Sumitomo Drive Technologies

Cyclo® HBB Helical Buddybox®

Parallel Shaft Helical Gearbox with Cyclo® Reducer Input

Operation and Maintenance Manual

Sumitomo Machinery Corporation of America

07.601.60.005 HBB O&M 2019

Table of Contents

Important Notes

Safety Symbols

These safety symbols appear throughout this manual to indicate important warnings:

DANGER: Incorrect handling of the unit and/or failure to follow the instructions may cause physical damage, serious personnel injury, and/or death.

CAUTION: Incorrect handling of the unit and/or failure to follow the instructions may cause physical damage and/or personnel injury.

Safety Precautions

Review and adhere to the instructions in this manual to ensure:

- trouble-free Cyclo® HBB operation
- your rights to make a warranty claim.

Read this manual and all accompanying documents thoroughly before use. Understand the machine, information on safety, and all precautions for correct operation. Sumitomo recommends that this manual is easily accessible for reference at the machine location.

- **Only properly trained personnel** should transport, install, align, wire, inspect, operate, and maintain the unit.
- The user should install secondary safety devices for applications involving passenger transportation. **Failure to do so may result in personnel injury, death, and/or equipment damage.**
- The user should install secondary safety devices for applications involving elevators. **Failure to do so may result in personnel injury, death, and/or equipment damage.**

Disposal

Please refer to local, state, and federal regulations governing disposal of:

Steel Scrap:

- Housing (Gray Cast Iron)
- Gears
- Shafts
- Bearings

Lubricants:

- Gear Oil
- Grease

Inspection Upon Delivery

- In order to avoid injury, **ensure that the unit is in the upright position** before unpacking.
- **Verify that the unit received matches your order.** Using the incorrect product may cause equipment damage or personnel injury.
- **Do not** remove the nameplate from the unit.

Upon delivery, inspect the unit for damage that may have occurred during shipment. Notify the shipping company immediately if you find any damage. **Do not** install or operate a damaged unit.

Upon receipt of the reducer/gearmotor, verify that:

- the model number on the unit nameplate matches the purchase order
- the unit was not damaged during shipping
- all bolts and nuts are fully tightened.

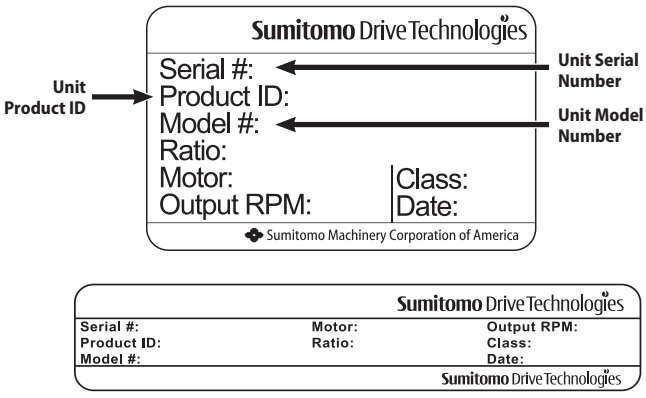
Please consult your Sumitomo agent, distributor, or sales office if you find any defects or if you have any questions.

Nameplate Inspection

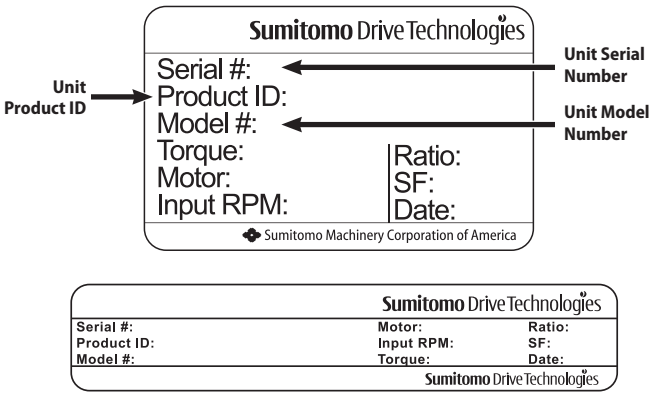
When contacting Sumitomo about this product, please be prepared to provide the following information from the reducer/gearmotor nameplate:

- **reducer or gearmotor model number (nomenclature)**
- **product ID**
- **serial number.**

Gearmotor



Reducer



Nomenclature

Nomenclature

Our nomenclature details specific information about our products. Verify that the nomenclature of the unit delivered matches your order.

Output Shaft Orientation

Type	Prefix
Horizontal	H
Vertical	V

Mounting Style

Type	Prefix
Shaft Mount	Y

Input Connection

Type of Input	Reducer Prefix	Gearmotor Prefix
Integral Motor		M
C-Face Adapter	J	JM
Hollow Input Shaft	X	XM

Frame Size

Single Reduction		
Z6090	B6120	D6160
Z6095	B6125	D6165
A6100	C6140	E6170
A6105	C6145	E6175
Double Reduction		
Z609DA	C614DB	D616DC
A610DA	C614DC	E617DA
B612DA	D616DA	E617DB
B612DB	D616DB	E617DC
C614DA		

Shaft Specifications

Input Shaft	Hollow Output Shaft	Suffix
mm	Key (mm)	
DIN	Key (DIN)	E
Inch	Key (Inch)	K
mm	Taper-Grip®	M
DIN	Taper-Grip®	G
Inch	Taper-Grip®	Y

Modification

Type	Prefix
Unit built with special mods	S
Standard	

Motor Power
(applies only to 1750 RPM)

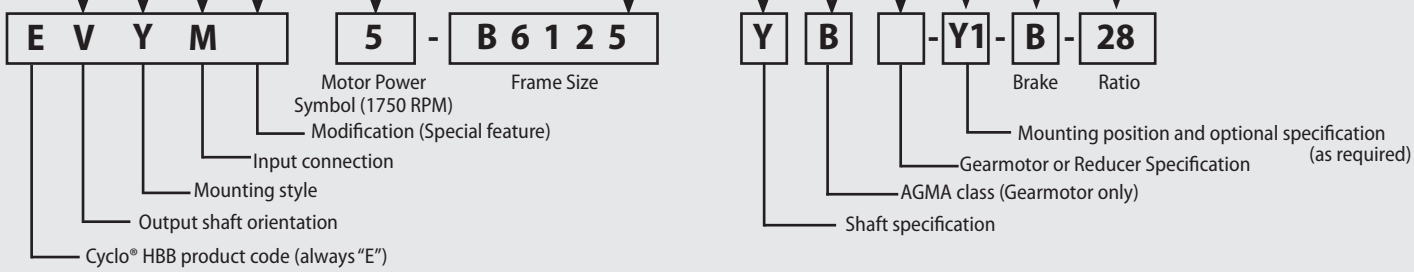
HP	(kW)	Symbol
1/8	(0.1)	**01**
1/4	(0.2)	**02**
1/3	(0.25)	**03**
1/2	(0.4)	**05**
3/4	(0.55)	**08**
1	(0.75)	**1**
1.5	(1.1)	**1H**
2	(1.5)	**2**
3	(2.2)	**3**
5	(3.7)	**5**
7.5	(5.5)	**8**
10	(7.5)	**10**
15	(11)	**15**
20	(15)	**20**
25	(18.5)	**25**
30	(22)	**30**
40	(30)	**40**

AGMA Class

Class	Suffix
I	A
II	B
III	C

Brake (Gearmotor Only)

	Suffix
With Brake	B
No Brake	



Nomenclature, continued

Gearmotor Specification

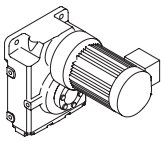
Specification	Suffix
Three-Phase Motor	
Single-Phase Motor	**SG**
AF Motor (Adj. Frequency)	**AV**
Servo Motor	**SV**
DC Motor	**DV**
High Capacity Bearing **(Required for Screw Conveyor)**	**R1**
Premium Efficient Three-Phase Motor	**EP**

Reducer Specification

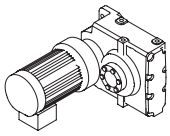
Type	Suffix
Standard	
High Capacity Bearing **(Required for Screw Conveyor)**	**BP**

Mounting Positions

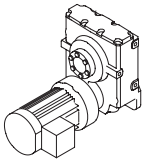
Y1



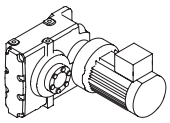
Y2



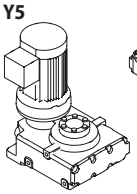
Y3



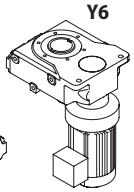
Y4



Y5



Y6



Nominal Total Ratio

Single Reduction	
Input Ratio	**Total Ratio**
3	**11**
5	**18**
6	**21**
8	**28**
11	**39**
13	**46**
15	**53**
17	**60**
21	**74**
25	**88**
29	**102**
35	**123**
43	**151**
51	**179**
59	**207**
71	**249**
87	**305**
119	**417**

Single Reduction	
Input Ratio	**Total Ratio**
104	**364**
121	**424**
143	**501**
165	**578**
195	**683**
231	**809**
273	**956**
319	**1117**
377	**1320**
473	**1656**
559	**1957**
649	**2272**
731	**2559**
841	**2944**
1003	**3511**
1247	**4365**
1479	**5177**
1849	**6472**
2065	**7228**
2537	**8880**
3045	**10568**
3481	**12184**
4437	**15530**
5133	**17966**
6177	**21620**
7569	**26492**

Nomenclature Example:
EVYM5-B6125YB-AVY1-53

E - Cyclo® Helical Buddybox
V - Vertical
Y - Shaft Mount (Hollow Shaft)
M - Integral Motor
5 - 5 HP *(3.7kW)*, 1750 RPM
B6125 - Frame Size
Y - Inch Shaft Specification
B - AGMA Class II
AV - Adj. Frequency Motor
Y5 - Installation Position
53 - Ratio

Storing and Transporting

Storage Location

- Store the unit in a clean, dry area.
- **Do not** store outdoors or in an area with high humidity, dust, sudden temperature changes, or corrosive gases.

Storage Period

- **Do not** store the unit for longer than 6 months without obtaining long-term storage procedures from Sumitomo.
- Consult Sumitomo when storing the unit for more than 6 months. Rustproofing procedures are required.
- Consult Sumitomo when exporting the unit. Rustproofing procedures may be required.

Operation After Storage

Before operating the unit after an extended storage period, ensure that non-metal parts, i.e., oil seals, o-rings, air breather, have not deteriorated. Non-metal parts may deteriorate easily from exposure to ambient conditions (i.e., extreme temperatures, UV rays). Replace deteriorated parts with new ones before unit start-up.

After starting the unit, verify that there is no abnormal noise, vibration, and/or temperature rise. Immediately stop the unit and call Sumitomo or your distributor if you observe any abnormality.

Transporting

- **Do not** stand directly under a unit suspended by a lifting mechanism. Injury or death may occur if the unit is dropped.

- **Before lifting the unit**, determine its weight (refer to catalog, packing list, etc.) and ensure that the moving equipment will support the unit's weight. **Never hoist or move a unit that exceeds the moving equipment's rated capacity** or else personnel injury and/or equipment damage may occur.
- **Do not** allow the unit to drop or fall while moving. **Always use the eye bolts** attached to the gear housing (and on motor if supplied) when moving the unit. After securing the unit to the machine, remove the moving hooks/straps from the eyebolts.

Installation Notes

Installation Precautions

- Do not use the reducer/gearmotor for specifications other than those shown on the nameplate or in the manufacturing specification documents. Personnel injury and/or equipment damage may occur.
- Do not place combustible material on or around the unit; fire may occur.
- Do not place any objects around the unit that will prohibit proper ventilation. Inadequate ventilation may lead to high unit temperature and/or fire.
- Do not step on or hang from the unit. Excessive weight may cause component breakage leading to personnel injury and/or equipment damage.
- Do not touch the shaft, keyway, or motor fan with bare hands; injury may occur.
- For applications in which lubricant leaks could adversely affect operations (i.e., package handling, food processing), place an oil pan below the unit to protect against contamination that may occur if oil seals become damaged or worn.

Installation Location

Ambient Temperature Range: 14 – 104°F (-10 – 40°C)
Ambient Humidity: 85% or less
Altitude: 3,280 feet (1,000 m) or less
Atmosphere: The location should not contain corrosive gas, explosive gas, or steam. The location should be free of dust and well ventilated.
Location: Indoor – free of dust and water

Consult Sumitomo when the unit will operate in conditions other than those specified above. Special unit modifications may be required.

Units manufactured according to customer specified application requirements (i.e. outdoor modifications, high-temperature modifications) are designed to operate within the specified environment.

Install the unit so inspection and/or maintenance procedures may be easily performed. Install all units that are not shaft mounted on a sufficiently rigid base.

Installation Angle

You must mount the unit horizontally. Please consult Sumitomo if the unit needs to be installed in a position other than horizontal.

If the unit was manufactured for a mounting position other than horizontal, **do not mount it in a position other than the one specified.**

Horizontal is the shaft orientation for standard units. Consult Sumitomo for shaft directions other than horizontal.

- Do not remove the eye-bolt from the motor. Should you need to remove the eye-bolt for any reason, install a replacement bolt in the tapped hole to prevent water from entering the motor.

Severe Loading Conditions

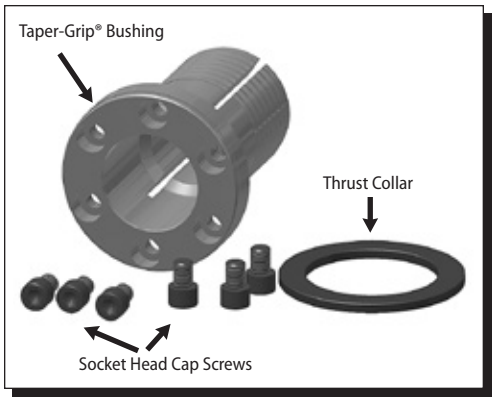
For applications with severe vibration and/or frequent starts and stops, Sumitomo recommends the use of high-strength bolts of Grade 8.8 (or greater) to mount the reducer/gearmotor.

Installation onto the Driven Machine

- Before mounting the reducer/gearmotor to the machine, verify the appropriate/desired rotation of the machine. Differences in the rotational direction may cause personnel injury and/or equipment damage.
- If a key is attached to the keyed hollow bore, temporarily remove the key if the unit is not coupled to the driven machine and you wish to run the unit.
- Before operating the unit, ensure that all safety guards around the rotating components are in-place and secure. Failure to do so may result in personnel injury.
- When joining the reducer or gearmotor to the load, ensure that the center alignment, belt tension, and/or parallelism of the coupling device are within the coupling manufacturer's established recommendations. For applications with a belt, ensure that the belt is properly tensioned to the manufacturer's specification, and the bolts securing the pulley and couplings are sufficiently tightened. Failure to follow these precautions may result in personnel injury and/or equipment damage.

Installation onto Driven Shaft

Taper-Grip® Bushing Installation



Introduction

The keyless Taper-Grip® Bushing system provides simple and reliable shaft attachment for Sumitomo speed reducers and gearmotors. This system allows bi-directional shaft rotation and stop-start operation with a powerful, slip-free grip. To assure peak performance of your equipment, please read, understand and follow these installation instructions.

Taper-Grip® Bushing Driven Shaft Tolerances

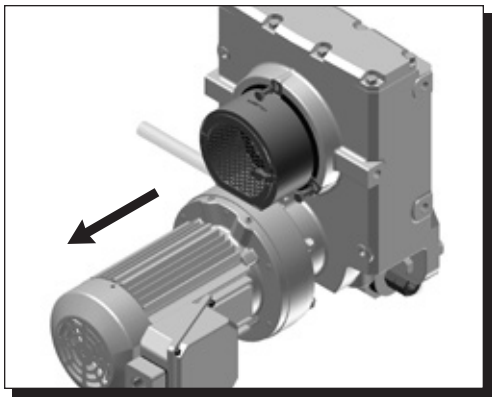
Shaft Diameter (inches)	Shaft Tolerance (inches)
$^{3}/_{4}$″ — $1^{1}/_{8}$″	+0″/ – 0.0013″
$1^{3}/_{16}$″ — 2″	+0″/ – 0.0015″
$2^{1}/_{16}$″ — $3^{1}/_{8}$″	+0″/ – 0.0018″
$3^{3}/_{16}$″ — $4^{3}/_{4}$″	+0″/ – 0.0021″
$4^{13}/_{16}$″ — $6^{1}/_{2}$″	+0″/ – 0.0025″

The required tolerance is h8.

Parts

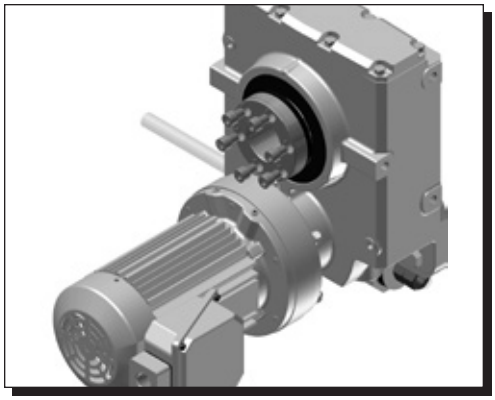
As shown in the figure on the left, the Taper-Grip® Bushing includes the **bushing, thrust collar**, and **socket head cap screws.**

Taper-Grip® Installation onto Driven Shaft



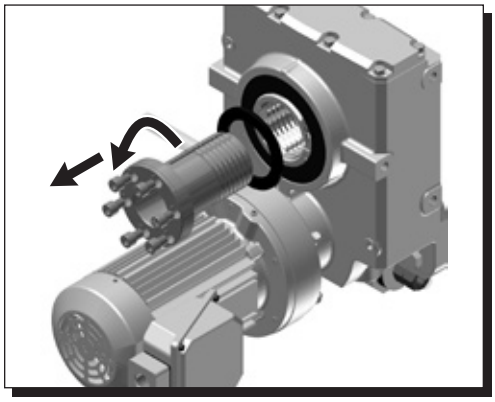
1

Remove the Taper-Grip® bushing **safety cover** if the unit includes one.



2

Loosen **socket head cap screws**.

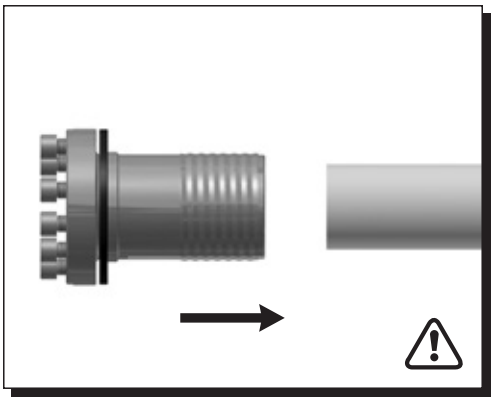


3

Remove (unscrew) Taper-Grip® bushing from the unit. Slide the thrust collar onto the Taper-Grip® bushing.

