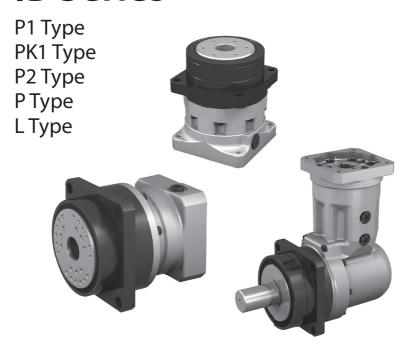
Sumitomo Drive Technologies

Planetary Gear Reducer for Servo Motor IB Series



<Note>

- This product should be handled by only those who have been trained for the work. Please read this manual carefully before use.
- \blacksquare Deliver this manual to the customer who will actually use the product.
- This instruction manual should be carefully stored.

(Introduction) Safety Precautions

 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



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

Matters described in \triangle CAUTION may lead to serious danger depending on the situation.

Be sure to observe important matters described herein.

! DANGER

- 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 our local subsidiary nearest to you.
- When the unit is to be used in a system for transport of human beings, a protective device should be installed. There is a risk of personal injury or damage to the equipment due to runaway or falling.
- When the unit is to be used in an elevator, install a protective device on the elevator side to
 prevent it from falling; otherwise, personal injury, death, or damage to the equipment may
 result.

[Contents]

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[1] Inspection Upon Delivery

⚠ CAUTION

- Unpack the unit after verifying that it is positioned right side up; otherwise, injury may result.
- Verify that the unit received is in fact the unit ordered. When a different unit is installed, injury or damage to the equipment may result.
- Do not remove the nameplate.

Upon delivery and receipt of the reducer check the following. If a nonconformity or problem is found, contact our nearest agent, distributor, or sales office.

- [1] Do the items on the nameplate conform to what was ordered?
- [2] Were there any parts that were broken during transport?
- [3] Are all bolts and nuts tightened firmly?

1-1 How to Refer to the Nameplate

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

When making an inquiry, advise us of the [1] Nomenclature and [2] Serial No.

■ Nameplate Type 1: P1, PK1, P2, P Type

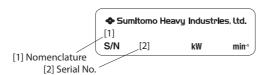


Figure 1-1 Nameplate (type 1)

■ Nameplate Type 2: L Type

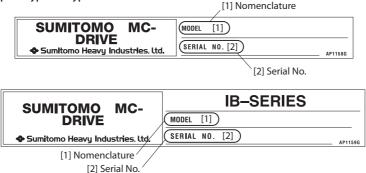


Figure 1-2 Nameplate (type 2)

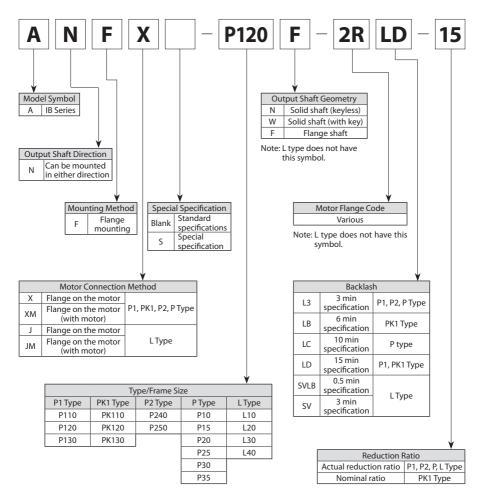
1-2 Lubrication Method

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] Inspection Upon Delivery

1-3 Nomenclature

The meanings of the symbols are as follows. Verify that the nomenclature matches that of the order.



When storing reducers for any extended period of time, consider the following important points.

2-1 Storage Location

Store the unit indoors in a clean dry location.

Do not store the unit outdoors or in locations where there is excessive moisture, dust, severe temperature change, corrosive gas, etc.

2-2 Storage Period

- · Storage period should be less than 1 year.
- · Standard Rust Prevention Specifications

External rust prevention Standard specification is no coating. The unit is packaged with volatile

rustproof paper, however, the surface condition should be checked for rust on the machined surfaces every 6 months after shipment. When long-term storage is necessary, rust prevention such as application of rust prevention

oil should be performed.

Internal rust prevention The unit should be stored inside a general factory or warehouse in an

environment that is free from moisture, dust, severe temperature change,

corrosive gas, etc.

