Hydraulic Fan Motor

Series F10
Fixed Displacement

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

parker.com/pmde

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ENGINEERING YOUR SUCCESS.

Basic formulas for hydraulic motors

Flow (q)

$$q = \frac{D \times n}{1000 \times \eta_v} \text{ [l/min]}$$

Torque (M)

$$M = \frac{D \times \Delta p \times \eta_{hm}}{63} \text{ [Nm]}$$

Power (P)

$$P = \frac{q \times \Delta p \times \eta_t}{600} \text{ [kW]}$$

D - displacement [cm^3/rev]
n - shaft speed [rpm]
η_v - volumetric efficiency
Δp - differential pressure [bar] (between inlet and outlet)
η_{hm} - mechanical efficiency
η_t - overall efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Conversion factors

1 kg	2.20 lb
1 N	0.225 lbf
1 Nm	0.738 lbf ft
1 bar	14.5 psi
1 l	0.264 US gallon
1 cm^3	0.061 cu in
1 mm	0.039 in
1°C	$^5/_9$(°F-32)
1 kW	1.34 hp

Conversion factors

1 lb	0.454 kg
1 lbf	4.448 N
1 lbf ft	1.356 Nm
1 psi	0.068948 bar
1 US gallon	3.785 l
1 cu in	16.387 cm^3
1 in	25.4 mm
1°F	$^9/_5$°C + 32
1 hp	0.7457 kW

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Pump & Motor Division Europe
Trollhättan, Sweden

Content Page

Introduction

Parker Hannifin offers an extensive range of components suitable for agriculture, on-road and off-road machines and can assist with an optimal technical solution to obtain the most cost-efficient system.

Based on many years of experience from fan drive applications, product development has optimized existing products to obtain the best possible performance from their machines. Many of our products have, therefore, been developed in direct and close cooperation with customers.

Parker Hannifin holds a leading position when it comes to product and application knowledge, dedicated to serve the fan drive market.

We have components such as pumps, cylinders, motors, directional control valves, remote controls and electronic equipment for most of the hydraulic functions on any machine.

The optimized fan motor

Series F10 motors have proven extremely reliable in demanding applications such as blowing fan and cooling fan drives. Primarily due to the 40 degree bent-axis design,double tapered bearings, spherical, light weight pistons (with laminated piston rings) and timing gear, high speeds can be allowed at highest efficiency, and the reliability is not affected even by radial and axial forces on the shaft.

To further enhance the fan function and, at the same time, reduce installation time and cost, the well proven bent-axis design, permits the fan be mounted directly on the shaft without the need for additional bearings.

Benefits

- Simple installation - lower cost
- Longer life time
- Highest efficiency
- Higher speed capability than other technologies

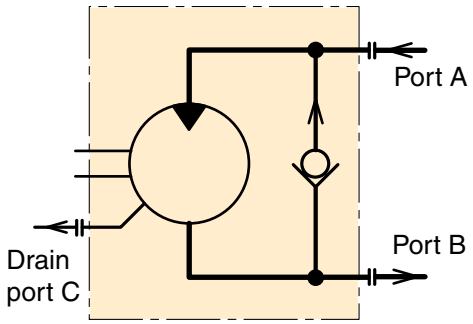
Fan motor versions

The fan motor is available in six sizes, 5, 6, 10, 14, and 19 cm^3/rev. Motors between 10 to 19 cm^3/rev can be equipped with an integrated, large capacity make-up (anti-cavitation) valve. The valve reduces the risk of cavitation when the pump supply is suddenly shut off while the motor is still running at high speed. A counter-pressure of around 10 bar (measured in port B in the exemplified schematic below) is recommended.

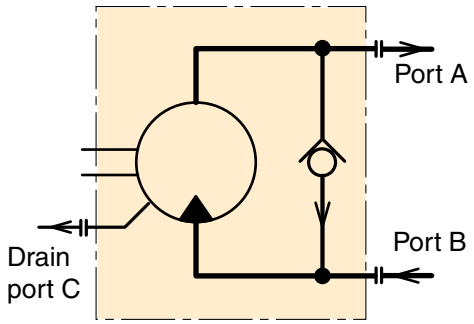
The make-up valve makes the motor uni directional; when ordering, either R (right hand/clockwise) or L (left hand/ counter clockwise) rotation must be specified.

When ordering a motor with make up valve, it is to be specified in product code. Ex below.

F10-010-AB-CV-K-000-**MUVR**-00



Hydraulic schematic, the motor is shown with make-up valve; shaft rotation 'L' (MUVL)



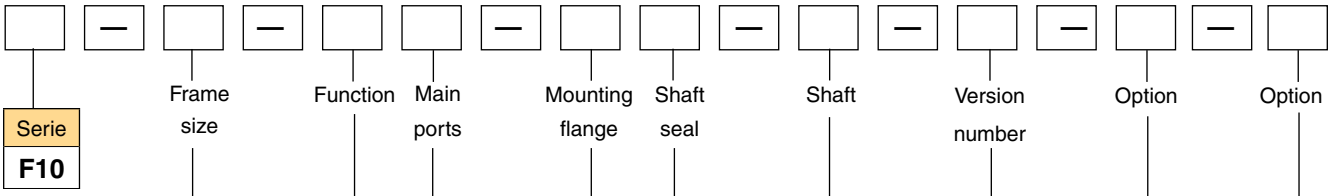
Hydraulic schematic, the motor is shown with make-up valve; shaft rotation 'R' (MUVR)

Specifications

Frame size F10	**-005**	**-006**	**-010**	**-014**	**-019**
Displacement [cm^3/rev]	4.9	6.0	9.8	14.3	19.0
Max Operating pressure [bar]	280	280	280	280	280
Max Motor operating speed [rpm]	7 500	7 200	7 200	7 000	6 800
Drain temperature[3], max [°C]	115	115	115	115	115
min [°C]	-40	-40	-40	-40	-40
Theoretical torque at 100 bar [Nm]	7.8	9.5	15.6	22.7	30.2
Mass moment of inertia					
($x10^{-3}$) [kg m^2]	0.16	0.39	0.39	0.42	1.1
Weight [kg]	4.7	7.5	7.5	8.3	11

3) See also installation information. Page 20

Flow requirement										
Motor speed	rpm	3500	4000	4500	5000	5500	6000	6500	7000	7500
F10-005	l/min	17	20	22	25	27	29	32	34	37
F10-006	l/min	21	24	27	30	33	36	39	42	-
F10-010	l/min	34	39	44	49	54	59	64	69	-
F10-014	l/min	50	57	64	72	79	86	93	100	-
F10-019	l/min	67	76	86	95	105	114	124	-	-



Frame size	
Code	Displacem. (cm^3/rev)
005	4.9
006	6.0
010	9.8
014	14.3
019	19.0

Version number
(assigned for special versions)

Frame size		5	6	10	14	19
Code	Option					
0000	Standard	x	x	x	x	x
MUVR	Make up/Anti cavitation valve clockwise rotation	-	-	(x)	(x)	(x)
MUVL	Make up/Anti cavitation valve counter clockwise rotation	-	-	(x)	(x)	(x)

Frame size		5	6	10	14	19
Code	Function					
A	Application optimized	x	x	x	x	x

Frame size		5	6	10	14	19
Code	Shaft					
K	Metric key, (Std)	x	x	x	x	x
T	SAE key	-	-	-	x	x
V	Tapered shafts	-	x	x	x	x

Frame size		5	6	10	14	19
Code	Main ports					
B	BSP threads	x	x	x	x	x
U	UN ports	x	x	x	x	x

Frame size		5	6	10	14	19
Code	Mounting flange					
C	CETOP	x	x	x	x	x
S	SAE	-	x	x	x	x

Frame size		6	6	10	14	19
Code	Shaft seal					
V	FPM, high pressure, high temperature	x	x	x	x	x

