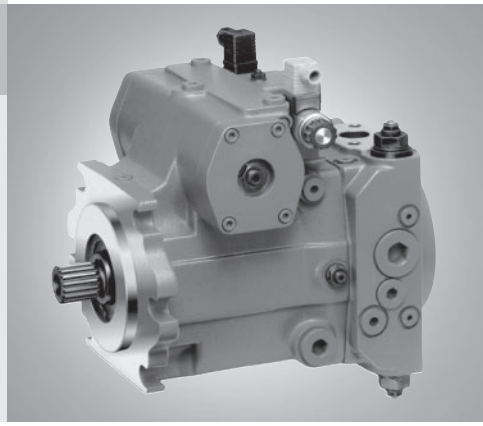
Rexroth
Bosch Group

Variable Displacement Pump A4VG

RE 92 003/05.03 1/52
replaces: 05.99

closed circuit



Sizes 28...250
Series 3
Nominal pressure 400 bar
Peak pressure 450 bar

Index

Features

- Variable displacement axial piston pump of swashplate design for hydrostatic closed circuit transmissions
- Flow is proportional to drive speed and displacement and is infinitely variable
- Output flow increases with swivel angle from 0 to its maximum value
- Swivelling the pump over centre smoothly changes the direction of flow
- Availability of a highly adaptable range of control and regulating devices
- The pump is equipped with two pressure relief valves on the high pressure ports to protect the hydrostatic transmission (pump and motor) from overloads
- These valves also function as boost inlet valves
- An integral auxiliary pump serves as boost and pilot oil pump
- The maximum boost pressure is limited by a built-in boost pressure relief valve
- The integral pressure cut-off is standard

- Further Informations:

  Variable Displacement Pump A4VTG RE 92 012
  for drum drives on mobile concrete mixers

Ordering Code / Standard Programm

Axial piston unit

Variable swashplate design, nominal pressure 400 bar, peak pressure 450 bar	**A4V**

Operation

Pump in closed circuits	**G**

Size

≙ Displacement $V_{g\,max}$ in cm³	28	40	56	71	90	125	180	250	

Control device

		28	40	56	71	90	125	180	250	
without control module	NV	●	●	●	●	●	●	●	●	**NV**
Hydraulic control, pilot pressure related	HD1	●	●	●	●	●	●	●	●	**HD1**
Hydraulic control, mechanical servo	HW	●	●	●	●	●	●	●	●	**HW**
Hydraulic control, speed related	DA	●	●	●	●	●	●	●	●	**DA**
Hydraulic control, direct operated	DG	●	●	●	●	●	●	●	●	**DG**
Electrical two-position control with switching solenoid	EZ	●	●	●	●	●	●	●	●	**EZ**
Electrical control with proportional solenoid	EP	●	●	●	●	●	●	●	●	**EP**

Solenoid voltage (only for EP, EZ or DA)

U = 12 V		●	●	●	●	●	●	●	●	**1**
U = 24 V		●	●	●	●	●	●	●	●	**2**

Pressure cut-off

with pressure cut-off (standard)		●	●	●	●	●	●	●	●	**D**

Neutral position switch (only for HW)

without neutral position switch (no code)		●	●	●	●	●	●	●	●	
with neutral position switch		●	●	●	●	●	●	●	●	**L**

Mechanical stroke limiter

without mechanical stroke limiter (no code)		●	●	●	●	●	●	●	●	
with mechanical stroke limiter, external adjustable		●	●	●	●	●	●	●	●	**M**

Ports X_3, X_4 for positioning pressure

without ports X_3, X_4 (no code)		●	●	●	●	●	●	●	●	
with ports X_3, X_4		●	●	●	●	●	●	●	●	**T**

DA control valve

		NV	EZ	DG	EP	HW	HD1	DA	28…250	
without DA control valve		●	●	●	●	●	●	–	●	**1**
with DA control valve, fixed setting		–	–	●	●	●	●	●	●	**2**
with DA control valve, mech adjust. with control lever	**L**	–	–	●	●	●	●	●	●	**3L**
	R	–	–	●	●	●	●	●	●	**3R**
with DA control valve, fixed setting and hydraulic inch valve built-on, control with brake fluid		–	–	–	–	–	–	●	●	**4**
with DA control valve, mech. adjust. with control lever and	**L**	–	–	–	–	–	–	●		**5L**
hydraulic inch valve built-on, control with brake fluid	**R**	–	–	–	–	–	–	●	●	**5R**
with DA control valve, fixed setting, and connections for master controller		–	–	●	●	●	●	●	●	**7**
with DA control valve, fixed setting and hydraulic inch valve built-on, control with mineral oil		–	–	–	–	–	–	●	●	**8**
with DA control valve, mech. adjust. with control lever and	**L**	–	–	–	–	–	–	●	●	**9L**
hydraulic inch valve built-on, control with mineral oil	**R**	–	–	–	–	–	–	●	●	**9R**

DA control valve with control lever

without control lever (no code)	
with control lever - anti-clockwise operation direction	**L**
with control lever - clockwise operation direction	**R**

Series

Series 3, Index 2	**32**

Direction of rotation

		28…250	
viewed on shaft end	clockwise	●	**R**
	anti-clockwise	●	**L**

Seals

NBR (nitrile-caoutchouc), shaft seal in FKM (fluor-caoutchouc)	**N**

Shaft end (permissible input torque see page 7)

		28	40	56	71	90	125	180	250	
splined shaft	for single pump	●	●	●	●	●	●	●	●	**Z**
DIN 5480	for combination pump -1st pump	– [1]	●	●	●	●	●	– [1]	– [1]	**A**
splined shaft	for single pump	●	●	●	●	●	●	●	●	**S**
ANSI B92.1a–1976	for combination pump -1st pump	– [2]	– [2]	●	●	– [2]	●	●	●	**T**
	only for combination pump - 2nd pump	–	●	–	–	●	–	–	–	**U**

A4V	G			/	3	2		–	N								

Axial piston unit
Operation
Size
Control device
Series
Direction of rotation
Seals
Shaft end

Mounting flange

	28	40	56	71	90	125	180	250	
SAE J744 – 2-hole	●	●	●	–	–	–	–	–	C
SAE J744 – 4-hole	–	–	–	–	–	–	●	●	D
SAE J744 – 2 + 4-hole	–	–	–	●	●	●	–	–	F

Service line connections

	28	40...180	250	
Ports A and B SAE, (metric fastening thread), at side (on opposite sides)	–	●	–	02
Ports A and B SAE, (metric fastening thread), at side (same side)	●	–	●	10

Auxiliary pump

	28	40	56	71	90	125	180	250	
with integral auxiliary pump, without through drive	●	●	●		●	●	●	●	F00
without integral auxiliary pump, without through drive	●	●	●	●	●	●	●	●	N00
with integral auxiliary pump, with through drive	●	●	●	●	●	●	●	●	F...
without integral auxiliary pump, with through drive	●	●	●	●	●	●	●	●	K...

Through drive (for mounting options see page 39)

Flange SAE J744 [3]	Splined shaft hub			28	40	56	71	90	125	180	250	
82-2(A)	5/8in	9T 16/32DP	[4]	●	●	●	●	●	●	●	●	...01
101-2(B)	7/8in	13T 16/32DP	[4]	●	●	●	●	●	●	●	●	...02
	1in	15T 16/32DP	[4]	●	●	●	●	●	●	●	●	...04
127-2(C)	1in	15T 16/32DP	[4]	–	●	–	–	–	–	–	–	...09
	1 1/4in	14T 12/24DP	[4]	–	–	●	●	●	●	●	●	...07
152-2/4(D)	W35	2x30x16x9g	[5]	–	–	–	–	●	–	–	–	...73
	1 3/4in	13T 8/16DP	[4]	–	–	–	–	–	●	●	●	...69
165-4(E)	1 3/4in	13T 8/16DP	[4]	–	–	–	–	–	–	●	●	...72

Valves

	Einstellbereich		28	40	56	71	90	125	180	250	
with high press. relief valve, pilot controlled	100...420 bar	with bypass	–	–	–	●	●	●	●	●	1
with high pressure relief valve, direct controlled, (fixed setting)	270...420 bar	without bypass	●	●	●	–	–	–	–	–	3
		with bypass	●	●	●	–	–	–	–	–	5
	100...250 bar	without bypass	●	●	●	–	–	–	–	–	4
		with bypass	●	●	●	–	–	–	–	–	6

Filtration

	28	40	56	71	90	125	180	250	
Filtration in the suction line of the auxiliary (boost) pump	●	●	●	●	●	●	●	●	S
Filtration in the pressure line of the auxiliary (boost) pump: ports for external boost circuit filter, (F_e and F_a)	●	●	●	●	●	●	●	●	D
cold start valve and ports for external boost circuit filter, (F_e and F_a)	–	●	●	●	●	●	●	–	K
filter built-on (supplied complete) [6]	–	●	●	●	●	●	●	–	F
filter built-on with contamination indicator, lamp and electr. signal [6]	–	●	●	●	●	●	●	–	M
filter built-on with contamination indicator, window [6]	–	●	●	●	●	●	●	–	P
filter built-on with contamination indicator, electr. signal [6]	–	●	●	●	●	●	●	–	L
External supply (model without integral auxiliary pump - N00, K..)	●	●	●	●	●	●	●	●	E

Swivel angle display

	28	40	56	71	90	125	180	250	
without swivel angle display (no code)	●	●	●	●	●	●	●	●	
Electrical swivel angle sensor	●	●	●	●	●	●	●	●	R

Range of male connectors for solenoids (only for EP, EZ and DA)

	28	40	56	71	90	125	180	250	
DEUTSCH male connector injection molded, 2-pin (without quenching diode)	●	●	●	●	●	●	●	●	P
DEUTSCH male connector injection molded, 2-pin (with bidirectional quenching diode) [7]	○	○	○	○	○	○	○	○	Q
DEUTSCH male connector with stranded wire, 2-pin (without quenching diode) [8]	●	●	●	●	●	●	●	●	T
DIN male connector to Hirschmann (without quenching diode) [8]	●	●	●	●	●	●	●	●	H

[1] standard for combination pumps - 1st pump: shaft **Z**
[2] standard for combination pumps - 1st pump: shaft **S**
[3] 2 ≙ 2-hole; 4 ≙ 4-hole
[4] splined shaft hub to ANSI B92.1a-1976 (splined shaft allocation to SAE J744, see pages 39-41)
[5] splined shaft hub to DIN 5480
[6] with cold start valve
[7] version with bidirectional quenching diode only for control device EZ and DA
[8] not for new projects

= preferred program

● = available ○ = available on request – = not available

Technical Data

Fluid

Before starting a project, get detailed information about the selection of pressure fluids and application conditions from our catalog sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable hydraulic fluids) and RE 90223 (fire resistant hydraulic fluids, HF).

The A4VG variable displacement pump is not suitable for operation with HFA, HFB and HFC fluids. When operating with HFD or environmentally acceptable hydraulic fluids, obey the restrictions in the technical data and seal selection – please contact us. The hydraulic fluid used should be stated in clear text in the order.

Operating viscosity range

In order to obtain optimum efficiency and service life, select the operating viscosity (at operating temperature) from within the range

ν_{opt} = operating viscosity 16...36 mm^2/s

depending on the circuit temperature (closed circuit).

Viscosity limits

The limiting values for viscosity are as follows:

ν_{min} = 5 mm^2/s
short term (t < 3 min)
at a max. permissible temp. of t_{max} = +115°C.

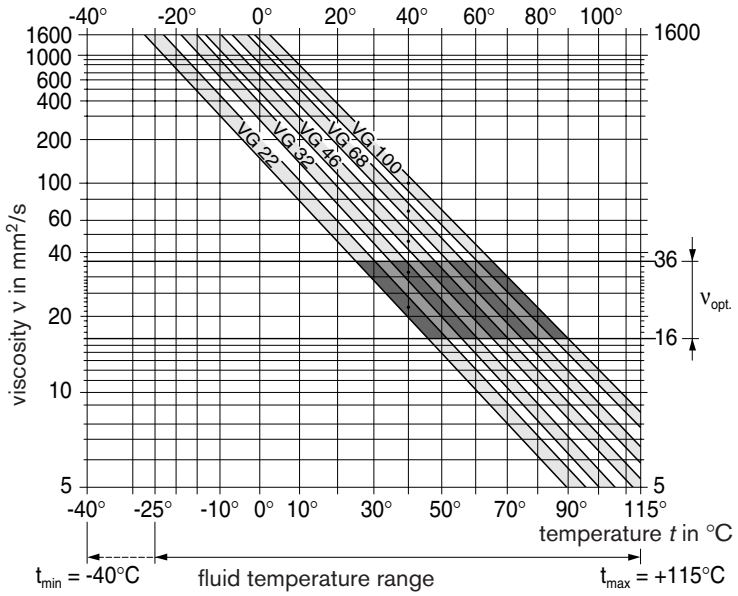
Ensure that the max. fluid temperature is also not exceeded in any pump space (for instance bearing area).

ν_{max} = 1600 mm^2/s
short term (t < 3min)
on cold start (p ≤ 30 bar, n ≤ 1000 rpm, t_{min} = -40°C).

At temperatures of -25°C down to -40°C special measures are required. Please contact us for further information.

For detailed information on use at low temperatures, see RE 90300-03-B.

Selection diagram



Notes on the selection of the hydraulic fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the circuit (closed circuit) in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range (ν_{opt}) (see shaded section of below selection diagram). We recommend to chose the higher possible viscosity range.

Example:
At a circuit temperature of 60°C, the recommended operating viscosity range is VG 46 or VG 68 (ν_{opt}; shaded area in below selection diagram). VG 68 should then be selected.

Important: The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the circuit temperature. However, the temperature must not exceed 115°C at no point in the circuit.

If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures please consult us.

Technical Data

Filtration

The finer the filtration the better the achieved purity grade of the pressure fluid and the longer the life of the axial piston unit.

To ensure safe operation of the axial piston unit, a minumum purity grade of

20/18/15 to ISO 4406 is necessary.

At very high temperatures of the hydraulic fluid (90°C to max. 115°C) at least purity grade

19/17/14 to ISO 4406 is necessary.

If above mentioned grades cannot be maintained please consult us.

Temperature range of the radial shaft seal

The FKM shaft seal is admissible for a housing temperature range from -25°C to +115°C.

Note:
For applications below -25°C a NBR shaft seal is necessary (admissible temperature range -40°C to +90°C).
When ordering, please state in clear text: with NBR shaft seal

Operating pressure range

Inlet

Variable pump (with external supply, E):

for control devices EP, EZ, HW and HD1
boost pressure (when n = 2000 rpm) p_{Sp} _____ 20 bar

for control devices DA, DG
boost pressure (when n = 2000 rpm) p_{Sp} _____ 25 bar

Auxiliary pump:
suction pressure $p_{s\,min}$ ($\nu \leq 30$ mm²/s) ____ ≥ 0,8 bar absolute
for cold start _____ ≥ 0,5 bar absolute

Outlet

Variable pump:
Pressure at port A or B

nominal pressure p_N _____ 400 bar

peak pressure p_{max} _____ 450 bar

summation pressure p_{max} _____ 700 bar
(pressure A + pressure B)

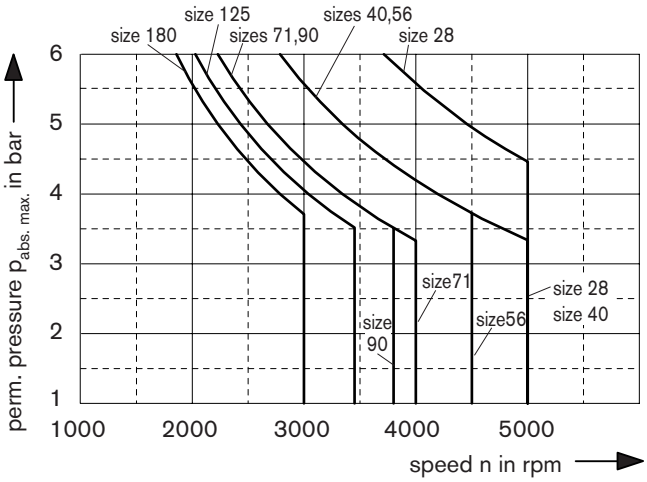
Auxiliary pump:
peak pressure $p_{H\,max}$ _____ 40 bar
(pressure data according to DIN 24312)

Case drain pressure

The lower the speed and the case drain pressure the higher the life expectation of the shaft seal ring. The values shown in the diagram are permissible loads of the seal ring and shall not be exceeded.

Stationary pressure loads in the range of the max. admissible leakage pressure may cause a reduction of the life experience of the seal ring will result.

For a short period (t < 5 min) pressure loads up to 6 bar independent from rotational speeds are permissible.



Technical Data

Table of values (theoretical values, without considering η_{mh} and η_v: values rounded)

Size				**28**	**40**	**56**	**71**	**90**	**125**	**180**	**250**
Displacement											
variable pump		$V_{g\,max}$	cm^3	28	40	56	71	90	125	180	250
auxiliary pump (at p = 20 bar)		$V_{g\,H}$	cm^3	6,1	8,6	11,6	19,6	19,6	28,3	39,8	52,5
Speed											
maximum $V_{g\,max}$		$n_{max\ contin.}$	rpm	4250	4000	3600	3300	3050	2850	2500	2400
limited maximum [1]		$n_{max\ limited}$	rpm	4500	4200	3900	3600	3300	3250	2900	2600
intermittent maximum [2]		$n_{max\ interm.}$	rpm	5000	5000	4500	4100	3800	3450	3000	2700
minimum		n_{min}	rpm	500	500	500	500	500	500	500	500
Flow											
at $n_{max\ contin.}$ and $V_{g\,max}$		$q_{v\,max}$	L/min	119	160	202	234	275	356	450	600
Power [3]											
at $n_{max\ contin.}$	Δp = 400 bar	P_{max}	kW	79	107	134	156	183	237	300	400
Torque [3]											
at $V_{g\,max}$	Δp = 400 bar	T_{max}	Nm	178	255	356	451	572	795	1144	1590
	Δp = 100 bar	T	Nm	44,5	63,5	89	112,8	143	198,8	286	398
Moment of inertia (about drive axis)		J	kgm^2	0,0022	0,0038	0,0066	0,0097	0,0149	0,0232	0,0444	0,0983
Angular acceleration, max.			rad/s^2	38000	30000	24000	21000	18000	14000	11000	6700
Speed variation, max.			rpm	70	62	55	50	47	42	32	30
Rotary stiffness	shaft end S		Nm/rad	31400	69000	80800	98800	158100	218300	244500	354500
	shaft end T		Nm/rad	–	–	95000	120900	–	252100	318400	534300
	shaft end A		Nm/rad	–	79600	95800	142400	176800	256500	–	–
	shaft end Z		Nm/rad	32800	67500	78800	122800	137000	223700	319600	624200
	shaft end U		Nm/rad	–	50800	–	–	107600	–	–	–
Filling capacity of housing			L	0,9	1,1	1,5	1,3	1,5	2,1	3,1	6,3
Weight approx. (without through drive)		m	kg	29	31	38	50	60	80	101	156

[1] Limited maximum speed: – at half corner power (e.g. at $V_{g\,max}$ and p_N /2)

[2] Intermittent maximum speed:
- at high idling speed
- at engine overspeed: Δp = 70...150 bar and $V_{g\,max}$
- with reversing pressure peaks: $\Delta p < 300$ bar and $t < 5$ sec.

[3] without auxiliary pump

Calculation of size

Output flow $q_v = \dfrac{V_g \cdot n \cdot \eta_v}{1000}$ in L/min

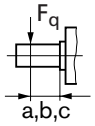
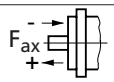
Torque $T = \dfrac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}}$ in Nm

Power $P = \dfrac{2\,\pi \cdot T \cdot n}{60\,000} = \dfrac{q_v \cdot \Delta p}{600 \cdot \eta_t}$ in kW

V_g = displacement per revolution in cm^3
Δp = differential pressure in bar
n = speed in rpm
η_v = volumetric efficiency
η_{mh} = mechanical-hydraulic efficiency
η_t = overall efficiency

Technical Data

Permissible axial and radial loading on drive shaft

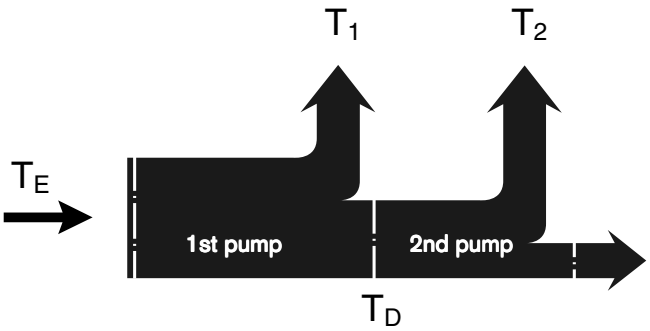
Size				28	40	56	71	90	125	180	250
Radial load, max.		$F_{q\,max}$	N	2500	3600	5000	6300	8000	11000	16000	22000
at distance (from shaft collar)		a	mm	17,5	17,5	17,5	20	20	22,5	25	29
		$F_{q\,max}$	N	2000	2891	4046	4950	6334	8594	12375	16809
		b	mm	30	30	30	35	35	40	45	50
		$F_{q\,max}$	N	1700	2416	3398	4077	5242	7051	10150	13600
		c	mm	42,5	42,5	42,5	50	50	57,5	60	71
Axial load, max.		$-F_{ax\,max}$	N	1557	2120	2910	4242	4330	5743	7053	4150
		$+F_{ax\,max}$	N	417	880	1490	2758	2670	3857	4947	4150

Permissible input and through drive rotation torques

Size			28	40	56	71	90	125	180	250
Torque (when $V_{g\,max}$ and $\Delta p = 400$ bar [1])	T_{max}	Nm	178	254	356	451	572	795	1144	1590
Input torque, max. [2])										
at shaft end Z	$T_{E\,perm.}$	Nm	352	522	522	912	912	1460	3140	4350
DIN 5480			W25	W30	W30	W35	W35	W40	W50	W55
at shaft end A	$T_{E\,perm.}$	Nm	–	912	912	1460	2190	2190	–	–
DIN 5480				W35	W35	W40	W45	W45		
at shaft end S	$T_{E\,perm.}$	Nm	314	602	602	602	1640	1640	1640	1640
SAE J744 (ANSI B92.1a-1976)			1in	1 1/4in	1 1/4in	1 1/4in	1 3/4in	1 3/4in	1 3/4in	1 3/4in
at shaft end T	$T_{E\,perm.}$	Nm	–	–	970	970	–	2670	4070	4070
SAE J744 (ANSI B92.1a-1976)					1 3/8in	1 3/8in		2in	2 1/4in	2 1/4in
at shaft end U [3])	$T_{E\,perm.}$	Nm	–	314	–	–	602	–	–	–
SAE J744 (ANSI B92.1a-1976)				1in			1 1/4in			
Through drive rotation torque, max. [4])	$T_{D\,perm.}$	Nm	231	314	521	660	822	1110	1760	2230

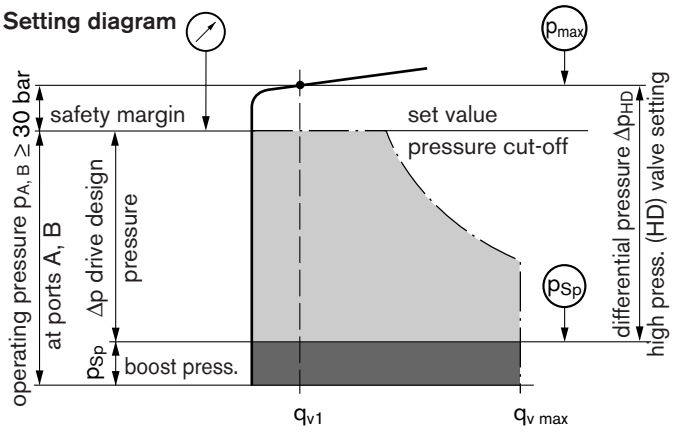
[1]) efficiency not considered
[2]) drive shaft without side load
[3]) shaft „U“ is only permissible as the shaft end in the **2nd pump** of a combination pump of the same size
[4]) note max. input torque for shaft **S**!

Torque distribution



High Pressure Relief Valve

Setting diagram



Note: valve setting is done at
n = 1000 rpm und $V_{g\,max}$ ($q_{V\,1}$)

Example: boost pressure 30 bar; operating pressure 400 bar

operating pres. $p_{A,B}$ – boost pres. p_{Sp} + safety margin = differential pres. Δp_{HD}
400 bar – 30 bar + 30 bar = **400 bar**

Setting range

High pressure relief valve, pilot controlled (sizes 71...250)	Differential pressure setting Δp_{HD}
Setting range valve **1** Δp 100 - 420 bar (see ordering code)	420 bar 400 bar [1]) 360 bar 340 bar 320 bar 300 bar 270 bar 250 bar 230 bar 200 bar 150 bar 100 bar

High pressure relief valve, direct controlled (sizes 28...56)	Differential pressure setting Δp_{HD}
Setting range valve **3, 5** Δp 270 - 420 bar (see ordering code)	420 bar 400 bar [1]) 360 bar 340 bar 320 bar 300 bar 270 bar
Setting range valve **4, 6** Δp 100 - 250 bar (see ordering code)	250 bar 230 bar [1]) 200 bar 150 bar 100 bar

[1]) Standard valve setting of differential pressure, if not specified.

Bypass function

Sizes 28...56: HD valves direct controlled (**3**), (**4**): without bypass

Sizes 28...56: HD valves direct controlled (**5**), (**6**): with bypass

Sizes 71...250: HD valves pilot controlled (**1**): with bypass

Simplification: The bypass function is not shown in the circuit diagrams

The pilot controlled HD-valves (sizes 71..250) are not shown in the circuit diagrams.

Please state in clear text when ordering:
(only the values Δp_{HD} shown in the table are possible)

High pressure relief valve A
Differential pressure setting: Δp_{HD} = ... bar
Opening pressure of the HD-valve (at $q_{V\,1}$): p_{max} = ... bar
($p_{max} = \Delta p_{HD} + p_{Sp}$)

High pressure relief valve B
Differential pressure setting: Δp_{HD} = ... bar
Opening pressure of the HD-valve (at $q_{V\,1}$): p_{max} = ... bar
($p_{max} = \Delta p_{HD} + p_{Sp}$)

Pressure Cut-Off, D

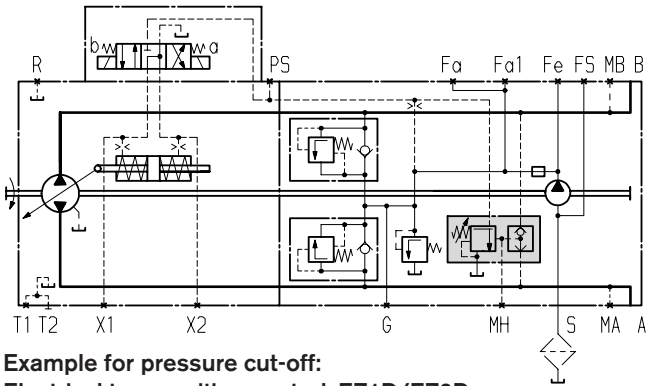
The pressure cut-off corresponds to a pressure regulation which, after reaching the set pressure, adjusts the pump volume of the pump to $V_{g\,0} = 0$.

This valve prevents the operation of the high pressure relief valves when accelerating or decelerating.

Both the pressure peaks occurring when the swashplate is swivelled rapidly and also the maximum pressure in the system are safeguarded by the high pressure relief valves.

The setting range of the pressure cut-off may be anywhere within the entire working pressure range. However, it must be set 30 bar lower than the setting of the high pressure safety relief valves (see setting diagram).

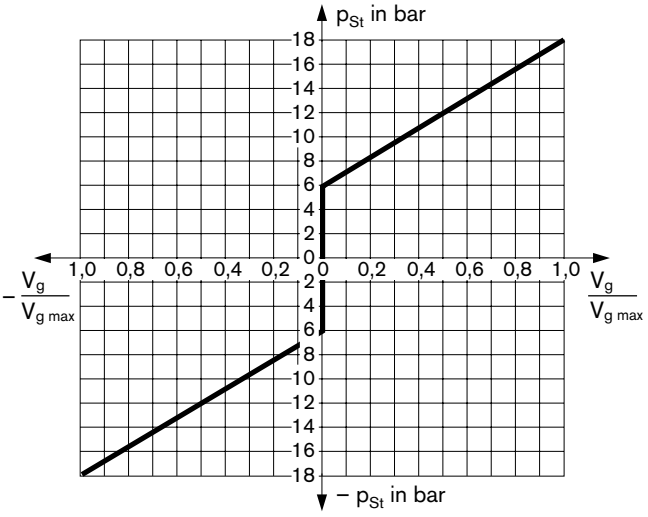
Please state the setting value of the pressure cut-off in clear text when ordering.



