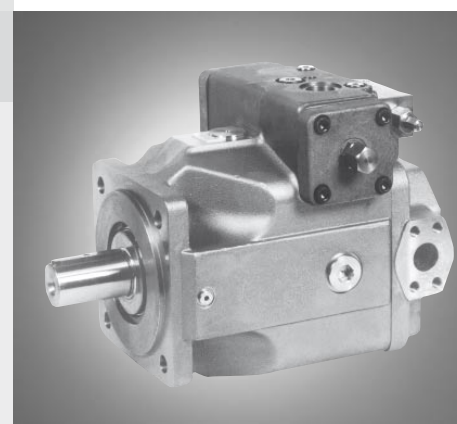


Power control LR2, LR3, LR2N and LR3N

RE 92 064/11.07 1/68
Replaces: 05.98

Data sheet

for variable pump A4VSO
Series 1 and 3
Size 40 to 1000
Nominal pressure 350 bar
Peak pressure 400 bar
open circuit operation



Contents

Ordering code – Standard program LR2 and LR3	2
Ordering code – Standard program LR2N and LR3N	3
LR2 Power control, with hyperbolic characteristic	4
LR3 with remote control of power characteristic	11
LR.D with pressure control	15
LR.G with remote pressure control	17
LR.F with flow control	21
LR.H with hydraulic stroke limiter	24
LR.M with mechanical stroke limiter $V_{g \max}$	30
LR.Z Hydraulic two-point control	34
LR.Y Electric two-point control	39
LR.S with Load-Sensing valve	42
LR.N Hydraulic stroke control, pilot pressure dependent	45
LR.NT with electric control of pilot pressure	51
Example of control combination LR2GN	58
Example of control combination LR2GNT	63
Installation notes	67
General notes	68

Features

- Power control with hyperbolic characteristic
- The power control varies the pump displacement, dependent on output pressure in such a manner, that a specified drive power at constant speed cannot be exceeded
- Power settings from min. to max. with one spring
- Supplementary functions in a modular system, eg.:
 - hydraulic remote control
 - pressure control
 - flow control
 - hydraulic stroke limiter
 - mechanical stroke limiter
 - hydraulic two-point control
 - electric control of pilot pressure

Further information:

Variable pump A4VSO Size 40 to 1000 RE 92 050

Ordering code – Standard program A4VSO LR2 and LR3

	A4VS	O		LR					/				-				
01	02	03	04	05	06	07	08	09		10	11	12		13	14	15	16

01 Fluid (Details see RE 92050)

Axial piston unit

02	Swash plate design, variable	A4VS
----	------------------------------	-------------

Type of operation

03	Pump, open circuit (see RE 92050)	O
----	-----------------------------------	----------

Size

	40	71	125	180	250	355	500	750	1000
04 Displacement $V_{g\max}$ [cm ³]	40	71	125	180	250	355	500	750	1000

Control devices

05	Power control with hyperbolic characteristic, initial position V _{gmax}													LR
06	Setting of power characteristic													
	mechanically adjustable	2				●	●	●	●	●	●	●	●	2
	hydraulic remote control	3				●	●	●	●	●	●	●	●	3
07	Pressure control													
	without pressure control (no code letter)					●	●	●	●	●	●	●	●	
	with pressure control		D			●	●	●	●	●	●	●	●	D
	with remote pressure control		G			●	●	●	●	●	●	●	●	G
08	Flow control /stroke limiter													
	without flow control /stroke limiter (no code letter)					●	●	●	●	●	●	●	●	
	with flow control			F		●	●	●	●	●	●	–	–	F ¹⁾
	with hydraulic stroke limiter, inverse proportional			H		●	●	●	●	●	●	●	●	H
	with hydraulic two-point control			Z		●	●	●	●	●	●	●	○	Z
	with electr. unloading valve for easy start			Y		●	●	●	●	●	●	○	○	Y
	with load sensing a. rem. press. control.		–	S		●	●	●	●	●	●	–	–	S ²⁾
09	Mechanical stroke limiter													
	without mechanical stroke limiter (no code letter)					●	●	●	●	●	●	●	●	
	with mechanical stroke limiter				M	●	●	●	●	●	●	–	–	M

¹⁾ for a dynamic control we recommend to use the LR.S option

²⁾ cannot be combined with pressure control D or G

● available ○ in preparation – not available preferred program

Ordering code – Standard program A4VSO LR2N and LR3N

	A4VS	O		LR			N		/				-				
01	02	03	04	05	06	07	08	09		10	11	12		13	14	15	16

Control devices

05	Power control with hyperbolic characteristic, initial position V_{gmin}, pilot pressure dependent														LR	
	Setting of power characteristic															
							40	71	125	180	250	355	500	750	1000	
06	mechanically adjustable	2		N			●	●	●	●	●	●	●	●	●	2
	hydraulic remote control	3		N			●	●	●	●	●	●	●	●	●	3
	Pressure control															
07	without press. control (no code letter)						●	●	●	●	●	●	●	●	●	
	with pressure control		D	N			●	●	●	●	●	●	●	●	●	D
	with remote pressure control		G	N			●	●	●	●	●	●	●	●	●	G
08	Hydraulic stroke limiter, proportional														N	
	Electric control of pilot pressure															
09	without electr. control of pilot press. (no code letter)			N			●	●	●	●	●	●	●	●	●	
	with electr. control. (DBEP 6)			N	T		○	●	●	●	●	●	●	○	○	T³⁾

³⁾ only available for clockwise rotation;

for operation on HF-fluid please observe RE 29164 (Proportional pressure relief valve type DBEP)

Series							40	71	125	180	250	355	500	750	1000	
10	of A4VSO						●	●	-	-	-	-	-	-	-	10
							-	-	●	●	●	●	●	●	●	30

11	Direction of rotation														
12	Seals														
13	Shaft end														
14	Mounting flange														
15	Port for service lines														
16	Through drive														

● available ○ in preparation - not available preferred program

For details see:
RE92050 – A4VSO

LR2 Power control, with hyperbolic characteristic

Initial position in pressureless condition: $V_{g\ max}$

The power control LR2 changes the pump displacement with varying output pressures in such a manner, that a specified drive power at constant drive speed cannot be exceeded.

$$p \cdot V_g = \text{constant}$$

p = Operating pressure
 V_g = Displacement

An exact control with a hyperbolic control characteristic enables an optimum utilisation of drive power.

The operating pressure acts together with a spring on the pump control piston towards $V_{g\ max}$. This force actuates via a lever arm the valve spool in the power control assembly against the adjustment spring. As soon as the pressure force against the control piston exceeds the set spring force at the valve spool, this spool shifts and fluid enters the large control chamber, forcing the pump towards $V_{g\ min}$. At the same time the leverage of the lever arm is being reduced and increasing output pressure results in a proportional decrease of displacement ($p \cdot V_g = \text{constant}$).

The beginning of control is set mechanically.
With one spring and one adjustment screw it is possible to set the beginning of control within the whole control range.

Setting range of control begin: 35...350 bar

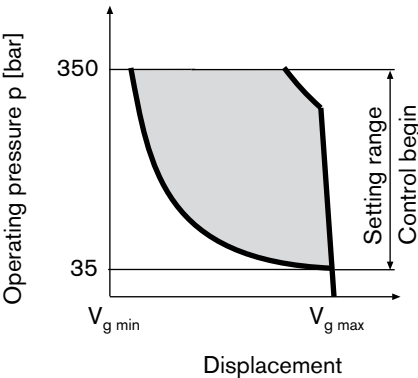
The power curve is factory set.

When ordering please state in clear text:

- Drive power P in kW
- Drive speed n in rpm
- Max. flow $q_{v\ max}$ in L/min (50...100 % $V_{g\ max}$)

The min. and max. swivel angle limitation (up to 50% $V_{g\ max}$) is factory set at a fixed value. When ordering please state in clear text the desired value.

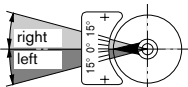
Characteristic



Direction of flow S to B

Direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

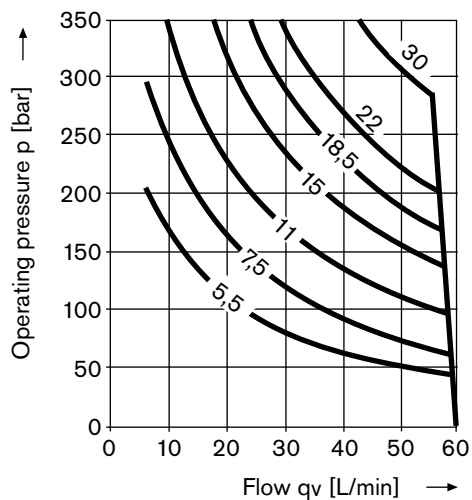
¹⁾ compare swivel angle indicator



LR2 Power control, with hyperbolic characteristic

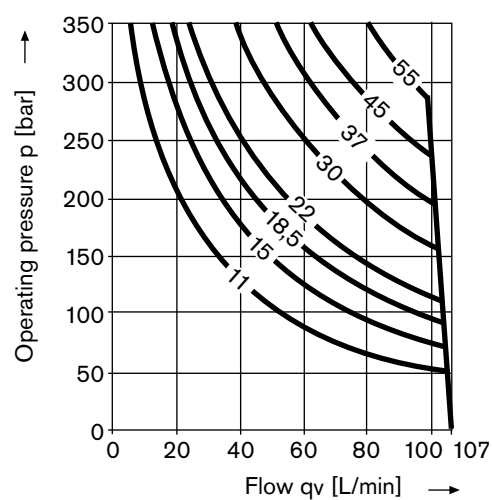
Power characteristics in kW

Size 40

at 1500 rpm¹

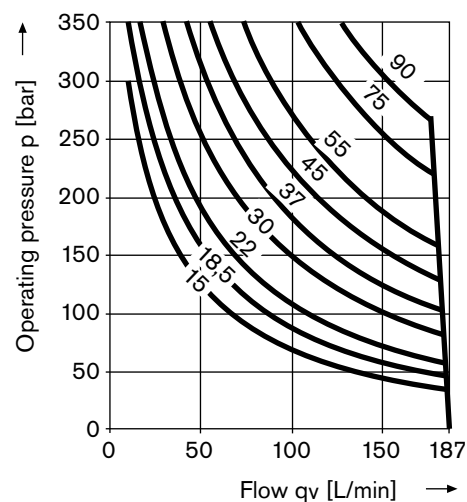
Size 71

at 1500 rpm



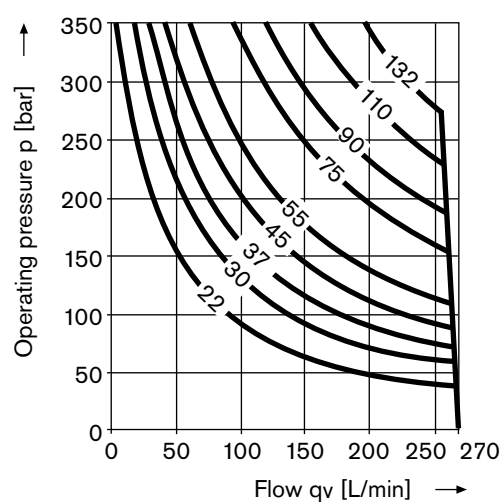
Size 125

at 1500 rpm



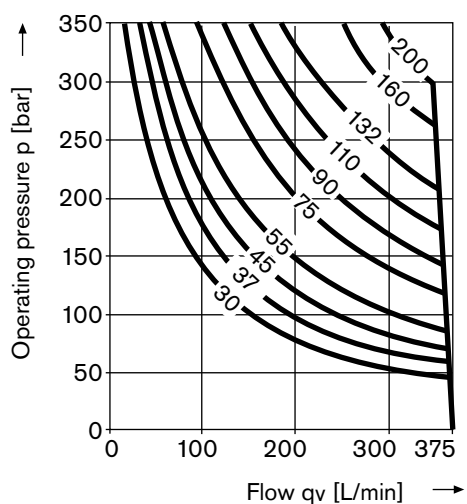
Size 180

at 1500 rpm



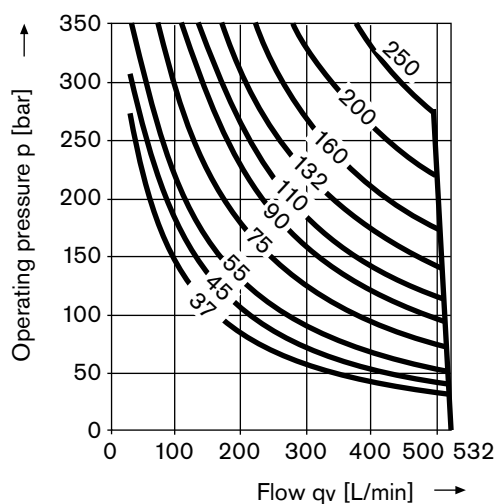
Size 250

at 1500 rpm



Size 355

at 1500 rpm

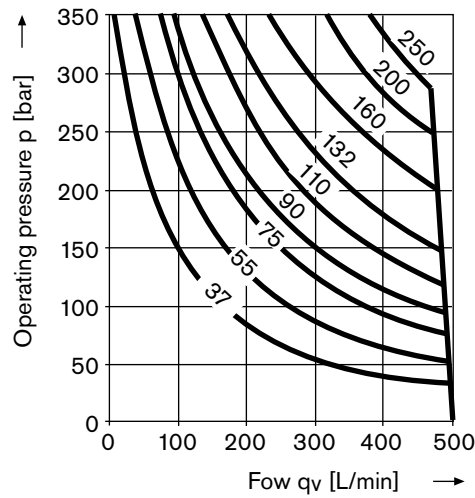


LR2 Power control, with hyperbolic characteristic

Power characteristics in kW

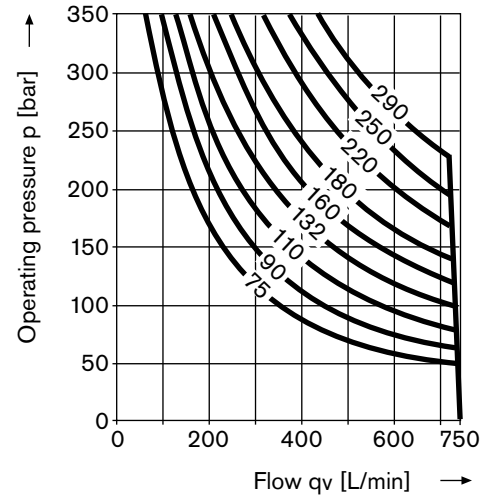
Size 500

at 1000 rpm



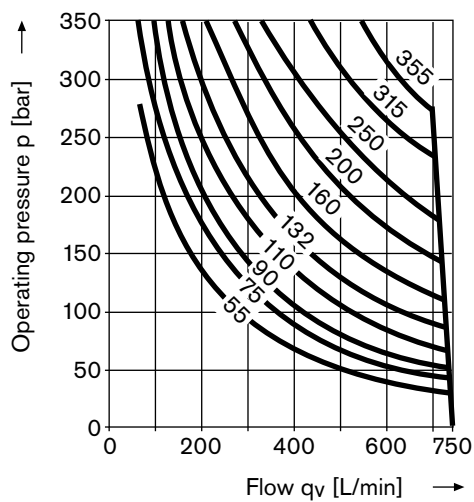
Size 500 High-Speed-Version HA4VSO

at 1500 rpm



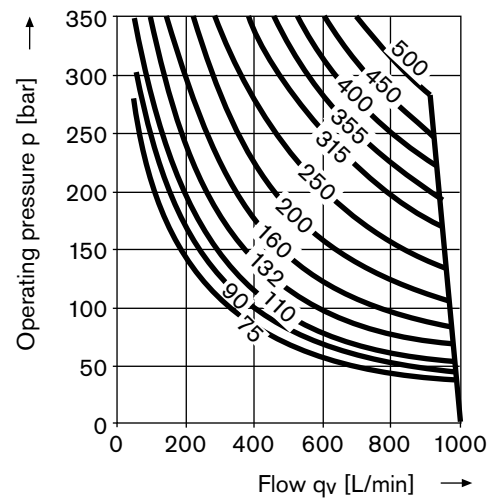
Size 750

at 1000 rpm



Size 1000

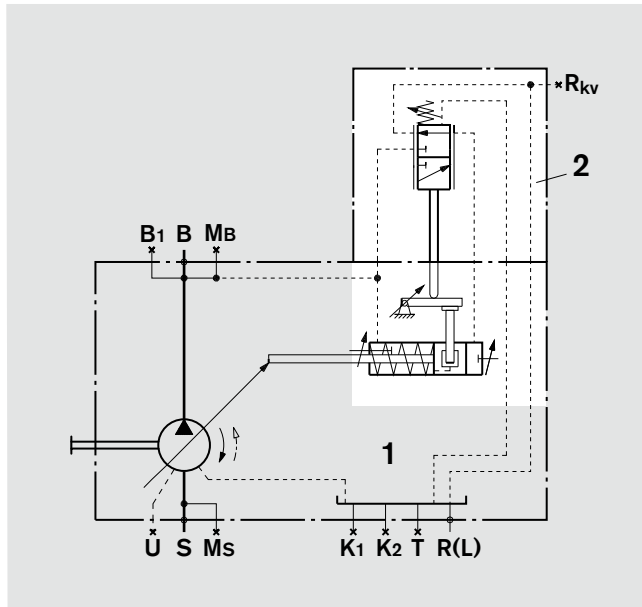
at 1000 rpm



Schematics LR2

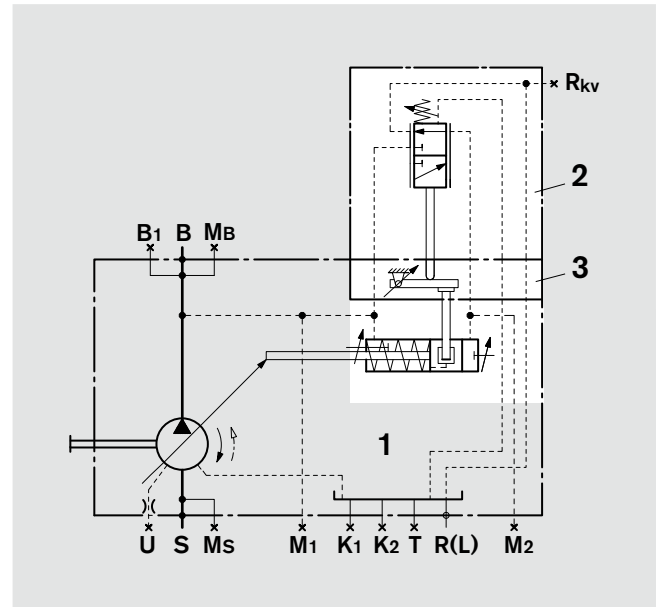
Size 40 and 71

A4VSO LR2, Series 1



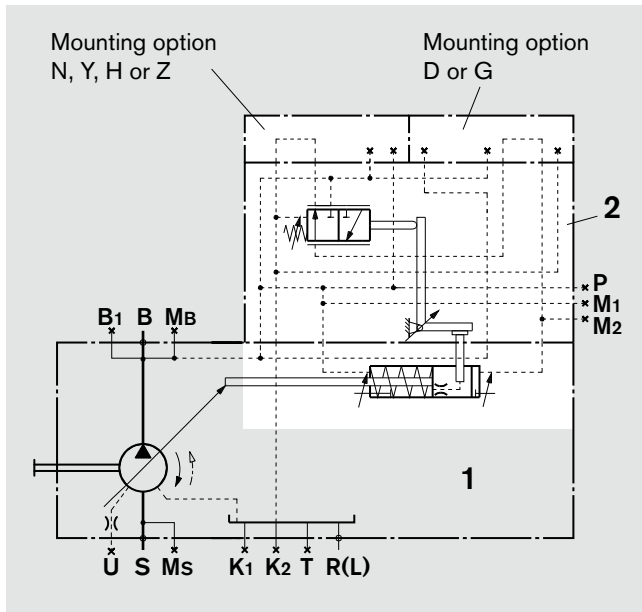
Size 125 to 355

A4VSO LR2, Series 3



Size 500 to 1000

A4VSO LR2, Series 3



Ports

- R_{kv} External control fluid return (Size 40 to 355)
- M_1, M_2 Gauging ports control chamber press. (Size 125 to 1000)
- P Control pressure port (Size 500 to 1000)

Subassemblies

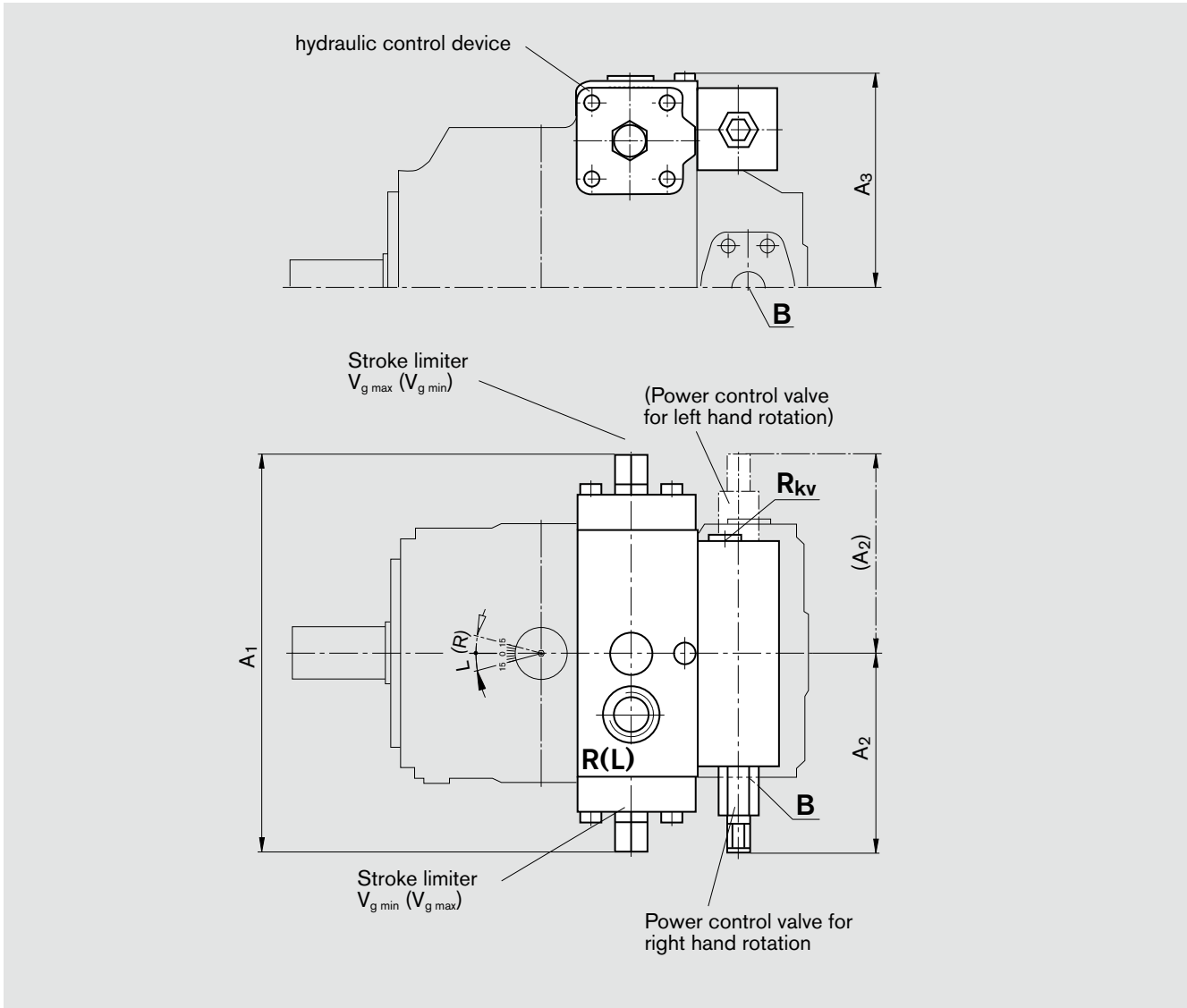
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)

Unit dimensions LR2

Before finalising your design please request a certified installation drawing. Dimensions in mm

Size 40 and 71, Series 1

Presentation right hand direction of rotation (left hand rotation)



Ports				max. tightening torque ¹⁾
R_{kv}	External control fluid return	DIN 3852	M18x1,5; 12 deep; plugged	140 Nm

Unit dimensions

Size	A_1	A_2	A_3	For detailed dimensions and technical data on the variable pump see the technical data sheet A4VSO RE 92050
40	260	132	148	
71	296	132	165	

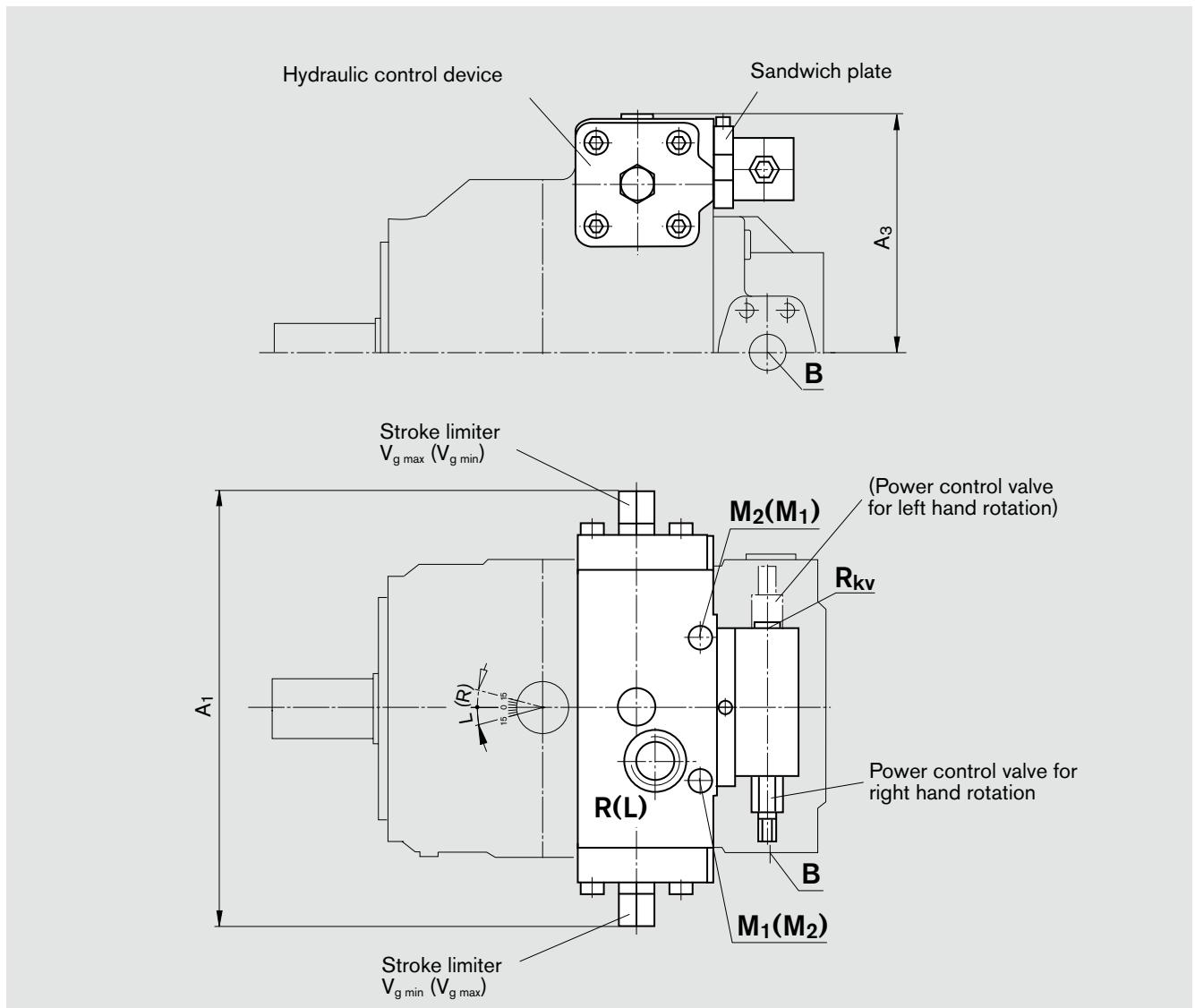
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR2

