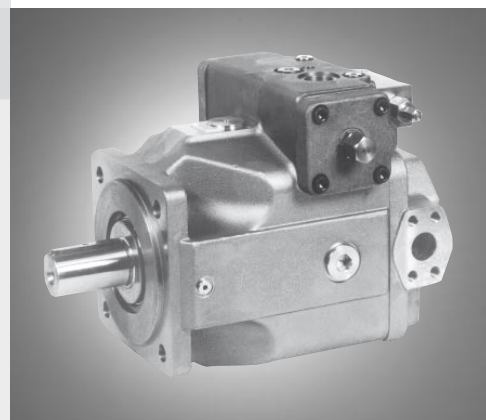


Power control LR2, LR3, LR2N and LR3N

RA 92 064/11.07 1/64
Replaces: 05.95

Data Sheet

for variable pump (A)A4VSO
Series 1 and 3
Size 40 to 1000
Nominal pressure 5100 psi (350 bar)
Peak pressure 5800 psi (400 bar)
open circuit



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.Z Hydraulic two-point control	30
LR.Y Electric two-point control	35
LR.S with Load-Sensing valve	38
LR.N Hydraulic stroke control, pilot pressure dependent	41
LR.NT with electric control of pilot pressure	47
Example of control combination LR2GN	54
Example of control combination LR2GNT	59
Installation notes	63
General notes	64

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
 - hydraulic two-point control
 - electric control of pilot pressure

Further information:

Variable pump (A)A4VSO Size 40 to 1000 RA 92 050

Ordering code – Standard program (A)A4VSO LR2 and LR3

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

01	Fluid (Details see RA 92050)
----	------------------------------

Axial piston unit

02	Swash plate design, variable	Size 40...355	AA4VS
		Size 500...1000	A4VS

Type of operation

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

Size

		40	71	125	180	250	355	500	750	1000	
04	Displacement $V_{g \max}$	in^3/rev	2.44	4.33	7.63	10.98	15.26	21.66	30.51	45.76	61.02
		cm^3/rev	40	71	125	180	250	355	500	750	1000

Control devices

05	Power control with hyperbolic characteristic, initial position $V_{g \max}$												LR	
Setting of power characteristic														
06	mechanically adjustable	2				●	●	●	●	●	●	●	●	2
	hydraulic remote control	3				●	●	●	●	●	●	●	●	3
Pressure control														
07	without pressure control (no code)					●	●	●	●	●	●	●	●	
	with pressure control		D			●	●	●	●	●	●	●	●	D
	with remote pressure control		G			●	●	●	●	●	●	●	●	G
Flow control /stroke limiter														
08	without flow control /stroke limiter (no code)					●	●	●	●	●	●	●	●	
	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		●	●	●	●	●	●	○	○	○
	with load sensing a. rem. press. control.		-	S		●	●	●	●	●	●	-	-	S ²⁾

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

Ordering code – Standard program (A)A4VSO LR2N and LR3N

	(A)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																	
06	mechanically adjustable			2		N		●	●	●	●	●	●	●	●	●	●	2
	hydraulic remote control			3		N		●	●	●	●	●	●	●	●	●	●	3
	Pressure control																	
	without press. control (no code)																	
07								●	●	●	●	●	●	●	●	●	●	
	with pressure control					D	N	●	●	●	●	●	●	●	●	●	●	D
	with remote pressure control					G	N	●	●	●	●	●	●	●	●	●	●	G
08	Hydraulic stroke limiter, proportional														N			
	Electric control of pilot pressure																	
	without electr. control of pilot press. (no code)																	
09							N	●	●	●	●	●	●	●	●	●	●	
	with electr. control. (DBEP 6)					N	T	○	●	●	●	●	●	●	●	○	○	T ³⁾

³⁾ only available for clockwise rotation;
for operation on HF-fluid please observe RE 29164 (Proportional pressure relief valve type DBEP)

	Series																	
10	of (A)A4VSO							●	●	-	-	-	-	-	-	-	-	10
								-	-	●	●	●	●	●	●	●	●	30

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

For details see:
RA92050 – (A)A4VSO

● available ○ in preparation – not available

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: 510...5100 psi (35...350 bar)

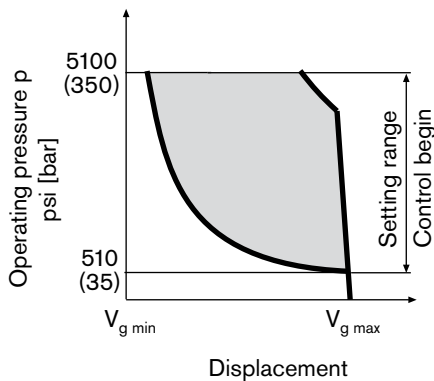
The power curve is factory set.

When ordering please state in clear text:

- Drive power P in kW
- Drive speed n in rpm
- Max. flow $q_{v \max}$ in gpm (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.

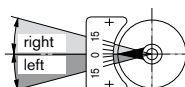
Characteristic



Direction of flow S to B

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

¹⁾ compare swivel angle indicator

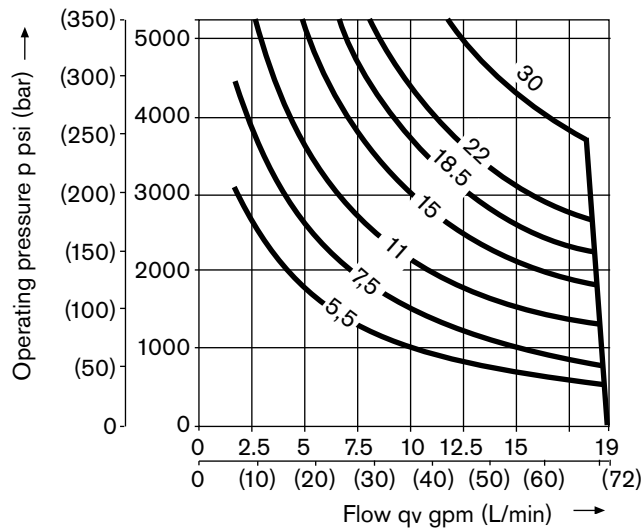


LR2 Power control, with hyperbolic characteristic

Power characteristics in kW

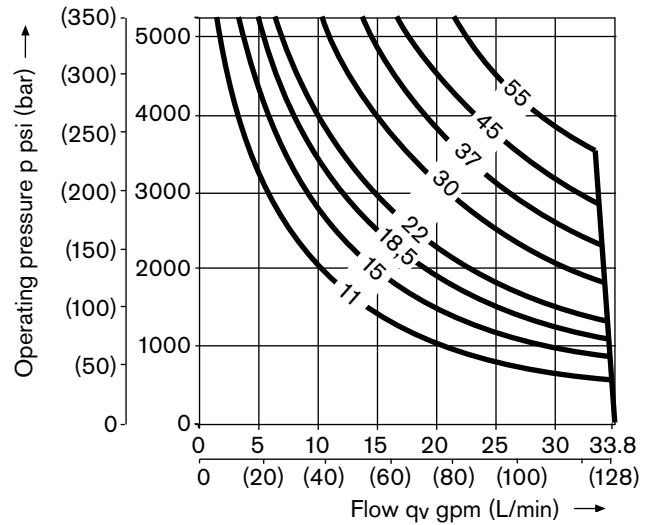
Size 40

at 1800 rpm



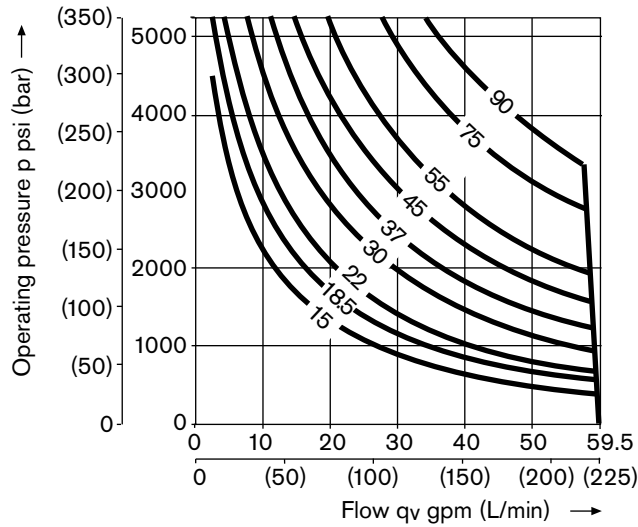
Size 71

at 1800 rpm



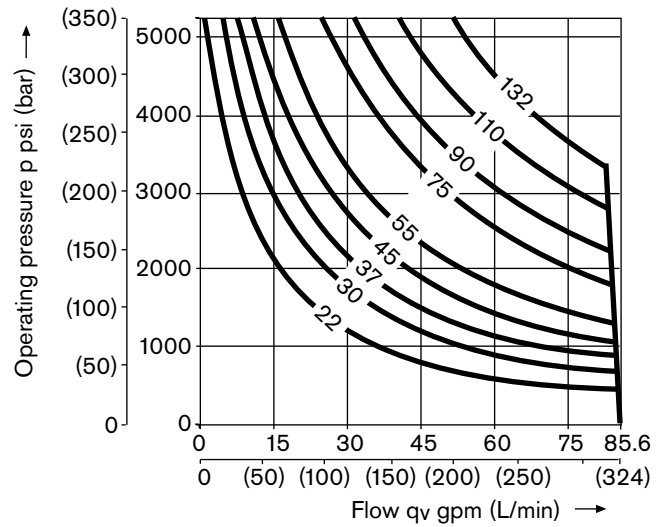
Size 125

at 1800 rpm



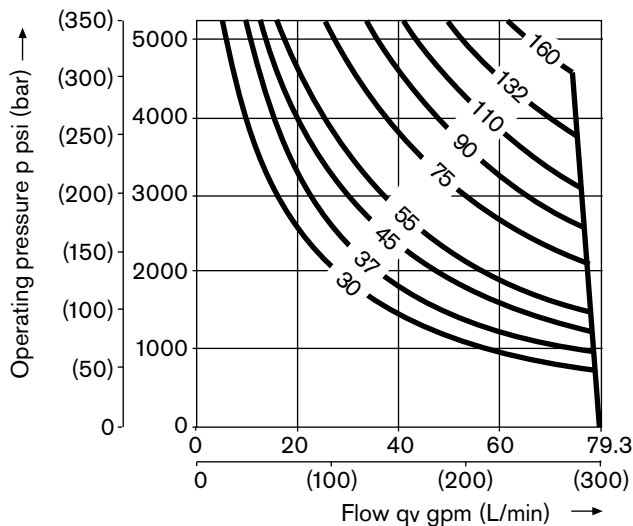
Size 180

at 1800 rpm



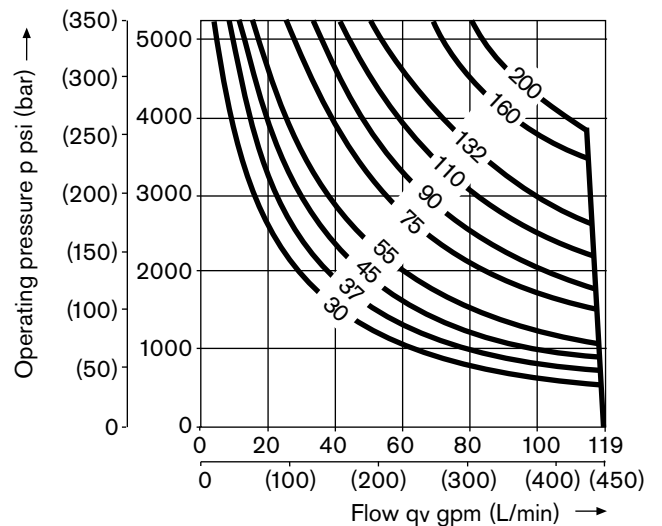
Size 250

at 1200 rpm



Size 250 High-Speed-Version HA4VSO

at 1800 rpm

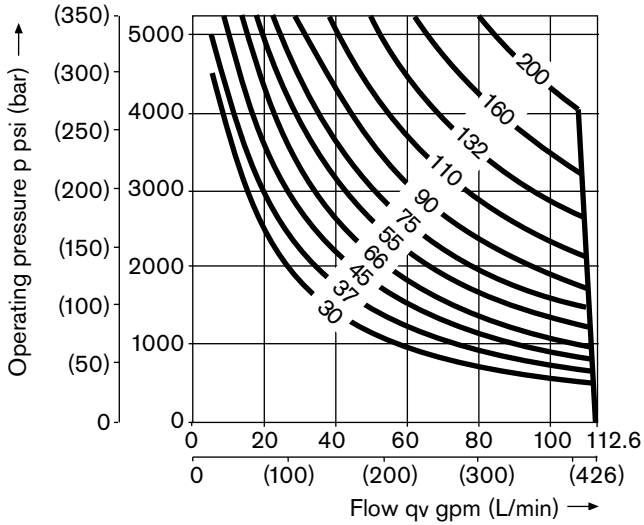


LR2 Power control, with hyperbolic characteristic

Power characteristics in kW

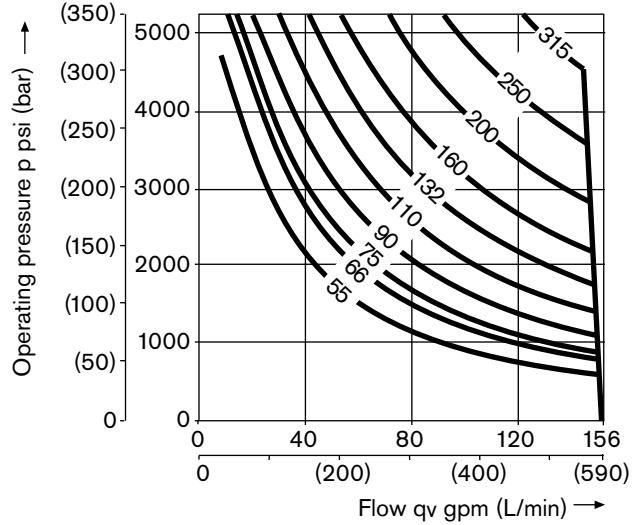
Size 355

at 1200 rpm



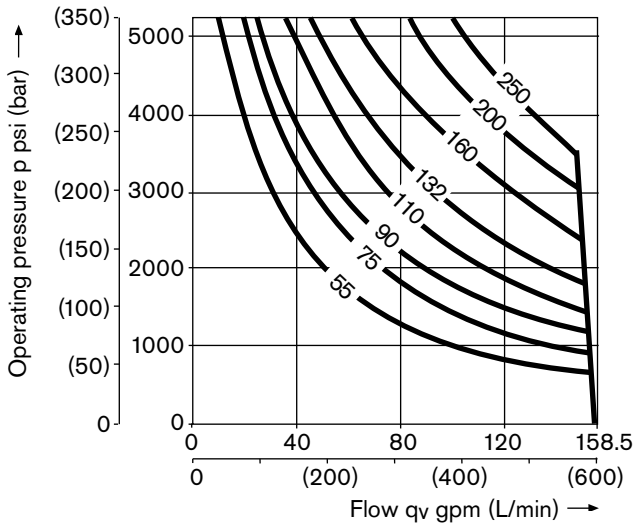
Size 355 High-Speed-Version HA4VSO

at 1800 rpm (max. displacement limited to 20 in³ (328 cm³))



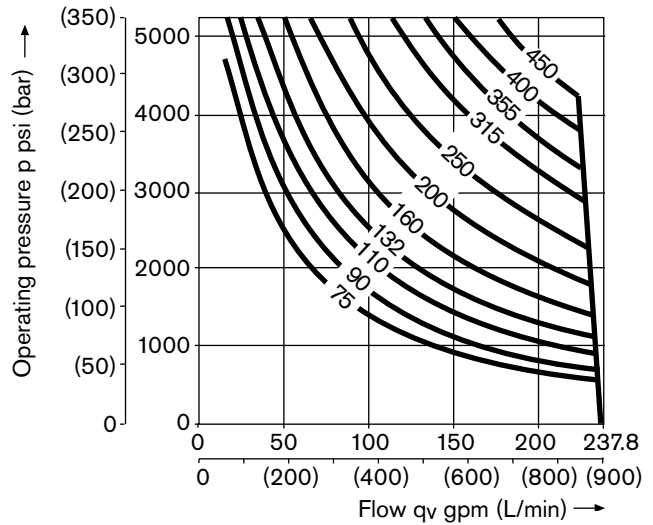
Size 500

at 1200 rpm



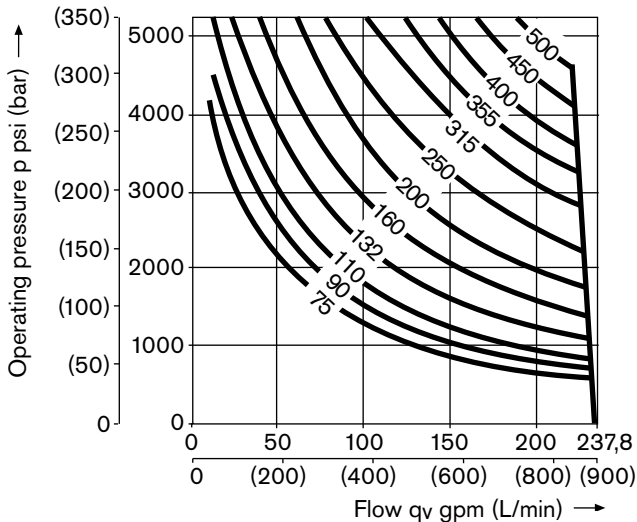
Size 750

at 1200 rpm



Size 1000

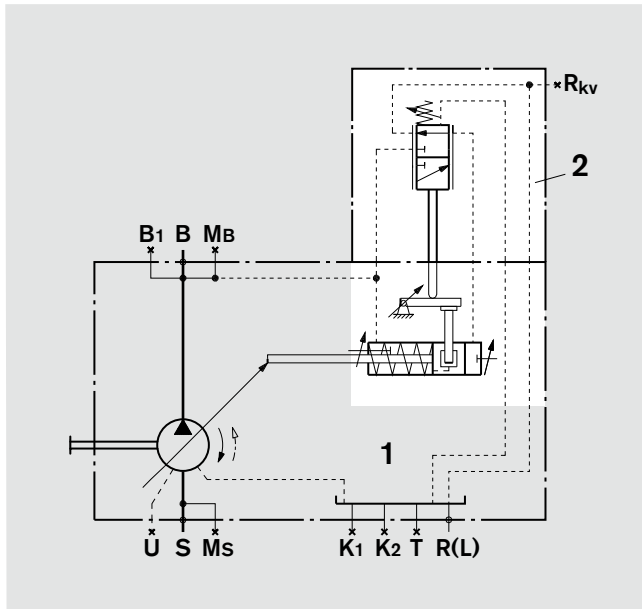
at 900 rpm



Schematics LR2

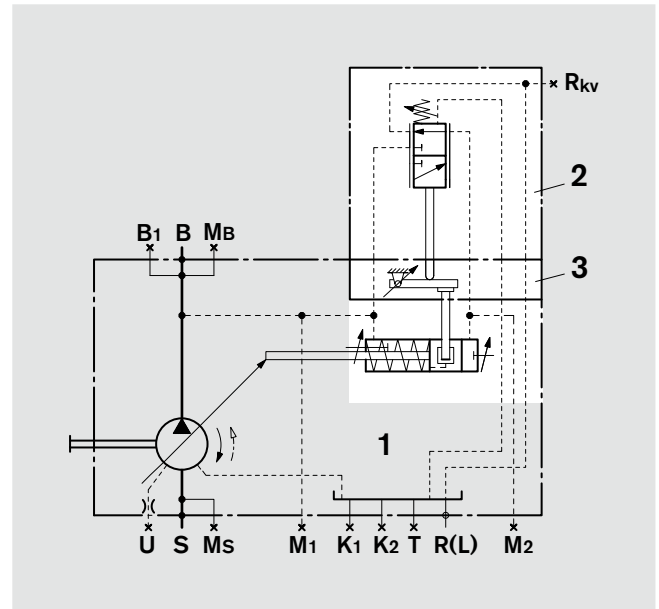
Size 40 and 71

AA4VSO LR2, Series 1



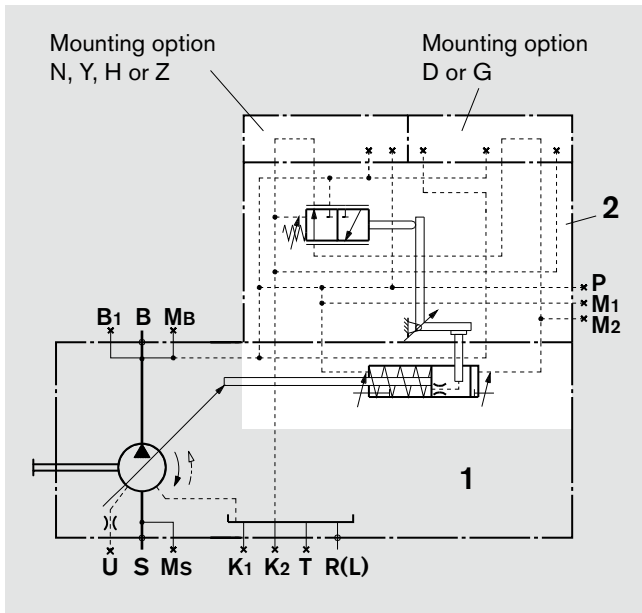
Size 125 to 355

AA4VSO 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

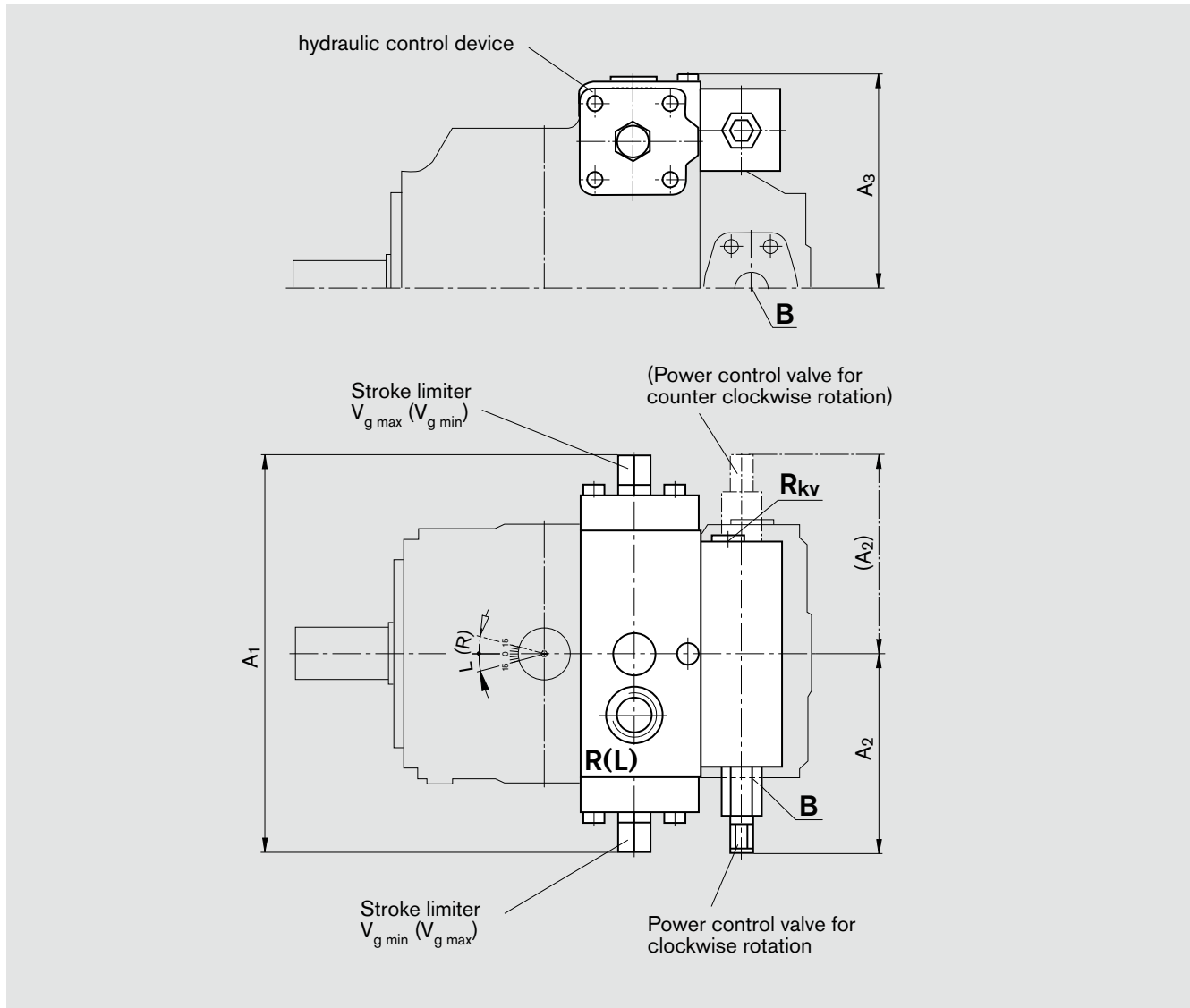
- 1 (A)A4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)

