

Fixed displacement motor A10FM and
fixed displacement plug-in motor A10FE
see RE 91172



A10VM

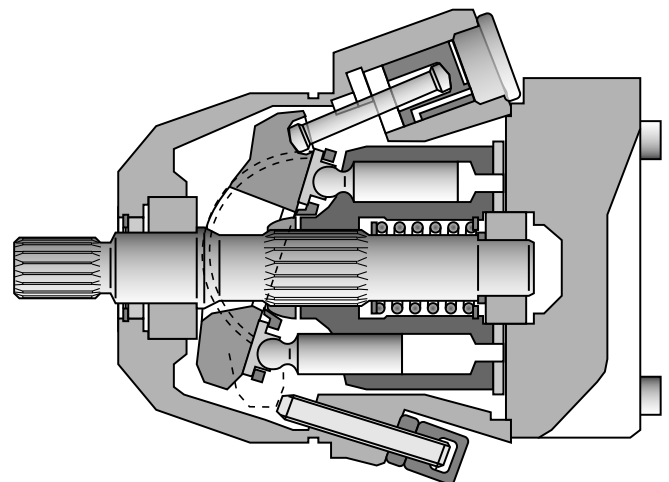
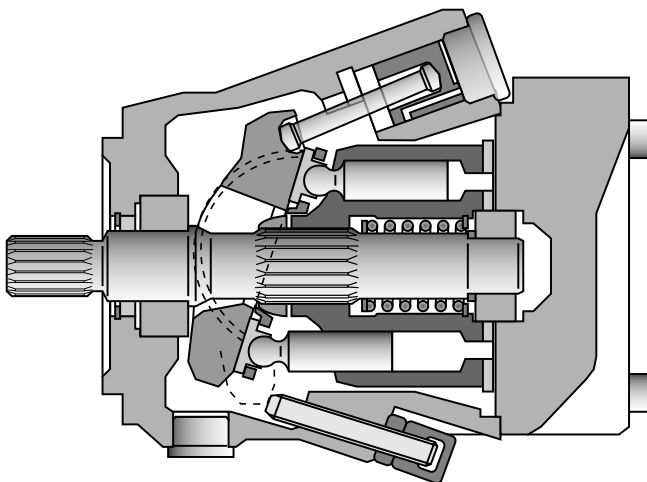


A10VE

Dual displacement motor AA10VM and plug-in motor AA10VE are axial piston motors in swash plate design. Output speed is proportional to input flow and inversely proportional to displacement.

Dependent upon the type of control a hydraulically or electrically operated 3/2 way valve is built onto the motorhousing. The necessary shuttle valve is integrated into the port plate.

- Proven A10-rotary group
- Heavy duty bearings for long service life
- High permissible output speed
- High power/weight ratio-compact size
- Low noise
- Hydraulic connections to SAE-standards
- Control range 1: 3,75
- External direct control supply possible
- Minimum displacement externally adjustable
- AA10VM has 2-bolt SAE-mounting flange
- AA10VE has special 2-bolt flange



Ordering code

A10V				/ 50 W		-		S		6		
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Fluid

Mineral oil (no code)

Axial piston unit

Swash plate design, variable

Nom. press. 250 bar, Peak press. 315 bar

A10V**Operating**

Motor, variable

M

Plug-in motor, variable

E**Size** \triangleq Displacement $V_{g \max}$ (cm³)**28****45****Control devices**

Electrical two-point control

EZ**1****EZ1**

with two position valve

EZ**2****EZ2**

control voltage 12V

control voltage 24V

Hydraulic two-point control

HZ**HZ**

Direct control pressure

DG**DG**

without pilot valve

Series**50****Direction of rotation**

Viewed on shaft end

bi-directional

W**Minimum displacement**stepless adjustable $V_{g \min} = 8$ cm³ at $V_{g \max}$ (Size 28)stepless adjustable $V_{g \min} = 12$ cm³ at $V_{g \max}$ (Size 45)Example 12 cm³ - please state when ordering**12****Seals**

NBR (Nitrile caoutchouk DIN ISO 1629) with shaft sealing FPM

P

FPM (Fluor caoutchouk DIN ISO 1629)

V**Shaft end**

SAE-splined

S**Mounting flange****A10VM****A10VE**

SAE 2-bolt

●

-

C

Special 2-bolt mounting flange

-

●

F**Service line connections****28 45**

Ports A/B SAE-flange at side (same side), UNC-threaded bolt holes

●

●

60**60 N00 0**

Ports A/B SAE-flange at side (same side), fixing threads metric

●

●

68**68 N00 X**

for mounting of motion control valve

●

68**68 BOX X****Brake option**

without mechanical holding brake

N00

mechanical holding brake reliable

B00

with mechanical holding brake, brake ventilation over brake valve

B01

with mechanical holding brake, brake ventilation external

B02**Valve options****28 45**

without valve

●

●

0

with mounted pressure control valve*

●

3

with brake valve MHB and mounted pressure control valve*

●

5

with mounted brake valve MHB

●

8* Enter valve setting in clear text: Set at Δp of = bar

● = available

- = not available

Technical data

Fluid

For extensive information on the selection of fluids and for application conditions, please consult our data sheets RE 90220 (mineral oils) or RE 90221 (environmentally acceptable hydraulic fluids).

You might have to consider reduced operating data with environmentally acceptable hydraulic fluids. Please contact our technical department.

Operating viscosity range

In order to obtain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected from within the range:

$$v_{opt} = \text{Operating Viscosity } 16 \dots 36 \text{ mm}^2/\text{s}$$

referred to the circuit temperature (closed loop).

Viscosity limits

The limiting values for viscosity are as follows:

$v_{min} = 10 \text{ mm}^2/\text{s}$
short term at a maximum permissible drain temperature of 90° C.

$v_{max} = 1000 \text{ mm}^2/\text{s}$
short term on cold start

Temperature range (see selection diagram)

$t_{min} = -25^\circ\text{C}$

$t_{max} = +90^\circ\text{C}$

Notes on the selection of the hydraulic fluid

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

The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range (v_{opt}) (see shaded section of the selection diagram). We recommend that the highest possible viscosity range should be chosen in each case.

Example: At an ambient temperature of X°C, the operating temperature is 60°C. Within the operating viscosity range (v_{opt} ; shaded area), this corresponds to viscosity ranges VG 46 or VG 68. VG 68 should be selected.

Important: The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the circuit temperature. However, at no point in the circuit may the temperature exceed 90°C.

