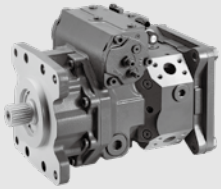
HP4VG SERIES

Swash-plate Type Axial Piston Variable Displacement Pump

HP4VG series axial piston pump is a newly-developed high pressure closed circuit pump, which can meet the application requirements of customers for harsh working conditions such as high pressure, high rotational speed and frequent impact.

Suitable for a high-pressure closed circuit

Size (cc/rev):	60	100	175
Rated pressure (bar):	400	400	450
Max. pressure (bar):	450	450	500



Contents

Features

- ◁ Variable axial piston pump of swashplate design for hydrostatic drives in closed circuit.
- ◁ Flow direction changes smoothly when the swashplate is moved through the neutral position.
- ◁ Two pressure relief valves are installed on the high-pressure side to prevent overload.
- ◁ The built-in charge pump acts as charge pump and control pump.
- ◁ The maximum charge pressure is limited by the built-in low pressure relief valve.
- ◁ New rotary components and bearings, make the transmission efficiency improved, and the input speed increased.
- ◁ The HP4VG175 pump adopts an integrated design at the rear of the housing to reduce leaking points.
- ◁ Optimized shell design to reduce vibration and noise.
- ◁ Electric proportional displacement control meets the application requirements of multiple industries.
- ◁ Various oil outlet connection methods help to optimize pipeline connection.
- ◁ HP4VG175 pump can be optionally equipped with a flush valve, which can be directly installed on the pump body.

Technical data

Size		60	100	175
Displacement (cc/rev)		60	100	175.4
Speed	Rated(rpm)	3600	3000	2650
	Max. (rpm)	3900	3300	2800
	Min. (rpm)	500	500	500
Pressure	Rated(bar) (Set the pressure of the high-pressure relief valve, relative to the charge pressure)	400	400	450
	Max. (bar) (Relative to the Charge pressure)	450	450	500
	Minimum low loop pressure(bar) (Relative to charge pump)	10	10	10
Charge pump displacement (cc/rev)		11.6	27	39
Casting pressure	Rated (bar)	2	2	1.7
	Max. (At cold start) (bar)	-	-	5.2
Suction pressure (Absolute pressure)	Rated (bar)	0.8	0.8	0.8
	Max. (bar)	5	5	6
Oil viscosity (mm^2/s)		10~1000，Best range: 16~36		
Oil temperature (°C)		-20~95		
Oil cleanliness		ISO 4406 Class 18/13 or higher		
Weight (w/o auxiliary flange) (Kg)		38	62	115

Type introduction

HP4V	G		EP3	D	M	P	R	/	C	R	N	C2	S1	02	F	B1	3	S	-	S
①	②	③	④	⑤	⑥	⑦	⑧		⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱		⑲

Axial piston unit

①	Swashplate design, variable, nominal pressure 400/450 bar, maximum pressure 450/500 bar	HP4V

Operating mode

②	Pump, closed circuit	G

Displacement

③	Displacement cc/rev	60	100	175

Control device

④	Proportional control, electric U = 12 V DC	EP3
	Proportional control, electric U = 24 V DC	EP4

Pressure cut-off

⑤	Without pressure cut-off	Blank
	Pressure cut-off	D

Mechanical displacement limitation

⑥	Without **mechanical displacement limitation**	Blank
	Mechanical displacement limitation	M

Connector for solenoids

⑦	Without connector (only for purely hydraulic control)	Blank
	Deutsch molded connector, 2-pin–without suppressor diode	P

Swivel angle sensor

⑧	Without swivel angle sensor	Blank
	Swivel angle sensor	R

Type introduction

Series

⑨	60 cc/rev	A
	100 cc/rev	B
	175 cc/rev	C

Direction of Rotation

	Direction of Rotation	60	100	175	Code
⑩	Viewed on drive shaft，clockwise	●	●	●	R
	Viewed on drive shaft，counter-clockwise	○	○	○	L

Sealing material

⑪	NBR (nitrile rubber), shaft seal in FKM (fluoroelastomer)	N

Mounting flange

	Mounting flange	60	100	175	Code
⑫	SAE C J744-127-2	●			C2
	SAE C J744-127-4		●		C4
	SAE E J744-165-4			●	E4

