Sumitomo Drive Technologies

Planetary Gear Reducer for Servo Motors **IB** Series

P1 Type PK1 Type P2 Type **P** Type L Type



«CAUTION»

- This product should be handled by only those who have been trained for the work. Carefully read the maintenance manual before use.
- Deliver this manual to the customer who will actually use the product.
- This maintenance manual should be kept by the user for future reference.



Sumitomo Heavy Industries, Ltd. Maintenance Manual No.ZM2003E-7

- Carefully read this maintenance manual and all accompanying documents before use (installation, operation, maintenance, inspection, etc.). Thoroughly understand the machine, information about safety, and all precautions for correct operation.

Maintain this manual for future reference.

- Pay particular attention to the "DANGER" and "CAUTION" warnings regarding safety and proper use.



Improper handling may result in physical damage, serious personal injury and/or death.



Improper handling may result in physical damage and/or personal injury.

Matters described in $\underline{\mathbb{A}}_{CAUTION}$ may lead to serious danger depending on the situation. Be sure to observe important matters described herein.

- Transport, installation, plumbing, wiring, operation, maintenance and inspections should be handled by properly trained technicians; otherwise, electric shock, injury, fire, or damage to the equipment may result.
- In the case of maintenance with disassembly, please contact the nearest authorized maintenance shop.
- When the unit is to be used in a system for human transport, a protecting device for human safety should be installed to prevent accidents resulting in personal injury, death, or damage to the equipment due to running out of control or falling.
- When the unit is to be used in an elevator or lifter, install a protective device on the elevator side to prevent it from falling; otherwise, personal injury, death, or damage to the equipment may result.



Please install loss prevention device such as oil pan to the machine which is vulnerable to oil especially (machine for food processing and machine for clean room, and so on) in case oil or grease leaks; otherwise, the product may fail because of oil leakage.

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- Unpack the unit after verifying that it is positioned correct side up; otherwise, injury may result.
- Verify that the unit received is the one you ordered. Installing the wrong unit may result in
 personal injury or equipment damage.
- Do not remove the nameplate.

Verify the items listed below upon receiving the product. If a nonconformity or problem is found, contact our nearest agent, distributor, or sales office.

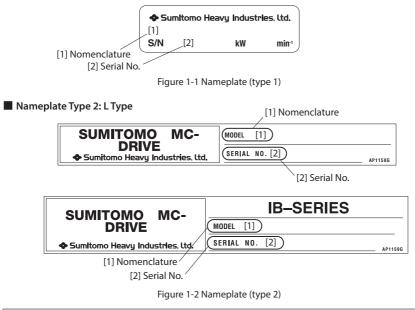
- [1] Does the information on the nameplate conform to what you ordered?
- [2] Was any part broken during transport?
- [3] Are all bolts and nuts tightened firmly?

1-1 Reading the Nameplates

There are two main types of nameplates: type 1 and type 2. Representative examples are shown below. Please observe them by type.

When contacting us, please provide [1] Nomenclature and [2] Serial No.



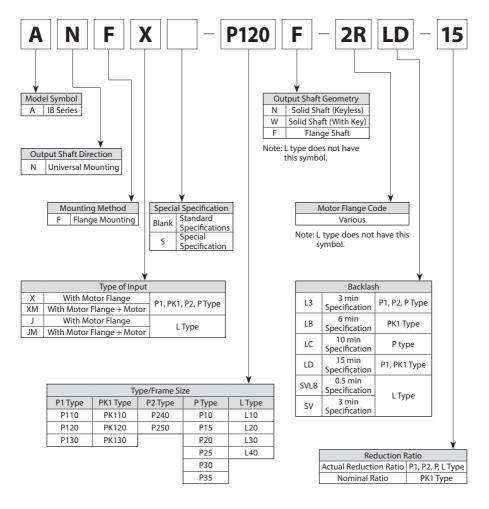


1-2 Checking Lubrication Method

IB Series is a grease-lubricated unit. Grease is injected into the unit components before shipment so that no further lubrication is necessary during use.

1-3 Nomenclature

Symbol meanings are shown below. Please confirm that the nomenclature matches your order.



If this product is not for immediate use, note the following points when storing it.

2-1 Storage Location

Store the unit indoors in a clean and dry location.

Do not store the product outdoors. Store it in a location that is free of moisture, dust, extreme temperature changes, corrosive gases, etc.

