

Axial Piston Variable Pump A11VO

Data sheet

Series 1
Size NG40 to 260
Nominal pressure 350 bar
Maximum pressure 400 bar
Open circuit



Features

- Variable axial piston pump of swashplate design for hydrostatic drives in open circuit hydraulic system.
- Designed primarily for use in mobile applications.
- The pump operates under self-priming conditions, with tank pressurization, or with an optional built-in charge pump (impeller).
- A comprehensive range of control options is available matching any application requirement.
- Power control option is externally adjustable, even when the pump is running.
- The through drive is suitable for adding gear pumps and axial piston pumps up to the same, i.e. 100% through drive.
- The output flow is proportional to the drive speed and infinitely variable between $q_{V \max}$ and $q_{V \min} = 0$.

Ordering Code / Standard Program

A11V		O			/	1			-	N							
01	02	03	04	05		06	07	08		09	10	11	12	13	14	15	16

Axial piston unit

01	Swashplate design, variable, nominal pressure 350 bar, maximum pressure 400 bar															A11V
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Charge pump (impeller)

						40	60	75	95	130	145	190	260	
02	without charge pump (no code)					●	●	●	●	●	●	●	●	
	with charge pump					-	-	-	-	●	●	●	●	L

Operation

03	Pump, open circuit															O
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Size

04	≈ Displacement $V_{g \max}$ in cm^3					40	60	75	95	130	145	190	260
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Control unit

05	Power control		LR				●	●	●	●	●	●	●	●	●	●	●	LR		
	with override	cross sensing	negative	LR		C		●	●	●	●	●	●	●	●	●	●	●	LR.C	
		high-pressure related	negative	LR3				●	●	●	●	●	●	●	●	●	●	●	LR3	
		pilot-pressure related	negative	LG1					●	●	●	●	●	●	●	●	●	●	●	LG1
			positive	LG2					●	●	●	●	●	●	●	●	●	●	●	LG2
	electric	U = 12 V	negative	LE1				○	○	○	●	●	●	●	●	●	●	●	LE1	
			negative	LE2				○	●	●	●	●	●	●	●	●	●	●	LE2	
	with pressure cut-off				D			●	●	●	●	●	●	●	●	●	●	●	L.D..	
		hydraulic, 2-stage			E			●	●	●	●	●	●	●	●	●	●	●	L.E..	
		hydraulic, remote controlled				G			●	●	●	●	●	●	●	●	●	●	●	L..G.
	with load sensing					S		●	●	●	●	●	●	●	●	●	●	●	L...S	
		electric, prop. override, 24 V				S2		○	○	○	●	●	●	●	●	●	●	●	L...S2	
		hydraulic, prop. override				S5		○	○	○	●	●	●	●	●	●	●	●	L...S5	
	with stroke limiter	negative characteristic	$\Delta p = 25$ bar			H1		●	●	●	●	●	●	●	●	●	●	●	L...H1	
			$\Delta p = 10$ bar			H5		●	●	●	●	●	●	●	●	●	●	●	L...H5	
		positive characteristic	$\Delta p = 25$ bar			H2		●	●	●	●	●	●	●	●	●	●	●	L...H2	
			$\Delta p = 10$ bar			H6		●	●	●	●	●	●	●	●	●	●	●	L...H6	
				U = 12 V			U1		●	●	●	●	●	●	●	●	●	●	●	L...U1
				U = 24 V			U2		●	●	●	●	●	●	●	●	●	●	●	L...U2
	Pressure control			DR				●	●	●	●	●	●	●	●	●	●	●	DR	
	with load sensing			DRS				●	●	●	●	●	●	●	●	●	●	●	DRS	
	remote controlled			DRG				●	●	●	●	●	●	●	●	●	●	●	DRG	
	for parallel operation			DRL				●	●	●	●	●	●	●	●	●	●	●	DRL	
	Hydraulic control,		$\Delta p = 10$ bar	HD1				●	●	●	●	●	●	●	●	●	●	●	HD1	
	pilot-pressure related	(positive characteristic)	$\Delta p = 25$ bar	HD2				●	●	●	●	●	●	●	●	●	●	●	HD2	
with pressure cut-off				D			●	●	●	●	●	●	●	●	●	●	●	HD.D		
with pressure cut-off, remote controlled				G			○	●	○	○	○	○	○	○	○	○	●	HD.G		
Electric control		U = 12 V	EP1				●	●	●	●	●	●	●	●	●	●	●	EP1		
with proportional solenoid	(positive characteristic)	U = 24 V	EP2				●	●	●	●	●	●	●	●	●	●	●	EP2		
		with pressure cut-off		D			●	●	●	●	●	●	●	●	●	●	●	EP.D		
	with pressure cut-off, remote control				G			●	●	●	●	●	●	●	●	●	●	●	EP.G	

