HYDRAULIC SAW MOTOR SERIES F11/F12

Fixed Displacement

Parker

Basic formulas for hydraulic motors

Flow (q)

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

Torque (M)

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

Power (P)

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

D – displacement [cm^3/rev]

n – shaft speed [rpm]

η_v – volumetric efficiency

Δp – differential pressure [bar] (between inlet and outlet)

η_{hm} – mechanical efficiency

η_t – overall efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Basic formulas for hydraulic pumps

Flow (q)

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

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

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

D – displacement [cm^3/rev]

n – shaft speed [rpm]

η_v – volumetric efficiency

Δp – differential pressure [bar] (between inlet and outlet)

η_{hm} – mechanical efficiency

η_t – overall efficiency ($\eta_t = \eta_v \times \eta_{hm}$)

Conversion factors

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

Conversion factors

1 lb	0.454 kg
1 lbf	4.448 N
1 lbf ft	1.356 Nm
1 psi	0.068948 bar
1 US gallon	3.785 l
1 cu in	16.387 cm^3
1 in	25.4 mm
1°F	9/5°C + 32
1 hp	0.7457 kW

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If you have questions about the products contained in this catalog, or their applications, please contact:
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GENERAL INFORMATION

Introduction

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

Based on many years of experience from forestry applications, product development has been focused on helping manufacturers obtain the best possible performance from their machines. Many of our products have, therefore, been developed in direct and close cooperation with customers.

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

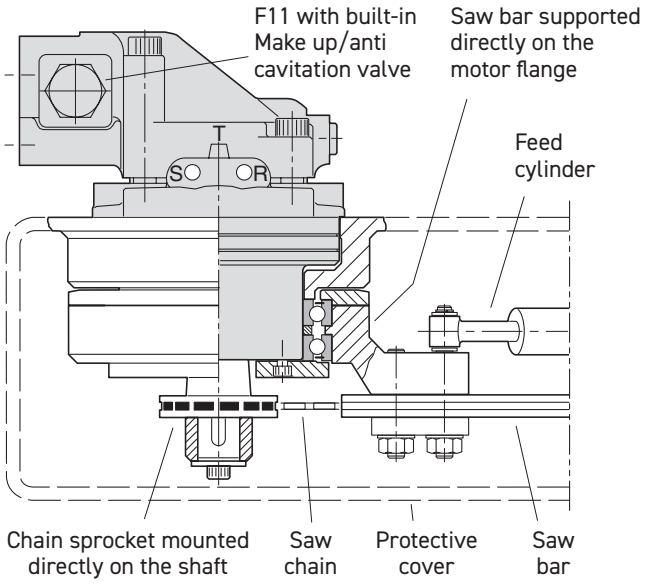
We have components such as pumps, cylinders, motors, directional control valves, remote controls and electronic equipment for most of the hydraulic functions on any forestry machine.

The optimal saw motor

Series F11/F12 motors have proven extremely reliable in demanding applications such as bar (chain) saw drives. Primarily due to the 40 degree bent-axis design, spherical, light weight pistons (with laminated piston rings) and timing gear, extremely high speeds can be allowed, and the reliability is not affected even by low-temperature start-ups.

To further enhance the saw function and, at the same time, reduce weight, cost and installation dimensions, Parker has developed a motor which is specifically dedicated to bar saws. Based on the well proven F11/F12 design, the saw motor permits saw bar bearings to be mounted directly on the motor housing, and the chain spur gear installs on the motor shaft without the need for additional bearings.

The saw flange has integrated ports for auxiliary functions.



Chain saw installation (example; F11-10 shown)

Benefits

- Simple installation – lower cost
- Sturdier saw bar support
- Lower overall weight
- Much more compact installation
- Same mounting flange installation dimensions for all sizes

TECHNICAL INFORMATION

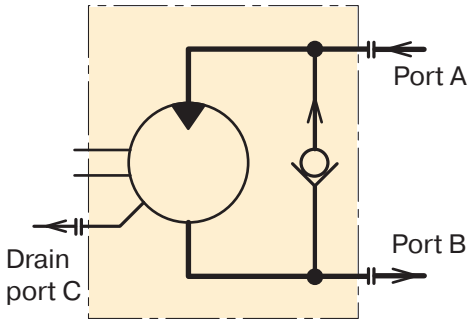
Saw motor versions

The saw motor is available in eight sizes, 6, 8, 10, 12, 14, 19, 30, 40 and 60 cm^3/rev. Motors between 6 to 30 cm^3/rev are equiped with an integrated, large capacity make-up (anti-cavitation) valve. The valve reduces the risk of cavitation when the pump supply is suddenly shut off while the motor is still running at high speed. A counter-pressure of around 10 bar (measured in port B in the exemplified schematic below) is recommended.

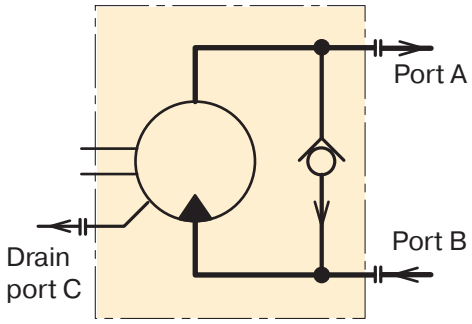
The make-up valve makes the motor directional; when ordering, either R (right hand/clockwise) or L (left hand/counter clockwise) rotation must be specified.

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

F12-030-SF-WS-X-284-**MUVL**-B0



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



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

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 F11-006, -008, -010, -012, -014, -019 and F12-030.

When to order a motor with Power Boost it is to be specified in product code. Ex below.