2-2 Storage Time

- Storage period should be less than 1 year.
- Standard rust prevention specifications
 - External rust preventionRust prevention oil is applied when shipping from the factory. Check the
rust conditions to see if any rust is forming on the machined surface every
six months after shipment. Reapply the rust prevention oil or any other rust
prevention process if necessary.

Internal rust prevention Store the product in a general factory or warehouse in an environment free of moisture, dust, extreme temperature changes, corrosive gases, etc.

- If the product is for export, or if the storage time is longer than 1 year, adherence to special rust prevention specifications is required. Please consult with us.
- If the storage time is longer than 1 year, run the product for a few minutes under no load once every 2 to 3 months.

2-3 Using after Storage

- Oil seals are affected by temperature, ultraviolet light and other ambient conditions and can easily degrade. After long storage periods, inspect it before operation, and replace any degraded seals with new seals.
- When the storage period is 2 years or longer, the oil seals and grease should be replaced before starting operation.
- At the start of operation, make sure there is no abnormal noise, vibration, heat, etc. If any abnormality is found, immediately contact the nearest authorized maintenance shop.

3. Transport

- Do not step under a unit suspended by a crane or other lifting mechanism for transport; otherwise, injury or death may result.

- When hanging bolts or holes are provided, be sure to use them. After mounting the unit to
 a machine, do not hoist the entire machine by using the hanging bolts or holes; otherwise,
 personal injury or damage to the equipment and/or lifting device may result due to falling of
 the machine or failure of hanging metal fitting.
- In the case the product is lifted by using the tapped hole on it, refer to the nameplate, crate, outline drawing, catalog, etc. for the weight of the unit before hoisting. Never hoist a unit that exceeds the load capacity of the crane or other mechanism being used to lift it; otherwise, personal injury or damage to the equipment and/or lifting device may result.
- When the product is lifted, use suitable lifting parts, and confirm that eye bolts and nuts are not loose.

- Do not use the unit for a purpose other than that indicated on the nameplate or in the manufacturing specifications; otherwise, injury or damage to the equipment may result.
- Do not place any object that will hinder ventilation around the reducer. Insufficient ventilation can cause excessive heat that may result in burns or fire.
- Do not step on or hang from the gearmotor or reducer; otherwise injury may result.
- Do not touch the shaft end of the product and inside key ways with bare hands; otherwise, injury may result.
- Install a loss prevention device such as oil pan to machines particularly vulnerable to oil
 especially (machine for food processing, machine for clean room, and so on) in case oil or
 grease leaks; otherwise, oil or grease leakage may cause failure of the unit.

4-1 Installation Location

Ambient temperature	0 to 40°C (Start failure may occur depending on the speed and torque of the
	motor in use, so consult us if the reducer will be used at about 0° C.)
Ambient humidity	P1, PK1, P2, P type: 85%RH or less with no condensation.
	L type: 90%RH or less with no condensation.
Altitude	1,000m max.
Ambient atmosphere	No corrosive or volatile gases, no steam .
	Dust-free, well-ventilated area.
Installation	Indoor (area with minimal dust, no contact with water)

- Mounting in conditions other than the above requires adherence to special specifications. Please consult with us.

- Mount in a location that enables smooth operation, such as inspection and maintenance.

- Mount on a sufficiently rigid base.

4-2 Installation Angle

There is no limit on a mounting angle.

5-1 P1, PK1, P2, P Type

The product has a special shaft coupling between the reducer and the motor so that shaft with keyway or D shaft other than straight shaft can be accommodated.

Attaching the motor in the following steps from (1) to (8): (In the case of a shaft with keyway, remove the key before assembly).

- (1) Wipe rustproofing or other oils from the motor shaft surface and the flange surface of the reducer. (see figure5-1).
- (2) Place the reducer on an appropriate working table with the coupling [3] facing straight up.
- (3) Remove the plug [1] from the setting hole.
- (4) Manually align the components so that the coupling tightening bolt [2] can be tightened from the setting hole [1].
- (5) Insert the motor shaft into the center hole of the coupling [3]. Press the shaft straight into the coupling, and engage the joint between the motor and the adapter plate [4].

In the case of the motor with the flange plate, set the flange plate [5] between motor and adapter plate [4].

After fitting the spigot of the flange plate [5] and adapter plate [4], insert motor shaft into the center hole of the coupling [3], press in vertically and fit the spigot of the motor and the flange plate [5].