Ordering Code / Standard Program

A11V		O			/	1			-	N							
01	02	03	04	05		06	07	08		09	10	11	12	13	14	15	16

Series

06																		1
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Index

07																			0
																			1

Direction of rotation

08	Viewed from shaft end																		R
																			L

Seals

09	NBR (nitrile-caoutchouc), shaft seal ring in FKM (fluor-caoutchouc)																N
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Shaft end (see page 8 for permissible input and through drive torques)

		40	60	75	95	130	145	190	260		
10	Splined shaft DIN 5480 for single and combination pump	●	●	●	●	●	●	●	●	Z	
	Parallel keyed shaft DIN 6885	●	●	●	●	●	●	●	●	P	
	Splined shaft ANSI B92.1a-1976	for single pump	●	●	●	●	●	●	●	●	S
		for combination pump	●	●	●	-1)	-1)	-1)	●	●	T

Mounting flange

		40	60	75	95	130	145	190	260	
11	SAE J744 - 2-hole	●	●	-	-	-	-	-	-	C
	SAE J744 - 4-hole	-	-	●	●	●	●	●	●	D
	SAE J617 ²⁾ (SAE 3)	-	-	-	●	●	●	●	-	G

Service line ports

		40	60	75	95	130	145	190	260	
12	Pressure and suction port SAE, at side, opposite side (with metric fastening threads)	●	●	●	●	●	●	●	●	12

Through drive (see page 58 for attachments)

		40	60	75	95	130	145	190	260		
13	Flange SAE J744 ³⁾ Coupler for splined shaft										
	-	●	●	●	●	●	●	●	●	N00	
	82-2 (A)	5/8in 9T 16/32DP (A)	●	●	●	●	●	●	●	●	K01
		3/4in 11T 16/32DP (A-B)	○	●	○	●	●	●	○	○	K52
	101-2 (B)	7/8in 13T 16/32DP (B)	●	●	●	●	●	●	●	●	K02
		1 in 15T 16/32DP (B-B)	●	●	●	●	●	●	●	●	K04
		W35 2x30x16x9g	●	●	●	●	●	●	●	●	K79
	127-2 (C) ⁴⁾	1 1/4in 14T 12/24DP (C)	-	●	●	●	●	●	●	●	K07
		1 1/2in 17T 12/24DP (C-C)	-	-	-	●	●	●	●	●	K24
		W30 2x30x14x9g	-	●	●	●	●	●	●	●	K80
		W35 2x30x16x9g	-	●	●	●	●	●	●	●	K61
	152-4 (D)	1 1/4in 14T 12/24DP (C)	-	-	●	●	●	●	●	●	K86
		1 3/4in 13T 8/16DP (D)	-	-	-	-	●	●	●	●	K17
		W40 2x30x18x9g	-	-	●	●	●	●	●	●	K81
		W45 2x30x21x9g	-	-	-	●	●	●	●	●	K82
		W50 2x30x24x9g	-	-	-	-	●	●	●	●	K83
	165-4 (E)	1 3/4in 13T 8/16DP (D)	-	-	-	-	-	-	●	●	K72
		W50 2x30x24x9g	-	-	-	-	-	-	●	●	K84
		W60 2x30x28x9g	-	-	-	-	-	-	-	●	K67

Technical Data

Operating pressure range

Inlet

Absolute pressure at port S (suction port)
Version *without* charge pump

$p_{abs \text{ min}}$ _____ 0.8 bar
 $p_{abs \text{ max}}$ _____ 30 bar

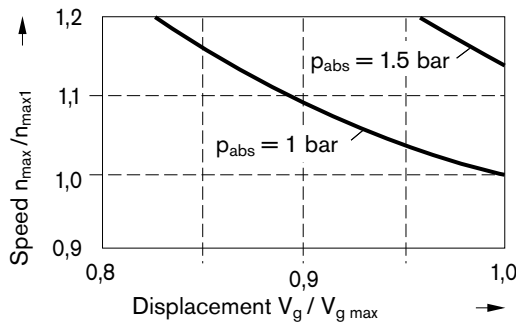
If the pressure is > 5 bar, please ask.

