

Hydraulic Motor/Pump

Series F11/F12
Fixed Displacement

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



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 [cm³/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 |
| $\frac{9}{5} \text{ }^\circ\text{C} + 32$ | 1 $^\circ\text{F}$ |
| 1 kW..... | 1.34 hp |

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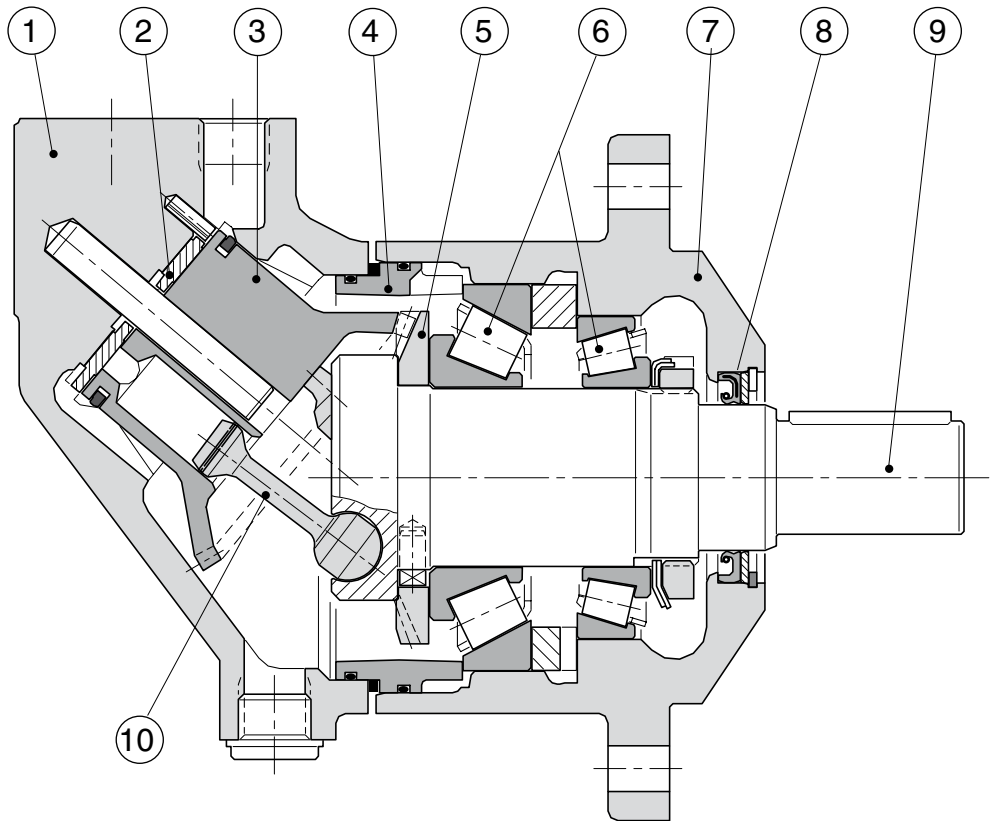
F11 and F12 are bent axis, fixed displacement heavy-duty motor/pump series. They can be used in numerous applications in both open and closed loop circuits.

- Series F11 is available in the following frame sizes and versions:
 - F11-5, -6, -10, -12, -14 and -19 with CETOP mounting flange and shaft end
 - F11-10, -12 and -14 with ISO flange and shaft
 - F11-10, -12, -14 and -19 with SAE flange and shaft
- Series F12 conforms to current ISO and SAE mounting flange and shaft end configurations. A very compact cartridge version is also available.
- Thanks to the unique spherical piston design, F11/F12 motors can be used at unusually high shaft speeds. Operating pressures to 480 bar provides for the high output power capability.
- The 40° angle between shaft and cylinder barrel allows for a very compact, lightweight motor/pump.

- The laminated piston ring offers important advantages such as low internal leakage and thermal shock resistance.
- The pump version has highly engineered valve plates for increased selfpriming speed and low noise, available with left and right hand rotation.
- The F11/F12 motors produce very high torque at start-up as well as at low speeds.
- Our unique timing gear design synchronizes shaft and cylinder barrel, making the F11/F12 very tolerant to high 'G' forces and torsional vibrations.
- Heavy duty roller bearings permit substantial external axial and radial shaft loads.
- The F11's and F12's have a simple and straight-forward design with very few moving parts, making them very reliable motors/pumps.
- 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.

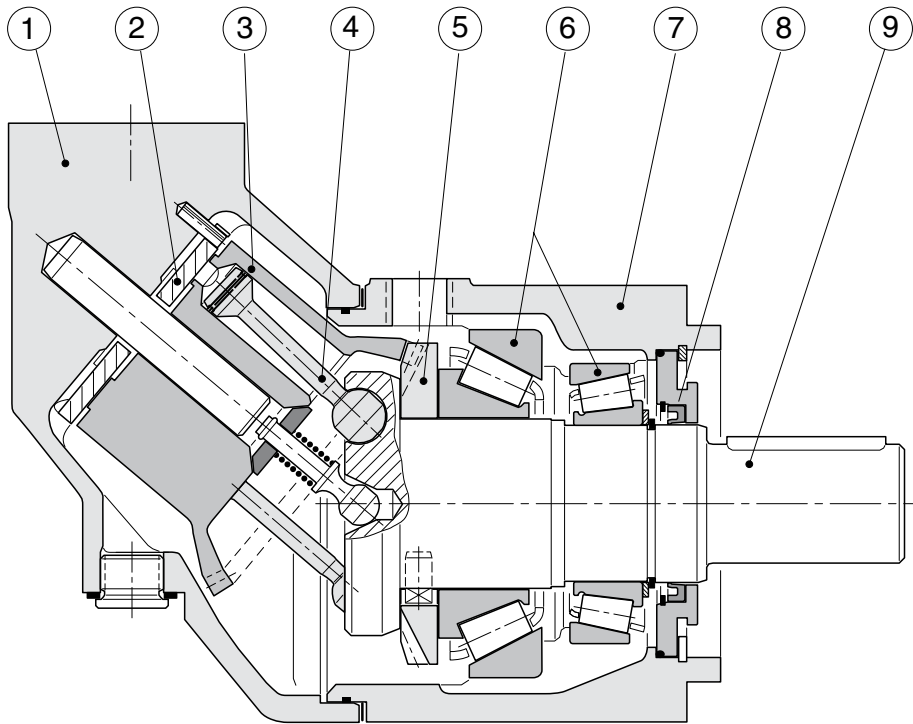
F11 cross section

1. Barrel housing
2. Valve plate
3. Cylinder barrel
4. Guide spacer with O-rings
5. Timing gear
6. Roller bearing
7. Bearing housing
8. Shaft seal
9. Output/input shaft
10. Piston with laminated piston ring



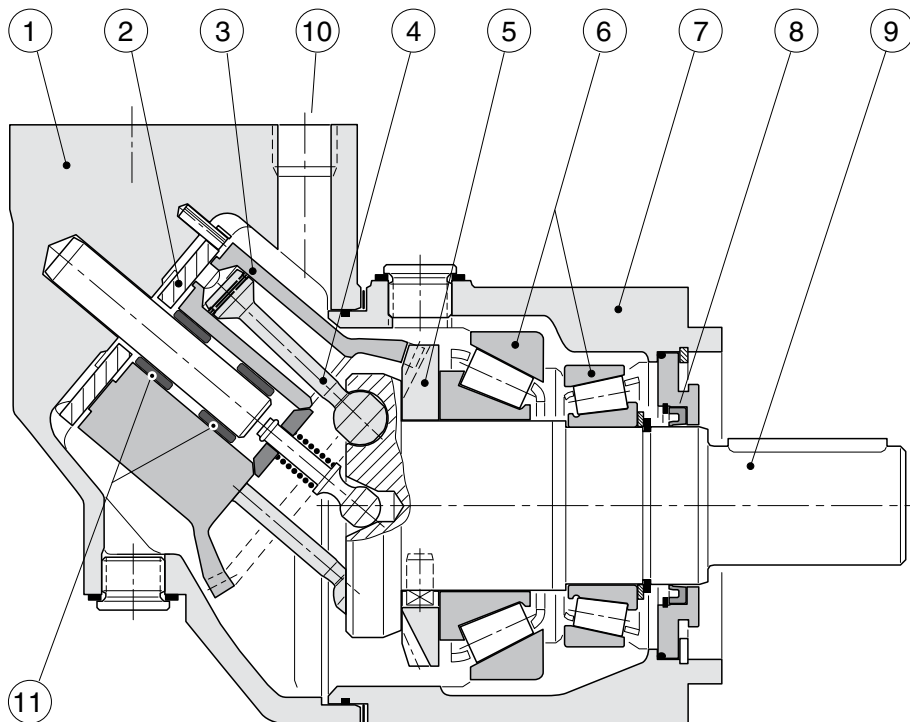
F12 cross sections

F12-30, -40, -60, -80 and -90
 (F12-60 shown)



- Legend:
- | | | |
|----------------------------|----------------------------|--|
| 1. Barrel housing | 5. Timing gear | 9. Output/input shaft |
| 2. Valve plate | 6. Tapered roller bearings | 10. Port E (F12-110 and -125) |
| 3. Cylinder barrel | 7. Bearing housing | 11. Needle bearings (F12-110 and -125) |
| 4. Piston with piston ring | 8. Shaft seal | |

F12-110 and -125
 (F12-110 shown)



Specifications

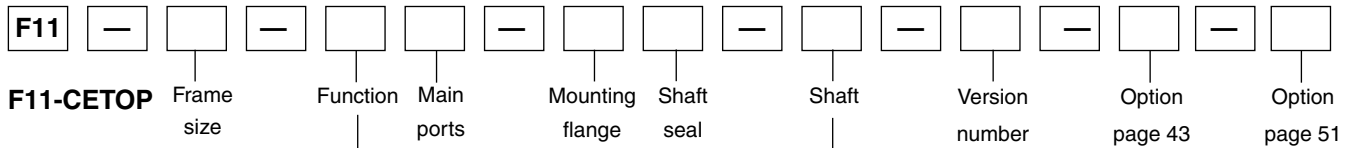
Hydraulic motor/pump

Series F11/F12

| Frame size F11 | -5 | -6 | -10 | -12 | -14 | -19 |
|--|--------|--------|--------|--------|-------|-------|
| Displacement [cm ³ /rev] | 4.9 | 6.0 | 9.8 | 12.5 | 14.3 | 19.0 |
| Operating pressure | | | | | | |
| max intermittent ¹⁾ [bar] | 420 | ————— | | | | 420 |
| max continuous [bar] | 350 | ————— | | | | 350 |
| Motor operating speed [rpm] | | | | | | |
| max intermittent ¹⁾ | 14 000 | 11 200 | 11 200 | 10 300 | 9 900 | 8 900 |
| max continuous | 12 800 | 10 200 | 10 200 | 9 400 | 9 000 | 8 100 |
| min continuous | 50 | ————— | | | | 50 |
| Max pump selfpriming speed²⁾ | | | | | | |
| L or R function; max [rpm] | 4 600 | — | 4 200 | 3 900 | 3 900 | 3 500 |
| Motor input flow | | | | | | |
| max intermittent ¹⁾ [l/min] | 69 | 67 | 110 | 129 | 142 | 169 |
| max continuous [l/min] | 63 | 61 | 100 | 118 | 129 | 154 |
| Main circuit temp.³⁾, max [°C] | 80 | ————— | | | | 80 |
| min [°C] | -40 | ————— | | | | -40 |
| Theoretical torque at 100 bar [Nm] | 7.8 | 9.5 | 15.6 | 19.8 | 22.7 | 30.2 |
| Mass moment of inertia | | | | | | |
| (x10 ⁻³) [kg m ²] | 0.16 | 0.39 | 0.39 | 0.40 | 0.42 | 1.1 |
| Weight [kg] | 4.7 | 7.5 | 7.5 | 8.2 | 8.3 | 11 |

| Frame size F12 | -30 | -40 | -60 | -80 | -90 | -110 | -125 | -150 | -250 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Displacement [cm ³ /rev] | 30.0 | 40.0 | 59.8 | 80.4 | 93.0 | 110.1 | 125.0 | 150 | 242 |
| Operating pressure | | | | | | | | | |
| max intermittent ¹⁾ [bar] | 480 | ————— | | 480 | 420 | 480 | 480 | 420 | 420 |
| max continuous [bar] | 420 | ————— | | 420 | 350 | 420 | 420 | 350 | 350 |
| Motor operating speed [rpm] | | | | | | | | | |
| max intermittent ¹⁾ | 7 300 | 6 700 | 5 800 | 5 300 | 5 000 | 4 800 | 4 600 | 3 500 | 3 000 |
| max continuous | 6 700 | 6 100 | 5 300 | 4 800 | 4 600 | 4 400 | 4 200 | 3 200 | 2 700 |
| min continuous | 50 | ————— | | | | | | | 50 |
| Max pump selfpriming speed²⁾ | | | | | | | | | |
| L or R function; max [rpm] | 3150 | 2870 | 2500 | 2300 | 2 250 | 2200 | 2 100 | 1 700 | 1 500 |
| Motor input flow | | | | | | | | | |
| max intermittent ¹⁾ [l/min] | 219 | 268 | 347 | 426 | 465 | 528 | 575 | 525 | 726 |
| max continuous [l/min] | 201 | 244 | 317 | 386 | 428 | 484 | 525 | 480 | 653 |
| Main circuit temp.³⁾, max [°C] | 80 | ————— | | | | | | | 80 |
| min [°C] | -40 | ————— | | | | | | | -40 |
| Theoretical torque at 100 bar [Nm] | 47.6 | 63.5 | 94.9 | 127.6 | 147.6 | 174.8 | 198.4 | 238.1 | 384.1 |
| Mass moment of inertia | | | | | | | | | |
| (x10 ⁻³) [kg m ²] | 1.7 | 2.9 | 5 | 8.4 | 8.4 | 11.2 | 11.2 | 40 | 46 |
| Weight [kg] | 12 | 16.5 | 21 | 26 | 26 | 36 | 36 | 70 | 77 |

1) Intermittent: max 6 seconds in any one minute.
 2) Selfpriming speed valid at sea level.
 3) See also installation information, operating temperature.



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

Version number
 (assigned for special versions)

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

| Frame size | 5 | 6 | 10 | 12 | 14 | 19 |
|---|---|---|-----|-----|-----|-----|
| Code | | | | | | |
| Option | | | | | | |
| MVR Make-up valve clockwise rotation | - | - | (x) | (x) | (x) | (x) |
| MVL Make-up valve counter clockwise rotation | - | - | (x) | (x) | (x) | (x) |

For other versions, contact Parker Hannifin

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

| Frame size | 5 | 6 | 10 | 12 | 14 | 19 |
|---|-----|-----|-----|-----|-----|-----|
| Code | | | | | | |
| Shaft | | | | | | |
| K Metric key | x | x | x | x | x | x |
| K Metric key, 25 mm ³ | - | (x) | (x) | (x) | - | - |
| D Spline, DIN 5480 | (x) | (x) | (x) | (x) | (x) | (x) |
| S Spline, SAE | (x) | - | - | - | - | - |

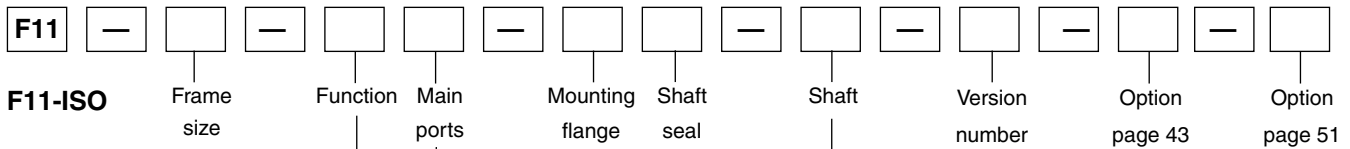
| Frame size | 5 | 6 | 10 | 12 | 14 | 19 |
|---------------------------|---|---|-----|-----|-----|-----|
| Code | | | | | | |
| Mounting flange | | | | | | |
| C CETOP flange | x | x | x | x | x | x |
| W Saw motor flange | - | - | (x) | (x) | (x) | (x) |

| Frame size | 5 | 6 | 10 | 12 | 14 | 19 |
|--|-----|-----|-----|----|----|-----|
| Code | | | | | | |
| Shaft seal | | | | | | |
| N NBR ¹⁾ , low pressure | (x) | (x) | (x) | - | - | (x) |
| V FPM ²⁾ , high pressure, high temperature | x | x | x | x | x | x |
| S FPM ²⁾ , saw motor | - | (x) | (x) | - | - | (x) |

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

- 1) NBR - Nitrile rubber
- 2) FPM - Fluor rubber
- 3) Special version number 349

| Frame size | 5 | 6 | 10 | 12 | 14 | 19 |
|------------------------------------|---|---|----|-----|-----|-----|
| Code | | | | | | |
| Option | | | | | | |
| P Prepared for speed sensor | - | - | - | (x) | (x) | (x) |



| Frame size | |
|------------|-----------------------------------|
| Code | Displacem. (cm ³ /rev) |
| 010 | 9.8 |
| 012 | 12.5 |
| 014 | 14.3 |

| Version number |
|---------------------------------|
| (assigned for special versions) |

| Frame size | 10 | 12 | 14 |
|---|-----|-----|-----|
| Code Option | | | |
| MVR Make-up valve clockwise rotation | (x) | (x) | (x) |
| MVL Make-up valve counter clockwise rotation | (x) | (x) | (x) |

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

| Frame size | 10 | 12 | 14 |
|---|-----|-----|-----|
| Code Shaft | | | |
| K Metric key | x | x | x |
| D Spline, DIN 5480 | (x) | (x) | (x) |
| K Metric key, 25 mm ²) | (x) | (x) | - |

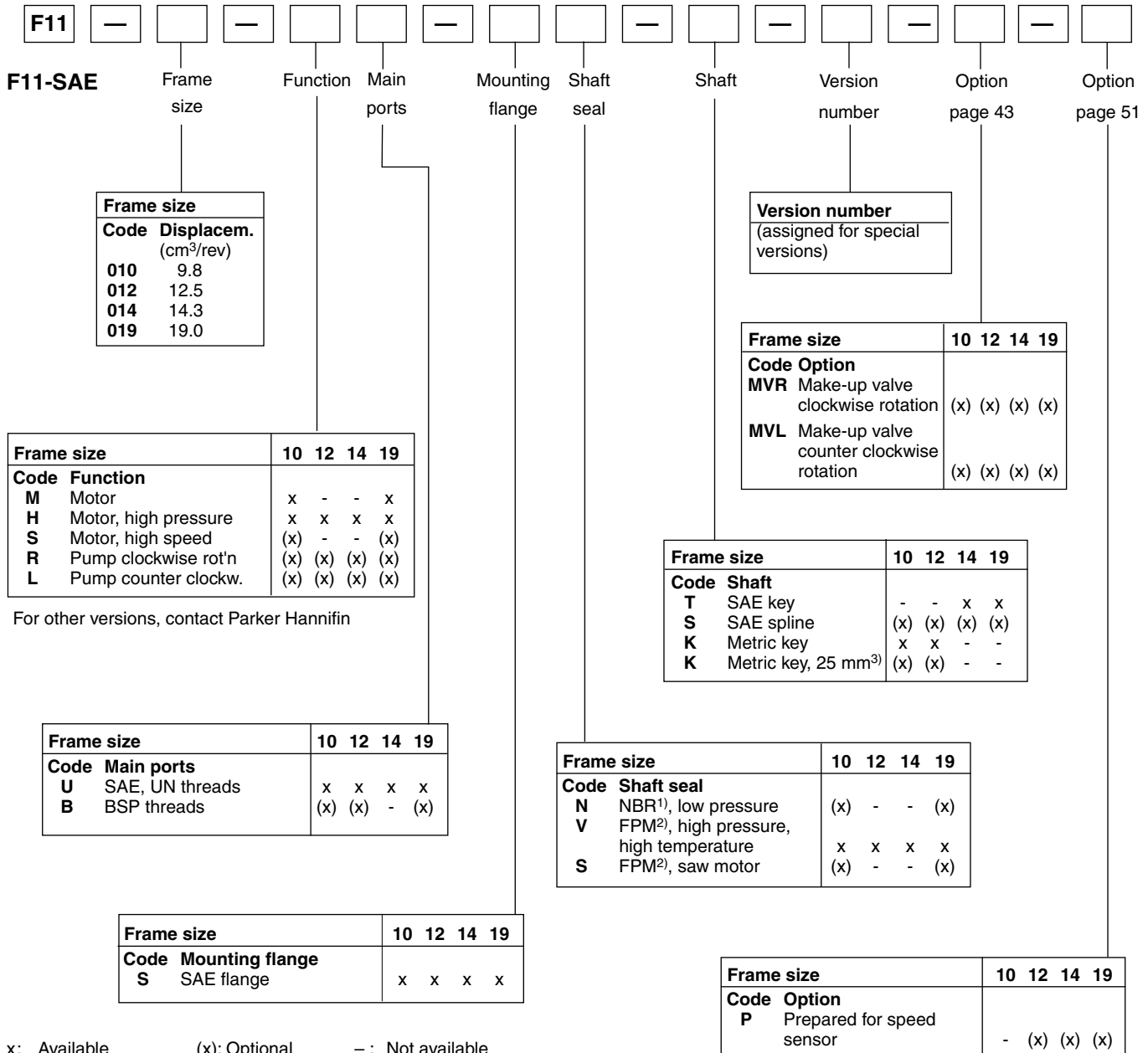
| Frame size | 10 | 12 | 14 |
|-------------------------|-----|-----|-----|
| Code Main ports | | | |
| F Metric threads | x | x | x |
| B BSP threads | (x) | (x) | (x) |

| Frame size | 10 | 12 | 14 |
|--|-----|----|----|
| Code Shaft seal | | | |
| V FPM ¹⁾ , high pressure, high temperature | x | x | x |
| S FPM ¹⁾ , saw motor | (x) | - | - |

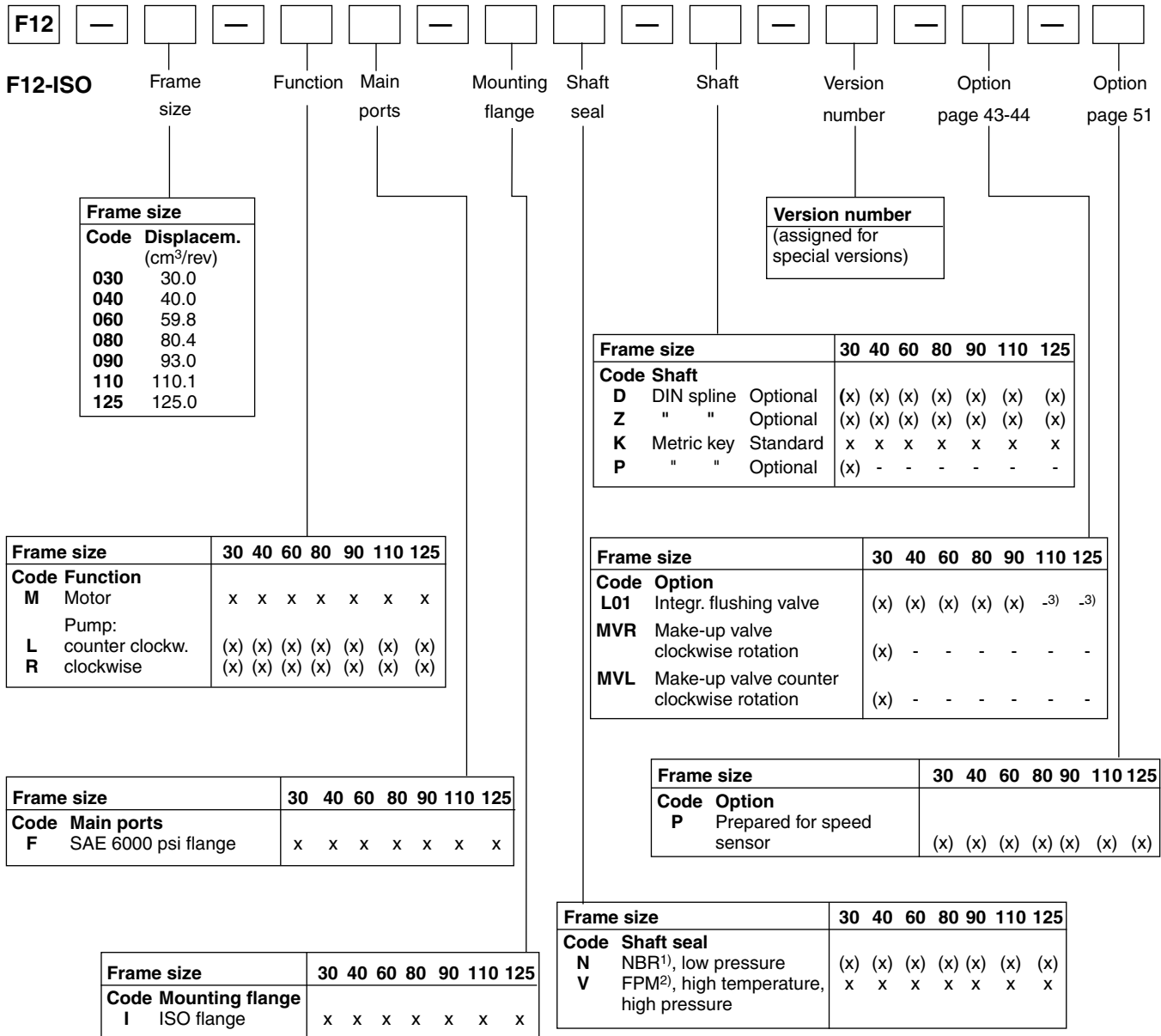
| Frame size | 10 | 12 | 14 |
|-----------------------------|----|----|----|
| Code Mounting flange | | | |
| I ISO flange | x | x | x |

| Frame size | 10 | 12 | 14 |
|------------------------------------|----|-----|-----|
| Code Option | | | |
| P Prepared for speed sensor | - | (x) | (x) |

