1. MODE

axial piston unit

variable displacement pump, swashplate struction, industrial use	A4VS

operation mode

pump, open circuit	O

specification

△disp. Vg max(ml/r)	40	71	125	180	250	355	

control mode

pressure control	DR	★	★	★	★	★	★	DR…
Const.Power Control	LR	★	★	★	★	★	★	LR…
manual control	MA	★	★	★	★	★	★	MA
electronic control	EO	☆	☆	☆	☆	☆	☆	EO…
hydraulic control related to pressure	HD	☆	☆	☆	☆	☆	☆	HD…

rotate direction

view from shaft end	clockwise	R
	counterclockwise	L

seals

nitrile rubber	P
fluorin rubber	V

shaft extension

flat key transmission	P
spline key transmission	Z

install flange

	40	71	125	180	250	355	
ISO 4 hole	★	★	★	★	★	★	B

operation oil port

B port, S port, 90 offset, auxilliary port B1 conneted by bolt	★	☆	★	★	★	☆	13
B port, S port, 90 offset, auxilliary port B1 conneted by flange	★	☆	★	★	★	☆	25

◆ ording code

A4VS	O			/			—			

axial piston unit
operation mode
specification
control mode
rotate direction
seals
shaft extension
install flange
operation oil port

2. calculation

output flow: $Q=Vg.n.\eta v/1000$ L/min

torque $M=1.59\ Vg.\triangle P/10\ \eta mh$ N.m

power $P=M.n/9549=Q.\triangle P/60\ \eta t$ kW

note: Vg=disp mL/r △P=pressure drop Mpa n= rotate speed rpm

ηv =volumetric efficiency ηmh=mechanical efficiency ηt=total efficiency

3. technical data

3.1 parameter(the following data not consider mechanical efficiency and volumetric efficiency

specification			40	71	125	180	250	355
disp. Vgmax		cm^3/r	40	71	125	180	250	355
Max. speed	n_{max} 1)	rpm	2600	2200	1800	1800	1500	1500
Max. flow	当n= n_{max}	L/min	104	156	225	324	375	532
	当 n= 1500 rpm	L/min	60	107	186	270	375	532
Max. power	当n= n_{max}	kW	61	91	131	189	219	310
(△P=35MPa)	当 n= 1500 rpm	kW	35	62	109	158	219	310
Max. torque	(△P=35MPa)	Nm	223	395	696	1002	1391	1976
torque	(△P=10MPa)	Nm	64	113	199	286	398	564
weight(appro.)		Kg	40	54	87	103	186	206

the above data would be right when there is 0.1 Mpa absolute pressure in the oil suction port S

3.2 pressure range

port S(inlet) absolute pressure Ps min=0.8bar Ps max=3MPa

port B(outlet) pressure rated pressure P=35 MPa peak press.=40 MPa

note:

a. the pump housing must be filled with fluid both when commissioning and in operation.

b. in order to achieve low noise levels, all connecting lines are to be isolated from the tank by flexible members.

c. a non-return line in the drain lines should be avoided, drain oil pressure is 0.2 MPa(absolute pressure)

d. with vertical mounting, in order to ensure lubrication of front bearing and shaft seal, we recommand bearing flushing. The bearing flushing port U is located in the mounting flange area of the pump. The flushing oil flows through the pump' s front bearing and leaves via the case drain. there will be a pressure difference of 0.2 Mpa between port U and the pump drain port T

specification	40	71	125	180	250	355
flow L/min	4	5	6	8	12	16

e. when pump continiously run in rated pressure or intermittent pressure, pump should use auxiliary equipment to freeze oil to make sure oil temperature not exceed the regulated range

4. performance standard

JB/T 7043-93 axial piston hydraulic pump techanical condition

JB/T 7044-93 axial piston hydraulic pump test method

5. 控制部分 control part

5.1 概述

pressure control **DR** /remote control **DRG**

原理：在设定压力范围内，压力补偿控制保证泵以最大流量输出。在保持设定压力的情况下，最大输出排量可按系统压力设定，当系统压力超过压力补偿设定，或系统不再需要流量时，在保持设定压力的情况下泵溢流，压力值设定范围 2 – 35MPa.

setting range 2--35 Mpa

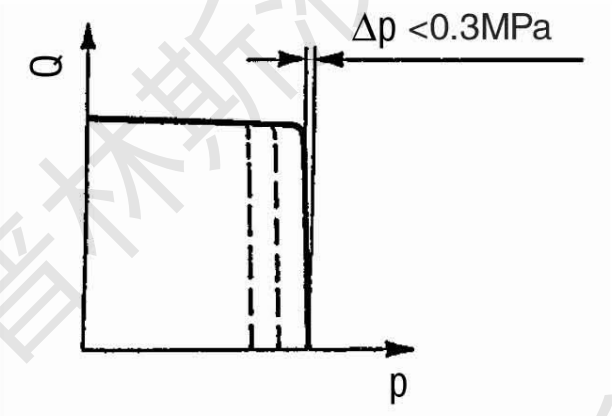


图 SO-01

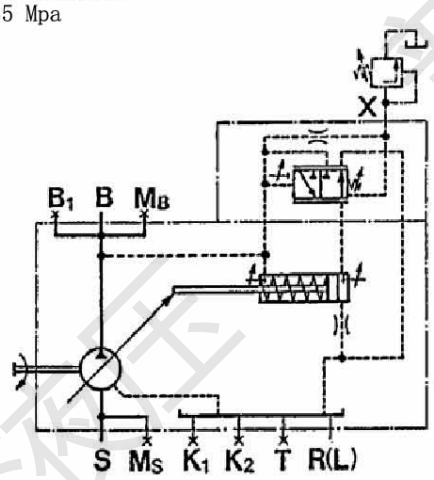


图 SO-02

power control **LR**

The power control holds the preset drive power constant at a constant drive speed under double curve control.