Before finalising your design please request a certified installation drawing. Dimensions in mm

Size 125 to 355, Series 3

Presentation right hand direction of rotation (left hand rotation)



Ports

max.tightening torque ¹⁾

R _{kv}	external control fluid return	DIN 3852	M18x1,5; 12 deep; plugged	140 Nm
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M14x1,5; 12 deep plugged (Size 125 a. 180) M18x1,5; 12 deep; plugged (Size 250 u. 355)	80 Nm 140 Nm

Unit dimensions

Size	A ₁	A ₃	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
125	354	195	
180	354	195	
250	424	238	
355	424	238	

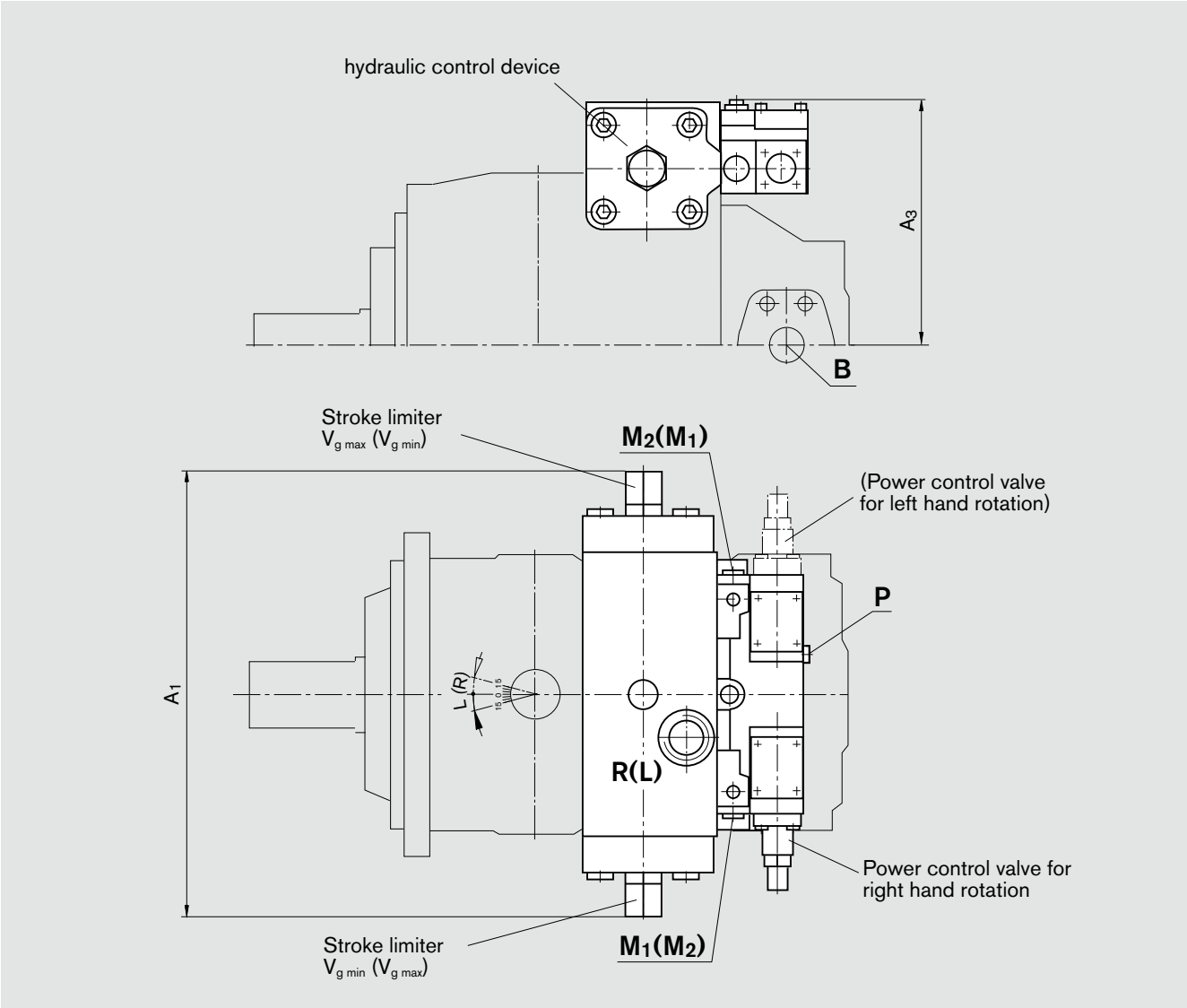
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR2

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000, Series 3

Presentation right hand direction of rotation (left hand rotation)



Ports				max. tightening torque ¹⁾
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 12 deep; plugged	140 Nm
P	Control pressure port	DIN 3852	M22x1,5; 14 deep; plugged	210 Nm

Unit dimensions

Size	A ₁	A ₃	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
500	510	285	
750	582	322	
1000	622	350	

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR3 with remote control of power characteristic

Initial position in pressureless condition: $V_{g \max}$

The power control LR3 can be remotely adjusted by applying an external pilot pressure (p_p) at port X_{LR} to the spring chamber of the power control valve.

The beginning of control can be changed in proportion to the applied pilot pressure.

The pilot pressure port X_{LR} may not be plugged.

Maximum external pilot pressure 100 bar

Total range for beginning of control setting: 50... 350 bar

The basic power control curve is factory set, with a pilot pressure signal p_p in $X_{LR} = 0$ bar.

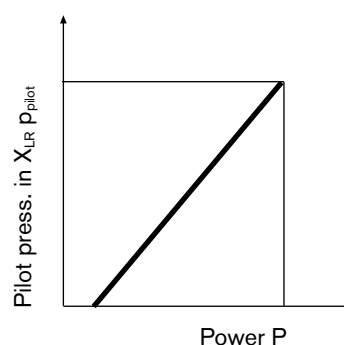
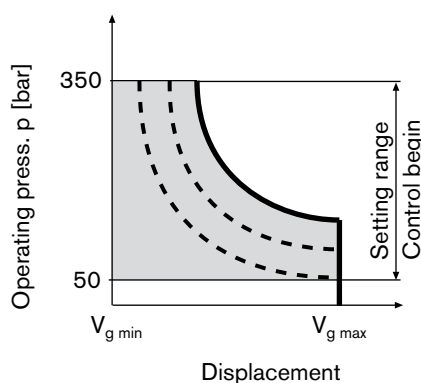
When ordering please state in clear text:

- Drive speed n in rpm
- Drive power P in kW with pilot pressure p_p in $X_{LR} = 0$ bar
- Max. flow $q_{v \max}$ in L/min (50...100 % $V_{g \max}$)

Otherwise the LR3 and the LR2 controls feature the same properties.

The min. and max. swivel angle limitations (up to 50% $V_{g \max}$) are factory set. When ordering please state the required values in clear text.

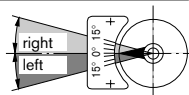
Characteristic



Direction of flow S to B

Direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

¹⁾ Compare swivel angle indicator



Power increase through pilot pressure in port X_{LR}

Power increase / pilot pressure (kW/bar)

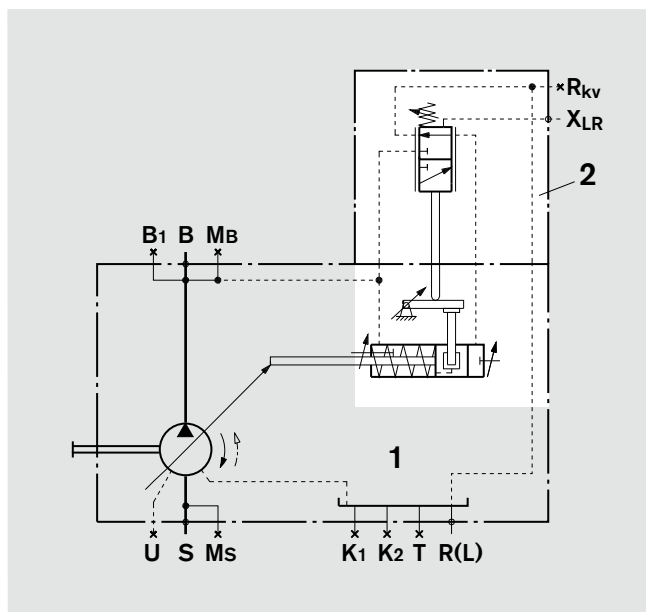
Size	40	71	125	180	250	355	500	750	1000
$n^*=1000\text{rpm}$	0,53	0,78	1,15	1,66	1,83	2,46	5,30	7,5	9,2
$n^*=1200\text{rpm}$	0,64	0,94	1,38	1,99	2,19	2,95	6,40	9,0	11,0
$n^*=1500\text{rpm}$	0,80	1,18	1,72	2,47	2,74	3,69	8,00	11,25	–
$n^*=1800\text{rpm}$	0,96	1,41	2,07	2,98	3,29	4,42	9,60	–	–

* Please observe speed limits and perm. flows acc. to RE 92050

Schematics LR3

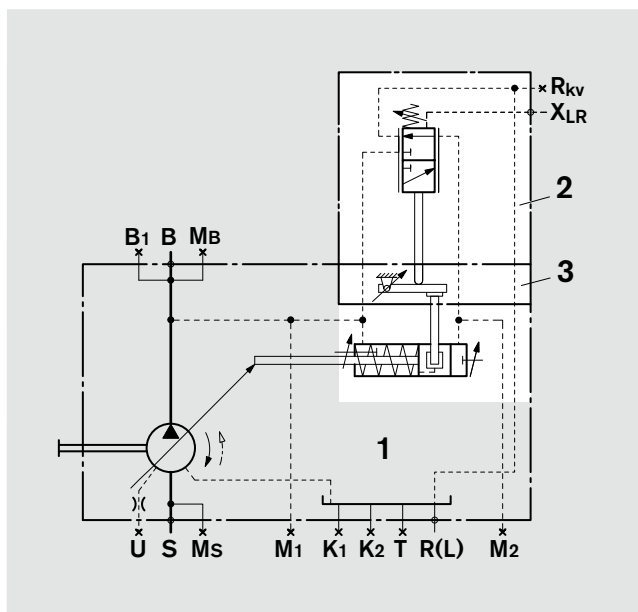
Size 40 and 71

A4VSO LR3, Series 1



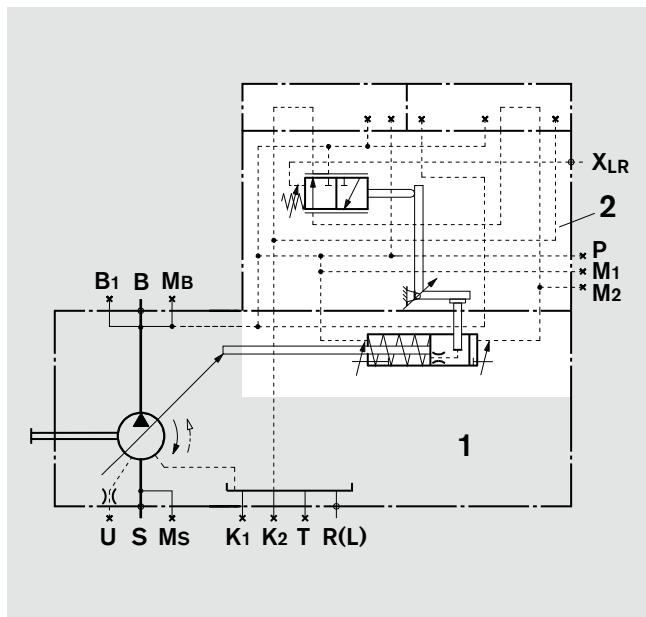
Size 125 to 355

A4VSO LR3, Series 3



Size 500 to 1000

A4VSO LR3, Series 3



Ports

- X_{LR} Pilot pressure port for remote power control
- R_{kv} External control fluid return (Size 40 to 355)
- P Control pressure port (Size 500 to 1000)
- M_1, M_2 Gauging port control chamber pressure (Size 125 to 1000)

Subassemblies

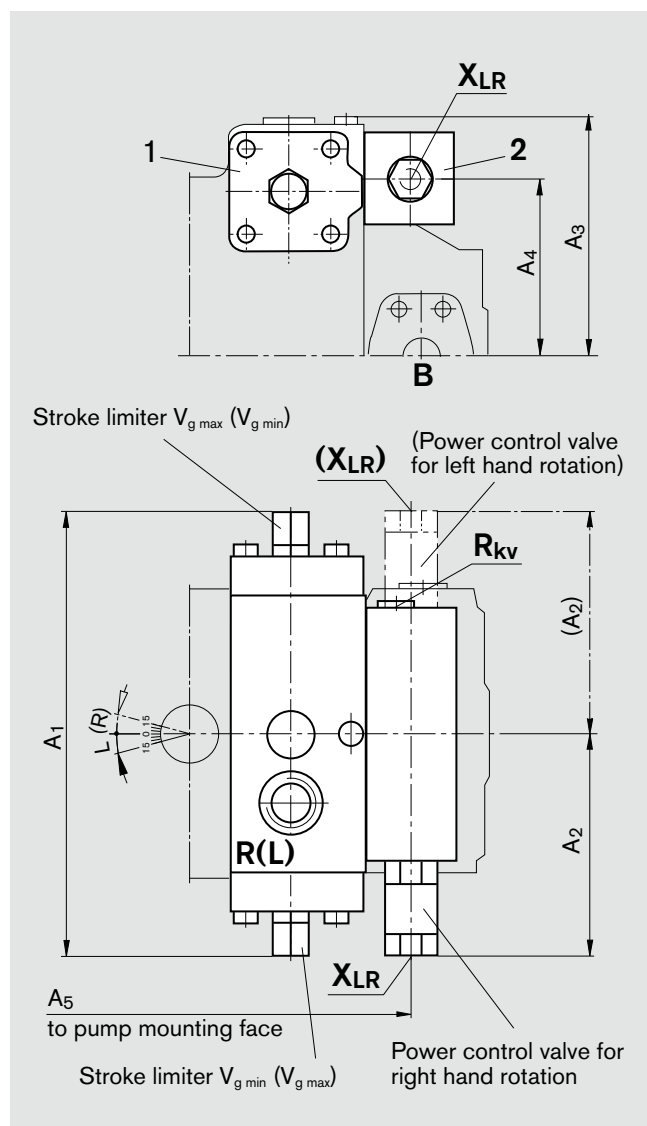
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)

Unit dimensions LR3

Before finalising your design please request a certified installation drawing. Dimensions in mm.

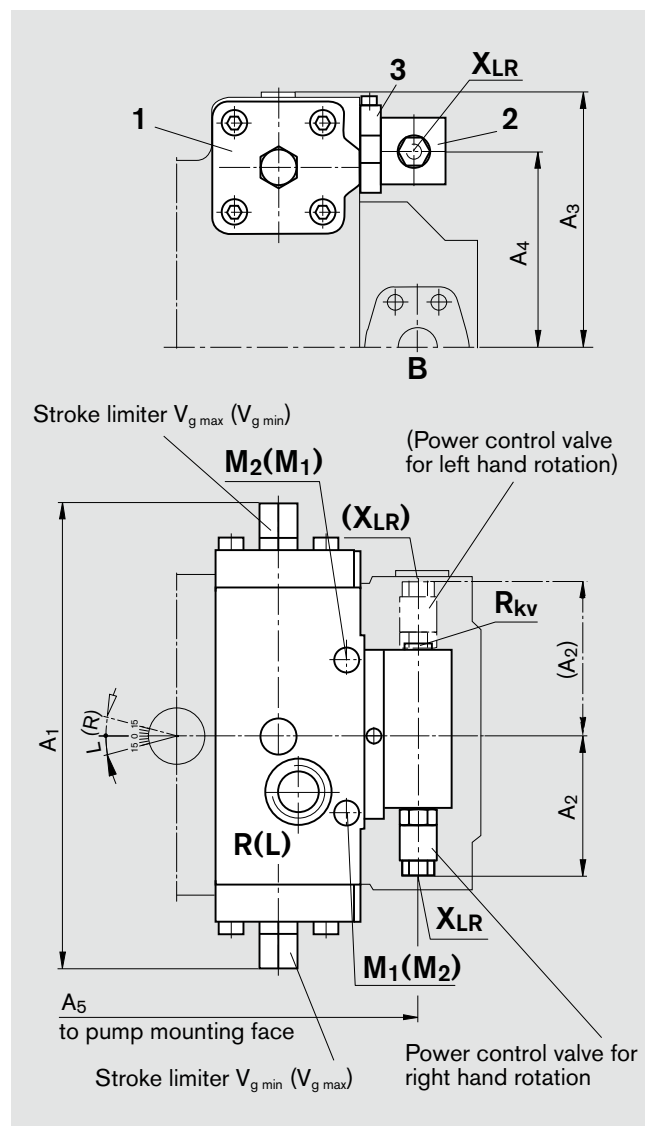
Size 40 and 71, Series 1

Right hand direction of rotation (left hand)



Size 125 to 355, Series 3

Right hand direction of rotation (left hand)



Subassemblies see page 12

Ports

					max. tightening torque ¹⁾
X _{LR}	Pilot pressure port for remote power control	DIN 3852	M14x1,5; 12 deep		80 Nm
R _{kv}	External control fluid return	DIN 3852	M18x1,5; 12 deep; plugged		40 Nm
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180)		80 Nm
			M18x1,5; 12 deep; plugged (Size 250 a. 355)		40 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅
40	260	133	148	106	219
71	296	133	165	117	246
125/180	354	133	195	147	315
250/355	424	133	238	183	377

For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050

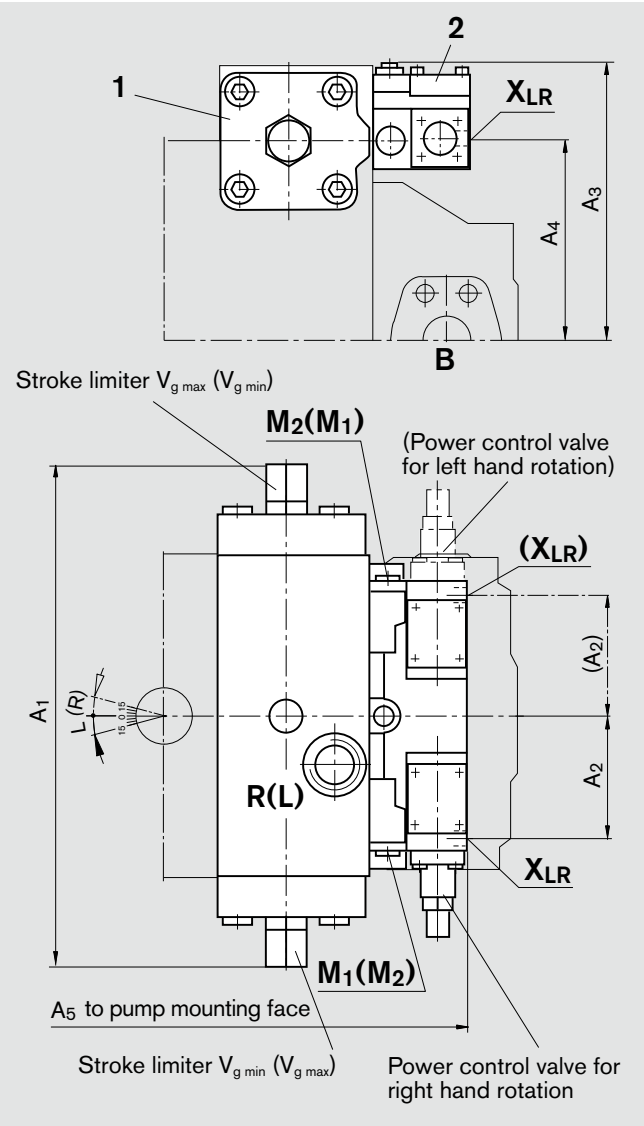
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR3

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000, Series 3

Right hand direction of rotation (left hand)



Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)

Ports

X_{LR}	Pilot pressure port for remote power control	DIN 3852 M14x1,5; 12 deep
$M_1; M_2$	Gauging port control chamber pressure	DIN 3852 M18x1,5; 12 deep; plugged

max. tightening torque ¹⁾

80 Nm
140 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
500	510	125	285	207	468	
750	582	125	322	237	502	
1000	622	125	350	260	566	

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.D with pressure control

Initial position in pressureless condition: $V_{g \max}$

The pressure control overrides the power control, i.e. below the set pressure control level the unit follows the power control function.

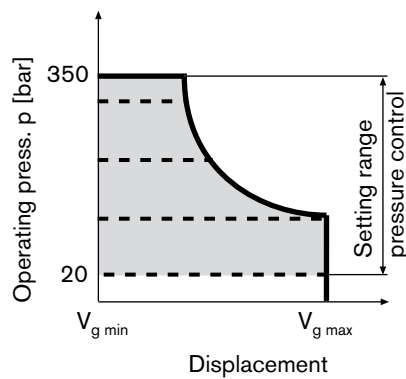
As soon as the pump output pressure reaches the pressure control level, the pump turns into the pressure control mode and delivers only the amount of fluid as required to maintain this pressure.

Setting range of the pressure control 20...350 bar

This pressure is set as standard to 350 bar.

If another setting is required please state in clear text when ordering.

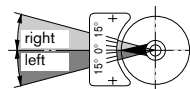
Characteristic



Direction of flow S to B

Direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

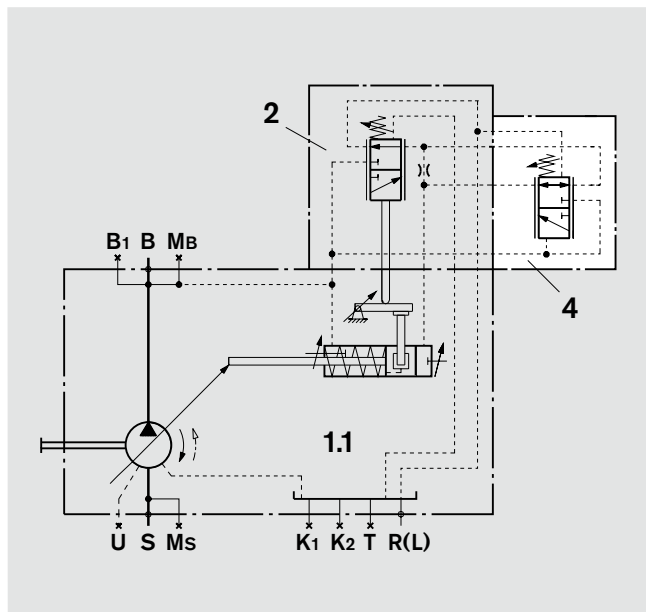
¹⁾ Compare swivel angle indicator



Schematics LR.D

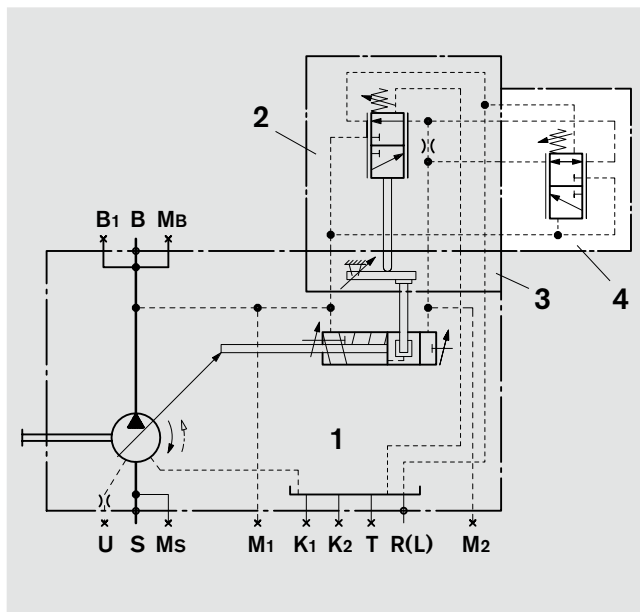
Size 40 and 71

Example: A4VSO LR2D



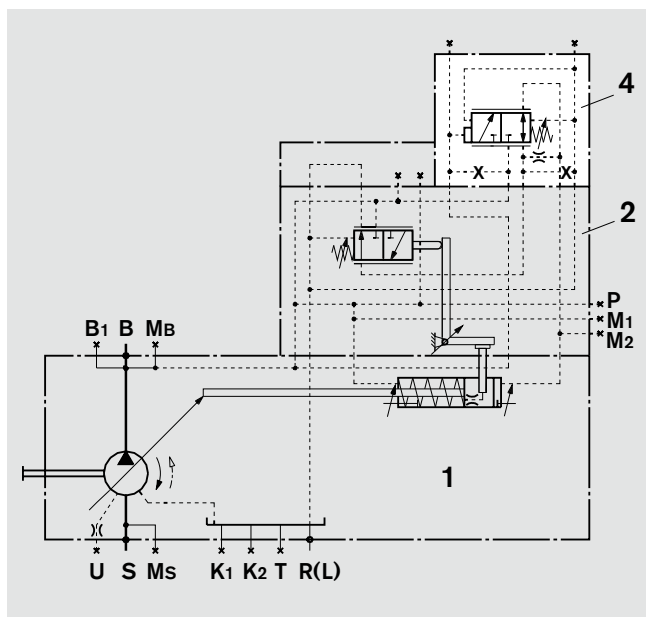
Size 125 to 355

Example: A4VSO LR2D



Size 500 to 1000

Example: A4VSO LR2D



Ports

- M₁, M₂ Gauging port control chamber pressure (Size 125 to 1000)
P Control pressure port (Size 500 to 1000)

Unit dimensions LR.D see page 19

Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 4 Pressure control valve

LR.G with remote pressure control

Initial position in pressureless condition: $V_{g \max}$

In order to enable a remote setting of the pressure control an external relief valve (item 5) can be piped to port X_D . This relief valve does not belong to the standard supply of the LR2G- or LR3G-control, if desired however it can be mounted depending on the pump version.

