



## 2.2.2

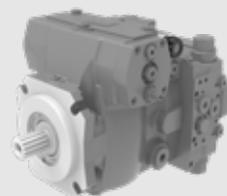
# V40E SERIES

## Swash-plate Type Axial Piston Variable Displacement Pump

Primarily suitable for use in mobile machinery, industrial vehicles, construction machinery, general industrial machinery, agricultural machinery, etc.

Suitable for a high-pressure closed circuit

Size :	32	47	60	75	100	135
Rated pressure (bar):	420	420	420	420	420	420
Max. pressure (bar):	450	450	450	450	450	450



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## Features

- ★ Swashplate axial piston pump for closed hydraulic circuits
- ★ Smooth directional change of hydraulic fluid flow when swashplate passes neutral position
- ★ Two pressure relief valves installed on high-pressure side to prevent overload
- ★ Built-in gear pump functions as both make-up oil pump and control pump
- ★ Maximum make-up pressure limited by integrated low-pressure relief valve
- ★ Newly designed rotating components and bearings enhance load capacity and rated speed
- ★ Optimized housing design reduces vibration and noise
- ★ Multiple control options available to meet diverse industry application requirements
- ★ Various port connection configurations optimize piping connections

## Technical data

Size		32	47	60	75	100	135
Displacement (cc/rev)		32	47	60	75.6	100	135
Speed	Rated (rpm)	4250	3300	3600	3300	3000	2850
	Max. (rpm)	4500	3550	3900	3600	3300	3250
	Min. (rpm)	500	500	500	500	500	500
Pressure	Rated (bar)	420	420	420	420	420	420
	Max. (bar)	450	450	450	450	450	450
	Minimum low loop pressure (bar) (Above charge pump)	10	10	10	10	10	10
Charge pump displacement (cc/rev)		8.6	8.6/11.6	11.6	17/21/27		28.3
Charge pressure (relative to Charge pump)	Max. (bar)	40	35	40	40	40	40
Casting pressure	Rated (bar)	5	3	3	5	5	5
	Max. (bar)(Short-time peak pressure)	10	6	6	10	10	10
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	0.8
	Max. (bar)	5	5	5	5	5	5
Oil viscosity (mm <sup>2</sup> /s)	10~1000, Best range: 16~36						
Oil temperature (°C)	-20~110						
Oil cleanliness	ISO 4406 Class 20/18/15 or higher						
Weight ( w/o auxiliary flange ) (Kg)		30	33	38	58	62	82

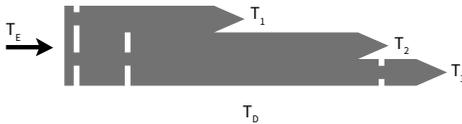
### •Theoretical Calculation

Flow	$Q = \frac{V_g \cdot n \cdot \eta_v}{1000} \quad (\text{L/min})$	$V_g$	= Displacement (cc/rev)
		$\Delta p$	= Pressure (bar)
Torque	$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} \quad (\text{N} \cdot \text{m})$	$n$	= Speed (rpm)
		$\eta_v$	= Volume efficiency
Power	$P = \frac{2\pi \cdot T \cdot n}{60000} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} \quad (\text{kW})$	$\eta_{mh}$	= Mechanical-hydraulic efficiency
		$\eta_t$	= Total efficiency ( $\eta_t = \eta_v \cdot \eta_{mh}$ )

## Technical data

Permissible input and through-drive torques							
Size		32	47	60	75	100	135
Torque at $V_{g,max}$ and $\Delta p = 400$ bar Nm	T	287	287	382	477	636	859
Maximum input torque at drive shaft (Nm)							
ANSI B92.1b	1 in 15T 16/32DP	$T_{E,max}$	272	272	319		
	1 1/4 in 14T 12/24 DP	$T_{E,max}$	552	552	602	630	630
	1 3/8 in 21T 16/32 DP	$T_{D,max}$			970	970	
	1 1/2 in 23T 16/32 DP	$T_{E,max}$				1305	1305
	1 3/4 in 13T 8/16 DP	$T_{E,max}$				1500	1500
	1 3/4 in 27T 16/32 DP	$T_{E,max}$					1830
	2 in 15T 8/16 DP	$T_{E,max}$					2670
	2 1/4 in 17T 8/16 DP	$T_{E,max}$					4070
DIN 5480	W30×2×14×9g	$T_{E,max}$			522		
	W35×2×16×9g	$T_{E,max}$			912	912	
	W40×2×18×9g	$T_{E,max}$				1460	1460
Maximum through-drive torque (Nm)		$T_{D,max}$	314	314	521	660	822
						1110	

### •Torque distribution



V40E	1st pump	$T_1$
	2nd pump	$T_2$
Attachment pump		$T_3$
Input torque		$T_E = T_1 + T_2 + T_3$
		$T_E < T_{E,max}$
Through-drive torque		$T_D = T_2 + T_3$
		$T_D < T_{D,max}$

## Type introduction

V40	E	100	E1	A	D	/	R	J	C8	2	F6	B4	3	F	G	2	-	S
①	②	③	④	⑤	⑥		⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯		⑰

### Product series

①	Variable piston pump of swashplate in closed circuit	V40
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### Nominal pressure

②	nominal pressure 400/420 bar	E
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### Size

③	Size	32	47	60	75	100	135
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### Control mode

		32	47	60	75	100	135	Code	
	Proportional control	12V	●	●	●	●	●	E1	
		24V	●	●	●	●	●	E2	
	Proportional control explosion proof electromagnetic coil	12V					○	E5	
		24V						○	E6
	Electrical two-point control	12V		●				E3	
		24V		●					E4
④	Mechanical servo control		●	●	●	●		H1	
	Mechanical Servo + Emergency Center Return	energized operate	12V				○		H5
			24V				○		H6
		de-energized operate	12V					○	H7
			24V					○	H8
	Mechanical servo + Center position switch*		○	○	○	○	○		H9
Mechanical Servo + Center Position Switch*+ Emergency Return to Center	energized operate	12V				○		HA	
		24V				○		HB	
	de-energized operate	12V					○	HC	
		24V					○	HD	
Hydraulic pilot proportional control			●		●	●	●	H2	
Hydraulic direct-acting			●		●			H3	

Note: Both 5A/12V and 3A/24V power supplies are acceptable.

### DA control valve

		32	47	60	75	100	135	Code
⑤	Without swivel DA control valve	●	●	●	●	●	●	Blank
	Swivel DA control valve	●	●	●			●	A
	Swivel DA control valve, and integrate manual storage function*	●	●					B

Note: The default is clockwise. If counterclockwise is required, please contact Hengli.

## Type introduction

### Pressure cut-off

		32	47	60	75	100	135	Code
⑥	Without pressure cut-off	●	○	○	○	○	○	Blank
	Pressure cut-off	●	●	●	●	●	●	D
	A/B Outlet Pressure Cutoff Independent Control	●				○	○	T

Remark: The "○" indicates that please contact Hengli for model selection.

### Rotation

		32	47	60	75	100	135	Code
⑦	Right hand (clockwise)	●	●	●	●	●	●	R
	Left hand (counter-clockwise)	●	●	●	●	●	●	L

Remark: Viewed from the shaft end

### Oil port specifications and sealing

⑧	Sealing element	Oil port standard (excluding ports A, B, and S)	32	47	60	75	100	135	Code
	Room temperature sealing	DIN 3852 (Metric Thread Flat Seals)	●	●	●	●	●	●	●
	ISO 11926 (UNF Thread angle seal)	●	●	●		●			K
	Cryogenic seal	DIN 3852 (Metric Thread Flat Seals)				○	○		W

