



**SM-CYCLO®**

Speed Reducers, Gearmotors and  
Brakemotors



**THE  
AVAILABLE  
SOLUTION,  
WORLDWIDE.**



**SUMITOMO**  
MACHINERY CORPORATION OF AMERICA

60000 SERIES

Manual

04.601.60.001

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## WARNINGS

- Consult factory if SM-Cyclo speed reducers are driven by D.C. motors, variable frequency A.C. drives, or speeds other than standard catalog input speeds.
- Be sure to install and operate SM-Cyclo speed reducers, gearmotors and brakemotors in compliance with applicable local and national safety codes. Appropriate guards for rotating shafts should be used and are available from the factory.
- When using SM-Cyclo speed reducers, gearmotors or brakemotors in a system for human transport, install a secondary safety device in order to minimize the risk of accidents that may result in personal injury, death or equipment damage.

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# SM-CYCLO<sup>®</sup> SPEED REDUCERS



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## Mounting

### 1. Mounting on Exact Planes

The Horizontal Type oil-lubricated units must be mounted on horizontal surfaces. Where they are mounted on inclined surfaces, some modifications may be necessary. Specify mounting plane inclination at time of ordering.

### 2. Accurate Alignment

Where the reducer is connected to the motor and the driven machine through couplings, align the shafts accurately. Where the reducer is connected through V pulleys or sprockets, insure that the belts or chains are neither too tight nor too slack.

### 3. Overhung Load Positions

Overhung loads should be located as close to the bearing as possible. (See the SM-CYCLO® 6000 Series Catalog page E-8.)

### 4. Foundations

Foundations must be rugged enough to withstand shock and stress applied from the load side through the reducer.

### 5. Secure Housing

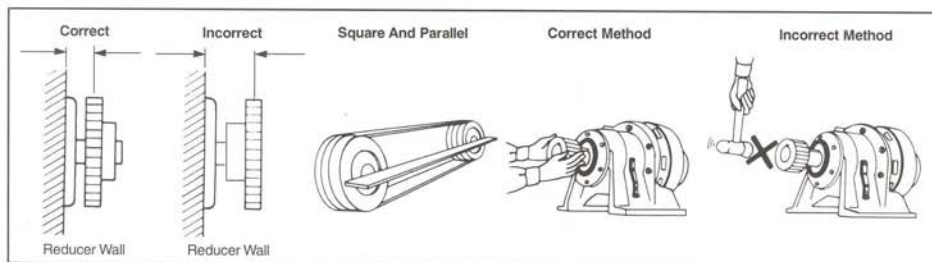
Where the reduction units are operated under conditions of vibration and/or frequent starts and stops, it is recommended to secure them on their mounting surfaces by inserting dowel pins into the knock-holes provided on the foot of the casing. This will insure that bending or shearing forces are reduced on the mounting bolts. Pins must be securely inserted, particularly when the units are to be operated under conditions of severe recurrent peak loads.

### 6. Mounting Accessibility

The reduction units must be mounted in locations with easy accessibility for lubrication maintenance purposes.

### 7. Ventilation

When the SM-CYCLO® Speed Reducer is mounted in a separate enclosure, be sure that adequate ventilation is provided.



# GENERAL CONSTRUCTION

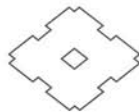


Fig. A-1 Speed Reducer – Horizontal Foot Mount, Single Reduction

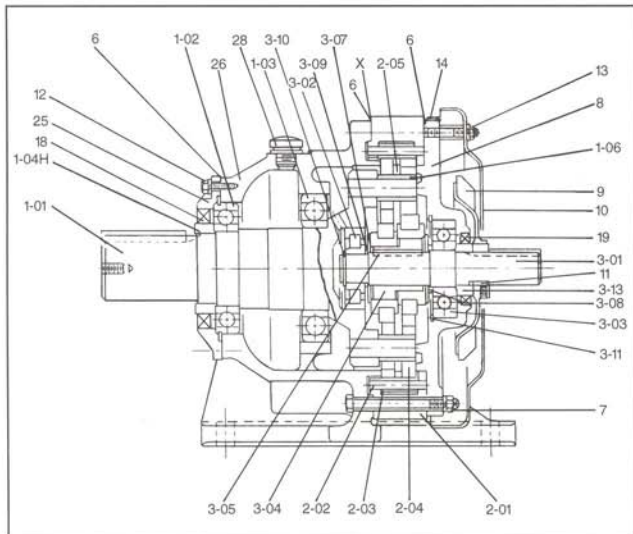
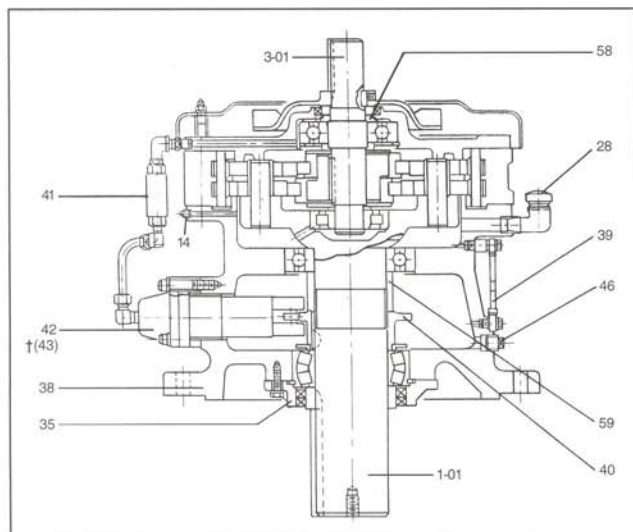


Fig. A-2 Speed Reducer – Vertical Base Mount, Single Reduction



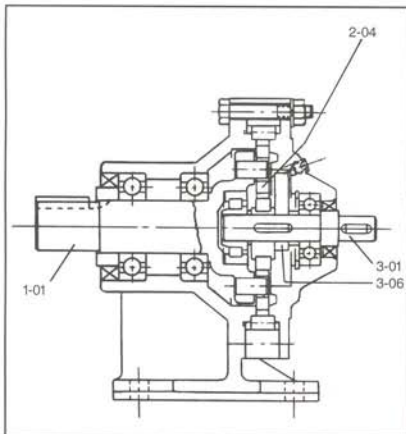
Note: For details of oil seals, bearings or gaskets, refer to A-11 ~ 13.  
 †Refer to Table A-16 on Pg. A-9 for units which require a positive displacement pump.  
 \*Pt. No. 58 — frame sizes 6195-6275 only; Pt. No. 59 — frame sizes 6205-6275 only.  
 \*\*See Fig. A-3, Page A-4; † See Fig. A-4, Page A-4.