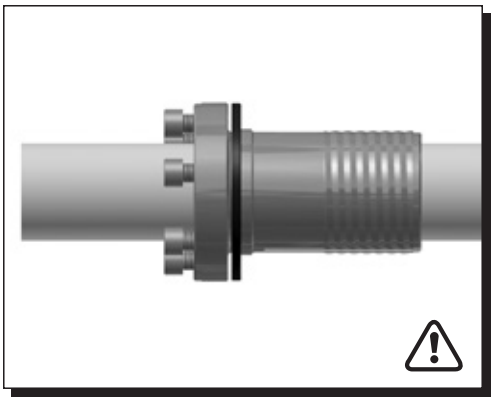
Installation onto Driven Shaft

Using Taper-Grip® Bushing



4

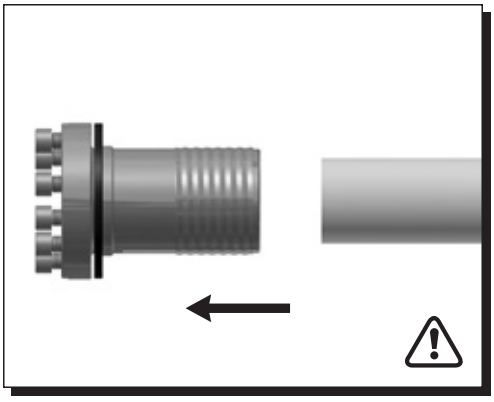
Clean all **grease, oil** and/or **anti-seize paste** from the driven shaft. Slide Taper-Grip® bushing onto driven shaft.



5

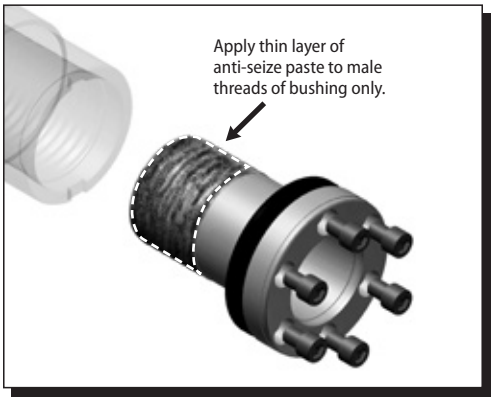
Inspect and test Taper-Grip® Bushing on shaft.

- Check shaft for **burrs, corrosion, or warpage**. Repair or replace shaft as necessary.
- Slide bushing back and forth along shaft, checking for surface irregularities and fit.
- Verify bushing bore size.



6

Remove Taper-Grip® Bushing from driven shaft.



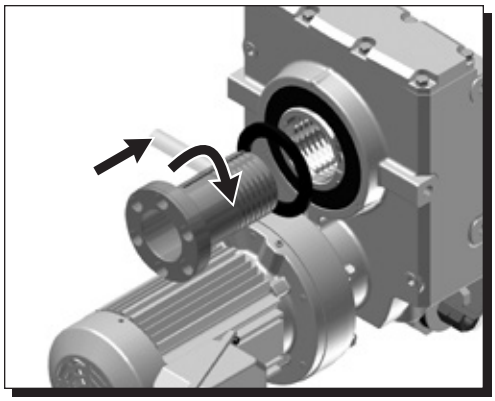
7

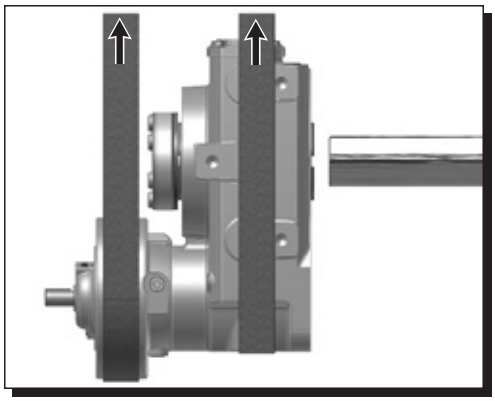
Apply a thin layer of anti-seize paste to the male threads of the Taper-Grip® bushing only. Ensure that the anti-seize paste does not enter the Taper-Grip® bushing bore. Carefully thread the Taper-Grip bushing into the hub of the speed reducer or gearmotor until the thrust collar solidly engages the unit hub surface and the bushing flange.

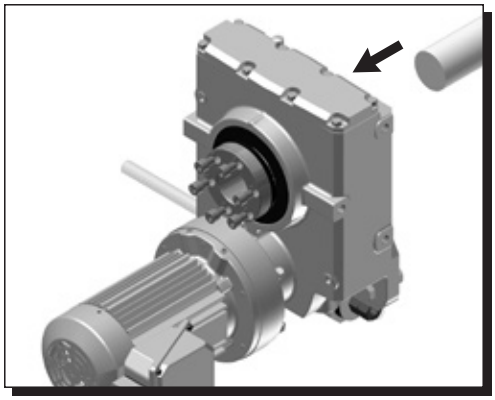
Do not apply anti-seize paste to the female threads in the hub.

Installation onto Driven Shaft

Using Taper-Grip® Bushing

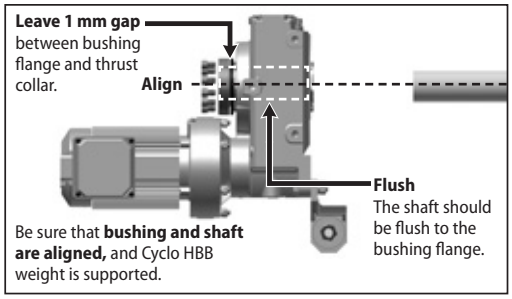






8

Unscrew Taper-Grip® bushing Cyclo ® HBB leaving **approximately 1 mm gap between the bushing flange and thrust collar.**



9

Externally support the Cyclo® HBB before inserting the driven shaft into the bushing. **Maintain external support** until all bushing socket head cap screws are tightened to the appropriate operational torque (Step 12).

Do not apply grease, oil, or anti-seize paste to the driven shaft or the bushing bore before placing the unit onto driven shaft. Use of these friction-minimizing products will adversely affect the ability of the unit to transmit torque.

10

Mount the Cyclo® HBB onto the driven shaft.

Do not rock or pry the unit.

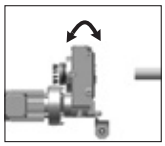
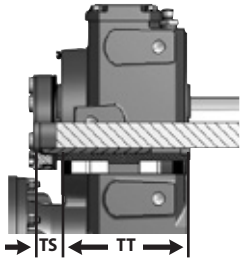


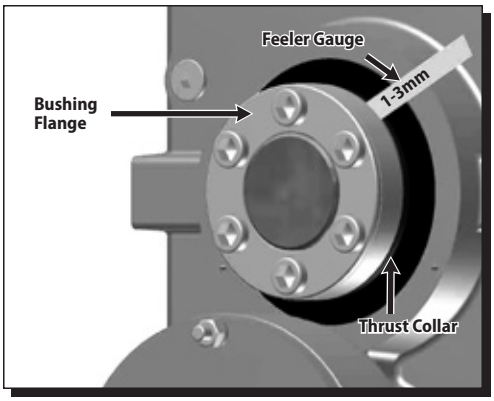
Table 1. Minimum Shaft Engagement



Cyclo HBB Size	Min. Shaft Engagement TT (in.)	Max. Depth to Shaft End TS (in.)
Z	4.47	1.22
A	5.00	1.38
B	5.67	1.77
C	7.36	1.57
D	8.07	1.97
E	8.86	2.01

Installation onto Driven Shaft

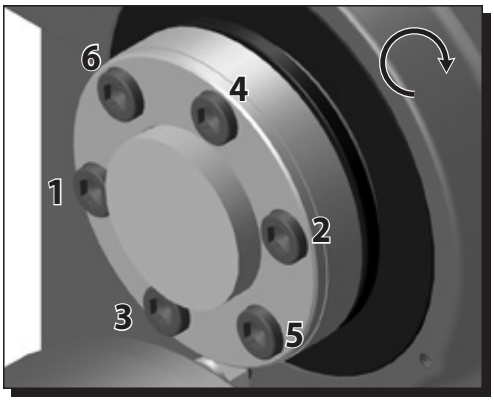
Using Taper-Grip® Bushing



11

Screw bolts into Taper-Grip bushing.

- Lightly oil the threads of each bolt before inserting.
- Finger tighten each bolt to secure in place
- Be sure to **maintain the 1 mm** (approximate) **gap** between the **thrust collar** and the **bushing flange.**



12

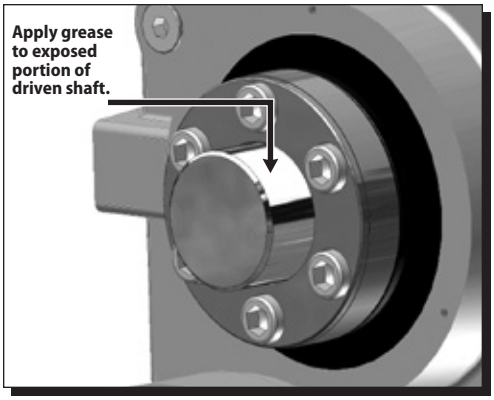
Tighten bushing bolts to the correct torque value.

- Following a star pattern, use a torque wrench to **gradually tighten each socket head cap screw in 20% increments.**
- Refer to **Table 1, Taper-Grip Bushing Bolt Tightening Torques**, for the correct operational screw torques.

Table 2. Taper-Grip® Bushing Bolt Tightening Torques

Cyclo® HBB Model	Cap screws (JIS Grade 12.9)		Cap screw Torque	
	Qty.	Size	Nm	Lb.Ft.
Z	6	M10x14	31	23
A	6	M12x16	51	37.5
B	6	M12x16	51	37.5
C	6	M16x20	128	95
D	6	M16x20	200	148
E	8	M16x20	200	148

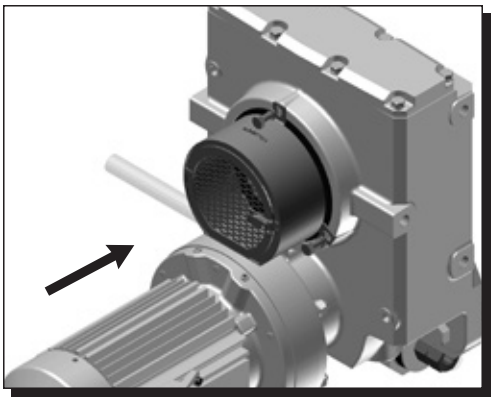
After the reducer has been running for 20 to 30 hours, re-torque the screws to the values in Table 2. Screw torques should be subsequently checked at normal service intervals (i.e. every 6 months).



13

Apply grease to the exposed portion of the driven shaft.

- **After installing and tightening** the bushing bolts with a torque wrench, **apply grease or an anti-corrosion product** to the exposed portion of the shaft.



14

For units that include a bushing safety cover, reinstall the guard over the Taper-Grip® bushing.

Installation onto Driven Shaft

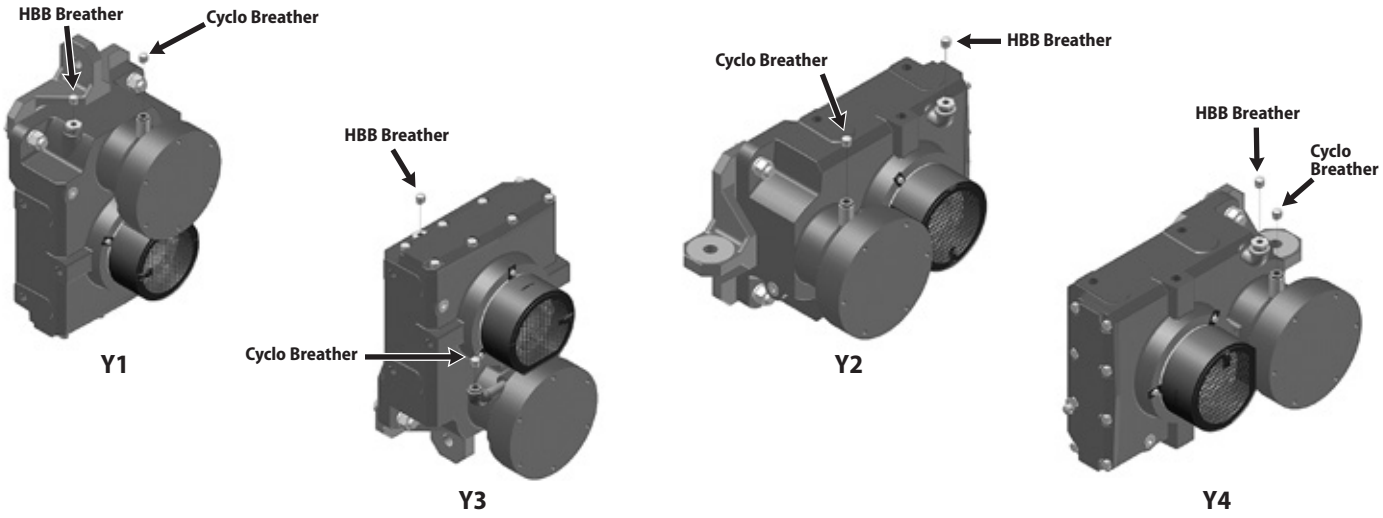
Using Taper-Grip® Bushing

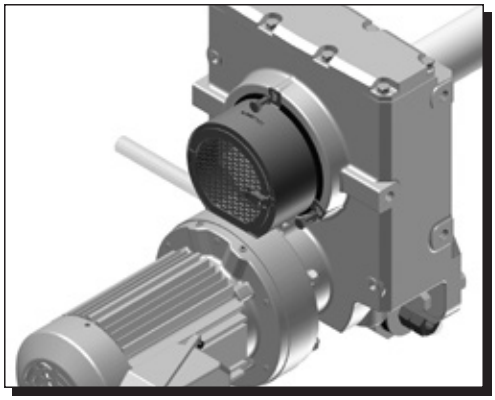
15

Verify lubrication and install air vents.

- Ensure reducer is in the proper mounting position.
- Remove plugs and install air vents included in reducer package.
- An elbow is include for:
  - the gear portion when mounting in the Y2 and Y4 position.
  - the Cyclo® portion when mounting in the Y3 position.

Unit is filled with oil. Removing plugs before placing unit in correct mounting position will cause oil to spill.





16

Finished Installation.

- **Install the Torque Arm Assembly** according to the instructions described in the **Torque Arm Installation** section of this manual.
- Check theTaper-Grip bushing screwtorques after 20 - 30 hours of operation. If necessary, tighten the screws according to the torque chart in step 10. Check the screwtorques every 6months thereafter.

STOP **Do not operate unit until the torque arm has been attached.** The torque arm prevents counter-rotation during unit operation. Refer to the **Torque Arm Installation section** in this manual for instructions.

Bore and Shaft Tolerance Specifications

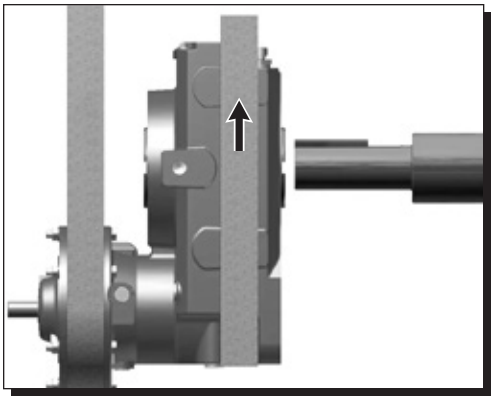
- The hollow shaft bore tolerance conforms to JIS H8, unless specified otherwise.
- Sumitomo recommends a shaft tolerance of JIS js6 or JIS k6 if the application involves high shock loading and/or large radial loads.

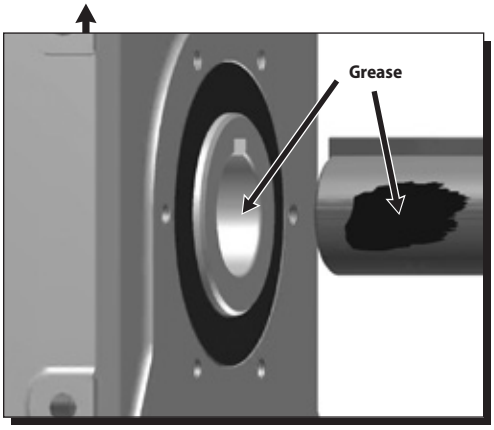
Table 3. Driven Shaft Tolerances - Uniform Load without Shock Load

Frame Size	Inch			Metric, mm		
	Shaft Dia		Tolerance	Shaft Dia.		Tolerance
	Min.	Max.		Min.	Max.	
Z	1-3/16	1-1/2	+0 / -0.0006	30	40	+0 / -0.016
A	1-3/4	1-15/16	+0 / -0.0006	45	50	+0 / -0.016
	2	2-3/16	+0 / -0.0007	51	55	+0 / -0.019
B	2-3/16	2-5/8	+0 / -0.0007	55	65	+0 / -0.019
C	2-7/16	3	+0 / -0.0007	60	75	+0 / -0.019
D	2-3/4	3-1/8	+0 / -0.0007	70	80	+0 / -0.019
	3-3/16	3-7/16	+0 / -0.0009	81	85	+0 / -0.022
E	3-3/16	3-15/16	+0 / -0.0009	80	80	+0 / -0.019
				81 - 100	81 - 100	+0 / -0.022

Table 4. Driven Shaft Tolerances – With Shock Load or Large Radial Load

Frame Size	Inch			Metric, mm		
	Shaft Dia		Tolerance	Shaft Dia.		Tolerance
	Min.	Max.		Min.	Max.	
Z	1-3/16	1-1/2	+0.0007 / +0.0001	30	40	+0.018 / +0.002
A	1-3/4	1-15/16	+0.0007 / +0.0001	45	50	+0.018 / +0.002
	2	2-3/16	+0.0008 / +0.0001	51	55	+0.021 / +0.002
B	2-3/16	2-5/8	+0.0008 / +0.0001	55	65	+0.021 / +0.002
C	2-7/16	3	+0.0008 / +0.0001	60	75	+0.021 / +0.002
D	2-3/4	3-1/8	+0.0008 / +0.0001	70	80	+0.021 / +0.002
	3-3/16	3-7/16	+0.0010 / +0.0001	81	85	+0.025 / +0.003
E	3-3/16	3-15/16	+0.0010 / +0.0001	80	80	+0.021 / +0.002
				81 - 100	81 - 100	+0.025 / +0.003





Keyed Hollow Bore Installation onto Driven Shaft

1

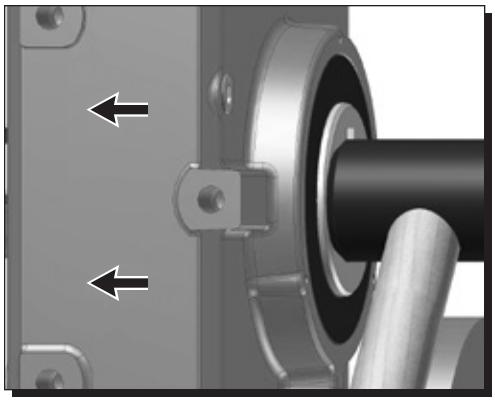
Externally support the Cyclo® HBB before inserting the driven shaft into the keyed hollow bore. Maintain external support until the shaft is completely inserted and secured to the unit.

