

**STERLING  
ELECTRIC, INC.**

*Responding with equipment that performs.*

***SLO-SPEED<sup>®</sup>***

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***2000HW***

**INSTALLATION & MAINTENANCE  
W030 through W080**

**WHERE QUALITY IS IN CONTROL**

**Product Safety Information**

**General** - Sterling Electric 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 vapor 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 of serious overheating (over 570°F), 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 arrangement drawing or 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, Sterling Electric, Inc. 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 bearing 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 Sterling Electric, Inc. 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 backup 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.

**GENERAL INFORMATION**

The following instructions will help you achieve a satisfactory installation of your Sterling Electric 2000HW unit, ensuring the best possible conditions for a long and trouble free operation.

All units are tested and checked prior to shipment; 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.

**1 FITTING OF COMPONENTS TO EITHER THE UNIT INPUT OR OUTPUT SHAFT**

Shaft diameters below 1.75 inches are held to limits of +0.0000 -0.0005.  
Shaft diameters of 1.75 inches and above are held to limits of +0.000 -0.001.

- 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 176/212°F to aid assembly further.

**THREADED HOLE DETAILS**

| Unit Size     | Input Shaft           | Output Shaft                            |
|---------------|-----------------------|-----------------------------------------|
| W0302 / W0303 | 1/4" UNF x 0.49 deep  | 1/4" UNF x 0.63 deep                    |
| W0402 / W0403 | 1/4" UNF x 0.49 deep  | 1/4" UNF x 0.63 deep                    |
| W0502 / W0503 | 1/4" UNF x 0.49 deep  | 3/8" UNF x 0.87 deep                    |
| W0602         | 1/4" UNF x 0.63 deep  | 1/2" UNF x 1.125 deep<br>(1.375 øShaft) |
| W0603         | 1/4" UNF x 0.49 deep  |                                         |
| W0702         | 5/16" UNF x 0.63 deep | 5/8" UNF x 1.44 deep                    |
| W0703         | 1/4" UNF x 0.63 deep  | 5/8" UNF x 1.44 deep                    |
| W0802         | 3/8" UNF x 0.87 deep  | 3/4" UNF x 1.75 deep                    |

## **2** **INSTALLATION**

### **2.1** **MOTORISED AND REDUCERS**

All sizes are supplied factory filled with correct amount of lubricant for mounting position quoted.

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 the same oil is used that is already in the unit.

### **2.2** **GEAR REDUCERS**

If the unit has been supplied as a gear reducer type to allow mounting of the motor separately, then refer to Appendix 1.

### **2.3** **MOUNTING TO CUSTOMER EQUIPMENT**

Use bolts of ISO grade 8.8 minimum when mounting the gear head flange or feet to the customer equipment.

Torque tighten to:

| <b>Bolt Size</b> | <b>Tightening Torque (in. lb.)</b> | <b>Tightening Torque (ft. lb.)</b> |
|------------------|------------------------------------|------------------------------------|
| M6               | 88                                 | 7.3                                |
| M8               | 220                                | 18.3                               |
| M10              | 450                                | 37.5                               |
| M12              | 750                                | 62.5                               |
| M16              | 1770                               | 147.5                              |
| M20              | 3100                               | 258.3                              |
| M24              | 5400                               | 450.0                              |

## **2.4 MOTOR CONNECTIONS TO MAINS**

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

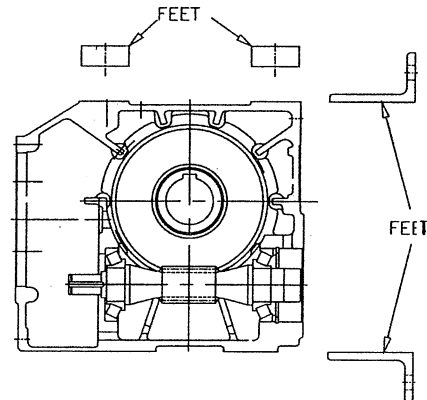
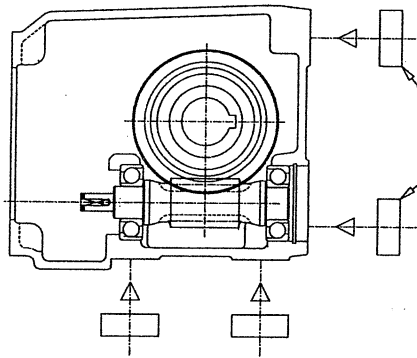
## **2.5 FOOT MOUNTED UNITS**

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 flexible coupling.

- a) Clean shaft extensions.
- b) Secure unit, or baseplate if fitted to a rigid foundation, using heavy duty bolts of 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 4).  
**Note:** It is important to ensure when aligning unit on baseplate that all machined mounting points are supported over their full area. If steel shims are used these should be placed either side of the foundation bolt as close as possible. During the final 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 guidelines.
- g) Check motor wiring for correct direction of rotation this is important when a holdback device is utilized.
- h) Fill gear unit with oil (if not factory filled) as detailed in Section 3.

## **2.6 FITTING FEET ON UNITS**

Series HW units are fitted with detachable feet. These are normally factory assembled, 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.



- Scrape any paint etc off foot location surfaces.
- Clean feet and case mounting faces.
- Fit feet with bolts to torques:

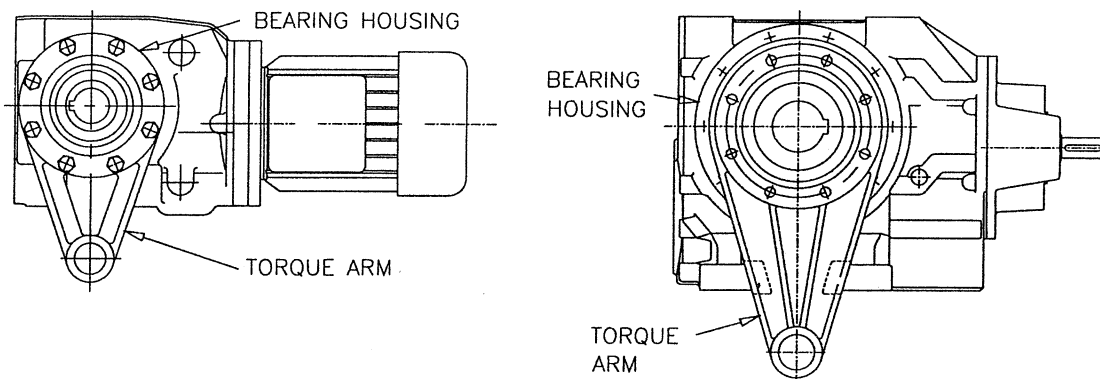
| Unit Size   | Bolt Size | Torque (in. lb.) |
|-------------|-----------|------------------|
| W030        | M8        | 220              |
| W040 / W050 | M10       | 450              |
| W060        | M12       | 750              |
| W070 / W080 | M20       | 1560             |

## **2.7 SHAFT MOUNTED UNITS**

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

- a) Clean shaft extensions and bore.
- b) Locate in position, using the most convenient method available see Appendix 5, 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 5.
- d) Fit torque arm to the side of the unit adjacent to the driven machine where possible, as detailed on next page.

