CMG

motors

THE WORLDS

Most Efficient Motor Range

MEPS 2 COMPLIANT (IE3)
PREMIUM HIGH EFFICIENCY

60 Years

Proudly manufacturing since 1948

XPA series motors

High Specification / Premium High Efficiency

“Solutions, not just products.”

Specialists in Electric Motors, Geared Motors & AC Drives

At CMG we offer customised packages to the most demanding industrial markets. Our success is built on a strong commitment to our customers’ needs and a willingness to find the best solution possible. We have been in business since 1948 so you can be confident our expertise and experience is second to none.

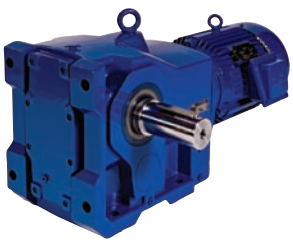
With over 650 staff around the globe, our branches extend across Australia, New Zealand, Asia Pacific, South Africa, Europe and the Middle East.

We have the capability to value-add our products through partnerships with leading international companies whose technical skills are equal to ours, including Gear Motors from NORD and AC Drives from VACON. In return we offer these companies superior technical support that complements their own R&D capabilities.

Our manufacturing facility in Melbourne, Australia, demonstrates our commitment to efficient automated manufacturing processes. This facility includes a NATA & ILAC accredited laboratory which offers complete design and testing services.

“We specialise in an extensive range of Electric Motors, Geared Motors and AC Drives. Offering a “complete package” ensures our customers get the most efficient, cost effective solution possible.”

➤ **Electric Motors**



➤ **Geared Motors**

➤ **AC Drives**

Our 3-year warranty provides ultimate peace of mind

XPA Premium High Efficiency cast iron motors H Class, IP66, Sizes 132 to 315

CMG's premium high efficiency motor range up to 150kW features all of your engineers' specifications as standard.

Meets world market needs and standards

– Three phase 380V, 400V, 415V, 440V, 525V, 690V, 1000V & 1100V, 50Hz & 60Hz
– Australian/British frame allocations

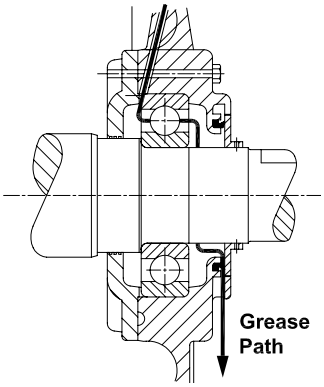
H class insulation, E class (75°C) temperature rise (page 9)

Totally enclosed IP66 protection standard (page 6)

20 years design life (page 4)

Maintenance without downtime

– Thru flushing grease relief valve system (page 4)



Designed and built for arduous environments and mining specifications

Custom designs from 100 to 1100V, 40Hz to 60Hz available (page 9)

Sensors and Protection built-in

– Thermistors
– SPM vibration stud (250 frame and above)
– Anti-condensation heaters (250 frame and above)
– Additional external earth screw
– Winding RTDs (315 frame)

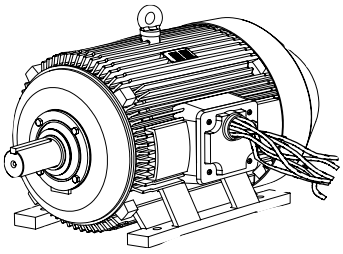
Low noise, low vibration design (page 8)

Cast iron fan, steel fan cover and stainless steel nameplates (page 5)

Standard 2-pack epoxy or customized surface finishes (page 5)

Oversized and reversible terminal box

Full cast iron construction



Note: Features vary according to frame size.

Introduction

This catalogue details CMG's premium range of XPA series motors. Building on the proven performance of the popular PPA series, CMG has developed the XPA series to meet the demand for more efficient electric motors. Incorporating all the mechanical features of the PPA series, the XPA series has been enhanced to comply with the new Australian standard for High Efficiency (MEPS2).

XPA motors are three phase squirrel cage TEFC (IC411), available in frame sizes 132 to 315, and have been designed and manufactured in accordance with AS/NZS1359 (IEC 60034 & IEC 60072). For sizes outside those specified in this catalogue, refer to CMG's complementary PPA range of motors.

High specification design

Electric motors are installed in a wide range of conditions from sub zero temperatures to tropical environments and dusty deserts. The XPA range, with its rugged cast iron enclosure, is designed to suit these harsh conditions and provide both high operational reliability and low operating costs.

20 year design life

All motors in the XPA range are manufactured with Class H insulation. They are designed to operate with a temperature rise of 75°C or less (Class E), and provide a thermal reserve in excess of 50°C when operating in a 40°C ambient. This ample thermal reserve means the XPA has a winding design life in excess of 20 years.

Ultimate protection

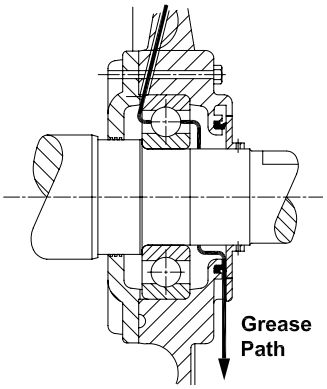
The entire XPA range has an enclosure protection rating of IP66. The windings are tropic protected and oil resistant with the motors being weather protected as standard.

Premium high efficiency

The XPA range of motors are designed and comply with AS/NZS 1359.5:2004 for high efficiency motors. XPA motors exceed Eff 1 and correspond to **IE3 (Premium Efficiency)** of the new international standard **IEC 60034-30**, published 21st October 2008. High efficiency means lower running costs and a reduction in the volume of greenhouse gas discharged into our atmosphere when electricity is produced, assisting the international drive for a reduction of this gas (in Australia typical emission is 1kg CO_2 per kWh).

Thru-flushing grease relief valve

The pressure grease relief valve, incorporating a V-ring seal, eliminates downtime by enabling relubrication of the bearings without stopping the motor.



A complete selection

XPA series motors can be designed for use on 100 to 1100V systems and for all common world frequencies including 40Hz, 50Hz and 60Hz. The most common power supplies are 380V, 400V, 415V, 440V, 525V, 690V, 1000V, and 1100V. Customer specified variations on these standards are readily available.

Standards and specifications

The main dimensions and rated outputs of XPA motors generally conform to IEC 60072 and AS/NZS1359 (Australian/British kW-frame size allocation table).

CMG Technology offer full load testing in their NATA and ILAC accredited laboratory on all motors within the XPA range. Speed-torque / current / efficiency curves are available upon request.

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 1 5 0 0	3	X P A	L	/ 6 9 5
1	2	3	4-8	9	10 - 12	13...	Suffix

Position 1
M = metric frame size

Position 2
Phase
3 = three phase single speed motor

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 arrangement
1 = V1 **3** = B3
4 = B3/B5 **5** = B5

Positions 10 to 12
Series
XPA = XPA series motors

Position 13...*
Series variation
Blank = Standard
F = Flying leads
L = LHS terminal box
R = Airstream rated

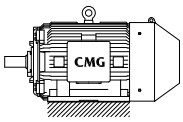
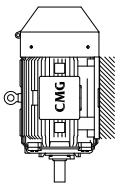
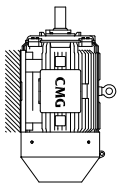
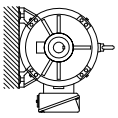
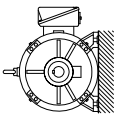
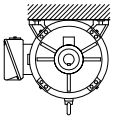
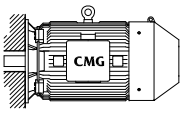
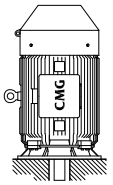
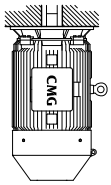
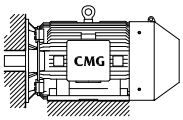
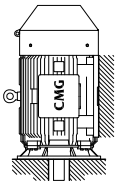
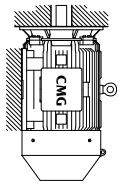
* Multiple letters indicate multiple variation.

Suffix
Winding design
Blank = 380 - 415V / 50Hz
/525 = 525V / 50Hz
/695 = 690V / 50Hz
/A05 = 1000V / 50Hz
/B05 = 1100V / 50Hz
/386 = 380V / 60Hz
/446 = 440V / 60Hz

Mechanical design

Mountings

CMG XPA motors are available in the mounting arrangements shown below. For all other mounting arrangements please contact CMG directly.