As soon as the pressure control level (relief valve setting plus pressure differential over the pressure control valve spool) is reached the pump turns into the pressure control mode.

The pressure differential over the pressure control valve spool (item 4) is set as standard to 20 bar, this results in a pilot oil flow of approx. 1.5 L/min. out of port X_D

If another setting is desired (recommended range 20...50 bar), please state the desired value in clear text.

As separate pressure relief valve we recommend:

- DBD 6 (hydraulic) to RE 25402.
- DBETR-SO 437 (electric) to RE 29166

The max. line length should not exceed 2 m.

Notes for the remote pressure control settings :

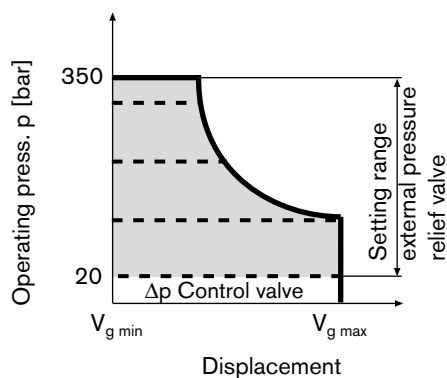
The overall level of the pressure control setting is a result of the separate relief valve setting plus the differential pressure Δp at the pressure control valve spool-

Example: external pressure relief valve 330 bar
 Differential pressure at pressure control valve 20 bar
 results in pressure control of $330 + 20 = 350$ bar

Please observe the following in control combinations with hydraulic stroke limiting (LR.GH or LR.GN):

With a pressure control setting below the pressure level of the external control pressure supply p_{contr} , all pumps up to size 355 will remain against the $V_{g \min}$ -mechanical stroke limiter and the sizes 500 to 1000 may experience oscillations

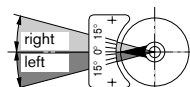
Characteristic



Direction of flow S to B

Direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

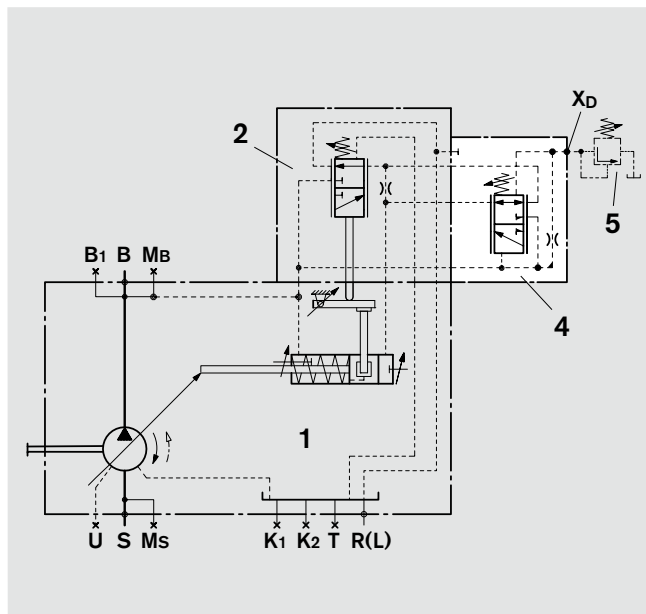
¹⁾ compare swivel angle indicator



Schematics LR.G

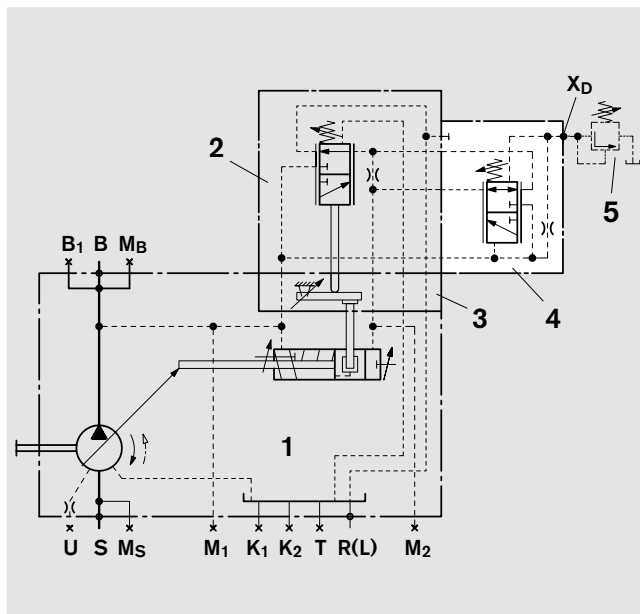
Size 40 and 71

Example: A4VSO LR2G



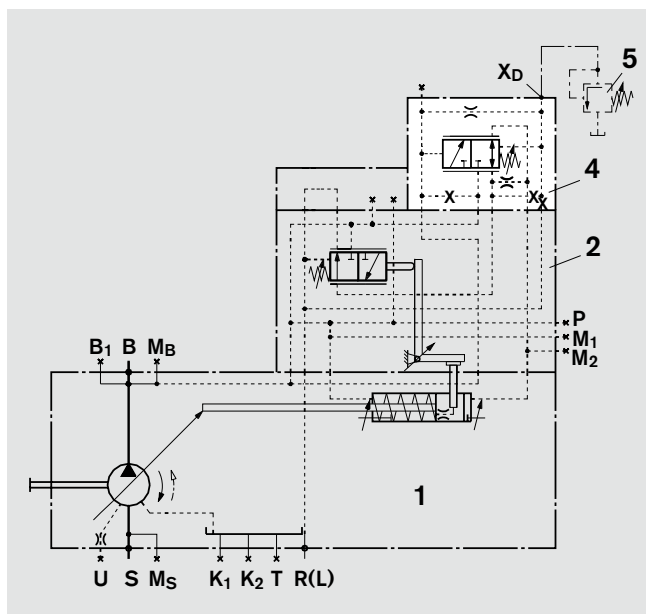
Size 125 to 355

Example: A4VSO LR2G



Size 500 to 1000

Example: A4VSO LR2G



Ports

- X_D Pilot pressure port remote pressure control
- M_1, M_2 Gauging port control chamber pressure (Size 125 to 1000)
- P Control pressure port (Size 500 to 1000)

Subassemblies

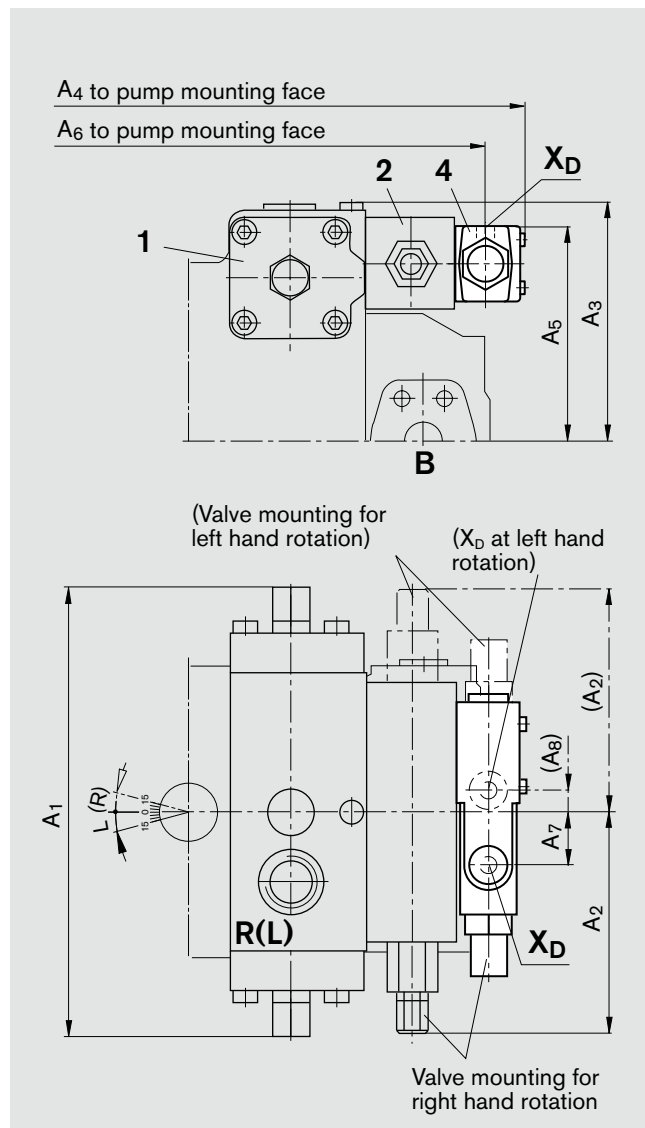
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 4 Pressure control valve
- 5 Pressure relief valve (not in scope of supply)

Unit dimensions LR.D and LR.G

Before finalising your design please request a certified installation drawing. Dimensions in mm.

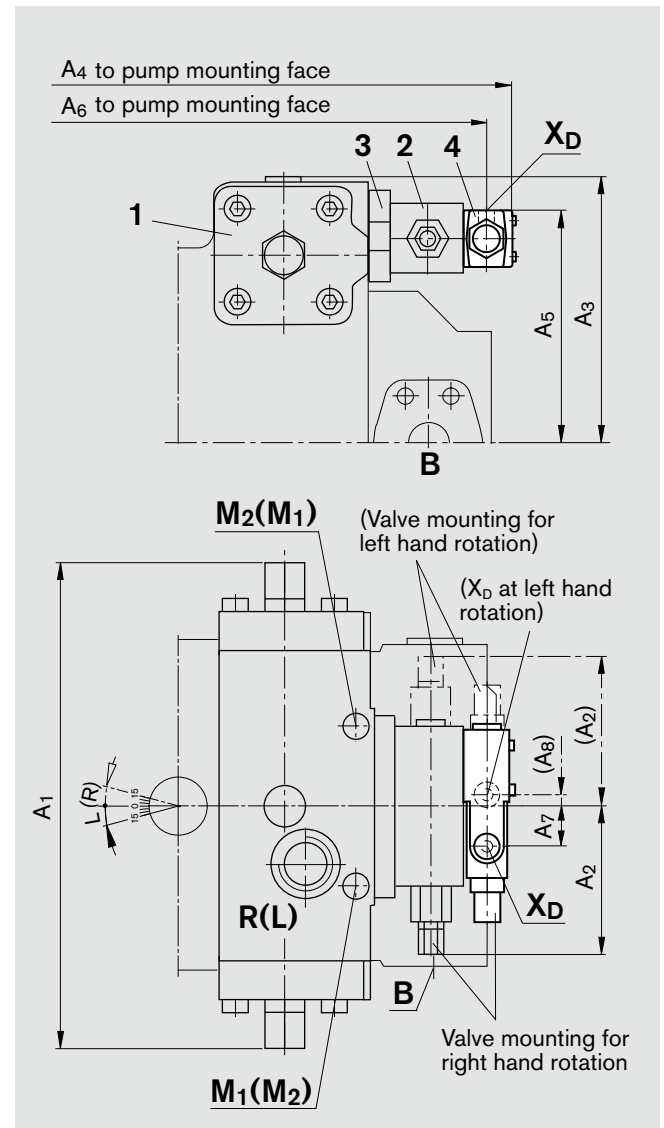
Size 40 and 71

Right hand rotation (left hand)



Size 125 to 355

Right hand rotation (left hand)



Subassemblies see page 18

Ports

max. tightening torque ¹⁾

X _D	Pilot pressure port remote pressure control	DIN 3852	M14x1,5; 12 deep; plugged at LR.D	80 Nm
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180) M18x1,5; 12 deep; plugged (Size 250 a 355)	80 Nm 140 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈
40	260	132	148	295	130	269	37	7
71	296	132	159	322	141	296	37	7
125/180	354	132	195	391	171	365	37	7
250/355	424	132	238	453	207	427	37	7

For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050

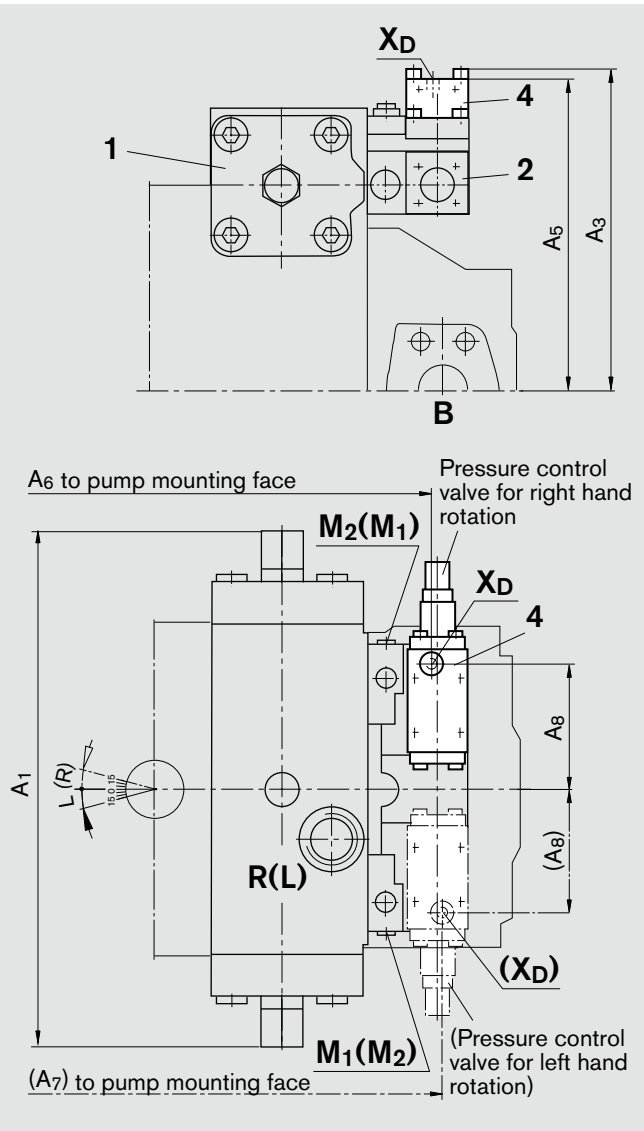
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.D and LR.G

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000

Right hand rotation (left hand rotation)



Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 4 Pressure control valve
- 5 Pressure relief valve (not in scope of supply)

Ports

			max. tightening torque ¹⁾
X _D	Pilot pressure port remote pressure control	DIN 3852 M14x1,5	80 Nm
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M18x1,5; 12 deep; plugged	140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₅	A ₆	A ₇	A ₈
500	510	320	311	430	441	125
750	582	350	342	462	473	125
1000	622	373	364	528	539	125

For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.F with flow control

Initial position in pressureless condition: $V_{g \max}$

In addition to the power control function it is also possible to control the pump output flow by means of a differential pressure i.e. over an orifice or valve opening between pump and actuator. The pump delivers only the amount of fluid as required by the actuator.

The pump flow depends on the cross section of the orifice (item. 7), mounted between pump and actuator. Below the power control and within the pump's control range the output flow is virtually independent of the actual load pressure.

The size of the orifice cross section determines the pump flow.

The flow controller measures the pressure before and after the orifice and keeps the pressure drop (differential pressure Δp) constant and can thus control the flow.

With an increasing differential pressure Δp the pump swivels back (towards $V_{g \min}$), and vice versa, if the Δp drops the pump increases the swivel angle (towards $V_{g \max}$), till the valve spool is in balance again.

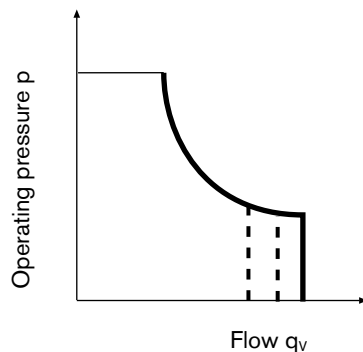
$$\Delta p_{\text{orifice}} = p_{\text{pump}} - p_{\text{actuator}}$$

The standard Δp setting at the flow control valve (item 6) amounts to 14 bar. If another setting is desired (recommended range 14...25 bar), please state in clear text. Higher values on request.

Note:

For dynamic control requirements we recommend to use the LR.S with Load-Sensing and remote pressure control (see page 42).

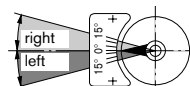
Characteristic



Direction of flow S to B

Direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

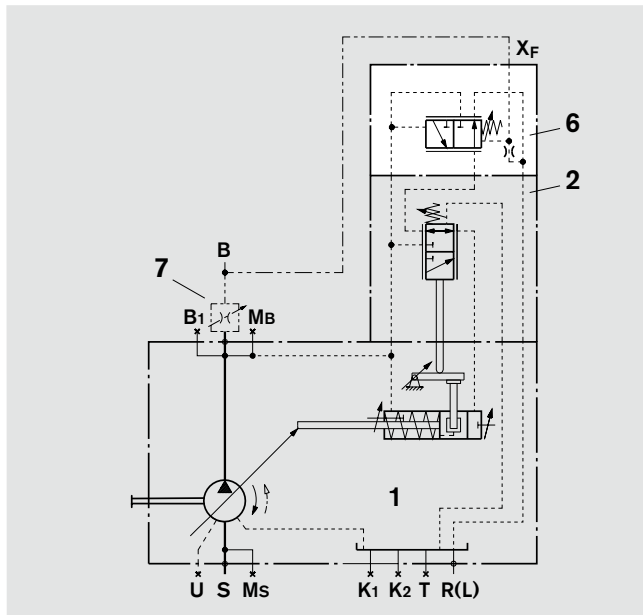
¹⁾ compare swivel angle indicator



Schematics LR.F

Size 40 and 71

Example: A4VSO LR2F

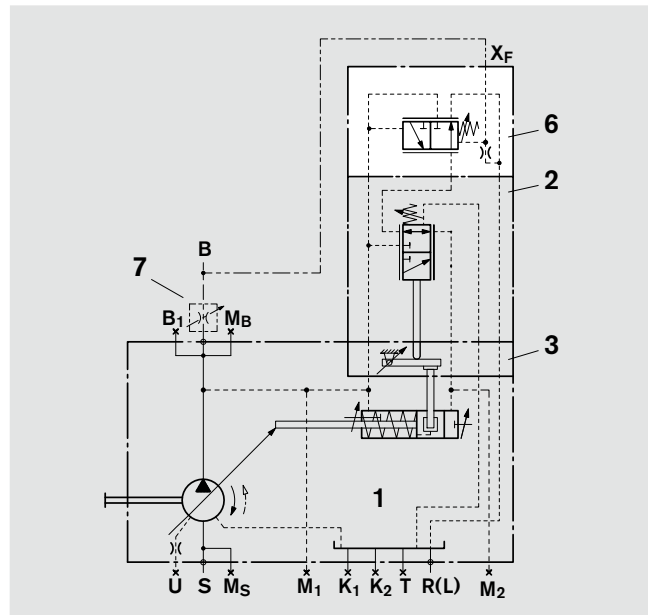


Ports

- X_F Pilot pressure port flow control
 M_1, M_2 Gauging port control chamber pressure (Size 125 to 355)

Size 125 to 355

Example A4VSO LR2F



Subassemblies

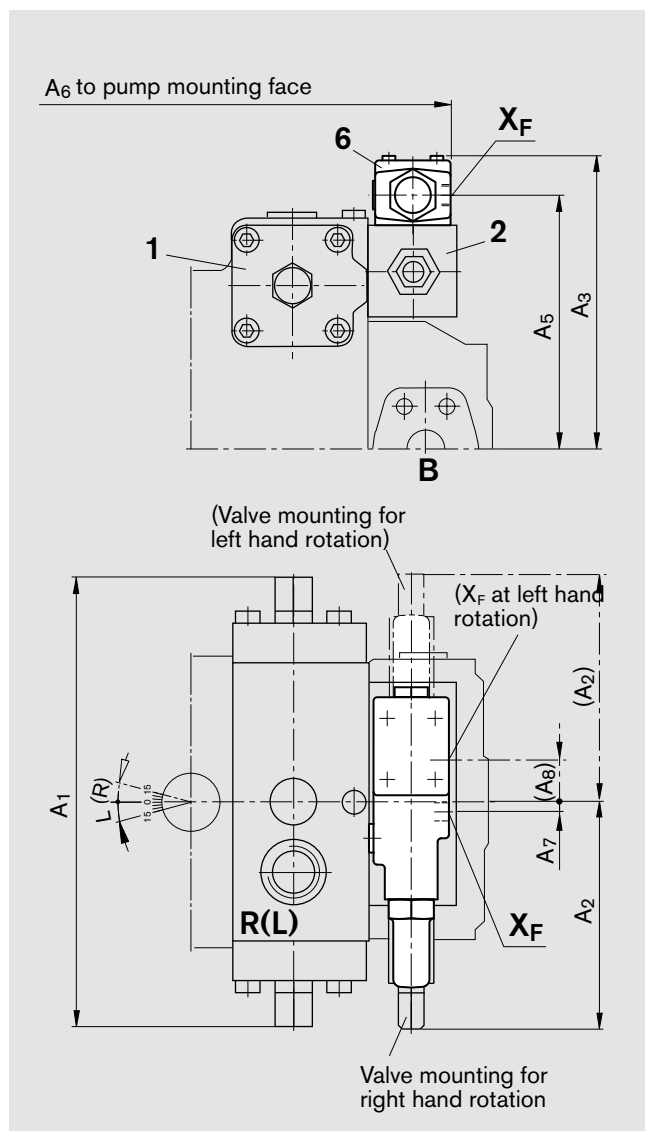
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 6 Flow control valve
- 7 External orifice (not in scope of supply)

Unit dimensions LR.F

Before finalising your design please request a certified installation drawing. Dimensions in mm.

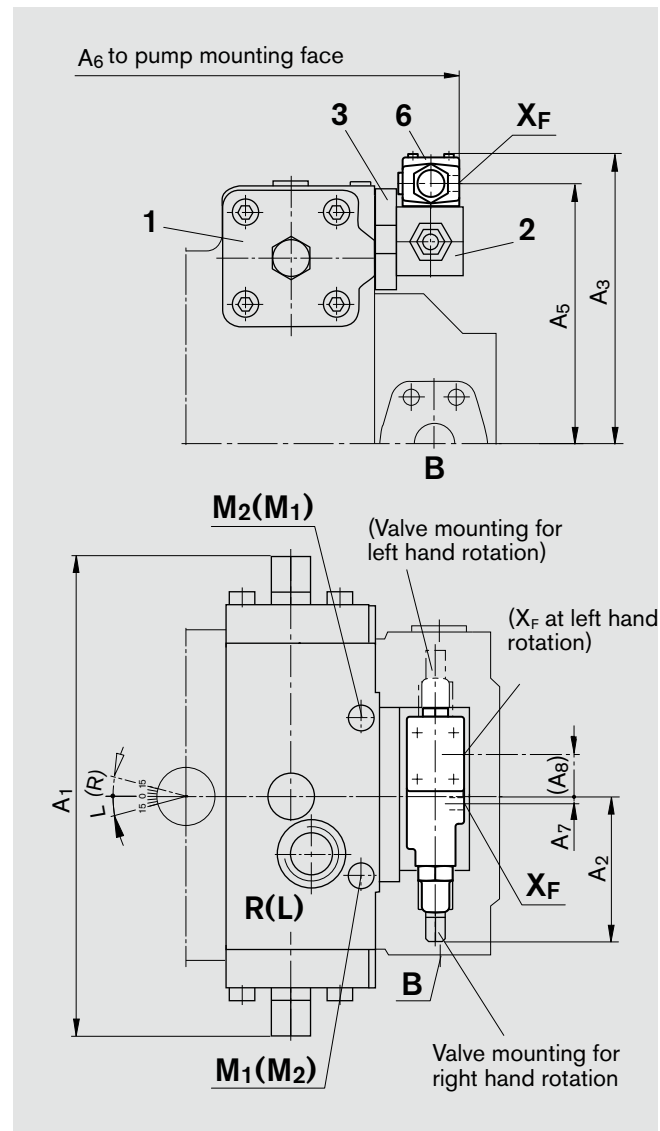
Size 40 and 71

Right hand rotation (left hand)



Size 125 to 355

Right hand rotation (lefthand)



Subassemblies see page 22

Ports

X_F	Pilot pressure port	DIN 3852	M14x1,5	80 Nm
$M_1; M_2$	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180) M18x1,5; 12 deep; plugged (Size 250 a. 355)	80 Nm 140 Nm

max. tightening torque ¹⁾

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₅	A ₆	A ₇	A ₈
40	260	132	182	156	243	7	37
71	296	132	193	167	270	7	37
125/180	354	132	223	197	339	7	37
250/355	424	132	259	233	401	7	37

For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.H with hydraulic stroke limiter

Initial position in pressureless condition: $V_{g \max}$

This control needs an external control pressure supply to port P.

The displacement is reduced in proportion to a pilot pressure in port P_{St}.

The hyperbolic power control is overriding the pilot pressure signal and keeps the max. drive power constant.

$$p \cdot V_g = \text{constant}$$

p = Operating pressure
 V_g = Displacement

Limitation of displacement is possible via:

- Direct swivel angle limitation at the control piston (item 1) - **mechanical**
- Additional stroke limitation at the pilot valve (item 6.1) - **hydraulic**

Setting range

mechanical swivel angle limitation at the control piston:

$$V_{g \min} \quad 0 \dots 50 \% \text{ of } V_{g \max} \quad V_{g \max} \quad 100 \dots 50 \% \text{ of } V_{g \max}$$

hydraulic stroke limitation at the pilot valve:

$$V_{g \min} \quad 0 \dots 100 \% \text{ of } V_{g \max} \quad V_{g \max} \quad 100 \dots 0 \% \text{ of } V_{g \max}$$

The min. and max. mechanical swivel angle limitations are factory set to a fixed value. Please state the desired value in clear text when ordering.

