SH11CR - Fixed displacement motors for gearbox, plug in version





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Type	Displacement cm³/rev [in³/rev]	Max. flow l/min [U.S. gpm]	Max pressure bar [psi]	Max peak pressure bar [psi]
SH11CR 020	19.9 [1.213]	125 [33]	430 [6235]	480 [6960]
SH11CR 030	31.9 [1.945]	201 [53.06]	430 [6235]	480 [6960]
SH11CR 045*	46 [2.807]	257 [67.89]	430 [6235]	480 [6960]
SH11CR 055	56.35 [3.437]	282 [74.45]	430 [6235]	480 [6960]
SH11CR 063	63.26 [3.859]	316 [83.42]	430 [6235]	480 [6960]
SH11CR 075	77.82 [4.747]	350 [92.4]	430 [6235]	480 [6960]
SH11CR 090	86.23 [5.26]	388 [102.5]	430 [6235]	480 [6960]
SH11CR 108	108.4 [6.612]	433 [114.31]	430 [6235]	480 [6960]
SH11CR 125	124.8 [7.613]	500 [132]	430 [6235]	480 [6960]
SH11CR 160	163.9 [9.998]	590 [155.76]	430 [6235]	480 [6960]
SH11CR 180	178.1 [10.864]	641 [169.22]	430 [6235]	480 [6960]

*: Under development

SH11CR series are a family of fixed displacement motors, bent axis piston design for operation in both open and closed circuit. SH11CR series motors are mainly intended for installation in mechanical gearboxes such as track drive and winches gear boxes.
The proven design incorporating the lens shape valve plate, the high quality components and manufacturing tecniques make the SH11CR series motors able to provide up to 430 bar [6235 psi] continuos and 480 bar [6960 psi] peak performance.
Fully laboratory tested and field proven, these motors provide maximum efficiency and long life. Heavy duty bearings permit high radial and axial loads.
Flangeable valves, both for open and closed circuit, enable SH11CR series motors to meet the requirements of the most different types of applications.

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The product images and drawings shown are for illustration purposes only and may not be an exact representation of the product.
We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.
Each product configuration listed below is subject to availability: please contact Sales Dpt. for more commercial detailed info.

General information - Features

Simbology:

C	N/bar [lbf/psi]	Load
$F_{ax\ max}$	N [lbf]	Axial pushing load
$F_{ax\ max}$	N [lbf]	Axial pulling load
F_q	N [lbf]	Radial load
$F_{q\ max}$	N [lbf]	Maximum permissible radial load
J	kg·m^2 [lbf·ft^2]	Moment of inertia
m	kg [lbs]	Weight
n_{max}	rpm	Maximum speed
p_{max}	bar [psi]	Maximum continuous pressure
p_{peak}	bar [psi]	Maximum pressure peak

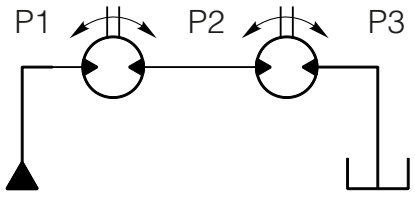
Q_{max}	l/min [U.S. gpm]	Maximum flow
q_d	l/min [U.S. gpm]	External drain flow
T_k	Nm/bar [lbf.ft/psi]	Torque costant
T_{max}	Nm [lbf.ft]	Maximum torque at pressure continuous
T_{peak}	Nm [lbf.ft]	Maximum torque at pressure peak
V_g	cm^3/rev [in^3/rev]	Displacement
P_{max}	kW [hp]	Maximum power at p_{nom}
η_{hm}	%	Mech-hyd. efficiency
η_v	%	Volumetric efficiency

Hydraulic fluids:
Use fluids with mineral oil basis and anticorrosive, antioxidant and wear preventing addition agents (HL or HM). Viscosity range at operating temperature must be of 15 ÷40 cSt. For short periods and upon cold start, a max. viscosity of 800 cSt is allowed, for different types of viscosity please contact Dana. Viscosities less then 10 cSt are not allowed. A viscosity range of 10 ÷ 15 cSt is allowed for extreme operating conditions and for short periods only.

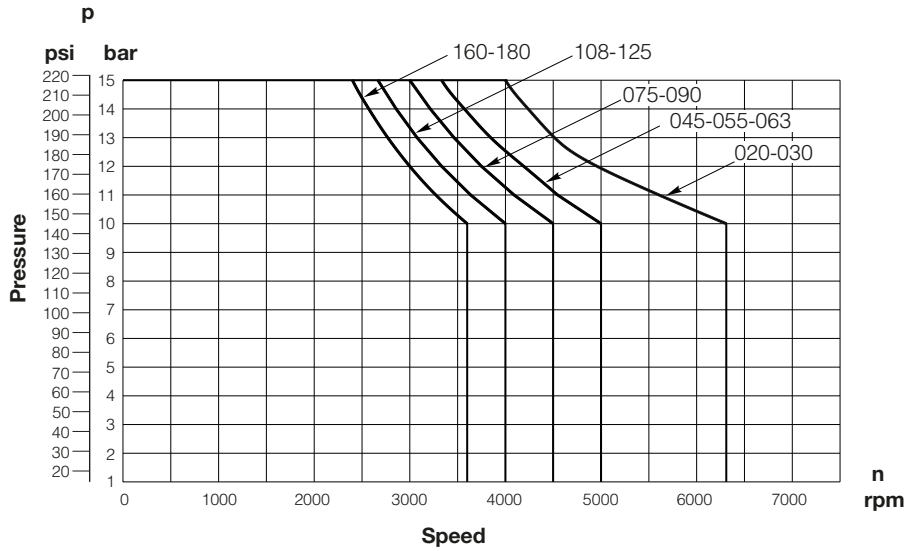
Temperature ranges:
The operating temperature of the oil must be within -25ºC÷ 115ºC [-13ºF ÷ 239ºF]. For applications with lower temperatures please contact Dana.