F12-030-SF-WS-X-284-MUVL-**B0**

SPECIFICATIONS

Frame size F11/F12	-006	-008	-010	-012	-014	-019	-030	-040	-060
Displacement [cm³/rev]	6.0	8.0	9.8	12.5	14.3	19.0	30.0	40.0	59.8
Max Operating pressure [bar]	420	420	420	420	420	420	500	480	500
Max Motor operating speed [rpm]	11200	11200	11200	10300	9900	8900	8600	6700	6400
Drain temperature[3], max [°C]	115	115	115	115	115	115	115	115	115
min [°C]	-40	-40	-40	-40	-40	-40	-40	-40	-40
Theoretical torque at 100 bar [Nm]	9.5	9.5	15.6	19.8	22.7	30.2	47.6	63.5	94.9
Mass moment of inertia ($x10^{-3}$) [kg m²]	0.39	0.39	0.39	0.40	0.42	1.1	1.7	2.9	5.0
Weight [kg]	7.5	7.5	7.5	8.2	8.3	11	12	16.5	21

3) See also installation information. Page 14

Chain		**0.404"**	**Chain speed 40 m/s**								
Sprocket	**No of teeth**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Motor speed	**rpm**	**10700**	**9800**	**9000**	**8400**	**7850**	**7350**	**6900**	**6550**	**5900**	**5350**
F11-006	l/min	66	60	55	51	–	–	–	–	–	–
F11-008	l/min	88	81	74	69	–	–	–	–	–	–
F11-010	l/min	107	98	90	84	–	–	–	–	–	–
F11-012	l/min	–	125	115	107	100	–	–	–	–	–
F11-014	l/min	–	143	131	123	115	–	–	–	–	–
F11-019	l/min	–	–	174	163	152	143	134	–	–	–
F12-030	l/min	–	–	–	–	240	225	211	201	181	164
F12-040	l/min	–	–	–	–	–	–	–	267	241	218
F12-060	l/min	–	–	–	–	–	–	–	–	360	326

Chain		3/4"	Chain speed 30 m/s				
Sprocket	No of teeth	7	8	9	10	11	12
Motor speed	rpm	6500	5700	5050	4550	4150	3800
F12-030	l/min	199	174	155	139	127	116
F12-040	l/min	265	233	206	186	169	155
F12-060	l/min	–	348	308	278	253	232

ORDERING CODES

Serie
F11
F12

Frame size	
Code	Displacem. (cm^3/rev)
006*	6.0
008*	8.0
010*	9.8
012*	12.5
014*	14.3
019*	19.0
030**	30.0
040**	40.0
060**	59.8

* F11
** F12

Version number
(assigned for special versions)

Frame size		6	8	10	12	14	19	30	40	60
Code	Function									
M	Motor	x	-	-	-	-	-	-	-	-
S	Motor, high speed	-	x	x	x	x	x	x	x	x

Frame size		6	8	10	12	14	19	30	40	60
Code	Main ports									
B	BSP threads	x	x	x	x	x	x	-	-	-
F	Metric SAE 6000 psi flange	-	-	-	-	-	-	x	x	x

Frame size		6	8	10	12	14	19	30	40	60
Code	Mounting flange									
C	CETOP / Cartridge	x	x	x	x	x	x	x	x	x
W	Saw motor flange	x	-	-	x	x	-	x	-	-
X	Saw motor flange	-	x	x	x	-	x	-	x	-

Frame size		6	8	10	12	14	19	30	40	60
Code	Option									
0000	Standard	x	x	x	x	x	x	x	x	x
MUVR	Make up/Anti cavitation valve clockwise rotation	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-	-
MUVL	Make up/Anti cavitation valve counter clockwise rotation	(x)	(x)	(x)	(x)	(x)	(x)	(x)	-	-

Frame size		6	8	10	12	14	19	30	40	60
Code	Shaft									
K	Metric key, (Std)	x	x	x	x	x*	x*	x*	x*	x
P	Metric key	-	-	-	-	x	-	x*	-	-
X	Metric key, (Saw motor flange)	-	-	-	-	x	x	x	x	-

* Only with C mounting flange

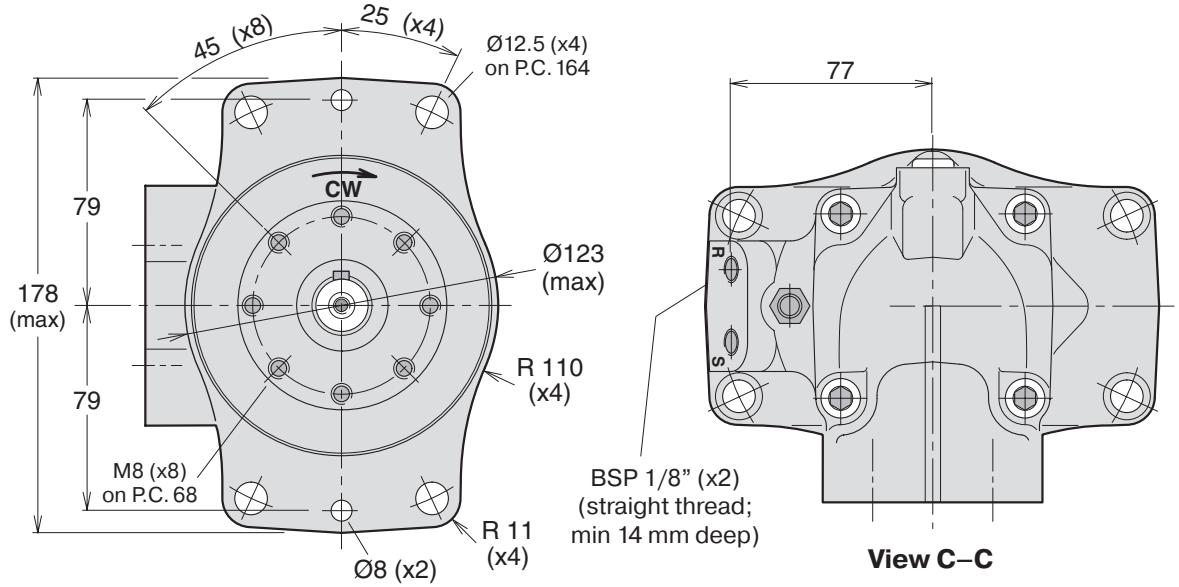
Frame size		6	8	10	12	14	19	30	40	60
Code	Shaft seal									
S	PTFE, high speed	x	x	x	x	x	x	x	-	-
V	FPM, high pressure, high temperature	-	-	-	-	-	-	-	x	x

