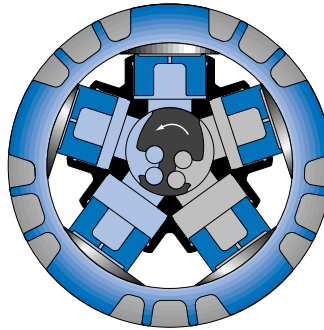


# THE SMA MOTOR

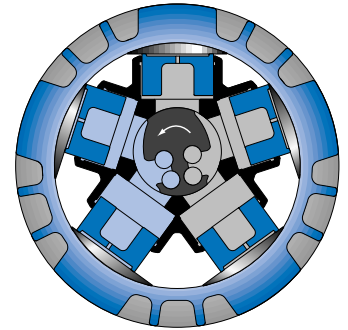
## DESCRIPTION OF OPERATION

The motor function is achieved by five piston sleeves carried radially in a cylinder block mounted on an eccentric incorporated in the driveshaft. Hydraulic fluid under pressure is fed to each piston sleeve in turn from axial galleries in the crankshaft through a timing slot in the eccentric. The piston sleeves are supported by flat reaction pads inside the motor case. Pressurising the cylinders therefore produces a resultant turning moment on the eccentric by direct hydraulic pressure, thus eliminating connecting rods or other mechanical linkage between piston and crankshaft and the resultant losses associated with such components. Each piston sleeve is supported at the reaction pad end by a hydrostatic bearing and is free to float sideways to accommodate the orbiting action of the cylinder block. Correct location of the cylinder block relative to the reaction pads is maintained by an Oldham coupling. The crankshaft is supported on large taper roller bearings capable of accepting both radial and axial external loads. Fluid is fed to and from the crankshaft galleries through a rotating distributor system at the non-drive end of the shaft.

Low pressure ■ High pressure ■ Re-circulating oil ■



*Multi-displacement  
shaft motor*



*Freewheel  
operation*

## ROTATING CASE OPTION

Types : E1,E1 High Power & B1

The SMA motor can be built in rotating case form by incorporating a crankshaft designed for use as the motor mounting point, with hydraulic fluid supplied directly to the internal galleries, eliminating the need for a distributor.

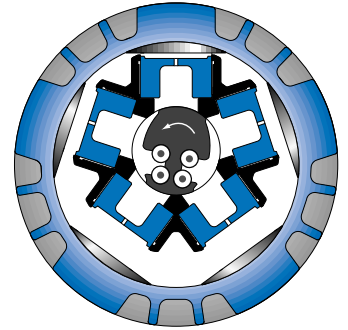
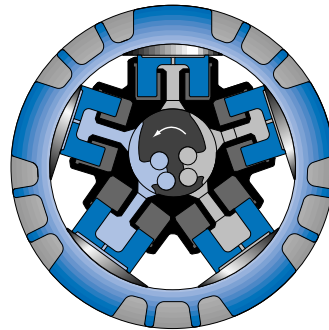
## MULTIPLE DISPLACEMENT OPTION

Type C2 :

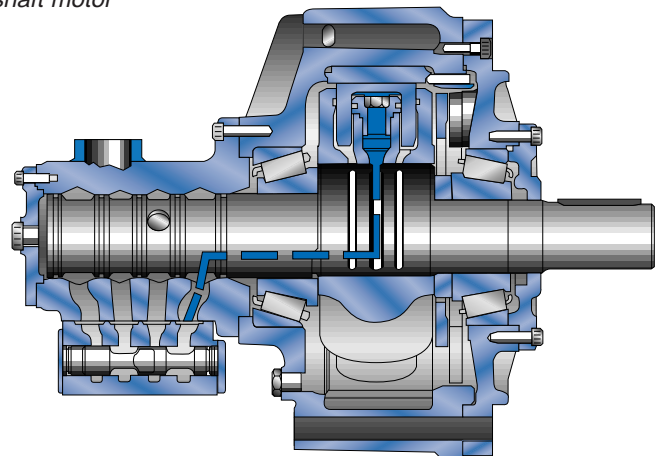
Multiple displacement is achieved by separating the bore and wall areas of the piston sleeves so that they can be pressurised simultaneously or independently. Pressuring the full area gives maximum torque, while pressuring the wall or bore areas gives intermediate and minimum displacement respectively. Flow is directed to the wall or bore area through dual galleries in the crankshaft, via an integral pilot-operated selector valve mounted on the distributor housing. This valve ensures that the non-pressurised area remains full of hydraulic fluid, thus allowing displacement to be changed while the motor is turning, under load.

## FREE-WHEEL ABILITY

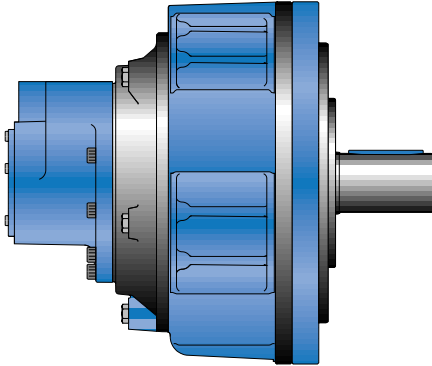
The ability to free-wheel is an inherent feature of the SMA range. Only hydraulic system pressure retains the piston sleeves against their respective pads; therefore if the motor is isolated from the rest of the system the piston sleeves are free to retract, thus allowing the cylinder block to orbit without pumping fluid and consequently with negligible resistance. Drive is re-engaged by opening the hydraulic supply to the motor, when the piston sleeves resume their normal working position against their respective pads. During this process the large hydrostatic bearing surface has a dampening effect, preventing harsh contact between each piston sleeve and its pad.



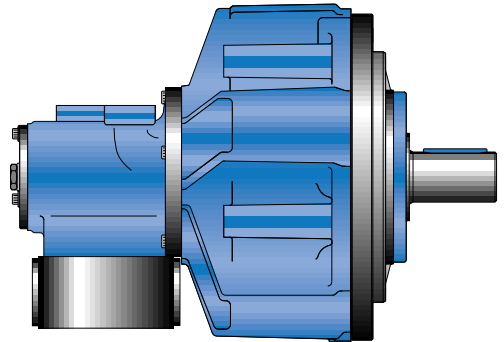
*Multi-displacement  
shaft motor*



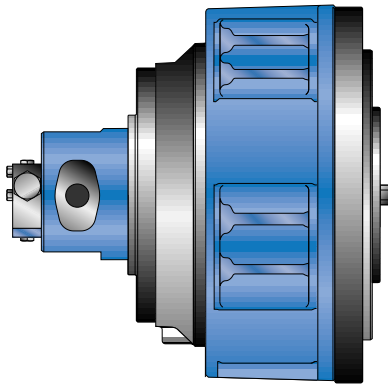
## ROTATING SHAFT C1 & C1 HIGH POWER MOTORS



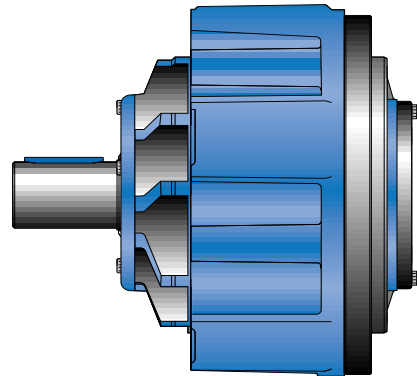
## ROTATING SHAFT C2 MOTORS



## ROTATING CASE E1 & E1 HIGH POWER MOTORS



## ROTATING CASE B1 MOTORS



## SMA GUIDE TO CONFIGURATIONS

**SMA motors may be supplied in six basic configurations. Listed below are some typical features for each type:**

### **Rotating shaft C1 motor**

-Heavy duty mobile, marine and industrial drives using pressures up to 350 bar continuously, may feature external loading.