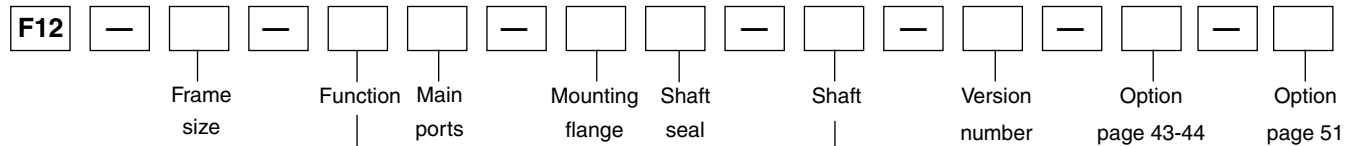
x: Available (x): Optional -: Not available
 1) FPM - Fluor rubber
 2) Special version number 349



x: Available (x): Optional - : Not available
 1) NBR - Nitrile rubber
 2) FPM - Fluor rubber
 3) Special version number 349



x: Available (x): Optional -: Not available
 1) NBR - Nitrile rubber
 2) FPM - Fluor rubber
 3) F12-110 and -125: Accessory valve block (page 45)



**F12-Cartridge
 CETOP**

| 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 |
| 150 | 150.0 |

Version number
 (assigned for special versions)

| Frame size | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 |
|-------------------------------|----|----|----|----|----|-----|-----|-----|
| Code Function | | | | | | | | |
| M Motor | x | x | x | x | x | x | x | x |
| H Motor, high pressure | - | - | - | - | - | - | - | (x) |
| Pump: | | | | | | | | |
| R Clockwise | - | - | - | - | - | - | - | (x) |
| L counter clockw. | - | - | - | - | - | - | - | (x) |

| Frame size | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|
| Code Shaft | | | | | | | | |
| C DIN spline Standard | x | x | x | x | x | x | x | - |
| K Metric key Optional | (x) | - | (x) | (x) | (x) | - | - | x |
| X Metric key ⁴ Optional | - | (x) | - | - | - | - | - | - |
| X Spline ⁵ DIN 5480 | - | - | - | - | - | x | x | - |
| D Spline DIN 5480 | - | - | - | - | - | - | - | (x) |

| Frame size | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 |
|---|-----|-----|-----|-----|-----|----------------|----------------|-----|
| Code Option | | | | | | | | |
| L01 Integr. flushing valve | (x) | (x) | (x) | (x) | (x) | - ³ | - ³ | - |
| MVR Make-up valve clockwise rotation | (x) | - | - | - | - | - | - | - |
| MVL Make-up valve counter clockwise rotation | (x) | - | - | - | - | - | - | - |

| Frame size | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 |
|------------------------------|----|----|----|----|----|-----|-----|-----|
| Code Main ports | | | | | | | | |
| F SAE 6000 psi flange | x | x | x | x | x | x | x | x |

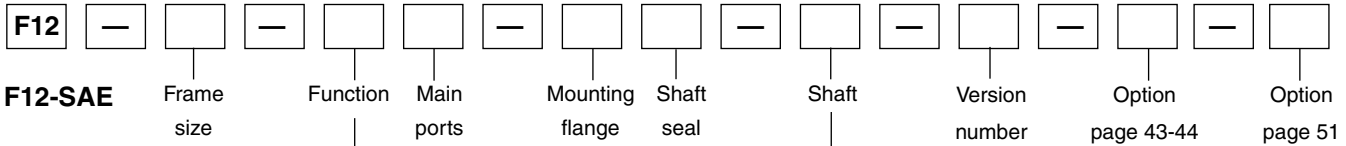
| Frame size | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 |
|------------------------------------|----|-----|-----|-----|-----|-----|-----|-----|
| Code Option | | | | | | | | |
| P Prepared for speed sensor | x | (x) | (x) | (x) | (x) | x | x | - |

| Frame size | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 |
|-----------------------------|----|----|----|----|----|-----|-----|-----|
| Code Mounting flange | | | | | | | | |
| C Cartridge | x | x | x | x | x | x | x | - |
| C CETOP | - | - | - | - | - | - | - | x |

| Frame size | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 |
|--|-----|-----|-----|-----|-----|-----|-----|-----|
| Code Shaft seal | | | | | | | | |
| N NBR ¹⁾ , low pressure | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) |
| V FPM ²⁾ , high temperature, high pressure | x | x | x | x | x | x | x | x |

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

- 1) NBR - Nitrile rubber
- 2) FPM - Fluor rubber
- 3) F12-110 and -125: Accessory valve block (page 45)
- 4) Special version number 264
- 5) Special version number 326



| 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 |
| 150 | 150.0 |
| 250 | 242.0 |

| Version number |
|---------------------------------|
| (assigned for special versions) |

| Frame size | | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 | 250 |
|-------------------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code Shaft | | | | | | | | | | |
| S | SAE spline | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) |
| U | " " Optional | - | - | (x) | (x) | - | - | - | - | - |
| T | SAE key Standard | x | x | x | x | x | x | x | x | - |
| K | Metric key | - | - | - | - | - | - | - | (x) | x |
| F | SAE spline | - | - | - | - | - | - | - | - | (x) |
| D | Spline, DIN 5480 | - | - | - | - | - | - | - | - | (x) |

| Frame size | | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 | 250 |
|----------------------|----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code Function | | | | | | | | | | |
| M | Motor | x | x | x | x | x | x | x | x | - |
| H | Motor, high pressure | - | - | - | - | - | - | - | (x) | - |
| Q | Motor | - | - | - | - | - | - | - | - | x |
| | Pump: | | | | | | | | | |
| L | counter clockw. | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) |
| R | clockwise | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) |

| Frame size | | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 | 250 |
|--------------------|--|-----|-----|-----|-----|-----|-----------------|-----------------|-----|-----|
| Code Option | | | | | | | | | | |
| L01 | Integr. flushing valve | (x) | (x) | (x) | (x) | (x) | - ³⁾ | - ³⁾ | - | - |
| MVR | Make-up valve clockwise rotation | (x) | - | - | - | - | - | - | - | - |
| MVL | Make-up valve counter clockwise rotation | (x) | - | - | - | - | - | - | - | - |

| Frame size | | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 | 250 |
|------------------------|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code Main ports | | | | | | | | | | |
| S | SAE 6000 psi flange | x | x | x | x | x | x | x | - | - |
| U | SAE, UN threads | (x) | (x) | (x) | (x) | (x) | (x) | (x) | - | - |
| F | SAE 6000 psi flange ⁴⁾ | - | - | - | - | - | - | - | x | x |

| Frame size | | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 | 250 |
|--------------------|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code Option | | | | | | | | | | |
| P | Prepared for speed sensor | (x) | (x) | (x) | (x) | (x) | (x) | (x) | - | - |

| Frame size | | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 | 250 |
|-----------------------------|------------|----|----|----|----|----|-----|-----|-----|-----|
| Code Mounting flange | | | | | | | | | | |
| S | SAE 4 bolt | x | x | x | x | x | x | x | x | x |
| T | SAE 2 bolt | x | x | x | - | - | - | - | - | - |

| Frame size | | 30 | 40 | 60 | 80 | 90 | 110 | 125 | 150 | 250 |
|------------------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code Shaft seal | | | | | | | | | | |
| N | NBR ¹⁾ , low pressure | (x) | (x) | (x) | (x) | (x) | (x) | (x) | (x) | - |
| V | FPM ²⁾ , high temperature, high pressure | x | x | x | x | x | x | x | x | x |

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

- 1) NBR - Nitrile rubber
- 2) FPM - Fluor rubber
- 3) F12-110 and -125: Accessory valve block (page 45)
- 4) Metric threads

Preferred versions F11/F12**F11**

| Ordering Codes | Part number |
|---------------------------|--------------------|
| F11-005-MB-CV-K-000-000-0 | 3707249 |
| F11-005-HU-CV-K-000-000-0 | 3707308 |
| F11-010-HU-CV-K-000-000-0 | 3707310 |
| F11-010-MB-CV-K-000-000-0 | 3706030 |
| F11-012-HF-IV-K-000-000-0 | 3786708 |
| F11-012-HF-IV-K-349-000-0 | 3787600 |
| F11-014-HB-CV-K-000-000-0 | 3782830 |
| F11-014-HF-IV-K-000-000-0 | 3783287 |
| F11-019-MB-CV-K-000-000-0 | 3707893 |
| F11-019-HU-SV-T-000-000-0 | 3707314 |

F12

| Ordering Codes | Part number |
|---------------------------|--------------------|
| F12-030-MF-IV-K-000-000-0 | 3799844 |
| F12-030-MS-SV-T-000-000-0 | 3799852 |
| F12-030-MS-TV-S-000-000-0 | 3799616 |
| F12-030-MF-IV-D-000-000-0 | 3799843 |
| F12-030-MS-SV-S-000-000-0 | 3799855 |
| F12-040-MS-SV-S-000-000-0 | 3799532 |
| F12-040-MF-IV-K-000-000-0 | 3799526 |
| F12-040-MS-SV-T-000-000-0 | 3799533 |
| F12-040-MF-IV-D-000-000-0 | 3799525 |
| F12-060-MF-IV-D-000-000-0 | 3799988 |
| F12-060-MS-SV-S-000-000-0 | 3799998 |
| F12-060-MF-IV-K-000-000-0 | 3799989 |
| F12-060-MS-SV-T-000-000-0 | 3799999 |
| F12-080-MF-IV-D-000-000-0 | 3780767 |
| F12-080-MS-SV-T-000-000-0 | 3780784 |
| F12-080-MF-IV-K-000-000-0 | 3780772 |
| F12-080-MS-SV-S-000-000-0 | 3780783 |
| F12-090-MS-SV-T-000-000-0 | 3785604 |
| F12-090-MF-IV-D-000-000-0 | 3785518 |
| F12-090-MF-IV-K-000-000-0 | 3785609 |
| F12-090-MS-SV-S-000-000-0 | 3785875 |
| F12-110-MS-SV-S-000-000-0 | 3781542 |
| F12-110-MF-IV-K-000-000-0 | 3781534 |
| F12-110-MF-IV-D-000-000-0 | 3781530 |
| F12-110-MS-SV-T-000-000-0 | 3782636 |
| F12-125-MS-SV-S-000-000-0 | 3785504 |
| F12-125-MF-IV-D-000-000-0 | 3785866 |
| F12-150-MF-SV-S-000-000-0 | 3787725 |
| F12-150-MF-CV-K-000-000-0 | 3787721 |
| F12-250-QF-SV-F-000 | 3787182 |
| F12-250-QF-SV-K-000 | 3787184 |

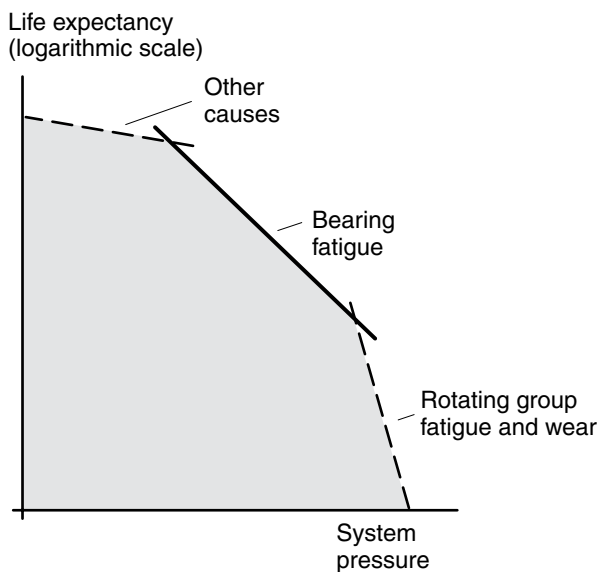
Bearing life

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 B_{10} (or L_{10}), is dependent of system pressure, operating speed, external shaft loads, fluid viscosity in the case, and fluid contamination level.

The B_{10} 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 B_{10} 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.

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

Required information

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

- A short presentation of the application
- F11 or F12 size and version
- Duty cycle (pressure and speed versus time at given displacements)
- Low system pressure
- Case fluid viscosity
- Life probability (B_{10} , B_{20} , 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:

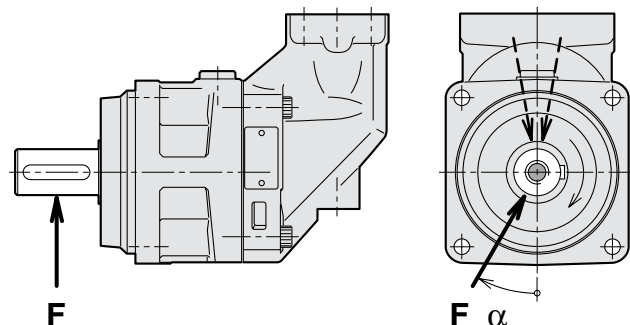
- Pitch diameter, Pressure angle, Spiral angle, Distance flange – gearwheel (mid) and Gearwheel spiral direction (R or L).

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

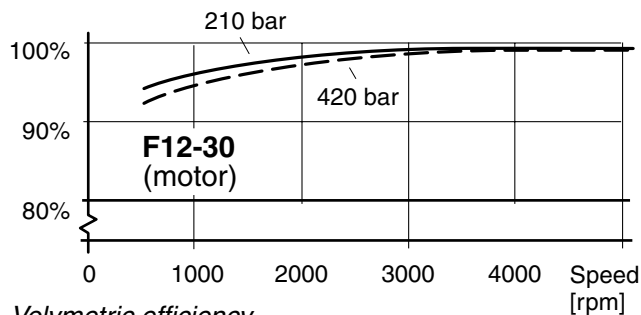
To obtain maximum bearing life, the radial load should, in most cases, be located approximately at 170° (motor; R.H. rot'n) or 190° (pump; R.H. rot'n).

Efficiency

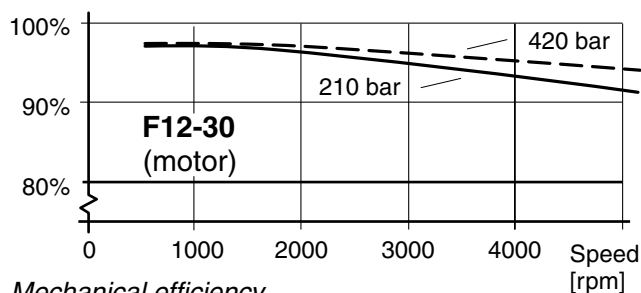
Because of its high overall efficiency, driving a motor/pump from series F11/F12 requires less fuel or electric power. Also, it allows the use of a small reservoir and heat exchanger, which in turn reduce cost, weight, and installation size.

The diagrams to the right shows volumetric and mechanical efficiencies of an F12-30.

Contact Parker Hannifin for efficiency information on a particular F11/F12 frame size that is being considered.



Volumetric efficiency.



Mechanical efficiency.

Noise level

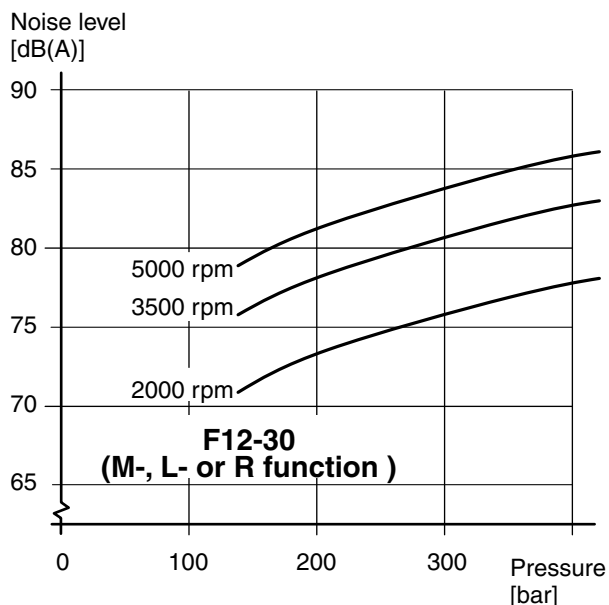
Series F11/F12 feature low noise levels from low to high speeds and pressures.

As an example, the diagram to the right shows the noise level of an F12-30.

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 F11/F12 frame sizes are available from Parker Hannifin.



Selfpriming speed and required inlet pressure

Series 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 selfpriming speeds (see table) as well as the lowest noise level. The **M** (motor) function can also be used as a pump, in either direction, but at a lower selfpriming speed.

Operating above the selfpriming 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 | L or R | M | H |
|----------|--------|------|------|
| F11-5 | 4600 | 3800 | 3200 |
| F11-10 | 4200 | 3100 | 2700 |
| F11-12 | 3900 | - | 3000 |
| F11-14 | 3900 | - | 3200 |
| F11-19 | 3500 | 2400 | 2100 |
| F12-150 | 1700 | 1300 | 1100 |
| F12-250 | 1500 | 950 | - |

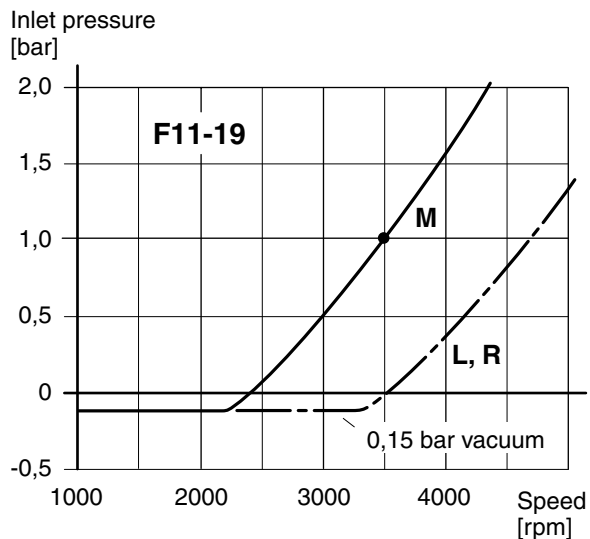
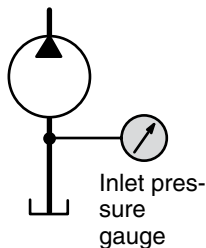


Diagram 1. Min required inlet pressure (F11-19).

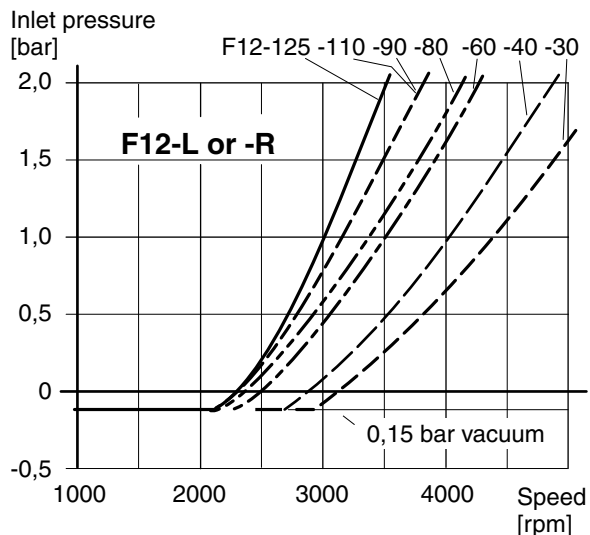


Diagram 2. Min. required pump (F12-L or -R) inlet press.

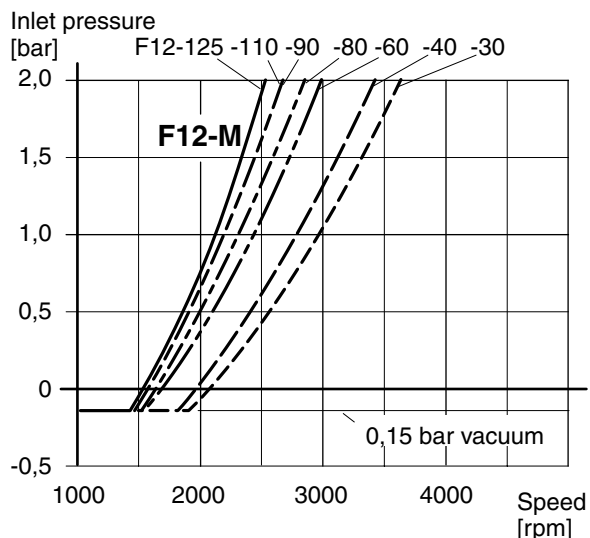
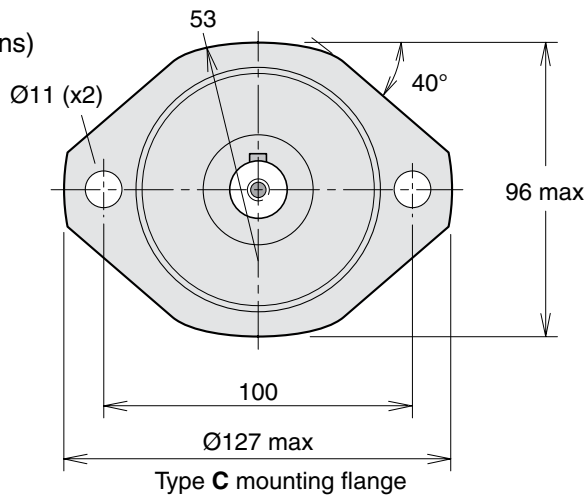


Diagram 3. Min. required motor (F12-M) inlet pressure.

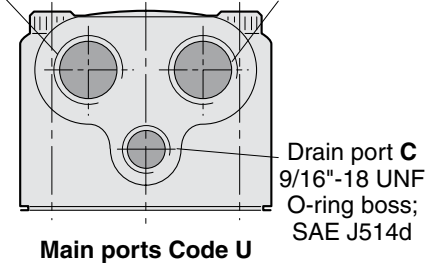
NOTE: Diagrams 1, 2 and 3 are valid at sea level.

