# Directions for safe use

This guide book provides “applications” for each product. Instructions provided in the “Applications” section are intended to ensure safe operation of the products, protect you and others from injury, and prevent property damage.
Please read these instructions carefully before selecting a model and using the product.

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Directions are classified into “DANGER,” “WARNING,” “CAUTION,” and general information, according to the degree of risk.

| | |
|---|---|
| ⚠ DANGER | This indicates that a danger is clearly anticipated.<br>If the described risk is not avoided, it may result in death or sever injury.<br>It may also lead to damage and harm to the property. |
| ⚠ WARNING | This does not pose an imminent danger but could lead to a hazard depending on situations.<br>If the described risk is not avoided, it may result in death or sever injury.<br>It may also lead to damage and harm to the property. |
| ⚠ CAUTION | This does not pose an imminent danger but could lead to a hazard depending on situations.<br>If the described risk is not avoided, it may result in minor or moderate injury.<br>It may also lead to damage and harm to the property. |

## ■ This product has been designed and manufactured as a component for general industrial machinery.

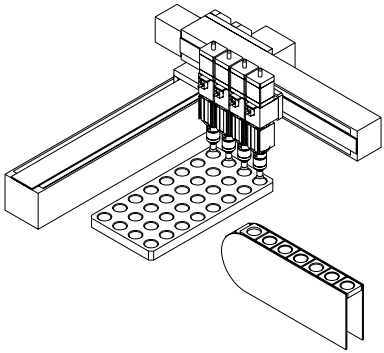
- Please read the “applications” described in this guide book as well as “catalogs” and “instruction manuals” before selecting a model and using the product.
- It is the customer’ s responsibility to verify and judge the compatibility between this product and the customer’ s system.
- As you incorporate the products into your system, add all safety information to the instruction manual of your system and make sure operators follow the instructions.
  Be sure to add to the instruction manual all safety information that needs to be provided as a result of implementing new ways of using the equipment.
- After reading “instruction manuals” and other materials, store them in a place where users of this product will have easy access to them when necessary.

# FA equipment

## Application examples PIU (Pick up unit)

### For X-Y ROBO

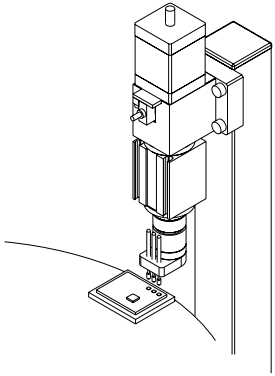
P-2



It allows workpieces to be accurately unloaded from and stored in a pallet even at high speed.

### For probe continuity test

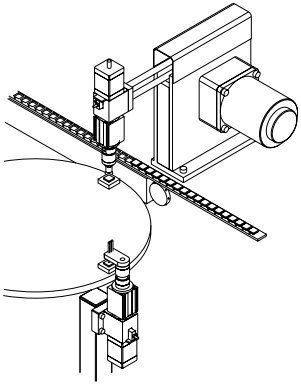
P-2



The probe gently touches circuit boards even in a high-speed operation. It enables stable test.

### For pick and place operation and inspection process

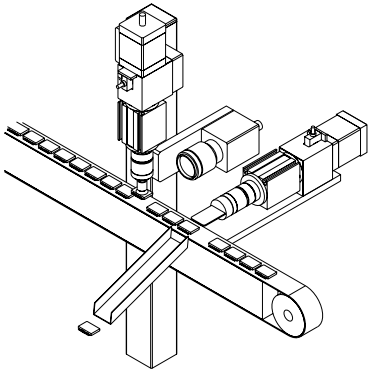
P-2



When used in the Z-axis of a pick & place unit, it enables high-speed, shock-free conveyance that cannot be achieved with an air cylinder.
Place this unit under a working surface and use it for the up and down movement in an inspection process. It becomes a device that provides excellent workability even when running at high speed.

### For image inspection and workpiece pusher

P-2



The unit can be used for image inspection in the pick-up position. It stops gently even in a high-speed operation, ensuring stable inspection.
The operation is quiet even at high speed, which makes the unit a suitable driving source for various units including a workpiece pusher.

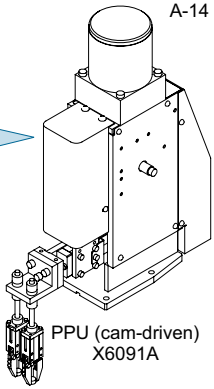
# *Parallel air chuck*

## Fast and stable gripping of workpieces

A-14

ECO-Multi type
X9612-N

Turning the solenoid valve on and off with the photo sensor of the cam shaft.



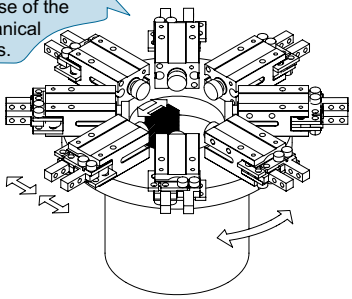
PPU (cam-driven)
X6091A

Combined with the MEG's PPU, it ensures easy-to-control and steady feeding even at a cycle time of 0.8 seconds.

## Clamp jig for index table

A-14

Secure hold because of the mechanical clamps.