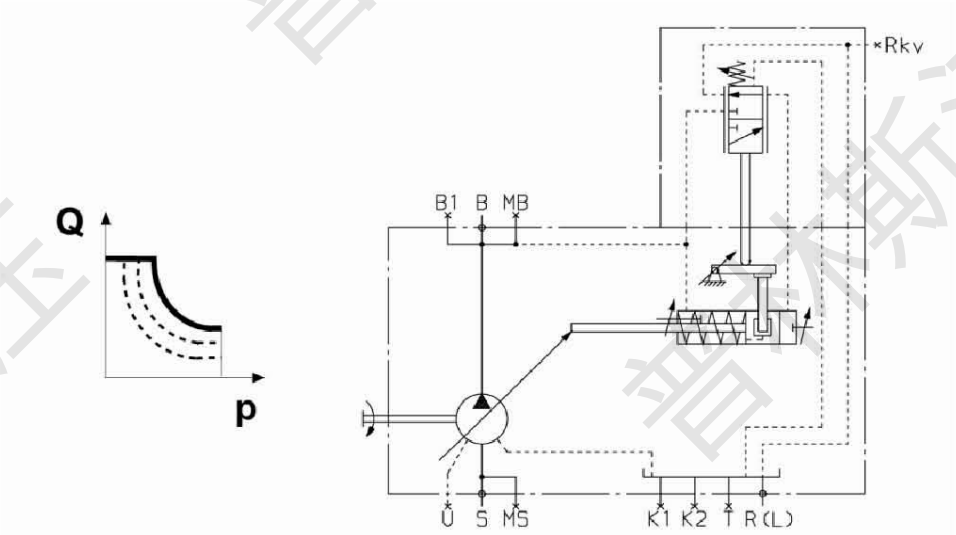


图 SO-03

manual control **MA**

stepless adjustment of displacement by means of handwheel

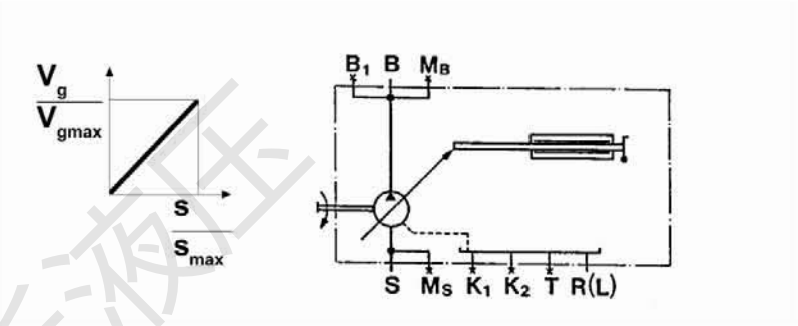


图 SO-04

hydraulic control **HD**

stepless control of displacement dependent on pilot pressure signal. The displacement is proportional to the pilot pressure

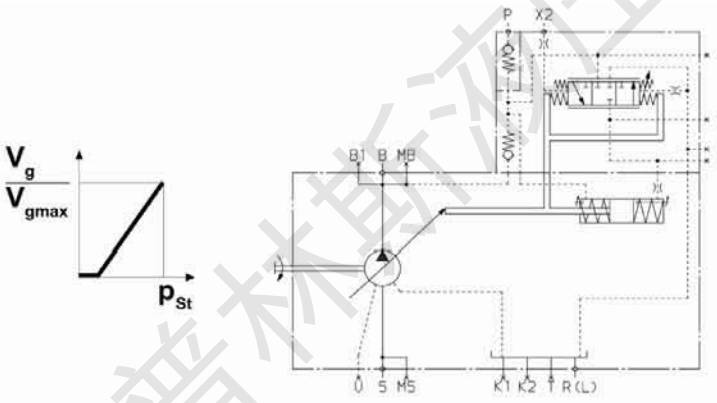


图 SO-05

hydraulic displacement control EO

The stepless displacement control is accomplished with a proportional valve with electrical feedback of swivel angle

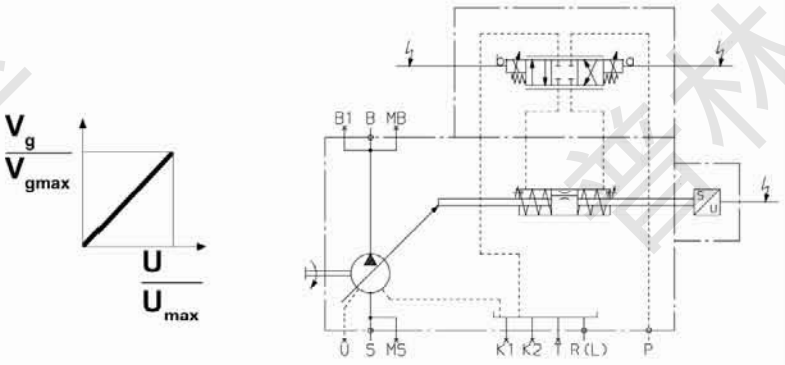


图 SO-06

5.2 control part code and its techanical parameter

5.2.1 hydraulic control HD

※ 概述

HD 液压控制设定泵的流量与先导压力信号有关。

机械摆角限制能够设定在 50%~100%Vgmax 范围内。
mechanical swing angle with the range 50%--100%Vgmax

※ 订货代号如下表格：

							HD			
pilot pressure	40	71	125	180	250	355		
1～4.5 MPa	☆	☆	☆	☆	☆	☆	1	
1～2.8 MPa	☆	☆	☆	☆	☆	☆	2	
0.55~1.9 MPa	☆	☆	☆	☆	☆	☆	3	
closed circuit pressure control								
A port with control	☆	☆	☆	☆	☆	☆	A	
B port with control	☆	☆	☆	☆	☆	☆	B	
without control not need to type code								

※ 外形图展示：

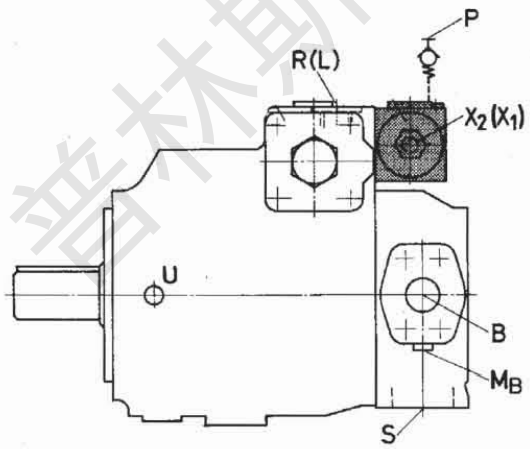


图 SO-07

※ techanical data

specification		40	71	125	180	250	355
control distance	mm	14.2	17.3	20.7	20.7	25.9	25.9
control area	cm^2	3.9	6.4	9	9	14.4	14.4
control volume	cm^3	5.5	11	18.7	18.7	37.3	37.3
lowest control pressure	MPa	3	3	5	5	5	5
control time [20 MPa 压力]	s	0.1	0.1	0.1	0.1	0.2	0.2

