Hydraulic Motor/Pump

Series F11/F12
Fixed Displacement

parker.com/pmde

Parker

ENGINEERING YOUR SUCCESS.

Series F12

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.

F12 Features

- Max intermittent pressure up to 480 bar and continuous operating pressure up to 420 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.
- The F11's and F12's have a simple and straight-forward design with very few moving parts, making them very reliable motors/pumps.
- 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.

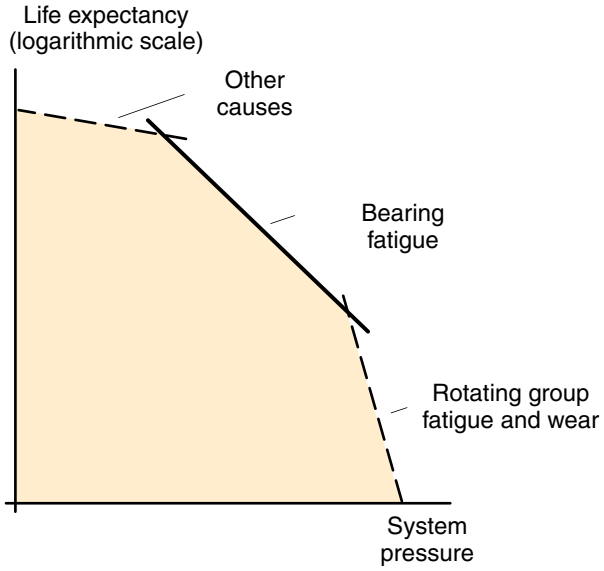
Bearing life

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:

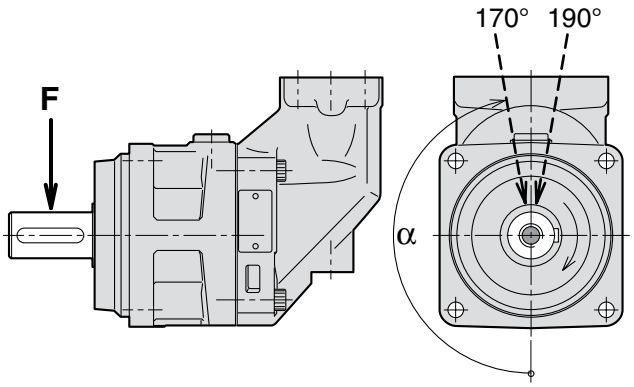
- Pitch diameter, Pressure angle, Spiral angle, Distance flange – gearwheel (mid) and Gearwheel spiral direction (R or L).

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



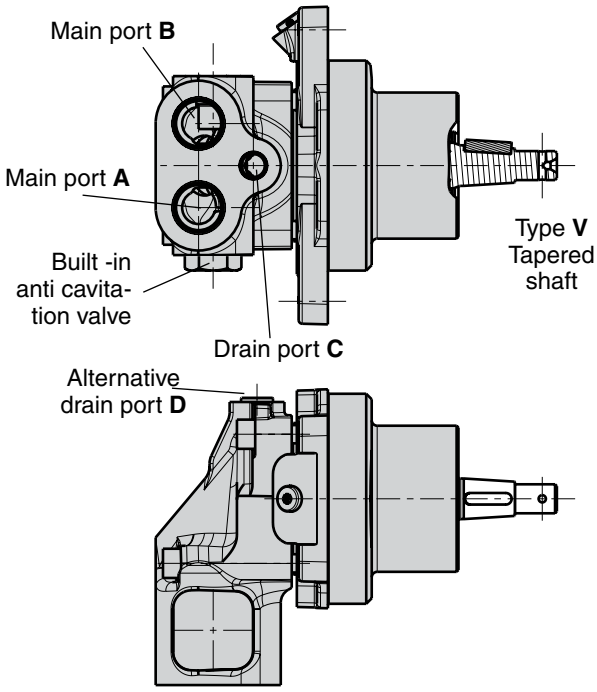
The direction (α) of the radial load is positive in the direction of rotation as shown.

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

F11/F12 Fan motors

F11/F12 motors, in frame sizes -5 to -40 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 F11/F12 has up to 95% overall efficiency which reduces the diesel consumption and minimizes the cooling demand.



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

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.

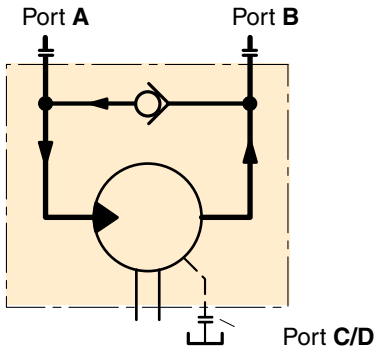
When the pump flow to the motor is shut off and the motor is operating at very high speeds, it is important that sufficient return port back pressure is available (port B in the schematic to the right).

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 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 chapters 2, F11 and 3, F12.

For more info about integrated pressure relief valves, see page 63.



Schematic Fan motor with anti cavitation valve

Example of ordering code
F11-010-MB-CV-K-000-**MUVL**-00
MUVL = Make up/anti cavitation valve, counter clockwise rotation
MUVR = Make up/anti cavitation valve, clockwise rotation

F11/F12 in saw motor applications

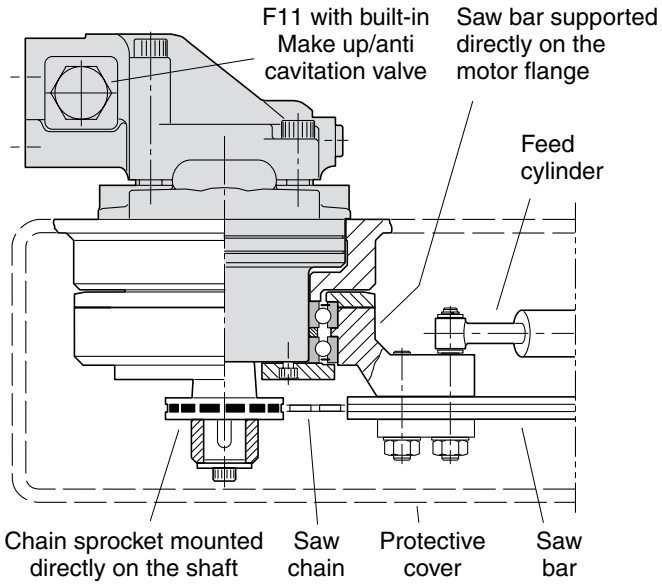
Series F11/F12 motors have proven suitable for demanding applications such as chain saws. Primarily due to the 40° bent-axis design, spherical pistons (with laminated piston rings) and gear synchronization, very high speeds are permissible. Not even low temperatures at start-up affect reliability.

