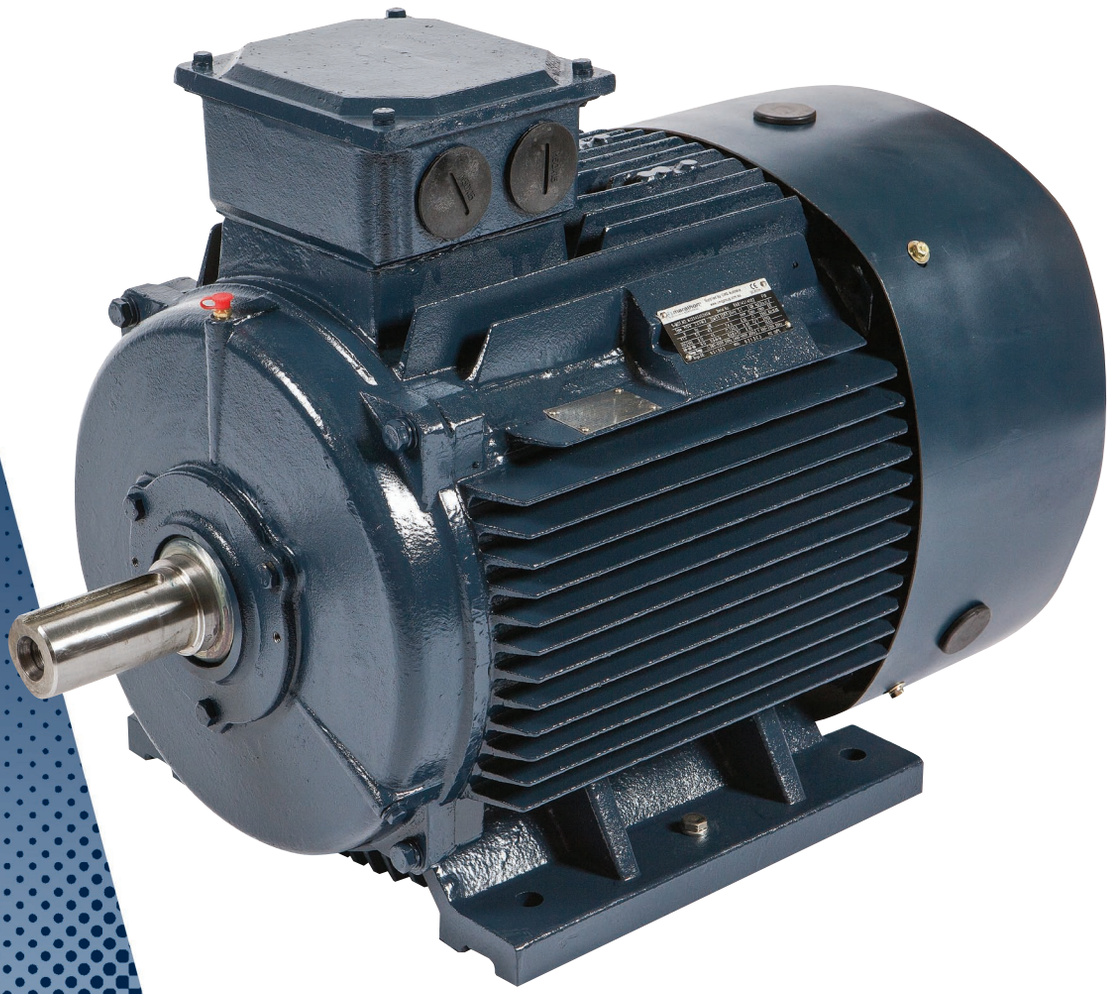
marathon™
CMG Motors

HGMT series
standard efficiency
cast iron motors



A Regal Brand

REGAL

REGAL

marathon™ CMG Motors

"We convert power into motion to help the world run more efficiently"

BUSINESS PURPOSE

ABOUT US

Regal Beloit Corporation is a leading manufacturer of electric motors, mechanical and electrical motion controls and power generation products serving markets throughout the world. Regal Beloit is headquartered in Beloit, Wisconsin, and has manufacturing, sales and service facilities throughout the United States, Canada, Mexico, Europe and Asia.

Regal Australia brings together the strength and experience of three of Australia's leading suppliers of engineered industrial products. CMG, OBA and Transmission Australia are now in a position to offer industry an unparalleled range of products under the Regal Australia banner.

Our products are efficient and innovative; they conform to Australian design, performance and engineering standards. Regal Australia sources products from Regal manufacturing facilities and represents some of the world's leading industrial manufactures.

Regal Australia embraces the company core values of Integrity, High Energy and Performance and has adopted the initiatives of customer care, globalization, innovation, sustainability and simplification.

Our company business statement is that "We convert power into motion to help the world run more efficiently" has direct lineage to our core values and initiatives.

REGAL OUR CORE VALUES

Integrity
We are a company that is honest, trustworthy, candid, transparent and fair.

High Energy
Our culture promotes a strong work ethic with high energy teams fostering a culture of inclusion and respect for all.

Performance
Everyone is expected to perform and our stakeholders count on us to execute, meet commitments and continuously improve.

REGAL OUR INITIATIVES

Customer Care
Our future depends on the success of our customers. We will establish closer relationships with our customers, actively listen to their feedback and respond with a sense of urgency.

Globalization
We want to be global for three reasons. First, we want to participate in high growth markets around the world. Second, many of our customers are global and we want to serve customers where they do business. Finally, we want to utilize our global capabilities to seek out the best talent and to remain globally competitive.

Innovation
We will build the future of the Company on products that are new and needed. While we accept that with an innovation headset comes a certain degree of risk, we are committed to investing in new products, technologies and processes that deliver real value to our customers.

Sustainability
The long term sustainability of our Company requires not only continuous growth and profitability, but also that we take personal responsibility for the impact we have on our planet, and for the fair and just treatment of the people we employ.

Simplification
Complexity is a serious disadvantage in business. We aim to simplify every aspect of our operations to eliminate complexities in order to increase our speed, improve our flexibility and reduce our costs.

HGMT series standard efficiency cast iron motors
Sizes 80 to 315, 0.75 to 160kW, three phase

Introduction

HGMT series motors. Standard HGMT motors are three phase squirrel cage TEFC (Totally Enclosed Fan Cooled), with IEC frame sizes from 80 to 315, with CENELEC frame allocation as standard. They combine excellent electrical characteristics with the robust strength of cast iron.

In addition to standard design, the range includes:

HGMTB - Brake motors
HGMTC - Cooling tower application
HGMTR - Airstream rated for axial flow fans

All units are supplied with F Class insulation, with temperature rise being limited to less than 80K (unless otherwise marked). This provides the end user with a wide safety margin under general operating conditions.

In addition we also offer motors wound with H Class insulation, and temperature rise still limited to 80K.

HGMTH - High ambient temperature application

Additional protection is provided by installation of 150°C thermistors in all units from 160 frame upward to continuously protect the winding.

The conservative rating of Regal Australia type HGMT motors provides additional operational safeguards, ensures long unit life, and renders this series inherently suitable for most arduous mining, industrial or agricultural applications.

Efficiency

The HGMT range meets or exceed MEPS2 requirements of AS/NZS1359.5:2004 with many sizes meeting High Efficiency levels of the same standard. HGMT motors exceed European Eff1 levels and correspond to IE2 (High Efficiency) of the new international standard IEC 60034-30.

Standards and specifications

The main dimensions and rated outputs of Regal Australia type HGMT motors generally conform to International Standards IEC60034, IEC60072 and Australian Standard AS1359.

Product code specification

When placing an order the motor product code should be specified. The product code of the motor is composed in accordance with the following example:

M	3	2	0 0 1 5 0	3	H G M T		/ 4 0 5
1	2	3	4 - 8	9	10 - 13	14...	Suffix

Position 1
M = metric frame size

Position 2
Winding design
3 = Standard three phase motors

Position 3
Number of poles
2 = 2 poles
4 = 4 poles
6 = 6 poles
8 = 8 poles

Positions 4 to 8
Rated power output
(kW x 100)

Position 9
Mounting arrangements

1 = V1	**5** = B5	**8** = B3/B14B
3 = B3	**6** = B3/B14A	**9** = B14B
4 = B3/B5	**7** = B14A	

Positions 10 to 13
Series
HGM = Regal Australia HGM series
T = Top mount terminal box

Positions 14...*
Series variation
Blank = Standard
B = Brake motor
C = Cooling tower motors
F = Flying leads
H = 'H' Class insulation
* Multiple letters indicate multiple variation.

Suffix
Winding design

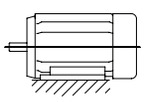
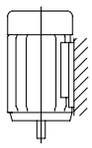
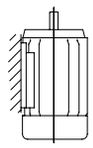
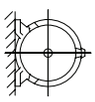
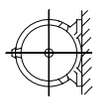
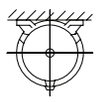
Blank = 380 - 415V/ 50Hz, 440 - 480V/ 60Hz		
/A05 = 1000V / 50Hz	**/386** = 380V / 60Hz
/B05 = 1100V / 50Hz	**/525** = 525V / 50Hz

Mechanical design

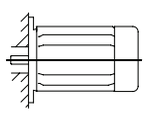
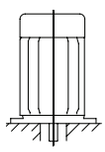
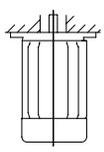
Mountings

Regal Australia HGMT motors are available in the mounting arrangements listed in the table below:

Foot mount

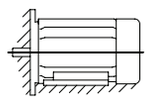
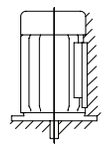
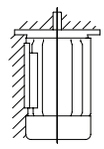
 B3 (IM1001) [HGMT 80 - 315]	 V5 (IM1011) [HGMT 80 - 280]	 V6 (IM1031) [HGMT 80 - 280]
 B6 (IM1051) [HGMT 80 - 250]	 B7 (IM1061) [HGMT 80 - 180]	 B8 (IM1071) [HGMT 80 - 180]

Large flange

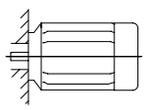
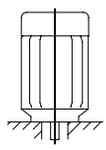
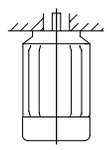
 B5 (IM3001) [HGMT 80 - 250]	 V1 (IM3011) [HGMT 80 - 315]	 V3 (IM3031) [HGMT 80 - 180]

Note: Bearing arrangement may require review for vertical shaft mounting.

