TS-A6VM

Axial Piston Variable Motor
Sizes: 28~200
Nominal Pressure: 400 Bar
Maximum Pressure: 450 Bar
Open & Closed Circuits

Index

Ordering Code

	TS-A6V		M					/	63	W		–	V						
01	02	03	04	05	06	07	08		09	10	11		12	13	14	15	16	17	18

Hydraulic fluid

01	Mineral oil and HFD.	
	HFB, HFC hydraulic fluid Sizes 28 to 200 (without code)	

Axial piston unit

02	Bent-axis design, variable	TS-A6V

Drive shaft bearing

		28...200	
03	Standard bearing (without code)	●	
	Long-life bearing	–	L

Operating mode

04	Motor (plug-in motor A6VE, see RE 91606)	M

Sizes (NG)

		28	55	80	107	140	160	200
05	Geometric displacement, see table of values on page 8							

Control devices

			28	55	80	107	140	160	200	
06	Proportional control hydraulic	Δp = 10 bar	●	●	●	●	●	●	●	HD1
		Δp = 25 bar	●	●	●	●	●	●	●	HD2
		Δp = 35 bar	–	–	–	–	–	–	–	HD3
	Two-point control hydraulic		–	–	–	–	–	–	–	HZ
			●	–	–	–	●	●	●	HZ1
			–	●	●	●	–	–	–	HZ3
	Proportional control electric	12 V	●	●	●	●	●	●	●	EP1
		24 V	●	●	●	●	●	●	●	EP2
	Two-point control electric	12 V	●	–	–	–	●	●	●	EZ1
		24 V	●	–	–	–	●	●	●	EZ2
		12 V	–	●	●	●	–	–	–	EZ3
		24 V	–	●	●	●	–	–	–	EZ4
	Automatic control high-pressure related with minimum pressure increase Δp ≤ approx. 10 bar		●	●	●	●	●	●	●	HA1
		with pressure increase Δp = 100 bar	●	●	●	●	●	●	●	HA2

Pressure control (only for HD, EP)

			28	55	80	107	140	160	200	
07	Without pressure control (without code)		●	●	●	●	●	●	●	
	Pressure control	fixed setting	●	●	●	●	●	●	●	D

● = Available – = Not available

Ordering Code

	TS-A6V		M					/	63	W		–	V						
01	02	03	04	05	06	07	08		09	10	11		12	13	14	15	16	17	18

Overrides for controls HA1 and HA2

		28	55	80	107	140	160	200	
08	Without override (without code)	●	●	●	●	●	●	●	
	Hydraulic override, remote control, proportional	●	●	●	●	●	●	●	T

Series

09	Series 6, index 3	63

Direction of rotation

10	Viewed on drive shaft, bidirectional	W

Setting ranges for displacement[2)]

		28	55	80	107	140	160	200	
11	$V_{g\ min} = 0$ to 0.7 $V_{g\ max}$ (without code)	●	●	●	●	●	●	●	

Seals

12	FKM (fluor-caoutchouc)	V

Drive shafts

		28	55	80	107	140	160	200	
13	Splined shaft DIN 5480	●	●	●	●	●	●	●	A
		●	●	●	●	●	●	●	Z

Mounting flanges

			28	55	80	107	140	160	200	
14	ISO 3019-2	4-hole	●	●	●	●	●	●	●	B

Port plates for service lines[3)]

					28	55	80	107	140	160	200	
15	SAE flange ports A and B at rear	01	0		●	●	●	●	●	●	●	010
			7		●	●	●	●	●	●	●	017
	SAE flange ports A and B at side, opposite	02	0		●	●	●	●	●	●	●	020
			7		●	●	●	●	●	●	●	027
	SAE flange ports A and B at side, opposite + rear	15	0		–	–	–	–	–	–	–	150
	Port plate with 1-level pressure-relief valves for mounting a counterbalance valve[4)]	37	0	BVD	–	–	–	●	–	–	–	370 378
		38	8		–	●	●	●	●	●	●	380

Valves (see pages 71 to 76)

Without valve	0
Flushing and boost pressure valve mounted	7
Counterbalance valve mounted[5)]	8

● = Available Not available

Ordering Code

	TS-A6V		M					/	63	W		–	V						
01	02	03	04	05	06	07	08		09	10	11		12	13	14	15	16	17	18

	Speed sensors	28	55	80	107	140	160	200	
16	Without speed sensor	●	●	●	●	●	●	●	0
	Prepared for HDD speed sensor	–	●	●	●	●	●	●	F
	HDD speed sensor mounted	–	●	●	●	●	●	●	H
	Prepared for DSA speed sensor	●	●	●	●	●	●	●	U
	DSA speed sensor mounted	●	●	●	●	●	●	●	V

	Swivel angle sensor	28	55	80	107	140	160	200	
17	Without swivel angle sensor (without code)	●	●	●	●	●	●	●	

	Beginning of control	28	55	80	107	140	160	200	
18	At $V_{g\ min}$ (standard for HA)	●	●	●	●	●	●	●	A
	At $V_{g\ max}$ (standard for HD, HZ, EP, EZ, DA)	●	●	●	●	●	●	●	B

● = Available – = Not available

Technical data

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

Size		NG	28	55	80	107	140	160	200
Displacement geometric[1], per revolution	$V_{g\,max}$	cm^3	28.1	54.8	80	107	140	160	200
	$V_{g\,min}$	cm^3	0	0	0	0	0	0	0
	$V_{g\,x}$	cm^3	18	35	51	68	88	61	76
Speed maximum[2] (while adhering to the maximum permissible input flow)									
at $V_{g\,max}$	n_{nom}	rpm	5550	4450	3900	3550	3250	3100	2900
at $V_g < V_{g\,x}$ (see diagram below)	n_{max}	rpm	8750	7000	6150	5600	5150	4900	4600
at $V_{g\,0}$	n_{max}	rpm	10450	8350	7350	6300	5750	5500	5100
Input flow[3]									
at n_{nom} and $V_{g\,max}$	$q_{V\,max}$	L/min	156	244	312	380	455	496	580
Torque[4]									
at $V_{g\,max}$ and $\Delta p = 400$ bar	T	Nm	179	349	509	681	891	1019	1273
at $V_{g\,max}$ and $\Delta p = 350$ bar	T	Nm	157	305	446	596	778	891	1114
Rotary stiffness									
$V_{g\,max}$ to $V_g/2$	c_{min}	KNm/rad	6	10	16	21	34	35	44
$V_g/2$ to 0 (interpolated)	c_{max}	KNm/rad	18	32	48	65	93	105	130
Moment of inertia for rotary group	J_{GR}	kgm^2	0.0014	0.0042	0.008	0.0127	0.0207	0.0253	0.0353
Maximum angular acceleration	α	rad/s^2	47000	31500	24000	19000	11000	11000	11000
Case volume	V	L	0.5	0.75	1.2	1.5	1.8	2.4	2.7
Mass (approx.)	m	kg	16	26	34	47	60	64	80

1) The minimum and maximum displacement are infinitely adjustable

2) The values are valid:
- for the optimum viscosity range from $\nu_{opt} = 36$ to 16 mm^2/s
- with hydraulic fluid based on mineral oils

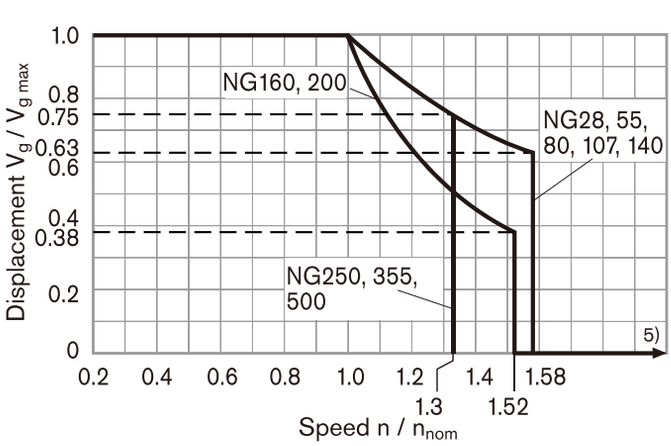
3) Restriction of input flow with counterbalance valve

4) Torque without radial force

Note

Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. Other permissible limit values, with respect to speed variation, reduced angular acceleration as a function of the frequency and the permissible startup angular acceleration (lower than the maximum angular acceleration)

Permissible displacement in relation to speed



5) Values in this range on request

Determining the operating characteristics

Input flow $q_v = \dfrac{V_g \cdot n}{1000 \cdot \eta_v}$ [L/min]

Speed $n = \dfrac{q_V \cdot 1000 \cdot \eta_v}{V_g}$ [min^{-1}]

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

Power $P = \dfrac{2\,\pi \cdot T \cdot n}{60000} = \dfrac{q_v \cdot \Delta p \cdot \eta_t}{600}$ [kW]

V_g = Displacement per revolution in cm^3

Δp = Differential pressure in bar

n = Speed in rpm

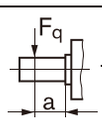
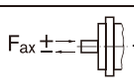
η_v = Volumetric efficiency

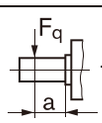
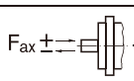
η_{mh} = Mechanical-hydraulic efficiency

η_t = Total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Technical data

Permissible radial and axial forces of the drive shafts

Size	NG		28	28	55	55	80	80	107	107	140
Drive shaft	ø	mm	30	25	35	30	40	35	45	40	45
Maximum radial force[1] at distance a (from shaft collar) 	$F_{q\ max}$	N	4838	6436	8069	7581	10283	10266	12215	13758	15982
	a	mm	17.5	14	20	17.5	22.5	20	25	22.5	25
with permissible torque	T_{max}	Nm	179	179	349	281	509	444	681	681	891
≙ Permissible pressure Δp at $V_{g\ max}$	$p_{nom\ perm.}$	bar	400	400	400	322	400	349	400	400	400
Maximum axial force[2] F_{ax} ± 	$+F_{ax\ max}$	N	315	315	500	500	710	710	900	900	1030
	$-F_{ax\ max}$	N	0	0	0	0	0	0	0	0	0
Permissible axial force per bar operating pressure	$F_{ax\ perm./bar}$	N/bar	4.6	4.6	7.5	7.5	9.6	9.6	11.3	11.3	13.3

Size	NG		160	160	200
Drive shaft	ø	mm	50	45	50
Maximum radial force[1] at distance a (from shaft collar) 	$F_{q\ max}$	N	16435	18278	20532
	a	mm	27.5	25	27.5
with permissible torque	T_{max}	Nm	1019	1019	1273
≙ Permissible pressure Δp at $V_{g\ max}$	$p_{nom\ perm.}$	bar	400	400	400
Maximum axial force[2] F_{ax} ± 	$+F_{ax\ max}$	N	1120	1120	1250
	$-F_{ax\ max}$	N	0	0	0
Permissible axial force per bar operating pressure	$F_{ax\ perm./bar}$	N/bar	15.1	15.1	17.0

Note

Influence of the direction of the permissible axial force:

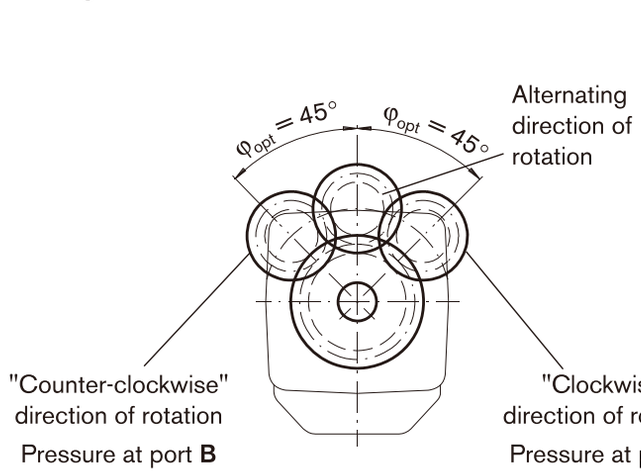
$+F_{ax\ max}$ = Increase in service life of bearings

$-F_{ax\ max}$ = Reduction in service life of bearings (avoid)

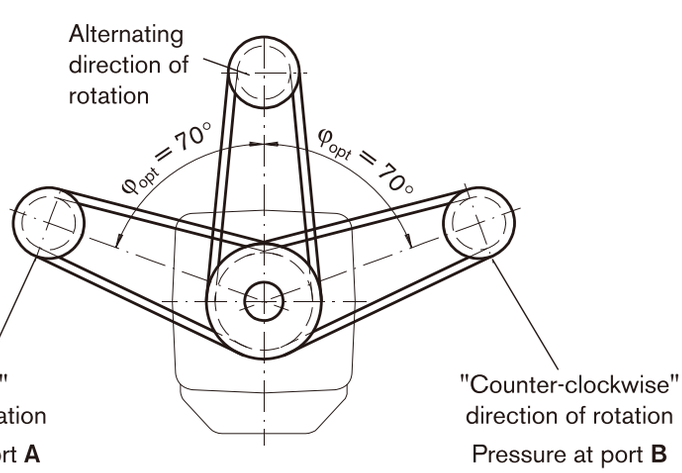
Effect of radial force F_q on the service life of bearings

By selecting a suitable direction of radial force F_q, the load on the bearings, caused by the internal rotary group forces can be reduced, thus optimizing the service life of the bearings. Recommended position of mating gear is dependent on direction of rotation. Examples:

Toothed gear drive



V-belt drive



HD - Proportional control hydraulic

The proportional hydraulic control provides infinite setting of the displacement, proportional to the pilot pressure applied to port X.

– Beginning of control at $V_{g\,max}$ (maximum torque, minimum speed at minimum pilot pressure)

– End of control at $V_{g\,min}$ (minimum torque, maximum permissible speed at maximum pilot pressure)

Note

– Maximum permissible pilot pressure: $p_{St} = 100$ bar

– The control oil is internally taken out of the high-pressure side of the motor (A or B). For reliable control, an operating pressure of at least 30 bar is required in A (B). If a control operation is performed at an operating pressure < 30 bar, an auxiliary pressure of at least 30 bar must be applied at port G via an external check valve. For lower pressures, please contact us.
Please note that pressures up to 450 bar can occur at port G.

– Please state the desired beginning of control in plain text when ordering, e. g.: beginning of control at 10 bar.

– The beginning of control and the HD characteristic are influenced by the case pressure. An increase in case pressure causes an increase in the beginning of control (see page 6) and thus a parallel shift of the characteristic.

– A leakage flow of maximum 0.3 L/min can escape at port X due to internal leakage (operating pressure > pilot pressure). The control is to be suitably configured to avoid an independent build-up of pilot pressure.

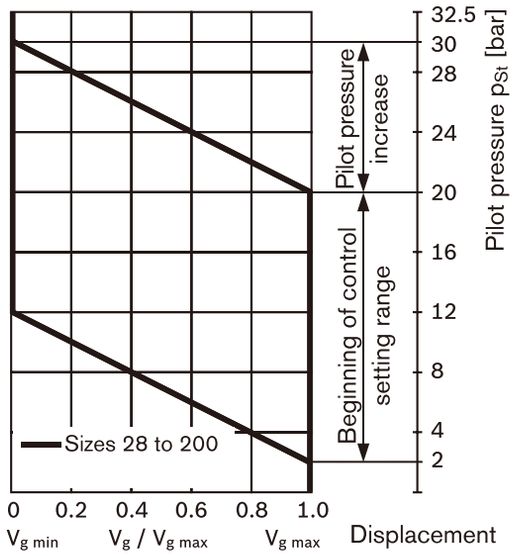
HD1
Pilot pressure increase $\Delta p_{St} = 10$ bar

A pilot pressure increase of 10 bar at port X results in a decrease in displacement from $V_{g\,max}$ to 0 cm^3 (sizes 28 to 200)

Beginning of control, setting range _____2 to 20 bar

Standard setting:
Beginning of control at 3 bar (end of control at 13 bar)

HD1 characteristic



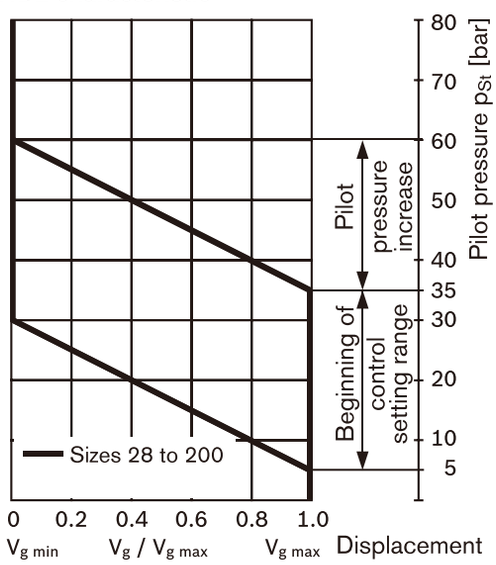
HD2
Pilot pressure increase $\Delta p_{St} = 25$ bar

A pilot pressure increase of 25 bar at port X results in a decrease in displacement from $V_{g\,max}$ to 0 cm^3 (sizes 28 to 200)

Beginning of control, setting range _____5 to 35 bar

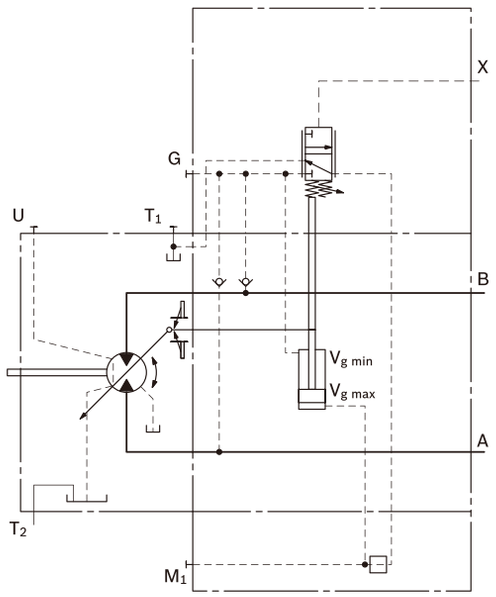
Standard setting:
Beginning of control at 10 bar (end of control at 35 bar)

HD2 characteristic



HD - Proportional control hydraulic

Schematic HD1, HD2
Sizes 28 to 200



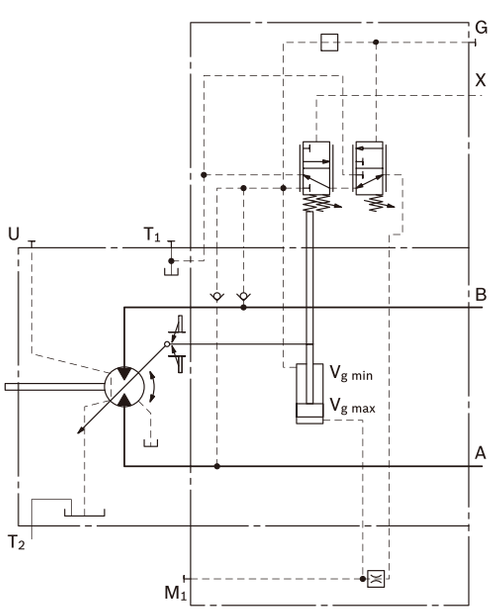
HD.D
Pressure control, fixed setting

The pressure control overrides the HD control function. If the load torque or a reduction in motor swivel angle causes the system pressure to reach the setpoint of the pressure control, the motor will swivel towards a larger displacement.

The increase in the displacement and the resulting reduction in pressure cause the control deviation to decrease. With the increase in displacement the motor develops more torque, while the pressure remains constant.