F11-5
 (CETOP versions)

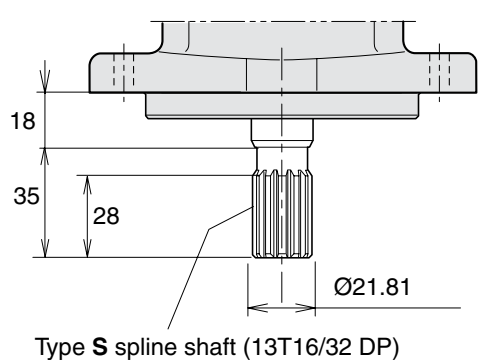
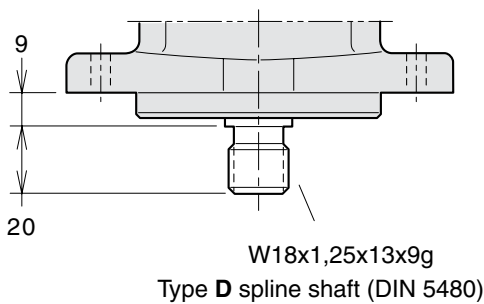
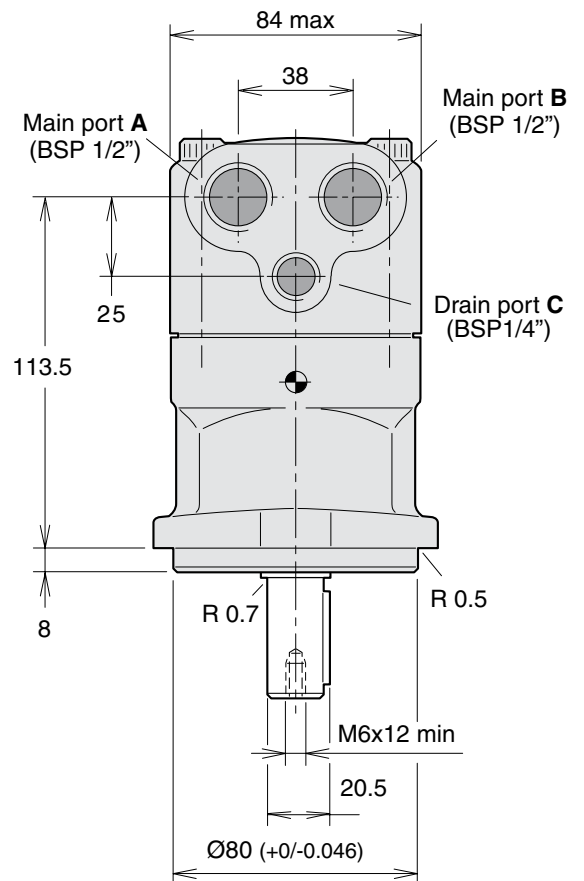
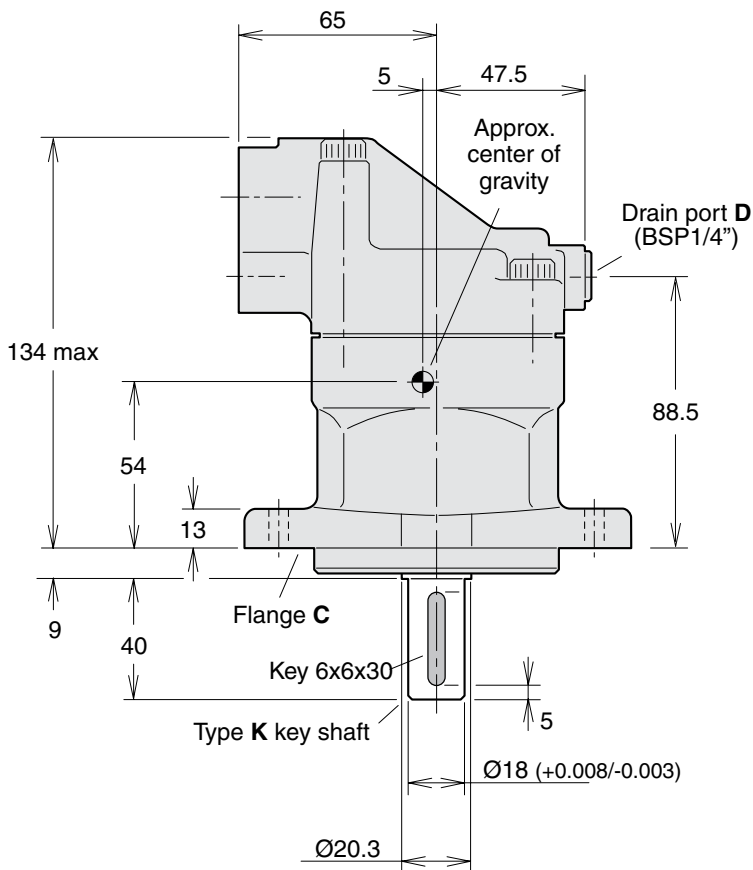


Main port A
 3/4"-16 UNF
 O-ring boss;
 SAE J514d

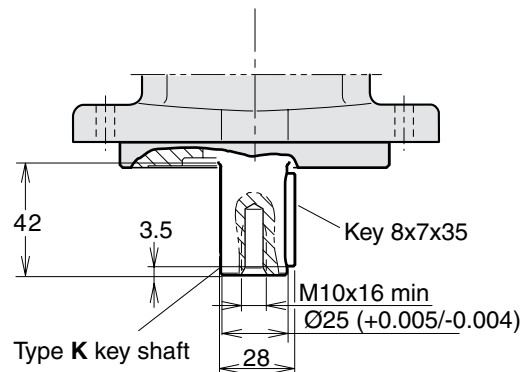
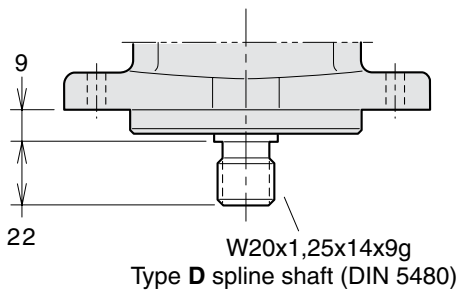
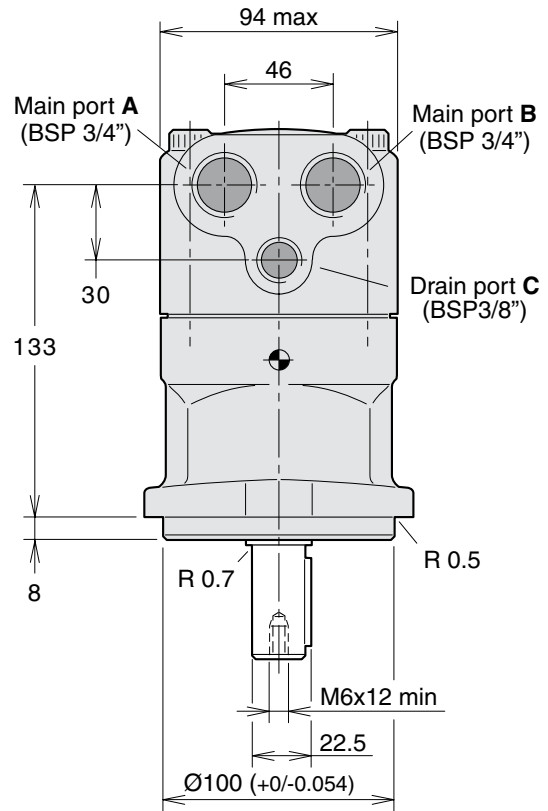
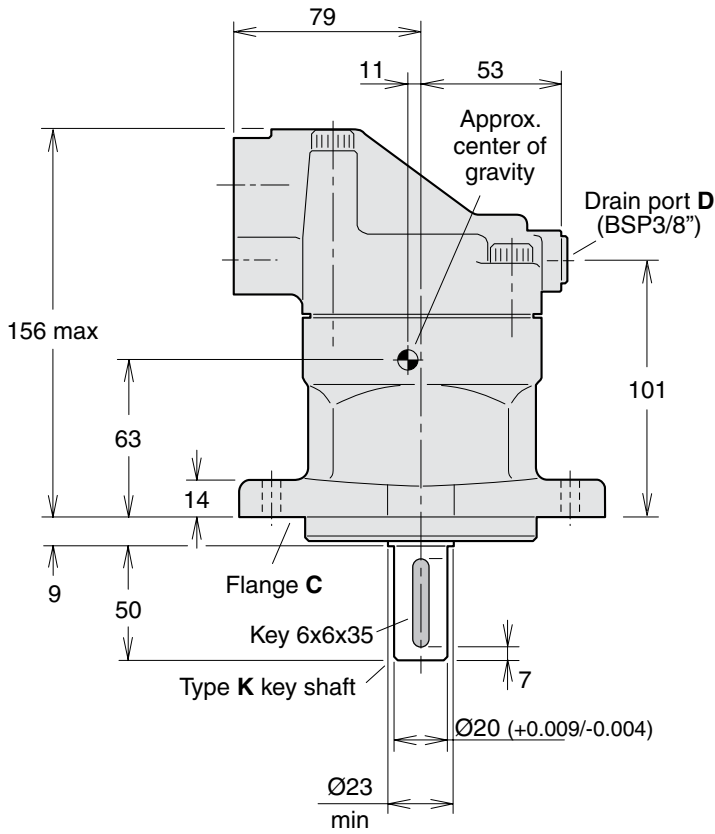
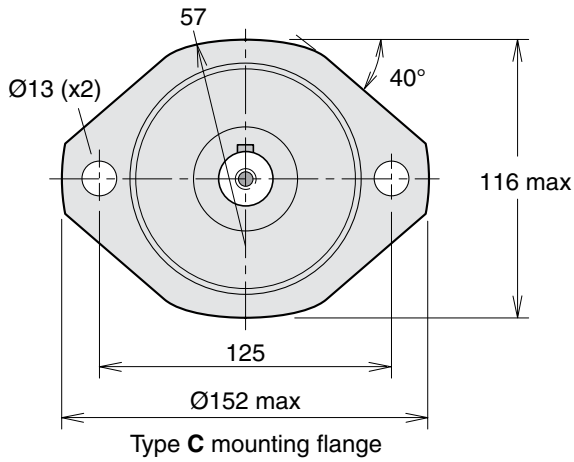
Main port B
 3/4"-16 UNF
 O-ring boss;
 SAE J514d



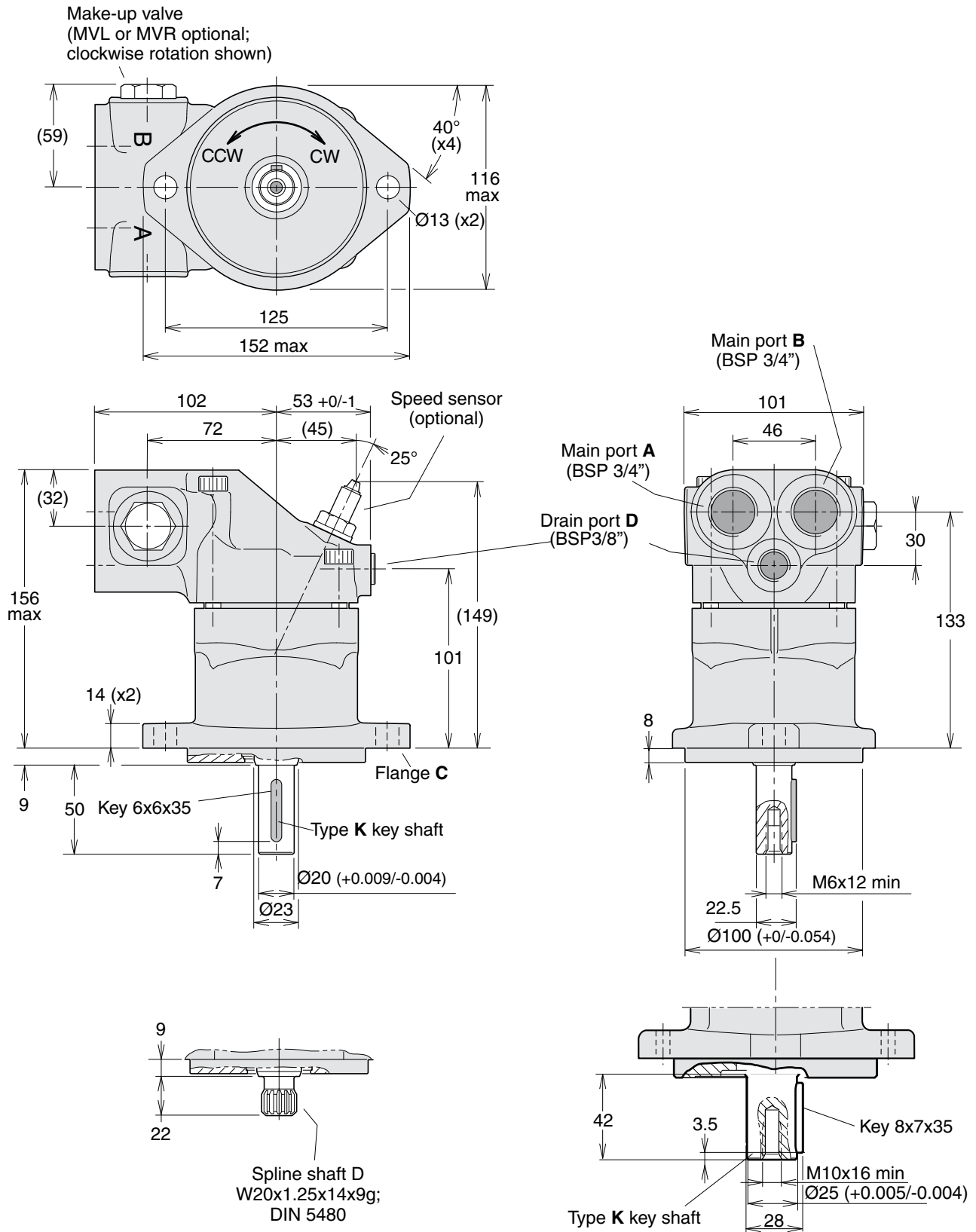
Type C mounting flange



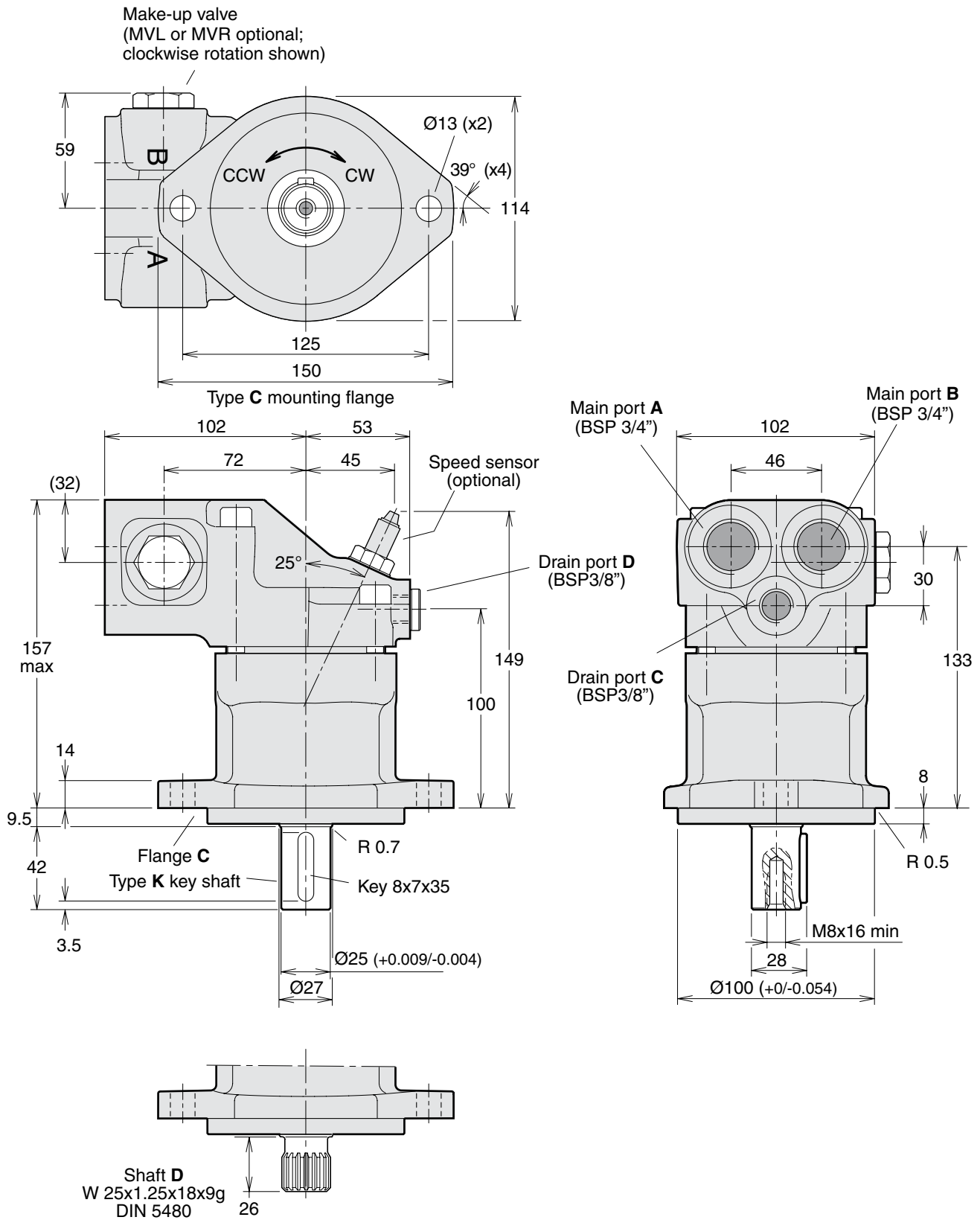
F11-6, -10
 (CETOP versions)



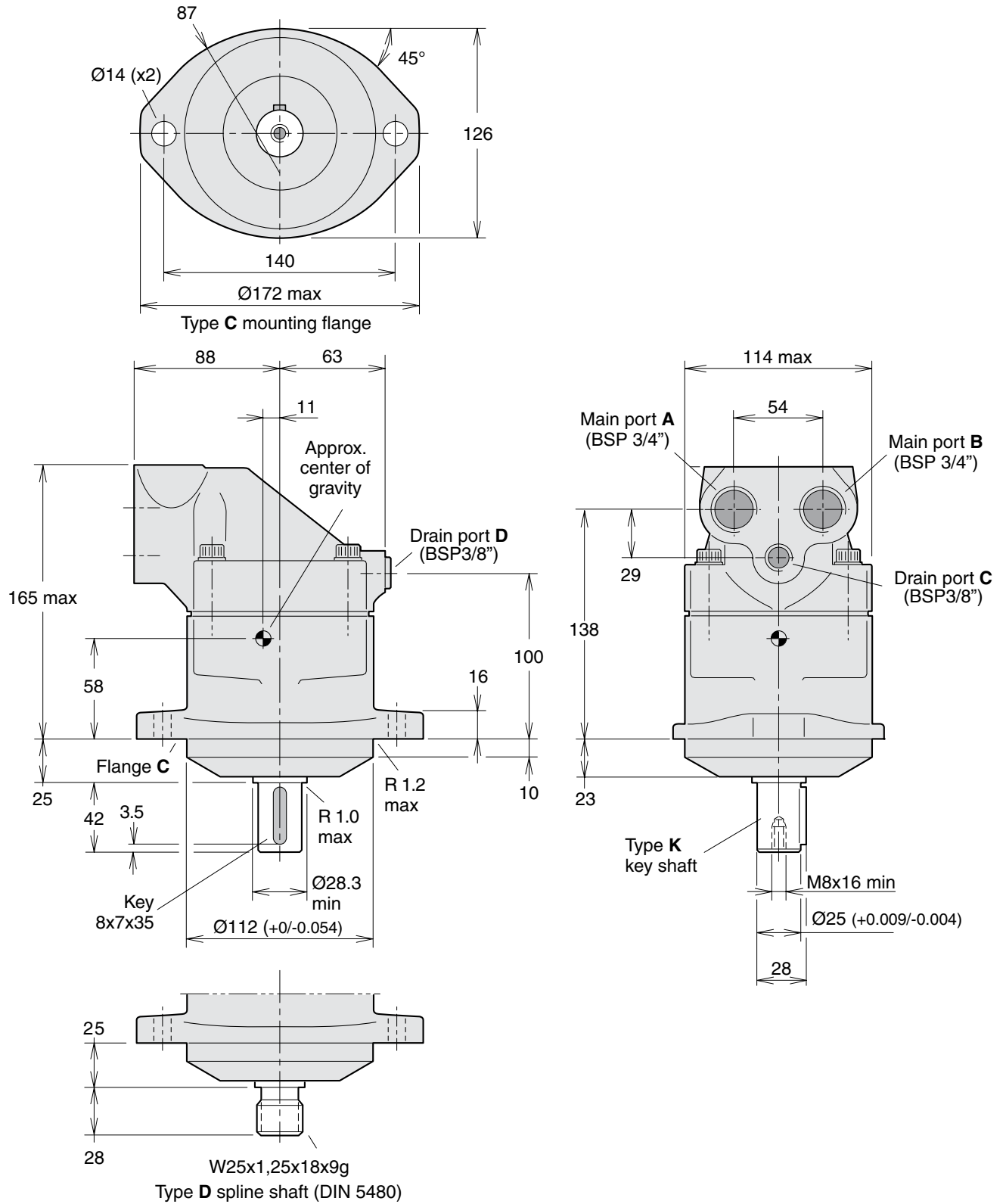
F11-12
 (CETOP versions)



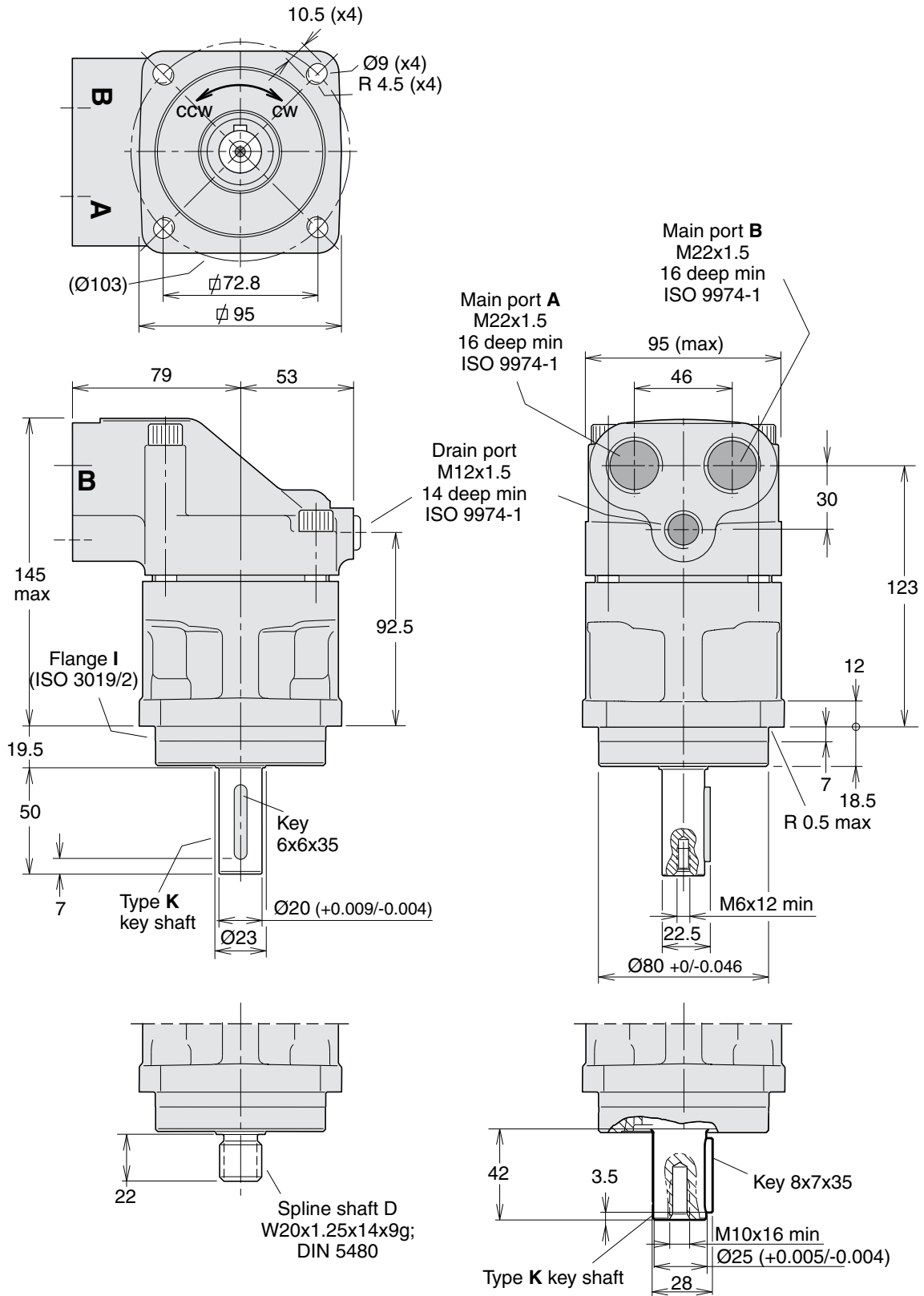
F11-14
 (CETOP versions)



F11-19
 (CETOP version)

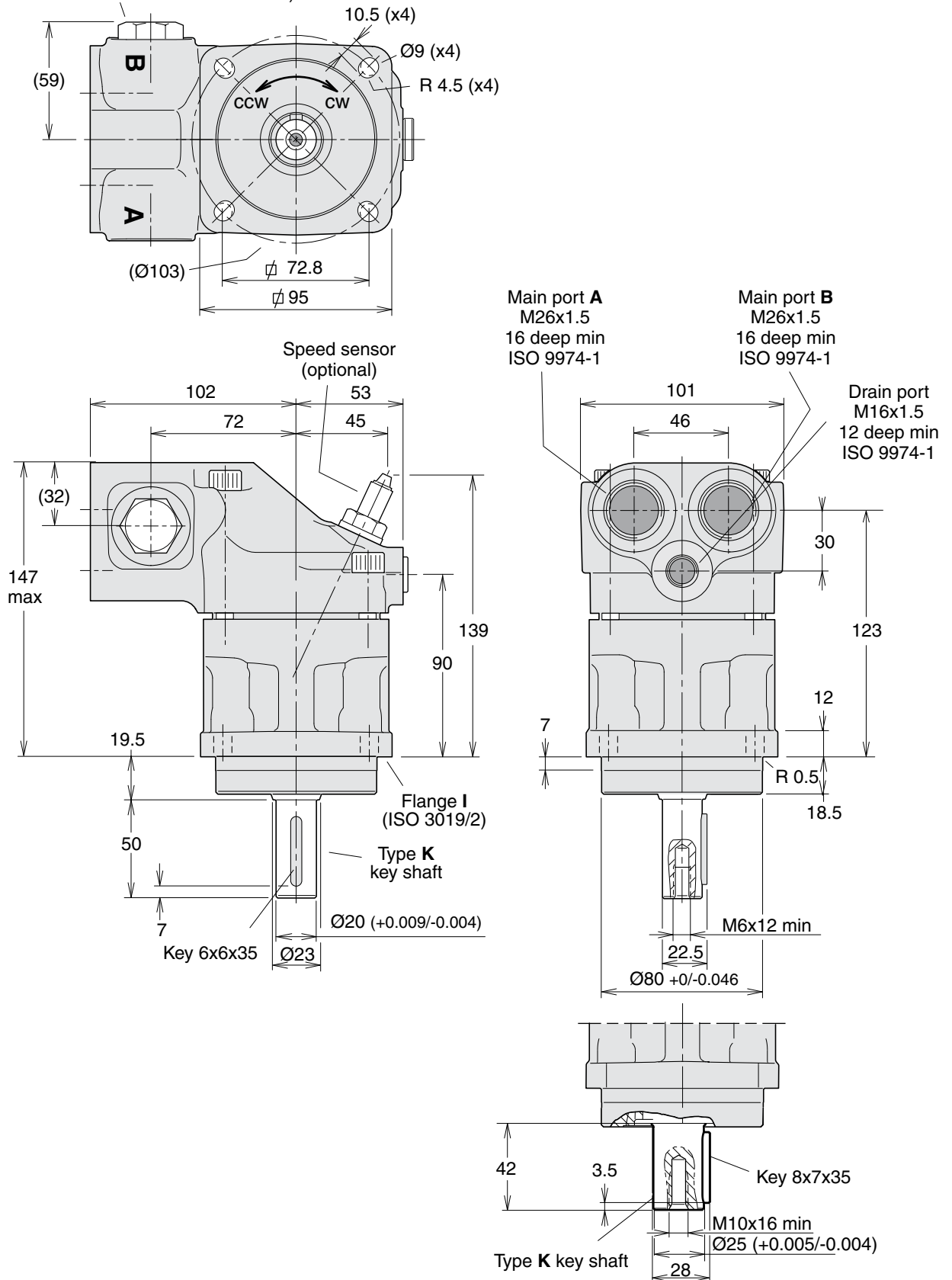


F11-10
 (ISO versions)

