure port
clockwise	b	clockwise	<b>B to A</b>	<b>A</b>
	a	counter-clockwise	<b>A to B</b>	<b>B</b>
counter-clockwise	b	clockwise	<b>A to B</b>	<b>B</b>
	a	counter-clockwise	<b>B to A</b>	<b>A</b>

2) cf. swivel angle indicator

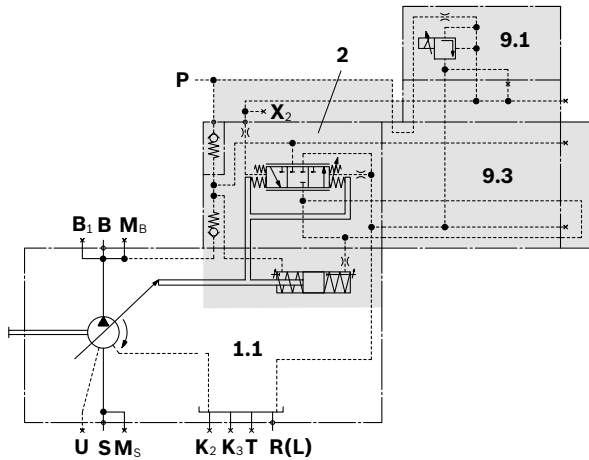


**A4CSG with HD1T**

Is in preparation and available on request.

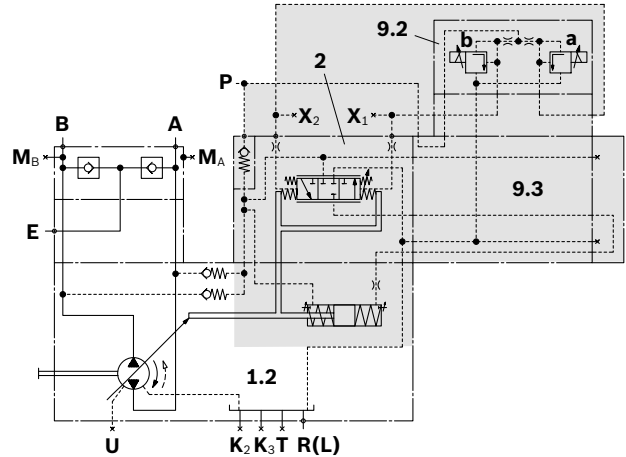
▼ **A4VSO, sizes 40 and 71<sup>1)</sup>**

Clockwise rotation



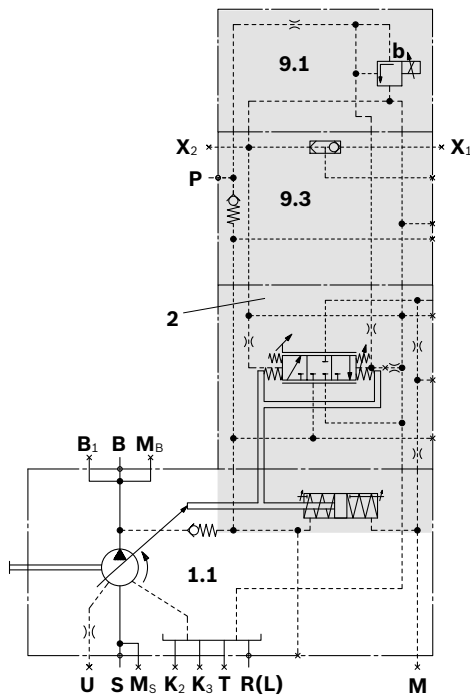
▼ **A4VSG, sizes 40 and 71**

Clockwise rotation



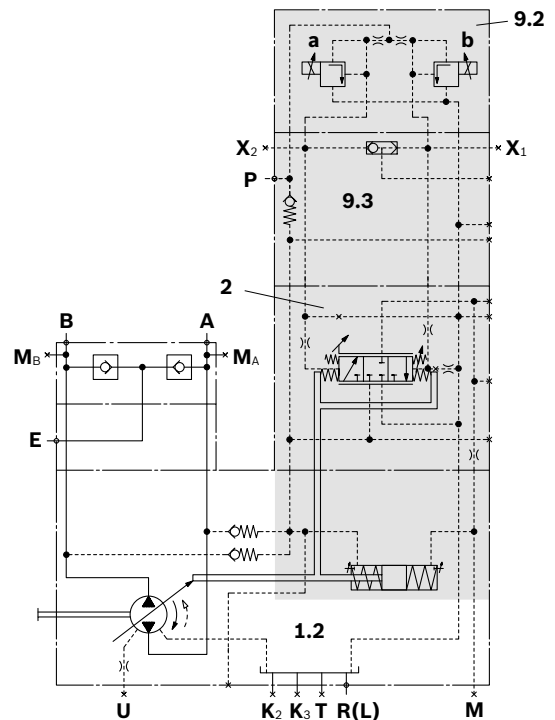
▼ **A4VSO, sizes 125 to 355<sup>1)</sup>**

Counter-clockwise rotation



▼ **A4VSG, sizes 125 to 355**

Clockwise rotation



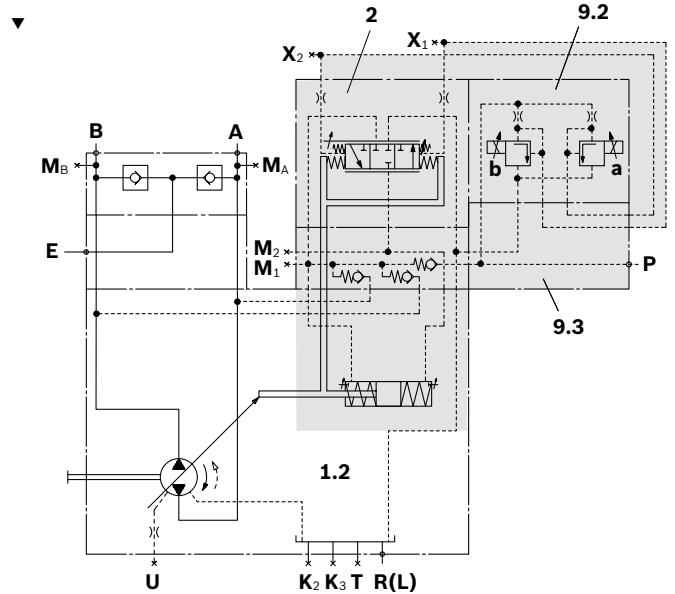
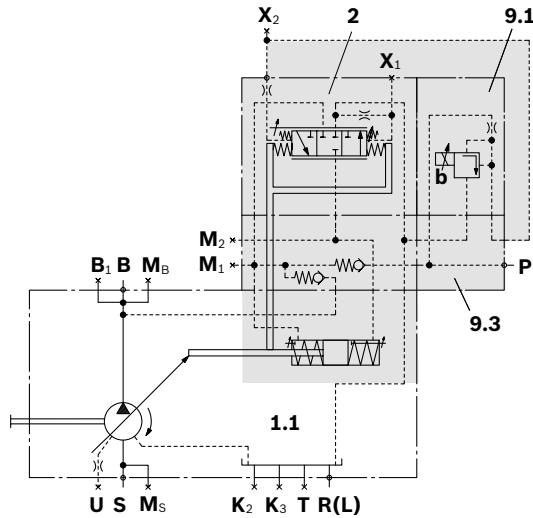
1) For counter-clockwise rotation only  $X_1$ , with the proportional valve piped up and  $X^2$  not available.

