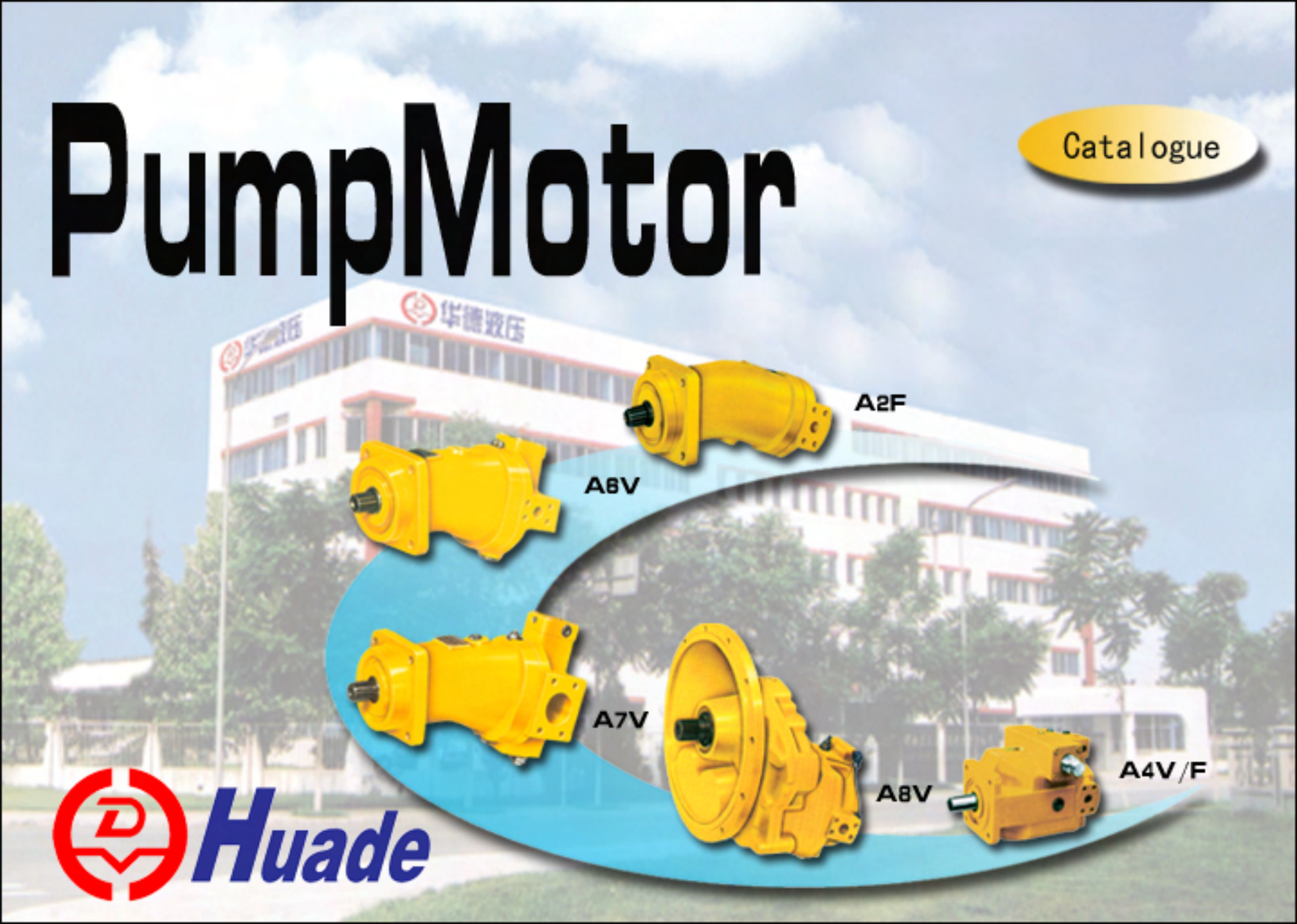
PumpMotor

Catalogue



Huade

华德液压
HUADE HYDRAULIC

A2F

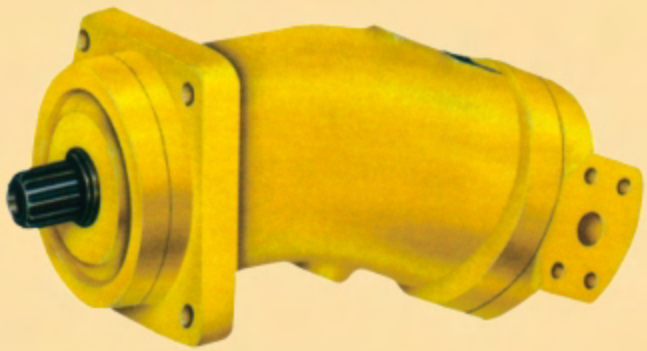
A6V A7V A8V A4V/F

选用手册 Selection Handbook

Axial Piston-
Bent Axis Design
Fixed Displacement
Pump/Motor

斜轴式轴向柱塞
定量泵/马达

For Open and Closed Circuits
用于开式和闭式系统



额定压力 Nominal Pressure PN=35 Mpa
规　　格 Sizes　　10–500

北京华德液压工业集团有限责任公司
BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP Co.,LTD.

目　录 CONTENTS

1 A2F 定量泵 / 马达 1
Fixed Displacement Pump/Motor A2F

2 A2FE 内藏式定量马达 7
Internal Installation Fixed Displacement Motor A2FE

3 A2FE 内藏式定量马达(6 系列) 11
Fixed Displacement Plug-In Motor A2FE

华德

注意事项

1.为了保证无故障的高效工作，在设计系统期间应根据工况仔细选择液压系统的液压油，所有矿物油基液压油均在某种程度上适用于轴向柱塞元件，它们的应用时基本划分取决于上述的水、粘度与温度关系，并考虑氧化和腐蚀保护、材料相容性、空气和水分离特性。

2.为了保证设备有长的使用寿命，必须进行良好而可靠的过滤。油液中的硬颗粒污染不得超过以下等级：

等级 9——按 NAS1638

等级 6——按 SAE

等级 18/15——按 ISO/DIS 4406

在油液温度很高时，最低清洁度为：

等级 8——按 NAS1638

等级 5——按 SAE

等级 17/14——按 ISO/DIS 4406

3.为了正确选择液压油，必须知道与环境温度有关的工作温度；在闭式回路中这是回路温度，在开式回路中这是油箱温度。

4.注意：漏油（壳体泄油）温度受压力和转速的影响，总是高于回路温度，然而要求回路中任何点温度不得超过 90℃。

如果由于极端的工作参数或较高的环境温度，而不能维持上述条件，订货时请询问我公司。

5.泵的进油口压力（绝对压力）处须≥ 0.08MPa，及泄油压力(壳体内允许的最高压力)为0.2MPa(绝对压力)，壳体内压力值必须等于或高于作用在轴密封上的外部压力值。

6.安装位置：一般要求液压泵／马达安装位置、壳体上边缘低于油箱最低液面。若安装需在油面以上，请在订货时提出。

《样本》所述技术资料，仅供参考。若有特殊要求请与我集团公司技术部门咨询，若有更改，恕不通知。

The technical information in the catalog is for your reference. Please consult our technical Dept., if you have any special requirements.

NOTES

1.In order to guarantee trouble-free and efficient operation, the hydraulic fluid in a hydrostatic system should be selected carefully according to the actual working conditions during the design of the system. All mineral oil based fluids are suitable to a greater or lesser degree for application in axial piston units. Their basic classification of application results from what has already been said due to the water , viscosity and temperature relationships, with consideration of oxidization and corrosion protection, material compatibility, air and water separation characteristics.

2.In order to guarantee a long service life for the installation, good and reliable filtration is necessary.The hard particle contamination of fluid may not exceed a level determined by:

Class 9 to NAS 1638

Class 6 to SAE

Class 18/15 to ISO/DIS 4406

When the fluid temperature is too high,the required minimum degree of cleanliness is:

Class 8 to NAS 1638

Class 5 to SAE

Class 17/14 to ISO/DIS 4406

3.In order to select the correct fluid,it is necessary to know the operating temperature in the circuit in relation to the ambient temperature-in an open circuit and the tank temperature.

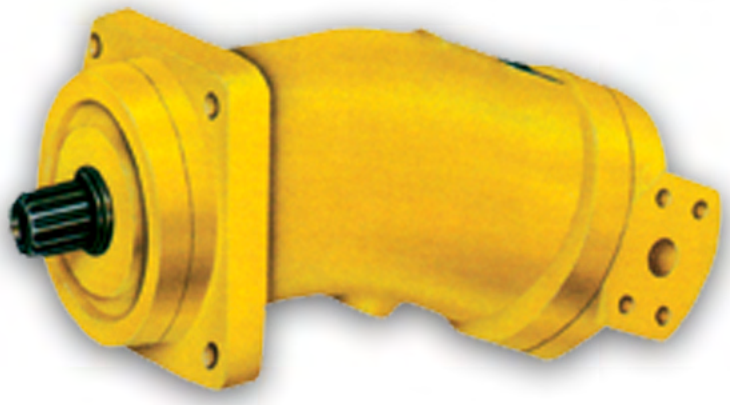
4.Important:The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the circuit temperature. However, at no point in the circuit may the temperature exceed 90℃。

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

5.The minimum pressure at the suction port of the pump ≥0.08 Mpa(absolute pressure), and the drain pressure (max. permissible casing pressure) is 0.2 MPa(absolute pressure). The pressure in the housing must be the same or greater than the external pressure on the shaft seal.

6.Installation position: in general, the upper point on the pump/motor housing must be below the minimum oil level of the tank. If you would like to install it above the minimum oil level, please indicate when order.

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A2F 定量泵／马达 Fixed Displacement Pump/Motor A2F 用于开式和闭式回路 For open and closed circuits 斜轴式轴向柱塞结构 axial tapered piston,bent axis design	RC90100/12.2004
	规格 Size 10–500	高压范围 Peak pressure 至 up to40MPa	替代：ReplaceRC90100/09.2003



说明：

- 弯轴结构的轴向柱塞元件，具有固定排量，在开式或闭式回路中用作静液传动的泵或马达。
- 当作为泵工作时，流量与驱动转速和排量成正比。
- 当作为马达工作时，输出转速与流量成正比而与排量成反比。输出扭矩随高压侧与低压侧之间的压差而加大。

Description：

Axial piston unit of bent axis design with fixed displacement, for use as either pump of motor in hydrostatic drivers, in open or closed circuit.
If operated as a pump, the flow is proportional to the drive speed and displacement.
If operated as a motor, the output speed is proportional to the swept volume and inversely proportional to displacement. The output torque increases with the pressure drop between the high and low pressure sides.

特点：

- 带有久经考验的球面配流盘的高性能旋转组件有自动对中、圆周速度低、效率高的优点。
- 耐用的球轴承和滚子轴承促进长工作寿命。
- 驱动轴能承受径向载荷。
- ISO 安装法兰，从规格 55 起定量泵／马达和变量马达一致。
- 可使用抗燃液压油。
- 噪声低。

Special Features：

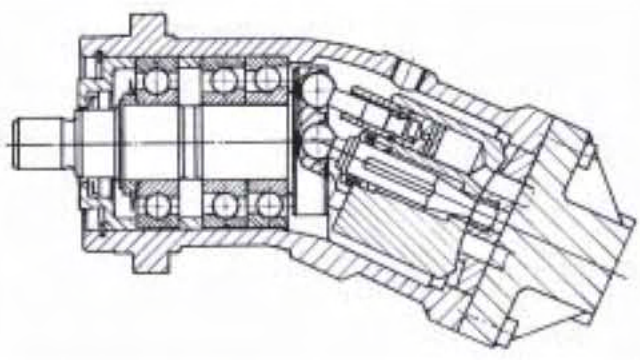
High performance rotary group with well-proven spherical control area with the advantages: self-centering low peripheral speed, high efficiency.
Robust rolling bearings endure long service life.
Drive shaft capable of adopting radial loading.
ISO mounting flange, uniform for fixed displacement Pumps/motors and variable motors from size 55
May be used in conjunction with fire-resistant fluids.
Low noises generation.

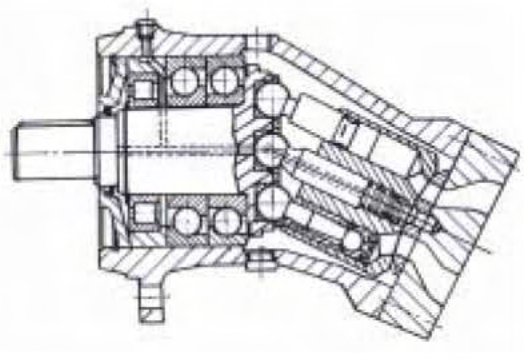
剖视图：

结构 1–4，规格 10–160

Section：

Series 5,Sizes 200–500





A2F定量泵／马达 Fixed Displacement Pump/Motor A2F

型号说明 Type Code

A2F	55	R	2	P	1

泵／马达型号 Pump/Motor Type

定量泵／马达 Fixed displacement pump/motor	A2F

规格 Size

(9.4)	10
(11.6)	12
(22.7)	23
(28.1)	28
(44.3)	45
(54.8)	55
(63.0)	63
(80.0)	80
(107)	107
(125)	125
(160)	160
(200)	200
(250)	250
(355)	355
(500)	500

(排量 displacement ml/r)

结构形式 Series

见下 see below	结构 Series	1
	结构 Series	2
	结构 Series	3
	结构 Series	4
	结构 Series	5

旋转方向 Direction of Rotation

从轴端看	viewed on drive shaft	
顺时针	clockwise	R
逆时针	anti-clockwise	L
双向	alternating	W

(不适用于开式回路中的泵) (not for pumps in open circuit)

轴伸 Shaft End

平键	keyed shaft GB1096-79	P
花键	splines shaft DIN 5480	Z
花键	splines shaft GB 3478.1-83	S

后盖 Port Plate

见下 below	后盖 Port Plate	1
	后盖 Port Plate	2
	后盖 Port Plate	3
	后盖 Port Plate	4

订货示例：

A2F.55.R.2.P.1

A2F 定量马达

规格 55，顺时针旋转，2结构，平键

1 号后盖

Ordering Example:

A2F.55.R.2.P.1

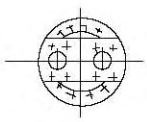
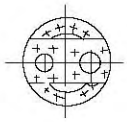
Fixed displacement motor A2F

size55, clockwise rotation, series 2,

keyed shaft, port plate 1

结构型式 Series		4		2/3		1	1/2	2		1/2	2		5			
规格 Size		10	12	23	28	45	55	63	80	107	125	160	200	250	355	500
后盖 port plate 1	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	2				•	•	•	•	•	•	•	•	•	•	•	•
	3					•	•	•	•	•	•	•				
	4	•	•	•	•											

后盖 port plate 1

规格 Size	10-160	200-500
闭式回路泵工况和马达工况 pump operation in closed circuit and motor operation	1 螺纹 metric threads 	1法兰 Flange 
	2 SAE 法兰 Flange 	
开式回路泵工况 pump operation in open circuit	3 法兰 Flange 	2法兰 Flange 
	4 螺纹 metric threads 	

技术数据 Technical Data

进口工作压力 Inlet Operating Pressure

泵 Pump

S、A或B口最低压力

Minimum pressure at ports A or B

P_{abs} _____ 0.08MPa

在闭式回路中，补油压力必须在0.2至0.6MPa之间，视泵的转速和液压油的粘度而定。

in closed circuits,the feed pressure must be between 0.2MPa and 0.6MPa,depending on pump speed and viscosity of hydraulic fluid.

马达 Motor

A或B口的压力 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口和B口压力之和不得超过70MPa(每侧压力最高40MPa)

The sum of the pressures at ports A and B must not exceed 70MPa (individual pressure on either side max.40MPa)

出口工作压力 Outlet Operating Pressure

泵 Pump

额定压力 Nominal pressure _____ P_N = 35MPa

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

壳体压力 Case pressure

允许最高壳体压力（油口T）

Maximum permissible case pressure(at port T)

P_{abs} _____ 0.2MPa

油温范围 Oil Temperature Range

t_{min} _____ −25℃

t_{max} _____ +80℃

粘度范围 Viscosity Range

V_{min} _____ (短期) (for short periods)10mm²/s

V_{max} _____ (短期) (for short periods)1000mm²/s

最佳工作粘度 Optimum Operating Viscosity

V_{opt} _____ 16−36mm²/s

规格计算 Calculation of Size

泵 pump

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

扭矩 Torque $M = \frac{1.59 \cdot V_g \cdot \triangle p}{10 \cdot \eta_{mh}}$ [Nm]

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

马达 Motor

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

扭矩 Torque $M = \frac{1.59 \cdot V_g \cdot \triangle p \cdot \eta_{mh}}{10}$ [Nm]

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

转速 Speed $n = \frac{Q \cdot 1000 \cdot \eta_v}{V_g}$ [r/min]

V_g = 排量 geom.displacement(ml/r)

$\triangle p$ = 压差 pressure differential(MPa)

n = 转速 speed(rpm)

η_v = 容积效率 volumetric efficiency

η_{mh} = 机械效率 mech−hydr.efficiency

η_t = 总效率 overall efficiency

$[\eta_t = \eta_v \cdot \eta_{mh}]$

油液选择 Fluid Recommendations

工作温度范围 推荐粘度等级 符合 DIN51519 ISO(VG)

Operating temperature range	Recommended viscosity grade to DIN 51 519 ISO(VG)		
30−40℃	VG22 △ 22mm²/s	在at	40℃
40−50℃	VG32 △ 32mm²/s	在at	40℃
50−60℃	VG46 △ 46mm²/s	在at	40℃
60−70℃	VG68 △ 68mm²/s	在at	40℃
70−80℃	VG100 △ 100mm²/s	在at	40℃

液压油的过滤

推荐过滤精度为10μm，25−40μm的较粗的过滤是可以使用，但是10μm过滤可以延长使用寿命(降低磨损)。

Filtration of Hydraulic Fluid

Recommended filtration:10μm

Coarser filtration of 25−40μm,is available, but with filtration of 10μm longer service life is obtained (reduced wearing).

转速范围

最低转速n_{min}没有限制，如果要求高度旋转均匀性，则n_{min}不得低于50rpm。关于最高转速n_{max}请见第4页的表。

Speed Range

No limitation on minimum speed n_{min} . If high uniformity of rotation is required,n_{min} should not be less than 50 rpm.See table on page 4 for maximum speed n_{max}.

安装位置

任选。壳体必须始终充满油液

Mounting Position

Optional.The housing must always be filled with oil.

A2F定量泵/马达 Fixed Displacement Pump/Motor A2F

技术参数表 理论值.未考虑 η_{mh} 和 η_v. 数值经过圆整

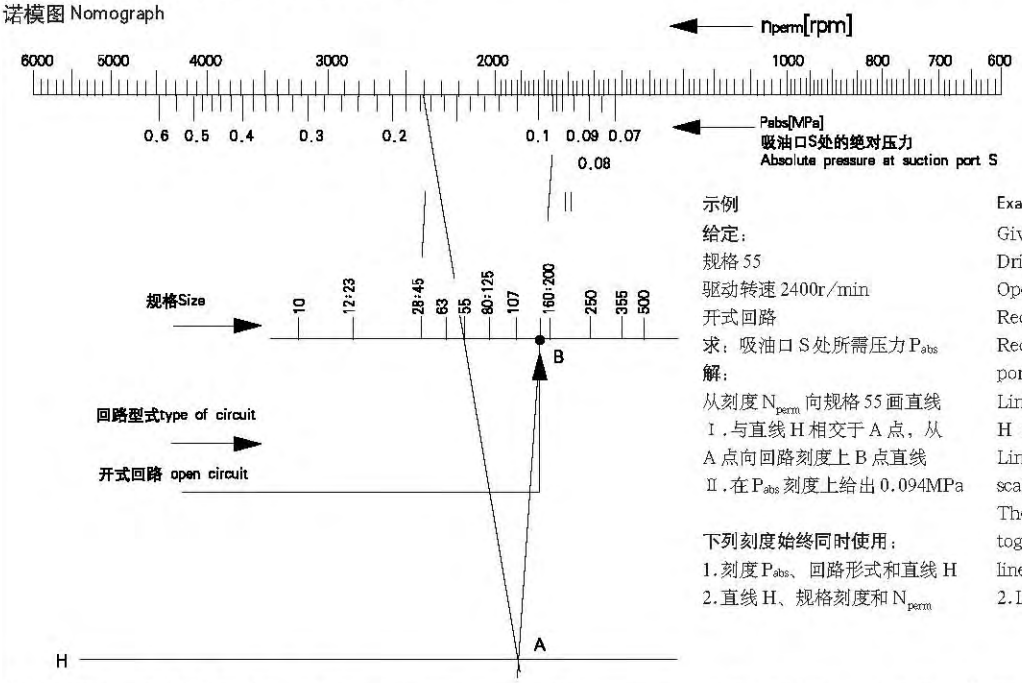
Technical Data theoretical values, without considering η_{mh} and η_v values rounded off

规格 Size					10	12	23	28	45	55	63	80	107	125	160	200	250	355	500
排量 Displacement			V_g	ml/r	9.4	11.6	22.7	28.1	44.3	54.8	63	80	107	125	160	200	250	355	500
最高转速	闭式回路	close circuit	n_{max}	r/min	7500	6000	5600	4750	3750	3750	4000	3350	3000	3150	2650	2500	2500	2240	2000
Max.speed	开式回路	在0.09MPa下[1]	$n_{0.09}$	r/min	4700	3750	3750	2800	2360	2360	2550	2120	1900	2120	1650	1700	1400	1250	1120
	open circuit	在0.1MPa下[1]	$n_{0.1}$	r/min	5000	4000	4000	3000	2500	2500	2700	2240	2000	2240	1750	1800	1500	1320	1200
		在0.15MPa下[1]	$n_{0.15}$	r/min	6000	4900	4900	3600	3000	3000	3300	2750	2450	2750	2100	2180	1850	1650	1500
最大流量	闭式回路	close circuit	Q_{max}	l/min	71	70	127	133	166	206	252	268	321	394	424	500	625	795	1000
Max.flow	开式回路	在$n_{0.09}$下[2]	$Q_{0.09}$	l/min	43	42	83	76	122	125	156	164	197	257	256	330	340	430	543
	open circuit	在$n_{0.1}$下[2]	$Q_{0.1}$	l/min	46	45	88	82	129	133	165	174	208	272	272	349	364	455	582
		在$n_{0.15}$下[2]	$Q_{0.15}$	l/min	55	55	108	98	157	160	202	213	254	334	326	423	449	568	728
最大功率	闭式回路	close circuit	P_{max}	KW	41	41	74	78	97	120	147	156	187	230	247	292	365	464	583
Max.power	开式回路	在$Q_{0.09}$下	$P_{0.09}$	KW	26	26	50	46	71	75	93	99	119	154	154	198	204	259	326
△p=35MPa	open circuit	在$Q_{0.1}$下	$P_{0.1}$	KW	27	27	53	49	75	80	99	105	125	163	163	210	218	273	350
		在$Q_{0.15}$下	$P_{0.15}$	KW	33	33	65	59	92	96	121	128	153	200	196	254	270	342	437
电机转速	流量	闭式close	Q	l/min	13.6	16.8	32.9	40.7	64.2	79.5	91.3	116	155	181.2	232				
Electric motor	flow	开式2)open	Qo	l/min	13.2	16.3	31.9	39.5	62.3	77.1	88.6	112.5	150.5	175.8	225				
speed	功率 power		P	KW	8	10	19	24	38	46	53	68	91	106	135				
n=1450rpm	(△p=35MPa)																		
扭矩 Torque	△p=10MPa		M	Nm	15	18.5	36	44.6	70.4	87	100	127.5	169.7	198	254	318.5	397.9	565	795.7
	△p=35MPa		M_{max}	Nm	52.5	64.5	126	156	247	305	350	446	594	693	889	1114	1393	1978	2785
近似重量	Weight(approx.)		kg		5	5	12	12	23	23	33	33	44	63	63	88	88	138	185

1)这些数值适用于吸油管S有绝对压力并用矿物油工作时
These values are valid provided there is an absolute pressure at suction inlet S and when operated on mineral oil.

2)在开式回路中 V_g 降低3%
V_g is 3% less in open circuit.

诺模图 Nomograph



示例
给定:
规格55
驱动转速2400r/min
开式回路
求:吸油口S处所需压力 P_{abs}
解:
从刻度 N_{perm} 向规格55画直线Ⅰ.与直线H相交于A点,从A点向回路刻度上B点直线Ⅱ.在 P_{abs} 刻度上给出0.094MPa

下列刻度始终同时使用:
1.刻度 P_{abs}、回路形式和直线H
2.直线H、规格刻度和 N_{perm}

Example
Given:Size.55
Drive speed 2400r/min
Open circuit
Required:
Required pressure Pabs at suction port Solution:
Line Ⅰ.on scale N_{perm} to size 55 meets line H at point A.
Line Ⅱ form point A to point B on circuit scale gives 0.094MPa on scale Pabs.
The following are always used together:1.Scales Pabs,type of circuit and line H.
2.Line H,size scale and n_{perm}.

允许转速 N_{perm} 可由诺模图确定。在马达工况,闭式回路或补油工况的允许转速也适用于开式回路。

The permissible speed N_{perm} can be determined from the nomograph.
In motor operation the permissible speeds for closed circuit and feed operation are also valid for open circuit.

当进口压力 P_{abs} >0.1MPa 时开式回路(自吸工况)的允许转速可以提高,但当 P_{abs} <0.1MPa 时必须降低。

The permissible speed in open circuit (self-priming operation)may be increased when inlet pressure P_{abs} >0.1MPa but must be reduced when P_{abs} <0.1MPa

外形尺寸 Unit Dimensions

规格 Size 10～160

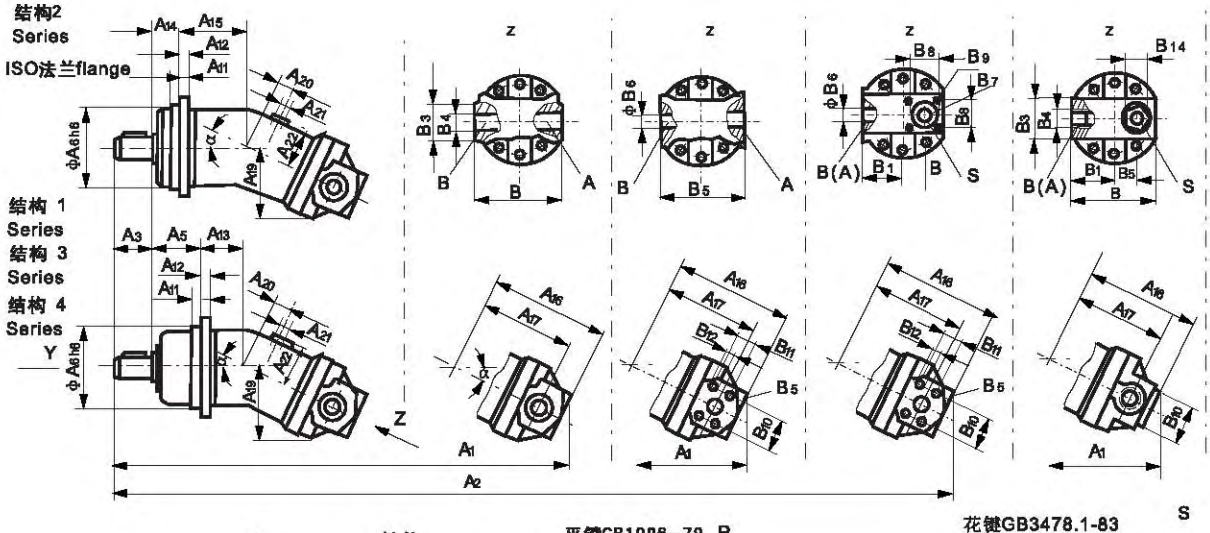
后盖Port Plates

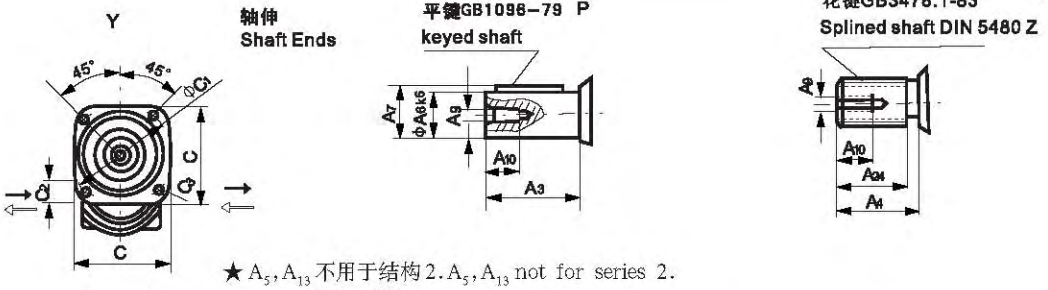
1 A.B:螺纹threads

2 A.B:SAE法兰 flange

3 B(A):SAE法兰 flange S:法兰flange

4 B(A).S:螺纹threads





★ A_5, A_{13} 不用于结构2. A_5, A_{13} not for series 2.

A_{14}, A_{15} 不用于结构1. A_{14}, A_{15} not for series 1.

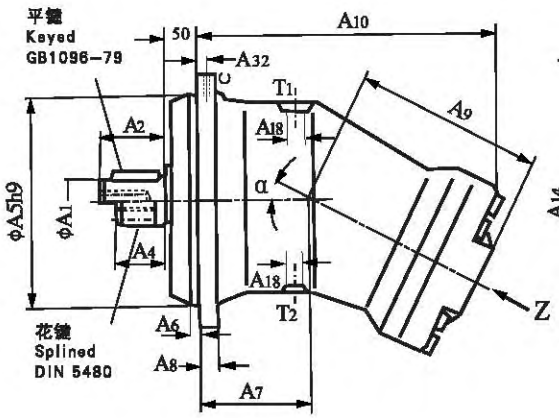
规格 Size		结构形式	后盖型式	A1		A2															
α20°	α25°	Series	Port Plates	α20°	α25°	α20°	α25°	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16
10	12	4	1、4	235	232	–	–	40	34	40	80	22.5	20	M6	16	8	12.5	42	–	–	112
23	28	3、2	1、4	296	293	–	–	50	43	50	100	27.9	25	M8	19	8	16	50	25	75	145
45	55	1.2	1、2、3	384	381	378	376	60	35	63	125	32.9	30	M12	28	10	20	77	32	108	183
63	80	2	1、2、3	452	450	447	444	70	40	–	140	38	35	M12	28	10	23	–	32	137	213
87	107	2、1	1、2、3	480	476	473	468	80	45	80	160	43.1	40	M12	28	12	25	90	40	130	230
125	160	2	1、2、3	552	547	547	540	90	50	–	180	48.5	45	M16	36	10	28	–	40	156	262

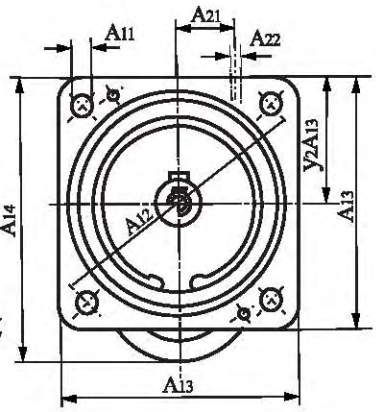
规格 Size		A19													深				
																B5(SAE法兰)			
α20°	α25°	A17	A18	α20°	α25°	A20	A21	A22	A23	A24	B	B1	B2	B3	B4	deep	Flange	B6	B7	B8
10	12	90	–	69	75	10	M12 × 1.5	40	–	22	89	42.5	18	40	M22 × 1.5	14	–	–	–	–
23	28	118	–	88	95	25	M16 × 1.5	50	–	28	106	53	25	47	M27 × 2	16	1/2"	13	–	–
45	55	150	178	110	118	31.5	M18 × 1.5	63	115	28	132	63	29	53	M33 × 2	18	3/4"	19	50	48
63	80	173	208	126	140	36	M18 × 1.5	77	173	33	156	75	35.5	63	M42 × 2	20	1"	25	56	60
87	107	190	225	138	149	40	M18 × 1.5	80	190	37.5	165	80	35.5	66	M42 × 2	20	1"	25	63	60
125	160	212	257	159	173.5	45	M22 × 1.5	93	212	42.5	195	95	42.2	70	M48 × 2	22	$1\frac{1}{4}$"	32	70	75

规格Size		深					深			深					平键keyed	花键Splined	花键Splined	重量 Weight
α20°	α25°	B9	deep	B10	B11	B12	deep	B13	B14	deep	B15	C	C1	C2	C3	GB1096—79	DIN5480	GB3478.1—83	kg
10	12	–	–	–	–	–	–	42	M33 × 2	18	–	95	100	9	10	键 6 × 32	W20 × 1.25 × 14 × 9g	EXT14Z × 1.25m × 30R × 5f	5.5
23	28	–	–	40.5	18.2	M8	15	53	M42 × 2	20	120	118	125	11	12	键 8 × 40	W25 × 1.25 × 18 × 9g	EXT18Z × 1.25m × 30R × 5f	12.5
45	55	M10	16	50.8	23.8	M10	16	–	–	–	126	150	160	13.5	16	键 8 × 50	W30 × 2 × 14 × 9g	EXT14Z × 2m × 30R × 5f	23
63	80	M12	18	57.1	27.8	M12	16	–	–	–	156	165	180	13.5	16	键 10 × 56	W35 × 2 × 16 × 9g	EXT16Z × 2m × 30R × 5f	33
87	107	M12	18	57.1	27.8	M12	18	–	–	–	160	190	200	17.5	20	键 12 × 63	W40 × 2 × 18 × 9g	EXT18Z × 2m × 30R × 5f	42
125	160	M16	24	66.7	31.8	M14	21	–	–	–	190	210	224	17.5	20	键 14 × 70	W45 × 2 × 21 × 9g	EXT21Z × 2m × 30R × 5f	63

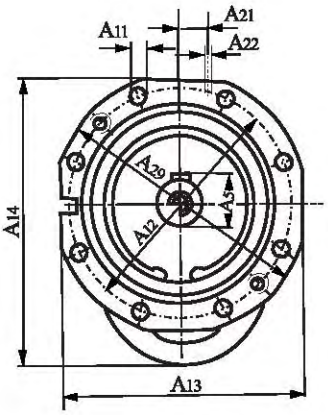
元件尺寸 Unit Dimensions

规格 Sizes 200–250





规格 Sizes 355–500



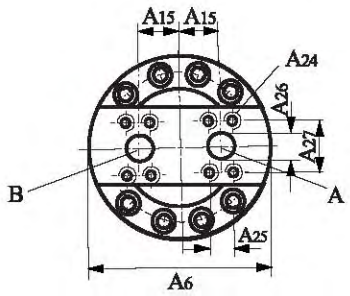
Z向
Viewed on Z

后盖
Port Plate
用于马达工况 for motor operation
用于泵工况 for pump operation
(闭式回路)(closed circuit)

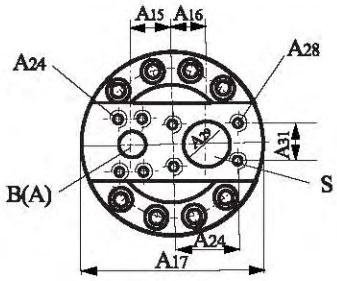
1

后盖
Port Plate
用于泵工况 for pump operation
(开式回路)(open circuit)

2



油口 Ports A,B:
SAE法兰 flange 6000 psi
见A19
(see dimension A19)



油口 Port B(A):
SAE法兰 flange 6000 psi
见尺寸 A19
(see dimension A19)

油口 Port S:SAE法兰 flange
规格 Sizes 200 355;2500psi
规格 Sizes 500;200psi
见尺寸 A20
(see dimension A20)

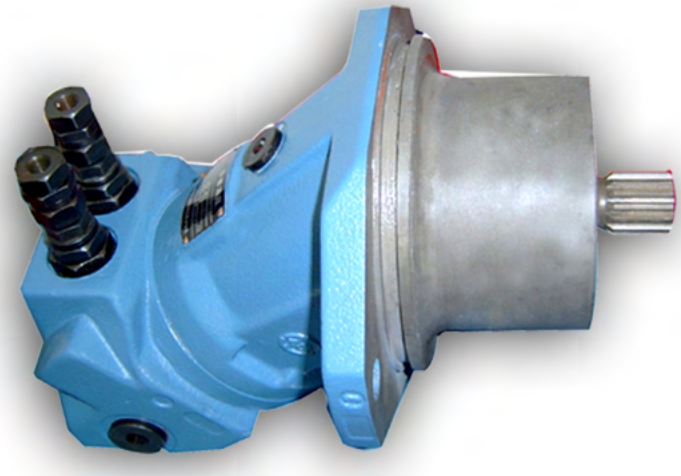
逆时针旋转时后盖2旋转180°　For anti-clockwise rotation port plate 2 is rotated 180°

规格

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}
200	21°	50_{K6}	82	53.5	58	224	9	134	25	232	368	22	280	252	300	55	45	216	M22 × 1.5	$1^1/_4$"	$2^1/_2$"
250	26.5°	50_{K6}	82	53.5	58	224	9	134	25	232	370	22	280	252	314	55	45	216	M22 × 1.5	$1^1/_4$"	$2^1/_2$"
355	26.5°	60_{m6}	105	64	82	280	15	160	28	260	422	18	320	335	380	60	50	245	M33 × 2	$1^1/_2$"	$2^1/_2$"
500	26.5°	70_{m6}	105	74.5	82	315	15	175	30	283	462	22	360	375	420	65	55	270	M33 × 2	$1^1/_2$"	3"

规格					深					深					keyed Shaft	Splined Shaft	(kg)
Size	A_{21}	A_{22}	A_{23}	A_{24}	deep	A_{25}	A_{26}	A_{27}	A_{28}	deep	A_{29}	A_{30}	A_{31}	A_{32}	GB1096–79	DIN5480	
200	70	M14 × 1.5		M14	22	31.8	32	66.7	M12	18	63	88.9	50.8	13	键 14 × 80	W50 × 2 × 24 × 9g	88
250	70	M14 × 1.5		M14	22	31.8	32	66.7	M12	18	63	88.9	50.8	13	键 14 × 80	W50 × 2 × 24 × 9g	88
355	35	M14 × 1.5	360	M16	24	36.6	40	79.4	M12	18	63	88.9	50.8	14	键 18 × 100	W60 × 2 × 28 × 9g	138
500	35	M18 × 1.5	400	M16	24	36.6	40	79.4	M16	24	75	106.4	62	15	键 20 × 100	W70 × 3 × 22 × 9g	185

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A2FE 内藏式定量马达 Internal Installation Fixed Displacement Motor A2FE 用于安装在机械齿轮箱中 For installation in mechanical gearboxes 斜轴式轴向柱塞结构 axial tapered piston,bent axis design	RC90200/12.2004
	规格 Size 55-160	高压范围 Peak pressure 至 up to40MPa	替代：ReplaceRC90200/09.2003



说明：

- 主要用于安装在机械齿轮箱中，例如：履带驱动齿轮箱。

Description：

Hydrostatic play-in motors are intended primarily for installation in mechanical gearboxes, e.g.track drive gear boxes.

特点：

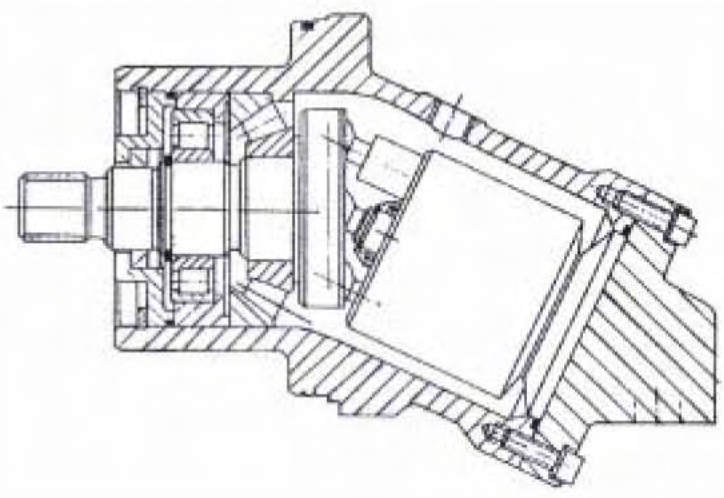
- 马达的安装法兰设计在壳体的中间,这种结构允许马达几乎完全装进机械齿轮箱，从而提供一个十分紧凑的部件。
- 易于组装，仅需“插入”机械齿轮箱。
- 不需要考虑安装公差。

Special Features：

The design of the motor with the mounting flange in center of the housing allows if to be almost fully integrated into a mechanical gear box to give an extremely compact unit.
No installation tolerances to consider.
Easy assembly, simply plug-in to mechanical gearboxes.

剖视图：

Section



A2FE内藏式定量马达Internal Installation Fixed Displacement Motor A2FE

型号说明 Type Code

A2F	E	80	W	70	A	11

马达型号 Motor Type

定量马达A2F

Fixed Displacement Motor

安装型式 Mounting Type

内藏式 E

Internal Installation

规格 Size

排量 ml/r	54.8	55
displacement	80	80
	107	107
	126.3	125
	160	160

后盖 Port Plate

11

轴伸 shaft End

花键	DIN5480	Z
	Splined shaft	A

	55	80	107	125	160
Z	●	○	●	○	●
A	●	●	●	●	●

○:没有 ●:有

结构型式 Series

125	71
55, 80, 107, 160	70

旋转方向 Direction of Rotation

双向 alternating W

订货示例：A2FE80W70A11，A2FE 内藏式定量马达规格 80，双向旋转，70 结构 A 型花键 11 号后盖

Ordering Example: A2FE80W70A11 Fixed displacement motor A2FE. Size 80. altrnating rotation W. Series 70 Splined shaftA. port plate 11.

