

**Characteristics:**

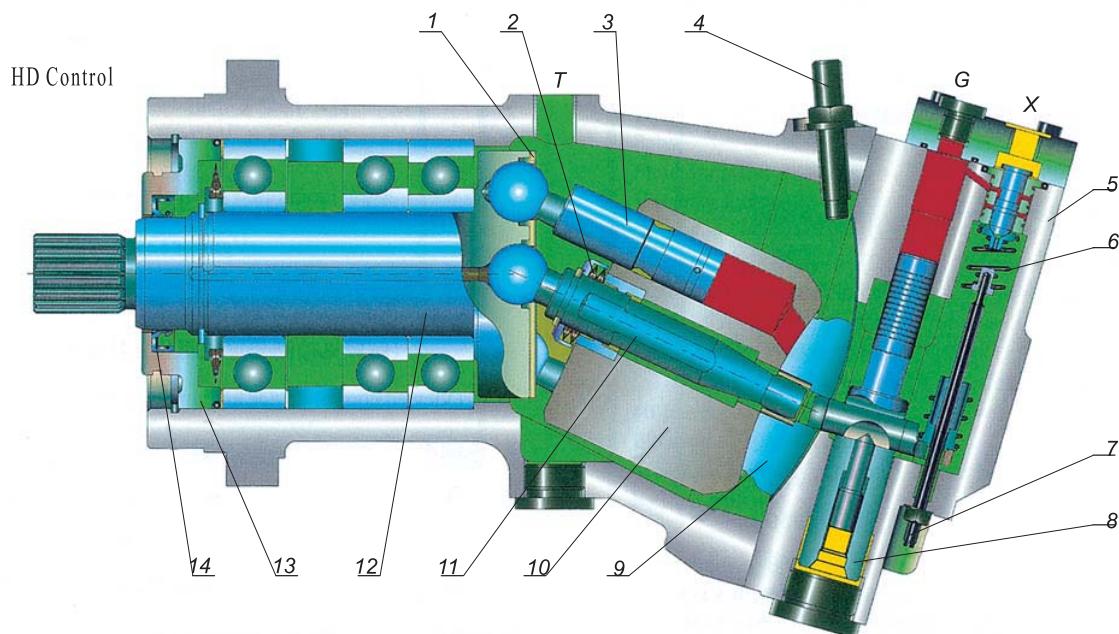
Widely control range for hydrostatic transmission;
Enhancing the output speed at smaller angle;
Cost-saving achieved by elimination of gearboxes;
High overall efficiency.

Description :

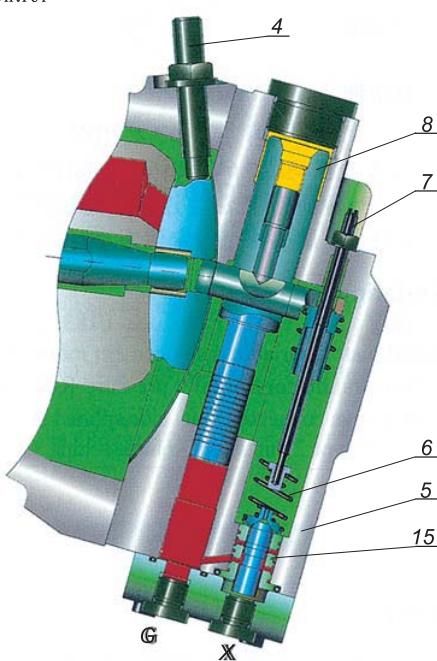
The variable displacement motor is specially designed with secondary control range for hydrostatic transmission, as its displacement varies $V_{gmax}/V_{gmin}=3.47$ (Size 250 excepted).

Variable displacement motor D6V**Technical Data:**

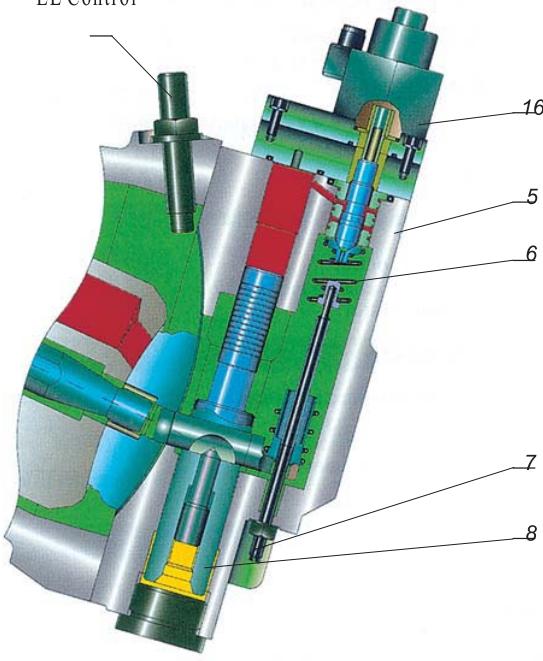
Size		28	55	80	107	160	225	250	468
Displacement	V_{gmax} (ml/r)	28.1	54.8	80	107	160	225	250	468
	V_{gmin} (ml/r)	8.1	15.8	23	30.8	46	64.8	0	135
Max.permissible Flow	Q_{max} (l/min)	133	206	268	321	424	531	590	889
Max.Speed	$\eta_{max} \quad V_{gmax}$ (r/min)	4750	3750	3350	3000	2650	2360	2360	1900
	$\eta_{max} \quad V_g < V_{gmax}$ (r/min)	6250	5000	4500	4000	3500	3100	3100	2500
Torque Constants	$M_k \quad V_{gmax}$ (N m/MPa)	4.47	8.71	12.72	17.01	25.44	35.78	39.79	74.41
	$M_k \quad V_{gmin}$ (N m/MPa)	1.29	2.51	3.66	4.90	7.31	10.30	11.46	21.47
Max.Torque P=35MPa	$M_{max} \quad V_{gmax}$ (N m)	156	305	445	595	890	1252	1391	2604
	$M_{max} \quad V_{gmin}$ (N m)	45	88	128	171	256	361	401	751
Max.Output Power	$P_{max} \quad 35MP$ and Q_{max} (kW)	78	120	156	187	247	310	335	519
Moment of inertia	J (kg m ²)	0.0017	0.0020	0.0109	0.0167	0.0322	0.0532	0.0532	0.225
Weight	G (kg)	18	27	39	52	74	103	103	223
Control Device	Hydraulic control pilot pressure related	•	•	•	•	•	•	•	•
	Automatic control high pressure,related	•	•	•	•	•	•	•	•
	Hydraulic control,speed related	•	•	•	•	•	•	•	•
	Electrical control	•	•	•	•	•	•	•	•
	Torque control		•	•	•	•	•	•	•
	Manual control	•	•	•	•	•	•	•	•