Setting range of the pressure control valve
Sizes 28 to 200 _____ 80 to 400 bar

Schematic HD.D
Sizes 28 to 200



HD.E
Pressure control, hydraulic override, two-point

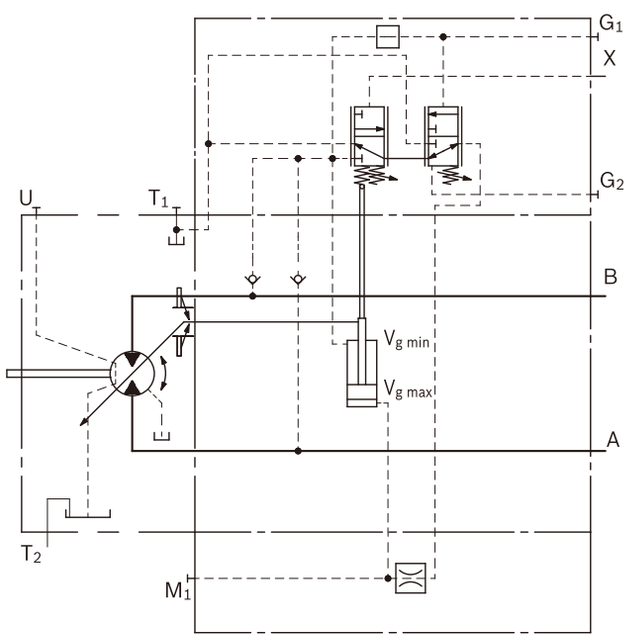
Sizes 28 to 200

The pressure control setting can be overridden by applying an external pilot pressure at port G_2, realizing a 2nd pressure setting.

Required pilot pressure at port G_2:
p_{St} = 20 to 50 bar

Please state the 2nd pressure setting in plain text when ordering.

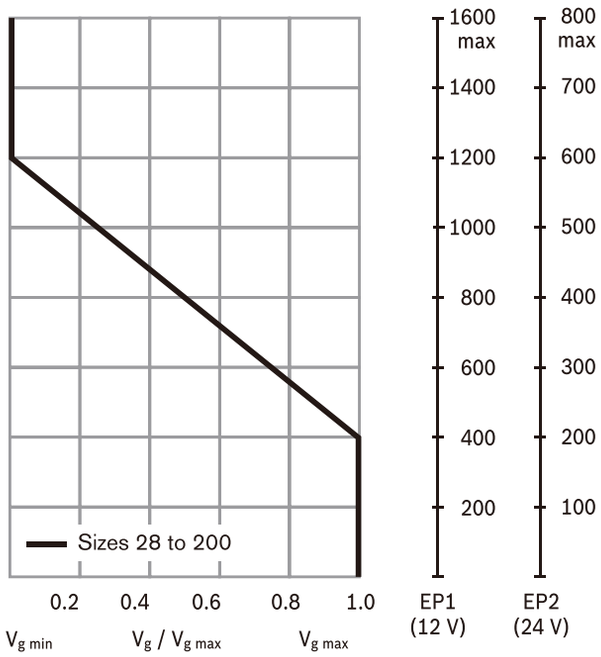
Schematic HD.E



EP - Proportional control electric

The proportional electric control provides infinite setting of the displacement, proportional to the control current applied to the solenoid (sizes 28 to 200)

Characteristic



Note

The control oil is internally taken out of the high-pressure side of the motor (A or B). For reliable control, an operating pressure of at least 30 bar is required in A (B). If a control operation is performed at an operating pressure < 30 bar, an auxiliary pressure of at least 30 bar must be applied at port G via an external check valve. For lower pressures, please contact us.
Please note that pressures up to 450 bar can occur at port G.

Technical data, solenoid
Sizes 28 to 200

	EP1	EP2
Voltage	12 V (±20 %)	24 V (±20 %)
Control current		
Beginning of control	400 mA	200 mA
End of control	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 %
Type of protection see connector design page 70		

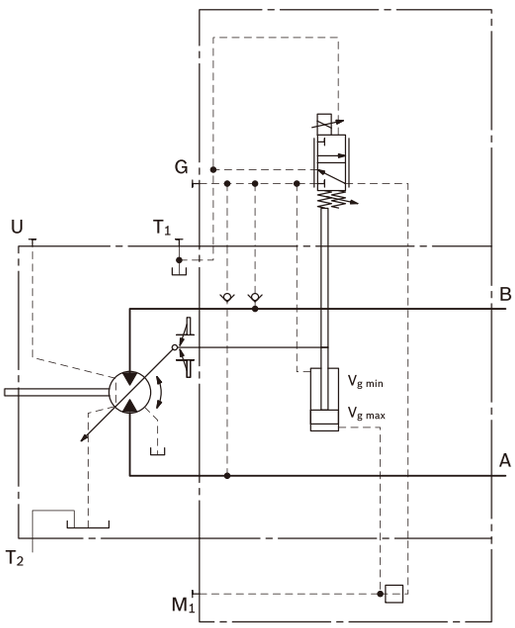
The following electronic controllers and amplifiers are available for controlling the proportional solenoids:

– BODAS controller RC
  Series 20
  Series 21
  Series 22
  Series 30
  and application software

– Analog amplifier RA

EP - Proportional control electric

Schematic EP1, EP2
Sizes 28 to 200



EP.E
Pressure control, hydraulic override, two-point

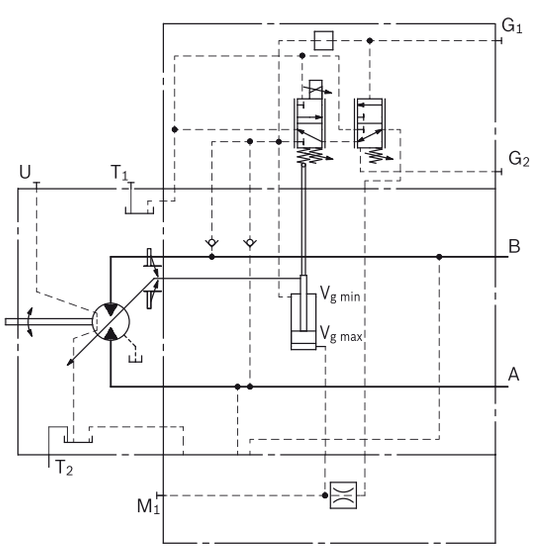
Sizes 28 to 200

The pressure control setting can be overridden by applying an external pilot pressure at port G_2, realizing a 2nd pressure setting.

Required pilot pressure at port G_2:
p_{St} = 20 to 50 bar

Please state the 2nd pressure setting in plain text when ordering.

Schematic EP.E



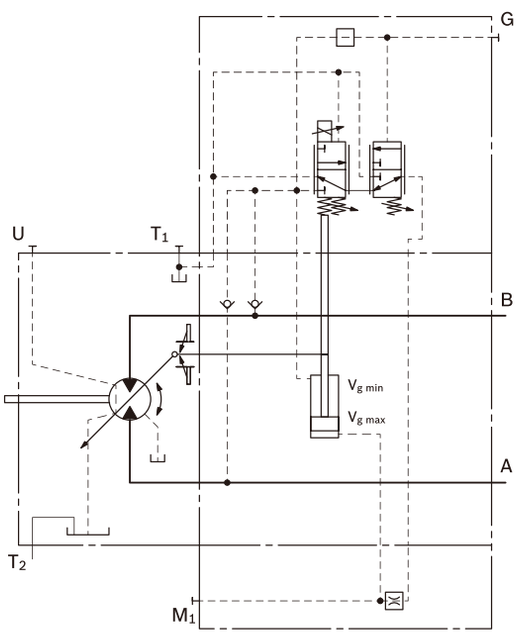
EP.D
Pressure control, fixed setting

The pressure control overrides the EP control function. If the load torque or a reduction in motor swivel angle causes the system pressure to reach the setpoint of the pressure control, the motor will swivel towards a larger displacement.

The increase in the displacement and the resulting reduction in pressure cause the control deviation to decrease. With the increase in displacement the motor develops more torque, while the pressure remains constant.

Setting range of the pressure control valve:
Sizes 28 to 200 _____ 80 to 400 bar

Schematic EP.D
Sizes 28 to 200

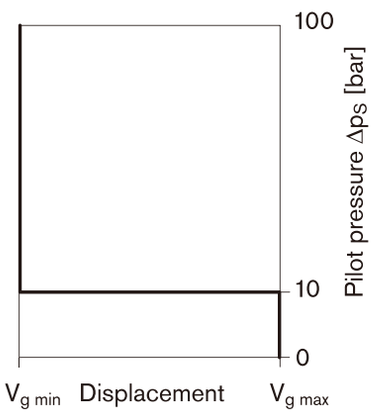


Hz - Two-point control hydraulic

The two-point hydraulic control allows the displacement to be set to either $V_{g\,min}$ or $V_{g\,max}$ by switching the pilot pressure at port X on or off.

- Position at $V_{g\,max}$ (without pilot pressure, maximum torque, minimum speed)
- Position at $V_{g\,min}$ (with pilot pressure > 10 bar activated, minimum torque, maximum permissible speed)

Characteristic HZ

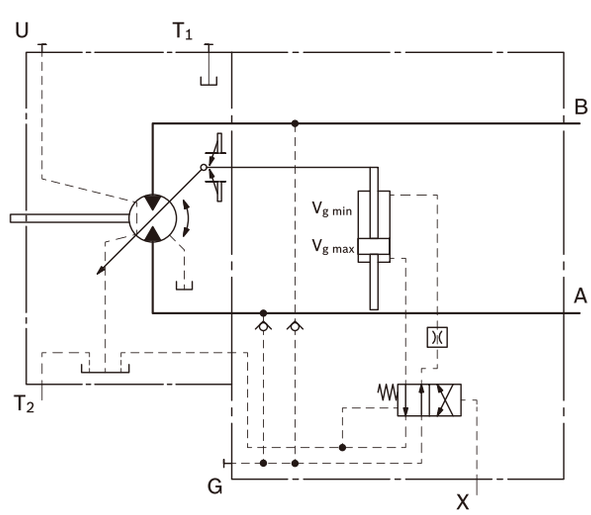


Note

- Maximum permissible pilot pressure: 100 bar
- The control oil is internally taken out of the high-pressure side of the motor (A or B). For reliable control, an operating pressure of at least 30 bar is required in A (B). If a control operation is performed at an operating pressure < 30 bar, an auxiliary pressure of at least 30 bar must be applied at port G via an external check valve. For lower pressures, please contact us.
  Please note that pressures up to 450 bar can occur at port G.
- A leakage flow of maximum 0.3 L/min is present at port X (operating pressure > pilot pressure). To avoid a build-up of pilot pressure, pressure is to be relieved from port X to the reservoir.

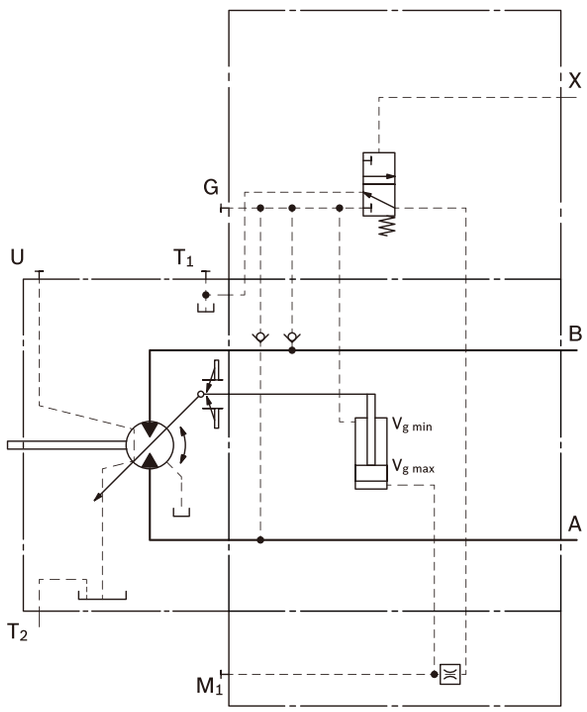
Schematic HZ3

Sizes 55 to 107



Schematic HZ1

Sizes 28, 140, 160, 200



Ez - Two-point control Electric

The two-point electric control with switching solenoid (sizes 28 to 200) allows the displacement to be set to either $V_{g\ min}$ or $V_{g\ max}$ by switching the electric current at the switching solenoid or control valve on or off.

Note

The control oil is internally taken out of the high-pressure side of the motor (A or B). For reliable control, an operating pressure of at least 30 bar is required in A (B). If a control operation is performed at an operating pressure < 30 bar, an auxiliary pressure of at least 30 bar must be applied at port G via an external check valve. For lower pressures, please contact us.
Please note that pressures up to 450 bar can occur at port G.

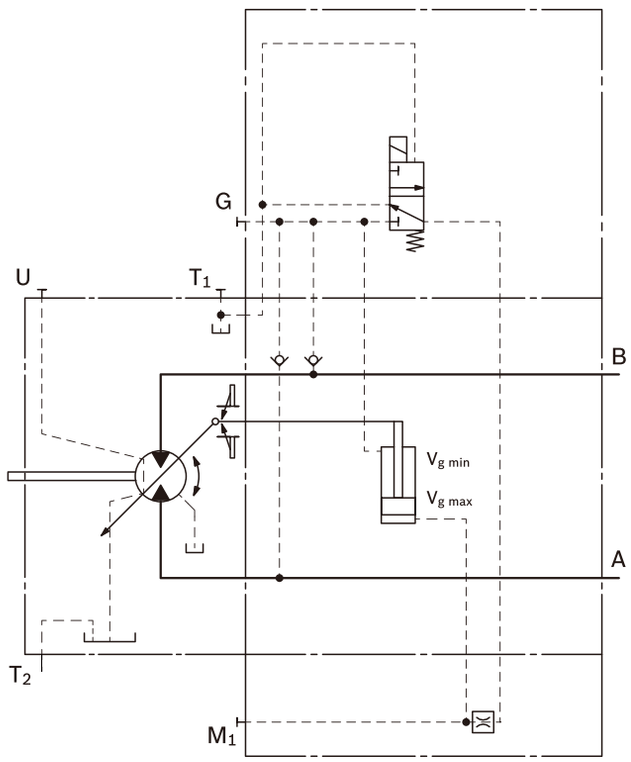
Technical data, solenoid with Ø37
Sizes 28, 140, 160, 200

	EZ1	EZ2
Voltage	12 V (±20 %)	24 V (±20 %)
Displacement $V_{g\ max}$	de-energized	de-energized
Displacement $V_{g\ min}$	energized	energized
Nominal resistance (at 20 °C)	5.5 Ω	21.7 Ω
Nominal power	26.2 W	26.5 W
Minimum required current	1.32 A	0.67 A
Duty cycle	100 %	100 %

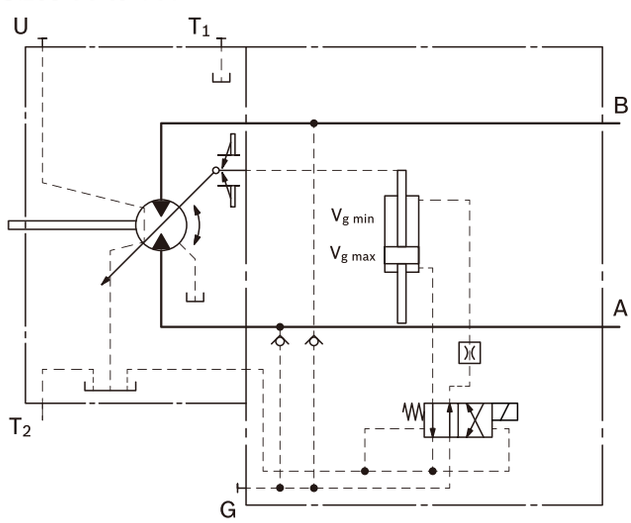
Technical data, solenoid with Ø45
Sizes 55 to 107

	EZ3	EZ4
Voltage	12 V (±20 %)	24 V (±20 %)
Displacement $V_{g\ max}$	de-energized	de-energized
Displacement $V_{g\ min}$	energized	energized
Nominal resistance (at 20 °C)	4.8 Ω	19.2 Ω
Nominal power	30 W	30W
Minimum required current	1.5 A	0.75 A
Duty cycle	100 %	100 %

Schematic EZ1, EZ2
Sizes 28, 140, 160, 200



Schematic EZ3, EZ4
Sizes 55 to 107



HA - Automatic control high pressure related

The automatic high-pressure related control adjusts the displacement automatically depending on the operating pressure.

The displacement of the A6VM motor with HA control is $V_{g\ min}$ (maximum speed and minimum torque). The control unit measures internally the operating pressure at A or B (no control line required) and upon reaching the beginning of control, the controller swivels the motor from $V_{g\ min}$ to $V_{g\ max}$ with increase of pressure. The displacement is modulated between $V_{g\ min}$ and $V_{g\ max}$, thereby depending on load conditions.

- Beginning of control at $V_{g\ min}$ (minimum torque, maximum speed)
- End of control at $V_{g\ max}$ (maximum torque, minimum speed)

Note

- For safety reasons, winch drives are not permissible with beginning of control at $V_{g\ min}$ (standard for HA).
- The control oil is internally taken out of the high-pressure side of the motor (A or B). For reliable control, an operating pressure of at least 30 bar is required in A (B). If a control operation is performed at an operating pressure < 30 bar, an auxiliary pressure of at least 30 bar must be applied at port G via an external check valve. For lower pressures, please contact us.
  Please note that pressures up to 450 bar can occur at port G.
- The beginning of control and the HA characteristic are influenced by the case pressure. An increase in case pressure causes an increase in the beginning of control and thus a parallel shift of the characteristic. Only for HA1T (sizes 28 to 200)
- A leakage flow of maximum 0.3 L/min is present at port X (operating pressure > pilot pressure). To avoid a build-up of pilot pressure, pressure is to be relieved from port X to the reservoir. **Only for control HA.T.**

HA - Automatic control high pressure related

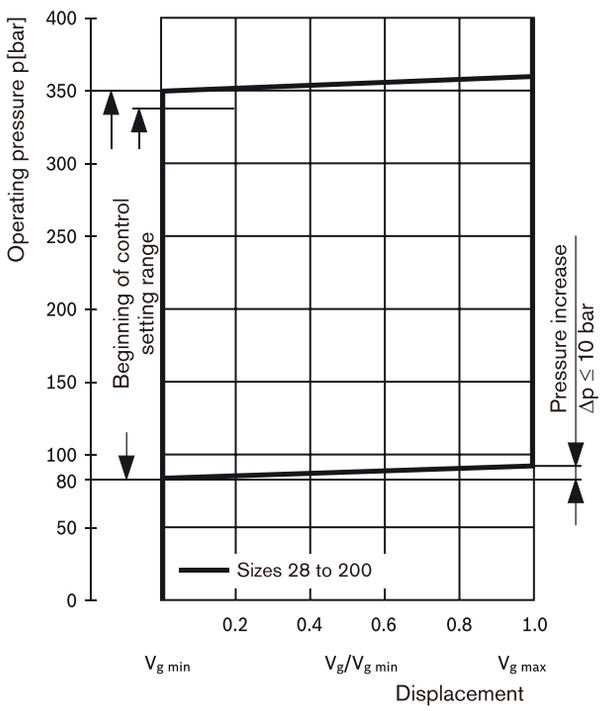
HA1
With minimum pressure increase

An operating pressure increase of $\Delta p \leq$ approx. 10 bar results in an increase in displacement from 0 cm^3 to $V_{g\,max}$ (sizes 28 to 200)

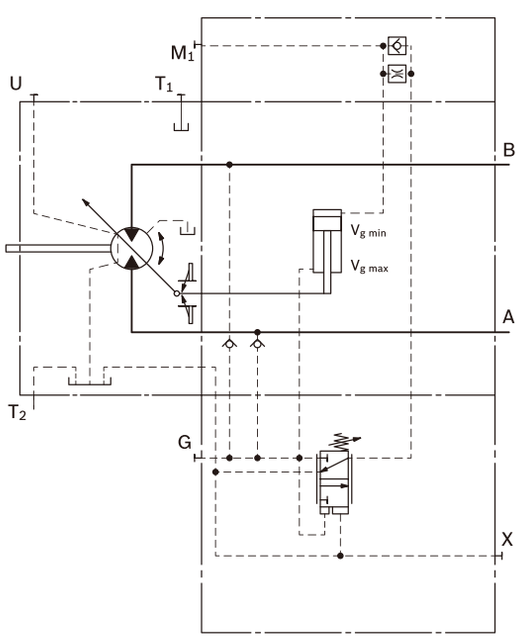
Beginning of control, setting range
Sizes 28 to 200 _____ 80 to 350 bar

Please state the desired beginning of control in plain text when ordering, e. g.: beginning of control at 300 bar.

