THM HYDRAULICS

TS-F11 & TS-F12

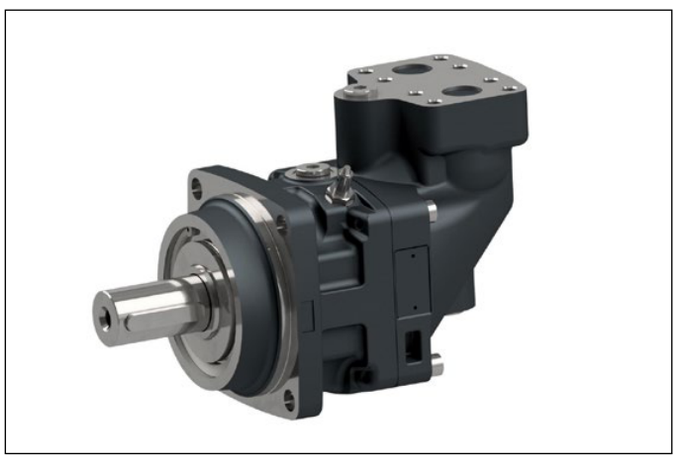
Bent Axis Fixed Displacement Motor /Pump
TS-F11: Displacement: 5~19 cc/rev
Max intermittent pressure up to 420 bar
continuous operating pressure up to 350 bar
TS-F12: Displacement: 30~250 cc/rev
Max intermittent pressure up to 500 bar
continuous operating pressure up to 450 bar

Index

General Product Information

TS-F11 is a bent-axis, fixed displacement motor/pump. It can be used in numerous applications in both open and closed loop circuits.
The TS-F11 series is available in sizes 5, 6, 8, 10, 12, 14 and 19 cc/rev.

TS-F12 is a bent-axis, fixed displacement motor/pump. It can be used in numerous applications in both open and closed loop circuits.
The F12 series is available in sizes 30, 40, 60, 80, 90, 110, 125, 152, 162, 182 and 250 cc.



TS-F11 Features:

- Max intermittent pressure up to 420 bar and continuous operating pressure up to 350 bar
- Thanks to low weight pistons and a compact design of the rotating parts, the TS-F11 tolerates very high speeds, up to 14000 rpm
- CETOP, ISO, SAW and SAE versions

TS-F12 Features:

- Max intermittent pressure up to 500 bar and continuous operating pressure up to 450 bar
- The 7 or 9 piston design provides high start-up torque and smooth motor operation
- ISO, Cartridge, SAW and SAE versions

General Features:

- The laminated piston ring offers important advantages such as unbeatable efficiency and thermal shock resistance
- High allowable speeds and operating pressures means high output power
- The unique piston locking, timing gear and bearing set-up as well as the limited number of parts add up to a very robust design with long service life and, above all, proven reliability.
- The 40° angle between shaft and cylinder barrel allows for a very compact, lightweight motor/pump.
- Small envelop size and a high power-to-weight ratio
- The motor version has highly engineered valve plates for high speed and low noise
- The pump version has highly engineered valve plates for increased self priming speed and low noise, available with left and right hand rotation.
- Our unique timing gear design synchronizes shaft and cylinder barrel, making the TS-F11/TS-F12 very tolerant to high 'G' forces and torsional vibrations.
- Heavy duty roller bearings permit substantial external axial and radial shaft loads.

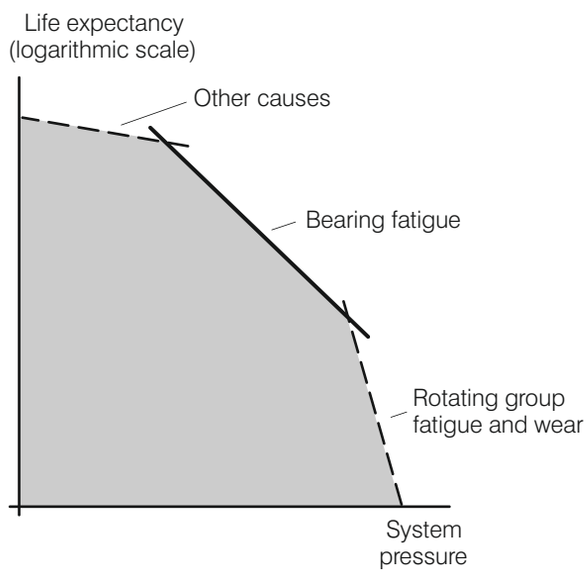
Technical information

General information

Bearing life can be calculated for that part of the load/life curve (shown below) that is designated 'Bearing fatigue'. 'Rotating group fatigue and wear' and 'Other' caused by material fatigue, fluid contamination, etc. should also be taken into consideration when estimating the service life of a motor/pump in a specific application.

Bearing life calculations are mainly used when comparing different frame sizes. Bearing life, designated B10 (or L10), is dependent of system pressure, operating speed, external shaft loads, fluid viscosity in the case, and fluid contamination level.

The B10 value means that 90 % of the bearings survive, at a minimum, the number of hours calculated. Statistically, 50 % of the bearings will survive at least five times the B10 life.



Hydraulic unit life versus system pressure.

Bearing life calculation

An application is usually governed by a certain duty or work cycle where pressure and speed vary with time during the cycle.

In addition, bearing life depends on external shaft forces, fluid viscosity in the case and fluid contamination.

THM has a computer program for calculating bearing life and will assist in determining TS-F11 or TS-F12 motor/pump life in a specific application.

Required information

When requesting a bearing life calculation from THM the following information (where applicable) should be provided:

- A short presentation of the application
- TS-F11 or TS-F12 size and version- Duty cycle (pressure and speed versus time at given displacements)
- Low system pressure
- Case fluid viscosity
- Life probability (B10, B20, etc.)
- Operating mode (pump or motor)
- Direction of rotation (L or R)
- External shaft loads (Forces, Gear, Belt, Cardan or none)

For forces please provide:

- Axial load, Fixed radial load, Bending moment, Rotating radial load and distance flange to radial load.

For Gear please provide:

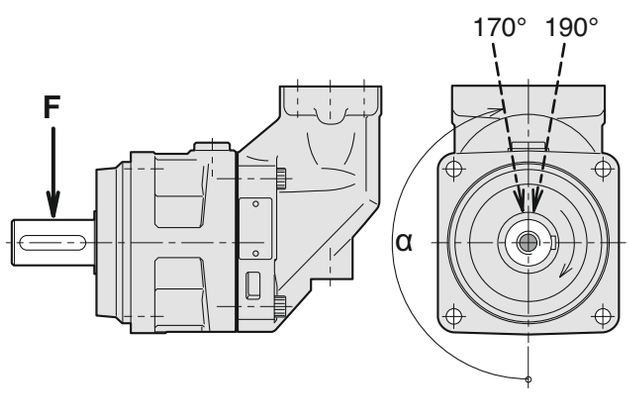
- Pitch diameter, Pressure angle, Spiral angle, Distance flange – gearwheel (mid) and Gearwheel spiral direction (R or L).

For Belt please provide:

- Pretension, Coefficient of friction, Angle of contact, Distance flange – pulley (mid) and Diameter pulley.

For Cardan please provide:

- Shaft angle, Distance flange – first joint and distance between joints
- Angle of attack (α) as defined below



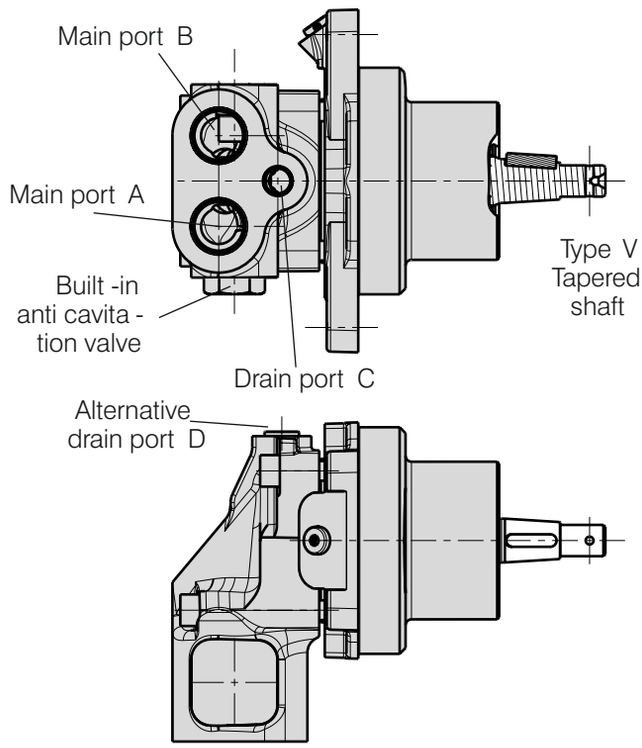
The direction (α) of the radial load is positive in the direction of rotation as shown.

To obtain maximum bearing life, the radial load should, in most cases, be located between 170° and 190°.

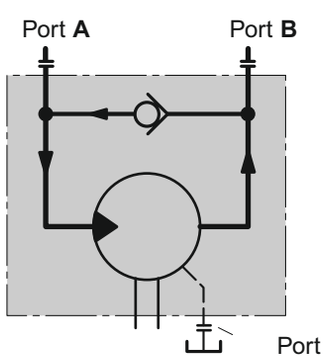
Technical information

TS-F11/TS-F12 Fan motors
TS-F11/TS-F12 motors, in frame sizes -5 to -80 cc, are common in Fan applications. Some typical options are, built in check valve, pressure relief valve, cartridge flange and tapered shaft (refer to the schematic to the right).
The fan motor can be operated at very high speeds without reliability problems. The fan is usually installed directly on the motor shaft without additional bearing support.
The TS-F11/TS-F12 has up to 95 % overall efficiency which reduces the diesel consumption and minimizes the cooling demand.

Fan motor circuit
Because of the built-in anti cavitation valve, either left hand (L) or right hand (R) rotation must be specified when ordering the motor.
When the pump flow to the motor is shut off and the motor is operating at very high speeds, it is important that sufficient return port back pressure is available (port B in the schematic to the right).
The anti cavitation valve will then open and direct flow to the motor inlet port. If the inlet pressure is insufficient, motor cavitation will be experienced.
In an open circuit, back pressure can be created by a coun ter pressure valve installed in the return line; preferably, it should be pilot operated to minimize power losses. A back pressure of about 10 bar is sufficient in most applications.



Fan motor (F11-10 left hand rotated shown)



Schematic Fan motor with anti cavitation valve

Example of ordering code
F11-010-MB-CV-K-000-**MUVL**-P0
MUVL = Make up/anti cavitation valve, counter clockwise rotation
MUVR = Make up/anti cavitation valve, clockwise rotation

Technical information

TS-F11/TS-F12 in saw motor applications

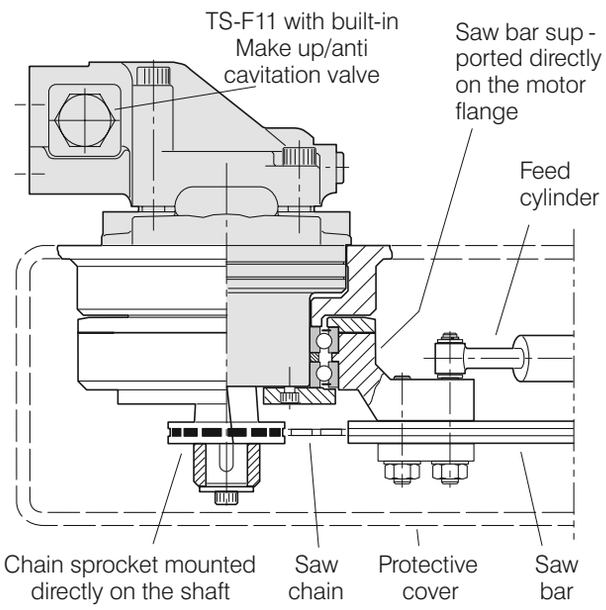
Series TS-F11/TS-F12 motors have proven suitable for demanding applications such as chain saws. Primarily due to the 40° bent-axis design, spherical pistons (with laminated piston rings) and gear synchronization, very high speeds are permissible. Not even low temperatures at start-up affect reliability.

Because of the built-in anti cavitation valve, either left hand (L) or right hand (R) rotation must be specified when ordering the motor.

When the pump flow to the motor is shut off and the motor is operating at very high speeds, it is important that sufficient return port back pressure is available.

The anti cavitation valve will then open and direct flow to the motor inlet port. If the inlet pressure is insufficient, motor cavitation will be experienced.

To further enhance the saw function and, at the same time, reduce weight, cost and installation dimensions, a specific saw motor has been developed (frame sizes TS-F11-6, -8, -10, -12, -14, -19, TS-F12-30 and -40; refer to the illustration to the right) which is specifically dedicated to bar saws. The motor allows the saw bar bearings to be mounted directly on the motor housing, and the sprocket installs on the motor shaft without additional bearings.



Chain saw installation (example; TS-F11-10 shown)

Specifications TS-F11

Frame size TS-F11		-005	-006	-008	-010	-012	-014	-019
Displacement	[cm³/rev]	4.9	6.0	8.0	9.8	12.5	14.3	19.0
Operating pressure								
Max intermittent[1)]	[bar]	420	420	420	420	420	420	420
Max continuous	[bar]	350	350	350	350	350	350	350
Motor operating speed	[rpm]							
Max intermittent[1)]		14 000	11 200	11 200	11 200	10 300	9 900	8 900
Max continuous		12 800	10 200	10 200	10 200	9 400	9 000	8 100
Min continuous		50	50	50	50	50	50	50
Max pump selfpriming speed[2)]								
L or R function; max [rpm]		4 600	–	4200	4 200	3 900	3 900	3 500
Motor input flow								
Max intermittent[1)]	[l/min]	69	67	90	110	129	142	169
Max continuous	[l/min]	63	61	82	100	118	129	154
Drain temperature , max	[°C]	115	115	115	115	115	115	115
min	[°C]	-40	-40	-40	-40	-40	-40	-40
Theoretical torque at 100 bar	[Nm]	7.8	9.5	9.5	15.6	19.8	22.7	30.2
Mass moment of inertia								
(x10 $^{-3}$)	[kg m²]	0.16	0.39	0.39	0.39	0.40	0.42	1.1
Weight	[kg]	4.7	6.5	6.5	6.5	7.5	7.5	11

1) Intermittent: max 6 seconds in any one minute.
2) Selfpriming speed valid at sea level. Find more info on page 08

Technical Specifications TS-F11

Efficiency

Because of its high overall efficiency, driving a motor/pump from series TS-F11 requires less fuel or electric power. Also, it allows the use of a small reservoir and heat exchanger, which in turn reduce cost, weight, and installation size.

The diagrams to the right show volumetric and mechanical efficiencies of an TS-F11-5 motor.

TS-F11-19 motors can be equipped with Power Boost which in high speed applications can decrease the mechanical losses by up to 15 %, see page 5.

Contact THM for efficiency information on a particular TS-F11 frame size that is being considered.

Noise level

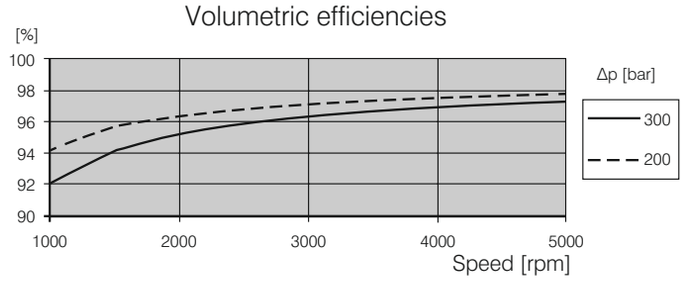
Series TS-F11 feature low noise levels from low to high speeds and pressures.

The noise level is measured in a semi-anechoic room, 1m behind the unit. As an example, the diagram to the right shows the noise level of an TS-F11-005.

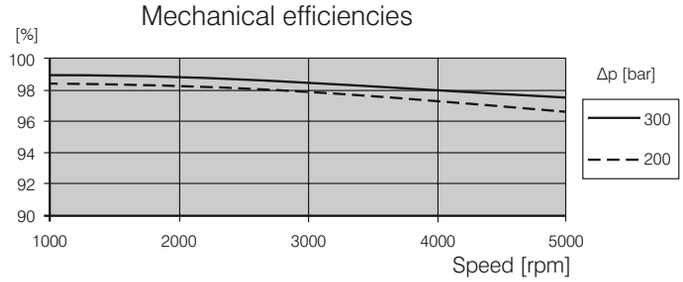
The noise level for a particular motor/pump may vary ±2 dB(A) compared to what is shown in the diagram.

NOTE: Noise information for TS-F11/TS-F12 frame sizes are available from THM

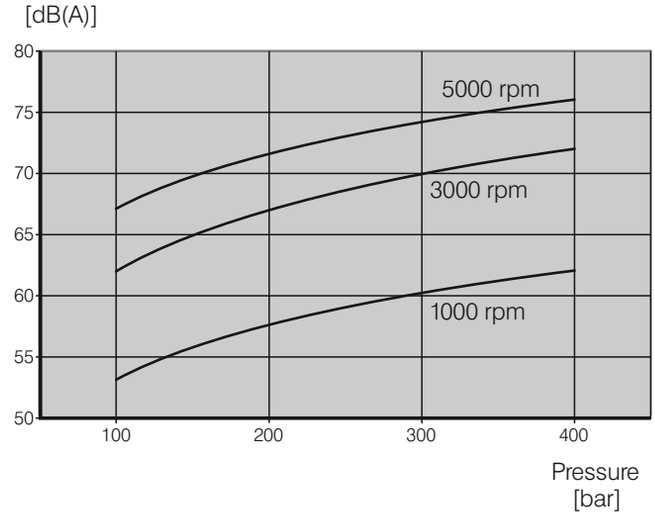
Volumetric efficiencies



Mechanical efficiencies



Noise level [dB(A)]



Technical Specifications TS-F11

Selfpriming speed and required inlet pressure

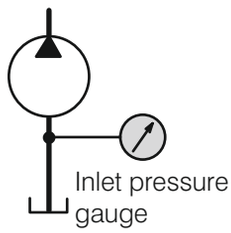
Series TS-F11

In pump applications, the F11 with function **L** (counter clockwise rotation) or **R** (clockwise rotation) is normally used. The L and R (pump) provide the highest self priming speeds (see table) as well as the lowest noise level. The **M** and **H** (motor) function can also be used as a pump, in either direction, but at a lower self priming speed.

Operating above the self priming speed (refer to Diagram 1) requires increased inlet pressure. As an example, at least 1.0 bar is needed when operating the F11-19-M as a pump at 3500 rpm. An F11 used as a motor (e.g. in a hydrostatic transmission), may sometimes operate as a pump at speeds above the selfpriming speed; this requires additional inlet pressure. Insufficient inlet pressure can cause pump cavitation resulting in greatly increased pump noise and deteriorating performance.

Function	Pump version	Motor version
TS-F11-5	4600	3800
TS-F11-6		3100
TS-F11-8	4200	3100
TS-F11-10	4200	3100
TS-F11-12	3900	3000
TS-F11-14	3900	3000
TS-F11-19	3500	2400

* Valve plate S



TS-F11 Motor version

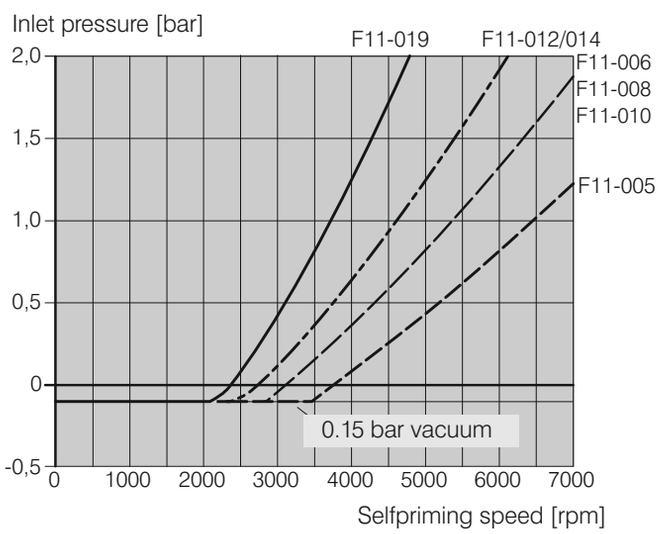


Diagram 1. Min required inlet pressure for Motor.

TS-F11 Pump version

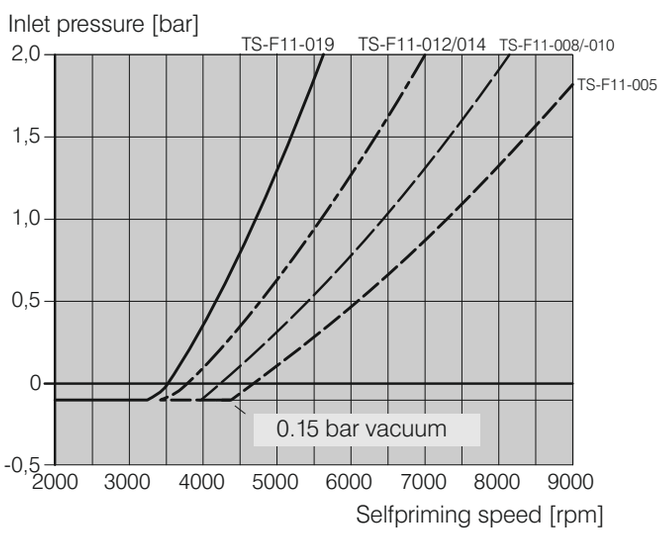


Diagram 2. Min required inlet pressure for Pump.

- The inlet pressure can be charged by external pump, pressurized reservoir or using BLA Boost unit

Ordering Code TS-F11

F11-CETOP

TS-F11 — ☐ — ☐ ☐ ☐ — ☐ ☐ — ☐ — ☐ — ☐ — ☐

Frame size · Function · Main ports · Mounting flange · Shaft seal · Shaft · Version number · Option page 4 · Option page 5

Frame size	
Code	Displacem. (cm^3/rev)
005	4.9
006	6.0
008	8.0
010	9.8
012	12.5
014	14.3
019	19.0

Version number
(assigned for special versions)

Frame size		5	6	8	10	12	14	19
Code	Function							
M	Motor	x	x	-	x	-	-	x
Q	Motor, low noise	x	-	x	x	x	x	x
S	Motor, high speed	-	-	(x)	(x)	(x)	(x)	(x)
H	Motor, high pressure	(x)	-	-	(x)	-	-	(x)
R	Pump, clockwise rot'n	(x)	-	(x)	(x)	(x)	(x)	(x)
L	Pump, counter clockw.	(x)	-	(x)	(x)	(x)	(x)	(x)

For other versions, contact THM

Frame size		5	6	8	10	12	14	19
Code	Option							
0000	Standard	x	x	x	x	x	x	x
MUVR	Make up/Anti cavitation valve clockwise rotation	-	(x)	(x)	(x)	(x)	(x)	(x)
MUVL	Make up/Anti cavitation valve counter clockwise rotation	-	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		5	6	8	10	12	14	19
Code	Shaft*							
K	Metric key	x	x	x	x	x	x	x
J	Metric key	(x)	(x)	(x)	(x)	(x)	-	-
P	Metric key	-	-	-	-	-	(x)	-
A	Spline, DIN 5480	-	(x)	(x)	(x)	(x)	-	-
D	Spline, DIN 5480	x	x	x	x	x	x	x
S	Spline, SAE	(x)	-	-	-	-	-	-
V	Tapered shaft	-	(x)	(x)	(x)	(x)	(x)	-

*See also dimensional drawings .

Frame size		5	6	8	10	12	14	19
Code	Main ports							
B	BSP threads	x	x	x	x	x	x	x
U	SAE, UN threads	(x)	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		5	6	8	10	12	14	19
Code	Mounting flange							
C	CETOP flange	x	x	x	x	x	x	x

Frame size		5	6	8	10	12	14	19
Code	Shaft seal							
V	FPM, high pressure, high temperature	x	x	x	x	x	x	x

For other versions, contact THM

Frame size		5	6	8	10	12	14	19
Code	Option							
00	Standard	x	x	x	x	x	x	x
P_	Prepared for speed sensor	-	x	x	x	x	x	x
B_	Power Boost and Prepared for speed sensor	-	(x)	(x)	(x)	(x)	(x)	(x)
_T	Painted Black	(x)	(x)	(x)	(x)	(x)	(x)	(x)

x: Available (x): Optional – : Not available

NOTE
All combinations are not valid, please contact THM

Ordering Code TS-F11

F11-ISO

TS-F11 — [ ] — [ ] [ ] [ ] [ ] [ ] — [ ] [ ] — [ ] — [ ] — [ ] — [ ]

Frame size · Function · Main ports · Mounting flange · Shaft seal · Shaft · Version number · Option page 4 · Option page 5

Frame size	
Code	Displacem. (cm^3/rev)
006	6.0
008	8.0
010	9.8
012	12.5
014	14.3

Version number
(assigned for special versions)

Frame size		6	8	10	12	14
Code	Function					
M	Motor	x	-	x	-	-
Q	Motor, low noise	-	x	x	x	x
S	Motor, high speed	-	(x)	(x)	(x)	(x)
H	Motor, high pressure	-	-	(x)	-	-
R	Pump, clockwise rot'n	-	(x)	(x)	(x)	(x)
L	Pump, counter clockw.	-	(x)	(x)	(x)	(x)

For other versions, contact THM

Frame size		6	8	10	12	14
Code	Main ports					
F	Metric threads	(x)	(x)	x	x	x
B	BSP threads	x	x	(x)	(x)	(x)
M	Side ports, metric	(x)	(x)	(x)	(x)	(x)

Frame size		6	8	10	12	14
Code	Mounting flange					
I	ISO flange	x	x	x	x	x

Frame size		6	8	10	12	14
Code	Shaft seal					
V	FPM,high pressure, high temperature	x	x	x	x	x

For other versions, contact THM

Frame size		6	8	10	12	14
Code	Shaft*					
K	Metric key	x	x	x	x	x
J	Metric key	(x)	(x)	(x)	(x)	-
P	Metric key	-	-	-	-	(x)
A	Spline, DIN 5480	(x)	(x)	(x)	(x)	-
D	Spline, DIN 5480	x	x	x	x	x
V	Tapered shaft	(x)	(x)	(x)	(x)	(x)

*See also dimensional drawings

Frame size		6	8	10	12	14
Code	Option					
0000	Standard	x	x	x	x	x
MUVR	Make up/Anti cavitation valve clockwise rotation	(x)	(x)	(x)	(x)	(x)
MUVL	Make up/Anti cavitation valve counter clockwise rotation	(x)	(x)	(x)	(x)	(x)

Frame size		6	8	10	12	14
Code	Option					
00	Standard	x	x	x	x	x
P_	Prepared for speed sensor	x	x	x	x	x
B_	Power Boost and Prepared for speed sensor	(x)	(x)	(x)	(x)	(x)
_T	Painted Black	(x)	(x)	(x)	(x)	(x)

x: Available (x): Optional – : Not available

NOTE
All combinations are not valid, please contact THM

Ordering Code TS-F11

F11-SAE

TS-F11 — ☐ — ☐ ☐ ☐ — ☐ ☐ — ☐ — ☐ — ☐ — ☐

Frame size · Function · Main ports · Mounting flange · Shaft seal · Shaft · Version number · Option page 4 · Option page 5

Frame size	
Code	Displacem. (cm^3/rev)
006	6.0
008	8.0
010	9.8
012	12.5
014	14.3
019	19.0

Version number
(assigned for special versions)

Frame size		6	8	10	12	14	19
Code	Function						
M	Motor	x	-	x	-	-	x
Q	Motor, low noise	-	x	x	x	x	x
S	Motor, high speed	-	(x)	(x)	(x)	(x)	(x)
H	Motor, high pressure	-	-	(x)	-	-	(x)
R	Pump, clockwise rot'n	-	(x)	(x)	(x)	(x)	(x)
L	Pump, counter clockw.	-	(x)	(x)	(x)	(x)	(x)

