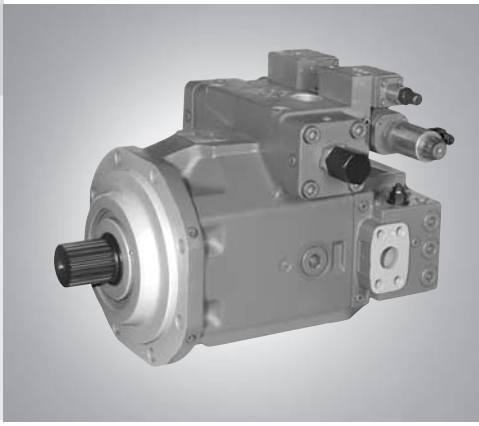
Rexroth
Bosch Group

Electro-hydraulic control with proportional solenoid EP

RA 92 084/12.04 1/16

Technical data sheet



for variable pump
(A)A4CSG series 3
(A)A4VSG series 1and 3
closed circuit

Contents

Features

- Electro-proportional control current dependent
- High control accuracy
- With fail-safe to zero flow on power loss
- Emergency manual override
- Use of standard proportional amplifiers possible

Further information:

Variable pump (A)A4CSG Size 250...750	RA 92105
Variable pump (A)A4VSG Size 40...1000	RA 92100

Ordering code

A4	G		EP...	/			–								
					Series	Direction of rotation		Seals	Shaft end	Mounting flange	Service ports	Boost pump	Through drive	Valves	Filtration

Axial piston unit

Compact unit, swash plate design, variable	●	**(A)A4CS**
Swash plate design, variable	❍	**(A)A4VS**

For detailed data see: RA 92105 – (A)A4CSG
RA 92100 – (A)A4VSG

Type of operation

Pump, closed circuit	**G**

Size

≙ Displacement $V_{g\,max}$ (cm^3)	**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**

Control and adjustment devices

Electro-hydraulic control, with proportional solenoid **EP...**

Pressure control	**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**	**1000**	
without pressure control – without code	❍	❍	❍	❍	●	●	❍	❍	❍	
with pressure control in A	❍	❍	❍	❍	●	●	●	●	❍	**.. A**
with remote pressure control in A	❍	❍	❍	❍	●	●	●	●	❍	**..GA**
with pressure control in B	❍	❍	❍	❍	●	●	●	●	❍	**..B**
with remote pressure control in B	❍	❍	❍	❍	●	●	●	●	❍	**..GB**
with pressure control both sides	❍	❍	❍	❍	●	●	●	●	❍	**..D**
with remote pressure control both sides	❍	❍	❍	❍	●	●	●	●	❍	**..G**

● = available ❍ = in preparation

EP - Electro-hydraulic control with proportional solenoid

The EP control adjusts the pump displacement proportional to the solenoid current.

The mechanical feedback system ensures a reliable and secure center (zero flow) position on power loss. This push-back to zero flow position is assisted by the standard spring centering.

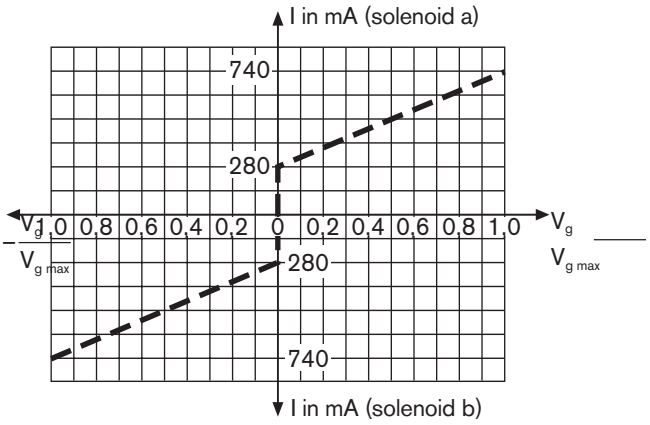
There are two solenoids: one for each swivel direction.

Standard is an emergency manual override on each solenoid. On actuation, these enable an adjustment of displacement from zero to V_{gmax} (proportional to applied force).

To control the solenoids, we recommend the use of current controlled amplifiers with PWM-signal (pulse width modulation), eg. VT 10159 (corresponds to VT 3000 but with 100 Hz see RE 29935). Some applications may use digital controller RC with amplifier software DSD (dual solenoid driver), see RE 95200 or amplifier RA2-1/10, see RE 95230. Please order separately.

Flows in both swivel directions can be limited by mechanical stops between V_{gmax} and 50% V_{gmax}, for the size 500 between V_{gmax} and 70% V_{gmax}.

Characteristic

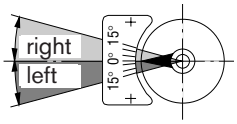


Relation between

Direction of rotation-solenoid-direction of flow

Direction of rotation	Solenoid	Swivel range[1])	Direction of flow	Pressure side
clockwise	b	right	B to A	A
	a	left	A to B	B
counter-clockwise	b	right	A to B	B
	a	left	B to A	A

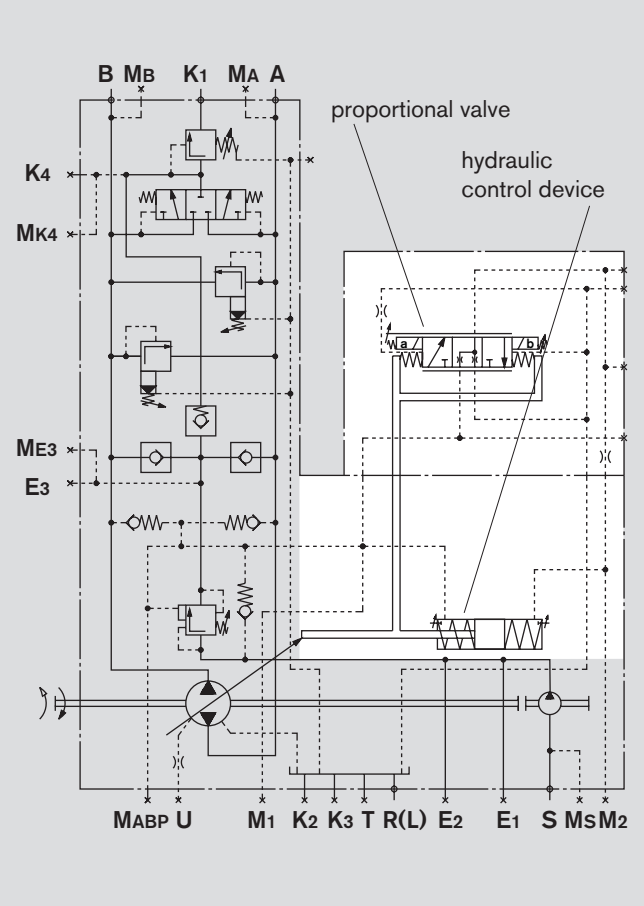
[1]) compare swivel angle indicator.



Technical data and circuit schematic

Circuit schematic EP

Example (A)A4CSG250EP/30X-XXXXXFXX4N



Technical data – electrical (sizes 125 ... 1000)

Operating voltage	24V
Nominal current	800 mA
Control current	
Beginning of control at V_{g0}	280 mA
End of control at V_{gmax}	740 mA
Current limit at U_{max}	1,05 A
Nom. resistance at 68°F R_{68} (at 20°C R_{20})	19 Ω
Max. duty cycle	100% (S1)
Dither frequency for PWM-signal	100 – 200 Hz (Recommended 100 Hz)
Class of isolation	F (T_{max} = 310°F (155°C))
Type of plug see page 16	DIN EN 175 301-803/ISO 4400
Protection to DIN/EN 60529	IP 65
Emergency override	Pressure plate in rubber cap
Force to actuate manual override	41 lbf (180 N) for V_{gmax}
Operating temperature coils	266°F (130°C) **Danger:** see safety information page 16

Formula for calculation of resistance

at T > 68 °F

$$R_W = \frac{R_{68} \times (391 + T_{°F})}{459} \text{ in°F}$$

at T > 20 °C

$$R_W = \frac{R_{20} \times (235 + T_{°C})}{255} \text{ in°C}$$

Technical data – hydraulics

Size			40	71	125/180	250/355	500	750
Stroke of control piston	s_{max}	in (mm)	0.56(14,2)	0.67(17,1)	0.81(20,7)	1.02(25,9)	1.28(32,6)	1.46(37)
Area of control piston	A	in^2 (cm^2)	0.60(3,9)	0.99(6,4)	1.40(9)	2.23(14,4)	2.91(18,8)	4.42(28,5)
Control volume	V_{Smax}	in^3 (cm^3)	0.34(5,5)	0.67(11)	1.14(18,7)	2.28(37,3)	3.75(61,4)	6.41(105)
Min. required control pressure	p_{min}	psi (bar)	double boost pressure in M1 (measuring port small control chamber)					
Control time* approx. at 2900psi (200 bar) high press.	t	s	0,08	0,15	0,15	0,3	0,4	0,7
Hysteresis			5...7 % of V_{gmax}					
Repeatability			< 2 % of V_{gmax}					

* with integrated pressure control longer control times are possible, dependent on difference between actual load pressure and pressure control setting.