2

Apply molybdenum disulfide grease to the driven shaft surface and inside the keyed hollow bore.

Installation onto Driven Shaft

Keyed Hollow Bore Installation



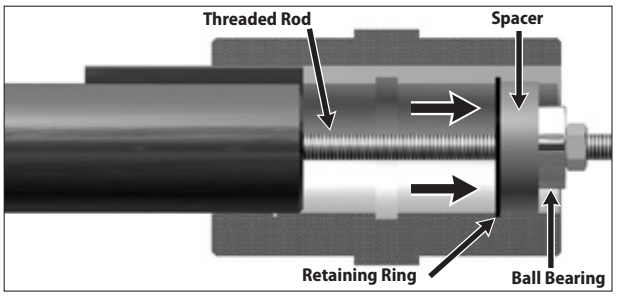
3

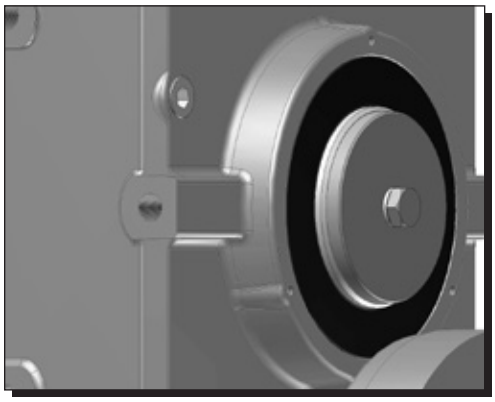
Align the driven shaft with the reducer/gearmotor bore and carefully slide unit onto the driven shaft.

- If the fit is tight, strike on the keyed hollow bore with a mallet to assist in the assembly.

If using a mallet during installation, strike **only** against the unit's steel keyed hollow bore. Do not strike the reducer housing or oil seal, damage to the bearings, the housing, and/or the seals may occur.

Note: If the fit is tight, you may use a jig such as the one shown here to ease assembly. **Sumitomo Drive Technologies does not supply a mounting jig. This information is provided for reference only.**





4

Once driven shaft has been completely inserted into the unit's keyed hollow bore, secure the shaft in place using a keeper plate as shown in this example.

Do not operate unit until the torque arm has been attached. Refer to the **Torque Arm Installation section** in this manual for instructions.

Torque Arm Installation

Torque Arm Introduction, Clevis Type Torque Arm

A **torque arm** is a device used to prevent counter-rotation of the shaft mounted reducer/gearmotor during operation.

STOP The torque arm must always be installed in tension.

Clevis Type Torque Arm

Fig. 1 Clevis Type Torque Arm Parts

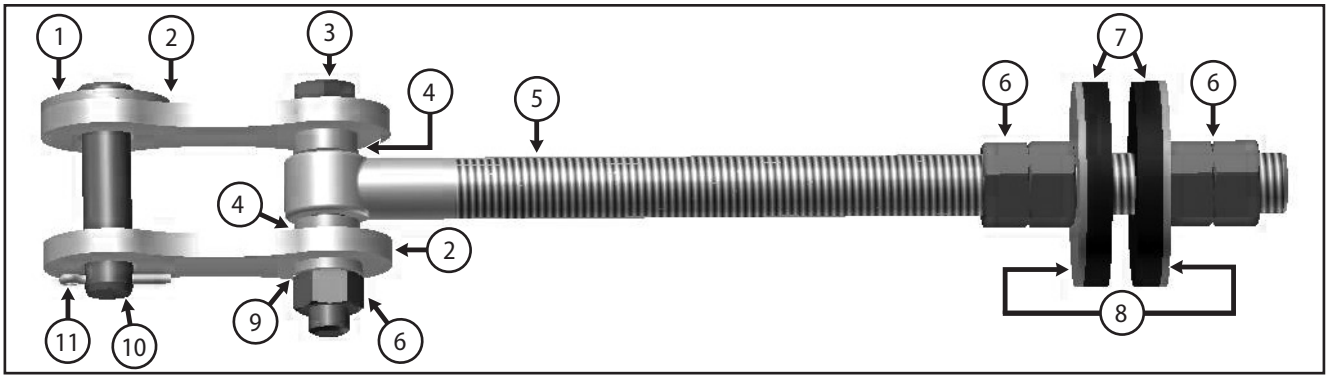
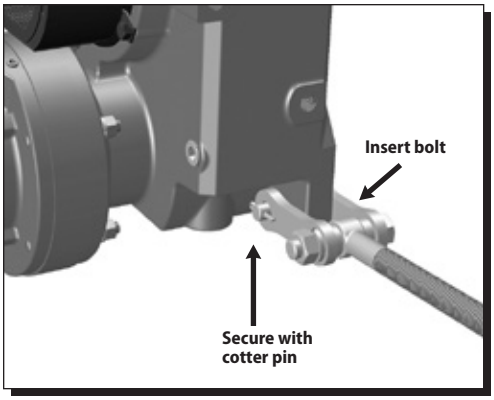


Table 5. Clevis Type Torque Arm Parts

Item Number	Description	Item Number	Description
1	Flat Washer	7	Rubber Bushings
2	Mounting Brackets	8	Washers
3	Hex Bolt	9	Lock Washer
4	Spacer	10	Clevis Pin
5	Torque Rod	11	Cotter Pin
6	Nuts		

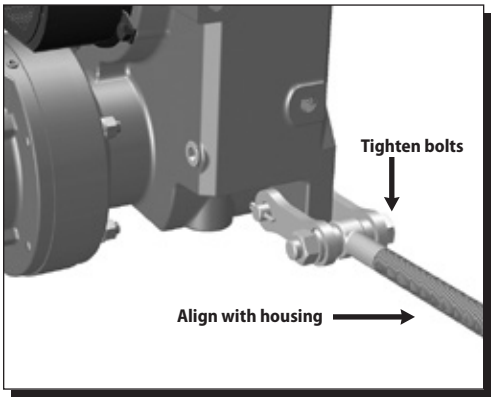


Clevis Torque Arm Installation Procedure

1

Attach the torque arm assembly to the Cyclo® HBB using pin and cotter key.

- Position torque arm mounting bracket over the Cyclo® HBB corner eyelet.
- Insert **clevis pin** through brackets and eyelet. Secure with **cotter pin.**

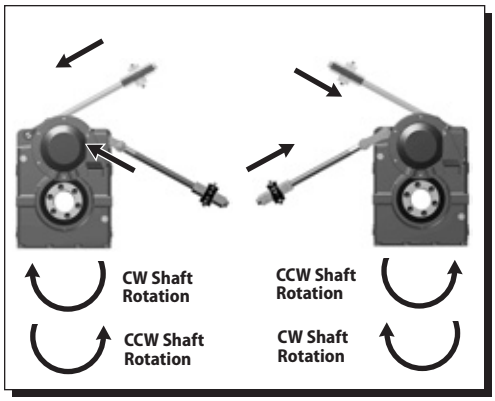


2

Align torque arm with unit housing and tighten bolts.

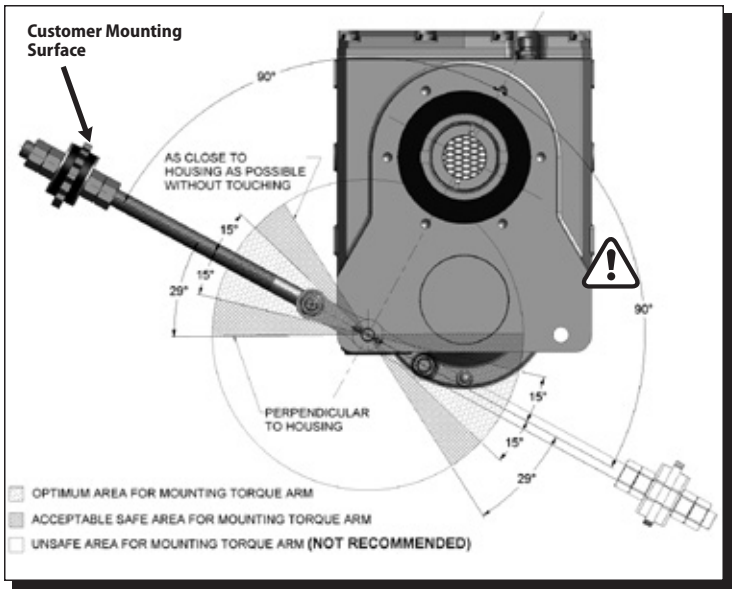
Torque Arm Installation

Clevis Torque Arm Installation Procedure



3

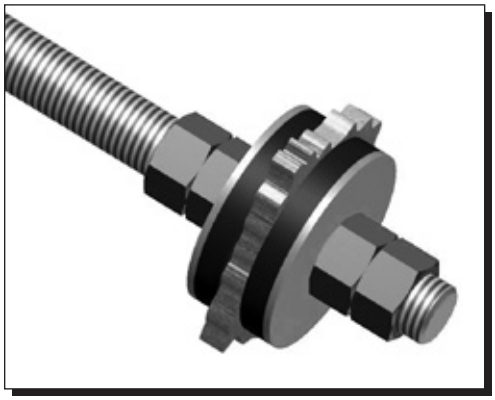
Position the torque arm so it will be in tension during unit operation.



4

Position Torque Arm as close as possible to 90° relative to the unit output bore.

Sumitomo does not recommend the use of multiple Torque Arm Assemblies to achieve greater overall length.



5

After inserting the torque rod into the mounting surface, carefully tighten nuts on either side of torque rod.

Do Not over tighten nuts. Tighten to point where rubber bushings can still be hand rotated when the unit is turned off.

Before starting unit, verify that:

- The torque arm will be in tension when the unit is operating.
- The torque arm is aligned with the Cyclo® HBB housing when viewed from the side.
- The torque arm is perpendicular to the line between the axis of the output shaft and the torque arm's housing connection point.
- The torque arm is not touching the gear housing.

T-Type Torque Arm

Fig. 2 T-Type Torque Arm Parts

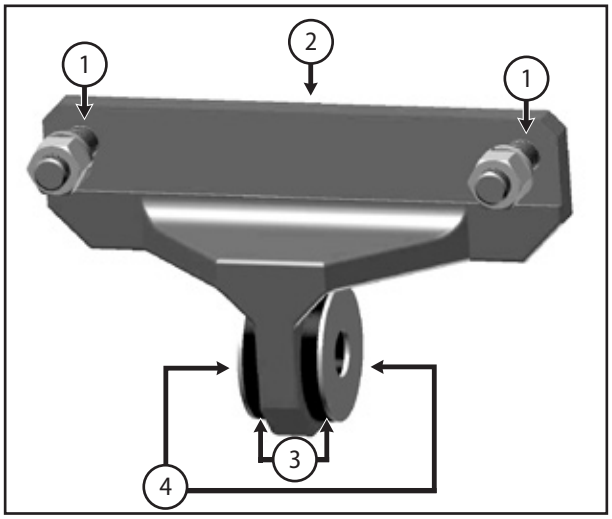


Table 6. Sumitomo Supplied T-Type Torque Arm Parts

Item Number	Description
1	Mounting Hardware (Bolts, Washers, Nuts)
2	T-Bracket
3	Rubber Bushings
4	Washers

Fig. 3 Customer Supplied T-Type Torque Arm Parts

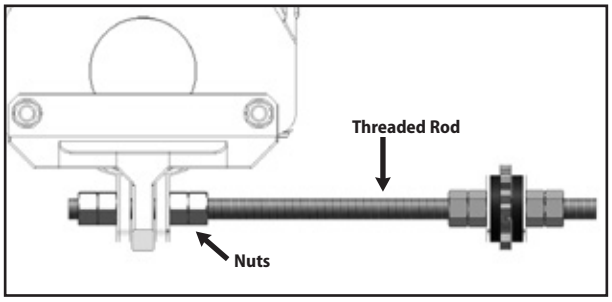
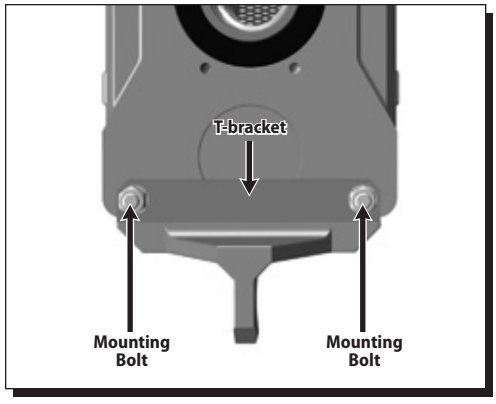


Table 7. Recommended Threaded Rod Diameter

Cyclo® HBB Size	Rod Diameter (Minimum Grade 8.8 Steel)
Z	M12
A	M16
B	M20
C	M24
D	M24
E	M30



T-Type Torque Arm Installation Procedure

1

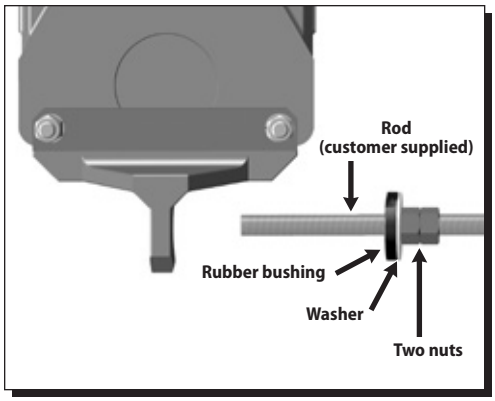
Attach the T-Bracket to the Cyclo® HBB using the supplied mounting hardware. Tighten mounting bolts according to the values listed in this table:

Table 8. T-Type Torque Arm Bolt Torques

HBB Size	Bolt Size	Tightening Torque ft•pound	Tightening Torque N•m
Z	M12	40-46	54-62
A	M16	92-130	125-176
B	M16	92-130	125-176
C	M20	191-270	259-366
D	M24	330-466	447-632
E	M30	655-923	888-1251

Torque Arm Installation

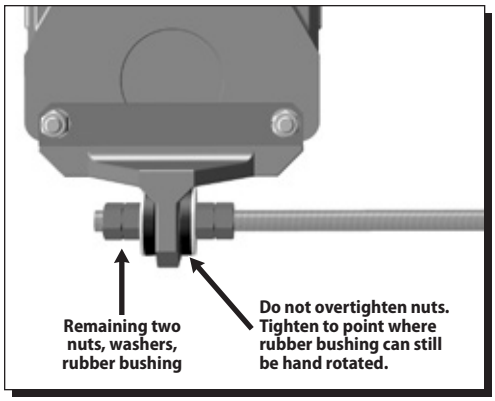
T-Type Torque Arm Installation Procedure



2

Place two nuts, washer, and rubber bushing on threaded rod.
Insert rod through mounting tab on T-Bracket.

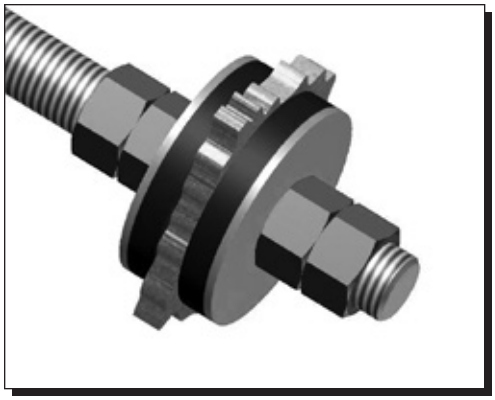
Make sure rod is parallel to HBB when fully installed.



3

Place remaining two nuts, washer, and rubber bushing on rod.

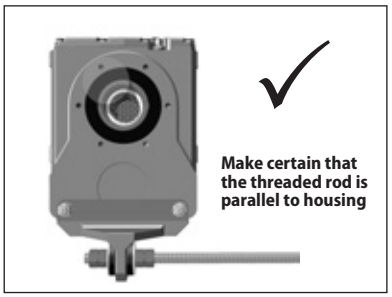
Do not overtighten nuts. Tighten only to point where rubber bushings can still be hand rotated.

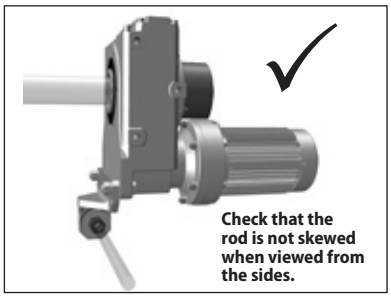


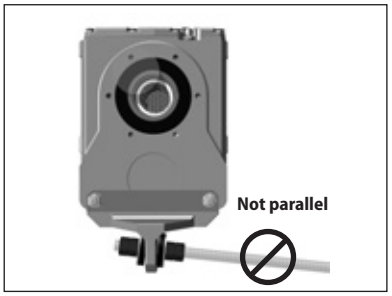
4

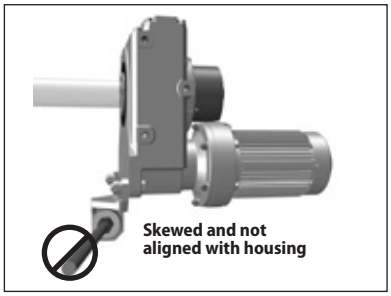
Place free end of rod into rigid and stable mounting surface and secure with washers and nuts.

