

SM-CYCLO® GEARMOTORS

Operating and Maintenance Manual
4000 Series



 **SUMITOMO**
MACHINERY CORPORATION OF AMERICA

Manual

04.301.60.005

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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 gearmotor is connected to the driven machine through coupling, align the shafts accurately. Where the gearmotor 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 Catalog page 16.)

4. Foundations

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

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

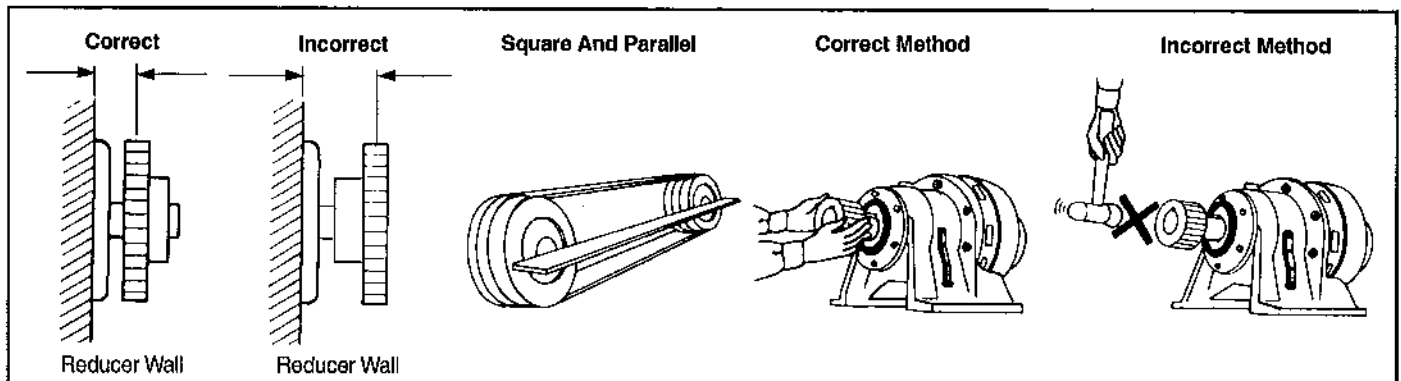
The reduction units must be mounted on places with easy accessibility for lubrication maintenance purposes and ease of inspection.

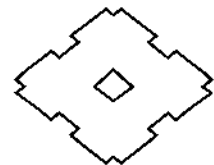
7. Ventilation

Avoid installation in places where the humidity is high, dust is considerable, or where the gearmotor will be in contact with water or oil. Select a clean, dry location with good ventilation.

8. Installation

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





General Construction

Fig. 1 Single Reduction (Horizontal Foot Mount)

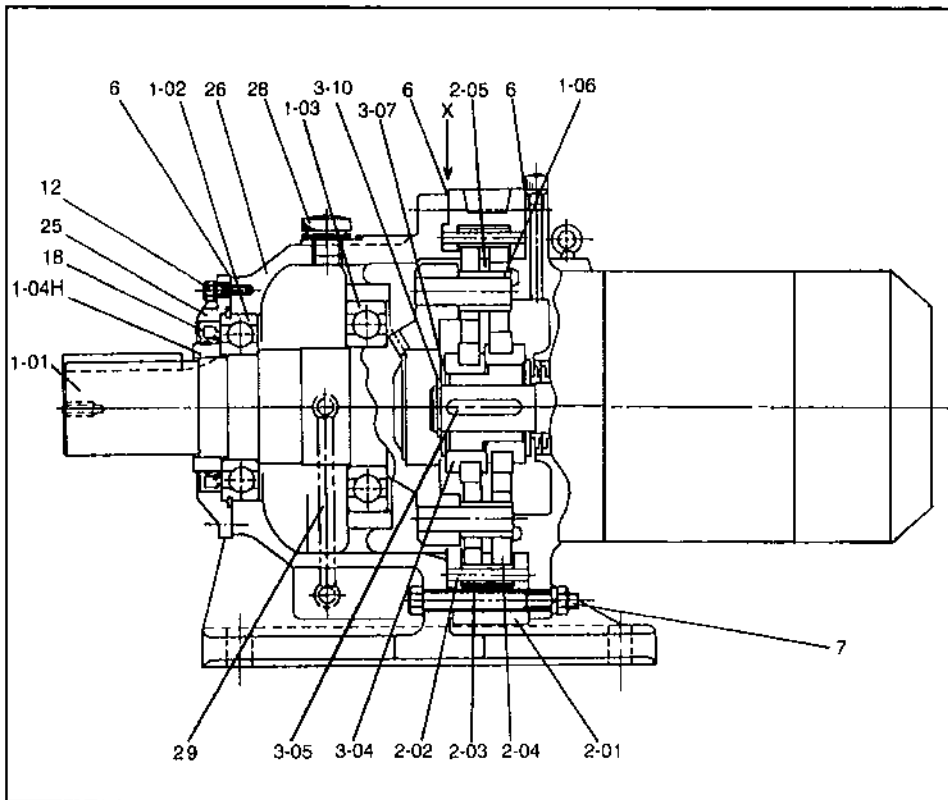


Fig. 2 Single Reduction (Vertical Base Mount)

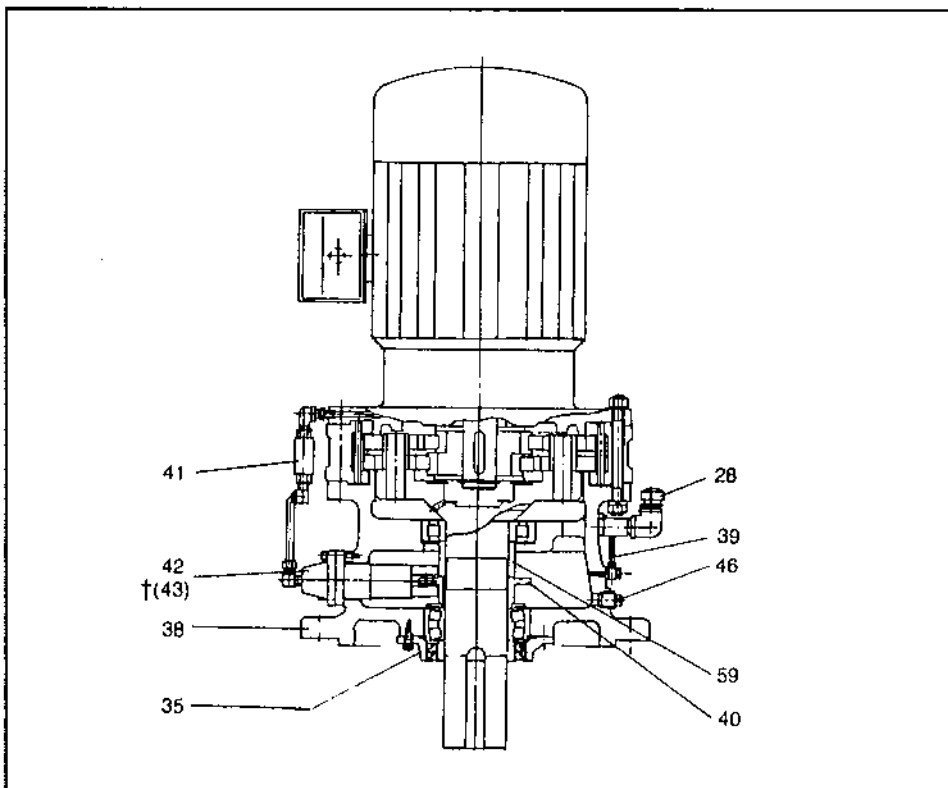


Table 1 Main Parts

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
3-04	Eccentric Bearing Assembly
3-05	Eccentric Key
**3-06	Balance Weight
3-07	Spacer
3-10	Retaining Ring
‡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
12	Bolts For SS Oil Seal Housing
‡15	Grease Nipple
18	Slow Speed Output 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
*59	Spacer

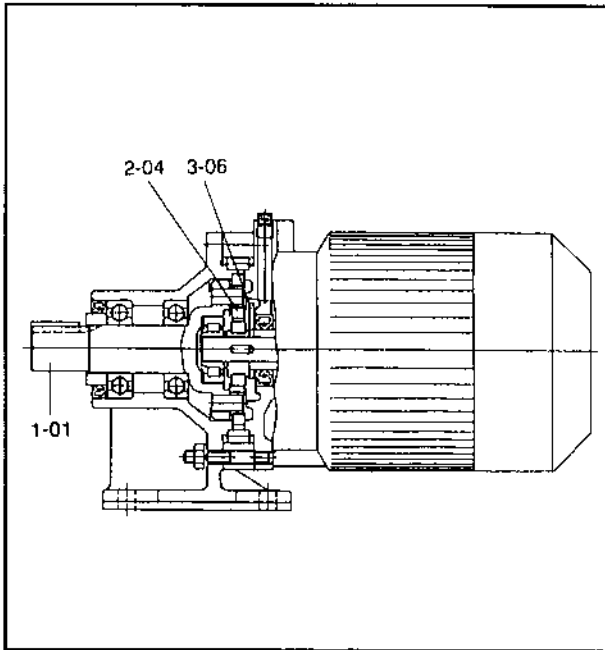
* Pt. No. 59 — frame sizes 4205-4275 only.

** See Fig. 3, Page 4.

‡ See Fig. 4, Page 4.

Note: For details of oil seals, bearings or gaskets, refer to pages 10 and 11.
 †Refer to Table 13 on Pg. 7 for units that require a positive displacement pump.

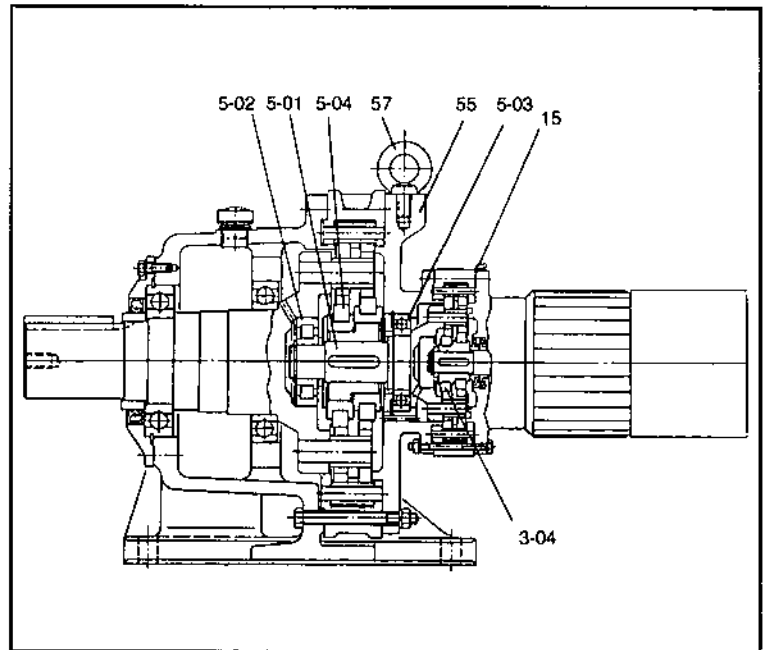
Fig. 3 Gearmotor/Single Disc Type (Frame Size 4075-4095)



Speed Reducer — Single Disc

SM-CYCLO single reduction, Models No. 4075-4095 employ the use of a single planetary gear (Cycloid Disc) and a balance weight.

