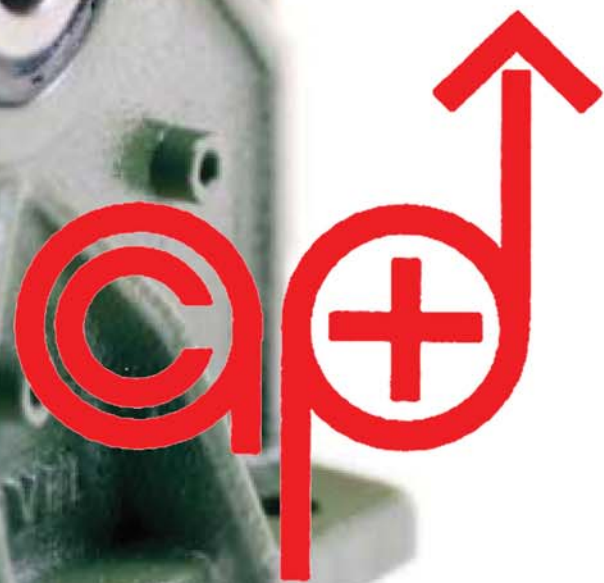


CMG

transmission



ACP&D Limited

FRS-SGA geared motors

All cast iron motor & wormbox units



The FRS worm geared motor units are outstanding examples of the diverse range and product performance that has built the CMG name. The FRS series ranges up to 1500Nm, 0.09 to 15kW, and offers adaptability, reliability and flexibility.

CMG's world best practices and technologies, plus our national computerised sales, spare parts and service back-up mean we can offer a total commitment to every customer.

You can be sure every product supplied by CMG's Motors, Transmission or Drives divisions... be it an electric motor, geared motor, variable frequency drive, soft starter, or one of our many other associated products...will perform exactly to specification, and deliver reliable performance year after year with minimum maintenance and downtime.

CMG's Technology division is a recognised R & D leader offering professional engineering staff and facilities for design, testing, product development and quality control.

As depicted in our new corporate identity, when you think Motors, Transmission, Drives, or research and development Technology...think CMG.



FRS-SGA worm geared motors

0.55 to 15 kW, ratios 7 to 100:1, up to 1500 Nm

This is a CMG short form catalogue for the CMG range of FRS-SGA geared motors.

For further detailed information please refer to the nearest CMG office for separate FRS gearbox or SGA motor catalogues.

This partnership of two proven products combine our cast iron FRS wormbox with our cast iron SGA motor, providing a rugged and reliable finished product. After assembly of the two components, all FRS-SGA geared motors are test run and painted with a final coat of high quality green enamel.

FRS wormbox

The FRS worm gearboxes, sizes 85 to 150, are manufactured with housings and covers of cast iron. The modular design allows for alternative input flanges and alternative output covers on both sides.

Wormshafts and wormwheels have a right-hand gearing design with a ZK tooth profile, and are designed and verified for 15,000 running hours in accordance with BS 721.

Wormshafts are alloy steel, case hardened and profile ground. Wormwheels are of centrifugally cast bronze on a cast iron hub.

Standard output format is hollow bore. Alternatively, single or double solid output shafts are available (see page 9).

FRS wormboxes, sizes 85 to 150, are delivered filled with ISO VG320 grade mineral oil (with plugs).

This catalogue details all output cover designs for wormboxes supplied fitted to SGA motors. Dimensions of free input shaft arrangements are available on request.

SGA motor

The CMG enhanced performance SGA range of motors are recognised for their inherent suitability for all geared motor applications.

Standard motors are 3 phase, 415 volt, 50 Hz.

Motors are manufactured with 'F' class insulation, with windings designed to limit the temperature rise to 80K.

The SGA motor has an all cast iron construction, and provides a protection rating of IP55 for both motor and terminal box.

Models listed in this catalogue are standard B5 flange mount, 4 pole (1500 rpm) with other motor speeds available upon request.

Also available is the CMG-SGA range of enhanced protection motors (Exe, Exn, DIP), brake and multi speed motors as well as motors built to customer specifications.

Product code specification

When placing an order the gearbox product code, mounting arrangement (see page 5), and motor kW rating should be specified. The product code of the gearbox is composed in accordance with the following example.

VRS	085	100	080	S
1-3	4-6	7-9	10-12	13-14

Positions 1 to 3

Series

VRS = CMG Varvel FRS wormbox

Positions 4 to 6

Gearbox size

(085, 110, 130 and 150)

Positions 7 to 9

Gearbox ratio

Positions 10 to 12

Gearbox input size

(080, 090, 100, 112, 132 and 160)

Positions 13 and 14

Mounting type/side covers

S = Foot mount type S overdriven
I = Foot mount type S underdriven
D = Foot mount type S vertical
P = Face mount type PC RHS
P1 = Face mount type PC LHS
PP = Face mount type PC both sides
F = Flange mount type FL RHS
F1 = Flange mount type FL LHS
 Note: For codes using alternative side covers contact CMG.