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



- Remove bearing housing bolts (**note:** take care not to split gasket joint).
- Clean torque arm & bearing housing surfaces.
- Fit torque arm as shown (unless order states otherwise) with longer bolts provided.
- Torque tighten to:

| Unit Size       | Bolt Size | Torque (in. lb.) |
|-----------------|-----------|------------------|
| W03 / W04 / W05 | M8        | 220              |
| W06             | M10       | 440              |
| W07 / W08       | M12       | 750              |

- e) Anchor case to a secure point by means of the torque arm.
- f) Fit guards in accordance with the factory requirements.
- 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.

## **2.8 REPLACEMENT OF OIL SEALS**

- a) Clean and drain the unit.
- b) Remove the holding screws and withdraw cover.  
**NOTE:** Take care not to damage the shims and do not alter the shaft position. Check for burrs or scratches on the shaft which could damage the new seal.
- c) Tap the old seal out of the housing or cover using an appropriate sized fixture.

- d) Ensure that joint faces and shims are clean and position the shims in the cover.
- f) Coat joint faces of cover and case with a good jointing compound, replace oil catcher and tighten screws.
- g) Smear oil seals with grease (See Appendix 3).
- h) Fit replacement seal on a seal guide, slide it along the shaft and press the seal into the housing or cover. See Appendix 1 for seal part numbers.
- i) Fill with the correct amount of an approved lubricant, see Appendix 2.

### **3 LUBRICATION AND MAINTENANCE**

#### **3.1 LUBRICATION**

Units are factory filled.

#### **3.2 PERIODIC INSPECTION**

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

#### **3.3 OIL CHANGES**

Size W030 and W040 units are lubricated for life. On all other sizes, regular oil changes are essential and the following factors should be used to determine the frequency of these changes.

- a) Oil temperature - unit operating under load.
- b) Type of oil.
- c) Environment - humidity, dust, etc.
- d) 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:

| <b>Unit Operating Temperature °F</b>                                                                                                                  | <b>Renewal Period Synthetic Oil</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 158 or less                                                                                                                                           | 26000 Hours or 3 Years              |
| 167                                                                                                                                                   | 22000 Hours or 3 Years              |
| 176                                                                                                                                                   | 15000 Hours or 3 Years              |
| 185                                                                                                                                                   | 10500 Hours or 3 Years              |
| 194                                                                                                                                                   | 7500 Hours or 2.5 Years             |
| 203                                                                                                                                                   | 6000 Hours or 2 Years               |
| 212                                                                                                                                                   | 4500 Hours or 18 Months             |
| <b>Initial fill of oil should be changed in a new gear unit after 1000 hours operation, one year or half the above life whichever is the soonest.</b> |                                     |

**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.

**3.4 LUBRICANT QUANTITY**

The quantity of lubricant required by size and mounting position is given in Table 2, Appendix 2. Mounting positions are also included in Appendix 2.

**3.5 APPROVED LUBRICANTS**

Table 3 Appendix 2 gives the lubricants approved for use in the gear unit.

**3.6 APPROVED GREASES**

Appendix 3 gives the greases approved for use in the unit.

**3.7 CLEANING**

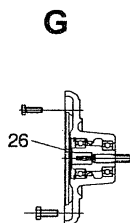
With the drive stationary periodically clean any dirt or dust from the gear unit and the electric motor cooling fins and fan guard to aid cooling.

**4 NOISE**

The range of Series HW 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), (AGMA 299.01).

**ASSEMBLY OF MOTOR AND MOTOR ADAPTOR TO THE GEAR HEAD**

| Motor Frame | Reducer Size                  |                |       |       |
|-------------|-------------------------------|----------------|-------|-------|
|             | W0302/03<br>W0402/03<br>W0603 | W0602<br>W0703 | W0702 | W0802 |
| 56C         | G                             | G              | G     | G     |
| 143/145TC   | G                             | G              | G     | G     |
| 182/184TC   | G                             | G              | G     | G     |
| 213/215TC   | N/A                           | G              | G     | G     |
| 254/256TC   | N/A                           | N/A            | G     | G     |



- Apply liquid gasket material (Loctite 514) to the gearhead, securing with screws provided.
- Fit motor adaptor assembly to the gearhead, securing with screws provided.
- Spray plug-in shaft (26) bore with MOLYKOTE TTF 52 spray.
- Attach the electric motor to the assembly securing with the screws provided.

**OIL SEALS**

| Shaft-in Input Seals |                 |            |
|----------------------|-----------------|------------|
| Unit Size            | Dimensions (mm) | CR Seal No |
| W03R<br>W04R<br>W05R | 20 x 32 x 7     | 7918       |
| W0602R               | 24 x 35 x 7     | 9500       |
| W0603R               | 20 x 32 x 7     | 7918       |
| W07R                 | 30 x 40 x 7     | 11604      |
| W08R                 | 35 x 50 x 7     | 13933      |

| C-face Input Seals                      |                 |            |
|-----------------------------------------|-----------------|------------|
| Unit Size                               | Dimensions (mm) | CR Seal No |
| W03C<br>W04C<br>W05C<br>W06C(56C-140TC) | 45 x 60 x 8     | 17752      |
| W06C(180TC-250TC)                       | 68 x 90 x 10    | 26648      |
| W07C(56C-140TC)                         | 45 x 60 x 8     | 17752      |
| W07C(180TC-250TC)<br>W08C               | 68 x 90 x 10    | 26648      |

| Output Seals |                 |            |
|--------------|-----------------|------------|
| Unit Size    | Dimensions (mm) | CR Seal No |
| W03          | 35 x 50 x 7     | 13933      |
| W04          | 45 x 60 x 8     | 17740      |
| W05          | 55 x 70 x 8     | 21612      |
| W06          | 63 x 85 x 10    | 24758      |
| W07          | 80 x 100 x 10   | 31512      |
| W08          | 95 x 120 x 12   | 37039      |