- (6) Lock the motor and the adapter plate [4] together by tightening the motor mounting bolt.
- (7) Tighten the coupling tightening bolt [2] from the setting hole using a torque wrench. Tighten to the appropriate torque value shown on Table 5-1 and 5-2.
- (8) Reinstall the plug [1] from the setting hole.

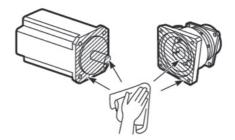


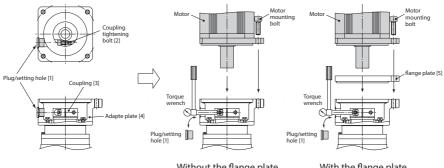
Figure 5-1 Part to Clean

Tightening Bolt	Tightening Torque	Coupling Hole Diameter
M3	1.67Nm	Ø 6-8
M4	3.92Nm	Ø 9-14
M5	7.35Nm	Ø 16-19
M6	8.83Nm	Ø 22-28
M8	21.6Nm	Ø 32-38

Table 5-1 Bolt Tightening Torque (P1, PK1, P Type)

Table 5-2 Bolt Tightening Torque (P2 Type)

Tightening Bolt	Tightening Torque	Coupling Hole Diameter
M8	35Nm	Ø 24-35
M10	65Nm	Ø 24-42
M12	102Nm	Ø 35-55
M16	253Nm	Ø 60



Without the flange plate for a motor

With the flange plate for a motor



5-2 LType

The product has a shaft coupling between the reducer and the motor. Assemble the motor in the following steps from (1) to (9).

- (1) Wipe rustproofing or other oils from the motor shaft surface.
- (2) Place the reducer on an appropriate working table with the oldham's coupling facing straight up.
- (3) Align the oldham' coupling boss 1 [5], spacer [4], and oldham' coupling boss 2 [2] straight and push in so that the claws of the boss engage sufficiently.
- (4) Remove the plug [3] from the setting hole.
- (5) Manually align the components so that the coupling tightening bolt [1] can be tightened from the setting hole [3].
- (6) Insert the motor shaft into the center hole of the oldham' coupling boss 2 [2]. Press the shaft straight into the coupling, and engage the joint between the motor and the adapter plate [6].
- (7) Lock the motor and the adapter plate [6] together by tightening the motor mounting bolt.
- (8) Tighten the coupling tightening bolt [1] from the setting hole using a torque wrench. Tighten to the appropriate torque value shown on Table 5-3.
- (9) Reinstall the plug [3] from the setting hole.

Table 5-3 Bolt Tightening Torque (L Type)

Tightening Bolt	Tightening Torque	Coupling Hole Diameter
M3	1.67Nm	CCZ18
M4	3.92Nm	CCZ25
M5	7.35Nm	CCZ35
M8	19.6Nm	CCZ50
M10	33.3Nm	CCZ70
M6	8.83Nm	FF10
M8	21.6Nm	FF15

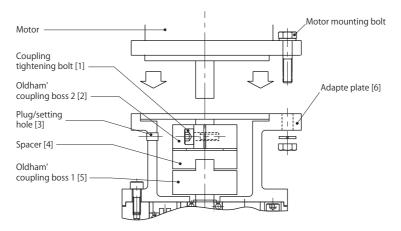


Figure 5-3 Assembly drawing

- Confirm the direction of rotation before coupling with the driven machine. Incorrect rotation
 direction may cause personal injury or damage to the equipment.
- When operating the product alone (uncoupled), remove the key that is temporarily attached to the output shaft; otherwise the key could fly off, and injury may result.
- Install a cover or other appropriate protection items over the rotating parts to prevent human contact; otherwise, injury may result.
- When coupling the product with another machine, check that the centering, the belt tension and parallelism of the pulleys are within the specified limits. When the unit is directly coupled with another machine, check that the direct coupling accuracy is within the specified limits. When a belt is used for coupling the unit with another machine, check the belt tension. Correctly tighten bolts on the pulley and coupling before operation; otherwise there is a risk of injury due to scattering the broken pieces or of damage to the products.

6-1 Checking the Rotational Direction

(1) P1, P2, P, L Type

Verify that the rotation direction is the same as that of the input shaft.

(2) PK1 Type

Verify that the rotation direction is the opposite to that of the input shaft.

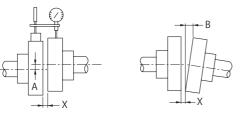
6-2 Mounting a Connector

- When installing a connector, do not apply impact or excessive axial load to the shaft. The bearing could be damaged, or the collar could come off.

- Shrinkage fit is recommend.