Service factors

Where the required service factor is not known it can be calculated using the following formula and tables.

$$\text{Service factor SF} = F_1 \times F_2 \times F_3$$

F ₁ selection				F ₂ selection		F ₃ selection	
Hours per day	Uniform load	Variable load	Shock load	Starts per hour	F ₂	Expected lifetime	F ₃
3 to 4	0.8	1.0	1.5	6	1.0	10 000	0.8
8 to 10	1.0	1.2	1.8	60	1.2	15 000	1.0
10 to 24	1.4	1.6	2.0	120	1.4	20 000	1.4

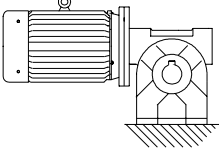
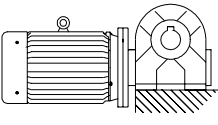
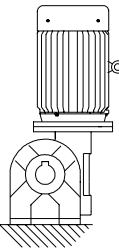
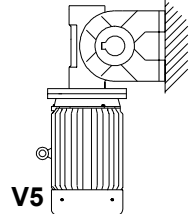
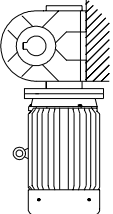
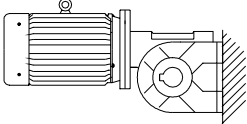
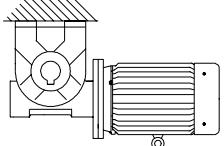
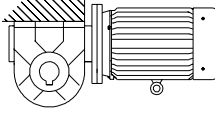
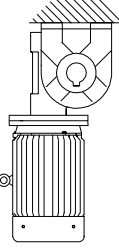
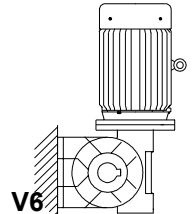
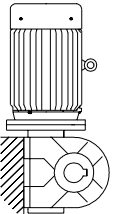
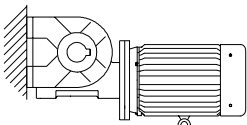
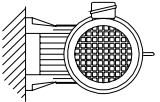
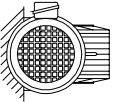
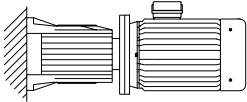
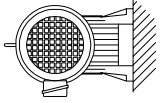
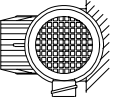
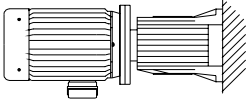
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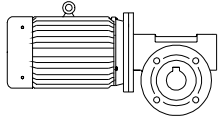
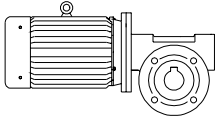
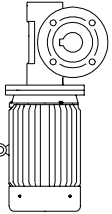
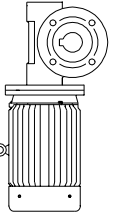
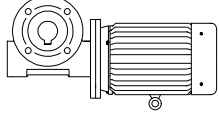
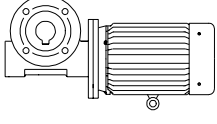
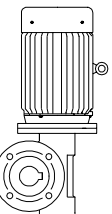
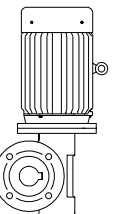
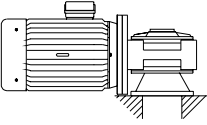
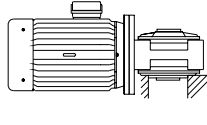
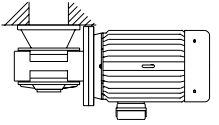
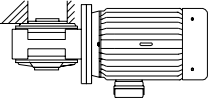
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0.55kW	Motor SGA80A-4 B5 code M34000555SGA 1410 r/min 1.4 Amps				
FRS 85-80	14	210	1.0	100	VRS085100080•
	18	180	1.6	80	VRS085080080•
	20	166	1.8	70	VRS085070080•
	25	143	2.1	56	VRS085056080•
	28	125	2.5	49	VRS085049080•
0.75kW	Motor SGA80B-4 B5 code M3400075SGA 1400 r/min 1.9 Amps				
FRS 110-80	14	312	1.5	100	VRS110100080•
FRS 85-80	18	246	1.1	80	VRS085080080•
	20	226	1.3	70	VRS085070080•
	25	195	1.6	56	VRS085056080•
	28	171	1.9	49	VRS085049080•
	35	147	2.7	40	VRS085040080•
1.1kW	Motor SGA90S-4 B5 code M34001105SGA 1415 r/min 2.5 Amps				
FRS 110-90S	14	458	1.0	100	VRS110100090•
	18	396	1.3	80	VRS110080090•
	20	352	1.8	70	VRS110070090•
	25	294	2.0	56	VRS110056090•
FRS 85-90S	25	285	1.0	56	VRS085056090•
	28	250	1.3	49	VRS085049090•
	35	216	1.9	40	VRS085040090•
	50	160	2.0	28	VRS085028090•
1.5kW	Motor SGA90L-4 B5 code M34001505SGA 1395 r/min 3.2 Amps				
FRS 130-90L	14	624	1.2	100	VRS130100090•
FRS 110-90L	18	540	1.0	80	VRS110080090•
	20	480	1.3	70	VRS110070090•
	25	401	1.5	56	VRS110056090•
	28	351	1.8	49	VRS110049090•
	35	299	2.3	40	VRS110040090•
FRS 85-90L	35	295	1.4	40	VRS085040090•
	50	218	1.5	28	VRS085028090•
	70	168	1.9	20	VRS085020090•
	93	127	2.3	15	VRS085015090•
2.2kW	Motor SGA100LA-4 B5 code M34002205SGA 1430 r/min 4.5 Amps				
FRS 150-100L	14	946	1.2	100	VRS150100100•
	18	780	1.5	80	VRS150080100•
FRS 130-100L	18	756	1.1	80	VRS130080100•
	20	704	1.2	70	VRS130070100•
FRS 110-100L	20	704	0.9	70	VRS110070100•
	25	588	1.0	56	VRS110056100•
	28	515	1.2	49	VRS110049100•
	35	438	1.6	40	VRS110040100•
	50	319	2.0	28	VRS110028112•
FRS 85-100L	50	319	1.0	28	VRS085028100•
	70	246	1.3	20	VRS085020100•
	93	187	1.6	15	VRS085015100•
	140	129	2.1	10	VRS085010112•
	200	92	2.8	7	VRS085007112•
3kW	Motor SGA100LB-4 B5 code M34003005SGA 1430 r/min 6.3 Amps				
FRS 150-100L	18	1064	1.1	80	VRS150080100•
	20	974	1.3	70	VRS150070112•
	25	837	1.7	56	VRS150056112•

