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DELIVERING CUSTOMER VALUE

静液压行走装置

Apply to 0.1-10 tons moving machines

适用于中小型行走机械

集开发、生产、销售、服务为一体的液压制造中心

AOVITE
奥 威 特 液 压

崇尚科技 * 提升品质 * 完美服务

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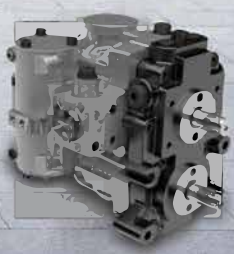


PRODUCT

产品目录 | Contents

HST 液压无级变速装置

产品结构特点 Product Features

HST液压无级变速装置由双向变量柱塞泵、手动定量马达、补油泵、阀组件、滤清器等组成。
WHPVMF HST consist of variable piston pump,bi-direction piston motor,Cycloid boost pump,valve assy,oil filters and other components.

工作原理 Work Principle

动力装置带动HST内的柱塞泵，实现机械能到液压能的转化；液压能通过柱塞马达，实现液压能到机械能的转化，从而为执行元件提供扭矩。柱塞泵和柱塞马达相互构成闭路循环，其泄漏油由补油泵供给。柱塞马达输出轴驱动行走装置，实现机器的前进、停止、后退功能。

Power device drive the piston pump to convert mechanical energy into hydraulic energy,then hydraulic energy converts into mechanical energy through piston motor to provide torque for executive component.Piston pump and motor constitute closed loop,leaked oil be supplied by cycloid boost pump.Piston motor output shaft drive the running device to realize the machine's forward,stop,back functions.

在行走机械上的应用特点 Features

1. 操作简便：采用HST的行走机械，一杆操作即可完成进退、换向及平稳的无级变速。
Operate easily:WHPVMF can fulfill retreat,commutation and stable any speed change only by operating a lever.

2.应用性强：HST集液压泵、马达、阀于一体，重量轻，不仅容易实现四轮四驱驱动、动力输出和脉宽调制，还可以增加电子控制等多种装置，实现机、电、液一体化控制，提高产品性能。
Uesfully：WHPVMF products are doing all-in-one right with a very small weight.It not only can easily to realize all-wheel drive,power output and pulse width modulation,but also canadd variety of electronic control device to achieve electrification,improving machines performance.

3.灵活性强：采用HST的行走机械，可以极低的速度在很小的回转半径内行走，实现灵活转弯或进出作业场地的目的。
Flexibility:Machine with the WHPVMF can move in a very small turning radius with a very slowly speed,it can turn or go in and out a site flexbility.

4.作业高效率：HST独特的结构设计在减轻重量的同时，缩短了管路，降低功率损耗，有效地提高工作效率，HST总效率高达80%；HST可根据不同工况，负载以及装卸的数量改变斜盘角度，调整流量和输出扭矩，使机器作业效率更高。
High efficiency:WHPVMF's unique design reduce the weight,shorten pipeline,lower power consumption,improve the efficiency,its overall efficiency is up to 80%.According to different conditions,load and unload,WHPVMF can Change oblique the plate angle,adjusts the flow and the output torque to make machine operate more efficiently.

技术参数的计算 Calculate Technical Data

流量 Flow
$$q_v = \frac{Vg \cdot n \cdot \eta_v}{1000}$$ L/min

驱动转矩 Driving torgue
$$T = \frac{Vg \cdot \triangle P}{20 \cdot \pi \cdot \eta_{mh}} = \frac{1.59 \cdot Vg \cdot \triangle P}{100}$$ Nm

功率 Power
$$P = \frac{2\pi \cdot T \cdot n}{6000} = \frac{q_v \cdot \triangle P}{600 \cdot \eta_t} = \frac{T \cdot n}{9549}$$ Kw

Vg = 每转排量，单位：cm^3 Displacent per revolution in cm
△P = 压差，单位：bar Differential pressure in bar
n = 转速，单位：rpm Speed in rpm
η_v = 容积效率 Volumetric efficency
η_{mh} = 机械液压效率 Mechanical hydraulic efficiency
η_t = 总效率 Total efficiency

工作要求 Technical Data

液压油 Hydraulic Fluid

有关液压油的选择和应用条件的详细资料，在项目设计之前请参考标GB11118.1-2011。（WHPVMF适用HM68抗磨液压油）

Before starting project planning,pls refer to standard GB11118.1-2011.For detailed information regarding the choice of hydraulic fluid and application conditions..
HM68 hydraulic fluid is suitable for WHPVMF

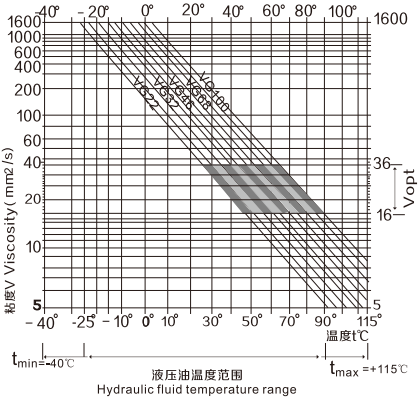
工作粘度范围 Viscosity range of operating oil

为了得到最有效率的使用寿命，我们推荐工作粘度（在工作温度时）在下列范围内选择：
Vopt=最佳工作粘度16. . . 36mm2/s 取决于油箱温度（闭合回路）。

For get Optimal service life, we recommend that the working viscosity (at operating temperature) be selected in the following rang:
Vopt=Optimum working viscosity 16.....36mm2/s Depends on the tank's temperature (closed circuit).

数据表（理论值，不包括系数和公差；近似值）

选择图 Selection diagram



粘度极限范围

粘度极限值如下：

V_{min}= 5mm²/s 短时（t<3 min） 允许最高温度 t max=+115℃	V_{max}= 1600mm²/s 短时（t<3 min） 冷启动时（p≤30bar，n≤1000tin=≤-40℃）rpm

以上仅适用于无负载启动，在大约15分钟内到达最佳工作粘度。

请注意：最高允许油液温度115℃即使在局部（如轴承区）也不可超过该温度。轴承区的温度与压力和转速有关，它最高比平均壳体泄油温度高5K。温度在-25℃和-40℃之间时（冷启动阶段）应采用特殊措施，请于我司联系。

工作温度范围（参见选图）。

The above is only applicable to no load start and can reaching the best working viscosity in about 15 minutes.
Please note, The maximum allowable hydraulic oil's temperature of 115° should not be exceeded even locally (such as the bearing area). Bearing's temperature base on pressure and speed, it is up to 5K higher than the average shell drain temperature. When the temperature is between -25 ° C to -40 ° C (choke lever), Please contact us with it for get the special measures .
Operating temperature range (see selection in below).

Viscosity and temperature of hydraulic fluid

Viscosity[mm²/s]	Temperature	Comment
Transport and storage at anbient temperature	Tmin≥-50℃ Top=+5℃ to +20℃	Factory preservation:up to 12months with standard, up to 24 months with long-term
(Cold) start-up[1] Vmax=1600 Permissible temperature difference	Tst≥-40℃ ΔT≤25K	t≤3 min,without load(p≤50 bar),n≤1000 rpm between axial piston unit and hydraulic fluid
Warm-up phase v<1600 to400	T=-40℃ to-25℃	at p≤0.7•P nom,n≤0.5•nnom andt≤15min
Operating phase		
Temperature difference Maximum temperature	ΔT=approx.5K 115℃ 110℃	between hydraulic fluid in the bearing and at portT in the bearing measured at portT
Continuous operation V=400 to 10 Vopt=36 to 16	T=-25℃ to+90℃	measured at port T, no restriction within the permissible data
Short-term operation Vmin≥7	Tmax=+110℃	measured at port T,t<3min,p<0.3•pnom
Shaft seal[1]	T≤+115℃	see below"Shaft seal"

At temperatures below-25℃,an NBR shaft seal is required(permissible temperature range:-40℃to+90℃).

液压油选择说明
Details regarding the choice of hydraulic fluid

为了正确选择液压油，必须知道与环境温度相关的工作温度：闭式回路中指回路温度。
液压油应这样选择：在工作温度范围内粘度处于最优范围（Vopt）见选择图的阴影区域，我们推荐在同种条件下选择较高的粘度等级。
示例：X℃的环境温度下，回路中的工作温度为60℃。在最佳的工作粘度范围（Vopt阴影区域），对应粘度等级VG46或VG68，应选择VG68。
请注意：壳体泄油温度受压力和转度的影响，总是高于回路温度，系统内任何一点的温度都不能超过115℃。

The correct choice of hydraulic fluid requires knowledge of the operating temperature in relation to the ambient temperature: in a closed circuit, the circuit temperature.

The hydraulic fluid should be chosen so that the operating viscosity in the operating temperature range is within the optimu range (Vopt see shaded area of the selection diagram). We recommended that the higher viscosity class be selected in each case.

Example:At an ambient temperature of X℃,an operating temperature of 60℃ is set in the circuit.In the optimum operating viscosity range (Vopt,shaded area), this corresponds to the viscosity classes VG 46 and VG 68; to beselected: VG 68.

Note:The case drain temperature,which is affected by pressure and speed,can be higher than the circuit temperature.At no point of the component may the temperature be higher than 115℃.

液压油的过滤
Filtration of the hydraulic fluid

油液过滤得越精细，油液的清洁度越高，轴向柱塞元件的使用寿命就越长。为了确保轴向柱塞元件的正常工作，油液的清洁度等级应至少按ISO4406的20/18/15级。
根据系统和应用情况，对WHPVMF我们推荐过滤器滤芯精度应在10μm之内；过滤器滤芯的压差升高时，过滤精度不得降低。
在较高油液温度（90℃至最高115℃），清洁度等级应至少按ISO4406的19/17/14级。
壳体内的压力必须等于或大于外部对轴密封圈的压力。

Finer filtration improves the cleanliness level of the hydraulic fluid,which increases the service life of the axial piston unit.
To ensure the functional reliability of the axial piston unit,a gravimetric analysis of the hydraulic fluid is necessary to determine the amount of solid contaminant and to determine the cleanliness level according to ISO 4406.
A cleanliness level of at least 20/18/15 is to be maintained.
Depending on the system and the application,for the WHPVMF,we recommend filter's filtering precision should within 10μm.With an increasing differential pressure at the filter cartridges,the filtering precision of fliter must not deteriorate.
At very high hydraulic fluid temperatures(90℃ to maximum 115℃),a cleanliness level of at least 19/17/14 according to ISO 4406 is necessary.
The case pressure must be equal to or higher than the ambient pressure.