### **Rotating shaft C1 high power motor**

-Heavy duty mobile, marine and industrial drives using pressures up to 350 bar continuously and may feature external loading and high running speeds.

### **Rotating shaft C2 (dual displacement ) motor**

-Heavy duty mobile, marine and industrial drives using pressures up to 350 bar continuously and may feature external loading. Used in applications needing a wide speed range from limited pump flows.

### **Rotating case B1 motor**

-Heavy duty mobile, marine and industrial drives using pressures up to 350 bar continuously, may feature external loading. Motor may form an integral part of the machine structure.

### **Rotating case E1 motor**

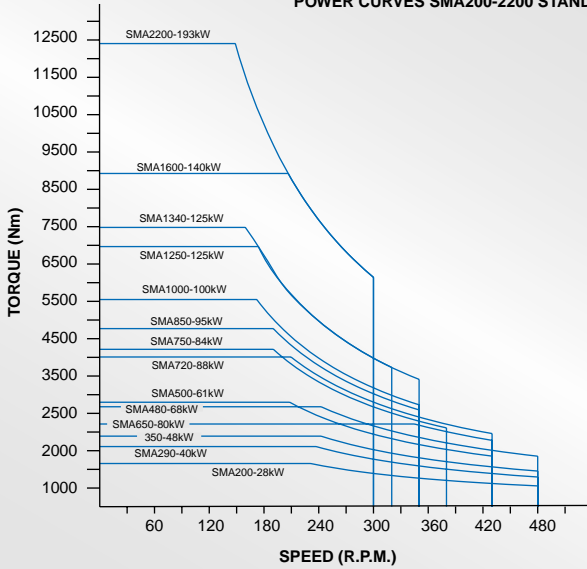
-Heavy duty mobile, marine and industrial drives using pressures up to 350 bar continuously, may feature very high external loading. Motor may form an integral part of the machine structure.

### **Rotating case E1 high power motor**

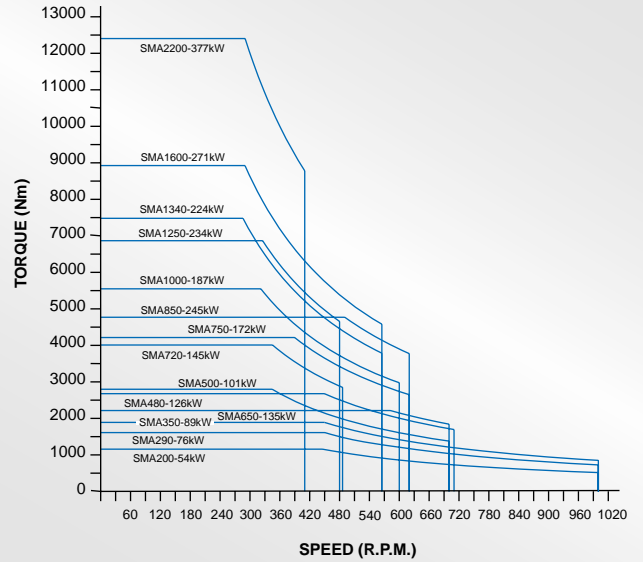
-Heavy duty mobile, marine and industrial drives using pressures up to 350 bar continuously, may feature very high external loading. Motor may form an integral part of the machine structure. High running speeds with minimal out of balance forces.

# PERFORMANCE DATA - POWER CHARTS

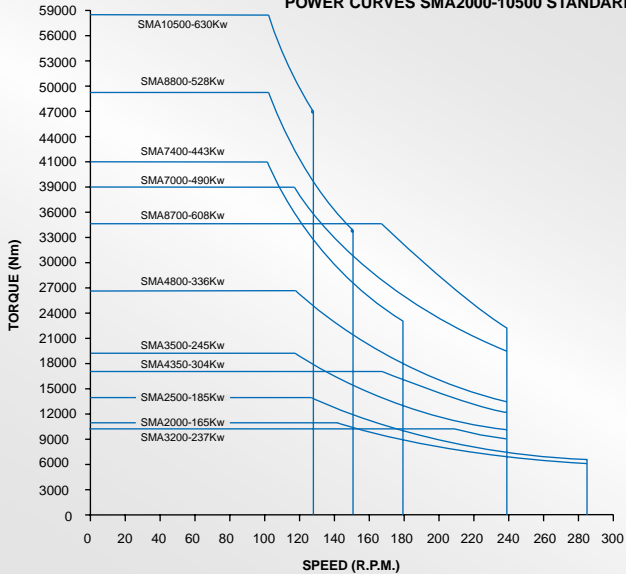
**POWER CURVES SMA200-2200 STANDARD**



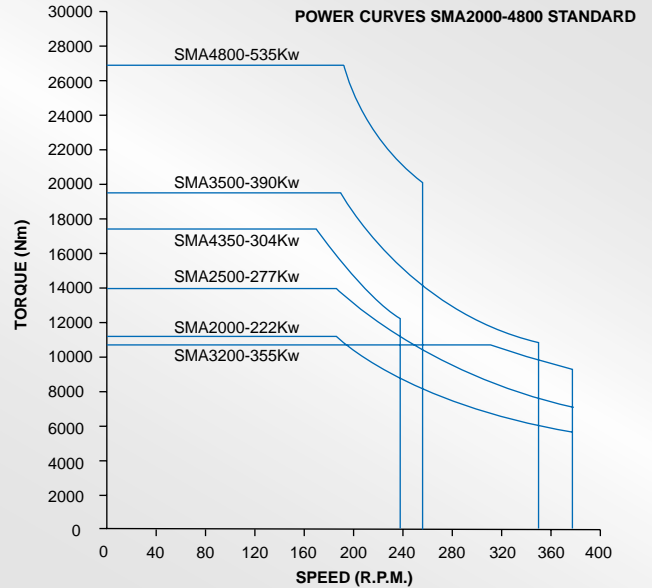
**POWER CURVES SMA200-2200 HIGH POWER**



**POWER CURVES SMA2000-10500 STANDARD**



**POWER CURVES SMA2000-4800 STANDARD**



## SMA POWER CHARTS

Power capabilities for SMA motors are indicated in the charts shown. These should be read in conjunction with the information given in the technical data charts for each motor type.