Table A-1. Speed Reducer Main Parts

Part No.	Part Name
1-01	Slow Speed Shaft w/pins
1-02	Bearing A
1-03	Bearing B
1-04H	Oil Seal Collar—Horizontal
1-06	Slow Speed Shaft Rollers
2-01	Ring Gear Housing
2-02	Ring Gear Pins
2-03	Ring Gear Rollers
2-04	Cyclo Disc
2-05	Spacer Ring
3-01	High Speed Shaft
3-02	Bearing C
3-03	Bearing D
3-04	Eccentric Bearing Assembly
3-05	Eccentric Key
**3-06	Balance Weight
3-07	Spacer
3-08	Spacer
3-09	Spacer
3-10	Retaining Ring
3-11	Retaining Ring
3-13	Collar
†5-01	Intermediate Shaft w/Pins
†5-02	Bearing F
†5-03	Bearing G
†5-04	Eccentric Bearing Assembly
6	Gasket Set
7	Casing Nuts & Bolts
8	High Speed End Shield
9	Cooling Fan & Set Screw
10	Fan Cover
11	Fan Key
12	Bolts For SS Oil Seal Housing
13	Bolts, Spacers For Fan Cover
14	Plug
†15	Grease Nipple
18	Slow Speed Output Oil Seal
19	High Speed Input Oil Seal
25	Horizontal Oil Seal Housing
26	Horizontal Case
28	Oil Fill Plug
29	Oil Gauge—Horizontal Unit
35	Vertical Oil Seal Housing
38	Vertical Case (Integral V Type)
39	Oil Gauge—Vertical Unit
40	Cam
41	Piping Set & Oil Signal
42	Plunger Pump
43	Positive Displacement Pump
46	Drain Plug
†55	Intermediate Cover
†57	Eye Bolt
*58	Oil Slinger
*59	Spacer

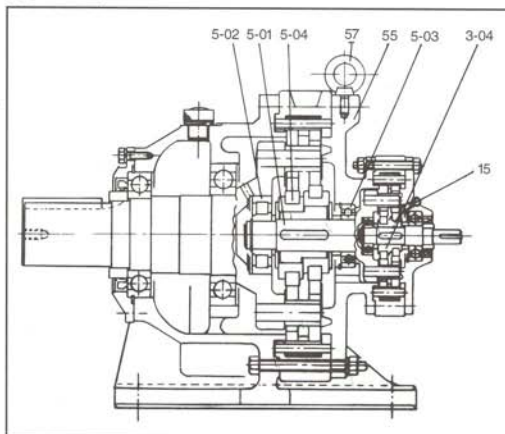
# GENERAL CONSTRUCTION

**Fig. A-3 Speed Reducer/Single Disc Type (Frame Size 6060-6095)**



**Speed Reducer — Single Disc**  
SM-CYCLO® single reduction, Models No. 6060-6095, employ the use of a single planetary gear (Cycloid Disc) and a balance weight.

**Fig. A-4 Speed Reducer/Double Reduction**



**Multiple Reduction Reducers**  
Multiple reduction SM-CYCLO® Reducers are a combination of standard reduction mechanism assemblies connected using an intermediate shaft (Part No. 5-01) and intermediate cover (Part No. 55) between them.

**Table A-2. Frame Sizes and Ratio Combination of Double Reduction Models**

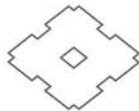
**Frame Size Combination**

Frame Size	Second Stage	First Stage
6060DA	6060	6060
6065DA	6065	6065
6070DA	6070	6065
6075DA	6075	6065
6090DA	6090	6075
6095DA	6095	6075
6100DA	6100	6075
6105DA	6105	6075
6120DA	6120	6075
6120DB	6120	6095
6125DA	6125	6075
6125DB	6125	6095
6130DA	6130	6075
6130DB	6130	6095
6130DC	6130	6105
6135DA	6135	6075
6135DB	6135	6095
6135DC	6135	6105
6140DA	6140	6075
6140DB	6140	6095
6140DC	6140	6105
6145DA	6145	6075
6145DB	6145	6095
6145DC	6145	6105
6160DA	6160	6095
6160DB	6160	6105
6160DC	6160	6125
6165DA	6165	6095
6165DB	6165	6105

**Reduction Ratio Combination**

Total Ratio	Second Stage Ratio	First Stage Ratio
104	13	8
121	11	11
143	13	11
165	15	11
195	15	13
231	21	11
273	21	13
319	29	11
377	29	13
473	43	11
559	43	13
649	59	11
731	43	17
841	29	29
1003	59	17
1247	43	29
1479	87	17
1849	43	43
2065	59	35
2537	59	43
3045	87	35
3481	59	59
4437	87	51
5133 <sup>[1]</sup>	87	59
6177	87	71
7589	87	87

Note: [1] For frame sizes 6205DA, DB or DC ~ 6265DA, DB or DC, second stage ratio is 59 and first stage ratio is 87.



# LUBRICATION

## Standard Type Mounted Reducer (Slow Speed Shaft Horizontal)<sup>[1,2]</sup>

Table A-3. Horizontal Mounted Single Reduction Reducers

Reduction Ratio	3	5	6	8	11	23	15	17	21	25	29	35	43	51	59	71	87	119
Frame Size																		
6060 6065																		
6070 6075																		
6080 6085																		
6090 6095																		
6100 6105 610H																		
6110 6115																		
6120 6125 612H																		
6130 6135																		
6140 6145 614H																		
6160 6165 616H																		
6170 6175																		
6180 6185																		
6190 6195																		
6205																		
6215																		
6225																		
6235																		
6245																		
6255																		
6265																		
6275																		

Maintenance-Free Grease Lubrication (MF)

Oil Bath Lubrication (PB)

Grease Lubricated (G)

Table A-4. Horizontal Mounted Double Reduction Reducers

Reduction Ratio	104	121	143	165	195	231	273	319	377	473	559	649	731	841	1003	1015	1247	1479	1849	2065	2537	3045	3481	4437	5133	6177	7569
Frame Size																											
6060DA 6065DA																											
6070DA 6075DA																											
6090DA 6095DA																											
6100DA 6105DA																											
6120DA 6120DB																											
6125DA 6125DB																											
6130DA 6135DA																											
6130DB 6135DB																											
6130DC 6135DC																											
6140DA 6140DB 6140DC																											
6145DA 6145DB 6145DC																											
6160DA 6165DA																											
6160DB 6165DB																											
6170DA 6175DA																											
6170DB 6175DB																											
6180DA 6185DA																											
6180DC 6185DC																											
6170DC 6175DC																											
6180DB 6185DB																											
6190DA 6195DA																											
6190DB 6195DB																											
6205DA 6205DB																											
6215DA 6215DB																											
6225DA 6225DB																											
6235DA 6235DB																											
6245DA 6245DB																											
6255DA 6255DB																											
6265DA																											
6275DA																											

Maintenance-Free Grease Lubrication (MF)

Grease Lubrication (G)

Oil Bath Lubrication (PB)

Notes: [1] Tables A-3 and A-4 show the standard lubrication method when the Cyclo drive is driven at the standard input speed.

[2] Ratios shown in white in Tables A-3 and A-4 are unavailable for the given unit sizes.

# LUBRICATION

## Standard Vertical Mounted Reducer (Slow Speed Shaft Vertical)<sup>[1,2,3]</sup>

Table A-5. Vertical Mounted Single Reduction Reducer

Reduction Ratio	3	5	6	8	11	13	15	17	21	25	29	35	43	51	59	71	87	119
Frame Size																		
6060 6065																		
6070 6075																		
6080 6085																		
6090 6095																		
6100 6105																		
6110 6115																		
6120 6125																		
6130 6135																		
6140 6145																		
6160 6165																		
6170 6175																		
6180 6185																		
6190 6195																		
6205																		
6215																		
6225																		
6235																		
6245																		
6255																		
6265																		
6275																		

TP: Positive Displacement Pump Lubrication (see Table A-16.)