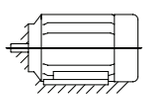
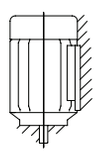
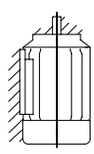
Large flange and feet

 B3/B5 (IM2001) [HGMT 80 - 315]	 V1/V5 (IM2011) [HGMT 80 - 180]	 V3/V6 (IM2031) [HGMT 80 - 180]

Small flange (face)

 B14 (IM3601) [HGMT 80 - 160]	 V18 (IM3611) [HGMT 80 - 160]	 V19 (IM3631) [HGMT 80 - 160]

Small flange (face) and feet

 B3/B14 (IM2101) [HGMT 80 - 160]	 V5/V18 (IM2111) [HGMT 80 - 160]	 V6/V19 (IM2131) [HGMT 80 - 160]

Protection

For vertically mounted motors

Motors to be mounted with the shaft vertically down must be provided with a suitable cover (available on request) to ensure foreign bodies are prevented from blocking the air intake.

Special care is necessary in fitting protective covers to ensure air flow is not impeded (refer to Cooling section on page 7).

To maintain IP rating, special additional measures may be required to protect the motor against the ingress of water or foreign bodies. Please contact Regal Australia for further information.

Against solar radiation

High solar radiation will result in undue temperature rise. In these circumstances motors should be screened from solar radiation by placement of adequate sunshades which do not inhibit air flow.

Degree of protection

Standard levels of enclosure protection for all HGMT frame sizes for both motor and terminal box is IP55, with IP56, IP65 and IP66 available on request.

Enclosure designations comply with IEC or AS60529. The enclosure protection required will depend upon the environmental and operational conditions within which the motor is to operate.

IP standards explanation

I P	**5**	**5**
1-2	3	4

Positions 1 and 2
International protection rating prefix

Position 3
First characteristic numeral
Degree of protection of persons against approach to live parts or contact with live or moving parts (other than smooth rotating shafts and the like) inside the enclosure, and degree of protection of equipment within the enclosure against the ingress of solid foreign bodies.

4 = *Protected against solid object greater than 1.0 mm*: Wires or strips of thickness greater than 1.0 mm, solid objects exceeding 1.0 mm

5 = *Dust protected*: Ingress of dust is not totally prevented but it does not enter in sufficient quantity to interfere with satisfactory operation of the equipment.

6 = *Dust tight*: No ingress of dust.

Position 4
Second characteristic numeral

4 = *Protected against splashing water*: Water splashed against the enclosure from any direction shall have no harmful effect.

5 = *Protected against water jets*: Water projected by a nozzle against the enclosure from any direction shall have no harmful effect.

6 = *Protected against heavy seas*: Water from heavy seas or water projected in powerful jets (larger nozzle and higher pressure than second numeral 5) shall not enter the enclosure in harmful quantities.

Materials and construction

	Motor frame size
Element	80 - 315
Frame	Cast iron
Endshields	Cast iron
Terminal box	Cast iron
Fan	Plastic (cast iron optional)
Fan cowl	Sheet steel
Fasteners	Corrosion protected

Shaft

HGMT motors have standard shaft extension lengths and are provided with standard key, and drilled and tapped hole. Non standard shaft extensions are available upon special order, with shaft design outlined on a detailed drawing.

Shaft extension run out, concentricity and perpendicularity to face of standard flange mount motors, comply with normal grade tolerance as specified in IEC 60072-1 and AS1359. Precision grade tolerance is available upon special order.

Finish

Standard HGMT motor color is RAL 5008 Grey Blue. Other colors are also available. All castings and steel parts are provided with a prime coat of rust-resistant paint.

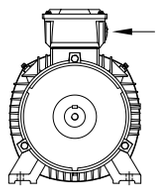
The finishing coat of enamel paint is sufficient for normal conditions, however special paint systems can be provided to accommodate stringent requirements for motors in corrosive environments. Special coatings are needed to resist such substances as acid, salt water and extreme climatic conditions.

Different colors and paint systems apply for varieties as described later in this catalogue.

Terminal box

HGMT motors have a cast iron terminal box with a one piece nitrile rubber barrier gasket between terminal box and motor, and a flat gasket under the terminal box lid. The earthing arrangement is available within the terminal box.

As standard the terminal box is mounted on the top.
The terminal box can be rotated through 4 positions at 90º intervals.



➔ indicates conduit entry position

Conduit entries for motor frame sizes 80 to 315 are provided tapped, with thread details set out below.

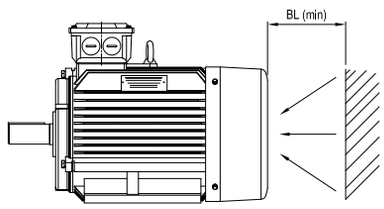
Motor frame	Entry/pitch Standard	Number of entries
80-100	M20 x 1.5	1
112-132	M25 x 1.5	2
160	M32 x 1.5	2
180	M40 x 1.5	2
200-280	M50 x 1.5	2
315	M63 x 1.5	2

Cooling

HGMT motors are totally enclosed fan cooled (TEFC) over an externally ribbed frame, with free movement of internal air by rotation of rotor blades, which is in accordance with IC0141 of IEC 60034-6 and AS1359.106.

Cooling air flows from the non-drive-end to the drive end. The fan is independent of the direction of rotation of the motor.

When the motor is installed care should be taken not to impede the air flow into the motor cowl. As a guide the following minimum dimension BL should be adopted.



Motor frame	Dimension BL [mm]
80-100	15
112-132	30
160-180	40
200-280	50
315	65

Bearings

As standard, frame sizes 80 to 180 have high quality deep groove sealed ball bearings. Bearings are prepacked with grease which, under normal operating conditions provides a high degree of operational reliability. Frame sizes 200 to 315 have high quality bearings with facilities to enable replenishment of the lubricant during operation. Grease nipples are fitted to end shields with the grease relief blanked off by a removable plug.

The table below sets out the permissible forces that can be applied to the motor shaft. Values assume the occurrence of only radial or axial loading. Point of application of the force is assumed to be at the tip of the shaft. Rotor weights have already been allowed for in the calculation of radial and axial loads. These loads are applicable for horizontal mounting only. The values are calculated on the basis of basic rating life or fatigue life L10 of 40,000 hours. Adjusted rating life for specific applications can be calculated if all influencing factors are known.

Greater axial forces can be tolerated if the motors are provided with angular contact ball bearings. Note that in such cases, the axial force must operate in one direction.

Bearing arrangement should be reviewed for motor frame sizes 200 and above if they are vertically mounted. Please contact Regal Australia for further information.

High capacity bearings

For frame sizes 200 to 280 in applications with increased radial force, cylindrical roller bearings can be substituted for ball bearings at the drive end, according to the accompanying table. When a roller bearing is fitted to the D-end, the N-end ball bearing is locked with a circlip to prevent axial movement. Note that the use of roller bearings is not recommended for 2 pole motors.

Permissible radial force - high capacity

Motor frame	D-end Roller	N-end Ball	Permissible radial force [N]		
			4 pole	6 pole	8 pole
200	NU312	6312	5825	6730	7455
225	NU313	6313	6015	7055	7740
250	NU314	6314	7295	8420	9315
280	NU317	6317	13445	15320	16770

Lubrication

HGMT motors standard bearings are lubricated with a polyurea based rolling contact bearing grease(Polyrex EM) suitable for operation within the cooling air temperature range of -20°C to +55°C. For operation outside this temperature range special lubricants are required.

Special lubricants or additional maintenance may be required in the case of motors exposed to comparatively high degrees of pollution, high humidity, increased or changed bearings loads, or prolonged continuous operation.

Permissible radial and axial forces – standard B3 mounted motors

	Bearing		Permissible radial force [N]				Permissible axial force [N]			
Motor frame	D-end	N-end	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
80	6204-2Z	6204-2Z	465	595	685	-	395	540	650	-
90	6205-2Z	6205-2Z	490	620	720	-	415	570	685	-
100	6206-2Z	6206-2Z	700	885	1030	1140	570	775	940	1075
112	6306-2Z	6306-2Z	960	1230	1415	1575	785	1080	1305	1515
132	6308-2Z	6308-2Z	1410	1815	2095	2320	1160	1590	1910	2200
160	6309-2Z	6309-2Z	1825	2345	2710	3020	1470	2030	2450	2800
180	6311-2Z	6311-2Z	2495	3200	3765	4200	1985	2700	3265	3755
200	6312	6312	2905	3745	4345	4825	2220	3055	3705	4225
225	6313	6313	3265	4010	4725	5205	2460	3385	4120	4730
250	6314	6314	3570	4635	5370	5960	2730	3775	4560	5220
280-2	6314	6314	3455				2605			
280-4,6,8	6317	6317		8170	9360	10270		4560	5580	6365
315-2	6317	6317	3550				2730			
315-4,6,8	NU319	6319		15720	17925	19660		4835	5890	6770

Vibration, balancing and noise

Vibration

HGMT motors fall within the Level N (normal) limits of vibration severity set out in standards IEC 60034-14:1996 and AS1359.114 (which are listed in the table below). As specified in the standards, these values relate to rotating machinery measured in soft suspension.

Vibration severity limit, Level N

Motor frame	Maximum RMS vibration velocity [mm/s]
80	1.8
90	1.8
100	1.8
112	1.8
132	1.8
160	2.8
180	2.8
200	2.8
225	2.8
250	3.5
280	3.5
315	3.5

Balancing

Rotors have been dynamically balanced with a half key. Pulleys or couplings used with motors must also be appropriately balanced.

Noise

Noise levels for HGMT motors comply with limits set by IEC 60034.9 and AS1359.109. HGMT sound pressure levels at 1 metre are set out in the table (above right). Data relates to motors tested at no load.