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Drive shaft

	Drive shaft		60	100	175	Code
⑬	Splined shaft ANSI B92.1a	1 1/4 in 14T 12/24 DP	●	●		S1
		1 3/8 in 21T 16/32 DP	○			S2
		1 1/2 in 23T 16/32 DP	○	○		S3
		1 3/4 in 13T 8/16 DP	○	○	●	S4
		2 1/4 in 17T 8/16 DP	○	○	○	S5
	Splined shaft DIN 5480	W30×2×14×9g	○	○		T1
		W35×2×16×9g	○	○		T2
		W45×2×21×9g	○	○		T3
		W50×2×24×9g			●	T4

Working port

	Working port	60	100	175	Code
⑭	Same-side SAE flange port A and B	○	●		1
	Off-side SAE flange port A and B	●	●		2
	SAE working port A and B, on right side (45° right)			●	3

Type introduction

Boost pump and rotary group configuration

⑮	Standard rotary group，boost pump integrated	F
	Standard rotary group，without boost pump	K

Through drive

⑯	Through drive		60	100	175	Code
	Without through drive		●	●	●	Blank
	Flange	Splined shaft				
	SAE B 101-2	SAE J744-22-4 13T 16/32 DP	●	●	●	B1
	SAE B 152-4	SAE J744-44-4 13T 8/16 DP			●	D1
	SAE E 165-4	SAE J744-44-4 13T 8/16 DP			●	E1

High-pressure relief valve

⑰	High-pressure relief valve	Setting range Δp	60	100	175	Code
	Pilot-operated high-pressure relief valve	100 ~ 420bar，with a bypass		●		1
	Direct-acting high-pressure relief valve, fixed setting	250 ~ 420bar，without a bypass	○	●		3
		250 ~ 420bar，with a bypass	●			5
		100 ~ 250bar，without a bypass	○			4
		100 ~ 250bar，with a bypass	○			6
		450bar，without a bypass			●	7

Filtration boost circuit/external boost pressure supply

⑱	Filtration in the boost pump suction line	S
	Filtration in the boost pump pressure line	D

Standard / special version

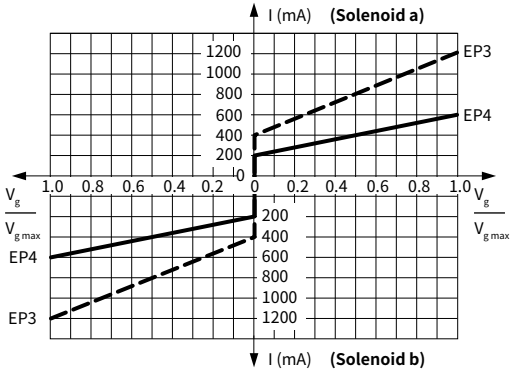
⑲	Standard / special version	S

Remark：● = Available； ○ = On request

Electrical displacement control

· Electrical displacement control principle

The output flow of the pump is infinitely variable between 0 and 100%, proportional to the electrical current sup-plied to solenoid a or b.
The electrical energy is converted into a force acting on the control spool.
This control spool then directs control oil into and out of the stroking cylinder to adjust pump displacement as required.
A feedback lever connected to the stroking piston main-tains the pump flow for any given current within the con-trol range.



Standard:
Proportional solenoid without manual emergency operation.

Supply as required:
Proportional solenoid with manual emergency operation and spring return.

Technical data, solenoid

Control		EP3 (HP4VG 60/100)	EP4 (HP4VG 60/100)	EP4 (HP4VG 175)
Voltage		12 V (±20%)	24 V (±20%)	24 V (±20%)
Control current	Start of control at Vg = 0	400 mA	200 mA	200 mA
	End of control at Vg max	1200 mA	600 mA	600 mA
Current limit		1540 mA	840 mA	840 mA
Nominal resistance (at 68 ° F (20 ° C)		5.5 Ω	21.7 Ω	21.7 Ω
Dither frequency		100 Hz	100 Hz	120 Hz
Duty cycle		100%		
Type of protection		See connector version		

Note:

The spring-return device in the control module is not a safety device

The control module may be stuck in an uncertain position by internal impurities (hydraulic oil impurities, system component wear or sediment). As a result, the controller can no longer respond correctly to the instruction from the operator.