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 F11-6, -10, -12, -14, -19, 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. Catalogue MSG30-8245/UK



Chain saw installation (example; F11-10 shown)

Parker Power Boost

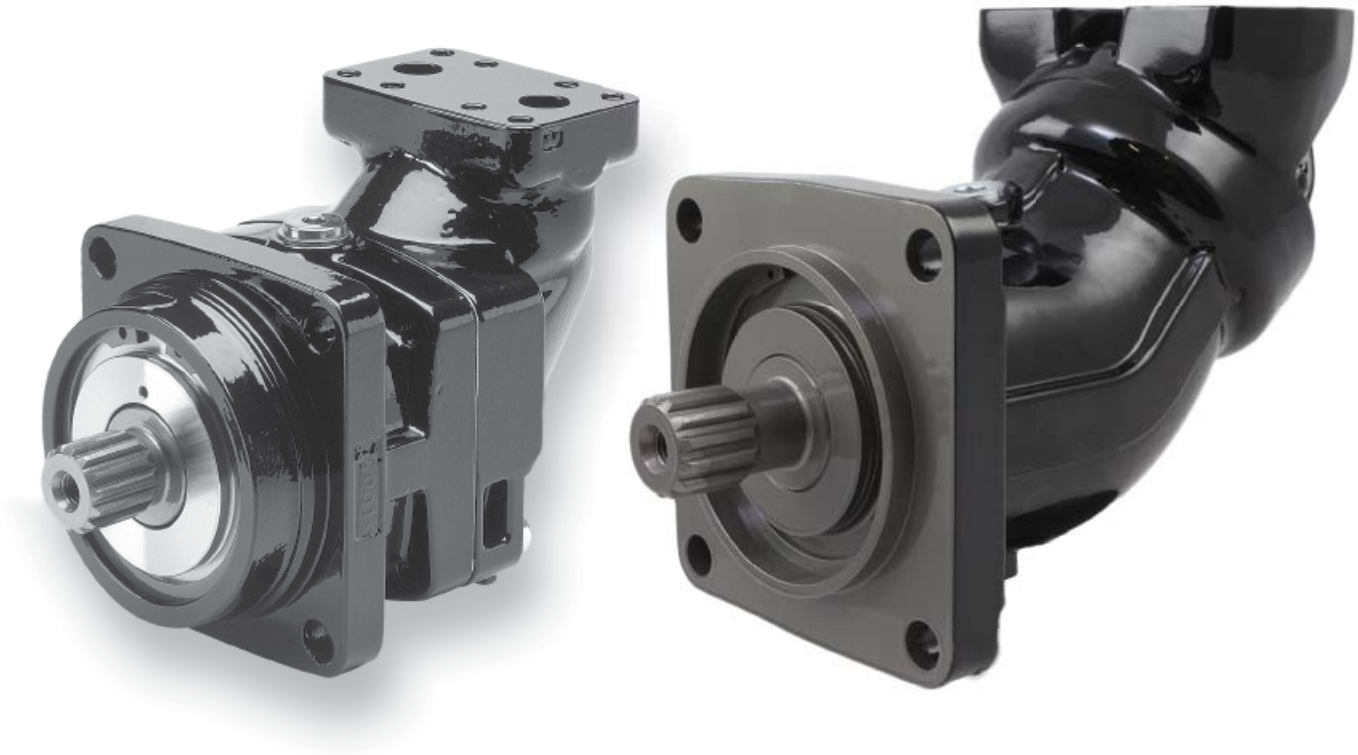
A high speed F11 or F12 motor could be optimized with a Power Boost™, which means less fluid friction and oil compression. This can reduce power losses by up to 5 kW. The improved efficiency generates less heat, reducing the need for cooling and consequently improves fuel consumption.

Parker Power Boost is available for size F11-6, -10, -12, -14, -19 and F12-30.

When to order a motor with Power Boost it is to be specified with a B in last field in model code. Ex below.

F11-019-SB-CS-K-000-MUVL-**B**0

F12



Frame size 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 3)											
max intermittent1) [bar]	500	480	500	480	420	480	480	480	480	480	420
max continuous [bar]	450	420	450	420	350	420	420	420	420	420	350
Motor operating speed 3) [rpm]											
max intermittent 1)	8600	6700	6400	5300	5000	4800	4600	4000	4000	4000	3000
max continuous	7300	6100	5800	4800	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 intermittent1) [l/min]	219	268	347	426	465	528	575	608	648	728	726
max continuous [l/min]	201	244	317	386	428	484	525	547	583	655	653
Drain temperature3), 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. Find more info on page 42
3) See also installation information. Page 69

Efficiency

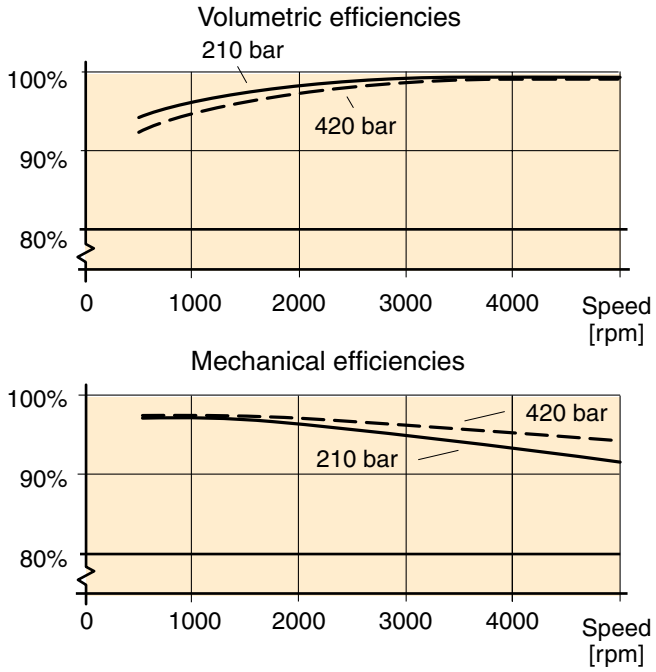
Because of its high overall efficiency, driving a motor/pump from series F12 requires less fuel or electric power.