**TABLE 1 SERIES HW OIL GRADES**

| Gear Unit Details |             |                              | Ambient temperature Range * |              |               |
|-------------------|-------------|------------------------------|-----------------------------|--------------|---------------|
| Unit Type         | Ratio Range | Input Speed<br>(Rev. / Min.) | -22°F to 50°F               | 14°F to 86°F | 68°F to 122°F |
| Double            |             | 0 - 750                      | 6G                          | 6G           | 8G            |
|                   | 8 - 18      | 751 - 2000                   | 5G                          | 6G           | 7G            |
|                   |             | 2001 - 3000                  | 4G                          | 6G           | 6G            |
|                   | 20 - 36     | 0 - 2000                     | 6G                          | 6G           | 8G            |
|                   |             | 2001 - 3000                  | 5G                          | 6G           | 7G            |
|                   | 40 - 250    | 0 - 3000                     | 6G                          | 6G           | 8G            |
| Triple            | All Ratios  | 0 - 3000                     | 6G                          | 6G           | 8G            |

\* For other ambient temperatures, refer to Sterling Electric.

The operating conditions used by Sterling Electric if not stated by customer at time of order.

**TABLE 2 LUBRICANT QUANTITY(Gallons)**

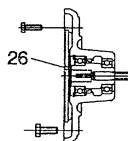
| Double Reduction     |     |           |       |       |       |       |       |
|----------------------|-----|-----------|-------|-------|-------|-------|-------|
| Unit Size            |     | W0302     | W0402 | W0502 | W0602 | W0702 | W0802 |
| Mounting<br>Position | ABC | .078      | .104  | .182  | .390  | 1.066 | 1.560 |
|                      | DEF | .208      | .260  | .416  | .858  | 1.248 | 2.262 |
|                      | GHJ | .156      | .208  | .286  | .650  | 1.092 | 1.560 |
|                      | KMN | .156      | .182  | .286  | .598  | 1.092 | 1.560 |
|                      | PST | .156      | .234  | .364  | .780  | 1.690 | 2.418 |
|                      | WXY | Motorized | .208  | .286  | .442  | 1.092 | 1.144 |
|                      |     | Reducer   | .260  | .338  | .494  | 1.144 | 1.248 |

| Triple Reduction     |     |           |       |       |       |       |
|----------------------|-----|-----------|-------|-------|-------|-------|
| Unit Size            |     | W0303     | W0403 | W0503 | W0603 | W0703 |
| Mounting<br>Position | ABC | .104      | .130  | .234  | .4160 | 1.196 |
|                      | DEF | .338      | .442  | .546  | 1.092 | 1.456 |
|                      | GHJ | .234      | .260  | .338  | .6760 | 1.430 |
|                      | KMN | .208      | .234  | .390  | .6760 | 1.430 |
|                      | PST | .260      | .338  | .520  | 1.196 | 2.678 |
|                      | WXY | Motorized | .338  | .416  | .572  | 1.300 |
|                      |     | Reducer   | .390  | .468  | .624  | 1.352 |

**ASSEMBLY OF MOTOR AND MOTOR ADAPTOR TO THE GEAR HEAD**

| Motor Frame | Reducer Size                  |                |       |       |
|-------------|-------------------------------|----------------|-------|-------|
|             | W0302/03<br>W0402/03<br>W0603 | W0602<br>W0703 | W0702 | W0802 |
| 56C         | G                             | G              | G     | G     |
| 143/145TC   | G                             | G              | G     | G     |
| 182/184TC   | G                             | G              | G     | G     |
| 213/215TC   | N/A                           | G              | G     | G     |
| 254/256TC   | N/A                           | N/A            | G     | G     |

**G**



- Apply liquid gasket material (Loctite 514) to the gearhead, securing with screws provided.
- Fit motor adaptor assembly to the gearhead, securing with screws provided.
- Spray plug-in shaft (26) bore with MOLYKOTE TTF 52 spray.
- Attach the electric motor to the assembly securing with the screws provided.

**OIL SEALS**

| Shaft-in Input Seals |                 |            |
|----------------------|-----------------|------------|
| Unit Size            | Dimensions (mm) | CR Seal No |
| W03R<br>W04R<br>W05R | 20 x 32 x 7     | 7918       |
| W0602R               | 24 x 35 x 7     | 9500       |
| W0603R               | 20 x 32 x 7     | 7918       |
| W07R                 | 30 x 40 x 7     | 11604      |
| W08R                 | 35 x 50 x 7     | 13933      |

| C-face Input Seals   |                 |            |
|----------------------|-----------------|------------|
| Unit Size            | Dimensions (mm) | CR Seal No |
| W03C<br>W04C<br>W05C | 45 x 60 x 8     | 17752      |
| W06C(56C-140TC)      |                 |            |
| W06C(180TC-250TC)    | 68 x 90 x 10    | 26648      |
| W07C(56C-140TC)      | 45 x 60 x 8     | 17752      |
| W07C(180TC-250TC)    | 68 x 90 x 10    | 26648      |
| W08C                 |                 |            |

| Output Seals |                 |            |
|--------------|-----------------|------------|
| Unit Size    | Dimensions (mm) | CR Seal No |
| W03          | 35 x 50 x 7     | 13933      |
| W04          | 45 x 60 x 8     | 17740      |
| W05          | 55 x 70 x 8     | 21612      |
| W06          | 63 x 85 x 10    | 24758      |
| W07          | 80 x 100 x 10   | 31512      |
| W08          | 95 x 120 x 12   | 37039      |

