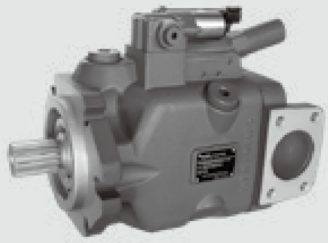
HP5V SERIES

Swash-plate Type
Axial Piston Variable Displacement Pump

HP5V series piston pump is high pressure open circuit axial piston pump specially designed with a new structure, and has lighter weight, higher power density, and longer life compared with HP3V pump.

Apply to open hydraulic circuit

Displacements (cc/rev):	(S)28	28	45	60	76	85	105
Rated pressure (bar):	250	320	320	250	320	280	350
Peaking pressure (bar):	315	350	350	280	350	320	400



Contents

Features

- Variable pump in swash-plate design for open circuit.
- High continuous pressure.
- Exceptional self-priming capability.
- Available with American (SAE) and Japanese (JIS) mounting flanges and shafts.
- Excellent reliability and long life.
- High power to weight ratio.
- Variety of control options.
- Optional through drive.
- Quick control response.
- Low pressure pulsation and low noise.
- Developed for engineering, mobile vehicles, industrial, other industrial application and agricultural machinery.

Technical Data

Size		HP5VS28	HP5V28	HP5V45	HP5V60	HP5V76	HP5V85	HP5V105
Displacement (cc/rev)		28	28	45	60	76	85	104.3
Pressure	Rated pressure (bar)	250	320	320	250	320	280	350
	Peak pressure (bar)	315	350	350	280	350	320	400
Rotation speed	Max for self-priming*1 (rpm)	3000	3000	2700	2400	2400	2400	2200
	Max*2 (rpm)	3600	3600	3250	3000	3000	3000	2600
Weight (Kg)		17.2	20	24	24	28	28	45
Quantity of oil to fill pump case (L)		0.55	0.6	0.6	0.6	0.8	0.8	1
Input torque rating (Nm)		198	155	225	225	400	400	530
Temperature Range (°C)		-20~95						
Viscosity Range (mm^2/s)		10-1000*3 (The best use of viscosity range 16~36 mm^2/s)						

Permissible through drive torque								
Input shaft code	S1	S2	S3	S4	S5	K1	K2	K3
Input torque rating (Nm)	171	272	552	925	1470	145	230	430

1. Steady state suction pressure should be 0 bar and above(at normal condition);
2. If suction pressure less than 0 bar, Boost pressure should be required;
3. In case of 200-1000mm^2/s, please allow system to warm up before using machine.

Type introduction

HP5V	76	/	A	V	1	O	R	B2	S1	M	S	—	L1/1	—	D	2	—	T
①	②		③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪		⑫		⑬	⑭		⑮

Product series

①	Product series	HP5V
	Compact product series	HP5VS

Displacement

②	Displacement cc/rev	28	45	60	76	85	105

Design series

③	Design series	A Series	A

Seals

④	Seals	FKM (Viton rubber: DIN ISO 1629)	V
		NBR (Nitrile rubble :DIN ISO 1629)	N

Hydraulic circuit

⑤	Hydraulic circuit	Open circuit	1

Through Drive

			S28	28	45	60	76	85	105	Code
⑥	Without through drive		●	●	●	●	●	●	●	O
	Without through drive, SAE flange ports, rear		●	○	●					NO1
	Without through drive, Thread ports, rear				●					NO2
	Standard configuration with gear pump 6cc/rev				●	●	●	●	○	X1
	Standard configuration with gear pump 10cc/rev				○	○	○	○	○	X2
	Mounting Flange	Spline shaft								
	SAE A 82-2	SAE J744-16-4 9T 16/32DP		●	●	●	●	●	●	A1
		SAE J744-19-4 11T 16/32DP			○	○	●	●	●	A2
	SAE B 101-2	SAE J744-22-4 13T 16/32DP	○	●	●	●	●	●	●	B1
		SAE J744-25-4 15T 16/32DP			●	●	●	●	●	B2
	SAE C 127-2	SAE J744-32-4 14T 12/24DP					●	●	○	C1
		SAE J744-38-4 17T 12/24DP							○	C2
	SAE C 127-4	SAE J744-32-4 14T 12/24DP					●	●	●	C3
		SAE J744-38-4 17T 12/24DP							●	C4

Type introduction

Direction of Rotation

⑦	Viewed on drive shaft	Clockwise	R
		Counter-clockwise	L

Input Mounting flanges

	Mounting flanges size	S28	28	45	60	76	85	105	Code
⑧	SAE B 101-2	●	●	●	●				B2
	SAE C 127-2					●	●	●	C2
	SAE C 127-4					●	●	●	C4