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.

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 7.

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



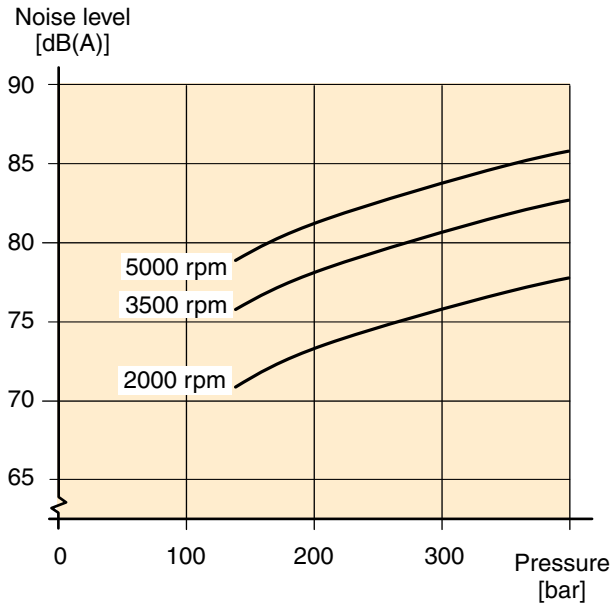
Noise level

Series 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 F12-030 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 Parker Hannifin.

Selfpriming speed and required inlet pressure

Series F12

When operating the 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 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.

Find more info about the BLA unit at page 68.

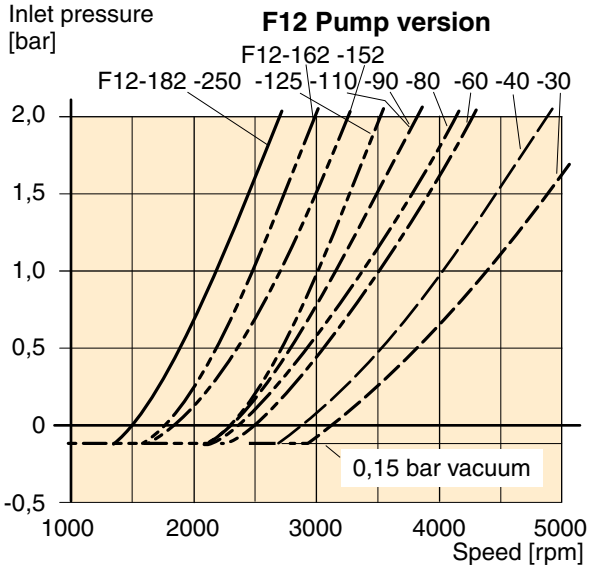


Diagram 2. Min. required pump (F12-L or -R) inlet press.

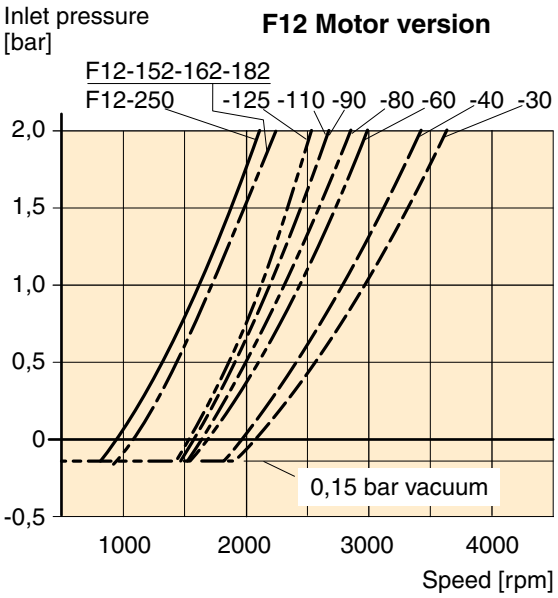


Diagram 3. Min. required motor (F12-M) inlet pressure.

F12-ISO — [ ] — [ ] [ ] — [ ] [ ] [ ] — [ ] [ ] — [ ] — [ ] — [ ] — [ ]

Frame size · Function · Main ports · Mounting flange · Shaft seal · Shaft · Version number · Option page 6, 61 · Option page 7, 67

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

Version number
(assigned for special versions)

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 Parker Hannifin

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	Mounting flange										
I	ISO flange	x	x	x	x	x	x	x	x	x	x
F	ISO 200 flange	-	-	-	-	-	-	-	x	x	x

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)	-	-	(x)	(x)	-	-	-

*See also dimensional drawings on pages 46 and 48.

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[2]	Pressure relief valve clockwise rotation	(x)	(x)	(x)	-	-	-	-	-	-	-
P__L[2]	Pressure relief valve counter clockwise rotation	(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	Shaft seal										
V	FPM, high pressure, high temperature	x	x	x	x	x	x	x	x	x	x

For other versions, contact Parker Hannifin

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

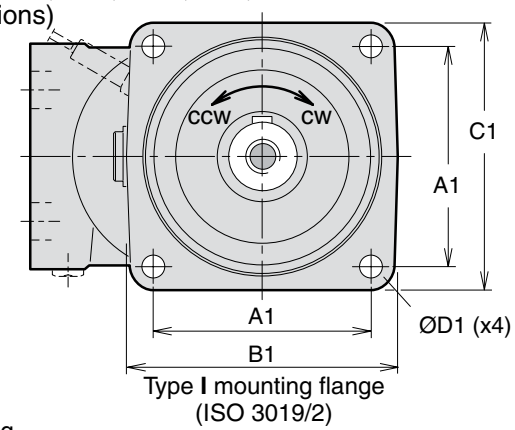
1) F12-110 and -125: Accessory valve block (page 62)