 When the unit will be shipped overseas or stored for a period of longer than 1 year, please contact us for special rust prevention specifications.

• When the unit will be stored for a period of longer than 1 year, the unit should be operated for a few minutes under no-load conditions every two or three months.

2-3 Use After Storage

- The oil seal is prone to deterioration due to the surrounding conditions such as temperature, ultraviolet rays, etc., so after long-term storage, the unit should be inspected before operation, and any deteriorated parts should be replaced with new parts.
- 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 our local subsidiary nearest to you.

[3] Transportation

↑ DANGER

 Do not stand directly under a unit suspended by a crane or other lifting mechanism; otherwise, injury or death may result.

! CAUTION

- Exercise ample care so as not to drop or tip over the unit during transportation.
- When lifting the unit using eye bolts in the threaded holes provided on the main unit, refer to the package, exterior drawings, catalog, etc., and do no lift a unit that is heavier than the rated load of the eye bolts; otherwise, the falling/tumbling of the unit or damage to the lifting devices may cause personal injury or equipment damage.
- After the unit has been mounted in the machine, avoid lifting the entire machine with using
 the eye bolts; otherwise, it may result in injury or damage to the equipment due to the unit
 falling or tipping over, or due to failure of the eye bolts.
- Use proper lifting fixtures, and make sure the eye bolts and nuts are not loose before lifting.

↑ CAUTION

- 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; otherwise, the cooling effect is reduced, possibly leading to fire or burns due to excessive heat built-up.
- Absolutely do not stand on or hang from the unit; otherwise, injury or damage to the equipment may result.
- Do not touch the keyways of the unit with bare hands; otherwise, injury may result.
- When the unit is used in food processing applications, machines for cleanroom and so on, vulnerable to oil contamination, install an oil pan or other such device to cope with grease leakage due to breakdown or failure; otherwise, grease leakage may cause failure of the unit, etc.

4-1 Place of Installation

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 85% or less (P1, PK1, P2, PType), 90% or less (LType). No condensation.

Altitude 1,000m max.

Ambient atmosphere There should be no corrosive gas, combustible gas, or steam.

The location should be free from dust and well ventilated.

Installation Indoor (Free from dust, water, other liquids)

- Mounting in conditions other than the above requires adherence to special specifications. Please consult with us.
- Mount in a location that enables easy operation, such as inspection and maintenance.
- · Mount on a sufficiently rigid member.

4-2 Installation Angle

There is no limit on a mounting angle.

[5] Mounting the Servo Motor

5-1 P1, PK1, P2, PType

The product has a special shaft coupling between the reducer gear and the motor so that a non-straight motor shaft such as key-or D-shape-cut shafts can be accommodated.

Assemble the motor in the following steps from (1) to (8): (In the case of a key-slotted shaft, remove the key before assembly).

- (1) Wipe rustproofing or other oils from the motor shaft surface.
- (2) Place the reducer on an appropriate work surface 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].
 P2 Type with flange plate, set the flange plate [5] between motor and adapter plate [4].
 After fitting the spirot of the flange plate [5] and adapter plate [4] insert motor shaft into the spirot.
 - 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.

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

Tightening Bolt	Tightening	Coupling Hole	
	Ingritering Boit	Torque	Diameter
	M3	1.67Nm	Ø 6-8
	M4	3.92Nm	Ø 9-14
	M5	7.35Nm	Ø 16-19
	M6	8.83Nm	Ø 24-28
	M8	21.6Nm	Ø 32-38

Table 5-2 Bolt Tightening Torque (P2 Type)

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

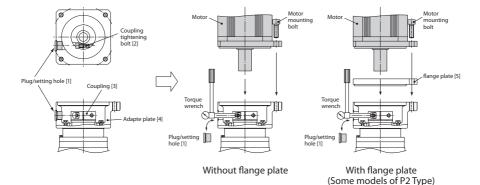


Figure 5-1 Assembly drawing

[5] Mounting the Servo Motor

5-2 LType

The product has a shaft coupling between the reducer gear 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 work surface 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