Characteristic HA1



Schematic HA1
Sizes 28 to 200



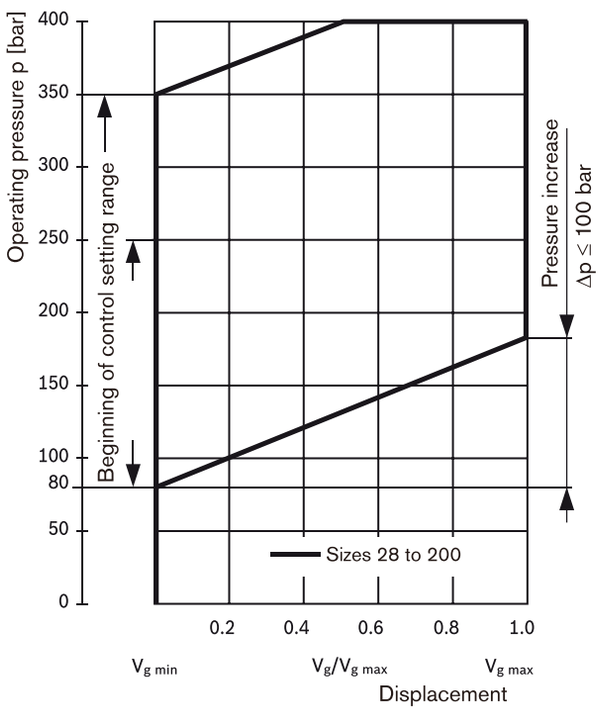
HA2
With pressure increase

An operating pressure increase of $\Delta p =$ approx. 100 bar results in an increase in displacement from 0 cm^3 to $V_{g\,max}$ (sizes 28 to 200)

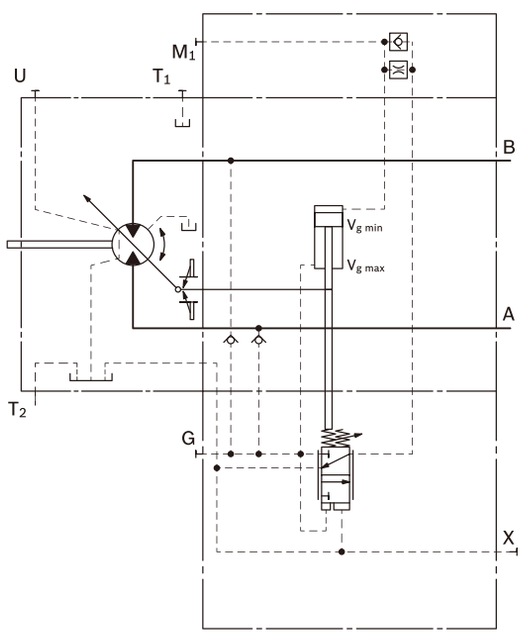
Beginning of control, setting range
Sizes 28 to 200 _____ 80 to 350 bar

Please state the desired beginning of control in plain text when ordering, e. g.: beginning of control at 200 bar.

Characteristic HA2



Schematic HA2
Sizes 28 to 200



HA - Automatic control high pressure related

HA.T
Override hydraulic remote control, proportional

With the HA.T3 control, the beginning of control can be influenced by applying a pilot pressure to port X.

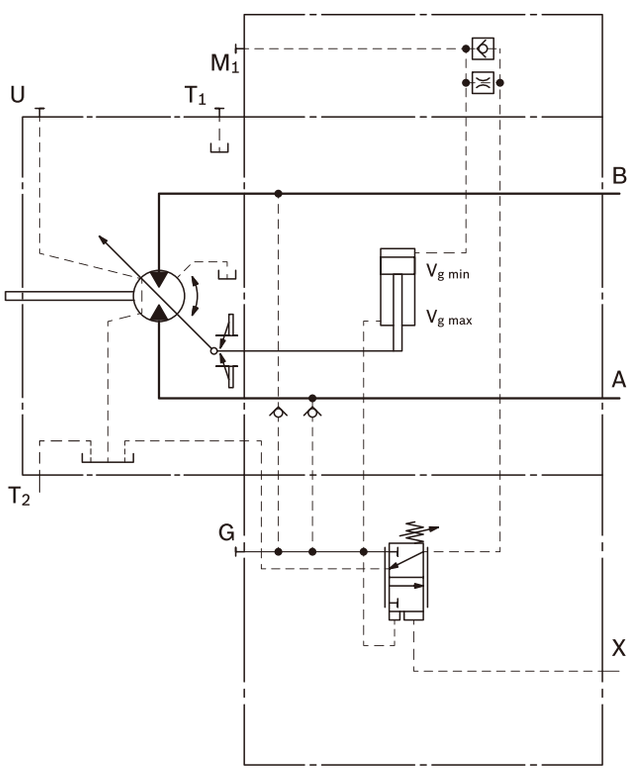
For each 1 bar of pilot pressure increase, the beginning of control is reduced by 17 bar (sizes 28 to 200)

Example (sizes 28 to 200):

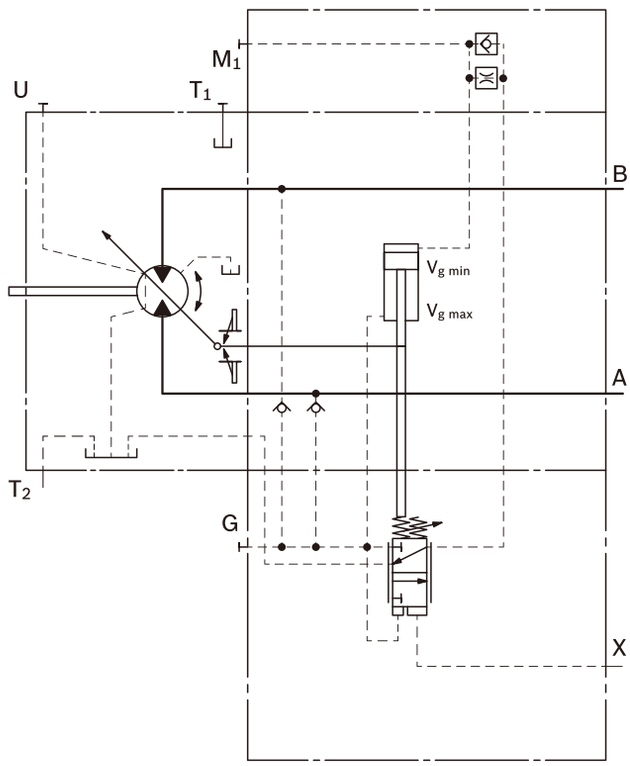
Beginning of control setting	300 bar	300 bar
Pilot pressure at port X	0 bar	10 bar
Beginning of control at	300 bar	130 bar

Note
Maximum permissible pilot pressure 100 bar.

Schematic HA1.T
Sizes 28 to 200



Schematic HA2.T
Sizes 28 to 200



HA - Automatic control high pressure related

HA.U1, HA.U2
Override electric two-point

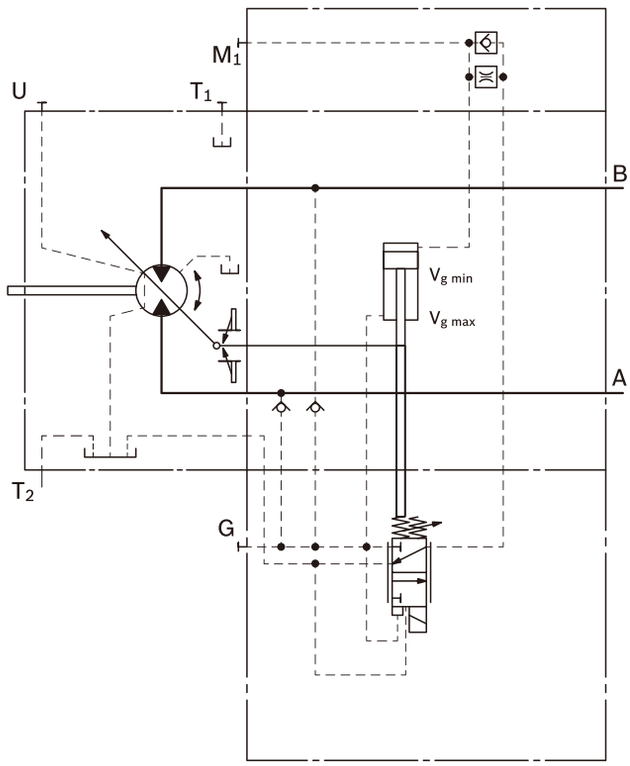
Sizes 28 to 200

With the HA.U1 or HA.U2 control, the beginning of control can be overridden by an electric signal to a switching solenoid. When the override solenoid is energized, the variable motor swivels to maximum swivel angle, without intermediate position. The beginning of control is adjustable between 80 and 300 bar (specify required setting in plain text when ordering).

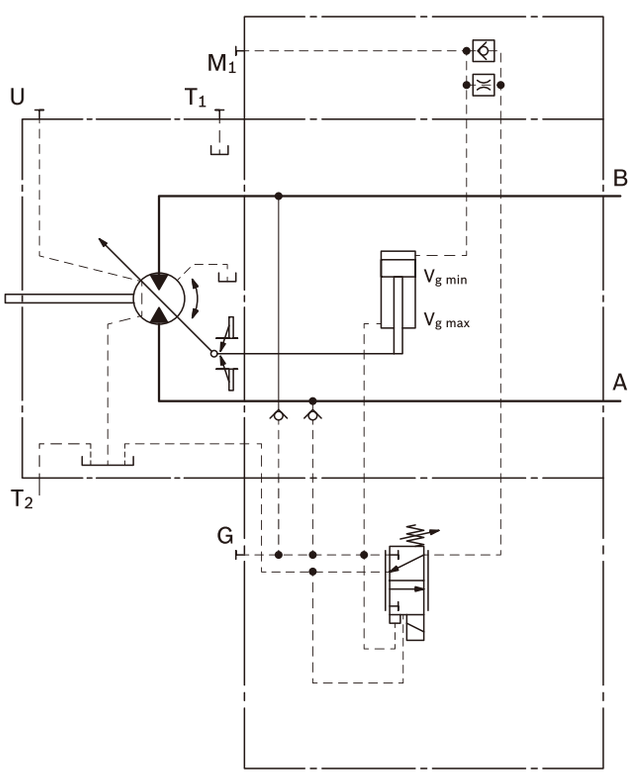
Technical data, solenoid with Ø45

	U1	U2
Voltage	12 V (±20 %)	24 V (±20 %)
No override	de-energized	de-energized
Displacement $V_{g\ max}$	energized	energized
Nominal resistance (at 20 °C)	4.8 Ω	19.2 Ω
Nominal power	30 W	30 W
Minimum required current	1.5 A	0.75 A
Duty cycle	100 %	100 %

Schematic HA2U1, HA2U2



Schematic HA1U1, HA1U2



HA - Automatic control high pressure related

HA.**R1**, HA.**R2**
Override electric, travel direction valve electric

Sizes 28 to 200

With the HA.R1 or HA.R2 control, the beginning of control can be overridden by an electric signal to switching solenoid b. When the override solenoid b is energized, the variable motor swivels to maximum swivel angle, without intermediate position.

The travel direction valve ensures that the preselected pressure side of the hydraulic motor (A or B) is always connected to the HA control, and thus determines the swivel angle, even if the high-pressure side changes (e. g. -travel drive during a downhill operation). This thereby prevents undesired jerky deceleration and/or braking characteristics.

Depending on the direction of rotation (direction of travel), the travel direction valve is actuated through the pressure spring or the switching solenoid a (see page 29 for further details).

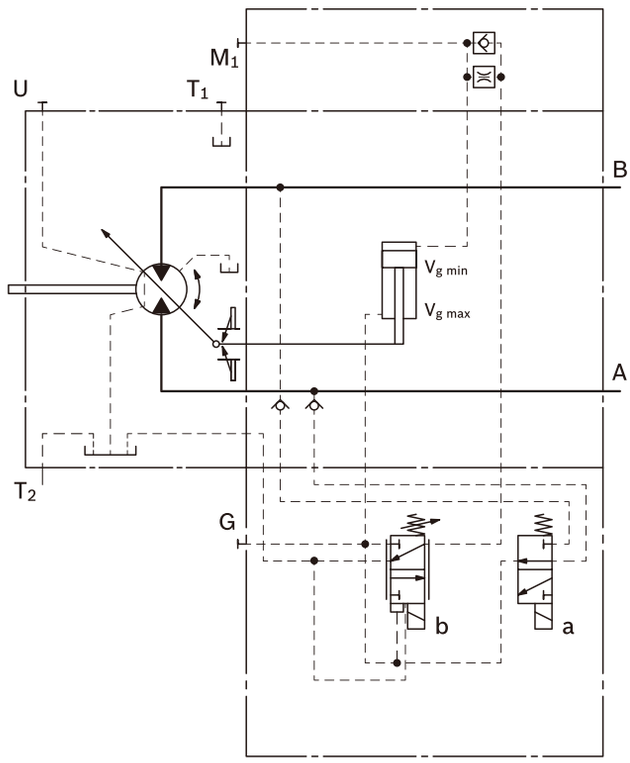
Technical data, solenoid a with Ø37
(travel direction valve)

		R1	R2
Voltage		12 V (±20 %)	24 V (±20 %)
No override		de-energized	de-energized
Direction of rotation	Operating pressure in		
ccw	B	energized	energized
cw	A	de-energized	de-energized
Nominal resistance (at 20 °C)		5.5 Ω	21.7 Ω
Nominal power		26.2 W	26.5 W
Minimum required current		1.32 A	0.67 A
Duty cycle		100 %	100 %

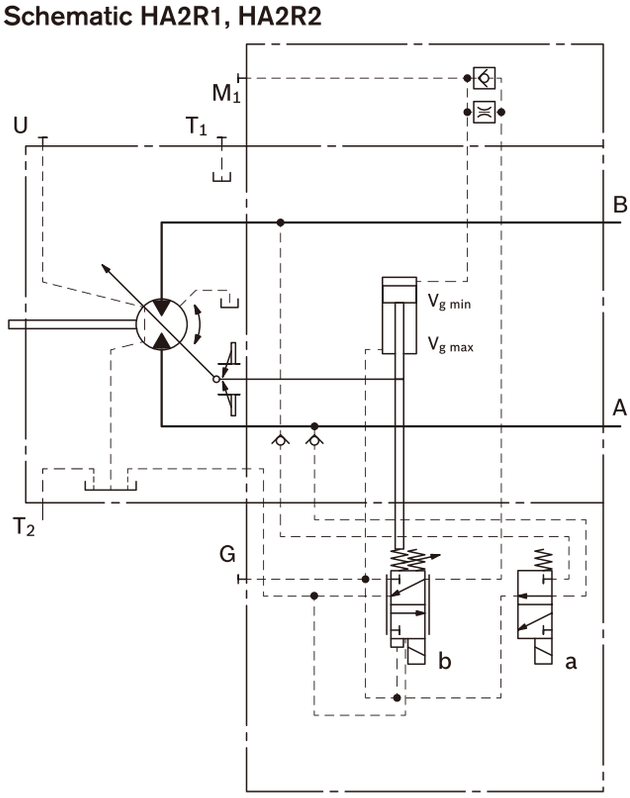
Technical data, solenoid b with Ø45
(electric override)

	R1	R2
Voltage	12 V (±20 %)	24 V (±20 %)
No override	de-energized	de-energized
Displacement $V_{g\ max}$	energized	energized
Nominal resistance (at 20 °C)	4.8 Ω	19.2 Ω
Nominal power	30 W	30 W
Minimum required current	1.5 A	0.75 A
Duty cycle	100 %	100 %

Schematic HA1R1, HA1R2



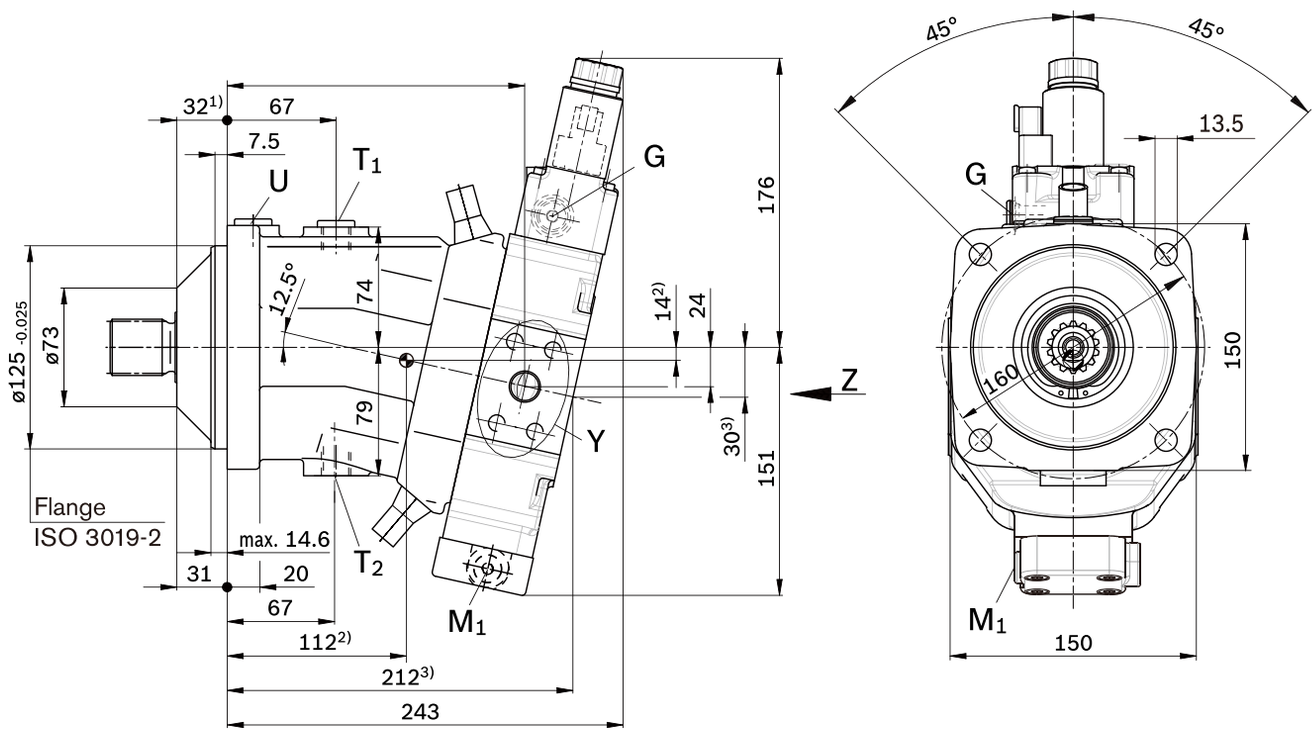
Schematic HA2R1, HA2R2



Unit Dimensions Size 55

EP1, EP2 – Proportional control electric

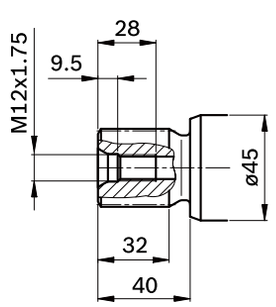
Port plate 02 – SAE flange ports A and B at side, opposite



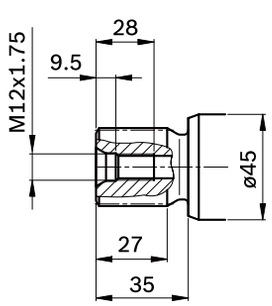
1) To shaft collar
2) Center of gravity
3) Port plate 1 – SAE flange ports A and B at rear

Drive shafts

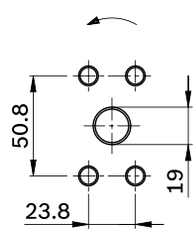
A Splined shaft DIN 5480 W35x2x16x9g



Z Splined shaft DIN 5480 W30x2x14x9g



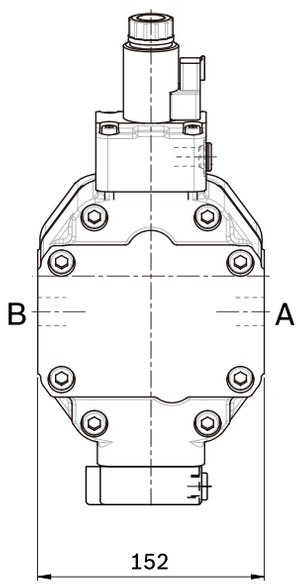
Service line port (detail Y)