Frame size		5	6	10	14	19
Code	Option					
00	Standard	x	x	x	x	x
P0	Prepared for speed sensor	-	x	x	x	x
_T	Painted Black	(x)	(x)	(x)	(x)	(x)

x: Available – : Not available

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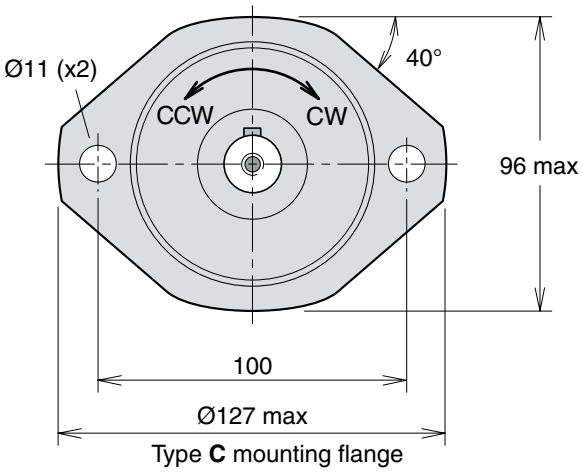
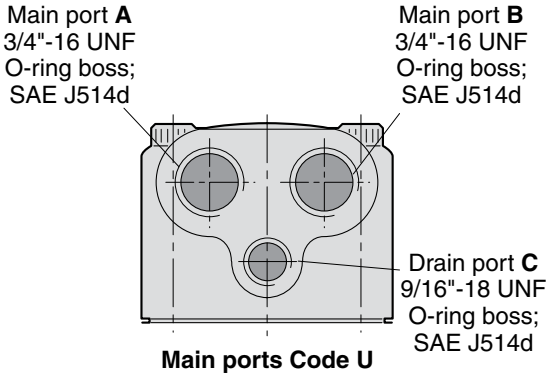
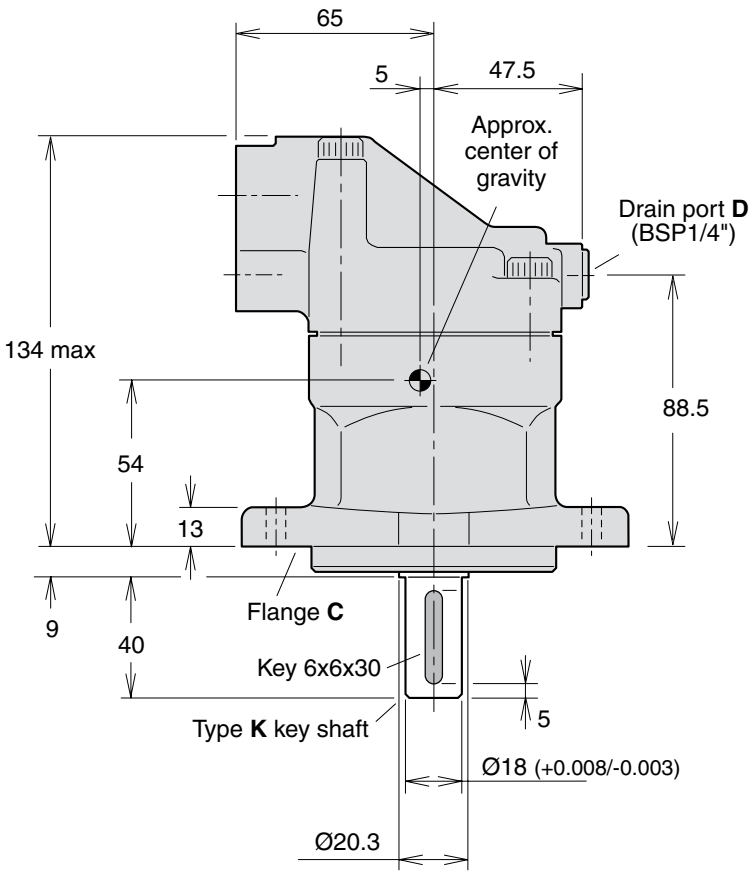
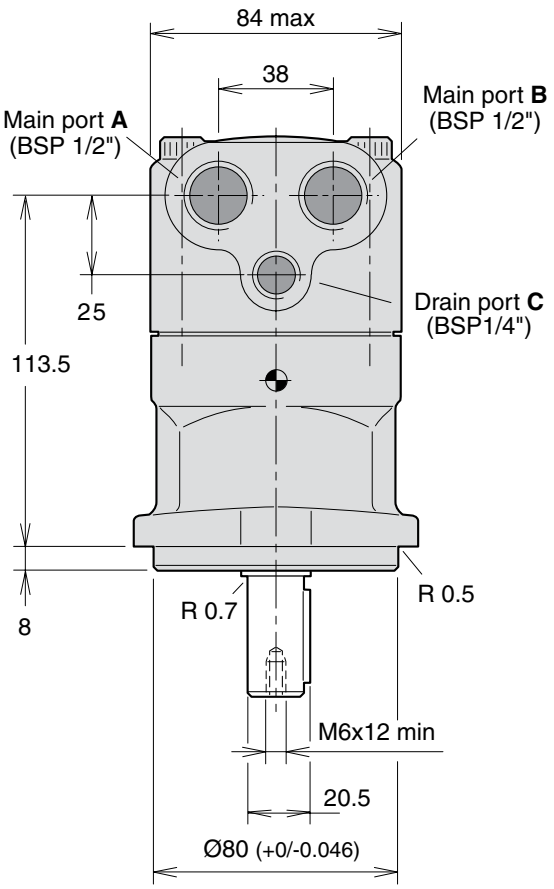
F10-5 fan motor version

(CETOP versions)