Table A-6. Vertical Mounted Double Reduction Reducer

Reduction Ratio	104	121	143	165	195	231	273	319	377	473	559	649	731	841	1003	1015	1247	1479	1849	2065	2537	3045	3481	4437	5133	6177	7569
Frame Size																											
6060DA 6065DA																											
6070DA 6075DA																											
6090DA 6095DA																											
6100DA 6105DA																											
6120DA 6120DB																											
6125DA 6125DB																											
6130DA 6135DA																											
6130DB 6135DB																											
6130DC 6135DC																											
6140DA 6140DB																											
6140DC																											
6145DA 6145DB																											
6145DC																											
6160DA 6165DA																											
6160DB 6165DB																											
6170DA 6175DA																											
6170DB 6175DB																											
6180DA 6185DA																											
6180DC 6185DC																											
6170DC 6175DC																											
6180DB 6185DB																											
6190DA 6195DA																											
6190DB 6195DB																											
6205DA 6205DB																											
6215DA 6215DB																											
6225DA 6225DB																											
6235DA 6235DB																											
6245DA 6245DB																											
6255DA 6255DB																											
6265DA																											
6275DA																											

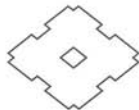
TP: Positive Displacement Pump Lubrication (see Table A-16.)

Notes: [1] Please consult the factory for applications where the slow speed shaft is up.

[2] Tables A-5 and A-6 show the standard lubrication method when the Cyclo drive is driven at the standard input speed.

[3] Ratios shown in white in Tables A-5 and A-6 are unavailable for the given unit sizes.





## Lubricants

### Grease Lubricated Models

Those models listed in Tables A-3 – A-6 as grease lubricated are filled with grease before shipment to the customer and are ready for use.

**Table A-7. Standard Greases<sup>[1]</sup>**

Ambient Temperature <sup>[2]</sup>		SM-Cyclo® Speed Reducer
°F	°C	Shell Oil
14 to 122	-10 to 50	Shell Alvania® Grease 2 (NLGI Grade #2)

**Table A-8. Grease Replenishment and Change Interval**

Model	Condition	Interval <sup>[3]</sup>	
Single and Double Reduction Maintenance Free Type	Replenishment	NOT REQUIRED	
	Overhaul <sup>[4]</sup>	Every 20,000 Hours or Every 4 – 5 Years	
Double Reduction	Replenishment	Less Than 10 Hours Per Day Operation	Every 3 – 6 Months
		10 – 24 Hours Per Day Operation	Every 500 – 1000
	Change	Speed Reducer Mechanism, High Speed Shaft Bearings (Speed Reducer Type)	Every 2 – 3 Years
		Slow Speed Shaft Bearings	Every 3 – 5 Years

### Replenishment and Change Guidelines

Replenish grease to the reduction mechanism 1/3 to 1/2 of the quantity listed in Table A-9 or A-10 for the first reduction stage at the interval recommended in Table A-8.

When the unit is disassembled for overhauling, refill with the grease quantities indicated in Table A-9 or A-10. Or alternatively, 80% of the space around the reduction mechanism and slow speed shaft bearings of single reduction units, and 50% around the reduction mechanism of both the first and second stage of double reduction units.

Slightly larger quantities may be supplied to lower reduction ratio units, and somewhat smaller quantities for high reduction ratio units.

Apply grease liberally to the central part (i.e., around the eccentric bearings) of the mechanism. Apply grease to both the slow speed and high speed shaft bearings as you would to ordinary bearings at the time of re-assembly.

If excessive grease is added, agitation heating of the grease will raise the operating temperature of the unit. Avoid excessive greasing, but do not supply an insufficient amount of grease. When the grease is insufficient, it will raise the unit's operating temperature due to breakdown of the lubrication films on the eccentric bearing. In this case, if the operating temperature rises, supply grease immediately.

**Table A-9. Single Reduction Grease Quantities – oz. (g.)**

Frame Size	6060 6065	6070 6075	6080 6085	6090 6095	6100 6105 610H	6110 6115	6120 6125 612H
Speed Reduction Mechanism	0.9 (25)		2.3 (65)	3.2 (90)	4.9 (140)	7.1 (200)	11.6 (330)
Slow Speed Shaft Bearing	1.2 (35)		2.5 (70)	3.5 (100)		3.2 (90)	4.2 (120)

Notes: [1] Avoid the use of grease other than shown in Table A-7.

[2] Consult the factory when the drives are used under widely fluctuating temperatures, ambient temperatures other than those listed in Table A-7, or any other special conditions.

[3] Single reduction frame sizes 6060 – 612H and double reduction frame sizes 6060DA – 6125DB are maintenance free units. Grease replenishment is not necessary. Where longer life of the drive is expected or if re-lubricating is preferred before the recommended interval, refer to Tables A-7, A-8, A-9 and A-10.

[4] Overhauling consists of disassembling the unit, replacing the seals and gaskets, cleaning the internal parts and then repacking the unit with designated grease.

# LUBRICATION

**Table A-10. Double Reduction Grease Quantities – oz. (g.)**

Frame Size	6060DA 6065DA	6070DA 6075DA	6090DA 6095DA	6100DA 6105DA	6120DA 6125DA	6120DB 6125DB	6130DA 6135DA	6130DB 6135DB	6130DC 6135DC	6140DA 6145DA	6140DB 6145DB	6140DC 6145DC
Speed Reduction Mechanism (1st Stage)	0.9 (25)			4.9 (140)		3.2 (90)	0.9 (25)	3.2 (90)	4.9 (140)	0.9 (25)	3.2 (90)	4.9 (140)
Speed Reduction Mechanism (2nd Stage)	0.9 (25)		3.2 (90)		11.6 (330)		15.9 (450)					
Slow Speed Shaft Bearing (2nd Stage)	1.2 (35)		3.5 (100)			4.2 (120)		10.6 (300)				

Frame Size	6160DA 6165DA	6160DB 6165DB	6160DC 6165DC	6170DA 6175DA	6170DB 6175DB	6170DC 6175DC	6180DA 6185DA	6180DB 6185DB	6190DA 6195DA	6190DB 6195DB	6205DA	6205DB
Speed Reduction Mechanism (1st Stage)	3.2 (90)	4.9 (140)	11.6 (330)	3.2 (90)	4.9 (140)	11.6 (330)	4.9 (140)	15.9 (450)	11.6 (330)	15.9 (450)	11.6 (330)	15.9 (450)
Speed Reduction Mechanism (2nd Stage)	26.5 (750)			35.3 (1000)			38.8 (1100)			52.9 (1500)		
Slow Speed Shaft Bearing (2nd Stage)	10.6 (300)		17.6 (500)			35.3 (1000)		38.8 (1100)		42.3 (1200)		24.7 (700)

Frame Size	6215DA	6215DB	6225DA	6225DB	6235DA	6235DB	6245DA	6245DB	6255DA	6255DB	6265DA	
Speed Reduction Mechanism (1st Stage)	15.9 (450)	26.5 (750)	15.9 (450)	35.3 (1000)	26.5 (750)	38.8 (1100)	26.5 (750)	38.8 (1100)	35.3 (1000)	52.9 (1500)		
Speed Reduction Mechanism (2nd Stage)	70.5 (2000)		88.2 (2500)			141.1 (4000)			158.7 (4500)		211.6 (6000)	282.2 (8000)
Slow Speed Shaft Bearing (2nd Stage)	28.2 (800)		31.7 (900)		35.3 (1000)		38.8 (1100)		42.3 (1200)		45.9 (1300)	

## Oil Lubricated Models

### Oil Fill Procedure

Oil lubricated models are not filled with oil prior to shipping. Before start-up, remove the oil fill plug (See Pg. A-3, Fig. A-2, Part #28) and fill the reducer with recommended oil. Refer to Tables A-11–A-14 for standard oil, allowable viscosity, quantity, and change interval. The oil level must be to the upper red line on the oil level gauge while the unit is not operating, and above the lower red line during operation. If too much oil is supplied, the unit's operating temperature will rise due to the churning heat of the oil, or oil will leak across the high speed shaft oil seal.

Before filling a vertical base type unit with oil, remove the vent plug (Fig. A-3, Fig. A-2, Part #14). After filling, apply teflon sealing tape to threads of the vent plug before installing.