Example for pressure cut-off:
Electrical two-position control, EZ1D/EZ2D

HD1 - Hydraulic Control, Pilot Pressure Related

The positioning cylinder of the pump and therefore the swivel angle is varied in proportion to the difference in pilot pressure applied to the two control ports (Y_1 and Y_2). The pump displacement is therefore infinitely variable. One pilot line is assigned to each direction of flow.



V_g displacement at p_{St}
$V_{g\,max}$ displacement at p_{St} = 18 bar

Pilot pressure p_{St} = 6 - 18 bar (at ports Y_1, Y_2)

Start of control 6 bar

End of control 18 bar (max. displacement $V_{g\,max}$)

An optional DA control valve allows automotive drive control of the vehicle see, page 13.

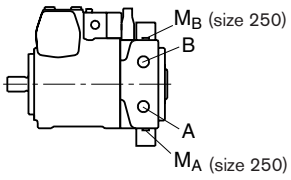
For pressure cut-off, see page 8.

Graph

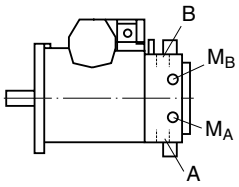
Direction of rotation – Control – Direction of through put flow

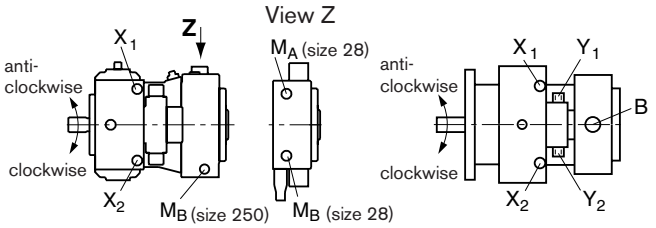
	Size	Pilot pressure	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	28...56	Y_1	X_1	A to B	M_B
		Y_2	X_2	B to A	M_A
	71...250	Y_1	X_1	B to A	M_A
		Y_2	X_2	A to B	M_B
Direction of rotation anti-clockwise	28...56	Y_1	X_1	B to A	M_A
		Y_2	X_2	A to B	M_B
	71...250	Y_1	X_1	A to B	M_B
		Y_2	X_2	B to A	M_A

Sizes 28, 250

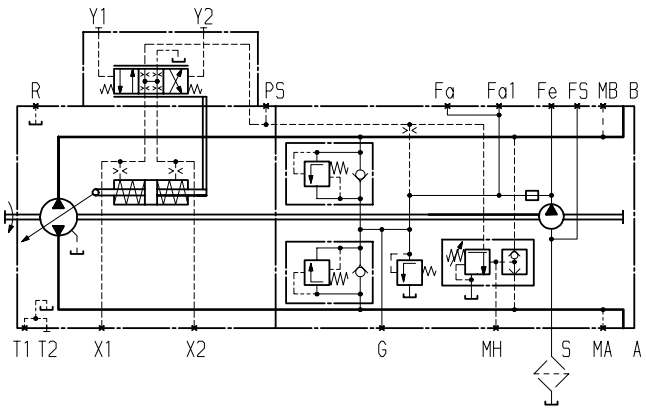


Sizes 40...180

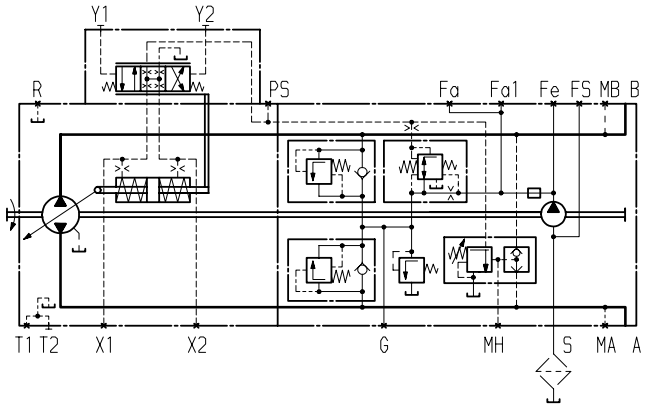




Standard model [1)]



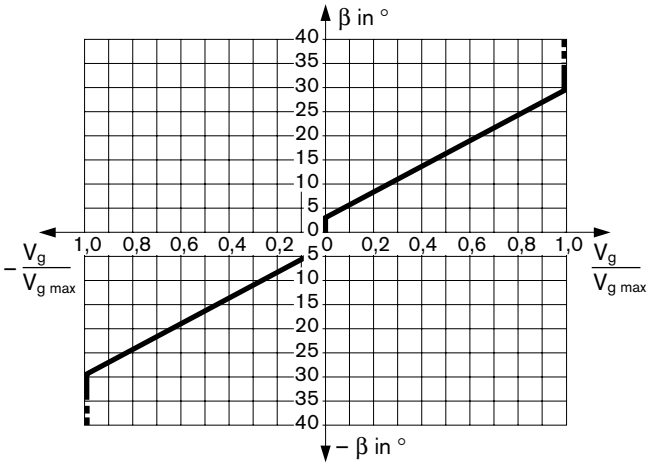
Model with DA control valve [1)]



[1)] size 28 and 250 without port F_{a1} and F_S

HW - Hydraulic Control, Mechanical Servo

The positioning cylinder of the pump and therefore the swivel angle is varied in proportion to the movement of the control lever. The pump control is infinitely variable. Each direction of flow is assigned to one direction of lever movement.



Swivel angle b at the control lever for swiveling outwards:

Start of control at $\beta = 3°$

End of control at $\beta = 29°$ (max. displacement $V_{g\,max}$)

mech. stop: sizes 28...71 _____ ±40°
sizes 90...250 _____ ±35°

The torque necessary at the control lever is between 85 and 210 Ncm.
The limitation of the operating range of the HW control lever must be fixed in the external control mechanism (required value setting).

An optional DA control valve allows automotive drive control of the vehicle, see page 13.

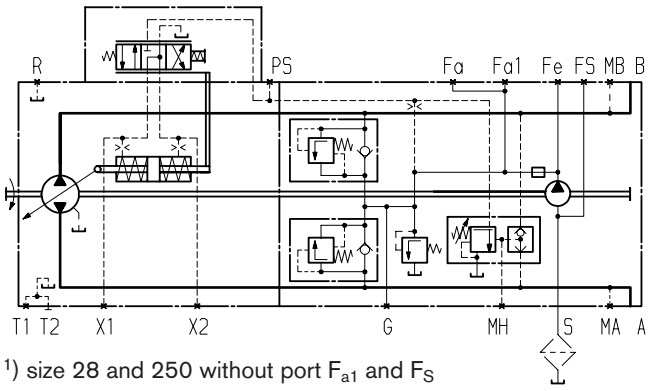
For pressure cut-off, see page 8.

Variation: neutral position switch, L

The neutral position switch is closed when the HW control lever is in the neutral position. The switch opens if the control lever is moved out of neutral in either direction.

The neutral position switch provides a safety function for systems that require zero flow under certain operating conditions (e.g. engine start).

Standard model [1])



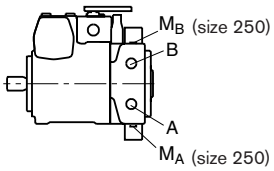
[1]) size 28 and 250 without port F_{a1} and F_S

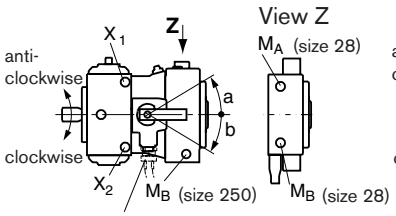
Graph

Direction of rotation – Control – Direction of through put flow

	Size	Lever direction	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	28...56	a	X_2	B to A	M_A
		b	X_1	A to B	M_B
	71...250	a	X_2	A to B	M_B
		b	X_1	B to A	M_A
Direction of rotation anti-clockwise	28...56	a	X_2	A to B	M_B
		b	X_1	B to A	M_A
	71...250	a	X_2	B to A	M_A
		b	X_1	A to B	M_B

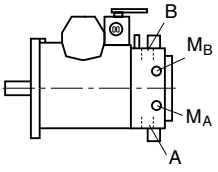
Sizes 28, 250

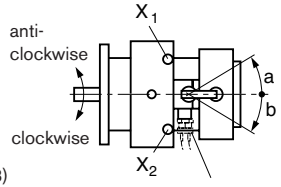




zero position switch

Sizes 40...180

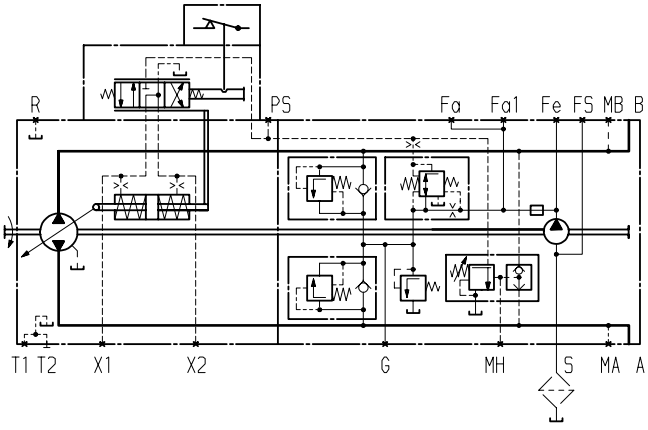




zero position switch

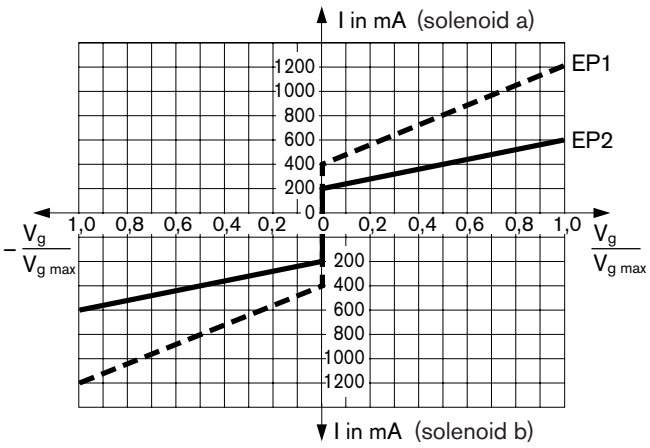
Technical data - neutral position switch	
Loading	20 A (continuous)
Switching power	15 A / 32 V (DC)
	4 A / 32 V (AC - inductive)
Connector design	DEUTSCH male connector DT04-2P-EP04 (mating connector see page 48)

Model with DA control valve and neutral position switch [1])



EP - Electrical Control, With Proportional Solenoids

Depending on the set current on the two proportional solenoids, the pump is supplied with control pressure on the positioning cylinder via the EP control device. The displacement of the pump is thus infinitely variable. One solenoid is assigned to each direction of flow.



Technical data - solenoids	EP1	EP2
Voltage	12 V (±20 %)	24 V (±20 %)
Control current		
start of control at $V_{g\,0}$	400 mA	200 mA
end of control at $V_{g\,max}$	1200 mA	600 mA
Limiting current	1,54 A	0,77 A
Nominal resistance (at 20°C)	5,5 Ω	22,7 Ω
Dither frequency	100 Hz	100 Hz
Duty cycle	100 %	100 %
Insulation class	see connector design, page 48	

To control the proportional solenoids the following electronic amplifiers and microcontroller are available:

– Proportional amplifier **PVR** (see RE 95022)

– Control unit **MC** (see RE 95050)

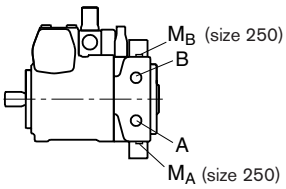
– Control unit **RC** (see RE 95200)

Graph

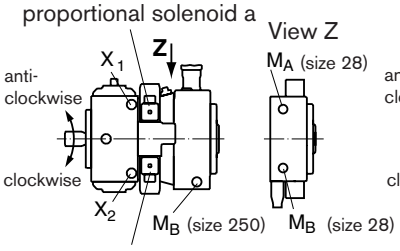
Direction of rotation – Control – Direction of through put flow

	Size	Solenoid	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	28...56	a	X_1	A to B	M_B
		b	X_2	B to A	M_A
	71...250	a	X_1	B to A	M_A
		b	X_2	A to B	M_B
Direction of rotation anti-clockwise	28...56	a	X_1	B to A	M_A
		b	X_2	A to B	M_B
	71...250	a	X_1	A to B	M_B
		b	X_2	B to A	M_A

Sizes 28, 250

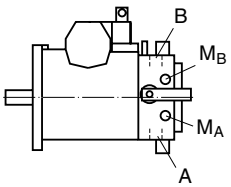


proportional solenoid a

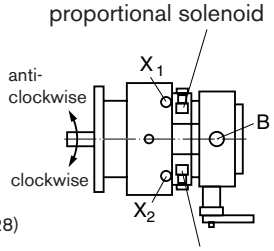


proportional solenoid b

Sizes 40...180



proportional solenoid a

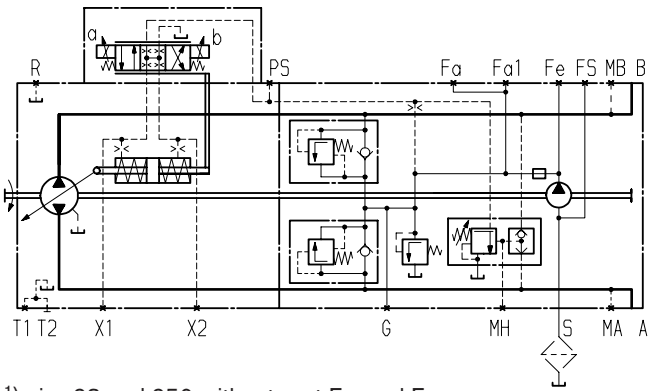


proportional solenoid b

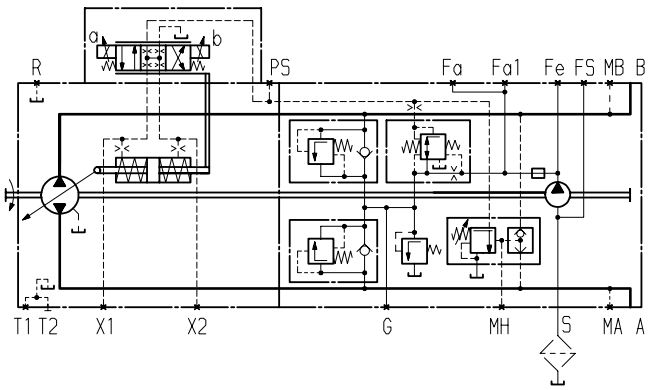
An optional DA control valve allows automotive drive control of the vehicle, see page 13.

Standard: Proportional solenoid without manual emergency operation. Manual emergency operation with spring return on demand.

Standard model [1)]



Model with DA control valve [1)]



[1)] size 28 and 250 without port F_{a1} and F_S

DA - Hydraulic Control, Speed Related

The DA control is an engine speed-dependent, or automotive, type control system. The built-in DA regulating cartridge generates a pilot pressure that is proportional to pump (engine) drive speed. This pilot pressure is directed to the positioning cylinder of the pump by a solenoid actuated 4/3 way directional valve. Pump displacement is infinitely variable in each direction of flow, and is influenced by both pump drive speed and discharge pressure. Flow direction (i.e. machine forward or reverse) is controlled by energizing solenoid a or b.

Increasing pump drive speed generates a higher pilot pressure from the DA cartridge, with a subsequent increase in pump flow and/or pressure.

Dependent on the selected pump operating characteristics, increasing system pressure (i.e. machine load) causes the pump to swivel back towards a smaller displacement. Engine overload (anti-stall) protection is achieved by the combination of this pressure-related pump de-stroking, and the reduction of pilot pressure as the engine speed droops.

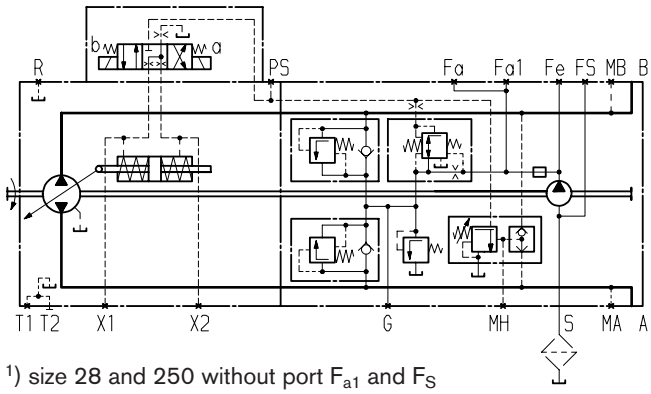
Any additional power requirement, such as implement hydraulics, may result in further engine pull down. This causes a further reduction in pilot pressure and therefore pump displacement. Automatic power division and full utilization of available power is thus achived for both the vehicle transmission and the implement hydraulics, with priority given to the implement hydraulics.

To provide controllable reduced vehicle speed operation when high engine speeds are required for fast implement hydraulics, various inching options are available.

The DA regulating cartridge can also be used in pumps with conventional control devices, such as EP, HW or HD, to provide an engine anti-stall function, or as a combination of automotive and displacement control functions.

Application of the DA control is only appropriate on certain types of vehicle drive systems, and requires a review of the engine and vehicle parameters to ensure proper application of the pump, and safe and efficient machine operation. All DA applications must therefore be reviewed by a Rexroth Application Engineer.

Hydraulic control, speed related,
DA-control valve, fixed setting, DA1D2/DA2D2 [1])



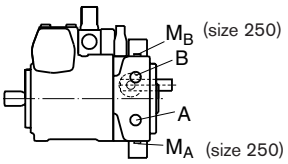
[1]) size 28 and 250 without port F_{a1} and F_S

Graph

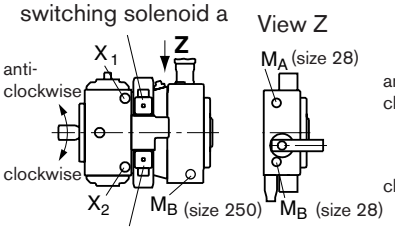
Direction of rotation – Control – Direction of through put flow

	Size	Solenoid	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	28...56	a	X_2	B to A	M_A
		b	X_1	A to B	M_B
	71...250	a	X_2	A to B	M_B
		b	X_1	B to A	M_A
Direction of rotation anti-clockwise	28...56	a	X_2	A to B	M_B
		b	X_1	B to A	M_A
	71...250	a	X_2	B to A	M_A
		b	X_1	A to B	M_B

Sizes 28, 250

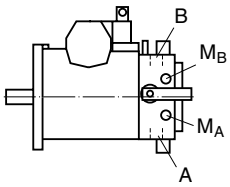


switching solenoid a

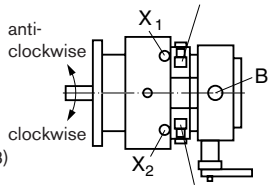


switching solenoid b

Sizes 40...180



switching solenoid a



switching solenoid b

Technical data - solenoids	DA1	DA2
Voltage	12 V (±20 %)	24 V (±20 %)
Zero position $V_{g\,0}$	solenoid de-energized	solenoid de-energized
Position $V_{g\,max}$	solenoid energized	solenoid energized
Nominal resistance (at 20°C)	5,5 Ω	21,7 Ω
Nominal power	26,2 W	26,5 W
Current required, minimum effective	1,32 A	0,67 A
Duty cycle	100 %	100 %
Insulation class	see connector design, page 48	

Standard: Switching solenoid without manual emergency operation. Manual emergency operation with reset by valve spring on demand.

Function and Control of DA Valves

DA control valve, fixed setting, (2)

Control pressure is generated in relation to drive speed. When ordering, please state in clear text: Start of control (set at factory).

DA control valve, mechanically adjustable with control lever (3)

Control pressure is generated in relation to drive speed. When ordering, please state in clear text: Start of control (set at factory).

Control pressure may be reduced (independently of drive speed) as required by operation of the control lever (inch function).

Max. adm. operating torque at the control lever __ $T_{max} = 4$ Nm

Max. angle of lever operation 70°. The position of the lever is optional.

Variation 3L ___ operation direction of the control lever anti-clockwise

Variation 3R _____ operation direction of the control lever clockwise

Hydraulic inch valve, (4, 5, 8, 9)
(only for pumps with DA control device)

– for inch function; for use in conjunction with DA control valve, fixed setting (4, 8) or mechanically adjustable (5, 9)
Model with throttle valve sizes 28, 40, 56, 71
Model with pressure reducing valve sizes 90, 125, 180, 250

Permits the control pressure to be reduced independently of the drive speed via hydraulic control (port Z).

Variation 4, 5:

The control at port Z by means of brake fluid from the vehicle braking system (hydraulically linked with the service brake).

Variation 8, 9:

The control at port Z by means of mineral oil.

Master controller as inch valve, (7)

– for inch function; for use in conjuction with DA control valve, fixed setting

Any reduction of control pressure, independent from the input speed through the mechanical operation of the master controller.

The master controller is installed separately from the pump (for instance in the driver's cabin) connected with the pump by 2 hydraulic control lines at ports P_S and Y.

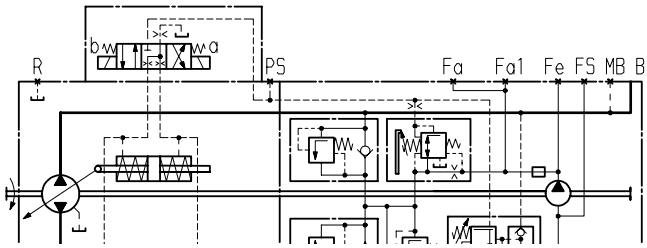
A suitable master controller needs to be ordered separately and is not included in delivery volume.

Extensive information is available from our mobile sales department. Please make use of an opportunity to confirm your transmission design through our computer programme. A DA control can only be approved by Rexroth.

Note: rotary inch valve see page 49.

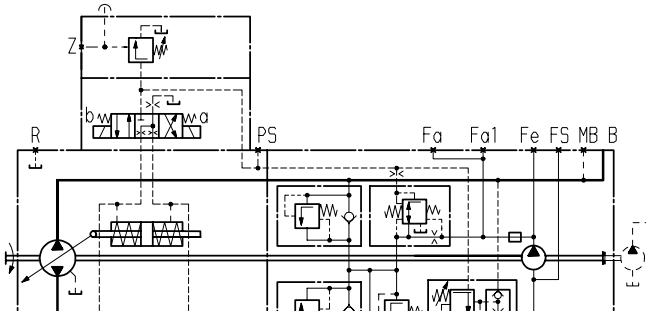
Circuit diagrams [1]:

Hydraulic control, speed related,
DA control valve, mech. adjustable with control lever DA1D**3**/DA2D**3**

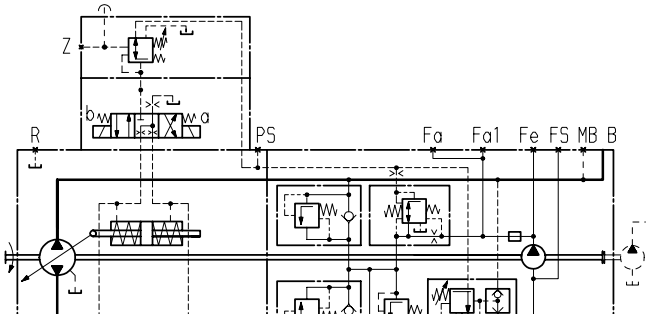


Hydraulic control, speed related,
DA control valve, fixed setting,
with hydraulic inch valve, DA1D**4**/DA2D**4**

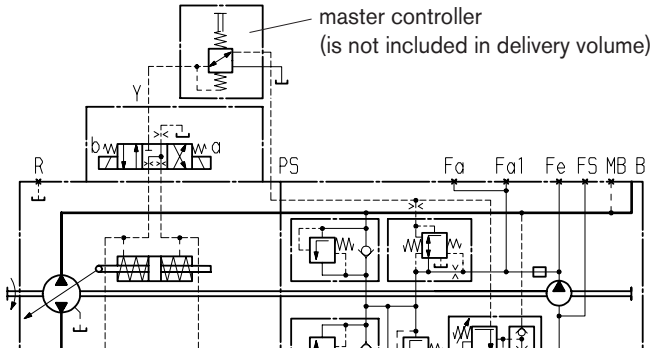
with throttle valve,
sizes 28...71



with pressure reducing valve,
sizes 90...250



Hydraulic control, speed related, DA
DA control valve, fixed setting, with separately installed master controller as inch valve, DA1D**7**/DA2D**7**



[1]) size 28 and 250 without port F_{a1} and F_S

DG - Hydraulic Control, Direct Operated

By switching the pilot pressure at the connections X_1 or X_2 the positioning cylinder of the pump is directly supplied with internal control pressure. Thus the swashplate and so the displacement is adjustable between $V_{g\,0} = 0$ and $V_{g\,max}$. Each direction of flow is assigned to a connection.

pilot pressure 0 bar ≙ setting $V_{g\,0} = 0$

The necessary pilot pressure for the setting $V_{g\,max}$ depends upon the operation pressure and rotational speed.

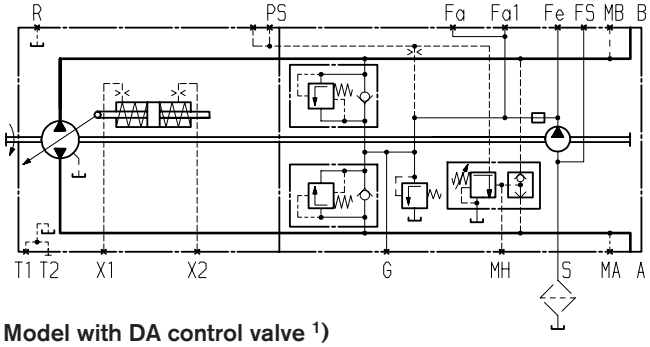
Please contact us for further information.

The pressure cut-off and the pressure cut-off control valve only operate correctly if the pilot control unit for pressure cut-off adjustment is supplied via the P_S port.

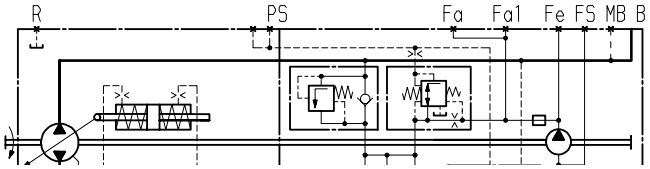
For pressure cut-off, see page 8.

Assignment direction of rotation – control – direction of flow HD control see page 9 (control pressure X_1; X_2).

Standard model [1])



Model with DA control valve [1])



[1]) size 28 and 250 without port F_{a1} and F_S

EZ - Electrical Two-Position Control With Switching Solenoid

By energizing either solenoid a or b, the positioning cylinder of the pump is directly supplied with internal control pressure, and the pump swivels to maximum displacement. In this way, the swashplate and thus the displacement is switchable from $V_{g\,0} = 0$ to $V_{g\,max}$. Each direction of flow is assigned to a solenoid.

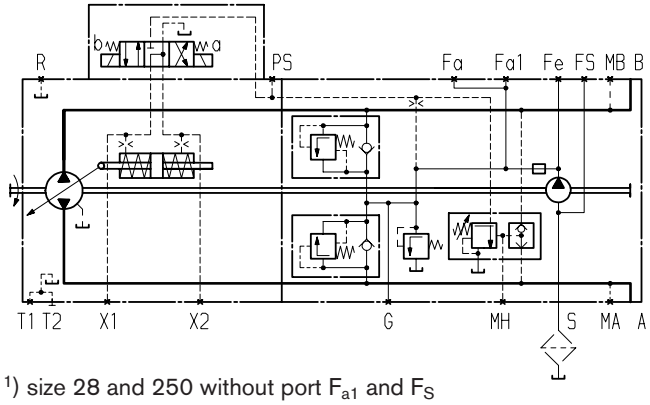
Technical data - solenoids	**EZ1**	**EZ2**
Voltage	12 V (±20 %)	24 V (±20 %)
Zero position $V_{g\,0}$	solenoid de-energized	solenoid de-energized
Position $V_{g\,max}$	solenoid energized	solenoid energized
Nominal resistance (at 20°C)	5,5 Ω	21,7 Ω
Nominal power	26,2 W	26,5 W
Minimum effective current required	1,32 A	0,67 A
Duty cycle	100 %	100 %
Insulation class	see connector design page 48	

Standard: Switching solenoid without manual emergency operation. Manual emergency operation with reset by valve spring on demand.