For other versions, contact THM

Frame size		6	8	10	12	14	19
Code	Option						
0000	Standard	x	x	x	x	x	x
MUVR	Make up/Anti cavitation valve clockwise rotation	(x)	(x)	(x)	(x)	(x)	(x)
MUVL	Make up/Anti cavitation valve counter clockwise rotation	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		6	8	10	12	14	19
Code	Shaft*						
T	SAE key	x	x	x	x	x	x
S	SAE spline	x	x	x	x	x	x
K	Metric key	(x)	(x)	(x)	(x)	-	-
J	Metric key	(x)	(x)	(x)	(x)	-	-
V	Tapered shaft	(x)	(x)	(x)	(x)	(x)	-

* See also dimensional drawings

Frame size		6	8	10	12	14	19
Code	Main ports						
U	SAE, UN threads	x	x	x	x	x	x
B	BSP threads	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		6	8	10	12	14	19
Code	Mounting flange						
S	SAE flange	x	x	x	x	x	x

Frame size		6	8	10	12	14	19
Code	Shaft seal						
V	FPM,high pressure, high temperature	x	x	x	x	x	x

For other versions, contact THM

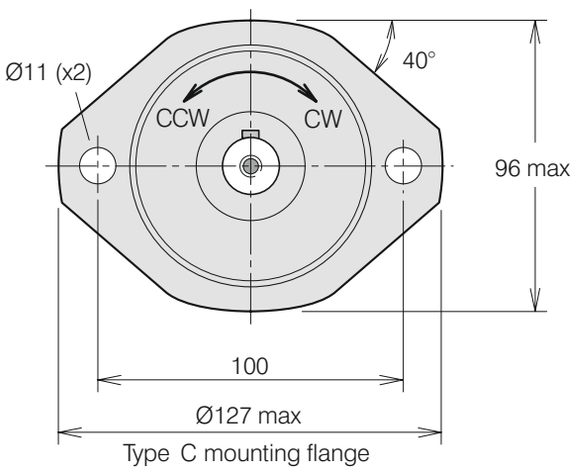
Frame size		6	8	10	12	14	19
Code	Option						
00	Standard	x	x	x	x	x	x
P_	Prepared for speed sensor	x	x	x	x	x	x
B_	Power Boost and Prepared for speed sensor	(x)	(x)	(x)	(x)	(x)	(x)
_T	Painted Black	(x)	(x)	(x)	(x)	(x)	(x)

x: Available (x): Optional – : Not available

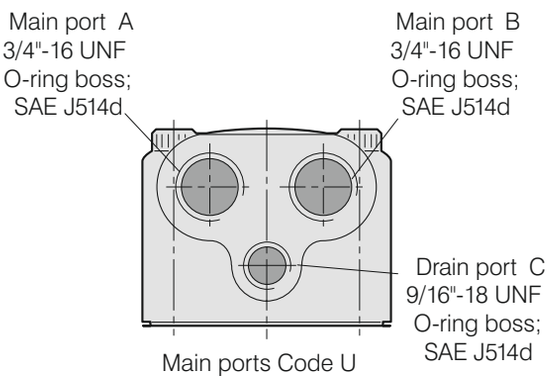
NOTE
All combinations are not valid, please contact THM

Installation Dimensions TS-F11

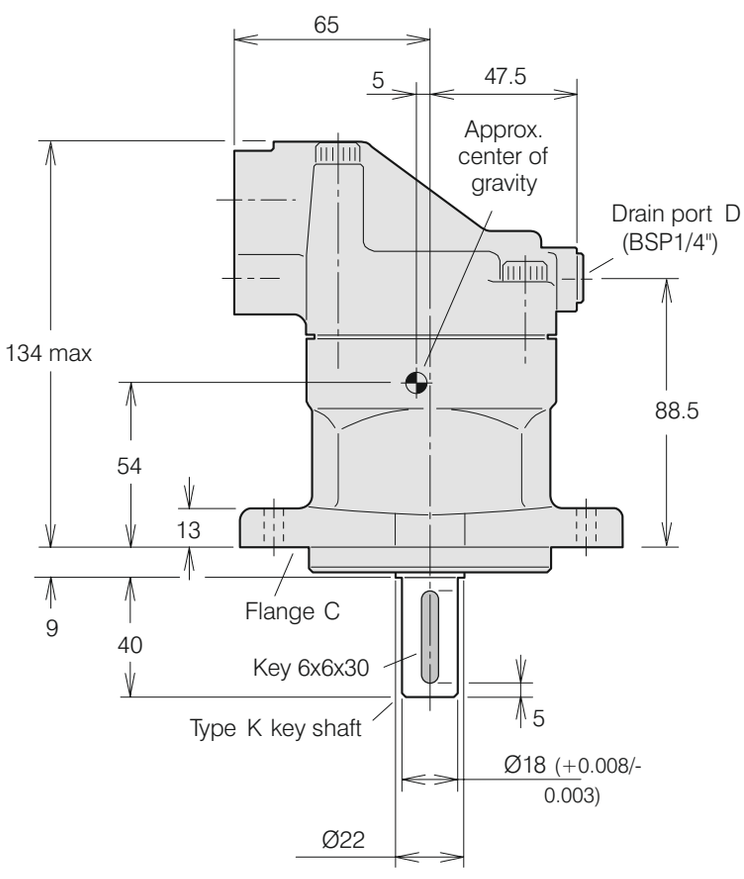
TS-F11-005 (CETOP versions)

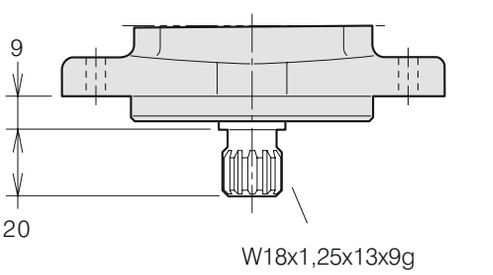


Type C mounting flange

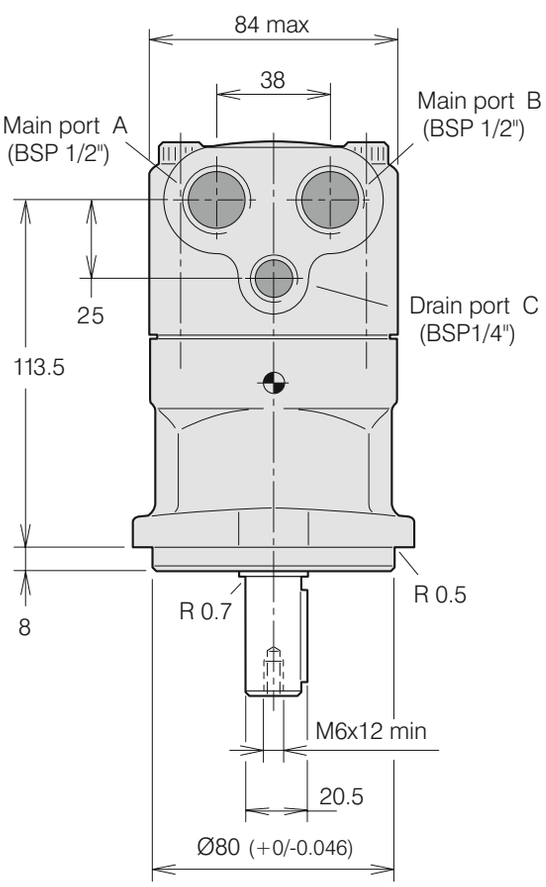


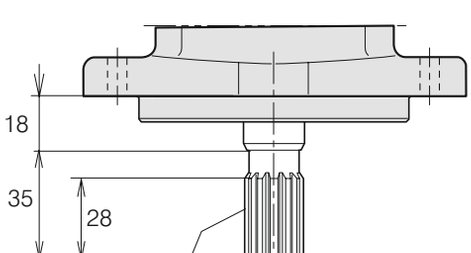
Main ports Code U





W18x1,25x13x9g
Type D spline shaft (DIN 5480)

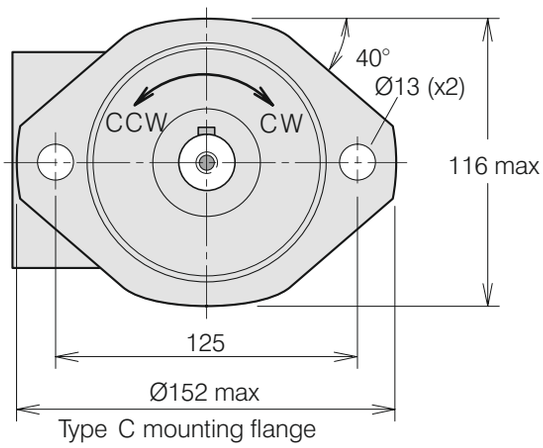


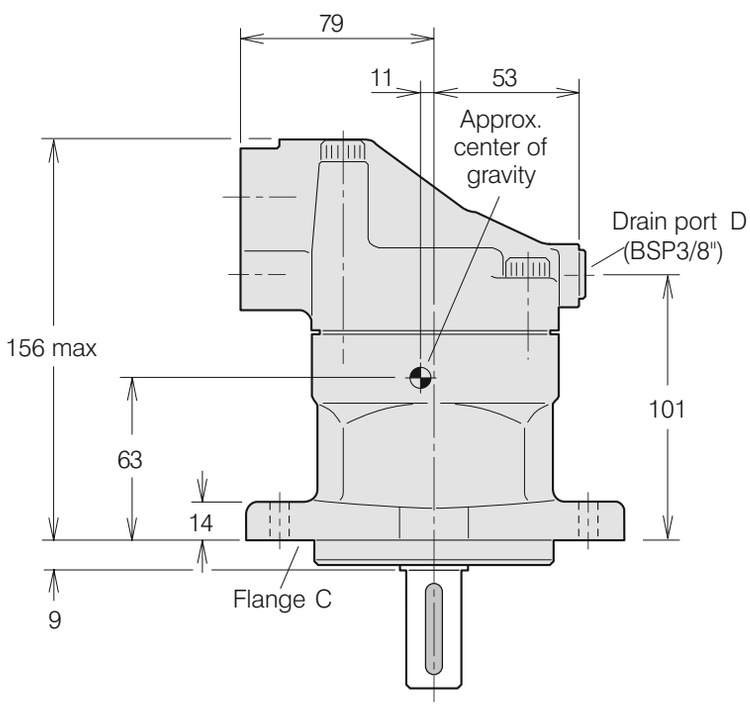


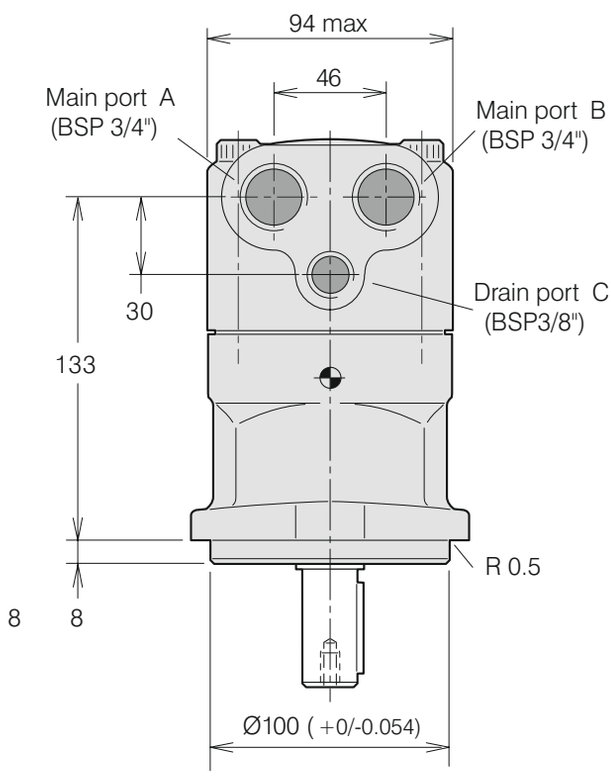
Type S spline shaft (13T16/32 DP)

Installation Dimensions TS-F11

TS-F11-006, -008, -010 (CETOP versions)

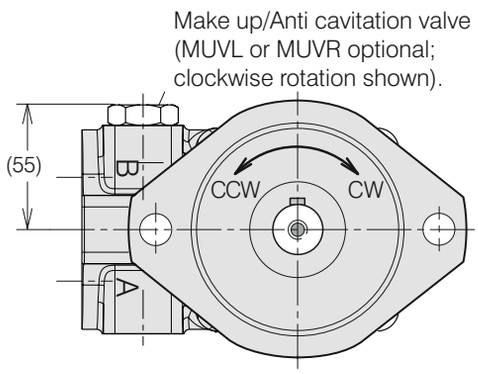


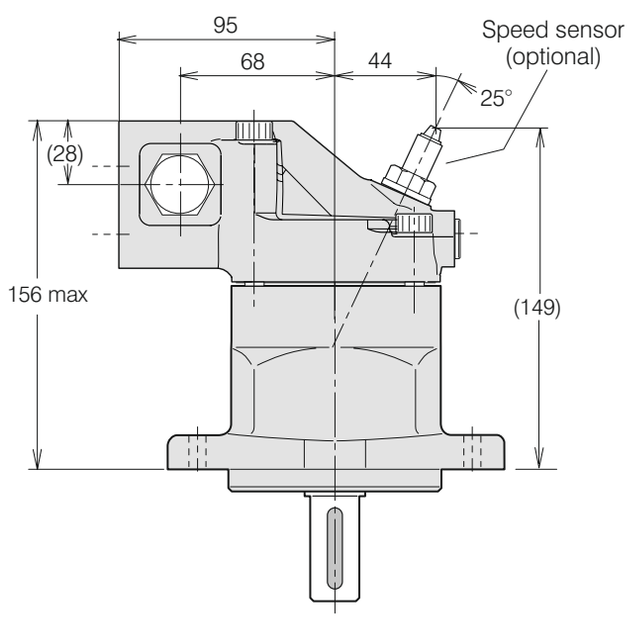




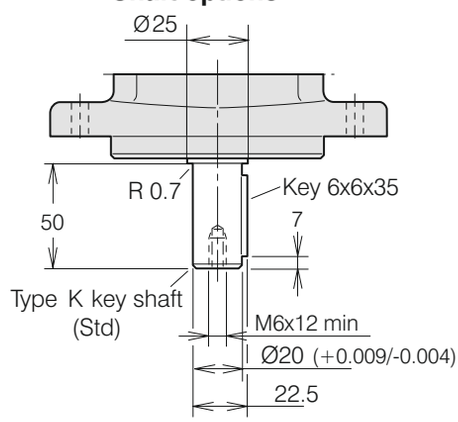
Installation Dimensions TS-F11

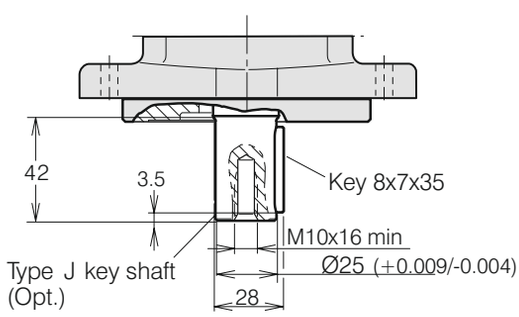
TS-F11-006, -008, -010 (CETOP versions)

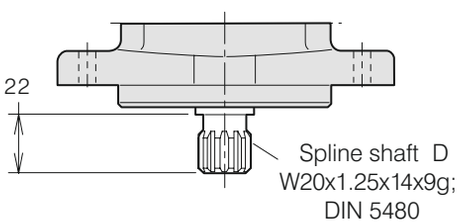


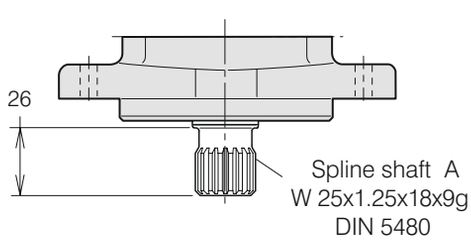


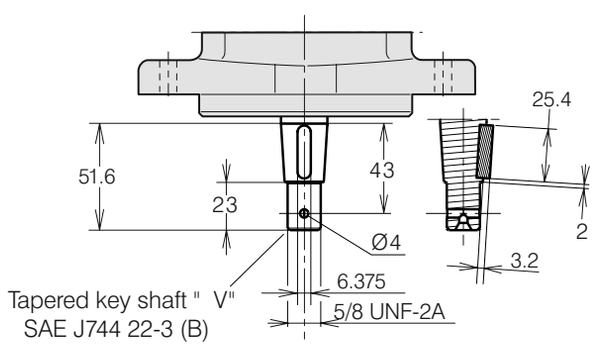
Shaft options





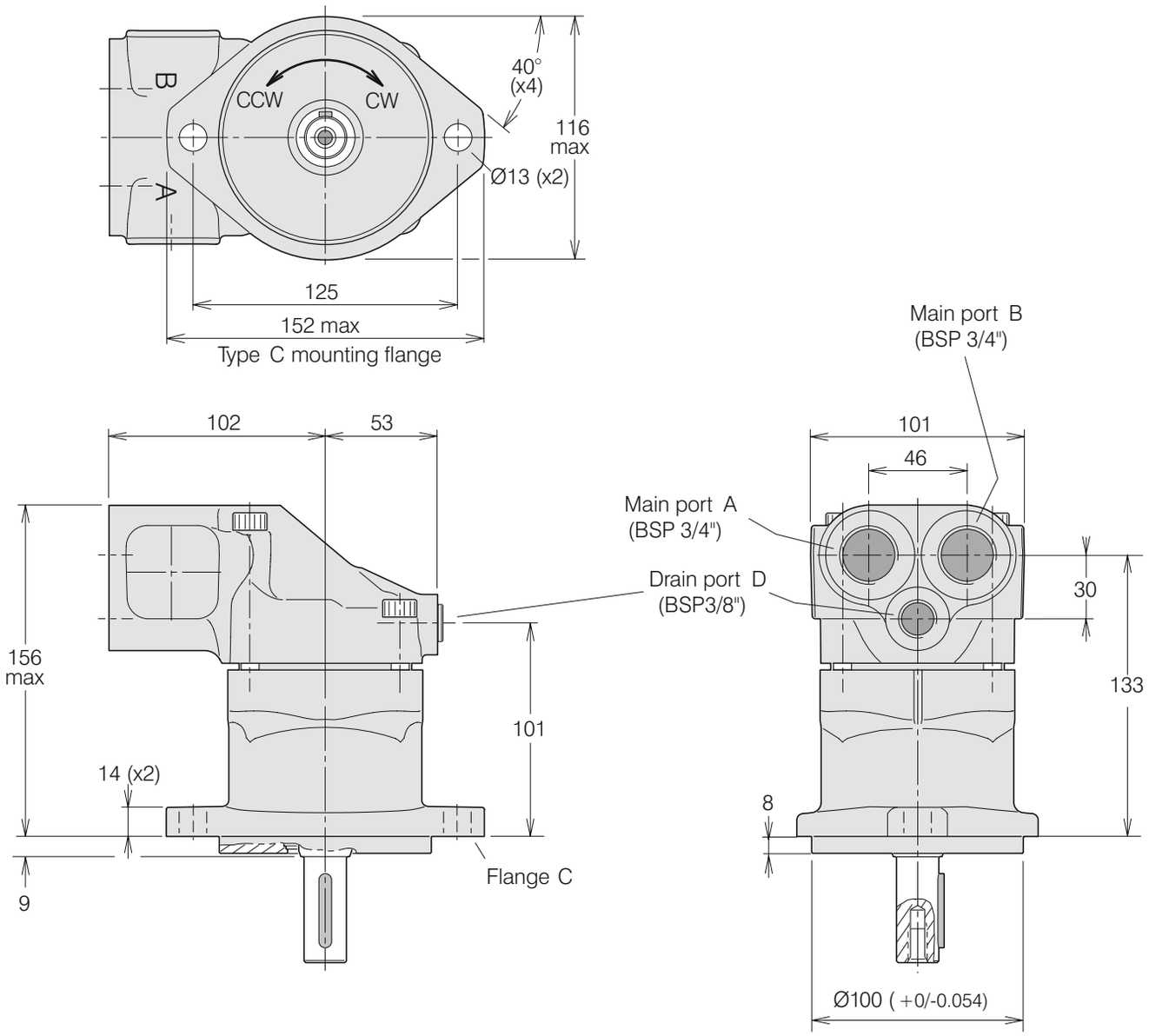






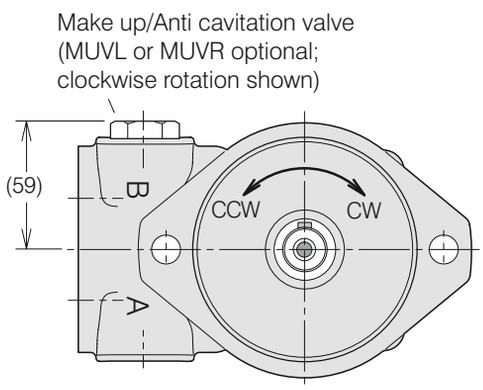
Installation Dimensions TS-F11

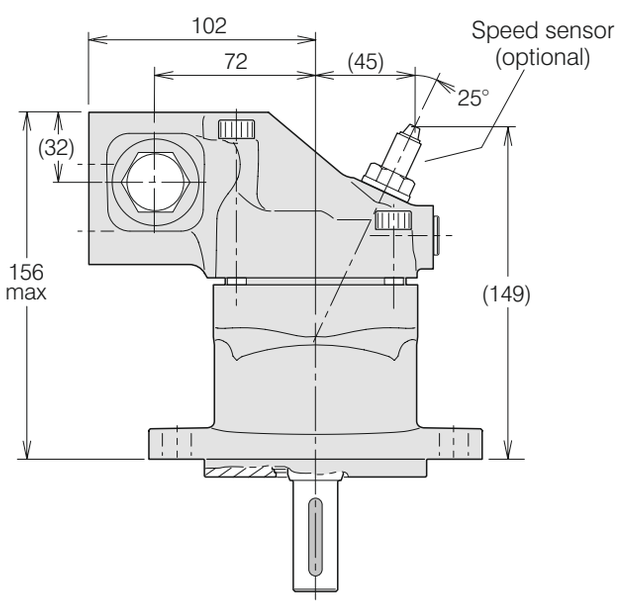
TS-F11-012 (CETOP versions)



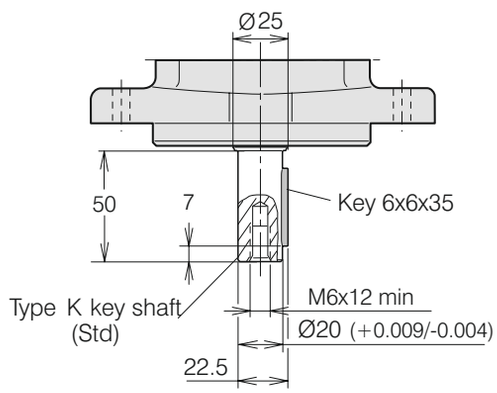
Installation Dimensions TS-F11

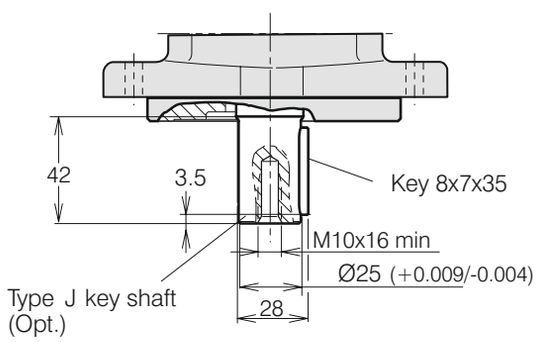
TS-F11-012 (CETOP versions)

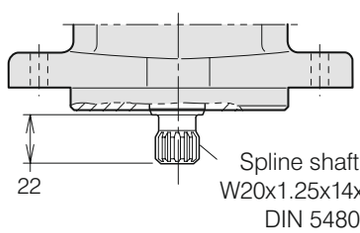


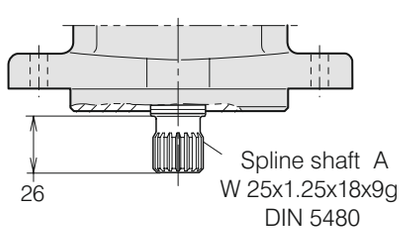


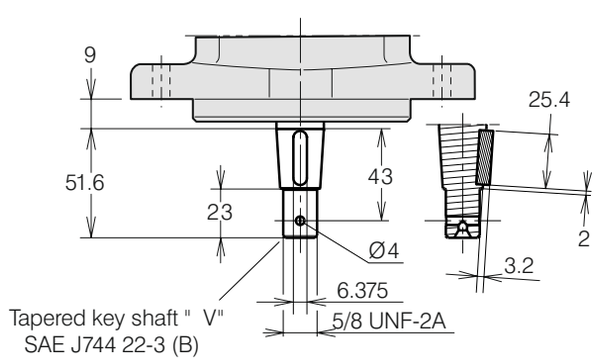
Shaft options





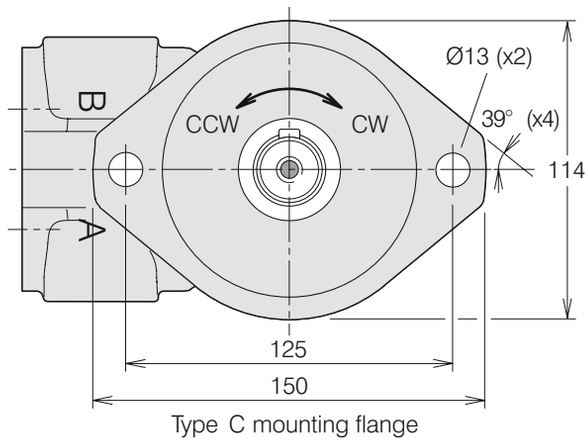


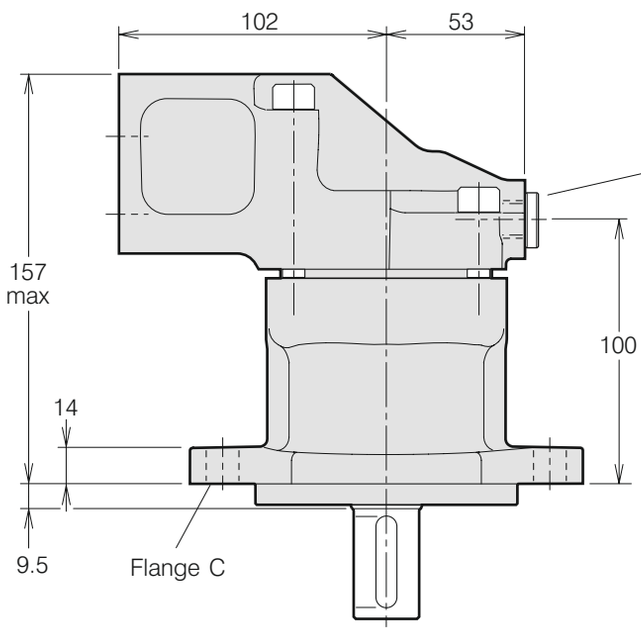


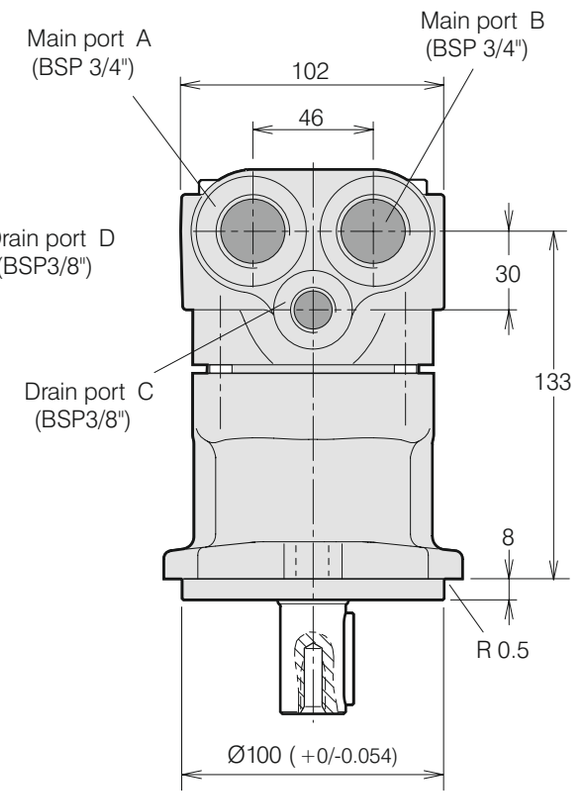


Installation Dimensions TS-F11

TS-F11-014 (CETOP versions)