D6V Series 1 And Series 2Section

HA Control



EL Control



1.	Retainer plate	9.	Port plate
2.	Dishing spring	10.	Cylinder block
3.	Piston	11.	Center pin
4.	Stop for Qmin	12.	Shaft
5.	Adjustment housing	13.	Front cover
6.	Spring	14.	Oil seal kit
7.	Adjustment screw	15.	Control rod
8.	Flow piston	16.	Electrical control

D6V Variable displacement motor

Model Code

D6V	55	HD1	D	F	Z	2	0183
Motor Type							Min. Swept Volume setting
Variable Displacement Motor D6V							Example : Vgmin=18.3(ml/r) 0183
Displacement (Vgmin~Vgmax)							Vgmin=123(ml/r) 1230
(8.1~28.1ml/r) 28							Assembly Type 1
(15.8~54.8ml/r) 55							(Viewed control device and unit dimensions) 2
(23~80ml/r) 80							Shaft End
(30.8~107ml/r) 107							GB1096-79 Keyed Shaft P
(46~160ml/r) 160							DIN5480 Splined Shaft Z
(64.8~225ml/r) 225							GB3478.1-83 Splined Shaft S
(0~250ml/r) 250							Pipe connections
(135~468ml/r) 468							SAE Flange on side F
Control							Metric Thread on side G
Hydraulic control, pilot pressure related							Ordering Example:
Pilot pressure Increase p=1MPa HD1							D6V 55 HD1 F Z 2 0183
Pilot pressure Increase p=2.5MPa HD2							Axial piston variable displacement motor D6V, Size 55,
Automatic control high pressure related							with hydraulic control, pilot pressure Related, P=1MPa,
constant pressure HA1							SAE flange connections on side, splined shaft DIN5480,
pressure increase p=10MPa HA2							assembly type 2,min.swept volume setting Vgmin=18.3ml/r.
proportional solenoid EL							
Electrical control							
2-point control ES							
Hydraulic control, speed related DA							
Mooring control MO							
Manual control MA							
Pressure adjustment							
with pressure adjusting (For HD control) D							
without pressure adjusting Without identifier							

Note :

To help ensure its longevity, please be careful to:

1. Keep the operating fluid clean anywhere.
2. Change the hydraulic fluid periodically (Operation 1000~3000 hours or six months).

● Technical Data:

Operating Pressure Range:

Pressure at ports A or B :

Nominal pressure _____ Pn=35MPa

Peak pressure _____ Pmax=40MPa

The sum of the pressures at part A and B should not exceed 63MPa(individual pressure at either port max. 40MPa):

Leakage oil Pressure:

Maximum permissible leakage oil pressure (at Port T):

Pabs _____ 0.2MPa

Fluid Temperature Range: -25~80 °C

Viscosity Range:

tmin _____ 10mm²/s

tmax _____ (for short periods) 1000mm²/s

Optimum Operating Viscosity: _____ 16-25mm²/s

Fluid Recommendation 40 low-solidifing

Filtration of Hydraulic Fluid :

Recommended filtration 10 µm. Coarserfiltration of 25 to 40 µm is possible. However ionger service life is achieved with filtration of 10 µm (reduce wear).

Mounting position:

Optional. Motor housing must always befilled with oil.

Speed Range :

No limitation on minimum speed n_{min}, Where very even speeds are required. n_{min} should not be less than 50r/min. The maximum flow from the pump and the minimum swept volume of the variable motor together determine the maximum output speed. The min swept volume is limited mechanically by means of an adjustment screw so that the max. Permissible speeds (of the variable motor and the driven unit) cannot be exceeded. See date table for max. permissible speeds.

Calculation of Size :

$$\text{Swept Volume } Q = \frac{V_{gxn}}{1000xnv} \quad [1/\text{min}]$$

$$\text{Output Speed } n = \frac{Q \cdot 1000 \cdot nv}{V_g} \quad [\text{r}/\text{min}]$$

$$\text{Output Torque } M = 0.159 \times V_{gx} \cdot P \cdot nmh \quad [\text{N} \cdot \text{m}]$$

$$\text{Output power } P = \frac{Q \cdot P}{60} \cdot nt \quad [\text{kW}]$$

V_g = max geometric displacement [ml/r]

M = torque [N.m]

P = differential pressure [MPa]

n = speed [r/min]

nv = volumetric efficiency

nmh = mechanical-hydraulic efficiency

nt = overall efficiency

D6 V Variable displacement pump

DA Hydraulic control , speed related

Speed related hydraulic control is used exclusively for transmission drives in conjunction with variable close loop pump. Assembly Design : Assembly type 2

Start of control:

Pilot pressure depend at Vgmax to Vgmin

High pressure depend at Vgmin to Vgmax

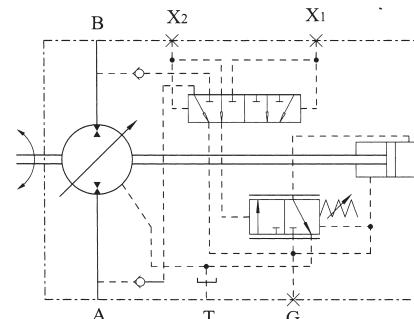
Start pilot at Vgmax (Max. torque)

The pilot pressure which is determined by the variable close loop pump (increasing speed of prime mover = increasing speed of pump=increasing pilot pressure) is directed to ports X1 or X2 dependent on the direction of travel, and causes a swivelling towards smaller motor capacity (lower torque, higher speed).

Should the operating pressure rise above the set pressure value at the regulator, the variable motor swivels to a higher capacity(higher torque, lower speed).

Pilot pressure and high pressure remain in a fixed relationship, Pst/Ph=3/100, this means that 0.3MPa variation in pilot pressure (rise or fall) gives a pressure rise or fall of 10 MPa in operating pressure.

When designing a drive with a DA control, the technical data of the variable close loop pump must be considered.



Connection Port:

A,B Pressure Port

X1,X2,G Pilot Pressure Port

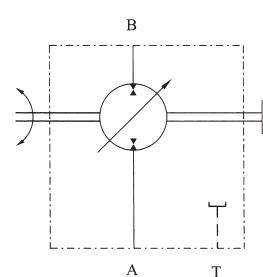
T Drain Port

MA Manual control

Adjustment of motor capacity dependent on the position of a threaded spindle-hand operation.

Assembly Design:

Assembly type 1



Connection Port:

A,B Pressure Port

T Drain Port

Hydraulic Control, Pilot Pressure Related, HD

Stepless control of the motor capacity dependent on a pilot pressure signal.