Sound pressure level

Output [kW]	Sound pressure level dB(A) at 1 metre			
	3000 r/min	1500 r/min	1000 r/min	750 r/min
0.75	64	56	61	TBA
1.1	65	63	61	TBA
1.5	75	63	55	TBA
2.2	75	60	60	TBA
3.0	72	59	69	TBA
4.0	72	61	63	TBA
5.5	74	69	62	TBA
7.5	74	72	63	TBA
11	76	65	62	TBA
15	76	65	65	TBA
18.5	76	69	68	TBA
22	74	70	68	TBA
30	74	72	65	TBA
37	83	72	69	TBA
45	81	72	70	TBA
55	79	82	69	TBA
75	82	73	75	TBA
90	85	73	75	TBA
110	84	78	83	TBA
132	88	80	88	-
160	87	83	-	-

Electrical design

As standard, HGMT motors have the following design and operating parameters. Performance data is based on this standard. Any deviation should be examined and performance values altered in accordance with the information provided in this section.

Three phase, 380 - 415V/ 50Hz, 440 - 480V/ 60Hz
Ambient cooling air temperature, 40°C
Altitude - 1000m
Duty cycle - S1 (continuous)
Rotation - Clockwise viewed from drive end
Connection - 230V Delta/400V Star (3kW and below)
- 400V Delta/690V Star (4kW and above)

Nameplate Design

Standard HGMT motors are suitable to operate at 380-415V 50Hz and 440-480V 60Hz supplies. This is indicated on the standard nameplate design as shown below.

marathon electric — Supplied by CMG Australia www.cmggroup.com.au — CE IEC60034-1

3~MOT.No: M34001505HGM Serial No: F16

Type HGM 90L-4	IM B5	IP 55	Duty S1	29 kg	Ins.cl: F
V	Hz	kW	A	cosφ	Conn	r/min	Eff
415	50	1.5	3.3	0.74	Y	1435	86.2%
230/400	50	1.5	5.9/3.4	0.75	△/Y	1430	
440-460-480	60	1.6-1.7-1.7	3.4-3.4-3.4	0.75	Y	1715	

Voltage Range: Y 380-420V 50Hz (440-480V 60Hz) △ 220-240V 50Hz

Brgs.DE: 6205-2Z C3 NDE: 6205-2Z C3

TYPICAL NAMEPLATE LAYOUT FOR MOTORS
UP TO 3.0kW

marathon electric — Supplied by CMG Australia www.cmggroup.com.au — CE IEC60034-1

3~MOT.No: M32005503HGM Serial No: F16

Type HGM 132SA-2	IM B3	IP 55	Duty S1	59 kg	Ins.cl: F
V	Hz	kW	A	cosφ	Conn	r/min	Eff
415	50	5.5	10.4	0.86	△	2925	85.7%
400/690	50	5.5	10.5/6.1	0.88	△/Y	2920	
440-460-480	60	6.3-6.6-6.6	11.0-11.0-10.5	0.88	△	3504	

Voltage Range: △ 380-420V 50Hz (440-480V 60Hz) Y 660-720V 50Hz

Brgs.DE: 6308-2Z C3 NDE: 6308-2Z C3

TYPICAL NAMEPLATE LAYOUT FOR MOTORS
4.0kW AND ABOVE

Nameplate currents correspond to the mid-point of the supply range (230/400/690V 50Hz and 460V 60Hz). Currents and torques at other supplies in reference to standard 400V 50Hz supply are shown in table above right.

	Data[1] in percentage of values at 400V/ 50Hz supply						
Supply	Output	r/min	I_N	I_L/I_N	T_N	T_L/T_N	T_B/T_N
380V 50Hz	100	100	105	91	100	90	90
415V 50Hz	100	100	96	108	100	108	108
400V 60Hz	100	120	98	83	83	70	85
415V 60Hz	104	120	98	89	86	75	88
440V 60Hz	110	120	98	95	91	85	93
460V 60Hz	115	120	100	100	96	93	98
480V 60Hz	120	120	100	105	100	100	103

1) I_N = Full load current; T_N = Full load torque; I_L/I_N = Locked rotor current/ full load current; T_L/T_N = Locked rotor torque/ full load torque; T_B/T_N = Breakdown torque/full load torque

Alternative supplies

HGMT motors can be manufactured for any voltage between 100V and 1100V and frequencies other than 50Hz. In case motor winding is designed for a specific voltage x, performance data will be in line with standard 400V data except current which is calculated with the following formula:

$$I_X = \frac{400 \times I_N}{U_X}$$

Where:
I_X = Current
I_N = Full load current at 400 volt
U_X = Design voltage

Temperature and altitude

Rated power specified in the performance data tables apply for standard ambient conditions of 40°C at 1000m above sea level. Where temperature or altitude differ from the standard, multiplication factors in the table below should be used.

Ambient temperature	Temperature factor
30°C	1.06
35°C	1.03
40°C	1.00
45°C	0.97
50°C	0.93
55°C	0.88
60°C	0.82

Altitude above sea level	Altitude factor
1000m	1.00
1500m	0.98
2000m	0.94
2500m	0.91
3000m	0.87
3500m	0.82
4000m	0.77

Effective Power = Rated Power x Temperature Factor x Altitude Factor

Example 1
Effective Power required = 15kW
Air temperature = 50°C (factor 0.93)
Altitude = 2500 metres (factor 0.91)

$$\textbf{Rated power required} = \frac{\textbf{15}}{\textbf{0.93 x 0.91}} = \textbf{17.7kW}$$

The appropriate motor is one with a rated power above the required, being 18.5kW.

Example 2
Rated power = 11kW
Air temperature = 50°C (factor 0.93)
Altitude = 1500 metres (factor 0.98)

Effective Power = 11 x 0.93 x 0.98 = 10.0kW

Rotation

For clockwise rotation viewed from drive end, standard three phase HGMT motor terminal markings coincide with the sequence of the phase line conductors.

For counter clockwise rotation, viewed from drive end, two of the line conductors have to be reversed. This is made clear in the accompanying table.

Terminal box location (viewed from drive end)	Sequential connection of L1, L2 and L3	Direction of rotation
Right or Top	U1 V1 W1	Clockwise
	V1 U1 W1	Counter-clockwise
Left	V1 U1 W1	Clockwise
	U1 V1 W1	Counter-clockwise

Duty

HGMT motors are supplied suitable for S1 operation (continuous operation under rated load). When the motor is to operate under any other type of duty the following information should be supplied to determine the correct motor size:

- Type and frequency of switching cycles as per duty factors S3 to S7 and duty cycle factor.
- Load torque variation during motor acceleration and braking (in graphical form).
- Moment of inertia of the load on the motor shaft.
- Type of braking (eg mechanical, electrical through phase reversal or DC injection).

Permissible output

Apply the factors in the accompanying table to the output rating for motors with duty cycles that are not continuous.

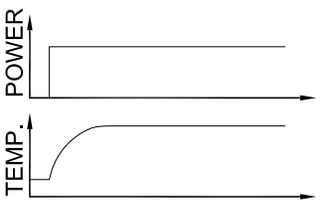
		Duty cycle factor		
	Poles	For frames 80 to 132	For frames 160 to 250	For frames 280 to 315
Short-time duty, S2				
30 min	2	1.05	1.20	1.20
	4 to 8	1.10	1.20	1.20
60 min	2 to 8	1.00	1.10	1.10
Intermittent duty, S3				
15%	2	1.15	1.45	1.40
	4 to 8	1.40	1.40	1.40
25%	2	1.10	1.30	1.30
	4 to 8	1.30	1.25	1.30
40%	2	1.10	1.10	1.20
	4 to 8	1.20	1.08	1.20
60%	2	1.05	1.07	1.10
	4 to 8	1.10	1.05	1.10

For other duties (S4, S5, S6 and S7) contact Regal Australia for appropriate duty cycle factors.

Duty cycles

S1 Continuous duty

Operation at constant load of sufficient duration for thermal equilibrium to be reached.

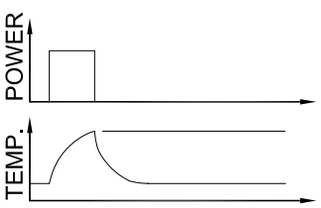


Ambient temperature	Temperature factor
30°C	1.06
35°C	1.03
40°C	1.00
45°C	0.97
50°C	0.93
55°C	0.88
60°C	0.82

Altitude above sea level	Altitude factor
1000m	1.00
1500m	0.98
2000m	0.94
2500m	0.91
3000m	0.87
3500m	0.82
4000m	0.77

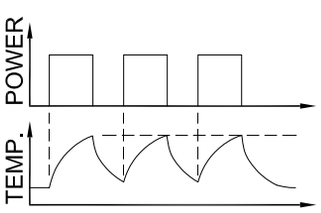
S2 Short - time duty

Operation at constant load during a given time, less than that required to reach thermal equilibrium, followed by a rest (de-energised) period of sufficient duration to allow machine temperatures to reduce to within 2K of the rated inlet coolant temperature.



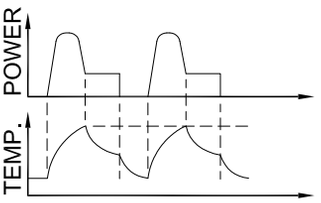
S3 Intermittent periodic duty with insignificant starting time

A sequence of identical duty cycles where each consists of a period of operating at constant load and a period at rest. The cycle is such that the starting current does not significantly affect the temperature rise.



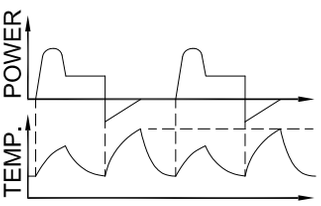
S4 Intermittent periodic duty with significant starting time

Sequence of identical duty cycles where each cycle consists of a significant period of starting, a period of operation at full load and a period of rest.