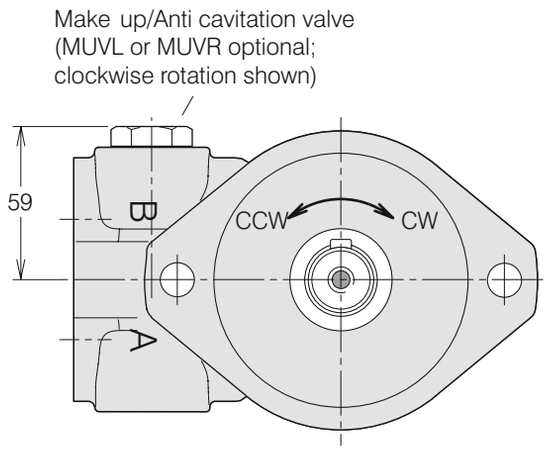


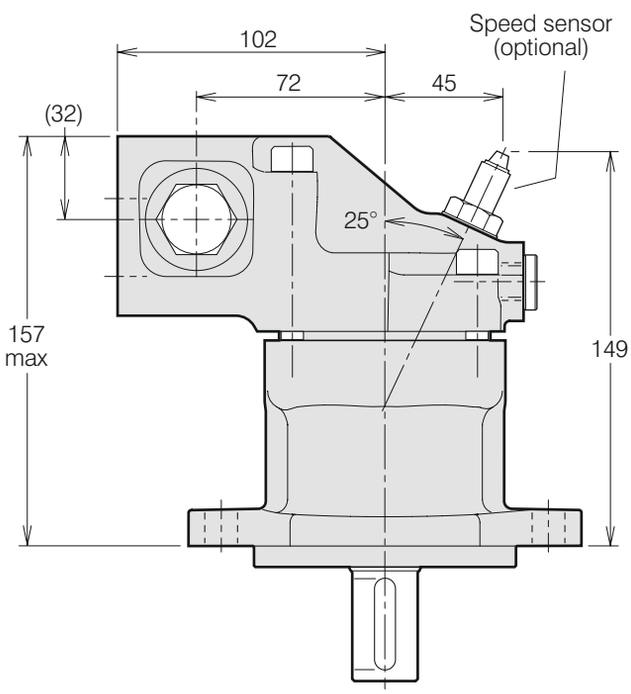




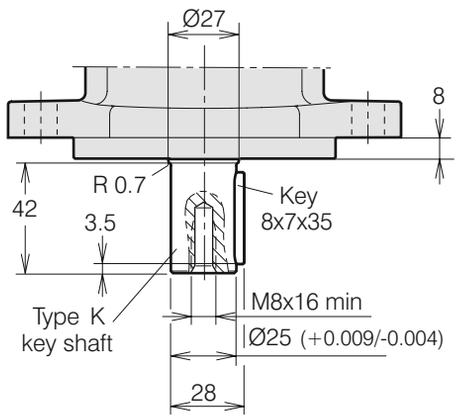
Installation Dimensions TS-F11

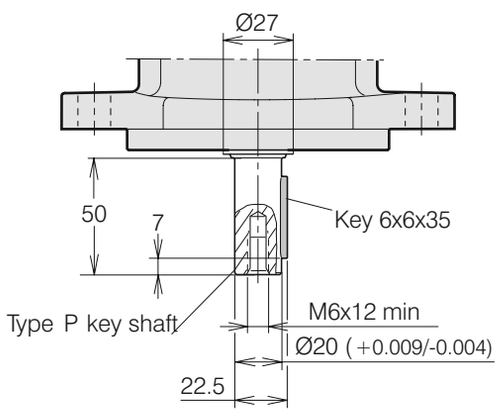
TS-F11-014 (CETOP versions)

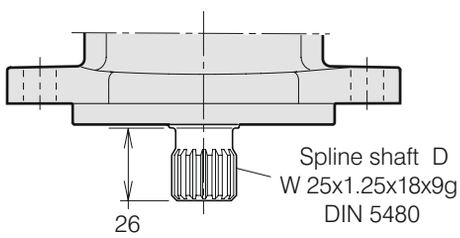


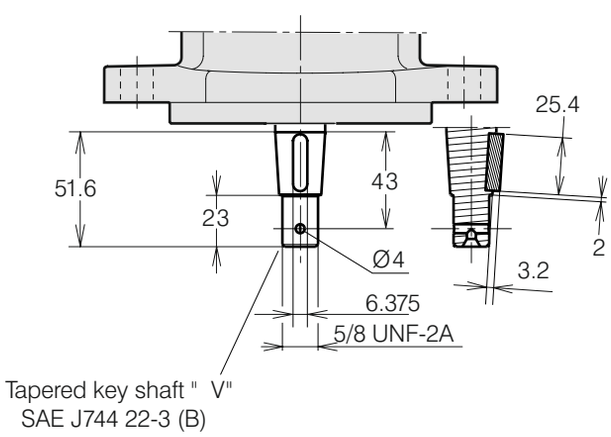


Shaft options



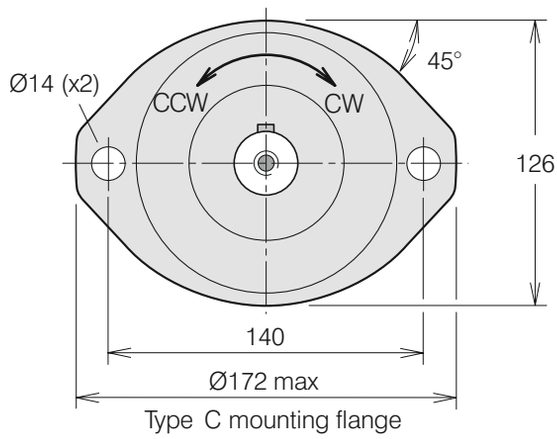


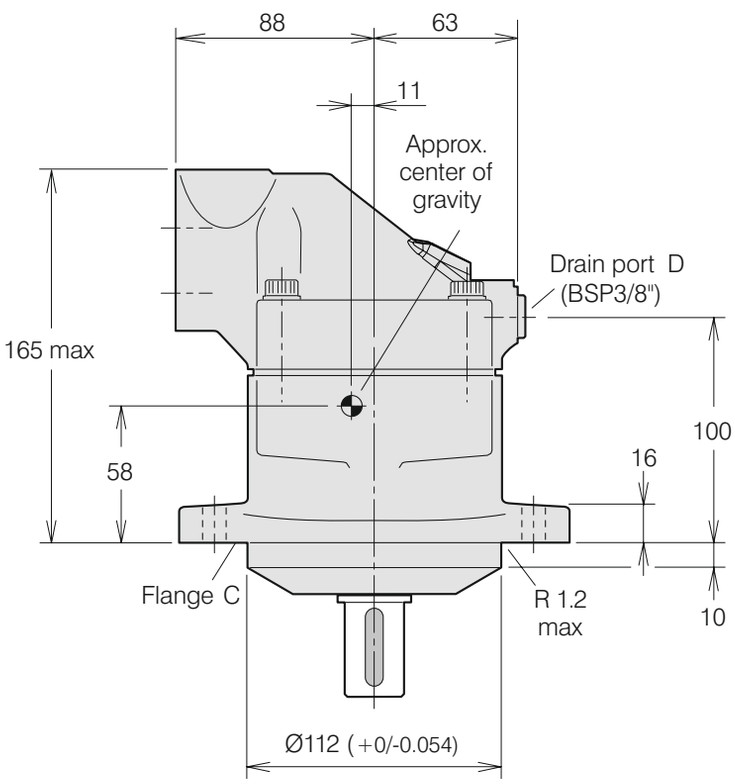


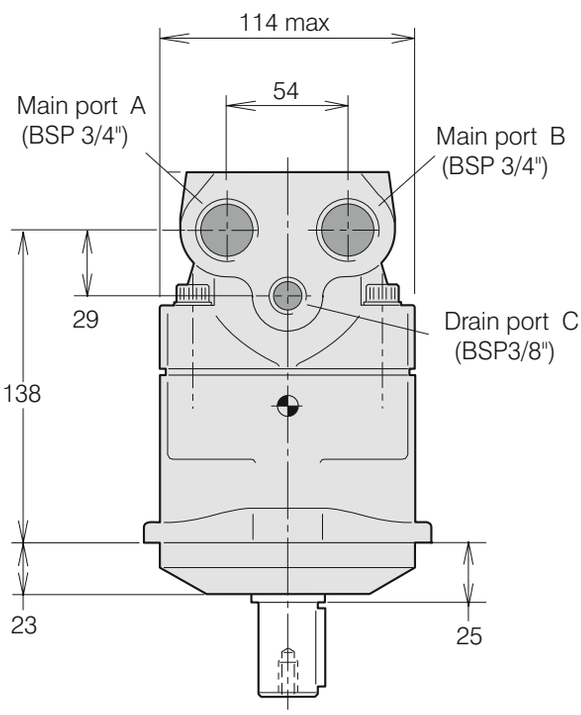


Installation Dimensions TS-F11

TS-F11-019 (CETOP version)

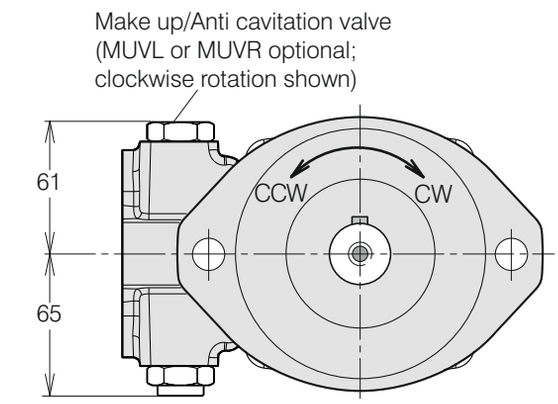


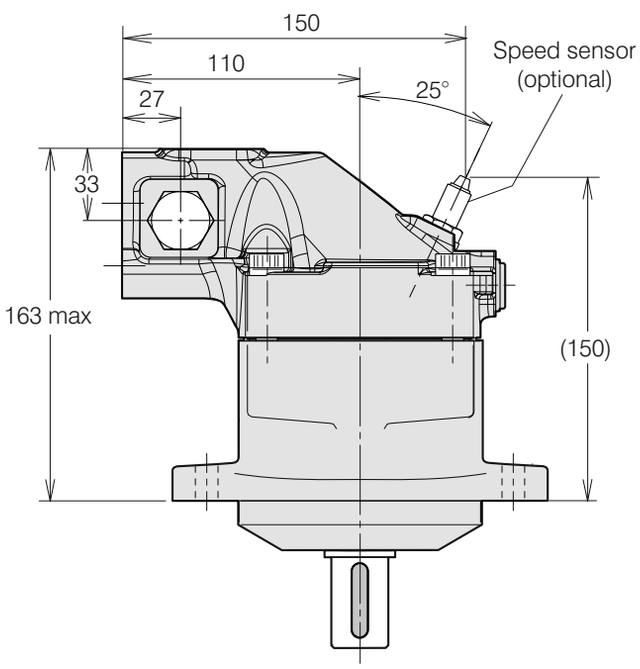




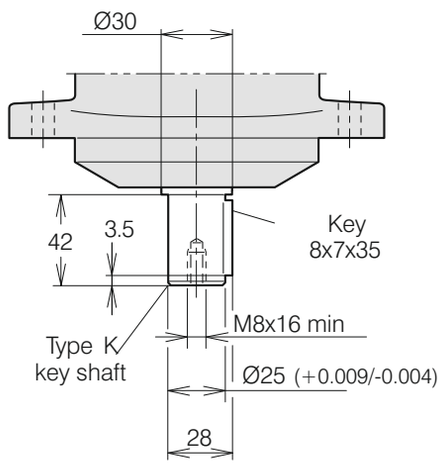
Installation Dimensions TS-F11

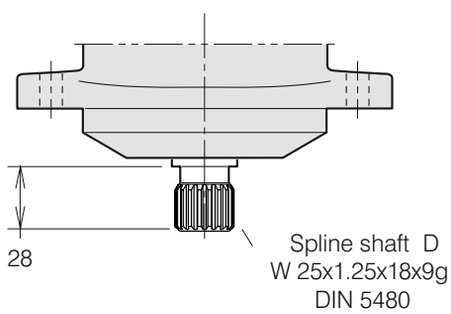
TS-F11-019 (CETOP version)





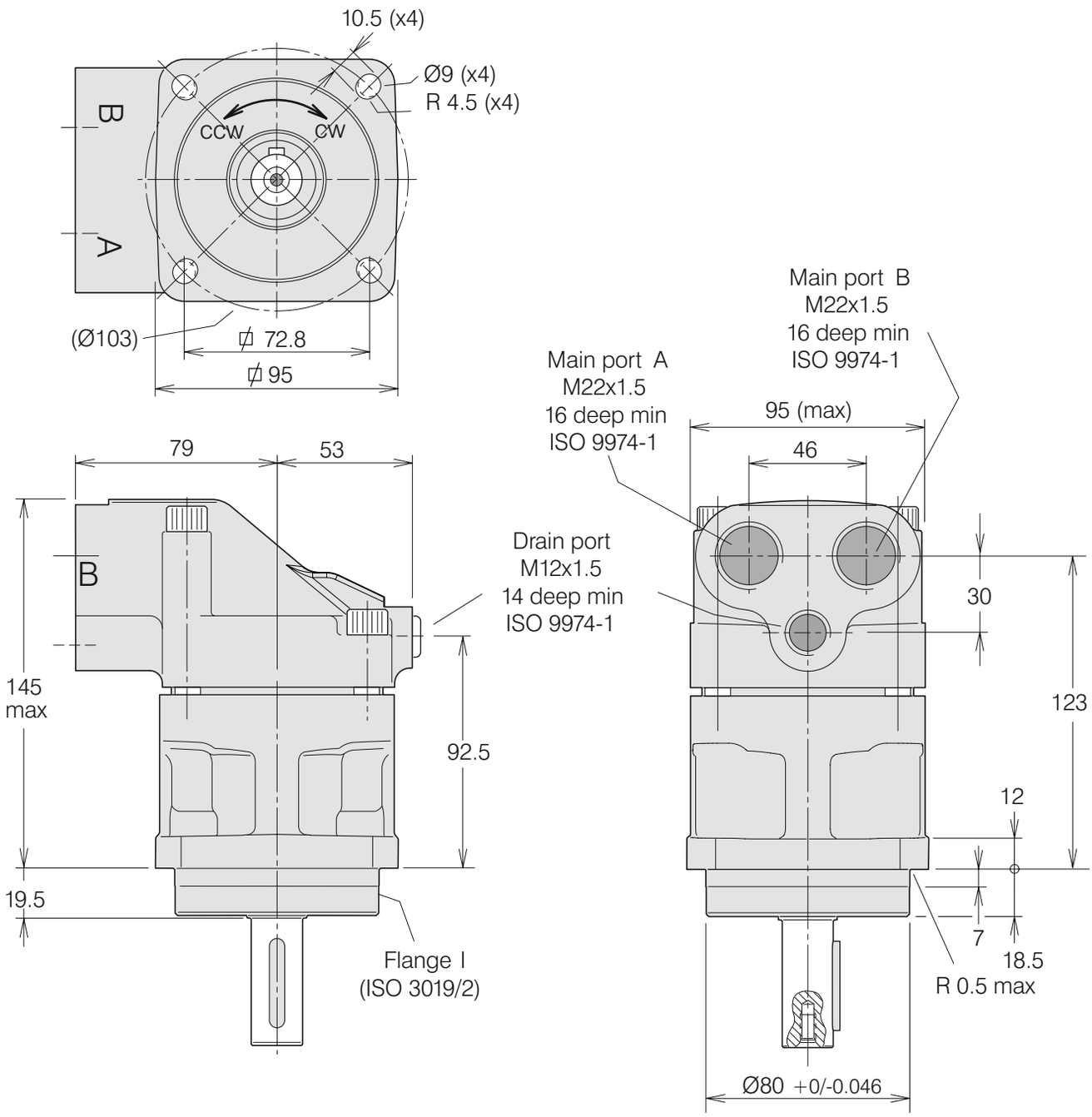
Shaft options





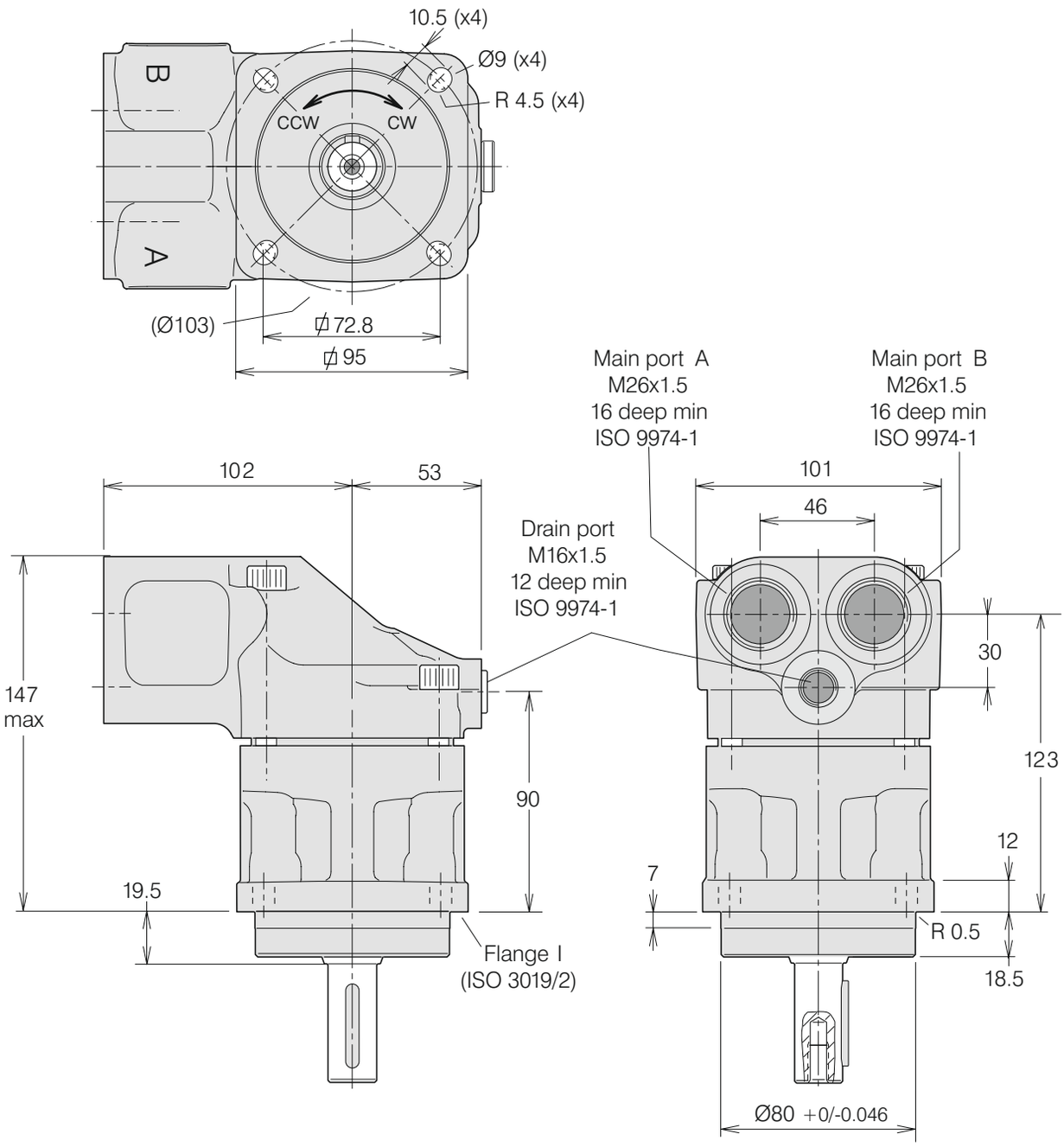
Installation Dimensions TS-F11

TS-F11-006, -008, -010 (ISO versions)



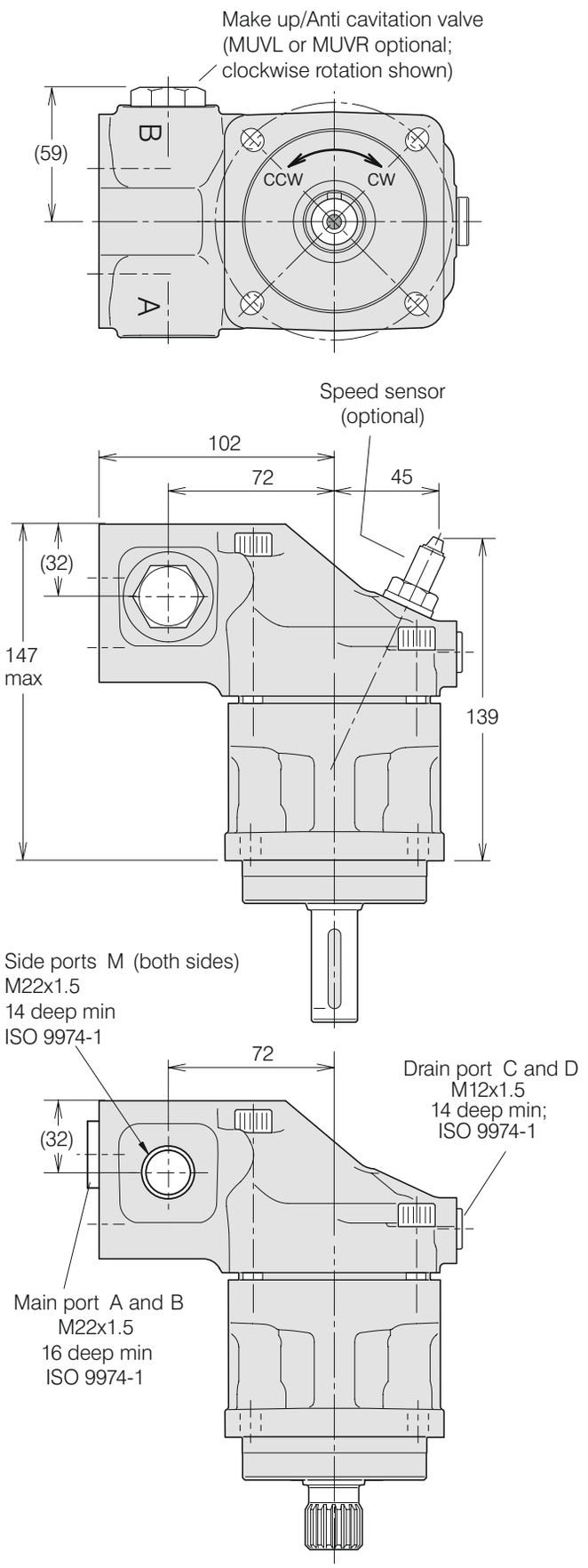
Installation Dimensions TS-F11

TS-F11-012 (ISO versions)

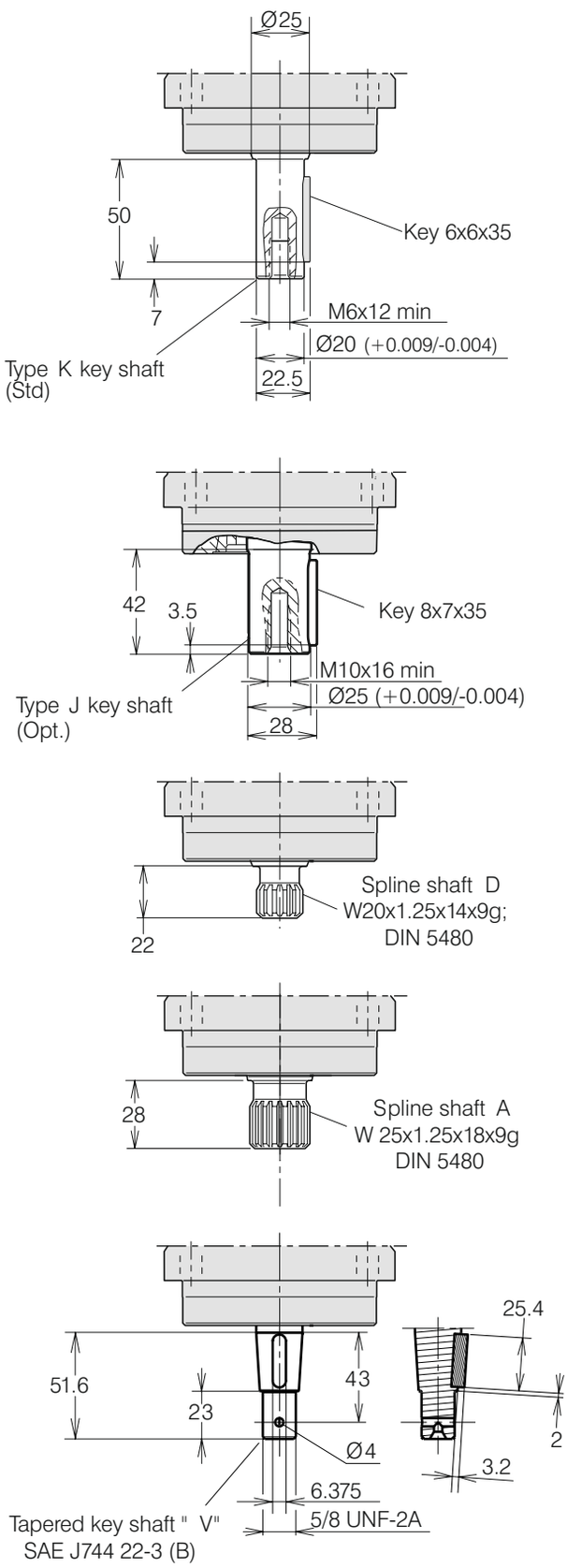


Installation Dimensions TS-F11

TS-F11-012 (ISO versions)

