

INSTRUCTION MANUAL INDEXMAN PICK & PLACE UNIT

PPLX Series

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.



To Safely Use This Product

Read this manual carefully before use.

The designer should confirm the safety of the mechanism and of the electric control devices.

To ensure the safe use of this product, it is important to correctly select, use, handle, and maintain the product.

The precautions indicated WARNING or CAUTIONS must be observed.



DANGER : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.



WARNING : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.



CAUTION : When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation.

In any case, important information that must be observed is explained.

When custom specifications, product specifications may differ from descriptions on this instruction manual. Refer to Drawing for Approval etc. per product.



WARNING :

- Use the product within the range of specifications. A load and/or r.p.m. exceeding the specifications may result in a damage, a malfunction and/or accuracy deterioration of the index unit.
- Don't touch any moving part during the operation of the Pick and Place unit.
- Don't suddenly stop the input shaft revolution during the output section is working.
- ① A sudden stop of the input shaft by clutch brake etc. will apply the overload to the unit. This may cause an overrun of the dial plate on the unit.
- ② If a torque saver is provided, a sudden stop will release the torque saver. This may cause an overrun of the dial plate on the unit.
- ③ If the emergency stop is necessary, install the safety measure to prevent a sudden stop, and select the larger torque saver enduring the overload.
- Shut off the power before maintenance or inspection. A sudden movement caused by malfunction or control circuit failure may result in personal injury.
- Do not use the product in an explosive or ignitable atmosphere.



CAUTION :

- The product must be assembled by a person with a basic knowledge about the assembly.
- Start and stop the Pick and Place unit at a dwell section. A start or stop other than the dwell section will cause the overload. This may result in a damage of the unit.
- If a position detection cam is provided on the input shaft, check the cam at the proper position periodically. A misalignment of the cam caused by a loose set screw may result in malfunction.
- Don't use the product where wet or oily environment. The product is not water-proof or drip-proof. Where the product is subject to splashes of water or oil, it must be protected with a cover or such.
- The Pick and Place unit contains lubricant oil, which may ooze out through the oil packing or another part during use. Check the packing periodically, and install the oil pan if necessary.

Terms of warranty

Conditions related to the warranty and scopes are as follows.

1) Period

The warranty period of the product is one year since the date of delivery.

(However, the period assumes eight hours of operation per day.

As well, if the durability limit is reached within one year, the period to the durability limit is the warranty period.)

2) Scope

If failure is caused in the above warranty period due to poor workmanship of our product, we will repair the product without charge without delay.

However, the scope of warranty shall not cover the following cases.

- ① Operation under the conditions or in the environment derailing from those specified in the product specifications
- ② Failure caused by lack of attention or erroneous control
- ③ Failure caused by other than the delivered product
- ④ Failure caused by operation derailing from the purposes for which the product is designed
- ⑤ Failure caused by modification in the structure, performance, specification or other features made by other than us after delivery, or failure caused by repairs done by other than our designated contractor
- ⑥ Loss in our product assembled to your machine or equipment, which would be avoided if your machine or equipment were provided with general functions, structures or other features common in the industry
- ⑦ Failure caused by reason that is unforeseeable with technology put into practical use at the time of delivery
- ⑧ Failure caused by fire, earthquake, flood, lightning, or other acts of God, earth shock, pollution, salt hazard, gas intoxication, excessive voltage, or other external causes
- ⑨ When it is caused by the part which is provided by a customer or a part used by the appointment of the customer.
- ⑩ When the consumption parts such as bearing or the oil seal used for our product were worn and deteriorated.

About optional parts (switch, drive parts etc.) we make the guarantee that followed the guarantee ranges of each maker because life is different by driving condition.

The warranty mentioned here covers the discrete delivered product.

Only the scope of warranty shall not cover losses induced by the failure of the delivered product.

3) Warranty of product exported outside Japan

- ① We will repair the product sent back to our factory or company or factory designated by us.
Work and cost necessary for transportation shall not be compensated for.
- ② The repaired product will be packed according to the domestic packing specification and delivered to a designated site inside Japan.

This warranty terms describe basic items.

Priority will be given to specification drawings and specification sheets if warranty description given on such specification drawings or specification sheets is different from the warranty terms given herein

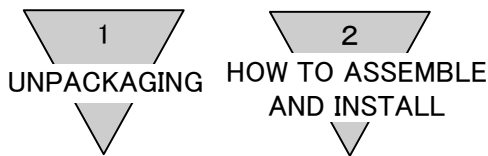
INDEX

Pick and Place Unit

PPL X

Manual No. SMB-20E

INTRODUCTION	5
1. UNPACKAGING	5
2. HOW TO ASSEMBLE AND INSTALL	5 ~ 7
3. BEFORE OPERATION	7
4. ADEQUATE OPERATION	8 ~ 11
5. MAINTENANCE	12
6. TROUBLE SHOOTING	13
7. WASTE	13
8. PRODUCT SPECIFICATIONS	14 ~ 16
9. INTERNAL STRUCTURE DRAWING	17 ~ 18
10. OTHERS	18



INTRODUCTION

Thank you for choosing our Pick & Place unit.

This product is a composite unit that uses two cams for the horizontal and vertical directions to output horizontal and vertical motions.