Pressure control

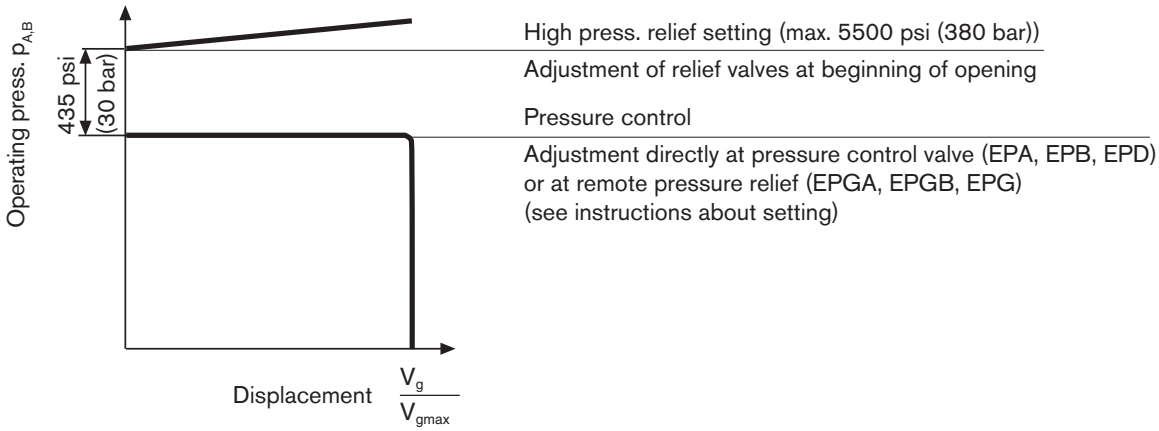
The pressure control (pressure compensator) is an optional function that regulates the pump displacement, as soon as a preset pressure value is reached. This max pressure is set at the pressure control valve, and if this pressure is exceeded, the pressure control valve opens and destrokes the pump until the preset pressure value is reached again.

The pressure control is available as an option:
EPA in port A only (circuit drawings see page 6)
EPB in port B only (circuit drawings see page 8)
EPD in both ports A and B (circuit drawings see page 10)

Adjustment range 725...5100 psi (50...350 bar)

Standard setting of pressure control is 5100 psi (350 bar), other settings please state in clear text when ordering. The pressure control settings must be at least 435 psi (30 bar) lower than the settings of the high pressure relief valves ((A)A4CSG), in order to avoid that the high pressure relief valves open before the pressure control is activated (heat generation and waste of energy).

Characteristic



Remote pressure control

Remote setting of pressure control is accomplished via ports X_A and or X_B, using a remote relief valve.

The external pressure relief valves are not part of the supply.

Recommended: direct operated relief valve DBD 6 (RA 25 402)

Max. line length between pump and external relief valve not to exceed 7 ft (2 m).

Standard setting of differential pressure at pressure control valve 435 psi (30 bar). Pilot oil consumption in this case approx. 0.5 gpm (2L/min).

If a different setting is required please state in clear text (range 200 - 725 psi (14 - 50 bar)).

Information for adjustment of remote pressure control:

Setting of external pressure relief valve plus differential pressure at pressure control valve = pressure control setting.

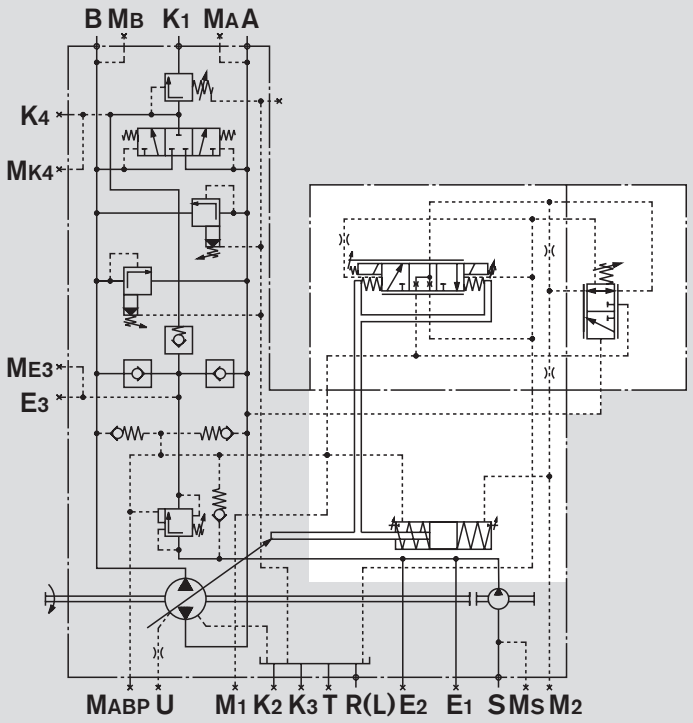
Example:
external pressure relief valve: 4640 psi (320 bar)
differential pressure at pressure control valve: 435 psi (30 bar)
results in pressure control setting of 4640 + 435 = 5075 psi
(320 + 30 = 350 bar)

Optional remote pressure control :
EPGA in port A only (circuit drawing see page 7)
EPGB in port B only (circuit drawing see page 9)
EPG in both ports A and B (circuit drawing see page 11)

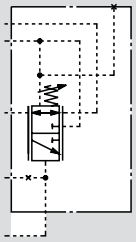
EPA with pressure control for port A only

The pressure control valve regulates the pressure in port A.
Description see page 5.