When draining oil, remove drain plug (Fig. A-5, Part #46) or lower side plug of the oil level gauge.

### Oil Level Gauge

The gauge must be replaced when it becomes difficult to check the oil level due to discoloration of the vinyl hose. Use the standard vinyl oil gauge for a reducer operating in ambient temperature  $-4^{\circ}\text{F}$  to  $100^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$  to  $40^{\circ}\text{C}$ ). Where the reducer is used at ambient temperatures greater than  $100^{\circ}\text{F}$  ( $40^{\circ}\text{C}$ ) or less than  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ), a glass gauge set or a dipstick is recommended.

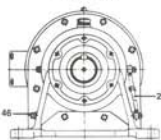
The oil level gauge can be attached on either side of the casing on horizontal units. Attach on the side that is most convenient for checking the oil level. (The oil level gauge is usually attached on the right side when viewed from the slow speed shaft end.)

**Table A-11. Standard Oils**

Ambient Temperature <sup>[1,2]</sup>		Gulf Oil	Exxon Oil	Mobil Oil	Shell Oil	BP Oil
°F	°C					
14 to 41	-10 to 5	EP Lubricant HD 68	Spartan® EP 68	Mobilgear® 626 (ISO VG 68)	Omala® Oil 68	Energol® GR-XP 68
32 to 95	0 to 35	EP Lubricant HD 100 HD 150	Spartan® EP 100 EP 150	Mobilgear® 627, 629 (ISO VG 100, 150)	Omala® Oil 100, 150	Energol® GR-XP 100 GR-XP 150
86 to 122	30 to 50	EP Lubricant HD 220 HD 320 HD 460	Spartan® EP 220 EP 320 EP 460	Mobilgear® 630, 632 633, 634 (ISO VG 220-460)	Omala® Oil 220, 320, 460	Energol® GR-XP 220 GR-XP 320 GR-XP 460

Notes: [1] Use the lower viscosity oil specified for each ambient temperature range for use in winter or relatively low ambient temperatures. [2] Please consult the factory for consistent use in ambient temperatures other than  $32^{\circ}\text{F}$  -  $104^{\circ}\text{F}$  ( $0^{\circ}\text{C}$  -  $40^{\circ}\text{C}$ ).

**Fig. A-5**



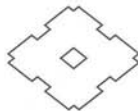


Table A-12. Oil Fill Quantities<sup>[1]</sup>

Frame Size	Single Reduction				Double Reduction				
	Mounting Configuration				Frame Size	Mounting Configuration			
	Horizontal		Vertical			Horizontal		Vertical	
	U.S. gal.	liter	U.S. gal.	liter	U.S. gal.	liter	U.S. gal.	liter	
6130, 6135	0.18	0.7	0.29	1.1	6160DC, 6165DC	0.40	1.5	0.26	1.0
6140, 6145, 614H	0.18	0.7	0.29	1.1	6170DC, 6175DC	0.63	2.4	0.50	1.9
6160, 6165, 616H	0.37	1.4	0.26	1.0	6180DB, 6185DB	0.92	3.5	0.53	2.0
6170, 6175	0.50	1.9	0.50	1.9	6190DA, 6195DA	1.5	5.8	0.71	2.7
6180, 6185	0.66	2.5	0.53	2.0	6190DB, 6195DB	1.6	6.0	0.71	2.7
6190, 6195	1.1	4.0	0.71	2.7	6205DA, 6205DB	1.6	6.0	2.9	11
6205	1.5	5.5	1.5	5.7	6215DA, 6215DB	2.6	10	3.7	14
6215	2.2	8.5	2.0	7.5	6225DA, 6225DB	2.9	11	4.8	18
6225	2.6	10	2.6	10	6235DA, 6235DB	4.5	17	6.1	23
6235	4.0	15	3.2	12	6245DA, 6245DB	4.8	18	7.7	29
6245	4.2	16	4.0	15	6255DA, 6255DB	6.1	23	11.1	42
6255	5.5	21	11.1	42	6265DA	8.5	32	13.5	51
6265	7.7	29	13.5	51	6275DA	15.9	60	(15.9)	(60)
6275	14.8	56	(15.9)	(60)					

( ) with trochoid pump

Table A-13. Allowable Oil Viscosity

Minimum Allowable Viscosity To Maintain Lubricating Oil Film	80 SUS During Operation	
	Oil Bath	20,000 SUS At Operation Start
Maximum Allowable Viscosity To Allow Easy Starting	Forced Oil Lubrication	10,000 SUS At Operation Start

### Forced Lubrication For Vertical Units

Table A-15. Plunger Pump Type

Small Size Pump		Large Size Pump	
Frame Size	Ratio	Frame Size	Ratio
6160, 6165, 6170, 6175, 6180, 6185, 6190, 6195	See Table A-5	6205, 6215, 6225, 6235, 6245, 6255, 6265, 6275	See Table A-5
6160DC, 6165DC, 6170DC, 6175DC, 6180DB, 6185DB, 6190DA, 6195DA, 6190DB, 6195DB	See Table A-6	6205DA, 6205DB, 6215DA, 6215DB, 6225DA, 6225DB, 6235DA, 6235DB, 6245DA, 6245DB, 6255DA, 6255DB, 6265DA	See Table A-6

Table A-16. Positive Displacement (Trochoid) Pump Type

Cyclo Drive		Trochoid Pump <sup>[2,3]</sup>										
Type	Frame Size	Reduction Ratio	Pump Type	Pump Motor	50 Hz Zone				60 Hz Zone			
					Flow		Max. Pressure		Flow		Max. Pressure	
					gal/min	l/min	psi	kgf/cm <sup>2</sup>	gal/min	l/min	psi	kgf/cm <sup>2</sup>
Vertical Shaft	6275	29, 43, 59, 87	TOP216HA-VB3	1 HP (0.75 kW) 4P	6.3	24.0	113.8	8	7.6	28.8	71.1	5.0
	6275DA	All	TOP204HA-VB3	1/2 HP (0.4 kW) 4P	1.6	6.0	227.6	16	1.9	7.2	163.6	11.5

### Positive Displacement (Trochoid) Pump Lubrication

Forced oil lubrication is accomplished by using a positive displacement pump and motor that requires an additional electric power source. It is recommended that the main

Table A-14. Oil Change Interval

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

### Plunger Pump Lubrication

The plunger pump (Fig. A-2, Part #42) is automatically operated by a cam (Fig. A-2, Part #40) fitted on the slow speed shaft (Fig. A-2, Part #1-01). The number of pumping cam teeth required is in direct relation to the reduction ratio and frame size. Please consult the factory for input speeds other than standard.

motor be interlocked with the pump motor to avoid operation without lubrication. The pump must be started 30 seconds or longer before the main motor is operated.

Notes: [1] Please consult the factory for oil quantities when the reducer/gearmotor is mounted in any other position or angle.

[2] Consult the factory when using an inverter.

[3] A relief valve, pressure set at 42.7 psi (3 kgf/cm<sup>2</sup>), is a standard attachment on the trochoid pump.