Before starting the unit, ensure that the torque arm is properly aligned:



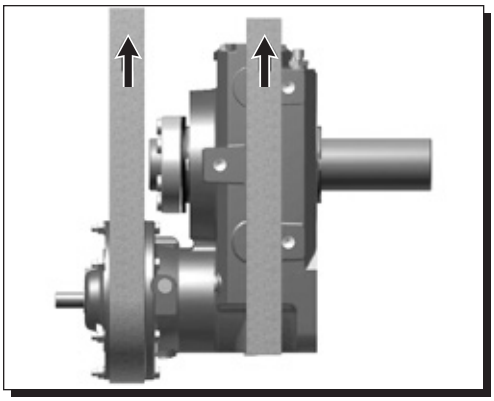






Removal from Driven Shaft

Cyclo® HBB with Taper-Grip® Bushing



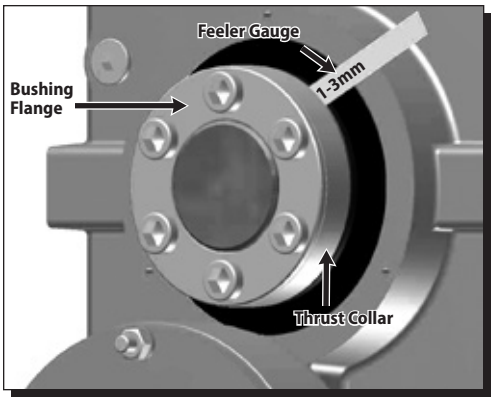
STOP Before starting the removal process, ensure that electrical power to the unit has been safely locked out and electrical connections to the unit have been disconnected.

1

Externally support the Cyclo® HBB so that all the unit's weight is removed from the driven shaft.

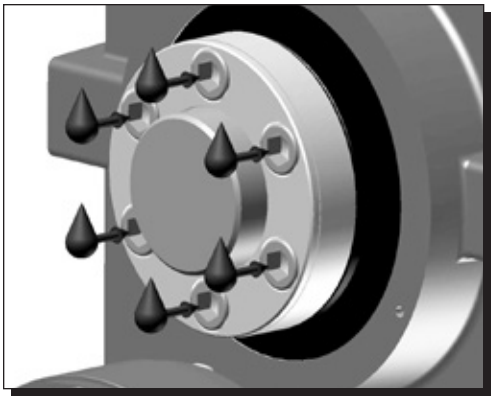
⚠ The weight of the Cyclo® HBB must be externally supported throughout the entire removal process.

Do not raise the unit too high! Shaft binding may occur.



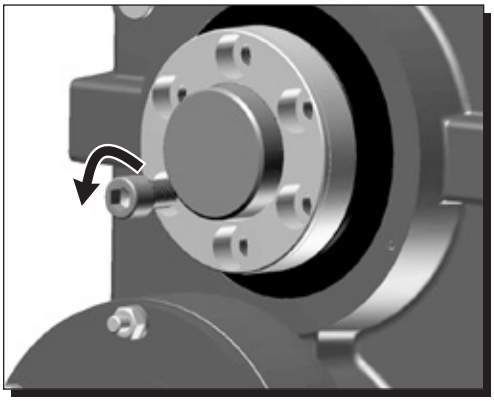
2

Inspect the Taper-Grip® Bushing to assure that a gap exists between the thrust collar and the bushing flange.



3

Apply a liquid-penetrant onto each of the Taper-Grip® Bushing socket-head cap screws. Allow time for the penetrant to settle into the threads of the screws.

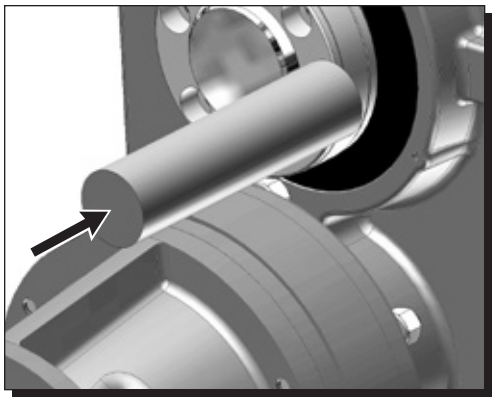


4

After the penetrant has settled, remove the socket head cap screws one at a time.

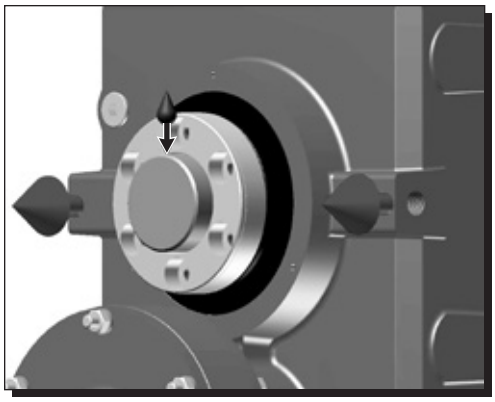
Removal from Driven Shaft

Cyclo® HBB with Taper-Grip® Bushing



5

Place a soft-metal (i.e. brass) bar against the flange of the Taper-Grip® Bushing and carefully strike end of bar with a hammer to release the bushing.



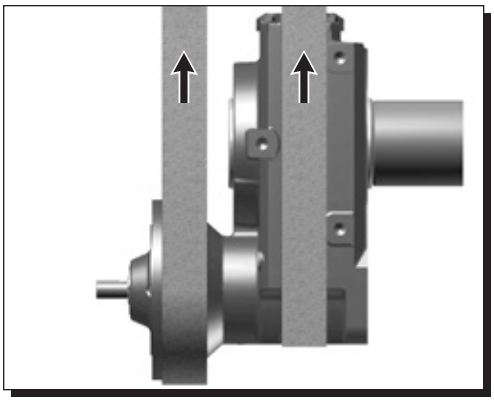
6

After releasing the bushing, reinstall the cap screws by hand only. Stop tightening them when they touch the thrust collar. They will ensure the reducer will not slide against the bushing and clamp it against the shaft when the reducer is removed. Apply a liquid penetrant to the shaft where it contacts the bushing. Allow time for the liquid to penetrate between the shaft and the bushing wall. Once the penetrant has settled adequately, carefully remove the Cyclo® HBB from the driven shaft.

Note: If the Taper-Grip® Bushing releases, but the unit cannot be removed from the driven shaft, a puller may need to be applied to the bushing flange to pull the unit free from the shaft.

Removal from Driven Shaft

Cyclo® HBB with Keyed Hollow Bore



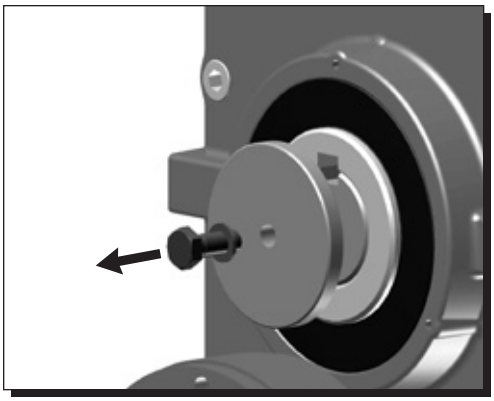
Before starting unit removal process, ensure that electrical power to unit has been safely locked out and that electrical connections to the unit have been disconnected.

1

Externally support the Cyclo® HBB so that all the unit's weight is removed from the driven shaft.

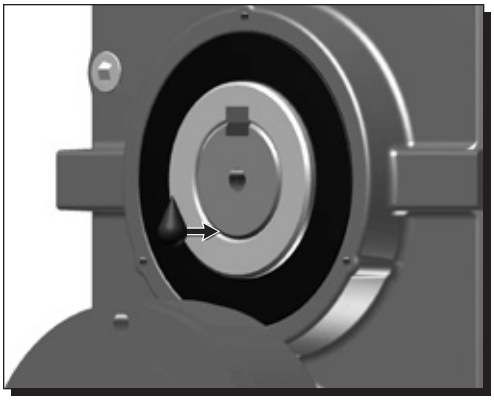
The weight of the Cyclo® HBB must be externally supported throughout the entire removal process.

Do not raise the unit too high! Shaft binding may occur.



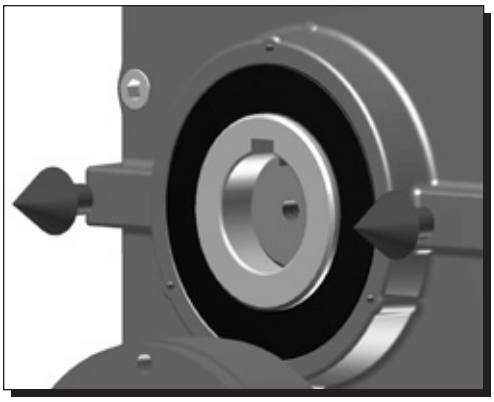
2

Carefully remove the shaft-retaining device from the driven shaft.



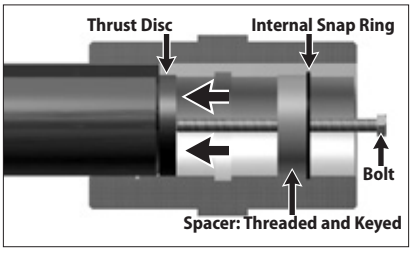
3

Apply a liquid penetrant to the shaft where it contacts the keyed hollow bore. Allow time for the liquid to penetrate between the shaft and the wall of the keyed hollow bore.



4

Once the penetrant has settled adequately, carefully remove the Cyclo® HBB from the driven shaft.



Note: If shaft removal is difficult, a jig such as the one shown here may be used to ease the removal process. **Sumitomo Drive Technologies does not supply the removal jig. This information is supplied for reference only.**

Lubrication

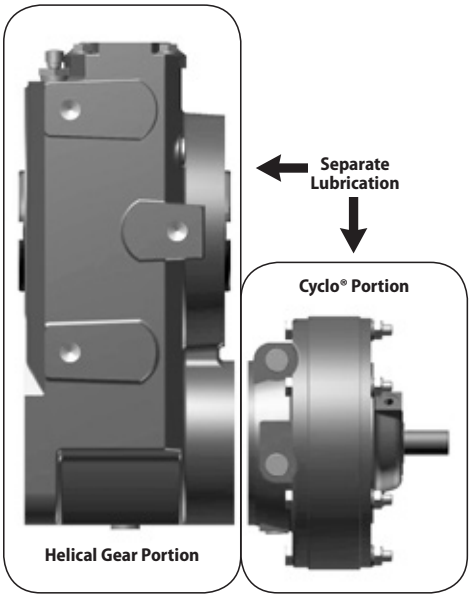
Determining Lubrication Method

Sumitomo Cyclo® HBBs are shipped from the factory **without** lubricating oil, unless the customer specified otherwise when the unit was ordered.

For some unit sizes and mounting configurations, the Cyclo® portion is filled at the factory with **maintenance-free grease.** For these units, the Cyclo® portion **does not** need to be filled with lubricant before start-up. Refer to the Lubrication Method section for details.

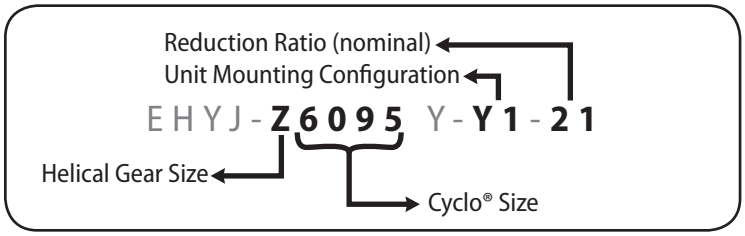
The unit must contain the correct type and amount of lubrication before operating.

For the Cyclo® HBB, the Cyclo® and the helical gear portions **must** be filled with lubricant separately and maintained separately. Lubricant **does not** flow from one section to the other.



Unit Nomenclature

Refer to the **Model** portion of the unit's nameplate to determine the unit size, reduction ratio, and mounting configuration:



Lubrication Method

Using the model number and mounting configuration, refer to Tables 9 and 10 to determine the unit's lubrication method.

Table 9. Lubrication Method for Configurations Y1 – Y4

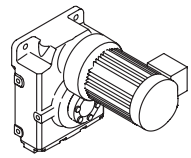
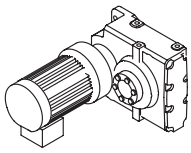
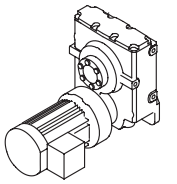
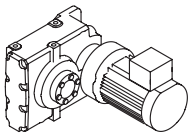
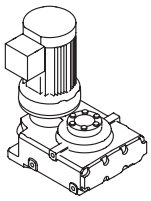
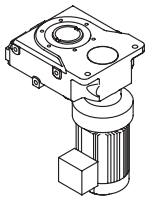
Mounting Configuration	Unit Size		Lubrication Method	
	Helical Gear Size	Cyclo® Size		
 Y1	Z	6090, 6095 6090DA, 6095DA	Cyclo® Portion:	Maintenance-Free Grease
			Helical Gear Portion:	Oil
	A	6100, 6105 6100DA, 6105DA	Cyclo® Portion:	Maintenance-Free Grease
			Helical Gear Portion:	Oil
 Y2	B	6120, 6125 6120DA, 6125DA 6120DB, 6125DB	Cyclo® Portion:	Maintenance-Free Grease
			Helical Gear Portion:	Oil
	C	6140, 6145	Cyclo® Portion:	Oil
			Helical Gear Portion:	Oil
 Y3	C	6140DA, 6145DA 6140DB, 6145DB	Cyclo® Portion:	Grease
			Helical Gear Portion:	Oil
	D	6160, 6165 6160DC, 6165DC	Cyclo® Portion:	Oil
			Helical Gear Portion:	Oil
	D	6160DA, 6165DA 6160DB, 6165DB	Cyclo® Portion:	Grease
			Helical Gear Portion:	Oil
 Y4	E	6170, 6175 6170DC, 6175DC	Cyclo® Portion:	Oil
			Helical Gear Portion:	Oil
	E	6170DA, 6175DA 6170DB, 6175DB	Cyclo® Portion:	Grease
			Helical Gear Portion:	Oil

Table 10. Lubrication Method for Configurations Y5, Y6

Mounting Configuration	Unit Size		Lubrication Method	
	Helical Gear Size	Cyclo® Size		
 Y5	Z	6090, 6095 6090DA, 6095DA	Cyclo® Portion:	Maintenance Free Grease
			Helical Gear Portion:	Oil
	A	6100, 6105 6100DA, 6105DA	Cyclo® Portion:	Maintenance Free Grease
			Helical Gear Portion:	Oil
	B	6120, 6125 6120DA, 6125DA 6120DB, 6125DB	Cyclo® Portion:	Maintenance Free Grease
			Helical Gear Portion:	Oil
 Y6	C	6140, 6145 6140DA, 6145DA 6140DB, 6145DB	Cyclo® Portion:	Grease
			Helical Gear Portion:	Oil
	D	6160, 6165 6160DA, 6165DA 6160DB, 6165DB 6160DC, 6165DC	Cyclo® Portion:	Grease
			Helical Gear Portion:	Oil
	E	6170, 6175 6170DA, 6175DA 6170DB, 6175DB 6170DC, 6175D	Cyclo® Portion:	Grease
			Helical Gear Portion:	Oil

Lubrication

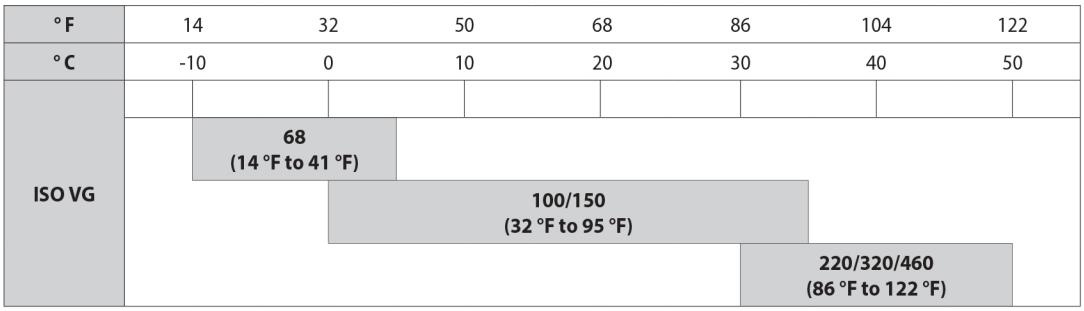
Recommended Lubricants

Helical Gear Portion and Cyclo® Portion Approved Oils

Table 11, Approved Oils, lists the oils that may be used to lubricate the Helical Gear portion of the unit. These oils may also be used in the Cyclo® portion if it is oil lubricated.

ExxonMobil:	Spartan EP	**Shell Oil:**	Omala S2 G	**Kluber:**	Kluberoil GEM1
ExxonMobil:	Mobilgear 600XP	**Caltex:**	Meropa	**Idemitsu Oil:**	Daphane Mechanic
ExxonMobil:	Mobil SHC Gear Hi-Shock 150	**Castrol:**	Alpha SP	**BP Oil:**	Energol GR-XP
Food Grade Oil:	Klübersynth UH1 6-460	**Gulf Oil:**	EP Lubricant HD	**Total:**	Carter EP

Table 11. Approved Oils



- Use lubricants with low viscosity for operation during winter or at relatively low temperatures.
- Use a lubricant with a viscosity within the range listed in **Table 12, Recommended Oil Viscosity.**

Table 12. Recommended Oil Viscosity

Min. allowable viscosity:	15 mm^2/s or more at operating temperature		Viscosity that ensures oil film strength adequate for load transmission.
Max. allowable viscosity:	Oil-Bath lubrication	4300 mm^2/s max.	Viscosity that permits start-up of Buddybox

- For smooth starting, ensure that the pour point of the oil is lower than the ambient temperature, at least with a 5C difference.
- Use oil with a high viscosity index when the unit has a wide operating temperature range. The oil should meet the requirements detailed in this section.
- Consult Sumitomo Drive Technologies when the unit will be operated in ambient temperatures other than 32 – 104°F (0 – 40C). Special unit modifications may be necessary.

Cyclo® Portion Approved Greases

Table 13, Cyclo Portion Approved Greases, lists the greases that may be used to lubricate the Cyclo® portion if grease is the specified lubrication method (refer to the Lubrication Method section for details).