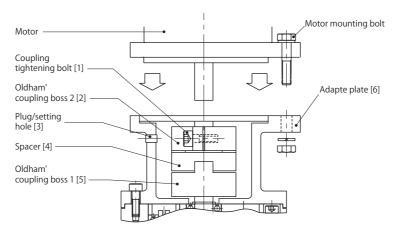


Figure 5-2 Assembly drawing

[6] Coupling with Other Machines

CAUTION

- Confirm the direction of rotation before coupling with the driven machine; otherwise, injury
 or damage to the equipment may result.
- When the product is to run on its own without being connected to other devices, remove
 the key from the output shaft in advance. Otherwise, the key may fly off the shaft and cause
 personal injury.
- Provide a cover etc. so that the rotating part cannot be touched; otherwise, injury may result.
- When coupling the reducer with a load, check that the centering, belt tension, parallelism of the pulleys, etc. 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, injury may result because of misalignment.

6-1 Checking the Rotation 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 as that of the input shaft.

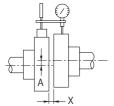
[6] Coupling with Other Machines

6-2 Mounting a Connecting Element

- When installing a connecting element, be careful not to impact the shaft or apply an excessive amount of thrust load. Bearing damage or collar disengagement may be caused.
- Installation by shrink fit or shaft end thread engagement is recommended.

(1)When Using a Coupling

Make sure that the alignment errors (A, B and X) illustrated in Figure 6.1 are not greater than the specification values shown in Table 6-1.



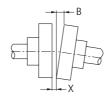


Table 6-1 Flexible Coupling Alignment Errors

A Size Tolerance	0.1 mm or manufacturer- specified value
B Side Tolerance	0.1 mm or manufacturer- specified value
Dimension X	Manufacturer-specified value

Figure 6-1

(2) When Using a Chain/Sprocket or Gear Coupling

- In the case of chain-based coupling, make sure that the tensioned chain angle is at the right angle to the shaft.
- Refer to the chain catalog or other appropriate information source to know the correct chain tension.
- Make sure that the sprocket or gear pitch circle diameter is more than three times longer than the shaft diameter.
- Have the sprocket or gear load action point positioned closer to this unit than the center of the shaft. (Refer to Figure 6-2)

(3) When Using a Timing Belt

- Excessively tensioning the timing belt may damage the shaft or bearing. Refer to the manufacturer's catalog or other appropriate information source to know the correct belt tension.
- Refer to the manufacturer's catalog for the allowable values of parallelism and eccentricity (β) between pulleys. (Refer to Figure 6-3)
- · Have the timing belt load action point positioned as close as possible to this unit.

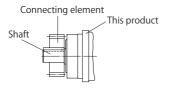




Figure 6-2

Figure 6-3

[7] Operation

⚠ DANGER

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

⚠ CAUTION

- 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 or come in contact with the unit; otherwise, burns may result.
- If anomaly occurs during operation, stop operation immediately; otherwise, injury may result.
- Do not operate the unit in excess of the rated load level; otherwise, injury or damage to the
 equipment may result.

7-1 Check Before Operation

After installation, check the following items before starting operation.

- Is the coupling with the driven machine performed correctly?
- Are the mounting bolts for each part securely tightened?
- Is the direction of rotation as planned?

After checking the items described above, perform a no-load break-in operation and gradually apply a load. When doing this, check the items in Table 7-1.

7-2 Check During Operation

Table 7-1 Check items during operation

Is there any abnormal noise or vibration?	 Is the case distorted because the installation surface is not flat? Is there vibration due to insufficient rigidity of installed parts? Does the center axis of the driven machine match? Is vibration of the driven machine transmitted to the reducer? 	
Is the surface temperature abnormally high?	Is the ambient temperature at the place of usage high?	

When an abnormality is found, stop operation and contact our local subsidiary nearest to you.

[8] Daily Inspection and Maintenance

↑ DANGER

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.

↑ CAUTION

- 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] Daily Inspection and Maintenance

8-1 Daily Inspection

To ensure proper and continued optimum operation, use table1 to perform daily inspections. All of the answers should be "No."

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 abnormal condition is observed during the daily inspection, remedy the situation by referring to 9, "Troubleshooting" (page 15. If the abnormal condition still persists, contact our local subsidiary nearest to you.

8-2 Maintenance of Main Unit

• Oil seals have a life, and after long-term use there may be a decrease in the seal effect due to natural deterioration and wear. Although the seal life greatly differs depending on the operating conditions and surrounding environment of the reducer, it is recommended that the seal be replaced every 1 to 3 years. If the sliding surface of the oil seal becomes worn or rusted, replace the seal with a new one.

