

# Axial Piston Variable Displacement Pump A10VG

**RE 92 750/06.04**  
replaces: 03.98

1/36

## Closed Circuit

Sizes 18...63  
Series 1  
Nominal pressure 300 bar  
Peak pressure 350 bar



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## Features

- Variable displacement axial piston pump with swashplate design for hydrostatic closed circuit transmissions
- Flow is proportional to drive speed and displacement and is infinitely variable
- Output flow increases with the swivel angle of the swashplate from 0 to its maximum value
- Flow direction changes smoothly when the swashplate is moved through the neutral position
- A wide range of highly adaptable control instruments is available for different control and regulating functions
- The pump is equipped with two pressure relief valves on the high pressure ports to protect the hydrostatic transmission (pump and motor) from overload
- The pressure relief 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

# Ordering Code / Standard Program

## Axial piston unit

Variable swashplate design, nominal pressure 300 bar, peak pressure 350 bar										A10V										
<b>Operation</b>																				
Pump in closed circuit										G										
<b>Size</b>																				
△ Displacement $V_{g\max}$ in cm <sup>3</sup>										18	28	45	63							
<b>Control device</b>										18	28	45	63							
Hydraulic control, pilot pressure related										●	●	●	●	HD1						
Hydraulic control, mechanical servo										●	●	●	●	HW						
Hydraulic control, speed related										-	●	●	●	DA						
Hydraulic control, direct operated										●	●	●	●	DG						
Electrical two-position control, with switching solenoid										●	●	●	●	EZ						
Electrical control, with proportional solenoid										●	●	●	●	EP						
Mechanical pivot control										●	-	-	-	MD						
<b>Solenoid voltage (only for EP, EZ or DA)</b>																				
U = 12 V										●	●	●	●	1						
U = 24 V										●	●	●	●	2						
<b>Pressure cut-off</b>																				
without pressure cut-off (no code)										●	●	●	●							
with pressure cut-off (standard for version with DA control valve)										-	●	●	●	D						
<b>Neutral position switch (only for HW)</b>																				
without neutral position switch (no code)										●	●	●	●							
with neutral position switch										●	●	●	●	L						
<b>Mechanical stroke limiter</b>																				
without mechanical stroke limiter (no code)										●	●	●	●							
with mechanical stroke limiter, external adjustable										●	●	●	●	M						
<b>Spring neutral position centering (only MD)</b>																				
without spring neutral position centering (no code)										●	-	-	-							
with spring neutral position centering										●	-	-	-	N						
<b>DA control valve</b>										EZ	DG	EP	HW	HD	DA	28	45	63		
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 connections for master controller										-	●	●	●	●	●	●	●	●	7	
with DA control valve, fixed setting, and hydraulic inch valve built-on, control																●	●	●	●	4
																●	●	●	●	8
with DA control valve, mech. adjust. with control lever and hydraulic inch valve built-on, control with brake fluid										L	-	-	-	-	●	●	●	●	5L	
										R	-	-	-	-	●	●	●	●	5R	
with DA control valve, mech. adjust. with control lever and hydraulic inch valve built-on, control with mineral oil										L	-	-	-	-	○	●	●	●	9L	
										R	-	-	-	-	○	●	●	●	9R	
<b>DA control valve with control lever</b>																				
without control lever (no code)																				
with control lever - anti-clockwise operation direction													L							
with control lever - clockwise operation direction													R							
<b>Series</b>																				
Series 1, Index 0													10							

**A10VG** **G** / **10** - **N** **C** - 4)

Axial piston unit  
 Operation  
 Size  
 Control device  
 Series, Index

Direction of rotation		18	28	45	63	
viewed on shaft end	clockwise	●	●	●	●	R
	anti-clockwise	●	●	●	●	L

Seals	18	28	45	63	
NBR, shaft seal in FKM (fluor-caoutchouc)	●	●	●	●	N

Shaft end (permissible input torque see page 7)		18	28	45	63	
splined shaft ANSI B92.1a-1976	standard for single pump	●	●	●	●	S
	standard for combination pump	-	-	●	●	T

Mounting flange	
SAE J744 – 2-hole	C

Service line ports	18	28	45	63	
SAE flange ports A and B, (metric fastening thread) at side (same side)	-	●	●	●	10
threaded ports A and B (metric), st side (same side)	●	-	-	-	16

Auxiliary pump and through drive					
Auxiliary pump	Flange SAE J744 <sup>1)</sup>	Splined shaft hub <sup>2)</sup>			
without	-	-	-	●	N00
with	-	-	-	●	F00
with	82-2 (A)	5/8 in	9T 16/32 DP	●	F01
		7/8 in	13T 16/32 DP	●	F02
	101-2 (B)	1 in	15T 16/32 DP	-	F04
		1 1/4 in	14T 12/24 DP	-	F07
without	82-2 (A)	5/8 in	9T 16/32 DP	●	K01
		7/8 in	13T 16/32 DP	●	K02
	101-2 (B)	1 in	15T 16/32 DP	-	K04
		1 1/4 in	14T 12/24 DP	-	K07

Valves		setting range			
with high pressure relief valve, direct controlled, (fixed setting)	250...340 bar	without bypass	●	●	3
		with bypass	●	●	5
	100...250 bar	without bypass	●	●	4
		with bypass	●	●	6

Filtration					
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 <sub>e</sub> and G (F <sub>a</sub> ))	●	●	●	●	D
External supply (model without integral auxiliary pump - N00, K..)	●	●	●	●	E

Range of male connectors for solenoids (only for EP, EZ and DA)					
DEUTSCH male connector injection molded, 2-pin (without quenching diode)	●	●	●	●	P
DEUTSCH male connector injection molded, 2-pin (with bi-directional quenching diode) <sup>3)</sup>	○	○	○	○	Q
DIN male connector to Hirschmann (without quenching diode) (not for new projects)	●	●	●	●	H

<sup>1)</sup> 2 ≅ 2-hole  
<sup>2)</sup> splined shaft hub to ANSI B92.1a-1976 (splined shaft allocation to SAE J744, see pages 26-27)  
<sup>3)</sup> only for control EZ and DA  
<sup>4)</sup> no code = standard version, S = special version, K = combination with mounted part or mounted pump

● = available      ○ = available on request      - = not available      □ = preferred program

# 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 variable displacement pump A10VG is unsuitable for operation with HFA, HFB and HFC. For operation with HFD or environmentally acceptable hydraulic fluids, restrictions in the technical data and seal selection must be noted; inquire if necessary (please state the hydraulic fluid to be used in plain text in the order).

### Operating viscosity range

For optimum efficiency and service life, select an operating viscosity (at operating temperature) within the optimum range of

$$v_{\text{opt}} = \text{opt. operating viscosity } 16 \dots 36 \text{ mm}^2/\text{s}$$

depending on the circuit temperature (closed circuit).

### Limits of viscosity range

The limiting values for viscosity are as follows:

$$v_{\text{min}} = 5 \text{ mm}^2/\text{s}$$

short term ( $t < 3 \text{ min}$ )  
at max. perm. temperature of  $t_{\text{max}} = +115^\circ\text{C}$ .

Note that the max. hydraulic fluid temperature of  $115^\circ\text{C}$  may not be exceeded even locally (e.g. in the bearing area).

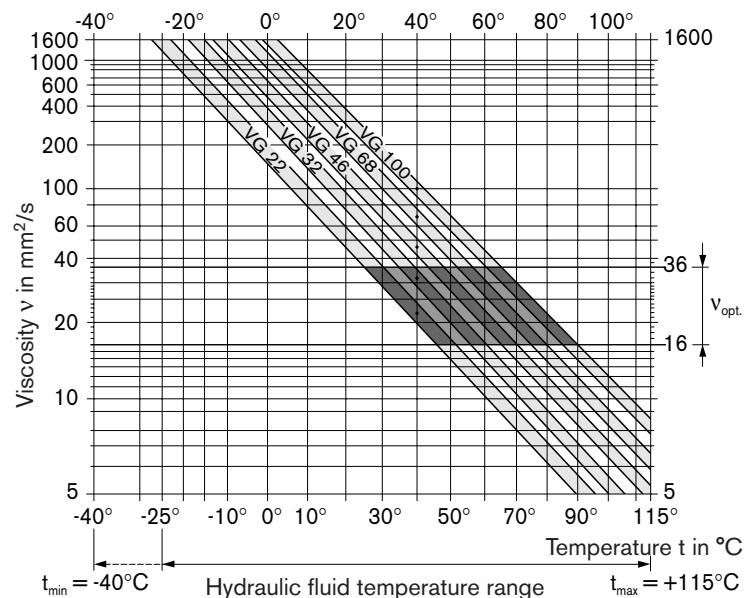
$$v_{\text{max}} = 1600 \text{ mm}^2/\text{s}$$

short term ( $t < 3 \text{ min}$ )  
at cold start ( $p \leq 30 \text{ bar}$ ,  $n \leq 1000 \text{ rpm}$ ,  $t_{\text{min}} = -40^\circ\text{C}$ ).  
Only for starting up without load. Optimum operating viscosity must be reached within approx. 15 minutes.

Special measures are necessary in the temperature range from  $-40^\circ\text{C}$  to  $-25^\circ\text{C}$ , please contact us.

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

### Selection diagram



### Notes on the selection of the hydraulic fluid

To choose the correct hydraulic fluid, it is necessary to know the operating temperature in the circuit (closed circuit), depending on the ambient temperature.

The hydraulic fluid should be selected so that the operating viscosity is in the optimum range ( $v_{\text{opt}}$ ) in the operating temperature range, see selection diagram, shaded area. We recommend choosing the higher viscosity class.

Example: At an ambient temperature of  $X^\circ\text{C}$  an operating temperature of  $60^\circ\text{C}$  is set in the circuit. In the optimum operating viscosity range ( $v_{\text{opt}}$ ; shaded area) this corresponds to the viscosity classes VG 46 or VG 68; choose: VG 68.

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  $115^\circ\text{C}$  at any point in the circuit.

If the above conditions cannot be satisfied in the case of extreme operating parameters or high ambient temperatures, please contact us.

# Technical Data

## Filtration

The finer the filtration, the higher the cleanliness class of the hydraulic fluid and the longer the life of the axial piston unit.

To ensure functional reliability of the axial piston unit at least cleanliness class

20/18/15 to ISO 4406 is necessary.

Depending on the system and the application, for the A10VG we recommend

filter elements  $\beta_{20} \geq 100$

With a rising pressure differential at the filter element, the  $\beta$ -value must not deteriorate.

At very high hydraulic fluid temperatures (90°C to max. 115°C) at least cleanliness class

19/17/14 to ISO 4406 is necessary.

If the above classes cannot be observed, please contact us. For notes on filtration types, see page 32.

## Shaft seal temperature range

The FKM shaft seal ring is permissible for housing temperatures of -25°C to +115°C.

Note:

For applications below -25°C, an NBR shaft seal is necessary (permissible temperature range: -40°C to +90°C). Please state NBR shaft seal in plain text when ordering

## Operating pressure range

### Inlet

Variable displacement pump (with external supply, E):

For control devices EP, EZ, HW and HD1

Boost pressure (at  $n = 2000$  rpm)  $p_{Sp}$  \_\_\_\_\_ 18 bar

For control devices DA, DG

Boost pressure (at  $n = 2000$  rpm)  $p_{Sp}$  \_\_\_\_\_ 25 bar

Auxiliary pump:

Suction pressure  $p_{s \min}$  ( $v \leq 30$  mm<sup>2</sup>/s) \_\_\_\_\_  $\geq 0.8$  bar absolute

For cold start \_\_\_\_\_  $\geq 0.5$  bar absolute

### Outlet

Variable displacement pump:

Pressure at port A or B

Nominal pressure  $p_N$  \_\_\_\_\_ 300 bar

Peak pressure  $p_{max}$  \_\_\_\_\_ 350 bar

Summation pressure (pressure A + pressure B)  $p_{max}$  \_\_\_\_\_ 600 bar

Auxiliary pump:

Peak pressure  $p_{H \max}$  size 18 \_\_\_\_\_ 25 bar

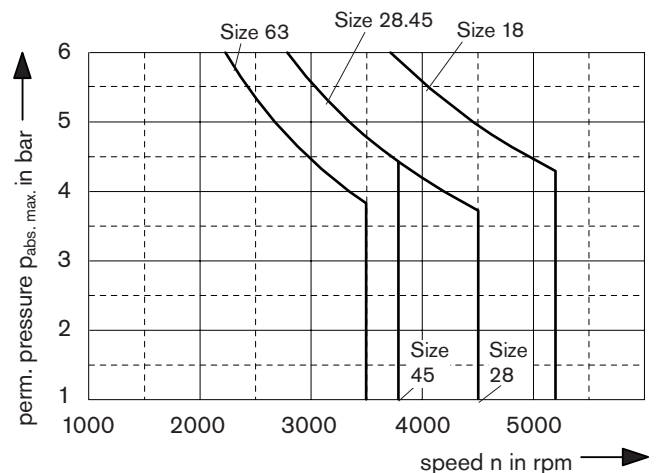
Summation pressure  $p_{H \max}$  size 28, 45, 63 \_\_\_\_\_ 40 bar  
(pressure data according to DIN 24312)

## Case drain pressure

The lower the speed and the case drain pressure, the longer the service life of the shaft seal ring. The values shown in the diagram are permitted maximum values for a shaft seal ring under intermittent pressure and must not be exceeded.

Stationary pressure loads within the range of the maximum permitted leakage pressure may reduce the service life of the shaft seal ring.

Pressure loads of up to 6 bar are acceptable for short periods ( $t < 5$  min), regardless of speed.



# Technical Data

**Table of values (theoretical values, without efficiencies and tolerances; values rounded)**

Size				18	28	45	63
Displacement							
Variable displacement pump	$V_{g \max}$	$\text{cm}^3$		18	28	46	63
Auxiliary pump (at $p = 20$ bar)	$V_{gH}$	$\text{cm}^3$		5.5	6.1	8.6	14.9
Speed							
Maximum at $V_{g \max}$	$n_{\max \text{ continuous}}$	rpm		4000	3900	3300	3000
Limited maximum <sup>1)</sup>	$n_{\max \text{ limited}}$	rpm		4850	4200	3550	3250
Intermittent maximum <sup>2)</sup>	$n_{\max \text{ interm.}}$	rpm		5200	4500	3800	3500
Minimum	$n_{\min}$	rpm		500	500	500	500
Flow							
at $n_{\max \text{ continuous}}$ and $V_{g \max}$	$q_{V \max}$	l/min		72	109	152	189
Power <sup>3)</sup>							
at $n_{\max \text{ continuous}}$ $\Delta p = 300$ bar	$P_{\max}$	kW		36	54.6	75.9	94.5
Torque <sup>3)</sup>							
at $V_{g \max}$ $\Delta p = 300$ bar	$T_{\max}$	Nm		86	134	220	301
$\Delta p = 100$ bar	$T$	Nm		28.6	44.6	73.2	100.3
Moment of inertia (about drive axis)							
	$J$	$\text{kgm}^2$		0.00093	0.0017	0.0033	0.0056
Rotational vibration <sup>4)</sup>							
Angular acceleration, max	$\alpha$	$\text{rad/s}^2$		6800	5500	4000	3300
Speed variation, max	$\Delta n$	rpm		18	17	14	13
Limit frequency	$f_{\text{limit}}$	$\text{sec}^{-1}$		1170	1013	855	788
Rotary stiffness							
Shaft end S		Nm/rad		20284	32143	53404	78370
Shaft end T		Nm/rad		–	–	73804	92368
Filling capacity							
		L		0.45	0.64	0.75	1.1
Mass (excluding through drive) approx.							
	$m$	kg		14(18) <sup>5)</sup>	25	27	39

<sup>1)</sup> Limited maximum speed: – at half power (e.g. at  $V_{g \max}$  and  $p_N / 2$ )

<sup>2)</sup> Intermittent maximum speed:  
 – at high idling speed  
 – at overspeed:  $\Delta p = 70 \dots 150$  bar and  $V_{g \max}$   
 – at reversing peaks:  $\Delta p < 300$  bar and  $t < 5$  sec.

<sup>3)</sup> Without auxiliary pump

<sup>4)</sup> The permissible angular acceleration or speed variation only applies to single pumps, not to combination pumps.

The load on connection parts (e.g. through drive) must be taken into account additionally.

at  $f < f_{\text{limit}}$ , the  $\Delta n$  indicated in the table is permitted.

at  $f > f_{\text{limit}}$ , the permitted angular acceleration  $\alpha$  indicated in the table limits the size of the speed variation:  $\Delta n_{\text{perm.}} = 3.04 \cdot \alpha / f$ .

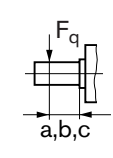
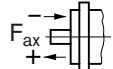
<sup>5)</sup> 14 kg: MD control, 18 kg: HD control

## Determining the nominal value

Flow	$q_v = \frac{V_g \cdot n \cdot \eta_v}{1000}$	l/min	$V_g =$ displacement volume per revolution in $\text{cm}^3$
			$\Delta p =$ differential pressure in bar
Torque	$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}}$	Nm	$n =$ speed in rpm
			$\eta_v =$ volumetric efficiency
			$\eta_{mh} =$ mechanical-hydraulic efficiency
Power	$P = \frac{2 \pi \cdot T \cdot n}{60 \cdot 1000} = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t}$	kW	$\eta_t =$ total efficiency

## Technical Data

### Permissible axial and radial loading on drive shaft

Size			18	28	45	63	
Radial load, max. at distance (from shaft collar)	$F_{q \max}$	EM	1300	2500	3600	5000	
	a	mm	16.5	17.5	17.5	17.5	
		$F_{q \max}$	E	1000	2000	2891	4046
	b	mm	29	30	30	30	
	$F_{q \max}$	EM	880	1700	2416	3398	
	c	mm	41.5	42.5	42.5	42.5	
Axial load, max.		EM	973	987	1500	2200	

Note: special requirements apply in the case of belt drives. Please contact us.