Standard Model :

Assembly type 2

Start of control at Vgmax (max torque,min.speed)

End of control at Vgmin (min.torque,max.speed)

Further to type 1, the control function is reversed:

Start of control at Vgmin,end of control at Vgmax.

Setting Regulator:

Three Options are available choice.

1. HD1

Pilot pressure increase (Vgmax-Vgmin) P=1MPa

Start control point can be adjusted _____ from 0.2~2MPa

Standard Setting: Start of control at 0.3MPa(End of control at 1.3MPa)

2. HD2

Pilot pressure increase (Vgmax-Vgmin) P=2.5MPa

Start control point can be adjusted _____ from 0.5MPa~5MPa

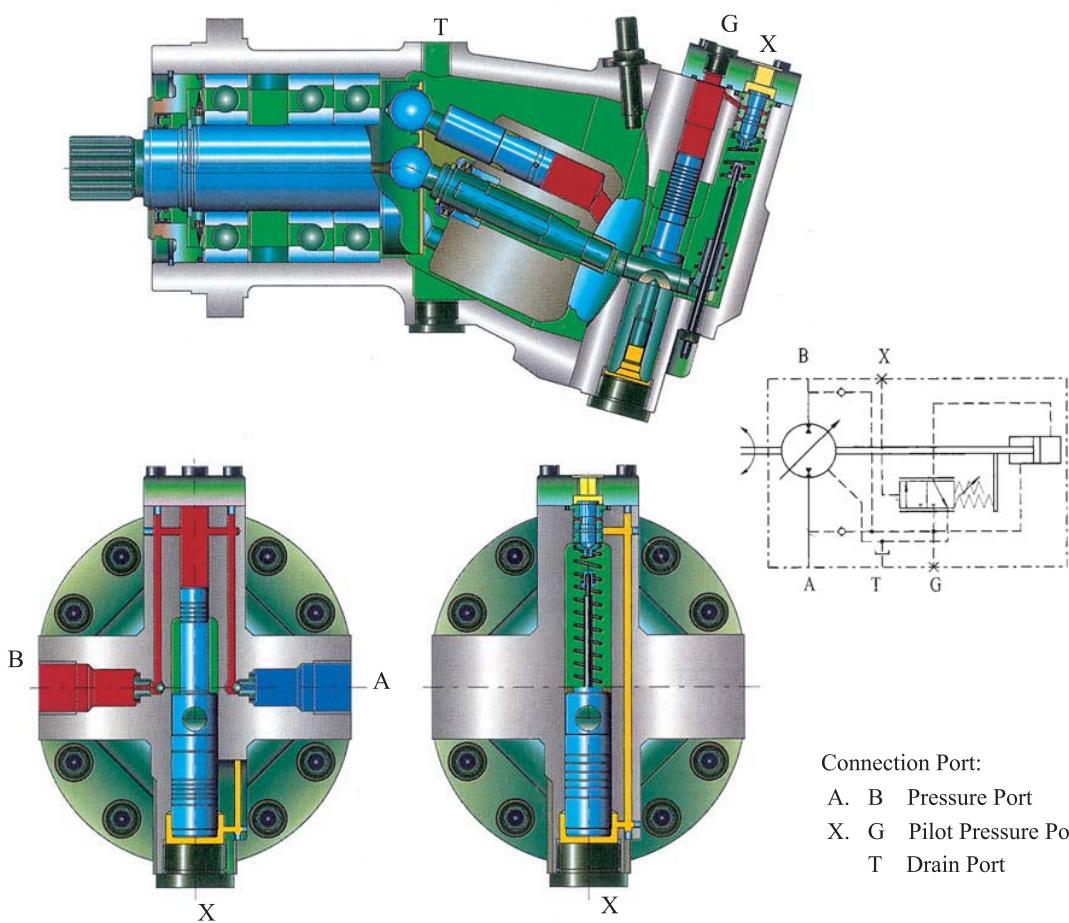
Standard Setting: Start of control at 1MPa(End of control at 3.5MPa)

When using HD control as a two-points control, the max.pilot pressure of 7.5MPa is permissible

Drain of approx.0.5 L/min occurs at pilot port X.

When operating pressure be <1.5MPa,an auxiliary pressure of 1.5MPa must be applied at port G.

Section and Function Drawing



Variable displacement motor D6V

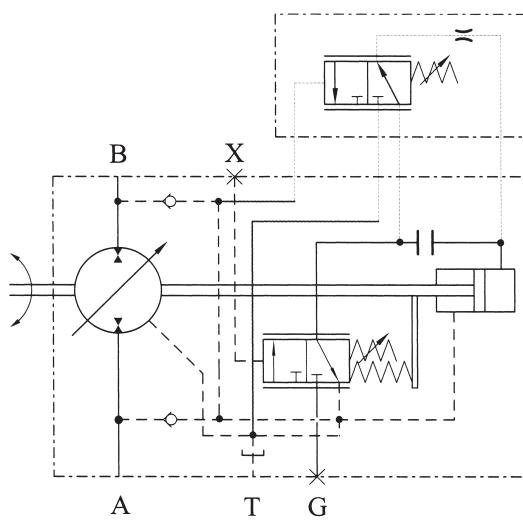
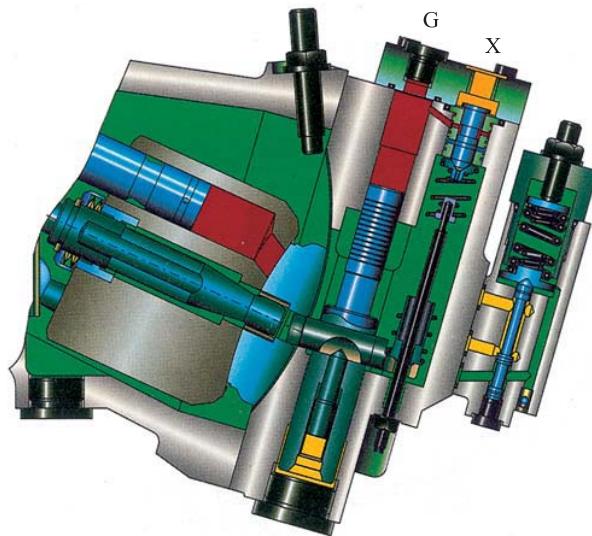
Hydraulic Control,Pilot Pressure Related,HD

3. With pressure adjusting D

Control Device:

Based on HD control, added a cutoff valve at the regulator to measure the operating pressure at port A or B, and when the set operation pressure is reached, Displacement of the motor increasing(inclination of the axis moving from the min.value to the max. value), and the pressure will be kepted at setting value to obtain more output torque. Here, pressure differential range of constant pressure is approx.1 Mpa.