### Mounting flangew and drive shaft

		32	47	60	75	100	135	Code
⑨	SAE B J744-101-2	ANSI B92.1 1 in 15T 16/32 DP	●	●				B3
		ANSI B92.1 1 1/4 in 14T 12/24 DP		●				B4
SAE C J744-127-2	ANSI B92.1 1 in 15T 16/32 DP			●				C1
	ANSI B92.1 1 1/4 in 14T 12/24 DP			●				C2
	ANSI B92.1 1 3/8 in 21T 16/32 DP			●				C3
	DIN 5480 W30×2×14×9g			○				C4
	DIN 5480 W35×2×16×9g			●				C5
	SAE C J744-127-4	ANSI B92.1 1 1/4 in 14T 12/24 DP				●	●	
ANSI B92.1 1 3/8 in 21T 16/32 DP					●			C7
ANSI B92.1 1 1/2 in 23T 16/32 DP					●	●		C8
ANSI B92.1 1 3/4 in 13T 8/16 DP					●	●		C9
DIN 5480 W35×2×16×9g					●	●		CA
DIN 5480 W40×2×18×9g					●			CB
DIN 5480 W45×2×21×9g						●		CE
SAE D J744-152-2/4	ANSI B92.1 1 3/4 in 13T 8/16 DP						●	D1
	ANSI B92.1 1 3/4 in 27T 16/32 DP						●	D2
	ANSI B92.1 2 in 15T 8/16 DP						●	D3
	DIN 5480 W40×2×18×9g						●	D4
	DIN 5480 W45×2×21×9g						●	D5

## Type introduction

### Working port

	Working port	32	47	60	75	100	135	Code
⑩	Same-side SAE flange port A and B	●	●	●	●	●	●	1
	Off-side SAE flange port A and B		●	●	●	●	●	2
	Same-side SAE flange ports A, B and S thread oil port				●			5

### Oil booster pump

		32	47	60	75	100	135	Code
⑪	Without oil booster pump	●	●	●	●	●	●	K
	With oil booster pump, displacement: 8.6 (cc/rev)	●	●					F0
	With oil booster pump, displacement: 11.6 (cc/rev)		●	●				F2
	With oil booster pump, displacement: 17 (cc/rev)				●	●		F5
	With oil booster pump, displacement: 21 (cc/rev)				●	●		F6
	With oil booster pump, displacement: 27 (cc/rev)				●	●		F8
	With oil booster pump, displacement: 28.3 (cc/rev)						●	F9

### Through drive

		32	47	60	75	100	135	Code	
⑫	Through drive								
	Without through drive	●	●	●	●	●	●	Blank	
⑫	SAE A J744-82-2	Flange							
		Splined shaft							
	ANSI B92.1 5/8 in 9T 16/32 DP	●	●	●	●	●	●	A1	
		ANSI B92.1 3/4 in 11T 16/32 DP	●	●	●	●	●		A2
	SAE B J744-101-2	ANSI B92.1 7/8 in 13T 16/32DP		●	●	●	●	●	B1
		ANSI B92.1 1 in 15T 16/32 DP		●	●	●	●		B3
		ANSI B92.1 1 1/4 in 14T 12/24 DP				○	○		B4
	SAE C J744-127-2	ANSI B92.1 1 1/4 in 14T 12/24 DP				●	●		C2
	SAE C J744-127-4	ANSI B92.1 1 3/4 in 13T 8/16 DP					○		CF
		ANSI B92.1 1 1/4 in 14T 12/24 DP				●	●		C6
SAE C J744-127-2/4	ANSI B92.1 1 1/4 in 14T 12/24 DP			●	●	●	●	CC	
SAE D J744-152-2/4	DIN 5480 N40×2×18×9g						●	D4	

Remark: The "○" indicates that please contact Hengli for model selection.

### Relief valve

	Relief valve	Setting range $\Delta p$	32	47	60	75	100	135	Code
⑬	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

Remark: "\*" indicates that this option cannot be selected simultaneously with SAE flange oil ports A and B (1) on the same side as shown in Table 10, and does not include a bypass function.

## Type introduction

### Oil replenishment filtration method

	32	47	60	75	100	135	Code
⑭	External Make-up Oil Filtration (without make-up oil pump)	●	●	●	●	●	无
	Filtration in the suction line of the make-up oil pump	●	●	●	●	●	S
	Filtration in the pressure line of the make-up oil pump (External filter circuit connection)	●	●	●	●	●	D
	Filtration in the pressure line of the make-up oil pump (Integrated filter)			●	●	●	F
	Filtration in the pressure line of the make-up oil pump (Integrated filter + cold start function + visual contamination indicator)			●	●	●	B*
Filtration in the pressure line of the make-up oil pump (Integrated filter + cold start function + electronic contamination indicator)				●	●	●	C*

Remark: “\*” indicates cannot be selected simultaneously with SAE flange oil ports A and B (1) on the same side as shown in Table 10. Without cold start, with bypass.

### Emergency return valve (Brake unloading valve)

	32	47	60	75	100	135	Code	
⑮	No emergency return valve (Brake unloading valve)	●	●	●	●	●	Blank	
	There is a 12V emergency return (brake unloading) valve, which works when powered on			●	●	●	G	
	There is a 12V emergency return (brake unloading) valve, which works when power is lost				●	●	H	
	There is a 24V emergency return (brake unloading) valve, which works when powered on				●	●	●	K
	There is a 12V emergency return (brake unloading) valve, which works when power is lost				●	●	●	L

Remark: Mutually exclusive with oil port specifications and seal K, and mutually exclusive with working line oil port 5.

### Flushing valve

	32	47	60	75	100	135	Code
⑯	No flushing valve	●	●	●	●	●	Blank
	With flush valve, Flushing flow 5 ( L/min )	●	●				7
	With flush valve, Flushing flow 10 ( L/min )		●	●	●	●	2
	With flush valve, Flushing flow 12 ( L/min )			●			6
	With flush valve, Flushing flow 15 ( L/min )				●	●	3
	With flush valve, Flushing flow 20 ( L/min )				●	●	4
	With flush valve, Flushing flow 25 ( L/min )				●	●	5

Remark: Opening pressure 16bar, differential pressure  $\Delta P=25\text{bar}$ .

### Standard / special version

	32	47	60	75	100	135	Code
⑰	Standard version	●	●	●	●	●	Blank
	pecial version	○	○	○	○	○	S

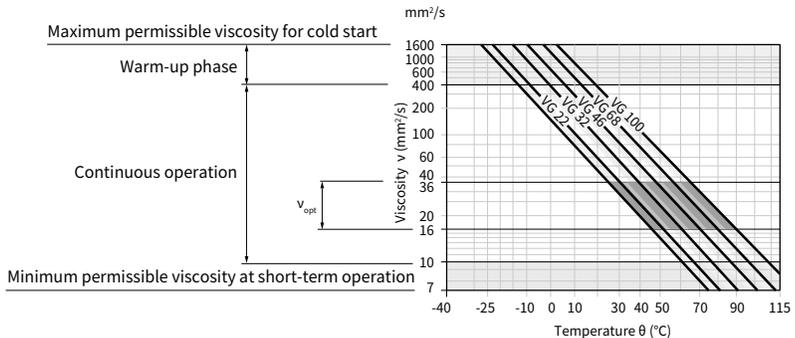
Remark: ● = Available; ○ = On request

## Hydraulic fluid

### Viscosity and temperature of the hydraulic fluid

	Viscosity(mm <sup>2</sup> /s)	Oil seal	Temperature	Note
Cold start	$v_{\max} \leq 1600$	NBR	$\theta_{st} \geq -40^{\circ}\text{C}$	$t \leq 3$ minutes, no load ( $p \leq 50\text{bar}$ ), $n \leq 1000\text{rpm}$ , Maximum permissible temperature difference between the rotating parts of the system and the hydraulic fluid $25^{\circ}\text{C}$ .
		FKM	$\theta_{st} \geq -25^{\circ}\text{C}$	
Warm-up phase	$v = 1600 \cdots 400$			$t \leq 15$ minutes, $p \leq 0.7 \times p_{\text{nom}}$ , $n \leq 0.5 \times n_{\text{nom}}$
Continuous operation	$v = 400 \cdots 10$	NBR	$\theta \leq +85^{\circ}\text{C}$	Measured at oil port T
		FKM	$\theta \leq +110^{\circ}\text{C}$	
	$v_{\text{opt}} = 36 \cdots 16$			Optimum operating viscosity and efficiency range
Short-term operation	$v_{\min} = 10 \cdots 7$	NBR	$\theta \leq +85^{\circ}\text{C}$	$t \leq 3$ minutes, $p \leq 0.3 \times p_{\text{nom}}$ , Measured at oil port T
		FKM	$\theta \leq +110^{\circ}\text{C}$	

### Selection chart



### Detailed information on the selection of hydraulic fluids

To select the hydraulic fluid correctly, it is necessary to know the operating temperature in relation to the ambient temperature: in closed circuits the oil circuit temperature.

When selecting a hydraulic fluid, the operating viscosity should be in the optimum range for the operating temperature range ( $v_{\text{opt}}$  see shaded area of the selection chart). We recommend selecting a higher viscosity grade in all cases.