Table 13. Cyclo Portion Approved Greases

Ambient Temp. °F (C)	Overall Reduction Ratio	Unit		
		Z6090, Z6095 A6120, A6125	B6120, B6125 C6140, C6145	D6160, D6165 E6170, E6175
14° to 122° F (-10 to 50 C)	11:1, 18:1	Shell Gadus S2 V220		
	21:1 and higher	ExxonMobil Unirex N2 grease		

Oil Quantities

Table 14. Single Reduction Cyclo® - Helical Gear Portion and Cyclo® Portion Approximate Oil Quantity
Units: US liquid gallon (liter) NOTE: "G" = Grease Lubricated

Model		Y1		Y2		Y3		Y4		Y5		Y6	
		Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.
Z609	Output	0.5	0.13	0.5	0.13	0.5	0.13	0.5	0.13	1.4	0.37	0.8	0.21
	Input	G	G	G	G	G	G	G	G	G	G	G	G
A610	Output	0.7	0.18	0.8	0.21	0.7	0.18	0.7	0.18	1.6	0.42	1.1	0.29
	Input	G	G	G	G	G	G	G	G	G	G	G	G
B612	Output	1.4	0.37	1.6	0.42	1.2	0.32	1.6	0.42	3.3	0.87	2.2	0.58
	Input	G	G	G	G	G	G	G	G	G	G	G	G
C614	Output	1.8	0.48	2.3	0.61	1.6	0.42	2.3	0.61	5.2	1.37	3.4	0.9
	Input	0.3	0.08	0.3	0.08	0.3	0.08	0.3	0.08	G	G	G	G
D616	Output	4.4	1.16	4.7	1.24	3.4	0.90	4.6	1.22	9.6	2.54	7.4	1.95
	Input	0.6	0.16	0.6	0.16	0.6	0.16	0.6	0.16	G	G	G	G
E617	Output	5.6	1.48	6.8	1.80	4.1	1.08	6.7	1.77	13	3.43	10.1	2.67
	Input	0.9	0.24	0.9	0.24	0.9	0.24	0.9	0.24	G	G	G	G

Table 15. Double Reduction Cyclo® - Helical Gear Portion and Cyclo® Portion Approximate Oil Quantity
Units: US liquid gallon (liter) NOTE: "G" = Grease Lubricated

Model		Y1		Y2		Y3		Y4		Y5		Y6	
		Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.	Ltr.	Gal.
Z609DA	Output	0.5	0.13	0.5	0.13	0.5	0.13	0.5	0.13	1.4	0.37	0.8	0.21
	Input	G	G	G	G	G	G	G	G	G	G	G	G
A610DA	Output	0.7	0.18	0.8	0.21	0.7	0.18	0.7	0.18	1.6	0.42	1.1	0.29
	Input	G	G	G	G	G	G	G	G	G	G	G	G
B612 DA,DB	Output	1.4	0.37	1.6	0.42	1.2	0.32	1.6	0.42	3.3	0.87	2.2	0.58
	Input	G	G	G	G	G	G	G	G	G	G	G	G
C614 DA,DB	Output	1.8	0.48	2.3	0.61	1.6	0.42	2.3	0.61	5.2	1.37	3.4	0.9
	Input	G	G	G	G	G	G	G	G	G	G	G	G
D616 DA,DB	Output	4.4	1.16	4.7	1.24	3.4	0.90	4.6	1.22	9.6	2.54	7.4	1.95
	Input	G	G	G	G	G	G	G	G	G	G	G	G
D616DC	Output	4.4	1.16	4.7	1.24	3.4	0.90	4.6	1.22	9.6	2.54	7.4	1.95
	Input	1.4	0.37	1.4	0.37	1.4	0.37	1.4	0.37	G	G	G	G
E617 DA,DB	Output	5.6	1.48	6.8	1.80	4.1	1.08	6.7	1.77	13	3.43	10.1	2.67
	Input	G	G	G	G	G	G	G	G	G	G	G	G
E617DC	Output	5.6	1.48	6.8	1.80	4.1	1.08	6.7	1.77	13	3.43	10.1	2.67
	Input	1.4	0.37	1.4	0.37	1.4	0.37	1.4	0.37	G	G	G	G

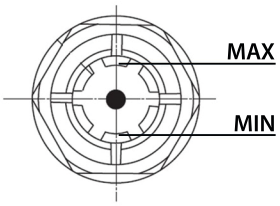
Lubrication

Oil Supply and Discharge

Oil supply

- Always stop the unit before adding oil.
- It may take some time for the oil surface to settle when the oil viscosity is high. Be careful not to add too much oil.
- Oil level may drop during operation, depending on the oil viscosity. Additional oil is not necessary. Check the oil level when the unit is stopped to ensure that it has the correct amount of oil.
- There are two oil fill locations for some combinations (on the output side is the Helical Buddybox and on the input side is the Cyclo®).
- After stopping the unit, it may take some time for the oil surface to settle on the input side (CYCLO). Do not overfill!

1. Remove the oil fill plug.
2. Slowly add oil while checking the level through the oil gauge.
3. After the oil has settled, make sure the level is mid-way between the high and low marks on the oil gauge.
4. Insert the oil fill plug after wrapping it with sealing tape.



Oil discharge

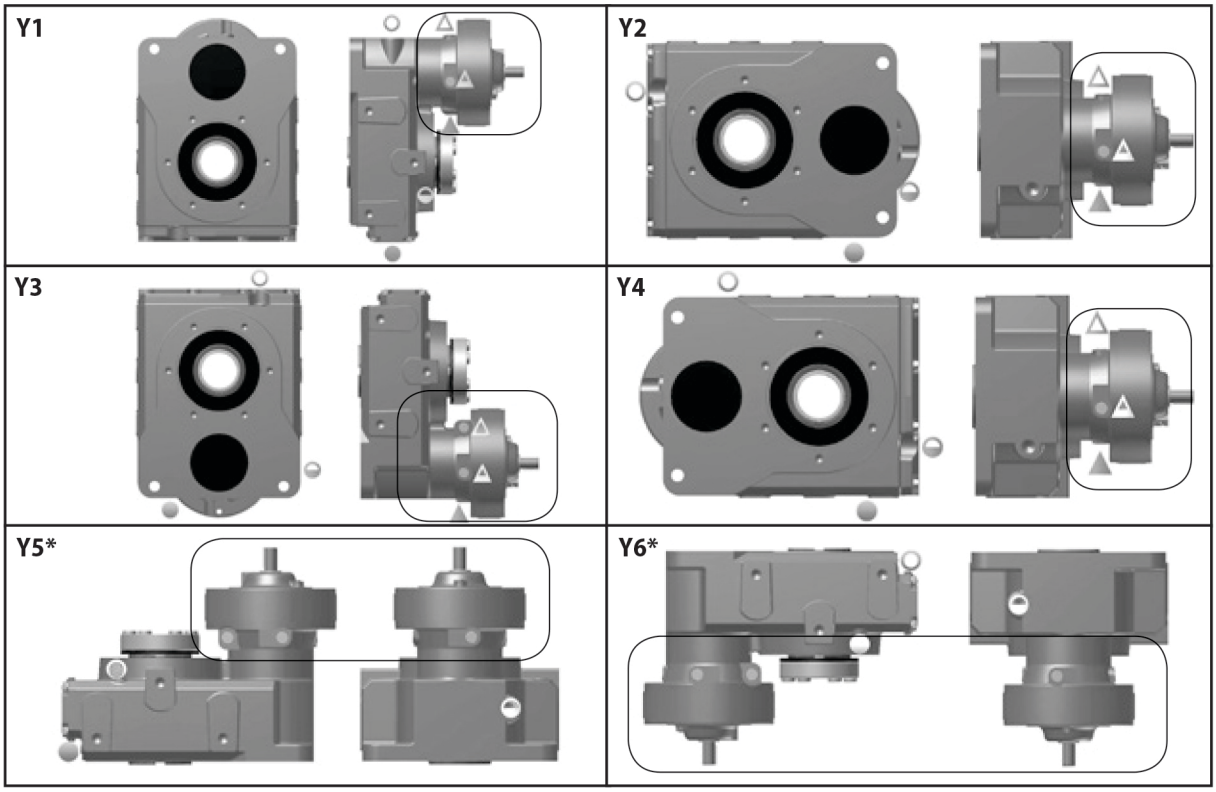
Remove the drain plug to discharge oil.

Table 16. Long-term stoppage

Stoppage period	Approx. 1 month	Change the oil and operate the unit for several minutes before stopping the unit.
	More than 1 month	Flush the unit, supply rust-preventive oil, and operate the unit without a load for several minutes before stopping the unit.

- Always replace old oil with new oil when starting after long-term stoppage. The old oil may have deteriorated.

Fig. 4 Oil Fill/Drain Locations



***Note:** For units ordered in Y5 or Y6 configuration, only the Cyclo portion is grease lubricated at the factory

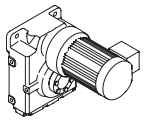
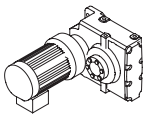
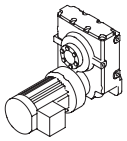
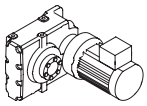
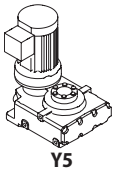
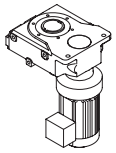
= Helical Gear Portion Oil Fill Location
= Helical Gear Portion Oil Sight Gauge Location
= Helical Gear Portion Oil Drain Location
= Cyclo® Portion Oil Fill Location
= Cyclo® Portion Oil Sight Gauge Location
= Cyclo® Portion Oil Drain Location

Grease Quantities

- Grease quantities listed in this section are for the Cyclo® portion of the reducer/gearmotor.
- The Helical portion is always oil lubricated.
- Refer to the **Helical Gear Portion and Cyclo® Portion Recommended Oils section** for Helical portion oil quantities.

Table 17. Single Reduction Cyclo® - Cyclo® Portion Approximate Grease Quantity

Units: ounce (gram) NOTE: "L" = Oil Lubricated, ☐ = Maintenance-Free Grease Model

Size Unit	Unit Lubrication Portion	Mounting Configuration					
		 Y1	 Y2	 Y3	 Y4	 Y5	 Y6
Z6090 Z6095	Cyclo®	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)
A6100 A6105	Cyclo®	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)
B6120 B6125	Cyclo®	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)
C6140 C6145	Cyclo®	L	L	L	L	15.87 (450)	15.87 (450)
D6160 D6165	Cyclo®	L	L	L	L	26.46 (750)	26.46 (750)
E6170 E6175	Cyclo®	L	L	L	L	35.27 (1000)	35.27 (1000)

Lubrication

Grease Quantities

Table 18. Double Reduction Cyclo® - Cyclo® Portion Approximate Grease Quantity
Units: ounce (gram) NOTE: "L" = Oil Lubricated, ☐ = Maintenance-Free Grease Model

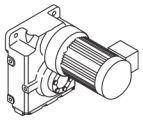
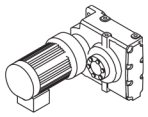
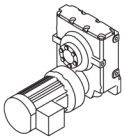
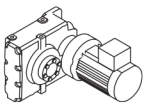
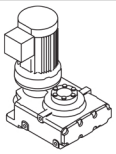
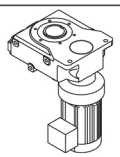
Size Unit	Cyclo® Stage	Mounting Configuration					
		 Y1	 Y2	 Y3	 Y4	 Y5	 Y6
Z6090DA Z6095DA	First (Input)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)
	Second	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)
A6100DA A6105DA	First (Input)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)
	Second	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)
B6120DA B6125DA	First (Input)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)
	Second	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)
B6120DB B6125DB	First (Input)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)
	Second	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)	8.82 (250)
C6140DA C6145DA	First (Input)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)	0.88 (25)
	Second	15.87 (450)	15.87 (450)	15.87 (450)	15.87 (450)	15.87 (450)	15.87 (450)
C6140DB C6145DB	First (Input)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)
	Second	15.87 (450)	15.87 (450)	15.87 (450)	15.87 (450)	15.87 (450)	15.87 (450)
D6160DA D6165DA	First (Input)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)
	Second	26.46 (750)	26.46 (750)	26.46 (750)	26.46 (750)	26.46 (750)	26.46 (750)
D6160DB D6165DB	First (Input)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)
	Second	26.46 (750)	26.46 (750)	26.46 (750)	26.46 (750)	26.46 (750)	26.46 (750)
D6160DC D6165DC	First (Input)	L	L	L	L	8.82 (250)	8.82 (250)
	Second	L	L	L	L	26.46 (750)	26.46 (750)
E6170DA E6175DA	First (Input)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)	2.12 (60)
	Second	35.27 (1000)	35.27 (1000)	35.27 (1000)	35.27 (1000)	35.27 (1000)	35.27 (1000)
E6170DB E6175DB	First (Input)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)	4.23 (120)
	Second	35.27 (1000)	35.27 (1000)	35.27 (1000)	35.27 (1000)	35.27 (1000)	35.27 (1000)
E6170DC E6175DC	First (Input)	L	L	L	L	8.82 (250)	8.82 (250)
	Second	L	L	L	L	35.27 (1000)	35.27 (1000)

Table 19a. Grease Replenishment Intervals
(For units other than maintenance-free grease)

Hours of operation	Replenishment interval	Remarks
10 hr max./day	3 – 6 months	Shorten the supply interval when the operating conditions are severe or the frame size is large.
10 – 24 hr/day	500 – 1000 hrs	

Table 20. Grease Replacement Intervals
(For units other than maintenance-free grease)

Change interval	Remarks
Every 20,000 hrs or 3 – 5 years	Shorten the supply interval when the operating conditions are severe or the frame size is large.

Table 19b. Oil Change Intervals

Oil Change Interval		Operation Condition
Initial Oil Change	After 500 Hours of Primary Operation	Under Every Condition
Subsequent Oil Change	Every 6 Months	Less Than 10 Hours/Day Operation
	Every 2,500 Hours	10 ~ 24 Hours/Day Operation
	Every 1 ~ 3 Months	High Ambient Temperature, High Humidity or Atmosphere of Active Gas

Note: Units supplied with Mobil SHC Gear Hi-Shock 150 may double oil change intervals.

Grease Replenishment and Draining Procedure

Procedure for adding grease to grease-lubricated models (excluding maintenance-free models)

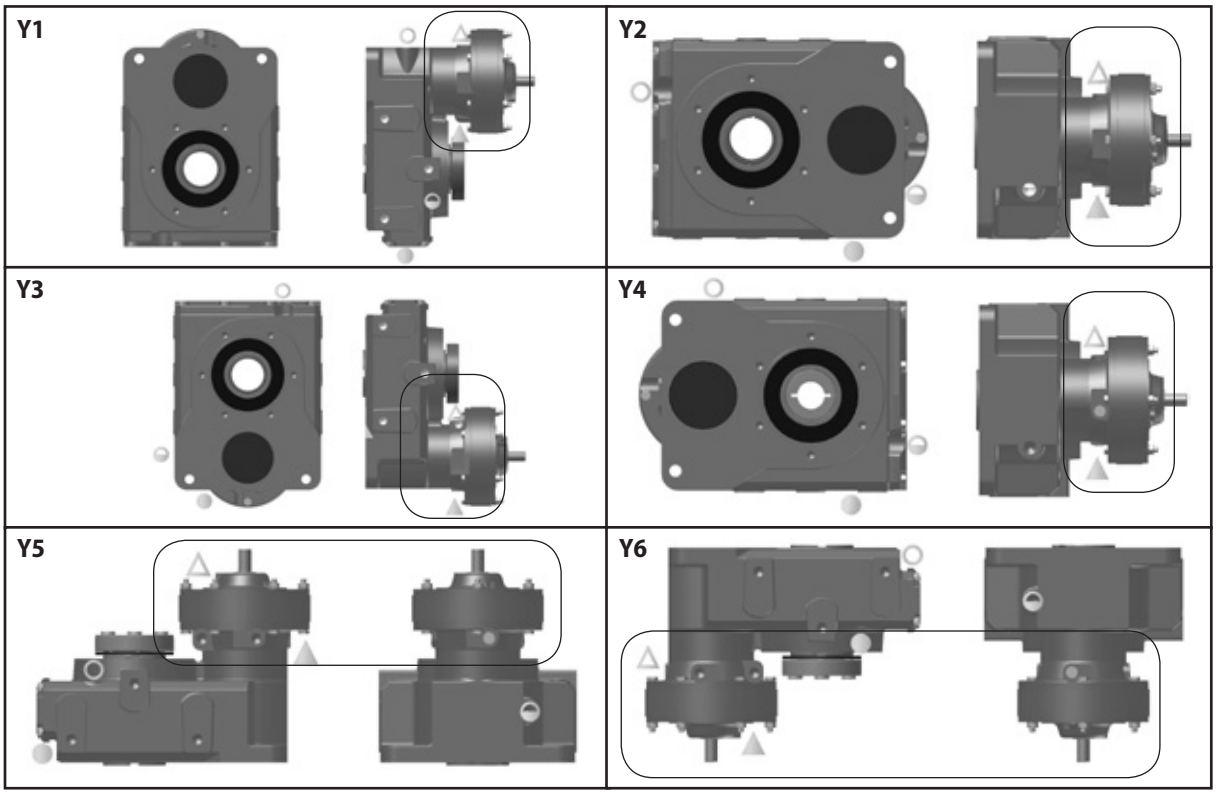
1. Remove the grease discharge plug from the outside cover.
2. Add grease with a grease gun from the grease nipple in the inside cover section or motor connection cover.
3. Insert the grease discharge plug.

- Add grease during operation to ensure proper, uniform circulation.
- Add grease slowly.
- Do not add more grease than the amount shown in **Table 17** and **18**. Adding too much grease may cause the grease temperature to rise, or grease to leak into the motor.

Grease Replacement for Grease-Lubricated and Maintenance-Free Grease Models

- The unit may be safely operated for an extended time because it is sealed with maintenance-free grease. However, Sumitomo recommends overhauling every 20,000 hours or 3-5 years of operation to ensure long service life.
- Always consult our specialized factory for overhaul of gearmotors and reducers. Experience is necessary for overhaul.