Foot mount		
		
B3 (IM1001)* [XPA 132 - 315]	V5 (IM1011) [XPA 132 - 280]	V6 (IM1031) [XPA 132 - 280]
		
B6 (IM1051) [XPA 132 - 280]	B7 (IM1061) [XPA 132 - 280]	B8 (IM1071) [XPA 132 - 280]
Flange mount		
		
B5 (IM3001)* [XPA 132 - 315]	V1 (IM3011)* [XPA 132 - 315]	V3 (IM3031) [XPA 132 - 280]
Flange and feet		
		
B3/B5 (IM2001)* [XPA 132 - 315]	V1/V5 (IM2011) [XPA 132 - 280]	V3/V6 (IM2031) [XPA 132 - 280]

* Most common mounting arrangements

Materials and construction

General

Frames 132-315	Cast iron construction, one piece
Endshields	Cast iron construction
Terminal box	Cast iron construction
Fan	Bi-directional cast iron or fabricated steel
Fan Cowl	Fabricated steel (heavy gauge)
Fasteners	Corrosion protected (stainless optional)

Endshields

Endshields are manufactured from close-grained pearlitic grey cast iron having a 250MPa tensile strength. The endshields are adequately ribbed to provide cooling to the area around the bearing. Their shallow design ensures they remain rigid under the stresses of starting and running, and are designed to withstand the radial and axial forces encountered during most applications.

Stator frame

Stator frames are manufactured from close-grained pearlitic grey cast iron having a 250MPa tensile strength. Their one piece design ensures the stator remains rigid under all starting and running conditions. The ribs are designed to dissipate the optimum amount of heat with the lowest airflow over the motor. This helps to ensure that windage noise is minimized. Adequate spacing between ribs is maintained to lessen the possibility of blockage due to the build up of dirt.

Shaft

Shafts are manufactured from high quality steel and adequately proportioned to provide strength and rigidity in operation. Bearing journals are ground to ensure an accurate bearing fit and positioning. Keys are provided with each motor.

Shaft extension run out, concentricity, and perpendicularity to the face of standard flange mount motors comply with normal grade tolerance as specified in IEC 60072 and AS/NZS1359. Precision grade tolerance is available upon special order.

Non-standard dimensions and shaft materials are available on request.

Rotor

Rugged one piece rotor cages are die cast aluminium. After fitting the rotor core to the shaft the rotor assembly is dynamically balanced to G1 limits for smooth operation.

Finish

All castings and steel parts are primed with a 2-pack epoxy coating, followed by a top coat of 2-pack epoxy to the customer's color specification. Standard colour is RAL 7016 (Anthracite Grey).

Special paint systems can be provided to accommodate stringent requirements for motors in corrosive environments, selected to resist substances such as acid, salt water and extreme climatic conditions.

Stainless steel nameplates

The motor nameplate is manufactured from stainless steel, with markings engraved, not printed, to provide permanency. Thermistor and heater labels are all manufactured from stainless steel.

Protection

For vertically mounted motors

The XPA series motor can be mounted vertically shaft up without the need for additional covers or protection. When mounted vertically shaft down protective hoods are available upon request. Bearing arrangement may require revision. Contact CMG for further information.

Solar radiation

High solar radiation from exposure to direct sunlight may result in an adverse total motor temperature. In these circumstances motors should be screened with adequate and appropriate sunshades without inhibiting airflow.

Degree of protection

Standard levels of enclosure protection for all XPA series motors is IP66 for both motor and terminal box. Sintered bronze porous drain plugs are fitted to the lowest point of the motor enclosure, as standard.

IP66 enclosure protection means dust tight (no ingress of dusts), and protection against heavy seas (water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities).

Enclosure designations comply with IEC 60529 and AS60529. The enclosure protection rating required depends upon the environmental and operational conditions in which the motor is to operate.

Additional earth terminal

In addition to the earth terminal fitted within the main terminal box, an external earth (for grounding of the frame) is fitted for frame sizes 250 and above. (Optional on smaller sizes.)

Terminal box

Cast iron diagonally split terminal boxes are provided on all XPA motors. They are located on the centre line of the stator allowing easy change of the terminal box from the right hand side to the left.

The terminal box is designed oversize to accommodate fitting of larger than standard cables used to minimise voltage drop over long cable runs. The box's ample dimensions also allow aluminium cables to be terminated using bi-metal lugs.

A removable gland plate is fitted to all terminal boxes, frame 225 and above (smaller frames optional). For frames 132 to 315 the gland entry is drilled and tapped with standard metric threads as per the accompanying table.

Conduit entries

Motor frame	Standard		Alternative (South Africa std)	
	Number of entries	Entry / pitch	Number of entries	Entry / pitch
132	2	M25 x 1.5	2	M25 x 1.5
160	1	M50 x 1.5	2	M25 x 1.5
180	1	M50 x 1.5	2	M32 x 1.5
200	1	M50 x 1.5	2	M32 x 1.5
225	1	M63 x 1.5	2	M40 x 1.5
250	1	M63 x1.5	2	M40 x 1.5
280	1	M63 x 1.5	2	M50 x 1.5
315	1	M63 x 1.5	2	M63 x 1.5

Nitrile gaskets are fitted between all mating surfaces to ensure that the IP66 degree of protection is maintained.

During transportation and storage the conduit entry hole is fitted with a removable plug to limit the ingress of moisture.

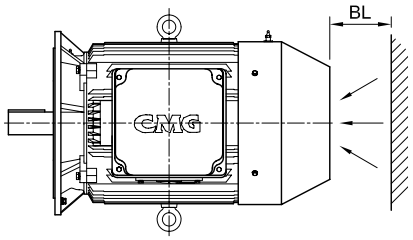
Cooling

XPA motors are fitted with a low noise bi-directional cast iron or fabricated steel fan. The fan, with its radial blades, and the fan cover of a conical shape, is designed to minimise turbulence within the fan housing and allow smooth airflow.

In most instances the fan and cover are designed to eliminate the need for special acoustic attenuation required to meet stringent noise level standards.

For special applications such as low speed, operation through a VVVF drive, or frequent starting and stopping, a separately driven cooling fan is available as an optional extra. See VVVF Drive Kit A in "Modification, variations and optional extras" section on page 18.

Cooling air flows from the non-drive-end to the drive end. When the motor is installed care should be taken not to impede the airflow into the motor cowl.



As a guide the following minimum dimension BL should be adopted:

Motor frame	BL [mm]
132	40
160 - 200	60
225 - 315	80

Bearings and lubrication

Bearings

As standard all XPA motors have high quality bearings made from vacuum degassed steel. The standard bearings in the range are selected to provide long operational life, quiet running, and high load carrying capacity.

4 and 6 pole motors up to 280 frame, and all 2 pole motors, as standard are fitted with high quality deep groove ball bearings. 315 frame 4 and 6 pole are fitted with cylindrical roller bearings on the drive end.

Motor frame	DE Standard	DE Optional	NDE Standard
132	6308	NU308	6308
160	6309	NU309	6309
180	6310	NU310	6310
200	6312	NU312	6312
225	6313	NU313	6313
250 - 2	6313		6313
250 - 4, 6	6315	NU315	6313
280 - 2	6314		6314
280 - 4, 6	6317	NU317	6314
315 - 2	6316		6316
315 - 4, 6	NU318		6316

In standard arrangement, non-drive end bearing is locked to prevent axial movement.

Drive and non-drive bearing housings

All motors of frame 132 and above are fitted with a thru-flushing pressure grease relief valve incorporating a V-ring seal which allows the bearing to be relubricated without stopping the motor.

Optional roller bearings

For motor frames 132 to 280, in applications with increased radial force, ball bearings can be substituted for cylindrical roller bearings at the drive end, in accordance with the bearings table on this page.

Shaft locking clamps

All motors within the XPA range 200 frame and above are fitted with a substantial shaft-locking clamp to help prevent false brinnelling in transport. The motors should always be transported or stored with this clamp fitted and tensioned to avoid bearing damage.

Once the motor has reached its final destination and is ready for installation the shaft-locking clamp must be removed before the motor is run no-load to confirm that the bearings are in good condition.

After this initial run normal installation can continue with additions of pulleys or couplings.

Lubrication

Standard bearings are lubricated with a lithium based rolling contact bearing grease, having an R3 consistency and 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 also be required in cases where motors are exposed to a comparatively high degree of pollution, high humidity, increased or changed bearing loads, or prolonged continuous operation. For details of grease quantities, re-lubrication intervals, and recommended grease types refer to the “Installation and maintenance” instructions on page 21 and 22.

Balancing, vibration and noise

Balancing

XPA motors have their rotor balanced separately to the external cooling fan so that the fan can be removed or changed without altering the balance of the rotor.

All rotors are balanced with a half key to fine tolerances (G1).

Pulleys or couplings used with motors must be appropriately balanced.

Vibration

XPA series motors fall within the limits of vibration severity as set out in IEC 60034-14 and AS1359.114, which are listed below. Values relate to rotating machinery measured in soft suspension.

Vibration severity limit

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

Vibration sensors

Provision for fitting vibration sensors for condition monitoring is standard on all motors of frame size 250 and above (optional on smaller sizes).

Vibration levels can be checked with an SPM monitor, or its equivalent, when the motor is new and on a regular basis, usually at the same time as re-greasing. This ensures optimum bearing life is achieved and bearing failures avoided.

Low noise

The XPA fan cooling system is designed to achieve the required air flow with minimum losses. This enables the fan to cool the motor whilst keeping noise levels to a minimum.

The table below shows the overall sound pressure levels of XPA motors at 1 metre (no load).