Input Shaft

	Shaft size	S28	28	45	60	76	85	105	Code
⑨	SAE J744-22-4 13T 16/32DP	●	●	●	●	○	○		S1
	SAE J744-25-4 15T 16/32DP			●	●	●	●		S2
	SAE J744-32-4 14T 12/24DP					●	●	●	S3
	SAE J744-38-4 17T 12/24DP							●	S4
	SAE J744-44-4 13T 8/16DP							●	S5
	SAE J744-22-1 B6.35×28 straight shaft	●	●						K1
	SAE J744-25-1 B6.35×32 straight shaft			●	●				K2
	SAE J744-32-1 B7.94×44 straight shaft					●	●		K3
	ISO straight shaft (non through shaft)		●	●	●	●	●	●	P

Thread type of Flange Fixing Port

⑩	Thread type	Metric threads	M
		UNC threads	S

Connection type (except inlet and outlet port)

⑪	UNC port, ISO 11926	A
	BSPPG thread, JIS B2351	G
	Metric port, ISO 9974	M

Type introduction

Control type

	Control type		S28	28	45	60	76	85	105	Code
	Apply to constant displacement pump		○	○	○	○	○	○	○	N
⑫	Pressure cut-off	Only pressure control	●	●	●	●	●	●	○	DR
		Electro-hydraulic pressure control, positive control	○	○	○					ER1
		Electro-hydraulic pressure control, negative control	●	●	●	●	●	●	●	ER2
		+Load sensing	●	●	●	●	●	●	○	L1
		Remotely operated	●	●	●	●	●	●	○	P0
	Power Control	Pressure cut-off+ Load sensing	●		●	●	●	●	●	L1/1
		Remotely operated+ Load sensing	●		●	●	●	●	○	P0/1
		Electrically (negative control) +Pressure cut-off+ Load sensing	●				●	●	○	L1/1-E0
		Hydraulic control + Pressure cut-off + Load sensing					●	●	○	L1/1-H0
		+Load sensing		●						LP1

Connector for solenoids

	Connector for solenoid	S28	28	45	60	76	85	105	Code
⑬	Without solenoid	●	●	●	●	●	●	●	Blank
	AMP Junior timer; 2 contact pin, (without suppressor diode)					●	●	○	A
	Deutsch DT04-2P ; 2 contact pin, (without suppressor diode)	●	●	●	●	●	●	●	D

Input Voltage

⑭	Without solenoid	Blank
	12VDC	1
	24VDC	2

Application Conditions

	Application	S28	28	45	60	76	85	105	Code
⑮	Apply to excavator	●	●	●	●	●	●	●	T
	Other mobile machinery, construction machinery, industrial application	●	●	●	●	●	●	●	Blank

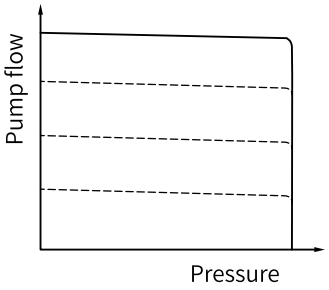
Remark: ● = available; ○ = On request;

Regulators introduction

Code: **L1(DR)**

Control Type :

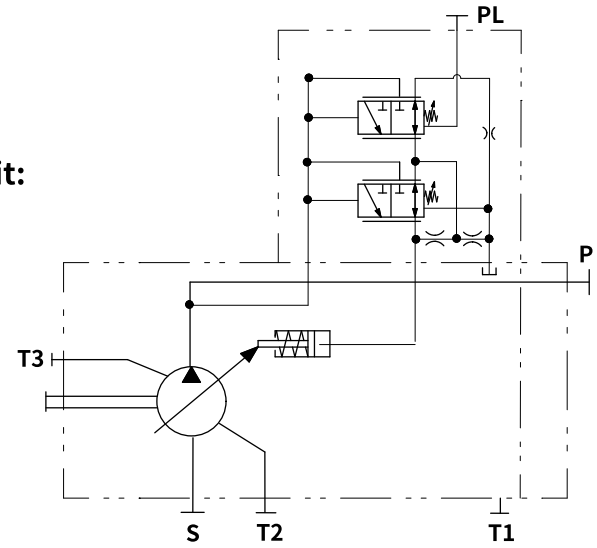
1. Load sensing
Standard setting: 15bar
Adjustment range: 10bar-21bar
2. Pressure Cut-off
Standard setting: 320bar
Adjustment range: 21bar-320bar