Ports	
$X_1; X_2$	Pilot pressure port
P	Control pressure port
M	Measuring port stroking chamber pressure (NG 125 to 355)
M <sub>1</sub>	Measuring port small stroking chamber (NG 500 to 1000)
M <sub>2</sub>	Measuring port large stroking chamber (NG 500 to 1000)



▼ **A4VSO, sizes 500 to 1000<sup>1)</sup>**

Clockwise rotation



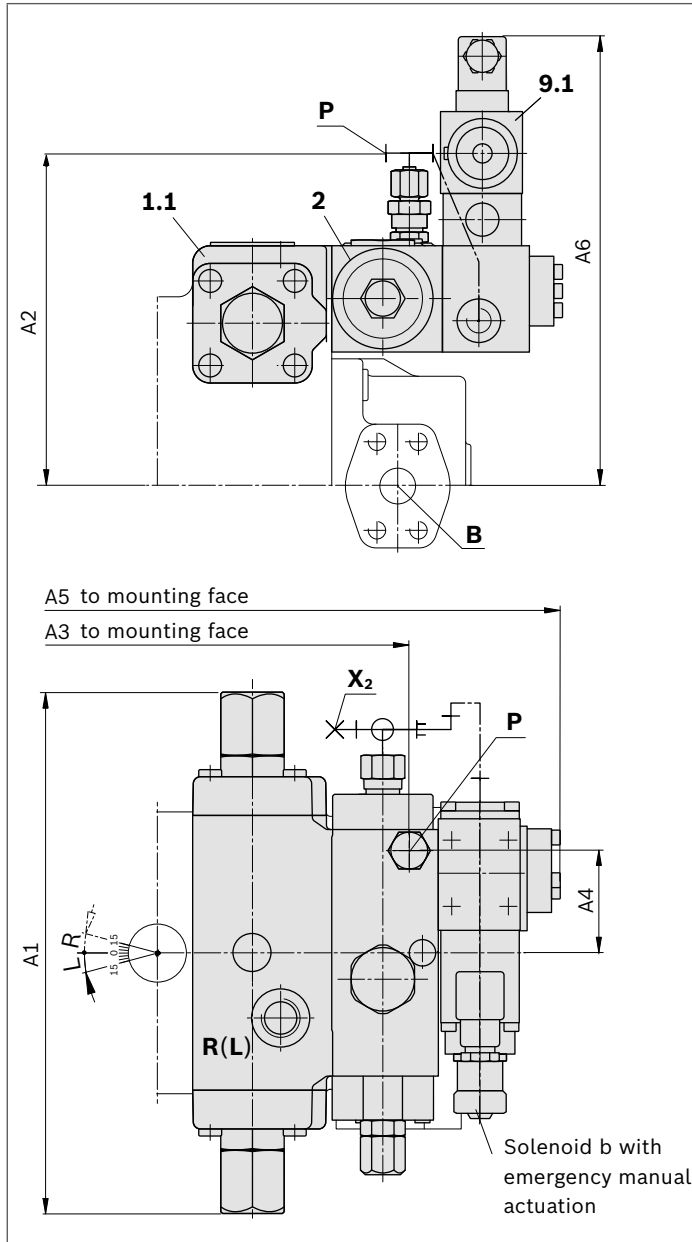
**Components**

<b>1</b>	Pump with hydraulic control device	
<b>1.1</b>	A4VSO	
<b>1.2</b>	A4VSG	
<b>2</b>	Control module	
<b>9.1</b>	Proportional pressure relief valve (open circuit) DBEP6 B06-1X/45AG24NZ4M-382 with inlet nozzle $\varnothing$ 1.0 mm DBEP6 A06-1X/45AG24NZ4M-382 for NG 125...355 clockwise rotation	Solenoids with plug-in connectors according to DIN EN 175 301-803 / ISO 4400 type of protection IP 65 and cable fitting M16 $\times$ 1.5 for line diameter 4.5...10mm
<b>9.2</b>	Proportional pressure relief valve (closed circuit) DBEP6 C06-1X/45AG24NZ4M-382 with inlet nozzle $\varnothing$ 1.0 mm	
<b>9.3</b>	Intermediate plate for mounting proportional valve	

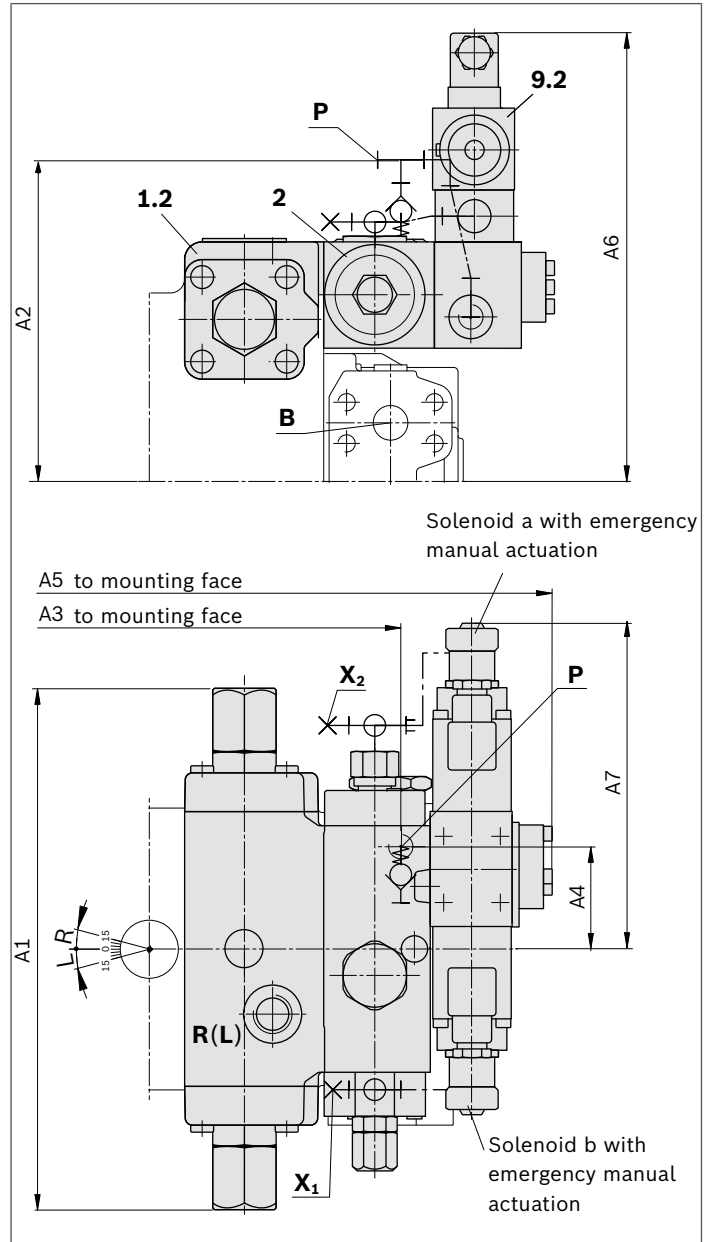
1) For A4VSO clockwise rotation only **X<sub>2</sub>**, counter-clockwise rotation only **X<sub>1</sub>**, with the proportional valve piped up and **X<sub>2</sub>** not available.