Section and Function Drawing



Based on HD control, added a cutoff valve at the regulator

A,B Pressure Port:
G Port for synchronous control
of multiple units and for
remote control pressure
X Pilot Pressure Port
T Drain Port

HA Automatic control high pressure

Automatic control of motor capacity dependent on operating pressure.

Standard Model: Assmbly type 1

Start of control at Vg_{min} (min.torque,max.speed)

End of control at Vg_{max} (max.torque,min.speed)

For assembly type 2, the control function is reversed

Start of control at Vg_{max} end of control at Vg_{min} .

Internal Control Device:

This control device measures the internal operating pressure at port A or B(not pilot required), and when the set operating pressure is reached, swivels the motor from Vg_{min} to Vg_{max} .

Two options are available choice:

1. HA1

Within the control range, the operating pressure is held practically constant. Pressure increase from Vg_{min} to Vg_{max} is approx. 1MPa.

2. HA2

Rising Pressure Control: Control is adjustable between 8~35MPa. In adjustable range, From Vg_{min} to Vg_{max} pressure raise 10MPa

Override Control:

HA control can be overridden at port X. In this case, the set value of pressure at the regulator(operating pressure) is reduced by 1.6MPa per 0.1MPa pilot pressure.

Example :

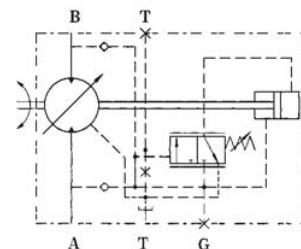
Regulator Setting : 30MPa

Pilot pressure (at X):0MPa,start of control at 30MPa;

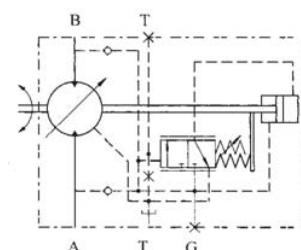
Pilot pressure (at X):1MPa,start of control at 14MPa;

$(30 \text{ MPa}-10 \times 1.6 \text{ MPa}=14 \text{ MPa})$

Override is only required to set max. capacity, a pilot pressure of 5 MPa is permissible.

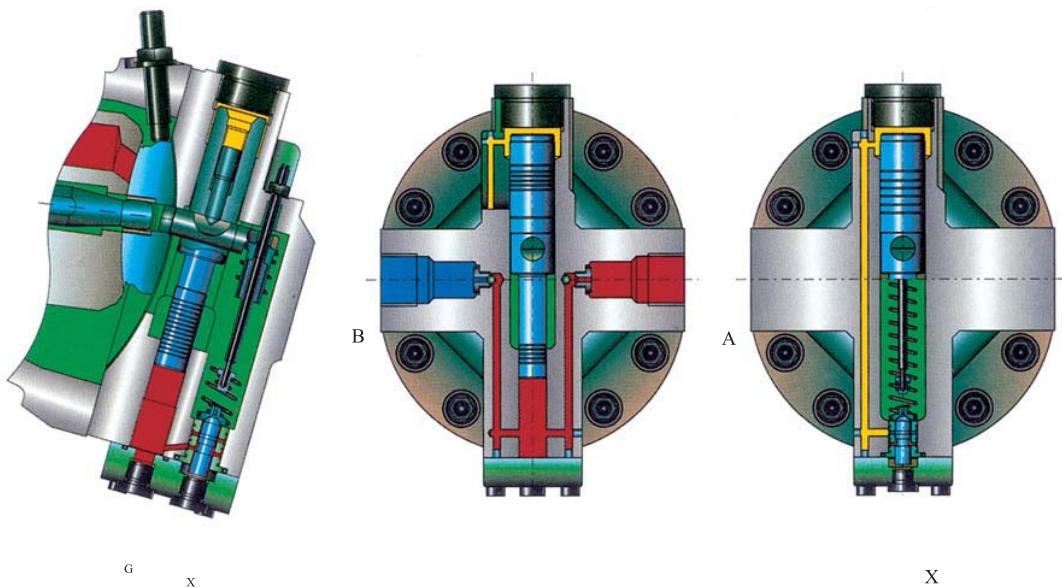


With Pilot pressure X port,
Within the control range, the
operating pressure is held practically
constant. Pressure is approx. 1MPa.



With Pilot pressure X port,
Within the control range, the operating
pressure is held practically constant.
Pressure is approx. 10MPa.

Section and Function Drawing



Variable displacement motor D6V

EL Electrical Control

For stepless control of the motor capacity, or for two point control, dependent on an electrical signal Standard Model: Assembly type 2 Start of control at Vgmax (max.torque,min.speed) End of control at Vgmin (min.torque,max.speed) Further to type 1, the control function is reversed: Start of control at Vgmin end of control at Vgmax. Should the variable motor EL only be required for two point control simply switching the current on and off is sufficient to attain these two positions (for assembly type 2: de-energise at Vgmax, for assembly type 1: de-energise at Vgmin). For two point control on size 55,80 and 107, normal solenoids may be used. For other size, these could be introduced for larger orders Power for normal (switching) solenoids is 12V DC,26W. If the operating pressure is less than 1.5MPa, then on auxiliary pressure of 1.5MPa is required at port G. Only in this case is a hydraulic pilot line required in addition to the electrical connection.

Two options are available choice :

1. EL

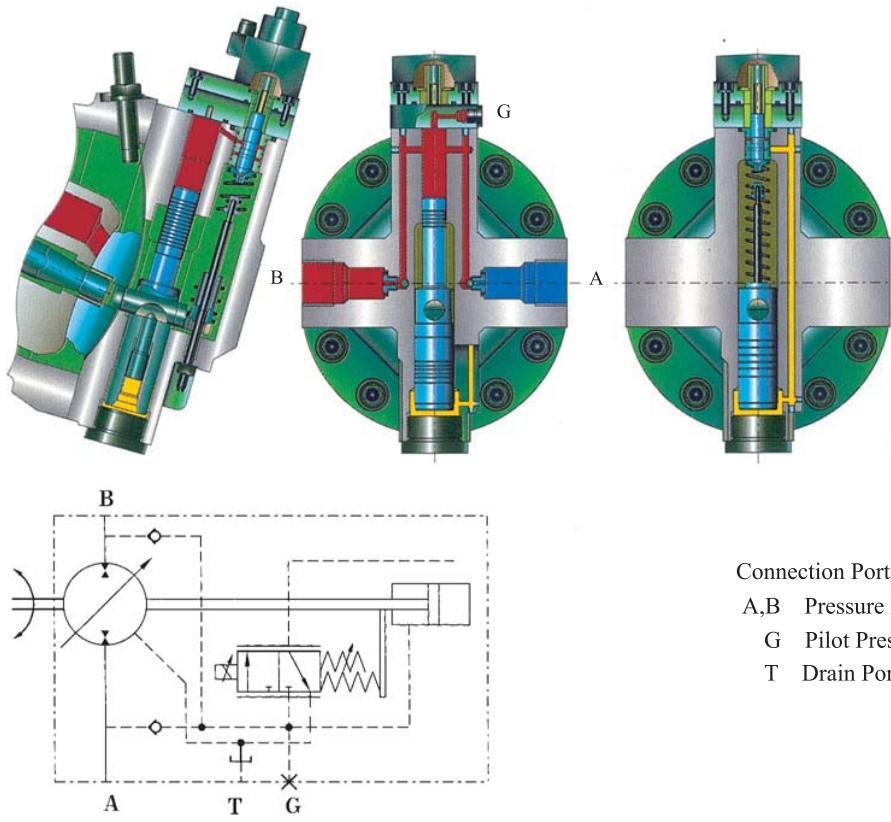
Electrical control with proportional solenoid.