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

## SMA ROTATING SHAFT MOTOR TYPE C1

TECHNICAL DATA													
<b>MODEL : SMA C1 standard</b>													
Nominal displacement cc/rev (1)	200	290	350	480	500	650	670*	750	850	1000	1230*	1340	1600
Geometric displacement cc/rev	207.8	289.3	339.3	480.7	502.4	662.9	669.9	756.7	856.5	996.2	1233.4	1342.9	1602.4
Max. speed cont. rev/min	480	480	480	480	430	430	322	380	350	350	283	320	300
Max. speed int. rev/min (2)	768	768	768	768	688	688	515	608	560	560	453	512	480
Max. speed freewheel	768	768	768	768	688	688	515	608	560	560	453	512	480
Min speed rev/min (std motor)	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. N.m	1157	1611	1890	2677	2798	2215	3731	4215	4770	5549	6870	7480	8925
Max. torque intermittent N.m (2)	1620	2256	2646	3748	3918	3059	5224	5900	6679	7768	9618	10471	12495
Max. power cont. K.w	28	40	48	68	61	80	81	84	95	100	124	125	140
Max power int. K.w (2)	56	80	96	136	122	160	162	168	190	200	248	250	280
Max diff. pressure cont. bar (3)	350	350	350	350	350	210	350	350	350	350	350	350	350
Max diff. pressure int bar (2)	490	490	490	490	490	290	490	490	490	490	490	490	490
Max flow cont L/min.	100	139	163	231	216	285	216	288	300	349	349	430	481
Max flow int L/min. (2)	160	222	261	369	346	456	345	460	480	558	558	688	769
Return pressure min. bar (3)	7	7	7	7	7	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	350	350	210	350	350	350	350	350	350	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)												
Min/ Max viscosity cSt	15-1000 cSt												
Optimum viscosity cSt (6)	20-200 cSt												
Min / Max operating temp (7)	-20 + 90 Degrees centigrade												
Optimum operating temp	50 Degrees centigrade												
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better												
Filtration	B25 ratio 75 or better for simple closed loop systems												
Starting torque N.m : (8)													
Min@Max. cont. pressure	1053	1465	1720	2437	2547	2016	3396	3836	4342	5050	6252	6807	8123
Avr@Max. cont. pressure	1077	1499	1758	2490	2603	2060	3470	3920	4437	5161	6390	6957	8301
Min@Max. int. pressure	1475	2053	2408	3411	3565	2784	4754	5370	6078	7070	8753	9530	11372
Avr@ Max. int. pressure (2)	1507	2098	2461	3486	3644	2845	4859	5488	6212	7225	8945	9740	11622
Polar moment of inertia kg.sq.m	0.0052	0.0052	0.0052	TBA	0.0094	0.0094	TBA	0.0174	0.0174	0.0199	TBA	0.0487	0.0487
Approx. weight kg (9)	83	83	83	88	110	110	TBA	170	170	170	TBA	290	290

### NOTES FOR TECHNICAL DATA TABLE

- Motors indicated with an asterisk (\*) are to be introduced shortly.
- 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 by ROTARY POWER.
- Maintain positive gauge pressure at both main ports at all times while the motor is under load, whether or not the motor is running. Do not allow the pressure to drop below 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 consult ROTARY POWER.
- 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.



## SMA ROTATING SHAFT MOTOR TYPE C1

TECHNICAL DATA													
<b>MODEL : SMA C1 standard</b>													
Nominal displacement cc/rev (1)	2200	2000	2500	3200	3500	4350	4300*	7000	8600*	8700	7400	8800	10500
Geometric displacement cc/rev	2227.3	2003.0	2507.2	3215.0	3504.3	4349.0	4310.8	7008.6	8421.6	8698.0	7381.4	8811.7	10497.8
Max. speed cont. rev/min	216	285	285	240	240	240	195	240	195	240	180	150	125
Max. speed int. rev/min (2)	346	456	456	384	384	384	312	384	312	384	288	240	200
Max. speed freewheel	346	456	456	384	384	384	312	384	312	384	288	240	200
Min speed rev/min (std motor)	5-10	5-10	5-10	5-10	5-10	5-10	5-10	2-4	2-4	2-4	5-10	5-10	5-10
Max. torque cont. N.m	12405	11156	13964	10744	19518	17302	24010	39036	46906	34604	41112	49078	58470
Max. torque intermittent N.m (2)	17368	15619	19550	14837	27325	24223	33614	54650	65668	48445	57557	68710	81858
Max. power cont. K.w	195	165	185	237	245	304	301	490	602	608	443	528	630
Max power int. K.w (2)	390	330	370	474	490	608	602	980	1204	1216	886	1056	1260
Max diff. pressure cont. bar (3)	350	350	350	210	350	250	350	350	350	250	350	350	350
Max diff. pressure int bar (2)	490	490	490	290	490	350	490	490	490	350	490	490	490
Max flow cont L/min.	481	571	715	772	841	1044	841	1682	1642	2088	1329	1322	1312
Max flow int L/min. (2)	770	913	1143	1235	1346	1670	1345	2691	2628	3340	2126	2115	2100
Return pressure min. bar (3)	7	7	7	7	7	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	210	350	250	350	350	350	250	350	350	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)												
Min/ Max viscosity cSt	15-1000 cSt												
Optimum viscosity cSt (6)	20-200 cSt												
Min / Max operating temp (7)	-20 + 90 Degrees centigrade												
Optimum operating temp	50 Degrees centigrade												
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better												
Filtration	B25 ratio 75 or better for simple closed loop systems												
Starting torque N.m : (8)													
Min@Max. cont. pressure	11290	10153	12709	9778	17764	15747	21852	35527	42690	31493	37417	44667	53214
Avr@Max. cont. pressure	11538	10377	12989	9993	18154	16093	22332	36308	43628	32186	38239	45649	54384
Min@Max. int. pressure	15806	14215	17793	13503	24869	22045	30592	49738	59766	44091	52383	62534	74500
Avr@ Max. int. pressure (2)	16154	14527	18184	13800	25416	22530	31265	50831	61079	45060	53535	63908	76137
Polar moment of inertia kg.sq.m	TBA	0.0715	0.0715	0.0715	0.2293	0.2293	TBA	TBA	TBA	TBA	TBA	TBA	TBA
Approx. weight kg (9)	TBA	440	440	440	790	790	790	1140	1140	1140	1250	1250	1250

### NOTES FOR TECHNICAL DATA TABLE

- SMAmotors will operate successfully on a wide variety of hydraulic fluids. Contact ROTARY POWER for further details.
- For very high or low speed operation, fluid viscosity should be as high as possible within the optimum viscosity limits.
- Higher temperatures may be possible if required, through
- viscosity remains within the optimum range, subject to approval by ROTARY POWER.
- Many factors affect starting efficiencies. Figures shown are a reasonable approximation for most conditions. Please contact ROTARY POWER for a more detailed assessment of a specific application.
- Weights shown are an approximation and depend on

