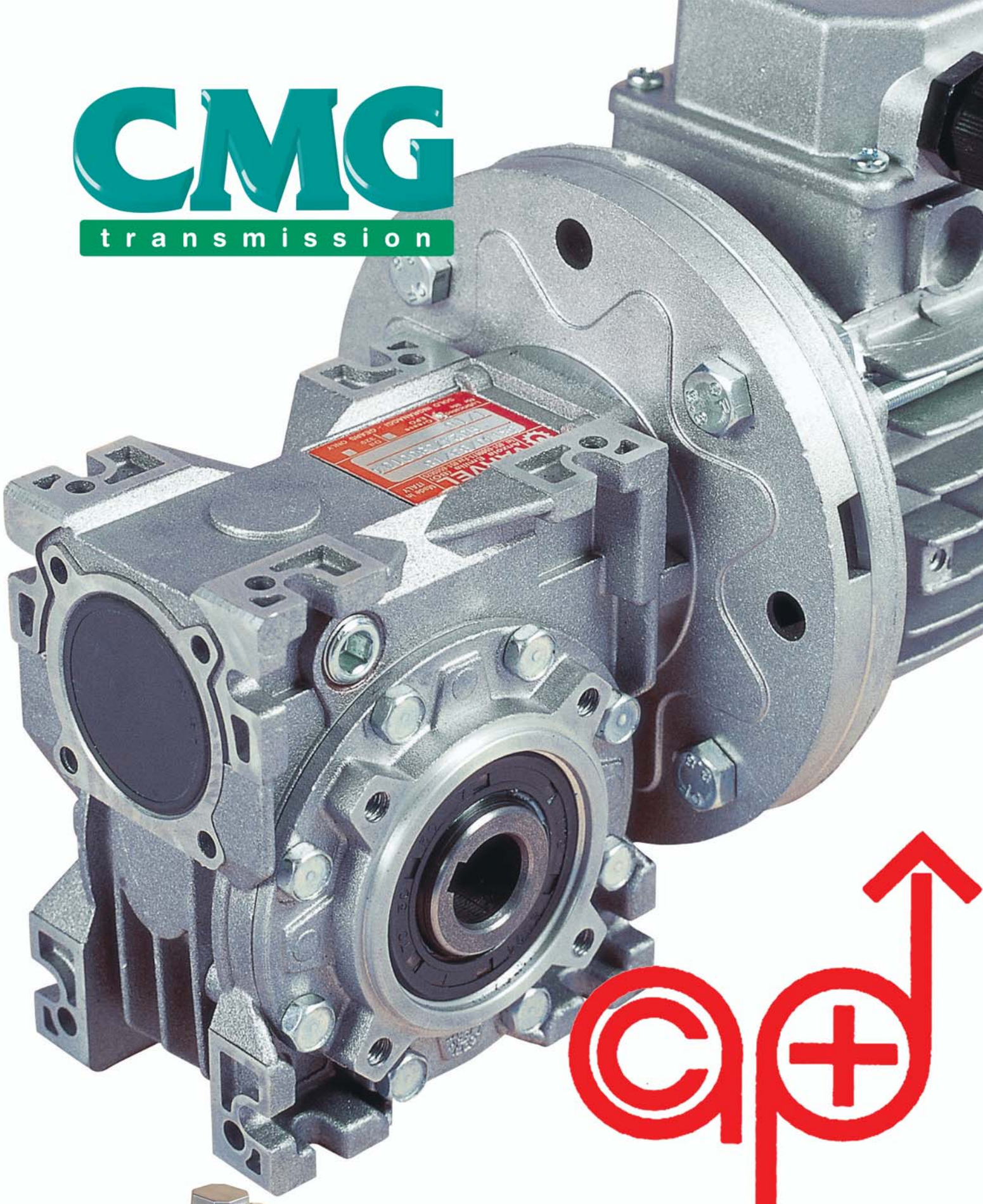
CMG

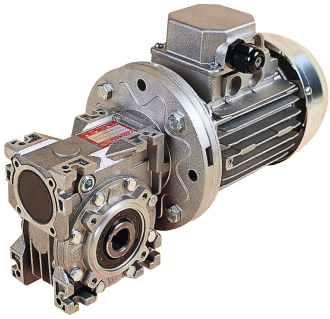
transmission



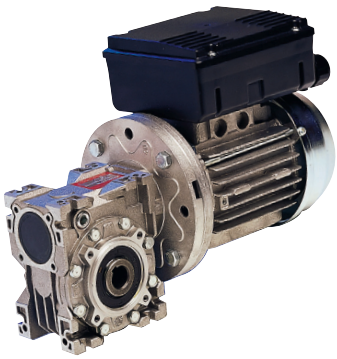
ACP&D Limited

FRT geared motors

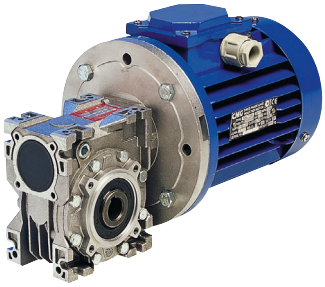
All aluminium universal mount wormbox units



FRT-MNT



FRT-MNA



FRT-MAL

The FRT all aluminium universal mount worm geared motor units are outstanding examples of the diverse range and product performance that has built the CMG name. The FRT series ranges up to 500Nm, 0.09 to 4.0kW, and offers adaptability, reliablity 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.