Fig. 4 Gearmotor/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 2 Frame Sizes and Ratio Combination Of Double Reduction Models

Frame Size Combination

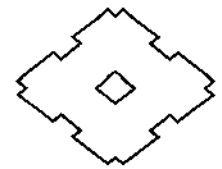
Frame Size	Second Stage	First Stage
4075DA	4075	4075
4085DA	4085	4075
4097DA	4097	4085
4105DA	4105	4085
4115DB	4115	4095
4135DC	4135	4105
4145DB	4145	4095
4165DC	4165	4115
4175DC	4175	4115
4185DB	4185	4135
4190DA	4190	4115
4195DA	4195	4115
4195DB	4195	4135

Frame Size	Second Stage	First Stage
4205DA	4205	4115
4205DB	4205	4135
4215DA	4215	4135
4215DB	4215	4165
4225DA	4225	4135
4225DB	4225	4175
4235DA	4235	4165
4235DB	4235	4185
4245DA	4245	4165
4245DB	4245	4185
4255DA	4255	4175
4255DB	4255	4195
4265DA	4265	4195
4275DA	4275	4195

Reduction Ratio Combination

Total Ratio	Second Stage Ratio	First Stage Ratio
102	17	6
121	11	11
165	15	11
174	29	6
187	17	11
210	35	6
231	21	11
258	43	6
289	17	17
319	29	11
354	59	6
385	35	11
473	43	11
493	29	17
522	87	6
595	35	17
649	59	11
731	43	17
841	29	29

Total Ratio	Second Stage Ratio	First Stage Ratio
957	87	11
1003	59	17
1015	35	29
1225	35	35
1247	43	29
1479	87	17
1505	43	35
1711	59	29
1849	43	43
2065	59	35
2523	87	29
2537	59	43
3045	87	35
3481	59	59
3741	87	43
5133	87	59
7569	87	87



Lubrication

SM-CYCLO® reducers, frame sizes 4075 through 4125 are grease-lubricated. Sizes 4130 through 4275 are normally oil-lubricated. Double reduction units may be grease or oil-lubricated, depending on size, ratio, and/or application.

Grease Lubrication

Table 3 Single Reduction Models

Frame Size	4075	4085	4090 4095 4097	4100 4105 410H	4110 4115 4125
Horizontal Shaft	Grease (MAINTENANCE FREE)				
Vertical Shaft	Grease (MAINTENANCE FREE)				

For the single reduction units, frame sizes 4075-4125 (maintenance-free type), NLGI No. 2 is designated. NLGI No. 2 is also designated for grease-lubricated multi-reduction units.

Grease-lubricated models are filled with grease before shipment to customer and are ready for use.

Table 4 Double Reduction Models

Frame Size	4075DA thru 4145DB	4185DC	4175DC	4185DB	4190DA 4195DA 4195DB	4205DA 4205DB	4215DA 4215DB	4225DA 4225DB	4235DA 4235DB	4245DA 4245DB	4255DA 4255DB	4265DA	4275DA
Horizontal													
VERTICAL	<Ratio> 102 ~493												
	522 ~841												
	957 ~1015												
	1225 ~2523	Grease Lubricated Models											
	2537 ~3045												
3045 ~7569													

Oil Lubricated Models

Table 5 Triple Reduction Models

Horizontal Shaft	Frame Size of The 1st Reduction Stage: 4105 or Smaller	Grease Lubricated (NLGI Grade 2)
Vertical Shaft	Frame Sizes: 4075TA 4265TA	Grease Lubricated (NLGI Grade 2)
	Frame Sizes: 4270TA 4275TB	Depending On The Operating Condition Consult Factory

Note: Tables above are for operation at standard input speed. If the input speed differs from the standard, please consult factory.

Table 6 Designated Greases

For additional information please refer to Engineering Sheet No. 03.301.63.001.

Ambient Temperature F° (C°)	Single Reduction (Maintenance Free)	Double Reduction
-5 ~ 122 (-15 ~ 50)	NLGI No. 2	NLGI No. 2

Table 7 Grease Replenishment And Change Interval

Model	Condition	Interval	
Single Reduction Maintenance Free Type)	Replenishment	NOT REQUIRED	
	*Overhaul	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	Every 500 ~ 1000 Hours
	Change	Speed Reduction Mechanism, High Speed Shaft Bearings (Speed Reducer Type)	Every 2 ~ 3 Years
		Slow Speed Shaft Bearings	Every 3 ~ 5 Years

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

Note 1: Frame sizes 4075-4125 are maintenance free units. Grease replenishment is not necessary. Where longer life of the drive is expected or if relubricating is preferred before recommended period of time, refer to Tables 6, 7 and 8.

Table 8 Quantities Of Grease (Ounces)

Frame Size	4075	4085	4090 4095 4097	4100 4105 410H	4110 4115 4125
Speed Reduction Mechanism	.7	.7	2.1	3.5	8.5
Slow Speed Shaft Bearings	.4	.9	2.3	3.9	4.9

Frame Size	4075DA	4085DA	4097DA 4105DA	4115DB	4135DC	4145DB	4165DC	4175DC	4185DB	4190DA 4195DA	4195DB	4205DA
Speed Reduction Mechanism (First Stage)	0.7		0.7	2.1	2.3	1.4	5.3	15.9	5.3	15.9	5.6	
Speed Reduction Mechanism (Second Stage)	0.7	0.7	3.5	8.5	15.9	15.9	26.5	35.3	38.8	52.9	52.9	
Slow Speed Shaft Bearing (Second Stage)	0.4	0.9	3.9	4.9	10.6	10.6	10.6	17.6	21.2	24.7	24.7	

Frame Size	4205DB	4215DA	4215DB	4225DA	4225DB	4235DA	4235DB	4245DA	4245DB	4255DA	4255DB	4265DA
Speed Reduction Mechanism (First Stage)	15.9	26.5	15.9	35.3	26.5	38.8	26.5	38.8	35.3	52.9		
Speed Reduction Mechanism (Second Stage)	52.9	70.5	88.2	141.0	158.7	211.6	282.2					
Slow Speed Shaft Bearing (Second Stage)	24.7	28.2	31.7	35.3	38.8	42.3	45.9					

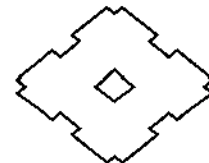
Note 1: Replenish grease to the reduction mechanism 1/3 to 1/2 of quantities for the first reduction stage described in Table 8 in accordance with replenishment interval recommended in Table 7.

Note 2: When the unit is disassembled for overhauling, refill with grease in quantities indicated in Table 8. Or alternatively, 80% of the space around reduction mechanism and slow speed shaft bearings of single reduction units and 50% around reduction mechanism of both 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 do to ordinary bearings at time of re-assembly.

Note 3: If excessive grease is added, agitation heating of the grease will raise the operating temperature of the unit. Avoid excessive greasing; however, when the grease is insufficient it will raise the operating temperature due to the breakdown of the lubrication films on the eccentric bearing. If the operating temperature rises, supply grease immediately.



Oil Lubrication

SM-CYCLO® reducers sizes 4130 through 4275 are normally oil-lubricated. Double reduction units may be grease or oil-lubricated, depending on size, ratio, and/or application.

Oil-lubricated models are shipped without oil. Units must be filled with recommended oil prior to start-up.

Table 9 Single Reduction Models

Frame Size	4130 4135	4145 4155	4160 4165 416H	4170 4175	4180 4185	4190 4195	4205	4215	4225	4235	4245	4255	4265	4275
Horizontal Shaft	Oil Bath													
Vertical Shaft	Oil Bath			Forced-oil Lubrication										

Table 10 Double Reduction Models

Frame Size	4165DC	4175DC	4185DB	4190DA 4195DA 4195DB	4205DA 4205DB	4215DA 4215DB	4225DA 4225DB	4235DA 4235DB	4245DA 4245DB	4255DA 4255DB	4265DA	4275DA
Horizontal					Oil Bath							
V E R T I C A L S H A F T	<Ratio> 102 ~493											
	522 ~841											
	957 ~1015											
	1225 ~2523	Grease Lubricated Models										
	2537 ~3045											
	3045 ~7569											

Table 11 Triple Reduction Models

Horizontal	Frame Size Of The 1st Reduction Stage: 4115 Or Larger	Oil Bath Lub. (Refer to Table 14)
Vertical	Frame Size: 4270TA 4275TB	Depending On the Operating Condition Consult Factory

Note: Tables above are for operation at standard input speed. If the input speed differs from the standard, please consult factory.

Forced Lubrication For Vertical Units

Table 12 Plunger Pump Type

Small Size Pump		Large Size Pump	
Frame Size	Ratio	Frame Size	Ratio
4160, 4170, 4180, 4190 4165, 416H, 4175, 4185, 4195	All	4205, 4215, 4225 4235, 4245, 4255, 4265	All
4165DC thru 4195DB	See Table 10	4205DA - 4265DA	See Table 10

Plunger Lubrication

The plunger pump (Part No. 42) is automatically operated by a cam (Part No. 40) fitted on the slow speed shaft (Part No. 1-01). The number of pumping cam teeth required is in direct relation to the reduction ratio and frame size. For input speeds other than standard, consult factory.

Table 13 Positive Displacement Type Pump

SM-CYCLO Reducer		Positive Displacement Pump
Frame Size	Reduction Ratio	
4275	All	TOP-216HAVB-3
4275DA	All	TOP-204HAVB-3

Positive Displacement 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 motor be interlocked with the pump motor to avoid misoperation. The pump must be started 30 seconds or longer before the main motor is operated.

Table 14 Type Of Lubrication Oil

Mild EP Oil is used for the lubrication of SM-CYCLO® Reducers, Models 4130 and larger.