Sound pressure level

	Sound pressure level dB(A) at 1 metre		
kW	3000 r/min	1500 r/min	1000 r/min
5.5	72	64	61
7.5	72	66	63
11	72	68	65
15	72	68	65
18.5	72	68	65
22	72	68	65
30	72	69	68
37	74	69	70
45	74	70	71
55	79	70	70
75	80	74	71
90	80	74	71
110	80	74	71
132	80	74	72
150	80	74	74

Alternate devices are available for noise reduction where very low levels are specified. These include uni-directional fans, separately driven cooling fans, inlet attenuation, and full motor attenuation.

Electrical design

Operating parameters

Standard XPA series motors have the design and operating parameters listed below. Performance data is based on this standard.

Three phase	See voltage and frequency below
Ambient cooling air temperature	40°C
Altitude	up to 1000m
Duty cycle	S1 (continuous)
Rotation	Refer table on page 10.

Any variation from these operating parameters should be examined and performance data altered in accordance with the information provided in this section.

Voltage and frequency

XPA motors are manufactured for various rated power supplies. Standard rated supplies include:

380V 50Hz	1000V 50Hz
400V 50Hz	1100V 50Hz
415V 50Hz	380V 60Hz
525V 50Hz	440V 60Hz
690V 50Hz	

Motors can be manufactured for any supply from 100 to 1100V and frequencies other than 50Hz or 60Hz.

XPA motors are designed to operate on VVVF drives and will provide constant torque on the condition that the voltage/frequency ratio remains constant.

XPA motors may operate when connected to other non-standard voltages and frequencies. Rated performance data values should be multiplied by the factors in the table below to give more realistic operating data values which, if used, will reduce additional motor temperature rise.

Apply these factors to motors with standard winding design but operated on other power supplies:

Supply [Volts / Hz]	Rated speed	Rated power	Rated current I_N	Rated torque T_N	Locked rotor torque T_L	Break down torque T_B
380/50	1.00	1.00	1.05	1.00	0.90	0.90
400/50	1.00	1.00	1.00	1.00	1.00	1.00
415/50	1.00	1.00	0.96	1.00	1.08	1.08
400/60	1.20	1.00	0.98	0.83	0.70	0.85
415/60	1.20	1.04	0.98	0.86	0.75	0.88
440/60	1.20	1.10	0.98	0.91	0.85	0.93
460/60	1.20	1.15	1.00	0.96	0.93	0.98
480/60	1.20	1.20	1.00	1.00	1.00	1.03

For critical applications data should be confirmed.

The performance data for motors with other supply ratings is the same as that provided on pages 12 and 14 for 400V motors, except for the currents which are presented on pages 13 and 15.

Temperature and altitude

Rated output power specified in the performance data tables apply for standard ambient conditions of 40°C up to 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	**Altitude above sea level**	Altitude factor
30°C	1.06	**1000m**	1.00
35°C	1.03	**1500m**	0.98
40°C	1.00	**2000m**	0.94
45°C	0.97	**2500m**	0.91
50°C	0.93	**3000m**	0.87
55°C	0.88	**3500m**	0.82
60°C	0.82	**4000m**	0.77

Effective power = Rated power x Temperature factor x Altitude factor

Insulation

XPA series motors are wound with H Class insulation and winding designs limit the temperature rise to 75K. The use of H Class insulation provides an additional safety margin of 50K, as shown in the accompanying table, together with a design life in excess of 20 years.

Due to their conservative design many sizes in the XPA range of motors have temperature rises considerably less than 75K and therefore provide even greater safety margins.

	Insulation class			
	E	B	F	H
Max. permissible winding temp. (°C)	120	130	155	180
Less ambient temp. (°C)	-40	-40	-40	-40
Less hotspot allowance (K)	-5	-10	-10	-15
Equals max. permissible temp. rise (K)	75	80	105	125
Less max. design temp. rise (K)	-75	-75	-75	-75
Equals min. safety margin (K)	-	5	30	50

Duty

XPA motors are supplied suitable for S1 operation (continuous operation under rated load). To determine the correct motor size for duty cycles other than S1 please contact CMG with the following information:

- Type and frequency of switching (short time, intermittent, periodic, high inertia, braking)
- Load torque variation during motor acceleration and braking (in graphical form)
- Moment of inertia of the load on the motor shaft
- Type of braking (e.g. mechanical, electrical through phase reversal or DC injection).

Rotation

For clockwise rotation (standard), viewed from drive end, standard three phase XPA 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.

Non-standard motors, with the terminal box located on the left when viewed from drive end, have a counter-clockwise rotation for coinciding markings, and reversing two of the line conductors will reverse the rotation to clockwise.

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

Connection and starting

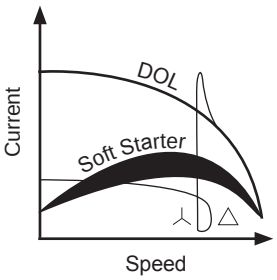
XPA motors are suitable for use with both rated voltage DOL operation and rated voltage three phase variable frequency drives. 3kW motors can also be used with 220-240V three phase variable frequency drives when connected in Delta.

Alternatively, 380-415V, 4kW to 150kW Delta connected motors can be operated DOL, or in the Star configuration with a 690V supply or with a 690V variable frequency drive. When used with a VVVF drive they must be supplied with an output reactor to protect the winding insulation. These motors are also suitable for Star/Delta starting.

Electronic soft starters and VVVF drives are available through CMG Drives Division, and are best supplied together with the motor.

Electronic soft starters

Through the use of an electronic soft starter, which controls parameters such as current and voltage, the starting sequence can be totally controlled. The starter can be programmed to limit the amount of starting current where, by limiting the rate of the current increase, the startup time can be extended.



VVVF drives

The XPA motor performs excellently without cogging at low speed when operating in conjunction with a Variable Voltage Variable Frequency (VVVF) drive. VVVF drives are primarily recognized 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 offer a simple and repeatable method of changing speeds or flow rates.

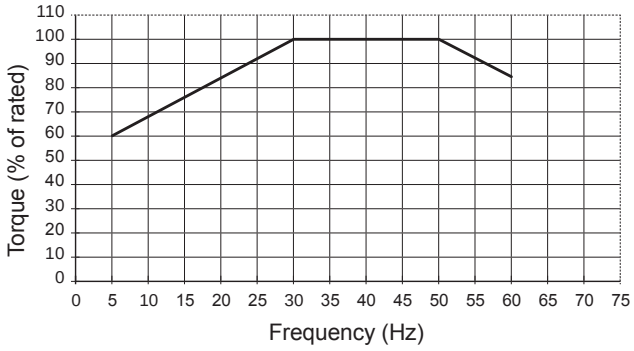
The standard insulation provided on XPA motors can accept a rise time of 3000V/µs and a peak voltage of 2600V. To ensure that this parameter is not exceeded care should be taken in the selection of the VVVF drive and, where necessary, suitable output voltage filters should be used. All drives supplied by the CMG Drives Division will comply with this parameter.

For operation below 30Hz motor cooling fan efficiency drops significantly. Hence, in the constant torque applications, a separately driven cooling fan should be fitted to provide sufficient cooling of the motor.

For operation between 30Hz and 50Hz speed range the motor is capable of delivering full rated torque with its standard fan.

For operation above 50Hz, all XPA 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 CMG for advice on suitability.

The XPA range of motors will operate without modification on VVVF drives however under certain conditions additional features should be considered (see EDM Concerns below). The graph below shows the XPA 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. CMG recommends the use of insulated bearings for all motors 315 frame and above.

Thermal protection

Resistance Temperature Detectors (RTDs) and additional thermistors can be installed in both the windings and the bearings.

Thermistors

XPA motors are fitted, as standard, with one set (3) of PTC thermistors, selected for a tripping temperature of 145°C. These thermo-variable resistors have a positive temperature coefficient and are fitted one per phase in the motor windings.

Additional sets of thermistors, if required for such functions as alarm or spare, can be fitted with the same or alternate tripping temperatures.

Frame 132: the thermistors are terminated within the main terminal box.
Frames 160 and above: the thermistors are terminated in the right hand auxiliary terminal box.

RTDs

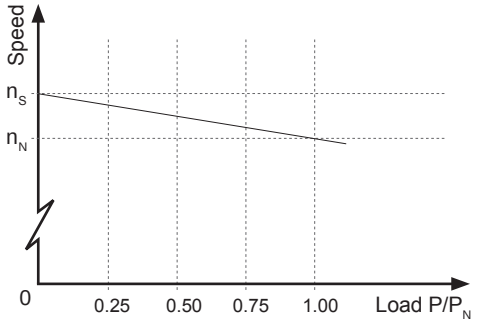
An additional method of monitoring temperature is to fit 3 wire PT100 Resistance Temperature Detectors (RTDs). RTDs are terminated in an auxiliary terminal box affixed to the main terminal box. These devices have a linear temperature / resistance gradient and can be used in conjunction with electronic control equipment e.g. PLC's. Winding RTDs are fitted as standard in 315 frame, optional in smaller frames.

