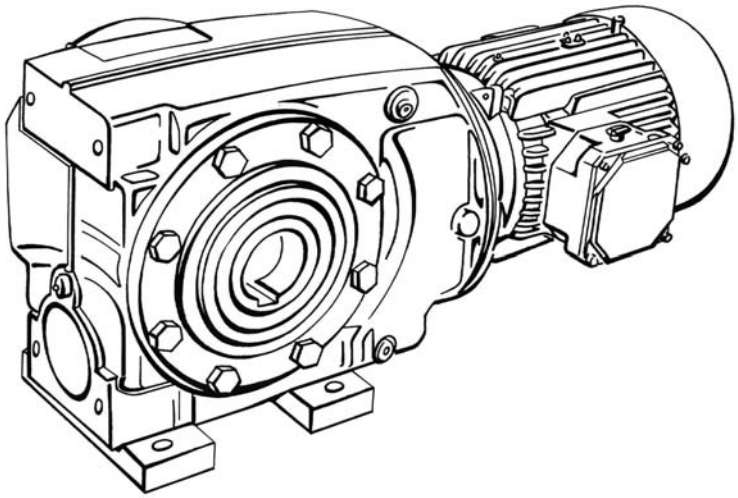
Dokumentation

Serie C



ASC GMBH Antriebe Distribution & Service

Westbahnstrasse 4 | Tel. +43 7223 82660-0 | http://www.asc-antriebe.at | Firmenbuch-Nr. FN 242473 d | ARA-Nr. 14452
A-4470 ENNS | Fax +43 7223 82660-4 | office@asc-antriebe.at | Handelsgericht Linz | UID-Nr. ATU57560400

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 Textron 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.

Textron 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.
   (b) In the event of fire or serious overheating (over 300°C), certain materials (rubber, plastics, etc.) may decompose arid 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.
   (c) If correctly installed and operated the equipment complies to 94/9/EC ATEX 100a as marked on the nameplate. Failure to comply could lead to severe or fatal injury.

2) Guards - Rotating shafts and couplings must 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 manufacturers instructions 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, Textron Power Transmission 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 fumed 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 manufacturers 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 Textron Power Transmission 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 bums. Allow equipment to cool before servicing or performing adjustments.

9) Selection and Design
   (a) Where gear units provide a backstop facility, ensure that back-up systems are provided if failure of the backstop 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 contacting Textron Power Transmission.

Safety warning Symbols

Electrical Hazard
Could result in death or serious injury

Danger
Could result in serious, slight or minor injuries

Danger (Touch Hazard)
Could result in death or serious injury

Damaging Situation
Could result in damage to gear unit or driven machinery

Important notes on Explosion Protection

Cleaning
Periodic cleaning necessary

1. General Information

The following instructions will help you achieve a satisfactory installation of your Textron Power Transmission gear 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.

2. Weather Protection of Unit

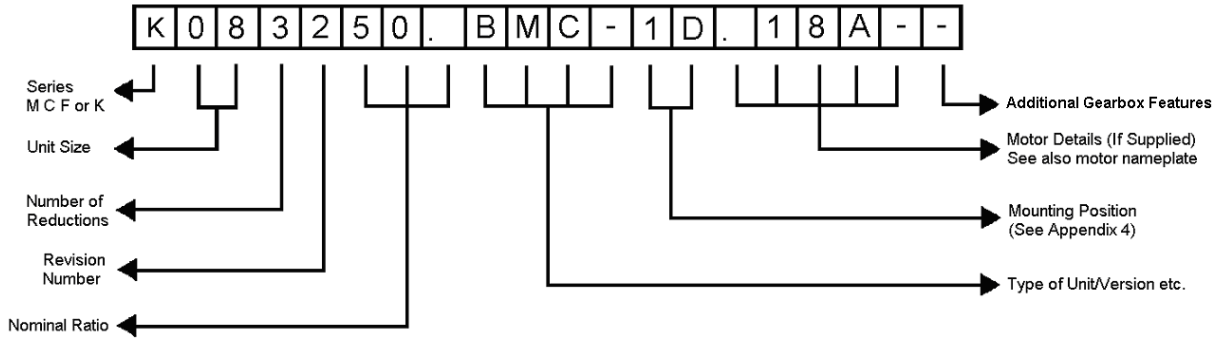
All Series M C F & K units are provided with protection against normal weather conditions. Where units are to operate in extreme conditions, or where they are to stand for long periods without running, eg during plant construction, consult Textron Power Transmission so that arrangements for adequate protection can be made.

3. Reading the Nameplate

Unit Identification

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

- Unit type (Model No)
- Order Number / Year of Manufacture



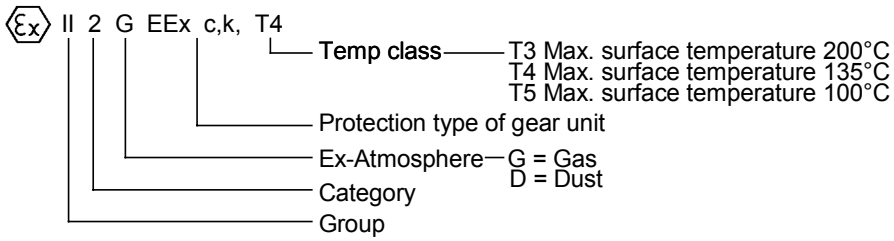
Lubrication Grade

The Textron lubrication grade is marked on the nameplate. See Appendix 4 for type and quantity of lubricant.

4. Marking

These gear units are intended for use in industrial systems.
Provided they are correctly installed in accordance with these instructions (**gear units only)** they comply with the EU directive 94/9/EC ATEX 100a Group II Cat 2 zones 1 & 21 & Cat 3 zones 2 & 22.
Motors, couplings, or any other equipment fitted to the gear unit must also comply with this directive.
If the gear unit is supplied as a geared motor package it is important to check the nameplates of the **gear unit and the motor** (or any other equipment fitted) corresponds with the classification of the potentially explosive atmosphere in which the unit is to be installed.

Understanding EU Directive 94/9/EC (ATEX 100a) Markings.



Examples:

II 2 G - (Zone 1) occasional hazardous explosive atmosphere

II 3 G - (Zone 2) rare short-term hazardous explosive atmosphere

II 2 D - (Zone 21) occasional hazardous explosive atmosphere during normal operation due to presence of combustible dust

II 3 D - (Zone 22) short-term hazardous explosive atmosphere due to presence of combustible dust; no hazard during normal operation

5. Installation

5.1. General

WARNING!

The customer shall be responsible for the proper use of articles supplied by the company, particularly the rotating shafts between their driving and driven members, and their guarding for safety, and the company shall not be responsible for any injury or damage sustained as a result of the improper use of the articles supplied.

Attention is hereby drawn to the danger of using naked lights in proximity to openings in gearboxes and gear units supplied by the company, and the company shall not be liable for any claim for injury or damage arising from any action in contravention of this warning.

5.2. Prior to Installation

5.2.1. Check gear unit has not been damaged.

5.2.2. Check the gear unit / motor nameplate matches the requirements of the machine the unit is to be installed into.

5.2.3. Thoroughly clean the shaft and mounting surfaces that are to be used of anti-corrosion agents using a commercially available solvent. Ensure solvent does not make contact with the oil seals.

5.3. 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 ≤ 50mm) and m6 (for shaft diameter > 50mm) and the fitted components should be to ISO tolerance M7 (for bore diameter ≤ 50mm) and K7 (for bore diameter > 50mm).

5.3.1. Ensure shaft extensions, bores & keys etc are cleaned.

5.3.2. Items (such as gears, sprockets, couplings etc) should not be hammered onto these shafts since this would damage the shaft support bearings.

5.3.3. 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. See table 1 below.

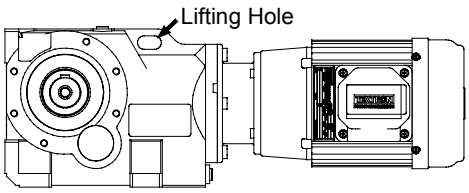
5.3.4. Items being fitted may be heated to 80/100°C to aid assembly further.

Shaft Diameter		Threaded Hole Details
Over	To	
13	16	M5 x 0.8 12 deep
16	21	M6 x 1.0 16 deep
21	24	M8 x 1.25 19 deep
24	30	M10 x 1.5 22 deep
30	38	M12 x 1.75 28 deep
38	50	M16 x 2.0 36 deep
50	85	M20 x 2.5 42 deep
85	130	M24 x 3.0 55 deep

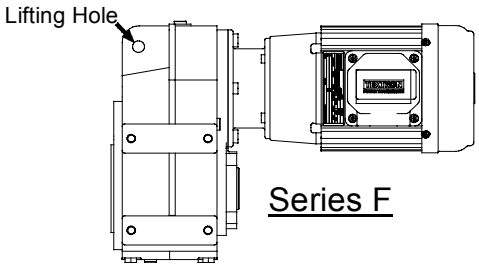
Table 1

5.4. Lifting

Use only lifting points provided.
Larger Series M & C units are supplied with a lifting eye.
Series F & K units, have a lifting hole in the gear housing as shown.

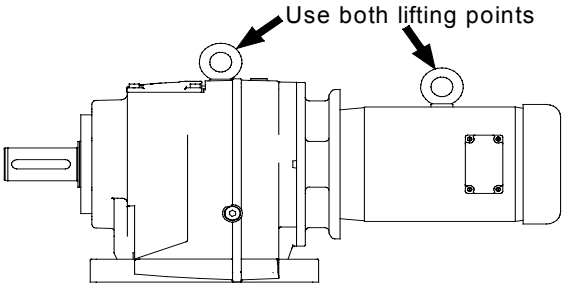


Series K



Series F

On units supplied with a lifting eye on the motor, both the lifting point on the gear unit and motor should be used.



5.5. Foot mounted or flange mounted units

5.5.1. Ensure the base foundation / flange mounting surface is flat[1], vibration absorbing and torsionally rigid.
Note: Units on baseplates should if possible be mounted on the same bedplate as the prime mover.

5.5.2. The gear unit must be installed in the specified mounting position. The maximum deviation from the designated mounting position is ± 5° (unless gear unit is suitably modified and approved for non standard mounting positions).

5.5.3. Align unit (see Appendix 1).

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 final bolting ensure the unit or baseplate is not distorted as this would cause strains in the gear case resulting in errors of alignment of shafts and gearing.

Check all mounting points are fully supported and adjust if necessary by using steel packings.

Torque tighten bolts to torque specified in table 2 below.

