

INSTALLATION & MAINTENANCE

SERIES M

DAVID BROWN
R A D I C O N

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IMPORTANT**Product Safety Information**

General - The following information is important in ensuring safety. It **must** be brought to the attention of personnel involved in the selection of David Brown Radicon Limited power transmission equipment, those responsible for the design of the machinery in which it is to be incorporated and those involved in its installation, use and maintenance.

David Brown power transmission equipment will operate safely provided it is selected, installed, used and maintained properly. As with any power transmission equipment **proper precautions must** be taken as indicated in the following paragraphs, to ensure safety.

Potential Hazards - these are **not** necessarily listed in any order of severity as the degree of danger varies in individual circumstances. It is important therefore that the list is studied in its entirety:-

- 1) Fire/Explosion
 - (a) Oil mists and vapour are generated within gear units. It is therefore dangerous to use naked lights in the proximity of gearbox openings, due to the risk of fire or explosion.
 - (b) In the event of fire or serious overheating (over 300 °C), certain materials (rubber, plastics, etc.) may decompose and produce fumes. Care should be taken to avoid exposure to the fumes, and the remains of burned or overheated plastic/rubber materials should be handled with rubber gloves.
- 2) Guards - Rotating shafts and couplings must be guarded to eliminate the possibility of physical contact or entanglement of clothing. It should be of rigid construction and firmly secured.
- 3) Noise - High speed gearboxes and gearbox driven machinery may produce noise levels which are damaging to the hearing with prolonged exposure. Ear defenders should be provided for personnel in these circumstances. Reference should be made to the Department of Employment Code of Practice for reducing exposure of employed persons to noise.
- 4) Lifting - Where provided (on larger units) only the lifting points or eyebolts must be used for lifting operations (see maintenance manual or general arrangement drawing for lifting point positions). Failure to use the lifting points provided may result in personal injury and/or damage to the product or surrounding equipment. Keep clear of raised equipment.
- 5) Lubricants and Lubrication
 - (a) Prolonged contact with lubricants can be detrimental to the skin. The manufacturer's instruction must be followed when handling lubricants.
 - (b) The lubrication status of the equipment must be checked before commissioning. Read and carry out all instructions on the lubricant plate and in the installation and maintenance literature. Heed all warning tags. Failure to do so could result in mechanical damage and in extreme cases risk of injury to personnel.
- 6) Electrical Equipment - Observe hazard warnings on electrical equipment and isolate power before working on the gearbox or associated equipment, in order to prevent the machinery being started.
- 7) Installation, Maintenance and Storage
 - (a) In the event that equipment is to be held in storage, for a period exceeding 6 months, prior to installation or commissioning, David Brown Radicon Limited must be consulted regarding special preservation requirements. Unless otherwise agreed, equipment must be stored in a building protected from extremes of temperature and humidity to prevent deterioration.
The rotating components (gears and shafts) must be turned a few revolutions once a month (to prevent bearings brinelling).
 - (b) External gearbox components may be supplied with preservative materials applied, in the form of a "waxed" tape overwrap or wax film preservative. Gloves should be worn when removing these materials. The former can be removed manually, the latter using white spirit as a solvent.
Preservatives applied to the internal parts of the gear units do not require removal prior to operation.
 - (c) Installation must be performed in accordance with the manufacturer's instructions and be undertaken by suitably qualified personnel.
 - (d) Before working on a gearbox or associated equipment, ensure that the load has been removed from the system to eliminate the possibility of any movement of the machinery and isolate power supply. Where necessary, provide mechanical means to ensure the machinery cannot move or rotate. Ensure removal of such devices after work is complete.
 - (e) Ensure the proper maintenance of gearboxes in operation. Use only the correct tools and David Brown Radicon Limited approved spare parts for repair and maintenance. Consult the Maintenance Manual before dismantling or performing maintenance work.
- 8) Hot Surfaces and Lubricants
 - (a) During operation, gear units may become sufficiently hot to cause skin burns. Care must be taken to avoid accidental contact.
 - (b) After extended running the lubricant in gear units and lubrication systems may reach temperatures sufficient to cause burns. Allow equipment to cool before servicing or performing adjustments.
- 9) Selection and Design
 - (a) Where gear units provide a holdback facility, ensure that back-up systems are provided if failure of the holdback device would endanger personnel or result in damage.
 - (b) The driving and driven equipment must be correctly selected to ensure that the complete machinery installation will perform satisfactorily, avoiding system critical speeds, system torsional vibration, etc.
 - (c) The equipment must not be operated in an environment or at speeds, powers, torques or with external loads beyond those for which it was designed.
 - (d) As improvements in design are being made continually the contents of this catalogue are not to be regarded as binding in detail, and drawings and capacities are subject to alterations without notice.

The above guidance is based on the current state of knowledge and our best assessment of the potential hazards in the operation of the gear units.

Any further information or clarification required may be obtained by telephoning or writing to:

English _____	Section	A
German / Deutsch _____	Section / Abschnitt	B
French / Français _____	Section / Section	C
Italian / Italiano _____	Section / Sezione	D
Spanish / Español _____	Section / Sección	E
Dutch / Nederlands _____	Section / Sectie	F

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1 UNIT IDENTIFICATION

When requesting further information, or service support quote the following information from the nameplate:

- Unit Type
- Order Number

DAVID BROWN RADICON®	
UNIT TYPE	<input type="text"/>
ORDER No	<input type="text"/>
INPUT KW	<input type="text"/>
RATIO	<input type="text"/>
OUTPUT RPM	<input type="text"/>
ASSEMBLY POSITION	<input type="text"/>
DB	<input type="text"/>
OIL GRADE	<input type="text"/>

* See Appendix 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
*																				

EXAMPLE M 0 3 2 0 8 . 0 B M C - 1 A . 7 5 4 A -

1 - SERIES M

RANGE

2, 3 - SIZE OF UNIT

THROUGH

4 - NO OF REDUCTIONS

THROUGH

5 - REVISION VERSION

ETC

6, 7, 8 - NOMINAL OVERALL RATIO

eg

9 - UNIT VERSION

- BASE MOUNTED
 - FLANGE MOUNTED

10 - TYPE OF UNIT

- MOTORISED
 - UNIT TO ALLOW FITTING OF NON DB RADICON MOTOR
 - UNIT TO ALLOW FITTING OF NEMA MOTOR
 - REDUCER UNIT

20 - ADDITIONAL FEATURES

PAINT, LUBRICANT
DOUBLE OIL SEAL ETC

eg

19 - MOTOR REQUIRED

eg

FOR R OR G TYPES WITHOUT
MOTOR ENTER

18 - NO OF MOTOR POLES

OR

FOR R OR G TYPE ENTER

15, 16, 17 - GEARED MOTOR

MOTOR POWER REQUIRED

eg

FOR R OR G TYPE

ENTER

13, 14 - MOUNTING POSITION

eg

12 - MOTOR ADAPTOR FOR G OR A TYPE UNIT

FOR ALL OTHER TYPES ENTER

11 - OUTPUT SHAFT

- STANDARD
 - IEC, FLANGE MOUNT
UNITS ONLY
 - REDUCED DIAMETER
FOR SIZE 03 ONLY
 - AMERICAN

2 GENERAL INFORMATION

The following instructions will help you achieve a satisfactory installation of your David Brown Radicon Series M unit, ensuring the best possible conditions for a long and trouble free operation.