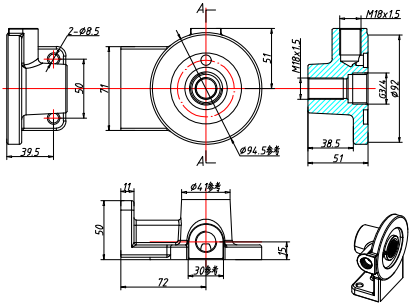
轴密封圈
Shaft Seal

允许压力负载
轴密封圈的使用寿命受泵的转速和壳体泄油压力的影响。建议工作温度下的平均持久壳体泄油压力不可超过0.28Mpa绝对压力。转速减小时，最高允许壳体泄油压力为0.6Mpa。短时（t<0.1s）允许绝对压力峰值最高为1Mpa，压力峰值出现的频率越高，轴密封圈的使用寿命越短。

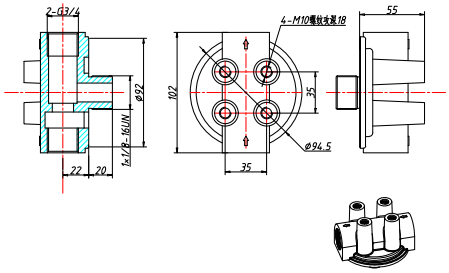
Permissible pressure loading
The service life of the shaft seal is influenced by the speed of the axial piston unit and the case drain pressure. We suggest the average of the persistent case drain pressure must not exceed 0.28 Mpa absolute pressure.When the speed decreases,the maximum permissible case drain pressure is 0.6Mpa under operating temerature.Momentary pressure spikes(t<0.1s)of up to 1Mpa are permitted.The service life the shaft seal decreases with an increase in the frequency of pressure spikes.

滤清 Filter

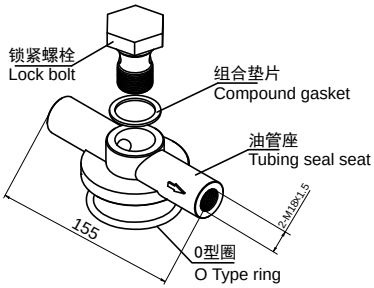
外接滤清安装座（F1）
External filter seat (F1)



外接滤清安装座（F2）
External filter seat (F2)



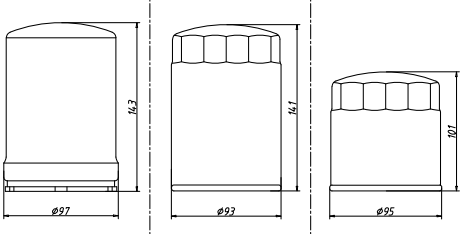
油管座：适用于WHPVMF、WHPM-10、WHPM-20系列
Pipeline seat: Suited to WHPVMF, WHPM-10, WHPM-20 series



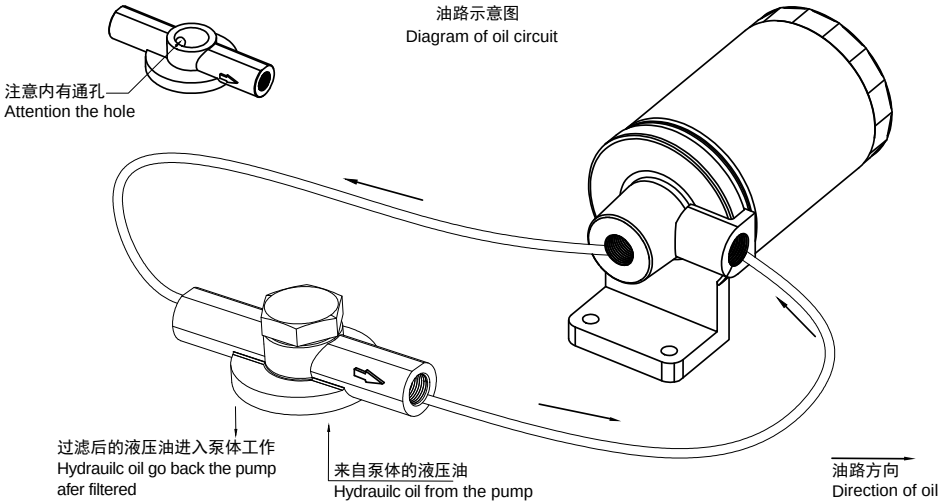
滤清器：50bar
Filter : 50bar

滤清器：15bar
Filter : 15bar

滤清器：15bar
Filter : 15bar



油路示意图
Diagram of oil circuit



WHPVMF 系列

型号说明 Specifications

WHPV	MF	-	28	-	L	-	02	A	-	Z	-	M
01	02		03		04		05	06		07		08

轴向柱塞元件 Axial Piston Unit

01	斜盘结构变量柱塞泵 Swashplate design,Variable pump
02	斜盘结构定量柱塞马达 Swashplate design,Fixed motor

规格 Size

03	排量 DSPL(ml/r)	28	32	37	42	47

旋转方向 Rotation

04	泵 Pump	顺时针 Clockwise	R
		逆时针 Anti-clockwise	L
	马达 Motor	双向 Bi direction	

滤清器 Filter

05	无滤清器 None	01
	有滤清器 With	02

滤清位置 Filter Location

06	安装于泵侧端 Install on the pump's side	A
	安装于泵后端 Install on the rear of pump	B
	加装连接装置 Install connect adapter	C

零位定位器 Positioner

07	无定位器则不标注 None	
	加装定位器 Choice positioner(能精准的控制驻车系统，帮助简化安装和调适。)	Z

手柄位置 Control Hand Location

08	手柄安装左侧 Control hand in the left	M
	手柄安装右侧 Control hand in the right	N

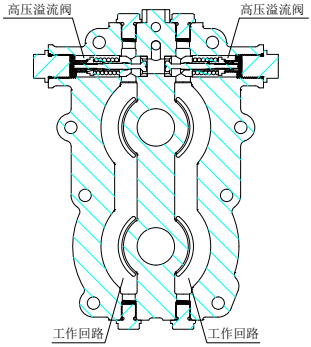
外形及安装结构 External Dimension

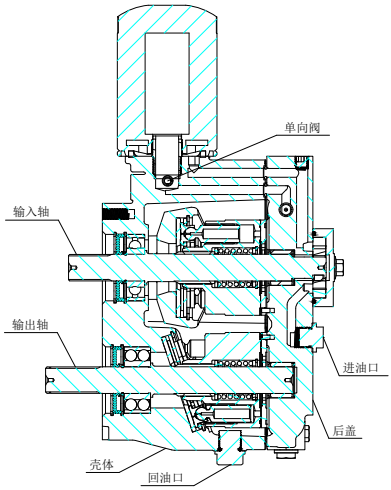
09	泵侧安装结构	标准型 Standard type	不标注
		圆型法兰 Circular flange	S
		矩型法兰 Square flange	F

技术参数 Technical Data

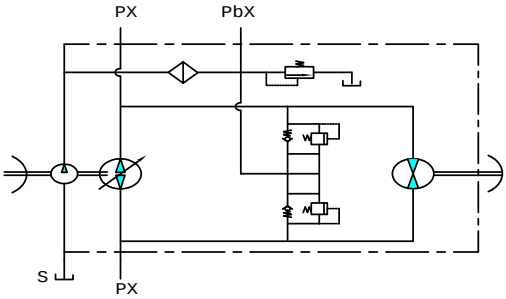
	规格 Size	28	32	37	42	47
排量 Displacement	泵 Pump Vg max ml/r	28	32	37	42	47
	马达 Motor Vg max ml/r	28	32	37	42	47
	补油泵 Boost Pump Vg max ml/r	7	7.2	7.3	10	10
转速 Rotation	输入 Input n max r/min	3000				
	输出 Output n max r/min	0——3000				
最大流量 Flow（Max）	在 When n max 时 L/min	84	96	111	126	141
	在 When n=1500 时 L/min	42	48	55.5	63	70.5
最大转矩 Torque（Max）	在 When Vg max时 ΔP=28Mpa	124.7	142.5	164.7	186.9	209.2
	在 When Vg max时 ΔP=10Mpa	44.5	50.9	58.8	66.8	74.7
最大功率 Power（Max）	在 n max时Pmax功率KW When n in max	39.2	44.8	51.8	58.7	65.7
	在 n=1500r/min时Pmax功率KW When n=1500r/min	19.6	22.4	25.9	29.4	32.9
壳体容积 Case volume	L	0.8	0.81	0.84	0.85	0.88
重量 Weight	KG	22.5	23	27.5	28	29.5

