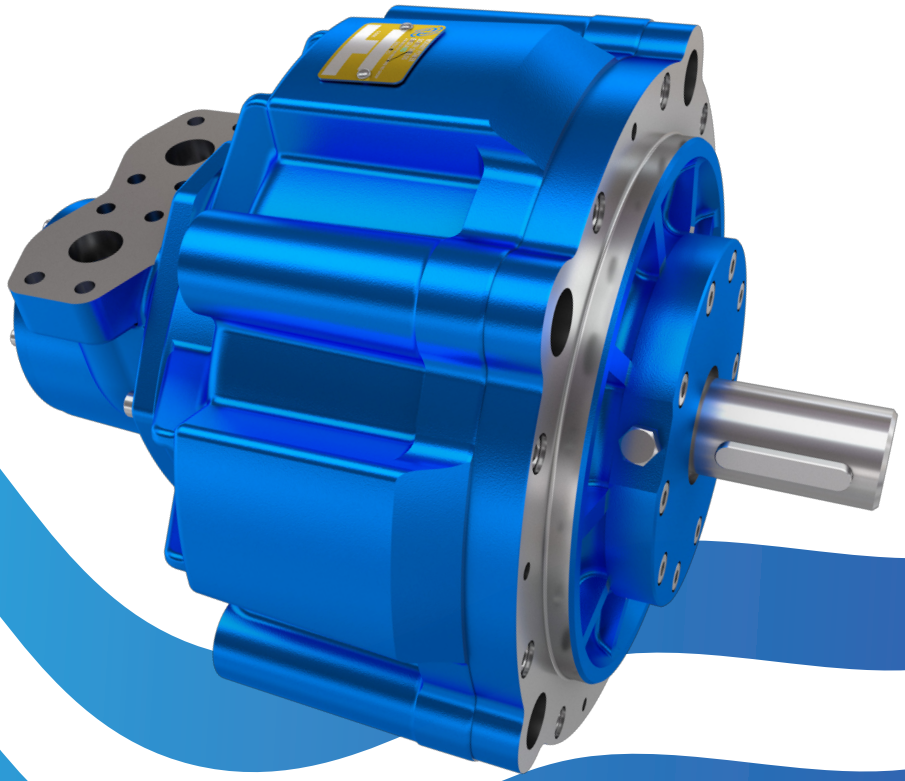
SMA RANGE

RADIAL PISTON MOTORS



ROTARY POWER

You are at the **centre**
of everything we do

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ABOUT US

Rotary Power specialises in the design, development and manufacture of hydraulic motors and pumps.

With a history dating back over 50 years, we understand the exacting and demanding requirements of today's hydraulic applications.

Operating from 18,000 sq. m. of purpose built manufacturing facilities in the UK and India, we continue to invest in the latest CNC machinery, automation and testing facilities. We have a clear focus on continuous improvement in lean cellular manufacturing. These facilities, alongside our European and US operations, offer sales, service and production support for the entire product range. A worldwide network of distribution partnerships provide additional support.

OUR BUSINESS
We recognise the importance of developing partnerships with our customers. That's why we offer flexibility in design, delivery and service to meet our customers' requirements.

Partnerships with our supply chain are key to our success and allow us to deliver superior service in order to exceed expectations.

OUR PEOPLE
People are at the centre of everything we do. As an innovative engineering and manufacturing business, we take recruitment and career development very seriously.

As part of the British Engines Group, we operate a training and development programme that maintains a strong focus on in-house manufacturing and a commitment to local employment. Our apprenticeship and graduate schemes provide the opportunity to develop and nurture engineering talent from an early stage.

OUR FUTURE
Whether in product design or internal processes and systems, our engineers are actively encouraged to develop new ideas within design and manufacturing. This ensures that we are at the forefront of our customer and sector led innovation, whilst continuously improving our business.

Our team of in-house design engineers invest time into understanding our customers' application and work with them to deliver value added solutions, customised to their application.

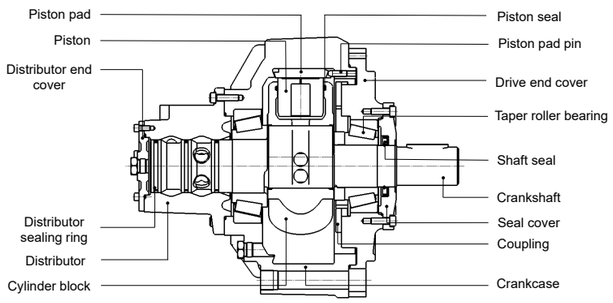
SMA RANGE

The SMA heavy duty motor is of radial piston, eccentric shaft configuration. The motor's efficient design includes a hardened, high tensile, steel crankshaft supported on taper roller bearings. The eccentric element of the crankshaft acts as a hydrodynamic bearing to support the cylinder block and pistons to provide low friction running. The SMA motor range offers displacements from 200 - 16,400 cc/rev.

Motors within this range can withstand both high mechanical and hydraulic shock loads, offering excellent life and continuous high power use. The speed and power ratings are significantly higher than standard high torque low speed (HTLS) motors.

The SMA motor has a range of features and options designed to suit a number of specific applications:

- High pressure
- High power
- High speed
- Fixed displacements
- Robust
- Free wheel capability
- Fluid versatility
- 350 bar continuous pressure



ROTATING CASE OPTION
For types E1, E1 high power and B1, the SMA motor can be built in rotating case form by incorporating a crankshaft, which is designed to be used as the motor mounting point. Hydraulic fluid is supplied directly to the internal galleries, therefore eliminating the need for a distributor.

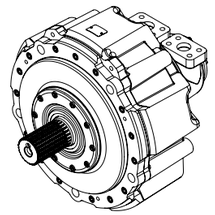
MULTIPLE DISPLACEMENT OPTION
For C2 type motors, multiple displacement is achieved via an integrated pilot operated selector valve, mounted on/in the distributor housing.

The activation of the selector valve discretely changes the internal displacement of the motor, changing the speed and available output torque. The valve ensures that the pressurised areas of the motor remain primed with hydraulic fluid, allowing displacement to be changed whilst the motor is turning under load.

FREE-WHEEL ABILITY
Only hydraulic system pressure retains the pistons against their respective pads. Therefore, if the motor is isolated from the rest of the system, the pistons are free to retract. This allows the cylinder block to orbit without pumping fluid and consequently providing negligible resistance to rotation.

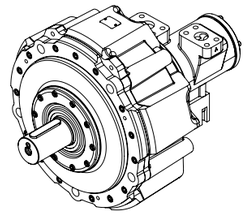
Piston retraction is achieved by pressurising the motor case. Drive is re-engaged by opening the hydraulic supply to the motor and returning the pistons to their normal working position against their respective pads. During this process the large hydrostatic bearing surface has a dampening effect which prevents harsh contact between each piston and its pad.

CONFIGURATIONS
HEAVY DUTY MOBILE, MARINE AND INDUSTRIAL DRIVES

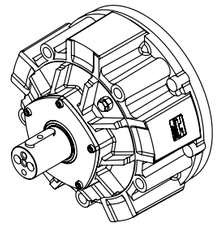


ROTATING SHAFT C1 MOTOR
Can operate up to pressures of 490 bar and may experience external loading.

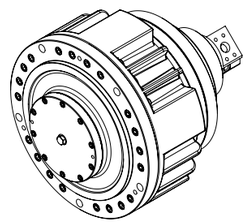
ROTATING SHAFT C1 HIGH POWER MOTOR
Can operate up to pressures of 490 bar and may experience external loading and higher than standard running speeds.



ROTATING SHAFT C2 (DUAL DISPLACEMENT) MOTOR
Can operate up to pressures of 490 bar and may experience external loading. Used in applications which require a wide speed range from limited pump flows.



ROTATING CASE B1 MOTOR
Can operate up to pressures of 490 bar and may experience external loading. This motor often forms an integral part of the machine structure. High running speeds with minimal out of balance forces.



ROTATING CASE E1 MOTOR
Can operate up to pressures of 490 bar and may experience very high external loading. This motor often forms an integral part of the machine structure.

ROTATING CASE E1 HIGH POWER MOTOR
Can operate up to pressures of 490 bar and may feature very high external loading. Motor often forms an integral part of the machine structure. High running speeds with minimal out of balance forces.

Fluid type	HL;HLP to DIN 51524 For alternatives please contact Rotary Power.
Minimum/maximum viscosity	15 - 1000 cSt
Optimum viscosity	20 - 200 cSt
Minimum/maximum operating temperature	-20° to + 90 °C [-4° to 194°F]
Optimum operating temperature	50 °C [122°F]
Fluid cleanliness	ISO code 18/13 or better/NAS 1638 class 9
Filtration	B25 ratio 75 or better for simple closed loop systems

MOTOR ORDER CODE

PRODUCT 01	DISPLACEMENT 02	TYPE 03	TYPE 04	REFERENCE 05
SMA				N/A

PRODUCT

01	**SMA**

NOMINAL DISPLACEMENT

02	**0200**
	0350
	0500
	0750
	1000
	etc. (see relevant data table)

TYPE

03	**B**	Rotating case single shaft
	C	Rotating single shaft
	E	Rotating case flange mount

TYPE - OTHER

04	**1**	Single
	2	Dual

REFERENCE

05	Sequential reference number determined by Rotary Power according to motor build specification*

*Individual motor specification including shaft type, seals, valves and other options will be established at the time of ordering when the build reference number is issued.

OPTIONS

A number of special features can be applied to the SMA motor. Please contact us for individual application requirements.

OUTPUT SHAFTS
- Male keyed and splined shafts to special, metric, imperial and SAE standards
- Female plain, keyed and splined shafts to metric, imperial and SAE standards for flange, shrink disc and through bolt mounting

CASE MOUNTING
- Non-standard spigot for mounting
- Re-profiled casings for installation clearance

PERFORMANCE
- High power
- Uni-directional consistency

SEALS
- Seal material options
- High pressure shaft seal
- Mechanical shaft seal (for type E1 motors)
- Back to back shaft seal
- Lip seal and dirt excluder
- Stainless steel shaft sleeve

PORT BLOCKS FOR E1 MOTORS
An integral port block is fitted for motors with displacement up to 750 cm^3. For motor capabilities 750 cm^3 and above, the base motor is supplied with plain ports for use with a customer supplied port block. Further options are as follows:
- Tapped ports in crankshaft face
- Standard port block with SAE ports
- High flow port block with SAE ports

OTHER
- Special porting
- Mechanical, proximity, induction and d.c. generator speed sensing
- Special paint and corrosion inhibition

SERVICE
All service activities should be carried out by Rotary Power or an approved source. A full factory service is available for general overhaul including hydraulic testing to confirm motor performance. Shaft seals may wear and require periodic replacement. Seal kits are available and it is recommended that a suitable stock level is held.

