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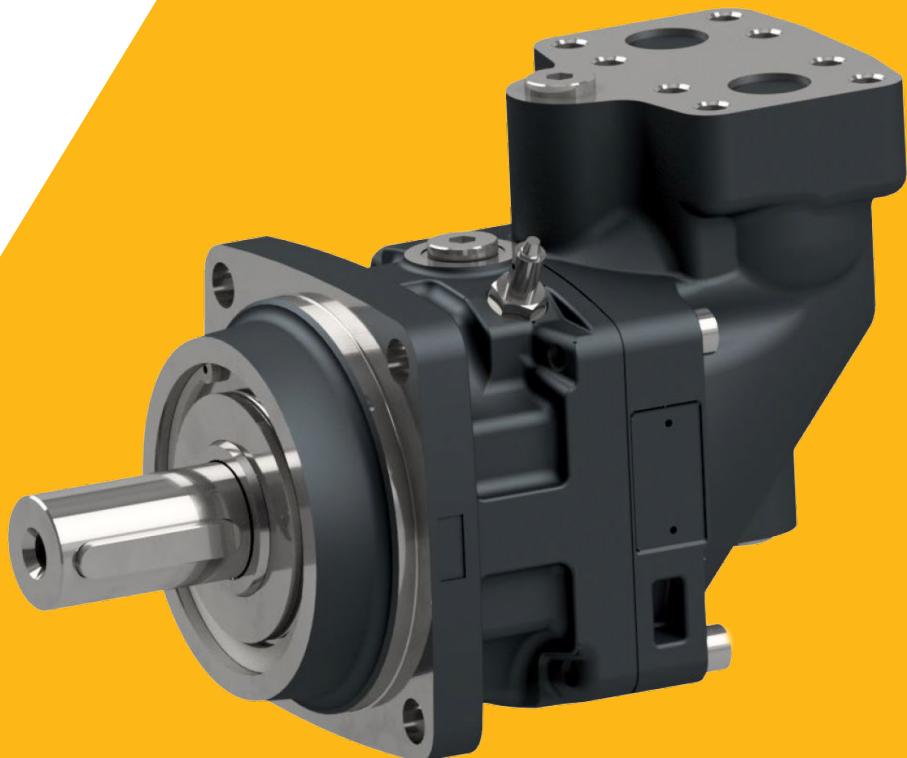
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100% GENUINE
MADE IN SWEDEN



**2025
DISTRIBUTOR
OF THE YEAR**



**SERIES F12-110
HYDRAULIC MOTOR/PUMP**

Fixed Displacement





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INVENTORY STATUS

[CHECK PRICING](#)

Unit Availability	
Parts Availability	
Ability to Solve Problems	

FEATURES

F12-110 is a bent-axis, fixed displacement motor/pump. It can be used in numerous applications in both open and closed loop circuits.

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

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SPECIFICATIONS

Displacement [cm ³ /rev]	110.1
	[cu in/rev]
Operating pressure ³⁾	
max intermittent ¹⁾ [bar]	480
	[psi]
max continuous [bar]	420
	[psi]
Motor operating speed ³⁾ [rpm]	
max intermittent ¹⁾	4800
max continuous	4400
min continuous	50
Max pump selfpriming speed ²⁾	
L or R function; max [rpm]	2000
Motor input flow	
max intermittent ¹⁾ [l/min]	528
	[gpm]
max continuous [l/min]	484
	[gpm]
Drain temperature ³⁾ , max [°C]	115
	min [°C]
Theoretical torque at 100 bar [Nm]	174.8
	[lbf ft]
Mass moment of inertia	
(x10 ⁻³) [kg m ²]	11.2
(x10 ⁻²) [lbf ft ²]	26.58
Weight [kg]	33
	[lb]
	72.6

F12 Pump version

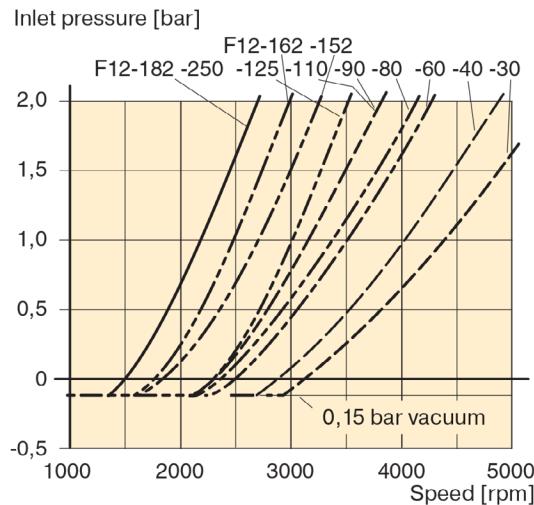


Diagram 2. Min. required pump (F12-L or -R) inlet press.

¹⁾ Intermittent: max 6 seconds in any one minute.

²⁾ Selfpriming speed valid at sea level.

³⁾ See also installation information.

SELFPRIMING SPEED & REQUIRED INLET PRESSURE

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.

The diagrams below show 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.