内部结构图 Hydraulic Principle Diagram

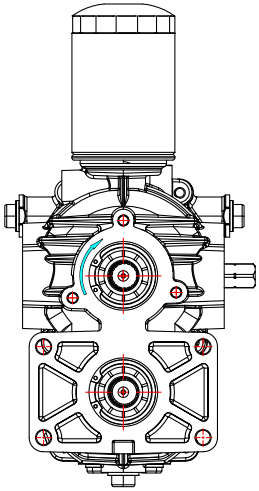




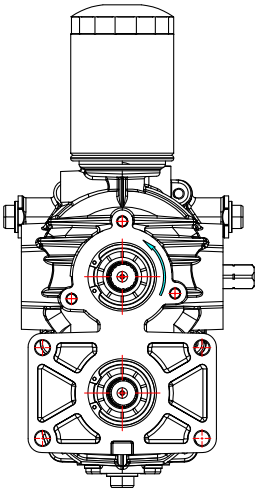
液压原理图 Hydraulic Principle Diagram



（04）旋转方向定义 Rotation Definition



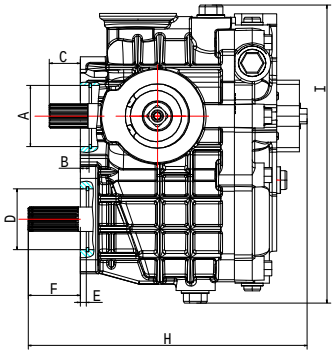
输入方向：顺时针　标记为：R



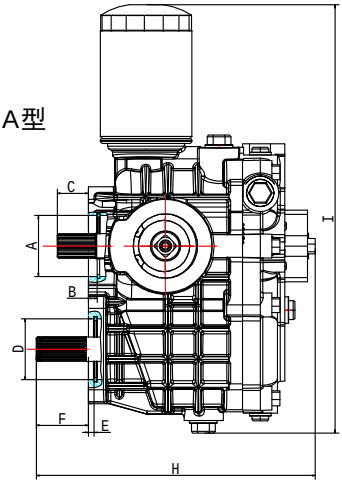
输入方向：逆时针　标记为：L

（05）（06）滤清器安装位置&外形尺寸
Filter Location & Dimensions

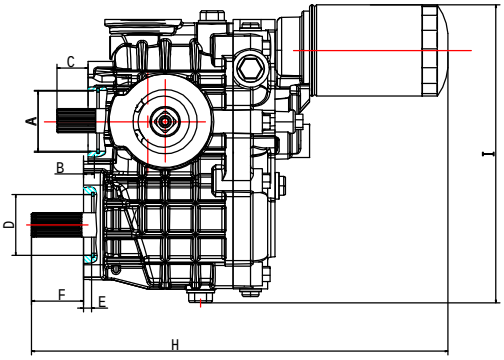
01 型



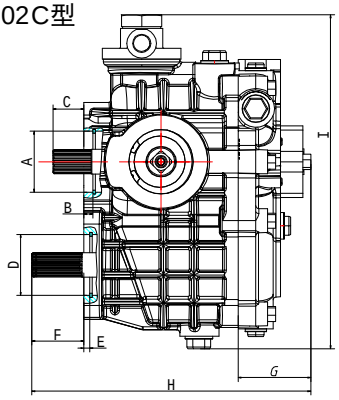
02A型



02B型



02C型

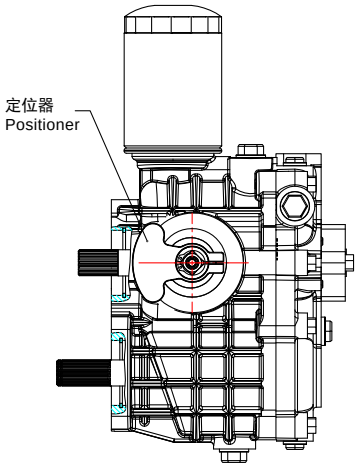


排量 Displacement	型号 Model	泵法兰直径与深(AxB) Pump flange's diameter and depth	泵轴长(C) Pump shaft long	马达法兰直径与深(DxE) Motor flange's diameter and depth	马达轴长(F) The motor shaft's length	总高度与总长(HxI) Total height and total length	总宽 Total width
28 32	01	Φ62H7*6	31.5	Φ62H7*4	53	274.5*300.5	216
	02A					274.5*430.5	
	02B					422*302.5	
	02C					274.5*332.5	
37	01	Φ62H7*11	31.5	Φ62H7*8	53	278*301	216
	02A					278*431	
	02B					425*303	
	02C					278*333	
	02A-S					288*431	
	02A-F						233
42 47	01	Φ62H7*11	31.5	Φ62H7*8	53	288*308	216
	02A					288*438	
	02B					431*309.5	
	02C					288*340	

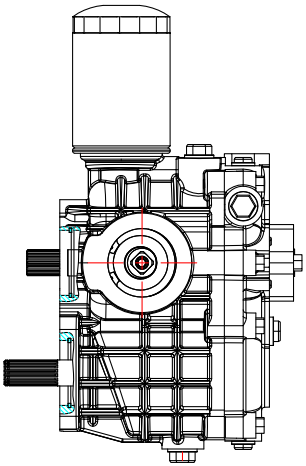
单位 / Unit：（mm）

注：总宽图中不予标注 / Ps:The total width only described by words

（07）定位器 Positioner

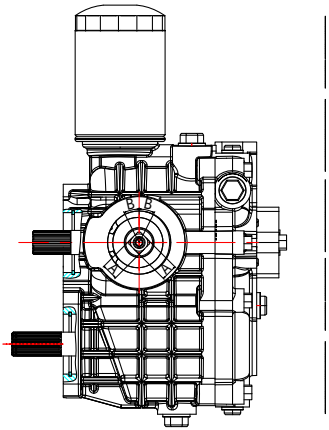


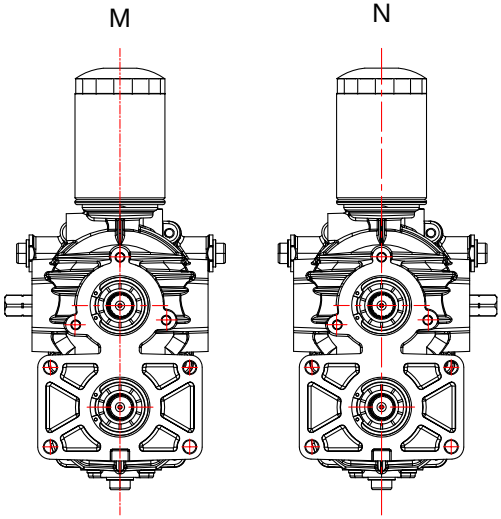
有定位器 标记为：Z
With Mark:Z



无定位器 不标记
With out Mark:None

（08）手柄位置定义 Control Hand Location





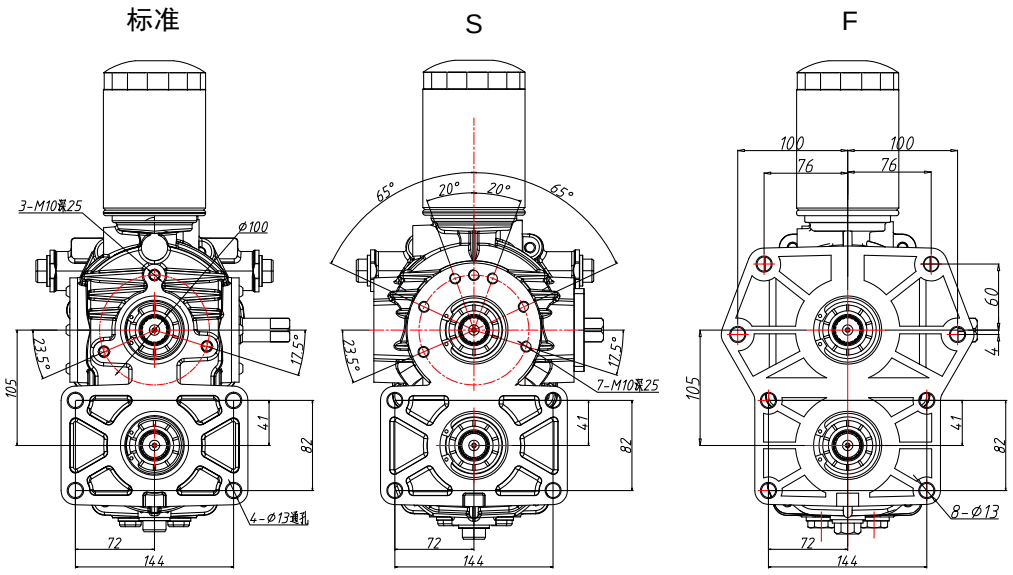
手柄位置位于左侧 标记为：M
Control Hand in the left Mark:M

手柄位置位于右侧 标记为：N
Control Hand in the right Mark:N

手柄尺寸与旋转角度 Control Hand's dimension and rotation angle

代号/Code Name 排量/Displacement	28	32	37	42	47
手柄尺寸 A / Control Hand's dimension A	17*17				
旋转角度 B / Rotation angle B	±20°	±20°	±18°	±20°	±20°

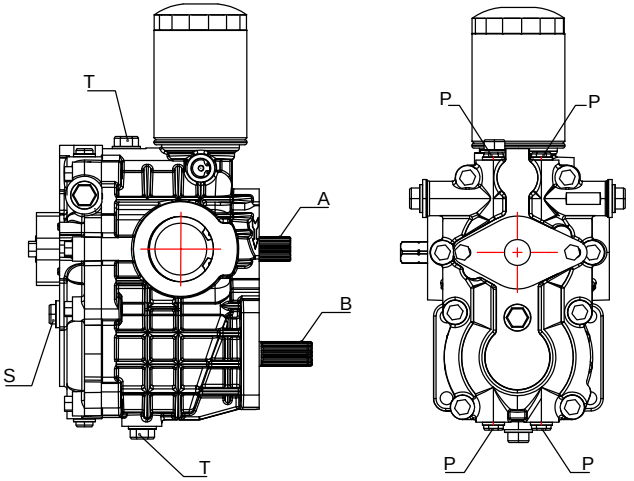
（09）外形及安装尺寸图 External Dimension



油口代号&花键参数 Port Code & Spline Parameters

油口代号 Port		规格 Size
测压口 Test port	P	G1/4
回油口 Return port	T	G1/2（G3/4可选）
进油口 Inlet port	S	3/4-16UNF

传动轴A、B渐开线花键参数 Drive shaft A, B involute spline parameters		
齿数 Number of teech	Z	18
模数 Modulus	m	1.25
压力角 Pressure angle	α	20°
分度圆直径 Standard pitch diameter	D	Φ22.5
大径 Major diameter	Dri	$\Phi 24.6^{-0}_{-0.1}$
小径 Minor diameter	Di	$\Phi 22^{-0}_{-0.21}$
变位系数 Modification coefficient	X	0.8
跨测齿数 Cross-test teeth	n	3
公法线 Common normal	We	$10.15^{-0.02}_{-0.06}$



WHPM 系列

型号说明 Specifications

WHP	M	52	/	10	L	-	T1	-	DT1	-	N	-	HW	-	A
01	02	03		04	05		06		07		08		09		10

轴向柱塞元件 Axial Piston Unit

01	斜盘结构变量柱塞泵 Swashplate design,Variable pump
02	斜盘结构定量柱塞马达 Swashplate design,Fixed motor

规格 Size

03	排量 Displacement (ml/r)	42	52	58

系列 Series

04	版本号 Model No.	10
		20
		30

旋转方向 Rotation

05	泵 Pump	顺时针 Clockwise	R
		逆时针 Anti-clockwise	L
	马达 Motor	双向 Bi direction	

输入/出轴 Input/output Shaft

06	输入 Input	18齿；Φ24.6；端面距离59 Spindle distance table 59	仅供10版本 OPT,Only 10	T1
	输出 Output	18齿；Φ24.6；端面距离56 Spindle distance table 56		
	输入 Input	18齿；Φ24.6；端面距离50 Spindle distance table 50	仅供20版本 OPT,Only 20	T2
	输出 Output	18齿；Φ24.6；端面距离56 Spindle distance table 56		
	输入 Input	18齿；Φ24.6；端面距离32.3 Spindle distance table 32.3	仅供30版本 OPT,Only 30	T3
	输出 Output	18齿；Φ24.6；端面距离56 Spindle distance table 56		
	输入 Input	18齿；Φ24.6；端面距离32.3 Spindle distance table 32.3		T4
	输出 Output	18齿；Φ24.6；端面距离40.3 Spindle distance table 40.3		
	输入 Input	18齿；Φ24.6；端面距离32.3 Spindle distance table 32.3		T5
	输出 Output	18齿；Φ19.73；端面距离91.1 Spindle distance table 91.1 (带螺纹M12*1.25)		

输入/输出法兰尺寸 Input / Output flange dimension

07	DT1	DT2	DT3	DT4	DT5	DT6
	详细见图表P15 / Detail Check P15					

手柄位置 Control Hand Location

08	手柄安装左侧 Control hand in the left	M
	手柄安装右侧 Control hand in the right	N

控制方式 Control Mode

09	纯机械控制 Mechinery control		MC
	机械伺服控制 Mechinery servo control		HW
	电气比例控制 Electric proportional control	U=12VDC	EP3
		U=24VDC	EP4

