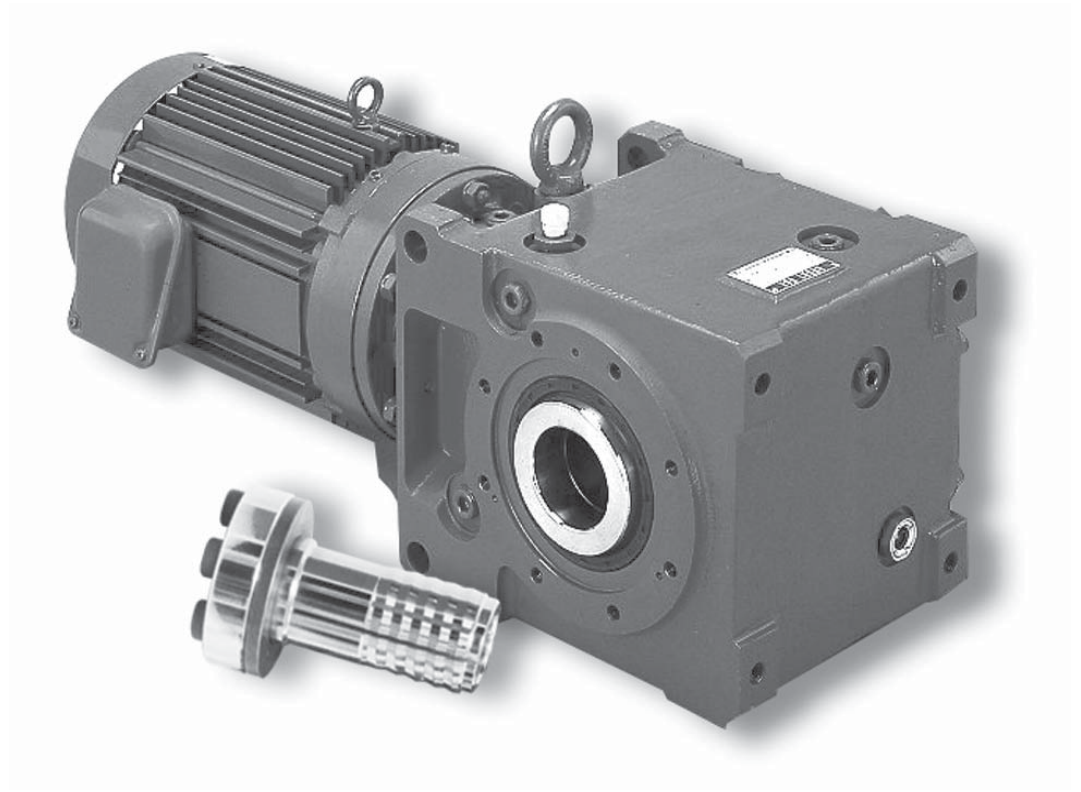


# Operation and Maintenance Manual



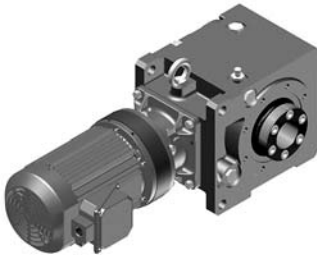
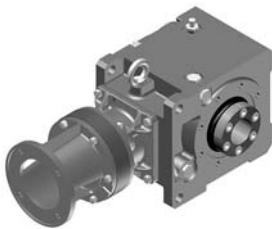
**Cyclo<sup>®</sup> BBB**  
Bevel Buddybox

# Cyclo BBB BEVEL BUDDYBOX

**Speed Reducers and Gearmotors**  
featuring Keyless Taper-Grip® Bushing

## **Operation and Maintenance Manual Table of Contents**

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# Taper Grip® Bushing



**NOTE:** Similar to all shrink disk type devices. It is essential to properly assemble and tighten the mounting bolts. Carefully follow the Sumitomo instructions for selection and installation in order to avoid any slippage. Incorrect mounting or slippage of the bushing will impair function and removal of the drive.

## Fitting the Reducer on the Shaft

1. Check the size and condition of the shaft to which the reducer will be fitted. Permissible shaft tolerances are given in Figure 1.
2. Ensure all mating surfaces of the hub, the inside and outside diameters of the Taper-Grip® bushing and the shaft are free from burrs and corrosion. Clean each surface with a solvent to REMOVE ALL TRACES OF GREASE AND OIL.
3. Lightly oil each screw and insert into the bushing flange; ensure they do not protrude beyond the rear face.
4. Slide the thrust collar onto the Taper-Grip® bushing, ensuring that it is located immediately behind the flange. Screw the Taper-Grip® bushing into the hub in a clockwise direction until the flange contacts the thrust collar.
5. Unscrew the Taper-Grip® bushing until a gap of 1mm minimum exists between the flange and thrust collar. Tighten all screws until they are finger tight.
6. Slide the reducer onto the shaft at least as far as the counter bore in the Taper-Grip® bushing. Gradually tighten each screw in a star pattern to the torque levels shown in Figure 2.
7. Install the torque arm assembly if one is used.
8. After mounting is complete, the Cyclo BBB can then be filled with oil. Please follow proper guidelines for oil lubrication. Grease lubricated units are pre-filled at the factory.
9. After the reducer has been running for 20 or 30 hours, re-tighten the screws to the torque values listed in Figure 2. Screw torque should be subsequently checked at normal service intervals.

**Figure 1. PERMISSIBLE SHAFT TOLERANCE**

| Shaft Dia.       | Tolerance  |
|------------------|------------|
| 3/4" - 1 1/8"    | +0 - .005" |
| 1 3/16" - 2"     | +0 - .006" |
| 2 1/16" - 3 1/8" | +0 - .007" |
| 3 3/16" - 4 3/4" | +0 - .008" |

**NOTE:** Shaft runout TIR should be no greater than .001".

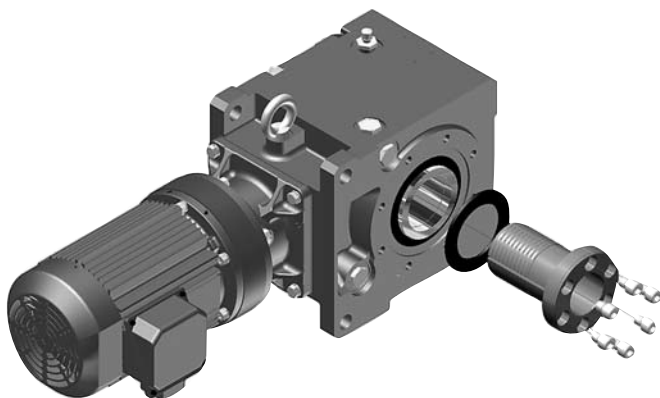
**Figure 2. BUSHING SCREW TIGHTENING TORQUES**

| Size | Screw Size Qty. & Code | Screw Torque lb. ft. |
|------|------------------------|----------------------|
| A    | 6 X M12 112E7003       | 56                   |
| B    | 6 X M12 112E7003       | 104                  |
| C    | 6 X M16 112G7003       | 185                  |
| D    | 6 X M16 112G7003       | 185                  |
| E    | 8 X M16 112G7003       | 185                  |

**Figure 3. BUSHING BORE TOLERANCES**

| Inch              | Tolerance     | Metric mm | Tolerance*  |
|-------------------|---------------|-----------|-------------|
| 1 11/16 - 1 15/16 | + .003 / .001 | 40-50     | .064 / .025 |
| 2 - 2 7/16        | + .003 / .001 | 50-65     | .076 / .030 |
| 2 1/2 - 3 7/16    | + .003 / .001 | 65-80     | .076 / .030 |
| 3 1/2 - 3 15/16   | + .003 / .001 | 80-100    | .090 / .036 |

\*Metric Tolerances are F8.