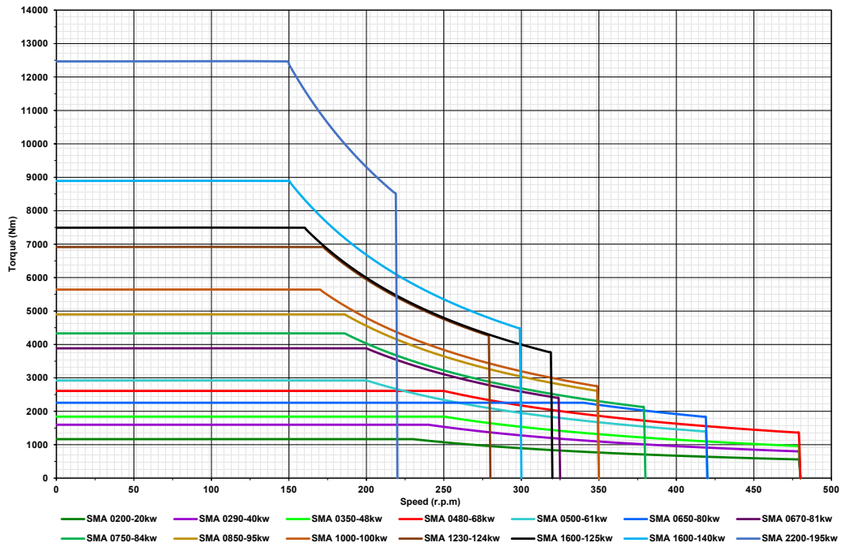
Motors returned for factory overhaul should be cleaned externally and drained of fluids. Transport plugs should be fitted to all ports as soon as the machine pipe work has been removed and before the motor is dismounted. All ancillary equipment should be removed where possible and the unit should be clearly labelled, stating the sender address and details.

POWER ENVELOPES

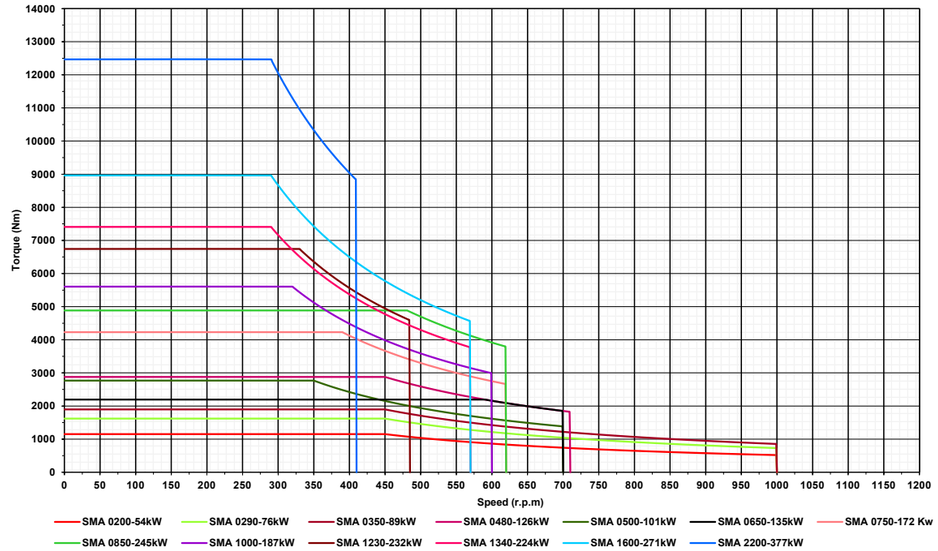
The below power capabilities should be read in conjunction with the technical data charts for each motor type.

These charts are based on maximum continuous values for C1 standard and high power motors. Other types may vary.

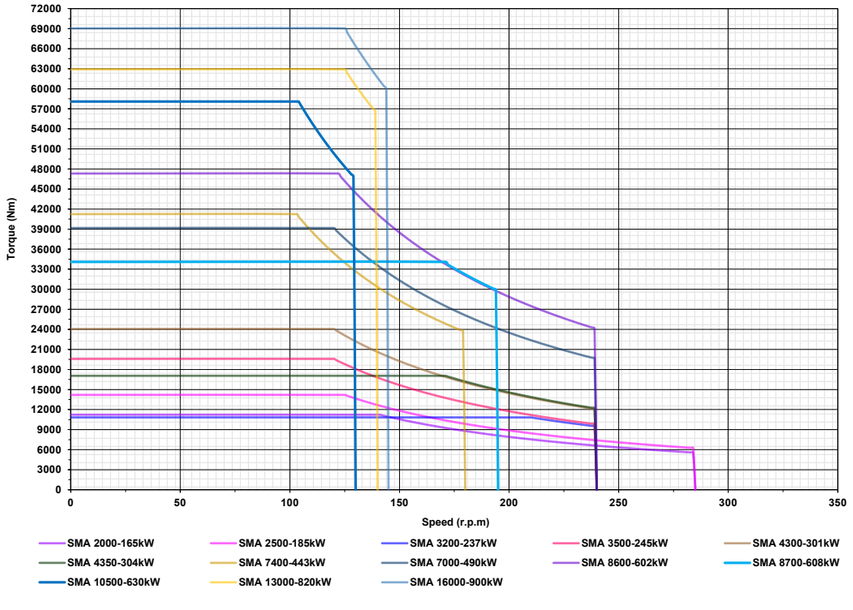
SMA 0200 - 2,200 STANDARD C1



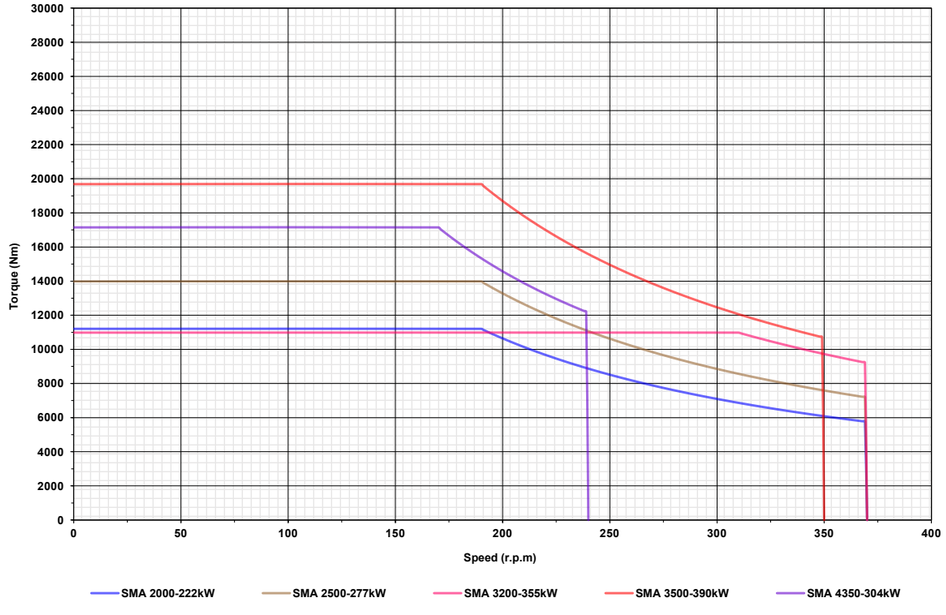
SMA 0200 - 2,200 HIGH POWER C1



SMA 2,000 - 16,000 STANDARD C1



SMA 2,000 - 4,800 HIGH POWER C1



CALCULATIONS

$$\text{Torque (Nm)} = \frac{\text{bar x disp. (cc)} \times \eta m}{20\pi}$$

$$\text{Torque (in. lbs)} = \frac{\text{psi x disp. (in}^3\text{)}}{6.28}$$

$$\text{Flow (lpm)} = \frac{\text{rpm x disp. (cc)}}{(1{,}000 \times \eta v)}$$

$$\text{Flow (gpm)} = \frac{\text{rpm x disp. (in}^3\text{)}}{231}$$

$$\text{Power (kW)} = \frac{\text{torque (Nm) x rpm}}{9{,}550}$$

$$\text{Fluid power (hp)} = \frac{\text{gpm x psi}}{1{,}714}$$

$$\text{Torque (Nm)} = \frac{\text{power (Kw) x 9,550}}{\text{rpm}}$$

$$\text{Torque (in. lbs)} = \frac{\text{hp x 63,025}}{\text{rpm}}$$

Where:
ηm = Mechanical efficiency
ηv = Volumetric efficiency

For estimates of performance use:
ηm = 0.95
ηv = 0.95

These can be assumed as typical values for 50% of maximum continuous speed and 275 bar pressure

Differential pressure =
inlet pressure - outlet pressure

CONVERSIONS

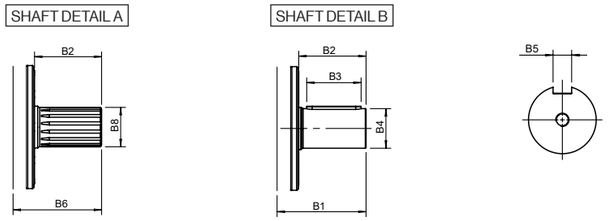
Nm → lbf.ft = x 0.7376
N → lbf = x 0.2248
bar → psi = x 14.5038
cc → in^3 = x 0.061
lpm → U.S. gpm = x 0.2641
kW → hp = x 1.341
kg → lb = x 2.2046

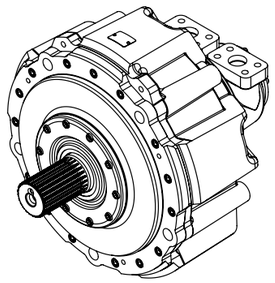
TECHNICAL DATA NOTES

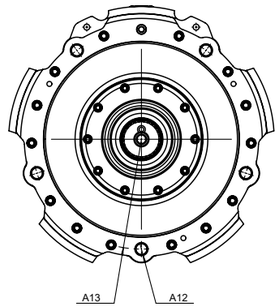
The notes below correspond with the numbered data in the following datasheets.

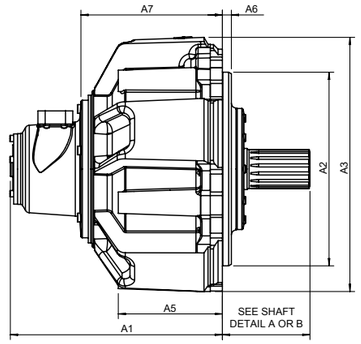
1. Intermittent values up to the maximum shown may occur for up to 10% of every minute as part of a known duty cycle, subject to approval.
2. Whether or not the motor shaft is rotating, positive gauge pressure must be maintained at both main ports at all times whilst the motor is under load. Boost pressure should not be less than 7 bar above case pressure with a fluid viscosity of 30 cSt. When utilising higher viscosities, higher boost pressures will be required. For over-running conditions, please consult Rotary Power.
3. Case pressure should be kept to the minimum possible. Continuously high case pressure will adversely affect the life of the shaft seal system. Motor drain lines should be independently returned to the tank.
4. SMA motors will operate successfully on a wide variety of hydraulic fluids.
5. For very high or very low speed operation, fluid viscosity should be as high as possible within the optimum viscosity limits.
6. Higher temperatures may be possible if required through the use of alternative seal materials, providing that fluid viscosity remains within the optimum range.
7. Please contact Rotary Power for a more detailed assessment of specific applications.
8. Weights and diameters shown are an approximation and depend on final specification supplied.