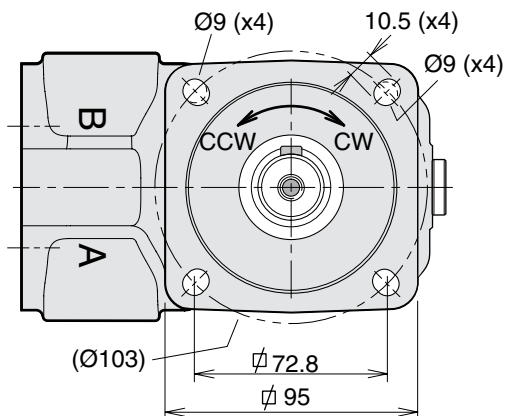


F11-12
 (ISO versions)

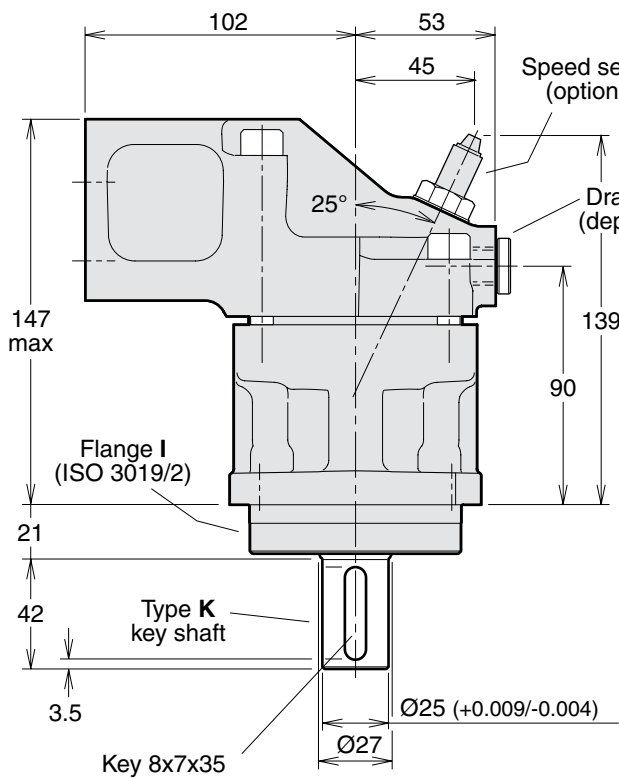
Make-up valve
 (MVL or MVR optional;
 clockwise rotation shown)



F11-14
 (ISO versions)

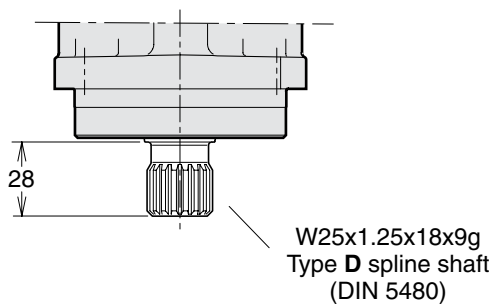
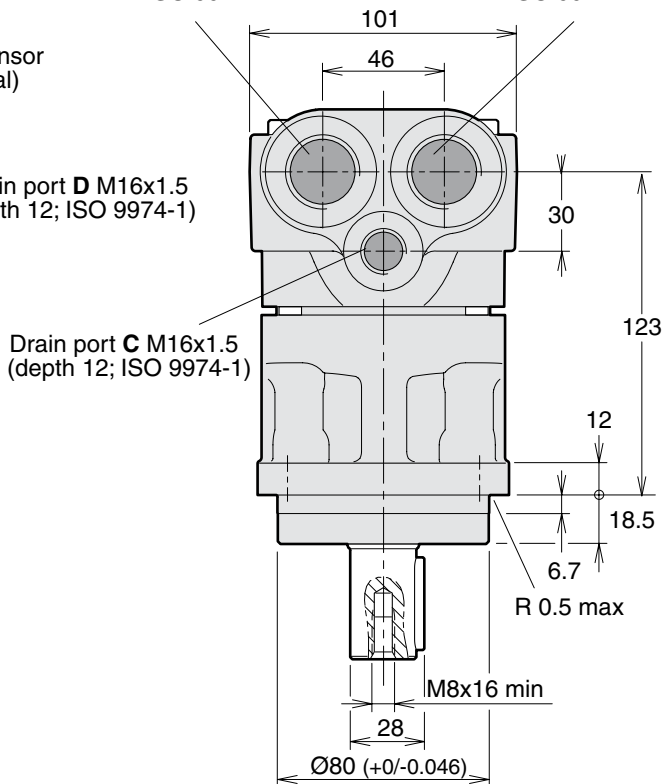


Type I mounting flange (ISO 3019/2)

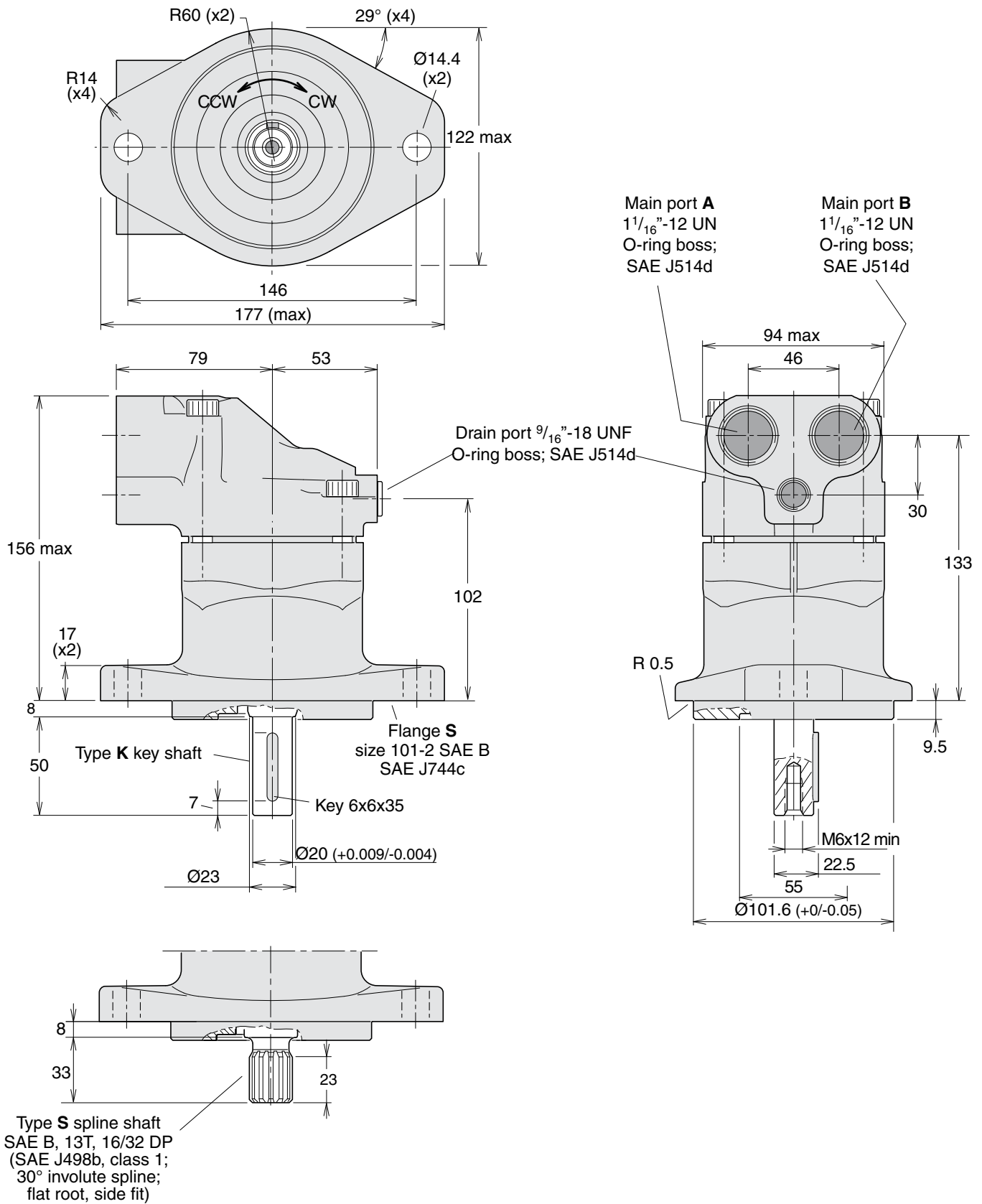


Main port A
 M26x1.5
 16 deep min
 ISO 9974-1

Main port B
 M26x1.5
 16 deep min
 ISO 9974-1

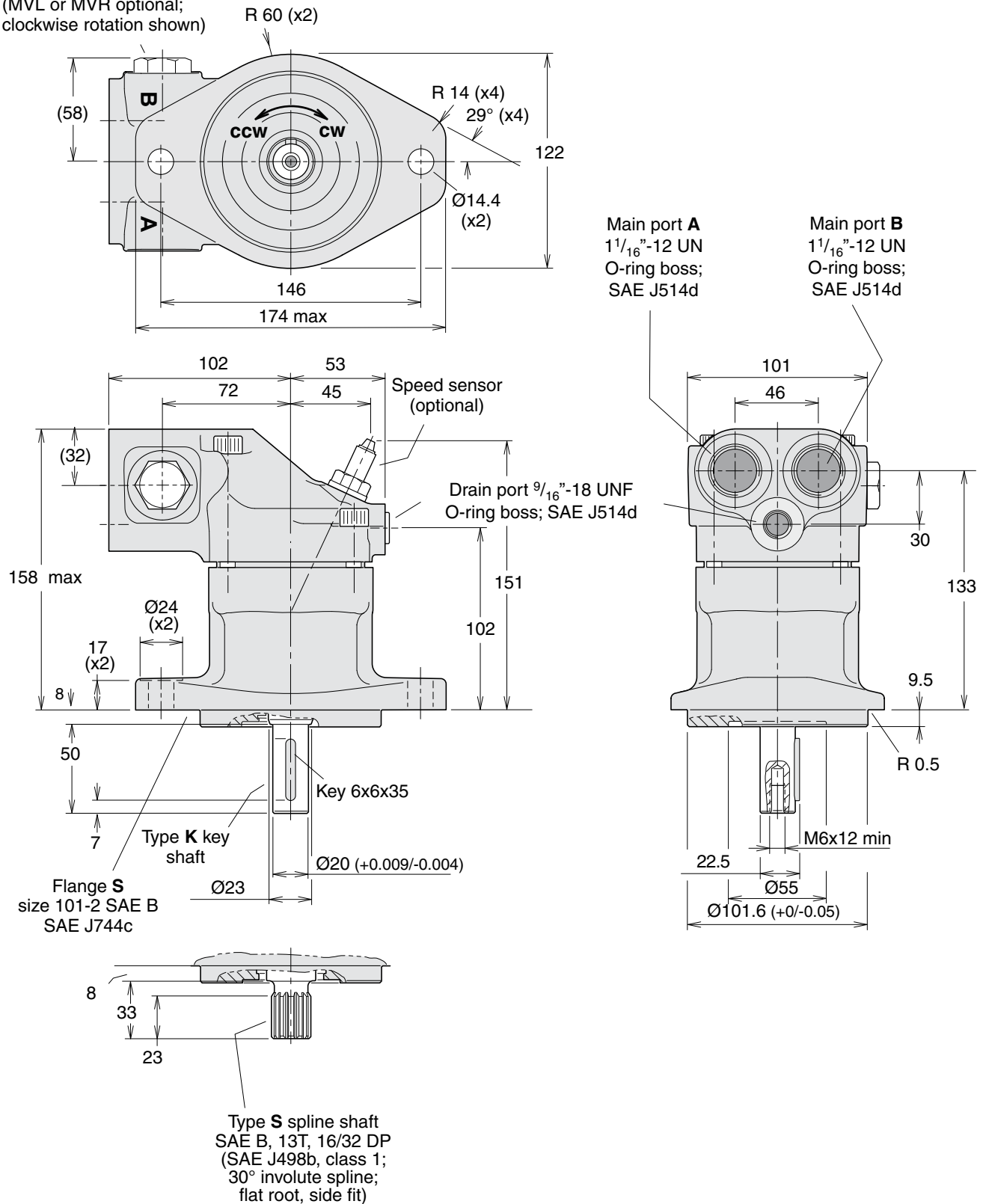


F11-10
 (SAE versions)

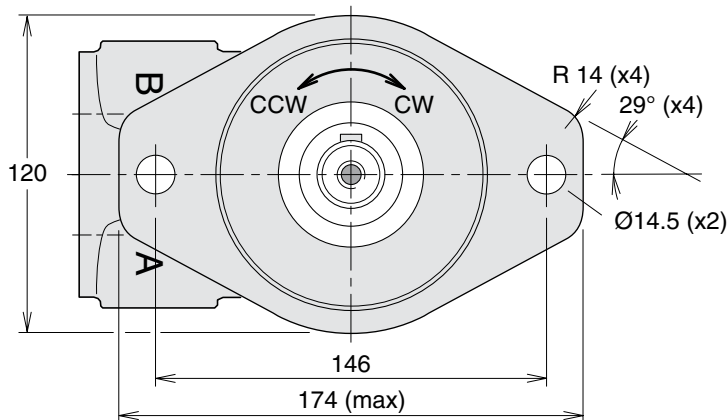


F11-12
 (SAE versions)

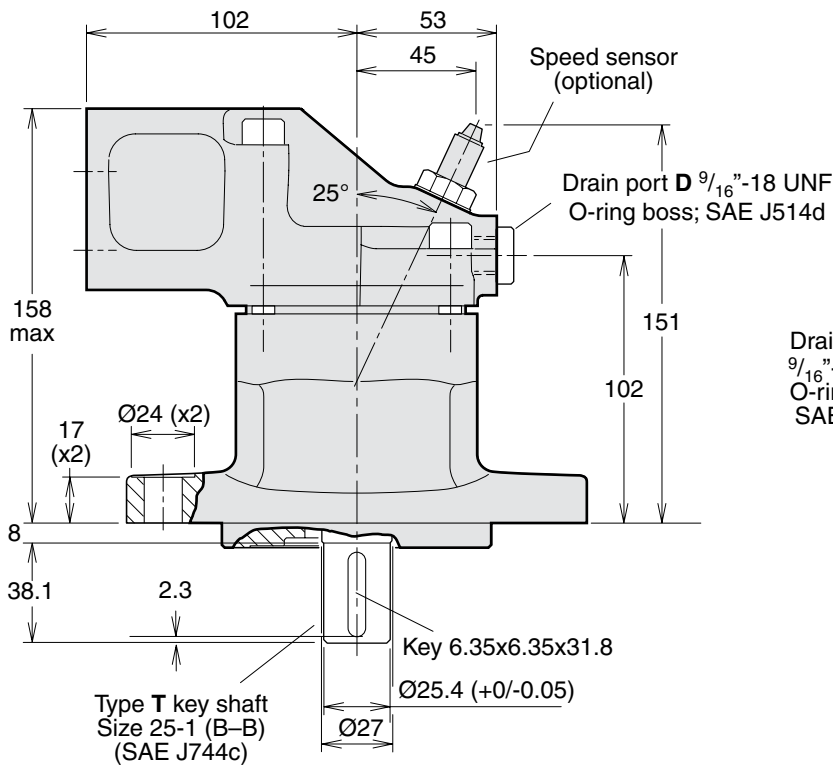
Make-up valve
 (MVL or MVR optional;
 clockwise rotation shown)



F11-14
 (SAE versions)

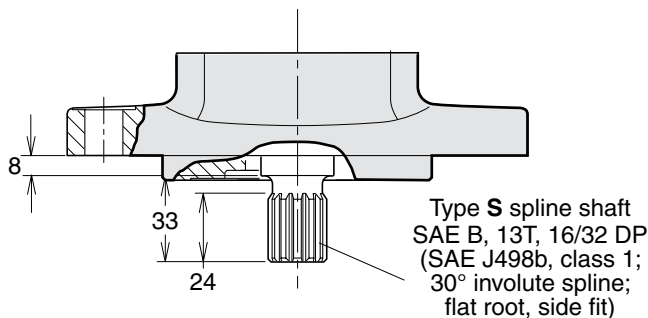


Type S mounting flange SAE 'B' (SAE J744c)

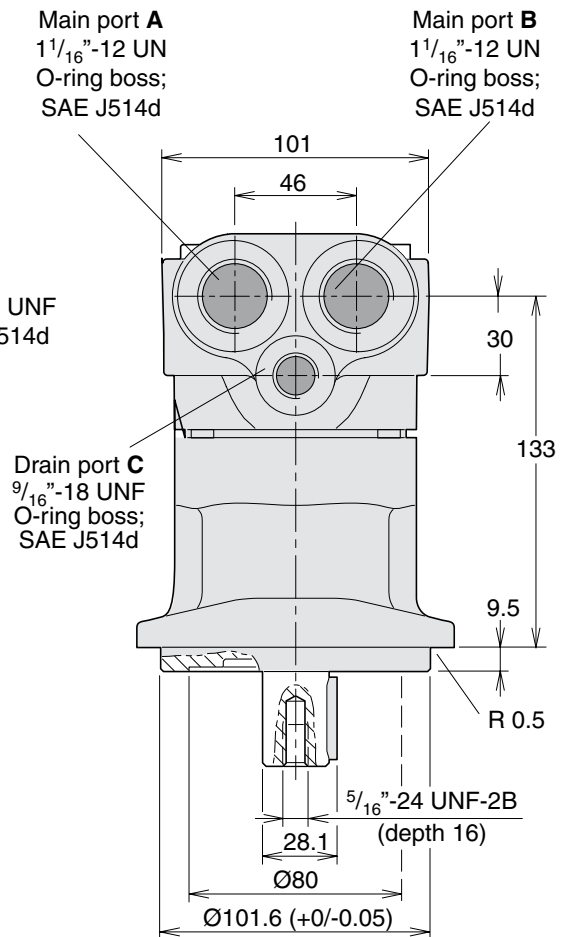


Type T key shaft
 Size 25-1 (B-B)
 (SAE J744c)

Key 6.35x6.35x31.8
 $\text{Ø}25.4 (+0/-0.05)$



Type S spline shaft
 SAE B, 13T, 16/32 DP
 (SAE J498b, class 1;
 30° involute spline;
 flat root, side fit)

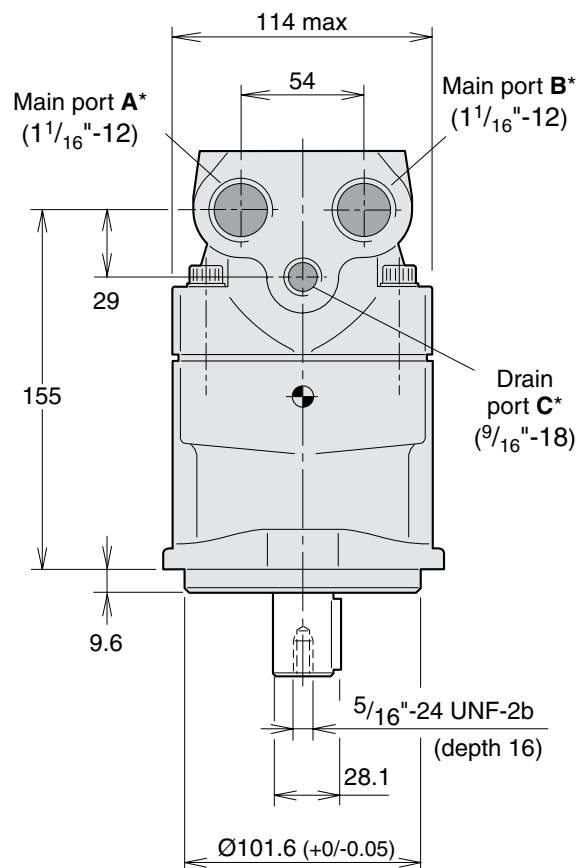
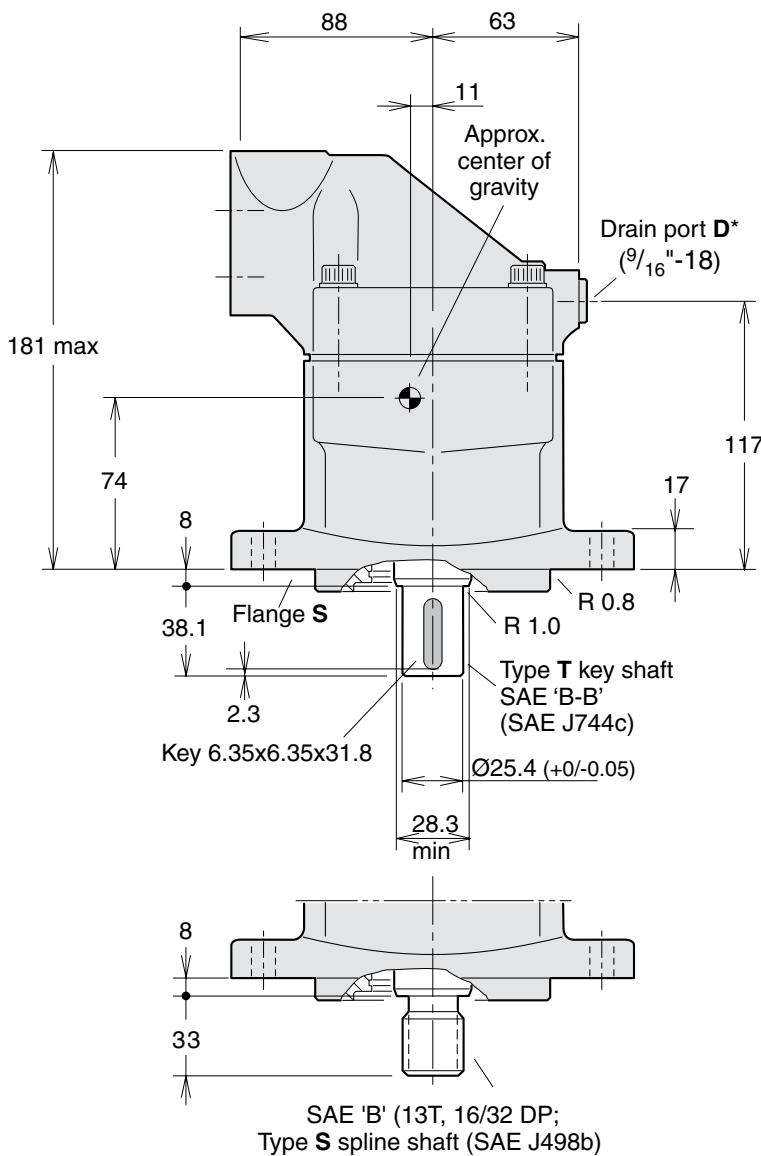
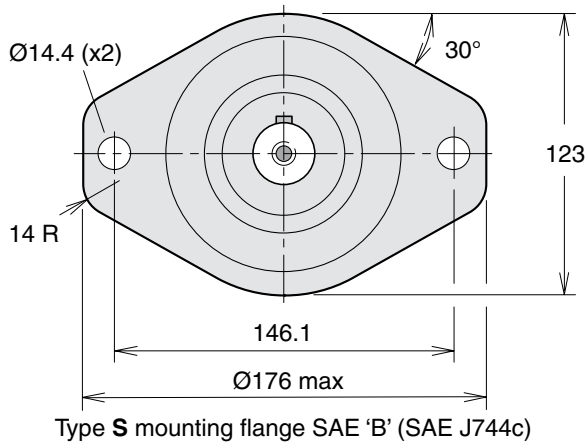


Main port A
 $\frac{1}{16}$ "-12 UN
 O-ring boss;
 SAE J514d

Main port B
 $\frac{1}{16}$ "-12 UN
 O-ring boss;
 SAE J514d

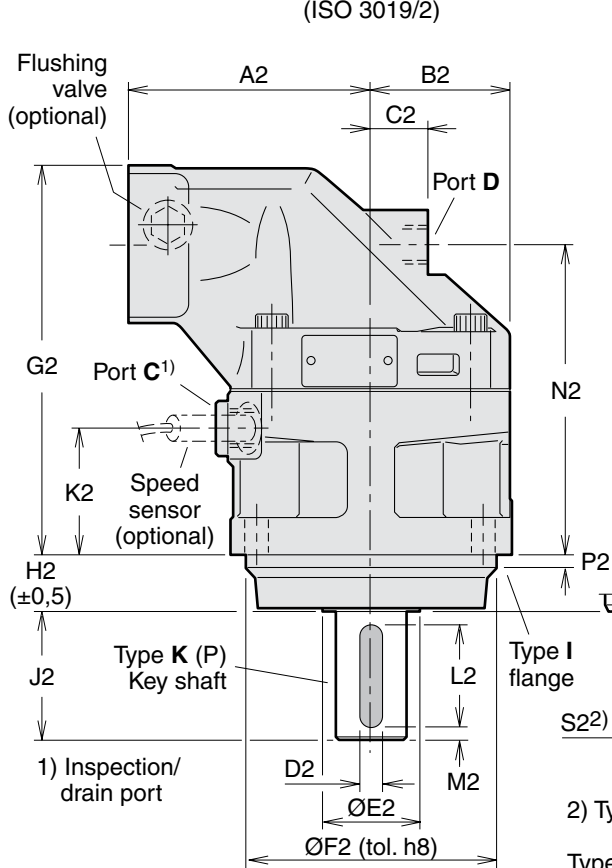
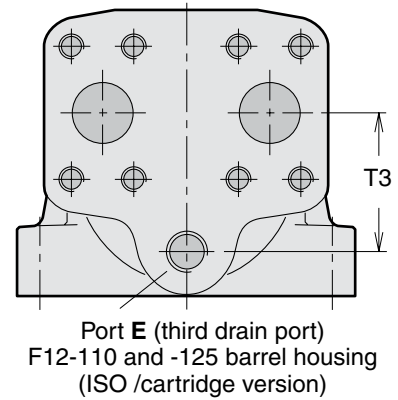
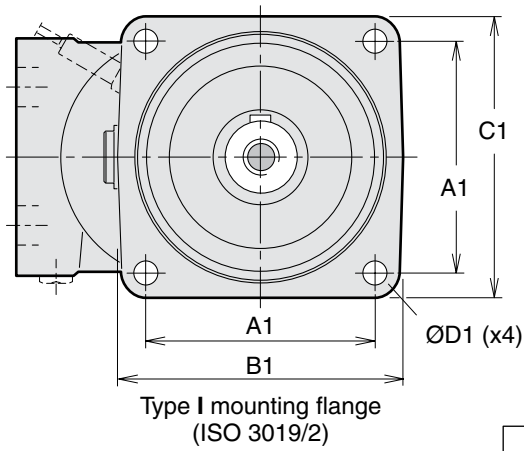
Drain port C
 $\frac{9}{16}$ "-18 UNF
 O-ring boss;
 SAE J514d