The standard setting of the hydraulic stroke limitation is done in such a manner, that the above mentioned mechanical $V_{g \min}$ - and $V_{g \max}$ settings can be achieved. Different settings please state in clear text.

Technical data

Min. required pilot pressure in P	$p_{\text{contr min}}$	bar	35
Max. permissible control pressure in P	$p_{\text{contr max}}$	bar	100
Control fluid consumption in P (at $p = 50$ bar)		L/min	max. 4
Pilot pressure range in P _{St}	p_{pilot}	bar	10...45
Max. pressure in P _{St}	$p_{\text{pilot max}}$	bar	100
Control begin of power curve, however above control press. p_{contr} in P	p	bar	50...350
Hysteresis			$\leq \pm 2\%$ von $V_{g \max}$

Please observe the following in control combinations with remote pressure control (LR2GH and LR3GH) :

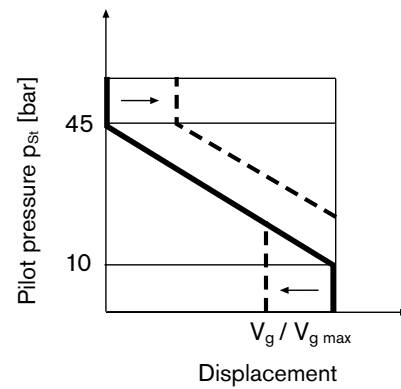
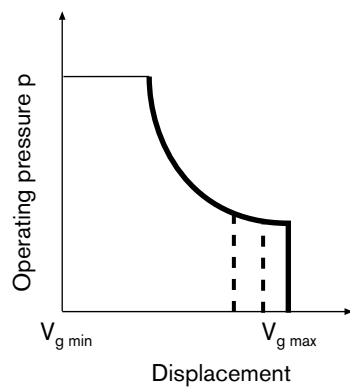
With a pressure control setting below the pressure level of the external control pressure supply p_{contr} all pumps up to size 355 will remain against the mechanical stroke limiter $V_{g \min}$ and the sizes 500 to 1000 may experience oscillations.

Table of values LR.H

Size			40	71	125	180	250	355	500	750	1000
Control volume	$V_{1 \max}$	cm ³	11,4	21,5	37,5	37,5	73,2	73,2	125,0	210,0	263,3
Control volume	$V_{2 \max}$	cm ³	2,9	5,4	9,4	9,4	18,3	18,3	31,4	51,3	65,8
Differential volume	$V_1 - V_2$	cm ³	8,5	16,1	28,1	28,1	54,9	54,9	94,1	158,7	197,5

LR.H with hydraulic stroke limiter

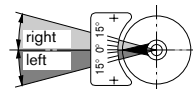
Characteristic



Direction of flow S to B

Direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

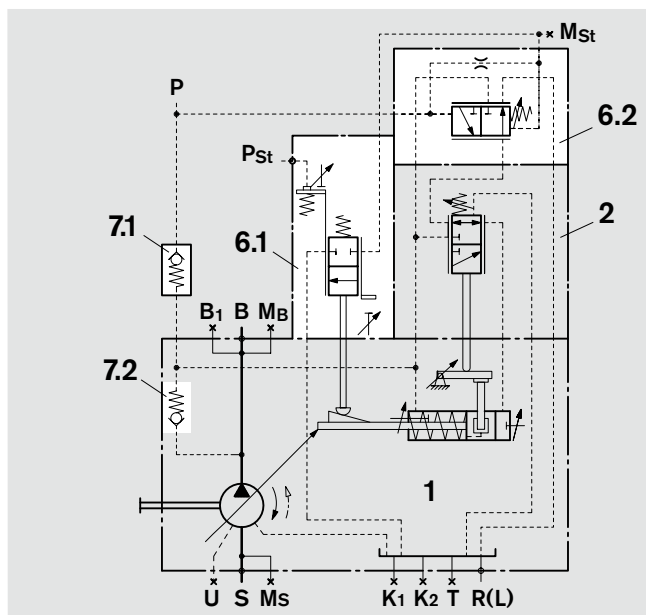
¹⁾ Compare swivel angle indicator



Schematics LR.H

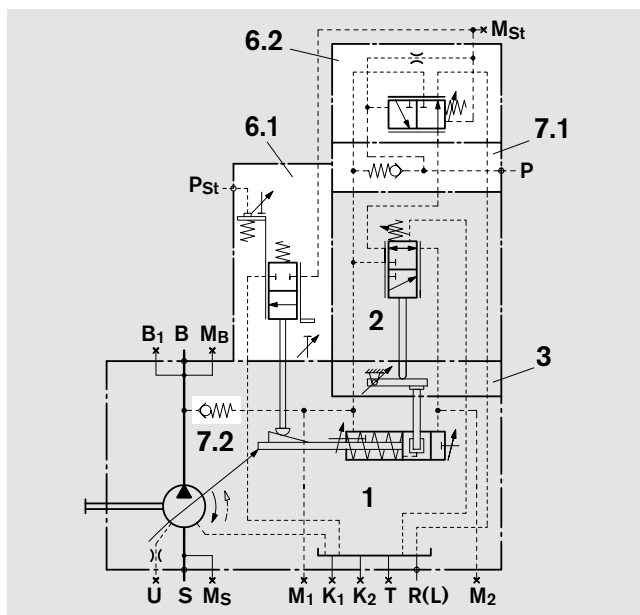
Size 40 and 71

Example: A4VSO LR2H



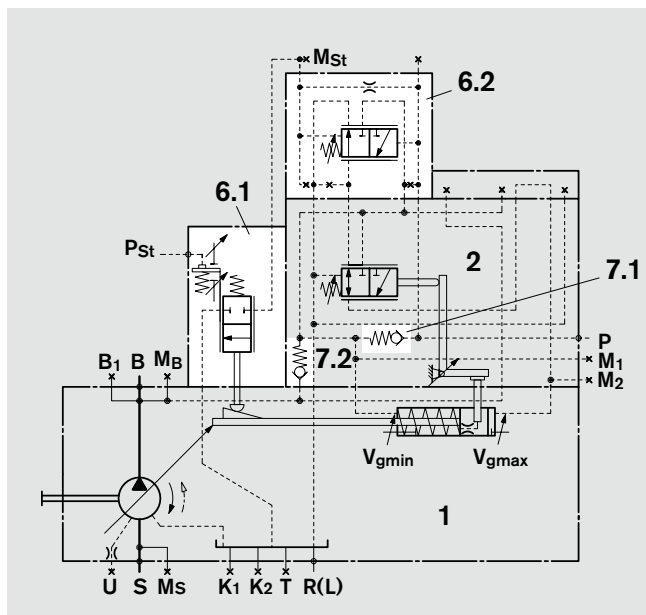
Size 125 to 355

Example A4VSO LR2H



Size 500 to 1000

Example: A4VSO LR2H



Ports

P	Control pressure port
P _{St}	Pilot pressure port
M _{St}	Gauging port pilot control pressure (plugged)
M ₁ , M ₂	Gauging port control chamber pressure (Size 125 to 1000)

Subassemblies

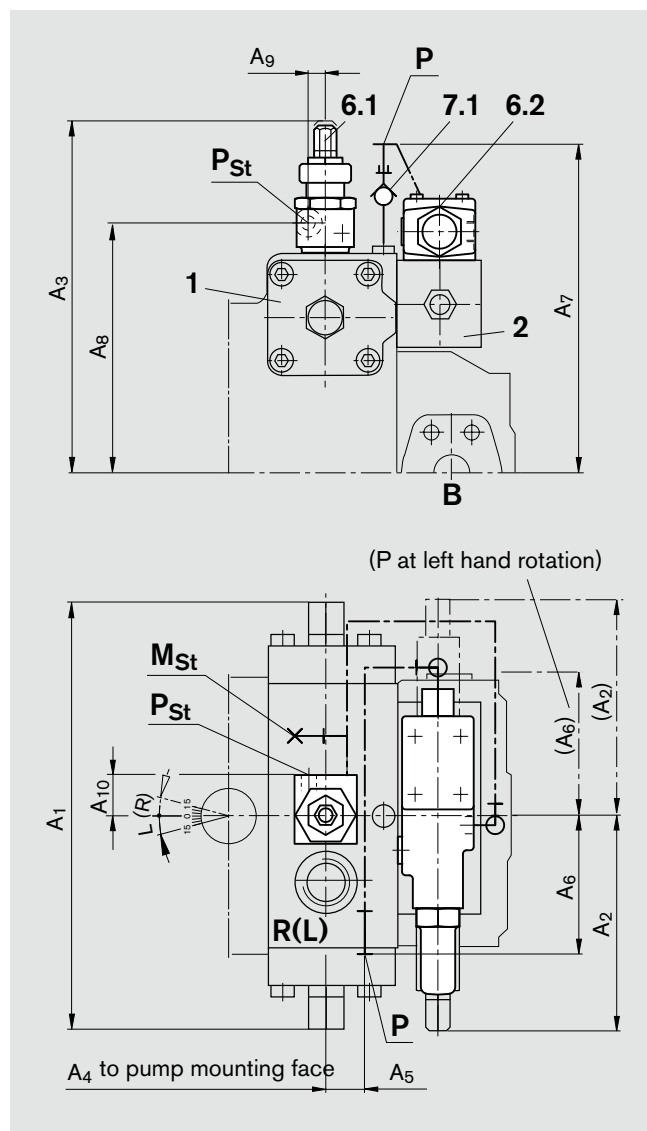
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 6.1 Pilot valve-stroke limiter
- 6.2 Pressure control valve for stroke limiter
- 7.1 Check valve (for size 40 and 71 external, integrated in sizes 125 to 1000)
- 7.2 Integrated check valve

Unit dimensions LR.H

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 40 and 71

Right hand rotation (left hand)



Valve mounting for left hand rotation item 2, 6.2 and 7.1 each rotated 180°

Subassemblies

- 1** A4VSO with hydraulic control device (see RE 92050)
- 2** Power control valve
- 6.1** Pilot valve-stroke limiter
- 6.2** Pressure control valve for stroke limiter
- 7.1** Check valve

Ports

P	Control pressure port	DIN 3853 S8 Form W
P _{St}	Pilot pressure port	DIN 3852 M14x1,5; 12 deep
M _{St}	Gauging port pilot control pressure	DIN 3853 S8 Form W plugged

max. tightening torque¹⁾

50 Nm
80 Nm
50 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
40	260	132	254	144	34	83	198	163	15	35	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
71	296	132	268	166	39	83	215	178	15	35	

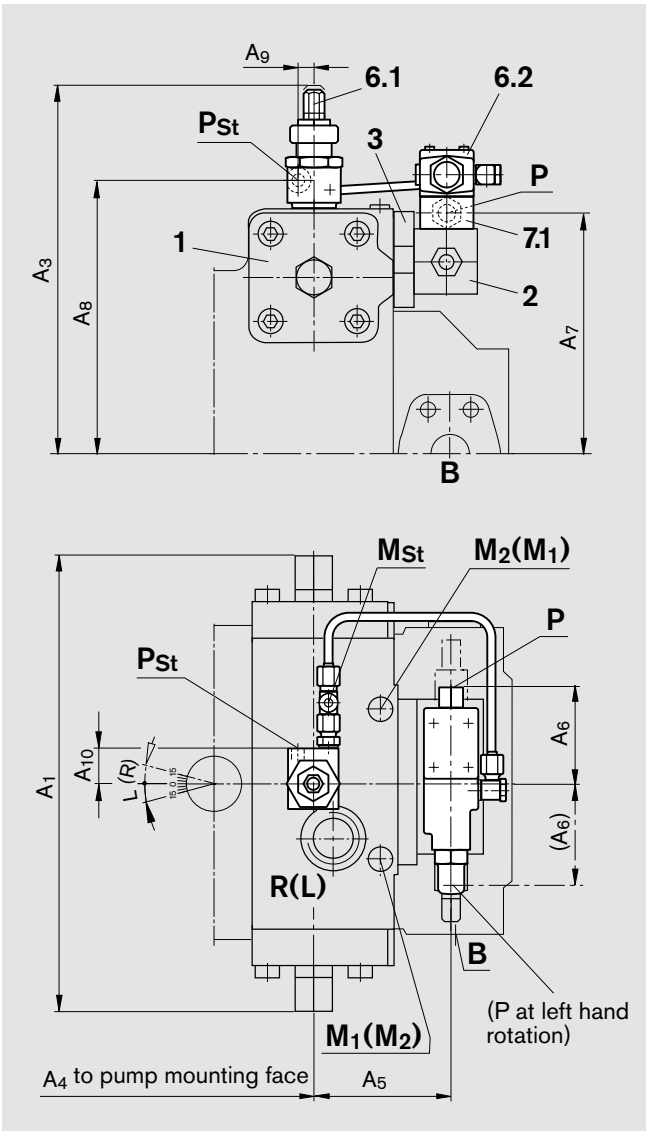
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.H

Before finalising your design please request a certified installation drawing Dimensions in mm.

Size 125 to 355

Right hand rotation (left hand)



Valve mounting for left hand rotation item 2, 6.2 and 7.1 each rotated 180°

Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate
- 6.1 Pilot valve-stroke limiter
- 6.2 Pressure control valve for stroke limiter
- 7.1 Integrated check valve in sandwich plate

Ports				max. tightening torque ¹⁾	
P	Control pressure port	DIN 3852	M18x1,5; 12 deep	140 Nm	
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep	80 Nm	
M _{St}	Gauging port pilot control press.	DIN 3853	S8 Form W closed	50 Nm	
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180)	80 Nm	
			M18x1,5; 12 deep; plugged (Size 250 a. 355)	140 Nm	

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
125/180	354	304	203	112	88	192	214	15	35	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
250/355	424	352	248	129	88	228	261	15	35	

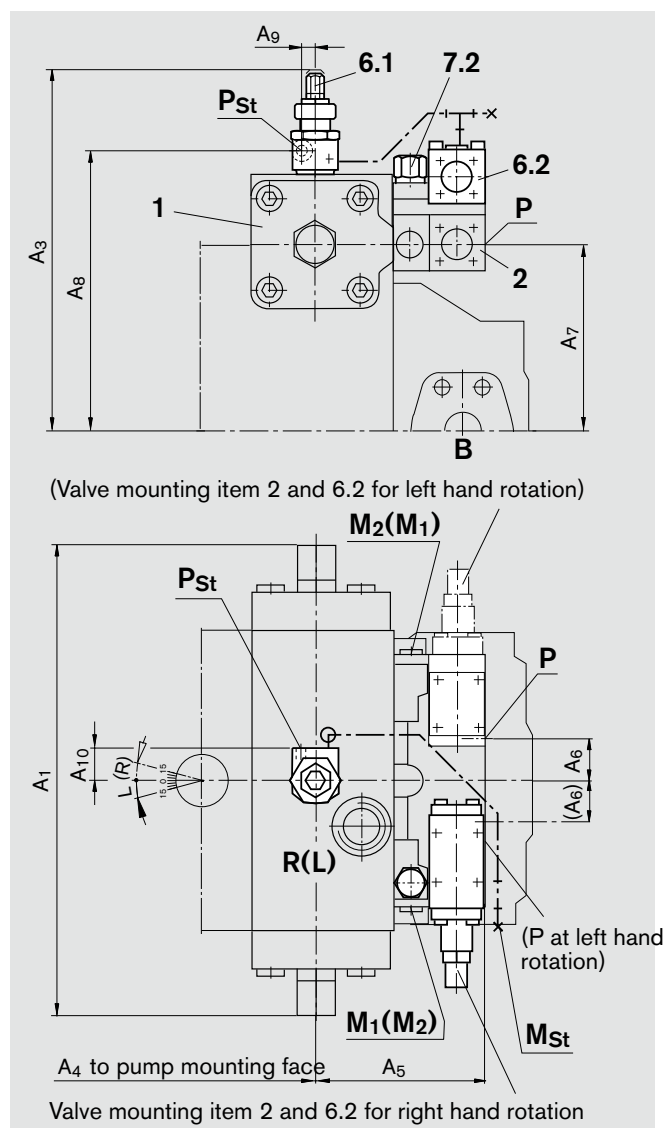
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.H

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000

Right hand rotation (left hand)



Subassemblies

- 1** A4VSO with hydraulic control device (see RE 92050)
- 2** Power control valve
- 6.1** Pilot valve-stroke limiter
- 6.2** Pressure control valve for stroke limiter
- 7.2** Integrated check valve in item 2

Ports

										max. tightening torque ¹⁾
P	Control pressure port	DIN 3852	M22x1,5; 14 deep							210 Nm
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep							80 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W closed							50 Nm
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 12 deep; plugged							140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
500	510	397	279	185	47	202	306	15	35	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
750	582	435	301	196	47	232	345	15	35	
1000	622	463	360	202	47	255	372	15	35	

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.M with mechanical stroke limiter $V_{g\ max}$

Initial position in pressureless condition: $V_{g\ max}$

In addition to the power control function it is also possible to limit the max. displacement $V_{g\ max}$ steplessly through adjustment of a screw spindle. The setting must be done in a pressureless condition.

Adjustment data of stroke limiter $V_{g\ max}$

Setting range: 100% $V_{g\ max}$... 0% $V_{g\ max}$
(can go up to 104% of nominal displacement value)

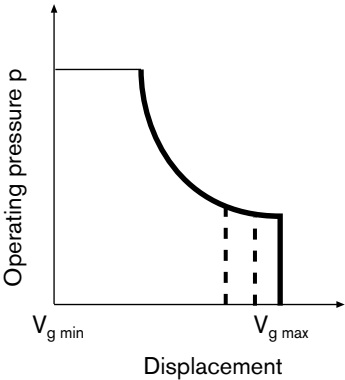
Standard setting: Nominal- $V_{g\ max}$

Size		40	71	125	180	250	355
V_g -change/revolution	cm ³	4,3	6,3	9,1	13,1	14,4	20,6
Total adjustment stroke	s mm	14,2	17,1	20,7	20,7	25,9	25,9

Right hand rotation (with view on screw spindle)–increase of displacement

Left hand rotation (with view on screw spindle)–decrease of displacement

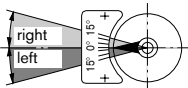
Characteristic



Direction of flow S to B

Pump direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

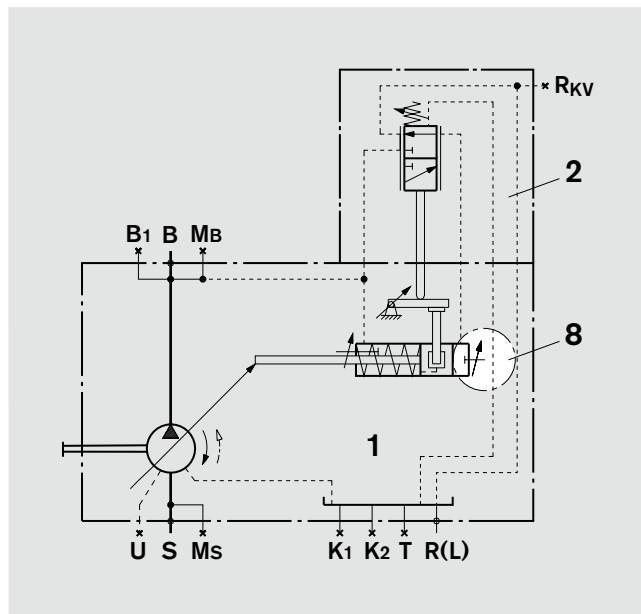
¹⁾ Compare swivel angle indicator



Schematics LR.M

Size 40 and 71

Example: A4VSO LR2M

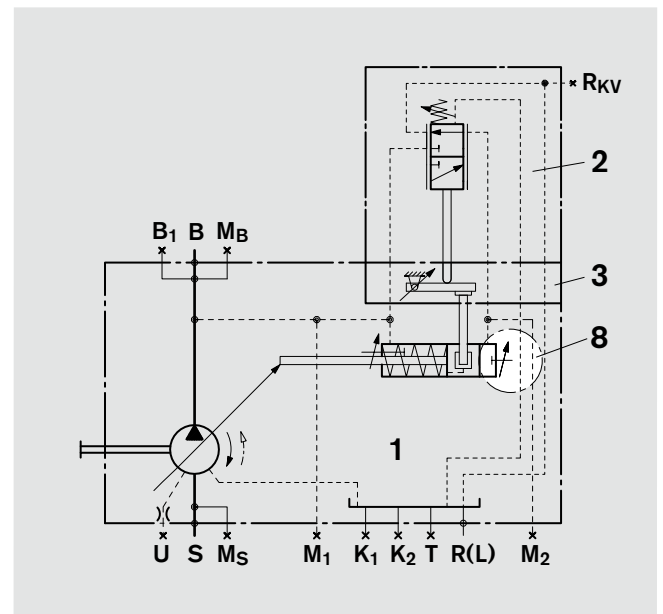


Ports

- R_{kv} External control fluid return
- M_1, M_2 Gauging port control chamber pressure (Size 125 to 355)

Size 125 to 355

Example: A4VSO LR2M



Subassemblies

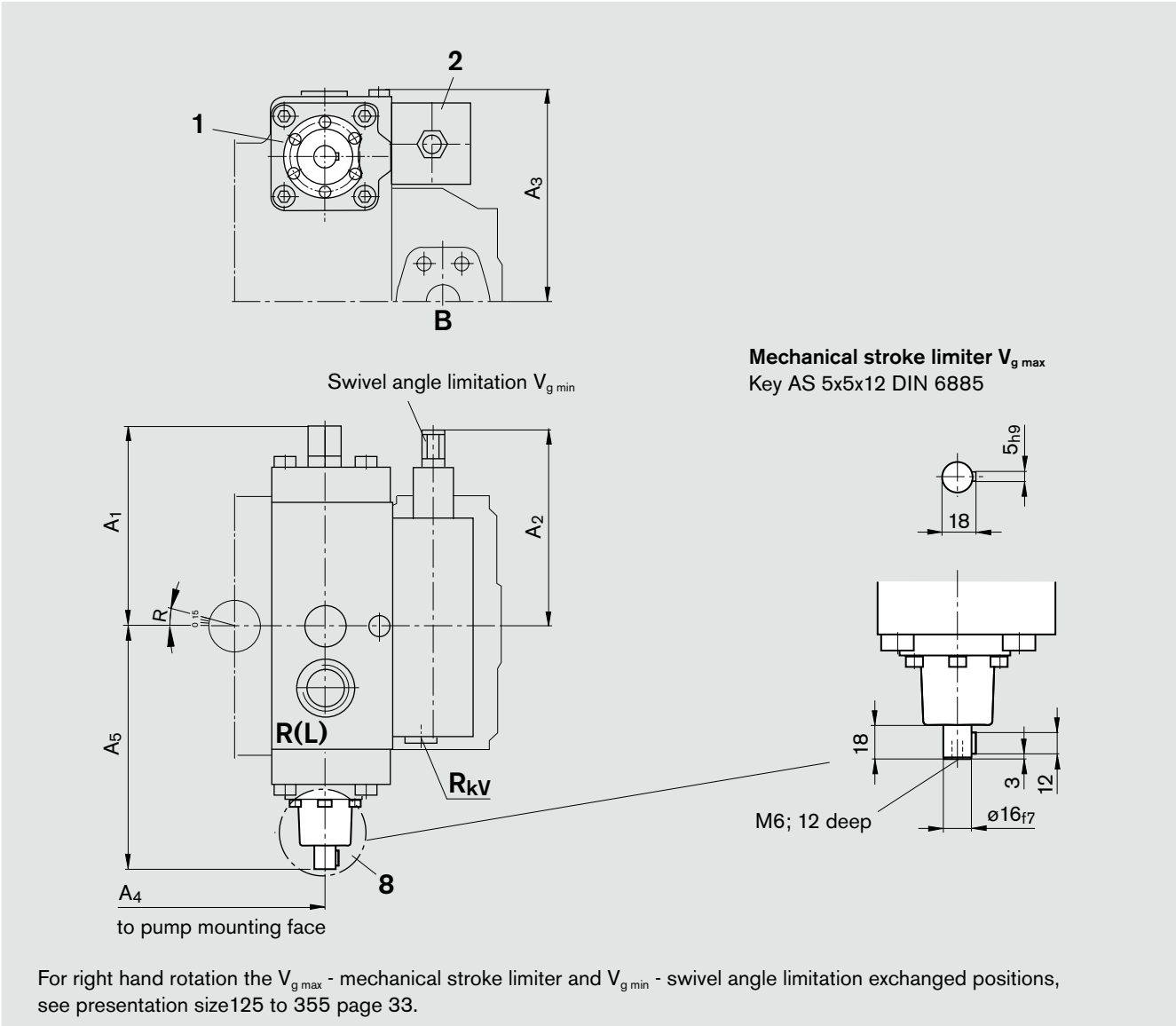
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 8 mechanical stroke limiter $V_{g\max}$

Unit dimensions LR.M

Before finalising your design please request a certified installation drawing Dimensions in mm.