PERFORMANCE DATA
SMA ROTATING SHAFT MOTOR TYPE C1 STANDARD



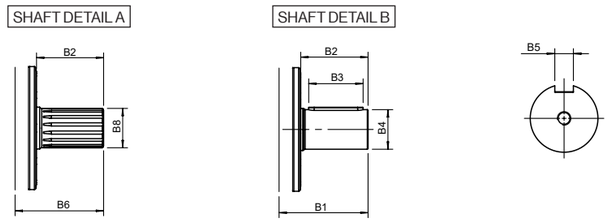


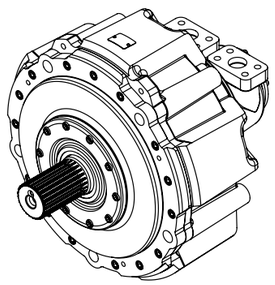


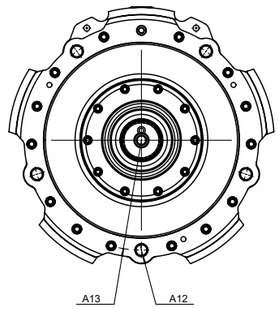


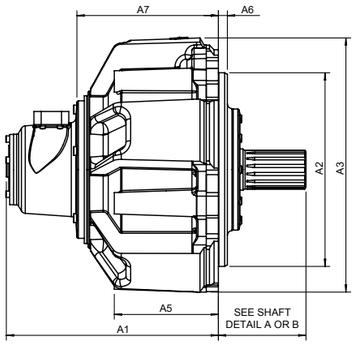
Nominal displacement (cc/rev) [in³]		200 [12.2]	290 [17.7]	350 [21.4]	480 [29.3]	500 [30.5]	650 [39.7]	750 [45.8]	850 [51.9]	1,000 [61]	1,230 [75]	1,340 [81.8]	1,600 [97.6]	2,000 [122]	2,200 [134.2]	2,500 [152.6]	3,200 [195.3]	3,500 [213.6]	4,350 [265.4]	7,000 [427]	7,400 [451.5]	8,700 [530.9]	8,800 [537]	10,500 [640.7]	13,000 [793.3]	16,000 [976.3]
Dimensions in mm [in]	A1	315 [12.4]	315 [12.4]	315 [12.4]	315 [12.4]	335 [13.19]	335 [13.19]	394 [15.51]	394 [15.51]	394 [15.51]	394 [15.51]	449 [17.68]	449 [17.68]	507.5 [19.98]	449 [17.68]	507.5 [19.98]	507.5 [19.98]	602 [23.70]	602 [23.70]	761 [29.96]	601 [23.66]	761 [29.96]	601 [23.66]	601 [23.66]	708 [27.8]	708 [27.8]
	A2	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø280 [11.02]	ø280 [11.02]	ø315 [12.4]	ø315 [12.4]	ø315 [12.4]	ø315 [12.4]	ø400 [15.75]	ø400 [15.75]	ø450 [17.72]	ø400 [15.75]	ø450 [17.72]	ø450 [17.72]	ø560 [22.05]	ø560 [22.05]	ø560 [22.05]	ø790 [31.10]	ø560 [22.05]	ø790 [31.10]	ø790 [31.10]	ø908 [35.78]	ø908 [35.78]
	A3	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø370 [14.57]	ø370 [14.57]	ø436 [17.17]	ø436 [17.17]	ø436 [17.17]	ø434 [17.1]	ø545 [21.46]	ø545 [1.77]	ø583 [22.95]	ø545 [21.46]	ø583 [22.95]	ø583 [22.95]	ø695 [27.36]	ø695 [27.36]	ø700 [27.56]	ø900 [35.43]	ø700 [27.56]	ø900 [35.43]	ø900 [35.43]	ø1140 [44.92	ø1140 [44.92]
	A5	139 [5.47]	139 [5.47]	139 [5.47]	139 [5.47]	150 [5.91]	150 [5.91]	187.5 [7.38]	187.5 [7.38]	187.5 [7.38]	187.5 [7.38]	215 [8.46]	215 [8.46]	242.0 [9.53]	215 [8.46]	242.0 [9.53]	242.0 [9.53]	86 [3.39]	86 [3.39]	100 [3.94]	102 [4.02]	100 [3.94]	102 [4.02]	102 [4.02]	411 [16.19]	411 [16.19]
	A6	12 [0.47]	12 [0.47]	12 [0.47]	12 [0.47]	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	19 [0.75]	19 [0.75]	15 [0.59]	19 [0.75]	15 [0.59]	15 [0.59]	27 [1.06]	27 [1.06]	27 [1.06]	13 [0.51]	27 [1.06]	13 [0.51]	13 [0.51]	30 [1.18]	30 [1.18]
	A7	236.5 [9.31]	236.5 [9.31]	236.5 [9.31]	236.5 [9.31]	259.5 [10.22]	259.5 [10.22]	308.5 [12.15]	308.5 [12.15]	308.5 [12.15]	263 [10.36]	345 [13.58]	345 [13.58]	386 [15.2]	345 [13.58]	386 [15.2]	386 [15.2]	462 [18.19]	462 [18.19]	690 [27.17]	474 [18.66]	690 [27.17]	474 [18.66]	474 [18.66]	530 [20.88]	530 [20.88]
	A12	ø24	ø24	ø24	ø24	ø22	ø22	ø24	ø24	ø24	ø24	ø22	ø22	ø24	ø22	ø24	ø24	ø26	ø26	ø22	ø24	ø22	ø24	ø24	ø26	ø26
	A13	M5	M5	M5	M5	M6	M6	M12	M12	M12	M12	M16	M16	M16	M16	M16	M16	M16	M16	M146	-	M16	-	-	-	-
	B1	122 [4.8]	122 [4.8]	122 [4.8]	122 [4.8]	154 [6.06]	154 [6.06]	156 [6.14]	156 [6.14]	156 [6.14]	155 [6.11]	181 [7.13]	181 [7.13]	184 [7.24]	181 [7.13]	184 [7.24]	184 [7.24]	225 [8.86]	225 [8.86]	225 [8.86]	305 [12.01]	225 [8.86]	305 [12.01]	305 [12.01]	-	-
	B2	82 [3.23]	82 [3.23]	82 [3.23]	82 [3.23]	105 [4.13]	105 [4.13]	105 [4.13]	105 [4.13]	105 [4.13]	105 [4.13]	130 [5.12]	130 [5.12]	150 [5.91]	130 [5.12]	150 [5.91]	150 [5.91]	165 [6.5]	165 [6.5]	165 [6.5]	220 [8.66]	165 [6.5]	220 [8.66]	220 [8.66]	-	-
	B3	69 [2.72]	69 [2.72]	69 [2.72]	69 [2.72]	74 [2.91]	74 [2.91]	92 [3.62]	92 [3.62]	92 [3.62]	80 [3.15]	120 [4.72]	120 [4.72]	135 [5.31]	120 [4.72]	135 [5.31]	135 [5.31]	145 [5.71]	145 [5.71]	145 [5.71]	208 [8.19]	145 [5.71]	208 [8.19]	208 [8.19]	-	-
	B4	ø50 [1.97]	ø50 [1.97]	ø50 [1.97]	ø50 [1.97]	ø60 [2.36]	ø60 [2.36]	ø63 [2.48]	ø63 [2.48]	ø63 [2.48]	ø63 [2.48]	ø80 [3.15]	ø80 [3.15]	ø95 [3.74]	ø80 [3.15]	ø95 [3.74]	ø95 [3.74]	ø110 [4.33]	ø110 [4.33]	ø110 [4.33]	ø160 [6.30]	ø110 [4.33]	ø160 [6.30]	ø160 [6.30]	-	-
	B5	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	18 [0.71]	18 [0.71]	18 [0.71]	18 [0.71]	18 [0.71]	18 [0.71]	22 [0.87]	22 [0.87]	25 [0.98]	22 [0.87]	25 [0.98]	25 [0.98]	28 [110]	28 [110]	28 [110]	40 [1.57]	28 [110]	40 [1.57]	40 [1.57]	-	-
	B6	122 [4.80]	122 [4.80]	122 [4.80]	122 [4.80]	154 [6.06]	154 [6.06]	156 [6.14]	156 [6.14]	156 [6.14]	155 [6.11]	181 [7.13]	181 [7.13]	184 [7.24]	181 [7.13]	184 [7.24]	184 [7.24]	225 [8.86]	225 [8.86]	223 [8.78]	305 [12.01]	223 [8.78]	305 [12.01]	305 [12.01]	-	-
	B7	63 [2.48]	63 [2.48]	63 [2.48]	63 [2.48]	85 [3.35]	85 [3.35]	80 [3.15]	80 [3.15]	80 [3.15]	80 [3.15]	105 [4.13]	105 [4.13]	100 [3.94]	105 [4.13]	100 [3.94]	100 [3.94]	140 [5.51]	140 [5.51]	130 [5.12]	180 [7.09]	130 [5.12]	180 [7.09]	180 [7.09]	-	-
	B8	19t 10/20	19t 10/20	19t 10/20	19t 10/20	18t 8/16	18t 8/16	19t 8/16	19t 8/16	19t 8/16	19t 8/16	24t 8/16	24t 8/16	28t 8/16	24t 8/16	28t 8/16	28t 8/16	25t 6/12	25t 6/12	26t 6/12	41t 6/12	26t 6/12	41t 6/12	41t 6/12	-	-
Geometric displacement (cc/rev) [in³]		208 [12.7]	289.5 [17.7]	339.5 [20.7]	480 [29.2]	502.5 [30.6]	663 [40.5]	756.5 [46.2]	856.5 [52.3]	996 [60.8]	1,233.5 [75.3]	1,343 [81.9]	1,602.5 [97.8]	2,003 [122.2]	2,227.5 [135.9]	2,507 [153]	3,215 [196.2]	3,504.5 [213.8]	4,349 [265.4]	7,008.5 [427.7]	7,381.5 [450.4]	8,698 [530.8]	8,811.5 [537.7]	10,498 [640.6]	13,000 [793.3]	16,400 [1,000.7]
Max. speed cont. (rev/min)		480	480	480	480	430	430	380	350	350	283	321	300	285	216	285	240	240	240	240	180	240	150	125	125	125