F12 Motor version

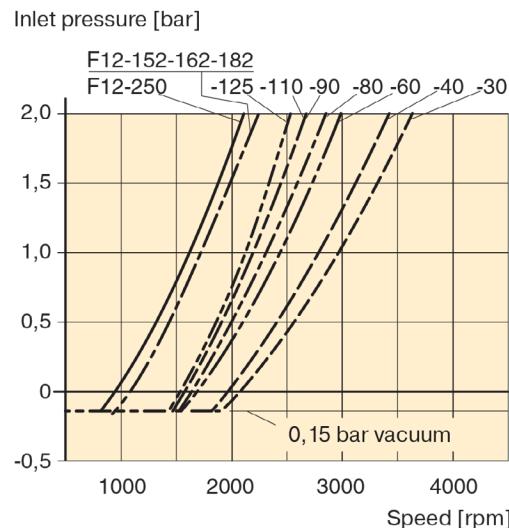


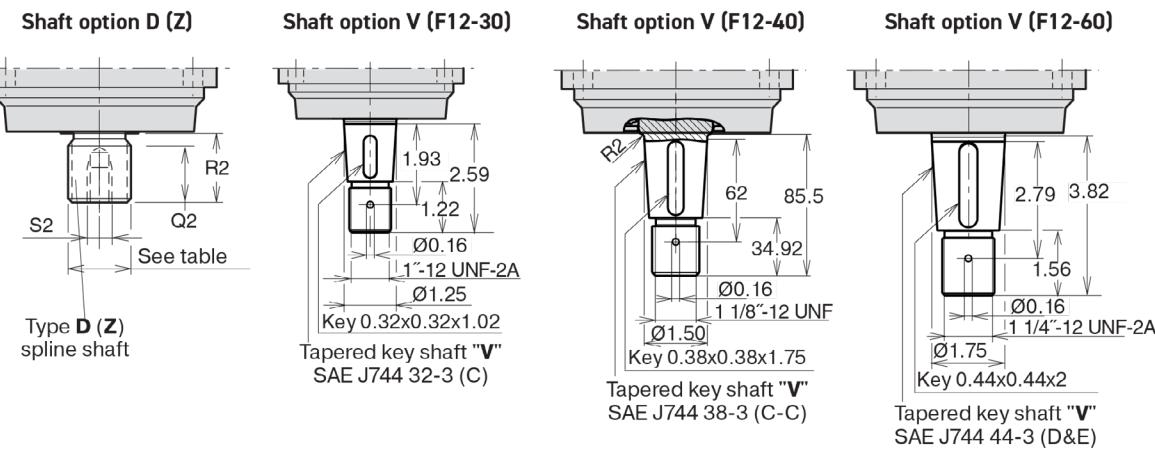
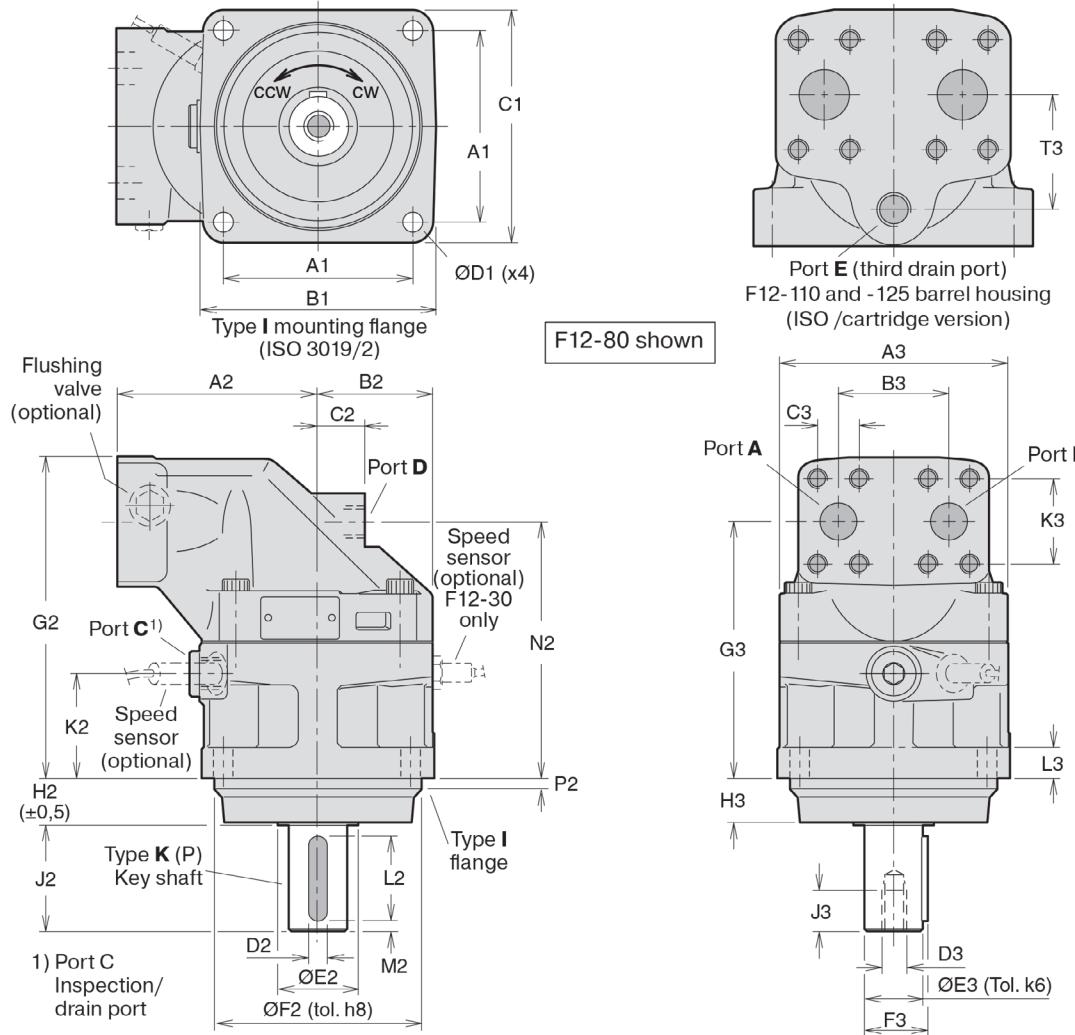
Diagram 3. Min. required motor (F12-M) inlet pressure.

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F12-110 INSTALLATION DIMENSIONS