2) Pressure setting on page 63

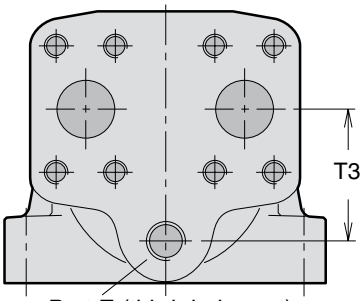
NOTE: All combinations are not valid, please contact Parker Hannifin

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden

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

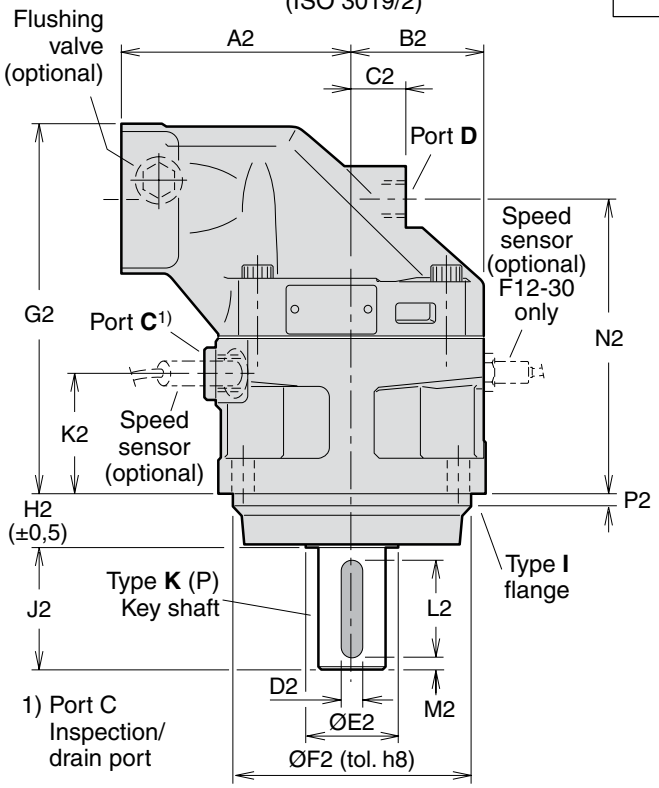


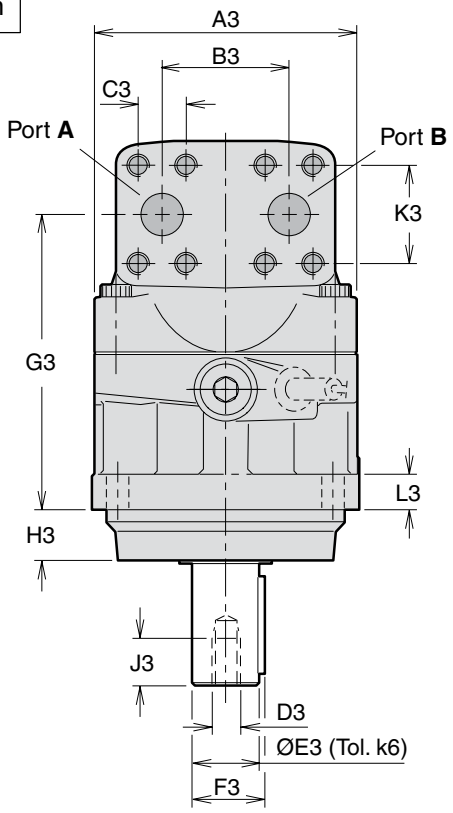
Type **I** mounting flange
(ISO 3019/2)



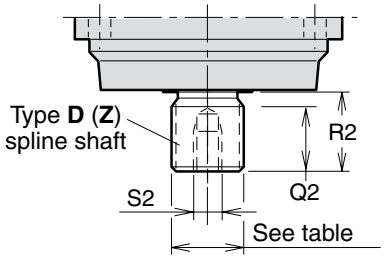
Port **E** (third drain port)
F12-110 and -125 barrel housing
(ISO /cartridge version)

F12-80 shown

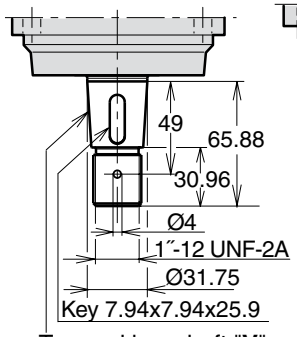




Shaft option D (Z)

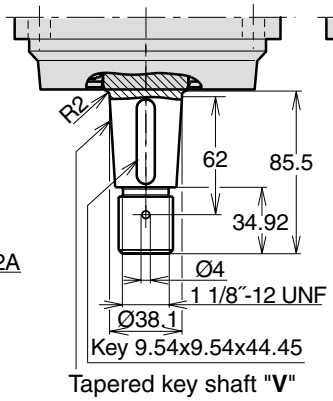


Shaft option V (F12-30)



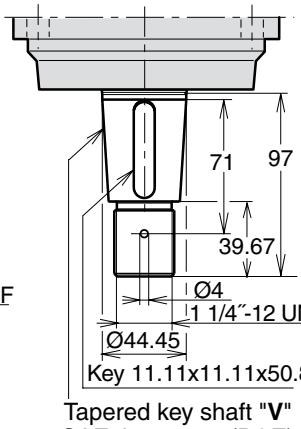
Tapered key shaft "**V**"
SAE J744 32-3 (C)

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)

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	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	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*)	M10 x20	M10 x20	M10 x20	M12 x20	M14 x26
C thread**)	M22 x1.5	M22 x1.5	M22 x1.5	M22 x1.5	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.