Filtering:
A correct filtering is essential for long and satisfactory life of axial piston units. In order to ensure a correct functioning of the unit, the max. permissible contamination class is 21/19/16 according to ISO 4406:1999.

Operating pressure:
The maximum permissible pressure on pressure ports is 430 bar [6235 psi] continuous and 480 bar [6960 psi] peak. If two motors are connected in series, total working pressure P1+P2 has to be limited 700 bar max. [10150 psi].



Case drain pressure:
The service life of the shaft seal is influenced by the speed of rotation of the motor and by case pressure. It's recommended not to exceed the value of 10 bar [145 psi], at reduced speed please see the diagram. Instantaneous pressure spikes (t<0.1 sec) up to 15 bar [217.5 psi] are permitted.



Output shaft:
The service life of the shaft seal is influenced by the speed of rotation of the motor and by case pressure. It's recommended not to exceed the value of 10 bar [145 psi], at reduced speed please see the diagram. Instantaneous pressure spikes (t<0.1 sec) up to 15 bar [217.5 psi] are permitted.

Seals:
Seals used on standard SH11CR series axial piston motors are made by FKM seals (Fluoroelastomer). In case of use of special fluids, contact Dana.

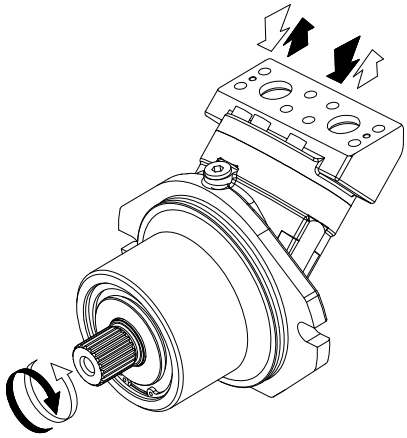
Minimum rotating speed:
No limit to Minimum speed; if uniformity of rotation is required, speed must not be less than 50 rpm. In case of use of special applications, contact Dana.

Installation:
SH11CR motors can be installed in various position and directions; however, installation in vertical position with shaft towards upper is not allowed. These axial piston units have separated ports and drain chambers and so must be always drained. For further detail see at General installation guidelines.

General information - Features

Flangeable valves:
Flangeable valves are available for motors both in open and closed loop. For more information see the catalogue Axial Valves.

Flushing valves:
The motors can be equipped with flushing valves.
The mount the flushing valve on motors, it is necessary to use a special port cover. For more information see the catalogue Axial Valves.
Relation between direction of rotation and direction of flow:
The relation between direction of rotation of shaft and direction of flow in SH11CR piston units is shown in the picture below.



			Size										
			020	030	045*	055	063	075	090	108	125	160	180
Displacement	V_g	cm^3/rev [in^3/rev]	19.9 [1.213]	31.9 [1.945]	46 [2.807]	56.35 [3.437]	63.26 [3.859]	77.82 [4.747]	86.23 [5.26]	108.4 [6.612]	124.8 [7.613]	163.9 [9.998]	178.1 [10.864]
Max. pressure	p_{max}	bar [psi]	430 [6235]	430 [6235]	430 [6235]	430 [6235]	430 [6235]	430 [6235]	430 [6235]	430 [6235]	430 [6235]	430 [6235]	430 [6235]
Max. peak pressure	p_{peak}	bar [psi]	480 [6960]	480 [6960]	480 [6960]	480 [6960]	480 [6960]	480 [6960]	480 [6960]	480 [6960]	480 [6960]	480 [6960]	480 [6960]
Max. speed	n_{max}	rpm	6300	6300	5600	5000	5000	4500	4500	4000	4000	3600	3600
Max. flow	Q_{max}	l/min [US gpm]	125 [33]	201 [53.06]	257 [67.89]	282 [74.45]	316 [83.42]	350 [92.4]	388 [102.5]	433 [114.31]	500 [132]	590 [155.76]	641 [169.22]
Max. power at p_{max}	P_{max}	kW [hp]	90 [120.6]	144 [192.96]	184 [246.7]	202 [270.68]	226 [302.84]	251 [336.34]	278 [372]	310 [415.4]	358 [479.72]	423 [566.82]	459 [615.06]
Torque costant	T_k	Nm/bar [lbf.ft/psi]	0.3 [0.015]	0.5 [0.025]	0.73 [0.037]	0.9 [0.045]	1 [0.05]	1.2 [0.06]	1.4 [0.07]	1.7 [0.085]	2 [0.1]	2.6 [0.13]	2.8 [0.14]
Max. cont. torque at p_{max}	T_{max}	Nm [lbf.ft]	136 [100.23]	218 [160.66]	315 [232.33]	386 [284.48]	433 [319.12]	533 [392.82]	590 [435.13]	742 [546.85]	855 [630.13]	1122 [826.91]	1219 [898.40]
Max peak torque at p_{peak}	T_{peak}	Nm [lbf.ft]	152 [112.02]	244 [179.82]	352 [260.36]	431 [317.65]	484 [356.71]	595 [438.51]	659 [486.05]	829 [610.97]	954 [703.10]	1253 [923.46]	1361 [1003.06]
Moment of inertia (2)	J	$kg \cdot m^2$ [$lbf.ft^2$]	0.001 [0.0235]	0.001 [0.0235]	0.004 [0.094]	0.004 [0.094]	0.004 [0.094]	0.007 [0.1645]	0.007 [0.1645]	0.012 [0.2820]	0.012 [0.2820]	0.022 [0.5170]	0.022 [0.5170]
Weight (2)	m	kg [lbs]	10 [22.04]	10 [22.04]	18 [39.68]	19 [41.876]	19 [41.876]	23.7 [52.23]	23.7 [52.23]	35 [77.14]	35 [77.14]	48 [105.79]	48 [105.79]
External drain flow (2)	Q_d	l/min [US gpm]	1 [0.264]	1 [0.264]	1.2 [0.317]	1.2 [0.317]	1.2 [0.317]	2.5 [0.66]	2.5 [0.66]	3 [0.79]	3 [0.79]	3 [0.79]	3 [0.79]

* : under development

Theorical values, without considering η_{hm} and η_v approximate values. Peak operations must not exceed 1% of every minute. A simultaneous maximum pressure and maximum speed not recommended.