Circuit schematic sizes 250 and 355



Press. control valve, direction of rotation clockwise

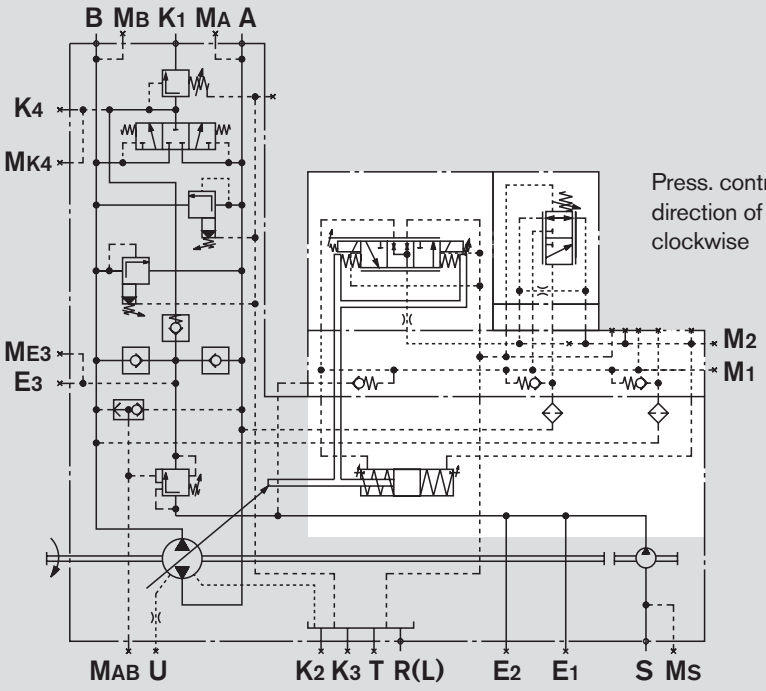


Press. control valve, direction of rotation counter-clockwise

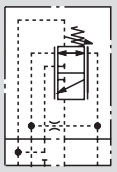
Ports

M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

Circuit schematic sizes 500 and 750



Press. control valve, direction of rotation clockwise



Press. control valve, direction of rotation counter-clockwise

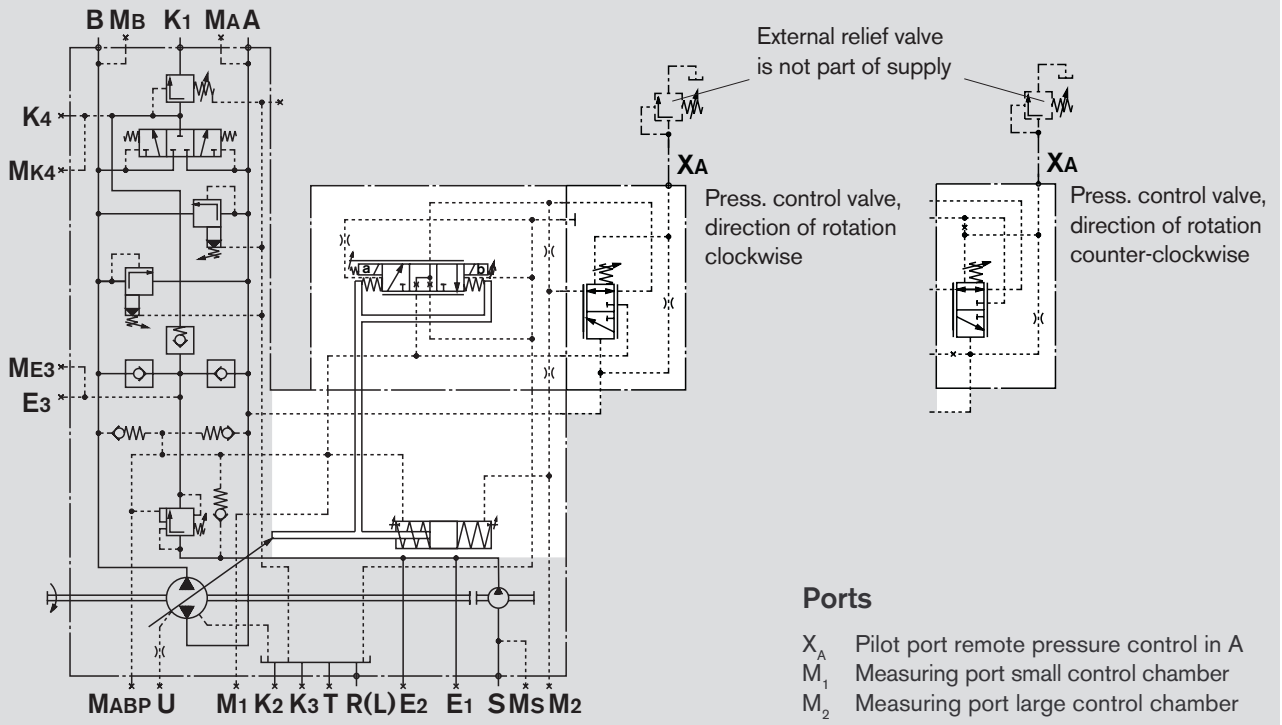
Ports

M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

EPGA with remote pressure control in port A only

Remote setting of pressure control is accomplished via port X_A. The external relief valve is not included in the supply.
Description see page 5.

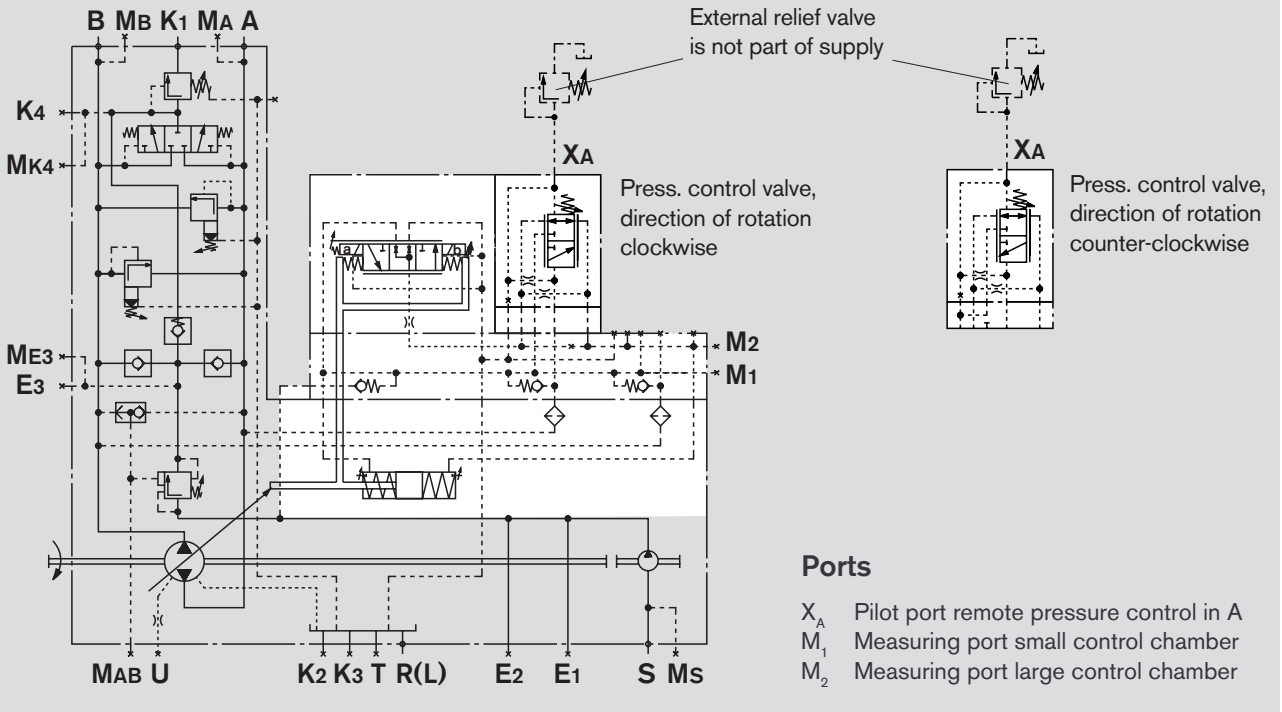
Circuit schematic sizes 250 and 355



Ports

X_A	Pilot port remote pressure control in A
M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

Circuit schematic sizes 500 and 750



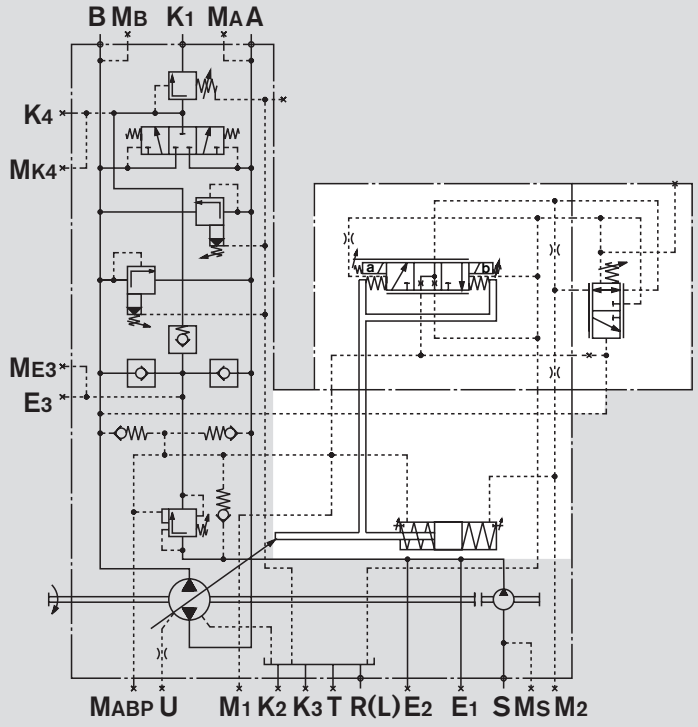
Ports

X_A	Pilot port remote pressure control in A
M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

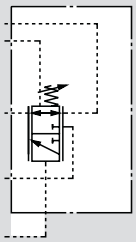
EPB with pressure control in port B only

The pressure control valve regulates the pressure in port B.
Description see page 5.