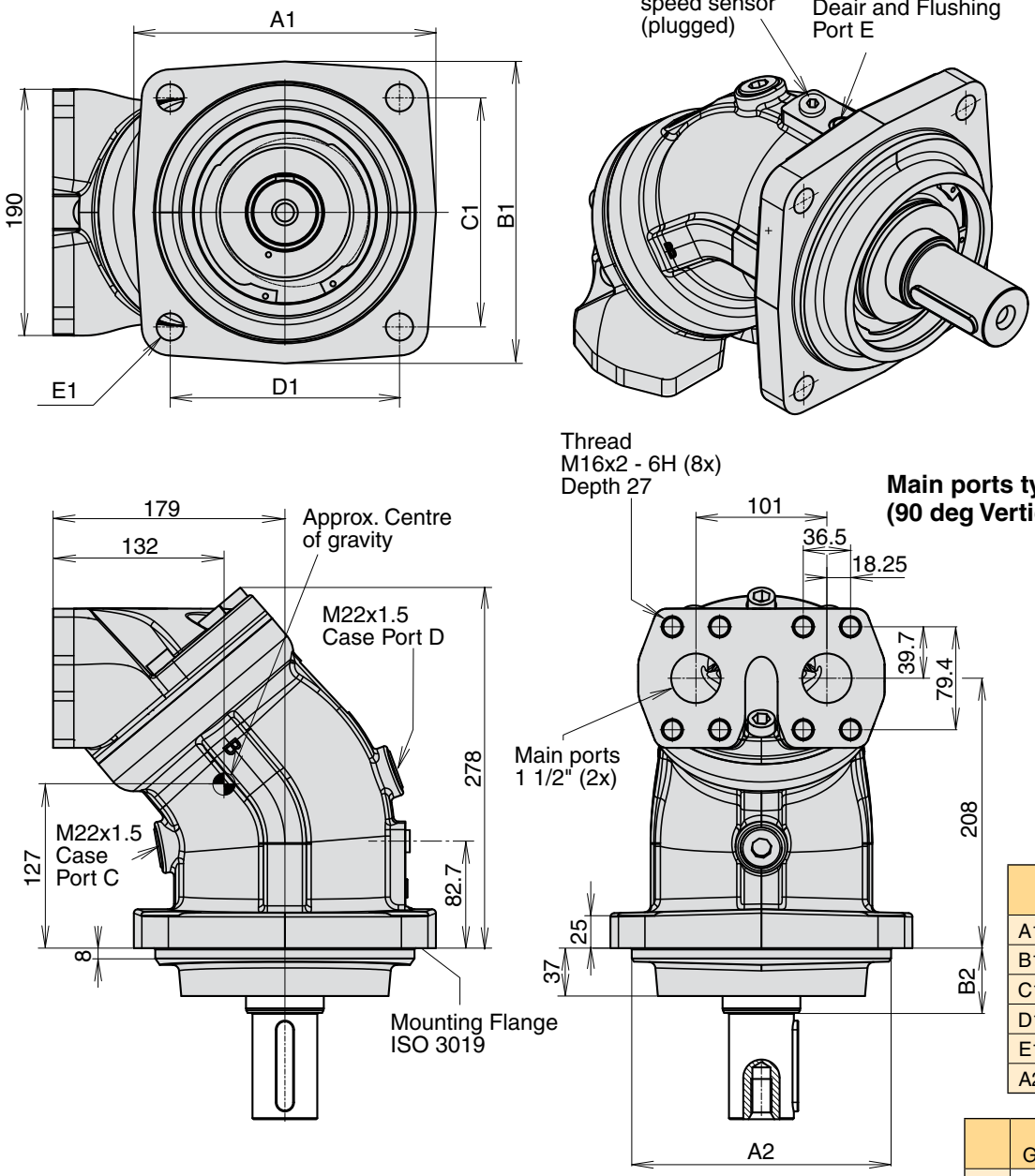
Spline shaft (DIN 5480)

	Type **D** (std)	Type **A**	Type **Z** (optional)
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

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

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

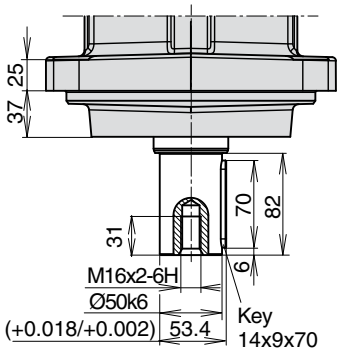


Main ports type F (90 deg Vertical)

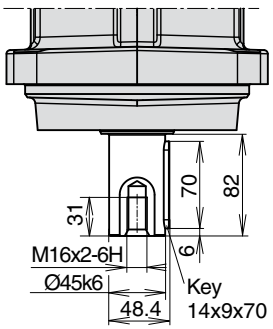
	ISO 180 (type I)	ISO 200 (type F)
A1	210	233
B1	210	233
C1	158.4	176.8
D1	158.4	176.8
E1	Ø18	Ø21
A2	180 h8	200 h8

