

INSTALLATION & MAINTENANCE

SERIES F

 **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:

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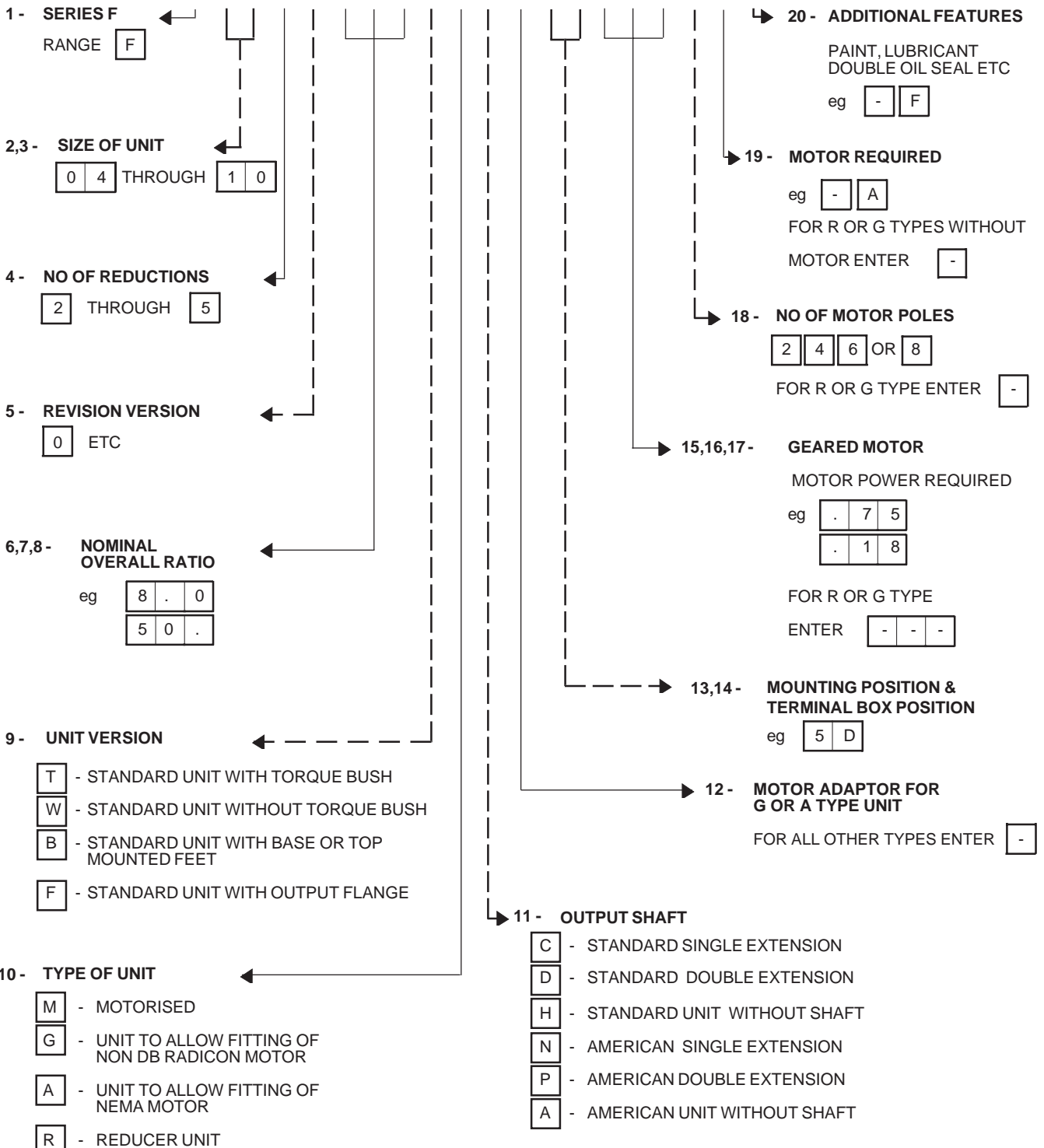
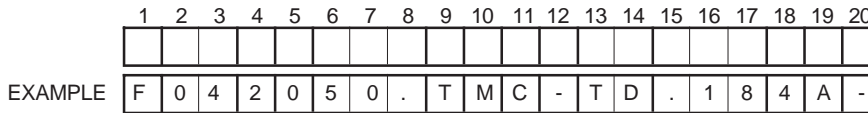
1 UNIT IDENTIFICATION

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

- Unit Type
- Order Number

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 OIL GRADE	<input type="text"/> *

* See Appendix 2



2 GENERAL INFORMATION

The following instructions will help you achieve a satisfactory installation of your David Brown Radicon Series F 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
F0420 / F0430	M5 x 12.5 mm deep	M10 x 22 mm deep
F0620	M6 x 16 mm deep	M16 x 36 mm deep
F0630	M5 x 12.5 mm deep	
F0720	M8 x 19 mm deep	M16 x 36 mm deep
F0730	M6 x 16 mm deep	
F0820	M10 x 22 mm deep	M20 x 42 mm deep
F0830	M8 x 19 mm deep	
F0920	M12 x 28 mm deep	M20 x 42 mm Deep
F0930	M10 x 22 mm deep	
F1020	M16 x 27 mm deep	
F1030	M12 x 28 mm deep	

4 WEATHER PROTECTION OF UNIT

All Series F 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 F04, 06 and 07 are supplied factory filled with correct amount of lubricant for mounting position quoted (Factory fill - David Brown Type E).
- Sizes F08, 09 and 10 will be oil filled by client.
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.

NOTE: It is important that the same oil is used as is already in the unit.

If an oil other than that in the unit is to be used the unit should be drained and flushed with the oil to be used and filled with the correct quantity.

