

# General Information and Maintenance Instructions



- Construction** The frame comprises pressure die-castings accurately located together, alternatively on machined spigots of the hydraulically riveted stator packs, ensuring concentric air gap with correct bearing alignment. The armature laminations or die-cast rotor are pressed onto a precision steel shaft. The armature after winding, impregnation and baking is then statically and dynamically balanced. All stators and armatures are wound with first class quality synthetic covered copper wire manufactured to B.S. Specification 2757 (≡IEC 85) Class "F" and then impregnated and baked in our Automatic Plant, and accordingly can be considered to be tropically impregnated for all practical purposes.
- Motor Enclosures** To IEC 34-5 and EN 60034:part 5 and IEC 34-6 and B.S. EN 60034-6. **Induction type motors:** Our standard ventilated internal fan cooled frame conforms to IP 20. **Commutator type motors** SD 1 ventilated internal fan cooled frame conforms to IP 20. SD 11, SD 12 and PM 1, PM 2, PM 6, PM 60 Drip Proof enclosure, internal fan cooled, conforms to IP 21. Plain totally enclosed frame conforms to IP 54. TEFC frames with terminal box conforms to IP 54.  
PM 3, PM 4, PM 5, PM 50, PM 7, PM 8, PM 9, PM 10, PM 11 also conforms to IP 54.
- Bearings** Shielded ball bearings throughout, spring loaded for quiet running. Temperature parameters -30°C to +100°C/120°C.
- Brush Gear** (Commutator motors). An adjustable rocker type for maximum brush life and good commutation with easily accessible brushes. To achieve maximum brush life a form factor on the supply voltage as near to 1 as possible would be required.
- Testing** To B.S. Specification 5000 Part II. (≠IEC 72). All our units are CE marked and comply to current regulations/directives at time of printing.
- Torque Ratings** All gearbox torque figures have been reproduced to represent an accurate output figure. These figures may be affected by tolerances created during production techniques as well as application circumstances once the units have been installed. **A margin of + or - 10% should be taken into consideration on these figures during your selection of an appropriate unit.**
- Temperature** All motors are built with Class "F" insulation to B.S. 2757 (≡IEC 85) which allows a temperature rise of 115°C based on an ambient of

40°C. These figures are with the motor running in normal working conditions in free air and not in any form of enclosure. Under full load the heat of the motor casing will be such that it is NOT possible to handle for any length of time.

- Braking** The problem of instantaneously stopping a motor or geared unit can be overcome by fitting an electromagnetic brake, details on pages 6, 45 and 72.
- Gear units** The motor is fitted with shielded spring loaded ball bearings absorbing worm thrust from the gear box. The output shaft with flats or keyways is carried in ball bearings pressed into gear wheels of composite or phosphor bronze with hardened and polished steel worms. Gearbox and ball bearings packed with appropriate grade of grease. Worm and multi-spur gear units are fitted with case hardened steel spur gears with an oil bath lubrication. All units are suitable for running in any position.
- Gearbox positions** Alternative positions for the gearboxes can be arranged to suit customer's requirements (see page 113) but unless specified, will be supplied in standard position as shown on the individual drawings. This also applies to the gearbox shaft extensions.
- Lubricants** Single and double reduction worm gearboxes are charged with a suitable semi-fluid grease and sealed for life. Worm and multi-spur and in-line spur gearboxes are filled with 20/50 multigrade oil and sealed for life. (in certain conditions semi-fluid grease may be used). Working temperature of lubricants:- Grease -15°C to 120°C; Oil -15°C to 150°C. For units used in extreme temperature conditions i.e., below zero degrees centigrade please contact our sales department.
- Single and double worm reduction gearboxes** Whilst worm gearing has lower efficiency than spur gearing it is true to say that generally the noise level of worm gear reduction is much lower and therefore, where noise is an important factor, this type of gearing should be considered. To prevent premature gear failure or excessive gear wear, the maximum gear loading and thermal rating of the particular gearbox must be taken into consideration otherwise there is a danger of stripping the gear wheel teeth or failure of the lubrication due to excessive gearbox temperature. If further information is required on this point please consult our sales engineers. The table below shows the recommended mechanical and thermal ratings for the various types of gearbox.