Fig. 5 Grease Fill/Drain Locations



= Helical Gear Portion Oil Fill Location

= Helical Gear Portion Oil Sight Gauge Location

= Helical Gear Portion Oil Drain Location

= Cyclo® Portion Grease Fill Location

= Cyclo® Portion Grease Drain Location

Parts

Cyclo® HBB Reducer

Fig. 6 Cyclo® HBB Reducer Parts

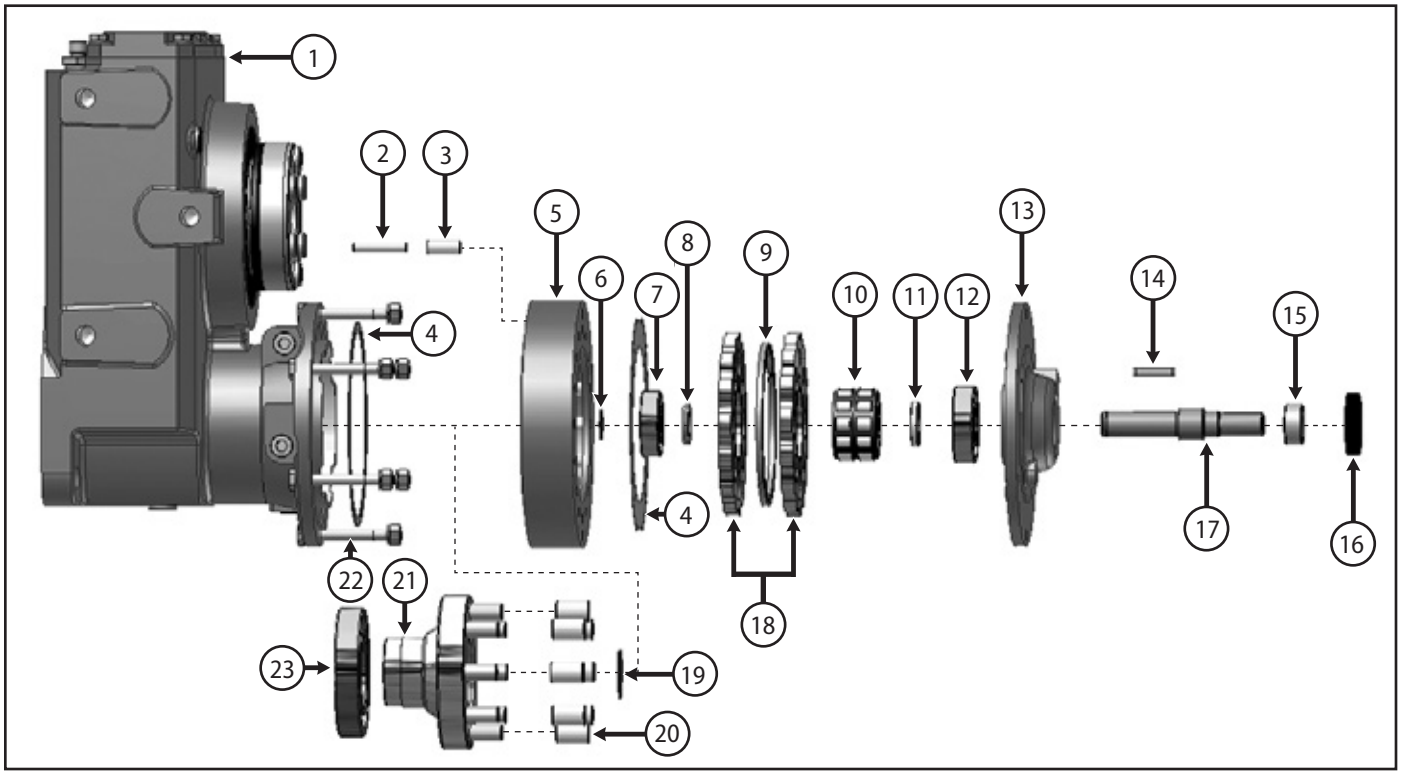


Table 21. Cyclo® HBB Reducer Parts

Number	Description
1	HBB Gear Assembly
2	Cyclo® Ring Gear Housing Pins
3	Cyclo® Ring Gear Housing Rollers
4	Gasket Set
5	Cyclo® Ring Gear Housing
6	Snap Ring
7	High-Speed Shaft A Bearing
8	Spacer
9	Cycloid Disc Spacer
10	Cyclo® Eccentric Cam Assembly
11	Spacer
12	High Speed Shaft B Bearing

Number	Description
13	Cyclo® High-Speed End Shield
14	Eccentric Key
15	High Speed Shaft Oil Seal Collar
16	High Speed Shaft Oil Seal
17	High Speed Shaft
18	Cycloid Discs
19	Snap Ring
20	Pin Carrier Rollers
21	Pin Carrier
22	Cyclo® Housing Bolt/Washer/Nut set
23	Pinion Shaft B Bearing

Reduction Component Part Numbers

Fig. 7 Typical Cyclo® Reduction Components – Z6090 & Z6095

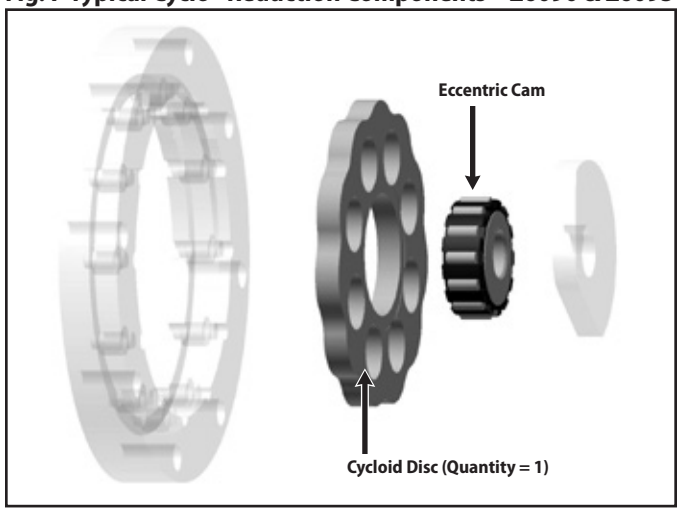


Fig. 8 Typical Cyclo® Reduction Components – A6100 thru E6175

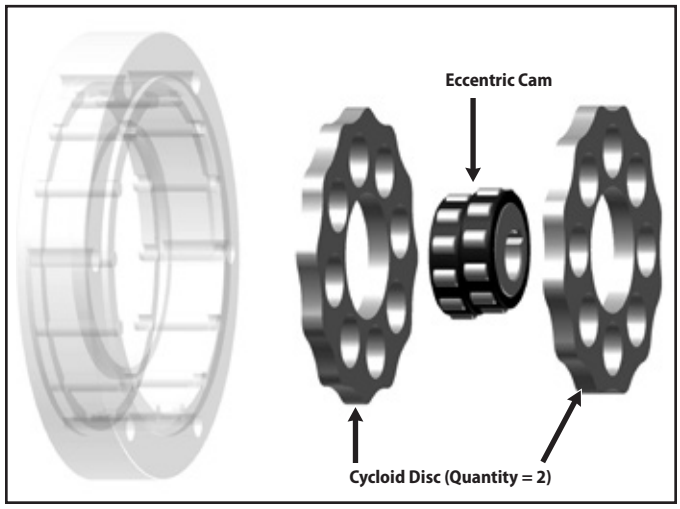


Table 22. Cyclo Reduction Component Parts

(Table 22 continued on next page.)

Model	Reduction Ratio		Part Numbers	
	Overall	Cyclo®	Cyclo® Disc	Eccentric Cam
Z6090 Z6095	21	6	AN9923G	AP1425G
	28	8	AN9924G	AP1426G
	39	11	AN9925G	AP1426G
	46	13	AN9926G	AP1426G
	53	15	AN9927G	AP1426G
	60	17	AN9928G	AP1427G
	74	21	AN9929G	AP1428G
	88	25	CN316LG	AP0017G
	102	29	BQ418LG	AP0017G
	123	35	BQ419LG	AP0018G
	151	43	BQ420LG	AP0019G
	179	51	CN317LG	AP0020G
	207	59	BQ421LG	AP0021G
	249	71	CN318LG	AP0022G
	305	87	CN257G	AP0023G
	417	119	CN259LG	AP0024G
A6100 A6105	21	6	AN9930G	AP0025G
	28	8	AN9931G	AP0025G
	39	11	AN9925G	AP0026G
	46	13	AN9926G	AP0026G
	53	15	AN9927G	AP0026G
	60	17	AN9928G	AP0027G
	74	21	AN9929G	AP0028G
	88	25	CN316LG	AP0029G
	102	29	BQ418LG	AP0029G
	123	35	BQ419LG	AP0030G
	151	43	BQ420LG	AP0031G
	179	51	CN317LG	AP0032G
	207	59	BQ421LG	AP0033G
	249	71	CN318LG	AP0034G
	305	87	CN257LG	AP0035G
	417	119	CN259LG	AP0036G

Parts

Cyclo® HBB Reducer

Table 22. Cyclo Reduction Component Parts (continued, refer to Fig. 8)

Model	Reduction Ratio		Part Numbers	
	Overall	Cyclo®	Cyclo® Disc	Eccentric Cam
B6120 B6125	21	6	AN9947G	AP0037G
	28	8	AN9948G	AP0037G
	39	11	AN9949G	AP0038G
	46	13	AN9950G	AP0039G
	53	15	AN9951G	AP0038G
	60	17	AN9952G	AP0039G
	74	21	AN9953G	AP0040G
	88	25	AN9954G	AP0041G
	102	29	AN1338G	AP0041G
	123	35	BQ396LG	AP0042G
	151	43	BQ397LG	AP0043G
	179	51	CN324LG	AP0044G
	207	59	BQ703LG	AP0044G
	249	71	CN325LG	AP0045G
	305	87	BS946LG	AP0045G
C6140 C6145	21	6	AN9372G	AN7775G-1
	28	8	AN9373G	AN7775G-1
	39	11	AN9374G	AN7775G-1
	46	13	AN9375G	AN7775G-2
	53	15	AN9376G	AN7775G-2
	60	17	AN9377G	AN7775G-2
	74	21	AN9378G	AN7775G-3
	88	25	AN9379G	AN7775G-3
	102	29	AN9380G	AN7775G-4
	123	35	AN9381G	AN7775G-4
	151	43	AN9382G	AN7775G-5
	179	51	AN9383G	AN7775G-5
	207	59	AN9384G	AN7775G-5
	249	71	AN9385G	AN7775G-6
	305	87	AN9386G	AN7775G-6

Model	Reduction Ratio		Part Numbers	
	Overall	Cyclo®	Cyclo® Disc	Eccentric Cam
D6160 D6165	21	6	AN9387G	AN7776G-1
	28	8	AN9388G	AN7776G-1
	39	11	AN9389G	AN7776G-2
	46	13	AN9390G	AN7776G-2
	53	15	AN9391G	AN7776G-2
	60	17	AN9392G	AN7776G-3
	74	21	AN9393G	AN7776G-3
	88	25	AN9394G	AN7776G-3
	102	29	AN9395G	AN7777G-4
	123	35	AN9396G	AN7777G-4
	151	43	AN9397G	AN7777G-5
	179	51	AN9398G	AN7777G-5
	207	59	AN9399G	AN7777G-6
	249	71	AN9400G	AN7776G-7
	305	87	AN9401G	AN7777G-8
E6170 E6175	21	6	AN9402G	AQ952LG-1
	28	8	AN9403G	AQ952LG-1
	39	11	AN9404G	AQ952LG-2
	46	13	AN9405G	AQ952LG-2
	53	15	AN9406G	AQ952LG-3
	60	17	AN9407G	AQ952LG-3
	74	21	AN9408G	AQ952LG-4
	88	25	AN9409G	AQ952LG-4
	102	29	AN9410G	AQ952LG-5
	123	35	AN9411G	AQ952LG-5
	151	43	AN9412G	AQ952LG-6
	179	51	AN9413G	AQ952LG-6
	207	59	AN9414G	AQ952LG-7
	249	71	AN9415G	AQ952LG-7
	305	87	AN9416G	AQ952LG-7

Parts

Cyclo® HBB Reducer Planetary Input (Ratios 11:1 and 18:1 Only)

Fig. 9 Cyclo® HBB Reducer Parts - Planetary Input (Ratios 11:1, 18:1)

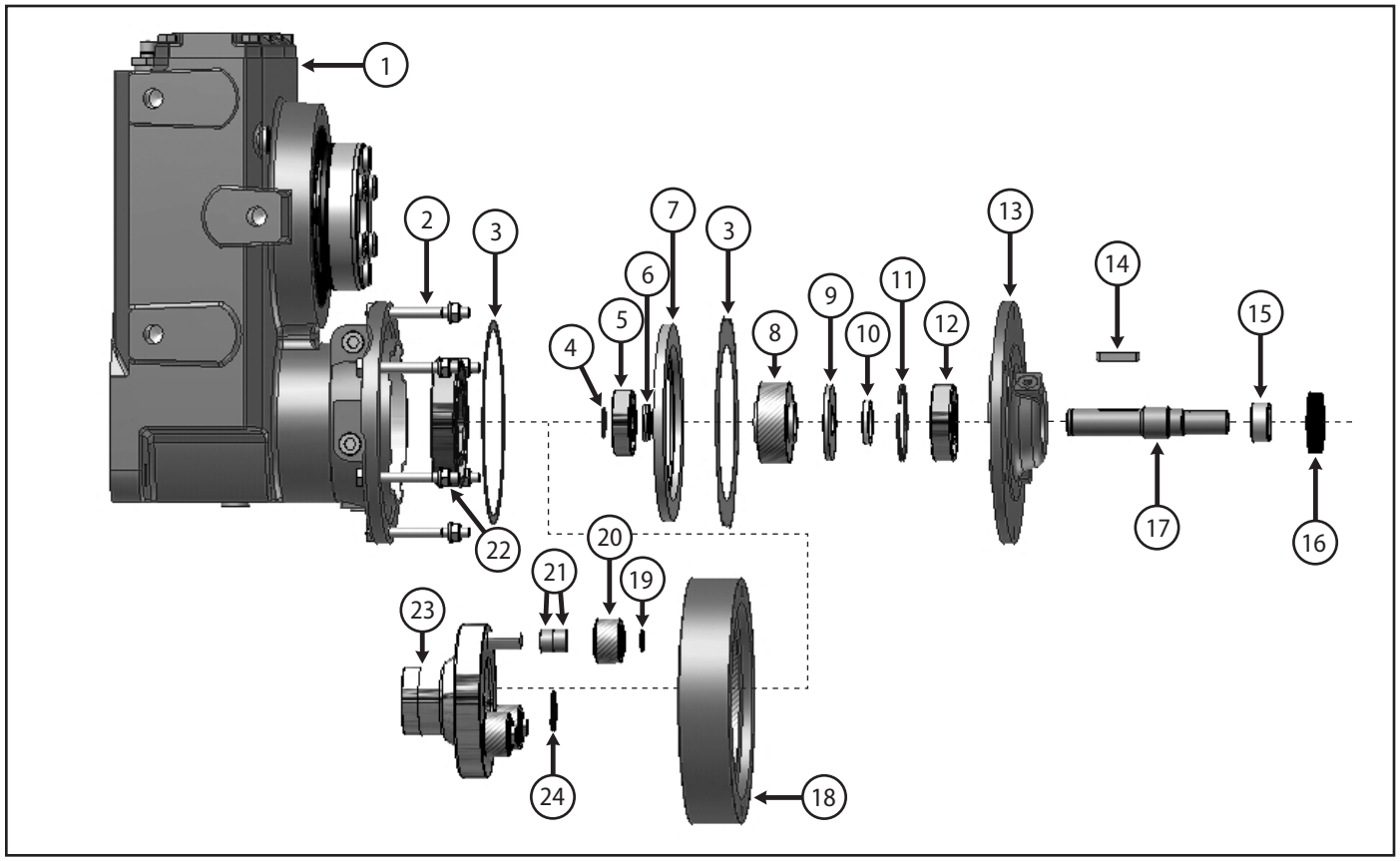


Table 23. Cyclo® HBB Reducer Parts - Planetary Input (Ratios 11:1, 18:1)

Number	Description
1	HBB Gear Assembly
2	Housing Bolt/Washer/Nut Set
3	Gasket Set
4	Snap Ring
5	Ball Bearing
6	Spacer
7	Planet Gear Holder Plate
8	Sun Gear
9	Oil Slinger
10	Spacer
11	Snap Ring
12	High Speed Shaft B Bearing

Number	Description
13	High-Speed End Shield
14	Sun Gear Key
15	High Speed Shaft Oil Seal Collar
16	High Speed Shaft Oil Seal
17	High Speed Shaft
18	Ring Gear
19	Snap Ring
20	Planet Gear (3)
21	Needle Roller Bearings
22	Ball Bearing
23	Planet Carrier
24	Snap Ring

Parts

Cyclo® HBB Reducer Planetary Input (Ratios 11:1 and 18:1 Only), Bearings and Oil Seals

Planetary Reduction Component Parts

Fig. 10 Cyclo® Planetary Reduction Component Parts

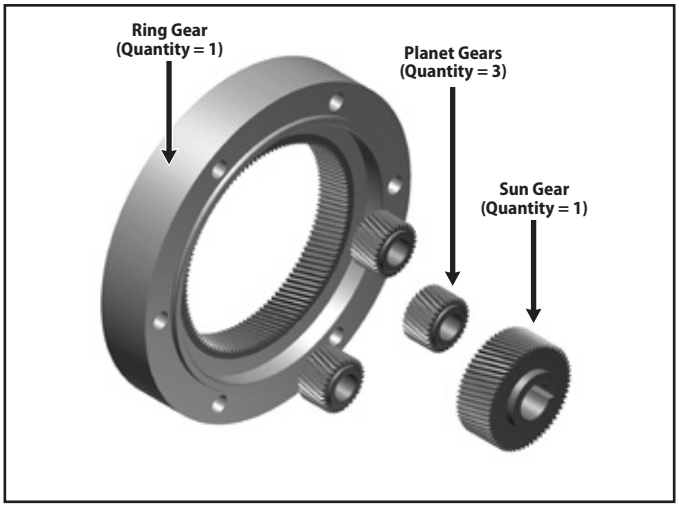


Table 24. Cyclo® Planetary Reduction Component Parts (Ratios 11:1, 18:1)

Model	Reduction Ratio (nominal)		Cyclo® Planetary Reduction Part Numbers		
	Overall	Cyclo®-Planetary	Planet Gear	Ring Gear	Sun Gear
A6100 A6105	11	3	AN8911G	AN8303G	AN8910G
	18	5	AN8305G	AN8306G	AN8304G
B6120 B6125	11	3	AN8308G	AN8309G	AN8307G
	18	5	AN8311G	AN8312G	AN8310G
C6140 C6145	11	3	AP0884G	AP0885G	AP0883G
	18	5	AN8317G	AN8318G	AN8316G
D6160 D6165	11	3	AP0890G	AP0891G	AP0889G
	18	5	AN8323G	AN8324G	AN8322G
E6170 E6175	11	3	AN8913G	AN8914G	AN8912G
	18	5	AN8329G	AN8330G	AN8328G

Bearings and Oil Seals

Fig. 11 Cyclo® HBB Reducer Bearings and Oil Seals

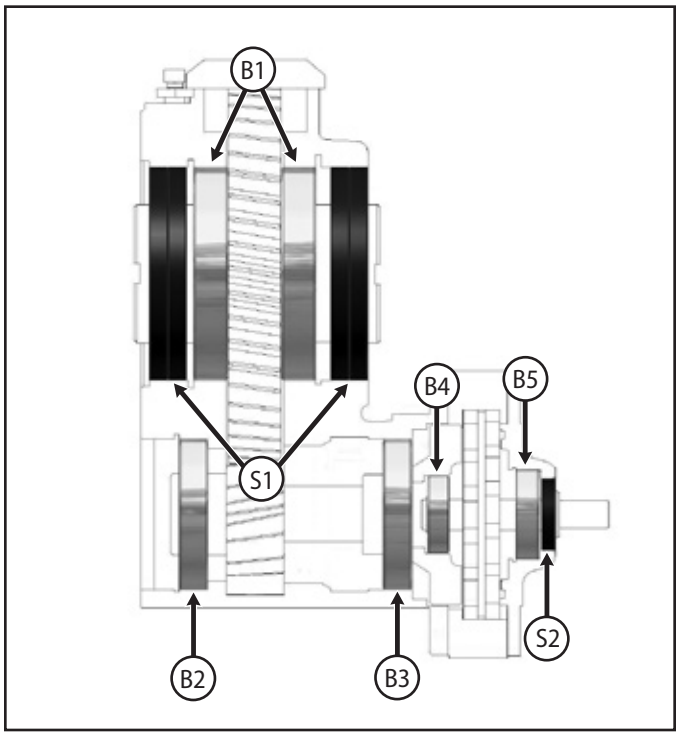


Table 25. Cyclo® HBB Reducer Bearings and Oil Seals

Model	Bearings					Oil Seals1	
	B1	B2	B3	B4	B5	S1	S2
Z6090 Z6095	6013ZZ	6207ZZ	6011	6302RSH2	6302Z	D 65x100x10	S 20x35x7
A6100 A6105	6017ZZ	6208ZZ	16011	6302RSH2	6302Z	D 85x130x10	S 20x35x7
B6120 B6125	6020ZZ	6211ZZ	6013	6304	6305Z	D 100x150x13	D 32x52x8
C6140 C6145	6022ZZ	6213ZZ	6213	6305R	6306	D 110x170x15	D 38x58x11
D6160 D6165	6026ZZ	6216ZZ	6215	6307R	6308	D 130x200x15	D 55x78x12
E6170 E6175	6030ZZ	6218ZZ	6218	6406	6407	D 150x225x15	D 60x82x12

Planet Gear Bearings

In addition to those bearings listed in the **Bearings and Oil Seals** section, HBB units incorporating the Planetary Cyclo as the first reduction stage (overall unit ratio 11:1 and 18:1 only) also include Needle Roller Bearings for each of the Planet Gears.