# OIL LEVEL DIMENSIONS

Foot Mount Horizontal Type  
Fig. A-6

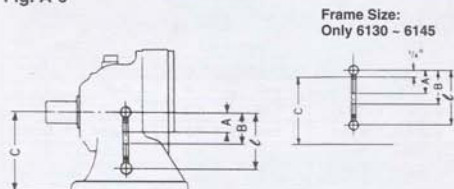
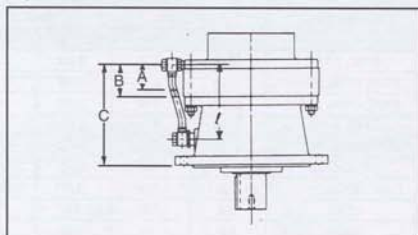


Table A-17. Oil Level Dimensions (Inches)

Frame Size	A	B	C	ℓ
6130-6135	1.38	2.17	5.91	4.65
6140, 6145, (614H)	1.38	2.17	5.91 (6.30)	4.65
6160-6165, (616H)	1.57	2.76	6.30 (7.87)	3.70
6160DC-6165DC	1.18	1.77	6.30	3.70
6170-6175	1.97	3.35	7.87	4.96
6170DC-6175DC	1.18	1.77	7.87	4.96
6180-6185	2.17	3.94	8.66	5.91
6180DB-6185DB	1.38	2.17	8.66	5.91
6190-6195	2.26	3.25	9.84	6.61
6190DA-6195DA	1.18	1.77	9.84	6.61
6190DB-6195DB	1.38	2.18	9.84	6.61
6205	2.12	3.19	9.84	6.06
6205DA	1.26	1.93	9.84	6.06
6205DB	1.26	2.13	9.84	6.06
6215	2.05	3.03	10.84	6.85
6215DA	1.18	1.97	10.43	6.85
6215DB	1.57	2.76	10.43	6.85
6225	2.25	3.43	11.03	6.85
6225DA	1.26	2.05	11.03	6.85
6225DB	1.85	3.43	11.03	6.85
6235	2.48	3.47	11.81	7.64
6235DA	1.57	2.75	11.81	7.64
6235DB	1.97	3.35	11.81	7.64
6245	2.76	3.78	13.19	8.46
6245DA	1.65	2.72	13.19	8.46
6245DB	2.00	3.35	13.19	8.46
6255	3.19	4.17	14.76	9.02
6255DA	1.97	3.35	14.76	9.02
6255DB	2.05	3.23	14.76	9.02
6265	3.23	4.21	15.75	10.16
6265DA	2.28	3.27	15.75	10.16
6275	3.35	4.53	21.26	11.22
6275DA	2.26	3.25	21.26	11.22

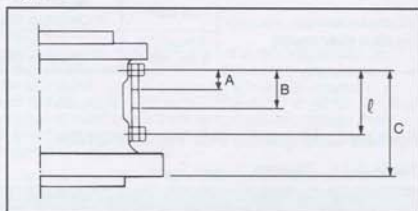
Base Mount Vertical Type  
Frame Size: 6130 - 614H  
Fig. A-7



Base Mount Vertical Type  
Table A-18. Oil Level Dimensions (Inches)  
Frame Size: 6130 - 614H

Frame Size	A	B	C	ℓ
6130-614H	1.85	2.72	7.52	5.79

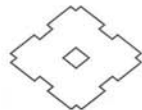
Base Mount Vertical Type  
Frame Size: 6160 - 6275  
Fig. A-8



Base Mount Vertical Type  
Table A-19. Oil Level Dimensions (Inches)  
Frame Size: 6160 - 6275

Frame Size	A	B	C	ℓ
6160-6165, 616H	1.02	1.42	4.68	2.72
6170-6175	1.69	2.48	6.02	3.78
6180-6185	1.93	2.72	6.81	4.25
6190-6195	2.09	3.27	7.87	5.47
6205	1.46	2.05	7.09	3.54
6215	1.46	2.05	7.09	3.54
6225	1.46	2.05	7.87	3.54
6235	1.46	2.05	7.72	3.54
6245	1.46	2.05	7.96	3.54
*6255	4.33	4.92	19.76	6.57
*6265	4.65	5.24	21.69	7.17
6275	1.97	2.76	13.39	5.51

\*Note: V6255 & V6265 Oil Gauge is on the Ring Gear Housing instead of V-Casing.



# BEARINGS, OIL SEALS, GASKETS

Fig. A-9

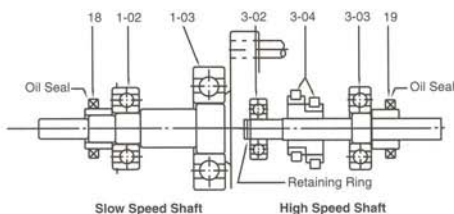


Table A-20. Slow Speed Shaft Bearing

Single Reduction	Frame Size	Double Reduction	Slow Speed Shaft	
			Bearing A Part #1-02	Bearing B Part #1-03
6060, 6065		6060DA, 6065DA	6204Z	6909
6070, 6075		6070DA, 6075DA	6204Z	6909
6080, 6085		—	6305Z	6009
6090, 6095		6090DA, 6095DA	6306Z	16011
6100, 6105, 610H		6100DA, 6105DA	6306Z	16011
6110, 6115		—	6307Z	6011
6120, 6125, 612H		6120DA, 6125DA, 6120DB, 6125DB	6308Z	6013
6130, 6135		6130DA, 6135DA, 6130DB, 6135DB, 6130DC, 6135DC	6211NR	6213
6140, 6145, 614H		6140DA, 6145DA, 6140DB, 6145DB, 6140DC, 6145DC	22211EXNR	6213
6160, 6165		6160DA, 6165DA, 6160DB, 6165DB, 6160DC, 6165DC	3TM-6213NR <sup>[1]</sup>	6215 <sup>[1]</sup>
6170, 6175		6170DA, 6175DA, 6170DB, 6175DB, 6170DC, 6175DC	6216NR <sup>[1]</sup>	6218 <sup>[1]</sup>
6180, 6185		6180DA, 6185DA, 6180DB, 6185DB	6218NR <sup>[1]</sup>	6220 <sup>[1]</sup>
6190, 6195		6190DA, 6195DA, 6190DB, 6195DB	6221NR <sup>[1]</sup>	6026 <sup>[1]</sup>
6205		6205DA, 6205DB	22220BNRC2	6222C2
6215		6215DA, 6215DB	23022BNRC2	6224C2
6225		6225DA, 6225DB	23024BNRC2	6226C2
6235		6235DA, 6235DB	23026BNRC2	NUP228C2
6245		6245DA, 6245DB	23028BNRC2	NUP230C2
6255		6255DA, 6255DB	23032BNRC2	NUP234C2
6265		6265DA	23034BNRC2	NUP236C2
6275		6275DA	23136BNXR	6340

Table A-21. High Speed Shaft Bearing

Single Reduction	Frame Size	Double Reduction	High Speed Shaft			Qty.
			Bearing C Part #3-02	Bearing D Part #3-03	Eccentric Part #3-04	
6060, 6065		6060DA, 6065DA, 6070DA, 6075DA	6301	6301Z	607YXX	1
6070, 6075		6090DA, 6095DA, 6100DA, 6105DA, 6120DA, 6125DA, 6130DA, 6135DA, 6140DA, 6145DA	6301	6301Z	607YXX	1
6080, 6085		—	6301SH	6302Z	6004RSH2ZCC3	1
6090, 6095		6120DB, 6125DB, 6130DB, 6135DB, 6140DB, 6145DB, 6160DA, 6165DA, 6170DA, 6175DA	6302RSH2	6302Z	Refer to Table A-22	1
6100, 6105, 610H		6130DC, 6135DC, 6140DC, 6145DC, 6160DB, 6165DB, 6170DB, 6175DB, 6180DA, 6185DA	6302RSH2	6302Z	Refer to Table A-22	1
6110, 6115		—	6302RSH2	6302Z	611YSS, 611GSS	2
6120, 6125, 612H		6160DC, 6165DC, 6170DC, 6175DC, 6190DA, 6195DA, 6205DA	6304	6305Z	Refer to Table A-22	1
6130, 6135		6180DB, 6185DB, 6190DB, 6195DB, 6205DB, 6215DA, 6225DA	6305	6306	Refer to Table A-22	1
6140, 6145, 614H		—	6305R	6306	Refer to Table A-22	1
6160, 6165, 616H		6215DB, 6235DA, 6245DA	6307R	6308	Refer to Table A-22	1
6170, 6175		6255DA, 6255DB	6406	6407	617YSX	2
6180, 6185		6235DB, 6245DB	6407	6409	618YSX	2
6190, 6195		6255DB, 6265DA, 6275DA	6408	6411	619YSX	2
6205		—	NJ310EV7	21311V1	620GXX	2
6215		—	NJ311EV16	21311V1	621GXX	2
6225		—	NJ312EV11	21312V1	622GXX	2
6235		—	NJ313EV11	21314V1	623GXX	2
6245		—	NJ314EV7	21315V1	624GXX	2
6255		—	NJ316EV1	21318V1	625GXX	2
6265		—	NJ317EV1	21318V1	626GXX	2
6275		—	NJ417	22222BL1	627GXX	2