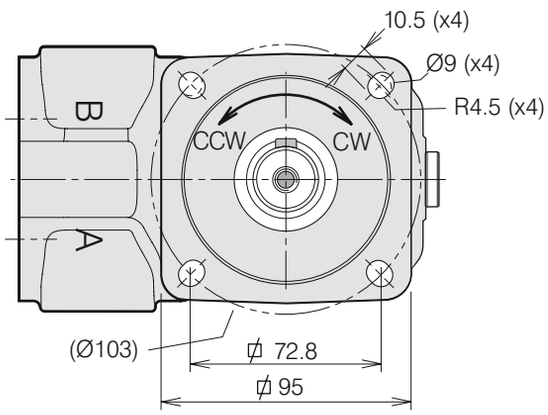


Shaft options

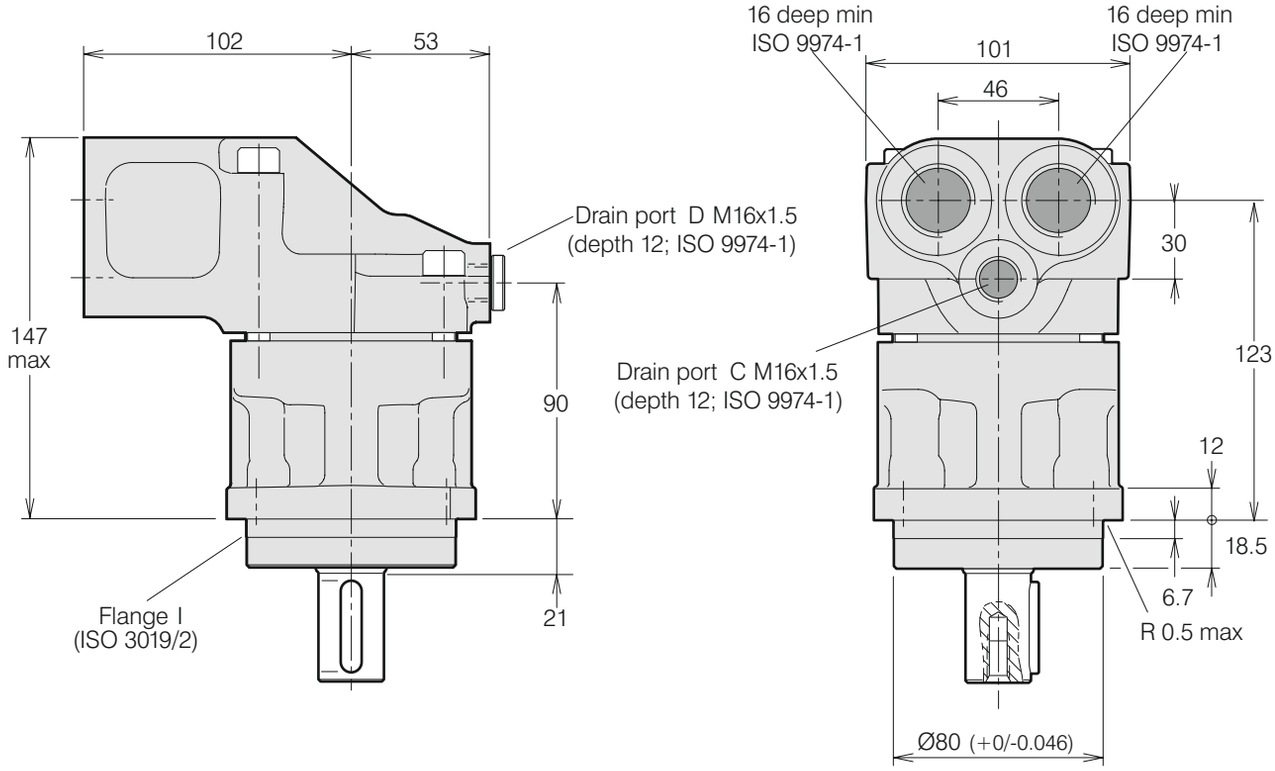


Installation Dimensions TS-F11

TS-F11-014 (ISO versions)

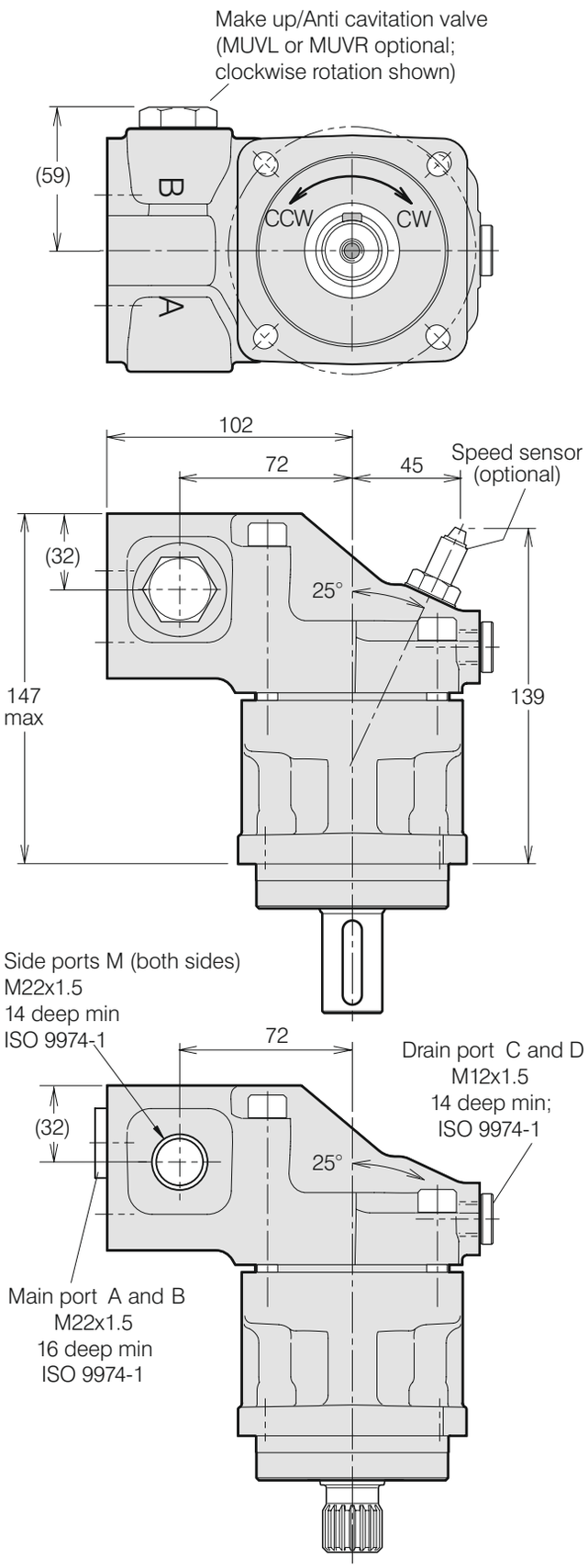


Type I mounting flange (ISO 3019/2)

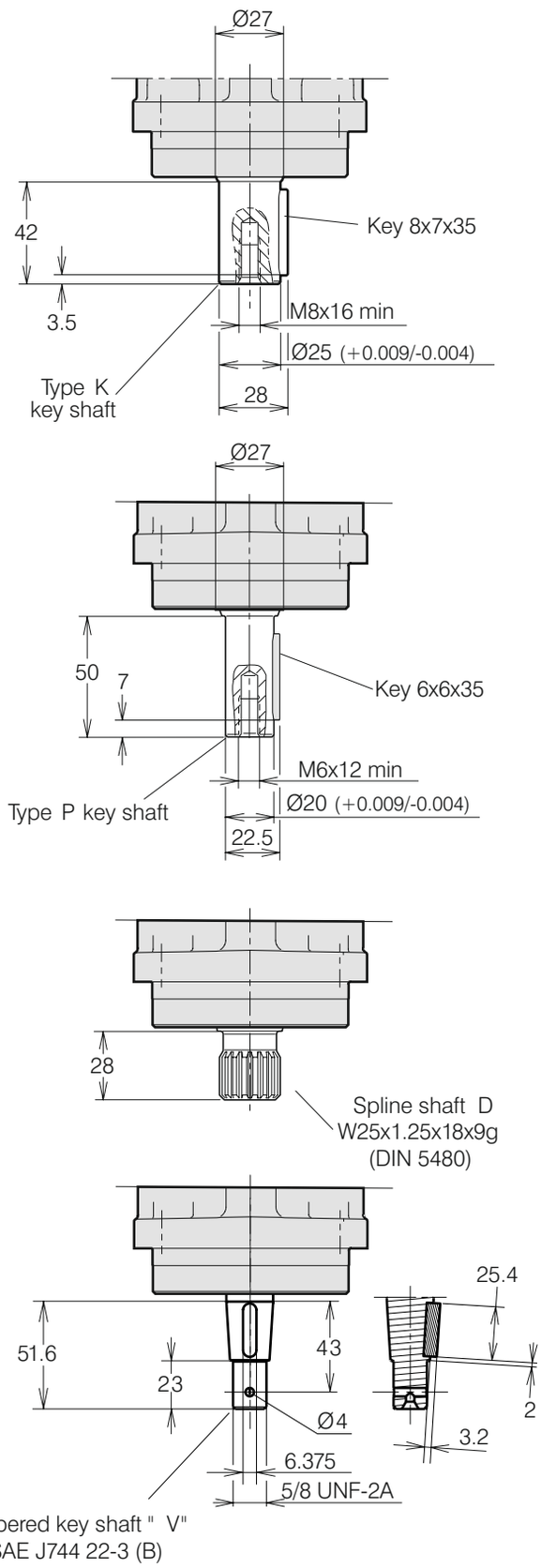


Installation Dimensions TS-F11

TS-F11-014 (ISO versions)

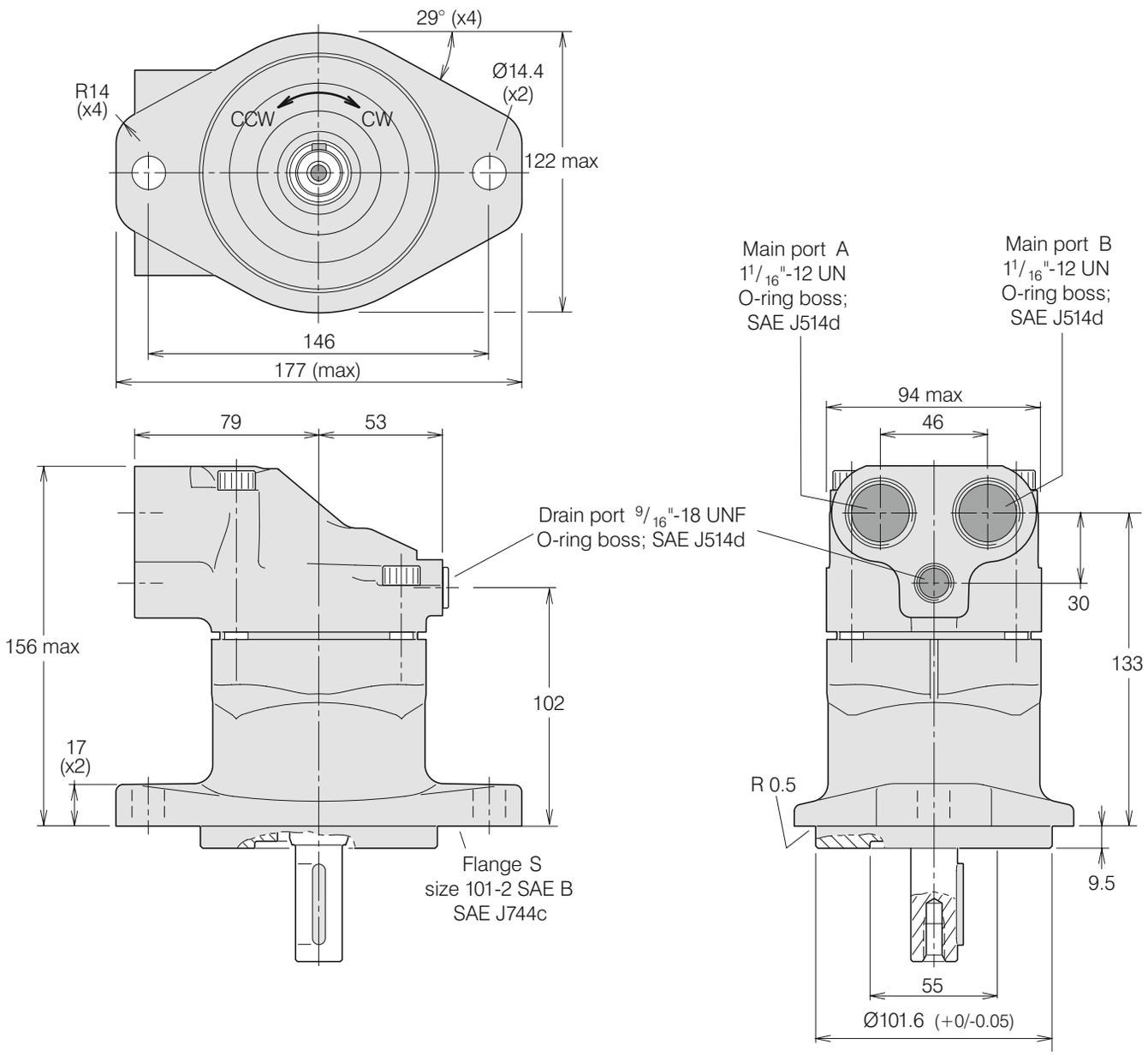


Shaft options



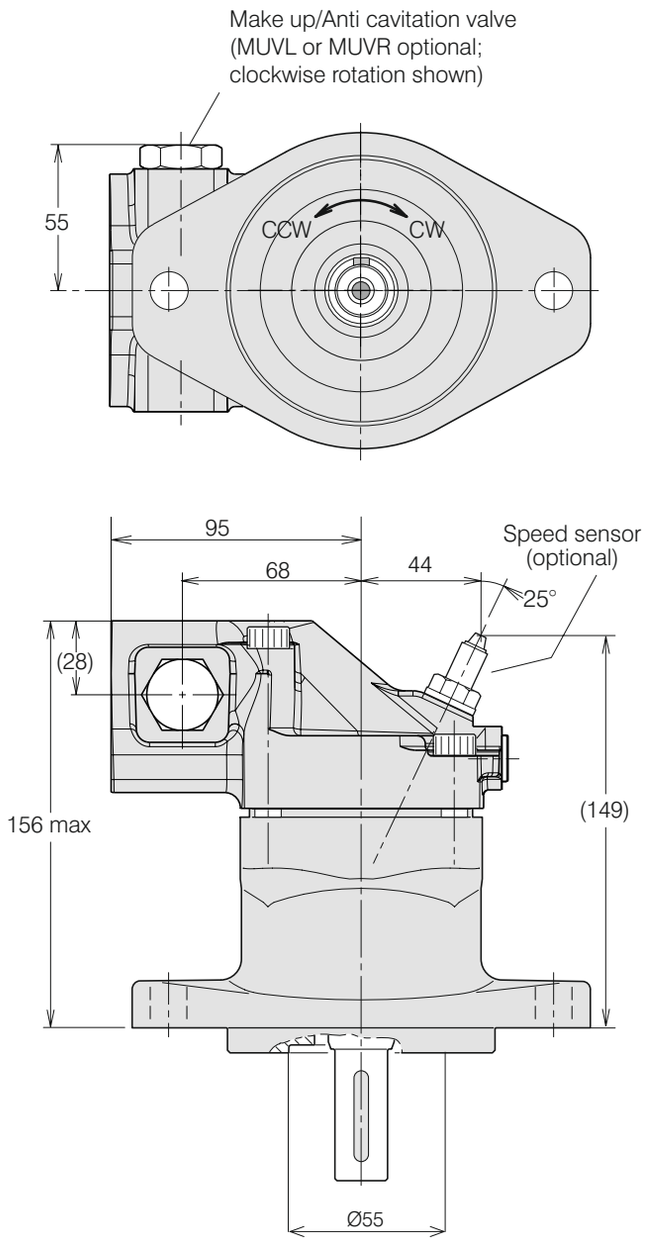
Installation Dimensions TS-F11

TS-F11-006, -008, -010 (SAE versions)

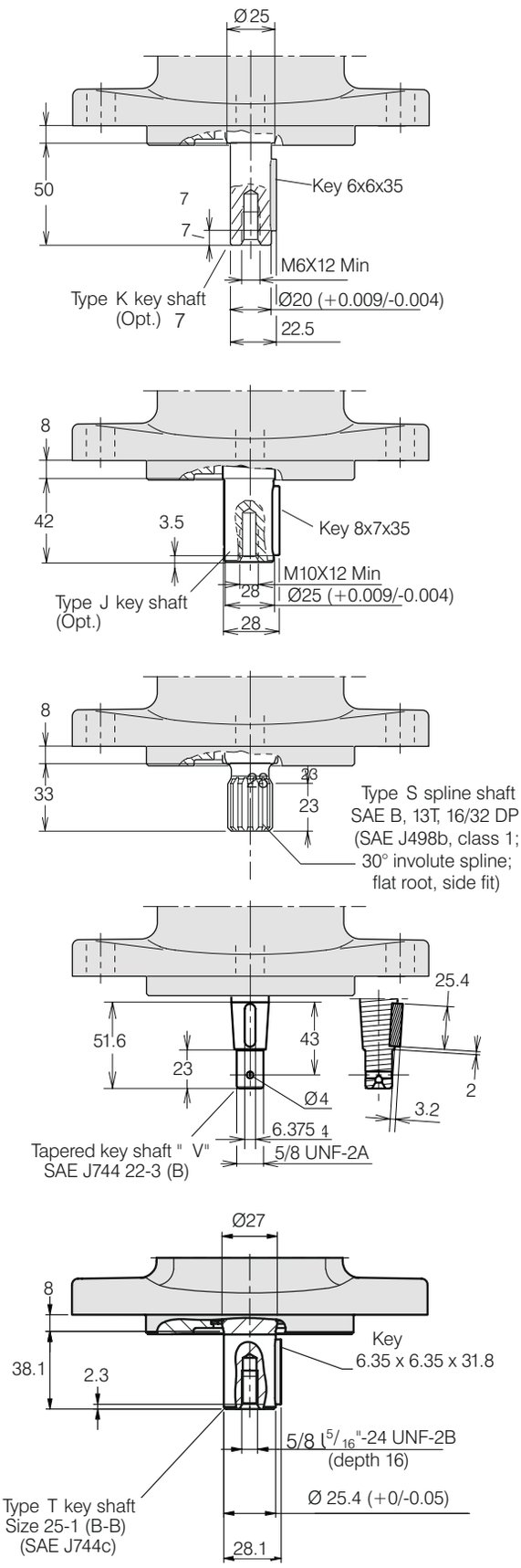


Installation Dimensions TS-F11

TS-F11-006, -008, -010 (SAE versions)

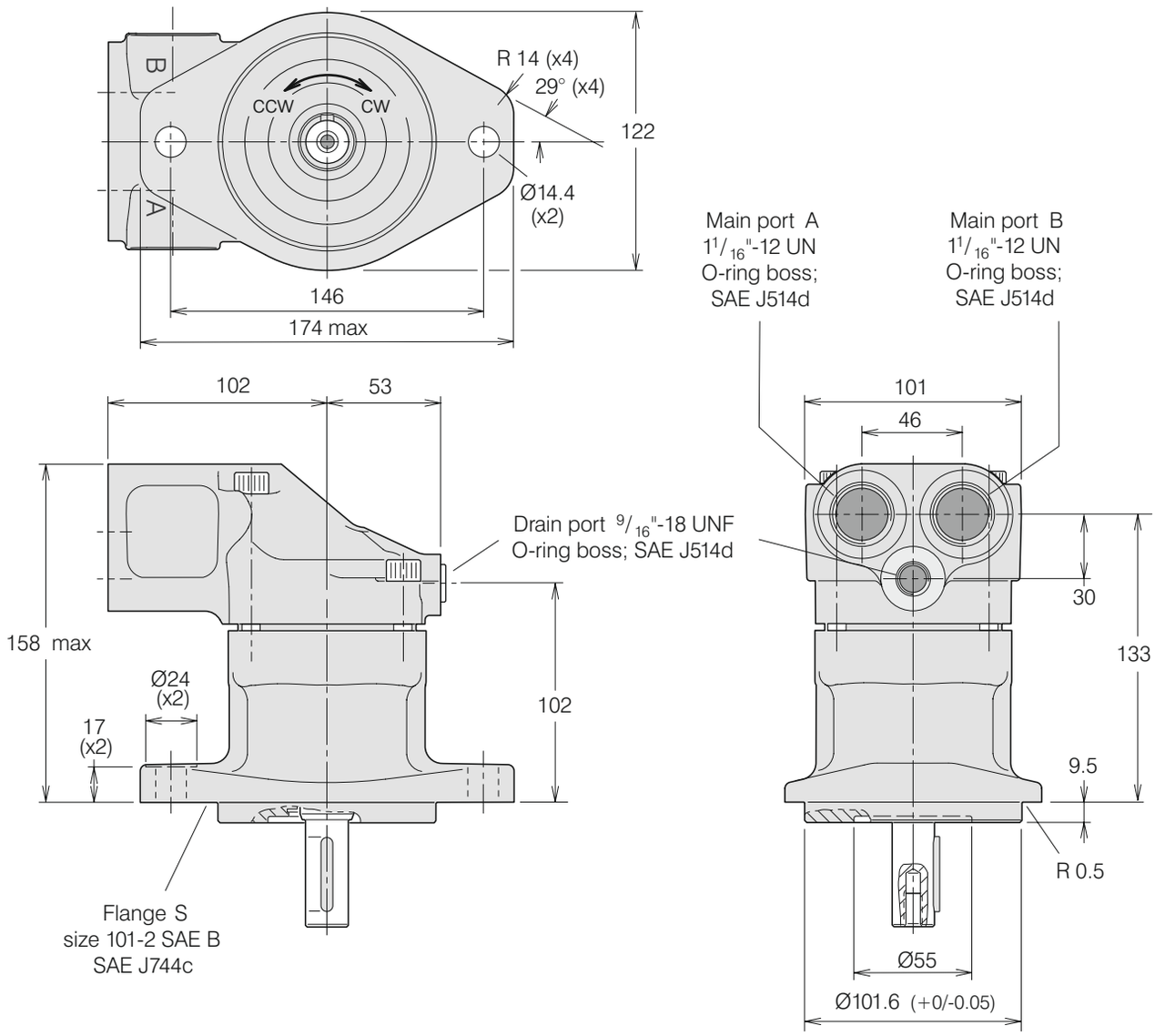


Shaft options



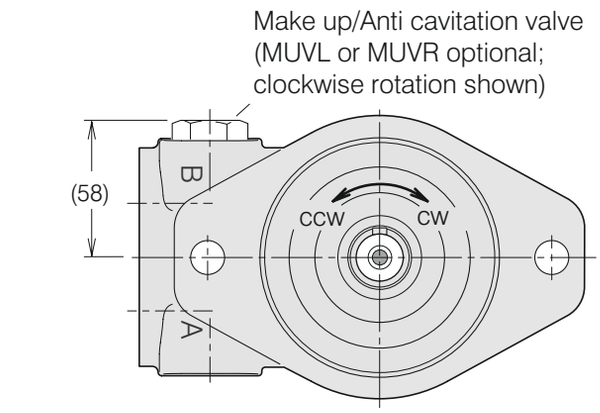
Installation Dimensions TS-F11

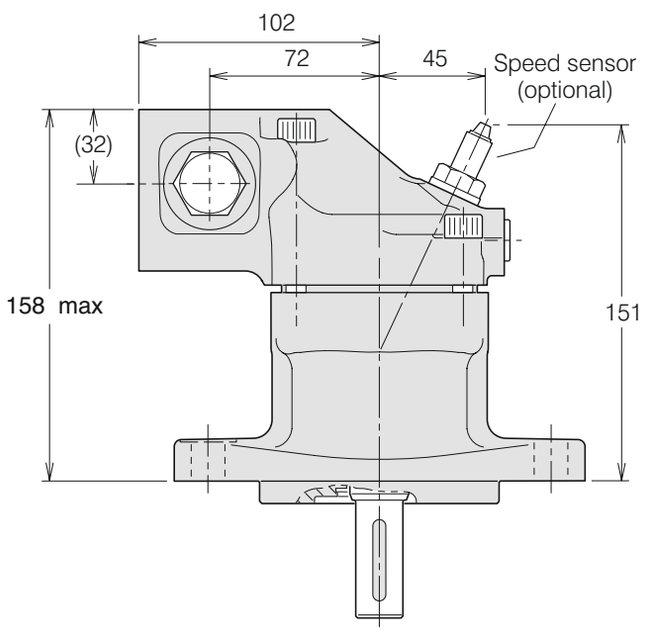
TS-F11-012 (SAE versions)



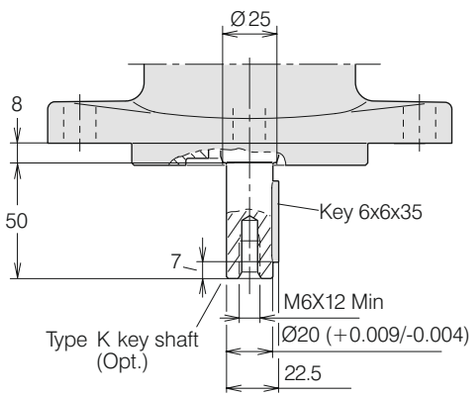
Installation Dimensions TS-F11

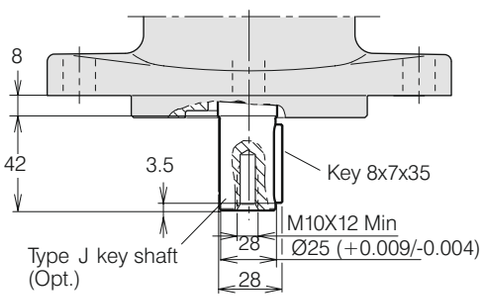
TS-F11-012 (SAE versions)

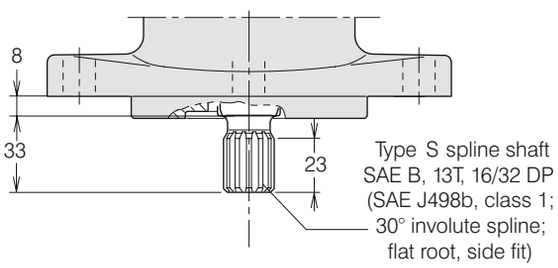


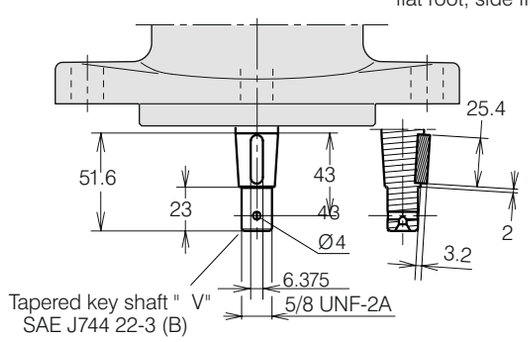


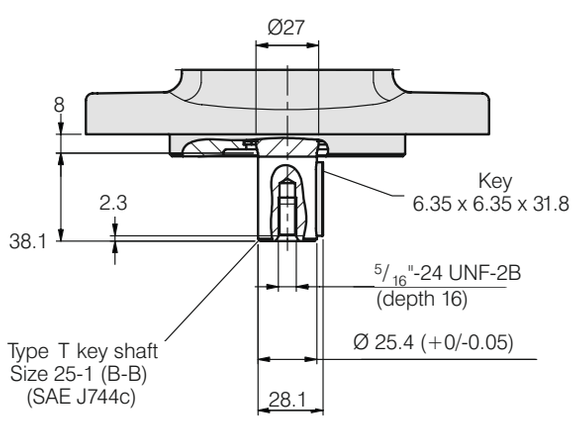
Shaft options





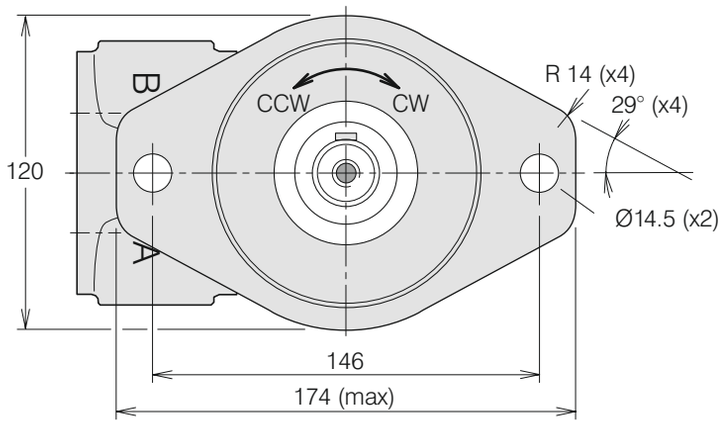




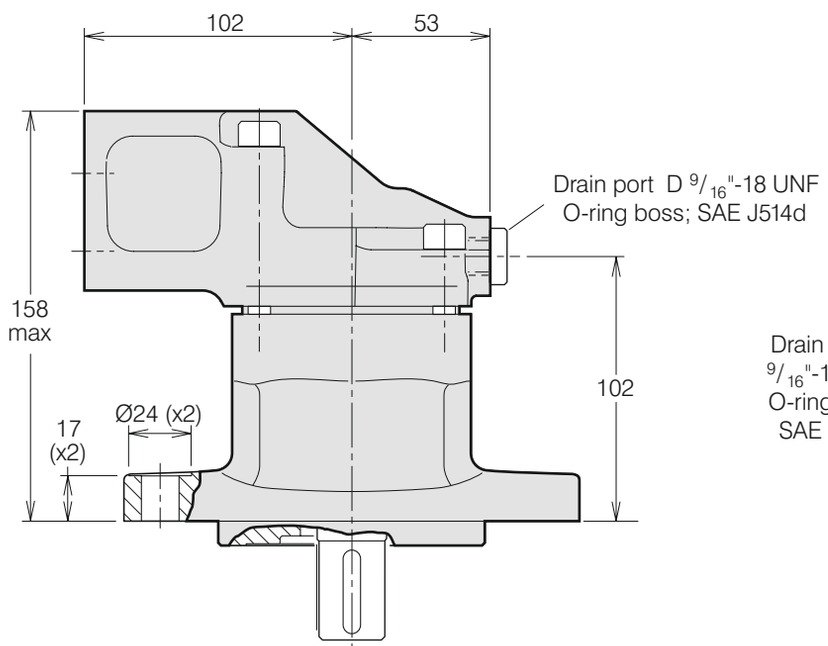


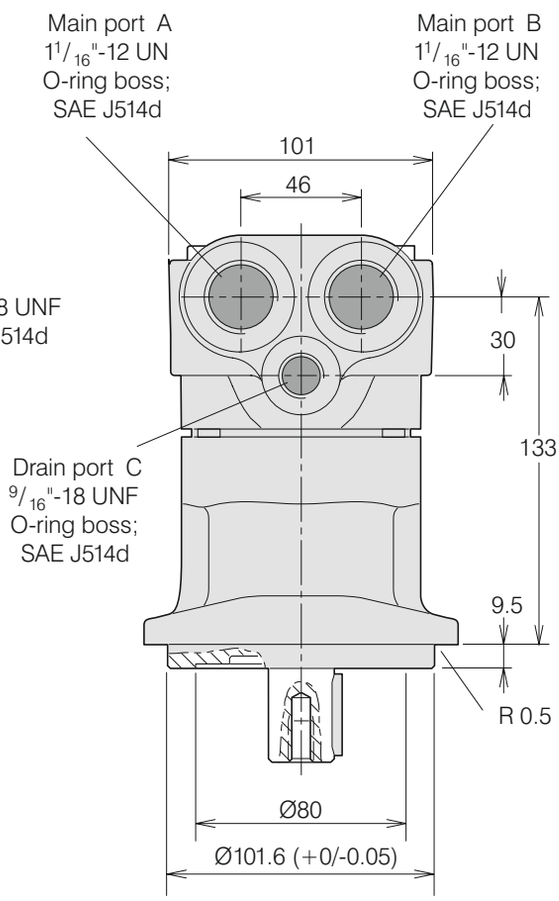
Installation Dimensions TS-F11

TS-F11-014 (SAE versions)