When you think Motors, Transmission, Drives, or research and development Technology...think CMG.

All CMG products are regularly redesigned and improved and CMG reserves the right to change the design, technical specification and dimensions without prior notice. E&OE.

FRT universal mount worm geared motors 0.09 to 4.0 kW, ratios 7 to 252:1, up to 500 Nm

This is a short form catalogue for the CMG range of FRT geared motors.

The partnership of two proven products, our die-cast aluminium FRT gearbox and our cast aluminium MAL and MN motors, provides a rugged and reliably finished product. After assembly of the two components, all FRT geared motors are test run.

For further detailed information please contact the nearest CMG office for separate FRT gearbox or MAL and MN motor catalogues.

FRT wormbox

FRT worm gearboxes, sizes 28 to 85, have housings and flanges manufactured of die-cast aluminium alloy. Its universal mounting provides, as standard, a versatile mounting system from five sides of the gearbox, and is interchangeable with other brands.

The FRT wormbox range has a clean and attractive unpainted sandblasted finish.

Wormshafts and wormwheels are designed for 15,000 running hours in accordance with BS 721. Wormshafts are alloy steel, case hardened and profile ground. Wormwheels are of centrifically cast bronze on a cast iron hub.

Standard output format is hollow bore. Alternatively, single or double solid output shafts are available (see page 10). Details of optional output flanges and torque arms are included. Dimensions of free input shaft arrangements are available on request.

All FRT wormboxes are delivered filled with ISO VG320 grade synthetic long-life oil (no plugs).

MAL and MN motor

The CMG low weight and compact profile MAL and MN motor ranges are recognized for their inherent suitability for all geared motor applications.

Connection: 3 phase, 415V, or single phase 240V, 50Hz.
Insulation: F class insulation, 80°C winding rise limit.
Speed: Nominally 1500 r/min (4 pole).
Mounting: B5 or B14A
Material: All cast aluminium
Protection: MAL - IP54 , MN - IP55.
Finish: MN - unpainted sandblasted finish
MAL **-** Blue (standard), Green (1st alternative)
Other colors available on request

Range	Phases /Connection	kW Range	Starting Torque
MAL	3∅	0.18 - 4.0	210 - 260%
MNT	3∅	0.09 - 0.75	230 - 260%
MNS	1∅ PSC	0.09 - 0.75	76 - 85%
MNA	1∅ CSCR	0.18 - 0.75	190 - 240%

Also available are **MNTB** brake motors and motors built to customer specifications.

Product code specification

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

V R T	0 4 0	0 8 0	0 6 3	S
1-3	4-6	7-9	10-12	13-14

Positions 1 to 3
Series
VRT = CMG Varvel FRT wormbox
VTA = FRT wormbox with FXA single stage helical box

Positions 4 to 6
Gearbox size
(028, 040, 050, 060, 070, and 085)

Positions 7 to 9
Gearbox ratio

Positions 10 to 12
Gearbox input size
056 = 56 B5
05A = 56 B14A
063 = 63 B5
06A = 63 B14A

Gearbox input size cont.
071 = 71 B5 07A = 71 14A
080 = 80 B5 08A = 80 B14A
090 = 90 B5 09A = 90 B14A
100 = 100 B5 10A = 100 B14A
112 = 112 B5 11A = 112 B14A

Positions 13 and 14
Mounting arrangement
S = standard (MultiMount)
F = Flange mount type F RHS
F1 = Flange mount type F LHS
V = Flange mount type FV RHS
V1 = Flange mount type FV LHS

Service factors

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

Service factor SF = F_1 x F_2 x F_3

F_1 selection			
Hours per day	Uniform load	Variable load	Shock load
3 to 4	0.8	1.0	1.5
8 to 10	1.0	1.2	1.8
10 to 24	1.4	1.6	2.0