Note: [1] For grease lubricated models, a sealed bearing should be used, which changes the following letters in the part number to those shown in bold: NR (Std.) – ZNR; NXR – ZNXR; None – add Z.

# BEARINGS, OIL SEALS, GASKETS

Fig. A-10

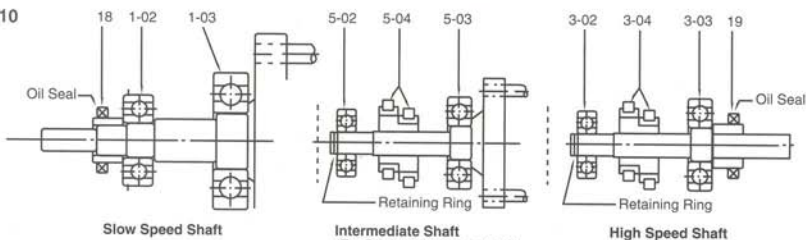
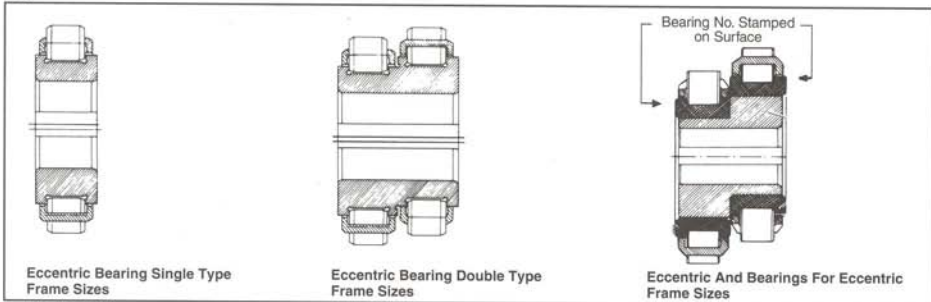


Table A-22. Eccentric Bearing

		Frame Size					
High Speed Shaft, Motor Shaft Part #3-04	6090, 6095	6100, 6105	6120, 6125	6130, 6135	6140, 6145	6160, 6165	
Intermediate Shaft Part #5-04	6090DA 6095DA	6100DA 6105DA	6120DA, 6125DA 6120DB, 6125DB	6130DA, 6135DA 6130DB, 6135DB 6130DC, 6135DC	6140DA, 6145DA 6140DB, 6145DB 6140DC, 6145DC	6160DA, 6165DA 6160DB, 6165DB 6160DC, 6165DC	
Reduction Ratio							
6	60906YRX	6100608YRX	6120608YRX	61406-11YSX	61406-11YSX	6160608YRX2	
8	60908-15YSX	6100608YRX	6120608YRX	61406-11YSX	61406-11YSX	6160608YRX2	
11	60908-15YSX	61011-15YRX	6121115YSX	61406-11YSX	61406-11YSX	61611-15YSX	
13	60908-15YSX	61011-15YRX	6121317YSX	61413-17YSX	61413-17YSX	61611-15YSX	
15	60908-15YSX	61011-15YRX	6121115YSX	61413-17YSX	61413-17YSX	61611-15YSX	
17	60917YSX	61017YSX	6121317YSX	61413-17YSX	61413-17YSX	61617-25YSX	
21	60921YSX	61021YRX	61221YRX	6142125YSX	6142125YSX	61617-25YSX	
25	6092529YSX	6102529YRX	6122529YSX	6142125YSX	6142125YSX	61617-25YSX	
29	6092529YSX	6102529YRX	6122529YSX	6142935YSX	6142935YSX	6162935YSX	
35	60935YSX	61035YRX	61235YRX	6142935YSX	6142935YSX	6162935YSX	
43	60943YSX	61043YSX	61243YSX	61443-59YSX	61443-59YSX	6164351YSX	
51	60951YRX	61051YRX	6125159YSX	61443-59YSX	61443-59YSX	6164351YSX	
59	60959YSX	61059YRX	6125159YSX	61443-59YSX	61443-59YSX	61659YSX	
71	60971YRX	61071YRX	6127187YSX	6147187YSX	6147187YSX	61671YRX2	
87	60987YSX	61087YRX	6127187YSX	6147187YSX	6147187YSX	61687YSX	
119	609119YSX	610119YSX	-	-	-	-	

Fig. A-11




**Table A-23. Intermediate Shaft Bearing**

Frame Size	Intermediate Shaft				Frame Size	Intermediate Shaft			
	Bearing F Part #5-02	Bearing G Part #5-03	Eccentric Bearing Part #5-04	Qty.		Bearing F Part #5-02	Bearing G Part #5-03	Eccentric Bearing Part #5-04	Qty.
6060DA, 6065DA	6301	6909	607YXX	1	6180DA, 6185DA	6407	6208	618YSX	2
6070DA, 6075DA	6301	6909	607YXX	1	6180DB, 6185DB	6407	6213	618YSX	2
6090DA, 6095DA	6302RSH2	6007	Refer to Table A-22	1	6190DA, 6195DA	6408	6210	619YSX	2
6100DA, 6105DA	6302RSH2	6007			6190DB, 6195DB	6408	6213	619YSX	2
6120DA, 6125DA	6304	6007			6205DA	NJ310EV7	6210	620GXX	2
6120DB, 6125DB	6304	6205			6205DB	NJ310EV7	6310	620GXX	2
6130DA, 6135DA	6305	6007			6215DA, 6215DB	NJ311EV16	6311	621GXX	2
6130DB, 6135DB	6305	6206			6225DA, 6225DB	NJ312EV11	6313	622GXX	2
6130DC, 6135DC	6305	6206			6235DA, 6235DB	NJ313EV11	6314	623GXX	2
6140DA, 6145DA	6305	6007			6245DA	NJ314EV7	6315	624GXX	2
6140DB, 6145DB	6305	6206			6245DB	NJ314EV7	6316	624GXX	2
6140DC, 6145DC	6305	6206			6255DA, 6255DB	NJ316EV1	6318	625GXX	2
6160DA, 6165DA	6307R	6207			6265DA	NJ317EV1	6320	626GXX	2
6160DB, 6165DB					6275DA	NJ417	22220RH	627GXX	2
6160DC, 6165DC	6307R	6208							
6170DA, 6175DA	6406	6207			617YSX				
6170DB, 6175DB					617YSX				
6170DC, 6175DC	6406	6208	617YSX						