Circuit schematic sizes 250 and 355



Press. control valve, direction of rotation clockwise

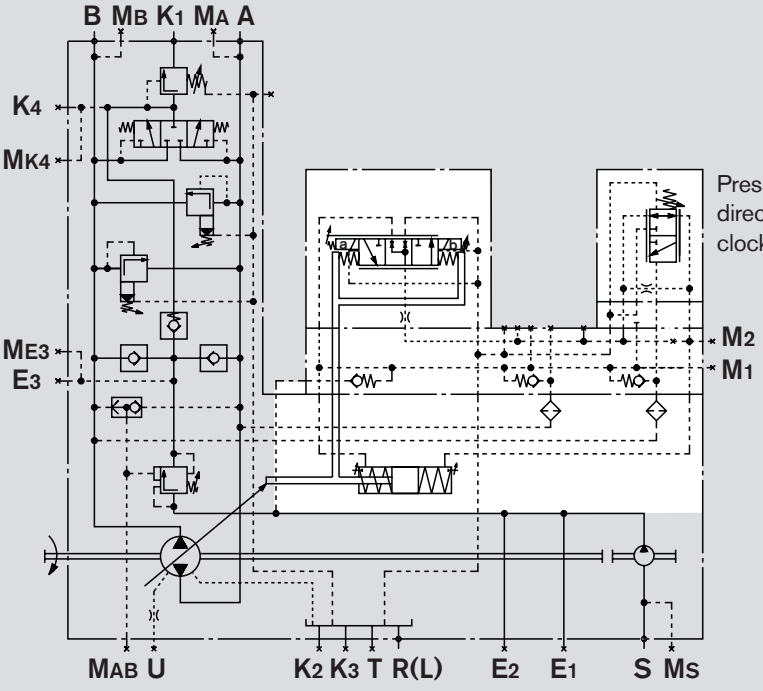


Press. control valve, direction of rotation counter-clockwise

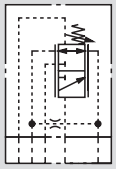
Ports

M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

Circuit schematic sizes 500 and 750



Press. control valve, direction of rotation clockwise



Press. control valve, direction of rotation counter-clockwise

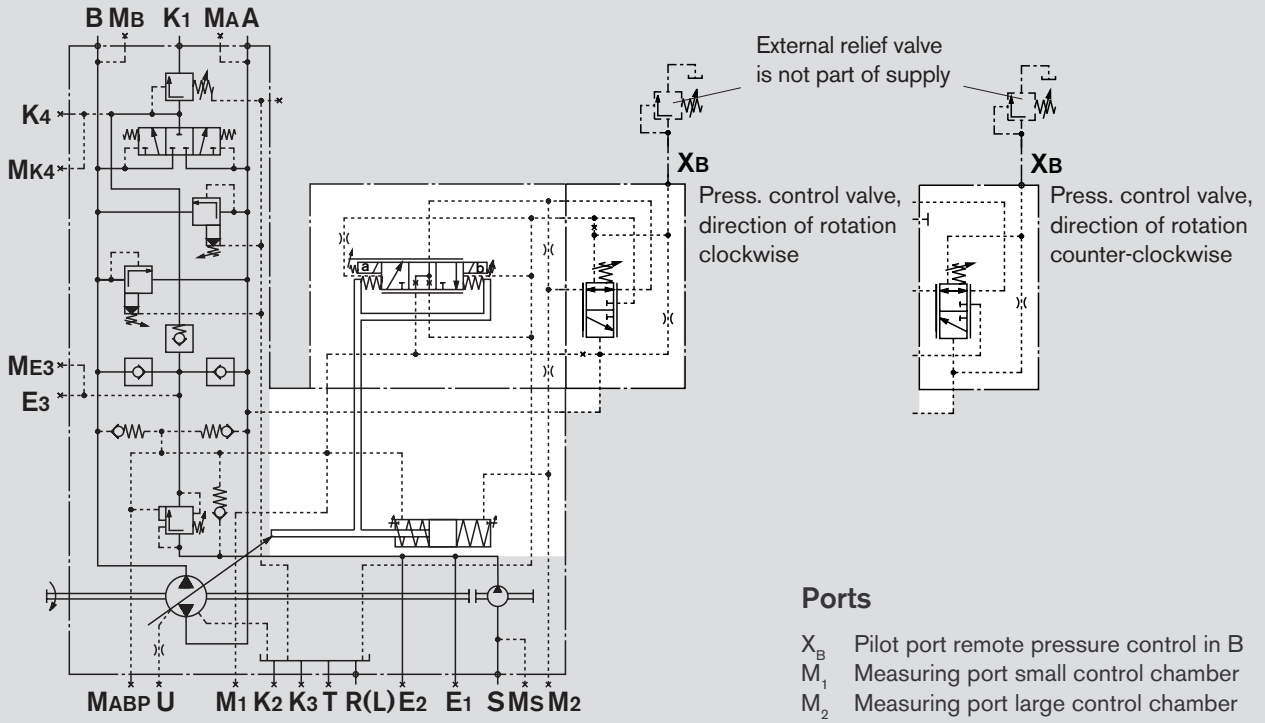
Ports

M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

EPGB with remote pressure control in port B only

Remote setting of pressure control is accomplished via port X_B. The external relief valve does not belong to the supply.
Description see page 5.

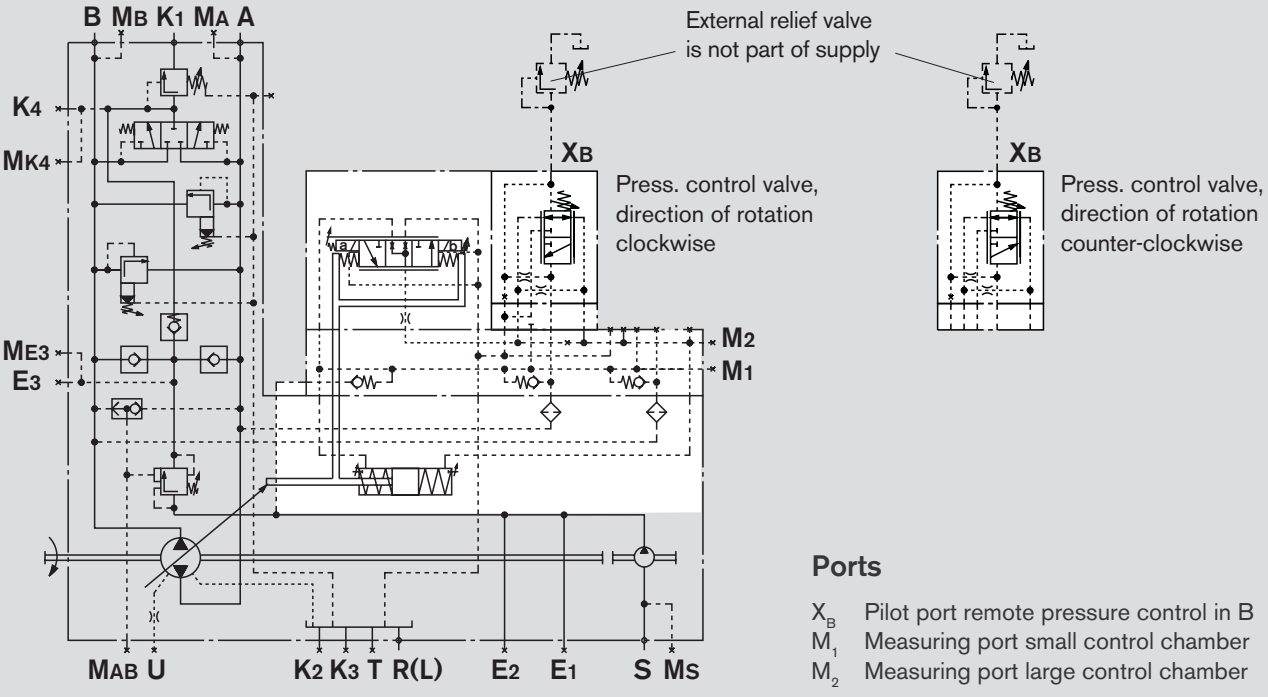
Circuit schematic sizes 250 and 355



Ports

X_B	Pilot port remote pressure control in B
M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

Circuit schematic sizes 500 and 750



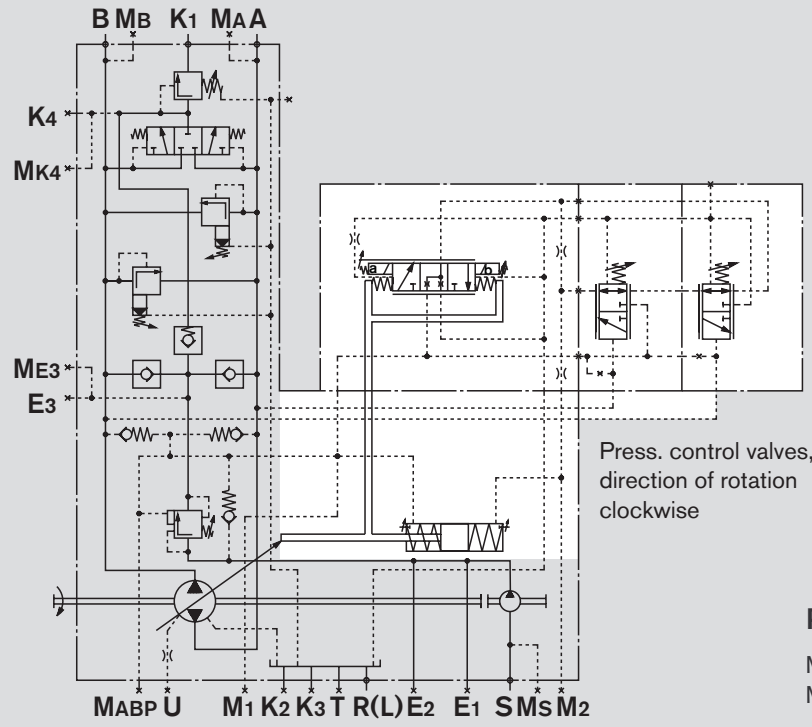
Ports

X_B	Pilot port remote pressure control in B
M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

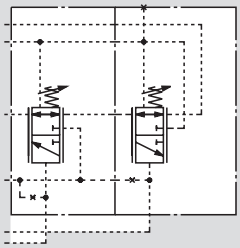
EPD with pressure control in both ports A and B

Two pressure relief valves control the pressure independently in ports A resp. B.
Description see page 5.