**Dimensions**

▼ **A4VSO, sizes 40 and 71**



▼ **A4VSG, sizes 40 and 71**



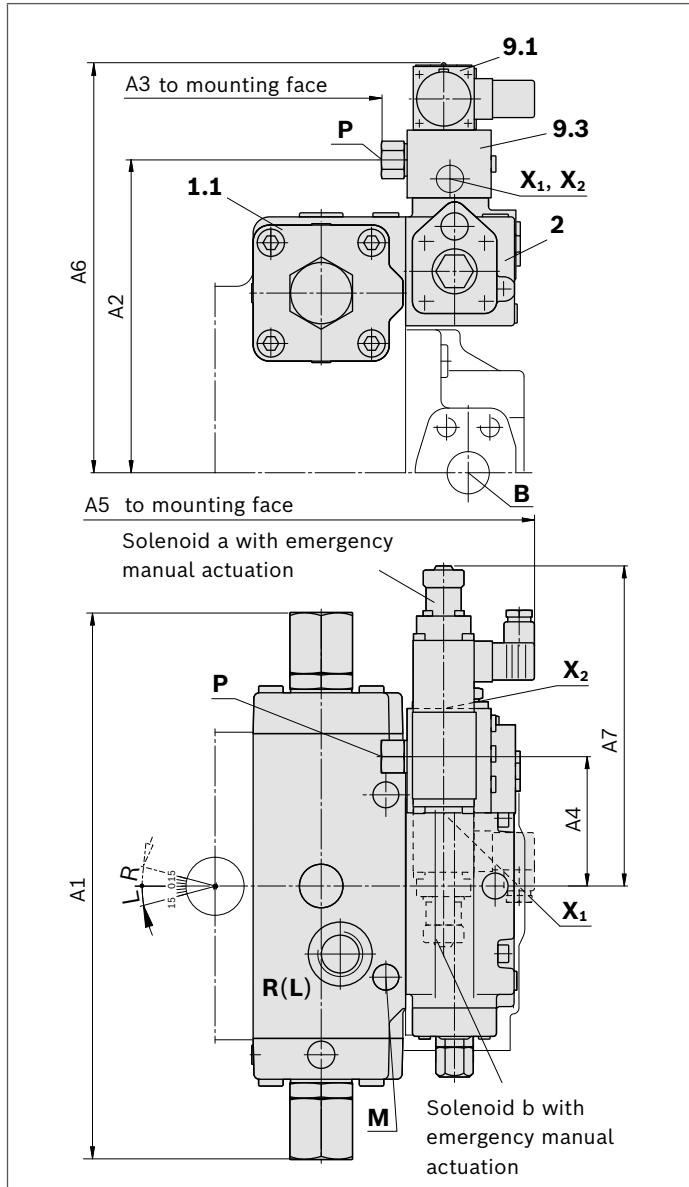
NG	A1	A2	A3	A4	A5	A6	A7	
40	296	193	233	58	323	257	189	For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100
71	332	209	260	58	350	273	189	

Port	Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>	
<b>P</b>	Control pressure	DIN 3853	S8 form W	350	O
<b>X<sub>1</sub>, X<sub>2</sub><sup>1)</sup></b>	Pilot pressure measuring	DIN 3853	S8 form W	45	X

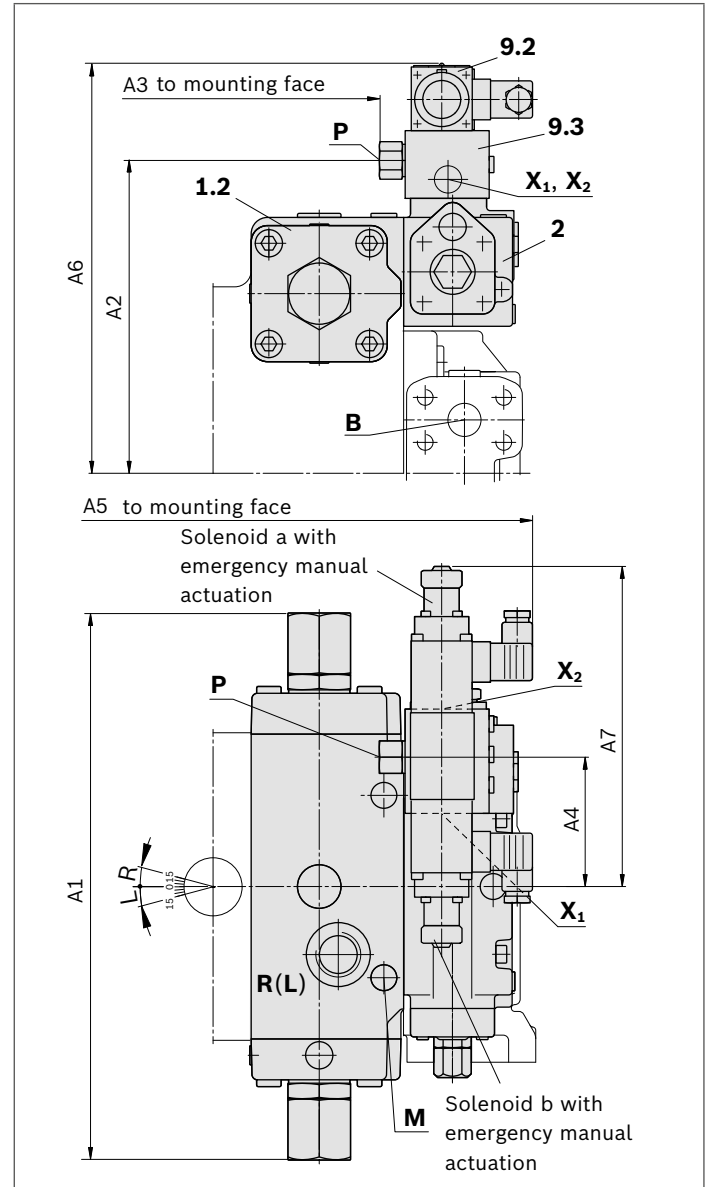
1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available (dimensions on request)  
2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
4) O = Must be connected (plugged on delivery)  
X = Plugged (in normal operation)