Max. speed int. (rev/min) (1)		768	768	768	768	688	688	608	560	560	453	512	480	456	346	456	384	384	384	384	288	384	240	200	150	150
Max. speed freewheel (rev/min)		768	768	768	768	688	688	608	560	560	453	512	480	456	346	456	387	387	387	387	288	387	240	200	150	150
Min. speed std. motor (rev/min)		5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	2-4	5-10	2-4	5-10	5-10	5	5
Max. torque cont. (Nm) [lbf.ft]		1,157 [853.3]	1,611 [1,225]	1,890 [1,393.9]	2,677 [1,974.3]	2,798 [2,063.5]	2,215 [1,633.6]	4,215 [3,108.6]	4,770 [3,517.9]	5,549 [4,092.4]	6,870 [5,066.6]	7,480 [5,516.5]	8,925 [6,582.2]	11,156 [8,227.6]	12,405 [9,148.7]	13,964 [10,298.5]	10,744 [7,923.7]	19,518 [14,394.5]	17,302 [12,760.2]	39,036 [28,789.1]	41,112 [30,320.1]	34,604 [25,520.5]	49,078 [36,195]	58,470 [43,121.6]	72,406 [53,399.4]	91,343 [67,365.5]
Max. torque intermittent (Nm) [lbf.ft] (1)		1,620 [1,194.8]	2,256 [1,663.8]	2,646 [1,951.4]	3,748 [2,764.2]	3,918 [2,889.5]	3,059 [2,225.6]	5,900 [4,351.3]	6,679 [4,925.8]	7,768 [5,728.9]	9,618 [7,093.3]	10,471 [7,722.4]	12,495 [9,215.1]	15,619 [11,519]	17,368 [12,808.9]	19,550 [14,418.1]	14,837 [10,942.3]	27,325 [20,152.2]	24,223 [17,864.5]	54,650 [40,304.4]	57,557 [42,448.3]	48,445 [35,728.2]	68,710 [50,673.6]	81,858 [60,370.3]	101,369 [74,759.6]	127,880 [94,311.5]
Max. power cont. (kW) [hp]		28 [37.5]	40 [53.6]	48 [64.4]	68 [91.2]	61 [81.8]	80 [107.3]	84 [112.6]	95 [127.4]	100 [134.1]	124 [166.3]	125 [167.6]	140 [187.7]	195 [261.5]	165 [221.3]	185 [248.1]	237 [317.8]	245 [328.5]	304 [407.7]	490 [657.1]	443 [549.1]	608 [815.3]	528 [708]	630 [844.8]	820 [1,099.6]	900 [1,206.9]
Max. power int. (kW) [hp] (1)		56 [75.1]	80 [107.3]	96 [128.7]	136 [182.4]	122 [163.6]	160 [214.6]	168 [225.3]	190 [254.8]	200 [268.2]	248 [332.6]	250 [335.3]	280 [375.5]	390 [523]	330 [442.5]	370 [496.2]	474 [635.6]	490 [657.1]	608 [815.3]	980 [1,314.2]	886 [1,188.1]	1,216 [1,630.7]	1,056 [1,416.1]	1,260 [1,689.7]	1,640 [2,199.2]	1,800 [2,413.8]
Max. diff. pressure cont. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	250 [3,625]	350 [5,075]	350 [5,075]	250 [3,625]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]
Max. diff. pressure int. (bar) [psi] (1)		490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	290 [4,205]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	290 [4,205]	490 [7,105]	350 [5,075]	490 [7,105]	490 [7,105]	350 [5,075]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]
Max. flow cont. l/min		100	139	163	231	216	285	288	300	349	349	430	481	571	481	715	772	841	1,044	1,682	1,329	2,088	1,322	1,312	1,625	2050
Max. flow int. l/min (1)		160	222	261	369	346	456	460	480	558	558	688	769	770	913	1,143	1,235	1,346	1,670	2,691	2,126	3,340	2,115	2,100	1,950	2460
Return pressure min. (bar) [psi] (2)		7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]
Return pressure max. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	250 [3,625]	350 [5,075]	350 [5,075]	250 [3,625]	350 [5,075]	350 [5,075]	350	350
Case pressure max. (bar) [psi] (3)		8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]
Starting torque (Nm) [lbf.ft] (7)	Min. @ max. cont. pressure	1,053 [776.7]	1,465 [1,080.6]	1,720 [1,268.7]	2,437 [1,797.5]	2,547 [1,878.7]	2,016 [1,487.0]	3,836 [2,829.4]	4,342 [3,202.7]	5,050 [3,724.9]	6,252 [4,611.5]	6,807 [5,020.8]	8,123 [5,991.5]	10,153 [7,488.9]	11,290 [8,327.5]	12,709 [9,374.2]	9,778 [7,212.3]	17,764 [13,102.7]	15,747 [11,615.0]	35,527 [26,204.7]	37,417 [27,598.8]	31,493 [23,229.2]	44,667 [32,946.4]	53,214 [39,250.6]	65,809 [48,540.7]	83,122 [61,310.8]
	Average @ max. cont. pressure	1,077 [794.4]	1,499 [1,105.7]	1,758 [1,296.7]	2,490 [1,836.6]	2,603 [1,920]	2,060 [1,519.5]	3,920 [2,891.4]	4,437 [3,272.7]	5,161 [3,806.8]	6,390 [4,713.3]	6,957 [5,131.5]	8,301 [6,122.8]	10,377 [7,654.1]	11,538 [8,510.4]	12,989 [9,580.7]	9,993 [7,370.8]	18,154 [13,390.4]	16,093 [11,870.2]	36,308 [26,780.8]	38,239 [28,205.1]	32,186 [23,740.4]	45,649 [33,670.7]	54,384 [40,113.6]	67,337 [49,667.8]	84,947 [62,656.9]
	Min. @ max. int. pressure	1,475 [1,088]	2,053 [1,514.3]	2,408 [1,776.1]	3,411 [2,516]	3,565 [2,629.5]	2,784 [2,053.5]	5,370 [3,960.9]	6,078 [4,483.1]	7,070 [5,214.8]	8,753 [6,456.2]	9,530 [7,029.3]	11,372 [8,388]	14,215 [10,485]	15,806 [11,658.5]	17,793 [13,124.1]	13,503 [9,959.8]	24,869 [18,343.4]	22,045 [16,260.4]	49,738 [36,686.7]	52,383 [38,637.7]	44,091 [32,521.5]	62,534 [46,125.1]	74,500 [54,951.2]	92,245 [68,039.9]	116,371 [85,835.2]
	Average @ max. int. pressure (1)	1,507 [1,111.6]	2,098 [1,547.5]	2,461 [1,815.2]	3,486 [2,571.3]	3,644 [2,687.8]	2,845 [2,098.5]	5,488 [4,047.9]	6,212 [4,582]	7,225 [5,329.2]	8,945 [6,597.8]	9,740 [7,184.2]	11,622 [8,572.4]	14,527 [10,715.1]	16,154 [11,915.2]	18,184 [13,412.5]	13,800 [10,178.9]	25,416 [18,746.8]	22,530 [16,618.1]	50,831 [37,492.9]	53,535 [39,487.4]	45,060 [33,236.3]	63,908 [47,138.5]	76,137 [56,158.7]	94,273 [69,535.8]	118,928 [87,721.3]
Approx. weight (kg) [lbs] (8)		83 [183]	83 [183]	83 [183]	88 [194]	110 [242.6]	110 [242.6]	170 [374.9]	170 [374.9]	170 [374.9]	170 [374.9]	290 [639.5]	290 [639.5]	440 [970.2]	327 [721]	440 [970.2]	440 [970.2]	790 [1,742]	790 [1,742]	1,140 [2,513.7]	1,250 [2,756.3]	1,140 [2,513.7]	1,250 [2,756.3]	1,250 [2,756.3]	2,600 [3,486.6]	2,600 [3,486.6]