Check whether additional safety measures are required on your machine to move the drive actuator to a controlled safe position (emergency stop). When necessary, please ensure that these operations are implemented correctly.

Proportional control, hydraulic, pilot-pressure related

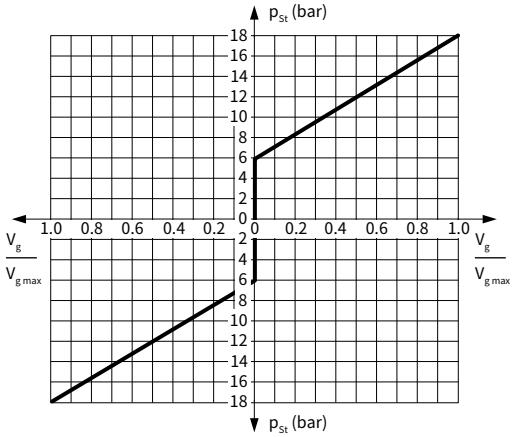
·Hydraulic proportional control principle

The output flow of the pump is infinitely variable between 0 and 100%, proportional to the difference in pilot pres-sure applied to the two pilot pressure ports (Y1 and Y2). The pilot signal, coming from an external source, is a pressure signal. Flow is negligible, as the pilot signal acts only on the control spool of the control valve.

This control spool then directs control oil into and out of the stroking cylinder to adjust pump displacement as required.

A feedback lever connected to the stroking piston main-tains the pump flow for any given pilot signal within the control range.

If the pump is also equipped with a DA control valve , automotive operation is possible for travel drives.



Displacement at Vg = pSt

Displacement at Vg max = pSt = 18bar

Pilot signal pSt = 6 to 18 bar (at port Y1, Y2)

Initial control value at 6 bar pressure

Control termination value when the pressure is 18 bar

(The maximum displacement Vg max)

Note:

In the neutral position, the HP control module must be unloaded to reservoir via the external pilot control device.

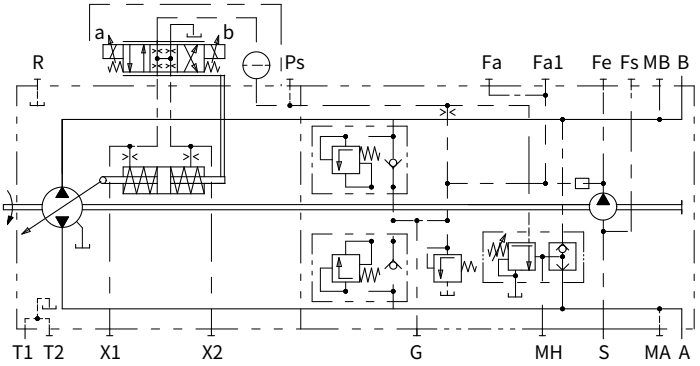
Note:

The spring-return device in the control module is not a safety device

The control module may be stuck in an uncertain position by internal impurities (hydraulic oil impurities, system component wear or sediment). As a result, the controller can no longer respond correctly to the instruction from the operator.

Check whether additional safety measures are required on your machine to move the drive actuator to a controlled safe position (emergency stop). When necessary, please ensure that these operations are implemented correctly.

HP4VG 60 Control principle



Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	B to A	A to B	A to B	B to A
Working pressure	MA	MB	MB	MA

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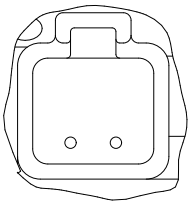
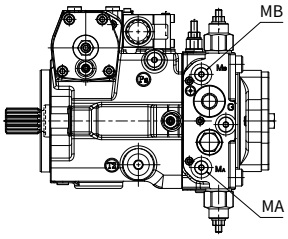
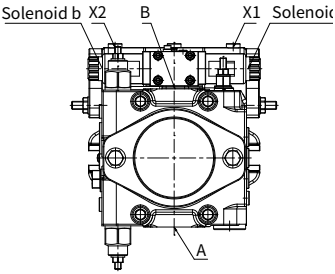
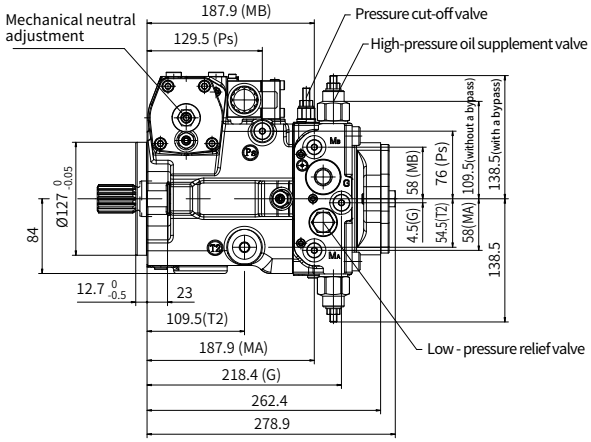