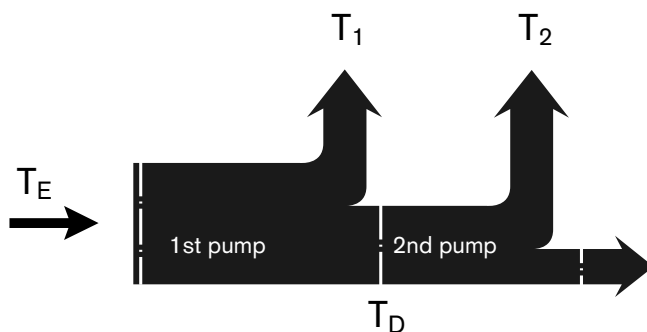
### Permissible input and through drive torques

Size			18	28	45	63
Torque (at $V_g \max$ and $\Delta p = 300 \text{ bar}^1$ )	$T_{\max}$	Nm	86	134	220	301
Input torque, max. <sup>2)</sup>						
at shaft end S	$T_{E \text{ perm.}}$	Nm	192	314	314	602
ANSI B92.1a-1976 (SAE J744)			7/8 in	1 in	1 in	1 1/4 in
at shaft end T	$T_{E \text{ perm.}}$	Nm	—	—	602	970
ANSI B92.1a-1976 (SAE J744)					1 1/4 in	1 3/8 in
Through drive torque, max.	$T_{D \text{ perm.}}$	Nm	112	220	314	439

<sup>1)</sup> Efficiency not taken into account

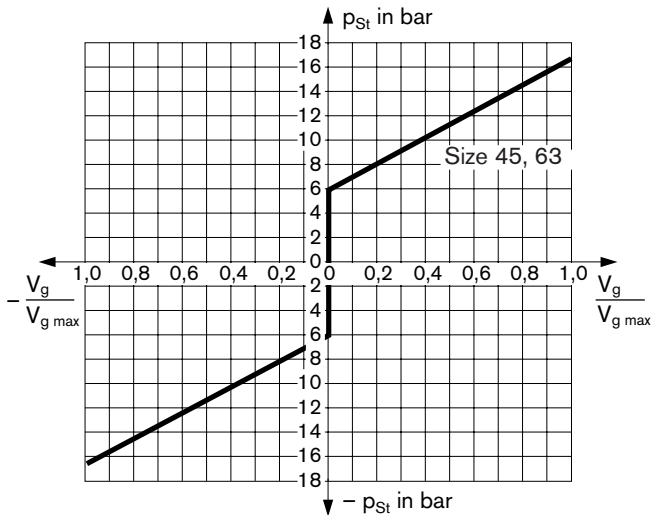
<sup>2)</sup> For drive shafts without transverse forces

### Torque distribution



# HD1 - Hydraulic Control, Pilot Pressure Related

Depending on the pressure difference of the pilot pressure  $p_{St}$  in the two control lines (ports  $Y_1$  and  $Y_2$ ) the positioning cylinder of the pump is supplied with control pressure via the HD1 control module. As a result, the swashplate and thus the displacement volume are continuously adjustable. A flow direction is assigned to each control line.



Size	18	28	45	63
Start of control ( $V_{g0}$ ) $p_{St}$ bar	6	6	6	6
End of control ( $V_{gmax}$ ) $p_{St}$ bar	15.7	16	16.7	16.7

$p_{St}$  : pilot pressure at port  $Y_1, Y_2$

The characteristic curve may shift depending on the operating status (operating pressure, oil temperature) of the pump.

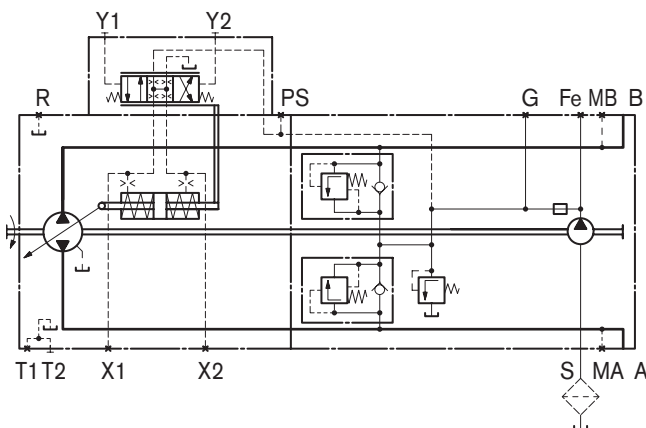
If the pump is also equipped with a DA control valve, automotive operation is possible for travel drives. For DA control valves, see page 11.

For pressure cut-off, see page 29.

Please note:

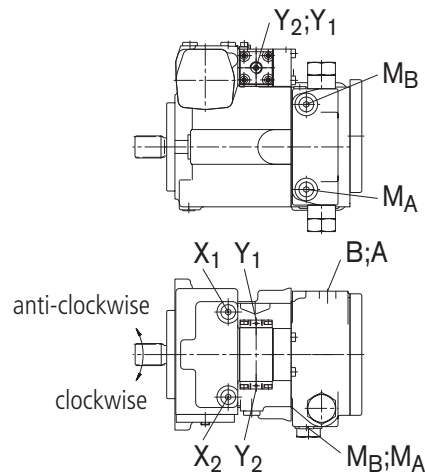
The HP control must be vented to the tank in the neutral position via the external pilot controller.

### Standard model

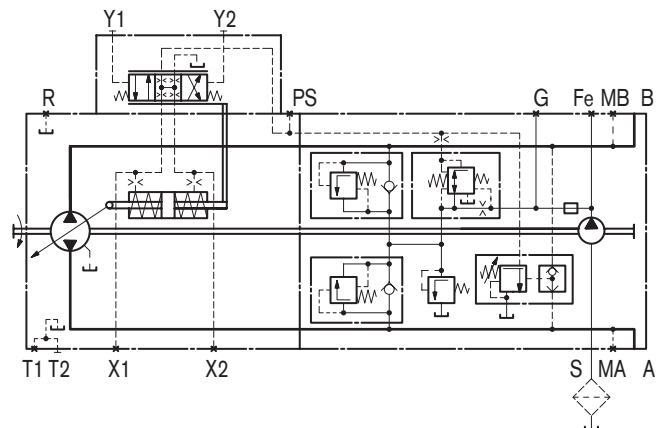


### Assignment

Direction of rotation - Control - Direction of through put flow				
	Pilot pressure	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	$Y_1$	$X_1$	A to B	$M_B$
	$Y_2$	$X_2$	B to A	$M_A$
Direction of rotation anti-clockwise	$Y_1$	$X_1$	B to A	$M_A$
	$Y_2$	$X_2$	A to B	$M_B$

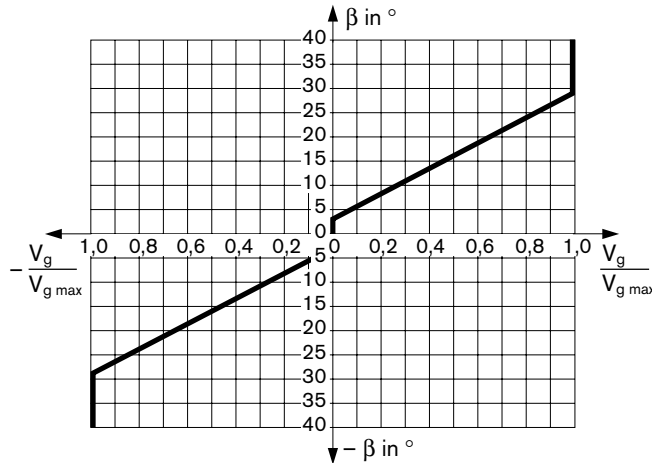


### Model with DA control valve



# HW - Hydraulic Control, Mechanical Servo

Depending on the actuation direction, a or b, of the control lever, the positioning cylinder of the pump is supplied with control pressure via the HW control module. As a result, the swashplate and thus the displacement volume are continuously adjustable. A flow direction is assigned to each operating direction of the control lever.



Swivel angle  $\beta$  at the control lever for deflection:

Start of control at  $\beta = 3^\circ$

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

Mech. stop:  $\pm 40^\circ$

Torque required at the control lever approx. 170 Ncm.

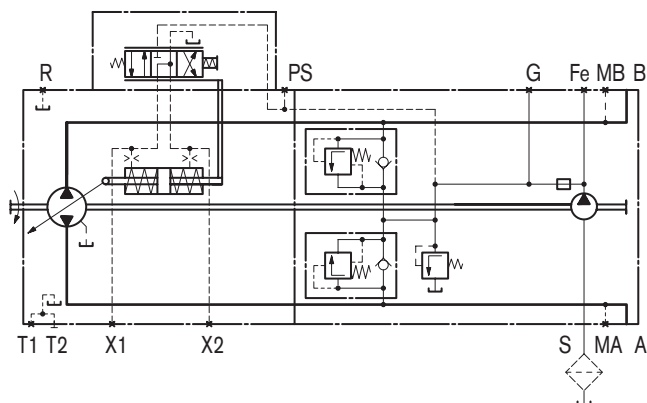
The deflection of the HW control lever must be limited by the external position sensor (setpoint device).

The characteristic curve may shift depending on the operating status (operating pressure, oil temperature) of the pump.

If the pump is also equipped with a DA control valve, automotive operation is possible for travel drives, for example. For DA control valves, see page 11.

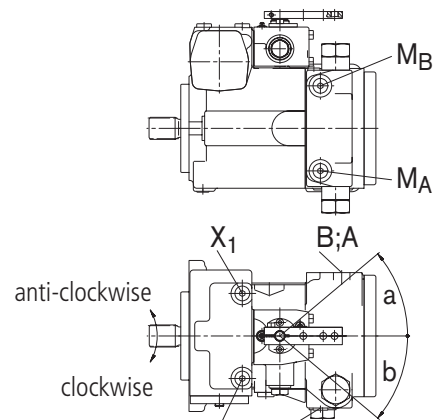
For pressure cut-off, see page 29.

## Standard model



**Assignment**  
Direction of rotation - Control - Direction of through put flow

	Lever direction	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	a	X <sub>2</sub>	B to A	M <sub>A</sub>
	b	X <sub>1</sub>	A to B	M <sub>B</sub>
Direction of rotation anti-clockwise	a	X <sub>2</sub>	A to B	M <sub>B</sub>
	b	X <sub>1</sub>	B to A	M <sub>A</sub>



## Variation: Neutral position switch, L

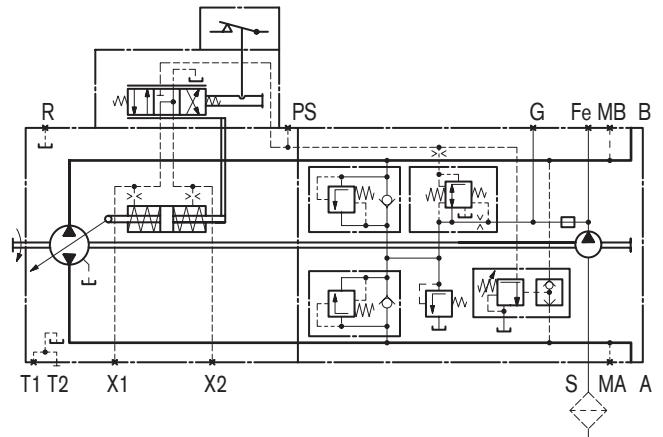
The neutral position switch is closed when the HW control lever is in the neutral position. The switch opens if the control lever is moved out of neutral in either direction.

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

### Technical data of neutral position switch

Load capacity	20 A (coninuous), without switching processes
Switching capacity	15 A / 32 V (resistive load) 4 A / 32 V (inductive load)
Connector design	DEUTSCH male connector DT04-2P-EP04 (mating connector see page 33)

## Model with DA control valve and neutral position switch



# 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 drops.

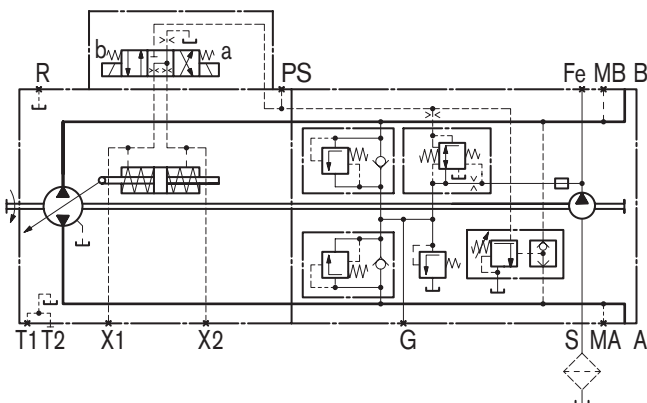
Any additional power requirement, such as implement hydraulics, may result in further engine pull down. This causes a further reduction in pilot pressure and therefore pump displacement. Automatic power division and full utilization of available power is thus achieved for both the vehicle transmission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

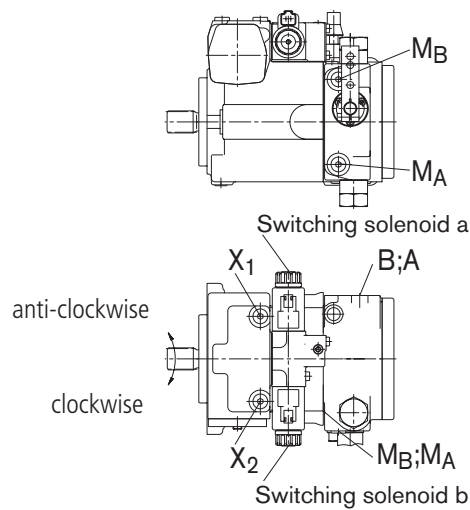
The DA regulating cartridge can also be used in pumps with conventional control devices, such as EP, HW or HD, to provide an engine anti-stall function, or as a combination of automotive and displacement control functions.

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 dependent, DA control valve, fixed setting, DA1D2/DA2D2



Assignment				
Direction of rotation - Control - Direction of through put flow				
	Solenoid	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	a	X <sub>2</sub>	B to A	M <sub>A</sub>
	b	X <sub>1</sub>	A to B	M <sub>B</sub>
Direction of rotation anti-clockwise	a	X <sub>2</sub>	A to B	M <sub>B</sub>
	b	X <sub>1</sub>	B to A	M <sub>A</sub>



Solenoid technical data		
Voltage	12 V (±20 %)	24 V (±20 %)
Neutral position V <sub>g 0</sub>	de-energized	de-energized
V <sub>g max</sub>	Current energized	Current 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 %
Type of protection	see connector version on page 33	

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

## Function and Control of DA Control Valves

### DA control valve, fixed setting (2)

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

Control pressure may be reduced, independently of drive speed, through mechanical operation of the control lever (inch function).

Max. permitted operating torque at the control lever  $T_{\max} = 4 \text{ Nm}$

Max. angle of rotation  $70^\circ$ , lever position: any.

Variation 3L \_\_\_ Operating direction of control lever anti-clockwise

Variation 3R \_\_\_ Operating direction of 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)

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

Max. permitted pressure at port Z  $p_{\max}$  \_\_\_\_\_ 80 bar

#### Variation 4, 5:

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

#### Variation 8, 9:

Control at port Z by means of mineral oil.

### Control as inch valve (7)

- for inch function; used in conjunction with DA control valve, fixed setting

Control pressure may be reduced, independently of drive speed, through mechanical operation of the master controller.

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

A suitable master controller must be ordered separately and is not supplied with the unit.

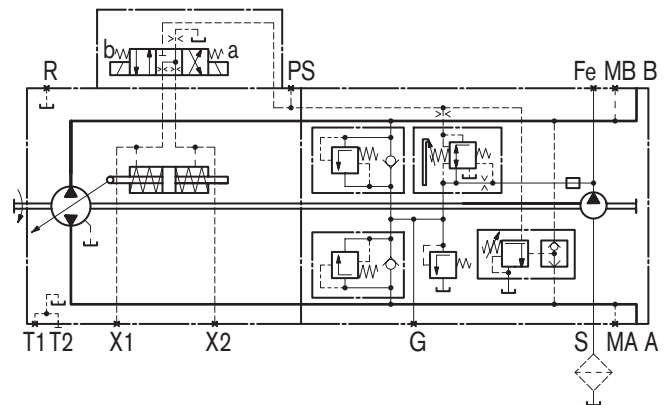
Detailed information is available from our sales department and on our website [www.boschrexroth.com/da-regelung](http://www.boschrexroth.com/da-regelung). Use our computer program to work out the drive design that meets your needs. A DA control must be approved by Rexroth.

Note: see page 31 for rotary inch valves.

### Circuit diagrams:

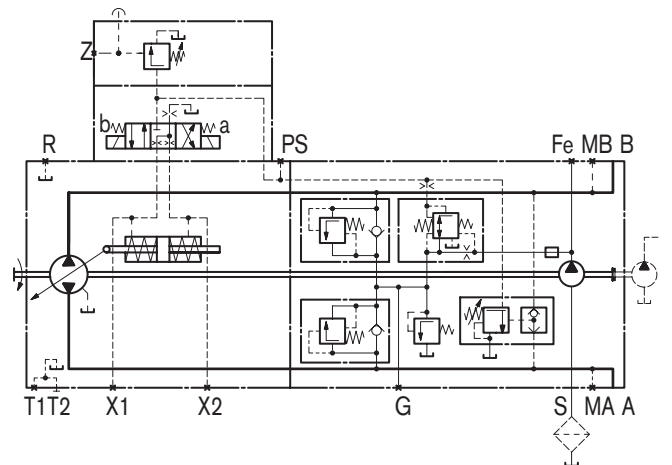
#### DA1D3/DA2D3

Hydraulic control, speed dependent,  
DA control valve, mech. adjustable with control lever



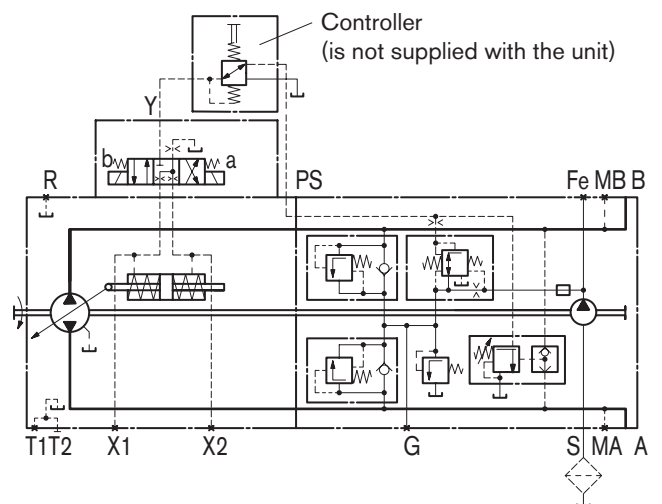
#### DA1D4/DA2D4

Hydraulic control, speed dependent,  
DA control valve, fixed setting, with hydraulic inch valve



#### DA1D7/DA2D7

Hydraulic control, speed dependent, DA  
DA control valve, fixed setting, with separately installed master controller as inch valve



# DG - Hydraulic Control, Direct Operated

The positioning cylinder of the pump is supplied with control pressure directly by turning a pilot pressure on or off at port X<sub>1</sub> or X<sub>2</sub>. As a result, the swashplate and thus the displacement can be set between V<sub>g0</sub> = 0 and V<sub>g max</sub>. A flow direction is assigned to each port.

Pilot pressure 0 bar  $\hat{=}$  Position V<sub>g0</sub> = 0

The pilot pressure requirement for the position V<sub>g max</sub> depends on the operating pressure and speed.