This manual shows precautions and service/inspection items below. Please carefully read this manual before use or maintenance.

1. UNPACKING

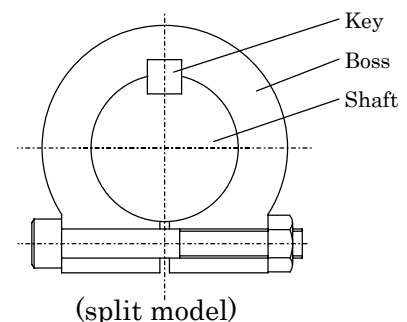
Check that the product is as ordered

- 1) Model No.
- 2) Check for damage caused during transportation.
If any failure such as a missing screw, oil leak, or bent shaft is found, contact the branch, sales office, or agency from which the product was purchased.

2. HOW TO ASSEMBLE AND INSTALL

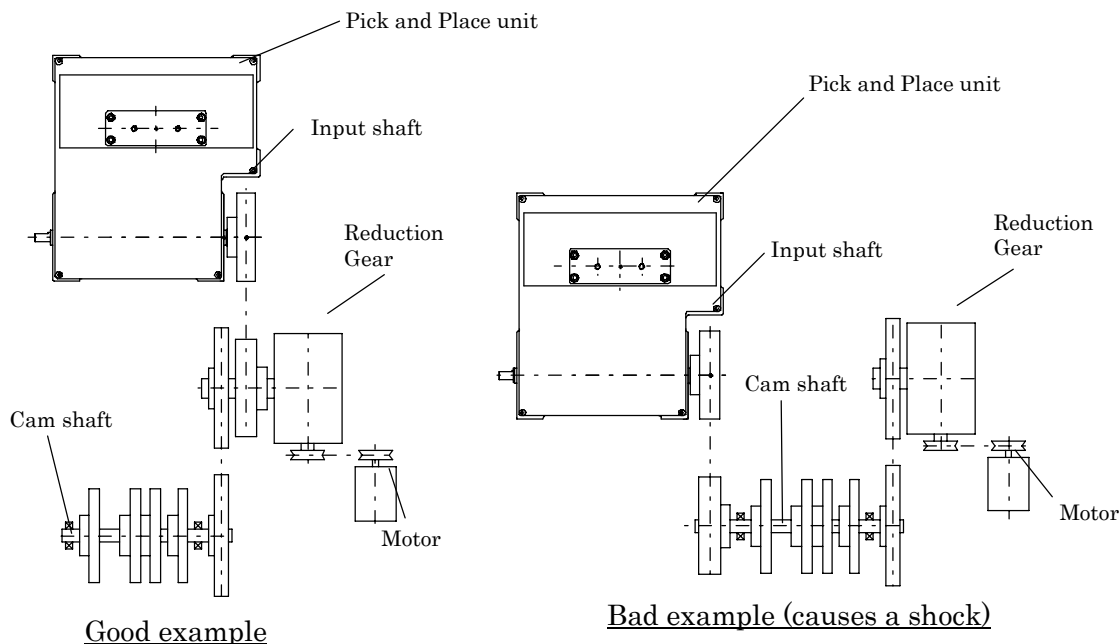
 **CAUTION:** The product must be assembled by a person with a basic knowledge about the assembly.

- 1) Install the product as the attitude according to the specifications.
- 2) Install the product so that it can be easily inspected, disassembled, and assembled and grease can be added..
- 3) Bolt a jig, if necessary, onto the output arm or output table in a position close to the center of the traveling section of the output axis. If this operation is done in the retention area of the output axis, force may be applied to the internal cam follower, resulting in damage to the P & P unit.
- 4) Do not apply an impact to the output arm or output table with a hammer or another tool when mounting a jig on it.
Such an impact may cause damage to the P & P unit or lower accuracy.
- 5) Key way are often used to secure the dial plate, coupling, gear, sprocket, pulley, cam, boss, or another part to the shaft. A chattering key way always leads to shock or vibration The use of standard key, JIS B 1301-1996 is recommended. The methods fixing certainly should be conducted for fixing important section not only using key but using split model and friction fasteners, etc.

