A6VG Series Variable Displacement Motor

Product show and brief introduction

说明：
弯轴结构的轴向柱塞变量马达，可用于开式和闭式液压传动回路。

这种马达适合于行走机械及工业中应用。
控制范围宽的变量马达能满足高转速和大扭矩的要求。
流量在 V_{gmax}/V_{gmin}=4.85 范围内无级可调，最大排量达 125ml/r。

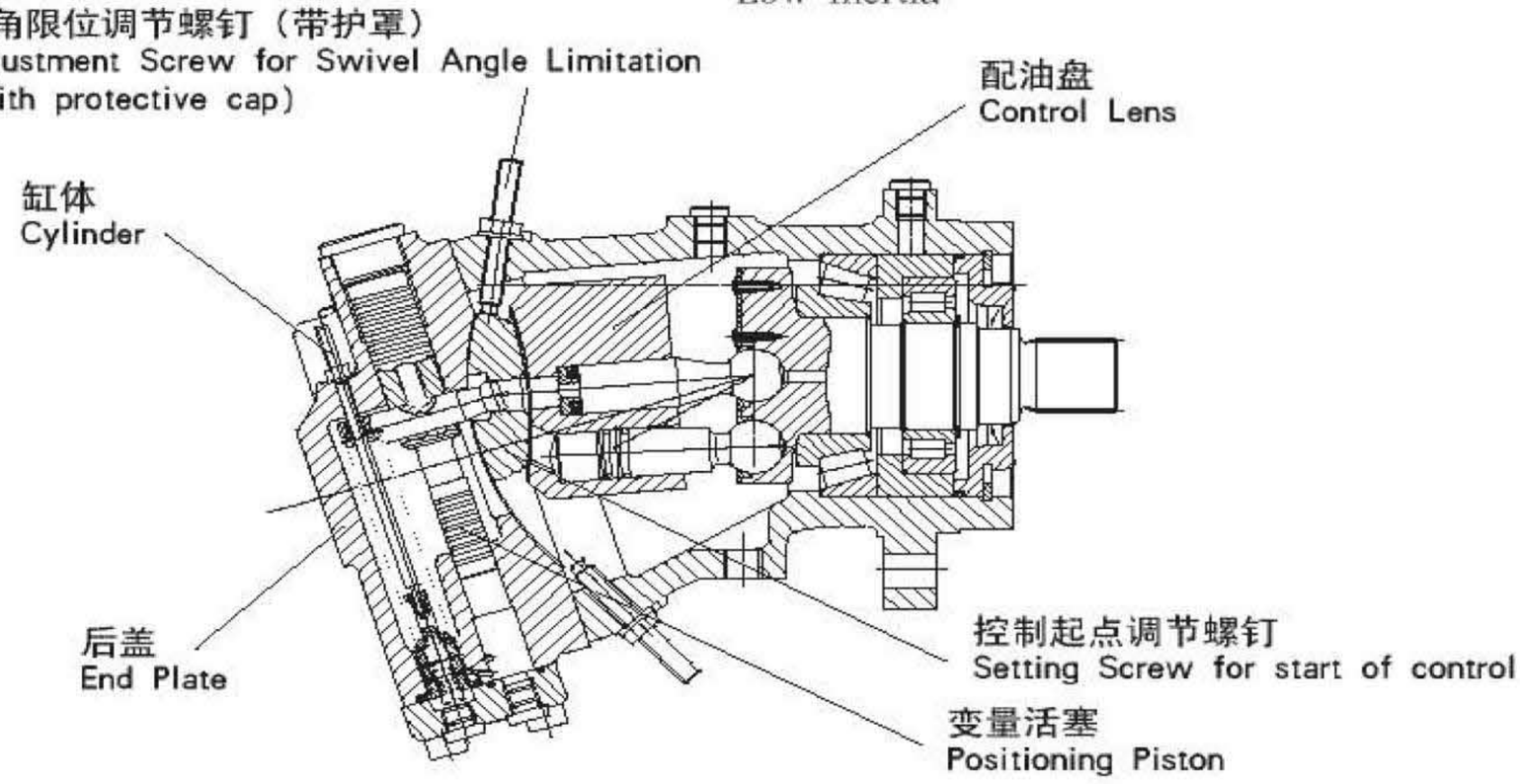
输出转速与流量成正比而与排量成反比。输出扭矩随马达上高低压侧压降的加大而增大，并随排量的增大而加大。

特点：
——用于液压驱动的宽控制范围
——多种多样的控制及调节装置
——由于省去齿轮箱并可用较小的泵而节省费用
——紧凑的、牢固的长寿命轴承系统
——与原型产品相比，轴向尺寸缩短了
——最大、最小摆角均为可调式设计
——单位功率小
——良好的启动特性
——惯量小

Description
Variable displacement motor with axial piston rotary group of bent axis design, for hydrostatic drives in open and closed circuits.
The motor is suitable for both mobile and industrial applications.
The wide control range of the variable displacement motor allows it to meet the requirements of high speed and high torque.
The flow is infinitely variable in the range V_{gmax}/V_{gmin}=4.85, the max. displacement is 125ml/r.
Output speed is proportional to flow and inversely proportional to displacement. The output torque increases with the pressure drop between the high and low pressure sides and with increasing displacement.