**SYNTHETIC OILS**

**TYPE G - POLYGLYCOL BASED SYNTHETIC**

| Lubrication Supplier      | Lubrication Range Name | See Notes | Oil Grade No. |           |           |           |           |           |           |
|---------------------------|------------------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                           |                        |           | 3G            | 4G        | 5G        | 6G        | 7G        | 8G        | 9G        |
| Applied Chemicals Ltd.    | Tribol 800             | b         | 100 (-35)     | 150 (-35) | 220 (-17) | 320 (-13) | 460 (-13) | 680 (-13) | 1000 (-9) |
| BP Oil Ltd.               | Enersyn SG-XP          | b,e       | -             | -         | 220 (-24) | -         | 460 (-18) | 680 (-18) | -         |
| Esso Petroleum / Exxon    | Glycolube              | b         | -             | 150 (-13) | 220 (-13) | 320 (-13) | 460 (-9)  | -         | -         |
| INT Specialty Chemical    | Breox IND LUB SW       | b         | -             | 150 (-13) | 220 (-13) | 320 (-13) | 460 (-9)  | -         | -         |
| Kluber Lubrication        | Klubersynth GH6        | b,g       | 100 (-22)     | 150 (-22) | 220 (-13) | 320 (-13) | 460 (-4)  | 680 (-4)  | 1000 (-4) |
| Koolex International Inc. | Q8 Gade                | b         | -             | -         | 220 (-8)  | 320 (-8)  | 460 (-8)  | -         | -         |
| Shell Oils                | Tivela                 | b         | -             | SA (-18)  | SB (-13)  | SC (-13)  | SD (-9)   | -         | -         |

**TYPE H - POLYOLEFIN - ESTER BASED SYNTHETIC**

| Lubricant Supplier         | Lubricant Range Name | See Notes | Oil Grade No. |           |            |           |           |           |           |
|----------------------------|----------------------|-----------|---------------|-----------|------------|-----------|-----------|-----------|-----------|
|                            |                      |           | 3H            | 4H        | 5H         | 6H        | 7H        | 8H        | 9H        |
| Applied Chemicals Ltd.     | Tribol 1510          | b         | 100 (-47)     | 150 (-42) | 220 (-33)  | 320 (-27) | 460 (-18) | 680 (-13) | 1000 (-9) |
| BP Oil Ltd.                | Enersyn EPX          |           | -             | -         | -          | 320 (-18) | -         | -         | -         |
|                            | Enersyn HTX          | b,e       | -             | -         | 220 (-24)  | 320 (-24) | 460 (-13) | -         | -         |
| Century Oils Ltd.          | Century SG Series    | b         | -             | SGE (-31) | SGF (-26)  | SGG (-22) | -         | -         | -         |
| Chevron / Gulf Oil Co.     | Gulf Synthetic DBH   | b         | 100 (-35)     | 150 (-35) | 220 (-56)  | -         | 460 (-56) | -         | -         |
|                            | Chevron Tegra        | b         | -             | -         | 220 (-51)  | -         | 460 (-40) | -         | -         |
| ESSO Petroleum Co. Ltd.    | Spartan Synthetic EP | b,e       | 100 (-33)     | 150 (-33) | 220 (-29)  | 320 (-24) | 460 (-18) | -         | -         |
|                            | Teresso Synth HP     | b         | -             | 150 (-35) | 220 (-35)  | 320 (-24) | 460 (-13) | -         | -         |
| Exxon                      | Terristic SHP        | b         | 100 (-40)     | 150 (-29) | 220 (-26)  | 320 (-22) | 460 (-8)  | -         | -         |
| Kluber Lubrication         | Klubersynth GEM4     | b         | 100 (-40)     | 150 (-40) | 220 (-31)  | 320 (-31) | 460 (-22) | 680 (-13) | -         |
| Koolex International Inc.  | Q8 Schumann          | b         | 100 (-45)     | -         | -          | -         | -         | -         | -         |
|                            | Q8 El Greco          | b         | -             | 150 (-18) | 220 (-8)   | 320 (-2)  | 460 (-3)  | -         | -         |
| Lubrication Engineers Inc. | Synolec Gear Oil     | b         | -             | -         | 9920 (-40) | -         | -         | -         | -         |
| Mobil Oil Co. Ltd.         | SHC 600 Series       | b         | 627 (-40)     | 629 (-40) | 630 (-40)  | 632 (-35) | 634 (-25) | 636 (-20) | 639 (-9)  |
| Shell Oils                 | Hyperia S            | b         | -             | -         | 220 (-58)  | 320 (-49) | 460 (-40) | -         | -         |
| Texaco Ltd.                | Synerol Star EP      | b         | 100 (-49)     | 150 (-40) | 220 (-35)  | 320 (-36) | 460 (-25) | -         | -         |

**DANGER** Numbers in brackets indicates recommended minimum operating temperature in °F. THE UNIT MUST NOT BE RUN BELOW THIS TEMPERATURE

- NOTES**
- These lubricants are straight mineral oils with no additives; their renewal period should be determined by adding 50°F to the unit operating temperature.
  - These lubricants should not be used in units fitted with trailing sprag holdback devices without prior agreement with the manufacturer or Sterling Electric Applications Department; the additives, or the base fluids may modify the coefficient of friction which these devices depend.
  - These lubricants contain lead based EP additives. They should not be used in units operating with bulk oil temperatures above 176°F. They must not be used in units fitted with trailing sprag holdback devices.
  - These lubricants contain additives which may adversely affect silvered or white metal components; consult oil supplier.
  - These lubricants are not suitable for use with aluminium or aluminium alloy components.