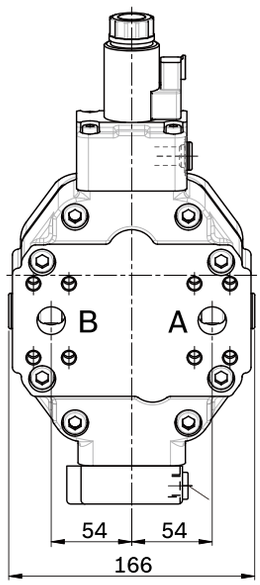
Unit Dimensions Size 55

Location of the service line ports on the port plates (view Z)

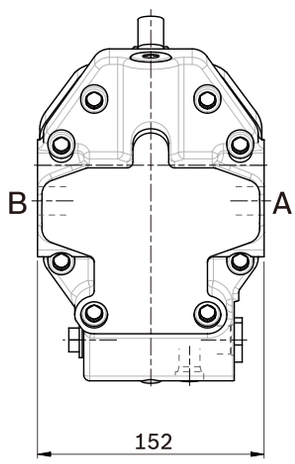
02 SAE flange ports A and B at side, opposite



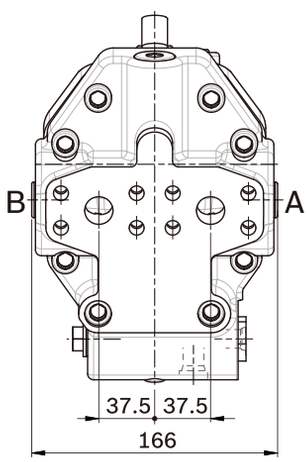
01 SAE flange ports A and B at rear



02 SAE flange port A and B at side, opposite only HZ3, EZ3, EZ4



01 SAE flange port A and B at rear only HZ3, EZ4, EZ4

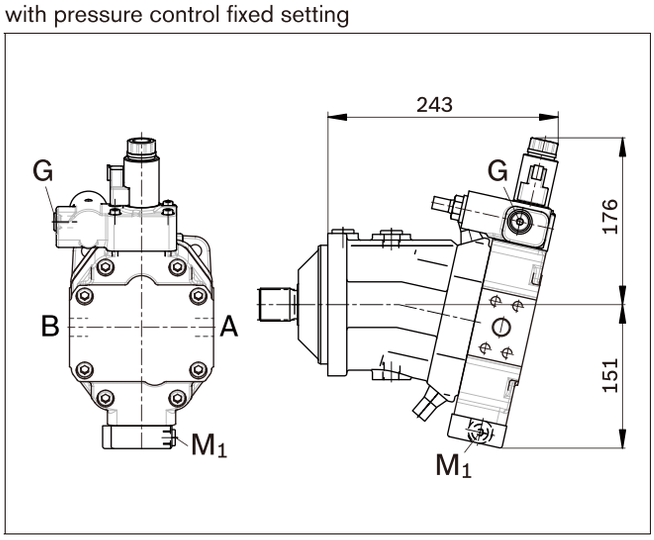


Ports

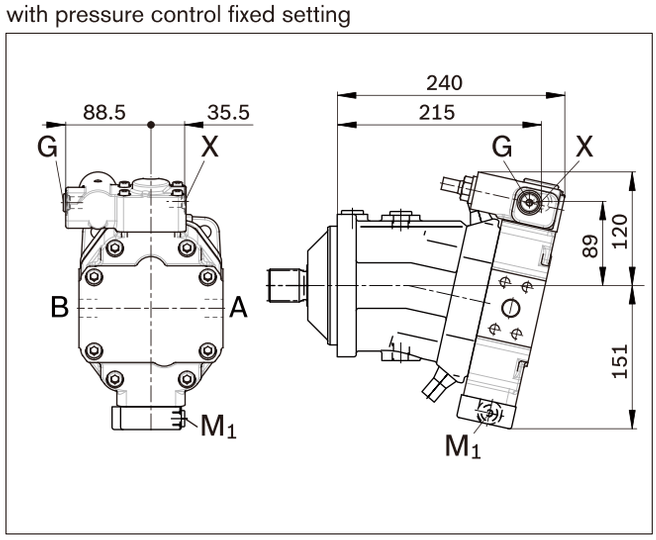
Designation	Port for	Standard	Size	Maximum pressure [bar]	State
A, B	Service line Fastening thread A/B	SAE J518 DIN 13	3/4 in M10 x 1.5; 17 deep	450	O
T_1	Drain line	DIN 3852	M18 x 1.5; 12 deep	3	X
T_2	Drain line	DIN 3852	M18 x 1.5; 12 deep	3	O
G	Synchronous control	DIN 3852	M14 x 1.5; 12 deep	450	X
G_2	2nd pressure setting (HD.E, EP.E)	DIN 3852	M14 x 1.5; 12 deep	100	X
U	Bearing flushing	DIN 3852	M18 x 1.5; 12 deep	3	X
X	Pilot signal (HD, HZ, HA1T/HA2T)	DIN 3852	M14 x 1.5; 12 deep	100	O
X	Pilot signal (HA1 and HA2)	DIN 3852	M14 x 1.5; 12 deep	3	X
X_1, X_2	Pilot signal (DA1, DA4)	DIN 2353-CL	8B-ST	40	O
X_1	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	O
X_3	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	X
M_1	Measuring stroking chamber	DIN 3852	M14 x 1.5; 12 deep	450	X

Unit Dimensions Size 55

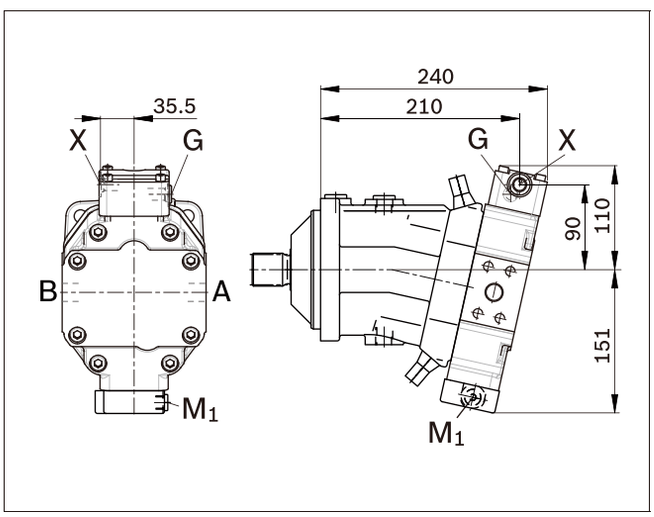
EP.D
Proportional control electric,
with pressure control fixed setting



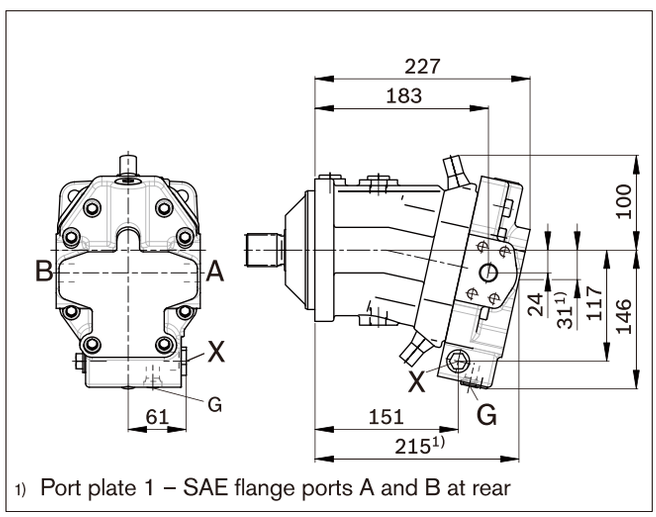
HD.D
Proportional control hydraulic,
with pressure control fixed setting



HD1, HD2
Proportional control hydraulic

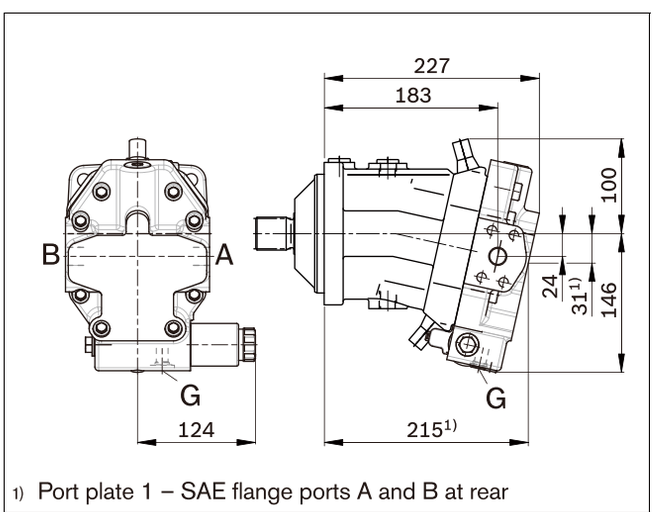


HZ3
Two-point control hydraulic



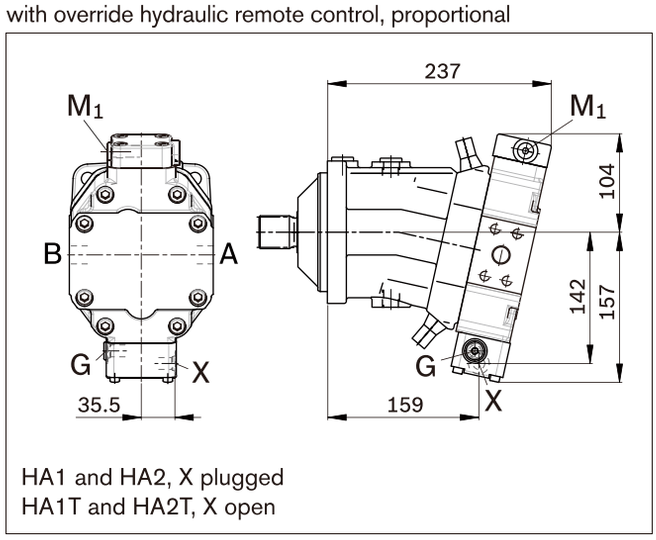
1) Port plate 1 – SAE flange ports A and B at rear

EZ3, EZ4
Two-point control electric



1) Port plate 1 – SAE flange ports A and B at rear

HA1, HA2 / HA1T, HA2T
Automatic control high-pressure related,
with override hydraulic remote control, proportional

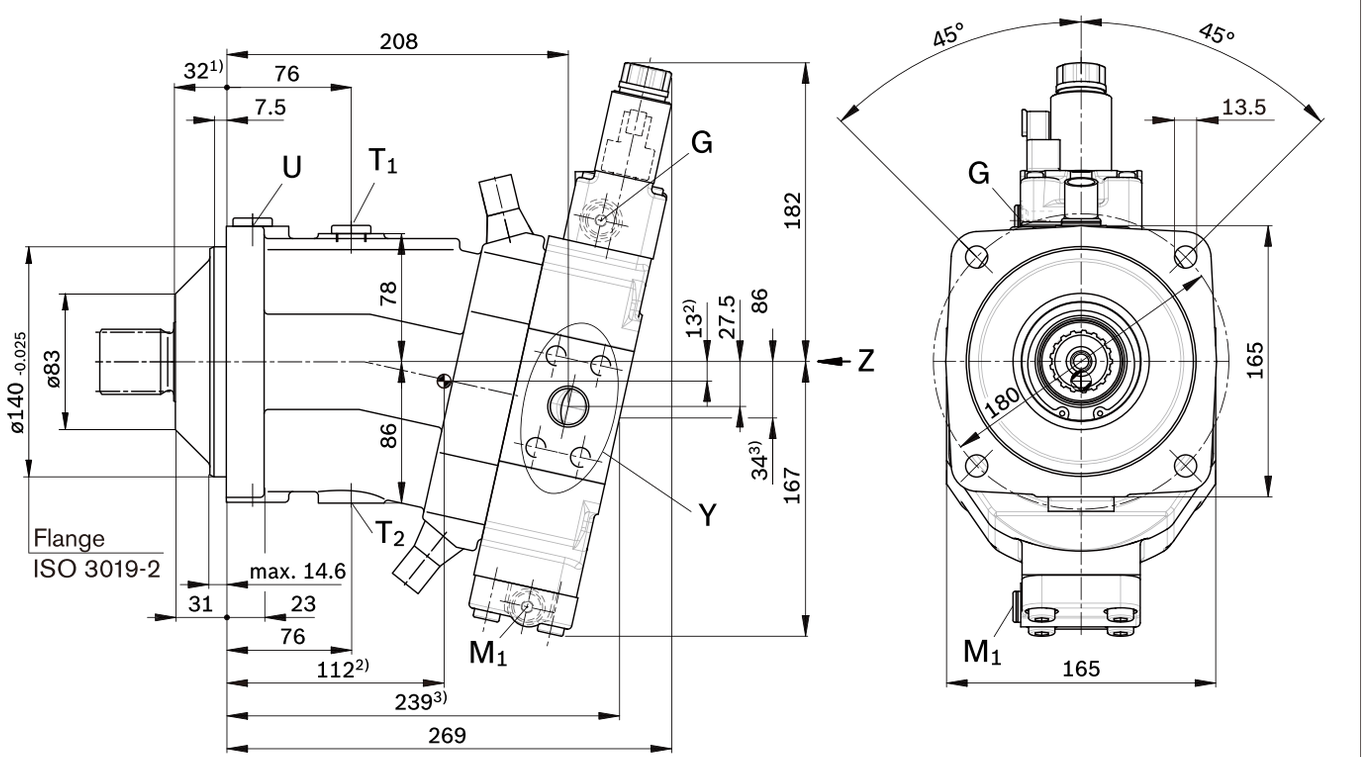


HA1 and HA2, X plugged
HA1T and HA2T, X open

Unit Dimensions Size 80

EP1, EP2 – Proportional control electric

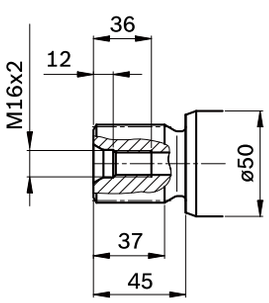
Port plate 02 – SAE flange ports A and B at side, opposite



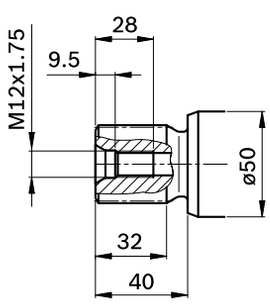
1) To shaft collar
2) Center of gravity
3) Port plate 1 – SAE flange ports A and B at rear

Drive shafts

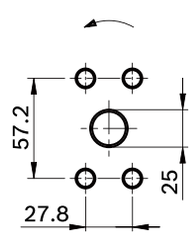
A Splined shaft DIN 5480
W40x2x18x9g



Z Splined shaft DIN 5480
W35x2x16x9g



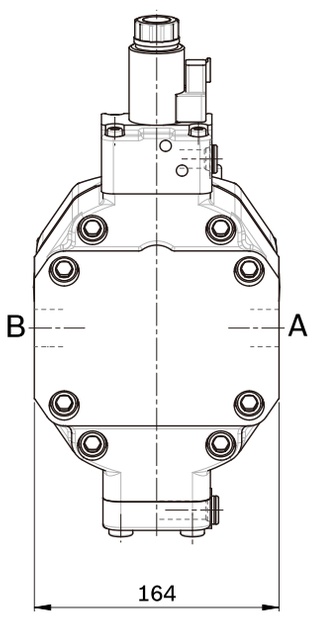
Service line port (detail Y)



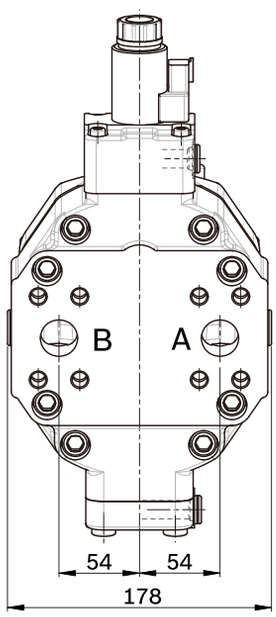
Unit Dimensions Size 80

Location of the service line ports on the port plates (view Z)

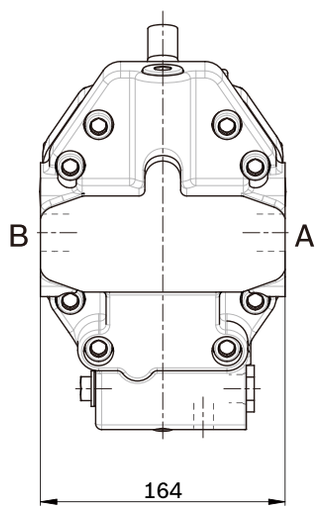
02 SAE flange ports
A and B at side,
opposite



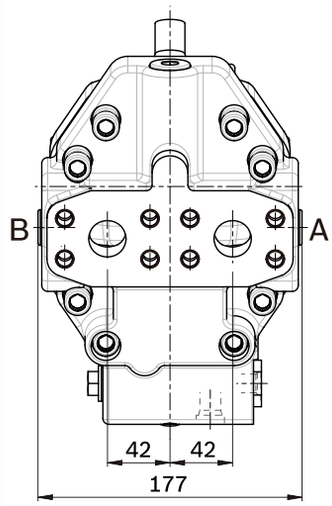
01 SAE flange ports
A and B at rear



02 SAE flange port
A and B at side,
opposite
only HZ3, EZ3, EZ4



01 SAE flange port
A and B at rear
only HZ3, EZ3, EZ4



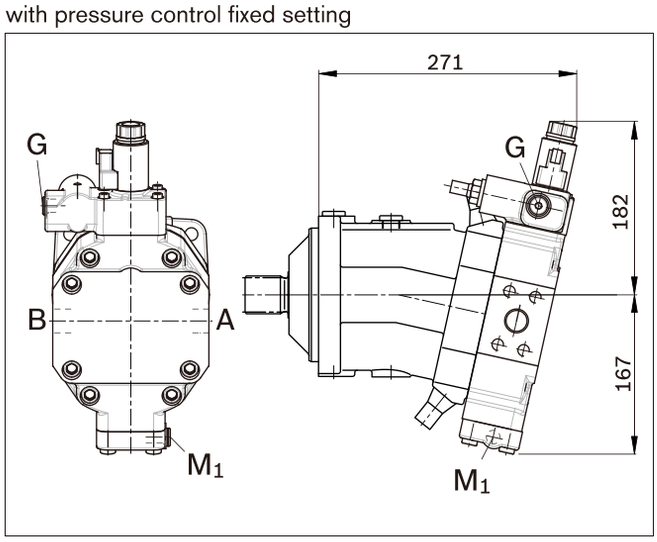
Ports

Designation	Port for	Standard	Size	Maximum pressure [bar]	State
A, B	Service line Fastening thread A/B	SAE J518 DIN 13	1 in M12 x 1.75; 17 deep	450	O
T_1	Drain line	DIN 3852	M18 x 1.5; 12 deep	3	X
T_2	Drain line	DIN 3852	M18 x 1.5; 12 deep	3	O
G	Synchronous control	DIN 3852	M14 x 1.5; 12 deep	450	X
G_2	2nd pressure setting (HD.E, EP.E)	DIN 3852	M14 x 1.5; 12 deep	100	X
U	Bearing flushing	DIN 3852	M18 x 1.5; 12 deep	3	X
X	Pilot signal (HD, HZ, HA1T/HA2T)	DIN 3852	M14 x 1.5; 12 deep	100	O
X	Pilot signal (HA1 and HA2)	DIN 3852	M14 x 1.5; 12 deep	3	X
X_1, X_2	Pilot signal (DA1, DA4)	DIN 2353-CL	8B-ST	40	O
X_1	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	O
X_3	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	X
M_1	Measuring stroking chamber	DIN 3852	M14 x 1.5; 12 deep	450	X