Example: When the operating temperature in the circuit is  $60^{\circ}\text{C}$ , in the optimum operating viscosity range (shaded area of the  $v_{\text{opt}}$ ), corresponding to viscosity grades VG46 or VG68; VG68 should be selected.

### Caution

The case drain temperature (influenced by pressure and speed) may be higher than the oil line temperature or tank temperature.

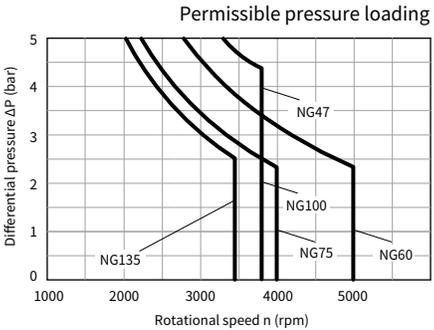
However, the temperature of any part of the component must not exceed  $100^{\circ}\text{C}$ .

# Hydraulic fluid

## Filtration of hydraulic fluid

Finer filtration improves the cleanliness of the hydraulic fluid, thereby extending the life of rotating parts. A cleanliness of at least 20/18/15 (ISO 4406) should be maintained. When the viscosity of the hydraulic fluid is less than 10mm<sup>2</sup>/s (e.g. due to high temperatures during short-term operation, a cleanliness level of at least 19/17/14 (ISO 4406) is required.

## Oil seals



### ▲ Note

- When using mineral oil based hydraulic fluid, refer to the left diagram for the range of pressures used for oil seals, please contact us if other hydraulic fluids are used.
- The service life of the oil seal is affected by the rotational speed and the pressure difference between the inside and outside of the seal, in addition to the hydraulic oil and temperature.
- The pressure difference between the inside and outside of the seal must be greater than or equal to zero.

02

## E - Electrical displacement control

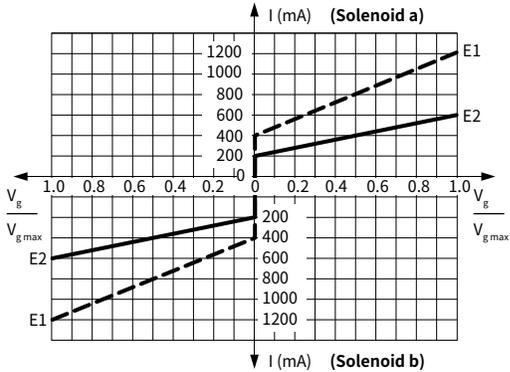
### · Electrical displacement control principle

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		E1	E2
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 $\Omega$	21.7 $\Omega$
Dither frequency		100Hz / 120Hz (120Hz only for the V40E175 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.

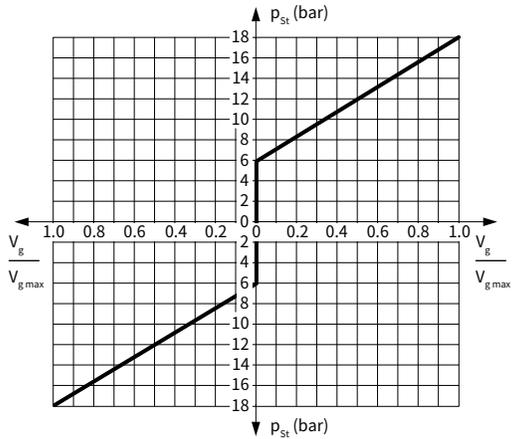
## H2 - Proportional control, hydraulic, pilot-pressure related

### • 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.

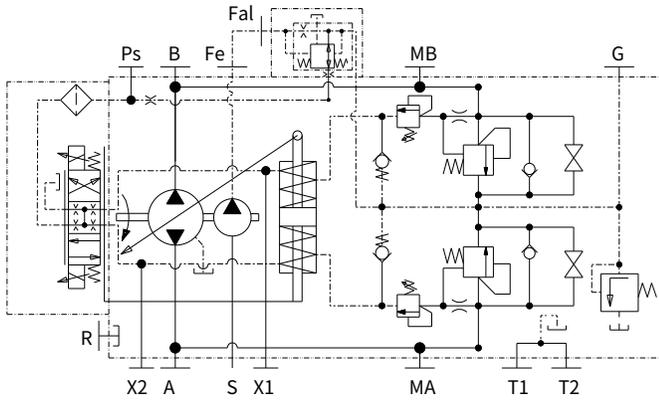
#### Note:

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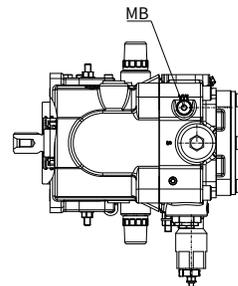
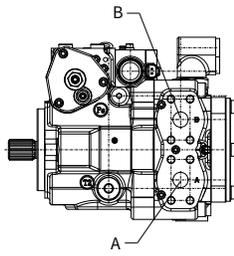
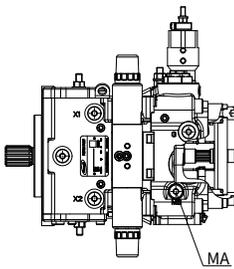
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## V40E 32 Control principle

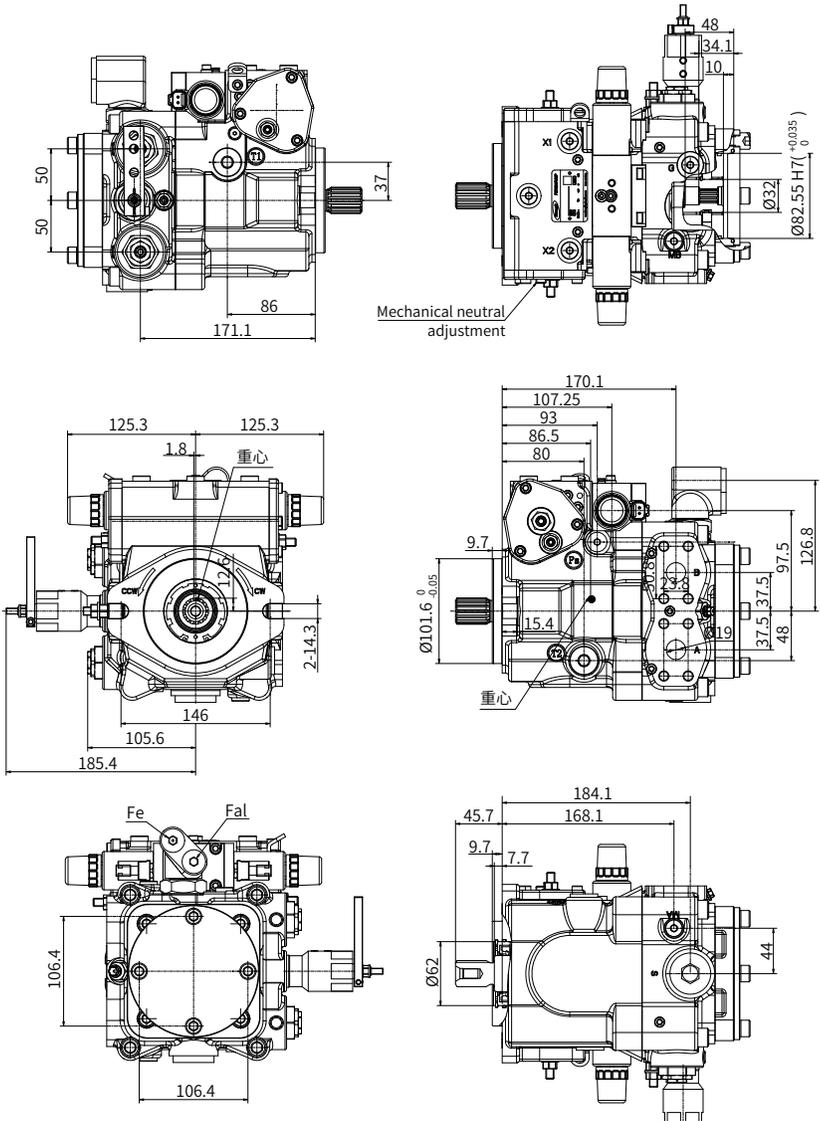


Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	A to B	B to A	B to A	A to B
Working pressure	MB	MA	MA	MB