Special Features:
Wide control range for hydrostatic drives
Various control and regulating devices
Cost saving through elimination of gearbox and possibility of using smaller motors
Compact, robust bearing system with long service life
20% Comparing with antetype product, the measure of axes' direction has shortened 20%
The max. and the min. displacement are variable design
Low unit power
Good starting characteristics
Low inertia

剖视图：Section



A6V	G	107	HA1	6	F	Z	2	21.8

马达型号 Motor Type

变量马达 Variable displacement motor — A6V

改进型 Ameliorate — G

规格 Size

21.8-107ml/r — 107

21.8-125ml/r — 125

变量方式 Control Device

高压自动变量 Automatic control, high pressure related	恒压	Constant pressure	
	不带超调	Without override	HA1
	带超调	With override	HA1H
	升压	Pressure increase △p=10MPa	
	不带超调	Without override	HA2
	带超调	With override	HA2H
液控变量 Hydraulic control, high pressure related	控制压差	△p=1MPa Pilot pressure Increase	HD1
	控制压差	△p=2.5MPa Pilot pressure Increase	HD2
	控制压差	△p=1MPa Pilot pressure Increase	HD1D
手动变量		Manual control (with handwheel)	MA

装配型式 Assembly Type

解释见变量说明及元件尺寸 For explanation see description of control device and unit dimensions

轴伸 Shaft End

平键 GB 1096-79	Keyed parallel shaft	P
花键 DIN 5480	Splined shaft	Z
花键 GB 3478.1-83	Splined shaft	S

油口连接 Pipe Connections

SAE法兰，侧面	SAE flange, on side	F
螺纹连接，侧面	Metric threads, on side	G

结构型式 Series

结构6，规格107 — Series 1, sizes 107

最小排量设定值 Min. Swept Volume Setting

例： Example：

V_{gmin}=21.8ml/r — 21.8

订货示例： A6VG.107HA1.6.F.Z.2.21.8

斜轴变量马达A6VG，规格107，液控变量，△p=1MPa，结构2，侧面SAE法兰连接，德标花键，第2种装配型式，最小排量 V_{gmin}=21.8ml/r

Ordering Example A6VG.107HA1.6.F.Z.2.21.8

Axial piston variable displacement motor A6VG, size 107, with hydraulic control, pilot pressure related, △p=1MPa, series 2, SAE flange connections on side, splined shaft, assembly type 2, min. swept volume setting V_{gmin}=21.8ml/r

技术参数 Technical Data

工作压力范围：Operating Pressure Range

A 或 B 口压力：Pressure at port A or B

额定压力 Nominal pressure _____ p_n=35MPa

最高压力 Peak pressure _____ p_{max}=40MPa

A、B 油口压力总和不得超过 63MPa，每侧油口压力最高 40MPa。

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

泄油压力：Leakage oil Pressure：

允许 T 口最大泄油压力

Maximum permissible leakage oil pressure(at Port T)

P_{abs} _____ 0.2MPa

油温范围：Fluid Temperature Range

t_{min} _____ −25℃

t_{max} _____ +80℃

粘度范围：Viscosity Range:

v_{min} _____ 10mm²/s

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

最佳工作粘度:Optimum Operating Viscosity:

v_{opt} _____ 16…25mm²/s

油液选择：Fluid Recommendation

工作温度 Operating temperature range	推荐粘度等级符合 DIN51519 Recommended Viscosity grade to DIN51519 ISO (VG)	
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℃

液压油的过滤：

推荐过滤精度为 10μm。亦可使用 25−40μm 的，但使用 10μm 可以延长使用寿命(降低磨损)。

Filtration of Hydraulic Fluid

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

转速范围：

最低转速没有限制，在要求十分均匀的转速时，n_{min} 不小于 50r/min

最高转速由来自泵的最大流量和变量马达的最小排量确定。最小排量则由一个调节螺钉限位，所以变量马达不会超速运转。

最高允许转速技术参数表

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.

规格计算： Calculation of size

流量 Swept Volume

$$Q=\frac{V_g\cdot n}{1000\cdot\eta_v} \quad [L/min]$$

输出转速 Output Speed

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

输出扭矩 Output Torque

$$M=\frac{V_g\cdot\triangle p\cdot\eta_{mh}}{2\pi}=\frac{1.59\times V_g\cdot\triangle p\cdot\eta_{mh}}{10} \quad [Nm]$$

或 or

$$M=\frac{K_M\cdot\triangle p\cdot\eta_{mh}}{10} \quad [Nm]$$

输出功率 Output Power

$$P=\frac{2\pi\cdot M\cdot n}{60000}=\frac{M\cdot n}{9549}=\frac{Q\cdot\triangle p}{60}\cdot\eta_t \quad [KW]$$

V_g= 最大排量(ml/r)	max geometry displacement[ml/r]
M= 扭矩 (Nm)	torque[Nm]
$\triangle_p$= 压差 (MPa)	differential pressure[MPa]
n= 转速(r/min)	speed[r/min]
η_V= 容积效率	volumetric efficiency
η_{mh}= 机械效率	mechanical−hydraulic efficiency
η_t= 总效率	overall efficiency