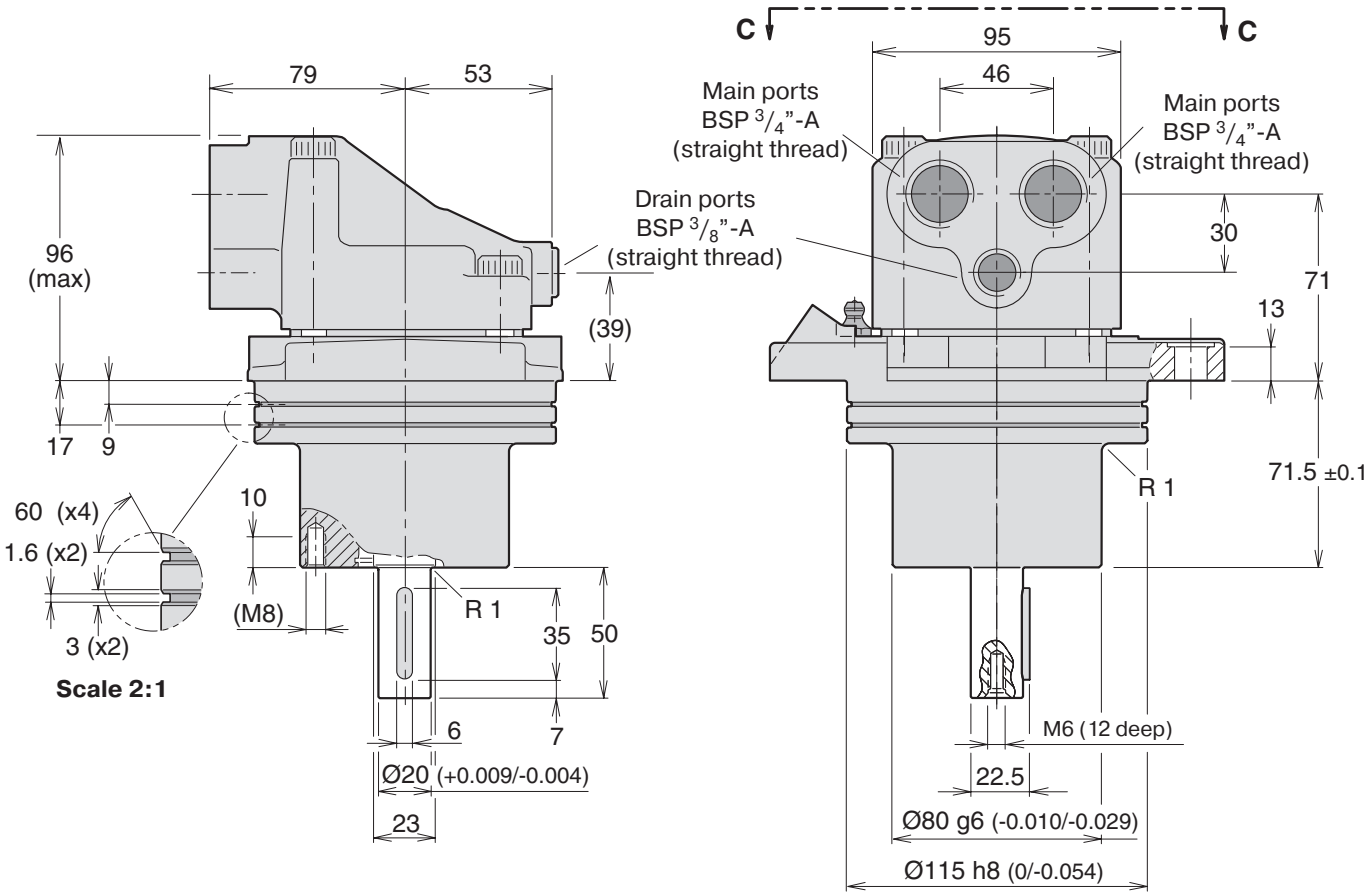
Frame size		6	8	10	12	14	19	30	40	60
Code	Option									
P0	Standard	-	-	-	-	-	-	-	x	x
B_	Power Boost	x	x	x	x	x	x	x	-	-
_T	Painted Black	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)	(x)