All units are tested and checked prior to despatch, a great deal of care is taken in packing and shipping arrangements to ensure that the unit arrives at the customer in the approved condition.

3 FITTING OF COMPONENTS TO EITHER THE UNIT INPUT OR OUTPUT SHAFT

The input or output shaft extension diameter tolerance is to ISO tolerance k6 (for shaft diameter $\leq 50\text{mm}$) and m6 (for shaft diameter $> 50\text{mm}$) and the fitted components should be to ISO tolerance M7 (for bore diameter $\leq 50\text{mm}$) and K7 (for bore diameter $> 50\text{mm}$).

- Items (such as gears, sprockets, couplings etc) should not be hammered onto these shafts since this would damage the shaft support bearings.
- The item should be pushed onto the shaft using a screw jack device fitted into the threaded hole provided in the end of the shaft.
- Items being fitted may be heated to 80/100°C to aid assembly further.

THREADED HOLE DETAILS

UNIT SIZE	INPUT SHAFT	OUTPUT SHAFT
M0320 / M0330	M5 x 12.5 mm deep	M6 x 16 mm deep
M0420 / M0430	M5 x 12.5 mm deep	M10 x 22 mm deep
M0620	M6 x 16 mm deep	M10 x 22 mm deep
M0630	M5 x 12.5 mm deep	
M0720	M8 x 19 mm deep	M16 x 36 mm deep
M0730	M6 x 16 mm deep	
M0820	M10 x 22 mm deep	M16 x 36 mm deep
M0830	M8 x 19 mm deep	
M0920	M12 x 28 mm deep	M20 x 42 mm deep
M0930	M10 x 22 mm deep	
M1020	M16 x 36 mm deep	M20 x 42 mm deep
M1030	M12 x 28 mm deep	
M1320 / M1330	M20 x 42 mm deep	M24 x 50 mm deep
M1420 / M1430	M20 x 42 mm deep	M24 x 50 mm deep

4 WEATHER PROTECTION OF UNIT

All Series M units are provided with protection against normal weather conditions. Where units are to operate in extreme conditions, or where they are to stand for long periods without running, eg during plant construction, we should be notified when ordering so that arrangements for adequate protection can be made.

5 INSTALLATION

5.1 MOTORISED AND REDUCERS (SIZES 03, 04, 06 & 07)

Motorised and Reducer types of sizes 03, 04, 06 & 07 are supplied ready filled with the appropriate amount of lubricant for the mounting position identified in the original order. (If the unit is to be mounted in a different position to that originally intended then the amount of lubricant in the unit will require amending

- See Appendix 2 of this document for the revised quantities
- See Appendix 1 for the methodology for doing this.

MOTORISED AND REDUCERS (SIZES 08, 09, 10, 13 & 14)

Motorised and Reducer types of sizes 08, 09, 10, 13 & 14 are shipped less oil, for the customer to fill on site once installed. The different mounting positions are indicated in Appendix 2 with the appropriate oil fill quantities. The units have several oil fill and drain plugs to cater for all mounting positions. A list of approved lubricants is supplied in Appendix 2.

5.2 GEAR HEADS (ALL SIZES SERIES M)

If the unit has been supplied as a Gear Head type to allow fitting of the motor separately then refer to Appendix 1. For sizes M03, 04, 06 & 07 only, units satisfying condition 'G' (ref Appendix 1) will be supplied filled with oil, and units satisfying condition 'A' or 'M' (ref Appendix 1) will be supplied less oil.

5.3 FIXING TO CUSTOMER EQUIPMENT

Fixing the Gear Head flange facing or feet to the customer equipment use set screws to ISO grade 8.8 minimum.

Torque tighten to:-

Set Screw Size	Tightening Torque
M8	25 Nm
M10	50 Nm
M12	85 Nm
M16	200 Nm
M20	350 Nm
M24	610 Nm
M30	1220 Nm
M36	2150 Nm

5.4 MOTOR CONNECTIONS

TO MAINS

Connection of the electric motor to the mains supply should be made by a qualified person. The current rating of the motor will be identified on the motor plate, and correct sizing of the cables to electrical regulations is essential.

MOTOR TERMINAL CONNECTION

Circuit diagrams for the correct wiring of the motor terminal box are included as Appendix 3 of this document if the motor is of David Brown Radicon plating.

Alternatively if the motor is supplied separately or if fitted with a motor from a different manufacturer, then this should have appropriate documentation provided with it.

BRAKE MOTOR CONNECTION

Installation of the David Brown Radicon Brake Motor is covered in Appendix 4.

5.5 FOOT-MOUNTED UNITS

The following procedure is recommended for all foot mounted units.

Foot mounted units are supplied either as free standing units, or if required, mounted on a standard baseplate with a foot mounted motor correctly aligned and connected by a David Brown Radicon flexible coupling.

- a) Clean shaft extensions and ventilator when fitted.
- b) Secure unit, or baseplate if fitted to a rigid foundation using heavy duty bolts to ISO grade 8.8 minimum.
- c) Ensure baseplate is not distorted
Note: Units not supplied on baseplates should if possible be mounted on the same bedplate as the prime mover.
- d) Align unit (see Appendix 6)
Note: It is important to ensure when aligning unit on baseplate that all machined mounting points are supported over their full area.
If steel packings are used these should be placed either side of the foundation bolt as close as possible. During the finale bolting ensure the unit or baseplate is not distorted this will cause strains in the gear case resulting in errors of alignment of shafts and gearing.
- e) For units mounted on bedplates after alignment select any two diagonally opposite feet, drill ream and dowel in position.
- f) Fit guards in accordance with the factory acts.
- g) Check motor wiring for correct direction of rotation this is important when a holdback device is fitted.
- h) Fill gear unit with oil (if not factory filled) as detailed in Section 6.

5.6 REPLACEMENT OF OIL SEALS

- a) Clean and drain the unit.
- b) Remove any equipment from the outputshaft such as couplings and remove the output key.
- c) Remove the old seal
- d) Smear oil seals with grease (see Appendix 5).
- e) Fit replacement seal on a seal guide, slide it along the shaft and press the seal into the housings.
- f) Fill with the correct amount of an approved lubricant, see Appendix 2.