Unit dimensions LR2

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 40 and 71, Series 1

Presentation clockwise direction of rotation (counter clockwise rotation)



Ports

R_{kv} External control fluid return DIN 3852 M18x1,5; 0.47 (12) deep; plugged

max. tightening torque ¹⁾

103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃	
40	10.24(260)	5.20(132)	5.83(148)	For detailed dimensions and technical data on the variable pump see the technical data sheet AA4VSO RA 92050
71	11.65(296)	5.20(132)	6.50(165)	

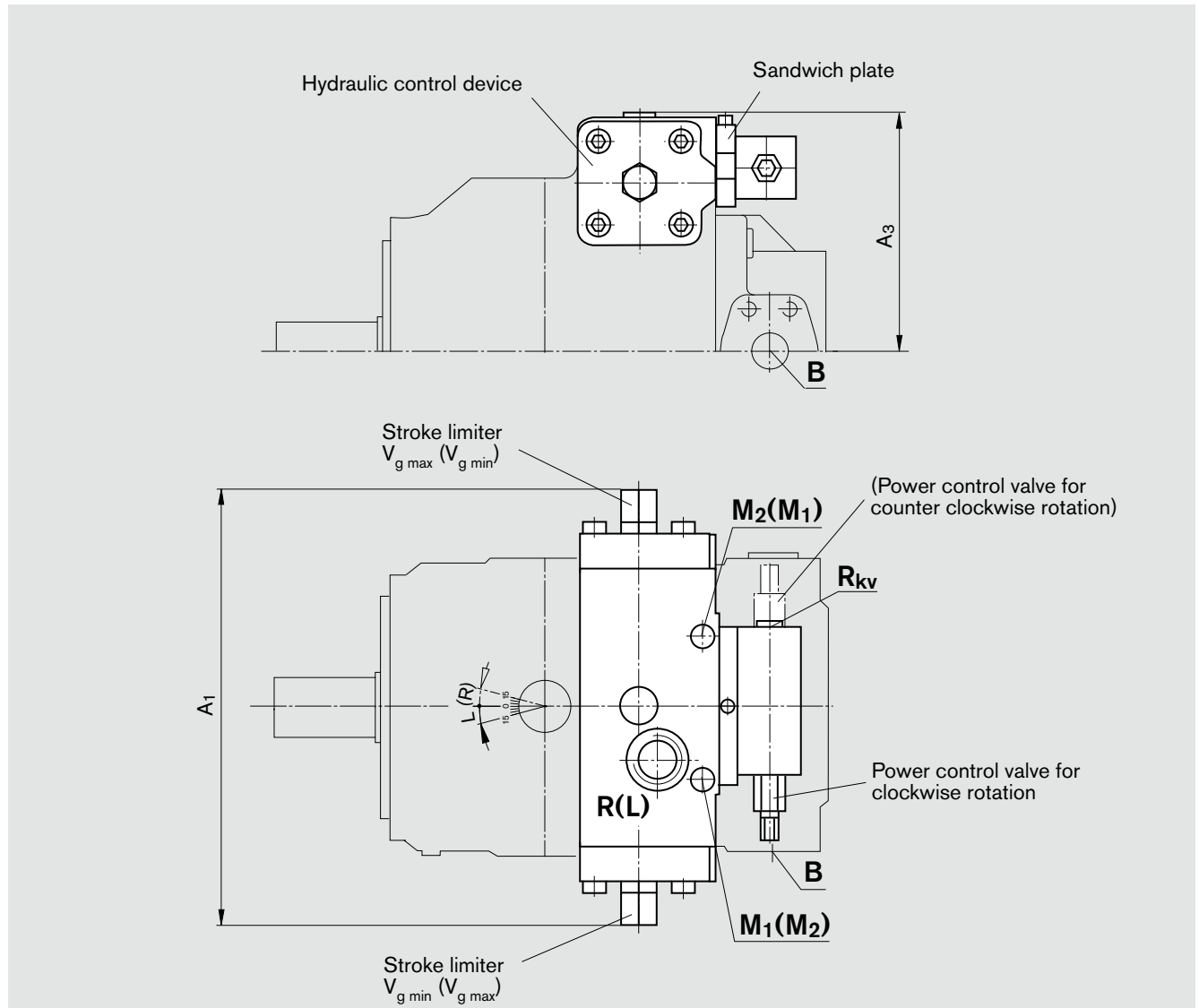
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR2

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 125 to 355, Series 3

Presentation clockwise direction of rotation (counter clockwise rotation)



Ports

Port	Description	Standard	Dimensions	max.tightening torque ¹⁾
R _{kv}	external control fluid return	DIN 3852	M18x1,5; 0.47(12) deep; plugged	103 lb-ft (140 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M14x1,5; 0.47(12) deep; plugged (Size 125 a. 180) M18x1,5; 0.47(12) deep; plugged (Size 250 u. 355)	59 lb-ft (80 Nm) 103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₃	
125	13.94 (354)	7.68 (195)	
180	13.94 (354)	7.68 (195)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
250	16.69 (424)	9.37 (238)	
355	16.69 (424)	9.37 (238)	

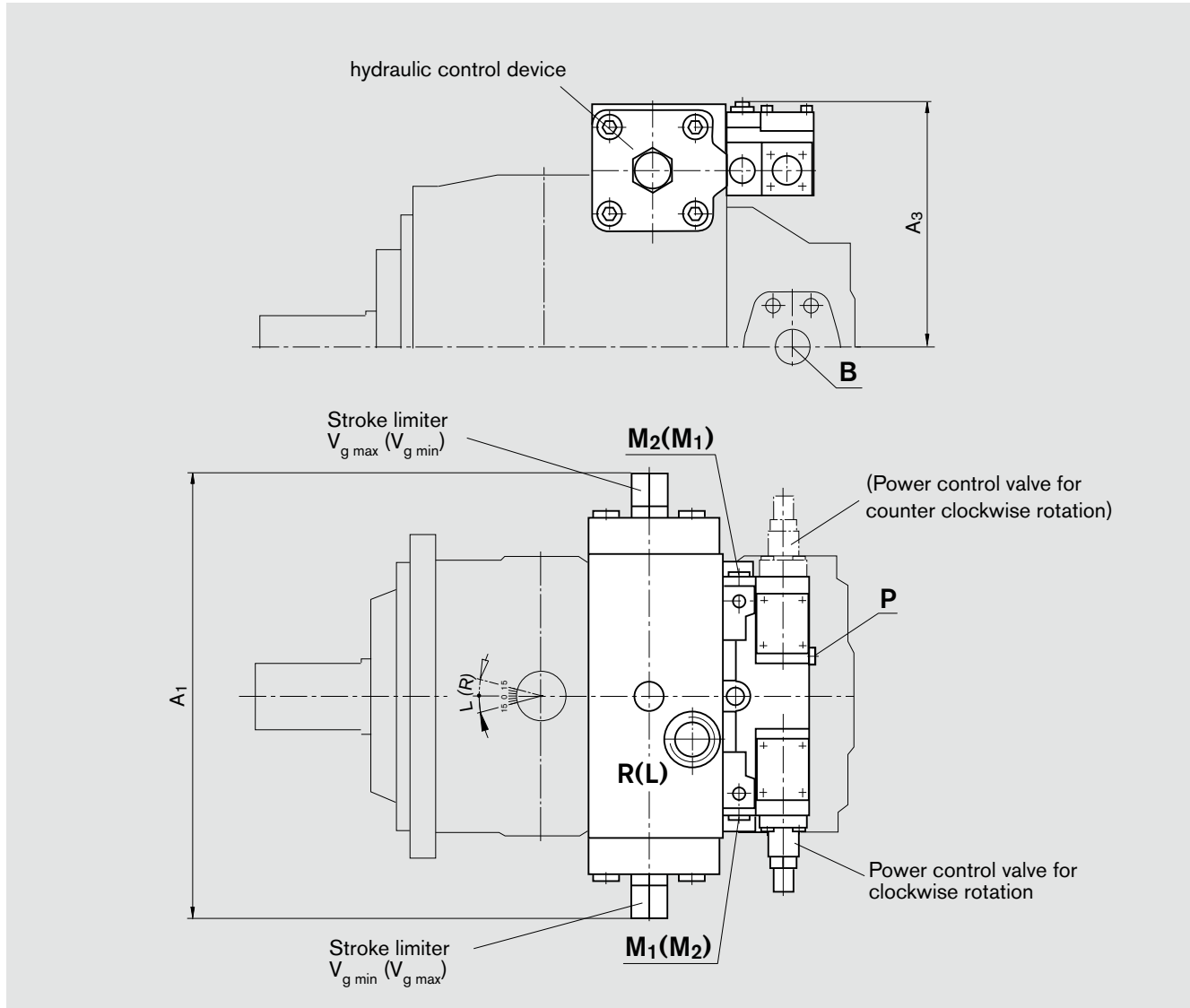
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR2

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000, Series 3

Presentation clockwise direction of rotation (counter clockwise hand rotation)



Ports

Port	Description	Standard	Dimensions	max. tightening torque ¹⁾
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 0.47 (12) deep; plugged	103 lb-ft (140 Nm)
P	Control pressure port	DIN 3852	M22x1,5; 0.55 (14) deep; plugged	155 lb-ft (210 Nm)

Unit dimensions

Size	A ₁	A ₃	
500	20.08 (510)	11.22 (285)	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RA 92050
750	22.91 (582)	12.68 (322)	
1000	24.49 (622)	13.78 (350)	

¹⁾ please observe the general notes for the max. tightening torques on page 64

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 1450 psi (100 bar)

Total range for beginning of control setting: 725...5100 psi (50... 350 bar)

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

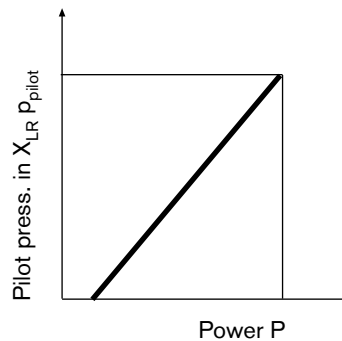
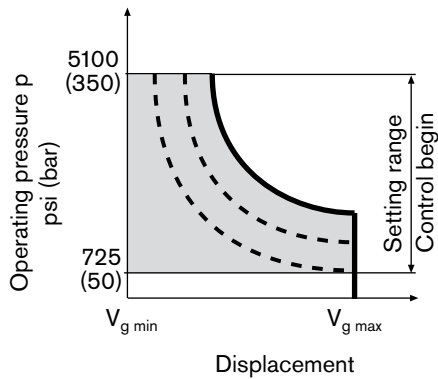
When ordering please state in clear text:

- Drive speed n in rpm
- Drive power P in kW with pilot pressure p_p in $X_{LR} = 0$ psi (bar)
 Max. flow $q_{v \max}$ in gpm (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.

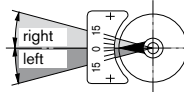
Characteristic



Direction of flow S to B

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

¹⁾ Compare swivel angle indicator



Power increase through pilot pressure in port X_{LR}

Power increase / pilot pressure: HP/psi (kW/bar)

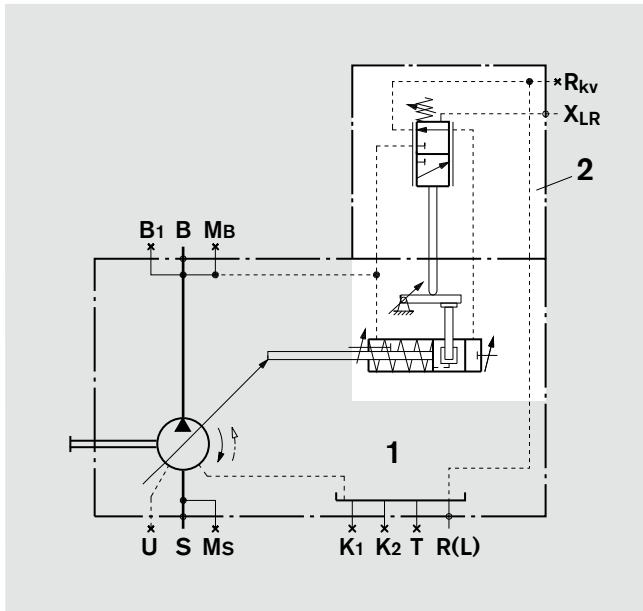
Size	40	71	125	180	250	355	500	750	1000
$n^* = 1000$ rpm	0.049 (0.53)	0.072 (0.78)	0.106 (1.15)	0.153 (1.66)	0.169 (1.83)	0.227 (2.46)	0.490 (5.30)	0.692 (7.5)	0.849 (9.2)
$n^* = 1200$ rpm	0.059 (0.64)	0.086 (0.94)	0.127 (1.38)	0.183 (1.99)	0.202 (2.19)	0.272 (2.95)	0.591 (6.40)	0.830 (9.0)	1.015 (11.0)
$n^* = 1500$ rpm	0.073 (0.80)	0.109 (1.18)	0.159 (1.72)	0.228 (2.47)	0.253 (2.74)	0.431 (3.69)	0.739 (8.00)	1.038 (11.25)	-
$n^* = 1800$ rpm	0.088 (0.96)	0.130 (1.41)	0.191 (2.07)	0.275 (2.98)	0.304 (3.29)	0.408 (4.42)	0.886 (9.60)	-	-

* Please observe speed limits and perm. flow acc. to RA 92050

Schematics LR3

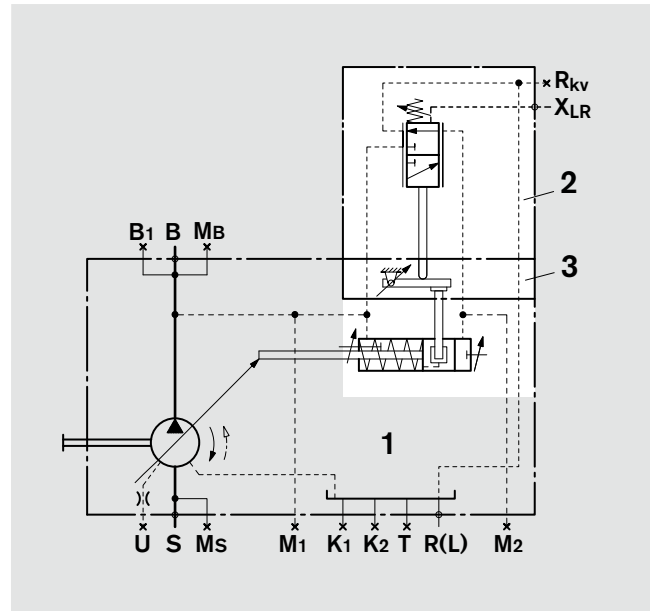
Size 40 and 71

AA4VSO LR3, Series 1



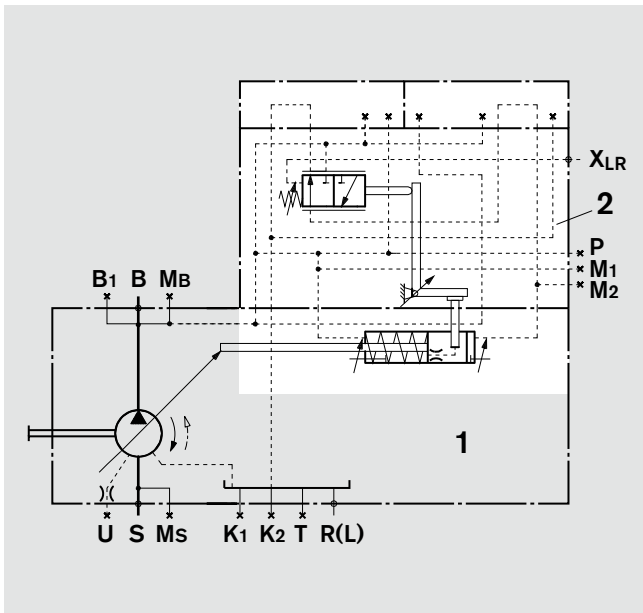
Size 125 to 355

AA4VSO 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

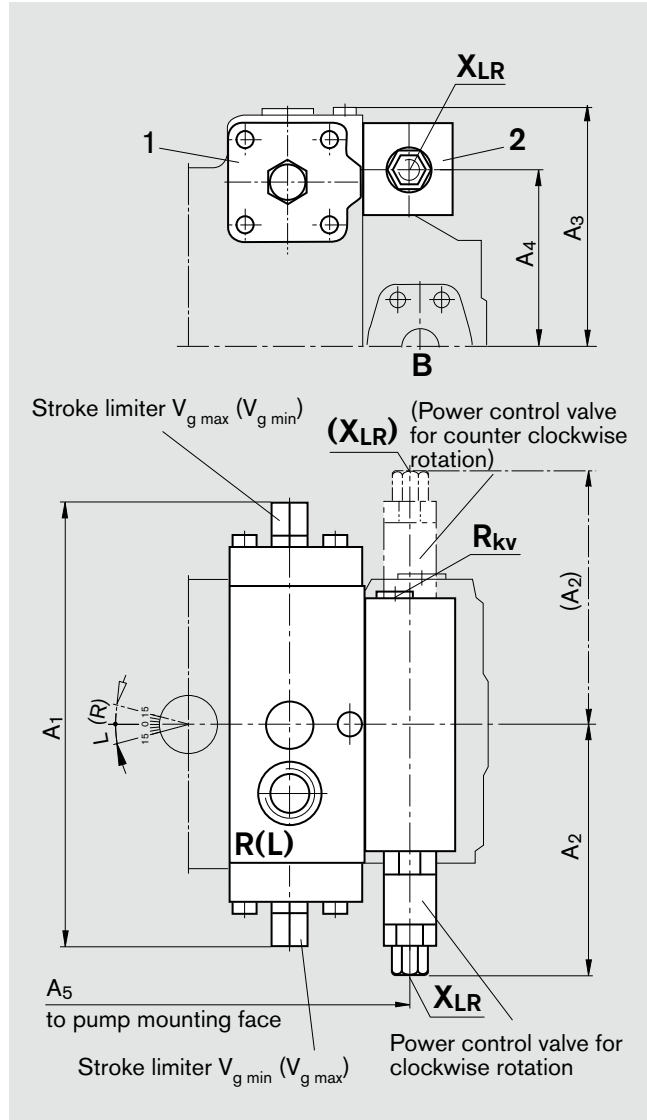
- 1 (A)A4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)

Unit dimensions LR3

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

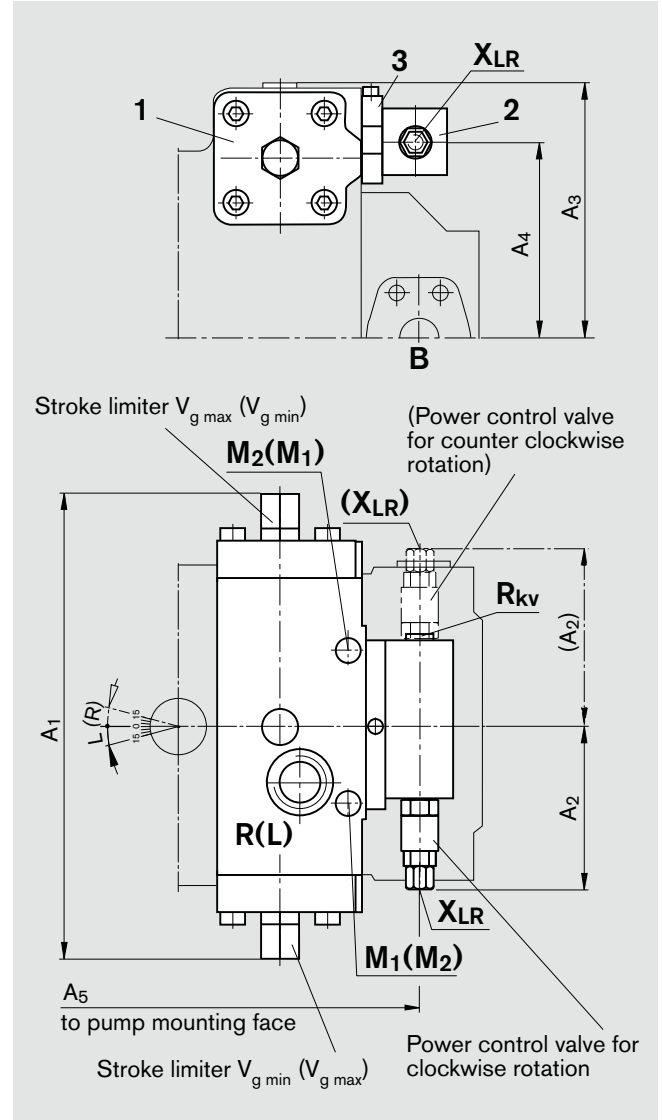
Size 40 and 71, Series 1

Clockwise direction of rotation (counter clockwise)



Size 125 to 355, Series 3

Clockwise direction of rotation (counter clockwise)



Subassemblies see page12

Ports

Port	Description	Thread	max. tightening torque ¹⁾
X _{LR}	Pilot pressure port for remote power control	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
R _{kv}	External control fluid return	DIN 3852 M18x1,5; 0.47(12) deep; plugged	103 lb-ft (140 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M14x1,5; 0.47(12) deep; plugged (Size 125 a. 180) M18x1,5; 0.47(12) deep; plugged (Size 250 a. 355)	59 lb-ft (80 Nm) 103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	
40	10.24 (260)	6.10 (155)	5.83 (148)	4.17 (106)	8.70 (221)	
71	11.65 (296)	6.10 (155)	6.50 (165)	4.61 (117)	9.76 (248)	
125/180	13.94 (354)	6.10 (155)	7.68 (195)	5.79 (147)	12.48 (317)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
250/355	16.69 (424)	6.10 (155)	9.37 (238)	7.20 (183)	14.92 (379)	

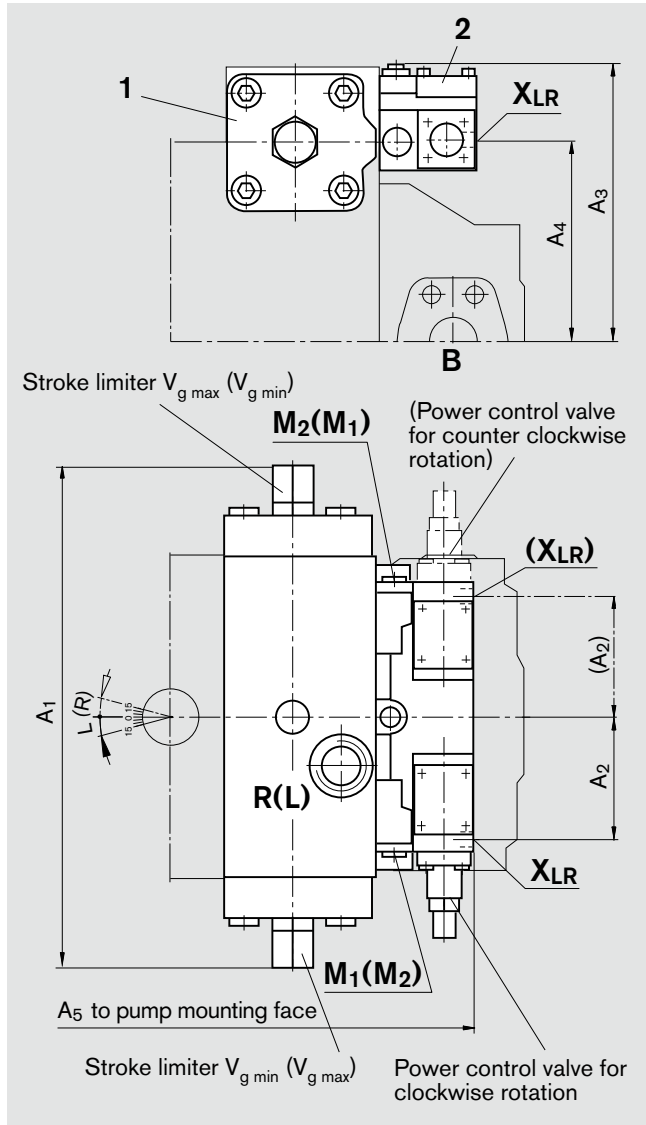
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR3

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000, Series 3

Clockwise direction of rotation (counter clockwise)



Subassemblies

- 1 A4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve

Ports

Port	Description	Standard	max. tightening torque ¹⁾
X _{LR}	Pilot pressure port for remote power control	DIN 3852 M14x1,5; 0.47(12) deep	59 lb-ft (80 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M18x1,5; 0.47(12) deep; plugged	103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	
500	20.08 (510)	4,92 (125)	11.22 (285)	8.15 (207)	18.43 (468)	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RA 92050
750	22.91 (582)	4,92 (125)	12.68 (322)	9.33 (237)	19.76 (502)	
1000	24.49 (622)	4,92 (125)	13.78 (350)	10.24 (260)	22.28 (566)	

¹⁾ please observe the general notes for the max. tightening torques on page 64

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.