5.2.2 hydraulic displacement control E0

※ 概述

在EO电气控制工作中，泵流量由电气控制的比例方向阀来设定。同时泵的流量通过电感式位置传感器反馈信号。

该泵在不加压的情况下可通过弹簧实现控制缸的零位对中，当在高压工作时没有确定的复位。同时为了减少控制缸的流量损失，所有规格液压泵缸腔是密封的。

※ ordering code

						40	71	125	180	250	355	
hydraulic control with pro-portional vavle	EO	1				☆	☆	☆	☆	☆	☆	EO1
	EO	1		E		☆	☆	☆	☆	☆	☆	EO1E
	EO	1			K	☆	☆	☆	☆	☆	☆	EO1K
	EO		2			☆	☆	☆	☆	☆	☆	EO2
	EO		2	E		☆	☆	☆	☆	☆	☆	EO2E
	EO		2		K	☆	☆	☆	☆	☆	☆	EO2K

setted max pressure 10 MPa
最高压力设定值 35 MPa

with short vavle

without vavle

※ 外形图展示：

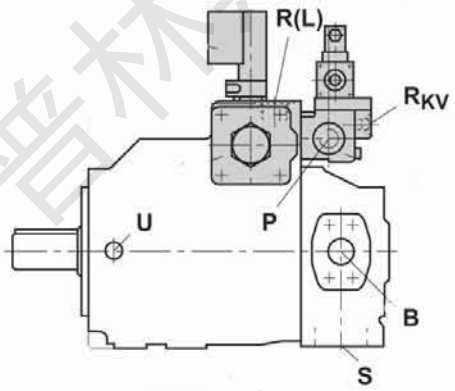


图 SO-08

※ techanical paramenter

specification		40	71	125	180	250	355
control cylinder distance	mm	14.2	17.3	20.7	20.7	25.9	25.9
area	cm^2	8.1	12.6	18.1	16.1	28.3	28.3
volume	cm^3	11.4	21.5	37.5	37.5	73.2	73.2
lowest control pressure	MPa	10	10	10	12.5	12.5	12.5
max. control pressure	MPa	31.5	31.5	31.5	31.5	31.5	31.5
control time	s	0.1	0.12	0.2	0.2	0.25	0.25

5.2.3 power control LR

※ 概述

控制泵在恒定驱动转速下不超过特定的驱动功率，使得 P×V g=常数

控制范围的开始也能够用机械方式设定，设定值的范围能够用弹簧和调整螺钉来调整。

当压力减低时可通过调整弹簧进入它的起动位置，设定值的调整范围：3.5Mpa~~35 Mpa

最小和最大回转角的限制能够机械方式调整至 Vgmax 的 50%

特征曲线：

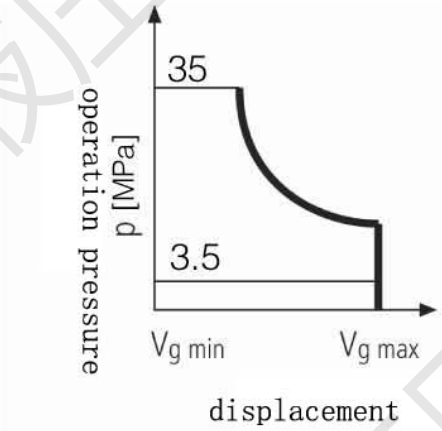


图 SO-09

※ 外形图展示：

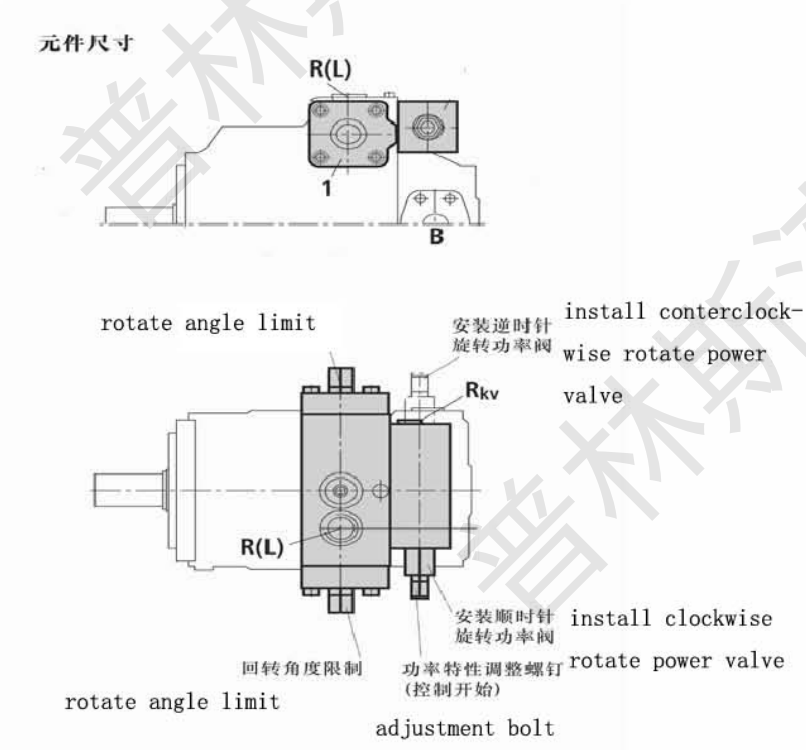
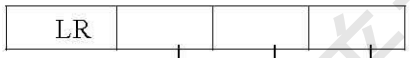


图 SO-10

※ ordering code

applied in open circuit

power adjuster with double curve character, basic set value Vgmax



power adjust mode	40	71	125	180	250	355	
mechanical adjustment	★	★	★	★	★	★	2
hydraulic remote control	☆	☆	☆	☆	☆	☆	3
pressure control							
with pressure control	☆	☆	☆	☆	☆	☆	D
with pressure control, remote pressure control	☆	☆	☆	☆	☆	☆	G
without pressure control, no need to type code							
flow control/limit							
with mechanic distance limit	☆	☆	☆	☆	☆	☆	M
without flow control/limit, no need to type code							

applied in open, semi-closed and closed circuit

power adjuster with double curve character, basic set value Vgmin, depend on control pressure



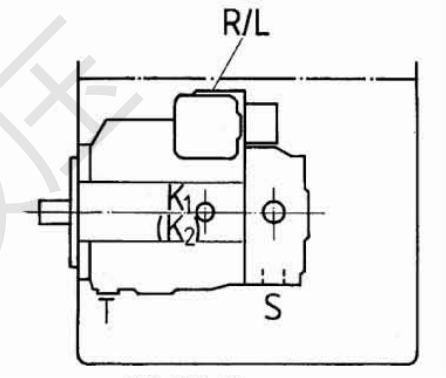
power adjust mode	40	71	125	180	250	355	
mechanical adjustment	☆	☆	☆	☆	☆	☆	2
hydraulic remote control	☆	☆	☆	☆	☆	☆	3
pressure control							
with pressure control	☆	☆	☆	☆	☆	☆	D
with pressure control and remote control	☆	☆	☆	☆	☆	☆	G
without pressure control, no need to type code							

6. install position

卧置 horizontal installation

6.1 液压泵安装在油箱内 installation within a tank

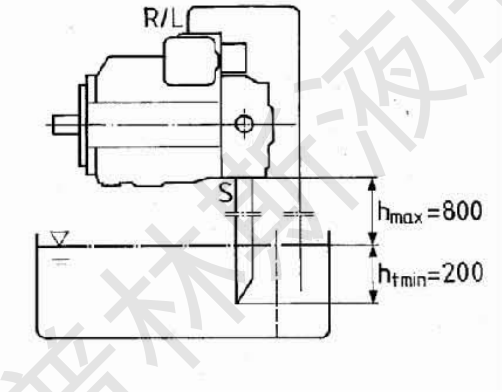
6.1.1 当油箱的最低液面高于泵的上端部分，泄油口和 S 口可敞开，如下图所示。



if the minimum fluid level does not fall below the upper point on the pump, drain port and port S can be open.