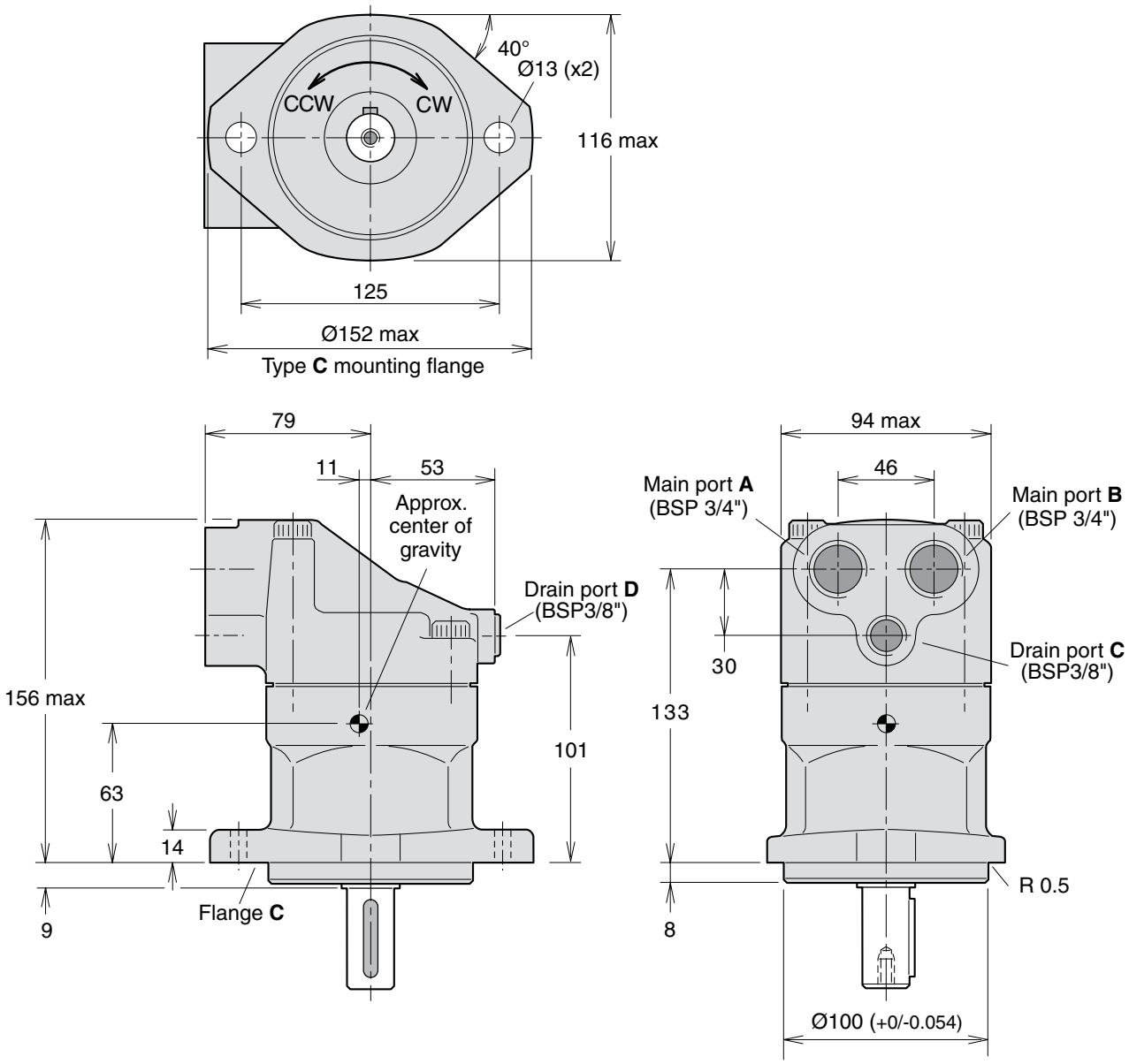








F10-006, -010 fan motor version
(CETOP versions)



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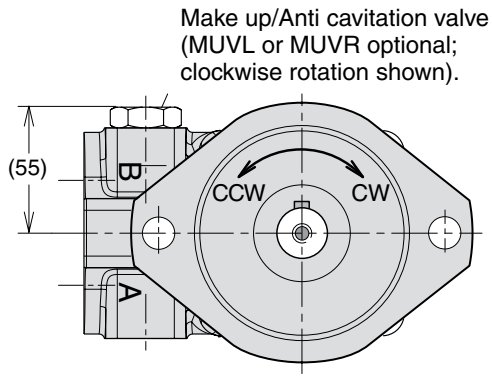
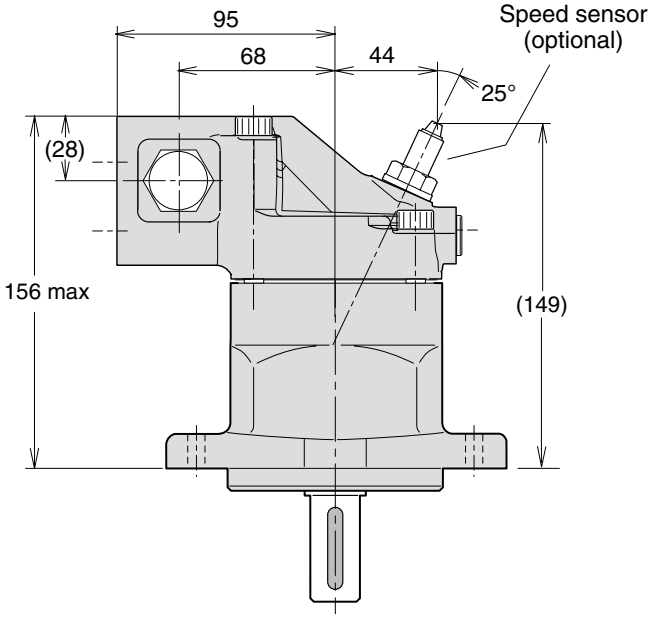
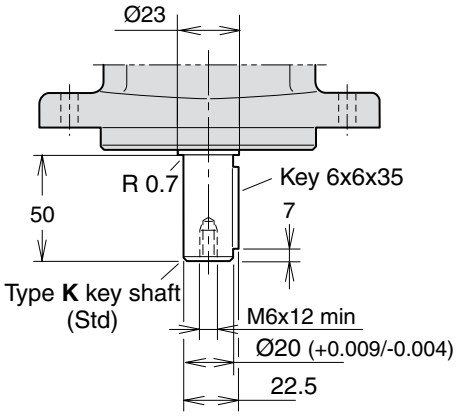
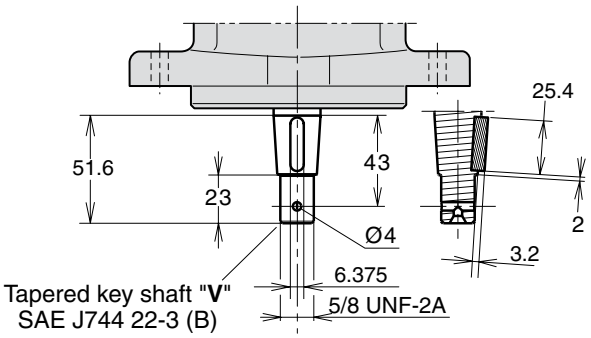
F10-006, -010 fan motor version
(CETOP versions)





Shaft options





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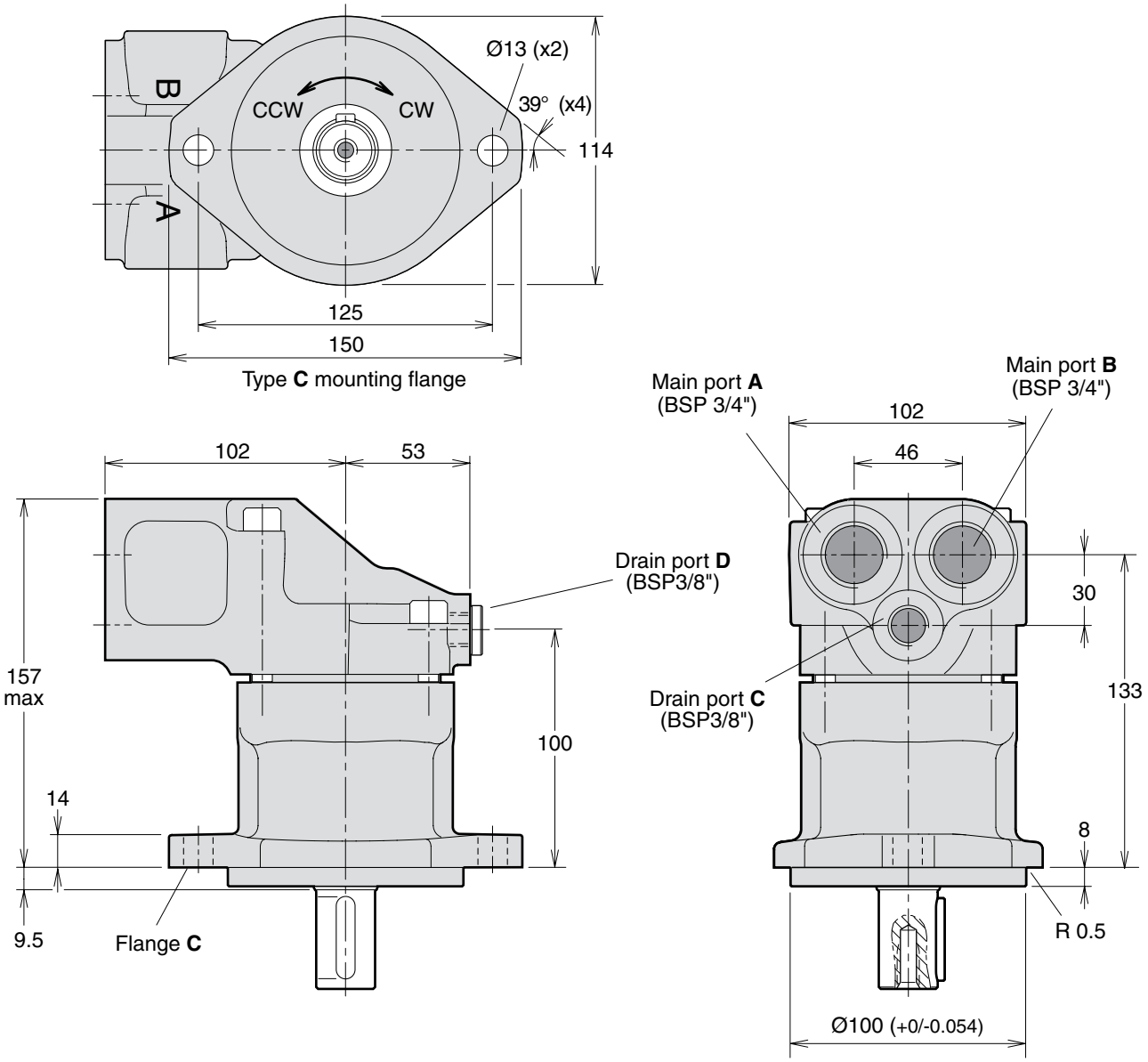
F10-014 fan motor version
(CETOP versions)