技术参数表 Technical Data

规格	Size				
变量方式	Control Device			107	125
HD1D 液控变量	Hydraulic control, pilot pressure related			•	•
HA 高压自动变量	Automatic control,high pressure related			•	•
MA 手动变量	Manual control			•	•
排量	Displacement	V_{gmax}	ml/r	107	125
		V_{gmin}	ml/r	30.8	21.8
最大允许流量	Max.Permissible.Swept volome	Q_{gmax}	L/min	342	400
最高转速	Max.speeds	n_{max} 在 at V_{gmax}	r/min	3200	3200
	(在 at Q_{max} 下)	n_{max} 在 at $V_g<V_{gmax}$	r/min	4200	4200
扭矩常数	Torque constants	M_x 在 at V_{gmax}	Nm/MPa	1.70	1.70
		M_x 在 at V_{gmin}	Nm/MPa	0.35	0.34
最大扭矩	Max.torque	M_{max} 在 at V_{gmax}	Nm	594	696
	(在 at △p=35MPa)	M_{max} 在 at V_{gmin}	Nm	171	201
最大输出功率(在 35MPa 和 Q_{max} 下)Max.output	power(at 35MPa and Q_{max})		KW	187	199
惯性矩	Moment		kgm²	0.0127	0.0127
重量 Weight			kg	46.5	46.5

HD 液压控制

与液控压力有关

与液控压力有关的液压控制方式允许马达的排量随液控压力信号无级变化。控制功能与作用在油口 x 上的液控压力成正比。

HD Hydroulic Control.

Pilot Pressure Related

The pilot pressure related hydroulic control allows infinite variation of the motor displacement in relation toa poilot pressure signal.Thecontrol function is proportional to the pilot pressure applied at port X.

标准型

控制起点在 V_{gmax}(最大扭矩、最低转速)

控制起点在 V_{gmin}(最小扭矩、最高转速)

Standard model

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

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

控制的设定

HD1

液控压力提高 (V_{gmax}-V_{gmin})_____△Ps=1MPa

控制起点可调 0.2-2MPa 之间

标准设定值：控制起点为 0.3MPa (控制终点为 1.3MPa)

HD2

液控压力提高 (V_{gmax}-V_{gmin})_____△Ps=2.5MPa

控制起点可调 0.5-5MPa 之间

标准设定值：控制起点为 1MPa (控制终点为 3.5MPa)

定货时，请用文字注明所需的控制起点。

例如：控制起点为 0.3MPa

Control setting

HD1

Pilot pressure increace (V_{gmax}-V_{gmin})____△Ps=10MPa

Start of control,setting range between _____2 and 20MPa

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

HD2

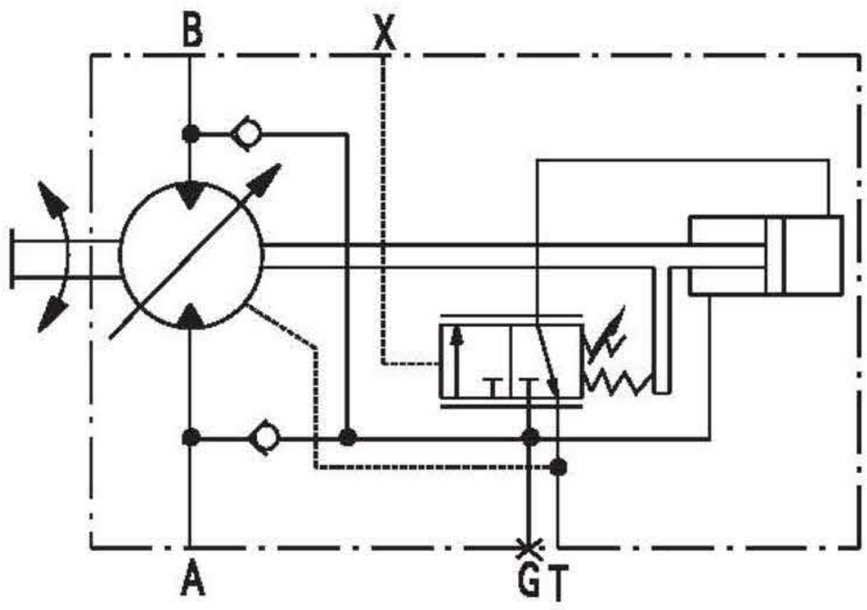
Pilot pressure increace (V_{gmax}-V_{gmin})___△Ps=25MPa

Start of control,setting range_____0.5 and 5MPa

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

When ordering please state required start of control in clear text,e.g.start of control at 0.3MPa.