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Dim.	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A1	3.48	4.46	4.46	5.01	5.57
B1	4.65	5.75	5.75	6.22	7.09
C1	4.65	5.59	5.67	6.10	7.09
D1	0.43	0.53	0.53	0.53	0.71
A2	3.94	4.33	4.92	5.32	5.71
B2	2.32	2.56	2.76	3.05	3.35
C2	0.98	1.02	0.87	1.26	1.50
D2	0.98	1.02	0.87	1.26	1.50
E2	1.38	1.77	1.77	2.17	2.36
F2	3.94	4.92	4.92	5.51	6.3
G2	6.77	6.81	7.48	8.50	9.09
H2	1.00	1.28	1.28	1.28	1.59
J2	1.97	2.36	2.36	2.76	3.23
K2	2.16	2.05	2.13	2.76	2.61
L2	1.58	1.97	1.97	2.21	2.76
M2	0.20	0.20	0.20	0.28	0.24
N2	5.37	5.39	6.06	6.79	7.05
P2	0.32	0.32	0.32	0.32	0.32
Q2	1.10	1.10	1.30	1.42	1.61
R2 ¹⁾	1.38	1.38	1.57	1.77	1.97
R2 ²⁾	1.69	1.38	1.38	1.38	1.77
S2 ¹⁾	M12 x0.94	M12 x0.94	M12 x1.10	M12 x1.42	M12 x1.42
S2 ²⁾	no thread	M12 x0.94	no thread	M12 x1.10	M12 x1.42
A3	4.80	5.28	5.67	6.10	6.69
B3	2.60	2.60	2.60	2.95	3.29
C3	0.937	0.937	0.937	1.094	1.250
D3	M12	M12	M12	M16	M16
E3	1.18	1.18	1.37	1.58	1.77
F3	1.30	1.30	1.50	1.69	1.91
G3	5.37	5.39	6.06	6.79	7.05
H3	0.93	1.20	1.20	1.20	1.52
J3	0.95	09.5	1.10	1.42	1.42
K3	2.000	2.000	2.000	2.250	2.626
L3	0.71	0.79	0.79	0.79	0.87
T3	-	-	-	-	2.68

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 x0.79	M10 x0.79	M10 x0.79	M10 x0.79	M14 x1.02
C thread ^{**)}	M22 x0.06	M22 x0.06	M22 x0.06	M22 x0.06	M22 x0.06
D thread ^{**)}	M18 x0.06	M18 x0.06	M22 x0.06	M22 x0.06	M22 x0..06
E thread	-	-	-	-	M22 x10.06

A, B: ISO 6162

*) Metric thread x depth in mm

**) Metric thread x pitch in mm.

Spline shaft (DIN 5480)

	Type D (std)	Type A (opt.)	Type Z (opt.)
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	Ø1.18	Ø0.98 ³⁾	-	32-3
-40	Ø1.18	-	Ø1.37	38-3
-60	Ø1.38	-	-	44-3
-80	Ø1.57	-	-	-
-90	Ø1.57	-	-	-
-110	Ø1.77	-	-	-
-125	Ø1.77	-	-	-

1) Spline shaft type D

2) Spline shaft type Z

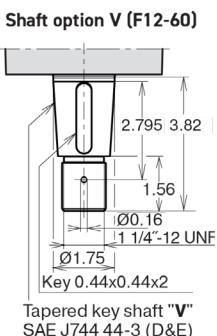
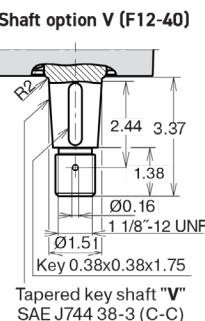
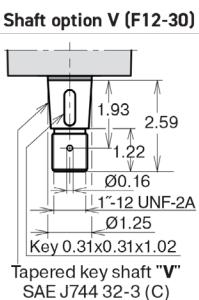
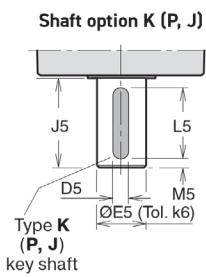
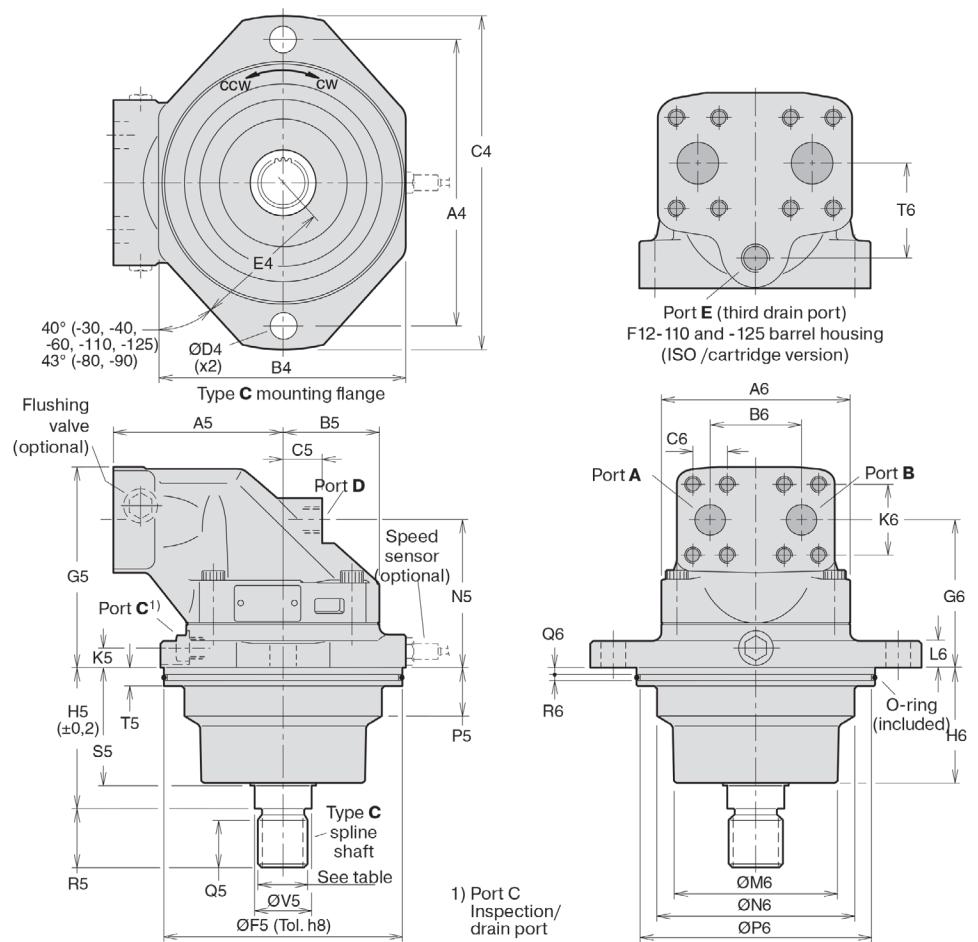
3) Max operating pressure 350 bar