# Parts List

## General Construction Bevel Gear Case

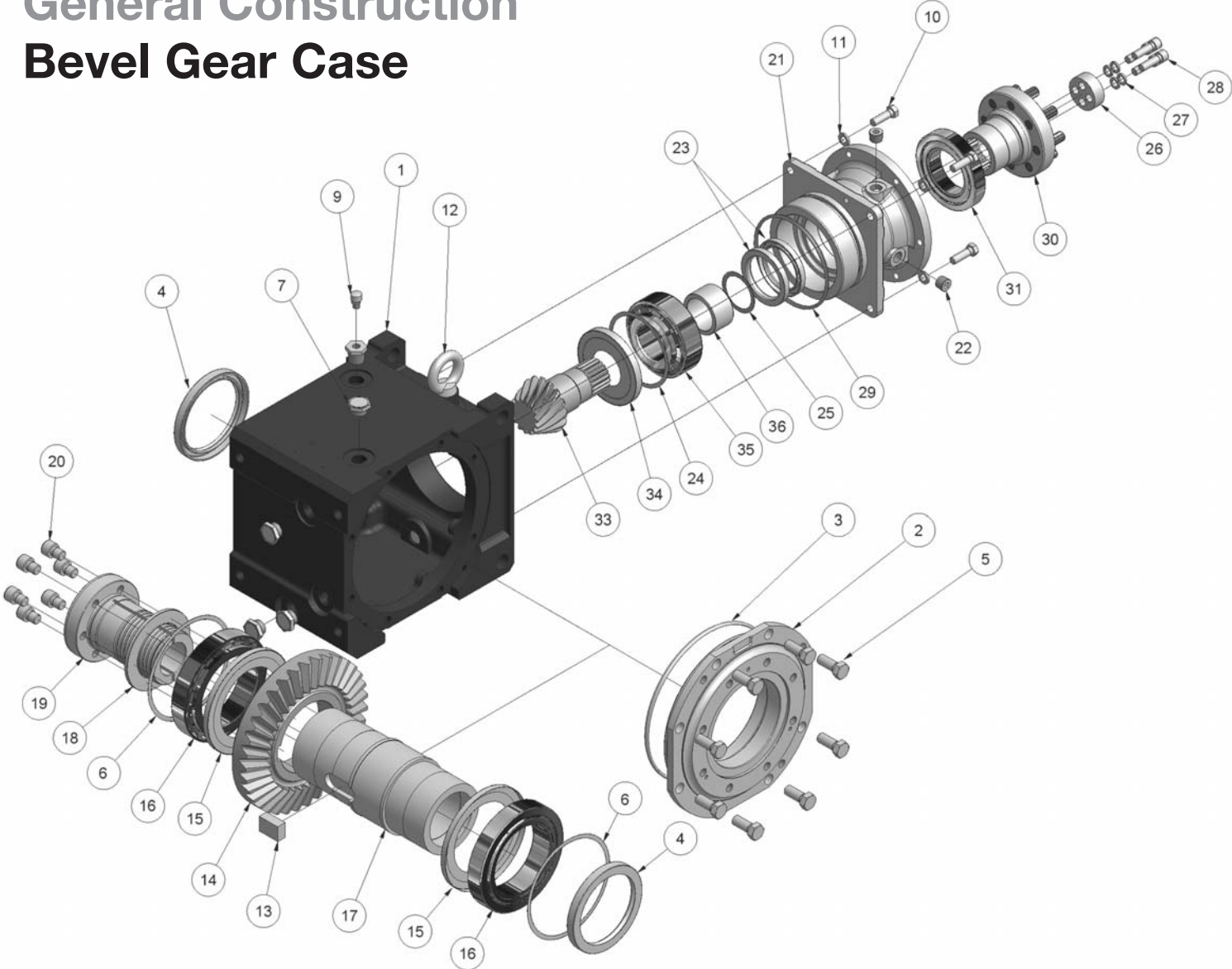


FIGURE 4. Parts Code Numbers

| Item No. | Description                | QTY    | Unit Size       |                 |                 |                 |                 |
|----------|----------------------------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|
|          |                            |        | A               | B               | C               | D               | E               |
| 1        | Gear Housing               | 1      | AE693LG         | AE774LG         | AE695LG         | AE696LG         | AE697LG         |
| 2        | Output Cover               | 1      | BL520LG         | BL531LG         | BL542LG         | BL550LG         | BL554LG         |
| 3        | O-Ring                     | 1      | 540NG1701-A-G   | 540NG2101-A-G   | 540NG2601-A-G   | 541N5.7-3258G   | 541N5.7-3757G   |
| 4        | Oil Seal                   | 2      | 531N8511013-G   | 531N10012513G   | 531N12015014G   | 531N14017014G   | 531N16019016G   |
| 5        | Hex Head Bolt              | 8      | 001M010R030NG   | 001M012R030NG   | 001M016R040NG   | 001M020R050NG   | 001M020R050NG   |
| 6[2]     | Shim                       | Varies | As required     | As required     | As required     | As required     | As required     |
| 7        | Plug                       | 8      | 343C008R- - -NG | 343C008R- - -NG | 343C012R- - -NG | 343C012R- - -NG | 343C012R- - -NG |
| 8        | Bushing                    | 1      | 332F008R004NG   | 332F008R004NG   | 332F012R004NG   | 332F012R004NG   | 332F012R004NG   |
| 9        | Air Vent                   | 1      | DT206LG         | DT206LG         | DT206LG         | DT206LG         | DT206LG         |
| 10       | Hex Head Bolt              | 4      | 001M010R030NG   | 001M010R030NG   | 001M012R040NG   | 001M016R050NG   | 001M016R050NG   |
| 11       | Spring Washer              | 4      | 062W010- - -NG  | 062W010- - -NG  | 062W012- - -NG  | 062W016- - -NG  | 062W016- - -NG  |
| 12       | Eye Bolt                   | 1      | 006C016R- - -NG | 006C016R- - -NG | 006C020R- - -NG | 006C020R- - -NG | 006C024R- - -NG |
| 13       | Key                        | 1      | 233M2214021NG   | 233M2514028NG   | 233M2816040NG   | 233M3218050NG   | 233M3620060NG   |
| 14       | Bevel Gear                 | 1      | AP0646G         | AP0647G         | AP0648G         | AP0649G         | AP0650G         |
| 15       | Nilos Ring                 | 2      | 50532017XAV-G   | 50532020XAV-G   | 50532024XAV-G   | 50532028XAV-G   | 50532032XAV-G   |
| 16       | Tapered Roller Bearing     | 2      | 503T32017XU-G   | 503T32020XU-G   | 503T32024XU-G   | 503T32028XU-G   | 503T32032XU-G   |
| 17       | Taper-Grip® Output Hub     | 1      | BL937LG         | BL938LG         | BL939LG         | BL940LG         | BL941LG         |
| 18[3]    | Thrust Plate               | 1      | —               | —               | —               | —               | —               |
| 19       | Taper-Grip® Bushing        | 1      | As required     | As required     | As required     | As required     | As required     |
| 20[3]    | Taper-Grip® Bushing Screws | Varies | —               | —               | —               | —               | —               |
| 21[4]    | Flanged Casing             | 1      | As required     | As required     | As required     | As required     | As required     |
| 22       | Hex Socket Plug            | Varies | As required     | 343C008R- - -NG | 343C008R- - -NG | 343C008R- - -NG | 343C008R- - -NG |
| 23       | Oil Seal                   | 2      | 530N50689- - -G | 530N60759- - -G | 530N709513- -G  | 530N9011513-G   | 530N9011513-G   |
| 24[2]    | Shim                       | Varies | As required     | As required     | As required     | As required     | As required     |
| 25[2]    | Shim                       | Varies | As required     | As required     | As required     | As required     | As required     |
| 26       | End Plate                  | 1      | AW7028G         | AW7030G         | AW7032G         | As required     | AW7036G         |
| 27       | Lock Washer                | 4      | EU593WW-05      | EU593WW-05      | EU593WW-07      | As required     | EU593WW-09      |
| 28       | Hex. Soc. Hd. Cap Screw    | 4      | 009M008R030NG   | 009M010R035NG   | 009M012R040NG   | As required     | 009M016R055NG   |
| 29       | O-Ring                     | 1      | 540NG1101-A-G   | 540NG1301-A-G   | 540NG1501-A-G   | 540NG1751-A-G   | 540NG1851-A-G   |
| 30[5]    | Pin Carrier                | 1      | As required     | As required     | As required     | As required     | As required     |
| 31       | Tapered Roller Bearing     | 1      | As required     | As required     | As required     | As required     | As required     |
| 33       | Bevel Pinion Shaft         | 1      | BL513LG         | BL525LG         | BL536LG         | As required     | BL553LG         |
| 34       | Nilos Ring                 | 1      | 50532308AV- -G  | 50532310AV- -G  | 50532312AV- -G  | 50532314AV- -G  | 50532315AV- -G  |
| 35       | Tapered Roller Bearing     | 1      | 503T32308U- -G  | 503T32310U- -G  | 503T32312U- -G  | 503T32314U- -G  | 503T32315U- -G  |
| 36       | Collar                     | 1      | AW7027G         | AW7029G         | AW7031G         | As required     | AW7034G         |

- Notes: [1] When ordering replacement parts, please indicate the complete unit model number, ratio and serial number.  
 [2] Shims are not available individually. They may be ordered as a complete set only.  
 [3] Item Numbers 18 and 20 are not available as individual parts. They come complete with the Taper-Grip® Bushing.  
 [4] The Flange Casing is determined based on the associated input Cyclo size.  
 [5] Item Number 30 is available as a complete subassembly only.