(1)When Using a Coupling

The alignment accuracy (A, B, X) in Figure 6-1 should be no greater than that shown in Table 6-1.



Allowable Dimensional Error for A	0.1 mm or manufacturer- specified value
Allowable Dimensional Error for B	0.1 mm or manufacturer- specified value
Dimension for X	Manufacturer-specified value

Table 6-1 Flexible Coupling Alignment Errors

Figure 6-1

(2) When Using a Chain, Sprocket, or Gear

- When using a chain, attach it so that the chain tension angle is perpendicular to the shaft.
- Refer to the chain catalog or other reference for chain tension.
- The pitch circle diameter of the sprocket and gear shall be three times or more of the shaft diameter.
- The load point of the sprocket or gear should be nearer to the product than to center of the shaft. (see figure 6-2)

(3) When Using a Timing Belt

- Over-tightening the timing belt will damage the shaft and bearing. Refer to the timing belt catalog or other reference for timing belt tension.
- Refer to the manufacturer's catalog for the allowable values of parallelism and eccentricity (β) between pulleys. (see figure 6-3)
- Have the timing belt load point positioned as close as possible to this unit.



Figure 6-2



- Do not touch rotating parts (output shaft, etc.) during operation; otherwise, loose clothing caught in these rotating parts may result in serious injury.

- Do not put fingers or foreign object into the opening of the reducer; otherwise, injury or damage to the equipment may result.
- The products becomes very hot during operation. Be careful not to touch with hands or body; otherwise, burns may result.
- If any abnormality occurs during operation, stop operation immediately; otherwise, electric shock, injury, or fire may result.
- Do not operate the products beyond the rated load; otherwise, personal injury or damage to the equipment may result.

7-1 Items to Check Before Operation

After installation and wiring are completed, check the following items before operating.

- Is the unit properly coupled with the driven machine?
- Are mounting bolts tightened firmly?
- Is the direction of rotation as required?

After confirming these items, operate without a load and gradually apply a load. Check the items shown in Table 7-1.

7-2 Items to Check During Operation

Table 7-1 Items to Check During Operation

Does abnormal sound or vibration generate?	 - Is the housing deformed because the installation surface is not flat? - Is insufficient rigidity of the installation base generating resonance? - Is the shaft center aligned with the driven machine? - Is the vibration of the driven machine transmitted to the gearmotor or reducer?
Is the surface temperature abnormally high?	- Is the ambient temperature too high?

If any abnormalities are found, immediately stop operation and contact the nearest authorized maintenance shop.

8. Daily Inspection and Maintenance

 Do not come close to or touch any rotating parts (output shaft, etc.) during maintenance or inspection of the unit; otherwise, loose clothing caught in these rotating parts may result in injury or death.

- Do not put fingers or foreign object into the opening of the reducer; otherwise, injury or damage to the equipment may result.
- The reducer will become very hot during operation. Do not touch the unit with bare hands; otherwise, burns may result.
- Identify and provide appropriate corrective action in a timely fashion and according to this maintenance manual if any abnormal operating characteristics are observed. Do not operate the unit corrective action has been taken.
- Do not use damaged reducers; otherwise, injury or damage to the equipment may result.
- We can not assume any responsibility for damage or injury as a result of an unauthorized modification by a customer.
- Dispose of the reducer as general industrial waste.

8-1 Daily Inspection

Be sure to perform daily inspection according to Table 8-1. Lack of inspections is a source of trouble.

Table 8-1 Daily Inspection

Inspection Item	Details of Inspection	
Noise	Is there abnormal sound? Is there sudden change in sound?	
Vibration	Is vibration abnormally large? Does vibration change suddenly?	
Surface temperature	Is the surface temperature abnormally high? Does the surface temperature rise suddenly?	
Grease leakage	Is there any grease leakage from the gears? Is there any rust on the sliding surface of the oil seal?	
Installation bolts	Have any of the installation bolts become loose?	
Chain Timing belt	Is the chain or timing belt loose?	

- If any problems are found in daily inspection, follow "9. Troubleshooting" (P16) to take appropriate actions. If these actions do not solve the issue, immediately contact the nearest authorized maintenance shop.