2. ES

Electrical 2-point control(with switching solenoid.)

Size	Control Voltage DC	Control Current Control Start-End
28~225	24V	200~350mA
	12V	400~1060mA
468	24V	320~790mA
250	24V	350~800mA

Section and Function Drawing



Connection Port:

- A,B Pressure Port
- G Pilot Pressure Port
- T Drain Port

MO Mooring control

The mooring control is used mainly for the drive of winches, to generate a constant line pull.

Standard Model : Assembly type 1

Start control at Vgmin (Min.torque, max.speed)

Setting of regulator :

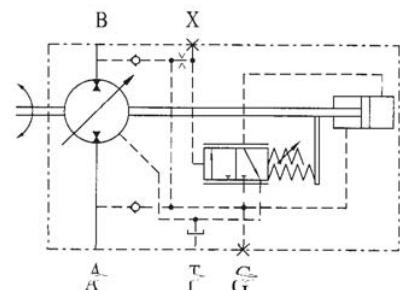
Pilot pressure increase (Vgmin-Vgmax) P=5MPa

Start of control adjustable from 8 to 35MPa.

A constant torque, which may be altered according to requirements in order to generate a constant line pull at the mooring winch is achieved by varying the capacity of the variable motor. If there is no pull at the drum, the variable motor requires a lower operating pressure and therefore generates a smaller pilot pressure.

The variable motor moves to a min.capacity(Vgmin). The higher motor speed thus resulting(werping speed) causes rapid operation of the winch until the mooring pull required of the winch is reached and set. In order to limit the max.speed of the Variable motor, a flow limiting valve, or Other such suitable, must be placed in the circuit before the motor.

As a pilot control for the mooring Control itself, a variable pressure relief value may be used. The max.oil flow at port X is approx. 5 L/min. The pilot oil flow reduces with lower differential pressure between pilot pressure and operating pressure.



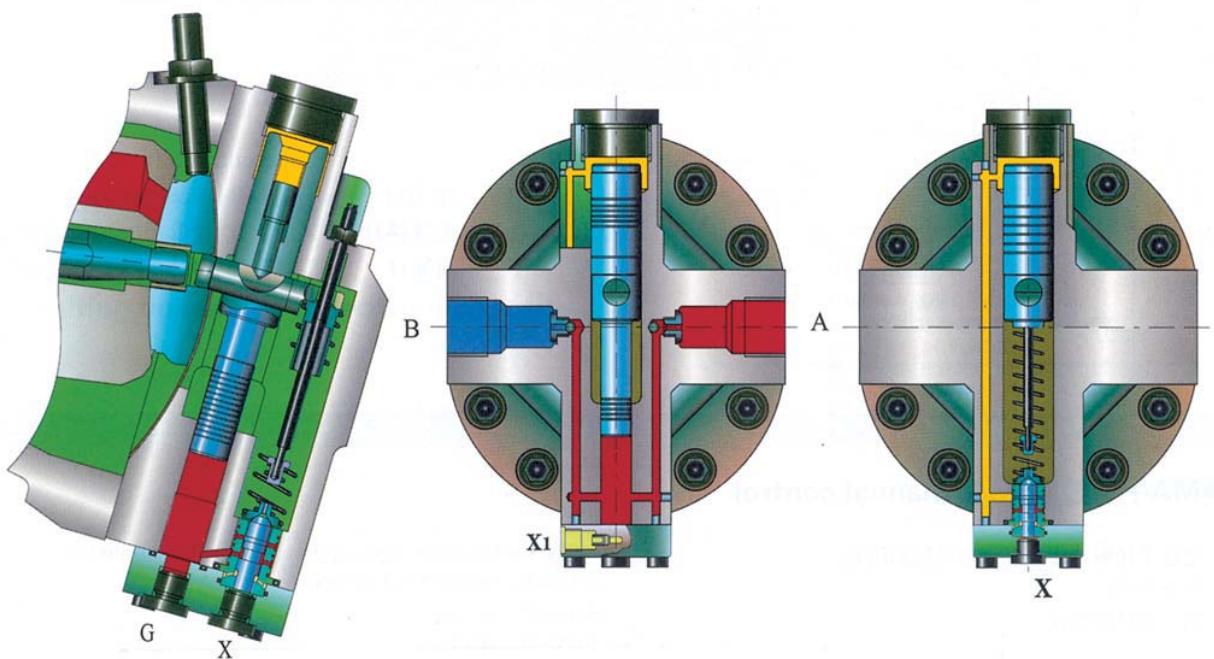
Connection Port:

A,B Pressure Port

X1,G,X Pilot Pressure Port

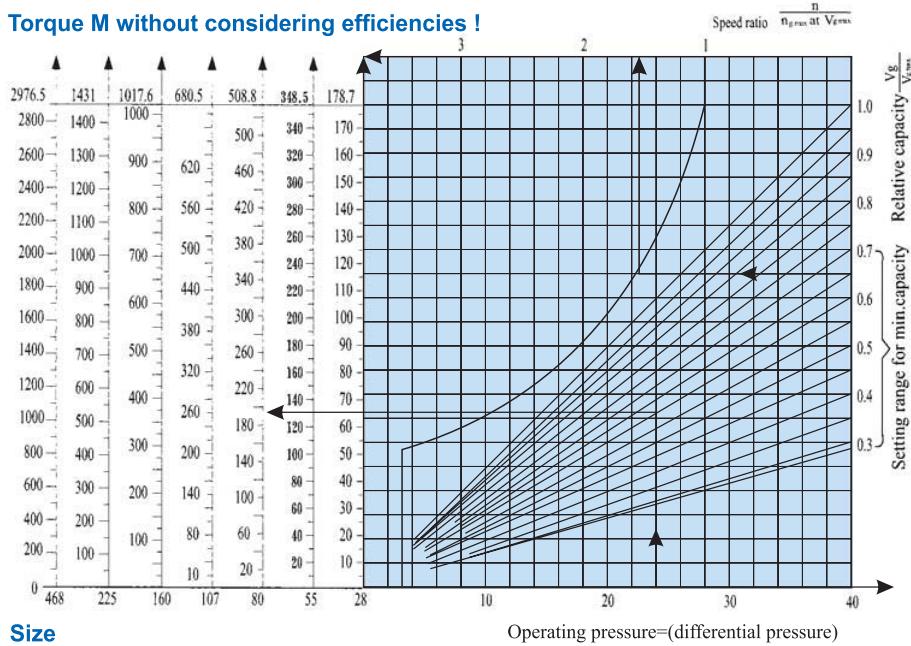
T Drain Port

Section and Function Drawing



General Operating Curve

Torque M without considering efficiencies !