▼ **A4VSO, sizes 125 to 355**



▼ **A4VSG, sizes 125 to 355 (A4CSG in preparation)**



NG	A1	A2	A3	A4	A5	A6	A7
125	402	230	247	96	360	302	236
180	402	230	247	96	360	302	2362
250	485	266	309	96	422	338	236
355	485	266	309	96	422	338	236

For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

Port	Standard	Size <sup>1)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>2)</sup>	State <sup>3)</sup>
<b>P</b>	DIN 3852	M18 × 1.5; 12 deep	350	O
<b>X<sub>1</sub>, X<sub>2</sub></b>	DIN 3852	M14 × 1.5; 12 deep	45	X
<b>M</b>	DIN 3852	M14 × 1.5; 12 deep (NG 125 and 180)	350	X
	DIN 3852	M18 × 1.5; 12 deep (NG 250 and 355)	350	X

1) For the maximum tightening torques the general instructions on page 49 must be observed.

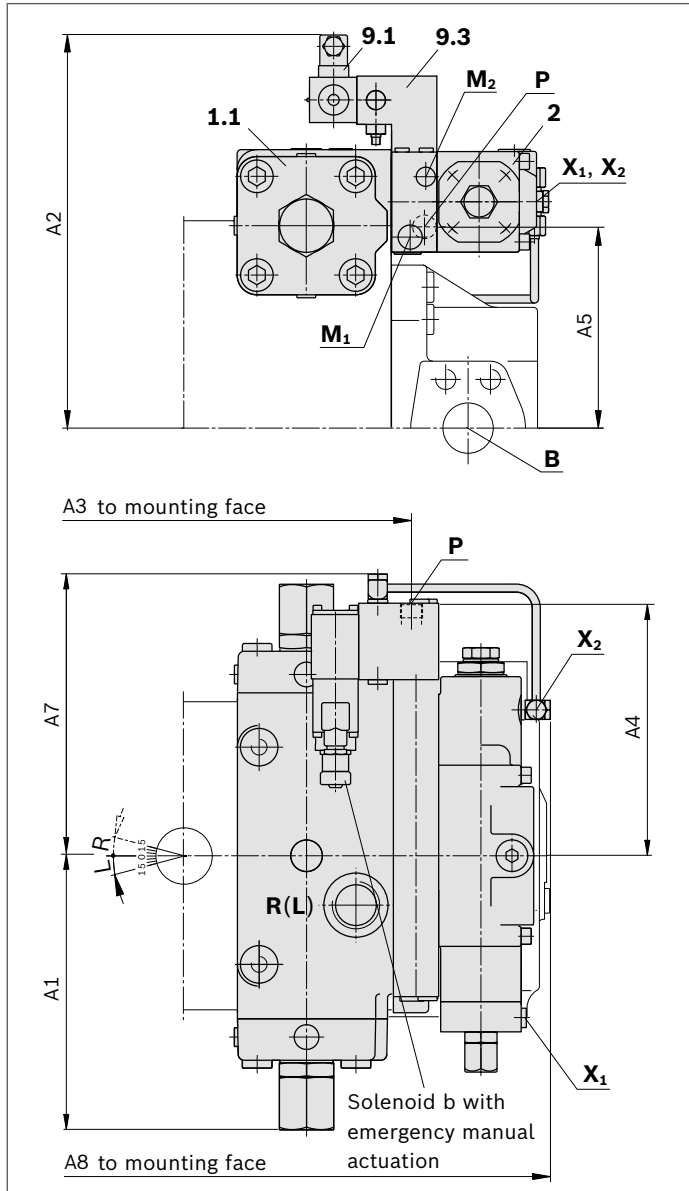
2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.

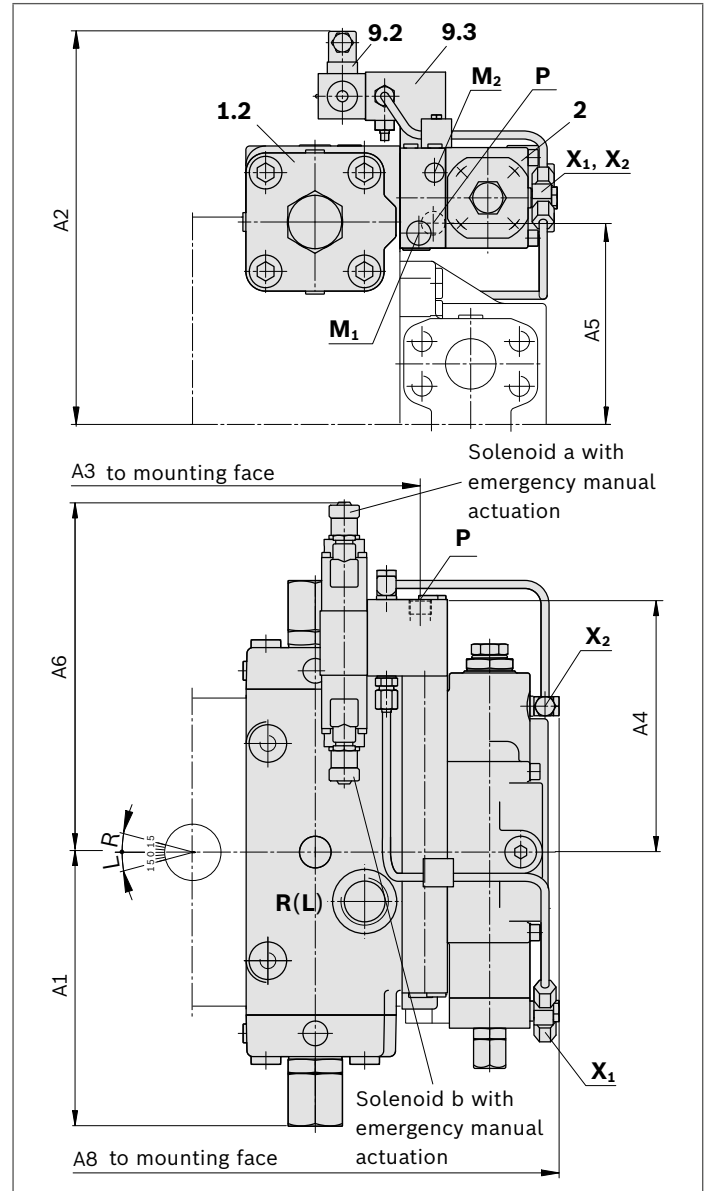
3) O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