Circuit schematic EPD sizes 250 and 355



Press. control valves, direction of rotation clockwise

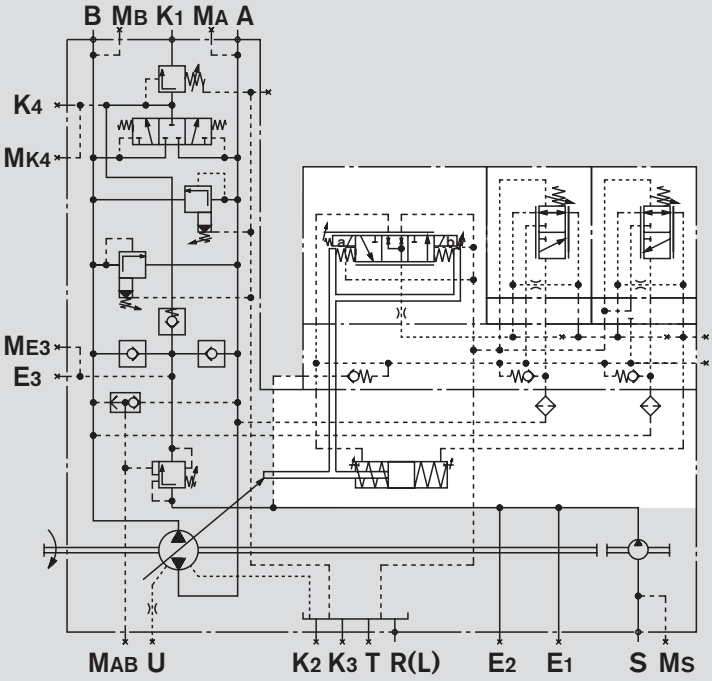


Press. control valves, direction of rotation counter-clockwise

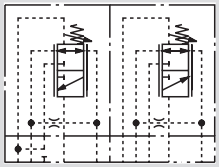
Ports

M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

Circuit schematic EPD sizes 500 and 750



Press. control valves, direction of rotation clockwise



Press. control valves, direction of rotation counter-clockwise

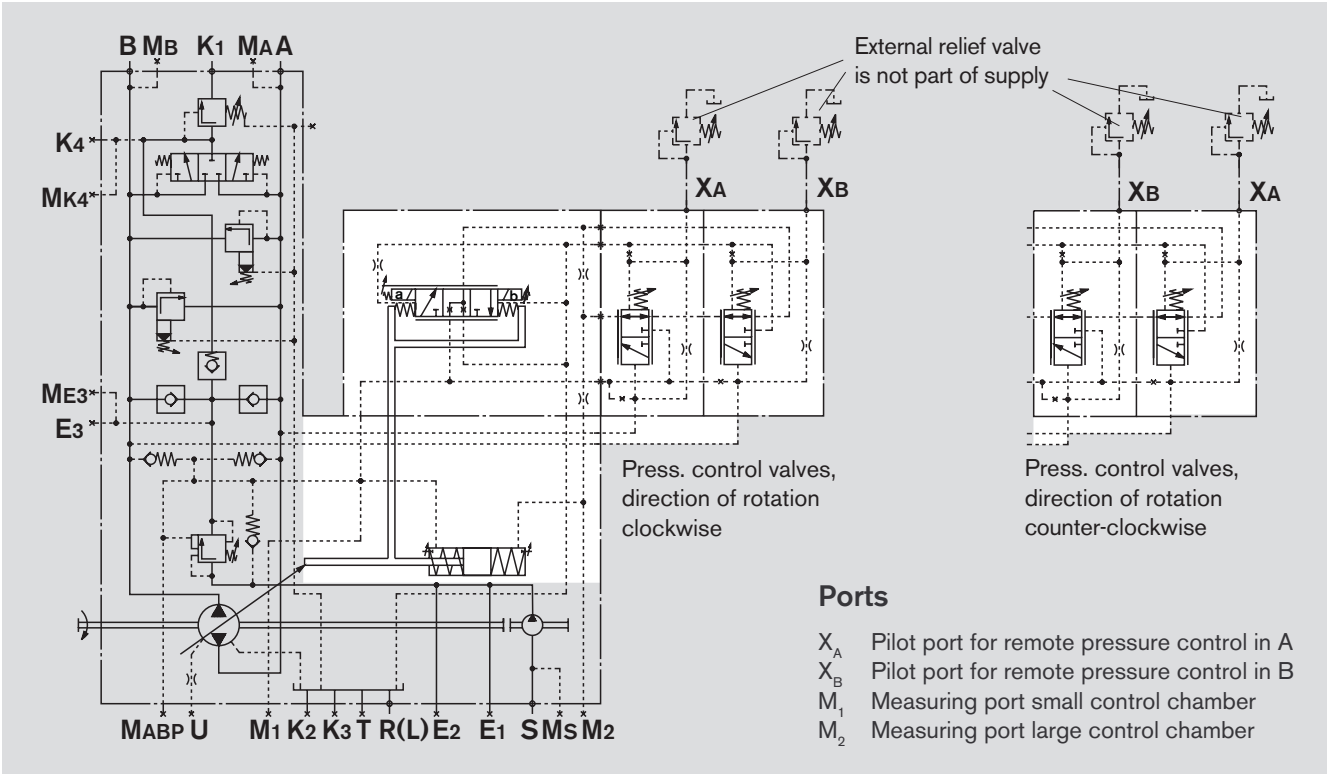
Ports

M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

EPG with remote pressure control in both ports A and B

The remote setting of pressure is accomplished via ports X_A and X_B. The external relief valves do not belong to the scope off supply.
Description see page 5.

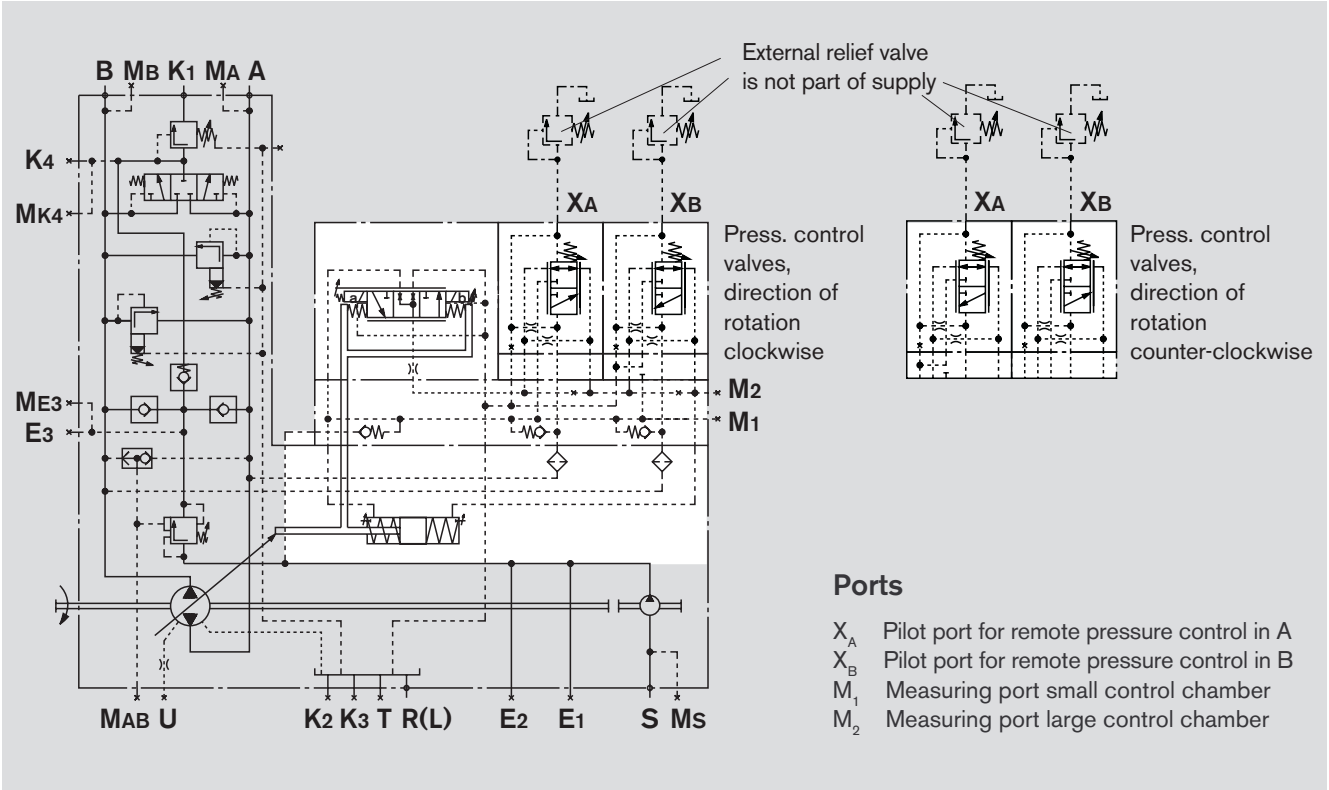
Circuit schematic EPG sizes 250 and 355



Ports

X_A	Pilot port for remote pressure control in A
X_B	Pilot port for remote pressure control in B
M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