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6 LUBRICATION AND MAINTENANCE

6.1 LUBRICATION

- Unit sizes M03, 04, 06 and 07 are factory filled with Mineral oil David Brown type E.
- Unit sizes M08, 09, 10, 13 and 14 will be oil filled by client. (See Appendix 2)

6.2 PERIODIC INSPECTION

- Check oil level weekly on sizes M06, 07, 08, 09, 10, 13 and 14 and if necessary top up with the recommended grade of lubricant.

6.3 OIL CHANGES

Size 03 and 04 units are lubricated for life. On all other sizes regular oil changes are essential and the following factors should be used to determine the frequency at which these are carried out.

- Oil temperature - unit operating under load.
- Type of oil.
- Environment - humidity, dust, etc.
- Operating conditions - shock, loading, etc.

At elevated temperatures the effective life of the oil is very much reduced. This is most pronounced with oils containing fatty and E.P. additives. To prevent damage to the unit through lubricant breakdown the oil should be renewed as detailed in the following table:

UNIT OPERATING TEMPERATURE°C	RENEWAL PERIOD			
	MINERAL OIL		SYNTHETIC OIL	
75 OR LESS	18000 HOURS	OR	3 YEARS	26000 HOURS OR 3 YEARS
80	12500 HOURS	OR	3 YEARS	26000 HOURS OR 3 YEARS
85	9000 HOURS	OR	3 YEARS	22000 HOURS OR 3 YEARS
90	6000 HOURS	OR	2 YEARS	15000 HOURS OR 3 YEARS
95	4500 HOURS	OR	17 MONTHS	10500 HOURS OR 3 YEARS
100	3000 HOURS	OR	12 MONTHS	7500 HOURS OR 2 1/2 YEARS
105	2200 HOURS	OR	8 MONTHS	6000 HOURS OR 2 YEARS
110	1500 HOURS	OR	6 MONTHS	4500 HOURS OR 18 MONTHS
NB: INITIAL FILL OF OIL SHOULD BE CHANGED IN A NEW GEAR UNIT AFTER 1000 HOURS OPERATION OR ONE YEAR OR HALF THE ABOVE LIFE WHICHEVER IS THE SOONEST				

Note:

Figures quoted are for oil temperatures when the unit has attained normal running temperature when operating under load. These figures are based on normal running but where conditions are particularly severe it may be necessary to change the oil more frequently. When changing lubricant, if same lubricant is not used then unit must be flushed out and filled only with one type of lubricant.

6.4 LUBRICANT QUANTITY

The quantity of lubricant required by size and mounting position is given in Table 1, Appendix 2. A diagram showing mounting position designations is also included in Appendix 2.

6.5 APPROVED LUBRICANTS

Table 2 Appendix 2 gives the lubricants approved for use in the gear unit.

6.6 APPROVED GREASES

Appendix 5 gives the greases approved for use in the unit.

6.7 CLEANING

With the drive stationary periodically clean any dirt or dust from the gear unit and the electric motor cooling fins and fan guard to aid cooling.

7 NOISE

The range of Series M product satisfies a noise (sound pressure level) of 85 dB(A) or less when measured at 1 metre from the unit surface.

Measurements taken in accordance with B.S.7676 Pt1 : 1993 (ISO 8579-1 : 1993).

Any further information or clarification required may be obtained by contacting:-

David Brown Radicon Ltd
Park Gear Works
Huddersfield
England HD4 5DD
Telephone: 01484 465610

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ASSEMBLY OF MOTOR AND MOTOR ADAPTOR TO THE GEAR HEAD

Depending on motor frame size and type of flange facing (C or D flange) determines whether or not the motor adaptor is attached firstly to the motor or to the Gear Head.

		M0320/0420 M0330/M0430/M0630		M0620/0730		M0720/M0830	
MOTOR FLANGE	MOTOR FRAME	C (B14)	D (B5)	C (B14)	D (B5)	C (B14)	D (B5)
63		N/A	A		G		
71		M	G	M	G		
80		M	G	M	G	M	G
90		G	G	M	G	M	G
100 / 112		G	G	M	G	M	G
132				G	G	M	G
160							G

	M0820/M0930	M0920/M1030	M1020	M1320/M1330	M1420/M1430
ALL MOTOR FRAME SIZES	G	G	G	G	G

- A - Adaptor sandwiched between motor and Gear Head
- M - Fix adaptor to motor then fix assembly to Gear Head
- G - Fix adaptor to Gear Head first then fit motor
- N/A - Not available

- Note:
- For build condition 'A' and 'M' only, prior to fitting the motor adaptor, fill the gearcase with the correct amount of lubricant (Appendix 2). Apply liquid gasket material (Loctite 518) to the upturned face of the gearhead in a continuous bead. The gasket material should be outside any leak path and all screw holes should be ringed. (Health and Safety instructions with the material must be observed).
 - When fitting the motor adaptor to the electric motor for build condition 'M', ensure that the copper washers supplied with the kit are fitted under the heads of the set screws fixing the adaptor to the motor, and that the threads of the set screws are coated with Loctite Nut Lock 243.

SET SCREW TORQUES:-

SET SCREW SIZES	RECOMMENDED TORQUE
M6	10 Nm
M8	18 Nm
M10	37 Nm
M12	64 Nm
M16	150 Nm

The standard lubricant is suitable for operation in ambient temperatures of 0° to 35°C, outside of this please consult Table 2 or David Brown Radicon Application Engineers.

TABLE 1 LUBRICANT QUANTITY (Litres) Oil quantities are approximate, fill gearbox until oil escapes from level plug hole

