



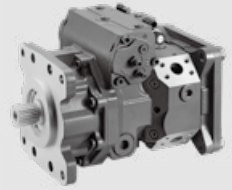
HP4VG SERIES

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	75	100	135	175
Rated pressure (bar):	400	400	400	400	450
Max. pressure (bar):	450	450	450	450	500



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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	75	100	135	175
Displacement (cc/rev)		60	75.6	100	135	175.4
Speed	Rated (rpm)	3600	3300	3000	2850	2650
	Max. (rpm)	3900	3600	3300	3250	2800
	Min. (rpm)	500	500	500	500	500
Pressure	Rated (bar) (Set the pressure of the high-pressure relief valve, relative to the charge pressure)	400	400	400	400	450
	Max. (bar) (Relative to the Charge pressure)	450	450	450	450	500
	Minimum low loop pressure (bar) (Above charge pump)	10	10	10	10	10
Charge pump displacement (cc/rev)		11.6	27	27	28.3	39
Casting pressure	Rated (bar)	2	2	2	2	1.7
	Max. (At cold start) (bar)	-	-	-	-	5.2
Suction pressure (Absolute pressure)	Rated (bar) Oil viscosity $\leq 30\text{mm}^2/\text{s}$	0.8	0.8	0.8	0.8	0.8
	Max. (bar)	5	5	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	58	62	82	115

Type introduction

HP4V	G		EP3	D	M	P	R	/	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

Axial piston unit

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

②	Pump, closed circuit	G
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Displacement

③	Displacement cc/rev	60	75	100	135*	175
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Control device

④	Proportional control, electric U = 12 V DC	EP3
	Proportional control, electric U = 24 V DC	EP4
	Mechanical servo control	HW
	Hydraulic pilot proportional control	HD

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 (not available yet, to be developed)	R

Type introduction

Direction of Rotation

	Direction of Rotation	60	75	100	135	175	Code
⑨	Viewed on drive shaft, clockwise	●	●	●	●	●	R
	Viewed on drive shaft, counter-clockwise	●	○	○		●	L

Sealing material

⑩	NBR (nitrile rubber), shaft seal in FKM (fluoroelastomer)	N
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Mounting flange

	Mounting flange	60	75	100	135	175	Code
⑪	SAE C J744-127-2	●					C2
	SAE C J744-127-4		●	●			C4
	SAE D J744-152-2/4				●		D4
	SAE E J744-165-4					●	E4

Drive shaft

	Drive shaft	60	75	100	135	175	Code	
⑫	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
		W40×2×18×9g		●	○			T5

Working port

	Working port	60	75	100	135	175	Code
⑬	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

⑭	Standard rotary group, boost pump integrated	F
	Standard rotary group, without boost pump	K
	High speed rotary group, boost pump integrated (only for HP4VG175)	H

Through drive

⑮	Through drive		60	75	100	135	175	Code
	Without through drive		●	●	●		●	None
	Flange	Splined shaft						
	SAE A 82-2	SAE J744-16-4 9T 16/32 DP	●		●	●		A1
	SAE B 101-2	SAE J744-22-4 13T 16/32 DP	●	●	●		●	B1
		SAE J744-25-4 15T 16/32 DP					●	E3
	SAE C 127-2	SAE J744-44-4 14T 12/24 DP		●	●			C1
	SAE C 127-4	SAE J744-44-4 14T 12/24 DP		○	●			C3
	SAE C 127-2/4	SAE J744 14T 12/24 DP					●	E2
	SAE D 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

⑯	High-pressure relief valve	Setting range Δp	60	75	100	135	175	Code
	Pilot-operated high-pressure relief valve	100~420bar, with a bypass		●	●	●		1
		250~420bar, without a bypass	○	●	●			3
	Direct-acting high-pressure relief valve, fixed setting	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

⑰	Filtration in the boost pump suction line	S
	Filtration in the boost pump pressure line (ports with external filter circuit)	D
	Filtration in the boost pump pressure line (with filter)	F

Standard / special version

⑱	Standard / special version	S
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Remark: ● = Available; ○ = On request

EP - Electrical displacement control

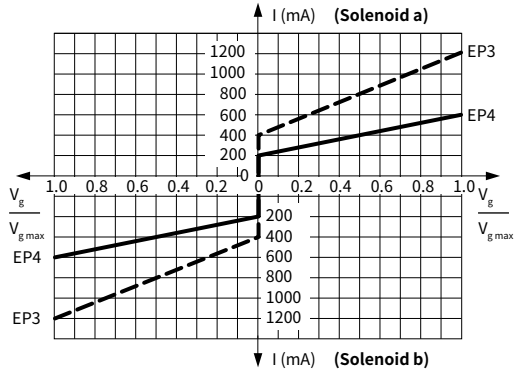
· Electrical displacement control principle

The output flow of the pump is infinitely variable between 0 and 100%, proportional to the electrical current supplied 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 maintains the pump flow for any given current within the control 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	EP4
Voltage		12 V ($\pm 20\%$)	24 V ($\pm 20\%$)
Control current	Start of control at $V_g=0$	400 mA	200 mA
	End of control at $V_{g,max}$	1200 mA	600 mA
Current limit		1540 mA	840 mA
Nominal resistance (at 68 °F (20°C))		5.5 Ω	21.7 Ω
Dither frequency		100Hz / 120Hz (120Hz only for the HP4VG175 closed pumps)	
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.