For pressure cut-off, see page 8.

Assignment direction of rotation – control – direction of flow DA control see page 12.

Standard model [1])

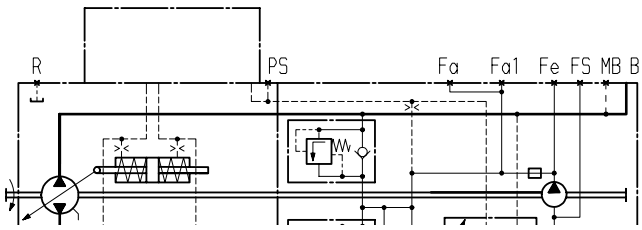


[1]) size 28 and 250 without port F_{a1} and F_S

NV - Pump Configuration Without Control Module

The mounting surface for the pilot control unit is machined and is sealed with the standard seal for pilot control units and a cover plate. This mounting assembly is ready for retrofitting pilot control units (HD, HW, EP, EZ). When used directly for "DA" control and in combinations with "DA" control, the appropriate adjustments must be made to the spring assembly of the adjusting cylinder and control plate.

Standard model [1])

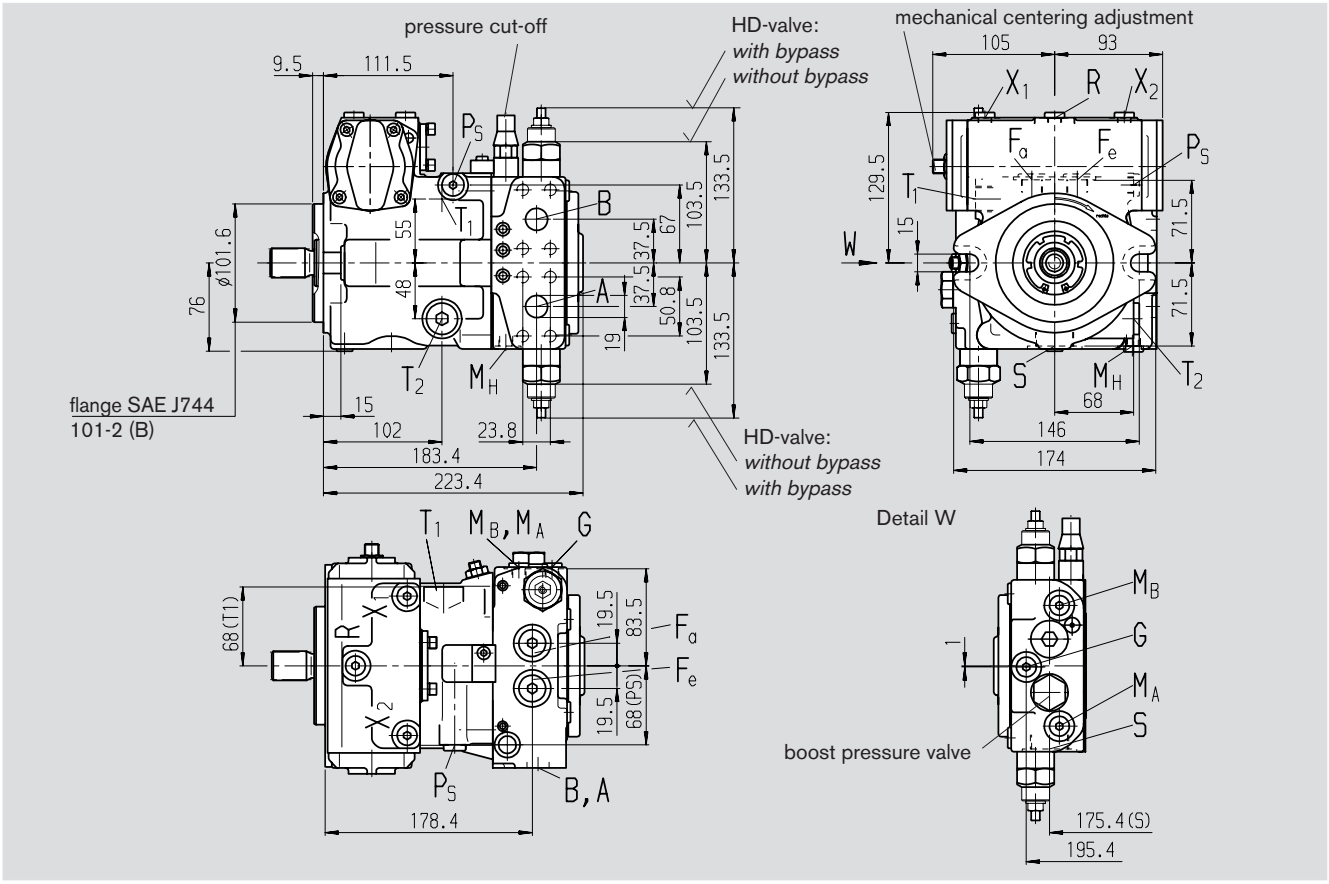


[1]) size 28 and 250 without port F_{a1} and F_S

Unit Dimensions, Size 28

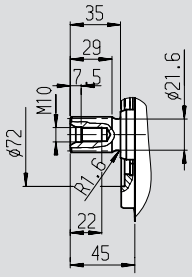
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

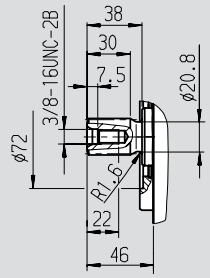


Shaft ends

Z Splined shaft DIN 5480
W25x1,25x30x18x9g



S Splined shaft 1in 15T 16/32DP [1]
(SAE J744 – 25-4 (B-B))



Connections

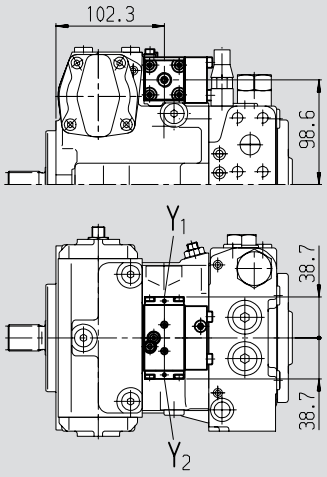
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	3/4 in	–
	Fastening thread A/B	DIN 13	M10x1,5; 17 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M22x1,5; 14 deep	210 Nm
T_2	Case drain [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
M_A, M_B	Pressure gauge - operating pressure A, B [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
R	Air bleed [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
S	Boost suction port	DIN 3852	M33x2; 18 deep	540 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
P_S	Control pressure supply [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
F_a	Filter outlet [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_e	Filter inlet [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
Y_1, Y_2	Remote control ports (only for HD1 control)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

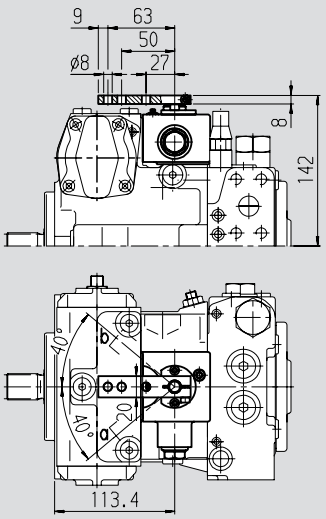
Unit Dimensions, Size 28

Before finalising your design, please request a certified drawing.

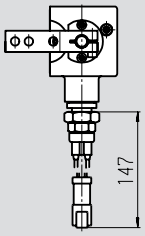
Hydraulic control, pilot pressure related, HD1



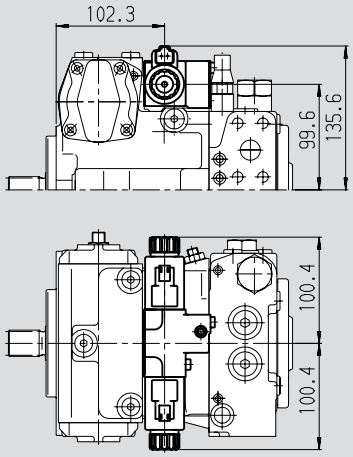
Hydraulic control, mechanical servo, HW



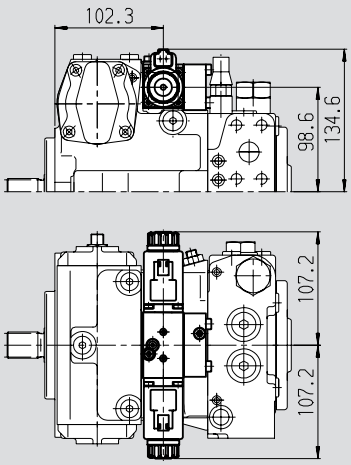
Model with zero position switch, HWL



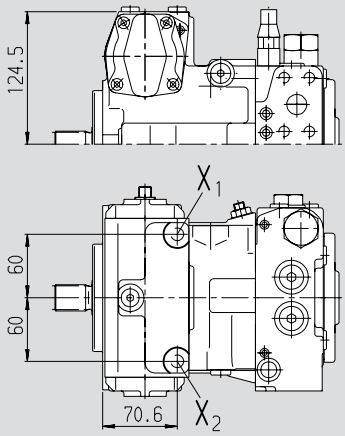
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

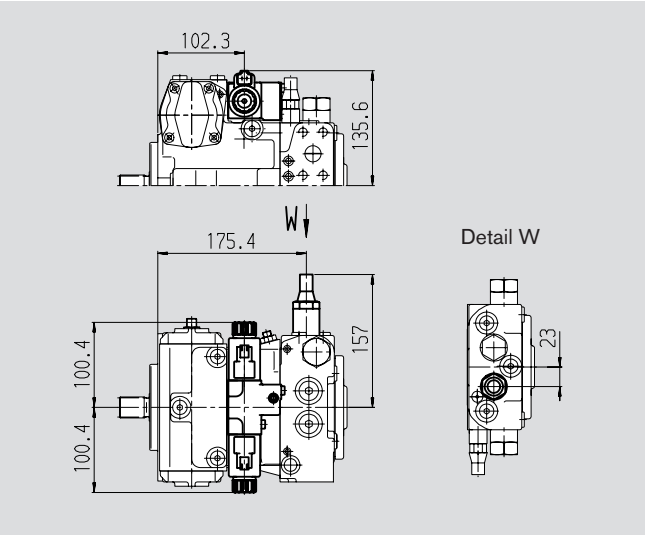


Unit Dimensions, Size 28

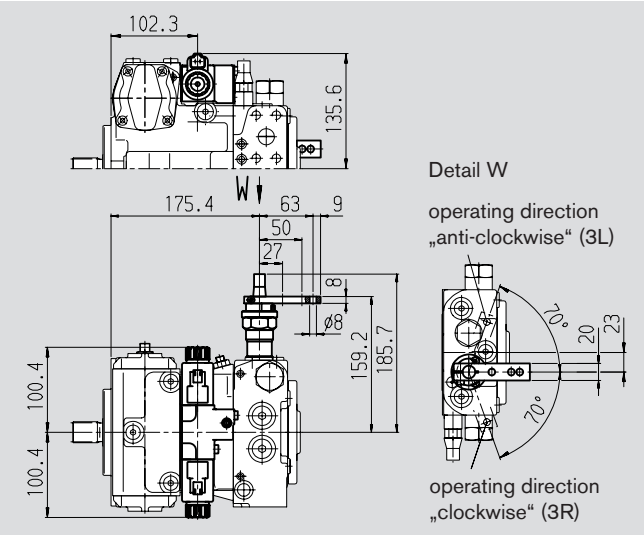
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

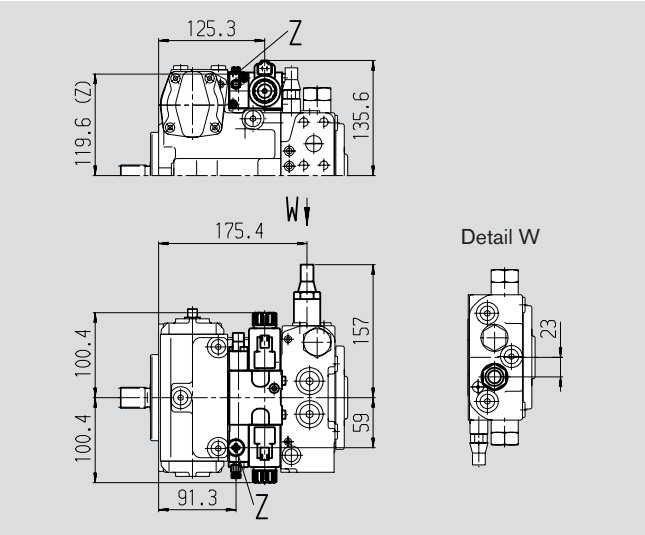
Control valve, fixed setting, DA2



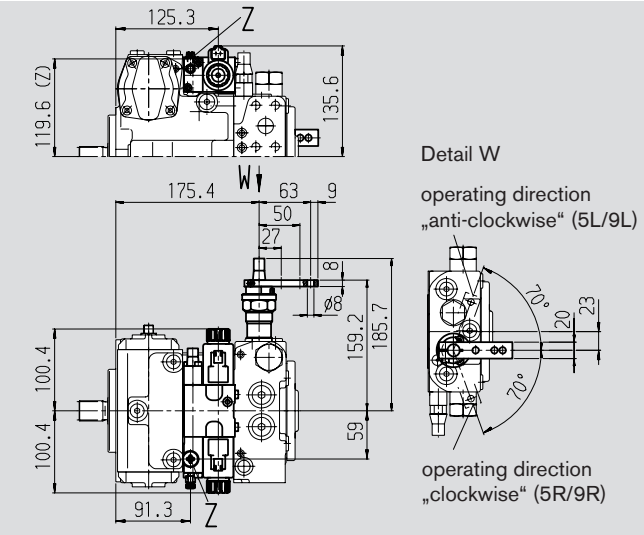
Control valve, mechanically adjustable with lever, DA3



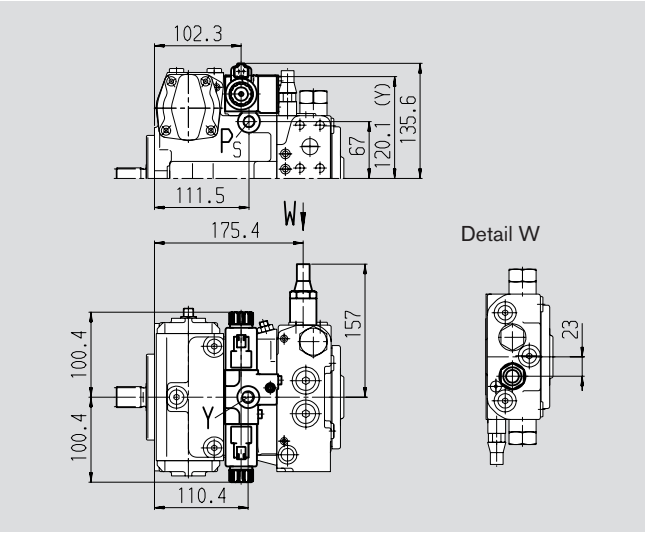
Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, mechanically adjustable with lever and hydraulic inch valve built-on, DA5/DA9



Control valve, fixed setting and connections for master controller, DA7



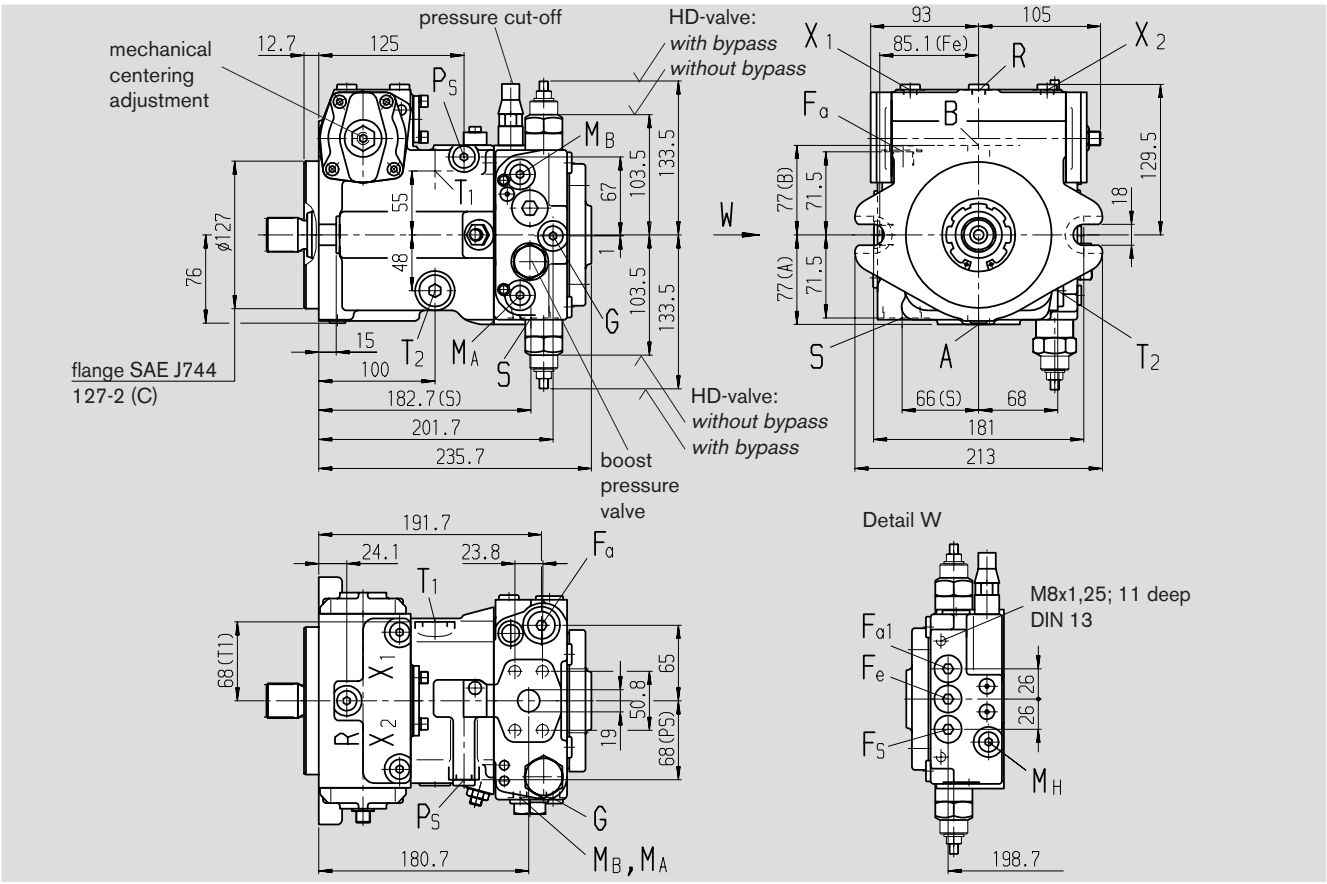
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M14x1,5; 12 deep	80 Nm

Unit Dimensions, Size 40

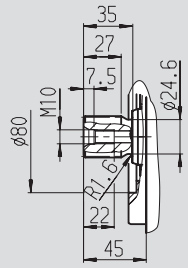
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

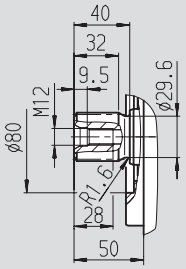


Shaft ends

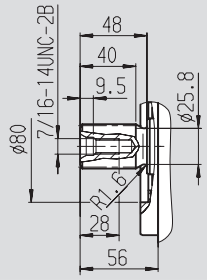
Z Splined shaft DIN 5480
W30x2x30x14x9g



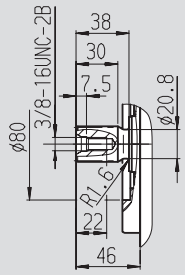
A Splined shaft DIN 5480
W35x2x30x16x9g



S Splined shaft 1 1/4in 14T 12/24DP [1]
(SAE J744 – 32-4 (C))



U Splined shaft 1in 15T 16/32DP [1]
(SAE J744 – 25-4 (B-B))



Connections

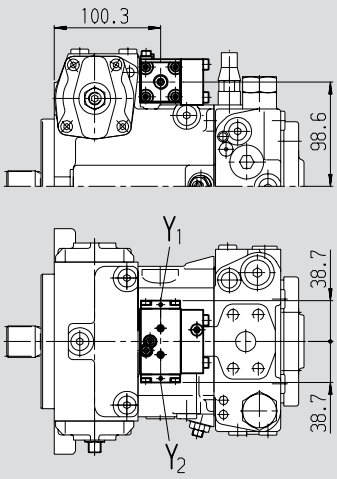
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	3/4 in	–
	Fastening thread A/B	DIN 13	M10x1,5; 17 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M22x1,5; 14 deep	210 Nm
T_2	Case drain [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
M_A, M_B	Pressure gauge - operating pressure A, B [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
R	Air bleed [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
S	Boost suction port	DIN 3852	M33x2; 18 deep	540 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
P_S	Control pressure supply [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
F_a	Filter outlet [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_{a1}	Filter outlet (filter assembly) [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_e	Filter inlet [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_S	Port from filter to suction line (cold start) [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
Y_1, Y_2	Remote control ports (only for HD1 control)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

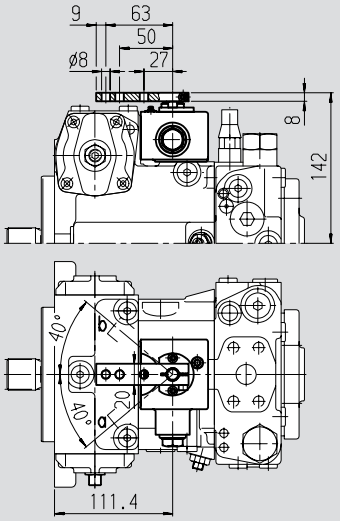
Unit Dimensions, Size 40

Before finalising your design, please request a certified drawing.

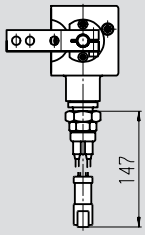
Hydraulic control, pilot pressure related, HD1



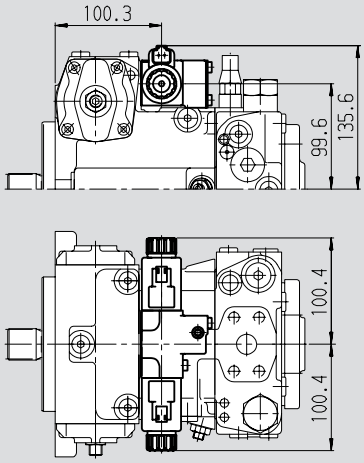
Hydraulic control, mechanical servo, HW



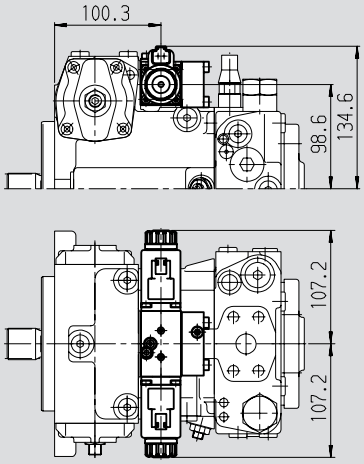
Model with zero position switch, HWL



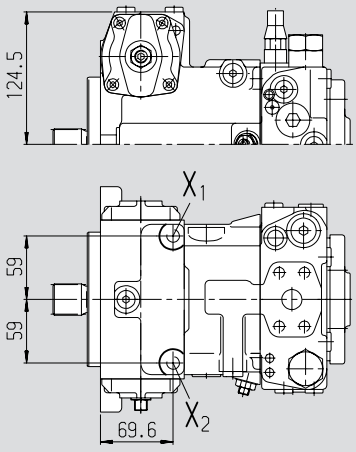
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

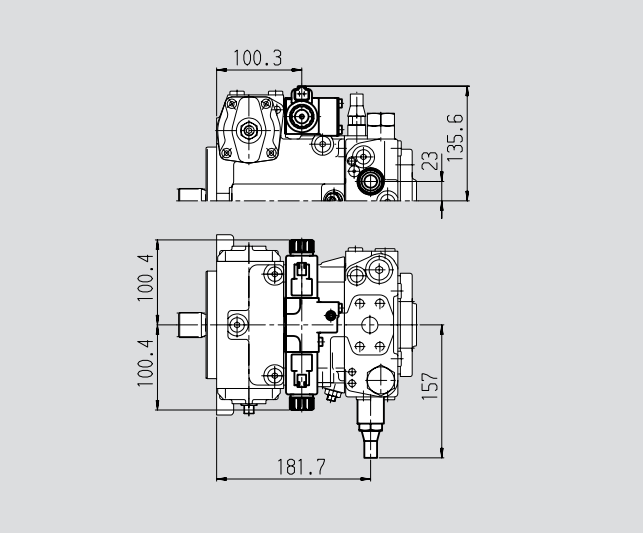


Unit Dimensions, Size 40

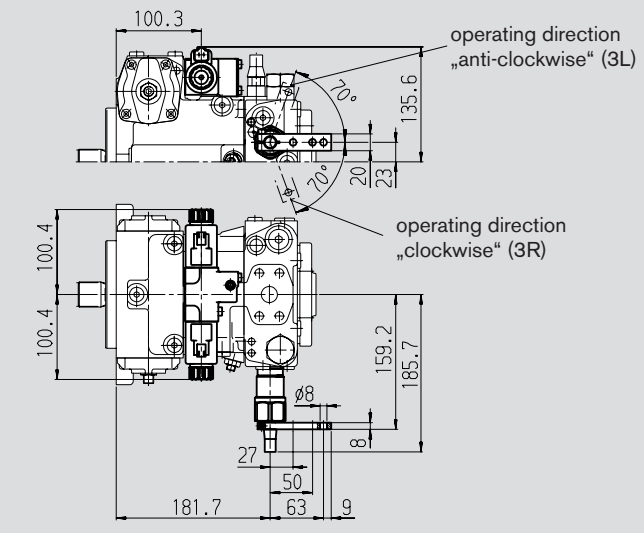
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

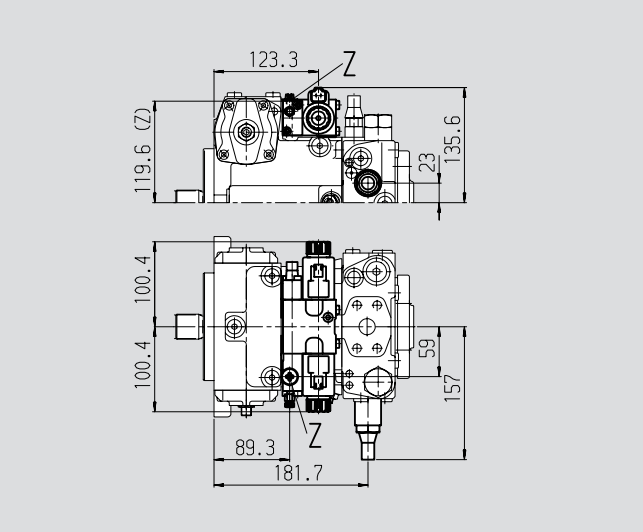
Control valve, fixed setting, DA2



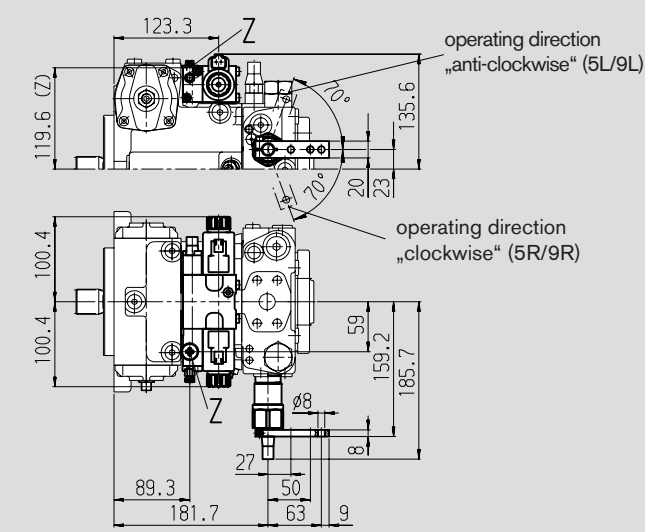
Control valve, mechanically adjustable with lever, DA3