DOUBLE AND TRIPLE REDUCTION AND FINAL STAGE QUADRUPLE AND QUINTUPLE REDUCTION																			
Unit Size	M0320	M0330	M0420	M0430	M0620	M0630	M0720	M0730	M0820	M0830	M0920	M0930	M1020	M1030	M1320	M1330	M1420	M1430	
MOUNTING POSITION	1	0.6	0.8	0.6	0.9	1.7	1.8	2.8	3.0	4.6	6.4	10.5	11.5	11.0	11.0	17.0	17.0	24.0	24.0
	2	0.6	0.8	0.6	0.9	2.1	2.4	4.0	4.9	6.8	7.1	12.0	11.5	22.0	23.0	31.0	33.0	49.0	50.0
	3	0.8	1.0	1.1	1.3	2.4	2.8	4.4	5.4	7.3	6.9	12.0	11.5	22.0	23.0	31.0	33.0	49.0	50.0
	4	0.8	1.0	1.1	1.3	2.7	3.4	5.4	7.0	6.4	6.9	12.0	11.5	19.0	20.0	28.0	30.0	41.0	43.0
	5	0.8	1.7	1.4	2.1	3.5	4.8	5.2	9.0	10.0	8.0	16.8	16.8	32.0	32.0	47.0	47.0	72.0	72.0
	6	1.0	1.5	1.6	2.1	3.2	4.8	6.0	9.0	9.6	9.3	16.4	16.5	26.0	27.0	38.0	40.0	65.0	67.0
	7	0.6	0.8	0.6	0.9	1.7	2.2	3.3	3.4	2.6	2.4	5.5	6.0	8.0	8.0	14.0	14.0	20.0	20.0
	8	0.8	1.7	1.4	2.1	3.1	5.0	6.3	10.0	9.5	9.0	16.0	16.0	22.0	22.0	45.0	45.0	65.0	65.0
	9	1.0	1.5	1.6	2.1	3.6	5.0	6.8	9.0	10.5	10.0	17.0	19.0	28.0	29.0	43.0	44.0	65.0	67.0
PRIMARY STAGE QUADRUPLE AND QUINTUPLE REDUCTION (Quantities obtained from above double and triple for sizes indicated)																			
Unit Size	M0640	M0650	M0740	M0750	M0840	M0850	M0940	M0950	M1040	M1050	M1340	M1350	M1440	M1450					
PRIMARY UNIT	M0420	M0430	M0420	M0430	M0620	M0620	M0620	M0620	M0720	M0720	M0820	M0720	M0820	M0720					
SECONDARY UNIT	M0620	M0620	M0720	M0720	M0820	M0830	M0920	M0930	M1020	M1030	M1320	M1330	M1420	M1430					

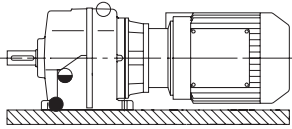
TABLE 2 RECOMMENDED LUBRICANTS

NUMBERS IN BRACKETS INDICATES RECOMMENDED MINIMUM OPERATING TEMPERATURE °C.

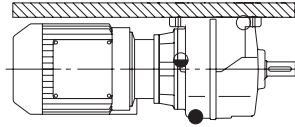
LUBRICANT SUPPLIER	LUBRICANT RANGE NAME	ISO VISCOSITY / DBR GRADE NO.		
Type E - Mineral oils containing industrial EP additives		220 / 5E	320 / 6E	460 / 7E
		AMBIENT TEMPERATURE RANGE °C		
		-5 to 20	0 to 35	20 to 50
Ampol Limited	Gearlube SP	SP220 (-1)	SP320 (-1)	SP460 (-1)
Batoyle Freedom Group	Remus	220 (-2)	320 (-2)	460 (-2)
Boxer Services Limited	Indus	220 (-10)	320 (-10)	460 (-10)
BP Oil International Limited	Energol GR-XF	220 (-16)	320 (-16)	460 (-16)
	Energol GR-XP	220 (-15)	320 (-10)	460 (-7)
Caltex	Meropa	220 (-4)	320 (-4)	460 (-4)
	RPM Borate EP Lubricant	220 (-7)	320 (-4)	460 (-7)
Carl Bechem GmbH	Berugear GS BM	220 (-20)	320 (-13)	460 (-10)
	Staroil G	220 (-13)	320 (-13)	460 (-10)
Castrol International	Alpha Max	220 (-19)	320 (-13)	460 (-10)
	Alpha SP	220 (-16)	320 (-16)	460 (-1)
Chevron International Oil Company Ltd	Gear Compound EP (USA version)	220 (-16)	320 (-13)	460 (-10)
	Gear Compound EP (Eastern ver)	220 (-13)	320 (-13)	460 (-13)
	Ultra Gear	220 (-10)	320 (-7)	460 (-7)
Eko-Elda (Greece)	Gearlub	220 (-13)	320 (-10)	460 (-1)
Engen Petroleum Limited	Gengear	220 (-13)	320 (-10)	460 (-1)
Esso	Spartan EP	220 (-16)	320 (-13)	460 (-7)
Esso/Exxon	Spartan EP	220 (-12)	320 (-12)	460 (-4)
Fina	Giran	220 (-13)	320 (-10)	460 (-10)
Fuchs Lubricants (UK) Plc	Powergear		P/Gear (-16)	M460 (-4)
	Renogear V	220EP (-13)	320EP (-4)	460EP (-4)
	Renogear WE	220 (-7)	320 (-7)	400 (-4)
Fuchs Mineraloelwerke GmbH	Renolin CLPF Super	6 (-13)	8 (-10)	10 (-10)
Klüber Lubrication	Klüberoil GEM1	220 (-5)	320 (-5)	460 (-5)
Kuwait Petroleum International	Q8 Goya	220 (-16)	320 (-13)	460 (-10)
Lubrication Engineers Inc	Almasol Vari-Purpose Gear	607 (-18)	605 (-13)	608 (-10)
Mobil Oil Company Limited	Mobil gear 600 Series	630 (-13)	632 (-13)	634 (-1)
	Mobil gear XMP	220 (-19)	320 (-13)	460 (-7)
Omega Manufacturing Division	Omega 690		85w/140 (-15)	
Optimol Ölwerke GmbH	Optigear BM	220 (-11)	320 (-10)	460 (-7)
	Optigear	220 (-18)	320 (-9)	460 (-7)
Pertamina (Indonesia)	Masri	220 (-4)	320 (-4)	460 (-4)
Petro-Canada	Ultima EP	220 (-22)	320 (-16)	460 (-10)
Petromin Lubricating Oil Co.	Gear Lube EP	EP220 (-1)	EP320 (0)	EP460 (0)
Rocol	Sapphire HI-Torque	220 (-13)	320 (-13)	460 (-13)
Sasol Oil (Pty) Limited	Cobalt	220 (-4)	320 (-1)	460 (-4)
	Hemat	220 (-10)	320 (-7)	460 (-4)
Shell Oils	Omala	220 (-4)	320 (-4)	460 (-4)
	Omala F	220 (-13)	320 (-10)	460 (-4)
Texaco Limited	Meropa	220 (-16)	320 (-16)	460 (-10)
Total	Carter EP	220 (-7)	320 (-7)	460 (-4)
Tribol GmbH	Molub-Alloy Gear Oil	90 (-18)	690 (-16)	140 (-13)
	Tribol 1100	220 (-20)	320 (-18)	460 (-16)
Type H - Polyalphaolefin base synthetic lubricants with EP additives		ISO VISCOSITY / DBR GRADE NO.		
		220 / 5H	320 / 6H	460 / 7H
		-30 to 20	0 to 35	20 to 50
Batoyle Freedom Group	Titan	220 (-31)	320 (-28)	
Boxer Services Limited	Silkgear	220 (-35)	320 (-35)	460 (-35)
BP Oil International Limited	Enersyn EPX		320 (-28)	
Caltex	Pinnacle EP	220 (-43)	320 (-43)	460 (-37)
Carl Bechem GmbH	Berusrsynth GP	220 (-38)	320 (-35)	460 (-32)
Castrol International	Alphasyn EP	220 (-37)	320 (-31)	460 (-31)
	Alphasyn T	220 (-31)	320 (-28)	460 (-28)
Chevron International Oil Company Ltd	Tegra	220 (-46)	320 (-33)	460 (-31)
Esso/Exxon	Spartan Synthetic EP	220 (-46)	320 (-43)	460 (-40)
Fina	Giran P	220 (-30)	320 (-25)	460 (-19)
Fuchs Lubricants (UK) Plc	Renogear SG	220 (-32)	320 (-30)	
Fuchs Mineraloelwerke GmbH	Renolin Unisyn CLP	220 (-37)	320 (-34)	460 (-28)
Klüber Lubrication	Klüberusrsynth GEM 4	220 (-35)	320 (-35)	460 (-30)
Kuwait Petroleum International	Q8 EL Greco	220 (-22)	320 (-19)	460 (-16)
Lubrication Engineers Inc	Synolec Gear Lubricant	9920 (-40)		
Mobil Oil Company Limited	Mobilgear SHC	220 (-40)	320 (-37)	460 (-32)
	Mobilgear SHC XMP	220 (-40)	320 (-33)	460 (-31)
Optimol Ölwerke GmbH	Optigear Synthetic A	220 (-31)	320 (-31)	
Petro-Canada	Super Gear Fluid	220 (-43)	320 (-37)	460 (-37)
Shell Oils	Omala HD	220 (-43)	320 (-40)	460 (-37)
Texaco Limited	Pinnacle EP	220 (-43)	320 (-43)	460 (-37)
Total	Carter EP/HT	220 (-34)	320 (-31)	460 (-28)
Tribol GmbH	Tribol 1510	220 (-36)	320 (-33)	460 (-28)