Circuit schematic EPG sizes 500 und 750



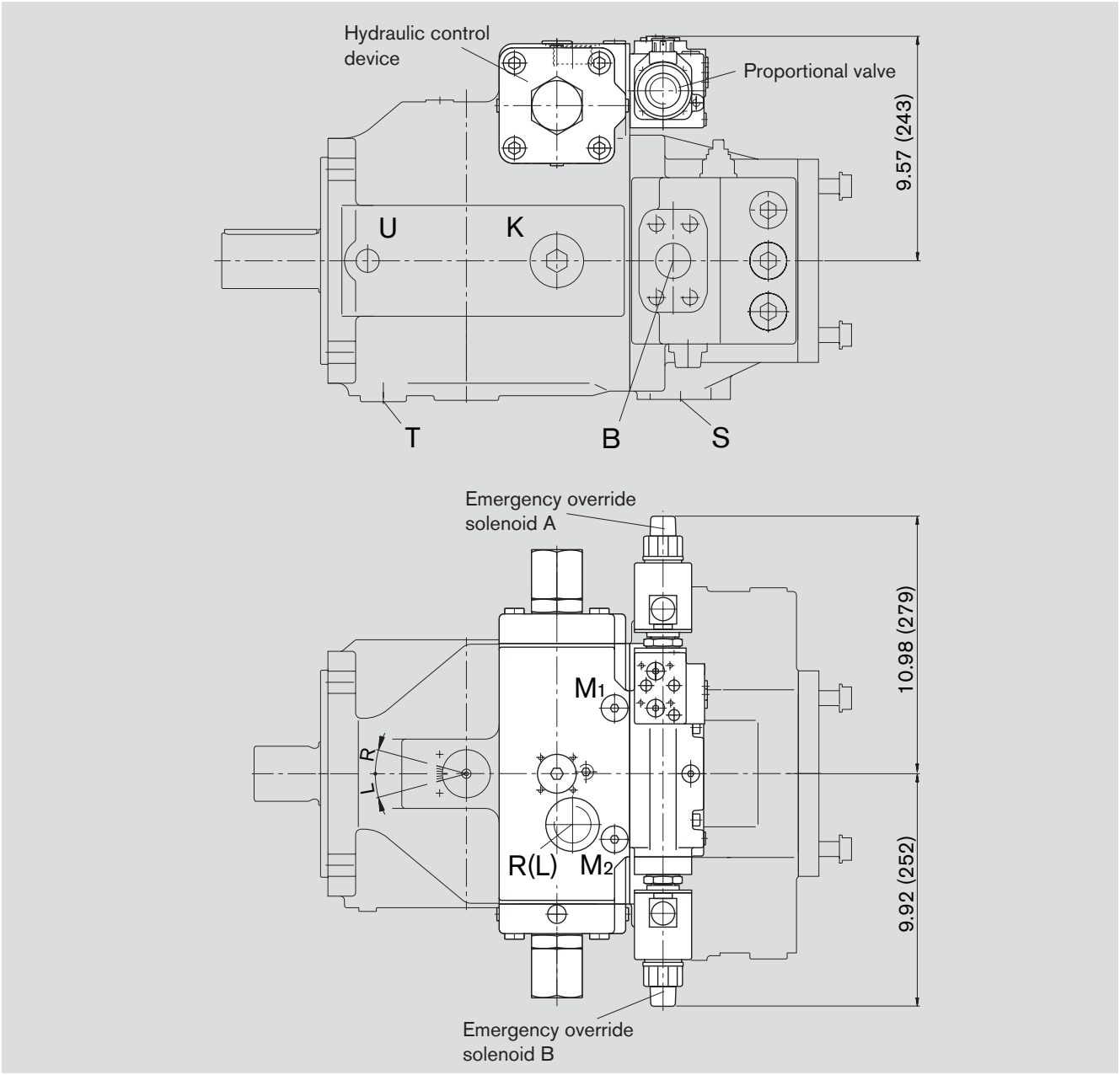
Ports

X_A	Pilot port for remote pressure control in A
X_B	Pilot port for remote pressure control in B
M_1	Measuring port small control chamber
M_2	Measuring port large control chamber

Unit dimensions EP

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

Sizes 250 and 355



For detailed dimensions and technical data of the variable pump see the main data sheets (A)A4CSG RA 92105 or (A)A4VSG RA 92100.

Ports

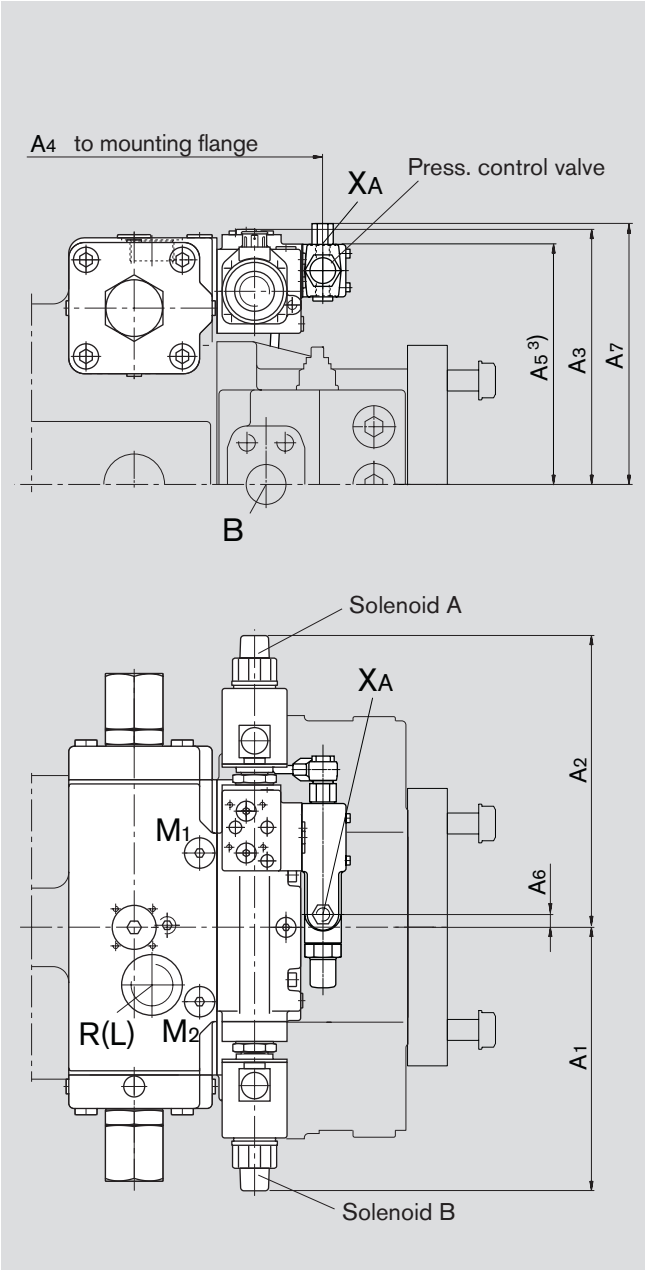
				max. tightening torque [1]
M_1	Measuring port small control chamber	DIN 3852	M18x1,5; 0.47(12) deep (plugged)	103 lb.ft (140 Nm)
M_2	Measuring port large control chamber	DIN 3852	M18x1,5; 0.47(12) deep (plugged)	103 lb.ft (140 Nm)