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F12-110 CARTRIDGE VERSION



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Dim.	F12-30	F12-40	F12-60	F12-80 F12-90	F12-110 F12-125
A4	6.30	7.87	7.87	8.82	9.84
B4	5.51	6.46	6.46	7.72	8.11
C4	7.40	9.25	9.25	10.24	11.26
D4	0.55	0.71	0.71	0.87	0.87
E4	3.03	3.74	3.74	4.33	4.54
A5	3.94	4.33	4.92	5.31	5.71
B5	2.32	2.56	2.76	3.05	3.35
C5	0.98	1.02	0.87	1.26	1.50
D5	0.31	0.31 ¹⁾ 0.39 ²⁾	0.39	0.47	0.55
E5	1.18	1.18 ¹⁾ 1.38 ²⁾	1.38	1.58	1.77
F5	5.32	6.30	6.30	7.48	7.87
G5	5.00	5.24	5.75	6.18	6.89
H5	3.50	3.63	3.63	4.35	4.38
J5	1.97	2.36	2.36	2.76	3.23
K5	0.55	0.63	0.59	0.59	0.59
L5	1.57	1.97	1.97	2.20	2.76
M5	0.20	0.20	0.20	0.28	0.24
N5	3.58	3.82	4.33	4.49	4.84
P5	0.87	1.18	1.22	1.57	1.57
Q5	1.10	1.10	1.10	1.46	1.46
R5	1.38	1.38	1.38	1.77	1.77
S5	2.78	2.83	2.99	3.58	3.77
T5	0.59	0.59	0.59	0.59	0.59
V5	1.30	1.38	1.38	1.77	1.77
A6	4.80	5.28	5.67	6.10	6.69
B6	2.60	2.60	2.60	2.95	3.27
C6	0.94	0.94	0.94	1.09	1.25
G6	3.6	3.82	4.33	4.49	4.84
H6	2.74	2.80	2.91	3.52	3.69
K6	2.00	2.00	2.00	2.25	2.63
L6	0.63	0.71	0.71	0.79	0.79
M6	3.62	4.53	4.53	5.12	5.51
N6	4.33	5.00	5.31	6.06	6.30
P6	5.05	6.03	6.03	7.24	7.61
Q6	0.20	0.20	0.20	0.20	0.20
R6	0.20	0.20	0.20	0.20	0.20
T6	-	-	-	-	2.68

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 x0.79	M10 x0.79	M10 x0.79	M10 x0.79	M14 x1.02
C thread	M14 x0.06	M14 x0.06	M14 x0.06	M14 x0.06	M14 x0.06
D, E thread	M18 x0.06	M18 x0.06	M22 x0.06	M22 x0.06	M22 x0.06

A, B: ISO 6162

Spline shaft (DIN 5480)

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

Key shaft

	Type K (std)	Type P, J (opt.)	Type V (opt.)
F12-30	Ø1.18	Ø0.98 (P)	32-3
-40	Ø1.18	Ø1.38 (J)	38-3
-60	Ø1.38	-	44-3
-80	Ø1.57	-	-
-90	Ø1.57	-	-
-110	Ø1.77	-	-
-125	Ø1.77	-	-

O-ring dimensions

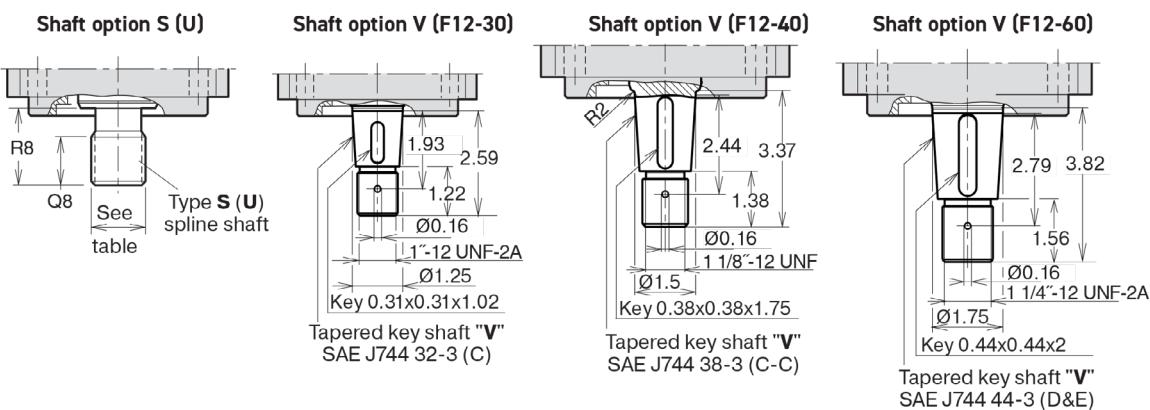
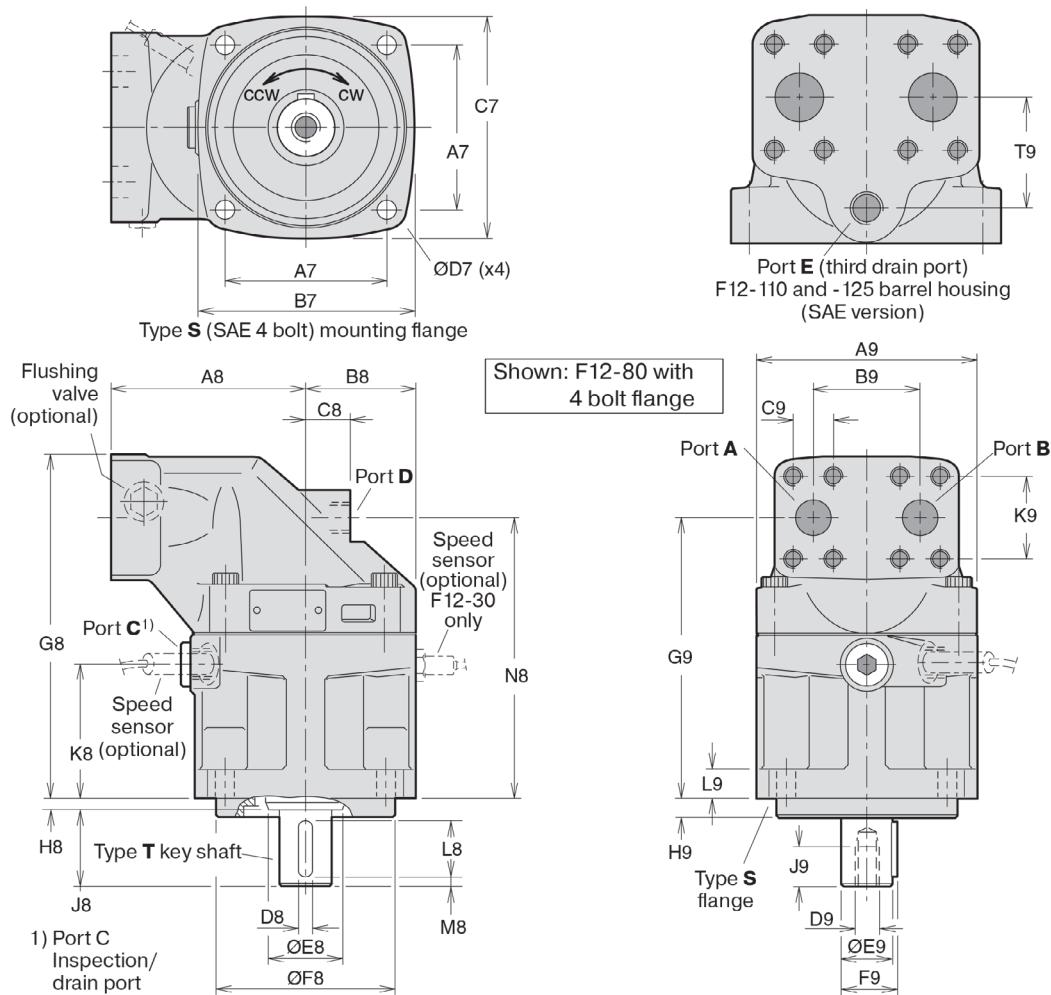
F12-30	127x4
-40	150x4
-60	150x4
-80	180x4
-90	180x4
-110	190x4
-125	190x4