5.5.4. Secure unit, or baseplate if fitted to a rigid foundation using heavy duty bolts to ISO grade 8.8 minimum

Set Screw Size	Tightening Torque	
	Holding Down Bolts / Output Flange Bolts	Motors to Gearhead
M6	10 Nm	10 Nm
M8	25 Nm	18 Nm
M10	50 Nm	37 Nm
M12	85 Nm	64 Nm
M16	200 Nm	150 Nm
M20	350 Nm	260 Nm
M24	610 Nm	-
M30	1220 Nm	-
M36	2150 Nm	-

Table 2

5.5.5. Recommended fasteners (Basemount units):

Unit Size	Recommended Fastener Size	Unit Size	Recommended Fastener Size	Unit Size	Recommended Fastener Size
M01	M8 x 25L	K03	M10 x 25L	C03	M8 x 20L
M02	M8 x 30L	K04	M10 x 30L	C04	M10 x 30L
M03	M8 x 30L	K05	M12 x 35L	C05	M10 x 30L
M04	M12 x 40L	K06	M12 x 40L	C06	M12 x 40L
M05	M12 x 40L	K07	M16 x 50L	C07	M16 x 50L
M06	M12 x 40L	K08	M20 x 60L	C08	M20 x 65L
M07	M16 x 45L	K09	M24 x 70L	C09	M24 x 75L
M08	M16 x 60L	K10	M30 x 80L	C10	M24 x 80L
M09	M20 x 70L	K12	M36 x 100L		
M10	M24 x 80L				
M13	M30 x 90L				
M14	M36 x 100L				

Table 3

[1] Maximum permissible flatness error for mounting surface is 0.12mm.

5.6. Shaft mounted units

5.6.1. The gear unit must be installed in the specified mounting position.

5.6.2. Assembly of gear unit on to the machine shaft:
There are four assembly methods dependant on the gear unit type:

- Standard straight bore with keyway. See Appendix 2A.
- Unit fitted with KIBO® bushes. See Appendix 2B.
- Unit fitted with taper release bushes. See Appendix 2C.
- Unit fitted with shrink disc. See Appendix 2D.

5.6.3. Anchor gear unit to a secure point on the structure by means of a torque arm. (See Appendix 2E)

5.7. Units for use in a potentially explosive atmosphere

5.7.1. If the unit has been damaged in transit do not use. (Remove all transport fixtures and packings prior to start up)

5.7.2. Check nameplate of unit corresponds with the sites potentially explosive atmosphere classification.

5.7.3. Check ambient temperature falls within lubricant grade recommendations. (See Approved Lubricants p27)

5.7.4. Make sure no potentially explosive atmosphere exists during installation.

5.7.5. Make sure that gear unit is sufficiently ventilated with no external heat input – cooling air temperature should not exceed 40°C

5.7.6. Ensure mounting position corresponds to that marked on the nameplate. (Note! ATEX approval is only valid for mounting position specified on the nameplate.)

5.7.7. Check motors, couplings or any other equipment fitted to the gear unit has ATEX approval. Check information listed on nameplates correspond to the environmental conditions of the site.

5.7.8. Ensure gearbox is not subjected to any loading greater than those marked on the nameplate.

5.7.9. **For units operated with inverter drives**, check motor suitability for use with the inverter. Ensure that the inverter parameters do not exceed those of the motor.

5.7.10. **For belt driven units**, check all belts fitted are of sufficient electrical leakage resistance. (< 10^9 Ω).

5.7.11. Ensure gear unit and other equipment is electrically grounded (Earthed).

5.7.12. Check and adjust guards and covers so that there is no ignition source from sparks that may be thrown by moving parts making contact with guards etc. Ensure coupling guards, covers etc are dust tight or are designed in such a way that a build up of dust deposits cannot form when the unit is used in Zone 21 & Zone 22 classification areas.

6. Lubrication

6.1. General

6.1.1. Series M F & K size 7 and below will be supplied factory filled with a quantity of EP mineral oil (TPT Grade 6E) appropriate to the intended mounting position. However if, as requested, the gear unit is supplied without lubricant then the oil quantity required is obtained from Table L1. Gear units size 8 and larger are supplied without lubricant (unless factory filled by request). Recommended lubricants are listed in the Approved Lubricant scheme booklet.

6.1.2. Series C size 6 and below are supplied factory filled with synthetic lubricant (TPT Grade 6G). Size 7 and larger are supplied without lubricant.

Temperature Limitations

The standard lubricant is suitable for operation in ambient temperatures of 0° to 35°C. Outside of this consult Table L1 or Textron Power Transmission Application Engineers.

(ISO)	Lubricant	Ambient Temperature Range		
		-5°C to 20°C (type E) -30°C to 20°C (type G & H)	0°C to 35°C	20°C to 50°C
CLP (CC)	EP Mineral Oil (type E)	5E (VG 220)	6E (VG 320)	7E (VG 460)
CLP (HC)	Polyalphaolefin based Synthetic with EP additive (type H)	5H (VG 220)	5H (VG 220)	6H (VG 320)
CLP (PG)	Polyglycol based Synthetic (type G)	5G (VG 220)	6G (VG 320)	7G (VG 460)

Table L1

Note! CLP (CC) & CLP (HC) are the recommended lubricants for Series F K & M.

6.2. Ventilator

6.2.1. Clean & secure the ventilator (if supplied) in the correct location for the required mounting position. (See Appendix 4)

6.3. Oil Level:

Units supplied without oil:

6.3.1. Fill gear unit with correct type of lubricant until oil escapes from level plug. See Appendix 4

Factory filled units:

6.3.2. If the unit is fitted with a level plug, (See Appendix 4) check oil level and top up with correct oil type as necessary.

WARNING Do not overfill as excess may cause overheating and leakage.

6.3.3. Re-fit plugs & tighten to correct torque figure – see notes in maintenance section. Clean away any oil spillage from the surface of the gear unit and driven machinery.

7. Motor Connections

To mains:

7.1. 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:

7.2. Circuit diagrams for the correct wiring of the motor terminal box are included as Appendix 3 of this document if the motor is of Textron Power Transmission 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.

8. Starting Up

8.1. Prior to starting up

8.1.1. Ensure ventilator is fitted (if supplied) see lubrication section 6.2

8.1.2. Check oil level, top up if necessary.

8.1.3. Ensure all safety devices are in place (ie guards fitted). Check and adjust guards and covers so that there is no ignition source from sparks that may be thrown by moving parts making contact with guards etc. Ensure coupling guards, covers etc are dust tight or are designed in such a way that a build up of dust deposits cannot form when the unit is used in Zone 21 & Zone 22 classification areas.

8.1.4. Remove any safety devices fitted to prevent machine rotation.

8.1.5. Starting up should only be performed or supervised by suitably qualified personnel.

Caution: Any deviation from normal operating conditions, (increased temperature, noise, vibrations, power consumption etc) suggest a malfunction, inform maintenance personnel immediately.

8.1.6. Units fitted with backstop, ensure motor is correctly wired for free direction of rotation.

9. Operation

9.1. Noise

The range of product satisfies a noise (sound pressure level) of 85dB(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).

9.2. General Safety

Potential hazards which can be encountered during installation, maintenance and operation of drives is covered in greater detail in the product safety page at the front of this booklet.

Advice is also given on sensible precautions which need to be taken to avoid injury or damage.
PLEASE READ!

9.3. Gear units for use in a potentially explosive atmosphere

After 3 hours of operation check the gear unit surface temperature. This temperature should not exceed 110°C. If temperature exceeds this limit, shut down immediately and contact Textron Power Transmission.

10. Maintenance

10.1. Prior to any maintenance operations

10.1.1. De-energise the drive and secure against un-intentional switch on.

10.1.2. Wait until the unit has cooled down – Danger of skin burns & pressure build up.

10.2. Oil plugs/ventilator

10.2.1. Prior to removing plugs, ensure that the unit has cooled sufficiently so that oil will not burn.

10.2.2. Remove ventilator plug prior to removing level and/or drain plug. Warning do not stand over ventilator plug whilst removing as pressure build up behind valved ventilator may cause it to eject when removed.

10.2.3. Place a container under the oil drain plug to be removed. Note: it is recommended that the oil should be slightly warm, (40-50°C) when drained. (Cooler oil will be more difficult to drain correctly).

10.2.4. Top ups or refills should be done through the ventilator position.

10.2.5. Remember to refit all plugs and torque tighten to table M1 below.

Plug Size	Tightening Torque
M10	12Nm
M12	20Nm
M14	26Nm
M16	34Nm
M22	65Nm

Table M1

10.2.6. Clean away any oil spillage.

10.3. Lubrication

10.3.1. Periodic inspection.

For Units fitted with level plug or other level indicating device, check the oil level every 3000 hours or 6 months whichever is sooner and if necessary top up with the recommended type of lubricant.

10.3.2. Oil changes.

- Smaller units (supplied without ventilator) are supplied lubricated for life* except for the following conditions:
  Units that are required to work in explosive atmosphere (94/9/EC Atex 100a Group II category 2 zones 1 & 21 & category 3 zones 2 & 22) should be drained and refilled with correct quantity of lubricant in accordance with the tables below. See Appendix 4 for correct oil quantity.
- Larger units (supplied with ventilator) should be drained and refilled with correct quantity of lubricant in accordance with the tables below. See Appendix 4 for correct oil quantity.

Oil Change Period: Series F K & M

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	2100 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		

Oil Change Period: Series C

UNIT OPERATING TEMPERATURE °C	RENEWAL PERIOD	
	MINERAL OIL	SYNTHETIC OIL
65 OR LESS	17000 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
70	12000 HOURS OR 3 YEARS	26000 HOURS OR 3 YEARS
75	8500 HOURS OR 3 YEARS	22000 HOURS OR 3 YEARS
80	6000 HOURS OR 2 YEARS	15000 HOURS OR 3 YEARS
85	4200 HOURS OR 17 MONTHS	10500 HOURS OR 3 YEARS
90	3000 HOURS OR 12 MONTHS	7500 HOURS OR 2 1/2 YEARS
95	2100 HOURS OR 8 MONTHS	6000 HOURS OR 2 YEARS
100	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		

*Mineral oil filled units operating over 70°C should be removed, drained and refilled with the correct quantity of oil after 3 years operation.

CAUTION

Warning.

Do not mix Synthetic and Mineral lubricants.
Do not overfill the unit as this can cause leakage and overheating.

10.4. Bearings

10.4.1 Bearings should be replaced every 5 years for Ex marked units.

10.5. Grease Lubrication

10.5.1. Where re-greasing points are provided add 2 shots monthly of NLGI 2 grade grease.

10.6. Cleaning

10.6.1. 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.