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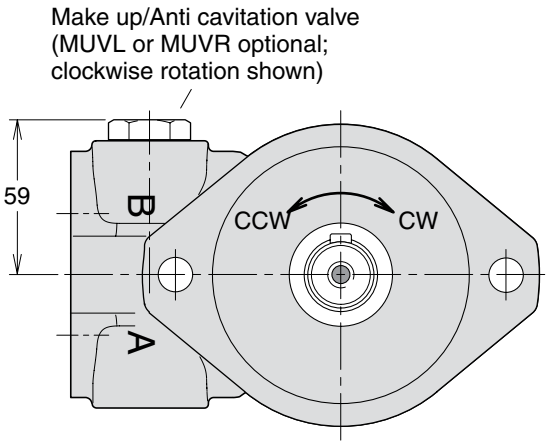
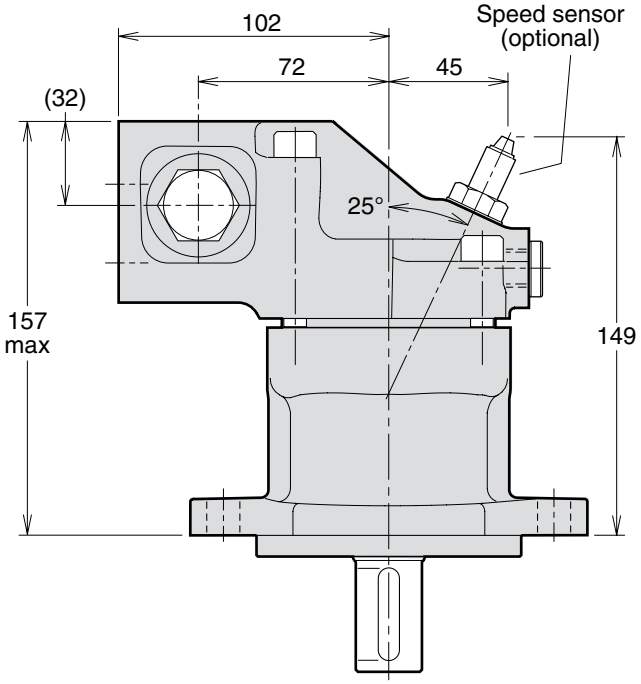
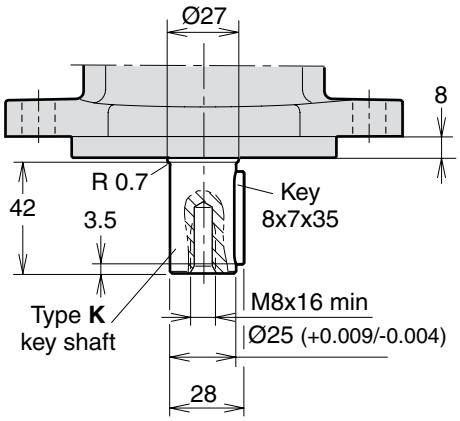
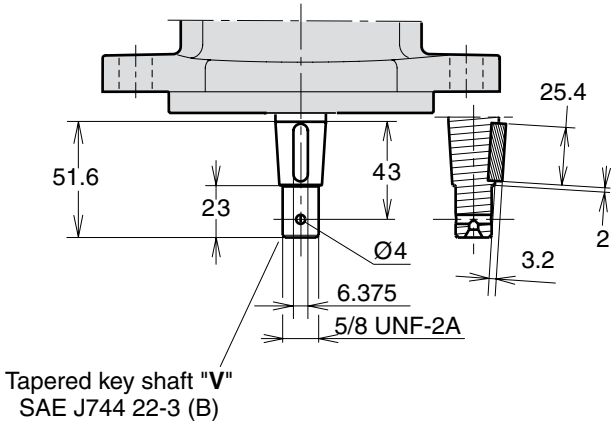
F10-014 fan motor version
(CETOP versions)





Shaft options





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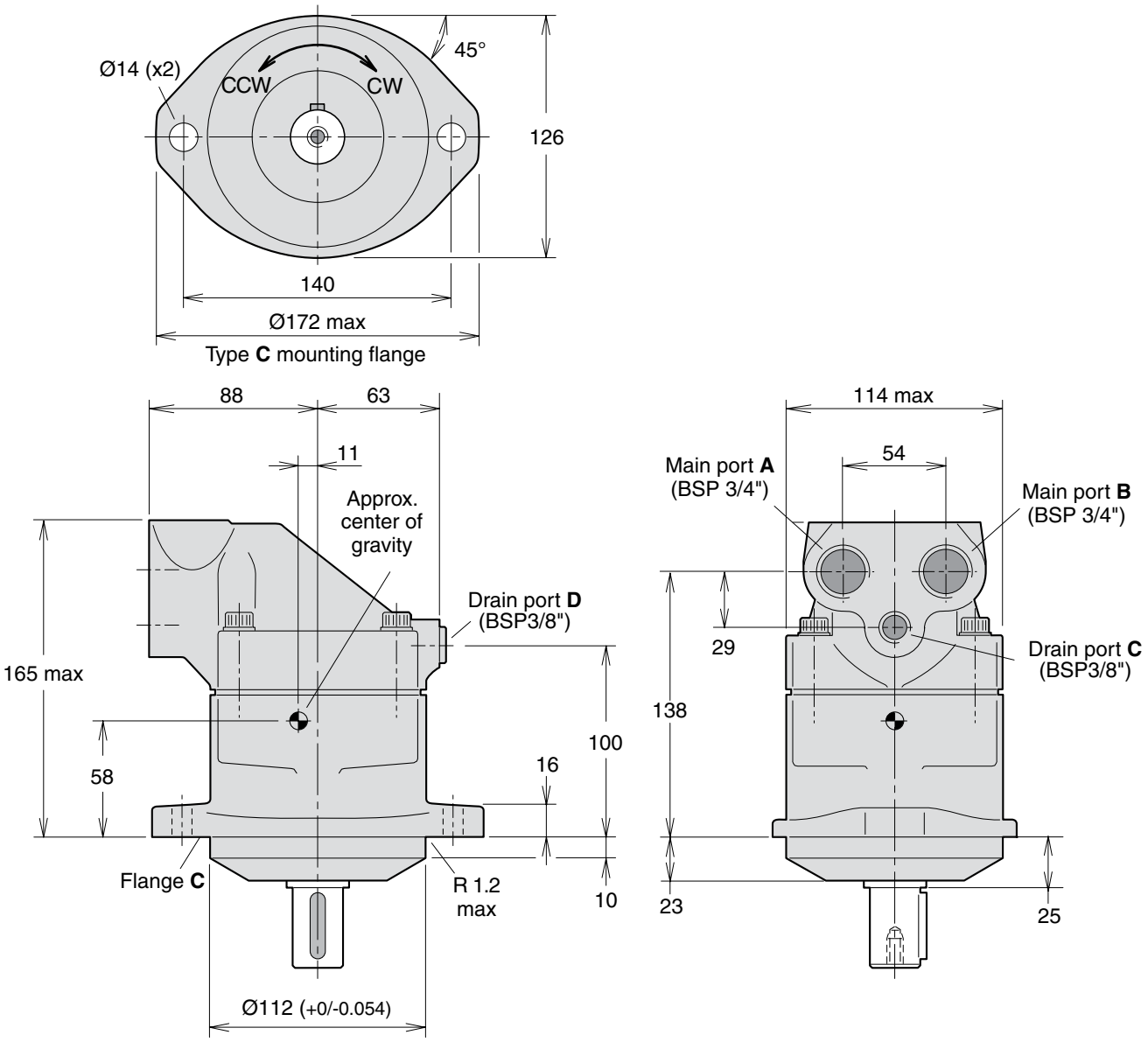
F10-019 fan motor version
(CETOP version)