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

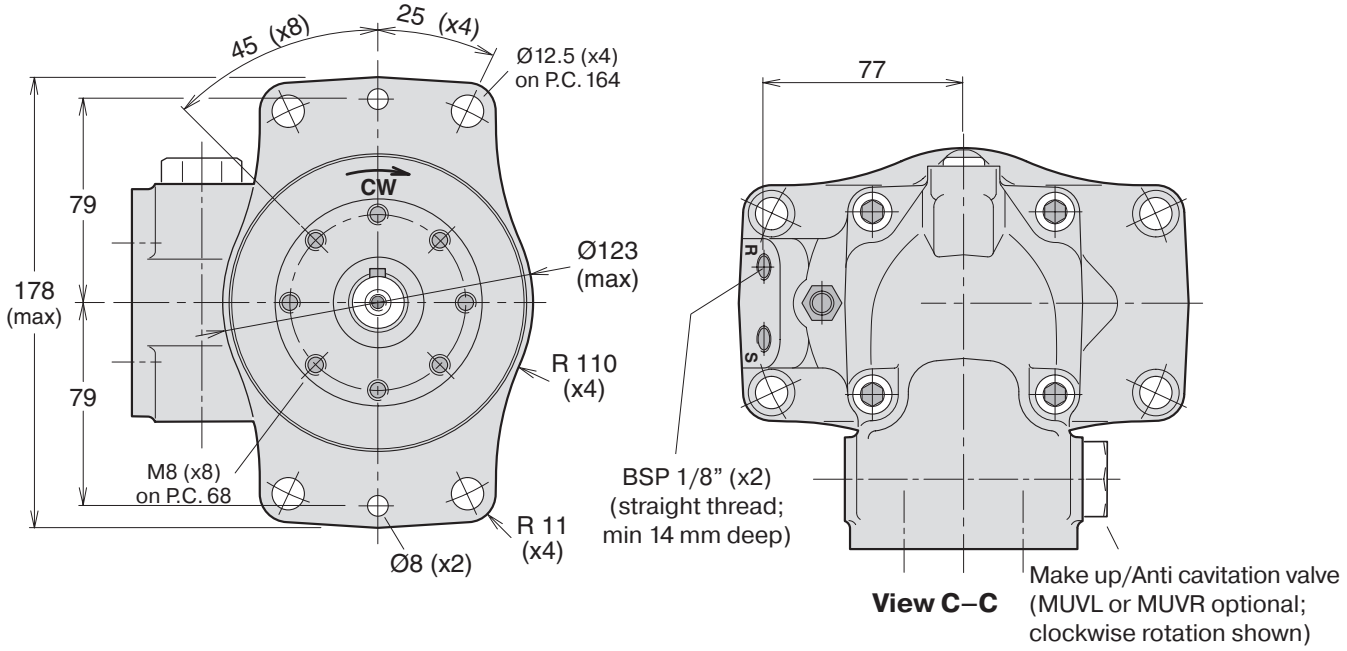
INSTALLATION DIMENSIONS

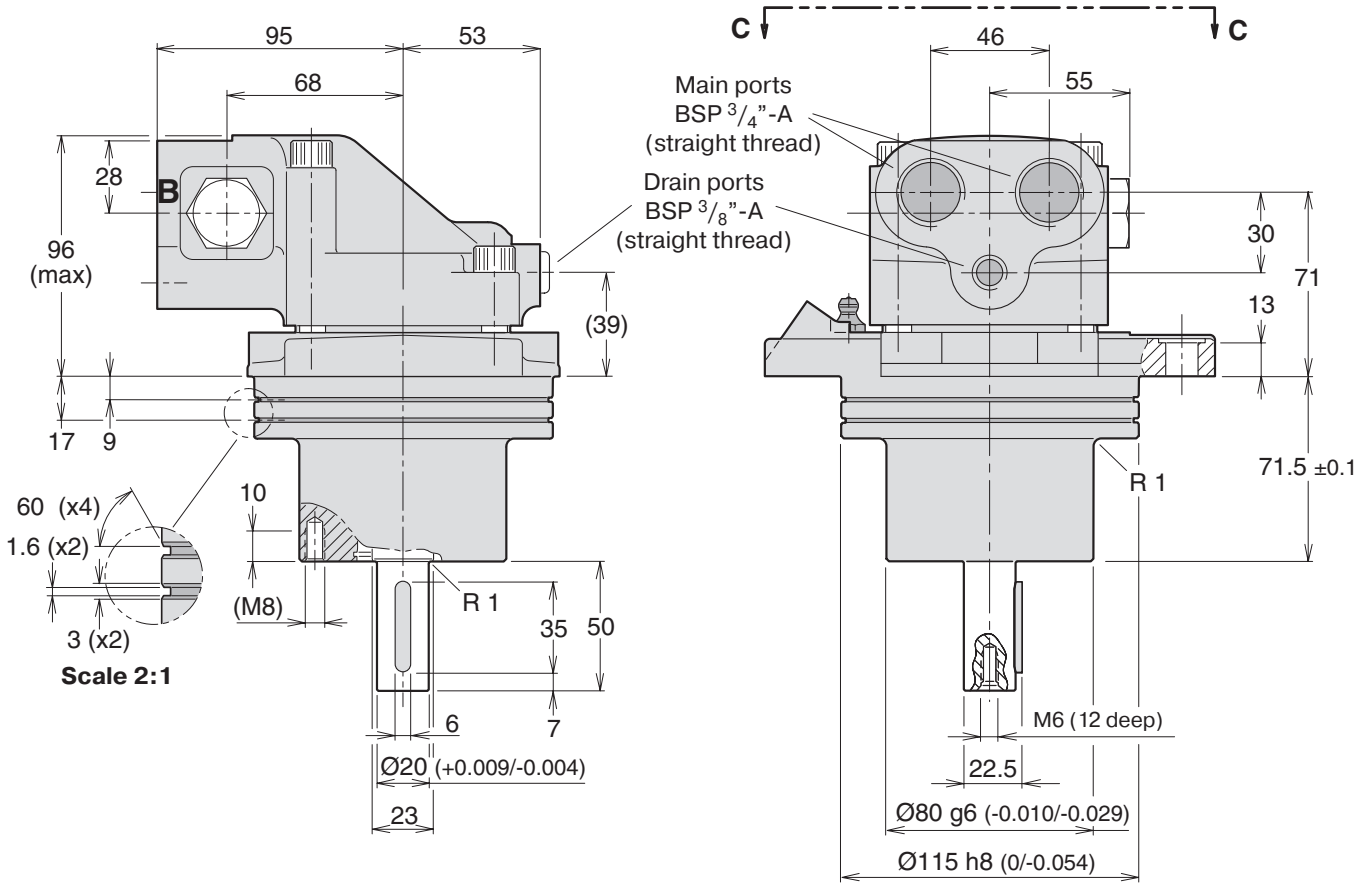
F11-6, -8 and -10 saw motor version without make up valve