Function and Features:

Load sensing + Pressure Cut-off
The load sensing control is a flow control option that operates as a function of the load pressure to regulate the pump displacement to match the actuator flow requirement.
The load sensing control compares pressure before and after the sensing orifice and maintains the pressure drop across the orifice (differential pressure Δp) and with it the pump flow constant.
If the differential pressure Δp increases, then the pump displacement decreases, and if the differential pressure Δp decreases, then the pump displacement increases until the pressure drop across the sensing orifice in the valve is restored.
$\Delta p=Pp-P_L$
Pump displacement is controlled to match the flow requirement as a function of the system differential pressure(load pressure vs delivery pressure).In addition, there is a pressure cut off function incorporated into the control.
The pressure cut off control keeps the pressure in a hydraulic system constant within its control range even under varying flow conditions, the variable pump only moves as much hydraulic fluid as is required by the actuators. if the operating pressure exceeds the set point set at the pressure control valve, the pump displacement is automatically swivelled back until the pressure deviation is corrected.
"DR" control is on the basis of "L1" control, tighten the load sensitive valve adjust screw, and the load sensitive valve doesn't work.

Hydraulic Circuit:

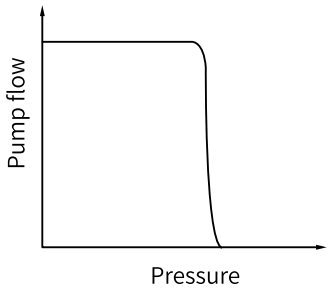


Regulators introduction

Code: **P0**

Control Type :

1. Load sensing
Standard setting:15bar
Adjustment range:10bar-21bar
2. Pressure Cut-off
Standard setting:320bar
Adjustment range:21bar-320bar

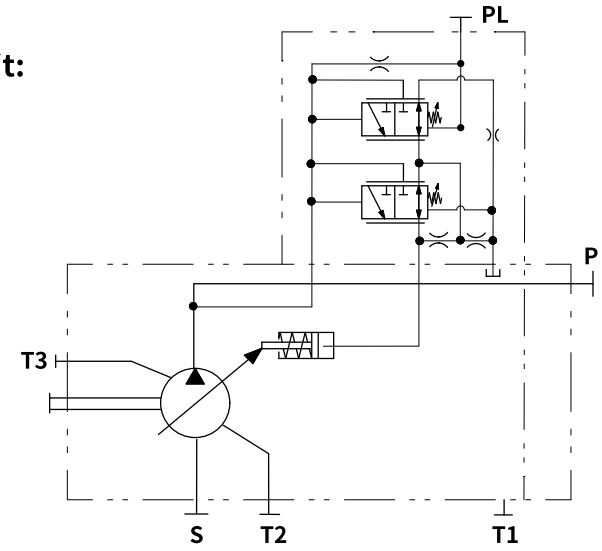


Function and Features:

P0 Pressure cut-off
The Pressure Cut-off regulator monitors outlet pressure once the pressure reaches the cut-off setting, the pump will return to minimum displacement.

Remote Control
The pump can be remotely controlled by connecting a relief valve to the PL port of the regulator. The pump can also be unload at a low pressure continue standby condition by using a solenoid valve.

Hydraulic Circuit:

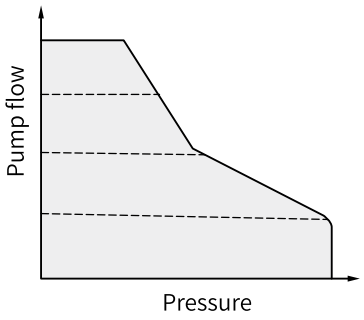


Regulators introduction

Code: □ /1

Control Type :

1. Load sensing
Standard setting: 15bar
Adjustment range: 10bar-21bar
2. Pressure Cut-off
Standard setting: 320 bar
Adjustment range: 21 bar-320 bar
3. Torque limiting