5.2 GEAR HEADS

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 F04, 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
M10	50 Nm
M12	85 Nm
M16	200 Nm
M20	350 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

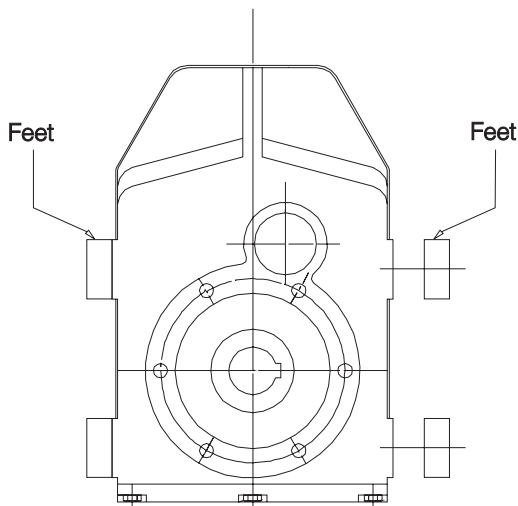
The following procedure is recommended for all foot mounted units.

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 FITTING FEET ON UNITS

Series F units are fitted with detachable feet. These are normally factory fitted to clients specification, but if for any reason the feet are supplied separately, or dismantling is necessary after supply, they should be re-fitted and torque tightened to the following settings.



ALL SIZES

- Scrape any paint etc off foot location faces on casing.
- Clean feet and case fixing faces with Lowtox or Loctite 7061.
- Fit feet with setscrews to torques:

Unit Size	Bolt Size	Torque
F04	M10	50 Nm
F06	M12	85 Nm
F07, F08, F09	M16	200 Nm
F10	M20	350 Nm

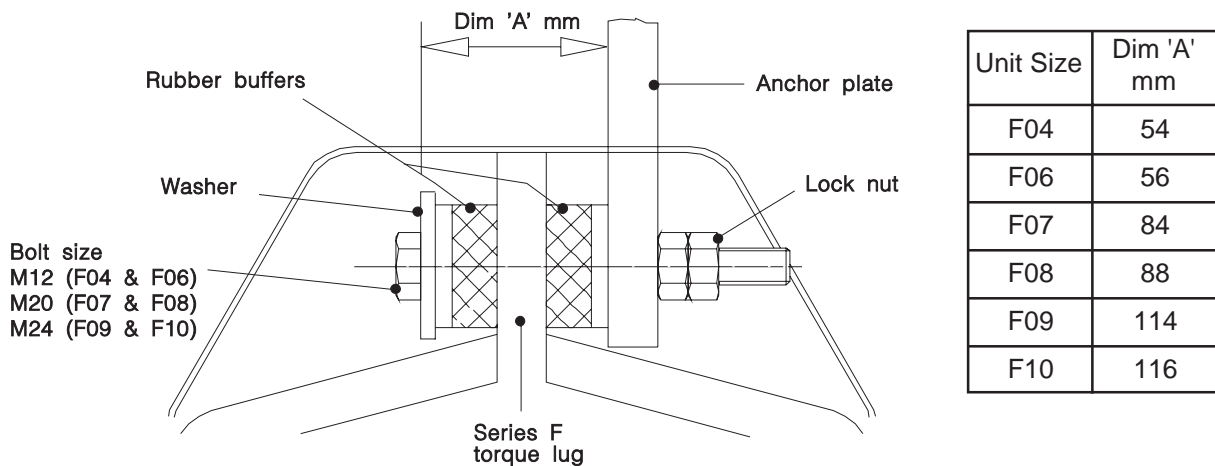
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5.7 SHAFT MOUNTED UNITS

The following procedure is recommended for all shaft and foot/shaft mounted units.

- a) Clean shaft extensions, bore and ventilator when fitted.
- b) Locate in position, using the most convenient method available see Appendix 7, ensuring it is as close as possible to the bearing on the driven machine.
- c) Secure unit onto the shaft using chosen method from Appendix 7.
- d) Fit torque bush as detailed below.

Note: Unless specified otherwise, the torque bush will be supplied loose.



- Notes
- 1) Tighten bolt to give Dim 'A' this will pre compress the rubber buffers
 - 2) David Brown torque arm kit comprises two rubber buffers. The customer must supply other components shown.

- e) Anchor case to a secure point by means of the torque bush.
- 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.

5.8 REPLACEMENT OF OIL SEALS

- a. Clean and drain the unit.
- b. If the unit has an output shaft then remove any equipment from the outputshaft such as couplings and remove the output key. If the unit is Shaft Mounted then remove the unit from the shaft.
- 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 housing.
- f. Fill with the correct amount of approved lubricant, see Appendix 2

6 LUBRICATION AND MAINTENANCE

6.1 LUBRICATION

- Unit sizes F04, 06 and 07 are factory filled with mineral oil David Brown type E.
- Unit sizes F08, 09 and 10 will be oil filled by client. (See Appendix 2).

6.2 PERIODIC INSPECTION

- Check oil level weekly and if necessary top up with the recommended grade of lubricant.
- Add two shots of grease monthly to units having grease lubricated bearings.

6.3 OIL CHANGES

On all 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	17000 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
80	12000 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
85	8500 HOURS OR 3 YEARS	21000 HOURS OR 3 YEARS
90	6000 HOURS OR 2 YEARS	15000 HOURS OR 3 YEARS
95	4200 HOURS OR 17 MONTHS	10500 HOURS OR 3 YEARS
100	3000 HOURS OR 12 MONTHS	7500 HOURS OR 2 1/2 YEARS
105	2100 HOURS OR 8 MONTHS	6200 HOURS OR 2 YEARS
110	1500 HOURS OR 6 MONTHS	5200 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

Tables 2 and 3 Appendix 2 give 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 F 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.

MOTOR FLANGE	MOTOR FRAME	F0420 F0430/F0630		F0620/0730		F0720/F0830	
		C (B14)	D (B5)	C (B14)	D (B5)	C (B14)	D (B5)
63		N/A	A				
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

	F0820, F09 & F10
ALL MOTOR FRAME SIZES	G

SERIES M MOTOR ADAPTORS	SERIES F GEARHEAD
M04	F04
M06	F06
M07	F07
M08	F08
M09	F09
M10	F10

- 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:
(Re Sizes
F04 to F07)

- 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.