Notes:

1) Approximate values.
2) Average values at 250 bar [3625 psi] with mineral oil at 45°C [113°F] and 35 cSt of viscosity.

Ordering code

The following alphanumeric codes system has been developed to identify all of the configuration options for the SH11CR series. Use the model code below to specify the desired features.
All alphanumeric digits system of the code must be present when ordering.
We advise to carefully read the catalogue before filling the ordering code.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Series	Motor	Size	Version	Mount flange	Shaft end	Port cover	Direction of rotation	Seal	Valve	Valve feature	Flushing valve	Special feature	Painting
SH11CR	M	030	GE	OH	SAG	VM2	RV	V	VCDM	000	06	RD	01

1

Series	
SH11CR	Fixed displacement, bent axis, axial piston unit

2

Motor	
M	Motor

3

Size		
020	20 cm^3/rev	[1.22 in^3/rev]
030	30 cm^3/rev	[1.83 in^3/rev]
045*	46 cm^3/rev	[2.807in^3/rev]
055	55 cm^3/rev	[3.355 in^3/rev]
063	63 cm^3/rev	[3.843 in^3/rev]
075	75 cm^3/rev	[4.575 in^3/rev]
090	90 cm^3/rev	[5.49 in^3/rev]
108	108 cm^3/rev	[6.588 in^3/rev]
125	125 cm^3/rev	[7.625 in^3/rev]
160	160 cm^3/rev	[9.76 in^3/rev]
180	180 cm^3/rev	[10.98 in^3/rev]

* : under development

4

Version	
GE	ISO 3019-2 metric

Ordering code

1	2	3	4	5	6	7	8	9	10	11	12	13	14
SH11CR	M	030	GE	OH	SAG	VM2	RV	V	VCDM	000	06	RD	01

5

Mount Flange		Size				
		020 - 030	045* - 055 - 063	075 - 090	108 - 125	160 - 180
OH	2 holes Ø 135 mm [Ø 5.315 in]	●	–	–	–	–
OL	2 holes Ø 160 mm [Ø 6.299 in]	–	●	–	–	–
OM	2 holes Ø 190 mm [Ø 7.480 in]	–	–	●	–	–
ON	2 holes Ø 200 mm [Ø 7.874 in]	–	–	–	●	●

• : Available
* : under development

6

Shaft end		Size				
		020 - 030	045* - 055 - 063	075 - 090	108 - 125	160 - 180
SAG	Splined W25x1.25x18x9g DIN 5480	●	–	–	–	–
SAI	Splined W30x2x14x9g DIN 5480	●	●	–	–	–
SAM	Splined W35x2x16x9g DIN 5480	–	●	●	–	–
SAO	Splined W40x2x18x9g DIN 5480	–	–	●	●	–
SAP	Splined W45x2x21x9g DIN 5480	–	–	–	●	●
SAR	Splined W50x2x24x9g DIN 5480	–	–	–	–	●

• : Available
* : under development

7

Port cover		Size				
		020 - 030	045* - 055 - 063	075 - 090	108 - 125	160 - 180
VM2	Lateral ports same side	●	●	●	●	●
LM2	Lateral ports same side	●	●	●	●	●
FM2	Frontal ports (only 055-063 displacements)	–	●	–	–	–

8

Direction of rotation (viewed from shaft side)	
RV	Reversible

9

Seal	
V	FKM

Ordering code

1	2	3	4	5	6	7	8	9	10	11	12	13	14
SH11CR	M	030	GE	OH	SAG	VM2	RV	V	VCDM	000	06	RD	01

10

Valve			Size				
			020 - 030	045 - 055* - 063	075 - 090	108 - 125	160 - 180
XXXX	None		●	●	●	●	●
VCDM	VCD/M Pilot assisted overcentre valve		VM2	VM2–FM2	VM2	VM2	VM2
VCD1	VCD/1 Pilot assisted overcentre valve		–	LM2	LM2	LM2	LM2
VCD2	VCD/2 Pilot assisted overcentre valve		–	–	LM2	LM2	LM2
VCR1	VCR1 D/AF Double acting overcentre valve	UPON REQUEST	VM2	–	–	–	–
VCR3	VCR3 Double acting overcentre valve		–	VM2	VM2	VM2	VM2

• : Available
* : under development

1) The VM2 digit means that the valve is only available with VM2 port cover.
2) The LM2 digit means that the valve is only available with LM2 port cover.