Unit Dimensions Size 80

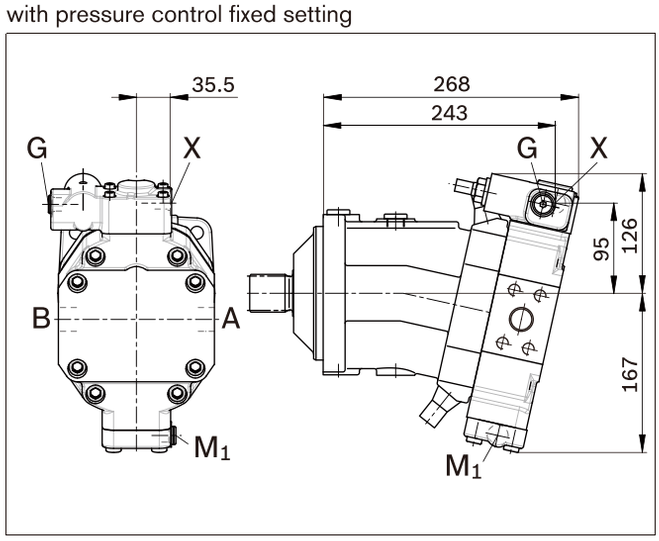
EP.D

Proportional control electric,
with pressure control fixed setting



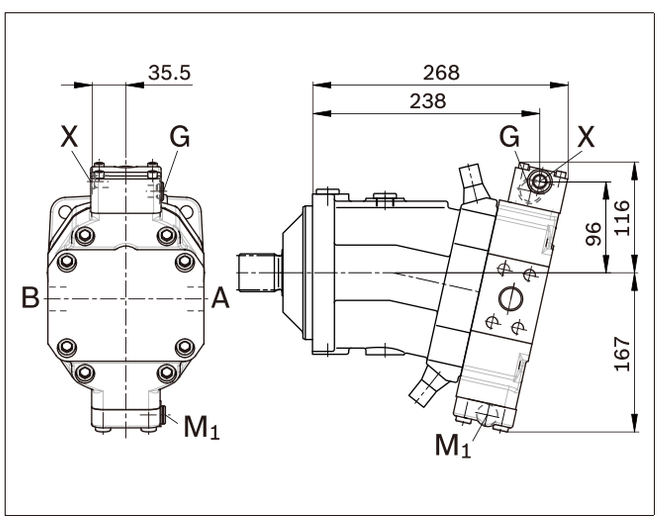
HD.D

Proportional control hydraulic,
with pressure control fixed setting



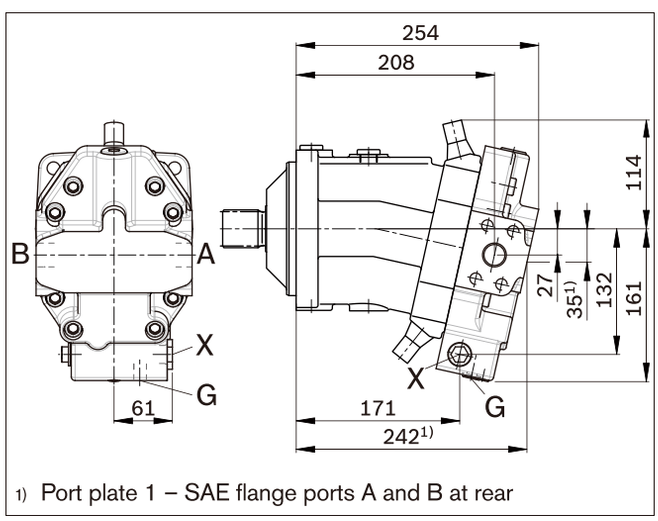
HD1, HD2

Proportional control hydraulic



HZ3

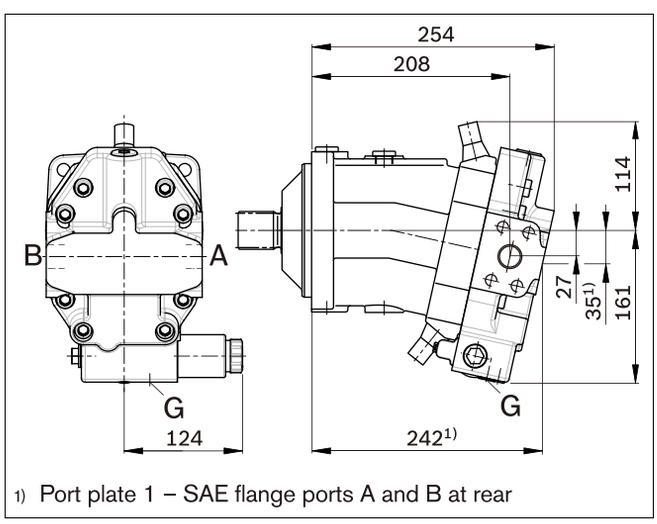
Two-point control hydraulic



1) Port plate 1 – SAE flange ports A and B at rear

EZ3, EZ4

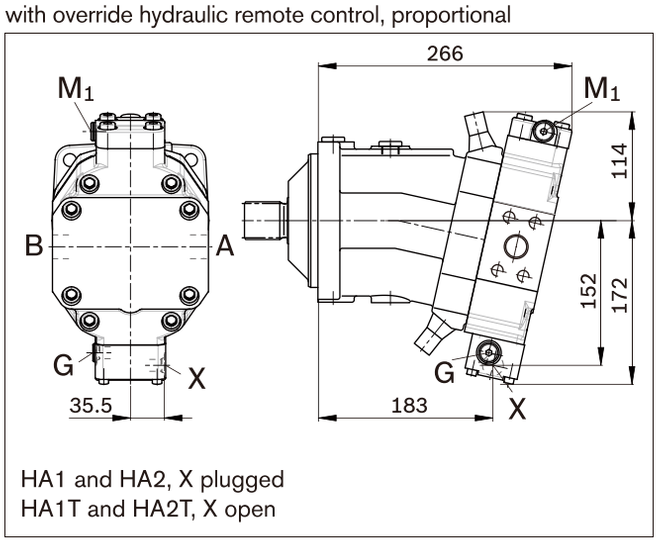
Two-point control electric



1) Port plate 1 – SAE flange ports A and B at rear

HA1, HA2 / HA1T, HA2T

Automatic control high-pressure related,
with override hydraulic remote control, proportional

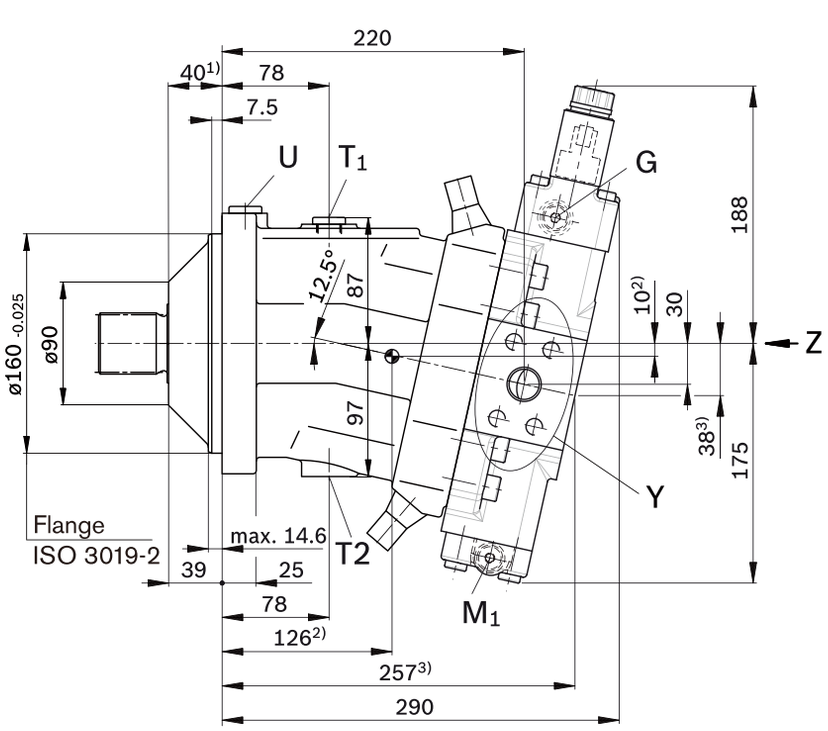


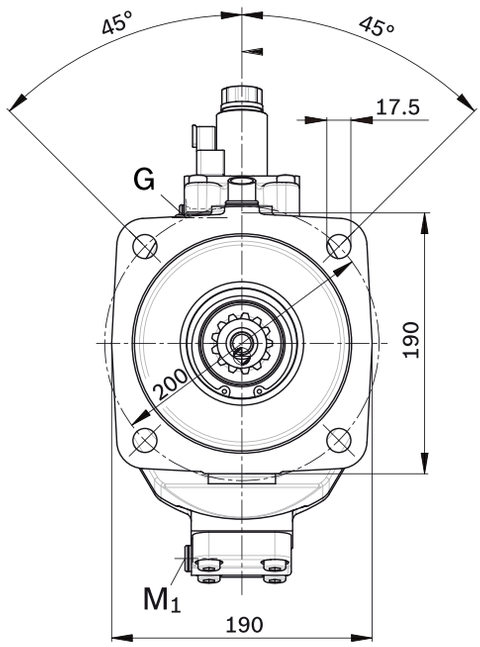
HA1 and HA2, X plugged
HA1T and HA2T, X open

Unit Dimensions Size 107

EP1, EP2 – Proportional control electric

Port plate 02 – SAE-SAE flange ports A and B at side, opposite

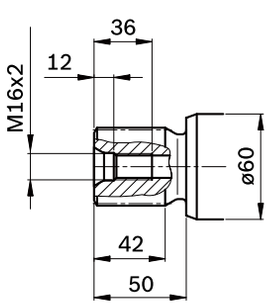




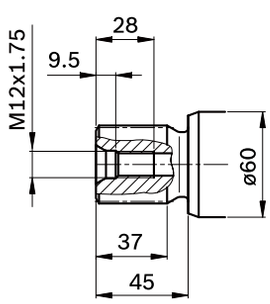
1) To shaft collar
2) Center of gravity
3) Port plate 1 – SAE flange ports A and B at rear

Drive shafts

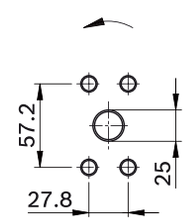
A Splined shaft DIN 5480
W45x2x21x9g



Z Splined shaft DIN 5480
W40x2x18x9g



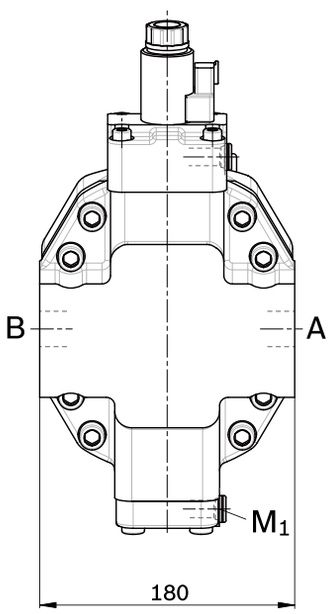
Service line port (detail Y)



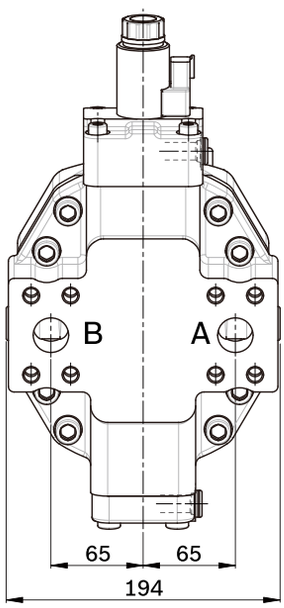
Unit Dimensions Size 107

Location of the service line ports on the port plates (view Z)

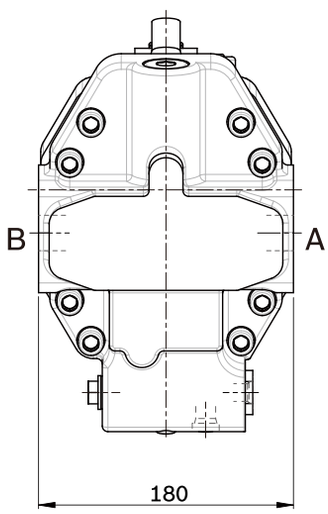
02 SAE flange ports A and B at side, opposite



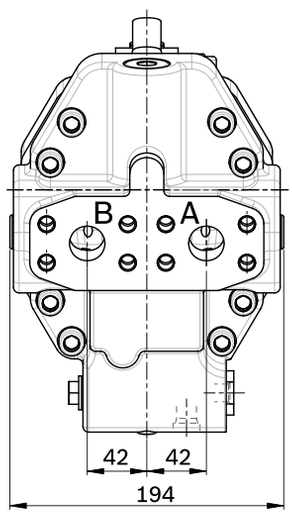
01 SAE flange ports A and B at rear



02 SAE flange port A and B at side, opposite only HZ3, EZ3, EZ4



01 SAE flange port A and B at rear only HZ3, EZ3, EZ4



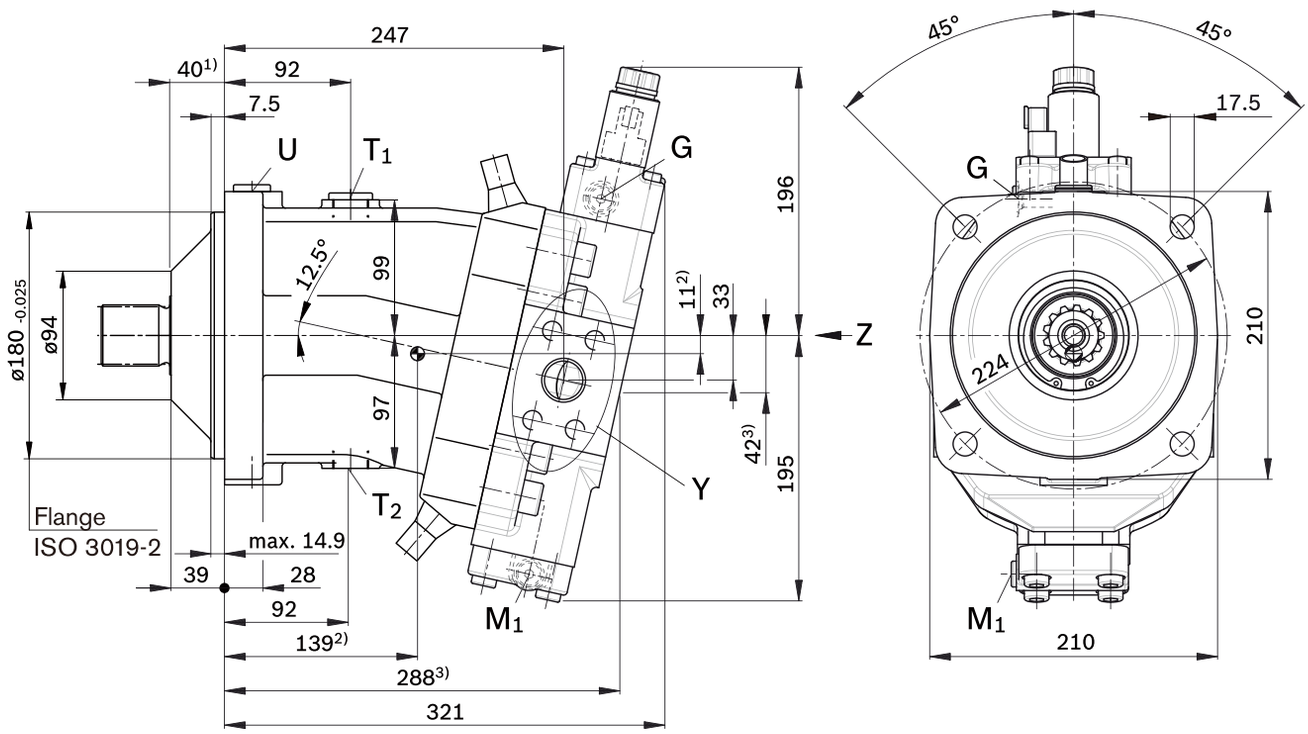
Ports

Designation	Port for	Standard	Size[1)]	Maximum pressure [bar][2)]	State[6)]
A, B	Service line Fastening thread A/B	SAE J518[3)] DIN 13	1 in M12 x 1.75; 17 deep	450	O
T_1	Drain line	DIN 3852[5)]	M18 x 1.5; 12 deep	3	X[4)]
T_2	Drain line	DIN 3852[5)]	M18 x 1.5; 12 deep	3	O[4)]
G	Synchronous control	DIN 3852[5)]	M14 x 1.5; 12 deep	450	X
G_2	2nd pressure setting (HD.E, EP.E)	DIN 3852[5)]	M14 x 1.5; 12 deep	100	X
U	Bearing flushing	DIN 3852[5)]	M18 x 1.5; 12 deep	3	X
X	Pilot signal (HD, HZ, HA1T/HA2T)	DIN 3852[5)]	M14 x 1.5; 12 deep	100	O
X	Pilot signal (HA1 and HA2)	DIN 3852[5)]	M14 x 1.5; 12 deep	3	X
X_1, X_2	Pilot signal (DA1, DA4)	DIN 2353-CL	8B-ST	40	O
X_1	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852[5)]	M14 x 1.5; 12 deep	40	O
X_3	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852[5)]	M14 x 1.5; 12 deep	40	X
M_1	Measuring stroking chamber	DIN 3852[5)]	M14 x 1.5; 12 deep	450	X

Unit Dimensions Size 140

EP1, EP2 – Proportional control electric

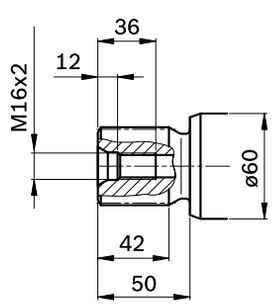
Port plate 02 – SAE flange ports A and B at side, opposite



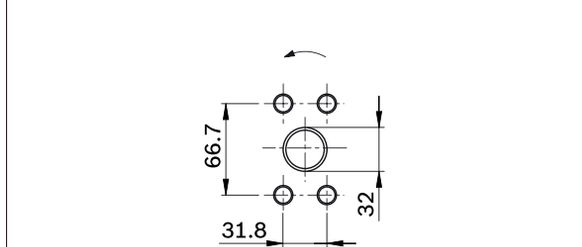
1) To shaft collar
2) Center of gravity
3) Port plate 1 – SAE flange ports A and B at rear

Drive shaft

Z Splined shaft DIN 5480
W45x2x21x9g



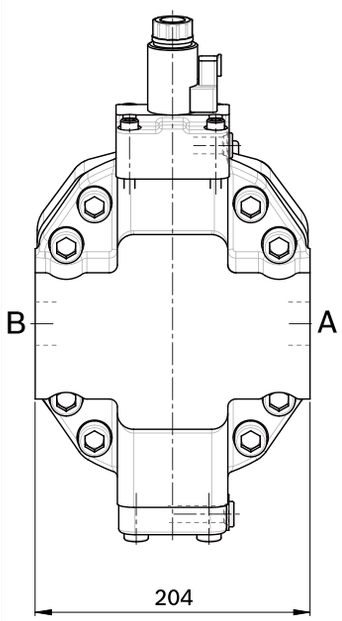
Service line port (detail Y)



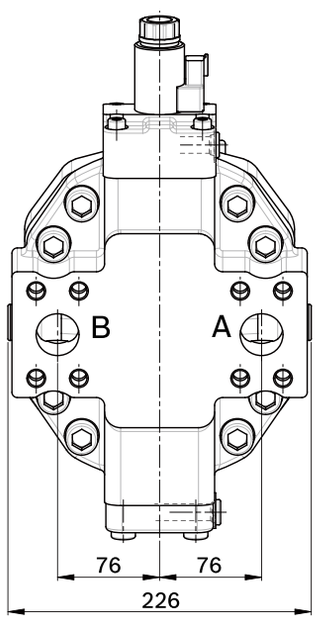
Unit Dimensions Size 140

Location of the service line ports on the port plates (view Z)