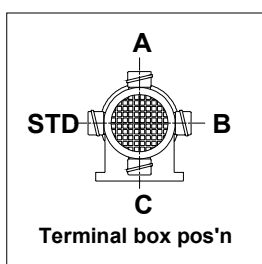
Type	r/min	Nm	SF	Ratio	Gearbox code
3kW	Motor SGA100LB-4 B5 code M34003005SGA 1430 r/min 6.3 Amps				
FRS 130-100L	25	814	1.2	56	VRS130056100•
	28	722	1.3	49	VRS130049112•
	35	622	1.8	40	VRS130040112•
FRS 110-100L	35	598	1.2	40	VRS110040100•
	50	436	1.5	28	VRS110028112•
	70	339	1.9	20	VRS110020112•
	93	258	2.2	15	VRS110015112•
FRS 85-100L	140	176	1.5	10	VRS085010112•
	200	126	2.1	7	VRS085007112•
4kW	Motor SGA112M-4 B5 code M34004005SGA 1440 r/min 7.9 Amps				
FRS 150-112M	20	1299	1.0	70	VRS150070112•
	25	1115	1.3	56	VRS150056112•
	28	976	1.5	49	VRS150049112•
FRS 130-112M	28	963	1.0	49	VRS130049112•
	35	830	1.4	40	VRS130040112•
	50	588	1.9	28	VRS130028112•
FRS 110-112M	50	581	1.1	28	VRS110028112•
	70	453	1.4	20	VRS110020112•
	93	344	1.6	15	VRS110015112•
FRS 85-112M	140	235	1.1	10	VRS085010112•
	200	168	1.5	7	VRS085007112•
5.5kW	Motor SGA132S-4 B5 code M34005505SGA 1450 r/min 10.5 Amps				
FRS 150-132S	25	1534	0.9	56	VRS150056132•
	28	1342	1.1	49	VRS150049132•
	35	1156	1.5	40	VRS150040132•
FRS 130-132S	35	1141	1.0	40	VRS130040132•
	50	809	1.4	28	VRS130028132•
	70	630	1.6	20	VRS130020132•
FRS 110-132S	70	623	1.0	20	VRS110020132•
	93	473	1.2	15	VRS110015132•
	140	326	1.6	10	VRS110010132•
	200	231	2.2	7	VRS110007132•
7.5kW	Motor SGA132M-4 B5 code M34007505SGA 1450 r/min 13.9 Amps				
FRS 150-132M	35	1576	1.1	40	VRS150040132•
	50	1132	1.3	28	VRS150028132•
FRS 130-132M	50	1103	1.0	28	VRS130028132•
	70	860	1.1	20	VRS130020132•
	93	652	1.5	15	VRS130015132•
	140	445	2.0	10	VRS130010132•
	200	319	2.5	7	VRS130007132•
FRS 110-132M	140	445	1.2	10	VRS110010132•
	200	315	1.7	7	VRS110007132•
11kW	Motor SGA160M-4 B5 code M34011005SGA 1465 r/min 21 Amps				
FRS 150-160M	70	1261	1.1	20	VRS150020160•
	93	968	1.5	15	VRS150015160•
	140	660	1.9	10	VRS150010160•
	200	468	2.2	7	VRS150007160•
15kW	Motor SGA160L-4 B5 code M34015005SGA 1460 r/min 27 Amps				
FRS 150-160L	93	1320	1.1	15	VRS150015160•
	140	900	1.4	10	VRS150010160•
	200	638	1.7	7	VRS150007160•

• = Mounting type/side covers: refer product code specification.