Version *with* charge pump

$p_{abs \text{ min}}$ _____ 0.6 bar
 $p_{abs \text{ max}}$ _____ 2 bar

Maximum permissible speed (speed limit)

Permissible speed by increasing the inlet pressure p_{abs} at the suction port S or at $V_g \leq V_{g \text{ max}}$



Outlet

Pressure at port A or B

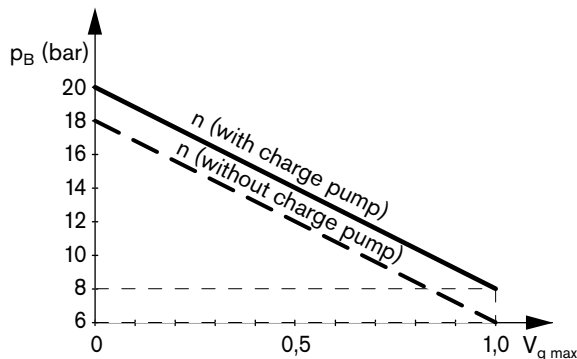
Nominal pressure p_N _____ 350 bar
Maximum pressure p_{max} _____ 400 bar

Nominal pressure: Max. design pressure at which fatigue strength is ensured.

Maximum pressure: Max. operating pressure which is permissible for short-term ($t < 1s$).

Minimum operating pressure

A minimum operating pressure $p_{B \text{ min}}$ is required in the pump service line depending on the speed, the swivel angle and the displacement (see diagram).



Case drain pressure

The case drain pressure at the ports T_1 and T_2 may be a maximum of 1.2 bar higher than the inlet pressure at the port S but not higher than

$p_{L \text{ abs. max}}$ _____ 2 bar.

An unrestricted, full size case drain line directly to tank is required.

Temperature range of the shaft seal ring

The FKM shaft seal ring is permissible for case drain temperatures of -25°C to $+115^\circ\text{C}$.

Note:

For applications below -25°C , an NBR shaft seal ring is necessary (permissible temperature range: -40°C to $+90^\circ\text{C}$). State NBR shaft seal ring in clear text in the order.

Flushing the case

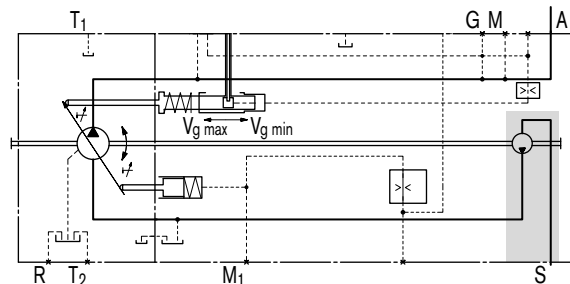
If a variable pump with control unit **EP, HD, DR** or stroke limiter (**H., U.,**) is operated over a long period ($t > 10$ min) with flow zero or operating pressure < 15 bar, flushing of the case via ports "T₁", "T₂" or "R" is necessary.

Size	40	60	75	95	130	145	190	260
qV_{flush} (l/min)	2	3	3	4	4	4	5	6

Flushing the case is unnecessary in versions with charge pump (A11VLO), since a part of the charge flow is directed to the case.

Charge pump (impeller)

The charge pump is a circulating pump with which the A11VLO (size 130...260) is filled and therefore can be operated at higher speeds. This also simplifies cold starting at low temperatures and high viscosity of the hydraulic fluid. Tank charging is therefore unnecessary in most cases. A tank pressure of a max. 2 bar is permissible with charge pump.



DR – Pressure Control

DRS Pressure control with load sensing

The load sensing control is a flow control option that operates as a function of the load pressure to regulate the pump displacement to match the actuator flow requirement.

The flow depends here on the cross section of the external sensing orifice (1) fitted between the pump outlet and the actuator. The flow is independent of the load pressure below the pressure cut-off setting and within the control range of the pump.

The sensing orifice is usually a separately arranged load sensing directional valve (control block). The position of the directional valve piston determines the opening cross section of the sensing orifice and thus the flow of the pump.

The load sensing control compares pressure before and after the sensing orifice and maintains the pressure drop across the orifice (differential pressure Δp) and with it the pump flow constant.

If the differential pressure Δp increases at the sensing orifice, the pump is swivelled back (towards $V_{g \min}$), and, if the differential pressure Δp decreases, the pump is swivelled out (towards $V_{g \max}$) until the pressure drop across the sensing orifice in the valve is restored.

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

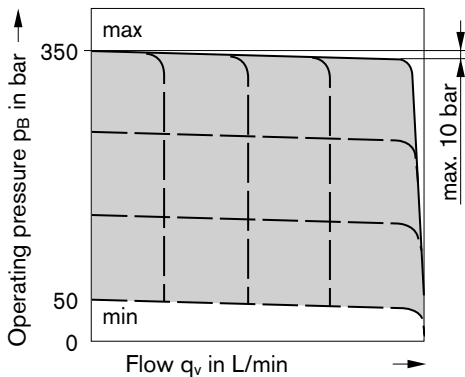
The setting range for Δp is between 14 bar and 25 bar.