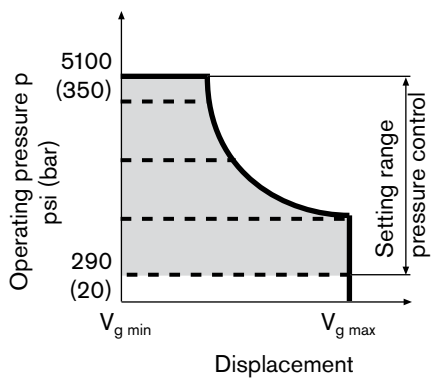
As soon as the pump output pressure reaches the pressure control level, the pump turns into the pressure control mode and delivers only the amount of fluid as required to maintain this pressure.

Setting range of the pressure control 290...5100 psi (20...350 bar)

This pressure is set as standard to 5100 psi (350 bar).

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

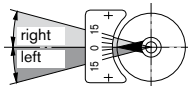
Characteristic



Direction of flow S to B

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

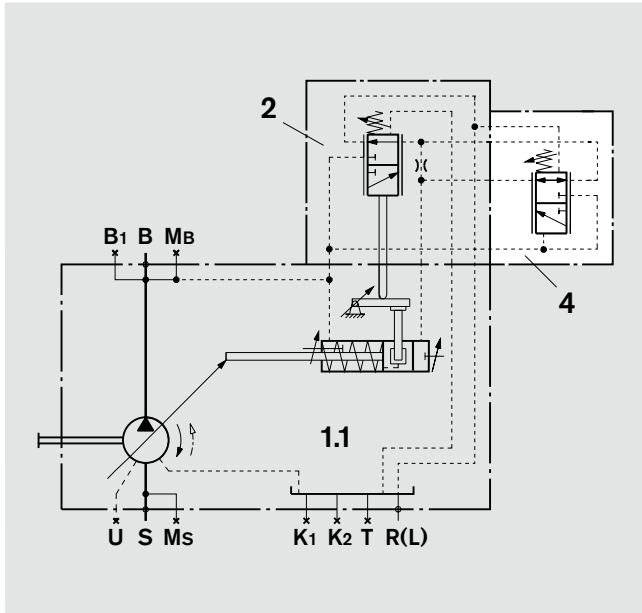
¹⁾ Compare swivel angle indicator



Schematics LR.D

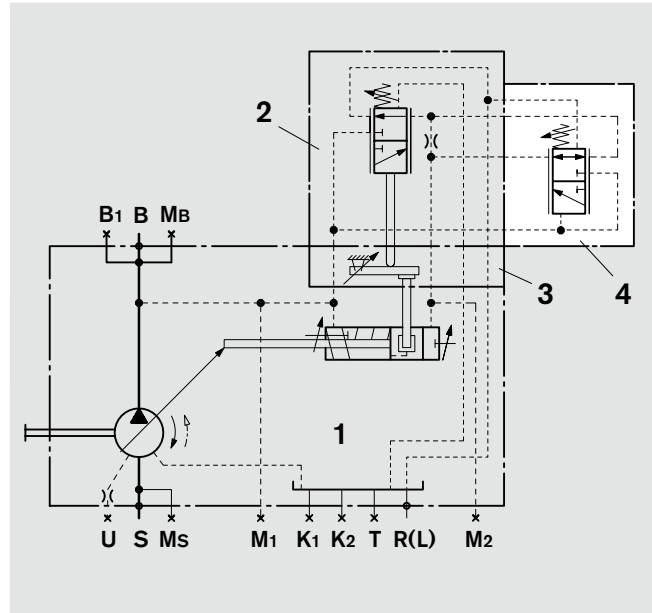
Size 40 and 71

Example: AA4VSO LR2D



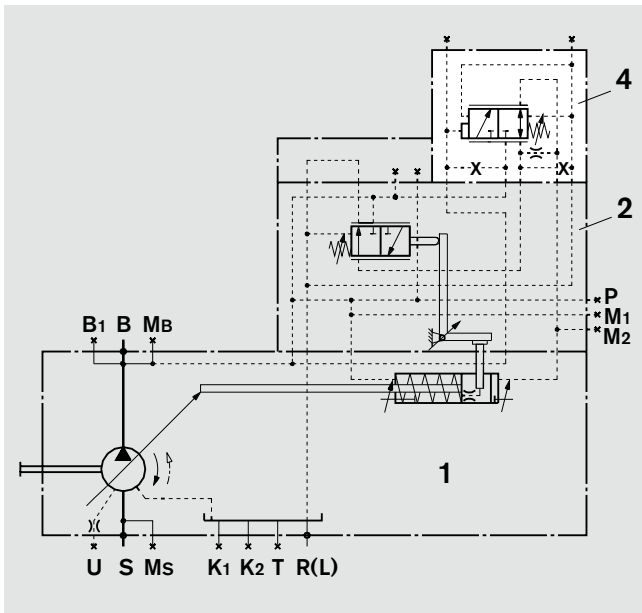
Size 125 to 355

Example: AA4VSO 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 (A)A4VSO with hydraulic control device (see RA 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 290 psi (20 bar), this results in a pilot oil flow of approx. 0.4 gpm (1.5 L/min.) out of port X_D

If another setting is desired (recommended range 290...725 psi (20...50 bar)), please state the desired value in clear text.

As separate pressure relief valve we recommend:

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

The max. line length should not exceed 6.5 ft (2 m).

Notes for the remote pressure control settings :

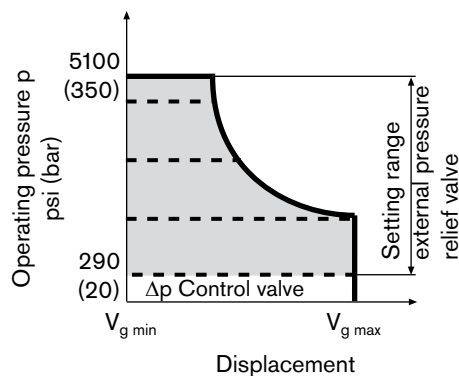
The setting of the separate pressure relief valve (item 5) plus the pressure differential at the pressure control valve determines the overall pressure control level.

Example: external pressure relief valve 4800 psi (330 bar)
 Differential pressure at pressure control valve 300 psi (20 bar)
 results in pressure control of $4800 + 300 = 5100$ psi ($330 + 20 = 350$ 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

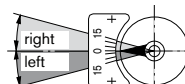
Characteristic



Direction of flow S to B

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

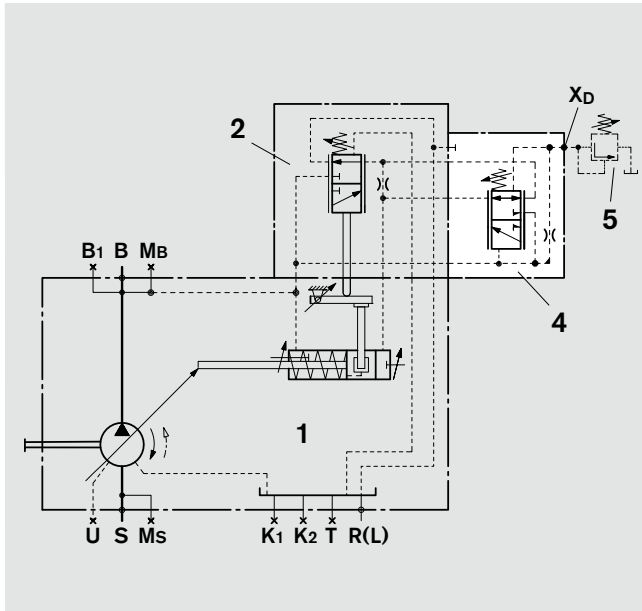
¹⁾ compare swivel angle indicator



Schematics LR.G

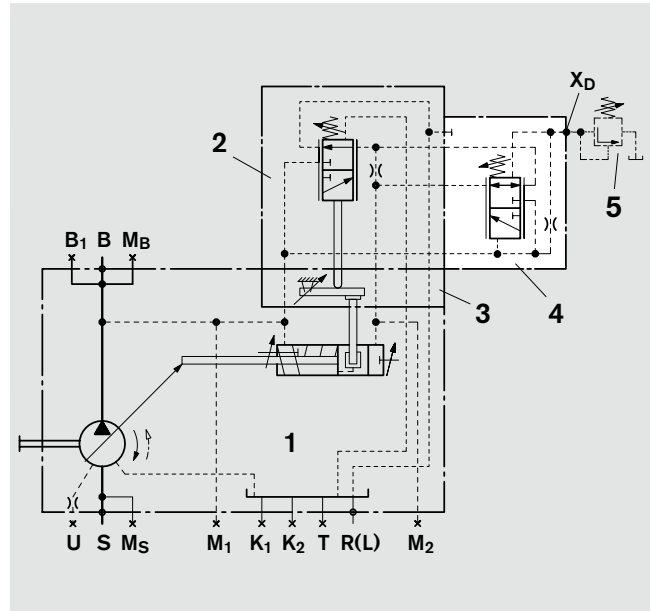
Size 40 and 71

Example: AA4VSO LR2G



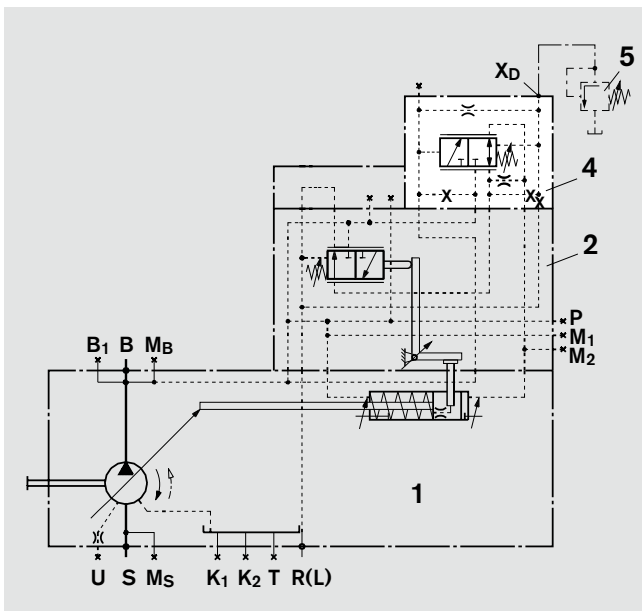
Size 125 to 355

Example: AA4VSO 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

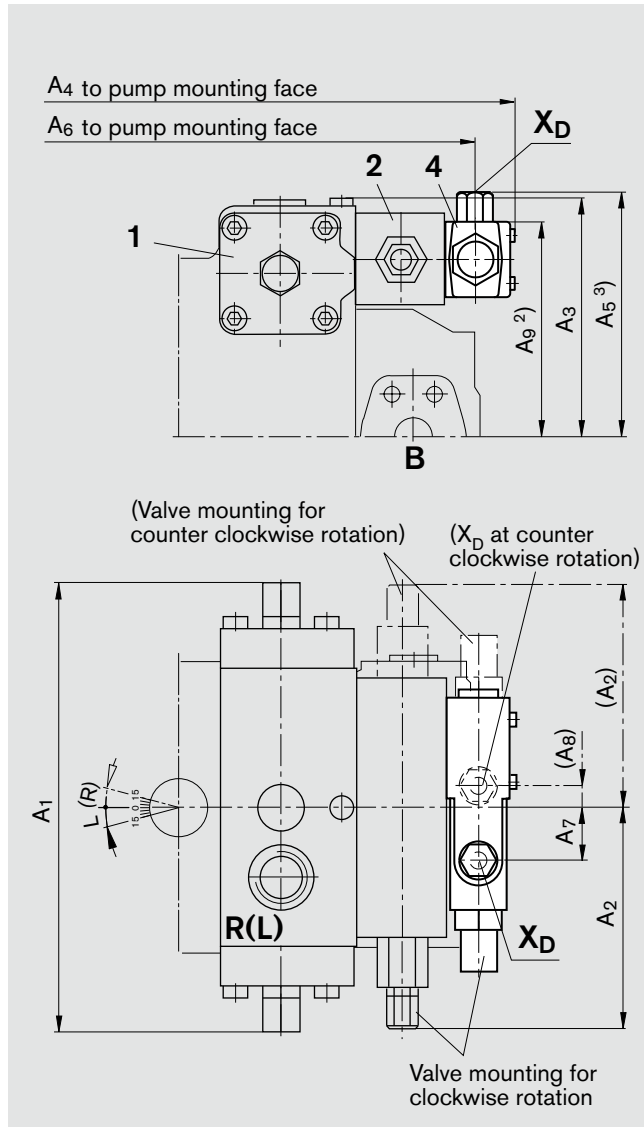
- 1 (A)A4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 4 Pressure control valve
- 5 Pressure relief valve (not in scope of supply)

Unit dimensions LR.D and LR.G

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

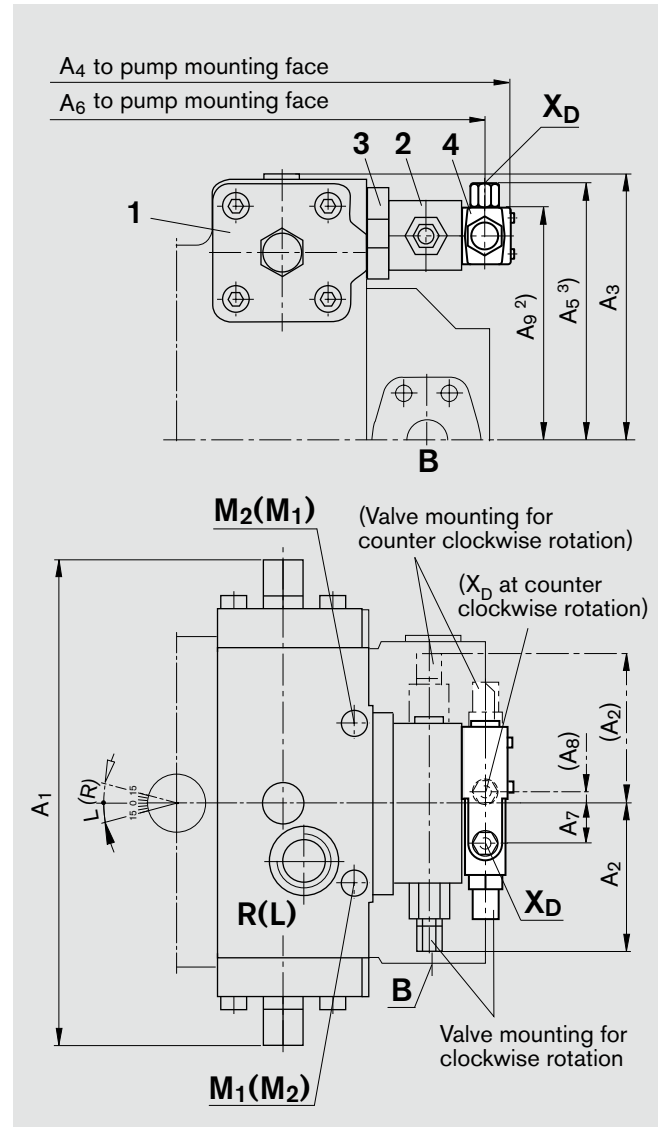
Size 40 and 71

Clockwise rotation (counter clockwise)



Size 125 to 355

Clockwise rotation (counter clockwise)



Subassemblies see page 18

Ports

max. tightening torque ¹⁾

X_D Pilot pressure port remote pressure control ISO 11926 9/16-18UNF-2B; 0.51 (13); plugged at LR.D (M14x1,5) 59 lb-ft (80 Nm)

M₁; M₂ Gauging port control chamber pressure DIN 3852 M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180) 59 lb-ft (80 Nm)
M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355) 103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅ ³⁾	A ₆	A ₇	A ₈	A ₉ ²⁾
40	10.24(260)	5.20(132)	5.83(148)	11.69(297)	5.98(152)	10.67(271)	1.46(37)	0.28(7)	5.12(130)
71	11.65(296)	5.20(132)	6.50(165)	12.76(324)	6.42(163)	11.73(298)	1.46(37)	0.28(7)	5.55(141)
125/180	13.94(354)	5.20(132)	7.68(195)	15.47(393)	7.60(193)	14.45(367)	1.46(37)	0.28(7)	6.73(171)
250/355	16.69(424)	5.20(132)	9.37(238)	17.91(455)	9.02(229)	16.89(429)	1.46(37)	0.28(7)	8.15(207)

For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050

¹⁾ please observe the general notes for the max. tightening torques on page 64

²⁾ valid for LR.D

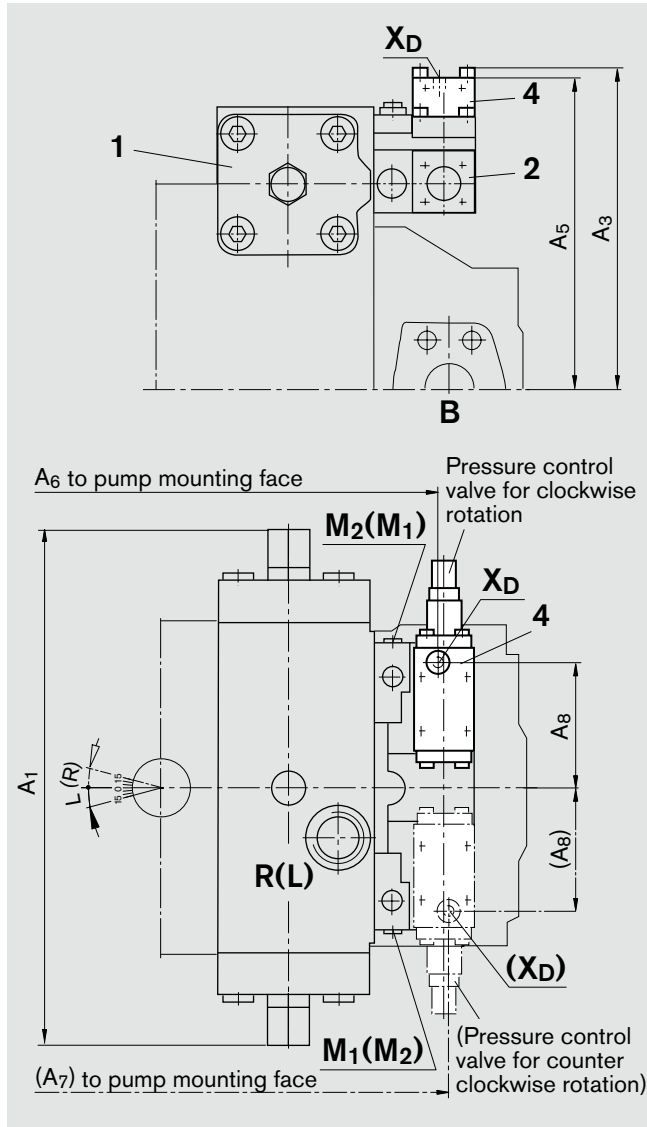
³⁾ valid for LR.G

Unit dimensions LR.D and LR.G

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000

Clockwise rotation (counter clockwise rotation)



Subassemblies

- 1 A4VSO with hydraulic control device (see RA 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; 0.47 (12) deep plugged at LR.D	59 lb-ft (80 Nm)
$M_1; M_2$	Gauging port control chamber pressure	DIN 3852 M18x1,5; 0.47 (12) deep; plugged	103 lb-ft (140 Nm)

Unit dimensions

Size	A_1	A_3	A_5	A_6	A_7	A_8	
500	20.08(510)	12.60(320)	12.24(311)	16.93(430)	17.36(441)	4.92(125)	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RA 92050
750	22.91(582)	13.78(350)	13.46(342)	18.19(462)	18.62(473)	4.92(125)	
1000	24.49(622)	14.69(373)	14.33(364)	20.79(528)	21.22(539)	4.92(125)	

¹⁾ please observe the general notes for the max. tightening torques on page 64

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.

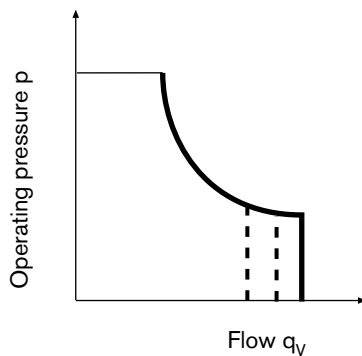
$$\Delta p_{\text{orifice}} = p_{\text{pump}} - p_{\text{actuator}}$$

The standard Δp setting at the flow control valve (item 6) amounts to 200 psi (14 bar). If another setting is desired (recommended range 200...365 psi (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).