Gearbox Type	Ratios	Mechanical Rating (Nm)		Thermal Rating (watts)		*Radial Loading		Axial Loading	
		COMPOSITE	BRONZE	COMPOSITE	BRONZE	LBS	KG	LBS	KG
<b>S</b>	4 1/8:1 to 40:1	2.9	4.5	20	25	15	7	8	3.6
	44:1 to 60:1	2.3	4						
	66:1 to 70:1	1.5	2.5						
<b>M</b>	4 1/8:1 to 40:1	7.9	11.8	38	45	30	13.5	20	9
	44:1 to 60:1	5.9	7.9						
	66:1 to 72:1	5.1	7.3						
<b>MB or MF</b>	4 1/8:1 to 40:1	7.9	11.8	40	48	50	23	24	11
	44:1 to 60:1	5.9	7.9						
	66:1 to 72:1	5.1	7.3						
<b>L or LH</b>	5:1 to 40:1	14.6	22	60	72	40	18	30	13.5
	50:1 to 60:1	11.3	17						
<b>LB or LF-LHB</b>	5:1 to 40:1	14.6	22	60	72	70	32	35	16
	50:1 to 60:1	11.3	17						
<b>SS</b>	47:1 to 2880:1	4	5.9	25	30	12	5.5	8	3.6
	3000:1 to 4300:1	2.7	4						
	4320:1 to 4900:1	1.5	2.5						
<b>MM</b>	47:1 to 2880:1	9	11.8	45	54	20	9	20	9
	3000:1 to 4300:1	5.9	7.9						
	4320:1 to 5184:1	5.1	7.3						
<b>MBM</b>	47:1 to 2880:1	9	11.8	47	58	40	18	24	11
	3000:1 to 4300:1	5.9	7.9						
	4320:1 to 5184:1	5.1	7.3						
<b>SIW</b>	All Ratios	7	11.3	28	38	20	8	12	5
<b>MIW</b>	All Ratios	17	28	50	65	60	27	30	13.5
<b>LIW</b>	All Ratios	28	45	-	-	72	36	45	20
	<b>Worm/Pinion</b>	<b>Spur Train</b>							
<b>SIS</b>	22:1 to 29:1	5.7		-	-	20	9	10	4.5
	53:1 to 303:1	7.9							
<b>MIS</b>	64:1 to 18.5:1	12		-	-	48	22	31	14
	15:1 to 43:1	28							
	35:1 to 101:1	45							
<b>LIS</b>	6:1 to 18:1	23		-	-	60	27	40	18
	24:1 to 72:1	51							
	57:1 to 171:1	100							
	112:1 to 336:1	74							
<b>SWS</b>	40:1 to 120:1	11		-	-	40	18	25	11.4
	147:1 to 219:1	11							
	292:1 to 1377:1	11							
<b>MWS</b>	26:1 to 54:1	9		-	-	80	36	40	18
	62:1 to 125:1	22							
	145:1 to 1406:1	45							
<b>LWS</b>	23:1 to 98:1	45		-	-	100	45.5	50	23
	49:1 to 480:1	45							
	99:1 to 492:1	62							
	231:1 to 1680:1	100							
	445:1 to 7776:1	100							
<b>GWS</b>	45:1 to 136:1	90		-	-	150	68	80	36
	258:1 to 154:1	200							
	351:1 to 1539:1	250							
	564:1 to 3300:1	250							

Approx Thermal Rating (W) =  $\frac{\text{Final RPM} \times \text{Torque (Nm)}}{9.55} \times (1/n - 1)$  (η=Gear efficiency)

\*Based on midway point of standard shaft extension (1Nm=10.2cm kp) (1Nm=8.85lbs. ins)

For intermittent duty the thermal rating for the gearbox is increased by multiplying the appropriate gearbox thermal rating by the factor  $X = \sqrt{\frac{100\%}{\text{Duty Cycle\%}}}$

## Maintenance Instructions

All units are fitted with grease packed shielded ball bearings and sealed for life, this can vary depending on operating conditions, temperature, and duty cycle. We recommend replacing a noisy bearing, as re-greasing is not possible. Prolonged storage can shorten the estimated life (in excess of 20,000 hours).

In most cases dismantling of the motor or gearbox is straightforward. Carefully note the position of spring loaded washers, shims, etc. However the commutator type motors require a suitable extractor to remove the armature from the main frame. Commutator motors require more maintenance than induction type due to the accumulation of carbon dust in the brush gear area. This dust should be blown out periodically with a dry air supply observing Health & Safety. Directives regarding inhalation of carbon dust and only when the commutator surface is in a very blackened condition should it be lightly cleaned with 'flour' paper or similar (note not emery paper). When replacing carbon brushes (which may have a life of some 2000 hours depending on operating conditions) care should be taken to ensure these are a free fit in the brush holders. When dismantling, the brush gear should be marked to ensure it is replaced in the original position and the pigtails clear the motor casing. Magnetic brakes require little maintenance since wear of the bonded lining is automatically compensated for.