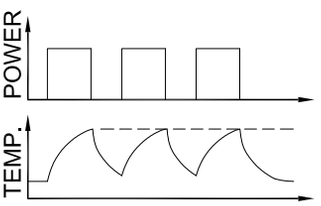
S5 Intermittent periodic duty with influence of running up period and electric braking

As S4, but with each cycle including a period of rapid electric braking.



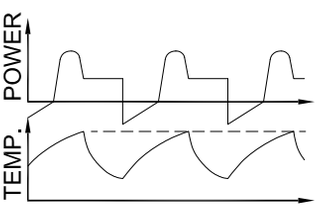
S6 Continuous periodic duty

A sequence of identical duty cycles, each cycle consisting of a period of operation at no-load. There is no rest or de-energised period.



S7 Continuous periodic duty with starting and electric braking

As S6, with each cycle including a period of starting and a period of electric braking.



Connection

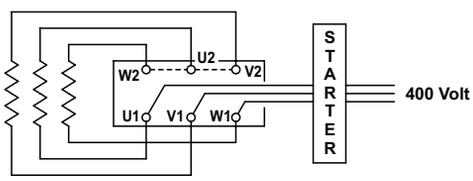
A motor's rated voltage must agree with the power supply line-to-line voltage. Care must therefore be taken to ensure the correct connection to the motor terminals.

Internal connections, voltages and VF drive selection

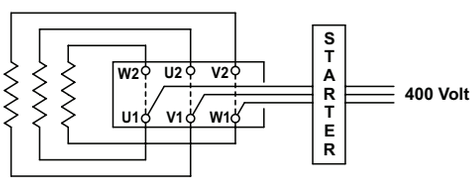
Standard terminal connections for motors 3.0kW and below is 230V delta / 400V star. These motors are designed for 400V Direct On Line (D.O.L.) starting, when connected in the star configuration. They are also suitable for operation with 230V three phase variable frequency drives, when connected in the delta configuration.

Standard terminal connections for motors 4.0kW and above is 400V delta / 690V star. These motors are designed for 400V Direct On Line (D.O.L.) starting, when connected in the delta configuration. They are also suitable for operation with 400V three phase variable frequency drives. Alternatively they can be operated D.O.L. in the star configuration from a 690V supply or with a 690V variable frequency drive. In this case the drive must be supplied with an output reactor to protect the winding insulation. These size motors are also suitable for 400V star-delta starting as described below.

Motor connected for D.O.L. starting with bridges in place for star connection (3.0kW and below)



Motor connected for D.O.L. starting with bridges in place for delta connection (4.0kW and above).



Starting

All of the following starter options are available through Regal Australia Drives division, and are best supplied together with the motor.

D.O.L. Starters

When an electric motor is started by direct connection to the power supply (D.O.L.), it draws a high current, called the 'starting current', which is approximately equal in magnitude to the locked rotor current I_L. As listed in the performance data, locked rotor current can be up to 8 times the rated current I_N of the motor. In circumstances where the motor starts under no load or where high starting toque is not required, it is preferable to reduce the starting current by one of the following means.

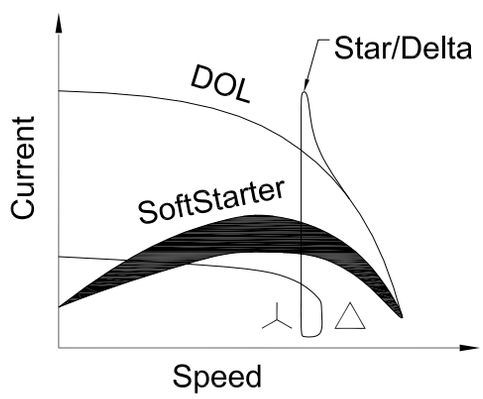
Star - Delta starting

HGMT motors 4.0kW and above are suitable for the star-delta starting method. Through the use of a star-delta starter, the motor terminals are connected in the star configuration during starting, and reconnected to the delta configuration when running.

The benefits of this starting method are a significantly lower starting current, to a value about 1/3 of the D.O.L. starting current, and a corresponding starting torque also reduced to about 1/3 of its D.O.L. value. It should be noted that a second current surge occurs on changeover to the delta connection. The level of this surge will depend on the speed the motor has reached at the moment of changeover.

Electronic soft starters

Through the use of an electronic soft starter, which controls such parameters as current and voltage, the starting sequence can be totally controlled. The starter can be programmed to limit the amount of starting current. By limiting the rate of the current increase the startup time is extended. This starting method is particularly suitable for centrifugal loads (fans and pumps).



VVVF Drives

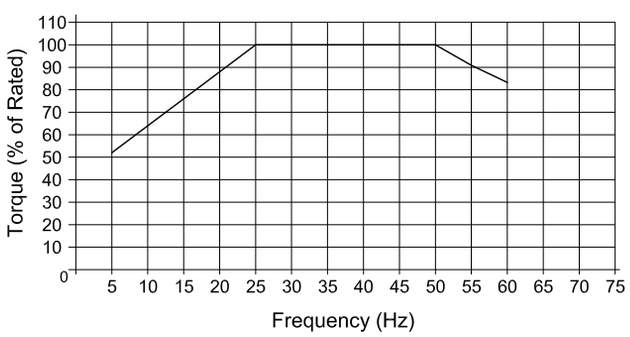
The HGMT motor performs excellently without cogging at low speed when operating in conjunction with a VVVF (Variable Voltage Variable Frequency) drive. VVVF drives are primarily recognised for their ability to manipulate power from a constant 3 phase 50/60Hz supply converting it to variable voltage and variable frequency power. This enables the speed of the motor to be matched to its load in a flexible and energy efficient manner. The only way of producing starting torque equal to full load torque with full load current is by using VVVF drives. The functionally flexible VVVF drive is also commonly used to reduce energy consumption on fans, pumps and compressors and offers a simple and repeatable method of changing speeds or flow rates.

For operation below 25Hz motor cooling fan efficiency drops significantly. Hence, in constant torque applications, a separately driven cooling fan should be fitted to provide sufficient cooling of the motor.

For operation between 25Hz and 50Hz speed range the motor is capable of delivering full rated torque with its standard fan.

For operation above 50Hz, all HGMT motors are capable of delivering constant rated power up to 60Hz. However, most of these motors are suitable to run and deliver constant power at much higher frequencies than 60Hz to a maximum of 100Hz. In the case of applications between 60Hz and 100Hz please contact Regal Australia for advice on suitability.

The HGMT range of motors will operate without modification on VVVF drives however under certain conditions additional features should be considered (see EDM Concerns). The graph below shows the HGMT motors' loadability with a frequency converter:



EDM concerns

Capacitive voltages in the rotor can be generated due to an effect caused by harmonics in the waveform causing voltage discharge to earth through the bearings. This discharge results in etching of the bearing running surfaces. This effect is known as Electrical Discharge Machining (EDM). It can be controlled with the fitment of appropriate filters to the drive.

To further reduce the effect of EDM, an insulated non drive bearing can be used. Regal Australia recommends the use of insulated bearings for all motors 315 frame.

Insulation

Standard HGMT series motors are wound with F class insulation and winding designs limit the temperature rise to 80K (unless otherwise noted) for which B Class insulation would normally be sufficient. The use of F class insulation provides an additional safety margin of 25K, as shown in the accompanying table, together with an extended operating life.

	Insulation class		
	B	F	H
Max. permissible winding temp. (°C)	130	155	180
Less ambient temp. (°C)	- 40	- 40	- 40
Less hotspot allowance (K)	- 10	-10	- 15
Equals max. permissible temp.rise (K)	80	105	125
Less max. design temp. rise (K)	- 80	- 80	- 80
Equals min. safety margin (K)	-	25	45

The HGMTH (Class H) version will provide a safety margin of 45K and can be safely operated at elevated ambient temperatures.

Due to their conservative design many sizes in the HGMT range of motors have temperature rises less than 80K and therefore provide even greater safety margins.

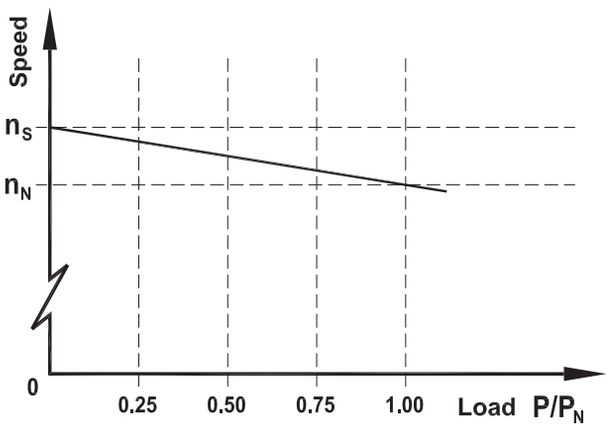
Thermal protection

Motors can be protected against excessive temperature rise by inserting, at various positions within the windings, thermal probes which can either give a warning signal or cut off the supply to the motor in the event of a temperature abnormality.

The units fitted to HGMT motors, frame sizes 160 and above, are PTC thermistors. These thermovariable resistors, with positive temperature co-efficient, are fitted one per phase, series connected and are terminated in a terminal strip located in the terminal box. Trip temperature is 150°C (180°C for HGMTH series). Additional 130°C thermistors can be fitted as an option for alarm connection.

Speed at partial loads

The relationship between motor speed and degree of loading on an HGMT motor is approximately linear up to the rated load. This is expressed graphically in the accompanying drawing.