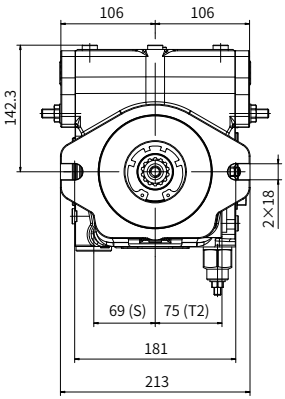


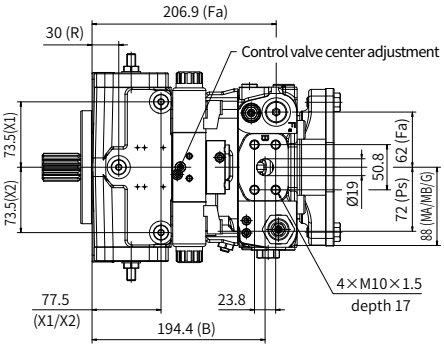


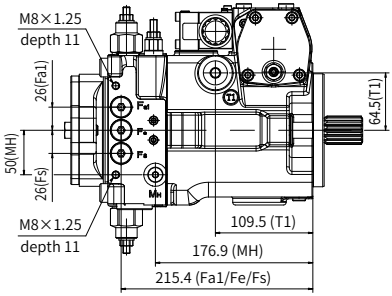
Installation size

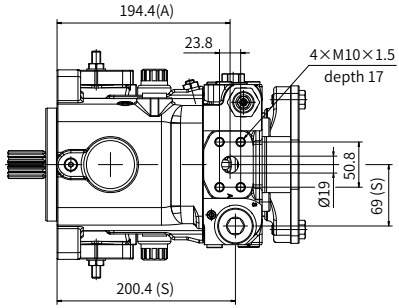
HP4VG 60 Installation size











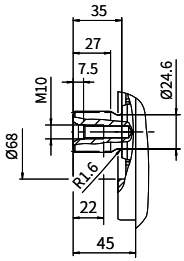
Installation size

· HP4VG 60 Port details

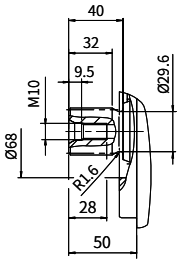
Port	Port Name	Standard	Oil Port Specification (thread depth)
A, B	Working port	SAE J518	3/4"
	Fastening thread	DIN 13	M10×1.5（depth 17mm）
S	Suction port	ISO 9974-1	M33×2（depth 18mm）
T1, T2	Drain port	ISO 9974-1	M22×1.5（depth 14mm）
R	Air bleed port	ISO 9974-1	M12×1.5（depth 12mm）
X1, X2	Control pressure port	ISO 9974-1	M12×1.5（depth 12mm）
G	Boost pressure port	ISO 9974-1	M14×1.5（depth 12mm）
P_S	Pilot pressure port inlet	ISO 9974-1	M14×1.5（depth 12mm）
MA, MB	Measuring port pressure A, B	ISO 9974-1	M12×1.5（depth 12mm）
MH	Measuring port, high pressure	ISO 9974-1	M12×1.5（depth 12mm）
Fa	Boost pressure port inlet	ISO 9974-1	M18×1.5（depth 12mm）
Fa1	Boost pressure port inlet(Filter can be installed)	ISO 9974-1	M18×1.5（depth 12mm）
Fe	Charge pressure outlet	ISO 9974-1	M18×1.5（depth 12mm）
Fs	From the filter to the oil suction line (at cold start)	ISO 9974-1	M18×1.5（depth 12mm）