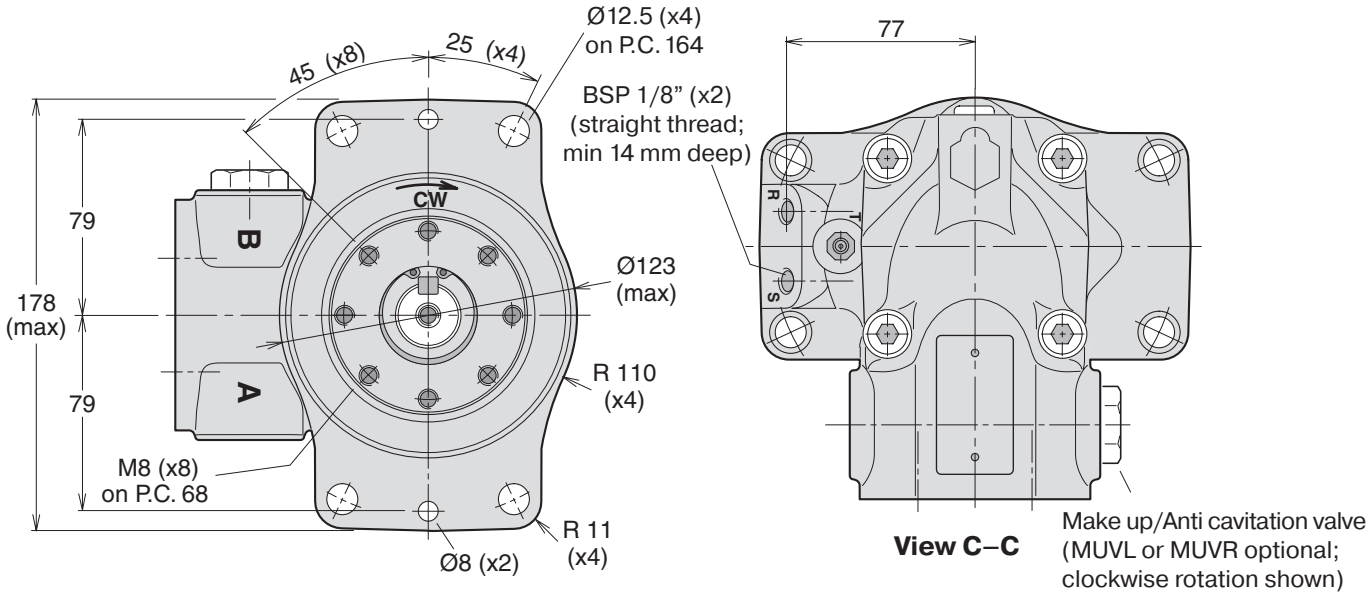


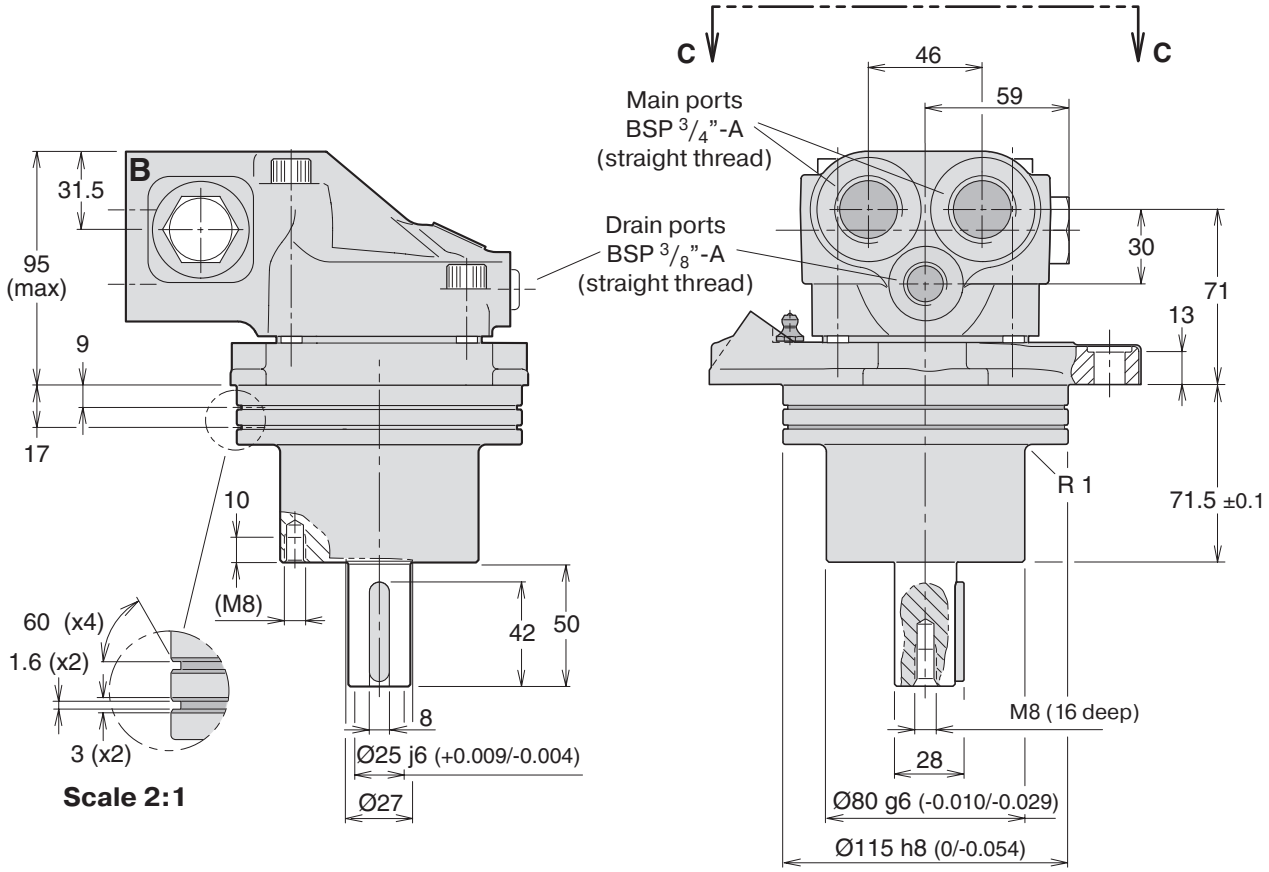
F11-6, -8 and -10 saw motor version with make up valve