F11-19
 (SAE version)

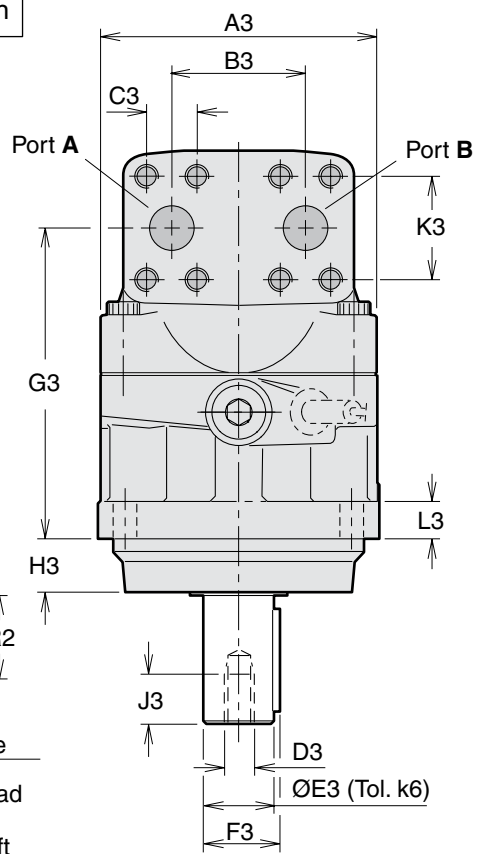
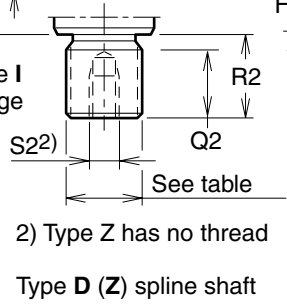


* O-ring ports according to SAE J514d

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



F12-80 shown



2) Type Z has no thread
 Type D (Z) spline shaft

| Dim. | F12-30 | F12-40 | F12-60 | F12-80 F12-90 | F12-110 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 | 33 | 42 | 42 | 52 | 58 |
| F2 | 100 | 125 | 125 | 140 | 160 |
| G2 | 172 | 173 | 190 | 216 | 231 |
| H2 | 25.5 | 32.5 | 32.5 | 32.5 | 40.5 |
| J2 ¹⁾ | 50 | 60 | 60 | 70 | 82 |
| J2 ²⁾ | 50 | - | - | - | - |
| 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 ³⁾ | 35 | 35 | 40 | 45 | 50 |
| R2 ⁴⁾ | 43 | 35 | 35 | 41 | - |
| S2 ³⁾ | M12 x24 | M12 x24 | M12 x28 | M16 x36 | M16 x36 |
| S2 ⁴⁾ | - | M12 x24 | - | M12 x28 | - |
| 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) Key shaft type K
- 2) Key shaft type P
- 3) Spline shaft type D

- 4) Spline shaft type Z
- 5) Special number 264

| Ports | F12-30 | F12-40 | F12-60 | F12-80 F12-90 | F12-110 F12-125 |
|----------------------------|-------------|-------------|-------------|------------------|--------------------|
| A, B size | 3/4" | 3/4" | 3/4" | 1" | 1 1/4" |
| Screw thread ¹⁾ | M10 x20 | M10 x20 | M10 x20 | M12 x20 | M14 x26 |
| C thread ²⁾ | M22 x1.5 | M22 x1.5 | M22 x1.5 | M22 x1.5 | M22 x1.5 |
| D thread ²⁾ | M18 x1.5 | M18 x1.5 | M22 x1.5 | M22 x1.5 | M22 x1.5 |
| E thread | - | - | - | - | M22 x1.5 |

A, B: ISO 6162 1) Metric thread x depth in mm
 2) Metric thread x pitch in mm.

Spline shaft (DIN 5480)

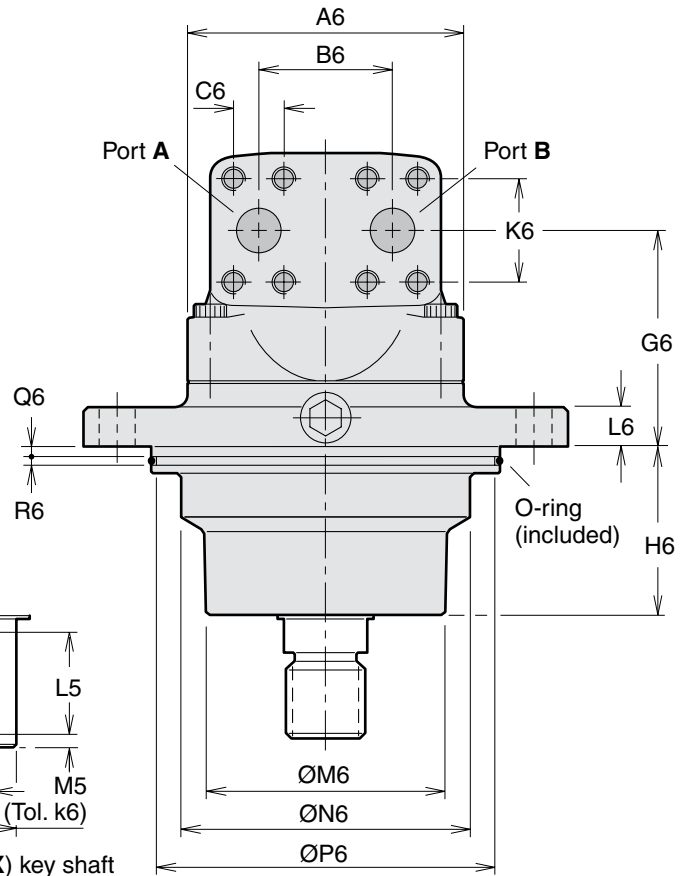
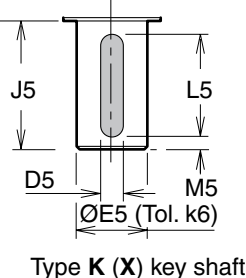
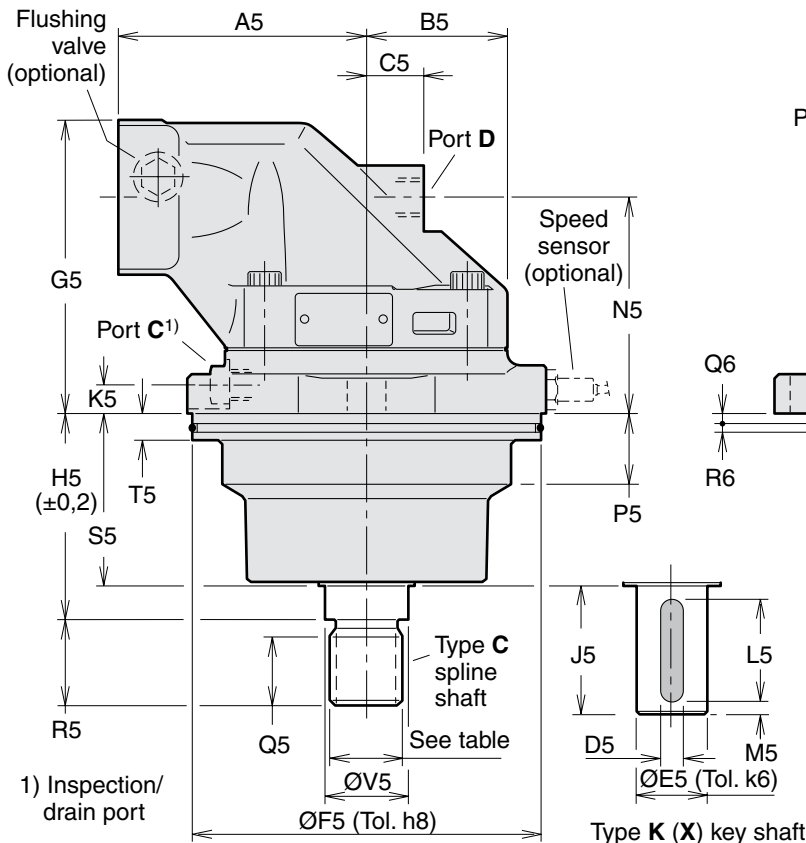
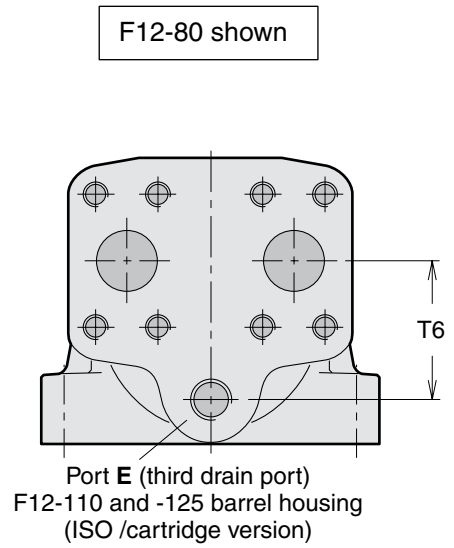
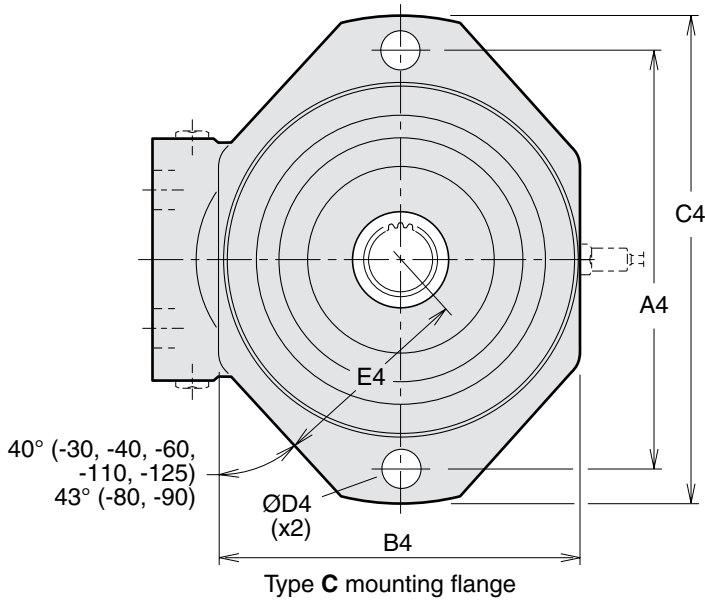
| | Type D (standard) | Type Z (optional) |
|--------|-------------------|-------------------|
| F12-30 | W30x2x14x9g | W25x1.25x18x9g |
| -40 | W32x2x14x9g | W30x2x14x9g |
| -60 | W35x2x16x9g | W32x2x14x9g |
| -80 | W40x2x18x9g | W35x2x16x9g |
| -90 | W40x2x18x9g | W35x2x16x9g |
| -110 | W45x2x21x9g | W40x2x18x9g |
| -125 | W45x2x21x9g | W40x2x18x9g |

Key shaft

| | Type K (std) | Type P (opt.) | Type X (opt.) |
|--------|--------------|---------------|-------------------|
| F12-30 | Ø30 | Ø25 | - |
| -40 | Ø30 | - | Ø35 ⁵⁾ |
| -60 | Ø35 | - | - |
| -80 | Ø40 | - | - |
| -90 | Ø40 | - | - |
| -110 | Ø45 | - | - |
| -125 | Ø45 | - | - |

= Max 350 bar operating pressure

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



| Dim. | F12-30 | F12-40 | F12-60 | F12-80 F12-90 | F12-110 F12-125 | Ports | F12-30 | F12-40 | F12-60 | F12-80 F12-90 | F12-110 F12-125 |
|------|--------|-----------------------------------|--------|------------------|--------------------|--------------|----------|----------|----------|------------------|--------------------|
| A4 | 160 | 200 | 200 | 224 | 250 | A, B size | 3/4" | 3/4" | 3/4" | 1" | 1 1/4" |
| B4 | 140 | 164 | 164 | 196 | 206 | Screw thread | M10 x20 | M10 x20 | M10 x20 | M12 x22 | M14 x26 |
| C4 | 188 | 235 | 235 | 260 | 286 | C thread | M14 x1.5 | M14 x1.5 | M14 x1.5 | M14 x1.5 | M14 x1.5 |
| D4 | 14 | 18 | 18 | 22 | 22 | D, E thread | M18 x1.5 | M18 x1.5 | M22 x1.5 | M22 x1.5 | M22 x1.5 |
| 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 | - | | | | | | |
| K5 | 14 | 16 | 15 | 15 | 15 | | | | | | |
| L5 | 40 | 50 | 50 | 56 | - | | | | | | |
| M5 | 5 | 5 | 5 | 7 | - | | | | | | |
| 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 | | | | | | |

A, B: ISO 6162

Spline shaft (DIN 5480)

| | Type C (standard) | Type X (optional) |
|--------|-------------------|---------------------------|
| F12-30 | W30x2x14x9g | - |
| -40 | W30x2x14x9g | - |
| -60 | W30x2x14x9g | W35x2x16x9g ³⁾ |
| -80 | W40x2x18x9g | W35x2x16x9g ³⁾ |
| -90 | W40x2x18x9g | W35x2x16x9g ³⁾ |
| -110 | W40x2x18x9g | W45x2x21x9g ⁴⁾ |
| -125 | W40x2x18x9g | W45x2x21x9g ⁴⁾ |

Key shaft

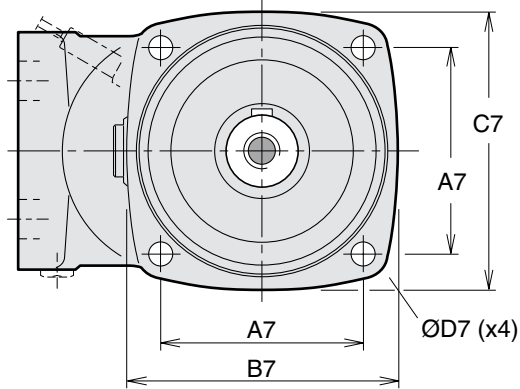
| | Type K (std) | Type X (opt.) |
|--------|--------------|-------------------|
| F12-30 | Ø30 | - |
| -40 | - | Ø35 ⁵⁾ |
| -60 | Ø35 | - |
| -80 | Ø40 | - |
| -90 | Ø40 | - |

O-ring dimensions

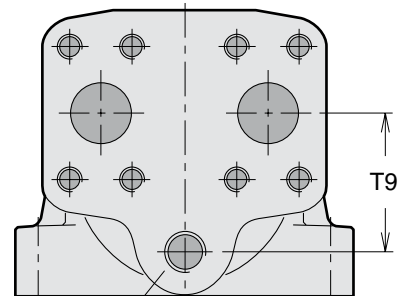
| | |
|--------|-------|
| F12-30 | 127x4 |
| -40 | 150x4 |
| -60 | 150x4 |
| -80 | 180x4 |
| -90 | 180x4 |
| -110 | 190x4 |
| -125 | 190x4 |

- 1) Key shaft type **K**
- 2) Key shaft type **X** (opt.).
- 3) Special number 330
- 4) Special number 326
- 5) Special number 264

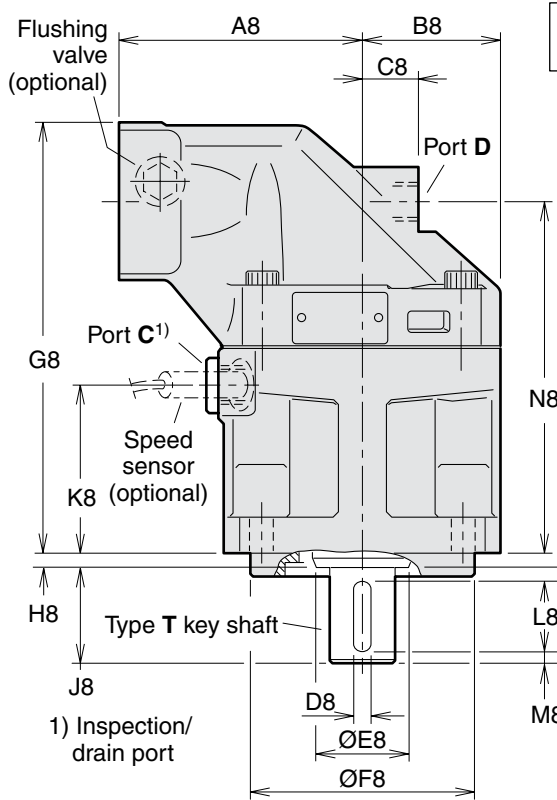
F12-30, -40, -60, -80, -90, -110 and -125
 (SAE versions with 4 bolt flange)



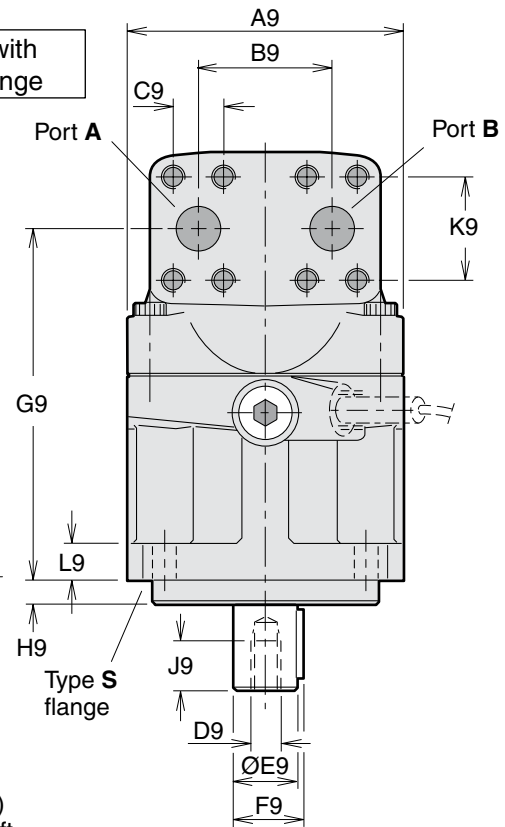
Type S (SAE 4 bolt) mounting flange



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



Shown: F12-80 with
 4 bolt flange



Type S (U)
 spline shaft

| Dim. | F12-30 | F12-40 | F12-60 | F12-80 F12-90 | F12-110 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 | 33 | 42 | 42 | 52 | 57.5 |
| 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⁾ | 23 | 23 | 23 | 25 | 34 |
| 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/ 38.05 | 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 4) Special number 255

1) Spline shaft type **S** 5) Special number 254

2) Spline shaft type **U** 6) Special number 328

3) Special number 254 or 255

Main ports A and B, type U (optional)

| | |
|---------|-----------------|
| F12-80 | 1 5/16" - 12 UN |
| F12-90 | 1 5/16" - 12 UN |
| F12-110 | 1 5/8" - 12 UN |
| F12-125 | 1 5/8" - 12 UN |

O-ring ports according to SAE J514d

| Ports | F12-30 | F12-40 | F12-60 | F12-80 F12-90 | F12-110 F12-125 |
|----------------------------|----------------|----------------|----------------|------------------|--------------------|
| A, B size | 3/4" | 3/4" | 3/4" | 1" | 1 1/4" |
| Screw thread ³⁾ | 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)

3) UN thread x depth in mm.

Mounting flange (SAE J744)

| | S (standard) | X (optional) |
|--------|---------------------|-------------------------------|
| F12-30 | SAE 'B', 4 bolt | - |
| -40 | SAE 'C', " | - |
| -60 | SAE 'C', " | - |
| -80 | SAE 'C', " | SAE 'D', 4 bolt ³⁾ |
| -90 | SAE 'C', " | SAE 'D', 4 bolt ³⁾ |
| -110 | SAE 'D', " | - |
| -125 | SAE 'D', " | - |

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

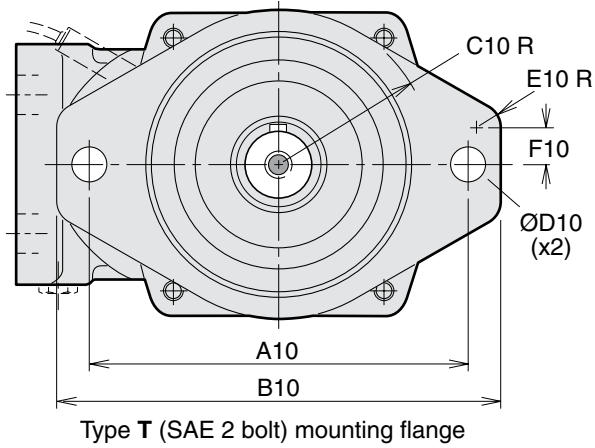
| | S (standard) | U (opt.) | X (optional) |
|--------|----------------------------|-------------------------|---------------------------------------|
| F12-30 | SAE 'B' 13T, 16/32 DP | - | - |
| -40 | SAE 'C' 14T, 12/24 DP | - | - |
| -60 | SAE 'C' 14T, 12/24 DP | - | 21T, 16/32DP ⁶⁾ |
| -80 | SAE 'C-C' 17T, 12/24 DP | SAE 'C' 14T, 12/24DP | SAE 'D' 13T, 8/16 DP ⁴⁾ |
| -90 | SAE 'C-C' 17T, 12/24 DP | SAE 'C' 14T, 12/24DP | SAE 'D' 13T, 8/16 DP ⁴⁾ |
| -110 | SAE 'D' 13T, 8/16 DP | - | - |
| -125 | SAE 'D' 13T, 8/16 DP | - | - |

= Max 350 bar operating pressure.

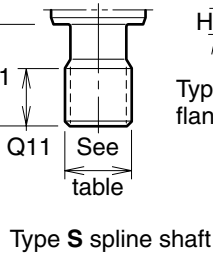
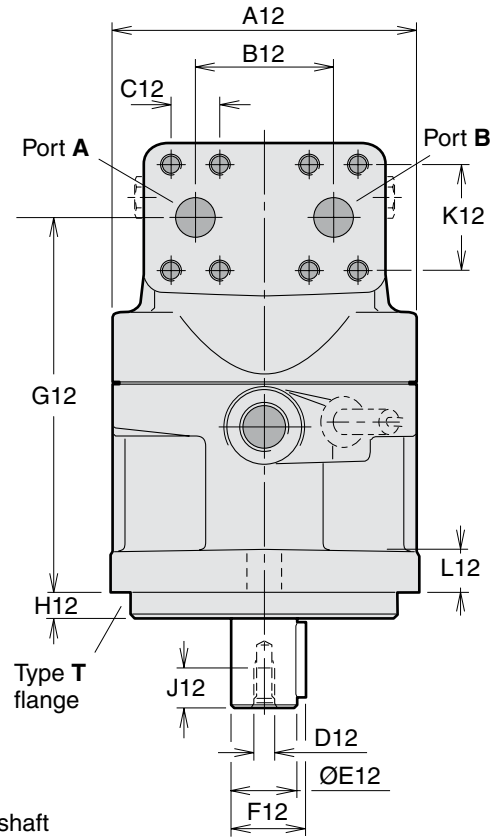
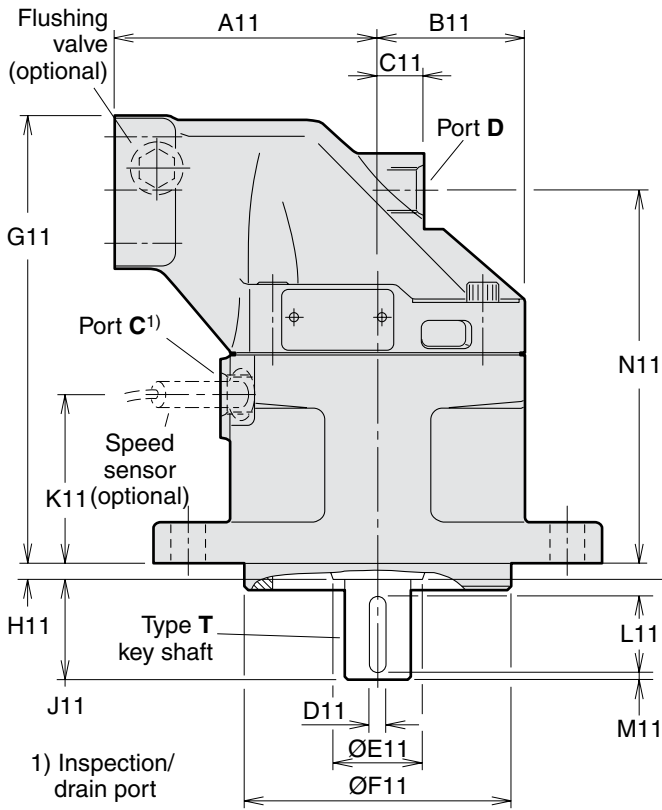
Key shaft (SAE J744)

| | T (standard) | X (optional) |
|--------|--------------------------------|---|
| F12-30 | SAE 'B-B' (Ø25.4 mm/1") | - |
| -40 | SAE 'C' (Ø31.75 mm/1 1/4") | - |
| -60 | SAE 'C' (Ø31.75 mm/1 1/4") | - |
| -80 | SAE 'C-C' (Ø38.1 mm/1 1/2") | SAE 'D' (Ø44.45 mm/1 3/4") ⁵⁾ |
| -90 | SAE 'C-C' (Ø38.1 mm/1 1/2") | SAE 'D' (Ø44.45 mm/1 3/4") ⁵⁾ |
| -110 | SAE 'D' (Ø44.45 mm/1 3/4") | - |
| -125 | SAE 'D' (Ø44.45 mm/1 3/4") | - |

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



Shown: F12-60 with 2 bolt flange



1) Inspection/ drain port

| Dim. | F12-30 | F12-40 | 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 | 33 | 42 | 42 |
| 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 |


| Ports | F12-30 | F12-40 | F12-60 |
|-------------------------------|----------------|----------------|----------------|
| A, B size | 19 (3/4") | 19 (3/4") | 19 (3/4") |
| Screw thread ²⁾ | 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)
 2) UN thread

Main ports A and B, type U (optional)

| | |
|--------|-----------------|
| F12-30 | 1 1/16" - 12 UN |
| -40 | 1 5/16" - 12 UN |
| -60 | 1 5/16" - 12 UN |

O-ring ports according to SAE J514d

 = Max 350 bar operating pressure.