10.6.2. Ensure dust build up does not exceed 5mm (maximum)

11. Fault diagnosis

11.1. Gear unit problems:

Symptom	Possible Causes	Remedy
Output shaft does not rotate, even though the motor is running or the input shaft is rotating.	Drive between shafts interupted in the gear unit	Return the gear unit / geared motor for repair
Unusual, regular running noise	a) A meshing or grinding sound : damage to bearings b) A knocking sound : irregularity in the gearing	a) Check oil (See Inspection and Maintenance b) Contact Textron Power Transmission
Unusual, irregular running noise	Foreign matter present in the oil	a) Check oil (See Inspection and Maintenance b) Stop the unit, Contact Textron Power Transmission
Oil leaking[1] • from the gear unit cover • from the motor flange • from the gear unit flange • from the output end oilseal	a) Defective gasket on gear unit cover b) Defective gasket c) Gear unit not ventilated	a) Retighten screws on gear unit cover and observe gear unit. If oil still leaks contact Textron Power Transmission b) Contact Textron Power Transmission c) Vent the gear unit (see Appendix 4 - Mounting positions)
Oil leaking from the ventilator	a) Gear unit over filled with oil b) Gear unit installed in an incorrect mounting positon c) Frequent cold starts (oil foaming) and/or high oil level.	a) Correct the oil level (see lubrication section) b) Fit the ventilator in the correct position (see Appendix 4 - Mounting positions) and check oil level (see lubrication) c) Check the oil level (see lubrication)

1) it is normal for small amounts of oil/grease to leak out of the oil seal during the running in period (24 hours running time)

When contacting Textron Power Transmission
Please have the following information available:

- Nameplate data (complete)
- Type and extent of the problem encountered
- The time and the circumstances the problem occurred
- A possible cause

Any further information or clarification required may be obtained by contacting Textron Power Transmission, please see contact details at the back of this booklet.

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.

Figure 1

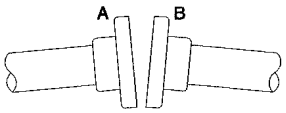


Figure 2

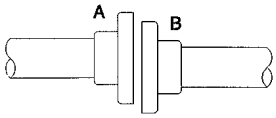
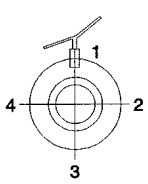


Figure 3



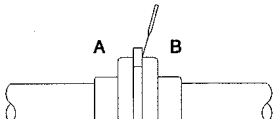


Figure 4

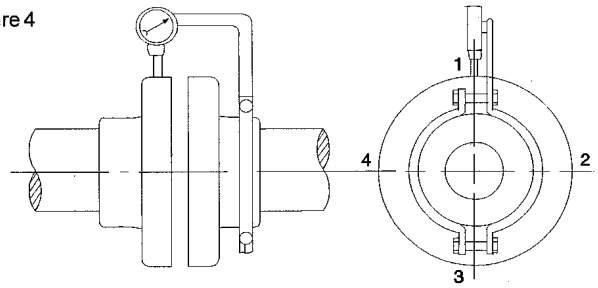
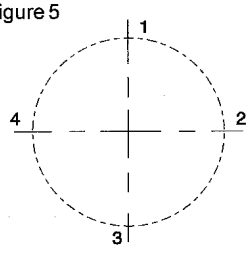
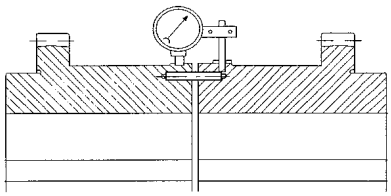


Figure 5





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

The permitted angularity error is as follows

TYPE OF COUPLING	ALLOWABLE GAP (G) (mm)
Rigid coupling	G = 0.0005 D
All other types	Please see appropriate installation and maintenance manual for coupling type fitted

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

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 10.

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)
Rigid	SIZE 08 & UNDER	0.025
	SIZE 09 & OVER	0.035
All other types	Please see appropriate installation and maintenance manual for coupling type fitted	

SPECIAL NOTE CONCERNING RIGID COUPLINGS

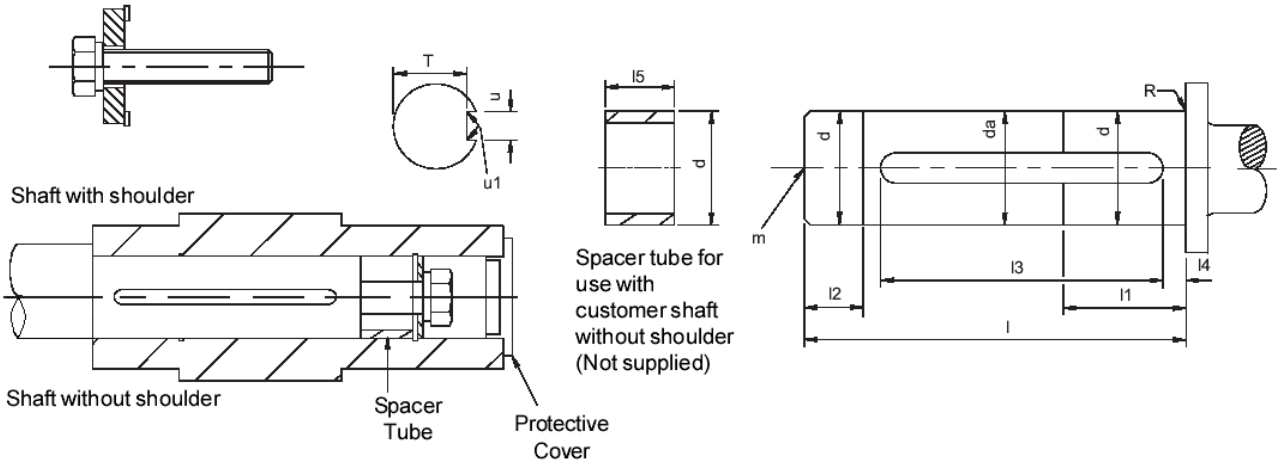
In lining up elements involving rigid couplings it is important that no attempt is made to correct errors of alignment or eccentricity greater than those above by tightening of the coupling bolts (This applies when the system is cold or at operating temperature). The result is mis-alignment and the setting 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

Textron Power Transmission, produce standard flexible couplings to cover the complete range of Textron units, please contact Textron Power Transmission for details.

Series C, K & F Standard Bore Assembly.

ASSEMBLY ONTO SHAFT - CUSTOMERS SHAFT DETAIL



UNIT	Bore	d	da	l	l1	l2	l3	l4	l5	m	R	T	u	u1
C03	Std	19.993/ 19.980	19.6	82	30	10	61.3 61.0	3	22	M6 x 1.0 16 deep	0.8R	16.5 16.4	6.000/ 5.970	0.16 0.25R
C04	Reduced	24.993/ 24.980	24.6	99	38	13	79.3 79.0	3	23	M10 x 1.5 22 deep	0.8R	21.0 20.8	8.000/ 7.964	0.16 0.25R
	Std	29.993/ 29.980	29.6	99	45	15	79.3 79.0	3	26	M10 x 1.5 22 deep	0.8R	26.0 25.8	8.000/ 7.964	0.16 0.25R
C05	Reduced	29.993/ 29.980	29.6	104	45	15	79.3 79.0	3	23	M10 x 1.5 22 deep	0.8R	26.0 25.8	8.000/ 7.964	0.16 0.25R
	Std	34.991/ 34.975	34.6	104	53	18	77.3 77.0	3	23	M12 x 1.75 28 deep	0.8R	30.0 29.8	10.000/ 9.964	0.16 0.25R
C06	Reduced	39.991/ 39.975	39.6	125	60	20	100.5 100.0	3	31	M16 x 2 36 deep	0.8R	35.0 34.8	12.000/ 11.957	0.4 0.25R
	Std	44.991/ 44.975	44.6	125	68	23	101.5 101.0	3	31	M16 x 2 36 deep	0.8R	39.5 39.3	14.000/ 13.957	0.4 0.25R
C07	Reduced	49.991/ 49.975	49.6	153	75	25	130.5 130.0	3	35	M16 x 2 38 deep	1.2R	44.5 44.3	14.000/ 13.957	0.4 0.25R
	Std	59.990/ 59.971	59.6	153	90	30	148.5 148.0	3	38	M20 x 2.5 42 deep	1.2R	53.0 52.8	18.000/ 17.957	0.4 0.25R
C08	Reduced	59.990/ 59.971	59.6	183	91	31	148.5 148.0	3	37	M20 x 2.5 42 deep	1.2R	53.0 52.8	18.000/ 17.957	0.4 0.25R
	Std	69.990/ 69.971	69.6	183	105	35	177.5 177.0	3	37	M20 x 2.5 42 deep	1.2R	62.5 62.3	20.000/ 19.948	0.6 0.4R
C09	Reduced	69.990/ 69.971	69.6	227	105	35	177.5 177.0	3	58	M20 x 2.5 42 deep	1.2R	62.5 62.3	20.000/ 19.948	0.6 0.4R
	Std	89.988/ 89.966	76.6	227	135	45	221.5 221.0	3	58	M24 x 3.0 50 deep	1.2R	81.0 80.8	25.000/ 24.948	0.6 0.4R
C10	Reduced	79.990/ 79.971	79.6	260	120	40	225.5 225.0	3	53	M20 x 2.5 42 deep	1.2R	71.0 70.8	22.000/ 21.946	0.6 0.4R
	Std	99.988/ 99.966	99.6	327	150	45	238.5 238.0	10	46	M24 x 3.0 50 deep	0.8R	90.0 89.8	28.000/ 27.948	0.6 0.4R
K03	-	29.993/ 29.980	29.6	82	45	15	70.3 70.0	3	23	M10 x 1.5 22 deep	0.8R	26.0 25.8	8.000/ 7.964	0.16 0.25R
F04	-	29.993/ 29.980	29.6	99	45	15	70.3 70.0	3	23	M10 x 1.5 22 deep	0.8R	26.0 25.8	8.000/ 7.964	0.16 0.25R
K04	-	34.991/ 34.975	34.6	109	60	20	90.5 90.0	3	23	M12 x 1.75 28 deep	0.8R	30.0 29.8	10.000/ 9.964	0.16 0.25R
K05	-	39.991/ 39.975	39.6	112	60	20	92.5 92.0	3	30	M16 x 2 36 deep	0.8R	35.0 34.8	12.000/ 11.957	0.4 0.25R
F06	-	39.991/ 39.975	39.6	126	60	20	93.3 93.0	3	30	M16 x 2 36 deep	0.8R	35.0 34.8	12.000/ 11.957	0.4 0.25R
K06	-	39.991/ 39.975	39.6	126	75	25	100.5 100.0	3	30	M16 x 2 36 deep	0.8R	35.0 34.8	12.000/ 11.957	0.4 0.25R
F07	-	44.991/ 44.975	49.6	153	75	25	101.5 101.0	3	30	M16 x 2 36 deep	0.8R	44.5 44.3	14.000/ 13.957	0.4 0.25R
K07	-	44.991/ 44.975	49.6	153	90	30	130.5 130.0	3	30	M16 x 2 36 deep	0.8R	44.5 44.3	14.000/ 13.957	0.4 0.25R
F08 & K08	-	59.990/ 59.971	59.6	173	90	30	148.5 148.0	3	37	M20 x 2.5 42 deep	0.8R	53.0 52.8	18.000/ 17.957	0.4 0.25R
F09 & K09	-	69.990/ 69.971	69.6	232	105	35	161.5 161.0	3	38	M20 x 2.5 42 deep	0.8R	62.5 62.3	20.000/ 19.948	0.6 0.4R
F10 & K10	-	79.990/ 79.971	79.6	275	120	40	188.5 188.0	5	37	M20 x 2.5 42 deep	0.8R	71.0 70.8	22.000/ 21.946	0.6 0.4R
K12	-	99.988/ 99.966	99.6	327	150	45	238.5 238.0	10	46	M24 x 3.0 50 deep	0.8R	90.0 89.8	28.000/ 27.948	0.6 0.4R