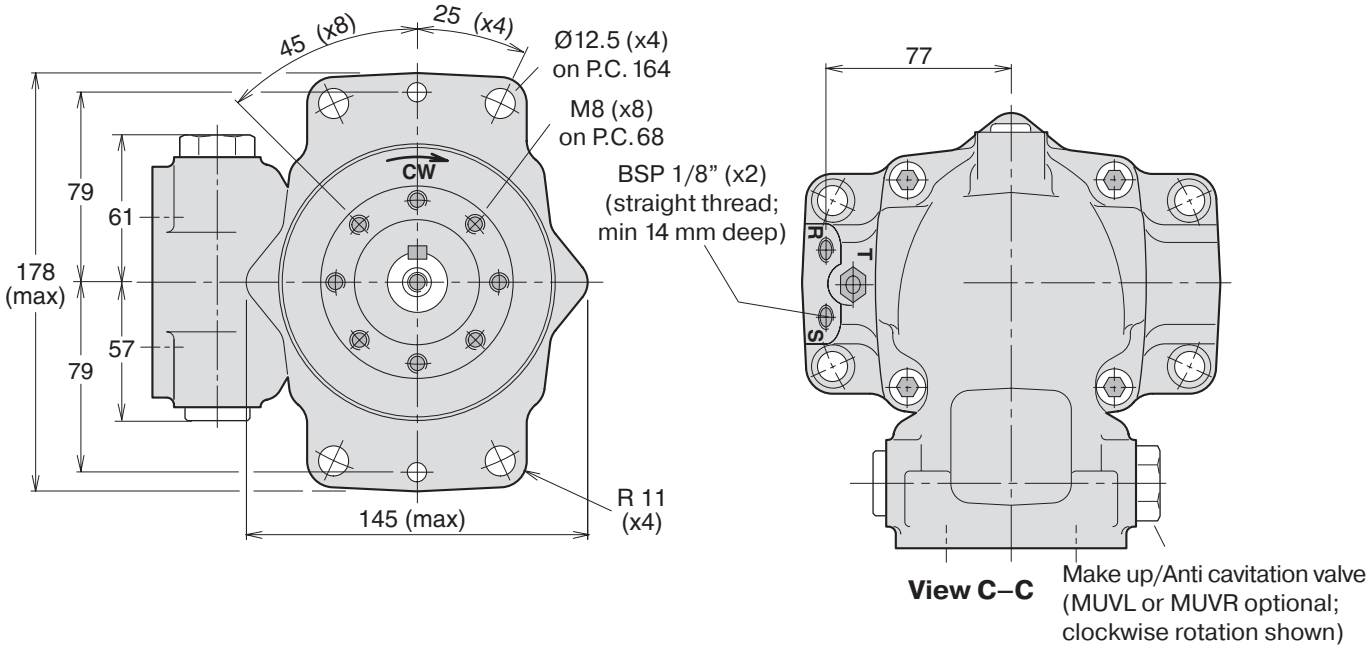


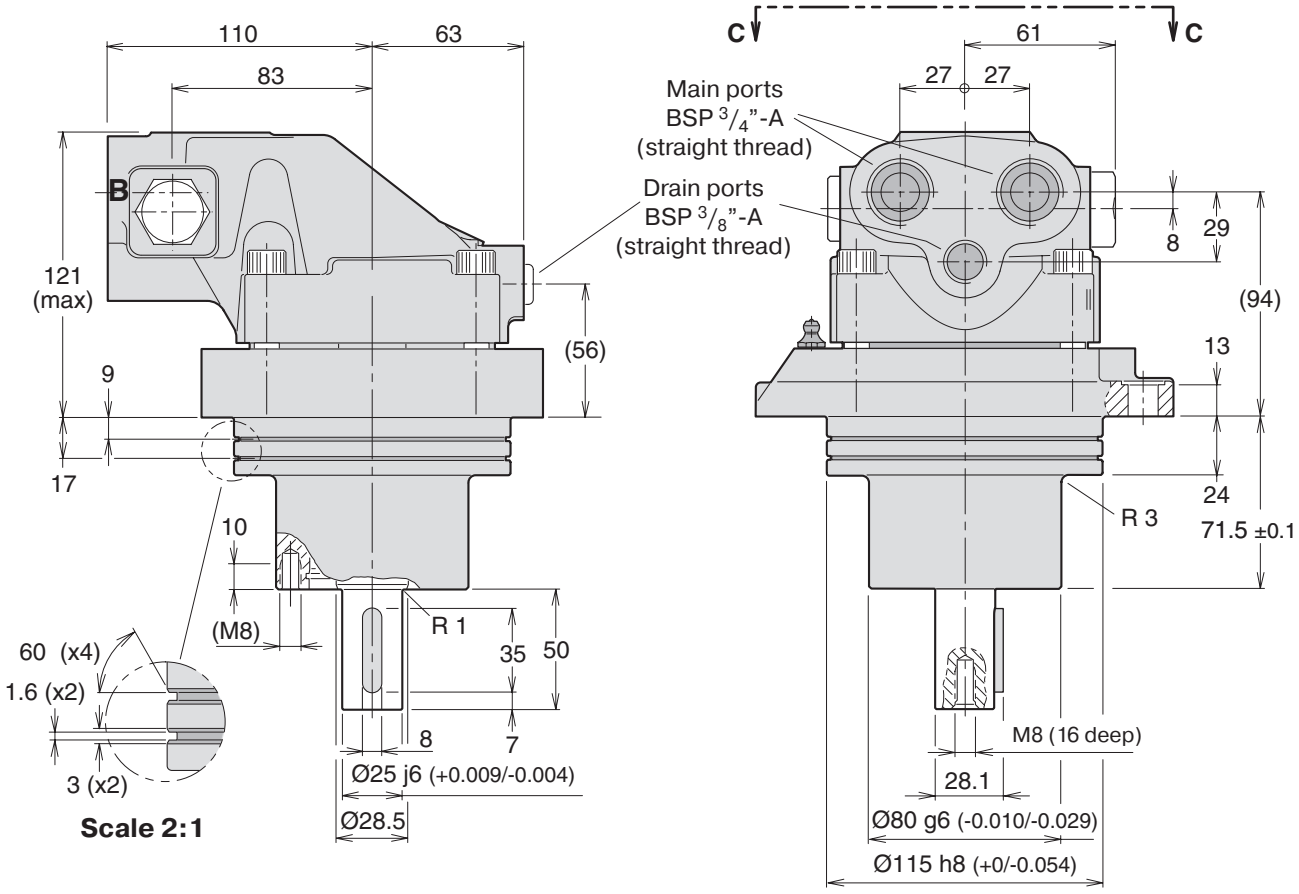
F11-12 and -14 saw motor version with make up valve