Mounting flange T (SAE J744)

| | |
|--------|-----------------|
| 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)

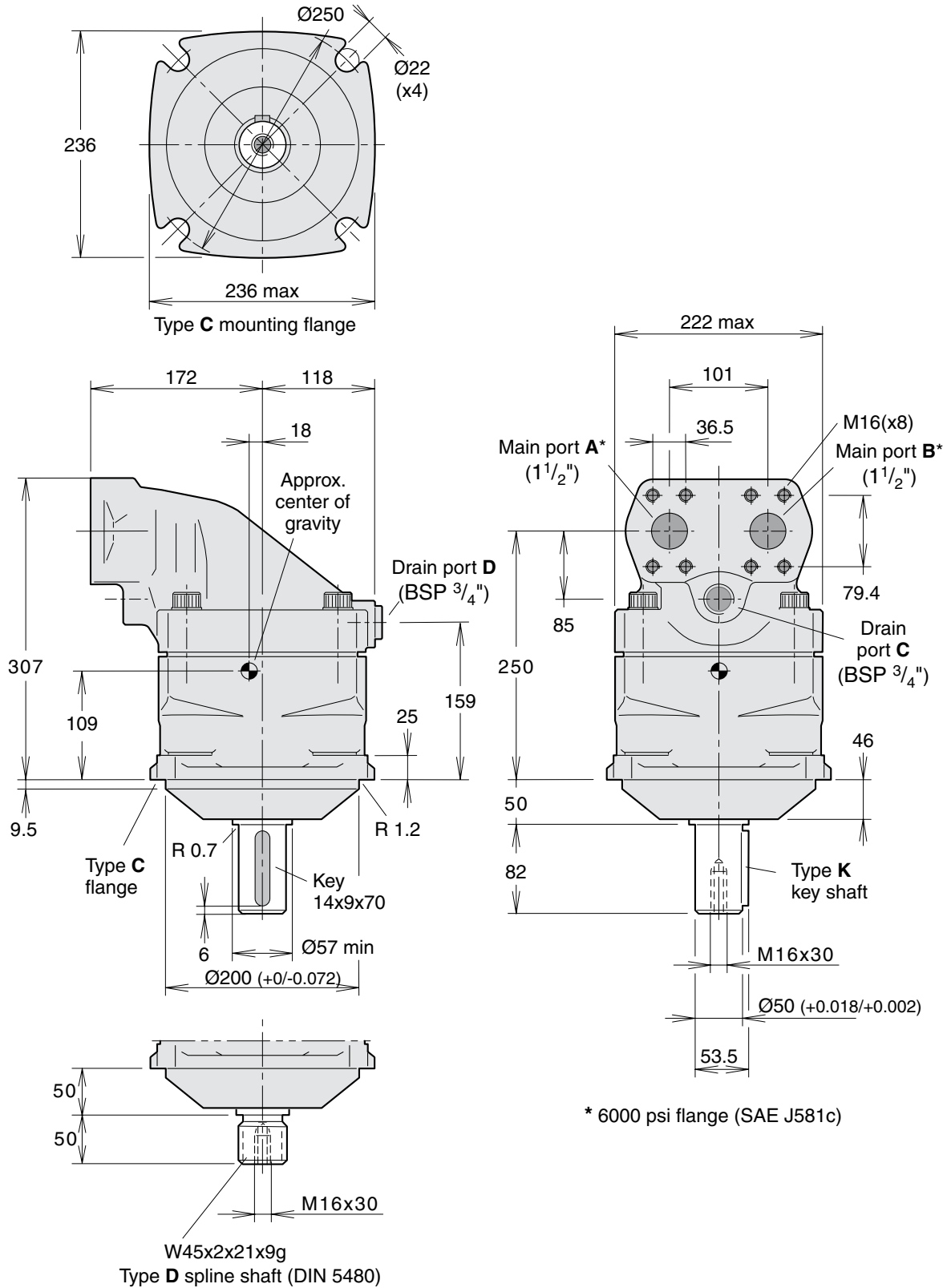
| | |
|--------|---------------------------|
| F12-30 | SAE 'B' 13 T; 16/32 DP |
| -40 | SAE 'C' 14 T; 12/24 DP |
| -60 | SAE 'C' 14 T; 12/24 DP |

1) UNF-2B thread

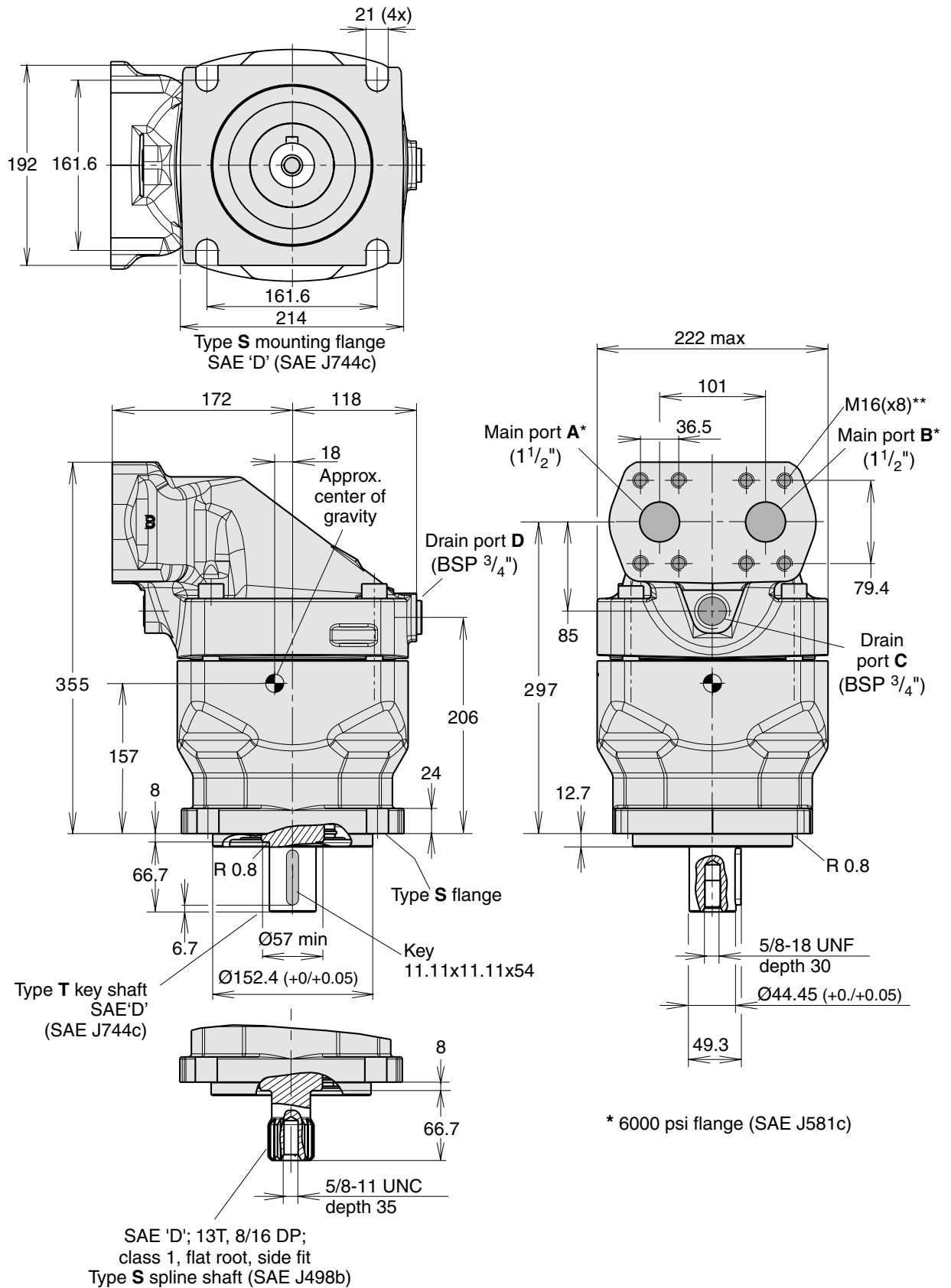
Key shaft T (SAE J744)

| | |
|--------|-----------------------------|
| F12-30 | SAE 'B-B' Ø25.4 mm/1" |
| -40 | SAE 'C' Ø31.75 mm/1 1/4" |
| -60 | SAE 'C' Ø31.75 mm/1 1/4" |

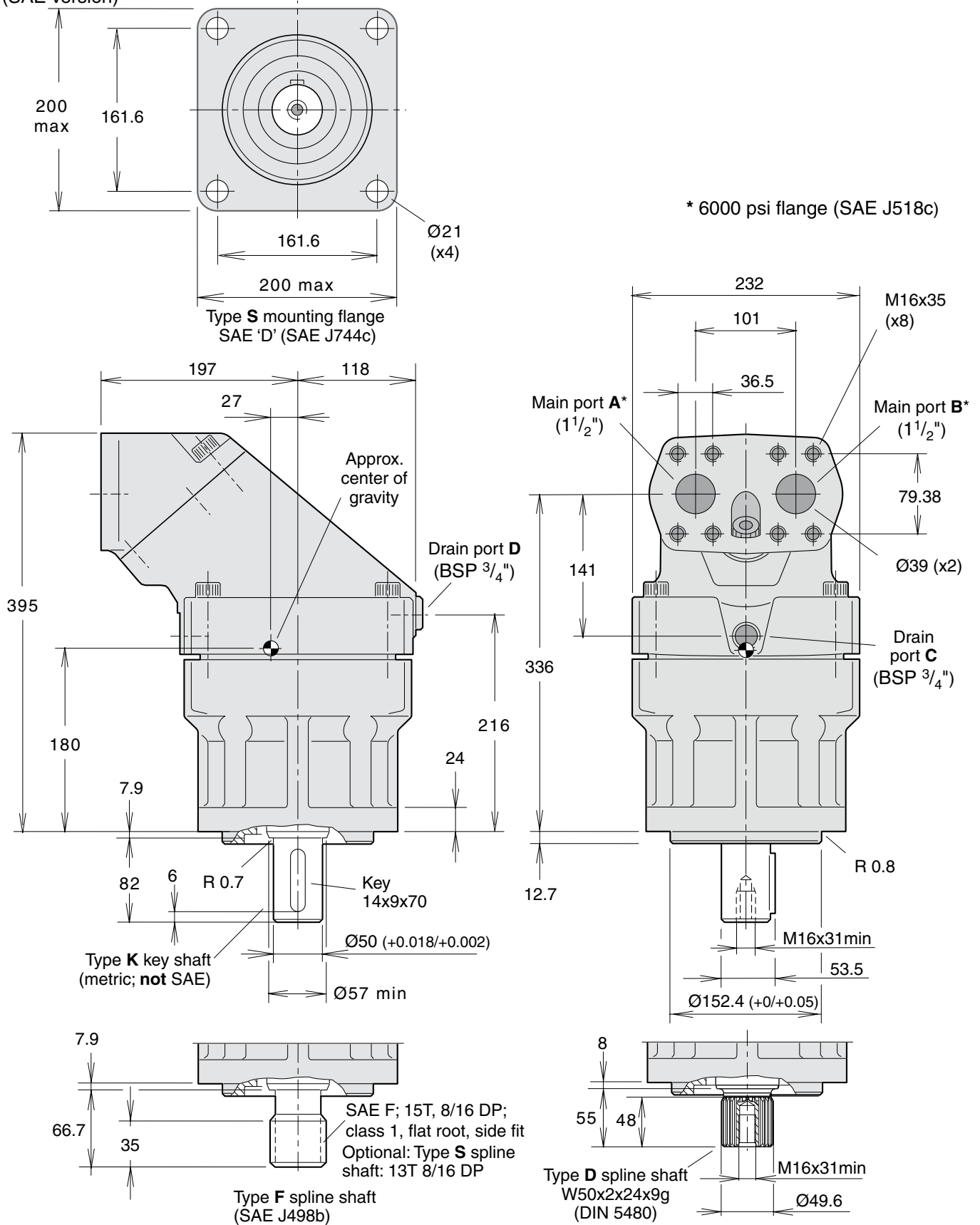
F12-150
 (CETOP version)



F12-150
 (SAE version)



F12-250
 (SAE version)



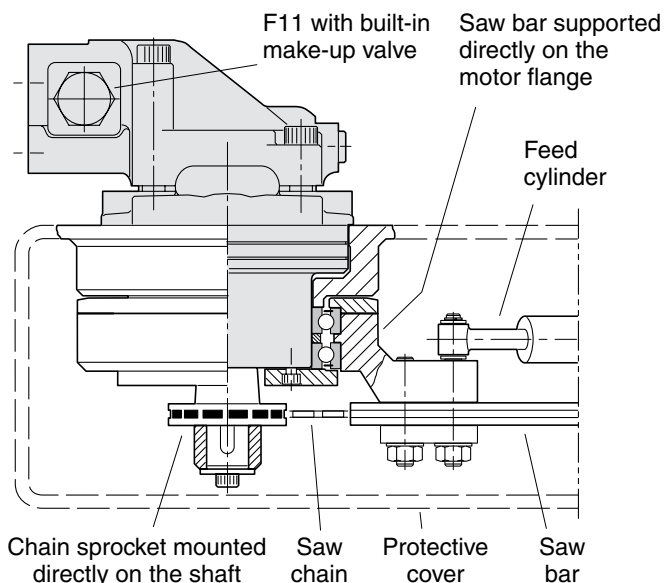
F11 in saw motor applications

Series F11 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.

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 -10, -14 and -19; 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.

For more detailed information (available versions, ordering codes, installation dimensions, etc.), refer to 'F11 Saw Motors' (catalogue HY30-8245).



Chain saw installation (example; F11-10 shown)

Series F11iP

The saw motor unit has integrated functions for start/stop and speed control, which means long motor life.

The saw motor also controls the saw bar feed function, which provides optimal chain speed and saw performance during the entire cutting process.

To further enhance the saw function and, at the same time, reduce weight, cost and installation dimensions, Parker Hannifin has thus developed a motor unit which is specifically dedicated to chain saws.



Benefits

- Simple installation means lower cost
- Low overall weight
- Compact installation
- Reduced motor shaft loading
- Improved performance
- Controlled cutting process.

Saw motor requirements and recommendations

In order to obtain the most satisfactory function of the saw motor, the hydraulic system of the machine must be able to maintain a system pressure through the whole cut of at least 220 bar at the motor; higher pres-

sure levels (up to max allowed for the motor) will, of course, increase the performance even further.

Through the whole cut the corresponding flow into the unit should, at least, be:

- 180 l/min @ 8 500 rpm and 14-tooth chain sprocket
- 195 l/min @ 9 200 rpm and 13-tooth chain sprocket
- 210 l/min @ 9 900 rpm and 12-tooth chain sprocket.

As a consequence, the pump must be able to deliver at least a 5% higher flow than what is shown above to properly secure the saw function.

In order to utilize the full potential of the saw motor, it is most important to minimize pressure losses in the hydraulic system as much as possible. Avoid using so called 'banjo' couplings and make sure there are no sharp bends in the utilized hydraulic hoses, couplings and hydraulic piping.

The saw motor unit has a motor flushing function which is integrated with the sword feed function. By connecting the drain port "D" directly to tank, additional flushing will usually not be required.

As the saw bar feed function is of a re-generative type (refer to the saw function on page 42) a 40/30 or 40/25 mm feed cylinder is recommended; this will ensure the best cutting performance of the saw.

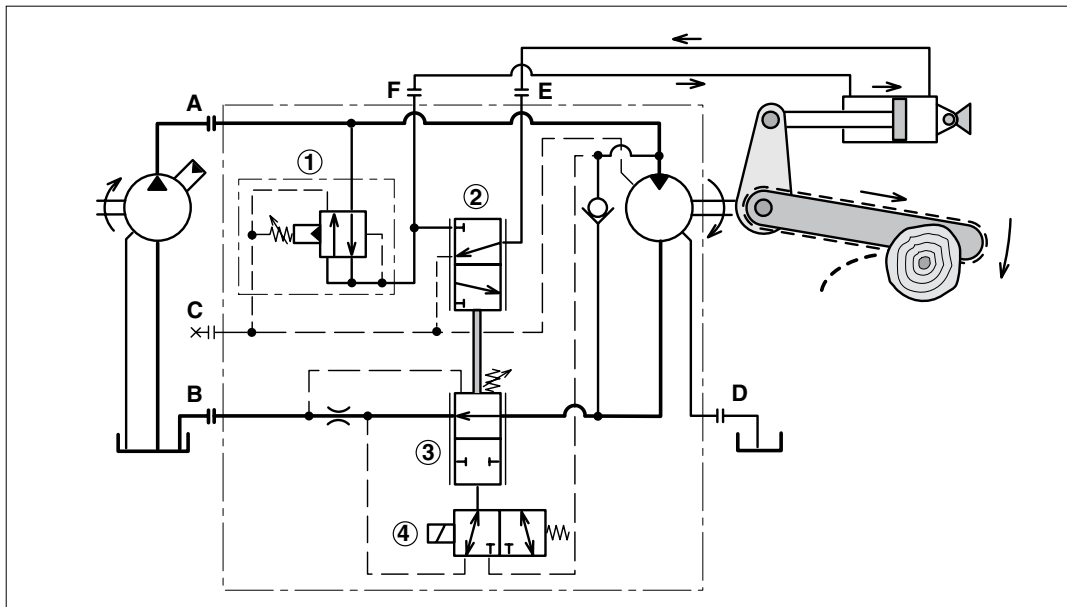
If another cylinder configuration is being considered, please contact Parker Hannifin.

The electric signal to the 'start/stop' solenoid which starts the cutting cycle must be of the 'no ramp' type, so that the saw motor can start immediately without delay; otherwise, there may be a risk of motor breakdown.

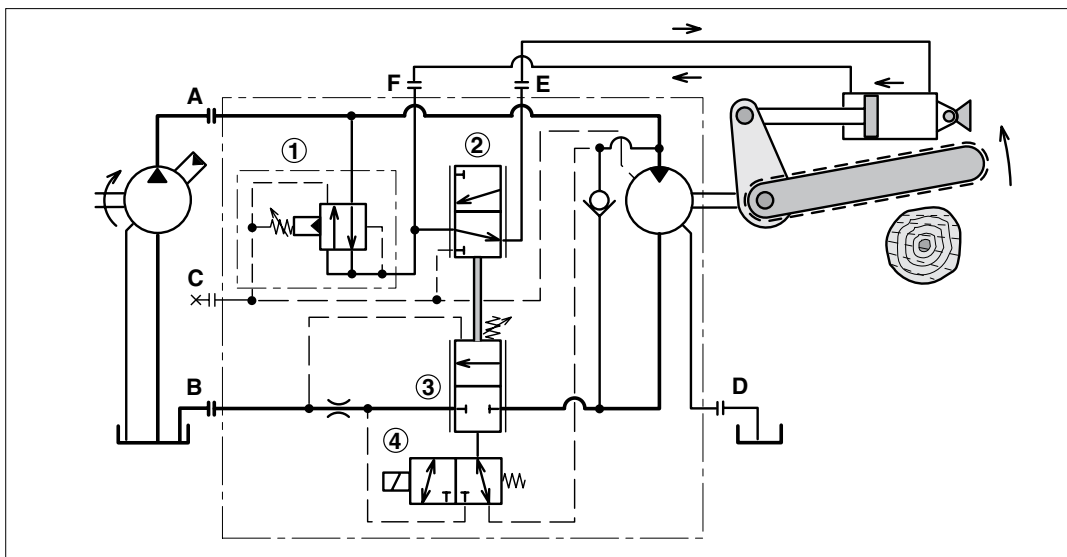
NOTE: The chain saw function is covered on page 42

For more detailed information (available versions, ordering codes, installation dimensions, etc.), refer to 'F11 Saw Motors' (catalogue HY30-8251).

Chain saw function



Chain saw function - cutting mode.



Chain saw function - return mode.

Cutting mode (refer to the top schematic)

The machine operator activates the start/stop function '4' which starts the saw motor. When the motor reaches operating speed, the cylinder piston side (port 'E') is drained and the cutting bar starts to move 'down'.

The drain flow (through port 'E' and valve '2'), provides cooling to the motor case.

Return mode (refer to the bottom schematic)

When the tree or log has been cut through, the operator de-activates the start/stop solenoid valve '4'. Valve spools '2' and '3' move to the 'up' position and the motor stops turning.

At the same time both sides of the cylinder are pressurized and the cutting bar moves 'up' to the start position (because of the re-generative cylinder/valve hook-up).

- NOTE:** - The pressure compensated pump is operating during the entire cutting cycle.
 - The pressure reducing valve, '1', reduces the pressure to the saw bar cylinder.

- The connected spool valve functions, '2' and '3', control the speed of the motor as well as the saw bar speed.

F11 and F12 fan motors

Frame sizes -10, -12, -14, -19 (F11) and -30 (F12) are also available as 'fan motors' with a built-in check valve (refer to the schematic below)

Just like the saw motor, 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.

Fan motor circuit

Because of the built-in check 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 check 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 counter 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.

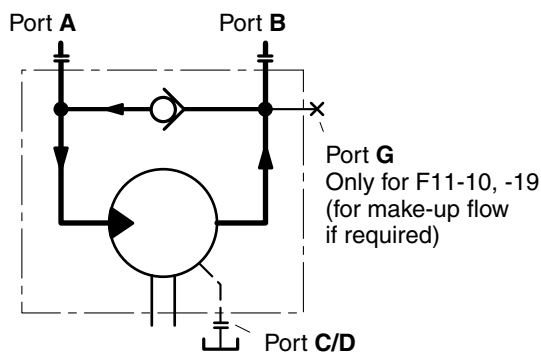
For more drawings illustrating motors with make-up valve, see page 19, 20, 23 and 26

Example of ordering code

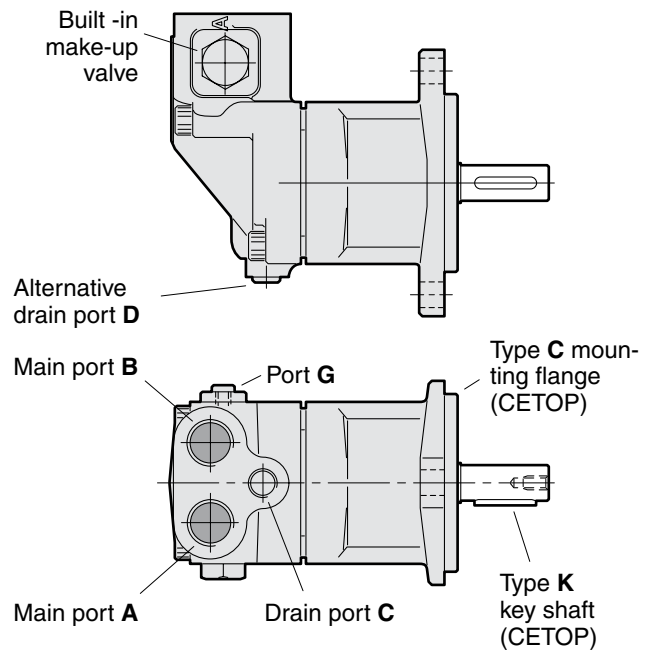
F11-012-HB-IV-K-000-MVL-0

MVL = Make-up valve, counter clockwise rotation

MVR = Make-up valve, clockwise rotation



Fan motor schematic (left hand rotation shown).



Fan motor (F11-10 left hand rotated shown).



Integrated flushing valve (F12-30, -40, -60, -80, -90)

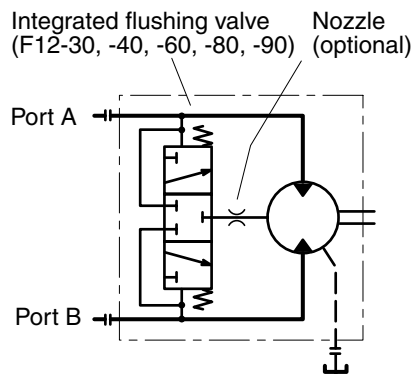
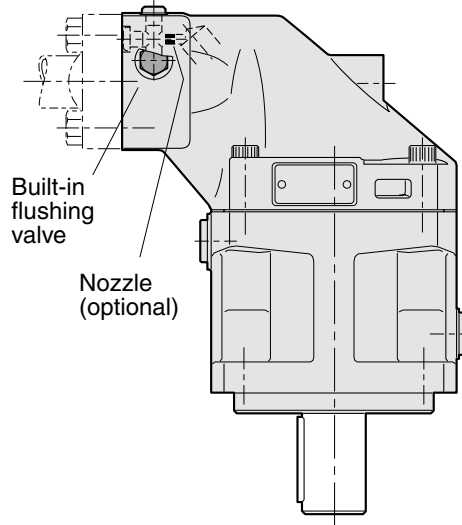
General information

The integrated flushing valve supplies the motor with a cooling flow through the case which may be required when operating at high speeds and power levels.