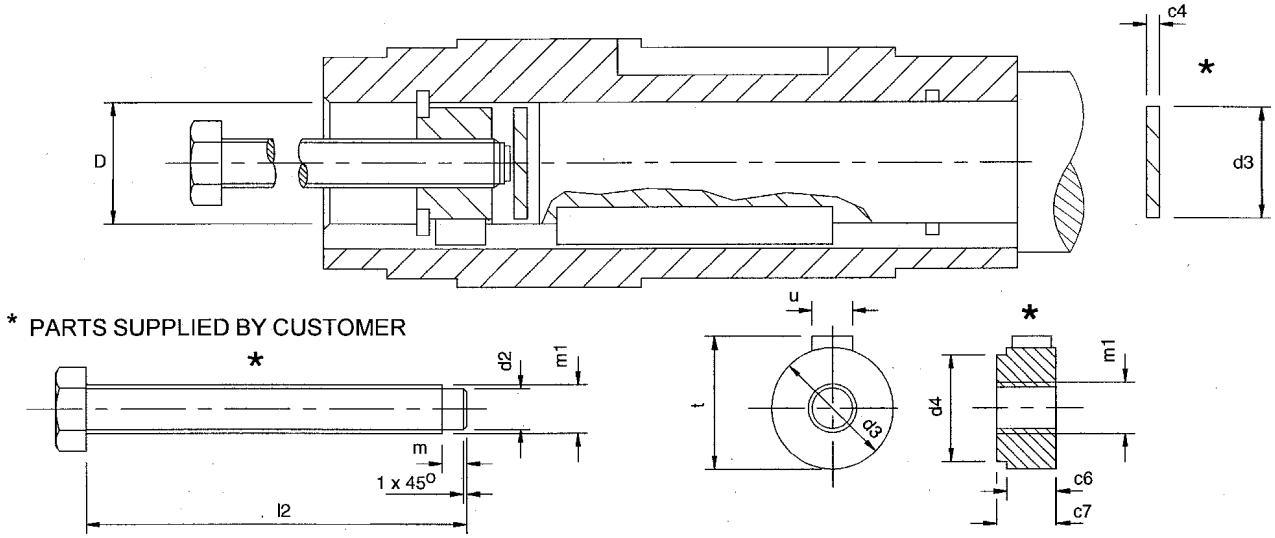
See next page for shaft assembly instructions

1. Spray the hollow shaft bore and mating diameter of output shaft with an anti fret compound.
2. Fit the shaft to hollow bore location key in position in the output shaft.
3. Fit the circlip into the output sleeve.
4. Fit the spacer tube only if the output shaft has no shoulder, then fit the output shaft into the output sleeve.
5. Secure in place with the washer and bolt, tighten to the values stated in the table below.
6. Fit the protective cover over the open end of the output sleeve.

Bolt Size	Tightening Torques Nm
M10	15
M12	20
M16	45
M20	85
M24	200

Series C, K & F Standard Bore Disassembly.

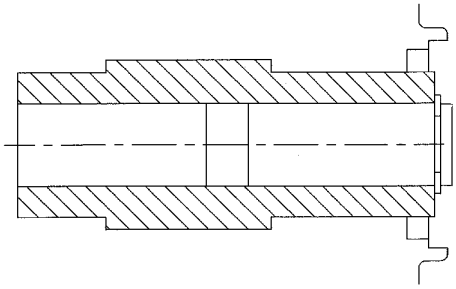
DISASSEMBLY METHOD FROM SHAFT



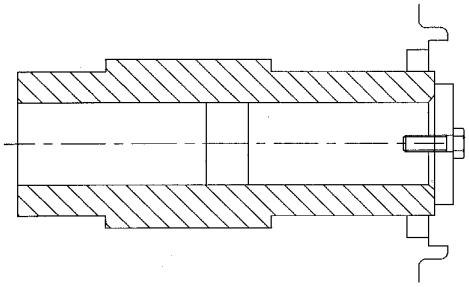
UNIT	Bore	c4	c6	c7	D (H7)	d2	d3	d4	l2	m	m1	t	u
C03	Std	5	10	12	20	7	19.9	11.2	120	3	M10 x 1.5	22	6
C04	Reduced	5	15	17	25	13	24.9	16.2	23	3	M16 x 2	28	8
	Std	5	15	17	30	13	29.9	20.8	160	3	M16 x 2	33	8
C05	Reduced	5	15	17	30	13	29.9	20.8	260	3	M16 x 2	33	8
	Std	5	15	17	35	13	34.9	25.2	160	3	M16 x 2	38	10
C06	Reduced	5	20	23	40	20	39.9	30.9	220	3	M24 x 3	43	12
	Std	5	20	23	45	20	44.9	34.1	220	3	M24 x 3	49	14
C07	Reduced	5	20	23	50	20	49.9	39	220	3	M24 x 3	54	14
	Std	8	24	27	60	26	59.9	47.4	250	5	M30 x 3.5	64	18
C08	Reduced	8	24	27	60	26	59.9	47.4	250	5	M30 x 3.5	64	18
	Std	8	24	27	70	26	69.9	58.4	310	5	M30 x 3.5	74.5	20
C09	Reduced	8	24	27	70	26	69.9	58.4	310	5	M30 x 3.5	74.5	20
	Std	8	24	27	90	26	89.9	75.3	360	5	M30 x 3.5	95	25
C10	Reduced	8	24	27	80	26	79.9	65.5	360	5	M30 x 3.5	85	22
	Std	8	30	34	100	32	99.9	84.1	420	5	M36 x 4	106	28
F04	-	5	15	17	30	13	29.9	20.8	120	5	M16 x 2	33	8
F06	-	5	20	23	40	20	39.9	29.9	154	5	M24 x 3	43	12
F07	-	5	20	23	50	20	49.9	39	186	5	M24 x 3	53.5	14
F08	-	8	24	27	60	26	59.9	47.4	205	5	M30 x 3.5	64	18
F09	-	8	24	27	70	26	69.9	56.4	273	5	M30 x 3.5	74.5	20
F10	-	8	24	27	80	26	79.9	75.3	316	5	M30 x 3.5	95	25
K03	-	5	15	17	30	13	29.9	20.8	130	3	M16 x 2	33	8
K04	-	5	15	17	35	13	34.9	25.2	160	3	M16 x 2	38	10
K05	-	5	20	23	40	20	39.9	29.9	190	3	M24 x 3	43	12
K06	-	5	20	23	40	20	39.9	29.9	190	3	M24 x 3	43	12
K07	-	5	20	23	50	20	49.9	39	220	3	M24 x 3	53.5	14
K08	-	8	24	27	60	26	59.9	47.4	250	5	M30 x 3.5	64	18
K09	-	8	24	27	70	26	69.9	56.4	310	5	M30 x 3.5	74.5	20
K10	-	8	24	27	80	26	79.9	65.5	360	5	M30 x 3.5	95	25
K12	-	8	30	34	100	32	99.9	84.1	420	5	M36 x 4	116	28

Series C, K & F Shaft Mount Units.

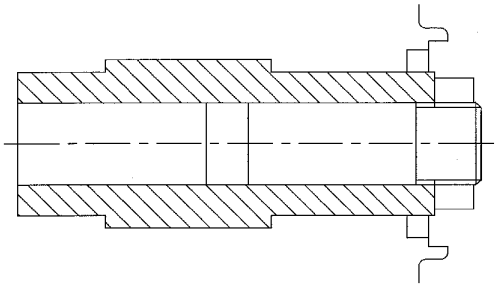
Alternative Shaft Fixing Methods.



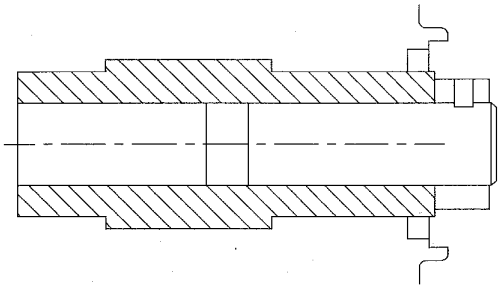
SHAFT MOUNT UNITS RETAINED WITH A **CIRCLIP** INCLUDING DOUBLE EXTENSION SHAFT



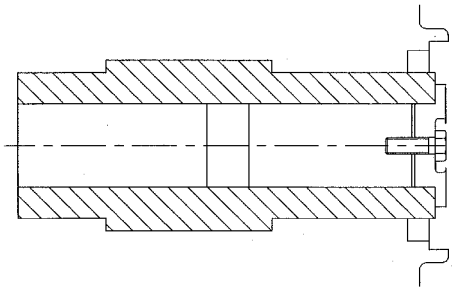
SHAFT MOUNT UNITS RETAINED WITH A BOLT AND PLATE



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

Series C, & K Kibo Bushes.

Advantages with Kibo taper bushes

- Simple design
- Easy to mount
- Easy to dismount, built in puller
- Tapered bushes assure a safe mounting
- Reduces risk for shearing of key
- Bushings for different bore dimensions are available

The Kibo bush kit comprises of: bushes, locking nuts, end plate, fastening bolt, shaft key and protective cover.

Mounting

For correct mounting of speed reducer it is important that both bushings get the same squeezing force.

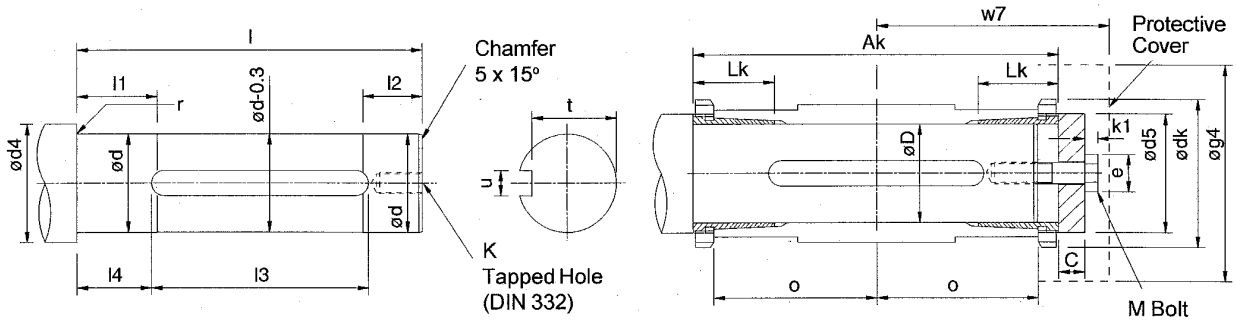
1. Mount the inner bushing with the nut in its outer position. The bushing should be mounted against the shoulder or circlip. The shoulder should not exceed inside diameter of nut.
2. Fit the key in the keyway.
3. Mount the reducer on the machine-shaft and press it against the inner bushing
4. Mount the outer bushing with the nut in it's inner position. Check that the bushing is not squeezed but the nut is in contact with the shaft sleeve.
5. Mount the end plate with its fixing bolt. Tighten the bolt with correct torque. The inner bushing is now locked.
6. Loosen the bolt, so the outer bushing is loose. Turn the nut on the bushing, in it's outer position.
7. Tighten the bolt once again with correct torque. The outer bushing is now locked.
   The thicker end plate may be changed to the thinner one in order to gain more space at the hollow shaft end. The thinner end plate should be tightened with a torque of 25% of the value given in the table below.