Installation size

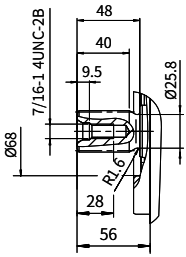
HP4VG 60 Shaft extension type and through shaft drive



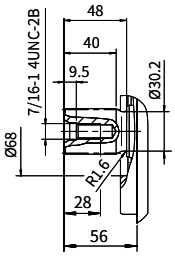
"T1" type spline shaft
DIN 5480
W30×2×14×9 g



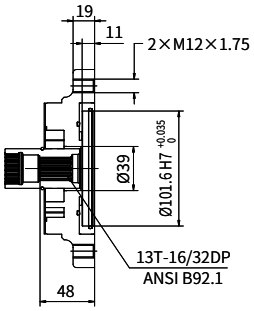
"T2" type spline shaft
DIN 5480
W35×2×16×9 g



"S1" type spline shaft
ANSI B92.1a
1 1/4 in 14T 12/24DP



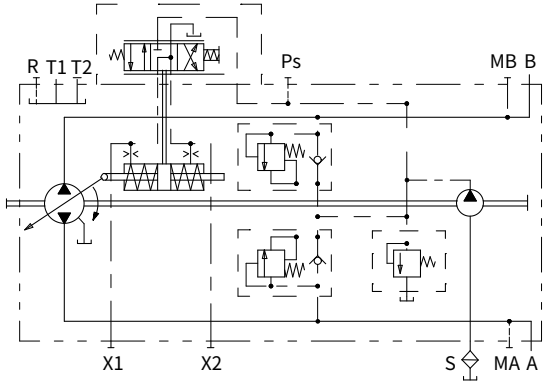
"S2" type spline shaft
ANSI B92.1a
1 3/8 in 21T 16/32DP



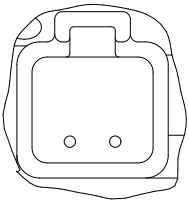
"B1" type through drive

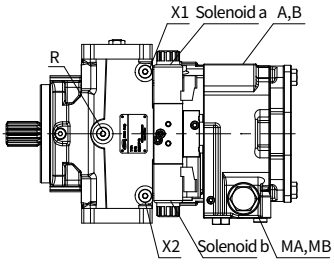
HP4VG 100 Control principle

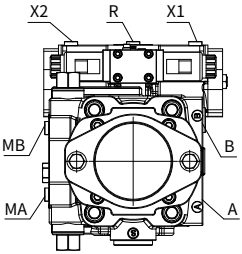
· HP4VG 100 Port details



Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	B to A	A to B	A to B	B to A
Working pressure	MA	MB	MB	MA