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

Filtration of fluid

In order to ensure correct functioning of the unit, a minimum level of cleanliness

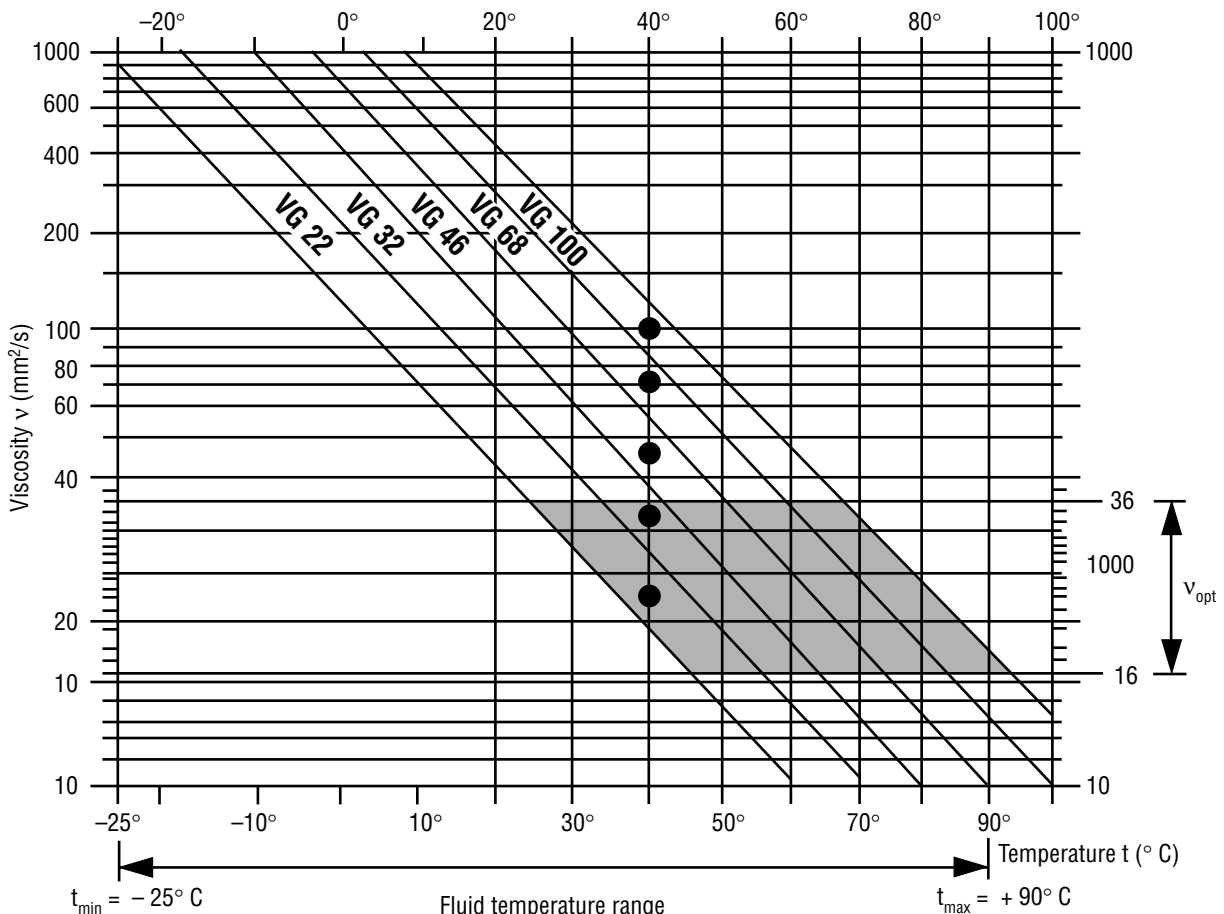
to NAS 1638 class 9,

to SAE; ASTM, AIA class 6 or

to ISO/DIS 4406 class 18/15 is required.

If it is not possible to comply with the above conditions, please consult us.

Selection diagram



Technical Data

Operating pressure range

Pressure at ports A or B

Nominal pressure p_N _____ 250 barPeak pressure p_{max} _____ 315 bar

(Pressure data to DIN 24312)

Case drain pressure

Max. permissible pressure at ports L, L₁ $p_{abs\ max}$ _____ 2 bar

Direction of rotation

Flow B to A = Clockwise

Flow A to B = Counter-clockwise

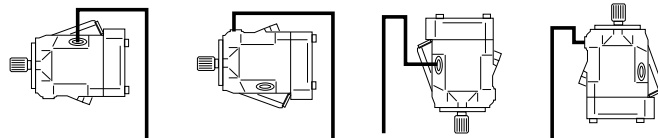
Displacement

The minimum displacement is factory set in accordance with the ordering code.

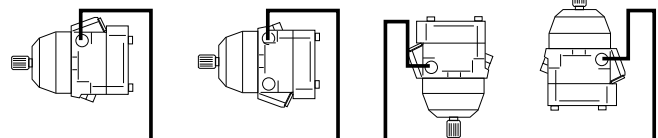
Mounting position

Is optional. The motorhousing must be filled with oil during commissioning and must be laid in such a manner, that the housing cannot empty when the motor must be below the reservoir oil level. In any mounting position, the port, located at the highest point should be used for filling the housing and for connecting the drain line.

A10VM



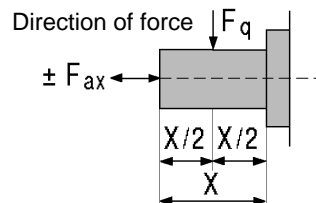
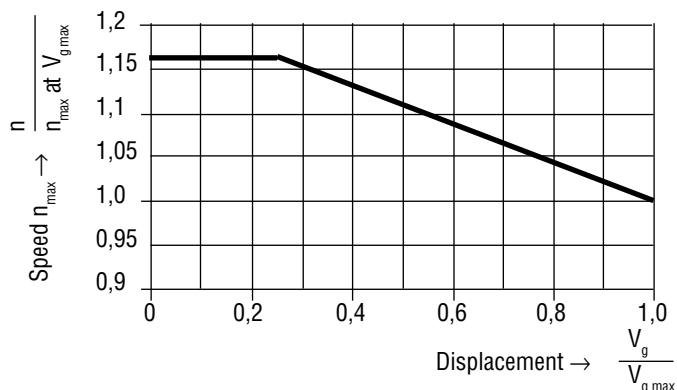
A10VE


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

Size			28	45
Displacement		$V_{g\ max}$	28	45
		$V_{g\ min}$	8	12
Speed ¹⁾	at $V_{g\ max}$	n_{max}	4700	4000
	at $V_{g\ min}$	n_{max1}	5300	4600
Max. inlet flow	at n_{max} and $V_{g\ max}$	Q_{max}	131,6	180
Max. output power ($\Delta p = 250$ bar)	at n_{max} and $V_{g\ max}$	P_{max}	55	75
Max. torque ($\Delta p = 250$ bar)	at n_{max} and $V_{g\ max}$	M_{max}	111	179
Moment of inertia about drive axis		J	0,0017	0,0033
Filling volume		L	0,6	0,7
Weight		m	14	17
Permissible loading on drive shaft	max. perm. axial load	$F_{ax\ max}$	1000	1500
	max. perm. radial load	$F_{q\ max}$	1200	1500
Actual starting torque ($\Delta p = 250$ bar)	at $n = 0$ rpm		Nm (approx.)	85
				138

¹⁾ at max. speed it is necessary, to have low pressure of 18 bar

Determination of n_{max}



Sizing calculation

$$\text{Inlet flow } Q = \frac{V_g \cdot n}{1000 \cdot \eta_v} \quad (\text{L/min})$$

$$\text{Output torque } M = \frac{1,59 \cdot V_g \cdot \Delta p \cdot \eta_{mh}}{100} \quad (\text{Nm})$$

$$\text{Output power } P = \frac{M \cdot n}{9549} = \frac{Q \cdot \Delta p \cdot \eta_t}{600} \quad (\text{kW})$$