技术数据 Technical Date

A 或 B 口的压力 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 口或 B 口的压力和不得超过 70MPa

(每侧最高压力 40MPa)

The sum of the pressure at port A or B must not exceed 70MPa

(Individual pressure on either side max, 40MPa)

壳体允许最高压力 Maximum permissible case pressure

P_{ca} 0.2MPa

油温范围 Fluid Temperature Range

t_{min} −25℃

t_{max} +80℃

粘度范围 Viscosity Range

V_{min}(短期 for short periods) 10mm²/s

V_{max}(短期 for short periods) 1000mm²/s

最佳工作粘度 Optimum Operating viscosity

V_{opt} 16−36mm²/s

油液选择 Fluid Recommendations

工作温度范围 Operating temperature range	推荐粘度按 DIN 51519 或 ISO(VG) Recommendations viscosity class to DIN 51519 ISO(VG)
30−40℃	VG22 22mm²/s at 40℃
40−50℃	VG35 32mm²/s at 40℃
50−60℃	VG46 46mm²/s at 40℃
60−70℃	VG68 68mm²/s at 40℃
70−80℃	VG100 100mm²/s at 40℃

A2FE 内藏式定量马达 Internal Installation Fixed Displacement Motor A2FE

油液的过滤

推荐过滤精度为 10μm，25-40μm 的较粗过滤是可以使用，但用 10μm 的过滤可延长使用寿命(降低磨损)

Filtration of Fluid

Recommended filtration:10μm. Coarser filtration of 25-40μm,is possible, but with filtration of 10um. longer service life is obtained (reduce wearing).

转速范围

最低转速 n_{min} 没限制，如果要求高的旋转均匀性，则 n_{min} 不低于 50rpm.

最高转速见下表

Speed Range

No limitation on minimum Speed n_{min}.if high uniformity of rotation is required, n_{min} should not be lower than 50 rpm.See table for maximum Speed n_{max}.

安装位置

任选。壳体必须始终充满油液

Mounting Position

Optional.The housing must always be filled with oil.

参数计算 Calculation of size

马达 Motor

流量 Flow $Q = \frac{V_g \cdot n}{1000 \cdot \eta_v}$ (L/min)

扭矩 Torque $M = \frac{1.59 V_g \cdot \triangle P \cdot \eta_{mh}}{10}$ (Nm)

功率 Power $P = \frac{Mn}{9549} = \frac{Q \cdot \triangle P \cdot \eta_t}{60}$ (KW)

转速 Speed $n = \frac{1000 \cdot Q \cdot \eta_v}{V_g}$ (r/min)

V_g:排量 geom.displacement(ml/r)

$\triangle P$:压差 Pressure differential(MPa)

n:转数 Speed

η_v:容积效率 volumetric efficiency

η_{mh}:机械效率 mech.hydr.efficiency

η_t:总效率 Overall efficiency

$[\eta_t = \eta_v \cdot \eta_{mh}]$

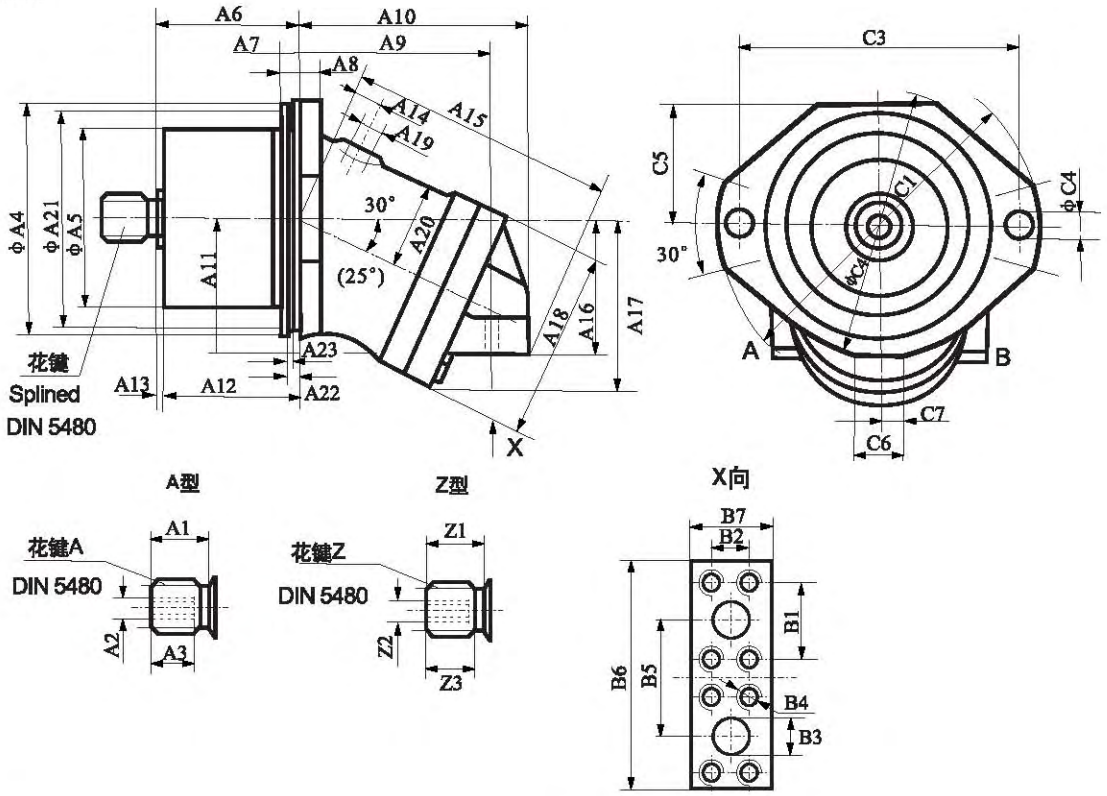
技术参数（理论值、未考虑 η_v、η_{mh} 数值经过圆整）

Technical Data (theoretical Values,without considering η_v. η_{mh}.Values rounded off)

规格 size			55	80	107	125	160
排量 Displacement	V_g	ml/r	54.8	80	107	126.3	160
最高转速 Max.Speed	n_{max}	r/min	3750	3350	3000	3000	2650
最大流量 Max.flow	Q_{max}	L/min	206	268	321	379	424
扭矩常数 Torque constants	Mk	Nm/MPa	8.71	12.74	16.97	20.1	25.40
最大扭矩 Max.Torque △p=35MPa	M	Nm	305	446	594	703.5	889
最大功率 Max.Power △p=35MPa	P	kw	120	156	187	221	247
惯性矩 Moment of inertia about drive shaft	J	Kgm^2	0.0052	0.0109	0.0167	0.0322	0.0532
重量 Weight(approx)		Kg					

A2FE 内藏式定量马达 Internal Installation Fixed Displacement Motor A2FE

元件尺寸：
Unite Dimensions



规格	A 型花键				Z 型花键						
size	Splined A DIN 5480	A_1	A_2	A_3	Splined Z DIN 5480	Z_1	Z_2	Z_3	A_4	A_5	A_6	A_7
55	W35 × 2 × 30 × 16 × 9g	40	M12	28	W30 × 2 × 30 × 14 × 9g	35	M12	28	160h6	120	92.3	15
80	W40 × 2 × 30 × 18 × 9g	45	M12	28	W35 × 2 × 30 × 16 × 9g	40	M12	28	190h6	139	110.8	15
107	W45 × 2 × 30 × 21 × 9g	50	M16	36	W40 × 2 × 30 × 18 × 9g	45	M16	28	200h6	155	122.8	15
125	W45 × 2 × 30 × 21 × 9g	50	M16	36	W40 × 2 × 30 × 18 × 9g	45	M16	28	200h6	155	123	15
160	W50 × 2 × 30 × 24 × 9g	55	M16	36	W45 × 2 × 30 × 21 × 9g	50	M16	36	200h6	170	122.8	15

规格												深				
size	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}	A_{16}	A_{17}	A_{18}	A_{19}(J)	deep	A_{20}	A_{21}	A_{22}	A_{23}
55	18	151	175	109	90	2.3	34.5	193.5	82	112	132	M18 × 1.5	12	63	151.62	10.5	7.1
80	20	160	187	113	106	4.8	18	218	108	136	160	M18 × 1.5	12	80	183.7	10	5.2
107	20	152	206	114	120	2.8	25	230	116	146	165	M18 × 1.5	12	82	193.7	10	5.2
125	20	143	178	114	120	3	25	210	112	148	165	M18 × 1.5	12	82	193.7	10	5.2
160	20	222	255	134	121.7	3.5	45	292	137	175	195	M18 × 1.5	14	93	191.62	10.5	7.1

规格						深										O 型圈 GB3452.1–83	
size	R	B_1	B_2	B_3	B_4	deep	B_5	B_6	B_7	C_1	C_2	C_3	C_4	C_5	C_6	C_7	O–Ring	
55	10	50.8	23.8	19	M10	17	75	147	48	235	190	200	18	82	40	20	ø150 × 5.3	GB3452.1–83
80	10	57.2	27.8	25	M12	17	84	166	66	260	220	224	22	98	40	0	ø180 × 4	DIN
107	16	66.7	31.8	32	M14	19	99	194	70	286	232	250	22	103	40	0	ø192 × 4	DIN
125	16	66.7	31.8	32	M14	19	99	194	70	286	232	250	22	103	40	0	ø192 × 4	DIN
160	12	66.7	31.8	32	M14	19	99	194	70	286	232	250	22	104	42	0	ø190 × 5.3	GB3452.1–83

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BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,Ltd. 华德

2004年12月编制

华德液压
HUADE HYDRAULIC

A6V

A2F A7V A8V A4V/F

选用手册 Selection Handbook

Axial Piston-
Bent Axis Design
Variable Displacement
Motor

斜轴式轴向柱塞
变量马达

For Open and Closed Circuits
用于开式和闭式系统



额定压力 Nominal Pressure PN=35 Mpa
规　　格 Sizes　　28–500

北京华德液压工业集团有限责任公司
BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP Co.,LTD.

目 录 CONTENTS

1 A6V 变量马达 1
Variable Displacement Motor A6V

2 A6VG 变量马达 14
Variable Displacement Motor A6VG

3 A6VE 内藏式变量马达 21
Plug-In Variable Displacement Motor A6VE

华德

注意事项

1.为了保证无故障的高效工作，在设计系统期间应根据工况仔细选择液压系统的液压油，所有矿物油基液压油均在某种程度上适用于轴向柱塞元件，它们的应用时基本划分取决于上述的水、粘度与温度关系，并考虑氧化和腐蚀保护、材料相容性、空气和水分离特性。

2.为了保证设备有长的使用寿命，必须进行良好而可靠的过滤。油液中的硬颗粒污染不得超过以下等级：

等级9……按NAS1638

等级6……按 SAE

等级18/15……按ISO/DIS 4406

在油液温度很高时，最低清洁度为：

等级8……按NAS1638

等级5……按 SAE

等级17/14……按ISO/DIS 4406

3.为了正确选择液压油，必须知道与环境温度有关的工作温度；在闭式回路中这是回路温度，在开式回路中这是油箱温度。

4.注意：漏油（壳体泄油）温度受压力和转速的影响，总是高于回路温度，然而要求回路中任何点温度不得超过90℃。

如果由于极端的工作参数或较高的环境温度，而不能维持上述条件，订货时请询问我公司。

5.泵的进油口压力（绝对压力）处须≥0.08MPa，及泄油压力(壳体内允许的最高压力)为0.2MPa(绝对压力)，壳体内压力值必须等于或高于作用在轴密封上的外部压力值。

6.安装位置：一般要求液压泵／马达安装位置、壳体上边缘低于油箱最低液面。若安装需在油面以上，请在订货时提出。

《样本》所述技术资料，仅供参考。若有特殊要求请与我集团公司技术部门咨询，若有更改，恕不通知。

The technical information in the catalog is for your reference. Please consult our technical Dept., if you have any special requirements.

NOTES

1.In order to guarantee trouble-free and efficient operation, the hydraulic fluid in a hydrostatic system should be selected carefully according to the actual working conditions during the design of the system. All mineral oil based fluids are suitable to a greater or lesser degree for application in axial piston units. Their basic classification of application results from what has already been said due to the water , viscosity and temperature relationships, with consideration of oxidization and corrosion protection, material compatibility, air and water separation characteristics.

2.In order to guarantee a long service life for the installation, good and reliable filtration is necessary.The hard particle contamination of fluid may not exceed a level determined by:

Class 9 to NAS 1638

Class 6 to SAE

Class 18/15 to ISO/DIS 4406

When the fluid temperature is too high,the required minimum degree of cleanliness is:

Class 8 to NAS 1638

Class 5 to SAE

Class 17/14 to ISO/DIS 4406

3.In order to select the correct fluid,it is necessary to know the operating temperature in the circuit in relation to the ambient temperature-in an open circuit and the tank temperature.

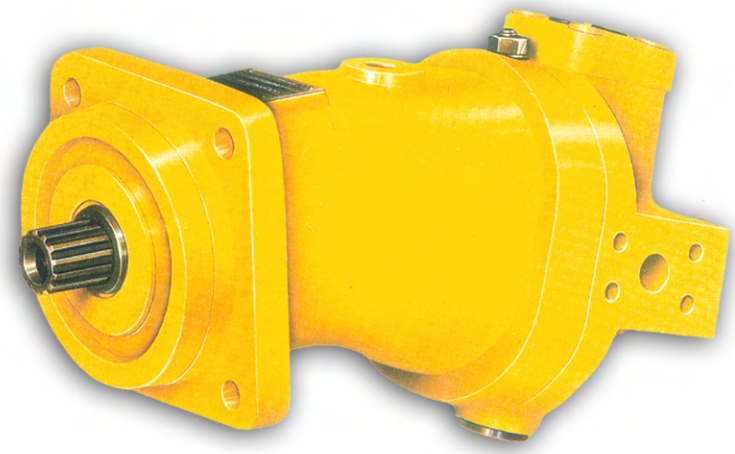
4.Important:The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the circuit temperature. However, at no point in the circuit may the temperature exceed 90℃。

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

5.The minimum pressure at the suction port of the pump ≥0.08 Mpa(absolute pressure), and the drain pressure (max. permissible casing pressure) is 0.2 MPa(absolute pressure). The pressure in the housing must be the same or greater than the external pressure on the shaft seal.

6.Installation position: in general, the upper point on the pump/motor housing must be below the minimum oil level of the tank. If you would like to install it above the minimum oil level, please indicate when order.

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A6V 变量马达 Variable Displacement Motor A6V 用于开式和闭式回路 For open and closed circuits 斜轴式轴向柱塞结构 axial tapered piston,bent axis design	RC91100/12.2004
	规格 Size 28－500	高压范围 Peak pressure 至 up to 35MPa	替代：ReplaceRC91100/09.2003



说明：

- 该变量马达是专为带次级控制的静液驱动设计的。
- 配有最大调节范围 V_{max}/V_{min}=3.47 的整套控制总成。

Description

The variable displacement motor was designed especially for hydrostatic drives with secondary controls.

A complete control assembly for a maximum swivel range of V_{max}/V_{min}=3.47 is fitted.

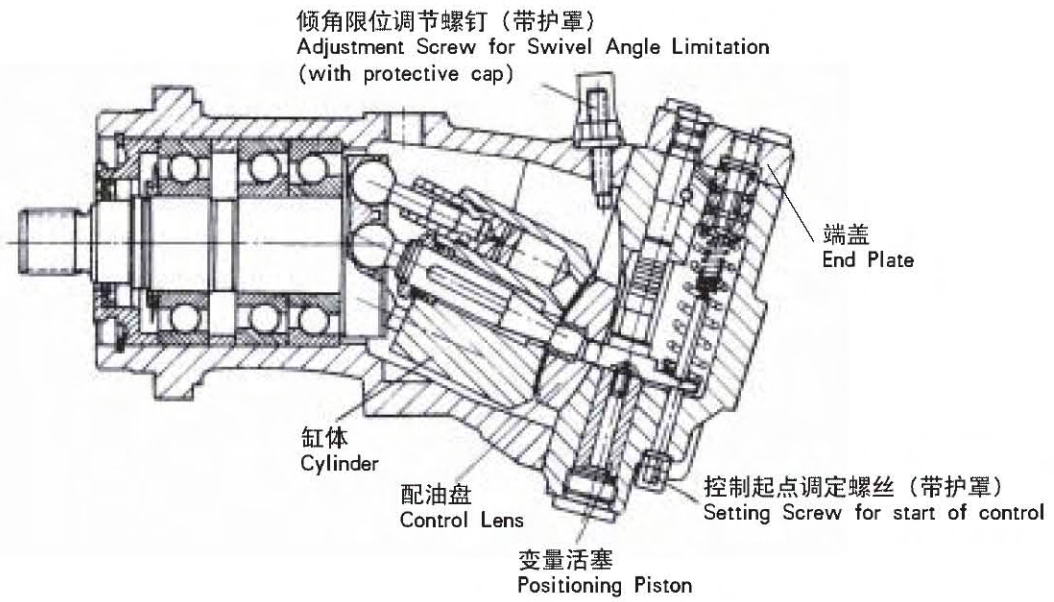
特点：

- 用静液传动时有较大的调节范围
- 次级控制和带有各种控制装置的调节
- 在较小的倾角下提高最高输出转速
- 由于可用较小的泵而节省费用
- 省掉多速比齿轮驱动
- 高功率密度
- 允许高的外界轴载荷
- 任选安装位置
- 高效率
- 优秀的起动特性
- 小惯量

Special Characteristics

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

剖视图：



A6V 变量马达 Variable Displacement Motor A6V

型号 Type Code

A6V	80	HA2	2	F	Z	2	–	039

马达型号 Motor Type
变量马达 Variable displacement motor — A6V

规格 Size

8.1–28.1ml/r	28
15.8–54.8ml/r	55
23–80ml/r	80
30.8–107ml/r	107
46–160ml/r	160
64.8–225ml/r	225
137–500ml/r	500

(排量 V_{gmin}–V_{gmax}) Displacement

变量方式 Control Device

液控变量 Hydraulic control, pilot pressure related	控制压差△p=1MPa Pilot pressure increase	HD1
	带恒压控制△p=1MPa With pressusre control	HD1D
	控制压差△p=2.5MPa Pilot pressure increase	HD2
	带恒压控制△p=1MPa With pressusre control	HD2D
液控双速变量 Hydraulic 2-speed control pilot pressure related	控制起点 Start of control 0.2–2MPa	HSI
	控制起点 Start of control 0.5–5MPa	HS2
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	HA2
	不带超调 Without override	HA2H
	带超调 With override	
转速液控变量	Hydraulic control, speed related	DA
电控双速变量	Electrical 2-speed control 12V	ES1
	(with switching solenoid)24V	ES2
电控比例变量	Electrical control 12V	EP1
	(with proportional solenoid) 24V	EP2
扭矩变量	Mooring control	MO
手动变量	Manual control (with handwheel)	MA

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 2，规格 28–225 Series 2, sizes 28–225	2
结构 1，规格 500 Series 1, size 500	1

装配型式 Assembly Type

For explanation see description of control device and unit dimensions 解释见变量说明及元件尺寸	1
	2

起重机系列产品专用(带单向节流阀) For crane products	–

最小排量设定值 Min. Swept Volume Setting

例： Example.
Vgmin=39ml/r — 039

订货示例： A6V80HD12FZ2-039

Ordering Example A6V80HD12FZ2-039

斜轴变量马达 A6V，规格 80，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}=39ml/r

Axial piston variable displacement motor A6V, size 80, 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}=39ml/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=31.5MPa

最高压力 Peak pressure _____ p_{max}=35MPa

A、B油口压力总和不得超过63MPa，每侧油口压力最高35MPa。 The sum of the pressures at ports A and B should not exceed 63MPa. (Individual pressure at either port max.35MPa

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—36mm²/s

油液选择： Fluid Recommendation

工作温度推荐粘度等级符合DIN51519 Operating Recommended Viscosity grade temperature to DIN51519 range 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的可以延长使用寿命（降低磨损）。

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。

最高允许转速见技术参数表。

Filtration of Hydraulic Fluid

Recommended filtration 10μm .Coarser filtration of 25 to 40μm is possible,however longer service life is achieved with filtration of 10μm .(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 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 $Q=\frac{V_g \cdot n}{1000 \cdot \eta_v}$ [L/min]

输出转速 Output Speed $n=\frac{Q \cdot 1000 \cdot \eta v}{V_g}$ [r/min]

输出扭矩 Output Torque $M=\frac{V_g \cdot \triangle p \cdot \eta_{mh}}{2\pi}$

$\frac{1.59 V_g \cdot \triangle p \cdot \eta_{mh}}{10}$ [Nm]

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

输出功率 Output Power $P=\frac{M \cdot n}{9549}$

$=\frac{Q \cdot \triangle p}{60} \cdot \eta_t$ [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			28	55	80	107	160	225	500
变量方式	Control Device									
HD液控变量	Hydraulic control pilot pressure related			●	●	●	●	●	●	●
HD1D液控恒压变量	Hydraulic control pilot pressure related				●		●			
HS液控（双速）变量	Hydraulic control(two speed), pilot pressure related			●	●	●	●	●	●	●
HA高压自动变量	Automatic control,high pressure related			●	●	●	●	●	●	
DA转速液控变量	Hydraulic control.speed related			●	●	●	●	●		
ES电控（双速）变量	Electric control (two speed)			●	●	●	●	●		
EP电控（比例）变量	Electric control (proportional)			●	●	●	●	●		
MO扭矩变量	Mooring control			●	●	●	●	●	●	
MA手动变量	Manual control									
排量	Displacement	V_{gmax}	ml/r	28.1	54.8	80	107	160	225	500
		V_{gmax}	ml/r	8.1	15.8	23	30.8	46	64.8	137
最大允许流量	Max.Permissible.Swept volome	Q_{gmax}	L/min	133	206	268	321	424	530	950
最高转速	Max.speeds	n_{max} 在at V_{gmax}	r/min	4750	3750	3350	3000	2650	2360	1900
	(在at Q_{max} 下)	n_{max} 在 at $V_g<V_{gmax}$	r/min	6250	5000	4500	4000	3500	3100	2500
扭矩常数	Torque constants	M_x 在at V_{gmax}	Nm/MPa	4.463	8.701	12.75	16.97	25.41	35.71	79.577
		M_x 在at V_{gmin}	Nm/MPa	1.285	2.511	3.73	4.9	7.35	10.30	21.804
最大扭矩	Max.torque	M_{max} 在at V_{gmax}	Nm	156	304	446	594	889	1250	2782
	(在at △p=35MPa)	M_{max} 在at V_{gmin}	Nm	45	88	130	171	257	360	763
最大输出功率(在35MPa和Q_{max}下)Max.output power(at 35MPa and Q_{max})			kW	78	120	156	187	247	309	507
惯性矩	Moment		kgm²	0.0017	0.0052	0.0109	0.0167	0.0322	0.0532	
重量	Weight		kg	18	27	39	52	74	103	223

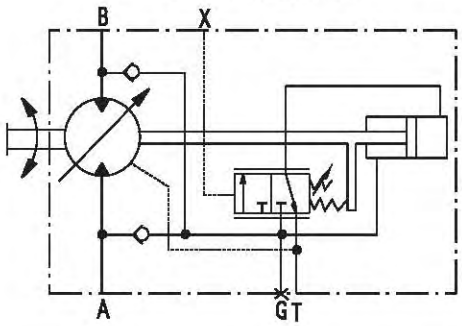
HD 液控变量

按外控油源的先导压力来无极的控制马达的排量
标准结构：按第2种装配型式供货
控制起点在V_{gmax}(最大扭矩、最低转速)
控制终点在V_{gmin}(最小扭矩、最高转速)
对于第一种装配型式，控制功能相反：
控制起点在V_{gmin} 控制终点在V_{gmax}。
变量机构的设定
有两种方案供选用：
1.HD1- 先导压力压差(由$V_{gmax} \longrightarrow V_{gmin}$)- △Ps=1MPa
控制起点可调 _____ 从0.2-2MPa
标准设定值：控制起点压力为0.3MPa，控制终点压力为1.3MPa
2.HD2- 先导压力压差(由$V_{gmax} \longrightarrow V_{gmin}$)- △Ps=2.5MPa
控制起点可调 _____ 从0.5-5MPa
标准设定值：控制起点压力为1MPa，控制终点压力为3.5MPa，
当用HD作双速控制时，最高先导压力可到7.5MPa
外控口x处的供油量：约0.5L/min.
当工作压力<1.5MPa时，必须在G口供入1.5MPa的辅助压力。

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 V_{gmax}(max.torque, min.speed)
End of control at V_{gmax}(min.torque,max.speed)
For assembly type 1,the control function is reversed:
Start of control at V_{gmin},end of control at V_{gmin}
Setting of Regulator
Two options are available:
1.HD1
Pilot pressure increase adjustable($V_{gmax} - V_{gmin}$) -△Ps=1MPa
Start of control adjustable-from 0.2-2MPa
Standard setting:start of control at 0.3MPa (end of control at 1.3MPa)
2.HD2
Pilot pressure increase ($V_{gmax} - V_{gmin}$) -△Ps=2.5MPa
Start of control adjustable-from 0.5-5MPa
Standard setting:start of control at 1.0MPa (end of control at 3.5MPa)
When using the HD control as a two-point control a max.pilot pressure of 7.5MPa is permissible.
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.

HD, 液控变量(HD1, HD2)



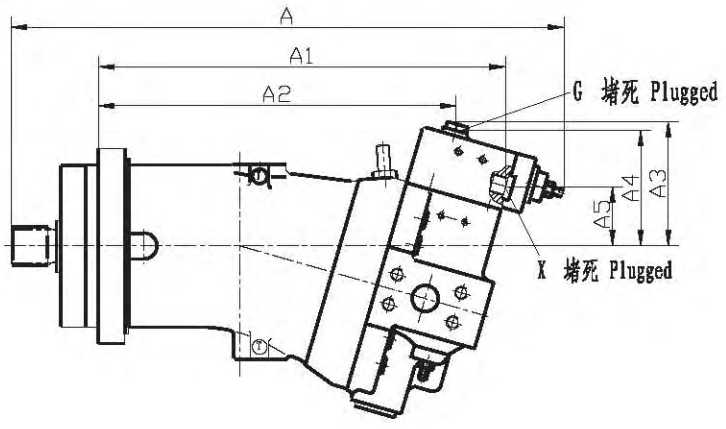
HD1D 液控恒压变量

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

HD1,HD2



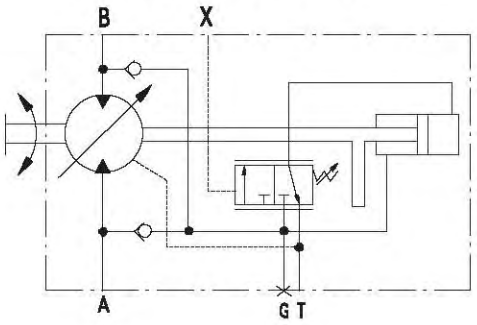
HS 液控双速变量

按外控油源的先导压力来两点式的控制马达排量
标准结构：按第2种装配型式供货。
控制起点在V_{gmax}(最大扭矩、最低转速)
控制终点在V_{gmin}(最小扭矩、最高转速)
对于第一种装配型式，控制功能相反：
控制起点在V_{gmin} 控制终点在V_{gmax}。
变量机构的设定
有两种方案供选用
1.HS1 – 控制起点可调 – 从0.2—2MPa
2.HS2 – 控制起点可调 – 从0.5—5MPa
(由$V_{gmin} \rightarrow V_{gmax}$)– △p ≤ 0.2MPa
外控口x处的供油量：约0.5L/min.
当工作压力＜1.5MPa时，必须在G口供入1.5MPa的辅助压力。

Hydraulic Control,2-Speed Pilot Pressure Related,HS

Two point 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:
start of control at V_{gmin},end of control at V_{gmax}.
Setting of Regulator
Two options are available:
1.HS1–Start of control adjustable–from 0.2–2MPa
2.HS2–Start of control adjustable–from 0.5–5MPa
(V_{gmin}–V_{gmax})– △P ≤ 0.2MPa
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.

HS 液控双速变量(HS1、HS2)



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1种装配型式供货
控制起点在V_{gmax}(最小扭矩、最高转速)
控制终点在V_{gmin}(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间可调。
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，工作压力升高。△P=10MPa
从V_{gmin}(7°)变至V_{gmax}(25°)时，压力升高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时变量起点变为14MPa。
(30MPa–10 × 1.6MPa=14MPa)

Automatic Control,High Pressure Related,HA

Automatic,control of motor capacity dependent on operating pressure.
Assembly type 1 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 8MPa 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 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)

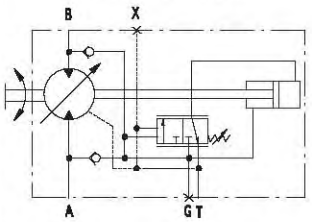
带有超调的 HA,变量有两种方式供选用：

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，工作压力升高 ，△P=10MPa。
如果控制仅需达到最大排量，则允许先导压力最高为 5MPa。
外控口 X 处的供油量 0.5L/min。

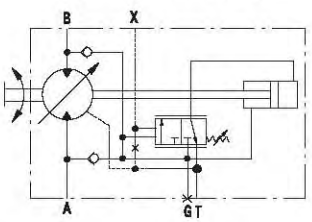
Two options are available for HA control with override.

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.

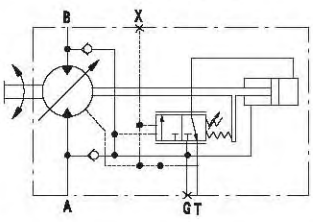
HA. 高压自动变量 (HA1)



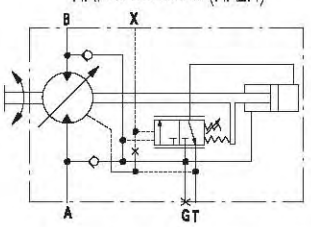
HA. 高压自动变量 (HA1H)



HA. 高压自动变量 (HA2)



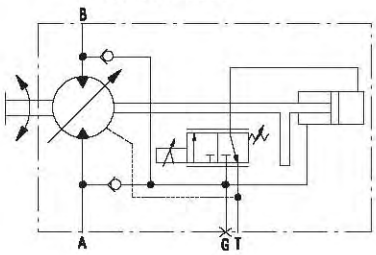
HA. 高压自动变量 (HA2H)



ES,电控双速变量

马达排量处于 V_{gmin} 或 V_{gmax} 是由控制电磁铁通断来实现。
标准结构：按第 2 种装配型式供货
控制起点在 V_{gmax}(最大扭矩、最低转速)
控制终点在 V_{gmin}(最小扭矩、最高转速)
对于第一种装配型式，控制功能相反：
有两种方案供选用 ：
1.ES1－控制电压 12VDC
2.ES2－控制电压 24VDC

ES. 电控双速变量



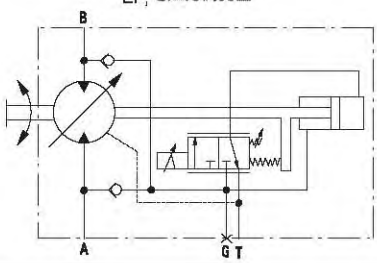
ES,Electrical 2-Speed Control

The motor capacity is set to V_{gmin} or V_{gmax} by switching on or off an electrical current at the switching solenoid.
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.
Two options are available:
1.ES1－control voltage 12VDC
2.ES2－control voltage 24VDC

EP,电控比例变量

根据电信号无级的或双点的控制马达排量
标准结构：按第 2 种装配型式供货
控制起点在 V_{gmax}(最大扭矩、最低转速)
控制终点在 V_{gmin}(最小扭矩、最高转速)
对于第一种装配型式，控制功能相反：
能过比例电磁铁操纵液压控制。
有两种方案供选用 ：
1.ES1－控制电压 12VDC 400mA－900mA
2.ES2－控制电压 24VDC 200mA－450mA
如果仅要求变量马达作双点（双速）控制，则只要使电流通断即可得到这两个位置（对第 2 种装配型式在 V_{gmax} 断电，对第 1 种装配型式在 V_{gmin} 断电）。
如果工作压力低于 1.5MPa,则在 G 口要求引入 1.5MPa 的辅助压力。

EP,电控比例变量



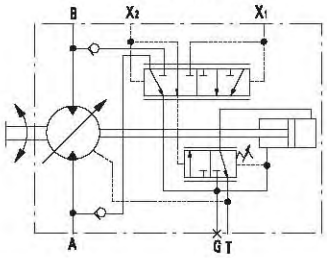
EP Electrical Proportional Control

For two-speed control of the motor capacity, or for two point control dependent on an electrical 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.
The hydraulic control is operated by a proportional solenoid.
Two options are available:
1.EP1－control voltage 12VDC
2.EP2－control voltage 24VDC
Should the variable motor 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:deenergise at V_{gmax},for assembly type 1:deenergise at V_{gmin}).if the operating pressure is less than 15MPa,then an auxiliary pressure of 15MPa is required at port G.

DA.转速液控变量

转速液控变量只用于与变量泵 A4V.DA 合用的传动系统。
装配型：2
变量起点，按先导压力：在 V_{gmax}(到 V_{gmin})
按工作压力：在 V_{gmin}(到 V_{gmax})
起点在 V_{gmax}（最大扭矩）。
由 A4V 变量泵确定的先导压力（提高原动机转速＝提高变量泵转速＝提高先导压力）引到 X1 或 X2 口，视行驶方向而定，使马达向减小排量方向转变（扭矩减小，转速增加）。
若工作压力升高到超过变量机构设定的压力值，则马达向增大量排量方向转变（扭矩增大，转速降低）。
先导压力与高压保持定值：Pst/PH=3/100.
先导压力变化 0.3MPa(升或降）相应使工作压力升、降 10MP。
设计带 DA 变量的驱动时，必须考虑 A4V.DA 变量泵的技术数据。

DA 转速液控变量



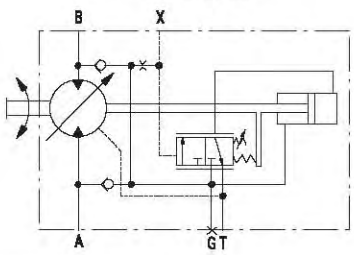
DA Hydraulic Control,Speed Related.

Speed related hydraulic control is used exclusively for transmission drives in conjunction with variable pump A4V.DA.
Assembly design 2
Start of control,pilot pressure dependent at V_{gmax}(to V_{gmin}),high pressure dependent at V_{gmin}(to V_{gmax}).
Start point at V_{gmax}(max.torque).
The pilot pressure, which is determined by the variable pump A4V (increasing speed of prime mover=increasing speed of variable 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.
0.3MPa variation pilot pressure(rise or fall)gives a pressure rise or fall of 10MPa in operating pressure.
When designing a drive with a DA control the technical data of the variable pump type A4V.DA must be considered.

MO.扭矩变量

扭矩变量，主要用来驱动绞车，产生恒定的牵引力。
装配型式：第 1 种装配型式
控制起点在 V_{gmin}(最小扭矩、最高转速)
变量机构的设定：
先导压力升高(V_{gmin}-V_{gmax})△p=5MPa,控制起点从8-35MPa，可调(订货时注明)。
通过改变马达的排量可以得到恒定的扭矩，它可根据需要进行改变，使铰车产生恒 定的牵引力。如果卷筒上没有拉力，则马达在较低的压力下工作，从而先导压力也较低，马达排量减小，转速增加，铰车加速运转，直至达到铰车的拉力时保持拉力并停止运转。为限制马达的最高转速 ，在回中马达前面应设有流量阀或尖似元件。
作为扭矩变量本身的先导控制，可采用一个溢流阀调节。X 口最大供油量约为 5L/min,随先导压力与工作压力差的降低，先导油液流量也减小。

MO 扭矩变量



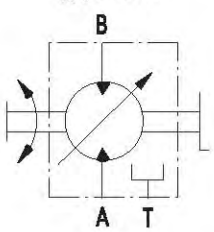
MO,Mooring Control

The mooring control is used mainly for the drive of winches,to generate a constant line pull.
Assembly type 1
Start of control at V_{gmin}(min.torque,max.speed)
Setting of Regulator
Pilot pressure increase(V_{gmin}-V_{gmax})△p=5MPa.
Start of control adjustable from 8 to 35MPa (must be indicated in cleat text when ordering).
A constant torque, which may be altered according to requirements in order to generate a constant line pull at the 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(V_{gmin}).The higher motor speed thus resulting (warping speed)causes rapid operation of the winch until the mooring pull required of the winch is reached and set.
In order to limit the maximum 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 valve may be used. The max.oil flow at port X is approx5L/min.The pilot oil flow reduces with lower differential pressure between pilot pressure and operating pressure.

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 1 种装配型式

MA 手动变量



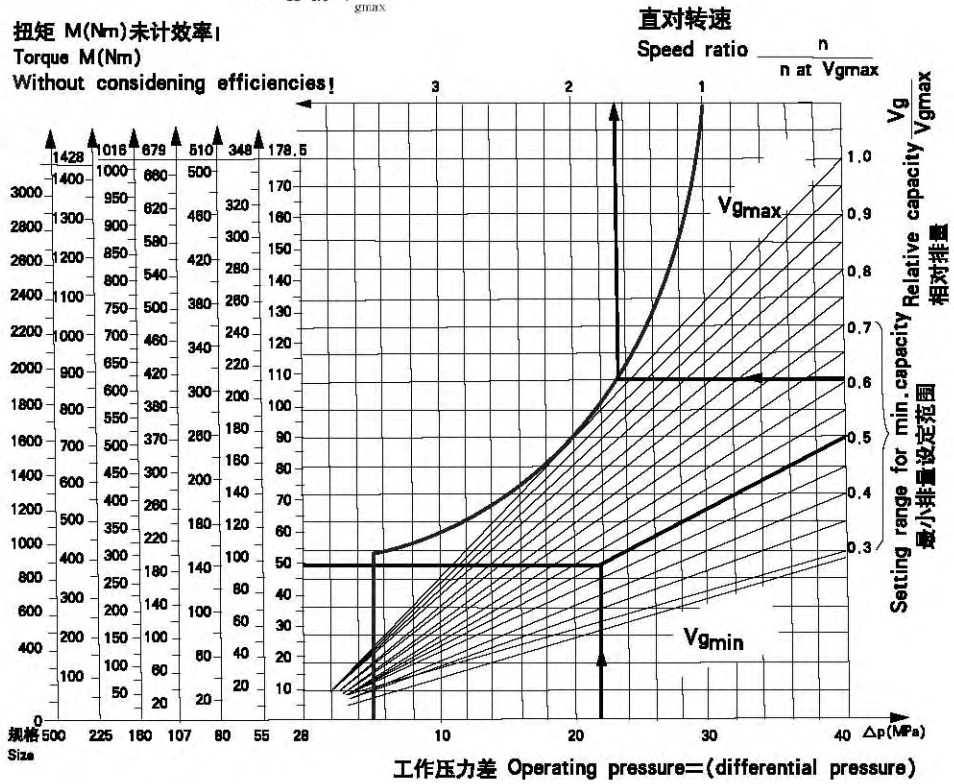
MA,Manual Control

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

通用特性曲线 General Operating Curve

(P-M) 和 (V_g n在V_{gmax}时) 特 性

Characteristic (P-M)and(V_g n at V_{gmax})



应用示例 1

规格 55：压差 △P=22MPa

排量 V_g=27.4ml/r

求：输出扭矩 M

解：相对排量

$\frac{V_g}{V_{gmax}}=\frac{27.4}{54.8}=0.5$

在图表即可按 $V_g=0.5V_{gmax}$，△P=22MPa 查出 M=96Nm.

Example 1

Size 55

Differential pressure △P=22MPa

Capacity V_g=27.4ml/r

Required:Output torque M

Solution:Capacity V_g=27.4Ml/r

$\frac{V_g}{V_{gmax}}=\frac{27.54}{54.8}=0.5$

$0.5V_{gmax}$ at 22 MPa gives an output torque M of 96Nm.

应用示例 2

规格 55 排量 V_g=32.9ml/r

求：相对转速

由 $\frac{V_g}{V_{gmax}}=\frac{32.9}{54.8}=0.6$

据此由图表中查出相对转速：

$\frac{n}{n_{max}}=1.666$

即可同样流量下，马达转速是最大排量(V_{gmax})时的 1.666 倍。

Example 2

Size 55

Capacity V_g=32.9ml/r

Required:Speed ratio

Solution:Capacity V_g=32.9ml/r

$\frac{V_g}{V_{gmax}}=\frac{32.9}{54.8}=0.6$

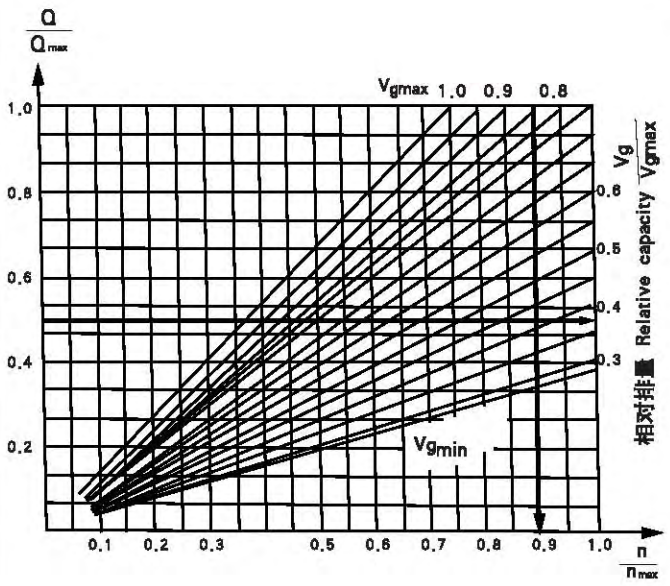
$0.6V_{gmax}$ gives a a speed ratio of

$\frac{n}{n_{max}}=1.666$

I.e.at the same flow, the variable motor speed of rotation at factor of 1.666 times the speed at max capacity(V_{gmax}).