滤清器 Filter

10	无滤清器 None filter	N
	配带滤清器 With filter	A
	外接滤清器 External filter	C

注意事项：

液压系统设计要求

1. 考虑主机的工作环境，应采用闭式油箱，并安装空气过滤器。 同时对系统油箱做合理设置 ，以确保进口压力不低于0.08Mpa，否则会造成油泵吸空。最低清洁度按IS0440616/19级。

2. 合理设置冷却器, 使主机连续工作时, 系统工作油液温度不超过本产品所允许最高油温80℃。

3. 合理设计系统管道, 使壳体回油压力不超过0.15Mpa。

安装使用

1. 输出传动轴与泵输入轴的同轴度误差应小于Φ0.05,马达输出轴与泵输入轴的安装尺寸为105±0.025。

2. 所有与液压系统连接的管接头、堵头及测量接头必须保持清洁，避免任何颗粒杂质进入液压系统。

3. 主机启动前，系统各管道内应充满液压油，无级变速器壳体腔否则将由于润滑不良造成产品损坏。

4. 主机操作时，前进、后退、换向应平稳，以减少冲击，提高使用寿命。若主机使用过程中出现异常现象，如操作不灵、行走乏力、尖叫声等，应立即停车，检查，直到故障排除为止。

维护保养

1.液压油：推荐使用vg46#抗耐磨液压油，油液污染等级不低于NAS16389级。工作油温温度-20 C - +80 C,更换期一般为600小时，如果液压油被水或其它外部物质污染或承受异常运转情况，应视具体情况及时更换液压油。

2.滤清器： 若选择了配带的滤清器建议首次使用100小时后予以更换，建议之后600小时更换一次。

3.散热器：本产品在油温为常温时，可获得最大输出功率，因此需定期检查系统散热器外部是否堵塞并清洗干净。

Notes

Hydraulic system design requirements

1. Considering the working environment of the main engine, closed fuel tank should be used and air filter should be installed. At the same time, the system oil tank shall be reasonably set to ensure that the inlet pressure is not less than 0.08mpa, otherwise the oil pump will be empty.The minimum cleanliness level is IS0440616/19.

2. Set the cooler reasonably, so that when the main engine is working continuously, the working oil temperature of the system does not exceed the maximum allowed oil temperature of the product 80℃.

3. Reasonable design of system pipeline, so that the oil return pressure of the shell does not exceed 0.15mpa.

Installation and use

1. The coaxiality error between the output drive shaft and the pump input shaft should be less than φ 0.05, and the installation size of the motor output shaft and the pump input shaft should be 105±0.025.

2. All pipe joints, plugs and measuring joints connected with the hydraulic system must be kept clean to avoid any particle impurities entering the hydraulic system.

3. Before the main engine starts, each pipe in the system should be filled with hydraulic oil. Otherwise, the product will be damaged due to poor lubrication.

4. When the main engine is operating, forward, backward and reversing should be stable to reduce impact and improve service life. If there are abnormal phenomena in the use of the main engine, such as ineffective operation, weak walking, screaming, etc., it should be stopped immediately and checked until the fault is removed.

Maintain

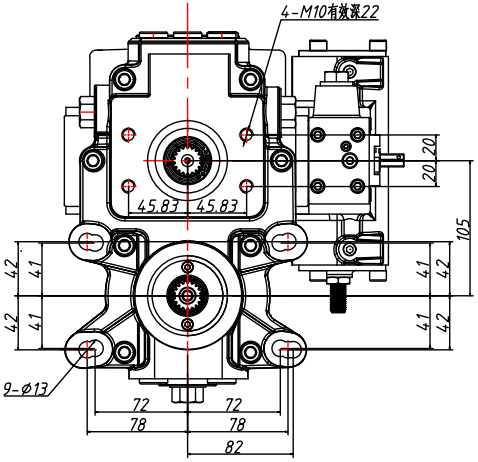
1. Hydraulic oil: It is recommended to use VA46 # antibody hydraulic oil, the oil pollution level is not lower than NAS16389. The working oil temperature is -20 C-+80 C, and thereplacement period is generally 600 hours. If the hydraulic oil is polluted by water or other external substances or suffers abnormal operation, the hydraulic oil should be replaced in time according to the specific situation.

2. Filter: If the filter with the belt is selected, it is recommended to replace it after 100 hours of first use, and it is recommended to replace it once after 600 hours.

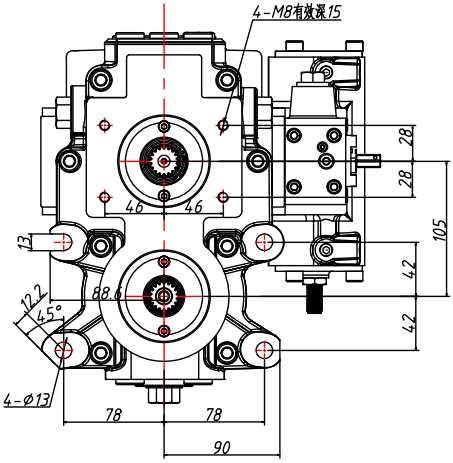
3. Radiator: The maximum output power can be obtained when the oil temperature is normal. Therefore, it is necessary to regularly check whether the outside of the system radiator is blocked and clean it.

（04）版本号 Edition

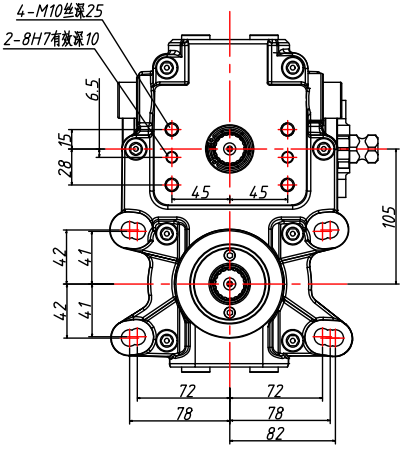
10版本
Edition 10



20版本
Edition 20

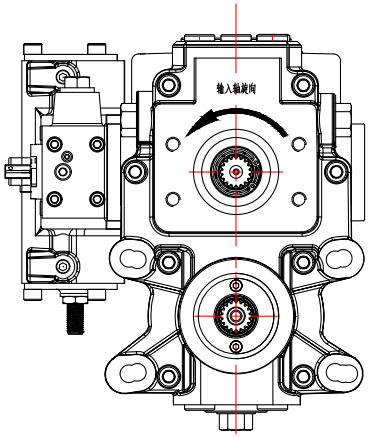


30版本
Edition 30

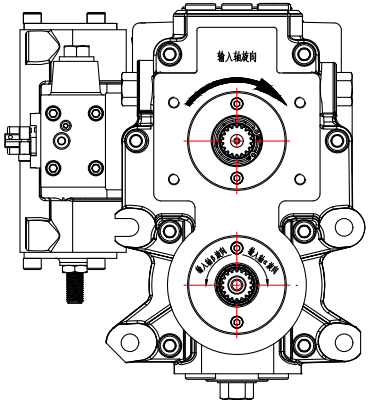


（05）旋转方向 Rotation

10/20版本
10/20Edition

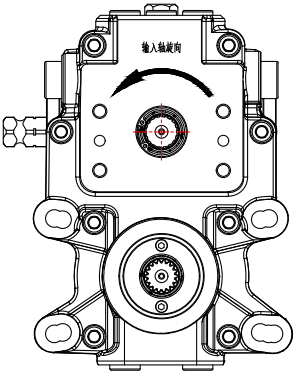


输入方向：逆时针　　标记为：L
Input Rotation (CCW)　　Mark (L)

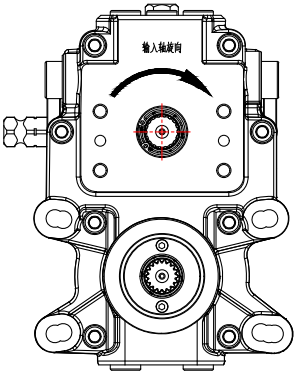


输入方向：顺时针　　标记为：R
Input Rotation (CW)　　Mark (R)

30版本
30Edition



输入方向：逆时针　　标记为：L
Input Rotation (CCW)　　Mark (L)

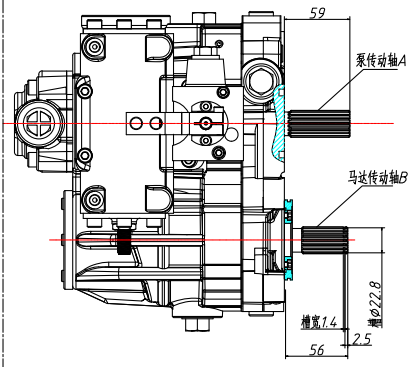


输入方向：顺时针　　标记为：R
Input Rotation (CW)　　Mark (R)

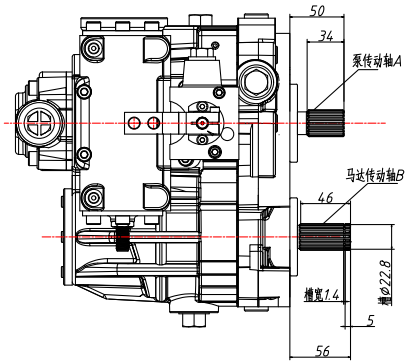
（06）输入/输出轴 Input/output Shaft

渐开线花键参数 Involute spline parameters		泵传动轴A Pump drive shaft A	马达传动轴B Motor drive shaft B	马达传动轴C Motor drive shaft B
齿数 Number of teech	Z	18	18	18
模数 Modulus	m	1.25	1.25	1.05833
压力角 Pressure angle	α	20°	20°	25°
分度圆直径 Standard pitch diameter	D	Φ22.5	Φ22.5	Φ18
大径 Major diameter	Dri	Φ24.6-$^{0}_{0.1}$	Φ24.6-$^{0}_{0.1}$	Φ19.37± 0.05
小径 Minor diameter	Di	Φ22-$^{0}_{0.21}$	Φ22-$^{0}_{0.21}$	Φ17.5-$^{0}_{0.21}$
变位系数 Modification coefficient	X	0.8	0.8	0.7
跨测齿数 Cross-test teeth	n	3	3	3
公法线 Common normal	We	10.15$^{-0.02}_{-0.06}$	10.15$^{-0.02}_{-0.06}$	8.1±0.05