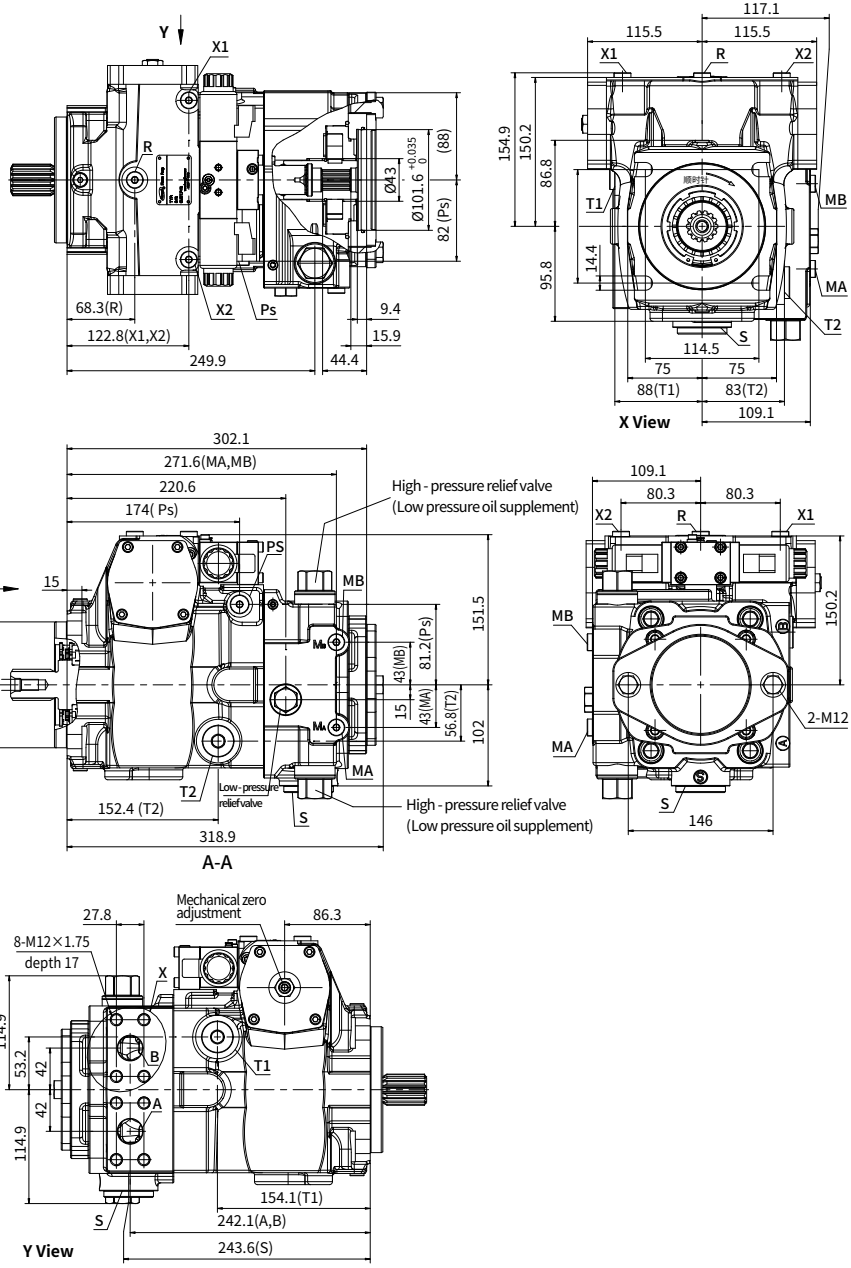






Installation size

HP4VG 100 Installation size



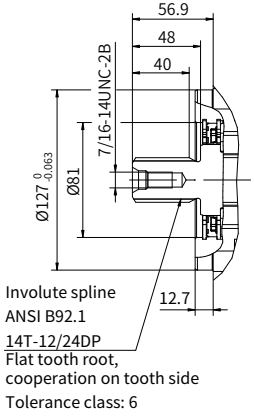
Installation size

· HP4VG 100 Port details

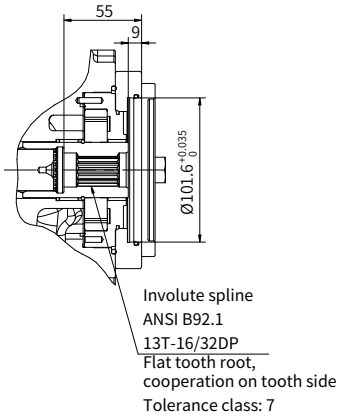
Port	Port Name	Standard	Oil Port Specification (thread depth))
A, B	Working port	SAE J518	11"
	Fastening thread	DIN 13	M12×1.75（depth 17mm）
S	Suction port	ISO 9974-1	M42×2（depth 20mm）
T1, T2	Drain port	ISO 9974-1	M26×1.5（depth 16mm）
R	Air bleed port	ISO 9974-1	M12×1.5（depth 12mm）
X1, X2	Control pressure port	ISO 9974-1	M12×1.5（depth 12mm）
P_S	Pilot pressure port inlet	ISO 9974-1	M14×1.5（depth 12mm）
MA, MB	Measuring port pressure A, B	ISO 9974-1	M12×1.5（depth 12mm）