转速与排量的极限值

Limiting values for speed and capacity



应用示例 1

规格 107

流量 Q=160.5L/min

求：不超过马达允许最高转速的最小排量（当 $V_g<V_{gmax}$）

解：规格 107 的允许最大流量是：Q_{max}=321L/min.因此

$\frac{Q}{Q_{max}}=\frac{160.5}{321}=0.5$

由表查出相对排量为：

$\frac{V_g}{V_{gmax}}=0.375$

因此马达最小排量为：

$0.375\times V_{gmax}=0.375\times 107$

$=40.125ml/r$

应用示例 2

规格 107

马达排量 V_g=91ml/r<V_{gmax}

求：允许最高转速 n

解：

相对排量

$\frac{V_g}{V_{gmax}}=\frac{91}{107}=0.85$

据此在图表中查出对应的相对转速

$\frac{n}{n_{max}}=0.9$

$\therefore n=0.9n_{max}$

$=0.9\times 4000=3600r/min$

Example 1

Size 107

Oil flow Q=160.5L/min

Required: Minimum permissible capacity in order not to exceed the maximum permissible motor speed

(at $V_g<V_{gmax}$)

Solution:Max permissible oil flow for size 107 is 321L/min,therefore

$\frac{Q}{Q_{max}}=\frac{160.5}{321}=0.5$

This gives a capacity of :

$\frac{V_g}{V_{gmax}}=0.375$

The minimum motor capacity is therefore

$0.375\times V_{gmax}=0.375\times 107=40.125ml/r$

Example 2

Size 107

Motor capacity V_g= 91ml/r<V_{gmax}

Required:

Maximum permissible speed n

Solution:Motor capacity

V_g=91ml $\therefore \frac{V_g}{V_{gmax}}=\frac{91}{107}=0.85$

The motor capacity $0.85V_{gmax}$ gives

$\frac{n}{n_{max}}=0.9$

$n=0.9\times n_{max}=0.9\times 4000$

$=3600r/min$

HD 特性曲线 Control curve

(P-M)和 $(V_g - \frac{n}{n\text{在}V_{max}\text{时}})$ 特性

Characteristic (P-M) and $(V_g - \frac{n}{n \text{ at } V_{max}})$

扭矩 Torque M(Nm)

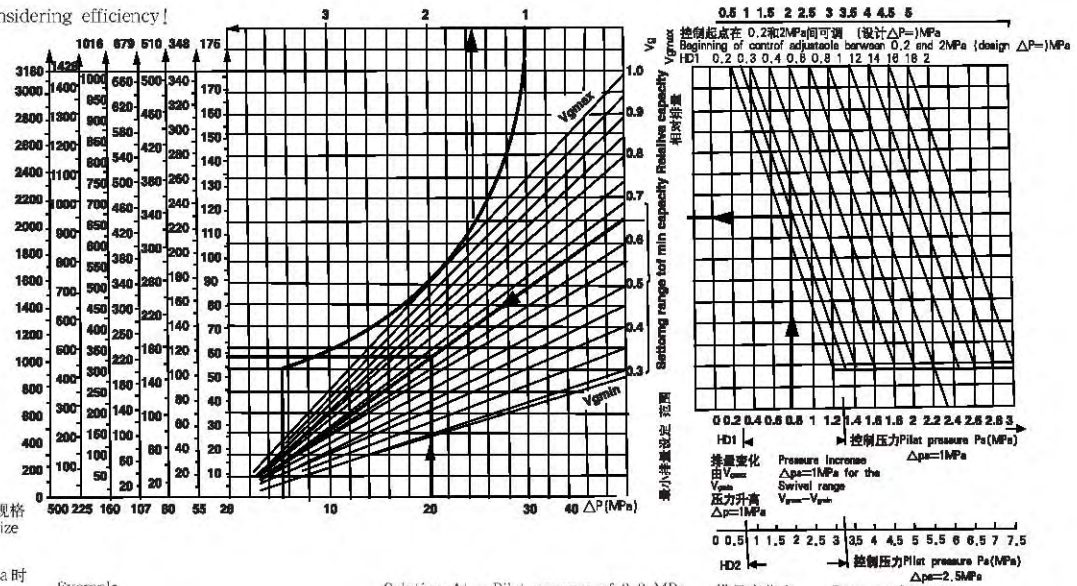
未计效率! Without considering efficiency!

相对转速

Speed ratio $\frac{n}{n \text{ at } V_{max}}$

控制起点在 0.5 和 5MPa 间可调 (设计△Ps=2.5MPa)

Beginning of control adjustable between 0.5 and 5MPa (design △Ps=2.5MPa)



应用示例:

规格 55;HDI;$\triangle P_s$=1MPa

当 P_s=0.8MPa 及 △P=20MPa 时

求:输出扭矩和相对转速

解:

Ps=0.8MPa 对应的 $\frac{V_x}{V_{gmax}}$ =0.65

和 $\frac{n}{n\text{在}V_{gmax}}$ =1.54

V_g=0.65 × V_{gmax}=0.65 × 54.8 =35.6ml/r

在△P=20MPa 时的扭矩 M=114Nm.

Example

size 55.HDI

Start of control at pilot pressure increase $\triangle P_s$=1MPa

available pilot pressure main pressure P_s=0.8MPa and △P=20MPa

Required: Output torque and speed ratio

Solution:At a Pilot pressure of 0.8 MPa a capacity ratio $\frac{V_x}{V_{gmax}}$ =0.65

and speed ratio $\frac{n}{n \text{ at } V_{gmax}}$ =1.54

$\frac{V_g}{V_{gmax}}$ =0.65 sives a capacity of

0.65V_{gmax}=0.65 × 54.8=35.6ml/r

At a main pressure (differential pressure) of △P=20MPa the output torque will be approximatei approxi 114Nm

排量变化由 V_{gmax} 至 V_{gmin} 压力升高 △P = 2.5MPa

Pressure Incrense △Ps = 2.5MPa for the Swivel range 升高 V_{gmax}-V_{gmin}

EP 特性曲线 Control Curve

(P-M)和$(V_g - \frac{n}{n\text{在}V_{gmax}\text{时}})$ 特性

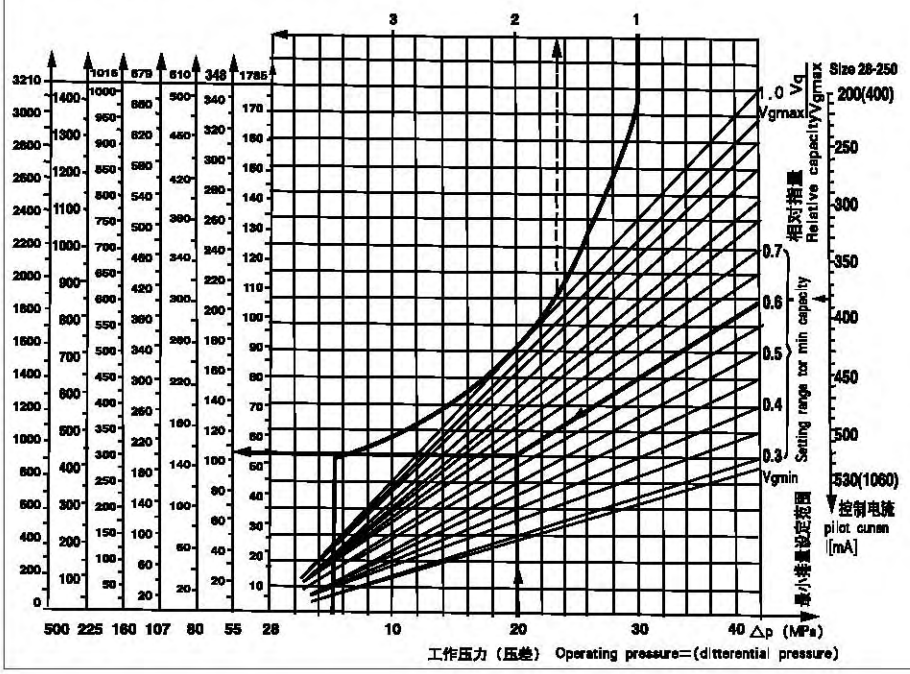
Characteristic (P-M) and $(V_g - \frac{n}{n \text{ at } V_{gmax}})$

扭矩 Torque M(Nm)

未计效率! Without considering efficiency!

相对转速

Speed ratio $\frac{n}{n \text{ at } V_{max}}$



应用示例:

规格 55:控制电流 385mA(24V)

工作压力△P=20MPa

求:输出扭矩和相对转速

解:查表得 385mA 时的相对排量

$\frac{V_g}{V_{gmax}}$ =0.6

其对应的转速比

$\frac{n}{n\text{在}V_{gmax}\text{时}}$ = 1.666

即在相同的流量下,马达转速是最大排量 V_{gmax} 时的 1.666 倍。

由表中可以查出相对排量

$\frac{V_g}{V_{gmax}}$ =0.6

则 V_g=0.6V_{gmax} =0.6 × 54.8 =32.9ml/r

在△P=20MPa 时的输出扭矩 M=105Nm

Example:

Size 55

Pilot current 385 mA(24V)

Operating pressure △P=20MPa

Required:Output torque and speed ration

Solution:At a pilot current of 385 mA.

a capacity ratio $\frac{V_g}{V_{gmax}}$ =0.6 and a speed ratio of

$\frac{n}{n \text{ at } V_{gmax}}$ =1.666

is obtainedi.e. for same oil flow the variable motor rotates at a factor of 1.666 faster than at max capacity V_{gmax}. The capacity ratio $\frac{V_g}{V_{gmax}}$ =0.6

gives a capacity of 0.6V_{gmax}=0.6 × 54.8=32.9ml/r. At an operating pressure of △P=20MPa the output torque is approx 105Nm.

HA 特性曲线 Control Curve

(P-M) 和 (V_g - $\frac{n}{n\ 在V_{gmax}时}$)特性

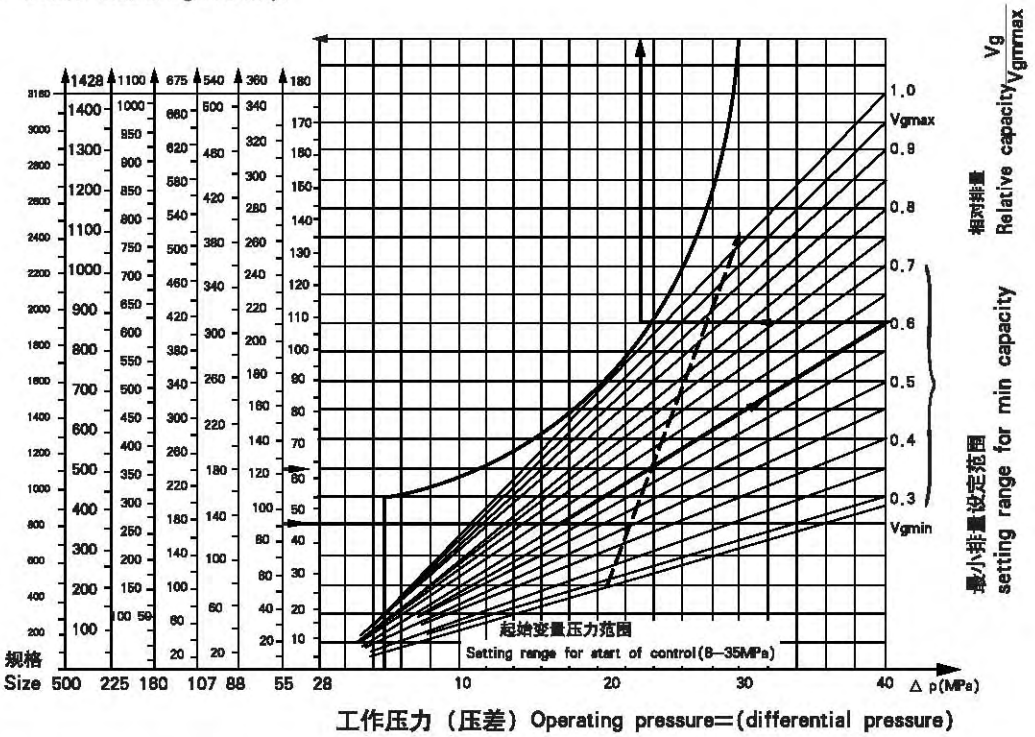
Characteristic (P-M) and (V_g - $\frac{n}{n\ at\ V_{gmax}}$)

相对转速

Speed ratio $\frac{n}{n\ at\ V_{max}}$

扭矩 Torque M(Nm)

未计效率! Without considering efficiency!



工作压力（压差）Operating pressure=(differential pressure)

应用示例 1

规格 55：HA1

变量起点压力设定为 17MPa 从 V_{gmin} 到 V_{gmax} 压力恒定，输出扭矩 M=90Nm，

求：马达排量和相对转速。

解：

对于 M=90Nm 和△P=17MPa 由图表 查出相对排量为

$\frac{V_m}{V_{gmax}}=0.6$

和相对转速 $\frac{n}{n\ 在V_{gmax}时}=1.666.$

即在相同流量下马达的转速是在最大排量时约 1.666 倍。

这时的排量

$V_g=0.6\times V_{gmax}=0.6\times 54.89$

$=32.9ml/r$

应用示例 2

规格 55：HA2

变量起点压力设定为 20MPa 从 V_{gmin} 到 V_{gmax} 压力升高 10MPa；输出扭矩 M=122Nm；

求：马达排量工作压力和相对转速。

解：对 HA 的变量马达按下述步骤求解

先找出起始变量压力 20MPa 时与 V_{gmin} 线的交点和变量终点压力 20MPa 时与 V_{gmin} 线的交点和变量终点压力 20+10=30MPa 与 V_{gmin} 线的交点，该两点的连线即为该马达的变量特性曲线。

当 M=122Nm 时对应于该点的工作压力△P=23.5MPa；相对排量为：

$\frac{V_g}{V_{gmax}}=0.6$

相对转速为 $\frac{n}{n\ 在V_{gmax}时}=1.666$

排量 $V_g=0.6\times V_{gmax}$

$=0.6\times 54.89$

$=32.9ml/r$

Example 1

Size 55：HA 1

Start control set at 17MPa

Model without pressure increase from V_{gmin} to V_{gmax}.

Output torque M=90Nm

Required：Motor capacity and speed ratio

Solution：For a required output torque of 90 Nm and an operating pressure

△P=17MPa a capacity ratio

$\frac{V_g}{V_{gmax}}=0.6$ and a speed ratio

$\frac{n}{n\ at\ V_{gmax}}=1.666$, is obtained i.e.

at the same oil flow, the variable motor rotates at a factor of 1.666 faster than at max capacity V_{gmax}.

The capacity ratio

$V_g=0.6\times V_{gmax}=0.6\times 54.89$

$=32.9ml/r$

Example 2

Size 55：HA2

Start of control set at 20MPa Model with pressure increase from V_{gmin} to V_{gmax} 10MPa. Required output torque M=122Nm.

Required：Motor capacity operating pressure and speed ratio.

Solution：For variable motor HA2 with pressure increase, other characteristics apply.

These are obtained as follows.

The intersection point between line V_{gmin} and the pressure line for the end of control (e.g. start of control 20 MPa pressure increase 10MPa=end of control 30 MPa) is taken.

These two points are joined by a straight line. This is the correct characteristic line. For the required output torque of 122 Nm in the example, an operating pressure of approx 23.5 MPa 3.5MPa pressure increase) and a capacity ratio of

$\frac{V_g}{V_{gmax}}=0.6$

is obtained together with a speed ratio

$\frac{n}{n\ at\ V_{gmax}}=1.666.$

The capacity ratio

$V_g=0.6\times V_{gmax}$

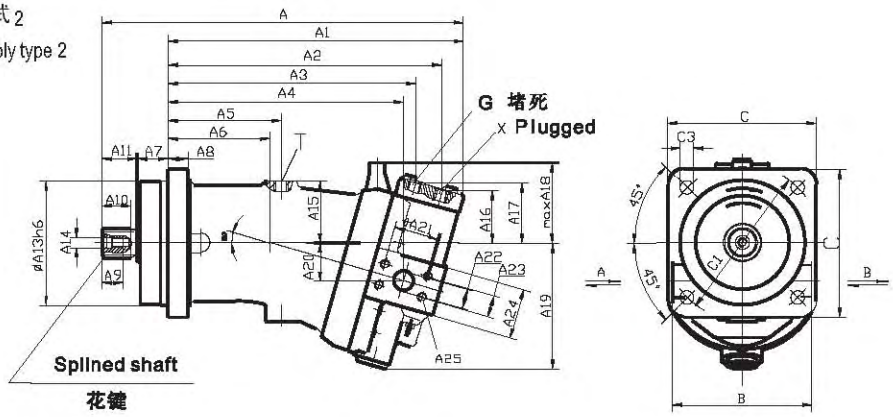
$=0.6\times 54.89$

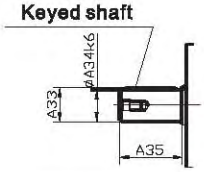
$=32.9ml/r$

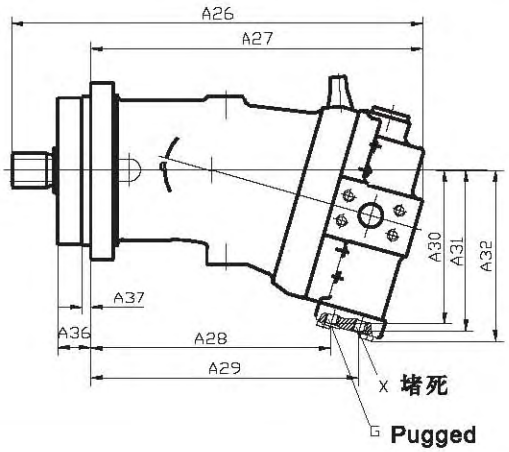
A6V变量马达 Variable Displacement Motor A6V

外形尺寸 Unit Dimensions
规格 Size 28~225
HD、HS变量 Control

装配方式2
Assembly type 2

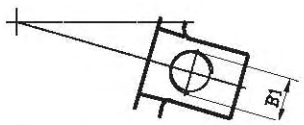






SAE 法兰连接（压力油口）
螺纹连接（压力油口）

SAE pressure port
Threaded pressure port



A,B,工作油口
G 多元件同步控制和遥控压力油口
X 先导（外控）油口
T 壳体·油口

service port
port for synchronous control of multiple units and for remote control pressure.
pilot pressure
case drain

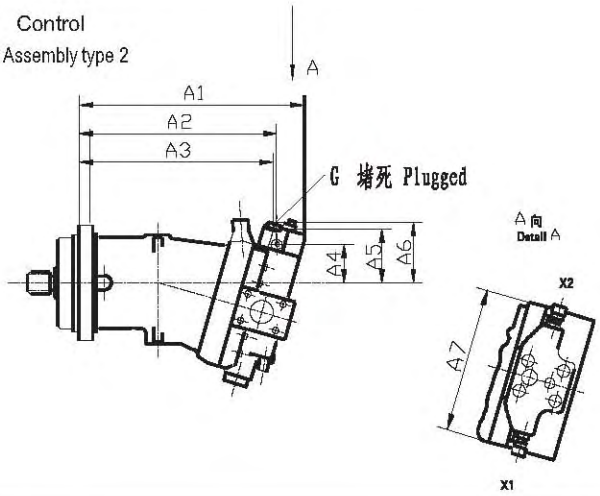
规格																								深			
Size	A	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}	A_{16}	A_{17}	A_{18}	A_{19}	A_{20}	A_{21}	A_{22}	A_{23}	A_{24}	A_{25}	deep	A_{26}	A_{27}	A_{28}
28	317	249	230	206	189	107	75	25	16	19	28	43	M16 × 1.5	100	M8	50	57	64	81	110	33	50.8	20	23.8	45	M10	17	298	230	152
55	379	312	291	264	249	123	108	32	20	28	28	35	M18 × 1.5	125	M12	63	52	60	84	132	40	50.8	20	23.8	53	M10	17	368	301	208
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
225	573	468	441	405	375	222	162	50	32	36	43.5	55	M22 × 1.5	200	M16	96	74	85	121	199	61	66.7	32	31.8	70	M14	21	546	441	324

规格															平键 keyed	花键 splined	花键 splined		
Size	A_{29}	A_{30}	A_{31}	A_{32}	A_{33}	A_{34}	A_{35}	A_{36}	A_{37}	B	B_1	C	C_1	C_2	C_3	GB1096-79	DIN 5480	GB3478.1-83	G	X
28	176	124	131	139	27.9	25	50	23	8	116	M27 × 2	118	125	12	11	键8 × 50	W25 × 1.25 × 18 × 9g	EXT18Z × 1.25M × 30R × 5f	M12 × 1.5	M14 × 1.5
55	235	133	141	153	32.9	30	60	29	10	142	M33 × 2	150	160	16	13.5	键8 × 50	W30 × 2 × 14 × 9g	EXT14Z × 2m × 30R × 5f	M14 × 1.5	M14 × 1.5
80	282	152	161	177	38	35	70	29.5	10	172	M42 × 2	165	180	16	13.5	键10 × 56	W35 × 2 × 16 × 9g	EXT16Z × 2m × 30R × 5f	M14 × 1.5	M14 × 1.5
107	288	164	173	188	43.1	40	80	35	10	178	M42 × 2	190	200	20	17.5	键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	键14 × 70	W45 × 2 × 21 × 9g	EXT21Z × 2m × 30R × 5f	M14 × 1.5	M14 × 1.5
225	359	201	211	219	53.5	50	100	50	12	226	M48 × 2	236	250	25	22	键14 × 80	W50 × 2 × 24 × 9g	EXT24Z × 2m × 30R × 5f	M14 × 1.5	M14 × 1.5

A6V变量马达 Variable Displacement Motor A6V

DA 变量 Control

装配方式 2 Assembly type 2



规格 Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	X_1、X_2
28	253	212	209	53	73	81	144	M14 × 1.5
55	317	272	268	49	70	77	146	M14 × 1.5
80	371	326	322	56	77	83	152	M14 × 1.5
107	380	336	332	59	81	88	152	M14 × 1.5
160	442	387	383	65	86	94	158	M14 × 1.5
225	471	416	411	73	95	103	158	M14 × 1.5

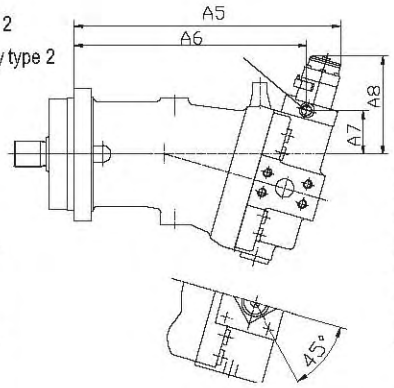
其余尺寸见 HD/HA.

Other dimensions see HD/HA.

EP 变量 Control

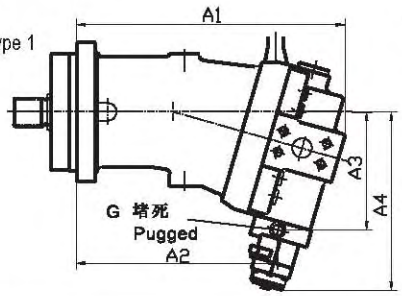
装配方式 2

Assembly type 2



装配方式 1

Assembly type 1



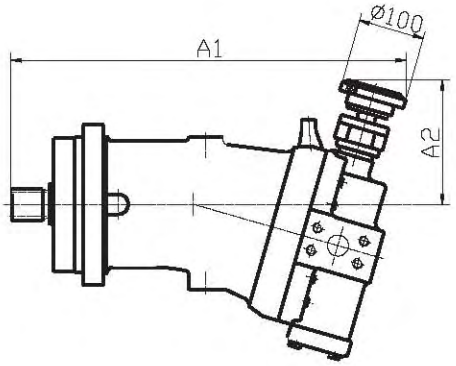
规格 Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8
28	230	164	119	204	266	212	53	131
55	301	223	129	213	334	274	48	124
80	353	267	148	240	392	326	56	137
107	357	269.5	160	254	393	333	61.5	144
160	423	313	177	265	452	386	70	139
225	441	334	196	284	481	414	74.5	147

其余尺寸见 HD/HA.

Other dimensions see HD/HA

MA 变量 Control

装配方式 1 Assembly type 1

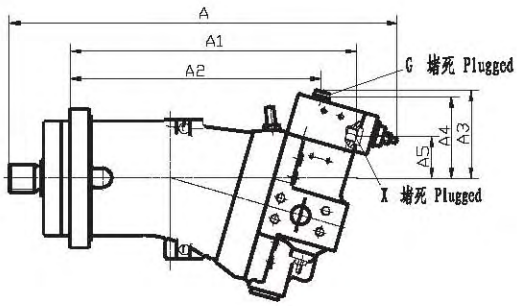


规格 Size	A_1	A_2
28	269	128
55	329	134
80	381	138
107	390	137
160	441	149
225	470	155

其余尺寸见 HD/HA.

Other dimensions see HD/HA.

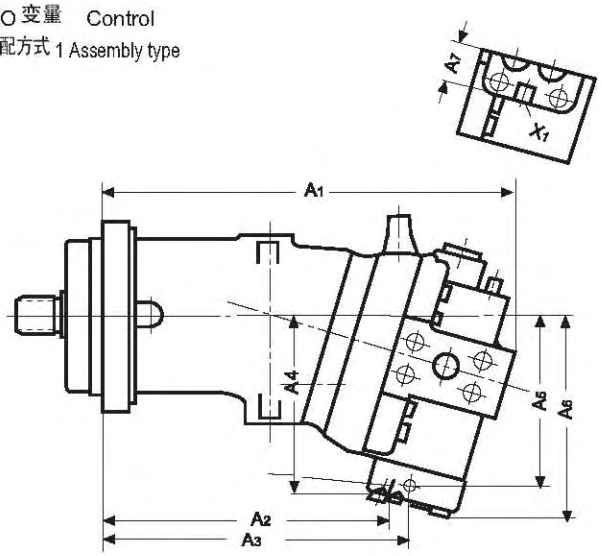
HD1D



规格 Size	A	A1	A2	A3	A4	A5
55	422	311	273	96	89	46
107	496	376.5	335.5	108	100	56

A6V变量马达 Variable Displacement Motor A6V

MO变量 Control
装配方式 1 Assembly type

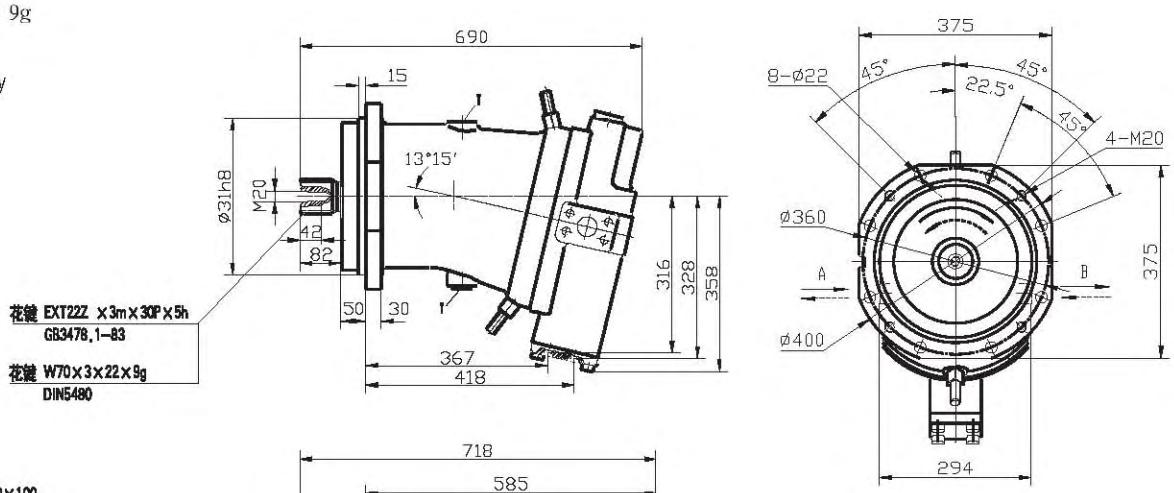


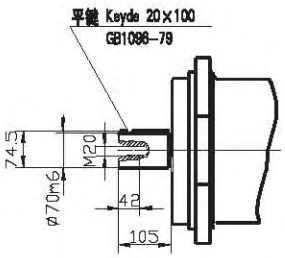
规格 Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	X_1
55	301	208	224	138	130	155	30	M14 × 1.5
80	353	252	268	157	149	177	33	M14 × 1.5
107	357	257	273	169	161	188	33	M14 × 1.5
160	423	300	312	187	178	206	34	M14 × 1.5
225	441	322	334	206	197	225	34	M14 × 1.5

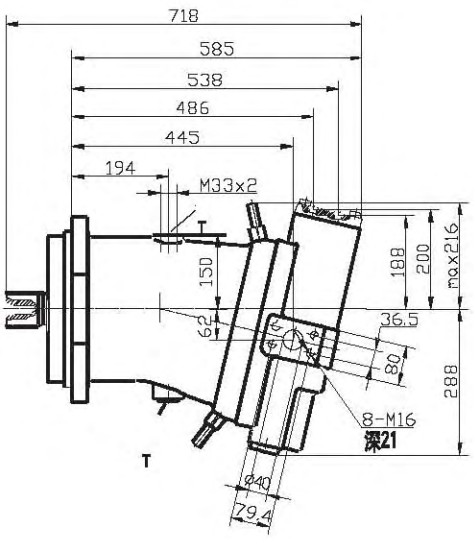
其余尺寸见 HD/HA.

Other dimensions see HD/HA.

外形尺寸 Unit Dim dimensions
规格 Size 500
HA 变量 Control
花键 Splined
W70 × 3 × 22 × 9g
(DIN 5480)
装配方式 1 Assembly

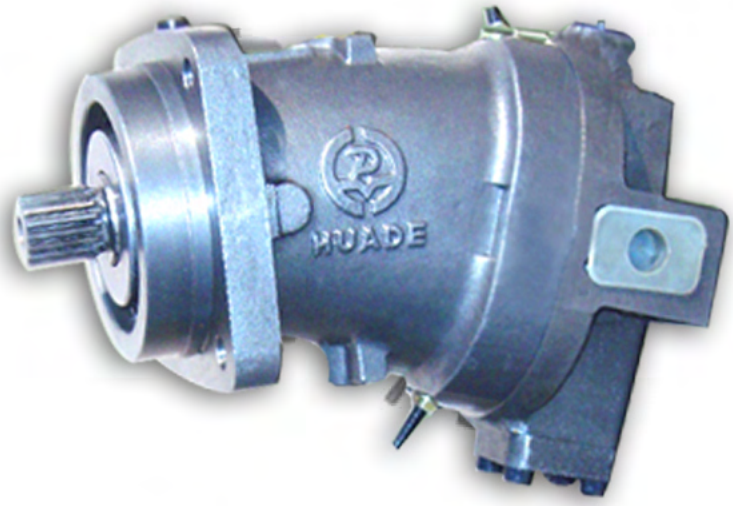






HD 变量 Control
装配方式 2 Assembly 2

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A6VG 变量马达 Variable Displacement Motor A6VG 用于开式和闭式回路 For open and closed circuits 斜轴式轴向柱塞结构 axial tapered piston,bent axis design	RC91010/12.2004
规格 Size 107-125	高压范围 Peak pressure 至 up to 40MPa	替代：Replace



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

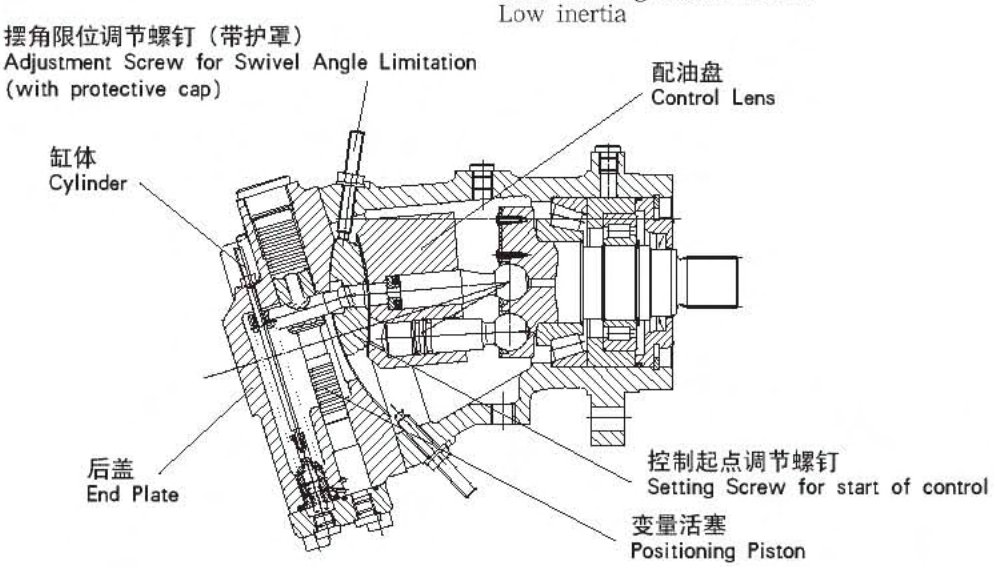
Description

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



型号 Type Code

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

结构型式 Series

结构6，规格107	Series 1,sizes 107

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

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

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

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

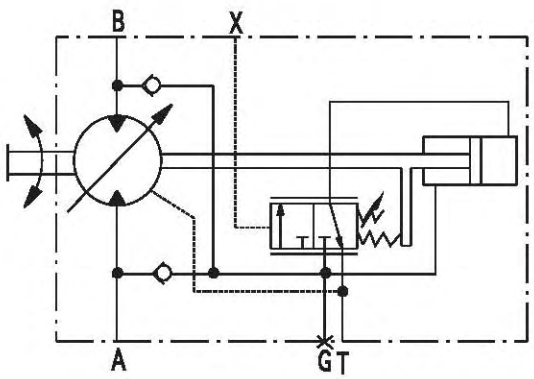
Pilot pressure increace (V_{gmax}-V_{gmin})___△Ps=25MPa

Start of control,setting range_____0.5 and 5MPa

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

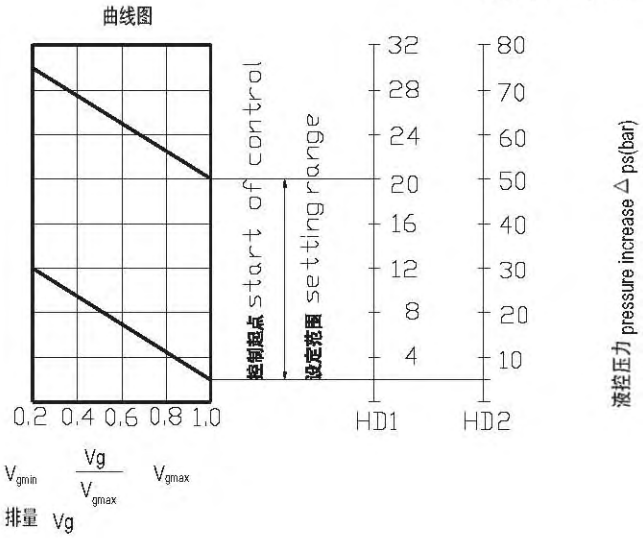
When ordering please state required start of control in clear text,e.g.start of control at 0.3MPa.

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.

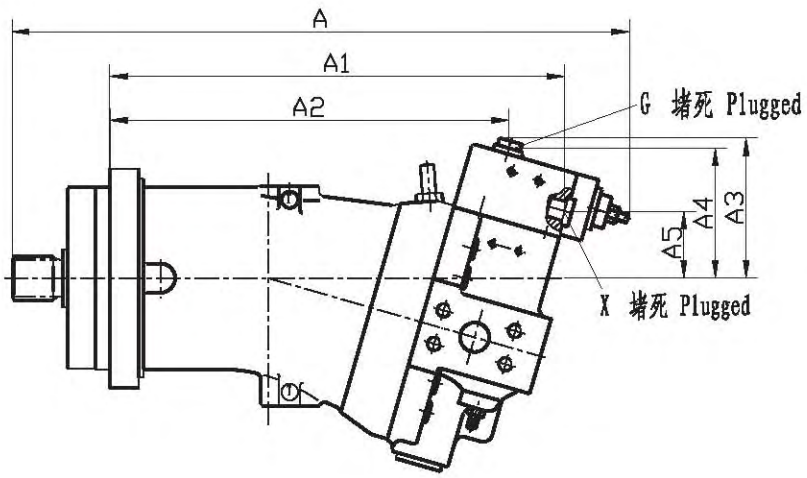


HD1D 液控恒压变量

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.

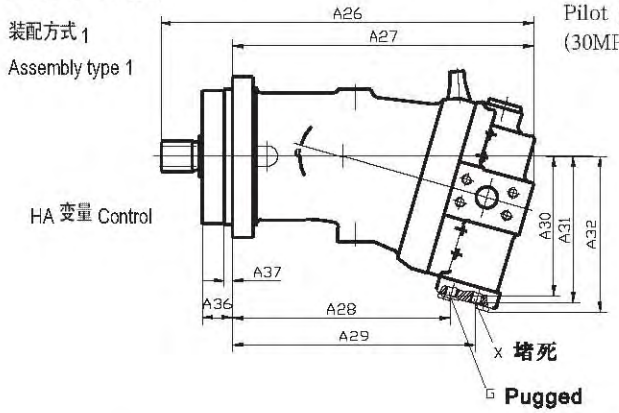
Example:

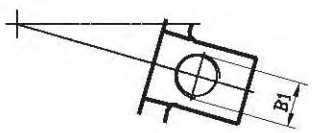
Regulator setting:30MPa.

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。

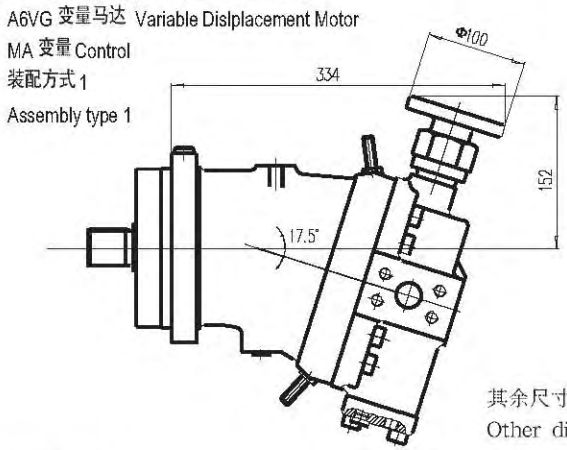
Two options are available for HA control with override.

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

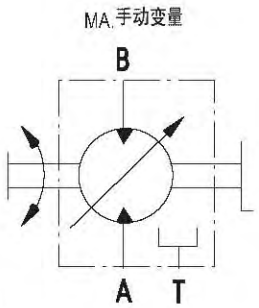
If override is only required to set max.capacity(swivelling the motor toV_{gmax}),a pilot pressure of up to 5MPa max is permissible.