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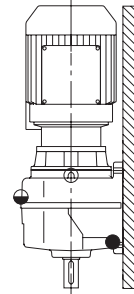
MOUNTING 1 B3



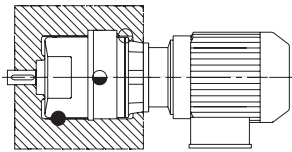
MOUNTING 4 B8



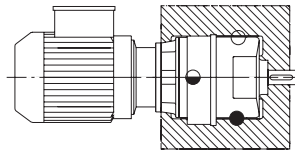
MOUNTING 5 V5



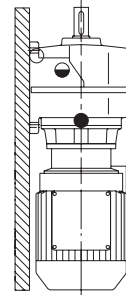
MOUNTING 3 B6



MOUNTING 2 B7

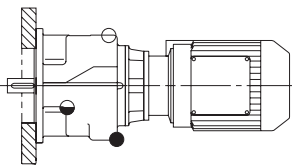


MOUNTING 6 V6

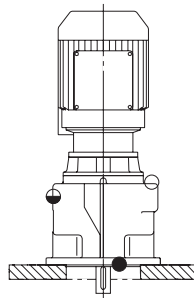


MOTOR MUST BE FITTED WITH SEAL FOR THIS POSITION

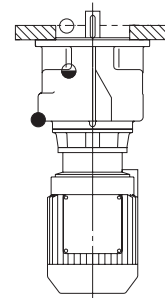
MOUNTING 7 B5



MOUNTING 8 V1



MOUNTING 9 V3



MOTOR MUST BE FITTED WITH SEAL FOR THIS POSITION

PLUG POSITIONS APPLY FOR SIZES M06 AND LARGER

- DRAIN POSITION
- LEVEL POSITION
- VENTILATOR/FILLING POSITION

MOUNTING POSITIONS - SHOWN AS MOTORISED - APPLIES ALSO FOR REDUCERS

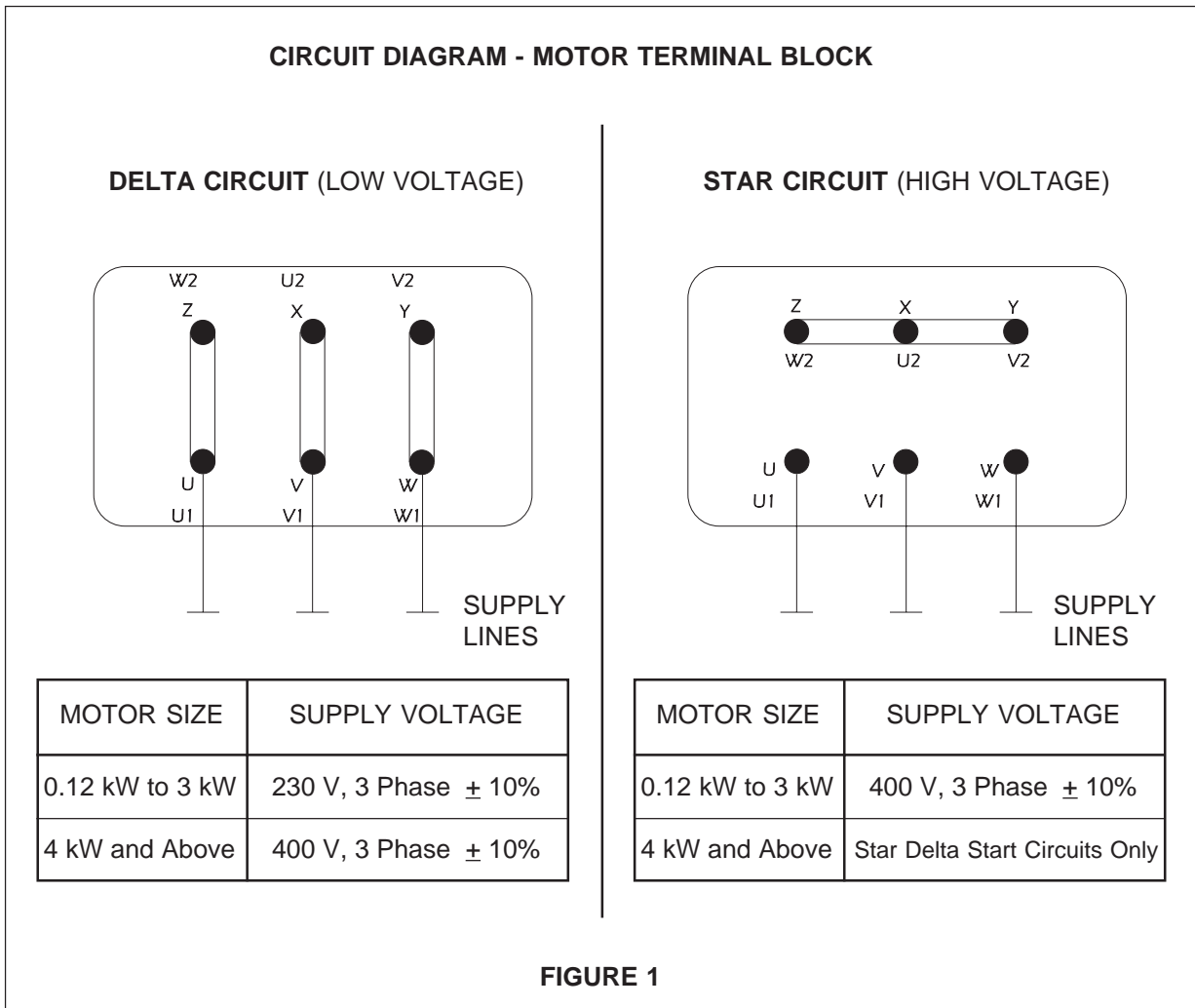
THREE PHASE INDUCTION MOTOR INSTALLATION