Where:
n_N = full load speed
n_S = synchronous speed
P/P$_N$ = partial load factor

Current at partial loads

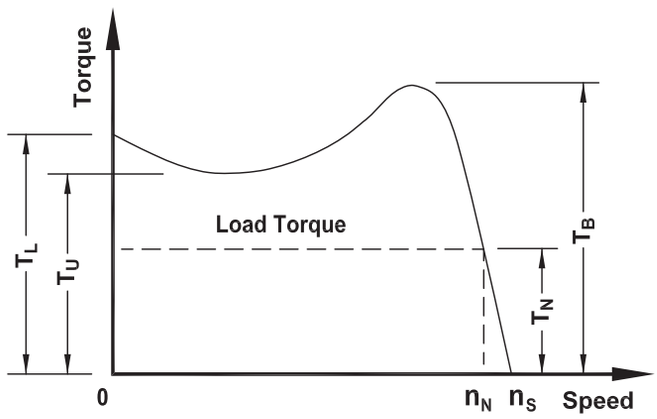
Current at partial loads can be calculated using the following formula:

$$I_X = \frac{Pout_X}{\sqrt{3} \times U_N \times \cos\varphi_X \times \eta_X} \times 10^5$$

Where:
I_X = partial load current (amps)
$Pout_X$ = partial load (kW)
U_N = rated voltage
$\cos\varphi_X$ = partial load power factor
η_X = partial load efficiency (%)

Torque characteristics

Typical characteristics of torque behaviour relative to speed are shown in the torque speed curve example below.



Where:
T_N = full load torque
T_L = locked rotor torque
T_U = pull-up torque
T_B = break down torque
n_N = full load speed
n_S = synchronous speed

HGMT motors all exceed the minimum starting torque requirements for Design N (Normal torque) as specified in IEC60034-12.

Rated torque can be calculated with the following formula:

$$T_N = \frac{9550 \times P_N}{n_N}$$

Where:
T_N = full load torque (Nm)
P_N = full load output power (kW)
n_N = full load speed (r/min)

Installation, operation & maintenance

For a copy of the HGMT Installation, Operation & Maintenance manual, please contact Regal Australia or download from our website at www.regalaustralia.com

Performance data

HGMT series, three phase, 380-415V 50Hz
IP55, F class insulation, B class temperature rise

			400V 50Hz									**380V 50Hz**	**415V 50Hz**		
			Efficiency		Power factor		Current		Torque			Current	Current		
			at % full load		at % full load										
Motor Frame	**kW**	Speed [r/min]	**100** [%]	75 [%]	**100** [%]	75 [%]	Full load I_N [A]	Locked rotor I_L/I_N	Full load T_N [Nm]	Locked rotor T_L/T_N	Break down T_B/T_N	Full load I_N [A]	Full load I_N [A]	Moment of inertia $J=¼GD^2$ [kg·m²]	Weight of foot mount motor [kg]
3000 r/min = 2 poles															
HGMT 80A	0.75	2890	82.2	82.6	0.82	0.74	1.6	8.0	2.5	2.2	3.5	1.7	1.55	0.00068	18
HGMT 80B	1.1	2880	83.2	84.5	0.83	0.77	2.4	7.8	3.6	2.6	3.6	2.5	2.3	0.00080	19
HGMT 90S	1.5	2815	82.6	84.9	0.84	0.79	3.1	7.0	5.1	2.7	3.3	3.3	3.0	0.00093	23
HGMT 90L	2.2	2820	84.1	86.6	0.87	0.82	4.4	7.3	7.5	2.9	3.1	4.6	4.2	0.00119	26
HGMT 100L	3	2850	85.3	87.2	0.89	0.86	5.7	7.9	10.1	2.9	3.4	6.0	5.5	0.00216	34
HGMT 112M	4	2870	86.3	87.9	0.93	0.89	7.3	8.8	13.3	2.7	4.2	7.6	7.0	0.0043	44
HGMT 132SA	5.5	2905	88.3	89.4	0.87	0.84	10.4	7.8	18.1	2.4	3.7	10.9	10	0.0113	59
HGMT 132SB	7.5	2900	88.1	89.4	0.89	0.85	13.9	7.5	25.0	2.2	3.5	14.6	13.4	0.0131	62
HGMT 160MA	11	2935	89.5	89.8	0.89	0.86	20.0	7.1	36.0	2.1	3.3	21.1	19.3	0.032	109
HGMT 160MB	15	2935	90.3	90.9	0.89	0.87	27.0	7.3	49.0	2.3	3.3	28.4	26.0	0.037	119
HGMT 160L	18.5	2925	90.8	91.6	0.91	0.89	32.4	7.6	60.0	2.6	3.4	34.1	31.2	0.046	142
HGMT 180M	22	2950	91.2	91.6	0.91	0.88	38.4	9.1	71.2	3.1	4.1	40.4	37.0	0.073	188
HGMT 200LA	30	2950	92.0	92.3	0.89	0.87	52.8	7.1	97.1	2.5	3.3	55.6	50.9	0.132	230
HGMT 200LB	37	2955	92.5	92.7	0.90	0.89	64.1	7.2	120	2.4	3.5	67.5	61.8	0.147	250
HGMT 225M	45	2960	92.9	93.3	0.92	0.91	75.9	8.5	145	3.0	3.7	79.9	73.2	0.22	330
HGMT 250M	55	2970	93.2	93.2	0.90	0.88	94.7	8.2	177	2.4	3.8	99.7	91.3	0.23	445
HGMT 280S	75	2970	93.9	94.1	0.89	0.88	129.2	6.7	241	2.4	3.1	136	124.5	0.46	565
HGMT 280M	90	2970	94.2	94.3	0.90	0.89	152.9	7.0	289	2.6	3.3	161	147.4	0.57	645
HGMT 315S	110	2980	94.5	94.3	0.88	0.86	190.0	8.0	353	2.4	3.7	200	183.1	1.05	920
HGMT 315MA	132	2980	94.8	94.7	0.90	0.89	222.5	7.7	423	2.4	3.8	234.3	214.5	1.25	970
HGMT 315LA	160	2975	95.0	95.1	0.90	0.89	269.1	7.5	514	2.4	3.5	283.3	259.4	1.41	1170

This data is provided for guidance only, guaranteed only when confirmed by Regal Australia.

Performance data

HGMT series, three phase, 380-415V 50Hz
IP55, F class insulation, B class temperature rise

			400V 50Hz									**380V 50Hz**	**415V 50Hz**		
			Efficiency		Power factor		Current		Torque			Current	Current		
			at % full load		at % full load										
Motor Frame	**kW**	Speed [r/min]	**100** [%]	75 [%]	**100** [%]	75 [%]	Full load I_N [A]	Locked rotor I_L/I_N	Full load T_N [Nm]	Locked rotor T_L/T_N	Break down T_B/T_N	Full load I_N [A]	Full load I_N [A]	Moment of inertia J=¼GD² [kg·m²]	Weight of foot mount motor [kg]
1500 r/min = 4 poles															
HGMT 80B	0.75	1415	80.5	80.8	0.69	0.6	2.0	6.0	5.1	2.9	3.4	2.1	1.88	0.00125	19
HGMT 90S	1.1	1415	82.8	84.3	0.76	0.68	2.6	6.2	7.4	3.0	3.2	2.7	2.5	0.00166	23
HGMT 90L	1.5	1410	83.5	85.5	0.77	0.7	3.4	6.4	10.2	3.1	2.9	3.6	3.3	0.00210	29
HGMT 100LA	2.2	1430	84.9	85.7	0.81	0.74	4.7	7.4	14.7	3.2	3.6	4.9	4.5	0.00516	34
HGMT 100LB	3	1410	86.0	88.1	0.81	0.75	6.2	6.9	20.3	3.0	3.4	6.6	6.0	0.00573	35
HGMT 112M	4	1435	87.0	88.5	0.84	0.79	7.9	7.6	26.6	2.7	3.5	8.3	7.6	0.0095	52
HGMT 132S	5.5	1445	87.7	88.3	0.81	0.76	11.2	7.2	36.3	2.6	3.4	11.8	10.8	0.0213	66
HGMT 132M	7.5	1440	88.7	89.9	0.83	0.78	14.7	7.2	49.7	2.7	3.3	15.5	14.2	0.0277	80
HGMT 160M	11	1465	89.9	90.4	0.85	0.81	20.9	7.2	71.7	2.5	3.0	22.0	20.1	0.061	125
HGMT 160L	15	1460	90.8	91.6	0.83	0.8	28.6	7.1	98.1	2.5	2.9	30.1	27.6	0.079	135
HGMT 180M	18.5	1470	91.2	91.3	0.83	0.77	35.3	8.6	120	3.0	4.0	37.1	34.0	0.118	181
HGMT 180L	22	1475	91.6	92.0	0.85	0.79	41.0	8.3	142	2.8	4.0	43.1	39.5	0.135	196
HGMT 200L	30	1470	92.3	92.8	0.88	0.85	53.6	6.5	195	2.1	3.1	56.5	51.7	0.225	240
HGMT 225S	37	1480	92.8	93.1	0.85	0.82	67.6	7.4	239	2.7	3.5	71.2	65.2	0.378	306
HGMT 225M	45	1475	93.1	93.6	0.86	0.83	81.1	7.5	291	2.7	3.5	85.4	78.2	0.44	343
HGMT 250M	55	1480	93.5	94.0	0.88	0.86	96.3	7.9	355	2.4	3.5	101.3	92.8	0.56	455
HGMT 280S	75	1485	94.0	94.3	0.88	0.86	130.3	8.2	482	2.9	3.7	137.2	125.6	1.42	620
HGMT 280M	90	1480	94.4	94.8	0.88	0.86	156.2	8.2	581	3.0	3.7	164.5	150.6	1.58	695
HGMT 315S	110	1485	94.7	95.1	0.90	0.87	187	6.7	707	2.1	3.3	196.8	180.2	2.09	925
HGMT 315MA	132	1485	94.9	95.1	0.89	0.86	226.7	7.1	849	2.3	3.7	238.6	218.5	2.35	1010
HGMT 315LA	160	1480	95.2	95.5	0.90	0.88	270.4	6.8	1032	2.2	3.4	284.6	260.6	2.81	1080

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Performance data

HGMT series, three phase, 380-415V 50Hz
IP55, F class insulation, B class temperature rise