Mounting arrangements

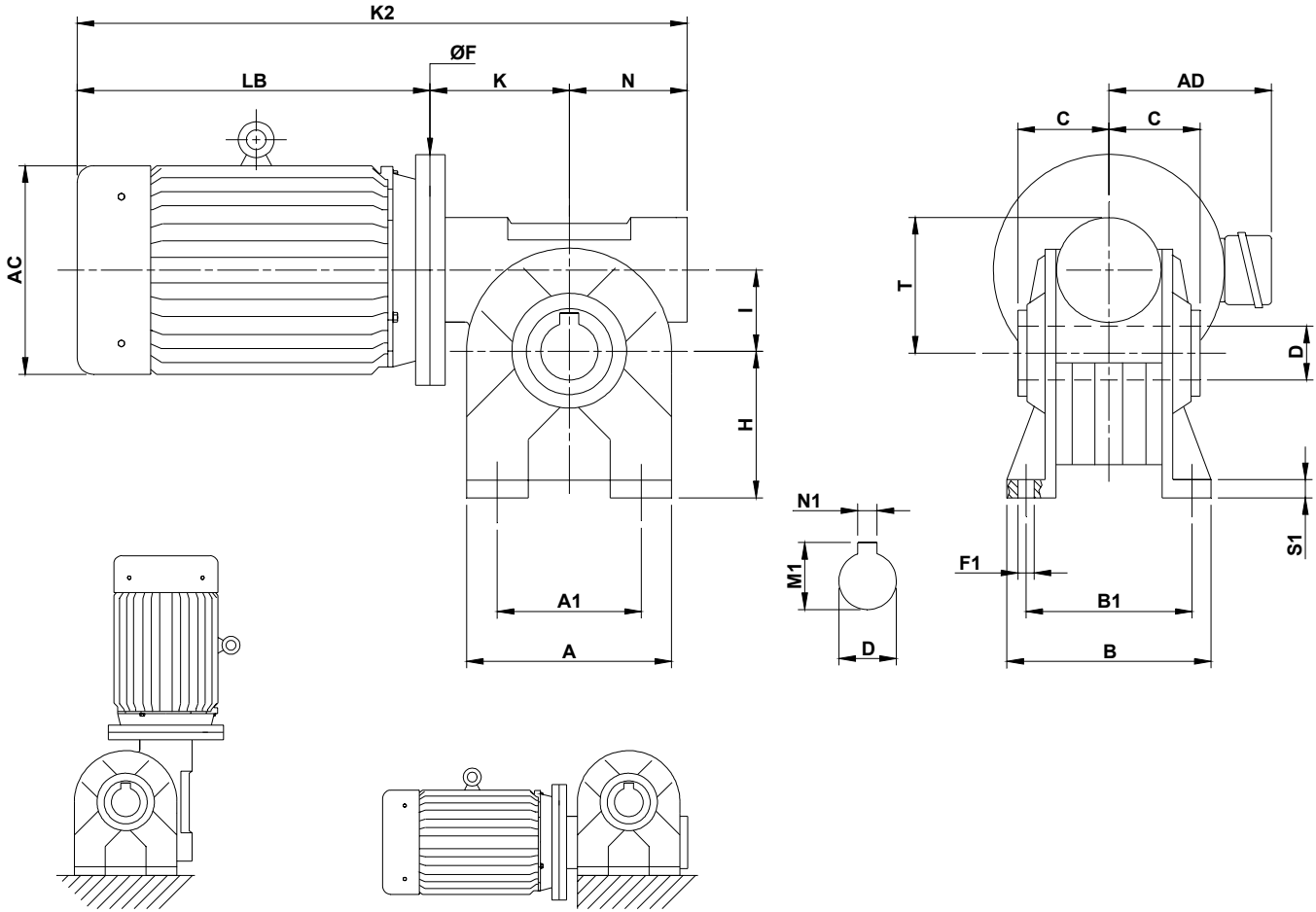
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 <p>B3</p>	 <p>B3</p>	 <p>B3</p>
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 <p>B8</p>	 <p>B8</p>	 <p>B8</p>
 <p>V6</p>	 <p>V6</p>	 <p>V6</p>
 <p>B6</p>	 <p>B6</p>	 <p>B6</p>
 <p>B7</p>	 <p>B7</p>	 <p>B7</p>