Installation size

HP4VG 100 Shaft extension type and through shaft drive

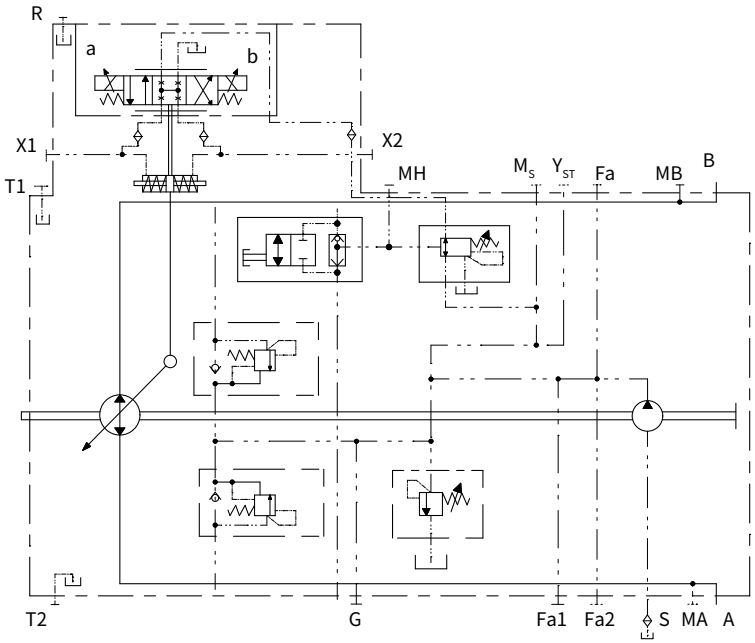


"S1" type spline shaft

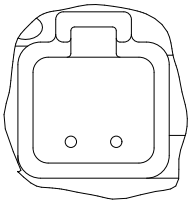


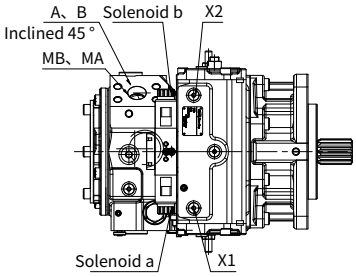
"B1" type through drive

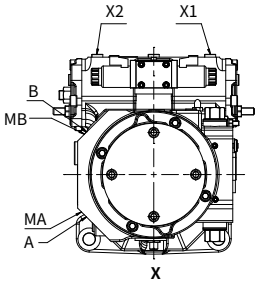
HP4VG 175 Control principle



Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	B to A	A to B	A to B	B to A
Working pressure	MA	MB	MB	MA