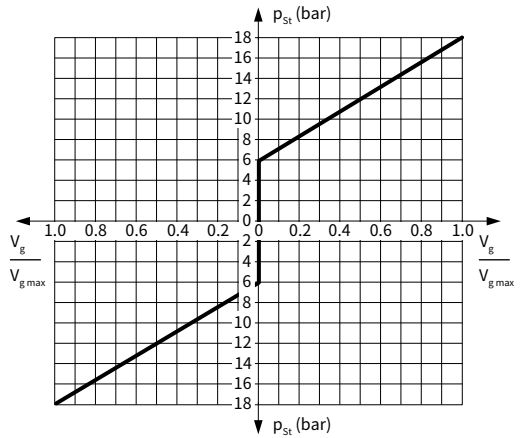
HD - Proportional control, hydraulic, pilot-pressure related

• Hydraulic proportional control principle

The output flow of the pump is infinitely variable between 0 and 100%, proportional to the difference in pilot pressure 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 maintains the pump flow for any given pilot signal within the control range.



Displacement at $V_g = p_{St}$

Displacement at $V_g \text{ max} = p_{St} = 18\text{bar}$

Pilot signal $p_{St} = 6$ 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 $V_g \text{ max}$)

Note:

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

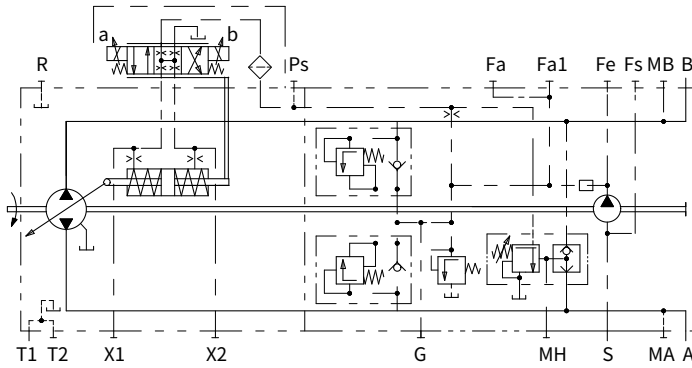
Note:

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.

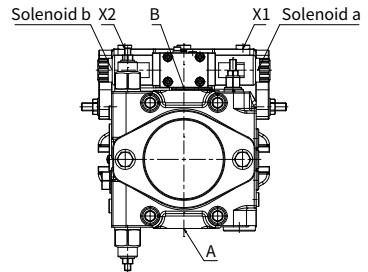
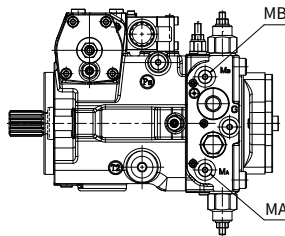
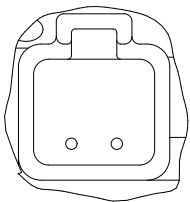
Check whether additional safety measures are required on your machine to move the drive actuator to a controlled safe position (emergency stop). When necessary, please ensure that these operations are implemented correctly.

HP4VG 60 Control principle



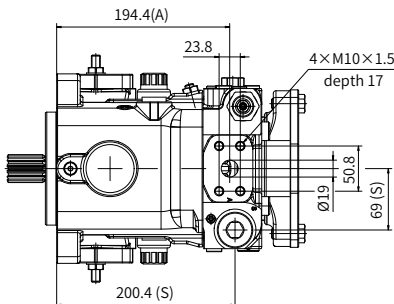
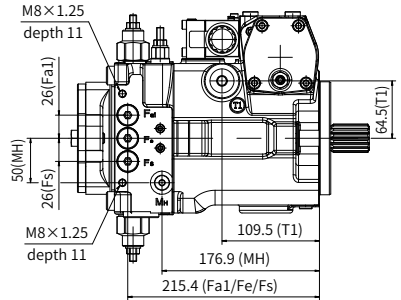
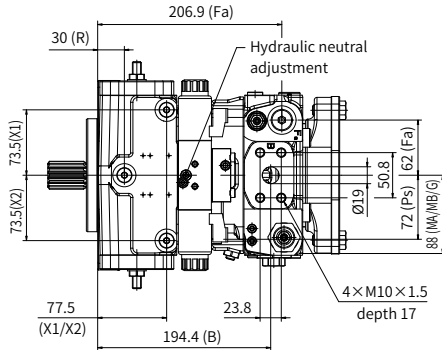
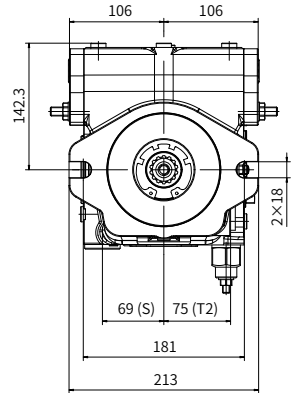
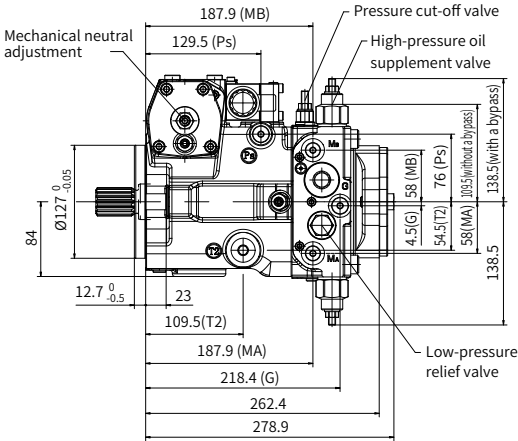
Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	A to B	B to A	B to A	A to B
Working pressure	MB	MA	MA	MB