# Installation size

## V40E 32 Installation size



02

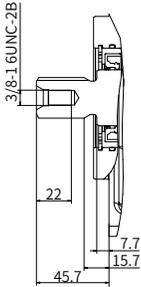
## Installation size

### ·V40E 32 Port details

Port	Port Name	Standard	Oil Port Specification (thread depth)	Maximum pressure (bar)
A, B	Working port	SAE J518	3/4"	450
	Fastening thread	DIN 13	M10 (depth17)	-
S	Suction port	DIN 3852	M33×2 (depth18)	5
T1, T2	Drain port	DIN 3852	M22×1.5 (depth14)	3
R	Air bleed port	DIN 3852	M12×1.5 (depth12)	3
X1, X2	Control pressure port	DIN 3852	M12×1.5 (depth12)	30
P <sub>s</sub>	Pilot pressure port inlet	DIN 3852	M14×1.5 (depth12)	30
MA, MB	Measuring port pressure A, B	DIN 3852	M12×1.5 (depth12)	450
Fal	Boost pressure port inlet (installable filters)	DIN 3852	M18×1.5 (depth14)	40
Fe	Charge pressure outlet	DIN 3852	M18×1.5 (depth14)	40
G	Measuring port of slippage pump pressure	DIN 3852	M12×1.5 (depth12)	40

## Installation size

### •V40E 32 Shaft extension type

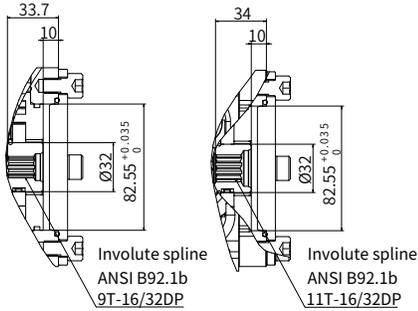


### "B3" type spline shaft

ANSI B92.1b

1 in 15T 16/32DP

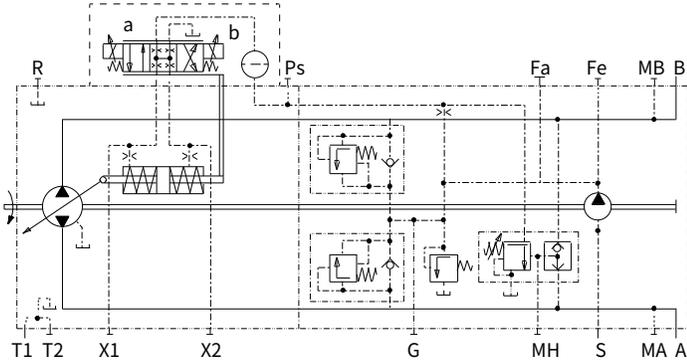
### •V40E 32 Through shaft drive



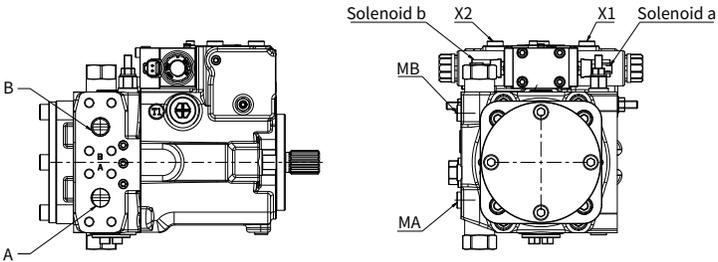
"A1" type through drive

"A2" type through drive

# V40E 47 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





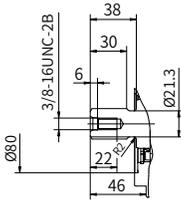
## Installation size

### ·V40E 47 Port details

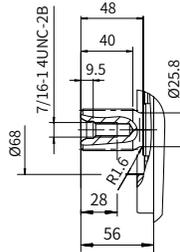
Port	Port Name	Standard	Oil Port Specification (thread depth)	Maximum pressure (bar)
A, B	Working port	SAE J518	3/4"	450
	Fastening thread	DIN 13	M10 (depth17)	-
S	Suction port	DIN 3852	M33×2 (depth18)	5
T1, T2	Drain port	DIN 3852	M22×1.5 (depth14)	3
R	Air bleed port	DIN 3852	M12×1.5 (depth12)	3
X1, X2	Control pressure port	DIN 3852	M12×1.5 (depth12)	30
P <sub>s</sub>	Pilot pressure port inlet	DIN 3852	M14×1.5 (depth12)	30
MA, MB	Measuring port pressure A, B	DIN 3852	M12×1.5 (depth12)	450
Fa	Boost pressure port inlet	DIN 3852	M18×1.5 (depth12)	40
Fe	Charge pressure outlet	DIN 3852	M18×1.5 (depth12)	40
G	Measuring port of slippage pump pressure	DIN 3852	M12×1.5 (depth12)	40
MH	Measuring port of high pressure	DIN 3852	M12×1.5 (depth12)	450