The standard differential pressure setting is 18 bar. (Please state in clear text when ordering).

The stand-by pressure in zero stroke operation (sensing orifice plugged) is slightly above the Δp setting.

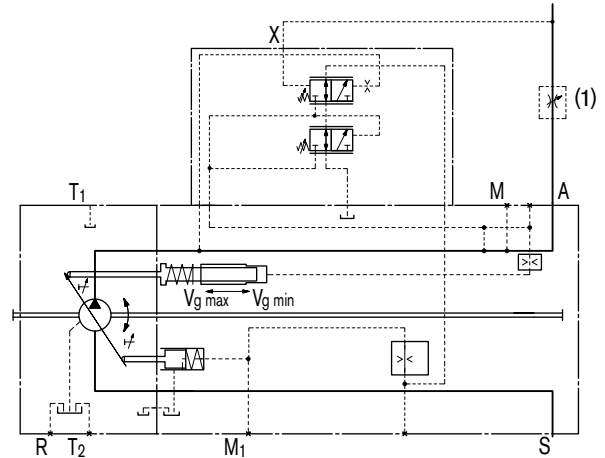
(1) The sensing orifice (control block) is not included in the pump supply.

Characteristic: DRS

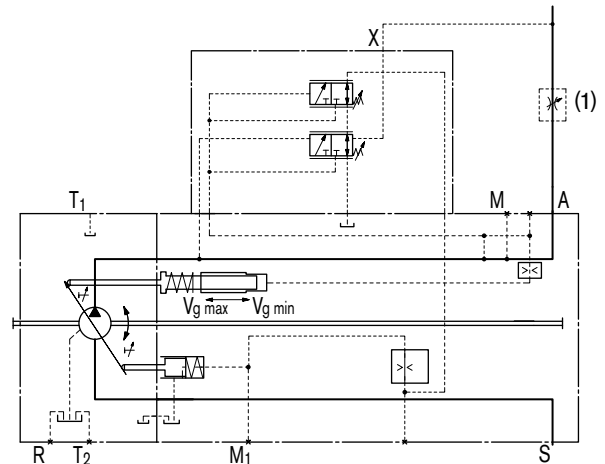


Circuit diagram DRS

Size 40 ... 145



Size 190 ... 260

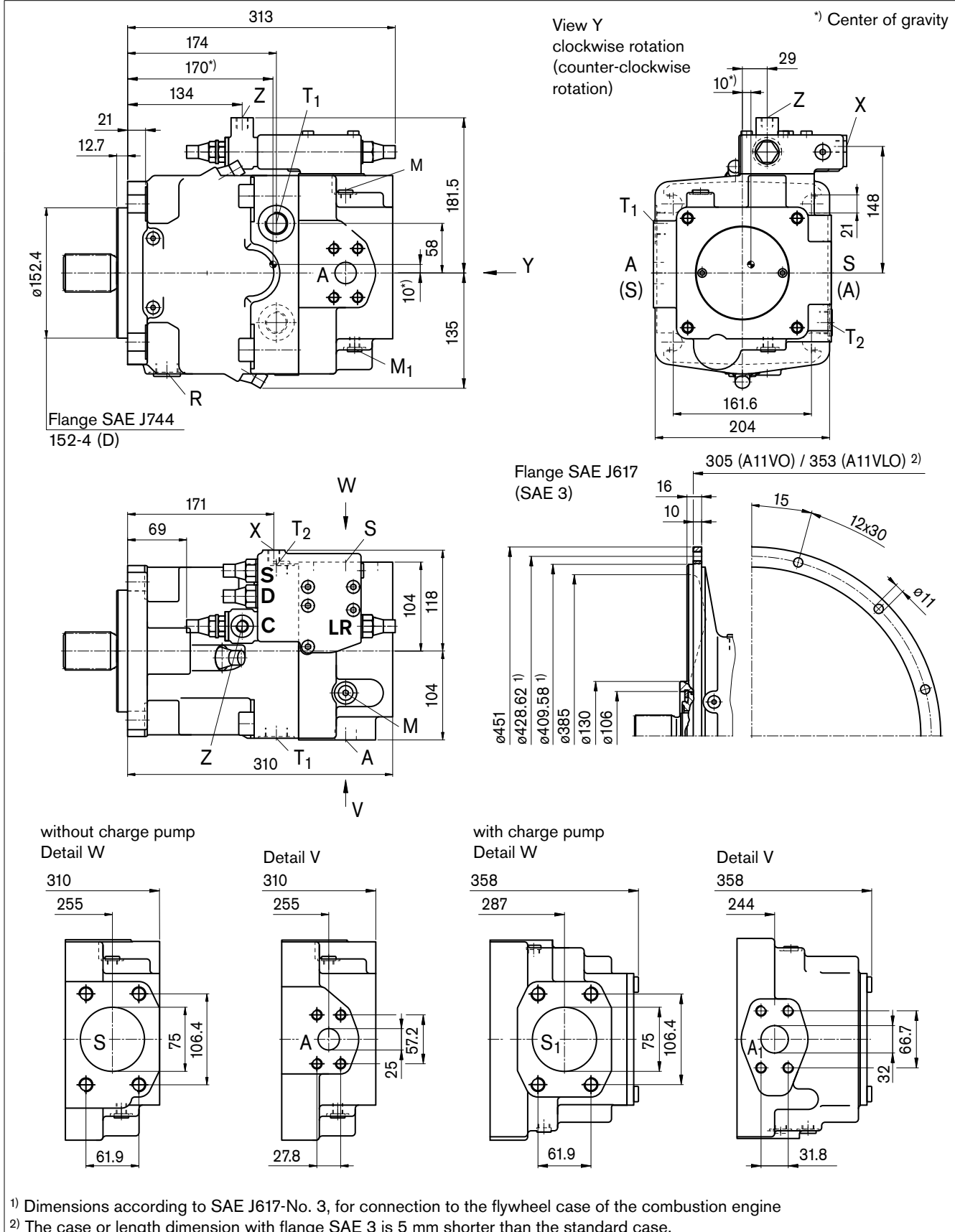


Dimensions, Size 130/145

Before finalizing your design, please request a certified drawing. Dimensions in mm.

LRDCS

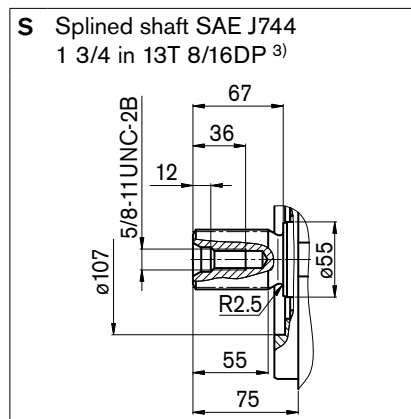
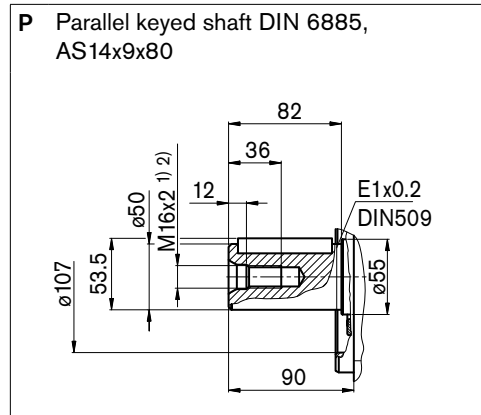
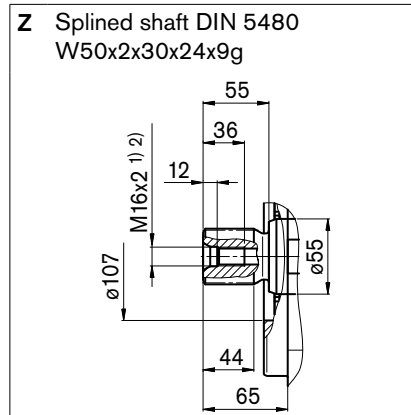
Power control LR with pressure cut-off D, cross sensing control C and load sensing control S



Dimensions, Size 130/145

Before finalizing your design, please request a certified drawing. Dimensions in mm.

Shaft ends



Ports

Designation	Function	Standard	Size ²⁾	Max. pres- sure (bar) ⁴⁾	State