			400V 50Hz									**380V 50Hz**	**415V 50Hz**		
			Efficiency		Power factor		Current		Torque			Current	Current		
			at % full load		at % full load										
Motor Frame	**kW**	Speed [r/min]	**100** [%]	75 [%]	**100** [%]	75 [%]	Full load I_N [A]	Locked rotor I_L/I_N	Full load T_N [Nm]	Locked rotor T_L/T_N	Break down T_B/T_N	Full load I_N [A]	Full load I_N [A]	Moment of inertia $J=¼GD^2$ [kg·m²]	Weight of foot mount motor [kg]
1000 r/min = 6 poles															
HGMT 90S	0.75	935	76.0	76.1	0.68	0.57	2.2	4.4	7.7	2.4	3.0	2.3	2.1	0.00277	24
HGMT 90L	1.1	925	78.3	79.6	0.69	0.60	3.0	4.6	11.4	2.4	2.8	3.2	2.9	0.00349	26
HGMT 100L	1.5	925	79.9	81.6	0.77	0.68	3.5	5.7	15.5	2.6	3.5	3.7	3.4	0.00761	34
HGMT 112M	2.2	955	81.9	82.5	0.73	0.64	5.4	6.4	22.0	2.6	3.3	5.7	5.2	0.01083	45
HGMT 132S	3	965	83.3	83.7	0.78	0.71	6.7	6.7	29.7	1.6	3.4	7.1	6.5	0.02737	58
HGMT 132MA	4	965	84.6	85.0	0.80	0.73	8.6	7.2	39.6	1.9	3.6	9.1	8.3	0.0314	71
HGMT 132MB	5.5	965	86.0	86.4	0.78	0.71	11.8	7.7	54.4	2.1	3.9	12.5	11.4	0.0438	78
HGMT 160M	7.5	970	88.6	88.9	0.75	0.68	16.5	6.5	73.8	2.4	3.2	17.4	15.9	0.0784	114
HGMT 160L	11	970	88.7	89.2	0.76	0.69	23.7	6.5	108	2.7	3.0	24.9	22.8	0.104	132
HGMT 180L	15	980	89.6	89.6	0.81	0.74	29.9	7.4	146	2.9	3.6	31.5	28.8	0.188	190
HGMT 200LA	18.5	980	90.4	90.6	0.87	0.81	34.1	7.0	180	2.2	3.1	35.9	32.9	0.287	220
HGMT 200LB	22	975	90.8	91.4	0.84	0.80	41.7	6.5	215	2.2	3.1	43.9	40.2	0.330	230
HGMT 225M	30	985	91.8	91.7	0.82	0.78	57.6	6.5	291	2.3	3.0	60.6	55.5	0.534	324
HGMT 250M	37	985	92.2	92.5	0.87	0.84	66.8	7.1	359	2.3	3.1	70.3	64.4	0.696	415
HGMT 280S	45	985	92.8	92.9	0.85	0.82	82.4	6.6	436	2.2	3.2	86.7	79.4	1.27	555
HGMT 280M	55	985	93.2	93.4	0.87	0.84	98.5	7.1	533	2.4	3.3	103.6	94.9	1.53	640
HGMT 315S	75	985	93.7	94.2	0.86	0.84	134.9	6.2	727	2.1	3.0	142	130	2.34	861
HGMT 315MA	90	985	94.2	94.6	0.86	0.85	159.7	6.3	873	2.1	3.0	168.1	153.9	2.76	940
HGMT 315LA	110	985	94.5	94.8	0.87	0.84	194.2	6.6	1066	2.1	3.2	204.4	187.2	3.39	1110
HGMT 315LB	132	985	94.8	95.2	0.87	0.85	230.7	6.9	1280	2.4	3.1	242.9	222.4	3.89	1175

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Performance data

HGMT series, three phase, 380-415V 50Hz
IP55, F class insulation, B class temperature rise

			400V 50Hz									**380V 50Hz**	**415V 50Hz**		
			Efficiency		Power factor		Current		Torque			Current	Current		
			at % full load		at % full load										
Motor Frame	**kW**	Speed [r/min]	**100** [%]	75 [%]	**100** [%]	75 [%]	Full load I_N [A]	Locked rotor I_L/I_N	Full load T_N [Nm]	Locked rotor T_L/T_N	Break down T_B/T_N	Full load I_N [A]	Full load I_N [A]	Moment of inertia $J=¼GD^2$ [kg·m²]	Weight of foot mount motor [kg]
750 r/min = 8 poles															
HGMT 100LA	0.75														
HGMT 100LB	1.1														
HGMT 112M	1.5														
HGMT 132S	2.2														
HGMT 132M	3														
HGMT 160MA	4														
HGMT 160MB	5.5														
HGMT 160L	7.5														
HGMT 180L	11														
HGMT 200L	15														
HGMT 225S	18.5														
HGMT 225M	22														
HGMT 250M	30														
HGMT 280S	37														
HGMT 280M	45														
HGMT 315S	55														
HGMT 315M	75														
HGMT 315LA	90														
HGMT 315LB	110														

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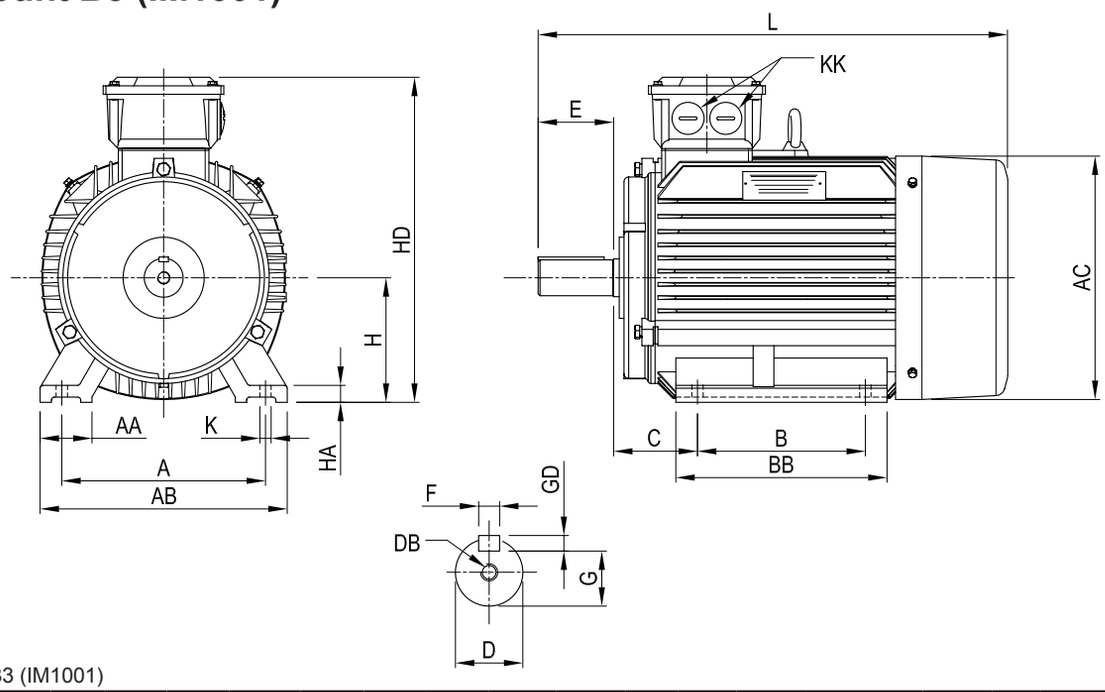
HGMT Dimensional drawings

Foot mount B3 (IM1001)



Foot mount B3 (IM1001)

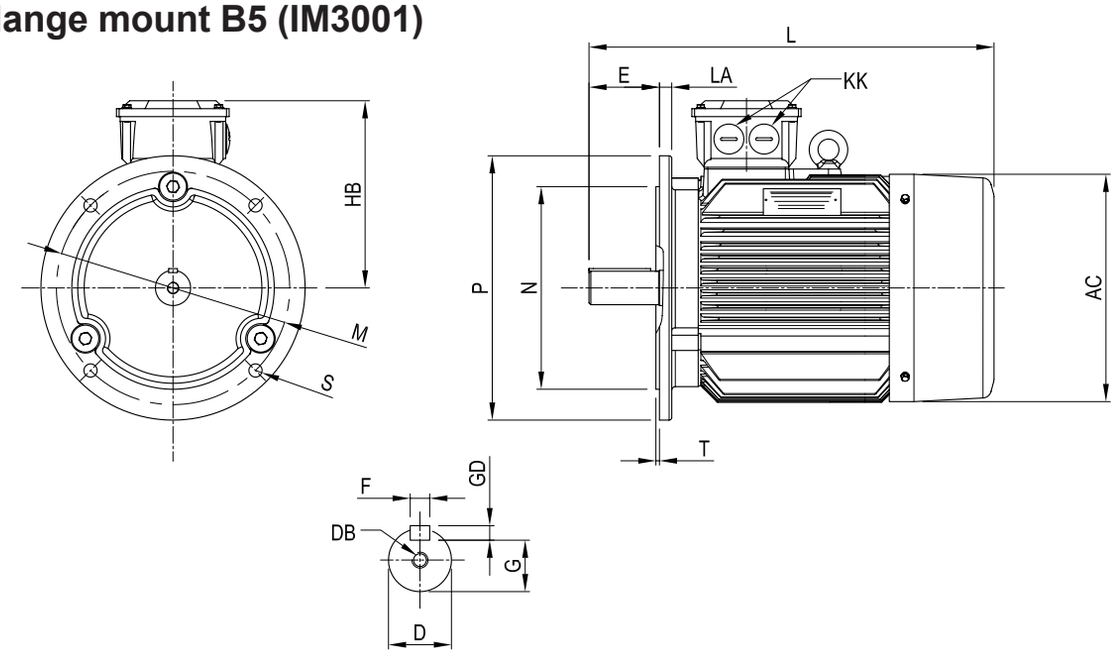
Motor frame		A	AA	AB	AC	B	BB	C	D	DB	E	F	GD	G	H	HA	HD	K	KK	L
80	-19	125	35	160	172	100	130	50	19	M6	40	6	6	15.5	80	10	225	10	1 x M20 x 1.5	285
90S	-24	140	36	174	185	100	140	56	24	M8	50	8	7	20	90	12	245	10	1 x M20 x 1.5	335
90L	-24	140	36	174	185	125	165	56	24	M8	50	8	7	20	90	12	225	10	1 x M20 x 1.5	360
100L	-28	160	40	200	205	140	176	63	28	M10	60	8	7	24	100	14	270	12	1 x M20 x 1.5	375
112M	-28	190	45	226	220	140	180	70	28	M10	60	8	7	24	112	15	305	12	2 x M25 x 1.5	420
132S	-38	216	60	265	265	140	186	89	38	M12	80	10	8	33	132	18	348	12	2 x M25 x 1.5	463
132M	-38	216	60	265	265	178	224	89	38	M12	80	10	8	33	132	18	348	12	2 x M25 x 1.5	500
160M	-42	254	70	315	315	210	260	108	42	M16	110	12	8	37	160	20	420	15	2 x M32 x 1.5	620
160L	-42	254	70	315	315	254	304	108	42	M16	110	12	8	37	160	20	420	15	2 x M32 x 1.5	670
180M	-48	279	70	350	355	241	311	121	48	M16	110	14	9	42.5	180	22	455	15	2 x M40 x 1.5	690
180L	-48	279	70	350	355	279	349	121	48	M16	110	14	9	42.5	180	22	455	15	2 x M40 x 1.5	730
200L	-55	318	70	390	395	305	370	133	55	M20	110	16	10	49	200	25	510	19	2 x M50 x 1.5	775
225S	-60	356	75	435	445	286	368	149	60	M20	140	18	11	53	225	28	555	19	2 x M50 x 1.5	810
225M	-60	356	75	435	445	311	394	149	60*	M20	140*	18*	11*	53*	225	28	555	19	2 x M50 x 1.5	835*
250M	-65	406	80	485	485	349	445	168	65*	M20	140*	18*	11*	58*	250	30	620	24	2 x M50 x 1.5	915*
280S	-75	457	85	545	540	368	485	190	75*	M20	140*	20*	12*	67.5*	280	35	685	24	2 x M50 x 1.5	1005*
280M	-75	457	85	545	545	419	536	190	75*	M20	140*	20*	12*	67.5*	280	35	685	24	2 x M50 x 1.5	1055*
315S	-85	508	120	630	630	406	570	216	85*	M20	170*	22*	14*	76*	315	45	845	28	2 x M63 x 1.5	1210*
315M	-85	508	120	630	630	457	680	216	85*	M20	170*	22*	14*	76*	315	45	845	28	2 x M63 x 1.5	1320*
315L	-85	508	120	630	630	508	680	216	85*	M20	170*	22*	14*	76*	315	45	845	28	2 x M63 x 1.5	1320*