HP4VG



Installation size

HP4VG 60 Installation size



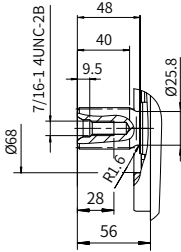
Installation size

· 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

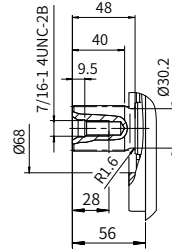
HP4VG 60 Shaft extension type and through shaft drive



"S1" type spline shaft

ANSI B92.1a

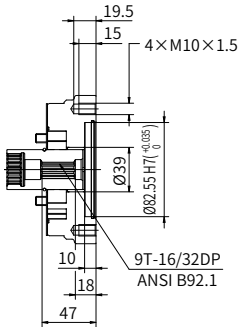
1 1/4 in 14T 12/24DP



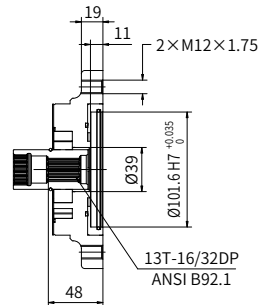
"S2" type spline shaft

ANSI B92.1a

1 3/8 in 21T 16/32DP

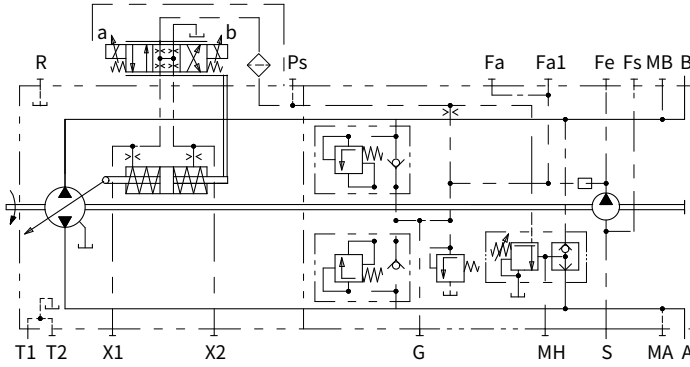


"A1" type through drive

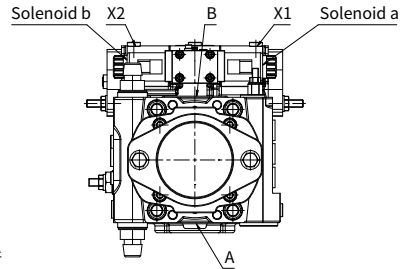
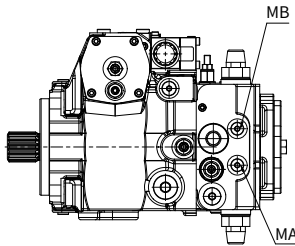
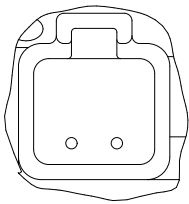


"B1" type through drive

HP4VG 75 Control principle

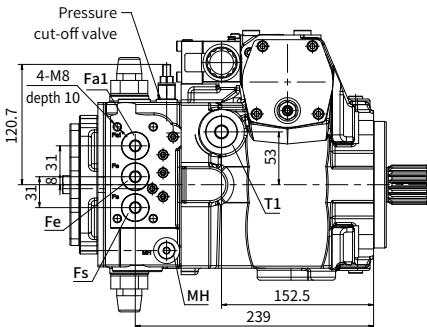
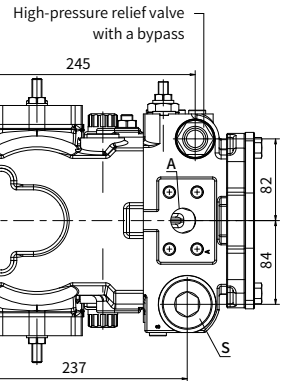
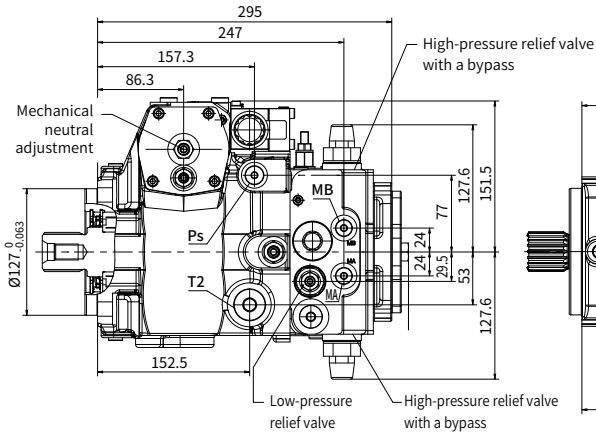
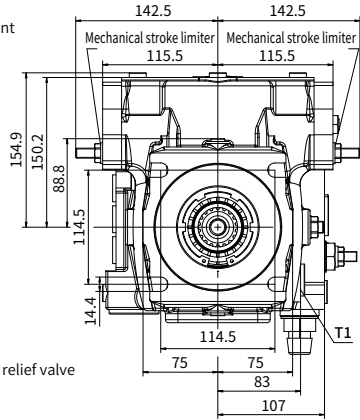
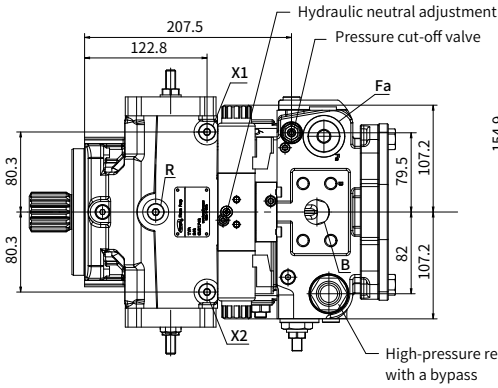


Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	B to A	A to B	A to B	B to A
Working pressure	MA	MB	MB	MA



Installation size

HP4VG 75 Installation size



HP4VG

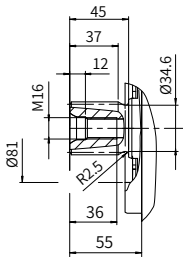
Installation size

• HP4VG 75 Port details

Port	Port Name	Standard	Oil Port Specification (thread depth)
A, B	Working port	SAE J518	1"
	Fastening thread	DIN 13	M12×1.75 (depth 17)
S	Suction port	DIN 3852	M42×2 (depth 20)
T1, T2	Drain port	DIN 3852	M26×1.5 (depth 16)
R	Air bleed port	DIN 3852	M12×1.5 (depth 12)
X1, X2	Control pressure port	DIN 3852	M12×1.5 (depth 12)
G	Boost pressure port	DIN 3852	M18×1.5 (depth 12)
P _s	Pilot pressure port inlet	DIN 3852	M14×1.5 (depth 12)
MA, MB	Measuring port pressure A, B	DIN 3852	M12×1.5 (depth 12)
MH	Measuring port, high pressure	DIN 3852	M12×1.5 (depth 12)
Fa	Boost pressure port inlet	DIN 3852	M26×1.5 (depth 16)
Fa1	Boost pressure port inlet (Filter can be installed)	DIN 3852	M22×1.5 (depth 14)
Fe	Charge pressure outlet	DIN 3852	M22×1.5 (depth 14)
Fs	From the filter to the oil suction line (at cold start)	DIN 3852	M22×1.5 (depth 14)

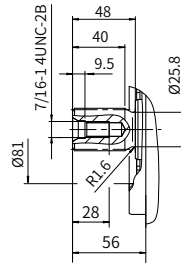
Installation size

HP4VG 75 Shaft extension type and through shaft drive



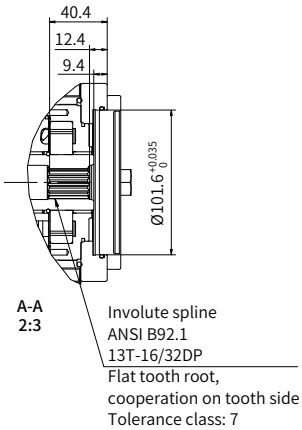
"T5" type spline shaft

DIN 5480
W40×2×18×9 g



"S1" type spline shaft

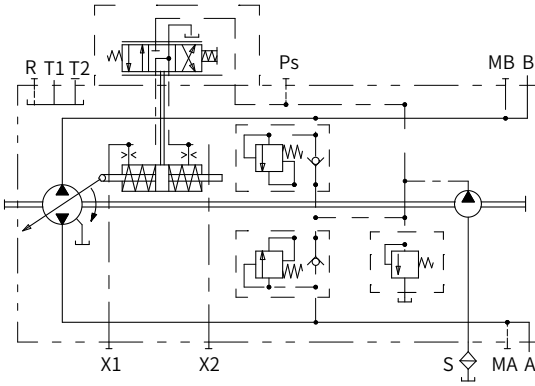
ANSI B92.1a
1 1/4 in 14T 12/24DP



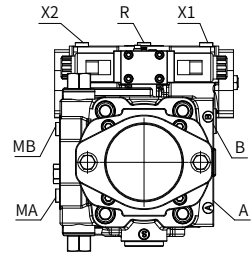
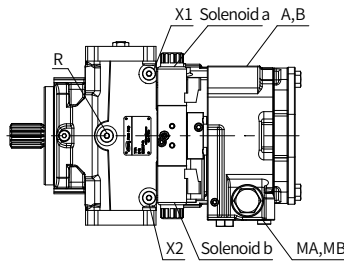
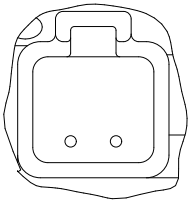
"B1" type through drive

