HA6V Series Variable Displacement Motor

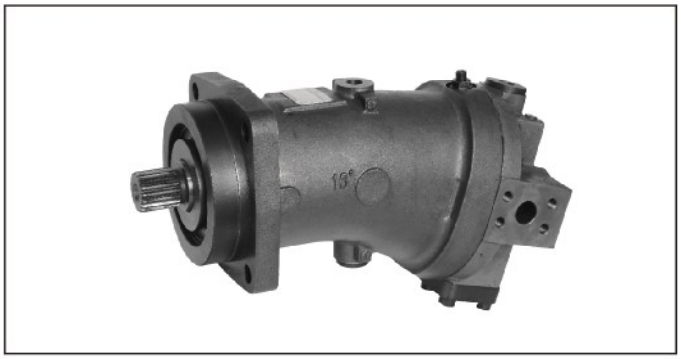
Product show and brief introduction

For open and closed circuits

Axial tapered piston,bent axis design

Size 80、107、160

Peak pressure:up to 35MPa

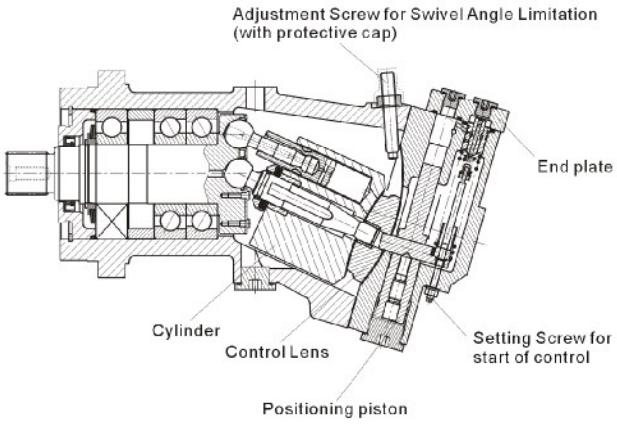


Contents

Features

- Large control range with hydraulic transmissions.
- Secondary control regulation with various control devices.
- Increased maximum output.speeds at reduces swivel angle.
- Cost-saving due to be possibility of using smaller pumps.
- Obviates the multispeed ratio gear drives.
- High power density.
- Optional mounting position.
- High efficient.
- Excellent starting characteristics.
- Low inertia.

Cutaway View



Model Code

HA6V	80	HA2	F	Z	2	039	B

Motor Type

Variable displacement motor	HA6V

Size

Displacement(V_{gmin}-V_{gmax}) 23-80mL/r	80
30.8-107mL/r	107
46-160mL/r	160

Control Device

Hydraulic control, pilot pressure related	Pilot pressure increase△p=1MPa		HD1
	With pressure control△p=1MPa		HD1D
	Pilot pressure increase△p=2.5MPa		HD2
	With pressure control△p=2.5MPa		HD2D
Automatic control, high pressure related	Constant pressure	Without override	HA1
		With override	HA1H
	Pressure increase △p=10MPa	Without override	HA2
		With override	HA2H

Pipe Connections

SAE flange,side	F
Metric threads,on side	G

Shaft End

Key parallel shaft GB 1096-79	P
Splined shaft DIN 5480	Z
Splined shaft GB 3478.1-83	S

Assembly type

For explanation see description of control device and unit dimensions	1
	2

Min.Swept Volume setting

Example: V_{gmin}=39mL/r	039

For crane products

With throttle and check valve	B

Operating Pressure Range

Pressure at port A or B

Nominal pressure ——— P_n=31.5 MPa

Peak pressure ——— P_{max}=35 MPa

The sum of the pressure at ports A and B should not exceed 63 Mpa. Individual pressure at either port max. 35MPa.