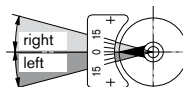
Characteristic



Direction of flow S to B

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

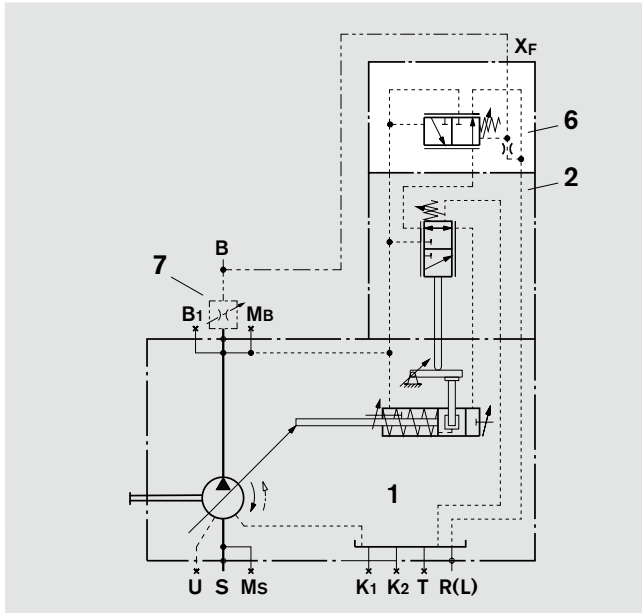
¹⁾ compare swivel angle indicator



Schematics LR.F

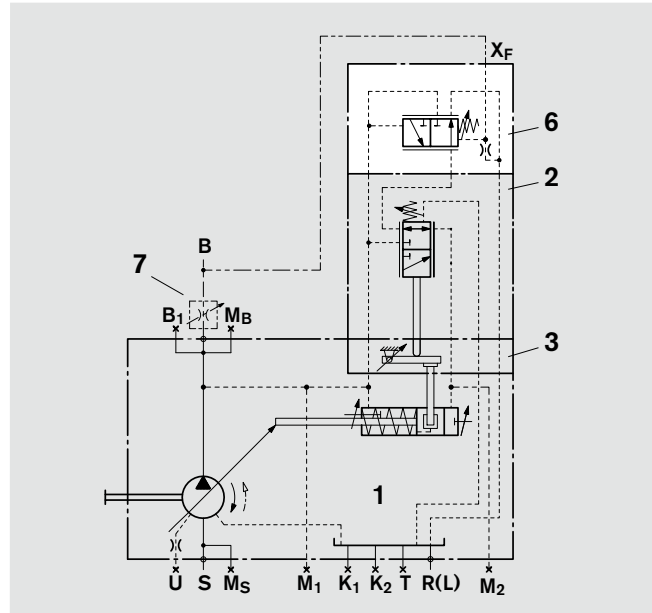
Size 40 and 71

Example: AA4VSO LR2F



Size 125 to 355

Example AA4VSO LR2F



Ports

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

Subassemblies

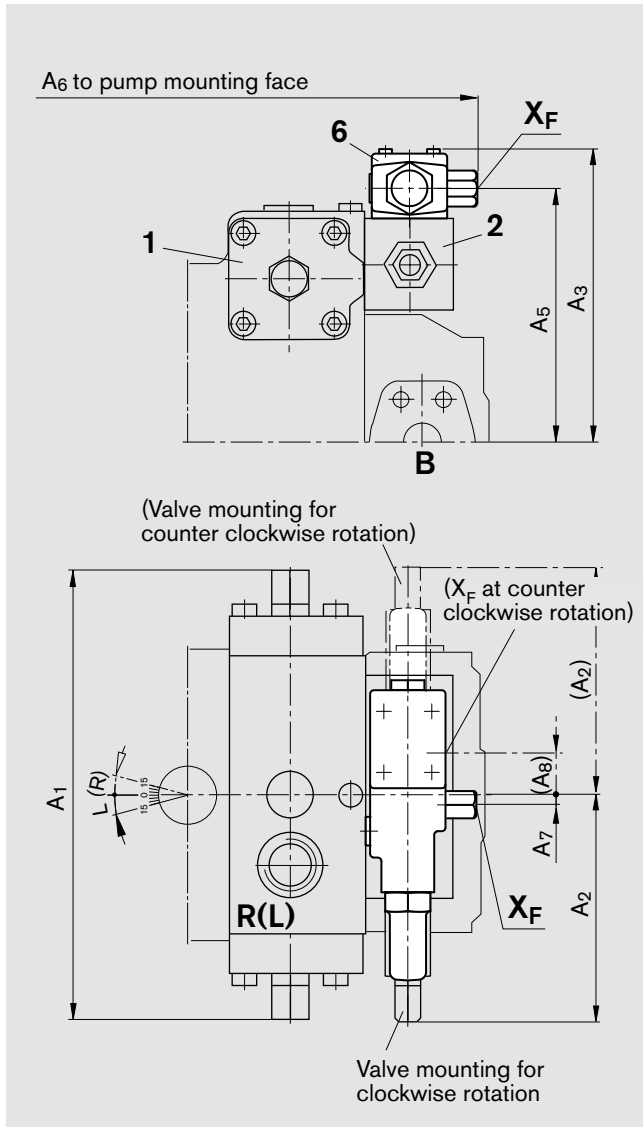
- 1 AA4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 6 Flow control valve
- 7 External orifice (not in scope of supply)

Unit dimensions LR.F

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

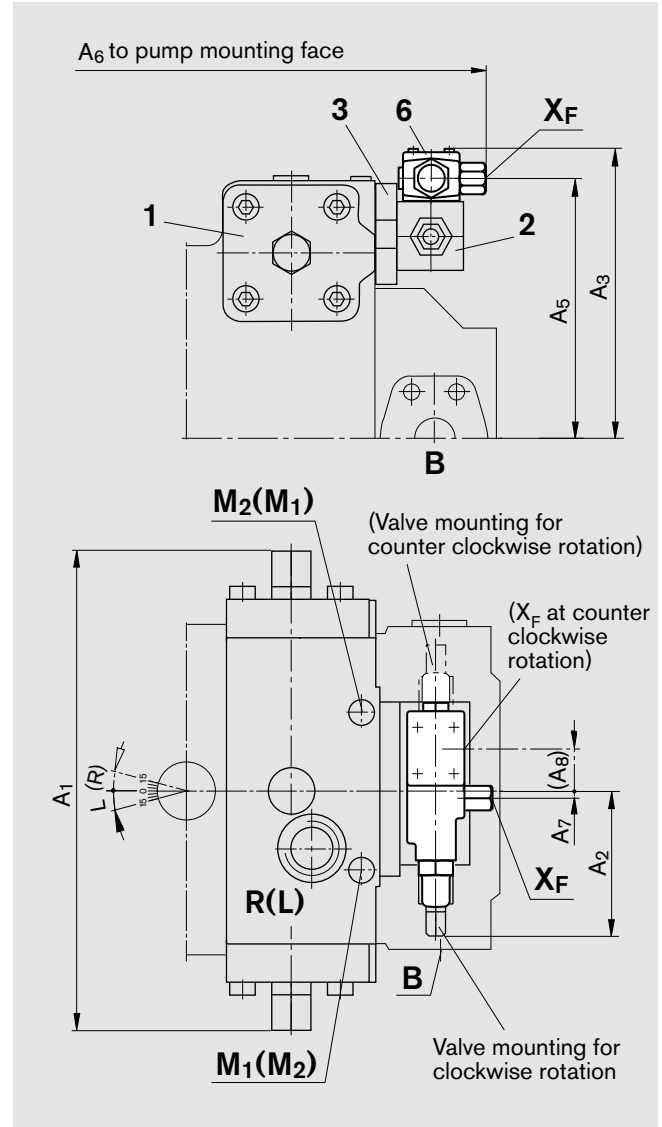
Size 40 and 71

Clockwise rotation (counter clockwise)



Size 125 to 355

Clockwise rotation (counter clockwise)



Subassemblies see page 22

Ports

max. tightening torque ¹⁾

X_F	Pilot pressure port	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
$M_1; M_2$	Gauging port control chamber pressure	DIN 3852 M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180) M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355)	59 lb-ft (80 Nm) 103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₅	A ₆	A ₇	A ₈
40	10.24(260)	5.20(132)	7.17(182)	6.14(156)	10.51(267)	0.28(7)	1.46(37)
71	11.65(296)	5.20(132)	7.60(193)	6.57(167)	11.57(294)	0.28(7)	1.46(37)
125/180	13.94(354)	5.20(132)	8.78(223)	7.76(197)	14.29(363)	0.28(7)	1.46(37)
250/355	16.69(424)	5.20(132)	10.20(259)	9.17(233)	16.73(425)	0.28(7)	1.46(37)

For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050

¹⁾ please observe the general notes for the max. tightening torques on page 64

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	$p_{\text{contr min}}$	psi (bar)	510 (35)
Max. permissible control pressure in P	$p_{\text{contr max}}$	psi (bar)	1450 (100)
Control fluid consumption in P (at $p = 725$ psi (50 bar))		gpm (L/min)	max. 1 (4)
Pilot pressure range in P _{St}	p_{pilot}	psi (bar)	145...650 (10...45)
Max. pressure in P _{St}	$p_{\text{pilot max}}$	psi (bar)	1450 (100)
Control begin of power curve, however above control press. p_{contr} in P	p	psi (bar)	725...5100 (50...350)
Hysteresis			$\leq \pm 2\%$ von $V_{g \max}$

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

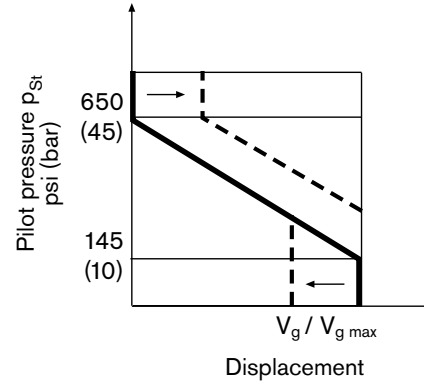
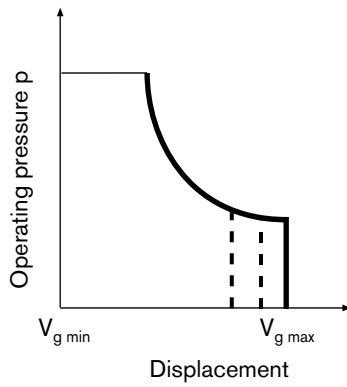
With a pressure control setting below the pressure level of the external control pressure supply p_{contr} all pumps up to size 355 will remain against the mechanical stroke limiter $V_{g \min}$ and the sizes 500 to 1000 may experience oscillations.

Table of values LR.H

Size			40	71	125	180	250	355	500	750	1000
Control volume	$V_{1 \max}$	in ³ (cm ³)	0.70 (11,4)	1.31 (21,5)	2.29 (37,5)	2.29 (37,5)	4.74 (73,2)	4.74 (73,2)	7.63 (125,0)	12.81 (210,0)	16.07 (263,3)
Control volume	$V_{2 \max}$	in ³ (cm ³)	0.18 (2,9)	0.33 (5,4)	0.57 (9,4)	0.57 (9,4)	1.12 (18,3)	1.12 (18,3)	1.92 (31,4)	3.11 (51,3)	4.02 (65,8)
Differential volume	$V_1 - V_2$	in ³ (cm ³)	0.52 (8,5)	0.98 (16,1)	1.72 (28,1)	1.72 (28,1)	3.35 (54,9)	3.35 (54,9)	5.71 (94,1)	9.69 (158,7)	12.06 (197,5)

LR.H with hydraulic stroke limiter

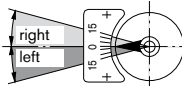
Characteristic



Direction of flow S to B

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

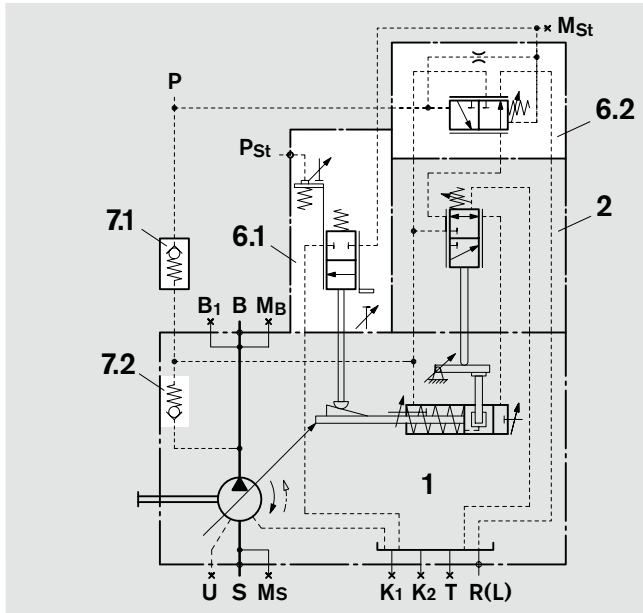
¹⁾ Compare swivel angle indicator



Schematics LR.H

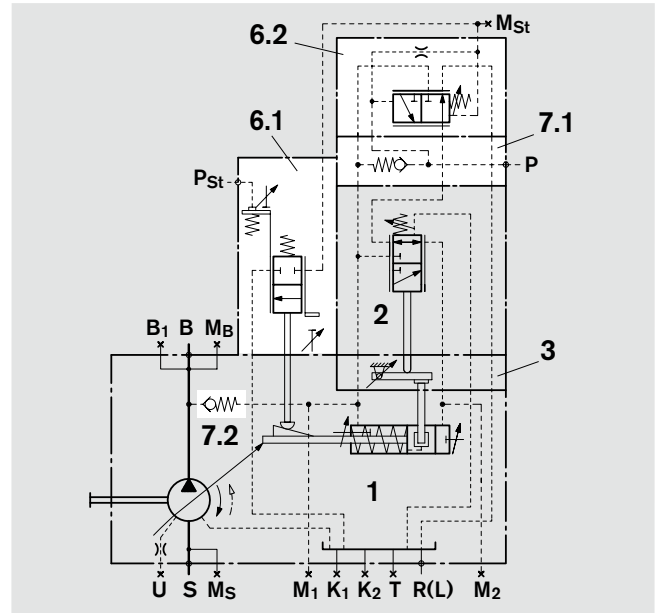
Size 40 and 71

Example: AA4VSO LR2H



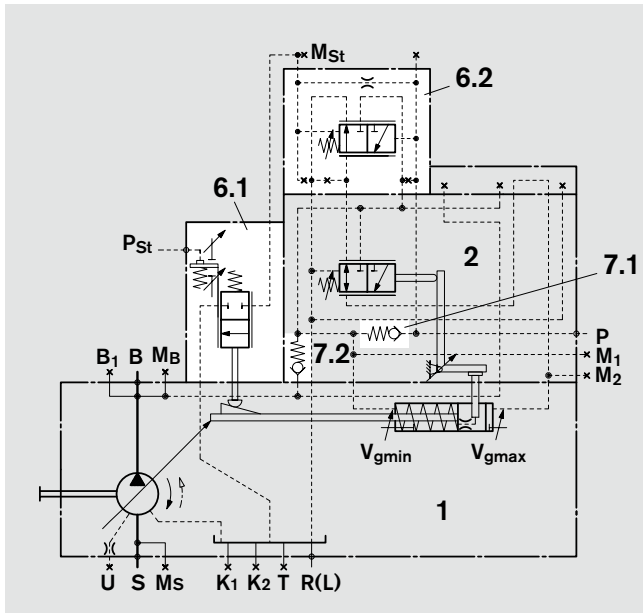
Size 125 to 355

Example AA4VSO 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
- M₁, M₂ Gauging port control chamber pressure (Size 125 to 1000)

Subassemblies

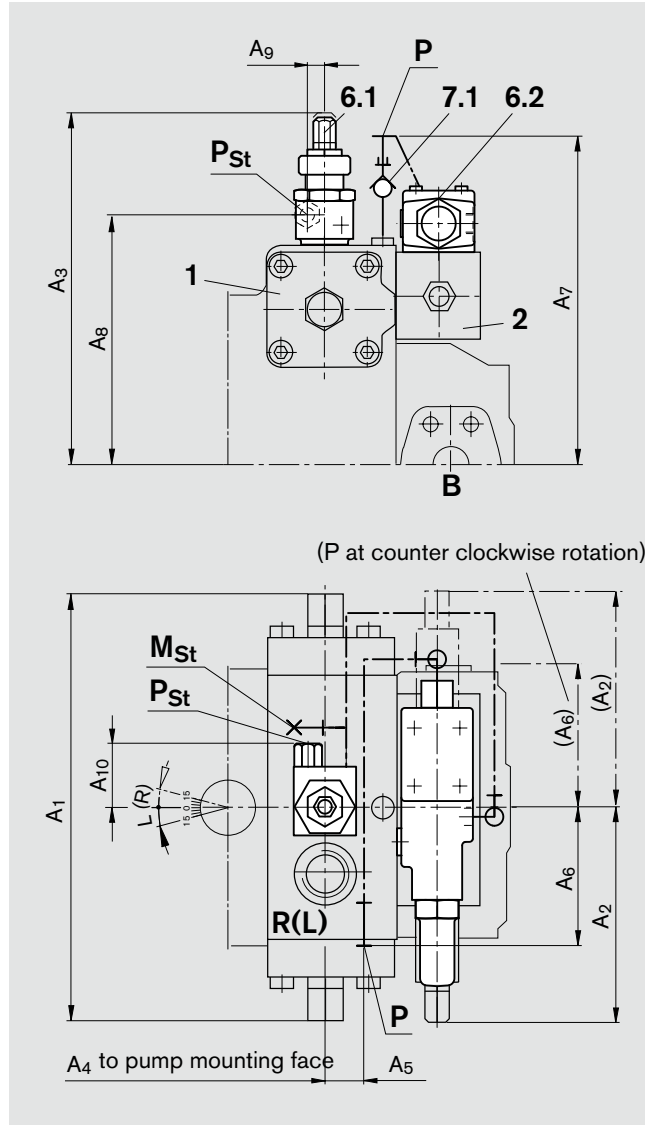
- 1 (A)A4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 6.1 Pilot valve-stroke limiter
- 6.2 Pressure control valve for stroke limiter
- 7.1 Check valve (for size 40 and 71 external, integrated in sizes 125 to 1000)
- 7.2 Integrated check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

Unit dimensions LR.H

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 40 and 71

Clockwise rotation (counter clockwise)



Valve mounting for counter clockwise rotation item 2, 6.2 and 7.1 each rotated 180°

Subassemblies

- 1 AA4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 6.1 Pilot valve-stroke limiter
- 6.2 Pressure control valve for stroke limiter
- 7.1 Check valve

Ports

Port	Description	Tube dia.	max. tightening torque ¹⁾
P	Control pressure port	8x1.5mm (DIN 3853 S8 Form W)	37 lb-ft (50 Nm)
P _{St}	Pilot pressure port	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (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	10.24 (260)	5.20 (132)	10.00 (254)	5.75 (146)	1.34 (34)	3.27 (83)	7.80 (198)	6.42 (163)	0.59 (15)	2.24 (57)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
71	11.65 (296)	5.20 (132)	10.55 (268)	6.61 (168)	1.54 (39)	3.27 (83)	8.46 (215)	7.01 (178)	0.59 (15)	2.24 (57)	

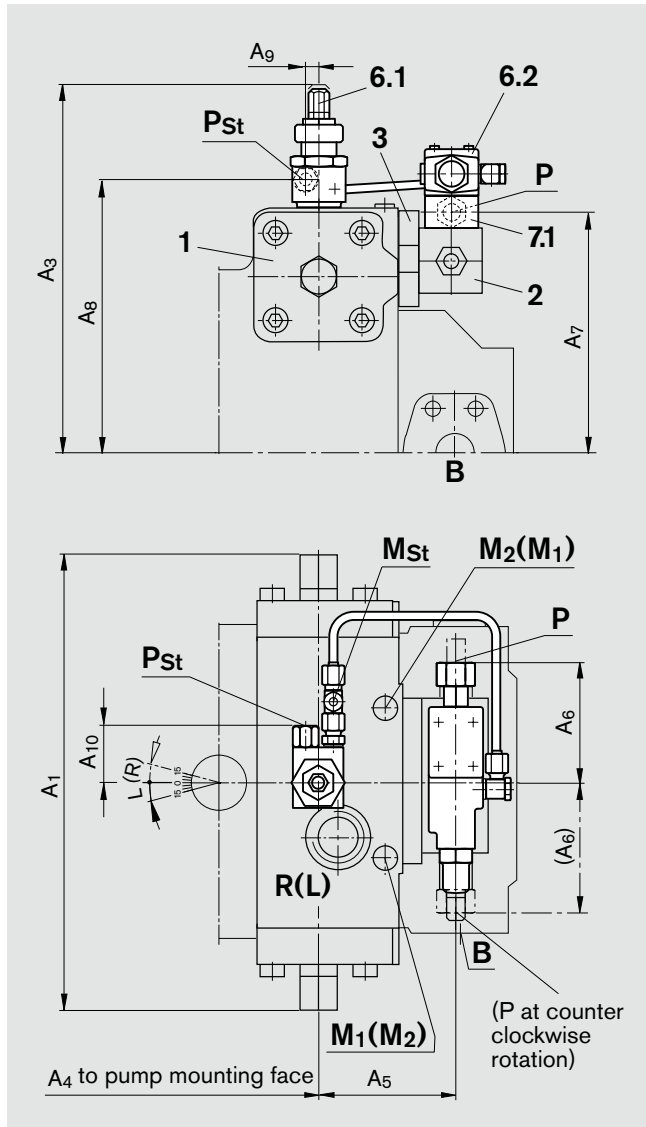
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.H

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 125 to 355

Clockwise rotation (counter clockwise)



Valve mounting for counter clockwise rotation item 2, 6.2 and 7.1 each rotated 180°

Subassemblies

- 1 AA4VSO with hydraulic control device (see RA 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

Port	Description	ISO Standard	Depth	max. tightening torque ¹⁾
P	Control pressure port	ISO 11926 3/4-16UNF-2B	0.59 (15) deep	103 lb-ft (140 Nm)
P _{St}	Pilot pressure port	ISO 11926 9/16-18UNF-2B	0.51 (13) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control press.	Tube dia. 8x1.5mm (DIN 3853 S8 Form W)	capped	37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M14x1,5; M18x1,5	0.47 (12) deep; plugged (Size 125 a. 180)	59 lb-ft (80 Nm)
			0.47 (12) deep; plugged (Size 250 a. 355)	103 lb-ft (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	13.94 (354)	11.97 (304)	8.07 (205)	4.41 (112)	4.57 (116)	7.56 (192)	8.43 (214)	0.59 (15)	2.24 (57)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
250/355	16.69 (424)	13.86 (352)	9.84 (250)	5.08 (129)	4.57 (116)	8.98 (228)	10.28 (261)	0.59 (15)	2.24 (57)	

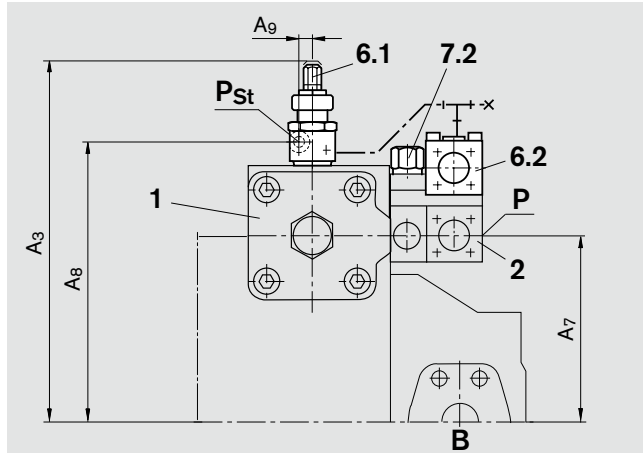
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.H

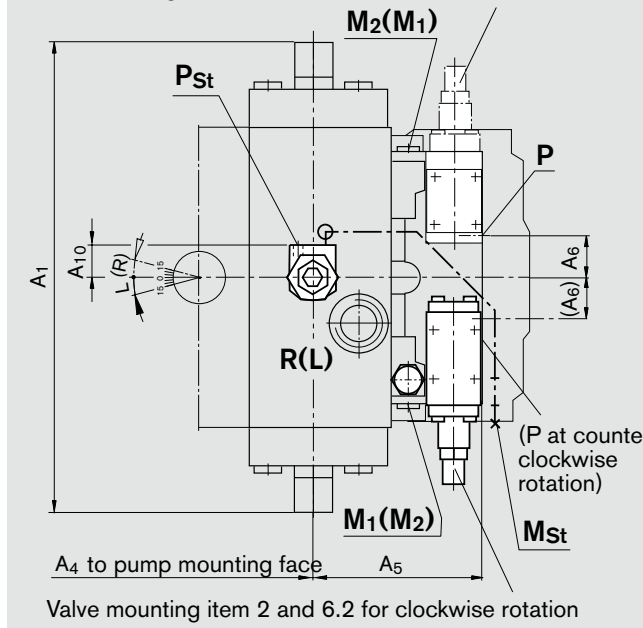
Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000

Clockwise rotation (counter clockwise)



(Valve mounting item 2 and 6.2 for counter clockwise rotation)



Valve mounting item 2 and 6.2 for clockwise rotation

Subassemblies

- 1 A4VSO with hydraulic control device (see RA 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

Port	Description	Standard	max. tightening torque ¹⁾
P	Control pressure port	DIN 3852 M22x1,5; 0.55 (14) deep	155 lb-ft (210 Nm)
P _{St}	Pilot pressure port	DIN 3852 M14x1,5; 0.47 (12) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M18x1,5; 0.47 (12) deep; plugged	103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀
500	20.08 (510)	15.63 (397)	10.98 (279)	7.28 (185)	1.85 (47)	7.95 (202)	12.05 (306)	0.59 (15)	1.38 (35)
750	22.91 (582)	17.13 (435)	11.85 (301)	7.72 (196)	1.85 (47)	9.13 (232)	13.58 (345)	0.59 (15)	1.38 (35)
1000	24.49 (622)	18.23 (463)	14.17 (360)	7.95 (202)	1.85 (47)	10.04 (255)	14.65 (372)	0.59 (15)	1.38 (35)

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

¹⁾ please observe the general notes for the max. tightening torques on page 64

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.

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

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.

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

Recommended pilot pressure at port R_{kv} :

$$p_p = \frac{\text{Output press. } p_{HD}}{2} \quad \text{however at least 290 psi (20 bar).}$$

The V_{gmin} -stop will be factory set (between 0...50% V_{gmax}).