Fig. 12 Planet Gear Bearings (Ratios 11:1, 18:1)

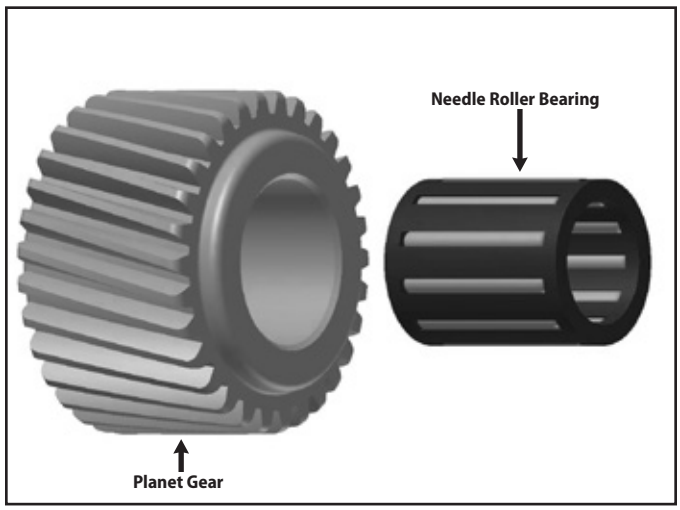


Table 26. Planet Gear Bearings (Ratios 11:1, 18:1)

Model	Unit Reduction Ratio	Needle Roller Bearing Number	Bearings per Gear	Total in Unit
A6100 A6105	11:1, 18:1	K 10 x 14 x 8	2	6
B6120 B6125	11:1, 18:1	12R1620A	1	3
C6140 C6145	11:1, 18:1	K 16 x 22 x 12	2	6
D6160 D6165	11:1, 18:1	RS17/13, 17 x 23 x 13	2	6
E6170 E6175	11:1, 18:1	PK 22 x 28 x 16.8 x 5	2	6

Helical Gearing Tooth Count

Sumitomo does not sell replacement helical gearsets for the Cyclo® HBB. The following information regarding helical gearset tooth count is provided for vibration analysis purposes.

Fig. 13 Helical Gearset

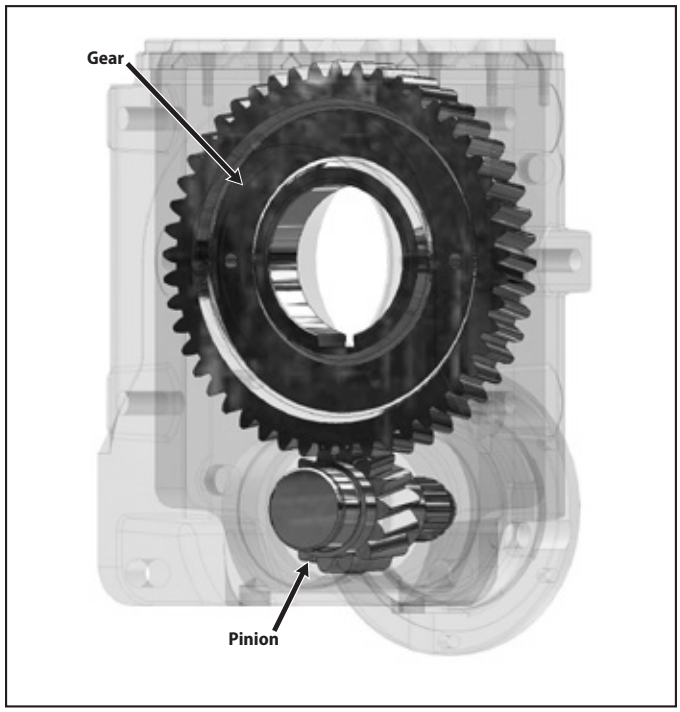


Table 27. Helical Gearset Tooth Count

Model	Number of Gear Teeth	
	Gear	Pinion
Z6090 Z6095	52	15
A6100 A6105	49	14
B6120 B6125	49	14
C6140 C6145	49	14
D6160 D6165	52	15
E6170 E6175	52	15

Cyclo® HBB Screw Conveyor Option

Components

Fig. 14 Cyclo® HBB Screw Conveyor Components

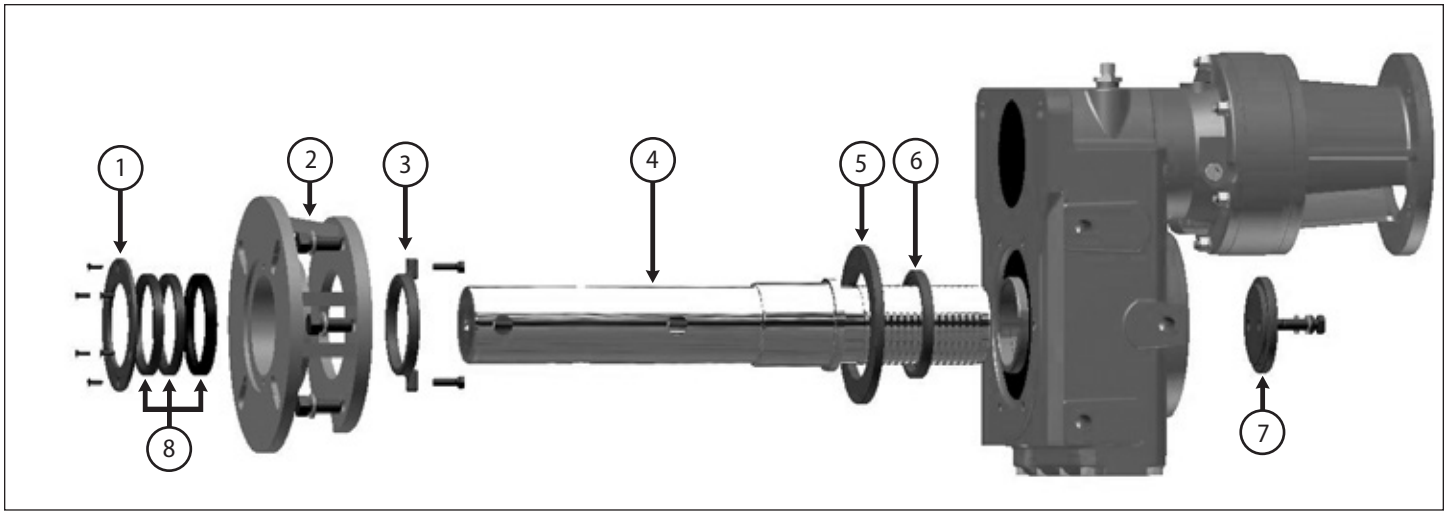
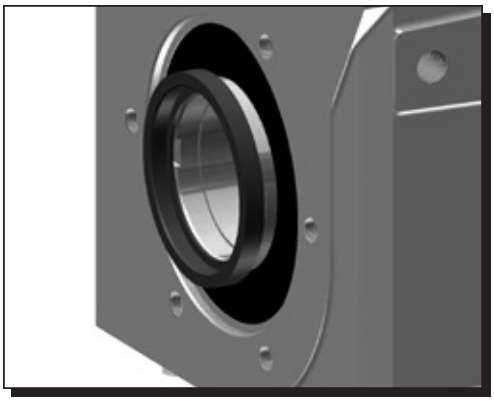


Table 28. Cyclo® HBB Screw Conveyor Component Usage

Model	Screw Conveyor Component Usage							
	1	2	3	4	5	6	7	8
	Cover Plate	Screw Conveyor Adaptor	Gland Cover	Screw Conveyor Shaft	Adaptor Plate	Shaft Collar	Keeper Plate	Seal/Packing Material
Z6090 Z6095	✓	✓	✓	✓	—	—	✓	✓
A6100 A6105	✓	✓	✓	✓	✓	✓	✓	✓
B6120 B6125	✓	✓	✓	✓	✓	✓	✓	✓
C6140 C6145	✓	✓	✓	✓	✓	✓	✓	✓
D6160 D6175	✓	✓	✓	✓	✓	✓	✓	✓
E6170 E6175	✓	✓	✓	✓	—	—	✓	✓

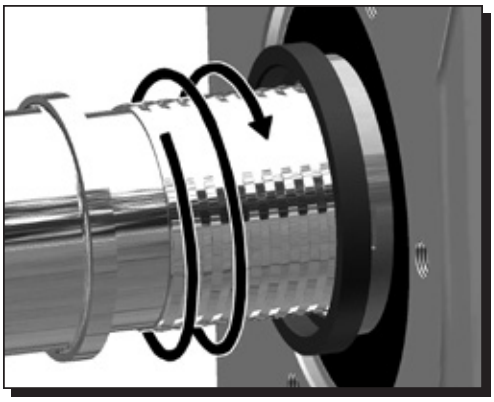
Cyclo® HBB Screw Conveyor Option

Assembly Instructions



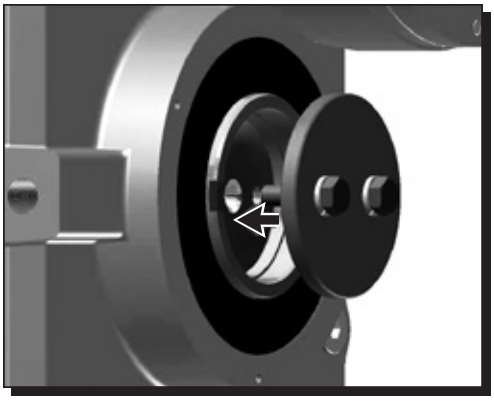
1

For Screw Conveyor Kits equipped with a **shaft collar**, place the shaft collar onto the output hub of the Cyclo® HBB.



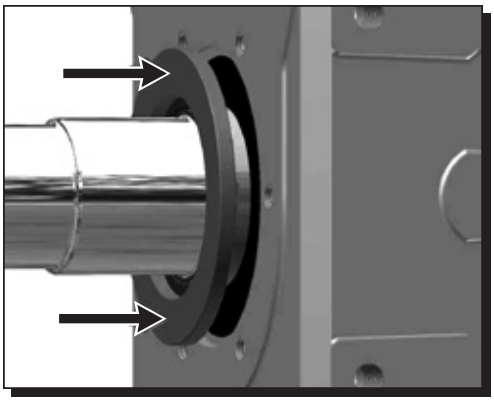
2

Thread the **screw conveyor shaft** completely into the Cyclo® HBB **output hub**.



3

Secure the screw conveyor shaft in place using the **keeper plate** with the supplied hardware.

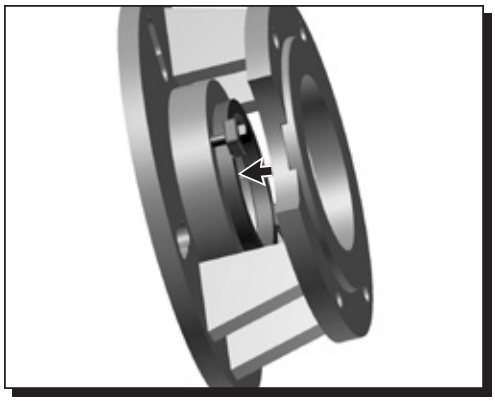


4

For units equipped with an **adapter plate**, carefully slide the adapter plate over the screw conveyor shaft and place it against the output bore of the Cyclo® HBB.

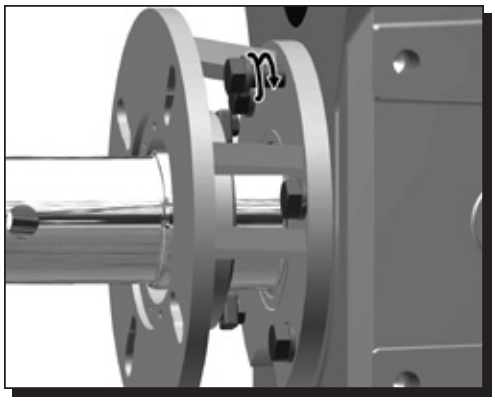
Cyclo® HBB Screw Conveyor Option

Assembly Instructions



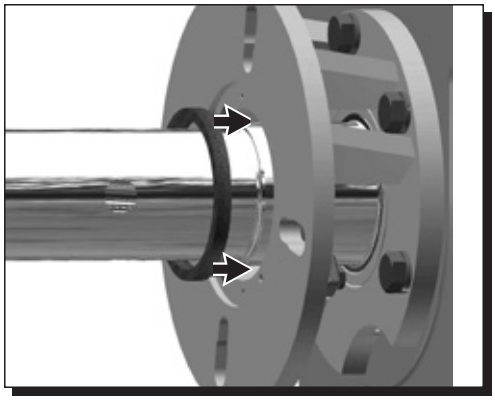
5

Place the **gland cover** into the screw conveyor adapter and secure it in place with the supplied hardware.



6

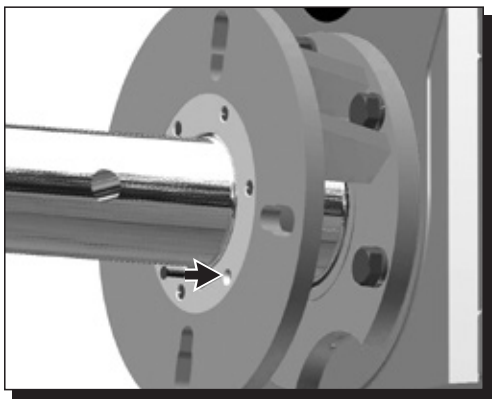
Carefully slide the screw conveyor adapter over the shaft and position it against the corresponding threaded holes in the Cyclo® HBB housing. Use the included hardware to secure the adapter to the housing.



7

Carefully insert the application-appropriate sealing material into the bore of the screw conveyor adapter.

- To seal the output portion of the **screw conveyor adapter**, Sumitomo Drive Technologies provides two different options for each screw conveyor kit:
  - High-Performance Braided Cord: recommended for use if the conveyed material is abrasive.
  - Double-Lip, Nitrile Oil Seal: recommended for use if conveyed material is a nonabrasive liquid.
- Sumitomo **does not** recommend the use of both sealing options at the same.

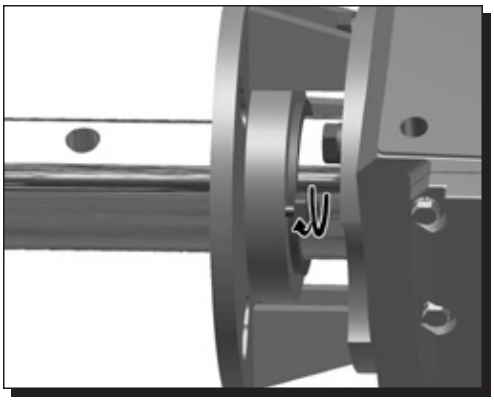


8

Carefully slide the **cover plate** over the screw conveyor shaft and place it against the screw conveyor adapter. Secure the cover plate using the supplied hardware.

Cyclo® HBB Screw Conveyor Option

Assembly Instructions



9

If using the **braided cord seal**, tighten the **gland cover bolts** to achieve appropriate sealing on the screw conveyor shaft.

Cyclo® Portion Disassembly/Assembly

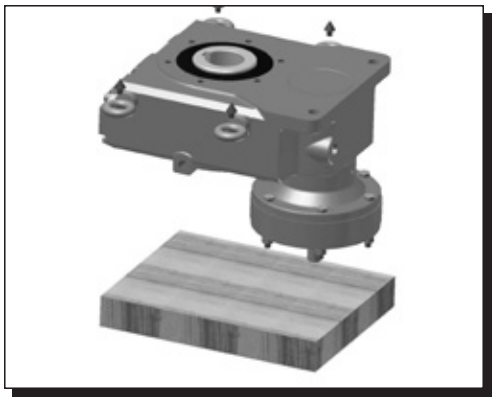
Cyclo® Disassembly Procedure

1

Before starting the disassembly process, Sumitomo recommends draining all lubricating oil from the Helical portion and also the Cyclo® portion if it is oil lubricated.

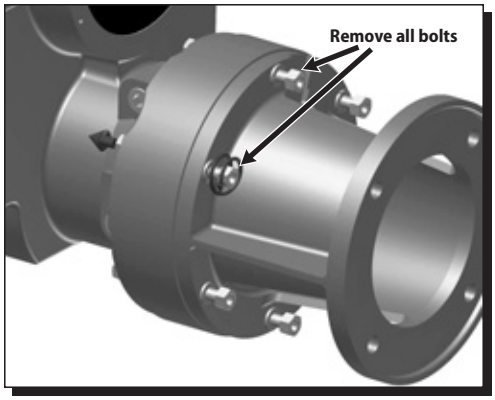
2

Carefully remove the entire Cyclo® HBB from the driven shaft by following the instructions outlined in the **Removal From Driven Shaft** section of this manual.