For additional information please refer to Lubrication Specification Sheet No. 03.301.63.002

Ambient Temperature	14°F ~ 32°F (+10°C ~ 0°C)	32°F ~ 95°F (0°C ~ 35°C)	95°F ~ 122°F (35°C ~ 50°C)
Viscosity @ 40°C (104°F) cSt.	41.4 ~ 74.8	90 ~ 165	198 ~ 506
ISO Viscosity Grade	46 ~ 68	100 ~ 150	220 ~ 460
AGMA Viscosity Grade	2EP	3EP 4EP	5EP ~ 7EP

Table 15 Allowable Viscosity Of Oil

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

Table 16 Oil Quantities (Gallons)

Single Reduction	Frame Size	4130	4160	4170	4180	4190	4205	4215	4225	4235	4245	4255	4265	4275	
		4135	4165	4175	4185	4195									
		4145	416H												
	Horizontal	0.2	0.4	0.5	0.6	1.1	1.5	2.3	2.6	4.0	4.2	5.6	7.7	14.8	
	Vertical	0.3	0.3	0.5	0.5	0.7	1.5	2.0	2.6	3.2	4.0	11.1	13.5	(15.9)	

Double Reduction	Frame Size	4165DC	4175DC	4185DB	4190DA	4205DA	4215DA	4225DA	4235DA	4245DA	4255DA	4265DA	4275DA
					4195DA	4205DB	4215DB	4225DB	4235DB	4245DB	4255DB		
					4195DB								
	Horizontal	0.4	0.6	0.9	1.6	1.6	2.7	2.9	4.5	4.8	6.1	8.5	18.5
	Vertical	0.3	0.5	0.5	0.7	2.9	3.7	4.8	6.1	7.7	11.1	13.5	(15.9)

The above quantities shown in parentheses are for the forced-oil lubricated models with a positive displacement pump.

Table 17 Oil Change

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

Oil Fill Procedure

Fill the reducer with recommended oil through the filler plug before start-up. The oil levels must be to the upper red line on the oil level gauge while the unit is not operated, and above the lower red line during operation. If too much oil is supplied, the temperature will rise due to the churning heat of the oil, or oil will leak across the high speed shaft oil seal.

Oil Level Gauge

When it becomes difficult to check the oil level due to the discoloration of the vinyl hose, the gauge must be replaced. Use the standard vinyl oil gauge for a reducer operating in ambient temperature: -4°F to 100°F. Where the reducer is used at ambient temperatures greater than 100°F (+40°C)

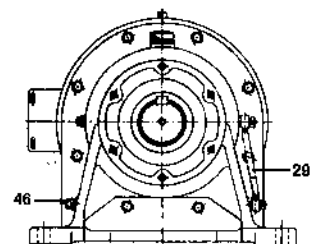
or less than -4°F (-20°C), a glass gauge set or a dipstick is recommended.

Note 1: When draining oil, remove drain plug (Part No. 46) or lower side plug of the oil level gauge. See fig. 5.

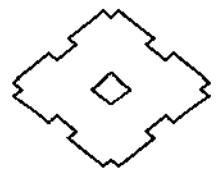
Note 2: Before filling vertical base type unit with lubrication oil, remove the vent plug. After filling, apply teflon sealing tape to threads of the vent plug prior to installation.

Note 3: The oil level gauge can be attached on either side of the casing on horizontal units. Locate on whichever side is more convenient to check oil level. (The oil level gauge is normally attached on the right when viewed from slow speed shaft end.)

Fig. 5



Oil Level Dimensions



Foot Mount Horizontal Type
Fig. 6

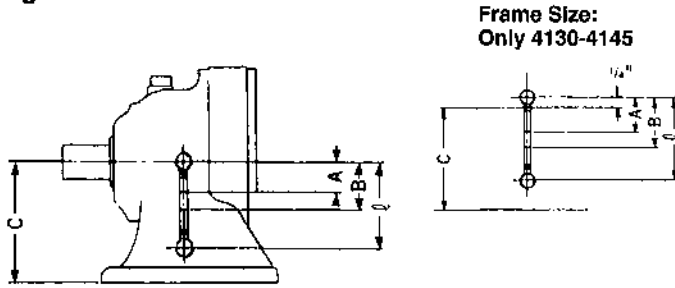
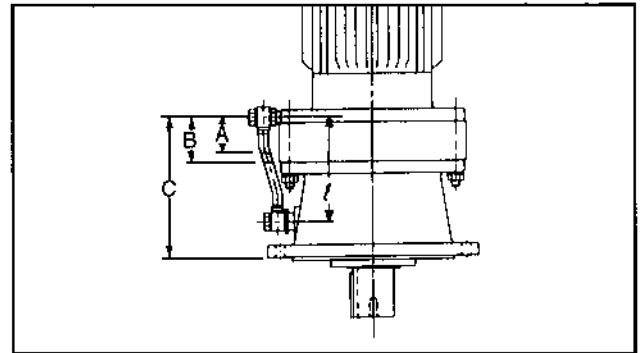


Table 18 Oil Level Dimensions (Inches)

Frame Size	A	B	C	l
4130-4135	1.38	2.17	5.91	4.65
4145, (4155)	1.38	2.17	5.91 (6.30)	4.65
4160-4165, (416H)	1.57	2.76	6.30 (7.87)	3.70
4165DC	1.18	1.77	6.30	3.70
4170-4175	1.97	3.35	7.87	4.96
4175DC	1.18	1.77	7.87	4.96
4180-4185	2.17	3.94	8.66	5.91
4185DB	1.38	2.17	8.66	5.91
4190-4195	2.26	3.25	9.84	6.61
4190DA-4195DA	1.18	1.77	9.84	6.61
4195DB	1.38	2.18	9.84	6.61
4205	2.12	3.19	9.84	6.06
4205DA	1.26	1.93	9.84	6.06
4205DB	1.26	2.13	9.84	6.06
4215	2.05	3.03	10.84	6.85
4215DA	1.18	1.97	10.43	6.85
4215DB	1.57	2.76	10.43	6.85
4225	2.25	3.43	11.03	6.85
4225DA	1.26	2.05	11.03	6.85
4225DB	1.85	3.43	11.03	6.85
4235	2.48	3.47	11.81	7.64
4235DA	1.57	2.75	11.81	7.64
4235DB	1.97	3.35	11.81	7.64
4245	2.76	3.78	13.19	8.46
4245DA	1.65	2.72	13.19	8.46
4245DB	2.00	3.35	13.19	8.46
4255	3.19	4.17	14.76	9.02
4255DA	1.97	3.35	14.76	9.02
4255DB	2.05	3.23	14.76	9.02
4265	3.23	4.21	15.75	10.16
4265DA	2.28	3.27	15.75	10.16
4275	3.35	4.53	21.26	11.22
4275DA	2.26	3.25	21.26	11.22

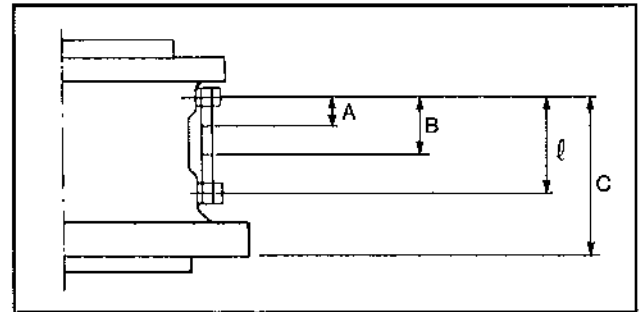
Base Mount Vertical Type
Frame Size: 4130 ~ 4155
Fig. 7



Base Mount Vertical Type
Table 19 Oil Level Dimensions (Inches)
Frame Size: 4130-4155

Frame Size	A	B	C	l
4130-4155	1.85	2.72	7.52	5.79

Base Mount Vertical Type
Frame Size: 4160 ~ 4275
Fig. 8



Base Mount Vertical Type
Table 20 Oil Level Dimensions (Inches)
Frame Size: 4160 ~ 4275

Frame Size	A	B	C	l
4160-4165, 416H	1.02	1.42	4.68	2.72
4170-4175	1.69	2.48	6.02	3.78
4180-4185	1.93	2.72	6.81	4.25
4190-4195	2.09	3.27	7.87	5.47
4205	1.46	2.05	7.09	3.54
4215	1.46	2.05	7.09	3.54
4225	1.46	2.05	7.87	3.54
4235	1.46	2.05	7.72	3.54
4245	1.46	2.05	7.96	3.54
*4255	4.33	4.92	19.76	6.57
*4265	4.65	5.24	21.69	7.17
4275	1.97	2.76	13.39	5.51

*NOTE: V4255 & V4265 Oil Gauge is on the Ring Gear Housing instead of V-Casing.