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, David Brown Grade 6E, is suitable for operation in ambient temperatures of 0° to 30°C, outside of this consult Tables 2 and 3 or David Brown Radicon Application Engineers.

Oil quantities are only approximate and units should be filled until oil escapes from the level plug hole. Do not overfill as excess will cause overheating and leakage.

TABLE 1 LUBRICANT QUANTITY (Litres)

DOUBLE AND TRIPLE REDUCTION													
Unit Size		F0420	F0430	F0620	F0630	F0720	F0730	F0820	F0830	F0920	F0930	F1020	F1030
DAVID BROWN MOUNTING POSITION	1	1.7	2.0	4.7	4.8	8.0	8.2	10.9	10.9	19.0	18.0	34.0	34.0
	2	1.0	1.2	2.5	3.4	4.2	5.6	8.6	8.7	13.0	14.5	22.0	23.0
	3	1.4	1.8	3.9	4.7	7.0	7.7	10.0	9.4	17.0	16.0	28.0	28.0
	4	1.1	1.3	2.5	2.7	4.4	4.8	9.4	9.0	15.0	16.0	26.5	27.5
	5	1.8	2.6	3.9	6.5	7.0	11.9	14.0	14.0	24.0	24.0	43.0	43.0
	6	2.1	2.6	5.0	5.8	8.8	10.9	15.3	15.3	25.0	25.0	43.0	43.0

QUADRUPLE AND QUINTUPLE REDUCTION													
Unit Size	F0640		F0650		F0740		F0750		F0840		F0850		
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	
	M0420	F0620	M0430	F0620	M0420	F0720	M0430	F0720	M0620	F0820	M0420	F0830	
DAVID BROWN MOUNTING POSITION	1	0.6	4.7	0.9	4.7	0.6	8.0	0.9	8.0	1.7	10.9	0.6	10.9
	2	0.6	2.5	0.9	2.5	0.6	4.2	0.9	4.2	1.7	8.6	0.6	8.7
	3	0.6	3.9	0.9	3.9	0.6	7.0	0.9	7.0	1.7	10.0	0.6	9.4
	4	0.6	2.5	0.9	2.5	0.6	4.4	0.9	4.4	1.7	9.4	0.6	9.0
	5	1.4	3.9	2.1	3.9	1.4	7.0	2.1	7.0	3.1	14.0	1.4	14.0
	6	1.6	5.0	2.1	5.0	1.6	8.8	2.1	8.8	3.6	15.3	1.6	15.3

QUADRUPLE AND QUINTUPLE REDUCTION									
Unit Size	F0940		F0950		F1040		F1050		
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	
	M0720	F0920	M0420	F0930	M0820	F1020	M0420	F1030	
DAVID BROWN MOUNTING POSITION	1	2.8	19.0	0.6	18.0	4.6	34.0	0.6	34.0
	2	2.8	13.0	0.6	14.5	4.6	22.0	0.6	23.0
	3	2.8	17.0	0.6	16.0	4.6	28.0	0.6	28.0
	4	2.8	15.0	0.6	16.0	4.6	26.5	0.6	27.5
	5	6.3	24.0	1.4	24.0	9.5	43.0	1.4	43.0
	6	6.8	25.0	1.6	25.0	10.5	43.0	1.6	43.0

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TABLE 2 MINERAL OILS**Type E** - Mineral oils containing industrial EP additives. These have a high load carrying capacity

SUPPLIER	LUBRICANT RANGE	DAVID BROWN GRADE NUMBERS	
		6E	7E
		AMBIENT TEMPERATURE RANGE °C	
		0 to 30	20 to 50
Ampol Limited	Gearlube SP	SP320 (-1)	SP460 (-1)
Batoyle Freedom Group	Remus	320 (-2)	460 (-2)
Boxer Services Limited	Indus	320 (-10)	460 (-10)
BP Oil International Limited	Energol GR-XF	320 (-13)	460 (-1)
	Energol GR-XP	320 (-10)	460 (-7)
Caltex	Meropa	320 (-4)	460 (-4)
	RPM Borate EP Lubricant	320 (-4)	460 (-7)
Carl Bechem GmbH	Berugear GS BM	320 (-13)	460 (-10)
	Staroil G	320 (-13)	460 (-10)
Castrol International	Alpha Max	320 (-13)	460 (-10)
	Alpha SP	320 (-16)	460 (-1)
Chevron Lubricants	Gear Compound EP (USA version)	320 (-13)	460 (-10)
	Gear Compound EP (Eastern ver)	320 (-13)	460 (-13)
	Ultra Gear	320 (-7)	460 (-7)
Eko-Elda (Greece)	Gearlub	320 (-10)	460 (-1)
Engen Petroleum Limited	Gengear	320 (-10)	460 (-1)
Esso	Spartan EP	320 (-13)	460 (-7)
Esso/Exxon	Spartan EP	320 (-12)	460 (-4)
Fina	Giran	320 (-10)	460 (-10)
Fuchs Lubricants (UK) Plc	Powergear	P/Gear (-16)	M460 (-4)
	Renogear V	320EP (-4)	460EP (-4)
	Renogear WE	320 (-4)	400 (-4)
Fuchs Mineraloelwerke GmbH	Renolin CLPF Super	8 (-10)	10 (-10)
Klüber Lubrication	Klüberoil GEM1	320 (-5)	460 (-5)
Kuwait Petroleum International	Q8 Goya	320 (-13)	460 (-10)
Lubrication Engineers Inc	Almasol Vari-Purpose Gear	605 (-13)	608 (-10)
Mobil Oil Company Limited	Mobil gear 600 Series	632 (-13)	634 (-1)
	Mobil gear XMP	320 (-13)	460 (-7)
Omega Manufacturing Division	Omega 690	85w/140 (-15)	
Optimol Ölwerke GmbH	Optigear BM	320 (-10)	460 (-7)
	Optigear	320 (-9)	460 (-7)
Pertamina (Indonesia)	Masri	320 (-4)	460 (-4)
Petro-Canada	Ultima EP	320 (-16)	460 (-10)
Petromin Lubricating Oil Co.	Gear Lube EP	EP320 (0)	EP460 (0)
Rocol	Sapphire Hi-Torque	320 (-13)	460 (-13)
Sasol Oil (Pty) Limited	Cobalt	320 (-1)	460 (-4)
	Hemat	320 (-7)	460 (-4)
Shell Oils	Omala	320 (-4)	460 (-4)
	Omala F	320 (-10)	460 (-4)
Texaco Limited	Meropa	320 (-16)	460 (-10)
Total	Carter EP	320 (-7)	460 (-4)
Tribol GmbH	Molub-Alloy Gear Oil	690 (-16)	140 (-13)
	Tribol 1100	320 (-18)	460 (-16)