图 SO-11

6.1.2 当油箱的最低液面低于泵的上端部分，泄油口以及 S 口须用管道连接，如下图所示。

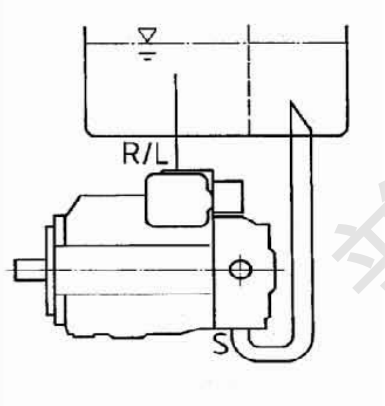


if the minimum fluid level falls below the upper point on the pump, drain port and port S should be connected by pipeline.

图 SO-12

6.2 液压泵安装在油箱外面 installation outside a tank

6.2.1 若泵安装在油箱下面，则泄漏油管和 S 口用管道连接，如下图所示。



if the pump be installed below the tank, leakage oil pipe and port S should be connected by pipeline.

图 SO-13

6.2.2 若泵安装在油箱上面，则泄漏油管和 S 口用管道连接，参照 6.1.2

if the pump be installed above the tank, leadage oil pipe and port S should be connected by pipeline

垂直安装 vertical installation

6.3 液压泵安装在油箱内 installation within a tank

6.3.1 当油箱的最低液面高于泵的前段法兰面时，泄油口 T 和 S 口，R/L 口可敞开，如下图所示。

if the minimum fluid level is above the pump mounting flange, drain port T , port S and port R/L can be open

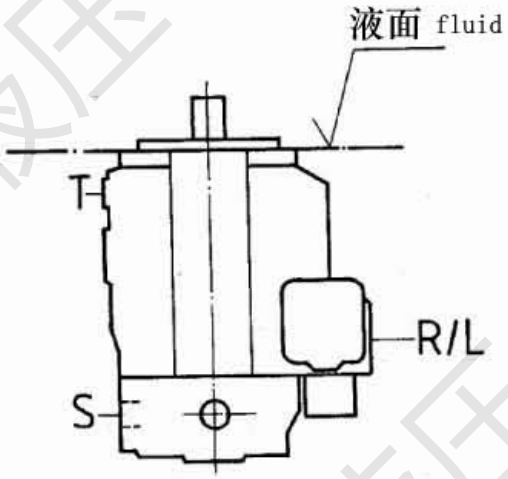


图 SO-14

6.3.2 当油箱的最低液面低于泵的泵前段法兰面时，泄油口 T， S 口以及 R/L 口须用管道连接，如下图所示。

if the minimum fluid level falls below the pump mounting flange, port T, S and R/L should be connected by pipeline

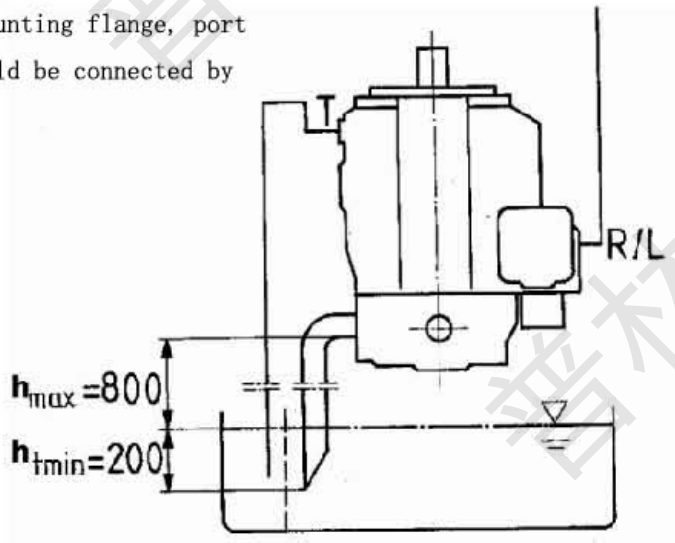


图 SO-15

7. 油液选择 fluid choose

7.1 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，所有矿物油均在某种程度上适用于轴向柱塞元件，它们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。

7.2 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。油液中的颗粒污染不得超过以下等级：

in order to guarantee equipment have long service life, filtration of the hydraulic fluid must be reliable, contamination level is not allowed to exceed the following level

等级 18/15——按 GB/T 14039-1993

等级 6————按 SAE

等级 18/15——按 ISO/DIS 4406

if the temperature is high

在油液温度很高[75℃≤t，t≥90℃]时，最低清洁度为： minimum cleanliness level

等级 17/14——按 GB/T 14039-1993

等级 5————按 SAE

等级 17/14——按 ISO/DIS 4406

7.3 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，要求温度不得超过 90℃，推荐在工作温度下选择工作粘度为 16~36mm^2/s的液压油。可参考如下图表选择液压油的粘度，在每种工况下均选用尽可能高的粘度等级。可参考以下图表：