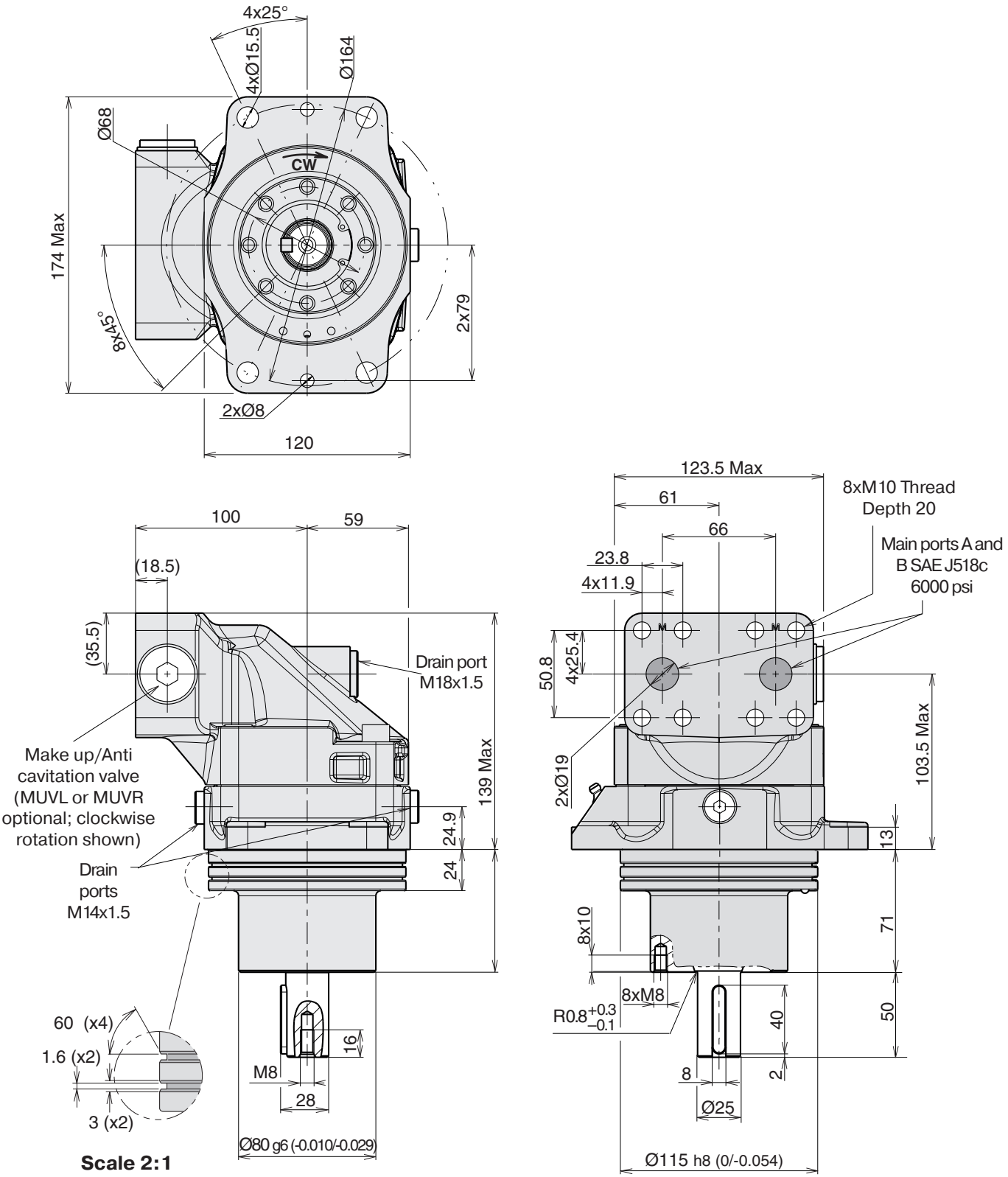


F11-19 saw motor version with make up valve



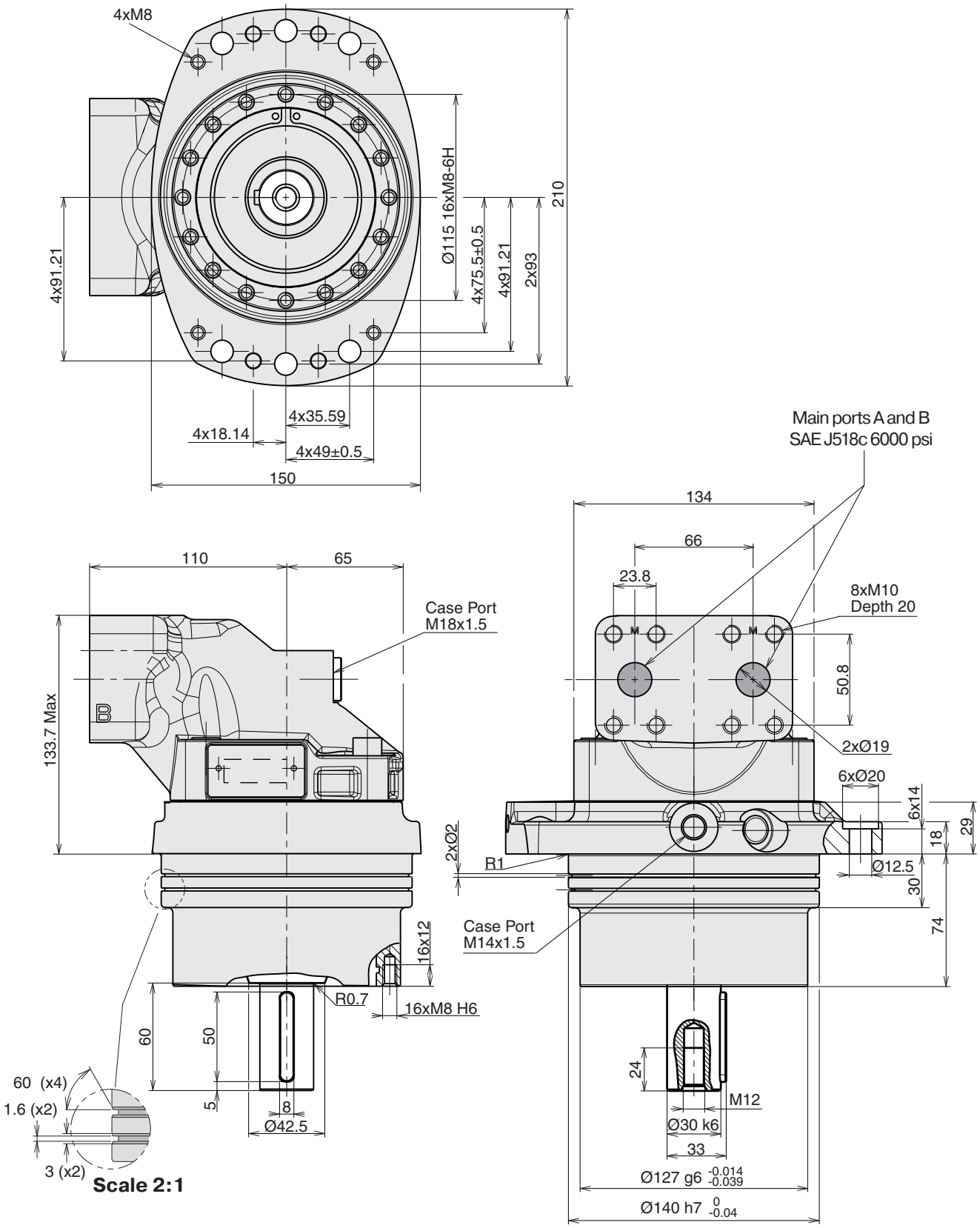


F12-30 saw motor version with make up valve



Scale 2:1

F12-40 saw motor version without make up valve



F12-60 motor versions

For dimensional drawings we refer to main catalogue F11/ F12 MSG30-8249, pages 46 to 53.

INSTALLATION INFORMATION

Hydraulic fluids

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

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

Operating temperature

The fluid temperature in the main hydraulic system must not exceed 70 °C; the drain fluid must not exceed 115 °C.

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

Case pressure

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