F_2 selection	
Starts per hour	F_2
6	1.0
60	1.2
120	1.4

F_3 selection	
Expected lifetime	F_3
10 000	0.8
15 000	1.0
20 000	1.4

Gearbox selection data

Type	r/min	Nm	SF	ratio	Gearbox code
0.09kW					
FRT 28-56	14	26	0.3	100	VRT02810005••
	18	22	0.5	80	VRT02808005••
	20	19	0.6	70	VRT02807005••
	25	18	0.9	56	VRT02805605••
	28	17	1.0	49	VRT02804905••
	35	15	1.1	40	VRT02804005••
	50	11	1.8	28	VRT02802805••
	70	9.1	1.8	20	VRT02802005••
	93	7.1	2.5	15	VRT02801505••
	140	5	>3	10	VRT02801005••
	200	3.6	>3	7	VRT02800705••
0.18kW					
FTA 50-63	8.0	118	1.2	176	VTA05017606••
	11	98	1.2	126	VTA05012606••
FRT 50-63	14	57	0.8	100	VRT05010006••
	18	51	1.1	80	VRT05008006••
	20	45	1.4	70	VRT05007006••
FRT 40-63	25	38	1.0	56	VRT04005606••
	28	35	1.2	49	VRT04004906••
	35	30	1.4	40	VRT04004006••
	50	23	2.1	28	VRT04002806••
	70	18	2.1	20	VRT04002006••
	93	14	3.0	15	VRT04001506••
	140	10	>3	10	VRT04001006••
	200	7.3	>3	7	VRT04000706••
FRT 28-63	50	23	0.9	28	VRT02802806••
	70	18	0.9	20	VRT02802006••
	93	14	1.3	15	VRT02801506••
	140	10	1.7	10	VRT02801006••
	200	7.0	2.4	7	VRT02800706••
0.37kW					
FTA 70-71	5.5	346	0.9	252	VTA07025207••
FTA 60-71	8.0	251	1.0	176	VTA06017607••
	11	215	1.1	126	VTA06012607••
FRT 70-71	14	130	1.0	100	VRT07010007••
	18	110	1.4	80	VRT07008007••
FRT 60-71	18	106	1.0	80	VRT06008007••
	20	97	1.3	70	VRT06007007••
	25	85	1.5	56	VRT06005607••
FRT 50-71	28	76	1.0	49	VRT05004907••
	35	65	1.1	40	VRT05004007••
FRT 40-71	50	48	1.0	28	VRT04002807••
	70	38	1.0	20	VRT04002007••
	93	30	1.4	15	VRT04001507••
	140	21	2.1	10	VRT04001007••
	200	15	2.9	7	VRT04000707••

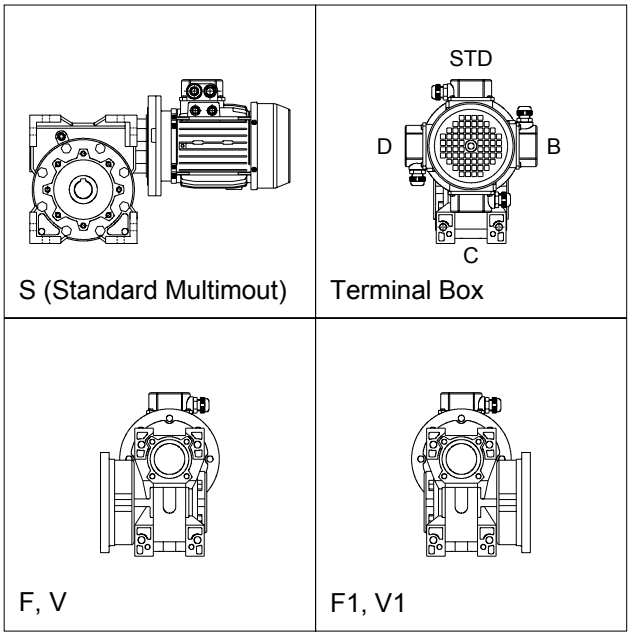
•• = refer product code specification, on page 3, positions 12 and 13.

Type	r/min	Nm	SF	ratio	Gearbox code
0.55kW					
FTA 85-80	5.5	525	1.0	252	VTA08525208••
	8.0	394	1.3	176	VTA08517608••
FTA 70-80	11	325	0.9	126	VTA07012608••
FRT 70-80	14	210	1.0	100	VRT07010008••
	18	163	1.0	80	VRT07008008••
	20	155	1.1	70	VRT07007008••
	25	135	1.3	56	VRT07005608••
	28	126	1.5	49	VRT07004908••
FRT 60-80	25	125	1.0	56	VRT06005608••
	28	114	1.1	49	VRT06004908••
	35	99	1.4	40	VRT06004008••
	50	75	1.9	28	VRT06002808••
FRT 50-80	50	75	1.1	28	VRT05002808••
	70	57	1.1	20	VRT05002008••
	93	44	1.7	15	VRT05001508••
	140	32	2.4	10	VRT05001008••
	200	23	>3	7	VRT05000708••
0.75kW					
FTA 70-80	8.0	537	0.9	176	VTA07017608••
	11	449	1.1	126	VTA07012608••
FRT 85-80	18	239	1.2	80	VRT08508008••
	20	225	1.3	70	VRT08507008••
FRT 70-80	25	180	1.0	56	VRT07005608••
	28	171	1.1	49	VRT07004908••
FRT 60-80	35	135	1.0	40	VRT06004008••
	50	102	1.4	28	VRT06002808••
	70	79	1.5	20	VRT06002008••
FRT 50-80	93	60	1.2	15	VRT05001508••
	140	43	1.7	10	VRT05001008••
	200	31	2.4	7	VRT05000708••
1.1kW					
FTA 85-90S	15	505	1.0	125	VTA08512509••
	22	404	1.3	63	VTA08506309••
FRT 85-90S	25	285	1.1	56	VRT08505609••
	28	246	1.3	49	VRT08504909••
FRT 70-90S	35	212	1.1	40	VRT07004009••
	50	158	1.4	28	VRT07002809••
	70	122	1.6	20	VRT07002009••
FRT 60-90S	70	116	1.1	20	VRT06002009••
	93	91	1.4	15	VRT06001509••
	140	63	2.1	10	VRT06001009••
	200	45	2.5	7	VRT06000709••