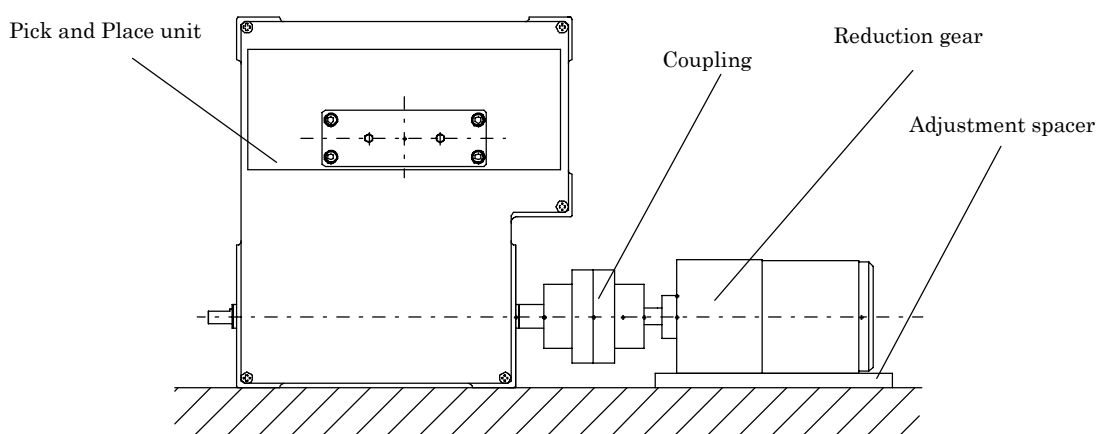


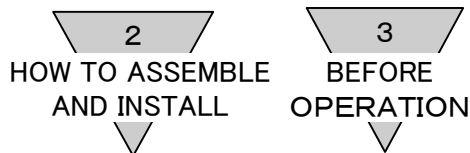
6) The driveline from the motor to the index unit input shaft should be rigid and nobacklash. A backlash may cause a shock during the dial plate rotation, shorten the service life of the unit, and/or damage parts.

(1) Do not use another input shaft in series between the motor and the Pick and Place Unit input shaft. If used, it should be sufficiently rigid.

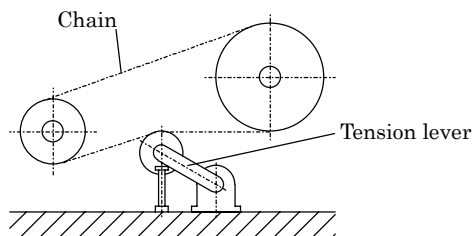


(2) When directly connecting the Pick and Place unit input and reduction shafts with a coupling, use a coupling of no backlash and easier to adjust alignment. (If the space permits, a model that the Pick and Place unit and reducer are integrated may be used.)





- (3) Correctly install a tension adjuster for the timing belt or chain if used.
The lack of the tension adjuster may lead to shock or vibration.



An example of tension lever

- 7) Center the shafts.
Center the shafts when connected with a coupling. Eccentric shafts may be broken.

3. BEFORE OPERATION

Before operating the P & P unit, confirm the following:

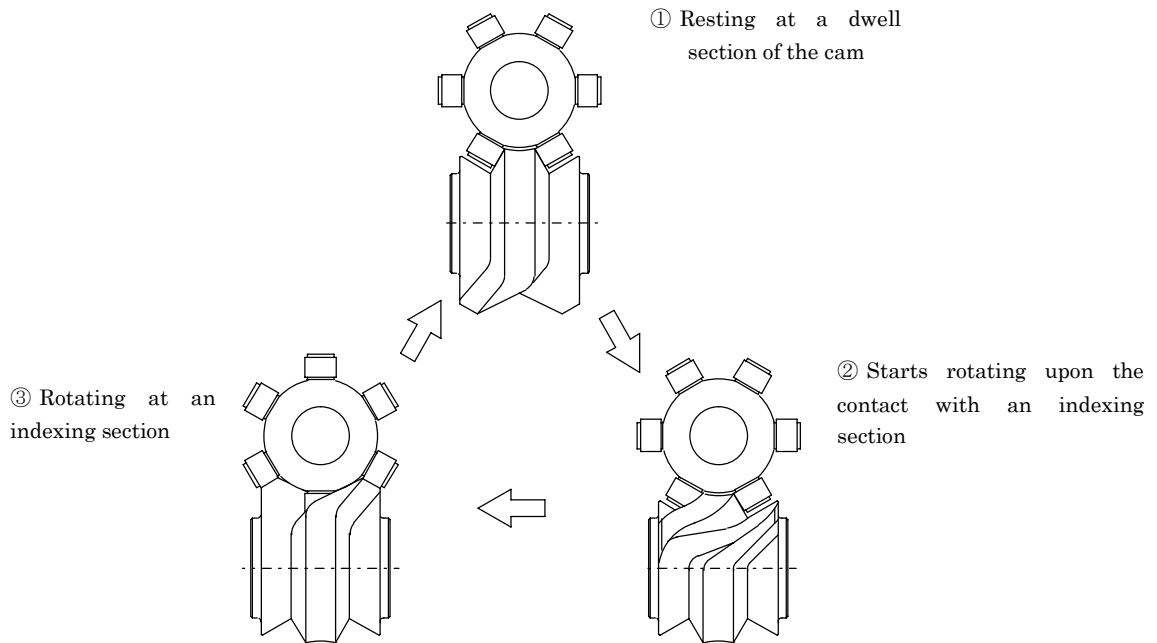
- 1) Check if the bolts or screws for each part are firmly tightened.
- 2) Check if the input shaft is connected securely to the output arm or output table.
If the input shaft is loose, the table may rotate in an unstable manner and cause a shock.
- 3) Check if the tension of the belt is proper.
A loose belt may run unsmoothly and cause residual vibration.
- 4) The PPLX uses a lubricating grease. A sufficient amount of grease is applied before delivery, but add it periodically (semiannually). Apply a specified grease to the sliding face of the cam and the direct-acting bearing under the front cover of the PPLX.
- 5) Greases for the PPLX
Shown in the table below are the specified greases for the PPLX.