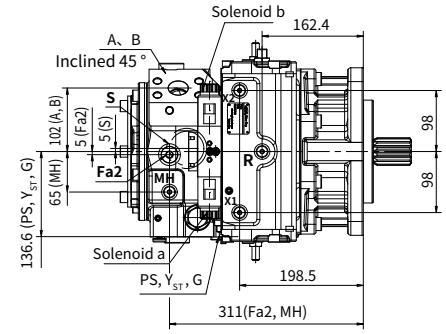


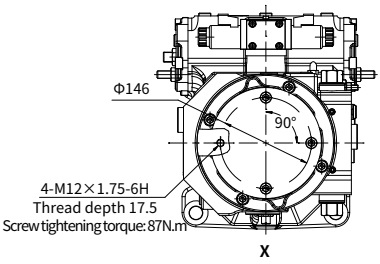


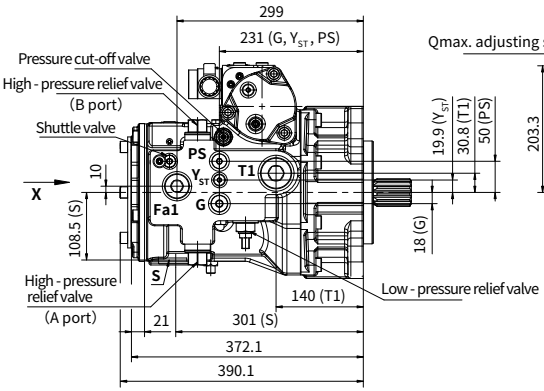


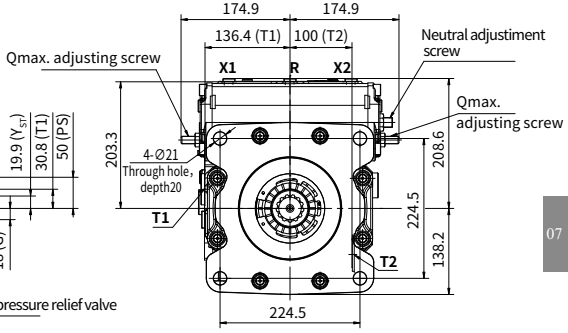
Installation size

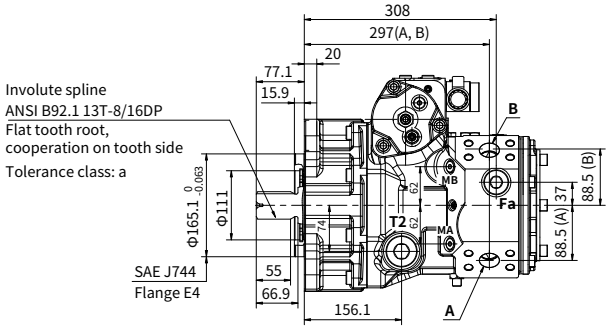
HP4VG 175 Installation size











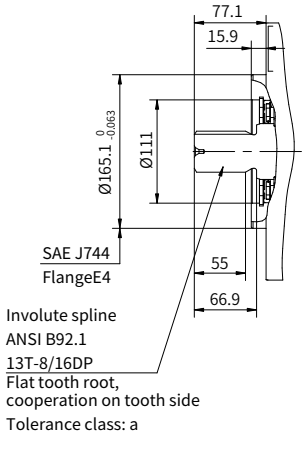
Installation size

· HP4VG 175 Port details

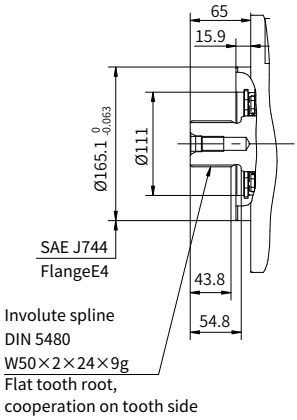
Port	Port Name	Standard	Oil Port Specification (thread depth)
A, B	Working port	SAE J518	1 1/4in
	Fastening thread	DIN 13	M14×2（depth 19mm）
S	Suction port	ISO 9974-1	M48×2（depth 24mm）
T1, T2	Drain port	ISO 9974-1	M42×2（depth 20mm）
R	Air bleed port	ISO 9974-1	M14×1.5（depth 14.1mm）
X1, X2	Control pressure port	ISO 9974-1	M14×1.5（depth 20mm）
G	Boost pressure port	ISO 9974-1	M22×1.5（depth 19mm）
P_S	Pilot pressure port inlet	ISO 9974-1	M18×1.5（depth 17mm）
Y_{ST}	Pilot pressure port outlet	ISO 9974-1	M14×1.5（depth 17.5mm）
MA, MB	Measuring port pressure A, B	ISO 9974-1	M14×1.5（depth 15.5mm）
MH	Measuring port, high pressure	ISO 9974-1	M14×1.5（depth 15mm）
Fa	Boost pressure port	ISO 9974-1	M33×2（depth 21mm）
Fa1	Boost pressure port	ISO 9974-1	M33×2（depth 15mm）
Fa2	Boost pressure port	ISO 9974-1	M22×1.5（depth 18.5mm）

Installation size

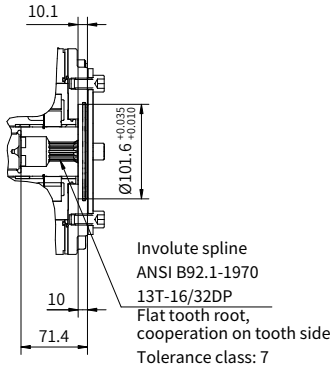
HP4VG175 Shaft extension type and through shaft drive



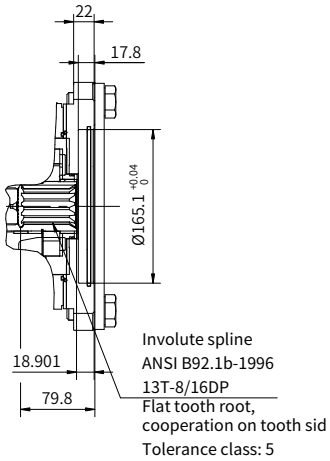
"T1" type spline shaft



“A2” type spline shaft



"B1" type through drive



“B2” type through drive

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