Mounting arrangements

Type	r/min	Nm	SF	ratio	Gearbox code
1.5kW					
FTA 85-90L	22	550	1.0	63	VTA08506309••
FRT 85-90L	29	330	1.0	49	VRT08504909••
	35	295	1.4	40	VRT08504009••
FRT 70-90L	50	215	1.0	28	VRT07002809••
	70	166	1.2	20	VRT07002009••
	93	128	1.5	15	VRT07001509••
	140	88	2.0	10	VRT07001009••
FRT 60-90L	93	125	1.0	15	VRT06001509••
	140	86	1.5	10	VRT06001009••
	200	61	1.8	7	VRT06000709••
2.2kW					
FRT 85-100L	50	319	1.0	28	VRT08502810••
	70	246	1.3	20	VRT08502010••
FRT 70-100L	93	187	1.0	15	VRT07001510••
	140	129	1.4	10	VRT07001010••
	200	92	1.8	7	VRT07000710••
3.0 kW					
FRT 85-100L	70	335	1.0	20	VRT08502010••
	93	255	1.1	15	VRT08501510••
FRT 70-100L	140	176	1.0	10	VRT07001010••
	200	126	1.3	7	VRT07000710••
4.0 kW					
FRT 85-112M	140	235	1.1	10	VRT08501011••
	200	168	1.5	7	VRT08500711••

•• = refer product code specification, on page 3, positions 12 and 13.



Motor selection data

kW	MAL (Three Phase) Starting torque 210-260%			MNT* (Three Phase) Starting torque 230-260%			MNS (Single Phase - PSC) Starting torque 76-85%			MNA (Single Phase - CS/CR) Starting torque 190-240%		
	Product code	r/min	amps	Product code	amps	amps	Product code	r/min	amps	Product code	r/min	amps
0.09				M3400009•MNT	1360	0.45	M2400009•MNS	1340	0.9			
0.18	M3400018•MAL	1365	0.62	M3400018•MNT	1370	0.75	M2400018•MNS	1360	1.6	M2400018•MNA	1360	1.6
0.37	M3400037•MAL	1390	1.07	M3400037•MNT	1380	1.2	M2400037•MNS	1380	3.2	M2400037•MNA	1380	3.2
0.55	M3400055•MAL	1340	1.45	M3400055•MNT	1390	1.7	M2400055•MNS	1400	4.8	M2400055•MNA	1400	4.8
0.75	M3400075•MAL	1380	1.95	M3400075•MNT	1390	2.0	M2400075•MNS	1420	5.6	M2400075•MNA	1420	5.6
1.1	M3400110•MAL	1405	2.50									
1.5	M3400150•MAL	1415	3.50									
2.2	M3400220•MAL	1430	4.70									
3.0	M3400300•MAL	1395	6.12									
4.0	M3400400•MAL	1415	8.15									

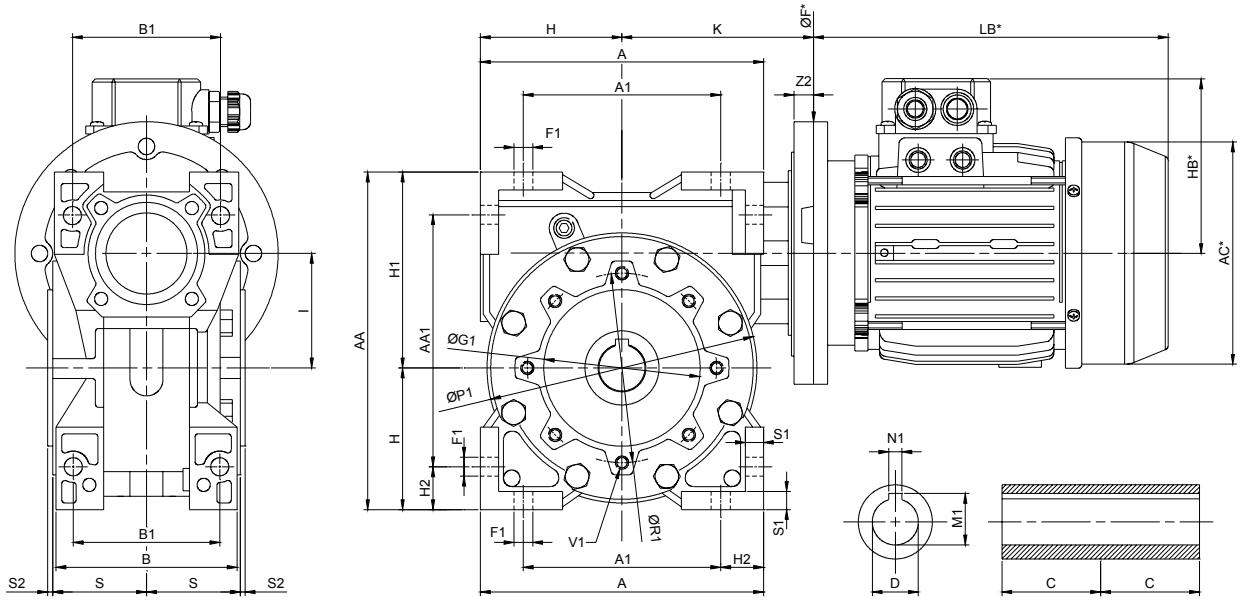
MN Series motors, 1.1 to 4.0 kW, are available on special order

• = Specify mounting (5=B5, 7=B14A)

* MNTB for brake motors.