DANGER

Numbers in brackets indicate recommended minimum operating temperature in °C.

THE UNIT MUST NOT RUN BELOW THIS TEMPERATURE.

TABLE 3 SYNTHETIC OILS

Type H - Polyalphaolefin based synthetic lubricants with Anti-Wear or EP additives.
These have a medium to high load carrying capacity.

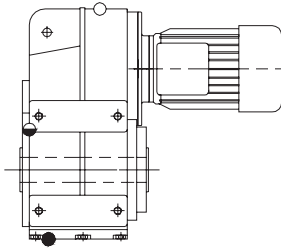
SUPPLIER	LUBRICANT RANGE	DAVID BROWN GRADE NUMBERS		
		5H	6H	7H
		AMBIENT TEMPERATURE RANGE °C		
		-30 to 10	-10 to 30	20 to 50
Batoyle Freedom Group	Titan	220 (-31)	320 (-28)	
Boxer Services Limited	Silkgear	220 (-35)	320 (-35)	460 (-35)
BP Oil International Limited	Enersyn EPX		320 (-28)	
Caltex	Pinnacle EP	220 (-43)	320 (-43)	460 (-37)
Carl Bechem GmbH	Berusynth 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 Lubricants	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	Klübersynth 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)

DANGER

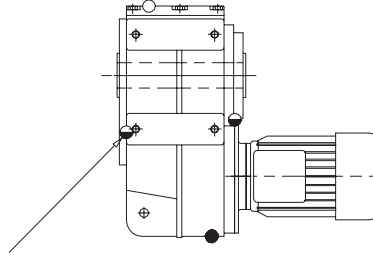
Numbers in brackets indicate recommended minimum operating temperature in °C.
THE UNIT MUST NOT RUN BELOW THIS TEMPERATURE.