Bearings, Oil Seals, Gaskets

Fig. 9

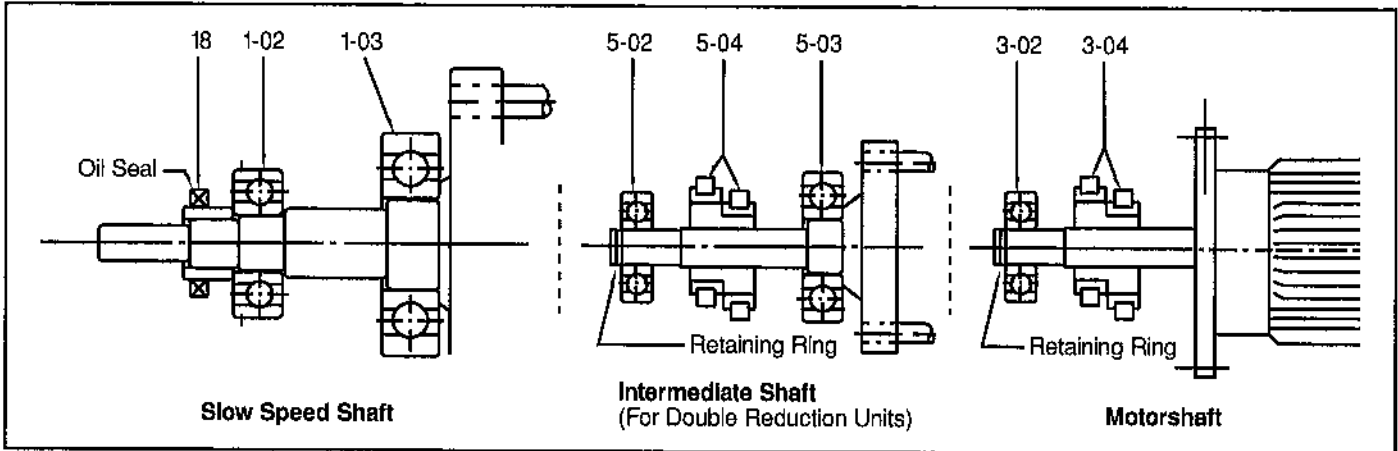


Table 21 Single Reduction Units

Frame Size	BEARING					OIL SEAL			
	SLOW SPEED SHAFT		MOTOR SHAFT			SLOW SPEED SHAFT			
	Part No. 1-02	Part No. 1-03	Part No. 3-02	Part No. 3-04		Part No. 18			
	Number	Number	Number	Number	Qty	Type	Dimension	Qty	
							H Type	V Type	
4075	6202Z	6203	6201	19UZS208	1	D	20/35x7	1	1
4085	6204Z	6909	6301	19UZS208	1	D	30/47x8	1	1
4090-4095 4097	6206Z	6011	6302RSH2	Refer to Table 21	1	D	45/62x9	1	1
4100-4105	6306Z	16011	6302			D	50/72x12	1	1
410H	6306Z	16011	6302			D	50/72x12	1	1
4110-4115 4125	6308Z	6013	6304			D	65/90x13	1	1
4130-4135	6211NR	6213	-			D	65/88x12	1	2
4145-4155	22211BNR	6213	-			D	65/88x12	1	2
4160-4165	3TM-6213NR	6215	-			D	85/110x13	1	2
416H	3TM 6213NR	6215	-			D	85/110x13	1	2
4170-4175	6216NXR	6218	-	60UZS 417T2-SX	2	D	95/130x15	1	2
4180-4185	6218NR	6220	-	65UZS 418T2-SX	2	D	110/145x15	1	2
4190-4195	6221NR	6026	-	85UZS 419T2-SX	2	D	120/155x16	1	2
4205	22220 BNRC2	6222C2	-	E-85UZ S220	2	D	120/155x16	1	2
4215	23022 BNRC2	6224CZ	-	E-95UZ S221	2	D	130/160x14	1	2
4225	23024 BNRC2	6226C2	-	E-100UZ S222	2	D	145/175x14	1	2
4235	23026 BNRC2	NUP228C2	-	E-105UZ S223	2	D	160/190x16	1	2
4245	23028 BNRC2	NUP230C2	-	E-125UZ S224	2	D	170/200x16	1	2
4255	23032 BNRC2	NUP234C2	-	140UZ S425-XX1	2	D	190/225/16	1	2
4265	23034 BNRC2	NUP236C2	-	140UZ S226	2	D	200/240x20	1	2
4275	23136 BNXR	6340	-	180UZ S93	2	D	230/270x20	1	2

*D: Double lip (dust proof and seal lip) type.

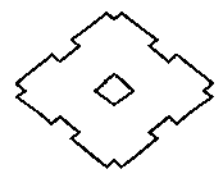


Table 22 Double Reduction Units Intermediate Shaft Parts

Frame Size	BEARINGS			
	Part No. 5-02	Part No. 5-04		Part No. 5-03
	Number	Number	Qty	Number
4075DA	6201	19UZS208T2	1	6909
4085DA	6301	19UZS208T2	1	6909
4097DA	6302RSH2	Refer to Table 21	1	6007
4105DA	6302			6007
4115DB	6304			6205
4135DC	6305			6206
4145DB	6305			6206
4165DC	6307R			6208
4175DC	6406	60UZS417T2-SX	2	6208
4185DB	6407	65UZS418T2-SX	2	6213
4190DA- 4195DA	6408	85UZS419T2-SX	2	6210
4195DB	6408	85UZS419T2-SX	2	6213

Note 1: Required quantity of bearings (Part No. 1-02, 1-03, 3-02, 3-03, 5-02, 5-03) for each unit is one.

Frame Size	BEARINGS			
	Part No. 5-02	Part No. 5-04		Part No. 5-03
	Number	Number	Qty	Number
4205DA	NJ310EV3	E-85UZS220	2	6210
4205DB	NJ310EV3	E-85UZS220	2	6310
4215DA- 4215DB	NJ311EV1	E-95UZS221	2	6311
4225DA- 4225DB	NJ312EV2	E-100UZS222	2	6313
4235DA- 4235DB	NJ313EV3	E-105UZS223	2	6314
4245DA	NJ314EV5	E-125UZS224	2	6315
4245DB	NJ314EV5	E-125UZS224	2	6316
4255DA- 4255DB	NJ316EV1	140UZS425-XX1	2	6318
4265DA	NJ317EV1	140UZS226	2	6320
4275DA	NJ417	180UZS93	2	22220RH

Note 2: On Table 15, Bearing for eccentric (Part No. 5-04) suffixed with "V" such as 60UZS87V is roller bearing without retainer.

Fig. 10

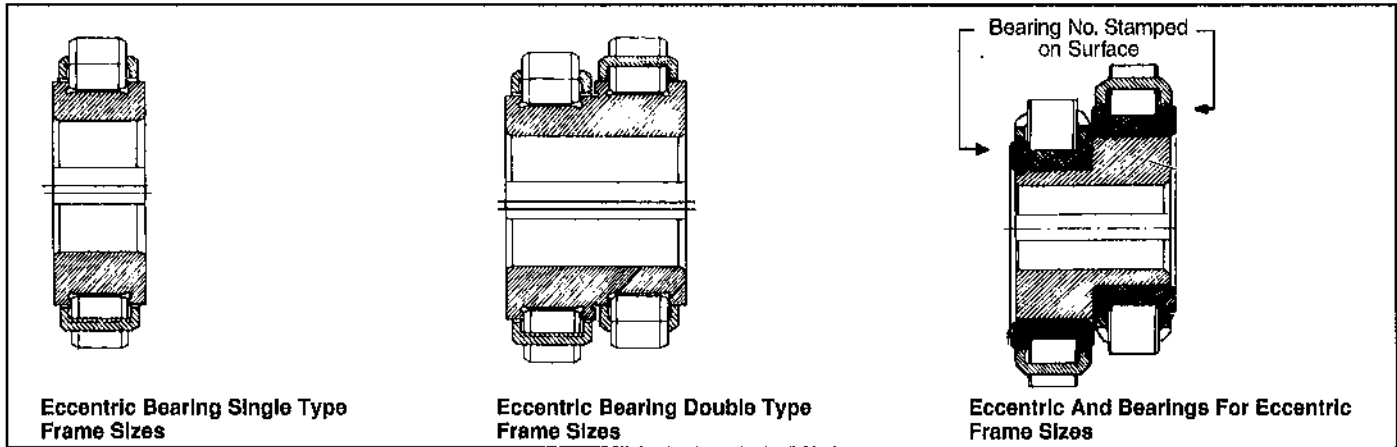
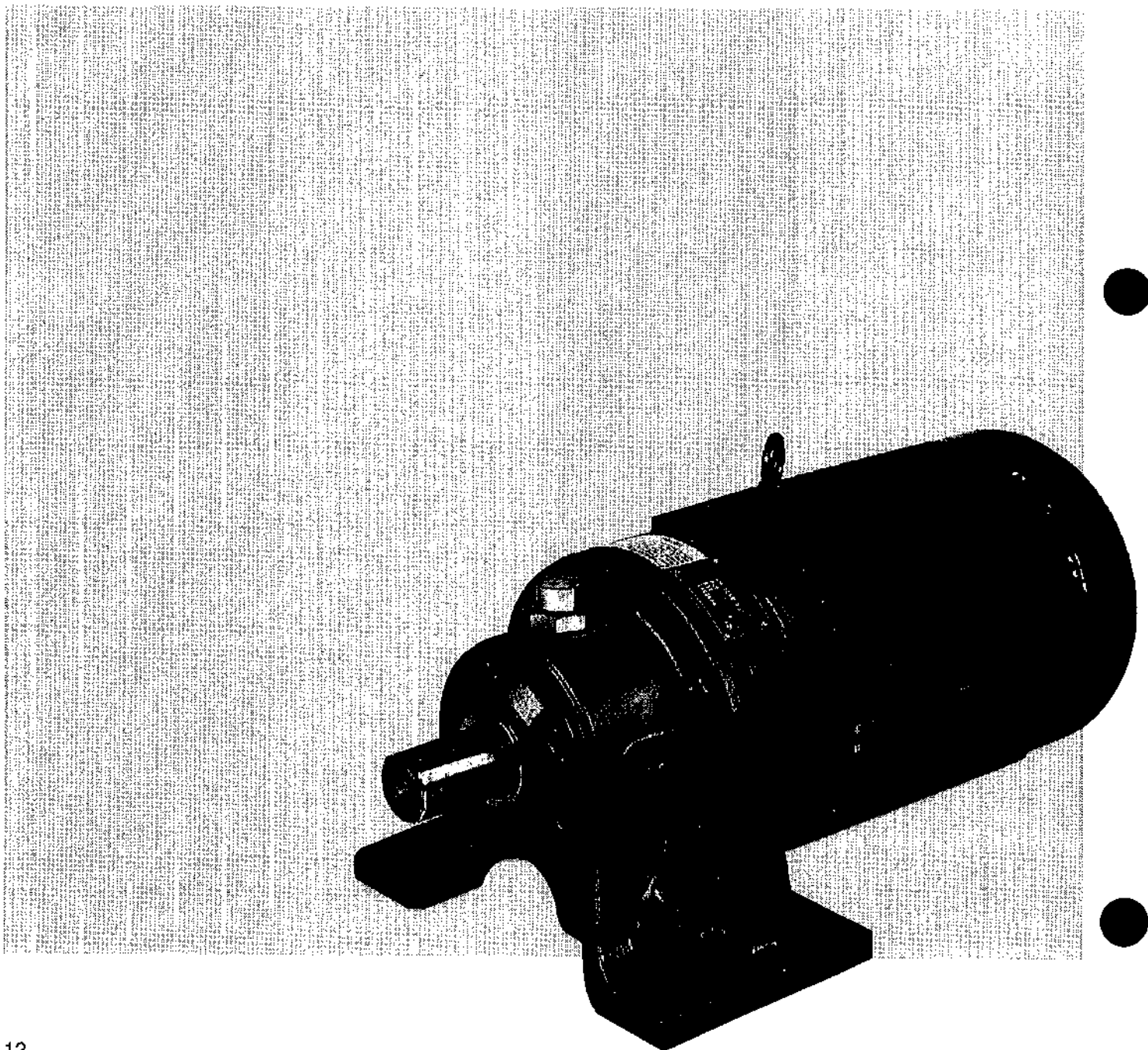