8-2 Maintenance of Main Unit

- Oil seals have a lifetime. During long use, natural degradation and frictional wear will reduce effectiveness. Depending on the operating conditions and ambient environment for this product, the lifetime of seals greatly varies. Given normal operation, (uniform load, running 10 hours per day, normal temperature) it is recommended to change them every 1 to 3 years. If the sliding surfaces of oil seals or V-rings show signs of wear or corrosion, replace them with new ones. Because sliding surfaces for oil seals are made of carbon steel, take periodic rust prevention measures not to spread rust on them by applying rustproof oil and so on, if there are exposed surfaces of steel.

8-3 Backlash

The product has been assembled with a preconditioned backlash.

A complete backlash reconditioning would be necessary if the product is disassembled. Never disassemble the product.

If any abnormal condition occurs, refer to Table 9-1 and promptly take appropriate measures. If these actions do not solve the issue, immediately contact the nearest authorized maintenance shop.

	Condition Possible causes Control				
The m	otor	rotates without a load			
	ie out	put shaft does not	Unit damaged due to gear overloading etc.	Confer with authorized maintenance shop.	
The output shaft turns without a load	but wher	The speed will not increase and the motor is overheating	Overload	Reduce the load to the specification level	
	- - - It stops -	The key is not inserted	Insert the key		
		Bearing is burned	Confer with authorized maintenance shop.		
rns	Runs	s in the reverse direction	Control setup error	Change the control setup	
			Overload	Reduce the load to the specification level	
-	ei ve tu		Ambient temperature at the use location is too high	Improve ventilation	
Exces	Excessive temperature rise		Bearing damaged	Confer with authorized maintenance shop.	
			Reduction gears excessively worn due to overloading etc.	Confer with authorized maintenance shop.	
Oil and fat blot or drip from the seal section of input / output shaft.		eal section of input / out shaft.	Grease applied to the oil seals tends to seep out from the seals at the beginning of use	Wipe the grease off the oil seals and observe the condition	
Grease leaking	ຍັ Leakage of oil or grease from input or output shaft section		Oil seal or shaft damaged	Confer with authorized maintenance shop.	
Leakage from case or other mating surfaces			Tightening bolt loose	Confer with authorized maintenance shop.	
			Dust or foreign objects inside the bearing, or the bearing is damaged	Confer with authorized maintenance shop.	
			Foreign objects stuck between reduction gears	Confer with authorized maintenance shop.	
Abnormal noise Abnormally severe vibration			Reduction gears damaged	Confer with authorized maintenance shop.	
			Warping of housing because the installation surface is not flat	Correct the installation surface to make it completely flat or use liners etc. for adjustment	
			Resonance due to the installation surface not being sufficiently rigid	Reinforce the installation surface for greater rigidity	
			Shaft misalignment with the driven machine	Align the shaft centers	
			Vibration of the driven machine transmitted to the reducer	Individually operate the products to check the source of the sound.	

Table 9-1 Troubleshooting

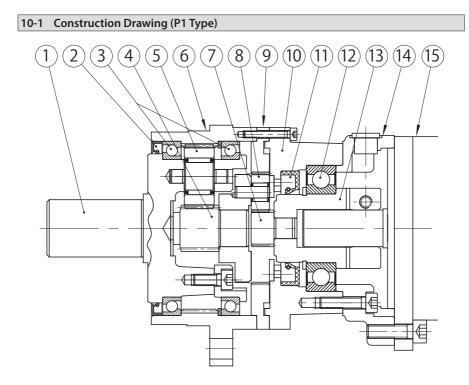


Figure 10-1 P1 Type Double-reduction (example: ANFX-P120N)

Part Number	Description
1	Output shaft
2	Oil seal
3	Main bearing
4	Sun gear of output
5	Planetary gear of output
6	Casing with internal gear
7	Sun gear of input
8	Planetary gear of input
9	Internal gear of input
10	Motor flange bracket
11	Oil seal
12	Input shaft bearing
13	Coupling
14	Adaptor plate
15	Motor (Provided by the user)

Table 10-1 Main Components (P1 Type)

10-2 Construction Drawing (PK1 Type)

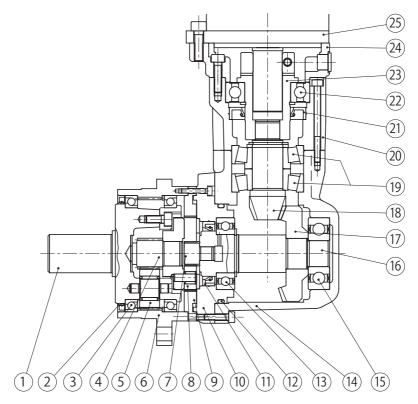


Figure 10-2 PK1 Type Triple-reduction (example: ANFX-PK120N)