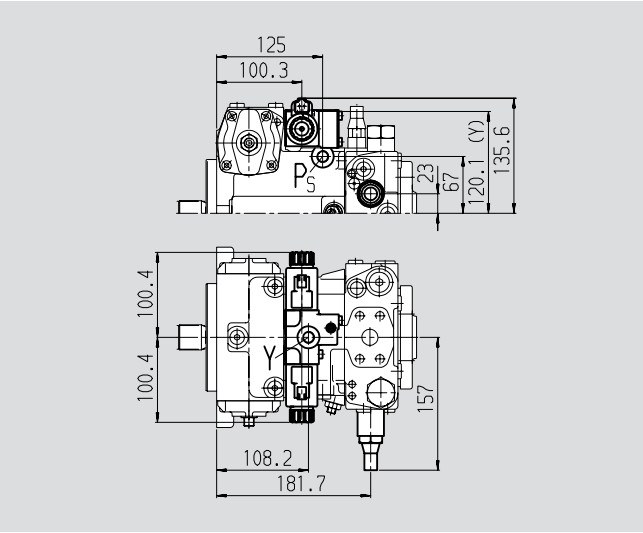
Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, mechanically adjustable with lever and hydraulic inch valve built-on, DA5/DA9



Control valve, fixed setting and connections for master controller, DA7



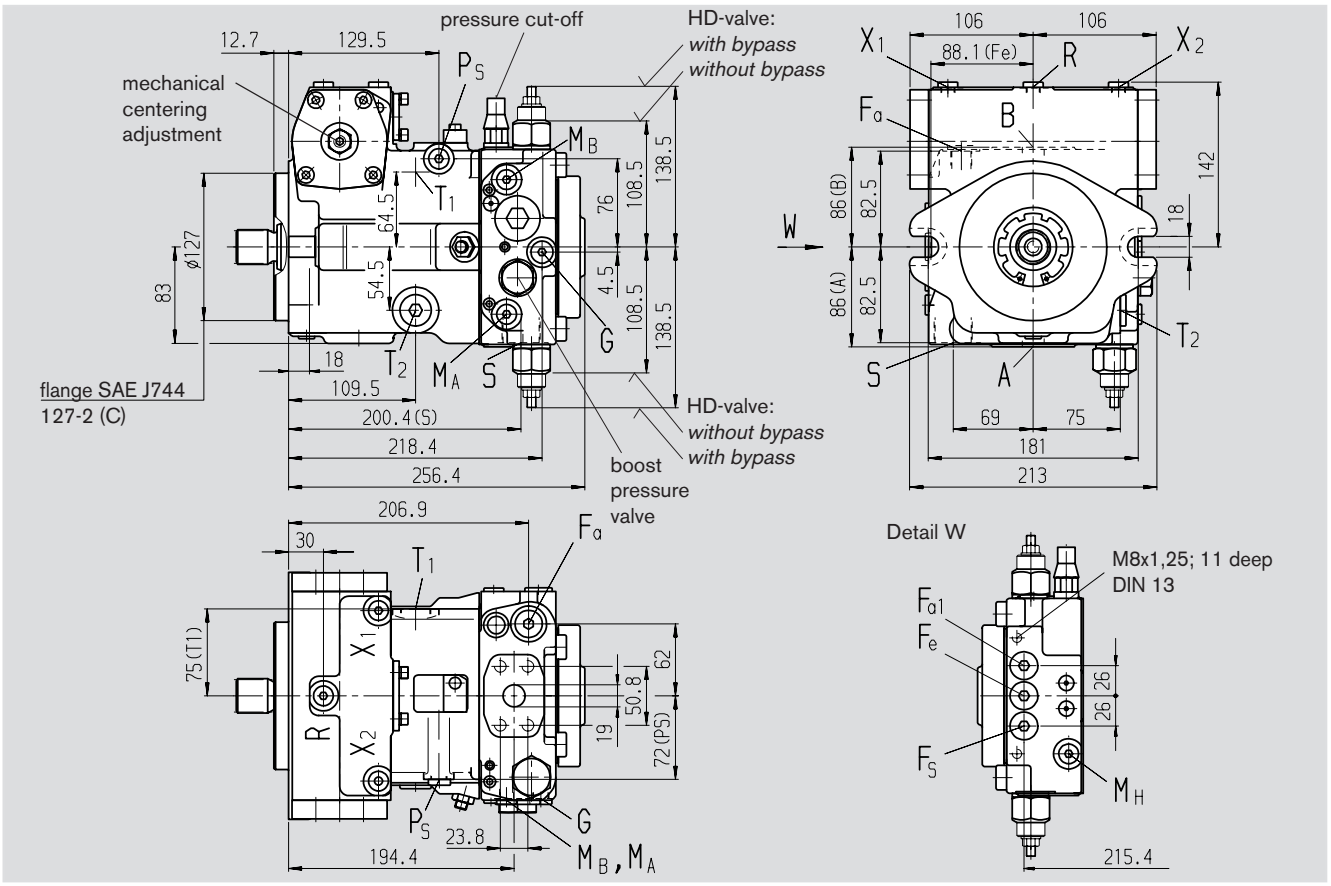
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M14x1,5; 12 deep	80 Nm

Unit Dimensions, Size 56

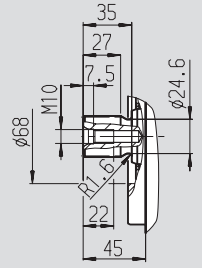
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

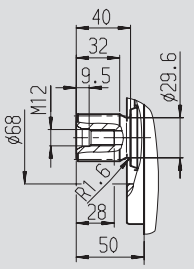


Shaft ends

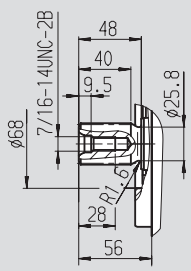
Z Splined shaft DIN 5480
W30x2x30x14x9g



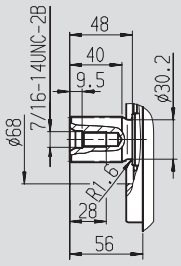
A Splined shaft DIN 5480
W35x2x30x16x9g



S Splined shaft 1 1/4in 14T 12/24DP [1]
(SAE J744 – 32-4 (C))



T Splined shaft 1 3/8in 21T 16/32DP [1]



Connections

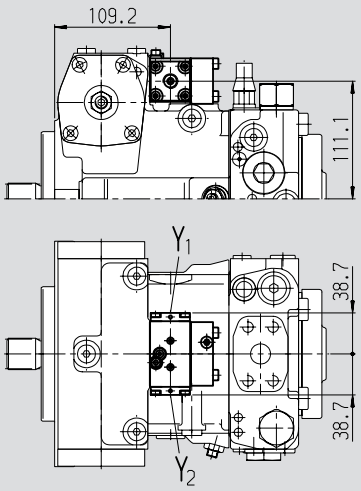
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	3/4 in	–
	Fastening thread A/B	DIN 13	M10x1,5; 17 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M22x1,5; 14 deep	210 Nm
T_2	Case drain [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
M_A, M_B	Pressure gauge - operating pressure A, B [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
R	Air bleed [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
S	Boost suction port	DIN 3852	M33x2; 18 deep	540 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
P_S	Control pressure supply [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
F_a	Filter outlet [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_{a1}	Filter outlet (filter assembly) [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_e	Filter inlet [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_S	Port from filter to suction line (cold start) [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
Y_1, Y_2	Remote control ports (only for HD1 control)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

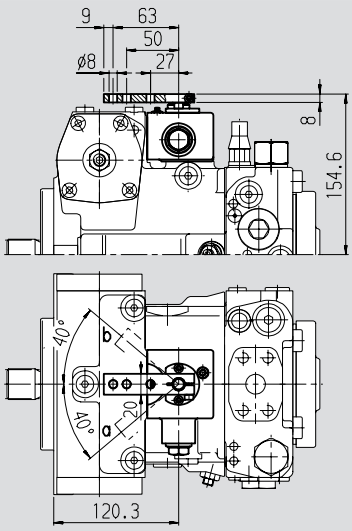
Unit Dimensions, Size 56

Before finalising your design, please request a certified drawing.

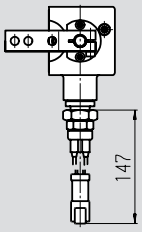
Hydraulic control, pilot pressure related, HD1



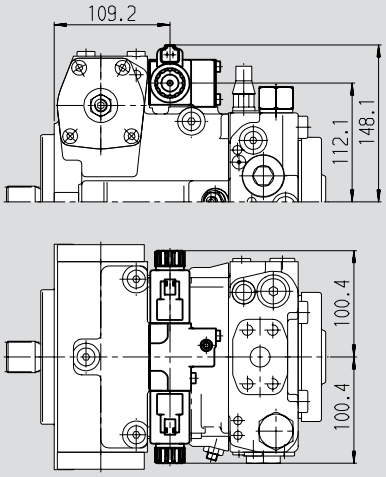
Hydraulic control, mechanical servo, HW



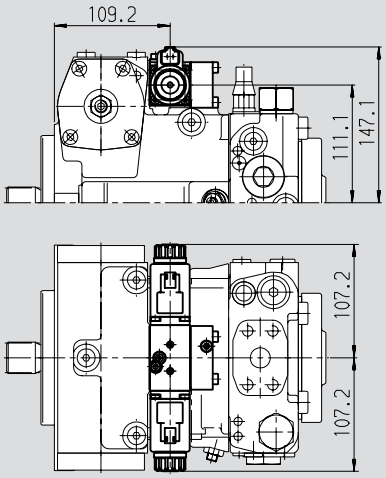
Model with zero position switch, HWL



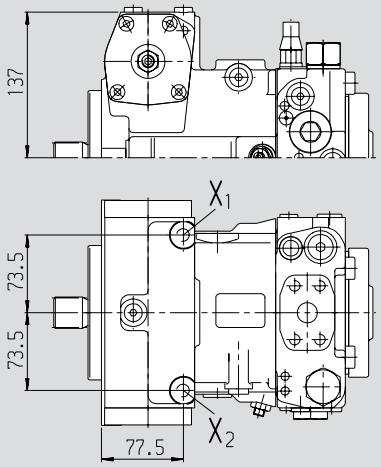
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

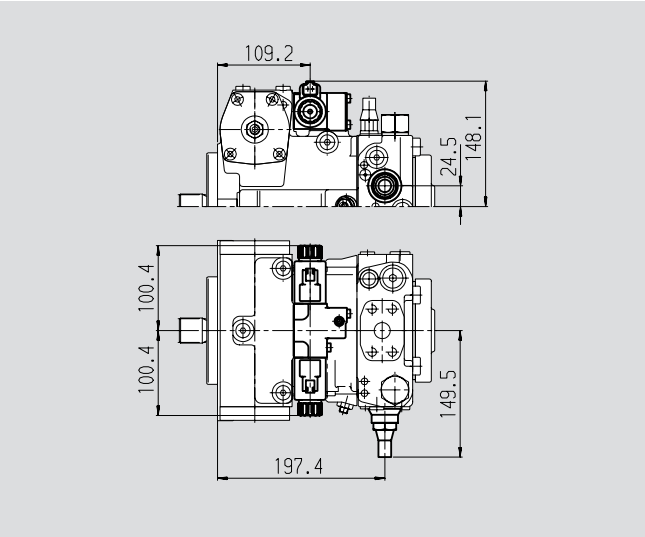


Unit Dimensions, Size 56

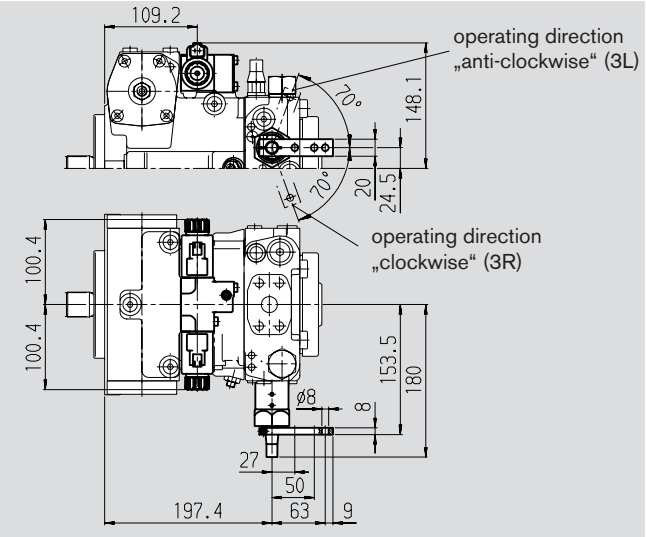
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

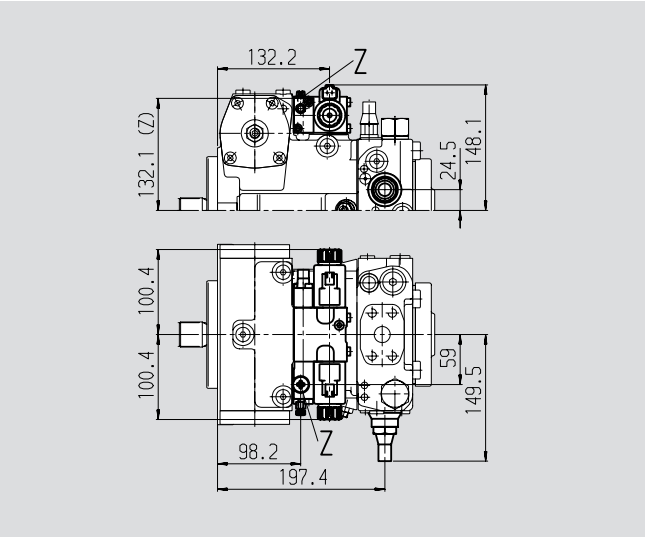
Control valve, fixed setting, DA2



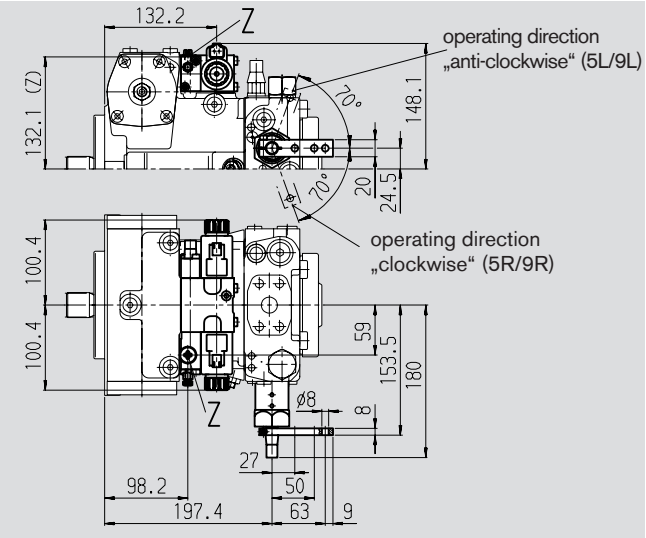
Control valve, mechanically adjustable with lever, DA3



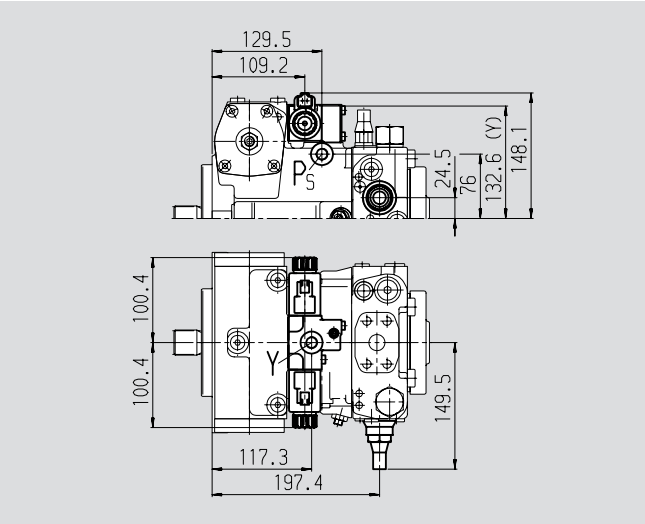
Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, mechanically adjustable with lever and hydraulic inch valve built-on, DA5/DA9



Control valve, fixed setting and connections for master controller, DA7



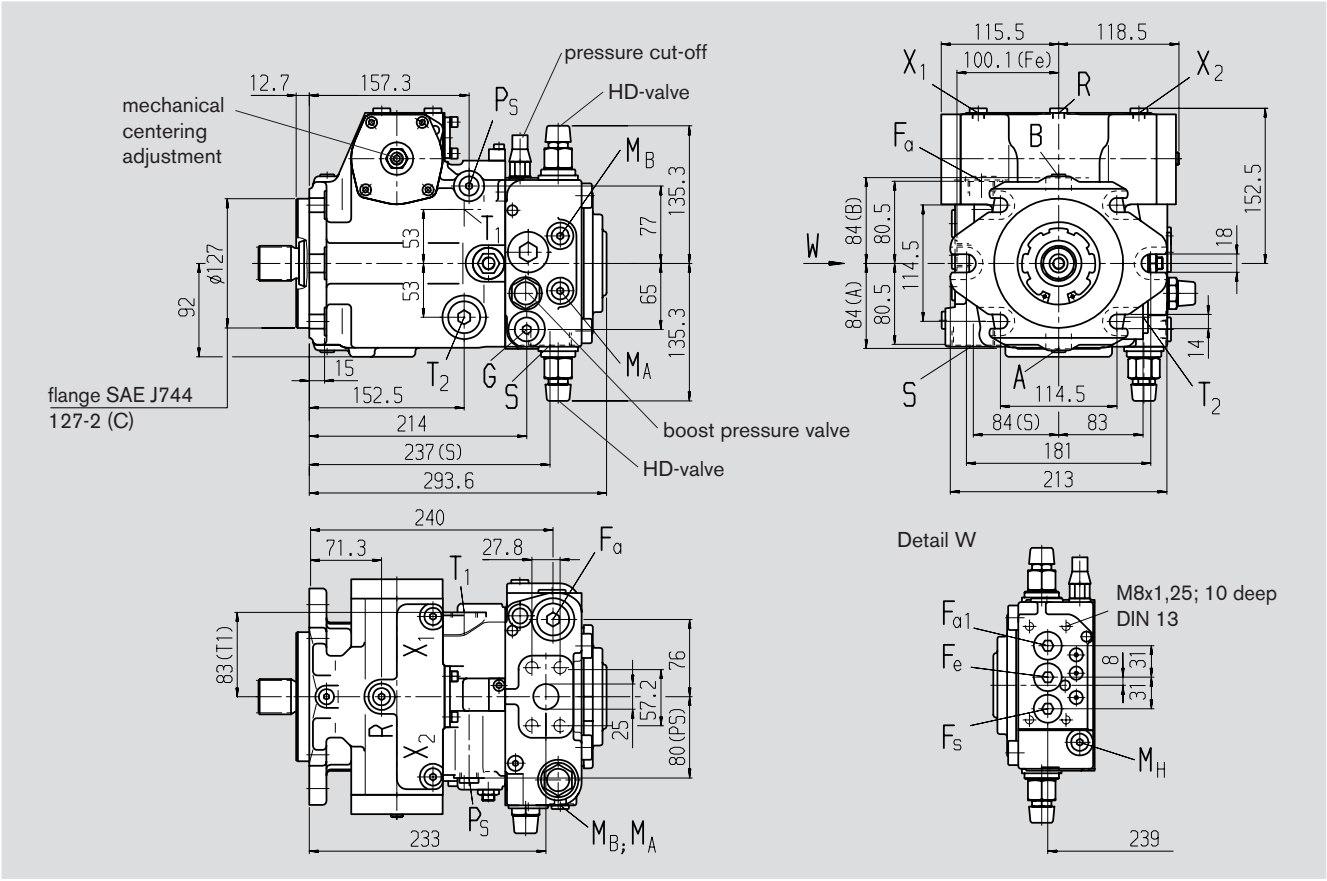
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M14x1,5; 12 deep	80 Nm

Unit Dimensions, Size 71

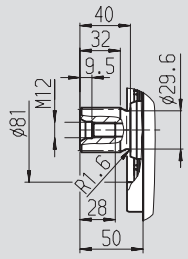
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

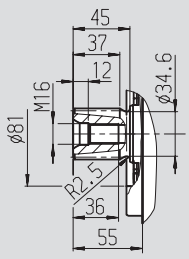


Shaft ends

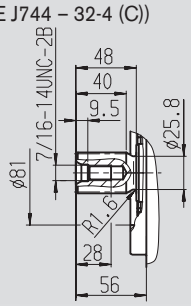
Z Splined shaft DIN 5480 W35x2x30x16x9g



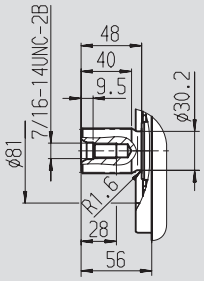
A Splined shaft DIN 5480 W40x2x30x18x9g



S Splined shaft 1 1/4in 14T 12/24DP [1] (SAE J744 – 32-4 (C))



T Splined shaft 1 3/8in 21T 16/32DP [1]



Connections

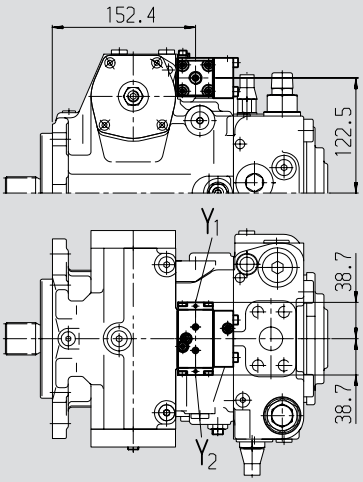
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	1 in	–
	Fastening thread A/B	DIN 13	M12x1,75; 17 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M26x1,5; 16 deep	230 Nm
T_2	Case drain [2]	DIN 3852	M26x1,5; 16 deep	230 Nm
M_A, M_B	Pressure gauge - operating pressure A, B [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
R	Air bleed [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
S	Boost suction port	DIN 3852	M42x2; 20 deep	720 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
P_S	Control pressure supply [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
F_a	Filter outlet [2]	DIN 3852	M26x1,5; 16 deep	230 Nm
F_{a1}	Filter outlet (filter assembly) [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
F_e	Filter inlet [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
F_S	Port from filter to suction line (cold start) [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
Y_1, Y_2	Remote control ports (only for HD1 control)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

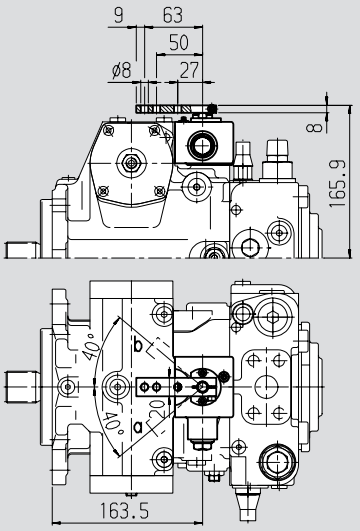
Unit Dimensions, Size 71

Before finalising your design, please request a certified drawing.

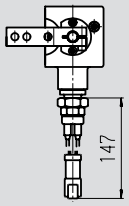
Hydraulic control, pilot pressure related, HD1



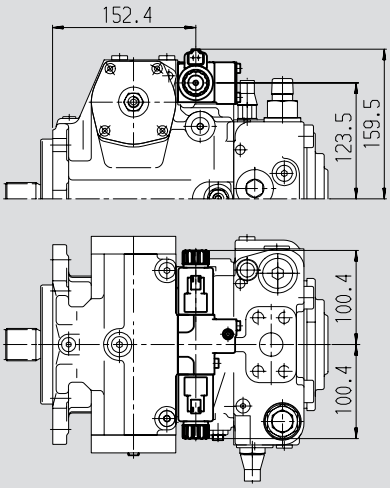
Hydraulic control, mechanical servo, HW



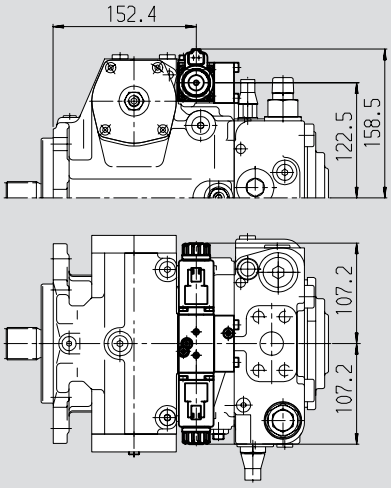
Model with zero position switch, HWL



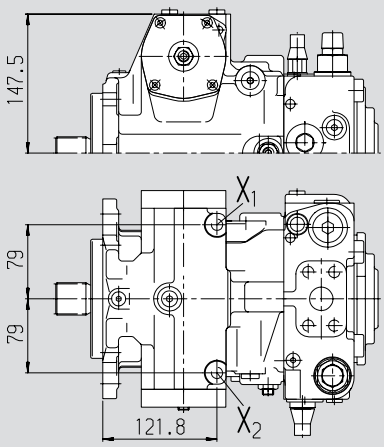
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

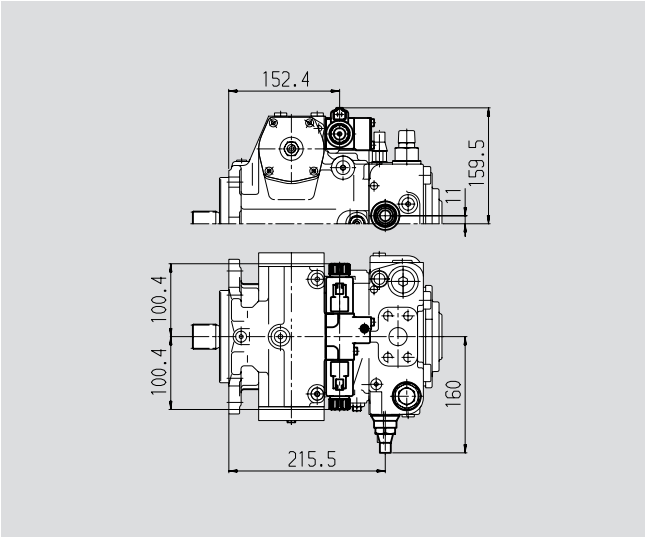


Unit Dimensions, Size 71

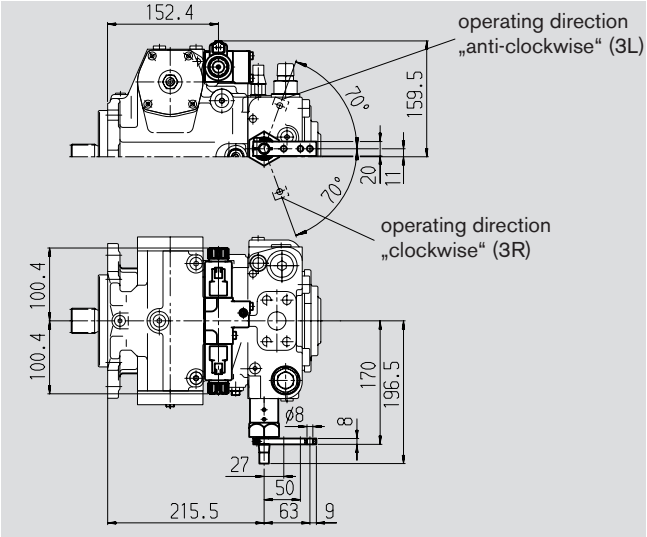
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

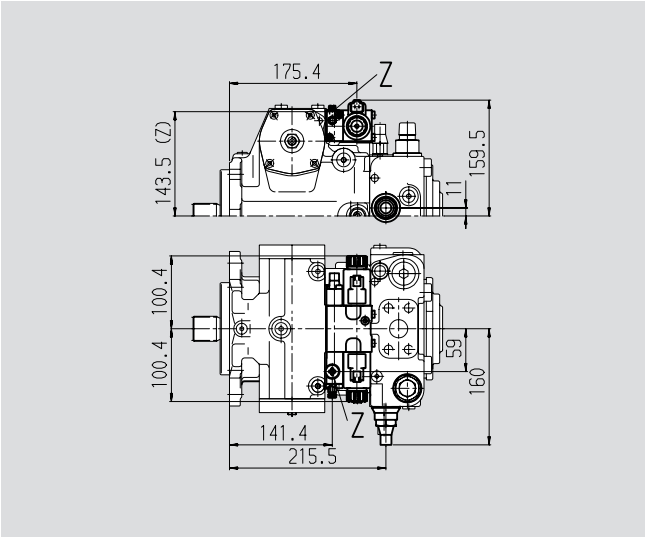
Control valve, fixed setting, DA2



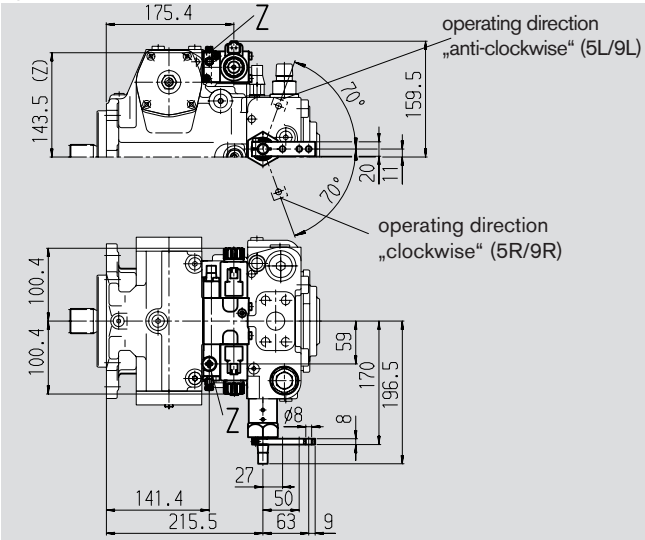
Control valve, mechanically adjustable with lever, DA3