 V_g = displacement (cm^3) per revolution Δp = pressure differential (bar) n = speed (rpm) η_v = volumetric efficiency η_{mh} = mechanical-hydraulic efficiency η_t = overall efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

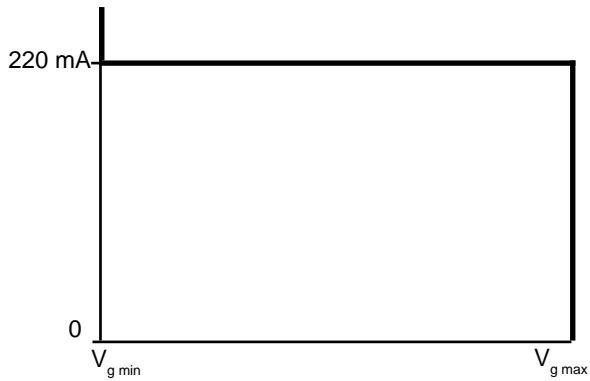
Electrical two-point control, EZ

Normally, the motor is at max. displacement. By energizing the solenoid of the control valve, the destroking piston is pressured, and the motor switches to minimum displacement.

The necessary control pressure is via a shuttle valve, taken out of the port A or B.

The minimum required control pressure is ≥ 20 bar.

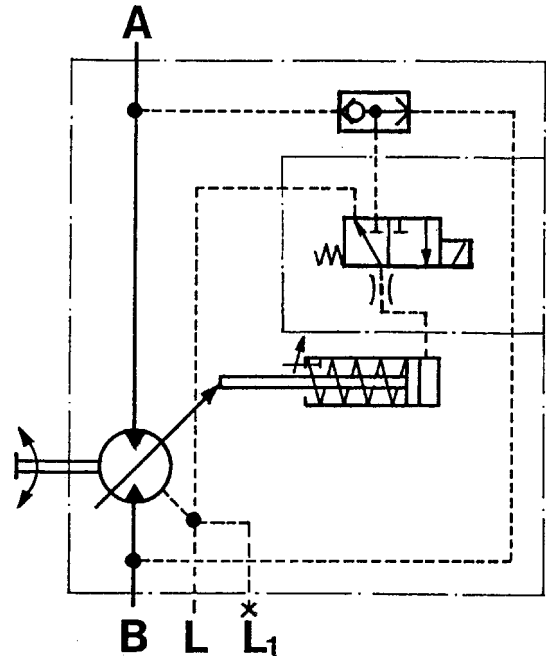
Only max. and min. displacements are possible.



De-energizing = 0 mA = $V_{g \max}$

Energizing ≥ 220 mA = $V_{g \min}$

Circuit diagram



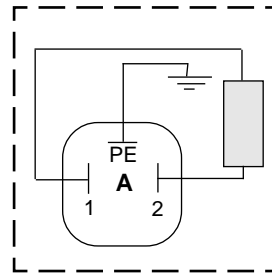
Technical data EZ

Type	EZ1	EZ2
Supply voltage (DC)	12 V	24 V
Power consumption	26 W	26 W
Duty cycle	100%	100%
Insulation class	IP 65	IP 65

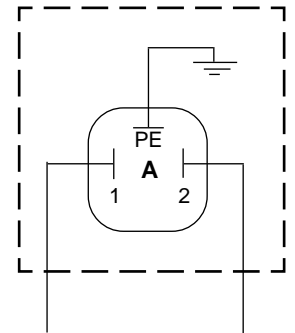
Features:

- with spring return
- solenoid plug can be rotated 4 x 90°

Connection to solenoid



Connection to plug



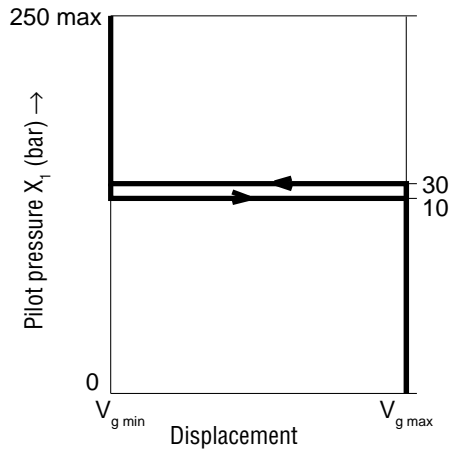
Hydraulic two-point control, HZ

Normally, the motor is at max. displacement. By applying a pilot pressure to port X, the destroking piston is pressurized and the motor switches to minimum displacement.

The necessary control pressure is via a shuttle valve, taken out of the port A or B.

The minimum required control pressure is ≥ 20 bar.

Only max. and min. displacements are possible.



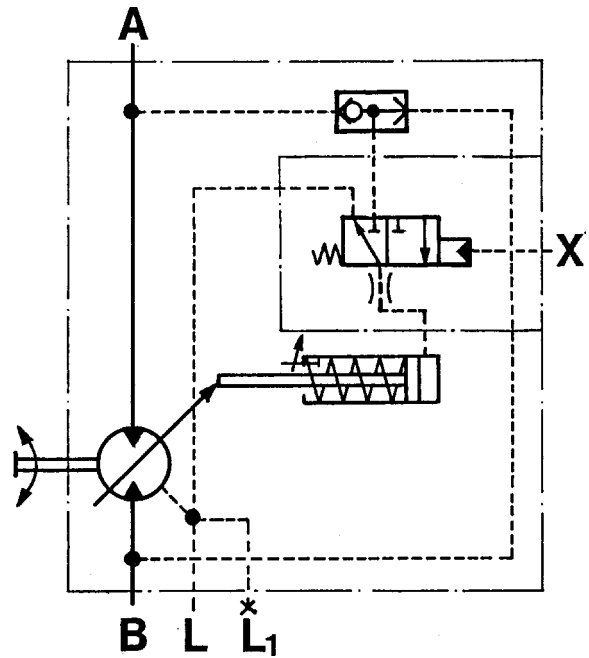
Pilot pressure in X = 0 bar = $V_{g \max}$

Pilot pressure in X ≥ 30 bar = $V_{g \min}$

Technical data HZ

minimum pilot pressure	30 bar
maximum perm. pilot pressure	250 bar

Circuit diagram



Direct control pressure, DG

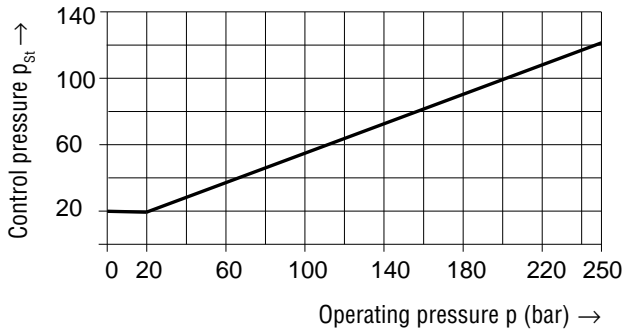
Normally, the motor is at max. displacement. By applying an external pressure to port G, the destroking piston is directly pressurized and the motor switches to minimum displacement.