## FEATURES

TECHNICAL DATA										
<b>MODEL : SMA C1 HI-POWER</b>										
Nominal displacement cc/rev (1)	200	290	350	480	500	650	670*	750	850	1000
Geometric displacement cc/rev	207.8	289.3	339.3	480.7	502.4	662.9	669.9	756.7	856.5	996.2
Max. speed cont. rev/min	1000	1000	1000	710	700	700	525	620	620	600
Max. speed int. rev/min (2)	1250	1250	1250	890	880	880	840	780	780	750
Max. speed freewheel rev/min	1250	1250	1250	890	880	880	840	780	780	750
Min speed rev/min (std motor)	20	20	20	20	20	20	5-10	20	20	20
Max. torque cont. N.m	1157	1611	1890	2677	2798	2215	3731	4215	4770	5549
Max. torque intermittent N.m (2)	1620	2256	2646	3748	3918	3101	5224	5900	6679	7768
Max. power cont. K.w	54	76	89	126	101	135	135	172	245	187
Max power int. K.w (2)	108	152	178	252	202	270	270	344	490	374
Max diff. pressure cont. bar (3)	350	350	350	350	350	210	350	350	350	350
Max diff. pressure int bar (2)	490	490	490	490	490	294	490	490	350	490
Max flow cont L/min.	208	289	339	341	352	464	352	469	531	598
Max flow int L/min. (2)	260	362	424	428	442	583	563	590	668	747
Return pressure min. bar (3)	7	7	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	350	350	210	350	350	250	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)									
Min/ Max viscosity cSt	15-1000 cSt									
Optimum viscosity cSt (6)	20-200 cSt									
Min / Max operating temp (7)	-20 + 90 Degrees centigrade									
Optimum operating temp	50 Degrees centigrade									
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better									
Filtration	B25 ratio 75 or better for simple closed loop systems									
Starting torque N.m : (8)										
Min@Max. cont. pressure	1053	1466	1720	2437	2547	2016	3396	3836	4342	5050
Avr@Max. cont. pressure	1077	1499	1758	2490	2603	2060	3470	3920	4437	5161
Min@Max. int. pressure	1475	2053	2408	3411	3565	2823	4754	5370	6078	7070
Avr@ Max. int. pressure (2)	1507	2098	2461	3486	3644	2885	4859	5488	6212	7225
Polar moment of inertia kg.sq.m	0.0052	0.0052	0.0052	TBA	0.0094	0.0094	TBA	0.0174	0.0174	0.0199
Approx. weight kg (9)	83	83	83	88	110	110	TBA	170	170	170

### NOTES FOR TECHNICAL DATA TABLE

- Motors indicated with an asterisk (\*) are to be introduced shortly.
- 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 by ROTARY POWER.
- Maintain positive gauge pressure at both main ports at all times while the motor is under load, whether or not the motor shaft is rotating. 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 consult ROTARY POWER.
- 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.



## SMA ROTATING SHAFT MOTOR TYPE C1 HIGH POWER

TECHNICAL DATA										
MODEL : SMA C1 HI-POWER										
Nominal displacement cc/rev (1)	1230*	1340	1600	2200*	2000	2500	3200	3500	4350	4300*
Geometric displacement cc/rev	1233.4	1342.9	1602.4	2227.3	2003.0	2507.2	3215.0	3504.3	4349.0	4310.8
Max. speed cont. rev/min	485	565	565	406	380	380	380	350	240	285
Max. speed int. rev/min (2)	776	700	700	650	475	475	475	438	384	456
Max. speed freewheel rev/min	776	700	700	650	475	475	475	438	384	456
Min speed rev/min	5-10	20	20	5-10	20	20	20	20	20	5-10
Max. torque cont. N.m	6870	7480	8925	12405	11156	13964	10744	19518	17302	24010
Max. torque intermittent N.m (2)	9618	10471	12495	17368	15619	19550	14837	27325	24223	33614
Max. power cont. K.w	232	224	271	377	222	277	355	390	304	595
Max power int. K.w (2)	464	448	542	754	444	554	710	780	608	1190
Max diff. pressure cont. bar (3)	350	350	350	350	350	350	210	350	250	350
Max diff. pressure int bar (2)	490	490	490	490	490	490	294	490	350	490
Max flow cont L/min.	598	759	905	904	761	953	1222	1227	1044	1229
Max flow int L/min. (2)	957	940	1122	1447	951	1191	1527	1535	1670	1966
Return pressure min. bar (3)	7	7	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	350	350	350	210	350	250	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)									
Min/ Max viscosity cSt	15-1000 cSt									
Optimum viscosity cSt (6)	20-200 cSt									
Min / Max operating temp (7)	-20 + 90 Degrees centigrade									
Optimum operating temp	50 Degrees centigrade									
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better									
Filtration	B25 ratio 75 or better for simple closed loop systems									
Starting torque N.m : (8)										
Min@Max. cont. pressure	6252	6807	8123	11290	10153	12709	9778	17764	15747	21852
Avr@Max. cont. pressure	6390	6957	8301	11538	10377	12989	9993	18154	16093	22332
Min@Max. int. pressure	8753	9530	11372	15806	14215	17793	13503	24869	22045	30592
Avr@ Max. int. pressure (2)	8945	9740	11622	16154	14527	18184	13800	25416	22530	31265
Polar moment of inertia kg.sq.m	TBA	0.0487	0.0487	TBA	0.0715	0.0715	0.0715	0.2293	0.2293	TBA
Approx. weight kg (9)	180	290	290	TBA	440	440	440	790	790	TBA

### NOTES FOR TECHNICAL DATA TABLE

- SMAmotors will operate successfully on a wide variety of hydraulic fluids. Contact ROTARY POWER for further details.
- For very high or low speed operation, fluid viscosity should be as high as possible within the optimum viscosity limits.
- Higher temperatures may be possible if required, through the use of alternative seal materials, providing fluid viscosity remains within the optimum range, subject to approval by ROTARY POWER.
- Many factors affect starting efficiencies. Figures shown are a reasonable approximation for most conditions. Please contact ROTARY POWER for a more detailed assessment of a specific application.
- Weights shown are an approximation and depend on final specification supplied.