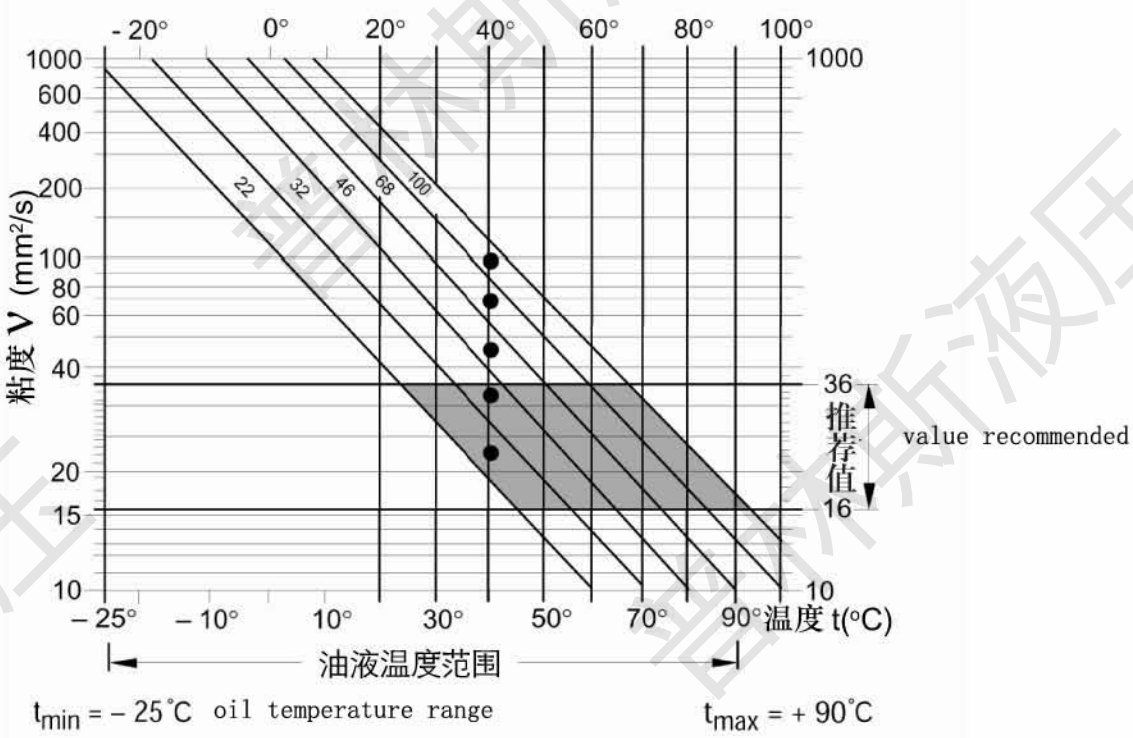
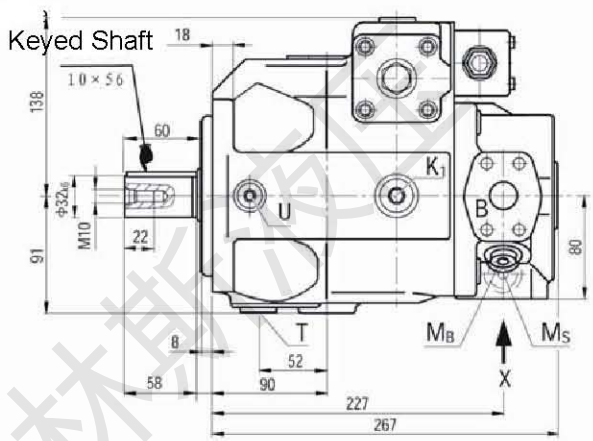


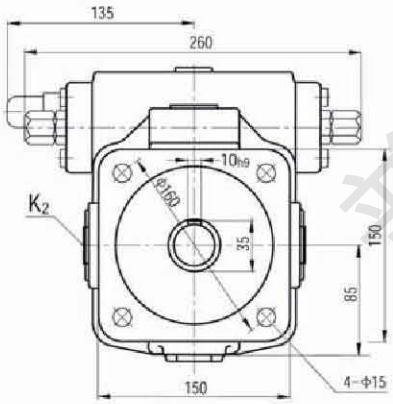
图 SO-16

for choose the fluid, you have to know the operation temperature related to ambient temperature, and temperature not exceed 90, we recommend fluid of working viscosity 16--36 mm^2/s in working temperature

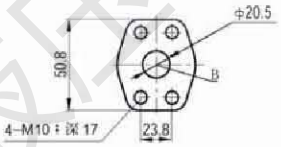
8. Unit Dimensions

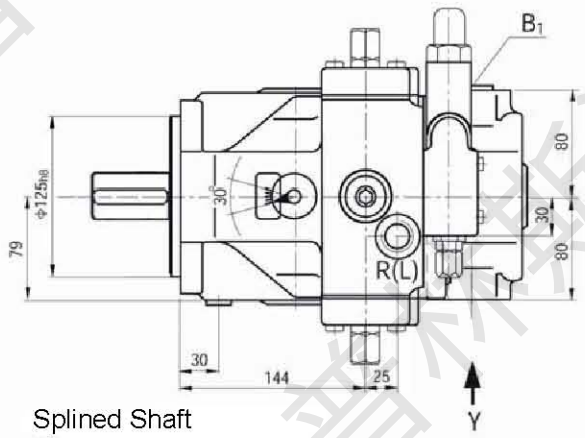
Unit Dimension ,Size 40,SAE Version (DR Control)



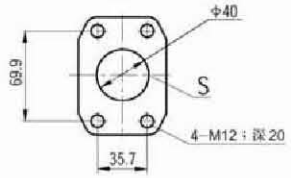


Y向视[出油口] Detail Y (Pressure Port)

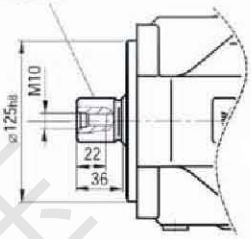




X向视[进油口] Detail X (Suction Port)



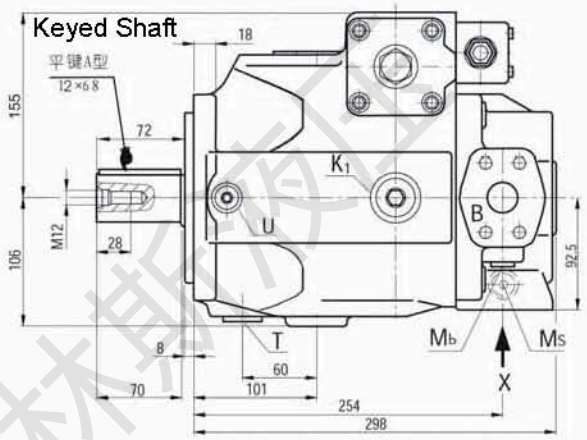
Splined Shaft
W 32 x 2 x 30 x 14 x 9g
DIN 5480

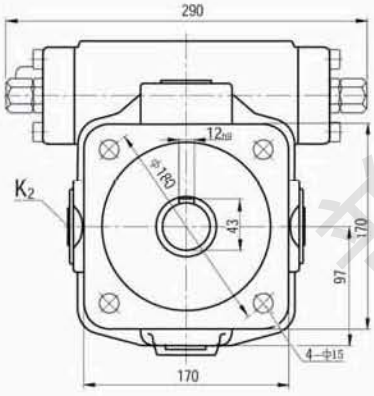


B	压力油口	φ20	B Pressure Port
B1	辅助压力油口	M22×1.5,深16	B1 Additional Port
当工作油口为25型时，B1口为Y向视所示			When ports are type25,B1 for Y
S	吸油口	φ40	S Suction Port
T	泄油口	M22×1.5,深16	T Case Drain Port
R(L)	注油口+通气口	M22×1.5	R(L) Fluid fill and air bleed port
Mb,Ms	测压点	M14×1.5,深12	Mb,Ms Test Port
K1,K2	冲洗油口	M22×1.5,深14	K1,K2 Flushing Ports
U	轴承冲洗油口	M14×1.5,深12(堵)	U: Bearing Flushing Ports