CONNECTION TO MAINS POWER SUPPLY

- Connection of the electric motor to the mains supply should be done by a qualified person.
- Connect motor terminals in accordance with the diagram inside the terminal box cover. (Also identified in Fig. 1 on this sheet).

Note: It is important that the mains supply details are checked against the nameplate data and that they are connected as indicated on the nameplate. The correct sizing of the cables to electrical regulations is essential.

- To change the direction of rotation of the electric motor, one of the three main line terminals should be changed with the other.
- Connect the earth conductors to the marked earth terminals.



NOTE: This instruction only applies to David Brown Radicon plated motors. Motors fitted by the customer or requested by the customer of David Brown Radicon from a different manufacturer will have separate documentation provided with it.

MAINTENANCE (BRAKE)

To maintain safety and efficient brake action, regular brake inspections are essential. Generally, a three monthly interval is adequate.

NOTE: More frequent inspections should be made for arduous applications (particularly cranes, hoists, lifts or high inertia drives).

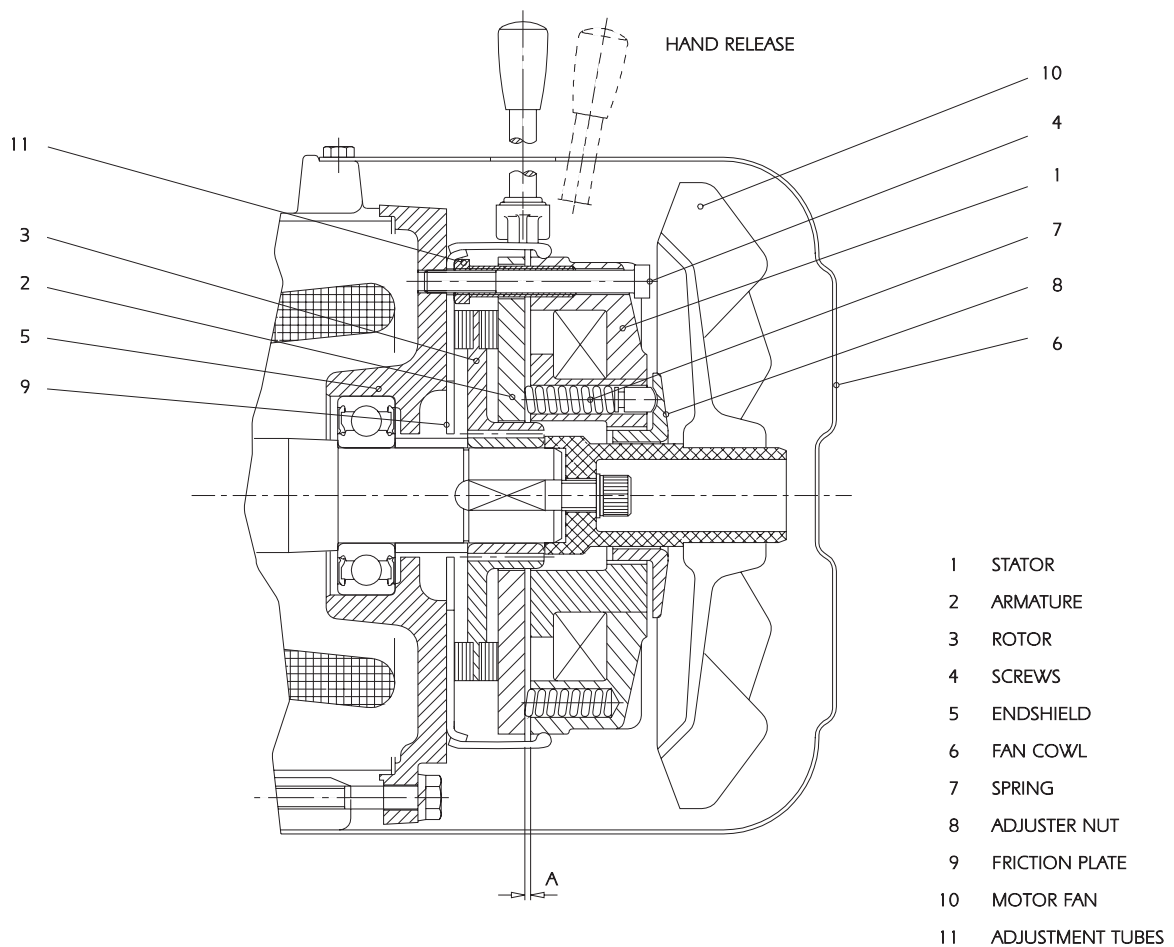


FIGURE 5

CHECKS AND ADJUSTMENTS (Fig 5)

NOTE: To access the brake for inspection remove fan cowl (6), any adjustment may require the removal of the motor fan (10) also.

- 1 Check the brake is free of oil, grease and excess dust.
- 2 Check the maximum air gap 'A' (Fig 5), this must not be exceeded. Use a feeler gauge and check in three positions, ensuring the gap is even (see table 1).

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Where adjustment is needed, slacken screws (4) and reset the gap by turning adjustment tubes (11). Re-tighten screws (4) to the correct torques in table 1.

- 3 At the same time as 2, check that the rotor (3) has not worn below the minimum thickness (see table 1)
- 4 If the brake is fitted with a hand release, check the hand release air gap 'U' (Fig 6, and table 1). This is a minimum figure, do not allow smaller settings. To reset this gap tighten the hexagonal hand release nuts (15).

TORQUE ADJUSTMENT

The brake is supplied with nominal torque (table 1) set at the factory. This torque can be reduced by unscrewing the torque nut (8) (Fig 5) using a 'C' spanner to approximately 60% of nominal torque. Torque reduction steps identified in table 1.