02 SAE flange ports A and B at side, opposite



01 SAE flange ports A and B at rear

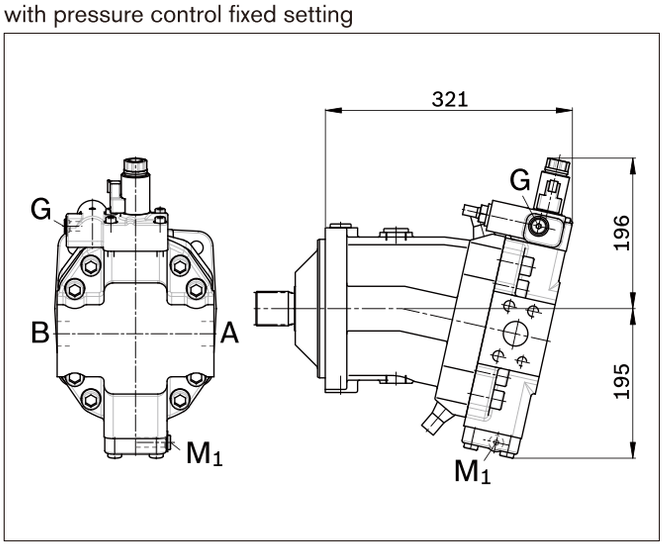


Ports

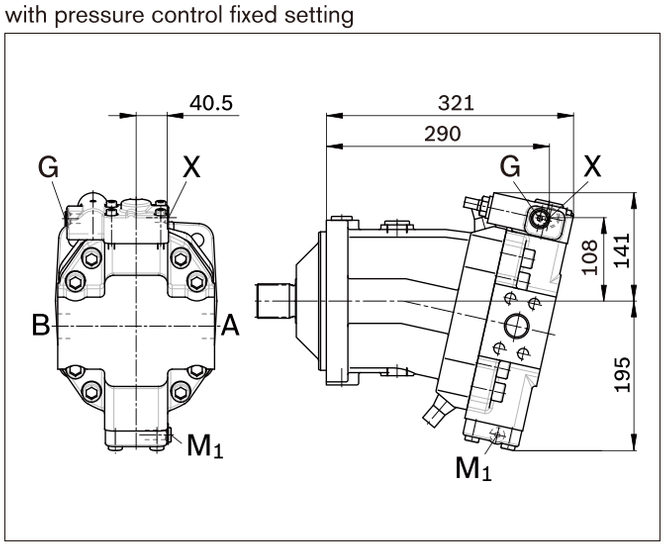
Designation	Port for	Standard	Size	Maximum pressure [bar]	State
A, B	Service line Fastening thread A/B	SAE J518 DIN 13	1 1/4 in M14 x 2; 19 deep	450	O
T_1	Drain line	DIN 3852	M26 x 1.5; 16 deep	3	X
T_2	Drain line	DIN 3852	M26 x 1.5; 16 deep	3	O
G	Synchronous control	DIN 3852	M14 x 1.5; 12 deep	450	X
G_2	2nd pressure setting (HD.E, EP.E)	DIN 3852	M14 x 1.5; 12 deep	100	X
U	Bearing flushing	DIN 3852	M22 x 1.5; 14 deep	3	X
X	Pilot signal (HD, HZ, HA1T/HA2T)	DIN 3852	M14 x 1.5; 12 deep	100	O
X	Pilot signal (HA1 and HA2)	DIN 3852	M14 x 1.5; 12 deep	3	X
X_1, X_2	Pilot signal (DA1, DA4)	DIN 2353-CL	8B-ST	40	O
X_1	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	O
X_3	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	X
M_1	Measuring stroking chamber	DIN 3852	M14 x 1.5; 12 deep	450	X

Unit Dimensions Size 140

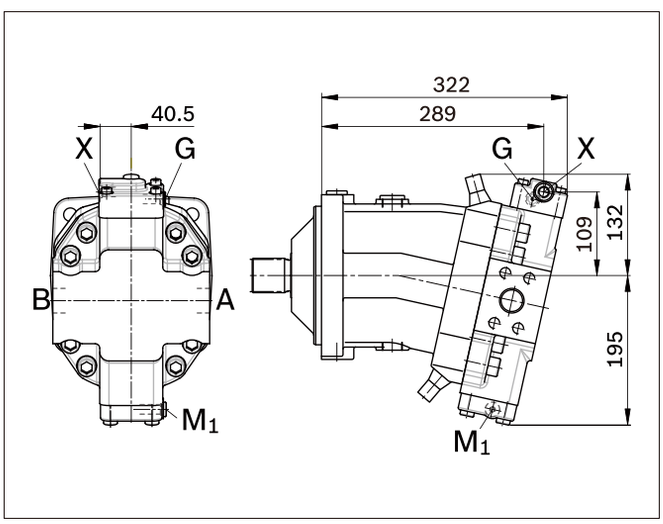
EP.D
Proportional control electric,
with pressure control fixed setting



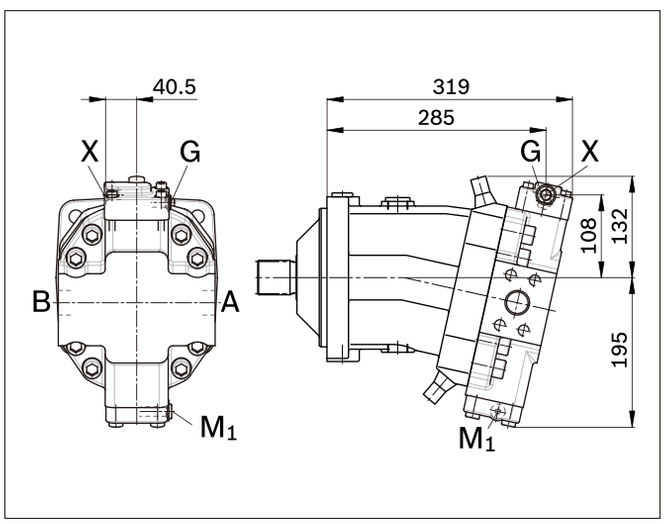
HD.D
Proportional control hydraulic,
with pressure control fixed setting



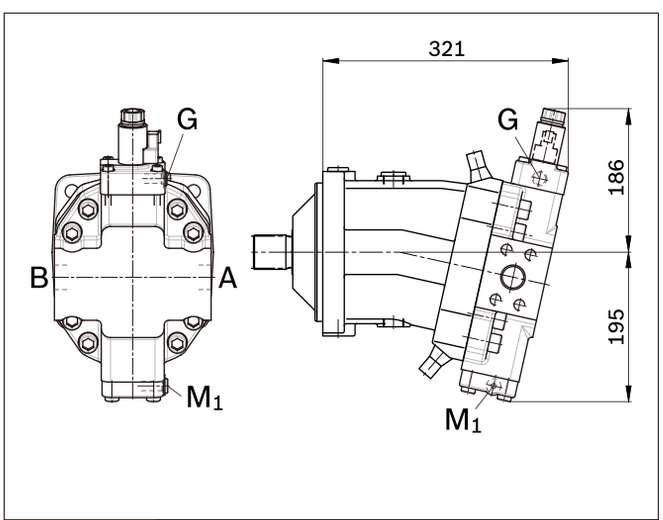
HD1, HD2
Proportional control hydraulic



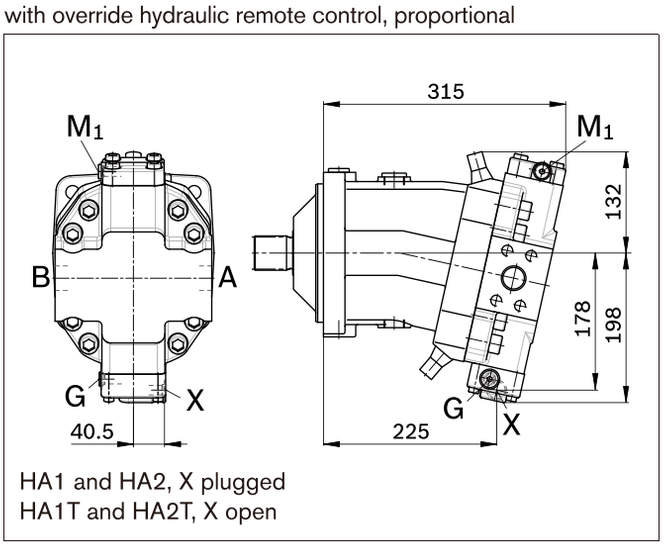
HZ1
Two-point control hydraulic



EZ1, EZ2
Two-point control electric



HA1, HA2 / HA1T, HA2T
Automatic control high-pressure related,
with override hydraulic remote control, proportional

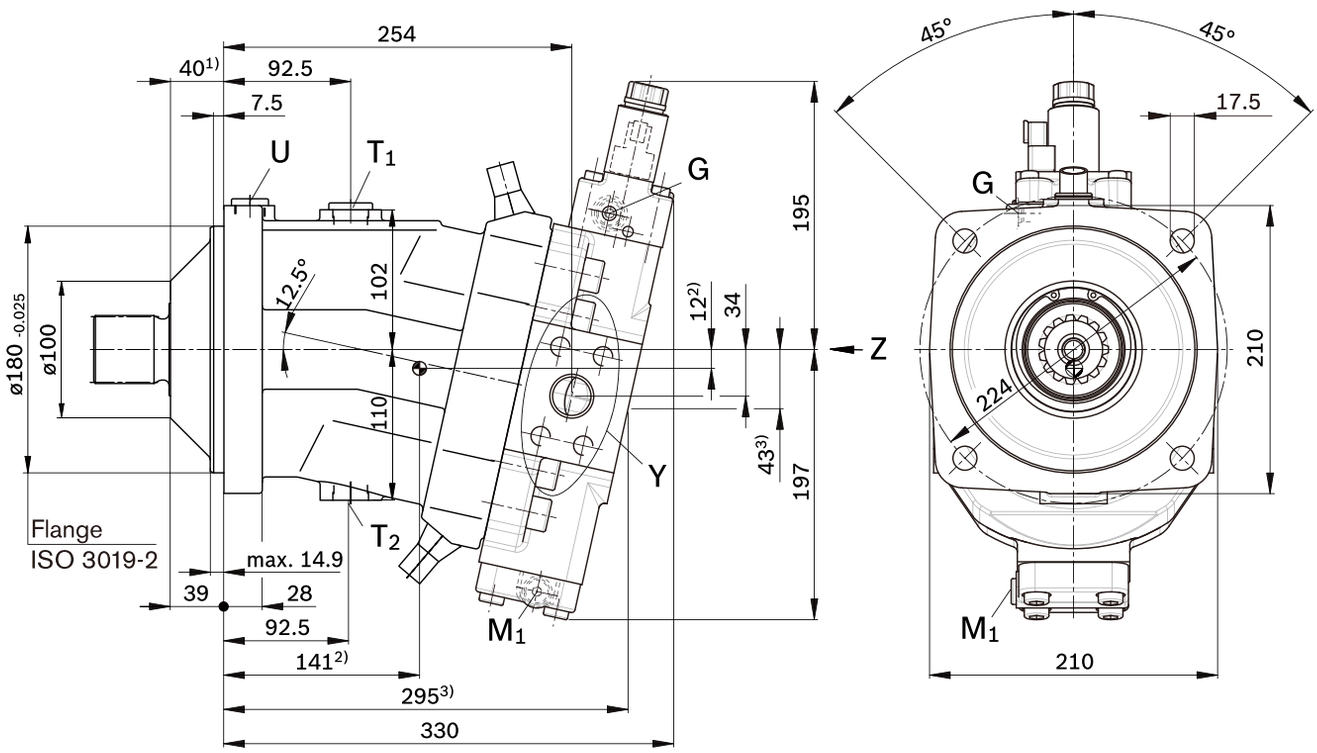


HA1 and HA2, X plugged
HA1T and HA2T, X open

Unit Dimensions Size 160

EP1, EP2 – Proportional control electric

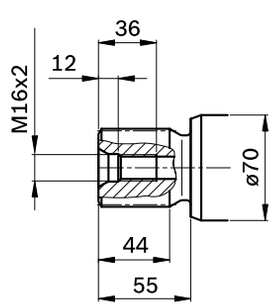
Port plate 02 – SAE-SAE flange ports A and B at side, opposite



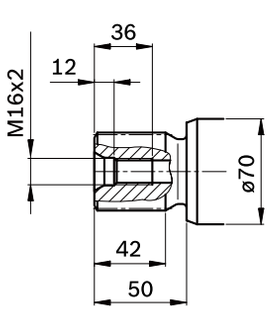
1) To shaft collar
2) Center of gravity
3) Port plate 1 – SAE flange ports A and B at rear

Drive shafts

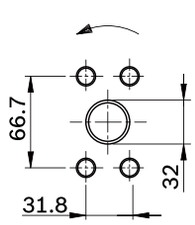
A Splined shaft DIN 5480 W50x2x24x9g



Z Splined shaft DIN 5480 W45x2x21x9g



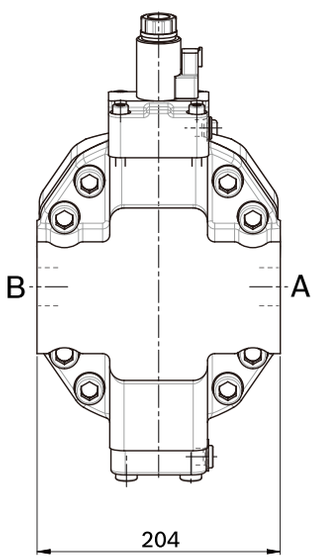
Service line port (detail Y)



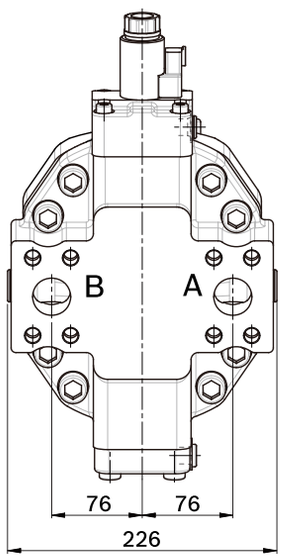
Unit Dimensions Size 160

Location of the service line ports on the port plates (view Z)

02 SAE flange ports A and B at side, opposite



01 SAE flange ports A and B at rear

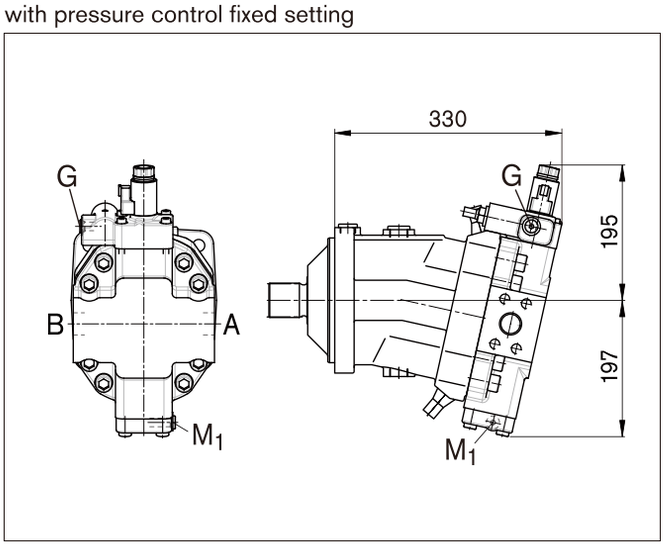


Ports

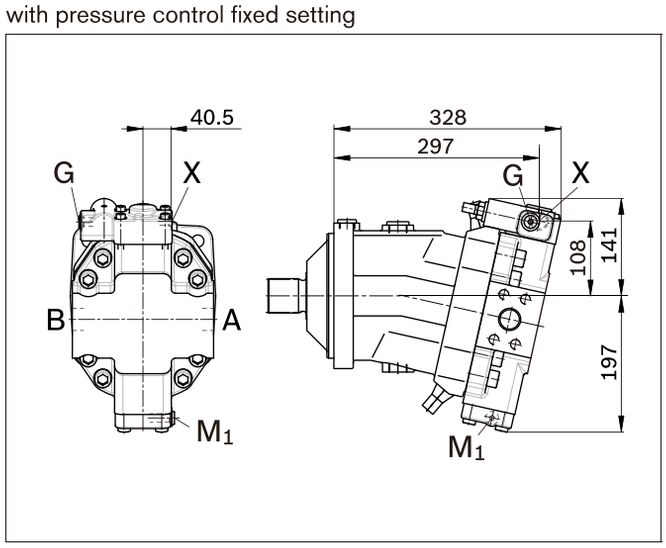
Designation	Port for	Standard	Size	Maximum pressure [bar][2)]	State
A, B	Service line Fastening thread A/B	SAE J518 DIN 13	1 1/4 in M14 x 2; 19 deep	450	O
T_1	Drain line	DIN 3852	M26 x 1.5; 16 deep	3	X
T_2	Drain line	DIN 3852	M26 x 1.5; 16 deep	3	O
G	Synchronous control	DIN 3852	M14 x 1.5; 12 deep	450	X
G_2	2nd pressure setting (HD.E, EP.E)	DIN 3852	M14 x 1.5; 12 deep	100	X
U	Bearing flushing	DIN 3852	M22 x 1.5; 14 deep	3	X
X	Pilot signal (HD, HZ, HA1T/HA2T)	DIN 3852	M14 x 1.5; 12 deep	100	O
X	Pilot signal (HA1 and HA2)	DIN 3852	M14 x 1.5; 12 deep	3	X
X_1, X_2	Pilot signal (DA1, DA4)	DIN 2353-CL	8B-ST	40	O
X_1	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	O
X_3	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	X
M_1	Measuring stroking chamber	DIN 3852	M14 x 1.5; 12 deep	450	X

Unit Dimensions Size 160

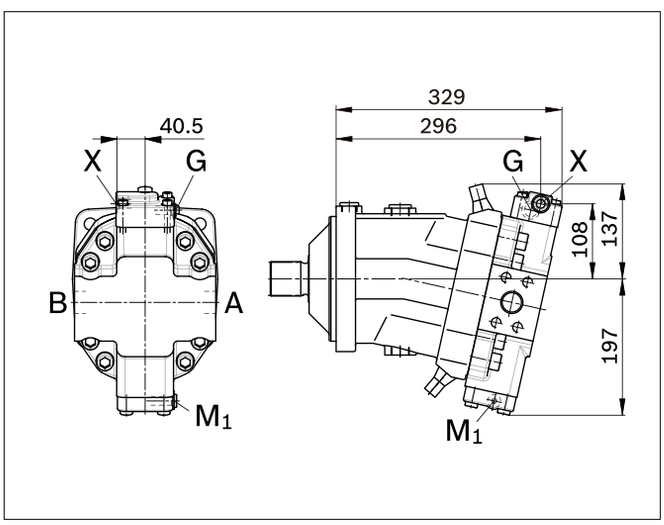
EP.D
Proportional control electric,
with pressure control fixed setting



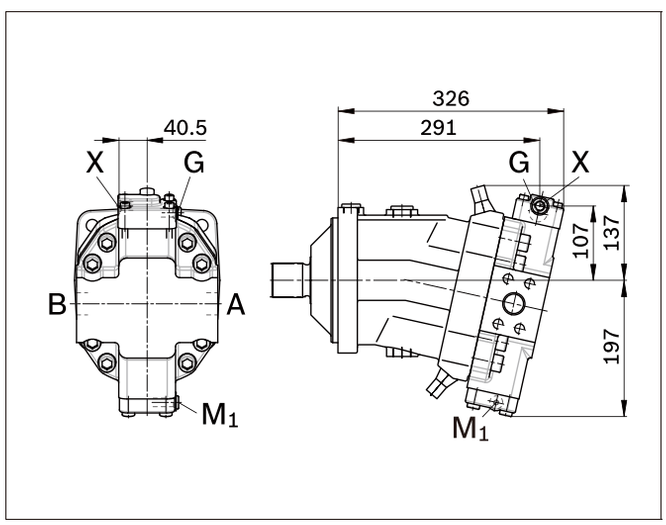
HD.D
Proportional control hydraulic,
with pressure control fixed setting