Leakage oil pressure:

maximum permissible leakage oil pressure(at port T)

P_{abs} ——— 0.2 MPa

Fluid Temperature Range

t_{min} ——— -25℃

t_{max} ——— +80℃

Viscosity Range

v_{min} ——— 10mm²/s

v_{max} ——— (for short periods) 1000mm²/s

Optimum Operating Viscosity

V_{opt} = 16…36mm²/s

Fluid Recommendation

Operating recommended:

(Viscosity grade temperature to DIN51519)

30-40℃	VG22=22mm²/s	at40℃
40-50℃	VG32=32mm2/s	at40℃
50-60℃	VG46=46mm2/s	at40℃
60-70℃	VG68=68mm2/s	at40℃
70-80℃	VG100=100mm2/s	at40℃

Filtration of Hydraulic fluid

Recommended filtration 10 μ m. Coarser filtration of 25 to 40 μ m is possible, however longer service life is achieved with fitration of 10 μ m. (reduced wear)

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 swpet 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 data table for max. permissible speeda.

Calculation of size

Swept volume $q_v = \frac{V_g \cdot n \cdot \eta_v}{1000}$ [L/min]

Output Speed $N = \frac{Q \cdot 1000 \cdot \eta v}{V_g}$ [r/min]

Output Torque $M = \frac{V_g \cdot \triangle p \cdot \eta_{mh}}{2\pi}$ [Nm]

$= \frac{1.59 V_g \cdot \triangle p \cdot \eta_{mh}}{10}$ Or $M = \frac{K_M \cdot \triangle P \cdot \eta_{mh}}{10}$ [Nm]

Output Power $P = \frac{M \cdot n}{9549} = \frac{Q \cdot \triangle p}{60} \cdot \eta_t$ [kW]

V_g = max geometry displacement [mL/r]

M = torque [Nm]

$\triangle P$ = differential pressure [MPa]

n = speed [rpm]

η_v = volumtric effciency

η_{mh} = mechanical-hydraulic effciency

η_t = overall effciency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Technical Data

Size			80	107	160
Control Device					
HD hydraulic control pilot pressure related			●	●	●
HD1D hydraulic control pilot pressure related				●	
HA automatic control, high pressure related			●	●	●
Displacement	$V_{g\,max}$	mL/r	80	107	160
	$V_{g\,min}$	mL/r	23	30.8	46
Max. permissible. swept volome	$Q_{g\,max}$	L/min	268	321	424
Max. speeds (at Q_{gmax})	n_{max} at V_{gmax}	r/min	3350	3000	2650
	n_{max} at $V_g < V_{gmax}$	r/min	4500	4000	3500
Torque constants	M_x at V_{gmax}	Nm/MPa	12.75	16.97	25.41
	M_x at V_{gmin}	Nm/MPa	3.73	4.9	7.35
Max. torque (at $\triangle$P=35 MPa)	M_{max} at V_{gmax}	Nm	446	594	889
	M_{max} at V_{gmin}	Nm	130	171	257
Max. output power	at 35MPa and Q_{max}	kW	156	187	247
Moment		Kgm^2	0.0109	0.0167	0.0322
Weight		kg	39	52	74

HD Hydraulic Control, Pilot Pressure Related

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

Standard model: assembly type 2

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

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

For assembly type 1,the control function is reversed:

Strat of control at V_{gmin},end of control at V_{gmax}。

Setting of Regulator

Two options are available:

1.HD1-Pilot pressure increase ($V_{gmax} \rightarrow V_{gmin}$)-△Ps=1MPa,

Start of control adjustable-from 0.2-2MPa

Standard setting: start of control at 0.3MPa(end of control at 1.3 MPa)

2.HD2-Pilot pressure increase ($V_{gmax} \rightarrow V_{gmin}$)-△Ps=2.5MPa ,

Start of control adjustable-from 0.5-5MPa

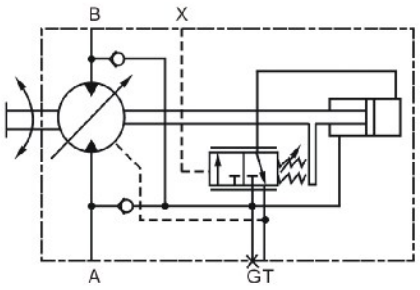
Standard setting: start of control at 1MPa(end of control at 3.5 MPa)

When using the HD control as a two-point control a max.pilot pressure of 7.5MPa is permissble.