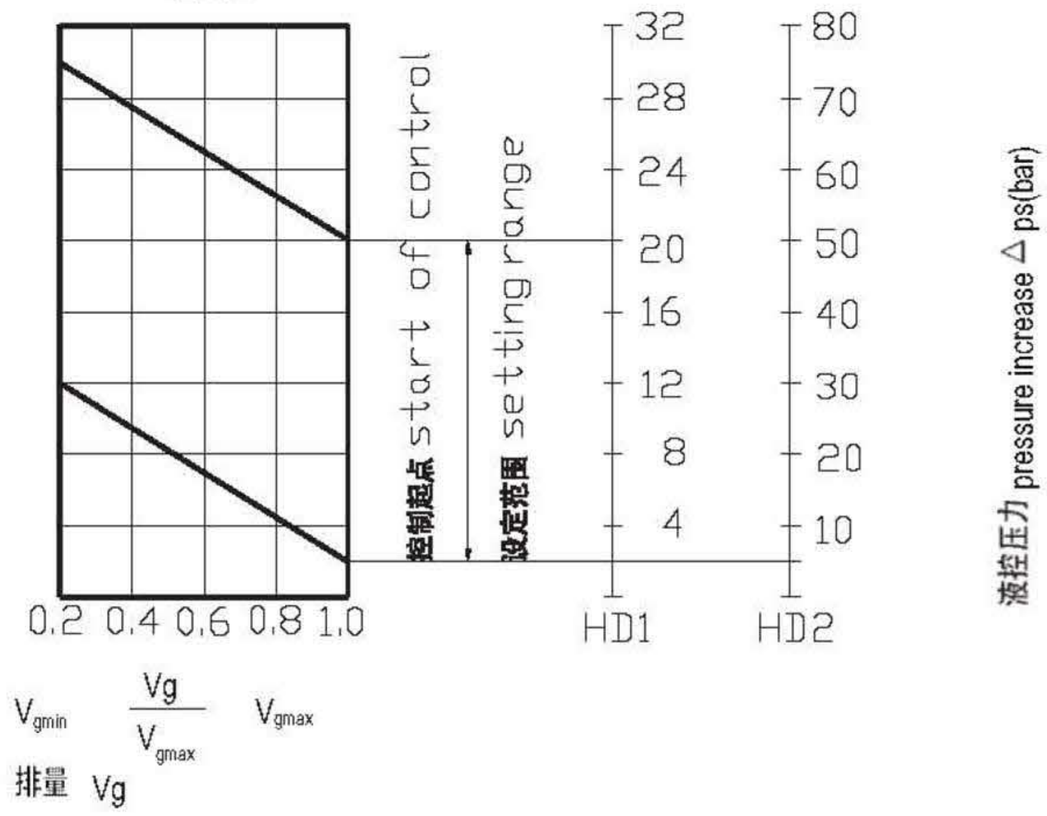
HD.液控变量（HD1，HD2）



所需的控制油来自高压侧，因此，必需最低的工作压力为1.5MPa。
假如需要在工作压力<1.5MPa进行控制 工作，需外加一台单向阀 ，使作用在油口G上升压压力最低值为1.5MPa。
最高允许的液控压力 _____10MPa。

The required control oil is taken from the high pressure side, for this, a minimum operating pressure of 1.5MPa is necessary. If it is necessary to operate the control at an operating pressure of <1.5 MPa,a boost pressure of min.1.5MPa must be applied at port G via an external check valve.
Max.perm.pilot pressure _____10MPa.