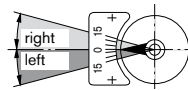
Please state desired value in clear text when ordering.

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
clockwise	left	B
counter clockwise	right	B

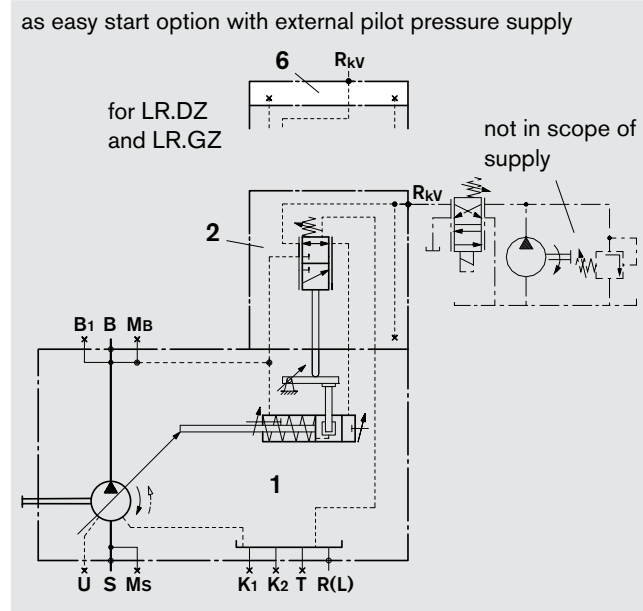
¹⁾ Compare swivel angle indicator



Schematics LR.Z

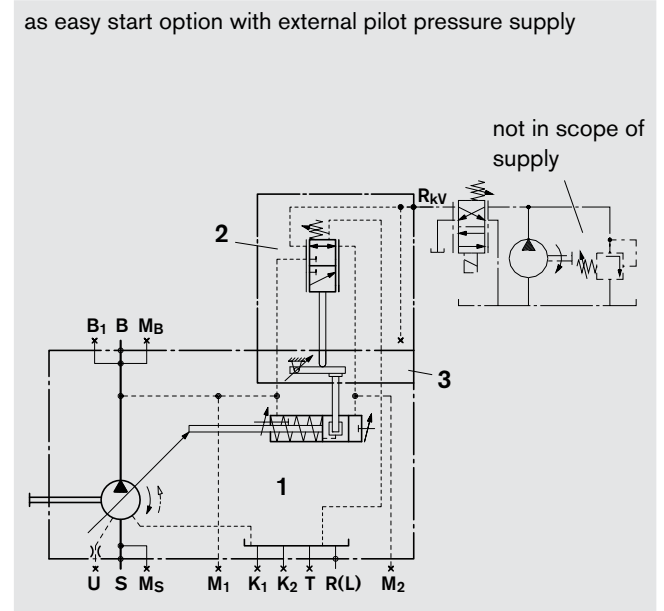
Size 40 and 71

Example: AA4VSO LR2Z



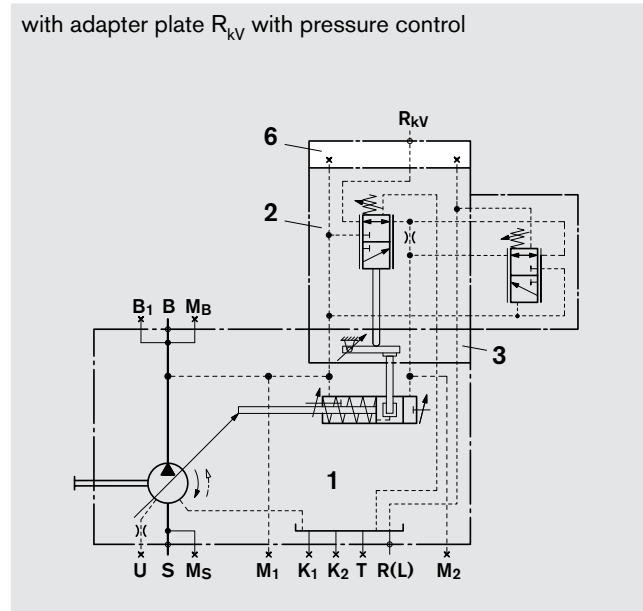
Size 125 to 355

Example: AA4VSO LR2Z



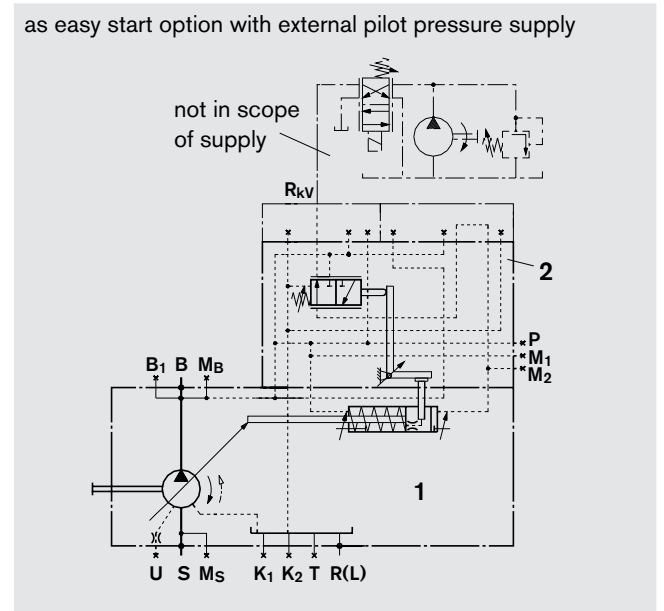
Size 125 to 355

Example: AA4VSO LR2DZ



Size 500 to 1000

Example: A4VSO LR2Z



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

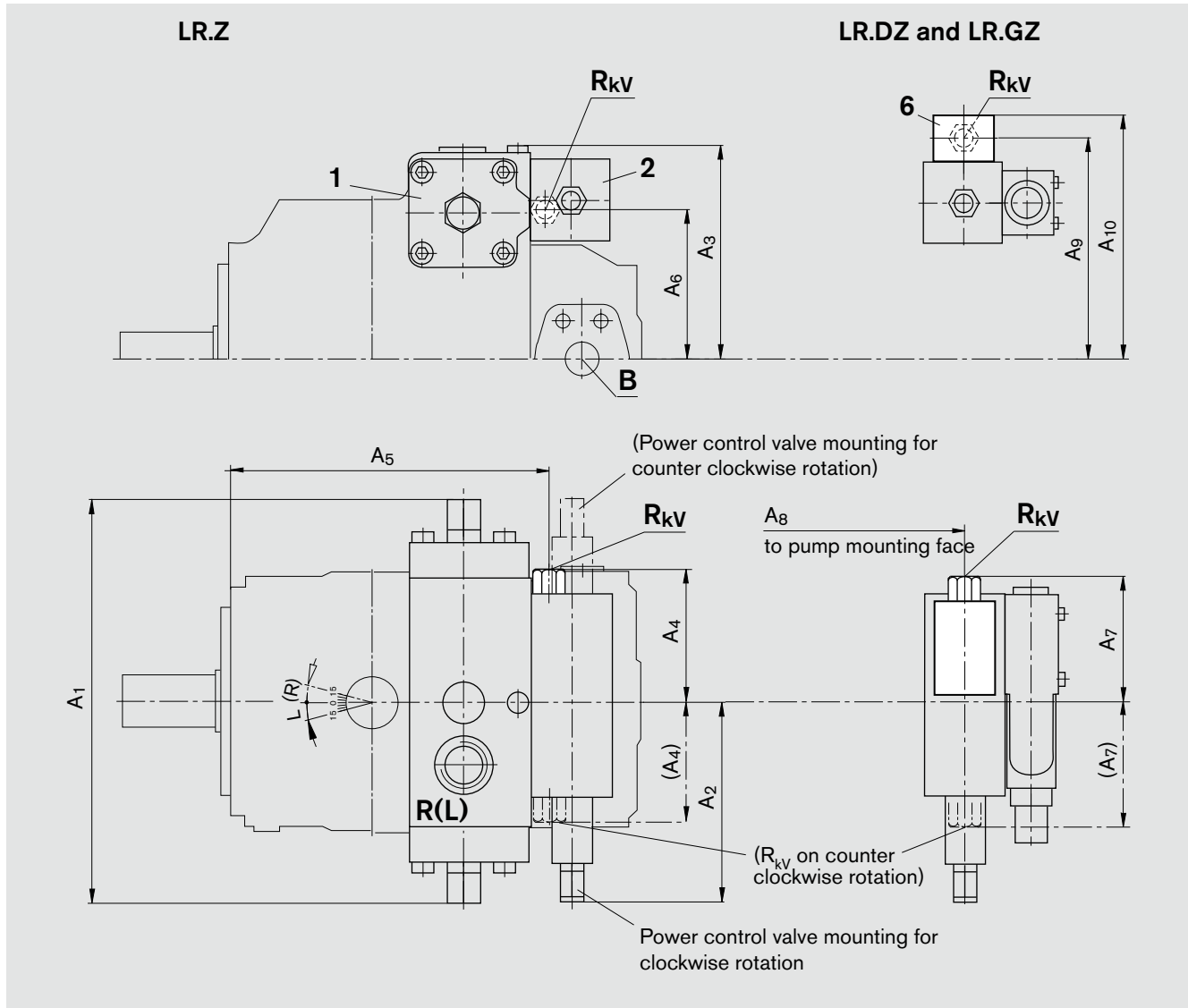
- 1 (A)A4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 6 Adapter plate R_{kv} for LR.DZ and LR.GZ (Size 40 to 355)

Unit dimensions LR.Z

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 40 and 71

Clockwise rotation (counter clockwise)



Subassemblies see page 31

Ports

R_{kv} External control fluid return ISO 11926 3/4-16 UNF-2B; 0.59 (15) deep

max. tightening torque ¹⁾

103 lb-ft (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	10.24 (260)	5.20 (132)	5.83 (148)	4.25 (108)	8.31 (211)	4.49 (114)	2.48 (63)	8.70 (221)	5.98 (152)	6.61 (168)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
71	11.65 (296)	5.20 (132)	6.50 (165)	4.25 (108)	9.37 (238)	4.92 (125)	2.48 (63)	9.76 (248)	6.42 (163)	7.24 (184)	

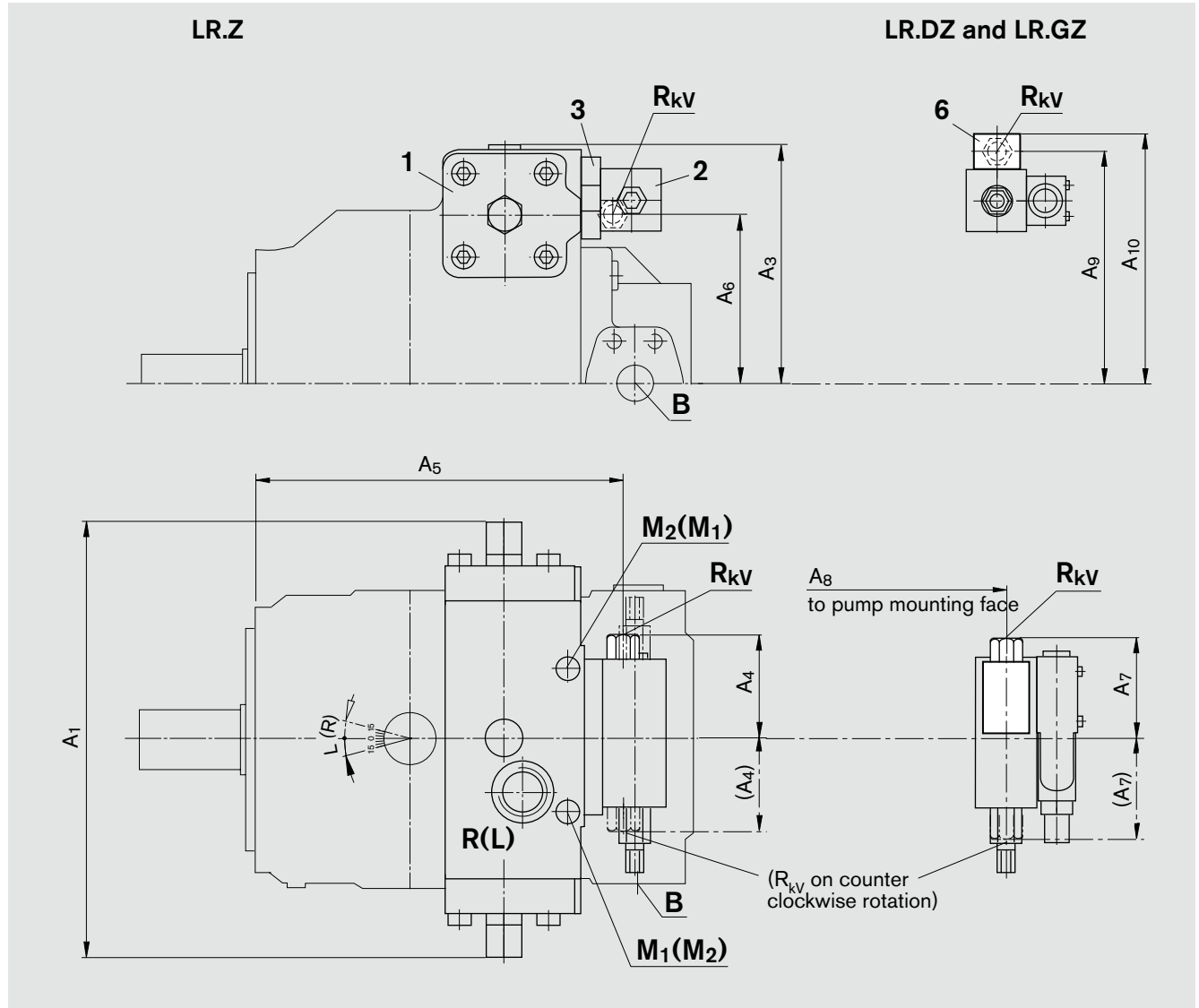
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.Z

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 125 to 355

Clockwise rotation (counter clockwise)



Subassemblies see page 31

Ports

max. tightening torque ¹⁾

R _{kv}	External control fluid return	ISO 11926	3/4-16 UNF-2B; 0.59 (15) deep	103 lb-ft (140 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180) M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355)	59 lb-ft (80 Nm) 103 lb-ft (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	13.94 (354)	7.68 (195)	4.25 (108)	12.09 (307)	6.10 (155)	2.48 (63)	12.48 (317)	7.60 (193)	8.23 (209)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
250/355	16.69 (424)	9.37 (238)	4.25 (108)	14.53 (369)	7.52 (191)	2.48 (63)	14.92 (379)	9.02 (229)	9.84 (250)	

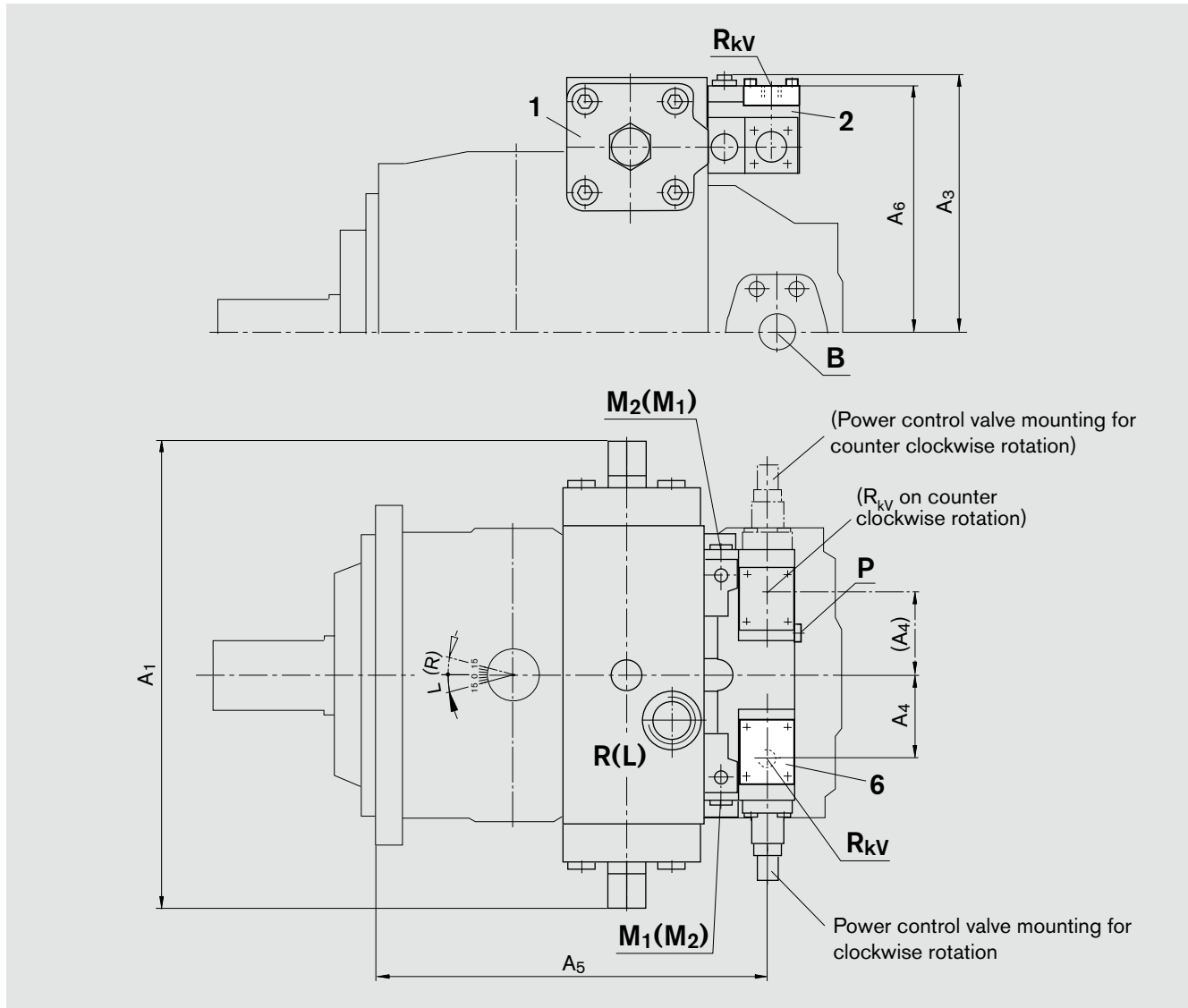
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.Z

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000

Clockwise rotation (counter clockwise)



Subassemblies see page 31

Ports

max. tightening torque ¹⁾

R _{kV}	External control fluid return	DIN 3852	M18x1,5; 0.47 (12) deep	103 lb-ft (140 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 0.47 (12) deep; plugged	103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	
500	20.08 (510)	11.22 (285)	3.70 (94)	17.05 (433)	10.91 (277)	
750	22.91 (582)	12.68 (322)	3.70 (94)	18.31 (465)	12.09 (307)	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RA 92050
1000	24.49 (622)	13.78 (350)	3.70 (94)	20.94 (532)	12.99 (330)	

¹⁾ please observe the general notes for the max. tightening torques on page 64

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.

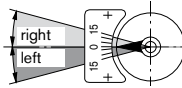
Valve function:

- a) Solenoid de-energized = easy start, pump swivels back towards V_{gmin} -stop as soon as an operating pressure of approx. 60...145 psi (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
clockwise	left	B
counter clockwise	right	B

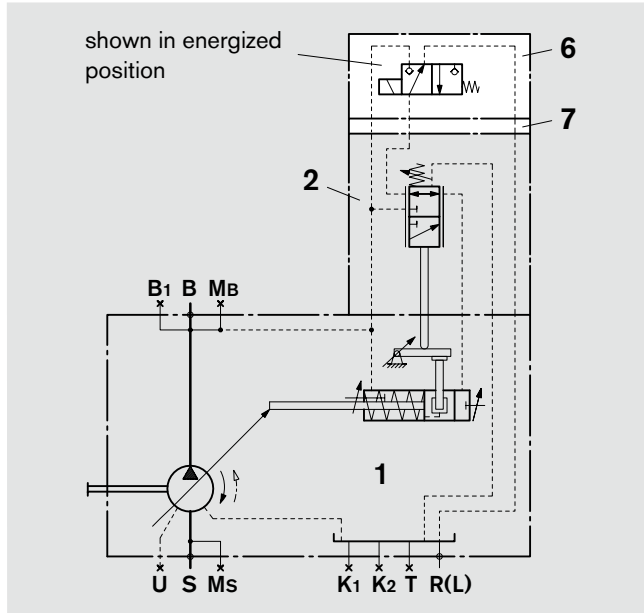
¹⁾ Compare swivel angle indicator



Schematics LR.Y

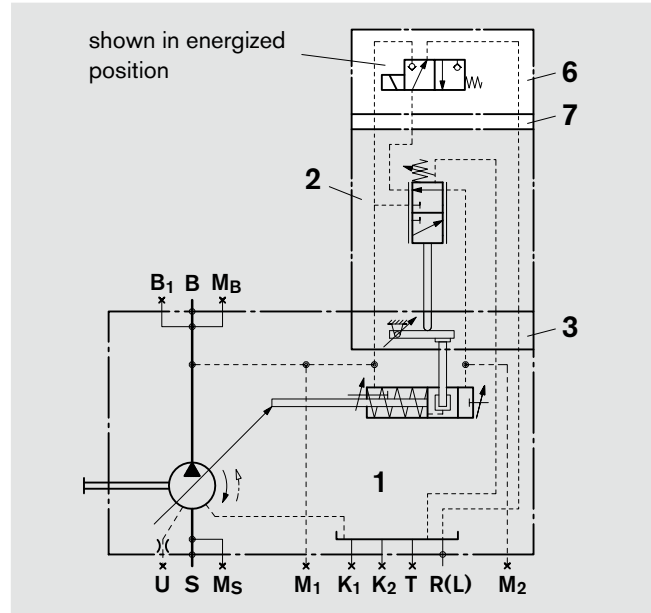
Size 40 and 71

Example: AA4VSO LR2Y



Size 125 to 355

Example: AA4VSO LR2Y



Ports

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

Subassemblies

- 1 AA4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (size 125 to 355)
- 6 3/2-directional poppet valve see RA 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. 0.18...0.39 in (4,5...10 mm) protection IP65

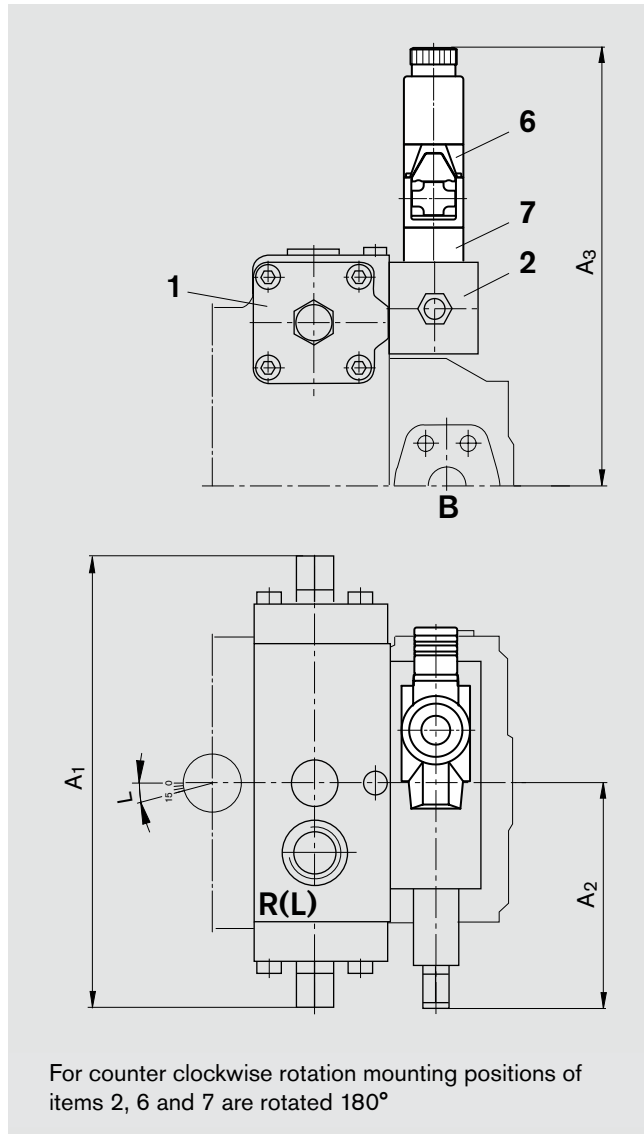
- 7 sandwich plate

Unit dimensions LR.Y

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

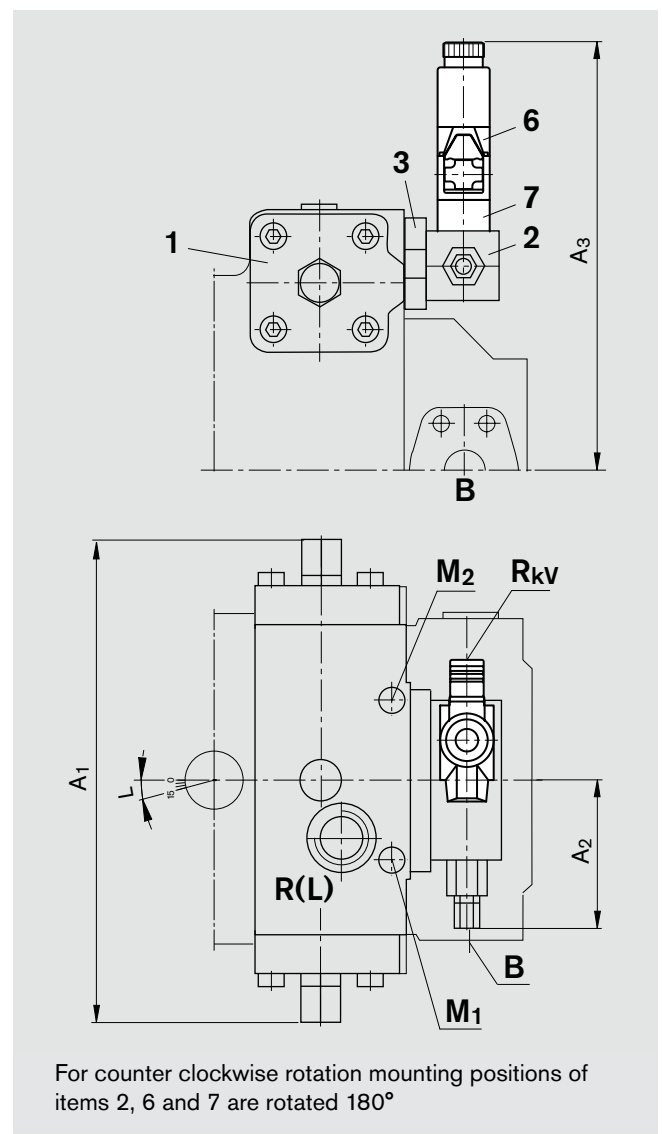
Size 40 and 71

Example: clockwise rotation



Size 125 to 355

Example: clockwise rotation



Subassemblies see page 36

Ports

max. tightening torque¹⁾

M₁; M₂ Gauging port control chamber press. DIN 3852 M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180) 59 lb-ft (80 Nm)
 M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355) 103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃
40	10.24 (260)	5.20 (132)	11.50 (292)
71	11.65 (296)	5.20 (132)	12.13 (308)
125/180	13.94 (354)	5.20 (132)	13.31 (338)
250/355	16.69 (424)	5.20 (132)	14.72 (374)

For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050

¹⁾ please observe the general notes for the max. tightening torques on page 64

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 (item 5), 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 $\Delta p = 200$ psi (14 bar).