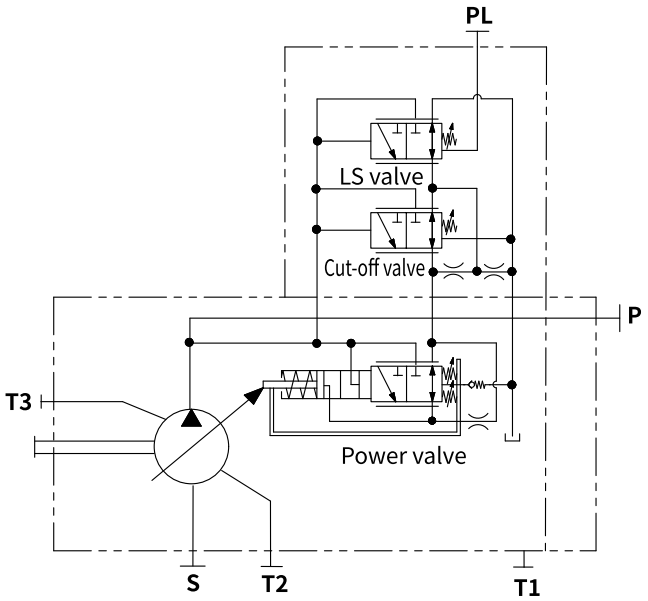
Function and Features:

_/1 Load Sense and Pressure Cut-off with Torque limiting

The L1 control functions as previously noted. In response to a rise in delivery pressure the swash plate angle is decreased, restricting the input torque. This regulator prevents excessive load against the prime mover.

The torque limit control module is comprised of two springs that oppose the spool force by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set.

Hydraulic Circuit:

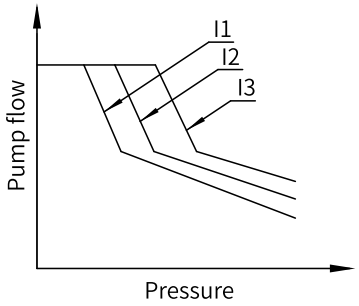


Regulators introduction

Code: □ /1-E0

Control Type :

1. Load sensing
Standard setting:15bar
Adjustment range:10bar-21bar
2. Pressure Cut-off
Standard setting: 320bar
Adjustment range: 21bar-320bar
3. Port Pr pressure: 20bar~45bar
4. Electromagnet characters



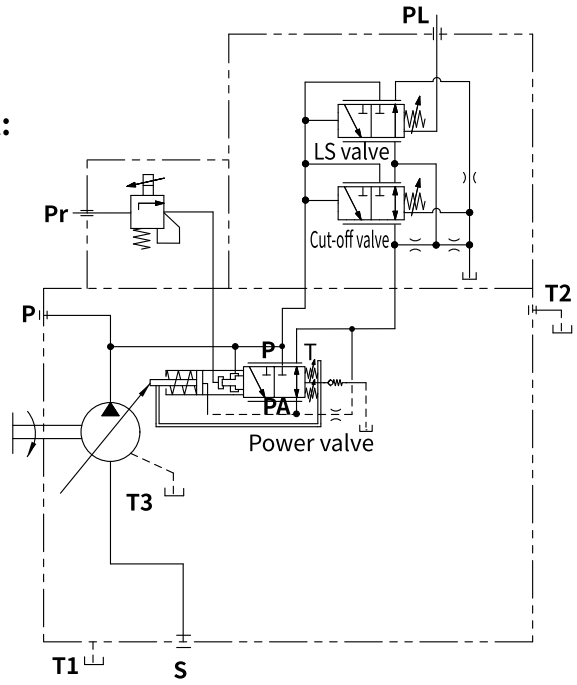
Voltage(V)	Current(A)	Resistence(Ω)	Insulation grade
12	0.80	7.3±10%(20°C)	H(180°C)
24	0.75	21.2±10%	UP to IP6K6/IPX9K

5. Connector (deutsch or Amp)
DEUTSCH: DT04-2P-E005
AMP: 174354-2 , 173706-1

Function and Features:

_/1-E0 Load Sense and Pressure Cut-off with Torque limiting
The L1 control functions as previously noted. It controls the input torque of the pump by changing different current, specific current is related to certain input torque, thus satisfy needs of different torque on excavator

Hydraulic Circuit:

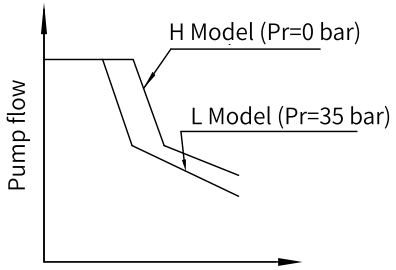


Regulators introduction

Code: ☐ /1-H0

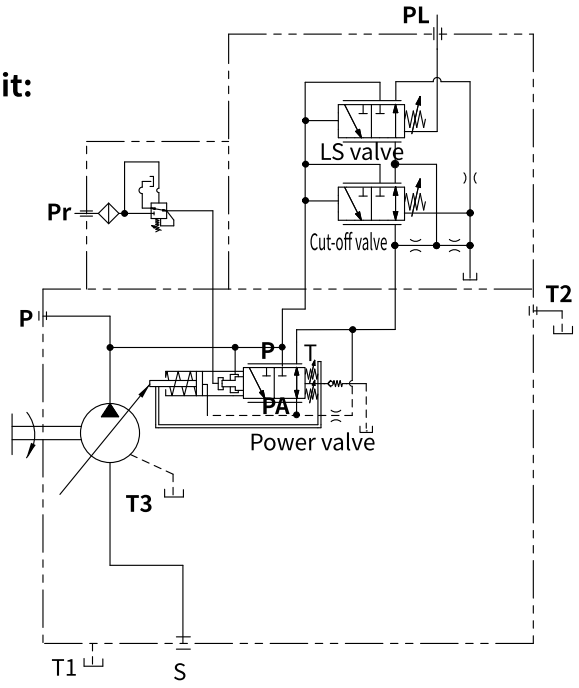
Control Type :

1. Load sensing
Standard setting:15bar
Adjustment range:10bar-21bar
2. Pressure Cut-off
Standard setting: 320bar
Adjustment range: 21bar-320bar
3. Port Pr pressure: 0bar~39bar



Function and Features: **_/1-H0 Load Sense and Pressure Cut-off with Total torque limiting**
The L1 control functions as previously noted.
It controls the input torque of the pump by changing different input pressure of port Pr, specific current is related to certain input torque, thus satisfy needs of different torque on excavator.

Hydraulic Circuit:



Regulators introduction

Code: **LP1**

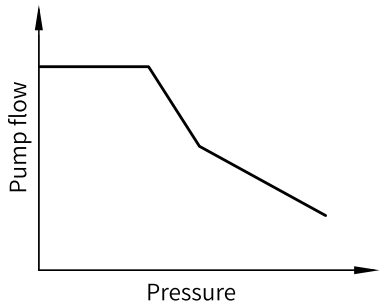
Control Type:

1. Load sensing

Standard setting: 17bar

Adjustment range:13bar~17bar

2. Torque limiting



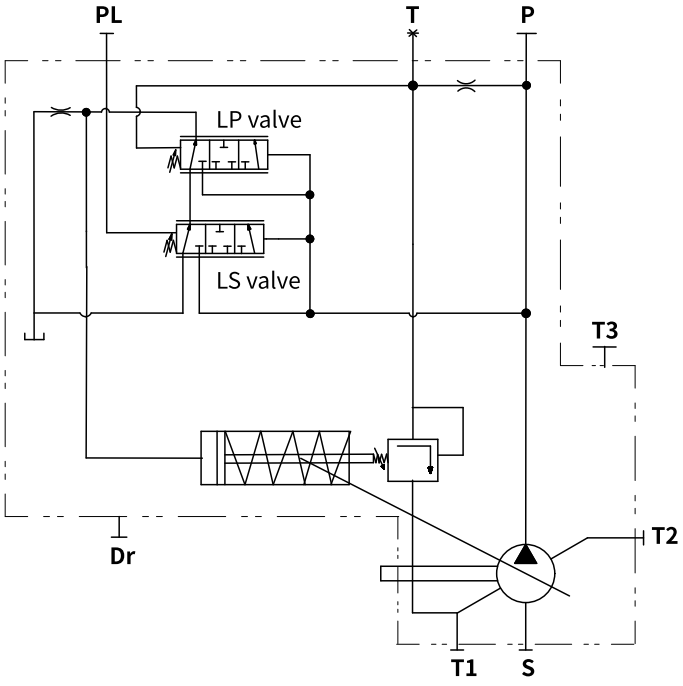
Function and Features:

_/1 Load Sense and Pressure Cut-off with Torque limiting

The L1 control functions as previously noted. In response to a rise in delivery pressure the swash plate angle is decreased, restricting the input torque. This regulator prevents excessive load against the prime mover.

The torque limit control module is comprised of two springs that oppose the spool force by the system pressure. By turning an outer and inner spring adjustment screw, the appropriate input torque limit can be set.