曲线图

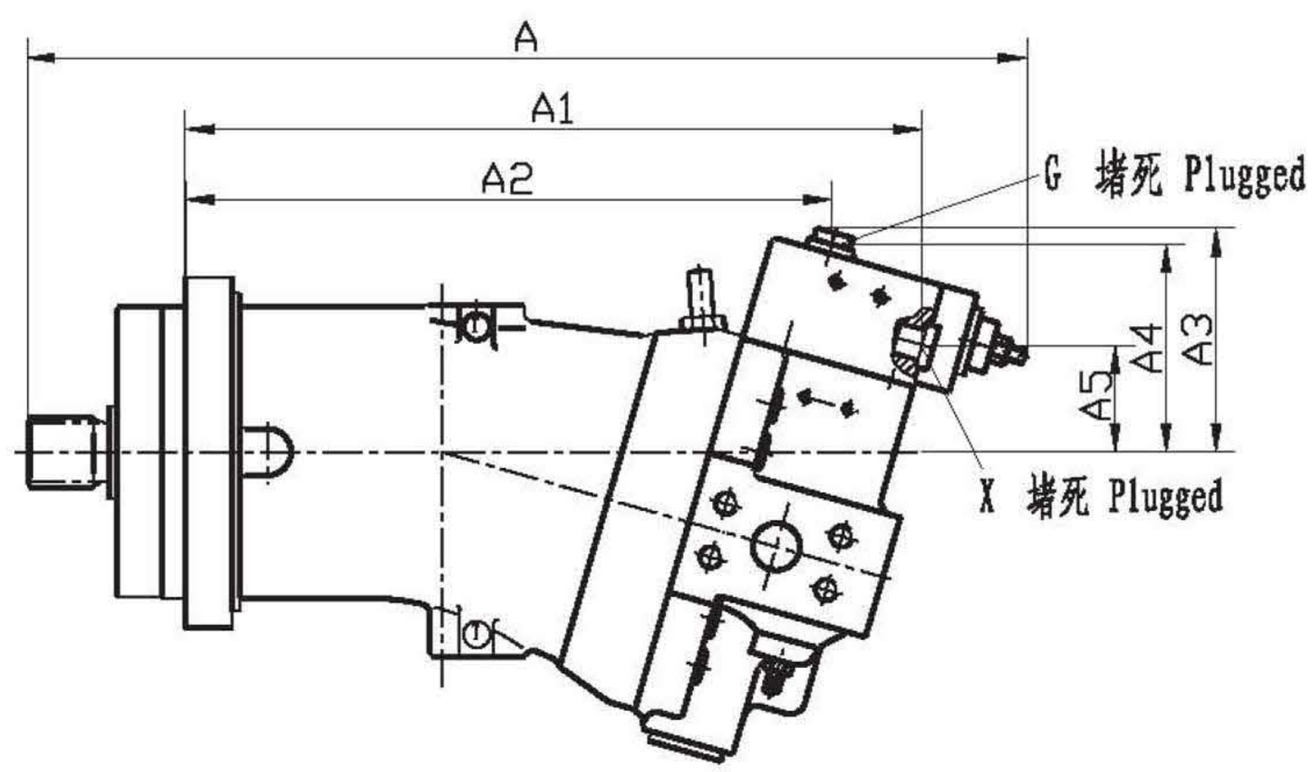


HD1D 液控恒压变量

恒压控制是在HD功能基础上增加的。
如果系统压力由于负载扭矩缘故或由于马达摆角减小而升高，则达到恒压控制的设定值时，马达摆出到较大的摆角。
由于增大排量和减小压力，控制偏差消失。
通过增大排量，马达在恒压下产生较大扭矩。
通过在油口G2处施加一压力信号可得到第二个恒压设定压力。
(如起身和下降)，该信号须在2-5MPa之间。
恒压控制阀的设定范围为8-40MPa.
标准型：按第二种装配型式供货。
控制起点在V_{gmax}(最大扭矩、最低转速)
控制起点在 V_{gmin}(最小扭矩、最高转速)

HD1D:Constant pressure control

The constant pressure control is superimposed on the HD function. Should system psressure 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 displacement 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 receive the second consstant setting pressure.
(for example rise and drop),the signal between 2 and 5MPa.
Setting range of constant pressure control valve:8-40MPa



HA 高压自动变量

按工作压力自动控制马达排量
标准结构：按第一种装配型式供货
控制起点在 V_{gmin}(最小扭矩、最高转速)
控制终点在 V_{gmax}(最大扭矩、最低转速)
此种变量方式，当 A 或 B 口的内部工作压力达到设定值时，马达由最小排量 V_{gmin} 向最大排量 V_{gmax} 转变。
控制起点在 8 至 35MPa 间转变。

Automatic Control,High Pressure Related,HA

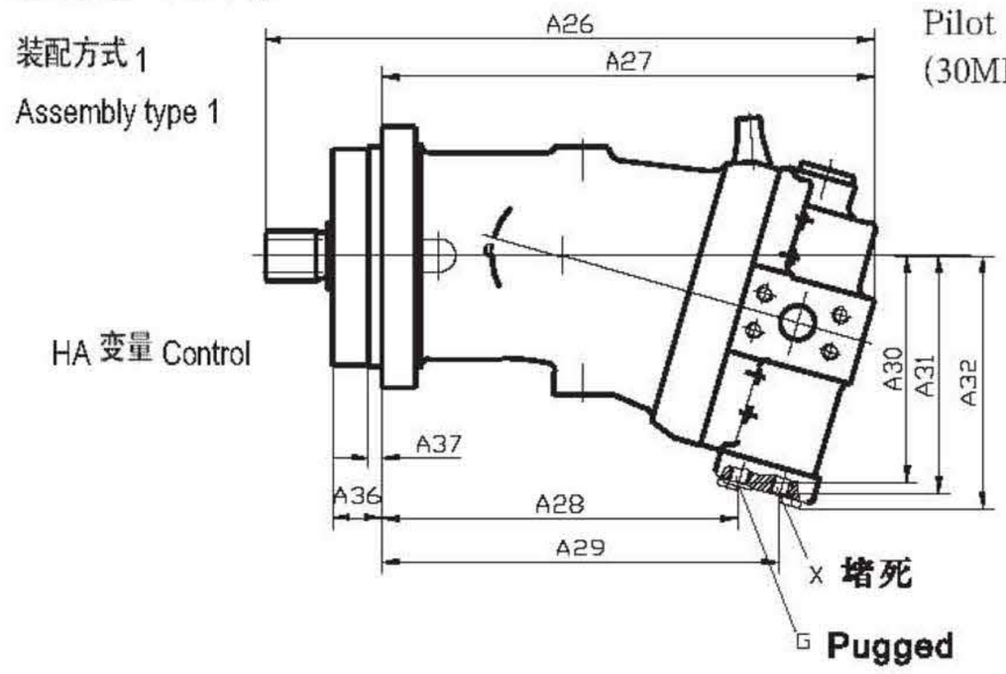
Automatic control of motor capacity dependent on operating pressure.
Assembly type 1
Start of control at V_{gmin}(min.torque,max speed)
End of control at V_{gmax}(max.torque,min speed)
This control device measuresthe internal operating pressure at port A or B(no pilot line required),and when the set operating pressure is reached,swivels the motor from min. 0capacity(V_{gmin}) to max. capacity(V_{gmax}).
Start of contro;is adjutable between 8MPa and 35MPa .