## Installation size

### ·V40E 47 Shaft extension type

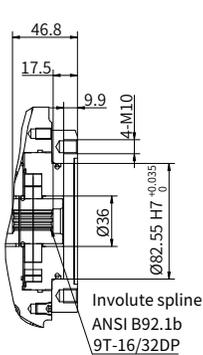


**"B3" type spline shaft**  
ANSI B92.1b  
1 in 15T 16/32DP

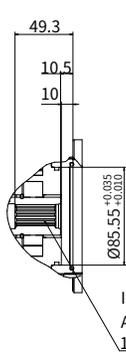


**"B4" type spline shaft**  
ANSI B92.1b  
1 1/4 in 14T 12/24DP

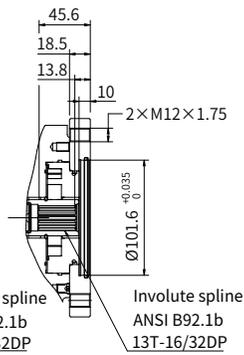
### ·V40E 47 Through shaft drive



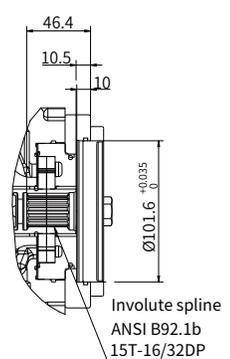
**"A1" type through drive**



**"A2" type through drive**

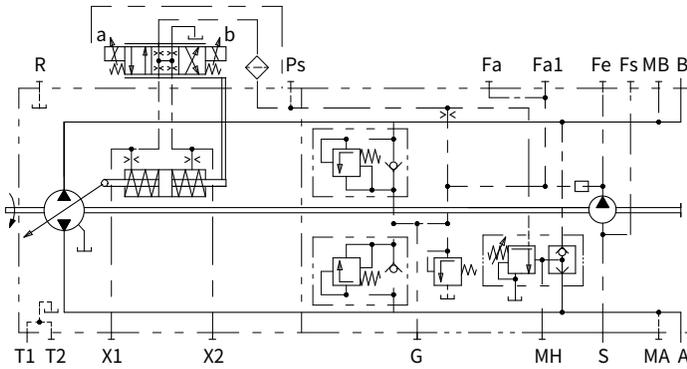


**"B1" type through drive**

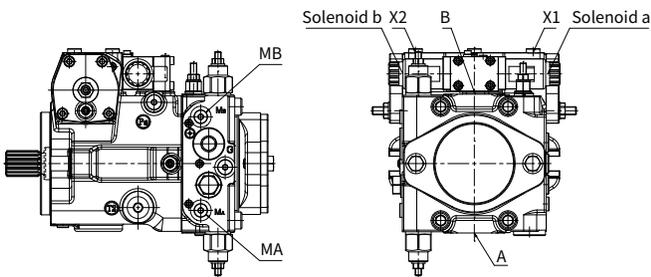


**"B3" type through drive**

# V40E 60 Control principle

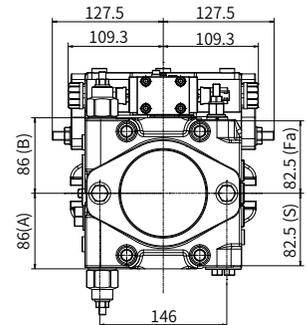
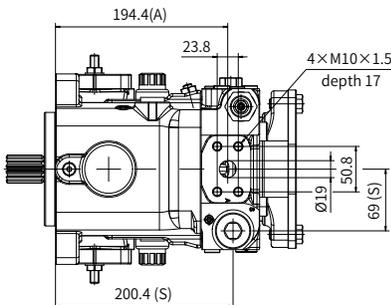
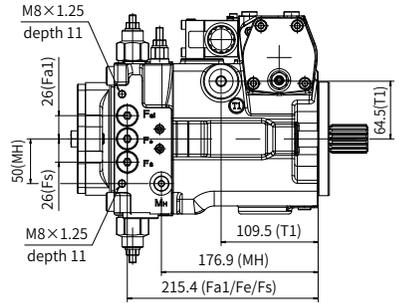
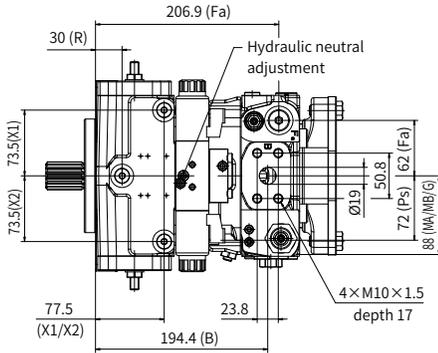
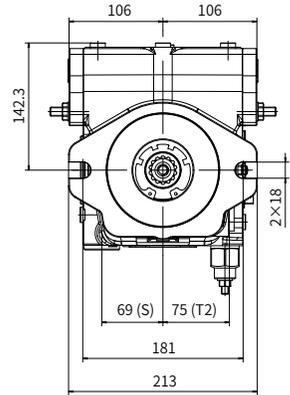
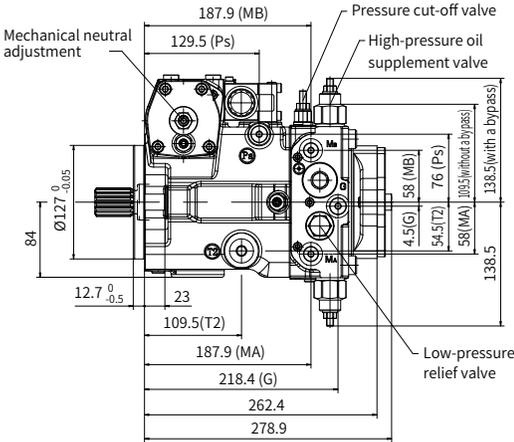


Direction of rotation	Clockwise		Counter-clockwise	
Actuation of proportional solenoid	a	b	a	b
Control pressure	X1	X2	X1	X2
Flow direction	A to B	B to A	B to A	A to B
Working pressure	MB	MA	MA	MB



# Installation size

## V40E 60 Installation size



02

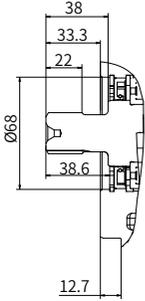
## Installation size

### ·V40E 60 Port details

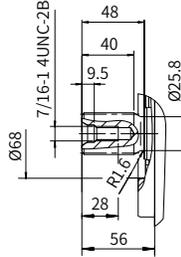
Port	Port Name	Standard	Oil Port Specification (thread depth)	Maximum pressure (bar)
A, B	Working port	SAE J518	3/4"	450
	Fastening thread	DIN 13	M10×1.5 (depth 17mm)	-
S	Suction port	ISO 9974-1	M33×2 (depth 18mm)	3
T1, T2	Drain port	ISO 9974-1	M22×1.5 (depth 14mm)	3
R	Air bleed port	ISO 9974-1	M12×1.5 (depth 12mm)	3
X1, X2	Control pressure port	ISO 9974-1	M12×1.5 (depth 12mm)	40
G	Boost pressure port	ISO 9974-1	M14×1.5 (depth 12mm)	40
P <sub>s</sub>	Pilot pressure port inlet	ISO 9974-1	M14×1.5 (depth 12mm)	40
MA, MB	Measuring port pressure A, B	ISO 9974-1	M12×1.5 (depth 12mm)	450
MH	Measuring port, high pressure	ISO 9974-1	M12×1.5 (depth 12mm)	450
Fa	Boost pressure port inlet	ISO 9974-1	M18×1.5 (depth 12mm)	40
Fa1	Boost pressure port inlet(Filter can be installed)	ISO 9974-1	M18×1.5 (depth 12mm)	40
Fe	Charge pressure outlet	ISO 9974-1	M18×1.5 (depth 12mm)	40
Fs	From the filter to the oil suction line (at cold start)	ISO 9974-1	M18×1.5 (depth 12mm)	40

## Installation size

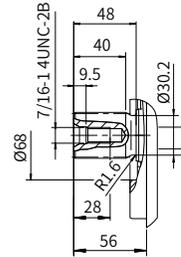
### ·V40E 60 Shaft extension type



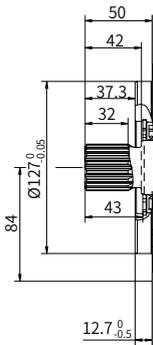
**"C1" type spline shaft**  
ANSI B92.1b  
1 1/4 in 15T 16/32DP



**"C2" type spline shaft**  
ANSI B92.1b  
1 1/4 in 14T 12/24DP



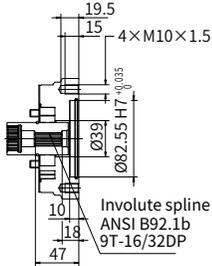
**"C3" type spline shaft**  
ANSI B92.1b  
1 3/8 in 21T 16/32DP



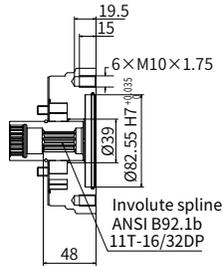
**"C5" type spline shaft**  
DIN 5480  
W35×2×16×9g