Anti-condensation heaters

XPA motors frames 250 and above are fitted with anti-condensation heaters (optional on smaller sizes). These heaters are connected during manufacture for 220-240V operation and can be supplied connected for 380-440V operation against special order. They are terminated in the left hand auxiliary terminal box.

Speed at partial loads

The relationship between motor speed and degree of loading in an XPA motor is approximately linear up to the rated load.



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:

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

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

Torque characteristics

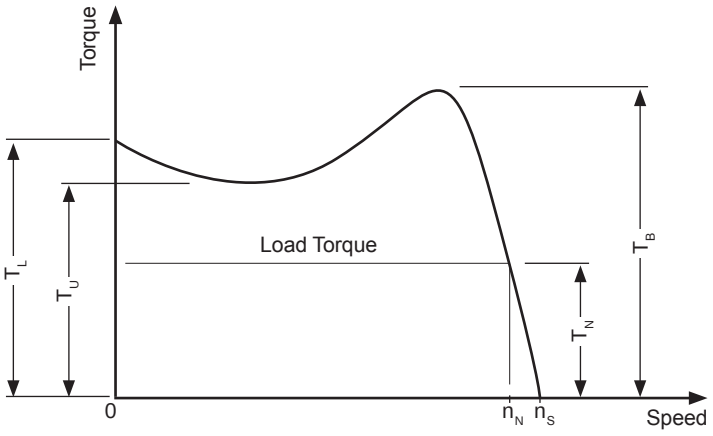
Typical characteristics of torque behaviour relative to speed are shown in the torque speed curve example below.

The design of high efficiency motors requires a significant reduction in rotor losses. It is inherent in this design that reduction of rotor losses leads to reduced starting torques. Please consider carefully the values detailed in the technical data section of this catalogue if the application requires high starting torques.

Full load 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)
T_L = locked rotor torque
T_U = pull-up torque
T_B = break down torque
n_S = synchronous speed



Performance data

XPA series, Three phase, 380-415V 50Hz
IP66, H class insulation, E class temperature rise

kW	Motor frame	Speed [r/min]	Efficiency [%] at % full load 100	75	50	Power factor [cos φ] at % full load 100	75	50	Current Full load I_N [A]	Locked rotor I_L/I_N	Torque Full load T_N [Nm]	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² [kg m²]	Weight of foot mount motor [kg]
3000 r/min = 2 poles															
5.5	132SA - 38	2955	93.0	92.8	92.1	0.87	0.84	0.79	9.9	7.9	17.8	2.2	3.3	0.019	95
7.5	132SB - 38	2950	93.3	93.4	92.8	0.88	0.86	0.80	13.2	7.3	24.3	2.0	1.9	0.021	100
11	160MA - 42	2955	91.9	91.6	90.1	0.89	0.85	0.77	19.5	8.1	35.5	2.5	3.3	0.065	160
15	160MB - 42	2955	92.6	92.3	90.9	0.89	0.85	0.77	26.3	8.5	48.5	2.6	3.2	0.067	175
18.5	160L - 42	2960	93.8	93.7	92.8	0.87	0.83	0.74	32.7	9.0	60	2.9	3.6	0.079	180
22	180M - 48	2955	93.4	93.5	92.5	0.90	0.88	0.81	38.0	7.5	71	2.4	3.0	0.113	245
30	200LA - 55	2975	94.0	93.5	92.2	0.89	0.86	0.81	53	8.6	96	2.4	2.9	0.200	322
37	200LB - 55	2975	94.3	93.8	92.5	0.87	0.84	0.76	65	8.3	119	2.1	3.1	0.209	333
45	225M - 55	2975	94.9	94.4	93.1	0.89	0.87	0.81	77	8.5	145	1.8	3.1	0.360	396
55	250S - 60	2975	95.2	94.8	93.8	0.90	0.89	0.85	93	6.5	177	1.5	2.1	0.456	540
75	250M - 60	2975	95.6	95.5	94.5	0.91	0.91	0.86	125	6.6	241	1.5	2.4	0.564	589
90	280S - 65	2985	95.8	95.3	94.1	0.89	0.87	0.81	153	6.4	288	1.3	2.7	0.948	768
110	280M - 65	2982	95.8	95.4	94.4	0.89	0.89	0.84	185	5.4	353	1.3	2.1	1.116	814
132	315S - 85	2982	96.1	95.8	94.7	0.91	0.90	0.86	217	6.0	423	1.4	2.8	1.680	1176
150	315M - 85	2985	96.1	95.7	94.5	0.91	0.91	0.87	246	6.0	480	1.3	3.1	1.860	1236
1500 r/min = 4 poles															
5.5	132S - 38	1475	92.6	92.7	91.8	0.81	0.76	0.67	10.8	6.6	36.0	2.3	2.3	0.035	102
7.5	132M - 38	1470	92.4	92.6	91.7	0.81	0.77	0.67	14.6	6.2	49.0	2.2	2.2	0.043	110
11	160M - 42	1475	92.4	92.4	91.5	0.88	0.83	0.73	20.5	7.8	71	2.5	3.4	0.114	180
15	160L - 42	1475	93.0	93.0	92.2	0.88	0.83	0.72	26.5	8.3	97	2.5	3.4	0.181	190
18.5	180M - 42	1480	93.3	93.3	92.4	0.88	0.83	0.75	32.6	9.6	119	2.6	3.2	0.181	246
22	180L - 48	1477	93.6	93.5	92.7	0.87	0.84	0.76	38.9	7.6	142	2.5	3.1	0.203	260
30	200L - 55	1485	94.5	94.4	93.3	0.88	0.84	0.76	52	8.4	193	2.2	3.5	0.370	343
37	225S - 55	1485	95.0	94.8	93.9	0.87	0.83	0.74	65	8.4	238	2.6	3.4	0.640	425
45	225M - 55	1485	95.4	95.3	94.7	0.88	0.85	0.78	77	8.2	289	2.4	3.1	0.698	465
55	250S - 60	1485	95.7	95.6	94.9	0.85	0.83	0.76	97	5.7	354	1.5	2.1	0.894	560
75	250M - 60	1485	95.8	95.8	95.4	0.87	0.86	0.81	131	4.7	482	1.3	2.0	1.068	612
90	280S - 65	1485	95.7	95.9	95.5	0.85	0.85	0.81	159	5.6	579	1.4	2.0	2.121	777
110	280M - 65	1485	96.3	96.4	96.2	0.86	0.85	0.80	193	5.7	707	1.4	2.1	2.536	841
132	315S - 85	1489	96.1	96.0	95.3	0.86	0.84	0.78	231	7.0	847	2.1	2.7	3.276	1116
150	315M - 85	1490	96.4	96.4	95.8	0.86	0.84	0.78	260	7.6	961	2.6	2.7	3.648	1230

Full load current corresponds to 400V 50Hz supply. For currents at 415V and other supplies see opposite page.
This data is provided for guidance only, guaranteed only when confirmed by CMG.

Full load currents at various power supplies

XPA series, Three phase, 380-415V 50Hz
IP66, H class insulation, E class temperature rise

		Standard winding design			Motors specifically wound for nominated power supply						
		Current Full load I_N 50Hz			Current Full load I_N 50Hz				Current Full load I_N 60Hz		Speed
kW	Motor frame	380V [A]	400V [A]	415V [A]	525V [A]	690V [A]	1000V [A]	1100V [A]	380V [A]	440V [A]	60Hz [r/min]
3000\3600 r/min = 2 poles											
5.5	132SA - 38	10.3	9.9	9.5	7.5	5.7	4.0	3.6	10.3	9.0	3546
7.5	132SB - 38	13.9	13.2	12.9	10.1	7.7	5.3	4.8	13.9	12.0	3540
11	160MA - 42	20.2	19.5	19.1	14.9	11.3	7.8	7.1	20.2	17.7	3546
15	160MB - 42	27.7	26.3	26.1	20.0	15.2	10.5	9.6	27.7	23.9	3546
18.5	160L - 42	33.7	32.7	32.3	24.9	19.0	13.1	11.9	33.7	29.7	3552
22	180M - 48	39.5	38.0	36.5	29.0	22.0	15.2	13.8	39.5	34.5	3546
30	200LA - 55	55	53	51	40.0	30.4	21.0	19.1	55.0	47.7	3570
37	200LB - 55	67	65	63	50	37.7	26.0	23.6	67.0	59.1	3570
45	225M - 55	81	77	75	59	44.7	30.8	28.0	81.0	70.1	3570
55	250S - 60	98	93	90	71	54	37.2	33.9	98.0	84.6	3570
75	250M - 60	129	125	121	95	72	50.0	45.4	129.0	113.5	3570
90	280S - 65	159	153	149	116	89	61.2	55.6	159.0	139.0	3582
110	280M - 65	195	185	180	141	107	74.1	67.4	195.0	168.5	3578
132	315S - 85	228	217	209	165	126	86.7	78.8	228.0	197.1	3578
150	315M - 85	259	246	238	187	143	98.4	89.5	259.0	223.6	3582
1500\1800 r/min = 4 poles											
5.5	132S - 38	11.1	10.8	10.4	8.2	6.3	4.3	3.9	11.1	9.8	1770
7.5	132M - 38	14.9	14.6	14.1	11.1	8.5	5.8	5.3	14.9	13.3	1764
11	160M - 42	20.3	20.5	19.2	15.6	11.9	8.2	7.5	20.3	18.6	1770
15	160L - 42	27.5	26.5	26.1	20.2	15.4	10.6	9.6	27.5	24.1	1770
18.5	180M - 42	33.9	32.6	31.7	24.8	18.9	13.0	11.9	33.9	29.6	1776
22	180L - 48	40.4	38.9	37.7	29.6	22.6	15.6	14.1	40.4	35.4	1772
30	200L - 55	55	52	51	39.6	30.1	20.8	18.9	55	47	1782
37	225S - 55	68	65	63	49.6	37.7	26.0	23.7	68	59	1782
45	225M - 55	81	77	75	59	44.9	31.0	28.1	81	70	1782
55	250S - 60	101	97	95	74	56.4	38.9	35.4	101	88	1782
75	250M - 60	138	131	126	100	76.1	52.5	47.7	138	119	1782
90	280S - 65	167	159	153	121	91.9	63.4	57.6	167	144	1782
110	280M - 65	203	193	187	147	111.9	77.2	70.2	203	176	1782
132	315S - 85	242	231	224	176	133.6	92.2	83.8	242	210	1787
150	315M - 85	274	260	253	198	150.8	104.1	94.6	274	237	1788