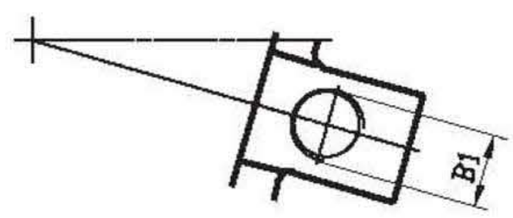
有两种方式供选用：

1.HA1 ……在控制范围内，工作压力保持恒定。△P=1MPa
从 V_{gmin} 变至 V_{gmax} 时，压力升高约为 1MPa。
2.HA2 ……在控制范围内，工作压力保持恒定。△P=10MPa
从 V_{gmin} 变至 V_{gmax} 时，压力升高约为 10MPa。
HA 变量可在 X 口进行外控（即带有超调），在这种情况下，变量机构的压力设定值（工作压力）按每 0.1MPa 先导（外控）压力下降 1.6MPa 的比率降低。
例如：
变量机构起始变量压力设定值为 30MPa
先导压力（X 口）：0MPa 时变量起点在 30MPa。
先导压力（X 口）：1MPa 时变量起点在 14MPa。
(30MPa-10 × 1.6MPa=14MPa)

Two options are available:

1.HA1 -- Within the control range,the operating pressure held practically constant.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} to V_{gmax}.
The HA control can be overridden at port X.In this case, set value of pressure at the regulator(operating pressure) is reduced 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
(30MPa-10 × 1.6MPa=14MPa)



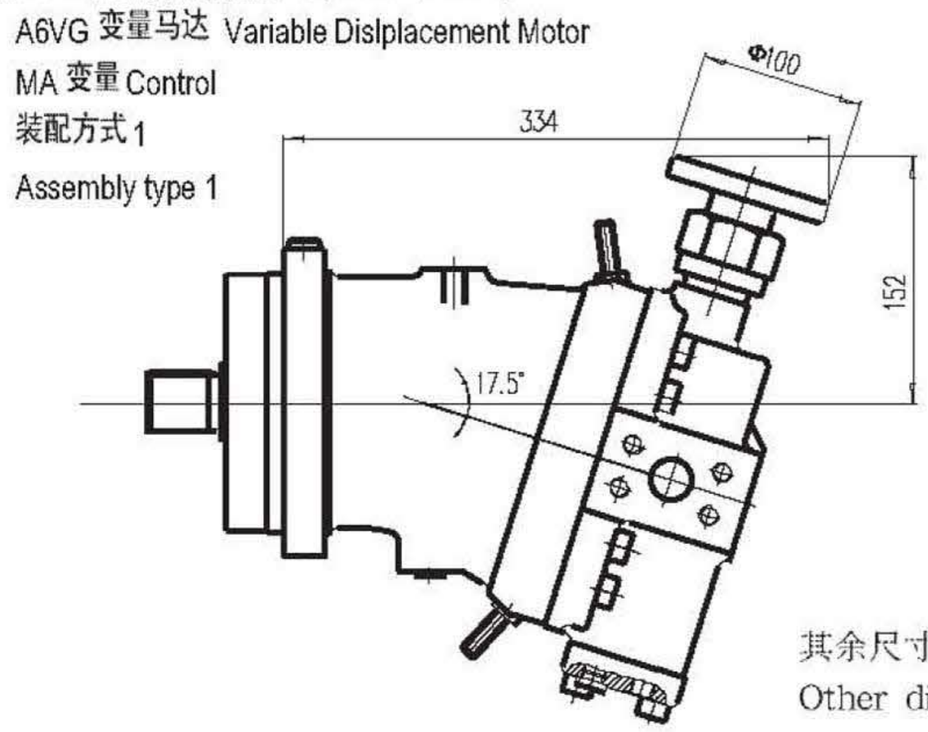


带有超调的 HA,变量有两种方法供选用：

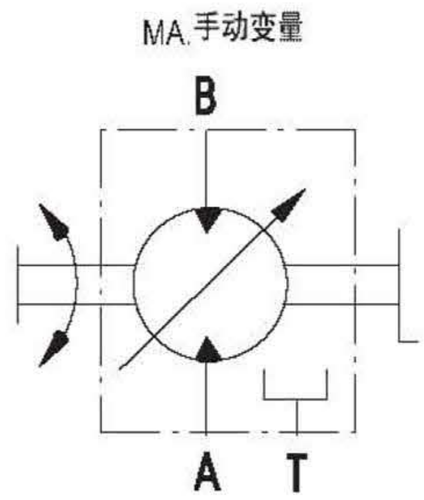
1.HA1H-- 在控制范围内，工作压力保持恒定，△P=1MPa。
2.HA2H-- 在控制范围内，工作压力保持恒定，△P=10MPa。
如果控制仅需要达到最大排量，则允许先导压力最高为 5MPa。
外控口 X 处的供油量：约 0.5L/min。

Two options are available for HA control with override.

1.HA1H-Within the control range.the operating pressure is held, practically constant.△P=1MPa
2.HA2H-Within the control range.the operating pressure is held, practically constant.△P=10MPa
If override is only required to set max.capacity(swivelling the motor toV_{gmax}),a pilot pressure of up to 5MPa max is permissible.
The max oil flow at piolt X is approx 0.5L/min



其余尺寸见 HD/HA
Other dimensions see HD/HA



MA 手动变量

通过手轮驱动螺杆以调节马达的排量。装配型式：第一种装配型式

MA,Manual Control

Adiustment of motor capacity dependent on the position of a threaded spindle-hand opoeration.
Assembly design 1