	()
Part Number	Description
1	Output shaft
2	Oil seal
3	Bearing of output
4	Sun gear of output
5	Planetary gear of output
6	Casing with internal gear
7	Sun gear of input
8	Planetary gear of input
9	Internal gear of input
10	Adaptor
11	Oil seal
12	O-ring
13	Bearing

Part Number	Description
14	Casing
15	Bearing
16	Intermediate Shaft
17	Spiral bevel gear
18	Pinion shaft
19	Bearing
20	Cover
21	Oil seal
22	Input shaft bearing
23	Coupling
24	Adaptor plate
25	Motor (Provided by the user)

Table 10-2	Main Components	(PK1 Type)
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10-3 Construction Drawing (P2 Type)

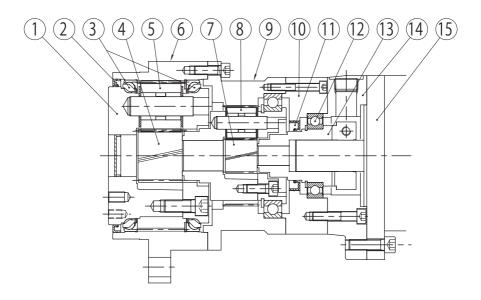
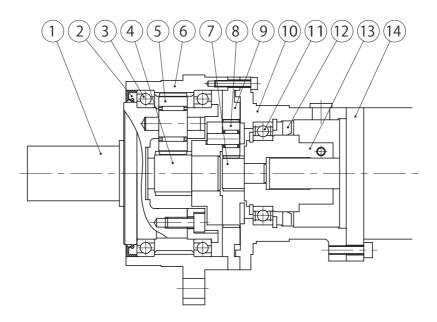


Figure 10-3 P2 Type Double-reduction (example: ANFX-P250F)

Part Number	Description
1	Output shaft
2	Oil seal
3	Main bearing
4	Sun gear of output
5	Planetary gear of output
6	Casing with internal gear
7	Sun gear of input
8	Planetary gear of input
9	Internal gear of input
10	Joint cover
11	Oil seal
12	Input shaft bearing
13	Coupling
14	Adaptor plate
15	Motor (Provided by the user)

Table 10-3 Main Components (P2 Type)

10-4 Construction Drawing (P Type)





Part Number	Description
1	Output shaft
2	Oil seal
3	Main bearing
4	Sun gear of output
5	Planetary gear of output
6	Casing with internal gear
7	Sun gear of input
8	Planetary gear of input
9	Internal gear of input
10	Joint cover
11	Input shaft bearing
12	Oil seal
13	Coupling
14	Motor (Provided by the user)

Table 10-4 Main Components (P Type)

10-5 Construction Drawing (L Type)

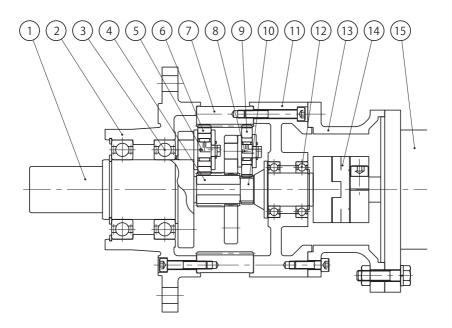


Figure 10-5 L Type Double-reduction (example: ANFJ-L40)

Part Number	Description
1	Slow speed shaft
2	Case
3	Slow speed shaft bearing
4	Secondary sun gear
5	Secondary planetary shaft
6	Secondary planetary gear
7	Inner gear
8	Primary planetary shaft
9	Primary planetary gear
10	Primary sun gear
11	Cover
12	High speed shaft bearing
13	Adaptor plate
14	Coupling
15	Motor (Provided by the user)

Table 10-5 Main Components (L Type)

11. Warranty

The scope of warranty of our delivered products is limited only to what we manufactured. Warranty (period and description)