Size 40 and 71

Example: left hand rotation



Subassemblies see page 31

Ports				max. tightening torque ¹⁾
R_{kv}	External control fluid return	DIN 3852	M18x1,5; 12 deep; plugged	140 Nm

Unit dimensions

Size	A_1	A_2	A_3	A_4	A_5	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
40	130	132	148	144	172	
71	148	132	159	166	188	

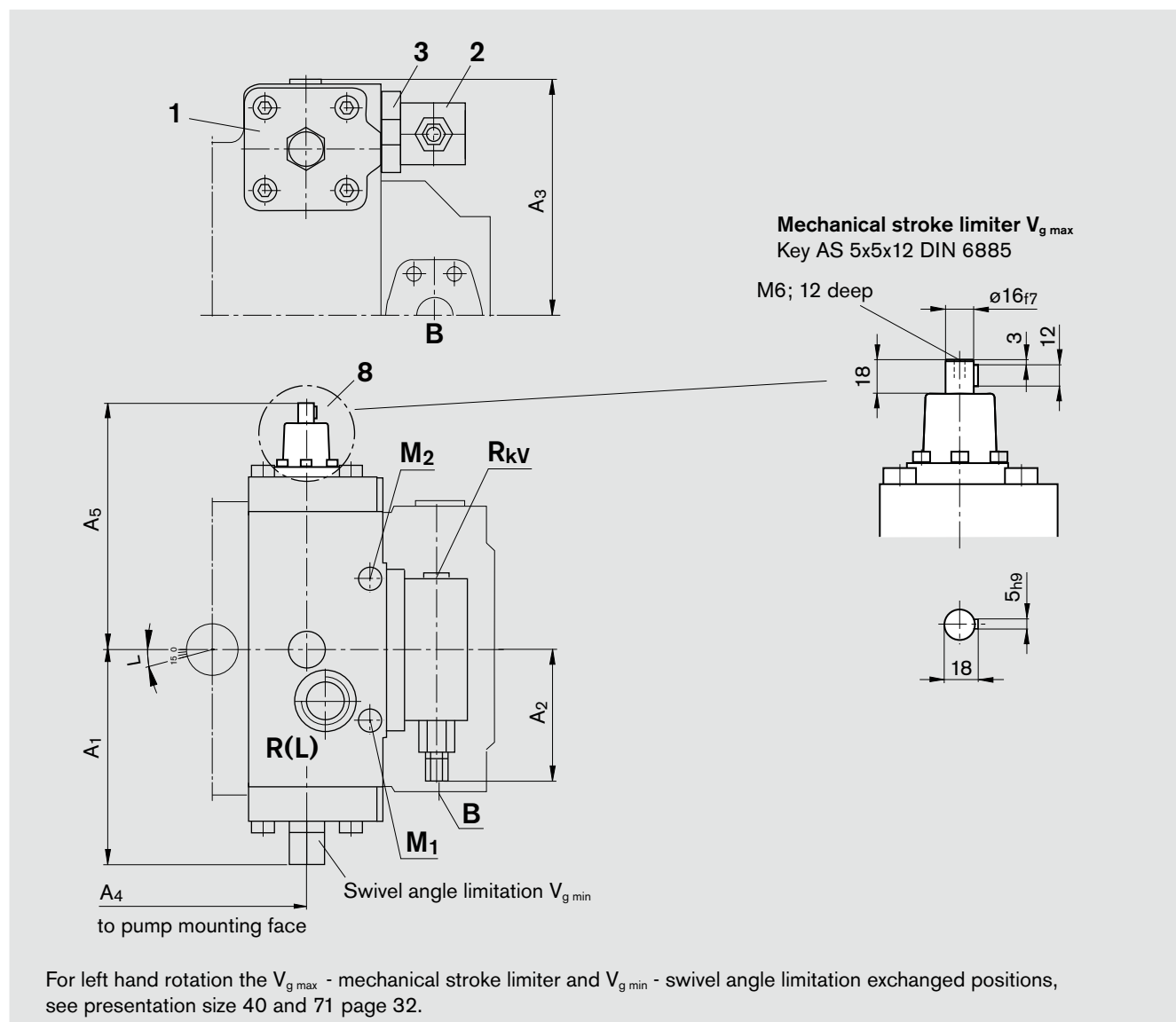
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.M

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 125 to 355

Example: right hand rotation



Subassemblies see page 31

Ports

					max. tightening torque ¹⁾
R_{kv}	External control fluid return	DIN 3852	M18x1,5; 12 deep; plugged		140 Nm
$M_1; M_2$	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180)	80 Nm	
			M18x1,5; 12 deep; plugged (Size 250 a. 355)	140 Nm	

Unit dimensions

Size	A_1	A_2	A_3	A_4	A_5	
125/180	177	132	195	203	213	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
250/355	212	132	238	248	243	

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.Z Hydraulic two-point control

can be used as easy start option, external pilot pressure required

Initial position in pressureless condition and with R_{kv} port unloaded: V_{gmax}

The LR2(3)Z is a simple 2-point displacement adjustment with overriding power control.

Pressurizing port R_{kv} brings the control device towards the adjustable V_{gmin}-stop. Unloading the port R_{kv} to tank enables the pump to perform the LR2(3)-control functions.

For the power and pressure pressure control functions port R_{kv} must be unloaded to tank (by customer).

This feature enables a pump to be started against a reduced starting torque.

Recommended pilot pressure at port R_{kv}:

$$p_p = \frac{\text{Output press. } p_{HD}}{2} \quad \text{however at least 20 bar.}$$

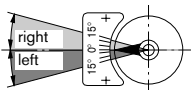
The V_{gmin}-stop will be factory set (between 0...50% V_{gmax}).
Please state desired value in clear text when ordering.

For prolonged periods in standby we recommend to use LR.G with external unloading of pilot pressure.

Direction of flow S to B

Pump direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

¹⁾ Compare swivel angle indicator

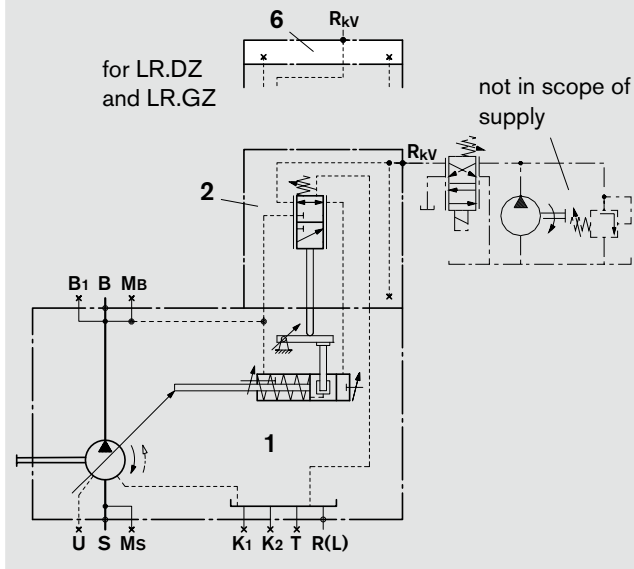


Schematics LR.Z

Size 40 and 71

Example: A4VSO LR2Z

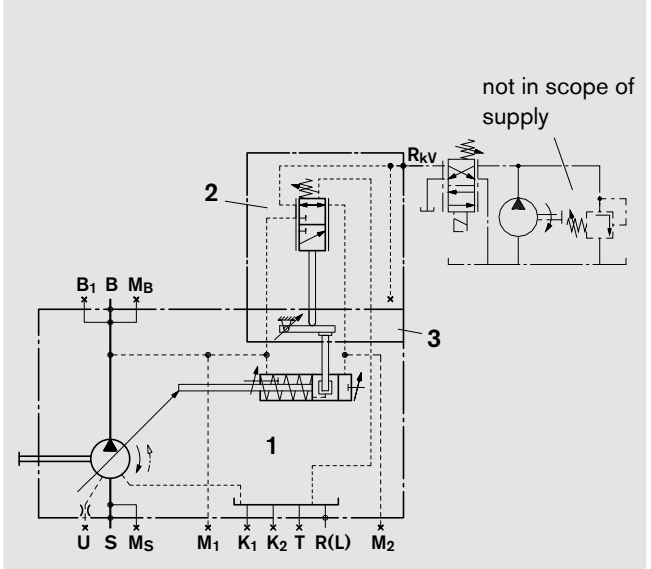
as easy start option with external pilot pressure supply



Size 125 to 355

Example: A4VSO LR2Z

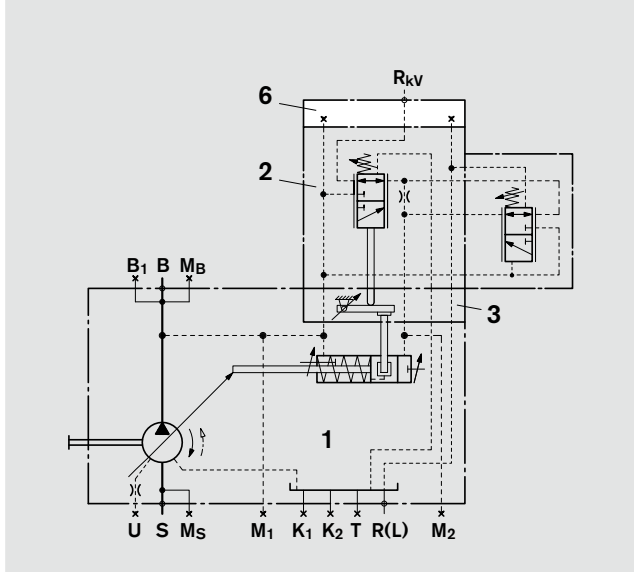
as easy start option with external pilot pressure supply



Size 125 to 355

Example: A4VSO LR2DZ

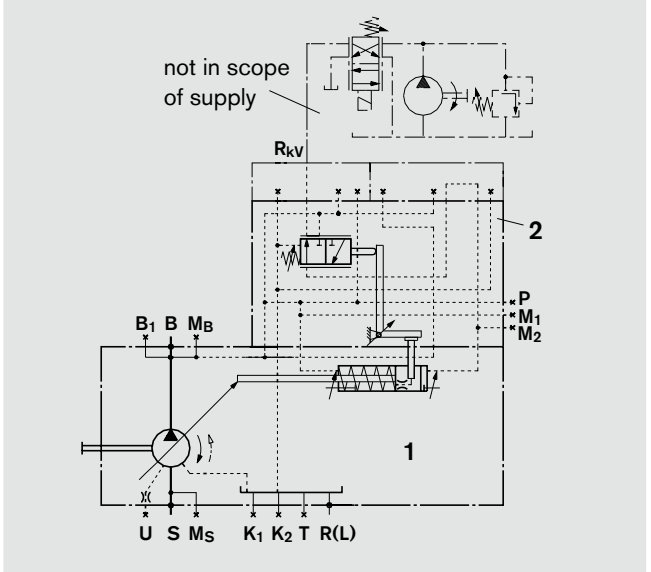
with adapter plate Rkv with pressure control



Size 500 to 1000

Example: A4VSO LR2Z

as easy start option with external pilot pressure supply



Ports

R _{kV}	External control fluid return
M ₁ , M ₂	Gauging port control chamber pressure (Size 125 to 1000)
P	Control pressure port (Size 500 to 1000)

Subassemblies

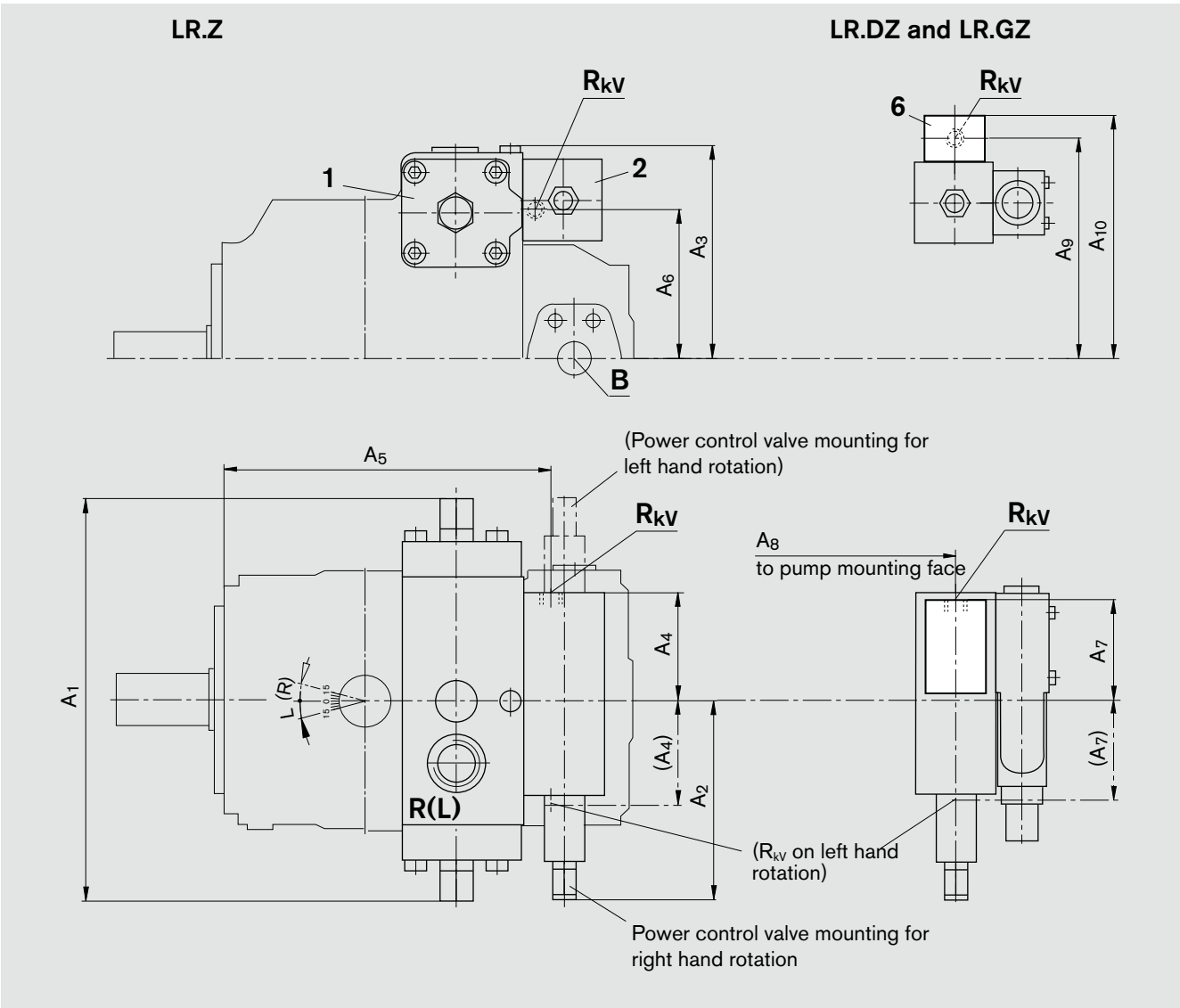
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 6 Adapter plate R_{kV} for LR.DZ and LR.GZ (Size 40 to 355)

Unit dimension LR.Z

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 40 and 71

Right hand rotation (left hand)



Subassemblies see page 35

Ports

R_{kv} External control fluid return DIN 3852 M18x1,5; 12 deep

max. tightening torque ¹⁾

140 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
40	260	132	149	80	209	114	63	219	152	168	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
71	296	132	159	80	236	125	63	246	163	184	

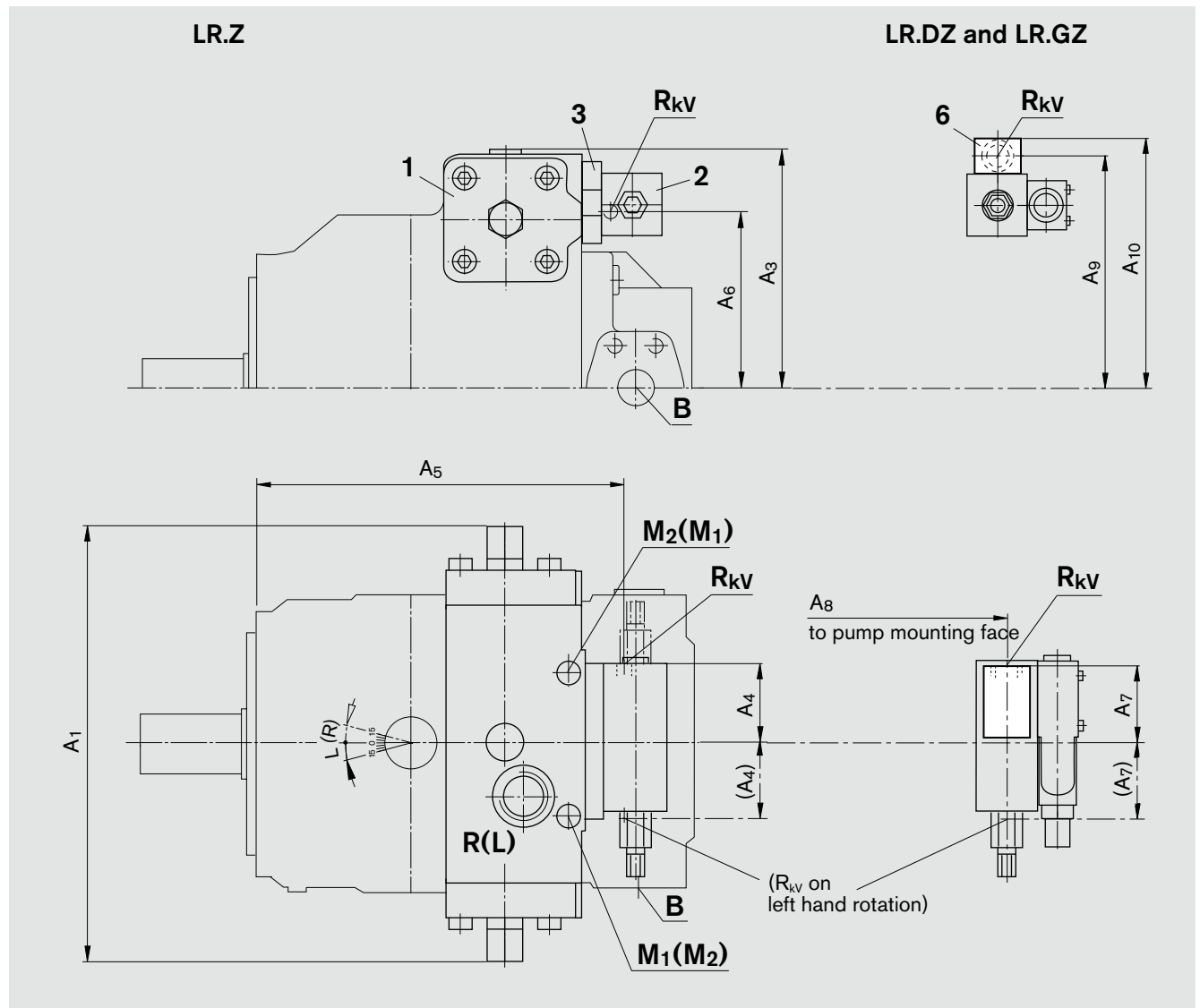
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimension LR.Z

Before finalising your design please request a certified installation drawing. Dimensions in mm..

Size 125 to 355

Right hand rotation (left hand)



Subassemblies see page 35

Ports

											max. tightening torque ¹⁾
R _{kV}	External control fluid return	DIN 3852	M18x1,5; 12 deep								140 Nm
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180)								80 Nm
			M18x1,5; 12 deep; plugged (Size 250 a. 355)								140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
125/180	354	195	80	305	155	63	315	193	209	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
250/355	424	238	80	367	191	63	377	229	250	

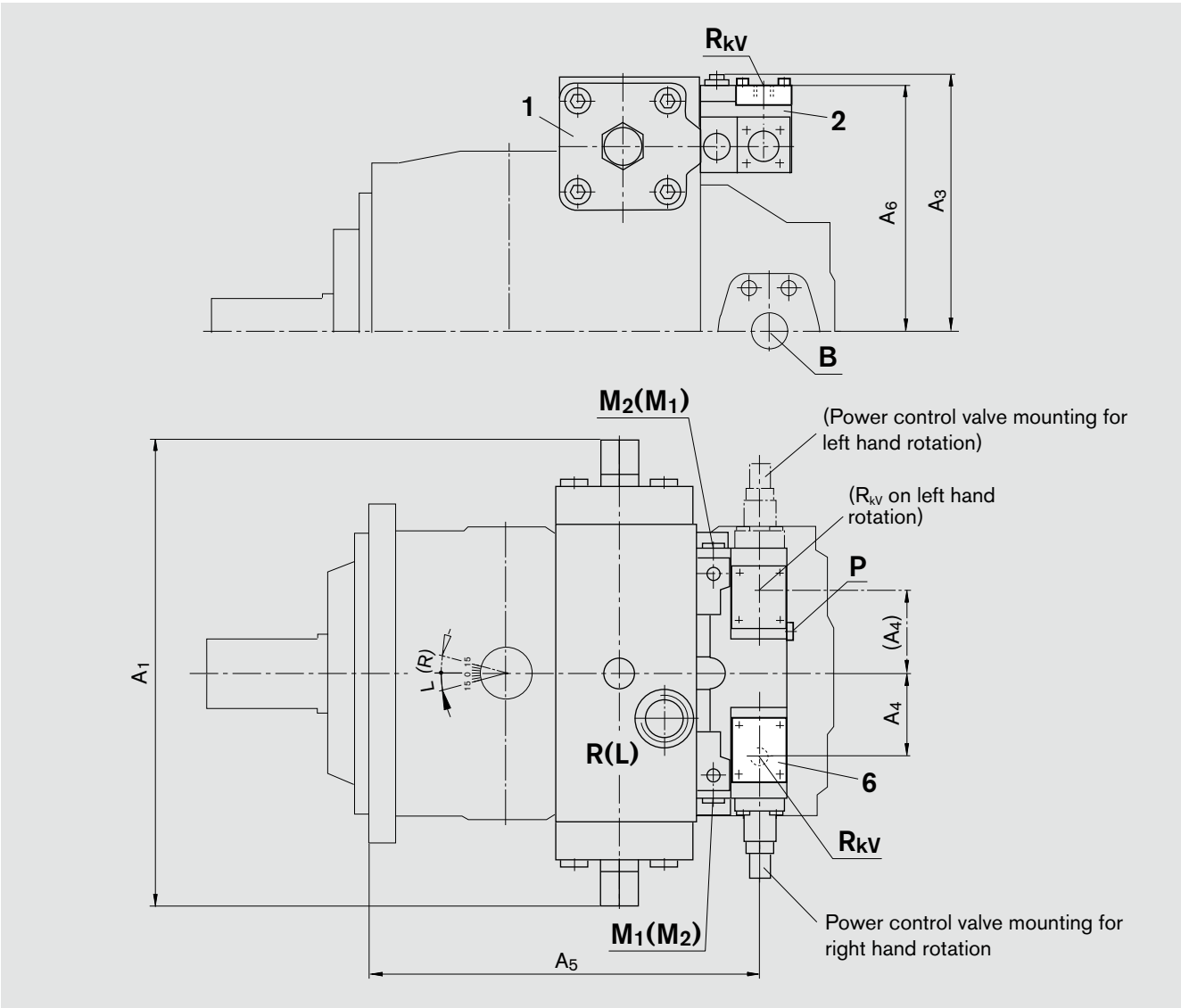
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.Z

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000

Right hand rotation (left hand)



Subassemblies see page 35

Ports				max. tightening torque ¹⁾
R _{kV}	External control fluid return	DIN 3852	M18x1,5; 12 deep	140 Nm
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M18x1,5; 12 deep; plugged	140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	For detailed unit dimensions and technical data on the variable pump see technical dat sheet A4VSO RE 92050
500	510	285	94	433	277	
750	582	322	94	465	307	
1000	622	350	94	532	330	

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.Y Electric two-point control

with internal supply of pilot pressure

Initial position in pressureless condition and solenoid energized: V_{gmax}

The LR2(3)Y is an electric two-position displacement adjustment with overriding power control and internal pilot pressure supply, i.e. the necessary pilot pressure is taken out of the pump pressure side.

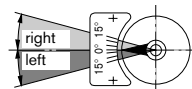
Valve function:

- a) Solenoid de-energized = easy start, pump swivels back towards V_{gmin} -stop as soon as an operating pressure of approx. 4...10 bar is reached
- b) Solenoid energized = pump operates in power control mode

Direction of flow S to B

Pump direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

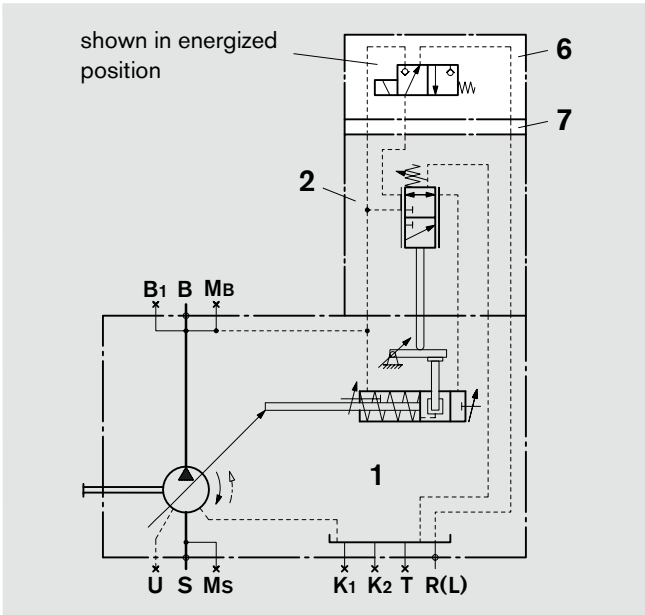
¹⁾ Compare swivel angle indicator



Schematics LR.Y

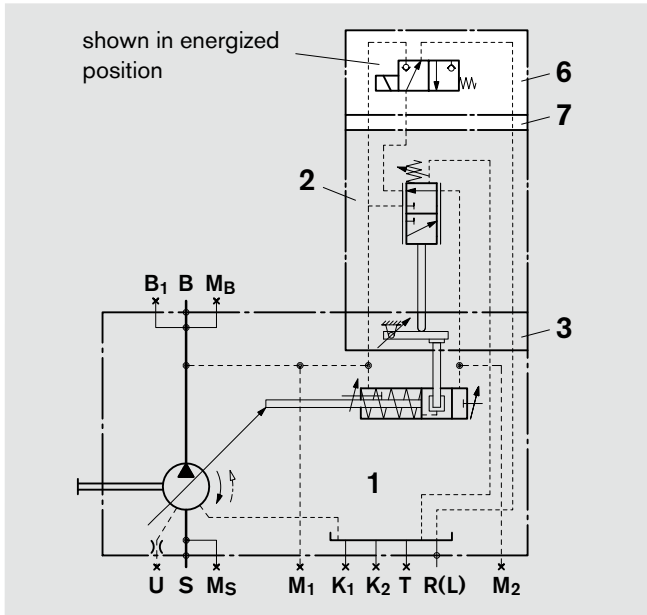
Size 40 and 71

Example: A4VSO LR2Y



Size 125 to 355

Example: A4VSO LR2Y



Ports

M₁, M₂ Gauging port control chamber pressure (size 125 to 355)

Subassemblies

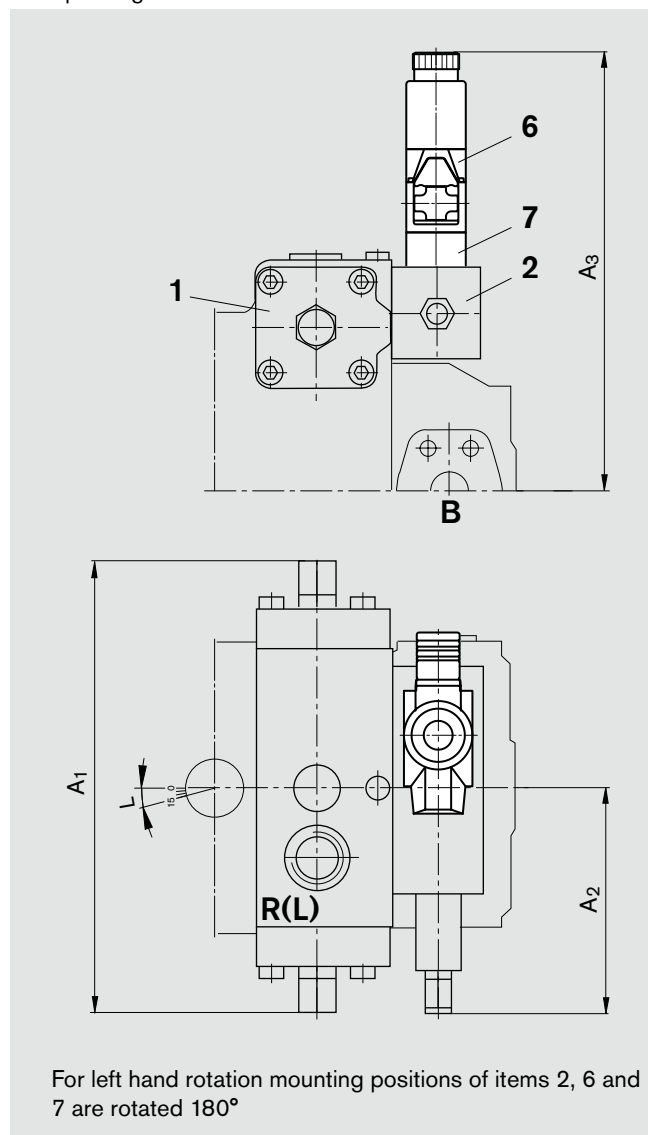
1	A4VSO with hydraulic control device (see RE 92050)	
2	Power control valve	
3	Sandwich plate (size 125 to 355)	
6	3/2-directional poppet valve see RE 22058 (for size 40 to 355)	
	Type	Solenoid
	M-3SEW6U3X/420MG24N9K4	Solenoid with junction box (Hirschmann) to DIN EN 175 301-803 cable joint M16x1,5 for cable dia. 4,5...10 mm protection IP65
7	sandwich plate	

Unit dimensions LR.Y

Before finalising your design please request a certified installation drawing. Dimensions in mm.