# Cyclo Parts List

## Cyclo Reducer Input Section

### Single Reduction

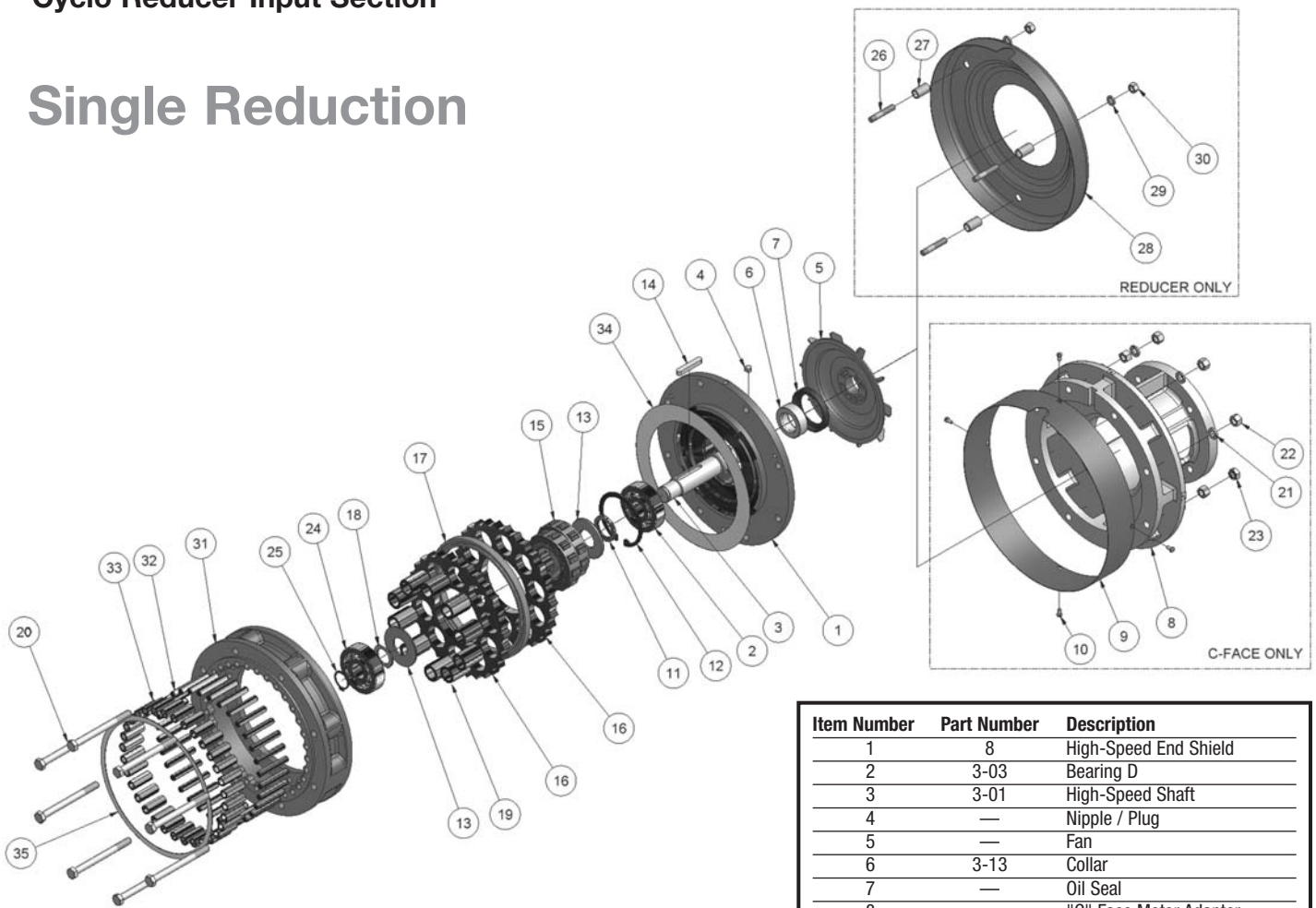


Figure 5. Main Parts

| Item Number | Part Number | Description              |
|-------------|-------------|--------------------------|
| 1           | 8           | High-Speed End Shield    |
| 2           | 3-03        | Bearing D                |
| 3           | 3-01        | High-Speed Shaft         |
| 4           | —           | Nipple / Plug            |
| 5           | —           | Fan                      |
| 6           | 3-13        | Collar                   |
| 7           | —           | Oil Seal                 |
| 8           | —           | "C" Face Motor Adapter   |
| 9           | —           | Fan Shroud               |
| 10          | —           | Shroud Bolts/Screws      |
| 11          | 3-08        | Spacer                   |
| 12          | 3-11        | Snap Ring                |
| 13          | —           | Endplate                 |
| 14          | 3-05        | Eccentric Key            |
| 15          | 3-04        | Eccentric Cam Assembly   |
| 16          | 2-04        | Cycloid Discs            |
| 17          | 2-05        | Disc Spacer              |
| 18          | 3-09        | Spacer                   |
| 19          | —           | Slow Speed Shaft Rollers |
| 20          | —           | Housing Bolts            |
| 21          | —           | Washers                  |
| 22          | —           | Nuts                     |
| 23          | —           | Locknut                  |
| 24          | 3-02        | Bearing C                |
| 25          | 3-10        | Snap Ring                |
| 26          | —           | Tap-End Stud             |
| 27          | —           | Fan Spacer               |
| 28          | —           | Fan Cover                |
| 29          | —           | Washers                  |
| 30          | —           | Nuts                     |
| 31          | 2-01        | Ring Gear Housing        |
| 32          | 2-02        | Ring Gear Pins           |
| 33          | 2-03        | Ring Gear Rollers        |
| 34          | —           | Gasket*                  |
| 35          | —           | Gasket*                  |