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

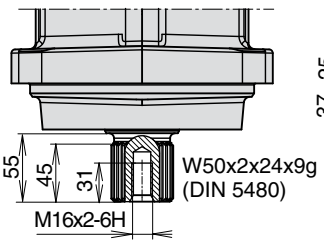
Shaft options K and G



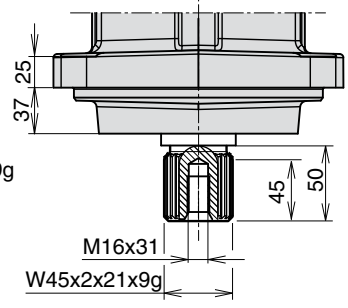
Shaft option P



Shaft option D

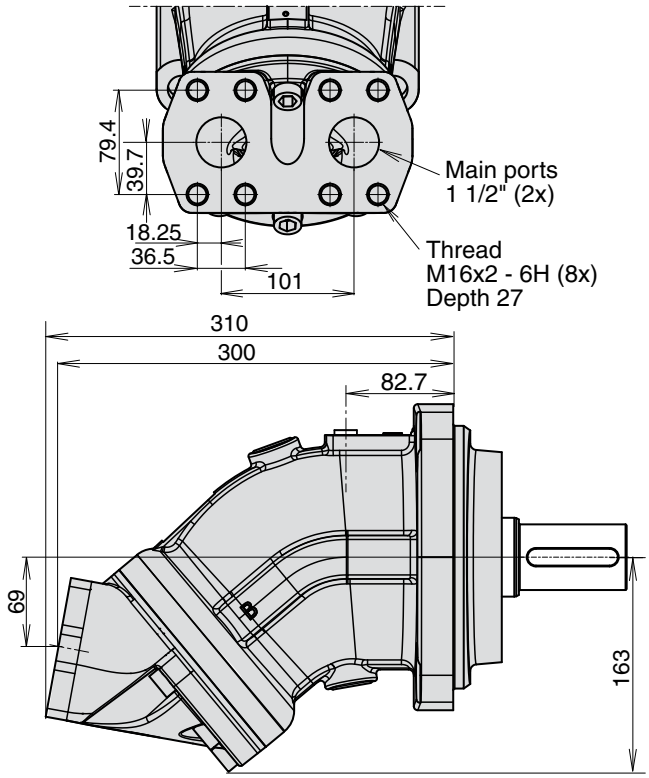


Shaft options Z and H

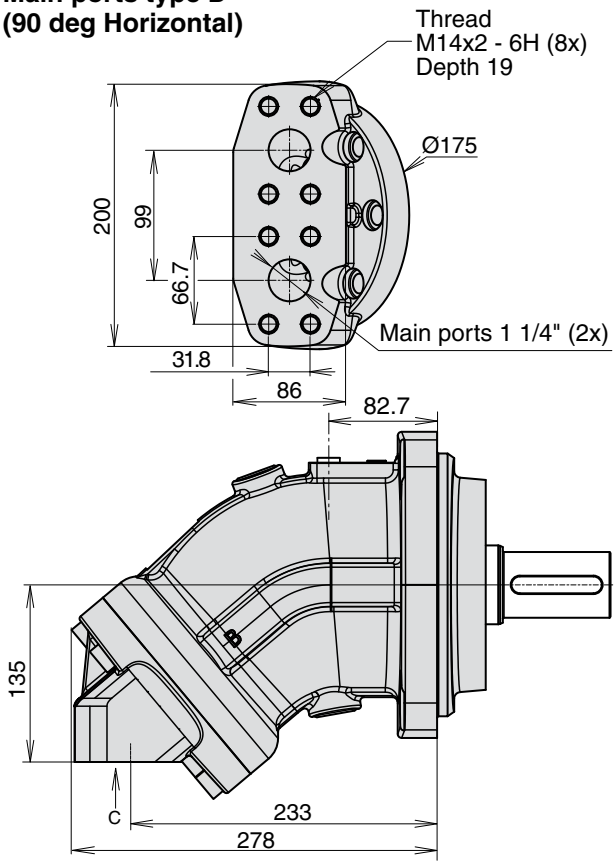


F12-152, -162 and -182
(ISO versions)

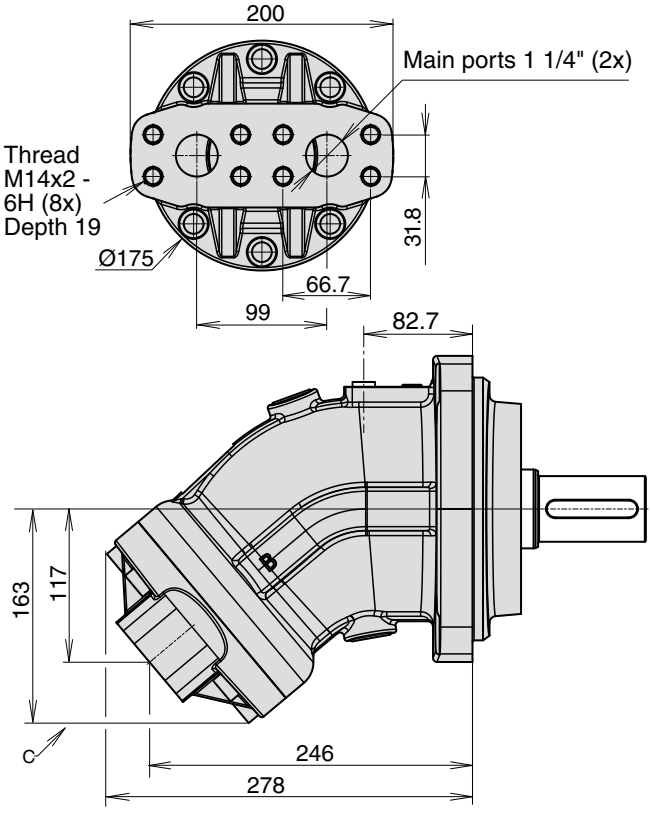
Main ports type A (180 deg Vertical)



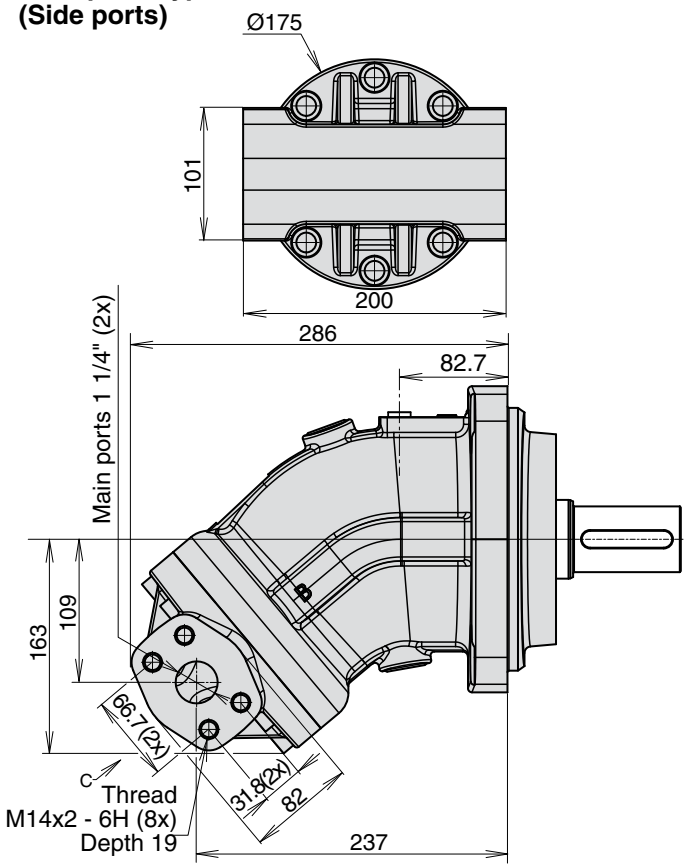
Main ports type D (90 deg Horizontal)