**MINERAL OILS****TYPE M - STRAIGHT MINERAL OIL**

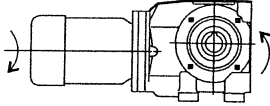
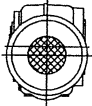
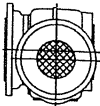
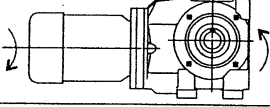
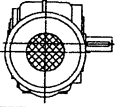
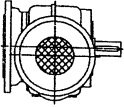
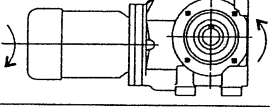
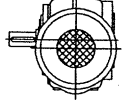
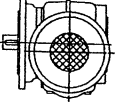
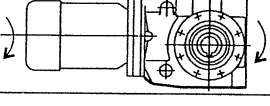
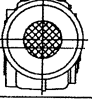
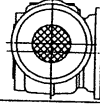
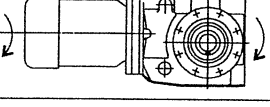
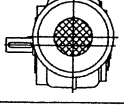
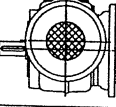
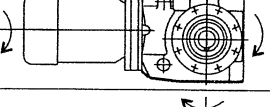
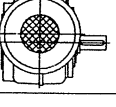
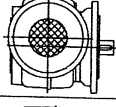
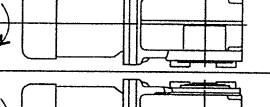
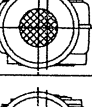
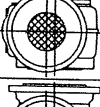
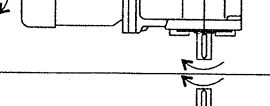
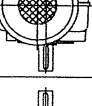
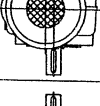
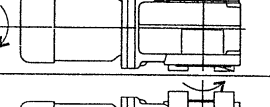
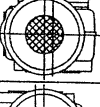
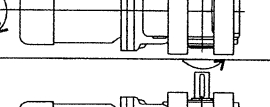
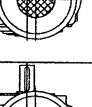
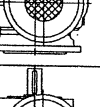
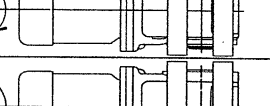
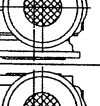
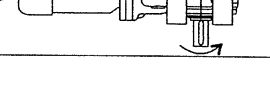
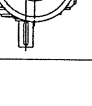
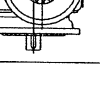
| Lubricant Supplier         | Lubricant Range Name    | Refer to Notes | Oil Grade No. |            |            |          |           |
|----------------------------|-------------------------|----------------|---------------|------------|------------|----------|-----------|
|                            |                         |                | 5M            | 6M         | 7M         | 8M       | 9M        |
| BP Oil Ltd.                | Energol CS & DC Series  | a              | CS220 (25)    | CS320 (25) | CS460 (25) | -        | -         |
| Century Oils Ltd.          | Centlube 'O' Series     | b              | -             | U0 (27)    | H0 (28)    | -        | -         |
|                            | PWL & WL Series         | b              | PWLR (9)      | -          | -          | -        | -         |
| Chevron / Gulf Oil Co.     | Harmony                 |                | 220 (19)      | 320 (19)   | 460 (19)   | -        | -         |
| ESSO Petroleum Co. Ltd.    | Teresso                 |                | 220 (9)       | 320 (23)   | 460 (25)   | -        | -         |
|                            | Canthus TX              | a              | -             | -          | -          | -        | 1000 (27) |
| Exxon                      | Teresstic               |                | 220 (10)      | 320 (23)   | 460 (25)   | -        | -         |
| Kluber Lubrication         | Crucolan                |                | 220 (23)      | 320 (23)   | 460 (23)   | -        | -         |
| Koolex International Inc.  | Q8 Verdi                |                | 220 (-2)      | 320 (19)   | 460 (19)   | -        | -         |
| Lubrication Engineers Inc. | Multitec Industrial Oil |                | 6806 (18)     | 6807 (18)  | -          | -        | -         |
| Shell Oils                 | Vitrea                  | a              | 220 (30)      | 320 (30)   | 460 (30)   | 680 (30) | -         |
| Texaco Ltd.                | Regal Oil R & O         |                | 220 (30)      | 320 (30)   | 460 (30)   | -        | -         |

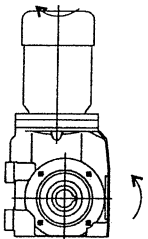
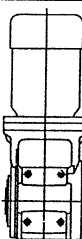
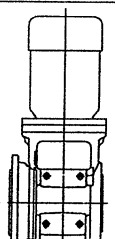
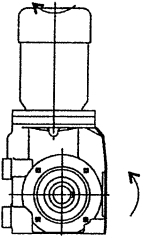
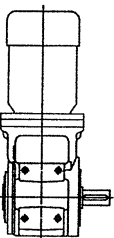
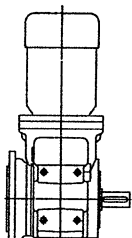
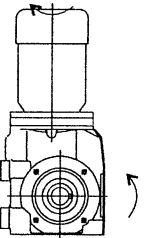
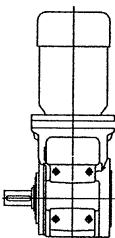
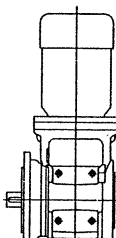
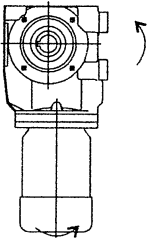
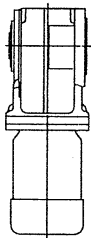
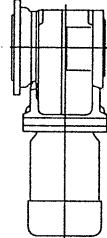
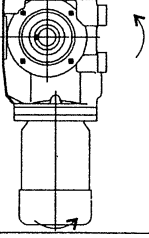
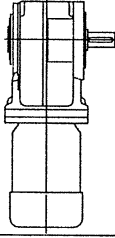
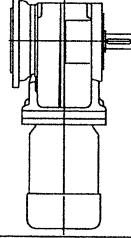
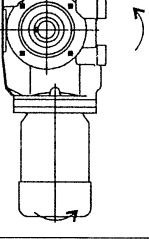
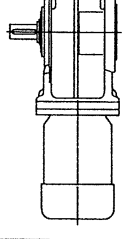
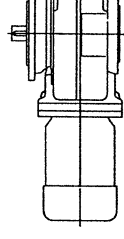
**TYPE A - MINERAL OIL PLUS MILD EP ADDITIVE**

| Lubricant Supplier     | Lubricant Range Name | Refer to Notes | Oil Grade No. |         |         |    |    |
|------------------------|----------------------|----------------|---------------|---------|---------|----|----|
|                        |                      |                | 5A            | 6A      | 7A      | 8A | 9A |
| Applied Chemicals Ltd. | Tribol 770 Series    | b              | 779 (28)      | -       | -       | -  | -  |
| Century Oils Ltd.      | Centigear            | c              | F (30)        | G (30)  | H (30)  | -  | -  |
| Chevron / Gulf Oil Co. | Hydrasil             | b              | 220 (19)      | -       | -       | -  | -  |
| Mobil Oil Co. Ltd.     | DTE                  | b,e            | BB (19)       | AA (36) | HH (36) | -  | -  |