FL	PC
 <p>B5</p>	 <p>B5</p>
 <p>B5a</p>	 <p>B5a</p>
 <p>B5b</p>	 <p>B5b</p>
 <p>B5c</p>	 <p>B5c</p>
 <p>V1</p>	 <p>V1</p>
 <p>V3</p>	 <p>V3</p>



Dimensional drawings

Foot mount – type S



Mounting type D

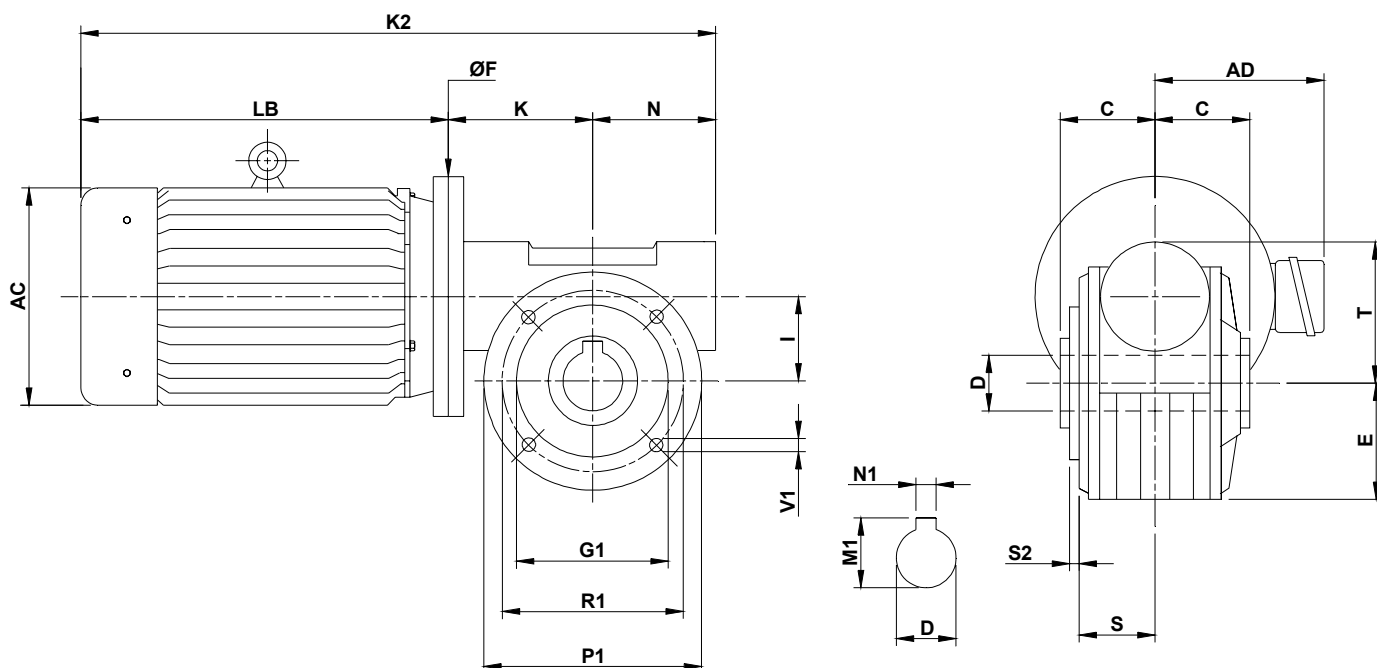
Mounting type I

Type	Gearbox dimensions														Motor dimensions					Weight ²⁾ [kg]		
	A	A1	B	B1	C	D ¹⁾	F1	H	I	K	M1	N	N1	S1	T	AC	AD	ØF	K2		LB	
FRS85	-80	193	140	168	140	61	35	13	135	85	116	38.3	111	10	15	129	165	150	200	472	245	40
	-90S																175	155	200	487	260	45
	-90L																175	155	200	512	285	48
	-100L																205	180	250	547	320	59
	-112M																230	190	250	567	340	65
FRS110	-80	250	200	200	162	77.5	42	14	172	110	145	45.3	142	12	17	170	165	150	200	532	245	56
	-90S																175	155	200	547	260	61
	-90L																175	155	200	572	285	64
	-100L																205	180	250	607	320	75
	-112M																230	190	250	627	340	81
	-132S																275	210	300	682	395	108
FRS130	-90L	286	235	230	190	90	48	15	200	130	164	51.8	159	14	19	200	175	155	200	608	285	78
	-100L																205	180	250	643	320	89
	-112M																230	190	250	663	340	95
	-132S																275	210	300	718	395	122
	-132M																275	210	300	758	435	134
FRS150	-100L	336	260	250	210	105	55	19	230	150	190	59.3	189	16	20	224	205	180	250	699	320	119
	-112M																230	190	250	719	340	125
	-132S																275	210	300	774	395	152
	-132M																275	210	300	814	435	164
	-160M																325	255	350	889	490	210
	-160L																325	255	350	934	535	225