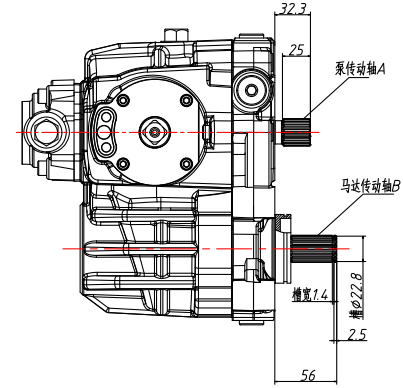
T1



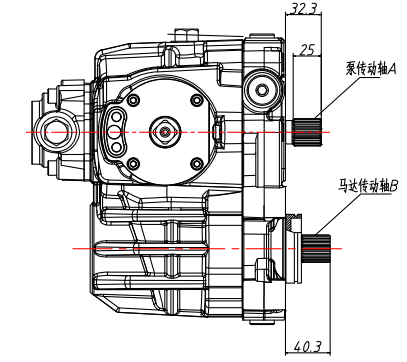
T2



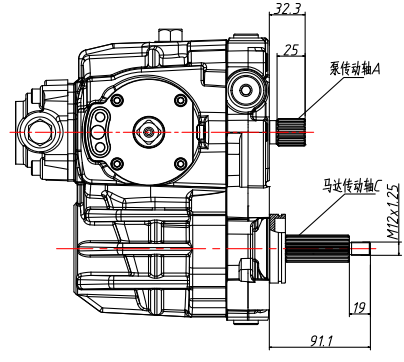
T3



T4



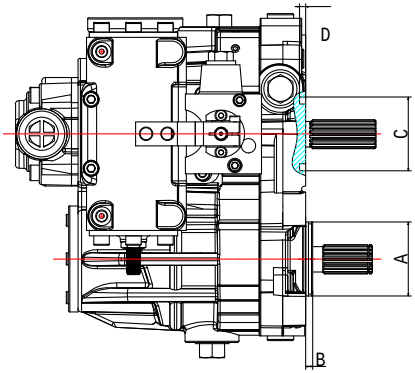
T5



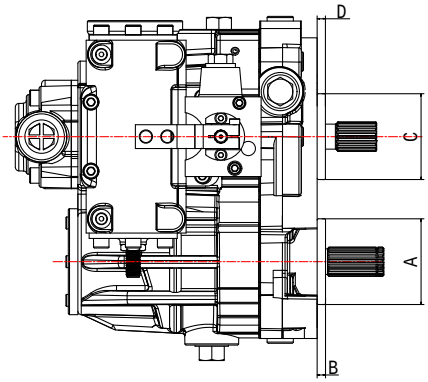
（07）输入/输出法兰尺寸 Input / Output flange dimension

10版本-T1系列 Edition 10 - Series T1				
可选择法兰型号 Select flange type	泵传动轴法兰直径A Pump shaft flange diameter A	泵传动轴法兰厚度B Pump shaft flange thickness B	马达传动轴法兰直径C Motor drive shaft flangeThe diameter of the C	马达传动轴法兰厚度D Motor drive shaft flangeThe thickness of the D
DT1	Φ62	6	凹槽 内Φ50*外Φ62 Dent Inside Φ50 * Outside Φ62	深5 Depth 5
DT2		11.5		
DT3		14		
DT4	Φ72	7		
DT6		9		

20版本-T2系列 Edition 20 - Series T2				
可选择法兰型号 Select flange type	泵传动轴法兰直径A Pump shaft flange diameter A	泵传动轴法兰厚度B Pump shaft flange thickness B	马达传动轴法兰直径C Motor drive shaft flangeThe diameter of the C	马达传动轴法兰厚度D Motor drive shaft flangeThe thickness of the D
DT5	Φ72	7	Φ72	7

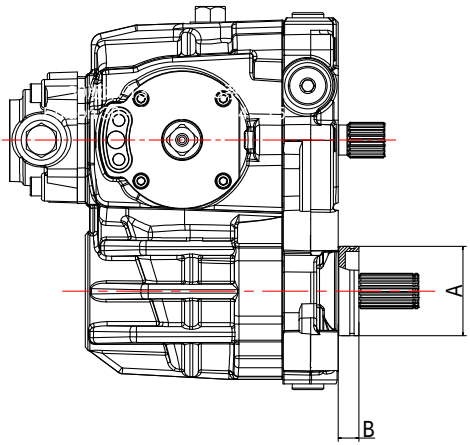


10版本-T1系列
Edition 10 - Series T1



20版本-T2系列
Edition 20 - Series T2

30版本-T3、T4、T5系列 Edition 30 - Series T3、T4、T5		
可选择法兰型号 Select flange type	泵传动轴法兰直径A Pump shaft flange diameter A	泵传动轴法兰厚度B Pump shaft flange thickness B
DT1	Φ62	6
DT2		11.5
DT3		14
DT4	Φ72	7
DT6		9

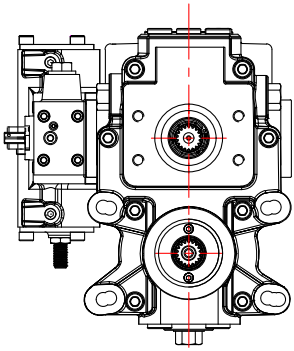


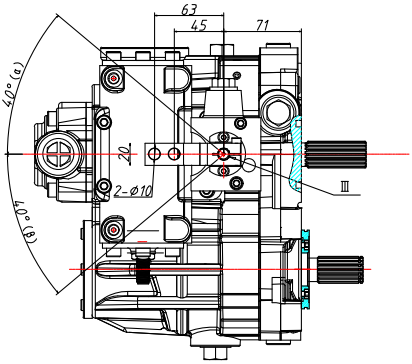
30版本-T3、T4、T5系列
Edition 30 - Series T3、T4、T5

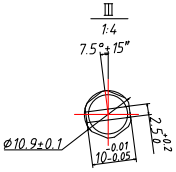
（08）手柄位置 Control Hand Location

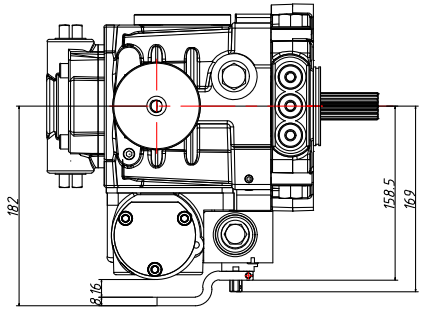
输入轴方向 Input Rotation	手柄位置 Choice Positioner	α	β	备注 Remark
L	M	右旋(CW)	左旋(CCW)	对应输出轴旋转方向 Match the output shaft's rotation
	N	左旋(CCW)	右旋(CW)	
R	M	左旋(CCW)	右旋(CW)	
	N	右旋(CW)	左旋(CCW)	

10版本
Edition 10



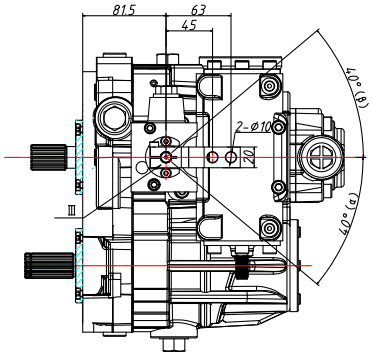


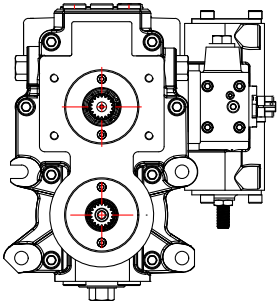


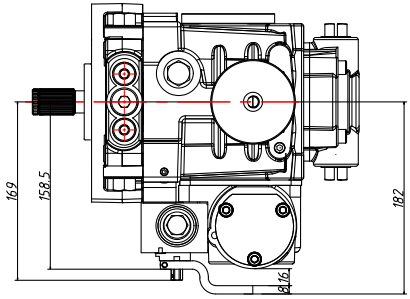


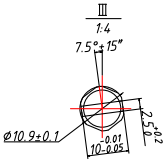
手柄位置位于左侧 标记为：M
Control Hand in the left Mark:M

20版本
Edition 20



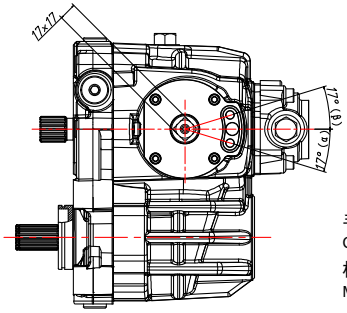




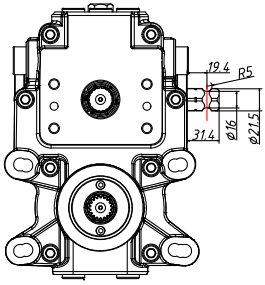


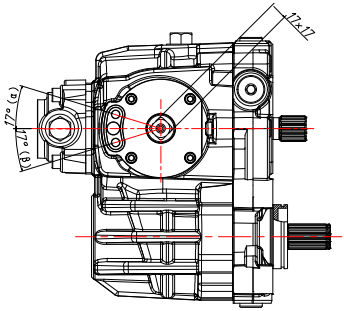
手柄位置位于右侧 标记为：N
Control Hand in the right Mark:N

30版本
Edition .30

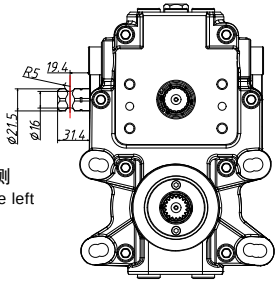


手柄位置位于右侧
Control Hand in the right
标记为：N
Mark:N



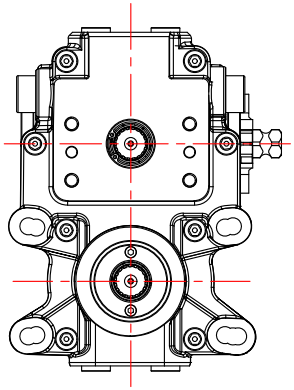


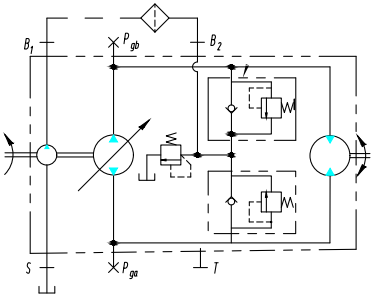
手柄位置位于左侧
Control Hand in the left
标记为：M
Mark:M