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

Performance data

XPA series, Three phase, 380-415V 50Hz
IP66, H class insulation, E class temperature rise

kW	Motor frame	Speed [r/min]	Efficiency [%] at % full load			Power factor [cos φ] at % full load			Current		Torque			Moment of inertia $J=¼GD^2$ [kg m²]	Weight of foot mount motor [kg]
			100	75	50	100	75	50	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		
1000 r/min = 6 poles															
3	132S - 38	975	88.1	88.2	86.7	0.79	0.73	0.60	6.2	7.3	29.4	2.1	2.6	0.042	88
4	132MA - 38	975	89.7	90.0	89.1	0.78	0.73	0.62	8.3	7.3	39.2	2.2	3.3	0.053	100
5.5	132MB - 38	975	90.0	90.3	89.1	0.78	0.73	0.59	11.3	7.6	54	2.5	2.8	0.064	105
7.5	160M - 42	985	90.2	89.9	88.0	0.78	0.71	0.57	15.3	7.6	73	2.7	3.1	0.132	175
11	160L - 42	980	91.3	91.0	89.5	0.80	0.73	0.62	22.0	8.0	108	2.8	3.5	0.156	197
15	180L - 48	980	92.2	92.5	91.7	0.84	0.79	0.68	28.0	7.0	146	2.4	2.8	0.300	255
18.5	200LA - 55	985	92.5	92.6	91.6	0.83	0.78	0.69	35.0	6.3	179	2.1	2.5	0.372	285
22	200LB - 55	985	93.2	93.4	92.8	0.83	0.79	0.71	41.1	6.6	213	1.8	2.5	0.492	320
30	225M - 55	985	93.6	93.4	91.9	0.85	0.80	0.61	55	7.0	291	2.2	2.2	0.804	393
37	250S - 60	985	94.1	94.5	94.1	0.81	0.80	0.73	70	5.2	359	1.6	1.6	1.128	523
45	250M - 60	990	94.6	94.8	94.4	0.81	0.79	0.73	85	5.2	434	1.7	1.7	1.380	549
55	280S - 65	990	95.3	95.5	95.1	0.85	0.83	0.78	98	5.7	531	1.6	1.9	2.184	715
75	280M - 65	990	95.3	95.7	95.6	0.85	0.84	0.78	134	5.9	724	1.5	1.9	2.796	779
90	315S - 85	993	95.5	95.4	94.6	0.85	0.83	0.76	160	6.4	866	2.4	2.6	5.484	1080
110	315MA - 85	993	95.8	95.7	94.9	0.85	0.82	0.74	196	7.0	1058	2.8	2.8	5.796	1216
132	315MB - 85	993	96.1	96.1	95.5	0.85	0.83	0.76	233	7.1	1270	2.9	2.7	6.384	1428
150	315L - 85	993	96.2	96.2	95.6	0.85	0.83	0.77	263	7.1	1443	3.0	2.7	7.140	1498

Full load current corresponds to 400V 50Hz supply. For currents at 415V and other supplies see opposite page.
This data is provided for guidance only, guaranteed only when confirmed by CMG.

Full load currents at various power supplies

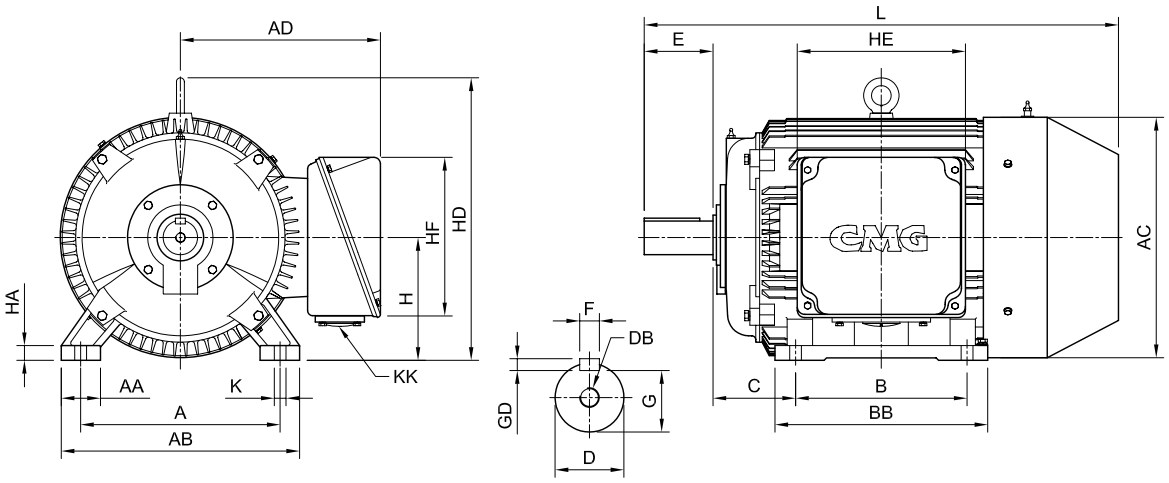
XPA series, Three phase, 380-415V 50Hz
IP66, H class insulation, E class temperature rise

				Standard winding design			Motors specifically wound for nominated power supply						
				Current Full load I_N 50Hz			Current Full load I_N 50Hz				Current Full load I_N 60Hz		Speed
kW	Motor frame			380V [A]	400V [A]	415V [A]	525V [A]	690V [A]	1000V [A]	1100V [A]	380V [A]	440V [A]	60Hz [r/min]
1000\1200 r/min = 6 poles													
3	132S	-	38	6.5	6.2	6.0	4.7	3.6	2.5	2.3	6.5	5.6	1170
4	132MA	-	38	8.5	8.3	8.1	6.3	4.8	3.3	3.0	8.5	7.5	1170
5.5	132MB	-	38	11.6	11.3	11.2	8.6	6.6	4.5	4.1	11.6	10.3	1170
7.5	160M	-	42	15.7	15.3	15.4	11.7	8.9	6.1	5.6	15.7	13.9	1182
11	160L	-	42	22.2	22.0	21.6	16.8	12.8	8.8	8.0	22.2	20.0	1176
15	180L	-	48	29.3	28.0	27.4	21.3	16.2	11.2	10.2	29.3	25.5	1176
18.5	200LA	-	55	35.8	35.0	33.4	26.7	20.3	14.0	12.7	35.8	31.8	1182
22	200LB	-	55	42.6	41.1	40.3	31.3	23.8	16.4	14.9	42.6	37.4	1182
30	225M	-	55	57	55	54	41.8	31.8	22.0	20.0	57	49.9	1182
37	250S	-	60	73	70	68	53.0	40.3	27.8	25.3	73	63	1182
45	250M	-	60	89	85	82	65	49.1	33.9	30.8	89	77	1188
55	280S	-	65	103	98	95	75	57	39.3	35.7	103	89	1188
75	280M	-	65	140	134	130	102	78	53	49	140	122	1188
90	315S	-	85	168	160	156	122	92	64	58	168	145	1192
110	315MA	-	85	204	196	193	149	114	78	71	204	178	1192
132	315MB	-	85	243	233	226	178	135	93	85	243	212	1192
150	315L	-	85	277	263	256	201	153	105	96	277	239	1192

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

Dimensional drawings - XPA

(Australian/British kW/Frame Sizes)



Foot mount B3 (IM1001)