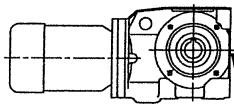
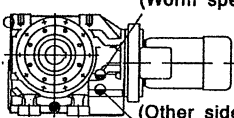
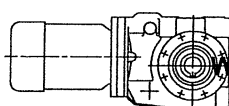
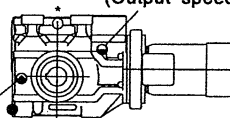
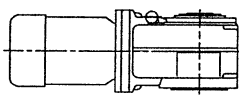
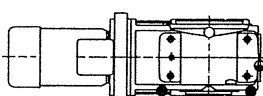
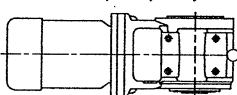
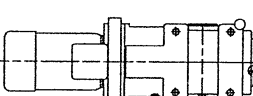
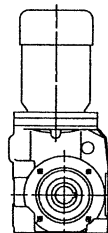
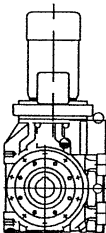
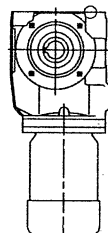
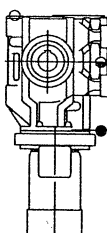
**DANGER** Numbers in brackets indicates recommended minimum operating temperature in °F. THE UNIT MUST NOT BE RUN BELOW THIS TEMPERATURE.

- NOTES**
- a) These lubricants are straight mineral oils with no additives; their renewal period should be determined by adding 50°F to the unit operating temperature.
  - b) These lubricants should not be used in units fitted with trailing sprag holdback devices without prior agreement with the manufacturer or Sterling Electric Applications Department; the additives, or the base fluids may modify the coefficient of friction which these devices depend.
  - c) These lubricants contain lead based EP additives. They should not be used in units operating with bulk oil temperatures above 176°F. They must not be used in units fitted with trailing sprag holdback devices.
  - e) These lubricants contain additives which may adversely affect silvered or white metal components; consult oil supplier.
  - f) These lubricants are not suitable for use with aluminium or aluminium alloy components.

| Mounting Position | Double output shafts are available for all mounting positions<br>Mounting positions shown as motorized - applies for reducers also |                                                                                      |                                                                                       |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>A</b>          |                                                   |    |    |
| <b>B</b>          |                                                   |    |    |
| <b>C</b>          |                                                   |    |    |
| <b>D</b>          |                                                   |    |    |
| <b>E</b>          |                                                   |    |    |
| <b>F</b>          |                                                  |   |   |
| <b>G</b>          |                                                 |  |  |
| <b>H</b>          |                                                 |  |  |
| <b>J</b>          |                                                 |  |  |
| <b>K</b>          |                                                 |  |  |
| <b>M</b>          |                                                 |  |  |
| <b>N</b>          |                                                 |  |  |

| Mounting Position | Double output shafts are available for all mounting positions<br>Mounting positions shown as motorized - applies for reducers also |                                                                                     |                                                                                       |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| P                 |                                                   |    |    |
| S                 |                                                   |    |    |
| T                 |                                                  |   |   |
| W                 |                                                 |  |  |
| X                 |                                                 |  |  |
| Y                 |                                                 |  |  |



|                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>MOUNTING <b>A B C</b></p>  <p>W03, 04, 05, 06</p>  <p>(Worm speed 600 rpm &amp; below)<br/>W07, 08<br/>(Other side of case)<br/>(Worm speed above 600 rpm)</p>                                                  | <p>MOUNTING <b>D E F</b></p>  <p>W03, 04, 05, 06</p>  <p>(Output speed 100 rpm &amp; below)<br/>W07, 08<br/>(Output speed above 100 rpm)</p> |
| <p>MOUNTING <b>G H J</b></p>  <p>W03, 04, 05, 06</p>  <p>W07, 08</p>                                                                                                                                             | <p>MOUNTING <b>K M N</b></p>  <p>W03, 04, 05, 06</p>  <p>W07, 08</p>                                                                       |
| <p>MOUNTING <b>P S T</b></p> <p>W03, 04, 05, 06      W07, 08</p>   <div data-bbox="332 1701 771 1816"> <p>● DRAIN POSITION } W07/08 ONLY<br/>● LEVEL POSITION }<br/>○ VENTILATOR / FILLING POSITION</p> </div> | <p>MOUNTING <b>W X Y</b></p> <p>W03, 04, 05, 06      W07, 08</p>   <p>MOTOR MUST BE FITTED WITH SEAL FOR THIS POSITION</p>              |

Mounting positions shown as motorized - applies for reducers also

| Supplier                       | Designation     | Allowable<br>Operating<br>Temperature<br>Range °F |     |
|--------------------------------|-----------------|---------------------------------------------------|-----|
|                                |                 | Above                                             | To  |
| Applied Chemicals Ltd.         | 4020-220-2      | 32                                                | 248 |
| BP Oil Ltd.                    | LS EP2          | -22                                               | 266 |
| Chevron / Gulf                 | Crown EP        | -22                                               | 248 |
| Century Oils Ltd.              | Lupus A3        | -22                                               | 257 |
| Esso Petroleum Co Ltd. / Exxon | Beacon EP2      | -13                                               | 257 |
| Kluber Lubrication             | Centoplex 2     | -4                                                | 266 |
| Koolex International Inc.      | Q8 Rembrant EP2 | -22                                               | 248 |
| Lubrication Engineers Inc.     | Almaplex 1275   | -22                                               | 320 |
| Mobil Oil Co Ltd.              | Mobilux EP2     | -4                                                | 266 |
| Shell Oils                     | Albida R2       | -4                                                | 302 |
| Texaco Ltd.                    | Multifax EP2    | 32                                                | 248 |

**NOTES**

- 1) Above greases are suitable for use with lubricant oil types M, A and H.
- 2) Refer to Sterling Electric Application Engineers if:
  - (i) The unit has a grease lubricated bearing and a type G lubricating oil is to be used.
  - (ii) The unit is operating in an ambient temperature outside of the range -22°F to 122°F.