▼ **A4VSO, sizes 500 to 1000**



▼ **A4VSG, sizes 500 to 1000 (A4CSG in preparation)**



NG	A1	A2	A3	A4	A5	A6	A7	A8
500	278	391	383	251	206	348	278	521
750	315	423	415	251	236	348	278	553
1000	335	444	481	251	259	348	278	619

For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

Port	Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>	
<b>P</b>	Control pressure	DIN 3852	M22 × 1.5; 14 deep	350	O
<b>M<sub>1</sub></b>	Small stroking chamber measurement	DIN 3852	M18 × 1.5; 12 deep	350	X
<b>M<sub>2</sub></b>	Stroking chamber measurement	DIN 3852	M14 × 1.5; 12 deep	350	X
<b>X<sub>1</sub>, X<sub>2</sub></b> <sup>1)</sup>	Pilot pressure measuring	DIN 3853	S8 form W	45	X

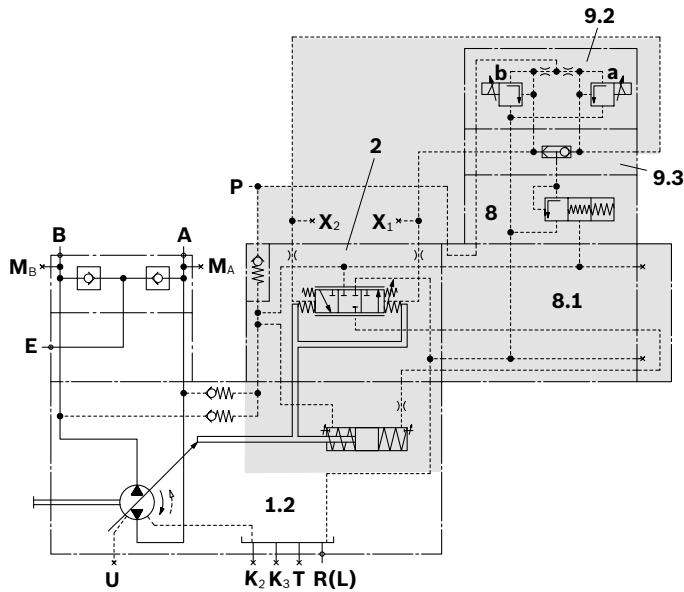
1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available  
2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
4) O = Must be connected (plugged on delivery)  
X = Plugged (in normal operation)

## HD1U – with power control and electrical control of pilot pressure

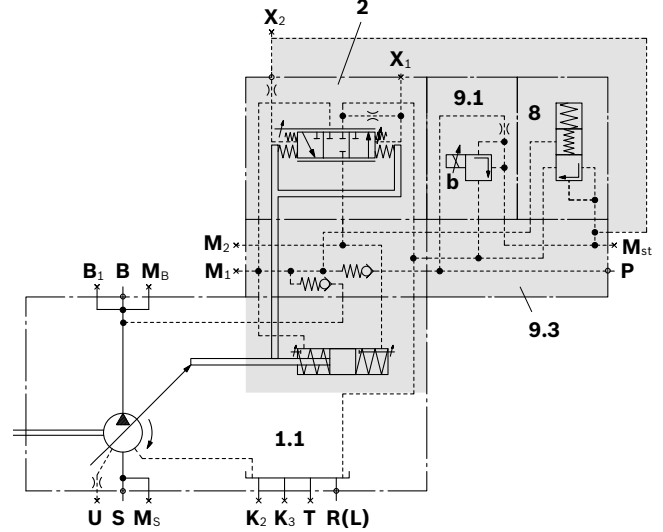
### ▼ A4VSG, sizes 40 and 71<sup>1)</sup>

Clockwise rotation



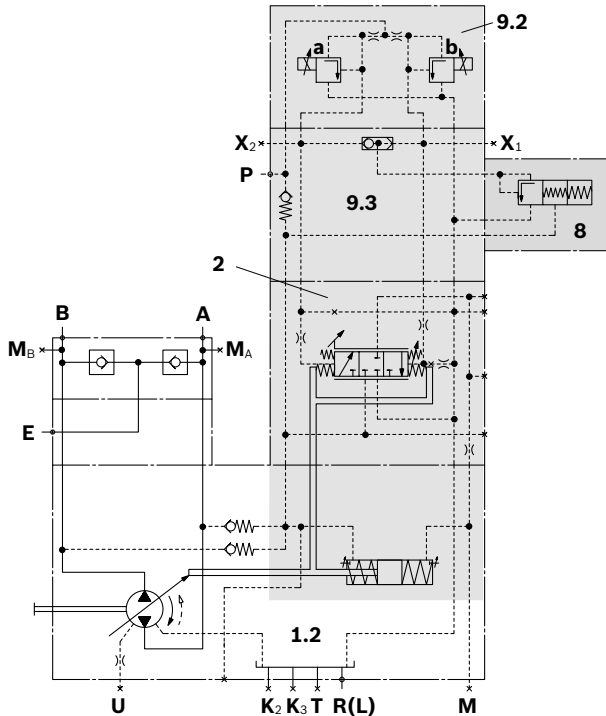
### ▼ A4VSO, sizes 500 to 1000<sup>2)</sup>

Clockwise rotation



### ▼ A4VSG, sizes 125 to 355

Clockwise rotation



#### Components

<b>1</b>	Pump with hydraulic control device
<b>1.1</b>	A4VSO
<b>1.2</b>	A4VSG
<b>2</b>	Control module
<b>8</b>	Power limiting valve LV 06 405 (NG 40 and 71) Power limiting valve LV 06 205 (NG 125 to 1000)
<b>9.1</b>	Proportional pressure relief valve (A4VSO) DBEP6 B06; DBEP6 A06 (NG 125 to 1000)
<b>9.2</b>	Proportional-pressure relief valve DBEP6 B06 (A4VSG and A4CSG)
<b>9.3</b>	Intermediate plate for mounting proportional valve