## Installation size

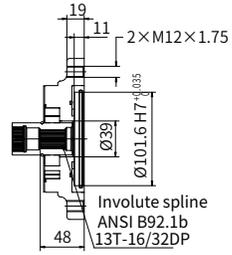
### ·V40E 60 Through shaft drive



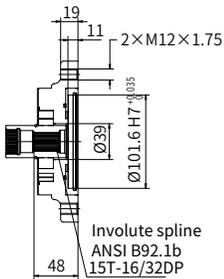
"A1" type through drive



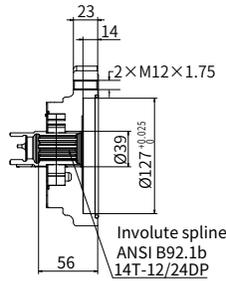
"A2" type through drive



"B1" type through drive

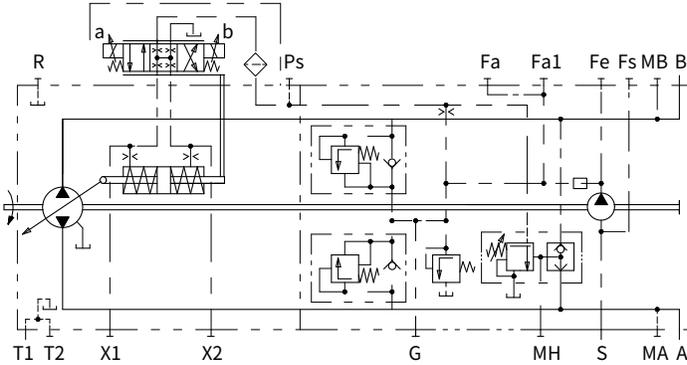


"B3" type through drive

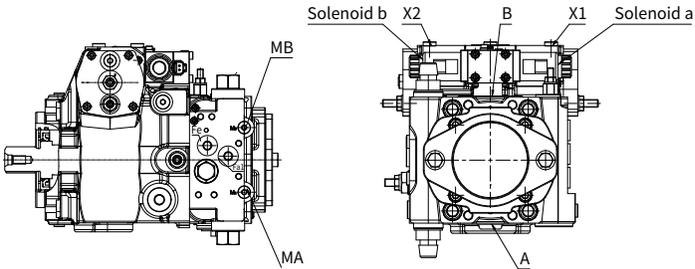


"CC" type through drive

# V40E 75 Control principle

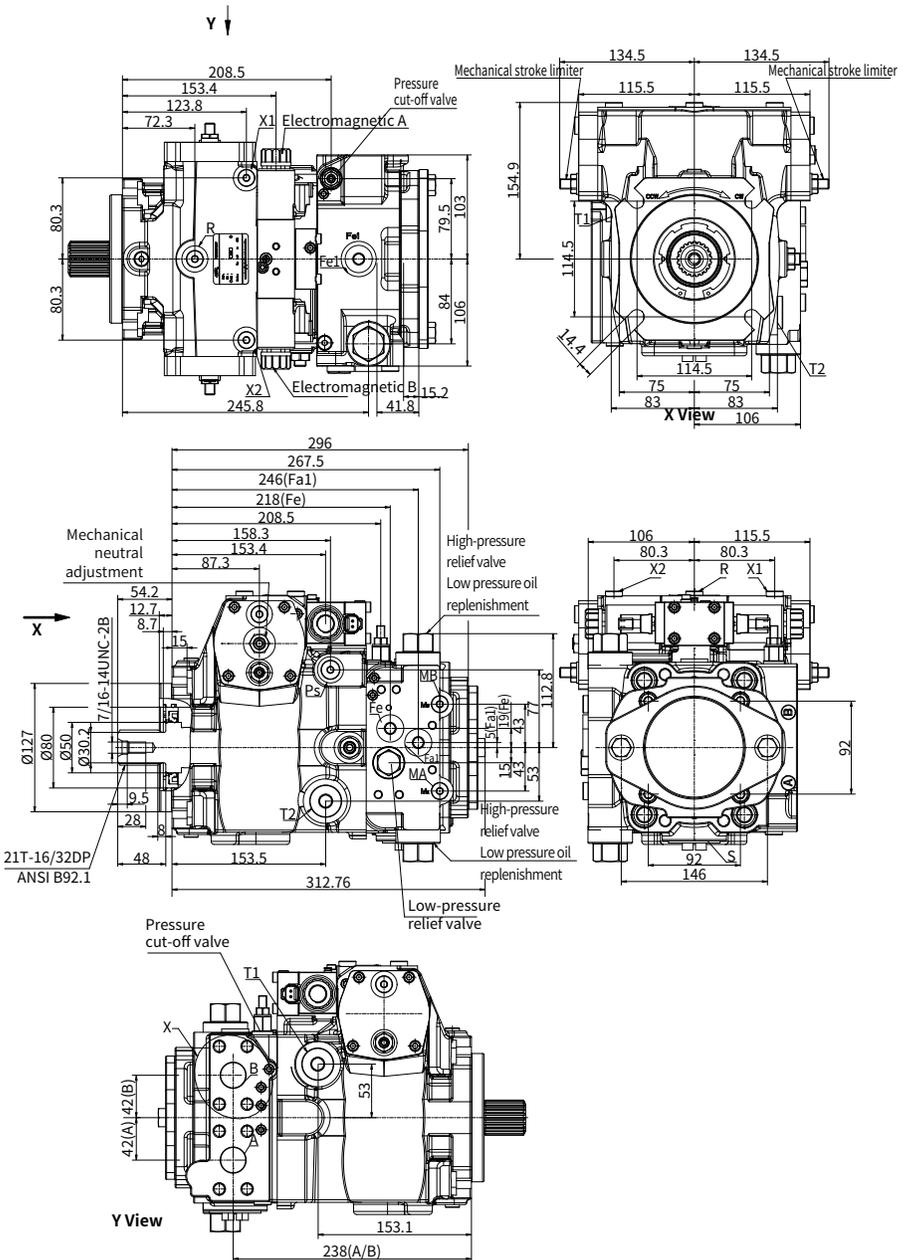


Direction of rotation	Clockwise		Counter-clockwise	
	a	b	a	b
Actuation of proportional solenoid	X1	X2	X1	X2
Control pressure	B to A	A to B	A to B	B to A
Flow direction	MA	MB	MB	MA



# Installation size

## V40E 75 Installation size



02

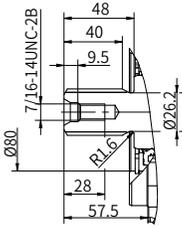
## Installation size

### •V40E 75 Port details

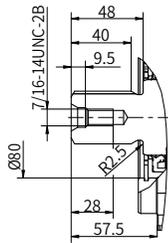
Port	Port Name	Standard	Oil Port Specification (thread depth)	Maximum pressure (bar)
A, B	Working port	SAE J518	1"	450
	Fastening thread	DIN 13	M12×1.75 (depth 17)	-
S	Suction port	DIN 3852	M42×2 (depth 20)	3
T1, T2	Drain port	DIN 3852	M26×1.5 (depth 16)	3
R	Air bleed port	DIN 3852	M12×1.5 (depth 12)	3
X1, X2	Control pressure port	DIN 3852	M12×1.5 (depth 12)	40
G	Boost pressure port	DIN 3852	M18×1.5 (depth 12)	40
P <sub>s</sub>	Pilot pressure port inlet	DIN 3852	M14×1.5 (depth 12)	40
MA, MB	Measuring port pressure A, B	DIN 3852	M12×1.5 (depth 12)	450
MH	Measuring port, high pressure	DIN 3852	M12×1.5 (depth 12)	450
Fa	Boost pressure port inlet	DIN 3852	M26×1.5 (depth 16)	40
Fa1	Boost pressure port inlet (Filter can be installed)	DIN 3852	M22×1.5 (depth 14)	40
Fe	Charge pressure outlet	DIN 3852	M22×1.5 (depth 14)	40
Fs	From the filter to the oil suction line (at cold start)	DIN 3852	M22×1.5 (depth 14)	40

## Installation size

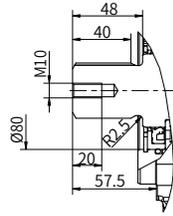
### ·V40E 75 Shaft extension type



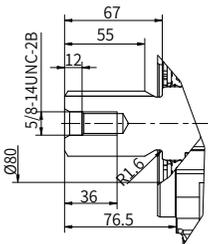
“C6” type spline shaft  
ANSI B92.1b  
1 1/4 in 14T 12/24DP



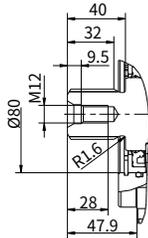
“C7” type spline shaft  
ANSI B92.1b  
1 3/8 in 21T 16/32DP



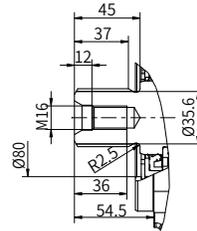
“C8” type spline shaft  
ANSI B92.1b  
1 1/2 in 23T 16/32DP



“C9” type spline shaft  
ANSI B92.1b  
1 3/4 in 13T 8/16DP



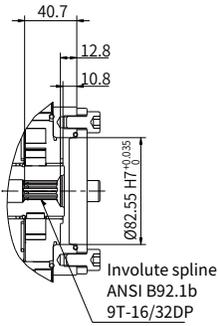
“CA” type spline shaft  
DIN 5480  
W35×2×16×9 g



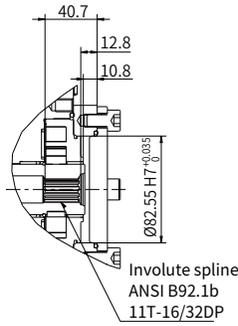
“CB” type spline shaft  
DIN 5480  
W40×2×18×9 g