A	Service line port Fixing thread	SAE J518 DIN 13	1 in M12x1.75; 17 deep	400	O
A ₁	Service line port Fixing thread	SAE J518 DIN 13	1 1/4 in M14x2; 19 deep	400	O
S, S ₁	Suction port Fixing thread	SAE J518 DIN 13	3 in M16x2; 24 deep	30 2 ⁶⁾	O
T ₁ , T ₂	Tank port	DIN 3852	M26x1.5; 16 deep	10	5)
R	Air bleed	DIN 3852	M26x1.5; 16 deep	10	X
M ₁	Measurement point, positioning chamber	DIN 3852	M12x1.5; 12 deep	400	X
M	Measurement point, service line port	DIN 3852	M12x1.5; 12 deep	400	X
X	Pilot pressure port in version with load sensing (S) and remote controlled pressure cut-off (G)	DIN 3852	M14x1.5; 12 deep	400	O
Y	Pilot pressure port in version with stroke limiter (H...), 2-stage pressure cut-off (E) and HD	DIN 3852	M14x1.5; 12 deep	40	O
Z	Pilot pressure port in version with cross sensing (C) and power override (LR3) power override (LG1)	DIN 3852	M14x1.5; 12 deep	400 40	O
G	Port for control pressure (controller) in version with stroke limiter (H..., U2), HD and EP with screw union GE10 - PLM (otherwise closed)	DIN 3852	M14x1.5; 12 deep	40	O