Max. permitted pilot pressure: 40 bar

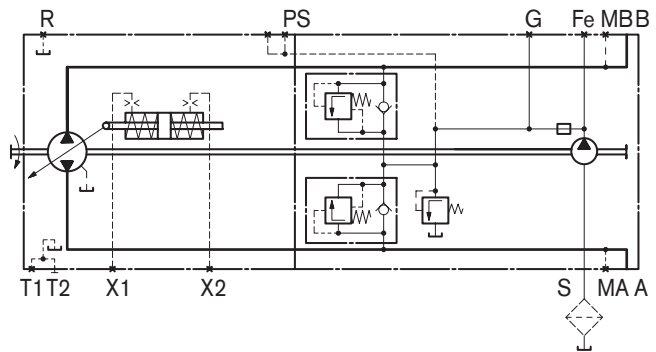
Please inquire when configuring.

The pressure cut-off and the DA control valve are only effective if the pilot controller for controlling the DG adjustment is supplied from port P<sub>S</sub>.

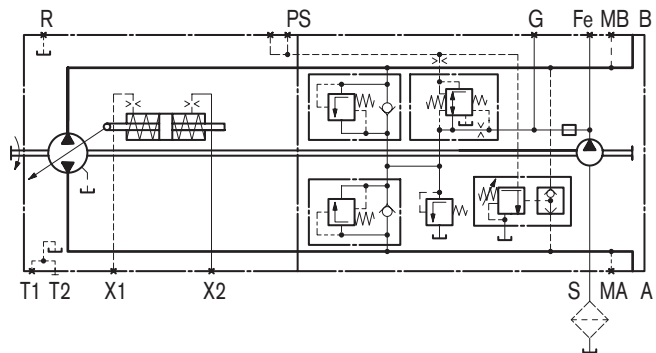
For pressure cut-off, see page 29.

Assignment Direction of rotation – Control – Direction of flow see HD1 adjustment, page 8 (control pressure X<sub>1</sub>; X<sub>2</sub>).

Standard model



Model with DA control valve



# 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<sub>g0</sub> = 0 to V<sub>g max</sub>. Each direction of flow is assigned to a solenoid.

Solenoid technical data	EZ1	EZ2
Voltage	12 V (±20 %)	24 V (±20 %)
Neutral position V <sub>g0</sub>	de-energized	de-energized
Position V <sub>g max</sub>	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 %
Type of protection	see connector version on page 33	

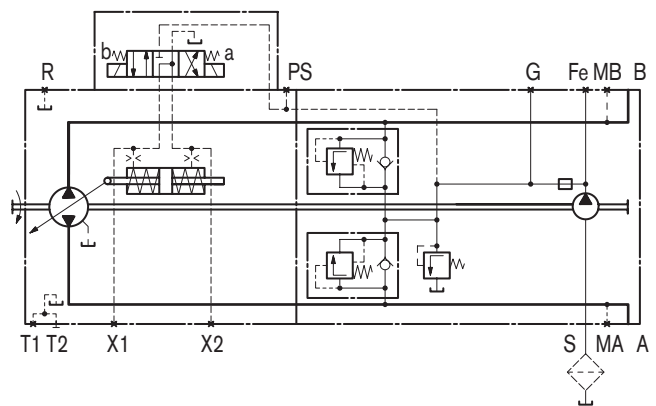
Standard:

Switching solenoid without manual emergency operation. Manual emergency operation with reset by valve spring available on request.

For pressure cut-off, see page 29.

Assignment Direction of rotation - Control - Direction of through put flow DA control see page 10.

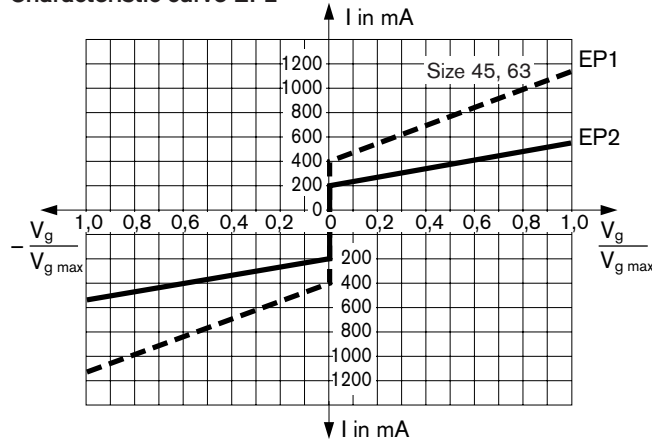
Standard model



# EP - Electrical Control, With Proportional Solenoid

The positioning cylinder of the pump is supplied with control pressure via the EP control module depending on the pre-selected current strength  $I$  at the two proportional solenoids (a and b). As a result, the swashplate and thus the displacement volume are continuously adjustable. A flow direction is assigned to each proportional solenoid.

Characteristic curve EP2

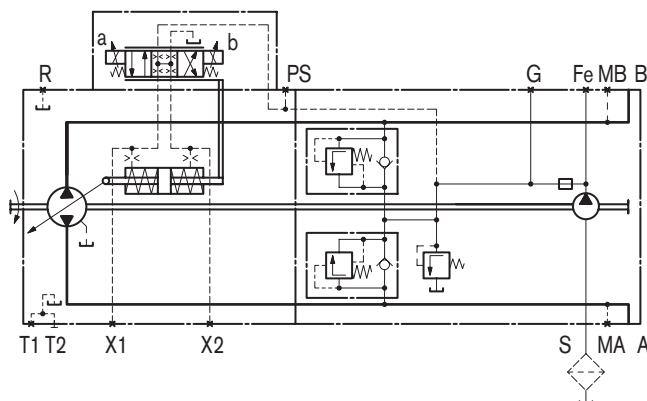


Control current						
<b>EP1</b>	<b>Size</b>	<b>18</b>	<b>28</b>	<b>45</b>	<b>63</b>	
	Start of control	mA	400	400	400	400
	End of control	mA	1050	1060	1115	1115
<b>EP2</b>	<b>Size</b>	<b>18</b>	<b>28</b>	<b>45</b>	<b>63</b>	
	Start of control	mA	200	200	200	200
	End of control	mA	525	530	560	560

The characteristic curve may shift depending on the operating status (operating pressure, oil temperature) of the pump.

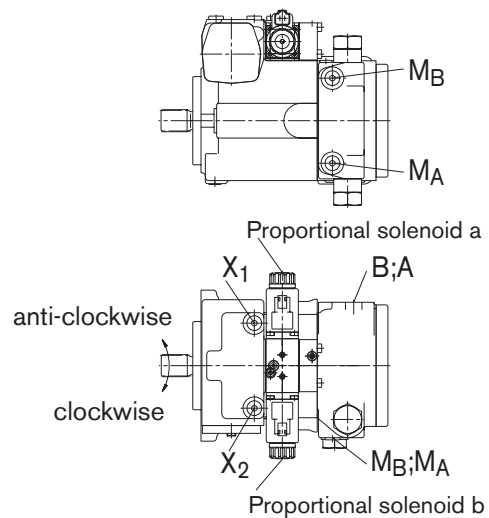
Solenoid technical data	EP1	EP2
Voltage	12 V ( $\pm 20\%$ )	24 V ( $\pm 20\%$ )
Limiting current	1.54 A	0.77 A
Nominal resistance (at 20°C)	5.5 $\Omega$	22.7 $\Omega$
Dither frequency	100 Hz	100 Hz
Duty cycle	100 %	100 %
Type of protection	see connector version on page 33	

## Standard model



Assignment  
Direction of rotation - Control - Direction of through put flow

	Solenoid	Control pressure	Through put flow	Operating pressure
Direction of rotation clockwise	a	X <sub>1</sub>	A to B	M <sub>B</sub>
	b	X <sub>2</sub>	B to A	M <sub>A</sub>
Direction of rotation anti-clockwise	a	X <sub>1</sub>	B to A	M <sub>A</sub>
	b	X <sub>2</sub>	A to B	M <sub>B</sub>



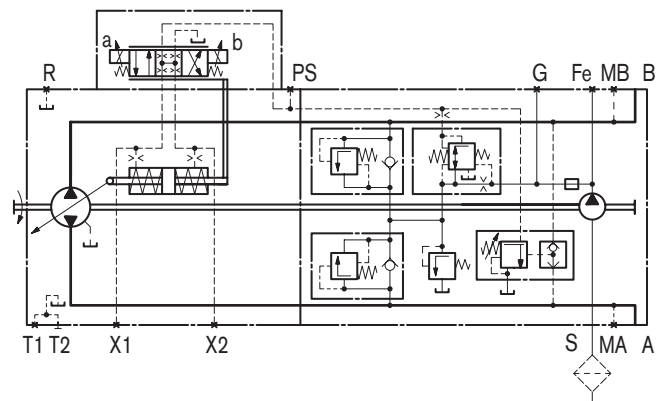
The following electronic control modules and amplifiers are available for actuating the proportional solenoids (details also available at [www.boschrexroth.com/mobile-electronics](http://www.boschrexroth.com/mobile-electronics)):

- Control unit RC (see RE 95200) and application software
- Proportional amplifier PVR (see RE 95022)

If the pump is also equipped with a DA control valve (see page 11), automotive operation is possible for travel drives.

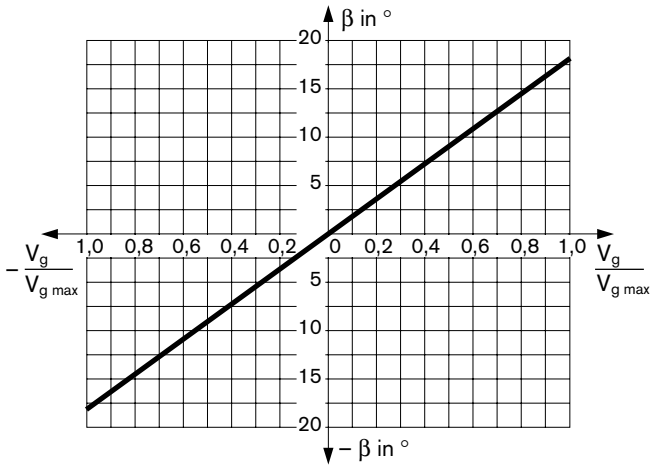
Standard:  
Proportional solenoid without emergency manual operation.  
Emergency manual operation with spring reset available on request.

## Model with DA control valve



# MD - Mechanical Pivot Control (size 18 only)

The swashplate is adjusted directly and thus the displacement volume of the pump is continuously varied depending on the position of the pivot. A rotation direction of the pivot is assigned to each flow direction.

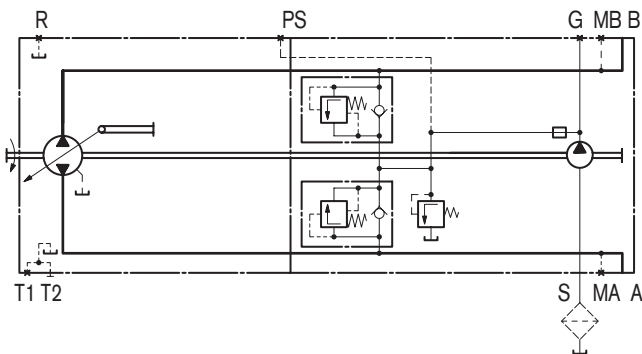


Swivel angle  $\beta$  at the control lever for deflection:  
 Start of control at  $\beta = 0^\circ$   
 End of control at  $\beta = 17.79^\circ$  (max. displacement volume  $V_{g\ max}$ )  
 Max. permitted operating torque at the control lever  $T_{max} = 30\ Nm$

The required actuating torque is independent of the operating pressure, speed, displacement volume, design of the control plate and its torsion.

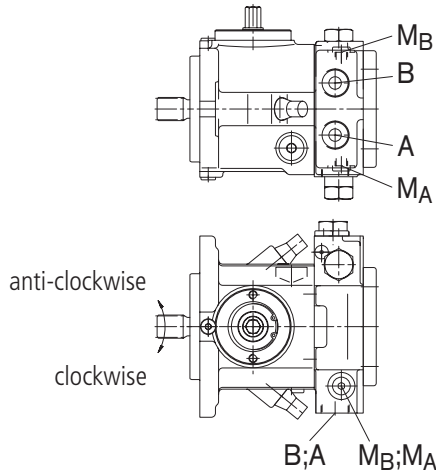
- higher operating pressure \_\_\_\_\_ higher actuating torque
- higher speed \_\_\_\_\_ higher actuating torque
- larger displacement volume \_\_\_\_\_ lower actuating torque

### Standard model (MD)



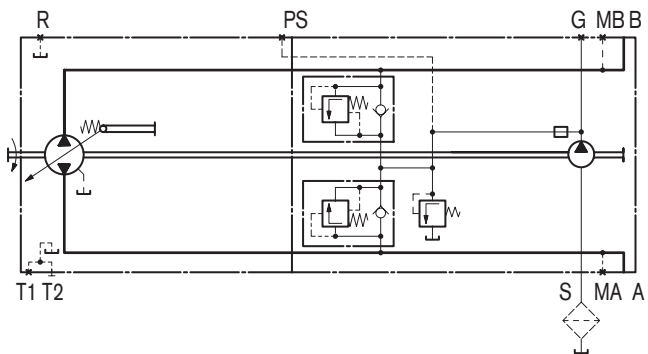
**Assignment**  
 Direction of rotation - Control - Direction of through put flow

	Lever direction	Through put flow	Operating pressure	Operating pressure
Direction of rotation clockwise	a	B to A	$M_A$	$M_A$
	b	A to B	$M_B$	$M_B$
Direction of rotation anti-clockwise	a	A to B	$M_B$	$M_B$
	b	B to A	$M_A$	$M_A$



### Variation: Spring neutral position centering (MDN)

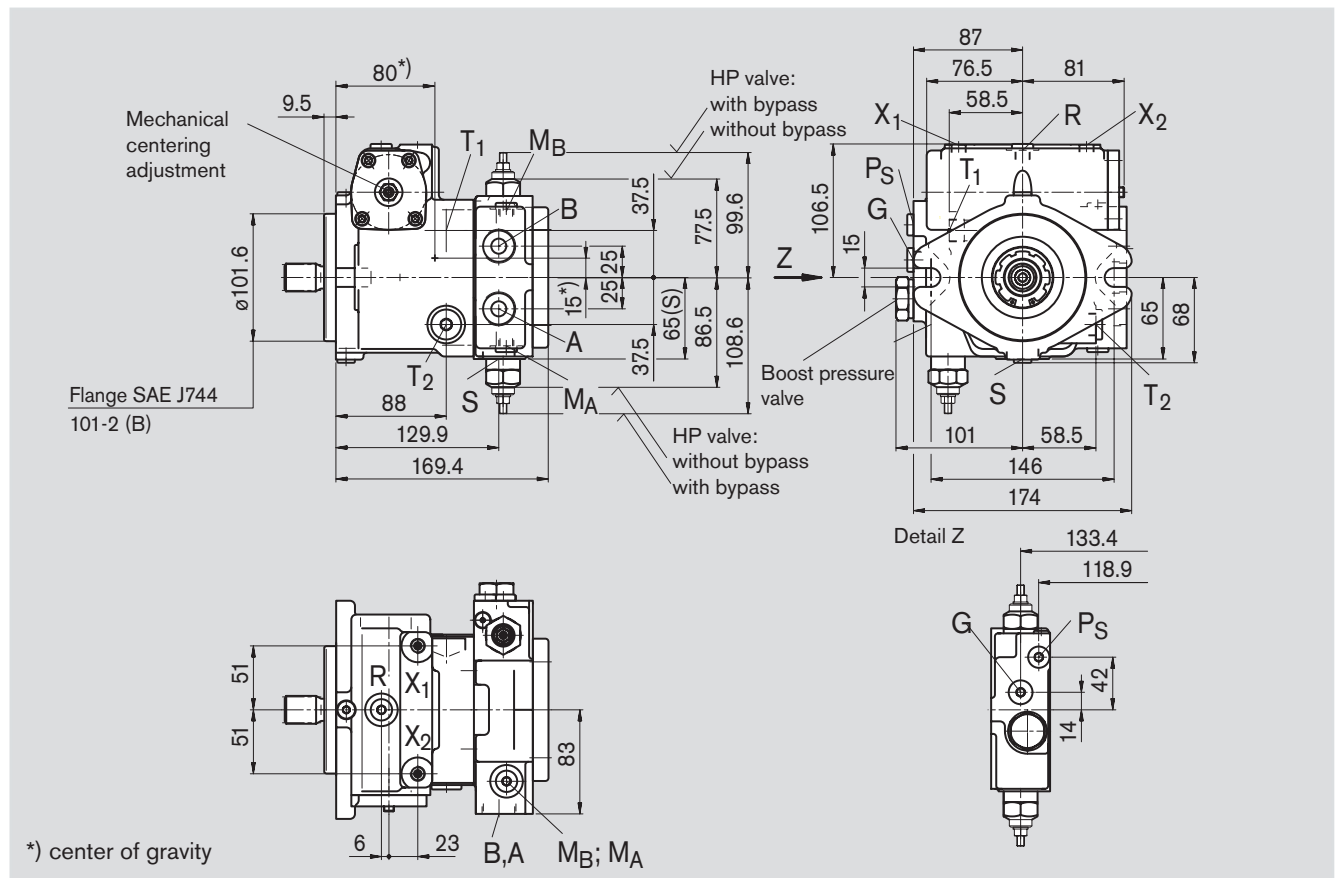
Spring neutral position centering automatically sets the pump to swivel angle 0 as soon as there is no actuating torque at the pivot pin.



# Unit Dimensions, Size 18

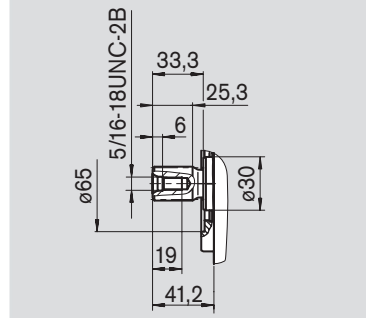
Please request a certified installation drawing before finalizing your design..