# Installation size

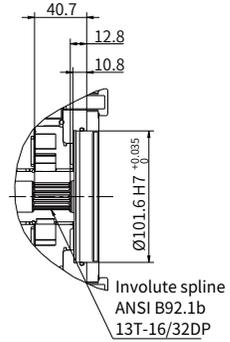
## -V40E 75 Through shaft drive



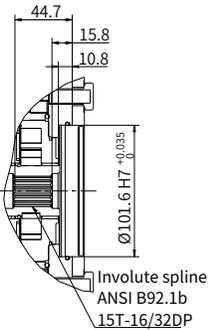
**“A1” type through drive**



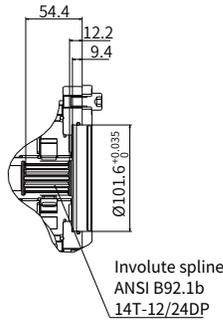
**“A2” type through drive**



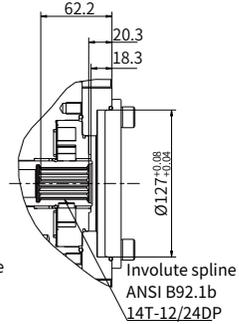
**“B1” type through drive**



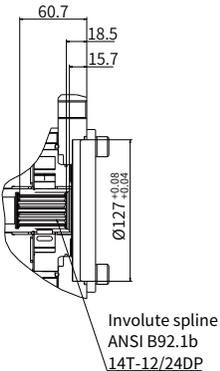
**“B3” type through drive**



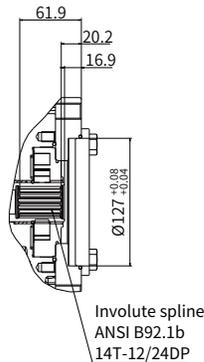
**“B4” type through drive**



**“C2” type through drive**



**“C6” type through drive**

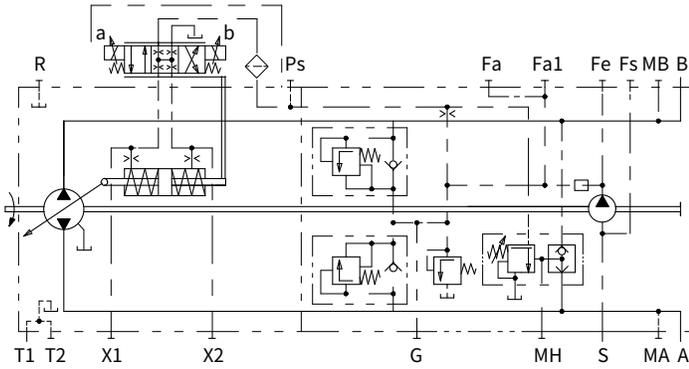


**“CC” type through drive**

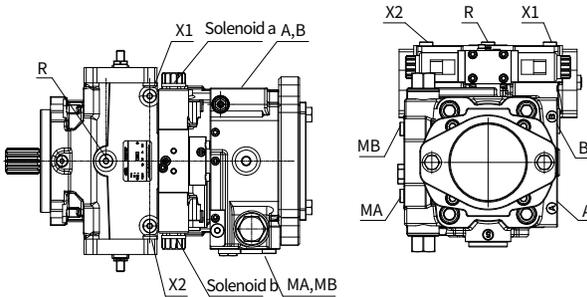
02

# V40E 100 Control principle

## ·V40E 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





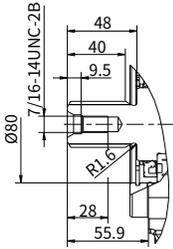
## Installation size

### ·V40E 100 Port details

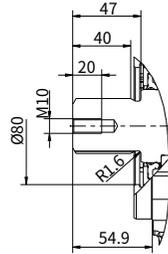
Port	Port Name	Standard	Oil Port Specification (thread depth)	Maximum pressure (bar)
A, B	Working port	SAE J518	1"	450
	Fastening thread	DIN 13	M12×1.75 (depth 17mm)	-
S	Suction port	DIN 3852	M42×2 (depth 20mm)	3
T1, T2	Drain port	DIN 3852	M26×1.5 (depth 16mm)	3
R	Air bleed port	DIN 3852	M12×1.5 (depth 12mm)	3
X1, X2	Control pressure port	DIN 3852	M12×1.5 (depth 12mm)	40
P <sub>s</sub>	Pilot pressure port inlet	DIN 3852	M14×1.5 (depth 12mm)	40
MA, MB	Measuring port pressure A, B	DIN 3852	M12×1.5 (depth 12mm)	450
Fa	Boost pressure port inlet	DIN 3852	M22×1.5 (depth 14mm)	40
Fa1	Boost pressure port inlet (Filter can be installed)	DIN 3852	M22×1.5 (depth 14mm)	40
Fe	Charge pressure outlet	DIN 3852	M22×1.5 (depth 14mm)	40
Fs	From the filter to the oil suction line (at cold start)	DIN 3852	M22×1.5 (depth 14mm)	40

## Installation size

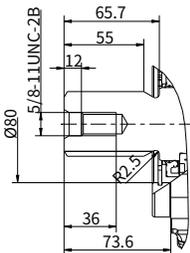
### ·V40E 100 Shaft extension type



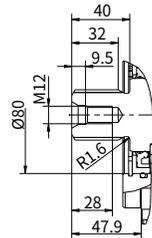
“C6” type spline shaft  
ANSI B92.1b  
1 1/4 in 14T-12/24DP



“C8” type spline shaft  
ANSI B92.1b  
1 1/2 in 23T-16/32DP



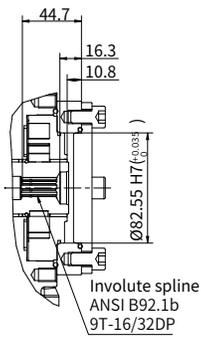
“C9” type spline shaft  
ANSI B92.1b  
1 3/4 in 13T-8/16DP



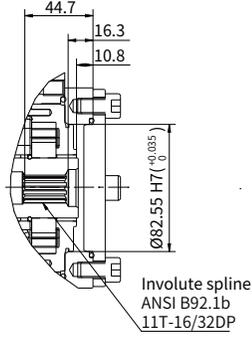
“CA” type spline shaft  
DIN 5480  
W35×2×16×9 g