Warranty Period	The warranty period applies only to new products and represents 18 months after the shipment or 12 months after the actual operation, whichever is shorter.
Description	If the product failed within the warranty period, during which despite a proper mounting, connection and maintenance & administration are followed according to the maintenance manual, and the product is properly run based on the specification on the catalog or under conditions agreed separately, we will repair or provide an alternative product at our discretion for free of charge, except the exclusions below. However, as far as the product is connected with customers' other devices, we will not indemnify those expenses on dismounting from/mounting on the devices, etc. and other associated construction expenses, transportation expenses and opportunity loss and operation loss the customers suffered from, and otherr indirect damages.
Exclusion from the warranty	 The following items will be excluded from the warranty: 1. A breakdown resulting from defects in the mounting of the product and connection with other devices, etc. 2. A breakdown resulting from insufficient maintenance & administration and improper handling of the product, including a case that the product is not stored according to our defined storage manual. 3. A breakdown resulting from operation which does not fall within our specification and other operation conditions and use status we hardly can know or a failure caused by the use of lubricant which we do not recommended. 4. A breakdown resulting from defects, special specification, etc of device prepared and connected by customer. 5. A breakdown resulting from defects in parts supplied or specified by customers. 7. A breakdown caused by inevitable force including earthquake, fire, flood disaster, salt damage, gas damage, and lightning strike, etc. 8. Natural wear and tear, abrasion, and deterioration of such relevant consumable parts as a bearing and oil seal, etc. under normal usage. 9. A breakdown caused for reasons not attributable to each of the above item.

MEMO

Worldwide Locations

U.S.A

Sumitomo Machinery Corporation of America (SMA)

4200 Holland Blvd. Chesapeake, VA 23323, U.S.A. TEL (1)757-485-3355 FAX (1)757-485-7490

Canada

SM Cyclo of Canada, Ltd. (SMC) 1453 Cornwall Road, Oakville, Canada ON L6J 7T5 TEL (1)905-469-1050 FAX (1)905-469-1055

Mexico

SM Cyclo de México, S.A. de C.V. (SMME) Fresnos #201, Pocket Park Oriente, 67258 Juárez, N.L. México TEL (52)81-8144-5130

Brazil

Sumitomo Industrias Pesadas do Brasil Ltda. (SHIB) Rodovia do Acucar (SP-075) Km 26

Itu, Sao Paulo, Brasil TEL (55)11-4886-1000 FAX (55)11-4886-1000

Chile

SM-Cyclo de Chile Ltda. (SMCH) Camino Lo Echevers 550, Bodegas 5 y 6, Quilicura, Región Metropolitana, Chile TEL (56)2-892-7000 FAX (56)2-892-7001

Argentina

SM-Cyclo de Argentina S.A. (SMAR) Ing Delpini 2230, B1615KGB Grand Bourg, Malvinas Argentinas, Buenos Aires, Argentina TEL (54)3327-45-4095 FAX (54)3327-45-4099

Guatemala

SM Cyclo de Guatemala Ensambladora, Ltda. (SMGT)

Parque Industrial Unisur, 0 Calle B 19-50 Zona 3, Bodega D-1 Delta Bárcenas en Villa Nueva, Guatemala TEL (502)6648-0500 FAX (502)6631-9171

Colombia

SM Cyclo Colombia, S.A.S. (SMCO)

Parque Industrial Celta, Km 7.0 Autopista Medellín, Costado Occidental, Funza, Cundinamarca, Colombia TEL (57)1-300-0673

Peru

SM Cyclo de Perú, S.A.C (SMPE)

Jr. Monte Rosa 255, Oficina 702, Lima, Santiago de Surco, Perú TEL (51)1-713-0342 FAX (51)1-715-0223

Germany

Sumitomo (SHI) Cyclo Drive Germany GmbH (SCG)

Cyclostraße 92, 85229 Markt Indersdorf, Germany TEL (49)8136-66-0 FAX (49)8136-5771

Austria

Sumitomo (SHI) Cyclo Drive Germany GmbH (SCG)

SCG Branch Austria Office Gruentalerstraße 30A, 4020 Linz, Austria TEL (43)732-330958 FAX (43)732-331978

Belgium

Hansen Industrial Transmissions NV (HIT) Leonardo da Vincilaan 1, Edegem, Belgium TEL (32)34-50-12-11 FAX (32)34-50-12-20

France

SM-Cyclo France SAS (SMFR) 8 Avenue Christian Doppler, 77700 Serris, France TEL (33)164171717 FAX (33)164171718

Italy

SM-Cyclo Italy Srl (SMIT) Via dell' Artigianato 23, 20010 Cornaredo (MI), Italy TEL (39)293-481101 FAX (39)293-481103

Spain

SM-Cyclo Iberia, S.L.U. (SMIB) C/Gran Vía Nº 63 Bis, Planta 1, Departamento 1B 48011 Bilbao-Vizcaya, Spain TEL (34)9448-05389 FAX (34)9448-01550