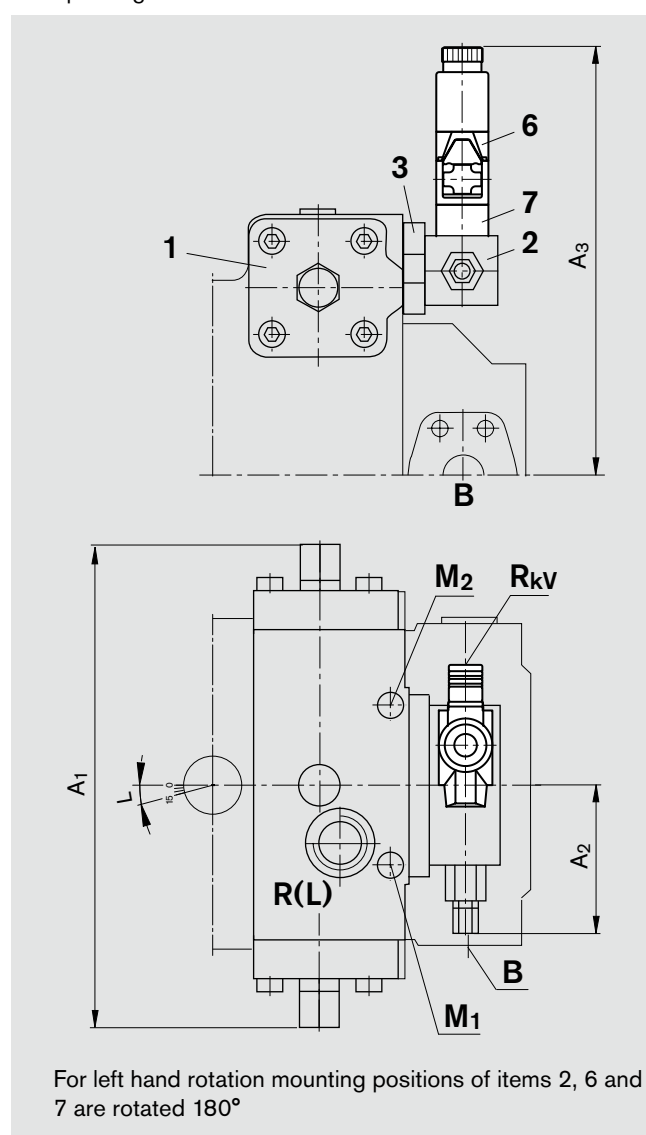
Size 40 and 71

Example: Right hand rotation



Size 125 to 355

Example: Right hand rotation



Subassemblies see page 40

Ports

max. tightening torque¹⁾

M₁; M₂ Gauging port control chamber press. DIN 3852 M14x1,5; 12 deep; plugged (Size 125 a. 180) 80 Nm
M18x1,5; 12 deep; plugged (Size 250 a. 355) 140 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
40	260	132	292	
71	296	132	308	
125/180	354	132	338	
250/355	424	132	374	

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.S with Load-Sensing valve

and remote pressure control

Initial position in pressureless condition: V_{gmax}

The LRS- control works as a load pressure independent flow controller and matches the pump output flow with the flow requirement from the actuator.

The pump output pressure at port B will always be higher by the set differential pressure Δp than the load pressure at the actuator.

The pump flow depends on the opening cross section of an orifice item 4.1 (throttle valve, proportional valve or valve block), and below the power control curve the pump flow is not influenced by the actual load pressure.

The Load-Sensing valve compares the operating pressure upstream of the orifice item 4.1 (throttle valve, proportional valve or valve block) with the operating pressure downstream of this orifice and keeps the pressure drop (differential pressure Δp) constant at the set value, i.e. the pump flow remains constant.

At a change of the differential pressure Δp over orifice (item 4.1), caused by a change in orifice or valve opening cross section, the pump flow adapts to this new condition, i.e. increase of differential pressure brings the pump to a smaller displacement.

Optional pressure control (item 5 and 5.1)

As soon as the load pressure reaches the level as set at pressure relief valve (item5), the system will go to the pressure control mode, regardless of the actual differential pressure at orifice (item 4.1). This requires an additional orifice (item 5.1).

The standard setting of the differential pressure at the Load Sensing valve (item 4) amounts to $\Delta p = 14$ bar.

Actuation of relief valve (item 5) causes a pilot fluid consumption of approx. 1,3 L/min with an orifice dia. of 0,8 mm (item 5.1) and a $\Delta p = 14$ bar.

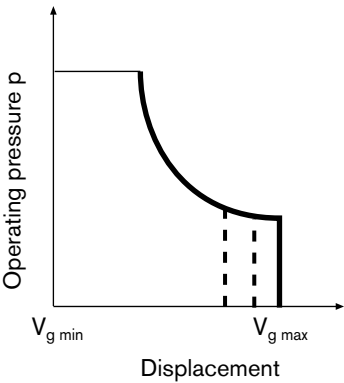
The max. line length to the separate pressure relief valve (item 5) should not exceed 2 m.

Notes to the setting of the remote pressure control:

The setting of the separate pressure relief valve (item 5) plus the pressure differential at the Load-Sensing valve determines the overall pressure control level.

Example: external pressure relief valve 336 bar
 Differential pressure at Load-Sensing 14 bar
 results in pressure control of $336 + 14 = 350$ bar

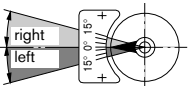
Characteristic



Direction of flow S to B

Pump direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

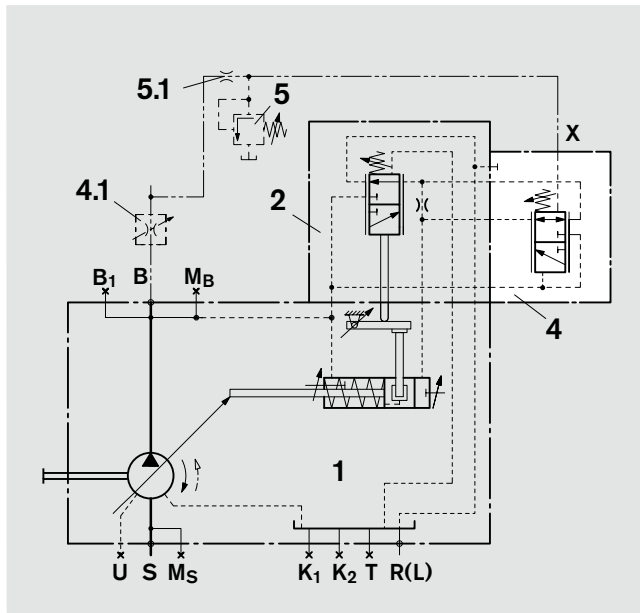
¹⁾ Compare swivel angle indicator



Schematics LR.S

Size 40 and 71

Example: A4VSO LR2S

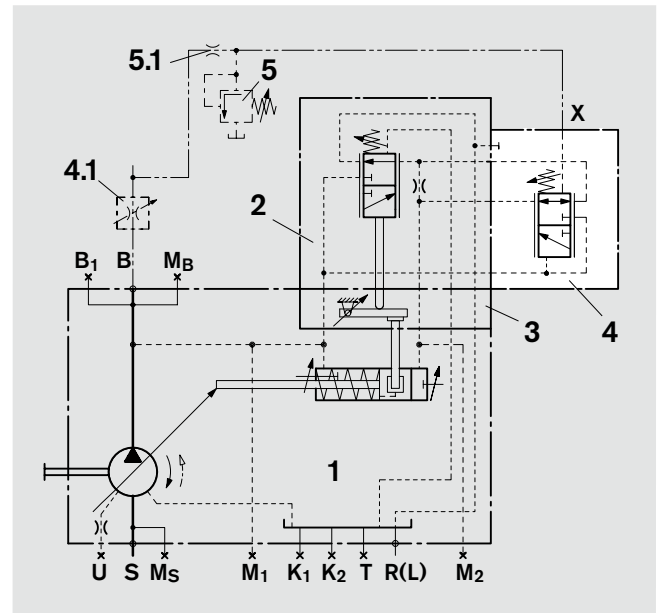


Ports

- X Pilot pressure control
 M₁, M₂ Gauging port control chamber pressure
 (Size 125 to 355)

Size 125 to 355

Example: A4VSO LR2S



Subassemblies

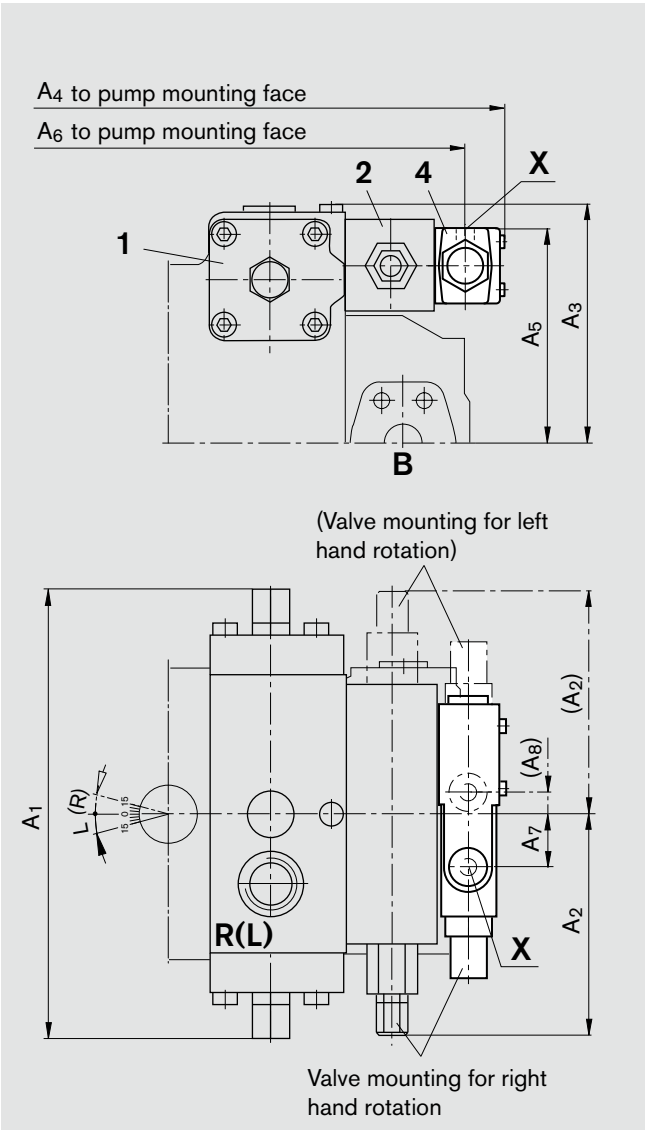
- 1 A4VSO with hydraulic control device
 (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 4 Load-Sensing valve
- 4.1 Orifice for load sensing
 (not in scope of supply)
- 5 Pressure relief valve optional
 (not in scope of supply)
 Recommended:
 DBD 6 (hydraulic) to RE 25402
 or DBETR-SO 437 (electric) to RE 29166
- 5.1 Orifice for remote pressure control optional
 (not in scope of supply)
 Recommended: 0,8 - 1 mm
 depending on the load sensing control the pressure
 increase can amount to 14 bar

Unit dimensions LR.S

Before finalising your design please request a certified installation drawing. Dimensions in mm.

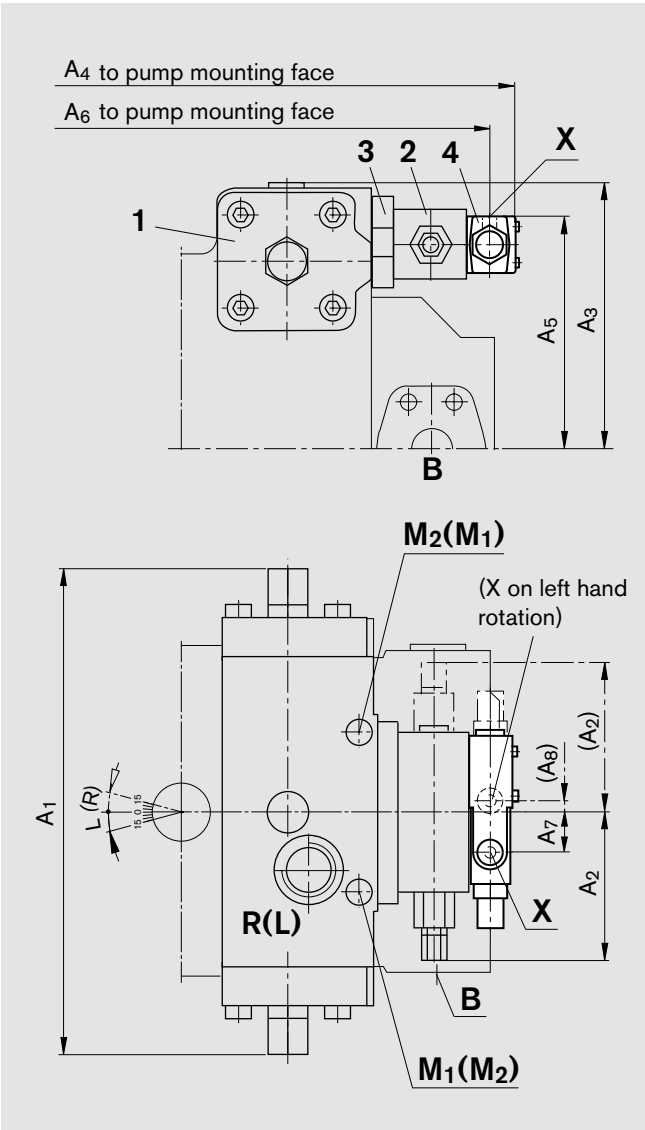
Size 40 and 71

Right hand rotation (left hand)



Size 125 to 355

Right hand rotation (left hand)



Subassemblies see page 43

Ports				max. tightening torque ¹⁾
X	Pilot pressure port	DIN 3852	14x1,5; 12 deep	80 Nm
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180)	80 Nm
			M18x1,5; 12 deep plugged (Size 250 a. 355)	140 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈
40	260	132	148	295	130	269	37	7
71	296	132	159	322	141	296	37	7
125/180	354	132	195	391	171	365	37	7
250/355	424	132	238	453	207	427	37	7

For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.N Hydraulic stroke control, pilot pressure dependent

Initial position in pressureless condition: $V_{g \min}$

The hydraulic stroke control needs an external control pressure supply to port P

The displacement is increased proportional to an external pilot pressure signal in port P_{St}.

The hyperbolic power control is overriding the pilot pressure signal and will keep the pre-determined drive power constant.

$$p \cdot V_g = \text{constant}$$

p = Operating pressure
 V_g = Displacement

Limitation of displacement is possible via:

- Direct swivel angle limitation at the control piston (item 1) - **mechanical**
- Additional stroke limitation at the pilot valve (item 6.1) - **hydraulic**

Setting range

mechanical swivel angle limitation at the control piston:

$$V_{g \min} \quad 0...50 \% \text{ of } V_{g \max} \quad V_{g \max} \quad 100...50 \% \text{ of } V_{g \max}$$

hydraulic stroke limitation at the pilot valve:

$$V_{g \min} \quad 0...100 \% \text{ of } V_{g \max} \quad V_{g \max} \quad 100...0 \% \text{ of } V_{g \max}$$

The min. and max. mechanical swivel angle limitations are factory set to a fixed value. Please state the desired value in clear text when ordering.

The standard setting of the hydraulic stroke limitation is done in such a manner, that the above mentioned mechanical $V_{g \min}$ - and $V_{g \max}$ settings can be achieved. Different settings please state in clear text.

Technical data

Min. required control pressure in P	$p_{\text{contr min}}$	bar		35
Min. required control pressure in P with boosted inlet S of max. 20 bar	$p_{\text{contr min}}$	bar		50
Max. permissible control pressure in P	$p_{\text{contr max}}$	bar		100
Control fluid consumption in P (at $p = 50$ bar)		L/min		max. 4
Pilot pressure range	p_{pilot}	bar		10...45
Beginning of power control curve, however must be above control press. p_{contr}	p	bar		50...350
Hysteresis				$\leq \pm 2\%$ von $V_{g \max}$

Please observe the following in control combinations with remote pressure control (LR2GN and LR3GN):

With a pressure control setting below the pressure level of the external control pressure supply p_{contr} in P all pumps up to size 355 will remain against the mechanical stroke limiter $V_{g \min}$ and the sizes 500 to 1000 may experience oscillations.

Table of values LR.N

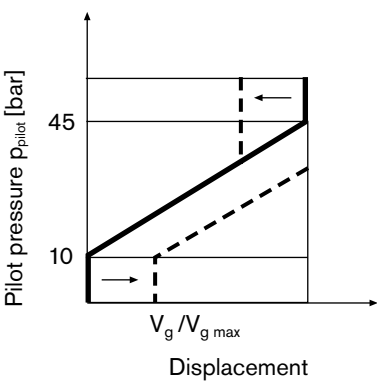
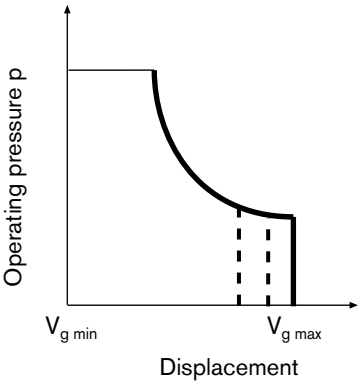
Size		40	71	125	180	250	355	500	750	1000
Control volume	$V_{1 \max}$ cm ³	11,4	21,5	37,5	37,5	73,2	73,2	125,0	210,0	263,3
Control volume	$V_{2 \max}$ cm ³	2,9	5,4	12,7	12,7	24,9	24,9	40,1	72,6	88,0
Differential volume	$V_1 - V_2$ cm ³	8,5	16,1	24,8	24,8	48,3	48,3	84,9	137,4	175,3
Control fluid required for de-stroking at Control pressure $p_{\text{contr}} = 50$ bar; Operating pressure $p < 50$ bar; Beginning of power control $p > 50$ bar	L/min	5,16*	6,44*	7,44*	7,44*	9,66*	9,66*	10,13*	11,00*	10,50*
at de-stroking time	s	0,10	0,15	0,20	0,20	0,30	0,30	0,50	0,75	1,00

* Note that the control pressure supply needs an additional 4 L/min flow to compensate for the flow losses in the pilot circuit

LR.N hydraulic stroke control, pilot pressure dependent

Initial position in pressureless condition: $V_{g \min}$

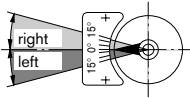
Characteristics



Direction of flow S to B

Pump direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B
left hand	right	B

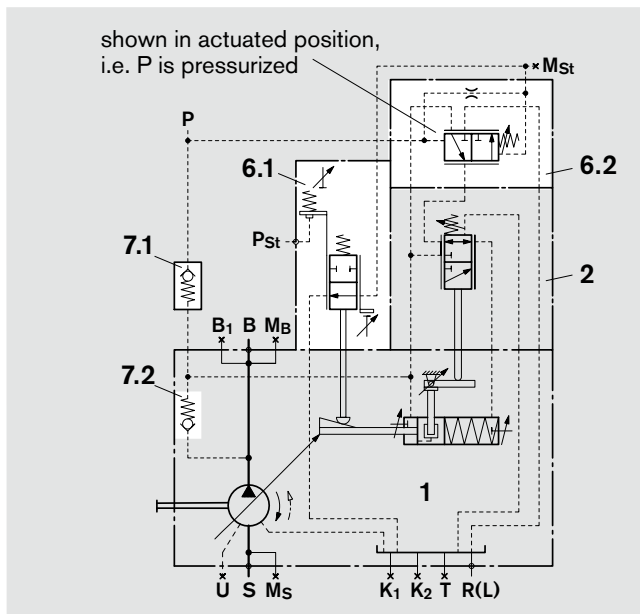
¹⁾ Compare swivel angle indicator



Schematics LR.N

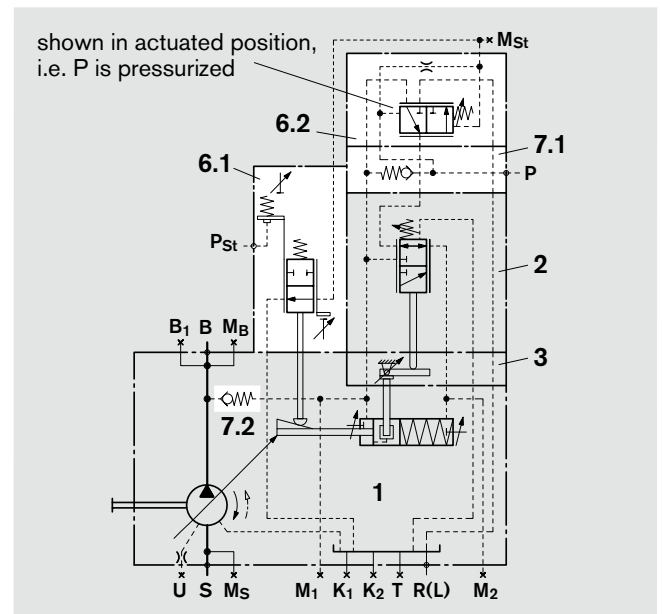
Size 40 and 71

Example: A4VSO LR2N



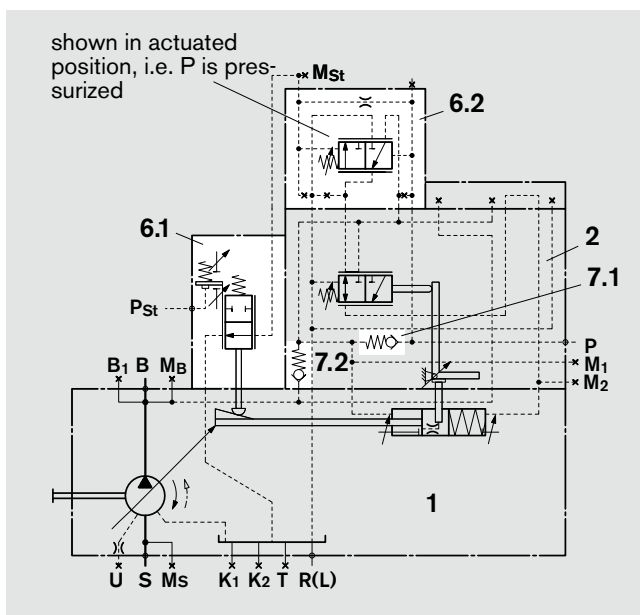
Size 125 to 355

Example: A4VSO LR2N



Size 500 to 1000

Example: A4VSO LR2N



Ports

P	Control pressure port
P _{St}	Pilot pressure port
M _{St}	Gauging port pilot control pressure (closed)
M ₁ , M ₂	Gauging port control chamber press. (Size 125 to 1000)

Subassemblies

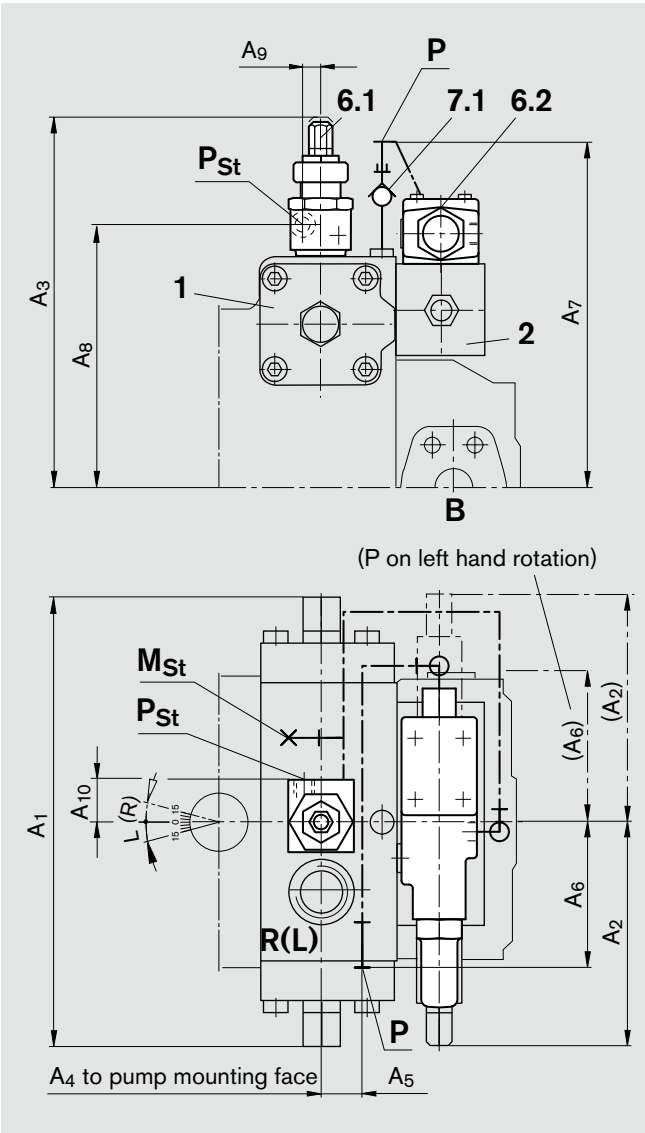
- 1** Pump with hydraulic control device
A4VSO (see RE 92050)
- 2** Power control valve
- 3** Sandwich plate (Size 125 to 355)
- 6.1** Pilot valve
- 6.2** Control valve
- 7.1** Check valve (integrated in sizes 125 to 1000)
- 7.2** Integrated check valve