8. Screw the nuts against the hollow shaft by hand, mounting is completed.
9. Fit protective cover.

Dismounting

- Loosen the bolt and take away the end plate.
- Pull out the outer bushing with the nut, by turning the nut with an adequate tool. Take out the bushing.
- Press the reducer from the inner bushing with the nut, dismounting is completed.

NOTE:
If reducer is mounted in a corrosive environment, ensure machine shaft bushings and nuts are oiled or greased.
Do NOT use grease based on molybdendisulfide.



Series C & K Kibo Bushes Cont.

Unit Size	Customers Shaft											
	ød (h8)	ød4 min	ød4 max	K (DIN 332)	l	l1	l2	l3	l4	r (max)	t	u (N9)
C05	35	40	42	M12x28	161	40	36	50	57	1.2	30	10
	32	37									27	10
	30	35		M10x22							26	8
	25	30									21	8
C06	45	50	51	M16x36	200	50	45	65	70	1.2	39.5	14
	40	45									35	12
	35	40		M12x28							30	10
	30	35		M10x22							26	8
	25	30									21	8
C07	60	66	71	M20x42	232	61	50	90	77	1.6	53	18
	55	61									49	16
	50	56		M16x36							44.5	14
	45	51									39.5	14
C08	70	76	81	M20x42	272	68	51	110	90	1.6	62.5	20
	65	71									58	18
	60	66									53	18
	55	61									49	16
C09	90	98	101	M24x50	314	70	73	181	76	2	76	22
	85	93		M20x42							71	22
	80	88									67.5	20
	75	83									62.5	20
C10	100	110	116	M24x50	433	70	51	160	148	2.5	90	28
	95	105									86	25
	90	100									81	25
	85	95		M20x42							76	22
	80	90									71	22

Unit Size	Hollow Shaft							End Plate						Cover	
	øD	KIBO Bush Kit	Column 11 Entry	ødk	o	Ak	Lk	ød5	C	Fixing Bolt M	Fixing Bolt e	Fixing Bolt k1	Tightening Torque Nm	øg4	w7
C05	35	C38214-S1	1	65	70	164	40	45	10	M12	22	8	56	108	108
	32	C38214-S2	2												
	30	C38214-S3	3							M10	20	7	40		
	25	C38214-S4	4												
C06	45	C38364-S1	1	75	90	205	50	55	12	M16	28	10	89	133	140
	40	C38364-S2	2												
	35	C38364-S3	3							M12	22	8	56		
	30	C38364-S4	4							M10	20	7	40		
	25	C38364-S5	5												
C07	60	C38614-S1	1	98	105	243	61	75	16	M20	35	13	144	133	161
	55	C38614-S2	2												
	50	C38614-S3	3							M16	28	10	89		
	45	C38614-S4	4												
C08	70	C38684-S1	1	110	125	289	67.5	85	20	M20	35	13	225	160	180
	65	C38684-S2	2												
	60	C38684-S3	3												
	55	C38684-S4	4												
C09	90	B91884-S1	1	140	145	332	57	105	26	M24	42	15	209	190	210
	85	B91884-S2	2												
	80	B91884-S3	3							M20	35	13	225		
	75	B91884-S4	4												
C10	100	C38834-S1	1	155	205	455	68	130	12.5	M24	42	15	400	240	245
	95	C38834-S2	2												
	90	C38834-S3	3												
	85	C38834-S4	4							M20	35	13	331		
	80	C38834-S5	5												

Series C & K Kibo Bushes Cont.

Unit Size	Customers Shaft											
	ød (h8)	ød4 min	ød4 max	K (DIN 332)	l	l1	l2	l3	l4	r (max)	t	u (N9)
K04	35	40	42	M12x28	171	40	36	50	63	1.2	30	10
	32	37									27	10
	30	35		M10x22							26	8
	25	30									21	8
K05	35	40	42	M12x28	187	40	36	50	63	1.2	30	10
	32	37									27	10
	30	35		M10x22							26	8
	25	30									21	8
K06	45	50	51	M16x36	200	50	45	65	70	1.2	39.5	14
	40	45									35	12
	35	40		M12x28							30	10
	30	35									26	8
	25	30		M10x22							21	8
K07	55	60	61	M20x42	238	58	55	65	88	1.2	49	16
	50	55									44.5	14
	45	50		M16x36							39.5	14
	40	45									35	12
K08	60	66	71	M20x42	262	61	50	90	92	1.6	53	18
	55	61									49	16
	50	56		M16x36							44.5	14
	45	51									39.5	14
K09	70	76	81	M20x42	322	68	51	110	115	1.6	62.5	20
	65	71									58	18
	60	66									53	18
	55	61									49	16
K10	85	93	96	M20x42	377	67	67	141	126	2	76	22
	80	88									71	22
	75	83									67.5	20
	70	78									62.5	20
K12	100	110	116	M24x50	433	70	51	160	148	2.5	90	28
	95	105									86	25
	90	100									81	25
	85	95		M20x42							76	22
	80	90									71	22

Unit Size	Hollow Shaft							End Plate						Cover	
	øD	KIBO Bush Kit	Column 11 Entry	ødk	o	Ak	Lk	ød5	C	Fixing Bolt M	Fixing Bolt e	Fixing Bolt k1	Tightening Torque Nm	øg4	w7
K04	35	C38214-S1	1	65	75	175	40	45	10	M12	22	8	56	107	112
	32	C38214-S2	2												
	30	C38214-S3	3							M10	20	7	40		
	25	C38214-S4	4												
K05	35	C38214-S1	1	65	83	191	40	45	10	M12	22	8	56	107	118
	32	C38214-S2	2												
	30	C38214-S3	3							M10	20	7	40		
	25	C38214-S4	4												
K06	45	C38364-S1	1	75	90	205	50	55	12	M16	28	10	124	132	130
	40	C38364-S2	2												
	35	C38364-S3	3							M12	22	8	70		
	30	C38364-S4	4												
	25	C38364-S5	5							M10	20	7	40		
K07	55	C38534-S1	1	85	105	241	58	65	14	M20	35	13	191	132	152
	50	C38534-S2	2												
	45	C38534-S3	3							M16	28	10	154		
	40	C38534-S4	4												
K08	60	C38614-S1	1	98	120	273	61	75	16	M20	35	13	240	160	175
	55	C38614-S2	2												
	50	C38614-S3	3							M16	28	10	169		
	45	C38614-S4	4												
K09	70	C38684-S1	1	110	150	340	67.5	85	20	M20	35	13	290	175	210
	65	C38684-S2	2												
	60	C38684-S3	3												
	55	C38684-S4	4												
K10	85	C38744-S1	1	130	175	392	53	100	24	M20	35	13	274	200	245
	80	C38744-S2	2												
	75	C38744-S3	3												
	70	C38744-S4	4												
K12	100	C38834-S1	1	155	205	455	68	130	12.5	M24	42	15	400	240	295
	95	C38834-S2	2												
	90	C38834-S3	3												
	85	C38834-S4	4							M20	35	13	331		
	80	C38834-S5	5												

Series C, F & K Taper Release Bushing.

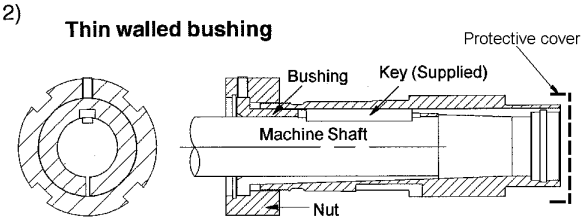
Installation

1) Thoroughly clean and degrease, machine shaft, bushing and gear unit tapered bore using Lowtox or Loctite 7063 Superclean.

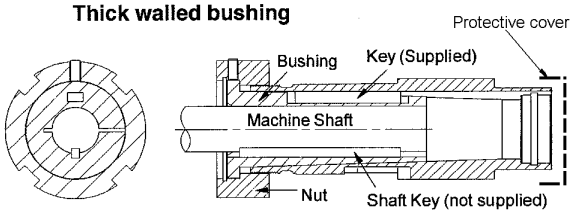
Note: the bushing nut threads are coated with anti seize compound at the factory, this should not be removed (if re-installing previously used nut, re-coat threads with anti-seize compound).

2)

Thin walled bushing



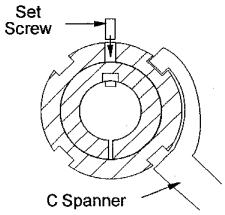
Thick walled bushing



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

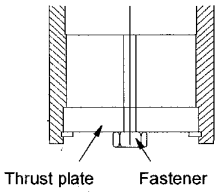
3) Slide gear unit onto driven shaft and bushing taper taking care that key seats into unit keyway, hand tighten nut, (ensure gear unit is in correct axial location) lock the driven shaft and use 'C' spanner or pipe wrench to tighten bushing nut to torque value listed in table 1 below, Do not overtighten.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



4) Fit protective cover.

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 C05 K05 (107)TR	2" - 4 3/4"	115	1/4 turn of nut
F06 C06 K06 (115)TR	2" - 4 3/4"	115	
F07 C07 K07 (203)TR	2" - 4 3/4"	225	1/2 turn of nut
F08 C08 K08 (207)TR	4 1/2" - 6 1/4"	225	
F09 C09 K09 (215)TR	4 1/2" - 6 1/4"	340	
F10 C10 K10 (307)TR	4 1/2" - 6 1/4"	340	
K12 (315)TR	6 1/8" - 8 3/4"	340	

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

Size	Fastener Size	Torque (Nm)
F04 C05 K05 (107)TR	M12 x 1.75p	125
F06 C06 K06 (115)TR	M12 x 1.75p	125
F07 C07 K07 (203)TR	M16 x 2p	250
F08 C08 K08 (207)TR	M16 x 2p	250
F09 C09 K09 (215)TR	M20 x 2.5p	725
F10 C10 K10 (307)TR	M24 x 2.5p	1075
K12 (315)TR	M24 x 2.5p	1075

Series C & K Shrink Disc.