The minimum required control pressure is ≥ 20 bar.

This control pressure depends directly on the working pressure in A or B.

See control pressure diagram below. With a control pressure above this minimum required pressure level the motor will destroke properly.

Control pressure diagram

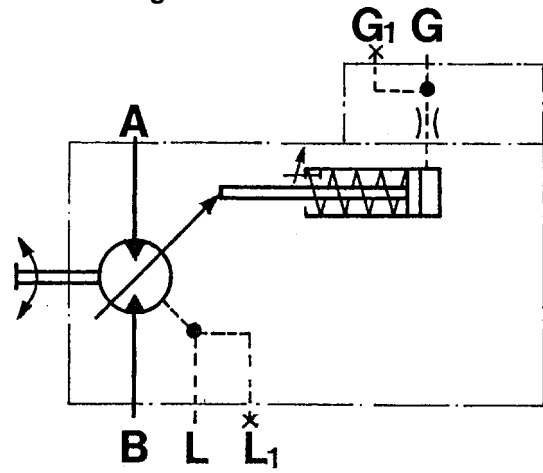


Control pressure = 0 bar = at $V_{g \max}$

Control pressure > 20 bar = $V_{g \min}$

Max. perm control pressure amounts to $p_{st} = 250$ bar.

Circuit diagram



L_1 on AA10VM only

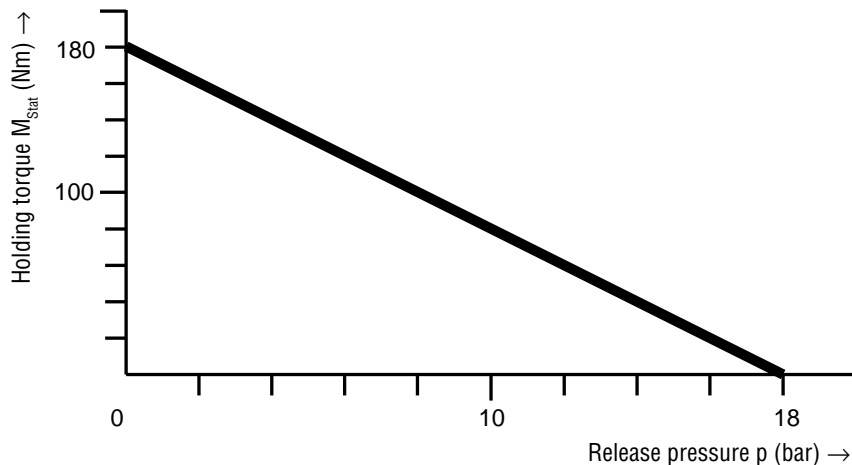
Mechanical holding brake, B01

Only available in conjunction with motion control valve, ordering code 5.

This mechanical holding brake is only a parking brake, and is applied automatically, when the operating pressure drops below a pre determined level (break release pressure), see holding torque diagram

The brake release pressure is taken from the motion control valve via an integrated shuttle valve out of the port A or B.

Holding torque diagram



Motion control valve with pressure relief valve, 5

For the function of the motion control valve see the description beside.

The pressure relief valves prevent damage, caused by excessive pressure. Two valves are incorporated for either direction of rotation.

They function as cross-over relief valve.

The relief valves should be factory set, please state in ordering code.

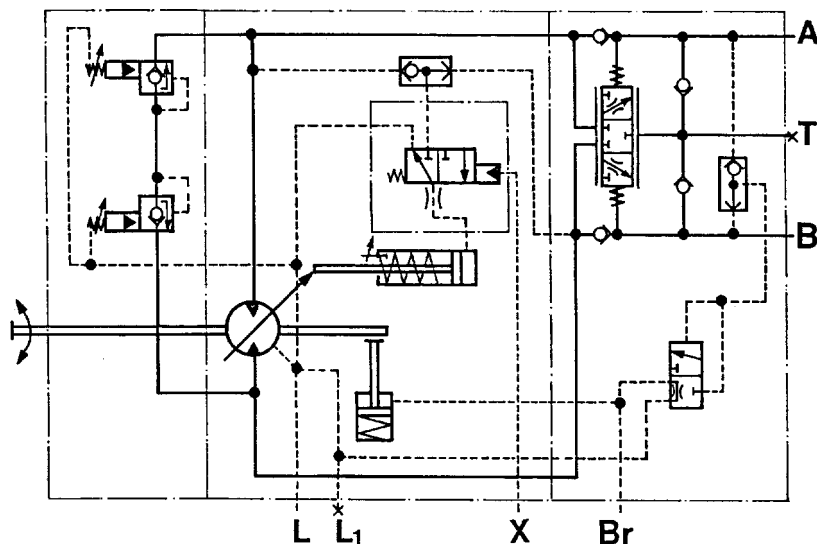
Motion control valve

The motion control valve prevents insufficient filling or cavitation of the hydraulic motor during downhill travel or deceleration. Insufficient filling happens, when external forces causes the motor to overspeed, whereby the required oil flow exceeds the available flow.

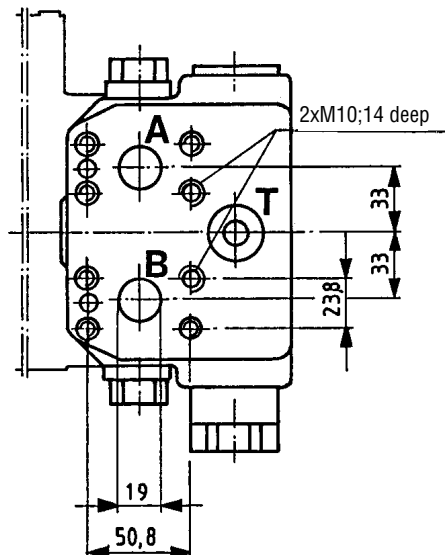
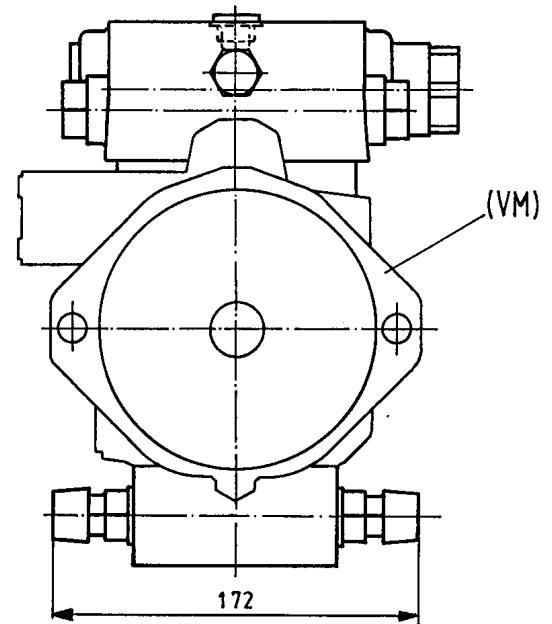
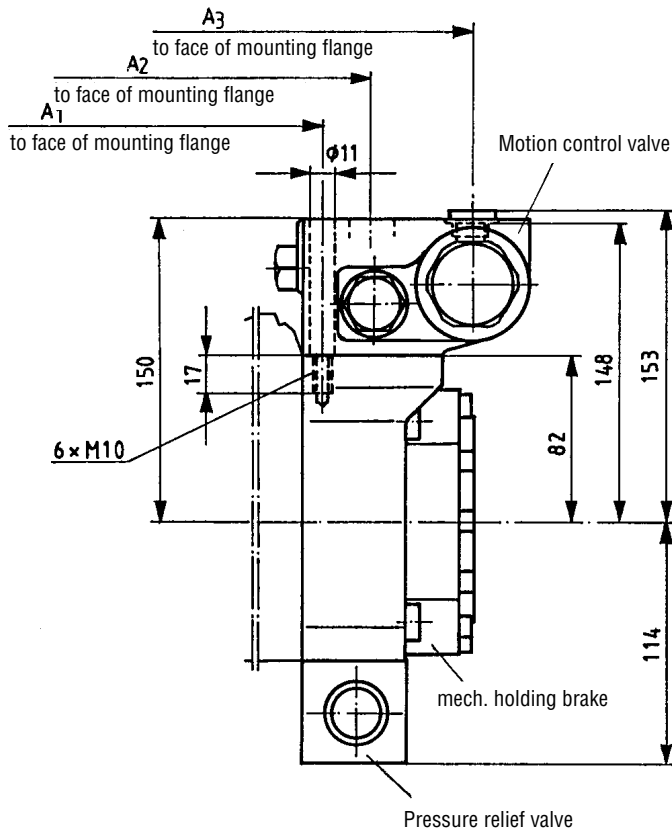
The valve spool opens only at a certain pre determined pressure in the inletflow side of the motor and enables thus unit to start moving. If pressure on the motor inlet side should drop due to speed increases or inlet flow, the spool shifts gradually to centre position causing a braking face of mounting flange action. In centre position high pressure ports A and B are nearly closed leaving only a small residual passage. This motion control function operates in both directions of rotation.