**Table A-24. Oil Seals**

Frame Size	Type <sup>(1)</sup>	Slow Speed Shaft Part #18				High Speed Shaft Part #19			
		Dimension (mm)		Quantity		Dimension (mm)		Quantity	
		(I.D. x O.D. x W)		Horizontal Shaft	Vertical Shaft	(I.D. x O.D. x W)			
6060, 6065	D	30 x 47 x 8		1	1	17 x 30 x 6		1	
6070, 6075	D	30 x 47 x 8		1	1	17 x 30 x 6		1	
6080, 6085	D	45 x 62 x 9		1	1	17 x 30 x 6		1	
6090, 6095	D	50 x 72 x 12		1	1	20 x 35 x 7		1	
6100, 6105	D	50 x 72 x 12		1	1	20 x 35 x 7		1	
6110, 6115	D	55 x 80 x 12		1	1	20 x 35 x 7		1	
6120, 6125	D	65 x 90 x 13		1	1	32 x 52 x 8		1	
6130, 6135	D	68 x 88 x 12		1	2	38 x 58 x 11		1	
6140, 6145	D	65 x 88 x 12		1	2	38 x 58 x 11		1	
6160, 6165	D	85 x 110 x 13		1	2	55 x 78 x 12		1	
6170, 6175	D	95 x 130 x 15		1	2	60 x 82 x 12		1	
6180, 6185	D	110 x 145 x 15		1	2	65 x 88 x 12		1	
6190, 6195	D	120 x 155 x 16		1	2	70 x 88 x 10		1	
6205	D	120 x 155 x 16		1	2	70 x 88 x 10		1	
6215	D	130 x 160 x 14		1	2	75 x 100 x 13		1	
6225	D	145 x 175 x 14		1	2	75 x 100 x 13		1	
6235	D	160 x 190 x 16		1	2	85 x 110 x 13		1	
6245	D	170 x 200 x 16		1	2	95 x 120 x 13		1	
6255	D	190 x 225 x 16		1	2	110 x 140 x 14		1	
6265	D	200 x 240 x 20		1	2	110 x 140 x 14		1	
6275	D	230 x 270 x 20		1	2	120 x 150 x 14		1	

Note: [1] D indicates lip (dust proof and seal lip) type.

# DISASSEMBLY/ASSEMBLY

## Disassembly

SM-CYCLO® Reducers are designed to provide maximum ease when disassembling and reassembling; they require no special maintenance skills.

1. Remove the complete SM-CYCLO® Reducer with adaptor (motorized type) from the driven machine.
2. Remove the plug at the bottom of the oil gauge to drain all oil from the unit.
3. Remove the cooling fan cover and fan from those Speed Reducers (not motorized) equipped with a cooling fan, and stand the unit on a solid base with its high speed shaft side down. Remove the through bolts for the high speed end shield, ring gear housing, and lift the slow speed side, thus separating the unit into two parts so that the inner mechanism can be removed (Figs. A-12 ~ A17).

**Note:** If the reducer is motorized (C-adaptor and coupling) remove the motor and coupling before following the procedure outlined above. As a final step, remove the adaptor and cooling fan.

4. If the unit will not separate easily, gently drive a wedge at the line X shown in Fig. A-1 on page A-3 (if this produces a burr, be sure to remove it before reassembly).
5. To lift the slow speed side, attach an eyebolt to the tapped hole on the end of the slow speed shaft and use a hoist or chain block (Fig. A-12).
6. Take out the slow speed shaft rollers, item 1-06, page A-3 (Fig. A-13). Check the slow speed shaft pins (1-01) to see whether any rollers have adhered to them.
7. Using both hands, lift out the top cycloid disc (2-04) on the slow speed side (Fig. A-14).

8. Remove the spacer ring (2-05).
9. The eccentric (3-04) can be removed from the input shaft (3-01) after taking out the retaining ring (3-10) and the inner bearing raceway (Figs. A-15, A-16).

**Note:** In certain sizes, the eccentric bearings are roller bearings without a retainer. Remove bearings of the top disc before proceeding with the next step.

10. Take out the second disc located on the motor side. (Also remove second disc bearings and eccentric with inner bearing raceway if required.)
  11. Remove the ring gear housing (2-01).
  12. Follow these steps to remove the slow speed shaft (1-01) with its bearings from the casing (26): (a) Remove the horizontal oil seal housing (25). (b) With a wooden or hard rubber mallet, rap the inner end of the slow speed shaft to expose the retaining ring\* from the outer raceway of the bearing. (c) Remove the retaining ring. (d) Rap the outer end of the slow speed shaft with a wooden or hard rubber mallet, and remove it from the casing.
  13. The high speed shaft (3-01) with bearings is removed from the high speed shaft end shield (8) by tapping the shaft end after first taking off the retaining ring (3-11).
  14. The cycloid disc is made from heat-treated bearing steel and the spacer ring is cast iron. Take care not to strike them together while handling. The above instructions cover complete disassembly. In ordinary cases, however, only the removal of the cycloid discs and the eccentric, and removal of the slow speed shaft from the slow speed end cap is necessary.
- \*Note: Retaining ring is part of bearing A (Part No. 1-02).

## Assembly

SM-CYCLO® Reducers are reassembled by reversing the disassembly procedure. Care must be taken to exclude dust or foreign matter from the moving parts, and to see that gaskets are properly placed to make the assembly oil-tight.

Following are some helpful points to remember when assembling SM-CYCLO® Reducers.

1. Set the ring gear housing and insert the ring gear pins and rollers; then test-rotate the pins and rollers by hand. (Apply grease liberally to the ring gear pins and rollers before they are inserted in grease lubricated SM-CYCLO® Reducers.)
2. Cycloid discs are a matched pair. Each carries the same number stamped on one side of the disc.
3. Set the cycloid disc with the stamped number face up as shown in Fig. A-17.

4. Insert the spacer (3-07) and then insert the eccentric with bearings by rapping with a wooden or hard rubber mallet (Fig. A-16).

5. Insert the other spacer and the inner bearing raceway. Secure them with the retaining ring (Fig. A-15).

6. Set the spacer ring in place.

7. **Insert top disc in such a way that the mark is 180° opposed to the mark on the bottom disc (Fig. A-13).**

8. Insert slow speed shaft rollers (Fig. A-13).

9. Put the slow speed shaft pins into the rollers (Fig. A-12). The above instructions are for **eccentric bearings with retainer**. Following are the instructions suggested for **roller bearings without retainer**.

a. First insert the eccentric with inner raceways of bearings by rapping with a wooden or hard rubber mallet.



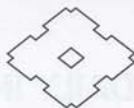


Fig. A-12



Fig. A-13



Fig. A-16



Fig. A-14



Fig. A-15



Fig. A-17



**Note:** Insert second disc with number facing slow speed side, exactly 180° opposed to number on first disc.

**Note:** Set disc with number facing slow speed side.

b. Apply grease to the raceway of the eccentric on the disc. Fix the rollers and set disc in place.

c. Insert the spacer ring and set second disc in such a way that mark is 180° opposed to mark on the bottom disc.

#### Eccentric Bearing Replacement Precautions

The eccentric bearings are specially designed for installation on SM-CYCLO® Reducers. They are special roller bearings without outer raceways (refer to the list of bearings on pages A-12 ~ A-13).

It is necessary to insert replacement bearings with numbered surfaces of the inner raceways facing outward. Note that incorrect insertion of the bearings (i.e., insertion of bearings with numbered surfaces inside) causes trouble.