The max oil flow at pilot X is approx 0.5L/min.

Should the available operating pressure be＜1.5MPa then an auxiliary pressure of 1.5MPa must be applied at port G.

HD1, HD2



HD1D Constant pressure control

The constant pressure control is superimposed on the HD function.

Should system pressure rise as a result of the load torque or reduction of the motor swivel angle,When the setting swivelled out to a higher angle.

As a result of the increased diaplacement and consequent pressure reduction,the control debiation is eliminated.

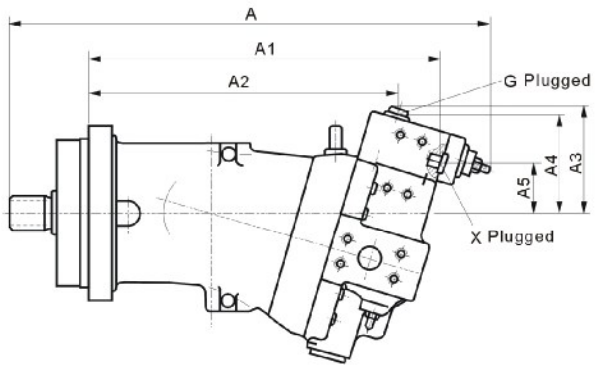
By increaseing the displacement the motor produces a higher torque at a constant pressure.

Throw a pressure signal at port G2 will recelve the second consatant setting pressure.

(For example rise and drop),the between 2 and 5MPa.

Setting range of constant pressure control valve:8-40MPa.

HD1, HD2



HA Automatic Control,High Pressure Related

Automatic,control of motor capacity dependent on operating pressure.

standard model: assembly type 1

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

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

This control device measures the internal operating pressure at port A or B(no pilot line required),

and when the set operating pressure is reached,swivels the motor from min.capacity(V_{gmin}) to max.capacity(V_{gmax}).

Start of control is adjustable between 8 MPa and 35MPa.

Two options are available:

1.HA1-Within the control range,the operating pressure is held practically constant.△P=1MPa Pressure increase between V_{gmin} and V_{gmax} is approx 1MPa.

2.HA2-Within the control range,with pressure increase.△P=10MPa from V_{gmin}(7°) to V_{gmax}(25°).

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

Example:

Regulator setting:30MPa.

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

Pilot pressur（at X）: 1MPa start of control at 14MPa.

（30MPa-10×1.6MPa=14MPa)

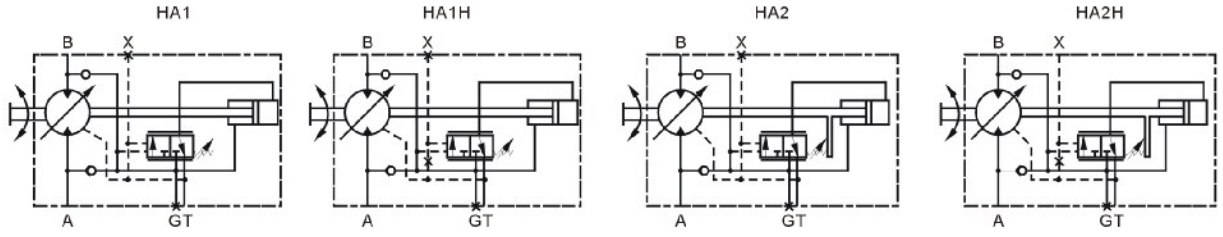
Two options are available for HA control with override

1、HA1H-With in the control range,the operating pressure is held,practically constant,△P=1MPa,

2、HA2H-With in the control range,the operating pressure in crease,△P=10MPa.