¹⁾ See page 9 for alternative shaft sizes

²⁾ Includes oil

Face mount – type PC

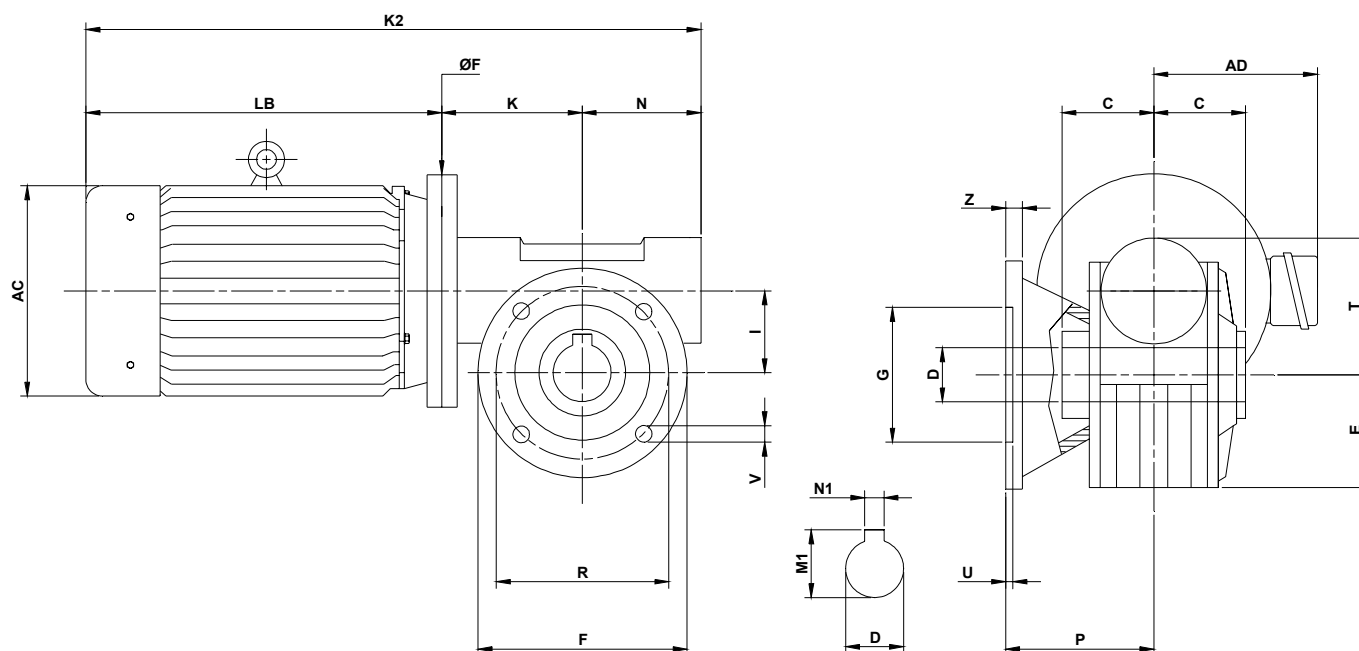


Type	Gearbox dimensions														Motor dimensions					Weight ²⁾ [kg]		
	C	D ¹⁾	E	G1	I	K	M1	N	N1	P1	R1	S	S2	T	V1	AC	AD	ØF	K2		LB	
FRS85	-80	61	35	105	110	85	116	38.3	111	10	150	130	56.5	3	129	M10	165	150	200	472	245	40
	-90S																175	155	200	487	260	45
	-90L																175	155	200	512	285	48
	-100L																205	180	250	547	320	59
	-112M																230	190	250	567	340	65
FRS110	-80	77.5	42	135	130	110	145	45.3	142	12	200	165	74.5	2.5	170	M12	165	150	200	532	245	56
	-90S																175	155	200	547	260	61
	-90L																175	155	200	572	285	64
	-100L																205	180	250	607	320	75
	-112M																230	190	250	627	340	81
	-132S																275	210	300	682	395	108
	-132M																275	210	300	722	435	120
FRS130	-90L	90	48	150	180	130	164	51.8	159	14	240	215	87	5	200	M12	175	155	200	608	285	78
	-100L																205	180	250	643	320	89
	-112M																230	190	250	663	340	95
	-132S																275	210	300	718	395	122
	-132M																275	210	300	758	435	134
FRS150	-100L	105	55	178	180	150	190	59.3	189	16	250	215	102	5	224	M14	205	160	250	699	320	119
	-112M																230	190	250	719	340	125
	-132S																275	210	300	774	395	152
	-132M																275	210	300	814	435	164
	-160M																325	255	350	889	490	210
	-160L																325	255	350	934	535	225