Main ports type K (40 deg rear)



Main ports type M (Side ports)



3

Dim.	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 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	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	M10 x20	M10 x20	M10 x20	M12 x22	M14 x26
C thread	M14 x1.5	M14 x1.5	M14 x1.5	M14 x1.5	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

3

Spline shaft (DIN 5480)

	Type **C** (standard)	Type **B** (optional)
F12-30	W30x2x14x9g	-
-40	W30x2x14x9g	-
-60	W30x2x14x9g	W35x2x16x9g
-80	W40x2x18x9g	-
-90	W40x2x18x9g	-
-110	W40x2x18x9g	W45x2x21x9g
-125	W40x2x18x9g	W45x2x21x9g

Key shaft

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

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

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)]	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

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**)	$^3/_8$"-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** (opt.)	**F** (optional)
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,12/24DP[3)]	SAE 'D' 13T, 8/16 DP
-90	SAE 'C-C' 17T, 12/24 DP	SAE 'C' 14T,12/24DP[3)]	SAE 'D' 13T, 8/16 DP
-110	SAE 'D' 13T, 8/16 DP	-	-
-125	SAE 'D' 13T, 8/16 DP	-	-

Main ports A and B, type U (optional)

F12-30	$1\ ^1/_{16}$" - 12 UN[3)]
F12-40	$1\ ^5/_{16}$" - 12 UN[3)]
F12-60	$1\ ^5/_{16}$" - 12 UN[3)]
F12-80	$1\ ^5/_{16}$" - 12 UN[3)]
F12-90	$1\ ^5/_{16}$" - 12 UN[3)]
F12-110	$1\ ^5/_8$" - 12 UN[3)]
F12-125	$1\ ^5/_8$" - 12 UN[3)]

Key shaft (SAE J744)

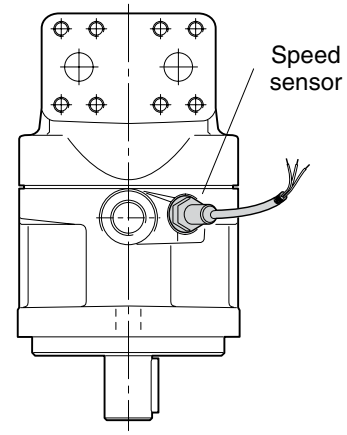
F12	**T** (standard)	**R** (optional)	**V** (optional)
-30	SAE 'B-B' (Ø25.4 mm/1")	-	32-3
-40	SAE 'C' (Ø31.75 mm/$1^1/_4$")	-	38-3
-60	SAE 'C' (Ø31.75 mm/$1^1/_4$")	-	44-3
-80	SAE 'C-C' (Ø38.1 mm/$1^1/_2$")	SAE 'D' (Ø44.45 mm/$1^3/_4$")	-
-90	SAE 'C-C' (Ø38.1 mm/$1^1/_2$")	SAE 'D' (Ø44.45 mm/$1^3/_4$")	-
-110	SAE 'D' (Ø44.45 mm/$1^3/_4$")	-	44-3
-125	SAE 'D' (Ø44.45 mm/$1^3/_4$")	-	44-3

Parker Hannifin
Pump & Motor Division Europe
Trollhättan, Sweden

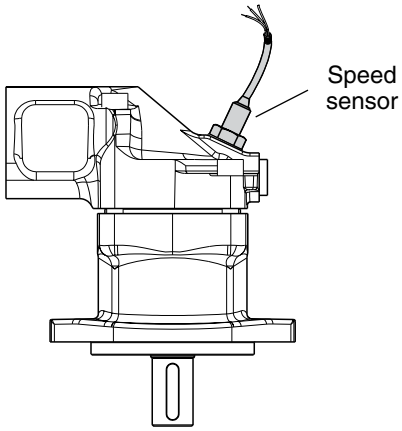
A wide range of speed sensor kits are available for series F11/F12.

The sensors are ferrostat differential (Hall-effect) 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 square wave signal within a frequency range of 0 Hz to 15 kHz.

NOTE: - All F12 are prepared for speed sensor as standard, but F11 series must be specified in the ordering code refer to pages 12-14 (F11)
- **On F11 the pistons position must be known before mounting.**
- The speed sensor is also shown in the illustrations on pages 17 to 37 and 46 to 59.



F12 with speed sensor.



F11-14 with speed sensor.

Order number	Electronic	Signals	Installation	Connector	Cable lenght	Installation instruction
3785190	NPN	2	M12*1 adjustable	Free leads	1000 mm	MSG30-8301-INST
3722481	NPN	2	M12*1 adjustable	M12 4 pin	260 mm	MSG30-8303-INST
3722480	NPN	1	M12*1 adjustable	AMP 3 pin	338 mm	MSG30-8304-INST

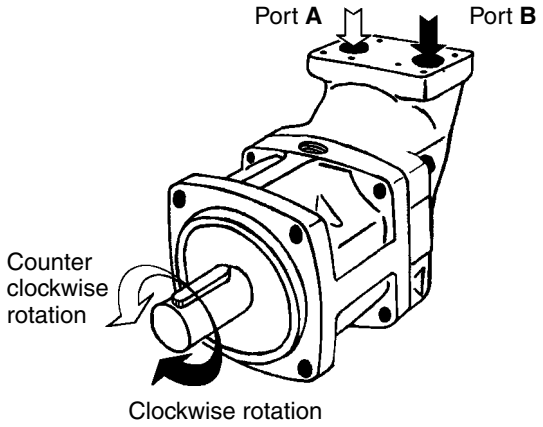
Direction of rotation

The motor versions are bi-directional.