Circuit diagram

e.g. Dual displacement motor with motion control valve, pressure relief valve and mechanical holding brake



Motion control valve MHB with pressure relief valve and mechanical holding brake, 68 B015, Size 45



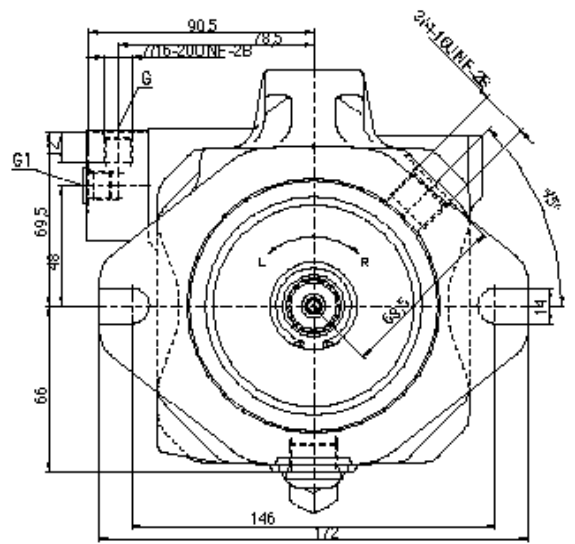
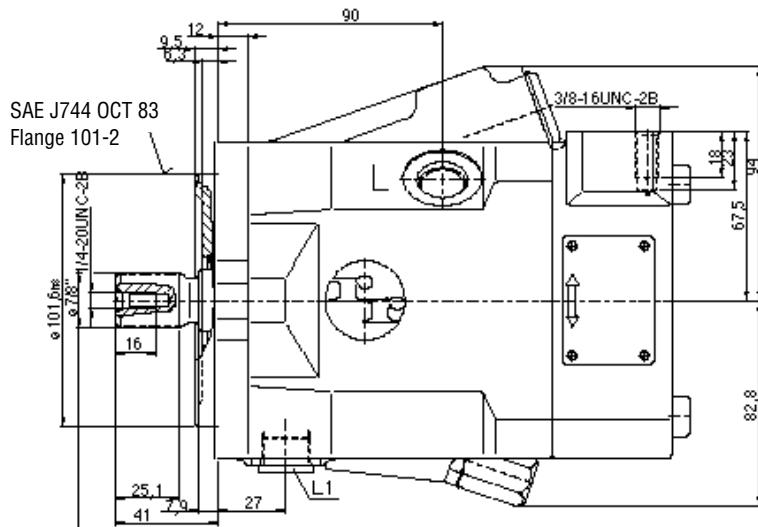
Connections

A, B	Pressure port	SAE 3/4", standard pressure range
L, L ₁	Caise drain port	7/8 - 14 UNF - 2B
X	Pilot port	7/16-20UNF-2B, 10 deep (with HZ)
T	Tank port	M18x1,5

Type	A ₁	A ₂	A ₃
AA10VM	155	181	233
AA10VE	77	103	152

Unit dimensions A10VM; Size 28

two-point control, direct control pressure DG,
with control valve, port plate 60

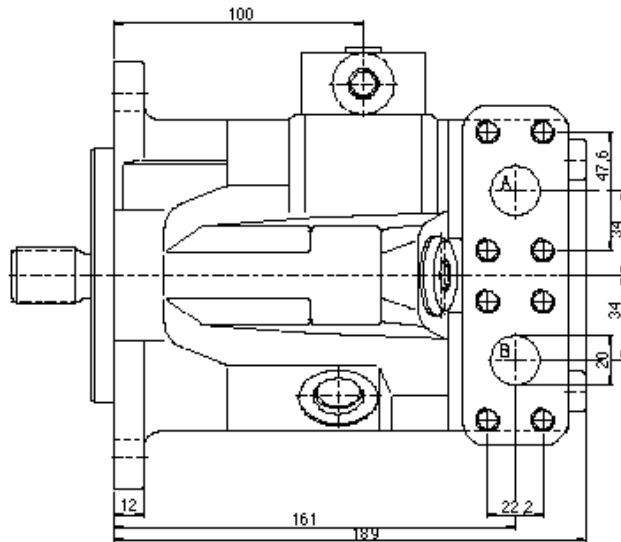


Shaft 22-4; SAE J744 OCT 83

7/8" dia splined shaft; 30° pressure angle; 13 teeth;

16/32 Pitch; flat base; flank centering;