Table 23 Identification No. Of Eccentric Bearing

Frame Size	4090 4095 4097	4100 4105 410H 4105DA	4110 4115 4125 4115DB	4130 4135 4135DC	4145 4145DB	4155	4160 4165 4165DC	416H
Ratio \ Part No.	5-04							
6	15UZE20906T2	15UZ21006T2	22UZ2110608T2	25UZ21406-11T2	-	25UZ8506-11T2S	35UZ2160608T2S	35UZ2160608T2S
8	15UZE20908-15T2	15UZ21008-15T2	22UZ2110608T2	25UZ21406-11T2	-	25UZ8506-11T2S	35UZ2160608T2S	35UZ2160608T2S
11	15UZE20908-15T2	15UZ21008-15T2	22UZ2111115T2	25UZ21406-11T2	25UZ21406-11T2	25UZ8506-11T2S	35UZ21611-15T2S	35UZ21611-15T2S
13	15UZE20908-15T2	15UZ21008-15T2	22UZ2111317T2	25UZ21413-17T2	25UZ21413-17T2	25UZ8513-17T2S	35UZ21611-15T2S	35UZ21611-15T2S
15	15UZE20908-15T2	15UZ21008-15T2	22UZ2111115T2	25UZ21413-17T2	25UZ21413-17T2	25UZ8513-17T2S	35UZ21611-15T2S	35UZ21611-15T2S
17	15UZE20917T2	15UZ21017T2	22UZ2111317T2	25UZ21413-17T2	25UZ21413-17T2	25UZ8513-17T2S	35UZ21617-25T2S	35UZ21617-25T2S
21	15UZE20921T2	15UZ21021T2	22UZ21121T2	25UZ2142125/417T2	25UZ2142125/417T2	25UZ852125/417T2S	35UZ21617-25T2S	35UZ21617-25T2S
25	15UZE2092529T2	15UZ2102529T2	22UZ2112529T2	25UZ2142125/417T2	25UZ2142125/417T2	25UZ852125/417T2S	35UZ21617-25T2S	35UZ21617-25T2S
29	15UZE2092529T2	15UZ2102529T2	22UZ2112529T2	25UZ2142935T2	25UZ2142935T2	25UZ852935T2S	35UZ2162935T2S	35UZ2162935T2S
35	15UZE20935T2	15UZ21035T2	22UZ21135T2	25UZ2142935T2	25UZ2142935T2	25UZ852935T2S	35UZ2162935T2S	35UZ2162935T2S
43	15UZE20943T2	15UZ21043T2	22UZ21143T2	25UZ21443-59T2	25UZ21443-59T2	25UZ8543-59T2S	35UZ2164351T2S	35UZ2164351T2S
51	15UZE20951/ 814359T2	15UZ21051/ 824359T2	22UZ2115159T2	25UZ21443-59T2	25UZ21443-59T2	25UZ8543-59T2S	35UZ2164351T2S	35UZ2164351T2S
59	15UZE20959T2	15UZ21059T2	22UZ2115159T2	25UZ21443-59T2	25UZ21443-59T2	25UZ8543-59T2S	35UZ21659T2S	35UZ21659T2S
71	15UZE20971/ 8187T2	15UZ21071/ 8287T2	22UZ2117187T2	25UZ2147187T2	25UZ2147187T2	25UZ857187T2S	35UZ21671/ 659T2S	35UZ21671/ 659T2S
87	15UZE20987T2	15UZ21087T2	22UZ2117187T2	25UZ2147187T2	25UZ2147187T2	25UZ857187T2S	35UZ21687T2S	35UZ21687T2S
119	15UZE209119T2	15UZ210119T2	-	-	-	-	-	-

ELECTRIC MOTOR

Sumitomo Heavy Industries Electrical Division has been manufacturing its various types of motors since 1913. The motor used with the SM-Cyclo® Gearmotor has been manufactured since 1969 with over 6 million shipped throughout the world.



General Construction of Motor

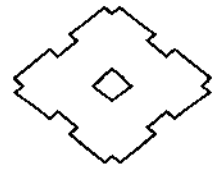


Fig. 11 Motor construction

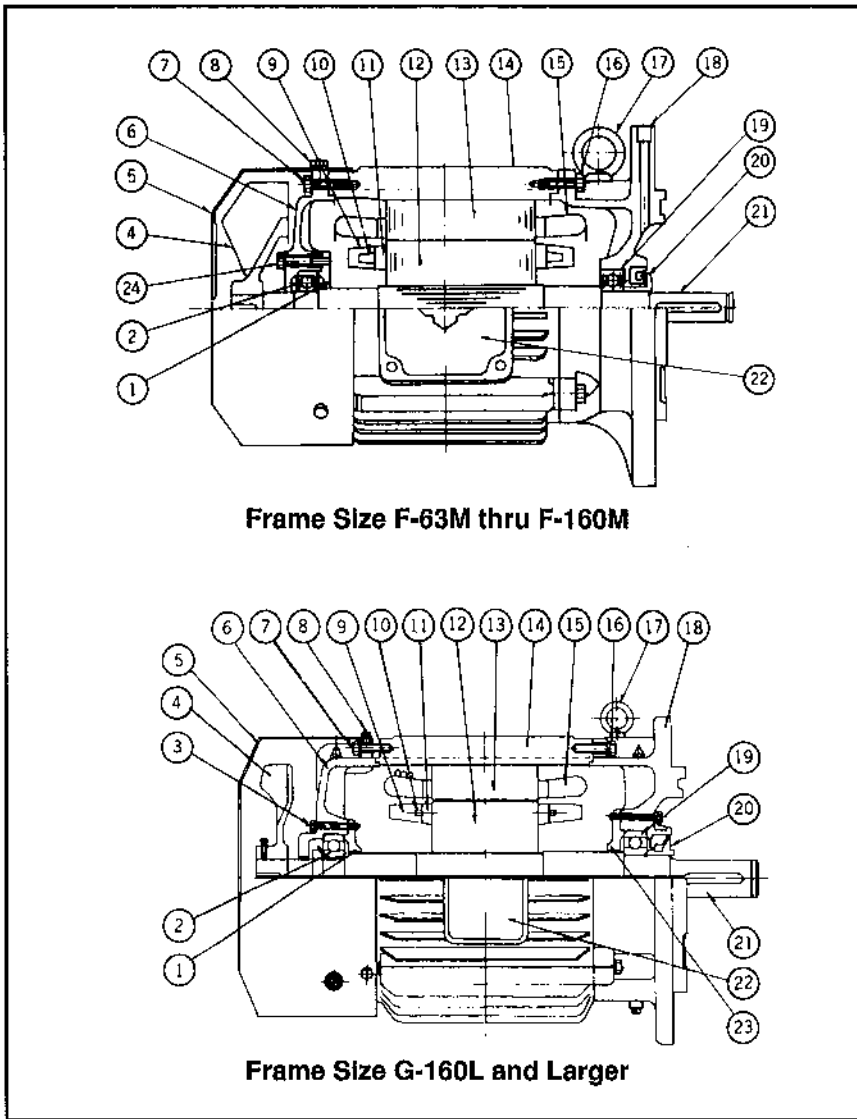


Table 24 Main Parts
Part No. Part Name

1	Bearing Cover
2	Bearing
3	Bolt
4	Fan*
5	Fan Cover
6	End Bracket
7	Bolt
8	Bolt
9	Internal Fan
10	Hub
11	Short Circuit Ring
12	Rotor Core
13	Stationary Core
14	Stator Frame
15	Stator Winding
16	Bolt
17	Eye Bolt
18	Cyclo Flange Bracket
19	Bearing
20	Slinger/Oil Seal
21	Motor Shaft
22	Conduit Box
23	Bearing Cover
24	Bearing Sleeve

*No Fan 1/8 H.P., F-63S frame.

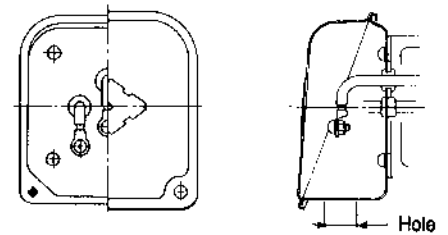


Fig. 12 Conduit Box-Standard Type

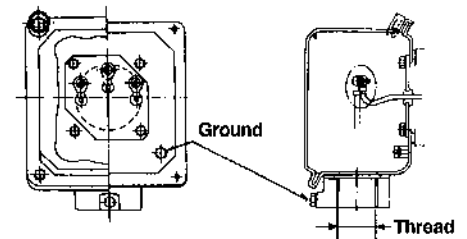


Fig. 13 Weather-Proof Type

General Inspection of Motor

The following items should be verified when the motor is received:

1. Check the nameplate horsepower rating (H.P.), number of poles (P), type, voltage (volt) and frequency (Hz).

2. Rotate the motor shaft by hand to check for binding.

3. Check the motor's overall appearance for possible shipping damage.

Pre-Start Up Inspection

Check the following prior to start-up:

1. Wiring: Prior to wiring, refer to the name plate affixed to the motor portion of the gearmotor. Check power supply, interconnects, relays protective starting devices, [i.e., Star (Wye) delta — if reduced voltage starting is required], space heaters, thermal sensors and other accessories.

2. Grounding: Caution: The motor frame and conduit box must be properly grounded so as to avoid electrical shock.

3. Insulation Resistance: Stator winding measurements are to be made at the motor terminals. Stator windings of less than 600 volts are to be measured with a 500 volts megger.

Insulation resistance will vary depending on winding temperature, moisture, cleanliness, duration of usage, and test voltage and charging period.

Other factors that will affect insulation resistance are: output rating, voltage, insulation class and RPM.

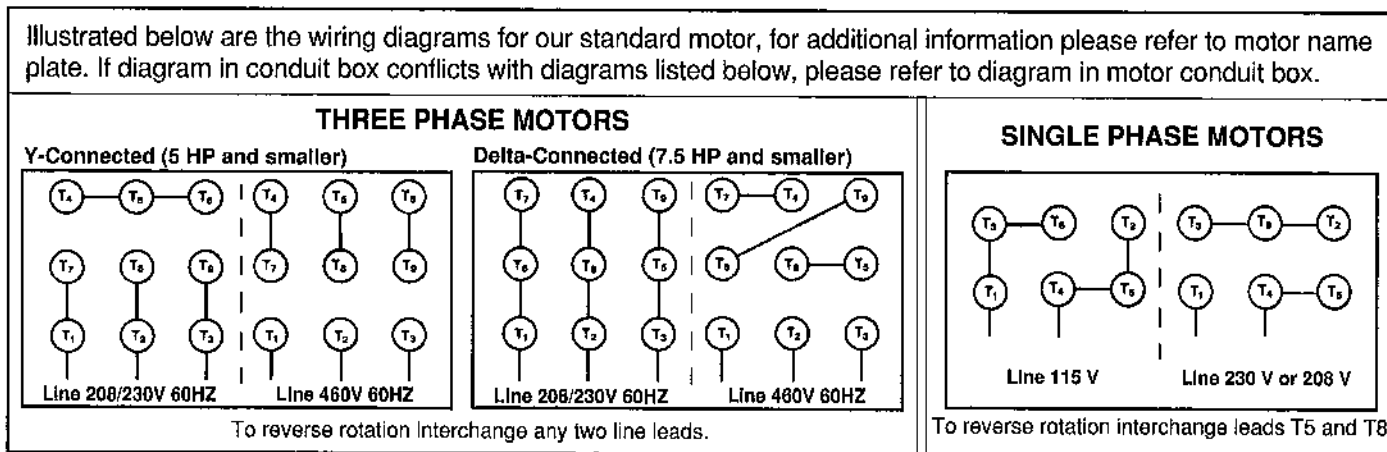
Although it is difficult to determine a minimum value applicable to each and every case, for simplicity the following may be used as a guide:

1 Mega ohm for less than 600 volts

If the measured insulation resistance is less than indicated above, the cause may be due to moisture. The resistance can therefore be increased by subjecting wire to heat, hot air, vacuum, current (short circuit current, low voltage — no load current, or direct current).