Dimensional drawings

FRT



*refer to page 8 for motor dimensions.

	Gearbox dimensions																	
Type	A	A1	AA	AA1	B	B1	C	D[1)]	F1	G1	H	H1	H2	I	K	M1	N1	P1	R1
FRT 28	80	54	97	71	53	44	30	14	7	55	40	57	13	28	58	16.3	5	77	65
FRT 40	100	70	121.5	90	71	60	41	18	7	60	50	71.5	15	40	71	21.8	6	88	75
FRT 50	120	80	144	104	85	70	49	25	9	70	60	84	20	50	83	27.3	8	100	85
FRT 60	144	100	174	130	100	85	60	25	9	80	72	102	22	60	94	28.3	8	110	95
FRT 70	172	120	205	153	108	90	60	28	11	95	86	119	26	70	117	31.3	8	132	115
FRT 85	206	140	238	172	130	100	61	35	13	110	103	135	33	85	134	35.3	10	160	130

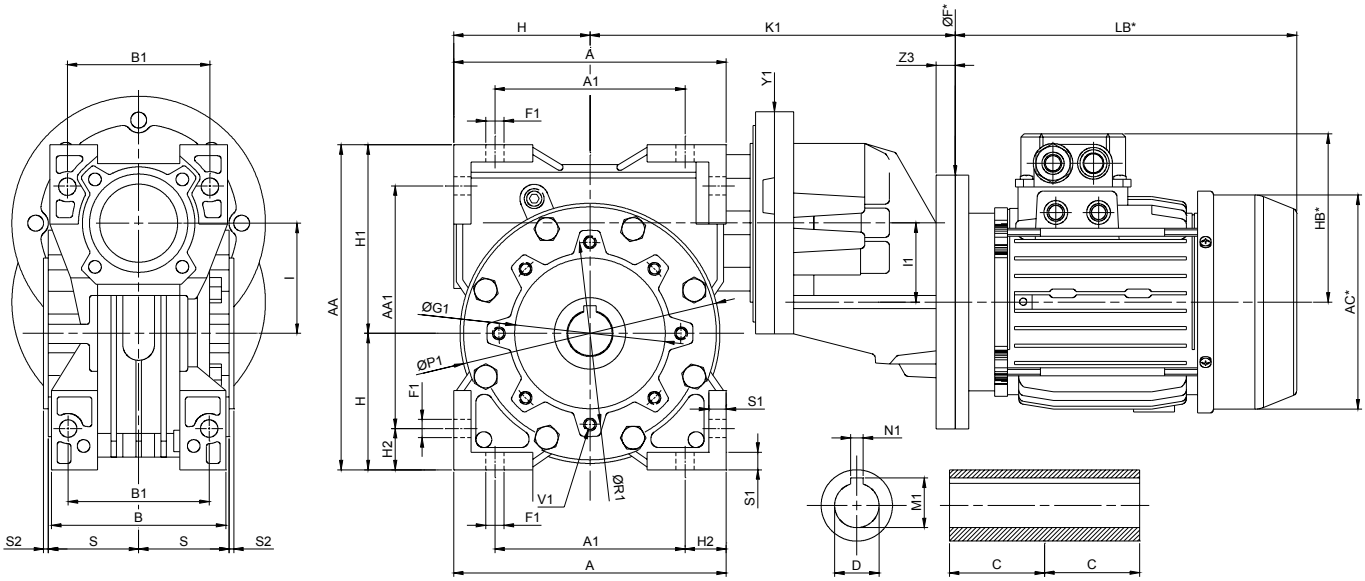
	Gearbox dimensions cont.					Weight [2)]
Type	S	S1	S2	V1[3)]	Z2	(kg)
FRT 28	27.5	6	2.5	M6x10 (4)	8	1.1
FRT 40	38.5	7	2.5	M6x10 (4)	9	2.5
FRT 50	46.5	8	2.5	M8x10 (4)	10	3.8
FRT 60	57	10	3	M8x15 (8)	12	6.5
FRT 70	57	12	3	M8x15 (8)	12	8.3
FRT 85	67	15	3	M10x20 (8)	14	12.0

[1)] See page 10 for alternative shaft sizes

[2)] Includes oil

[3)] FRT 28-50 have 4 holes at 45° offset from top
FRT 60-85 have 8 holes at 0° offset from top

FTA



*refer to page 8 for motor dimensions.