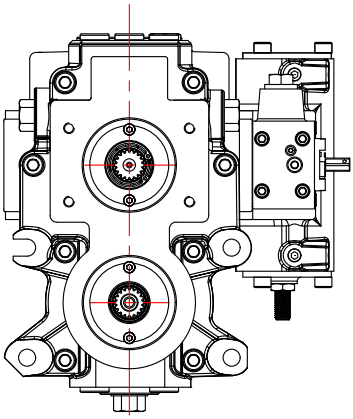
(09) 控制方式 Control Mode

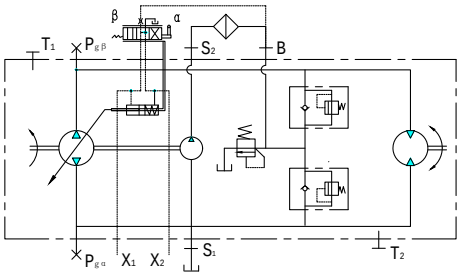
MC



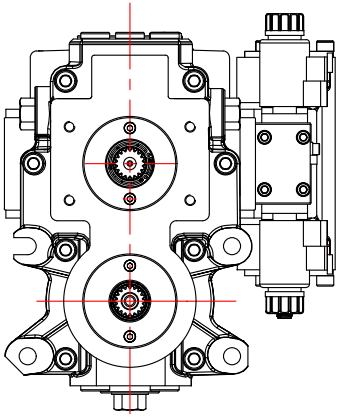


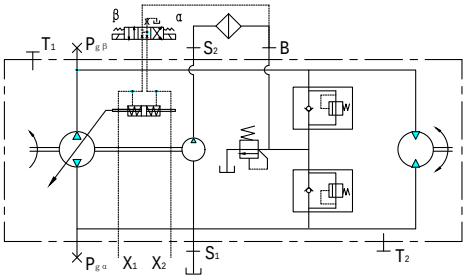
HW



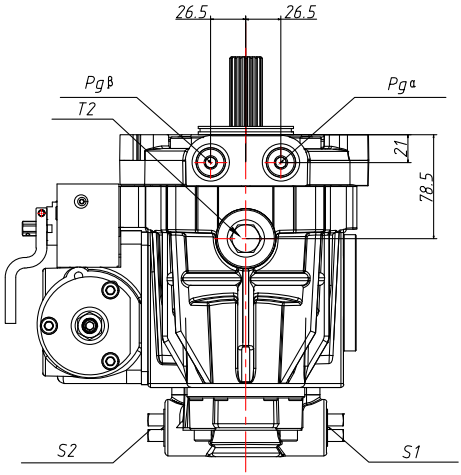


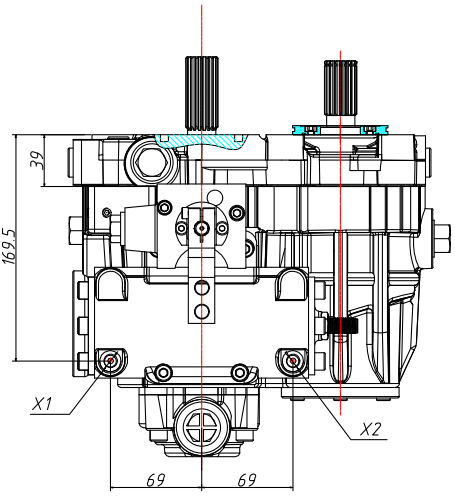
EP3/EP4



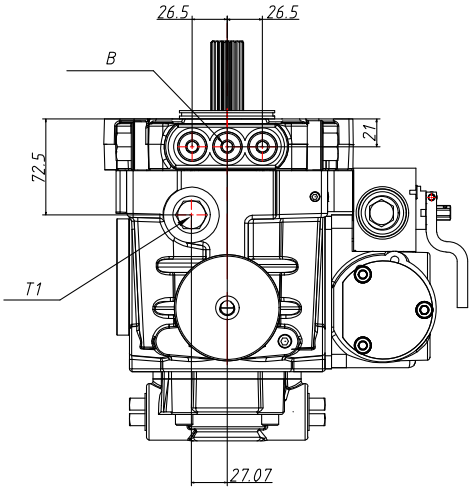


油口尺寸:10版本 Port size:Edition 10





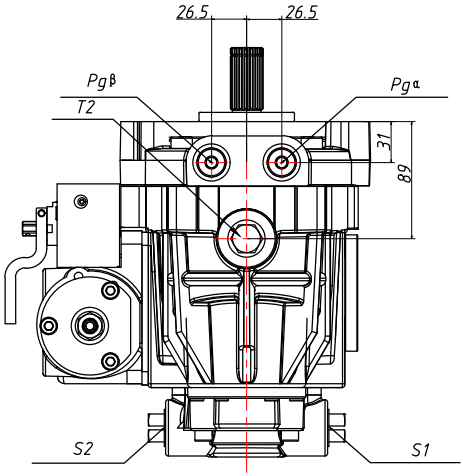
注：此示意图仅用于外置滤清器的结构，其它结构见右侧详表。
Ps：This diagram is only used for the structure of the external filter, Other structures are shown in the table on the right.

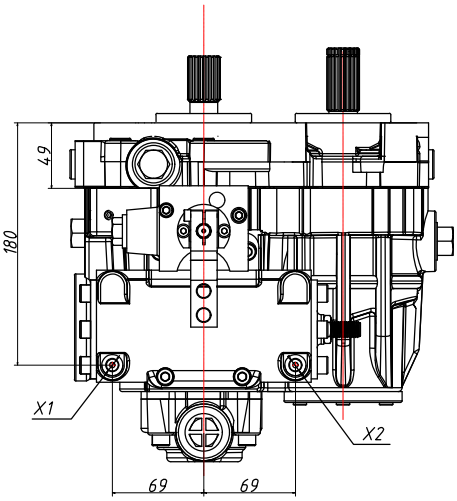


滤清结构与补油泵进出补油口的关系（10与20版本） The relationship between Filter structure and Charge pump's direction (Edition 10 and 20)				
滤清 Filter	泵旋转方向 Rotation	手柄方向 Control hand	补油泵吸油口 Charge pump inlet	补油泵出油口 Charge pump outlet
外置 External	L/R	N/M	S1	S2
整体 Overall		N	S2	
		M	S1	

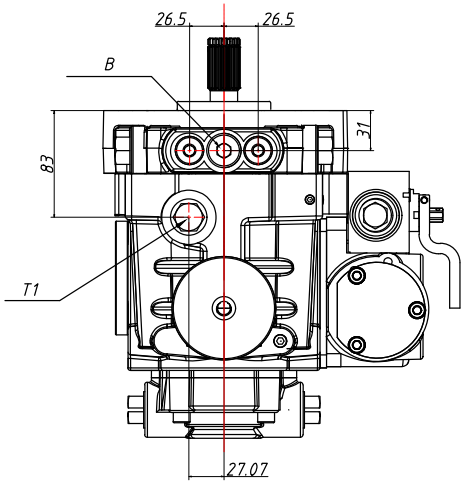
螺纹插孔尺寸规格说明（10与20版本） Specification for Screw Jack Dimensions (Edition 10 and 20)		
代号 Code	接油口名称 Name of oil port	规格及接口标准接口名称 Specifications and Interface Standard Indicates the interface name
S1	补油泵吸油口 Feed pump inlet	G3/4" 0-RING BOSS (JIS B2351)
S2	补油泵出油口 Feed pump outlet	G1/2" 0-RING BOSS (JIS B2351)
B	阀体低压油进口 Valve body low pressure oil inlet	G1/2" 0-RING BOSS (JIS B2351)
$P_{gα}$,$P_{gβ}$	压力检测口 Pressure detection port	G3/8" 0-RING BOSS (JIS B2351)
T_1,T_2	泄油口 Drainage port	G3/4" 0-RING BOSS (JIS B2351)
X_1,X_2	液压刹车接口 Hydraulic brake interface	M10x(螺纹长10)平面密封 M10x(thread length 10) flat seal

油口尺寸:20版本 Port size:Edition 20





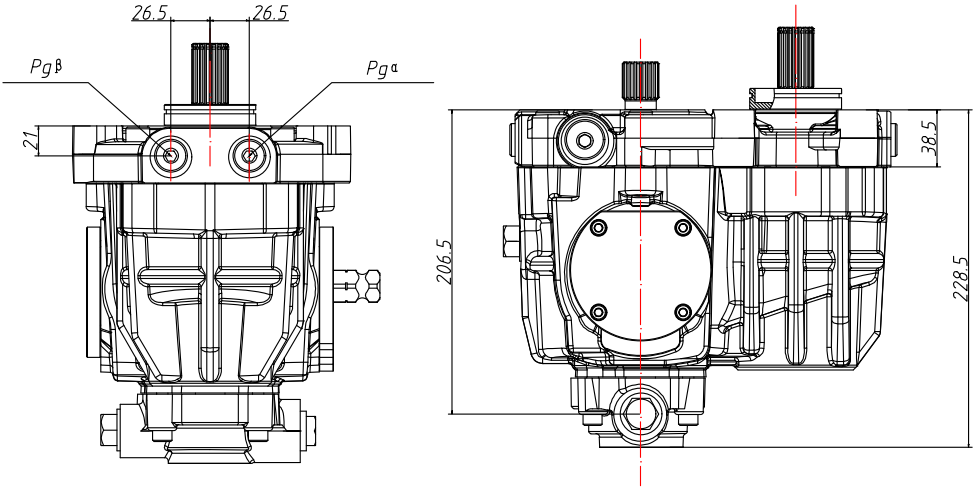
注：此示意图仅用于外置滤清器的结构，其它结构见右侧详表。
Ps: This diagram is only used for the structure of the external filter, Other structures are shown in the table on the right.

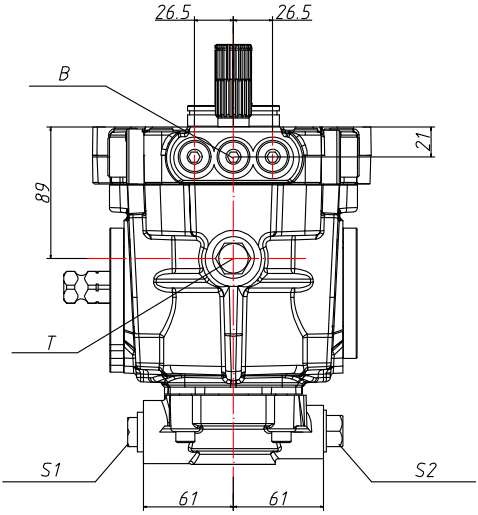


滤清结构与补油泵进出补油口的关系（10与20版本） The relationship between Filter structure and Charge pump's direction (Edition 10 and 20)				
滤清 Filter	泵旋转方向 Rotation	手柄方向 Control hand	补油泵吸油口 Charge pump inlet	补油泵出油口 Charge pump outlet
外置 External	L/R	N/M	S1	S2
整体 Overall		N	S2	
		M	S1	

螺纹插孔尺寸规格说明（10与20版本） Specification for Screw Jack Dimensions (Edition 10 and 20)		
代号 Code	接油口名称 Name of oil port	规格及接口标准接口名称 Specifications and Interface Standard Indicates the interface name
S1	补油泵吸油口 Feed pump inlet	G3/4" 0-RING BOSS (JIS B2351)
S2	补油泵出油口 Feed pump outlet	G1/2" 0-RING BOSS (JIS B2351)
B	阀体低压油进口 Valve body low pressure oil inlet	G1/2" 0-RING BOSS (JIS B2351)
$P_{g\alpha}$,$P_{g\beta}$	压力检测口 Pressure detection port	G3/8" 0-RING BOSS (JIS B2351)
T_1,T_2	泄油口 Drainage port	G3/4" 0-RING BOSS (JIS B2351)
X_1,X_2	液压刹车接口 Hydraulic brake interface	M10x(螺纹长10)平面密封 M10x(thread length 10) flat seal