11

Valve feature			Valve					
			XXXX	VCDM	VCD1	VCD2	VCR1	VCR3
000	Feature not necessary		●	–	–	–	–	●
001	Not Set 30÷350 bar [435 to 5075 psi] (Piloting ratio 6.2:1)	UPON REQUEST	–	–	–	–	●	–
002	Not Set 0÷350 bar [0 to 5075 psi] (Piloting ratio 2.9:1) Control of rotation CW		–	–	●	–	–	–
006	Not Set 0÷350 bar [0 to 5075 psi] (Piloting ratio 2.9:1) Control of rotation CCW		–	–	●	–	–	–
004	Not Set 30÷350 bar [435 to 5075 psi] (Piloting ratio 6.2:1) Control of rotation CW		–	●	–	–	–	–
005	Not Set 30÷350 bar [435 to 5075 psi] (Piloting ratio 6.2:1) Control of rotation CCW		–	●(1)	–	–	–	–
003	Not Set 250÷500 bar [3625 to 7250 psi] (Piloting ratio 13:1) Control of rotation CW		–	–	–	●	–	–
007	Not Set 250÷500 bar [3625 to 7250 psi] (Piloting ratio 13:1) Control of rotation CCW		–	–	–	●	–	–

• : Available
1) : Available with FM2 port cover

Please contact Technical department for valve which requie specific setting.
For the technical specifications see catalogue valves.

Ordering code

1	2	3	4	5	6	7	8	9	10	11	12	13	14
SH11CR	M	030	GE	OH	SAG	VM2	RV	V	VCDM	000	06	RD	01

12

Flushing valve		
XX	None	•
PR	Arranged for Flushing Valve	LM2
06	VSC/F Flushing valve - 6 l/min [1.58 U.S. gpm]	LM2-VM2
09	VSC/F Flushing valve - 10.5 l/min [2.77 U.S. gpm]	LM2-VM2
15	VSC/F Flushing valve - 15 l/min [3.96 U.S. gpm]	LM2-VM2

• : Available

It is not possible to combine the flushing valves with valve on table 10.
For the technical specifications see catalogue valves.

1) The LM2-VM2 digit means that the valve is only available with LM2 and VM2 port cover.

13

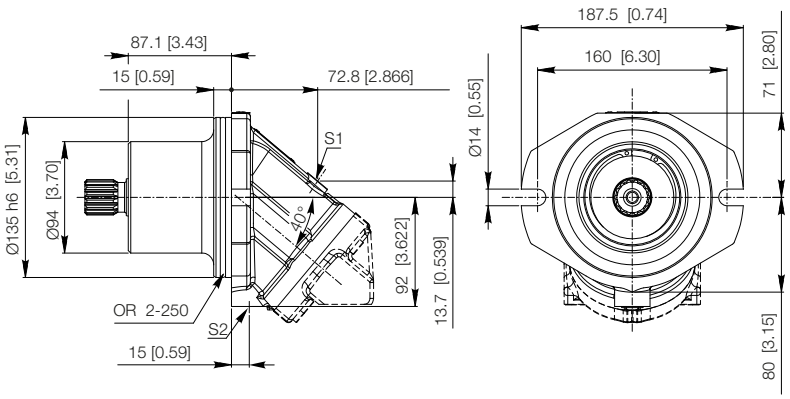
Special feature	
XX	None
RD	Drain plugs reversed
TS	Prepared for tachometer sensor
TZ	Tachometer + sensor 2-channel-Hall effect

14

Painting	
XX	None
01	Painted RAL 9005
02	Painted RAL 5015

Dimensions 2 Bolts flange (OH)

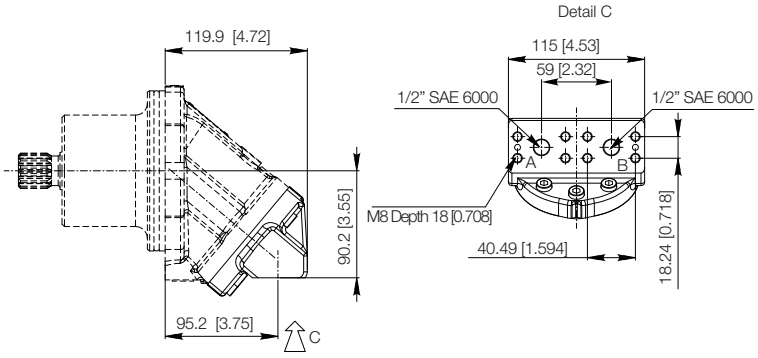
SH11CR 020-030



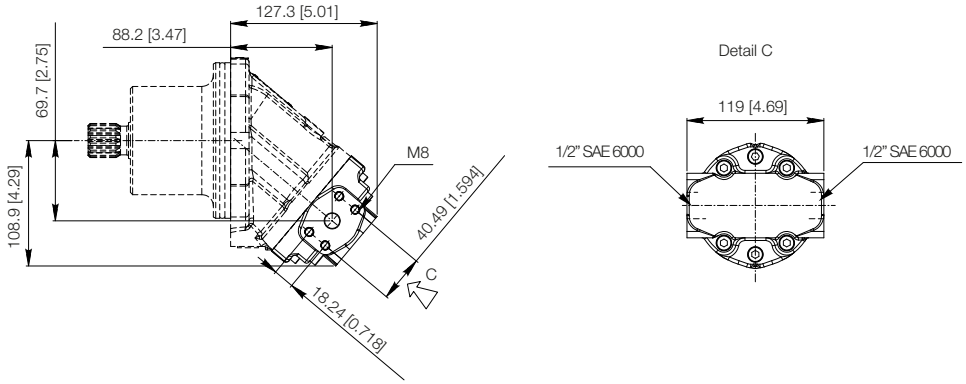
S1, S2: Drain ports (1 plugged) - 3/8 G (BSPP)
A, B: Service line ports