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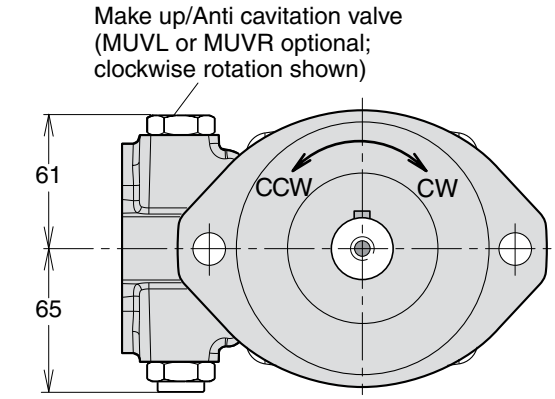
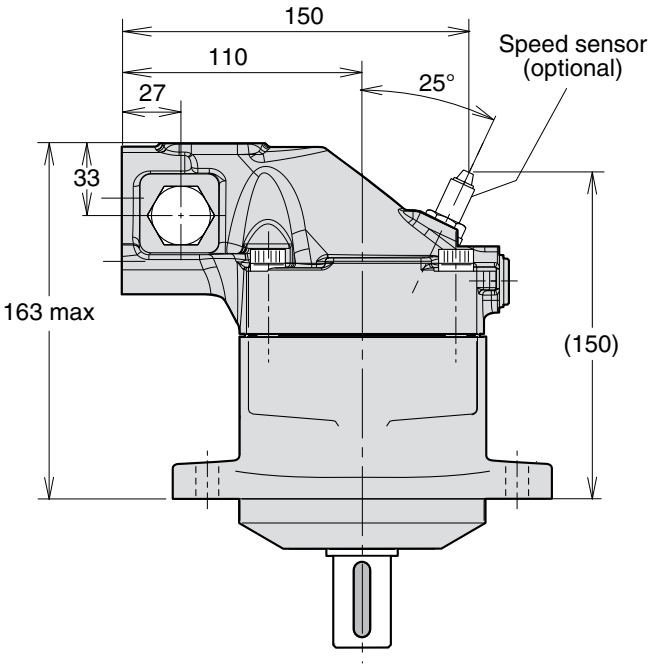
F10-019 fan motor version
(CETOP version)





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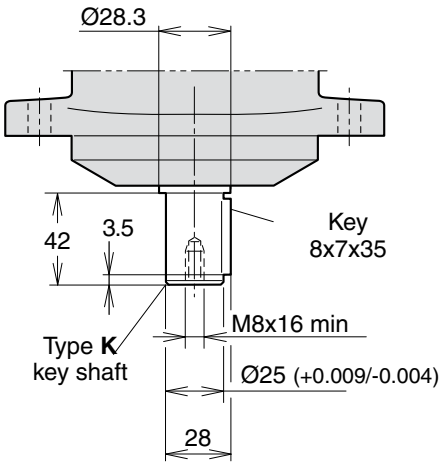

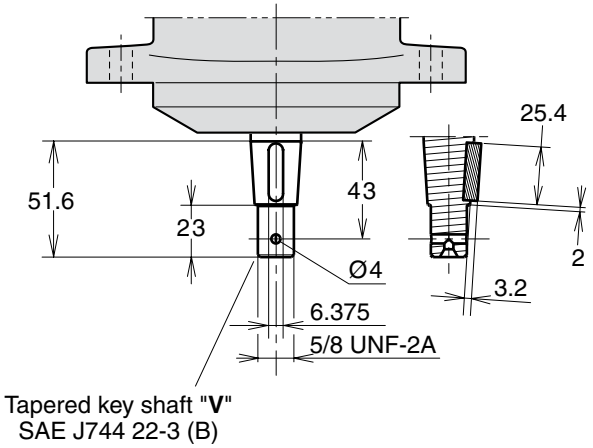

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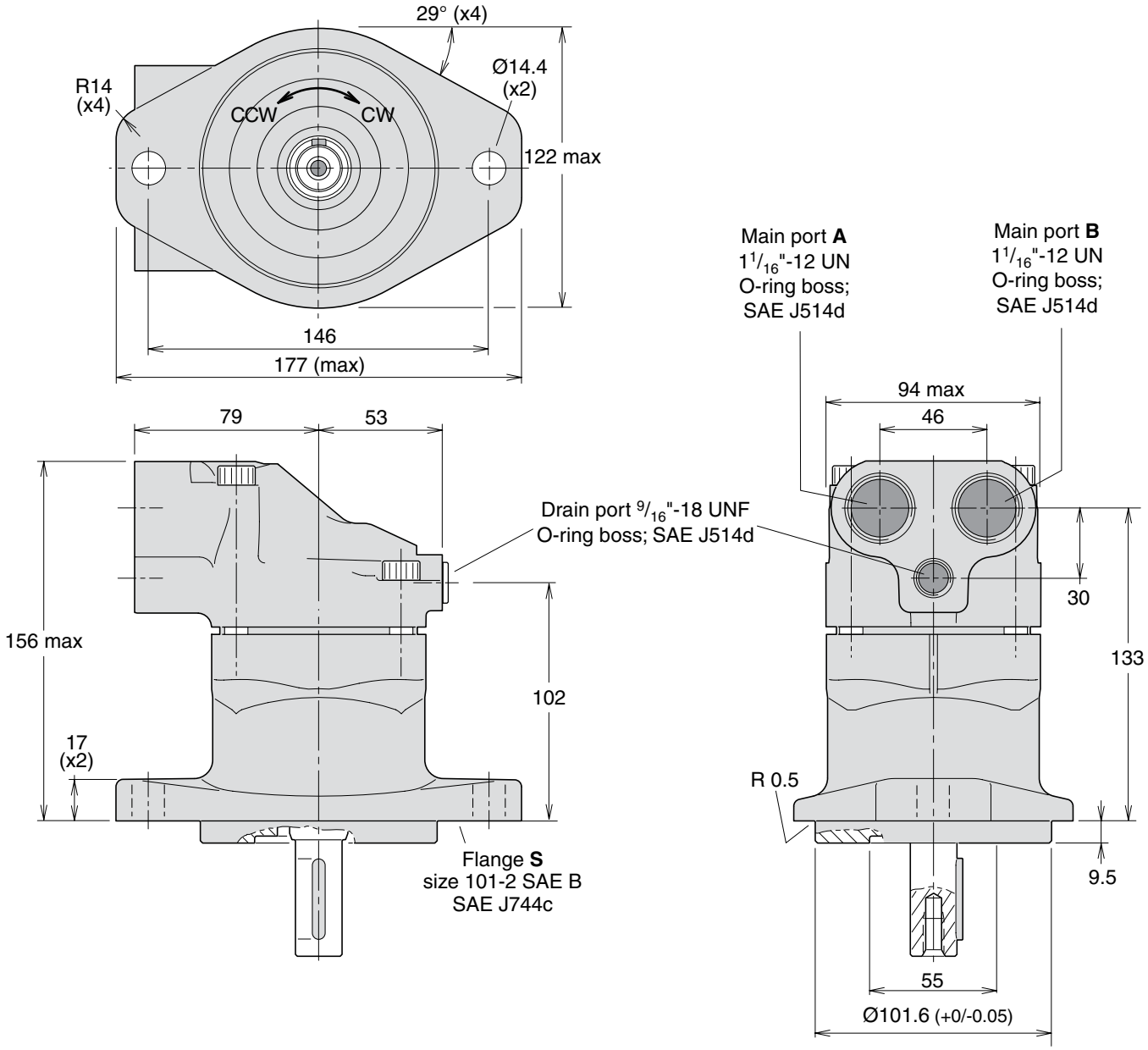
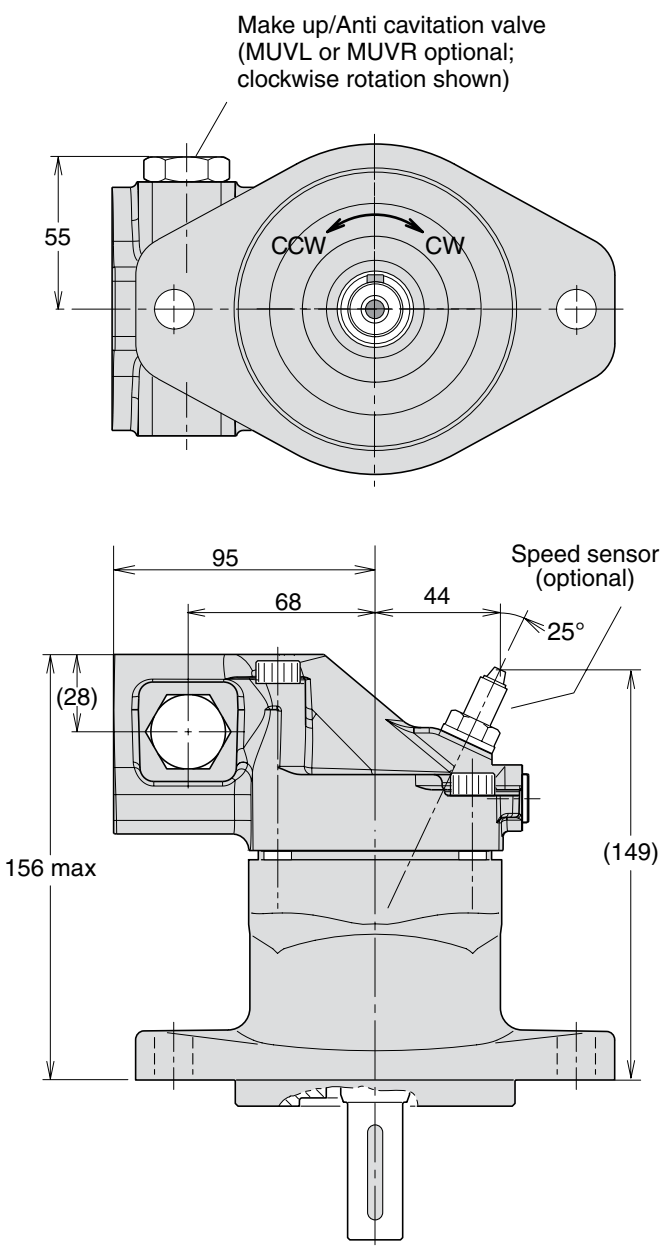
F10-006, -010 fan motor version
(SAE versions)