Fit class 5; ANSI B 92.1a-1976

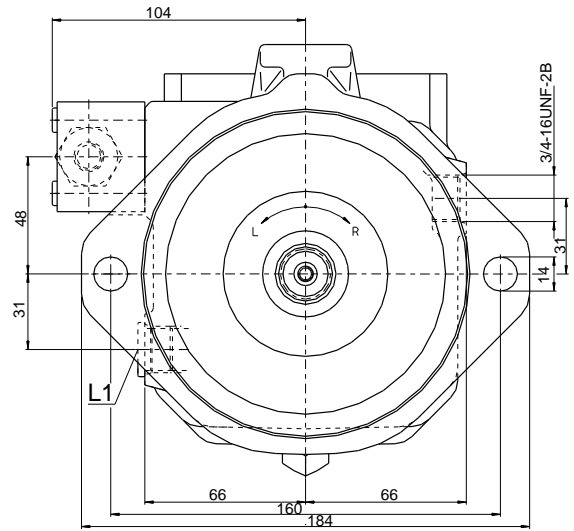
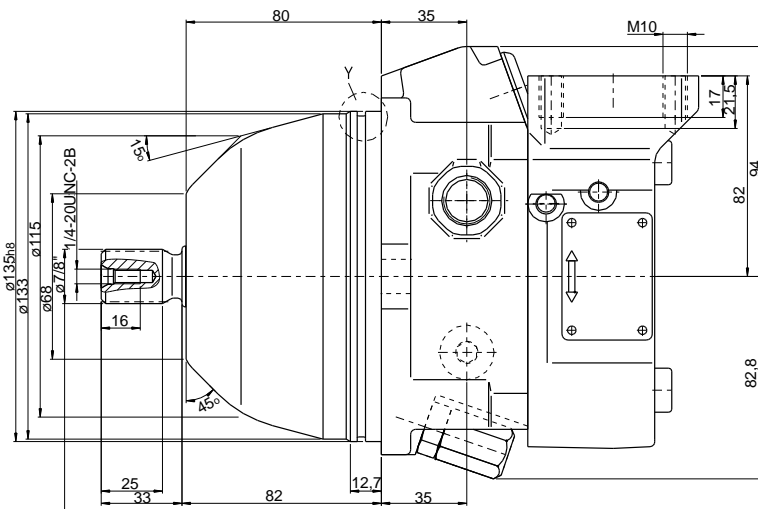


Connections

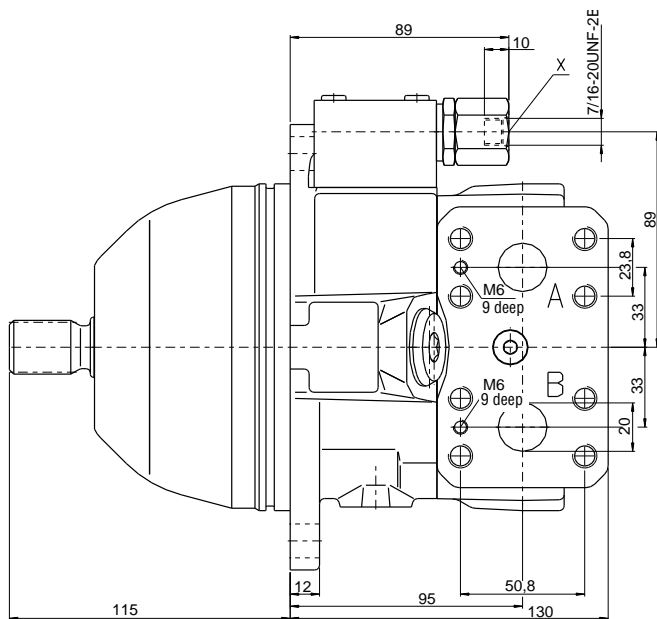
A,B	Pressure port	SAE 3/4", standard pressure range
G, G ₁	External pressure port	7/16 - 20 UNF - 2B, 12 deep
L, L ₁	Cause drain port	3/4 - 16 UNF - 2B

Unit dimensions A10VE; Size 28

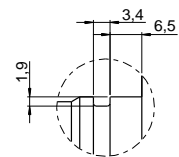
Hydraulical two-point control HZ,
with control valve, port plate 68



Shaft 22-4; SAE J744 OCT 83
7/8" dia splined shaft; 30° pressure angle; 13 teeth;
16/32 Pitch; flat base; flank centering;
Fit class 5; ANSI B 92.1a-1976

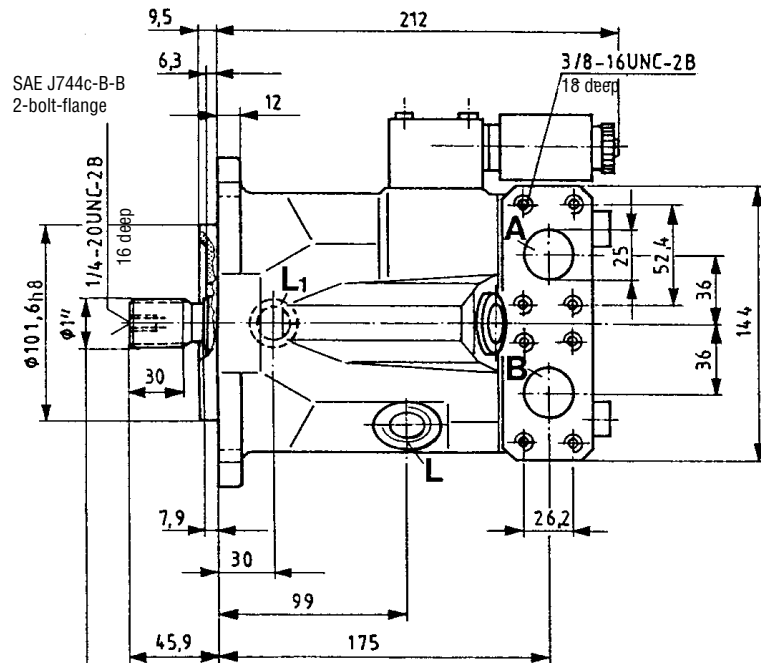


Detail Y

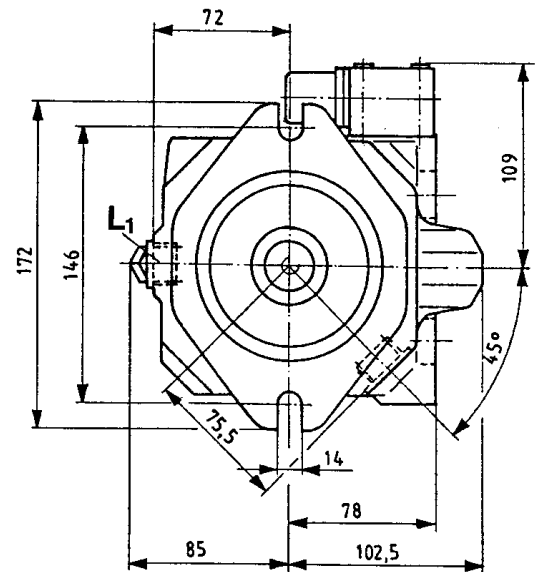
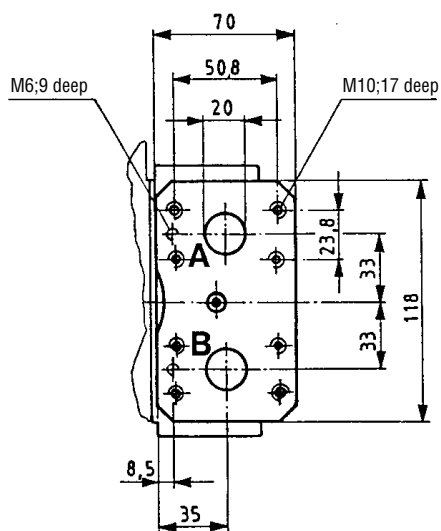