Hydraulic Circuit:



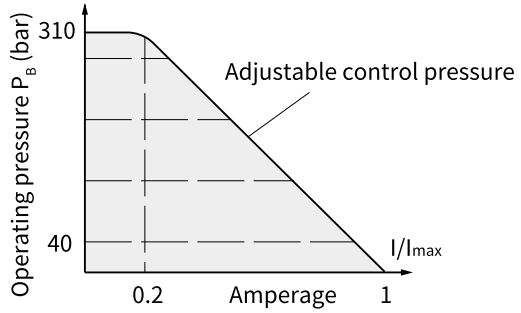
Regulators introduction

Code: **ER2**

Control Type : **Electro-hydraulic pressure control**

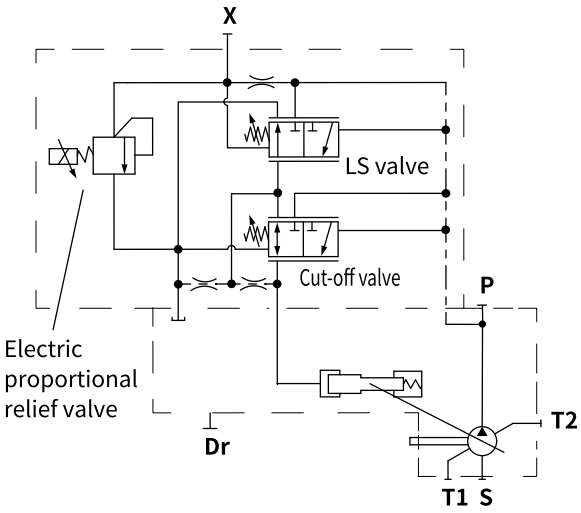
The ER2 valve is set to a certain pressure by a specified variable solenoid current.
This causes an increase or decrease in the pump swivel angle (flow) in order to maintain the electrically set pressure level. The pump thus only delivers as much hydraulic fluid as the consumers can take. The desired pressure level can be set steplessly by varying the solenoid current.
As the solenoid current signal drops towards zero, the pressure will be limited to Pmax by an adjustable hydraulic pressure cut-off to secure fail safe function

Static current-pressure characteristic curve ER2
(negative characteristic curve measured with pump in zero stroke)

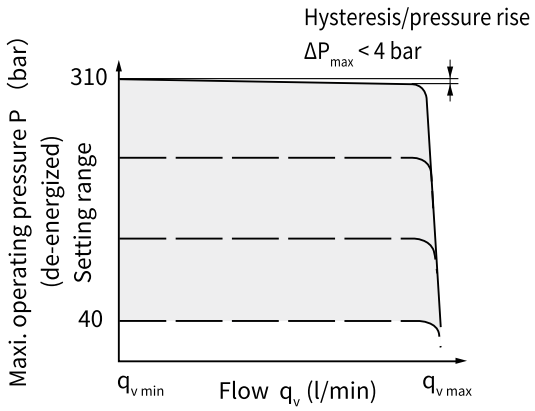


- Hysteresis static < 3 bar

Circuit diagram:



Flow-pressure characteristic curve



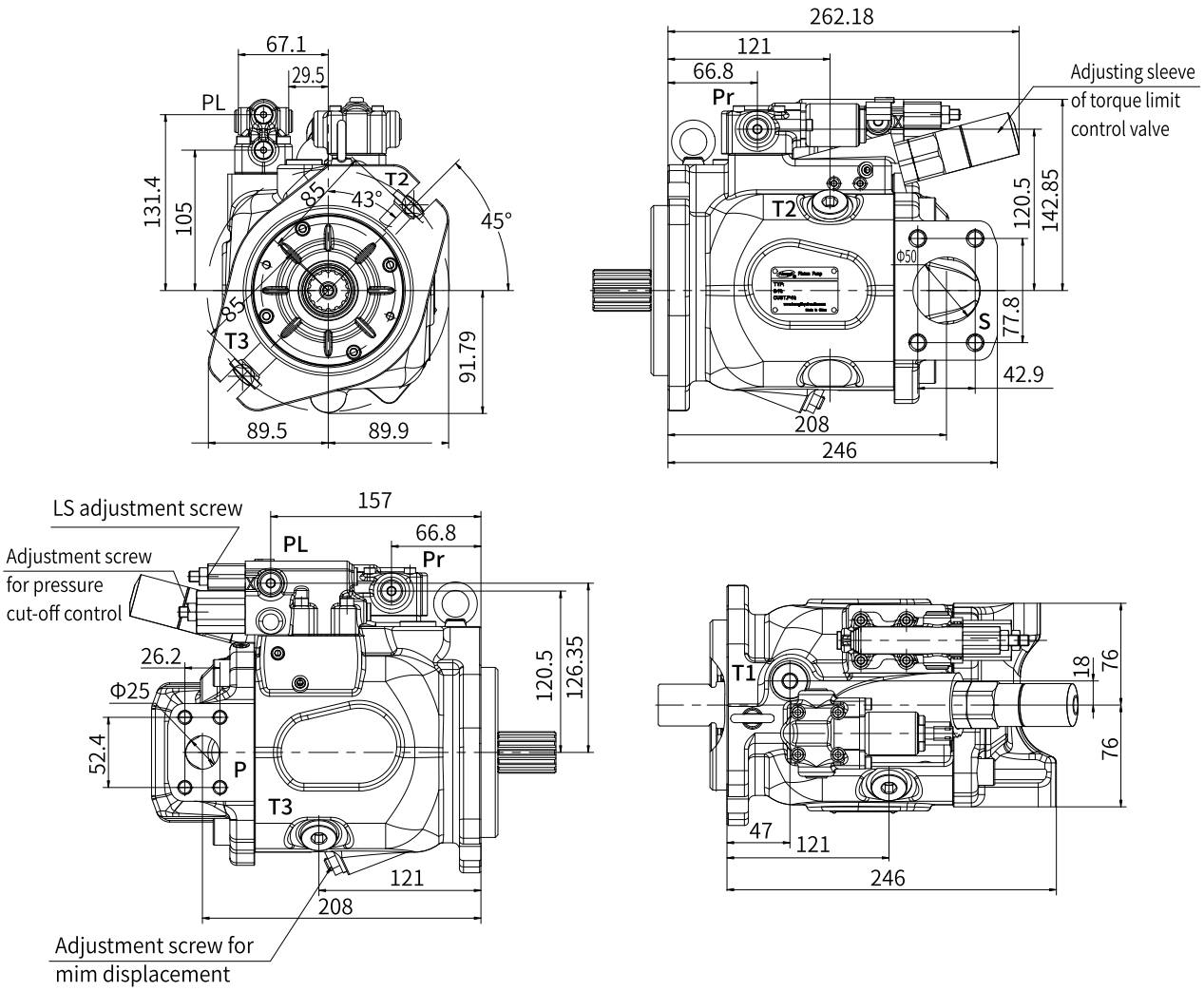
- Characteristic curves valid for n_1 = 1500 rpm and t_{fluid} = 50 °C .

Technical data, solenoid		
Voltage		24 V (±20%)
Control current	Start of control at $p_{max.}$	50 mA
	End of control at $p_{min.}$	600 mA
Limiting current		0.77 A
Nominal resistance (at 20°C)		22.7Ω
Dither frequency		100 ~ 200 Hz
Actuated time		100%
Operating temperature range at valve		-20°C to +115°C

Installation size

HP5V76/85 installation size

HP5V76/85 with Cut-off/Load Sense Control with torque limit (Clockwise Rotation)
For the CCW pump just reverse the inlet and outlet port.