## **SHAFT ALIGNMENT**

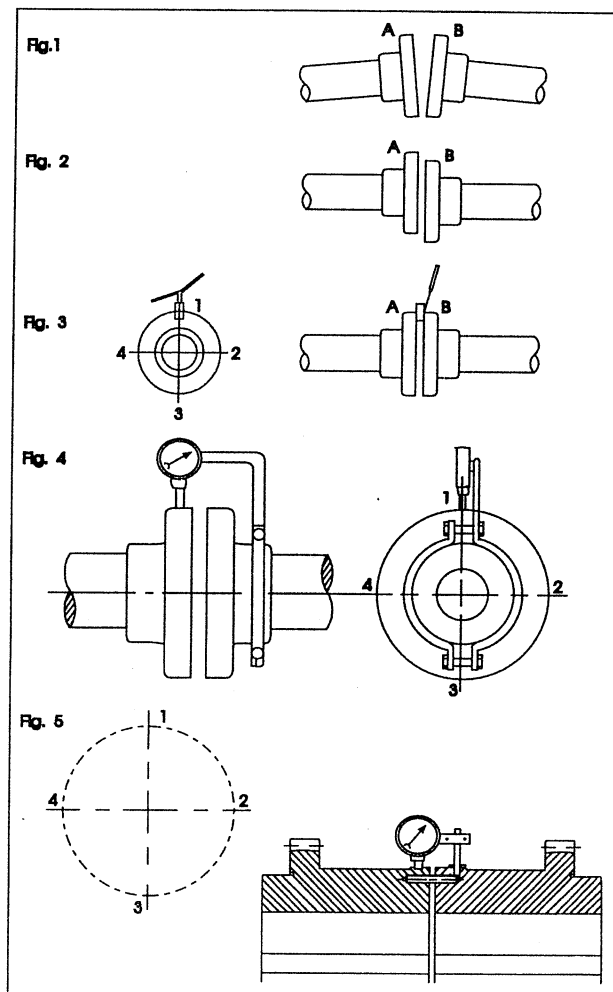
Errors of alignment fall into categories of angularity (see figure 1) and eccentricity (see figure 2), or a combination of both.

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

### **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.



**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)<br>(mm or inches) |
|---------------------------------------------------------------------------------------|-------------------------------------|
| Flexible coupling with rubber elements<br>or<br>Double engagement gear type couplings | $G = .002 D$                        |
| Single engagement gear type coupling                                                  | $G = .001 D$                        |
| Rigid coupling                                                                        | $G = .0005 D$                       |

**NOTE:** D is the diameter (mm or inches) 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 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 15.

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

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

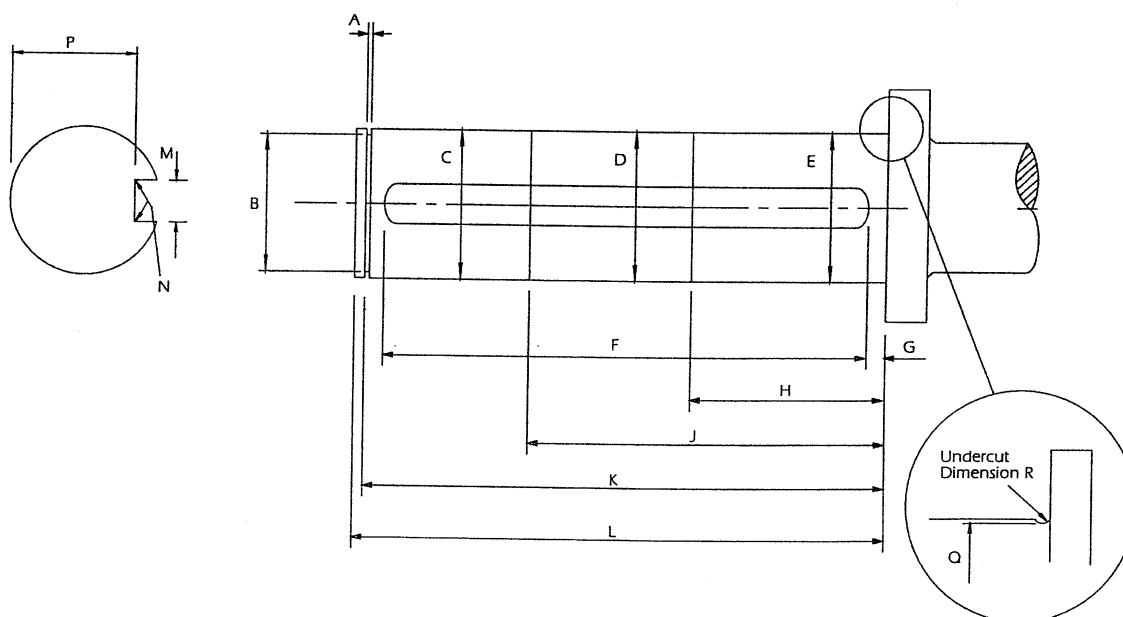
The permitted eccentricity error which can be accommodated in addition to that of the angularity error is as follows:

| Type of Coupling        | Unit Size  | Allowable Eccentricity (inches) |
|-------------------------|------------|---------------------------------|
| Flexible Rubber Element | W03 to W04 | .004                            |
|                         | W05 to W06 | .005                            |
|                         | W07        | .006                            |
|                         | W08        | .007                            |
| Gear Type               | W03 to W08 | .002                            |
| Rigid                   | W03 to W08 | .001                            |

**SPECIAL NOTE CONCERNING RIGID COUPLINGS**

In lining up jobs involving rigid couplings, it is important that no attempt be made to bring gear, motor or driven machine in to line by tightening the coupling bolts. The rigidity of the shafts is never sufficient to permit this, and 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.