油口尺寸:30版本 Port size:Edition 30





螺纹插孔尺寸规格说明（30版本） Specification for Screw Jack Dimensions (Edition 30)		
代号 Code	接油口名称 Name of oil port	规格及接口标准接口名称 Specifications and Interface Standard Indicates the interface name
S1	补油泵吸油口 Feed pump inlet	G3/4" 0-RING BOSS (JIS B2351)
S2	补油泵出油口 Feed pump outlet	G1/2" 0-RING BOSS (JIS B2351)
B	阀体低压油进口 Valve body low pressure oil inlet	G1/2" 0-RING BOSS (JIS B2351)
$P_{gα}$,$P_{gβ}$	压力检测口 Pressure detection port	G3/8" 0-RING BOSS (JIS B2351)
T	泄油口 Drainage port	G3/4" 0-RING BOSS (JIS B2351)

WHU 系列

型号说明 Specifications

WH	U	-	20	-	L	-	T1	-	Z	-	N	-	M
01	02		03		04		05		06		07		08

轴向柱塞元件 Axial Piston Unit

01	斜盘结构变量柱塞泵 Swashplate design,Variable pump	
02	斜盘结构定量柱塞马达 Swashplate design,Fixed motor	

规格 Size

03	排量 Displacement (ml/r)	20

旋转方向 Rotation

04	泵 Pump	顺时针 Clockwise(从输入轴端方向看向右旋转)	R
		逆时针 Anti-clockwise(从输入轴端方向看向左旋转)	L
	马达 Motor	双向 Bi direction	

输入/出轴 Input/output Shaft

05	输入(双向可选) Input	内花键9齿，齿根Φ12.89；深21	T1
		轴外径Φ22，平键A6*36	
	输出 Output	14齿；Φ19.7；端面距离37	
	输入(双向可选) Input	14齿；Φ19.7；端面距离45.5	T2
		轴外径Φ22，平键A6*36	
	输出 Output	14齿；Φ19.7；端面距离37	

零位定位器 Positioner

06	无定位器则不标注 None	
	加装定位器 Choice positioner(能精准的控制驻车系统，帮助简化安装和调试)	Z

补油泵 Charge Pump

07	无补油泵 None	N
	加装补油泵 Charge Pump（仅供T1版本）	P

手柄位置 Control Hand Location

08	泵位于上方 Pump Upside	从输入轴端方向看位于左侧 Trunnion on the left side through shaft side	M
		从输入轴端方向看位于右侧 Trunnion on the right side through shaft side	N

技术参数 Technical Data

排量		补油泵排量	输入转速		系统压力		出厂设定压力	补油泵压力	重量
泵 Vg max mL/r	马达 Vg max mL/r	mL/r	额定 n max r/min	最高 n max r/min	额定 n max Mpa	最高 n max Mpa	Mpa	Mpa	Kg
0~21	20	6~8	3400	3800	30	34.5	30	0.6~0.8	14

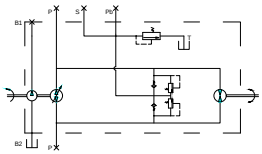
外形及安装尺寸图 Mounting Dimension

WHU - 20 - L/R - T1 - N/P - M 液压无级变速装置 HST ASSY

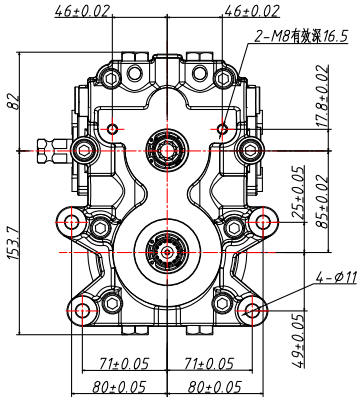
油口代号 Port	规格 Size
T	3/4 - 16UNF
S	9/16 - 18UNF
B1,B2	NPT318

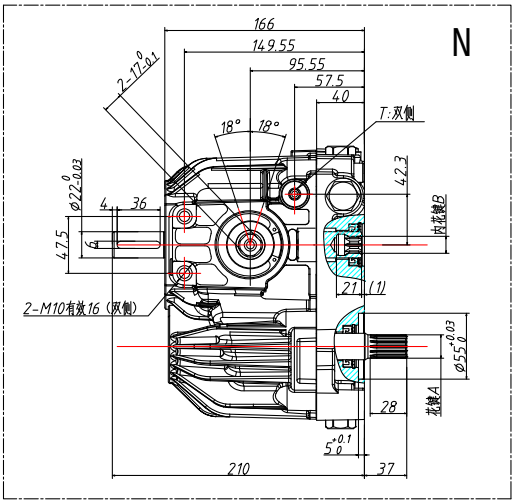
传动轴A渐开线花键参数 Drive shaft A involute spline parameters		
齿数 Number of teech	Z	18
模数 Modulus	m	1.25
压力角 Pressure angle	α	20°
分度圆直径 Standard pitch diameter	D	Φ17.5
大径 Major diameter	Dri	Φ19.7-$^{0}_{0.1}$
小径 Minor diameter	Di	Φ17-$^{0}_{0.1}$
变位系数 Modification coefficient	X	0.65
跨测齿数 Cross-test teeth	n	3
公法线 Common normal	We	10.04±0.02

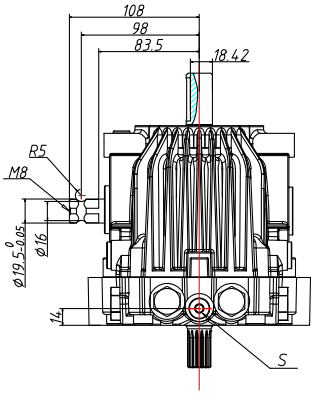
B内花键参数表 B Parameter table of internal spline	
齿数 Number of teech	9
径节 Diametral pitch	16/32
模数 Modulus	1.5875/0.79375
压力角 Pressure angle	30°
基圆直径 Base diameter	Φ12.373
分度圆 Reference circle	Φ14.288
齿顶圆 Addendum circle	Φ17.526 MAX
成型直径 Compression diameter	15.977
齿根圆 Root circle	12.890

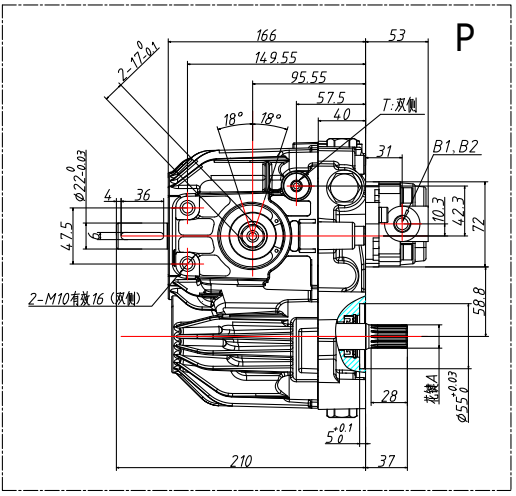


液压原理图



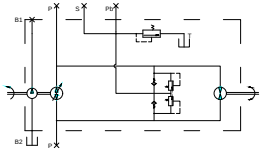






外形及安装尺寸图 Mounting Dimension

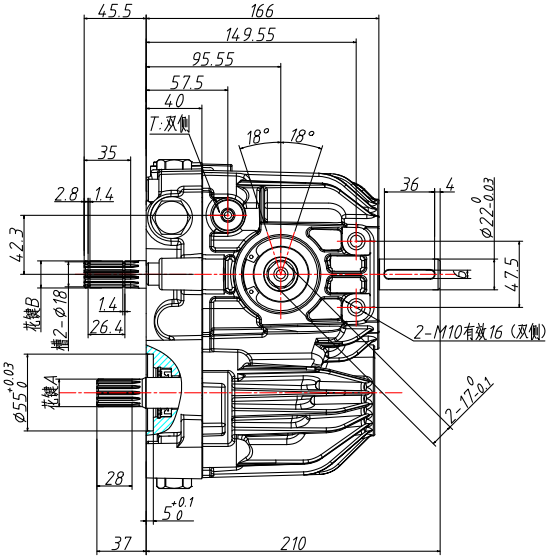
WHU - 20 - L/R - T2 - N - N　液压无级变速装置 HST ASSY

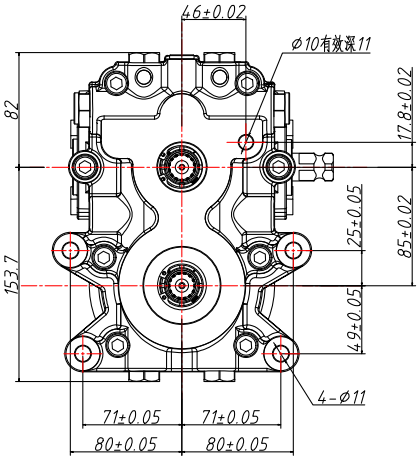


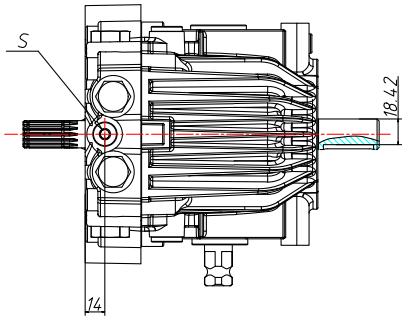
液压原理图

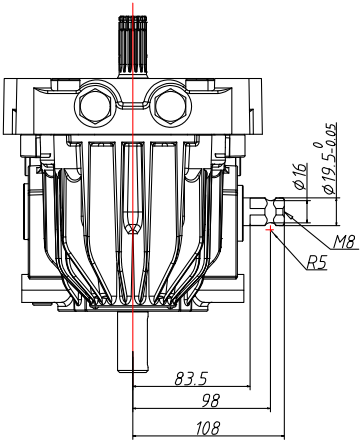
油口代号 Port	规格 Size
T	3/4 - 16UNF
S	9/16 - 18UNF

传动轴A、B渐开线花键参数 Drive shaft A, B involute spline parameters		
齿数 Number of teech	Z	18
模数 Modulus	m	1.25
压力角 Pressure angle	α	20°
分度圆直径 Standard pitch diameter	D	Φ17.5
大径 Major diameter	Dri	Φ19.7-$^{0}_{0.1}$
小径 Minor diameter	Di	Φ17-$^{0}_{0.1}$
变位系数 Modification coefficient	X	0.65
跨测齿数 Cross-test teeth	n	3
公法线 Common normal	We	10.04±0.02