Type	Motor Mount	Gearbox dimensions															
		A	A1	AA	AA1	B	B1	C	D[1)]	F1	G1	H	H1	H2	I	I1	K1	M1
FTA 40	**-63 B5**	100	70	121.5	90	71	60	41	18	7	60	50	71.5	15	40	32	154	21.8
FTA 50	**-63 B5**	120	80	144	104	85	70	49	25	9	70	60	84	20	50	32	167	27.3
	-71 B5	120	80	144	104	85	70	49	25	9	70	60	84	20	50	40	173	27.3
FTA 60	**-71 B5**	144	100	174	130	100	85	60	25	9	80	72	102	22	60	40	184	28.3
	-80 B5	144	100	174	130	100	85	60	25	9	80	72	102	22	60	50	209	28.3
FTA 70	**-71 B5**	172	120	205	153	108	90	60	28	11	95	86	119	26	70	40	207	31.3
	-80 B5	172	120	205	153	108	90	60	28	11	95	86	119	26	70	50	232	31.3
FTA 85	**-80 B5**	206	140	238	172	130	100	61	35	13	110	103	135	33	85	50	249	35.3

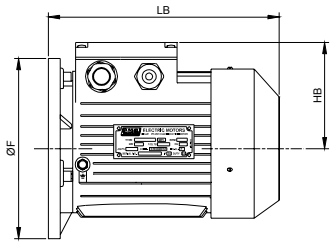
Type	Motor Mount	Gearbox dimensions cont.									Weight [2)] (kg)
		N1	P1	R1	S	S1	S 2	V 1[3)]	Y 1	Z 3	
FTA 40	**-63 B5**	6	88	75	38.5	7	2.5	M6X10 (4)	105	9	4.6
FTA 50	**-63 B5**	8	100	85	46.5	8	2.5	M8X10 (4)	105	9	5.9
	-71 B5	8	100	85	46.5	8	2.5	M8X10 (4)	120	10	6.1
FTA 60	**-71 B5**	8	110	95	57	10	3	M8X15 (8)	120	10	10.3
	-80 B5	8	110	95	57	10	3	M8X15 (8)	140	12	9.5
FTA 70	**-71 B5**	8	132	115	57	12	3	M8X15 (8)	120	10	10.3
	-80 B5	8	132	115	57	12	3	M8X15 (8)	140	12	11.0
FTA 85	**-80 B5**	10	160	130	67	15	3	M10X20 (8)	140	12	15.0

[1)] See page 10 for alternative shaft sizes
[2)] Includes oil
[3)] FTA 28-50 have 4 holes at 45° offset from top
FTA 60-85 have 8 holes at 0° offset from top

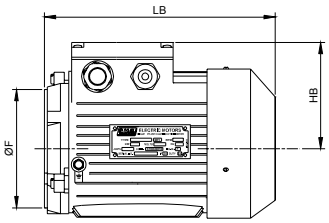
Motor dimensions

MAL Series

B5

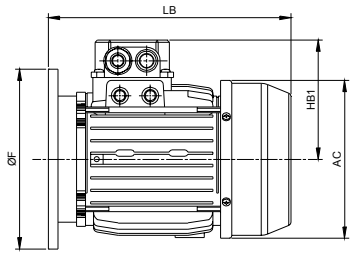


B14A



MNT Series

B5



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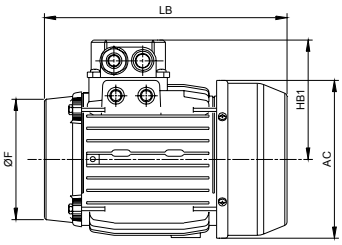
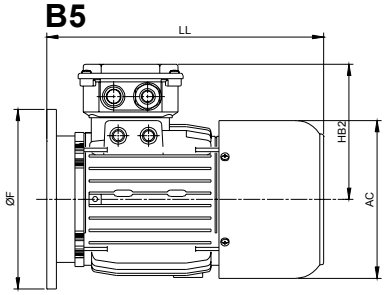
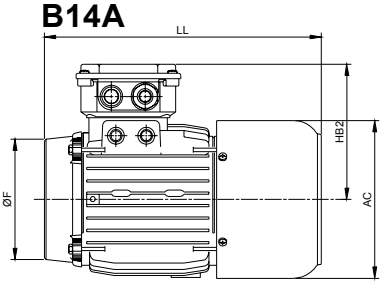