外形尺寸 Unit Dimensions

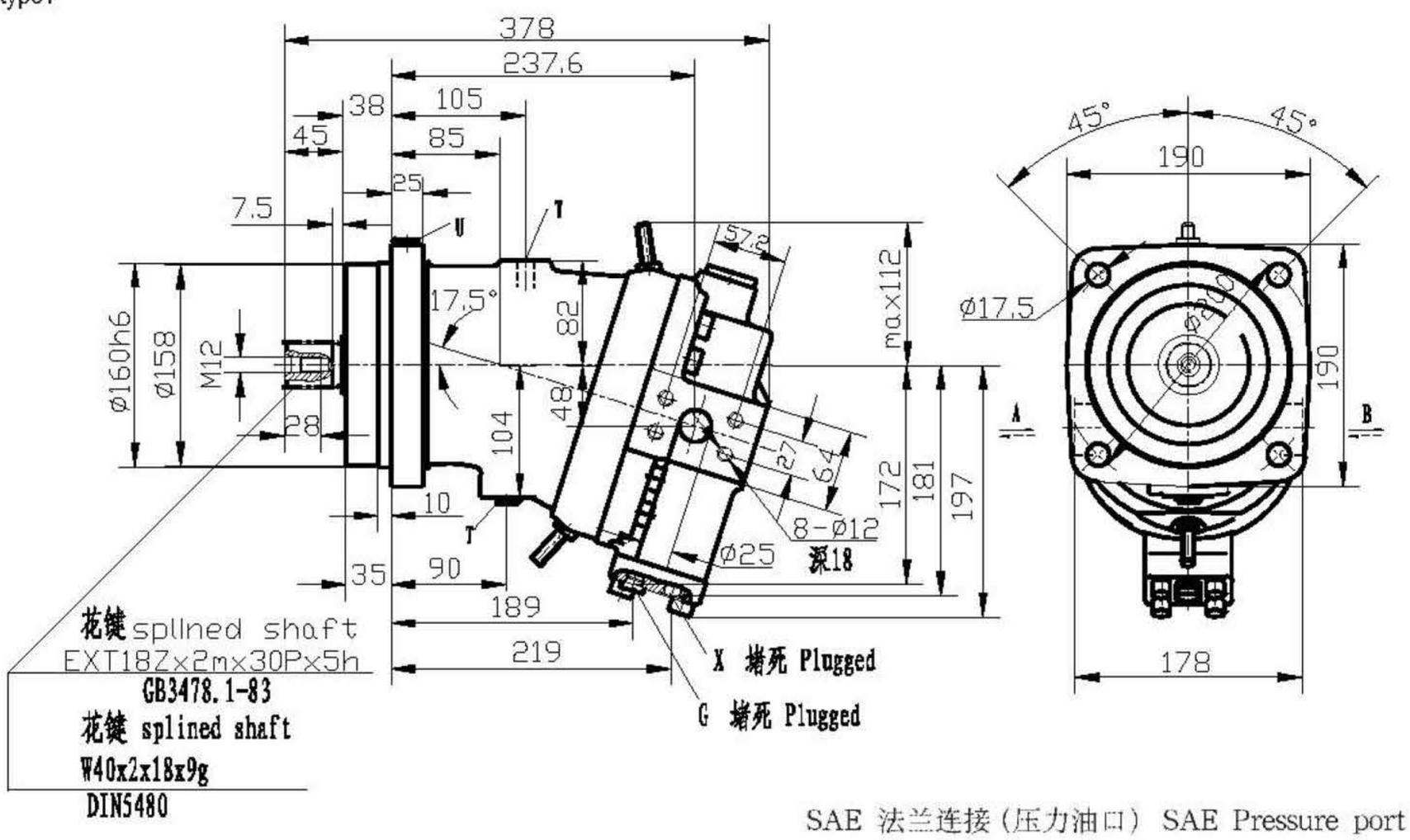
规格 Size 107、125

HA 高压自动变量 Control

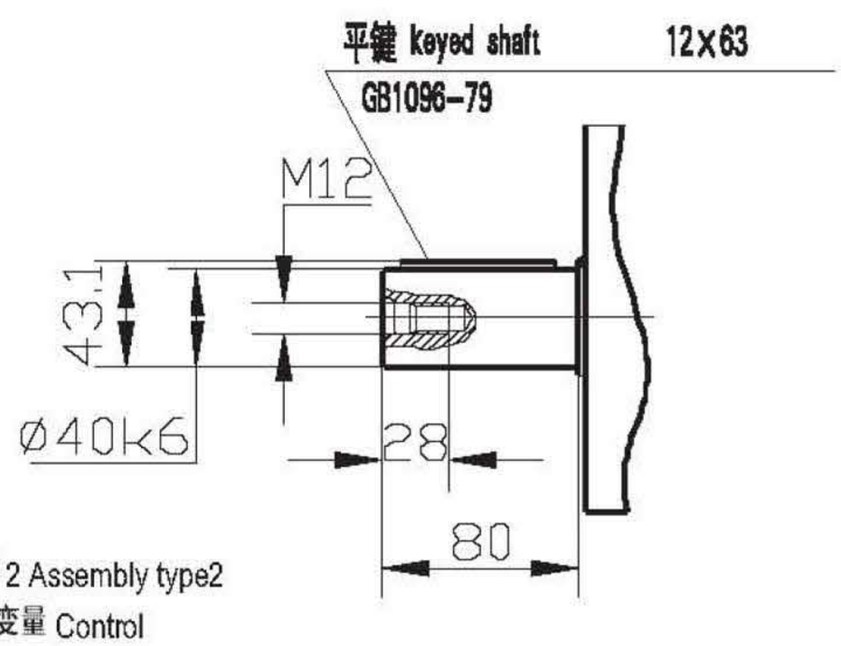
装配型式 1 Assembly type1

SAE 法兰连接（压力油口）

SAE pressure port



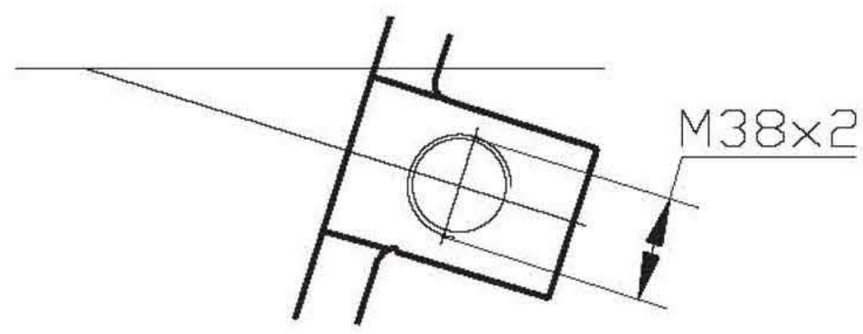
SAE 法兰连接（压力油口） SAE Pressure port



装配形式 2 Assembly type2

HD 液控变量 Control

螺纹连接（压力油口） Threaded pressure port