## Hydraulic Control, Direct Operated, DG



### Shaft ends

S Splined shaft 7/8in 13T 16/32DP <sup>1)</sup>  
(SAE J744 - 22-4 (B))



### Ports

Port	Description	Standard	Size	Depth	tightening torque, max.
A, B	Service line ports	DIN 3852	M27x2;	16 deep	330 Nm
T1	Case drain or filling port	DIN 3852	M18x1.5;	12 deep	140 Nm
T2	Case drain <sup>2)</sup>	DIN 3852	M18x1.5;	12 deep	140 Nm
MA, MB	Pressure gauge - operating pressure A, B <sup>2)</sup>	DIN 3852	M12x1.5;	12 deep	50 Nm
R	Air bleed <sup>2)</sup>	DIN 3852	M12x1.5;	12 deep	50 Nm
S	Boost suction port	DIN 3852	M26x1.5;	16 deep	230 Nm
X1, X2	Control pressure ports (before the orifice) <sup>2)</sup>	DIN 3852	M12x1.5;	12 deep	50 Nm
G	Pressure port for auxiliary circuits <sup>2)</sup>	DIN 3852	M14x1.5;	12 deep	80 Nm
PS	Control pressure supply <sup>2)</sup>	DIN 3852	M12x1.5;	12 deep	50 Nm
Y1, Y2	Remote control ports (only for HD1 control)	DIN 3852	M14x1.5;	12 deep	80 Nm

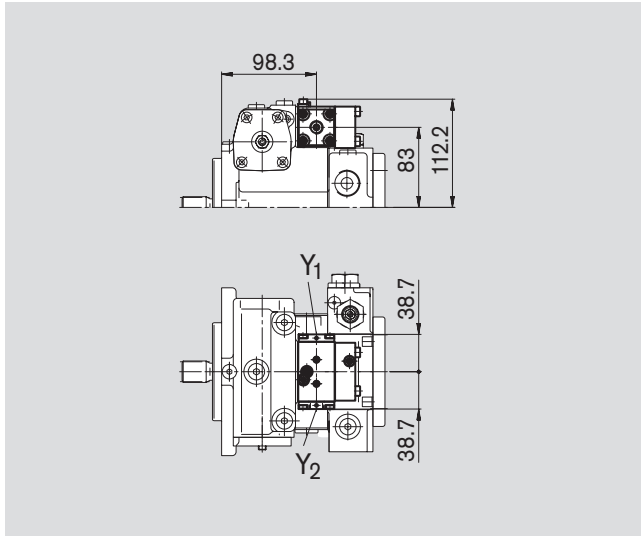
<sup>1)</sup> ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

<sup>2)</sup> plugged

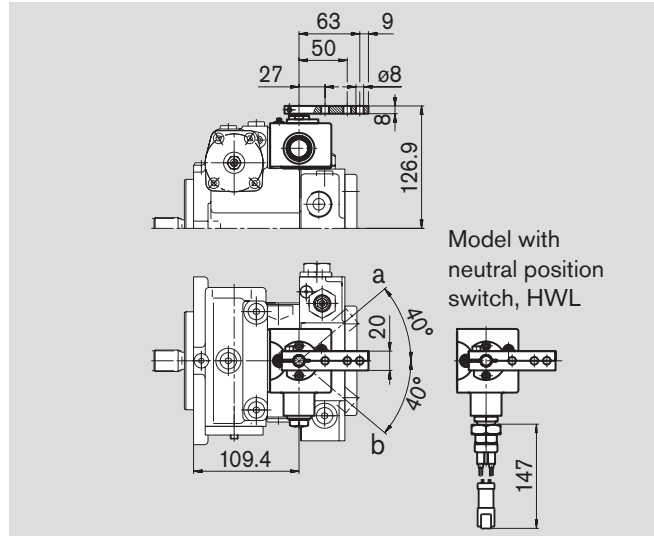
# Unit Dimensions, Size 18

Please request a certified installation drawing before finalizing your design.

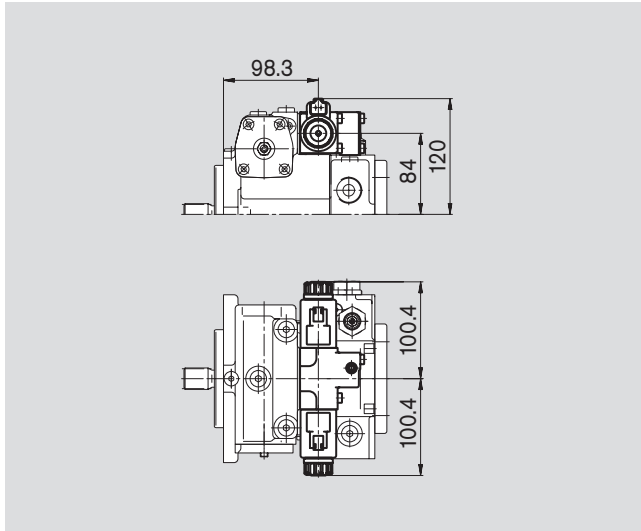
**Hydraulic Control, Pilot Pressure Related, HD1**



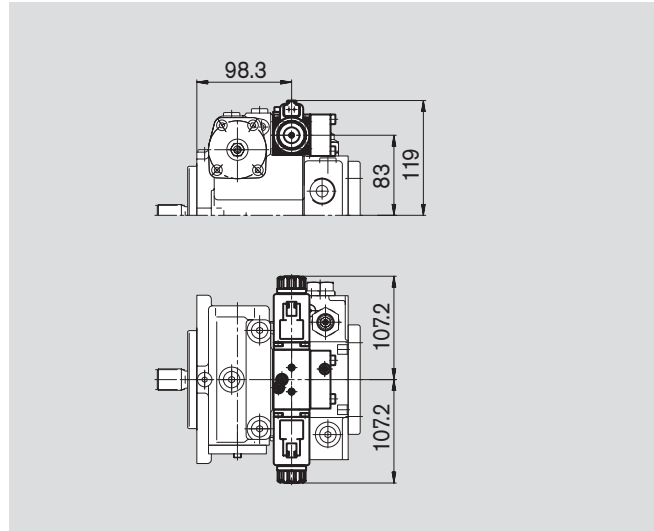
**Hydraulic Control, Mechanical Servo, HW**



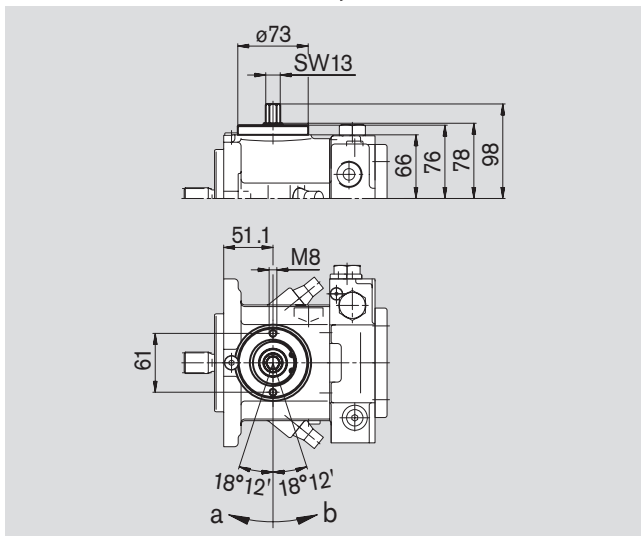
**Electrical Two-Position Control With Switching Solenoid, EZ**



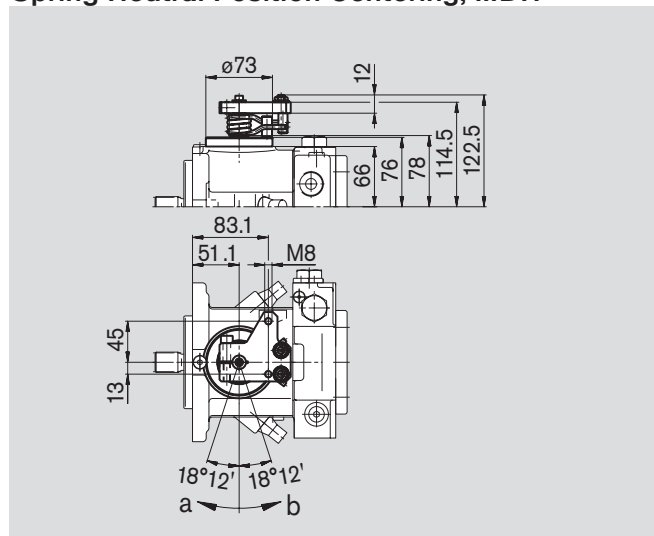
**Electric Control With Proportional Solenoid, EP**



**Mechanical Pivot Control, MD**



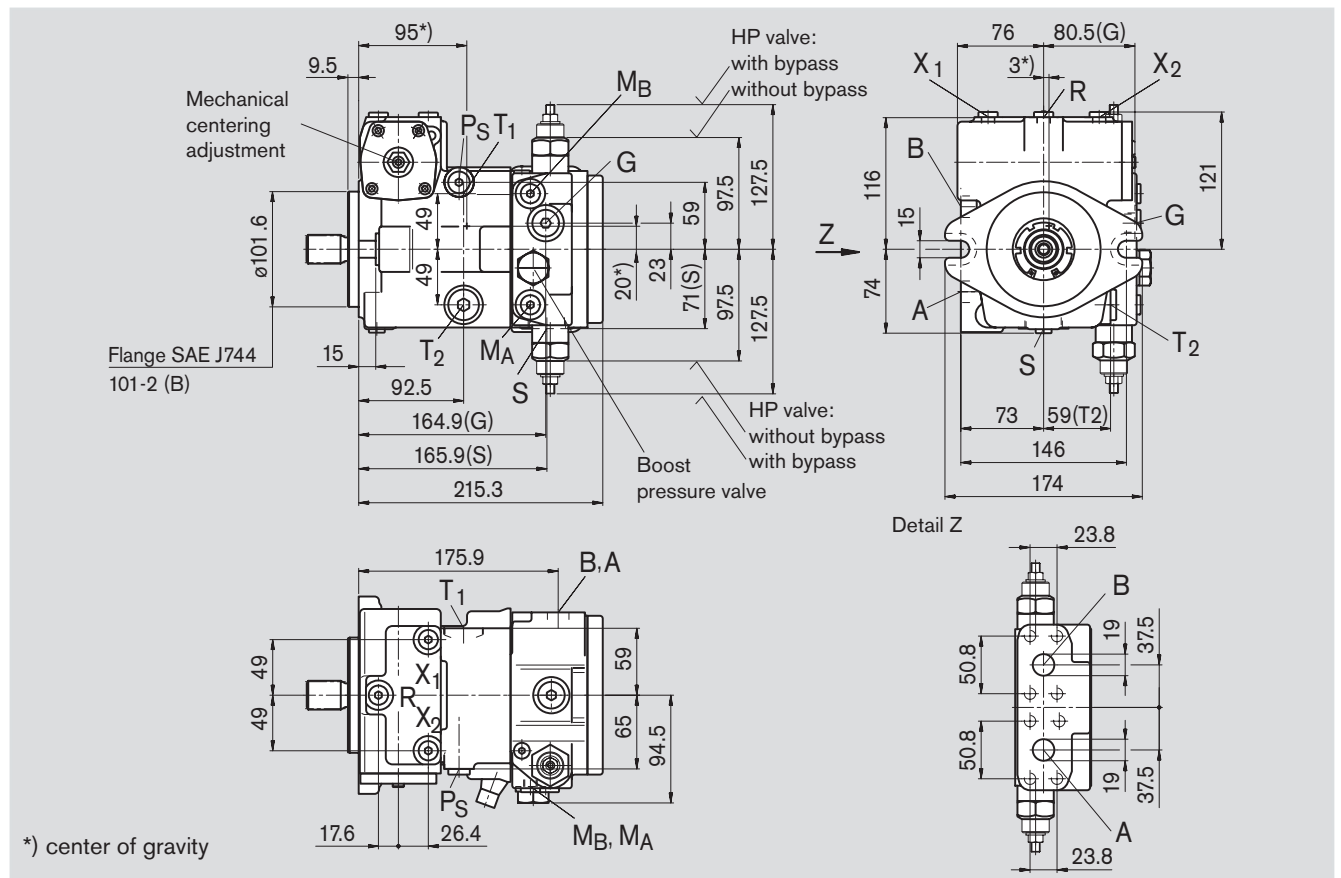
**Mechanical Pivot Control, Spring Neutral Position Centering, MDN**



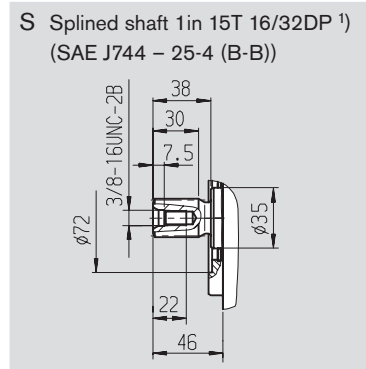
# Unit Dimensions, Size 28

Please request a certified installation drawing before finalizing your design.

## Hdraulic Control, Direct Operated, DG



## Shaft ends



## Ports

Port	Description	Thread	Size	Depth	tightening torque, max.
A, B	Service ports (high pressure series)	SAE J518	3/4in		
	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 ( $F_a$ )	Pressure port for auxiliary circuits 2)	DIN 3852	M18x1.5;	12 deep	140 Nm
$P_S$	Control pressure supply, boost 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
$F_e$	Filter inlet	DIN 3852	M18x1.5;	12 deep	140 Nm

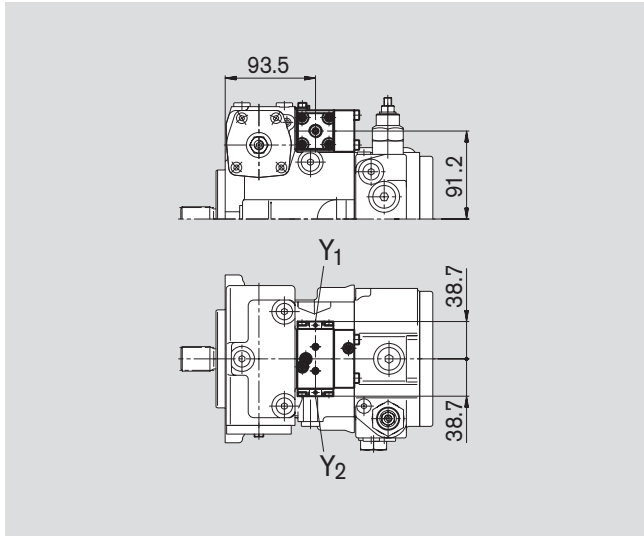
1) ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

2) plugged

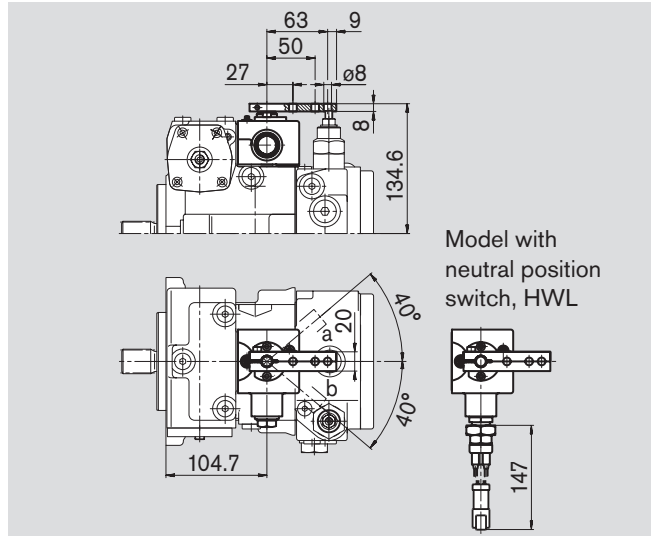
# Unit Dimensions, Size 28

Please request a certified installation drawing before finalizing your design.

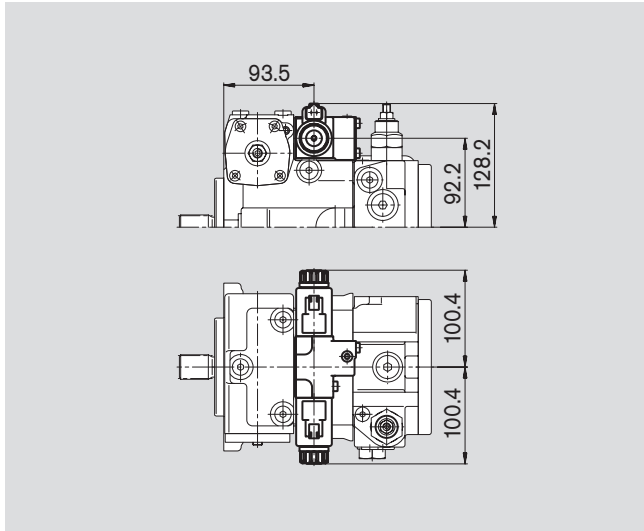
### Hydraulic Control, Pilot Pressure Related, HD1



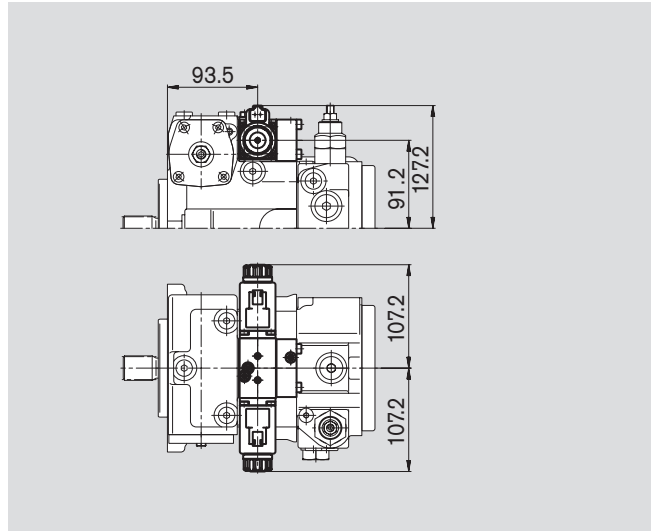
### Hydraulic Control, Mechanical Servo, HW



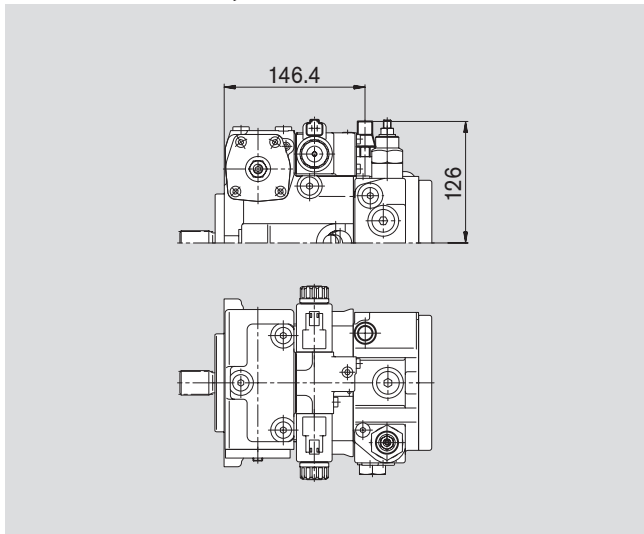
### Electrical Two-Position Control With Switching Solenoid, EZ



### Electric Control With Proportional Solenoid, EP



### Pressure Cut-Off, D

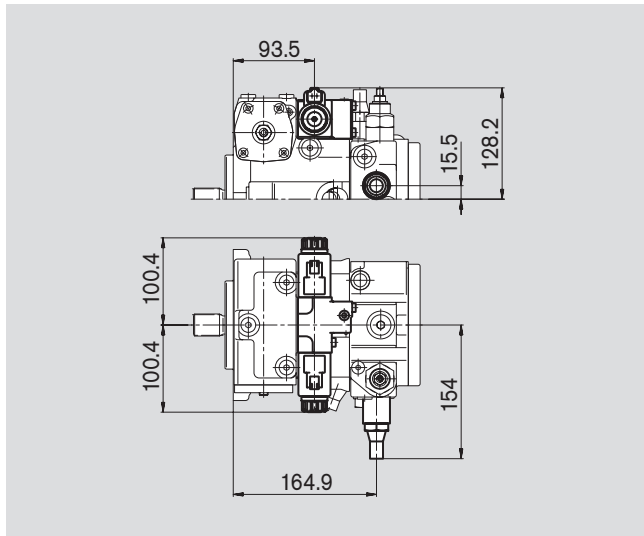


# Unit Dimensions, Size 28

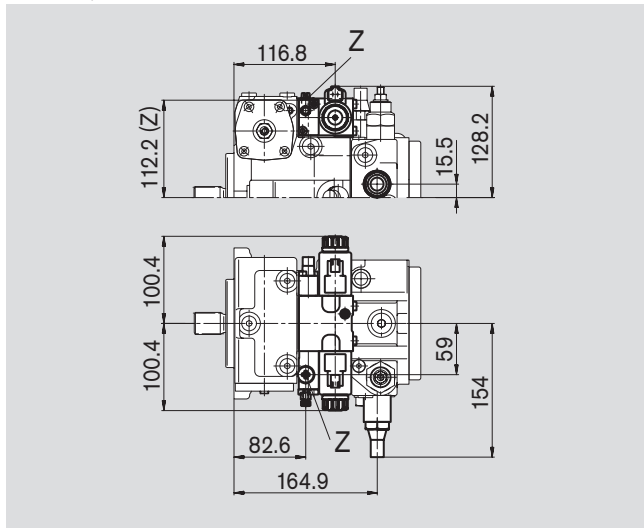
Please request a certified installation drawing before finalizing your design.