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

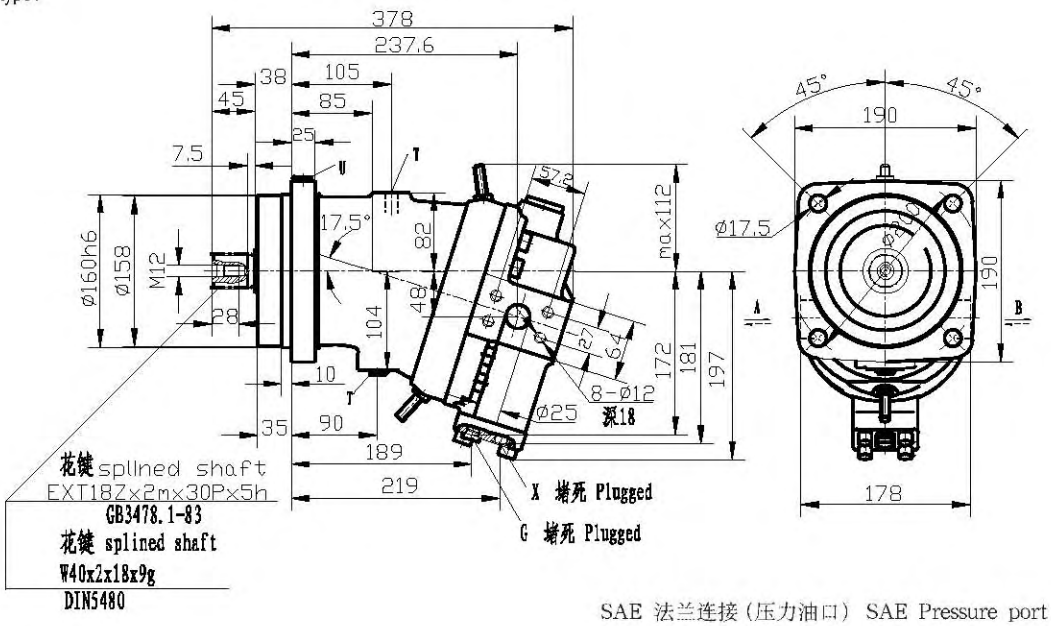
规格 Size 107、125

HA 高压自动变量 Control

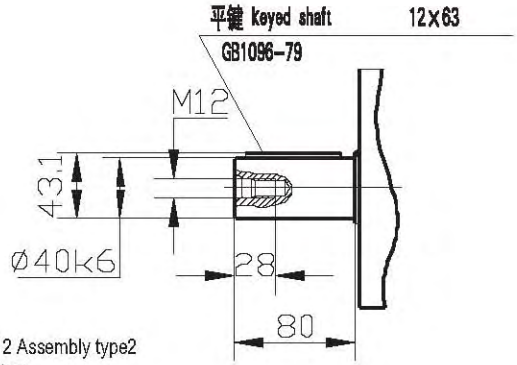
装配型式 1 Assembly type1

SAE 法兰连接（压力油口）

SAE pressure port



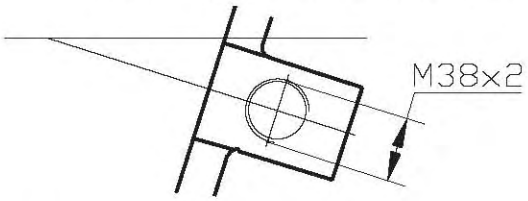
SAE 法兰连接（压力油口） SAE Pressure port



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

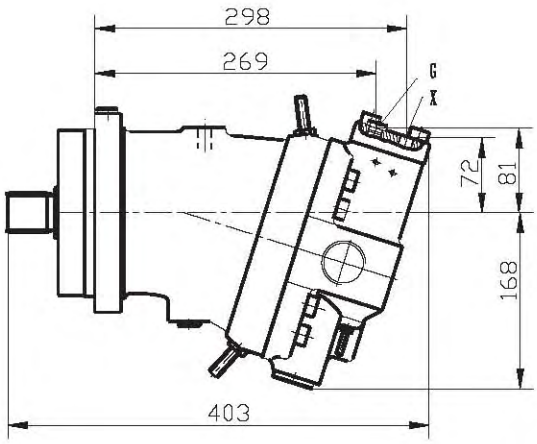
G 多元件同步 port for synchronous control

控制和遥控 of multiple units and for

压力油口 remote control pressure

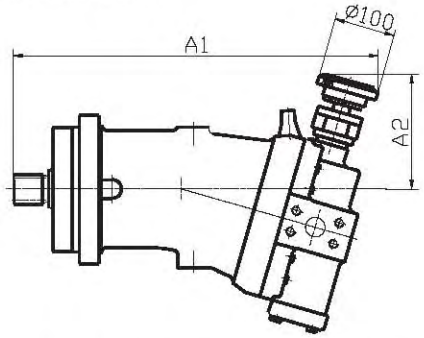
X 先导（外控）油口 Polot pressure

t 壳体、油口 case drain

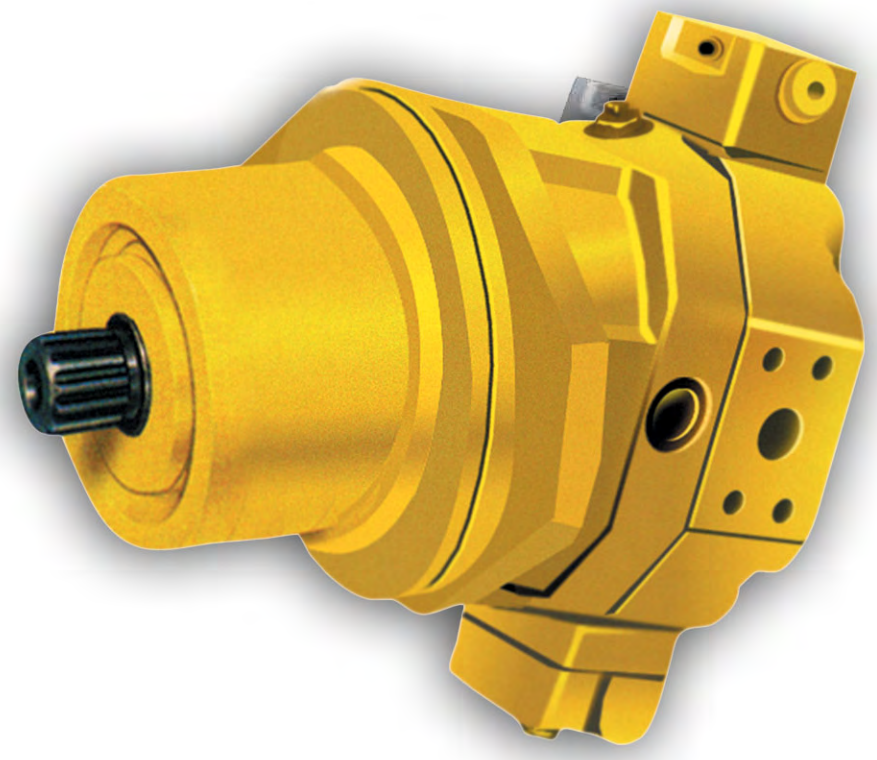


MA 变量 Control

装配方式 1 Assembly type1



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



A6VE 内藏式变量马达装有一套弯轴结构的标准轴向锥形柱塞旋转组件。

液压内藏式马达主要用来安装在机械齿轮箱中，例如，履带驱动轮箱。

马达的安装法兰设计在壳体的中间，这种结构允许马达几乎完全装进机械齿轮箱，从而提供一个十分紧凑的部件。

内藏式马达部件的特殊优点是：

- 整个部件，已组装和试验
- 易于组装，仅需“插入”机械齿轮箱
- 不需要考虑安装公差

The variable displacement plug-in motor A6VE is equipped with a standard axial tapered piston rotary group of bent axis design. Hydrostatic plug-in motors are intended primarily for installation in mechanical gearboxes,e.g. track drive gear boxes.

The design of the motor with the mounting flange in the center of the housing allows it to be almost fully integrated into a mechanical gearbox to give an extremely compact unit.

The particular advantages of the plug-in motor over kit designs are:

- complete unit, ready assembled and tested.
- easy assembly simply plug-in to mechanical gearboxes.
- no installation tolerances to consider.

型号说明 Type Code

A6V	E	80	HA1	2	F	Z	1	039

马达型号 Motor Type

变量马达 Variable displacement motor — A6V

安装型式 Mounting Type

内藏式 E plug-in E — E

规格 Size

排量/ml/r displacement

1.5-54.8ml/r	55
23-80ml/r	80
30.8-107ml/r	107
46-160ml/r	160

变量方式 Control Device

液控变量 Hydraulic control, pilot pressure related	控制压差 △p=1MPa Pilot pressure Increase	HD1
	控制压差 △p=2.5MPa Pilot pressure Increase	HD2
	恒压 Constant pressure	
高压自动变量 Automatic control, high pressure related	不带超调 With out override	HA1
	升压 Pressure increase △p=10MPa	HA2
	不带超调 With out override	
电控双速变量	Electrical 2-speed 12v control(with switching solenoid)24	ES1
		ES2
电控比例变量	Electrical control 12v (with proportional solenoid) 24v	EP1
		EP2
手动变量	Manual control (with handwheel)	MA

结构型式 Series

结构2，规格 55.80.107.160	Series 2,sizes — 2

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

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

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	1
		2

最小排量设定值 Min. Swept Volume Setting

例：	Example. V_{gmin}=39ml/r	039
例：	Example. V_{gmin}=54ml/r	054

订货示例： A6V.E.80.HDI.2.F.Z.2.039

斜轴变量马达 A6V，内藏式 E，规格 80，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}=39ml/r

Ordering Example A6V.E.80.HDI.2.F.Z.2.039

Axial-piston-variable displacement motor A6V, plug-in E size 80, 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}=39ml/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=31.5MPa

最高压力 Peak pressure _____ p_{max}=35MPa

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.35MPa)

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:

u_{min} _____ 10mm²/s

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

最佳工作粘度：Optimum Operating Viscosity：

vopt _____ 16……36mm²/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 10μm. Coarser filtration of 25 to 40μm is possible,however longer service life 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时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。

最高允许转速见技术参数表

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.

流量

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

输出转速

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

输出扭矩

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

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

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

输出功率

Output Power $P = \frac{M \cdot n}{9549}$

$= \frac{Q \cdot \triangle p}{60} \cdot \eta_t$ [KW]

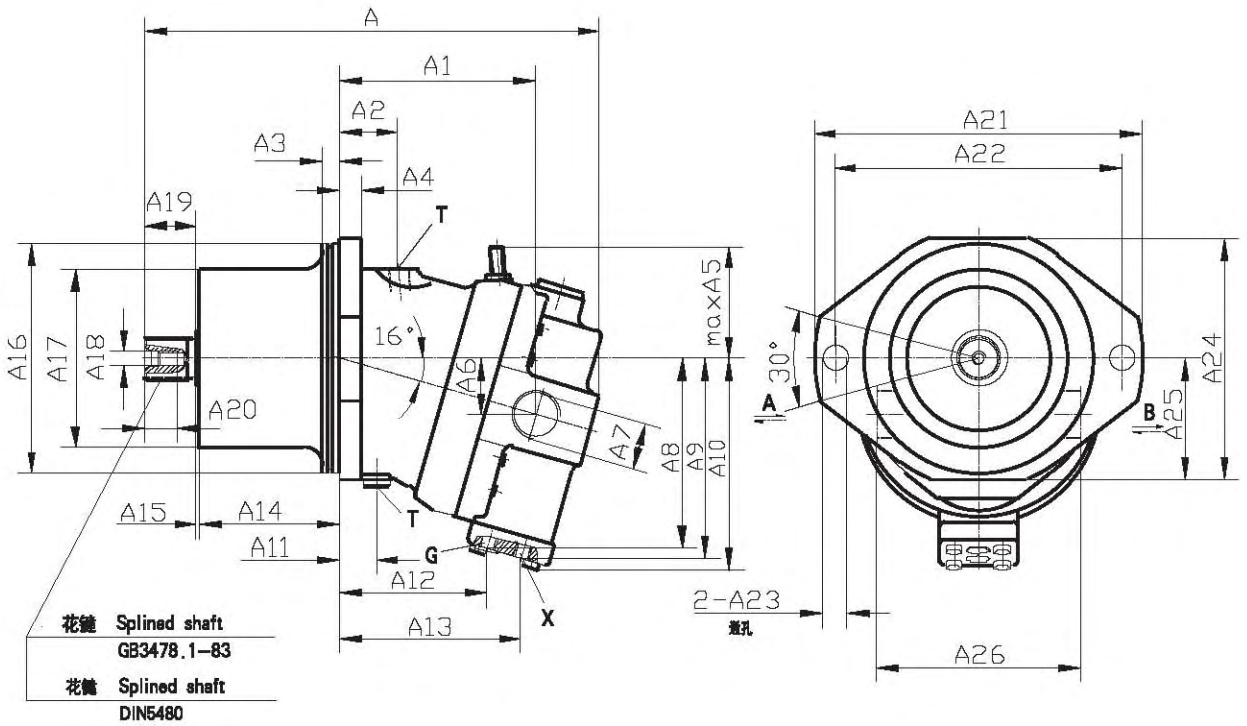
V_g=最大排量(ml/r)	max geometry displacement[ml/r]
M=扭矩 (Nm)	torque[Nm]
△p=压差 (MPa)	differential pressure[MPa]
n=转速(r/min)	speed[r/min]
μ_v=容积效率	volumetric efficiency
μ_{mh}=机械效率	mechanical-hydraulic efficiency
μ_t=总效率	overall efficiency

技术参数表 Technical Data

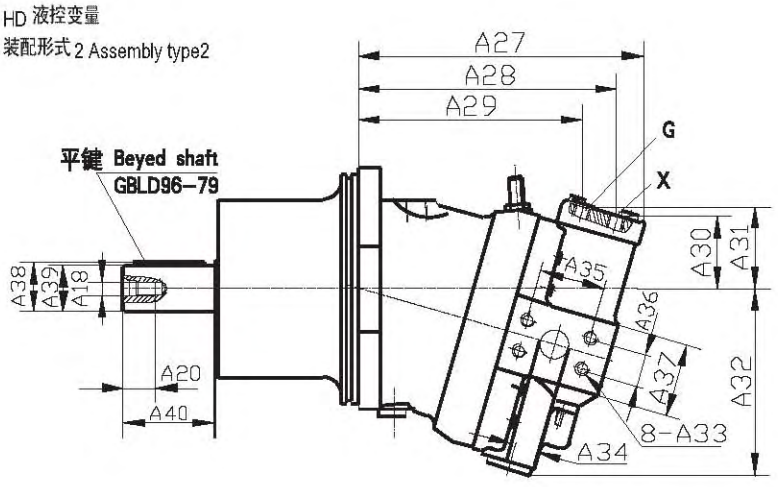
规格	size			55	80	107	160
排量	Displacement	V_{gmax}	ml/r	54.8	80	107	160
		V_{gmax}	ml/r	15.8	23	30.8	46
最大允许流量	Max.Permissible.Swept volume	Q_{gmax}	l/min	206	268	321	424
最高转速	Max.speeds	n_{max} 在at V_{gmax}	r/min	3750	3350	3000	2650
	(在at Q_{max}下)	n_{max} 在at $V_g<V_{gmax}$	r/min	5000	4500	4000	3500
扭矩常数	Torque constants	M_x 在at V_{gmax}	Nm/MPa	8.701	12.75	16.97	25.41
		M_x 在at V_{gmin}	Nm/MPa	2.511	3.73	4.9	7.35
最大扭矩	Max.torque	M_{max} 在at V_{gmax}	Nm	304	446	594	889
	(在at △p=35MPa)	M_{max} 在at V_{gmax}	Nm	88	130	171	257
最大输出功率(在35MPa和Q_{max}下)Max.output power(at 35MPa and Q_{max})			kW	120	156	187	247
惯性矩	Moment		kgm²	0.0042	0.008	0.0127	0.0253
重量	Weight		kg	26	34	45	64

外形尺寸 Unit Dimensions
规格 160 size 160

HA 高压自动变量 Control
装配形式 1 Assembly type1



HD 液控变量
装配形式 2 Assembly type2



A,B 工作油口	service port
G 多元件同步控	port for synchronous
制和遥控压力	control of multiple
油口 M14 × 1.5	units and for
	remote control pressure
X 先导油口	pilot pressure
M22 × 1.5	
T 壳体、泄油口	case drain
M14 × 1.5	

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Beijing Economic & Technological Development Zone
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返首页
Return To Home Page

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,Ltd. 华德

2004年12月编制

华德液压
HUADE HYDRAULIC

A7V

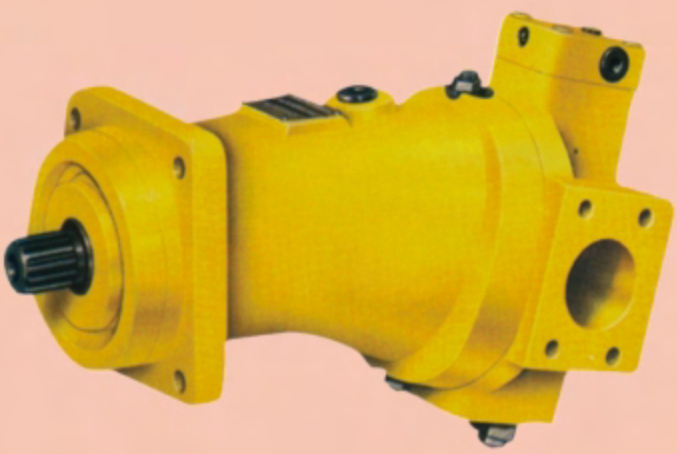
A2F A6V A8V A4V/F

选用手册 Selection Handbook

Axial Piston-
Bent Axis Design
Variable Displacement
Pump

斜轴式轴向柱塞
变量泵

For Open Circuits
用于开式系统



额定压力 Nominal Pressure PN=35 Mpa

规　格 Sizes　20–500

北京华德液压工业集团有限责任公司
BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP Co.,LTD.

目　录 CONTENTS

1 A7V 变量泵 1

Variable Displacement Pump A7V

注意事项

1.为了保证无故障的高效工作，在设计系统期间应根据工况仔细选择液压系统的液压油，所有矿物油基液压油均在某种程度上适用于轴向柱塞元件，它们的应用时基本划分取决于上述的水、粘度与温度关系，并考虑氧化和腐蚀保护、材料相容性、空气和水分离特性。

2.为了保证设备有长的使用寿命，必须进行良好而可靠的过滤。油液中的硬颗粒污染不得超过以下等级：

等级 9——按 NAS1638

等级 6——按 SAE

等级 18/15——按 ISO/DIS 4406

在油液温度很高时，最低清洁度为：

等级 8——按 NAS1638

等级 5——按 SAE

等级 17/14——按 ISO/DIS 4406

3.为了正确选择液压油，必须知道与环境温度有关的工作温度；在闭式回路中这是回路温度，在开式回路中这是油箱温度。

4.注意：漏油（壳体泄油）温度受压力和转速的影响，总是高于回路温度，然而要求回路中任何点温度不得超过 90℃。

如果由于极端的工作参数或较高的环境温度，而不能维持上述条件，订货时请询问我公司。

5.泵的进油口压力（绝对压力）处须≥ 0.08MPa，及泄油压力(壳体内允许的最高压力)为0.2MPa(绝对压力)，壳体内压力值必须等于或高于作用在轴密封上的外部压力值。

6.安装位置：一般要求液压泵／马达安装位置、壳体上边缘低于油箱最低液面。若安装需在油面以上，请在订货时提出。

《样本》所述技术资料，仅供参考。若有特殊要求请与我集团公司技术部门咨询，若有更改，恕不通知。

The technical information in the catalog is for your reference. Please consult our technical Dept., if you have any special requirements.

NOTES

1.In order to guarantee trouble-free and efficient operation, the hydraulic fluid in a hydrostatic system should be selected carefully according to the actual working conditions during the design of the system. All mineral oil based fluids are suitable to a greater or lesser degree for application in axial piston units. Their basic classification of application results from what has already been said due to the water , viscosity and temperature relationships, with consideration of oxidization and corrosion protection, material compatibility, air and water separation characteristics.

2.In order to guarantee a long service life for the installation, good and reliable filtration is necessary.The hard particle contamination of fluid may not exceed a level determined by:

Class 9 to NAS 1638

Class 6 to SAE

Class 18/15 to ISO/DIS 4406

When the fluid temperature is too high,the required minimum degree of cleanliness is:

Class 8 to NAS 1638

Class 5 to SAE

Class 17/14 to ISO/DIS 4406

3.In order to select the correct fluid,it is necessary to know the operating temperature in the circuit in relation to the ambient temperature-in an open circuit and the tank temperature.

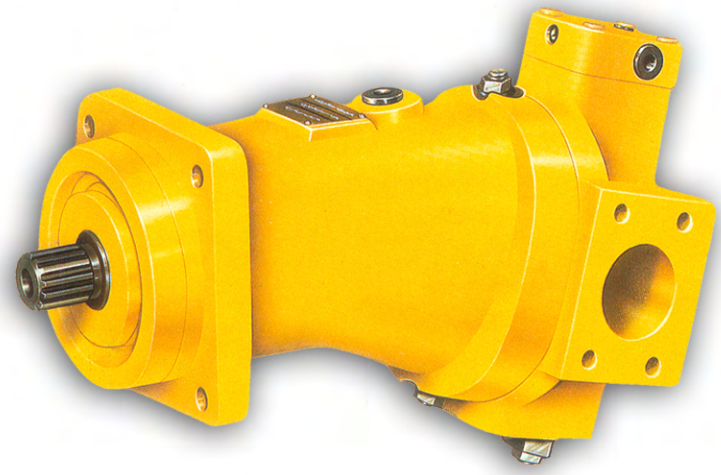
4.Important:The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the circuit temperature. However, at no point in the circuit may the temperature exceed 90℃。

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

5.The minimum pressure at the suction port of the pump ≥0.08 Mpa(absolute pressure), and the drain pressure (max. permissible casing pressure) is 0.2 MPa(absolute pressure). The pressure in the housing must be the same or greater than the external pressure on the shaft seal.

6.Installation position: in general, the upper point on the pump/motor housing must be below the minimum oil level of the tank. If you would like to install it above the minimum oil level, please indicate when order.

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A7V 变量泵 Variable Displacement Pump A7V 用于开式回路 For open circuits　斜轴式轴向柱塞结构 axial tapered piston,bent axis design	RC92100/12.2004
	规格 Size 20–500　高压范围 Peak pressure 至 up to 40MPa	替代：ReplaceRC92100/09.2003



说明：

●斜轴式轴向柱塞泵，用于开式回路静液压传动中。
●流量与驱动转速及排量成正比，在恒定驱动转速下，可以无级变化。
●控制装置品种齐全，用于每种控制和调节功能。
●用矿物油和抗燃液体工作。

结构特点：

结构 1

●高性能的旋转组件及球面配油盘，可实现自动对中，低周速，高效率。
●驱动轴能承受径向载荷。
●长寿命。
●低噪声级。

结构 5.1

●具有提高技术数据后的新型高性能旋转组件及经过考验的球面配油盘。
●结构紧凑。

Description

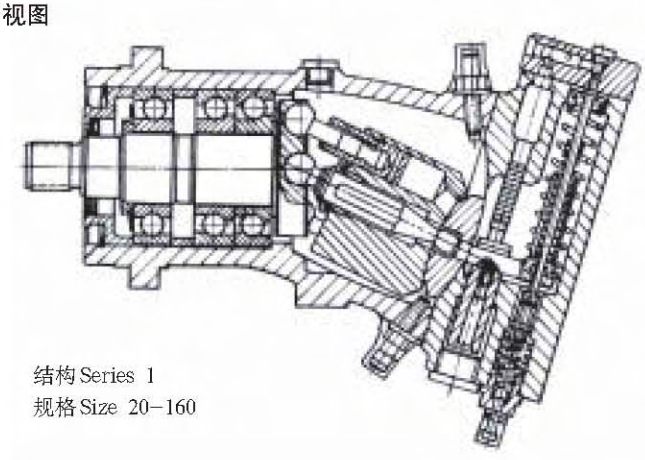
Variable displacement pump, axial piston, bent axis design, for hydrostatic transmissions in open circuits.
The flow if proportional to the drive speed and the displacement and is steplessly variable at constant drive speed.
comprehensive programme of control devices for every control and regulation function.
operation of both mineral, and fire-resistant fluids.

Special Features

series 1

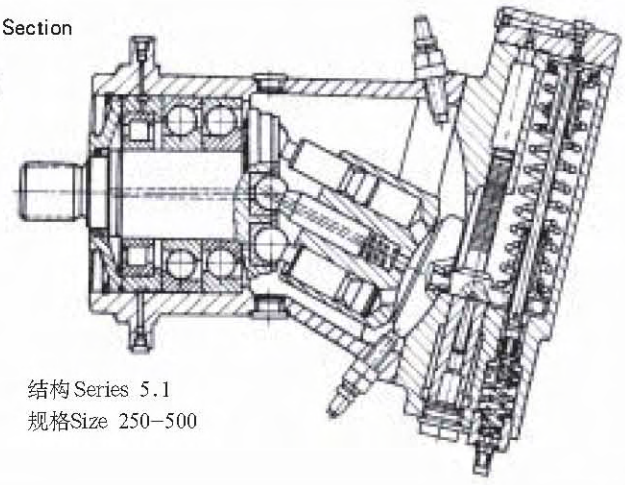
High performance rotary group with well-proven spherical control area offering the following advantages ;self-centering,low peripheral speed, high efficiency.
Long service life robust rolling bearing.
Drive shaft will support radial loads.
Low noise level.
High duty roller bearing for inter-mittent high pressure operation.
For continuous duty hydrostatic bearing are available.

剖视图



结构 Series 1
规格 Size 20–160

Section



结构 Series 5.1
规格 Size 250–500

A7V变量泵 Variable Displacement Pump A7V

型号说明 Type Code

A7V	55	LV	1	L	Z	F	O	O

泵型号 Pimp Type

变量泵 Axial piston variable Displacement pump	A7V

规格 Size

0–20.5	20
8.1–28.1	28
0–40.1	40
15.8–54.8	55
0–58	58
23.1–80	80
0–78	78
30.8–107	107
0–117	117
46.2–160	160
0–250	250
0–355	355
0–500	500

(排量 Displacement V_{gmin}–V_{gmax} ml/r)

变量方式 Control Device

恒功率变量	Constant horsepower control	LV
恒压变量	Constant pressure control	DR
电控比例变量	Electrical control (with prop.solenoid)	EP
液控变量	Hydraulic control pressure related	HD
手动变量(带手轮)	Manual control (with handwheel)	MA
刹车变量	Brake control	SC
数字变量	Numerical control	NC

结构型式 Series

见剖视图	see section	1
		5.1

转向(从轴端看) Direction of Rotation(Viewed of shaft end)

顺时针	clockwise	R
逆时针	anti–clockwise	L

轴伸 Shaft End

花键	splined shaft DIN 5480	Z
花键	splined shaft GB 3478.1–83	S
平键	keyed shaft GB1096–79	P

油口连接 Pipe Connections

压力油口：SAE法兰；在侧面 吸油口：SAE法兰；在侧面	Pressure port: SAE flange, on side Suction port: SAE flange, on side	F
压力油口：螺纹连接，在侧面 吸油口：SAE法兰；在侧面	Pressure port: threaded, on side Suction port: SAE flange, on side	G

行程限位 Stroke Limiter

没有	none	O
机械行程限位 (用于LV和DR)	Stroke limiter mechanically adjustable (for LV and DR)	M
液压行程限位 (用于LV)	Stroke Limiter, hydraulic (for LV)	H

辅助元件 Auxiliary Equipment

没有	none	O

订货示例.A7V.55.LV.1.L.Z.F.O.O

轴向柱塞变量泵A7V，规格55，恒功率控制，结构 1逆时针旋转，花键，SAE法兰连接，没有行程限位器和辅助元件。

Ordering Example: A7V.55.LV.1.L.Z.F.O.O

Axial piston variable displacement pump A7V, size 55. With constant horsepower control, series 1.
anti–clockwise rotation, splined shaft
SAE side flange connections, without auxiliary equipment.

A7V变量泵 Variable Displacement Pump A7V

技术参数表 Technical Data

(理论值，未考虑机械效率和容积效率) (theoretical values,without considering mech-hyd.and volumetric efficiency)

规格 Size				20	28	40	55	58	80	78	107	117	160	250	355	500
变量方式 control Device																
LV 恒功率变量 Constant HP control				•	•	•	•	•	•	•	•	•	•	•	•	•
LVS 恒功率负荷传感变量 Constant HP control with load sending												•				
DR 恒压变量 Constant pressure control				•		•		•		•		•		•	•	•
DRS 恒压负荷传感变量 Constant pressure control with load sending												•				
HD 液控变量 Hydraulic control				•	•	•	•	•	•	•	•	•				
EP 电控比便变量 Electric control(Proportional)						•	•	•	•	•	•	•	•	•		
MA 手动变量 Manual control				•	•	•	•	•	•	•	•	•	•	•		
SC 刹车变量 Brake control												•	•	•		
NC 数字变量 Numerical control										•	•					
排量 Displacement			V_{gmax}	mi/r	20.5	28.1	40.1	54.8	58.8	80	78	107	117	160	250	
355 500																
		V_{gmin}		mi/r	0	8.1	0	15.8	0	23.1	0	30.8	0	46.2	0	0	0
	在0.09MPa[1]	$n_{max}0.09$		r/min	3800	2800	3200	2360	2850	2120	2540	1900	2240	1650	1400	1250	1120
最高转速 Max.speed[3]	在0.1MPa[1]	$n_{max}0.1$		r/min	4100	3000	3400	2500	3000	2240	2700	2000	2360	1750	1500	1320	1200
	在0.15MPa[1]	$n_{max}0.15$		r/min	4750	3600	3750	3000	3350	2750	3000	2450	2650	2100	1850	1650	1500
	在$n_{max}0.09$	$Q_{max}0.09$		L/min	76	76	124	125	161	164	192	197	254	256	340	430	543
最大流量 Max.flow[2]	在$n_{max}0.1$	$Q_{max}0.1$		L/min	82	82	132	133	170	174	204	208	267	271	364	455	582
	在$n_{max}0.15$	$Q_{max}0.15$		L/min	94	98	146	160	190	213	227	254	300	326	449	568	728
	在$Q_{max}0.09$	$P_{max}0.09$		KW	45	46	75	75	97	99	116	119	153	154	204	259	326
最大功率 Max.Power	在$Q_{max}0.1$	$P_{max}0.1$		KW	49	49	80	80	102	105	123	125	161	163	218	273	350
(△p=35MPa)	在$Q_{max}0.15$	$P_{max}0.15$		KW	57	59	88	96	114	128	136	153	181	196	270	342	437
流量 Flow Q^2	在NE=1450r/min			L/min	28.8	39.5	56.4	77.1	82.3	112.5	109.7	150.5	164.6	225	–	–	–
功率 Power																	
P(△p=35MPa)	在NE=1450r/min			KW	17	24	34	46	50	68	66	91	99	135	–	–	–
扭矩 Torque	在V_{gmax}			Nm/10MPa	32.6	44.6	63.7	87	93.2	127.5	124	169.7	186	254	397.5	564.5	795
M(△p=10MPa)	在V_{gmin}			Nm/10MPa	–	12.9	–	25.1	–	36.8	–	49	–	73.5	–	–	–
最大扭矩 (△p=35MPa)	在V_{gmax}			Nm	114	156	223	305	326	446	431	594	651	889	1391	1975	2782
Max.torque M_{max}	在V_{gmin}			Nm	–	45	–	88	–	129	–	171	–	257	–	–	–
惯性矩 Moment		J		kgm^2	0.0017	0.0017	0.0052	0.0052	0.0109	0.0109	0.0167	0.0167	0.0322	0.0322	0.0880	0.1600	0.270
重量 Weight				kg	19	19	28	28	44	44	53	53	76	76	105	165	245

1)所示值为吸油口S的绝对压力，且在V_{gmax}用矿物油工作。

2)以容积效率97%算出。

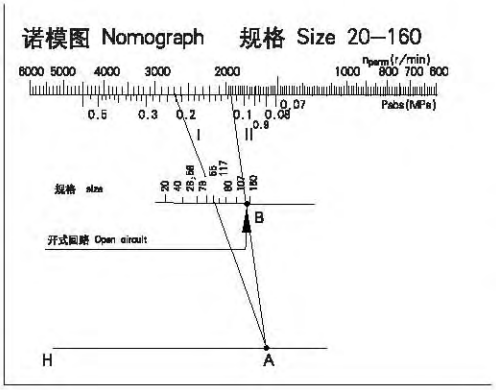
3)即使在更高的负载下，最高转速不得超过0.15MPa时的数值，但对于$V_{gmin}>0$的那些规格：28-20,55-40,80-85,107-78,160-117,通过减少排量($V_g<V_{gmax}$)和维持最大流量，最高转速可提高到$V_{gmin}=0$的那些规格的值。

1)The values shown are valid for V_{gmax}.with an absolute pressure at suction inlet S and when operated on mineral oil.

2)Calculated with a volumetric efficiency of 97%.

3)The maximum speeds at 0.15MPa shown must not be exceeded ,even with higher loading. On those sizes with $V_{gmin}>0$,however the maximum speeds can be increased to the values for those sizes with $V_{gmin}=0$ by reducing the displacement($V_g<V_{gmax}$) and maintaining max.flow.The relevant sizes are 28-20,55-40,80-85,107-78,160-117.

诺模图 Nomograph 规格 Size 20-160



允许转速N_{perm}和吸油口压力P_{abs}可由诺模图确定，不过必须考虑最高转速（见参数表）及最低和最高吸油压力。

例：

给定：规格55，驱动转速2700r/min.

求：吸油口S处的绝对压力，P_{abs}.

解：从nperm刻度向规格联直线与线H相交于A点，再从A点向B点连直线Ⅱ得到$P_{abs}=0.117MPa$.

Permissible speed n_{perm} and suction pressure p_{abs} can be read from the nommograph. However,the max ,speeds(see table)and min. and max. suction pressure must be taken into account.

Example:Given:size 55D rive speed 2700r/min Required: pressure P_{abs} at the suction inlet.

Solution: Line 1 on scale npem drawn towards size 55 crosses line Hat port A . Line 11 from point A to point B(open circuit) gives the result $P_{abs}=0.117MPa$.

技术参数 Technical Data

进口工作压力(S口绝对压力)Inlet Operation Pressure
Absolute pressure at port S

$P_{abs\ min}$ 0.08MPa

$P_{abs\ max}$ 0.2MPa

出口工作压力范围 Operating Pressure Range–Outlet Side

额定压力 Nominal pressure p_N=35MPa

最高压力 Peak pressure p_{max}=40MPa

油温范围：Fluid Temperature Range

t_{min} −25℃

t_{max} +80℃

粘度范围：Viscosity Range：

v_{min} 10mm²/s

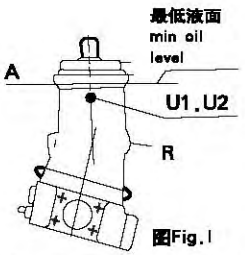
v_{max} (短时)(for short periods)1000mm²/s

最佳工作粘度:Optimum Operating Viscosity：

v_{opt} 16—36mm²/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 DIN 51519 ISO(VG) (在40℃时，at40℃)
30–40℃	VG22 . 22mm²/s
40–50℃	VG32 . 32mm²/s
50–60℃	VG46 . 46mm²/s
60–70℃	VG68 . 68mm²/s
70–80℃	VG100 . 100mm²/s



图Fig.1

Mounting on Top of Tank

when mounting outside a tank, the pump must be bled at port U1 or U2 prior to commissioning.

Mounting on Top of Tank

Mounting of the A7Vvariable pump above tank must be considered as a special pump installation and should only be realized under specific conditions.

When ordering pumps for mounting on top of tank, state in clear text: "To Be Used for Above Tank Mounting"

This installation requires that the suction port be at the top and the suction pipe be kept as short as possible and the end of the pope be at least 200mm below minimum oil level, see Fig2.

The cross–cut of the suction pump should be so dimensioned to ensure that the flow velocity of the pressure fluid lies between 0.8 and 1m/s.

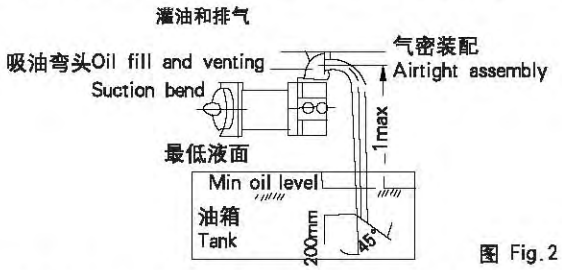


图 Fig.2

液压油的过滤：

推荐过滤精度为10∝m。亦可使用25–40∝m的，但使用∝m的可以延长使用寿命，元件磨损减少。

安装位置

任选。泵壳内必须始终充满油液。当装于油箱内时，油口R的 螺塞必须取下，此油口必须在顶部，并拧上一个90° 的弯头(以减少噪音)。驱动轴朝上垂直安装：

对此必须定货带有油口U_1和U_2的型号（用文字说明带油口U_1和U_2)。最低液面不低于"A"线，如图1所示。

该泵装于油箱内时油口U_1和U_2和R的螺塞必须取下，当装于油箱外时，泵在启动前必须在油口U_1或U_2排气。

泵装于油箱顶部：

A7V 变量泵装于油箱顶部应看作特殊安装，只能在特定的条件下实现订货时请注明：用于油箱顶部安装。

这种安装要求吸油口位于上方，吸油管尽可能短，管端至少低于最低液面200mm 见图 2。

吸油管的内径应保证油的流速在0.8至1m/s之间。

Filtration of Hydraulic Fluid

Recommended filtration 10∝m Coarser filtration of 25–40∝m is possible,but longer component life,will be achieved using 10∝m filtration due to lowest component wear.

Mounting Position

Optional, The pump housing must always be filled with oil. When mounting within a tank the plug must be removed form port R and this port must be at the top. 90℃ pipe bend to be screwed in (noise reduction).

Note:

Vertical mounting with drive shaft pointing upwards: for this case a model with ports U_1 and U_2 must be ordered (indicate in clear text:"with ports U_1 and U_2 "). The minimum oil level must not fall below the "A" line,as shown is Fig1.

规格 Size	最高转速1) Max speed n_{max} r/min	吸油管最大长度 Max length of suction pipe L_{max}(mm)	在流速 V=0.9m/s和下V_{gmax}下算出的吸油管内径(mm) Calculated suction pie 1.D. (mm)at flow velocity V=0.9m/s and V_{gmax}. speed转速 n_{max}(r/min)	speed转速 n_E=1450(r/min)
20	3610	600	41.8	26.5
28	2660	600	42	31
40	3040	750	53.6	37
55	2240	750	53.8	43.3
58	2700	750	61.3	45
80	2015	750	61.6	52.3
78	2410	750	66.6	51.6
107	1800	750	67.5	60.5
117	2125	850	76.6	63.3
160	1565	850	77	74

1)此数值仅适用于吸油口绝对压力为0.09MPa,排量为V_{gmax}及用矿物油工作时。

注：

A7V 泵只能在泵处于最大摆角(V_{gmax}) 时启动，对于调节从V_{gmin}开始的泵，Q_{min}限位螺钉必须调到最小流量≥V_{gmax}5% 处，以免在零位工作时吸油管放空。

1)The values shown are valid for V_{gmax}. with 0.09MPa absolute pressure at suction inlet S and when operated on mineral oil.

Note:

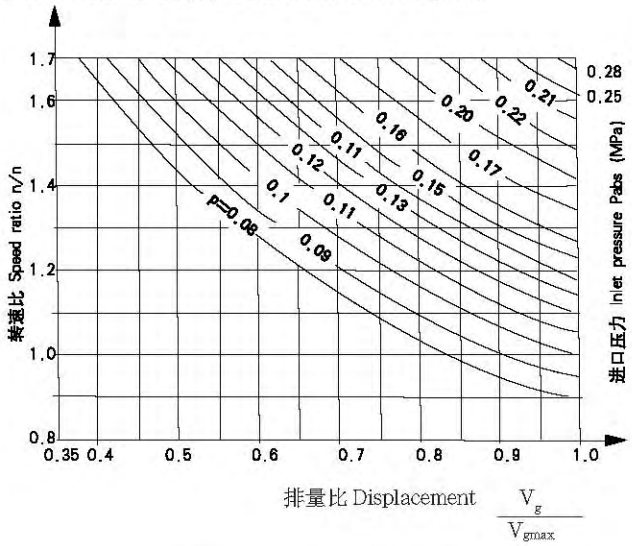
Start–up of the pump with all controls is only possible when the pump is at its full swivel angle (V_{gmax}),For pumps with minimum flow of

≥ 5% of V_{gmax}.in order to avoid emptying of the suction line during zero position operation.

规格 Size 250–500

吸油口 S 处的绝对压力和转速增加时排量减少值的计算。

Calculation of Inlet Pressure Pabs at Suction Inlet S and of Reduction in Displacement at Increased Speeds.



排量比 Displacement $\frac{V_g}{V_{gmax}}$

规格 Size	250	355	500
$n_{maxperm}$(T/min)	2500	2240	2000

示例

给定：规格 500，驱动转速 1320r/min

求：吸油口 S 的压力 Pabs

解：转速比 $\frac{n}{n_{max0.1}}=\frac{1320}{1200}=1.1$

在最大摆角下给出 Pabs=0.12MPa

如果对本例说仅在 Pabs=0.1MPa 时能自流，则排量须减小到 87.6%。

Example:

Given:

Size 500

Drive speed 1320rpm

Required:

pressure Pabs at suction inlet S

Solution:speed ration

$\frac{n}{n_{max0.1}}=\frac{1320}{1200}=1.1$

gives an inlet pressure of Pabs=0.12MPa

at full swivel for example free flow is only possible with Pabs=0.12MPa ,the displacement must be reduced to 87.6%.

n_{max}= 最高允许转速 Max,perm speed.

规格计算 Calculation of Size

流量 Flow $Q=\frac{V_g.n.\eta_v}{1000}$ [L/min]

驱动扭矩 Drive Torque $M=\frac{1.59.V_g.\triangle P}{10.\eta_{mh}}$ [Nm]

驱动功率 Drive Power $P=\frac{M.n}{9549}=\frac{Q.\triangle P}{60\eta_t}$ [kW]

V_g= 排量 geom.displacement per rev(ml/r)

$\triangle P$ = 压差 differential pressure(MPa)

n= 转速 speed(r/min)

η_v= 容积效率 volumetric efficiency

η_{mh}= 机械效率 mech.hyd.efficiency

η_t= 总效率 overall efficiency

$[\eta_t=\eta_v.\eta_{mh}]$

LV 恒功率变量 Constant Horsepower Control

恒功率变量是与 压力有关的控制流量，以保持液压功率恒定（当驱动转速恒定时）。

The constant HP control controls flow in relation to pressure. thereby maintaining hydraulic power constant.(Provided that the drive speed is constant.)