Size

1. 80, P=24MPa

Example:

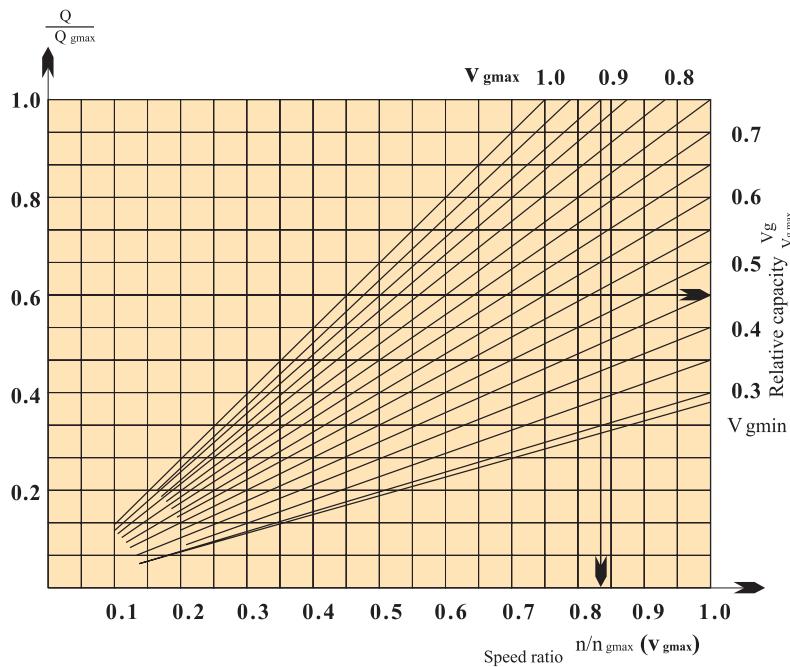
- size 80, differential $P=24\text{MPa}$, Capacity $V_g=48\text{ml/r}$
- Required: Output torque
- Solution: Capacity $V_g/V_{g\text{max}} = 48/80=0.6$
- $0.6V_{g\text{max}}$ at 24MPa gives an output torque M of 183.168N m .

2. 80, $V_g = 52\text{ml/r}$

Example:

- size 80, Capacity $V_g=48\text{ml/r}$
- Required: Speed ratio
- Solution: Capacity $V_g/V_{g\text{max}} = 52/80=0.65$
- $0.65V_{g\text{max}}$ gives an speed ration of 1.539, i.e. at the same flow, the variable motor turns at factor of 1.539 times the speed at max capacity($V_{g\text{max}}$).

Limiting values for speed and capacity



Example:

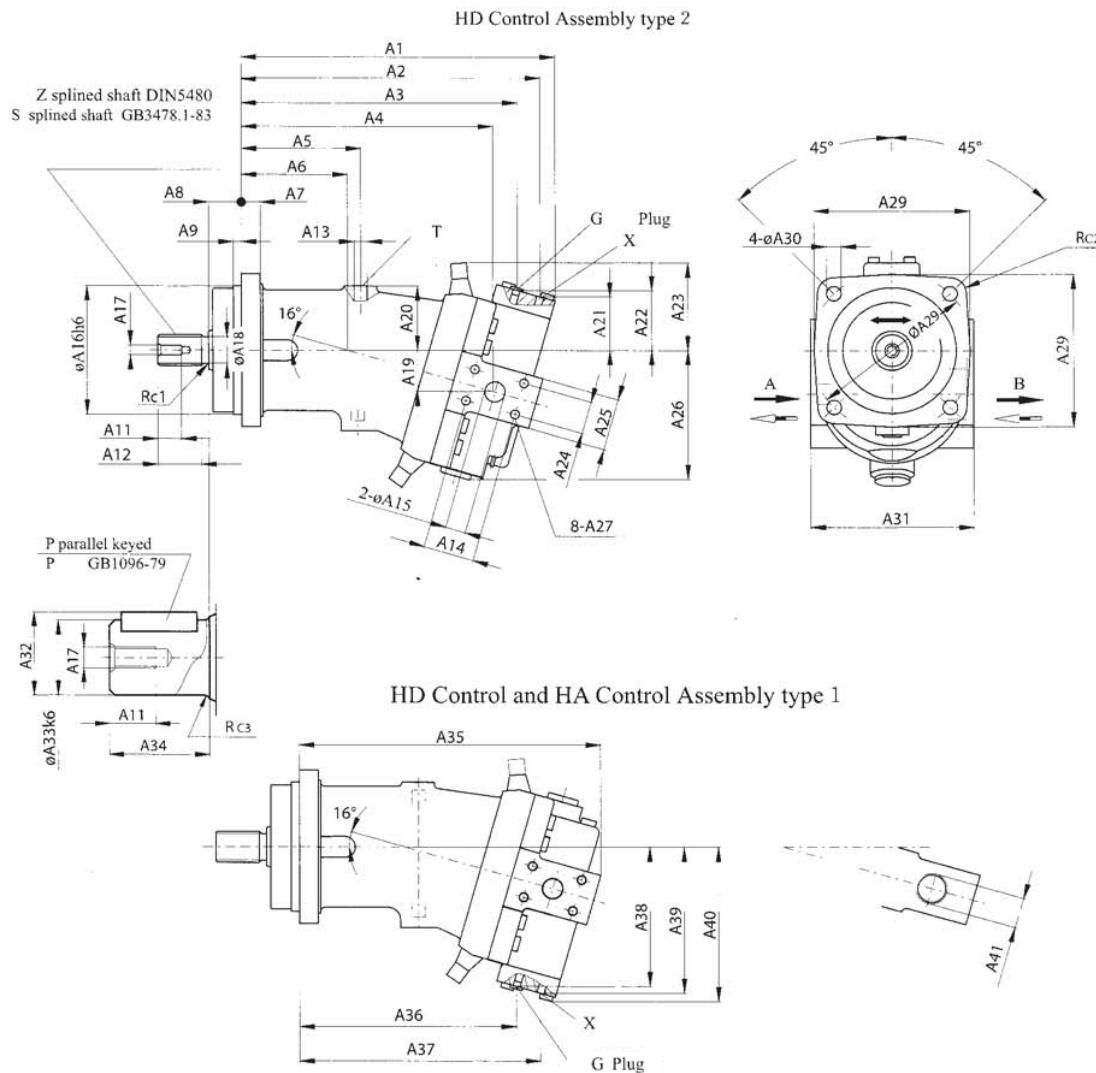
- size 107, oil flow $Q=192.6\text{L/min}$
- Required: Minimum permissible capacity in order not to exceed the maximum permissible motor speed(at $V_g < V_{g\text{max}}$)
- Solution: Max permissible oil flow for size 107 is 321 L/min , therefore $Q/\text{max}=192.6/321=0.6$, This gives a capacity of $V_g/V_{g\text{max}}=0.45$, The minimum motor capacity is therefore $0.45 \times V_{g\text{max}}=0.45 \times 107=48.15\text{ml/r}$.