\*Supplied as a set only



Cyclo Reducer Input Section

Double Reduction

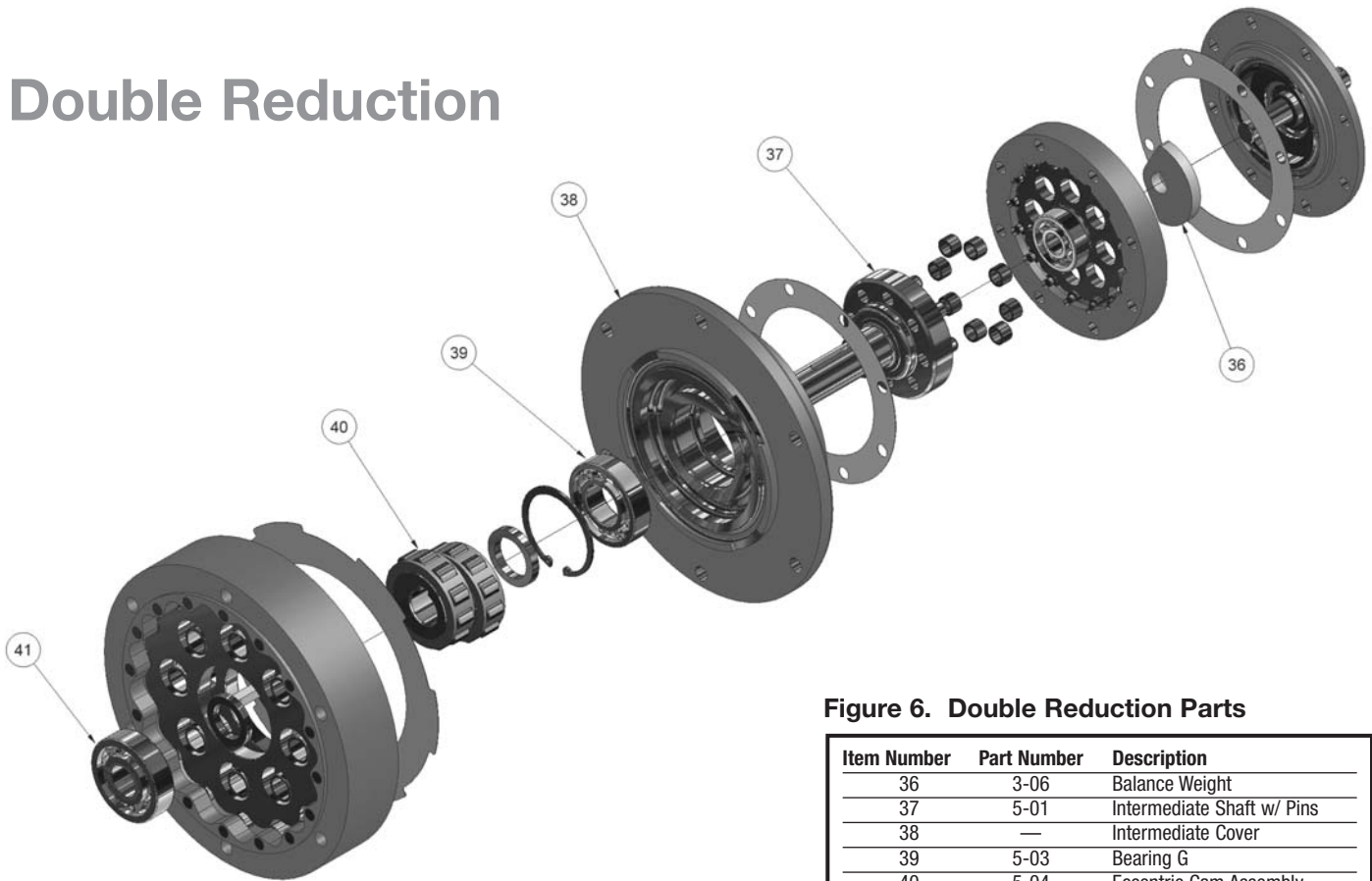


Figure 6. Double Reduction Parts

| Item Number | Part Number | Description                |
|-------------|-------------|----------------------------|
| 36          | 3-06        | Balance Weight             |
| 37          | 5-01        | Intermediate Shaft w/ Pins |
| 38          | —           | Intermediate Cover         |
| 39          | 5-03        | Bearing G                  |
| 40          | 5-04        | Eccentric Cam Assembly     |
| 41          | 5-02        | Bearing F                  |

NOTE: The parts listed are a general representation of the components found in a single and double reduction Cyclo.

Specific units may or may not contain all shown here.

Please consult the factory for specific part questions.



# Standard Motor Characteristics

## Motor Characteristics

The Cyclo® BBB gearmotors full load ratings and amperage can be found below in Figure 7. These ratings are based on the motor's design values. If additional information is required, please consult factory.

**Figure 7. 230/460 Volt, Synchronous Speed 1800 rpm, 60 Hz, Continuous Duty, TEFC**

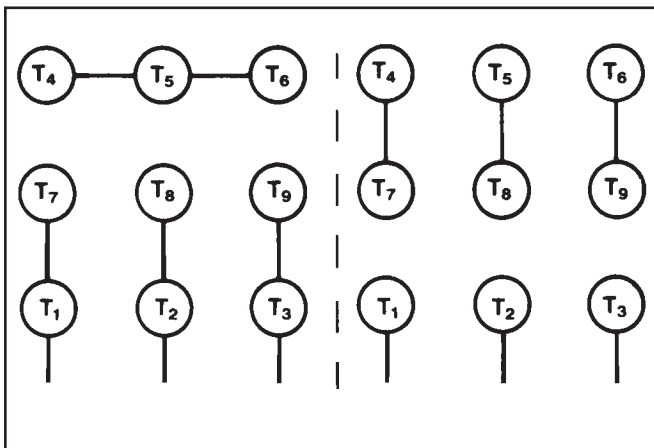
| HP  | Frame Size | Full Load rpm | Full Load Torque in. lb. | Full Load Current Amperage |      |      | Starting Current Amperage |      | Torque % of F.L. Break-down |            | Efficiency % | Power Factor % | Code Letter* | Inertia WR <sup>2</sup> lb. ft <sup>2</sup> |
|-----|------------|---------------|--------------------------|----------------------------|------|------|---------------------------|------|-----------------------------|------------|--------------|----------------|--------------|---|
|     |            |               |                          | 230V                       | 460V | 208V | 230V                      | 460V | Starting                    | Break-down |              |                |              |   |
| 1/2 | F-71M      | 1740          | 18.3                     | 2.1                        | 1.1  | 2.0  | 9.8                       | 4.9  | 295                         | 280        | 71.9         | 65.1           | J            | 0.0154                                      |
| 3/4 | F-80S      | 1730          | 27.4                     | 2.5                        | 1.2  | 2.5  | 12.3                      | 6.2  | 266                         | 245        | 76.9         | 73.0           | H            | 0.0227                                      |
| 1   | F-80       | 1750          | 36.0                     | 3.4                        | 1.7  | 3.4  | 17.6                      | 8.8  | 269                         | 303        | 77.2         | 72.3           | H            | 0.0285                                      |
| 1.5 | F-90S      | 1730          | 54.7                     | 4.6                        | 2.3  | 4.7  | 28.6                      | 14.3 | 273                         | 281        | 80.3         | 74.1           | J            | 0.0451                                      |
| 2   | F-90L      | 1740          | 72.5                     | 6.0                        | 3.0  | 6.2  | 36.8                      | 18.4 | 263                         | 270        | 82.3         | 75.6           | J            | 0.0504                                      |
| 3   | F-100L     | 1730          | 109                      | 8.4                        | 4.2  | 8.7  | 54.8                      | 27.4 | 277                         | 266        | 84.4         | 77.2           | J            | 0.0789                                      |
| 5   | F-112M     | 1730          | 183                      | 13.0                       | 6.5  | 13.7 | 91.5                      | 45.8 | 308                         | 279        | 86.3         | 82.4           | K            | 0.201                                       |
| 7.5 | F-132S     | 1710          | 277                      | 18.1                       | 9.0  | 20.1 | 120                       | 61   | 223                         | 221        | 86.7         | 88.2           | H            | 0.271                                       |
| 10  | F-132M     | 1740          | 361                      | 23.6                       | 11.8 | 26.4 | 147                       | 73.5 | 212                         | 214        | 89.6         | 88.9           | G            | 0.635                                       |
| 15  | F-160M     | 1740          | 542                      | 34.3                       | 17.2 | 38.2 | 231                       | 115  | 248                         | 221        | 90.5         | 89.0           | G            | 0.891                                       |
| 20  | G-160L     | 1740          | 725                      | 45.8                       | 22.9 | 51   | 272                       | 136  | 222                         | 220        | 91.6         | 89.9           | F            | 2.13  |
| 25  | G-180M     | 1770          | 891                      | 57                         | 28.4 | 63   | 343                       | 171  | 199                         | 235        | 92.6         | 88.2           | F            | 5.34  |
| 30  | G-180M     | 1760          | 1075                     | 68                         | 34.2 | 77   | 388                       | 194  | 192                         | 226        | 91.5         | 88.1           | F            | 5.34  |

\*Code letter shown is for 230V or 460V operation. Consult factory for other voltages.

## Standard Wiring Diagram – 208, 230/460V

Illustrated below are the wiring diagrams for our standard motor. For additional information please refer to motor name plate. Due to changes in design features, this diagram may not always agree with that on the motor. If different, the motor diagram found inside the conduit box cover is correct.

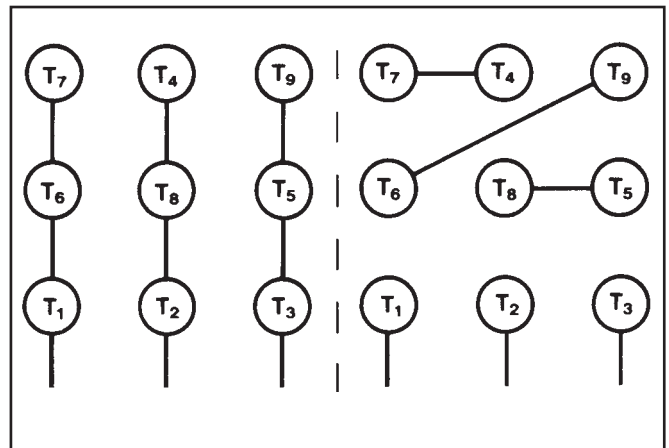
**Figure 8. Y-Connected (5 HP and smaller)**



Line 208/230V 60Hz

Line 460V 60Hz

**Figure 9. Delta-Connected (7 1/2 HP and larger)**



Line 208/230V 60Hz

Line 460V 60Hz

# Brakemotor Characteristics

The brakemotor on Cyclo® BBB gearmotors operates on a D.C. current supplied by a dual voltage rectifier mounted on the motor conduit box.

The standard brake input voltage is 208V OR 230V OR 460V at 60 Hz. (For other available voltages consult factory.)

Our standard brakemotor when used for outdoor installations must be protected with some type of covering. Such coverings are available from the factory, please inquire when ordering.

**Note:** While the brake torque can be field adjusted within a limited range, if you require larger or smaller brake torque than those listed, please advise the factory when ordering.