United Kingdom

SM-Cyclo UK Ltd. (SMUK) Unit 29, Bergen Way, Sutton Fields Industrial Estate, Kingston upon Hull, HU7 0YO, East Yorkshire, United Kingdom TEL (44)1482-790340 FAX (44)1482-790321

Turkey

SM Cyclo Turkey Güç Aktarım Sis. Tic. Ltd. Sti. (SMTR)

Barbaros Mh. Ciğdem Sk. Ağaoğlu, Office Mrk. No:1 Kat:4 D.18 Atasehir, İstanbul, Turkey TEL (90)216-250-6069 FAX (90)216-250-5556

India

Sumi-Cyclo Drive India Private Limited (SDI) Gat No. 186, Raisoni Industrial Park, Alandi Markal Road, Fulgaon-Pune, Maharashtra, India TEL (91)96-0774-5353

China

Sumitomo (SHI) Cyclo Drive Shanghai, Ltd. (SCS)

11F, SMEG Plaza, No. 1386 Hongqiao Road, Changning District, Shanghai, China 200336 TEL (86)21-3462-7877 FAX (86)21-3462-7922

Hong Kong

SM-Cyclo of Hong Kong Co., Ltd. (SMHK) Room 19, 28th Floor, Metropole Square, No.2 On Yiu Street, Shatin, New Territories, Hong Kong TEL (852)2460-1881 FAX (852)2460-1882

Korea

Sumitomo (SHI) Cyclo Drive Korea, Ltd. (SCK) Royal Bldg Room #913, 19, Saemunan-ro 5-gil, Jongno-gu, Seoul, 03173, Korea TEL (82)2-730-0151 FAX (82)2-730-0156

Taiwan

Tatung SM-Cyclo Co., Ltd. (TSC) 22 Chungshan N. Road 3rd., Sec. Taipei, Taiwan 104, ROC TEL (886)2-2595-7275 FAX (886)2-2595-5594

Singapore

Sumitomo (SHI) Cyclo Drive Asia Pacific Pte. Ltd. (SCA) 15 Kwong Min Road, Singapore 628718

TEL (65)6591-7800 FAX (65)6863-4238

Philippines

Sumitomo (SHI) Cyclo Drive Asia Pacific Pte. Ltd. Philippines Branch Office (SMPH) C4 & C5 Buildings Granville Industrial Complex, Carmona, Cavite 4116, Philippines

TEL (63)2-584-4921 FAX (63)2-584-4922

Vietnam

SM-Cyclo (Vietnam) Co., Ltd. (SMVN) Factory 2B, Lot K1-2-5, Road No. 2-3-5A, Le Minh Xuan Industrial Park, Binh Chanh Dist., HCMC, Vietnam TEL (84)8-3766-3709 FAX (84)8-3766-3710

Malaysia

SM-Cyclo (Malaysia) Sdn. Bhd. (SMMA)

No 7C Jalan Anggerik Mokara 31/56 Kota Kemuning Seksyen 31, 40460 Shah Alam, Selangor Darul Ehsan, Malaysia TEL (60)3-5121-0455 FAX (60)3-5121-0578

Indonesia

PT. SM-Cyclo Indonesia (SMID) Jalan Sungkai Blok F 25 No. 09 K, Delta Silicon III, Lippo Cikarang, Bekasi 17530, Indonesia

TEL (62)21-2961-2100 FAX (62)21-2961-2211

Thailand

SM-Cyclo (Thailand) Co., Ltd. (SMTH)

195 Empire Tower, Unit 2103-4, 21st Floor, South Sathorn Road, Yannawa, Sathorn, Bangkok 10120, Thailand

TEL (66)2670-0998 FAX (66)2670-0999

Australia

Sumitomo (SHI) Hansen Australia Pty. Ltd. (SHAU)

181 Power St, Glendenning, NSW 2761, Australia TEL (61)2-9208-3000 FAX (61)2-9208-3050

Japan

Sumitomo Heavy Industries, Ltd. (SHI) ThinkPark Tower, 1-1 Osaki 2-chome, Shinagawa-ku, Tokyo 141-6025, Japan TEL (81)3-6737-2511 FAX (81)3-6866-5160

Sumitomo Heavy Industries, Ltd.

Specifications, dimensions, and other items are subject to change without prior notice.



Power Transmission & Controls Group Headquarter ThinkPark Tower, 1-1 Osaki 2-chome, Shinagawa-ku, Tokyo 141-6025, Japan