7 Port cover

VM2



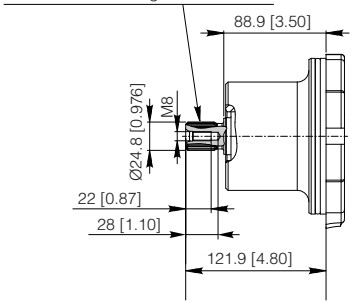
LM2



6 Shaft end

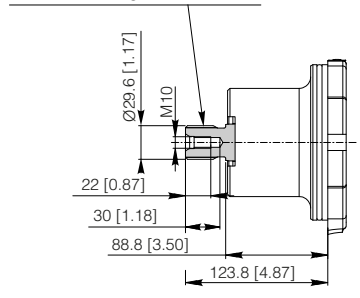
SAG Splined shaft

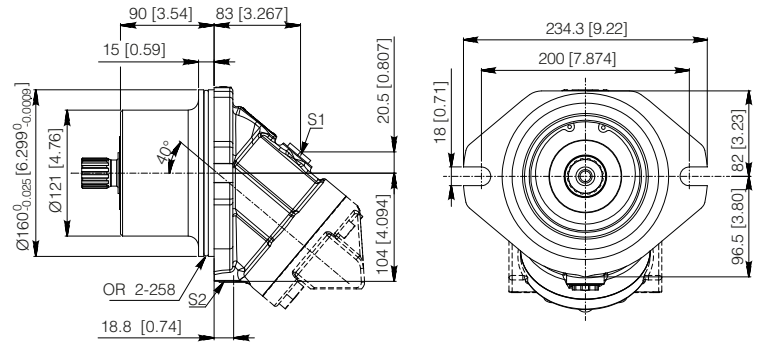
Spline
W25x1.25x30x18x9g DIN 5480



SAI Splined shaft

Spline
W30x2x30x14x9g DIN 5480

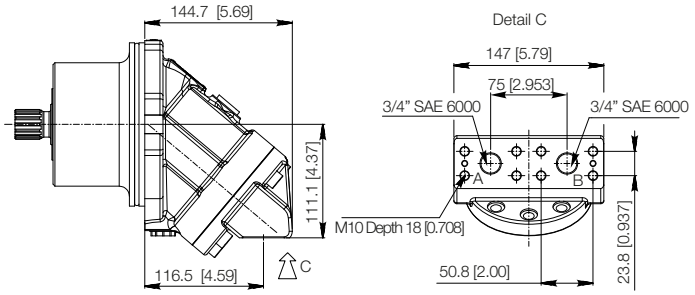




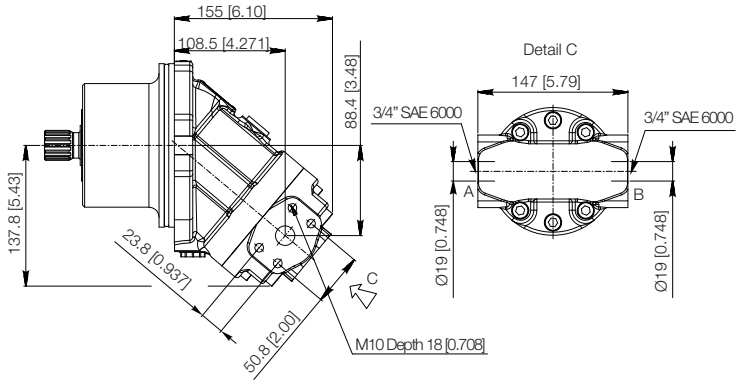
S1, S2: Drain ports - 1/2 G (BSPP)
A, B: Service line ports

7 Port cover

VM2

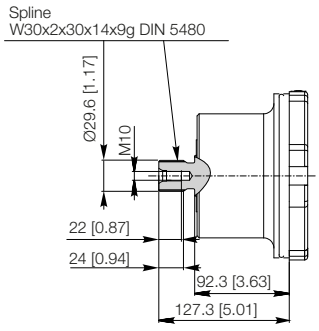


LM2

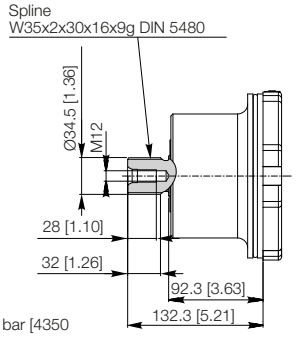


6 Shaft end

SAI Splined shaft

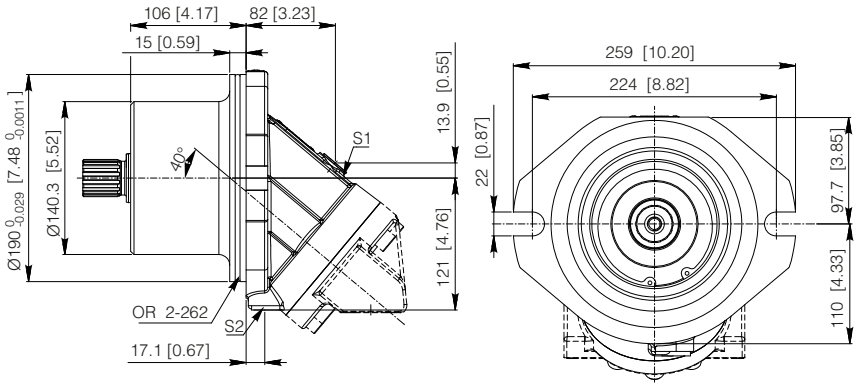


SAM Splined shaft



Maximum working pressure for 063 displacement: 300 bar [4350 psi]

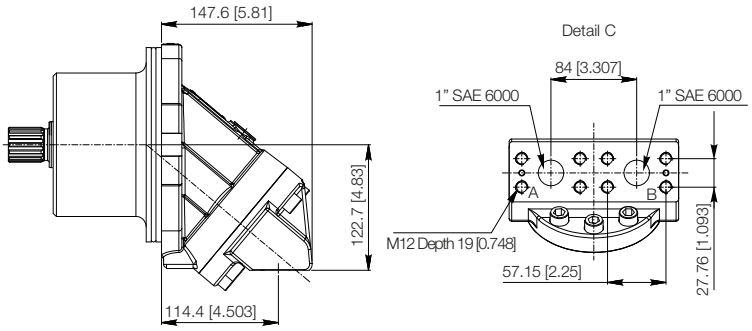
Click i button to return to main index
Click Dana button to return to Section index