F10-006, -010 fan motor version
(SAE versions)



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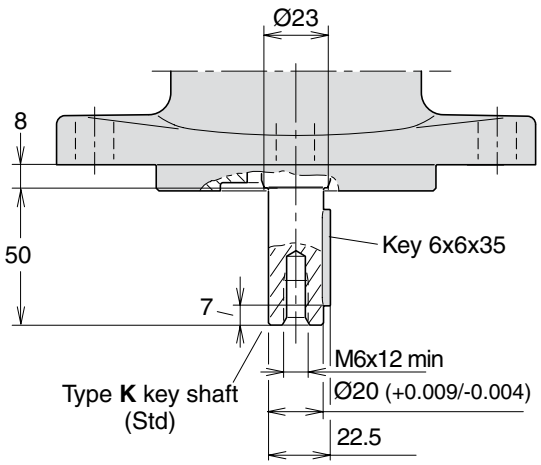

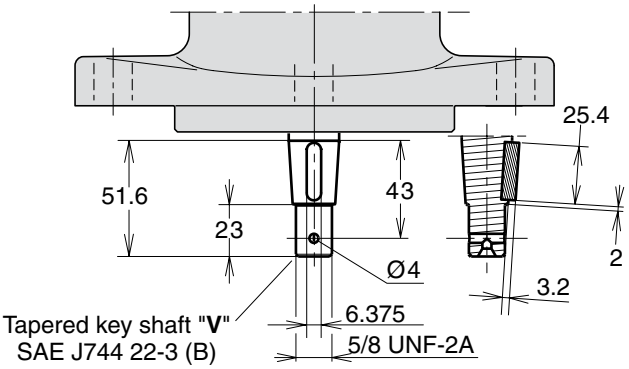

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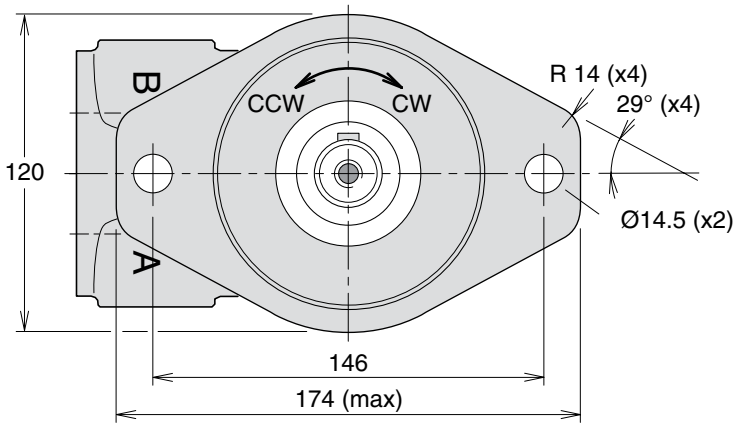
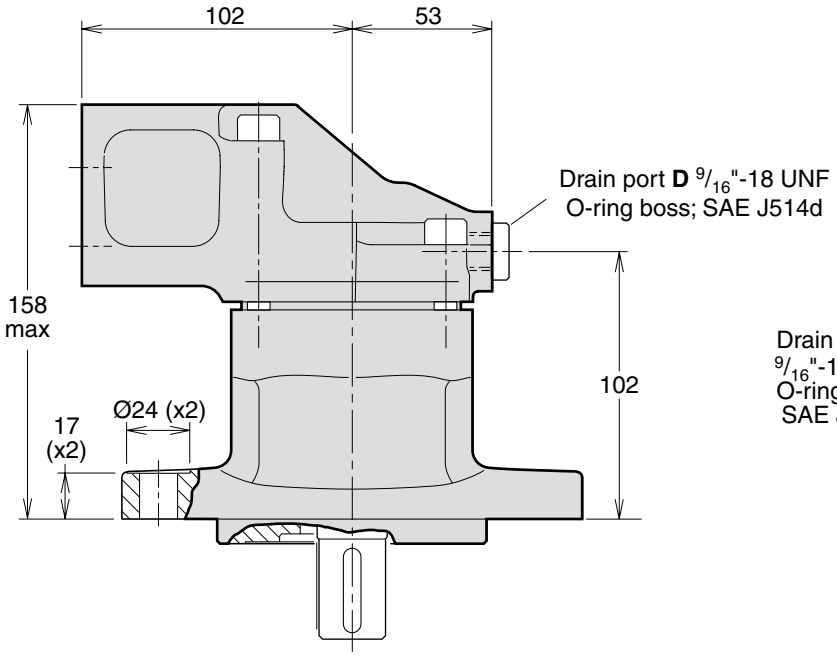
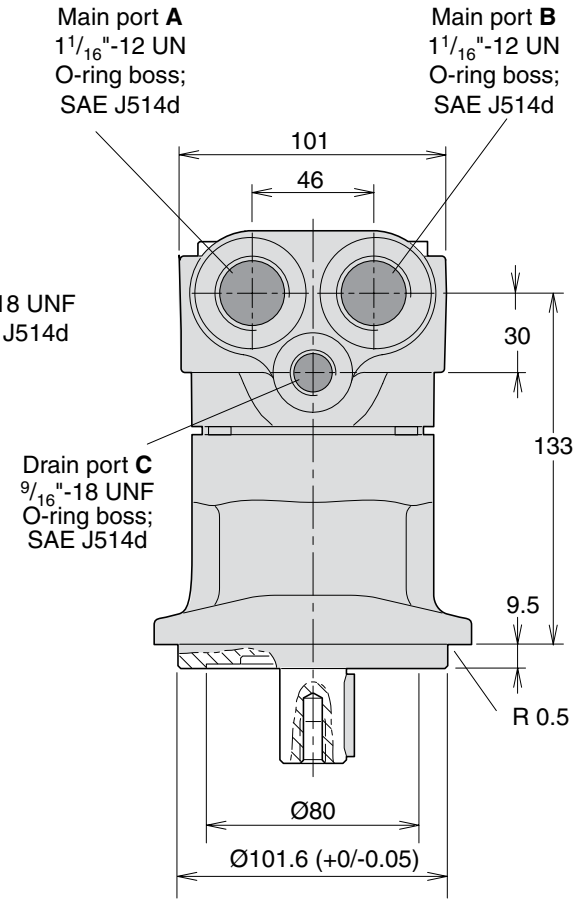
F10-014 fan motor version
(SAE versions)