$P=\frac{P.Q}{60}$=Constant

P= 功率 power[KW]

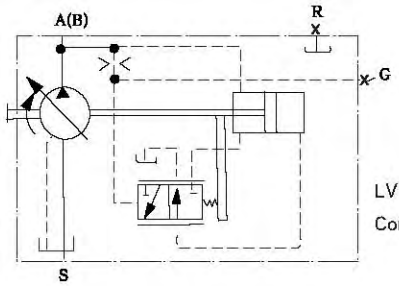
P= 压力 pressure[MPa]

Q= 流量 flow[1/min]

变量起点 Commencement of control:min.5MPa

通过油口 G 的并联可实现总功率变量

Summation HP control possible by throttles via port G.



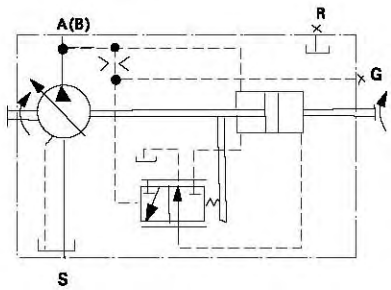
LV 恒功率变量

Constant Hp control LV

行程限位器 Stroke Limiter:

通过机械行程限位器可无极的改变或限制最大排量，调节范围从 V_{gmax} 到 V_{gmin}.

By means of a mechanical or hydraulic stroke limiter,the max. displacement can be infinitely varied or limited. Adjustment range from V_{gmax} to V_{gmin}.



LV 带机械行程限位的恒功率变量

Constant Hp control LV with mechanical stroke limiter

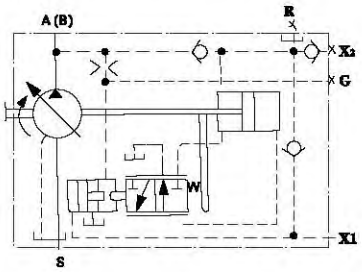
规格 Size	20	40	58	78	117	250	355	500
	28	55	80	107	160			
螺杆转数 Spindle Revolutions	23	21	28	31	26	21.25	24	25
所需扭矩 Required Torque (approx.)Ncm	80	140	500	630	–	–	–	

液压行程限位器需要不小于工作压力10%的先导压力(X1油口)。油口X1的最高允许压力＝20MPa(对所有规格)，如果需要限制工作压力＜5MPa时的流量，则需在油口X2施加不低于5MPa的供油压力(油口X1压力为5.10%=0.5MPa).

A Pilot pressure(port X1)of at least 10% of the operating pressure is required for the hydraulic stroke limiter Max. permissible pressure at port X1=20MPa(for all sizes)

if it is required to limit the flow at an operating pressure <5MPa then a boost pressure of min 5MPa must be applied at port X2(at port X1 then,min10% =0.5MPa

LV带液压行程限位的恒功率变量Constant HP control LV with hydraulic stroke limiter



辅助元件：压力切断 Auxiliary Equipment:Pressure Cut-Off

适用于 $V_{gmin}=0$ 的所有规格。

压力切断是叠加在恒功率控制的恒压控制，它借助于顺序阀，当达到设定的最高压力时(调节范围到31.5MPa)，该阀打开，流量自动减小至Q=0.顺序阀与泵分开安装，可装于任何适当位置（遥控）的底板上。其连接管长（单管）不得大于5m，顺序阀与底板需要独订货。

当采用带压力切断的恒功率变量时，泵变量时间将比恒压变量泵DR的长3倍。

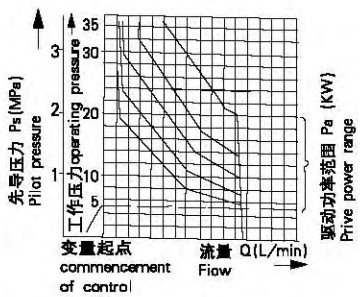
注意：顺序阀油口T和先导回油口T1必须直接通回油箱。

在零位连续工作见DR恒压变量。

LV 的 Q-P 特性曲线 Characteristics

不带压力切断

without Pressure Cut-off



For all sizes with $V_{gmin}=0$

The pressure cut-off is a constant pressure control superposed on the constant HP control and is carried out by means of a sequence valve. when the set.maximum pressure is reached(adjustment range up to 315MPa),the valve opens and the flow is automatically reduced(to Q=0).

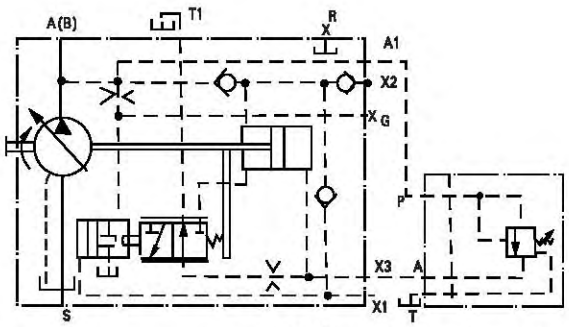
The sequence valve is mounted separately from the pump in any suitable location one subplate(remote control).

The max./single pipe length must not exceed 5 m. order sequence valve and subplate separately.

When using the constant HP control with pressure cut -off, the pump control times,will be approximately 3 times longer than those obtained with the constant pressure control DR. Important : Port T form the sequence valve and pilot oil return line T1 must be piped direct to tank(cooler).Continuous operation in zero position see constant pressure control DR.

LV 带压力切断（遥控）和液压行程限位的恒功率变量

Constant HP control LV with pressure cutoff(remote controlled)and hydraulic stroke limiter



接口 connections

A.B 工作油口 service lines

S 吸油口 suction-line

G 总功率控制油口 port for summation HP control line

X1 先导压力口 pilot pressure

X2 遥控口 remote contr.pressure

A1、X3 遥控阀油口 ports for remote control valve

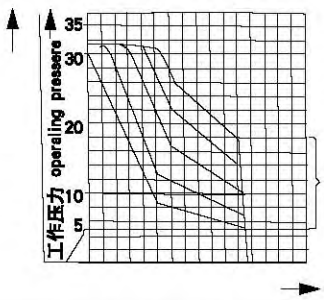
T1 先导回油口 pilot oil return

R 排气口 air bleed

带压力切断

with Pressure Cut-Off

驱动功率范围 Pa(KW)



规格 Size			20	28	40	55	58	80	78	107	117	160	250	355	500
转速 Speed	no	r/min	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450	980	980	980
最大流量 Max.Flow Q 在 at no		L/min	28	39	57	77	81	110.5	110	150	165	225	237	337	475
驱动率范围不带压力切断		P_{omin}	3	4	5.5	7.5	7.5	11	11	15	15	22	22	30	45
Drive without pressure		P_{omax}	11	15	18.5	30	30	37	37	45	55	75	90	132	200
cut-off power 带压力切断		P_{omin}	3	–	5.5	–	7.5	–	11	–	15	–	22	30	45
range		P_{omax}	10	–	18.5	–	27	–	37	–	55	–	90	132	200
P.(KW) with pressure cut-off															

当转速为n时换算如下 Conversion to speeds n(rpm) other than n.

驱动功率 Drive power $P=P_0 \frac{n}{no}$

1)以容积效率97%算出。

Calculated with a volumetric efficiency of 97%

改变型：恒功率负荷传感变量(LVS)

负荷传感阀是个流量控制阀，它工作时作为负载压力的函数来调节泵的排量以使之与负载的需求相匹配。在低于功率曲线的整个范围内，泵的流量受装在泵与负载之间的外部节流孔(控制块,节流阀）的影响，而不受负载压力的影响。该阀比较节流孔前后的压力并用节流孔压降（压差△P）把泵流量保持恒定。如果压差增大，则泵向V_{gmin}变化，如果压差减小，则泵向V_{gmax}变化，直到在阀中恢复平衡。

$\triangle P = P_{pump} - P_{serviced\ unit}$

△P可设定成14-25bar,标准设定18bar(请用文字说明所需设定值)。零行程工作(节流阀关闭)时的启动压力比△P 设定值高出2bar。

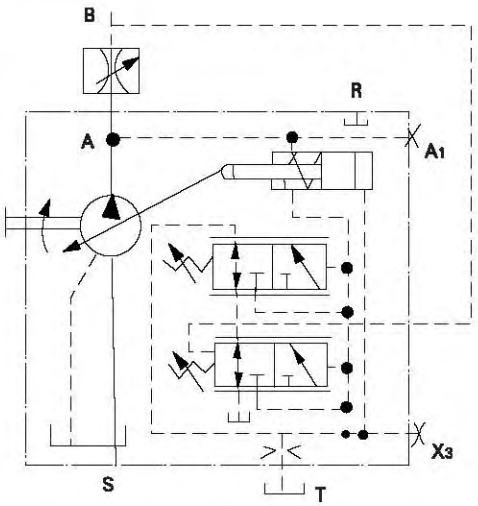
恒功率控制和压力切断越权于负荷传感阀，既负荷传感功能在低于设定功率曲线设定压力时工作。节流阀不包括在标准供货中。

Variation:Constant HP Control with Load Sensing

The load sensing valve is a flow control valve which operates as function of the load pressure to regulate the pump displacement in order to match the requirement of the consumer unit. The pump flow is influenced by the external orifice(control black, throttle) fitted between pump and serviced unit , ber curve.The valve compares pressure before and after the orifice and maintains the pressure before and after the orifice and maintains the pressure drop (differential pressure △P)across the orifice-and therefore the pump flow-constant. if differential pressure △P increases, the pump is swiivelled back towards V_{gmin},and if △P decreases the pump is swivelled out towards Vgmax, until a balance is restored within the valve.

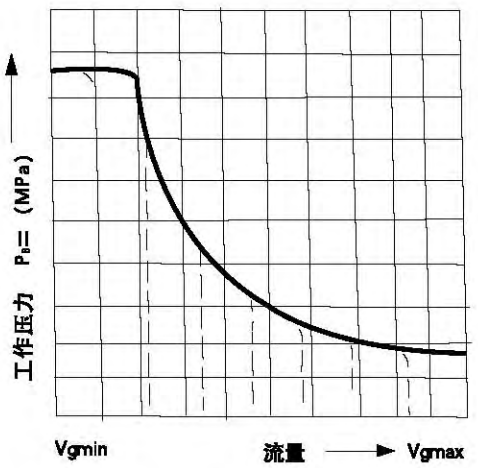
$\triangle P = P_{serviced\ unit}$

△P may be set with the range 14 bar to 25 bar. The standard setting is 18 bar (please state required setting in clear text). The stand by pressure for zero stroke operation(orifice close)is approx.2 bar above the △P setting. The constant power control and the pressure cut -off are super imposed on the load sensing valve, for example the set power hyperbola and set pressure the orifice is not included in the standard in the standard supply.



LVS恒功率负荷传感变量

Constant HP control with load Sensing



DR恒压变量

恒压变量在其变量范围内保持系统压力恒定不受泵流量变化的影响，变量泵仅供应工作必须的油液体积。如果压力超过设定值，则泵自动摆回小角度。

所需压力可直接在泵上设定（阀内装，标准型），也可在用于带遥控型单独的顺序阀上设定。设定范围5-35MPa。

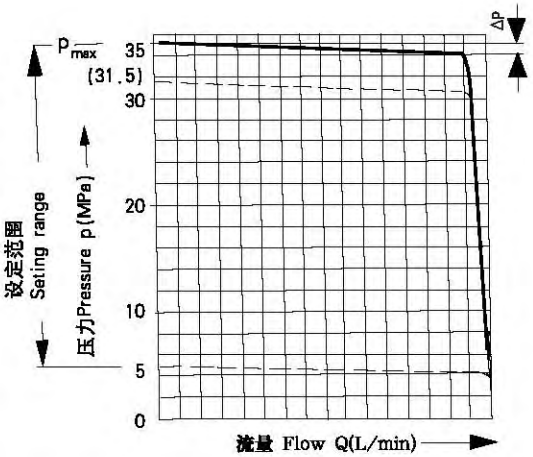
遥控的设定范围5-35MPa。

Constant Pressure Control

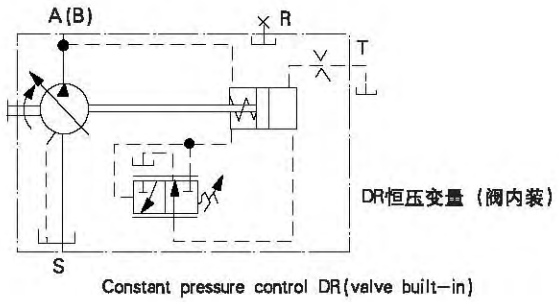
The constant pressure control maintains the pressure in a hydraulic system constant within its control range in spite of changing pump flow requirements. The variable pump supplies only the volume of fluid required by the services, Should operating pressure exceed the set pressure, the pump is automatically swivelled back to a smaller angle. The required pressure is set either direct at the pump(valve built in standard model) or at the separate sequence valve for the model with remote control.

Setting range from 5 to 35MPa.

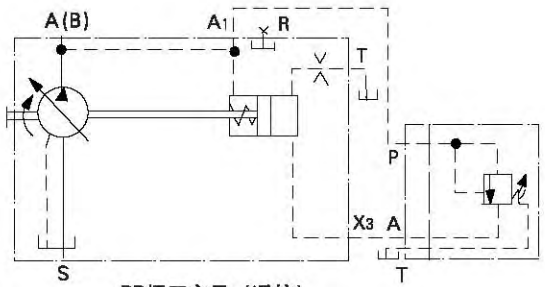
Setting range for remote control 5 to 31.5MPa.



规格 Size	20-17	250-500
△P Max (MPa)	1	1.4



Constant pressure control DR(valve built-in)



Constant pressure control DR(remote controlled)

注：
顺序阀和底板须单独定货。
最大遥控管单根长度不超过 5m。
顺序阀油口 T 须单独接回油箱。
装于系统中用于压力保护的安全阀，其压力设定必须比恒压变量的压力设定值高 2MPa。

Note:
Order sequence valve subplate separately. The max. single pipe length should not exceed 5m. Port T from the sequence valve must be piped separately to tank. A pressure relief valve installed in the system for protection of the max. pressure must be set 2MPa above the setting of the constant pressure control.

调节时间 Adjustment times

规格 Size		20	40	58	78	117
$V_{gmin}-V_{gmax}$	te(S)	0.16	0.2	0.25	0.25	0.3
卸压 35-5MPa Pressure unloading						
$V_{gmax}-V_{gmin}$	ta(S)	0.03	0.04	0.05	0.05	0.06
升压 5-35MPa Pressure built-up						

对于遥控，表中数值增大 3 倍。
The values in the table are increased by 3 times for remote control.

并联工作 Parallel Operation

几台 A7V 恒压变量泵并联工作时，其恒压曲线较徒。在订货时请注明“并联工作”。
并联工作时每台泵需要各自的顺序阀。

For parallel operation of several A7V pumps with constant pressure control. a steeper curve is used for the constant pressure control.
please indicate this requirement in text after the type code when order in (“parallel operation”).
For parallel operation each individual pump requires its own sequence valve.

行程限位

借助于机械行程限位器可把最大排量无级地限制在 V_{gmax} 与 V_{gmin} 之间，详见 LV 变量。

Stroke Limiter

The max. displacement can be steplessly limited between V_{gmax} to V_{gmin} by means of a mechanical stroke limiter.
For details see control device LV.

在零位连续工作

不带体冲洗的零行程工作

Continuous Operation in Zero Position

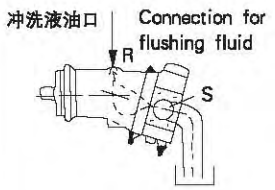
Zero stroke operation without flushing of housing.

短期 short periods<10min (~50%ED)		长期 long periods	
最高允许压力 max.perm pressure	最高允许温度 max.perm tank temperature	最高允许压力 max.perm pressure	最高允许温度 max.perm tank temperature
p_{max}(MPa)	t_{max}(℃)	p_{max}(MPa)	t_{max}(℃)
31.5	50	20	50

带壳体冲洗的零行程工作

Zero stroke operation with flushing of housing

长期 long periods	
最高允许压力 max.perm pressure	最高允许温度 max.perm tank temperature
p_{max}(MPa)	t_{max}(℃)
31.5	50



冲洗流量 Flushing flow

规格 Size		20	40	58	78	117	250	355	500
流量 flow	Qsp 1/min	2	4	6	8	12	12.5	16	25

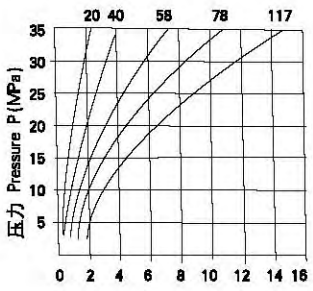
冲洗液温度 ≤油箱温度

注：当所A7V泵装于油箱顶部在Pmax为31.5MPa下长时间零行程工作时，必须提供≥上表对应规格的冲洗流量对壳体冲洗。

Temperature of flushing fluid ≤ tank temperature

Note: When mounting the A7V on top of tank and at zero stroke operation for longer periods of time at pressures up to P_{max} 31.5MPa a minimum flow ≥ corresponding to flushing flow as indicated for each size in the above table must be set instead of case flushing.

零行程时的功率 Power at Zero Stroke



规格 Size
在转速 n=1450r/min 油温 t=50℃ 时的典型曲线
Typical values at speed n=1450rpm
fluid temperature=50℃
零行程时的功率(KW)
Power at zero stroke(KW)

改变型：恒压负荷传感变量(DRS)

负荷传感阀是个流量控制阀,它工作时作为负载压力的函数来调节泵的排量以使之与负载的要求相匹配。在低于设定压力的整个范围内，泵的流量受装在泵与负载之间的外部节流孔（控制块，节流阀）的影响，该阀比较节流孔前后的压力并用节流孔压降（压差）△P使泵流量保持恒定。

如果压差△P加大，则泵向V_{gmin}变量，而如果 △P减小，则泵向V_{gmax}变量，直到在阀中恢复平衡。

$\triangle P = P_{pump} - P_{serviced\ unit}$

△P可设定为14-25bar，标准设定为18bar（请用文字注明所需设定值）。

零行程工作时（节流阀关闭），启动压力约比△P设定值高出2bar。

恒压力控制越权于负荷传感阀,即负荷传感功能在低于设定压力时工作 。

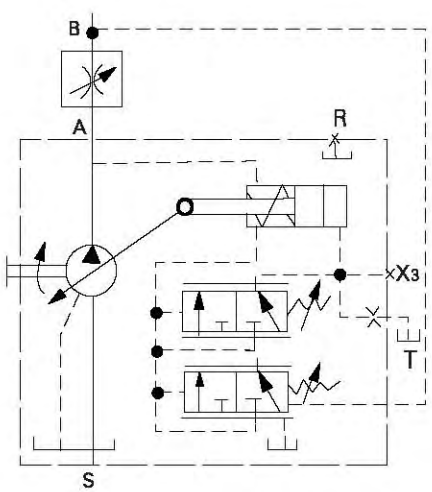
节流阀不包抱在标准供货中。

Variation:Constant Pressure control with Load sensing

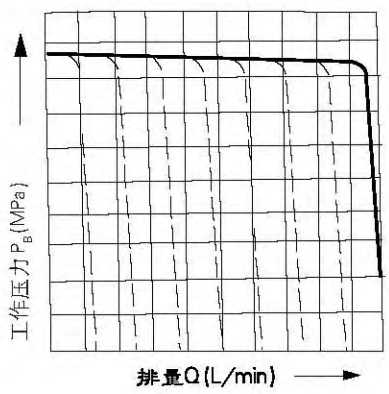
The load sensing valve is a flow control valve which operates as function of the load pressure to regulate the pump displacement in order to match the requirement of the consumer unit. The pump flow is influenced by the external orifice(control black, throttle) fitted between pump and serviced unit, but is not affected by load pressure throughout the range below the power curve. The valve compares pressure before and after the orifice and maintains the pressure before and after the orifice and maintains the pressure drop(differential pressure △P)across the orifice-and therefore the pump flow-constant. if differential pressure △P increases, the pump is swivelled back towards V_{gmin}, and if △P decreases the pump is swivelled out towards V_{gmax}, until a balance is restored with in the valve.

$\triangle P = P_{Pump} - P_{serviced\ unit}$

△P may be set with the range 14 bar to 25 bar. The standard setting is 18 bar (please state required setting in clear text).The stand by pressure for zero stroke operation(orifice close)is approx.2 bar above the △P setting. The constant pressure control is superimposed on the load sensing valve, i ,e ,the load sensing function operates below the set pressure. The orifice is not included in the standard supply.



DRS恒压带负荷传感变量
Constant pressure control with load sensing valve.



EP 电控比例变量

电控比例变量可以无级地按程序控制泵的排量。泵排量与电磁铁吸力成正比，即与电磁铁的电流成正比。变量活塞上的控制力由比例电磁铁产生。比例电磁铁需要一个电流为300～630mA(600～1260mA)的24V(12V),直流电源。

变量起点约在300mA(600mA)

变量终点约在630mA(1260mA)

调节从 V_{gmin} 至 V_{gmax}.如果需要反向控制(V_{gmax} 至 V_{gmin})请询问我厂。

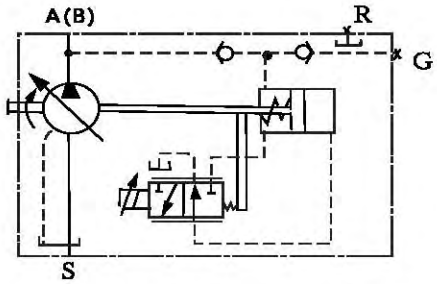
如果泵在零位启动或工作压力<4MPa,则油口G须接入4MPa的先导压力。

Electric Proportional control

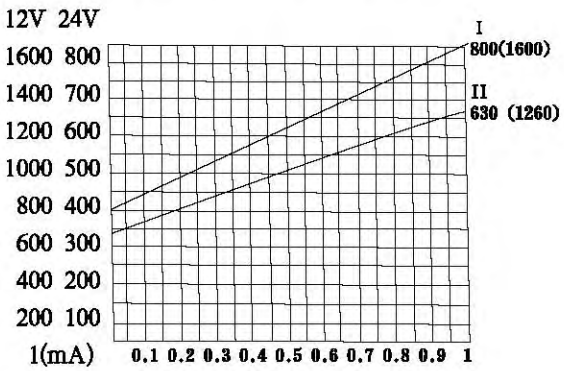
The electric control permits stepless and programmable adjustment of the solenoid force i.e.the strength of solenoid current. The control force on the control piston is generated by a proportional solenoid. The proportional solenoid need a 24V(12V)DC power supply that the current is 300_630mA(600_1260mA). commencement of control at approx. 300mA(600mA).

End of control at approx.630 mA (1260mA). Adjustment is from V_{gmin} to V_{gmax}. please consult us if control in the opposite direction (V_{gmax} to V_{gmin})is required.

if the pump is to be moved out of the zero position (V_g=0)or if the operating pressure<4MPa,a pilot pressure of 4Mpa is necessary at port G.



EP 电控比例变量 Electric pro.Control



变量起点在 Commencement of control at V_{gmin} $\frac{V_g}{V_{gmax}}$

注：

曲线I适用于 $V_{gmax} \geqslant 250ml/r$;曲线II适用于 $V_{gmax}<250ml/r$.

Line I adapts for $V_{gmax} \geqslant 250ml/r$,Line II adapts for $V_{gmax}<250ml/r$.

调节时间 Adjustment Times

规格 Size	20	40	58	78	117
	28	55	80	107	160
$V_{gmin}-V_{gmax}$ t_{min} ※(s)	0.16	0.2	0.25	0.25	0.3
$V_{gmax}-V_{gmin}$ t_{min} ※(s)	0.12	0.16	0.2	0.2	0.25

※所示值仅适用于工作压力 P_b=20MPa 时。

※The values shown are valid for operating pressure P_b=20MPa.

滞环

由于电气/液压控制(对于 V_{gmin} 至 V_{gmax} 的整个调节范围内)，在控制中约有2.5～4%的滞环。当从同一方向启动时泵位置的重复精度约为2～4%。

Hysteresis

A hysteresis of±2.5 to 4%(approx.) is present in the control because of the electric/hydraulic control(referred to the complete adjustment,range V_{gmin} to V_{gmax}).The repeatability of the pump position,when starting from the same direction,is around 2-4%.

注：

只有当使用矿物油箱内最高油温不大于80℃时才能把EP变量泵装在油箱内。(如果把泵浸在油中，请在订货时说明)。

Note：

Mounting of the pump with EP. control inside the oil tank is possible. only when using mineral hydraulic oils and with a max.oil temperature in the tank of 80℃.if the pump is to be submersed in oil ,please indicate in clear text when ordering).

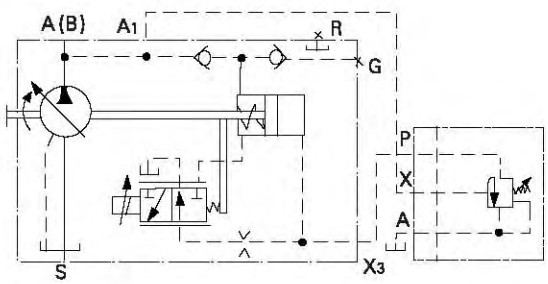
辅助元件：压力切断

用于 V_{gmin}=0的所有规格。说明见HD变量。顺序阀和底板需单独订货。

Auxiliary Equipment:Pressure Cut-Off

For all sizes with V_{gmin}=0.

For description see control device HD. Order sequence valve and subplate separately



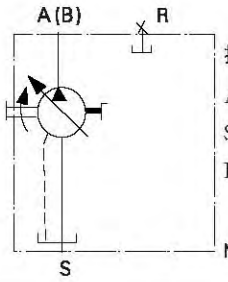
EP带压力切断的电控比例变量接口	Electric Pro.Control with Pressure cut-off Connections
A.B 工作油口	Service lines
S.吸油口	suction line
G.遥控压力口	remote control pressure
R.排气口	air bleed
A_1,X_3,遥控阀油口	ports for remote control valve

MA 手动变量

通过转动手轮借助于螺杆使变量活塞沿轴向运动，并经拨销使配油盘沿其滑动面运动，从而使泵在 V_{gmax} 范围内无级地改变其排量。

Manual Control

By turning the handwheel, a piston is is moved in an axial direction by means of a threaded spindle. A carrier pin moves the control lens on its sliding plane, thus permitting stepless variation of the pump displacement in the range V_{gmin} to V_{gmax}. The pump position indicator is located in the handwheel.



接口 Connections

A, B	工作油口	service lines
S	吸油口	suction line
R	排气口	air bleed

MA 手动变量 Manual Control

HD 液控变量

液控变量可按先导压力无级地调节泵的排量，调节量与油口 X1 的先导压力成正比。

当用HD作2位变量时(V_{gmin}至V_{gmax})，X1 口的先导压力不得超过 4MPa 调节从 V_{gmin} 至 V_{gmax}.

在整个变量范围内(min-max)先导压力升高 1MPa.

变量起点的设定范围为 0.4-1.5MPa。所需的控制油从高压回路取得，要求的最低工作压力为4MPa。若低于此值，需在油口 X2 通入 4MPa 的先导压力 。

先导口X1处的供油量约为0.5L/min。

Hydraulic Control, Pressure Related

The hydraulic control. pressure related, permits the stepless adjustment of the pump displacement in relation to pilot pressure Adjustment is proportional to the pilot pressure at port X1. When using the Hd control ax 2-position control(V_{gmin} to V_{gmax}). the pilot oil pressure on port X1 must not exceed 4MPa.

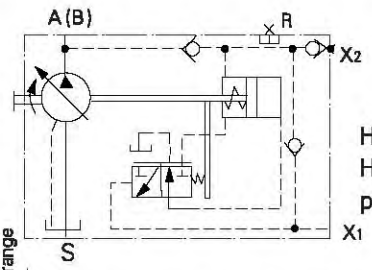
Adjustment is from V_{gmin} to V_{gmax}.

The increase in pilot pressure over the complete adjustment range(min-max)is 1MPa.

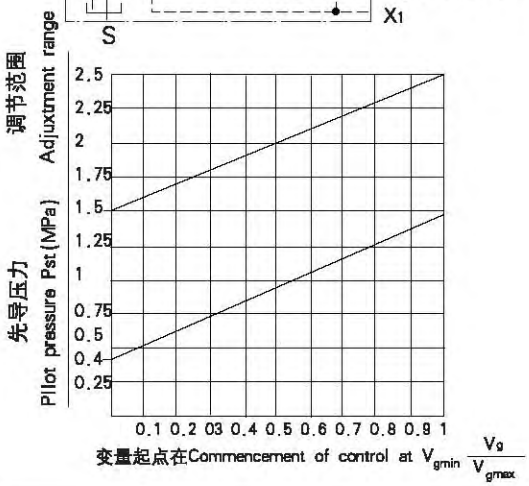
The setting range for commencement of control is between 0.4 and 1.5MPa.

The necessary control oil is taken from the high pressure circuit, and a minimum operating pressure of 4MPa is required. If necessary apply pilot pressure of 4MPa at port X2.

The oil flow at pilot X1 is approx 0.5L/min.



HD液控变量
Hydraulic control, pressure related, HD



附加功能：压力切断

用于 V_{gmin}=0 的所有规格。

压力切断用来把流量限制成高压的函数，以便不超过设定的工作压力。此功能由顺序阀实现。达到设定的最高压力(调节范围达31.5MPa)时，该阀打开，流量自动减小(到 Q=0)。

顺序阀离开泵单独安装，借助于底板可装于任何适当的位置(遥控)。最大单管长度不大于 5m。

顺序阀与底板须单独订货。

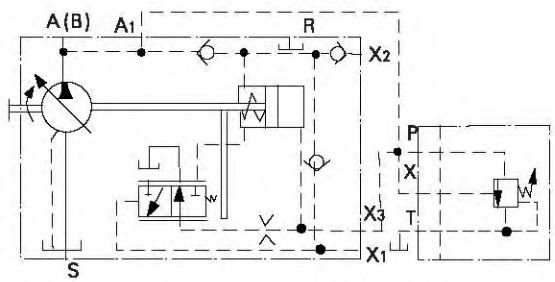
Additional Function: Pressure cut-Off

For all sizes with V_{gmin}=0.

The pressure cut-off serves to limit the flow as a function of the high pressure so that a predetermined operating pressure is not exceeded. This function is carried out by a sequence valve. On reaching the set maximum pressure (adjustment range up to 31.5MPa), the valve opens and the flow is automatically reduced(to Q=0).

The sequence valve is mounted separately from the pump in any suitable location by means of a subplate (remote control). The max, Single pipe length should not exceed 5m.

Order sequence valve and subplate separately.



HD 带压力切断的液控变量

注意：顺序阀油口T必须单独通油箱

在零位连续工作：详见DR恒压变量。

Hydraulic Control, pressure related, HD with pressure cut-off

Important: port T from the sequence valve must be piped separately to tank.

Continuous Operations is Zero position

For details see constant pressure control DR.

接口

A, B 工作油口
S. 吸油口
X_1 先导压力油口
X_2 遥控压力油口
A_1, X_3, 遥控阀油口
R. 排气口

Connections

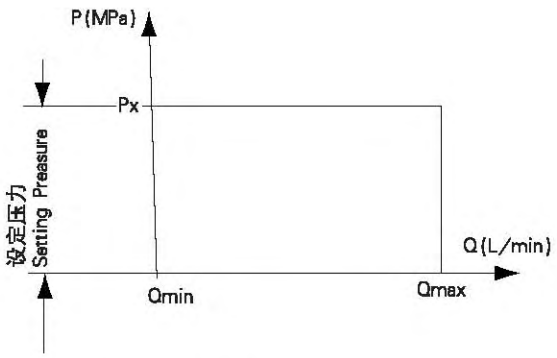
service lines
suction line
pilot pressure
remote control pressure
ports for remote control valve
air bleed

SC 刹车变量

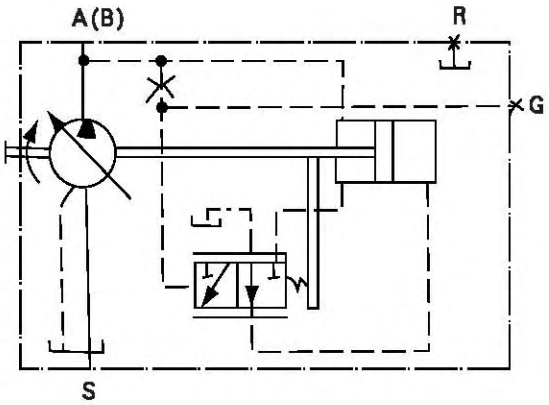
用于刹车系统，当系统压力达到一定值后($P_x \geqslant 4MPa$)，立刻使泵达到大摆角，即大流量，大扭矩。

Brake Control

When operating pressure goes up to the setting pressure (≥4MPa), the flow is max,and the torque is max.



SC的P—Q特性曲线Characteristics



SC刹车变量
Brake control.SC

NC 数字变量

用步进电机来驱动泵变量，可通过控制装置随意设定工作曲线。(如LV,DR,EP等)

调节时间不大于3秒。

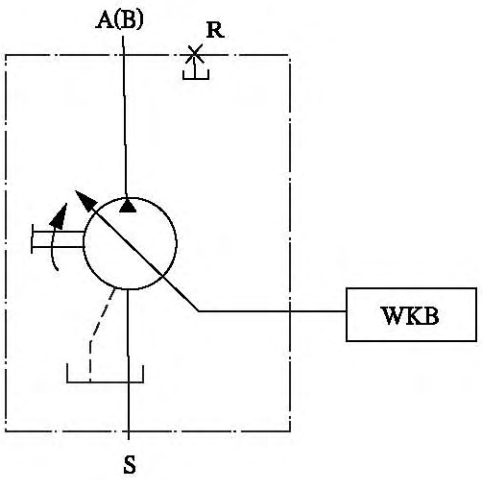
Numerical Control

Varied displacement is driven by electric stepping motor.

The working curve is set optionally by control apparatus.

(i.e.LV.DR.EP.etc.)

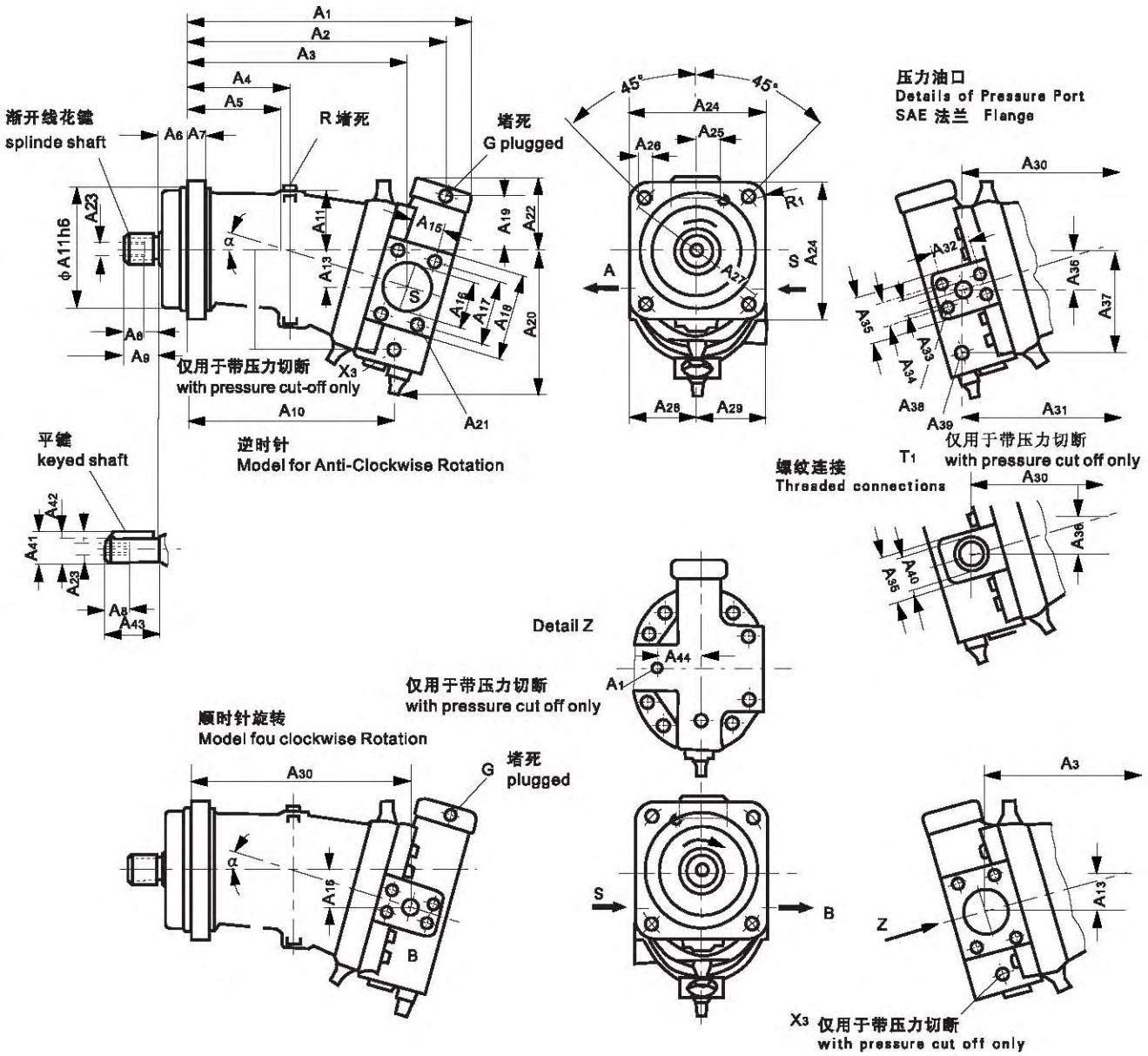
Adjustment time is not longer than 3s.