## Hydraulic Control, Speed Dependent, DA

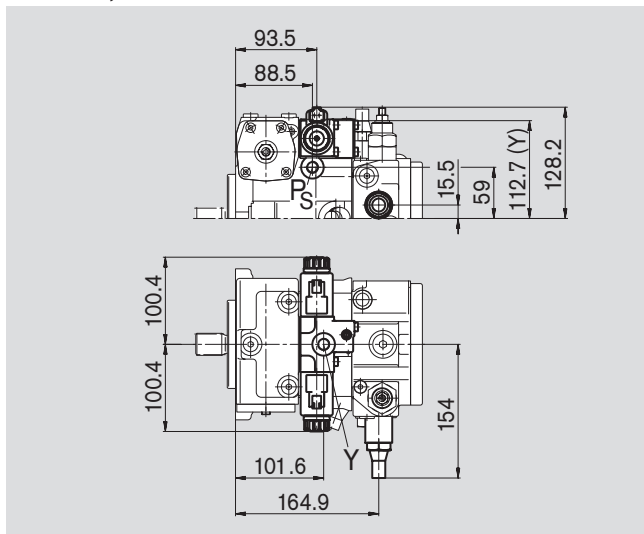
### Control valve, fixed setting, DA2



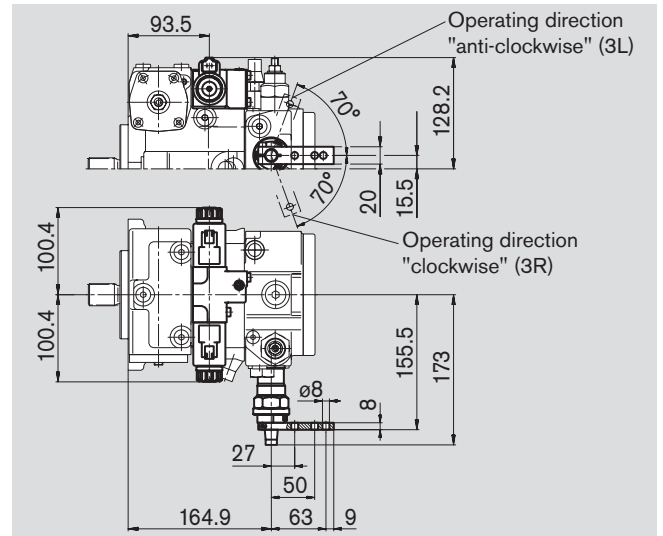
### Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



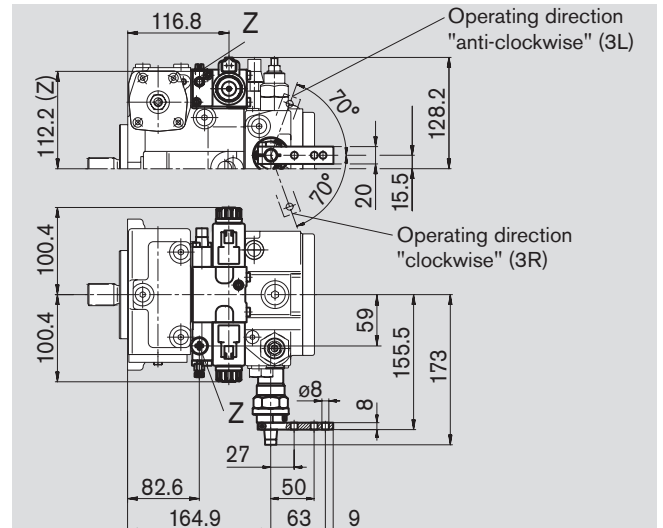
### Control valve, fixed and connections for master controller, DA7



### Control valve, mech. adjustable with control lever, DA3



### Control valve, mech. adjustable with control lever and hydr. inch valve built-on, DA5



## Ports

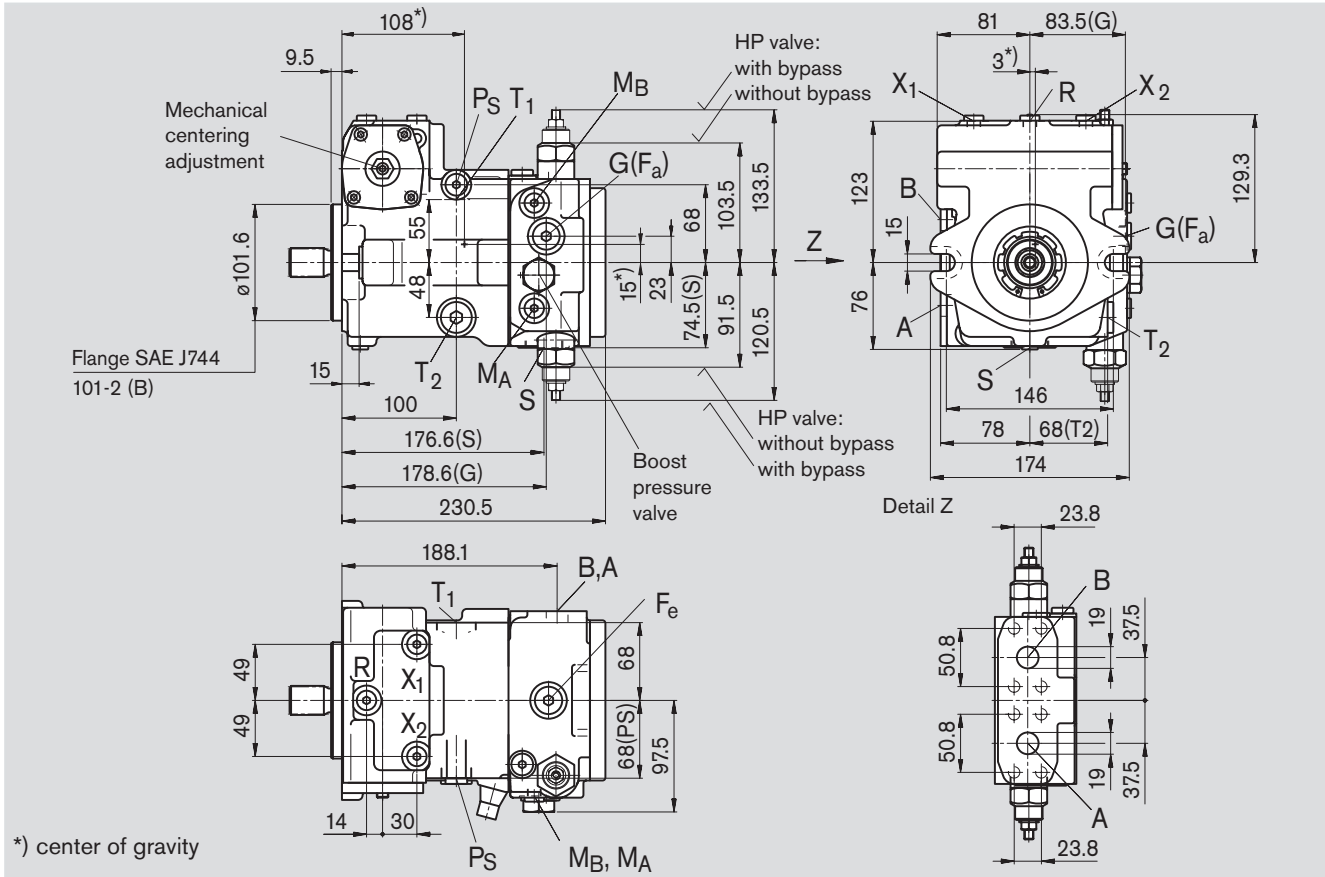
tightening torque, max.

- 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 45

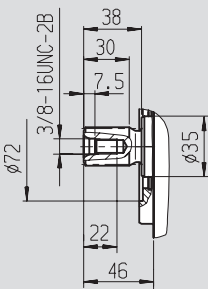
Please request a certified installation drawing before finalizing your design.

## Hydraulic Control, Direct Operated, DG

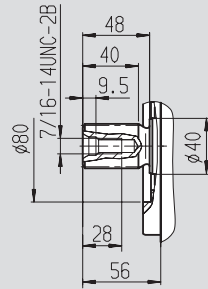


## Shaft ends

**S** Splined shaft 1 in 15T 16/32DP <sup>1)</sup>  
(SAE J744 - 25-4 (B-B))



**T** Splined shaft 1 1/4 in 14T 16/32DP <sup>1)</sup>  
(SAE J744 - 32-4 (C))



## Ports

Port	Description	SAE J518	3/4in	tightening torque, max.
A, B	Service ports (high pressure series)	SAE J518	3/4in	
	Fastening thread A/B	DIN 13	M10x1.5; 17 deep	see safety instructions
T <sub>1</sub>	Case drain or filling port	DIN 3852	M22x1.5; 14 deep	210 Nm
T <sub>2</sub>	Case drain <sup>2)</sup>	DIN 3852	M22x1.5; 14 deep	210 Nm
M <sub>A</sub> , M <sub>B</sub>	Pressure gauge - operating pressure A, B <sup>2)</sup>	DIN 3852	M12x1.5; 12 deep	50 Nm
R	Air bleed <sup>2)</sup>	DIN 3852	M12x1.5; 12 deep	50 Nm
S	Boost suction port	DIN 3852	M33x2; 18 deep	540 Nm
X <sub>1</sub> , X <sub>2</sub>	Control pressure ports (before the orifice) <sup>2)</sup>	DIN 3852	M12x1.5; 12 deep	50 Nm
G (F <sub>a</sub> )	Pressure port for auxiliary circuits <sup>2)</sup>	DIN 3852	M18x1.5; 12 deep	140 Nm
P <sub>S</sub>	Control pressure supply, boost pressure <sup>2)</sup>	DIN 3852	M14x1.5; 12 deep	80 Nm
Y <sub>1</sub> , Y <sub>2</sub>	Remote control ports (only for HD1 control)	DIN 3852	M14x1.5; 12 deep	80 Nm
F <sub>e</sub>	Filter inlet	DIN 3852	M18x1.5; 12 deep	140 Nm

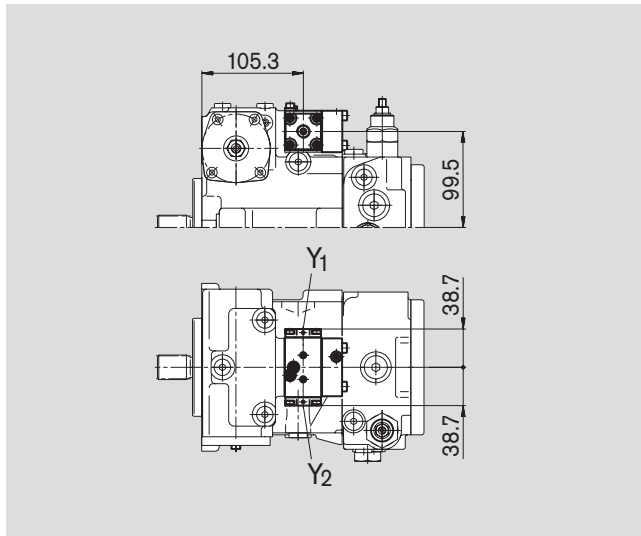
<sup>1)</sup> ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

<sup>2)</sup> plugged

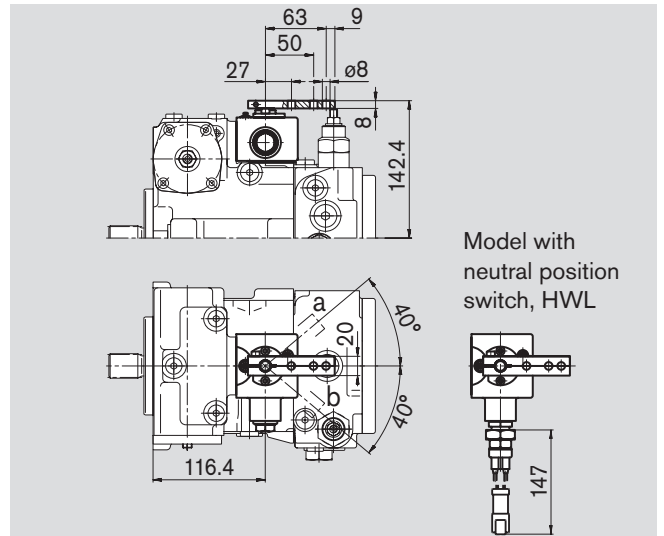
# Unit Dimensions, Size 45

Please request a certified installation drawing before finalizing your design.

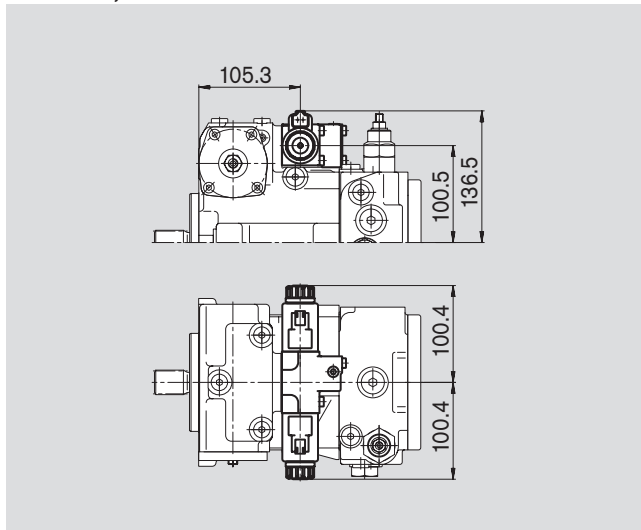
**Hydraulic Control, Pilot Pressure Related, HD1**



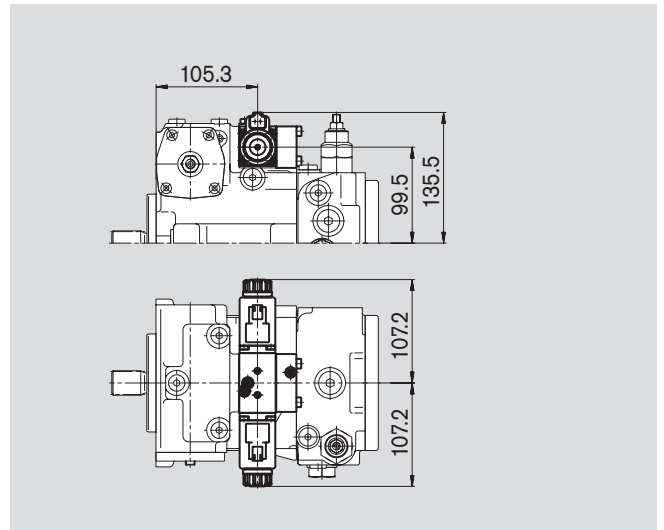
**Hydraulic Control, Mechanical Servo, HW**



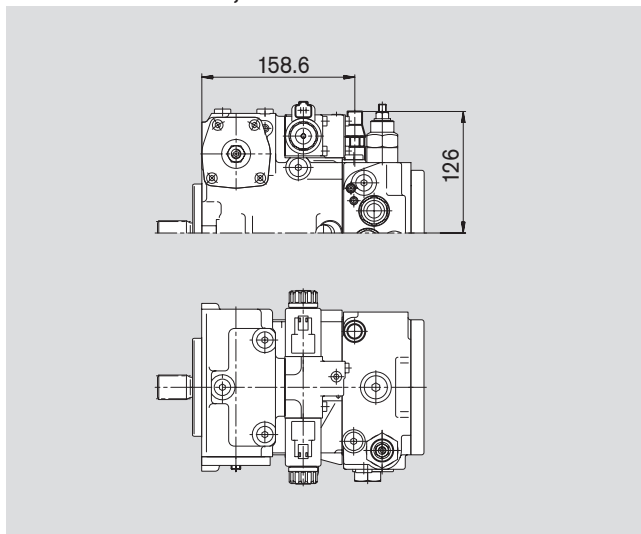
**Electrical Two-Position Control With Switching Solenoid, EZ**



**Electric Control With Proportional Solenoid, EP**



**Pressure Cut-Off, D**

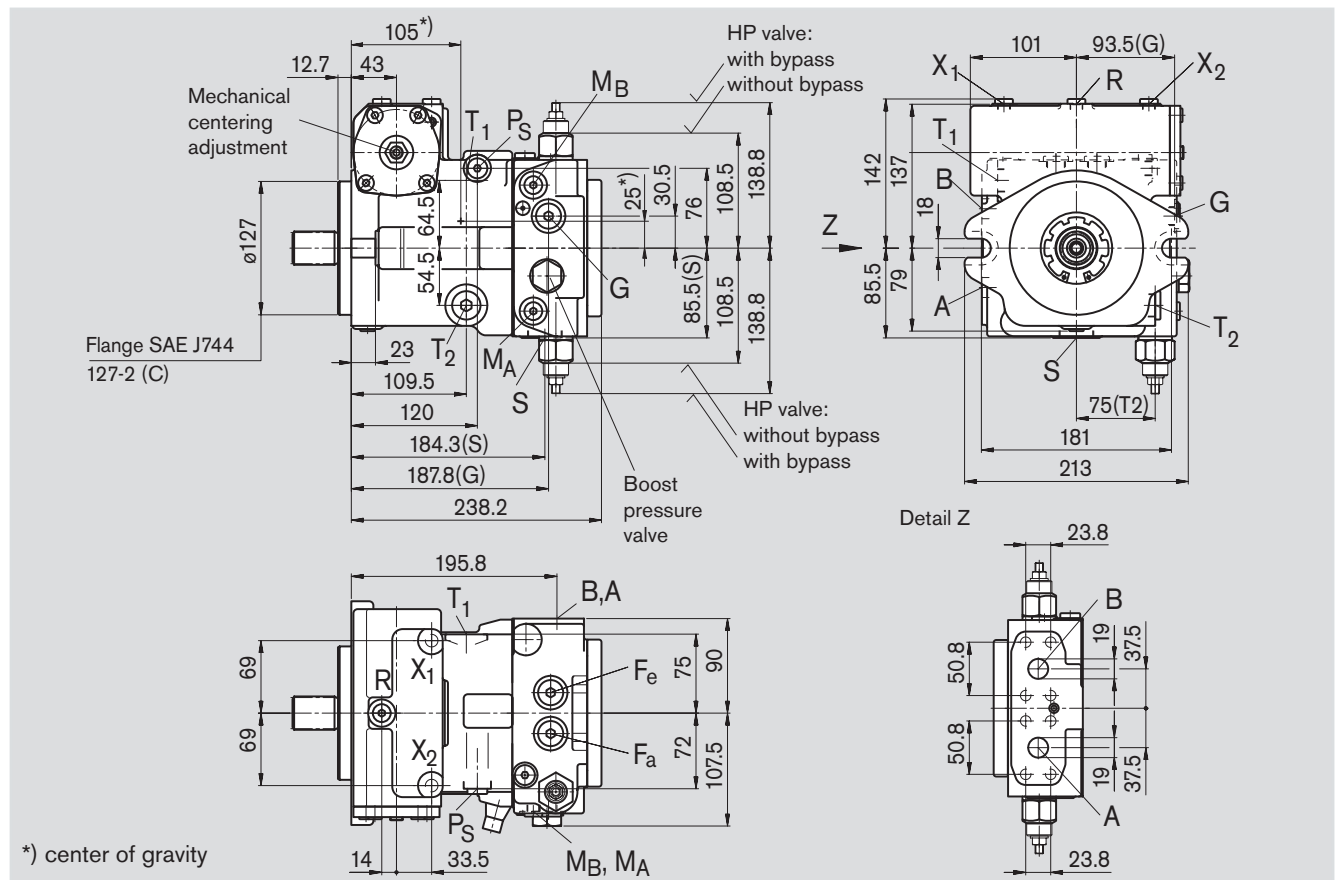




# Unit Dimensions, Size 63

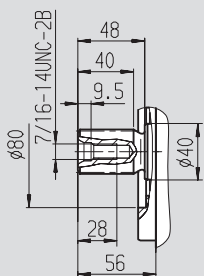
Please request a certified installation drawing before finalizing your design.