HP4VG 100 Control principle

• HP4VG 100 Port details

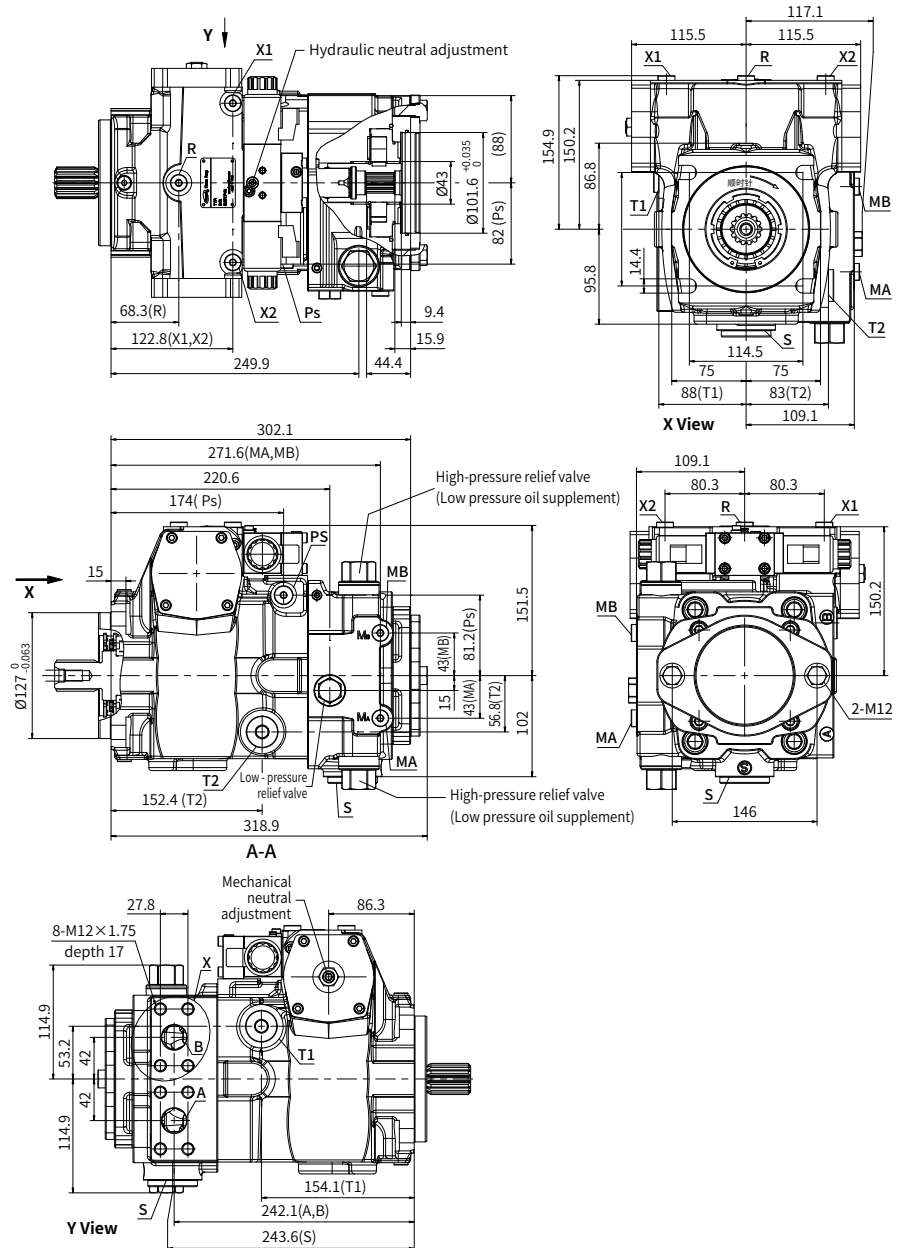


Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	B to A	A to B	A to B	B to A
Working pressure	MA	MB	MB	MA



Installation size

HP4VG 100 Installation size



HP4VG

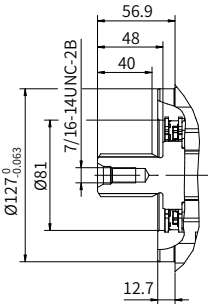
Installation size

• HP4VG 100 Port details

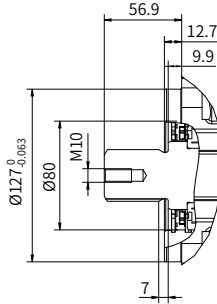
Port	Port Name	Standard	Oil Port Specification (thread depth)
A, B	Working port	SAE J518	1"
	Fastening thread	DIN 13	M12×1.75 (depth 17mm)
S	Suction port	ISO 9974-1	M42×2 (depth 20mm)
T1, T2	Drain port	ISO 9974-1	M26×1.5 (depth 16mm)
R	Air bleed port	ISO 9974-1	M12×1.5 (depth 12mm)
X1, X2	Control pressure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

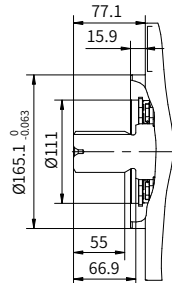
HP4VG 100 Shaft extension type and through shaft drive



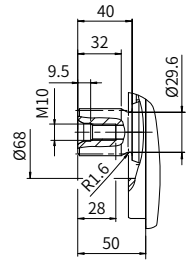
"S1" type spline shaft
ANSI B92.1
14T-12/24DP