	Body	Linear way section
Manufacturer	Kyodo Yushi	Kyodo Yushi
Grease name	Citrax EP No.2	Multemp PS2

4. ADEQUATE OPERATION

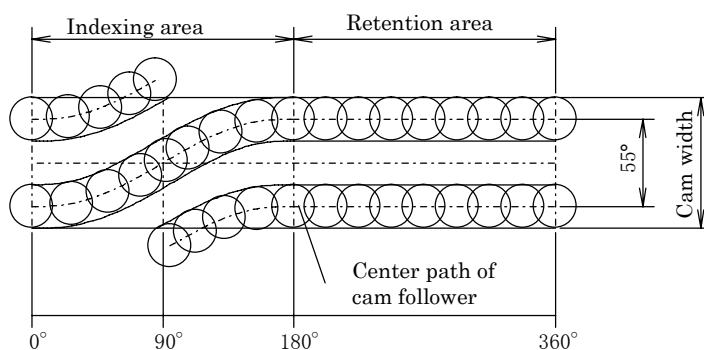
1) Explanation of operation

- (1) Relative positions of the roller gear cam and turret w/cam follower are illustrated below.

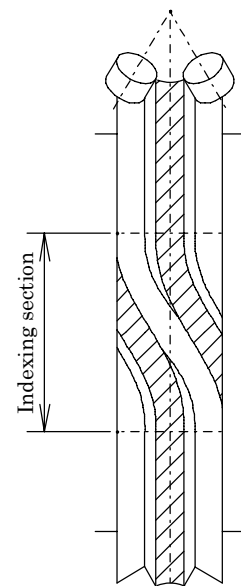


(2) Cam indexing angle

A cycle (360°) of the cam groove comprises a retention (straight) area and an indexing (curved) area. In the retention section, the output section does not travel even if the cam is rotating. It travels when the cam follower is in the indexing area and the cam is rotating. The rotating angle of the cam corresponding to this travel is called an indexing angle.



Development (path of cam follower)



A development of cam

2) Adequate operation



WARNING: Use the product within the range of specifications. A load and/or r.p.m. exceeding the specifications may result in a damage, a malfunction and/or accuracy deterioration of the Pick and Place unit.

- (1) Keep the load mass (carrying mass) below the dynamic rated carrying mass.



WARNING: Don't touch any moving part during the operation of the Pick and Place unit.

- (2) Input shaft revolving speed

Use the r. p. m. of input shaft within the specifications.

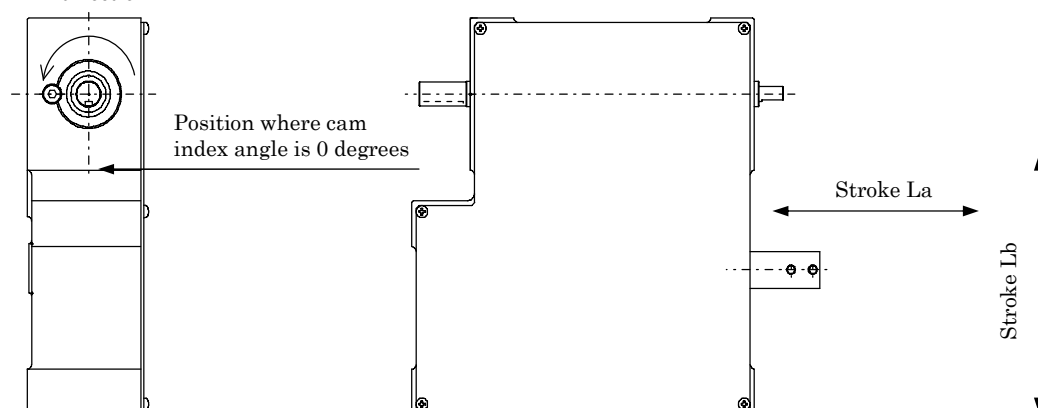


CAUTION: Start and stop the Pick and Place unit at a dwell section. A start or stop other than the dwell section will cause the overload. This may result in a damage of the unit.