[1]) see safety information

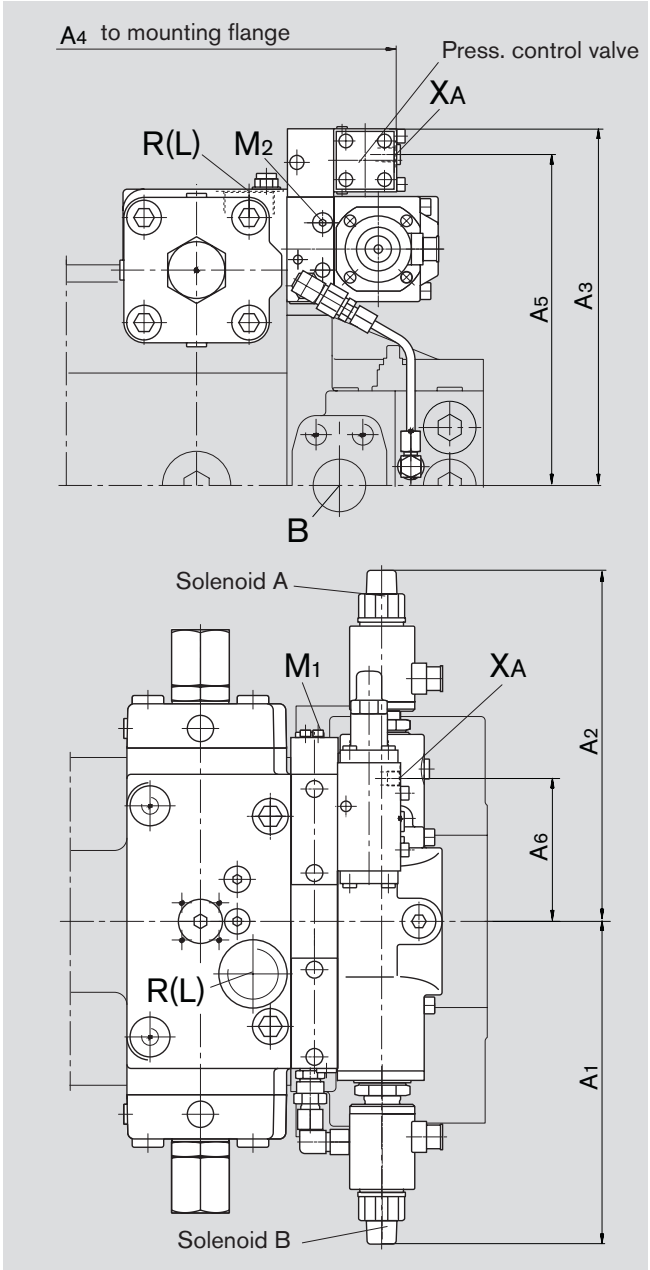
Unit dimensions EPA / EPGA

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

Sizes 250 and 355



Sizes 500 and 750



Unit dimensions

Size	A_1	A_2	A_3	A_4	A_5 [3]	A_6	A_7
250	9.92(252)	10.98(279)	9.57(243)	16.93(430)	8.98(228)	0.51(13)	9.84(250)
355	9.92(252)	10.98(279)	9.57(243)	16.93(430)	8.98(228)	0.51(13)	9.84(250)
500	12.05(306)	13.07(332)	13.46(342)	18.46(469)	12.40(315)	5.35(136)	–
750	12.40(315)	13.07(332)	14.65(372)	19.72(501)	13.58(345)	5.35(136)	–

For detailed dimensions and technical data of the variable pump see main data sheet (A)A4CSG RA 92105 or (A)A4VSG RA 92100.

Ports

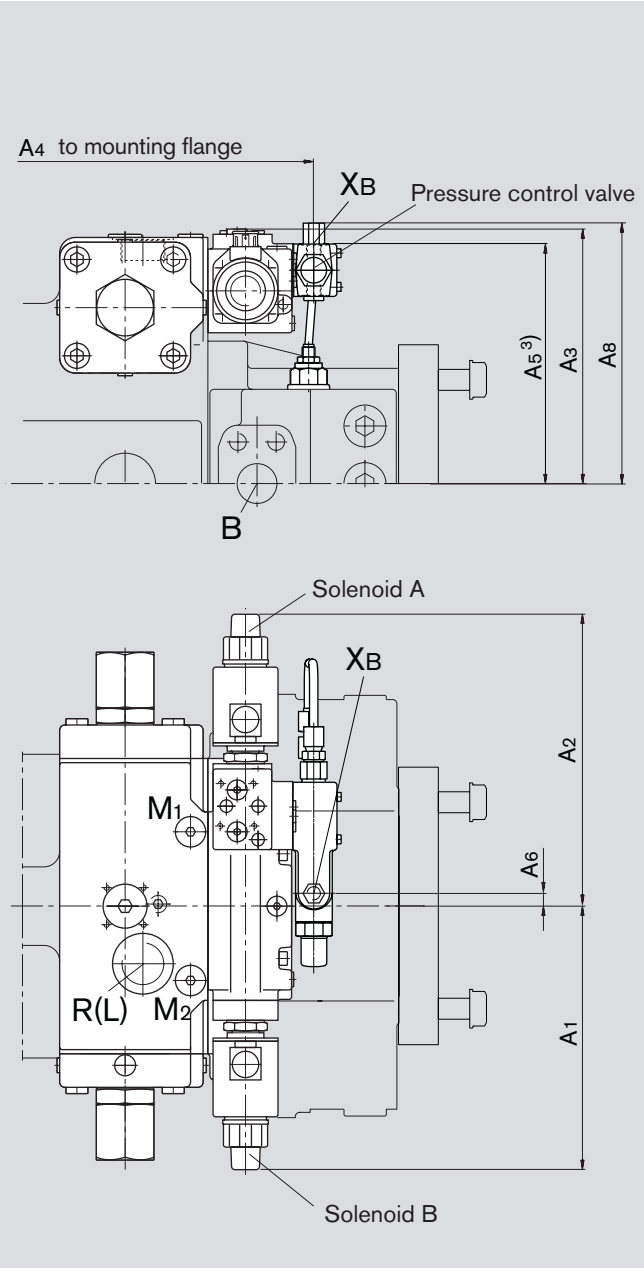
					max. tightening torque [1]
X_A Pilot port for remote pressure control in A (with EPA plugged)[3]	ISO 11926	9/16-18UNF-2B	0.51(13) deep	(Size 250 a. 355)	59lb-ft(80Nm)
	DIN 3852	M14x1,5;	0.47(12) deep	(Size 500 a. 750)	59lb-ft(80Nm)
M_1 Measuring port small control chamber	DIN 3852	M18x1,5;	0.47(12) deep [2]	(Size 250 a. 355)	103lb-ft(140 Nm)
		M22x1,5;	0.55(14) deep [2]	(Size 500 a. 750)	155lb-ft(210 Nm)
M_2 Measuring port large control chamber	DIN 3852	M18x1,5;	0.47(12) deep [2]	(Size 250 a. 355)	103lb-ft(140 Nm)
		M14x1,5;	0.47(12) deep [2]	(Size 500 a. 750)	59lb-ft(80Nm)

[1]) see safety information [2]) plugged [3]) version EPA size 250 and 355 without adaptor

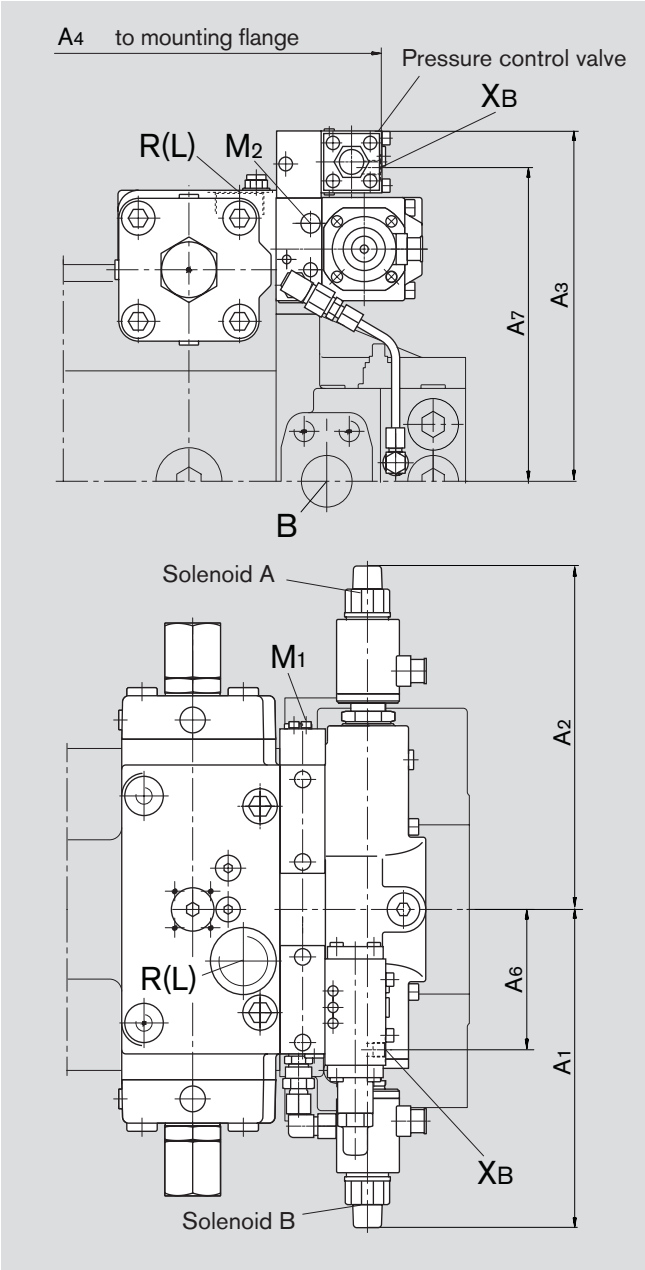
Unit dimensions EPB / EPGB

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

Sizes 250 and 355



Sizes 500 and 750



Unit dimensions

Size	A_1	A_2	A_3	A_4	A_5 3)	A_6	A_7	A_8
250	9.92(252)	10.98(279)	9.57(243)	16.93(430)	8.98(228)	0.51(13)	–	9.84(250)
355	9.92(252)	10.98(279)	9.57(243)	16.93(430)	8.98(228)	0.51(13)	–	9.84(250)
500	12.05(306)	13.07(332)	13.46(342)	18.46(469)	–	5.35(136)	11.97(304)	–
750	12.40(315)	13.07(332)	14.65(372)	19.72(501)	–	5.35(136)	11.97(304)	–

For detailed dimensions and technical data of the variable pump see main data sheets (A)A4CSG RA 92105 or (A)A4VSG RA 92100.