## SMA ROTATING CASE MOTOR TYPE E1 & B1

TECHNICAL DATA										
MODEL : SMA	E1	E1	E1	B1	B1	E1*	E1	E1	B1	E1
Nominal displacement cc/rev (1)	290	350	480	500	650	670	750	850	1000	1000
Geometric displacement cc/rev	289.3	339.3	480.7	502.4	662.9	669.9	756.7	856.5	996.2	996.2
Max. speed cont. rev/min	480	480	480	430	430	322	380	350	350	350
Max. speed int. rev/min (2)	768	768	768	688	688	515	608	560	560	560
Max. speed freewheel	768	768	768	688	688	515	608	560	560	560
Min speed rev/min (std motor)	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10
Max. torque cont. N.m	1611	1890	2677	2798	2215	3731	4215	4770	5549	5549
Max. torque intermittent N.m (2)	2256	2646	3748	3918	3059	5224	5900	6679	7768	7768
Max. power cont. K.w	40	48	68	61	80	81	84	95	100	100
Max power int. K.w (2)	80	96	136	122	160	162	168	190	200	200
Max diff. pressure cont. bar (3)	350	350	350	350	210	350	350	350	350	350
Max diff. pressure int bar (2)	490	490	490	490	290	490	490	490	490	490
Max flow cont L/min.	139	163	231	216	285	216	288	300	349	349
Max flow int L/min. (2)	222	261	369	346	456	345	460	480	558	558
Return pressure min. bar (3)	7	7	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	350	210	350	350	350	350	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)									
Min/ Max viscosity cSt	15-1000 cSt									
Optimum viscosity cSt (6)	20-200 cSt									
Min / Max operating temp (7)	-20 + 90 Degrees centigrade									
Optimum operating temp	50 Degrees centigrade									
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better									
Filtration	B25 ratio 75 or better for simple closed loop systems									
Starting torque N.m : (8)										
Min@Max. cont. pressure	1466	1720	2437	2547	2016	3396	3836	4342	5050	5050
Avr@Max. cont. pressure	1499	1758	2490	2603	2060	3470	3920	4437	5161	5161
Min@Max. int. pressure	2053	2408	3411	3565	2784	4754	5370	6078	7070	7070
Avr@ Max. int. pressure (2)	2098	2461	3486	3644	2845	4859	5488	6212	7225	7225
Approx. weight kg (9)	80	80	85	105	105	TBA	189	189	160	189

### NOTES FOR TECHNICAL DATA TABLE

1. Motors indicated with an asterisk (\*) are to be introduced shortly.
2. 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 by ROTARY POWER.
3. Maintain positive gauge pressure at both main ports at all times while the motor is under load, whether or not the motor shaft is rotating. 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 consult ROTARY POWER.
4. 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.





## SMA ROTATING CASE MOTOR TYPE E1 & B1

TECHNICAL DATA										
MODEL : SMA	E1*	E1	E1	E1*	E1	E1	E1	E1*	E1*	E1*
Nominal displacement cc/rev (1)	1230	1340	1600	2200	2000	2500	3200	3500	4350	4300
Geometric displacement cc/rev	1233.4	1342.9	1602.4	2227.3	2003.0	2507.2	3215.0	3504.3	4349.0	4310.8
Max. speed cont. rev/min	283	320	300	216	285	285	240	240	240	195
Max. speed int. rev/min (2)	453	512	480	346	456	456	384	384	384	312
Max. speed freewheel rev/min	453	512	480	346	456	456	384	384	384	312
Min speed rev/min (std motor)	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10
Max. torque cont. N.m	6870	7480	8925	12405	11156	13964	10744	19518	17302	24010
Max. torque intermittent N.m (2)	9618	10471	12495	17368	15619	19550	14837	27325	24223	33614
Max. power cont. K.w	124	125	140	195	165	185	237	245	304	301
Max power int. K.w (2)	248	250	280	390	330	370	474	490	608	602
Max diff. pressure cont. bar (3)	350	350	350	350	350	350	350	350	250	350
Max diff. pressure int bar (2)	490	490	490	490	290	490	490	490	350	490
Max flow cont L/min.	349	430	481	481	571	715	772	841	1044	841
Max flow int L/min. (2)	558	688	769	770	913	1143	1235	1346	1670	1345
Return pressure min. bar (3)	7	7	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	350	210	350	350	350	250	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)									
Min/ Max viscosity cSt	15-1000 cSt									
Optimum viscosity cSt (6)	20-200 cSt									
Min / Max operating temp (7)	-20 + 90 Degrees centigrade									
Optimum operating temp	50 Degrees centigrade									
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better									
Filtration	B25 ratio 75 or better for simple closed loop systems									
Starting torque N.m : (8)										
Min@Max. cont. pressure	6252	6807	8123	11290	10153	12709	16297	17764	15747	21852
Avr@Max. cont. pressure	6390	6957	8301	11538	10377	12989	16655	18154	16093	22332
Min@Max. int. pressure	8653	9530	11372	15806	14215	17793	22816	24869	22045	30592
Avr@ Max. int. pressure (2)	8945	9740	11622	16154	14527	18184	23317	25416	22530	31265
Approx. weight kg (9)	TBA	320	320	TBA	490	490	490	880	880	TBA

### NOTES FOR TECHNICAL DATA TABLE

- SMAmotors will operate successfully on a wide variety of hydraulic fluids. Contact ROTARY POWER for further details.
- For very high or low speed operation, fluid viscosity should be as high as possible within the optimum viscosity limits.
- Higher temperatures may be possible if required, through the use of alternative seal materials, providing fluid viscosity remains within the optimum range, subject to approval by ROTARY POWER.
- Many factors affect starting efficiencies. Figures shown are a reasonable approximation for most conditions. Please contact ROTARY POWER for a more detailed assessment of a specific application.
- Weights shown are an approximation and depend on final specification supplied.

## SMA ROTATING CASE MOTOR TYPE E1 HIGH POWER

TECHNICAL DATA								
<b>MODEL : SMA HI POWER</b>	<b>E1</b>	<b>E1</b>	<b>E1</b>	<b>E1</b>	<b>E1</b>	<b>E1</b>	<b>E1</b>	<b>E1</b>
Nominal displacement cc/rev (1)	290	350	480	670*	750	850	1000	1230*
Geometric displacement cc/rev	289.3	339.3	480.7	669.9	756.7	856.5	996.2	1233.4
Max. speed cont. rev/min	1000	1000	710	525	620	620	600	485
Max. speed int. rev/min (2)	1250	1250	890	840	780	780	750	776
Max. speed freewheel	1250	1250	890	840	780	780	750	776
Min speed rev/min (std motor)	20	20	20	5-10	20	20	20	5-10
Max. torque cont. N.m	1611	1890	2677	3731	4215	4770	5549	6870
Max. torque intermittent N.m (2)	2256	2646	3748	5224	5900	6679	7768	9618
Max. power cont. K.w	76	89	126	135	172	245	187	232
Max power int. K.w (2)	152	178	252	270	344	490	374	464
Max diff. pressure cont. bar (3)	350	350	350	350	350	350	350	350
Max diff. pressure int bar (2)	490	490	490	490	490	490	490	490
Max flow cont L/min.	289	339	341	352	469	531	598	598
Max flow int L/min. (2)	362	424	428	563	590	668	747	957
Return pressure min. bar (3)	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	350	350	350	350	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)							
Min/ Max viscosity cSt	15-1000 cSt							
Optimum viscosity cSt (6)	20-200 cSt							
Min / Max operating temp (7)	-20 + 90 Degrees centigrade							
Optimum operating temp	50 Degrees centigrade							
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better							
Filtration	B25 ratio 75 or better for simple closed loop systems							
Starting torque N.m : (8)								
Min@Max. cont. pressure	1466	1720	2437	3396	3836	4342	5050	6252
Avr@Max. cont. pressure	1499	1758	2490	3470	3920	4437	5161	6390
Min@Max. int. pressure	2053	2408	3411	4754	5370	6078	7070	8753
Avr@ Max. int. pressure (2)	2098	2461	3486	4859	5488	6212	7225	8945
Approx. weight kg (9)	80	80	85	TBA	189	189	189	TBA

### NOTES FOR TECHNICAL DATA TABLE

1. Motors indicated with an asterisk (\*) are to be introduced shortly.
2. 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 by ROTARY POWER.
3. Maintain positive gauge pressure at both main ports at all times while the motor is under load, whether or not the motor shaft is rotating. 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 consult ROTARY POWER.
4. 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.