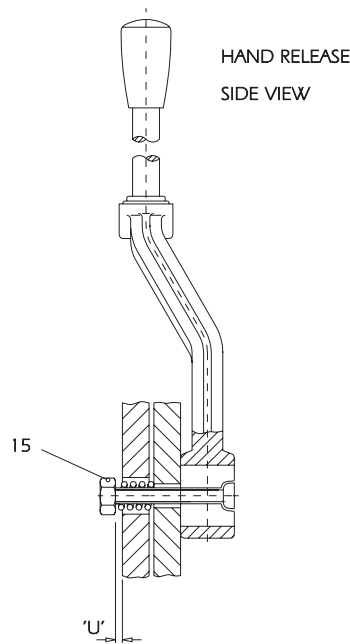


FIGURE 6

TABLE 1

MOTOR FRAME SIZE		63	71	80	90	100/112	132
BRAKE SIZE		06	06	08	10	12	14
BRAKE TORQUE	Nm	2.85	4	8	16	32	60
A	mm	0.2	0.2	0.2	0.2	0.3	0.3
A max	mm	0.5	0.5	0.5	0.5	0.75	0.8
ROTOR BRAKE DISC MIN THICKNESS	mm	4.3	4.3	5.3	7.3	6	6.6
HAND RELEASE CLEARANCE 'U'	mm	1	1	1	1	1	1
BRAKE TORQUE REDUCTION/STEP	Nm	0.2	0.2	0.4	0.6	1.2	1.6
ASSEMBLY KIT BOLTS TIGHTENING TORQUE	Nm	3	3	6	10	10	25

SUPPLIER	LUBRICANT RANGE	ALLOWABLE OPERATING TEMPERATURE RANGE °C	
		ABOVE	TO
BP Oil International Limited	Energrease LS-EP	-30	130
Caltex	Multifak EP	0	120
Castrol International	LMX Grease	-40	150
	Spheerol AP	-30	110
	Spheerol EPL	-10	120
Klüber Lubrication	Klüberlub BE 41-542	-20	140
Mobil Oil Company Limited	Mobilgrease XHP	-15	150
	Mobilith SHC	-20	180
Omega Manufacturing Division	Omega 85	-40	230
Optimol Ölwerke GmbH	Longtime PD	-45	140
Shell Oils	Albida RL	-20	150
	Alvania EP B	-20	120
	Nerita HV	-30	130
Texaco Limited	Multifak All Purpose EP	-30	140

Notes:

- 1) All the above greases are NLGI grade 2.
- 2) Refer to David Brown Radicon Application Engineers if the unit is operating in an ambient temperature outside the range of -30°C to 50°C.

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SHAFT ALIGNMENT

Errors of alignment fall into categories of angularity (see figure 1) and eccentricity (see figure 2), or a combination of both.

Errors of angularity should be checked for and corrected before errors of eccentricity

Alignment in accordance with the following procedure will ensure vibration levels meeting those set out in ISO 10816 Part 1.

Errors of Angularity

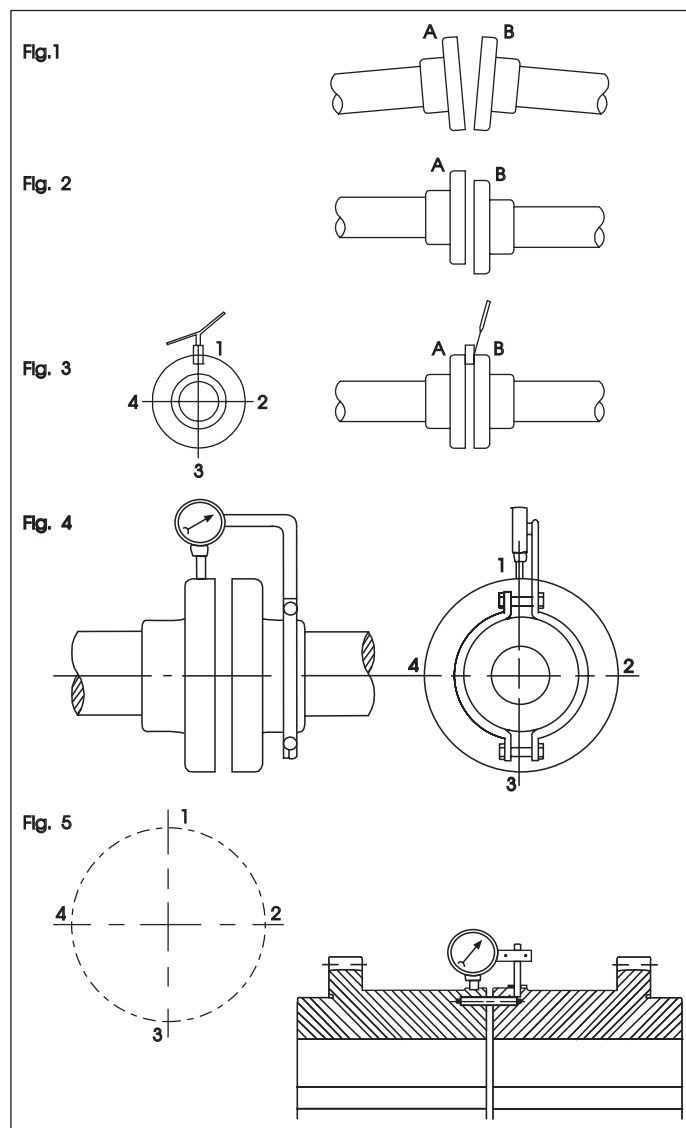
If the faces are perfectly true, the angularity can be checked by keeping both shafts stationary and taking measurements with a block gauge and feelers at the four points 1, 2, 3 and 4 as shown in figure 3. The difference between the readings 1 and 3 will give the error of alignment in the vertical plane, over the length of the shaft equal to the diameter of the coupling flanges, and from this the difference in the relative heights of the feet of the motor or other connected machine can be found by proportion. Similarly the difference between the readings 2 and 4 gives the amount of sideways adjustment necessary to correct any errors of alignment in the horizontal plane.

Generally, however, the coupling faces will not be absolutely true and whilst any errors so found could be allowed for in checking angularity by the stationary method an easier method presents itself. This consists in marking the points 1 on both "A" and "B" and rotating both half couplings, keeping the marked points together. By taking measurements each quarter-revolution the errors in the vertical and horizontal planes are again found.

The permitted angularity error is as follows

TYPE OF COUPLING	ALLOWABLE GAP (G) (mm)
Flexible coupling with rubber elements or Double engagement gear type couplings	$G = 0.002 D$
Single engagement gear type coupling	$G = 0.001 D$
Rigid coupling	$G = 0.0005 D$

NOTE: D is the diameter (mm) at which the gap is measured.



NOTE: Check the alignment after running the unit until it has attained its normal working temperature. Any discrepancies can then be rectified.

Errors of Eccentricity

The procedure for measuring eccentricity is precisely analogous to that used for angularity. In this case, however, the measurements are taken in a radial direction and the most convenient and accurate means of doing this utilises a dial indicator suitably clamped to one half coupling, and bearing on the hub or flange of the other, as shown in figures 4 and 5 on page A..15.