**Figure 10. Required Brake Response Action**

| Condition                          | % Motor Torque Rating | Typical Application                    | Remarks  |
|------------------------------------|-----------------------|--|--|
| Rapid Brake Action                 | 100%                  | Machine Tool Cutter and Table Transfer |  |
| Frequent Start/Stop                | 100%                  | Conveyor Drive                         | Fast Brake Action May Be Required                |
| Rapid Braking and Fail Safe        | Over 150%             | Crane, Hoist Winch, Gate, Lifting      | Wiring Connection for Fast Brake Action Required |
| Rapid Deceleration of High Inertia | Over 150%             | Centrifuge Drive Textile               |  |

**Figure 11. Brake Torque**

| HP  | TYPE        |             | BRAKE Torque ft. lb. |      | Inertia WR <sup>2</sup> lb.ft. <sup>2</sup> | Brake Delay Time (sec) |                     | Coil Current AC Amperage |      |      |
|-----|-------------|-------------|----------------------|------|---|------------------------|---------------------|--------------------------|------|------|
|     | Motor Frame | Brake Model | Std.                 | Max. |   | Normal Braking Action  | Fast Braking Action | 230V                     | 460V | 208V |
|     |             |             |                      |      |   |                        |                     |                          |      |      |
| 1/8 | F-63S       | FB-01A      | 0.7                  | 1.0  | 0.0083                                      | 0.15 ~ 0.2             | 0.015 ~ 0.02        | 0.06                     | 0.04 | 0.06 |
| 1/4 | F-63M       | FB-02A      | 1.4                  | 2.0  | 0.0131                                      | 0.15 ~ 0.2             | 0.015 ~ 0.02        | 0.1                      | 0.06 | 0.1  |
| 1/3 | F-63M       | FB-02A      | 1.4                  | 2.9  | 0.0131                                      | 0.15 ~ 0.2             | 0.015 ~ 0.02        | 0.1                      | 0.06 | 0.1  |
| 1/2 | F-71M       | FB-05A      | 2.9                  | 2.9  | 0.016                                       | 0.1 ~ 0.15             | 0.01 ~ 0.015        | 0.1                      | 0.06 | 0.1  |
| 3/4 | F-80S       | FB-1B       | 5.8                  | 7.7  | 0.0267                                      | 0.2 ~ 0.3              | 0.01 ~ 0.02         | 0.1                      | 0.1  | 0.1  |
| 1   | F-80M       | FB-1B       | 5.8                  | 7.7  | 0.0308                                      | 0.2 ~ 0.3              | 0.01 ~ 0.02         | 0.1                      | 0.1  | 0.1  |
| 1.5 | F-90S       | FB-2B       | 11                   | 14   | 0.0510                                      | 0.2 ~ 0.3              | 0.01 ~ 0.02         | 0.3                      | 0.2  | 0.3  |
| 2   | F-90L       | FB-2B       | 11                   | 14   | 0.0564                                      | 0.2 ~ 0.3              | 0.01 ~ 0.02         | 0.3                      | 0.2  | 0.3  |
| 3   | F-100L      | FB-3B       | 16                   | 21   | 0.0884                                      | 0.3 ~ 0.4              | 0.02 ~ 0.03         | 0.4                      | 0.2  | 0.4  |
| 5   | F-112M      | FB-5B       | 27                   | 36   | 0.239                                       | 0.4 ~ 0.5              | 0.02 ~ 0.03         | 0.5                      | 0.3  | 0.4  |
| 7.5 | F-132S      | FB-8B       | 40                   | 53   | 0.309                                       | 0.3 ~ 0.4              | 0.02 ~ 0.03         | 0.5                      | 0.3  | 0.4  |
| 10  | F-132M      | FB-10B      | 54                   | 72   | 0.736                                       | 0.7 ~ 0.8              | 0.04 ~ 0.05         | 0.8                      | 0.5  | 0.7  |
| 15  | F-160M      | FB-15B      | 80                   | 80   | 0.991                                       | 0.5 ~ 0.6              | 0.04 ~ 0.05         | 0.8                      | 0.5  | 0.7  |
| 20  | G-160L      | CMB-20      | 72                   | 80   | 3.150                                       | 0.6 ~ 0.8              | 0.1 ~ 0.15          | 1.7                      | 1.9  | 1.5  |

**Figure 12. Rectifier**

| BRAKE TYPE | MOTOR (HP X P)     | VOLTAGE (V)            | RECTIFIER P.N. SINGLE VOLTAGE (SEE NOTE BELOW) | BRAKE TYPE | MOTOR (HP X P) | VOLTAGE (V)            | RECTIFIER P.N. SINGLE VOLTAGE (SEE NOTE BELOW) |
|------------|--------------------|------------------------|--|------------|----------------|------------------------|--|
| FB-01A     | 1/8 x 4            | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       | FB-5B      | 5 x 4          | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       |
| FB-02A     | 1/4 x 4<br>1/3 x 4 | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       | FB-8B      | 7.5 x 4        | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       |
| FB-05A     | 1/2 x 4            | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       | FB-10B     | 10 x 4         | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       |
| FB-1B      | 3/4 x 4<br>1/4 x 4 | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       | FB-15B     | 15 x 4         | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       |
| FB-2B      | 1.5 x 4<br>2 x 4   | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       | CMB-20     | 20 x 4         | 180 ~ 460              | SB25F-3HS                                      |
| FB-3B      | 3 x 4              | 190 ~ 230<br>380 ~ 460 | 25FW-4FB                                       |            |                |                        |  |

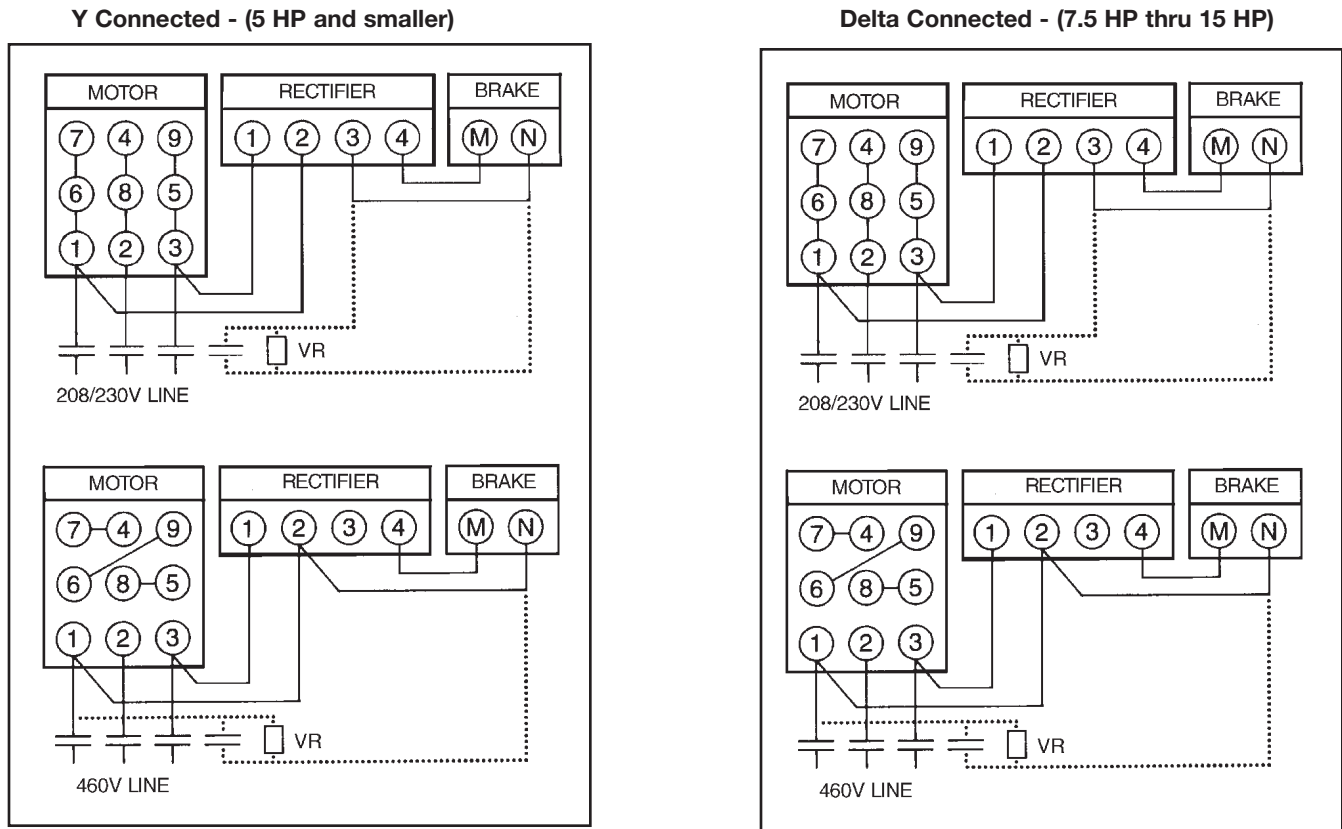
**NOTE:** Dual Voltage Rectifier P.N. 25FW-4FB is now standard for all FB brakes. The voltage range is 190 ~ 460 V.