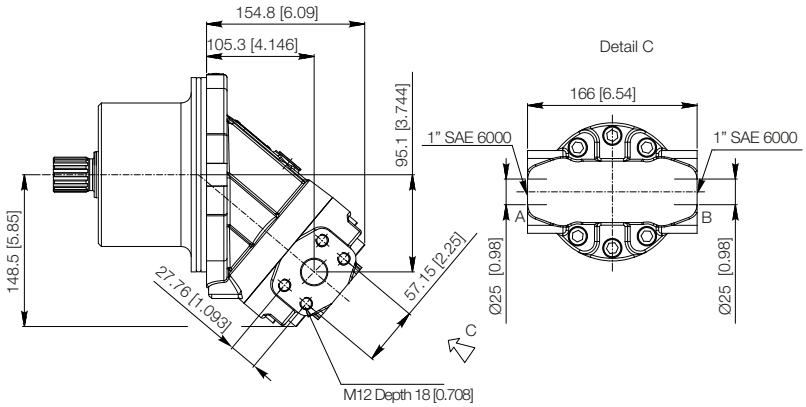
S1, S2: Drain ports - 1/2 G (BSPP)
A, B: Service line ports

7 Port cover

VM2

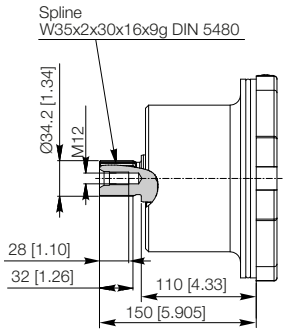


LM2

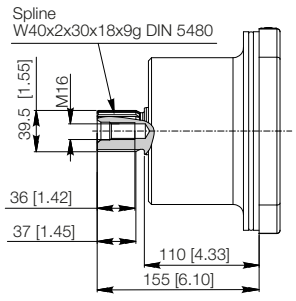


6 Shaft end

SAM Splined shaft

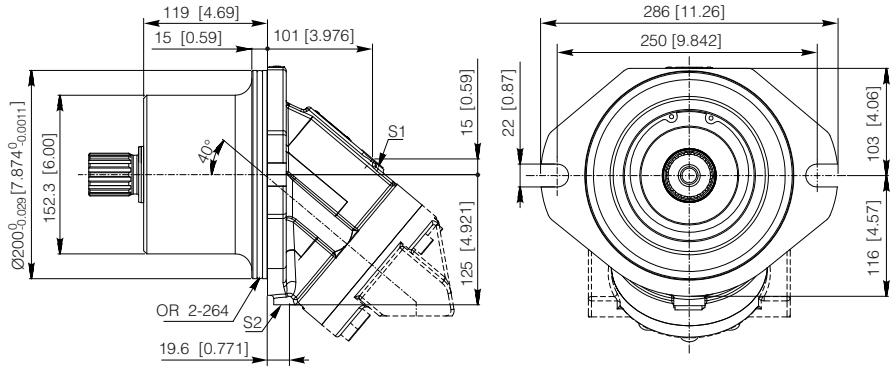


SAO Splined shaft



Maximum working pressure for 090displacement: 300 bar [4350 psi]

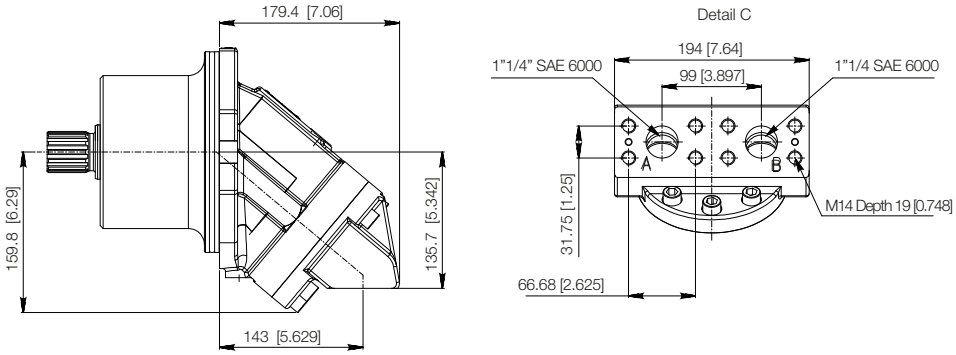
Click DANA button to return to Section Index
Click i button to return to main index



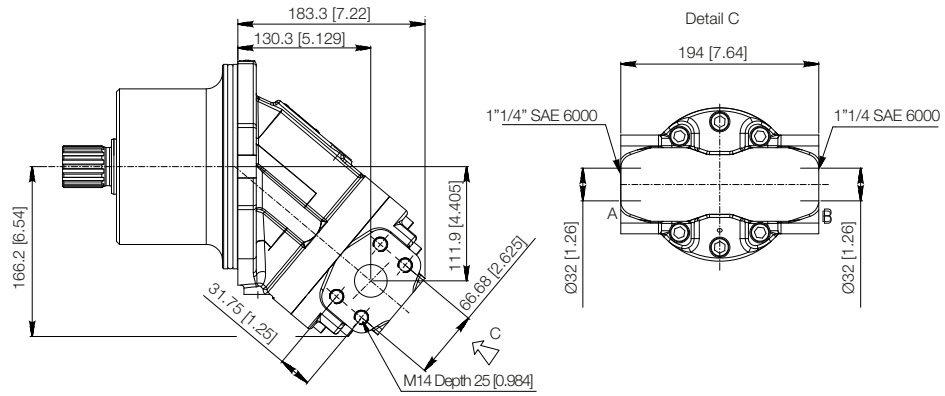
S1, S2: Drain ports (1 plugged) - 1/2 G (BSPP)
A, B: Service line ports