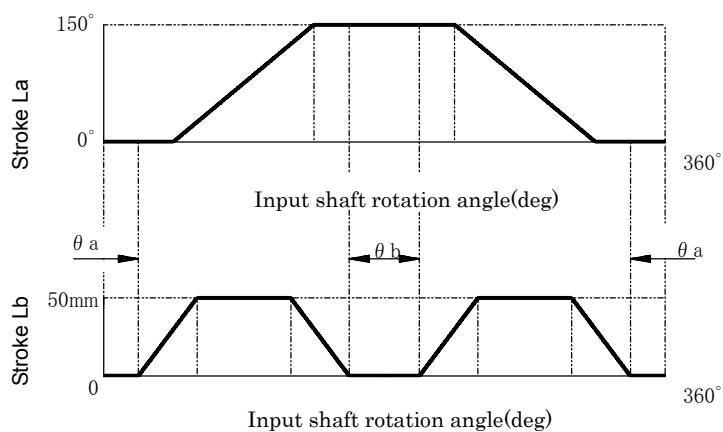
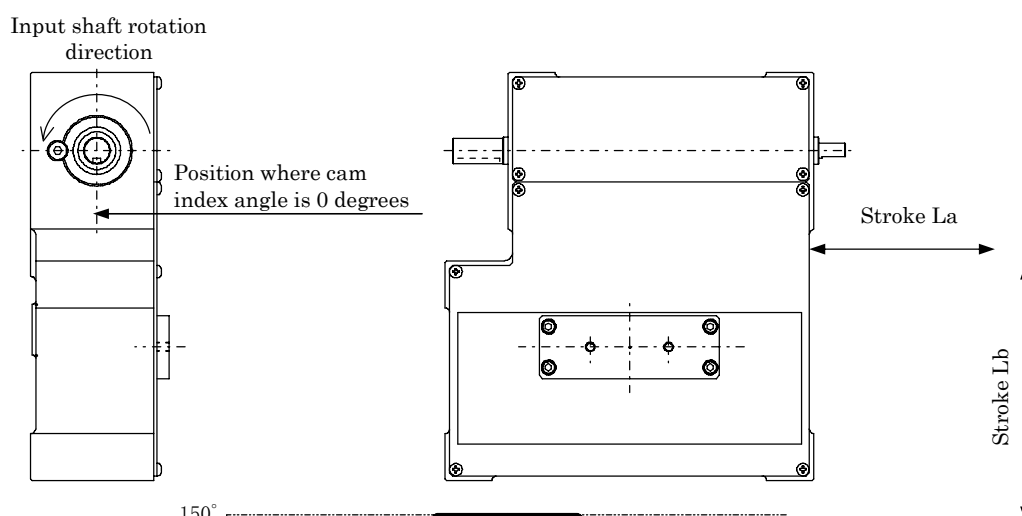
(3) Positional relationship between the timing chart and the key groove in the input shaft

Start and stop the input shaft in the horizontal-direction and vertical-direction retention zones (θ_a , θ_b) according to the positional relationship between the timing chart determined and the input shaft.

[Type A] Input shaft rotation direction



[Type B]



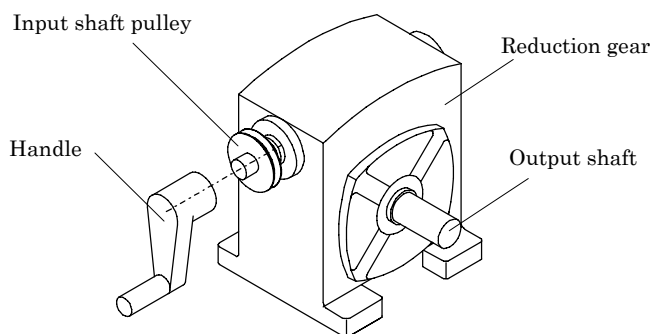
**WARNING:**

Don't suddenly stop the input shaft revolution during the output section is working.

- ① A sudden stop of the input shaft by clutch brake etc. will apply the overload to the unit. This may cause an overrun of the dial plate on the unit.
- ② If a torque saver is provided, a sudden stop will release the torque saver. This may cause an overrun of the dial plate on the unit.
- ③ If the emergency stop is necessary, install the safety measure to prevent a sudden stop, and select the larger torque saver enduring the overload.

- (4) After emergency stop, manually rotate the shaft to the dwell section and start again.

A handle should be provided with the driving system to permit the manual rotation of the input shaft in such a case.



- (5) Check for unusual sound.

If any unusual sound is heard during use, immediately stop the operation. The cam follower or an internal part may have been failed. Contact the nearest sales agency or factory.



WARNING : Do not use the product in an explosive or ignitable atmosphere.

**CAUTION**

Don't use the product where wet or oily environment.


- : The product is not water-proof or drip-proof.
- Where the product is subject to splashes of water or oil, it must be protected with a cover or such.


- (6) Prevention of water intrusion and corrosion

The Pick and Place unit input and output axis and mounting surfaces are not protected from corrosion. They may be corroded depending on the storing conditions or the operating atmosphere.

Always apply a coat of rust-preventive oil, grease, or rust proof paint over the machined surfaces

5. MAINTENANCE

 **WARNING:** Shut off the power before maintenance or inspection. A sudden movement caused by malfunction or control circuit failure may result in personal injury.

 **CAUTION:** If a position detection cam is provided on the input shaft, check the cam at the proper position periodically. A misalignment of the cam caused by a loose set screw may result in malfunction.

 **CAUTION:** The Pick and Place unit contains lubricant oil, which may ooze out through the oil packing or another part during use. Check the packing periodically, and install the oil pan if necessary.

6. TROUBLE SHOOTING

Phenomenon			Measure to take
<p>A shock is applied to the output arm or output table.</p> <p>The stop position is incorrect.</p>	Pick and Place unit	No shock is produced by reducing the speed of the input shaft.	The carrying mass is excessive. Reconsider using another P & P model.
		A shock remains although the speed of the input shaft is reduced.	There is something wrong with the driving system or another. Please contact us. We will determine what measure to take after consultation with you.
		Internal Unusual sound or temperature rise is suspected.	Internal damage is suspected. Contact us for replacement of Pick and Place unit.
	Driveline	Input shaft has a backlash between gear when driven.	Reduce backlash between gear.
		Key chatters when driven by gear.	Replace key to reduce chatter.
		The timing belt is significantly slack when it is running.	Tighten with tension adjuster.
		Input shaft angular position sensor switch is out of place.	Relocate input shaft angular position sensor switch.
		Faulty input shaft angular position sensor.	Replace.
		Backlash at worm reduction gear	Overhaul worm reduction gear.
		Overload on geared motor reduction gear	Reduce the carrying mass, or use a worm speed reduction gear.
		Clutch release error	Check clutch.
		Frequent emergency stops	Remove cause(s) of emergency stop.
	Mounting of Pick and Place unit body	Incomplete mounting or securing	Firmly secure.
	Mounting of subsidiary table/arm	The tightening torque is insufficient, or the bolt is loose.	Check and tighten.
	Unusual load	The P & P unit is used under a load beyond the permissible carrying mass.	Recalculate the carrying mass, and consult us about measures.
	Overload protector	Wrong torque setting	Adjust torque setting.
		Poor repeatability	Replace.
Pick and Place unit does not rotate.	Pick and Place unit body or driveline	There is something wrong with the Internal failure of Pick and Place unit body	Replace or contact us.
		Faulty motor	Replace.
		Brake has been applied.	Repair or replace.
		Grease has run out.	Add grease.