Ports

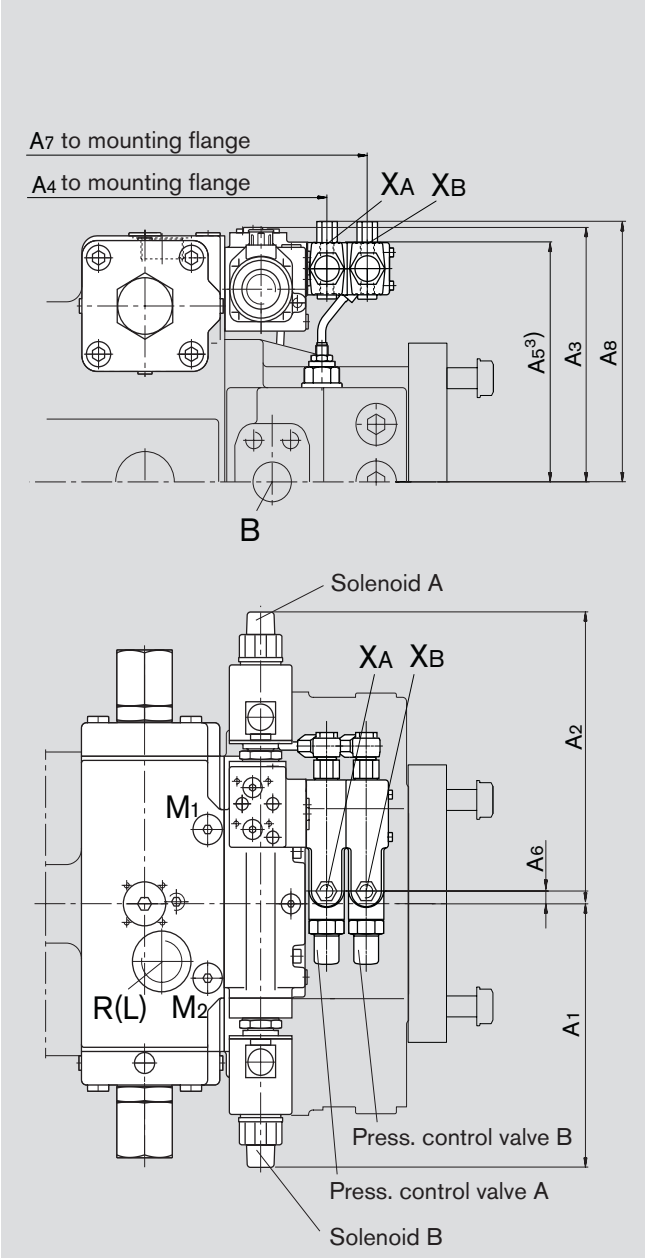
						max. tightening torque 1)
X_B	Pilot port for remote pressure control in B (with EPB plugged)3)	ISO 11926	9/16-18UNF-2B	0.51(13) deep	(Size 250 a. 355)	59lb-ft(80Nm)
		DIN 3852	M14x1,5;	0.47(12) deep	(Size 500 a. 750)	59lb-ft(80Nm)
M_1	Measuring port small control chamber	DIN 3852	M18x1,5;	0.47(12) deep 2)	(Size 250 a. 355)	103lb-ft(140 Nm)
			M22x1,5;	0.55(14) deep 2)	(Size 500 a. 750)	155lb-ft(210 Nm)
M_2	Measuring port large control chamber	DIN 3852	M18x1,5;	0.47(12) deep 2)	(Size 250 a. 355)	103lb-ft(140 Nm)
			M14x1,5;	0.47(12) deep 2)	(Size 500 a. 750)	59lb-ft(80Nm)

1) see safety information 2) plugged 3) version EPB size 250 and 355 without adaptor

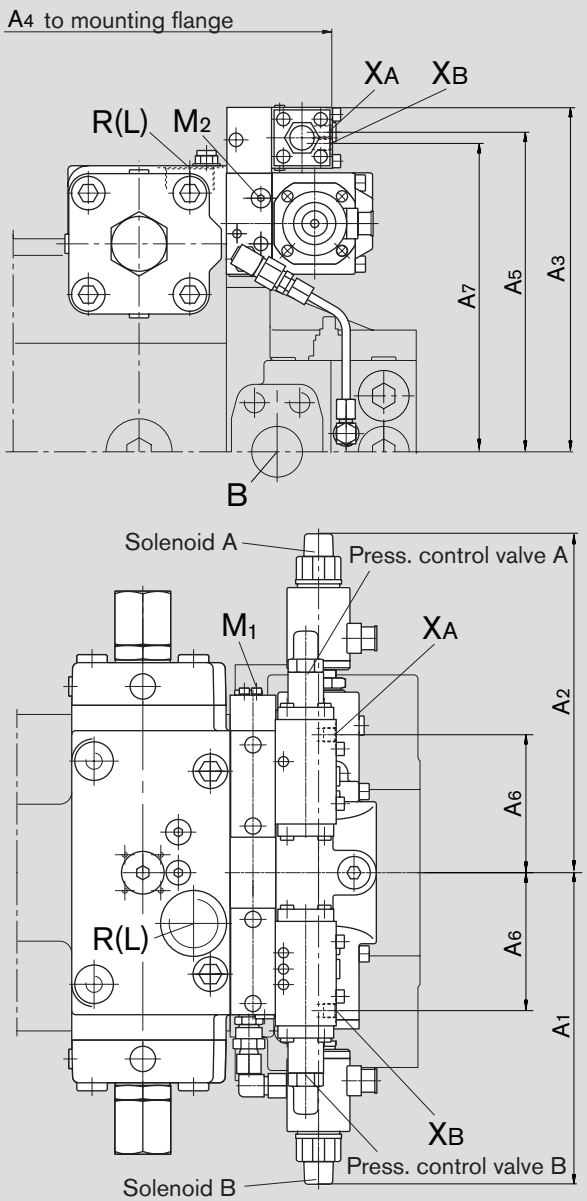
Unit dimensions EPD / EPG

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

Sizes 250 and 355



Sizes 500 and 750



Unit dimensions

Size	A_1	A_2	A_3	A_4	A_5 3)	A_6	A_7	A_8	
250	9.92(252)	10.98(279)	9.57(243)	16.93(430)	8.98(228)	0.51(13)	18.43(468)	9.84(250)	Detailed dimensions and technical data of the variable pump see main data sheets (A)A4CSG RA 92105 or (A)A4VSG RA 92100.
355	9.92(252)	10.98(279)	9.57(243)	16.93(430)	8.98(228)	0.51(13)	18.43(468)	9.84(250)	
500	12.05(306)	13.07(332)	13.46(342)	18.46(469)	12.40(315)	5.35(136)	11.97(304)	–	
750	12.40(315)	13.07(332)	14.65(372)	19.72(501)	13.58(345)	5.35(136)	11.97(304)	–	

Ports

						max. tightening torque 1)
X_A, X_B	Pilot port for remote pressure control (with EPD plugged)3)	ISO 11926	9/16-18UNF-2B	0.51(13) deep	(Size 250 a. 355)	59lb-ft(80Nm)
		DIN 3852	M14x1,5;	0.47(12) deep	(Size 500 a. 750)	59lb-ft(80Nm)
M_1	Measuring port small control chamber	DIN 3852	M18x1,5;	0.47(12) deep 2)	(Size 250 a. 355)	103lb-ft(140 Nm)
			M22x1,5;	0.55(14) deep 2)	(Size 500 a. 750)	155lb-ft(210 Nm)
M_2	Measuring port large control chamber	DIN 3852	M18x1,5;	0.47(12) deep 2)	(Size 250 a. 355)	103lb-ft(140 Nm)
			M14x1,5;	0.47(12) deep 2)	(Size 500 a. 750)	59lb-ft(80Nm)

1) see safety information 2) plugged 3) version EPD size 250 and 355 without adaptor

Type of connector

Hirschmann-connector

to DIN EN 175301-803/ISO 4400

Type of protection IP 65

Male plug:

to DIN EN 175 301–803/ISO 4400 with screw cable gland M16x1,5 for cable Dia 0.18...0.39 (ø 4,5...10mm) does not belong to is not part of the supply of the EP control, however is available under the following Rexroth part numbers: R902602623 (black) or R902602622 (grey)

Safety information

– The pump (A)A4V(C)SG is designed for operation in closed circuits.

– Systems design, installation and commissioning requires trained technicians engineers or tradesmen.

– All hydraulic ports can only be used for the fastening of hydraulic service lines.

– Tightening torques: all max. tightening torques, mentioned in this data sheet are maximum values and cannot be exceeded (they represent the max. permissible value for the female threads in the castings)

For fastening screws to ISO 68/DIN 13 we recommend to check the permissible tightening torques in each individual case acc. to VDI 2230 dated 2003.

– **WARNING: High Temperature Hazard**

During and shortly after operation of the pump the housing, control valves and especially solenoids can be extremely hot; avoid close contact for risk of severe burns!

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