WHPV 系列

型号说明 Specifications

WHPV	-	37	-	S	-	L	-	02	-	Z	-	M
01	-	02	-	03	-	04	-	05	-	06	-	07

轴向柱塞元件 Axial Piston Unit

01	斜盘结构变量柱塞泵 Swashplate design,Variable pump

规格 Size

02	排量 DSPL(ml/r)	37	42

结构 Struction

03	泵 Pump	单泵 Single Pump	S
		串泵 Double Pump	D

旋转方向 Rotation

04	泵 Pump	顺时针 Clockwise	R
		逆时针 Anti-clockwise	L

滤清器 Filter

05	无滤清器 None		01
	有滤清器 With		02

零位定位器 Positioner

06	无定位器则不标注 None	
	加装定位器 Choice zero controller（能精准的控制驻车系统，帮助简化安装和调试。）	Z

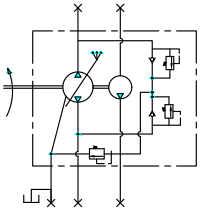
手柄位置 Control Hand Location

07	手柄安装左侧 Control hand in the left	详细见图表P26 / Detail Check P26	M
	手柄安装右侧 Control hand in the right		N

技术参数 Technical Data

规格 Size		37S	37D	42S	42D
排量 Displacement	泵 Pump Vg max ml/r	37	2*37	42	2*42
	补油泵 Boost Pump Vg max ml/r	10	2*10	10	2*10
转速 Rotation	输入 Input n max r/min	3000			
	输出 Output n max r/min	0---3000			
最大流量 Flow（Max）	在 When n max 时 L/min	111	2*111	126	2*126
	在 When n=1500 时 L/min	55.5	2*55.5	63	2*63
压力 Presssure（Max）	额定压力 Nominal pressure	21	21	21	21
	最高压力 Max pressure	33	33	35	35
最大功率 Power（Max）	在 n max时Pmax功率KW When n in max	61	2*61	73.5	2*73.5
	在 n=1500r/min时Pmax功率KW When n=1500r/min	30.5	2*30.5	36.75	2*36.75
重量 Weight	KG	21	43	25	51

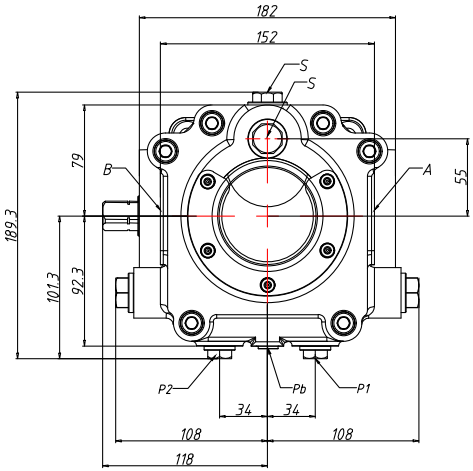
外形及安装尺寸图 Mounting Dimension

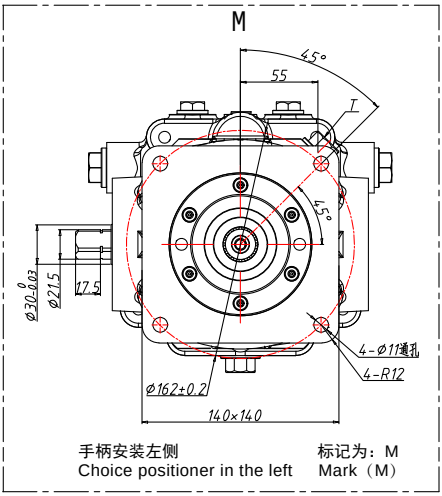


液压原理图

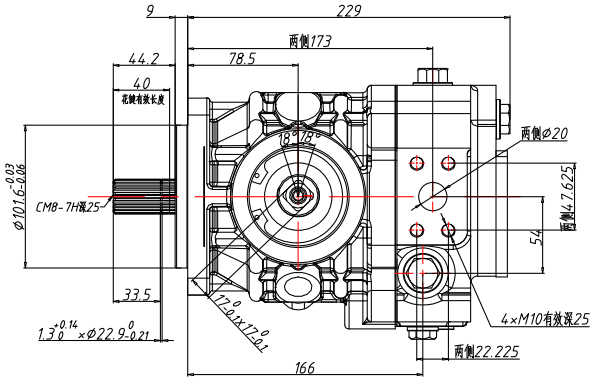
油口代号 Port		规格 Size
补油泵测压口 Pressure measuring port of oil refill pump	Pb	M10
主泵测压口 Main pump pressure port	P1,P2	G1/4
回油口 Return port	T	G1/2
进油口 Inlet opening	S	G1/2

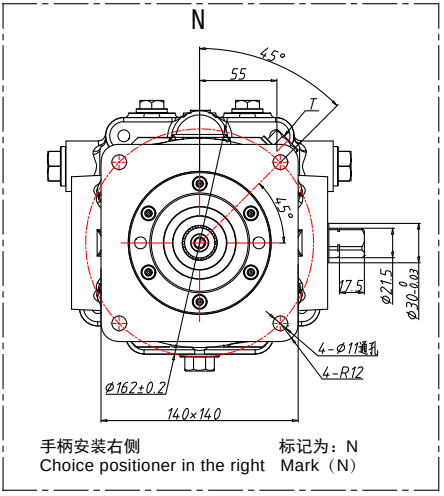
传动轴A、B渐开线花键参数 Drive shaft A, B involute spline parameters		
齿数 Number of teech	Z	18
模数 Modulus	m	1.25
压力角 Pressure angle	α	20°
分度圆直径 Standard pitch diameter	D	Φ22.5
大径 Major diameter	Dri	$\Phi 24.6^{0}_{0.1}$
小径 Minor diameter	Di	$\Phi 22^{0}_{0.21}$
变位系数 Modification coefficient	X	0.8
跨测齿数 Cross-test teeth	n	3
公法线 Common normal	We	$10.15^{-0.02}_{-0.06}$





手柄安装左侧 标记为：M
Choice positioner in the left Mark（M）





手柄安装右侧 标记为：N
Choice positioner in the right Mark（N）

WHM 系列

型号说明 Specifications

WHM	47	/	10	W	—	F	T1	—	B	01	F
01	02		03	04		05	06		07	08	09

轴向柱塞元件 Axial Piston Unit

01	固定式柱塞马达 Bent aixs design,Fixed	

规格 Size

02	排量DSPL(ml/r)	47	52

系列 Series

03	版本号 Model	10

旋转方向 Rotation

04	从轴端上看，双向	W

密封件 Seals

05	氟橡胶(FKM)	F
	丁晴胶(NBR)	N

轴端 Shaft End

		47	52	
06	花键尺寸 Splined Shaft,DIN 5480	●	●	T1
	平键尺寸 Parallel Keyed Shaft,DIN 6885	○	○	T2

安装法兰 Mouting Flange

07	符合ISO3019-2 4孔 4-Hole-ISO3019-2	详细见图表P28 / Detail Check P28	B

法兰油口 Flange Port

08	对侧侧面螺纹油口	M27*2	01

选配功能 Optional Features

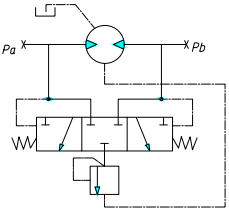
09	不配冲洗阀 None	N
	配冲洗阀 Flush Valve	F

技术参数 Techniacal Data

数据值（理论值，不考虑系数和公差；近似值）

规格	NG		47	52
排量	vg	cm^3	47.4	52.1
转速	n_{nom}	rpm	2800	2800
	n_{max}	rpm	3000	3000
输入流量 n_{nom}且vg	q_v	l/min	131.6	145.6
vg 且 扭矩	ΔP=300	Bar	224.2	248.0
	ΔP=350	Bar	261.6	289.4
质量（近似值）	m	KG	12	12.5

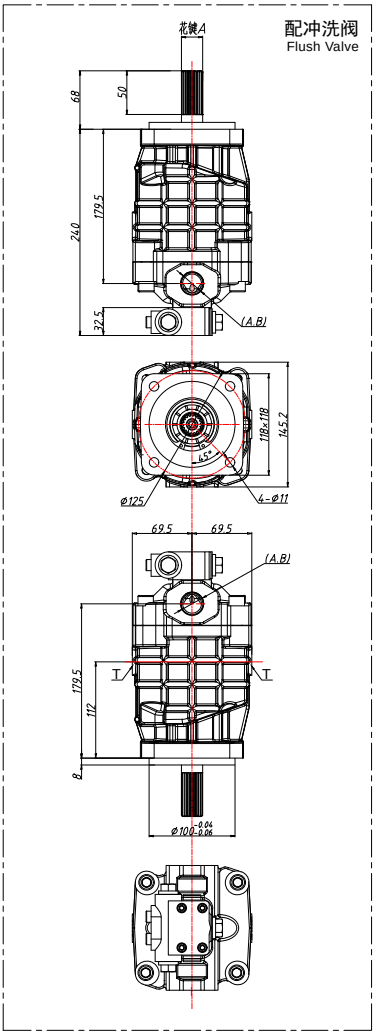
外形及安装尺寸图 Mounting Dimension

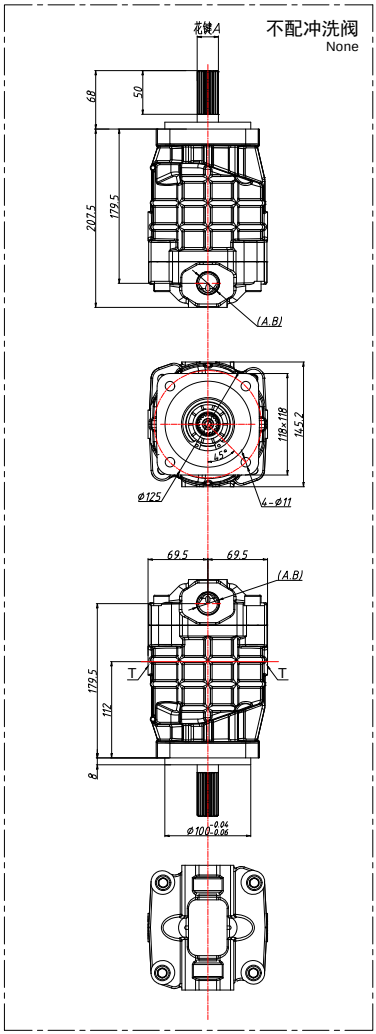


液压原理图

油口代号 Port		规格 Size
回油口 Return port	T	G1/2
注：回油口选其中任何一个即可。 Ps：Only choice one of “T” ports.		
进/出油口 Inlet/outlet port	A	M27
	B	

传动轴A渐开线花键参数 Drive shaft A involute spline parameters		
齿数 Number of teech	Z	18
模数 Modulus	m	1.25
压力角 Pressure angle	α	30°
分度圆直径 Standard pitch diameter	D	Φ22.5
大径 Major diameter	Dri	$\Phi24.75^{0}_{-0.1}$
小径 Minor diameter	Di	$\Phi22.25^{0}_{-0.21}$
变位系数 Modification coefficient	X	0.45
跨测齿数 Cross-test teeth	n	4
公法线 Common normal	We	$13.513^{-0.02}_{-0.06}$





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