1) Center bore according to DIN 332 (thread acc. to DIN 13)

2) For max. tightening torque, please refer to general notes on page 64

3) ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5

4) Depending on adjustment data and operating pressure

5) Depending on installation position, 11 and 12 must be connected (see also page 61)

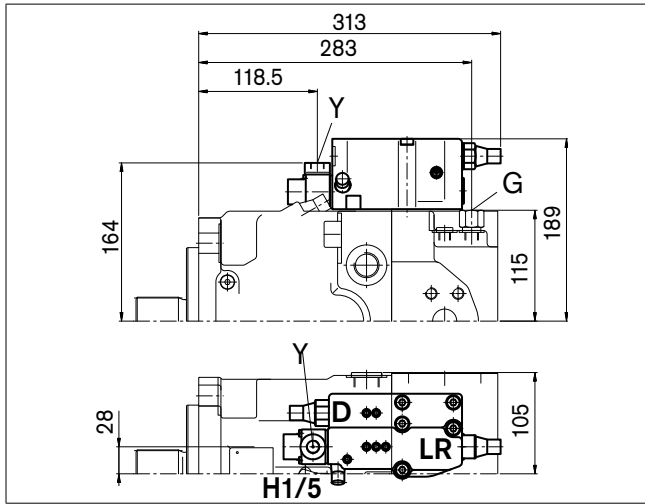
6) with charge pump

Dimensions, Size 130/145

Before finalizing your design, please request a certified drawing. Dimensions in mm.

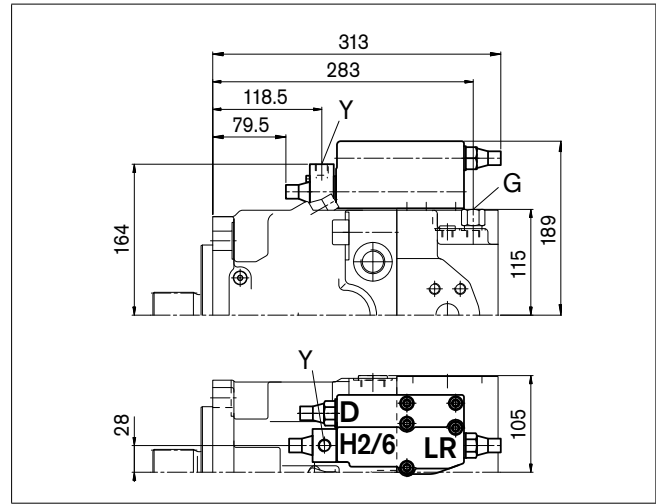
LRDH1/LRDH5

Power control with pressure cut-off and hydraulic stroke limiter (negative characteristic)



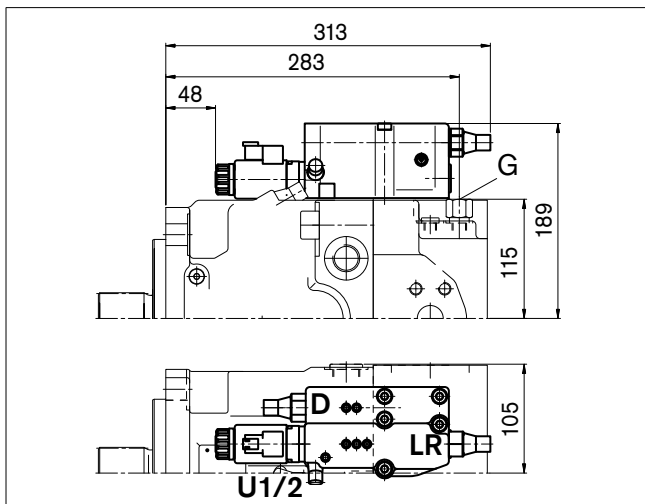
LRDH2/LRDH6

Power control with pressure cut-off and hydraulic stroke limiter (positive characteristic)