9704

MOUNTING 1

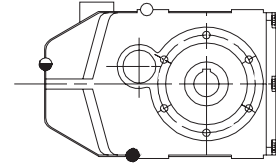


MOUNTING 2

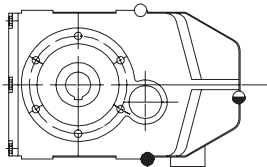


FILL TO PLUG AT THIS SIDE OF CASE FOR F08, F09 AND F10 UNITS

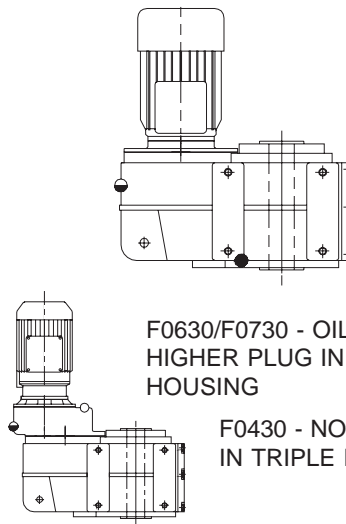
MOUNTING 3



MOUNTING 4



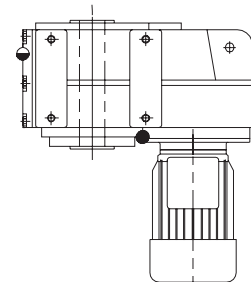
MOUNTING 5



F0630/F0730 - OIL LEVELS TO HIGHER PLUG IN TRIPLE HOUSING

F0430 - NO OIL PLUGS IN TRIPLE HOUSING

MOUNTING 6



MOTOR MUST BE FITTED WITH SEAL FOR THIS POSITION

- DRAIN POSITION
- ◐ LEVEL POSITION
- VENTILATOR/FILLING POSITION

MOUNTING POSITIONS - SHOWN AS MOTORISED - APPLIES ALSO FOR REDUCERS

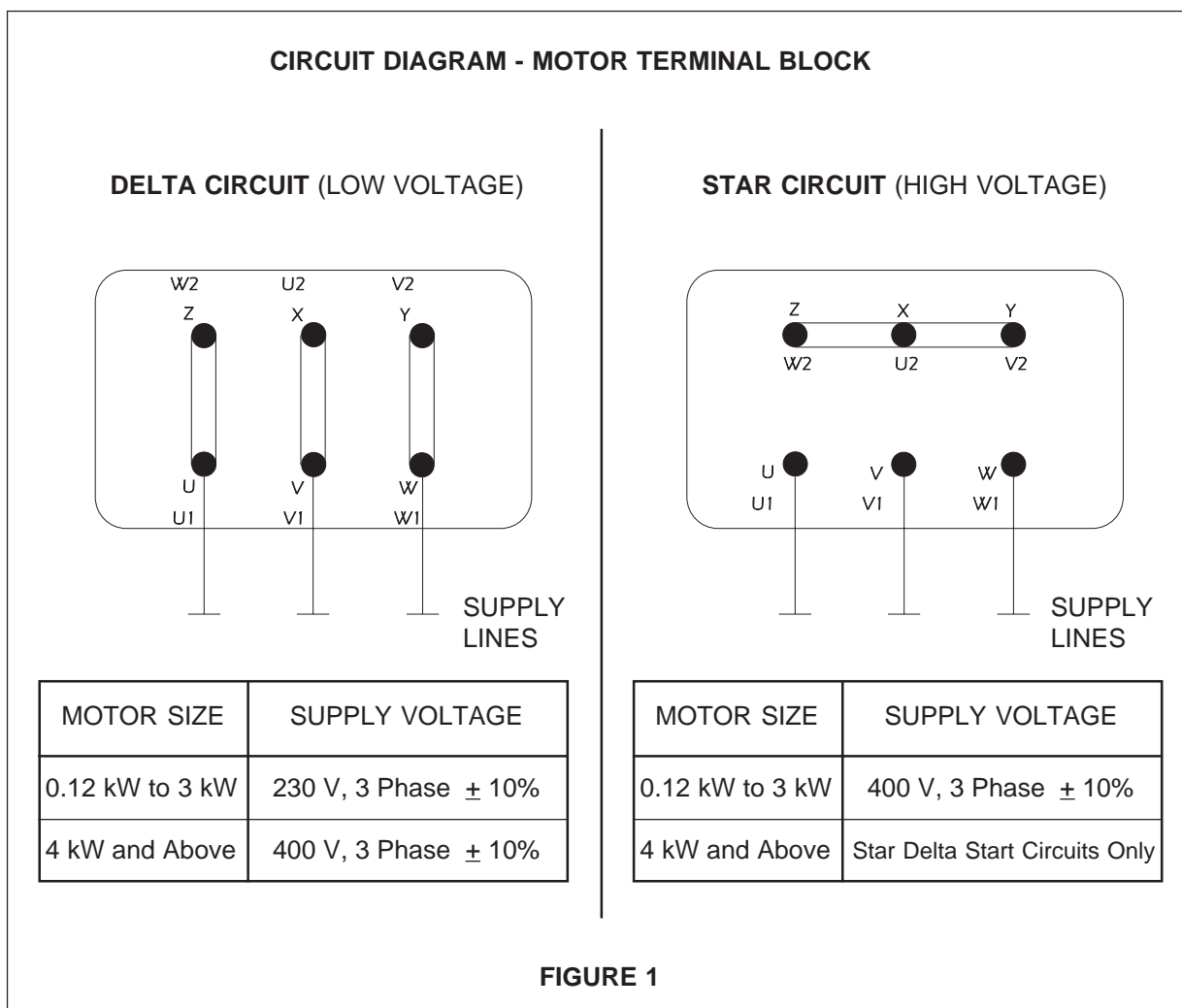
THREE PHASE INDUCTION MOTOR INSTALLATION

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).

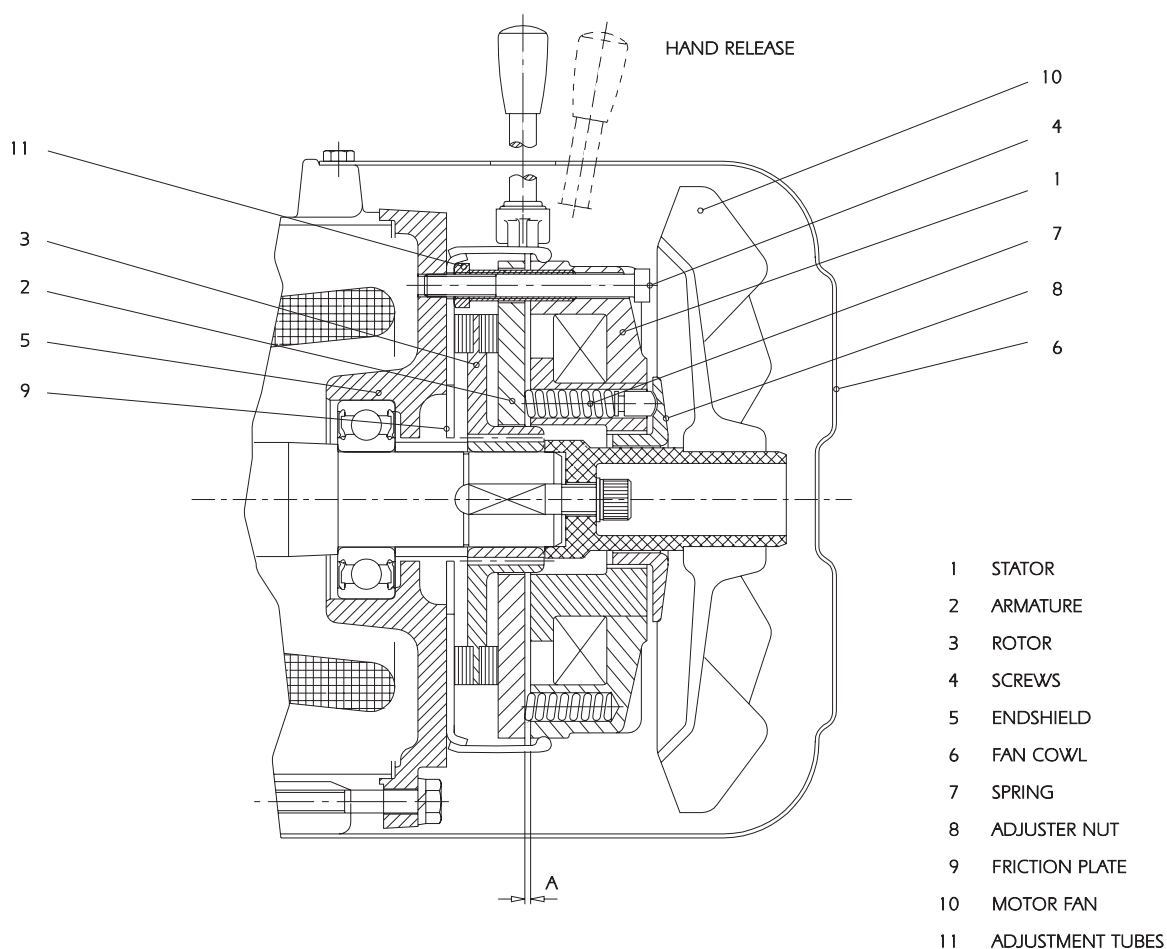


FIGURE 5

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.