Motor frame	A	AA	AB	AC	AD	B	BB	C	D	DB	E	F	GD	G	H	HA	HD	HE	HF	K	KK[1)]	L
132S - 38	216	62	276	305	245	140	238	89	38	M12	80	10	8	33	132	18	315	160	171	12	M25 x 2	510
132M - 38	216	62	276	305	245	178	276	89	38	M12	80	10	8	33	132	18	315	160	171	12	M25 x 2	540
160M - 42	254	70	315	360	305	210	314	108	42	M16	110	12	8	37	160	20	395	238	223	15	M50	670
160L - 42	254	70	315	360	305	254	314	108	42	M16	110	12	8	37	160	20	395	238	223	15	M50	670
180M - 48	279	75	355	410	305	241	349	121	48	M16	110	14	9	42.5	180	22	420	238	223	15	M50	720
180L - 48	279	75	355	410	305	279	349	121	48	M16	110	14	9	42.5	180	22	420	238	223	15	M50	720
200L - 55	318	70	400	470	340	305	380	133	55	M20	110	16	10	49	200	25	470	238	223	19	M50	805
225S - 60	356	75	435	515	415	286	370	149	60	M20	140	18	11	53	225	25	525	342	326	19	M63	845
225M* - 55	356	75	435	515	415	311	395	149	55	M20	110	16	10	49	225	25	525	342	326	19	M63	815
225M - 60	356	75	435	515	415	311	395	149	60	M20	140	18	11	53	225	25	525	342	326	19	M63	845
250S* - 60	406	80	490	580	440	311	440	168	60	M20	140	18	11	53	250	26	615	342	326	24	M63	925
250S - 70	406	80	490	580	440	311	440	168	70	M20	140	20	12	62.5	250	26	615	342	326	24	M63	925
250M* - 60	406	80	490	580	440	349	440	168	60	M20	140	18	11	53	250	26	615	342	326	24	M63	925
250M - 70	406	80	490	580	440	349	440	168	70	M20	140	20	12	62.5	250	26	615	342	326	24	M63	925
280S* - 65	457	90	555	620	475	368	570	190	65	M20	140	18	11	58	280	35	660	342	326	24	M63	1055
280S - 80	457	90	555	620	475	368	570	190	80	M20	170	22	14	71	280	35	660	342	326	24	M63	1085
280M* - 65	457	90	555	620	475	419	570	190	65	M20	140	18	11	58	280	35	660	342	326	24	M63	1055
280M - 80	457	90	555	620	475	419	570	190	80	M20	170	22	14	71	280	35	660	342	326	24	M63	1085
315S* - 65	508	114	622	710	785	406	508	216	65	M20	140	18	11	58	315	28	775	470	445	28	M63	1240
315S - 85	508	114	622	710	785	406	508	216	85	M20	170	22	14	76	315	28	775	470	445	28	M63	1270
315M* - 65	508	114	622	710	785	457	559	216	65	M20	140	18	11	58	315	28	775	470	445	28	M63	1240
315M - 85	508	114	622	710	785	457	559	216	85	M20	170	22	14	76	315	28	775	470	445	28	M63	1270
315L* - 65	508	114	622	710	785	508	610	216	65	M20	140	18	11	58	315	28	775	470	445	28	M63	1480
315L - 85	508	114	622	710	785	508	610	216	85	M20	170	22	14	76	315	28	775	470	445	28	M63	1510

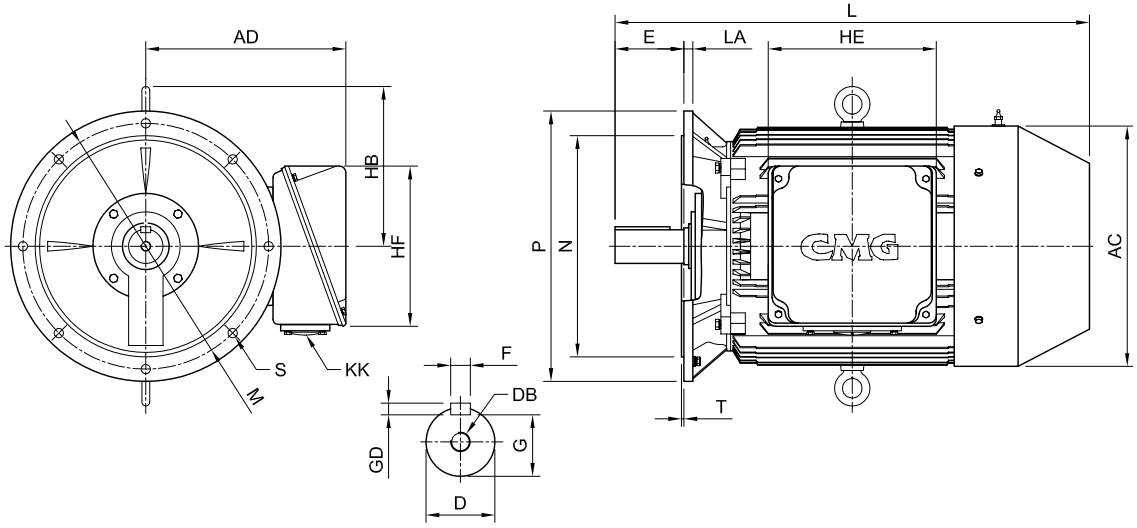
* 2 pole motors only

[1)] See page 6 for alternative conduit entry options

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

Dimensional drawings - XPA

(Australian/British kW/Frame Sizes)



Flange mount B5 (IM3001)

Motor frame	AC	AD	D	DB	E	F	GD	G	HB	HE	HF	KK[1]	L	LA	M	N	P	S[2]	T
132S - 38	305	245	38	M12	80	10	8	33	198	160	171	M25 x 2	510	12	265	230	300	15	4
132M - 38	305	245	38	M12	80	10	8	33	198	160	171	M25 x 2	540	12	265	230	300	15	4
160M - 42	360	305	42	M16	110	12	8	37	235	238	223	M50	670	14	300	250	350	19	5
160L - 42	360	305	42	M16	110	12	8	37	235	238	223	M50	670	14	300	250	350	19	5
180M - 48	410	305	48	M16	110	14	9	42.5	277	238	223	M50	720	15	300	250	350	19	5
180L - 48	410	305	48	M16	110	14	9	42.5	277	238	223	M50	720	15	300	250	350	19	5
200L - 55	470	340	55	M20	110	16	10	49	300	238	223	M50	805	16	350	300	400	19	5
225S - 60	515	415	60	M20	140	18	11	53	320	342	326	M63	845	16	400	350	450	19	5
225M* - 55	515	415	55	M20	110	16	10	49	320	342	326	M63	815	16	400	350	450	19	5
225M - 60	515	415	60	M20	140	18	11	53	320	342	326	M63	845	16	400	350	450	19	5
250S* - 60	580	440	60	M20	140	18	11	53	365	342	326	M63	925	16	500	450	550	19	5
250S - 70	580	440	70	M20	140	20	12	62.5	365	342	326	M63	925	16	500	450	550	19	5
250M* - 60	580	440	60	M20	140	18	11	53	365	342	326	M63	925	16	500	450	550	19	5
250M - 70	580	440	70	M20	140	20	12	62.5	365	342	326	M63	925	16	500	450	550	19	5
280S* - 65	620	475	65	M20	140	18	11	58	400	342	326	M63	1055	17	500	450	550	19	5
280S - 80	620	475	80	M20	170	22	14	71	400	342	326	M63	1085	17	500	450	550	19	5
280M* - 65	620	475	65	M20	140	18	11	58	400	342	326	M63	1055	17	500	450	550	19	5
280M - 80	620	475	80	M20	170	22	14	71	400	342	326	M63	1085	17	500	450	550	19	5
315S* - 65	710	785	65	M20	140	18	11	58	460	470	445	M63	1240	25	600	550	660	24	6
315S - 85	710	785	85	M20	170	22	14	76	460	470	445	M63	1270	25	600	550	660	24	6
315M* - 65	710	785	65	M20	140	18	11	58	460	470	445	M63	1240	25	600	550	660	24	6
315M - 85	710	785	85	M20	170	22	14	76	460	470	445	M63	1270	25	600	550	660	24	6
315L * - 65	710	785	65	M20	140	18	11	58	460	470	445	M63	1480	25	600	550	660	24	6
315L - 85	710	785	85	M20	170	22	14	76	460	470	445	M63	1510	25	600	550	660	24	6

* 2 pole motors only

[1] See page 6 for alternative conduit entry options

[2] Mounting Holes: Frames 80 - 200 have 4 holes at 45° offset from top. Frames 225 and above have 8 holes at 0° offset from top

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

Modifications, variations and optional extras

VVVF drives

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

VVVF drive kit A – Separately driven cooling fan (230 & 400V)
This fan should be used when the motor speed is required to be reduced below 30Hz in constant torque mode. 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 10.

VVVF drive kit B1 – Standard motor (EDM)
This kit incorporates a single insulated bearing, normally at the non-drive end, and an earthing brush at the drive end. Together they are designed to remove the effect of electrical discharge through the bearings.

Vertical hoods and dust shields

When XPA motors are mounted vertically shaft down, a protective hood is available on request.

For use in very dusty environments, dust shields are available manufactured from stainless steel. These shields are fitted over the motor in the IM1001 (B3), IM2001 (B3/B5) or IM3001 (B5) horizontal mounted position, and prevent the ribs of the motor from clogging with dust.