## Hdraulic Control, Direct Operated, DG

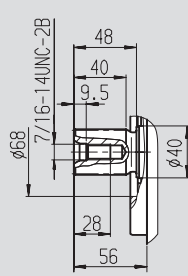


## Shaft ends

S Splined shaft 1 1/4in 14T 16/32DP <sup>1)</sup>  
(SAE J744 - 32-4 (C))



T Splined shaft 3/8in 21T 16/32DP <sup>1)</sup>



## Ports

Port Label	Description	Thread	Size	Depth	Max. Tightening Torque
A, B	Service ports (high pressure series)	SAE J518	3/4in		
	Fastening thread A/B	DIN 13	M10x1.5	17 deep	see safety instructions
T <sub>1</sub>	Case drain or filling port	DIN 3852	M22x1.5	14 deep	210 Nm
T <sub>2</sub>	Case drain <sup>2)</sup>	DIN 3852	M22x1.5	14 deep	210 Nm
M <sub>A</sub> , M <sub>B</sub>	Pressure gauge - operating pressure A, B <sup>2)</sup>	DIN 3852	M12x1.5	12 deep	50 Nm
R	Air bleed <sup>2)</sup>	DIN 3852	M12x1.5	12 deep	50 Nm
S	Boost suction port	DIN 3852	M33x2	18 deep	540 Nm
X <sub>1</sub> , X <sub>2</sub>	Control pressure ports (before the orifice) <sup>2)</sup>	DIN 3852	M12x1.5	12 deep	50 Nm
G	Pressure port for auxiliary circuits <sup>2)</sup>	DIN 3852	M18x1.5	12 deep	140 Nm
P <sub>S</sub>	Control pressure supply, boost pressure <sup>2)</sup>	DIN 3852	M14x1.5	12 deep	80 Nm
Y <sub>1</sub> , Y <sub>2</sub>	Remote control ports (only for HD1 control)	DIN 3852	M14x1.5	12 deep	80 Nm
F <sub>a</sub>	Filter outlet	DIN 3852	M18x1.5	12 deep	140 Nm
F <sub>e</sub>	Filter inlet	DIN 3852	M18x1.5	12 deep	140 Nm

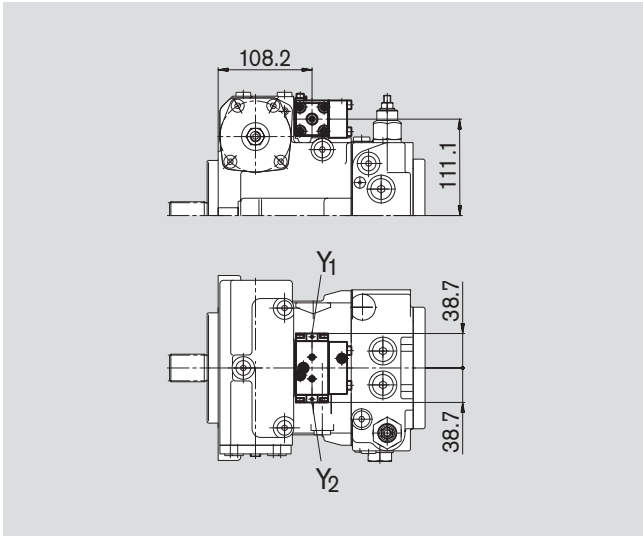
<sup>1)</sup> ANSI B92.1a-1976, pressure angle 30°, flat root side fit, tolerance class 5

<sup>2)</sup> plugged

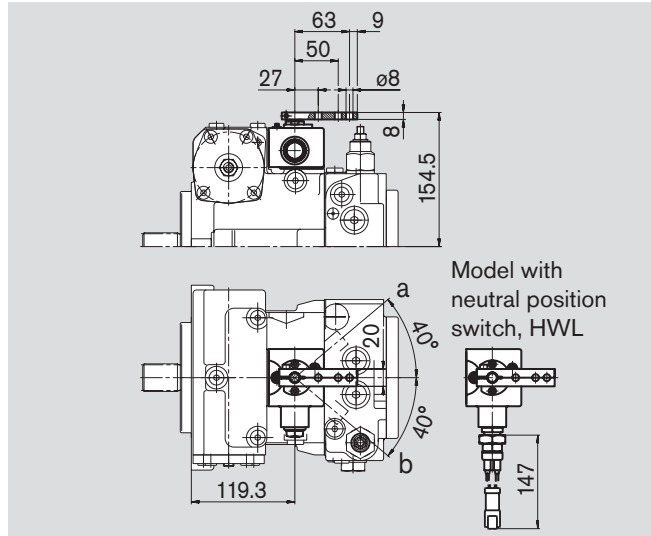
# Unit Dimensions, Size 63

Please request a certified installation drawing before finalizing your design.

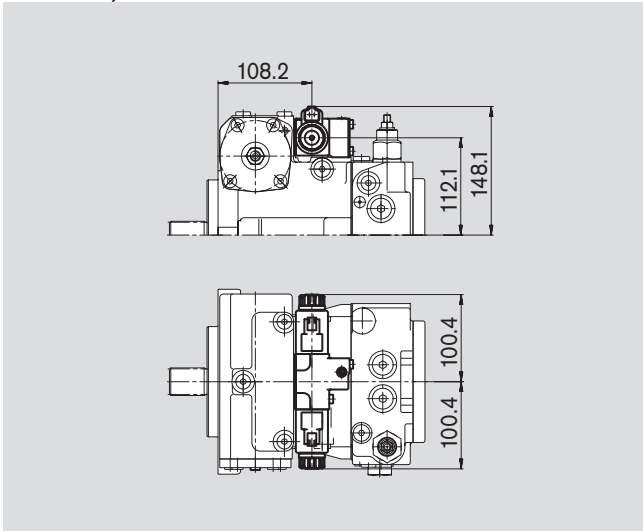
**Hydraulic Control, Pilot Pressure Related, HD1**



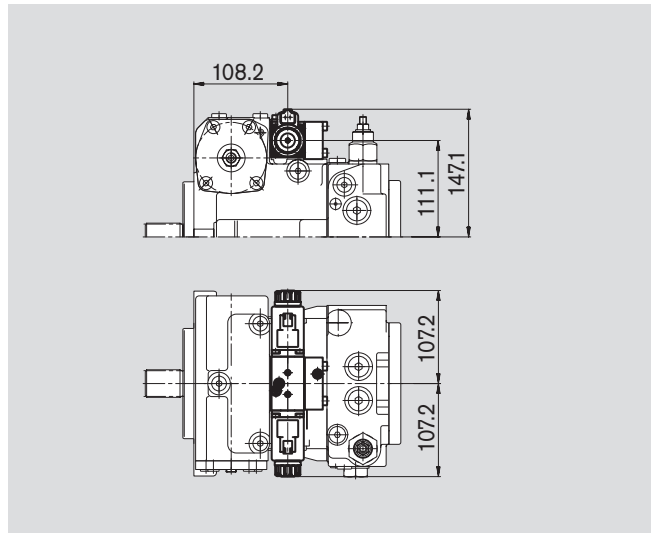
**Hydraulic Control, Mechanical Servo, HW**



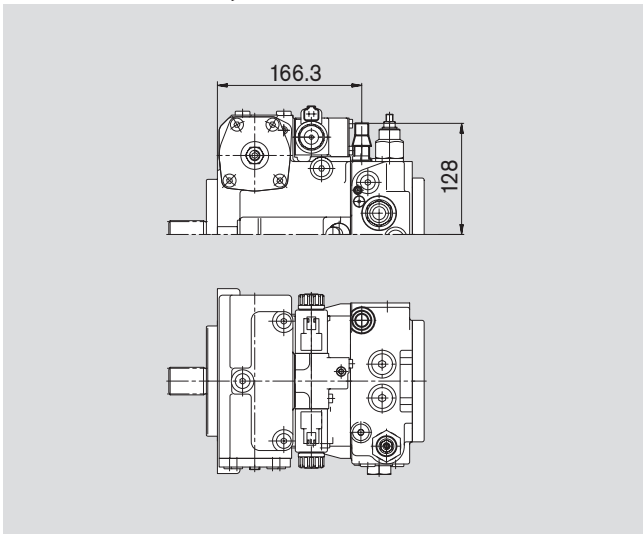
**Electrical Two-Position Control With Switching Solenoid, EZ**



**Electric Control With Proportional Solenoid, EP**



**Pressure Cut-Off, D**

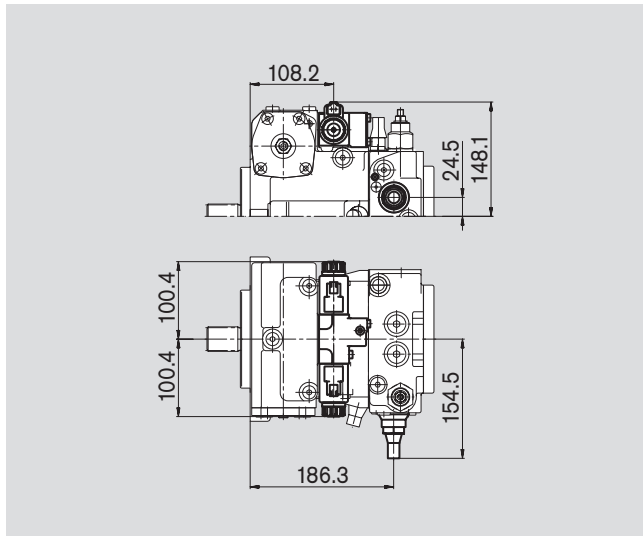


# Unit Dimensions, Size 63

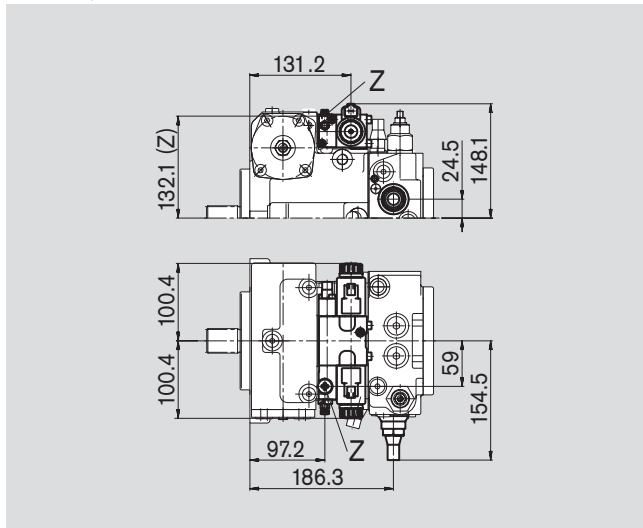
Please request a certified installation drawing before finalizing your design.

## Hydraulic Control, Speed Dependent, DA

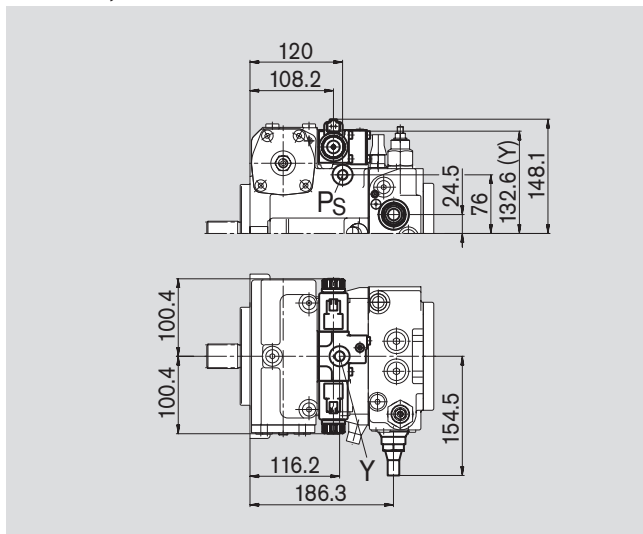
### Control valve, fixed setting, DA2



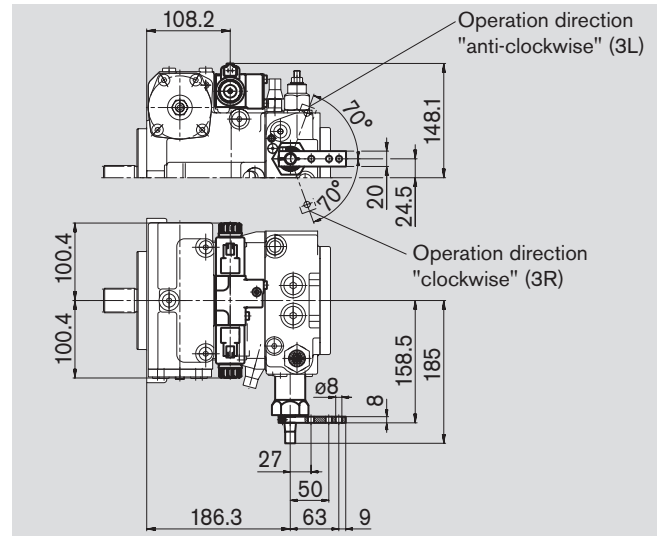
### Control valve, fixed setting and hydraulic inch valve built-on, DA4/DA8



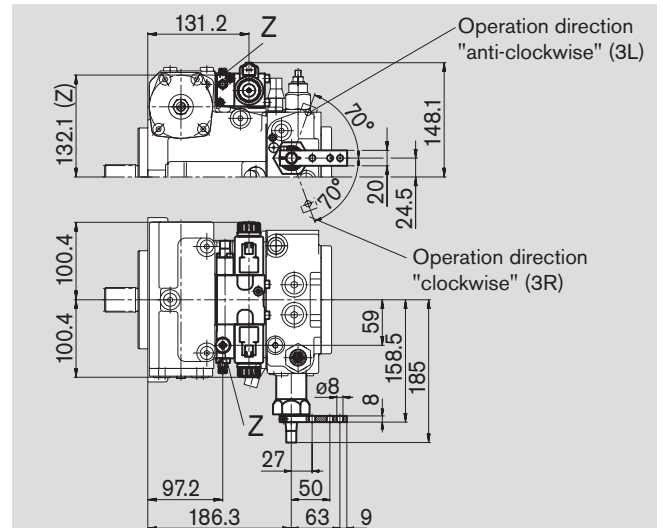
### Control valve, fixed and connections for master controller, DA7



### Control valve, mech. adjustable with control lever, DA3



### Control valve, mech. adjustable with control lever and hydr. inch valve built-on, DA5



## Ports

tightening torque, max.

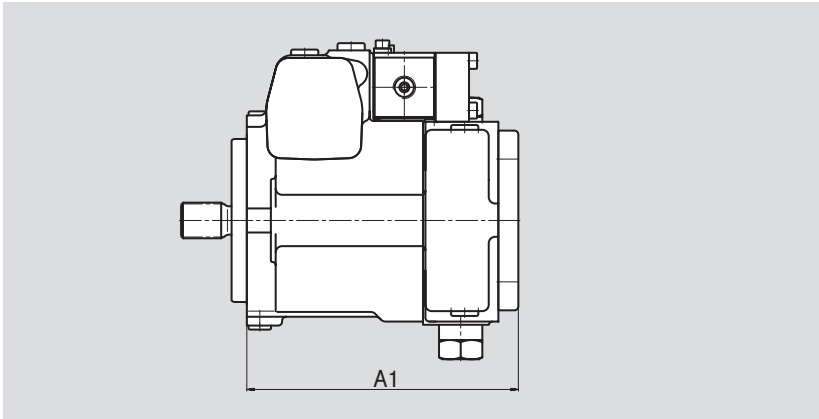
- Z Pilot pressure port (plugged)  
DIN 3852 M10x1; 8 deep 30 Nm
- Y Pilot pressure port  
DIN 3852 M14x1.5; 12 deep 80 Nm

# Through Drive Dimensions

Please request a certified installation drawing before finalizing your design.