Example :

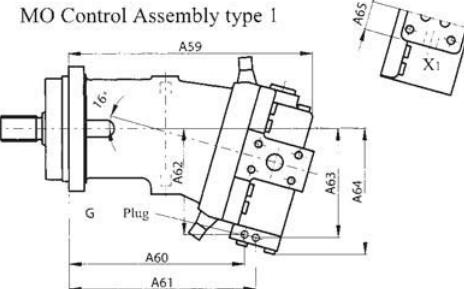
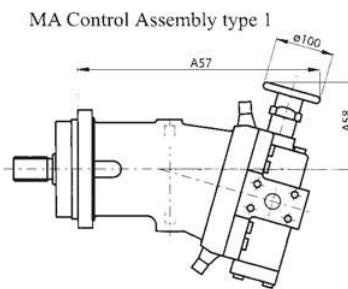
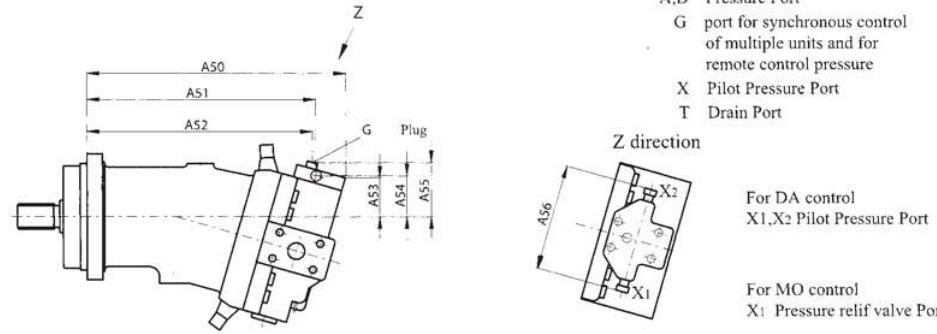
- size 107, Motor capacity $V_g=96.3\text{ml/r} < V_{g\text{max}}$
- Required : Maximum permissible speed n
- Solution: Motor capacity $V_g=96.3\text{ml/r}$, $V_g/V_{g\text{max}}=96.3/107=0.9$, $V_g=0.9V_{g\text{max}}$
- The motor capacity $0.9 V_{g\text{max}}$ gives $n=n_{\text{max}} \times 0.8333 = 4000 \times 0.8333 = 3333.2\text{r/min}$

Variable displacement motor D6V

28~250 Unit Dimensions Series 2 size 28~250



Unit Dimensions Series 2 size 28~250



Size	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21
28	249	230	206	189	107	75	16	25	8	15	19	43	M16x1.5	50.8	20	100	M8	21.5	33	50	57
55	312	291	264	249	123	108	20	32	10	7	28	35	M18x1.5	50.8	20	125	M12	25	40	63	52
80	368	345	316	297	152	137	23	32	10	7	28	40	M18x1.5	57.2	25	140	M12	30	46	71	59
107	378	356	326	301	145	130	25	40	10	7.5	28	45	M18x1.5	57.2	25	160	M12	35	49	80	63
160	440	412	377	354	213	156	28	40	11.5	7.5	36	50	M22x1.5	66.7	32	180	M16	40	57	88	66
225	468	441	405	375	222	162	32	50	12	11.2	36	55	M22x1.5	66.7	32	200	M16	45.2	61	96	74
250	505	411	472	354	120	134	25	50	12	-	36	82	M22x1.5	66.7	32	224	M16	50	51.8	100	150

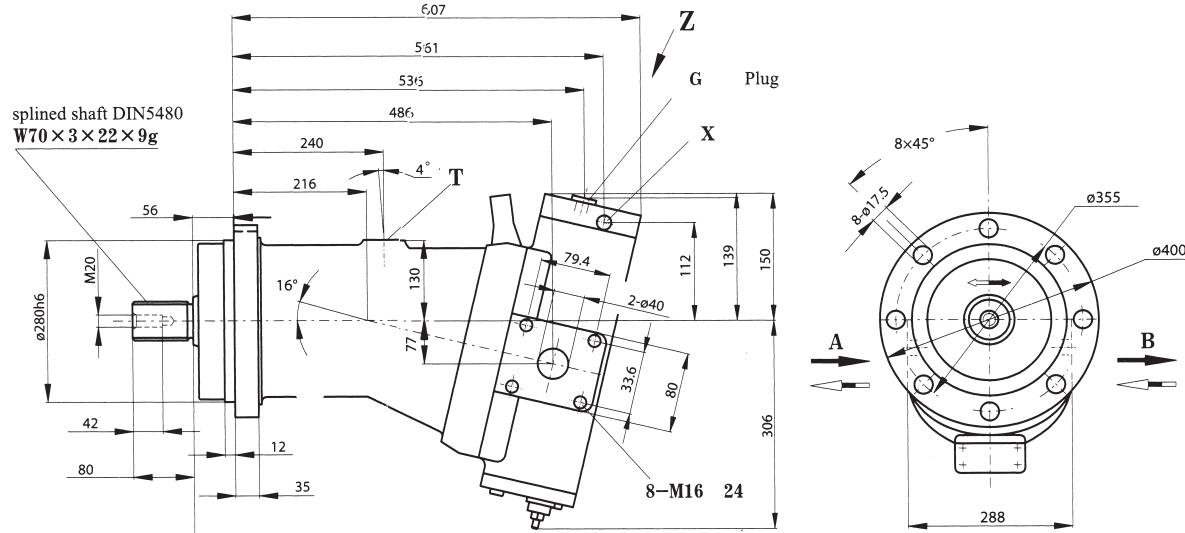
Size	A22	A23	A24	A25	A26	A27Deep	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	A14	
28	64	81	23.8	45	110	M10	17	125	118	11	116	27.9	25	50	230	152	175	124	131	139	M27x2
55	60	84	23.8	53	132	M10	17	160	150	13.5	142	33	30	60	301	208	235	133	141	153	M33x2
80	68	99	27.8	64	150	M12	18	180	165	13.5	172	38	35	70	353	252	282	152	161	177	M42x2
107	71	107	27.8	64	162	M12	18	200	190	17.5	178	43	40	80	357	259	288	164	173	188	M42x2
160	77	108	31.8	70	182	M14	19	224	210	17.5	208	48.5	45	90	423	302.5	338	182.5	193	201	M48x2
225	85	121	31.8	70	199	M14	21	250	236	22	226	53.5	50	100	441	324	359	201	211	219	M48x2
250	179	211	31.8	95	296	M14	20	280	252	22	262	53.5	50	82	497	352	371	223	230	296	M48x2