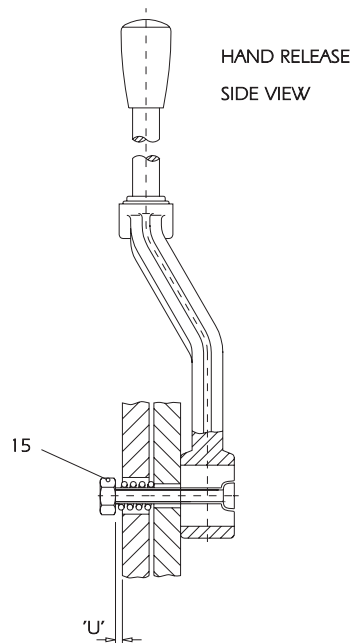


FIGURE 6

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

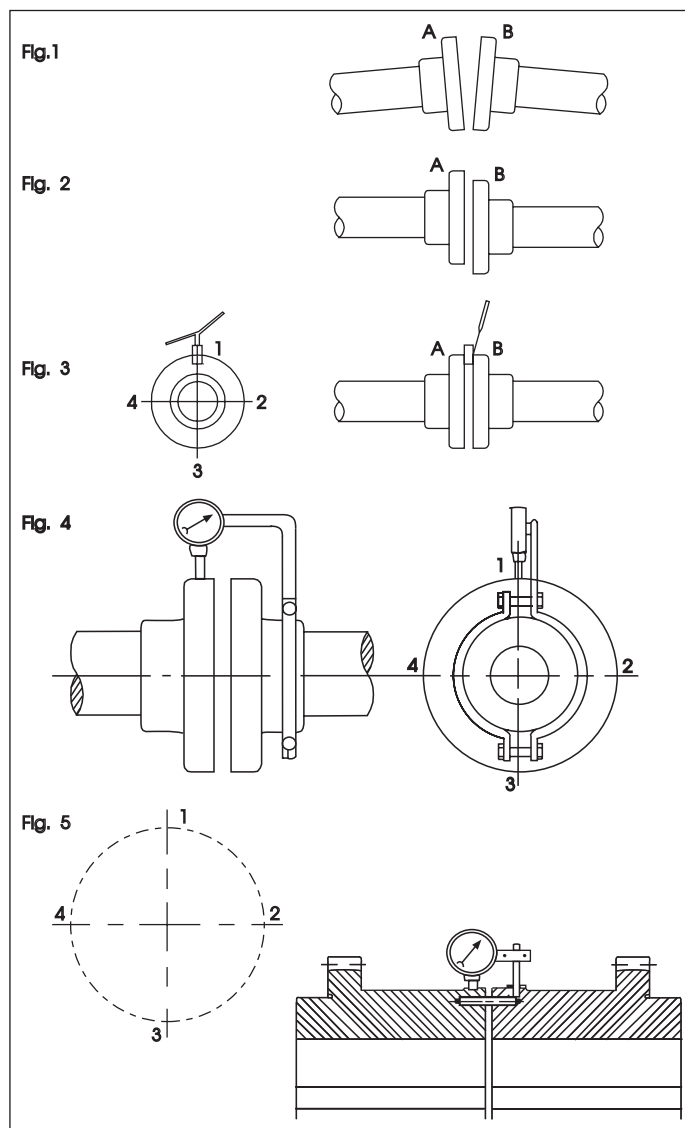
If the faces are perfectly true, the angularity can be checked by keeping both shafts stationary and taking measurements with a block gauge and feelers at the four points 1, 2, 3 and 4 as shown in figure 3. The difference between the readings 1 and 3 will give the error of alignment in the vertical plane, 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 stationery 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 radial direction and the most convenient and accurate means of doing this consists of the use of 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 17.

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	F04 & F06	0.100
	F07, F08, F09 & F10	0.125
Gear type	F04, F06, F07 & F08	0.050
	F09 & F10	0.075
Rigid	F04, F06, F07 & F08	0.025
	F09 & F10	0.035

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

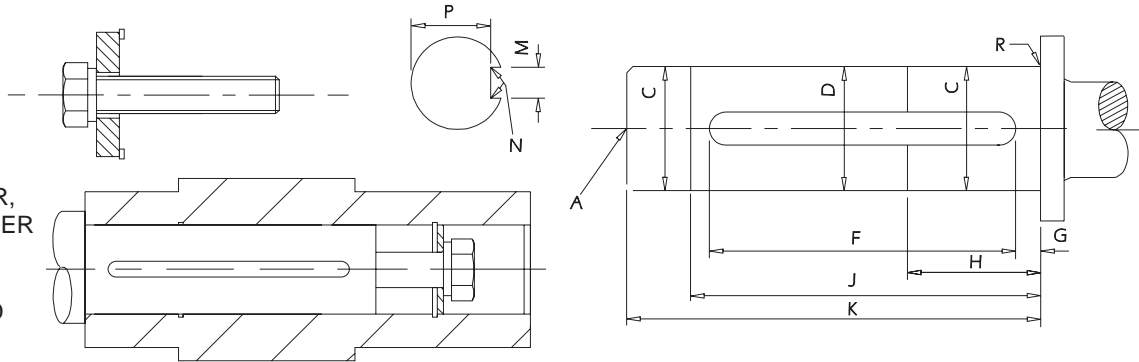
David Brown Radicon Limited, produce standard flexible couplings to cover the complete range of Radicon units as follows:

- 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.