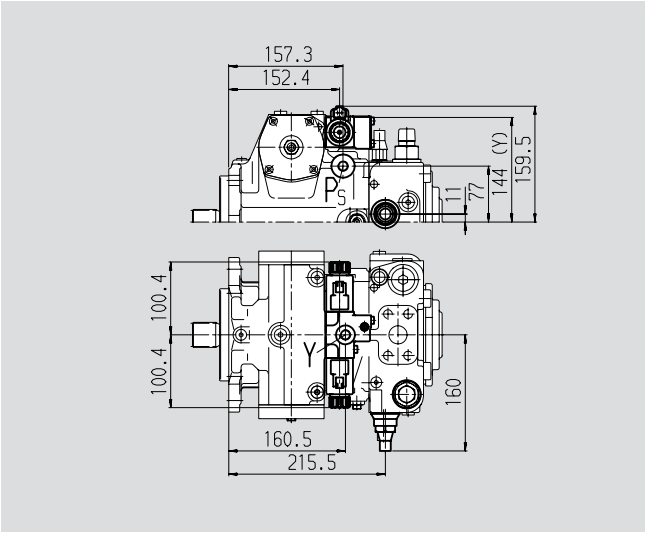
Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, mechanically adjustable with lever and hydraulic inch valve built-on, DA5/DA9



Control valve, fixed setting and connections for master controller, DA7



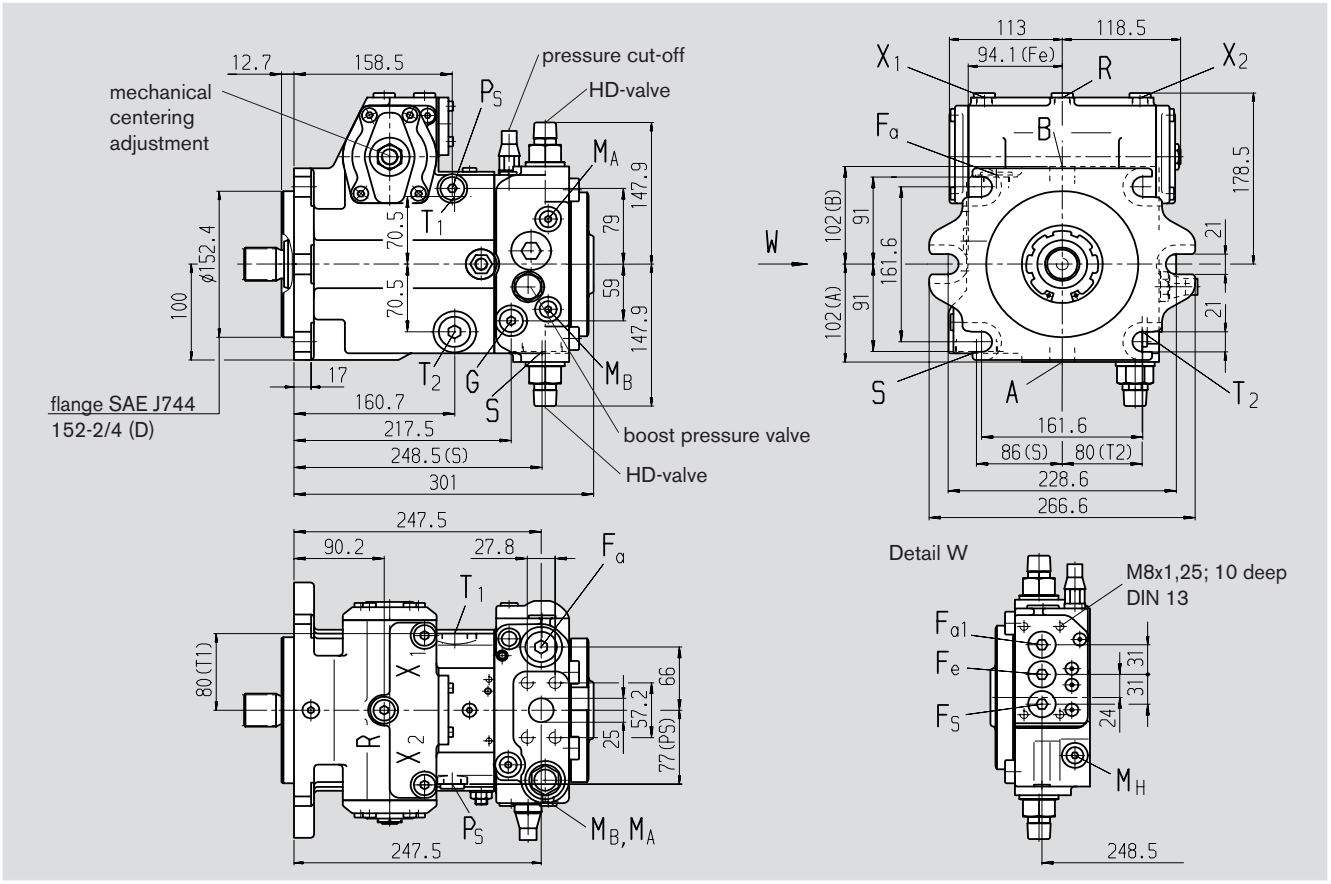
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M14x1,5; 12 deep	80 Nm

Unit Dimensions, Size 90

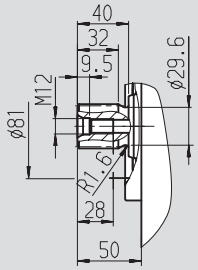
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

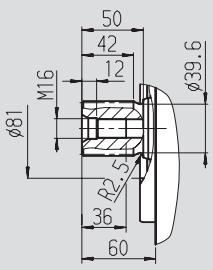


Shaft ends

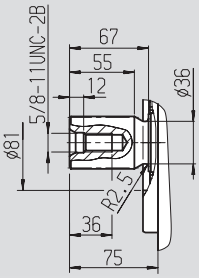
Z Splined shaft DIN 5480 W35x2x30x16x9g



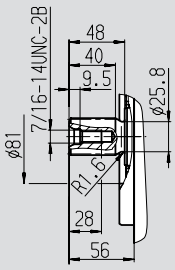
A Splined shaft DIN 5480 W45x2x30x21x9g



S Splined shaft 1 3/4in 13T 8/16DP [1] (SAE J744 – 44-4 (D))



U Splined shaft 1 1/4in 14T 12/24DP [1] (SAE J744 – 32-4 (C))



Connections

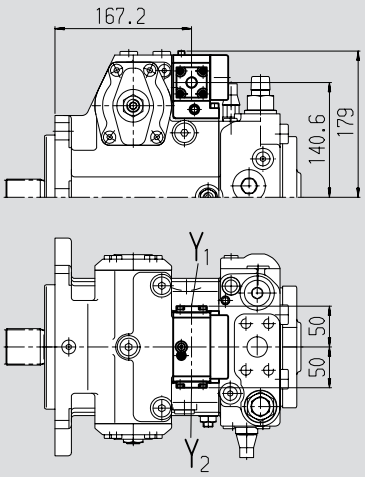
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	1 in	–
	Fastening thread A/B	DIN 13	M12x1,75; 17 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M26x1,5; 16 deep	230 Nm
T_2	Case drain [2]	DIN 3852	M26x1,5; 16 deep	230 Nm
M_A, M_B	Pressure gauge - operating pressure A, B [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
R	Air bleed [2]	DIN 3852	M16x1,5; 12 deep	100 Nm
S	Boost suction port	DIN 3852	M42x2; 20 deep	720 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M16x1,5; 12 deep	100 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
P_S	Control pressure supply [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_a	Filter outlet [2]	DIN 3852	M26x1,5; 16 deep	230 Nm
F_{a1}	Filter outlet (filter assembly) [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
F_e	Filter inlet [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
F_S	Port from filter to suction line (cold start) [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
Y_1, Y_2	Remote control ports (only for HD1 control)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

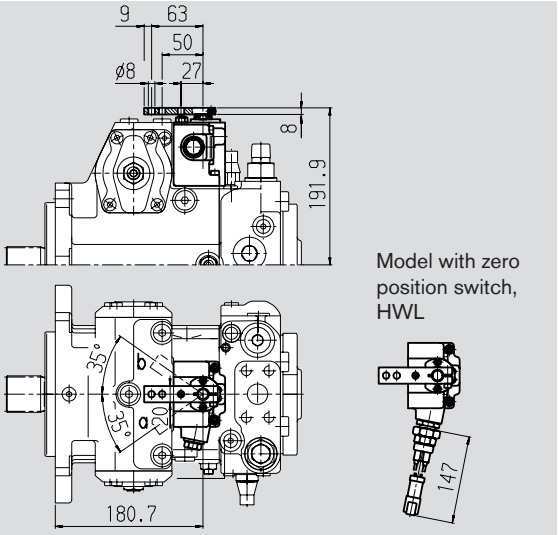
Unit Dimensions, Size 90

Before finalising your design, please request a certified drawing.

Hydraulic control, pilot pressure related, HD1

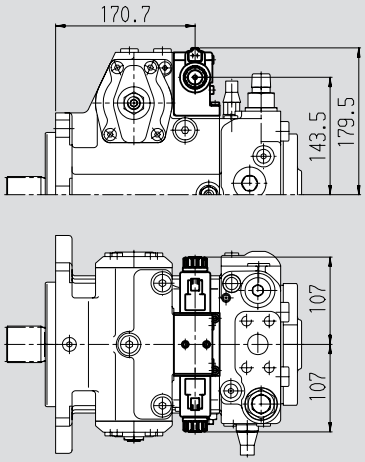


Hydraulic control, mechanical servo, HW

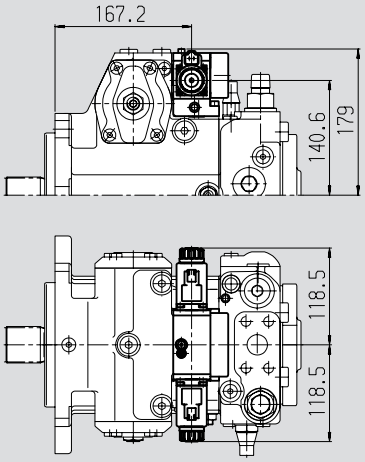


Model with zero position switch, HWL

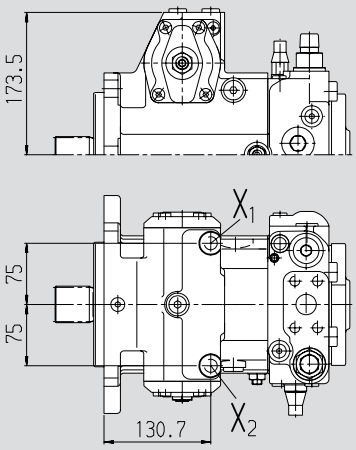
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

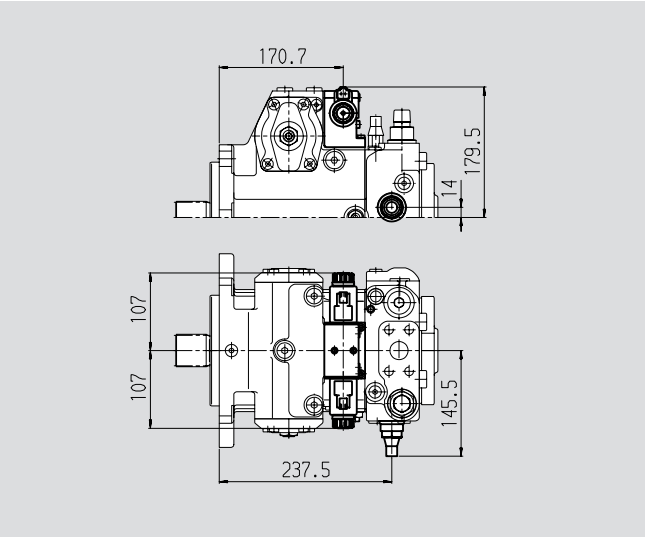


Unit Dimensions, Size 90

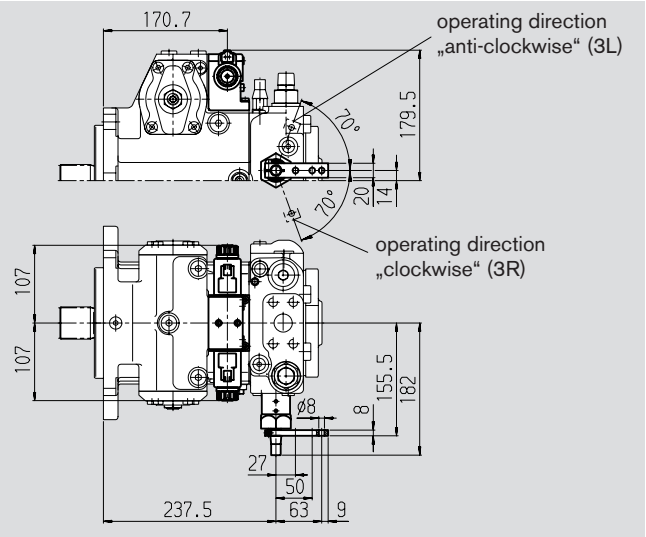
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

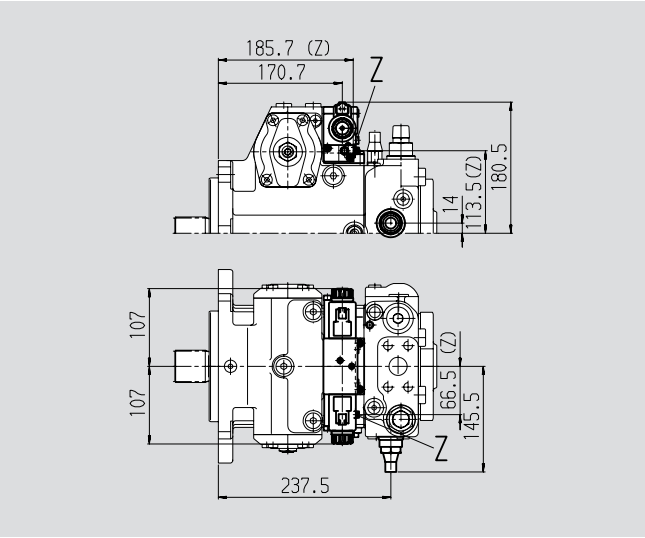
Control valve, fixed setting, DA2



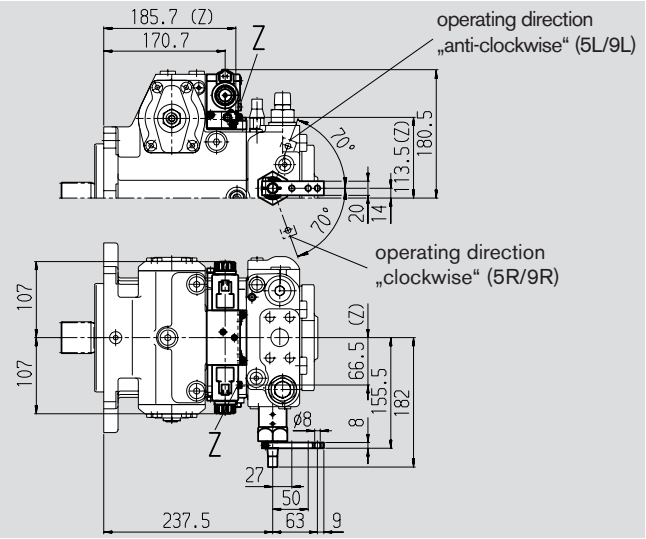
Control valve, mechanically adjustable with lever, DA3



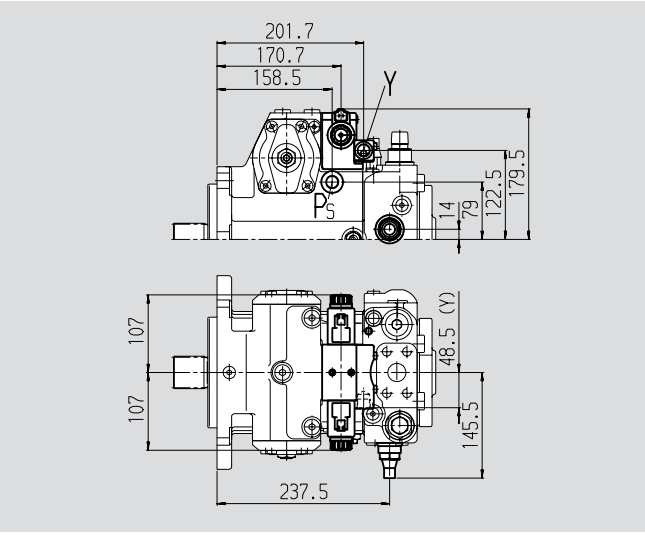
Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, mechanically adjustable with lever and hydraulic inch valve built-on, DA5/DA9



Control valve, fixed setting and connections for master controller, DA7



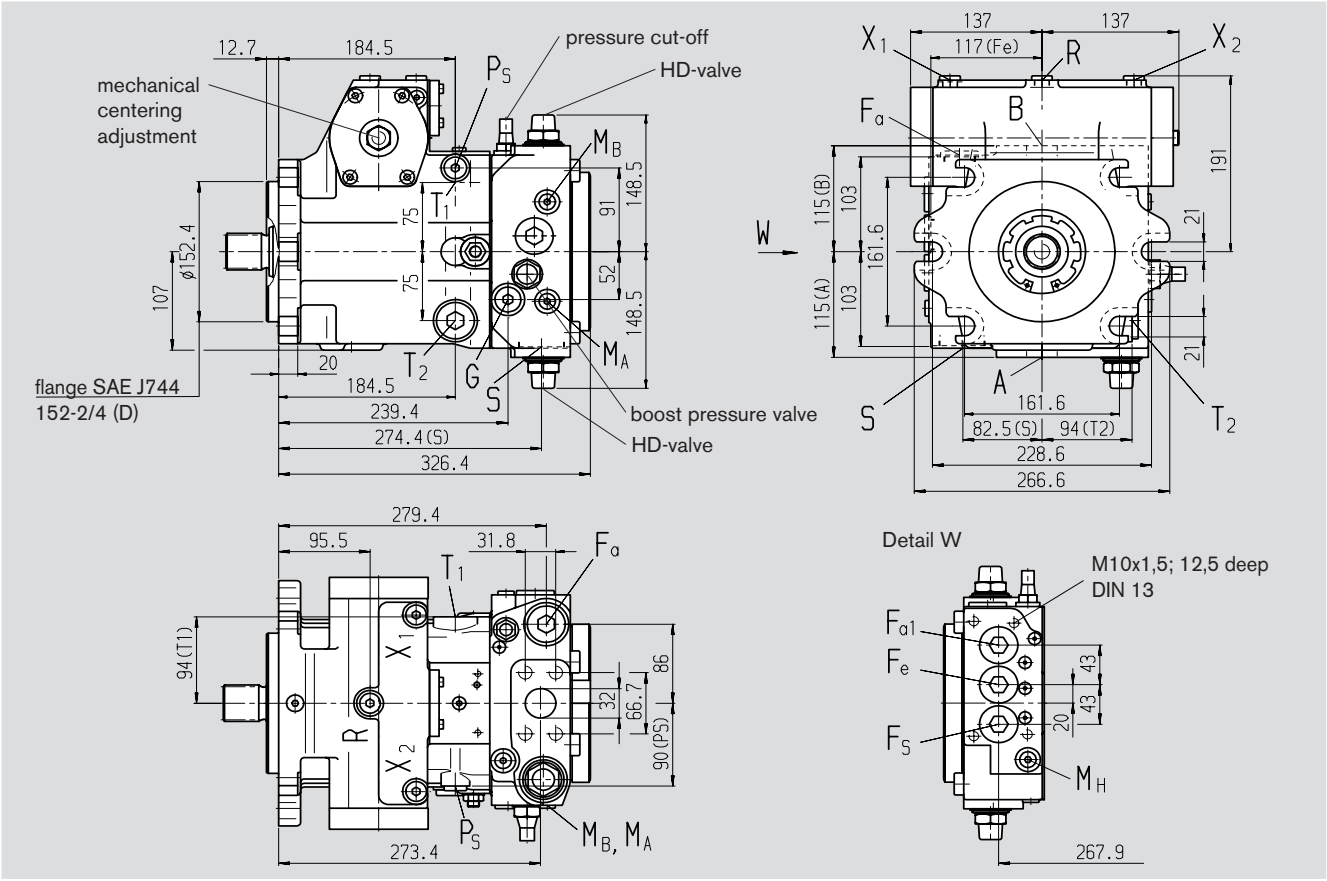
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M18x1,5; 12 deep	140 Nm

Unit Dimensions, Size 125

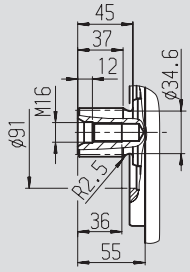
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

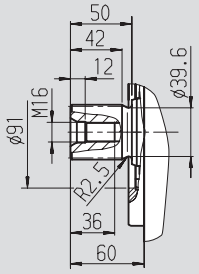


Shaft ends

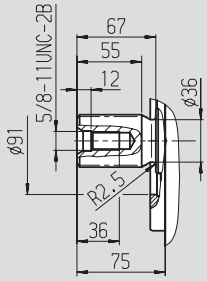
Z Splined shaft DIN 5480 W40x2x30x18x9g



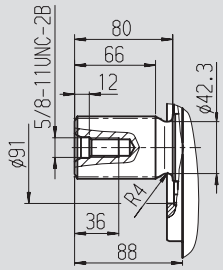
A Splined shaft DIN 5480 W45x2x30x21x9g



S Splined shaft 1 3/4in 13T 8/16DP [1] (SAE J744 – 44-4 (D))



T Splined shaft 2in 15T 8/16DP [1] (SAE J744 – 50-4 (F))



Connections

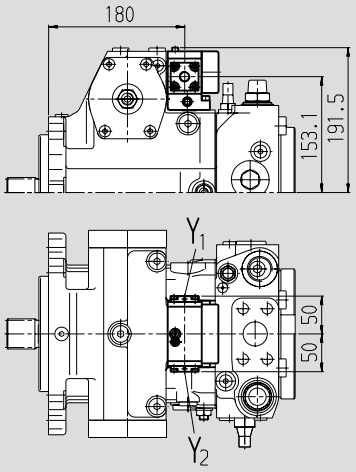
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	1 in	–
	Fastening thread A/B	DIN 13	M14x2; 19 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M26x1,5; 16 deep	230 Nm
T_2	Case drain [2]	DIN 3852	M26x1,5; 16 deep	230 Nm
M_A, M_B	Pressure gauge - operating pressure A, B [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
R	Air bleed [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
S	Boost suction port	DIN 3852	M42x2; 20 deep	720 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
P_S	Control pressure supply [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
F_a	Filter outlet [2]	DIN 3852	M26x1,5; 16 deep	230 Nm
F_{a1}	Filter outlet (filter assembly) [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
F_e	Filter inlet [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
F_S	Port from filter to suction line (cold start) [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
Y_1, Y_2	Remote control ports (only for HD1 control.)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

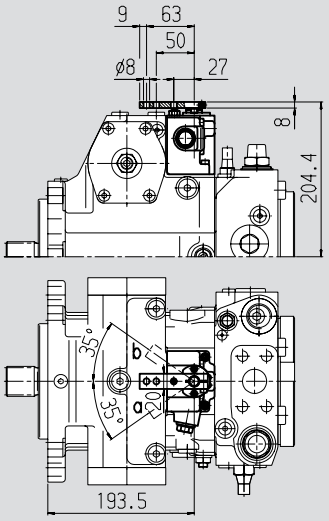
Unit Dimensions, Size 125

Before finalising your design, please request a certified drawing.

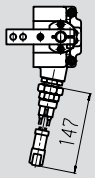
Hydraulic control, pilot pressure related, HD1



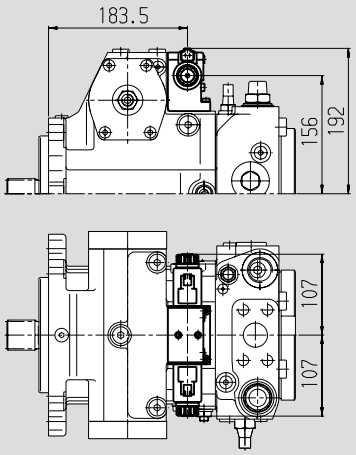
Hydraulic control, mechanical servo, HW



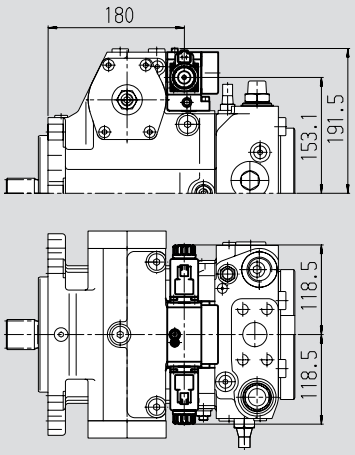
Model with zero position switch, HWL



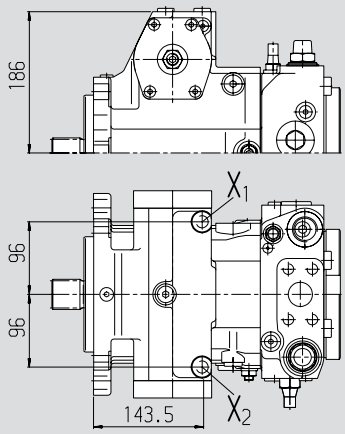
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

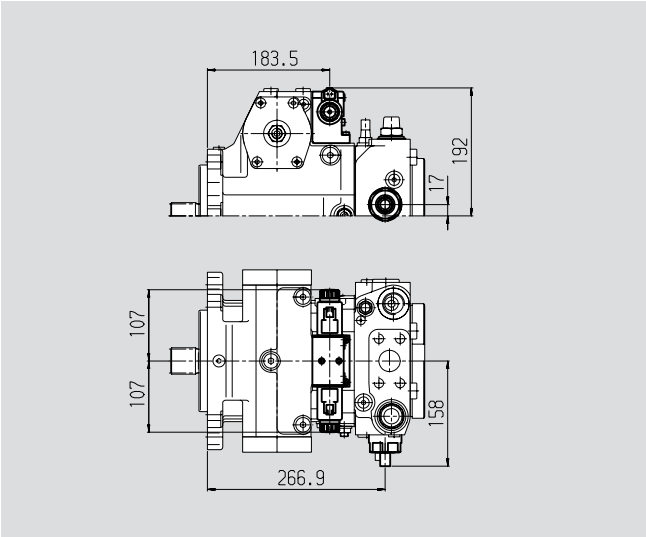


Unit Dimensions, Size 125

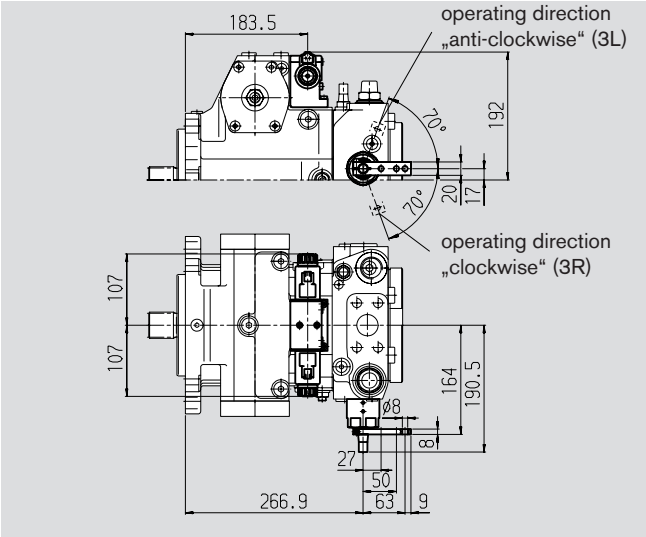
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