#### Disassembly and Assembly of Sizes 6060-6095 SM-CYCLO® Reducers

Small sizes 6060-6095 have a single disc system, so they differ in construction from larger sizes in the following ways:

1. A balance weight is provided in lieu of the two-disc system. Refer to figure A-18.
2. The balance weight must be positioned exactly 180° as opposed to that of the eccentric.
3. There are no end plates on either side of the eccentric. In all other respects, 6060-6095 have exactly the same construction as the larger sizes. Follow the instructions given under "Disassembly and Assembly".

#### Disassembly Of Output Side (6060-612H)

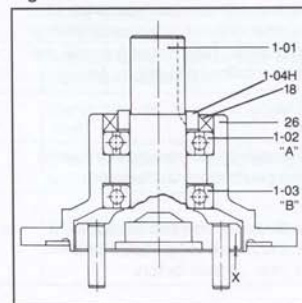
1. With casing supported, tap output shaft until it is disengaged from casing.
2. Remove bearing "A" by using pulling tool.
3. Replace all bearings, gaskets and seals when reassembling. (Pages A-11 ~ A-13).

#### Assembly Of Output Side (6060-612H)

1. Assemble the "B" bearing (Part No. 1-03) on the slow speed shaft (Part No. 1-01). Heating of "B" bearing is recommended for easier assembly.
- Note:** Do not exceed temperature of 200°F.
2. Assemble the casing (Part No. 26) over the slow speed shaft (Part No. 1-01), being sure to maintain "X" (Fig. A-18).
3. Carefully tap bearing "A" (Part No. 1-02) onto the slow speed shaft (Part No. 1-01) until the bearing is flush with the shoulder of the casing.
4. Place the collar (Part No. 1-04H) onto the slow speed shaft (Part No. 1-01). Heating the collar is recommended for easier assembly.
5. Insert the oil seal (Part No. 18), lip in, into the casing (Part No. 26).

**Note:** Measure for dimension "X" preferably in 3 places to insure proper spacing.

Fig. A-18



X" Dimension (Inches)

Frame Size	Dimension
6060/65	0.046 ± 0.007
6070/75	0.042 ± 0.007
6080/85	0.046 ± 0.007
6090/95	0.046 ± 0.007
6100/05	0.046 ± 0.007
6110/15/20/ 25, 612H	0.042 ± 0.007

# DAILY INSPECTION

1. Visually check the oil level gauge on the vertical unit, forced-lubricated type. Check lubrication flow by viewing piping set and oil signal (Part No. 41). Faulty operation is caused by a lack of lubrication oil, damage to the plunger pump (Part No. 42) or the positive displacement pump (Part No. 43) or the clogging of pipes, etc. In case of faulty operation, stop and inspect the unit immediately.
2. A temperature rise of approximately 105°F (40.6°C) above ambient on the surface of the ring gear housing (Part No. 2-01) is allowable if the temperature

fluctuation is small. If temperature rises rapidly from a stable condition, add the recommended oil or grease (Tables A-7 and A-11). A rapid temperature rise may be caused from a lack of lubrication.

If after lubricating unit, the problem persists, stop operation and consult factory.


3. When an abnormal sound is heard from inside the unit, stop operation and inspect the unit.
4. If the lubrication oil leaks, replace the damaged or worn part with a new one. (Refer to Part No. 1-04H, Page A-3.)

## Ordering Correct Replacement Units Or Parts

The SM-CYCLO® is fully standardized to offer maximum part interchangeability among models of the same frame size. However, there are many frame sizes, models and types in the production range of SM-CYCLO®. Therefore to get correct replacement units or parts, proper information to identify the speed reducer in question is essential. The name plate, which is secured to the body of the drive, provides this identifying data.

Please give the full description shown on the name plate to your distributor. Be sure to include the *SERIAL NUMBER* and *MODEL NUMBER*. This information, along with our production records, will enable us to provide you with the correct replacement unit or parts.

### Name Plate on SM-CYCLO®

<b>SM-CYCLO®</b> CHESAPEAKE, VIRGINIA			
MODEL			
RATIO		SERVICE FACTOR	
INPUT	HP	RPM	
OUTPUT TORQUE		IN-LB	
SERIAL NO.			
 <b>SUMITOMO</b> MACHINERY CORP. OF AMERICA			

## Storage And Operation After Storage

### Storage 6 Months–1 Year

#### Oil-Lubricated

1. Completely fill unit(s) with a rust-preventive oil (NP20 or equivalent) or a circulating oil (Shell VSI No. 100 or equivalent).
2. At approximately 3 month intervals, rotate the input shaft a sufficient number of times to insure all internal components remain coated. (The higher the ratio, the greater the amount of rotations needed for proper lubrication.)

#### Grease-Lubricated

Grease-lubricated models do not require any special attention during storage. (Inspect unit before operation.)

**Note:** For both the *Oil-Lubricated* and *Grease-Lubricated* models, if units are to be stored for a period exceeding 1 year, consult factory.

### Operation After Storage 6 Months–1 Year

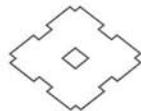
#### Oil-Lubricated

1. Completely drain the rust preventive, or circulating oil from unit.
2. Flush unit with the recommended operating oil as shown in Table A-11.
3. After flushing, fill the unit to the proper oil level with the recommended lubricating oil.

#### Grease-Lubricated

Add ½ of the recommended quantity of new grease as shown in Table A-10.

**Note:** Consult the factory before operating units stored for periods greater than 1 year.



# TROUBLESHOOTING AND REPAIR

This troubleshooting guide is to help you identify and overcome common problems of reducers. If you have a problem not listed below, please consult factory.

PROBLEM WITH THE REDUCER		POSSIBLE CAUSES	SUGGESTED REMEDY
Runs Hot	Overloading	Load exceeds the capacity of the reducer.	Check rated capacity of reducer, replace with unit of sufficient capacity or reduce load.
	Improper Lubrication	Insufficient lubrication.	Check lubricant level and adjust up to recommended levels.
		Excessive lubrication.	Check lubricant level and adjust down to recommended level.
		Wrong lubricant.	Flush out and refill with correct lubricant as recommended.
Runs Noisy	Loose Foundation Bolts	Weak mounting structure.	Inspect mounting of reducer. Tighten loose bolts and/or reinforce mounting and structure.
		Loose hold down bolts.	Tighten bolts.
	Worn Disc	Overloading unit may result in damage to disc.	Disassemble and replace disc. Recheck rated capacity of reducer.
	Failure of Bearings	May be due to lack of lubricant.	Replace bearing. Clean and flush reducer and fill with recommended lubricant.
		Overload.	Check rated capacity of reducer, replace with unit of sufficient capacity or reduce load.
	Insufficient Lubricant	Level of lubricant in the reducer not properly maintained.	Check lubricant level and adjust to factory-recommended level.
Damaged Pins & Rollers	Overloading of reducer.	Disassemble and replace ring gear pins and rollers. Check load on reducer.	
Output Shaft Does Not Turn	Input Shaft Broken	Overloading of reducer can cause damage.	Replace broken shaft. Check rated capacity of reducer.
		Key missing or sheared off on input shaft.	Replace key.
	Eccentric Bearing Broken	Lack of lubricant.	Replace eccentric bearing. Flush and refill with recommended lubricant.
		Coupling loose or disconnected.	Properly align reducer and coupling. Tighten coupling.
Oil Leakage	Worn Seals	Caused by dirt or grit entering seal.	Replace seals. Breather filter may be clogged. Replace or clean filter.
		Overfilled reducer.	Check lubricant level and adjust to recommended level.
		Vent clogged.	Clean or replace element, being sure to prevent any dirt from falling into the reducer.
		Improper mounting position, such as wall or ceiling mount of horizontal reducer.	Mount horizontally or rework reducer to wall or ceiling mount.