Connections

- | | | |
|-------------------|------------------------|-----------------------------------|
| A, B | Pressure port | SAE 3/4", standard pressure range |
| L, L ₁ | External pressure port | 3/4 - 16 UNF - 2B |
| X | Cause drain port | 7/16 - 20 UNF-2B |

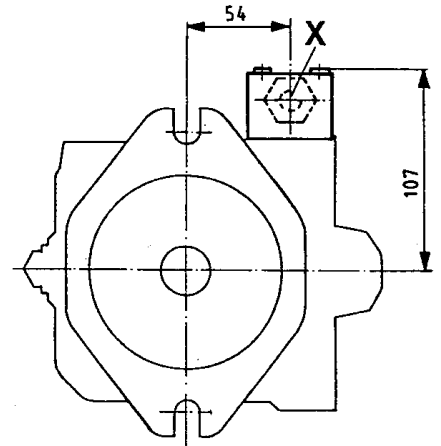
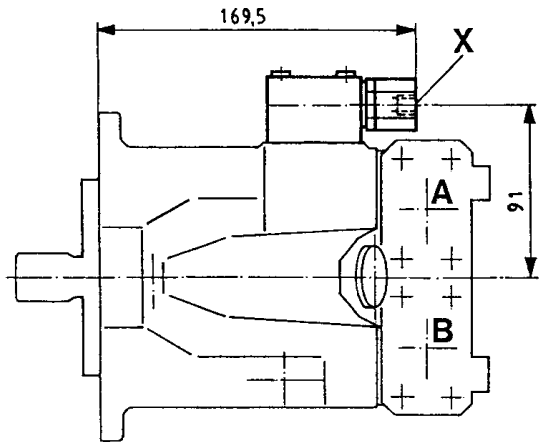
Unit dimensions A10VM; Size 45Electrical two-point control, EZ,
with control valve, port plate 60

1" dia splined shaft; 30° pressure angle; 15 teeth;
16/32 Pitch; flat base; flank centering;
Fit class 5; ANSI B 92.1a-1976

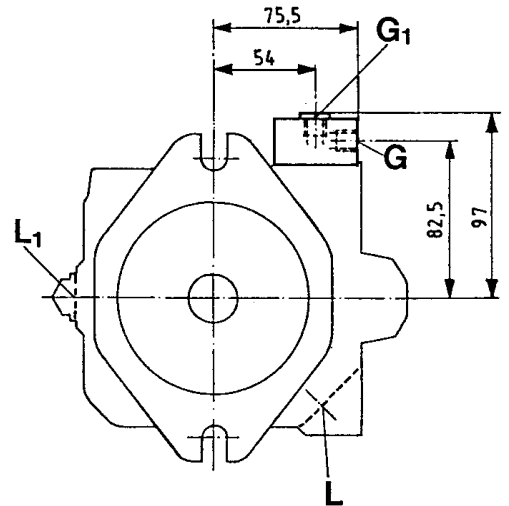
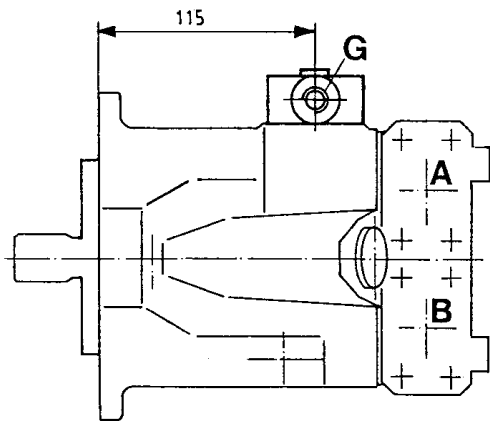
**Port plate 68****Connections**

A,B Pressure port SAE 1", standard pressure range
L, L₁ Caise drain port 7/8 - 14 UNF - 2B

**Hydraulic two-point control, HZ,
with control valve**



Two-point control, direct control, without control valve DG



Connections

A,B Pressure port

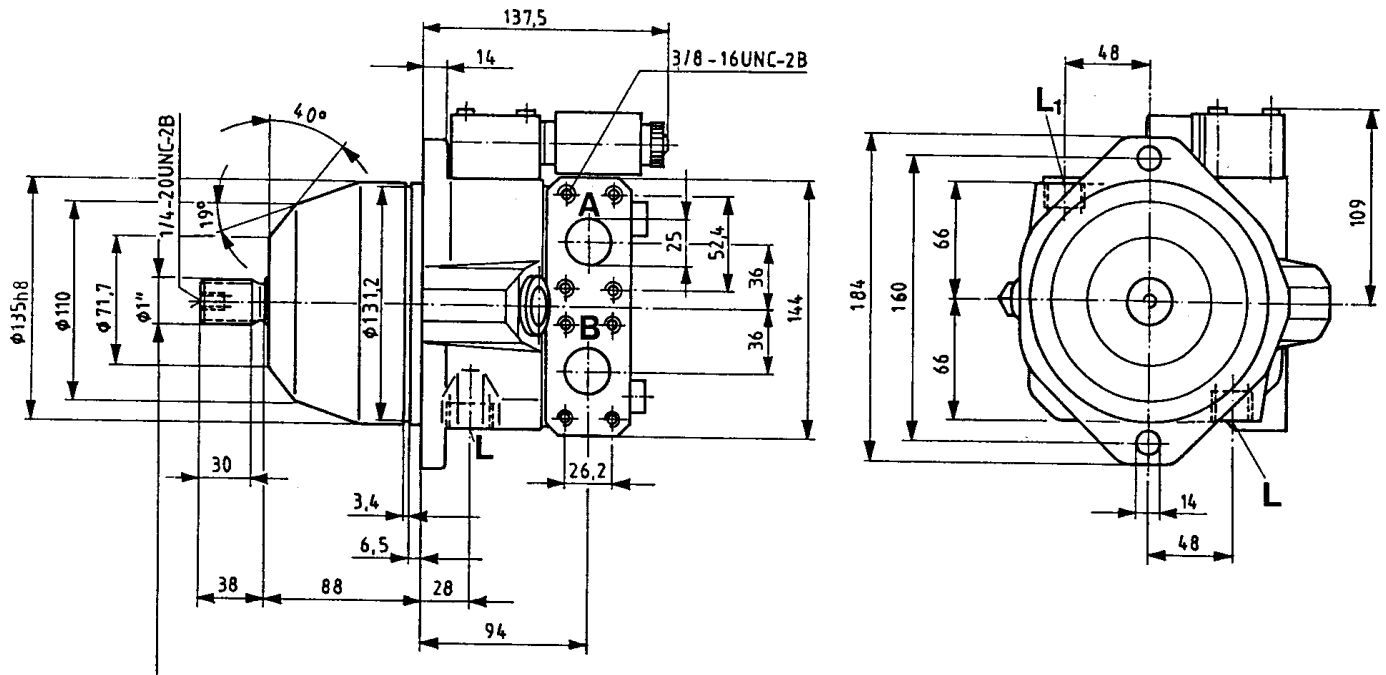
G,G₁ External pressure port

SAE 1", standard pressure range

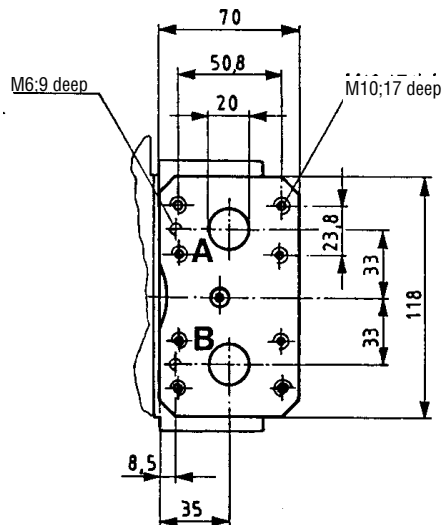
7/16 - 20 UNF - 2B, 12 deep (with NV)