## SMA ROTATING CASE MOTOR TYPE E1 HIGH POWER

TECHNICAL DATA									
MODEL : SMA HI POWER	E1	E1	E1	E1	E1	E1	E1*	E1*	E1*
Nominal displacement cc/rev (1)	1340	1600	2200*	2000	2500	3200	3500	4350	4300*
Geometric displacement cc/rev	1342.9	1602.4	2227.3	2003.0	2507.2	3215.0	3504.3	4349.0	4310.8
Max. speed cont. rev/min	565	565	406	380	380	380	350	240	285
Max. speed int. rev/min (2)	700	700	650	475	475	475	438	384	456
Max. speed freewheel rev/min	700	700	650	475	475	475	438	384	456
Min speed rev/min (std motor)	20	20	5-10	20	20	20	20	20	5-10
Max. torque cont. N.m	7480	8925	12405	11156	13964	10744	19518	17302	24010
Max. torque intermittent N.m (2)	10471	12495	17368	15619	19550	14837	27325	24223	33614
Max. power cont. K.w	224	271	377	222	277	355	390	304	595
Max power int. K.w 2	448	542	754	444	554	710	780	608	1190
Max diff. pressure cont. bar (3)	350	350	350	350	350	350	350	250	350
Max diff. pressure int bar (2)	490	490	490	290	490	460	490	350	490
Max flow cont L/min.	759	905	904	761	953	1222	1227	1044	1229
Max flow int L/min. (2)	940	1122	1447	951	1191	1527	1535	1670	1966
Return pressure min. bar (3)	7	7	7	7	7	7	7	7	7
Return pressure max. bar (3)	350	350	350	350	350	350	350	250	350
Case pressure max. bar (4)	8	8	8	8	8	8	8	8	8
Fluid type (5)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)								
Min/ Max viscosity cSt	15-1000 cSt								
Optimum viscosity cSt (6)	20-200 cSt								
Min / Max operating temp (7)	-20 + 90 Degrees centigrade								
Optimum operating temp	50 Degrees centigrade								
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better								
Filtration	B25 ratio 75 or better for simple closed loop systems								
Starting torque N.m (8)									
Min@Max. cont. pressure	6807	8123	11290	10153	12709	16297	17764	15747	21852
Avr@Max. cont. pressure	6957	8301	11538	10377	12989	16655	18154	16093	22332
Min@Max.int. pressure	9530	11372	15806	14215	17793	22816	24869	22045	30592
Avr@ Max. int. pressure (2)	9740	11622	16154	14527	18184	23317	25416	22530	31265
Approx. weight kg (9)	320	320	TBA	490	490	490	880	880	TBA

### NOTES FOR TECHNICAL DATA TABLE

- SMAmotors will operate successfully on a wide variety of hydraulic fluids. Contact ROTARY POWER for further details.
- For very high or low speed operation, fluid viscosity should be as high as possible within the optimum viscosity limits.
- Higher temperatures may be possible if required, through the use of alternative seal materials, providing fluid viscosity remains within the optimum range, subject to approval by ROTARY POWER.
- Many factors affect starting efficiencies. Figures shown are a reasonable approximation for most conditions. Please contact ROTARY POWER for a more detailed assessment of a specific application.
- Weights shown are an approximation and depend on final specification supplied.

## SMA DUAL DISPLACEMENT ROTATING SHAFT MOTOR TYPE C2

TECHNICAL DATA								
<b>MODEL : SMA C2 Dual displacement rotating shaft motor maximum displacements</b>								
Nominal displacement cc/rev	750	1000	1340	1600	3500	4350	7000	8700
Geometric displacement cc/rev	756	996.2	1342.9	1602.4	3506.5	4344.7	7013.0	8689.4
Max. speed cont. rev/min	360	350	320	300	240	240	240	240
Max. speed int. rev/min (1)	610	560	510	480	380	307	380	307
Max. speed freewheel	610	560	510	480	380	307	380	307
Min speed rev/min (std motor)	5-10	5-10	5-10	5-10	5-10	5-10	2-4	2-4
Max. torque cont. N.m	4209	5541	7470	8914	19505	24168	39011	48336
Max. torque intermittent N.m (1)	5901	7769	10473	12496	27346	33882	54691	67765
Max. power cont. K.w	84	102	125	140	245	304	490	607
Max power int. K.w (1)	167	203	250	280	490	607	980	1215
Max diff. pressure cont. bar (2)	350	350	350	350	350	250	350	250
Max diff. pressure int bar (1)	490	490	490	490	490	350	490	350
Max flow cont L/min.	288	349	430	481	842	1043	1683	2085
Max flow int L/min.	462	558	685	769	1332	1334	2665	2668
Return pressure min. bar (2)	7	7	7	7	7	7	7	7
Return pressure max. bar (2)	350	350	350	350	350	250	350	250
Case pressure max. bar (3)	8	8	8	8	8	8	8	8
Fluid type (4)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)							
Min/ Max viscosity cSt	15-1000 cSt							
Optimum viscosity cSt (5)	20-200 cSt							
Min / Max operating temp (6)	-20 + 90 Degrees centigrade							
Optimum operating temp	50 Degrees centigrade							
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better							
Filtration	B25 ratio 75 or better for simple closed loop systems							
Starting torque N.m (7)								
Min@Max. cont. pressure	3836	5050	6807	8123	17775	15731	35940	31808
Avr@Max. cont. pressure	3962	5216	7032	8390	18361	16250	37503	33191
Min@Max. Int. pressure (1)	5370	7070	9530	11372	24885	22024	50316	44531
Avr@ Max. int. pressure	5547	7303	9844	11747	25705	22750	51410	46467
Approx. weight Kg. (8)	180	180	305	305	760	760	1100	1100

MAXIMUM DISPLACEMENT FOR DUAL DISPLACEMENT MOTORS

### NOTES FOR TECHNICAL DATA TABLE

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 by ROTARY POWER.
2. Maintain positive gauge pressure at both main ports at all times while the motor is under load, whether or not the motor shaft is rotating. 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 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. SMAmotors will operate successfully on a wide variety of hydraulic fluids. Contact ROTARY POWER for further details.
5. For very high or low speed operation, fluid viscosity should be as high as possible within the optimum