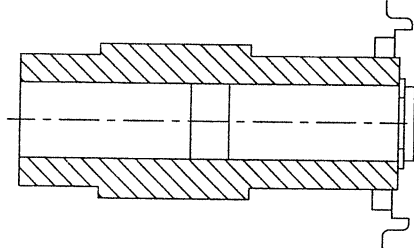
**SHAFT MOUNT UNITS**  
**CUSTOMER SHAFT DETAIL**



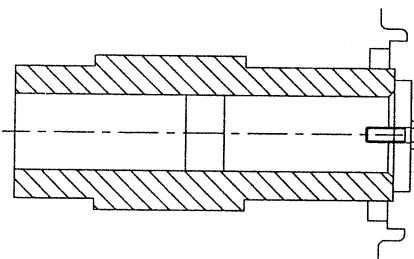
| Size | A            | B              | C                | D              | E                | F              | G    | H    | J    | K              | L     | M            | N    | P              | Q     | R    |
|------|--------------|----------------|------------------|----------------|------------------|----------------|------|------|------|----------------|-------|--------------|------|----------------|-------|------|
| W03  | .049<br>.043 | .7070<br>.7010 | .74970<br>.74920 | *              | .7497<br>.7492   | 2.731<br>2.719 | 1.06 | *    | *    | 4.930<br>4.926 | 5.00  | .198<br>.197 | .01R | .6440<br>.6380 | .7100 | .03R |
| W04  | .060<br>.056 | 1.180<br>1.172 | 1.2486<br>1.2480 | *              | 1.2486<br>1.2480 | 3.887<br>3.875 | .620 | *    | *    | 5.174<br>5.170 | 5.28  | .250<br>.249 | .01R | 1.112<br>1.106 | 1.210 | .03R |
| W05  | .060<br>.056 | 1.295<br>1.287 | 1.3746<br>1.3740 | *              | 1.3746<br>1.3740 | 3.575<br>3.563 | .970 | *    | *    | 5.568<br>5.564 | 5.67  | .312<br>.311 | .01R | 1.201<br>1.195 | 1.335 | .03R |
| W06  | .060<br>.056 | 1.410<br>1.402 | 1.4996<br>1.4990 | *              | 1.4996<br>1.4990 | 3.262<br>3.250 | 1.72 | *    | *    | 7.142<br>7.138 | 7.32  | .375<br>.374 | .01R | 1.289<br>1.283 | 1.480 | .03R |
| W07  | .072<br>.068 | 1.891<br>1.881 | 2.0000<br>1.9988 | 1.985<br>1.975 | 2.0000<br>1.9988 | 8.020<br>8.000 | .280 | 3.11 | 5.47 | 8.654<br>8.652 | 8.86  | .500<br>.499 | .02R | 1.718<br>1.712 | 1.920 | .05R |
| W08  | .091<br>.086 | 2.245<br>2.233 | 2.3750<br>2.3741 | 2.360<br>2.350 | 2.3750<br>2.3741 | 9.270<br>9.250 | .280 | 3.54 | 6.30 | 9.930<br>9.928 | 10.16 | .625<br>.624 | .02R | 2.021<br>2.015 | 2.275 | .05R |

\* Not applicable to sizes C03, C04, C05 and C06

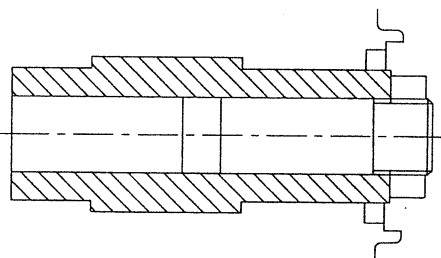
**SHAFT MOUNT UNITS**  
**ALTERNATIVE SHAFT FIXING METHODS**



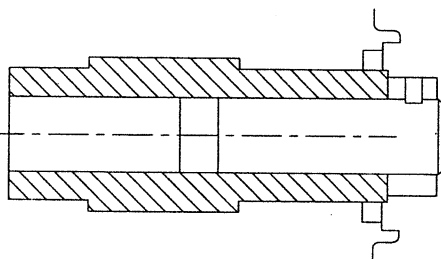
SHAFT MOUNT UNITS RETAINED WITH  
A CIRCLIP



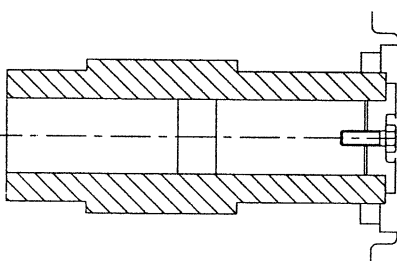
SHAFT MOUNT UNITS RETAINED WITH  
A BOLT AND PLATE



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

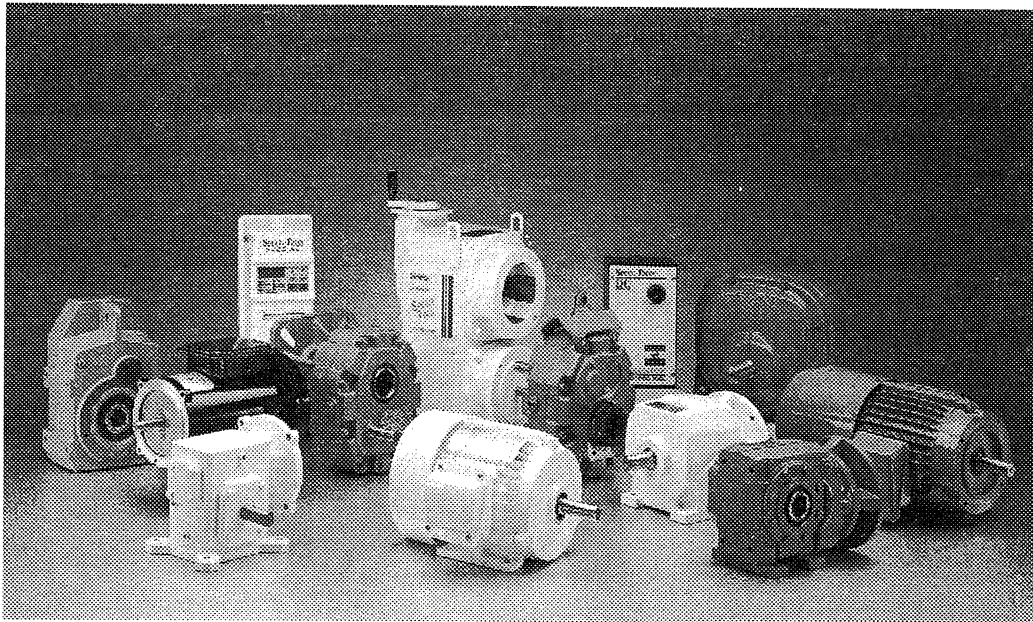
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