Type **S** mounting flange SAE 'B' (SAE J744c)





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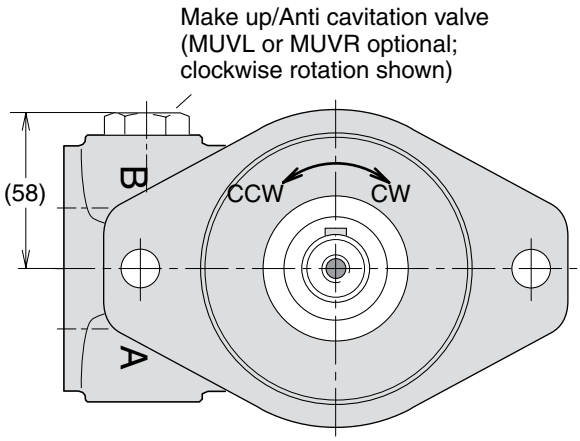
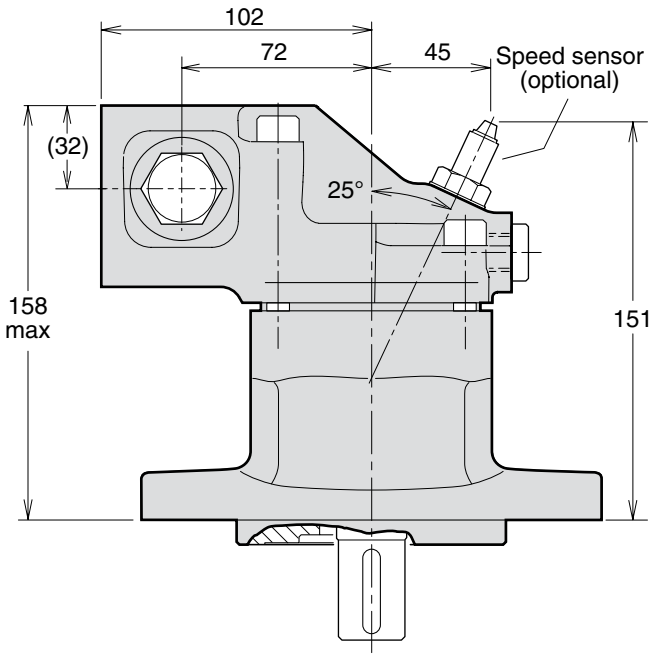
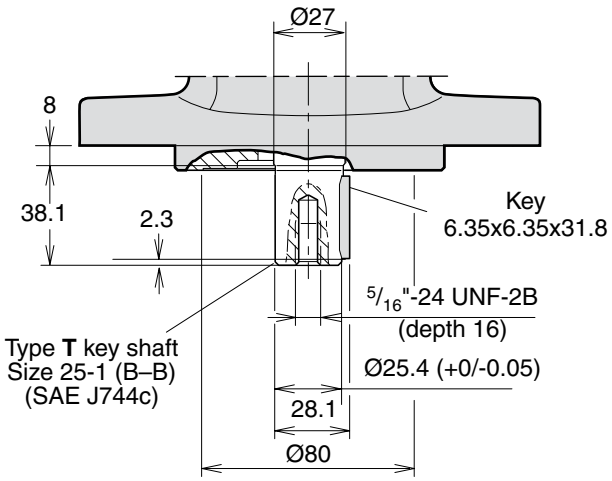
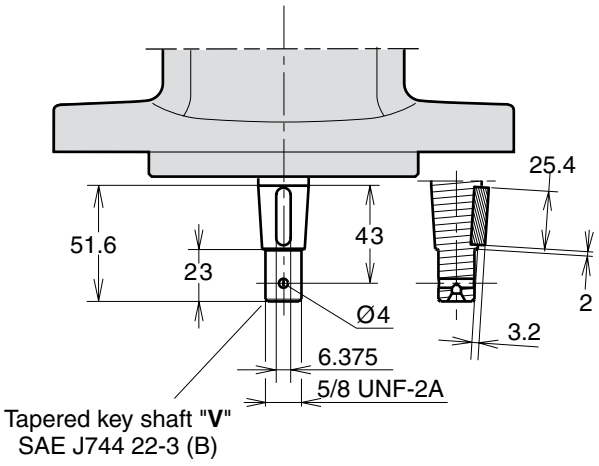
F10-014 fan motor version
(SAE versions)





Shaft options





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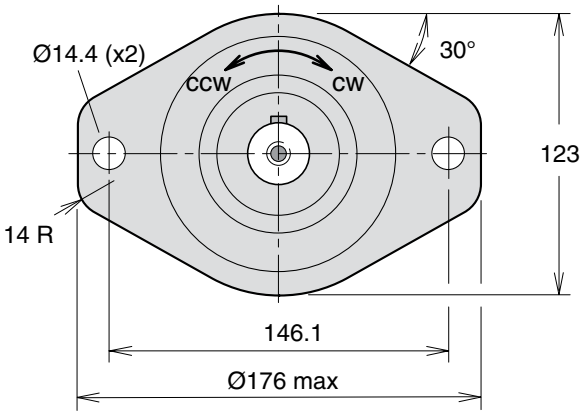
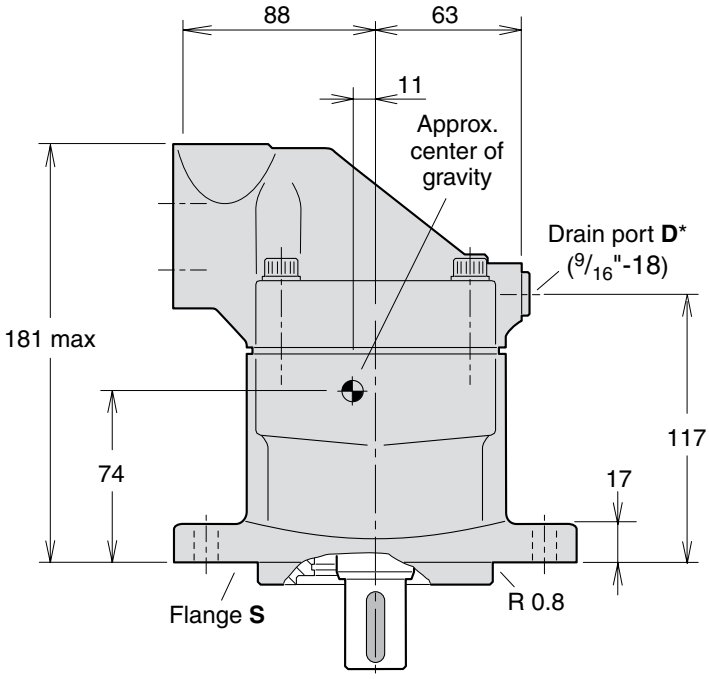
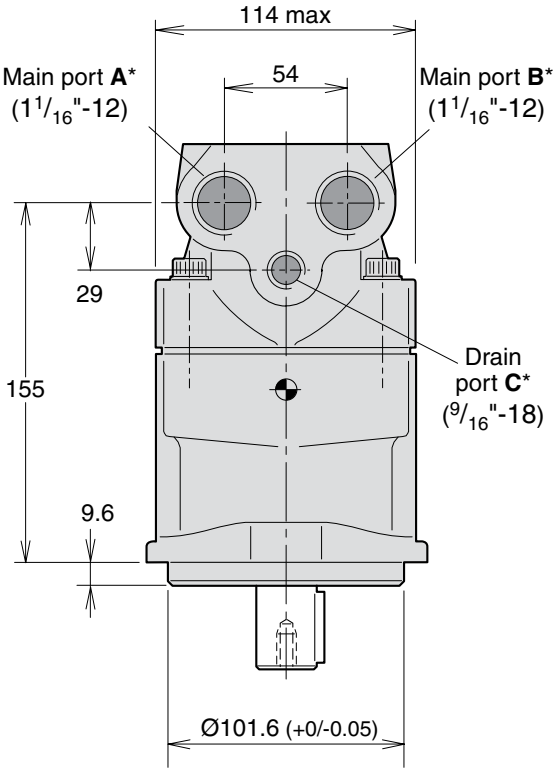
F10-019 fan motor version
(SAE version)