The gear unit is fitted with a 'shrink disc' device located on the hollow output shaft to provide a positive outer locking connection between gear unit and driven shaft. The 'shrink disc' is a friction device, without keys, which exerts an external clamping force on the hollow output shaft, thus establishing a mechanical shrink fit between the gear unit hollow shaft and driven shaft. 'Shrink disc' capacities have ample margins in dealing with transmitted torques and external loading imposed on gear units.

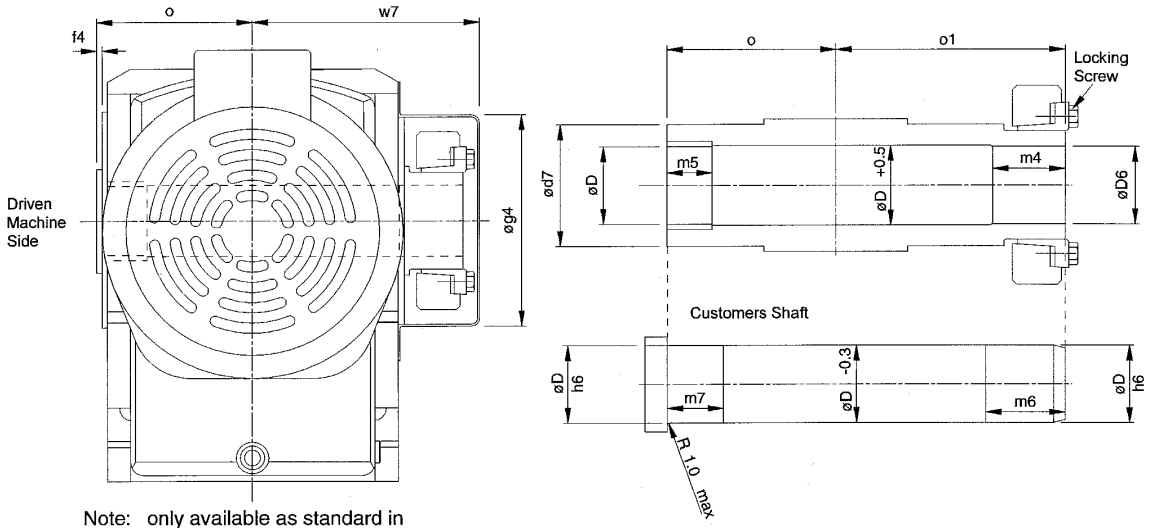
WORKING PRINCIPLE

The 'shrink disc' consists of a locking collar, a tapered inner ring and locking screws. By tightening the locking screws, the locking collar and tapered inner ring are pulled together, exerting radial forces on the inner ring, thus creating a positive friction connection between hollow shaft and driven shaft.

As the tapered surfaces of locking collar and inner ring are lubricated with Molykote 321R or similar and the taper angle is not self locking, locking collar will not seize on the inner ring and can be released easily when removal is necessary.

When the shrink disc is clamped in position the high contact pressures between tapered surfaces and screw heads and their seatings ensure hermetic sealing and eliminate the possibility of fretting corrosion.

Figure 1



Note: only available as standard in this handing, please contact Textron Power Transmission for opposite handing

SIZE	D	D6	d7	f4	g4	m4	m5	m6	m7	o	o1	w7	Locking Screws Torque Ta (Nm)
C03	20	20	35	-	72	24	20	29	25	60	79	91	12
C04	30	30	45	-	87	31	20	36	25	60	86	93	29
C05	35	35	55	-	108	32	20	37	25	75	102	108	29
C06	40	40	65	-	133	38	20	43	25	84	112	140	29
C07	50	50	80	-	133	36	30	41	35	105	136	161	35
C08	65	65	95	-	160	40	40	45	45	125	165	180	68
C09	75	75	105	-	190	55	50	60	55	145	190	210	58
C10	95	95	120	-	240	65	60	70	65	175	230	245	100
K03	30	30	50	2.5	87	31	20	36	25	60	86	91	29
K04	35	35	55	2.5	107	32	20	37	25	75	102	112	29
K05	40	40	60	3	107	36	20	41	25	83	112	118	29
K06	40	40	70	3.5	132	38	20	43	25	90	118	130	29
K07	50	50	80	6	132	36	30	41	35	105	136	152	35
K08	65	65	90	5	160	41	40	46	45	120	161	175	58
K09	75	75	100	5	175	55	40	60	55	150	195	210	58
K10	95	95	120	5	200	65	60	70	65	175	230	245	100
K12	105	105	140	5	240	85	60	90	75	205	280	295	160

Shrink Disc Installation & Maintenance.

SHAFT MOUNTED UNITS USING A SHRINK DISC DEVICE

INSTALLATION

'Shrink discs' can be supplied with shaft mounted units. The following procedures should be followed when fitting or removing units from the driven shaft.

1 Release locking screws gradually and in succession. Initially a quarter of a turn on each screw will avoid tilting and jamming - do not remove locking bolts completely.
2 Remove 'shrink disc' - from gear unit hollow shaft.
3 Clean and degrease locating diameters of gear unit hollow shaft, driven shaft and 'shrink disc' locating diameter on hollow shaft extension.
4 Draw the gear unit onto the driven shaft (See Figure 3).
5 Grease tapered surfaces of outer ring and inner ring with Molykote 321R or similar.
6 Fit 'shrink disc' on gear unit hollow shaft to position shown in Figure 1.
7 Tighten all locking screws gradually and in succession. Do not tighten in a diametrically opposite sequence. Several passes are required until all screws are tightened until the inner and outer ring faces are in-line and the torque figures Ta shown in the table on page 17 are achieved.
8 Fit protective cover.

Note: When the hollow output shaft is to operate in a vertical position it is essential that the shaft of the driven machine is provided with a shoulder. When the thrust load is not taken by the shoulder on the driven shaft, an end plate, as shown in Figure 3, must be fitted.

It is recommended that customers' shafts at the non-clamped end of the sleeve should be coated with Molykote 321R or equivalent.

REMOVAL

1 Removal procedure is similar to the reverse of installation.
Note: Do not remove 'shrink disc' locking screws completely.
2 Remove any rust and dirt from gear unit hollow shaft.
3 Withdraw gear unit from driven shaft.

Note: 'Shrink disc' should be removed and cleaned thoroughly, and Molykote 321R or similar applied to the tapered surfaces of inner ring and locking collar before re-use.

Note: Protective covers are supplied with all 'shrink discs'. Assembly or removal kits and thrust plates are not provided by Textron Power Transmission.

Figure 2

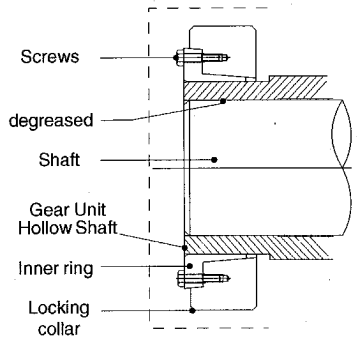
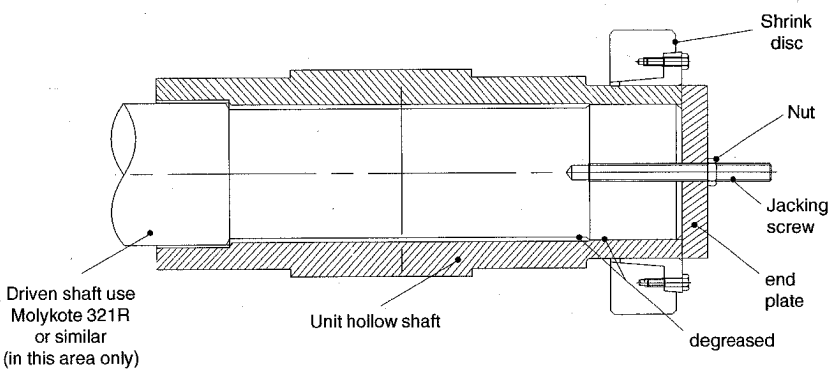


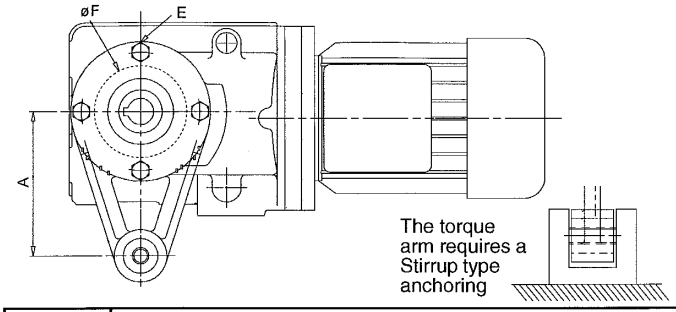
Figure 3 Mounting Gear Unit

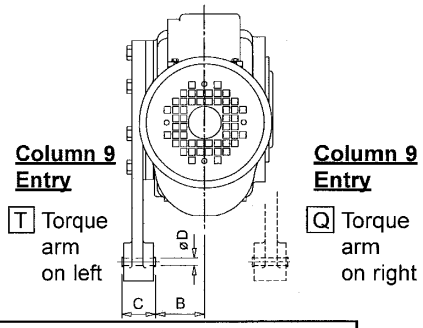


Series C Torque Bracket Dimensions.

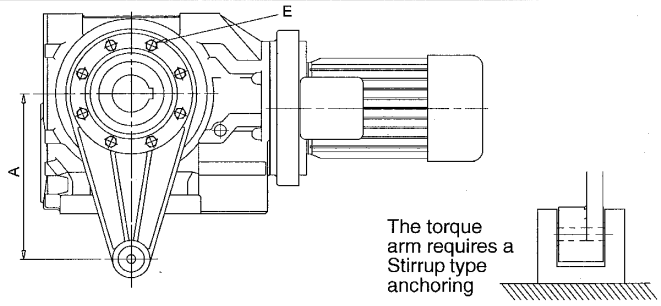
CAUTION

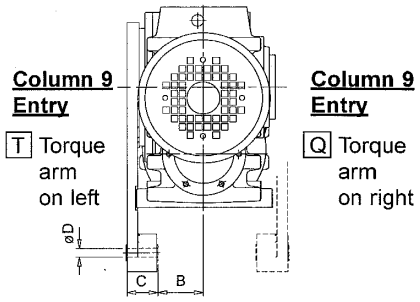
It is recommended that the torque arm is positioned such that the it is fitted on the side of the unit adjacent to the driven machine.