Care must, however, be taken to ensure the support for the dial indicator is sufficiently rigid to prevent the weight of the indicator from causing deflection and, in consequence, inaccurate readings.

Extra care should be taken where taper roller bearings are fitted to ensure that alignment is checked with shafts in mid-point position and a final check made with the unit at operating temperature.

The permitted eccentricity error which can be accommodated in addition to that of the angularity error is as follows :-

TYPE OF COUPLING	UNIT SIZE	ALLOWABLE ECCENTRICITY (mm)
Flexible or rubber element	M03 & M04	0.075
	M06 & M07	0.100
	M08, M09 & M10	0.125
	M13 & M14	0.150
Gear type	M03, M04	0.050
	M06, M07 & M08	
	M09 & M10	0.075
	M13 & M14	0.100
Rigid	M03, M04	0.025
	M06, M07 & M08	
	M09 & M10	0.035
	M13 & M14	0.050

SPECIAL NOTE CONCERNING RIGID COUPLINGS

In lining up elements involving rigid couplings it is important that no attempt is made to correct errors of alignment or eccentricity greater than those above by tightening of the coupling bolts (This applies when the system is cold or at operating temperature). The result is mis-alignment and the setting up of undue stresses in the shaft, coupling and bearings. This will be revealed by the springing apart of the coupling faces if the bolts are slackened off. A check on the angularity of a pre-assembled job, after bolting down, can be obtained in the case of rigid couplings by slackening off the coupling bolts, when any mis-alignment will cause the coupling faces to spring apart. This check may not, however, reveal any strains due to eccentricity owing to the constant restraint imposed by the spigot.

SERIES X COUPLINGS

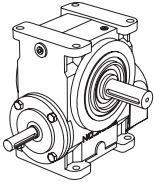
David Brown Radicon Limited, produce standard flexible couplings to cover the complete range of Radicon units as follows:

- NYLICON** couplings, type 600 designed for fractional and small power drives up to a maximum torque of 465 Nm.
- CONE RING** couplings, type 611, 612, 613 and 614 designed for medium or heavy duty use. They are of the pin and bush type with bore sizes from 19 to 170 mm diameter.
- GEAR TYPE** couplings, types 621, 622 and 623 of single and double engagement types covering flange and sleeve designs. Hardened hubs are profile ground, fully crowned and chamfered. External dimensions are metric.
- RIGID TYPE** couplings, type 629 with bore sizes up to 280 mm diameter.

ALL PRODUCTS IN THE RADICON RANGE

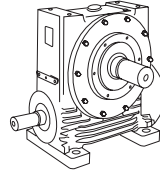
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SERIES A - JUNIOR



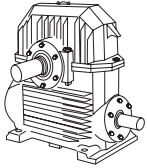
Power capacity to 11 kW
Output torque capacity to 1,000 Nm
Sizes 280, 410, 510, 610, 730 and 860
Foot, flange and shaft mounting

SERIES A - MID RANGE



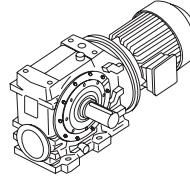
Power capacity to 140 kW
Output torque capacity to 10,000 Nm
Sizes 1002, 1252, 1602 and 2002
Foot, flange and shaft mounting

SERIES A - HEAVY DUTY



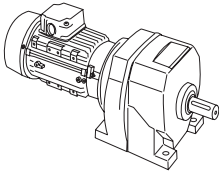
Power capacity to 835 kW
Output torque capacity to 100,000 Nm
Sizes 10, 12, 14, 17, 20 and 24
Foot, flange and shaft mounting

SERIES C



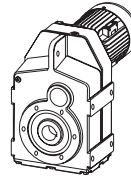
Power capacity to 45 kW
Output torque capacity to 10,000 Nm
Sizes 03, 04, 05, 06, 07, 08, 09 and 10
Foot, flange and shaft mounting

SERIES M



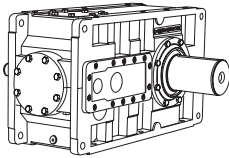
Power capacity to 90 kW
Output torque capacity to 11,000 Nm
Sizes 03, 04, 06, 07, 08, 09, 10, 13 and 14
Foot and flange mounting

SERIES F



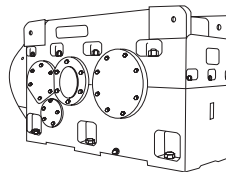
Power capacity to 45 kW
Output torque capacity to 7,200 Nm
Sizes 04, 06, 07, 08, 09 and 10
Foot, flange and shaft mounting

SERIES G



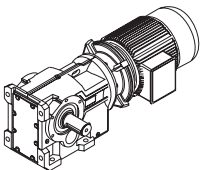
Power capacity to 1200 kW
Output torque capacity to 80,000 Nm
Sizes 14, 15, 16, 17, 18 and 19
Double, triple and quadruple parallel shafts
Triple and quadruple right angle shafts
Foot, flange and shaft mounting

SERIES H



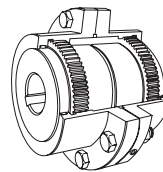
Power capacity to 8300 kW
Output torque capacity to 128,000 Nm
Sizes 140, 160, 180, 200, 225, 250, 280,
315, 355, 400 and 450
Single, double and triple parallel and
right angle shaft
Foot and shaft mounting

SERIES K



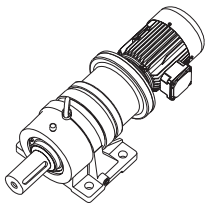
Power capacity to 90 kW
Output torque capacity to 12,300 Nm
Sizes 08, 09, 10 and 12
Foot, flange and shaft mounting

SERIES X



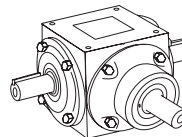
Nylicon low cost couplings to
55 mm dia. bore
610 Series Cone-Ring type to
355 mm dia. bore
620 Series Gear type to
540 mm dia. bore
Sadiguard Torque limiters for overload
protection, to 115 mm dia. bore

SERIES Q



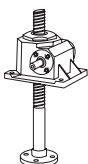
Power capacity to 45 kW
Output torque capacity to 12,300 Nm
Sizes 07, 08, 09, 10 and 13
Foot mounting

SERIES R



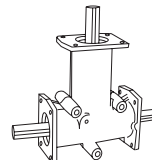
Power capacity to 265 kW
Output torque capacity to 1,265 Nm
Sizes 120, 160, 200, 260 and 350
Output shaft and shaft mounting

SERIES S



Load capacity to 100 tonnes
Sizes 0.5, 1, 2.5, 5, 10, 25, 50 and 100

SERIES T



Power capacity to 15 kW
Output torque capacity to 132 Nm
Sizes 1, 2, 3, 4 and 5