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F12-110 SAE VERSION WITH 4 BOLT FLANGE



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Dim.	F12-30	F12-40	F12-60	F12-80	F12-110
	F12-90	F12-125			
A7	3.54	4.51	4.51	4.51	6.36
B7	4.65	5.83	5.83	6.10	8.03
C7	4.65	5.67	5.67	6.10	7.87
D7	0.55	0.55	0.55	0.55	0.83
A8	3.94	4.33	4.92	5.31	5.71
B8	2.32	2.56	2.76	3.05	3.35
C8	0.98	1.02	0.87	1.26	1.50
D8	0.25	0.31	0.31	0.38	0.44
E8	1.38	1.77	1.77	2.16	2.36
F8	4.00/ 3.99	5.00/ 4.99	5.00/ 4.99	5.00/ 4.99	6.00/ 5.99
G8	7.46	7.76	8.43	9.45	10.39
H8	0.31	0.31	0.31	0.31	0.31
J8	1.50	1.89	1.89	2.13	2.64
K8	2.83	2.99	3.11	3.74	3.90
L8	1.25	1.50	1.50	1.75	2.13
M8	0.10	0.16	0.16	0.16	0.29
N8	6.04	6.34	7.02	7.76	8.35
Q8 ¹⁾	1.02	1.06	1.06	1.14	1.54
Q8 ²⁾	-	-	-	0.91	-
R8 ¹⁾	1.30	1.89	1.89	2.13	2.63
R8 ²⁾	-	-	-	1.88	-
A9	4.80	5.28	5.67	6.10	6.69
B9	2.60	2.60	2.60	2.95	3.27
C9	0.94	0.94	0.94	1.09	1.25
D9*	5/16"-24	3/8"-24	3/8"-24	1/2"-20	5/8"-18
E9	1.00/ 0.99	1.25/ 1.25	1.25/ 1.25	1.50/ 1.49	1.75/ 1.75
F9	1.11	1.39	1.39	1.50	1.75
G9	6.06	6.34	7.02	7.76	8.35
H9	0.38	0.50	0.50	0.50	0.50
J9	0.63	0.75	0.75	1.02	1.26
K9	2.00	2.00	2.00	2.25	2.63
L9	0.71	0.79	0.79	0.79	0.87
T9	-	-	-	-	2.68

* UNF-2B thread

1)Spline shaft type **S**

2)Spline shaft type **U**

3)Max operating pressure 350 bar

Main ports A and B, type U (optional)	
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⁾

Ports	F12-30	F12-40	F12-60	F12-80	F12-110
	F12-90	F12-125			
A, B size	3/4"	3/4"	3/4"	1"	1 1/4"
Screw thread ^{**)}	3/8"-16 x0.87	3/8"-16 x0.79	3/8"-16 x0.87	7/16"-14 x1.06	1/2"-13 x0.98
C thread	7/8"-14	7/8"-14	7/8"-14	7/8"-14	1 1/16"-12
D thread	3/4"-16	3/4"-16	7/8"-14	7/8"-14	1 1/16"-12
E thread	-	-	-	-	1 1/16"-12

A, B: ISO 6162 C, D, E: O-ring boss (SAE J514)

**) UN thread x depth in mm.

Mounting flange (SAE J744)

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

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

	S (standard)	U (optional)	F (optional)
F12-30	SAE 'B' 13T, 16/32 DP	-	-
-40	SAE 'C' 14T, 12/24 DP	-	-
-60	SAE 'C' 14T, 12/24 DP	-	-
-80	SAE 'C-C' 17T, 12/24 DP	SAE 'C' 14T, 12/24 DP ³⁾	SAE 'D' 13T, 8/16 DP
-90	SAE 'C-C' 17T, 12/24 DP	SAE 'C' 14T, 11/24 DP ³⁾	SAE 'D' 13T, 8/16 DP
-110	SAE 'D' 13T, 8/16 DP	-	-
-125	SAE 'D' 13T, 8/16 DP	-	-

Key shaft (SAE J744)