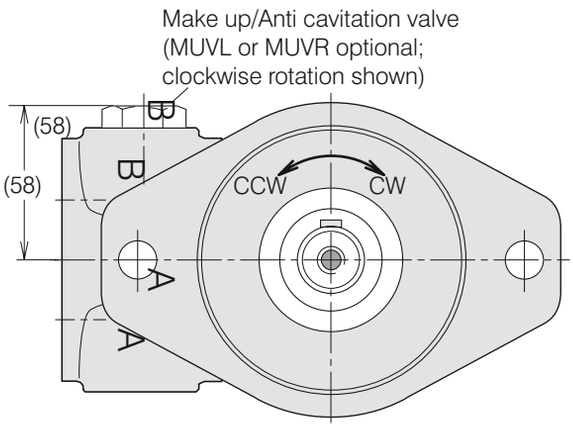
Type S mounting flange SAE 'B' (SAE J744c)

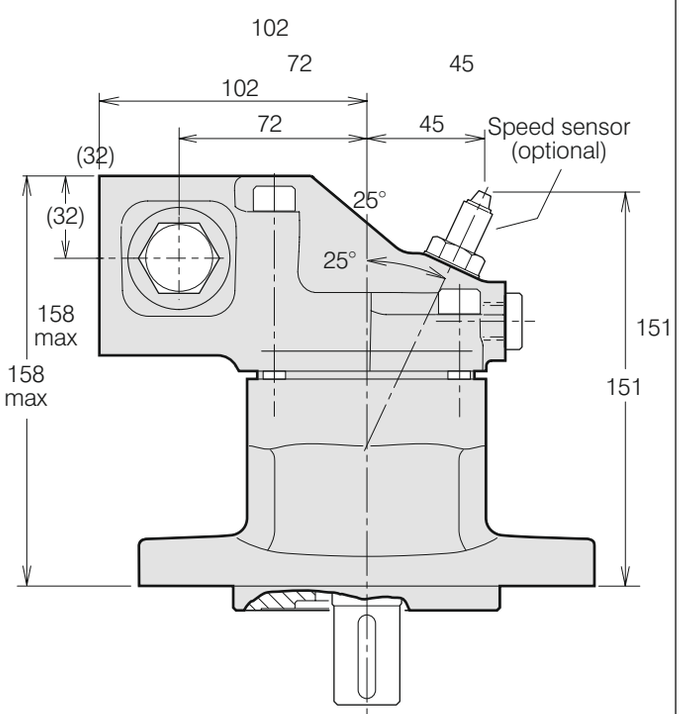




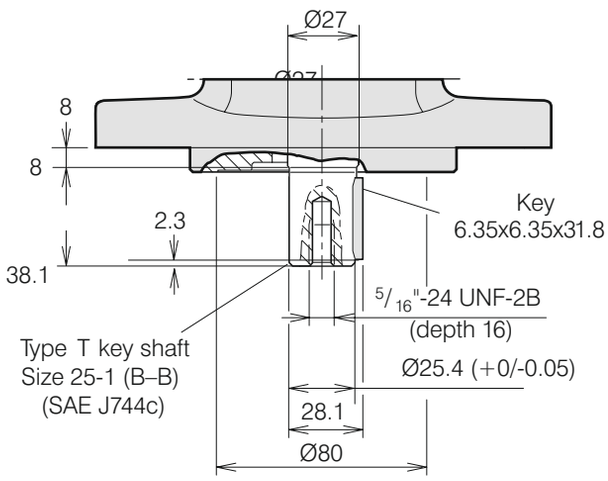
Installation Dimensions TS-F11

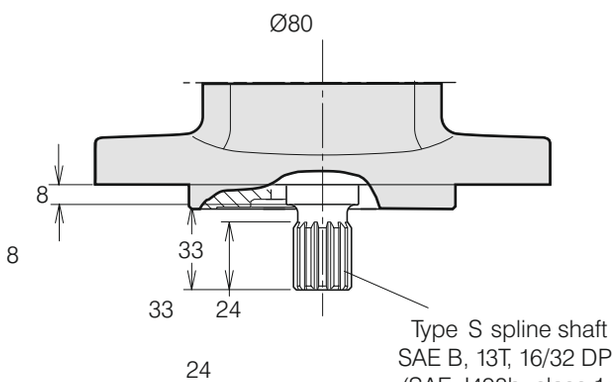
TS-F11-014 (SAE versions)

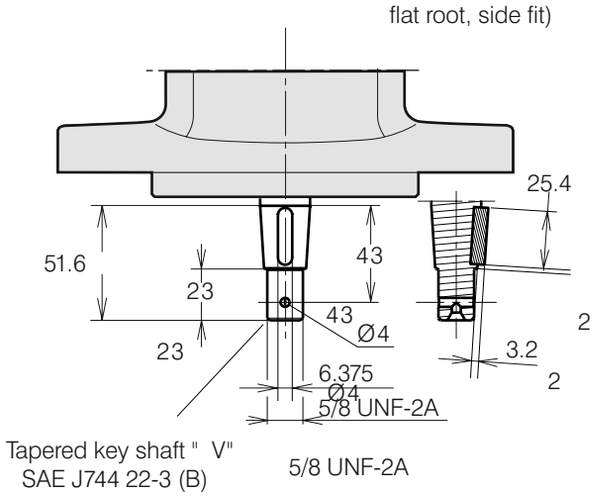




Shaft options

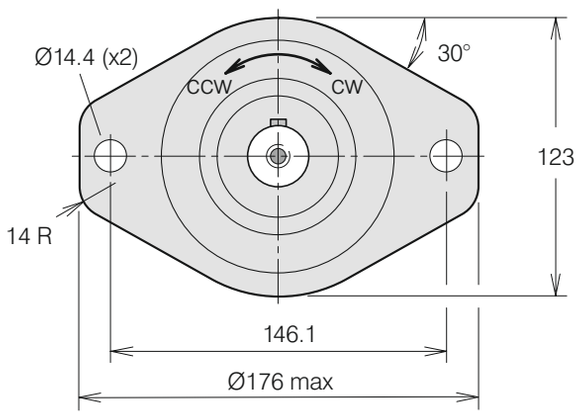




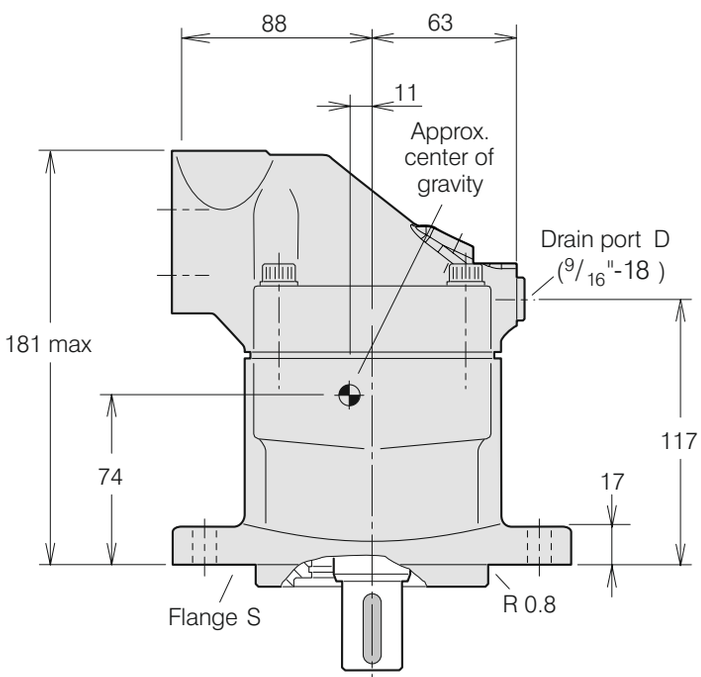


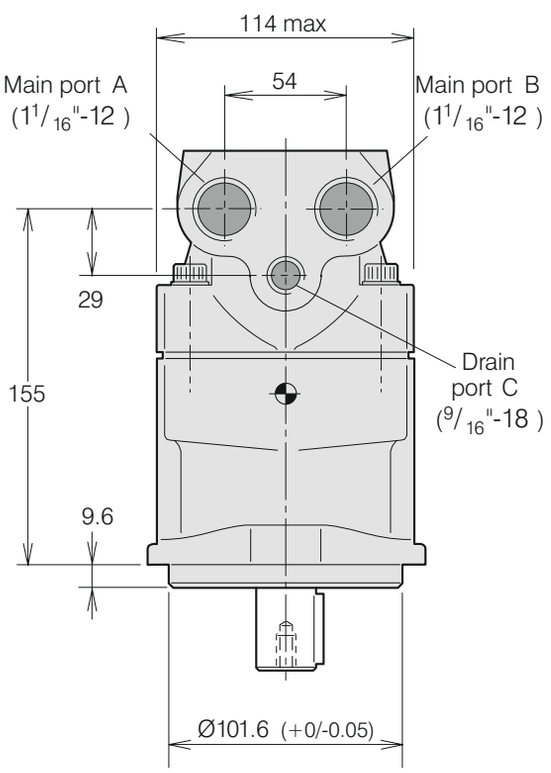
Installation Dimensions TS-F11

TS-F11-019 (SAE version)



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

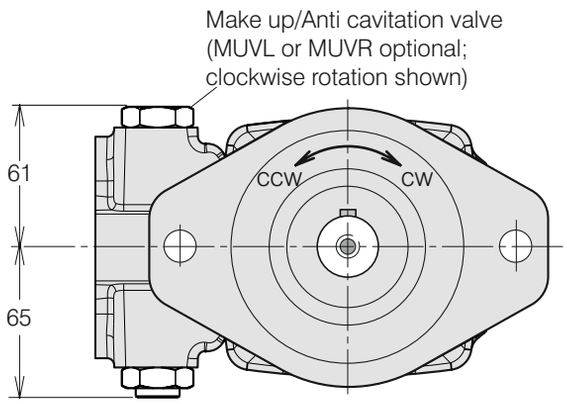


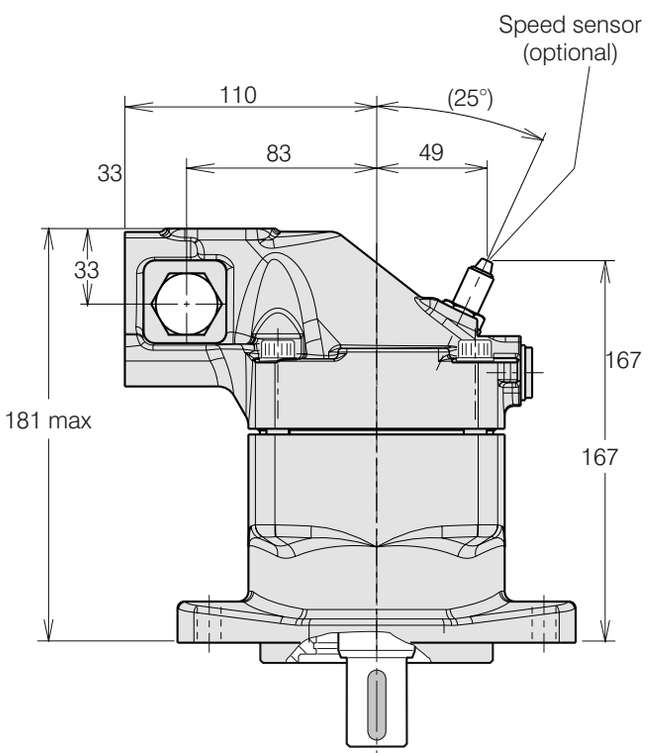


* O-ring ports according to SAE J514d

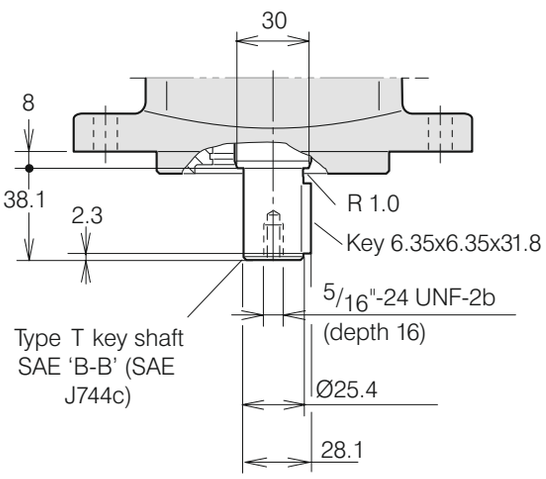
Installation Dimensions TS-F11

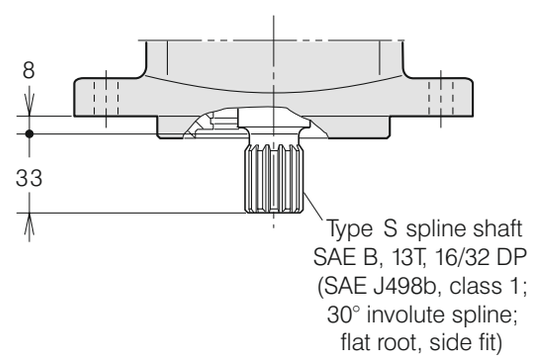
TS-F11-019 (SAE version)





Shaft options





Specifications TS-F12

Frame size TS-F12	-030	-040	-060	-080	-090	-110	-125	-152	-162	-182	-250
Displacement [cm^3/rev]	30.0	40.0	59.8	80.4	93.0	110.1	125.0	149.8	163.1	179.8	242
Operating pressure											
max intermittent[1)] [bar]	500	500	500	500	420	480	480	480	480	480	420
max continuous [bar]	450	450	450	450	350	420	420	420	420	420	350
Motor operating speed [rpm]											
max intermittent[1)]	8600	6900	6400	5500	5100	4800	4600	4000	4000	4000	3000
max continuous	7300	6300	5800	5100	4600	4400	4200	3700	3700	3700	2700
min continuous	50	50	50	50	50	50	50	50	50	50	50
Max pump selfpriming speed [2)]											
L or R function; max [rpm]	3100	2800	2400	2200	2200	2000	2000	1700	1600	1500	1500
Motor input flow											
max intermittent[1)] [l/min]	258	276	383	440	474	528	575	608	648	728	726
max continuous [l/min]	219	252	347	408	428	484	525	547	583	655	653
Drain temperature , max [°C]	115	115	115	115	115	115	115	115	115	115	115
min [°C]	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
Theoretical torque at 100 bar [Nm]	47.6	63.5	94.9	127.6	147.6	174.8	198.4	241	257	289	384.1
Mass moment of inertia											
($x10^{-3}$) [kg m^2]	1.7	2.9	5	8.4	8.4	11.2	11.2	21	21	21	46
Weight [kg]	11.5	15.7	18.6	25.7	25.7	33	33	40	40	40	77

1) Intermittent: max 6 seconds in any one minute.
2) Selfpriming speed valid at sea level.

Technical Specification TS-F12

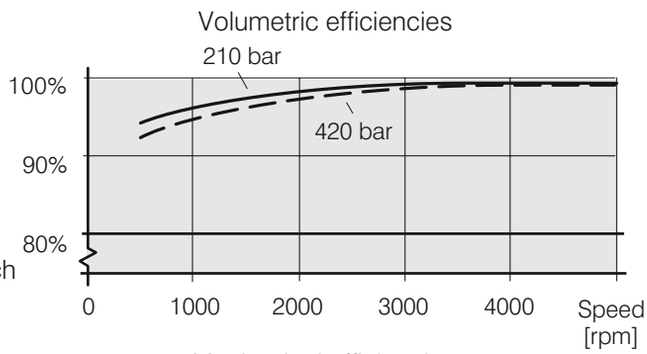
Efficiency

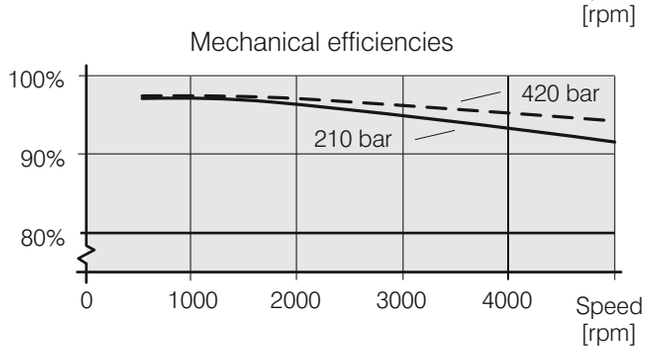
Because of its high overall efficiency, driving a motor/pump from series F12 requires less fuel or electric power. Also, it allows the use of a small reservoir and heat exchanger, which in turn reduce cost, weight, and installation size.

The diagrams to the right show volumetric and mechanical efficiencies of an F12-030 motor.

TS-F12-030 motors can be equipped with Power Boost which in high speed applications can decrease the mechanical losses by up to 15 %, see page 5.

Contact THM for efficiency information on a particular TS-F12 frame size that is being considered.





Noise level

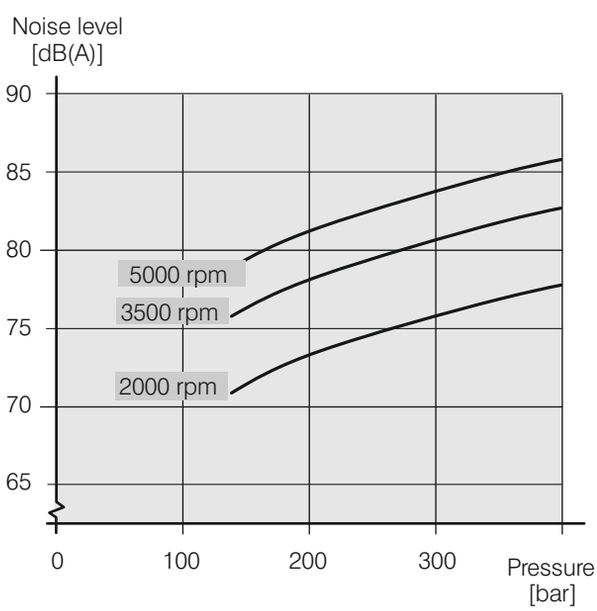
Series TS-F12 feature low noise levels from low to high speeds and pressures.

As an example, the diagram to the right shows the noise level of an TS-F12-030 pump/motor.

The noise level is measured in a semi-anechoic room, 1 m behind the unit.

The noise level for a particular motor/pump may vary ±2 dB(A) compared to what is shown in the diagram.

NOTE: Noise information for F12 frame sizes are available from THM.



Technical Specification TS-F12

Series TS-F12
When operating the TS-F12 as a pump (with L or R valve plate) above the selfpriming speed, the inlet must be pressurized. Increased noise and deteriorating performance may otherwise be experienced.
Diagrams 2 and 3 shows required pump inlet pressure vs. shaft speed.
The TS-F12 motor (type M valve plate) sometimes operates as a pump e.g. when used in a propel transmission and the vehicle is going downhill.
Minimum required inlet pressure versus shaft speed is shown in the diagrams.
The inlet pressure can be charged by external pump, pressurized reservoir or using BLA Boost unit.

TS-F12 Pump version

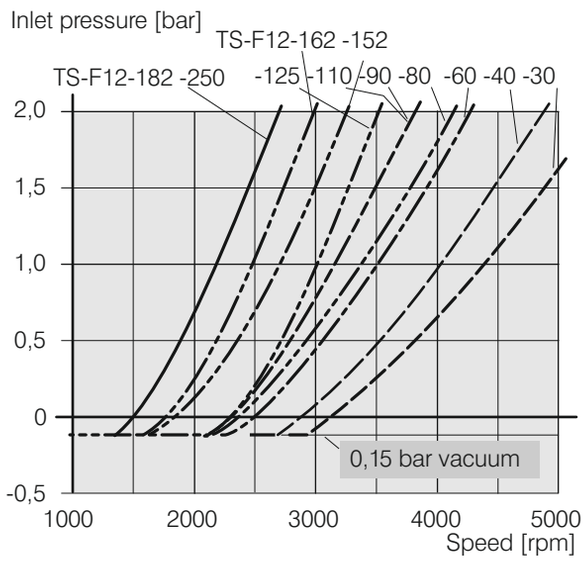


Diagram 2. Min. required pump (TS-F12-L or -R) inlet press.

TS-F12 Motor version

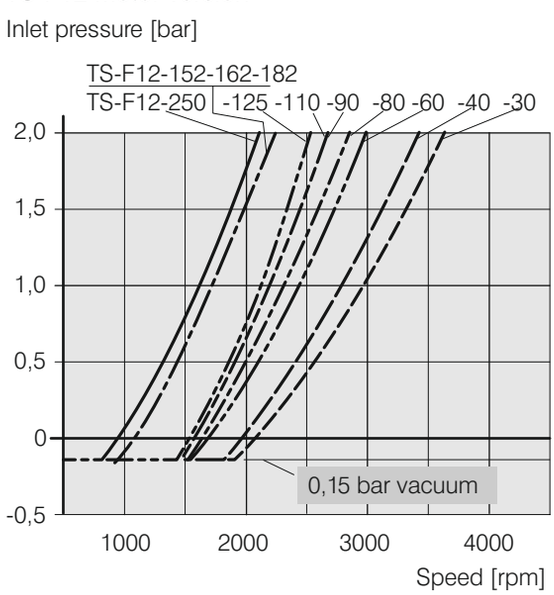


Diagram 3. Min. required motor (TS-F12-M) inlet pressure.