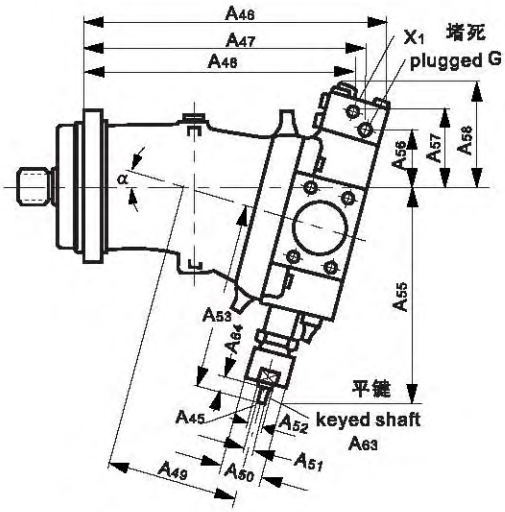
NC数字变量
Numerical control.NC

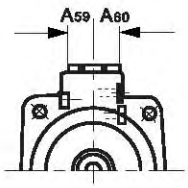
元件尺寸 Unit dimensions 规格 Size 20-160

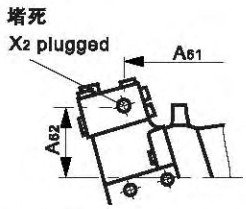
LV:恒功率控制 Constant HP Control



A7V变量泵 Variable Displacement Pump A7V







辅助元件：液压行程限位(用于LV)
辅助元件：机械行程限位(用于LV和DR)

Auxiliary equipment:hydraulic stroke limiter(for LV)
Auxiliary equipment:mechanical stroke limiter(for LV—and DR)

接口		Connections
A,B	工作油口	service lines
S.	吸油口	suction line
G	遥控压力口	remote control pressure M14 × 1.5
	(总功率控制油口)	(connection for summation HP control)
X_1	先导压力油口	pilot pressure M14 × 1.5
X_2	遥控压力口(HD)	remote control pressure(HD) M14 × 1.5
A_1,X_3,	遥控阀油口	ports for remote control valve
T	先导油回油口	pilot oil return line M12 × 1.5
T_1	先导油回油口	pilot oil return line
R.	排气口	air bleed

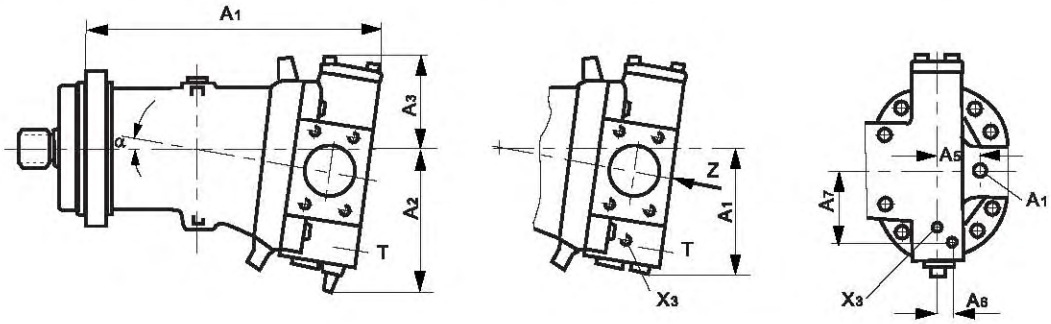
规格																												
																					深							
Size	a	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}	A_{16}	A_{17}	A_{18}	A_{19}	A_{20}	A_{21}	deep	A_{22}	A_{23}	A_{24}	A_{25}	A_{26}	A_{27}
20	9	251	224	199	107	75	25	16	19	43	160	100	85	20	52	35.7	38	69.9	94	78	132	M12	20	95	M8	118	23.5	11	125
28	16	260	232	195	107	75	25	16	19	43	149	100	95	34	50	37.5	38	69.9	94	59	145	M12	20	80	M8	118	23.5	11	125
40	9	317	287	255	123	108	32	20	28	35	244	125	95	23	63	42.9	50	77.8	102	87	166	M12	20	109	M12	150	29	13.5	160
55	16	327	296	251	123	108	32	20	28	35	—	125	—	41	63	42.9	50	77.8	102	64	182	M12	20	91	M12	150	29	13.5	160
58	9	374	337	304	152	137	32	23	28	40	295	140	106	26.5	77	50.8	63	88.9	115	93	168	M12	20	113	M12	165	33	13.5	180
80	16	385	347	300	152	137	32	23	28	40	—	140	—	48	77	50.8	63	88.9	115	68	194	M12	20	120	M12	165	33	13.5	180
78	9	381	347	310	145	130	40	25	28	45	298	160	113	29	80	50.8	63	88.9	115	101	180	M12	20	120	M12	190	33	17.5	200
107	16	393	358	305	145	130	40	25	28	45	—	160	—	50	80	50.8	63	88.9	115	73	200	M12	20	98	M12	190	33	17.5	200
117	9	443	402	364	214	156	40	28	36	50	350	180	130	33	93	61.9	75	106.4	135	114	195	M16	24	137	M16	210	34	17.5	224
160	16	454	414	359	213	156	40	28	36	50	—	180	—	58	88	61.9	75	106.4	135	83	222	M16	21	112	M16	210	34	17.5	224

规格												深	(T1)								深						
Size	A_{28}	A_{29}	A_{30}	A_{31}	A_{32}	A_{33}	A_{34}	A_{35}	A_{36}	A_{37}	A_{38}	deep	A_{39}	A_{40}	A_{41}	A_{42}	A_{43}	A_{44}	A_{45}	deep	A_{46}	A_{47}	A_{48}	A_{49}	A_{50}	A_{51}	A_{52}
20	58	58	193	—	50.8	19	23.8	46	19	—	M10	17	—	M27 × 2	27.9	25	50	38	M3	9	257	226	230	108	42	8.8	8
28	58	58	189	—	50.8	19	23.8	46	33	—	M10	17	—	M27 × 2	27.9	25	50	38	M3	9	269	234	240	108	42	8.8	8
40	71	81	253	261	50.8	19	23.8	53	23	98	M10	17	M18 × 1.5	M33 × 2	32.9	30	60	40	M4	10	323	290	279	134	—	11.2	10
55	71	81	249	—	50.8	19	23.8	53	40	—	M10	17	—	M33 × 2	32.9	30	60	40	M4	10	337	299	292	134	—	11.2	10
58	86	92	301	313	57.2	25	27.8	64	26	109	M12	18	M18 × 1.5	M42 × 2	38	35	70	62	M5	12	378	344	330	155.5	52	18	16
80	86	92	297	—	57.2	25	27.8	64	47	—	M12	18	—	M42 × 2	38	35	70	62	M5	12	391	354	343	155.5	52	18	16
78	89	93	306	318	57.2	25	27.8	64	28	119	M12	18	M18 × 1.5	M42 × 2	43.1	40	80	55	M5	12	385	342	338	169	52	18	16
107	89	93	301	—	57.2	25	27.8	64	19	—	M12	18	—	M42 × 2	43.1	40	80	55	M5	12	400	363	351	169	52	18	16
117	104	113	359	369	66.7	32	31.8	70	32	136	M14	19	M18 × 1.5	M45 × 2	48.5	45	90	65	M5	12.5	445	408	384	192	65	18	16
160	104	113	354	—	66.7	32	31.8	70	57	—	M14	19	—	M48 × 2	48.5	45	90	65	M5	12.5	461	420	399	192	65	18	16

规格											平键 A63 Keyed	平键 Keyed	花键 Splined	花键 Splined		油口 Connection	油口 Connection	重量 Weight
size	A_{53}	A_{54}	A_{55}	A_{56}	A_{57}	A_{58}	A_{59}	A_{60}	A_{61}	A_{62}	GB1096 79	GB1096 79	DIN5180	GB3478.1 83	R_1	R	A_1X_3	kg
20	161	14	176	77	104	129	35	30	228	92	键2 × 10	键8 × 40	W25 × 1.25 × 18 × 9g	EXT18Z × 1.25m × 30R × 5f	12	M16 × 1.5	M12 × 1.5	19
28	161	14	186	58	84	144	35	30	238	73	键2 × 10	键8 × 40	W25 × 1.25 × 18 × 9g	EXT18Z × 1.25m × 30R × 5f	12	M16 × 1.5	M12 × 1.5	19
40	184	16	204	85	117	147	30	30	276	104	键3 × 10	键8 × 50	W30 × 2 × 14 × 9g	EXT14Z × 2m × 30R × 5f	12	M16 × 1.5	M12 × 1.5	28
55	184	16	215	62	98	128	30	30	288	83	键3 × 10	键8 × 50	W30 × 2 × 14 × 9g	EXT14Z × 2m × 30R × 5f	12	M18 × 1.5	M12 × 1.5	28
58	228	24	251	91	116	142	33	33	328	104	键5 × 16	键10 × 56	W35 × 2 × 16 × 9g	EXT16Z × 2m × 30R × 5f	12	M18 × 1.5	M18 × 1.5	44
80	228	24	265	65	91	120	33	33	339	80	键5 × 16	键10 × 56	W35 × 2 × 16 × 9g	EXT16Z × 2m × 30R × 5f	12	M18 × 1.5	M18 × 1.5	44
78	236	24	261	99	124	150	33	33	336	112	键5 × 16	键12 × 63	W40 × 2 × 18 × 9g	EXT18Z × 2m × 30R × 5f	12	M18 × 1.5	M18 × 1.5	53
107	236	24	276	71	97	126	33	33	348	86	键5 × 16	键12 × 63	W40 × 2 × 18 × 9g	EXT18Z × 2m × 30R × 5f	12	M18 × 1.5	M18 × 1.5	53
117	266	24	294	111	137	164	34	34	382	125	键5 × 16	键14 × 70	W45 × 2 × 21 × 9g	EXT21Z × 2m × 30R × 5f	12	M22 × 1.5	M20 × 1.5	76
160	266	24	310	79	108	137	34	34	396	96	键5 × 16	键14 × 70	W45 × 2 × 21 × 9g	EXT21Z × 2m × 30R × 5f	12	M22 × 1.5	M20 × 1.5	76

DR 恒压变量 Constant Pressure Control

标准型 Standard Model　　遥控 Remote Control　　Z 向 Detail z



规格 Size	a	A_1	A_2	A_3	A_4	A_5	A_6	A_7
20	9°	251	134	95	106	38	–	–
40	9°	315	166	107	127	40	14	53
58	9°	372	160	107	138	62	15	69
78	9°	380	180	114	147	60	14	70
117	9°	441	199	132	165	65	14	83

A1 和 X3 仅用于遥控 A1 and X3 only for remote control

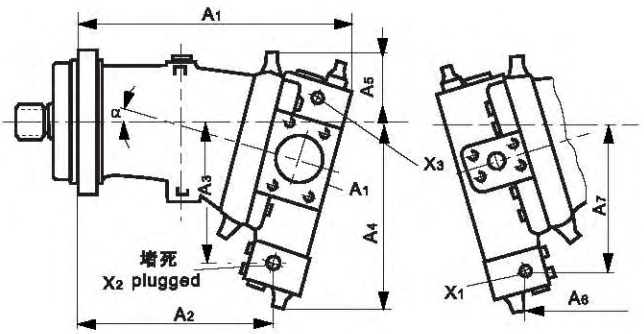
其余尺寸见 LV. Other dimensions see LV.

T1: M12 × 1.5

HD 液控变量 Hydraulic Control, Pressure Related

规格 Size	a	A_1	A_2	A_3	A_4	A_5	A_6	A_7
20	9°	248	175	132	182	75	190	147
28	16°	253	158	143	195	75	172	160
40	9°	312	236	151	206	110	233	166
55	16°	318	217	166	220	84	212	180
58	9°	367	287	158	213	110	285	170
80	16°	373	266	175	232	105	263	186
78	9°	375	292	170	225	122	290	182
107	16°	382	270	188	245	106	266	200
117	9°	434	333	188	250	132	331	200
160	16°	442	308	209	272	114	305	220

其余尺寸见 LV Other dimensions see LV.



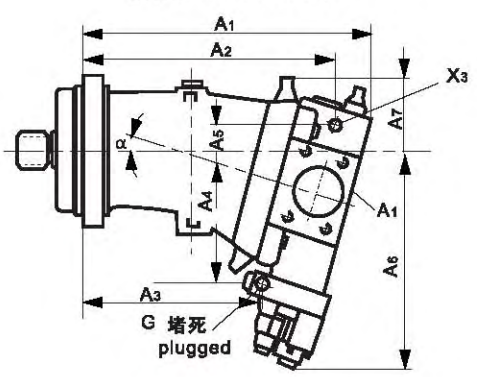
A_1 和 X_3 仅用于带压力切断 A_1 and X_3 with pressure cut-off only

EP 电控比例变量 electric Proportional Control

规格 Size	a	A_1	A_2	A_3	A_4	A_5	A_6	A_7
20	9°	248	182	144	113	54	216	75
28	16°	252	188	130	121	41	229	75
40	9°	312	267	201	130	49	234	110
55	16°	318	217	184	140	29	249	84
58	9°	367	320	249	141	52	245	110
80	16°	373	325	231	154	29	264	105
78	9°	374	325	254	153	55	257	122
107	16°	381	330	234	167	31	277	106
117	9°	434	381	294	172	64	279	132
160	16°	442	387	272	187	36	298	114

其余尺寸见 LV Other dimensions see LV.

标准型 Standard Model



A_1 和 X_3 仅用于带压力切断 A_1 and X_3 with pressure cut-off only

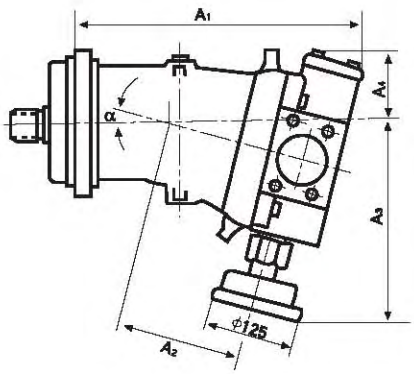
MA 手动变量 Manual Control

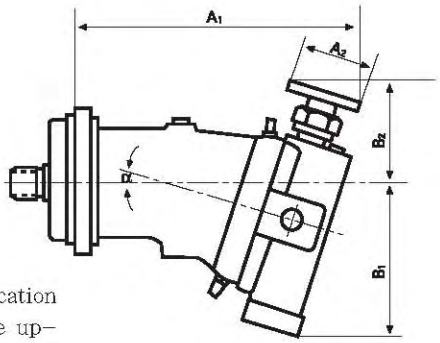
手动朝下 handwheel downwards

规格 Size	a	A_1	A_2	A_3	A_4
20	9°	251	108	175	95
28	16°	260	108	190	80
40	9°	315	134	197	108
55	16°	323	134	215	89
58	9°	327	155.5	215	107
80	16°	380	155.5	235	86
78	9°	380	169	246	144
107	16°	390	169	270	92
117	9°	441	192	261	132
160	16°	450	192	285	107

手动朝上 handwheel upwards

规格 Size	a	A_1	A_2	B_1	B_2
20	9°	–	–	–	–
28	16°	–	–	–	–
40	9°	317	100	175	132.5
58	9°	–	–	–	–
80	16°	–	–	–	–
78	9°	315	1000	180	157.5
107	16°	383	100	270.5	132.5
117	19°	–	–	–	–
160	16°	445	100	225	143
250	26.5	584	120	320	230



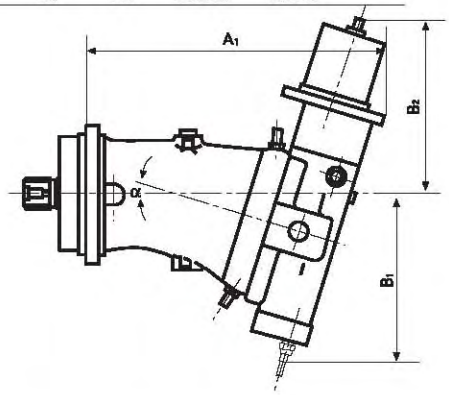


注：手轮朝上或朝下，订货时请说明。

Please give clear indication of the handwheels are upwards or downwards, when you order goods!

NC 数字变量 Numerical Control

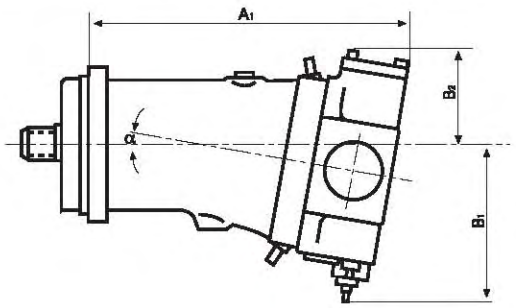
规格 Size	a	A_1	B_1	B_2
107	16°	419	225.5	224.5



LVS 恒 功率负荷传感变量

Constant HP Control with Load Sensing

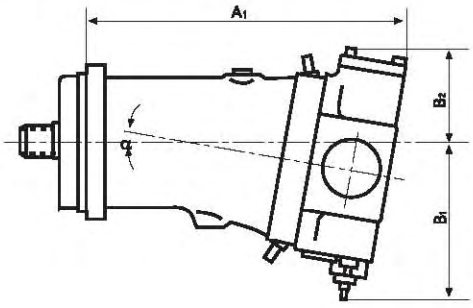
规格 Size	a	A_1	B_1	B_2
117	9°	443	215	137



DRS 恒压负荷传感变量

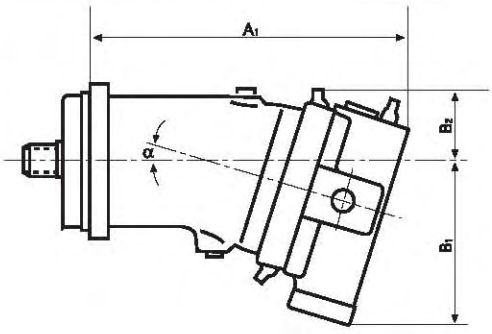
Constant Pressure Control with Load Sensing SC

规格 Size	a	A_1	B_1	B_2
117	9°	441	214	132



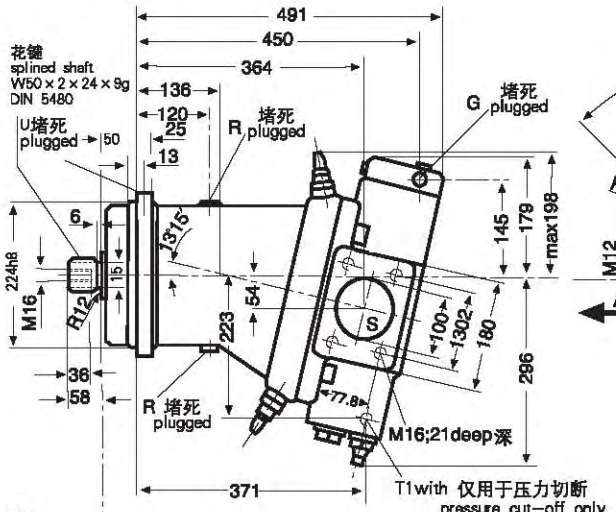
SC 刹车变量 Brake Control

规格 Size	a	A_1	B_1	B_2
160	16°	441	230	98



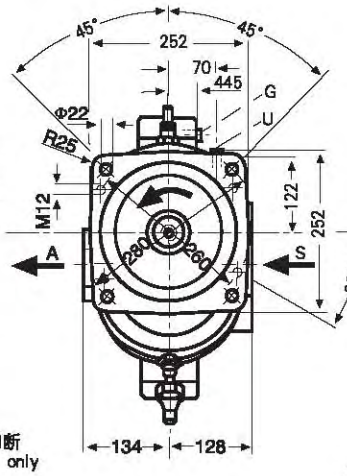
元件尺寸 Unit dimensions 规格 Size-250

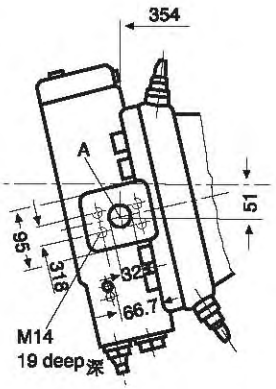
LV 恒功率变量 Constant HP control



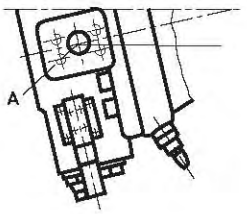
逆时针旋转
Model for Anti-Clockwise Rotation

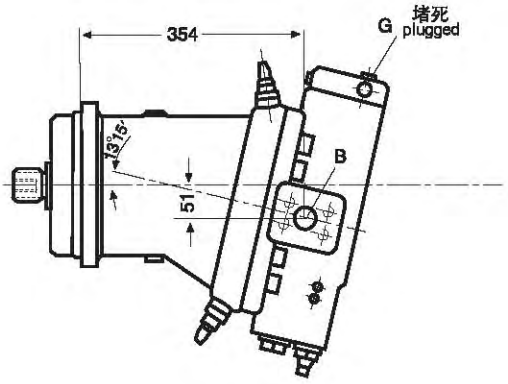
顺时针旋转
Model for Clockwise Rotation

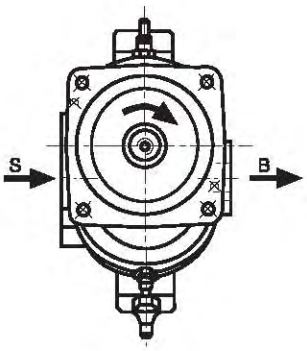


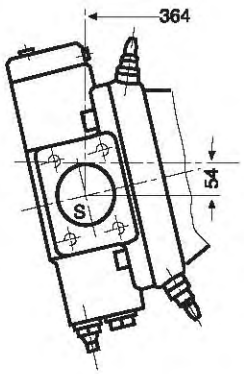


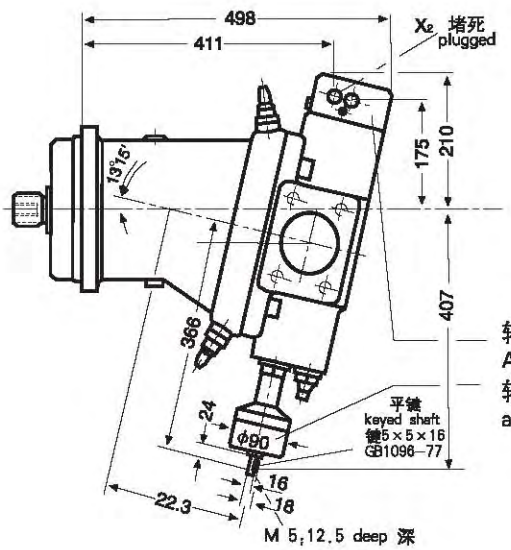
带压力切断With Pressure Cut-Off

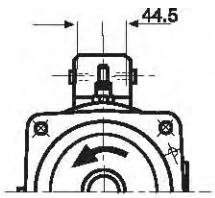


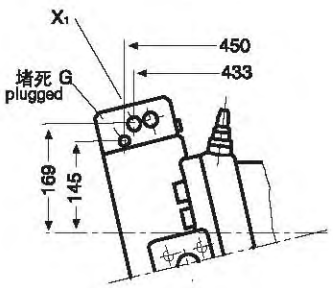










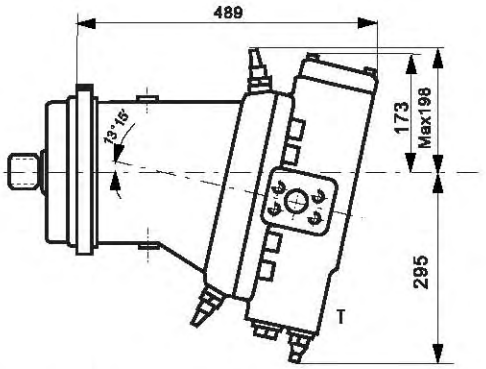


辅助元件：液压行程限位（用于LV）
Auxiliary equipment:hydraulic stroke limiter(for LV)
辅助元件：机械行程限位（用于LV和DR）
anxiliary equipment:mechanical stroke limiter(for LV and DR)

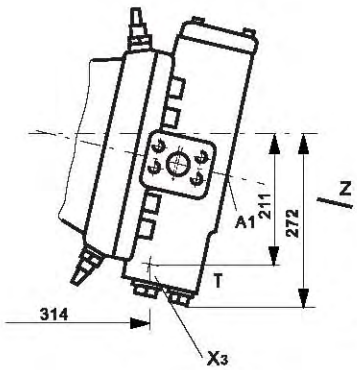
重量，规格250：约105公斤
Weight,size 250:approx.105kg

DR 恒压变量 Constant Pressure Control

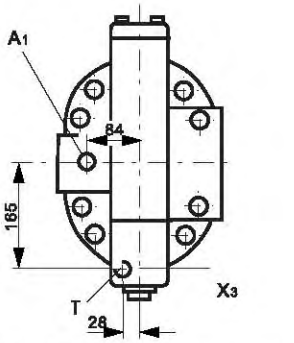
标准型 Standard Model



遥控 Remote Control



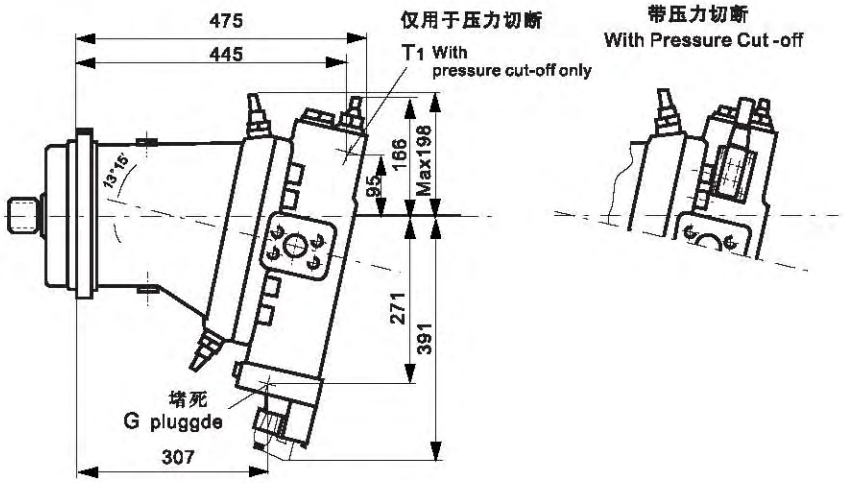
Z 向 Detail z



A1 and X3 only for remote conrtol

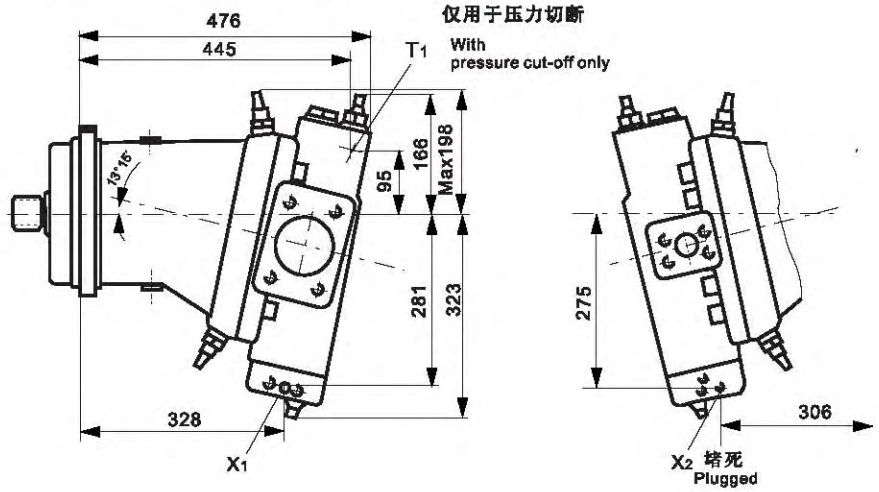
A1和X3仅限于遥控

EP电控变量 Flectric Control

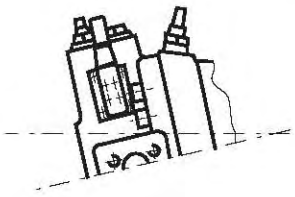


带压力切断
With Pressure Cut-off

HD液控变量 Hydraulic Control, Pressure Rclatcd



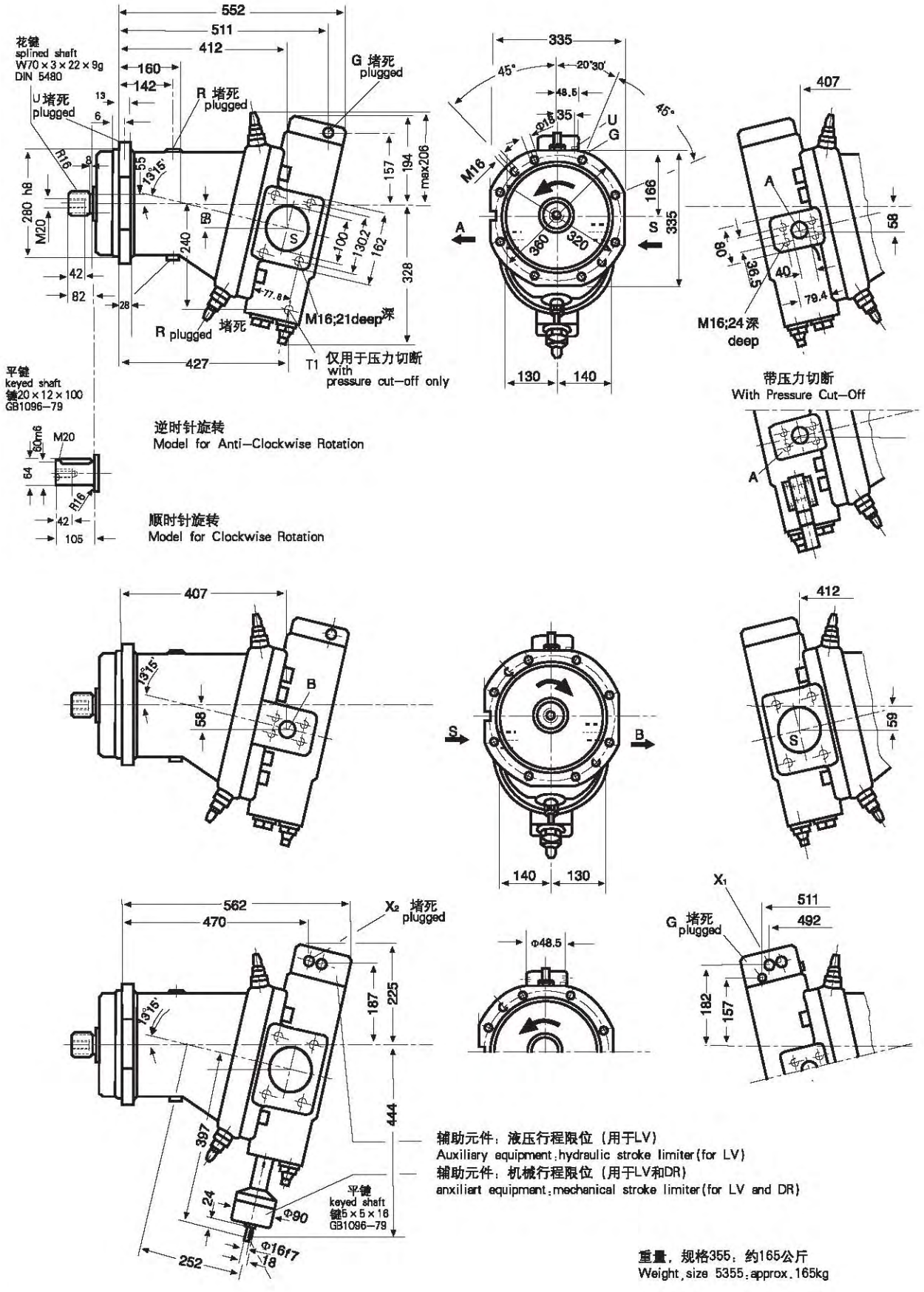
带压力切断
With pressure cut-off only



A,B	压力油口	service lines	X_1	先导压力口	pilot pressure M14 × 1.5
S	吸油口	suction line	X_2	遥控压力口	remote control pressure(HD) M14 × 1.5
G	遥控压力口	remote control pressure M14 × 1.5	T	先导油回油口	pilot oil return line M16 × 1.5
	(总功率控制油口)	(connection for summation HP control)	T_1	先导油回油口	pilot oil return line M22 × 1.5
A_1,X_3	遥控阀油口	ports for remote control valve M16 × 1.5	R.	排气口	air bleed M22 × 2
U	冲洗口	flushing port M14 × 1.5			

元件尺寸 Unit dimensions 规格 Size-355

LV 恒功率变量 Constant HP control

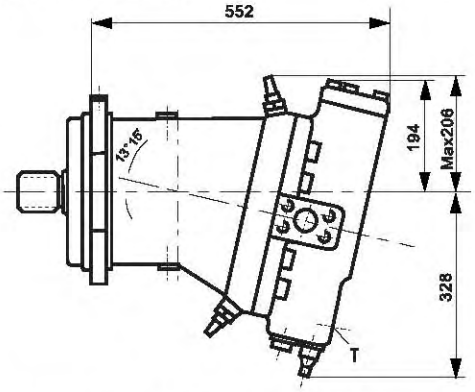


重量，规格355：约165公斤

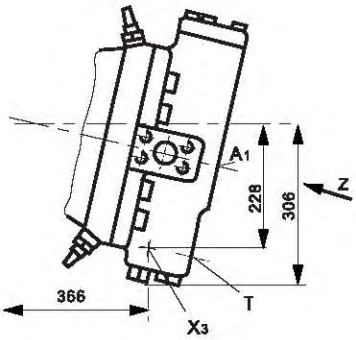
Weight,size 5355:approx.165kg

DR 恒压变量 Constant Pressure Control

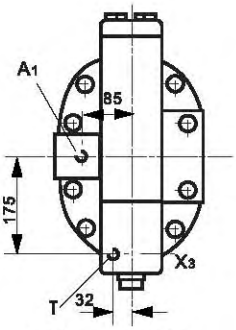
标准型 Standard Model



遥控 Remote Control



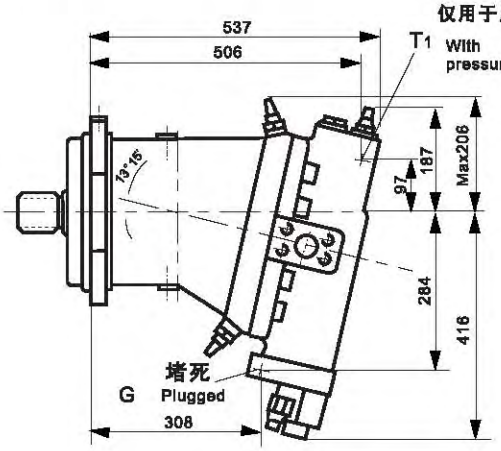
Z 向 Detail z



A1和X3仅限于遥控

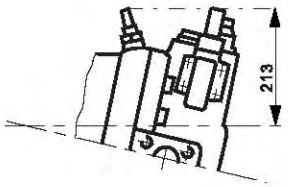
A1 and X3 only for remote conrtol

EP电控变量 Flectric Control

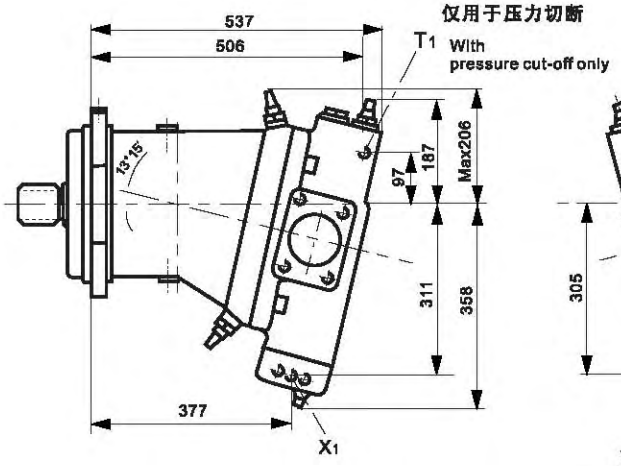


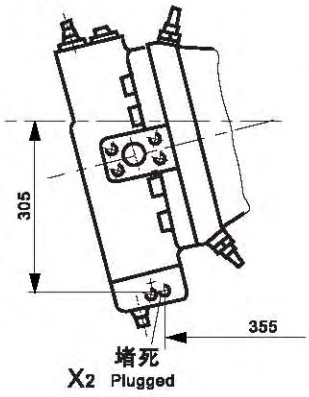
带压力切断

With Pressure Cut -off



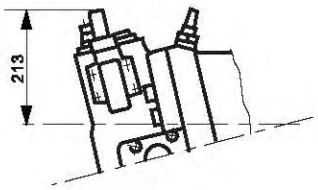
HD液控变量 Hydraulic Control, Pressure Rclatcd





仅用于压力切断

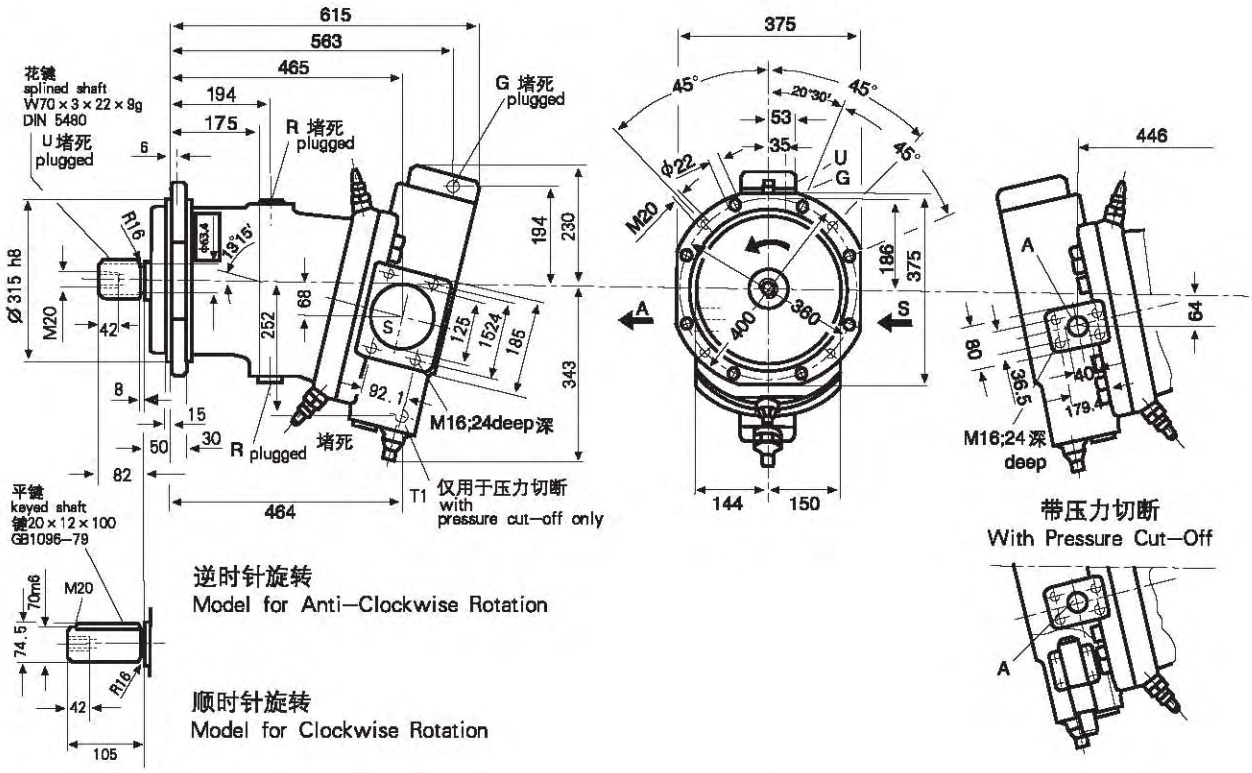
With pressure cut-off only



A,B	压力油口	service lines
S	吸油口	suction line
G	遥控压力口	remote control pressure M16 × 1.5
	(总功率控制油口)	(connection for summation HP control)
X_1	先导压力口	pilot pressure M16 × 1.5
X_2	遥控压力口	remote control pressure(HD) M16 × 1.5
A_1, X_3	遥控阀油口	ports for remote control valve M22 × 1.5
T	先导油回油口	pilot oil return line M16 × 1.5
T_1	先导油回油口	pilot oil return line M22 × 1.5
R	排气口	air bleed M33 × 2
U	冲洗口	flushing port M14 × 1.5

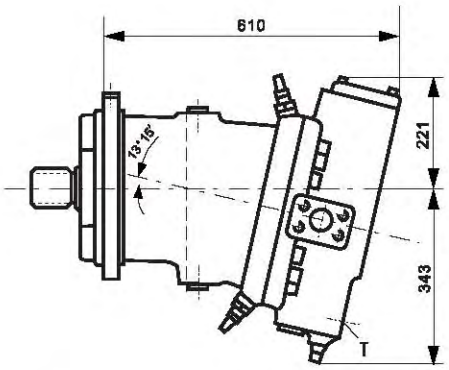
元件尺寸 Unit dimensions 规格 Size-500

LV 恒功率变量 Constant HP control

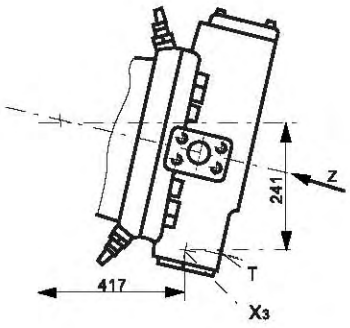


DR 恒压变量 Constant Pressure Control

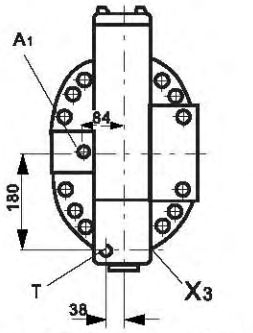
标准型 Standard Model



遥控 Remote Control



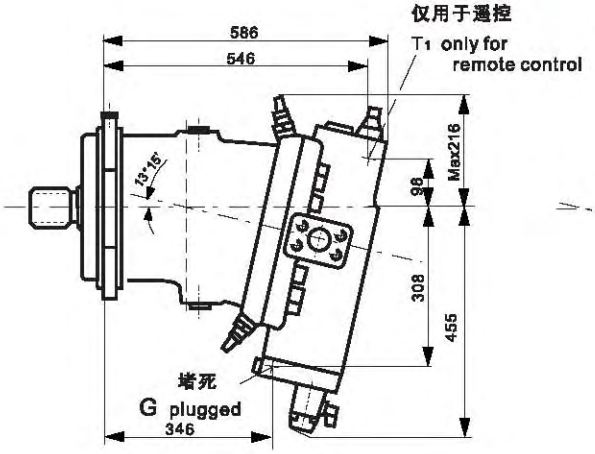
Z 向 Detail z



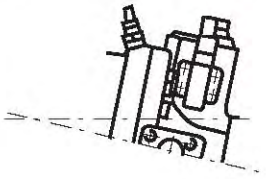
A1 and X3 only for remote conrtol

A1和X3仅限于遥控

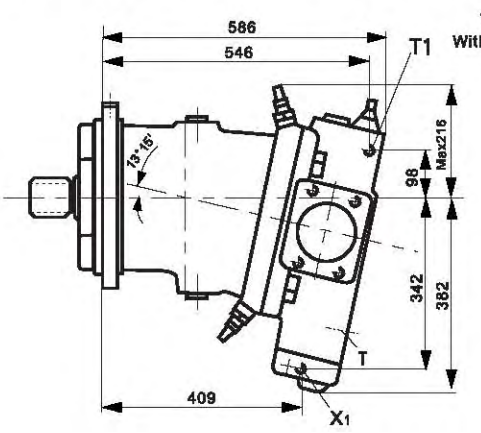
Ep电控变量 Electric Control

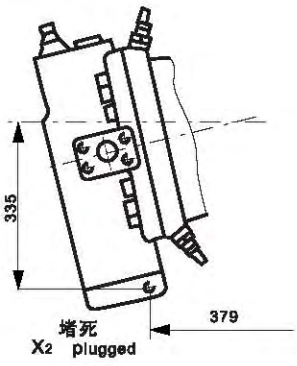


带压力切断 With Pressure Cut-off

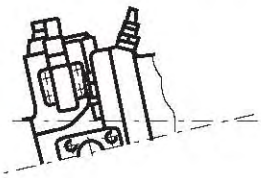


Hp液控变量 Hydraulic Control, Pressure Rclatcd





带压力断切 With Pressure Cut-Off



A,B	压力油口	service lines
S	吸油口	suction line
G	遥控压力口	remote control pressure
	(总功率控制油口)	(connection for summation HP control) M16 × 1.5
X_1	先导压力口	pilot pressure M16 × 1.5
X_2	遥控压力口	remote control pressure(HD) M16 × 1.5
A_1, X_3	遥控阀油口	ports for remote control valve M22 × 1.5
T	先导油回油口	pilot oil return line M16 × 1.5
T_1	先导油回油口	pilot oil return line M22 × 1.5
R	排气口	air bleed M33 × 2
U	冲洗口	flushing port M14 × 1.5

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北京华德液压集团企业发展部

返首页
Return To Home Page

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,Ltd. 华德

2004年12月编制

华德液压
HUADE HYDRAULIC

A8V

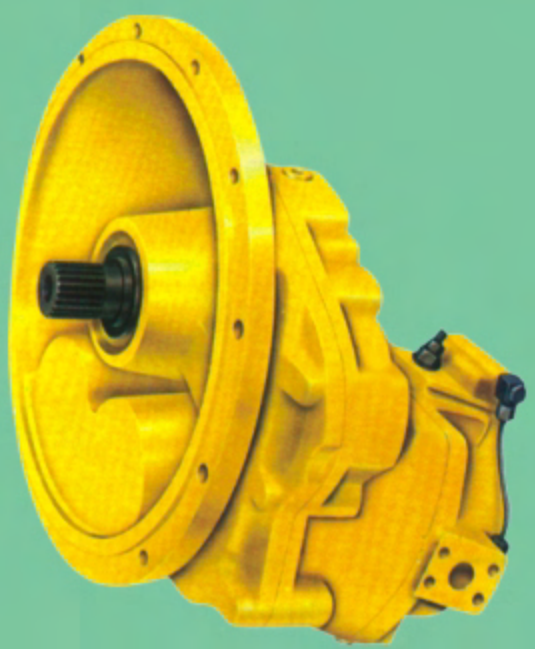
A2F A6V A7V A4V/F

选用手册 Selection Handbook

Axial Piston Bent Axis-Design Variable Displacement Double Pump

斜轴式轴向柱塞变量双泵

For Open Circuits
用于开式系统



额定压力 Nominal Pressure PN=35 Mpa

规　格 Sizes　28–160

北京华德液压工业集团有限责任公司
BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP Co.,LTD.