The sliding surface is made of a carbon steel, so rusting may occur and advance due to moisture, etc., which may lead to damage of the oil seal, so periodically take rust prevention measures.

8-3 Backlash

The product has been assembled with a preconditioned backlash.

A complete backlash reconditioning would be necessary if the product is disassembled. Do not disassemble the product.

If any abnormal condition is observed in or related to this unit, promptly remedy the situation by referring to Table 9-1. If the abnormal condition still persists, contact our local subsidiary nearest to you.

Table 9-1 Troubleshooting

Condition		Condition	Possible causes	Control
The motor runs when without load, but the output shaft does not turn			Unit damaged due to gear overloading etc.	Contact our local subsidiary
The motor runs with the output shaft turning when without load	but when load is applied	Cannot run fast and becomes overheated	Unit overloaded	Reduce the load to the specification level
		en load is applied	The key is not fitted	Fit the key
with the c			Bearing is burned	Contact our local subsidiary
output ut load	Runs	in the reverse direction	Control setup error	Change the control setup
			Unit overloaded	Reduce the load to the specification level
		pecomes excessively	Ambient temperature at the use location is too high	Improve ventilation
heate	d		Bearing damaged	Contact our local subsidiary
			Reduction gears excessively worn due to overloading etc.	Contact our local subsidiary
Grea	Small amounts of grease seeping out or drooling from input or output shaft seals		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	Input or output shaft area Grease leakage		Oil seal or shaft damaged	Contact our local subsidiary
ng	Grease leaking from case joints or other mating faces		Tightening bolt loose	Contact our local subsidiary
Abnormal noise Abnormally severe vibration			Debris or foreign objects inside the bearing, or the bearing is damaged	Contact our local subsidiary
			Foreign objects stuck between reduction gears	Contact our local subsidiary
			Reduction gears damaged	Contact our local subsidiary
			Case deformed due to the installation surface not being completely 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 shafts
			Vibration of the driven machine transmitted to the reducer	Run the reducer on its own to locate the noise source

[10] Structural Drawing

10-1 Structural Drawing (P1 Type)

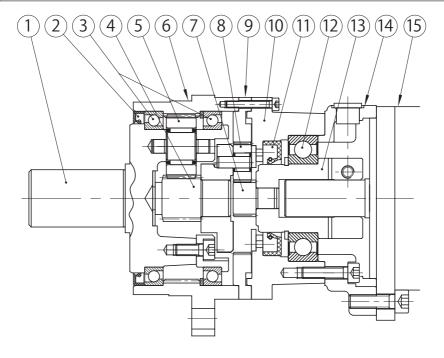


Figure 10-1 P1 Type Double-reduction (example: ANFX-P120N)

Table 10-1 Main Components (P1 Type)

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	Joint cover
11	Oil seal
12	Input shaft bearing
13	Coupling
14	Adaptor plate
15	Motor (Provided by the user)

10-2 Structural Drawing (PK1 Type)

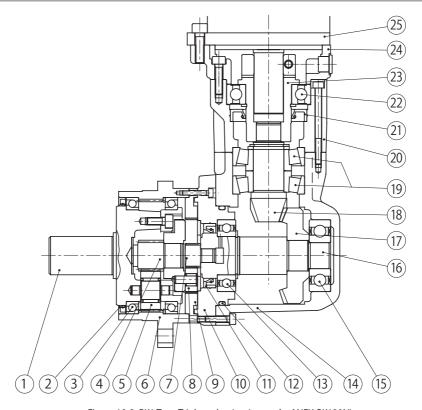


Figure 10-2 PK1 Type Triple-reduction (example: ANFX-PK120N)

Table 10-2 Main Components (PK1 Type)

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 (Casing)
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 (Casing)
21	Oil seal
22	Input shaft bearing
23	Coupling
24	Adaptor plate
25	Motor (Provided by the user)

[10] Structural Drawing

10-3 Structural Drawing (P2 Type)

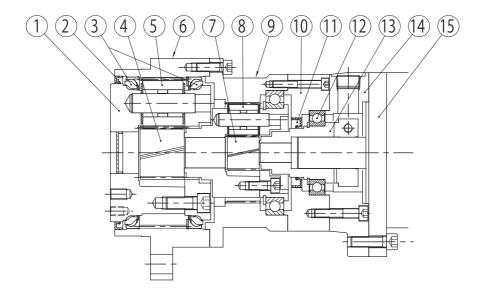


Figure 10-3 P2 Type Double-reduction (example: ANFX-P250F)