Ordering Code TS-F12

TS-F12-ISO

TS-F12 — [ ] — [ ] [ ] — [ ] [ ] — [ ] [ ] — [ ] — [ ] [ ] — [ ] — [ ]

Frame size · Function · Main ports · Mounting flange · Shaft seal · Shaft · Version number · Option · Option

Frame size	
Code	Displacem. (cm³/rev)
030	30.0
040	40.0
060	59.8
080	80.4
090	93.0
110	110.1
125	125.0
152	149.8
162	163.1
182	179.8

Version number
(assigned for special versions)

Frame size		30	40	60	80	90	110	125	152	162	182
Code	Shaft*										
D	DIN Spline, Standard	x	x	x	x	x	x	x	x	x	x
A	DIN Spline, Optional	-	(x)	-	-	-	-	-	-	-	-
Z	DIN Spline, Optional	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)
K	Metric key, Standard	x	x	x	x	x	x	x	x	x	x
J	Metric key, Optional	-	(x)	-	-	-	-	-	-	-	-
H	DIN Spline, Optional	-	-	-	-	-	-	-	(x)	(x)	(x)
G	Metric key, Optional	-	-	-	-	-	-	-	(x)	(x)	(x)
P	Metric key, Optional	(x)	-	-	-	-	-	-	(x)	(x)	(x)
V	Tapered shaft	(x)	(x)	(x)	-	-	-	-	-	-	-

*See also dimensional drawings

Frame size		30	40	60	80	90	110	125	152	162	182
Code	Function										
M	Motor	x	x	x	x	x	x	x	x	x	x
S	Motor, high speed	(x)	(x)	(x)	-	-	-	-	(x)	(x)	(x)
R	Pump, clockwise rotation	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)
L	Pump, counter clockwise rot'n	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)

For other versions, contact THM

Frame size		30	40	60	80	90	110	125	152	162	182
Code	Option										
0000	Standard	x	x	x	x	x	x	x	x	x	x
L130	Flushing valve 1.3 mm orifice	(x)	(x)	(x)	(x)	(x)	-[1]	-[1]	-	-	-
MUVR	Make up/Anti cavitation valve clockwise rotation	(x)	-	-	-	-	-	-	-	-	-
MUVL	Make up/Anti cavitation valve counter clockwise rotation	(x)	-	-	-	-	-	-	-	-	-
P__R	Pressure relief valve clockwise rotation [2]	(x)	(x)	(x)	-	-	-	-	-	-	-
P__L	Pressure relief valve counter clockwise rotation [2]	(x)	(x)	(x)	-	-	-	-	-	-	-

Frame size		30	40	60	80	90	110	125	152	162	182
Code	Main ports										
F	SAE 6000 psi flange	x	x	x	x	x	x	x	x	x	x
D	SAE 6000 psi Horizontal	-	-	-	-	-	-	-	(x)	(x)	(x)
A	SAE 6000 psi Axial	-	-	-	-	-	-	-	(x)	(x)	(x)
K	SAE 6000 psi Rear	-	-	-	-	-	-	-	(x)	(x)	(x)
M	SAE 6000 psi Side	-	-	-	-	-	-	-	(x)	(x)	(x)

Frame size		30	40	60	80	90	110	125	152	162	182
Code	Option										
P0	Prepared for speed sensor	x	x	x	x	x	x	x	x	x	x
PT	Prepared for speed sensor and Painted Black	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)
B0	Power Boost and Prepared for speed sensor	(x)	-	-	-	-	-	-	-	-	-
BT	Power Boost, Prepared for speed sensor and Painted Black	(x)	-	-	-	-	-	-	-	-	-

Frame size		30	40	60	80	90	110	125	152	162	182
Code	Mounting flange										
I	ISO flange	x	x	x	x	x	x	x	x	x	x
F	ISO 200 flange	-	-	-	-	-	-	-	x	x	x

x: Available (x): Optional – : Not available

Frame size		30	40	60	80	90	110	125	152	162	182
Code	Shaft seal										
V	FPM, high pressure, high temperature	x	x	x	x	x	x	x	x	x	x

For other versions, contact THM

NOTE All combinations are not valid, please contact THM

Ordering Code TS-F12

TS-F12-Cartridge

TS-F12 — [ ] — [ ] [ ] [ ] — [ ] [ ] — [ ] — [ ] — [ ] [ ] — [ ]

Frame size | Function | Main ports | Mounting flange | Shaft seal | Shaft | Version number | Option | Option

Frame size	
Code	Displacem. (cm^3/rev)
030	30.0
040	40.0
060	59.8
080	80.4
090	93.0
110	110.1
125	125.0

Version number
(assigned for special versions)

Frame size		30	40	60	80	90	110	125
Code	Shaft*							
C	DIN Spline, Std.	x	x	x	x	x	x	x
K	Metric key, Option	(x)	-	(x)	(x)	(x)	(x)	(x)
J	Metric key, Option	-	(x)	-	-	-	-	-
B	Spline DIN 5480	-	-	-	-	-	(x)	(x)
V	Tapered shaft	(x)	(x)	(x)	-	-	-	-
P	Metric Key, Optional	30 (X)	-	-	-	-	-	-

*See also dimensional drawings

Frame size		30	40	60	80	90	110	125
Code	Function							
M	Motor	x	x	x	x	x	x	x
S	Motor, high speed	(x)	(x)	(x)	-	-	-	-

For other versions, contact THM

Frame size		30	40	60	80	90	110	125
Code	Main ports							
F	SAE 6000 psi flange	x	x	x	x	x	x	x

Frame size		30	40	60	80	90	110	125
Code	Mounting flange							
C	Cartridge	x	x	x	x	x	x	x

Frame size		30	40	60	80	90	110	125
Code	Option							
0000	Standard	x	x	x	x	x	x	x
L130	Flushing valve 1.3 mm orifice	(x)	(x)	(x)	(x)	(x)	-[1]	-[1]
MUVR	Make up/Anti cavitation valve clockwise rotation	(x)	-	-	-	-	-	-
MUVL	Make up/Anti cavitation valve counter clockwise rotation	(x)	-	-	-	-	-	-
P_[2]_R	Pressure relief valve clockwise rotation	(x)	(x)	(x)	-	-	-	-
P_[2]_L	Pressure relief valve counter clockwise rotation	(x)	(x)	(x)	-	-	-	-

Frame size		30	40	60	80	90	110	125
Code	Option							
P0	Prepared for speed sensor	x	x	x	x	x	x	x
PT	Prepared for speed sensor and Painted Black	(x)	(x)	(x)	(x)	(x)	(x)	(x)
B0	Power Boost and Prepared for speed sensor	(x)	-	-	-	-	-	-
BT	Power Boost, Prepared speed sensor and Painted Black	(x)	-	-	-	-	-	-

Frame size		30	40	60	80	90	110	125
Code	Shaft seal							
V	FPM,high pressure, high temperature	x	x	x	x	x	x	x

For other versions, contact THM

x: Available (x): Optional – : Not available

NOTE All combinations are not valid, please contact THM

Ordering Code TS-F12

TS-F12-SAE

TS-F12 — [Frame size] — [Function] [Main ports] — [Mounting flange] [Shaft seal] — [Shaft] — [Version number] — [Option] [Option]

Frame size	
Code	Displacem. (cm^3/rev)
030	30.0
040	40.0
060	59.8
080	80.4
090	93.0
110	110.1
125	125.0
152	149.8
162	163.1
182	179.8
250	242.0

Version number
(assigned for special versions)

Frame size		30	40	60	80	90	110	125	152	162	182	250
Code	Function											
M	Motor	x	x	x	x	x	x	x	x	x	x	-
S	Motor, high speed	(x)	(x)	(x)	-	-	-	-	(x)	(x)	(x)	-
Q	Motor	-	-	-	-	-	-	-	-	-	-	x
R	Pump, clockwise rotation	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)
L	Pump, counter clockwise rot'n	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)

For other versions, contact THM

Frame size		30	40	60	80	90	110	125	152	162	182	250
Code	Main ports											
S	SAE 6000 psi flange	x	x	x	x	x	x	x	-	-	-	-
U	SAE UN threads [4]	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-	-	-	-
F	SAE 6000 psi flange [2]	-	-	-	-	-	-	-	x	x	x	x
D	SAE 6000 psi Horizontal [2]	-	-	-	-	-	-	-	(x)	(x)	(x)	-
A	SAE 6000 psi Axial [2]	-	-	-	-	-	-	-	(x)	(x)	(x)	-
K	SAE 6000 psi Rear [2]	-	-	-	-	-	-	-	(x)	(x)	(x)	-
M	SAE 6000 psi Side [2]	-	-	-	-	-	-	-	(x)	(x)	(x)	-

Frame size		30	40	60	80	90	110	125	152	162	182	250
Code	Mounting flange											
S	SAE 4 bolt	x	x	x	x	x	x	x	x	x	x	x
R	SAE 4 bolt	-	-	-	(x)	(x)	-	-	-	-	-	-
T	SAE 2 bolt	x	x	x	-	-	-	-	-	-	-	-

x: Available (x): Optional – : Not available

NOTE All combinations are not valid, please contact THM

Frame size		30	40	60	80	90	110	125	152	162	182	250
Code	Shaft*											
T	SAE key, Standard	x	x	x	x	x	x	x	x	x	x	x
R	SAE key, Optional	-	-	-	(x)	(x)	-	-	-	-	-	-
S	SAE Spline, Optional	x	x	x	x	x	x	x	x	x	x	x
F	SAE Spline, Optional	-	-	-	(x)	(x)	-	-	(x)	(x)	(x)	(x)
U	SAE Spline, Optional	-	-	-	(x)	(x)	-	-	-	-	-	-
K	Metric key, Standard	-	-	-	-	-	-	-	-	-	-	x
D	Spline DIN 5480	-	-	-	-	-	-	-	-	-	-	(x)
V	Tapered shaft	(x)	(x)	(x)	-	-	-	-	-	-	-	-

*See also dimensional drawings

Frame size		30	40	60	80	90	110	125	152	162	182	250
Code	Option											
0000	Standard	x	x	x	x	x	x	x	x	x	x	x
L130	Flushing valve 1.3 mm orifice	(x)	(x)	(x)	(x)	(x)	-[1]	-[1]	-	-	-	-
MUVR	Make up/Anti cavitation valve clockwise rotation	(x)	-	-	-	-	-	-	-	-	-	-
MUVL	Make up/Anti cavitation valve counter clock-wise rotation	(x)	-	-	-	-	-	-	-	-	-	-
P__R	Pressure relief valve clockwise rotation [3]	(x)	(x)	(x)	-	-	-	-	-	-	-	-
P__L	Pressure relief valve counter clockwise rotation [3]	(x)	(x)	(x)	-	-	-	-	-	-	-	-

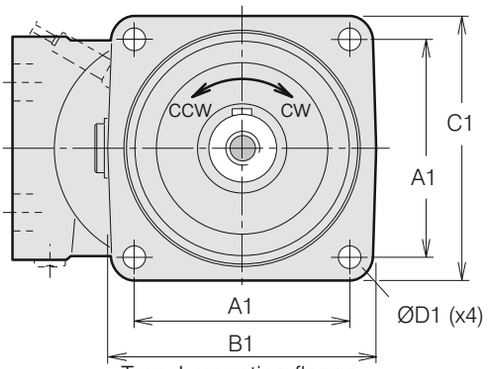
Frame size		30	40	60	80	90	110	125	152	162	182	250
Code	Option											
P_	Standard, prepared for speed sensor	x	x	x	x	x	x	x	x	x	x	x
B_	Power Boost and Prepared for speed sensor	(x)	-	-	-	-	-	-	-	-	-	-
_T	Painted Black	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)

Frame size		30	40	60	80	90	110	125	152	162	182	250
Code	Shaft seal											
V	FPM, high pressure, high temperature	x	x	x	x	x	x	x	x	x	x	x

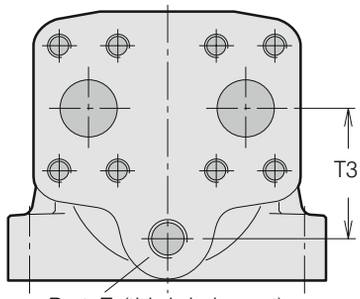
For other versions, contact THM

Installation Dimensions TS-F12

TS-F12-30, -40, -60, -80, -90, -110 and -125 (ISO versions)

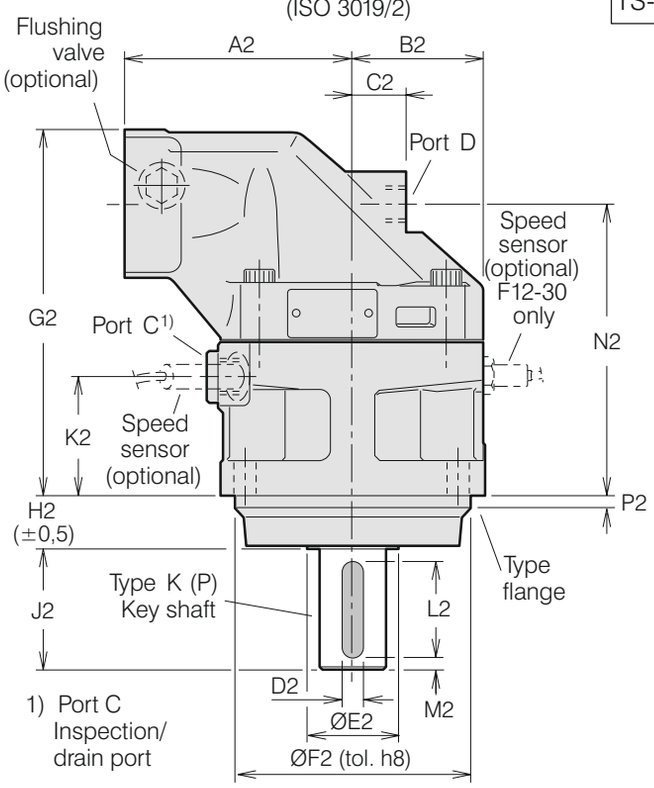


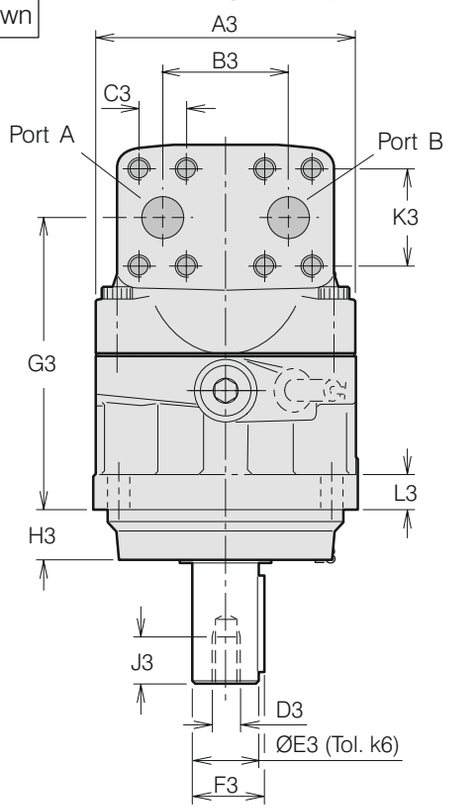
Type I mounting flange
(ISO 3019/2)



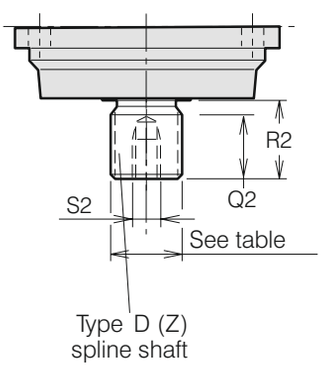
Port E (third drain port)
F12-110 and -125 barrel housing
(ISO /cartridge version)

TS-F12-80 shown



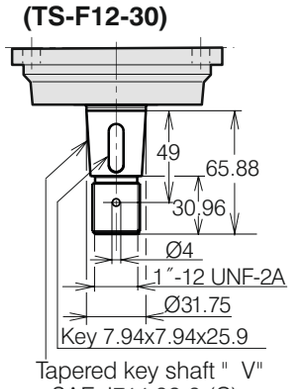


Shaft option D (Z)



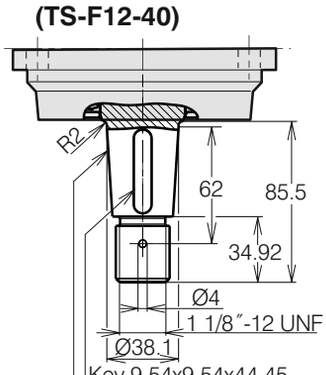
Type D (Z)
spline shaft

Shaft option V (TS-F12-30)



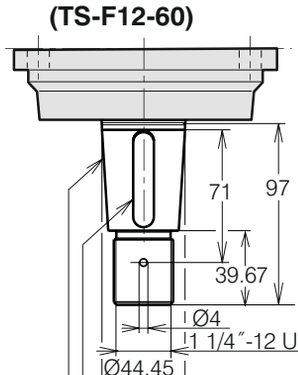
Tapered key shaft " V"
SAE J744 32-3 (C)

Shaft option V (TS-F12-40)



Tapered key shaft " V"
SAE J744 38-3 (C-C)

Shaft option V (TS-F12-60)



Tapered key shaft " V"
SAE J744 44-3 (D&E)

Installation Dimensions TS-F12

Dim.	TS-F12-30	TS-F12-40	TS-F12-60	TS-F12-80 TS-F12-90	TS-F12-110 TS-F12-125
A1	88.4	113.2	113.2	127.2	141.4
B1	118	146	146	158	180
C1	118	142	144	155	180
D1	11	13.5	13.5	13.5	18
A2	100	110	125	135	145
B2	59	65	70	78	85
C2	25	26	22	32	38
D2	8	8	10	12	14
E2	35	45	45	55	60
F2	100	125	125	140	160
G2	172	173	190	216	231
H2	25.5	32.5	32.5	32.5	40.5
J2	50	60	60	70	82
K2	55	52	54	70.5	66.5
L2	40	50	50	56	70
M2	5	5	5	7	6
N2	136.5	137	154	172.5	179
P2	8	8	8	8	8
Q2	28	28	33	36	41
R2[1)]	35	35	40	45	50
R2[2)]	43	35	35	35	45
S2[1)]	M12 x24	M12 x24	M12 x28	M16 x36	M16 x36
S2[2)]	no thread	M12 x24	no thread	M12 x28	M16 x36
A3	122	134	144	155	170
B3	66	66	66	75	83
C3	23.8	23.8	23.8	27.8	31.8
D3	M12	M12	M12	M16	M16
E3	30	30	35	40	45
F3	33	33	38	43	49
G3	136.5	137	154	172.5	179
H3	23.5	30.5	30.5	30.5	38.5
J3	24	24	28	36	36
K3	50.8	50.8	50.8	57.2	66.7
L3	18	20	20	20	22
T3	-	-	-	-	68

1) Spline shaft type D
2) Spline shaft type Z
3) Max operating pressure 350 bar

Ports	TS-F12-30	TS-F12-40	TS-F12-60	TS-F12-80 TS-F12-90	TS-F12-110 TS-F12-125
A, B size	$^3/_4$"	$^3/_4$"	$^3/_4$"	1"	$1^1/_4$"
Screw thread*)	M10x20	M10x20	M10x20	M12x20	M14 x26
C thread**)	M22x1.5	M22x1.5	M22x1.5	M22x1.5	M22 x1.5
D thread**)	M18 x1.5	M18 x1.5	M22 x1.5	M22 x1.5	M22 x1.5
E thread	-	-	-	-	M22 x1.5

A, B: ISO 6162 *) Metric thread x depth in mm
**)Metric thread x pitch in mm.

Spline shaft (DIN 5480)

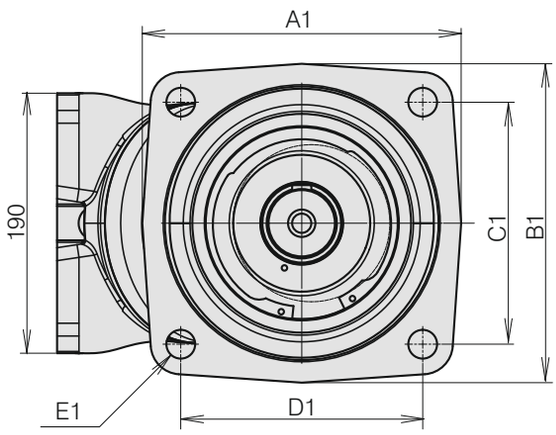
	Type D (std)	Type A (opt.)	Type Z (opt.)
TS-F12-30	W30x2x14x9g	-	W25x1.25x18x9g[3)]
-40	W32x2x14x9g	W35x2x16x9g	W30x2x14x9g
-60	W35x2x16x9g	-	W32x2x14x9g
-80	W40x2x18x9g	-	W35x2x16x9g[3)]
-90	W40x2x18x9g	-	W35x2x16x9g[3)]
-110	W45x2x21x9g	-	W40x2x18x9g[3)]
-125	W45x2x21x9g	-	W40x2x18x9g[3)]

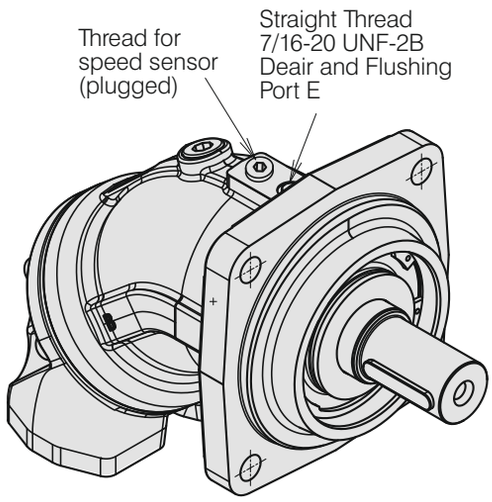
Key shaft

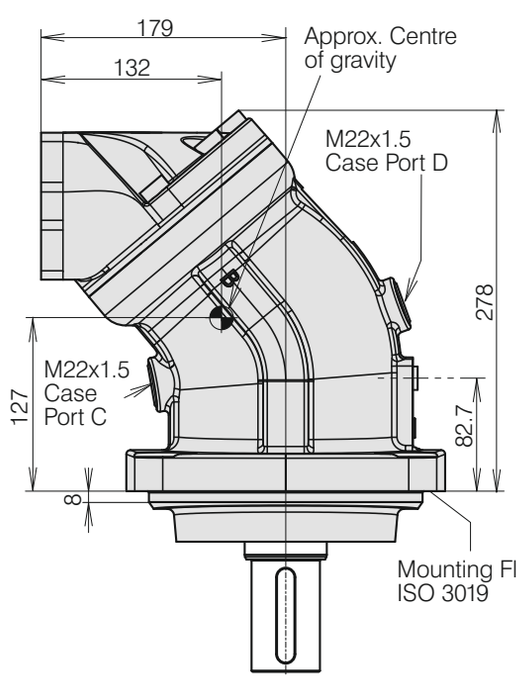
	TypeK(std)	Type P (opt.)	Type J (opt.)	Type V (opt.)
TS-F12-30	Ø30	Ø25[3)]	-	32-3
-40	Ø30	-	Ø35	38-3
-60	Ø35	-	-	44-3
-80	Ø40	-	-	-
-90	Ø40	-	-	-
-110	Ø45	-	-	-
-125	Ø45	-	-	-

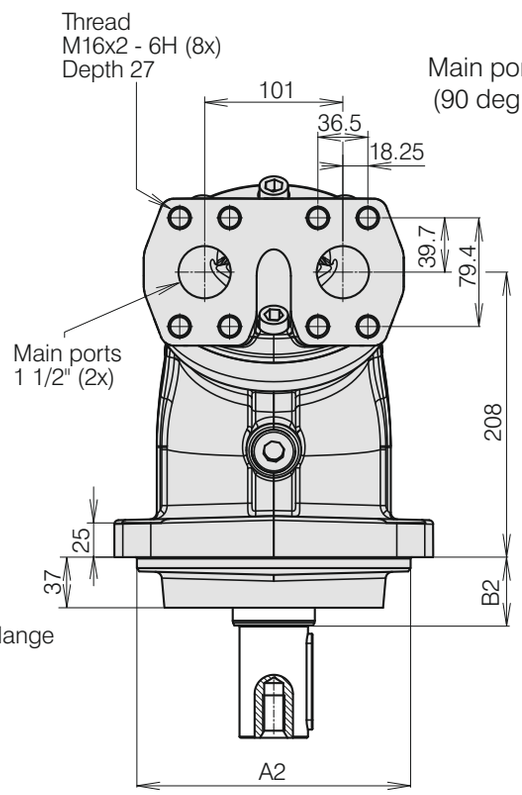
Installation Dimensions TS-F12

TS-F12-152, -162 and -182 (ISO versions)





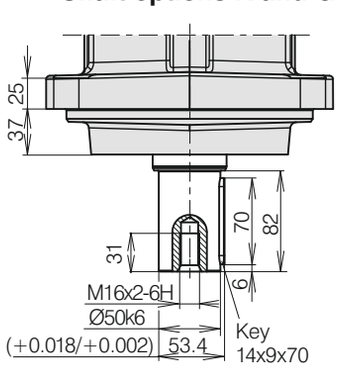




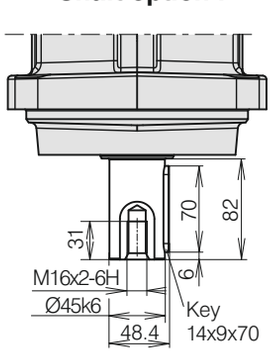
	ISO 180 (type I)	ISO 200 (type F)
A1	210	233
B1	210	233
C1	158.4	176.8
D1	158.4	176.8
E1	Ø18	Ø21
A2	180 h8	200 h8

	Shaft G and H	Shaft D, Z, K and P
B2	50	40

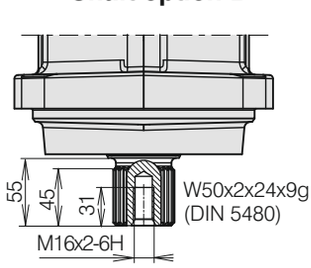
Shaft options K and G



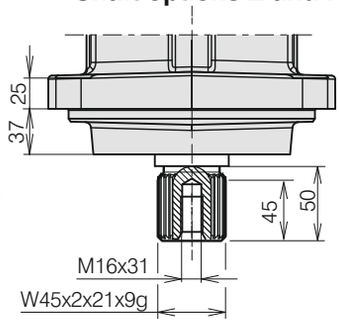
Shaft option P



Shaft option D



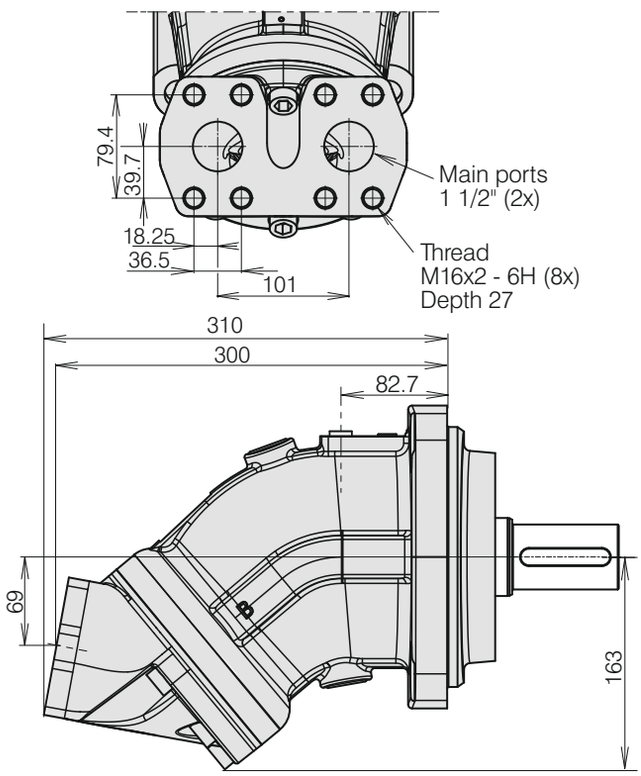
Shaft options Z and H



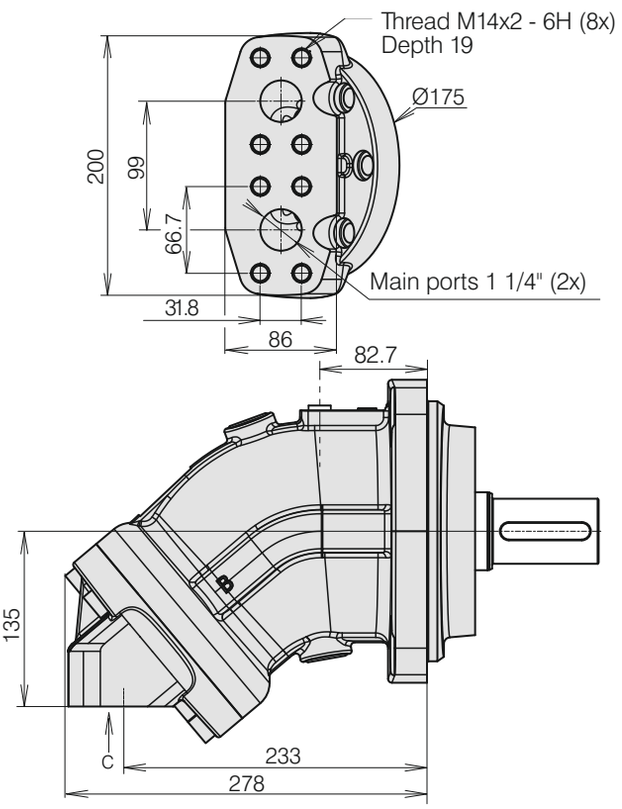
Installation Dimensions TS-F12

TS-F12-152, -162 and -182 (ISO versions)

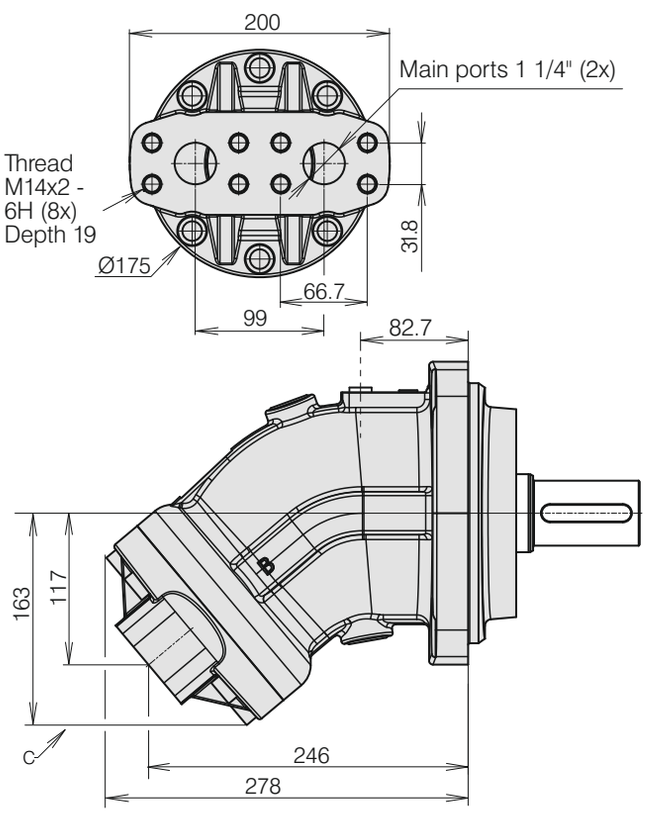
Main ports type A (180 deg Vertical)