**N00** without auxiliary pump, without through drive

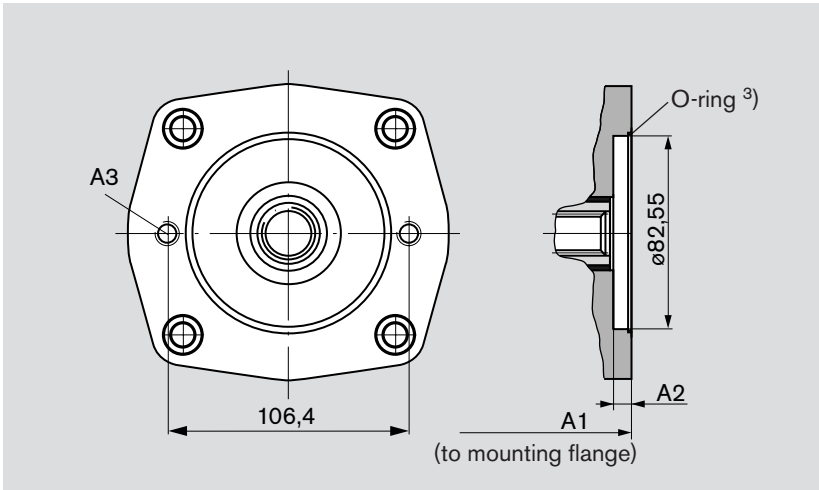
**F00** with auxiliary pump, without through drive



Size	A1 (N00)	A1 (F00)
18	169.4	169.4
28	201.7	215.3
45	216.8	230.5
63	224.5	238.2

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

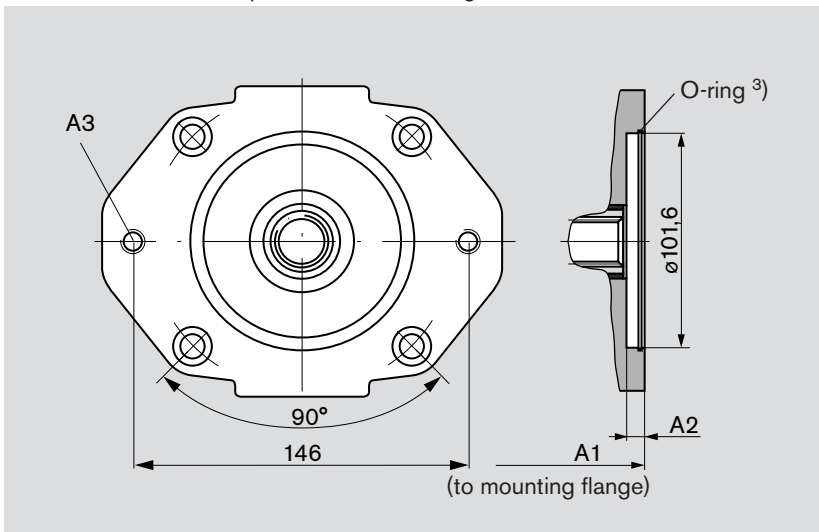
Hub for splined shaft according to ANSI B92.1a-1976 5/8in 9T 16/32DP <sup>1)</sup> (SAE J744 – 16-4 (A))



Size	A1	A2	A3 <sup>2)</sup>
18	178.4	9	M10x1.5; 15 deep
28	219.2	9	M10x1.5; 17.5 deep
45	234.5	9	M10x1.5; 17.5 deep
63	242.2	9	M10x1.5; 17.5 deep

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

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



Size	A1	A2	A3 <sup>2)</sup>
18	187.4	10	M12x1.75; 18 deep
28	220.2	10	M12x1.75; 18.5 deep
45	235.5	10	M12x1.75; 18.5 deep
63	243.2	10	M12x1.75; 18.5 deep

<sup>1)</sup> 30° pressure angle, flat root side fit, tolerance class 5

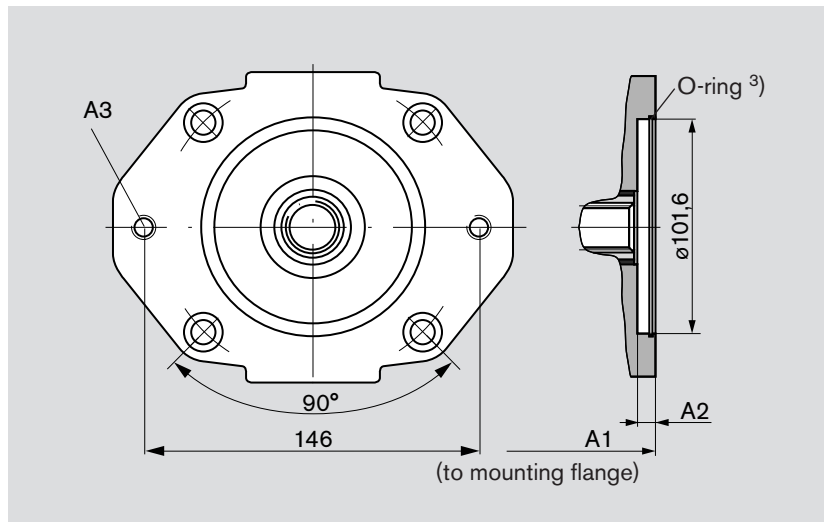
<sup>2)</sup> DIN 13, for tightening torques see safety instructions <sup>3)</sup> O-Ring supplied with unit

Note: the mounting flange can be turned through 90°. Standard position is shown. Please state in plain text if required.

# Through Drive Dimensions

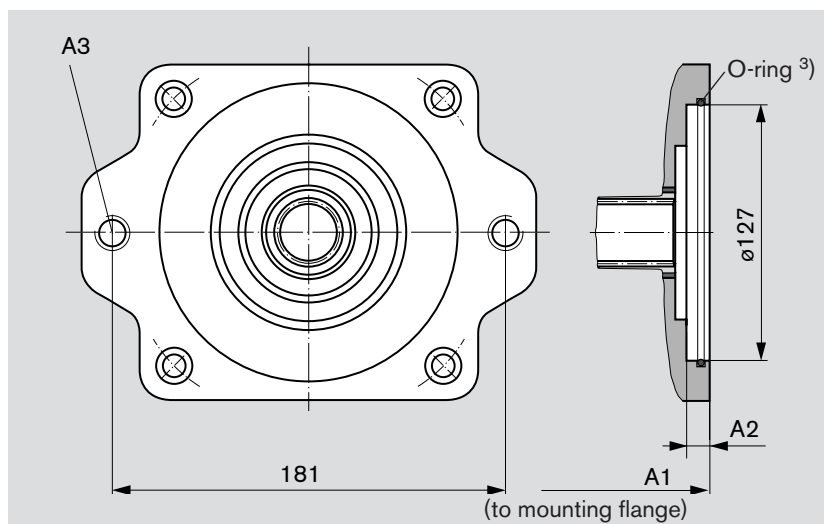
Please request a certified installation drawing before finalizing your design.

**F04/K04** Flange SAE J744 – 101-2 (B)  
Hub for splined shaft according to ANSI B92.1a-1976 1 in 15T 16/32DP <sup>1)</sup> (SAE J744 – 25-4 (B-B))



Size	A1	A2	A3 <sup>2)</sup>
28	220.2	10	M12x1.75; 18.5 deep
45	235.5	10	M12x1.75; 18.5 deep
63	243.2	10	M12x1.75; 18.5 deep

**F07/K07** Flange SAE J744 – 127-2 (C)  
Hub for splined shaft according to ANSI B92.1a-1976 1 1/4in 14T 12/24DP <sup>1)</sup> (SAE J744 – 32-4 (C))



Size	A1	A2	A3 <sup>2)</sup>
63	249.5	14	M16x2; 24.8 deep

<sup>1)</sup> 30° pressure angle, flat root side fit, tolerance class 5

<sup>2)</sup> DIN 13, for tightening torques see safety instructions <sup>3)</sup> O-Ring supplied with unit

Note: the mounting flange can be turned through 90°. Standard position is shown. Please state in plain text if required.

## Overview of Attachments on A10VG

Through drive – A10VG			Attachment for 2nd pump						Through drive	
Flange	Hub for splined shaft	Order code	A10VG Size (shaft)	A4VG Size (shaft)	A10V(S)O/31 Size (shaft)	A10V(S)O/52 Size (shaft)	A4FO Size (shaft)	A11VO 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 <sup>1)</sup>	18...63
101-2 (B)	7/8in	F/K02	18 (S)	–	28 (S,R)	28 (S,R)	16 (S), 22 (S)	–	Frame size N size 20-32 <sup>1)</sup>	18...63
	1in	F/K04	28 (S), 45 (S)	28 (S)	45 (S,R)	45 (S,R)	–	40 (S)	–	
127-2 (C)	1 1/4in	F/K07	63 (S)	40 (S), 56 (S)	71 (S,R)	–	–	60 (S)	–	63
				71 (S)	100 (U)	85 (U)	–	–		

<sup>1)</sup> Rexroth recommends special gear pump versions. Please contact us for details.

## Combination Pumps A10VG + A10VG

### Overall length A

A10VG (1st pump)	A10VG (2nd pump) <sup>1)</sup>			
	Size 18	Size 28	Size 45	Size 63
Size 18	356.8	–	–	–
Size 28	389.6	435.5	–	–
Size 45	404.9	450.8	466.0	–
Size 63	412.6	458.5	473.7	487.7

<sup>1)</sup> 2nd pump without through drive and with auxiliary pump, F00

Combination pumps make it possible to have independent circuits without the need to fit splitter gearboxes.

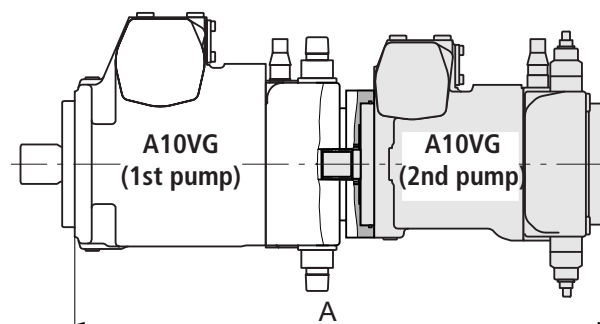
When ordering combination pumps, the type designations of the 1st and 2nd pumps must be linked by a “+”.

Example of order:

A10VG45HW1/10R-NTC10F04 + A10VG45HW1/10R-NSC10F00

A tandem pump combined of two equal sizes is permissible without additional supports where the dynamic acceleration does not exceed 10g (= 98.1 m/s<sup>2</sup>).

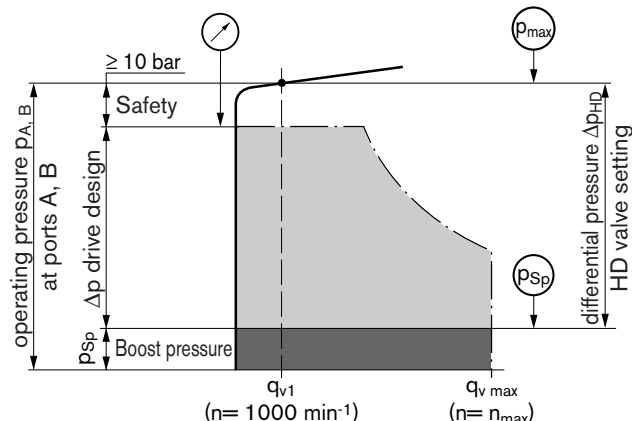
For combination pumps consisting of more than two pumps, the mounting flange must be rated for the permissible mass torque.



# High Pressure Relief Valves

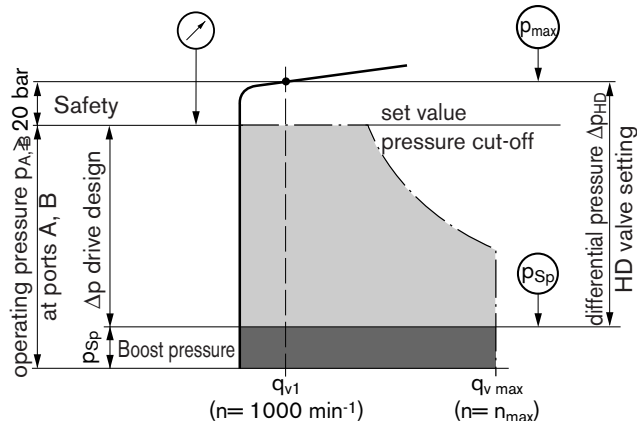
## Setting diagram

Model without pressure cut-off



Example: boost pressure 20 bar; operating pressure 300 bar  
 operating pres.  $p_{A,B}$  - boost pres.  $p_{Sp}$  = differential pres.  $\Delta p_{HD}$   
 300 bar - 20 bar = 280 bar

Model with pressure cut-off



Example: boost pressure 20 bar; operating pressure 300 bar  
 operating pres.  $p_{A,B}$  - boost pres.  $p_{Sp}$  + safety margin = differential pres.  $\Delta p_{HD}$   
 300 bar - 20 bar + 20 bar = 300 bar

Note: valve setting is done at  
 **$n = 1000 \text{ rpm}$  and  $V_{g \text{ max}} (q_{v1})$**

## Setting ranges

High pressure relief valve, directly operated	Differential pressure setting $\Delta p_{HD}$
Setting range valve 3, 5 $\Delta p$ 250 - 340 bar (see ordering code)	340 bar
	320 bar
	300 bar <sup>1)</sup>
	270 bar
Setting range valve 4, 6 $\Delta p$ 100 - 250 bar (see ordering code)	250 bar
	230 bar
	200 bar <sup>1)</sup>
	150 bar
	100 bar

<sup>1)</sup> Standard differential pressure setting. The valves will be set to this value if the differential pressure is not specified on ordering.

For the sake of simplicity: The bypass function is not shown in the circuit diagrams

**Please state in plain text when ordering:**

(only the  $\Delta p_{HD}$  values shown in the table are possible)

### High pressure relief valve A

Differential pressure setting:  $\Delta p_{HD} = \dots \text{ bar}$

Opening pressure of the HP valve (at  $q_{v1}$ ):  $p_{max} = \dots \text{ bar}$   
 ( $p_{max} = \Delta p_{HP} + p_{Sp}$ )

### High pressure relief valve B

Differential pressure setting:  $\Delta p_{HD} = \dots \text{ bar}$

Opening pressure of the HP valve (at  $q_{v1}$ ):  $p_{max} = \dots \text{ bar}$   
 ( $p_{max} = \Delta p_{HP} + p_{Sp}$ )

## Pressure Cut-Off, D

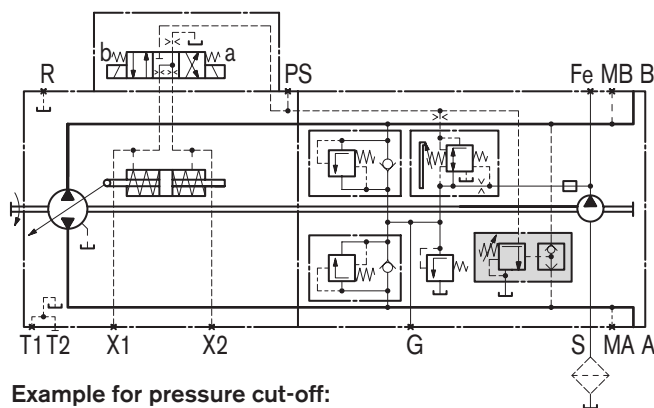
The pressure cut-off corresponds to a pressure regulation which, after reaching the set pressure, adjusts the displacement volume of the pump to  $V_g 0 = 0$ .

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

The pressure peaks occurring when the swashplate is swiveled rapidly and also the maximum pressure in the system are maintained by the high pressure relief valves.

The setting range of the pressure cut-off may be anywhere within the entire operating 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 plain text when ordering.



**Example for pressure cut-off:**  
**Hydraulic control, speed dependent DA.D3**

# Mechanical Stroke Limiter, M

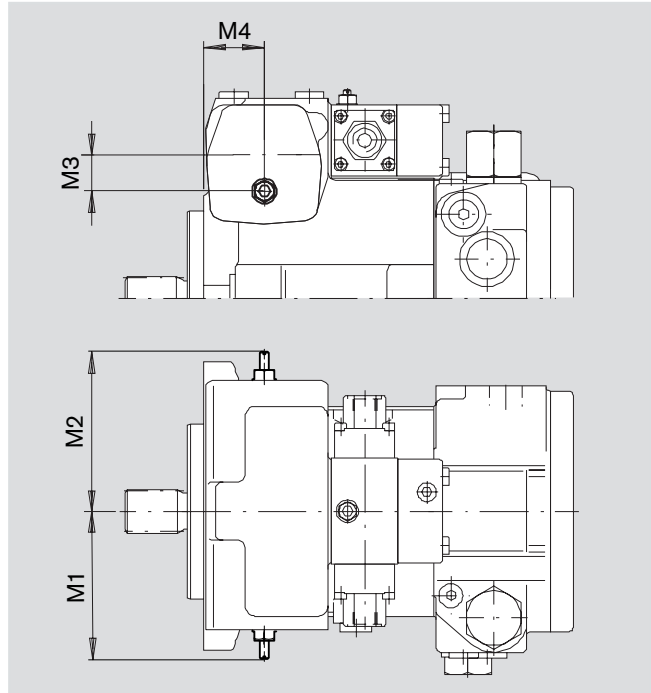
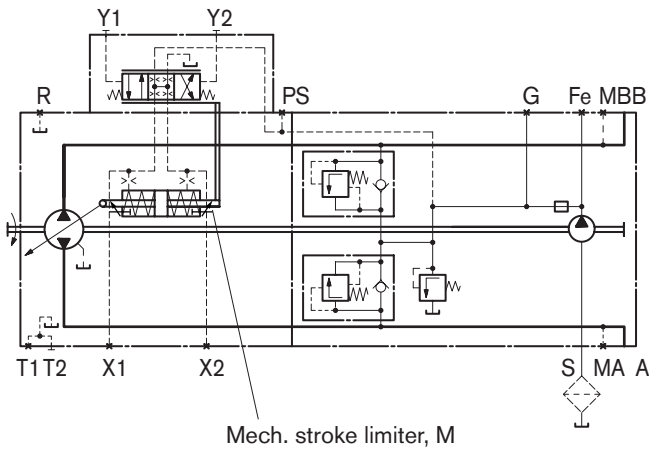
The mechanical stroke limiter is an additional function allowing continuous reduction of the maximum displacement volume of the pump, regardless of the control device used.

The stroke of the positioning cylinder and hence the maximum swivel angle of the pump are limited by means of two adjusting screws.

## Dimensions

Size	M1	M2	M3	M4
18	94.9	96.9	18	42.1
28	99	99	21.5	35
45	101.6	101.6	22.5	35.5
63	124	124	26.5	43

## Circuit diagram



# Rotary Inch Valve

Allows the control pressure to be reduced, independently of the drive speed, through mechanical operation of the control lever. Maximum rotation angle 90°. The lever may be fixed in any position.

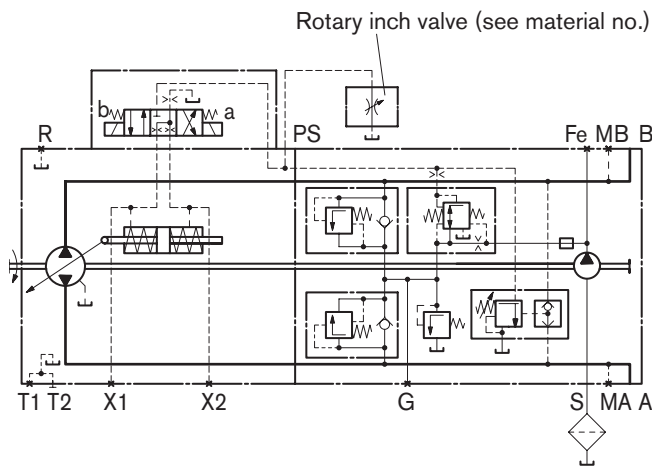
The valve is mounted separately from the pump and connected with the pump by the hydraulic control line at port P<sub>S</sub> (max. line length approximately 2 meters).