A,B，工作油口 service port

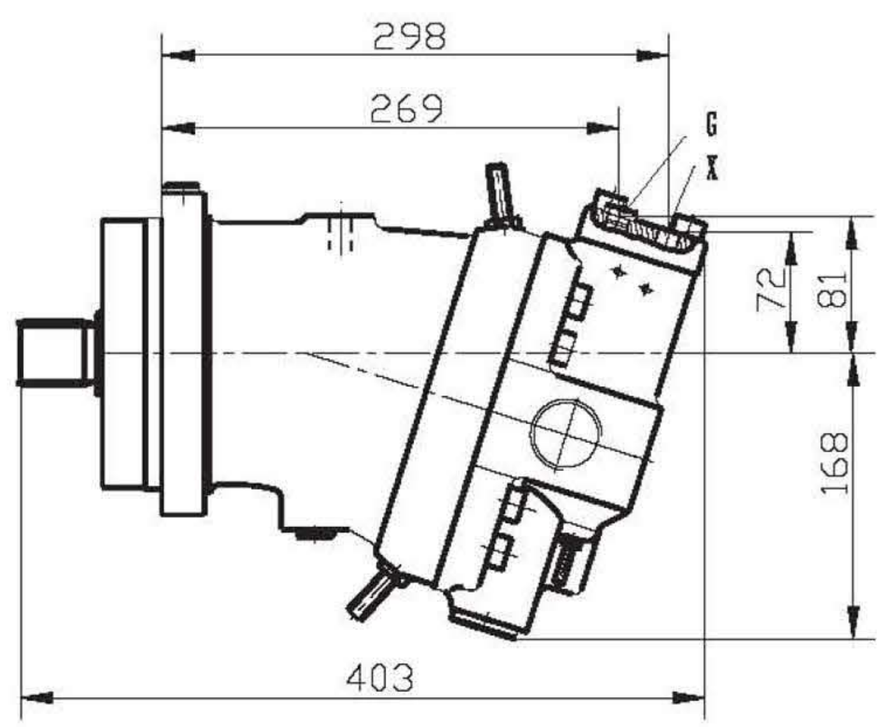
G 多元件同步 port for synchronous control

控制和遥控 of multiple units and for

压力油口 remote control pressure

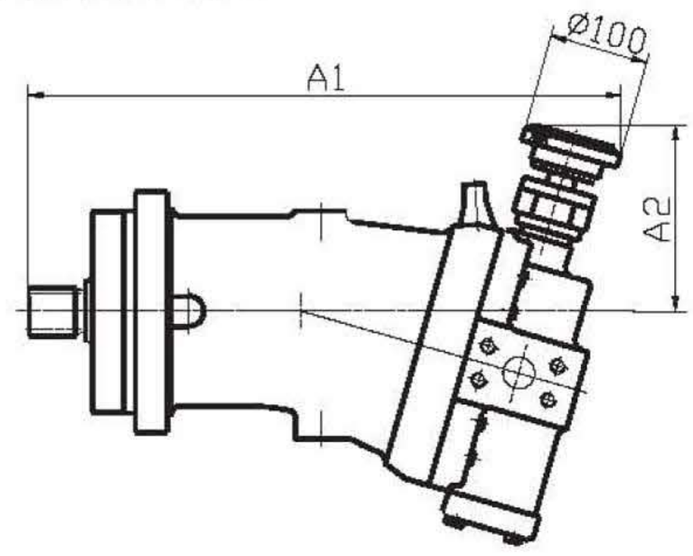
X 先导（外控）油口 Polot pressure

t 壳体、油口 case drain



MA 变量 Control

装配方式 1 Assembly type1



其余尺寸见 HD/HA Other dimensions see HD/HA