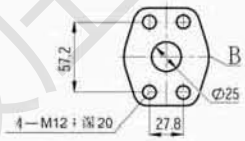
图 SO-17

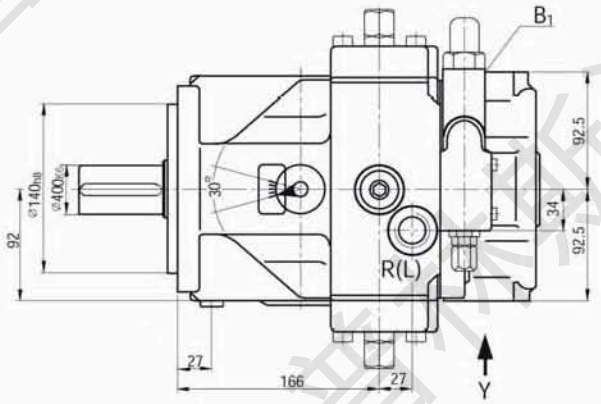
Unit Dimension ,Size 71,SAE Version (DR Control)



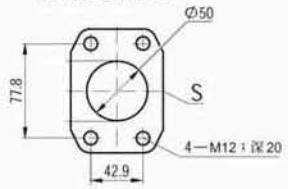


Y向视[出油口] Detail Y (Pressure Port)

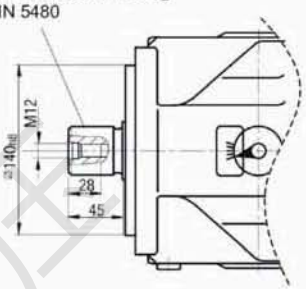




X向视[进油口] Detail X (Suction Port)



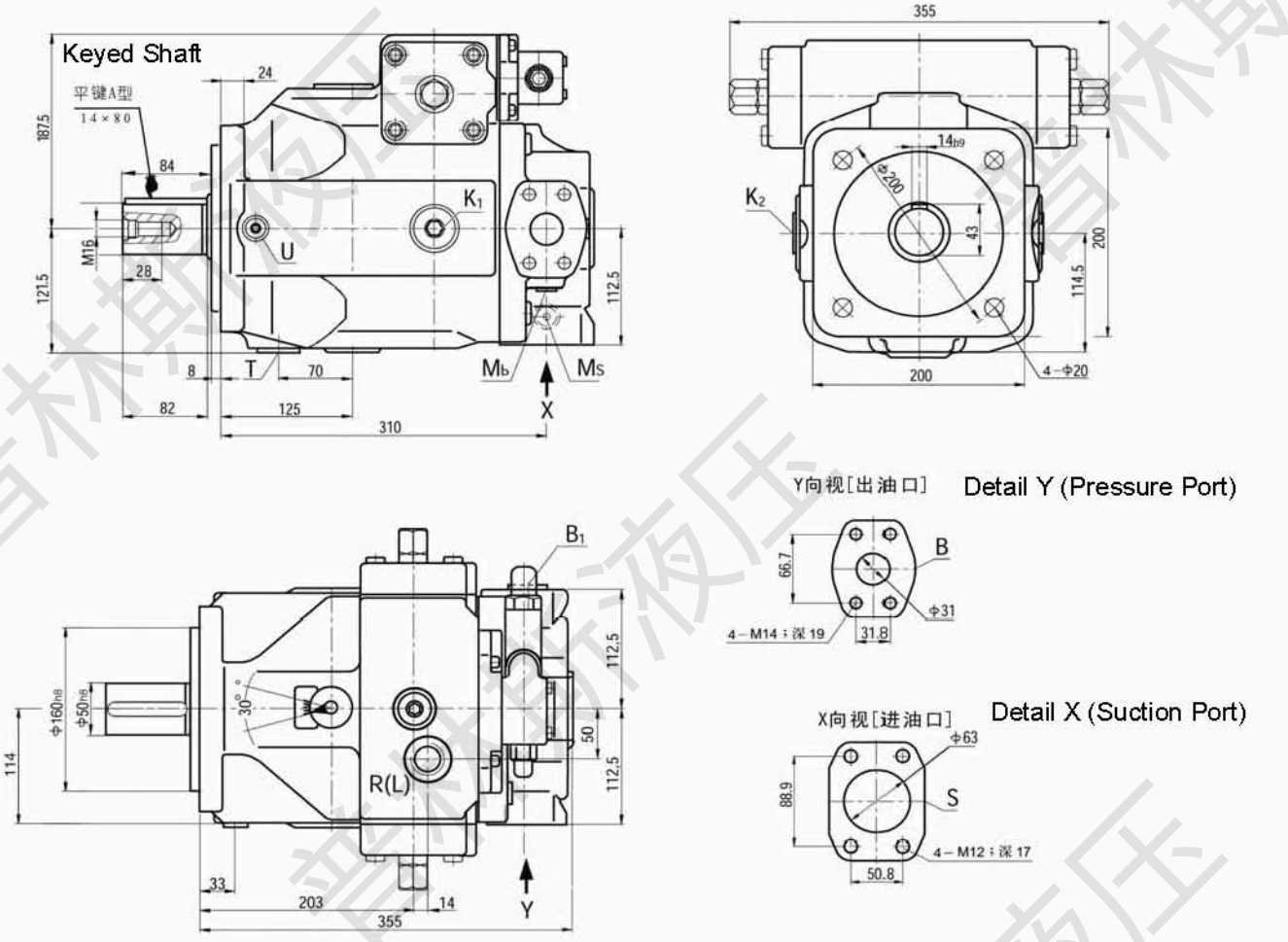
花键轴 Splined Shaft
W 40 x 2 x 30 x 18 x 9g
DIN 5480



B	压力油口	φ25	B Pressure Port
B1	辅助油口	M27×2，深16	B1 Additional Port
当工作油口为25型时，B1口为Y向视所示			When ports are type25,B1 for Y
S	吸油口	φ50	S Suction Port
T	泄油口	M27×2，深16	T Case Drain Port
R(L)	注油口+通气口	M27×2	R(L) Fluid fill and air bleed port
Mb，Ms	测压点	M14×1.5，深12	Mb,Ms Test Port
K1，K2	冲洗油口	M27×2，深16	K1,K2 Flushing Ports
U	轴承冲洗油口	M 14×1.5，深12（堵）	U: Bearing Flushing Ports