*2 pole variances

Motor frame	D	E	F	GD	G	L
225M - 55	55	110	16	10	49	805
250M - 60	60	140	18	11	53	915
280S - 65	65	140	18	11	58	1005
280M - 65	65	140	18	11	58	1055
315S - 65	65	140	18	11	58	1180
315M - 65	65	140	18	11	58	1290
315L - 65	65	140	18	11	58	1290

HGMT Dimensional drawings

Large flange mount B5 (IM3001)



Large flange mount B5 (IM3001)

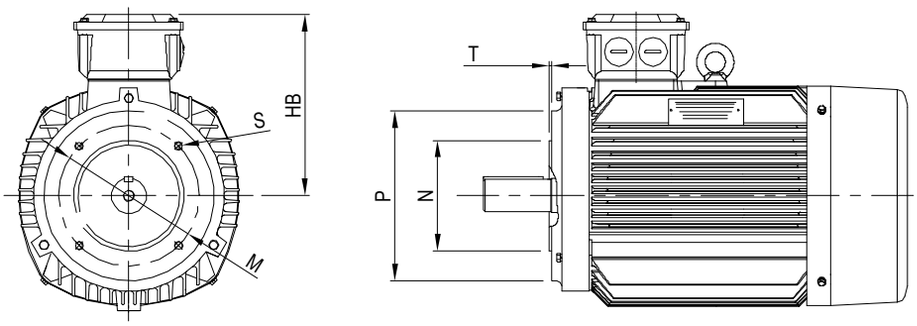
Motor frame		AC	D	DB	E	F	GD	G	HB	KK	L	LA	M	N	P	S	T
80	-19	172	19	M6	40	6	6	15.5	145	1 x M20 x 1.5	285	12	165	130	200	12	3.5
90S	-24	185	24	M8	50	8	7	20	155	1 x M20 x 1.5	335	12	165	130	200	12	3.5
90L	-24	185	24	M8	50	8	7	20	155	1 x M20 x 1.5	360	12	165	130	200	12	3.5
100L	-28	205	28	M10	60	8	7	24	170	1 x M20 x 1.5	375	12	215	180	250	15	4.0
112M	-28	220	28	M10	60	8	7	24	193	1 x M25 x 1.5	420	12	215	180	250	15	4.0
132S	-38	265	38	M12	80	10	8	33	210	2 x M25 x 1.5	463	12	265	230	300	15	4.0
132M	-38	265	38	M12	80	10	8	33	210	2 x M25 x 1.5	500	12	265	230	300	15	4.0
160M	-42	315	42	M16	110	12	8	37	260	2 x M32 x 1.5	620	16	300	250	350	19	5.0
160L	-42	315	42	M16	110	12	8	37	260	2 x M32 x 1.5	670	16	300	250	350	19	5.0
180M	-48	355	48	M16	110	14	9	42.5	275	2 x M32 x 1.5	690	18	300	250	350	19	5.0
180L	-48	355	48	M16	110	14	9	42.5	275	2 x M32 x 1.5	730	18	300	250	350	19	5.0
200L	-55	395	55	M20	110	16	10	49	310	2 x M50 x 1.5	775	18	350	300	400	19	5.0
225S	60	445	60	M20	140	18	11	53	330	2 x M50 x 1.5	810	20	400	350	450	19	5.0
225M	-60	445	60*	M20	140*	18*	11*	53*	330	2 x M50 x 1.5	835*	20	400	350	450	19	5.0
250M	-65	485	65*	M20	140*	18*	11*	58*	370	2 x M63 x 1.5	915*	22	500	450	550	19	5.0
280S	-75	540	75*	M20	140*	20*	12*	67.5*	405	2 x M63 x 1.5	1005*	22	500	450	550	19	5.0
280M	-75	545	75*	M20	140*	20*	12*	67.5*	405	2 x M63 x 1.5	1055*	22	500	450	550	19	5.0
315S	-85	630	85*	M20	170*	22*	14*	76*	530	2 x M63 x 1.5	1210*	22	600	550	660	24	6.0
315M	-85	630	85*	M20	170*	22*	14*	76*	530	2 x M63 x 1.5	1320*	22	600	550	660	24	6.0
315L	-85	630	85*	M20	170*	22*	14*	76*	530	2 x M63 x 1.5	1320*	22	600	550	660	24	6.0

*2 pole variances

Motor frame	D	E	F	GD	G	L
225M - 55	55	110	16	10	49	805
250M - 60	60	140	18	11	53	915
280S - 65	65	140	18	11	58	1005
280M - 65	65	140	18	11	58	1055
315S - 65	65	140	18	11	58	1180
315M - 65	65	140	18	11	58	1290
315L - 65	65	140	18	11	58	1290

HGMT Dimensional drawings

Small flange (face) mount B14 (IM3601)



B14A

Motor frame		HB	M	N	P	S	T
80	-19	145	100	80	120	M6	3
90S	-24	155	115	95	140	M8	3
90L	-24	155	115	95	140	M8	3.0
100L	-28	170	130	110	160	M8	3.5
112M	-28	193	130	110	160	M8	3.5
132S	-38	210	165	130	200	M10	3.5
132M	-38	210	165	130	200	M10	3.5

For motor frame and shaft dimensions please refer to large flange mount B5 dimensional drawings (page 21)

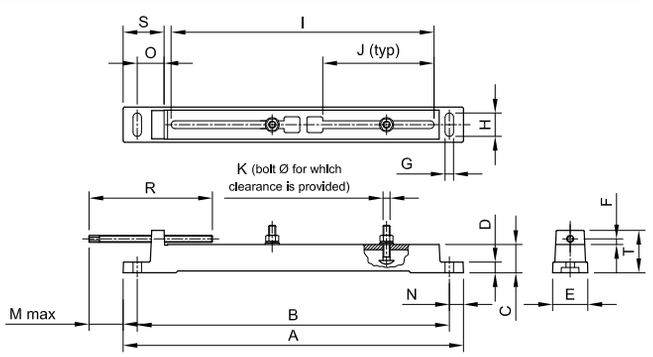
B14B

Motor frame		M	N	P	S	T
80	-19	130	110	160	M8	3.5
90S	-24	130	110	160	M8	3.5
90L	-24	130	110	160	M8	3.5
100L	-28	165	130	200	M10	3.5
112M	-28	165	130	200	M10	3.5
132S	-38	215	180	250	M12	4.0
132M	-38	215	180	250	M12	4.0

Slide rails

Slide rails are designed for motor position adjustment when belt drives are used. Applications include tension adjustment for belt driven equipment.

Regal Australia stock slide rails to suit frame sizes 80 to 355. Rail sets are manufactured from cast iron and provided with mounting bolts and nuts between motor and rail.