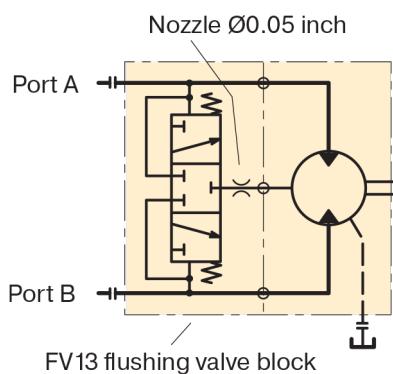
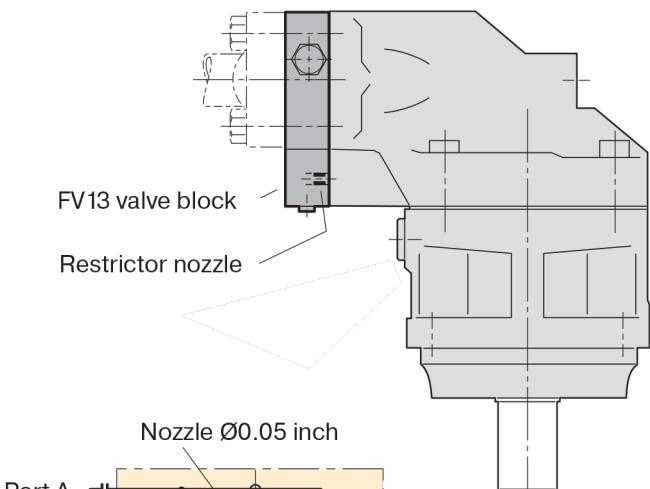
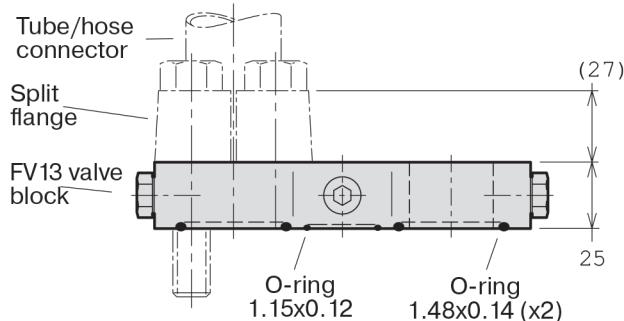
F12	T (standard)	R (optional)	V (optional)
-30	SAE 'B-B' (Ø25.4 mm/1")	-	32-3
-40	SAE 'C' (Ø31.75 mm/1 1/4")	-	38-3
-60	SAE 'C' (Ø31.75 mm/1 1/4")	-	44-3
-80	SAE 'C-C' (Ø38.1 mm/1 1/2")	SAE 'D' (Ø44.45 mm/1 3/4")	-
-90	SAE 'C-C' (Ø38.1 mm/1 1/2")	SAE 'D' (Ø44.45 mm/1 3/4")	-
-110	SAE 'D' (Ø44.45 mm/1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

FV13 FLUSHING VALVE BLOCK

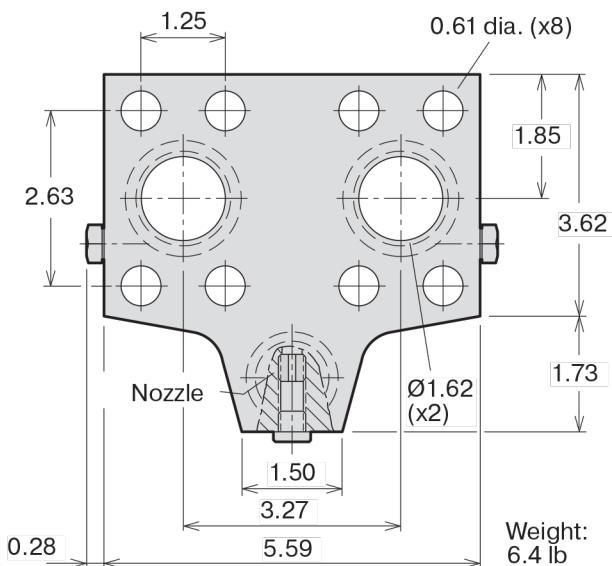
The FV13 for the F10-125/F12-110/-125 motor has the same function as the integrated flushing valve for the other F12 frame sizes. The valve block mounts between the motor port flange and the split-flange tube/hose connectors utilizing 'long' mounting screws (screw size M14x75 or 1/2"-13 UNC based on 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.

FV13 installation



Hydraulic schematic.



FV13 RESTRICTOR NOZZLES

When required, a nozzle is utilized to restrict the flow through the 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 following table lists currently available nozzles and the corresponding FV13 ordering code designation.

Designation	Flushing valve Part number	Orifice size [inch]
L000 no nozzle	3780292	
L130 (std.)	3795623	0.05

SR PRESSURE RELIEF ANTI-CAVITATION VALVE

The SR pressure relief/make-up valve block for series F10/12 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 3 sizes:

- 1 3/4" for F10-30, -37, -56, -80 and F12-30 -40 -60
- 2 1" for F10-90, -107 and F12-80, -90
- 3 1 1/4" for F10-125 and **F12-110**, -125

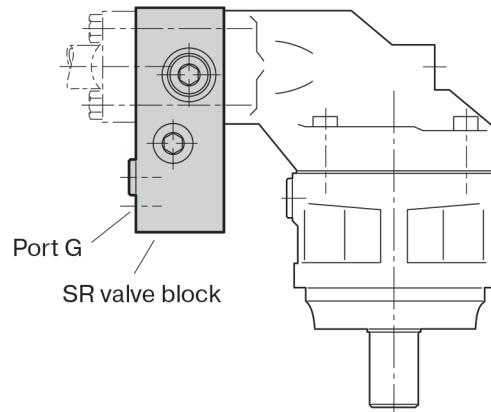
The SR valve block consists of a housing containing two high pressure relief cartridges and two separate check valves for anti-cavitation. Cartridges are available in non-adjustable pressure settings between 280 and 420 bar (4 000 and 6000 psi respectively).

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.