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

Case drain connections

Series F11/F12 has two drain ports, C and D.

To secure correct case pressure and lubrication a spring loaded check valve in the drain line is recommended.

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

Viscosity

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

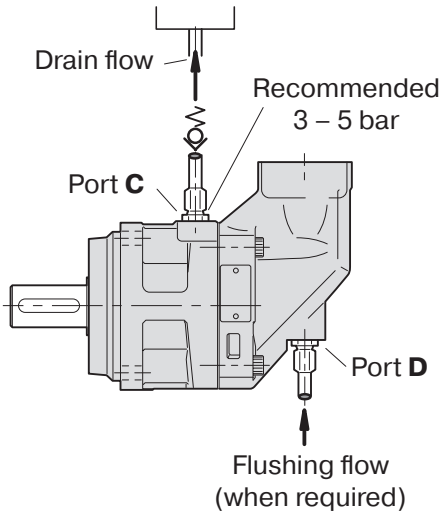
Max start-up viscosity: 1 000 mm^2/s.

Filtration

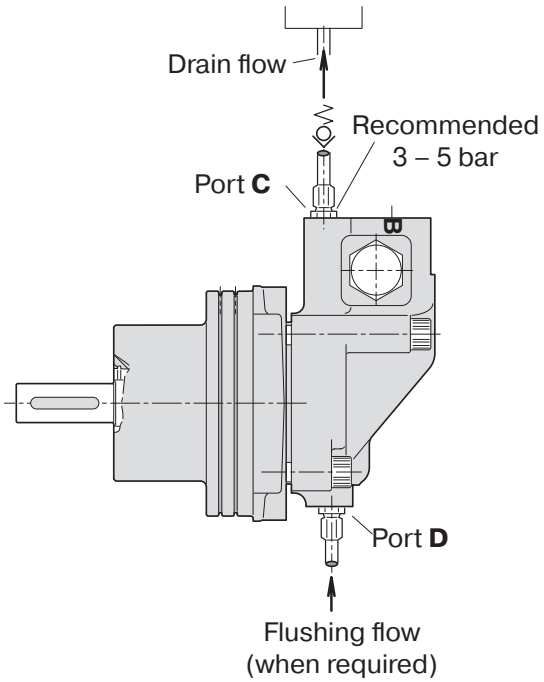
Long saw motor life can be expected if fluid cleanleness meets or exceeds 'ISO code 20/18/13' (according to ISO 4406).

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

F12



F11



NOTES

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