Testing services

CMG can provide both type test certificates and individual motor test reports on any CMG motor. Testing is carried out by CMG Technology Pty Ltd in our own NATA and ILAC accredited test laboratory.

Type test reports and outline drawings of standard motors are available at www.cmggroup.com.au.

Accreditation No. 14396

Special shafts

XPA motors come standard with a single output shaft to standard dimensions. CMG can provide customer specific shaft designs including the following common alternatives:

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

Bearings and bearing RTDs

In applications where bearings need special consideration CMG can provide the following solutions:

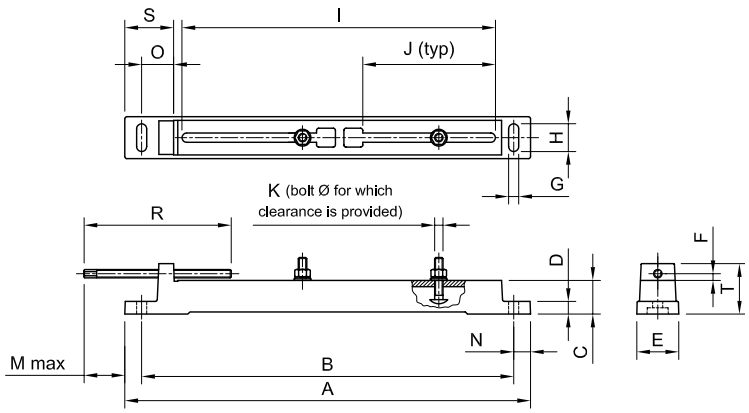
- Bearing monitors
- Alternative bearing types
- Low/high temperature bearing grease
- Insulated bearings.

In addition to the winding RTDs previously described in this catalogue, bearing RTDs (one per bearing) are available as an option on the full XPA range. These RTD can be terminated in the winding RTD terminal box or their own auxiliary box.

Slide rails

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

CMG 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

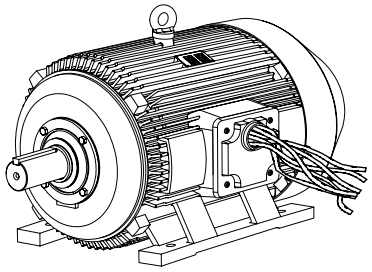
Slide rail product code	To suit motor frame	Dimensions [mm]																	Weight per set [kg]
		A	B	C	D	E	F	G	H	I	J	K	M	N	O	R	S	T	
MR080090	80 & 90	380	328	30	15	48	10	15	25	245	95	8	75	25	40	145	65	50	3
MR100132	100, 112 & 132	475	425	37	19	70	10	14	35	340	150	10	135	26	42	200	68	62	6.5
MR160180	160 & 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

Terminal box

XPA motors come standard with a terminal box on the right hand side viewed from drive end.

The following alternatives are available:

- Left hand terminal box – **XPAL**
  - by modification of standard unit
- Removed terminal box – **XPAF**
  - fitted with a blanking plate and threaded conduit entry, and extended leads, including earth connector.



Special identification plates

Additional identification and warning plates in stainless steel or other specified materials can be fitted to this XPA range. These include:

- Equipment number plates
- Direction of rotation (arrow) plates
- RTD plates
- Lubrication instruction plates.

Protection against harsh environments

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

- Winding temperature monitors
- Anti-condensation heaters on motors below frame 250
- Separately driven cooling fans
- Tropic proofing
- Special paint finish.

Where the motor is to be installed in harsh chemical conditions optional surface treatments are available to protect against acid and alkaline splashing. In addition to these surface systems we are able to supply stainless steel nuts, bolts and screws, plus inlet fan grills manufactured from stainless steel.

Special fans

CMG offer a range of uni-directional and bi-directional low-noise fans.

Installation and maintenance

XPA series motors are designed and manufactured to be robust and reliable for minimal maintenance. The following items should be taken into consideration to ensure trouble free installation and reliable running throughout the motors' life.

Inspection

On receipt of the motor check the following:

- Rating plate details and enclosure are as ordered
- Shaft turns freely
- Motor was not damaged during transport
- Condensation drain holes are in the correct position for the motor mounting application (they should be located at the lowest point of the motor when it is in its operating position).
- If the winding is meggered to earth, ensure that the thermal protectors are not inadvertently damaged. (the thermistor leads should be shorted together whilst meggering takes place).

Storage

When the motor is not for immediate use store in a clean, dry location, free from vibration. (Bearings are susceptible to damage from vibration.)

Ensure shaft locking clamps, where supplied, are fitted securely. Anti-condensation heaters, where fitted, should be energised if the environment is likely to be damp.

Installation

The following items should be considered when installing to ensure motor reliability:

Surroundings
Ensure that the motor is properly protected against ingress of oil, water or dust if construction work is in progress around the motor.

Shaft locking clamp
Motors 200 frame and above are fitted with a shaft-locking clamp. The clamp should remain fitted for as long as possible, preferably until the motor is put into service. Motors that are likely to remain stationary for lengthy periods should have locking clamps refitted. Shaft-locking clamps stop axial movement of the rotor assembly caused by vibration. This causes a phenomenon known as 'false brinelling', which eventually leads to premature bearing failure particularly where roller bearings are fitted.

Pulleys and couplings

- Pulleys and couplings should be machined to H7 limits. Both shaft and bore should be cleaned and lubricated. If the fit is still too tight the pulley or coupling should be heated up in air or oil to approximately 95°C.
- Shock methods must not be used in removing pulleys and couplings. Proper wheel or pulley removers should be used to prevent shaft and bearing damage.
- Pulleys and couplings should be balanced before the keyway is cut to eliminate vibration caused by lack of balancing. Rotor and shaft assemblies have been finely balanced during manufacture, and drive end shafts balanced with a half key.
- When slide rails are used in conjunction with pulley drives the adjusting screw ends should be positioned between the motor and load at drive shaft end and the other diagonally opposite. This helps speedy and accurate belt aligning, tensioning and replacement.

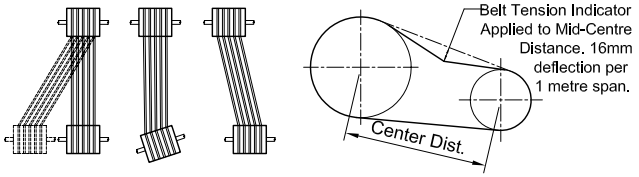
Shafts and keys

Shafts are machined to AS1359.10-1985 dimensions.

Shaft diameter	Tolerance		Length	Key size	Seat
38	+0.018	+0.002	80	10x8x56	33
42	+0.018	+0.002	110	12x8x80	37
48	+0.018	+0.002	110	14x9x80	42.5
55	+0.030	+0.011	110	16x10x80	49
60	+0.030	+0.011	140	18x11x110	53
65	+0.030	+0.011	140	18x11x110	58
70	+0.030	+0.011	140	20x12x110	62.5
75	+0.030	+0.011	140	20x12x110	67.5
80	+0.030	+0.011	170	22x14x140	71
85	+0.035	+0.013	170	22x14x140	76

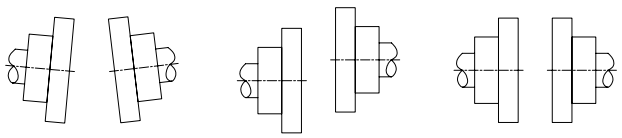
Belt Drives

The belt manufacturer's recommendations for installation, alignment and tensioning must be strictly adhered to when fitting belt drives.



Direct coupling

Care must be taken in checking alignment of driving and driven shafts. The motor and driven equipment must be in alignment from all aspects.



WARNING: MISALIGNMENT OF PULLEYS WILL LEAD TO PREMATURE BEARING FAILURE

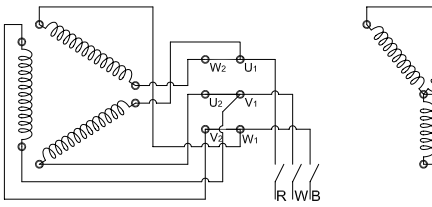
Connection

XPA motors should be connected to the rated voltage as follows:

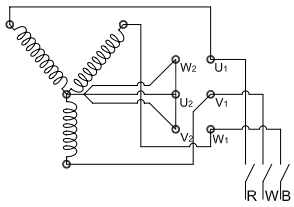
3kW	Star (220-240V three phase Delta)
4kW to 150kW	Delta

XPA motors are suitable for use with both rated voltage DOL operation and rated voltage three phase variable frequency drives. 3kW can also be used with 220-240V three phase variable frequency drives.

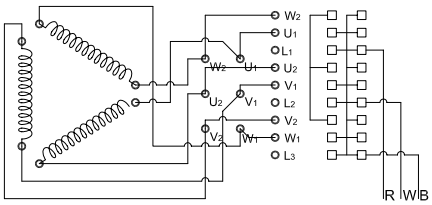
Alternatively, 380-415V, 4kW to 150kW Delta connected motors can be operated DOL, or in the Star configuration with a 690V supply or with a 690V variable frequency drive. When used with a VVVF drive they must be used in conjunction with an output reactor to protect the winding insulation. These motors are also suitable for Star/Delta starting.