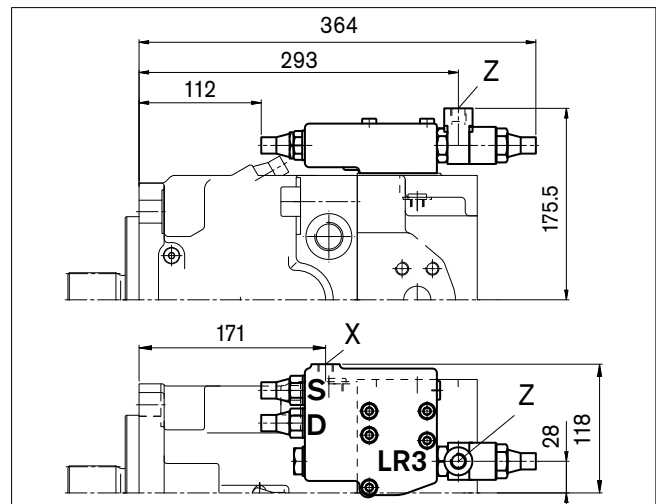
LRDU1/LRDU2

Power control with pressure cut-off and electric stroke limiter (positive characteristic)



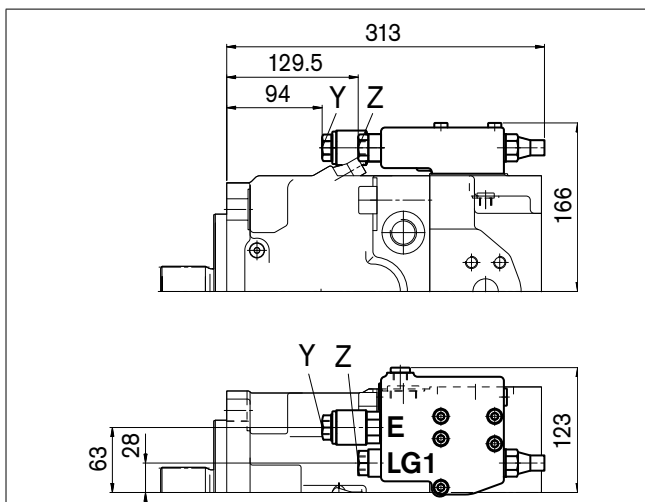
LR3DS

Power control with high-pressure related override, pressure cut-off and load sensing control



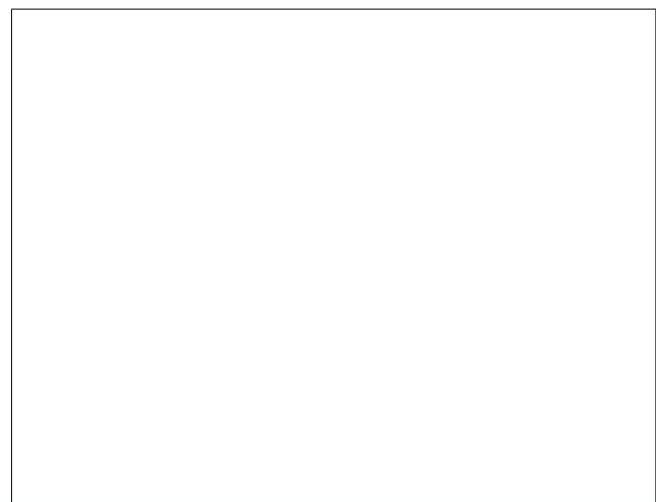
LG1E

Power control with pilot-pressure related override (negative) and 2-stage pressure cut-off



LG2E

Power control with pilot-pressure related override (positive) and 2-stage pressure cut-off

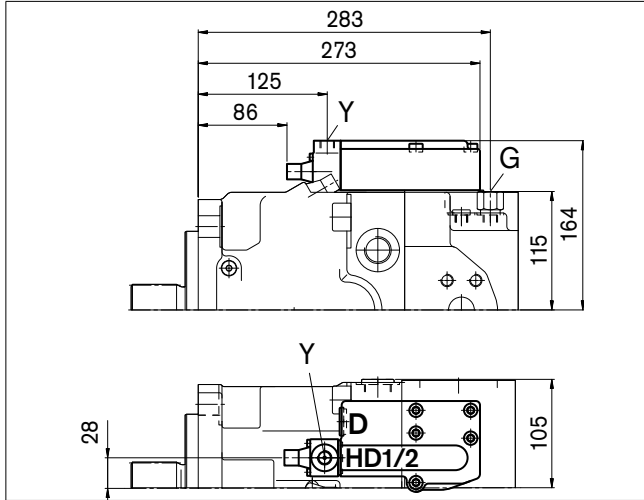


Dimensions, Size 130/145

Before finalizing your design, please request a certified drawing. Dimensions in mm.