## SMA DUAL DISPLACEMENT ROTATING SHAFT MOTOR TYPE C2

TECHNICAL DATA														
<b>MODEL : SMA C2 Dual displacement rotating shaft motor minimum displacements</b>														
	MINIMUM DISPLACEMENT FOR DUAL DISPLACEMENT MOTOR - 1.6:1 RATIO					MINIMUM DISPLACEMENT FOR DUAL DISPLACEMENT MOTOR - 2.0:1 RATIO		MINIMUM DISPLACEMENT FOR DUAL DISPLACEMENT MOTOR - 2.6:1 RATIO						
	750	1000	1340	1600	3500	7000	8700	750	1000	1340	1600	3500		
Nominal displacement cc/rev	750	1000	1340	1600	3500	7000	8700	750	1000	1340	1600	3500		
Geometric displacement cc/rev	468.8	627.1	830.8	1037.0	2170.7	3506	4344	287.9	371.0	510.3	565.4	1335.8		
Max. speed cont. rev/min	505	465	425	400	320	240	240	760	700	640	600	290		
Max. speed int. rev/min (1)	808	744	680	640	512	380	307	986	910	832	780	377		
Max. speed freewheel rev/min	610	560	510	480	380	380	307	610	560	510	480	380		
Min speed rev/min (std motor)	5-10	5-10	5-10	5-10	5-10	2-4	2-4	5-10	5-10	5-10	5-10	5-10		
Max. torque cont. N.m	2608	3488	4621	5768	12075	19505	24168	1601	2064	2839	3145	7431		
Max. torque intermittent N.m (1)	3656	4890	6479	8067	16928	27346	33882	2245	2893	3980	4409	10417		
Max. power cont. K.w	69	85	103	121	202	245	304	64	76	95	108	113		
Max power int. K.w (1)	90	110	206	242	405	490	607	82	100	122	140	147		
Max diff. pressure cont. bar (2)	350	350	350	350	350	350	250	350	350	350	350	350		
Max diff. pressure int bar (1)	490	490	490	490	490	490	350	490	490	490	490	490		
Max flow cont L/min.	237	292	353	415	695	842	1043	219	260	327	339	387		
Max flow int L/min.	379	467	565	664	1111	1332	1334	284	338	425	441	504		
Return pressure min. bar (2)	7	7	7	7	7	7	7	7	7	7	7	7		
Return pressure max. bar (2)	350	350	350	350	350	350	250	350	350	350	350	350		
Case pressure max. bar (3)	8	8	8	8	8	8	8	8	8	8	8	8		
Fluid type (4)	HL;HLP TO DIN 51524 (for alternatives contact Rotary Power)													
Min/ Max viscosity cSt	15-1000 cSt													
Optimum viscosity cSt (5)	20-200 cSt													
Min / Max operating temp (6)	-20 + 90 Degrees centigrade													
Optimum operating temp	50 Degrees centigrade													
Fluid cleanliness	To NAS 1638 Class 9 ISO code 18/13 or better													
Filtration	B25 ratio 75 or better for simple closed loop systems													
Starting torque N.m (7)														
Min@Max. cont. pressure	2324	3109	4119	5141	10762	17579	15558	1411	1819	2501	2772	6548		
Avr@Max. cont. pressure	2429	3249	4304	5372	11245	18556	16423	1475	1901	2615	2898	6846		
Min@Max. int. pressure (1)	3254	4353	5766	7196	15066	24611	21782	1998	2575	3542	3924	9271		
Avr@ Max. int. pressure	3400	4548	6026	7521	15743	25705	23234	2066	2662	3661	4057	9584		

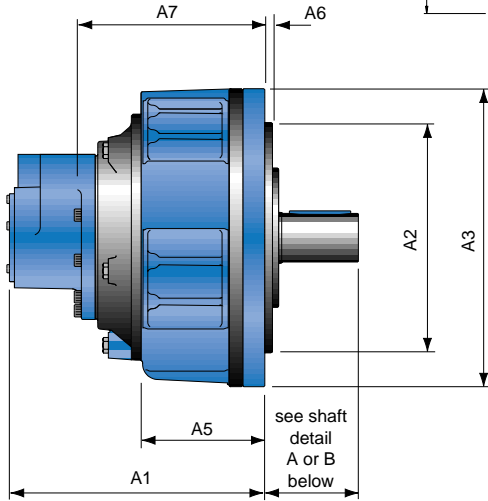
### NOTES FOR TECHNICAL DATA TABLE

- Higher temperatures may be possible if required, through the use of alternative seal materials, providing fluid viscosity remains within the optimum range, subject to approval by ROTARY POWER.
- Many factors affect starting efficiencies. Figures shown are a reasonable approximation for most conditions. Please contact ROTARY POWER for a more detailed assessment of a specific application.
- Weights shown are an approximation and depend on final specification supplied.
- For dual displacement motors, it may be necessary to provide a cooling flow through the idling section. This is required under all conditions for the SMA3500 and on all 2.6:1 ratio motors at high speed. The cooling flow is supplied through the speed change valve signal port. The speed change valve that is supplied for this purpose is modified to suit.

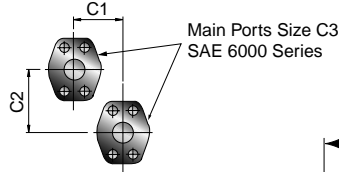
# INSTALLATION DRAWING DATA

Before finalising your installation please ask for a copy of the latest issue drawing.

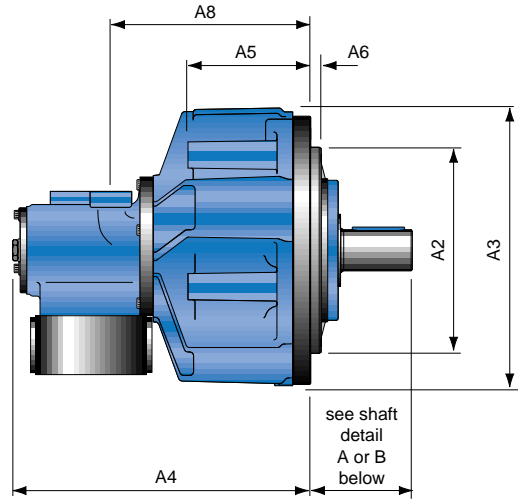
**ROTATING SHAFT C1 & C1  
HIGH POWER MOTORS**