# Brakemotor Characteristics: Wiring

## Typical Brakemotor Wiring

Illustrated below is a typical brakemotor wiring schematic. Note the rectifier shown is supplied in the motor conduit box. Due to changes in design features, this diagram may not always agree with that on the motor. If different, the motor diagram found inside the conduit box cover is correct.

Figure 13.



- New dual voltage rectifier can be wired for 230V or 460V supply.
- Solid lines show the wiring connections for standard brake action.
- For fast brake action connect terminals as indicated by dotted lines. Add an additional contactor, and varistor VR from Figure 14 below. Do not connect terminal N on brake coil to terminal 3 on rectifier for fast brake action. For 460V fast action braking do not connect terminal N on brake coil to terminal 2 on rectifier.

Figure 14. Varistors for Fast Braking Action

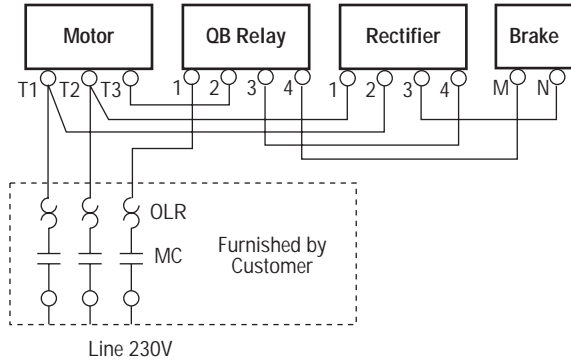
| OPERATING VOLTAGE      |                   | 208 V / 230 V | 460 V      | 575 V      |
|------------------------|-------------------|---------------|------------|------------|
| Varistor Rated Voltage |                   | AC260 ~ 300 V | AC510 V    | AC604 V    |
| Varistor Voltage       |                   | 430 ~ 470 V   | 820 V      | 1000 V     |
| Varistor Rated Wattage | FB-01A, 02A, 05A  | Over 0.2 W    | Over 0.4 W | Over 0.4 W |
|                        | FB-1A             | Over 0.4 W    | Over 0.6 W | Over 0.6 W |
|                        | FB-2A, 3A, 5A, 8A | Over 0.6 W    | Over 1.5 W | Over 1.5 W |
|                        | FB-10A, 15A       | Over 1 W      | Over 1.5 W | Over 1.5 W |

- Please refer to page 5.13, Figure 5.24 for rectifier data.

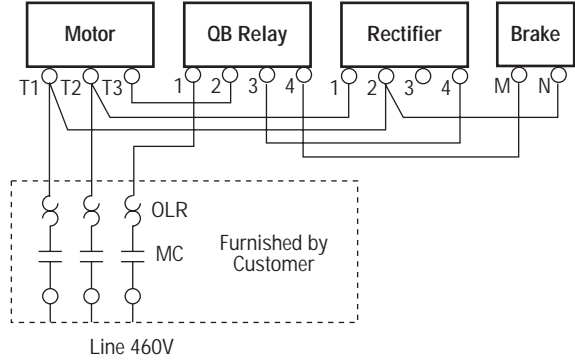
# Standard Wiring Connection

## Quick Brake Relay Equipped Models (1/8 to 7.5 HP)

**Figure 15. Quick Brake Action, Low Voltage (FB-05A, FB-1B, FB-2B, FB-3B)**

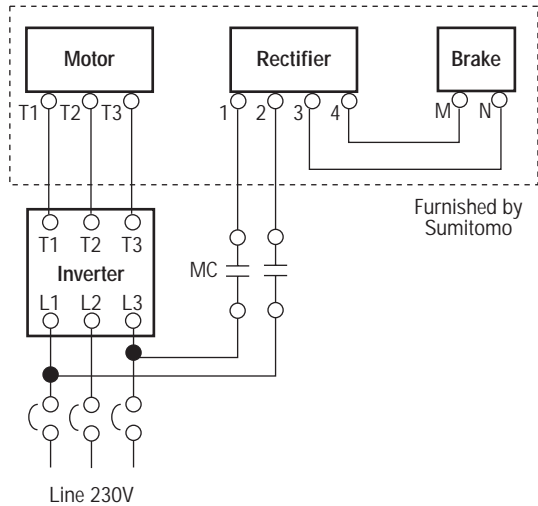


**Figure 16. Quick Brake Action, High Voltage (FB-2B, FB-3B, FB-5B, FB-8B)**

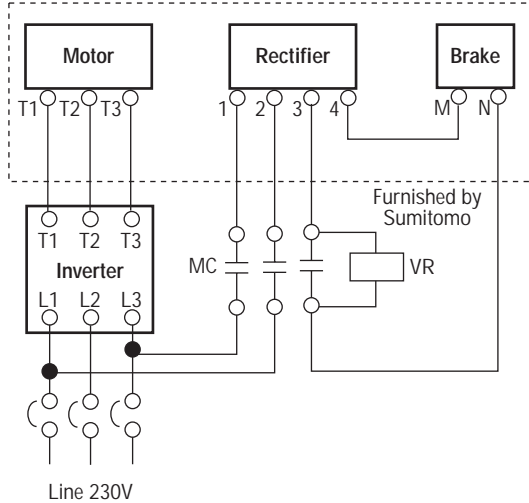


## FB Brake (1/8 to 7.5 HP) with Inverter

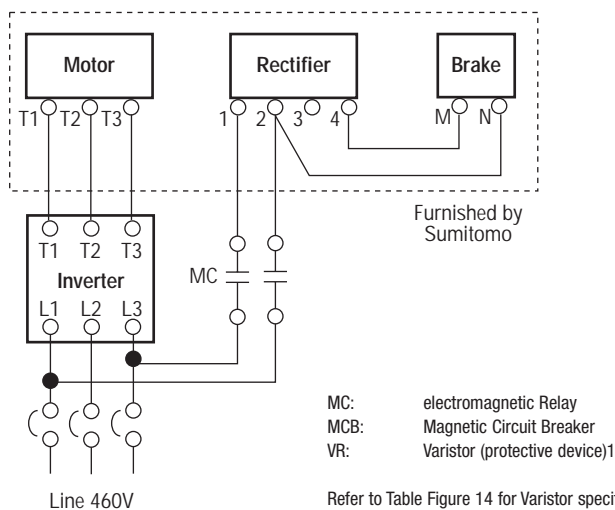
**Figure 17. Normal Brake Action, Low Voltage**



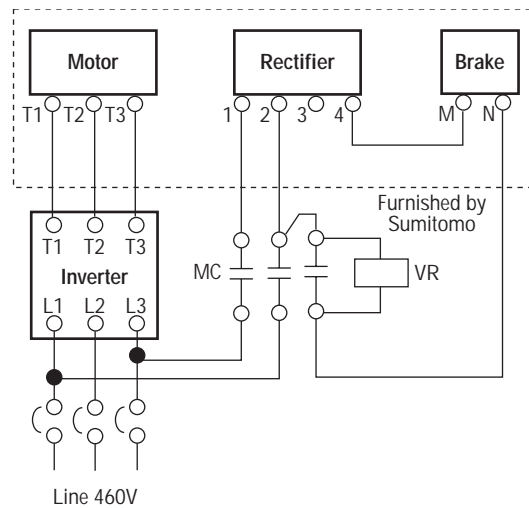
**Figure 18. Fast Brake Action, Low Voltage**



**Figure 19. Normal Brake Action, High Voltage**



**Figure 20. Fast Brake Action, High Voltage**



MC: electromagnetic Relay  
 MCB: Magnetic Circuit Breaker  
 VR: Varistor (protective device)<sup>1</sup>

Refer to Table Figure 14 for Varistor specifications

# Lubrication

## Oil lubricated models are not filled with oil prior to shipping.

Before operating, fill the unit with the appropriate amount of the correct lubricant for the mounting position (see Figure 22 and 24). When operating in winter or other relatively low ambient temperatures, use the lower viscosity oil specified for each ambient temperature range. Please consult the factory if the unit will be operated consistently in ambient temperatures other than 32°F–104°F.

## Grease lubricated models are lubricated with grease prior to shipment from the factory.

Adding grease prior to initial start-up is not required. If grease must be replenished or changed (see Grease Lubrication section), avoid using greases other than those listed in the Figure 23. Please consult the factory when the units will be used in widely fluctuating temperatures, ambient temperatures other than those specified in Figure 23, or when other special conditions exist for the application. When motors from another manufacturer will be used, please consult and adhere to the associated motor maintenance manual for the appropriate lubrication instructions.