Unit dimensions LR.N

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 40 and 71

Right hand rotation (left hand)



Valve mounting position for left hand rotation item 2, 6.2 and 7.1 rotated by 180°

Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 6.1 Pilot valve
- 6.2 Control valve
- 7.1 check valve

Ports					max. tightening torque ¹⁾	
P	Control pressure port	DIN 3853	S8 Form W		50 Nm	
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep		80 Nm	
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed		50 Nm	

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
40	260	132	248	144	34	83	198	163	15	35	
71	296	132	264	166	39	83	215	180	15	35	

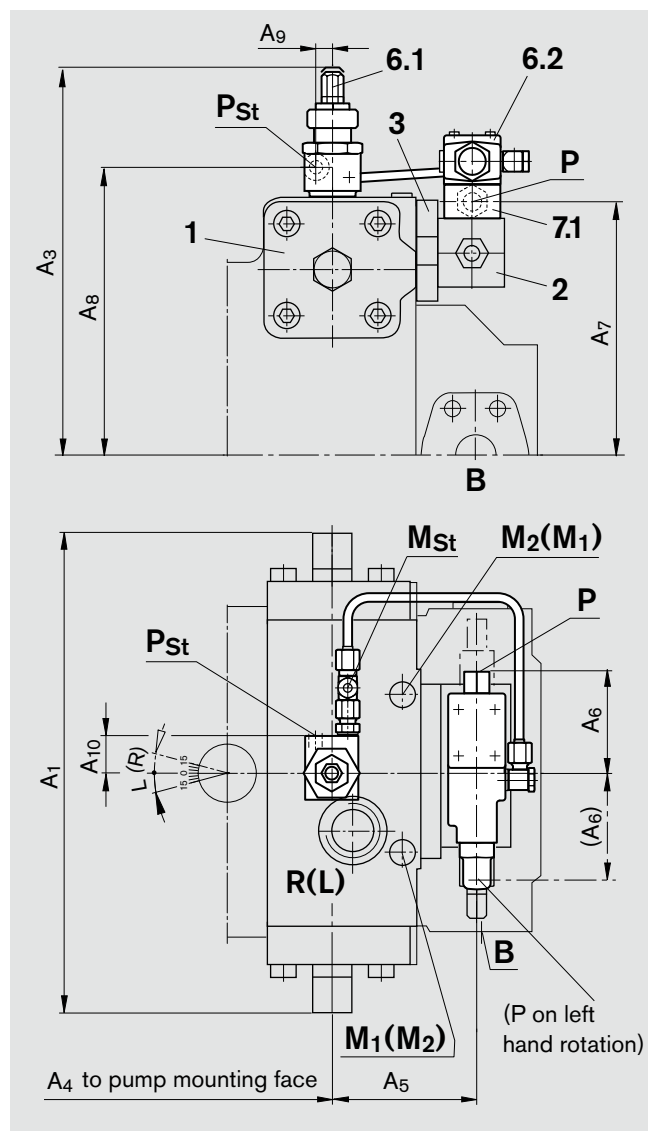
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.N

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 125 to 355

Right hand rotation (left hand)



Valve mounting position for left hand rotation item 2, 6.2 and 7.1 rotated by 180°

Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 6.1 Pilot valve
- 6.2 Pilot control valve
- 7.1 Integrated check valve in sandwich plate

Ports

										max. tightening torque ¹⁾
P	Control pressure port	DIN 3852	M18x1,5; 12 deep							140 Nm
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep							80 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W closed							50 Nm
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180)							80 Nm
			M18x1,5; 12 deep; plugged (Size 250 a. 355)							140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
125/180	354	298	203	112	88	192	214	15	35	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
250/355	424	346	248	129	88	228	261	15	35	

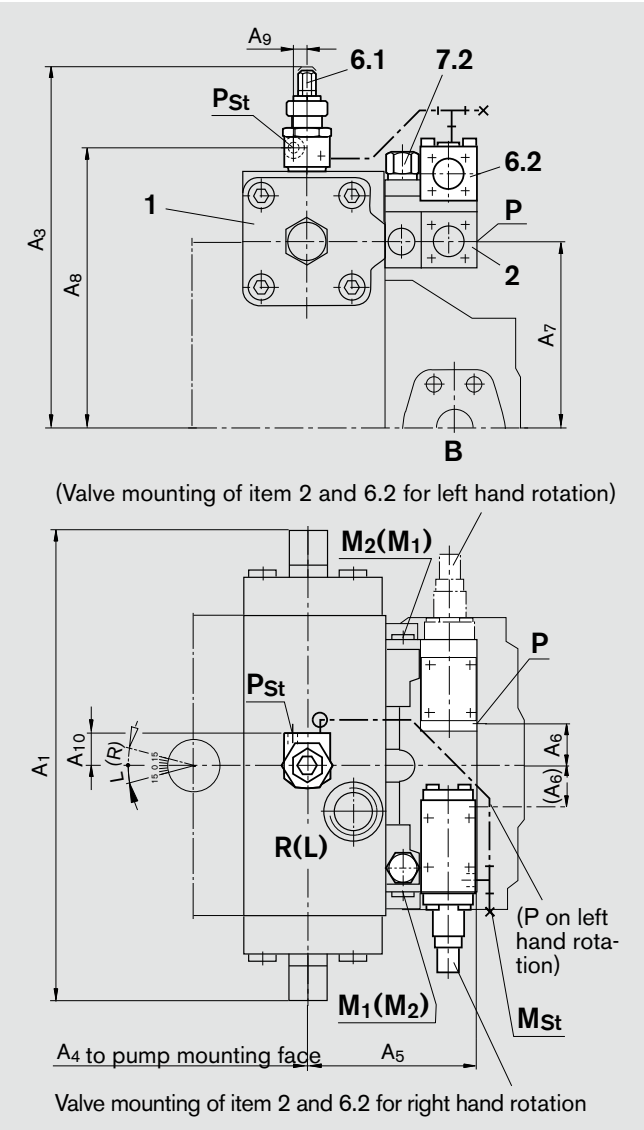
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.N

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000

Right hand rotation (left hand)



Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 6.1 Pilot valve
- 6.2 Pilot control valve
- 7.2 Integrated check valve in item 2

Ports

										max. tightening torque ¹⁾
P	Control pressure port	DIN 3852	M22x1,5; 14 deep							210 Nm
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep							80 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed							50 Nm
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 12 deep; plugged							140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
500	510	392	279	185	47	202	306	15	35	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
750	582	430	301	195	47	232	345	15	35	
1000	622	456	360	203	47	255	372	15	35	

¹⁾ please observe the general notes for the max. tightening torques on page 68

LR.NT with hydr. stroke control and electric control of pilot pressure

Initial position in pressureless condition: $V_{g\ min}$

Only available in right hand rotation.

This control needs an external control pressure supply to port P

The proportional relief valve DBEP6 (to RE 29164) supplies a pilot pressure signal to the pilot pressure chamber at P_{St} proportional to the valve solenoid current.

The solenoid current controls and limits the pilot pressure.

Control through an electric command value. Current control through pulse width modulation.

Analogue or digital amplifiers can be used to drive the solenoids eg. proportional amplifier VT 3000 with 170 Hz (see RE 29935). Please order separately.

For the selection of electronics and operating fluids, description of functions and emergency overrides and further technical data please observe RE 29164.

Technical data – electric

Operating voltage	24 V
Nominal solenoid current	700 mA
Control current	
Beginning of control at V_{g0} and 10 bar pilot pressure	300 mA
End of control at V_{gmax} and 45 bar pilot pressure	700 mA
Nominal resistance at 20°C (R_{20})	19,5 Ω
Max. duty cycle	100 % (S1)
Solenoid plug	Solenoid with cable box (Hirschmann) DIN EN 175 301-803 with cable junction M16x1,5 for cable dia. 4,5...10 mm
Protection to DIN/EN 60529	IP 65
Emergency override	yes, siehe RE 29164
Coil operating temperature	to 150 °C

Technical data – hydraulic

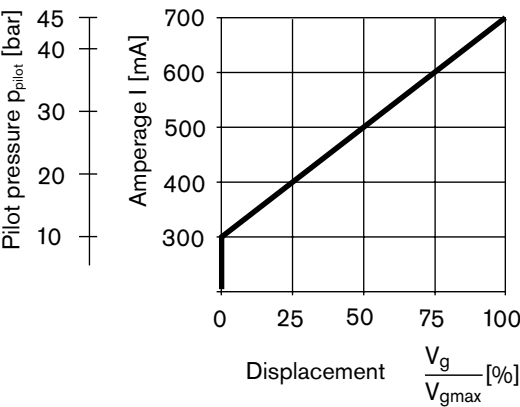
Control pressure (in P)	p_{min}	bar	50
	p_{max}	bar	100
Hysteresis	$\leq \pm 4\%$ of V_{gmax}		
Repeatability	$\leq 2\%$ von V_{gmax}		

When calculating the required flow in port P it is necessary to consider the pilot flow losses in the proportional valve (eg. 4 L/min. at $p = 50$ bar).

LR.NT hydr. stroke control and electric control of pilot pressure

Initial position in pressureless condition: $V_{g\ min}$

Characteristic

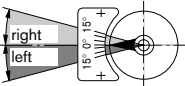


only available in right hand rotation

Direction of flow S to B

Pump direction of rotation	Swivel range ¹⁾	Pressure port
right hand	left	B

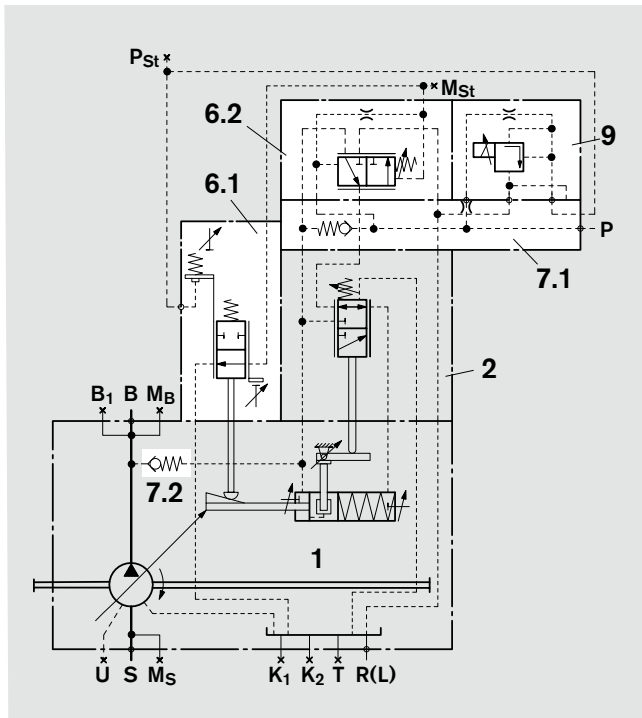
¹⁾ Compare swivel angle indicator



Schematics LR.NT

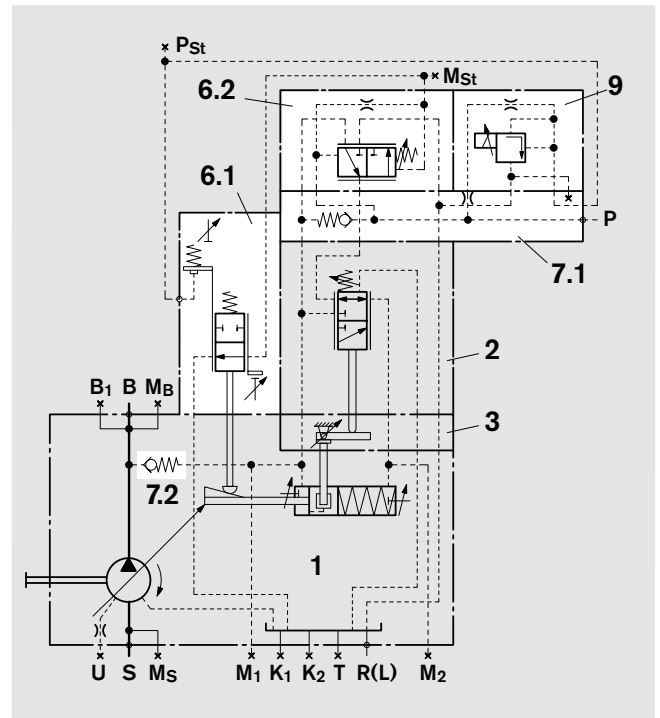
Size 40 and 71

Example: A4VSO LR2NT



Size 125 to 355

Example: A4VSO LR2NT



Ports

- P Control pressure port
- P_{St} Gauging port pilot pressure
- M_{st} Gauging port pilot control pressure
- M₁, M₂ Gauging port control chamber pressure (Size 125 to 355)

Subassemblies

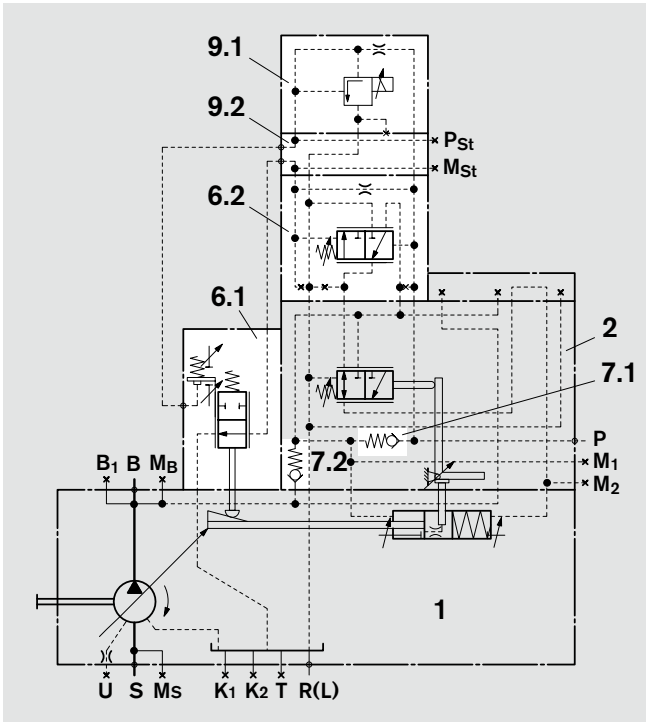
1	A4VSO with hydraulic control device (see RE 92050)	
2	Power control valve	
3	Sandwich plate (only on size 125 to 355)	
6.1	Pilot valve	
6.2	Pilot control valve (shown in actuated position, i.e. P is pressurized)	
7.1	Sandwich plate for mounting of proportional valve with check valve	
7.2	Check valve, integrated in item 1	
9	Proportional-pressure relief valve	
	DBEP6 B06-1X/45AG24NZ4M-382 with meter-in orifice dia. 1,0 mm	Solenoid with cable box (Hirschmann) to DIN EN 175 301-803 protection class IP 65 cable junction box M16x1,5 for cable dia. 4,5...10 mm

Size 500 to 1000 see page 54

Schematics LR.NT

Size 500 to 1000

Example: A4VSO LR2NT



Ports

- P Control pressure port
- P_{St} Gauging port pilot pressure
- M_{St} Gauging port pilot control pressure
- M₁, M₂ Gauging port control chamber pressure

Subassemblies

1	A4VSO with hydraulic control device (see RE 92050)	
2	Power control valve	
6.1	Pilot valve	
6.2	Pilot control valve (shown in actuated position i.e. P is pressurized)	
7.1, 7.2	Check valve integrated in power control valve (item 2)	
9.1	Proportional pressure relief valve DBEP6 A06-1X/45AG24NZ4M-382 with meter-in orifice dia. 1,0 mm	Solenoid with cable box (Hirschmann) to DIN EN 175 301-803 protection class IP 65 cable junction box M16x1,5 for cable dia. 4,5...10 mm
9.2	Sandwich plate for mounting of proportional valve	

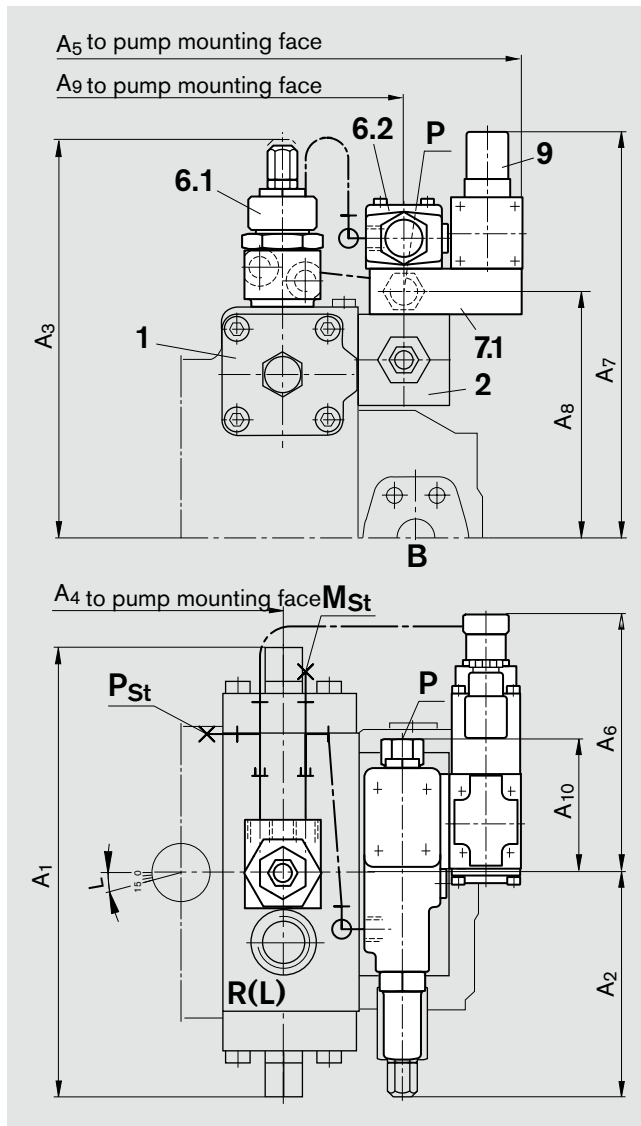
Size 40 to 355 see page 53

Unit dimensions LR.NT

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 40 and 71

Right hand rotation



Subassemblies see page 53

Ports

				max. tightening torque ¹⁾
P	Control pressure port	DIN 3852	M18x1,5; 12 deep	140 Nm
P _{St}	Gauging port pilot pressure	DIN 3853	S8 Form W; closed	50 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed	50 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	
40	260	132	248	144	297	173	256	151	219	88	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
71	296	132	264	166	324	173	267	162	246	88	

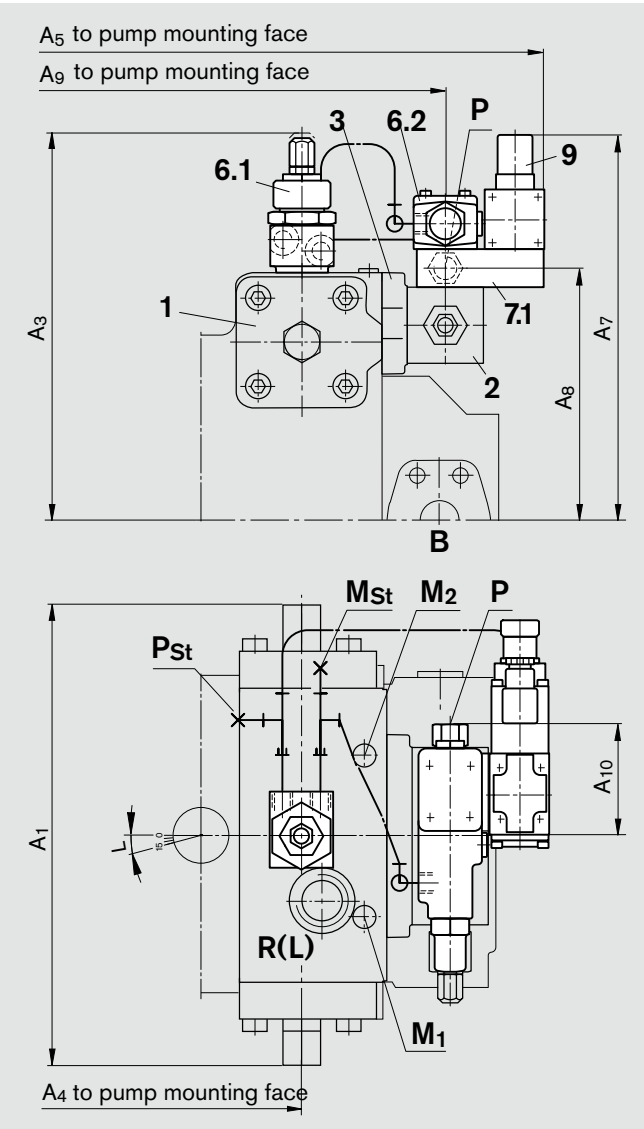
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.NT

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 125 to 355

Right hand rotation



Subassemblies see page 53

Ports					max. tightening torque ¹⁾	
P	Control pressure port	DIN 3852	M18x1,5; 12 deep		140 Nm	
P _{St}	Gauging port pilot pressure	DIN 3853	S8 Form W; closed		50 Nm	
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed		50 Nm	
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size125 a. 180)	80 Nm		
			M18x1,5; 12 deep; plugged (Size 250 a. 355)	140 Nm		

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₇	A ₈	A ₉	A ₁₀	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
125/180	354	298	203	393	297	192	315	88	
250/355	424	346	248	455	333	228	377	88	

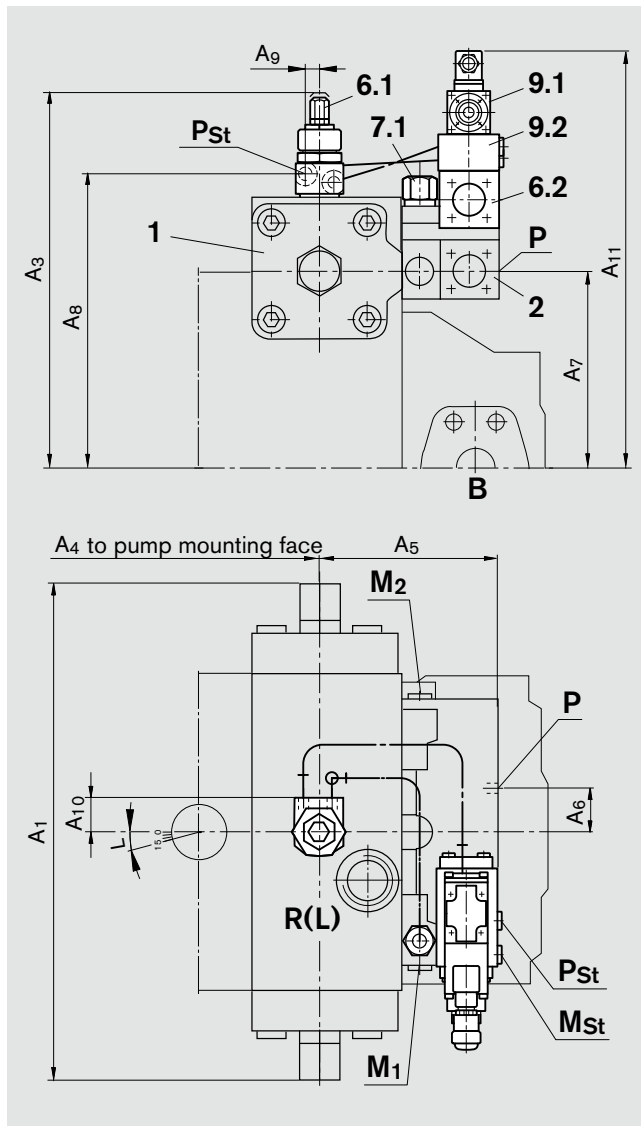
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR.NT

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000

Right hand rotation



Subassemblies see page 54

Ports

				max. tightening torque ¹⁾
P	Control pressure port	DIN 3852	M22x1,5; 14 deep	210 Nm
P _{St}	Gauging port pilot pressure	DIN 3852	M14x1,5; 12 deep; plugged	80 Nm
M _{St}	Gauging port pilot control pressure	DIN 3852	M14x1,5; 12 deep; plugged	80 Nm
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 12 deep; plugged	140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	
500	510	392	279	185	47	202	306	15	35	438	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
750	582	430	301	196	47	232	345	15	35	468	
1000	622	456	360	203	47	255	372	15	35	491	

¹⁾ please observe the general notes for the max. tightening torques on page 68

Example of control combination LR2GN

Hyperbolic power control with hydraulic stroke control and remote pressure control

Initial position in pressureless condition: $V_{g \min}$

For a description and the technical data in each case see:

- hyperbolic power control LR2 see page 4
- remote pressure control G see page 17
- hydraulic stroke control N see page 45

This control needs an external control pressure supply to port P.

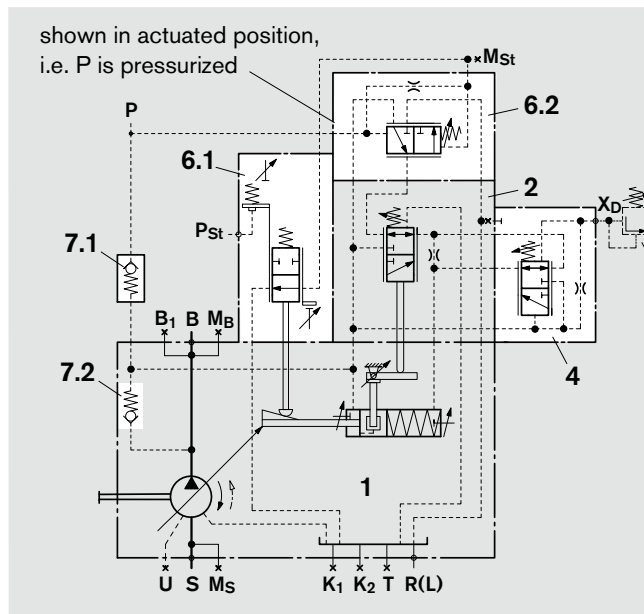
With control combinations LR2GN and LR3GN please note the following:

With a pressure control setting below the pressure level of the external control pressure supply p_{contr} in P all pumps up to size 355 will remain against the mechanical stroke limiter $V_{g \min}$ and the sizes 500 to 1000 may experience oscillations.