图 SO-18

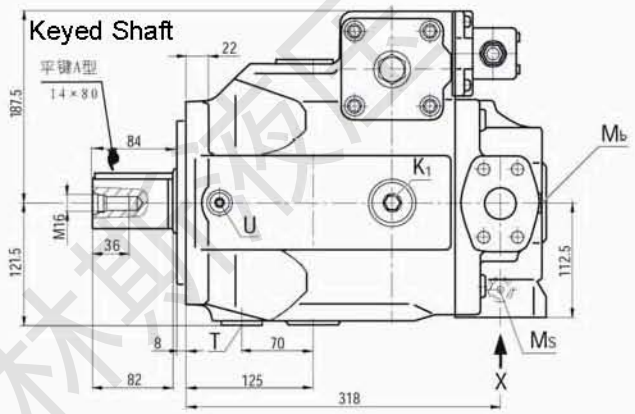
Unit Dimension ,Size 125,SAE Version (DR Control)

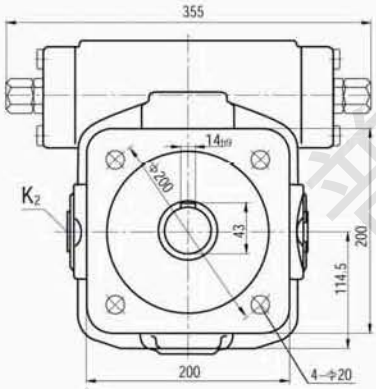


B	压力油口	Φ31	B Pressure Port
B1	辅助油口	M33×2，深18	B1 Additional Port
当工作油口为25型时，B1口为Y向视所示			When ports are type25,B1 for Y
S	吸油口	Φ63	S Suction Port
T	泄油口	M33×2，深18	T Case Drain Port
R(L)	注油口+通气口	M33×2	R(L) Fluid fill and air bleed port
Mb,Ms	测压点	M14×1.5，深12	Mb,Ms Test Port
K1,K2	冲洗油口	M33×2，深18	K1,K2 Flushing Ports
U	轴承冲洗油口	M14×1.5，深12（堵）	U: Bearing Flushing Ports

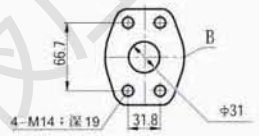
图 SO-19

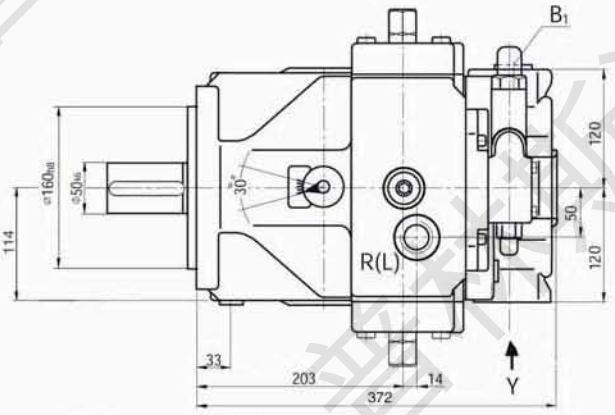
Unit Dimension Size 180,SAE Version(DR Control)



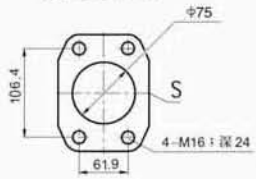


Y向视[出油口] Detail Y (Pressure Port)

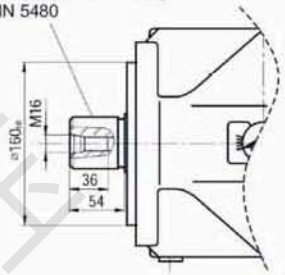




X向视[进油口] Detail X (Suction Port)



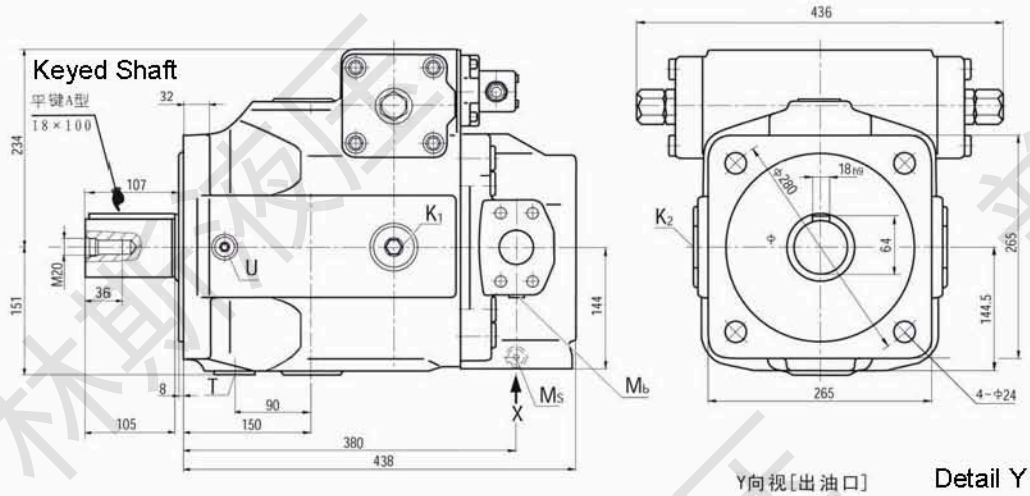
花键轴 Splined Shaft
W 50 x 2 x 30 x 24 x 9g
DIN 5480

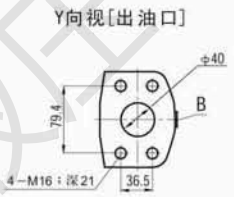


B	压力油口	⌀31	B Pressure Port
	当工作油口为25型时，B1口为Y向视所示		When ports are type25,B1 for Y
B1	辅助油口	M33×2，深18（堵）	B1 Additional Port
S	吸油口	⌀75	S Suction Port
T	泄油口	M33×2，深18（堵）	T Case Drain Port
R（L）	注油口+通气口	M33×2	R(L) Fluid fill and air bleed port
Mb，Ms	测压点	M14×1.5，深12（堵）	Mb,Ms Test Port
K1，K2	冲洗油口	M33×2，深18	K1,K2 Flushing Ports
U	轴承用冲洗油口	M14×1.5，深12（堵）	U: Bearing Flushing Ports