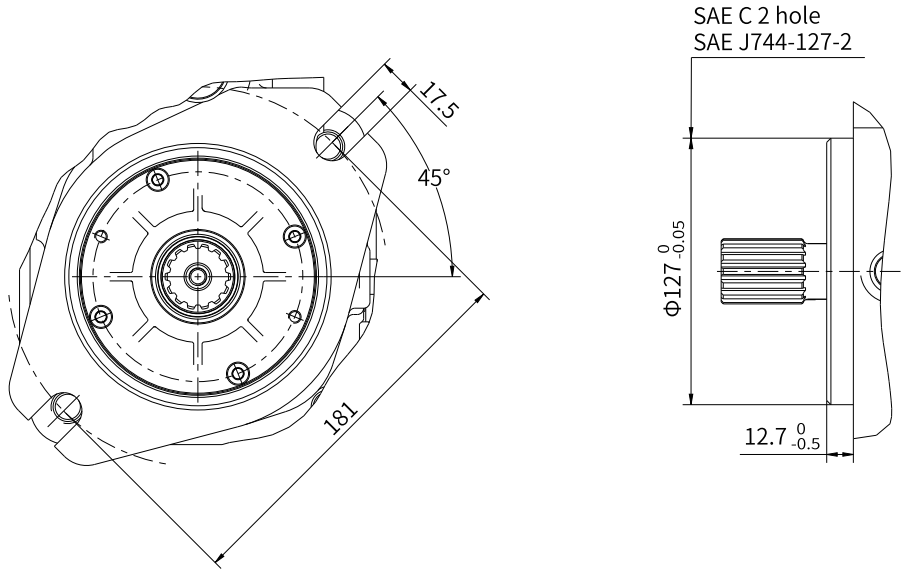


Port Details

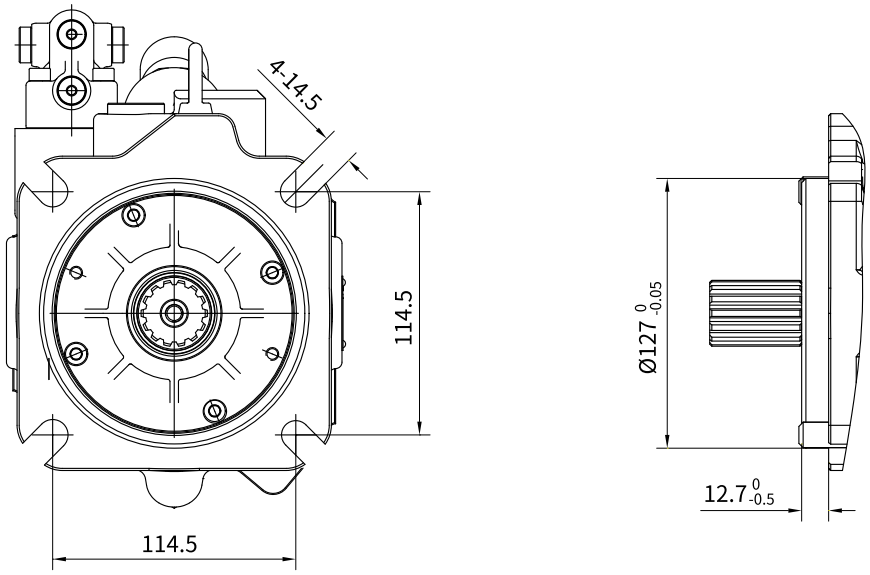
	Port Name	Port Size and Description			Tightening Torque (N-m)
P	Working port	1"SAE J518C Code 61 (5000psi)	M (metric)	M10×1.5 (depth 17mm)	57
			S(UNC)	3/8-16UNC-2B (depth 17mm)	
S	Suction Port	2"SAE J518C Code 61 (3000psi)	M (metric)	M12X1.75 (depth 20mm)	98
			S(UNC)	1/2-13UNC-2B (depth 20mm)	
T1、T2、T3	Case drain Port	SAE J1926/1 (3/4-16UNF-2B) (depth 16 mm)			98
PL	LS Control Port	SAE J1926/1 (7/16-20UNF-2B) (depth 11.5mm)			12
Pr	Electronic control or Hydraulic control pilot	SAE J1926/1 (7/16-20UNF-2B) depth 11.5mm			12

Installation size

HP5V76/85 Mounting Flange



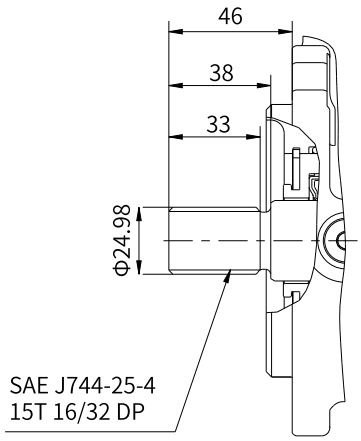
SAE "C2" type



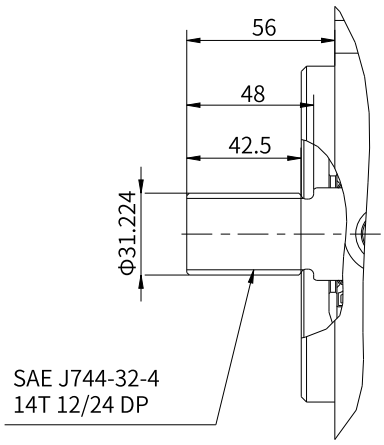
SAE "C4" type

Installation size

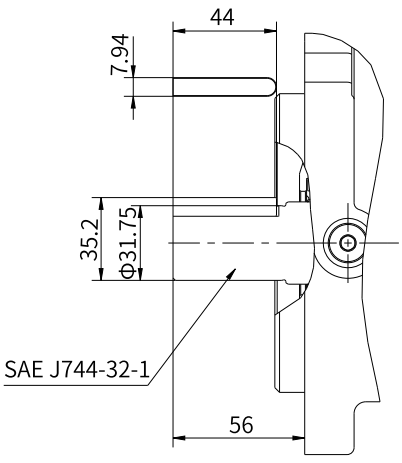
HP5V76/85 Input Shaft type



"S2" type spline shaft



"S3" type spline shaft



"K3" type straight shaft