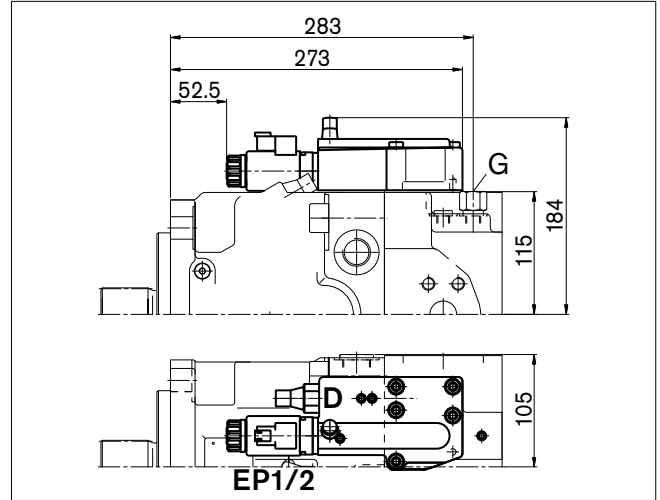
HD1D/HD2D

Hydraulic control, pilot-pressure related with pressure cut-off



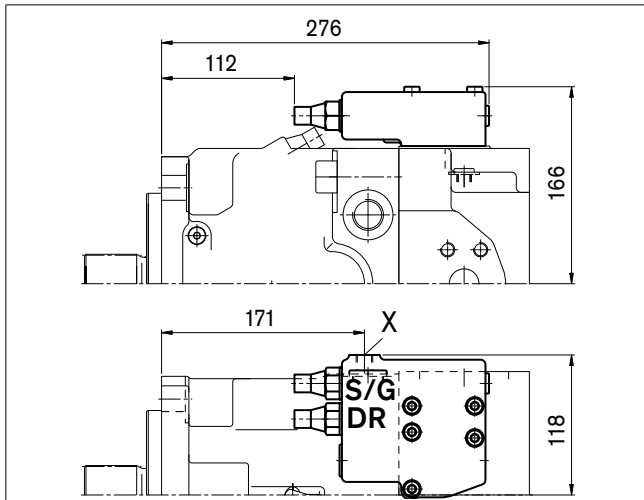
EP1D/EP2D

Electric control with proportional solenoid and pressure cut-off



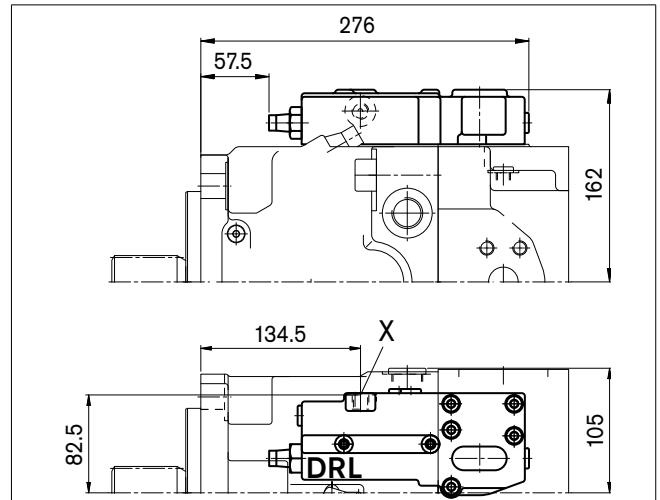
DRS/DRG

Pressure control with load sensing control
Pressure control remote controlled



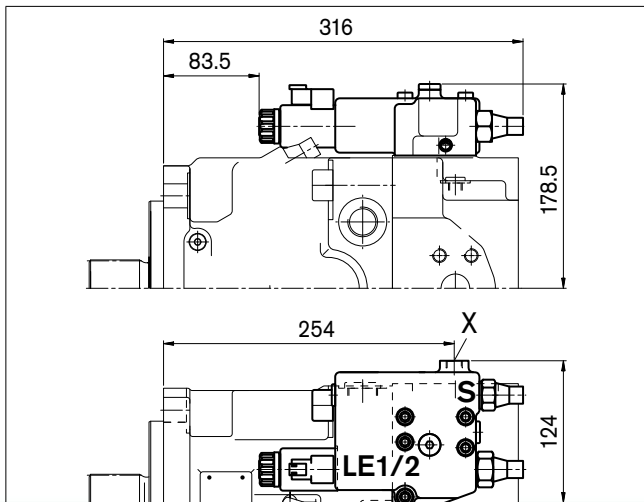
DRL

Pressure control for parallel operation



LE1S/LE2S

Power control with electric override (negative) and load sensing control



LE2S2/LE1S5/LE2S5

Power control with electric override (negative) and load sensing control, override