#### Ports

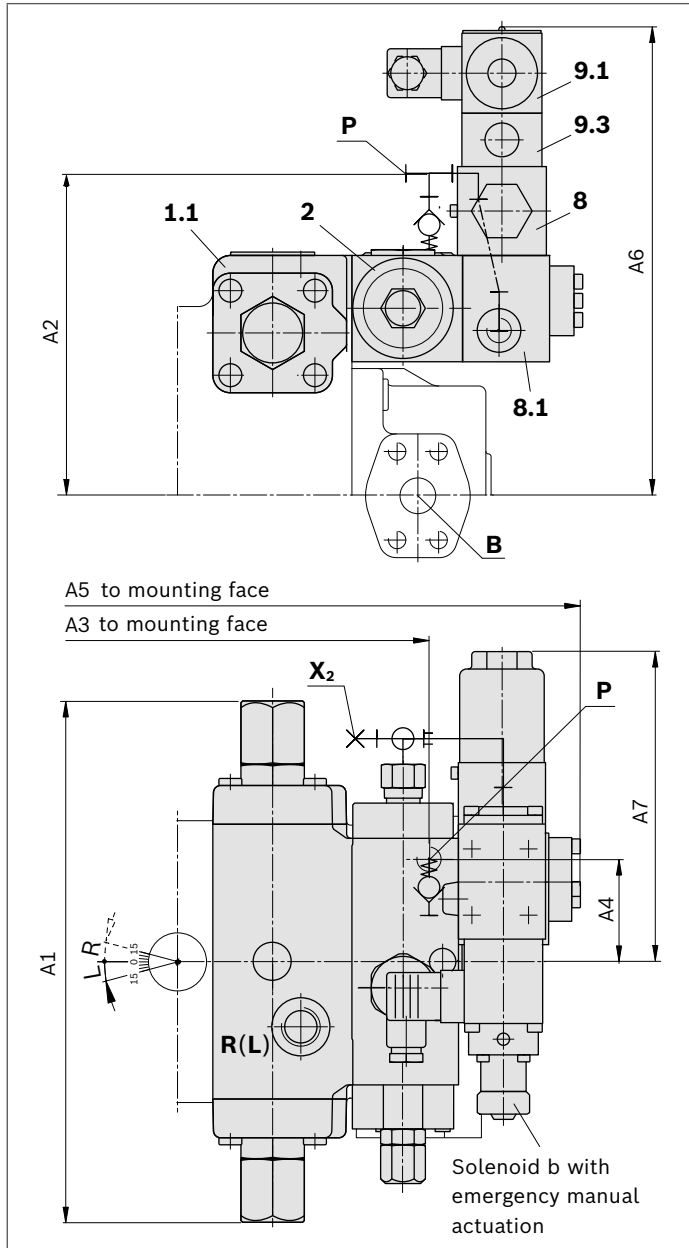
<b>X<sub>1</sub>; X<sub>2</sub></b>	Pilot pressure port
<b>P</b>	Control pressure port
<b>M</b>	Measuring port stroking chamber pressure (NG 125 to 355)
<b>M<sub>1</sub></b>	Measuring port small stroking chamber (NG 500 to 1000)
<b>M<sub>2</sub></b>	Measuring port large stroking chamber (NG 500 to 1000)
<b>M<sub>st</sub></b>	Measuring port pilot pressure (NG 500 to 1000)

1) For A4VSO clockwise rotation only **X<sub>2</sub>**, counter-clockwise rotation only **X<sub>1</sub>**, with the proportional valve piped up and **X<sub>2</sub>** not available.

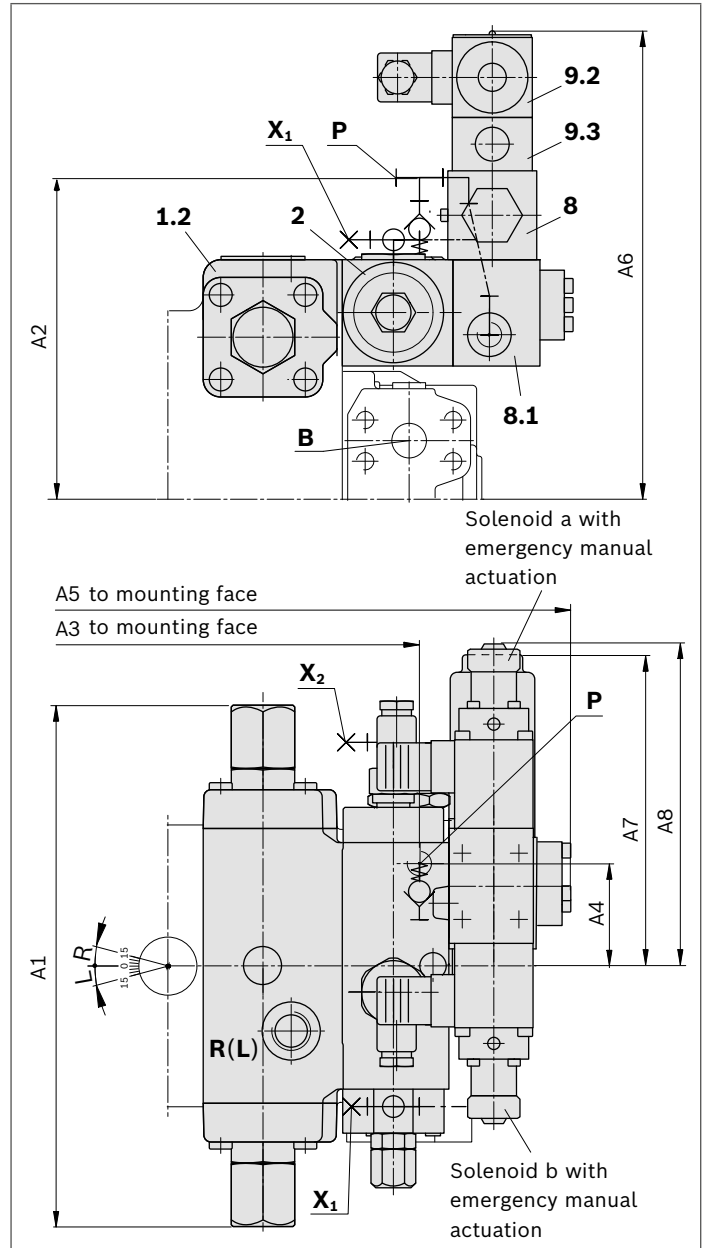
2) For counter-clockwise rotation **X<sub>1</sub>** connected with the power limiting valve.