Size	A42	A43	A44	A45	A46	A47	A48	A49	A50	A51	A52	A53	A54	A55	A56	A57	A58	A59	A60	A61	A62
28	230	164	119	204	266	212	53	131	253	212	209	53	73	-	144	269	102	-	-	-	-
55	301	223	129	213	334	274	48	124	317	272	268	49	70	77	146	329	111	301	208	224	138
80	353	267	148	240	282	326	56	137	371	326	322	56	77	83	152	381	115	353	252	268	157
107	357	269.5	160	254	394	333	61.5	144	380	336	332	59	81	88	152	390	115	357	257	273	169
160	423	313	177	265	452	386	70	139	442	387	383	65	86	94	158	441	130	423	300	312	187
225	441	334	196	284	481	414	74.5	147	471	416	411	73	95	-	158	470	135	441	322	334	206
250	497	314	253	391	514	389	158	260	484	392	380	158	167	172	-	510	250	497	352	371	223

Size	A63	A64	A65	C1	C2	C3	GB1096-79 Parallel keyed		DIN5480 splined shaft		GB3487.1~83 splined shaft		G	X	(kg)	
							8x40	W25x1.25x18x9g	EXT18Zx1.25Mx30Rx5f	16°	M12x1.5	M14x1.5				
28	-	-	-	1.2	12	0.8										
55	130	155	30	1.5	16	1.5	8x50	W30x2x14x9g	EXT14Zx2Mx30Rx5f	16°	M14x1.5	M14x1.5			27	
80	149	177	33	1.5	16	1.6	10x56	W35x2x16x9g	vEXT16Zx2Mx30Rx5f	16°	M14x1.5	M14x1.5			39	
107	161	188	33	2	20	1.6	12x63	W40x2x18x9g	EXT18Zx2Mx30Rx5f	16°	M14x1.5	M14x1.5			52	
160	178	206	34	2.5	20	2.5	14x70	W45x2x21x9g	EXT21Zx2Mx30Rx5f	16°	M14x1.5	M14x1.5			74	
225	197	225	34	4	25	2.5	14x80	W50x2x24x9g	EXT24Zx2Mx30Rx5f	16°	M12x1.5	M14x1.5			103	
250	230	296	-	4	25	2.5	14x80	W50x2x24x9g	EXT24Zx2Mx30Rx5f	13.5°	M12x1.5	M14x1.5			103	

D6V Variable displacement motor**Unit Dimensions Series 1 size 468 weight 223Kg**

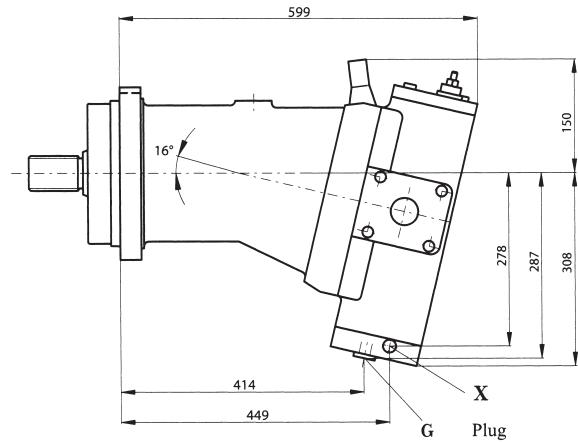
HD control Assembly 2



Z direction



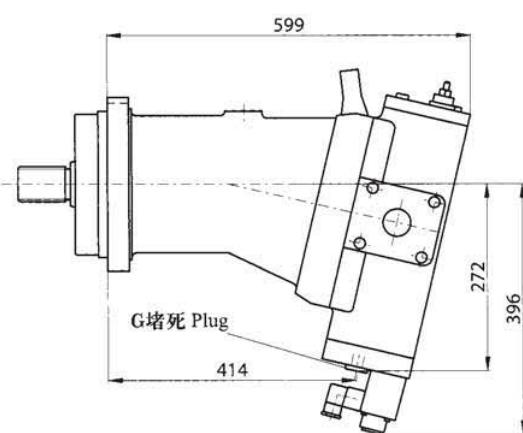
HD Control Assembly 1



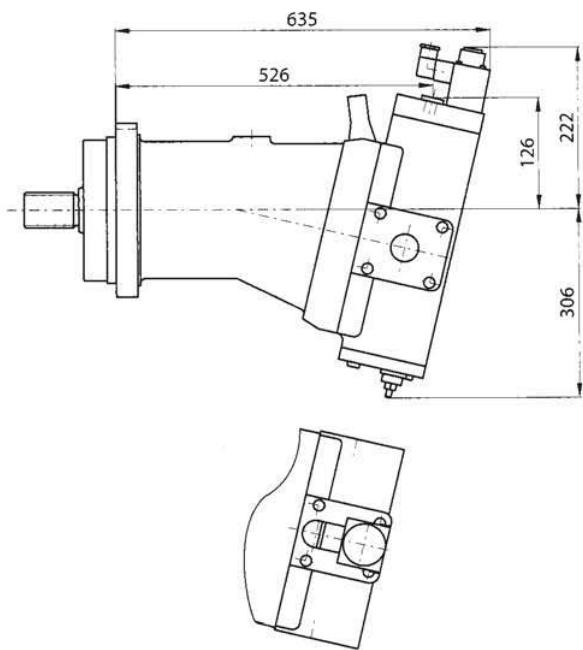
A,B	Pressure Port
G	port for synchronous control of multiple units and for remote control pressure M22×1.5
X	Pilot Pressure Port M16×1.5
T	Drain Port M33×1.5

Unit Dimensions Series 1 size 468 weight 223 Kg

EL Control Assembly 1



EL Control Assembly 2



HA Control Assembly 1