7. WASTE

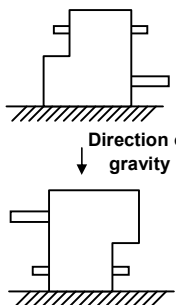
Metal, rubber and lubricant are used for this product. Since this product can not be burned, this must be disposed as industrial waste.

8. PRODUCT SPECIFICATIONS

1) How to order

(Example) **PPLX** **080** – **060** **030** – **A** – **1** – **X012345**

(a) (b) (c) (d) (e) (f) (g)

(a) Model	(b) Size		(c)Horizontal- direction stroke (La)		(d) Vertical- direction stroke (Lb)		(e) Output axis type		(f) Installation orientation		(g) Special specification n No.
PPLX	040	40mm	010	10mm	005	5mm	A	Type A: Arm type	1		Six numbers after "X"
	050	50mm	↘	↘	↘	↘	B	Type B: Table type	2		
	063	63mm									
	080	80mm	200	200mm	060	60mm					

2) Characteristic chart

PPLX040 type A (arm type)

Item			Characteristic value	Item		Characteristic value
Stroke La			mm	max.80		
Stroke Lb			mm	max.30		
Mass inside stroke La (moa)			kg	0.5		
Mass inside stroke Lb (mob)			kg	1.0		
Output section bending rigidity	Direction b	mm/N	0.004	Repeated accuracy		mm
	Direction c	mm/N	0.015	Body mass		kg
Lubrication method			Lubrication by grease	Paint color		Silver

PPLX050 type A (arm type)

Item			Characteristic value	Item		Characteristic value
Stroke La			mm	max.100		
Stroke Lb			mm	max.40		
Mass inside stroke La (moa)			kg	0.8		
Mass inside stroke Lb (mob)			kg	1.8		
Output section bending rigidity	Direction b	mm/N	0.0035	Repeated accuracy		mm
	Direction c	mm/N	0.0150	Body mass		kg
Lubrication method			Lubrication by grease	Paint color		Silver

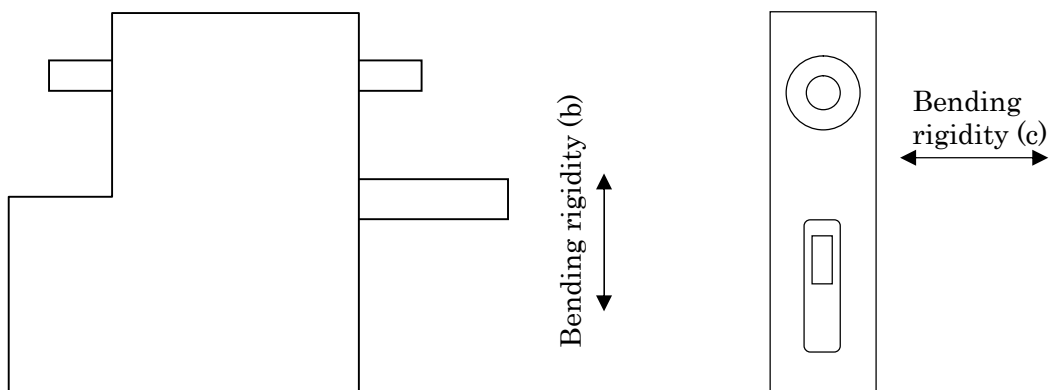
PRODUCT SPECIFICATIONS

PPLX063 type A (arm type)

Item			Characteristic value	Item		Characteristic value
Stroke La			mm	max.150		
Stroke Lb			mm	max.50		
Mass inside stroke La (moa)			kg	1.7		
Mass inside stroke Lb (mob)			kg	3.0		
Output section bending rigidity	Direction b	mm/N	0.003	Permissible thrust force of input shaft		N
	Direction c	mm/N	0.020	Permissible radial force of input shaft		N
Lubrication method			Lubrication by grease	Moment of inertia of input shaft		kg·m ²
				Internal frictional torque (Tin)		N·m
				Repeated accuracy		mm
				Body mass		kg
				Paint color		Silver

PPLX080 type A (arm type)