**Dimensions**

▼ **A4VSO, sizes 40 and 71**



▼ **A4VSG, sizes 40 and 71**



NG	A1	A2	A3	A4	A5	A6	A7	A8
40	296	193	233	58	323	266	175	189
71	332	209	260	58	350	282	175	189

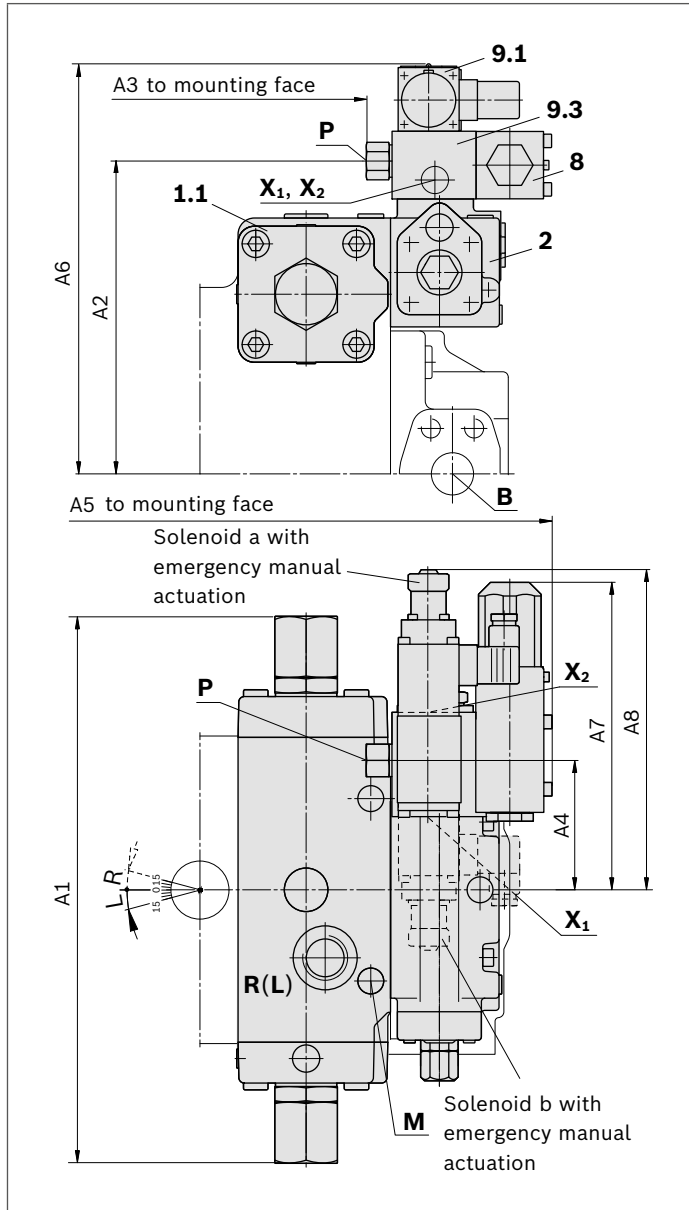
For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

Port	Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>	
P	Control pressure	DIN 3853	S8 form W	350	O
X <sub>1</sub> , X <sub>2</sub> <sup>1)</sup>	Pilot pressure measuring	DIN 3853	S8 form W	45	X

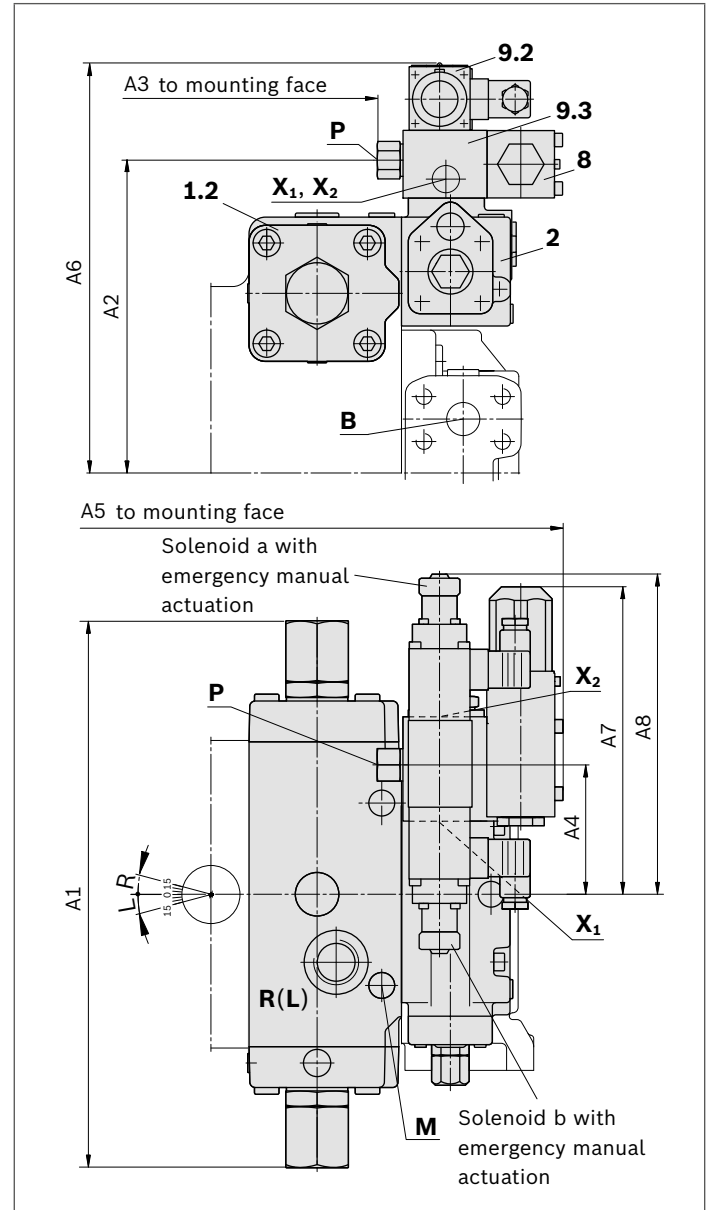
1) For A4VSO clockwise rotation only X<sub>2</sub> is available; for A4VSO counter-clockwise rotation only X<sub>1</sub> is available (dimensions on request)  
 2) For the maximum tightening torques the general instructions on page 49 must be observed.