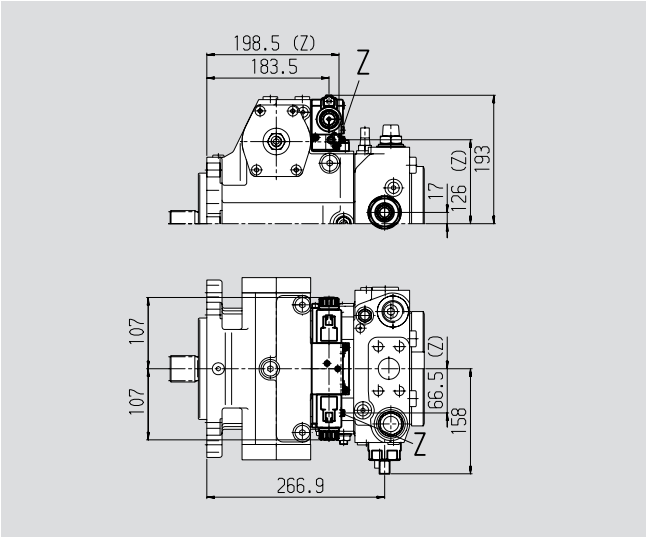
Control valve, fixed setting, DA2



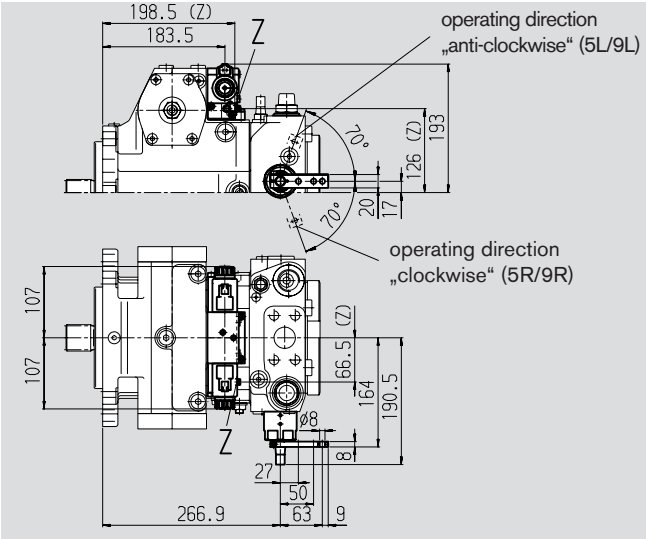
Control valve, mechanically adjustable with lever, DA3



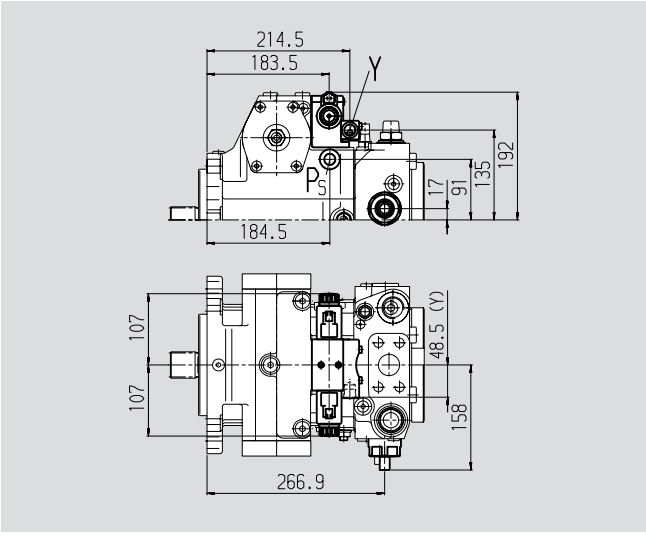
Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, mechanically adjustable with lever and hydraulic inch valve built-on, DA5/DA9



Control valve, fixed setting and connections for master controller, DA7



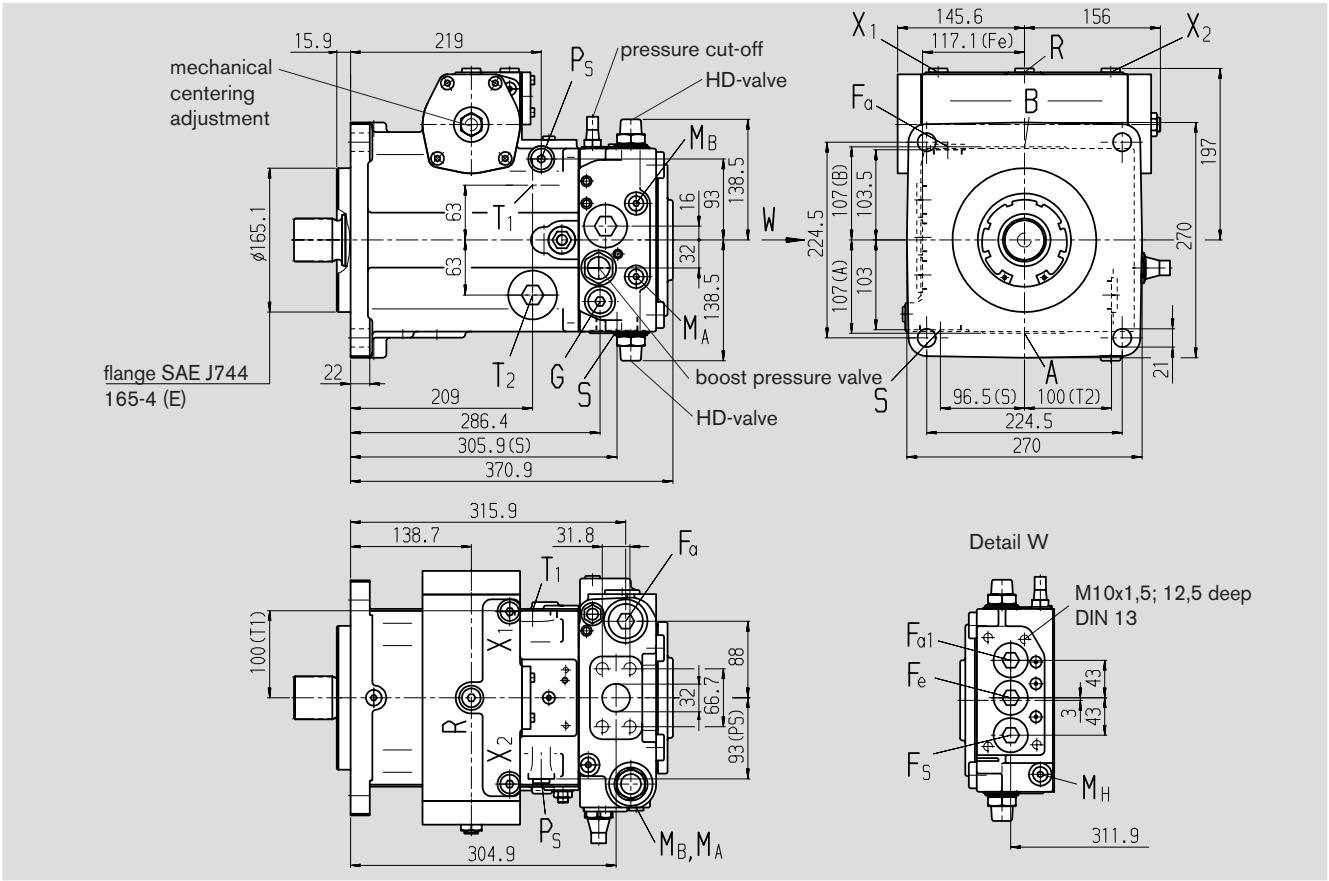
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M18x1,5; 12 deep	140 Nm

Unit Dimensions, Size 180

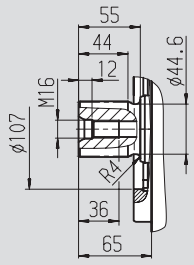
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

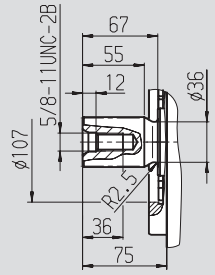


Shaft ends

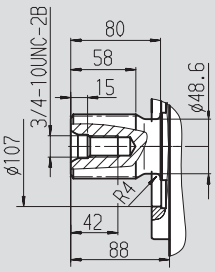
Z Splined shaft DIN 5480 W50x2x30x24x9g



S Splined shaft 1 3/4in 13T 8/16DP [1] (SAE J744 – 44-4 (D))



T Splined shaft 2 1/4in 17T 8/16DP [1]



Connections

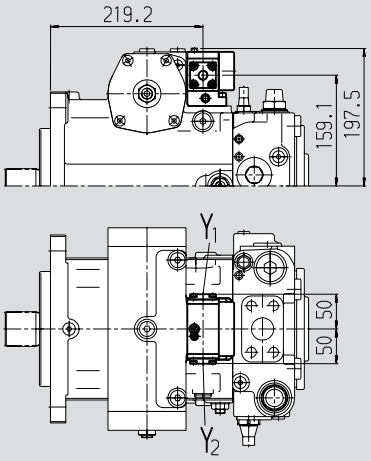
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	1 1/4 in	–
	Fastening thread A/B	DIN 13	M14x2; 19 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M42x2; 20 deep	720 Nm
T_2	Case drain [2]	DIN 3852	M42x2; 20 deep	720 Nm
M_A, M_B	Pressure gauge - operating pressure A/B [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
R	Air bleed [2]	DIN 3852	M16x1,5; 12 deep	100 Nm
S	Boost suction port	DIN 3852	M48x2; 22 deep	960 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M16x1,5; 12 deep	100 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M22x1,5; 14 deep	210 Nm
P_S	Control pressure supply [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_a	Filter outlet [2]	DIN 3852	M33x2; 18 deep	540 Nm
F_{a1}	Filter outlet (filter assembly) [2]	DIN 3852	M33x2; 18 deep	540 Nm
F_e	Filter inlet [2]	DIN 3852	M33x2; 18 deep	540 Nm
F_S	Port from filter to suction line (cold start) [2]	DIN 3852	M33x2; 18 deep	540 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M12x1,5; 12 deep	50 Nm
Y_1, Y_2	Remote control ports (only for HD1 control)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

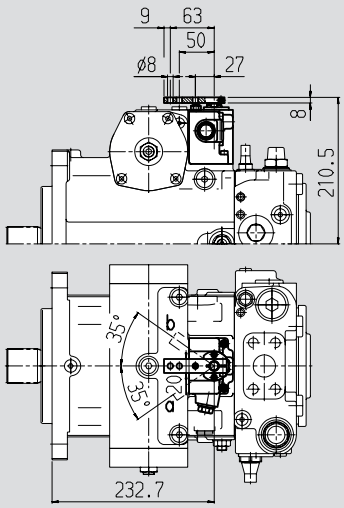
Unit Dimensions, Size 180

Before finalising your design, please request a certified drawing.

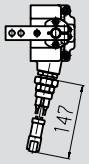
Hydraulic control, pilot pressure related, HD1



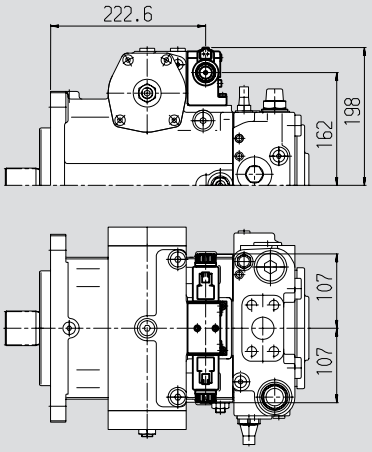
Hydraulic control, mechanical servo, HW



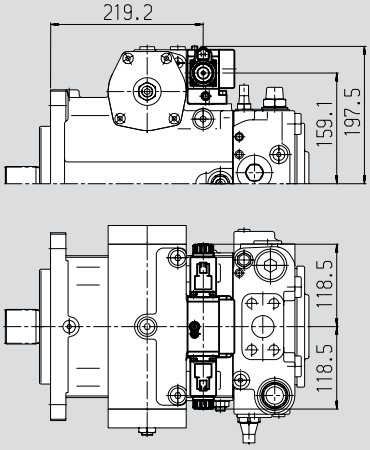
Model with zero position switch, HWL



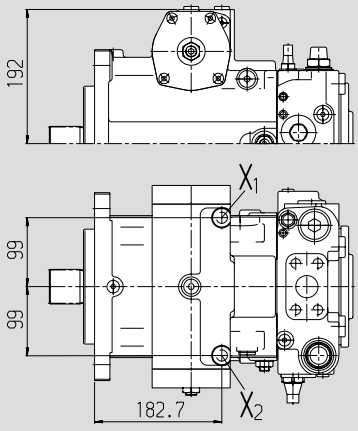
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

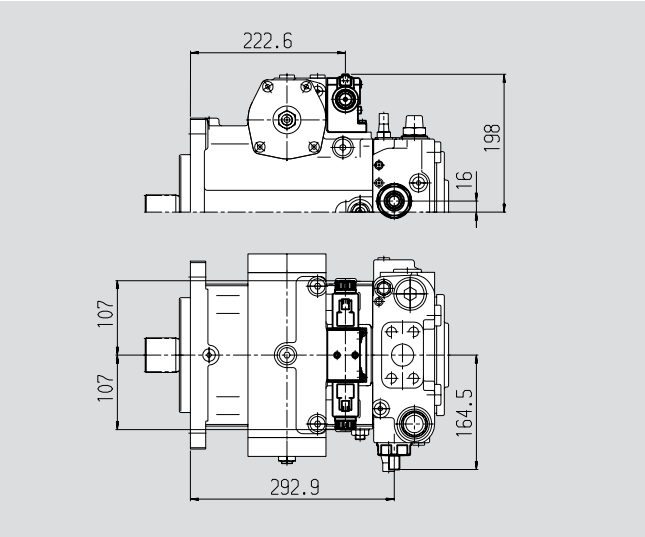


Unit Dimensions, Size 180

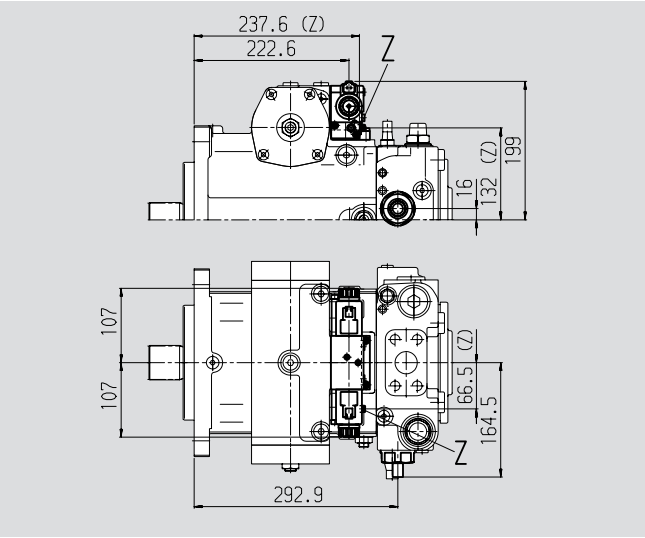
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

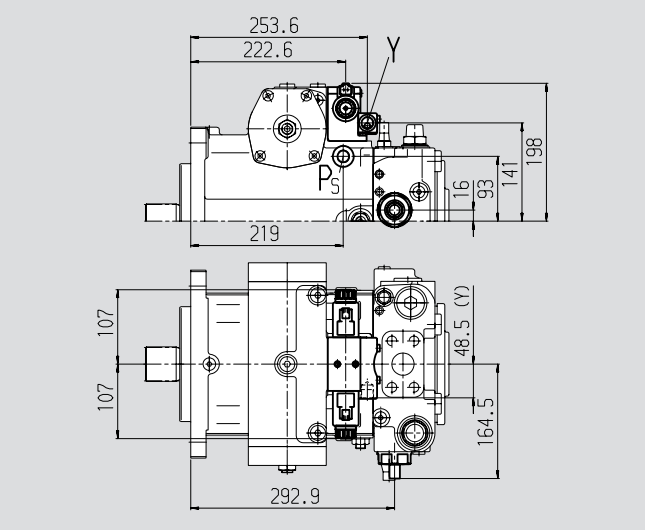
Control valve, fixed setting, DA2



Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, fixed setting and connections for master controller, DA7



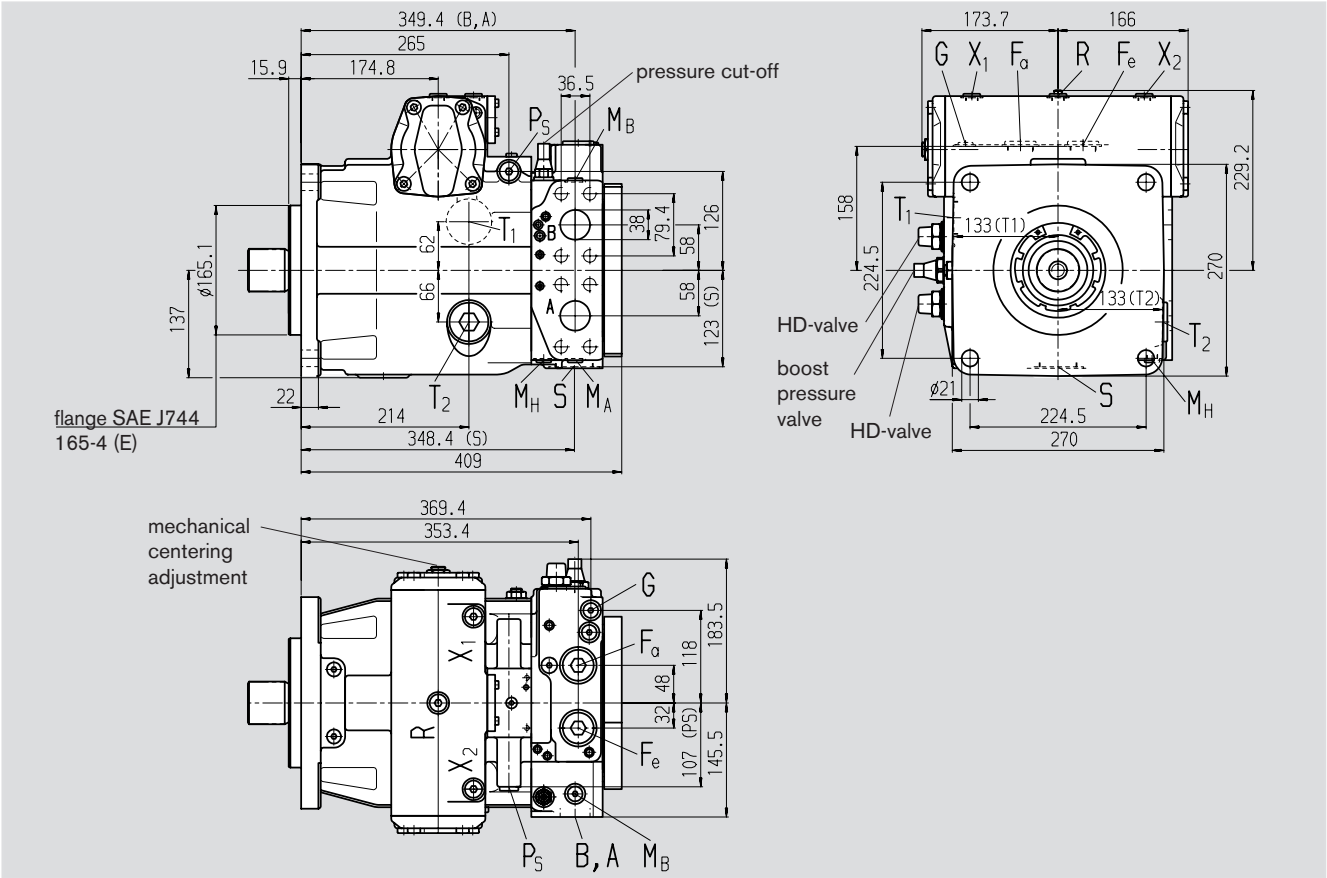
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M18x1,5; 12 deep	140 Nm

Unit Dimensions, Size 250

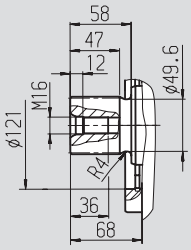
Before finalising your design, please request a certified drawing.

Pump configuration without control module, NV

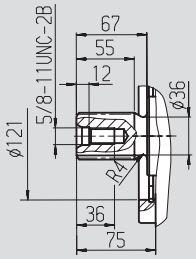


Shaft ends

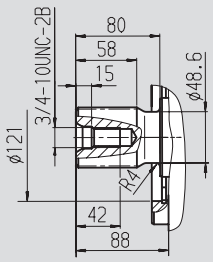
Z Splined shaft DIN 5480
W55x2x30x26x9g



S Splined shaft 1 3/4in 13T 8/16DP [1]
(SAE J744 – 44-4 (D))



T Splined shaft 2 1/4in 17T 8/16DP [1]



Connections

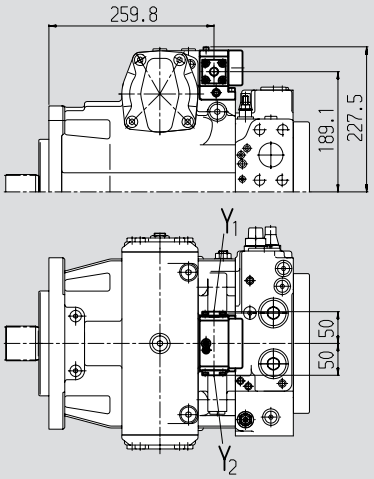
				Tightening torque, max.
A, B	Service line ports (high pressure series)	SAE J518	1 1/2 in	–
	Fastening thread A/B	DIN 13	M16x2; 21 deep	see safety instructions
T_1	Case drain or filling port	DIN 3852	M42x2; 20 deep	720 Nm
T_2	Case drain [2]	DIN 3852	M42x2; 20 deep	720 Nm
M_A, M_B	Pressure gauge - operating pressure A/B [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
R	Air bleed [2]	DIN 3852	M16x1,5; 12 deep	100 Nm
S	Boost suction port	DIN 3852	M48x2; 22 deep	960 Nm
X_1, X_2	Control pressure ports (before the orifice) [2]	DIN 3852	M16x1,5; 12 deep	100 Nm
G	Pressure port for auxiliary circuit [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
P_S	Control pressure supply [2]	DIN 3852	M18x1,5; 12 deep	140 Nm
F_a	Filter outlet [2]	DIN 3852	M33x2; 18 deep	540 Nm
F_e	Filter inlet [2]	DIN 3852	M33x2; 18 deep	540 Nm
M_H	Port for balanced high pressure [2]	DIN 3852	M14x1,5; 12 deep	80 Nm
Y_1, Y_2	Remote control ports (only for HD1 control)	DIN 3852	M14x1,5; 12 deep	80 Nm

[1] ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5 [2] plugged

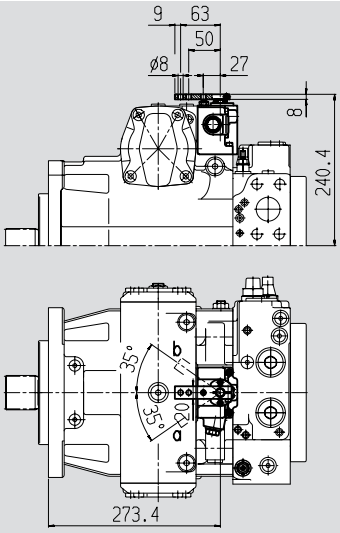
Unit Dimensions, Size 250

Before finalising your design, please request a certified drawing.

Hydraulic control, pilot pressure related, HD1

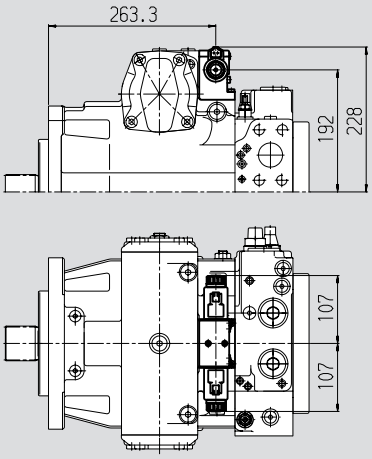


Hydraulic control, mechanical servo, HW

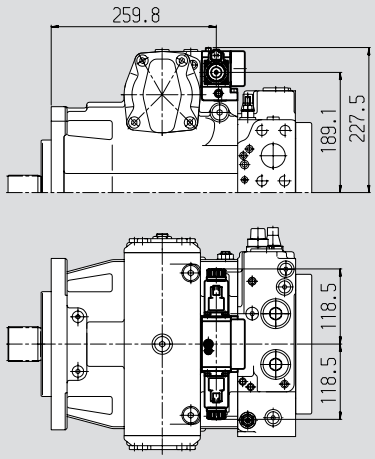


Model with zero position switch, HWL

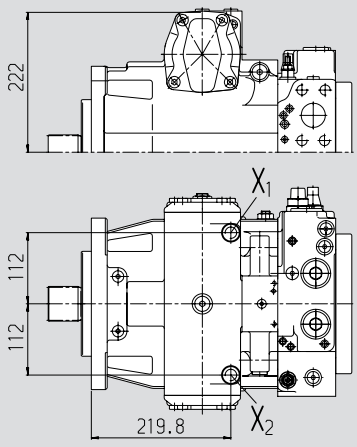
Electrical two-position control, with switching solenoid, EZ



Electrical control, with proportional solenoid, EP



Hydraulic control, direct operated, DG

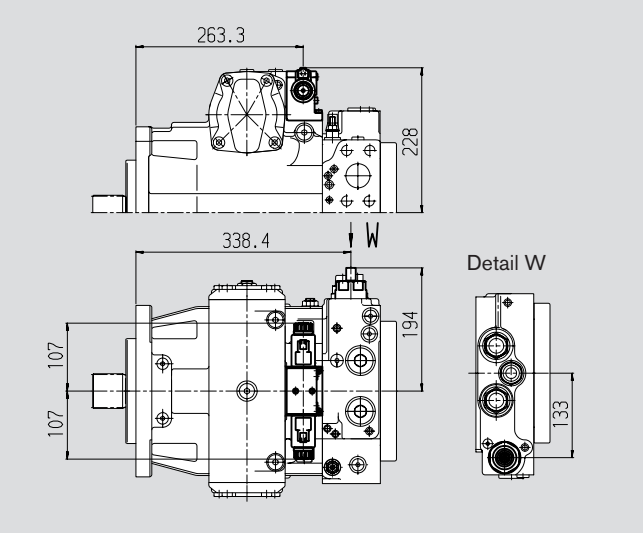


Unit Dimensions, Size 250

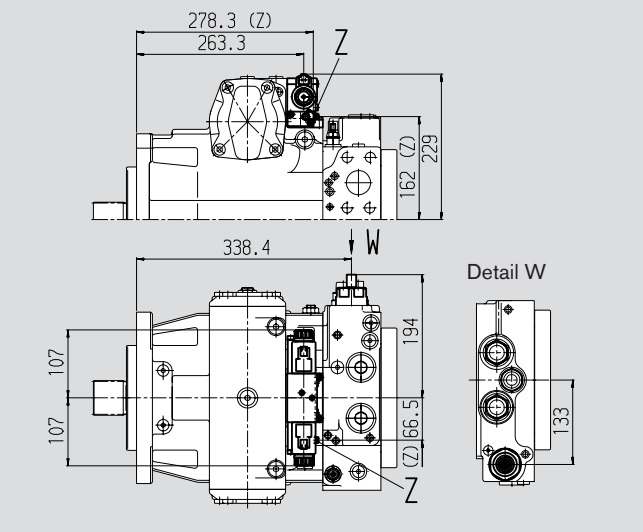
Before finalising your design, please request a certified drawing.

Hydraulic control, speed related, DA

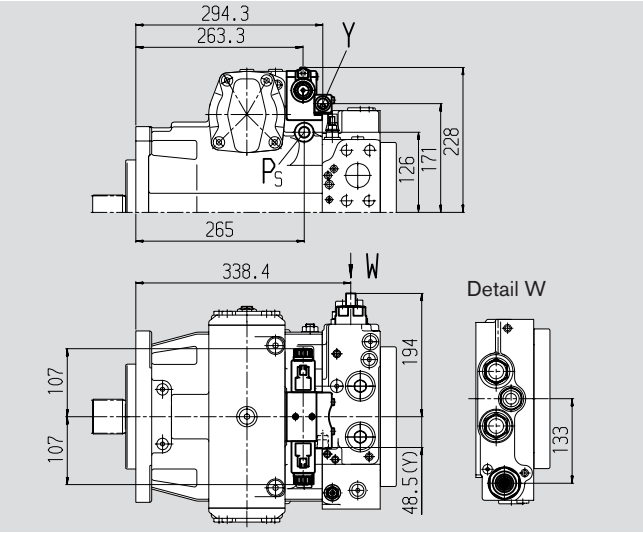
Control valve, fixed setting, DA2



Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



Control valve, fixed setting and connections for master controller, DA7



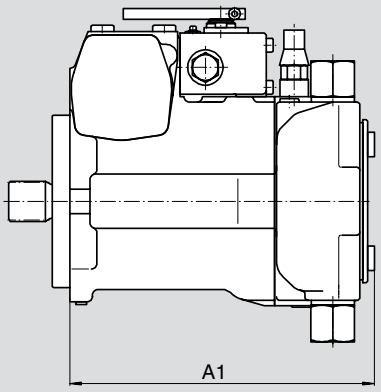
Connections

			Tightening torque, max.
Z	Pilot pressure port (plugged)		
	DIN 3852	M10x1; 8 deep	30 Nm
Y	Pilot pressure port		
	DIN 3852	M18x1,5; 12 deep	140 Nm

Dimensions for Through Drives

Before finalising your design, please request a certified drawing.