Item			Characteristic value	Item		Characteristic value
Stroke La			mm	max.200		
Stroke Lb			mm	max.60		
Mass inside stroke La (moa)			kg	3.2		
Mass inside stroke Lb (mob)			kg	5.3		
Output section bending rigidity	Direction b	mm/N	0.0025	Permissible thrust force of input shaft		N
	Direction c	mm/N	0.0250	Permissible radial force of input shaft		N
Lubrication method			Lubrication by grease	Moment of inertia of input shaft		kg·m ²
				Internal frictional torque (Tin)		N·m
				Repeated accuracy		mm
				Body mass		kg
				Paint color		Silver



PPLX040 type B (table type)

Item	Characteristic value	Item	Characteristic value
Stroke La mm	max.80	Permissible thrust force of input shaft N	800
Stroke Lb mm	max.30	Permissible radial force of input shaft N	750
Mass inside stroke La (moa) kg	0.6	Moment of inertia of input shaft kg·m ²	2.7×10 ⁻⁴
Mass inside stroke Lb (mob) kg	1.2	Internal frictional torque (Tin) N·m	1.9
Body mass kg	10	Repeated accuracy mm	±0.02
Lubrication method	Lubrication by grease	Paint color	Silver

PPLX050 type B (table type)

Item	Characteristic value	Item	Characteristic value
Stroke La mm	max.100	Permissible thrust force of input shaft N	1200
Stroke Lb mm	max.40	Permissible radial force of input shaft N	900
Mass inside stroke La (moa) kg	1.1	Moment of inertia of input shaft kg·m ²	7.3×10 ⁻⁴
Mass inside stroke Lb (mob) kg	2.3	Internal frictional torque (Tin) N·m	3.0
Body mass kg	15	Repeated accuracy mm	±0.02
Lubrication method	Lubrication by grease	Paint color	Silver

PPLX063 type B (table type)

Item	Characteristic value	Item	Characteristic value
Stroke La mm	max.150	Permissible thrust force of input shaft N	2000
Stroke Lb mm	max.50	Permissible radial force of input shaft N	1600
Mass inside stroke La (moa) kg	1.8	Moment of inertia of input shaft kg·m ²	2.4×10 ⁻⁴
Mass inside stroke Lb (mob) kg	3.8	Internal frictional torque (Tin) N·m	4.8
Body mass kg	25	Repeated accuracy mm	±0.02
Lubrication method	Lubrication by grease	Paint color	Silver

PPLX080 type B (table type)

Item	Characteristic value	Item	Characteristic value
Stroke La mm	max.200	Permissible thrust force of input shaft N	2500
Stroke Lb mm	max.60	Permissible radial force of input shaft N	270
Mass inside stroke La (moa) kg	3.6	Moment of inertia of input shaft kg·m ²	8.6×10 ⁻⁴
Mass inside stroke Lb (mob) kg	6.9	Internal frictional torque (Tin) N·m	7.8
Body mass kg	50	Repeated accuracy mm	±0.02
Lubrication method	Lubrication by grease	Paint color	Silver

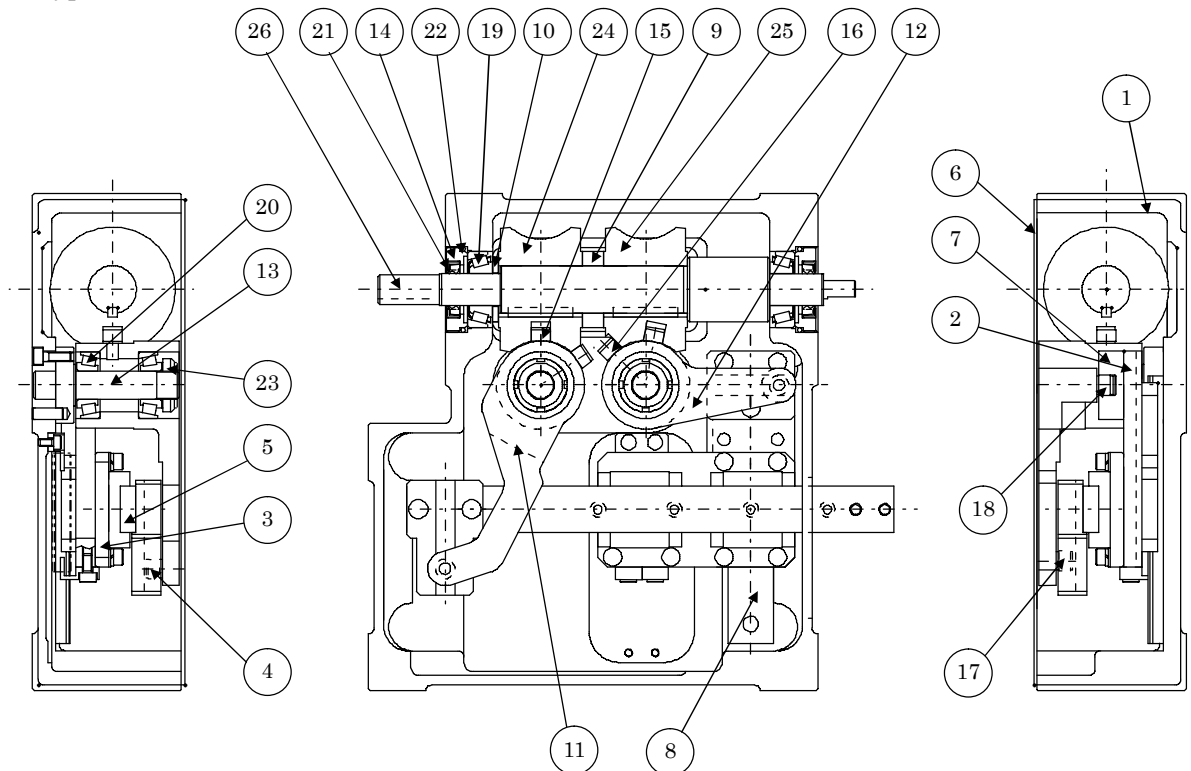
3) Others

- For the dynamic rated carrying mass, see the catalog.
- Refer to catalogs for dimensions.