7 Port cover

VM2

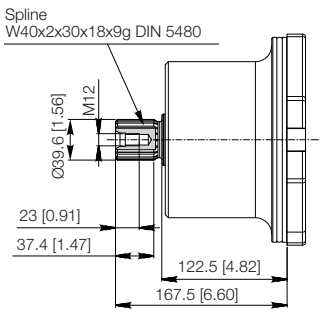


LM2

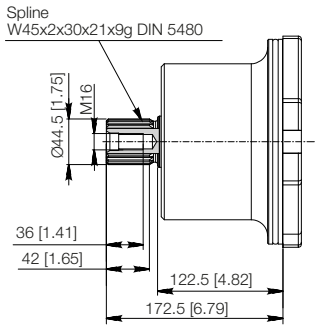


6 Shaft end

SAO Splined shaft

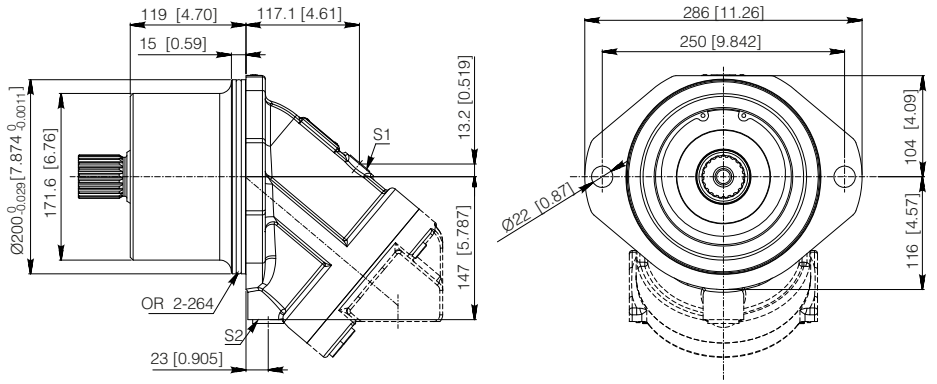


SAP Splined shaft



Maximum working pressure for 125 displacement: 300 bar [4350 psi]

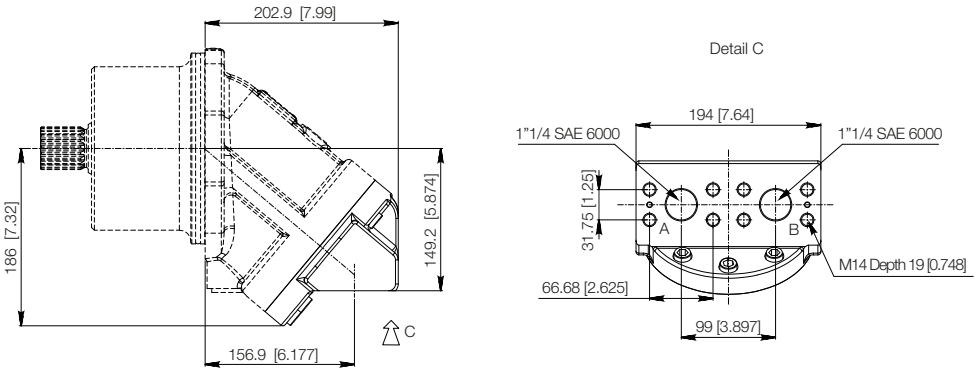
Click i button to return to main index
Click Dana button to return to Section index



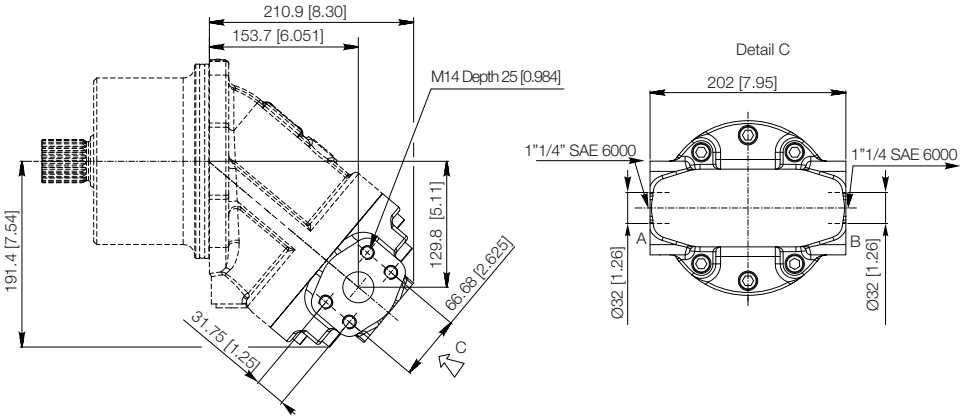
S1, S2: Drain ports (1 plugged) - 3/4 G (BSPP)
A, B: Service line ports