¹⁾ See page 9 for alternative shaft sizes

²⁾ Includes oil

Flange mount – type FL

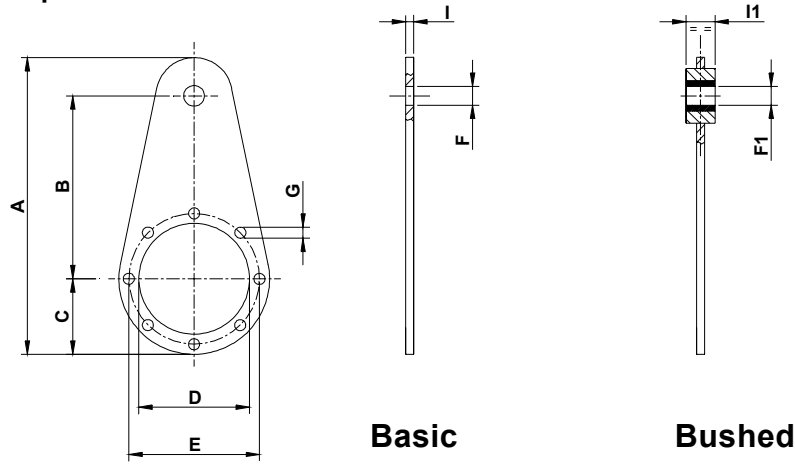


Type	Gearbox dimensions													Motor dimensions					Weight ²⁾ [kg]			
	C	D ¹⁾	E	F	G	I	K	M1	N	N1	P	R	T	U	V	AC	AD	ØF		K2	LB	
FRS85	-80	61	35	105	200	130	85	116	38.3	111	10	100	165	129	5	13	165	150	200	472	245	40
	-90S												175	155			175	155	200	487	260	45
	-90L												175	155			175	155	200	512	285	48
	-100L												205	180			205	180	250	547	320	59
	-112M												230	190			230	190	250	567	340	65
FRS110	-80	77.5	42	135	250	180	110	145	45.3	142	12	150	215	170	5	15	165	150	200	532	245	56
	-90S												175	155			175	155	200	547	260	61
	-90L												175	155			175	155	200	572	285	64
	-100L												205	180			205	180	250	607	320	75
	-112M												230	190			230	190	250	627	340	81
	-132S												275	210			275	210	300	682	395	108
	-132M												275	210			275	210	300	722	435	120
FRS130	-90L	90	48	150	300	230	130	164	51.8	159	14	150	265	200	5	15	175	155	200	608	285	78
	-100L												205	180			205	180	250	643	320	89
	-112M												230	190			230	190	250	663	340	95
	-132S												275	210			275	210	300	718	395	122
	-132M												275	210			275	210	300	758	435	134
FRS150	-100L	105	55	178	350	250	150	190	59.3	189	16	160	300	224	6	19	205	180	250	699	320	119
	-112M												230	190			230	190	250	719	340	125
	-132S												275	210			275	210	300	774	395	152
	-132M												275	210			275	210	300	814	435	164
	-160M												325	255			325	255	350	889	490	210
	-160L												325	255			325	255	350	934	535	225

¹⁾ See page 9 for alternative shaft sizes

²⁾ Includes oil

Torque arms



Basic

Bushed

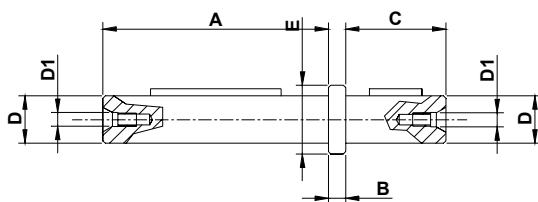
FRS	Part number		Dimensions									
	Basic	Bushed	A	B	C	D	E	F	F1	G	I	I1
85	V474-202-004	V474-202-002	313	200	75	110	130	20.5	20	11	6	25
110	V475-202-004	V475-202-002	388	250	100	130	165	20.5	20	13	6	25
130	V476-202-004	V476-202-002	465	300	120	180	215	26	25	13	6	30
150	V477-202-004	V477-202-002	525	350	125	180	215	26	25	15	6	30

Alternative shaft sizes

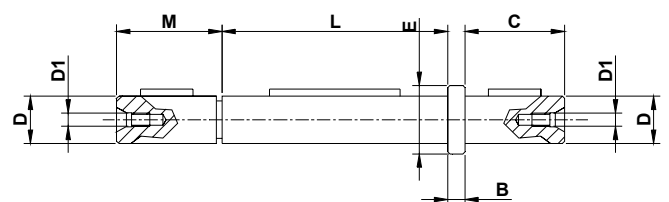
CMG standard hollow shaft diameter is chosen to meet the Australian market preference. Also available is the European alternative.