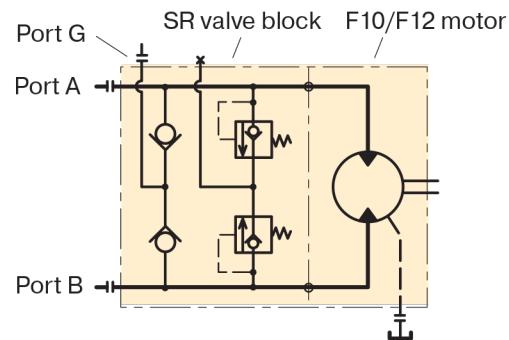
To prevent this, the G port should be pressurized.

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, 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.

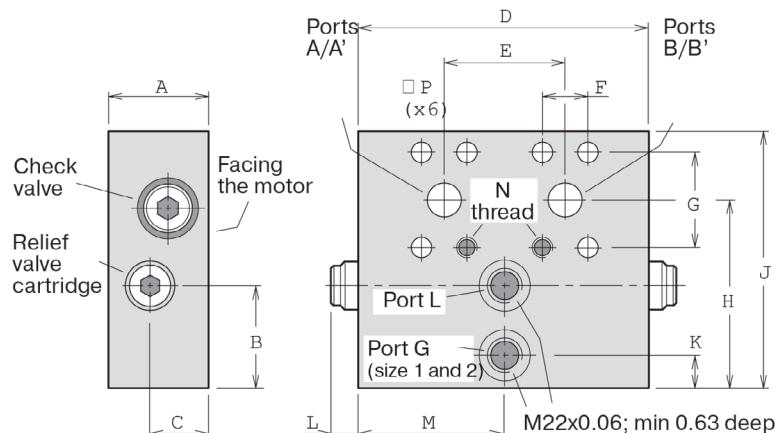
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SR PRESSURE RELIEF ANTI-CAVITATION VALVE

Dimensions

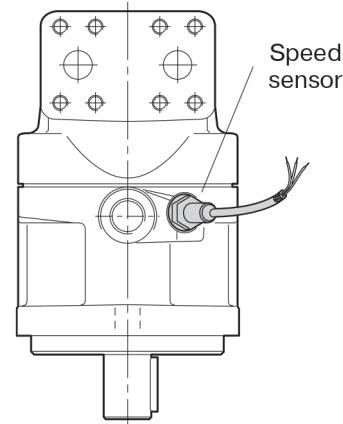


Dim. [mm]	Size 1 ($\frac{3}{4}$ "")	Size 2 (1")	Size 3 (1 $\frac{1}{4}$ ")
A	2.17	2.24	2.24
B	2.17	2.17	0.98
C	1.26	1.26	1.02
D	6.18	6.30	6.30
E	2.60	2.95	3.27
F	0.94	1.09	1.25
G	2.00	2.25	2.63
H	4.06	4.29	3.46
J	5.51	5.91	5.31
K	0.71	0.71	-
L	0.71	0.71	0.71
M	3.09	3.15	-
N	M10 x0.71	M12 x0.79	M14 x0.91
P	0.43	0.51	0.61

Weight [lb]	Size 1 ($\frac{3}{4}$ "")	Size 2 (1")	Size 3 (1 $\frac{1}{4}$ ")
16.3	20.1	18.8	

SPEED SENSOR KITS

The sensors are ferrostat differential (Hall-effect) On F12 the speed sensor is directed towards the ring gear.



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BLA BOOST UNITS

The BLA boost unit simplifies the building of closed or semiclosed hydrostatic transmissions.

- **Replaces conventional charge pump and corresponding valves in many applications**

- **Allows pump speeds above normal selfpriming speed**
- **Suitable for system flow rates to 400 l/min (106 US gpm)**
- **Includes filter**
- **Simple construction – no moving/wear parts**
- **Cost-effective installation**
- **Small tank size**
- **Helps in building a low-cost hydrostatic transmission.**

In a closed circuit hydrostatic transmission, a charge pump is normally included with the main pump, providing make-up fluid which replaces pump and motor volumetric losses. It also maintains sufficient pump inlet pressure to avoid cavitation.

The BLA boost unit replaces the charge pump in many applications, when the following conditions are met:

- The max-to-min pump flow ratio does not exceed 2:1
- System pressure changes gradually without frequent and pronounced pressure peaks
- The line length between pump and boost unit is relatively short.

There are two basic sizes of the BLA boost unit:

- BLA 4 (to 160 l/min (42 uS gpm) pump flow)
- BLA 6 (to 400 l/min (106 uS gpm) pump flow)

The main part of the unit is an aluminium housing with a built-in nozzle and an injector; refer to the cross section to the right.

When fluid flows from the motor outlet port through the unit and to the pump inlet port, the increased fluid velocity between the nozzle and injector creates a low pressure zone causing additional fluid to be drawn from tank into the main circuit.

Also, pressure increases after the injector, allowing the pump to be operated at speeds higher than the self-priming speed. The 'boost pressure' increases with flow.

The housing includes ports that should be connected to the pump and motor drain ports respectively.

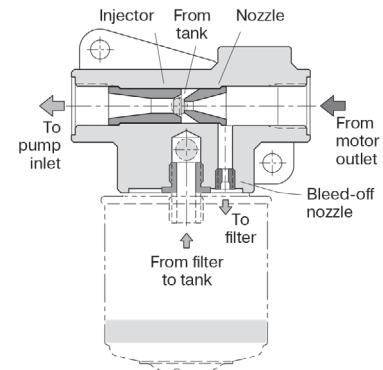
An additional bleed-off nozzle diverts approx. 10% of the main flow through the cartridge filter before being directed to the tank.

OIL COOLING

The BLA boost unit simplifies the building of closed or semiclosed hydrostatic transmissions.

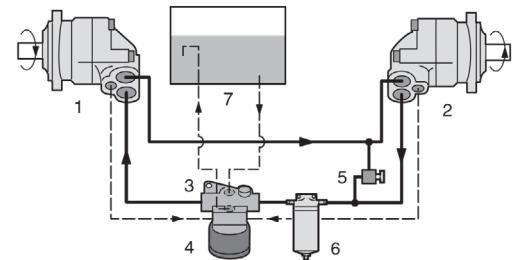
TYPICAL APPLICATIONS

- Fan drives
- Propeller drives
- Generator drives
- Pump drives



BLA boost unit cross section.