Figure 21. Lubrication Type Per Unit Size

| Unit Size  | Output (Gear Side) | Input (Cyclo Side) |                |
|--|--------------------|--------------------|----------------|
|  |                    | Motor Horizontal   | Motor Vertical |
| 3A100, 3A105, 3A110, 3A115<br>3A120, 3A125, 3B120, 3B125   | Oil Bath           | Grease             | Grease         |
| 3A140, 3A145 3B140, 3B145,<br>3C140, 3C145, 3B160, 3B165,<br>3C160, 3C165, 3D160, 3D165,<br>3C170, 3C175, 3D170, 3D175<br>3E170, 3E175 |                    | Oil Bath           | Grease         |

Figure 22. Standard Oils

| Ambient Temperature (°F) | ChevronTexaco                  | Exxon Oil                    | Mobil Oil                                      | Shell Oil              | BP Oil                                |
|--------------------------|--------------------------------|------------------------------|--|------------------------|---------------------------------------|
| 14 to 41°                | EP Gear Compound 68            | Spartan EP 68                | Mobilgear 600 XP 68 (ISO VG 68)                | Omala Oil 68           | Energol GR-XP 68                      |
| 32 to 95°                | EP Gear Compound 100, 150      | Spartan EP 100 EP 150        | Mobilgear 600 XP 100, 150 (ISO VG 100, 150)    | Omala Oil 100, 150     | Energol GR-XP 100 GR-XP 150           |
| 86 to 122°               | EP Gear Compound 220, 320, 460 | Spartan EP 220 EP 320 EP 460 | Mobilgear 600 XP 200 320, 460 (ISO VG 220–460) | Omala Oil 220, 320 460 | Energol GR-XP 220 GR-XP 320 GR-XP 460 |

Figure 23. Standard Greases

| Ambient Temperature (°F) | Reduction Ratio | Input (Cyclo Side)  |
|--------------------------|-----------------|---------------------|
| 14 to 122°               | 11, 18:1        | Shell Alvania EP R0 |
|                          | 21:1 and higher | Exxon Unirex N2     |

Figure 24.

## Oil Plug Locations

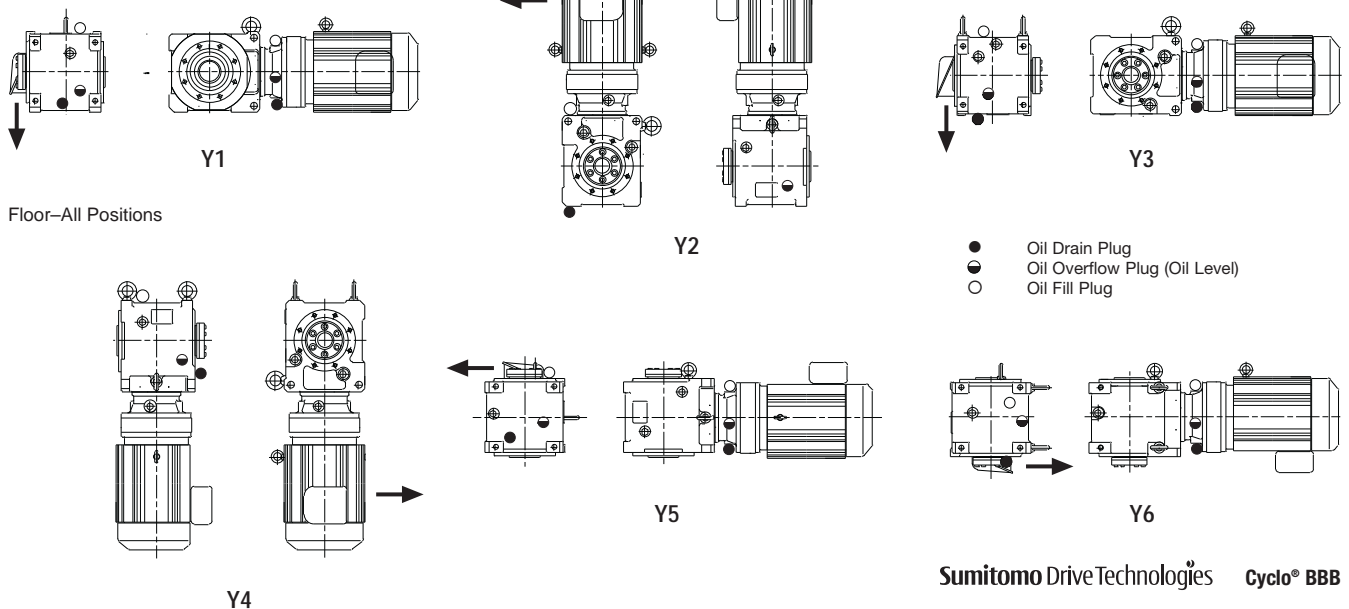


Figure 25. Oil Fill Quantities

Unit: U.S. Gallons

\*G = Grease

| Frame Size   | Mounting Configuration |        |        |        |        |        |        |        |        |        |        |        |
|--------------|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|              | Y1                     |        | Y2     |        | Y3     |        | Y4     |        | Y5     |        | Y6     |        |
|              | Output                 | Input* | Output | Input* | Output | Input* | Output | Input* | Output | Input* | Output | Input* |
| 3A100, 3A105 |                        | G      |        | G      |        | G      |        | G      |        | G      |        | G      |
| 3A110, 3A115 | 0.29                   | G      | 0.26   | G      | 0.29   | G      | 0.26   | G      | 0.45   | G      | 0.42   | G      |
| 3A120, 3A125 |                        | G      |        | G      |        | G      |        | G      |        | G      |        | G      |
| 3A140, 3A145 |                        | 0.08   |        | G      |        | 0.08   |        | G      |        | 0.08   |        | 0.08   |
| 3B120, 3B125 |                        | G      |        | G      |        | G      |        | G      |        | G      |        | G      |
| 3B140, 3B145 | 0.48                   | 0.12   | 0.37   | G      | 0.48   | 0.12   | 0.48   | G      | 0.61   | 0.12   | 0.66   | 0.12   |
| 3B160, 3B165 |                        | 0.20   |        | G      |        | 0.20   |        | G      |        | 0.20   |        | 0.20   |
| 3C140, 3C145 |                        | 0.12   |        | G      |        | 0.12   |        | G      |        | 0.12   |        | 0.12   |
| 3C160, 3C165 | 0.87                   | 0.20   | 0.92   | G      | 0.87   | 0.20   | 1.16   | G      | 0.95   | 0.20   | 1.4    | 0.20   |
| 3C170, 3C175 |                        | 0.28   |        | G      |        | 0.28   |        | G      |        | 0.28   |        | 0.28   |
| 3D160, 3D165 | 1.16                   | 0.18   | 1.32   | G      | 1.16   | 0.18   | 1.11   | G      | 1.48   | 0.18   | 1.59   | 0.18   |
| 3D170, 3D175 |                        | 0.24   |        | G      |        | 0.24   |        | G      |        | 0.24   |        | 0.24   |
| 3E170, 3E175 | 1.95                   | 0.24   | 1.93   | G      | 1.95   | 0.24   | 1.59   | G      | 1.90   | 0.24   | 2.80   | 0.24   |

Figure 26. Grease Replenishment and Change Interval (Cyclo Portion)

| Model  | Condition     |  | Interval                                |
|--|---------------|--|---|
| Single & Double Reduction<br>(Maintenance-Free Type) | Replenishment |  | NOT REQUIRED                            |
|  | Overhaul      |  | Every 20,000 hours or every 4 - 5 years |
| Double Reduction<br>(Non Maintenance-Free Type)      | Replenishment | Less than 10 hours per day operation   | Every 3 - 6 months                      |
|  |               | 10 - 24 hours per day operation  | Every 500 - 1000 hours                  |
|  | Change        | Speed reduction mechanism, high speed shaft bearings<br>(speed reducer type) | Every 2 - 3 years                       |

**Oil lubricated units** are shipped without oil. Prior to initial start-up, the unit must be filled with the correct amount of oil (see Figure 25). For those units where both the gear and Cyclo® portions are oil lubricated, the oil must be filled in two separate locations, one on the gear housing and one on the Cyclo® housing.

**Grease lubricated models** are lubricated at the factory. Additional grease does not need to be added prior to initial start-up.

### Oil Replenishment and Change Interval

- A. Maintain proper oil levels at all times.
- B. An oil change after the first 500 hours of operation is highly recommended.
- C. Sumitomo recommends an oil change every 2500 hours, or six months, whichever comes first. If a proper preventive maintenance program is implemented and maintained, a longer change period may be acceptable.
- D. If the unit is running in a high ambient, high humidity, or corrosive environment, the lubricant will have to be changed more frequently. Consult the factory for recommendations.
- E. Note: The Cyclo® portion and Bevel portion, where applicable, must be filled with oil separately. Oil does not flow from one section to the other.