MNTB Series

B5

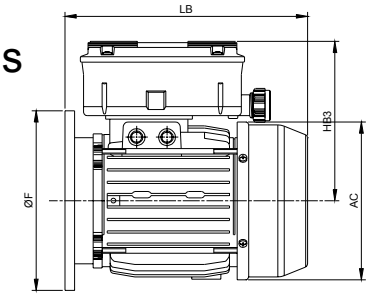


B14A

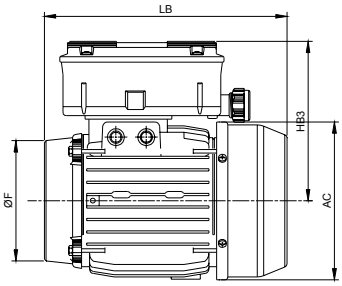


MNS/MNA Series

B5



B14A



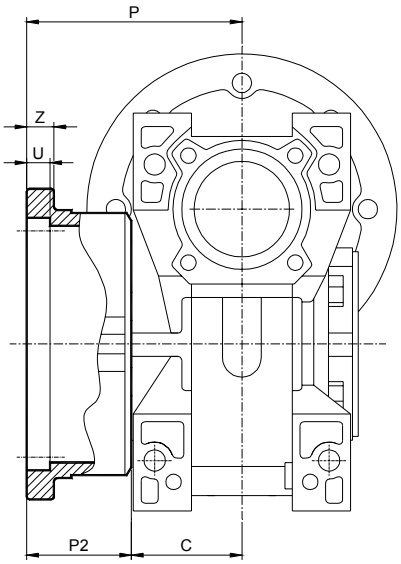
			MAL motor dimensions					MN motor dimensions							
Gearbox Sizes	**Motor Mount**		AC	∅F	HB	LB	Motor Weight (kg)	AC	∅F	HB1	HB2	HB3	LB	LL	Motor Weight (kg)
28	**56**	**B14A**						110	80	94	103	94[1)]	168	232	2.6
28,40,50	**63**	**B14A**	120	90	87	190	4.0	123	90	97	106	132	185	257	4.3
	63	**B5**	120	140	87	190	4.0	123	140	97	106	132	185	257	4.3
40, 50, 60, 70	**71**	**B14A**	134	105	92	205	6.3	140	105	107	122	142	215	276	6.2
	71	**B5**	134	160	92	205	6.3	140	160	107	122	142	215	276	6.2
50, 60, 70, 85	**80**	**B14A**	164	120	107	232	9.5	159	120	123	138	145	238	303	9.8
	80	**B5**	164	200	107	232	9.5	159	200	123	138	145	238	303	9.8
60, 70, 85	**90S**	**B14A**	177	140	115	250	12.1								
	90S	**B5**	177	200	115	250	12.1								
	90L	**B14A**	177	140	115	270	13.6								
	90L	**B5**	177	200	115	270	13.6								
70, 85	**100L**	**B14A**	223	160	138	302	26.2								
	100L	**B5**	223	250	138	302	26.2								
85	**112M**	**B5**	223	250	138	331	31.7								

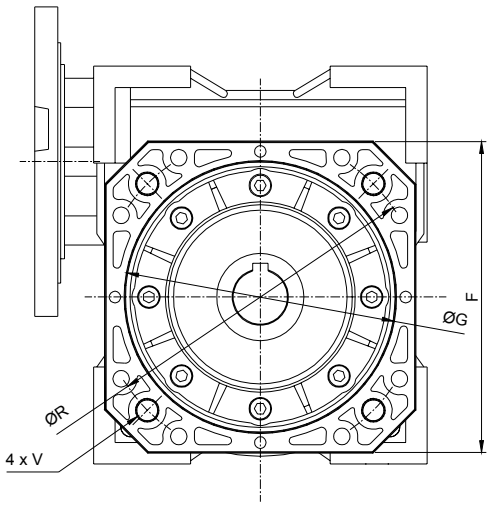
MN Series 90-112 Frame available on special order.

[1)] 56 frame single phase only MNS available.
Terminal box as per MNT with external capacitor.

Options and Extras

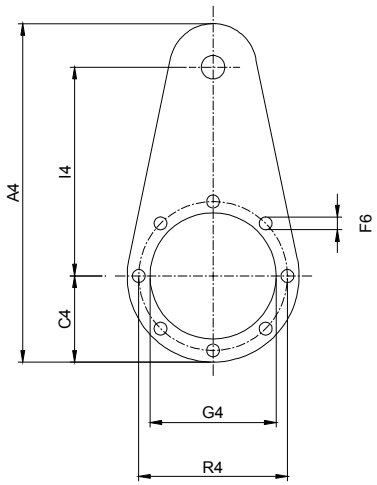
Flanges

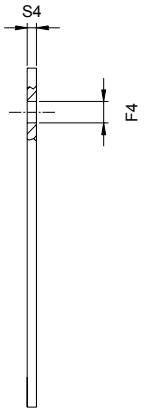




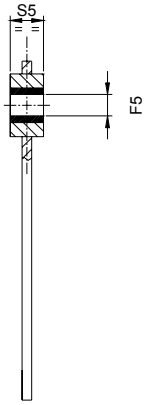
FRT	Type	Part Number	F	G	P	P2	R	U	V	Z
28	F	V530-203	80	50	53	23	68	4	7 (4)	7
40	F	V531-203	110	60	69	28	87	4	9 (4)	9
40	FV	V531-203-002	Under Development							
50	F	V532-203	125	70	93	44	90	5	9 (4)	10
50	FV	V532-203-002	160	110	90.5	41.5	130	5	9 (4)	10
60	F	V539-203	180	115	86	26	150	5	11 (4)	12
60	FV	V539-203-002	Under Development							
70	F	V533-203	200	130	111	51	165	5	13 (4)	14
85	F	V534-203	210	152	111	50	175	5	13 (4)	16

Torque arms





Basic (BT)



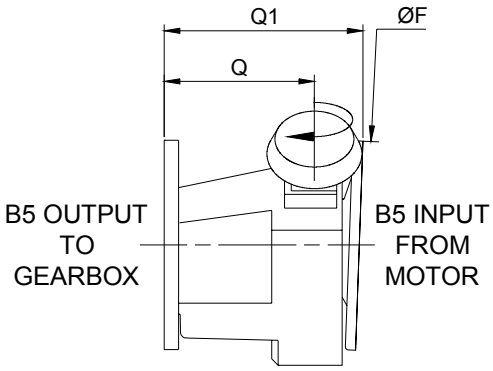
Bushed (BTV)

FRT	Part Number		Dimensions									
	Basic	Bushed	A4	C4	F4	F5	F6	G4	I4	R4	S4	S5
28	V530-202-004	V530-202-002	138	38	10.5	10	7	55	80	65	4	15
40	V531-202-004	V531-202-002	168	43	10.5	10	7	60	100	75	4	15
50	V472-202-004	V472-202-002	185	60	10.5	10	9	70	100	85	4	15
60	V539-202-004	V539-202-002	235	55	10.5	10	9	80	150	95	6	20
70	V533-202-004	V533-202-002	295	65	10.5	10	9	95	200	115	6	20
85	V474-202-004	V474-202-002	313	75	20.5	20	12	110	200	130	6	25

FVR mechanical variator

In addition to fixed speed units, a variable speed model is available by incorporating the CMG Varvel FVR series mechanical variator between the motor and FRT or FTA gearbox.