PERFORMANCE DATA
SMA ROTATING SHAFT MOTOR TYPE C1 HIGH POWER



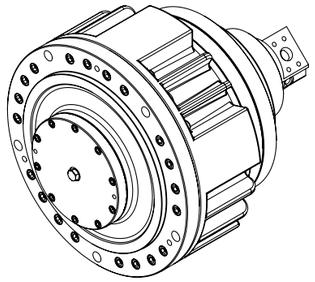


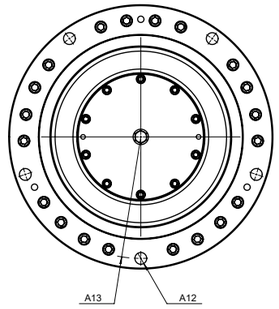


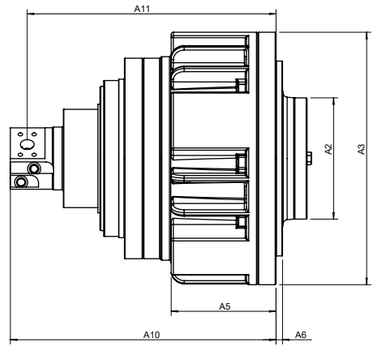


Nominal displacement (cc/rev) [in³]		200 [12.2]	290 [17.7]	350 [21.4]	480 [29.3]	500 [30.5]	650 [39.7]	750 [45.8]	850 [51.9]	1,000 [61]	1,230 [75.1]	1,340 [81.8]	1,600 [97.6]	2,000 [122]	2,200 [134.2]	2,500 [152.6]	3,200 [195.3]	3,500 [213.6]	4,350 [265.4]
Dimensions in mm [in]	**A1**	315 [12.4]	315 [12.4]	315 [12.4]	315 [12.4]	335 [13.19]	335 [13.19]	394 [15.51]	394 [15.51]	394 [15.51]	394 [15.51]	449 [17.68]	449 [17.68]	507.5 [19.98]	449 [17.68]	507.5 [19.98]	507.5 [19.98]	602 [23.70]	602 [23.70]
	A2	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø280 [11.02]	ø280 [11.02]	ø315 [12.4]	ø315 [12.4]	ø315 [12.4]	ø315 [12.4]	ø400 [15.75]	ø400 [15.75]	ø450 [17.72]	ø400 [15.75]	ø450 [17.72]	ø450 [17.72]	ø560 [22.05]	ø560 [22.05]
	A3	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø370 [14.57]	ø370 [14.57]	ø436 [17.17]	ø436 [17.17]	ø436 [17.17]	ø434 [17.1]	ø545 [21.46]	ø545 [21.46]	ø583 [22.95]	ø545 [21.46]	ø583 [22.95]	ø583 [22.95]	ø695 [27.36]	ø695 [27.36]
	A5	139 [5.47]	139 [5.47]	139 [5.47]	139 [5.47]	150 [5.91]	150 [5.91]	187.5 [7.38]	187.5 [7.38]	187.5 [7.38]	187.5 [7.38]	215 [8.46]	215 [8.46]	242 [9.53]	215 [8.46]	242 [9.53]	242 [9.53]	86 [3.39]	86 [3.39]
	A6	12 [0.47]	12 [0.47]	12 [0.47]	12 [0.47]	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	19 [0.75]	19 [0.75]	15 [0.59]	19 [0.75]	15 [0.59]	15 [0.59]	27 [1.06]	27 [1.06]
	A7	236.5 [9.31]	236.5 [9.31]	236.5 [9.31]	236.5 [9.31]	259.5 [10.22]	259.5 [10.22]	308.5 [12.15]	308.5 [12.15]	308.5 [12.15]	263 [10.36]	345 [13.58]	345 [13.58]	386 [15.20]	345 [13.58]	386 [15.2]	386 [15.2]	462 [18.19]	462 [18.19]
	A12	ø24	ø24	ø24	ø24	ø22	ø22	ø24	ø24	ø24	ø24	ø22	ø22	ø22	ø24	ø24	ø24	ø26	ø26
	A13	M5	M5	M5	M5	M6	M6	M12	M12	M12	M12	M16	M16	M16	M16	M16	M16	M16	M16
	B1	122 [4.8]	122 [4.8]	122 [4.8]	122 [4.8]	154 [6.06]	154 [6.06]	156 [6.14]	156 [6.14]	156 [6.14]	155 [6.11]	181 [7.13]	181 [7.13]	184 [7.24]	181 [7.13]	184 [7.24]	184 [7.24]	225 [8.86]	225 [8.86]
	B2	82 [3.23]	82 [3.23]	82 [3.23]	82 [3.23]	105 [4.13]	105 [4.13]	105 [4.13]	105 [4.13]	105 [4.13]	105 [4.13]	130 [5.12]	130 [5.12]	150 [5.91]	130 [5.12]	150 [5.91]	150 [5.91]	165 [6.5]	165 [6.5]
	B3	69 [2.72]	69 [2.72]	69 [2.72]	69 [2.72]	74 [2.91]	74 [2.91]	92 [3.62]	92 [3.62]	92 [3.62]	80 [3.15]	120 [4.72]	120 [4.72]	135 [5.31]	120 [4.72]	135 [5.31]	135 [5.31]	145 [5.71]	145 [5.71]
	B4	ø50 [1.97]	ø50 [1.97]	ø50 [1.97]	ø50 [1.97]	ø60 [2.36]	ø60 [2.36]	ø63 [2.48]	ø63 [2.48]	ø63 [2.48]	ø63 [2.48]	ø80 [3.15]	ø80 [3.15]	ø95 [3.74]	ø80 [3.15]	ø95 [3.74]	ø95 [3.74]	ø110 [4.33]	ø110 [4.33]
	B5	16 [0.63]	16 [0.63]	16 [0.63]	16 [0.63]	18 [0.71]	18 [0.71]	18 [0.71]	18 [0.71]	18 [0.71]	18 [0.71]	22 [0.87]	22 [0.87]	25 [0.98]	22 [0.87]	25 [0.98]	25 [0.98]	28 [1.10]	28 [1.10]
	B6	122 [4.8]	122 [4.8]	122 [4.8]	122 [4.8]	154 [6.06]	154 [6.06]	156 [6.14]	156 [6.14]	156 [6.14]	155 [6.11]	181 [7.13]	181 [7.13]	184 [7.24]	181 [7.13]	184 [7.24]	184 [7.24]	225 [8.86]	225 [8.86]
	B7	63 [2.48]	63 [2.48]	63 [2.48]	63 [2.48]	85 [3.35]	85 [3.35]	80 [3.15]	80 [3.15]	80 [3.15]	80 [3.15]	105 [4.13]	105 [4.13]	100 [3.94]	105 [4.13]	100 [3.94]	100 [3.94]	140 [5.51]	140 [5.51]
	B8	19t 10/20	19t 10/20	19t 10/20	19t 10/20	18t 8/16	18t 8/16	19t 8/16	19t 8/16	19t 8/16	19t 8/16	24t 8/16	24t 8/16	28t 8/16	24t 8/16	28t 8/16	28t 8/16	25t 6/12	25t 6/12
Geometric displacement (cc/rev) [in³]		208 [12.7]	289.5 [17.7]	339.5 [20.7]	480.5 [29.3]	502.5 [30.7]	663 [40.5]	756.5 [46.2]	856.5 [52.3]	996 [60.8]	1,233.5 [75.3]	1,343 [81.9]	1,602.4 [97.8]	2,003 [122.2]	2,227.5 [135.9]	2,807 [171.3]	3,215 [196.2]	3,504.5 [213.8]	4,349 [265.4]
Max. speed cont. (rev/min)		1000	1000	1000	710	700	700	620	620	600	485	565	565	380	406	380	380	350	240
Max. speed int. (rev/min) (1)		1250	1250	1250	890	880	880	780	780	750	776	700	700	475	560	475	475	438	348
Max. speed freewheel (rev/min)		1250	1250	1250	890	880	880	780	780	750	776	700	700	475	650	475	475	438	384
Min. speed std. motor (rev/min)		20	20	20	20	20	20	20	20	20	5-10	20	20	20	5-10	20	20	20	20
Max. torque cont. (Nm) [lbf.ft]		1,157 [853.3]	1,611 [1,225]	1,890 [1,393.9]	2,677 [1,974.3]	2,798 [2,063.5]	2,215 [1,633.6]	4,215 [3,108.6]	4,770 [3,517.9]	5,549 [4,092.4]	6,870 [5,066.6]	7,480 [5,516.5]	8,925 [6,582.2]	11,156 [8,227.6]	12,405 [9,148.7]	13,964 [10,298.5]	10,744 [7,923.7]	19,518 [14,394.5]	17,302 [12,760.2]
Max. torque intermittent (Nm) [lbf.ft] (1)		1,620 [1,194.8]	2,256 [1,663.8]	2,646 [1,951.4]	3,748 [2,764.2]	3,918 [2,889.5]	3,101 [2,287]	5,900 [4,351.3]	6,679 [4,925.8]	7,768 [5,728.9]	9,618 [7,093.3]	10,471 [7,722.4]	12,495 [9,215.1]	15,619 [12,256.5]	17,368 [12,808.9]	19,550 [14,418.1]	14,837 [10,942.3]	27,325 [20,152.2]	24,223 [32,844.7]
Max. power cont. (kW) [hp]		54 [72.4]	76 [101.9]	89 [119.3]	126 [169]	101 [135.4]	135 [181]	172 [230.7]	245 [328.5]	187 [250.8]	232 [311.1]	224 [300.4]	271 [363.4]	222 [297.7]	377 [505.6]	277 [371.5]	355 [476.1]	390 [523]	304 [407.7]
Max. power int. (kW) [hp] (1)		108 [144.8]	152 [203.8]	178 [238.7]	252 [337.9]	202 [270.9]	270 [362.1]	344 [461.3]	490 [657.1]	374 [501.5]	464 [622.2]	448 [600.8]	542 [726.8]	444 [595.4]	754 [1011.1]	554 [742.9]	710 [952.1]	780 [1046]	608 [815.3]
Max. diff. pressure cont. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	250 [3,625]
Max. diff. pressure int. (bar) [psi] (1)		490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	294 [4,263]	490 [7,105]	350 [5,075]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	294 [4,263]	490 [7,105]	350 5,075
Max. flow cont. l/min		208	289	339	341	352	464	469	531	598	598	759	905	761	504	953	1,222	1,227	1,044
Max. flow int. l/min (1)		260	362	424	428	442	583	590	668	747	957	940	1,122	951	1,447	1,191	1,527	1,535	1,670
Return pressure min. (bar) [psi] (2)		7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]
Return pressure max. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	250 [3,625]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	250 [3,625]
Case pressure max. (bar) [psi] (3)		8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]
Starting torque (Nm) [lbf.ft] (7)	**Min. @ max. cont. pressure**	1,053 [776.7]	1,465 [1,080.6]	1,720 [1,268.7]	2,437 [1,797.5]	2,547 [1,878.7]	2,016 [1,487.0]	3,836 [2,829.4]	4,342 [3,202.7]	5,050 [3,724.9]	6,252 [4,611.5]	6,807 [5,020.8]	8,123 [5,991.5]	11,290 [8,327.5]	10,153 [7,488.9]	12,709 [9,374.2]	9,778 [7,212.3]	17,764 [13,102.7]	15,747 [11,615.0]
	Average @ max. cont. pressure	1,077 [794.4]	1,499 [1,105.7]	1,758 [1,296.7]	2,490 [1,836.6]	2,603 [1,920]	2,060 [1,519.5]	3,920 [2,891.4]	4,437 [3,272.7]	5,161 [3,806.8]	6,390 [4,713.3]	6,957 [5,131.5]	8,301 [6,122.8]	11,538 [8,510.4]	10,377 [7,654.1]	12,989 [9,580.7]	9,993 [7,370.8]	18,154 [13,390.4]	16,093 [11,870.2]
	Min. @ max. int. pressure	1,475 [1,088]	2,053 [1,514.3]	2,408 [1,776.1]	3,411 [2,516]	3,565 [2,629.5]	2,784 [2,053.5]	5,370 [3,960.9]	6,078 [4,483.1]	7,070 [5,214.8]	8,753 [6,456.2]	9,530 [7,029.3]	11,372 [8,388]	15,806 [11,658.5]	14,215 [10,485]	17,793 [13,124.1]	13,503 [9,959.8]	24,869 [18,343.4]	22,045 [16,260.4]
	Average @ max. int. pressure (1)	1,507 [1,111.6]	2,098 [1,547.5]	2,461 [1,815.2]	3,486 [2,571.3]	3,644 [2,687.8]	2,845 [2,098.5]	5,488 [4,047.9]	6,212 [4,582]	7,225 [5,329.2]	8,945 [6,597.8]	9,740 [7,184.2]	11,622 [8,572.4]	16,154 [11,915.2]	14,527 [10,715.1]	18,184 [13,412.5]	13,800 [10,178.9]	25,416 [18,746.8]	22,530 [16,618.1]
Approx. weight (kg) [lbs] (7)		83 [183]	83 [183]	83 [183]	88 [194]	110 [242.6]	110 [242.6]	170 [374.9]	170 [374.9]	170 [374.9]	180 [396.9]	290 [639.5]	290 [639.5]	440 [970.2]	322 [710]	440 [970.2]	440 [970.2]	790 [1,742]	790 [1,742]