Table 10-3 Main Components (P2 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	Oil seal			
12	Input shaft bearing			
13	Coupling			
14	Adaptor plate			
15	Motor (Provided by the user)			

10-4 Structural Drawing (P Type)

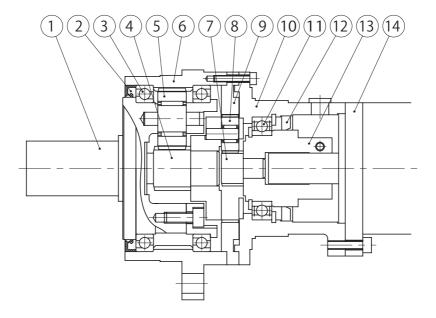


Figure 10-4 P Type Double-reduction (example: ANFX-P20N)

Table 10-4 Main Components (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)		

[10] Structural Drawing

10-5 Structural Drawing (L Type)

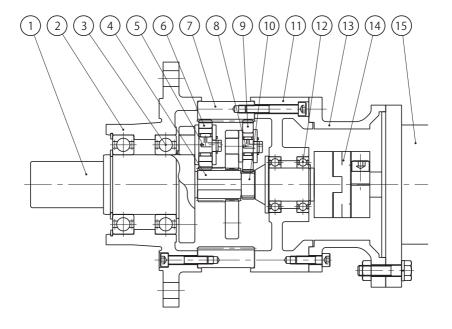


Figure 10-5 L Type Double-reduction (example: ANFJ-L40)

Table 10-5 Main Components (L Type)

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)			

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

Warranty Period	The warranty period for the Products shall be 18 months after the shipment of the Products from the seller's works or 12 months from the Products coming into operation, whether comes first.
Warranty Condition	In the event that any problem or damage to the Product arises during the "Warranty Period" from defects in the Product whenever the Product is properly installed and combined with the Buyer's equipment or machines, maintained as specified in this manual, and properly operated under the conditions described in this manual, or as otherwise agree upon in writing between the Seller and the Buyer or its customers; the Seller will provide, at its sole discretion, appropriate repair or replacement of the Product without charge at a designted facility, except as stipulated in the "Warranty Exclusions" as described below. However, if the Product is installed or integrated into the Buyer's equipment or machines, the Seller shall not reimburse the cost of: removal or re-installation of the Product or other incidental costs related thereto, any lost opportunity, any profit loss or other incidental or consequential losses or damages incurred by the Buyer or its customers.
Warranty Exclusions	Notwithstanding the above warranty, the warranty as set forth herein shall not apply to any problem or damage to the Product that is caused by: 1. installation, connection, combination or integration of the Product in or to the other equipment or machine that is rendered by any person or entity other than the Seller; 2. insufficient maintenance or improper operation by the Buyer or its customers, such that the Product is not maintained in accordance with the maintenance manual provided or designated by the Seller; 3. improper use or operation of the Product by the Buyer or its customers that is not informed to the Seller, including, without limitation, the Buyer's or its customers, operation of the Product not in conformity with the specifications, or use of lubricating oil in the Product that is not recommended by the Seller; 4. any problem or damage on any equipment or machine to which the Product is installed, connected or combined or on any specifications particular to the Buyer or its customers; 5. any changes, modifications, improvements or alterations to the Product or those functions that are rendered on the Product by any person or entity other than the Seller; 6. any parts in the Product that are supplied or designated by the Buyer or its customers; 7. earthquake, fire, flood, sea-breeze, gas, thunder, acts of God or any other reasons beyond the control of the Seller; 8. normal wear and tear, or deterioration of the Product's parts, such as bearings, oil-seals; 9. any other troubles, problems or damage to the Product that are not attributable to the Seller.

[MEMO]

[MEMO]

[MEMO]

Worldwide Locations

U.S.A

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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 Mexico, S.A. de C.V. (SMME)

Av. Desarrollo 541, Col. Finsa, Guadalupe, Nuevo León, México, CP67132 TEL (52)81-8144-5130 FAX (52)81-8144-5130

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