The pump versions are uni-directional, allowing higher selfpriming speeds (refer to pages 9, 11 and 40, 42).

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 operat-ing conditions) and synthetic fluids may also be suitable.

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 pages 11 and 42.

5

Operating temperature

The following temperatures should not be exceeded (type **V** FPM shaft seals):
Main circuit 80 °C
Drain circuit: 115 °C.
NBR shaft seals (type **N)** can be used to 90 °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 Parker Hannifin for further information.

Maximum Power

Corner power is the theoretical maximum power of a hydraulic machine, calculated by its maximum torque and maximum speed. In practice, calculated corner power is of no use as hydraulic machines are not intended to be run at maximum torque and maximum speed simultaneously. Maximum power that a F11/F12 motor can run at depends on ambient temperature, fluid temperature, viscosity, rate of power increase, flushing capacity.
Please contact Parker Hannifin for further information

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
F12-152/162/182	2200	10 - 20
F12-250	1800	12 - 22

Viscosity
The ideal operating range is15 to 30 mm^2/s [cSt].
At operating temperature, the viscosity (of the drain fluid) should be kept above 8 mm^2/s [cSt].
At start-up, the viscosity should not exceed 1000 mm^2/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 table below shows recommended case pressure as a function of shaft speed.

Shaft speed	[rpm]	1500	3000	4500	6000	max
F11-5, -6, -10, -12, -14, -19	[bar]	0.5 - 10	0.5 - 7.0	1.0 - 5.0	2.0 - 5.0	3.0 - 5.0
F12-30, -40, -60, -80, -90	[bar]	0.5 - 8	0.5 - 6.0	1.0 - 4.5	2.0 - 4.0	-
F12-110, -125, -152, -162, -182, -250	[bar]	0.5 - 6	1.0 - 4.0	2.0 - 4.0	-	-

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

To secure correct case pressure and lubrication, a spring loaded check valve, 1-3 bar, in the drain line (shown on next page) is recommended.

Note.
Contact Parker Hannifin for information when operating at high speeds.

Required inlet pressure

The motor may operate as a pump under certain conditions.

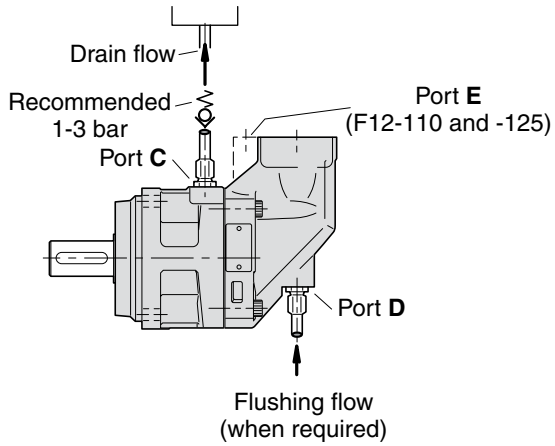
When this occurs, a minimum pressure must be maintained at the inlet port; increased noise and gradually deteriorating performance due to cavitation may otherwise be experienced.

A 15 bar inlet pressure, measured at the motor inlet port, satisfies most operating conditions.

Contact Parker Hannifin for more specific information on inlet pressure requirements.

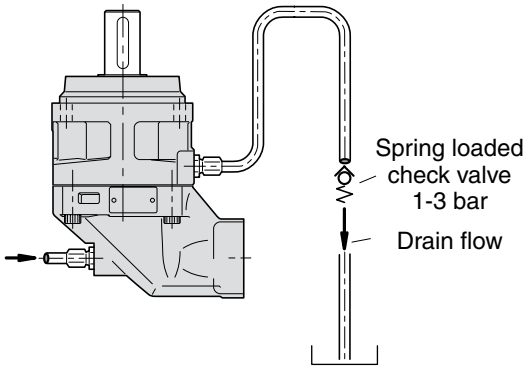
Case drain connections
Series F11/F12 have two drain ports, **C** and **D**, while F12-110 and -125 have an additional port, **E**.

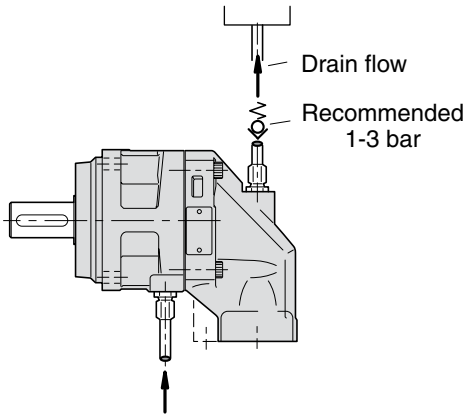
The uppermost drain port (such as port C in the illustration below) should always be utilized.

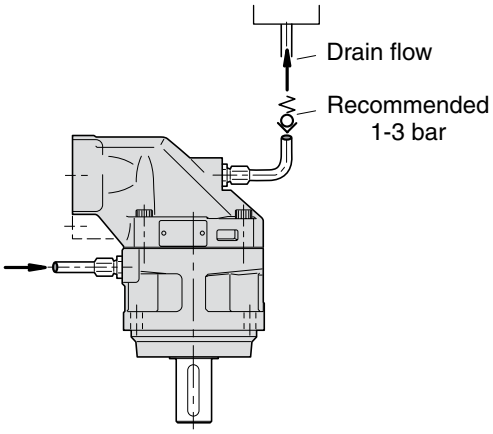


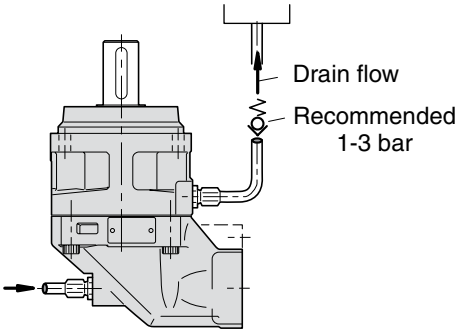
In mounting positions such as 'shaft up' (below) a spring loaded check valve should be installed in the drain line in order to insure a sufficiently high oil level in the case.

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.