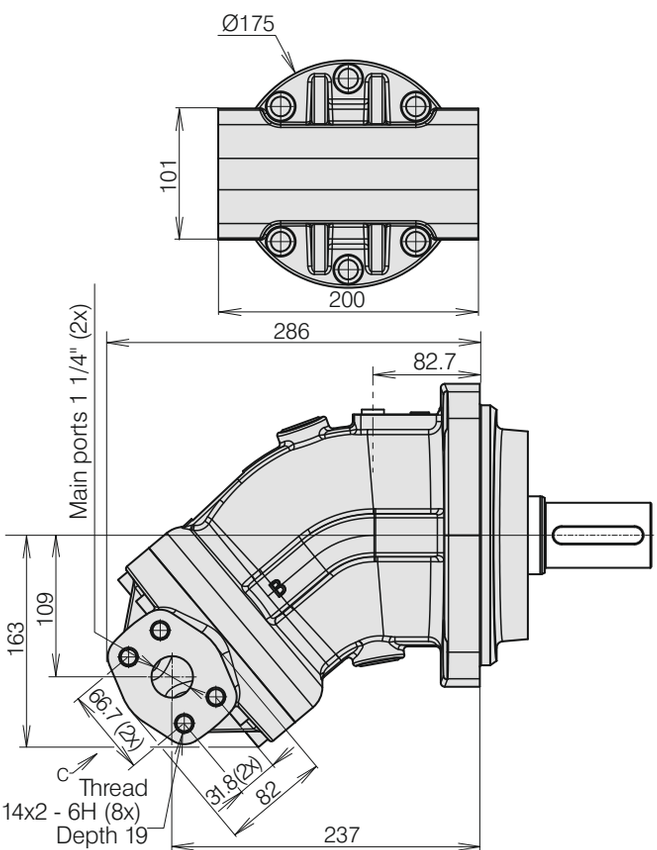
Main ports type D (90 deg Horizontal)



Main ports type K (40 deg rear)

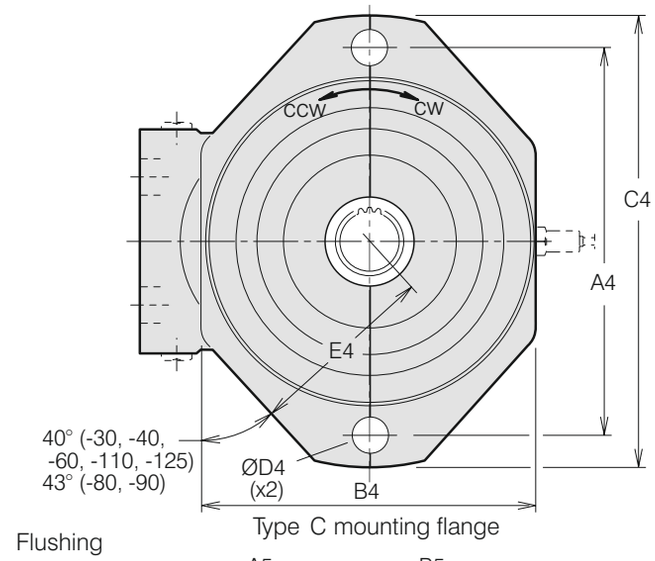


Main ports type M (Side ports)



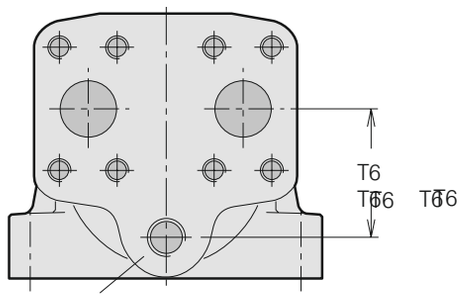
Installation Dimensions TS-F12

TS-F12-30, -40, -60, -80, -90, -110 and -125 (Cartridge versions)

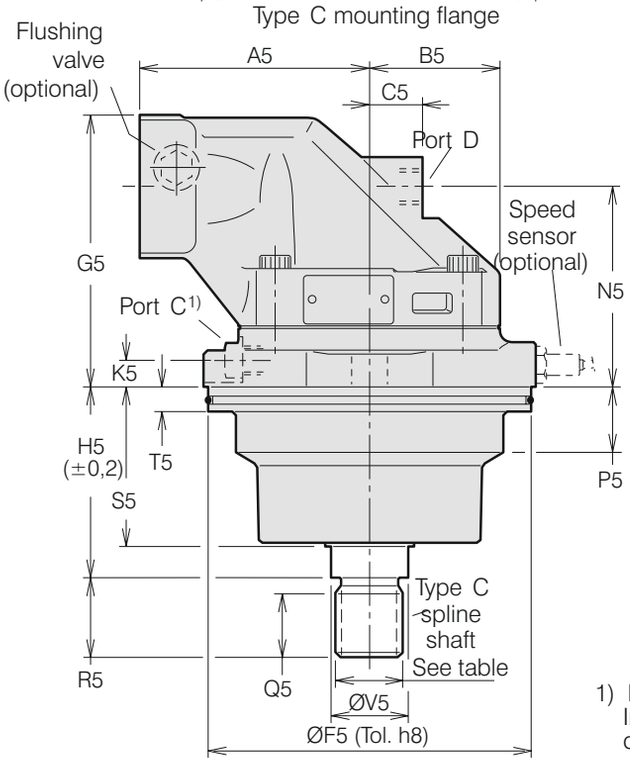


Type C mounting flange

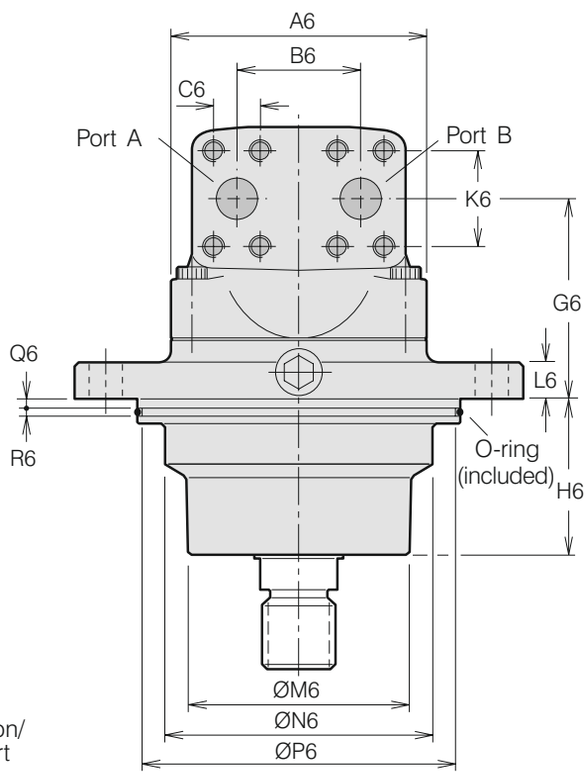
TS-F12-80 shown



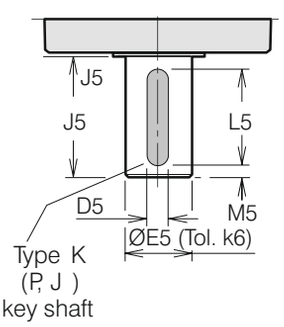
Port E (third drain port)
F12-110 and -125 barrel housing
(ISO /cartridge version)



1) Port C
Inspection/
drain port

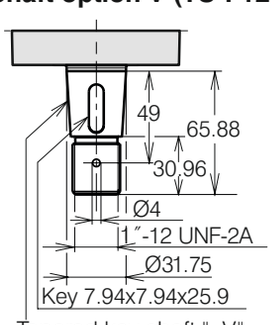


Shaft option K (P, J)



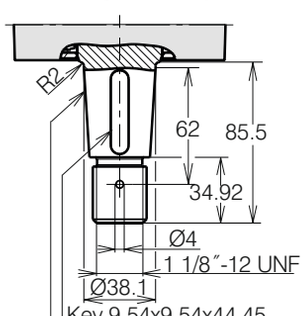
Type K
(P, J)
key shaft

Shaft option V (TS-F12-30)



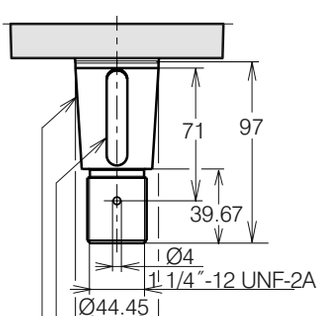
Tapered key shaft " V"
SAE J744 32-3 (C)

Shaft option V (TS-F12-40)



Tapered key shaft " V"
SAE J744 38-3 (C-C)

Shaft option V (TS-F12-60)



Tapered key shaft " V"
SAE J744 44-3 (D&E)

Installation Dimensions TS-F12

Dim.	TS-F12-30	TS-F12-40	TS-F12-60	TS-F12-80 TS-F12-90	TS-F12-110 TS-F12-125
A4	160	200	200	224	250
B4	140	164	164	196	206
C4	188	235	235	260	286
D4	14	18	18	22	22
E4	77	95	95	110	116
A5	100	110	125	135	145
B5	59	65	70	77.5	85
C5	25	26	22	32	38
D5	8	8[1)] 10[2)]	10	12	14
E5	30	30[1)]35[2)]	35	40	45
F5	135	160	160	190	200
G5	127	133	146	157	175
H5	89	92.3	92.3	110.5	122.8
J5	50	60	60	70	82
K5	14	16	15	15	15
L5	40	50	50	56	70
M5	5	5	5	7	6
N5	91	97	110	114	123
P5	22	30	31	40	40
Q5	28	28	28	37	37
R5	35	35	35	45	45
S5	70.5	72	76	91	95.7
T5	15	15	15	15	15
V5	32	35	35	45	45
A6	122	134	144	155	170
B6	66	66	66	75	83
C6	23.8	23.8	23.8	27.8	31.8
G6	91.5	97	110	114	123
H6	69.5	71	74	89.5	93.7
K6	50.8	50.8	50.8	57.2	66.7
L6	16	18	18	20	20
M6	92	115	115	130	140
N6	110	127	135	154	160
P6	128.2	153.2	153.2	183.2	193.2
Q6	5	5	5	5	5
R6	5	5	5	5	5
T6	-	-	-	-	68

1) Key shaft type K
2) Key shaft type J(opt.).

Ports	TS-F12-30	TS-F12-40	TS-F12-60	TS-F12-80 TS-F12-90	TS-F12-110 TS-F12-125
A, B size	$^3/_4$"	$^3/_4$"	$^3/_4$"	1"	$1^1/_4$"
Screw thread	M10x20	M10x20	M10x20	M12x22	M14 x26
C thread	M14 x1.5	M14x1.5	M14x1.5	M14x1.5	M14 x1.5
D, E thread	M18 x1.5	M18 x1.5	M22 x1.5	M22 x1.5	M22 x1.5

A, B: ISO 6162

Spline shaft (DIN 5480)

	Type C (standard)	Type B (optional)
TS-F12-30	W30x2x14x9g	-
-40	W30x2x14x9g	-
-60	W30x2x14x9g	-
-80	W40x2x18x9g	-
-90	W40x2x18x9g	-
-110	W40x2x18x9g	W45x2x21x9g
-125	W40x2x18x9g	W45x2x21x9g

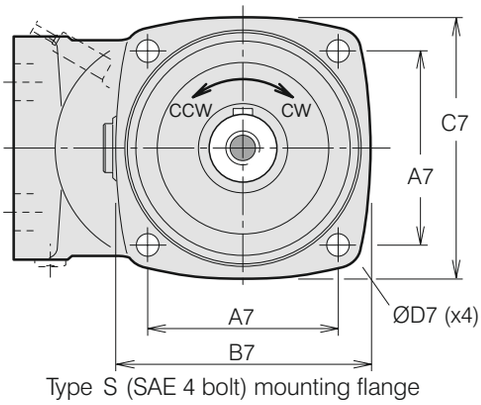
Key shaft

	Type K (std)	Type P, J (opt.)	Type V (opt.)
TS-F12-30	Ø30	Ø25 (P)	32-3
-40	Ø30	Ø35 (J)	38-3
-60	Ø35	-	44-3
-80	Ø40	-	-
-90	Ø40	-	-
-110	Ø45	-	-
-125	Ø45	-	-

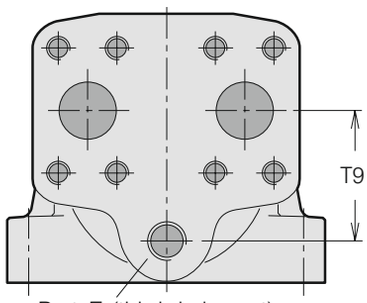
O-ring dimensions	
TS-F12-30	127x4
-40	150x4
-60	150x4
-80	180x4
-90	180x4
-110	190x4
-125	190x4

Installation Dimensions TS-F12

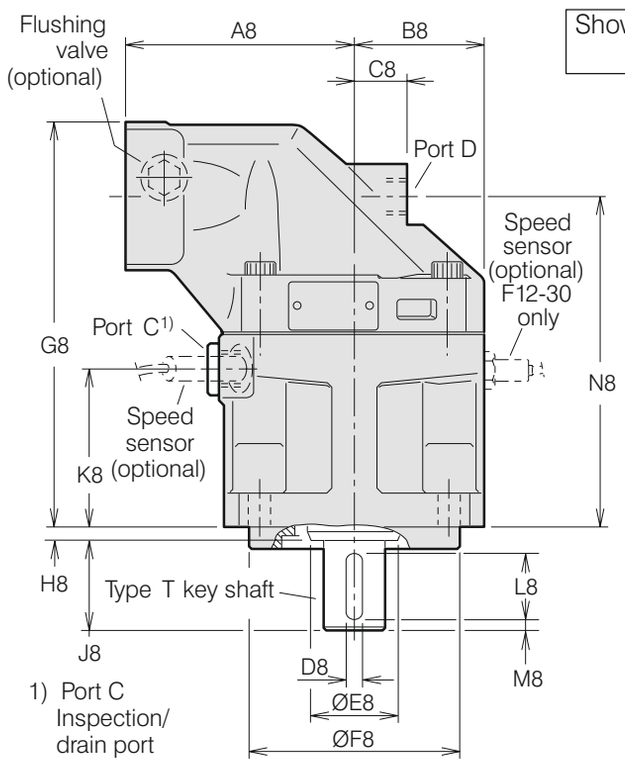
TS-F12-30, -40, -60, -80, -90, -110 and -125 (SAE versions with 4 bolt flange)



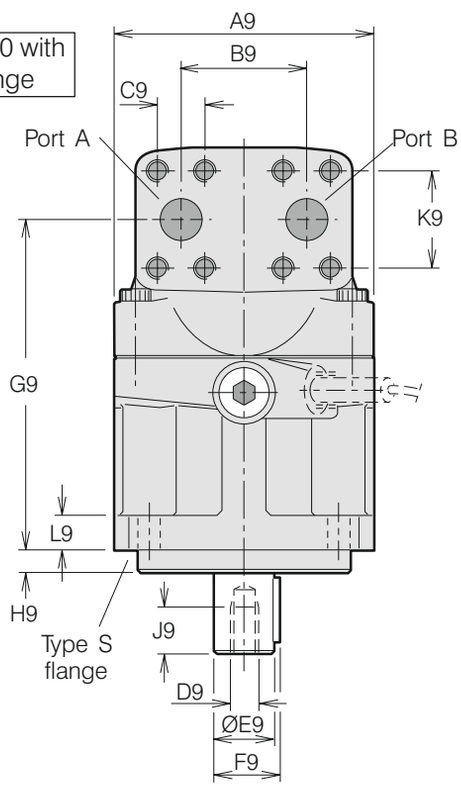
Type S (SAE 4 bolt) mounting flange



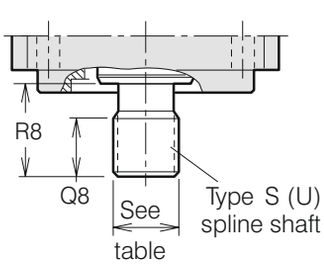
Port E (third drain port)
F12-110 and -125 barrel housing
(SAE version)



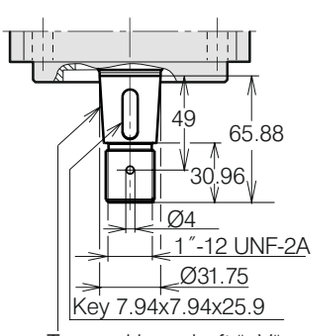
Shown: TS-F12-80 with 4 bolt flange



Shaft option S (U)

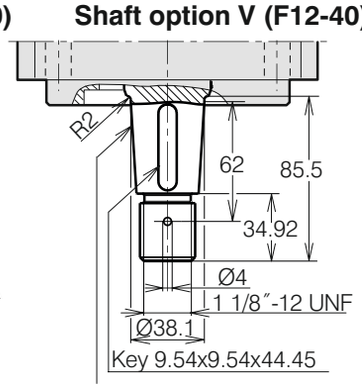


Shaft option V (F12-30)



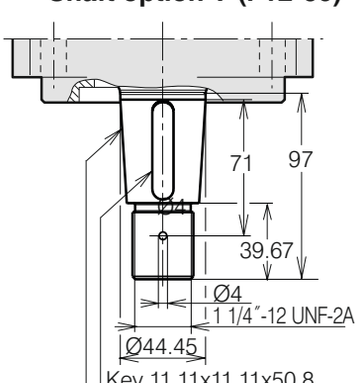
Tapered key shaft " V"
SAE J744 32-3 (C)

Shaft option V (F12-40)



Tapered key shaft " V"
SAE J744 38-3 (C-C)

Shaft option V (F12-60)



Tapered key shaft " V"
SAE J744 44-3 (D&E)

Installation Dimensions TS-F12

Dim.	TS-F12-30	TS-F12-40	TS-F12-60	TS-F12-80 TS-F12-90	TS-F12-110 TS-F12-125
A7	89.8	114.5	114.5	114.5	161.6
B7	118	148	148	155	204
C7	118	144	144	155	200
D7	14	14	14	14	21
A8	100	110	125	135	145
B8	59	65	70	77.5	85
C8	25	26	22	32	38
D8	6.35	7.94	7.94	9.53	11.1
E8	35	45	45	55	60
F8	101.60/ 101.55	127.00/ 126.94	127.00/ 126.94	127.00/ 126.94	152.40/ 152.34
G8	189.5	197	214	240	264
H8	8	8	8	8	8
J8	38	48	48	54	67
K8	72	76	79	95	99
L8	31.8	38.1	38.1	44.5	54.1
M8	2.5	4	4	4	7.5
N8	153.5	161	178.3	197.1	212
Q8[1)]	26	27	27	29	39
Q8[2)]	-	-	-	23	-
R8[1)]	33	48	48	54	66.7
R8[2)]	-	-	-	48	-
A9	122	134	144	155	170
B9	66	66	66	75	83
C9	23.8	23.8	23.8	27.8	31.8
D9*	5/16"-24	3/8"-24	3/8"-24	1/2"-20	5/8"-18
E9	25.40/ 25.35	31.75/ 31.70	31.75/ 31.70	38.10/ 38.5	44.45/ 44.40
F9	28.2	35.3	35.3	42.3	49.4
G9	153.8	161	178.3	197.1	212
H9	9.7	12.7	12.7	12.7	12.7
J9	16	19	19	26	32
K9	50.8	50.8	50.8	57.2	66.7
L9	18	20	20	20	22
T9	-	-	-	-	68

* UNF-2B thread
1) Spline shaft type S
2) Spline shaft type U
3) Max operating pressure 350 bar

Main ports A and B, type U (optional)	
TS-F12-30	1 1/16" - 12 UN [3)]
TS-F12-40	1 5/16" - 12 UN [3)]
TS-F12-60	1 5/16" - 12 UN [3)]
TS-F12-80	1 5/16" - 12 UN [3)]
TS-F12-90	1 5/16" - 12 UN [3)]
TS-F12-110	1 5/8" - 12 UN [3)]
TS-F12-125	1 5/8" - 12 UN [3)]

Ports	TS-F12-30	TS-F12-40	TS-F12-60	TS-F12-80 TS-F12-90	TS-F12-110 TS-F12-125
A, B size	3/4"	3/4"	3/4"	1"	1 1/4"
Screw thread**)	3/8"-16 x22	3/8"-16 x20	3/8"-16 x22	7/16"-14 x27	1/2"-13 x25
C thread	7/8"-14	7/8"-14	7/8"-14	7/8"-14	1 1/16"-12
D thread	3/4"-16	3/4"-16	7/8"-14	7/8"-14	1 1/16"-12
E thread	-	-	-	-	1 1/16"-12

A, B: ISO 6162 C, D, E: O-ring boss (SAE J514)
**) UN thread x depth in mm.

Mounting flange (SAE J744)

	S (standard)	R (optional)
F12-30	SAE 'B', 4 bolt	-
-40	SAE 'C', 4 bolt	-
-60	SAE 'C', 4 bolt	-
-80	SAE 'C', 4 bolt	SAE 'D', 4 bolt
-90	SAE 'C', 4 bolt	SAE 'D', 4 bolt
-110	SAE 'D', 4 bolt	-
-125	SAE 'D', 4 bolt	-

Spline shaft (SAE J498b, class 1, flat root, side fit)

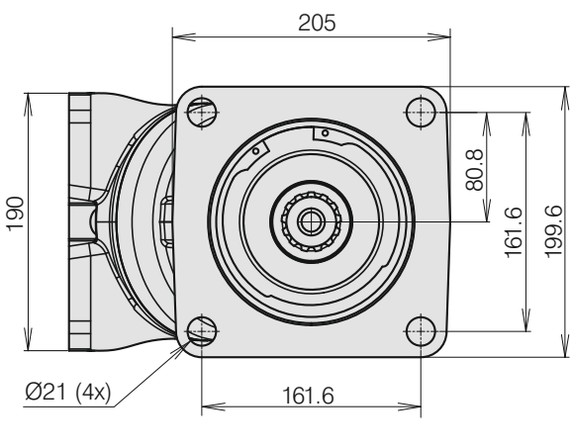
	S (standard)	U (optional)	F (optional)
TS-F12-30	SAE 'B' 13T, 16/32 DP	-	-
-40	SAE 'C' 14T, 12/24 DP	-	-
-60	SAE 'C' 14T, 12/24 DP	-	-
-80	SAE 'C-C' 17T, 12/24 DP	SAE 'C' 14T, 12/24 DP[3)]	SAE 'D' 13T, 8/16 DP
-90	SAE 'C-C' 17T, 12/24 DP	SAE 'C' 14T, 12/24 DP[3)]	SAE 'D' 13T, 8/16 DP
-110	SAE 'D' 13T, 8/16 DP	-	-
-125	SAE 'D' 13T, 8/16 DP	-	-

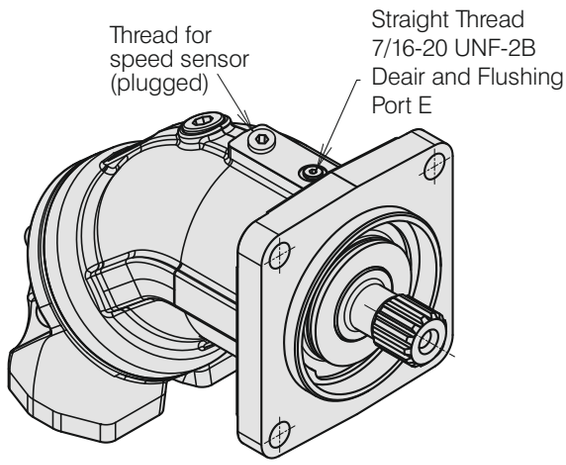
Key shaft (SAE J744)

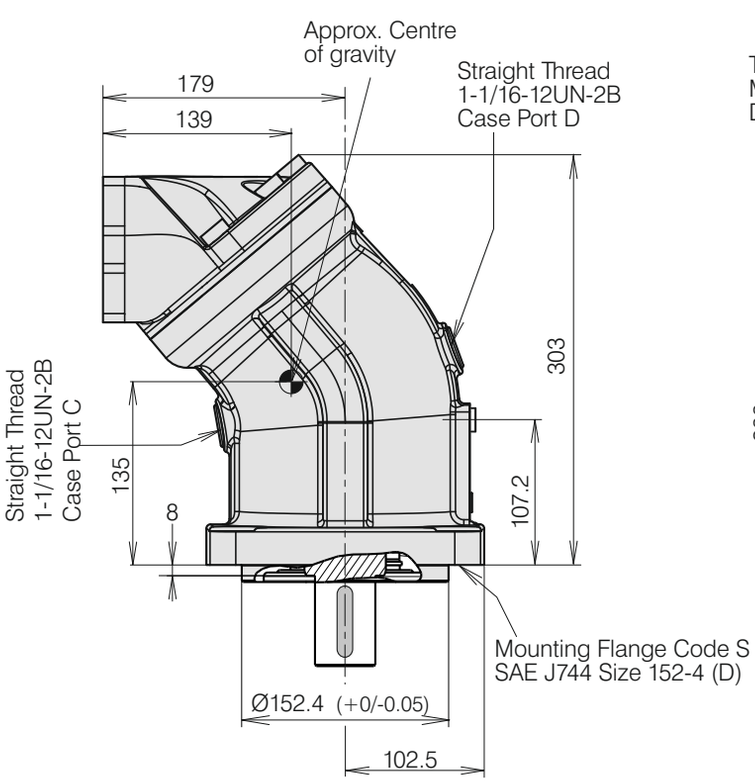
F12	T (standard)	R (optional)	V (optional)
-30	SAE 'B-B' (Ø25.4 mm/1")	-	32-3
-40	SAE 'C' (Ø31.75 mm/1 1/4")	-	38-3
-60	SAE 'C' (Ø31.75 mm/1 1/4")	-	44-3
-80	SAE 'C-C' (Ø38.1 mm/1 1/2")	SAE 'D' (Ø44.45 mm/1 3/4")	-
-90	SAE 'C-C' (Ø38.1 mm/1 1/2")	SAE 'D' (Ø44.45 mm/1 3/4")	-
-110	SAE 'D' (Ø44.45 mm/1 3/4")	-	-
-125	SAE 'D' (Ø44.45 mm/1 3/4")	-	-

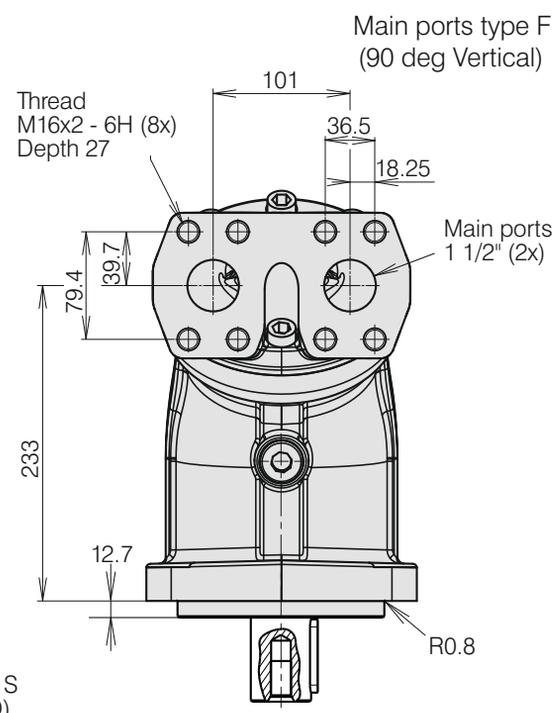
Installation Dimensions TS-F12

TS-F12-152, -162 and -182 (SAE versions)