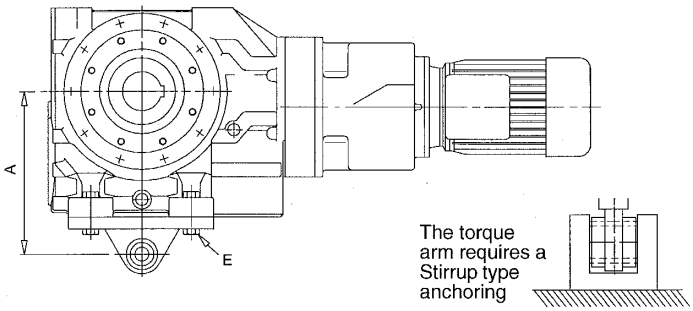


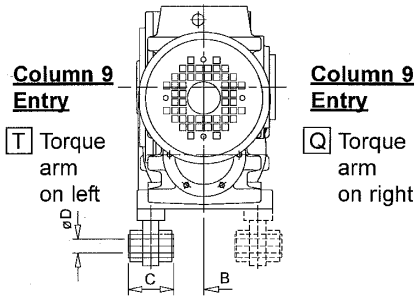
SIZE OF UNIT	DIMENSIONS IN MM					
	A	B	C	øD	E	øF (Spigot Dia)
C03	110	47	36	10.3	4 x M8 on a 90 pcd	69.990 / 69.969
C04	130	52	36	10.3	8 x M8 on a 107 pcd	84.990 / 84.968
C05	160	52	36	10.3	8 x M8 on a 130 pcd	104.990 / 104.968
C06	200	71.5	44	16.5	8 x M10 on a 155 pcd	124.990 / 124.965





SIZE OF UNIT	DIMENSIONS IN MM				
	A	B	C	øD	E
C07	250	77.5	60	16.4	6 x M12 on a 150 pcd
C08	310	85.5	60	16.4	8 x M12 on a 195 pcd
C09	380	98	80	25	6 x M16 on a 230 pcd
C10	430	137	80	25	10 x M16 on a 280 pcd





SIZE OF UNIT	DIMENSIONS IN MM				
	A	B	C	øD	E
C1040	430	95	110	25	2 Nuts & M24 x 100L Bolts

Three Phase Induction Motor Installation.

Connection to Mains Power Supply.

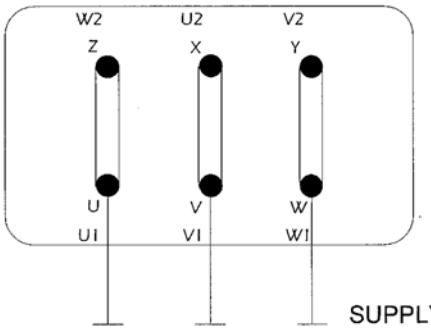
- Connection of the electric motor to the mains supply should be done by a qualified person.
- Connect motor terminals in accordance with the diagram inside the terminal box cover. (Also identified in Figure MI 1 below).

Note: It is important that the mains supply details are checked against the motor 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.

CIRCUIT DIAGRAM - MOTOR TERMINAL BLOCK

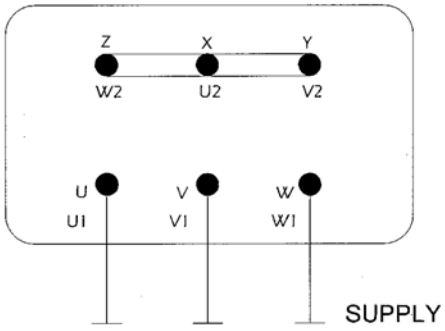
DELTA CIRCUIT (LOW VOLTAGE)



MOTOR SIZE	SUPPLY VOLTAGE
0.12 kW to 2.2 kW	220 / 240 V, 50 Hz 230 / 280 V, 60 Hz
3 kW and Above	380 / 420 V, 50 Hz 440 / 480 V, 60 Hz

suitable for Star / Delta starting

STAR CIRCUIT (HIGH VOLTAGE)



MOTOR SIZE	SUPPLY VOLTAGE
0.12 kW to 2.2 kW	380 / 420 V, 50 Hz 440 / 480 V, 60 Hz
3 kW and Above	660 / 690 V, 50 Hz

FIGURE MI 1

Note: This instruction only applies to Textron Power Transmission plated motors.
Motors fitted by the customer or requested by the customer of Textron Power Transmission from a different manufacturer will have separate documentation provided with it.

Approved Lubrication.

Type E Mineral oil containing industrial EP additives. These have a high load carrying capacity.

SUPPLIER	LUBRICANT RANGE	TEXTRON GRADE NUMBERS		
		5E	6E	7E
		AMBIENT TEMPERATURE RANGE °C		
		-5 TO 20	0 TO 35	20 TO 50
Batoyle Freedom Group	Remus	220 (-2)	320 (-2)	460 (-2)
Boxer Services / Millers Oils	Indus	220 (-10)	320 (-10)	460 (-10)
BP Oil International Limited	Energol GR-XF	220 (-16)	320 (-13)	460 (-1)
	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 Limited	Gear Comp EP (USA ver)	220 (-16)	320 (-13)	460 (-10)
	Gear Comp EP (Eastern ver)	220 (-13)	320 (-13)	460 (-13)
	Ultra Gear	220 (-10)	320 (-7)	460 (-7)
Eko-Elda Abee	Eko Gearlub	220 (-13)	320 (-10)	460 (-1)
Engen Petroleum Limited	Gengear	220 (-15)	320 (-12)	460 (-3)
Esso/Exxon	Spartan EP	220 (-12)	320 (-12)	460 (-4)
Fuchs Lubricants	Powergear		P/Gear (-16)	M460 (-4)
	Renogear V	220EP (-13)	320EP (-4)	460EP (-4)
	Renogear WE	220 (-7)	320 (-4)	400 (-4)
	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)	
Optimal 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 (-7)
Petro-Canada	Ultima EP	220 (-22)	320 (-16)	460 (-10)
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)
Saudi Arabian Lubr. Oil Co.	Gear Lube EP	EP220 (-1)	EP320 (0)	EP460 (0)
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)
	Meropa WM	220 (-19)	320 (-16)	460 (-11)
Total	Carter EP	220 (-7)	320 (-7)	460 (-4)
	CarterVP/CS	220 (-16)	320 (-13)	460 (-7)
Tribol GmbH	Molub-Alloy Gear Oil	90 (-18)	690 (-16)	140 (-13)
	Tribol 1100	220 (-20)	320 (-18)	460 (-16)

DANGER:

Numbers in brackets indicate the minimum pour point temperature of the specified oil in °C
THE UNIT MUST NOT BE RUN BELOW THIS TEMPERATURE.

Approved Lubrication.

Type G Polyglycol based synthetic lubricants with Anti-Wear or EP additives.
These have a medium to high load carrying capacity. (see +)
Refer to Series C Lubrication (page 31) for ambient temperature ranges.

SUPPLIER	LUBRICANT RANGE	TEXTRON GRADE NUMBERS				
		5G	6G	7G	8G	9G
		OIL SUPPLIERS CORRESPONDING DESIGNATIONS				
Boxer Services / Millers Oils	Boxergear W	220 (-31)	320 (-31)	460 (-28)		
BP Oil International Limited	Enersyn SG-XP	220 (-31)		460 (-34)	680 (-28)	
Caltex	Synlube CLP	220 (-34)	320 (-31)	460 (-28)	680 (-31)	
Carl Bechem GmbH	Berusynth EP	220 (-25)	320 (-25)	460 (-25)	680 (-28)	1000 (-28)
Castrol International	Alphasyn PG	220 (-34)	320 (-31)	460 (-28)		
Esso/Exxon	Glycolube	220 (-25)	320 (-25)	460 (-23)		
Fuchs Lubricants	Renolin PG	220 (-34)	320 (-34)	460 (-34)	680 (-28)	1000 (-28)
Klüber Lubrication	Klübersynth GH6	220 (-25)	320 (-25)	460 (-20)	680 (-20)	1000 (-28)
	Klübersynth UH1 6	220 (-30)	320 (-25)	460 (-25)		
Kuwait Petroleum International	Q8 Gade	220 (-22)	320 (-22)	460 (-22)		
Laporte Performance Chemicals Limited	Berox Industrial Lubricant SW	220 (-25)	320 (-25)	460 (-23)	680 (-20)	1000 (-28)
	Berox SL Range	220 (-40)	320 (-37)	460 (-23)		
	Berox Oil Soluble Industrial Lube **x**	220 (-23)				
Mobil Oil Company Limited	Glygoyle	30 (-22)	HE320 (-37)	HE460 (-35)		
Optimal Ölwerke GmbH	Optiflex A **+**	220 (-28)	320 (-28)	460 (-28)	680 (-28)	1000 (-25)
Shell Oils	Tivela	SB (-25)	SC (-25)	SD (-23)		
	Tivela S	220 (-34)	320 (-34)	460 (-34)		
Texaco Limited	Synlube CLP	220 (-34)	320 (-31)	460 (-10)	680 (-31)	
Total	Carter SY	220 (-25)	320 (-28)	460 (-22)		
Tribol GmbH	Tribol 800	220 (-27)	320 (-25)	460 (-25)	680 (-25)	1000 (-23)

+ NOT SUITABLE FOR APPLICATIONS REQUIRING INDUSTRIAL EP ADDITIVES
x THIS PARTICULAR LUBRICANT IS COMPATIBLE WITH TYPES M, A, E, AND H
NOTE: TYPE G LUBRICANTS WILL AFFECT CERTAIN GEARCASE PAINTS AND SHRINK CERTAIN SEALS, CONTACT TEXTRON POWER TRANSMISSION BEFORE USE.

DANGER:
Numbers in brackets indicate the minimum pour point temperature of the specified oil in °C
THE UNIT MUST NOT BE RUN BELOW THIS TEMPERATURE.

Approved Lubrication.

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

SUPPLIER	LUBRICANT RANGE	TEXTRON GRADE NUMBERS	
		5H	6H
		AMBIENT TEMPERATURE RANGE °C	
		-30 to 35	2 to 50
Batoyle Freedom Group	Titan	220 (-31)	320 (-28)
Boxer Services / Millers Oils	Silkgear	220 (-35)	320 (-35)
BP Oil International Limited	Enersyn EPX		320 (-28)
Caltex	Pinnacle EP	220 (-43)	320 (-43)
Carl Bechem GmbH	Berusynth GP	220 (-38)	320 (-35)
Castrol International	Alphasyn EP	220 (-37)	320 (-31)
	Alphasyn T	220 (-31)	320 (-28)
Chevron International Oil Co	Tegra	220 (-46)	320 (-33)
Esso/Exxon	Spartan Synthetic EP	220 (-46)	320 (-43)
Fuchs Lubricants	Renogear SG	220 (-32)	320 (-30)
	Renolin Unisyn CLP	220 (-37)	320 (-34)
Klüber Lubrication	Klübersynth GEM4	220 (-30)	320 (-25)
Kuwait Petroleum International	Q8 El Greco	220 (-22)	320 (-19)
Lubrication Engineers Inc.	Synolec Gear Lubricant	9920 (-40)	
Mobil Oil Company Limited	Mobilgear SHC	220 (-40)	320 (-37)
	Mobil gear XMP	220 (-40)	320 (-33)
Optimal Ölwerke GmbH	Optigear Synthetic A	220 (-31)	320 (-31)
Petro-Canada	Super Gear Fluid	220 (-43)	320 (-37)
Shell Oils	Omala HD	220 (-43)	320 (-40)
Texaco Limited	Pinnacle EP	220 (-43)	320 (-43)
	Pinnacle WM	220 (-43)	320 (-40)
Total	Carter EP/HT	220 (-34)	320 (-31)
Tribol GmbH	Tribol 1510	220 (-36)	320 (-33)

DANGER:

Numbers in brackets indicate the minimum pour point temperature of the specified oil in °C
THE UNIT MUST NOT BE RUN BELOW THIS TEMPERATURE.