When incorporating the FVR variator output speeds listed in the fixed speed selection data are the maximum speeds with a reduction of 5:1 stepless variation.



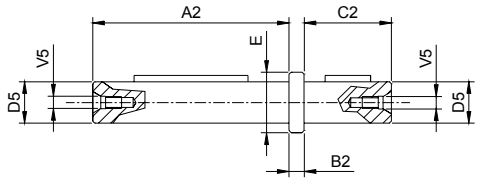
Motor Frame	Part Number	Q1	Q
63 B5	VVR010000063F	101	113
71 B5	VVR020000071F	124	164
80 B5	VVR030000080F	146	196
90 B5	VVR040000090F	176	236

Alternative shaft sizes

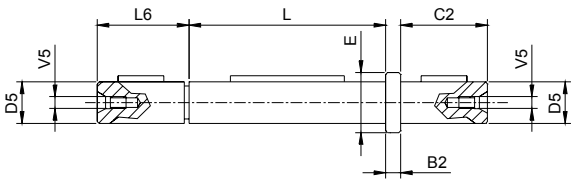
	Bore diameter	
Type	Preferred Stock	Alternative
FRT28	14mm	-
FRT40	18mm	19mm
FRT50	25mm	24mm
FRT60	25mm	-
FRT70	28mm	25mm
FRT85	35mm	32mm

Output shafts

Single ended



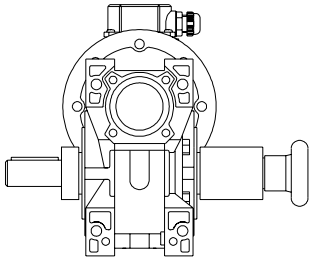
Double ended



	Part number		Dimensions							
FRT	Single ended	Double ended	A2	B2	C2	D5	E	L	L6	V5
28	V470-901-014	V470-902-014	58	1	30	14	-	60	31	M5
40	V471-901-018	V471-902-018	80	10	40	18	22	82	50	M8
40(alt)	V471-901-019	V471-902-019	80	10	40	19	22	82	50	M8
50	V472-901-025	V472-902-025	95	10	45	25	28	98	55	M8
50(alt)	V472-901-024	V472-902-024	95	10	45	24	28	98	55	M8
60	V479-901-025	V479-902-025	117	10	50	25	30	120	60	M8
70	V473-901-028	V473-902-028	117	10	60	28	34	120	70	M8
70(alt)	V473-901-025	V473-902-025	117	10	60	25	34	120	70	M8
85	V474-901-035	V474-902-035	119	10	70	35	38	122	80	M10
85(alt)	V474-901-032	V474-902-032	119	10	70	32	38	122	80	M10

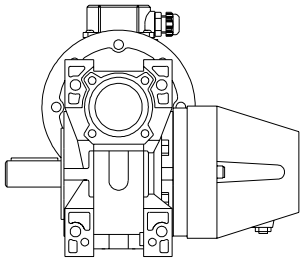
Torque limiting device – TL

The Varvel torque limiter 'TL' is a plug-in device to the FRT 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 FRT with easy wiring and adjustment on site without special tooling.



VRT Installation Operation And Maintenance

Installation

When mounting the gearbox ensure that the mounting surfaces are flat and stable to allow the unit to run without vibration or overloading.

Mounting of the gearbox hollow shaft should have a low interference fit. A bore of F7 tolerance is recommended when fitting chains, sprockets, pulleys or collars on the unit shaft. Such components should never be driven or hammered on or off the shaft because damage to internal parts may result. Use of the tapped hole in the shaft or pullers should be a priority.

When fitting belt and chain drives tension should be checked. It is important to avoid both excessive tension and exceeding the maximum permissible radial force of the unit.

Handling

When hoisting gearbox units use relevant housing locations or eyebolts where provided, or foot or flange holes. Never hoist on any moving parts.

Running in

Gearboxes are run no-load after assembly but it is recommended that units are not run at maximum load for the first 20-30 running hours to allow appropriate run-in.

Running

The unit may be connected for clockwise or anti-clockwise rotation. The unit must be stopped and returned to the factory as soon as defective running or unexpected noise occurs.

Lubrication

The gearboxes are delivered already filled with long-life synthetic oil. In the case of oil replacement or topping up, do not use mineral lubricants. Standard lubricant is ISOVG320 grade synthetic oil.

Painting

Carefully protect oil seals, coupling faces and shafts when painting the gearboxes.

Long-term storage

Antioxidants should be applied to the shafts and machined surfaces when units are stored for periods of 3 months or more. Oil seal lips should also be protected with grease.

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