9. INTERNAL STRUCTURE DRAWIND

1) Internal structural drawing of PPLX

[Type A]

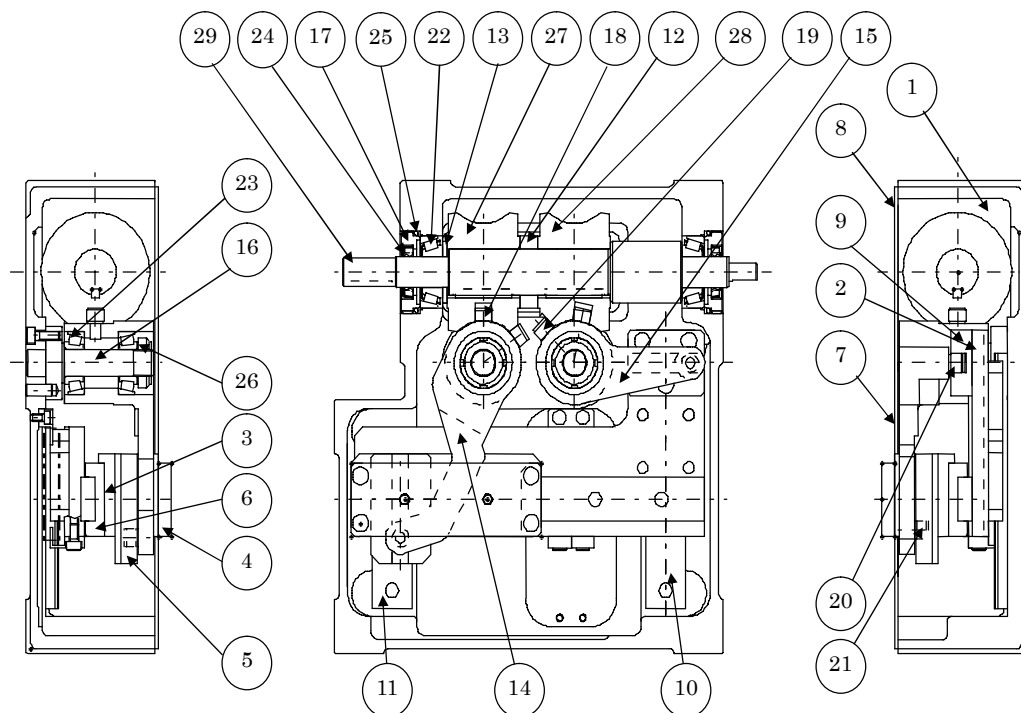


Internal structure and part names

No.	Part name	Quantity	No.	Part name	Quantity	No.	Part name	Quantity
1	Housing A	1	10	Spacer	1	19	Tapered roller bearings	2
2	Base plate A	1	11	Arm	1	20	Tapered roller bearings	4
3	Plate A	1	12	Lift arm	1	21	Oil seal	2
4	Guide block A	1	13	Stand	2	22	O-ring	2
5	Linear way A	1	14	Bearing retainer	2	23	Nut	2
6	Cover A	1	15	Cam follower (X)	—	24	Cam (X)	1
7	Guide block C	1	16	Cam follower (Y)	2	25	Cam (Y)	1
8	Linear way C	1	17	Cam follower	1	26	Input shaft	1
9	Matching spacer	1	18	Cam follower	1	27		

2) Internal structural drawing of PPLX

[Type B]



Internal structure and part names

No.	Part name	Quantity	No.	Part name	Quantity	No.	Part name	Quantity
1	Housing B	1	11	Linear way D	1	21	Cam follower	1
2	Base plate B	1	12	Matching spacer	1	22	Tapered roller bearings	2
3	Plate B	1	13	Spacer	1	23	Tapered roller bearings	4
4	Table	1	14	Arm	1	24	Oil seal	2
5	Guide block B	1	15	Lift arm	1	25	O-ring	2
6	Linear way B	1	16	Stand	2	26	Nut	2
7	Cover B1	1	17	Bearing retainer	1	27	Cam (X)	1
8	Cover B2	1	18	Cam follower (X)	1	28	Cam (Y)	1
9	Guide block C	1	19	Cam follower (Y)	2	29	Input shaft	1
10	Linear way C	1	20	Cam follower	1	30		

10. OTHERS

Please observe the matters mentioned above to maintain this product in normal operation. When trouble occurs, please check model No. (refer to 8.1) and part No. (refer to 9.) before contacting to your nearest business office or distributors to ask replacement or to place order of repair part.

If you have any questions on handling, please consults with CKD.