SERIES C
LUBRICATION

LUBRICANT AND QUANTITY

Unit sizes C03, 04, 05 and 06 are factory filled with a grade 6G lubricant.

Unit sizes C07, 08, 09 and 10 will be despatched without oil.

Note: Catalogue ratings are based on the polyglycol range of synthetic oils recommended on this page. The use of mineral or special oils will require a derate, please contact our Application Engineers.

The oil grade is stamped on the name plate and the oil level should be taken using the level plug. These are determined from the operating speed of the gear unit and the ambient temperature range, which if not given when ordering will be assumed to be 1450 rev / min input and ambient temperature range 0 to 35°C. Oil grades and oil level should therefore always be checked before installation, instructions are provided with all units despatched.
To determine the oil grade refer to table 1, and then subsequently to the approved lubricant tables which give approved lubricants for use in our industrial gearboxes.
To determine the oil capacity refer to appropriate table 2 or 3. Oil capacities are only approximate and units should be filled until oil escapes from the level plug holes. Do not overfill as excess will cause overheating and leakage.

If not stated with the order these are the operating conditions that will be assumed

TABLE 1 SERIES C OIL GRADES

GEAR UNIT DETAILS			AMBIENT TEMPERATURE RANGE *		
UNIT TYPE	RATIO RANGE	INPUT SPEED (REV / MIN)	-30°C to 20°C	0°C to 35°C	20°C to 50°C
DOUBLES	8 - 18	0 - 750	6G	6G	8G
		>750 - 2000	5G	6G	7G
		>2000 - 3000	5G	6G	6G
	20 - 36	0 - 2000	6G	6G	8G
		>2000 - 3000	5G	6G	7G
	40 - 250	0 - 3000	6G	6G	8G
QUADRUPLES	< - 2800	0 - 750	6G	7G	9G
		>750 - 3000	6G	6G	8G
	3200 - 16000	0 - 3000	6G	7G	9G

* For other ambient temperatures please refer to our Application Engineers

TABLE 2 LUBRICANT QUANTITY (Litres) (double reduction and final stage quadruple reduction)

DOUBLE REDUCTION AND FINAL STAGE QUADRUPLE REDUCTION										
Unit Size			C0322	C0422	C0522	C0622	C0722	C0822	C0921	C1021
MOUNTING POSITION	1	Level 1 •	0.3	0.4	0.7	1.5	4.5	7.4	14.4	21.6
		Level 2 •					3.4	6.5	8.5	12.2
	2		0.5	0.7	1.0	2.3	3.7	6.0	11.1	19.0
	3		0.5	0.6	1.0	2.2	3.7	6.0	11.1	19.0
	4	Level 1 •	0.7	1.0	1.4	3.1	5.5	10.25	17.1	31.3
		Level 2 •					3.2	5.75	7.5	17.3
	5		0.6	0.9	1.4	3.0	6.1	9.6	16.6	31.5
	6 *	Motorised	0.65 (0.65)	1.0 (0.88)	1.4 (1.3)	3.2 (3.0)	5.2	9.4	17.0	28.8
		Reducer	0.85 (0.75)	1.2 (1.0)	1.6 (1.5)	3.4 (3.1)	5.6	9.8	17.4	29.2

• See page 31 for oil level positions

* For PG kits 0.8 to 2.8 use the quantities in brackets

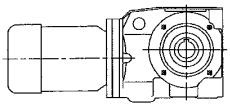
TABLE 3 LUBRICANT QUANTITY (Litres) (primary stage quadruple reduction)

PRIMARY STAGE QUADRUPLE REDUCTION									
Unit Size		C0342	C0442	C0542	C0642	C0742	C0842	C0941	C1041
SECONDARY UNIT (Lubricant quantity see table 2)		C0322	C0422	C0522	C0622	C0722	C0822	C0921	C1021
PRIMARY UNIT		M0122	M0122	M0122	M0322	M0322	M0522	M0522	M0722
PRIMARY QUANTITY • (Unit lubricant)	1 to 4	1.1	1.1	1.1	1.5	1.5	2.5	2.5	4.9
	5 & 6	0.7	0.7	0.7	0.8	0.8	1.6	1.6	2.8

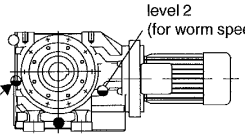
• Unit filled with Grade 6G lubricant suitable for all ambient temperatures between 0°C to 35°C and are 'lubricated for life'

SERIES C
LUBRICATION FILL LEVELS

MOUNTING 1 — **C03, 04, 05, 06** ●

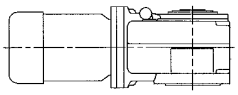


C07, 08, 09, 10

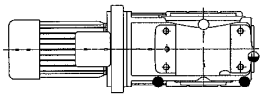


$$\text{Wormspeed} = \frac{\text{Input Speed}}{\text{Nominal Ratio}} \times \text{Worm Ratio}$$ (see page 7)

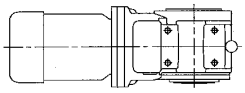
MOUNTING 2 — **C03, 04, 05, 06** ●



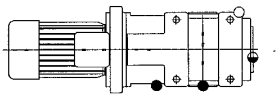
C07, 08, 09, 10



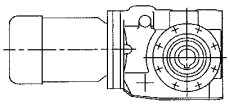
MOUNTING 3 — **C03, 04, 05, 06** ●



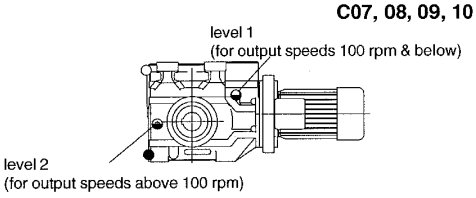
C07, 08, 09, 10



MOUNTING 4 — **C03, 04, 05, 06** ●

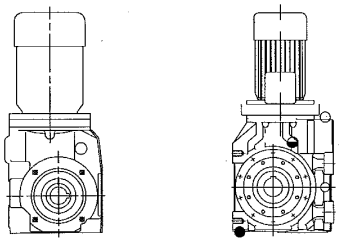


C07, 08, 09, 10



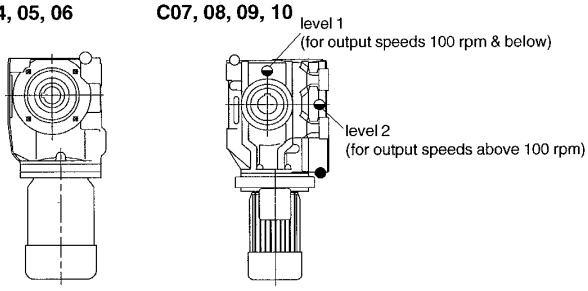
MOUNTING 5

C03, 04, 05, 06 ● **C07, 08, 09, 10**



MOUNTING 6

C03, 04, 05, 06 **C07, 08, 09, 10**



MOTOR MUST BE FITTED WITH SEAL FOR THIS POSITION

● DRAIN POSITION
◒ LEVEL POSITION
} C07/08/09/10 ONLY
○ VENTILATOR / FILLING POSITION

● THESE UNITS ARE NOT FITTED WITH A VENTILATOR
SIZES C03 AND C04 HAVE TWO TAPPED HOLES FOR FILLING PURPOSES,
SIZES C05 AND C06 HAVE THREE TAPPED HOLES FOR FILLING PURPOSES

BAUINDUSTRIE PAPIER & ZELLSTOFF KFZ-TECHNIK

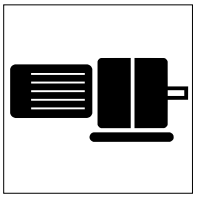
BERGBAU LANDWIRTSCHAFT TRANSPORTINDUSTRIE

CHEMIE LEBENSMITTEL SERVICE

MINERALSTOFFE METALLE WASSER

HOLZINDUSTRIE SCHIFFFAHRT ZEMENT

KUNSTSTOFF ENERGIE TEXTILINDUSTRIE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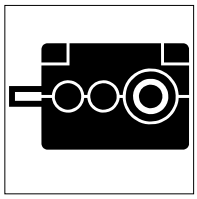
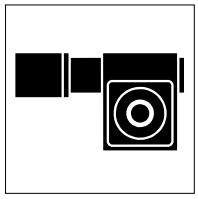

Industriegetriebe


SChneckengetriebe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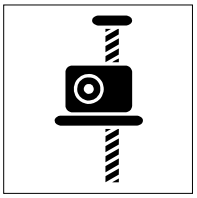
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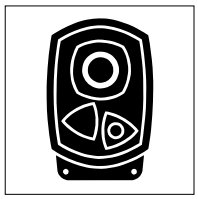
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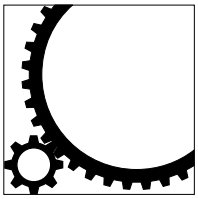
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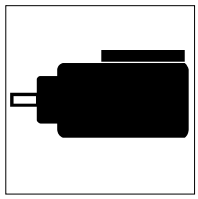
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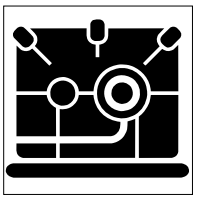
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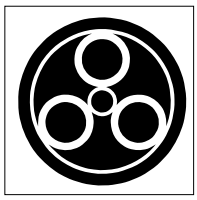
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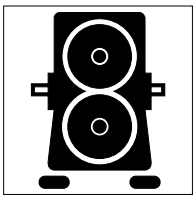
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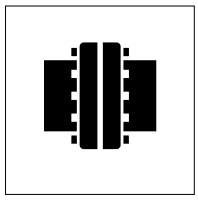
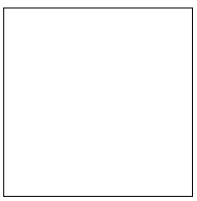

Kupplungen


Service

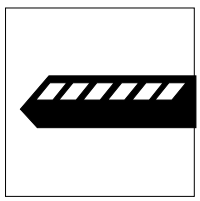
ASC ANTRIEBE DISTRIBUTION & SERVICE GMBH

AT 4470 ENNS **Westbahnstrasse 4**

Telefon **++43 7223 82660-0**

Telefax **++43 7223 82660-4**

office@asc-antriebe.at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