3) Depending on the application, momentary pressure peaks can occur. Keep this in mind when selecting measuring devices and fittings.  
 4) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

▼ **A4VSO, sizes 125 to 355**



▼ **A4VSG, sizes 125 to 355 (A4CSG in preparation)**



NG	A1	A2	A3	A4	A5	A6	A7	A8
125	402	230	247	96	384	302	227	2365
180	402	230	247	96	384	302	227	236
250	485	266	309	96	446	338	227	236
355	485	266	309	96	446	338	227	236

For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

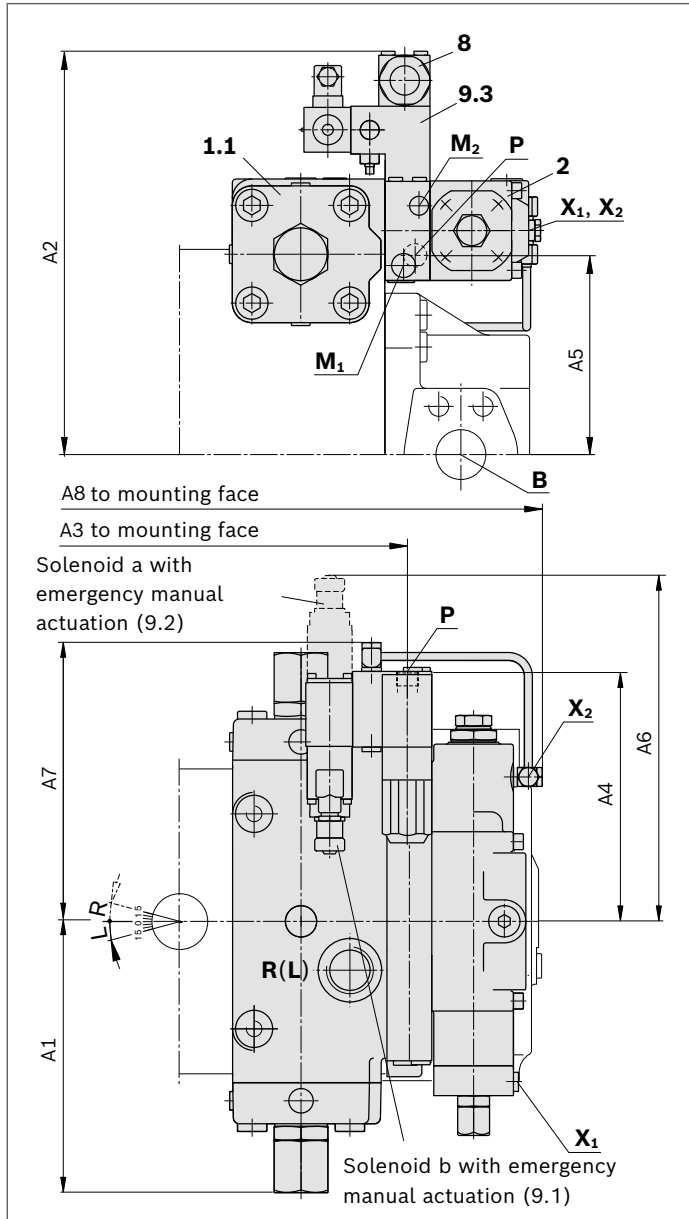
Port	Standard	Size <sup>1)</sup>	$p_{max abs}$ [bar] <sup>2)</sup>	State <sup>3)</sup>	
<b>P</b>	Control pressure	DIN 3852	M18 × 1.5; 12 deep	350	O
<b>M</b>	Measuring stroking chamber pressure	DIN 3852	M14 × 1.5; 12 deep	350	X
<b>X<sub>1</sub>, X<sub>2</sub></b>	Pilot pressure measuring	DIN 3852	M14 × 1.5; 12 deep	45	X

1) For the maximum tightening torques the general instructions on page 49 must be observed.  
 2) Depending on the application, momentary pressure peaks can occur.

Keep this in mind when selecting measuring devices and fittings.  
 3) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)

▼ **A4VSO, A4VSG, sizes 500 to 1000**

▼ **A4CSG in preparation**



Components	
<b>1</b>	Pump with hydraulic control device
<b>1.1</b>	A4VSO (see data sheet 92050)
<b>1.2</b>	A4VSG (see data sheet 92100)
<b>2</b>	Control module
<b>8</b>	Power limiting valve (see data sheet 95546) LV 06 405 (for NG 40 and 71) LV 06 205 (for NG 125 to 1000)
<b>8.1</b>	Intermediate plate for mounting power limiting valve
<b>9.1</b>	Proportional-pressure relief valve (for A4VSO) DBEP6 B06 DBEP6 A06 (for NG 125 to 355 clockwise rotation)
<b>9.2</b>	Proportional-pressure relief valve DBEP6 C06 (for A4VSG and A4CSG)
<b>9.3</b>	Intermediate plate for mounting proportional valve

NG	A1	A2	A3	A4	A5	A6	A7	A8
500	278	406	383	251	206	352	278	521
750	315	430	415	251	236	348	278	553
1000	335	459	481	251	259	348	278	619

For detailed dimensions and technical data of the variable pump, see data sheet 92050 or 92100

Port	Standard	Size <sup>2)</sup>	$p_{\max \text{ abs}}$ [bar] <sup>3)</sup>	State <sup>4)</sup>
<b>P</b>	Control pressure	DIN 3852	M22 × 1.5; 14 deep	O
<b>M<sub>1</sub></b>	Small stroking chamber measurement	DIN 3852	M18 × 1.5; 12 deep	X
<b>M<sub>2</sub></b>	Stroking chamber measurement	DIN 3852	M14 × 1.5; 12 deep	X
<b>X<sub>1</sub>, X<sub>2</sub><sup>1)</sup></b>	Pilot pressure measuring	DIN 3853	S8 form W	X

1) For A4VSO clockwise rotation only **X<sub>2</sub>** is available; for A4VSO counter-clockwise rotation only **X<sub>1</sub>** is available (M14 x 1.5; 12 deep)  
 2) For the maximum tightening torques the general instructions on page 49 must be observed.  
 3) Depending on the application, momentary pressure peaks can occur.

4) O = Must be connected (plugged on delivery)  
 X = Plugged (in normal operation)



## Project planning notes

- ▶ The hydraulic control HD is intended for use in the open circuit (A4VSO) or closed circuit (A4VSG, A4CSG) depending on the pump.
- ▶ 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 appropriate instruction manual thoroughly and in full. If necessary, this can be requested from Bosch Rexroth.
- ▶ Before finalizing your design, 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.
- ▶ Preservation: Our axial piston units are supplied as standard with preservative protection for a maximum of 12 months. If longer preservative protection is required (maximum 24 months), please specify this in plain text when placing your order. The preservation periods apply under optimal storage conditions, details of which can be found in the data sheet 90312 or the instruction manual.
- ▶ 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. A possible electromagnetic interference (EMI) exists if the solenoid is supplied with 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. Be sure to add a pressure relief valve to the hydraulic system.
- ▶ In drives, the natural frequency of the hydraulic system can be stimulated by the excitation frequency of the pump (rotational speed frequency  $\times 9$ ). This can be prevented with suitably designed hydraulic lines.
- ▶ 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 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.



**Bosch Rexroth AG**

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

© Bosch Rexroth AG 2020. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution as well as in the event of applications for industrial property rights. The data specified within only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.