目　录 CONTENTS

1 A8V 变量双泵 1
Variable Displacement Double Pump A8V

华德

注意事项

1.为了保证无故障的高效工作，在设计系统期间应根据工况仔细选择液压系统的液压油，所有矿物油基液压油均在某种程度上适用于轴向柱塞元件，它们的应用时基本划分取决于上述的水、粘度与温度关系，并考虑氧化和腐蚀保护、材料相容性、空气和水分离特性。

2.为了保证设备有长的使用寿命，必须进行良好而可靠的过滤。油液中的硬颗粒污染不得超过以下等级：

等级 9——按 NAS1638

等级 6——按 SAE

等级 18/15——按 ISO/DIS 4406

在油液温度很高时，最低清洁度为：

等级 8——按 NAS1638

等级 5——按 SAE

等级 17/14——按 ISO/DIS 4406

3.为了正确选择液压油，必须知道与环境温度有关的工作温度；在闭式回路中这是回路温度，在开式回路中这是油箱温度。

4.注意：漏油（壳体泄油）温度受压力和转速的影响，总是高于回路温度，然而要求回路中任何点温度不得超过 90℃。

如果由于极端的工作参数或较高的环境温度，而不能维持上述条件，订货时请询问我公司。

5.泵的进油口压力（绝对压力）处须≥ 0.08MPa，及泄油压力(壳体内允许的最高压力)为0.2MPa(绝对压力)，壳体内压力值必须等于或高于作用在轴密封上的外部压力值。

6.安装位置：一般要求液压泵／马达安装位置、壳体上边缘低于油箱最低液面。若安装需在油面以上，请在订货时提出。

《样本》所述技术资料，仅供参考。若有特殊要求请与我集团公司技术部门咨询，若有更改，恕不通知。

The technical information in the catalog is for your reference. Please consult our technical Dept., if you have any special requirements.

NOTES

1.In order to guarantee trouble-free and efficient operation, the hydraulic fluid in a hydrostatic system should be selected carefully according to the actual working conditions during the design of the system. All mineral oil based fluids are suitable to a greater or lesser degree for application in axial piston units. Their basic classification of application results from what has already been said due to the water , viscosity and temperature relationships, with consideration of oxidization and corrosion protection, material compatibility, air and water separation characteristics.

2.In order to guarantee a long service life for the installation, good and reliable filtration is necessary.The hard particle contamination of fluid may not exceed a level determined by:

Class 9 to NAS 1638

Class 6 to SAE

Class 18/15 to ISO/DIS 4406

When the fluid temperature is too high,the required minimum degree of cleanliness is:

Class 8 to NAS 1638

Class 5 to SAE

Class 17/14 to ISO/DIS 4406

3.In order to select the correct fluid,it is necessary to know the operating temperature in the circuit in relation to the ambient temperature-in an open circuit and the tank temperature.

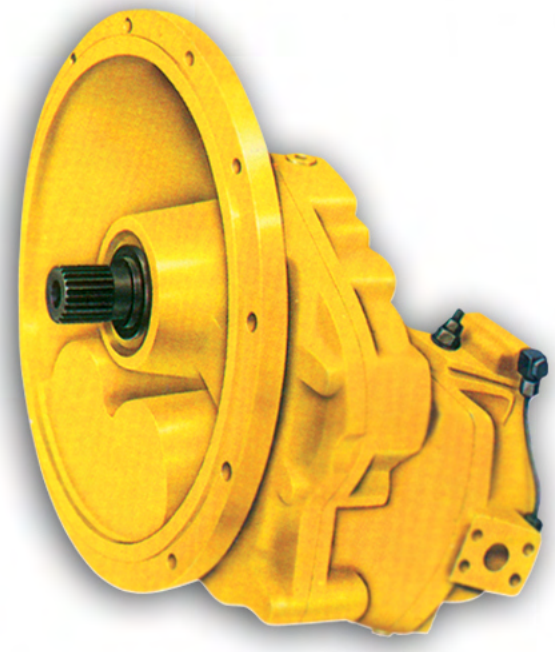
4.Important:The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the circuit temperature. However, at no point in the circuit may the temperature exceed 90℃。

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

5.The minimum pressure at the suction port of the pump ≥0.08 Mpa(absolute pressure), and the drain pressure (max. permissible casing pressure) is 0.2 MPa(absolute pressure). The pressure in the housing must be the same or greater than the external pressure on the shaft seal.

6.Installation position: in general, the upper point on the pump/motor housing must be below the minimum oil level of the tank. If you would like to install it above the minimum oil level, please indicate when order.

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A8V 变量双泵 Variable Displacement Double Pump A8V 用于开式回路 For open circuits　斜轴式轴向柱塞结构 axial tapered piston,bent axis design	RC92300/12.2004
	规格 Size 28-160　高压范围 Peak pressure 至 up to40MPa	替代：ReplaceRC92300/09.2003



说明：

- 主要部件有共用一个外壳的两个变量泵，分动箱，直接安装在原动机上的SAE法兰及控制装置－通常是叠加HP控制。
- 流量与转速和排量成正比，并可通过改变倾角来无级变化。

Description

Two variable pumps in a common housing,the splitter box,an SAE flange for direct mounting on to the prime mover and the control device-usually summation HP control.
Flow is proportional to speed by change the swivel angle.

特点：

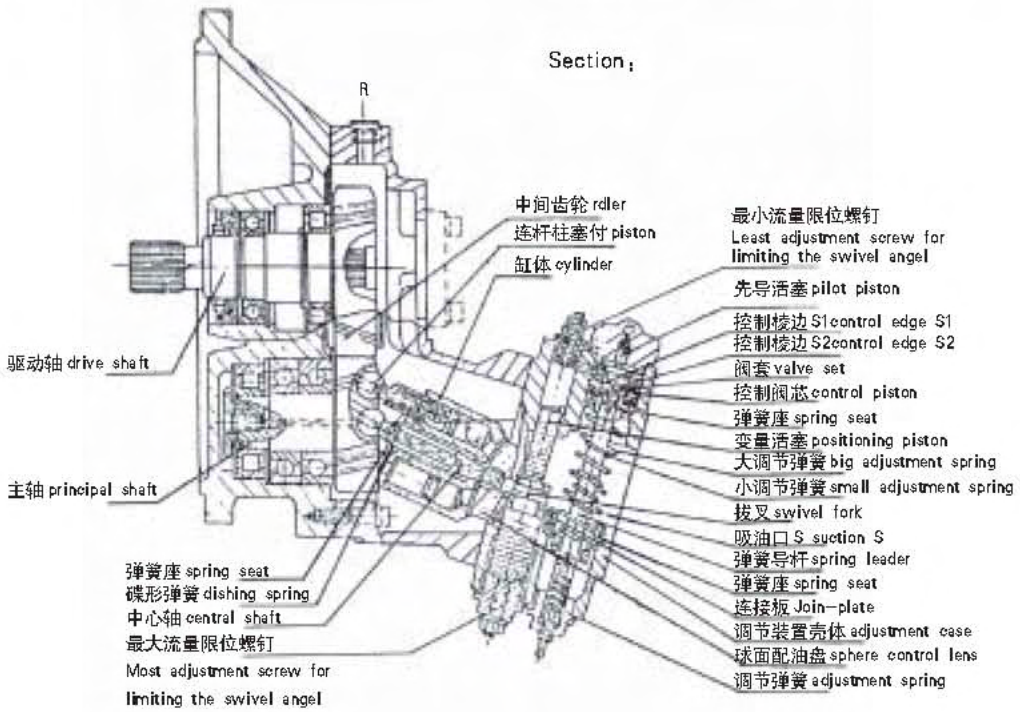
- 带有辅助驱动的不同结构方案及多回路控制的可能性,使它可与各种驱动应用最佳匹配。
- 结构紧凑，易于安装与保养。
- 压力高、耐冲击，工作寿命长。

Special Features

The various design options with auxiliary drive and the possibility of multi-circuit control allow optimum matching to individual drive applications.

剖视图：

Section：



A8V 变量双泵 Variable Displacement Double Pump A8V

型号说明 Ordering Code

A8V	55	SR	1.1	R	1	0	1	F	1

泵型号 Pump Type

变量双泵 Variable Displacement Double Pump

规格 Size

8.1–28.1ml/r	28
15.8–54.8ml/r	55
0–58ml/r	58
23.1–80ml/r	80
30.8–107ml/r	107
21.8–125ml/r	125
46.2–160ml/r	160

(每个旋转组件的排量 V_{gmin}–V_{gmax})
(Displacement V_{gmin}–V_{gmax} perrotary group)
只有 DM.LL 控制方式
Only exist control device DM.LL

控制方式 Control Device

总功率变量 Summation HP control	SR
分功率变量 Individual power control	LL
分功率交叉变量 Cross-sensing control	LLC
恒压手动变量 Constant pressure and manual control	DM

结构 Design

见下 See below	1.1
	1.2
	2
	3
	4
	5

行程限位 Stroke Limiter

固定的	fixed	1
液控的	hydraulic	2
机械的	mechanical	3
(2.3 不用于规格 28)	(2.3not for Size 28)	

压油口连接 Pressure Connection

螺纹(用于规格 28)		G
法兰	SAE SAE flange connection	F

吸油口连接 Suction Connection

SAE 法兰	SAE flange	1

速比 Gear Ratio

规格 size	28	55	58	80	107	125	160	
代号 Ratio 0	–	1.00	–	1.00	1.00	1.00	1.00	0
代号 Ratio 1	0.73	0.75	0.87	0.87	0.85			1
代号 Ratio 2	0.86	0.93	1.06	1.06	1.08			2
代号 Ratio 3	–	1.17	–	1.35	1.23			3
代号 Ratio 4	–	0.84	0.81	–	–			4
代号 Ratio 5	–	1.05	–	1.18	–			5

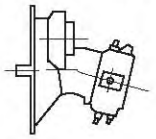
系列 Series 1

旋转方向(从轴端看) Direction of Rotation(View ed on shaft end)

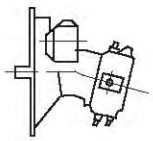
顺时针	Clock wise R

A8V 变量双泵 Variable Displacement Double Pump A8V

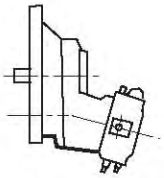
结构 Design 1.1–5



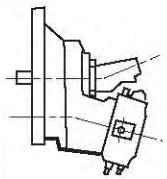
1.1 不带减速齿轮
带辅助驱动
without adaptor gear
without auxiliary drive



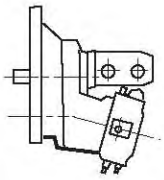
1.2 不带减速齿轮
带辅助驱动
without adaptor gear
without auxiliary drive



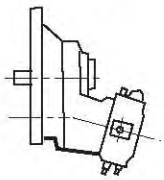
2 带减速齿轮
不带辅助驱动
without adaptor gear
without auxiliary drive



3 带减速速齿轮
带辅助驱动和安装
A2F 23.28
(带花键轴)的联轴节
with adaptor gear
with auxiliary drive and
coupling for mounting of
a fixed pump A2F 23.28
(with splined shaft)



4 带减速齿轮
带辅助驱动可安装齿轮泵
with adaptor gear
with auxiliary drive and
coupling for mounting of
a gear pump with
tapered shaft and bolton)



5 带减速齿轮
带辅助驱动、有盖板
with adaptor gear
with auxiliary drive,
plugged.
(with cover)

订货示例：

A8V,55,SR,1.1,R,1,0,1,F,1

变量双泵A8V，规格55,总功率变量，结构1.1，顺时针旋转，1系列，速比1.00，吸油口1 ，SAE压力油口，固定行程限位器。用于辅助驱动的泵应在订货时单独列出。

Ordering Example

A8V,55,SR,1.1,R,1,0,1,F,1

Variable Displacement Double Pump A8V,Size55,Summation HP Control,Design1.1,Clockwise rotation,Series 1,gear ratio 1.00,Suction Connection 1, SAE Pressure connection,fixed stroke limiter .Pimps for auxiliary drive should be listed separately when ordering.

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

吸油口的绝对压力：Absolute pressure on the suction inlet S

P_{absmin}_____ 0.08MPa

P_{absmax}_____ 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)100mm²/s

最佳工作粘度：Operating Viscosity：

V_{opt} _____ 16−36mm²/s

油液选择：Fluid Recommendation

工作温度 推荐粘度等级符合DIN 51519

Operating Recommended Viscosity grade

temperature to DIN51519

range ISO(VG)

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

液压油的过滤：Filtration of Hydraulic Fluid

推荐过滤精度为10∝m。亦可使用25−40∝m。使用10∝m的可以延长使用寿命(降低磨损)。

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

转速范围：Speed Range

最低转速没有限制，最高转速n_{Amax}见下表

No limitation on minimum speed n_{min}.

See data table for max.permissible speeds n_{Amax}.

安装位置：Mounting Position

驱动轴水平安装。其它位置也可以，但事先应询问本厂

Horizontal, as referred to the drive shaft; other positions are possible, but require prior consultation with us.

辅助驱动的输出转速与输入转速n_A相同 。(结构3,4,5)

Output speed of the auxiliary drive is the same as input speed n_A(Design 3,4,5)

辅助驱动速比：Auxiliary Drive Gear Ratio

结构	规格	Size			
Design	55	80	107	125	160
1.1	1.244	1.333	1.256		
1.2	1.00	1.00	1.00	1.00	1.00

旋转方向(从轴端看)：Direction of rotation (Viewed on Shaft)

结构1.1(Design 1.1)：逆时针(anti−Clockwise)

结构1.2(Design 1.2)：顺时针(Clockwise)

技术参数表

(理论值、未考虑 η_{mh} 和 η_v，数值经过园整)

Technical Data

(theoretical values, without considering mb and v, Values rounded off)

规格	单侧泵排量 V_{gmax}	分动箱齿轮速比	最大驱动转速 n_{Amax}(r/min) 当明油口 S 绝对压力为 P 及排量为 V_{gmax} 时			双泵最大流量 Q_{max}(l/min) (考虑 3% 的容积损失)在对应转速下			双泵驱动功率 P(KW)			惯性矩 J(kgm²)	重量 kg
Size	Displacement of double pump per rotary group V_{gmax}(ml/r)	Splitter box gear ratio $i=\frac{n_A}{n_p}$	Max.drive speed n_{Amax}(r/min)for (absolute)pressure P at suction inlet S and max.displ.V_{gmax} P=0.09MPa P=0.1MPa P=0.15MPa			Max.flow Q_{max}(l/min)of double pump(displacement losses of 3%included)at speed			Drive power P(kw) of double pump, with △p1+△p2=35MPa (start of control)and Q_{max} at speed			Moment of inertia J(kgm²)	Weight kg
			n0.09	n0.1	n0.15	n0.09	n0.1	n0.15	n0.09	n0.1	n0.15		
28	28.1	0.729	2040	2185	2350	2 × 76	2 × 82	2 × 88	46	49	53	0.014020	54
		0.860	2410	2580	2770							0.009351	
55	54.8	1.000	2360	2500	2640	2 × 125	2 × 133	2 × 140	75	80	84	0.012475	100
		0.745	1760	1860	1965							0.03743	
		0.837	1975	2090	2210							0.02818	
		0.9318	2200	2330	2460							0.02175	
		1.051	2480	2625	2775							0.01639	
		1.1714	2765	2930	3090							0.012977	
58	58.8	0.8125	2315	2435	2720	2 × 165	2 × 174	2 × 194				0.06189	130
		0.8667	2470	2600	2900							0.05590	
		1.054	3000	3160	3530							0.3579	
80	80	1.000	2120	2240	2370	2 × 164	2 × 174	2 × 184	99	105	111	0.02680	130
		0.8666	1840	1940	2055							0.05590	
		1.054	2235	2360	2500							0.03579	
		1.181	2505	2645	2800							0.02797	
		1.3448	2850	3010	3185							0.02137	
107	107	1.000	1900	2000	2135	2 × 197	2 × 208	2 × 222	119	125	133	0.03625	165
		0.8431	1600	1685	1800							0.08257	
		1.075	2040	2150	2295							0.047012	
		1.2285	2335	2455	2625							0.035353	
125	125	1.000	1900	2000	2135	2 × 230	2 × 242	2 × 258	139	146	156	0.055	180
160	160	1.000	1750	1900	2100	2 × 271	2 × 284	2 × 325	164	178	196	0.064	200

总功率变量

SR总功率变量是一种与压力有关的先导控制，可无级同步调节双泵的倾角，从而在V_{gmax}至V_{gmin}范围内调节泵的排量，流量与系统压力成反比，以保持液压功率恒定。

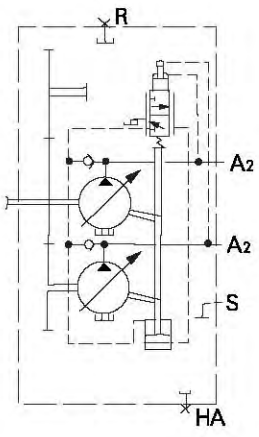
总功率变量是以两个压力之和(P_1+P_2)来进行控制的，因此，当一个泵要较小功率时，其余功率可作用于另一个泵。在极端情况下，任一个泵都可得到最大功率。

Summation HP Control

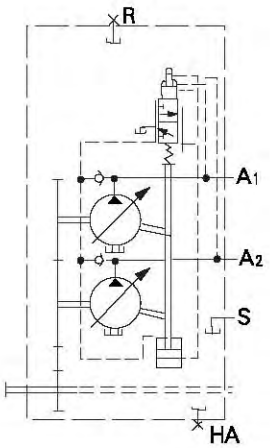
Summation HP control SR is a pressure related, pilot operated control which steplessly adjusts the swivel angle, and thus the displacement, of the under-coupled pumps in the range V_{gmax} to V_{gmin}. Flow is inversely proportional to system pressures, thereby maintaining hydraulic power constant. Summation HP control means control using the sum of the two pressure (P_1+P_2). If one pump requires less power, then the remaining power is available to the other pump. In extreme cases, either pump can be supplied with the maximum power.

$$P=\frac{(P_1+P_2)\cdot Q}{60\cdot\eta_t}=\text{恒量}$$ constant

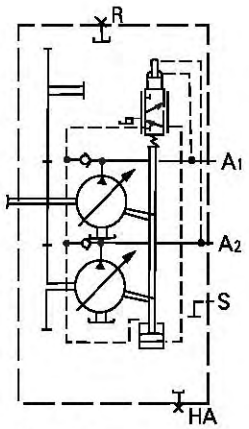
P= 驱动功率	drive power	[kw]
P_1P_2= 压力	pressure	[MPa]
η_t= 总效率	overall efficiency	
Q= 流量	flow	[L/min]



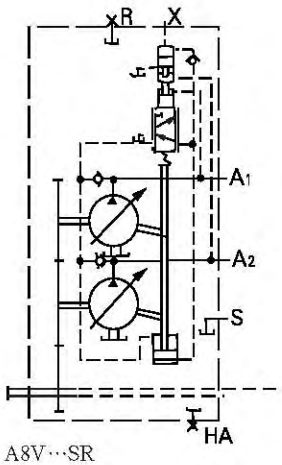
A8V…SR
结构 Design1.1



A8V…SR
结构 Design2-5



A8V…SR
结构 Design1.2



A8V…SR
结构 Design2-5
带液压行程限位
with hydraulic stroke limiter

接口	connections
A1,A2 工作油口	suction line
S 吸油口	suction line
R 排气口	air bleed
HA 放油口	oil drain
X 先导压力口	pilot pressure

辅助装置: 行程限位器Auxiliary Device:Stroke Limiter固定的-用限位螺钉把最大流量固定于所需的V_{gmax}上(订货时注明数值)。

机械的——通过机械行程 限位可无级地改变或限制最大排量，调节范围从 V_{gmax} 到 V_{gmin}。

液压的——用附加的液压行程限位器，可无级地改变或限制最大排量，调节范围从V_{gmax}(固定设置) 到 V_{gmin}。

液压行程限位器所需先导 (x 油口) 不低于工作压力(P_1+P_2)的1/14,但 x 口的最低压力不低于0.7MPa,最高允许压力为5MPa(所有规格)。

The fixed setting of the max.flow at the required value V_{gmax} is made by means of a stop screw (please indicate require value in clear text when ordering). By means of mechanical stroke limiter, the max. displacement can be steplessly varied of limited. Adjustment range from V_{gmax} to V_{gmin}.

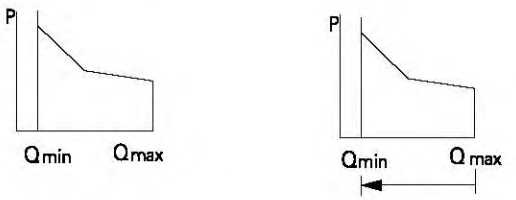
By means of an additional hydraulic stroke limiter, the max. displacement can be steplessly varied of limited. Adjustment range is from V_{gmax}(fixedsetting)to V_{gmin}.

A pilot pressure(port X) of at least 1/14 of the operating pressure (P1+P2)is required for the hydraulic stroke limiter;however,min. pressure at port X must not 0.7MPa.Max.Permissible pressure is 5MPA (for all Sizes)

恒压物动变量是一种分功率调节控制，一泵为恒压变量泵，一泵为手动变量泵，排量在0-58ml范围内可调，恒压变量在其变量范围内保持系统压力恒定，不受泵流量变化的影响，变量泵仅供应工作必须的油液体积。如果压力超过设定值，则泵自动摆回小角度。压力设定范围5-35MPa。△Pmax=1MPa。

Constant pressure and manual control DM is an individual power control. One pump is a constant pressure control, the other pump is a manual control, and the displacement is adjustable is the range 0 to 58ml.

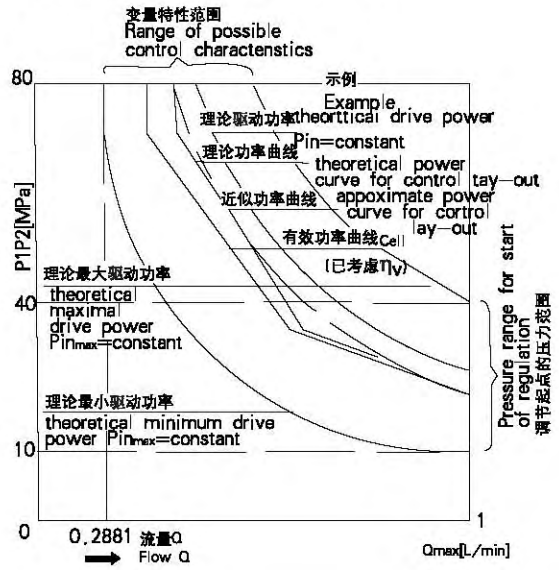
The constant pressure control maintains the pressure in a hydraulic system constant within its control range in spite of changing pump flow requirements. The variable pump supplies only the volume of fluid required by the services. Should operating pressure exceed the set pressure, the pump is automatically swivelled back to a smaller angle. Setting range from 5 to 35MPa . △Pmax=1MPa.

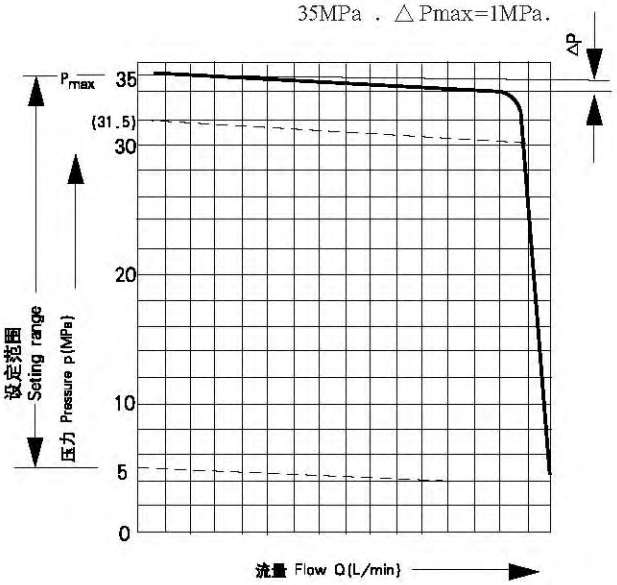


固定的 fixed setting

调节范围
adjustment range
机械的 mechanical
液压的 hydraulic

通用变量特性曲线 Control Curve(general)



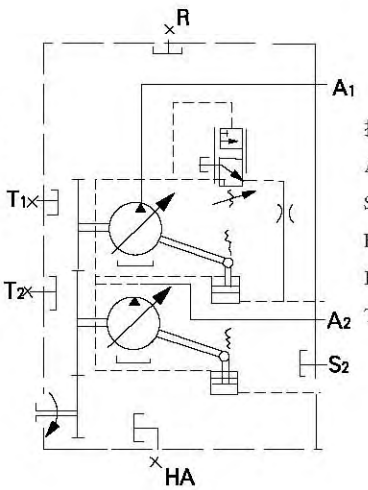


变量起点的压力范围 10-40MPa 为两泵之压力总和，P1=泵1的压力，P2=泵口的压力，每个驱动均有一个特定的功率曲线。

Pressure range at start of control 10-40MPa total summated pressure P1=pressure from pump 1,P2=pressure from pump 2. Special curves are produced for each individual drive.

恒压手动变量

Constant Pressure and Manual Control DM



接口	Connections
A1,A2 工作油口	service lines
S 吸油口	suction line
R 排气口	air bleed
HA 放油口	oil drain
T1,T2 冷却冲洗口	connection for flushing fluid

DM 恒压手动变量 Constant pressure and manual control DM

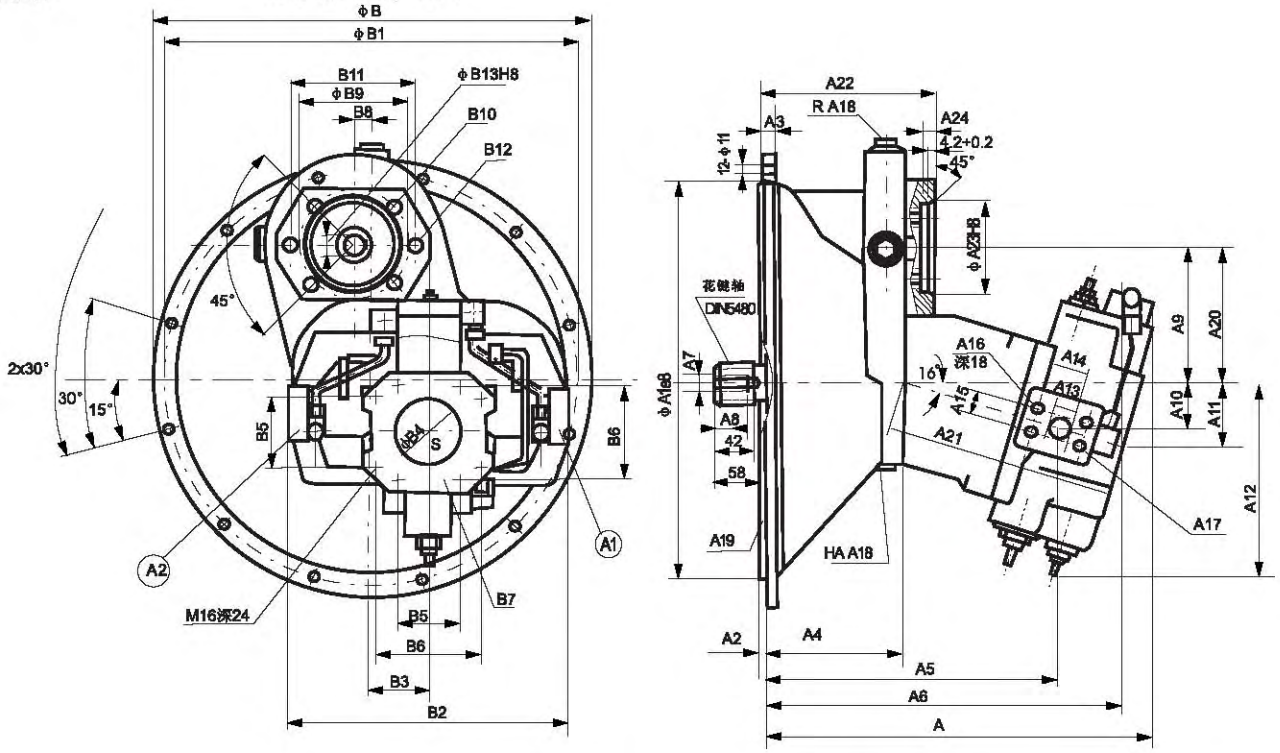
A8V 变量双泵 Variable Displacement Double Pump A8V

元件尺寸，规格 55、80 和 107 Unit Dimensions,Size 55、88 and 107

结构 1.1 Design 1.1

不带减速齿轮 With out adaptor gear

带辅助驱动 With auxiliary drive



A1:A2 工作油口 Service lines

S ＝吸油油口 Suction line

R ＝排气口（堵死） air bleed(plugged)

HA ＝泄油口（堵死） oil drain(plugged)

规格 Size	A	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	深 deep	A17 法兰 Flange
55	361	361.95	5	12	130	273	331	M12	28	92	41	57.6	179.5	20	50.8	23.8	M10	17	SAE3/4″ 42MPa(6000Psi)
80	418	409.575	6	12	144	310	383	M16	36	107.3	47.2	68.5	214.3	25	57.2	27.8	M12	17	SAE1″ 42MPa(6000Psi)
107	443	447.7	6	16	157	385	407	M16	36	115.6	51	71.6	216.3	25	57.2	27.8	M12	18	SAE1″ 42MPa(6000Psi)

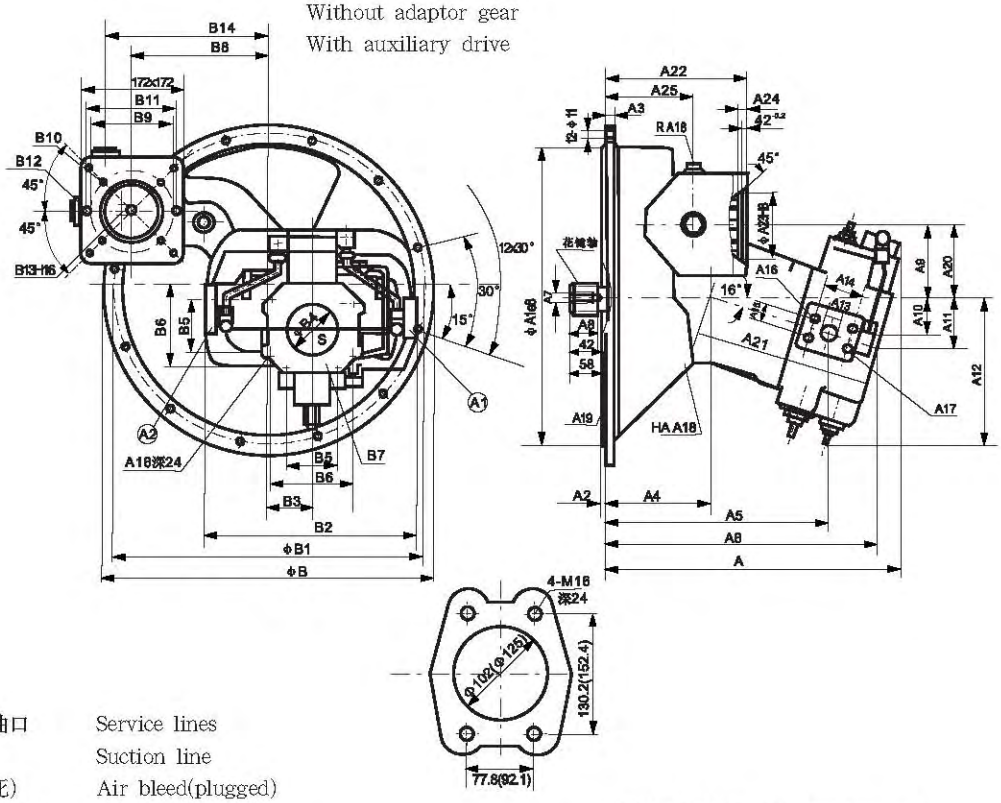
规格 Size	A18	A19 法兰 Flange	A20	A21	A22	A23	A24	B	B1	B2	B3	B4	B5	B6	B7 法兰 Flange	B8	B9
55	M18 × 1.5	SAE4	116	209	66.5	80	11.5	407	381	270	54.25	76	61.9	106.4	SAE3″ 3.5MPa		
80	M22 × 1.5	SAE3	140.08	248.5	180	100	12	456	428.625	290	60.5	102	77.8	130.2	SAE4″ 3.5MPa	20	125
107	M22 × 1.5	SAE2	150	260	192	100	12	495	466.7	320	67	102	77.8	130.2	SAE4″ 3.5MPa	20	125

规格 Size	B10	深 deep	B11	B12	深 deep	B13	平键 CB1096 Keyed	花键 DIN5480 Splined	重量 Weight Kg
55			109	M10	16	18	键 6 × 25	W40 × 2 × 18 × 9g	72
80	M10	16	140	M14	20	25	键 8 × 15	W45 × 2 × 21 × 9g	100
107	M10	16	140	M14	20	25	键 8 × 15	W50 × 2 × 24 × 9g	135

A8V 变量双泵 Variable Displacement Double Pump A8V

元件尺寸，规格55、80、107、125和160
结构1.2
不带减速齿轮
带辅助驱动

Unit Dimensions,Size55、80、107、125 and 160.
Design1.2
Without adaptor gear
With auxiliary drive



A8V125(160)吸油口 Suction line

A1,A2 =工作油口 Service lines
S =吸油口 Suction line
R =排气口(堵死) Air bleed(plugged)
HA =泄油口 (堵死) Oil drain(plugged)

规格																	深	A17法兰
size	A	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	Deep	Flange
55	361	361.95	5	12	130	273	331	M12	28	92	41	57.6	179.5	20	50.8	23.8	M10	17SAE3/4″	42MPa(6000Psi)
80	418	409.575	6	12	144	310	383	M16	36	107.3	47.2	68.5	214.3	25	57.2	27.8	M12	17SAE1/4″	42MPa(6000Psi)
107	443	447.7	6	16	157	385	407	M16	36	115.6	51	71.6	216.3	25	57.2	27.8	M12	18SAE1/4″	42MPa(6000Psi)
125	426	447.7	6	16	157	307.7	354.4	M16	36	272	47.5	62.2	222	25	57.2	27.8	M12	18SAE1″	42MPa(6000Psi)
160	542	511.2	6	20	221	421	473	M20	42	224	57	72	257	32	31.8	66.7	M14	19SAE1 1/4″	42MPa(6000Psi)

规格		A19法兰													B7法兰	
size	A18	Flange	A20	A21	A22	A23	A24	A25	B	B1	B2	B3	B4	B5	B6	Flange	
55	M18 × 1.5	SAE4							407	381	270	54.25	76	61.9	106.4	SAE3″	3.5MPa
80	M22 × 1.5	SAE3	110	240.5	211	100	12	127	456	428.625	290	60.5	102	77.8	103.2	SAE4″	3.5MPa
107	M22 × 1.5	SAE2	108	260	214	100	12	137	495	466.7	320	67	102	77.8	130.2	SAE4″	3.5MPa
125	M22 × 1.5	SAE2	108	157	214	100	12	137	495	466.7	320	67	102			SAE4″	3.5MPa
160	M22 × 1.5	SAE1	162.6	208	280	110	25		555	530.2	384	85.5	125			SAE5″	3.5MPa

规格				深			深		平键CB1096	花键DIN5480	重量Kg
Size	B8	B9	B10	deep	B11	B12	deep	B13	Keyed	Splined	Weight
55										W40 × 2 × 18 × 9g	80
80	175	125	M10	16	140	M14	20	25	8 × 36	W45 × 2 × 21 × 9g	110
107	198.5	125	M10	16	140	M14	20	25	8 × 45	W50 × 2 × 24 × 9g	145
125	198.5	125	M10	16	140	M14	20	25	8 × 45	W50 × 2 × 24 × 9g	180
160	202.8	138	M10	16	160	M14	20	25	8 × 45	W60 × 2 × 28 × 9g	200

元件尺寸，规格55、80和107
结构 2–5
结构 2
带减速齿轮
不带辅助驱动

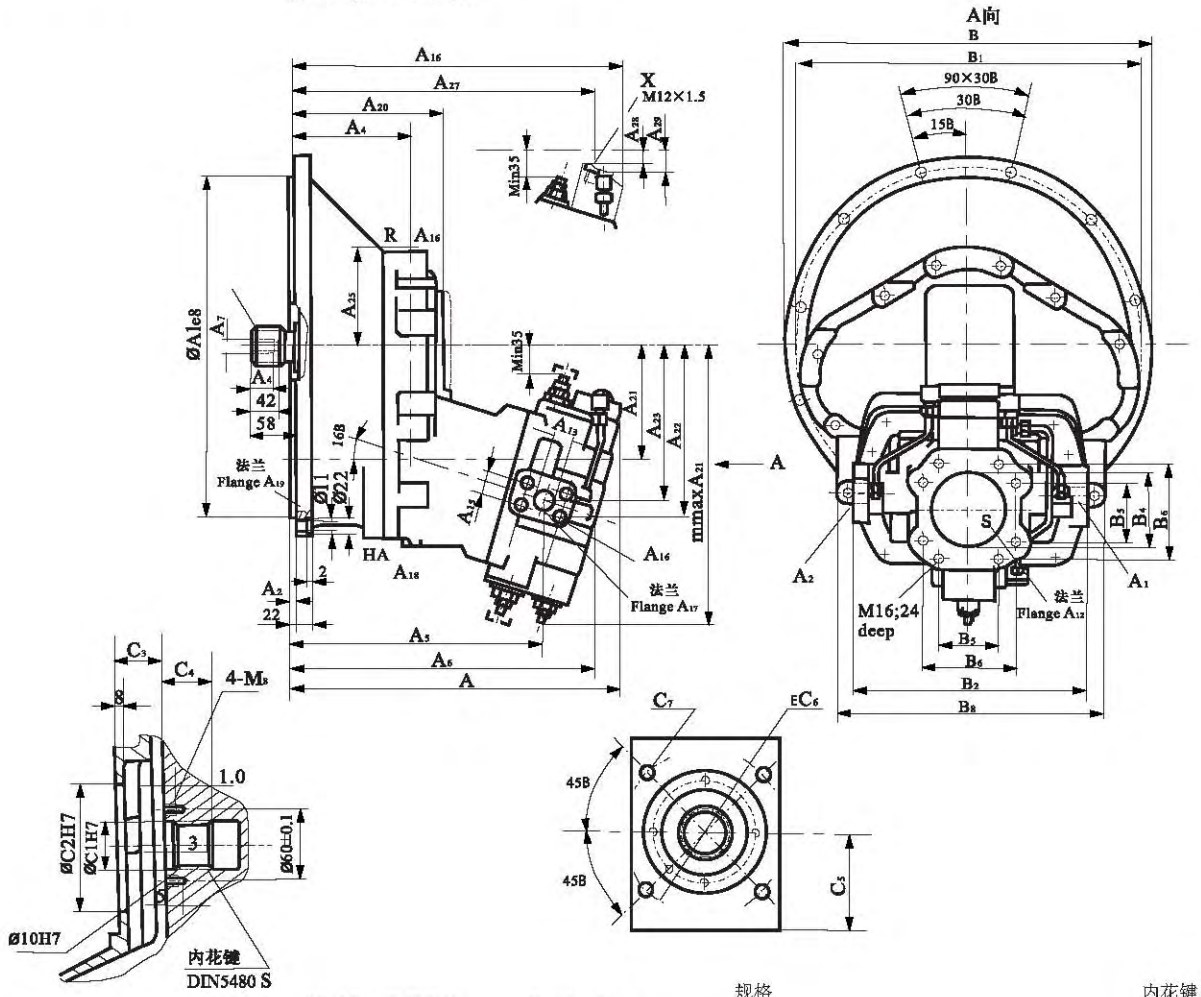
Unit Dimensions Size 55、80 and 107
Designs 2–5
Design 2
with adaptor gear
without auxiliary drive

结构 3
带减速齿轮
带辅助驱动和安装定量泵 A2F23.28
(带花键轴)的联轴节

Design 3
with adaptor gear
with auxiliary drive and coupling
for mounting of fixed pump A2F23.28
(with splined shaft)A.