7 Port cover

VM2



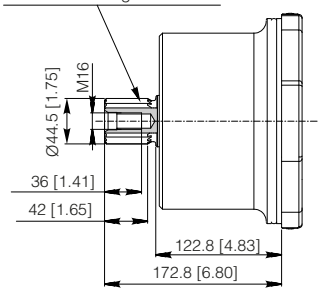
LM2



6 Shaft end

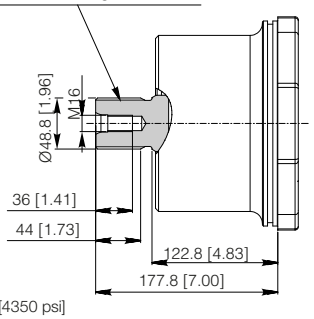
SAP Splined shaft

Spline
W45x2x30x21x9g DIN 5480



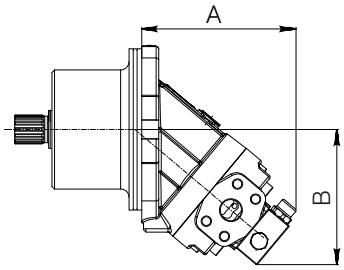
SAR Splined shaft

Spline
W50x2x30x24x9g DIN 5480

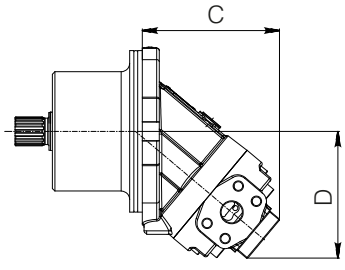


Maximum working pressure for 180 displacement: 300 bar [4350 psi]

7 + 12 Flushing valve version and port cover “LM2”



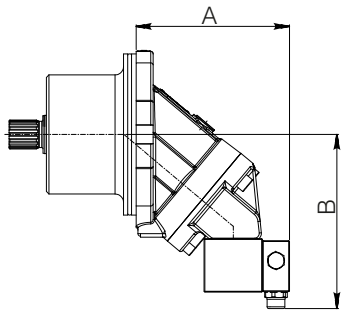
Flushing valve



Arranged for flushing valve

			020	045-055	075	108	160
			030	063	090	125	180
A	mm [in]	**LM2**	161 [6.33]	245.7 [9.67]	259.4 [10.21]	294.3 [11.58]	319.6 [12.58]
B	mm [in]	**LM2**	130 [5.12]	152.8 [6.01]	159.1 [6.26]	179.9 [7.08]	199.1 [7.84]
C	mm [in]	**LM2**	140 [5.51]	225.7 [8.88]	239.4 [9.42]	274.3 [10.79]	299.6 [11.79]
D	mm [in]	**LM2**	120 [4.72]	142.8 [5.62]	149.1 [5.87]	169.9 [6.68]	189.1 [7.44]

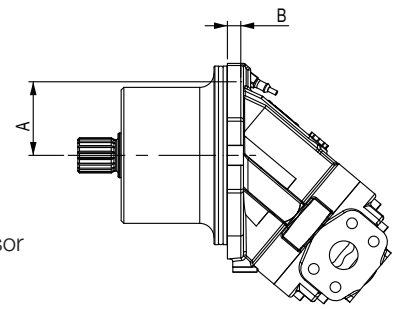
7 + 12 Flushing valve version and port cover “VM2”

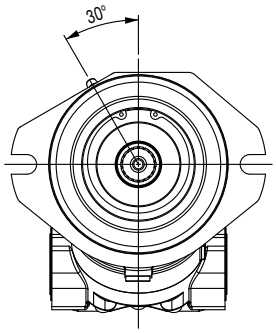


			020	045-055	075	108	160
			030	063	090	125	180
A	mm [in]	VM2	148 [5.82]	178 [7.01]	181 [7.12]	216.5 [8.52]	223.4 [8.79]
B	mm [in]	VM2	173 [6.81]	194 [7.64]	205 [8.07]	218 [8.58]	231.7 [9.12]

13 Version with tachometer and “TZ” sensor

TZ: With tachometer. Supplied with phonic wheel and sensor.





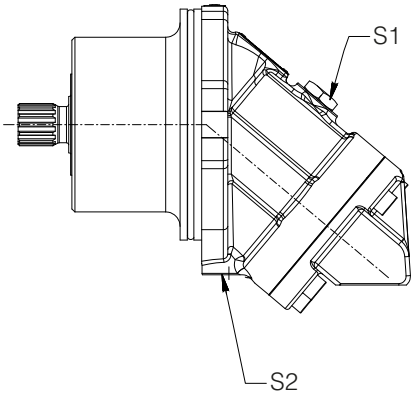
2-Channel differential-hall effect operating principle Sensor with dual-channel output (90°)
Power supply 8-32 VDC
Frequency 0-20.000 Hz
Operating temperature -40°C +125°C
Degree of protection IP67
Sensor connector Deutsch DT04-4P
Electromagnetic compatibility according to EN 60947-5-2
Resistence to schock and vibration in accordance with IEC 68-2-17 IEC 68-2-6

		020 030	045-055 063	075 090	108 125	160 180
A	mm [in]	58 [2.28]	77 [3.03]	76 [2.99]	86 [3.39]	93.5 [36.81]
B	mm [in]	15 [0.59]	32 [1.26]	11 [0.43]	25 [0.98]	26.5 [1.04]

	Size				
	020 030	045-055 063	075 090	108 125	160 180
Number of pulses per revolution	38	47	53	59	67

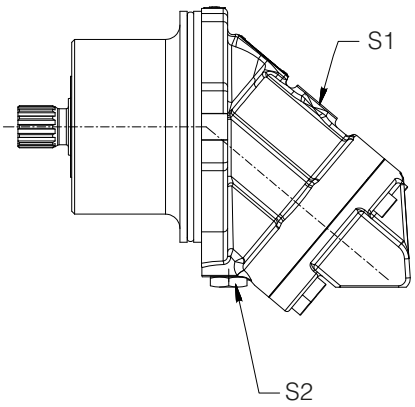
13 Drain plug reversed “RD”

STANDARD VERSION



S1 - Metallic plug.
S2 - Plastic plug.

“RD” VERSION



S1 - Plastic plug.
S2 - Metallic plug.

For the SH11CR motors it is possible to request the drain plug reversed compared to standard.
If it is necessary the motor with this configuration, to specify in the purchase order the value “RD” (See position 13 of ordering code).

DANA SAMHYDRAULIK™