L, L₁ Caise drain port 7/8 - 14 UNF - 2B

X Pilot pressure port 7/16-20UNF-2B, 10 deep (with HZ)

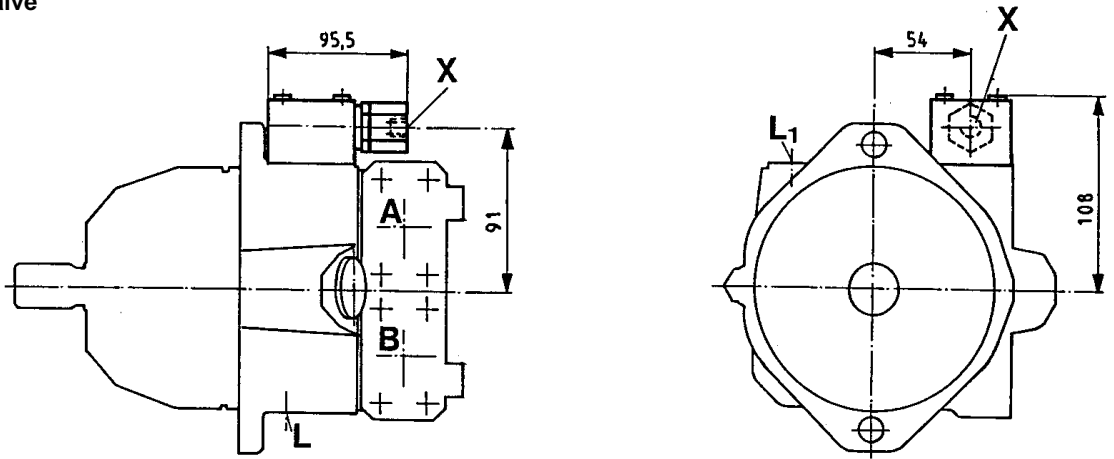
Unit dimensions A10VE; Size 45Electrical two-point control, EZ,
with control valve, port plate 60

1" dia splined shaft; 30° pressure angle; 15 teeth;
16/32 Pitch; flat base; flank centering;
Fit class 5; ANSI B 92.1a-1976

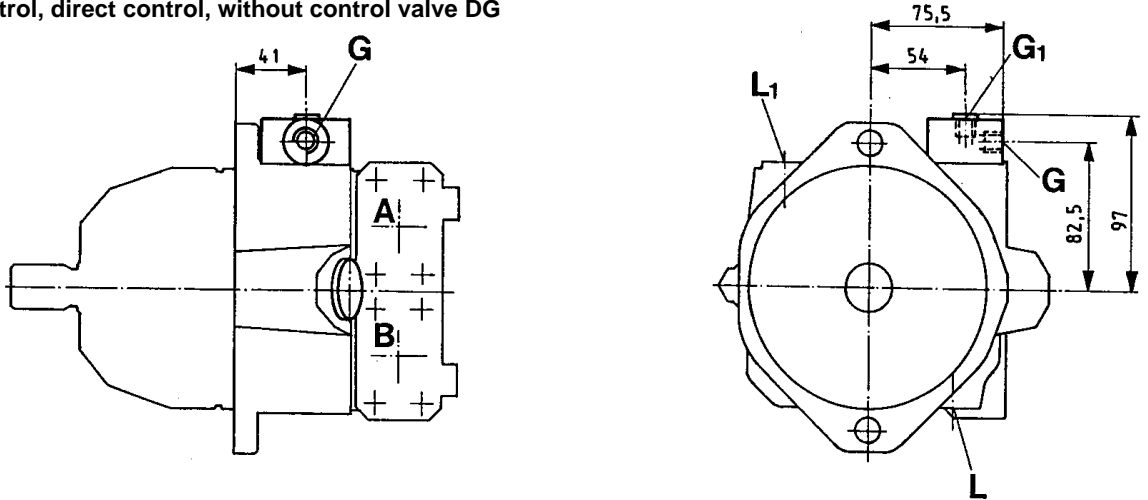
Port plate 68**Connections**

A, B Pressure port SAE 1", standard pressure range
L, L₁ Caise drain port 7/8 - 14 UNF - 2B

**Hydraulic two-point control, HZ,
with control valve**



Two-point control, direct control, without control valve DG

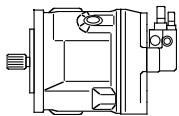


Connections

A,B Pressure port SAE 1", standard pressure range
 G, G₁ External pressure port 7/16 - 20 UNF - 2B, 12 deep (with **NV**)

L, L₁ Caise drain port 7/8 - 14 UNF - 2B
 X Pilot pressure port 7/16-20UNF-2B, 10 deep (with **HZ**)

**Notes on other items in the medium pressure A10 range:
Nominal pressure 280 bar / peak pressure 350 bar**

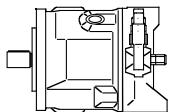


RE 92701

**Variable pump
A10VO
series 30**

Size:28 cm³ 45 cm³ 71 cm³ 100 cm³ 140 cm³**Control devices:**

DG Two-point control, direct control
 DR Pressure control
 DRT Adjustable pressure regulator
 DFR Pressure and flow control
 DFLR Pressure/flow and power control
 DFSR Pressure/flow and summary power control
 FHD Pilot pressure dependent flow control with pressure cut-off
 FE1 Electronic flow control
 DFE1 Electronic pressure and flow control
 DS Speed control, secondary control (RE 92715)

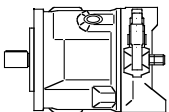


RE 92711

**Variable pump
A10VSO
series 30**

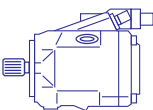
Size:16 cm³**Control devices:**

DR Pressure control
 DFR Pressure and flow control
 DFR1 Pressure and flow control orifice in X-port plugged
 DFE1 Electronic pressure and flow control



RE 92712

**Variable pump
A10VSO
series 30**

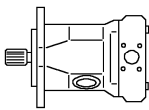


RE 92703

**Variable pump
A10VO
series 50**

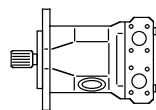
Size:45 cm³**Control devices:**

DR Pressure control
 DFR Pressure and flow control



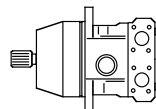
RE 91480

**Fixed displacement
pump
A10FO
series 30**

Size:37 cm³ 45 cm³

RE 91172

**Fixed displacement motor
A10FM
series 30**



**Fixed displacement
plug-in motor
A10FE
series 30**

Size:23 cm³ 28 cm³ 37 cm³ 45 cm³