### Grease Replenishment and Change Interval Bevel Portion

- A. Grease replenishment is usually not necessary.
- B. Drain, flush and regrease the bevel gearcase every 3000 - 5000 hours of operation. The unit should be overhauled every 2 - 3 years

### Cyclo Portion

- A. On single reduction Cyclo® Bevel Buddybox (Cyclo® BBB) sizes 2A100~125 and 2B120~125, the Cyclo® portion is grease lubricated as standard and usually maintenance free.
- B. For Cyclo® BBB sizes 2A140~145, 2B140~145, 2B160~165, and all sizes of 2C, 2D, and 2E mounted in the Y2 and Y4 positions, please refer to Figure 26 for the proper grease replenishment and change interval.

### Double Reduction Units

- A. The geared (output) portion is oil lubricated and must be filled by the customer with the correct amount of oil (see Figure 25).
- B. The Cyclo® (input) portion of all double reduction units is grease lubricated at the factory. Additional grease is not required prior to initial start-up.

# Installation

## Shaft Connections

*Pulley, sprocket or sheave connection* – When using any of these connections, mount as close to the unit housing as possible, never beyond the midpoint of the shaft projection, to avoid undue bearing load and shaft deflection. Never overtighten belts or chains. Careful and accurate installation is essential for best results and for trouble-free operation. Before installing, the shafts should be checked to make sure that they are parallel and level. Perfect alignment after mounting can be checked with a string or straight edge held against the sides of the sprocket or pulley base.

Couplings should be properly aligned to the limits specified by the manufacturer. On coupled speed reducers coupling alignment should be checked prior to initial startup.

## Shaft Rotation

On single reduction Cyclo® BBB speed reducers, ratios 11 through 305, the slow speed shaft rotates in a reverse direction to that of the high speed shaft.

On double reduction units, ratios 357 through 26,492, both the high speed and the slow speed shaft rotate in the same direction.

## Input Speeds

In general terms, the standard input speeds of single reduction units are 1750 and 1165 RPM.

When non-standard input speeds are used, the horsepower and torque ratings will also vary.

## Thermal Capacity

The Cyclo® BBB speed reducer's smooth, almost frictionless operation all but eliminates the conventional limitations due to heat. In all sizes, Cyclo® BBB speed reducers have thermal ratings that exceed their mechanical capacity.

## Mounting Tips

Horizontal and vertical oil-lubricated units should be mounted in exact planes whenever possible. When they are mounted on inclined surfaces, minor modifications are necessary, since an inclined mounting could lower the oil to a level that will starve reduction parts and bearings. On the other hand, overfilling a unit with oil may cause leakage through the air vent, foaming and churning and consequently overheating. Any of the above could result in damage to the unit. In many cases we can provide grease lubrication to solve this problem.

## Installation

Be sure to install and operate Cyclo® BBB speed reducers in compliance with applicable local and national safety codes. Appropriate guards for rotating shafts should be used and are available from local stocks.

## Dimensions

All dimensions in this catalog are for reference purposes only. Consult factory for certified dimensions.

## Installation: Keyed Hollow Shaft

### Mounting procedure:

1. Smear the surface of the shaft (e) with molybdenum disulfide compound. See Fig. 26.
2. Turn nut (b) and slide the reducer over the driven shaft. Install spacer (c) if necessary.
3. After mounting the reducer on the shaft, install bolt (f) and washer. See Fig. 27.

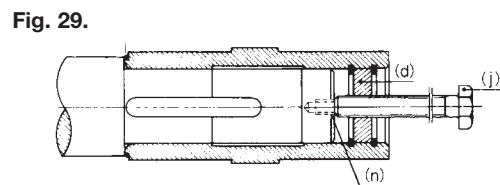
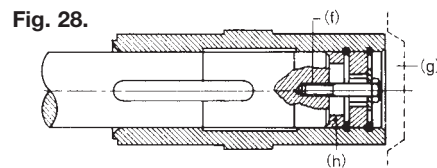
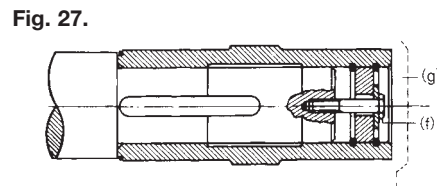
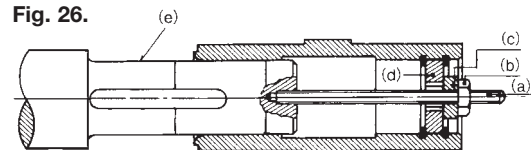
NOTE: The bore should be protected by a cover (g).

4. If the driven shaft does not have a shoulder, a spacer (h) should be used. See Fig. 28.

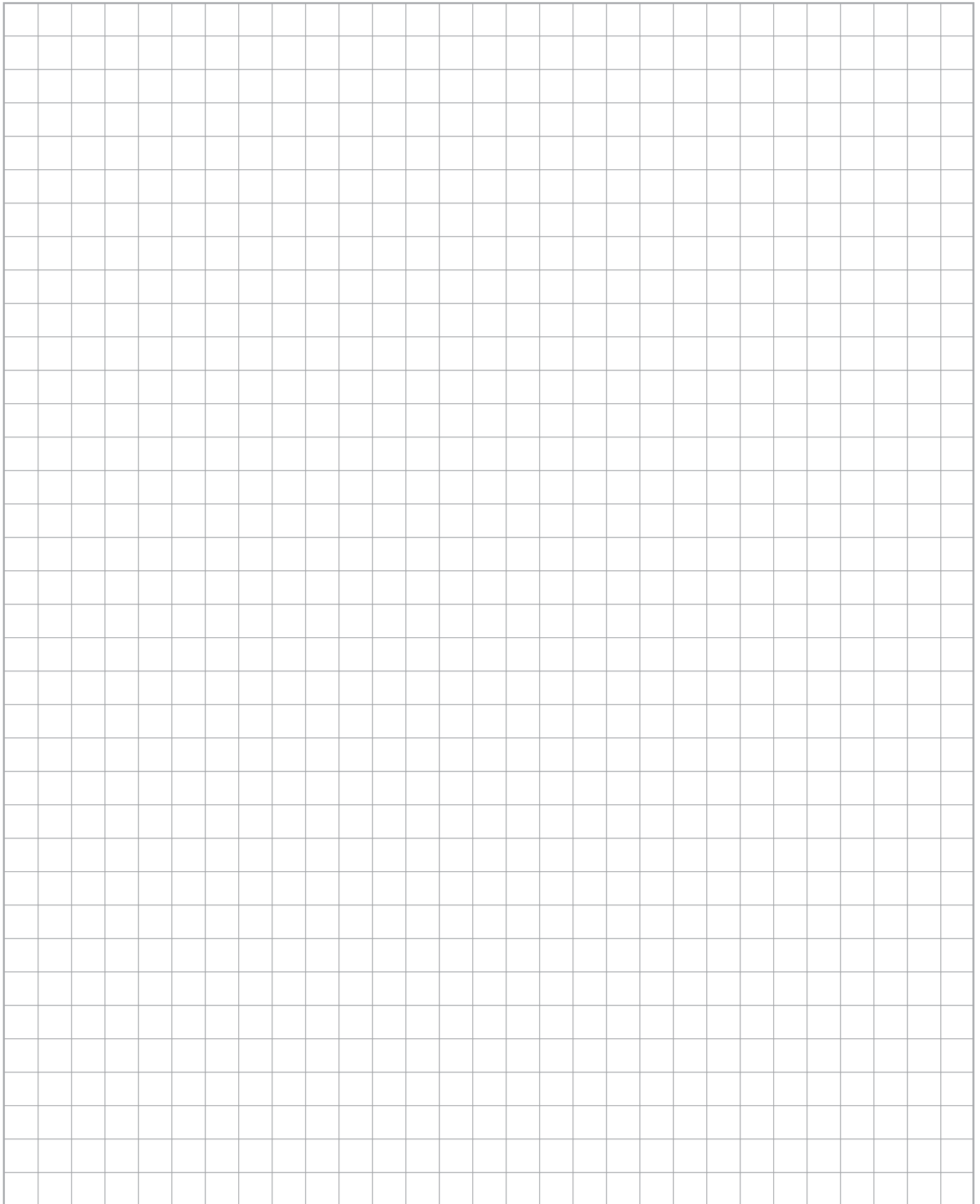
### Removal procedure:

1. Remove mount bolt (n). Attach bolt (j) to spacer (d) and turn bolt (j) to remove the hollow shaft from the driven shaft. See Fig. 29.

NOTE: Parts a through j and n are not provided by Sumitomo.







# Notes



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