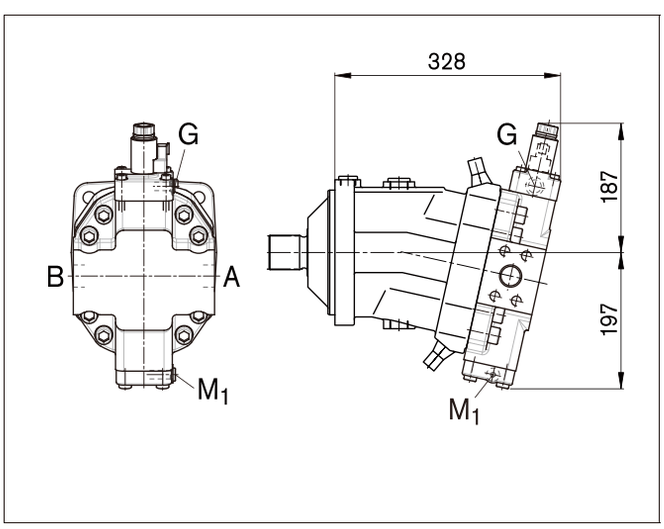
HD1, HD2
Proportional control hydraulic



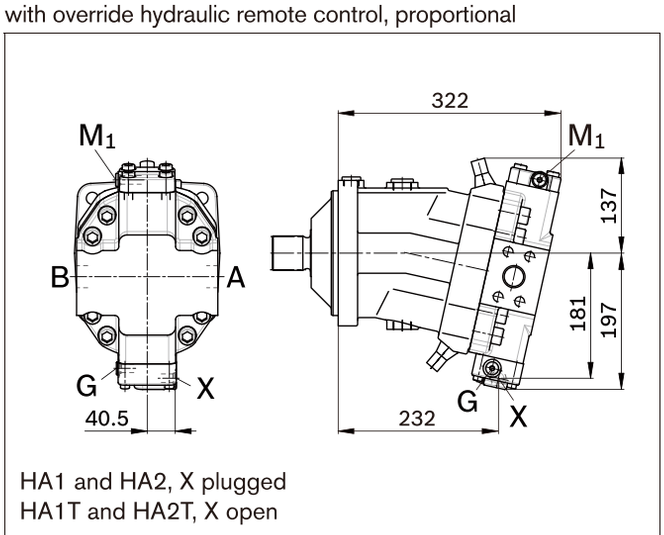
HZ1
Two-point control hydraulic



EZ1, EZ2
Two-point control electric



HA1, HA2 / HA1T, HA2T
Automatic control high-pressure related,
with override hydraulic remote control, proportional

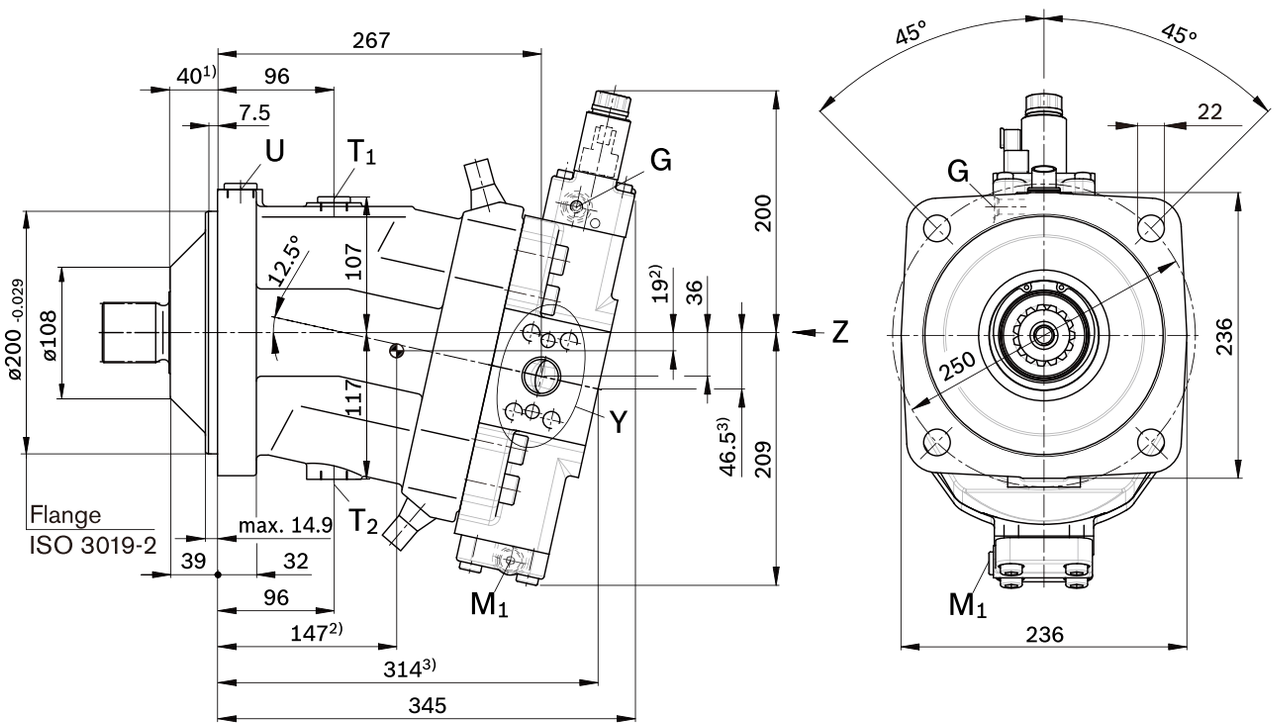


HA1 and HA2, X plugged
HA1T and HA2T, X open

Unit Dimensions Size 200

EP1, EP2 – Proportional control electric

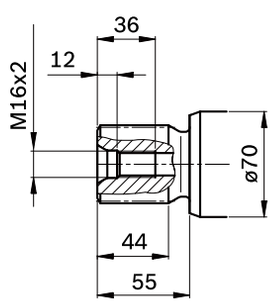
Port plate 02 – SAE-SAE flange ports A and B at side, opposite



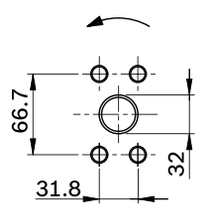
1) To shaft collar
2) Center of gravity
3) Port plate 1 – SAE flange ports A and B at rear

Drive shaft

A Splined shaft DIN 5480
W50x2x24x9g



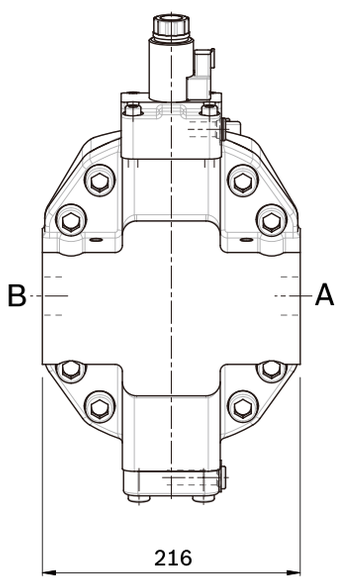
Service line port (detail Y)



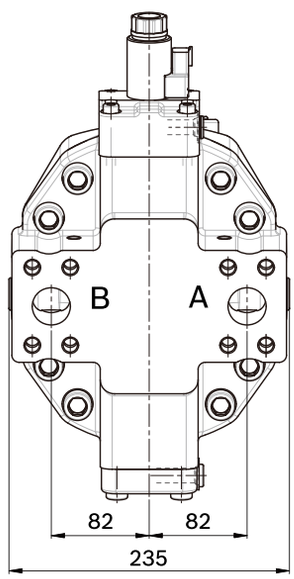
Unit Dimensions Size 200

Location of the service line ports on the port plates (view Z)

02 SAE flange ports A and B at side, opposite



01 SAE flange ports A and B at rear

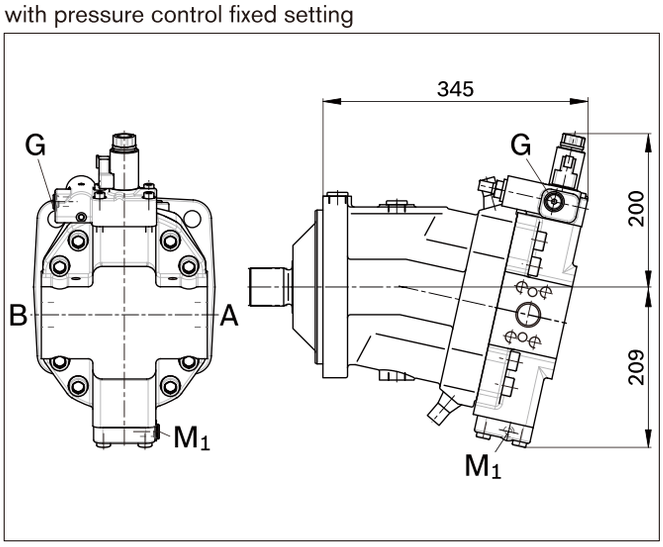


Ports

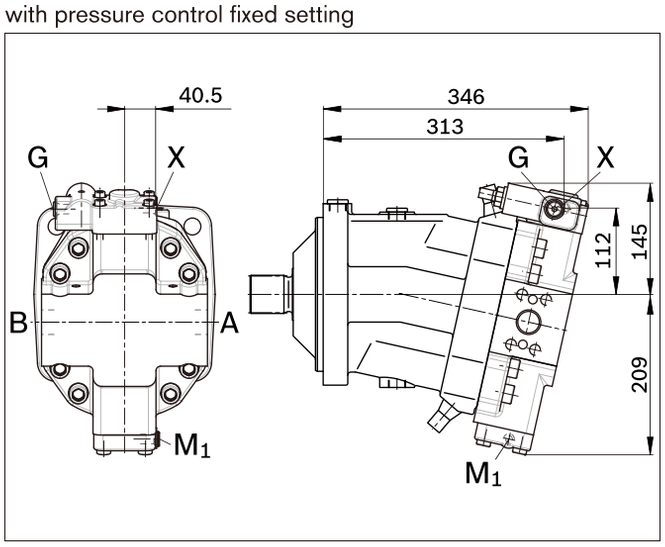
Designation	Port for	Standard	Size	Maximum pressure [bar]	State
A, B	Service line Fastening thread A/B	SAE J518 DIN 13	1 1/4 in M14 x 2; 19 deep	450	O
T_1	Drain line	DIN 3852	M26 x 1.5; 16 deep	3	X
T_2	Drain line	DIN 3852	M26 x 1.5; 16 deep	3	O
G	Synchronous control	DIN 3852	M14 x 1.5; 12 deep	450	X
G_2	2nd pressure setting (HD.E, EP.E)	DIN 3852	M14 x 1.5; 12 deep	100	X
U	Bearing flushing	DIN 3852	M22 x 1.5; 14 deep	3	X
X	Pilot signal (HD, HZ, HA1T/HA2T)	DIN 3852	M14 x 1.5; 12 deep	100	O
X	Pilot signal (HA1 and HA2)	DIN 3852	M14 x 1.5; 12 deep	3	X
X_1, X_2	Pilot signal (DA1, DA4)	DIN 2353-CL	8B-ST	40	O
X_1	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	O
X_3	Pilot signal (DA2, DA3, DA5, DA6)	DIN 3852	M14 x 1.5; 12 deep	40	X
M_1	Measuring stroking chamber	DIN 3852	M14 x 1.5; 12 deep	450	X

Unit Dimensions Size 200

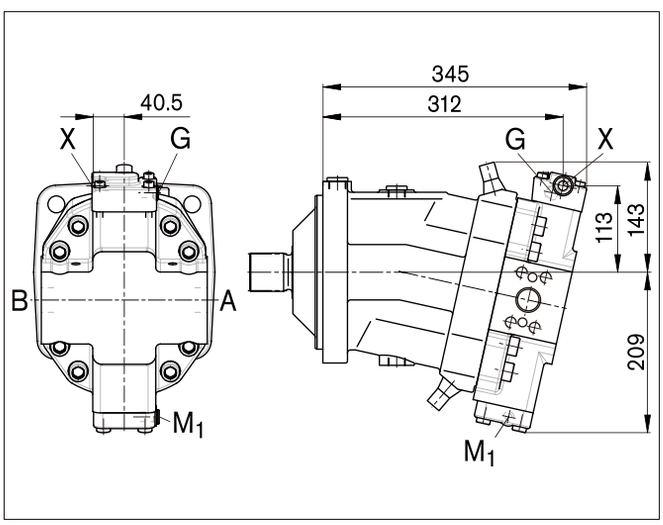
EP.D
Proportional control electric,
with pressure control fixed setting



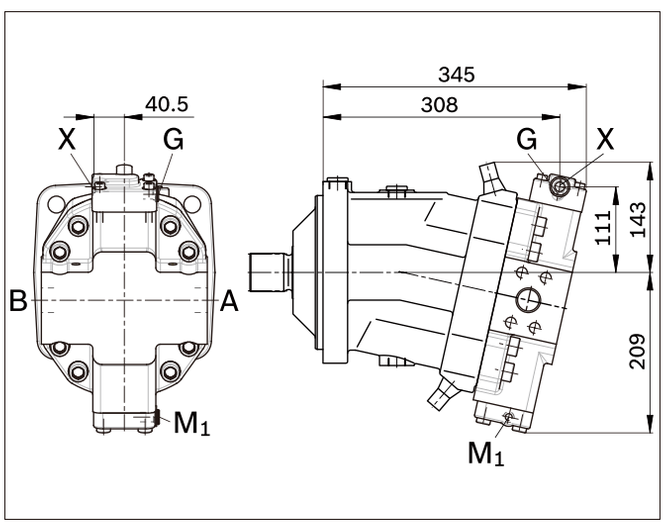
HD.D
Proportional control hydraulic,
with pressure control fixed setting



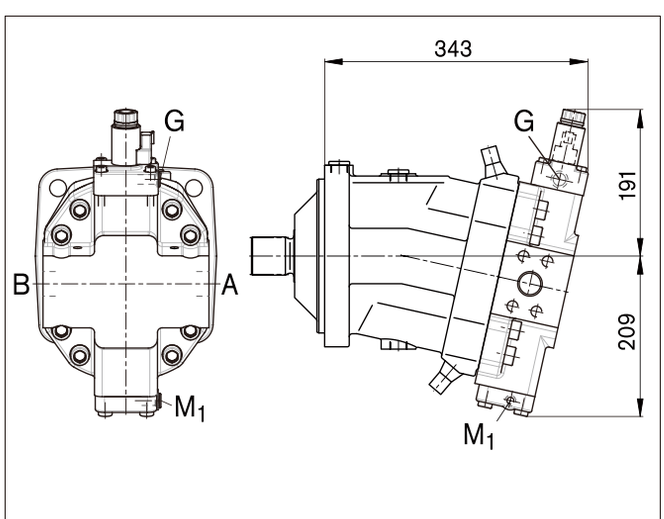
HD1, HD2
Proportional control hydraulic



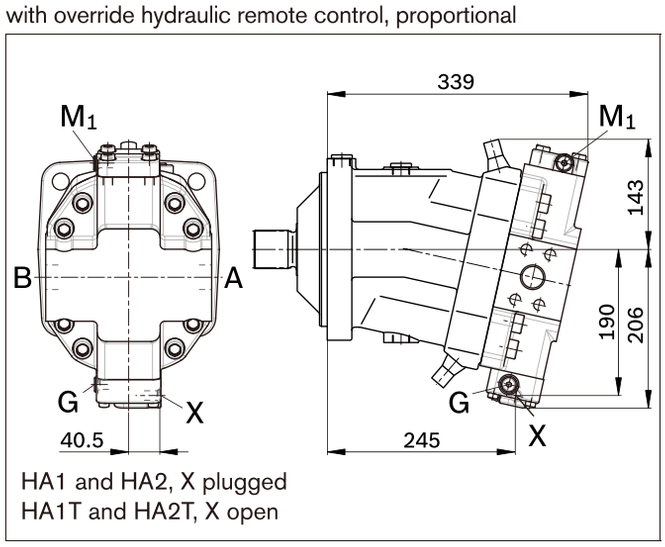
HZ1
Two-point control hydraulic



EZ1, EZ2
Two-point control electric



HA1, HA2 / HA1T, HA2T
Automatic control high-pressure related,
with override hydraulic remote control, proportional



HA1 and HA2, X plugged
HA1T and HA2T, X open

Connector for Solenoids

DEUTSCH DT04-2P-EP04

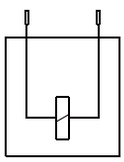
Sizes 28 to 200

Molded, 2-pin, without bidirectional suppressor diode

There is the following type of protection with mounted mating connector:
IP67 _____

and IP69K _____

Circuit symbol



Mating connector

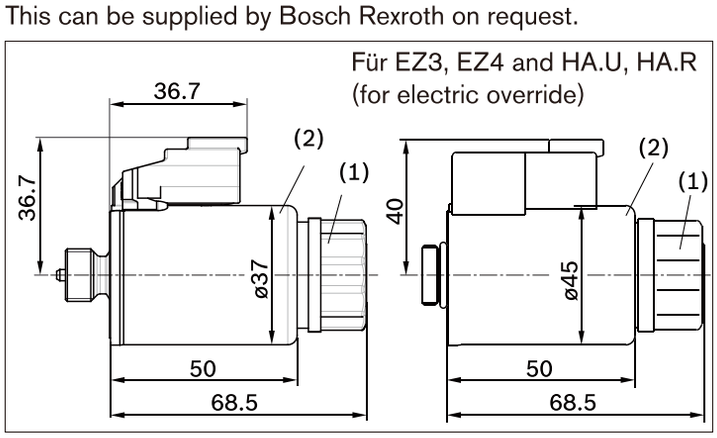
Consisting of:

– 1 housing _____

– 1 wedge _____

– 2 sockets _____

The mating connector is not included in the delivery contents. This can be supplied by Bosch Rexroth on request.



Flushing and Boost Pressure Valve

The flushing and boost pressure valve is used to remove heat from the hydraulic circuit.

In an open circuit, it is used only for flushing the housing.

In a closed circuit, it ensures a minimum boost pressure level in addition to the case flushing.

Hydraulic fluid is directed from the respective low pressure side into the motor housing. This is then fed into the reservoir, together with the case drain fluid. The hydraulic fluid, removed out of the closed circuit must be replaced by cooled hydraulic fluid from the boost pump.

The valve is mounted onto the port plate or integrated (depending on the control type and size).

Cracking pressure of pressure retaining valve
(observe when setting the primary valve)
fixed setting _____ 16 bar

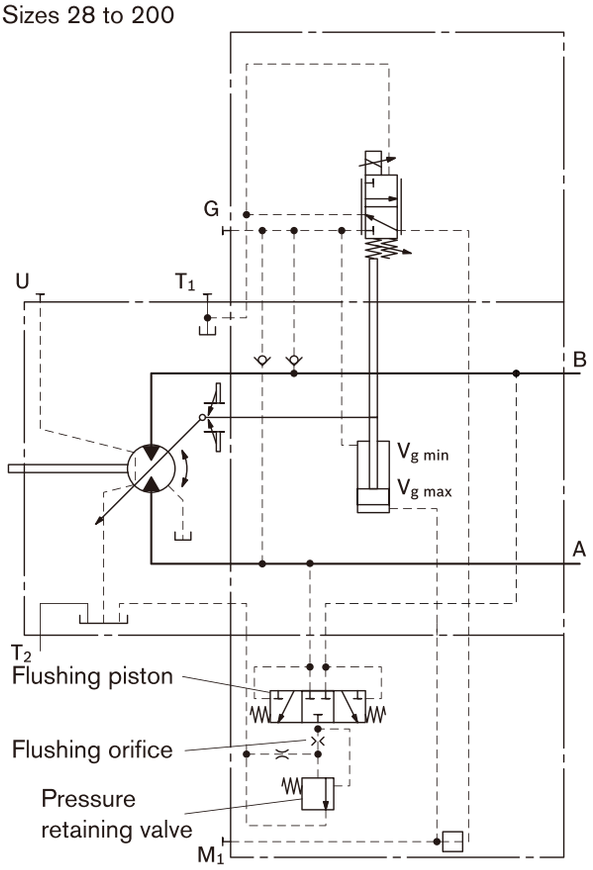
Switching pressure of flushing piston Δp_____ 8±1 bar

Flushing flow q_v
Orifices can be used to set the flushing flows as required.
Following parameters are based on:
$\Delta p_{ND} = p_{ND} - p_G = 25$ bar and $\nu = 10$ mm²/s
(p_{ND} = low pressure, p_G = case pressure)

Size	Flushing flow q_V [L/min]
28, 55	3.5
80	5
107	8
140, 160, 200	10

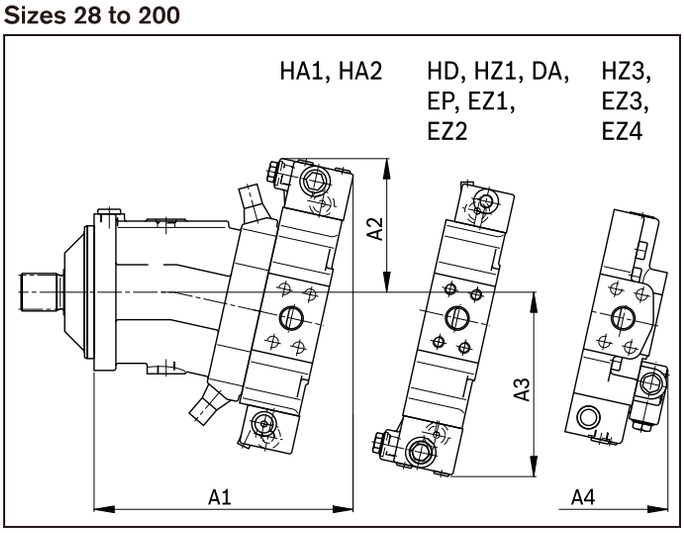
With sizes 28 to 200, orifices can be supplied for flushing flows from 3.5 to - 10 L/min. For other flushing flows, please state the required flushing flow when ordering. The flushing flow without orifice is approx. 12 to 14 L at low pressure $\Delta p_{ND} = 25$ bar.