Type **S** mounting flange SAE 'B' (SAE J744c)





* O-ring ports according to SAE J514d

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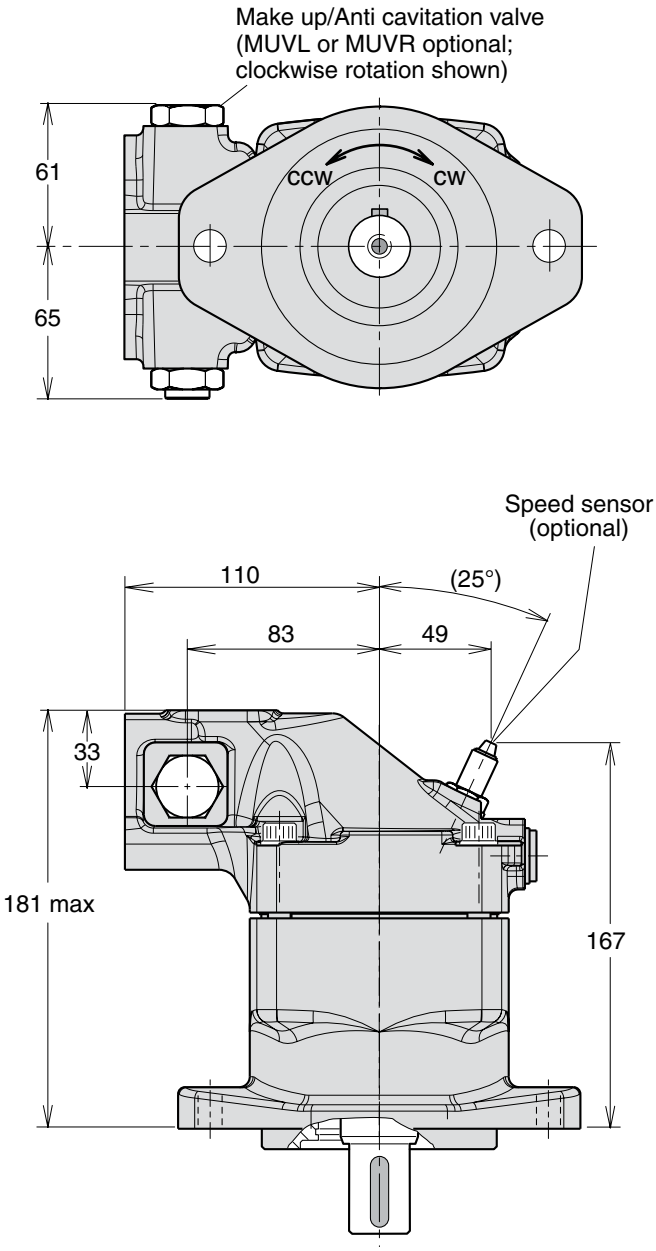
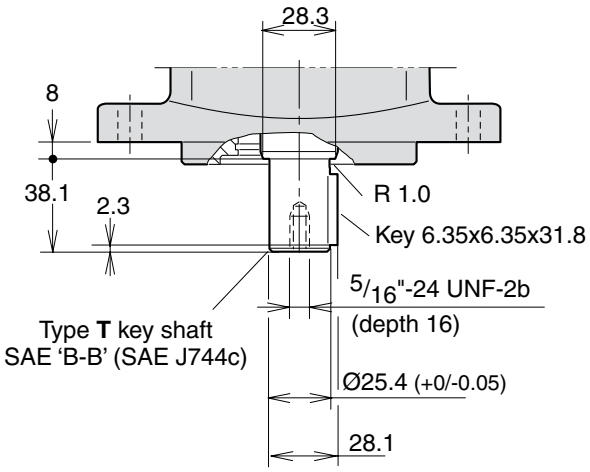
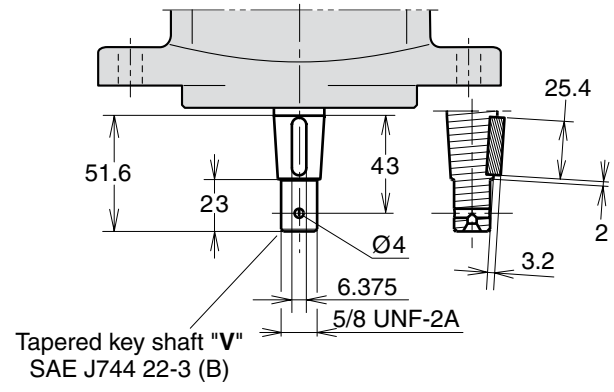
F10-019 fan motor version
(SAE version)



Shaft options





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Hydraulic fluids

The fan motor data shown in the specification are valid when operating on a high quality, mineral based fluid with a minimum of contamination.

Hydraulic fluids type HLP (DIN 51524), ATF (automatic transmission fluid), and API type CD engine oils are suitable.

Operating temperature

The fluid temperature in the main hydraulic system must not exceed 70 °C; the drain fluid must not exceed 115 °C. **NOTE:** Fluid temperature should be measured at the utilized motor drain port.

Case pressure

The service life of the shaft seal ring is affected by the speed of the motor and the case drain pressure and it can decrease with an increase in the frequency of pressure peaks.

Note, seal life can be shorter at unfavourable operating conditions (cavitation, over speed, high temperature, low oil viscosity, contaminated oil).

The case pressure must be equal to or greater than the external pressure on the shaft seal ring.

Viscosity

The ideal viscosity for the fan motor is 15–30 mm^2/s (cSt). When the hydraulic system has reached full operating temperature, the drain fluid viscosity must not be lower than 8 mm^2/s.

(measured at the utilized motor drain port).

Max start-up viscosity: 1 000 mm^2/s..

Filtration

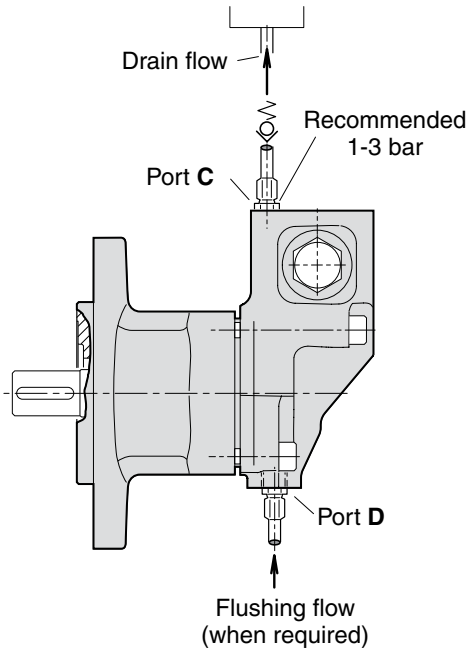
Long fan motor life can be expected if fluid cleanleness meets or exceeds 'ISO code 20/18/13' (according to ISO 4406).

Under normal operating conditions a filtration level of 10 µm (absolute) is recommended.

Case drain connections

Series F10 has two drain ports, C and D.
To secure correct case pressure and lubrication a spring loaded check valve in the drain line is recommended.

F10



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Trollhättan, Sweden

WARNING – USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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