If the Mega ohm reading cannot be recovered by drying — consult factory.

Fig. 14 Typical Wiring Diagrams



Preparation and Start-up

Prior to start-up, please check the following under no load:

1. The driven load and the SM-Cyclo gearmotor are properly secured prior to operation.

2. The motor bearings are grease packed when shipped from our factory, however, if the motor is operated after long term storage, you must replenish the grease in the open type bearing only. Please refer to page 15, Table 26 for correct quantity.

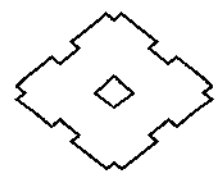
3. Check the direction of rotation. If a reverse direction is

required, simply reverse any two power leads.

4. Check the voltage supply and current (line and phase) to verify balancing for a 3 phase power source.

5. When power is supplied to the motor and the starting is abnormally long, starting is not completed, or any abnormal sound is heard — immediately shut off the power and consult factory.

6. Measure the current draw. The current measured at full load should not exceed the nameplate rating.



Bearings, Oil Seals for Motor

Non-Contact Shield Type Ball Bearings

These bearings do not require grease replenishment, however, it is recommended that they be replaced once every three years when operated under normal conditions, and once a year under severe duty conditions.

Open Type Ball or Roller Bearing

For interval of grease replenishment, quantities of grease and the type of grease for the open type bearing refer to tables 25 and 26.

Table 25 Type of Grease for Open Type Bearings

Class of Insulation	Grease
B	Shell Alvania No. 2
H, F	Shell Darina No. 2

Table 26 Interval and Quantity of Grease Replenishment

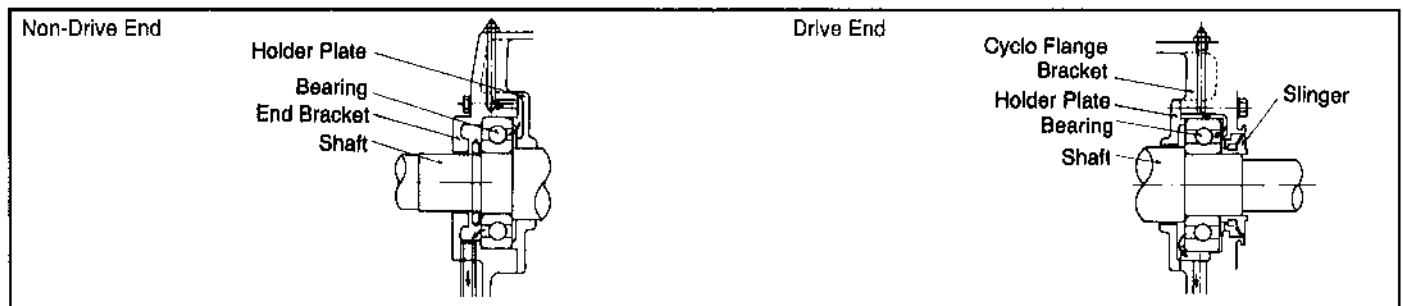
Bearing Size	Replenishment Qty (oz)	Initial Qty (oz)	Interval of Replenishment (HR)		
			900 rpm	1200 rpm	1800 rpm
6314	1.4	7.1	7000	5000	2500
6315	1.6	8.1	6500	4500	2500
6316	1.8	9.2	6500	4500	2500
6317	1.9	10	6000	4000	2000
6318	2.1	12	5500	4000	2000
6319	2.3	14	5500	3500	1500
6320	2.5	16	5000	3500	1500
6321	2.6	18	5000	3000	1500
6322	2.8	19	4500	3000	1000
6324	3.5	25	4000	2500	1000
6412	1.4	7.1	7000	5000	3000
6413	1.6	8.1	6500	4500	2500
6414	1.9	10	6500	4500	2500
NU314	1.4	4.2	3500	2500	—
NU315	1.6	5.3	3000	2000	—
NU316	1.8	7.1	3000	2000	—
NU317	1.9	8.8	3000	2000	—
NU318	2.1	10	2500	2000	—
NU319	2.3	12	2500	1500	—
NU320	2.5	14	2500	1500	—
NU321	2.6	16	2500	1500	—
NU322	2.8	18	2000	1500	—
NU324	3.5	23	2000	1000	—

Grease Replenishment Procedure

The gearmotor must be running with the drain plug removed. Using a grease gun, inject a quantity of grease until some grease is purged from the drain. Plug the drain approximately 10 minutes after start of operation.

Note: Excess grease replenishment may cause overheating or leakage. A lack of grease will cause premature failure.

Fig. 15 Typical Bearing Assembly



Oil Seal

The reducer and the motor of the SM-CYCLO® Gear motor are integrally assembled. In grease lubricated units, a single lip seal is installed between the motor section and reducer section as shown in figure 16. On oil lubricated units a slinger type oil seal is used — figure 17.

Fig. 16 Single Lip Type: Grease Lubed Units

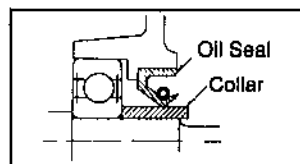
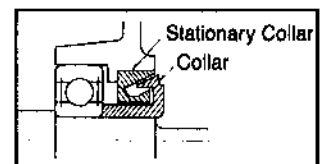


Fig. 17 Slinger Type: Oil Lubed Units



Note: For oil seal replacement sizes see table 27.

Bearings and Oil Seals

Table 27 Bearings and Oil Seals Sizes†

MOTOR FRAME NO.	MOTOR		CYCLO FRAME SIZE	BEARING		OIL SLINGER PART NO.	OIL SEAL SIZE**
	HP	RPM		NON-DRIVE END	DRIVE END		
F-63S	1/8	1800	4075	6202ZZ-CM	6302ZZ-CM	—	S20358
			4085	6202ZZ-CM	6302ZZ-CM	—	S20358
			4090/95/97	6202ZZ-CM	6303ZZ-CM	—	S22357
F-63M	1/4	1800	4075	6202ZZ-CM	6302ZZ-CM	—	S20358
			4085	6202ZZ-CM	6302ZZ-CM	—	S20358
	1/8		4090/95/97	6202ZZ-CM	6303ZZ-CM	—	S22357
	4100/05		6202ZZ-CM	6303ZZ-CM	—	S22357	
F-71M	1/2	1800	4085	6202ZZ-CM	6302ZZ-CM	—	S20358
			4090/95/97	6202ZZ-CM	6303ZZ-CM	—	S22357
			4100/05	6202ZZ-CM	6303ZZ-CM	—	S22357
			4110/15	6202ZZ-CM	6205ZZ-CM	—	S30458
F-80S F-80M	3/4	1800	4090/95/97	6203ZZ-CM	6303ZZ-CM	—	S22357
			4100/05	6203ZZ-CM	6303ZZ-CM	—	S22357
	1		4110/15	6203ZZ-CM	6205ZZ-CM	—	S30458
	4130/35		6203ZZ-CM	6206ZZ-CM	CD4-4501-G01	(S406212)	
F-90S F-90L	1 1/2	1800	4095/97	6204ZZ-CM	6303ZZ-CM	—	S25458
			4100/05/0H	6204ZZ-CM	6204ZZ-CM	—	S26428
	4110/15/25		6204ZZ-CM	6205ZZ-CM	—	S30458	
	2		4130/35 4145/55	6204ZZ-CM	6206ZZ-CM	CD4-4501-G01	(S406212)
	4160/65		6204ZZ-CM	6307ZZ-CM	CD4-4502-G01	(S456812)	
F-100L	3	1800	410H	6205ZZ-CM	6204ZZ-CM	—	S26428
			4110/15/25	6205ZZ-CM	6205ZZ-CM	—	S30458
			4130/35 4145/55	6205ZZ-CM	6206ZZ-CM	CD4-4501-G01	(S406212)
			4160/65/6H	6205ZZ-CM	6307ZZ-CM	CD4-4502-G01	(S456812)
F-112M	5	1800	4110/15/25	6206ZZ-CM	6305ZZ-CM	—	—
			4130/35 4145/55	6206ZZ-CM	6206ZZ-CM	CD4-4501-G01	(S406212)
			4160/65/6H	6206ZZ-CM	6307ZZ-CM	CD4-4502-G01	(S456812)
			4170/75	6206ZZ-CM	6308ZZ-CM	CD4-4503-G01	(S508014)
			4180/85	6206ZZ-CM	6309ZZ-CM	CD4-4504-G01	(S558514)
F-132S	7 1/2	1800	4125	6206ZZ-CM	6206ZZ-CM	—	(S30458)
			4130/35 4145/55	6206ZZ-CM	6206ZZ-CM	CD4-4501-G01	(S406212)
			4160/65/6H	6206ZZ-CM	6307ZZ-CM	CD4-4502-G01	(S456812)
			4170/75	6206ZZ-CM	6308ZZ-CM	CD4-4503-G01	(S508014)
			4180/85	6206ZZ-CM	6309ZZ-CM	CD4-4504-G01	(S558514)
			4190/95	6206ZZ-CM	6311ZZ-CM	CD4-4269-G01	(S609014)
F-132M	10	1800	4130/35 4145/55	6307ZZ-CM	6306ZZ-CM	CD4-4501-G01	(S406212)
			4160/65/6H	6307ZZ-CM	6307ZZ-CM	CD4-4502-G01	(S456812)
			4170/75	6307ZZ-CM	6309ZZ-CM	CD4-4504-G01	(S558514)
			4180/85	6307ZZ-CM	6310ZZ-CM	CD4-4269-G01	(S609014)
			4190/95	6307ZZ-CM	6311ZZ-CM	CD4-2814-G01	(S659514)

†For 6 pole motors not shown, please consult factory.