结构 4
带减速齿轮
带辅助驱动和安装齿轮泵
(带锥轴和螺钉固定)的联轴节

Design 4
with adaptor gear
with auxiliary drive and coupling for mounting
of gear pump
(with tapered shaft and bolt–on fixing)



A1,A2 =工作油口 Service lines
S =吸油口 Suction line
R =排气口(堵死) Air bleed(plugged)
HA =泄油口（堵死） Oil drain(plugged)
X =先导口 pilot port

规格 Size	C1	C2	C3	C4	C5	C6	C7	内花键DIN5480 Splined hub Profile
55	34	80	42.5	33	55	100	M8深 17	N30 × 2 × 14 × 9H
80	40	105	42.5	41	60	125	M10深 12.5	N35 × 2 × 16 × 9H
107	40	105	42	41	62	125	M10深 12.5	N35 × 2 × 16 × 9H

规格 size	A	A1	A2	A4	A5	A6	A7	A8	A13	A14	A15	A16	深 deep	A17法兰 Flange	A18	A19法兰 Flange	A20	A21
55	361	361.95	5	130	273	331	M12	28	20	50.8	23.8	M10	17	SAE$^{3}/_{4}$" 42MPa(6000Psi)	M18 × 1.5	SAE4	176	312
80	418	409.575	6	144	310	383	M16	36	25	57.2	27.8	M12	17	SAE" 42MPa(6000Psi)	M22 × 1.5	SAE3	191	344
107	443	447.7	6	157	335	407	M16	36	25	57.2	27.8	M12	17	SAE1" 42MPa(6000Psi)	M22 × 1.5	SAE2	204	360

规格 Size	A22	A23	A24	A25	A26	A27	A28	A29	B	B1	B2	B4	B5	B6	B7法兰 flange	B8	花键 Splined shaft DIN 5480	重量 Weight Kg
55	181	164.3	123.3	115	370	322	6	8	407	381	270	76	61.9	106.4	SAE3" 3.5MPa(500Psi)	320	W40 × 2 × 18 × 9g	100
80	198.2	177.5	129.7	115	420	382	7	12.5	456	428.625	290	102	77.8	130.2	SAE4" 3.5MPa(500Psi)	340	W45 × 2 × 21 × 9g	130
107	215.3	194.7	143.7	128	453	406	21.5	27	495	466.7	320	102	77.8	130.2	SAE4" 3.5MPa(500Psi)	360	W50 × 2 × 24 × 9g	165

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北京华德液压集团企业发展部

返首页
Return To Home Page

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2004年12月编制

华德液压
HUADE HYDRAULIC

A4V/F

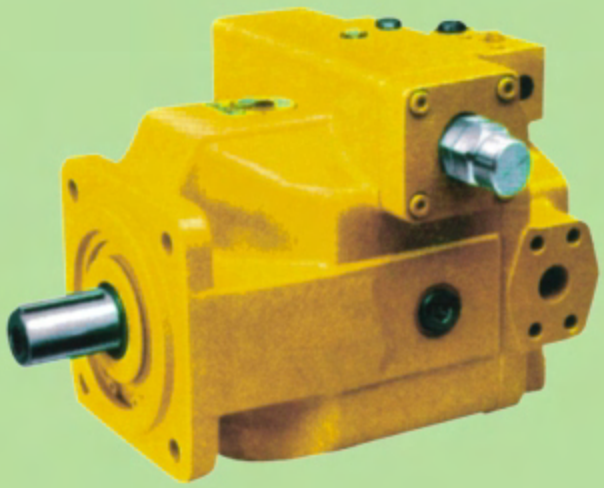
A2F A6V A7V A8V

选用手册 Selection Handbook

Axial Piston-
Swashplate Design
Variable /Fixed
Displacement Pump

斜盘式轴向柱塞
变量/定量泵

For Open Circuits
用于开式系统



额定压力 Nominal Pressure	PN=35 Mpa
规　格 Sizes	40. 71. 125. 180. 250. 500

北京华德液压工业集团有限责任公司
BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP Co.,LTD.

目　录 CONTENTS

1 A4VSO 变量泵 1
Variable Displacement Pump A4VSO

2 A4FO 定量泵 6
Fixed Displacement Pump A4FO

华德

注意事项

1.为了保证无故障的高效工作，在设计系统期间应根据工况仔细选择液压系统的液压油，所有矿物油基液压油均在某种程度上适用于轴向柱塞元件，它们的应用时基本划分取决于上述的水、粘度与温度关系，并考虑氧化和腐蚀保护、材料相容性、空气和水分离特性。

2.为了保证设备有长的使用寿命，必须进行良好而可靠的过滤。油液中的硬颗粒污染不得超过以下等级：

等级 9——按 NAS1638

等级 6——按 SAE

等级 18/15——按 ISO/DIS 4406

在油液温度很高时，最低清洁度为：

等级 8——按 NAS1638

等级 5——按 SAE

等级 17/14——按 ISO/DIS 4406

3.为了正确选择液压油，必须知道与环境温度有关的工作温度；在闭式回路中这是回路温度，在开式回路中这是油箱温度。

4.注意：漏油（壳体泄油）温度受压力和转速的影响，总是高于回路温度，然而要求回路中任何点温度不得超过 90℃。

如果由于极端的工作参数或较高的环境温度，而不能维持上述条件，订货时请询问我公司。

5.泵的进油口压力（绝对压力）处须≥ 0.08MPa，及泄油压力(壳体内允许的最高压力)为0.2MPa(绝对压力)，壳体内压力值必须等于或高于作用在轴密封上的外部压力值。

6.安装位置：一般要求液压泵／马达安装位置、壳体上边缘低于油箱最低液面。若安装需在油面以上，请在订货时提出。

《样本》所述技术资料，仅供参考。若有特殊要求请与我集团公司技术部门咨询，若有更改，恕不通知。

The technical information in the catalog is for your reference. Please consult our technical Dept., if you have any special requirements.

NOTES

1.In order to guarantee trouble-free and efficient operation, the hydraulic fluid in a hydrostatic system should be selected carefully according to the actual working conditions during the design of the system. All mineral oil based fluids are suitable to a greater or lesser degree for application in axial piston units. Their basic classification of application results from what has already been said due to the water , viscosity and temperature relationships, with consideration of oxidization and corrosion protection, material compatibility, air and water separation characteristics.

2.In order to guarantee a long service life for the installation, good and reliable filtration is necessary.The hard particle contamination of fluid may not exceed a level determined by:

Class 9 to NAS 1638

Class 6 to SAE

Class 18/15 to ISO/DIS 4406

When the fluid temperature is too high,the required minimum degree of cleanliness is:

Class 8 to NAS 1638

Class 5 to SAE

Class 17/14 to ISO/DIS 4406

3.In order to select the correct fluid,it is necessary to know the operating temperature in the circuit in relation to the ambient temperature-in an open circuit and the tank temperature.

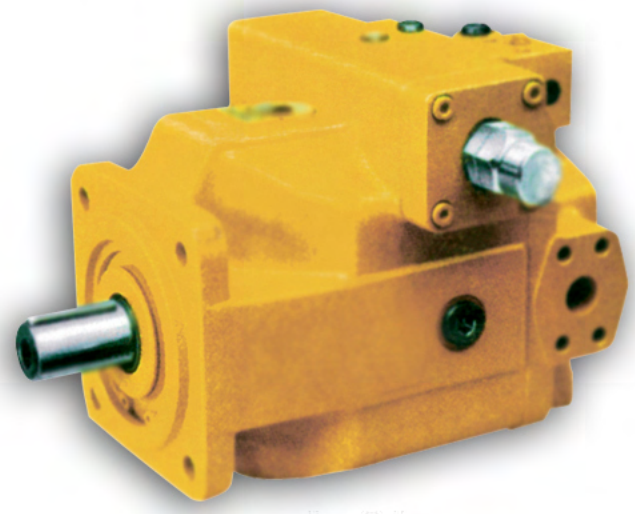
4.Important:The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the circuit temperature. However, at no point in the circuit may the temperature exceed 90℃。

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

5.The minimum pressure at the suction port of the pump ≥0.08 Mpa(absolute pressure), and the drain pressure (max. permissible casing pressure) is 0.2 MPa(absolute pressure). The pressure in the housing must be the same or greater than the external pressure on the shaft seal.

6.Installation position: in general, the upper point on the pump/motor housing must be below the minimum oil level of the tank. If you would like to install it above the minimum oil level, please indicate when order.

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A4VSO 变量泵 Variable Displacement Pump A4VSO 用于开式回路 For open circuits　斜盘式轴向柱塞结构 axial-pistson swash plate design	RC92050/12.2004
	规格 Size 40-500　高压范围 Peak pressure 至 up to 40MPa	替代：ReplaceRC92050/09.2003



说明：

- A4VSO 型斜盘设计轴向柱塞变量泵是为开式回路静液传动系统设计的。
- 流量与输入转速和排量成比例，并可通过调整盘连续变化。

Description

Axial piston, swashplate design, variable displacement pump, designed for hydrostatic transmission in open circuits.
Flow is proportional to input speed and displacement, and is infinitely variable by adjustment of the swashplate.

特点：

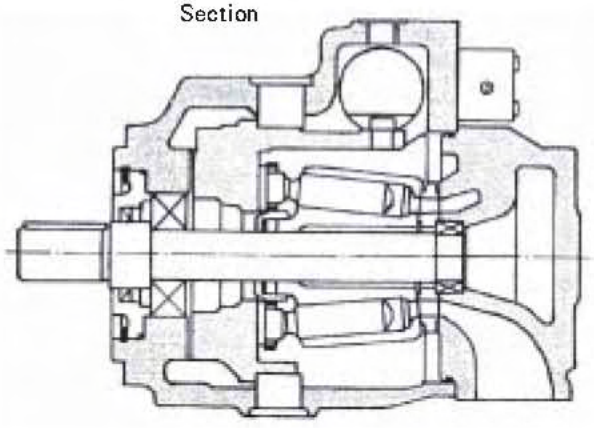
- 开槽控制的斜盘设计
- 连续可变的排量
- 良好的自吸特性
- 允许连续工作压力 35MPa
- 低噪声级
- 使用寿命长
- 驱动轴能吸收轴向和径向载荷
- 功率／重量比高
- 模块化设计
- 控制时间短
- 泵可以复合
- 通轴驱动
- 泵位置可选
- 安装位置可选
- 可在降低的工作参数下用 HFC 液工作

Special Features

slot-controlled swashplate design.
infinitely variable displacement.
good suction. characteristics.
self-adjusting slipper pads and control plate.
optimum compensation of slipper pads.
continuous pressure up to 35 MPa.
low noise level.
long service life.
drive shaft capable of absorbing axial and radial loads.
high power/weight ratio.
modular design.
short control time.
tandem pumps possible. through drive of 100% torque.
pump position indicator.
mounting position optional.
operating on fire resistant fluids HFC under reduced operating parameters.

剖视图：

Section



A4VSO 变量泵 Variable Displacement Pump A4VSO

型号说明

Type Code

A4VS	O	125	DR	/	10	R	P	P	A	11

轴向柱塞元件 Axial Piston Unit

变量，斜盘设计，用于工业用途
Variable capacity swashplate design for industrial applications

工作方式 Type of operation

泵，开式回路 pump,open circuit

规格 size

排量 V_{gmax}(ml/r) | 40 | 71 | 125 | 180 | 250 | 500 |
displacement

控制方式 Control Device

恒压力控制 Constant pressure control	DR

系列 Series 10

工作油口连接 Service Line Connections

连接B和S，侧面SAE油口(错开90°)米制固定螺钉 connection B and S:SAE ports at side(90° off set)Metric fixing screws	11

安装法兰 Mounting Flange

ISO 2-孔 2-hole	A
ISO 4-孔 4-hole	B

轴伸 Shaft End

平键 Keyed shaft GB1096-79	P
花键 Splined shaft DIN5480	Z
花键 Splined shaft GB3478.1-83	S

密封件 Seals

丁腈橡胶 Buna-N	P
氟橡胶 Viton	V

旋轴方向 Direction of Rotation

从轴端看	顺时针 clockwise viewed of shaft end	R
	逆时针 anti-clockwise	L

液压油液 Hydraulic Fluid

工作粘度范围 Operating Viscosity Range

为了得到最佳效率和工作寿命，我们推荐把工作粘度在工作温度下选在以下范围内

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

V_{opt}=16 — 36mm²/s

粘度范围的极限 Limits of Viscosity Range

以下值适用于关键工况：

For critical operating conditions the following values apply：

V_{min}=10mm²/s 短时，最高允许泄油温度 90℃。

for short periods at max,permissible leakage oil temperature of 90℃

V_{max}=1000mm²/s 短时，冷起动

对液压油液选择的意见

为了选择正确的油液，必须了解与环境温度有关的油箱内工作温度（开式回路）。液压油应该这样选择，即在工作温度范围内，工作粘度处于最佳范围内(Vopt)(见选择图的阴影部分)。我们建议在每种情况下均选择较高的粘度等级。

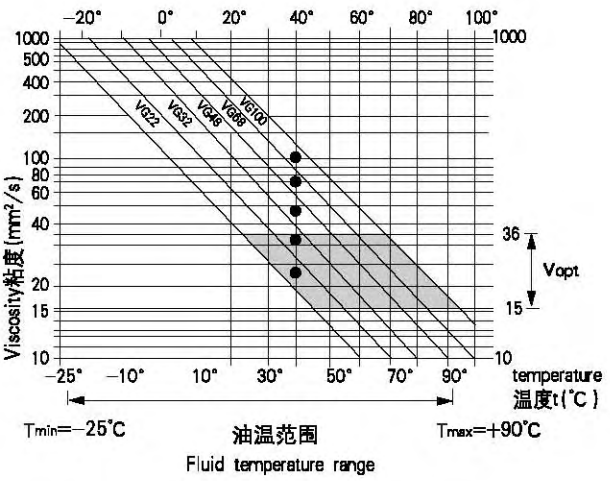
for,short periods upon cold start.

comments of the Selection of the Hydraulic Fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open circuits)in relation to the ambient temperature, Hydraulic fluid should be selected so that, within the operating temperature range, the operating viscosity lies with in the optimum range (Vopt)(see shaded section of selection diagram).we recommend.

that the higher viscosity grade is selected in each case.

选择图 Selection Diagram



示例：在X℃的环境温度下，油箱内的工作温度60℃。在最佳工作粘度范围内(Vopt，阴影部分)，这对应着粘度等级VG46或VG68；应选择VG68.

Example:At on ambient temperature of X℃,the operating temperature in the tank is 60℃,in the optimum operating viscosity range (vopt,shaded section),this corresponds to viscosity grades VG46 or VG68;VG68should be selected.

过滤 Filtration

为了保证可靠的功能，必须至少使工作油液达到以下清洁度。

In order to guarantee reliable function,the operating fluid must be maintained to a cleanliness grade of minimum.

9按 NAS.1638　　9 to NAS.1638

18/15按 ISO4406　　18/15 to ISO4406

温度范围 Temperature range

T_{min}=−25℃

T_{max}=+90℃

规格计算 Calculation of size

输出流量 output flow　$Q=\frac{V_g.n.\eta_v}{1000}$　(L/min)

扭矩 Torque　$M=\frac{1.59\cdot V_g\cdot\triangle p}{10\cdot\eta_{mh}}$　(Nm)

功率 Power　$P=\frac{M\cdot n}{9549}=\frac{Q\cdot\triangle p}{60\cdot\eta_t}$　(KW)

V_g= 排量 Displacement per rev.(ml/r)

△p= 压差 Differential pressure(MPa)

n= 转速 Speed(rpm)

η_v= 容积效率 Volumetric efficiency

η_{mh}= 机械效率 Mech−hydr.efficiency

η_t= 总效率 Overall efficiency($\eta t=\eta v.\eta mh$)

技术数据 Technical Date

工作压力范围－进口侧

Operating Pressure Range−Inlet side

进口S(吸油口)处的绝对压力

Absolute pressure at port S(suction inlet).

$P_{abs\ min}$ _____ 0.08MPa

$P_{abs\ max}$ _____ 0.2MPa

工作压力范围－出口侧

Operating Pressure Range−Outlet side

油口B处的压力 Pressure at port B

额定压力 Nominal pressure P_N−35MPa

最高压力 Peak pressure p_{max}−40MPa

转速提高时吸油上S处的进口压力P_{abs}或输出流量减小的确定

Determination of in let pressure p_{abs} at the suction port S,or the reduction in output flow when increasing rotational speed.

注 Note.

最高允许转速$n_{max\ perm}$(极限转速)

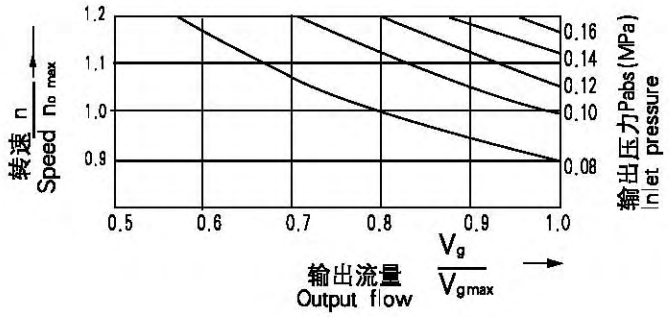
max,permissible speed $n_{max\ perm.}$(speed limit)

壳体泄油压力 Case Drain Pressure

最高壳体泄油压力(壳体压力)

Max.Caes drain pressure(housing pressure)

P_{absmax} _____ 0.2MPa



数值表 Table of Values

(理论值，未考虑ηmh和ηv；数值经过圆整) (theoretical values ,without considering ηmh and ηv; values rounded off)

规格 Size				40	71	125	250	500
排量 Displacement		V_{gmax}	cm^3	40	71	125	250	500
最高转速 Max.speed 1)		n_{omax}	rpm	2600	2200	1800	1500	1320
最高允许转速 Max.perm.speed 2) 当进口压力P_{abs}提高 With increased inlet pressure P_{abs} 对应$V_g<V_{gmax}$ respective $V_g<V_{gmax}$		n_{omax}perm	rpm	3200	2700	2200	1800	1600
最大流量 Max.flow 3)	当 at n_{omax}	Q_{OMAX}	L/min	101	151	218	364	640
	当 at n_E=1450rpm		L/min	56	100	176	352	600
最大功率 Max.Power	当 at n_{omax}	P_{omax}	KW	61	91	131	219	385
(△p=35MPa)	当 at n_E=1450rpm		KW	34	60	106	211	350
最大扭矩 Max.torque(△p=35MPa)	当 at V_{gmax}	M_{max}	Nm	223	395	696	1391	2783
扭矩 Torque (△p=10MPa)	当 at V_{gmax}	M	Nm	64	113	199	398	795
惯性矩 Moment		J	kgm^2	0.0049	0.0212	0.03	0.0959	0.3325
控制体积 Fillint volume			L	2	2.5	5	10	14
近拟重量 Approx,weight		m	kg	39	53	88	184	320
允许轴向载荷，当壳体压力P_{max} 0.1MPa abs perm.axial load with case pressure P_{max} 0.1MPa abs		± Faxmax	N	1000	1400	1900	3000	4000
允许径向载荷 perm.radial load		Fqmax	N	1200	1700	2500	4000	5000

1)只要在吸油S处有0.1MPa的绝对压力则所示数值成立。

The values shown are valid provided there is an absolute pressure of 0.1MPa at suction inlet S.

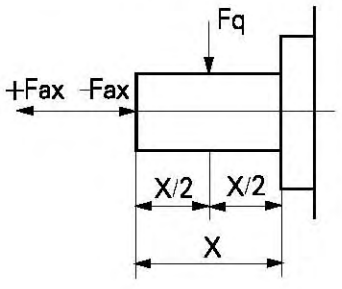
2)超过提高进口压力(超过0.1MPa) 或减小输出流量，转速可以提高到最高转速极限(见图).

By increasing the inlet pressure (pabs 0.1MPa)or reduction of the output flow,the speed can be raised up to the maximum speed limit (see diagram).

3)包括3%的容积损失。

3%Volumetric loss included.

作用力
Application of force



控制汇总 Summary of controls

恒压力控制 DR Constant pressure control

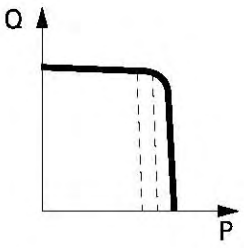
恒压力系统中保持最高压力值。

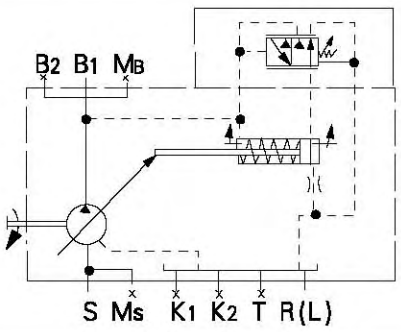
设定范围 2–35MPa

Maintain a max.pressure

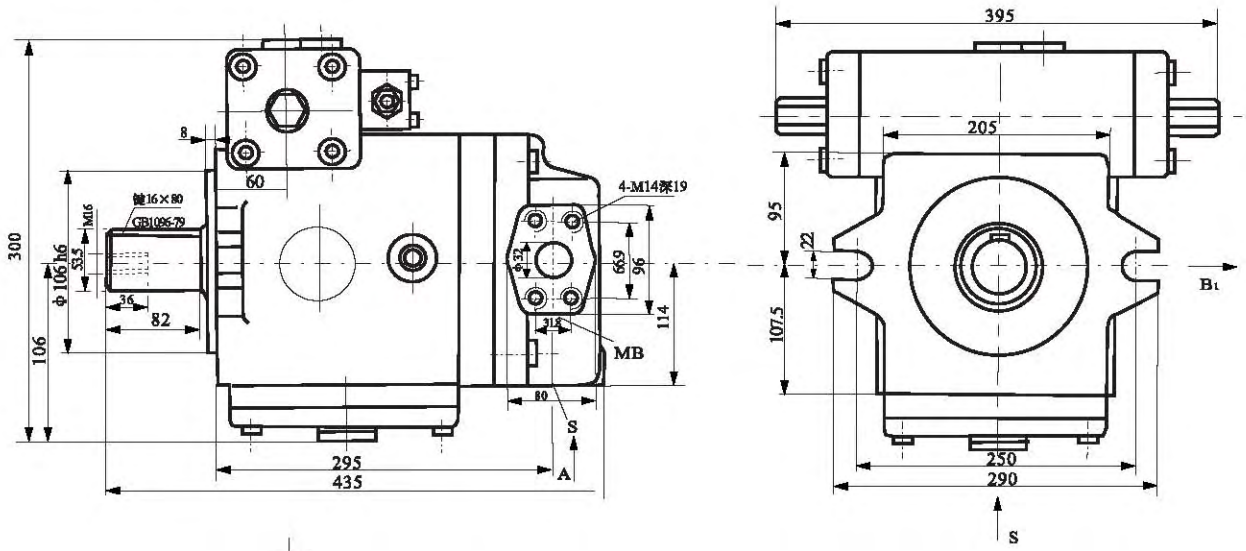
level in a hydraulic system.

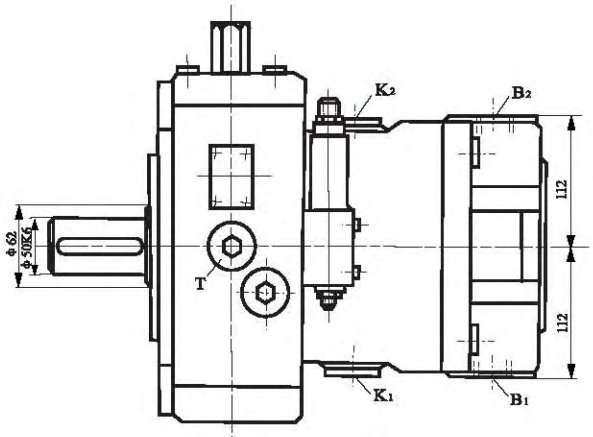
setting range 2–35MPa

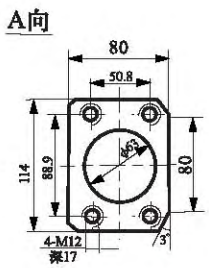




元件尺寸，规格 125 Unit Dimensions,size 125







连接口

S:吸油口 ø63

B1:压力口 ø32

B2:辅助油口 M33 × 2 深 18

K1、K2:冲洗油口 M33 × 2 深 16

T:壳体泄油口 M33 × 2 深 12

MB:压力表油口 M14 × 1.5 深 12

Connections

S:suction port ø63

B1:pressure port ø32

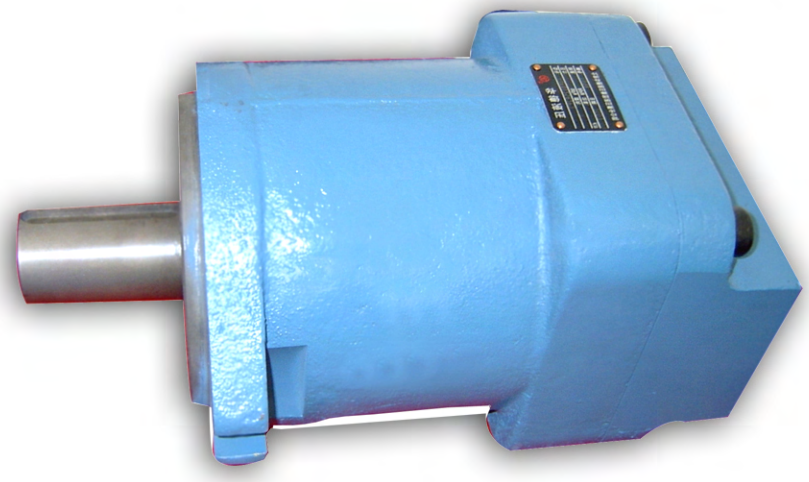
B2:auxiliary port M33 × 2,deep18

K1、K2:flushing port M33 × 2,deep16

T:case drain port M33 × 2,deep12

MB:gauge connection M14 × 1.5,deep12

北京华德液压工业集团有限责任公司 BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	A4FO 定量泵 Fixed Displacement Pump A4FO 用于开式回路 For open circuits　斜盘式轴向柱塞结构 axial piston swash plate design	RC91456/12.2004
	规格 Size 40–500　高压范围 Peak pressure　至 up to25MPa 最高 Peak press32Mpa	替代：ReplaceRC91456/09.2003



说明：

- A4FO 型斜盘设计轴向柱塞变量泵是为开式回路静液传动系统设计的。
- 流量与输入转速成比例。

特点：

- 开槽控制的斜盘设计
- 良好的自吸特性
- 允许连续工作压力 25MPa
- 低噪声级
- 使用寿命长
- 驱动轴能吸收轴向和径向载荷
- 功率／重量比高
- 模块化设计
- 泵可以复合
- 通轴驱动
- 泵位置可选
- 安装位置可选
- 可在降低的工作参数下用 HFC 液工作

Description

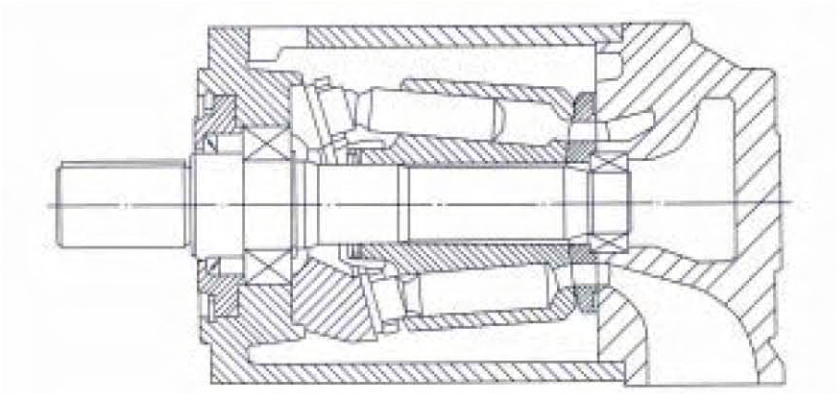
Fixed displacement pump A4FO is an axial piston pump of swash plate design for use in open circuits.
output flow is proportional to the drive speed.

Special Features

slot–controlled swashplate design.
good suction characteristics.
continuous pressure up to 25 MPa.
Low noise level.
Long service life.
drive shaft capable of absorbing axial and radial loads.
high power/weight ratio.
modular design.
tandem pumps possible.
through drive of 100% torque.
pump position optional.
operating on fire resistant fluids HFC under reduced operating parameters.

剖视图：

Section



A4FO 定量泵 Fixed Displacement Pump A4FO

型号说明 Type Code

A4F	O	125	R	2	P	3

轴向柱塞单元 Axial Piston Unit

定量，斜盘设计，用于工业用途
Fixed Capacity Swashplate design for industrial applications

工作方式 Type of operation

泵，开式回路 Pump,open circuit

规格 Size

排量 V_g(ml/r) displacement

40	71	125	180	250	500

旋轴方向 Direction of Rotation

从轴端看 viewed on drive shaft

顺时针	clockwise	R
逆时针	anti-clockwise	L

结构型式 Series

结构	Series	2

轴伸 Shaft End

平键	Keyed shaft GB1096-79	P
花键	Splined shaft DIN5480	Z
花键	Splined shaft GB3478.1-83	S

后盖 Port plate 3

液压油液 Hydraulic Fluid

工作粘度范围 Operating Viscosity Range

为了得到最佳效率和工作寿命，我们推荐把工作粘度在工作温度下选在以下范围内

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

V_{opt}=16 — 36mm²/s

粘度范围的极限 Limits of Viscosity Range

以下值适用于关键工况：

V_{min}=10mm²/s 短时，最高允许泄油温度 90℃。

For critical operating conditions the following values apply：

for short periods at max,permissible leakage oil temperature of 90℃

V_{max}=1000mm²/s 短时，冷起动

for,short periods upon cold start.

对液压油液选择的意见

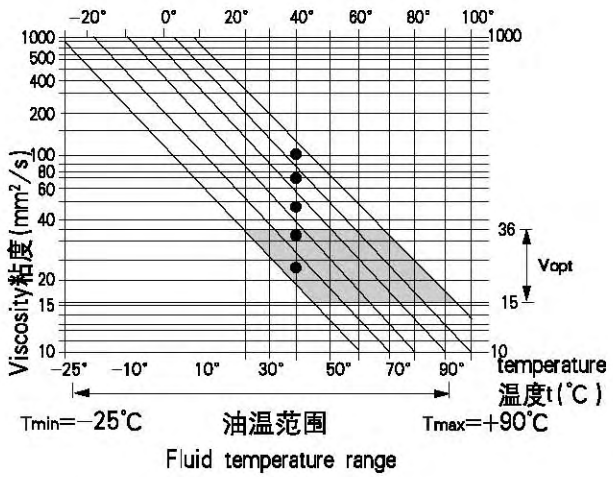
为了选择正确的油液，必须了解与环境温度有关的油箱内工作温度（开式回路）。液压油应该这样选择，即在工作温度范围内，工作粘度处于最佳范围内(Vopt)(见选择图的阴影部分)。我们建议在每种情况下均选择较高的粘度等级。

comments of the Selection of the Hydraulic Fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open circuits)in relation to the ambient temperature, Hydraulic fluid should be selected so that, within the operating temperature range, the operating viscosity lies with in the optimum range(Vopt)(see shaded section of selection diagram).We recommend.

that the higher viscosity grade is selected in each case.

选择图 Selection Diagram



示例：在X℃的环境温度下，油箱内的工作温度60℃。在最佳占工作粘度范围内(V_{opt}，阴影部分)，这对应着粘度等级VG46或VG68；应选择VG68.

Example: At on ambient temperature of X℃, the operating temperature in the tank is 60℃, in the optimum operating viscosity range(V_{opt}, shaded section), this corresponds to viscosity grades VG46 or VG68; VG68should be selected.

过滤

为了保证可靠的功能，必须至少使工作油液达到以下清洁度。

9按NAS1638

18/15按 ISO4406

Filtration

In order to guarantee reliable function, the operating fluid must be maintained to a cleanliness grade of minimum.

9 to NAS1638

18/15 to ISO4406

温度范围

T_{min}=-25℃

T_{max}=+90℃

Temperature range

规格计算 Calculation of size

输出流量 output flow $Q=\frac{V_g \cdot n \cdot \eta_v}{1000}$ (L/min)

扭矩 Torque $M=\frac{1.59 \cdot V_g \cdot \triangle p}{10 \cdot \eta_{mh}}$ (Nm)

功率 Power $P=\frac{M \cdot n}{9549}=\frac{Q \triangle p}{60 \cdot \eta_t}$ (Kw)

Vg=排量 Displacement per rev.(ml/r)

△p=压差 Differential pressure(MPa)

n=转速 Speed(rpm)

η_v=容积效率 Volumetric efficiency

η_{mh}=机械效率 Mech-hydr.effeciency

η_t=总效率 Overall efficiency($\eta_t=\eta_t \cdot \eta_{mh}$)

技术数据 Technical Date

工作压力范围－进口侧

Operating Pressure Range-Inlet side

进口S(吸油口)处的绝对压力

Absolute pressure at port S(suction inlet).

$P_{abs\ min}$ 0.08MPa

$P_{abs\ max}$ 3MPa

工作压力范围－出口侧Operating Pressure Range - Outlet Side

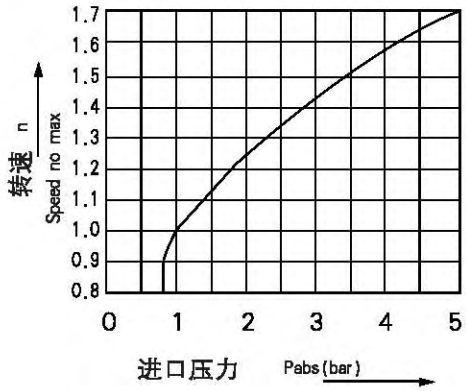
油口B处的压力 Pressure at port B

额定压力 Nominal Pressure P_N -25MPa

最高压力 Peak Pressure P_{max} -32MPa

转速提高时吸油上S处的进口压力Pabs的确定

Determination of inlet pressure pabs at the suction S ,when increasing rotational speed.



注 Note.

最高允许转速 $n_{o.max\ perm}$(极限转速)

max,permissible speed $n_{o.max\ perm}$ (speed limit)

壳体泄油压力 Case Drain Pressure

最高壳体泄油压力(壳体压力)

Max.Caes drain pressure(housing pressure)

Pabs max _____ 0.2MPa

数值表 Table of Values (理论值，未考虑 η_{mh} 和 η_v；数值经过圆整)

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

规格 Size				40	71	125	250	500
排量 Displacement		V_{gmax}	cm^3	40	71	125	250	500
最高转速 Max.speed [1]		n_{omax}	rpm	2600	2200	1800	1500	1320
最高允许转速 Max.perm.speed [2] 当进口压力 P_{abs} 提高 With increased inlet pressure P_{abs}		n_{omax}perm	rpm	3200	2700	2200	1800	1600
最大流量 Max.flow [3]	当 at $n_{o.max}$	Q_{omax}	L/min	101	151	218	364	640
	当 at n_E=1450rpm		L/min	56	100	176	352	600
最大功率 Max.Power	当 at $n_{o.max}$	P_{omax}	KW	44	65	94	157	275
(△p=25MPa)	当 at n_E=1450rpm		KW	25	43	76	151	250
最大扭矩 Max.torque(△p=25MPa)	当 at V_{gmax}	M_{max}	Nm	159	282	497	998	1987
扭矩 Torque (△p=10MPa)	当 at V_{gmax}	M	Nm	64	113	199	398	795
惯性矩 Moment		J	kgm^2	0.0049	0.0212	0.03	0.0959	0.3325
控制体积 Filling volume			L	2	2.5	5	10	14
近拟重量 Approx,weight		m	kg	39	53	88	184	320
允许轴向载荷，当壳体压力 P_{max} 0.1MPa abs perm.axial load with case pressure P_{max} 0.1MPa abs		± Fax_{max}	N	1000	1400	1900	3000	4000
允许径向载荷 perm.radial load		Fq_{max}	N	1200	1700	2500	4000	5000

1)只要在吸油S处有0.1MPa的绝对压力则所示数值成立。

The values shown are valid provided there is an absolute pressure of 0.1MPa at suction inlet S.

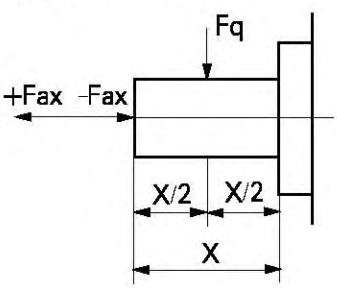
2)超过提高进口压力(超过 0.1MPa) 或减小输出流量，转速可以提高到最高转速极限(见图).

By increasing the inlet pressure (pabs 0.1MPa)or reduction of the output flow,the speed can be raised up to the maximum speed limit (see diagram).

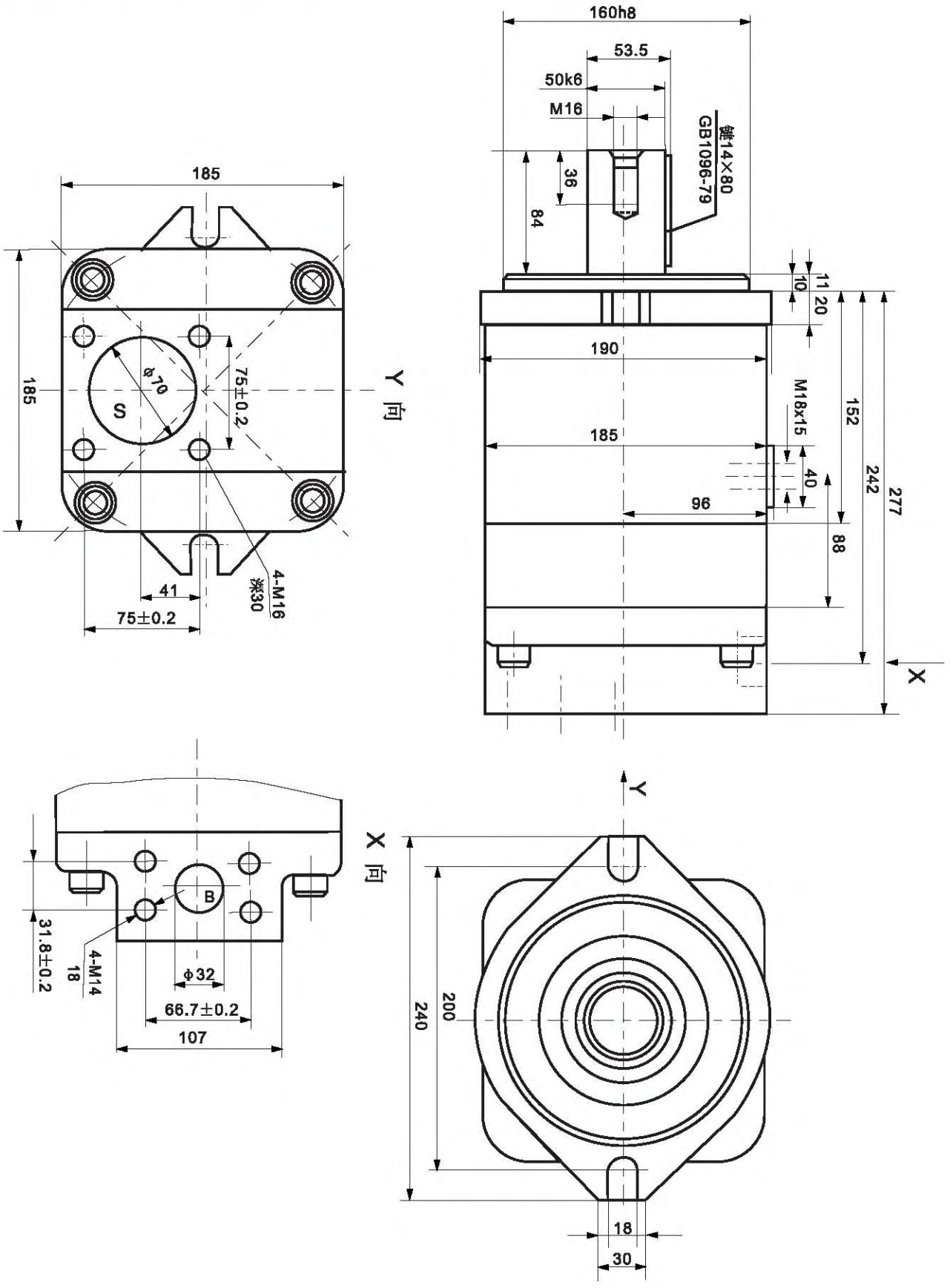
3)包括3%的容积损失。

3%Volumetric loss included.

作用力 Application of force



元件尺寸，规格 125　Unit Dimensions.Size 125



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