9906

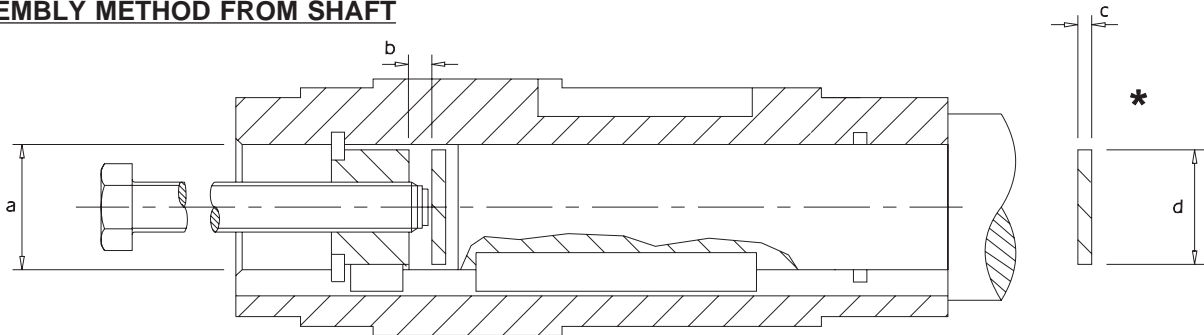
ASSEMBLY ONTO SHAFT - CUSTOMERS SHAFT DETAIL

CIRCLIP, SUPPORT WASHER, SPRING WASHER AND FIXING SCREW ARE SUPPLIED WITH UNIT

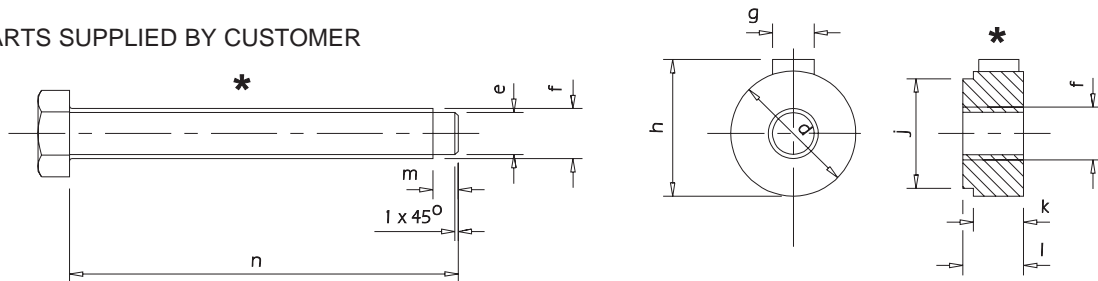


SIZE	A	C	D	F	G	H	J	K	M	N	P	R
F04	M10x 1.5 22 deep	29.993 / 29.980	29.6	79.3 79.0	2	45	84	99	8.000 / 7.964	0.25 0.16R	26.0 25.8	0.8R
F06	M16x 2.0 36 deep	39.991 / 39.975	39.6	93.3 93.0	3	60	106	126	12.000 / 11.957	0.40 0.25R	35.0 34.8	0.8R
F07	M16x 2.0 36 deep	49.991 / 49.975	49.6	101.5 101.0	3	75	128	153	14.000 / 13.957	0.40 0.25R	44.5 44.3	0.8R
F08	M20x 2.5 42 deep	59.990 / 59.971	59.6	148.5 148.0	3	90	143	173	18.000 / 17.957	0.40 0.25R	53.0 52.8	0.8R
F09	M20 x 2.5P 42 deep	69.990 / 69.971	69.6	161.5 161.0	3	105	197	232	20.000 / 19.948	0.6 0.4R	62.5 62.3	0.8R
F10	M20 x 2.5P 42 deep	79.990 / 79.971	79.6	188.5 188.0	5	120	235	275	22.000 / 21.948	0.6 0.4R	71.0 70.8	0.8R

DISASSEMBLY METHOD FROM SHAFT

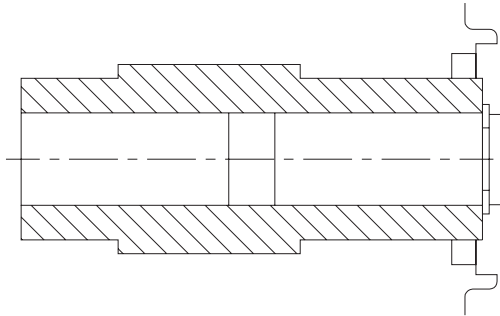


* PARTS SUPPLIED BY CUSTOMER

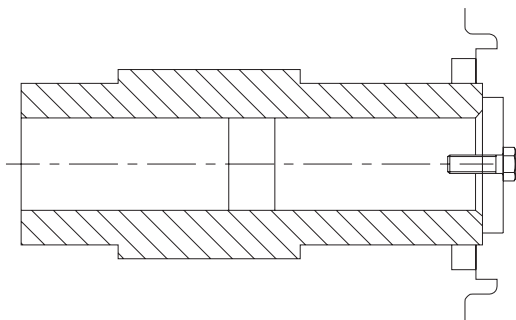


SIZE	a	b	c	d	e	f	g	h	j	k	l	m	n
F04	30	4.00	5	29.9	13	M16 x 1.5	8	33	20.8	15	17	5	120
F06	40	5.35	5	39.9	20	M24 x 1.5	12	43	29.9	20	23	5	154
F07	50	10.10	5	49.9	20	M24 x 1.5	14	53.5	39.0	20	23	5	186
F08	60	5.00	8	59.9	26	M30 x 1.5	18	64	47.4	24	27	5	205
F09	70	6.05	8	69.9	26	M30 x 1.5	20	74.5	56.4	24	27	5	273
F10	80	6.00	8	79.9	26	M30 x 1.5	25	95	75.3	24	27	5	316