Main Port Detail  
C Motors Only

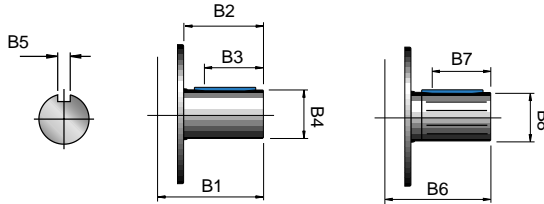


**ROTATING SHAFT C2  
MOTORS**

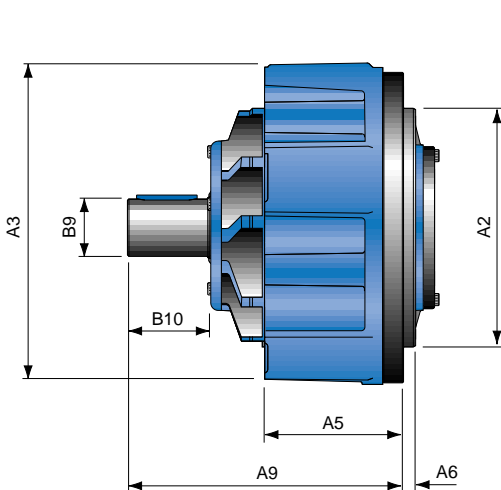


Standard Keyed  
Shaft Detail A

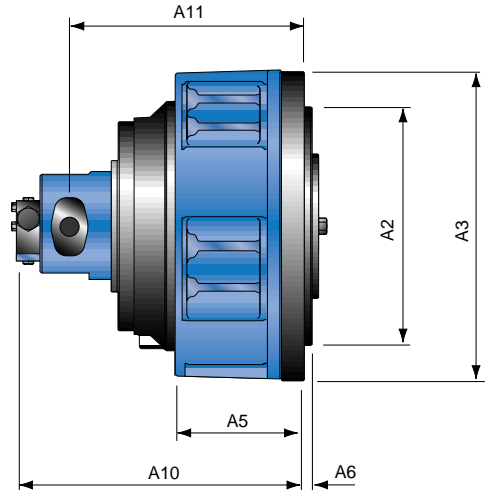
Standard Splined  
Shaft Detail B



**ROTATING CASE B1  
MOTORS**



**ROTATING CASE E1 & E1  
HIGH POWER MOTORS**

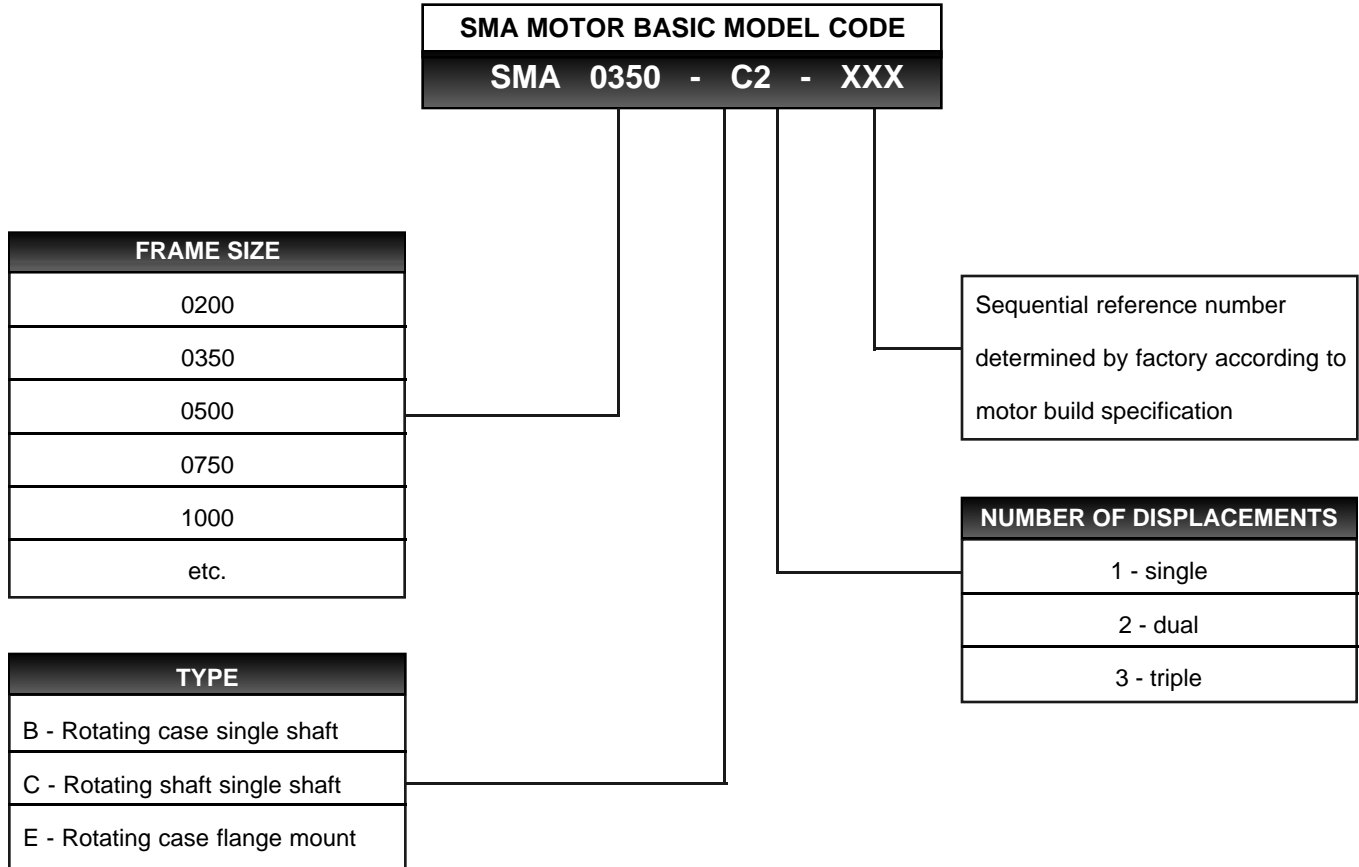


# INSTALLATION DRAWING DATA

		MOTOR CAPACITY							
		200	500	750	1340	2000	3500	7000	7400
		290	650	850	1600	2500	4350	8700	8800
		350	720	1000	2200	3200	4800		10500
		480		1200					
DIMENSIONS	A1	315	335	394	449	507.5	602	761	601
	A2	250 nom.	280	315	400	450	560	560	790
	A3	ø345	ø370	ø436	ø545	ø583	ø695	ø700	ø900
	A4	-	-	464	557	-	715	807	-
	A5	139	150	187.5	215	242.0	86	100	102
	A6	12	16	16	19	15	27	27	13
	A7	236.5	259.5	308.5	345	386.0	462	690	474
	A8	-	-	306	345	-	513	650	-
	A9	-	-	362	-	-	-	814	-
	A10	296	-	474	534	575	-	-	-
	A11	256	-	418	478	490	-	-	-
	B1	122	154	156	181	184	225	225	305
	B2	82	105	105	130	150	165	165	220
	B3	69	74	92	120	135	145	145	208
	B4	ø50	ø60	ø63	ø80	ø95	ø110	ø110	ø160
	B5	16	18	18	22	25	28	28	40
	B6	122	154	156	181	184	225	223	305
	B7	63	85	80	105	100	140	130	180
	B8	19t 10/20	18t 8/16	19t 8/16	24t 8/16	28t 8/16	25t 6/12	26t 6/12	41t 6/12
	B9	-	-	76	-	-	-	120	-
B10	-	-	108	-	-	-	132	-	
C1	0	0	0	0	54	0	54	0	
C2	84	84	114	140	170	140	170	180	
C3	1"	1"	1-1/4"	1-1/2"	2"	2"	2"	2"	

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.

## SMA MOTORS



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

### SMA SERVICE

Full factory service is available for general overhaul and test to new motor standard. Shaft seals may wear and need periodic replacement. Seal kits are available and it is recommended that a suitable stock level is held.

Motors returned for factory overhaul should have been cleaned externally and drained of fluids. Transport plugs should be fitted to all ports as soon as 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 who has sent it, and where from.

Please contact ROTARY POWER product support department for further information.