PERFORMANCE DATA
SMA ROTATING CASE MOTOR TYPE E1 STANDARD

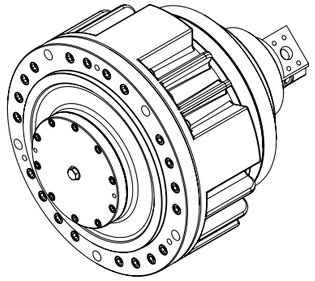


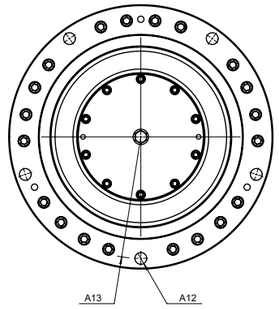


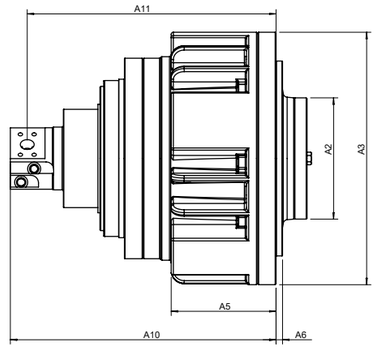


Nominal displacement (cc/rev) [in³]		200 [12.2]	290 [17.7]	350 [21.4]	480 [29.3]	750 [45.8]	1,000 [61]	1,230 [75.1]	1,340 [81.8]	1,600 [97.6]	2,000 [122]	2,200 [134.2]	2,500 [152.6]	3,200 [195.3]
Dimensions in mm [in]	**A2**	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø315 [12.4]	ø315 [12.4]	ø315 [12.4]	ø400 [15.75]	ø400 [15.75]	ø450 [17.72]	ø400 [15.75]	ø450 [17.72]	ø450 [17.72]
	A3	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø436 [17.17]	ø436 [17.17]	ø434 [17.1]	ø545 [21.46]	ø545 [21.46]	ø583 [22.95]	ø545 [21.46]	ø583 [22.95]	ø583 [22.95]
	A5	139 [5.47]	139 [5.47]	139 [5.47]	139 [5.47]	187.5 [7.38]	187.5 [7.38]	187.5 [7.38]	215 [8.46]	215 [8.46]	242 [9.53]	215 [8.46]	242 [9.53]	242 [9.53]
	A6	12 [0.47]	12 [0.47]	12 [0.47]	12 [0.47]	16 [0.63]	16 [0.63]	16 [0.63]	19 [0.75]	19 [0.75]	15 [0.59]	19 [0.75]	15 [0.59]	15 [0.59]
	A10	296 [11.65]	296 [11.65]	296 [11.65]	296 [11.65]	474 [18.66]	474 [18.66]	478.5 [18.85]	534 [21.02]	534 [21.02]	575 [22.64]	534 [21.02]	575 [22.64]	575 [22.64]
	A11	256 [10.08]	256 [10.08]	256 [10.08]	256 [10.08]	418 [16.46]	418 [16.46]	422.5 [16.65]	478 [18.82]	478 [18.82]	490 [19.29]	478 [18.82]	490 [19.29]	490 [19.29]
	A12	M30	M30	M30	M30	M20	ø22	M20	ø22	M24	ø26	M24	ø26	ø26
	A13	9/16 unf	9/16 unf	9/16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	7/8-14 unf	3/4-16 unf	7/8-14 unf	7/8-14 unf
Geometric displacement (cc/rev) [in³]		200 [12.2]	289.5 [17.7]	339.5 [20.7]	480.5 [29.3]	756.5 [46.2]	996 [60.8]	1,233.5 [75.3]	1,343 [81.9]	1,602.5 [97.8]	2,003 [122.2]	2,227.5 [135.9]	2,507 [153.0]	3,215 [196.2]
Max. speed cont. (rev/min)		480	480	480	480	380	350	283	320	300	285	216	285	240
Max. speed int. (rev/min) (1)		768	768	768	768	608	560	453	512	480	456	346	456	384
Max. speed freewheel (rev/min)		768	768	768	768	608	560	453	512	480	456	346	456	384
Min. speed std. motor (rev/min)		5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10
Max. torque cont. (Nm) [lbf.ft]		1,114 [821.7]	1,611 [1,188.1]	1,890 [1,393.9]	2,677 [1,974.3]	4,215 [3,108.6]	5,549 [4,092.4]	6,870 [5,066.6]	7,480 [5,516.5]	8,925 [6,582.2]	11,156 [8,227.6]	12,405 [9,148.7]	13,964 [10,298.5]	10,744 [7,923.7]
Max. torque intermittent (Nm) [lbf.ft] (1)		1,560 [1,150.7]	2,256 [1,663.8]	2,646 [1,951.4]	3,748 [2,764.2]	5,900 [4,351.3]	7,768 [5,728.9]	9,618 [7,093.3]	10,471 [7,722.4]	12,495 [9,215.1]	15,619 [11,519]	17,368 [12,808.9]	19,550 [14,418.1]	14,837 [10,942.3]
Max. power cont. (kW) [hp]		28 [37.5]	40 [53.6]	48 [64.4]	68 [91.2]	84 [112.6]	100 [134.1]	124 [166.3]	125 [167.6]	140 [187.7]	165 [221.3]	195 [261.5]	185 [248.1]	237 [317.8]
Max. power int. (kW) [hp] (1)		55 [73.8]	80 [107.3]	96 [128.7]	136 [182.4]	168 [225.3]	200 [268.2]	248 [332.6]	250 [335.3]	280 [375.5]	330 [442.5]	390 [523]	370 [496.2]	474 [635.6]
Max. diff. pressure cont. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]
Max. diff. pressure int. (bar) [psi] (1)		490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	290 [4,205]
Max. flow cont. l/min		96	139	163	231	288	349	349	430	481	571	481	715	772
Max. flow int. l/min (1)		153.6	222	261	369	460	558	558	688	769	913	770	1,143	1,235
Return pressure min. (bar) [psi] (2)		7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]
Return pressure max. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]	350 [5,075]	350 [5,075]	350 [5,075]
Case pressure max. (bar) [psi] (3)		8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]
Starting torque (Nm) [lbf.ft] (7)	**Min. @ max. cont. pressure**	1,014 [748]	1,466 [1,081]	1,720 [1,269]	2,437 [1,798]	3,836 [2,829]	5,050 [3,725]	6,252 [4,611]	6,807 [5,021]	8,123 [5,992]	10,153 [7,489]	11,290 [8,328]	12,709 [9,374]	16,297 [12,021]
	Average @ max. cont. pressure	1,039 [766]	1,499 [1,106]	1,758 [1,297]	2,490 [1,836]	3,920 [2,891]	5,161 [3,806]	6,390 [4,713]	6,957 [5,131]	8,301 [6,122]	10,377 [7,653]	11,538 [8,509]	12,989 [9,579]	16,655 [12,283]
	Min. @ max. int. pressure	1,420 [1,047]	2,053 [1,514]	2,408 [1,776]	3,411 [2,516]	5,370 [3,960]	7,070 [5,214]	8,653 [6,382]	9,530 [7,028]	11,372 [8,387]	14,215 [10,484]	15,806 [11,657]	17,793 [13,122]	22,816 [16,827]
	Average @ max. int. pressure (1)	1,451 [1,070]	2,098 [1,547]	2,461 [1,815]	3,486 [2,571]	5,488 [4,047]	7,225 [5,328]	8,945 [6,597]	9,740 [7,183]	11,622 [8,571]	14,527 [10,714]	16,154 [11,914]	18,184 [13,411]	23,317 [17,196]
Approx. weight (kg) [lbs] (7)		80 [176.4]	80 [176.4]	80 [176.4]	85 [187.4]	189 [416.7]	189 [416.7]	176 [388.1]	320 [705.6]	320 [705.6]	490 [1,080.5]	305 [672.5]	490 [1,080.5]	490 [1,080.5]

PERFORMANCE DATA
SMA ROTATING CASE MOTOR TYPE E1 HIGH POWER

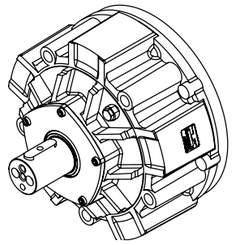


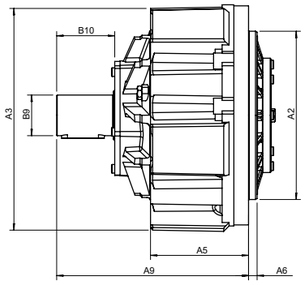


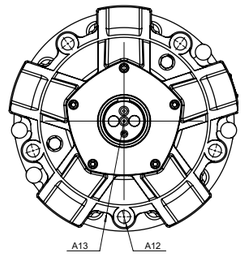


Nominal displacement (cc/rev) [in³]		200 [12.2]	290 [17.7]	350 [21.4]	480 [29.3]	750 [45.8]	1,000 [61]	1,230 [75.1]	1,340 [81.8]	1,600 [97.6]	2,000 [122]	2,200 [134.2]	2,500 [152.6]	3,200 [195.3]
Dimensions in mm [in]	A2	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø250 [9.84]	ø315 [12.4]	ø315 [12.4]	ø315 [12.4]	ø400 [15.75]	ø400 [15.75]	ø450 [17.72]	ø400 [15.75]	ø450 [17.72]	ø450 [17.72]
	A3	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø345 [13.58]	ø436 [17.17]	ø436 [17.17]	ø434 [17.1]	ø545 [21.46]	ø545 [21.46]	ø583 [22.95]	ø545 [21.46]	ø583 [22.95]	ø583 [22.95]
	A5	139 [5.47]	139 [5.47]	139 [5.47]	139 [5.47]	187.5 [7.38]	187.5 [7.38]	187.5 [7.38]	215 [8.46]	215 [8.46]	242 [9.53]	215 [8.46]	242 [9.53]	242 [9.53]
	A6	12 [0.47]	12 [0.47]	12 [0.47]	12 [0.47]	16 [0.63]	16 [0.63]	16 [0.63]	19 [0.75]	19 [0.75]	15 [0.59]	19 [0.75]	15 [0.59]	15 [0.59]
	A10	296 [11.65]	296 [11.65]	296 [11.65]	296 [11.65]	474 [18.66]	474 [18.66]	478.5 [18.85]	534 [21.02]	534 [21.02]	575 [22.64]	534 [21.02]	575 [22.64]	575 [22.64]
	A11	256 [10.08]	256 [10.08]	256 [10.08]	256 [10.08]	418 [16.46]	418 [16.46]	422.5 [16.65]	478 [18.82]	478 [18.82]	490 [19.29]	478 [18.82]	490 [19.29]	490 [19.29]
	A12	M30	M30	M30	M30	M20	ø22	M20	ø22	M24	ø26	M24	ø26	ø26
	A13	9/16 unf	9/16 unf	9/16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	3/4-16 unf	7/8-14 unf	3/4-16 unf	7/8-14 unf	7/8-14 unf
Geometric displacement (cc/rev) [in³]		207 [12.6]	289.3 [17.7]	339.3 [20.7]	480.7 [29.3]	756.7 [46.2]	996.2 [60.8]	1,233.4 [75.3]	1,342.9 [81.9]	1,602.4 [97.8]	2,003.0 [122.2]	2,227.3 [135.9]	2,507.2 [153.0]	3,215.0 [196.2]
Max. speed cont. (rev/min)		1000	1000	1000	710	620	600	485	565	565	380	406	380	380
Max. speed int. (rev/min) (1)		1250	1250	1250	890	780	750	776	700	700	475	650	475	475
Max. speed freewheel (rev/min)		1250	1250	1250	890	780	750	776	700	700	475	650	475	475
Min. speed std. motor (rev/min)		20	20	20	20	20	20	20	20	20	20	20	20	20
Max. torque cont. (Nm) [lbf.ft]		1153 [850]	1,611 [1,188]	1,890 [1,394]	2,677 [1,974]	4,215 [3,109]	5,549 [4,092]	6,870 [5,067]	7,480 [5,517]	8,925 [6,582]	11,156 [8,228]	12,405 [9,149]	13,964 [10,298]	10,744 [7,924]
Max. torque intermittent (Nm) [lbf.ft] (1)		1614 [1,190]	2,256 [1,664]	2,646 [1,951]	3,748 [2,764]	5,900 [4,351]	7,768 [5,729]	9,618 [7,093]	10,471 [7,722]	12,495 [9,215]	15,619 [11,519]	17,368 [12,809]	19,550 [14,418]	14,837 [10,942]
Max. power cont. (kW) [hp]		54 [72.4]	76 [101.9]	89 [119.3]	126 [169]	172 [230.7]	187 [250.8]	232 [311.1]	224 [300.4]	271 [363.4]	222 [297.7]	377 [505.6]	277 [371.5]	355 [476.1]
Max. power int. (kW) [hp] (1)		108 [144.8]	152 [203.8]	178 [238.7]	252 [337.9]	344 [461.3]	374 [501.5]	464 [622.2]	448 [600.8]	542 [726.8]	444 [595.4]	754 [1011.1]	554 [742.9]	710 [952.1]
Max. diff. pressure cont. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	210 [3,045]
Max. diff. pressure int. (bar) [psi] (1)		490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	290 [4,205]
Max. flow cont. l/min		207	289	339	341	469	598	598	759	905	761	904	953	1,222
Max. flow int. l/min (1)		259	262	424	428	590	747	957	940	1,122	951	1,447	1,191	1,527
Return pressure min. (bar) [psi] (2)		7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]
Return pressure max. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]
Case pressure max. (bar) [psi] (3)		8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]
Starting torque (Nm) [lbf.ft] (7)	Min. @ max. cont. pressure	1,014 [748]	1,466 [1,081]	1,720 [1,269]	2,437 [1,798]	3,836 [2,829]	5,050 [3,725]	6,252 [4,611]	6,807 [5,021]	8,123 [5,992]	10,153 [7,489]	11,290 [8,328]	12,709 [9,374]	16,297 [12,021]
	Average @ max. cont. pressure	1,039 [766]	1,499 [1,106]	1,758 [1,297]	2,490 [1,836]	3,920 [2,891]	5,161 [3,806]	6,390 [4,713]	6,957 [5,131]	8,301 [6,122]	10,377 [7,653]	11,538 [8,509]	12,989 [9,579]	16,655 [12,283]
	Min. @ max. int. pressure	1,420 [1,047]	2,053 [1,514]	2,408 [1,776]	3,411 [2,516]	5,370 [3,960]	7,070 [5,214]	8,653 [6,382]	9,530 [7,028]	11,372 [8,387]	14,215 [10,484]	15,806 [11,657]	17,793 [13,122]	22,816 [16,827]
	Average @ max. int. pressure (1)	1,451 [1,070]	2,098 [1,547]	2,461 [1,815]	3,486 [2,571]	5,488 [4,047]	7,225 [5,328]	8,945 [6,597]	9,740 [7,183]	11,622 [8,571]	14,527 [10,714]	16,154 [11,914]	18,184 [13,411]	23,317 [17,196]
Approx. weight (kg.) [lbs] (7)		80 [176.4]	80 [176.4]	80 [176.4]	85 [187.4]	189 [416.7]	189 [416.7]	176 [388.1]	320 [705.6]	320 [705.6]	490 [1,080.5]	305 [672.5]	490 [1,080.5]	490 [1,080.5]