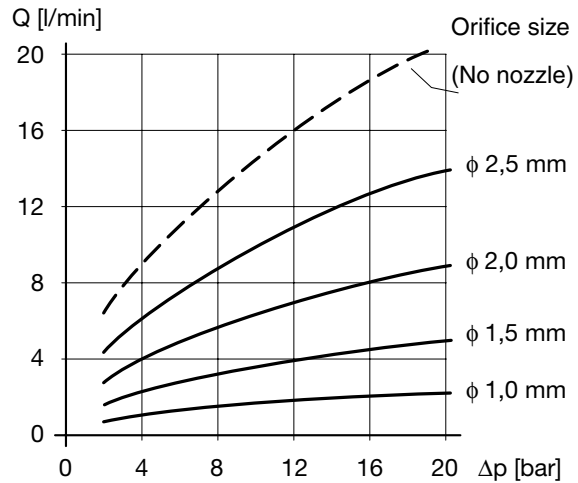
In a closed loop hydrostatic transmission the flushing valve provides that cool fluid from the charge circuit is constantly added to the main circuit.

The flushing valve consists of a 'three-position', three-way spool valve which connects the low pressure side of the main hydraulic circuit with the motor case. The valve opens at a pressure differential between port A and port B of about 14 bar.

In order to limit the flow, a nozzle with a suitable orifice is available from Parker Hannifin; refer to the table below right. The diagram to the right shows flow versus differential pressure at selected orifice sizes.



Hydraulic schematic.



Flow versus pressure differential (port A or B to tank).

Ordering code

F12 - **080** - **MF** - **IV** - **K** - **000** - **L01** - **0**

Standard F12 ordering code
(for F12-30, -40, -60, -80, -90)

| Code | Nozzle designation |
|------|----------------------|
| L | (refer to the table) |

NOTE: FV13 flushing valve block for F12-110 shown on next page.

Restrictor nozzles

The following table shows currently available nozzles and the corresponding F12 ordering code designation (F12-30/-40/-60: M5x0.8 thread; F12-80, -90: M10x1.0).

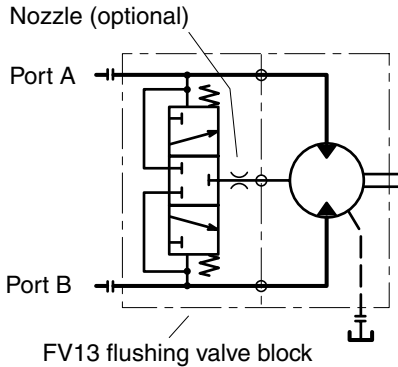
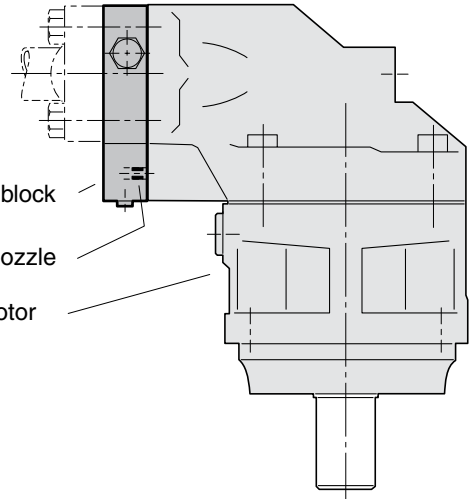
| Designation | Orifice size [mm] | Part no. for F12-30/-40/-60 | Part no. for F12-80/-90 |
|-------------------|-------------------|-----------------------------|-------------------------|
| L01 (std.) | 1.3 | 370 4595 | 379 4413 |
| L02 | 0.8 | 370 4590 | 379 3326 |
| L06 | 1.7 | 370 5821 | 379 4417 |
| L07 | 2.0 | 370 5824 | 379 4420 |
| L10 | 2.5 | 3783025 | 378 3029 |

NOTE: L00 - no nozzle.

General information (for F12-110, -125)

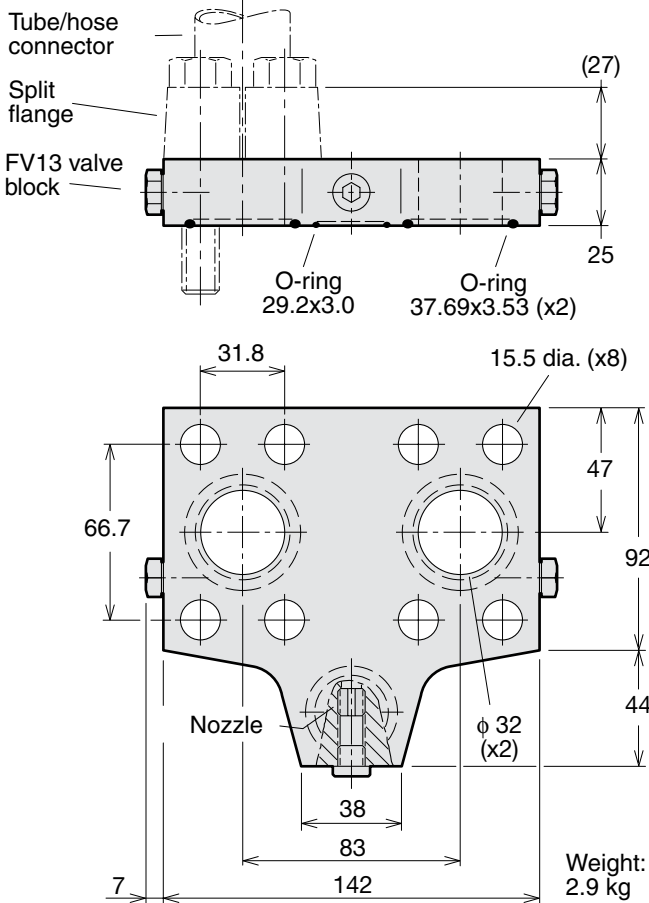
The FV13 for the F12-110 / -125 motor has the same function as the integrated flushing valve for the other F12 frame sizes. The valve block mounts between the motor port flange and the split-flange tube/hose connectors utilizing 'long' mounting screws (screw size M14x75 or 1/2"-13 UNC based on split-flange height as shown below).

The FV13 flushing valve kit contains the required O-rings (shown below) but no screws, split-flanges or tube/hose connectors.



Hydraulic schematic.

FV13 installation



FV13 Ordering code

| | | | | | | | | |
|--------------------|----------|-------------------------------|----------|------------------|------------------------------|--------------------|----------|------------|
| FV | 1 | 3 | - | H | - | A | - | L01 |
| Valve type | Version | Size | Seals | Techn. status | Nozzel | | | |
| Flushing valve | | | | | Code Nozzel L Table below | | | |
| Code Version | | Code Size (SAE 6000 psi) | | Code Seals | | Code Techn. status | | |
| 1 Factory assigned | | 3 1 1/2" (for F12-110 / -125) | | H Nitrile rubber | | A Factory assigned | | |

FV13 restrictor nozzles

When required, a nozzle is utilized to restrict the flow through the F12-110, -125 motor case. The nozzle installs in the drilled and tapped (M10x1.0) drain line located in the valve block as shown to the left. The diagram on page 1 shows flushing flow versus differential pressure for selected orifice sizes.

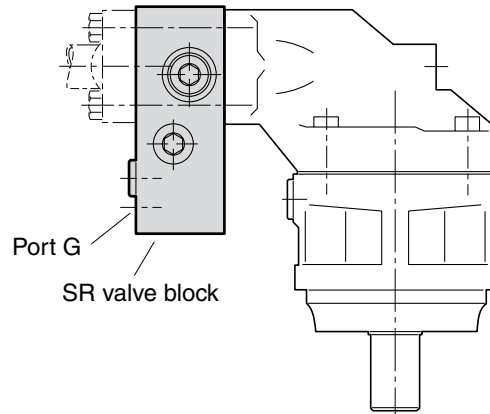
The following table lists currently available nozzles and the corresponding FV13 ordering code designation.

| Designation | Flushing valve Part number | Orifice size [mm] | Orifice Part number |
|-------------------|----------------------------|-------------------|---------------------|
| L00 no nozzle | 3780292 | | |
| L01 (std.) | 3795623 | 1.3 | 379 4413 |
| L04 | 3780593 | 1.2 | 379 4412 |
| L06 | 3787315 | 1.7 | 379 4417 |
| L07 | 3798322 | 2.0 | 379 4420 |

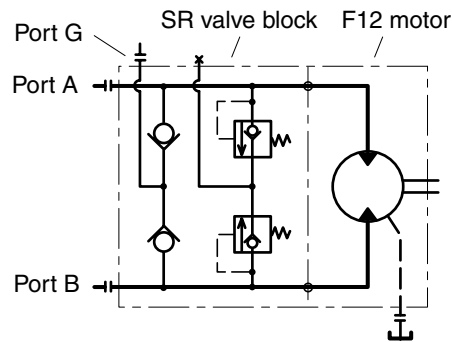
General information

- The SR pressure relief/make-up valve block for series F12 and V12 motors is designed to protect the motor and the main hydraulic lines from short duration pressure spikes. The valve block also provides an excellent make-up function.
- The valve block installs directly on the motor port flange, and is available in three sizes:
 - 1 $\frac{3}{4}$ " for F12-30/-40/-60, T12-60 and V12-60/-80
 - 2 1" for F12-80, -90, T12-80 and V14-110
 - 3 $1\frac{1}{4}$ " for F12-110, -125 and V14-160.
- The SR valve block consists of a housing containing two high pressure relief cartridges and two separate check valves for make-up. Cartridges are available in non-adjustable pressure settings between 280 and 420 bar (4000 and 6000 psi respectively).
- A make-up port (G) is also provided. In certain operating conditions, the motor (when operating as a pump) may cavitate because of insufficient inlet pressure. To prevent this, the G port should be pressurized. Contact Parker Hannifin for further information.
- The pressure drop through the main ports (A-A' or B-B') is low. As an example, the pressure drop on size 1 ($\frac{3}{4}$ ") is 0.45 bar (6.5 psi) at 175 l/min, and on size 2 (1") 0.7 bar (10 psi) at 250 l/min.

NOTE: The valve block includes main port O-rings (facing the motor) but no mounting screws.



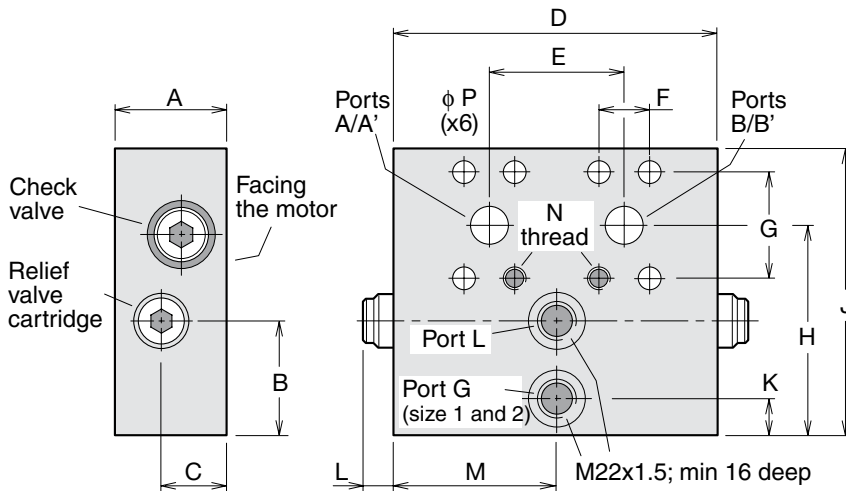
SR valve block location.



SR valve block schematic.

Ordering code

| | | | | | | | | | | | | | |
|--|---|--|---|--|---|--|---|--|---|---------------------------------------|--|---|---|
| SR | 1 | | - | | / | | - | 00 | - | H | F | - | A |
| Valve function | Version | Port size | | Pressure settings | | | | Serial number | | Seals | Threads | | Techn. status |
| Pressure relief/ make-up valve block | Code Version 1 Factory assigned | Code Port size (SAE 6000 psi) 1 $\frac{3}{4}$ " For: F12-30, -40, -60, T12-60 and V12-60, -80 2 1" For: F12-80, -90, T12-80 and V14-110 3 $1\frac{1}{4}$ " For: F12-110, -125 and V14-160 | | Code Pressure settings (A/B ports) [bar] 280, 300, 330, 350, 380, 400 or 420 | | | | Code Serial number 00 Factory assigned | | Code Seals H Nitrile rubber | Code Threads (port G) F Metric | | Code Techn. status A Factory assigned |



| Dim. [mm] | Size 1 (3/4") | Size 2 (1") | Size 3 (1 1/4") |
|-----------|---------------|-------------|-----------------|
| A | 55 | 57 | 57 |
| B | 55 | 55 | 25 |
| C | 32 | 32 | 26 |
| D | 157 | 160 | 160 |
| E | 66 | 75 | 83 |
| F | 23.8 | 27.8 | 31.8 |
| G | 50.8 | 57.15 | 66.7 |
| H | 103 | 109 | 88 |
| J | 140 | 150 | 135 |
| K | 18 | 18 | - |
| L | 16 | 16 | 16 |
| M | 78.5 | 80 | - |
| N | M10 x18 | M12 x20 | M14 x23 |
| P | 11 | 13 | 15.5 |

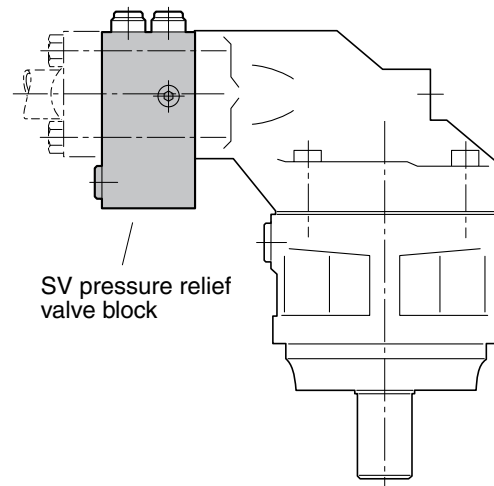
| Weight [kg] | Size 1 (3/4") | Size 2 (1") | Size 3 (1 1/4") |
|-------------|---------------|-------------|-----------------|
| | 7.4 | 9.1 | 8.5 |

SV pressure relief valve

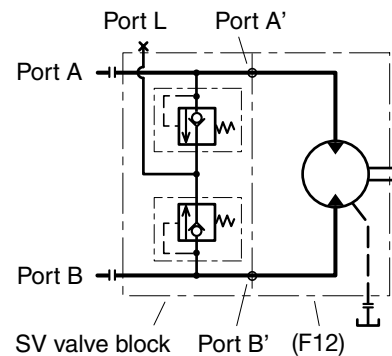
General information

- The SV pressure relief valve block for series F12 and V12 motors is designed to protect the motor and adjacent hydraulic components from short duration pressure peaks.
- It installs directly on the motor port flange and is available in three sizes:
 - '1': 3/4" for F12-30/-40/-60, T12-60 and V12-60/-80
 - '2': 1" for F12-80/-90, T12-80 and V14-110
 - '3': 1 1/4" for F12-110/-125 and V14-160
- The valve block consists of a housing containing two high pressure relief cartridges with anti-cavitation function. Cartridges are available in non-adjustable pressure settings between 280 and 420 bar.
- A make-up/drain port, L, is also provided. In certain operating conditions the motor may cavitate because of in-sufficient inlet pressure. To prevent this, the L port can be pressurized. When there is a risk of overheating, the L port can also be utilized to take out part of the flow for cooling. Contact Parker Hannifin for further information.
- The pressure drop through the main ports (A-A' or B-B') is low. As an example, the pressure drop on size 1 (3/4") is 0.45 bar (6,5 psi) at 175 l/min (45 gpm), and on size 2 (1") 0.7 bar (10 psi) at 250 l/min (65 gpm).

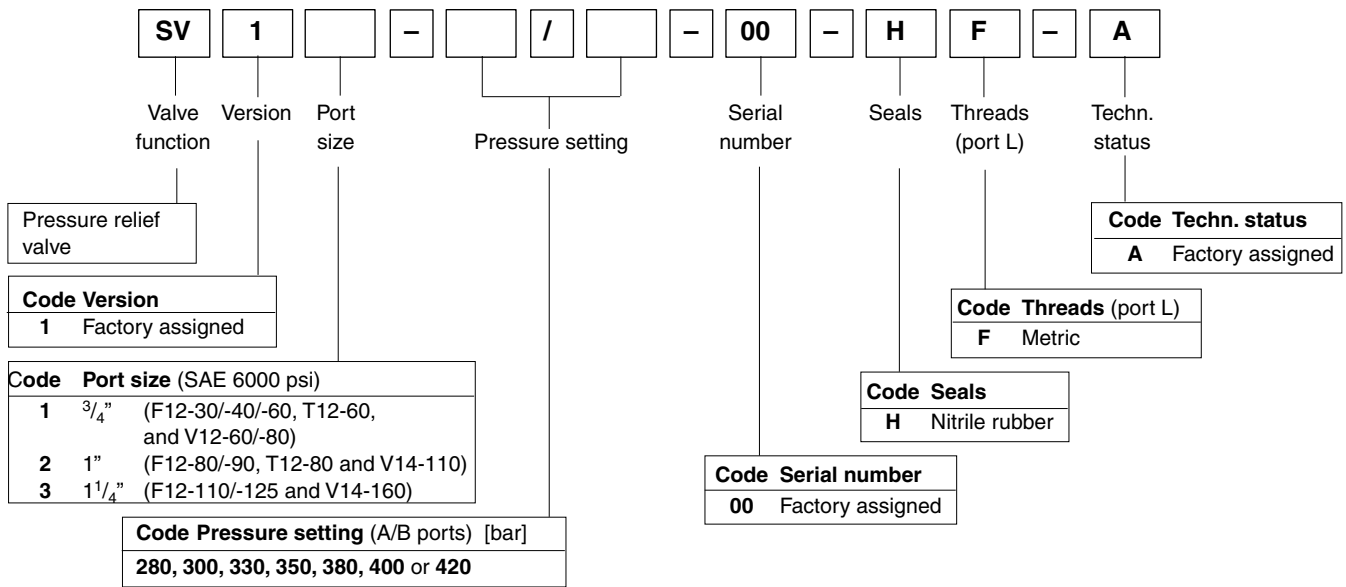
- NOTE:**
- The valve block includes main port O-rings (facing the motor) but no mounting screws.
 - The valve blocks can be used on all versions of series F12 as well as V12 and T12 motors.



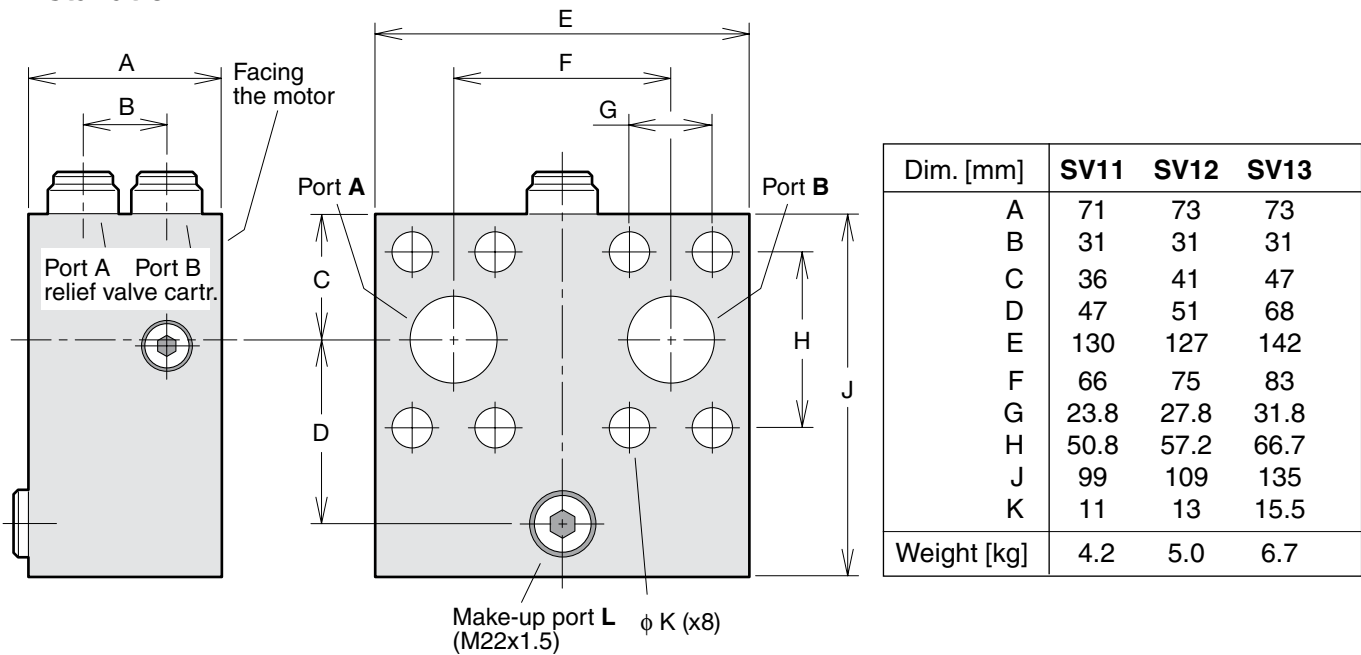
SV valve block installed on an F12 motor.



Hydraulic schematic.



Installation



The SP, super shockless, pressure relief/make-up valve block for series F12 motors is designed mainly for protection of the swing function of an excavator. It features a very 'soft' relief characteristic with very little overshoot and an excellent make-up function.

The pressure/time diagram to the right is a recording of an actual start-brake sequence of an excavator swing function. In the left part ('Start'), port A is pressurized and the swing is accelerating; the pump pressure is limited by the relief valve setting.

In the right part ('Brake'), port B is pressurized (as determined by the relief valve setting), and the swing movement stops.

The valve block installes directly on the motor port flange, and is available in three sizes:

SP11 3/4" for F12-30/-40/-60

SP12 1" for F12-80/-90

SP13 1 1/4" for F12-110/-125

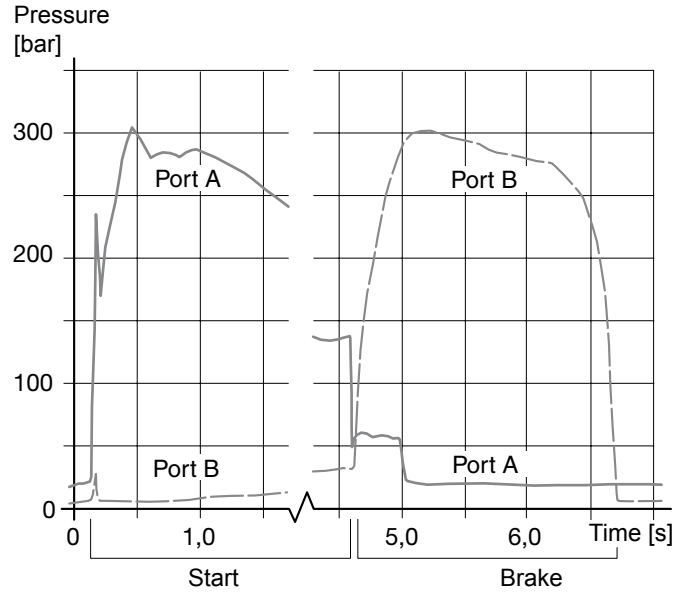
The SP valve consists of a valve block containing two high pressure relief cartridges and two separate check valves for make-up; refer to the split view below.

Cartridges are available in five non-adjustable pressure settings between 190 and 315 bar.

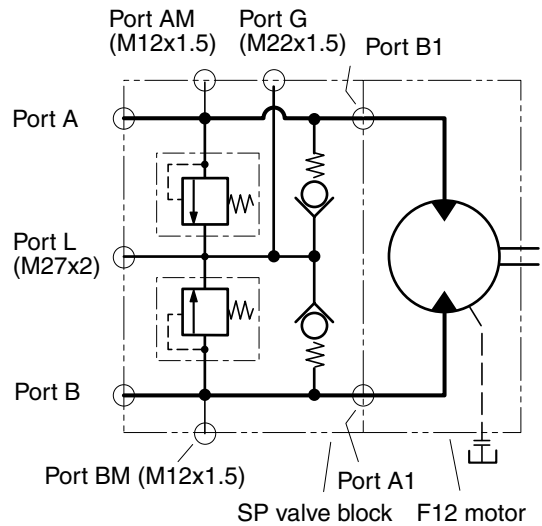
A make-up port (G) is also provided. In certain operating conditions, the motor (when operating as a pump) may cavitate because of insufficient inlet pressure. To prevent this, the G port should be pressurized.

Contact Parker Hannifin, for further information.