Actuation of relief valve (item 5) causes a pilot fluid consumption of approx. 0.34 gpm (1,3 L/min) with an orifice dia. of 0.0315 in (0,8 mm) (item 5.1) and a $\Delta p = 200$ psi (14 bar).

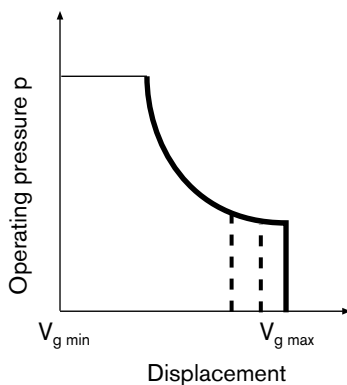
The max. line length to the separate pressure relief valve (item 5) should not exceed 6.6 ft (2 m).

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 4900 psi (336 bar)
 Differential pressure at Load-Sensing 200 psi (14 bar)
 results in pressure control of $4900 + 200 = 5100$ psi ($336 + 14 = 350$ bar)

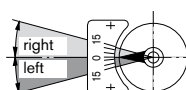
Characteristic



Direction of flow S to B

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

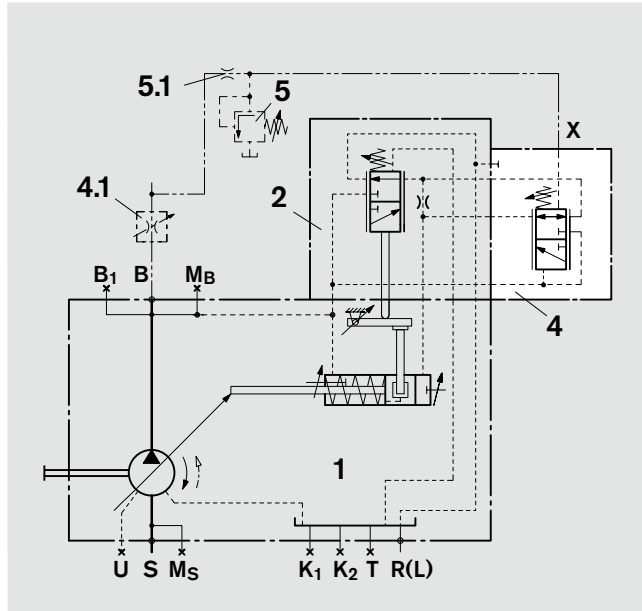
¹⁾ Compare swivel angle indicator



Schematics LR.S

Size 40 and 71

Example: AA4VSO LR2S

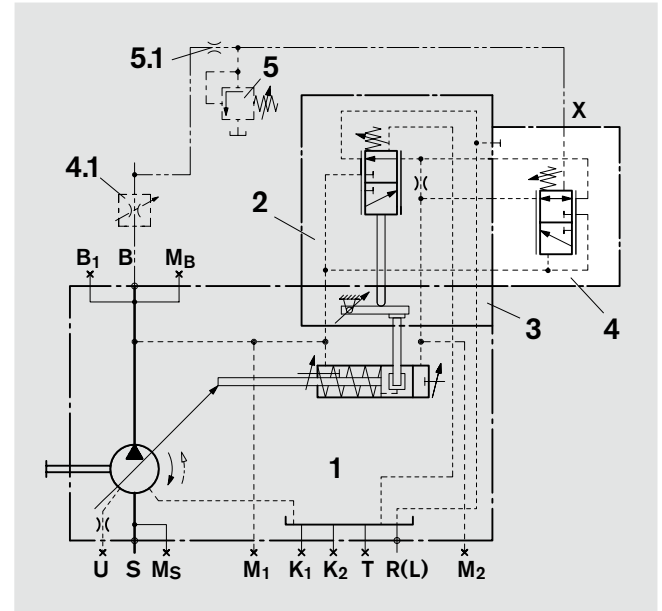


Ports

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

Size 125 to 355

Example: AA4VSO LR2S



Subassemblies

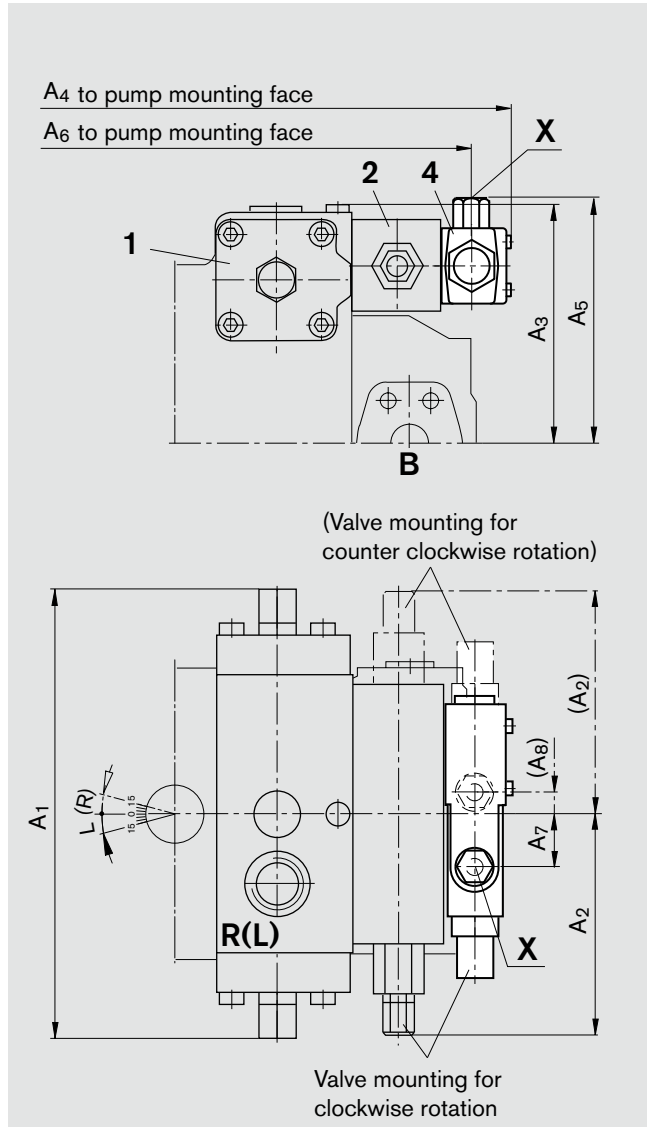
- 1 AA4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 4 Load-Sensing valve
- 4.1 Orifice for load sensing (not in scope of supply)
- 5 Pressure relief valve optional (not in scope of supply)
Recommended:
DBD 6 (hydraulic) to RA 25402
or DBETR-SO 437 (electric) to RA 29166
- 5.1 Orifice for remote pressure control optional (not in scope of supply)
Recommended: 0.0315 - 0.0394 in (0,8 - 1mm)
depending on the load sensing control the pressure increase can amount to 200 psi (14 bar)

Unit dimensions LR.S

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

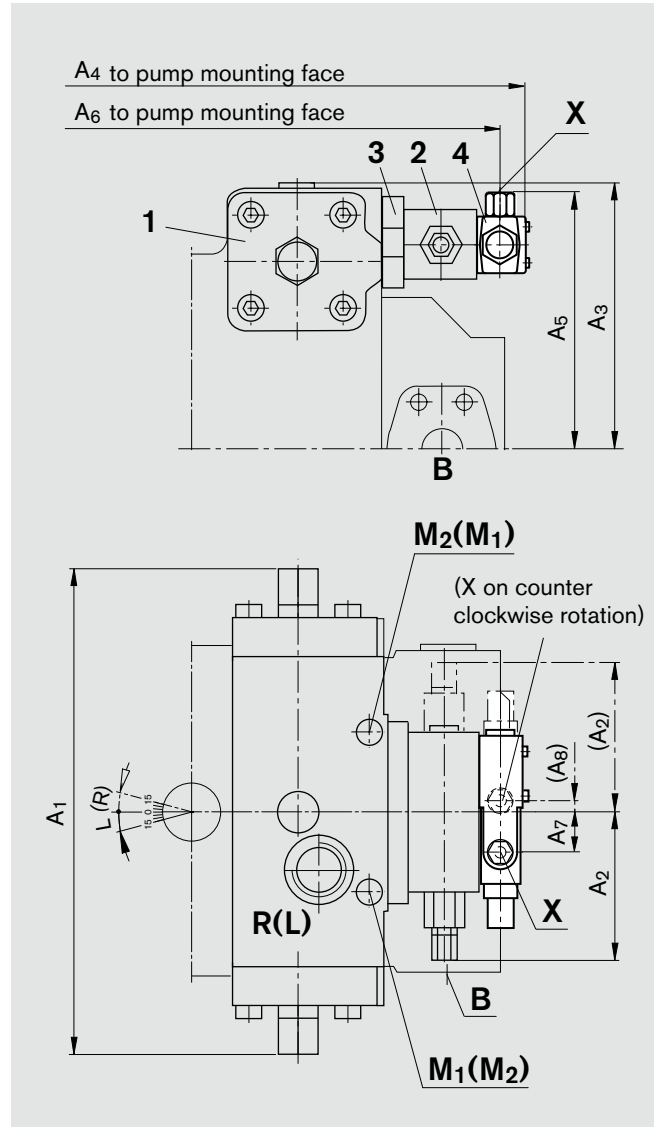
Size 40 and 71

Clockwise rotation (counter clockwise)



Size 125 to 355

Clockwise rotation (counter clockwise)



Subassemblies see page 39

Ports

				max. tightening torque ¹⁾
X	Pilot pressure port	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep		59 lb-ft (80 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180)		59 lb-ft (80 Nm)
		M18x1,5; 0.47 (12) deep plugged (Size 250 a. 355)		103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈
40	10.26(260)	5.20 (132)	5.83(148)	11.69(297)	5.98(152)	10.67(271)	1.46(37)	0.28(7)
71	11.65(296)	5.20 (132)	6.50(165)	12.76(324)	6.42(163)	11.73(298)	1.46(37)	0.28(7)
125/180	13.94(354)	5.20 (132)	7.68(195)	15.47(393)	7.60(193)	14.45(367)	1.46(37)	0.28(7)
250/355	16.69(424)	5.20 (132)	9.37(238)	17.91(455)	9.02(229)	16.89(429)	1.46(37)	0.28(7)

For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050

¹⁾ please observe the general notes for the max. tightening torques on page 64

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:

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

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 control pressure in P	$p_{\text{contr min}}$	psi (bar)	510 (35)
Min. required control pressure in P with boosted inlet S of max. 290 psi (20 bar)	$p_{\text{contr min}}$	psi (bar)	725 (50)
Max. permissible control pressure in P	$p_{\text{contr max}}$	psi (bar)	1450 (100)
Control fluid consumption in P (at $p = 725$ psi (50 bar))		gpm (L/min)	max. 1.06 (4)
Pilot pressure range	p_{pilot}	psi (bar)	145...650 (10...45)
Beginning of power control curve, however must be above control press. p_{contr}	p	psi (bar)	725...5100 (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

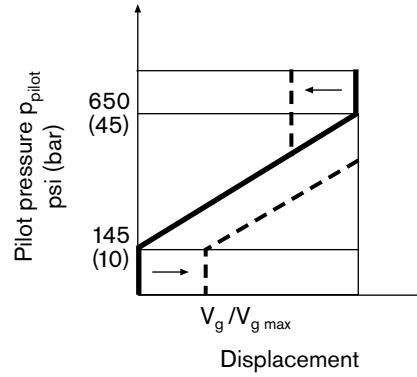
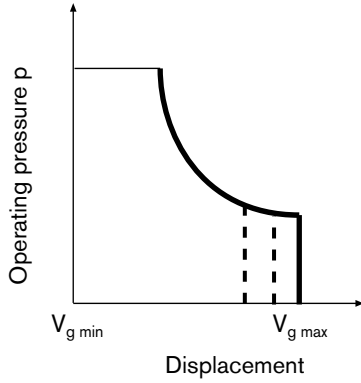
Size		40	71	125	180	250	355	500	750	1000
Control volume	$V_{1 \max}$ in ³ (cm ³)	0.70 (11,4)	1.31 (21,5)	2.29 (37,5)	2.29 (37,5)	4.47 (73,2)	4.47 (73,2)	7.63 (125,0)	12.82 (210,0)	16.07 (263,3)
Control volume	$V_{2 \max}$ in ³ (cm ³)	0.18 (2,9)	0.33 (5,4)	0.78 (12,7)	0.78 (12,7)	1.52 (24,9)	1.52 (24,9)	2.45 (40,1)	4.43 (72,6)	5.37 (88,0)
Differential volume	$V_1 - V_2$ in ³ (cm ³)	0.52 (8,5)	0.98 (16,1)	1.51 (24,8)	1.51 (24,8)	2.95 (48,3)	2.95 (48,3)	5.18 (84,9)	8.39 (137,4)	10.70 (175,3)
Control fluid required for de-stroking at										
Control pressure $p_{\text{contr}} = 725$ (50 bar);										
Operating pressure $p < 725$ (50 bar);	gpm (L/min)*	1.36 (5,16)	1.70 (6,44)	1.97 (7,44)	1.97 (7,44)	2.55 (9,66)	2.55 (9,66)	2.68 (10,13)	2.91 (11,00)	2.77 (10,50)
Beginning of power control $p > 725$ (50 bar)										
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 1.06 gpm (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: $V_{g \text{ min}}$

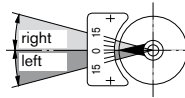
Characteristics



Direction of flow S to B

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

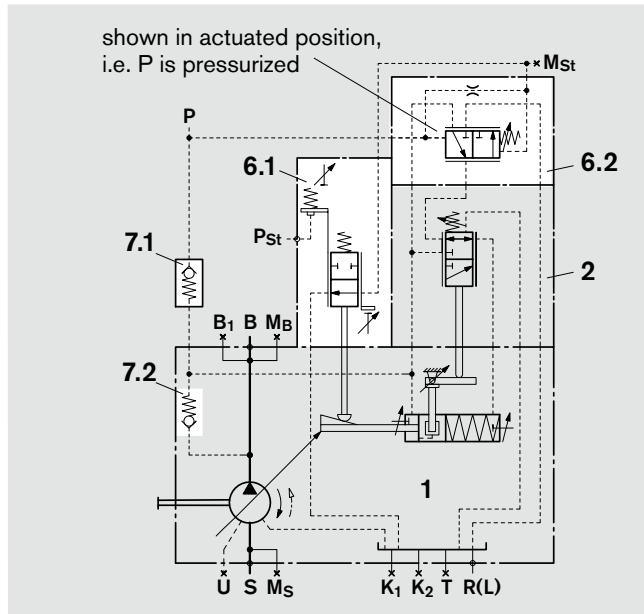
¹⁾ Compare swivel angle indicator



Schematics LR.N

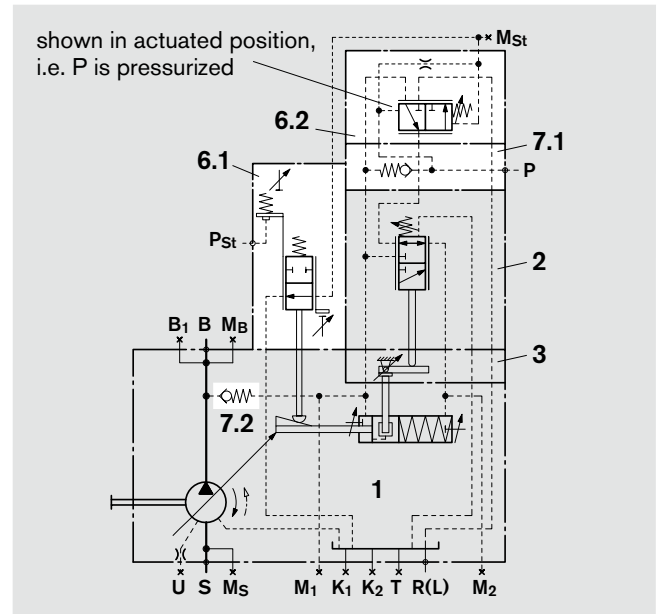
Size 40 and 71

Example: AA4VSO LR2N



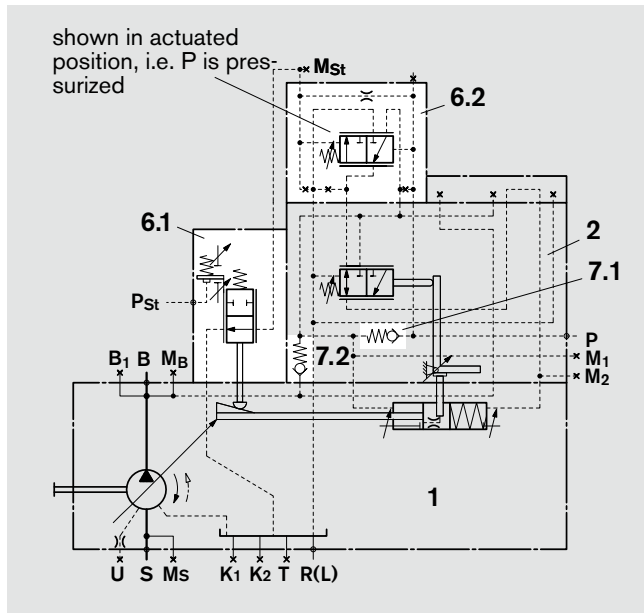
Size 125 to 355

Example: AA4VSO 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
- M₁, M₂ Gauging port control chamber press. (Size 125 to 1000)

Subassemblies

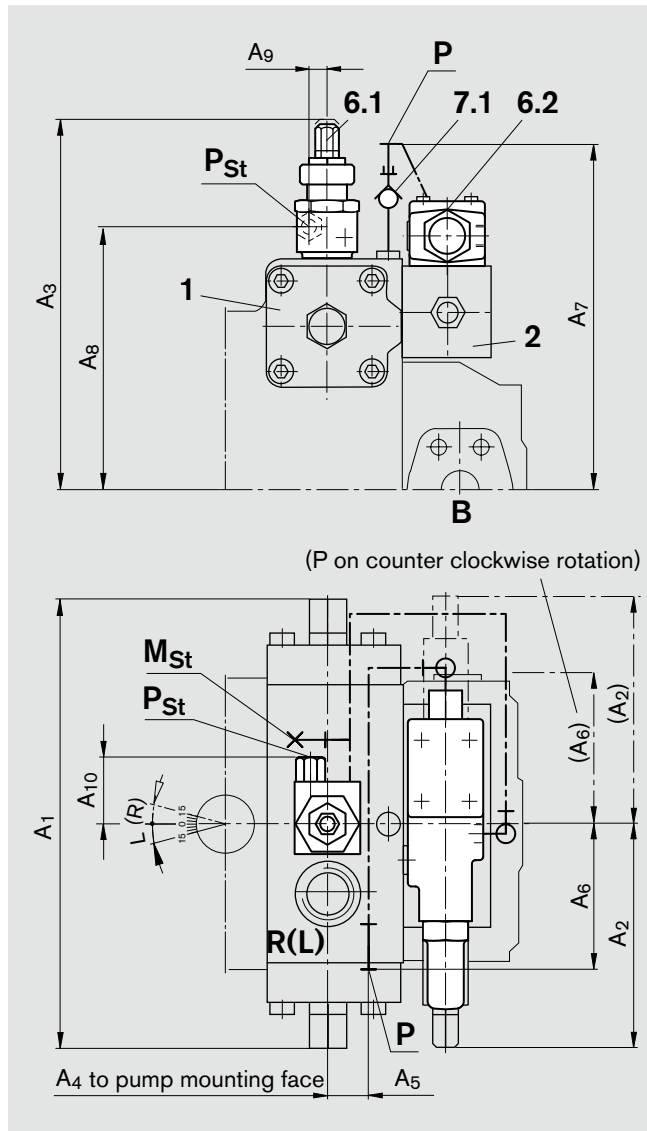
- 1 Pump with hydraulic control device (A)A4VSO (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 6.1 Pilot valve
- 6.2 Control valve
- 7.1 Check valve (integrated in sizes 125 to 1000)
- 7.2 Integrated check valve

Unit dimensions LR.N

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 40 and 71

Clockwise rotation (counter clockwise)



Valve mounting position for counter clockwise rotation item 2, 6.2 and 7.1 rotated by 180°

Subassemblies

- 1 AA4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 6.1 Pilot valve
- 6.2 Control valve
- 7.1 check valve

Ports

Port	Description	Tube dia.	max. tightening torque ¹⁾
P	Control pressure port	8x1.5mm (DIN 3853 S8 Form W)	37 lb-ft (50 Nm)
P _{St}	Pilot pressure port	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (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	10.24 (260)	5.20 (132)	9.76 (248)	5.75 (146)	134 (34)	3.27 (83)	7.80 (198)	6.42 (163)	0.59 (15)	2.24 (57)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
71	11.65 (296)	5.20 (132)	10.39 (264)	6.61 (168)	1.54 (39)	3.27 (83)	8.46 (215)	7.09 (180)	0.59 (15)	2.24 (57)	