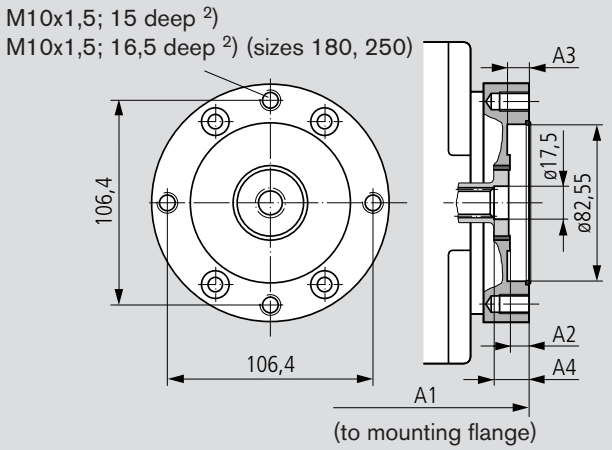
N00 without auxiliary pump, without through drive
F00 with auxiliary pump, without through drive



Size	A1 (N00)	A1 (F00)
28	213,9	223,4
40	220,2	235,7
56	239,4	256,4
71	279,1	293,6
90	287	301
125	320,9	326,4
180	370,9	370,9
250	398,2	409

F01/K01 **Flange** SAE J744 – 82-2 (A)

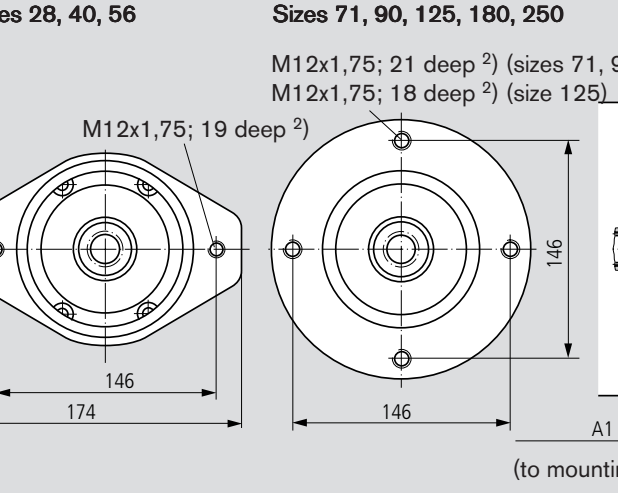
Hub for splined shaft according to ANSI B92.1a-1976 5/8in 9T 16/32DP [1] (SAE J744 – 16-4 (A))



Size	A1 (F01)	A1 (K01)	A2	A3	A4
28	227,9	227,9	7,5	7,5	
40	239,7	234,2	9	9	18
56	261,4	254,9	10	10	18
71	297,6	297,6	9	10	17
90	304	304	9	8	
125	330,9	330,9	10,5	9	
180	378,4	378,4	7,5	7,5	15,5
250	426,9		11	11	18

F02/K02 **Flange** SAE J744 – 101-2 (B)

Hub for splined shaft according to ANSI B92.1a-1976 7/8in 13T 16/32DP [1] (SAE J744 – 22-4 (B))



Size	A1	A2	A3	A4
28	230,4	9,7	9,7	
40	240,7	11	11	17
56	262,4	12	11	19,5
71	300,6	13	9,8	17
90	305	9	11	17
125	330,9	10	11	17
180	381,4	11	11	19
250	428,9	11	11	16

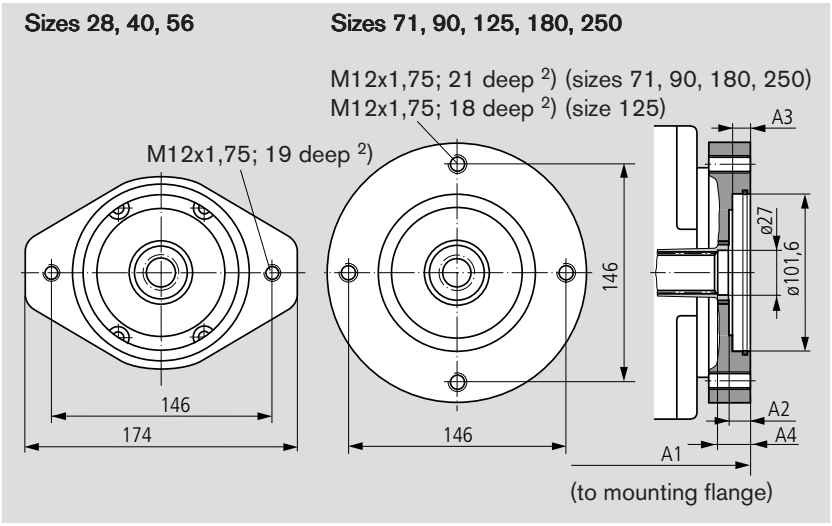
[1] pressure angle 30°, flat root side fit, tolerance class 5
[2] DIN 13, tightening torques see safety instructions

Dimensions for Through Drives

Before finalising your design, please request a certified drawing.

F04/K04 **Flange** SAE J744 – 101-2 (B)

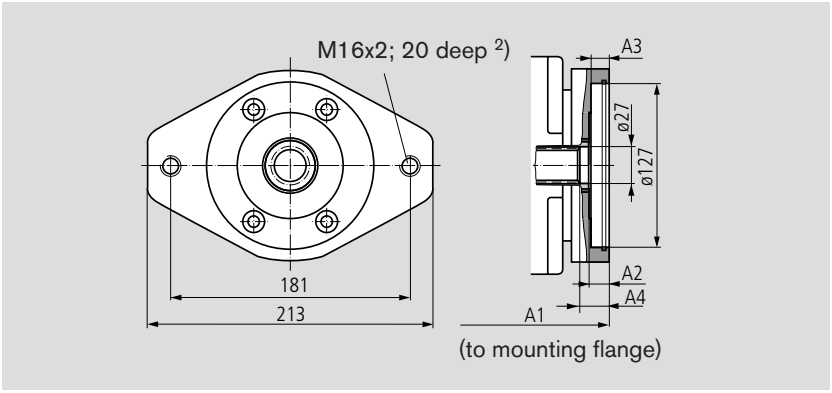
Hub for splined shaft according to ANSI B92.1a-1976 1in 15T 16/32DP [1] (SAE J744 – 25-4 (B-B))



Size	A1	A2	A3	A4
28	230,4	9,7	9,7	
40	240,7	11	9,7	16
56	262,4	13	11	18,5
71	300,6	13	9,8	15,5
90	305	9	11	15
125	330,9	10	11	16,5
180	381,4	11	11	18
250	428,9	11	11	15,5

F09/K09 **Flange** SAE J744 – 127-2 (C)

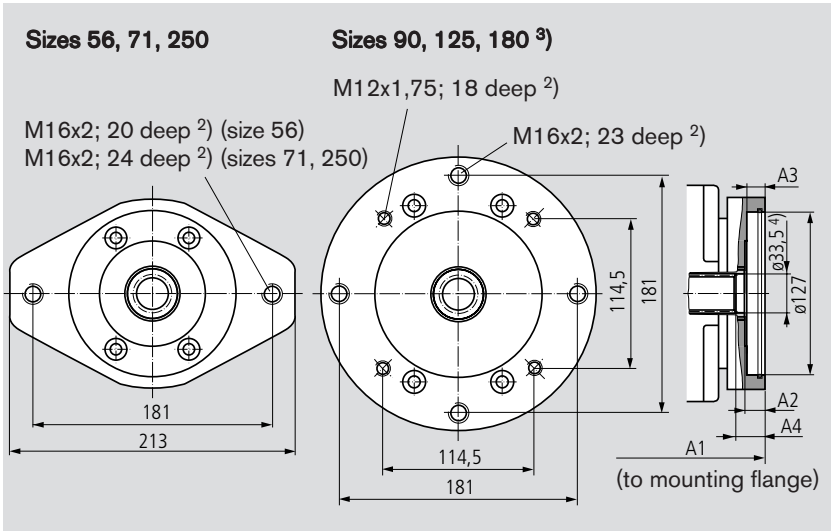
Hub for splined shaft according to ANSI B92.1a-1976 1in 15T 16/32DP [1] (SAE J744 – 25-4 (B-B))



Size	A1	A2	A3	A4
40	244,7	14	14	

F07/K07 **Flange** SAE J744 – 127-2 (C)

Hub for splined shaft according to ANSI B92.1a-1976 1 1/4in 14T 12/24DP [1] (SAE J744 – 32-4 (C))



Size	A1	A2	A3	A4
56	266,4	15	14	
71	303,6	15	13,5	20
90	309	13	14	20,5
125	335,9	15	15,5	22,5
180	384,4	14	19	
250	425,9		14	16

[1] pressure angle 30°, flat root side fit, tolerance class 5
[2] DIN 13, tightening torques see safety instructions

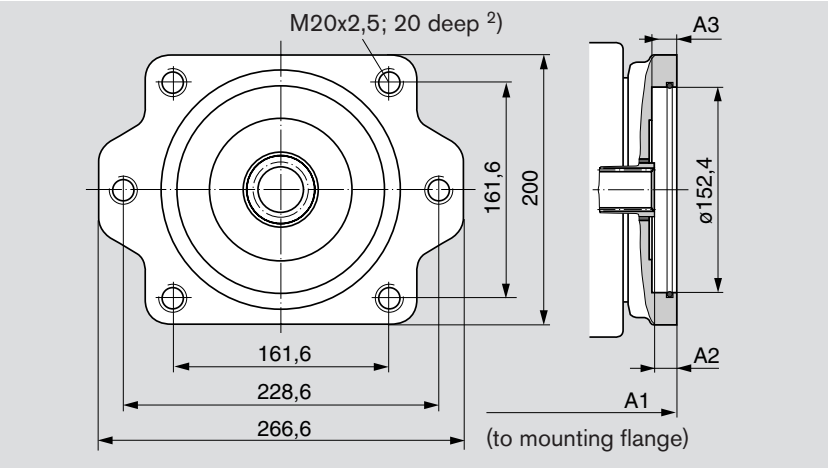
Dimensions for Through Drives

Before finalising your design, please request a certified drawing.

F73/K73

Flange SAE J744 – 152-2/4 (D)

Hub for splined shaft according to DIN 5480 W35x2x30x16x9g

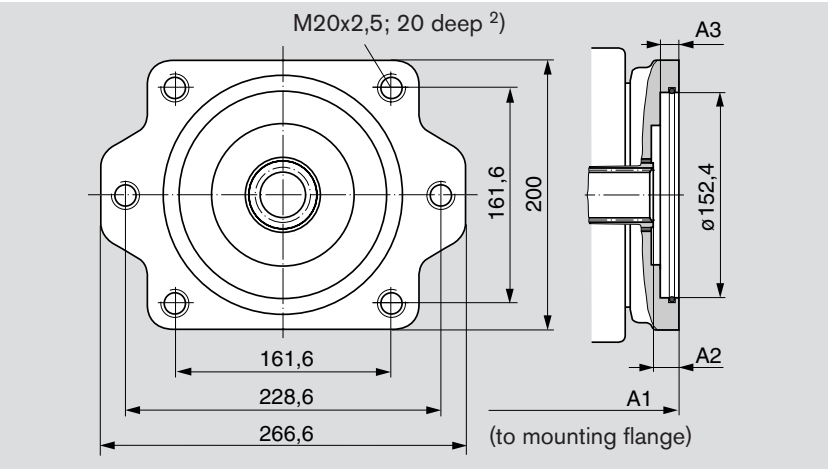


Size	A1	A2	A3
90	309	12	14

F69/K69

Flange SAE J744 – 152-2/4 (D)

Hub for splined shaft according to ANSI B92.1a-1976 1 3/4in 13T 8/16DP 1) (SAE J744 – 44-4 (D))

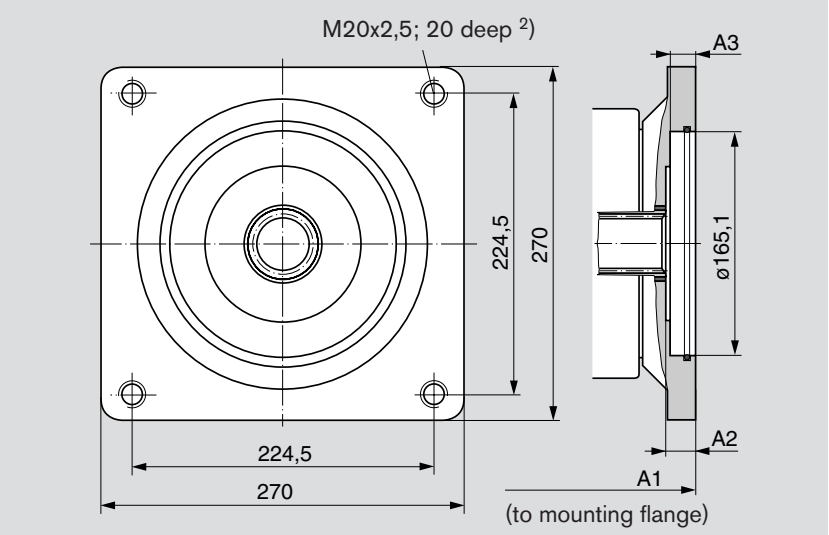


Size	A1	A2	A3
125	343,9	18	14
180	391,9	20,9	18
250	444,9		17

F72/K72

Flange SAE J744 – 165-4 (E)

Hub for splined shaft according to ANSI B92.1a-1976 1 3/4in 13T 8/16DP 1) (SAE J744 – 44-4 (D))



Size	A1	A2	A3
180	391,9	20,9	18
250	444,9		17

1) pressure angle 30°, flat root side fit, tolerance class 5

2) DIN 13, tightening torques see safety instructions

Overview of A4VG Attachments

Through drive – A4VG			Attachment for 2nd pump							Through drive
flange	hub for splined shaft	short code	A4VG size (shaft)	A10V(S)O/31 size (shaft)	A10V(S)O/52 size (shaft)	A4FO size (shaft)	A11VO size (shaft)	A10VG size (shaft)	external gear pump	available for size
82-2 (A)	5/8in	**F/K01**	–	18 (U)	10 (U)	–	–	–	frame size F size 4-22 [1]	28...250
101-2 (B)	7/8in	**F/K02**	–	28 (S,R)	28 (S,R)	16 (S), 22 (S)	–	18 (S)	frame size N size 20-32 [1]	28...250
				45 (U)	45 (U,W)	28 (S)			frame size G size 38-45 [1]	
127-2 (C)	1in	**F/K09**	40 (U)	–	–	–	–	–	–	40
	1 1/4in	**F/K07**	40 (S), 56 (S)	71 (S,R)	–	–	60 (S)	63 (S)	–	56...250
			71 (S)	100 (U)	85 (U)					
152-2/4 (D)	W35	**F/K73**	90 (Z)	–	–	–	–	–	–	90
	1 3/4in	**F/K69**	90 (S), 125 (S)	140 (S)	–	–	95 (S), 130 (S)	–	–	125...250
165-4 (E)	1 3/4in	**F/K72**	180 (S), 250 (S)	–	–	–	190 (S), 260 (S)	–	–	180...250

[1]) Rexroth recommends special gear pump versions. Please ask for details.

Combination Pumps A4VG + A4VG

Overall length A

A4VG	A4VG (2nd pump) [1]							
(1st pump)	size 28	size 40	size 56	size 71	size 90	size 125	size 180	size 250
size 28	453,8	–	–	–	–	–	–	–
size 40	464,1	480,4	–	–	–	–	–	–
size 56	485,8	502,1	522,8	–	–	–	–	–
size 71	524,0	539,3	560,0	597,2	–	–	–	–
size 90	528,4	544,7	565,4	602,6	610,0	–	–	–
size 125	554,3	571,6	592,3	629,5	644,9	670,3	–	–
size 180	604,8	620,1	640,8	678,0	692,9	718,3	762,8	–
size 250	652,3	661,6	682,3	719,5	745,9	771,3	815,8	854,8

[1]) 2nd pump without through drive and with auxiliary pump, F00

Combination pumps offer the facility of independent circuits without the need to fit splitter gearboxes.

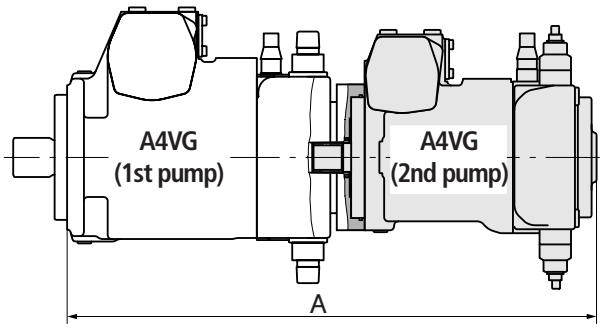
When ordering pump combinations the type designatins for the 1st and 2nd pumps should be joined by „+“

Order example:

A4VG56EP1D1/32R-N**A**C02**F07**3S + A4VG56EP1D1/32R-N**S**C02F003S

The series connection of two single pumps of the same size is permisssible without additional supports where the dynamic acceleration does not exceed 10 g (= 98,1 m/s^2).

We recommend the use of 4-hole connection flanges from size 71 and larger.

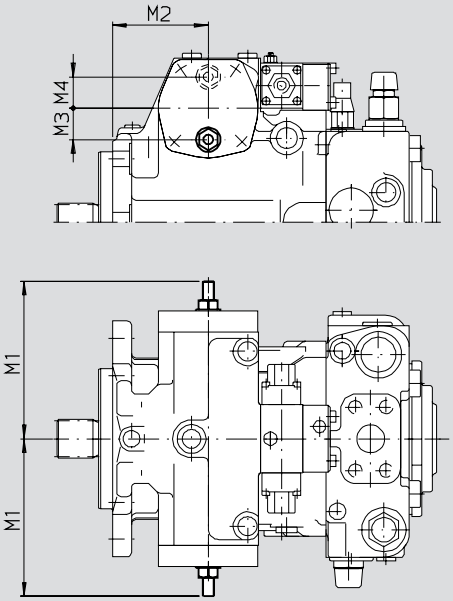


Mechanical Stroke Limiter, M

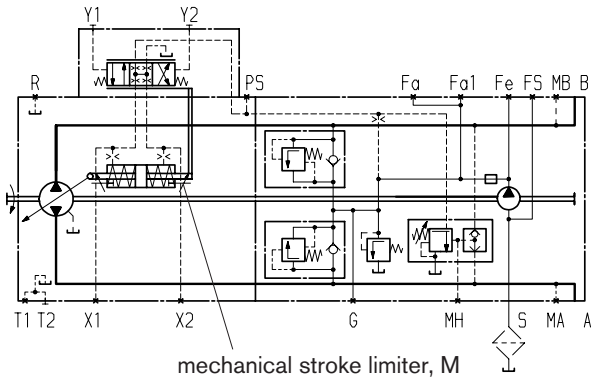
Adjustment screws for both $V_{g\,max}$ – values

Dimensions

Size	M1	M2	M3	M4
28	110,6 max.	40,1	24	–
40	110,6 max.	38,1	24	–
56	130,5 max.	44	25,5	–
71	135,4 max.	86,3	–	28,5
90	147 max.	95,7	31,5	–
125	162 max.	104,5	–	35,5
180	181,6 max.	138,7	38	–
250	198,9 max.	174,8	39,5	–



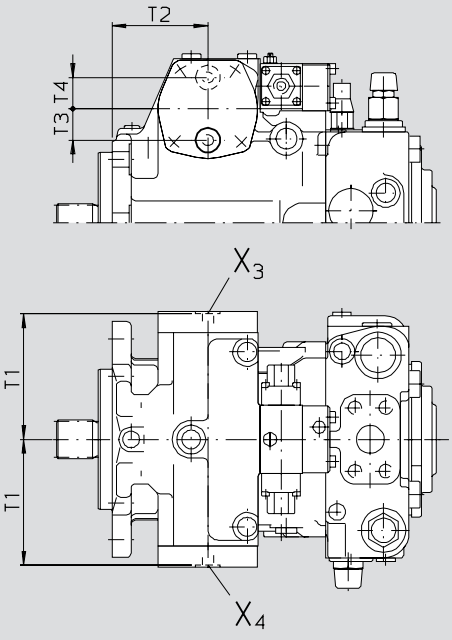
Circuit diagram [1])



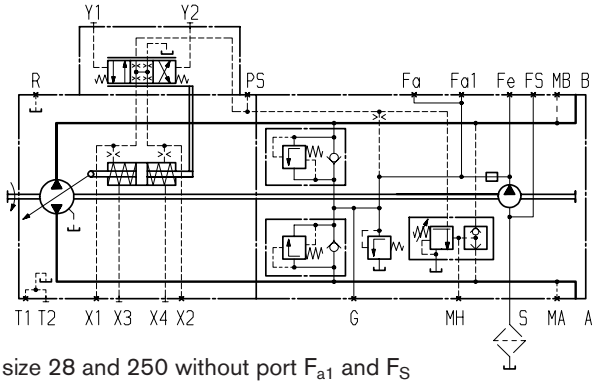
Ports X_3 and X_4 for Positioning Pressure, T

Dimensions

Size	T1	T2	T3	T4	X_3, X_4
28	92	40,1	–	24	M12x1,5
40	92	38,1	–	24	M12x1,5
56	104,5	44	–	25	M12x1,5
71	113,5	86,3	28	–	M12x1,5
90	111,5	95,7	–	30	M12x1,5
125	136	104,5	34	–	M12x1,5
180	146,5	138,7	–	35	M12x1,5
250	164,5	174,8	–	38	M16x1,5



Circuit diagram [1])



[1]) size 28 and 250 without port F_{a1} and F_S

Filtration Types

Standard: Filtration in the suction line of the auxiliary pump, S

Standard model (preferred)

Filter type: _____ filter **without** bypass

Recommendation: _____ **with** contamination indicator

Through flow resistance at the filter element:

at $\nu = 30$ mm²/s, $n = n_{max}$ _____ $\Delta p \leq 0{,}1$ bar

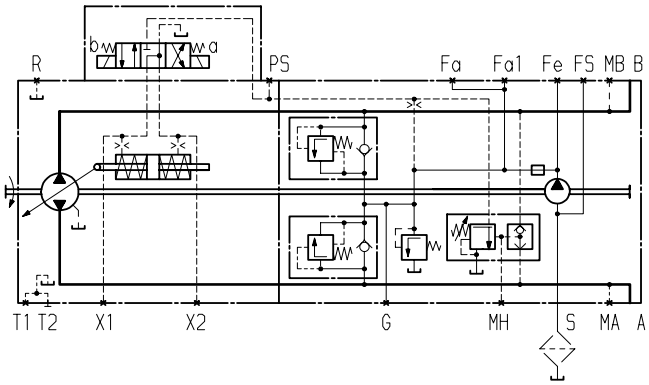
at $\nu = 1000$ mm²/s, $n = n_{max}$ _____ $\Delta p \leq 0{,}3$ bar

Pressure at port S of the auxiliary pump:

at $\nu = 30$ mm²/s _____ $p \geq 0{,}8$ bar

at cold start ($\nu = 1600$ mm²/s, $n \leq 1000$ rpm) ___ $p \geq 0{,}5$ bar

Circuit diagram standard S



Variation: external supply, E

For models **without** integral auxiliary pump (N00 or K..).

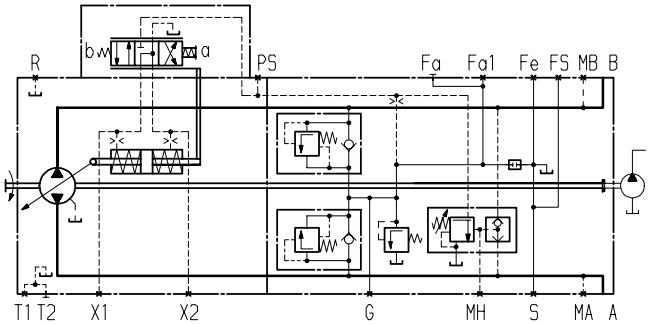
Connection S is closed.

Supply comes from connection F_a.

Filter arrangement: _____ separately

For safe operation ensure required purity grade for the boost pressure fluid at connection F_a (see page 5).

Circuit diagram variation E (external supply)



Variation: Filtration in the pressure line of the auxiliary pump, ports for external boost circuit filter, D

Port F_e : Filter inlet

Port F_a : Filter outlet

Filter type: Filter with bypass are **not** recommended. When applying with bypass please consult us.

Recommendation: **with** contamination indicator

Please note:
For **DG** control device (with control pressure not from the boost circuit) use the following filter type:

filter **with** bypass and **with** contamination indicator

Filter arrangement: __separately in the pressure line (line filter)

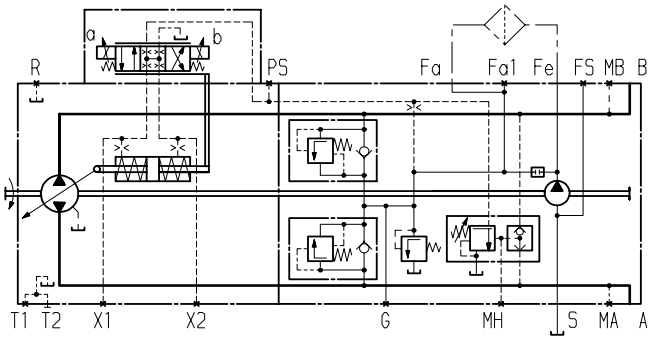
Flow resistance at filter element:

at $\nu = 30$ mm²/s _____ $\Delta p \leq 1$ bar

at cold start _____ $\Delta p \leq 3$ bar

(valid for entire speed range $n_{min} - n_{max}$)

Circuit diagram variation D



Filtration Types

Variation: Filtration in the pressure line of the auxiliary pump, with cold start valve and ports for external boost circuit filter, K

Design similar to variation D, however additionally with cold start valve:

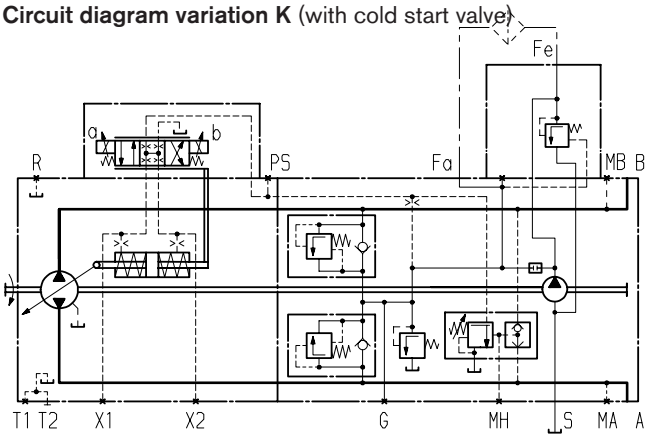
– Port plate is equipped with **cold start valve** and therefore protects the pump from damage.
The valve opens at flow resistance $\Delta p \geq 6$ bar.

Port F_e : Filter inlet (at the cold start valve)

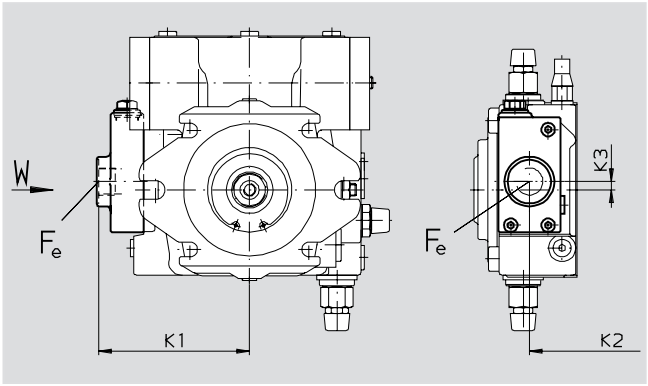
Port F_a : Filter outlet

Filter arrangement _ separately in the pressure line (hose filter)

Circuit diagram variation K (with cold start valve)



Dimensions variation K (with cold start valve)



Size	K1	K2	K3	F_e [1]	$T_{max.}$ [2]
40	122,5	198,7	0	M18x1,5; 15 deep	140 Nm
56	125,5	215,4	0	M18x1,5; 15 deep	140 Nm
71	145,5	239,0	8	M26x1,5; 16 deep	230 Nm
90	139,5	248,5	24	M26x1,5; 16 deep	230 Nm
125	172,0	267,9	20	M33x2; 18 deep	540 Nm
180	173,0	311,9	3	M33x2; 18 deep	540 Nm

[1]) DIN 3852

[2]) tightening torque, max.