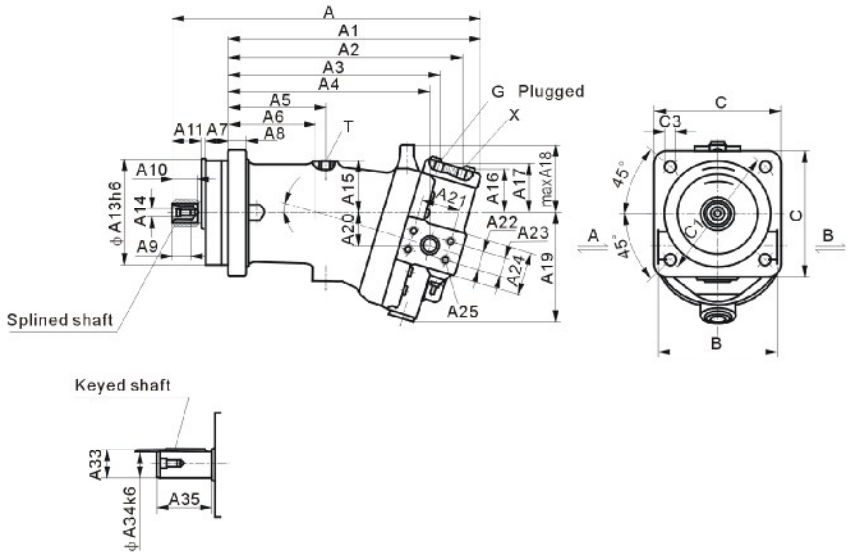
If override is only required to set max.capacity(swivelling the motor to V_{gmax}),a pilot pressure of up to 5MPa max is permissible.

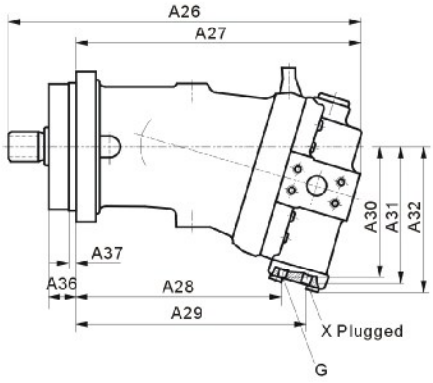
The max oil flow at X is approx 0.5L/min.



Installation dimensions

Size 80，107，160
HD Control
Assembly type 2





A,B: service port
G: port for synchronous control of multiple units and for remote control pressure
X: pilot pressure
T: case drain

Size	A	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}	A_{16}	A_{17}	A_{18}	A_{19}	A_{20}	A_{21}	A_{22}	A_{23}	A_{24}	A_{25}	Deep	A_{26}	A_{27}	A_{28}
80	440	368	345	316	297	152	137	32	23	28	33	40	M18×1.5	140	M12	71	59	68	99	150	46	57.2	25	27.8	64	M12	18	425	353	252
107	463	378	356	326	301	145	130	40	25	28	37.5	45	M18×1.5	160	M12	80	63	71	104	162	49	57.2	25	27.8	64	M12	18	442	357	259
160	530	440	412	377	354	213	156	40	28	36	42.5	50	M22×1.5	180	M16	88	66	77	108	182	57	66.7	32	31.8	70	M14	19	513	423	302.5

Size	A_{29}	A_{33}	A_{31}	A_{32}	A_{33}	A_{34}	A_{35}	A_{36}	A_{37}	B	B_1	C	C_1	C_2	C_3	Keyed GB1096-79	Splined DIN 5480	Splined GB3478.1-83	G	X
80	282	152	161	177	38	35	70	29.5	10	172	M42×2	165	180	16	13.5	Key 10×56	W35×2×16×9g	EXT16Z×2m×30R×5f	M14×1.5	M14×1.5
107	288	164	173	186	43.1	40	80	35	10	176	M42×2	190	200	20	17.5	key 12×63	W40×2×18×9g	EXT18Z×2m×30R×5f	M14×1.5	M14×1.5
160	338	182.5	193	201	48.5	45	90	36.5	11.5	208	M48×2	210	224	20	17.5	key 14×70	W45×2×21×9g	EXT21Z×2m×30R×5f	M14×1.5	M14×1.5