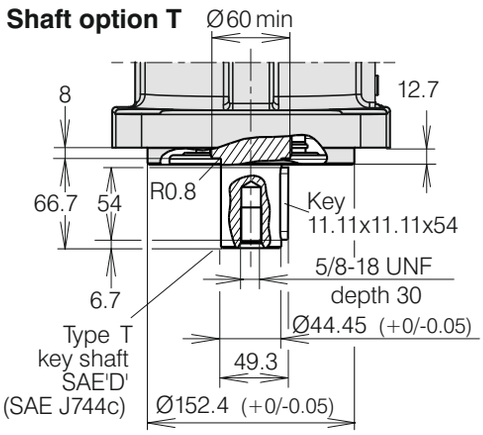




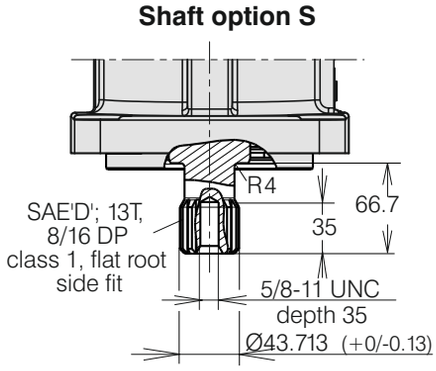




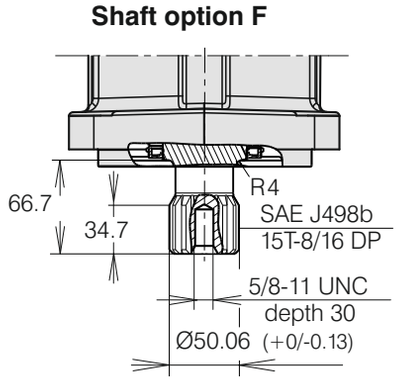
Shaft option T



Shaft option S



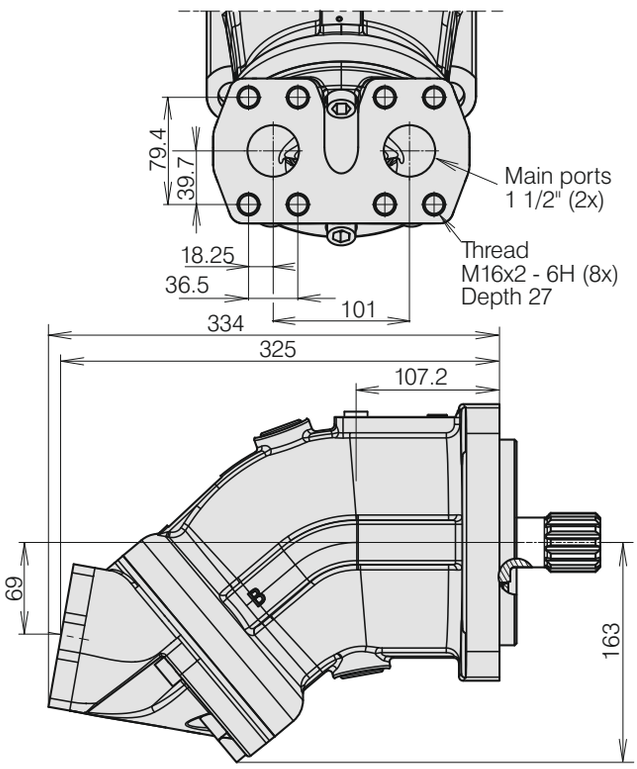
Shaft option F



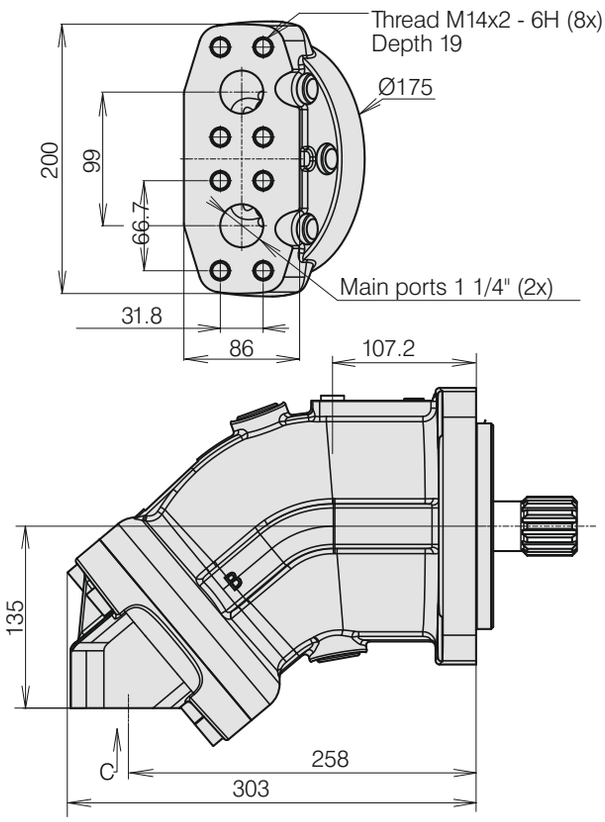
Installation Dimensions TS-F12

TS-F12-152, -162 and -182 (SAE versions)

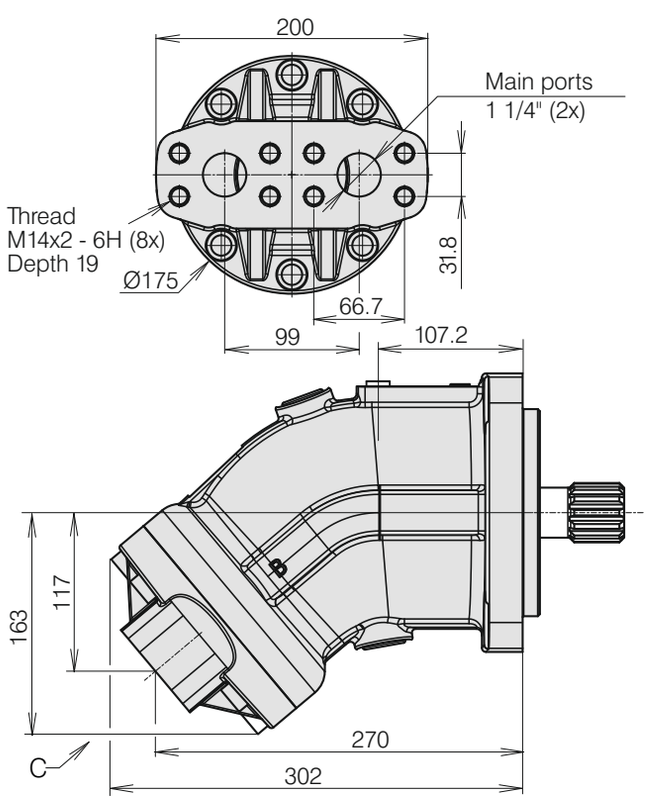
Main ports type A (180 deg Vertical)



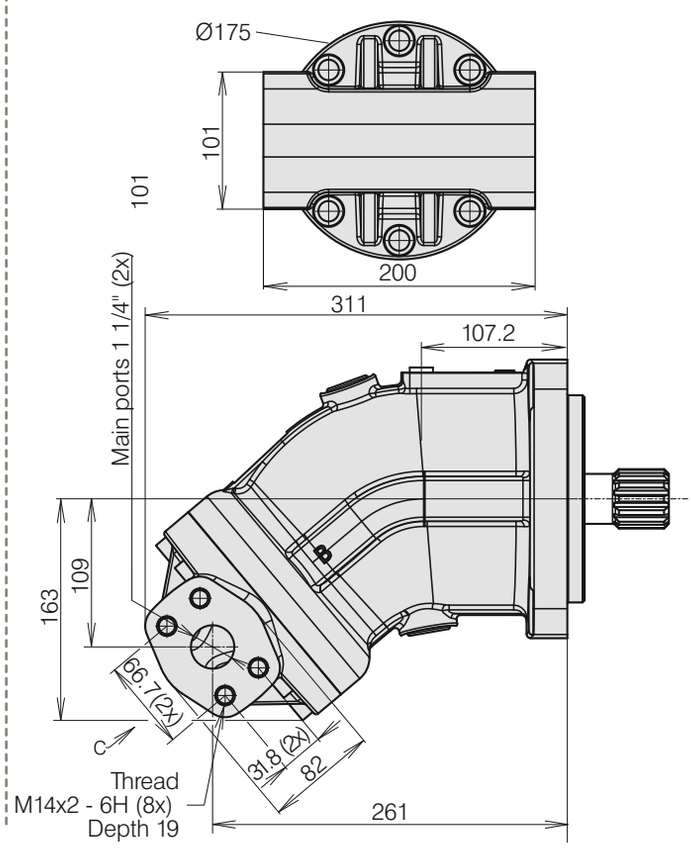
Main ports type D (90 deg Horizontal)



Main ports type K (40 deg rear)

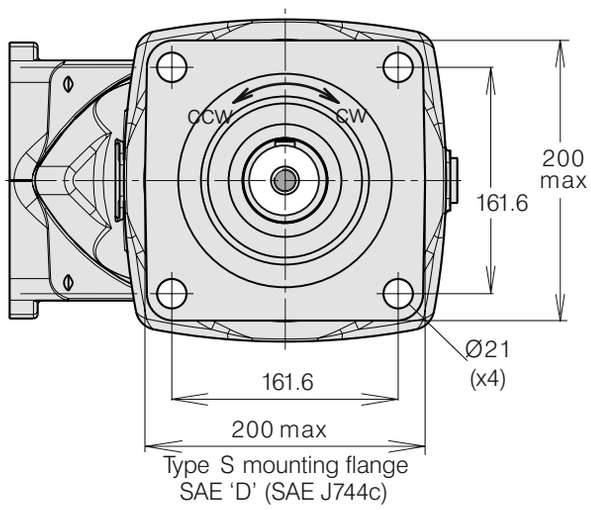


Main ports type M (Side ports)



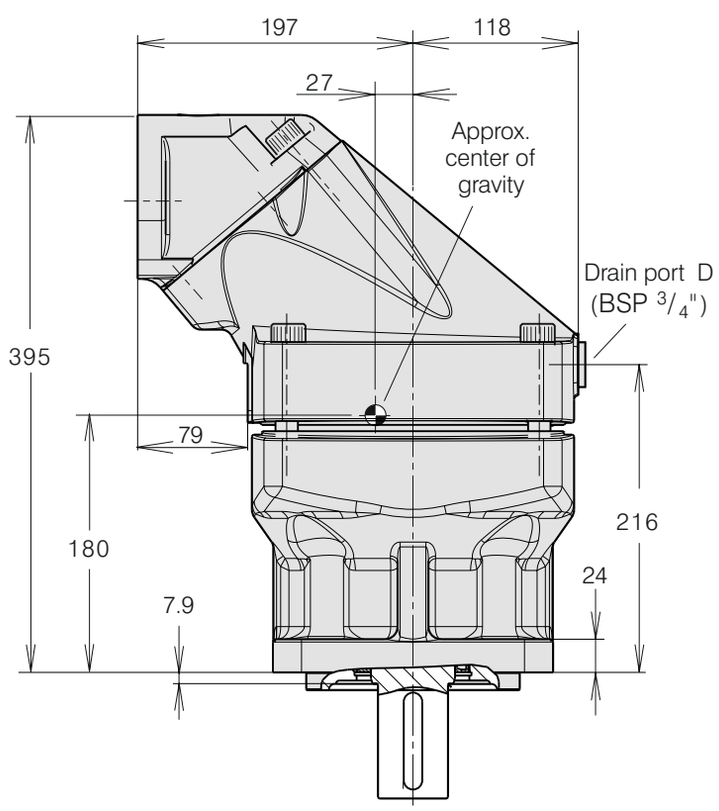
Installation Dimensions TS-F12

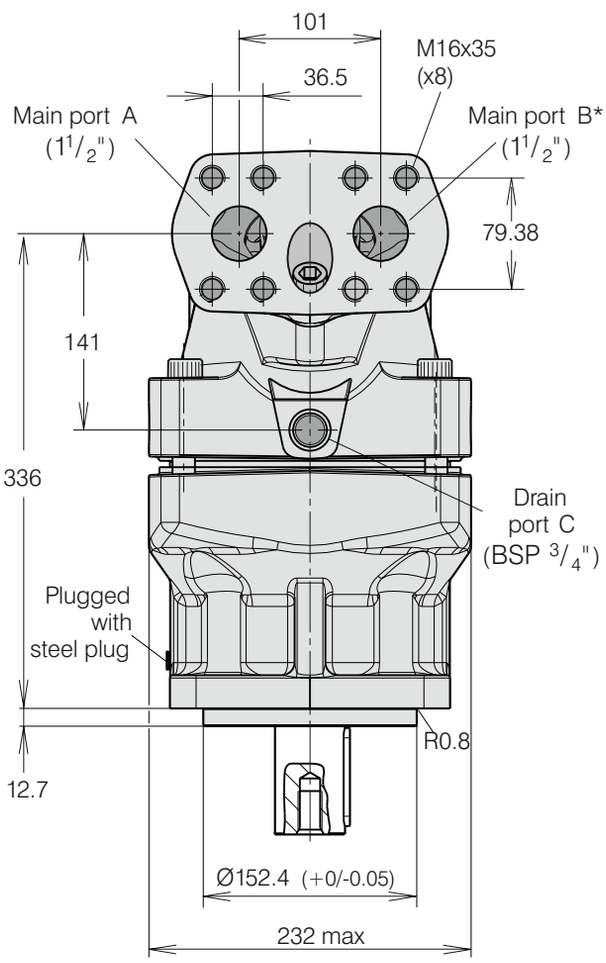
TS-F12-250 (SAE version)



Type S mounting flange
SAE 'D' (SAE J744c)

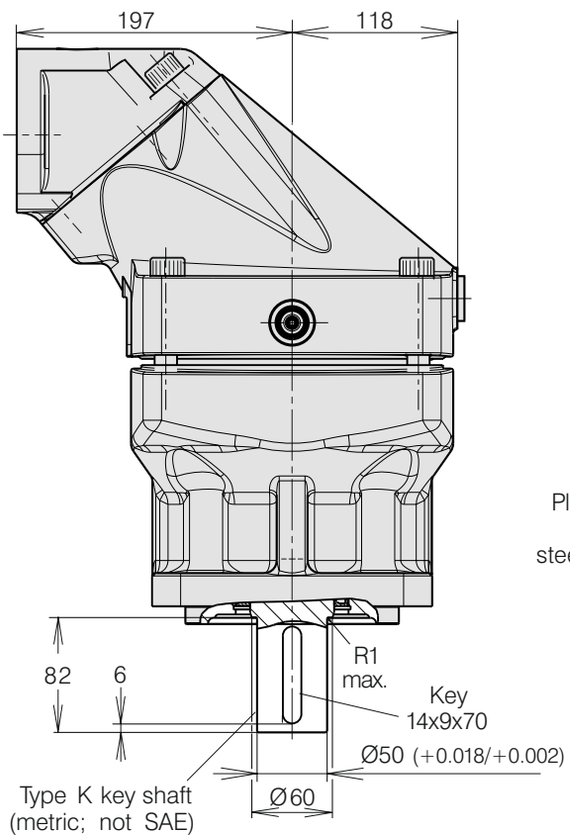
* 6000 psi flange (SAE J518c)



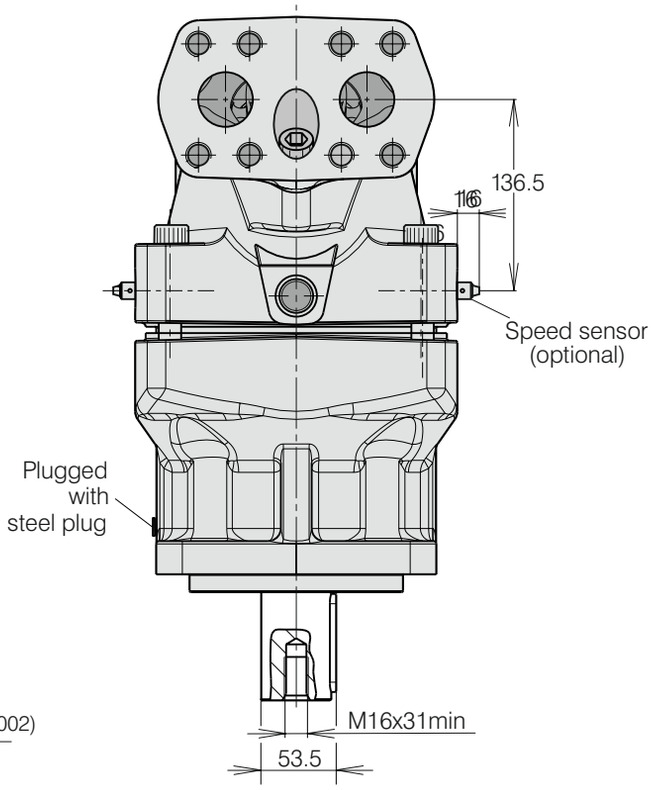


Installation Dimensions TS-F12

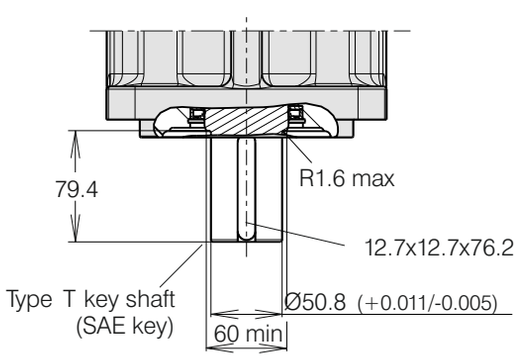
TS-F12-250 Options (SAE version)

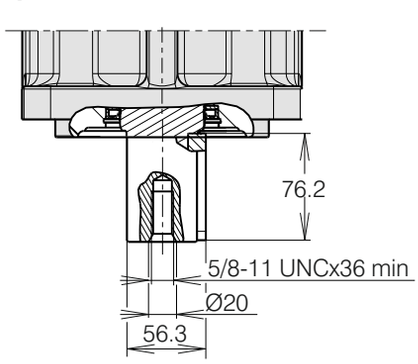


Shaft option K

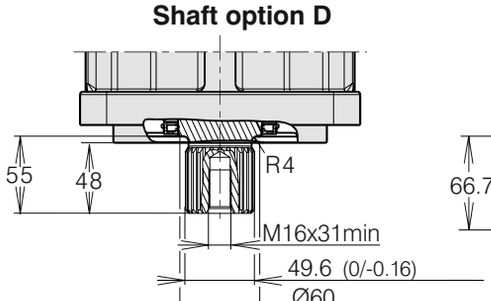


Shaft option T



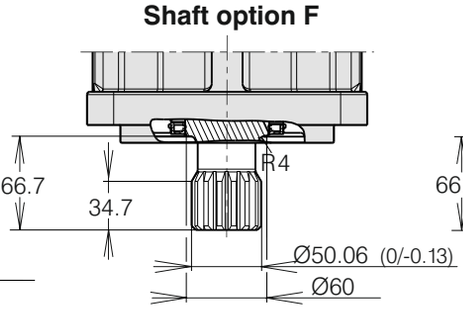


Shaft option D



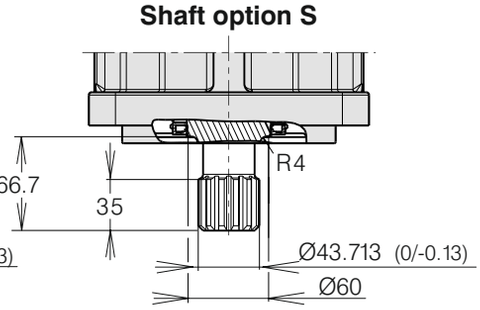
Type D spline shaft
W50x2x24x9g
DIN 5480 side fit

Shaft option F



Type F spline shaft
SAE J498b, class 1;
15T-8/16 DP;
fillet root, side fit

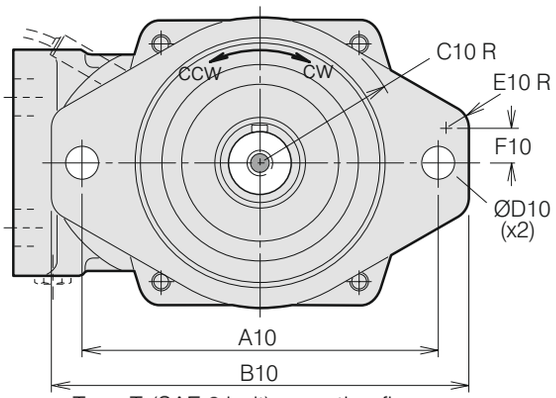
Shaft option S



Type S spline shaft
SAE J498b, class 1; 30° involute spline;
13T-8/16 DP;
flat root, side fit

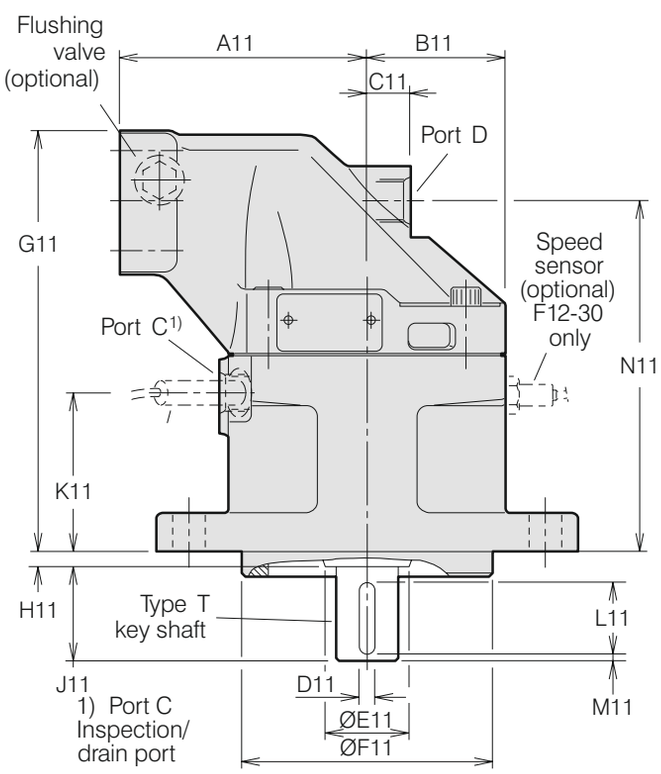
Installation Dimensions TS-F12

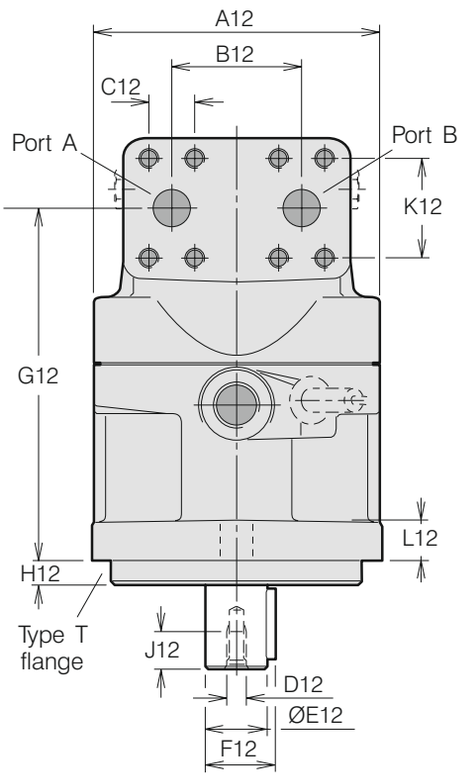
TS-F12-30, -40, and -60 (SAE versions with 2 bolt flange)

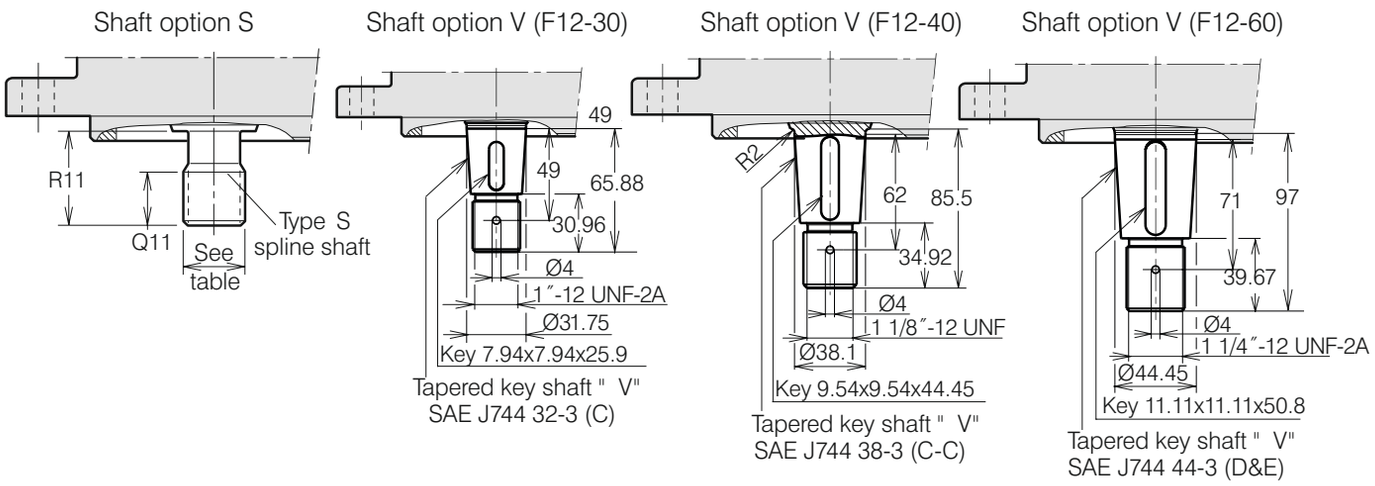


Type T (SAE 2 bolt) mounting flange

Shown: F12-60 with 2 bolt flange







Installation Dimensions TS-F12

Dim.	TS-F12-30	TS-F12-40	TS-F12-60
A10	146	181	181
B10	176	215	215
C10	63	74	74
D10	14.4	17.5	17.5
E10	10	16	16
F10	10	15.5	15.5
A11	100	110	125
B11	59	65	70
C11	25	26	22
D11	6.35	7.94	7.94
E11	35	45	45
F11	101.60/101.55	127.00/ 126.95	127.00/ 126.95
G11	189.5	197	214
H11	8	8	8
J11	38	48	48
K11	71	77	81.5
L11	31.8	38.1	38.1
M11	2.5	4	4
N11	154	161	178.5
Q11	26	27	27
R11	33	48	48
A12	122	134	144
B12	66	66	66
C12	23.8	23.8	23.8
D12[1)]	5/16"-24	3/8"-24	3/8"-24
E12	25.40/ 25.35	31.75/ 31.70	31.75/ 31.70
F12	28.2	35.2	35.2
G12	154	161	178.5
H12	9.7	12.7	12.7
J12	16	19	19
K12	50.8	50.8	50.8
L12	18	20	20

1) UNF-2B thread
2) Max operating pressure 350 bar

Ports	TS-F12-30	TS-F12-40	TS-F12-60
A, B size	19 (3/4")	19 (3/4")	19 (3/4")
Screw thread*)	3/8"-16 x22	3/8"-16 x20	3/8"-16 x22
C thread	3/4"-16	3/4"-16	7/8"-14
D thread	3/4"-16	3/4"-16	7/8"-14

A, B (main ports): SAE J518c (6000 psi)
C, D (drain ports): O-ring boss (SAE J514)
*) UN thread

Main ports A and B, type U (optional)	
TS-F12-30	1 1/16" - 12 UN 2)
-40	1 5/16" - 12 UN 2)
-60	1 5/16" - 12 UN 2)

O-ring ports according to SAE J514d

Mounting flange T (SAE J744)	
TS-F12-30	SAE 'B', 2 bolt
-40	SAE 'C', 2 bolt
-60	SAE 'C', 2 bolt

Spline shaft S (SAE J498b, class 1, flat root, side fit)	
TS-F12-30	SAE 'B' 13 T; 16/32 DP
-40	SAE 'C' 14 T; 12/24 DP
-60	SAE 'C' 14 T; 12/24 DP

Key shaft (SAE J744)

	T (Standard)	T (optional)
TS-F12-30	SAE 'B-B' Ø25.4 mm/1"	32-3
-40	SAE 'C' Ø31.75 mm/1 1/4"	38-3
-60	SAE 'C' Ø31.75 mm/1 1/4"	44-3

The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract.

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