Slide rail dimensions

Slide rail product code	To suit motor frame	Dimensions [mm]																	Weight per set [kg]
		A	B	C	D	E	F	G	H	I	J	K	M	N	O	R	S	T	
MR080090	80 & 90	380	328	30	15	48	10	15	25	245	95	8	75	25	40	145	65	50	3
MR100132	100, 112 & 132	475	425	37	19	70	10	14	35	340	150	10	135	26	42	200	68	62	6.5
MR160180	160 & 180	567	515	48	19	72	11	18	35	390	162	12	115	28	57	200	85	70	10
MR200225	200 & 225	790	730	60	32	92	16	20	20	610	265	16	200	30	60	290	90	92	22
MR250280	250 & 280	945	870	70	38	105	16	21	21	725	305	20	240	35	70	350	105	110	40
MR315355	315 & 355	1220	1115	125	40	122	22	30	30	920	420	24	285	50	105	450	155	170	105

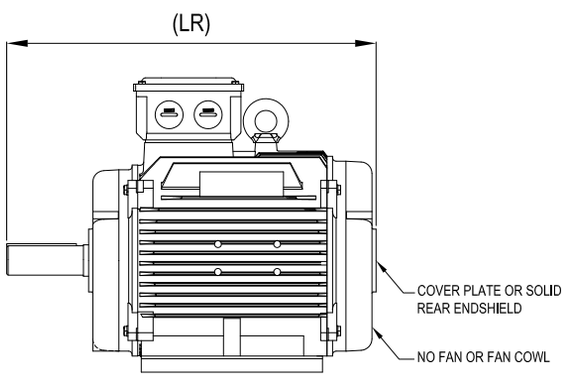
Airstream rated motors for axial fans

Regal Australia offer a comprehensive range of motors specifically built for use with axial flow fans, where the motor is mounted in the airstream.

Provided the airstream ensures ample cooling, the fan and cowl normally fitted to a standard TEFC motor is redundant. Enclosure rating of the motor is also improved with the use of a solid rear end shield.

Due to the elimination of losses associated with the motor fan these motors have a higher efficiency than standard HGMT motors.

Standard mount - HGMTR (B3, B5, B3/B5)



Motor frame	Dimension [LR]	Motor frame	Dimension [LR]
80	240	250M	800
90S	280	280S*	860
90L	305	280S	865
100L	325	280M*	910
112M	360	280M	920
132S	395	315S*	1015
132M	430	315S	1045
160M	525	315M*	1125
160L	570	315M	1155
180M	590	315L*	1125
180L	630	315L	1155
200L	705		
225S	705		
225M*	700		
225M	730		

*2 pole motors only

HGMTRF is a popular alternative to HGMTR, with the terminal box replaced by blanking plate and extended leads (see page 25 for details on blanking plates and extended leads). In this case, terminal box and block are supplied loose with motor for convenience of remote leads termination. These motors are also available in H class insulation (HGMTRHF).

Cooling tower - HGMTC

HGMTC cooling tower motors are specially developed for operation in air stream rated cooling towers. HGMTC motors are available in frame sizes 80 to 315, and rated power outputs of 0.75 to 160kW.

Applications

HGMTC motors are ideally suited to the cooling tower application, in industries such as food and beverage, air conditioning, chemical processing, and petrochemical.

Protection

Regal Australia HGMTC motors have a protection rating of IP66 for maximum protection against water and dust.

Additional enhancements

- 2 part epoxy coated for excellent protection against corrosive solids and liquids
- Stainless steel name plate
- Corrosion protection on threads
- Extra insulation coating (Red Isonel 300)
- Shaft seal fitted
- Silastic sealed
- Non-drive end shaft extension cut and blanking plate fitted. Alternatively, HGMTR used as base motor.

Paint

Standard paint finish for HGMTC motors is a 2 part epoxy RAL 9005 Jet Black paint. Regal Australia's HGMTC range of cooling tower motors combine the HGMT's standard high strength and high efficiency with significant enhancements to give the perfect motor for cooling tower applications.

Brake motors - HGMTB

Regal Australia offer a wide range of Brake motors, HGMTB, from frame size 80 through to 160. 4 pole models are stocked as standard. 2,6 and 8 pole and other non-standard sizes and speeds are available on special order.

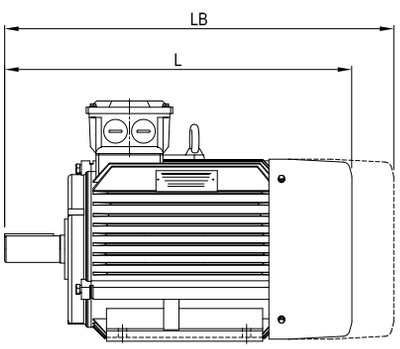
HGMTB brake motors are “fail to safe” design, as the brake will engage when power is interrupted.

Brake motors are designed for use in applications requiring rapid stopping, holding and position control.

HGMTB motors are available in all mounting arrangements. Brakes are made to the ‘Euro’ standard mounting dimension, providing interchangeability with other brands.

Dimensions

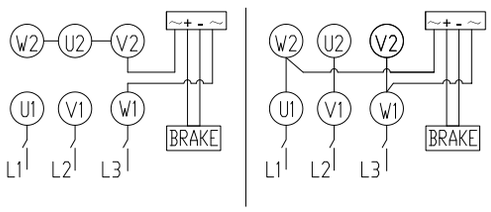
The only dimensional variations of HGMTB from HGMT is the overall motor length, due to the extended length of the cowl. These dimensional variations are listed in the accompanying table. Overall length L is replaced by LB.



Motor frame	Brake motor overall length [LB]
80	360
90S	395
90L	420
100L	450
112M	490
132S	550
132M	590
160M	700
160L	745

Connection

HGMTB motors 3kW and below are connected in 400V star connection with brake connected as shown below left. HGMTB motors 4kW and above are connected in 400 volt delta connection with brake connected as shown below right.



STAR (Y) DELTA (△)

The HGMTB 3 phase motor is fitted with a CE certified DC brake and rectifier mounted in the terminal box enabling direct connection of the brake to the AC supply.

Where response time is important, this time can be improved by switching the brake independently.

Brake details

Output kW	Motor frame	Brake size	Brake weight [kg]	Motor full load torque T_N [Nm]	Brake torque [Nm]	Brake torque as % of full load
					Nominal	Nominal
0.75	80B-4	08	2.0	5.1	8	157%
1.1	90S-4	10	4.0	7.4	16	216%
1.5	90L-4	10	4.0	10.2	16	157%
2.2	100LA-4	12	6.0	14.7	32	218%
3	100LB-4	12	6.0	20.3	32	158%
4	112M-4	14	8.6	26.6	60	226%
5.5	132S-4	16	12	36.3	80	220%
7.5	132M-4	16	12	49.7	80	161%
11	160M-4	18	18	71.7	150	209%
15	160L-4	18	18	98.1	150	153%

Modifications, variations and optional extras

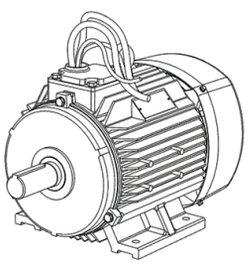
Regal Australia offers an extensive range of variations to the HGMT motor series. Other HGMT ranges outlined in other sections include:

Brake motors - **HGMTB**
Airstream motors for axial fans - **HGMTR, HGMTRF, HGMTRHF**
Cooling tower motors - **HGMTC**

Additional to these motor ranges Regal Australia offer a large array of modifications available on order. These modifications are outlined below.

Extended leads

HGMT motors come standard with a terminal box on top The terminal box can be removed and motor fitted with extended leads.



Extended leads: 1.5m
No. of power leads: 3+1 for up to 3kW, 6+1 for 4kW and above

Motor frame	Conduit size
80-100	M20 x 1.5
112-132	M25 x 1.5
160-180	M32 x 1.5
200-280	M50 x 1.5
315	M63 x 1.5

Bearings

Regal Australia can address applications where bearings need special consideration. Attention may need to be given to the following:

- Bearing monitors
- Alternative bearing types
- Low/high temperature bearing grease
- Oil seals
- Non contact labyrinth seals
- Insulated bearings

Shafts

HGMT motors come standard with a single output shaft to standard dimensions. The following alternatives are available:

- Double shaft extension
- Special shaft extension
- Stainless steel shaft material type
- Reduced shafts for geared motors

Environmental considerations

Where environmental factors need special consideration Regal Australia can provide the following modifications:

- Winding temperature monitors and thermistors
- Anti-condensation heaters
- Tropic proofing
- Special paint finish
- Higher Protection ratings, IP56, IP65 and IP66
- High ambient temperature motors – **HGMTH** with H class insulation

Special performance

Regal Australia has the ability to provide HGMT motors with special windings. These may include:

- Windings for alternative operating voltages and frequencies.
- Windings designed for increased outputs and short time ratings.

VVVF drives

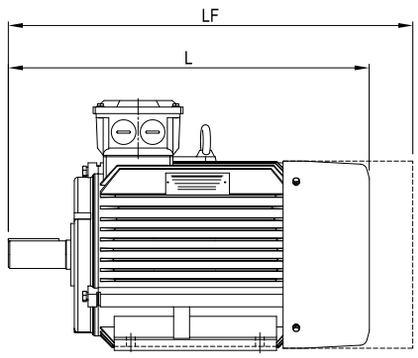
Two types of VVVF drives kit are available for the HGMT range to assist in maintaining satisfactory operation.

VVVF drive kit A - Separately driven cooling fan
This fan should be used when the motor speed is required to be reduced below 25Hz in constant torque mode. Refer to page 26 for Cooling Fan details. For centrifugal fan or pump, no separate cooling fan is required. For all other loads refer to the loadability curve in the section on VVVF Drives, refer page 14.

VVVF drive kit B - Standard motor (EDM)
This kit incorporates a single insulated bearing, normally at the non-drive end, designed to remove the effect of electrical discharge through the bearings.

A separately driven cooling fan is required if the motor is to be operated at below 25Hz with a VVVF drive for constant torque applications.

The increase in length due to the separately driven cooling fan is shown in the table below. Length L is replaced by LF.



Motor frame	Dimension [LF] mm	Motor frame	Dimension [LF] mm
80	365	250M	1105
90S	415	280S*	1180
90L	440	280S	1210
100L	475	280M*	1235
112M	515	280M	1265
132S	575	315S*	1440
132M	615	315S	1470
160M	745	315M/L*	1550
160L	790	315M/L	1580
180M	830		
180L	860		
200L	915		
225S	980		
225M*	980		
225M	1010		

*2 pole motors only

Testing services

Regal Australia can provide both type test certificates and individual motor test reports on any Regal Australia HGMT motor. Testing can be carried out by Regal Australia in our own NATA and ILAC accredited test laboratory.

Accreditation No. 14396

Type test reports and outline drawings of standard motors are available at **www.regalaustralia.com**