The rotary inch valve must be ordered separately.

Size	Material no.	Operation direction of the control lever
18, 28, 45, 63	R902048734	clockwise
18, 28, 45, 63	R902048735	anti-clockwise

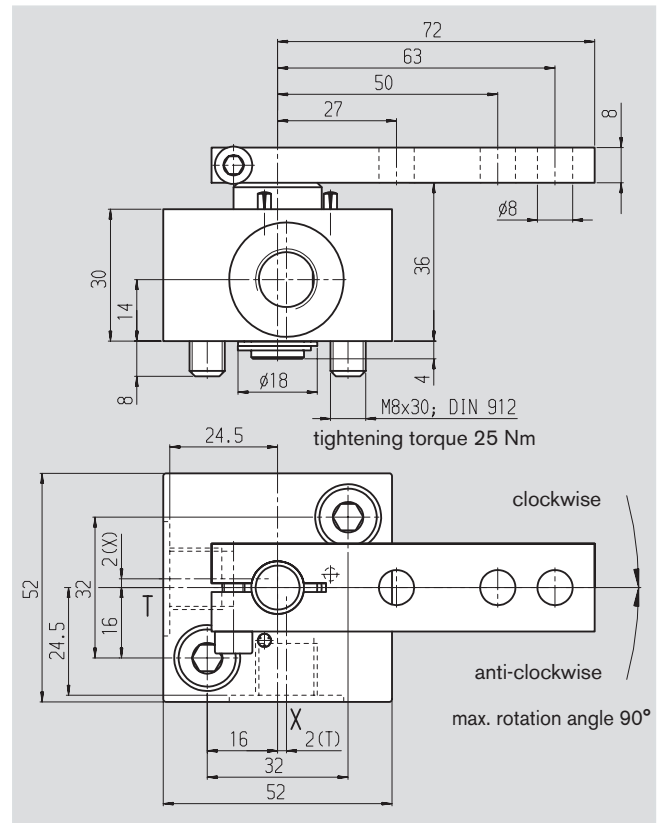
Note:

The rotary inch valve can be used independently of the control device.



**DA - Hydraulic Control, Speed Dependent with separately installed rotary inch valve**

## Unit Dimensions



## Ports

Port	Description	Tightening torque
X	Pressure port DIN 3852 M14x1.5; 12 deep	80 Nm
T	Drain port (tank) DIN 3852 M14x1.5; 12 deep	80 Nm

# 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

Flow resistance at the filter element:

at  $v = 30 \text{ mm}^2/\text{s}$ ,  $n = n_{\text{max}}$  \_\_\_\_\_  $\Delta p \leq 0.1 \text{ bar}$

at  $v = 1000 \text{ mm}^2/\text{s}$ ,  $n = n_{\text{max}}$  \_\_\_\_\_  $\Delta p \leq 0.3 \text{ bar}$

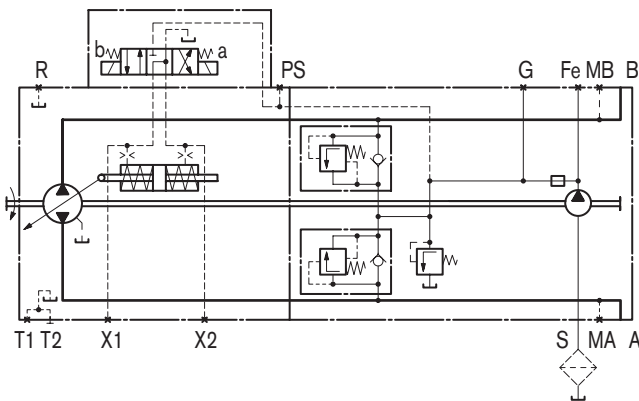
Pressure at port S of the auxiliary pump:

at  $v = 30 \text{ mm}^2/\text{s}$  \_\_\_\_\_  $p \geq 0.8 \text{ bar}$

at cold start ( $v = 1600 \text{ mm}^2/\text{s}$ ,  $n \leq 1000 \text{ rpm}$ ) \_\_\_\_\_  $p \geq 0.5 \text{ bar}$

Filter is not supplied with the pump.

### Circuit diagram - standard model S



### Variation: External supply, E

This variation should be used in models without integral auxiliary pump (N00 or K..).

The supply is provided as follows:

Size 18 \_\_\_\_\_ port S

Size 28, 45 (without DA control valve) \_\_\_\_\_ port G

Size 28, 45 (with DA control valve) \_\_\_\_\_ port Fe

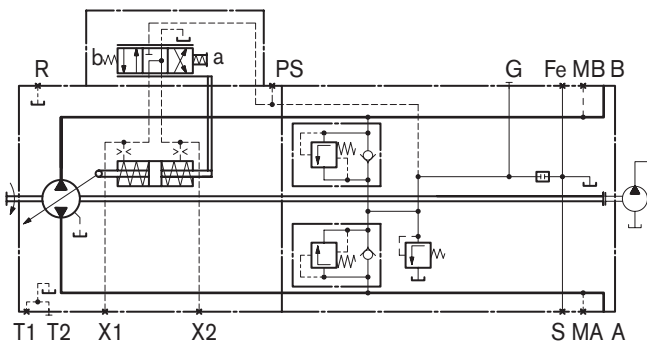
Size 63 \_\_\_\_\_ port Fa

With size 28, 45 and 63, port S is closed.

Filter arrangement: \_\_\_\_\_ separate

For safe operation, ensure that the boost pressure fluid is of the required purity grade (see page 5).

### Circuit diagram - variation E (external supply)



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

Filter inlet: \_\_\_\_\_ Port Fe

Filter outlet: Size 63 Port Fa  
Size 28, 45 Port G (Fa)

Filter type: Filters with bypass are **not recommended**, if using with bypass, please contact us.

Recommendation: **with** contamination indicator

Please note: Variant for size 28, 45 not possible in conjunction with DA control valve.

For versions with DG control device (with pilot 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 the filter element:

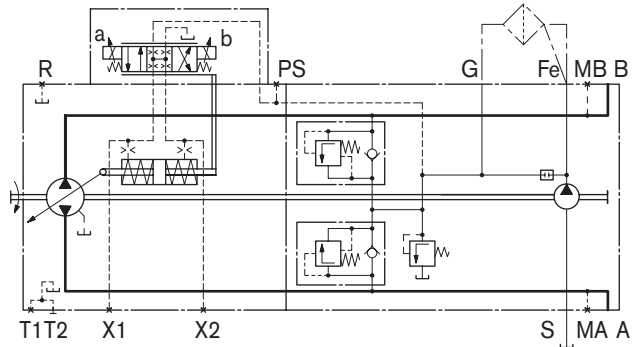
at  $v = 30 \text{ mm}^2/\text{s}$  \_\_\_\_\_  $\Delta p \leq 1 \text{ bar}$

at cold start \_\_\_\_\_  $\Delta p \leq 3 \text{ bar}$

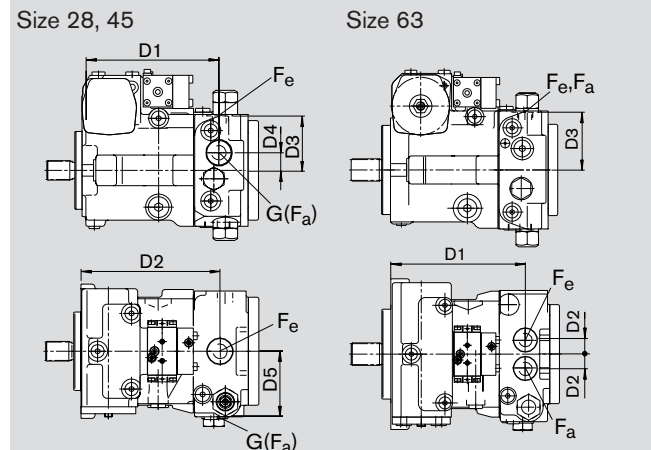
(valid for entire speed range  $n_{\text{min}} - n_{\text{max}}$ )

Filter is not supplied with the pump.

### Circuit diagram variant D



### Dimensions variant D



Size	D1	D2	D3	D4	D5	Fe, Fa, G <sup>1)</sup>
28	164.9	169.9	65.5	23	80.5	M18x1.5
45	178.6	180.6	71.5	23	83.5	M18x1.5
63	189.8	19.5	82.5	-	-	M18x1.5

<sup>1)</sup> With sizes 28, 45, port G serves as "filter outlet Fa". Pressure filtration is not possible in conjunction with a control valve (see ordering code, page 3).

# Connector Options for Solenoids

(only for EP, EZ, DA)

## DEUTSCH DT04-2P-EP04 (2-pin)

Molded, without bi-directional quenching diode  
(standard) \_\_\_\_\_ P

Molded, with bi-directional quenching diode  
(for EZ1/2, DA) \_\_\_\_\_ Q

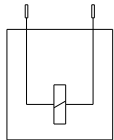
Type of protection according to DIN/EN 60529: IP67 and IP69K

Version Q with bi-directional quenching diode is available as an option only for the switching solenoids of controllers EZ1/2 and DA.

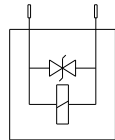
The protective circuit with bi-directional quenching diode is required in order to limit overvoltages. The overvoltages are produced by switching off the current with switches or relay contacts or by removing the female connector while it is in the energized state.

### Circuit symbol

**without** bi-directional quenching diode



**with** bi-directional quenching diode



### Mating connector

Female connector DEUTSCH DT06-2S-EP04  
Rexroth mat. no. 02601804

consisting of:

	DT designation
– 1 housing _____	DT06-2S-EP04
– 1 chock _____	W2S
– 2 sockets _____	0462-201-16141

The connector is not supplied with the pump  
It can be supplied by Rexroth on request.

## Hirschmann DIN EN 175 301-803-A/ISO 4400

(not for new projects)

without bi-directional quenching diode  
(for EP, EZ, DA) \_\_\_\_\_ H

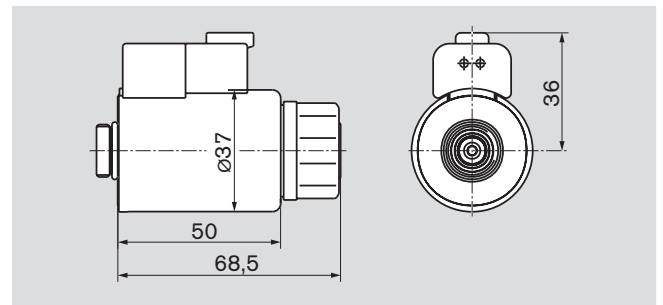
Protection class according to DIN/EN 60529: IP65

The sealing ring in the cable gland (M16x1.5) is suitable for line diameters of 4.5 mm to 10 mm.

The female connector is supplied with the pump.

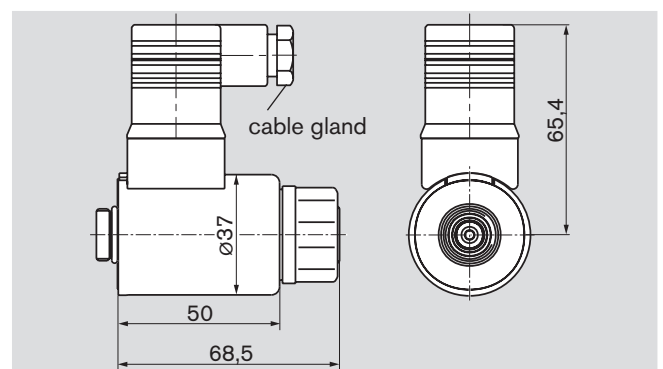
## DEUTSCH DT04-2P-EP04, 2-pin

injection molded, with/without bi-directional quenching diode \_\_\_ P, Q



## Hirschmann DIN EN 175 301-803-A/ISO 4400

without bi-directional quenching diode \_\_\_\_\_ H



### Note:

The position of the plug can be changed by turning the solenoid body.

Note the following procedure:

1. Loosen the fastening nut
2. Turn the magnet body to the desired position
3. Tighten the fastening nut

Tightening torque of fastening nut: 5<sup>+1</sup> Nm  
(width across flat 26, double hexagon DIN 3124)

# Installation Situation for Coupling Assembly

To ensure that rotating parts (coupling hub) and fixed parts (housing, circlip) do not come into contact with one other, the installation conditions described here must be observed. This depends on the size and the splined shaft.

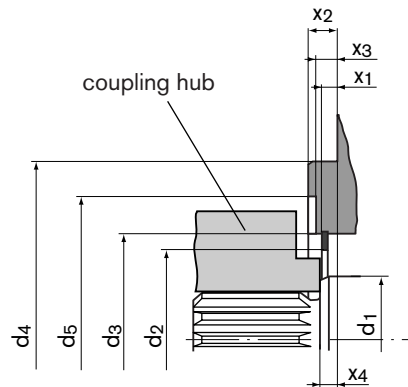
## Size 18 - 45 (with free turning):

Allow for the free turning diameter.

## Size 63 (without free turning):

The outer diameter of the coupling hub must be smaller than the inner diameter of the circlip  $d_2$  in the area of the shaft collar (dimension  $x_2 - x_4$ ).

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



Size	$\varnothing d_1$	$\varnothing d_{2 \text{ min}}$	$\varnothing d_3$	$\varnothing d_4$	$\varnothing d_5$	$x_1$	$x_2$	$x_3$	$x_4$
18	30	36.1	$49 \pm 0.1$	101.6	65	$5.9^{+0.2}$	$9.5_{-0.5}$	7	$8^{+0.9}_{-0.6}$
28	35	43.4	$55 \pm 0.1$	101.6	72	$3.9^{+0.2}$	$9.5_{-0.5}$	7	$8^{+0.9}_{-0.6}$
45	40	51.4	$63 \pm 0.1$	101.6	80	$4.3^{+0.2}$	$9.5_{-0.5}$	7	$8^{+0.9}_{-0.6}$
63	40	54.4	$68 \pm 0.1$	127	–	$7.0^{+0.2}$	$12.7_{-0.5}$	–	$8^{+0.9}_{-0.6}$

# Installation and Commissioning Notes

## General

The pump housing must be filled with hydraulic fluid during commissioning and operation (filling of housing space). Commissioning must take place at low speed and without load until the system has been bled completely.

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 back into operation.

The leak fluid in the housing space must be drained into the tank through the highest leakage oil port. Ensure a minimum suction pressure at port S of 0.8 bar abs. (cold start 0.5 bar absolute).

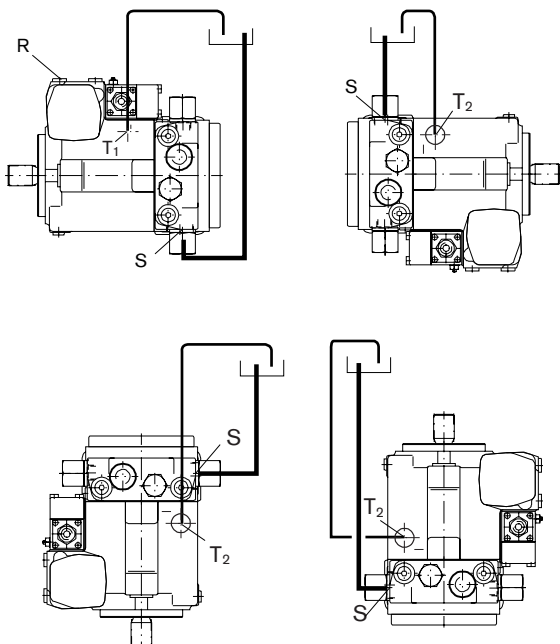
## Installation position

Optional.

### Mounting below the tank

Pump below minimum oil level in tank (standard)

- Before commissioning, fill the 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. An air cushion in the area of the bearings will damage to the axial piston machine.
- It is advisable to fill the suction lines.
- Operate the pump at low speed (starter speed) until the pump system is completely filled (check that oil escapes from port G without bubbles; drain oil via measuring line to tank).
- In the installation position "control device upwards", bleed air via port R.
- Minimum immersion depth of suction or leakage oil line in the tank: 200 mm (relative to minimum oil level in tank)
- Closed circuit air bleed (additionally):
  - Variable displacement motor A6VM: via port G
  - Motor with purging valve: no air bleed necessary.



### Installation above tank

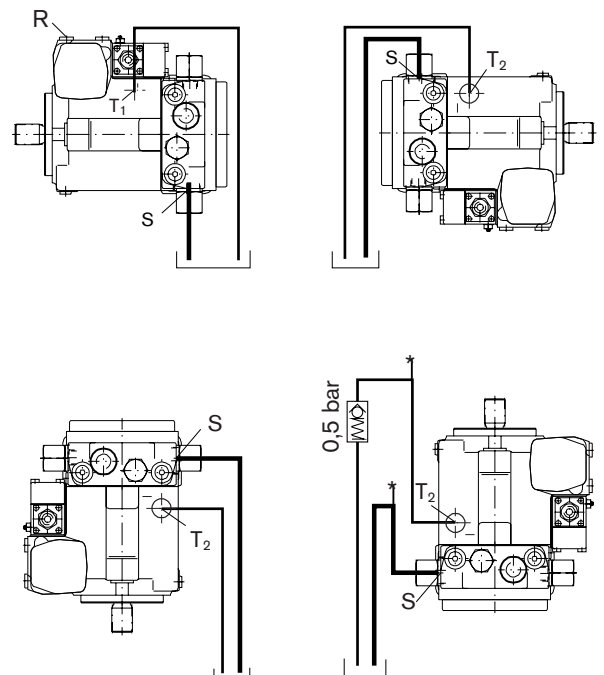
Pump above minimum oil level in tank

- 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 therefore insufficiently lubricated when the pump is restarted. This problem can be prevented by means of a non-return valve in the drain line (opening pressure 0.5 bar).

On commissioning, it is imperative that the pump is filled and bled via the leakage oil port. 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 A10VG is designed for use in closed circuits.
- The configuration, assembly and commissioning of the pump must be carried out by trained and qualified personnel.
- The service and operating ports are designed exclusively for the connection of hydraulic lines.
- Tightening torques: The tightening torques specified in this data sheet are maximum values and must not be exceeded (maximum values for screw threads).  
The maximum permitted tightening torques for fittings specified by their manufacturers must be observed.  
For DIN 13 fastening screws it is advisable to check tightening torque individually according to VDI 2230 Edition 2003.
- There is a danger of burns from the pump and especially the solenoids during and shortly after operation.
- Observe the specified data and instructions.