Boost unit installation



1. Pump
2. Motor
3. Boost unit (with injector and nozzle)
4. Filter cartridge
5. Pressure relief valve
6. Full-flow filter (when required)
7. Reservoir

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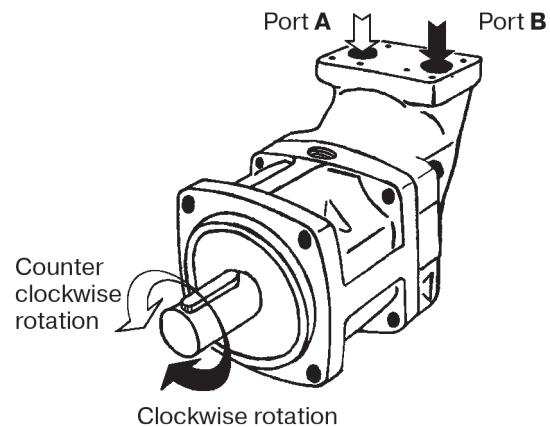
INSTALLATION INSTRUCTIONS

DIRECTION OF ROTATION

The motor versions are bi-directional. The pump versions are uni-directional, allowing higher selfpriming speeds.

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 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.

NOTE:

When operating the 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.

OPERATING TEMPERATURE

The following temperatures should not be exceeded (type V FPM shaft seals):

Main circuit 80 °C / 176 °F

Drain circuit: 115 °C / 239 °F

NBR shaft seals (type N) can be used to 90 °C / 194 °F 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.

Frame size	Speed [rpm]	Flow [l/min]	Flow [gpm]
F10-30, -37, F12-30	3500	4 – 8	1.0 - 2.1
F10-56, -80, F12-40, -60	3000	5 – 14	1.3 - 3.7
F10-90, -107, F12-80, -90	2500	8 – 16	2.1 - 4.2
F10-125, F12-110, -125	2300	9 – 18	2.4 - 4.8
F12-152, -162, -182	2200	10 – 20	2.6 - 5.2
F12-250	1800	12 – 22	3.2 - 5.8

IN SERIES OPERATION

When running the F12 in series at higher pressure levels, please contact us for further information.

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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.

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 is recommended.

Note: Contact us for information when operating at high speeds.

Shaft speed	[rpm]	1500	3000	4500	6000	max
F11-5, -6, -8, -10, -12, -14, -19	[bar]	0.5 - 10	0.5 - 7.0	1.0 - 5.0	2.0 - 5.0	3.0 - 5.0
	[psi]	7.3 - 145	7.3 - 102	14.5 - 72	29 - 72	43 - 72
F10-30, -37, -56, -80, -90, -107 F12-30, -40, -60, -80, -90	[bar]	0.5 - 8	0.5 - 6.0	1.0 - 4.5	2.0 - 4.0	-
	[psi]	7.3 - 116	7.3 - 87	14.5 - 65.3	29 - 58	-
F10-125, F12-110, -125, -152, -162, -182, -250	[bar]	0.5 - 6	1.0 - 4.0	2.0 - 4.0	-	-
	[psi]	7.3 - 87	14.5 - 58	29 - 58	-	-

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.

FILTRATION

To obtain the highest service life of the 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.

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].

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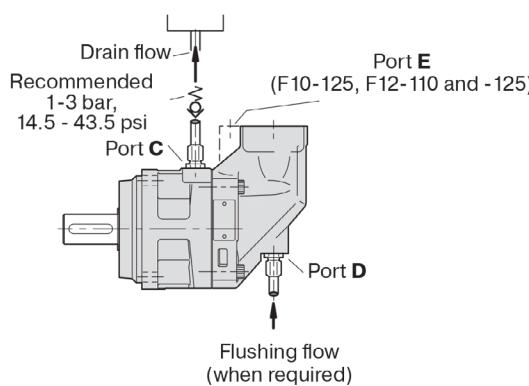
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Case drain connections

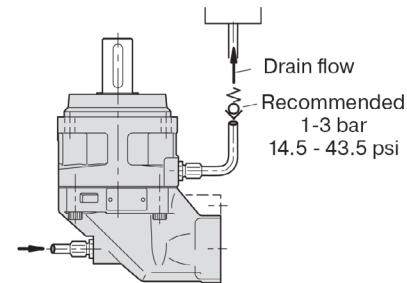
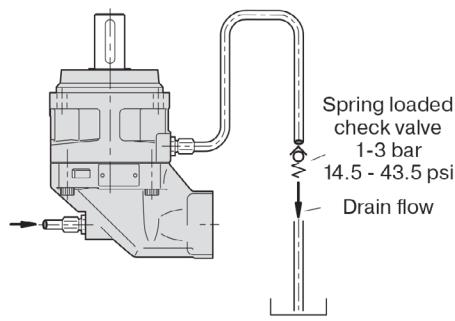
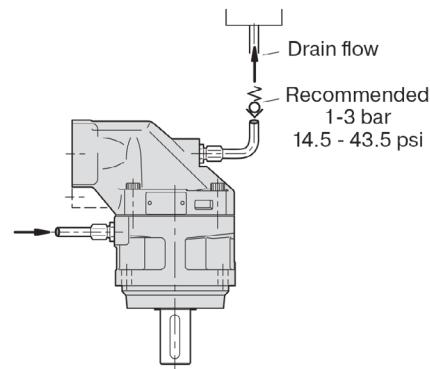
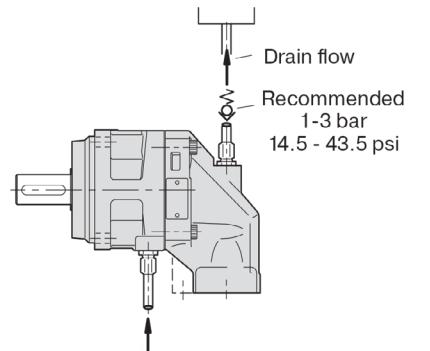
Series F10/F11/F12 have two drain ports, **C** and **D**, while F10-125, F12-110 and -125 have an additional port, **E**.

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 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 (1.6 to 3.3 ft/s), and pressure line flow speeds 3 to 5 m/s (9.8 to 16.4 ft/s).