Schematics LR2GN

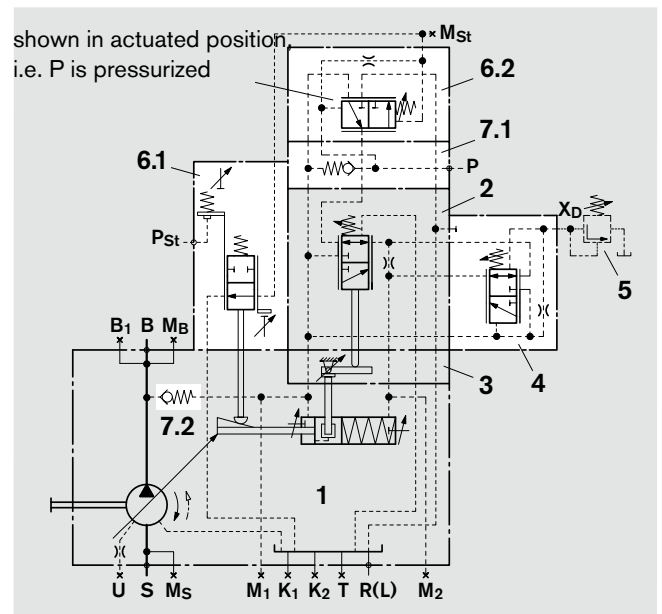
Size 40 and 71

A4VSO LR2GN



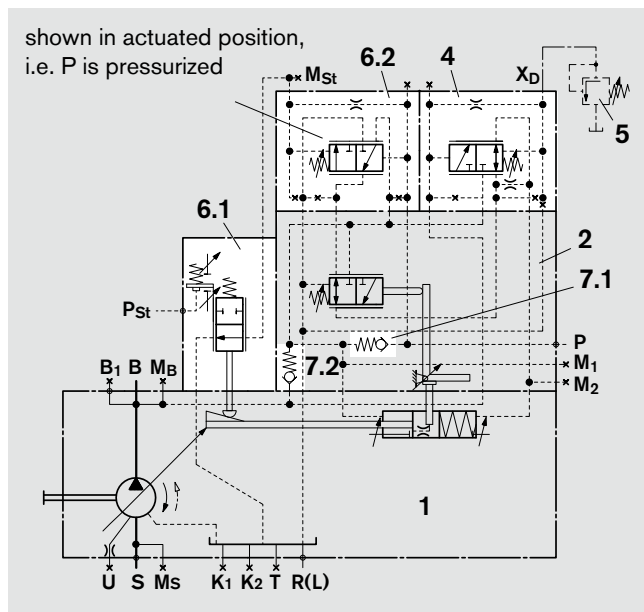
Size 125 to 355

A4VSO LR2GN



Size 500 to 1000

A4VSO LR2GN



Ports

X _D	Pilot port for remote pressure control
P	Control pressure port
P _{St}	Pilot pressure port
M _{St}	Gauging port pilot control pressure
M ₁ , M ₂	Gauging port control chamber press. (Size 125 to 1000)

Subassemblies

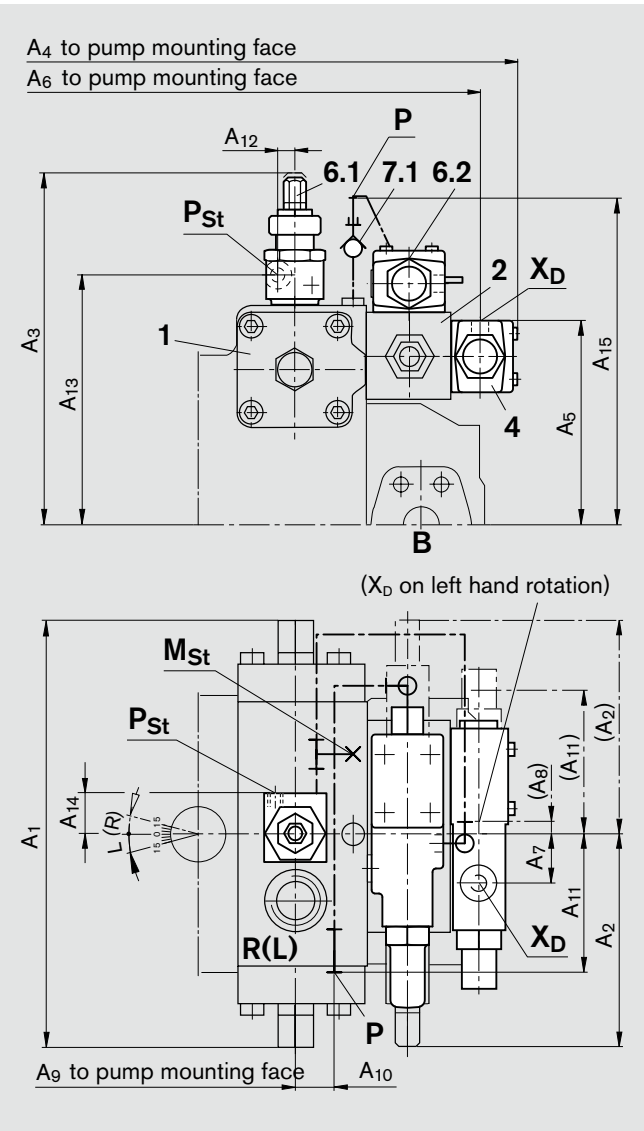
- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 4 Pilot control valve for remote pressure control
- 5 Separate pressure relief valve (not in scope of supply)
- 6.1 Pilot valve
- 6.2 Pilot control valve
- 7.1 Check valve (integrated in size 125 to 1000)
- 7.2 Integrated check valve

Unit dimensions LR2GN

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 40 and 71

Right hand rotation (left hand)



Valve mounting position for left hand rotation item 2, 4, 6.2 and 7.1 with piping rotated by 180°

Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 4 Pilot control valve for remote pressure control
- 5 Separate pressure relief valve (not in scope of supply)
- 6.1 Pilot valve
- 6.2 Pilot control valve
- 7.1 Check valve

Ports

																max. tightening torque ¹⁾
X _D	Pilot pressure port for remote pressure control	DIN 3852	M14x1,5; 12 deep													80 Nm
P	Control pressure port	DIN 3853	S8 Form W													50 Nm
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep													80 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed													50 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₂	A ₁₃	A ₁₄	A ₁₅	
40	260	132	248	295	130	269	37	7	144	34	83	15	163	35	198	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
71	296	132	258	322	146	296	37	7	166	39	83	15	180	35	215	

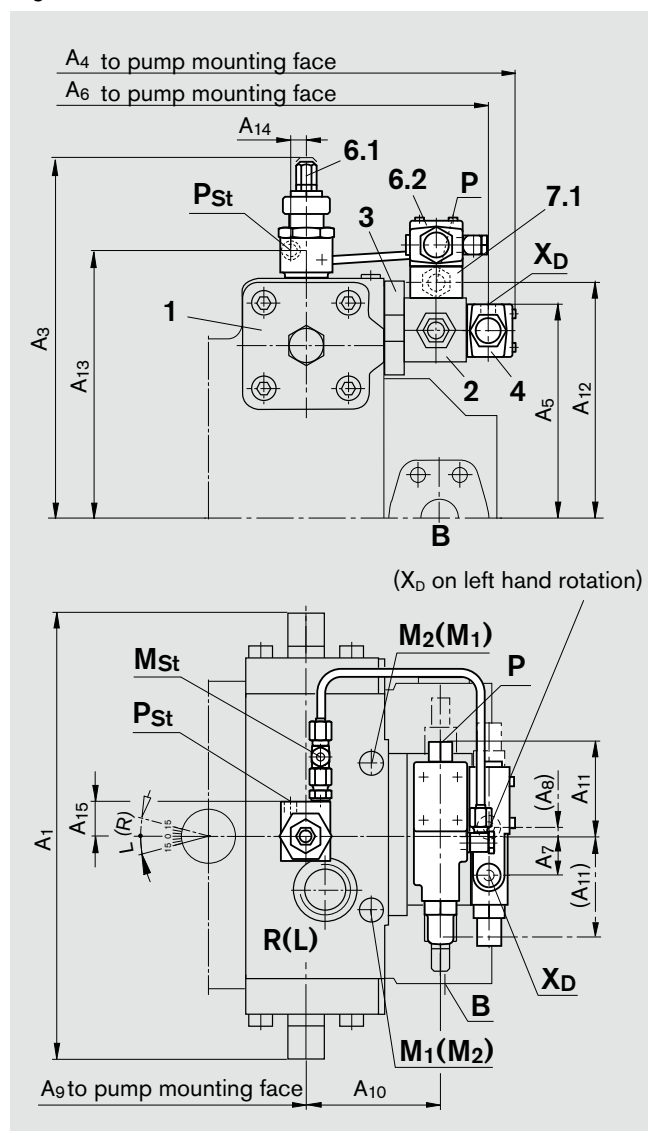
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR2GN

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 125 to 355

Right hand rotation (left hand)



Valve mounting position for left hand rotation item 2, 6.2 and 7.1 rotated by 180°

Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 3 Sandwich plate
- 4 Pilot control valve for remote pressure control
- 5 Separate pressure relief valve (not in scope of supply)
- 6.1 Pilot valve
- 6.2 Pilot control valve
- 7.1 Integrated check valve

Ports

															max. tightening torque ¹⁾
X _D	Pilot port for remote pressure control	DIN 3852	M14x1,5; 12 deep												80 Nm
P	Control pressure port	DIN 3852	M18x1,5; 12 deep												140 Nm
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep												80 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed												50 Nm
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180)												80 Nm
			M18x1,5; 12 deep; plugged (Size 250 a. 355)												140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₂	A ₁₃	A ₁₄	A ₁₅	
125/180	354	299	391	171	365	37	7	203	112	88	192	214	15	35	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
250/355	424	346	453	207	427	37	7	248	129	88	228	261	15	35	

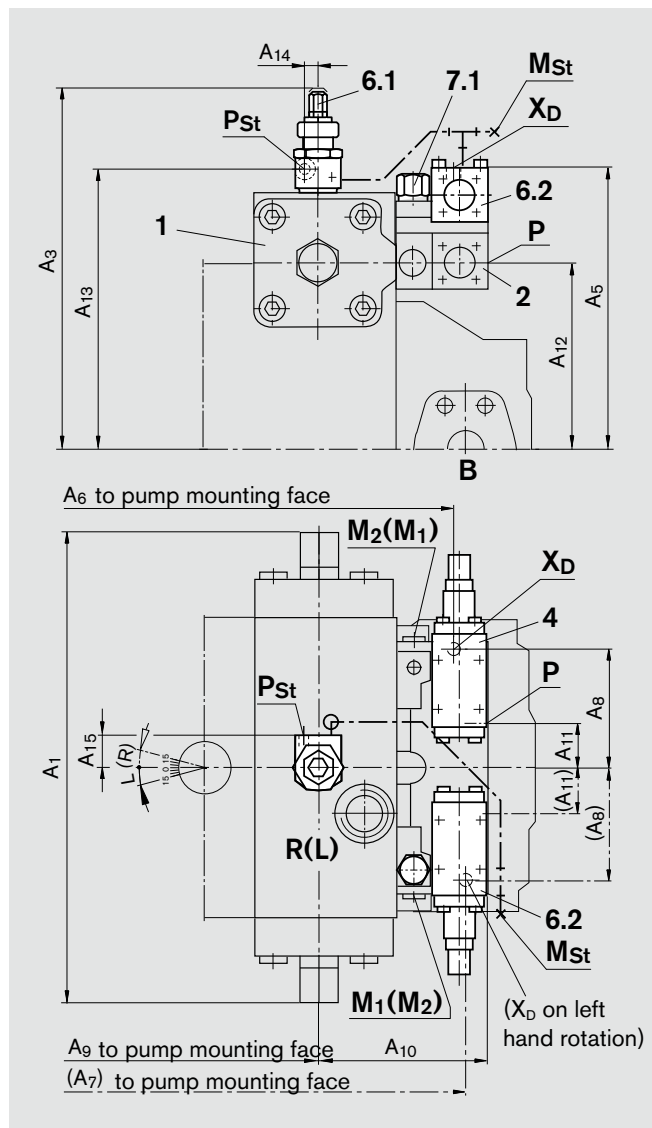
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR2GN

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000

Right hand rotation (left hand)



Valve mounting position for left hand rotation item 2, 4 and 6.2 rotated by 180° (mirror view around pump axis)

Subassemblies

- 1 A4VSO with hydraulic control device (see RE 92050)
- 2 Power control valve
- 4 Pilot control valve for remote pressure control
- 5 Separate pressure relief valve (not in scope of supply)
- 6.1 Pilot valve
- 6.2 Pilot control valve
- 7.1 Integrated check valve

Ports

														max. tightening torque ¹⁾
X _D	Pilot pressure port for remote pressure control	DIN 3852	M14x1,5; 12 deep											80 Nm
P	Control pressure port	DIN 3852	M22x1,5; 14 deep											210 Nm
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 12 deep											80 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed											50 Nm
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 12 deep; plugged											140 Nm

Unit dimensions

Size	A ₁	A ₃	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₂	A ₁₃	A ₁₄	A ₁₅	
500	510	392	311	430	441	125	279	186	47	202	306	15	35	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
750	582	430	342	462	473	125	301	195	47	232	345	15	35	
1000	622	456	364	528	539	125	360	203	47	255	372	15	35	

¹⁾ please observe the general notes for the max. tightening torques on page 68

Example of control combination LR2GNT

Hyperbolic-power control with hydraulic stroke control, electric control of pilot pressure and remote pressure control

Initial position in pressureless condition: $V_{g \min}$

Only available in right hand rotation.

For the description and technical data see previous pages:

- hyperbolic power control LR2 page 4
- remote pressure control G page 17
- hydraulic stroke control N page 45
- electric pilot pressure control T page 51

This control needs an external control pressure supply to port P.

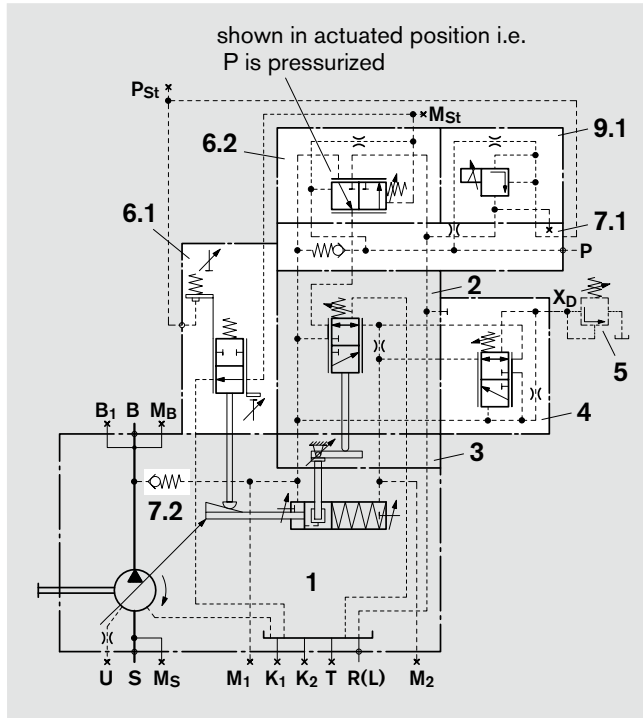
With control combinations LR2GNT and LR3GNT please note the following:

With a pressure control setting below the pressure level of the external control pressure supply p_{contr} in P all pumps up to size 355 will remain against the mechanical stroke limiter $V_{g \min}$ and the sizes 500 to 1000 may experience oscillations.

Schematics LR2GNT

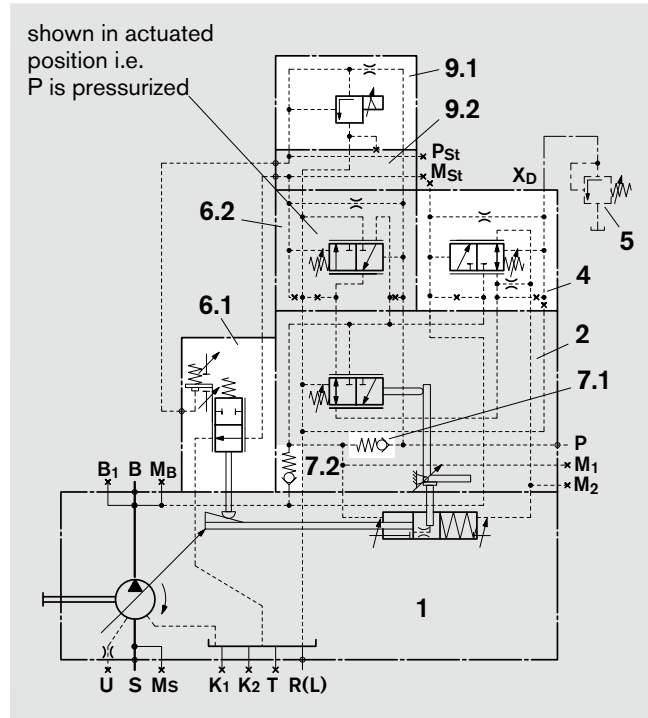
Size 125 to 355

A4VSO LR2GNT, right hand rotation



Size 500 to 1000

A4VSO LR2GNT, right hand rotation



Ports

- X_D Pilot pressure port for remote pressure control
- P Control pressure port
- P_{St} Gauging port pilot pressure
- M_1, M_2 Gauging port control chamber pressure
- M_{St} Gauging port pilot control pressure

Subassemblies

1	A4VSO with hydraulic control device (see RE 92050)
2	Power control valve
3	Sandwich plate (Size 125 to 355)
4	Pilot control valve for remote pressure control
5	Separate pressure relief valve (not in scope of supply)
6.1	Pilot valve
6.2	Pilot control valve
7.1	Sandwich plate for mounting of proportional valve with check valve (Size 125 to 355) Check valve, integrated in item 2 (Size 500 to 1000)
7.2	Check valve, integrated in item 1 (Size 125 to 355) Check valve, integrated in item 2 (Size 500 to 1000)
9.1	Proportional pressure relief valve DBEP6 B06-1X/45AG24NZ4M-382 (Size 125 to 355) DBEP6 A06-1X/45AG24NZ4M-382 (Size 500 to 1000) with meter-in orifice dia. 1,0 mm
9.2	Sandwich plate for mounting of proportional valve (Size 500 to 1000)

Solenoid with cable box(Hirschmann)
to DIN EN 175 301-803 protection class IP 65
cable junction M16x1,5 for cable dia. 4,5...10 mm

Size 40 and 71 available on request.

Unit dimensions LR2GNT

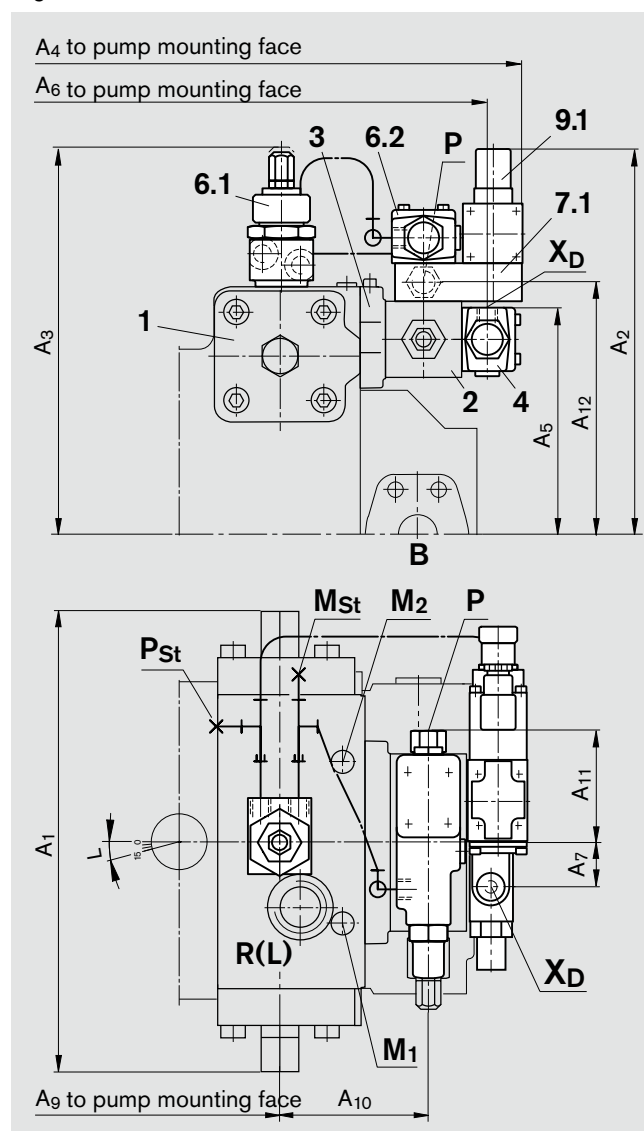
Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 40 and 71

available on request

Size 125 to 355

Right hand rotation



Subassemblies see page 64

Ports

													max. tightening torque ¹⁾
X _D	Pilot pressure port remote pressure control	DIN 3852	M14x1,5; 12 deep										80 Nm
P	Control pressure port	DIN 3852	M18x1,5; 12 deep										140 Nm
P _{St}	Gauging port pilot pressure	DIN 3853	S8 Form W; closed										50 Nm
M _{St}	Gauging port pilot control pressure	DIN 3853	S8 Form W; closed										50 Nm
M ₁ ; M ₂	Gauging port control chamber press.	DIN 3852	M14x1,5; 12 deep; plugged (Size 125 a. 180) M18x1,5; 12 deep; plugged (Size 250 a. 355)										80 Nm 140 Nm

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₂	
125/180	354	297	194	393	171	365	37	7	203	112	88	192	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
250/355	424	333	346	455	207	427	37	7	248	129	88	228	

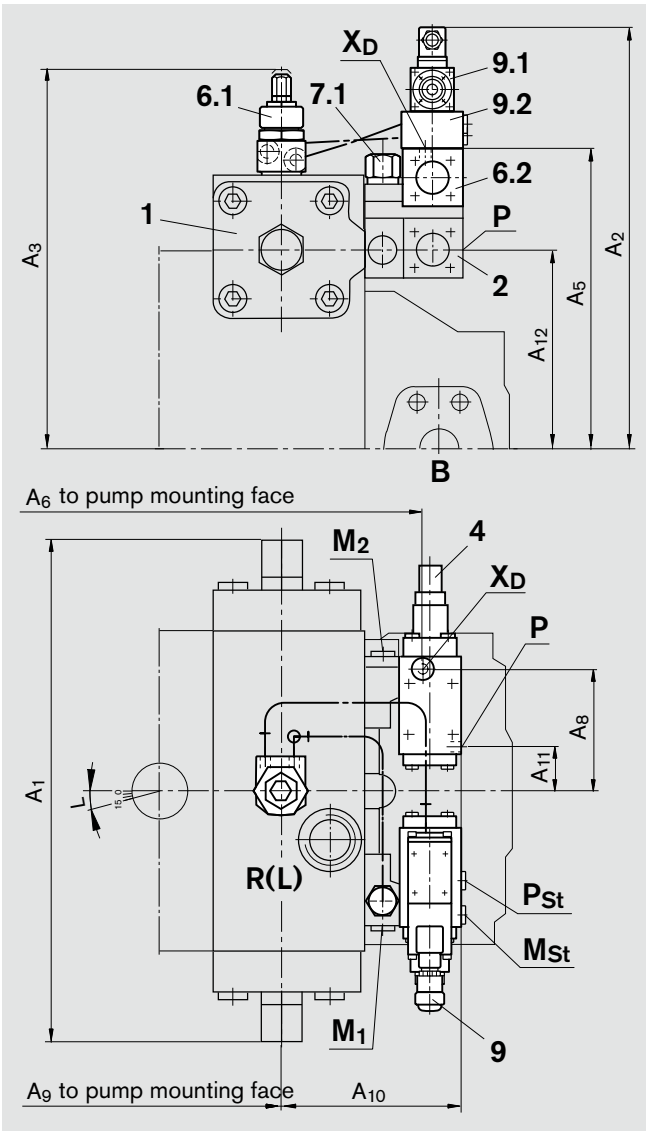
¹⁾ please observe the general notes for the max. tightening torques on page 68

Unit dimensions LR2GNT

Before finalising your design please request a certified installation drawing. Dimensions in mm.

Size 500 to 1000

Right hand rotation



Subassemblies see page 64

Ports					max. tightening torque ¹⁾	
X _D	Pilot pressure port for remote pressure control	DIN 3852	M14x1,5; 12 deep		80 Nm	
P	Control pressure port	DIN 3852	M22x1,5; 14 deep		210 Nm	
P _{St}	Gauging port pilot pressure	DIN 3852	M14x1,5; 12 deep; plugged		80 Nm	
M _{St}	Gauging port pilot control pressure	DIN 3852	M14x1,5; 12 deep plugged		80 Nm	
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 12 deep; plugged		140 Nm	

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₂	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RE 92050
500	510	438	392	311	430	441	125	279	185	47	202	
750	582	468	430	342	462	473	125	301	196	47	232	
1000	622	491	456	364	528	539	125	360	203	47	255	

¹⁾ please observe the general notes for the max. tightening torques on page 68

Installation notes

For mounting of pumps with control version LR.Y and LR.NT and combinations thereof inside the reservoir please consult us.

General notes

- The control devices LR2, LR3 and LR.N together with the pump A4VSO were designed for operation in open loop circuits.
- Systems design, installation and commissioning require trained technicians or tradesmen.
- All hydraulic ports and connections for control functions can only be used for the fastening of hydraulic lines.
- Tightening torques: The tightening torques mentioned in this data sheet are maximum values and must not be exceeded (Maximum values for thread). Manufacturers information concerning the maximum permitted tightening torques of the various fittings is to be observed!
For DIN 13 mounting bolts, we recommend that tightening torques be checked on a case by case basis in accordance with VDI 2230 published 2003.
- During and shortly after operation of a pump the housing and especially the solenoids can be extremely hot, avoid being burned. Wear protective clothing.
- All data, information and instructions mentioned in this data sheet must be adhered to.