PERFORMANCE DATA
SMA ROTATING CASE MOTOR TYPE B1 STANDARD

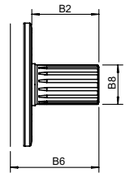




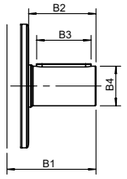


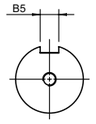
Nominal displacement (cc/rev) [in³]		750 [44]	1,000 [61]
Dimensions in mm [in]	**A2**	ø315 [12.40]	ø315 [12.40]
	A3	ø436 [17.17]	ø436 [17.17]
	A5	187.5 [7.38]	187.5 [7.38]
	A6	16 [0.63]	16 [0.63]
	A9	362 [14.25]	362 [14.25]
	A12	ø24	ø24
	A13	3/4-16 unf	3/4-16 unf
	B9	76 [2.99]	76 [2.99]
	B10	108 [4.25]	108 [4.25]
Geometric displacement (cc/rev) [in³]		756 [46.1]	996 [60.8]
Max. speed cont. (rev/min)		380	350
Max. speed int. (rev/min) (1)		608	560
Max. speed freewheel (rev/min)		608	560
Min. speed std. motor (rev/min)		5-10	5-10
Max. torque cont. (Nm) [lbf.ft]		4,211 [3,105]	5,549 [4,092]
Max. torque intermittent (Nm) [lbf.ft] (1)		5,895 [4,347]	7,768 [5,729]
Max. power cont. (kW) [hp]		84 [112.6]	100 [134.1]
Max. power int. (kW) [hp] (1)		168 [225.3]	200 [268.2]
Max. diff. pressure cont. (bar) [psi] (2)		350 [5,075]	350 [5,075]
Max. diff. pressure int. (bar) [psi] (1)		490 [7,105]	490 [7,105]
Max. flow cont. l/min		287	349
Max. flow int. l/min (1)		460	558
Return pressure min. (bar) [psi] (2)		7 [101.5]	7 [101.5]
Return pressure max. (bar) [psi] (2)		350 [5,075]	350 [5,075]
Case pressure max. (bar) [psi] (3)		8 [116]	8 [116]
Starting torque (Nm) [lbf.ft] (7)	**Min. @ max. cont. pressure**	3,832 [2,826]	5,050 [3,724]
	Average @ max. cont. pressure	3,916 [2,888]	5,161 [3,806]
	Min. @ max. int. pressure	5,364 [3,956]	7,070 [5,214]
	Average @ max. int. pressure (1)	9,482 [6,993]	7,225 [5,328]
Approx. weight (kg) [lbs] (7)		160 [352.8]	160 [352.8]

SHAFT DETAIL A

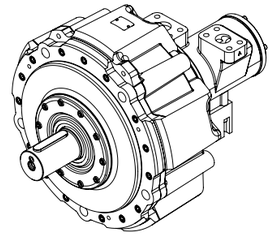


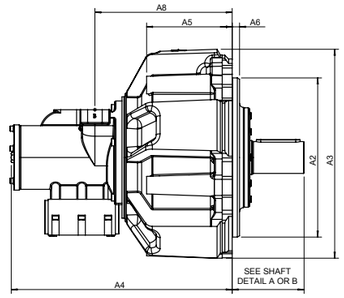
SHAFT DETAIL B

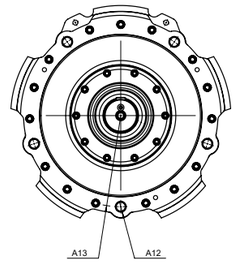




PERFORMANCE DATA
SMA DUAL DISPLACEMENT ROTATING SHAFT MOTOR TYPE C2







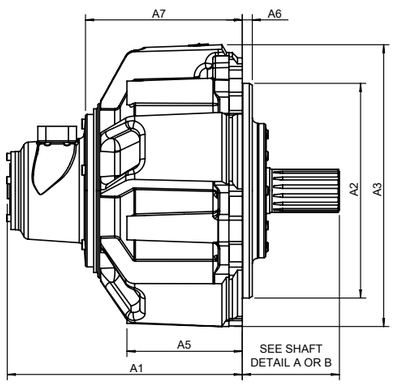
Nominal displacement (cc/rev) [in³]		750 [45.8]	1,000 [61]	1,340 [81.8]	1,600 [97.6]	3,500 [213.6]	7,000 [427.14]	8,700 [530.9]
Dimensions in mm [in]	**A2**	ø315 [12.4]	ø315 [12.4]	ø400 [15.75]	ø400 [15.75]	ø560 [22.05]	ø560 [22.05]	ø560 [22.05]
	A3	ø436 [17.17]	ø436 [17.17]	ø545 [21.46]	ø545 [21.46]	ø695 [27.36]	ø700 [27.56]	ø700 [27.56]
	A4	464 [18.27]	464 [18.27]	557 [21.93]	557 [21.93]	715 [28.15]	807 [31.77]	807 [31.77]
	A5	187.5 [7.38]	187.5 [7.38]	215 [8.46]	215 [8.46]	86 [3.39]	100 [3.94]	100 [3.94]
	A6	16 [0.63]	16 [0.63]	19 [0.75]	19 [0.75]	27 [1.06]	27 [1.06]	27 [1.06]
	A8	306 [12.05]	306 [12.05]	345 [13.58]	345 [13.58]	513 [20.20]	650 [25.59]	650 [25.59]
	A12	ø22	ø24	ø22	ø22	ø26	ø22	ø22
	A13	M12	M12	M16	M16	M16	M16 5/8 unf	M16 5/8 unf
Geometric displacement (cc/rev) [in³]		756 [46.1]	966 [58.9]	1,343 [81.9]	1,602.5 [97.8]	3,506.5 [214]	7,013 [427.9]	8,689.5 [420.4]
Max. speed cont. (rev/min)		360	350	320	300	240	240	240
Max. speed int. (rev/min) (1)		610	560	510	480	380	380	307
Max. speed freewheel (rev/min)		610	560	510	480	380	380	307
Min. speed std. motor (rev/min)		5-10	5-10	5-10	5-10	5-10	2-4	2-4
Max. torque cont. (N.m) [lbf.ft]		4,209 [3,104]	5,541 [4,086]	7,470 [5,509]	8,914 [6,574]	19,505 [14,385]	39,011 [28,771]	48,336 [35,648]
Max. torque intermittent (N.m) [lbf.ft] (1)		5,901 [4,352]	7,769 [5,730]	10,473 [7,724]	12,496 [9,216]	27,346 [20,168]	54,691 [40,335]	67,765 [49,977]
Max. power cont. (k.W) [hp]		84 [112.6]	102 [136.8]	125 [167.6]	140 [187.7]	245 [328.5]	490 [657.1]	607 [814]
Max. power int. (k.W) [hp] (1)		167 [2,421.5]	203 [2,943.5]	140 [2,030]	170 [2,465]	490 [7,105]	980 [14,210]	1,215 [17,617.5]
Max. diff. pressure cont. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	250 [3,625]
Max. diff. pressure int. (bar) [psi] (1)		490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	490 [7,105]	350 [5,075]
Max. flow cont. L/min		288	349	430	481	842	1,683	2,085
Max. flow int. L/min (1)		462	558	685	769	1,332	2,665	2,668
Return pressure min. (bar) [psi] (2)		7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]	7 [101.5]
Return pressure max. (bar) [psi] (2)		350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	350 [5,075]	250 [3,625]
Case pressure max. (bar) [psi] (3)		8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]	8 [116]
Starting torque (Nm) [lbf.ft] (7)	**Min. @ max. cont. pressure**	3,836 [2,829]	5,050 [3,724]	6,807 [5,020]	8,123 [5,991]	17,775 [13,109]	35,940 [26,506]	31,808 [23,458]
	Average @ max. cont. pressure	3,962 [2,922]	5,216 [3,847]	7,032 [5,186]	8,390 [6,188]	18,361 [13,541]	37,503 [27,658]	33,191 [24,478]
	Min. @ max int. pressure	5,370 [3,960]	7,070 [5,214]	5,930 [4,373]	11,372 [8,387]	24,885 [18,353]	50,316 [37,108]	44,531 [32,842]
	Average @max. int. pressure(1)	5,547 [4,091]	7,303 [5,386]	9,844 [7,260]	11,747 [8,663]	25,705 [18,957]	51,410 [37,915]	64,467 [47,544]
Approx. weight (kg) (8)		180 [396.9]	180 [396.9]	305 [672.5]	305 [672.5]	760 [1,675.8]	1,100 [2,425.5]	1,100 [2,425.5]

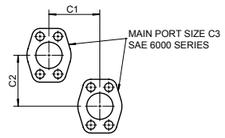
Maximum displacement for dual displacement motors

Please contact Rotary Power for second speed data.