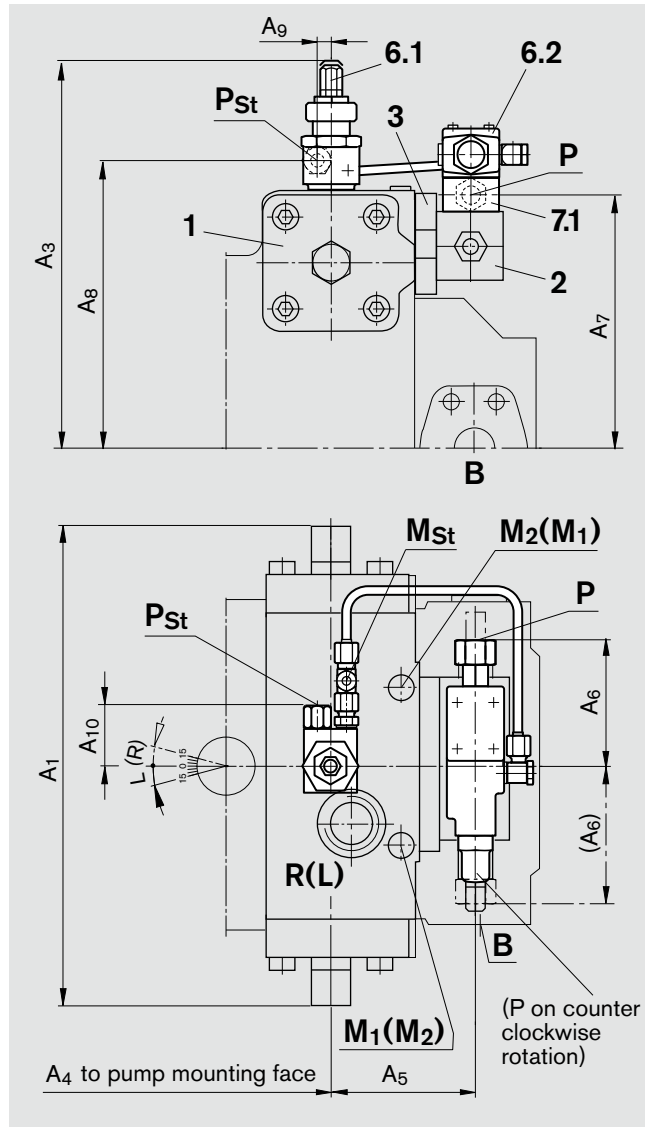
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.N

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 125 to 355

Clockwise rotation (counter clockwise)



Valve mounting position for counter clockwise rotation item 2, 6.2 and 7.1 rotated by 180°

Subassemblies

- 1 AA4VSO with hydraulic control device (see RA 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	ISO 11926 3/4-16UNF-2B; 0.59 (15) deep		103 lb-ft (140 Nm)
P _{St}	Pilot pressure port	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep		59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped		37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180) M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355)		59 lb-ft (80 Nm) 103 lb-ft (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	13.94 (354)	11.73 (298)	8.07 (205)	4.41 (112)	4.57 (116)	7.56 (192)	8.43 (214)	0.59 (15)	2.24 (57)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
250/355	16.69 (424)	13.62 (346)	9.84 (250)	5.08 (129)	4.57 (116)	8.98 (228)	10.28 (261)	0.59 (15)	2.24 (57)	

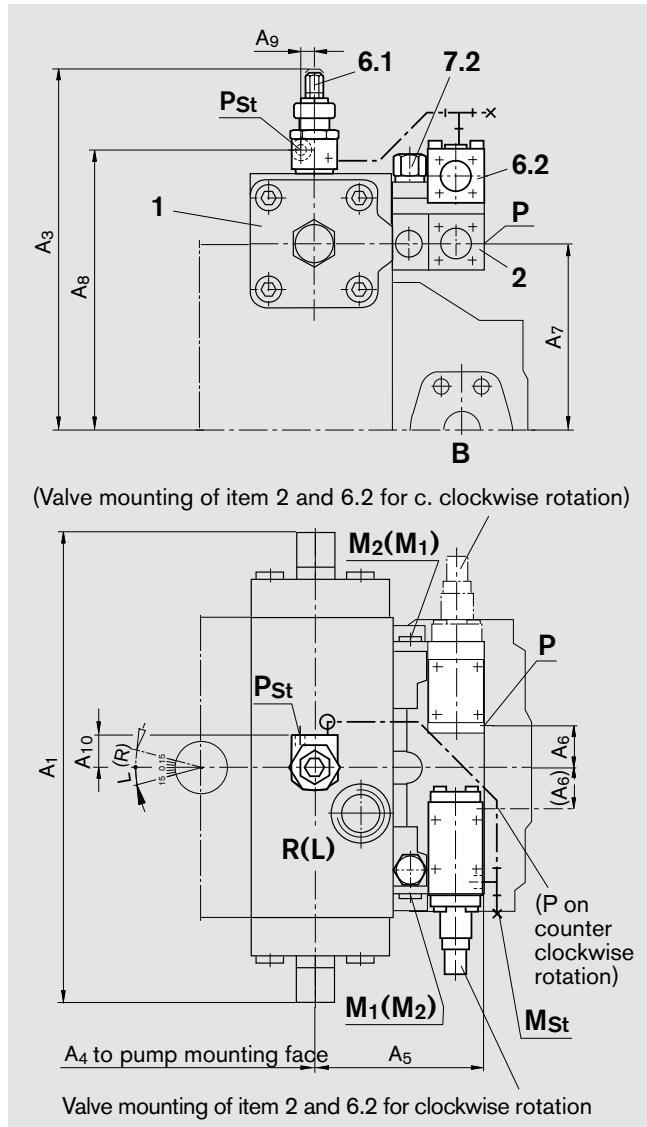
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.N

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000

Clockwise rotation (counter clockwise)



Subassemblies

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

Ports

Port	Description	Standard	max. tightening torque ¹⁾
P	Control pressure port	DIN 3852 M22x1,5; 0.55 (14) deep	155 lb-ft (210 Nm)
P _{St}	Pilot pressure port	DIN 3852 M14x1,5; 0.47 (12) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M18x1,5; 0.47 (12) deep; plugged	103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀
500	20.08 (510)	15.43 (392)	10.98 (279)	7.28 (185)	1.85 (47)	7.95 (202)	12.05 (306)	0.59 (15)	1.38 (35)
750	22.91 (582)	16.93 (430)	11.85 (301)	7.68 (195)	1.85 (47)	9.13 (232)	13.58 (345)	0.59 (15)	1.38 (35)
1000	24.49 (622)	17.95 (456)	14.17 (360)	7.99 (203)	1.85 (47)	10.04 (255)	14.65 (372)	0.59 (15)	1.38 (35)

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

¹⁾ please observe the general notes for the max. tightening torques on page 64

LR.NT with electric control of pilot pressure

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

Only available in clockwise 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 145 psi (10 bar) pilot pressure	300 mA
End of control at V_{gmax} and 650 psi (45 bar) pilot pressure	700 mA
Nominal resistance at 68°F R_{68} (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. 0.18...0.39 in (4,5...10 mm)
Protection to DIN/EN 60529	IP 65
Emergency override	yes, see RE 29164
Coil operating temperature	to 302°F (150 °C)

Technical data – hydraulic

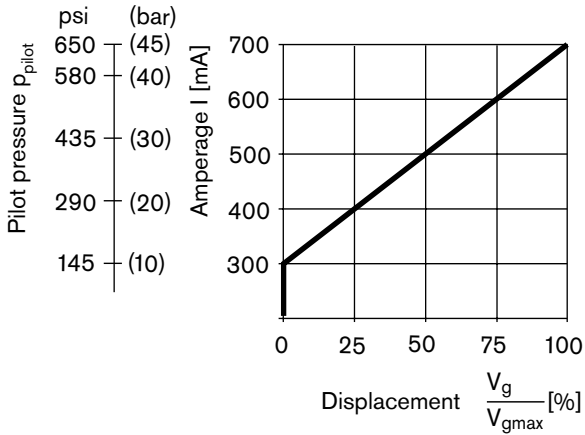
Control pressure (in P)	p_{min}	psi (bar)	725 (50)
	p_{max}	psi (bar)	1450 (100)
Hysteresis	$\leq \pm 4\%$ of V_{gmax}		
Repeatability	$\leq 2\%$ von V_{gmax}		

When calculating the required flow in port P it is necessary to consider the pilot flow losses in the proportional valve (eg. 1.06 gpm(4 L/min.) at $p = 725$ psi (50 bar)).

LR.NT with electric control of pilot pressure

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

Characteristic

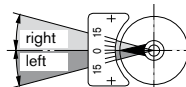


only available in clockwise rotation

Direction of flow S to B

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

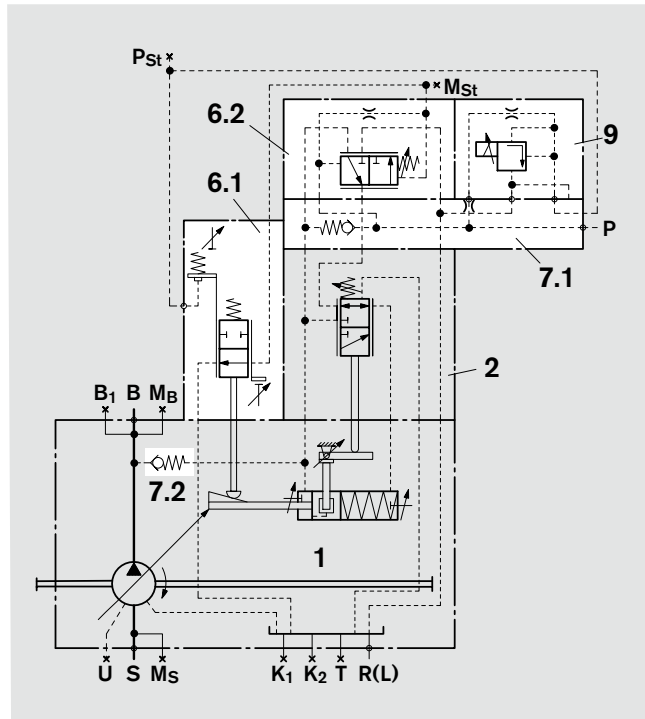
¹⁾ Compare swivel angle indicator



Schematics LR.NT

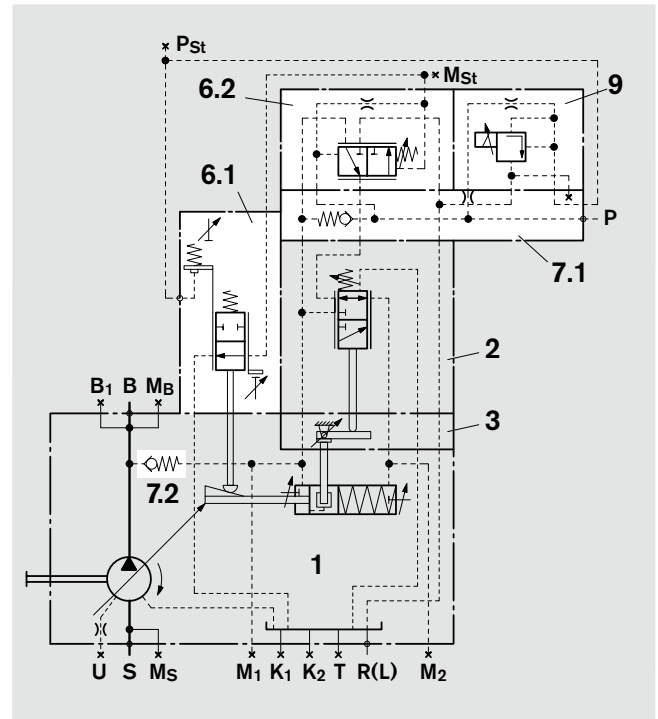
Size 40 and 71

Example: AA4VSO LR2NT



Size 125 to 355

Example: AA4VSO LR2NT



Ports

- P Control pressure port
- P_{St} Gauging port pilot pressure
- M_{st} Gauging port pilot control pressure
- M_1, M_2 Gauging port control chamber pressure (Size 125 to 355)

Subassemblies

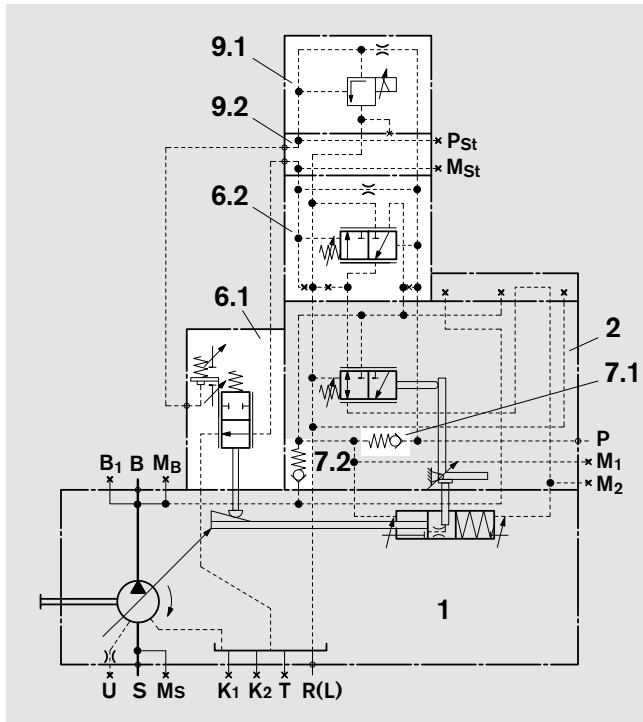
1	AA4VSO with hydraulic control device (see RA 92050)	
2	Power control valve	
3	Sandwich plate (only on size 125 to 355)	
6.1	Pilot valve	
6.2	Pilot control valve (shown in actuated position, i.e. P is pressurized)	
7.1	Sandwich plate for mounting of proportional valve with check valve	
7.2	Check valve, integrated in item 1	
9	Proportional-pressure relief valve	
	DBEP6 B06-1X/45AG24NZ4M-382 with meter-in orifice dia. 0.093 in (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. 0.18...0.39 in (4,5...10 mm)

Size 500 to 1000 see page 50

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
M ₁ , M ₂	Gauging port control chamber pressure

Subassemblies

1	A4VSO with hydraulic control device (see RA 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. 0.093 in (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. 0.18...0.39 in (4,5...10 mm)
9.2	Sandwich plate for mounting of proportional valve	

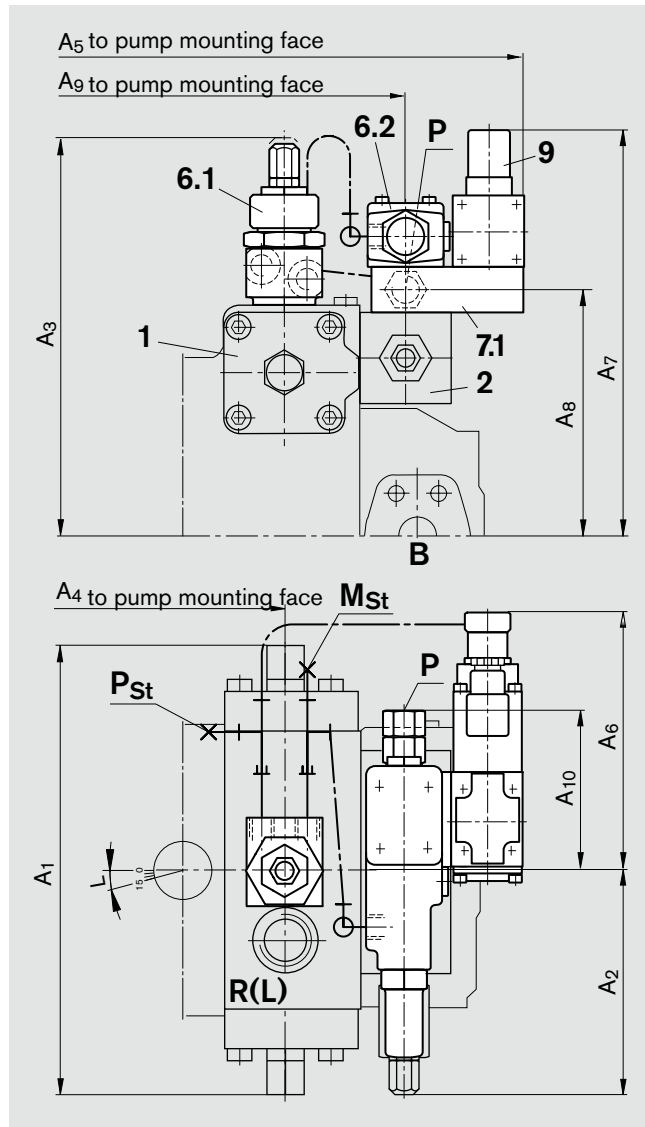
Size 40 to 355 see page 49

Unit dimensions LR.NT

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 40 and 71

Clockwise rotation



Subassemblies see page 49

Ports

Port	Description	ISO 11926	max. tightening torque ¹⁾
P	Control pressure port	3/4-16UNF-2B; 0.59 (15) deep	103 lb-ft (140 Nm)
P _{St}	Gauging port pilot pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (50 Nm)
M _{St}	Gauging port pilot control pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (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	10.23 (260)	5.20 (132)	9.76 (248)	5.75 (146)	11.77 (299)	6.81 (173)	10.08 (256)	5.94 (151)	8.70 (221)	4.57 (116)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
71	11.65 (296)	5.20 (132)	10.39 (264)	6.61 (168)	12.83 (326)	6.81 (173)	10.51 (267)	6.38 (162)	9.76 (248)	4.57 (116)	

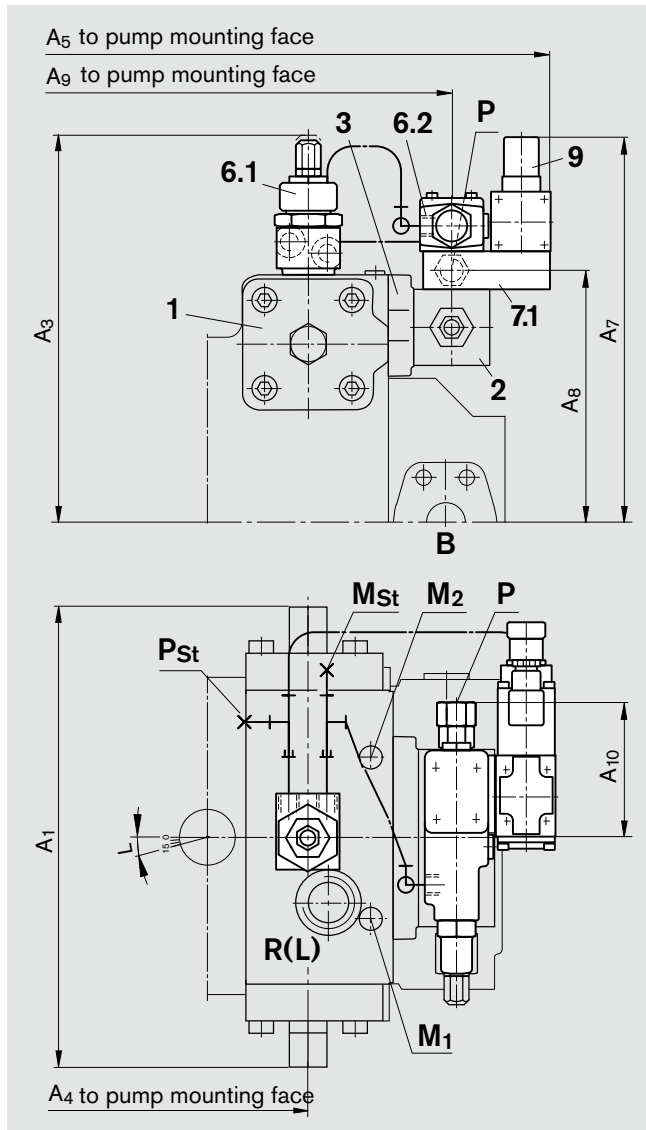
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.NT

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 125 to 355

Clockwise rotation



Subassemblies see page 49

Ports

Port	Description	ISO / Standard	max. tightening torque ¹⁾
P	Control pressure port	ISO 11926 3/4-16UNF-2B; 0.59 (15) deep	103 lb-ft (140 Nm)
P _{St}	Gauging port pilot pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (50 Nm)
M _{St}	Gauging port pilot control press.	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M14x1,5; 0.47 (12) deep; plugged (Size125 a. 180) M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355)	59 lb-ft (80 Nm) 103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₃	A ₄	A ₅	A ₇	A ₈	A ₉	A ₁₀	
125/180	13.94 (354)	11.73 (298)	8.07 (205)	15.55 (395)	11.69 (297)	7.56 (192)	12.48 (317)	4.57 (116)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
250/355	16.69 (424)	13.62 (346)	9.84 (250)	17.99 (457)	13.11 (333)	8.98 (228)	14.92 (379)	4.57 (116)	

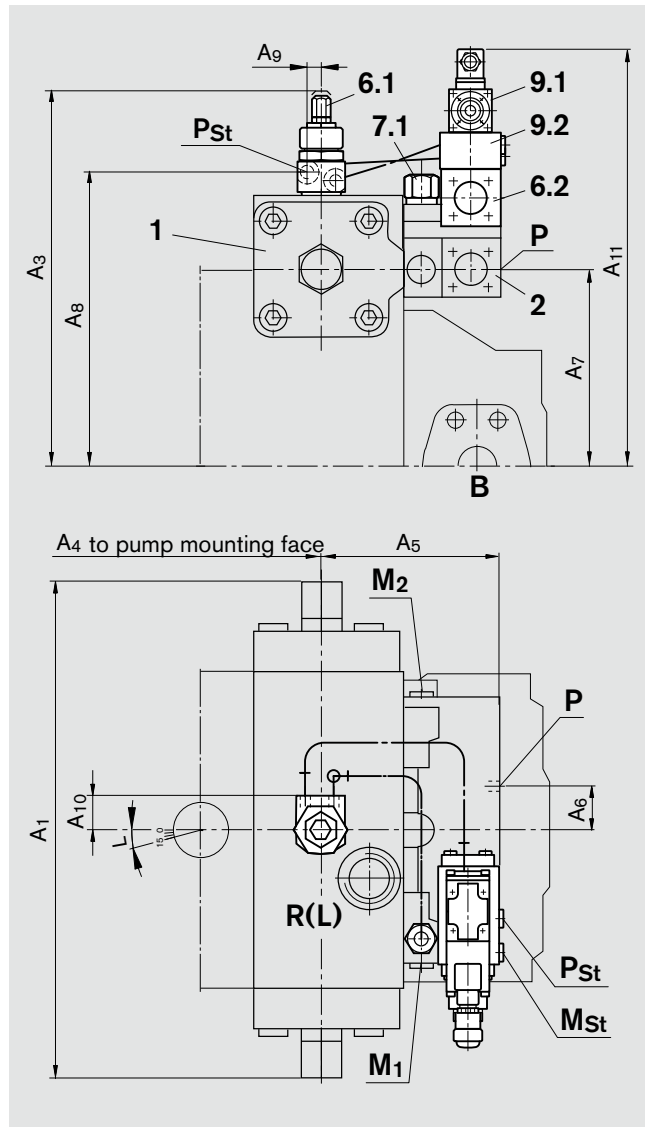
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR.NT

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000

Clockwise rotation



Subassemblies see page 50

Ports

Port	Description	Standard	Dimensions	max. tightening torque ¹⁾
P	Control pressure port	DIN 3852	M22x1,5; 0.55 (14) deep	155 lb-ft (210 Nm)
P _{St}	Gauging port pilot pressure	DIN 3852	M14x1,5; 0.47 (12) deep; plugged	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	DIN 3852	M14x1,5; 0.47 (12) deep; plugged	59 lb-ft (80 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 0.47 (12) deep; plugged	103 lb-ft (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	20.08 (510)	15.43 (392)	10.98 (279)	7.28 (185)	1.85 (47)	7.95 (202)	12.05 (306)	0.59 (15)	1.38 (35)	17.24 (438)
750	22.91 (582)	16.93 (430)	11.85 (301)	7.68 (195)	1.85 (47)	9.13 (232)	13.58 (345)	0.59 (15)	1.38 (35)	18.43 (468)
1000	24.49 (622)	17.95 (456)	14.17 (360)	7.99 (203)	1.85 (47)	10.04 (255)	14.65 (372)	0.59 (15)	1.38 (35)	19.33 (491)