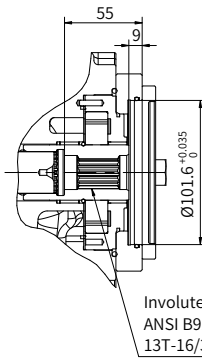
"S3" type spline shaft
ANSI B92.1
23T-16/32DP



"S4" type spline shaft
ANSI B92.1
13T-8/16DP



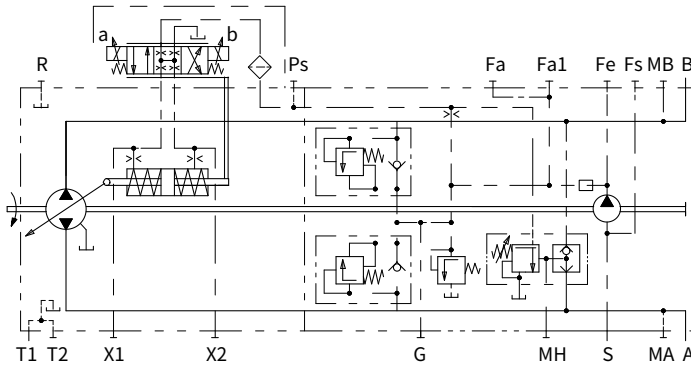
"T2" type spline shaft
DIN 5480
W35×2×16×9 g



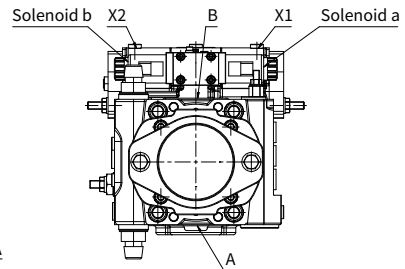
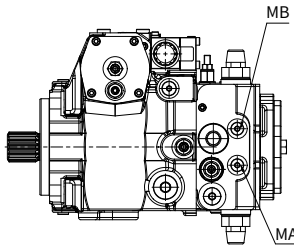
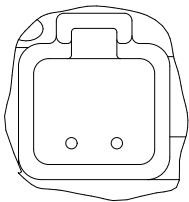
Involute spline
ANSI B92.1
13T-16/32DP
Flat tooth root,
cooperation on tooth side
Tolerance class: 7

"B1" type through drive

HP4VG 135 Control principle

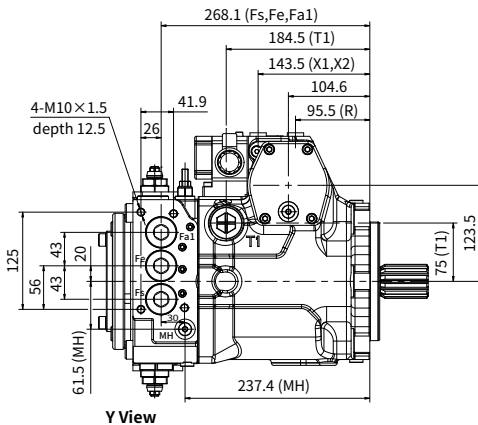
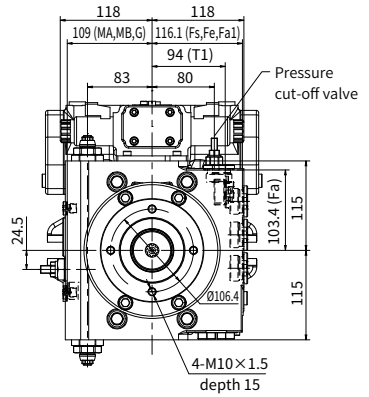
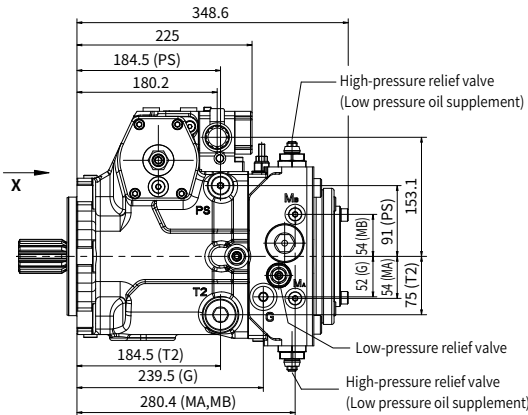
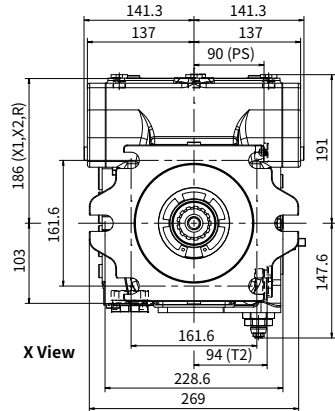
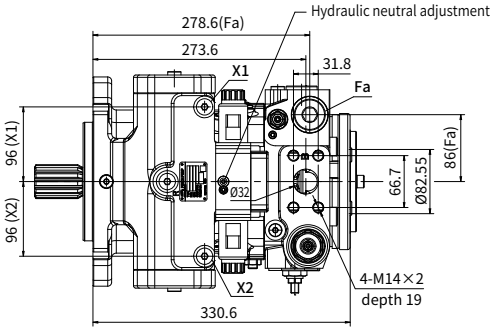


Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	B to A	A to B	A to B	B to A
Working pressure	MA	MB	MB	MA



Installation size

HP4VG 135 Installation size



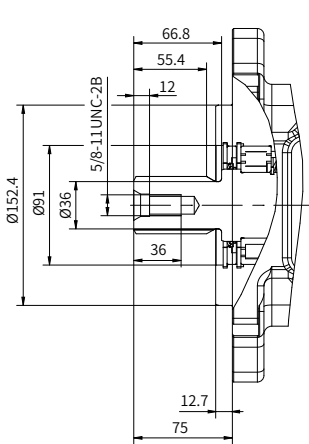
Installation size

• HP4VG 135 Port details

Port	Port Name	Standard	Oil Port Specification (thread depth)
A, B	Working port	SAE J518	1 1/4"
	Fastening thread	DIN 13	M14×2 (depth 19)
S	Suction port	DIN 3852	M48×2 (depth 22)
T1, T2	Drain port	DIN 3852	M33×2 (depth 18)
R	Air bleed port	DIN 3852	M16×1.5 (depth 12)
X1, X2	Control pressure port	DIN 3852	M16×1.5 (depth 12)
G	Boost pressure port	DIN 3852	M22×1.5 (depth 14)
P _s	Pilot pressure port inlet	DIN 3852	M18×1.5 (depth 12)
MA, MB	Measuring port pressure A, B	DIN 3852	M12×1.5 (depth 12)
MH	Measuring port, high pressure	DIN 3852	M12×1.5 (depth 12)
Fa	Boost pressure port inlet	DIN 3852	M33×2 (depth 18)
Fa1	Boost pressure port inlet (Filter can be installed)	DIN 3852	M33×2 (depth 18)
Fe	Charge pressure outlet	DIN 3852	M33×2 (depth 18)
Fs	From the filter to the oil suction line (at cold start)	DIN 3852	M33×2 (depth 18)