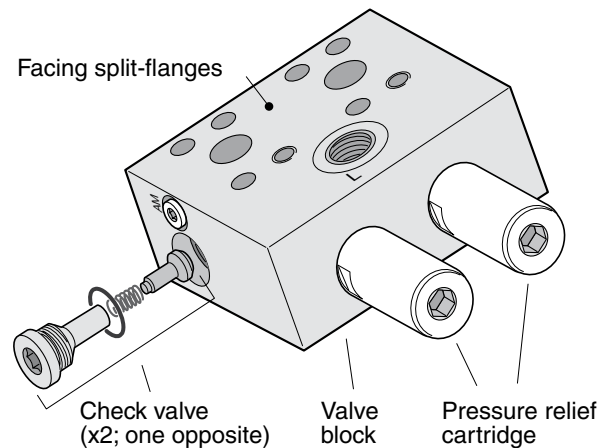
NOTE: The valve block includes main port O-rings (facing the motor) but no mounting screws.



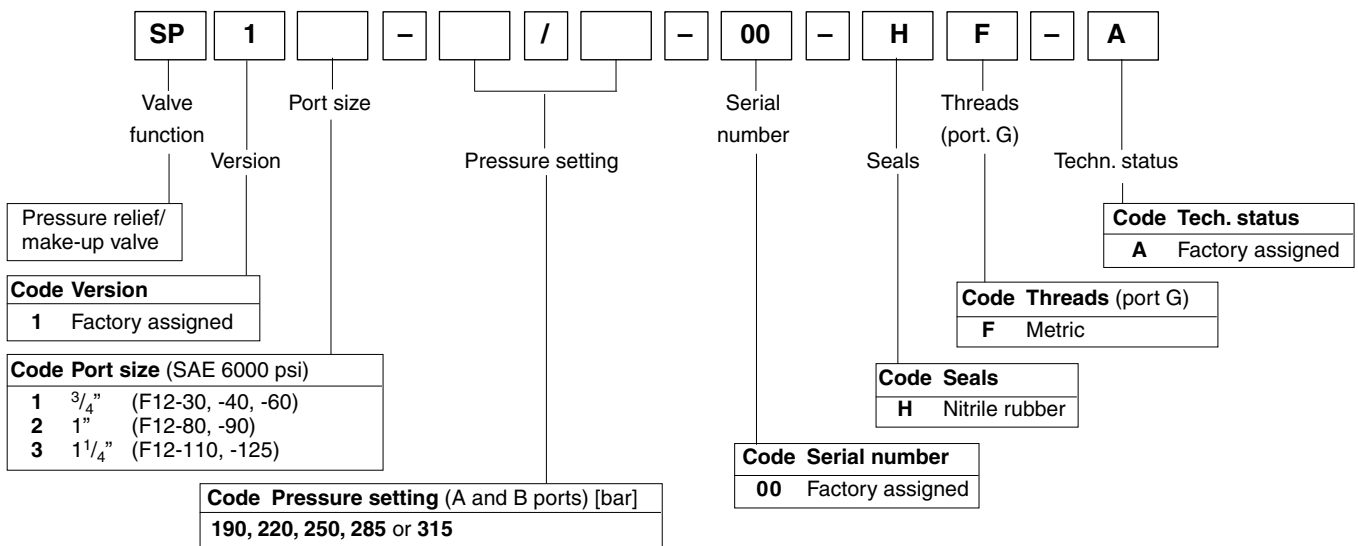
Pressure/time diagram (example).



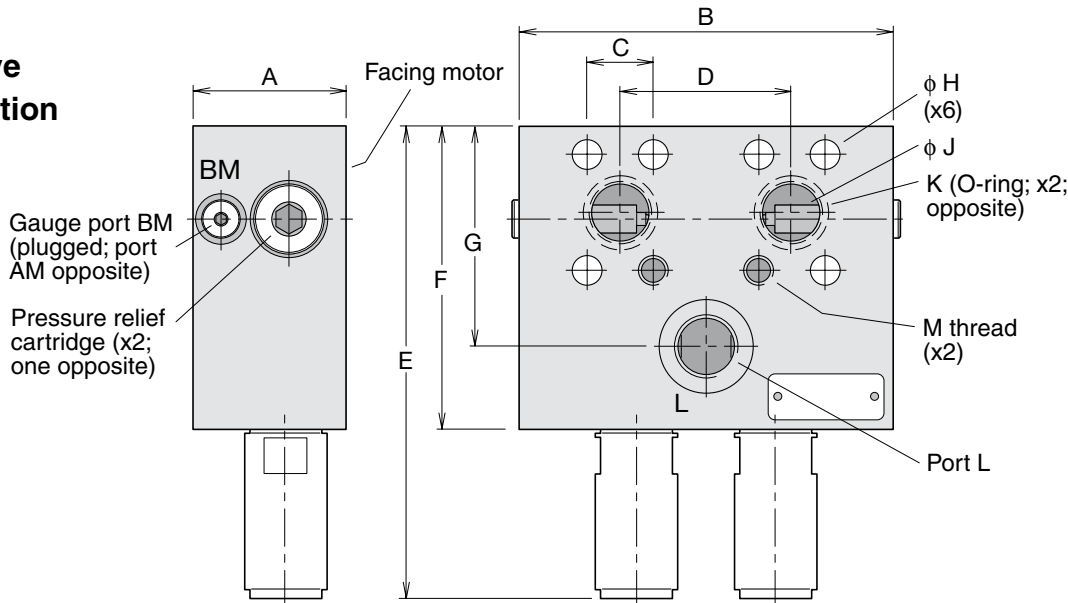
SP/F12 schematic.



SP valve components.



SP valve installation



Installation dimensions (refer to the illustration)

| Valve type | For F12-30/-40/-60 | For F12-80/-90 | For F12-110/-125 |
|------------|--------------------|------------------|------------------|
| A | 63 | 66 | 70 |
| B | 156 | 160 | 160 |
| C | 23.8 | 27.8 | 31.8 |
| D | 66 | 75 | 83 |
| E | 207 | 207 | 225 |
| F | 133 | 133 | 151 |
| G | 97 | 97 | 115 |
| H | 11 | 13 | 15 |
| J | 3/4" | 12 | 1 1/4" |
| K | 24.99x3.53 | 32,93x3.53 | 37.69x3.53 |
| M | M10 (20 deep) | M12 (20 deep) | M14 (26 deep) |
| Art. No | 0686 371 810 | 0663 918 801 | 0663 919 101 |

Valve assembly part numbers

| For motor type | Pressure setting [bar] at 20 l/min ¹⁾ | | | | |
|----------------|--|----------|----------|----------|----------|
| | 190 | 220 | 250 | 285 | 315 |
| F12-30/-40/-60 | 376 6320 | | 376 4631 | | 376 3674 |
| | | 376 7157 | | 376 3675 | |
| F12-80/-90 | 376 7161 | | 376 6924 | | 376 3677 |
| | | 376 7158 | | 376 3678 | |
| F12-110/-125 | 376 7162 | | 376 7163 | | 376 3679 |
| | | 376 7159 | | 376 7164 | |

1) Setting within ±10 bar

Pressure relief cartridges

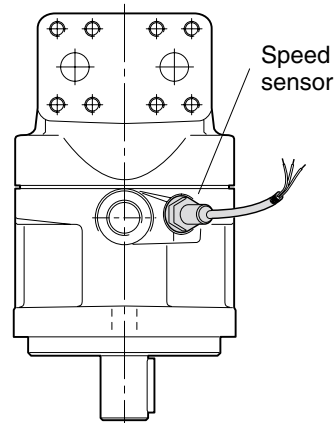
| Cartridge type | Pressure setting [bar] at 20 l/min ¹⁾ | | | | |
|-------------------|--|----------|----------|----------|----------|
| | 190 | 220 | 250 | 285 | 315 |
| Spare part number | 376 4610 | | 376 4632 | | 376 3825 |
| | | 376 7156 | | 376 3824 | |

A speed sensor kit is available for series F11/F12. A ferrostat differential (Hall-effect) sensor installs in a separate, threaded hole in the F11/F12 bearing housing.

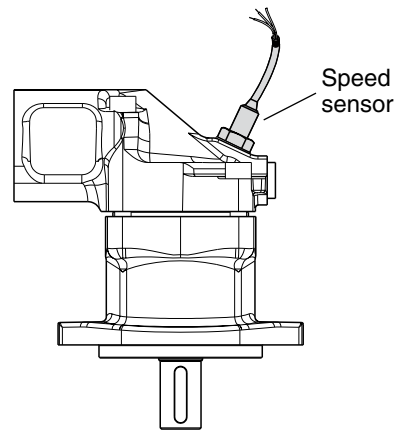
On F12 the speed sensor is directed towards the ring gear. On F11 the speed sensor is directed towards the pistons. The sensor output is a 2 phase shifted square wave signal within a frequency range of 0 Hz to 15 kHz.

- NOTE:**
- The motor bearing housing must be prepared for the speed pick-up; refer to the F11/F12 ordering codes (pages 7-12).
 - On F11 **the pistons position must be known before mounting.**
 - Additional information is provided in the Instruction (catalogue HY30-8301/UK).
 - The speed sensor is also shown in the illustrations on pages 19, 20, 23, 24, 26, 27, 30, 32, 34 and 36

Part number for Speed sensor is 378 5190.



F12 with speed sensor.



F11-14 with speed sensor.

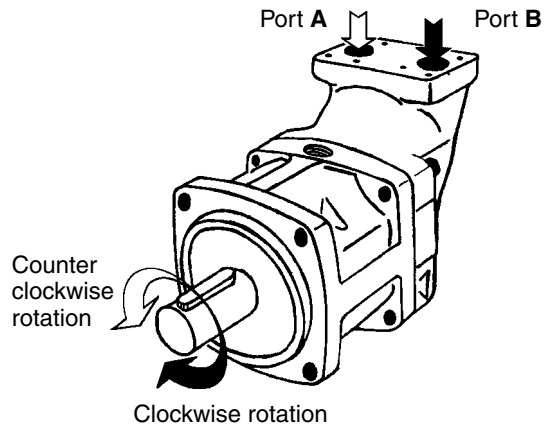
Direction of rotation

The M and H versions of series F11, and the M version of series F12, are bi-directional.

The L and R pump versions are uni-directional, allowing higher selfpriming speeds (refer to page 16).

The illustration to the right shows direction of flow versus shaft rotation. In a motor application, the shaft turns clockwise when port **B** (black arrow) is pressurized, and counter clockwise when port **A** (open arrow) is pressurized.

In a pump application where the shaft turns clock-wise, port B is the inlet port and should be connected to tank; when the shaft turns counter clockwise, port A is the inlet port.



Hydraulic fluids

Ratings and performance data for series F11/F12 are based on operating with good quality, contamination-free, petroleum-based fluids.

Hydraulic fluids type HLP (DIN 51524), automatic transmission fluids type A, or API CD engine oils can be used.

Fire resistant fluids (when used under modified operating conditions) and synthetic fluids may also be suitable.

For additional information, refer to Hydraulic Marketing Information System data base:

- Hydraulic fluid specifications
- Fire resistant fluids.

Operating temperature

The following temperatures should not be exceeded (type **N** shaft seals):

Main circuit 70 °C

Drain circuit: 90 °C.

FPM shaft seals (type **V**) can be used to 115 °C drain fluid temperature.

NOTE: The temperature should be measured at the utilized drain port.

Continuous operation may require case flushing in order to meet the viscosity and temperature limitations.

The following table shows operating speeds, above which flushing is usually required, as well as suggested flow through the case.

F11/F12 in series operation

When running F11/F12 in series at higher pressure levels,

Please contact Product Support, Pump and Motors in Trollhättan for further information.

NOTE:

When operating the F11/F12 as a pump above the selfpriming speed (valid for both the pump and motor versions), the inlet must be sufficiently pressurized. Increased noise and deteriorating performance may otherwise be experienced.

For further information refer to 'Selfpriming speed and required inlet pressure' on page 6.

Series F11

| Frame size | Speed [rpm] | Flow [l/min] |
|------------|-------------|--------------|
| F11-5 | 5500 | 1-2 |
| F11-6 | 4500 | 2-3 |
| F11-10 | 4500 | 2-3 |
| F11-12 | 4500 | 2-3 |
| F11-14 | 4500 | 2-3 |
| F11-19 | 4000 | 2-4 |

Series F12

| Frame size | Speed [rpm] | Flow [l/min] |
|------------|-------------|--------------|
| F12-30 | 3500 | 4-8 |
| F12-40 | 3000 | 5-10 |
| F12-60 | 3000 | 7-14 |
| F12-80 | 2500 | 8-16 |
| F12-90 | 2500 | 8-16 |
| F12-110 | 2300 | 9-18 |
| F12-125 | 2300 | 9-18 |
| F12-150 | 2200 | 10-20 |
| F12-250 | 1800 | 12-22 |

Viscosity

The ideal operating range is 15 to 30 mm²/s [cSt].
 At operating temperature, the viscosity (of the drain fluid) should be kept above 8 mm²/s [cSt].
 At start-up, the viscosity should not exceed 1000 mm²/s [cSt]

Filtration

To obtain the highest service life of the F11/F12, the fluid cleanliness should meet or exceed ISO code 20/18/13 (ISO 4406).
 During normal operating conditions, a 10 µm (absolute) filter is recommended.

Case pressure

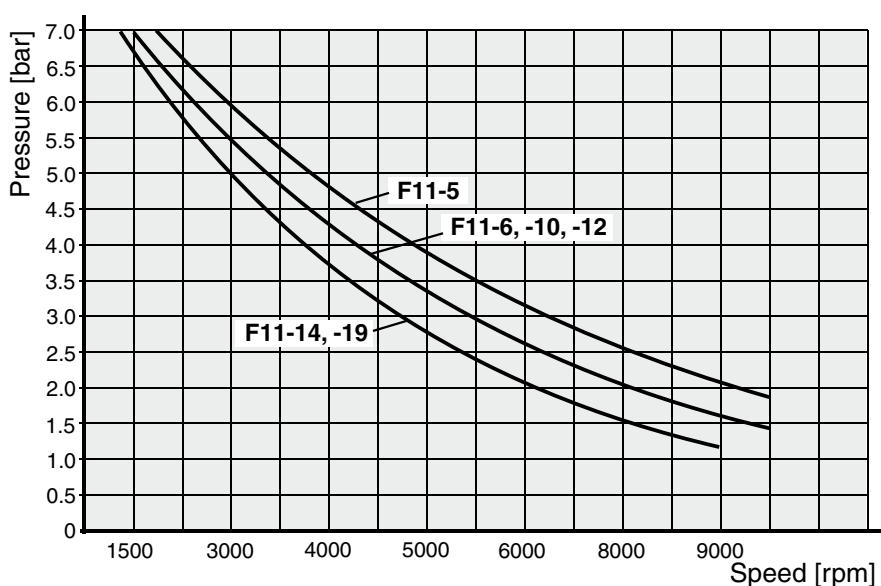
The service life of the shaft seal ring is affected by the speed of the motor and the case drain pressure and it can decrease with an increase in the frequency of pressure peaks.

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

The diagram below show the highest recommended case pressure as a function of shaft speed.

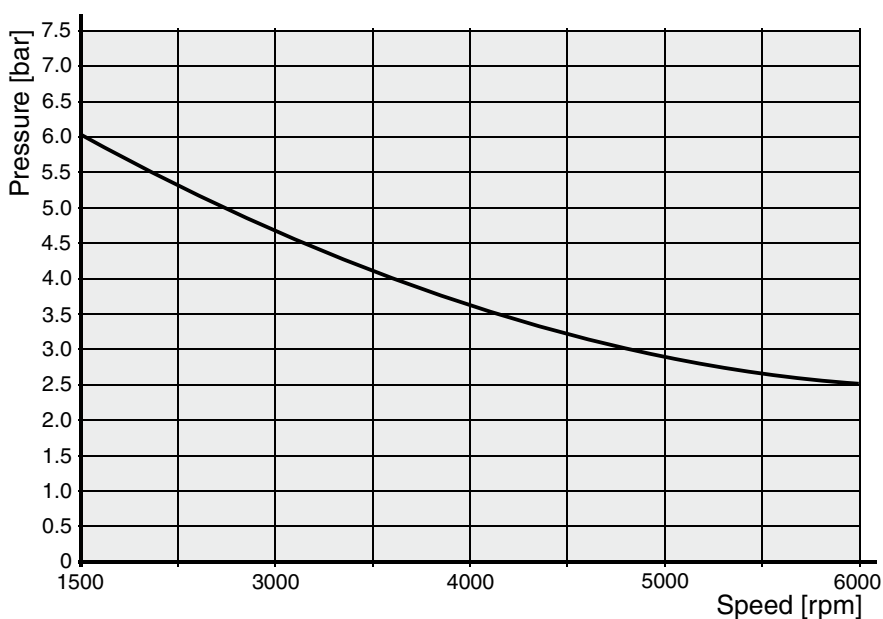
The case pressure must be equal to or greater than the external pressure on the shaft seal ring.

Serie F11



Valid for V seal, for other seals, please contact Parker Hannifin

Serie F12

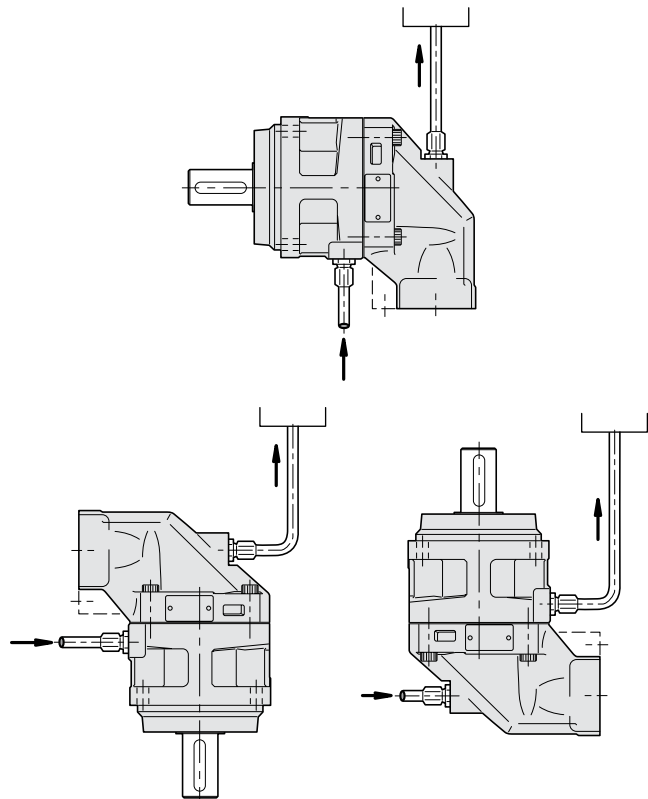
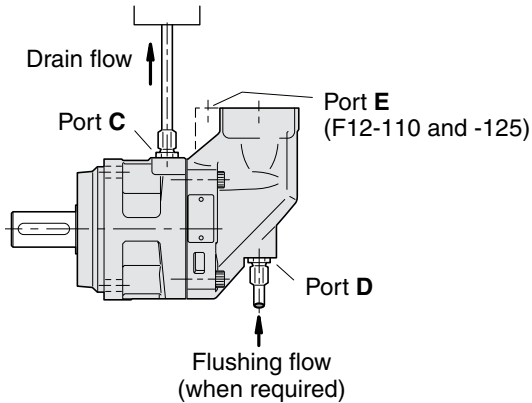


Valid for V seal, for other seals, please contact Parker Hannifin

Case drain connections

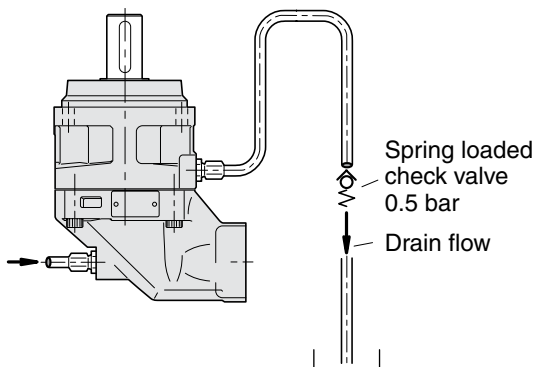
Series F11/F12 have two drain ports, **C** and **D**, while F12-110 and -125 have an additional port, **E**.

The uppermost drain port (such as port C in the illustration below) should always be utilized.



In mounting positions such as 'shaft up' (below) a spring loaded check valve should be installed in the drain line in order to insure a sufficiently high oil level in the case.

Preferably, the drain line should be connected directly to the reservoir.



Before start-up

Make sure the F11/F12 case as well as the entire hydraulic system is filled with a recommended fluid.

The internal leakage, especially at low operating pressures, is *not* sufficient to provide lubrication at start-up.

NOTE:

- To avoid cavitation and obtain a low noise level as well as reduced heat generation, tubes, hoses and fittings must be adequately dimensioned.
- Preferably, the suction line flow speed should be 0.5 to 1 m/s, and pressure line flow speeds 3 to 5 m/s.



WARNING – USER RESPONSIBILITY

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The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

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Parker Worldwide

AE – UAE, Dubai
Tel: +971 4 8127100
parker.me@parker.com

AR – Argentina, Buenos Aires
Tel: +54 3327 44 4129

AT – Austria, Wiener Neustadt
Tel: +43 (0)2622 23501-0
parker.austria@parker.com

AT – Eastern Europe, Wiener Neustadt
Tel: +43 (0)2622 23501 900
parker.easteurope@parker.com

AU – Australia, Castle Hill
Tel: +61 (0)2-9634 7777

AZ – Azerbaijan, Baku
Tel: +994 50 2233 458
parker.azerbaijan@parker.com

BE/LU – Belgium, Nivelles
Tel: +32 (0)67 280 900
parker.belgium@parker.com

BR – Brazil, Cachoeirinha RS
Tel: +55 51 3470 9144

BY – Belarus, Minsk
Tel: +375 17 209 9399
parker.belarus@parker.com

CA – Canada, Milton, Ontario
Tel: +1 905 693 3000

CH – Switzerland, Etoy
Tel: +41 (0) 21 821 02 30
parker.switzerland@parker.com

CL – Chile, Santiago
Tel: +56 2 623 1216

CN – China, Shanghai
Tel: +86 21 2899 5000

CZ – Czech Republic, Klecany
Tel: +420 284 083 111
parker.czechrepublic@parker.com

DE – Germany, Kaarst
Tel: +49 (0)2131 4016 0
parker.germany@parker.com

DK – Denmark, Ballerup
Tel: +45 43 56 04 00
parker.denmark@parker.com

ES – Spain, Madrid
Tel: +34 902 330 001
parker.spain@parker.com

FI – Finland, Vantaa
Tel: +358 (0)20 753 2500
parker.finland@parker.com

FR – France, Contamine s/Arve
Tel: +33 (0)4 50 25 80 25
parker.france@parker.com

GR – Greece, Athens
Tel: +30 210 933 6450
parker.greece@parker.com

HK – Hong Kong
Tel: +852 2428 8008

HU – Hungary, Budapest
Tel: +36 1 220 4155
parker.hungary@parker.com

IE – Ireland, Dublin
Tel: +353 (0)1 466 6370
parker.ireland@parker.com

IN – India, Mumbai
Tel: +91 22 6513 7081-85

IT – Italy, Corsico (MI)
Tel: +39 02 45 19 21
parker.italy@parker.com

JP – Japan, Fujisawa
Tel: +(81) 4 6635 3050

KR – South Korea, Seoul
Tel: +82 2 559 0400

KZ – Kazakhstan, Almaty
Tel: +7 7272 505 800
parker.easteurope@parker.com

LV – Latvia, Riga
Tel: +371 6 745 2601
parker.latvia@parker.com

MX – Mexico, Apodaca
Tel: +52 81 8156 6000

MY – Malaysia, Shah Alam
Tel: +60 3 7849 0800

NL – The Netherlands, Oldenzaal
Tel: +31 (0)541 585 000
parker.nl@parker.com

NO – Norway, Ski
Tel: +47 64 91 10 00
parker.norway@parker.com

NZ – New Zealand, Mt Wellington
Tel: +64 9 574 1744

PL – Poland, Warsaw
Tel: +48 (0)22 573 24 00
parker.poland@parker.com

PT – Portugal, Leca da Palmeira
Tel: +351 22 999 7360
parker.portugal@parker.com

RO – Romania, Bucharest
Tel: +40 21 252 1382
parker.romania@parker.com

RU – Russia, Moscow
Tel: +7 495 645-2156
parker.russia@parker.com

SE – Sweden, Spånga
Tel: +46 (0)8 59 79 50 00
parker.sweden@parker.com

SG – Singapore
Tel: +65 6887 6300

SK – Slovakia, Banská Bystrica
Tel: +421 484 162 252
parker.slovakia@parker.com

SL – Slovenia, Novo Mesto
Tel: +386 7 337 6650
parker.slovenia@parker.com

TH – Thailand, Bangkok
Tel: +662 717 8140

TR – Turkey, Istanbul
Tel: +90 216 4997081
parker.turkey@parker.com

TW – Taiwan, Taipei
Tel: +886 2 2298 8987

UA – Ukraine, Kiev
Tel: +380 44 494 2731
parker.ukraine@parker.com

UK – United Kingdom, Warwick
Tel: +44 (0)1926 317 878
parker.uk@parker.com

US – USA, Cleveland (industrial)
Tel: +1 216 896 3000

US – USA, Lincolnshire (mobile)
Tel: +1 847 821 1500

VE – Venezuela, Caracas
Tel: +58 212 238 5422

ZA – South Africa, Kempton Park
Tel: +27 (0)11 961 0700
parker.southafrica@parker.com

European Product Information Centre

Free phone: 00 800 27 27 5374
(from AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, IE, IL, IS, IT, LU, MT, NL, NO, PL, PT, RU, SE, UK, ZA)
Fax: +44 1442 458112

US Product Information Centre

Free phone: 1-800-27 27 537
www.parker.com