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

¹⁾ please observe the general notes for the max. tightening torques on page 64

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 41

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

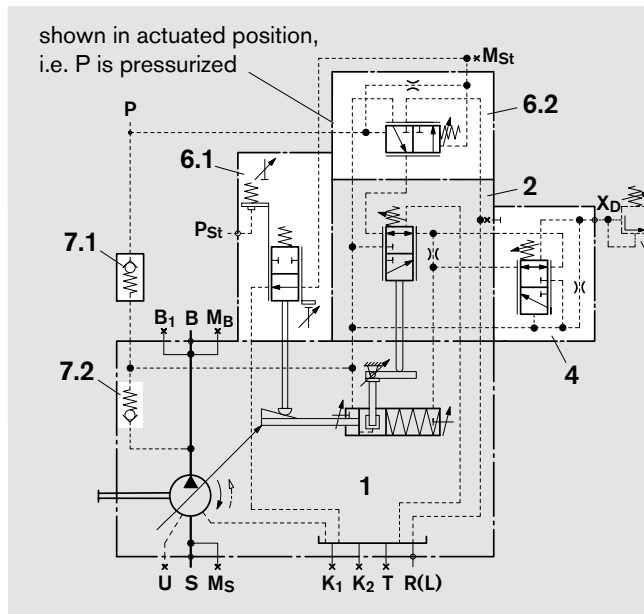
With control combinations LR2GN and LR3GN please note the following:

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

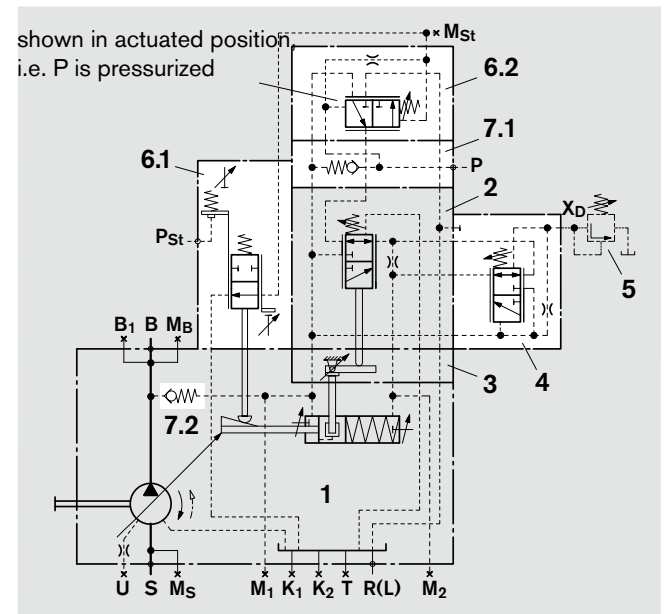
Size 40 and 71

AA4VSO LR2GN



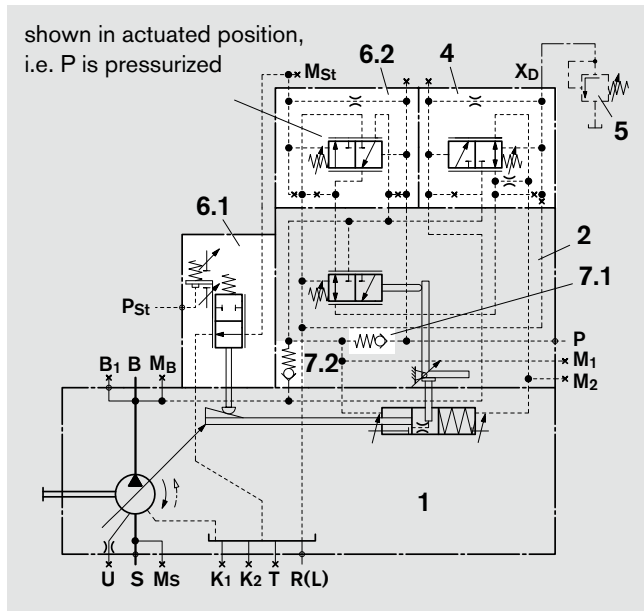
Size 125 to 355

AA4VSO 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

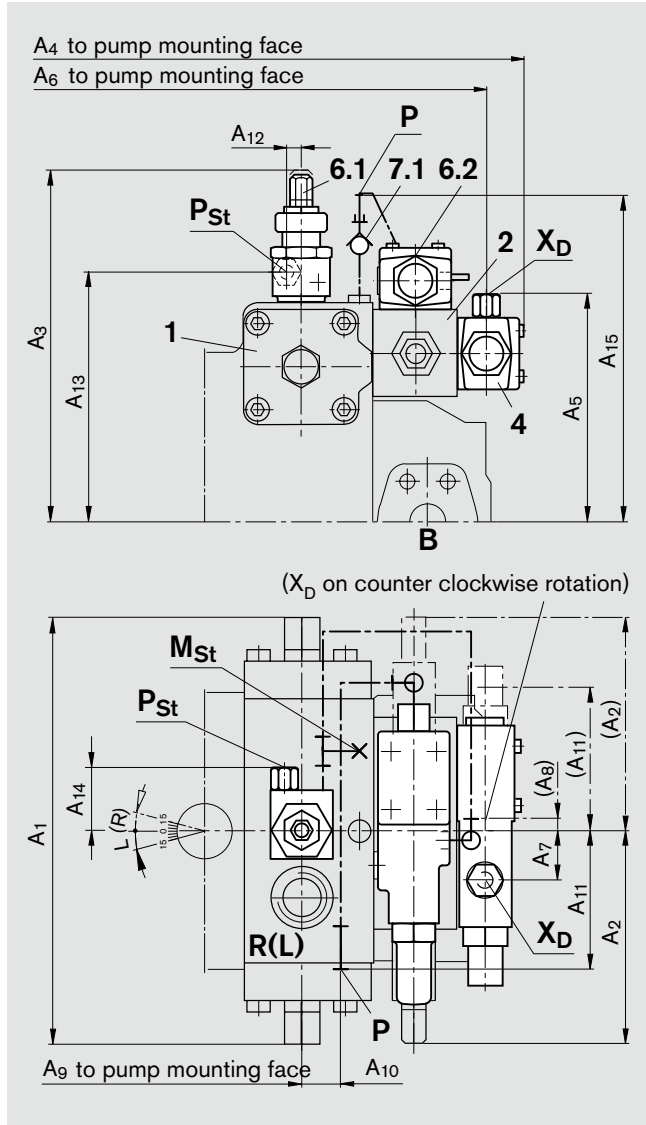
- 1 (A)A4VSO with hydraulic control device (see RA 92050)
- 2 Power control valve
- 3 Sandwich plate (Size 125 to 355)
- 4 Pilot control valve for remote pressure control
- 5 Separate pressure relief valve (not in scope of supply)
- 6.1 Pilot valve
- 6.2 Pilot control valve
- 7.1 Check valve (integrated 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 inches and (millimeters)

Size 40 and 71

Clockwise rotation (counter clockwise)



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

Subassemblies

- 1 AA4VSO with hydraulic control device (see RA 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

Port	Description	ISO Standard	max. tightening torque ¹⁾
X _D	Pilot pressure port for remote pressure control	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
P	Control pressure port	Tube dia. 8x1.5mm (DIN 3853 S8 Form W)	37 lb-ft (50 Nm)
P _{St}	Pilot pressure port	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (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	10.24 (260)	5.20 (132)	9.76 (248)	11.69 (297)	5.98 (152)	10.67 (271)	1.46 (37)	0.28 (7)	5.75 (146)	1.34 (34)	3.27 (83)	0.59 (15)	6.42 (163)	2.24 (57)	7.80 (198)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
71	11.65 (296)	5.20 (132)	10.16 (258)	12.76 (324)	6.61 (168)	11.73 (298)	1.46 (37)	0.28 (7)	6.61 (168)	1.54 (39)	3.27 (83)	0.59 (15)	7.09 (180)	2.24 (57)	8.46 (215)	

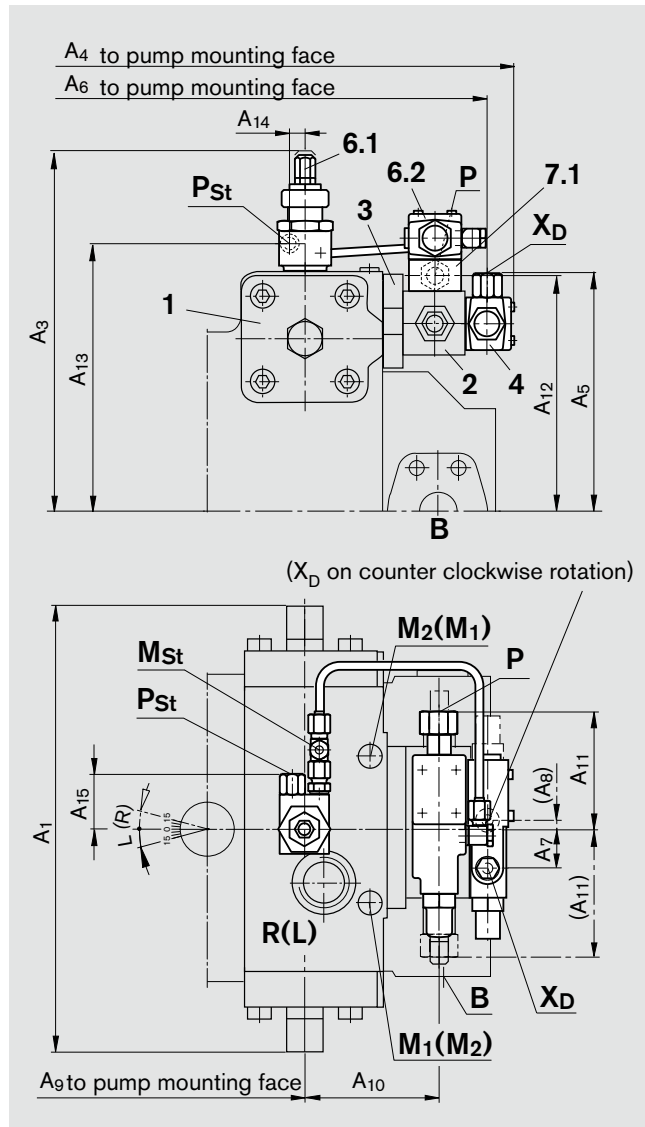
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR2GN

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 125 to 355

Clockwise rotation (counter clockwise)



Valve mounting position for counter clockwise rotation item 2, 6.2 and 7.1 rotated by 180°

Subassemblies

- 1 AA4VSO with hydraulic control device (see RA 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

Port	Description	ISO / DIN	Dimensions	max. tightening torque ¹⁾
X _D	Pilot port for remote pressure control	ISO 11926	9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
P	Control pressure port	ISO 11926	3/4-16UNF-2B; 0.59 (15) deep	103 lb-ft (140 Nm)
P _{St}	Pilot pressure port	ISO 11926	9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control press.	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped		37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180) M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355)	59 lb-ft (80 Nm) 103 lb-ft (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	13.94 (354)	11.77 (299)	15.47 (393)	7.60 (193)	14.45 (367)	1.46 (37)	0.28 (7)	8.07 (205)	4.41 (112)	4.57 (116)	7.56 (192)	8.43 (214)	0.59 (15)	2.24 (57)	For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050
250/355	16.69 (424)	13.62 (346)	17.91 (455)	9.02 (229)	16.89 (429)	1.46 (37)	0.28 (7)	9.84 (250)	5.08 (129)	4.57 (116)	8.98 (228)	10.28 (261)	0.59 (15)	2.24 (57)	

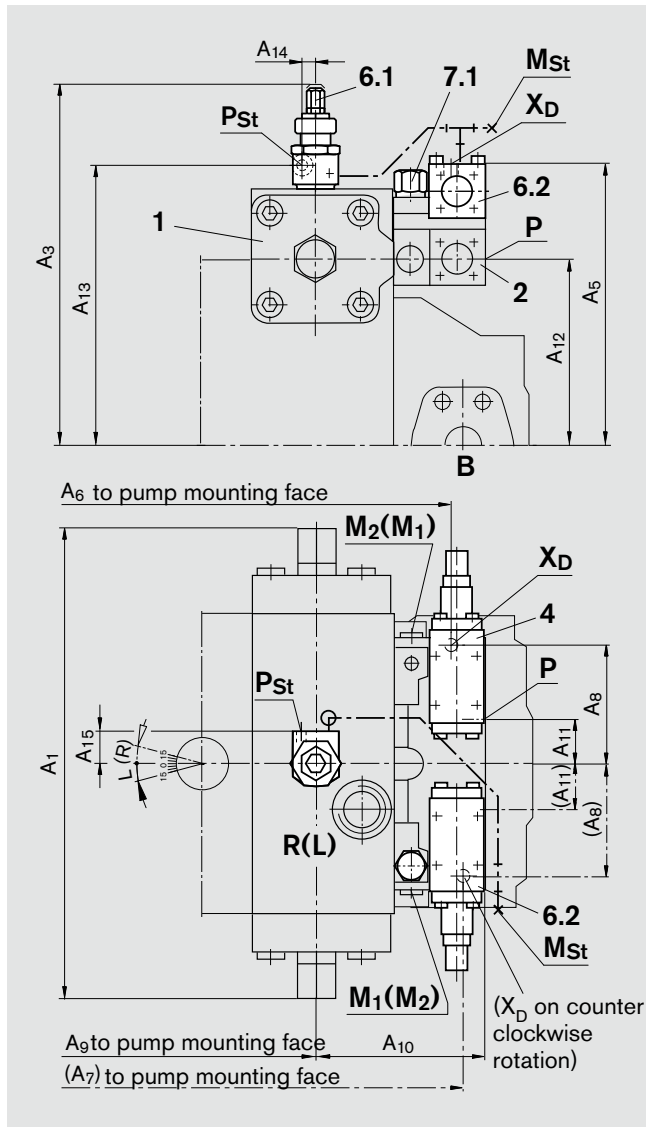
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR2GN

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000

Clockwise rotation (counter clockwise)



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

Subassemblies

- 1 A4VSO with hydraulic control device (see RA 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

Port	Description	Standard	Dimensions	max. tightening torque ¹⁾
X _D	Pilot pressure port for remote pressure control	DIN 3852	M14x1,5; 0.47 (12) deep	59 lb-ft (80 Nm)
P	Control pressure port	DIN 3852	M22x1,5; 0.55 (14) deep	155 lb-ft (210 Nm)
P _{St}	Pilot pressure port	DIN 3852	M14x1,5; 0.47 (12) deep	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped		37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852	M18x1,5; 0.47 (12) deep; plugged	103 lb-ft (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	20.08 (510)	15.43 (392)	12.24 (311)	16.93 (430)	17.36 (441)	4.92 (125)	10.98 (279)	7.28 (186)	1.85 (47)	7.95 (202)	12.05 (306)	0.59 (15)	1.38 (35)	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RA 92050
750	22.91 (582)	16.93 (430)	13.46 (342)	18.19 (462)	18.62 (473)	4.92 (125)	11.85 (301)	7.68 (195)	1.85 (47)	9.13 (232)	13.58 (345)	0.59 (15)	1.38 (35)	
1000	24.49 (622)	17.95 (456)	14.33 (364)	20.79 (528)	21.22 (539)	4.92 (125)	14.17 (360)	7.99 (203)	1.85 (47)	10.04 (255)	14.65 (372)	0.59 (15)	1.38 (35)	

¹⁾ please observe the general notes for the max. tightening torques on page 64

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 clockwise 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 41
- electric pilot pressure control T page 47

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.

Unit dimensions LR2GNT

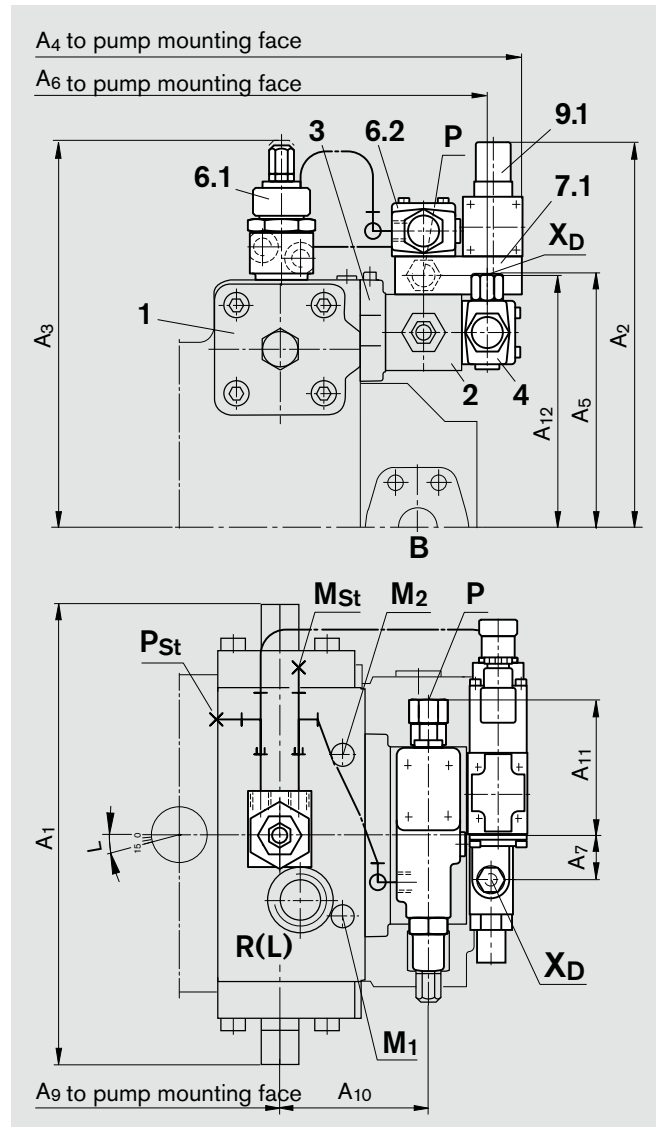
Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 40 and 71

available on request

Size 125 to 355

Clockwise rotation



Subassemblies see page 60

Ports

Port	Description	Thread	max. tightening torque ¹⁾
X _D	Pilot pressure port remote pressure control	ISO 11926 9/16-18UNF-2B; 0.51 (13) deep	59 lb-ft (80 Nm)
P	Control pressure port	ISO 11926 3/4-16UNF-2B; 0.59 (15) deep	103 lb-ft (140 Nm)
P _{St}	Gauging port pilot pressure	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (50 Nm)
M _{St}	Gauging port pilot control press.	Tube dia. 8x1.5mm (DIN 3853 S8 Form W); capped	37 lb-ft (50 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M14x1,5; 0.47 (12) deep; plugged (Size 125 a. 180) M18x1,5; 0.47 (12) deep; plugged (Size 250 a. 355)	59 lb-ft (80 Nm) 103 lb-ft (140 Nm)

Unit dimensions

Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₉	A ₁₀	A ₁₁	A ₁₂
125/180	13.94 (354)	11.69 (297)	7.64 (194)	15.55 (395)	7.60 (193)	14.45 (367)	1.46 (37)	8.07 (205)	4.41 (112)	4.57 (116)	7.56 (192)
250/355	16.69 (424)	13.11 (333)	13.62 (346)	17.99 (457)	9.02 (229)	16.89 (429)	1.46 (37)	9.84 (250)	5.08 (129)	4.57 (116)	8.98 (228)

For detailed unit dimensions and technical data on the variable pump see technical data sheet AA4VSO RA 92050

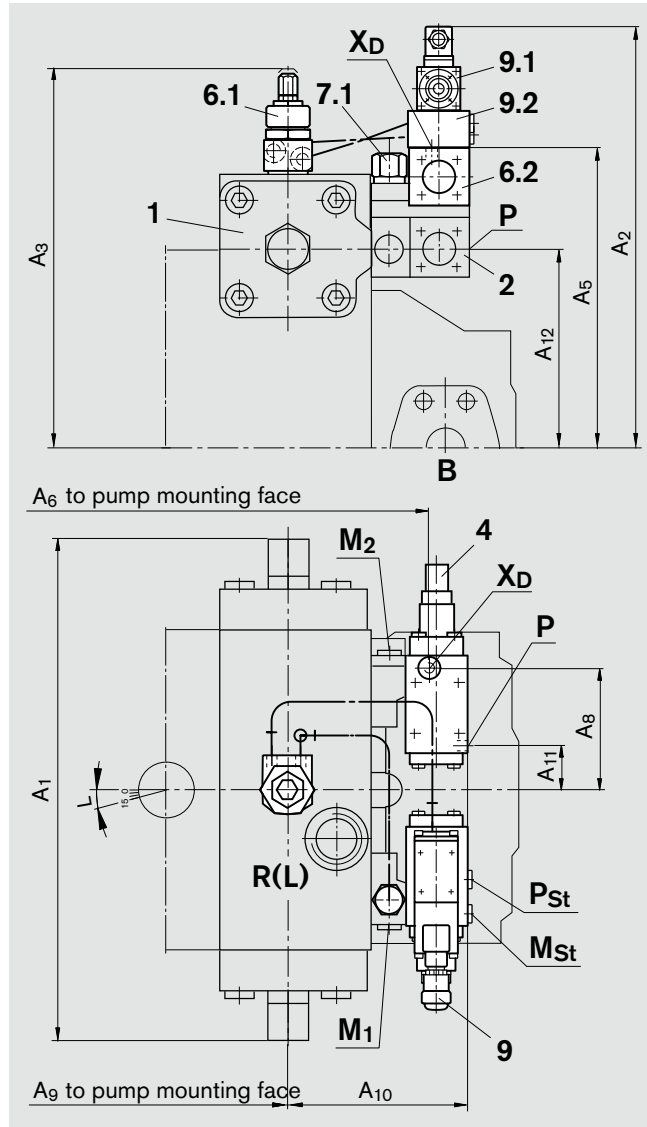
¹⁾ please observe the general notes for the max. tightening torques on page 64

Unit dimensions LR2GNT

Before finalising your design please request a certified installation drawing. Dimensions in inches and (millimeters)

Size 500 to 1000

Clockwise rotation



Subassemblies see page 60

Ports

Port	Description	Thread	Depth	max. tightening torque ¹⁾
X _D	Pilot pressure port for remote pressure control	DIN 3852 M14x1,5;	0.47 (12) deep	59 lb-ft (80 Nm)
P	Control pressure port	DIN 3852 M22x1,5;	0.55 (14) deep	155 lb-ft (210 Nm)
P _{St}	Gauging port pilot pressure	DIN 3852 M14x1,5;	0.47 (12) deep; plugged	59 lb-ft (80 Nm)
M _{St}	Gauging port pilot control pressure	DIN 3852 M14x1,5;	0.47 (12) deep plugged	59 lb-ft (80 Nm)
M ₁ ; M ₂	Gauging port control chamber pressure	DIN 3852 M18x1,5;	0.47 (12) deep; plugged	103 lb-ft (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	
500	20.08 (510)	17.24 (438)	15.43 (392)	12.24 (311)	16.93 (430)	17.36 (441)	4.92 (125)	10.98 (279)	7.28 (186)	1.85 (47)	7.95 (202)	For detailed unit dimensions and technical data on the variable pump see technical data sheet A4VSO RA 92050
750	22.91 (582)	18.43 (468)	16.93 (430)	13.46 (342)	18.19 (462)	18.62 (473)	4.92 (125)	11.85 (301)	7.68 (196)	1.85 (47)	9.13 (232)	
1000	24.49 (622)	19.33 (491)	17.95 (456)	14.33 (364)	20.79 (528)	21.22 (539)	4.92 (125)	14.17 (360)	7.99 (203)	1.85 (47)	10.04 (255)	

¹⁾ please observe the general notes for the max. tightening torques on page 64

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 (A)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.

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Subject to change.