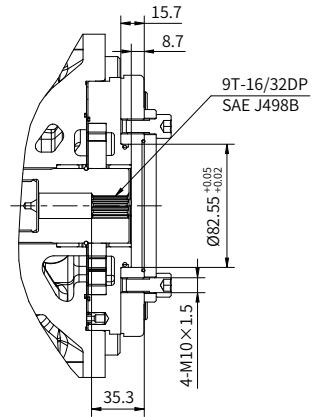
Installation size

HP4VG 135 Shaft extension type and through shaft drive



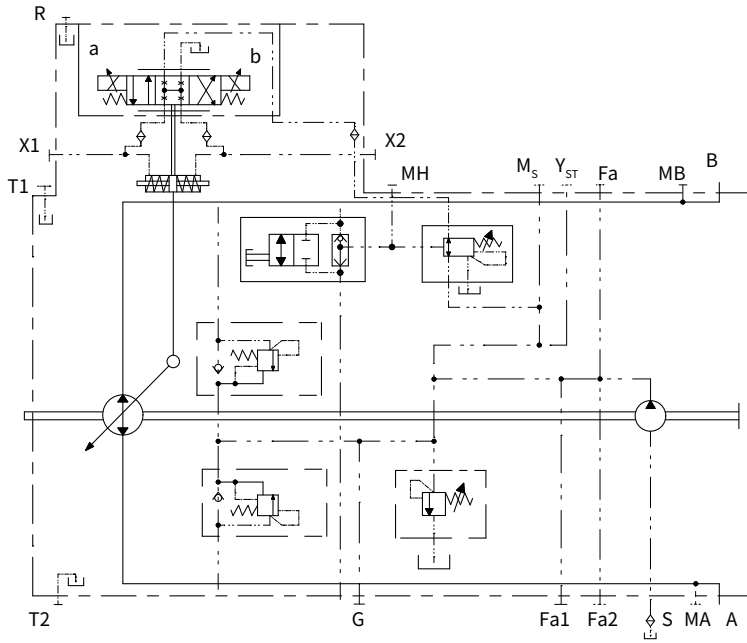
"S4" type spline shaft

ANSI B92.1a
1 3/4 in 13T 8/16 DP



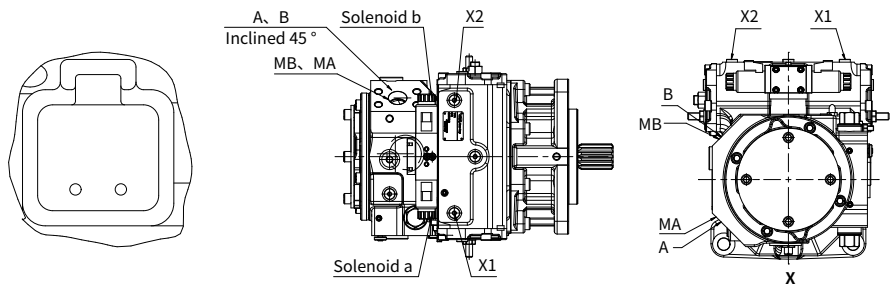
"A1" type through drive

HP4VG 175 Control principle



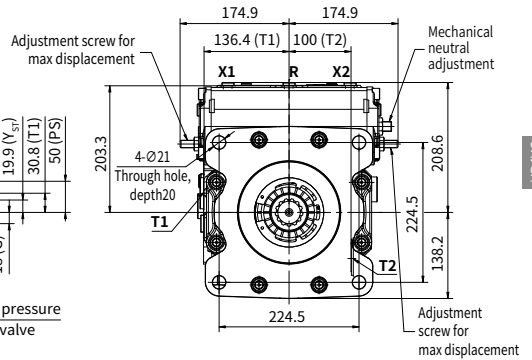
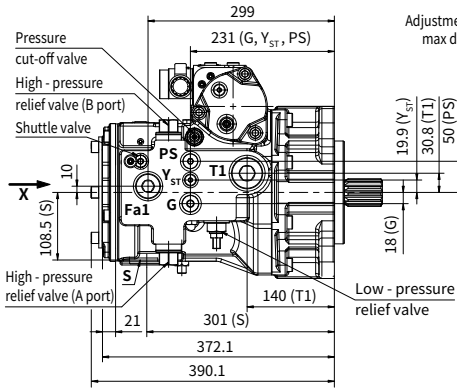
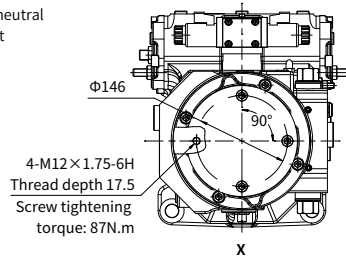
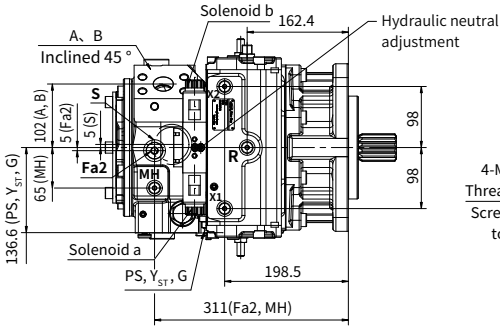
HP4VG

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

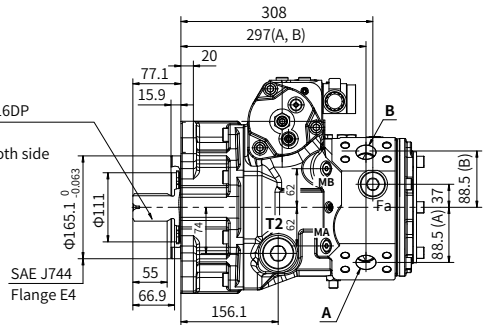


Installation size

HP4VG 175 Installation size



Involute spline
ANSI B92.1 13T-8/16DP
Flat tooth root,
cooperation on tooth side
Tolerance class: a



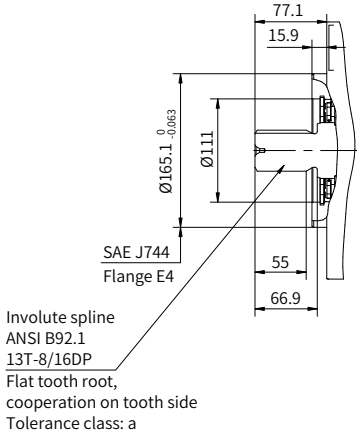
Installation size

• HP4VG 175 Port details

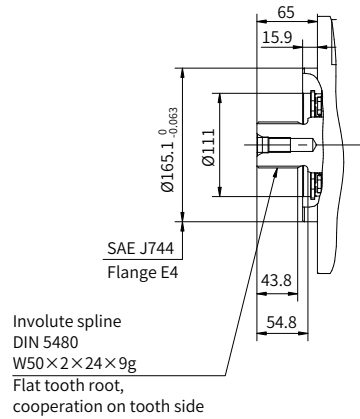
Port	Port Name	Standard	Oil Port Specification (thread depth)
A, B	Working port	SAE J518	1 1/4in
	Fastening thread	DIN 13	M14×2 (depth 19mm)
S	Suction port	ISO 9974-1	M48×2 (depth 24mm)
T1, T2	Drain port	ISO 9974-1	M42×2 (depth 20mm)
R	Air bleed port	ISO 9974-1	M14×1.5 (depth 14.1mm)
X1, X2	Control pressure 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

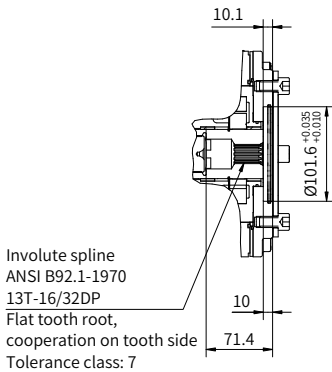
HP4VG175 Shaft extension type and through shaft drive



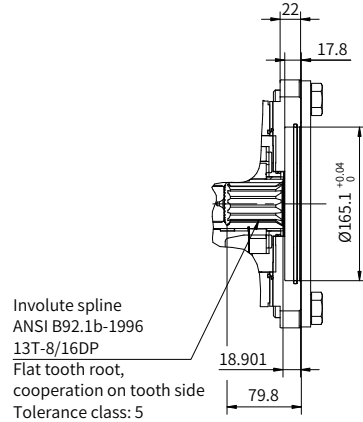
"S4" type spline shaft



"T4" type spline shaft



"B1" type through drive



"E1" type through drive

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