MOTOR FRAME NO.	MOTOR		CYCLO FRAME SIZE	BEARING		OIL SLINGER PART NO.	OIL SEAL SIZE**
	HP	RPM		NON-DRIVE END	DRIVE END		
F-160M	15	1800	4155	6307ZZ-CM	6306ZZ-CM	CD4-4501-G01	(S406212)
			4160/65/6H	6307ZZ-CM	6307ZZ-CM	CD4-4502-G01	(S456812)
			4170/75	6307ZZ-CM	6309ZZ-CM	CD4-4504-G01	(S558514)
			4180/85	6307ZZ-CM	6310ZZ-CM	CD4-4269-G01	(S609014)
			4190/95	6307ZZ-CM	6311ZZ-CM	CD4-2814-G01	(S659514)
			4205	6307ZZ-CM	6311ZZ-CM	CD4-4269-G01	(S609014)
			4215	6307ZZ-CM	6312ZZ-CM	CD4-2814-G01	(S659514)
G-160L	20	1800	4155	6309ZZ-CM	6306ZZ-CM	CD4-4501-G01	(S406212)
			4160/65/6H	6309ZZ-CM	6308ZZ-CM	CD4-4502-G01	(S456812)
	15	1200	4170/75	6309ZZ-CM	6309ZZ-CM	CD4-4504-G01	(S558514)
			4180/85	6309ZZ-CM	6311ZZ-CM	CD4-2814-G01	(S659514)
			4190/95	6309ZZ-CM	6311ZZ-CM	CD4-2814-G01	(S659514)
			4205	6309ZZ-CM	6312ZZ-CM	CD4-4269-G01	(S609014)
			4215	6309ZZ-CM	6313ZZ-CM	CD4-2814-G01	(S659514)
F-180MG	25	1800	4165/6H	6312ZZ-CM	6308ZZ-CM	CD4-4502-G01	(S456812)
			4175	6312ZZ-CM	6309ZZ-CM	CD4-4504-G01	(S558514)
			4180/85	6312ZZ-CM	6311ZZ-CM	CD4-2814-G01	(S659514)
	30	1200	4190/95	6312ZZ-CM	6313ZZ-CM	CD4-2816-G01	(S8011515)
			4205	6312ZZ-CM	6312ZZ-CM	CD4-4269-G01	(S609014)
			4215	6312ZZ-CM	6313ZZ-CM	CD4-2814-G01	(S659514)
			4225	6312ZZ-CM	6314ZZ-CM	CD4-2815-G01	(S7510013)
20	1200	4235	6312ZZ-CM	NU314G1	DT218WW-G01	(S8011515)	
		4190/95	6312ZZ-CM	6313ZZ-CM	CD4-2816-G01	(S8011515)	
F-180L	40	1800	4205	6312ZZ-CM	6312ZZ-CM	CD4-4269-G01	(S609014)
			4215	6312ZZ-CM	6313ZZ-CM	CD4-2814-G01	(S659514)
			4225	6312ZZ-CM	6314ZZ-CM	CD4-2815-G01	(S7510013)
			4235	6312ZZ-CM	NU314G1	DT218WW-G01	(S8011515)
	25	1200	4245	6312ZZ-CM	NU315G1	CD4-3160-G01	(S10513013)
			4245	6312ZZ-CM	NU315G1	CD4-3160-G01	(S10513013)
F-200L	50	1800	4205	6312ZZ-CM	6312ZZ-CM	CD4-4269-G01	(S609014)
			4215	6312ZZ-CM	6313ZZ-CM	CD4-2814-G01	(S659514)
			4225	6312ZZ-CM	6314ZZ-CM	CD4-2815-G01	(S7510013)
	60	1800	4235	6312ZZ-CM	NU314G1	DT218WW-G01	(S8011515)
			4245	6312ZZ-CM	NU315G1	CD4-3160-G01	(S10513013)
			4255	21312	NU317G1	CD4-2817-G01	(S11014014)
			4265	21312	NU318G1	CD4-3161-G01	(S12015014)
F-225S	75	1800	4215	6314ZZ-CM	6313ZZ-CM	CD4-2814-G01	(S659514)
			4225	6314ZZ-CM	6314ZZ-CM	CD4-2815-G01	(S7510013)
			4235	6314ZZ-CM	NU314G1	DT218WW-G01	(S8011515)
	60	1200	4245	6314ZZ-CM	NU315G1	CD4-3160-G01	(S10513013)
			4255	6314ZZ-CM	NU317G1	CD4-2817-G01	(S11014014)
			4265	6314ZZ-CM	NU318G1	CD4-3161-G01	(S12015014)
F-250S	75	1200	4235	6314ZZ-CM	NU314G1	DT218WW-G01	(S8011515)
			4245	6314ZZ-CM	NU315G1	CD4-3160-G01	(S10513013)
			4255	6314ZZ-CM	NU317G1	CD4-2817-G01	(S11014014)

Oil slinger is used on oil lubricated cyclo gearmotors.

**Oil seal is used on grease lubricated cyclo gearmotors. Where oil lubrication is standard, oil seal is shown in ().

Disassembly/Assembly of Gearmotor

Disassembly:

SM-CYCLO® Gearmotors are designed to provide maximum ease in disassembly and reassembly; they require no special maintenance skills.

The following procedures and precautions are recommended at time of disassembly and assembly:

- Perform work in a dust-free, humidity-free area.
- Use a soft or plastic hammer when required.
- Take care not to damage parts, i.e., coil, bearings, seals, etc.
- Inspect all components and replace as necessary.
- Be extremely careful when handling bearings.

1. Remove the complete SM-CYCLO® Gearmotor from the driven machine.

2. Place the gearmotor vertically with the output shaft upward.

3. Remove the through bolts from the motor flange, ring gear housing, and lift the slow speed side, thus separating the unit into two parts so that the inner mechanism can be removed (Fig. 18-23).

4. If the unit will not separate easily, gently drive a wedge at the line X shown in Fig. 1 on page 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. 18).

6. Take out the slow speed shaft rollers, item 1-06, page 3 (Fig. 19). 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. 20).

8. Remove the spacer ring (2-05).

9. The eccentric bearing assembly (3-04) can be removed from the motor shaft after taking out the retaining ring (3-10), or the bearings (3-02), figures 21, 22.

Note: In certain sizes, the eccentric bearings are roller bearings without a retainer. Remove rollers of the top disc and the second disc on the motor side before removing the eccentric.

10. Take out the second disc located on the motor side.

11. Remove the ring gear housing (2-01) from the motor.

12. The slow speed shaft (1-01) with its bearings is removed from the casing (26) as follows: (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 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.

***Note 1:** Retaining ring is part of bearing A. (See Part 1-02)

2: If motor is in need of repair, please send to any authorized EASA shop.

Assembly

SM-CYCLO® Gearmotors 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® Gearmotors.

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® Gearmotors).

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 figure 23.

4. Insert the eccentric bearing by rapping with a wooden or hard rubber mallet (Fig. 22).

5. Insert the spacer and the inner bearing raceway. Secure them with the retaining ring (Fig. 21).

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. 20).**

8. Insert slow speed shaft rollers (Fig. 19).

9. Put the slow speed shaft pins into the rollers (Fig. 18). 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.

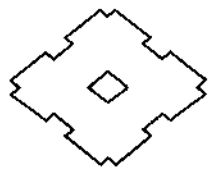


Fig. 18

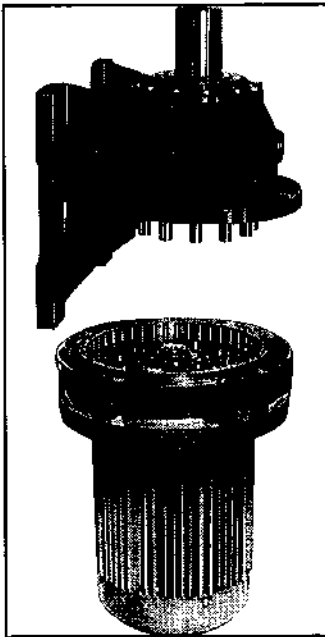


Fig. 19

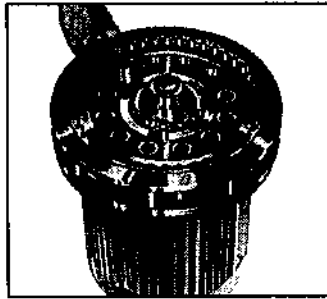


Fig. 22

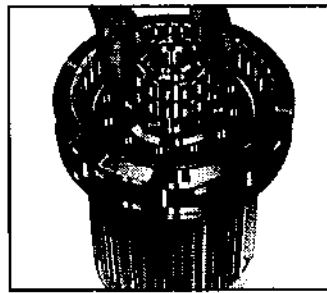


Fig. 20



Fig. 21

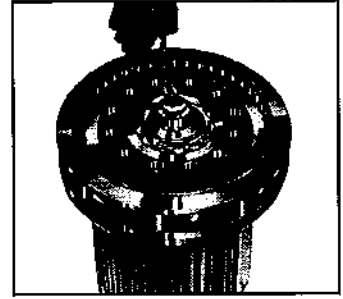
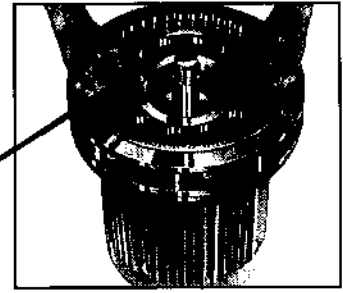


Fig. 23



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 of 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 page 11).

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 4075-4097 SM-CYCLO® Reducers

Small sizes 4075-4095 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 24.
- 2. The balance weight keyway must be in line with the eccentric keyway.
- 3. There are no end plates on either side of the eccentric. In all other respects, they have exactly the same construction as the larger sizes. Follow the instructions given under "Disassembly and Assembly".

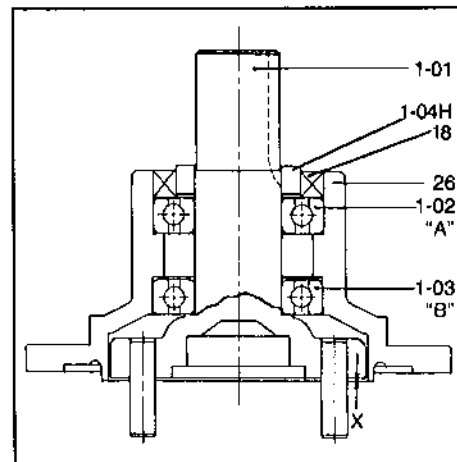
Disassembly Of Output Side (4085-4125)

- 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 10 & 11).

Assembly Of Output Side (4085-4125)

- 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).
- 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).