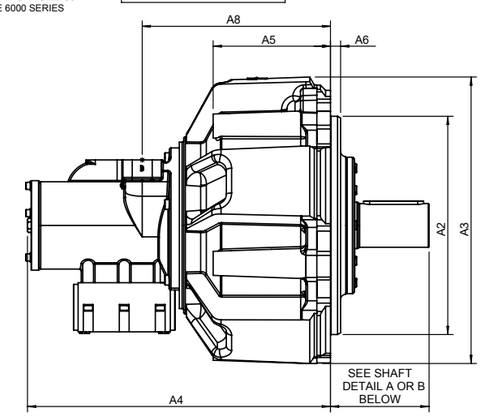
INSTALLATION DRAWING DATA

ROTATING SHAFT C1 & C1
HIGH POWER MOTORS

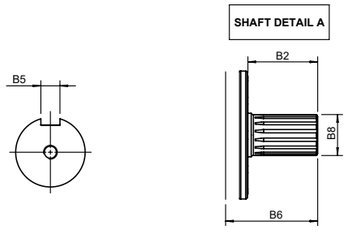




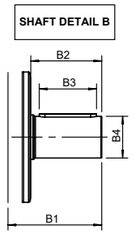
ROTATING SHAFT C2
MOTORS



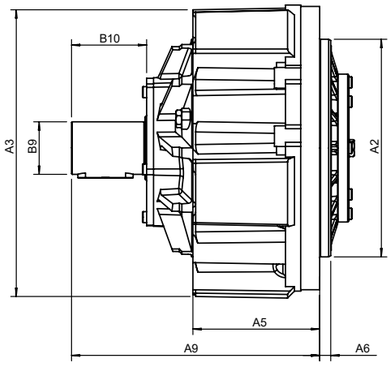
SHAFT DETAIL A



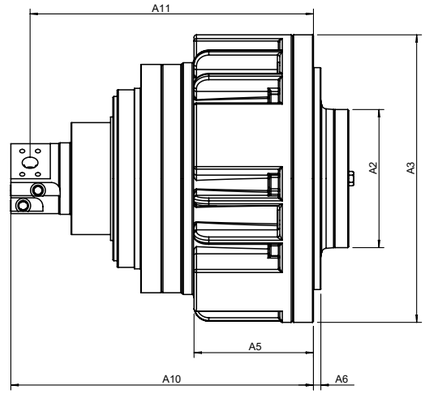
SHAFT DETAIL B



ROTATING CASE B1
MOTORS



ROTATING CASE E1 & E1
HIGH POWER MOTORS



		Motor capacity (cc/rev)								
		200 [12.2] 290 [17.7] 350 [21.4] 480 [29.3]	**500 [30.5] 650 [39.7]**	**750 [45.8] 850 [51.9] 1,000 [61] 1,230 [75.1]**	**1,340 [81.8] 1,600 [97.6] 2,200 [134.2]**	**2,000 [122] 2,500 [152.6] 2,800 [170.9] 3,200 [195.3]**	**3,500 [213.6] 4,350 [265.4]**	**7,000 [427.4] 8,700 [530.9]**	**7,400 [451.5] 8,800 [537] 10,500 [640.7]**	**13,000 [793.3] 16,000 [976.3]**
Dimensions (mm) [in]	**A1**	315 [12.40]	335 [13.19]	394 [15.51]	449 [17.68]	507.5 [19.98]	602 [23.7]	761 [29.96]	601 [23.66]	708 [27.9]
	A2	ø 250 [9.84]	ø 280 [11.02]	ø 315 [12.4]	ø 400 [15.75]	ø 450 [17.72]	ø 560 [22.05]	ø 560 [22.05]	ø 790 [31.1]	ø908 [35.78]
	A3	ø345 [13.58]	ø370 [14.57]	ø436 [17.17]	ø545 [21.46]	ø583 [22.95]	ø695 [27.36]	ø700 [27.56]	ø 900 [35.43]	ø1140 [44.92]
	A4	-	-	464 [18.27]	557 [21.93]	-	715 [28.15]	807 [31.77]	-	-
	A5	139 [5.47]	150 [5.91]	187.5 [7.38]	215 [8.46]	242.0 [9.53]	86 [3.39]	100 [3.94]	102 [4.02]	411 [16.19]
	A6	12 [0.47]	16 [0.63]	16 [0.63]	19 [0.75]	15 [0.59]	27 [1.06]	27 [1.06]	13 [0.51]	30 [1.18]
	A7	236.5 [9.31]	259.5 [10.22]	308.5 [12.15]	345 [13.58]	386 [15.2]	462 [18.19]	690 [27.17]	474 [18.66]	530 [20.88]
	A8	-	-	306 [12.05]	345 [13.58]	-	513 [20.2]	560 [22.05]	-	-
	A9	-	-	362 [14.25]	-	-	-	814 [32.05]	-	-
	A10	296 [11.65]	-	474 [18.66]	534 [21.02]	575 [22.64]	-	-	-	-
	A11	256 [10.08]	-	418 [16.46]	478 [18.82]	490 [19.29]	-	-	-	-
	B1	122 [4.8]	154 [6.06]	156 [6.14]	181 [7.13]	184 [7.24]	225 [8.86]	225 [8.86]	305 [12.01]	-
	B2	82 [3.23]	105 [4.13]	105 [4.13]	130 [5.12]	150 [5.91]	165 [6.5]	165 [6.5]	220 [8.66]	-
	B3	69 [2.72]	74 [2.91]	92 [3.62]	120 [4.72]	135 [5.31]	145 [5.71]	145 [5.71]	208 [8.19]	-
	B4	ø50 [1.97]	ø60 [2.36]	ø63 [2.48]	ø80 [3.15]	ø95 [3.74]	ø110 [4.33]	ø110 [4.33]	ø160 [6.3]	-
	B5	16 [0.63]	18 [0.71]	18 [0.71]	22 [0.87]	25 [0.98]	28 [1.1]	28 [1.1]	40 [1.57]	-
	B6	122 [4.8]	154 [6.06]	156 [6.14]	181 [7.13]	184 [7.24]	225 [8.86]	223 [8.78]	305 [12.01]	-
	B7	63 [2.48]	85 [3.35]	80 [3.15]	105 [4.13]	100 [3.94]	140 [5.51]	130 [5.12]	180 [7.09]	-
	B8	19t 10/20	18t 8/16	19t 8/16	24t 8/16	28t 8/16	25t 8/12	26t 6/12	41t 6/12	-
	B9	-	-	76 [2.99]	-	-	-	120 [4.72]	-	-
	B10	-	-	108 [4.25]	-	-	-	132 [5.2]	-	-
	C1	0	0	0	0	54 [2.13]	0	54 [2.13]	0	-
	C2	84 [3.31]	84 [3.31]	114 [4.49]	140 [5.51]	170 [6.69]	140 [5.51]	170 [6.69]	180 [7.09]	-
	C3	1”	1”	1-1/4”	1-1/2”	2”	2”	2”	2”	2”

The dimensions shown above are approximate and subject to change without notice. Before finalising your installation, please ask for a copy of the latest issue drawing.

GENERAL
The following information is for general guidance only. Contact Rotary Power to discuss individual applications.

- Always examine the motor externally to check that damage has not occurred during transit
- Ensure the areas around the protective plugs are clean and remove all protective coatings
- Do not remove protective plugs from the main ports or drain connections until the system flushing is complete. Once plugs are removed, immediate connection to the circuit should be made

CASE MOUNTING
Provision is made for locating the motor by means of a spigot diameter on the motor crankcase. The unit should be mounted on a flat machined face. The mounting surface pilot diameter should be machined to the nominal spigot diameter +0.0 to +0.05 mm. Clearance should be made for the fillet radius between the motor spigot and mounting face.

Depending on the size of the motor, fixing will be achieved by a number of mounting bolts. All fixing holes should be utilised and match the clearance holes in the mounting bracket. If heavy or frequent torque reversals are anticipated, one or more of the attachment holes should be reamed in conjunction with the mounting bracket and fitted bolts.

SHAFT DETAILS
C1/C1 HIGH POWER/C2 MODELS
Two standard forms of output shaft are offered on the SMA range. A cylindrical shaft with a parallel key and an involute side fit splined shaft. Motor drives should be designed to eliminate unnecessary axial and radial loads to prolong bearing life. A keyed shaft is recommended for a flexible coupling output connection and a splined shaft is recommended where the driven shaft is rigidly connected to the motor. Alignment of the two shafts should be maintained within 0.05 mm TIR.

Splined shaft motors should be assembled using molybdenum grease, or preferably in an oil bath. On keyed shaft motors operating in applications where the pressures are high, where the motor is subject to reverse loadings or shock loads; the adapter, gear pinion etc. should be shrunk onto the shaft to provide an interference fit.

B1 MODEL
This motor type is supplied with a cylindrical shaft and parallel key. The connection should be either an interference shrink fit or clamped into position. In applications where the driven load is constrained by any means other than a single drive motor, please consult Rotary Power.

E1/E1 HIGH POWER MODELS
The spigot diameter on the motor shaft or port block (if fitted) should be used to accurately position the motor. The unit should be mounted onto a flat, machined face. The mounting surface pilot diameter should be machined to the nominal spigot diameter +0.0 to +0.05 mm as case mounting. Clearance should be made for the fillet radius between the motor spigot and the mounting face.

Fixing is achieved by a number of mounting bolts. All fixing holes should be utilised and match the clearance holes in the mounting bracket. Fixing bolts should be tightened to the recommended torque settings shown in the relevant installation information. If heavy or frequent torque reversals are anticipated, one or more of the attachment holes should be reamed in conjunction with the mounting bracket and corresponding fitted bolts used. For special models or applications where the driven load is constrained by any other means, please contact Rotary Power.

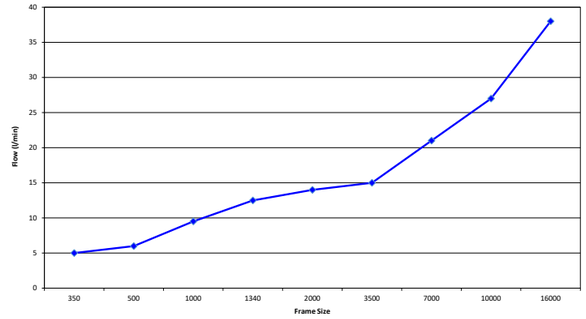
Please note: hammering or pressing components onto the shaft will damage the crankshaft bearings.

CASE DRAINS
Rotating shaft motors are provided with two or more main drain ports located in the main crankcase. Rotating case motors are supplied with either one or two drain ports. The drain port should be installed in the highest possible position. The bore size of the drain line should be big enough to minimise case pressure and under all conditions within the maximum value given in the relevant technical data section. Leakage rate values can be obtained from Rotary Power and must be considered together with any other requirements dictated by the application. High crankcase pressures will affect the shaft seal life and minimum boost pressure requirements for the correct motor operation.

A top vent port must be used for shaft up applications and a distributor end vent port must be used, together with the main drain ports, for shaft down applications. The main drain port must be looped up to the level of the top or distributor end vent to prevent siphoning.

RADIAL LOADS
The SMA motor accepts high radial and external loads. For individual motor information contact Rotary Power.

FLUSHING FLOW
A case warming flow may be required if temperature differentials of 30 °C are envisaged between motor temperature and bulk supply oil temperature. The flow rate required depends upon the temperature differential, motor size and motor running speeds under application conditions.



FREE WHEELING
True freewheel running is achieved by isolating the motor main ports from the pressure supply and connecting them directly to the tank. Additionally, case pressure should be developed by adding flow to the motor case and creating a back pressure (nominally 2 bar above any remaining port pressure) in the drain line. This retracts and holds the pistons in their respective bores and provides internal lubrication to the hydrostatic bearings. It is possible to engage and disengage freewheel whilst an SMA motor is rotating. However, due to the high flow rates, the high risk of pump cavitation damage and excessive motor case pressures, it is recommended to engage and disengage freewheel whilst SMA motors are stationary.

Recirculating freewheel is also possible by connecting the main ports together and applying a boost pressure. If this condition is to occur for long periods, it is recommended that a purge system is also incorporated.

FLUIDS
The SMA motor will run on a wide variety of hydraulic fluids. Derating factors are set out as below:

Fluid type	% of maximum catalogue speed rate	% of maximum catalogue pressure rating
HF-A high water base	66	50
HF-B water in oil	75	60
HF-C water glycol	50	50
HF-D phosphate ester*	100	100
HF-E synthetic	100	100

*Viton seals must be specified. Please contact Rotary Power if high speed running is to be part of the duty cycle or if any other special fluid will be used.

OUT OF BALANCE FORCES
The orbiting motion of the cylinder block in a rotating shaft motor creates out of balance forces. This rarely has a detectable effect, but for applications where the speed is high or the mass is low, it may be beneficial to install a calculated amount of counter balance.

SEALING
All standard motors are fitted with nitrile sealing systems compatible with mineral hydraulic oils and capable of operating up to 8 bar case pressure. Please refer to the options section for further details.

MOTOR INSTALLATION

1. During system assembly thoroughly descale, clean and flush the pipework, fittings and the reservoir. Fill the systems with new filtered fluid ensuring that it meets the required viscosity specifications at envisaged operating temperature, type and cleanliness for all components. The motor case must be filled through the motor case drain port on a rotating shaft motor, or through one of the case vent ports located in the crankcase on a rotating case motor. Ensure that the case drain line is filled and all connections are tightened.

2. Check the rotation flow information provided on the installation drawings.

3. Start up the pump drive slowly. For engines, turn on the starter motor for a few seconds at a time. For electric motors, start up by a series of rapid on/off cycles. This is to ensure that the pump internal components are filled with oil. Run the system at high flow and low pressure and actuate all systems in modes until the air in the system has been released as this could cause pulsation. The motor should run smoothly after approximately ten minutes of operation.

4. After the motor rotation has been proved under no-load conditions, it may be operated up to maximum pressure.

5. Top up fluid levels if necessary.

6. Check the motor case pressure in all operating modes to ensure that the maximum allowable value for a specific motor model is not exceeded.

7. Adjust all settings in compliance with system requirement instructions.

8. The steady state operating temperature should be in accordance with the system and component requirements.

9. Check for and repair any leaks.

10. After the first few running hours, clean or renew all filters as appropriate.

11. After 100 hours of operation, check the security of all mounting bolts and socket head screws used in the assembly of the motor. Check the security of the drive coupling and pipe connections and clean or replace filter elements.

NOTES

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