Variation: Filtration in pressure line of the auxiliary pump, readily built-on filter, F

Filter type _____ filter **without** bypass

Filter element pore size (absolute) _____ 20 µm

Filter material _____ Glass fiber

Pressure capacity _____ 100 bar

Filter arrangement _____ connected to pump

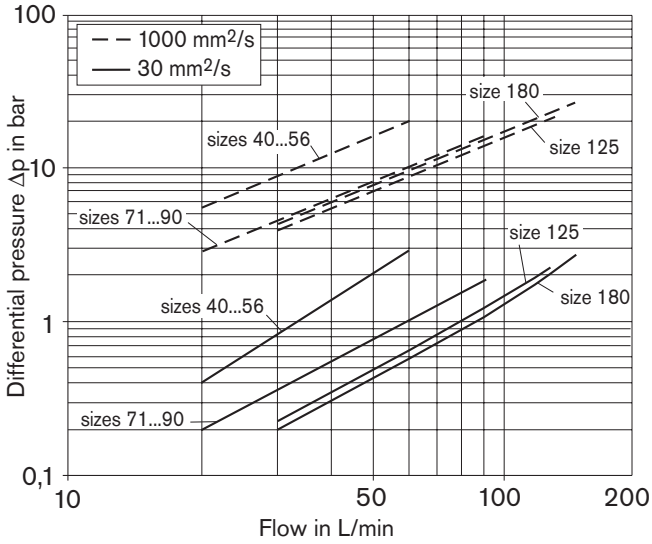
Please note:

– Port plate is equipped with **cold start valve** and therefore protects the pump from damage.
The valve opens at flow resistance $\Delta p \geq 6$ bar.

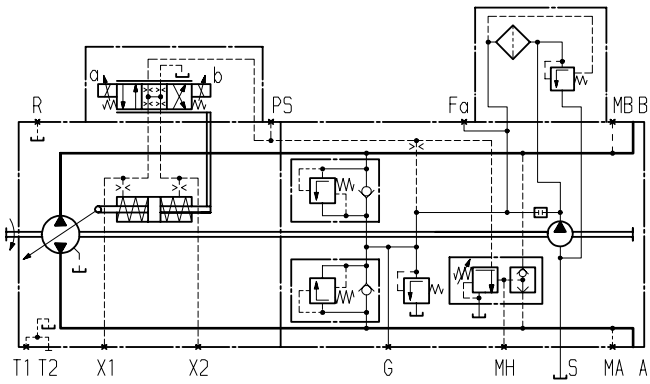
Recommendation: **with** contamination indicator (variaton P, L, M) (differential pressure $\Delta p = 5$ bar)

Filter characteristic

Differential pressure/volumetric flow characteristics conforming to ISO 3968 (valid for new filter element).



Circuit diagram variation F (with filter assembly)



Filtration Types

Variation: Filtration in pressure line of the auxiliary pump, readily built-on filter, with visual and electr. contamination indicator, M

Design similar to variation F, however additionally with visual and electrical contamination indicator.

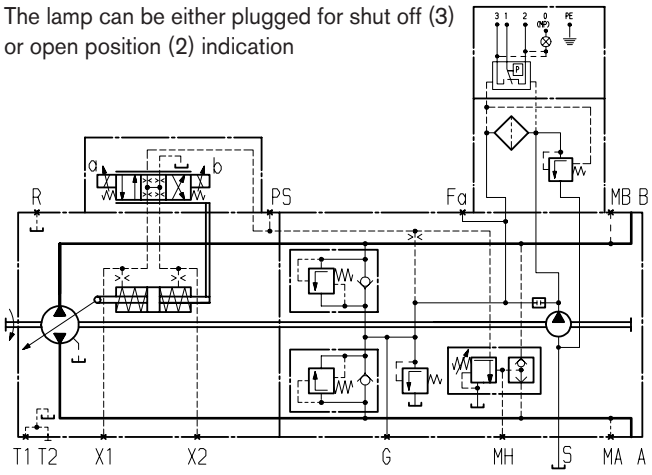
Indication: electrical and visual by lamp

differential pressure (switching pressure) $\Delta p = 5$ bar

Max. switching power at 24 V DC _____ 60 W

Circuit diagram variation M

The lamp can be either plugged for shut off (3) or open position (2) indication



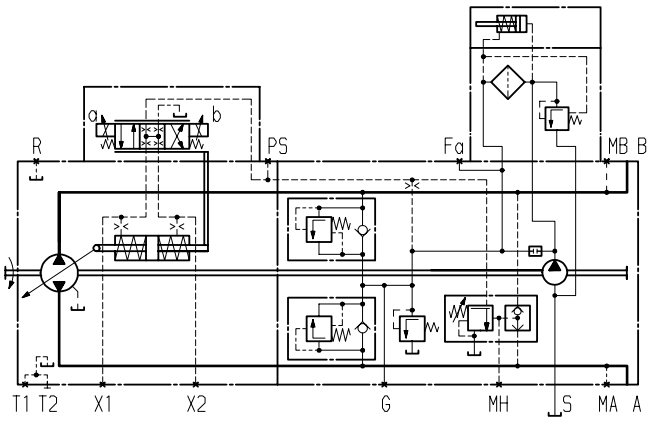
Variation: Filtration in pressure line of the auxiliary pump, readily built-on filter, with visual contamination indicator, P

Design similar to variation F, however additionally with visual contamination indicator.

Indication: green/red window

differential pressure (switching pressure) $\Delta p = 5$ bar

Circuit diagram variation P



Variation: Filtration in pressure line of the auxiliary pump, readily built-on filter, with electrical contamination indicator, L

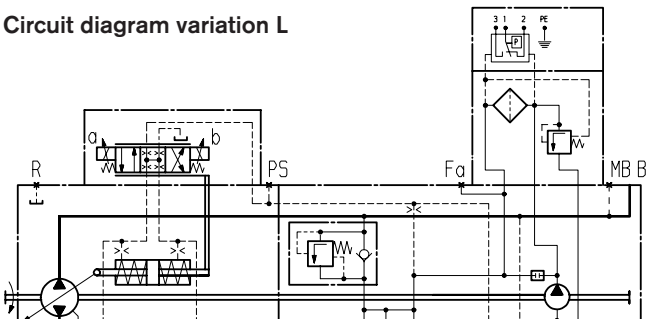
Design similar to variation F, however additionally with electrical contamination indicator.

Indication: electrical

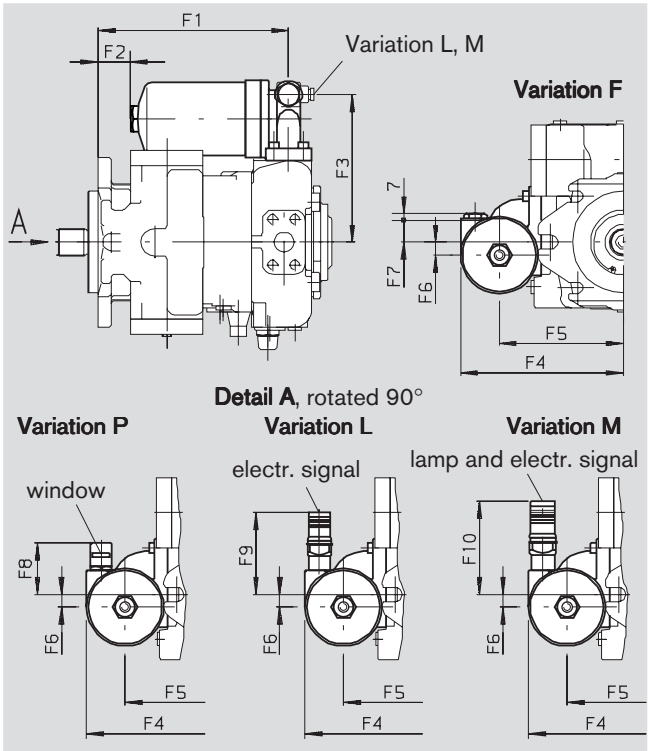
differential pressure (switching pressure) $\Delta p = 5$ bar

Max. switching power at 24 V DC _____ 60 W

Circuit diagram variation L



Dimensions with filter assembly (variations F, P, L, M)



Size	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
40	201,7	47,7	160	175	135	0	42	78,5	122	125
56	218,4	64,4	163	178	138	0	42	78,5	122	125
71	239	46,5	185	203,5	155	16	29	65,5	109	112
90	248,5	56	179	197,5	149	0	45	81,5	125	128
125	235,9	59,4	201	219,5	171	0	53	89,5	133	136
180	279,9	40,3	202	220,4	171,9	17	36	72,5	116	119

Swivel Angle Display

Electrical swivel angle sensor, R

For display of the swivel angle, the pump swivel position is measured by an electric swivel angle sensor. The sensor has a robust, sealed housing and a built-in electronic control unit specially developed for automotive applications.

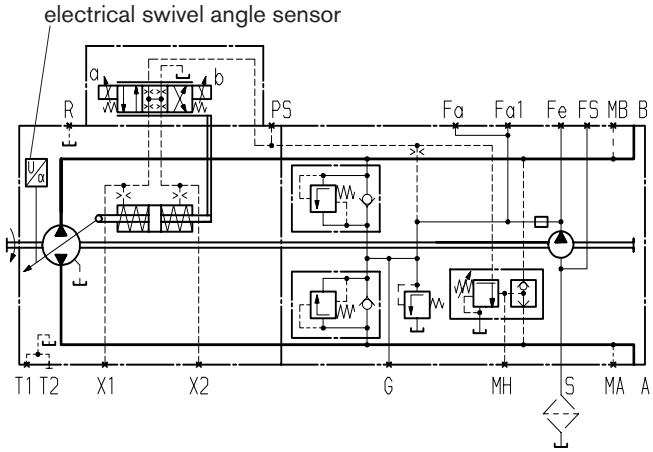
As output variable, the swivel angle sensor delivers a voltage proportional to the swivel angle (see below table).

Technical Data	
Voltage supply U_b	10...30 V DC
Current consumption	< 15 mA
Output voltage U_a	0,5...4,5 V
Load resistance	≥ 20 kW
Reserve polarity protection	supply voltage to ground
Protection against short circuit of the signal	to ground
EMC - DIN 40839 EN 55025, ISO/EN 14982, ISO 11452, ISO 7637-1	details on request
Operating temperature	-40° C...+125° C
Vibration resistance: oscillations sine-shaped EN 60068-2-6 oscillations random-shaped IEC 68-2-36	 4*g* / 22...500 Hz min. 0,02g^2 / Hz
Shock resistance: permanent shocking IEC 68-2-29	 10*g* / 15 ms
Insulation class DIN/EN 60529	IP67 and IP69K
Case material	synthetic material

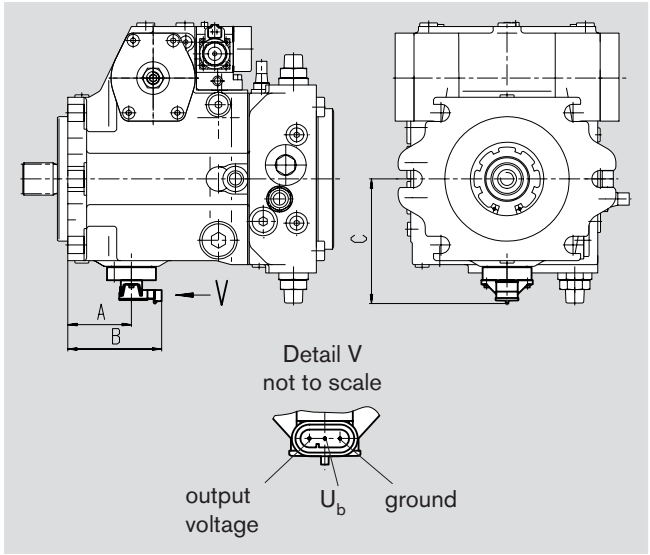
Output voltage

Direction of rotation	Direction of flow	Output voltage	
		at $V_{g\,0}$	at $V_{g\,max}$
clockwise	A to B	2,5 V	4,5 V
	B to A	2,5 V	0,5 V
anti-clockwise	B to A	2,5 V	4,5 V
	A to B	2,5 V	0,5 V

Circuit diagram



Dimensions



Size	A	B	C
28	56,6	94	119
40	58,6	96	119
56	60,5	97,5	128,5
71	71,6	108,6	137,5
90	70,7	107,7	145,5
125	78	115	152,5
180	100,7	137,7	153,5
250	105,1	142,1	180,5

Mating connector

Female connector AMP Superseal 1,5; 3-pin,
Rexroth part. No. 2602132

consisting of:	AMP-No.
– 1 socket housing, 3-pins	282087-1
– 3 single wire seal, yellow	281934-2
– 3 socket contact 1,8 - 3,3 mm	283025-1

The female connector is not included in delivery volume. Can be supplied by Rexroth upon request.

Connector Options for Solenoids

(only for EP, EZ, DA)

DEUTSCH male connector, injection molded (2-pin)

Designation: DT04-2P-EP04

without bidirectional quenching diode (standard) _____ **P**

with bidirectional quenching diode (option, only for EZ, DA) __ **Q**

Mating connector

Female connector DT06-2S-EP04, Rexroth part. No. 02601804

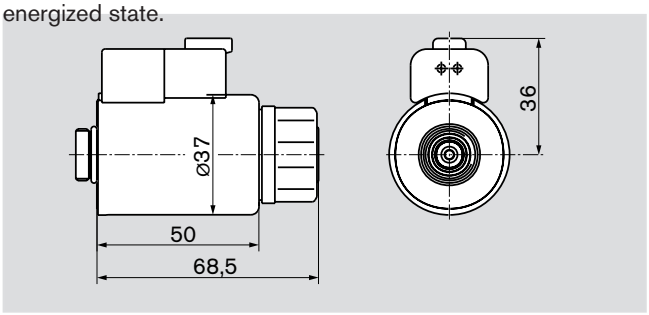
consisting of:	DT-designation
– 1 housing	DT06-2S-EP04
– 1 chock	W2S
– 2 socket	0462-201-16141

The female connector is not included in delivery volume. Can be supplied by Rexroth on request.

Insulation class to DIN/EN 60529: IP67 and IP69K

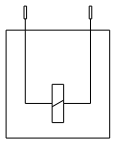
Version Q with bi-directional quenching diode is only available as an option for the switching solenoids on controllers EZ and DA.

The protective circuit with bidirectional quenching diode is required in order to limit overvoltages. The overvoltages are produced by switching off the current with switches or relay contacts or by removing the female connector while it is in the energized state.

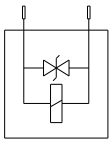


Circuit symbol

without bidirectional quenching diode



with bidirectional quenching diode



DEUTSCH male connector with stranded wire (2-pin)

Designation: DT04-2P-EP04

without bidirectional quenching diode _____ **T**

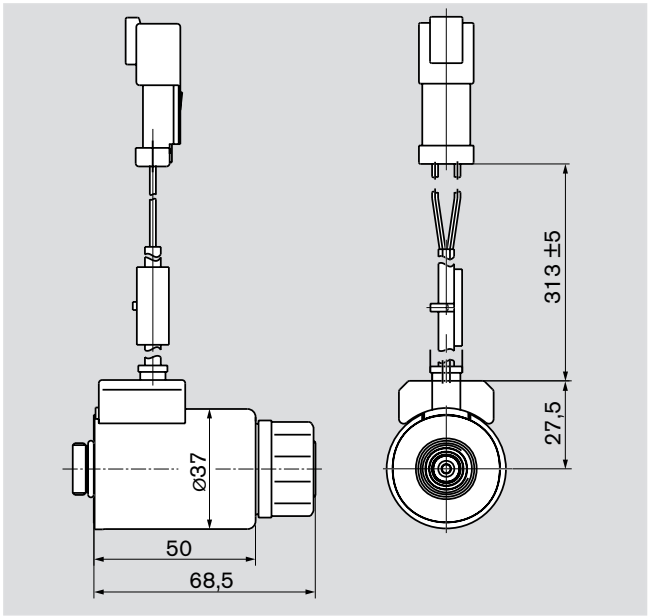
Mating connector

Female connector DT06-2S-EP04, Rexroth part. No. 02601804

consisting of:	DT-designation
– 1 housing	DT06-2S-EP04
– 1 chock	W2S
– 2 socket	0462-201-16141

The female connector is not included in delivery volume. Can be supplied by Rexroth upon request.

Insulation class to DIN/EN 60529: IP67 and IP69K



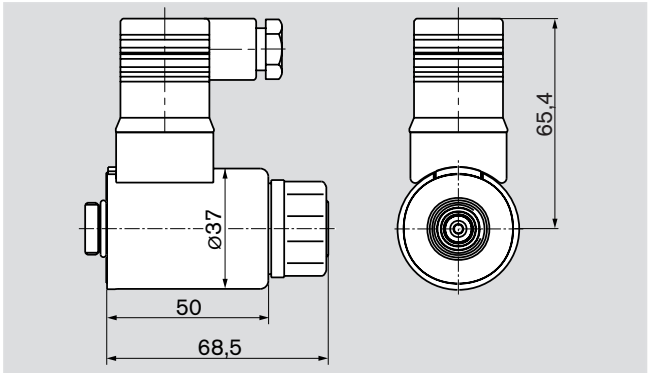
Hirschmann-Stecker nach DIN EN 175 301-803-A /ISO 4400

without bidirectional quenching diode _____ **H**

The mating connector is included in delivery volume of the pump.

Insulation class to DIN/EN 60529: IP65

The sealing ring in the screw-in cable connector (M16x1,5) is designed for cable diameters of 4,5 mm to 10 mm.



Rotary Inch Valve

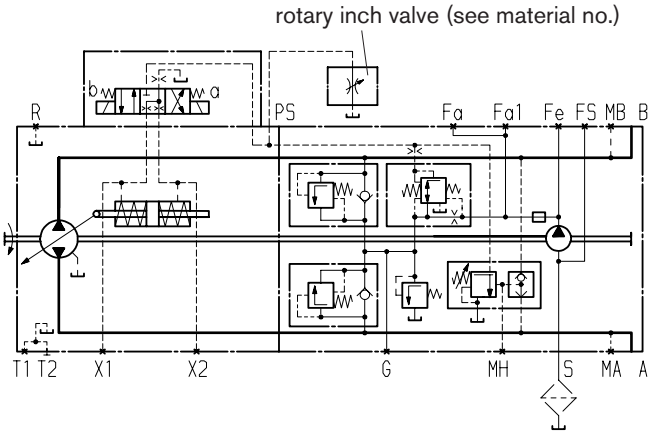
Permits the control pressure to be reduced independently of the drive speed controlled by the position of the inch lever. Maximum movement 90°. The lever may be fixed in any position.

The valve is mounted separately from the pump and connected with the pump by the hydraulic control line at port P_S; (max. line length approximately 2 metres).

The rotary inch valve needs to be ordered separately.

Size	Material-No.	Operation direction of the control lever
28, 40, 56, 71, 90	2048734 2048735	clockwise anti-clockwise
125	2048470 2048471	clockwise anti-clockwise
180, 250	2048474 2048475	clockwise anti-clockwise

Attention: The rotary inch valve can be used independently from the control device.



Hydraulic control, speed related, DA with separately installed hydraulic inch valve

Installation Situation for Coupling Assembly

In order to assure that rotating parts (coupling hub) and fixed parts (housing, circlip) do not contact each other the installation situations described in this leaflet have to be observed. The installation situation depends upon the sizes and the spline.

Size 28 and 40 (with free turning):

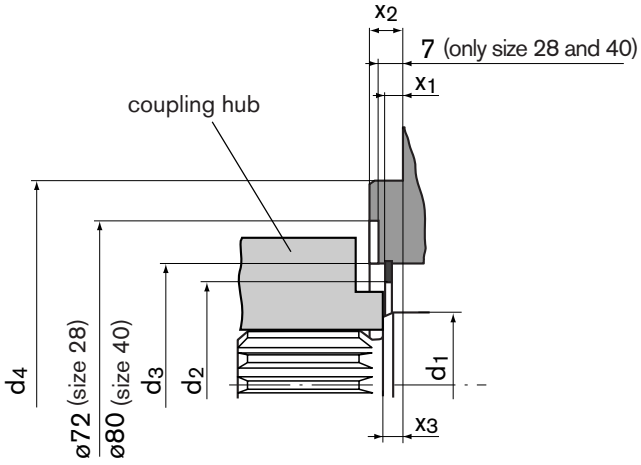
– SAE and DIN splined shaft
Please observe diameter of the free turning (size 28: ø72, size 40: ø80).

Size 56 to 250 (without free turning):

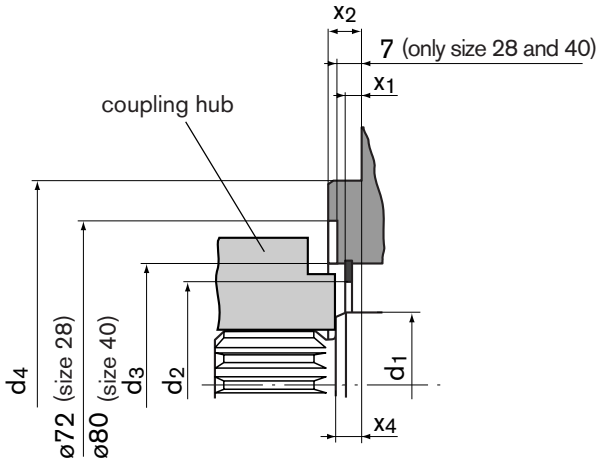
– SAE splined shaft (shaft S or T)
The outer diameter of the coupling hub must be smaller than the inner diameter of the circlip $\mathbf{d_2}$ at the zone of the drive shaft collar (measure $x_2 - x_3$).

– DIN splined shaft (shaft Z or A)
The outer diameter of the coupling hub must be smaller than the housing diameter d_3 at the zone of the drive shaft collar (measure $x_2 - x_4$).

SAE spline (spline to ANSI B92.1a-1976)



DIN spline (spline to DIN 5480)



Size	ød1	ød2 min	ød3	ød4	x1	x2	x3	x4
28	35	43,4	55 ±0,1	101,6	3,3 $^{+0,2}$	9,5 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,5}$
40	40	51,4	63 ±0,1	127	4,3 $^{+0,2}$	12,7 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,5}$
56	40	54,4	68 ±0,1	127	7,0 $^{+0,2}$	12,7 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,5}$
71	45	66,5	81 ±0,1	127	7,0 $^{+0,2}$	12,7 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,6}$
90	50	66,5	81 ±0,1	152,4	6,8 $^{+0,2}$	12,7 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,5}$
125	55	76,3	91 ±0,1	152,4	7,0 $^{+0,2}$	12,7 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,5}$
180	60	88	107 ±0,1	165,1	7,4 $^{+0,2}$	15,9 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,5}$
250	75	104,6	121	165,1	6,3 $^{+0,2}$	15,9 $_{-0,5}$	$8^{+0,9}_{-0,6}$	$10^{+0,9}_{-0,5}$

Installation and Commissioning Notes

General

The pump housing must be filled with hydraulic fluid prior to commissioning and remain full when operating.

Commissioning should be carried out at low speed and with no load until all air has been bled from the system.

If the pump is idle for extended periods, the housing may drain via the service lines. It is important to refill the housing sufficiently before putting the pump back into operation.

Leakage fluid in the housing space should be sent to the tank via the highest leakage oil port. Ensure a minimum suction pressure at port S of 0,8 bar abs. (cold start 0,5 bar absolute).

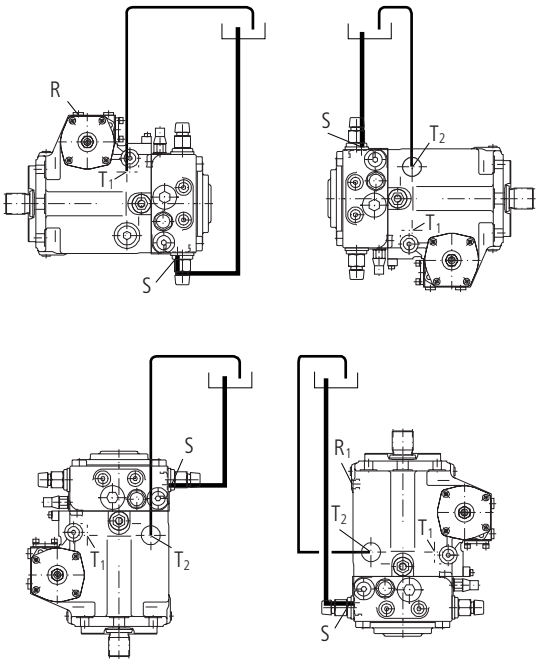
Installation position

Optional. In case pumps, sizes 71...250, are installed *„shaft upwards“* indicate accordingly on order. The pump is then supplied with additional bleeding port R1 in the flange area.

Installation below the tank

Pump below minimum oil level in tank (standard).

- Before commissioning, fill axial piston pump via the highest leakage oil port
- In the „shaft upwards“ installation position, make sure that the pump housing is completely filled when starting up (air bleed at port R1). Any air pocket in the bearing area will cause damage to the axial piston unit.
- Recommendation: fill the suction lines.
- Operate the pump at low speed (starter speed) until the pump system is completely filled (check: oil must be discharged without bubbles from port G; drain oil via measuring line to tank)
- In the installation position „control device upwards“, the air is bled from the pump via port R.
- Minimum immersion depth of suction or leakage oil line in the tank: 200 mm (in relation to min. oil level in tank).
- Closed circuit air bleed (additionally):
  - variable displacement motor A6VM: via port G
  - motor with flushing valve: no air bleed necessary.



Installation above the tank

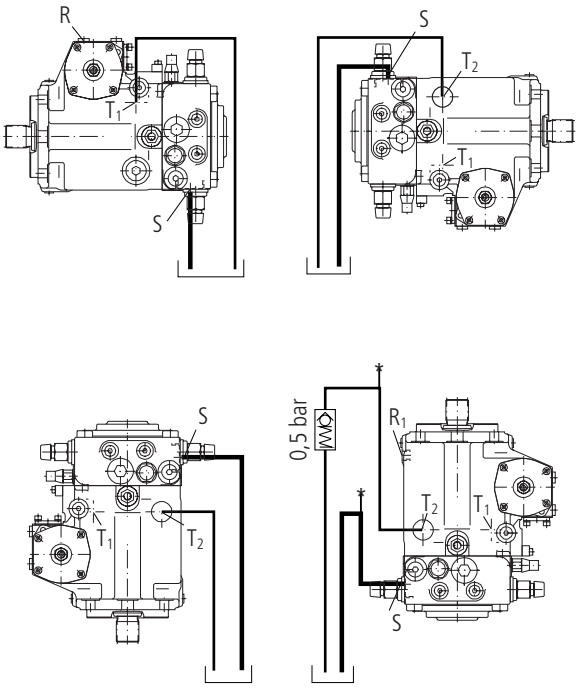
Pump above minimum oil level in tank

- Precautions: see installation below the tank
- Installation position (shaft upwards)

  Oil may drain out of the housing via the drain line after long periods at standstill (air enters via the shaft seal). The bearings are thus insufficiently lubricated when the pump is started up again. This problem can be prevented by means of a non-return valve in the drain line (opening pressure 0,5 bar).

  On starting up, it is absolutely necessary that the pump is filled via the drain port and bled via the additional port R1. We also recommend filling the suction line.

- Please note: - max. perm. suction height $h_{max} = 800$ mm
  - min. perm. suction pressure at port S (see page 5)



Safety Instructions

– The pump A4VG is designed for application in closed circuits.

– Layout, assembly, startup and operation of the pump requires sufficiently trained staff.

– The service and operating ports are only designed for the connection of hydraulic lines.

– Tightening torques: Do not exceed the max. permissible tightening torque of the fittings used, see manufacturer's specifications.
For fixing screws conforming to DIN 13, we recommend to verify the tightening torque in each individual case in accordance with VDI 2230, edition 2003.

– During and shortly after operation of the pump, the solenoids are extremely hot: do not touch - risk of burns.

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