Fig. 24



X" Dimension (Inches)

Frame Size	Dimension
4075	0.046 ± 0.007
4085	0.042 ± 0.007
4090/95/97	0.046 ± 0.007
4100/05/0H	0.046 ± 0.007
4110/15/25	0.042 ± 0.007

SM-CYCLO® Reducer Trouble-Shooting and Repair

This trouble shooting guide is to help you identify and overcome common problems of reducers and motors. 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.
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	Overloading unit may result in damage to disc	Disassemble and replace disc. Re-check 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	Motor 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.
	Motor Doesn't Turn	Motor	Refer to page 21.
Oil Leakage	Worn Seals	Caused by dirt or grit entering seal	Replace seals. Breather filter may be clogged. Replace or clean filter.
	Leakage Into Motor	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.

SM-CYCLO[®] Motor Trouble-Shooting and Repair

PROBLEM WITH THE MOTOR		POSSIBLE CAUSES	SUGGESTED REMEDY	
Load is disconnected but motor doesn't rotate	Makes a groaning sound	Faulty switch contact	Adjust the contact.	
		Blown fuse	Replace.	
		One phase wire of the power supply open	Replace.	
		Stator coil open	Repair by rewinding or replacing stator assembly.	
		Stator and rotor touching due to bearing housing wear	Replace the bearing and bracket.	
	Starts in either direction when turned by hand	Three-phase is operating as single-phase	Check the power source with a voltmeter.	
	Doesn't make any noise	Stator coil open	Repair by rewinding or replacing stator assembly.	
Outside the motor Power failure Open connection wire Faulty switch contact Faulty starter contact		Contact the power company. Check the source wiring. Adjust the contact.		
Rotates with the load disconnected, but:	Rotates in the wrong direction	Connection error	Change any two of the three phase source.	
	Fuse blows	Shorted lead wire	Replace.	
	Speed doesn't increase	Faulty starter contact	Adjust.	
	Groans	Overcurrent/ Overheating	Rotor and stator touching.	Repair by rewinding or replacing stator assembly.
		Over-current	One phase of stator coil shorted.	Replace the stator winding.
	Makes a high-pitched metallic noise	Faulty bearing	Replace the bearing.	
Rotates when the load is disconnected but when the load is connected it:	Switch overheated	Insufficient switch capacity	Replace with one having the rated capacity.	
		Overload	Drop to the rated load.	
	Fuse blows	Insufficient fuse capacity	Replace with one having the rated capacity.	
	Overheats	Overload	Drop to the rated load.	
		Voltage drop	Consult with the power company.	
	Speed suddenly drops	Voltage drop	Consult with the power company.	
		Overload	Drop to the rated load.	
	Stops	Bearing damaged by overheat	Replace the bearing.	

Maintenance and Inspection

To insure long life and trouble-free operation, periodic inspection and maintenance of your gearmotor is recommended.

Daily Inspection:

1. Check for loose nuts and bolts.
2. Check for cooling fan air obstruction.
3. Listen for abnormal sounds.
4. Check for abnormal temperature and vibration by carefully placing hand on unit (caution: be extremely careful when making direct contact with the unit to avoid burns from abnormal temperatures).
5. 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.

6. A temperature rise of approximately 105°F 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 stable condition, add the recommended oil or grease (Tables 6 & 12). A rapid temperature rise may be caused from a lack of lubrication. If after lubricating unit, the problem persists, stop operation and consult factory.
7. When an abnormal sound is heard from inside the unit, stop operation and inspect the unit.
8. If the lubrication oil leaks, replace the damaged or worn part with a new one. (Refer to Part No. 1-04H, Page 3.)

Periodic Inspection:



1. Replenish grease in the motor bearings; for quantities, refer to Table 26, Page 15.
2. Check installation resistance in accordance with instructions as shown on Page 14, Note 3.

Ordering Correct Replacement Units Or Parts

The SM-CYCLO® Gearmotor 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® Gearmotor

SM-CYCLO®		MEMBER OF	
CHESAPEAKE, VIRGINIA			
MODEL	<input type="text"/>		
MOTOR H.P.	<input type="text"/>	CLASS	<input type="text"/>
OUTPUT R.P.M.	<input type="text"/>	RATIO	<input type="text"/>
SERIAL NO.	<input type="text"/>	DATE	<input type="text"/>
 SUMITOMO MACHINERY CORP. OF AMERICA			

Storage and Operation After Storage

Storage 6 Months—1 Year

Oil-Lubricated

1. Fill unit(s) with 20% of the recommended quantity as shown in Table 16, Page 8 with a rust preventive oil (NP20 or equivalent) or a circulating oil (Shell VSI No. 100 or equivalent).
2. At approximately 3 months interval, change oil as described in No. 1.

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 of 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 14.
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 8.

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

CYCLO INTERCHANGE TABLE (3000-4000 SERIES)

CYCLO FRAME SIZE	SINGLE REDUCTION		DOUBLE REDUCTION		TRIPLE REDUCTION	
	Previous	New	Previous	New	Previous	New
	3075	4075	3075/07	4075DA	3075/07/07	4075TA
3085	4085	3085/07	4085DA	3085/07/07	4085TA	
3090	4090	3097/08	4097DA	3097/07/07	4095TA	
3095	4095	3105/08	4105DA	3105/08/07	4105TA	
3097	4097	3115/09	4115DB	3115/08/07	4115TA	
3100	4100	3145/10	4135DC	3115/09/08	4115TB	
3105	4105	3155/09	4145DB	3145/08/07	4135TA	
310H	410H	3165/11	4165DC	3145/09/08	4135TB	
3110	4110	3175/11	4175DC	3145/10/08	4135TC	
3115	4115	3185/14	4185DB	3155/10/08	4145TC	
311H	*4125	3190/11	4190DA	3165/10/08	4165TB	
3140	*4130	3195/11	4195DA	3175/10/08	4175TB	
3145	*4135	3195/14	4195DB	3185/10/08	4185TA	
3155	*4145	3205/11	4205DA	3185/14/09	4185TC	
315H	*4155	3205/14	4205DB	3190/11/08	4190TA	
3160	4160	3215/14	4215DA	3190/14/09	4190TD	
3165	4165	3215/16	4215DB	3195/11/08	4195TA	
316H	416H	3225/14	4225DA	3195/14/09	4195TD	
3170	4170	3225/17	4225DB	3205/14/09	4205TD	
3175	4175	3235/16	4235DA	3215/14/09	4215TB	
3180	4180	3235/18	4235DB	3225/14/09	4225TB	
3185	4185	3245/16	4245DA	3225/14/10	4225TC	
3190	4190	3245/18	4245DB	3235/16/09	4235TA	
3195	4195	3255/17	4255DA	3235/16/10	4235TB	
3205	4205	3255/19	4255DB	3245/16/09	4245TA	
3215	4215	3265/19	4265DA	3245/16/10	4245TB	
3225	4225	3275/19	4275DA	3255/17/09	4255TA	
3235	4235			3255/19/11	4255TD	
3245	4245			3265/19/11	4265TA	
3255	4255			3275/19/11	4270TA	
3265	4265			3275/19/14	4275TB	
3275	4275					

*Revised Models (Nomenclature)

Headquarters and Manufacturing

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 Toll Free: 1-800-SM-CYCLO (762-9256)
 Web: <http://www.smcyκλο.com>
 E-mail: smcamktg@series2000.com



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 175 West Lake Drive, Glendale Heights, IL 60139
 (630) 752-0200 • FAX: (630) 752-0208

West
 2375 Railroad Street, Corona, CA 91720
 (909) 340-4100 • FAX: (909) 340-4108

Southwest
 1420 Halsey Way #130, Carrollton, TX 75007
 (972) 323-9600 • FAX: (972) 323-9308

Canadian Stocking and Assembly Facilities

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 SM-CYCLO OF CANADA, LTD.
 870A Equestrian Court, Oakville, Ontario, Canada L6L 6L7
 (905) 469-1050 • FAX: (905) 469-1055

British Columbia (West)
 SM-CYCLO OF CANADA, LTD.
 740 Chester Road, Annacis Island, Delta
 B.C., Canada V3M 6J1
 (604) 525-5403 • FAX: (604) 525-0879

Mexican Sales and Engineering Facility

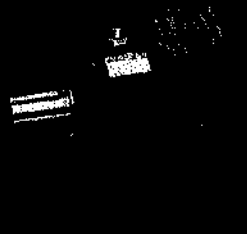
Monterrey
 SM-CYCLO DE MEXICO, S.A. DE C.V.
 Calle "C" No. 506A
 Parque Industrial Almacentro
 Apodaca, N.L., Mexico 66600
 011-52-8-369-3697/8
 FAX: 011-52-8-369-3699



Canadian Standards Association



SPEED REDUCER



SM-CYCLO
Concentric

GEARMOTOR



SM-CYCLO
Concentric

SHAFT MOUNTED
GEARMOTOR



SM-HELICAL BUDDYBOX
Parallel Offset

BEVEL GEARMOTOR



SM-BEVEL BUDDYBOX
Right Angle

WORM GEARMOTOR



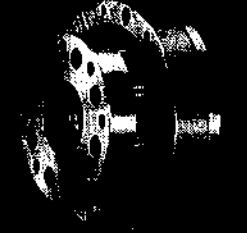
SM-WORM BUDDYBOX
Right Angle

LOW RATIO PLANETARY



SM-CYCLO
Concentric

ZERO BACKLASH CYCLO



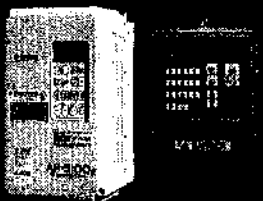
SM-SERVO-MATCH
Concentric

MECHANICAL
VARIABLE SPEED



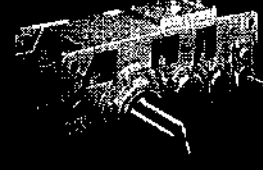
SM-BEIER
SM-BEISTER

ELECTRICAL
VARIABLE SPEED



AF-3100/
AC Drive NTAC-2000
AC Drive

HELICAL
GEAR REDUCER



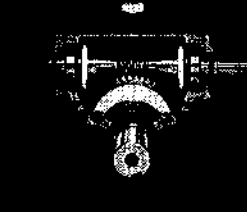
PARAMAX
Parallel Offset &
Right Angle

SHAFT MOUNT
SPEED REDUCER



SM-SHAFT MOUNT
Parallel Offset

DOUBLE ENVELOPING
WORM GEAR



SM-HEDCON
Right Angle

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- ▲ CONSTANT SPEED
- ▲ MECHANICAL VS
- ▲ ELECTRICAL VS



- ▲ THE AMERICAS
- ▲ ASIA
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