Type	Bore diameter	
	Australian market	European alternative
FRS85	35mm	32mm

Output shafts



Single ended



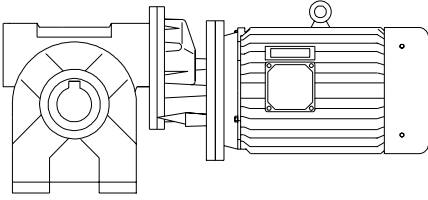
Double ended

FRS	Part number		Dimensions							
	Single ended	Double ended	A	B	C	D	D1	E	L	M
85	V474-901-035	V474-902-035	119	10	70	35	M10	38	122	80
85(alt)	V474-901-032	V474-902-032	119	10	70	32	M10	38	122	80
110	V475-901-042	V475-902-042	153	10	100	42	M10	50	155	110
130	V476-901-048	V476-902-048	177	20	110	48	M10	58	180	130
150	V477-901-055	V477-902-055	207	20	110	55	M12	63	210	130

Options and extras

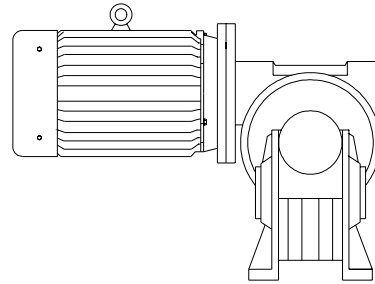
Helical/wormbox – FRA

The gearbox type FRA is a type FRS with a helical inline gear set on the input of the FRS wormbox. This gives a wider range of reduction ratios with greater output torque and higher efficiency than the corresponding standard FRS wormbox.



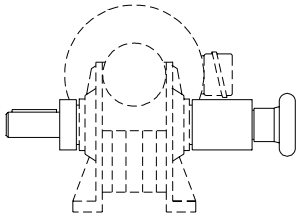
Double wormbox – FRS/FRS

Fitting two FRS type gearboxes together makes possible a selection of high reduction ratios to achieve low output speeds and a change of configuration.



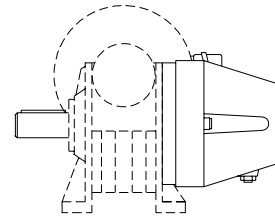
Torque limiting device – TL

The Varvel torque limiter 'TL' is a plug-in device to the FRS gearbox range which offers full gearbox protection against unexpected operational overloads. Simple hand release, and manual operation in the case of power failure are available with this device. Slipping torque can be adjusted through a locking knob control and is factory set to maximum torque of the gearbox or can be set to a demand torque.

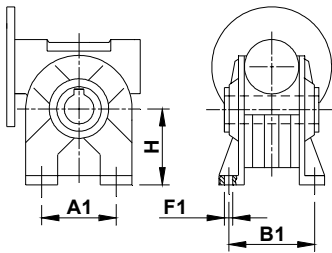


Travel limiting device – SL

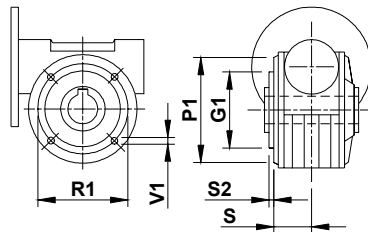
The Varvel Travel limiter 'SL' is used in all applications where a drive must be stopped by means of limit switches after a given operational time. The unit is designed to be fitted to the worm gearboxes type FRS with easy wiring and adjustment on site without special tooling.



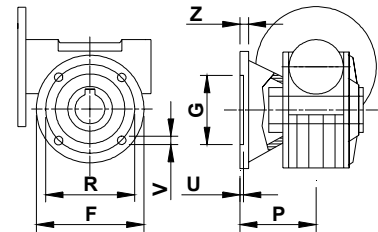
Alternative side covers (for interchangeability with other brands)



SA



PA-PB



FA-FB

SA	Dimensions			
	A1	B1	F1	H
85 SA	140	146	11	142
110 SA	-	-	-	-
130 SA	-	-	-	-
150 SA	-	-	-	-

PA-PB	Dimensions					
	G1	P1	R1	S	S2	V1
85 PA	-	-	-	-	-	-
85 PB	-	-	-	-	-	-
110 PA	-	-	-	-	-	-
110 PB	-	-	-	-	-	-
130 PA	-	-	-	-	-	-
130 PB	-	-	-	-	-	-
150 PA	-	-	-	-	-	-
150 PB	-	-	-	-	-	-

FA-FB	Dimensions						
	F	G	P	R	U	V	Z
85 FA	-	-	-	-	-	-	-
85 FB	210	152	119.5	176	5	10.5	14
110 FA	-	-	-	-	-	-	-
110 FB	270	170	131.5	230	5	13.5	18
130 FA	-	-	-	-	-	-	-
130 FB	-	-	-	-	-	-	-
150 FA	-	-	-	-	-	-	-
150 FB	-	-	-	-	-	-	-

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