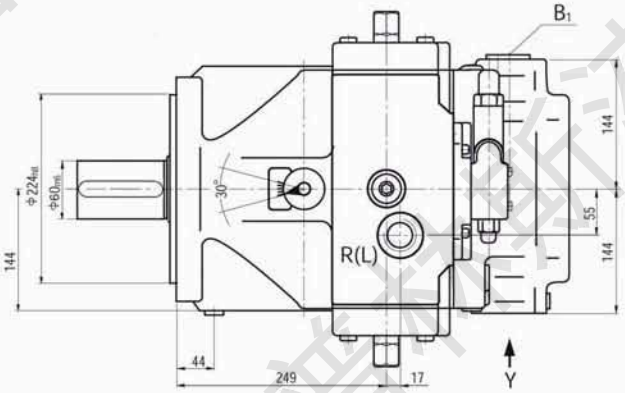
图 SO-20

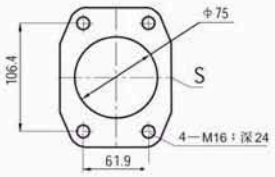
Unit Dimension,Size 250,SAE Version(DR Control)





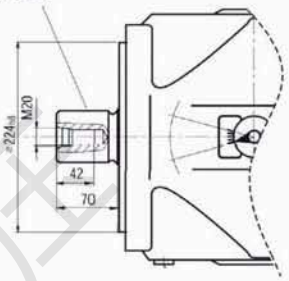
Detail Y (Pressure Port)





Detail X (Suction Port)

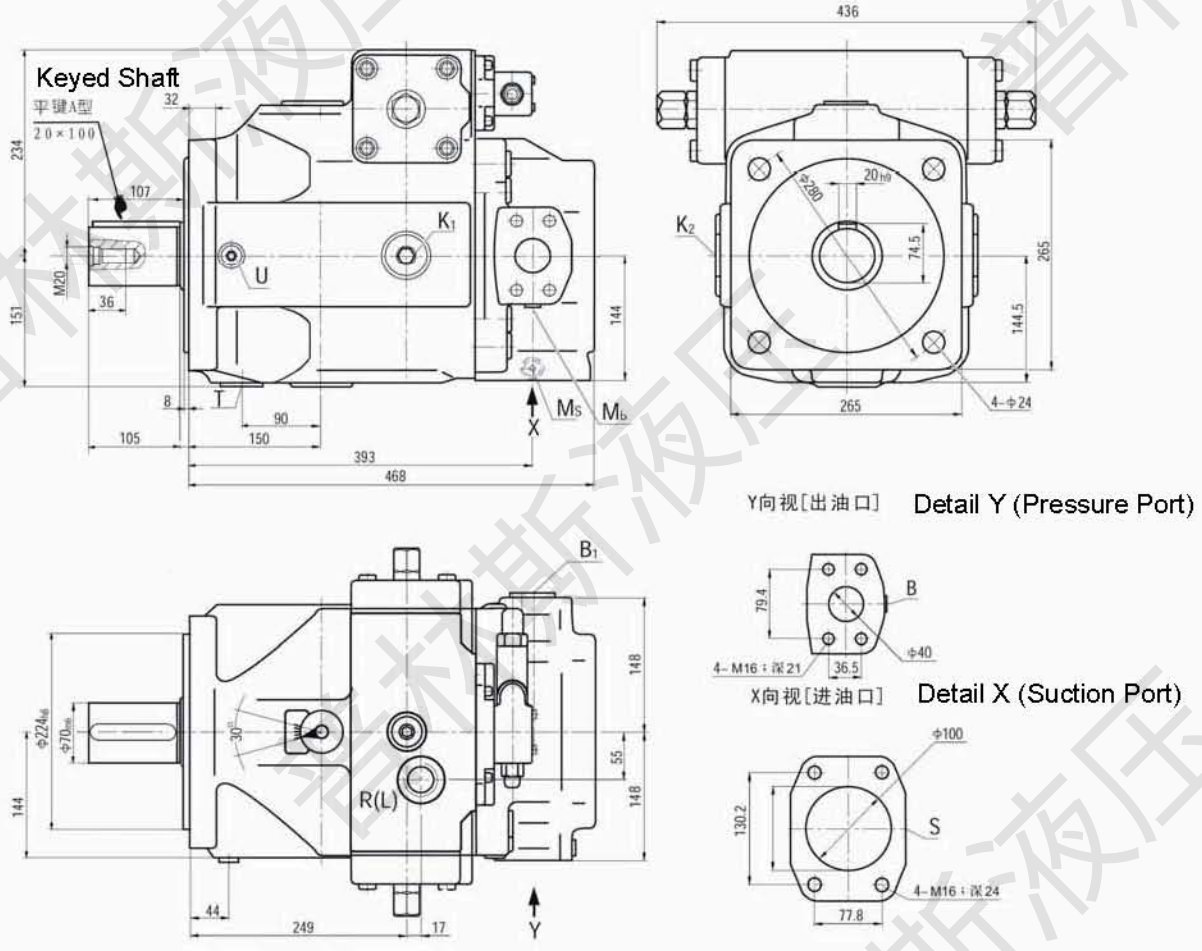
花键轴 Splined Shaft
W 60 x 2 x 30 x 28 x 9g
DIN 5480

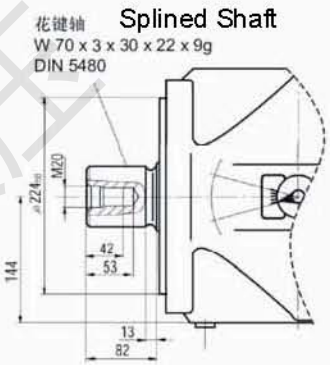


B	压力油口	Φ40	B Pressure Port
B1	辅助油口	M42×2，深18	B1 Additional Port
当工作油口为25型时，B1口为Y向视所示 When ports are type25,B1 for Y			
S	吸油口	Φ75	S Suction Port
T	泄油口	M42×2，深18	T Case Drain Port
R（L）	注油口+通气口	M42×2	R(L) Fluid fill and air bleed port
Mb，Ms	测压点	M14×1.5，深12	Mb,Ms Test Port
K1，K2	冲洗油口	M42×2，深18	K1,K2 Flushing Ports
U	轴承冲洗口	M14×1.5，深12（堵）	U: Bearing Flushing Ports

图 SO-21

Unit Dimension,Size 355,SAE Version (DR Control)





B	压力油口	φ40 B Pressure Port
当工作油口为25型时，B1口为Y向视所示 When ports are type25,B1 for Y		
B1	辅助油口	M42×2，深18 B1 Additional Port
S	吸油口	φ100 S Suction Port
T	泄油口	M42×2，深18 T Case Drain Port
R（L）	注油口+通气口	M42×2 R(L) Fluid fill and air bleed port
Mb，Ms	测压点	M14×1.5，深12 Mb,Ms Test Port
K1，K2	冲洗油口	M42×2，深18 K1,K2 Flushing Ports
U	轴承冲洗油口	M14×1.5，深12（堵） U: Bearing Flushing Ports

图 SO-22