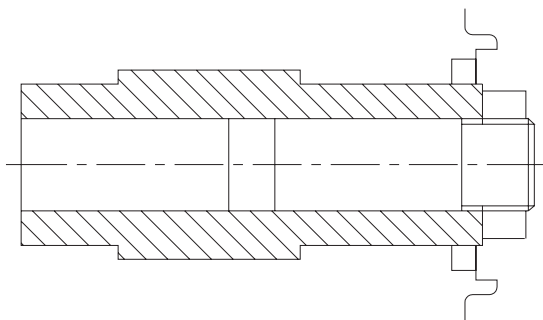
**SHAFT MOUNT UNITS
ALTERNATIVE SHAFT FIXING METHODS**



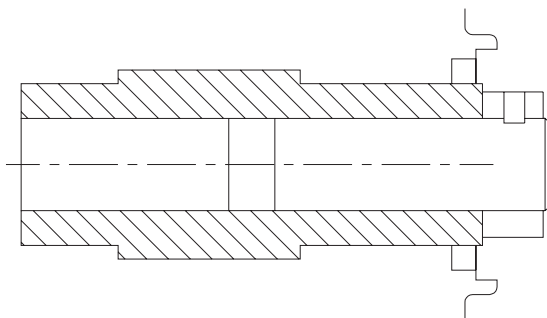
SHAFT MOUNT UNITS RETAINED WITH A
CIRCLIP



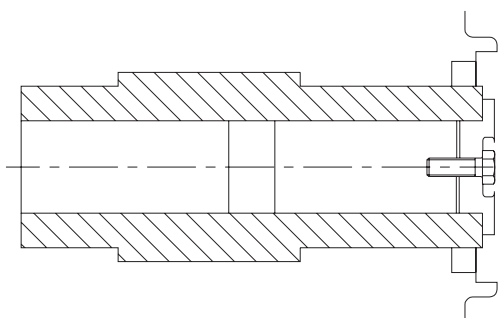
SHAFT MOUNT UNITS RETAINED WITH A
BOLT AND PLATE



SHAFT MOUNT UNITS RETAINED WITH A
LOCKNUT



SHAFT MOUNT UNITS RETAINED WITH A
COLLAR AND GRUBSCREW



SHAFT MOUNT UNITS RETAINED WITH A
RECESSED PLATE AND BOLT

9906

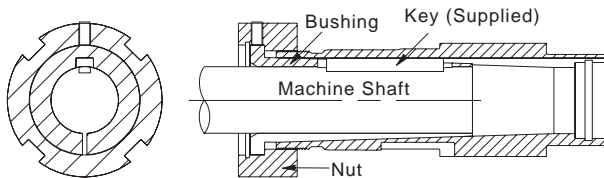
Installation

- 1) Thoroughly clean and degrease, machine shaft, bushing and gear unit tapered bore using Lowtox or Loctite 7061 Superclean.

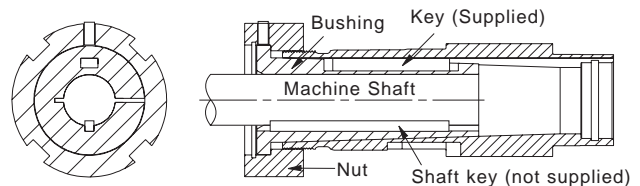
Note: the bushing nut threads are coated with anti seize compound at the factory, this should not be removed (if re-installing previously used nut, re-coat threads with anti-seize compound).

- 2)

Thin walled bushing



Thick walled bushing



Thin walled bushing (keyway slot through bushing wall)

Slide bushing assembly (bush and nut) onto machine shaft, nut end first, position the keyway slot with keyway in machine shaft (the bushing may need to be pried open slightly) insert the drive key supplied with the bushing.

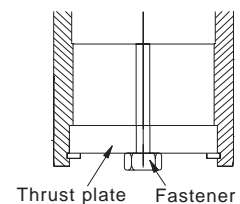
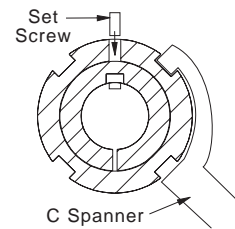
Thick walled bushing (with separate internal and external keyways)

Insert key (not supplied) into machine shaft (if shaft has open ended keyway secure key to prevent axial movement) slide bushing assembly (bush and nut) onto machine shaft, nut end first (the bushing may need to be pried open slightly) insert the drive key supplied with the bushing

- 3) Slide gear unit onto driven shaft and bushing taper taking care that key seats into unit keyway, hand tighten nut, (ensure gear unit is in correct axial location) lock the driven shaft and use 'C' spanner or pipe wrench to tighten bushing nut to torque value listed in table 1 below, Do not overtighten. Secure the bushing nut by locking with setscrew.

Alternative method (only use if torque cannot be measured)

Use wrench to tighten bushing nut gently until the gear unit cannot be moved axially along the shaft by hand, loosen bushing nut but do not dislodge unit from taper, re-tighten bushing nut by hand, lock the driven shaft and use 'C' spanner or pipe wrench to tighten bushing nut as listed in table 1 below, secure the bushing nut by locking with setscrew.



Vertical Application

If the gear unit is mounted vertically below the driven machine, a shouldered machine shaft together with a thrust plate and fastener should be used. Secure bushing nut then torque tighten thrust plate fastener as table 2 below.

Removal

Caution the gear unit must be supported during removal process

- 1) Loosen setscrew on OD of bushing nut
- 2) Use 'C' spanner or pipe wrench to remove bushing nut.

Table 1 'C' Spanner wrench type and bushing nut Tightening Torque

Size	'C' Spanner Size	Bushing Nut Tightening Torque (Nm)	No of turns (only use if torque cannot be measured)
F04 (107)TR	2" - 4 3/4"	115	1/4 turn of nut
F06 (115)TR	2" - 4 3/4"	115	
F07 (203)TR	2" - 4 3/4"	225	
F08 (207)TR	4 1/2" - 6 1/4"	225	1/2 turn of nut
F09 (215)TR	4 1/2" - 6 1/4"	340	
F10 (307)TR	4 1/2" - 6 1/4"	340	

Table 2 Thrust plate fastener data (secure fasteners with Loctite 242)

Size	Fastener Size	Torque (Nm)
F04 (107)TR	M12 x 1.75p	125
F06 (115)TR	M12 x 1.75p	125
F07 (203)TR	M16 x 2p	250
F08 (207)TR	M16 x 2p	250
F09 (215)TR	M20 x 2.5p	725
F10 (307)TR	M24 x 2.5p	1075