Schematic EP
Sizes 28 to 200



Dimensions

Sizes 28 to 200



NG	A1	A2	A3	A4
28	214	125	161	–
55	243	133	176	236
80	273	142	193	254
107	288	144	200	269
140	321	154	218	–
160	328	154	220	–
200	345	160	231	–

Counterbalance valve BVD

Function

Travel drive/winch counterbalance valves are designed to reduce the danger of overspeeding and cavitation of axial piston motors in open circuits. Cavitation occurs if the motor speed is greater than it should be for the given input flow while braking, travelling downhill, or lowering a load.

If the inlet pressure drops, the counterbalance spool throttles the return flow and brakes the motor until the inlet pressure returns to approx. 20 bar.

Note

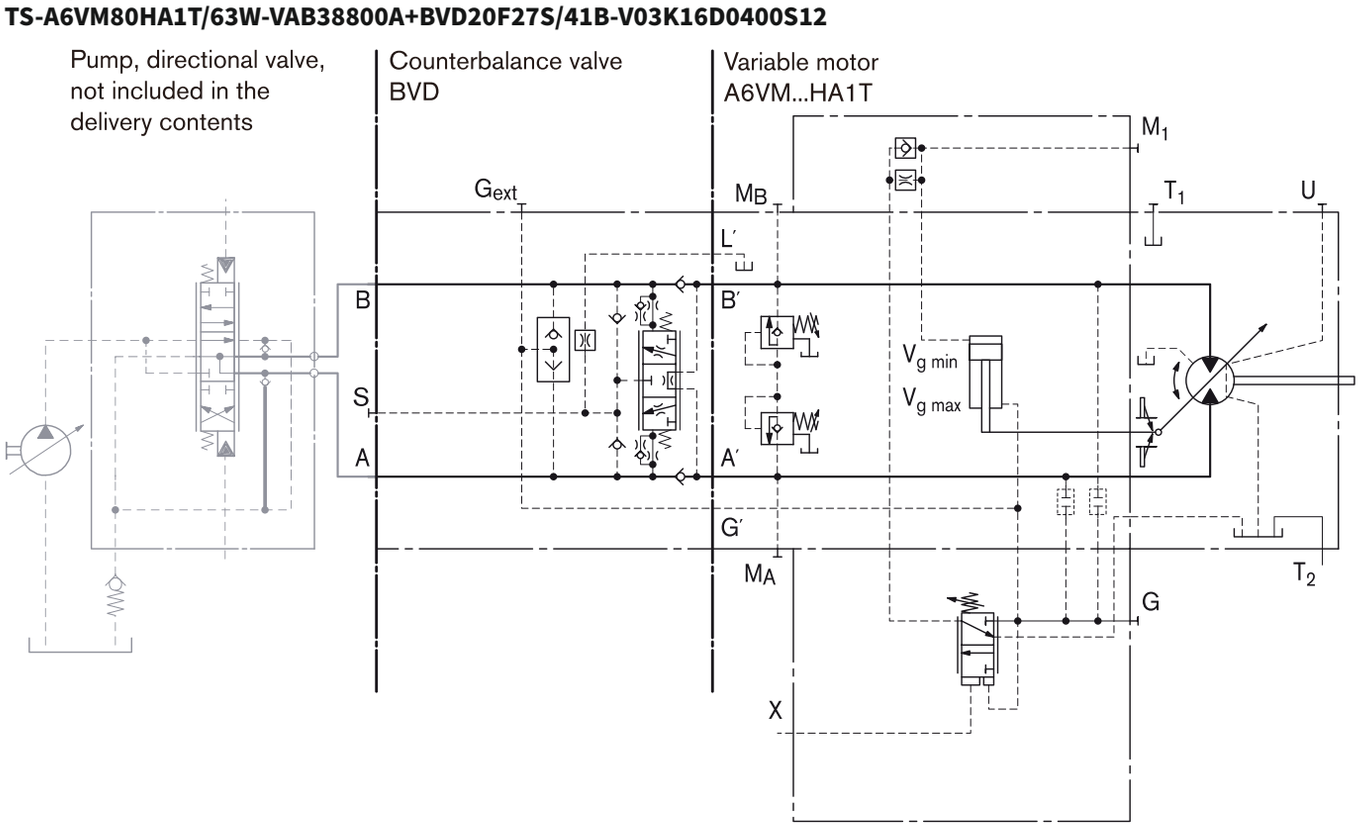
- BVD available for sizes 55 to 200 and BVE available for sizes 107 to 200.
- The counterbalance valve must be ordered additionally. We recommend ordering the counterbalance valve and the motor as a set. Ordering example: TS-A6VM80HA1T/63W-VAB38800A+BVD20F27S/41B-V03K16D0400S12
- For safety reasons, controls with beginning of control at $V_{g\ min}$ (e. g. HA) are not permissible for winch drives!
- The counterbalance valve does not replace the mechanical service brake and park brake.
- For the design of the brake release valve, we must know for the mechanical park brake:
  - the pressure at the start of opening
  - the volume of the counterbalance spool between minimum stroke (brake closed) and maximum stroke (brake released with 21 bar)
  - the required closing time for a warm device (oil viscosity approx. 15 mm^2/s)

Travel drive counterbalance valve BVD...F

Application option

- Travel drive on wheeled excavators

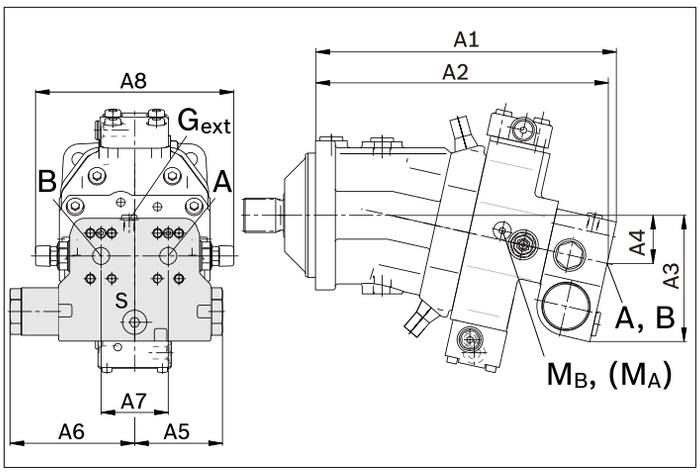
Example schematic for travel drive for wheeled excavators
TS-A6VM80HA1T/63W-VAB38800A+BVD20F27S/41B-V03K16D0400S12



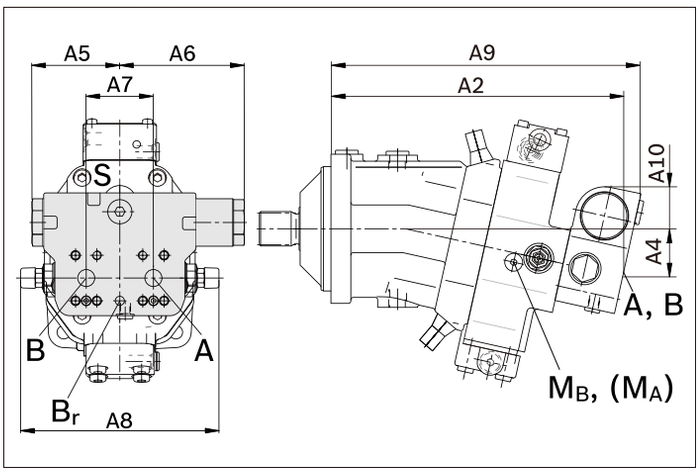
Counterbalance valve BVD

Dimensions

A6VM...HA



A6VM...HD or EP



A6VM NG...plate	Counterbalance valve Type	Ports A, B	Dimensions A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
55...38	BVD20...17	3/4 in	311	302	143	50	98	139	75	222	326	50
80...38	BVD20...27	1 in	340	331	148	55	98	139	75	222	355	46
107...37	BVD20...28	1 in	362	353	152	59	98	139	84	234	377	41
107...38	BVD25...38	1 1/4 in	380	370	165	63	120.5	175	84	238	395	56
140...38	BVD25...38	1 1/4 in	411	401	168	67	120.5	175	84	238	426	53
160...38	BVD25...38	1 1/4 in	417	407	170	68	120.5	175	84	238	432	51
200...38	BVD25...38	1 1/4 in	448	438	176	74	120.5	175	84	299	463	46

Ports

Designation	Port for	Version	A6VM Plate	Standard	Size	Maximum pressure [bar]	State
A, B	Service line			SAE J518	see table above	420	O
S	Infeed	BVD20		DIN 3852[4)]	M22 x 1.5; 14 deep	30	X
		BVD25, BVE25		DIN 3852[4)]	M27 x 2; 16 deep	30	X
Br	Brake release, reduced high-pressure	L	7	DIN 3852[4)]	M12 x 1.5; 12.5 deep	30	O
			8	DIN 3852[4)]	M12 x 1.5; 12 deep	30	O
G_{ext}	Brake release, high-pressure	S		DIN 3852[4)]	M12 x 1.5; 12.5 deep	420	X
M_A, M_B	Measuring pressure A and B			ISO 6149[4)]	M18 x 1.5; 14.5 deep	420	X

Counterbalance valve BVD

Mounting the counterbalance valve

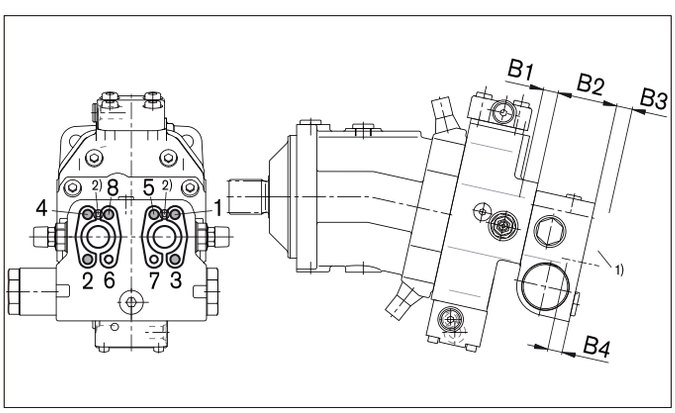
When delivered, the counterbalance valve is mounted to the motor with two tacking screws (transport protection). The tacking screws may not be removed while mounting the service lines. If the counterbalance valve and motor are delivered separately, the counterbalance valve must first be mounted to the motor port plate using the provided tacking screws. The counterbalance valve is finally mounted to the motor by screwing on the SAE flange with the following screws:

6 screws (**1, 2, 3, 4, 5, 8**) _____ length B1+B2+B3
2 screws (**6, 7**) _____ length B3+B4

Tighten the screws in two steps in the specified sequence from 1 to 8 (see following scheme).

In the first step, the screws must be tightened with half the tightening torque, and in the second step with the maximum tightening torque (see following table).

Thread	Strength class	Tightening torque [Nm]
M6 x 1 (tacking screw)	10.9	15.5
M10	10.9	75
M12	10.9	130
M14	10.9	205



1) SAE flange
2) Tacking screw (M6 x 1, length = B1 + B2, DIN 912)

NG...plate	55...38	80...38, 107...37	107, 140, 160, 200...38
B1[3)]	M10 x 1.5 17 deep	M12 x 1.75 15 deep	M14 x 2 19 deep
B2	68	68	85
B3	customer-specific		
B4	M10 x 1.5 15 deep	M12 x 1.75 16 deep	M14 x 2 19 deep

3) Minimum required thread reach 1 x Ø-thread

Speed Sensors

Version TS-A6VM...U and TS-A6VM...F ("prepared for speed sensor", i.e. without sensor) is quipped with a toothed ring on the rotary group.
On deliveries "prepared for speed sensor", the port is plugged with a pressure-resistant cover.
With the speed sensor DSA or HDD mounted, a signal proportional to the motor speed can be generated. The sensors measure the speed and direction of rotation.
Ordering code, technical data, dimensions and details on the connector, plus safety information about the s ensor can be found in the relevant data sheet.

DSA _____

HDD _____

Version "V" (sizes 28 to 200)

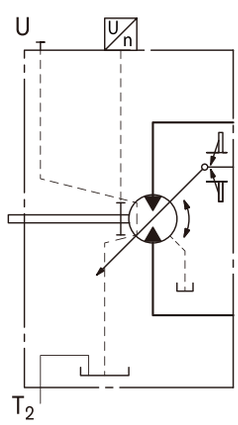
Suitable for mounting the DSA speed sensor. The sensor is fastened at the upper reservoir port T_1.

Note

With speed measuring, only port T_2 can be used to drain the case drain.

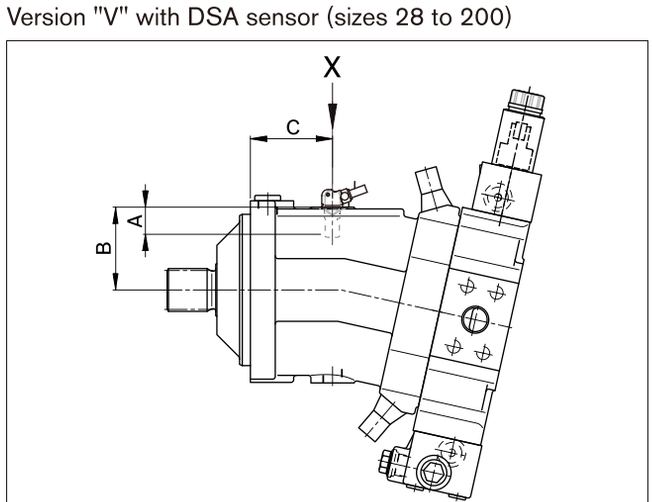
Schematic

Sizes 28 to 200



Dimensions

Version "V" with DSA sensor (sizes 28 to 200)



Installation Instructions

General

During commissioning and operation, the axial piston unit must be filled with hydraulic fluid and air bled. This must also be observed following a relatively long standstill as the axial piston unit may drain back to the reservoir via the hydraulic lines.

Particularly in the installation position "drive shaft upwards" filling and air bleeding must be carried out completely as there is, for example, a danger of dry running.

The case drain fluid in the motor housing must be directed to the reservoir via the highest available drain port (T_1, T_2).

For combinations of multiple units, make sure that the respective case pressure in each unit is not exceeded. In the event of pressure differences at the drain ports of the units, the shared drain line must be changed so that the minimum permissible case pressure of all connected units is not exceeded in any situation. If this is not possible, separate drain lines must be laid if necessary.

To achieve favorable noise values, decouple all connecting lines using elastic elements and avoid above-reservoir installation.

In all operating conditions, the drain line must flow into the reservoir below the minimum fluid level.

Installation position

See the following examples 1 to 8.
Further installation positions are possible upon request.

Recommended installation positions: 1 and 2.

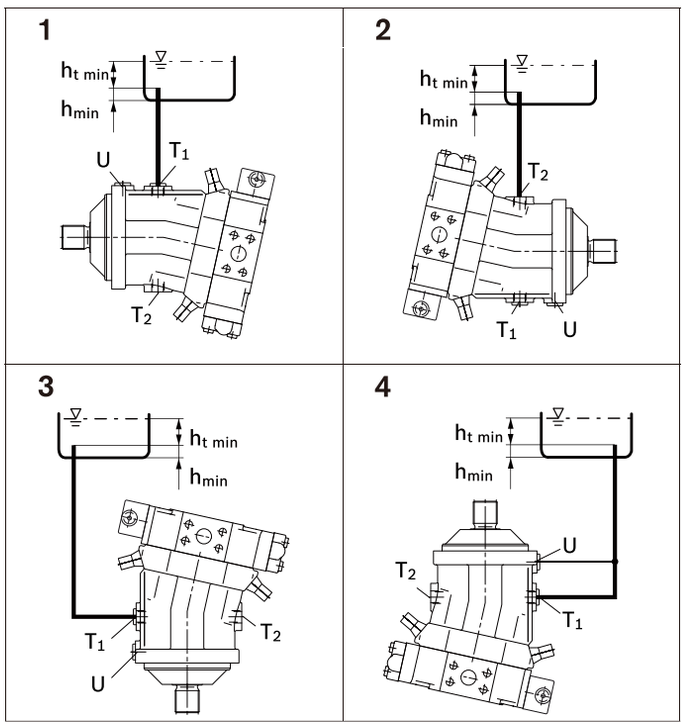
Note
In certain installation conditions, an influence on the control characteristics can be expected. Gravity, dead weight and case pressure can cause minor shifts in control characteristics and changes in response time.

Installation position	Air bleed	Filling
1	–	T_1
2	–	T_2
3	–	T_1
4	U	T_1
5	U (L_1)	T_1 (L_1)
6	L_1	T_2 (L_1)
7	L_1	T_1 (L_1)
8	U	T_1 (L_1)

L_1	Filling / air bleed
U	Bearing flushing / air bleed port
T_1, T_2	Drain port
$h_{t\,min}$	Minimum required immersion depth (200 mm)
h_{min}	Minimum required spacing to reservoir bottom (100 mm)

Below-reservoir installation (standard)

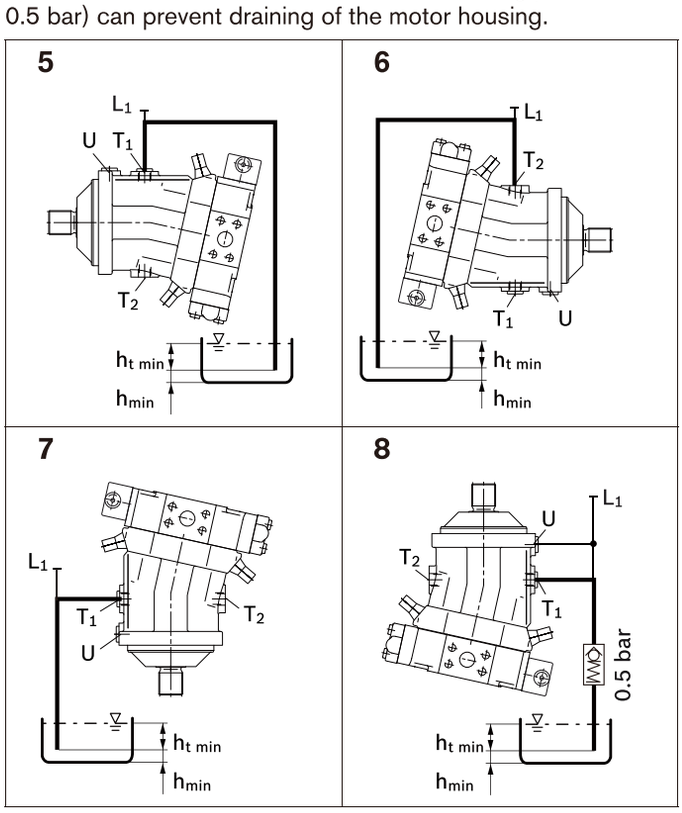
Below-reservoir installation means that the axial piston unit is installed outside of the reservoir below the minimum fluid level.



Above-reservoir installation

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir.

Recommendation for installation position 8 (drive shaft upward): A check valve in the drain line (cracking pressure 0.5 bar) can prevent draining of the motor housing.



The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract.

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