DOL DELTA, Softstarter or VVVF drive



DOL STAR, Softstarter or VVVF drive



STAR DELTA

Where special windings are supplied, a separate connection diagram will be supplied with the motor. All motors are provided with earthing arrangement within the terminal box.

Running current check

Check the running current of the motor on no load and full load.

Basic maintenance

Bearings

When re-greasing motors ensure that the correct type of grease is used. If in doubt about the existing grease type, clean out old grease thoroughly from bearings and bearing housings, prior to regreasing.

WARNING: NEVER MIX GREASE TYPES

Grease replenishment
The addition of fresh grease, to renew the original charge, must be made at regular intervals.

Thru-flushing grease valves are fitted to all XPA motors. For frames 132 and above replenishment should be carried out whilst the motor is running. The rotating slinger expels excess grease through an exhaust port in the bearing cap ensuring the correct level of fresh grease is maintained in the bearing housing. See the table on page 22 for bearing relubrication volumes.

Grease packing
Assembly
The thru-flushing grease valve operates automatically and cannot be overgreased. This feature eliminates problems associated with overpacking as any excess will be expelled from the housing as the motor operates. Overpacking can cause churning and over-heating which may result in breakdown of the grease and leakage from the housing. Too little grease can result in dry running and cage wear.

Bearing
The bearing itself should always be packed as full as possible, working the grease thoroughly into the bearing parts in order to ensure proper lubrication immediately upon starting.

Bearing caps
The most convenient way of packing bearing caps is to fill the inner-bearing cap completely and the outer bearing cap to one third of its capacity, preferably on the opposite side to the exhaust port.

Dismantling
If a motor is dismantled, cover the bearings with a plastic sheet or clean lint free rag to prevent ingress of foreign matter. Never use cotton waste.

Removing and fitting bearings
If bearings are removed they should be renewed, not refitted. Proper drawing and fitting equipment must be used when removing bearings as the bearings have an interference fit on the shaft. Replacement bearings must be the correct size and have the correct internal clearance grade. See the table on page 22 for bearing sizes. C3 clearances are normally preferred.

Recommended grease types
General purpose grease (standard)
- Lithium hydroxy-stearate grease
- NLGI consistency No. 3
- Operating temperature -20°C to +120°C
- High oxidation resistance
- Retains consistency after extreme periods of service
- Contains effective rust inhibitors
- Shell Alvania no. 3 or equivalent.

Extreme temperature range grease (optional)
- PTFE (Teflon) base with mineral oils
- Operating temperature -40°C to +260°C
- Non melting with high oxidation resistance
- Retains consistency
- Contains rust inhibitors
- Magnalube G or equivalent.

Current

Check periodically that the current drawn is balanced and is the same as at the time of installation.

Cable terminations

Cable terminations should have all incoming supply leads compressed between two nuts, locked with a locking nut. Other combinations may cause overheating due to high resistance joints.

WARNING: THE CORRECT CLEARANCE BETWEEN LIVE PARTS MUST BE MAINTAINED

Thermal protection devices

Standard
One set (3) of PTC thermistors are embedded in the head windings. The leads are terminated in an auxiliary terminal box for PPA motors frame 160 and above, and terminate in the main terminal box for frames 80 to 132.

Resistance Temperature Detectors (RTDs) are fitted to windings of 315 frame and above (leads terminated in separate auxiliary terminal box).

Optional
Other thermal protection devices may be optionally fitted, including bearing RTDs, winding RTDs for smaller frames, additional sets of PTC thermistors, or bi-metal thermal protectors.

WARNING: DO NOT APPLY MORE THAN 2.5V ACROSS ANY PROTECTION DEVICE

Insulation testing
When checking for insulation resistance (IR) the test voltage must not be applied across the protection device. The correct procedure is to short the entire protector leads together and apply the test voltage between the shorted leads and earth and/or phases. ‘Meggering’ across the terminals of the device, when not shorted, is likely to cause irreparable damage, and must not be carried out.

XPA bearing size and relubrication data

Standard bearings

	Drive end (ball bearing)				Non-Drive end (ball bearing)				Optional bearings Drive end (roller bearing)			
Motor fame	Bearing no.	Bearing size	Relubrication		Bearing no.	Bearing size	Relubrication		Bearing no.	Bearing size	Relubrication	
			Qty [g]	Interval [hours]			Qty [g]	Interval [hours]			Qty [g]	Interval [hours]
3000 r/min = 2 poles												
132	6308	40x90x23	11	7500	6308	40x90x23	11	7500	-	-	-	-
160	6309	45x100x25	13	6500	6309	45x100x25	13	6500	-	-	-	-
180	6310	50x110x27	15	6000	6310	50x110x27	15	6500	-	-	-	-
200	6312	60x130x31	20	5000	6312	60x130x31	20	5000	-	-	-	-
225	6313	65x140x33	23	4800	6313	65x140x33	23	4800	-	-	-	-
250	6313	65x140x33	30	4200	6313	65x140x33	23	4800	-	-	-	-
280	6314	70x150x35	37	2500	6314	70x150x35	26	4000	-	-	-	-
315	6316	80x170x39	41	2000	6316	80x170x39	41	2000	-	-	-	-
1500 r/min = 4 poles												
132	6308	40x90x23	11	11000	6308	40x90x23	11	11000	NU308	40x90x23	11	9500
160	6309	45x100x25	13	11000	6309	45x100x25	13	11000	NU309	45x100x25	13	8500
180	6310	50x110x27	15	10500	6310	50x110x27	15	11000	NU310	50x110x27	15	8500
200	6312	60x130x31	20	10000	6312	60x130x31	20	10000	NU312	60x130x31	20	6000
225	6313	65x140x33	23	9500	6313	65x140x33	23	9500	NU313	65x140x33	23	7000
250	6315	75x160x37	30	9100	6313	65x140x33	23	9500	NU315	75x160x37	30	7000
280	6317	85x180x41	37	8900	6314	70x150x35	26	8900	NU317	85x180x41	37	6800
315	NU318	90x190x43	41	6500	6316	80x170x39	41	7000	-	-	-	-
1000 r/min = 6 poles												
132	6308	40x90x23	11	15000	6308	40x90x23	11	15000	NU308	40x90x23	11	11000
160	6309	45x100x25	13	14000	6309	45x100x25	13	14000	NU309	45x100x25	13	8500
180	6310	50x110x27	15	14000	6310	50x110x27	15	14000	NU310	50x110x27	15	8500
200	6312	60x130x31	20	14000	6312	60x130x31	20	14000	NU312	60x130x31	20	6000
225	6313	65x140x33	23	13500	6313	65x140x33	23	13500	NU313	65x140x33	23	7000
250	6315	75x160x37	30	13000	6313	65x140x33	23	13500	NU315	75x160x37	30	7000
280	6317	85x180x41	37	12500	6314	70x150x35	26	12500	NU317	85x180x41	37	6800
315	NU318	90x190x43	41	9500	6316	80x170x39	41	10000	-	-	-	-

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☐	**HGA series**	Enhanced performance cast iron units MEPS2 (Eff 1) compliant
☐	**SGA series**	Enhanced performance cast iron units
☐	**HLA series**	Cast aluminium multi-mount units MEPS2 (Eff 1) compliant
☐	**SLA series**	Cast aluminium multi-mount units
☐	**PPA series**	High specification cast iron units
☐	**XPA series**	High specification / Premium efficiency cast iron units
☐	**PPD series**	Zone 1 Exd cast iron units
☐	**MT series**	Cast aluminium single & three phase units
☐	**CT series**	Air movement, pumping & general purpose application motors
☐	**CW series**	Australian made, special application & general purpose motors
☐	**Centurion series**	HTE & HCA series cast iron and fabricated steel high voltage motors

☑ Gear Motors

☐	**Nordbloc-HGA**	Euro dimension inline units
☐	**Nordunicase-HGA**	Heavy duty inline and flat helical units
☐	**Nordbevel-HGA**	Heavy duty helical bevel units
☐	**Nordworm-HGA**	All cast iron motor & wormbox units
☐	**FRT-MTT/HLA**	All aluminium universal mount wormbox units
☐	**FRS-HGA**	All cast iron motor & wormbox units
☐	**FRS-MTT/HLA**	All aluminium motor & wormbox units
☐	**FRD-MTT/HLA**	All aluminium Euro dimension inline units
☐	**C&H SLA**	High ratio inline multi-stage spur units
☐	**Cycloid 600**	Compact High Efficiency Cyloidal speed reducers
☐	**Geardrive**	C-frame sub-fractional horsepower units
☐	**SMR®**	Helical shaft mounted reducers
☐	**CRT-MTT/HLA**	All aluminium universal mount wormbox units

☑ AC Drives & Softstarters

☐	**Vacon NX**	Vacon frequency converters
☐	**Lovato ADX**	Softstarters with torque control

☑ Other

☐ Corporate Brochure & Product Selection Guide

Please note: not all products are available worldwide.