## Installation size

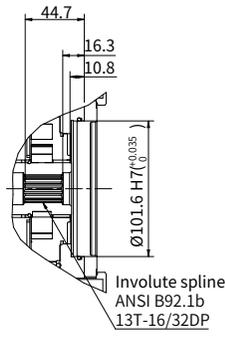
### ·V40E 100 Through shaft drive



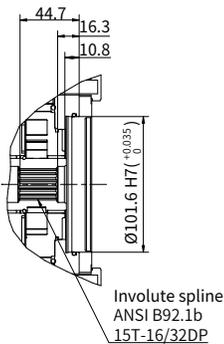
**"A1" type through drive**



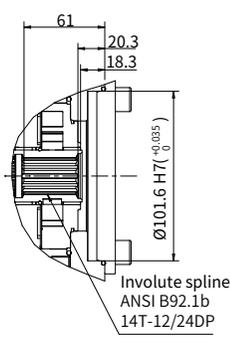
**"A2" type through drive**



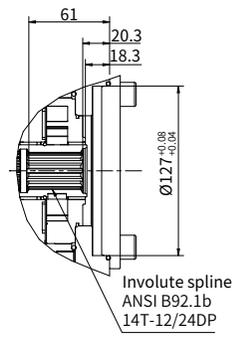
**"B1" type through drive**



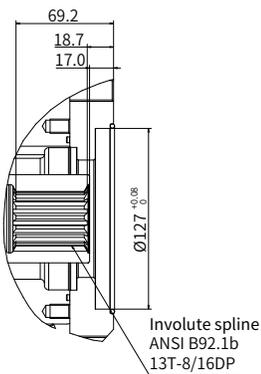
**"B3" type through drive**



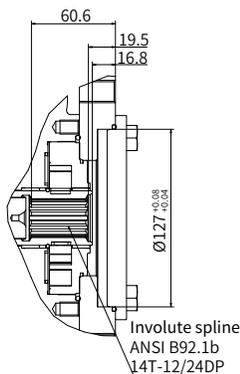
**"B4" type through drive**



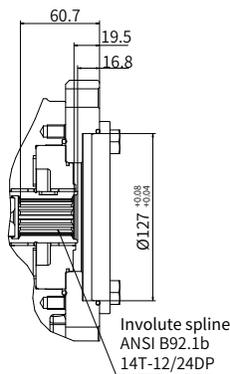
**"C2" type through drive**



**"CF" type through drive**

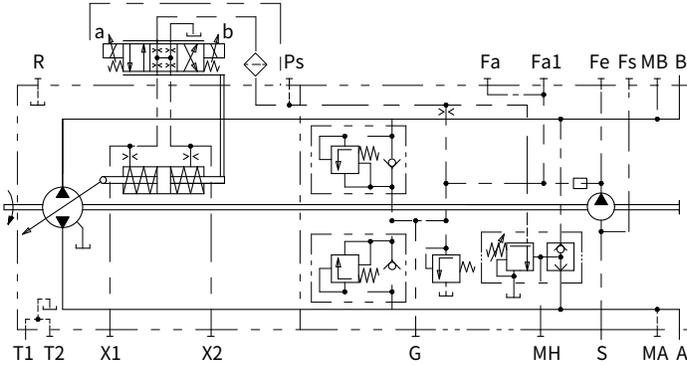


**"C6" type through drive**

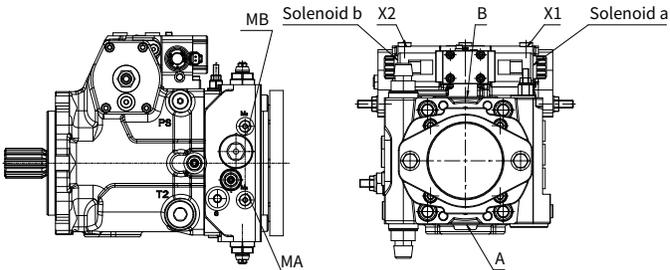


**"CC" type through drive**

# V40E 135 Control principle

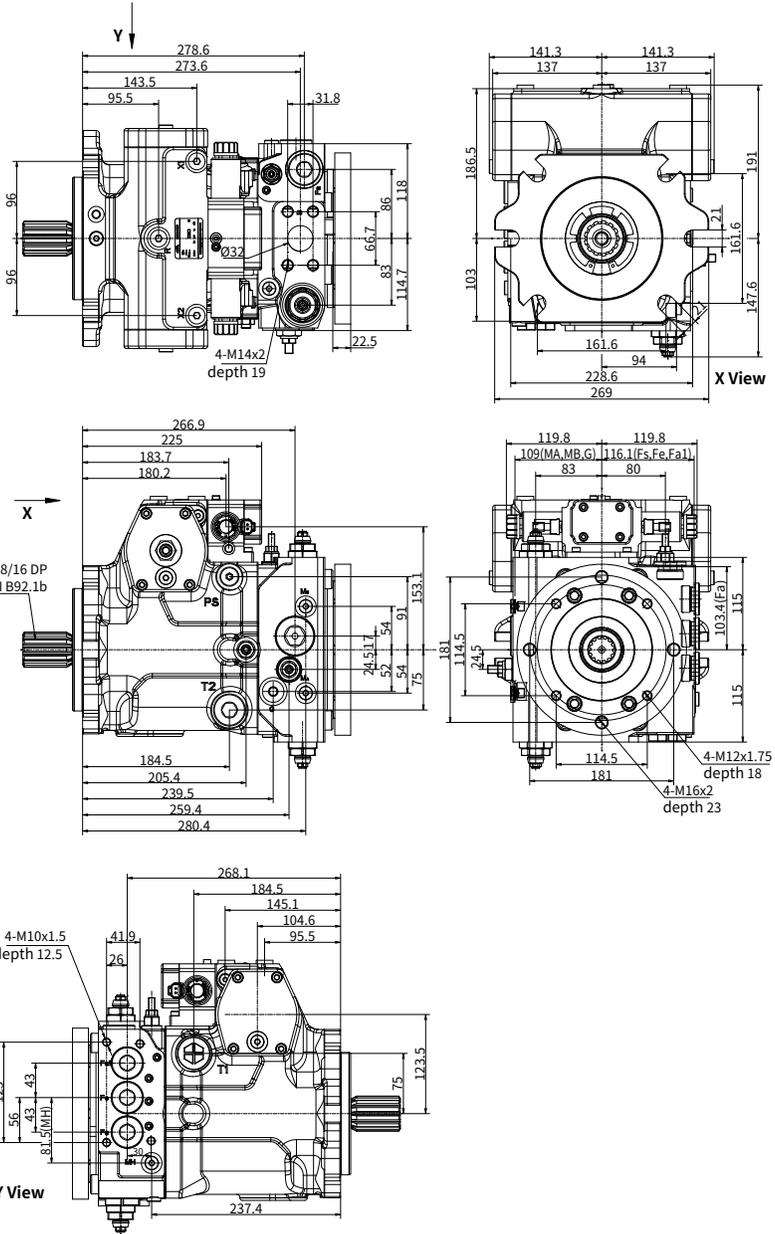


Direction of rotation	Clockwise		Counter-clockwise	
	a	b	a	b
Actuation of proportional solenoid	X1	X2	X1	X2
Control pressure	B to A	A to B	A to B	B to A
Flow direction	MA	MB	MB	MA



# Installation size

## V40E 135 Installation size



02

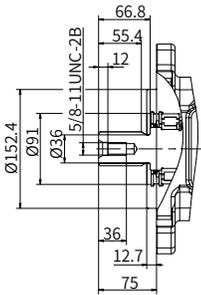
## Installation size

### •V40E 135 Port details

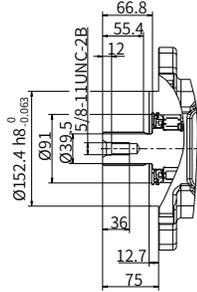
Port	Port Name	Standard	Oil Port Specification (thread depth)	Maximum pressure (bar)
A, B	Working port	SAE J518	1 1/4"	450
	Fastening thread	DIN 13	M14×2 (depth 19)	-
S	Suction port	DIN 3852	M48×2 (depth 22)	3
T1, T2	Drain port	DIN 3852	M33×2 (depth 18)	3
R	Air bleed port	DIN 3852	M16×1.5 (depth 12)	3
X1, X2	Control pressure port	DIN 3852	M16×1.5 (depth 12)	40
G	Boost pressure port	DIN 3852	M22×1.5 (depth 14)	40
P <sub>s</sub>	Pilot pressure port inlet	DIN 3852	M18×1.5 (depth 12)	40
MA, MB	Measuring port pressure A, B	DIN 3852	M12×1.5 (depth 12)	450
MH	Measuring port, high pressure	DIN 3852	M12×1.5 (depth 12)	450
Fa	Boost pressure port inlet	DIN 3852	M33×2 (depth 18)	40
Fa1	Boost pressure port inlet (Filter can be installed)	DIN 3852	M33×2 (depth 18)	40
Fe	Charge pressure outlet	DIN 3852	M33×2 (depth 18)	40
Fs	From the filter to the oil suction line (at cold start)	DIN 3852	M33×2 (depth 18)	40

## Installation size

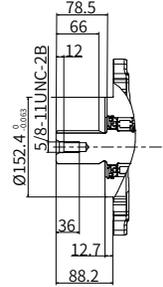
### ·V40E 135 Shaft extension type



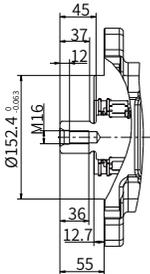
**“D1” type spline shaft**  
ANSI B92.1b  
1 3/4 in 13T 8/16 DP



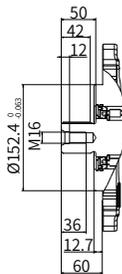
**“D2” type spline shaft**  
ANSI B92.1b  
1 3/4 in 27T 16/32 DP



**“D3” type spline shaft**  
ANSI B92.1b  
2 in 15T 8/16 DP



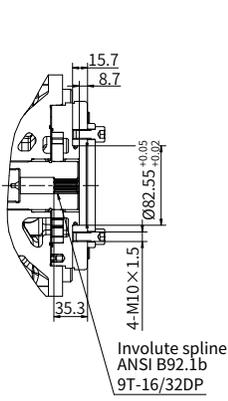
**“D4” type spline shaft**  
DIN 5480  
W40×2×18×9g



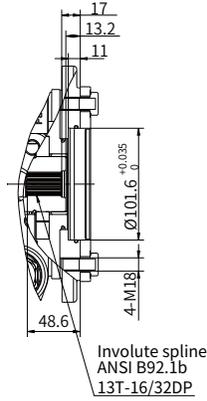
**“D4” type spline shaft**  
DIN 5480  
W45×2×21×9g

# Installation size

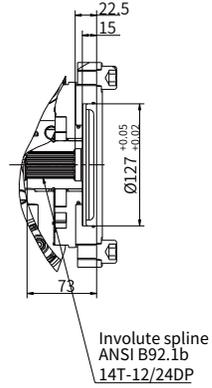
## ·V40E 135 Through shaft drive



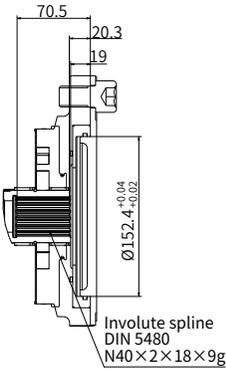
**"A1" type through drive**



**"B1" type through drive**



**"CC" type through drive**



**"D4" type through drive**



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