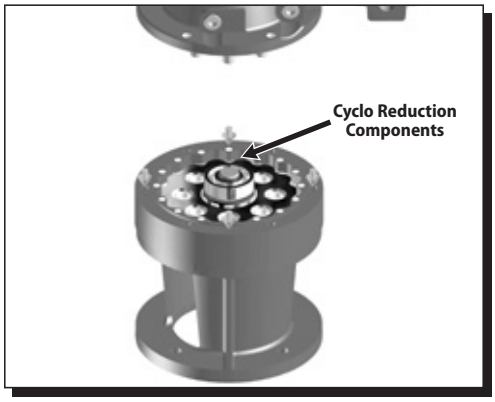
3

While carefully supporting the entire unit, place the unit on a level work surface so that the high-speed portion (Cyclo portion) is facing down.



4

While continuing to externally support the entire HBB unit, remove each of the bolts from the Cyclo® ring gear housing

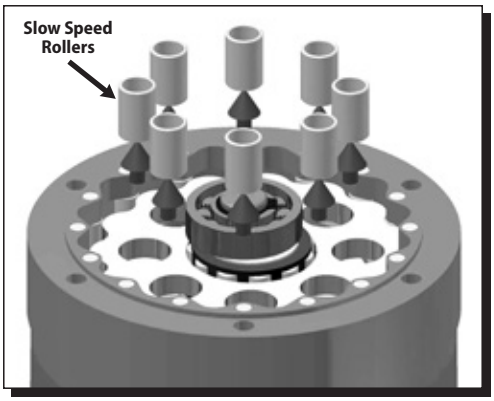


5

Carefully separate the **helical gear housing assembly** from the Cyclo® portion to gain access to the **Cyclo® reduction components.**

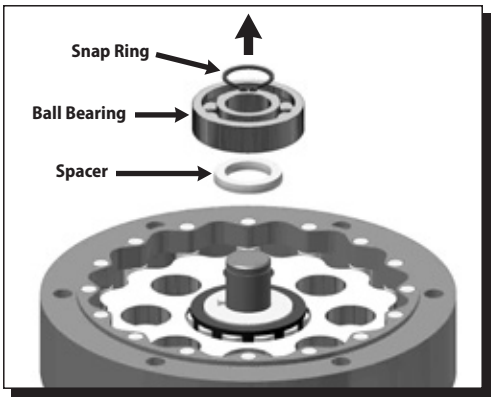
Cyclo® Portion Disassembly/Assembly

Cyclo® Disassembly Procedure



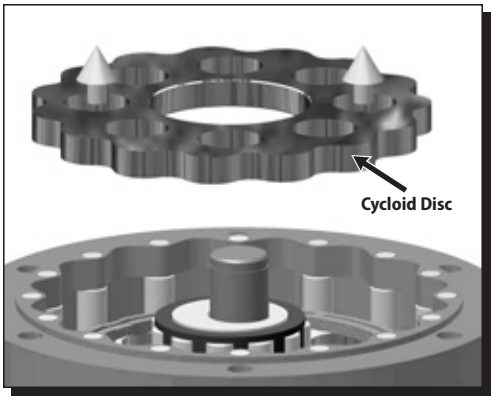
6

Remove the **slow speed rollers**. Additionally, check the pins on the pin carrier to see if any of the rollers have adhered to them.



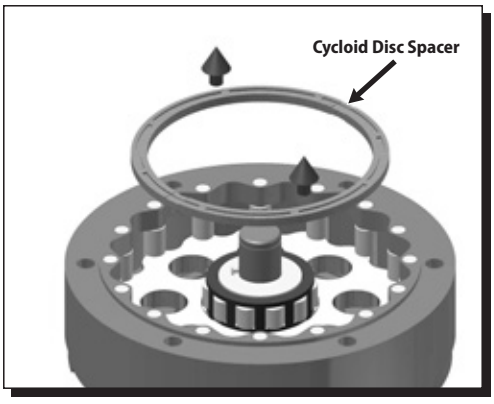
7

Remove the **snap ring,** the **ball bearing** and the **spacer** from the high-speed shaft.



8

Using both hands, lift out the top **Cycloid disc.**

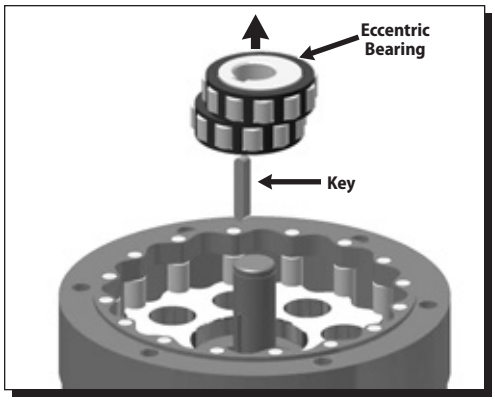


9

For Cyclo® units supplied with a **spacer**, remove the **Cycloidal disc spacer.**

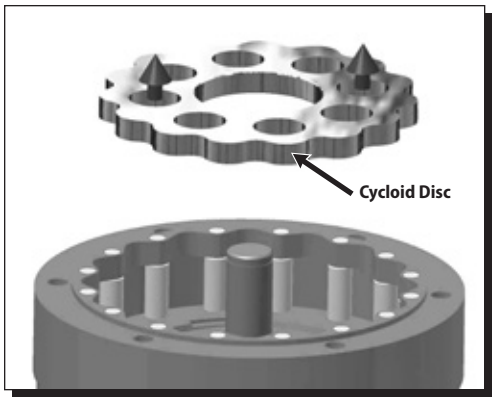
Cyclo® Portion Disassembly/Assembly

Cyclo® Disassembly Procedure



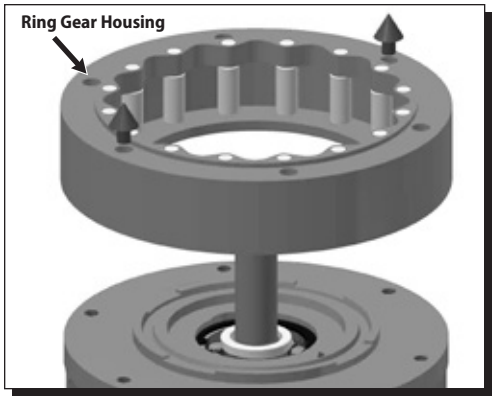
10

Remove the **eccentric bearing** from the high-speed shaft



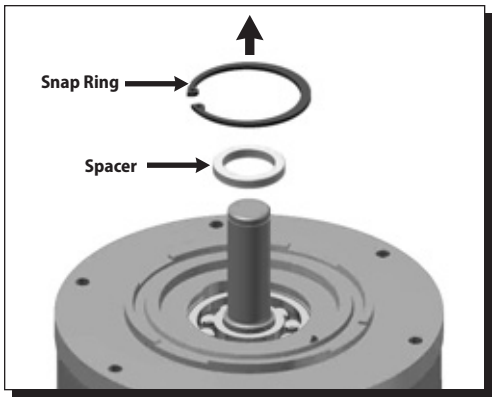
11

Using both hands, carefully remove the remaining **Cycloid disc.**



12

Remove the **ring gear housing**

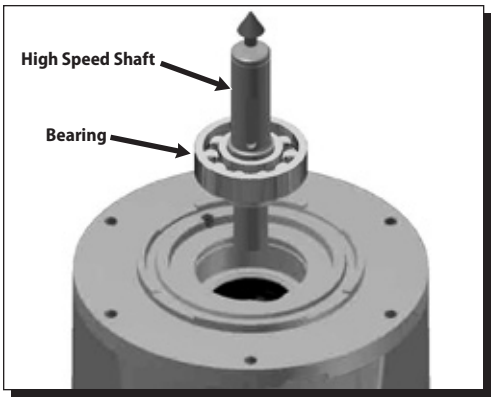


13

Remove the **spacer** and the **snap** ring from the **high speed end shield.**

Cyclo® Portion Disassembly/Assembly

Cyclo® Disassembly and Reassembly Procedures



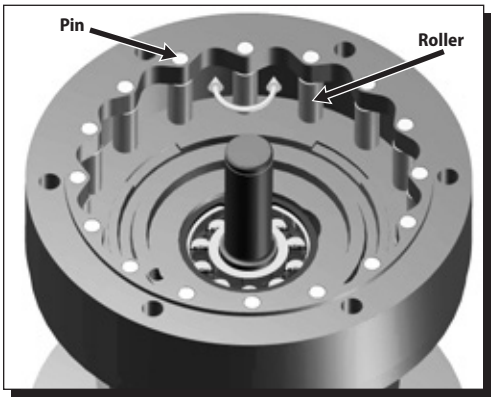
14

Remove the **high speed shaft**, along with its associated **bearing**, from the **high speed end shield.**

Cyclo Reassembly Procedure

The Cyclo® portion of the speed reducer may be reassembled by reversing the disassembly procedure. All parts must be returned to the original order from which they were removed during disassembly. Take care to keep the moving reduction components free of dust or foreign material, and properly align all gaskets in order to keep the assembly oil tight/leak free.

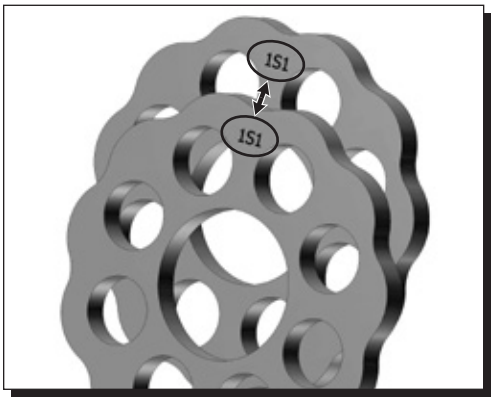
Remember these important notes when assembling the Cyclo® reducer:



1

Place the **ring gear housing** on the Cyclo® **high speed end shield** (or the motor flange) and insert the ring gear housing **pins** and **rollers** (if they had been removed during the disassembly process). Rotate each of the pins and rollers by hand to assure that they freely move/rotate.

If the Cyclo® portion of the HBB is grease lubricated, liberally apply grease to the ring gear pins and rollers before they are inserted into the ring gear housing.



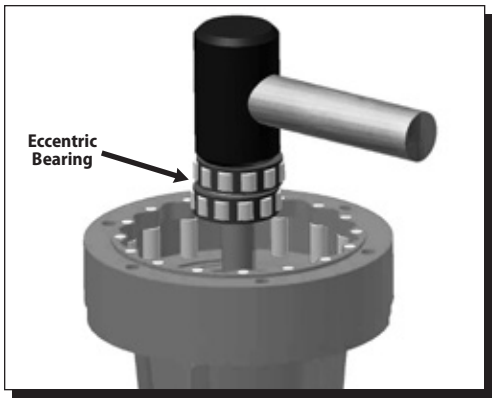
2

Cycloid discs are a matched pair. Each disc has the same code etched on one side.

When inserting these discs into the ring gear housing, be sure that the etched number is facing up.

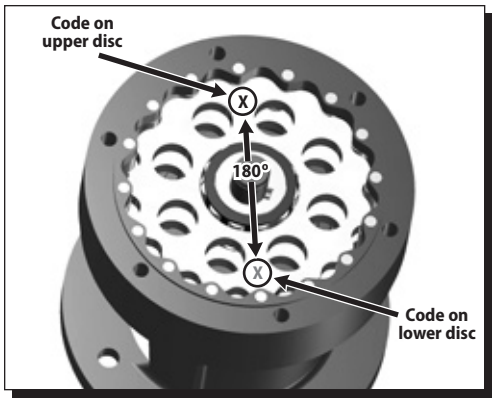
Cyclo® Portion Disassembly/Assembly

Cyclo® Reassembly Procedure



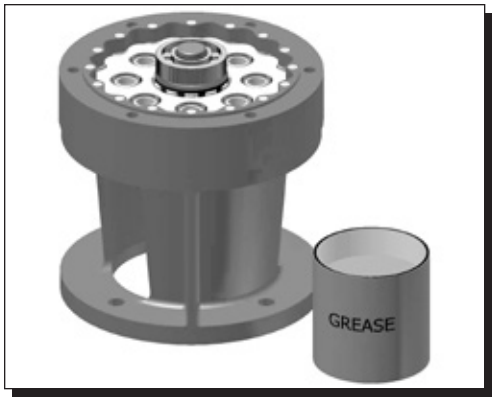
3

When reinserting the **eccentric bearing assembly**, use only a wooden or hardrubber mallet to tap it into place.



4

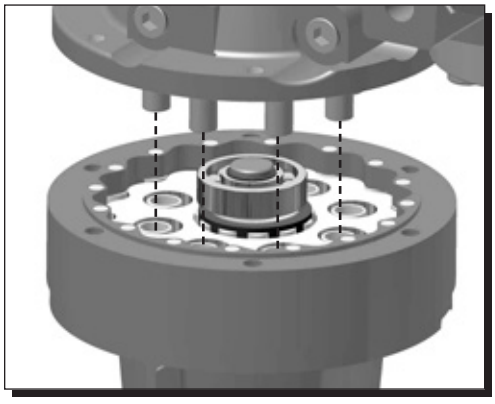
Insert the **top Cycloid disc** so that the code engraved on its surface is 180° opposed to the corresponding etched code on the **lower Cycloid disc.**



5

If the Cyclo® portion of the HBB unit is grease lubricated, refill the reduction components with the amount specified in **Grease Quantities** section of this manual; **or,** fill to 33%-50% of the space around the reduction mechanism and bearings of single reduction units, and 33%-50% of the space around the reduction mechanism of both the first and second stage of double reduction units.

If the Cyclo® portion of the HBB unit is oil lubricated – do not add any grease during the reassembly process.



6

When reassembling the HBB gear housing onto the Cyclo® reduction stage, ensure that the **carrier pins** are inserted and aligned with the corresponding bores of the **rollers.**

Troubleshooting

This troubleshooting guide provides assistance in identifying and overcoming common problems in reducers and motors. If you have a problem with the reducer and/or the motor that is not listed below, please consult the factory for assistance.

Problem with the Reducer		Possible Causes	Suggested Remedy
Runs Hot	Overloading	Load exceeds capacity of the reducer	Check the rated capacity of the reducer, replace with unit of sufficient capacity or reduce the load.
	Improper lubrication	Insufficient lubricant	Check lubricant level and increase to recommended levels.
		Excessive lubricant	Check lubricant level and reduce to recommended level.
		Incorrect lubricant	Flush old lubricant from the unit and refill with correct recommended lubricant.
Vibration or Noise	Loose foundation bolts	Weak mounting structure	Inspect mounting of reducer. Tighten loose bolts and/or reinforce mounting & structure.
		Loose hold-down bolts	Tighten bolts.
	Worn disc and/or helical gearing	Overloading of the unit may result in damage to the Helical gearing and/or the Cycloid discs.	If helical gearset is damaged, contact the factory. If Cycloid discs are damaged, disassemble the Cyclo® portion and replace discs. Re-check the rated capacity of the unit.
	Bearing Failure	May be due to lack of lubricant	If output bearings are damaged, contact the factory. If bearings in Cyclo® portion are damaged, replace the affected bearings. Clean & flush the reducer and fill with the correct type and quantity of lubricant.
		Overload	Check the rated capacity of the reducer. Replace with unit of sufficient capacity or reduce the driven load.
	Insufficient Lubricant	Level of lubricant in the reducer not properly maintained.	Check lubricant level and adjust to factory-recommended level.
	Damaged Cyclo® pins and rollers	Overloading of reducer	Disassemble Cyclo® portion of reducer and replace ring gear housing pins and rollers. Check load on reducer.
Output Shaft/Hub does not turn	Motor shaft broken	Overloading of reducer can cause this type of damage.	Replace broken shaft. Check rated capacity of reducer.
	Input shaft key missing or broken		Replace key.
	Eccentric bearing broken	Lack of Lubricant	Replace the Eccentric Bearing in the Cyclo® portion. Flush and refill the unit with the recommended lubricant.
	Motor does not turn	Motor	Refer to the "Motor" portion of this Troubleshooting guide.
Oil Leakage	Worn seals	Caused by dirt or grit entering the seal area.	Replace the oil seals. The breather filter may be clogged Replace or clean filter.
	Leakage into motor	Reducer has been overfilled with lubricant.	Check the lubricant level and adjust to the recommended level.
		Air breather clogged.	Clean or replace element, being sure to prevent any dirt from falling into the reducer.
		Improper mounting position, such as other than designed mounting angle.	Mount the unit in it's designed mounting angle.

Troubleshooting

Problem with the Motor		Possible Causes	Suggested Remedy.
Load is disconnected but motor does not rotate	Makes a "groaning" sound	Faulty switch contact	Adjust the contact.
		Blown fuse	Replace fuse.
		One phase wire of the power supply open.	Replace.
		Stator coil open	Repair by rewinding or replacing the stator assembly.
		Stator and rotor touching due to bearing housing wear.	Replace the bearing and bracket.
	Rotates in either direction when turned by hand	Three-phase is operating as singlephase	Check the power source with a voltmeter.
	Doesn't make any noise	Stator coil open	Repair by rewinding or replacing stator assembly
		External power failure	Contact the local power company.
		Open connection wire.	Check the source wiring.
		Faulty switch contact Faulty starter contact	Adjust the contacts.
Rotates with the load disconnected but:	Rotates in the wrong direction	Connection error	Change any two of the three-phase source connections.
	Fuse blows	Shorted lead wire	Replace
	Speed does not increase	Faulty starter contact	Adjust
	"Groans"	Excessive Current / Overheating due to rotor and stator touching	Repair by rewinding or replacing stator assembly.
		Excessive current due to one phase of stator coil shorted.	Replace the stator winding.
	Makes a highpitched "metallic" noise	Faulty bearing	Replace the bearing.
Rotates when the load is disconnected but when the load is connected:	Switch overheats	Insufficient switch capacity	Replace with switch having the rated capacity.
		Overload	Decrease load to the rated level.
	Fuse blows	Insufficient fuse capacity	Replace with fuse having the rated capacity.
	Overheats	Overload	Decrease load to rated value.
		Voltage drop	Consult with local power company.
	Speed suddenly drops	Voltage drop	Consult with local power company.
		Overload	Decrease load to rated value.
	Stops	Bearing damaged by overheating	Replace the bearings.

Notes

Notes

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