ECO-Multi Mecha type
X9612-M

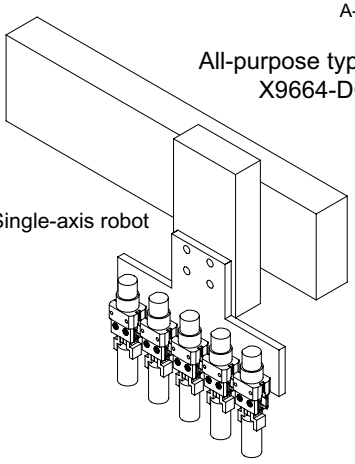
It can be conveniently used to hold workpieces in a space where installing air pipes is difficult.

## Gripping multiple workpieces

A-46

All-purpose type
X9664-DO

Single-axis robot



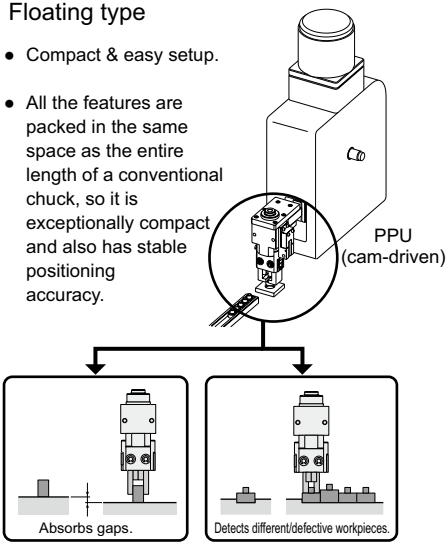
MEG's chuck is designed with a compact body and high gripping force.
Since it can be made one size smaller than the off-the-shelf models, it allows a single-axis robot to be lighter and faster.

## Absorbing feed height differences / Detection of workpiece

A-66

Floating type

- Compact & easy setup.
- All the features are packed in the same space as the entire length of a conventional chuck, so it is exceptionally compact and also has stable positioning accuracy.




Calibration of feeding height is also easy.

The float position sensor allows simultaneous feeding and detection.

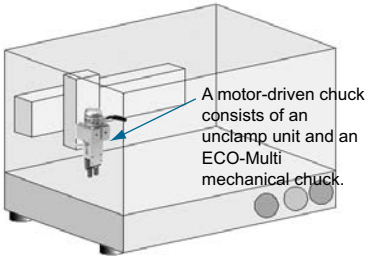
# FA equipment

## Application examples Parallel air chuck

### Holding workpieces in a desktop machine

A-24

Can be operated without air.

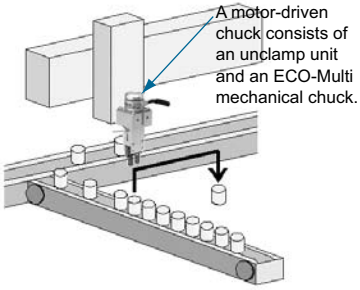



The motor-driven chuck allows easy chucking of small equipment.

### Feeding (unloading) workpieces on a line

A-24

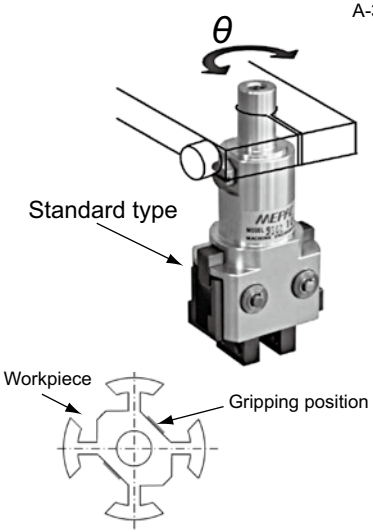
Can be operated without air.




The MEG's motor-driven chuck is super easy! It requires no control settings, and it can be easily added to a line.

### Positioning irregularly shaped workpieces in the θ direction

A-30

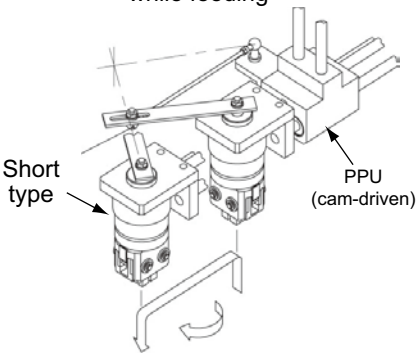



The angle of the jaws can be adjusted according to the workpiece gripping position, ensuring excellent workability.

### Chucking heads made compact

A-60

Example: A head that swings 90° while feeding

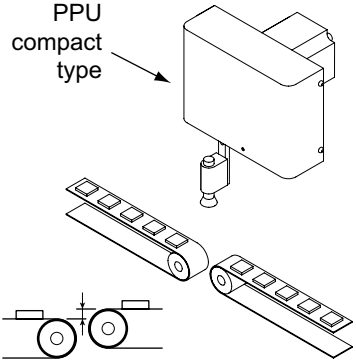



The short type is designed with a minimum height, making the head compact.
It also reduces overhang and helps ensure steady feeding.

# *PPU (pick & place unit)*

## Transfer of workpieces between conveyors

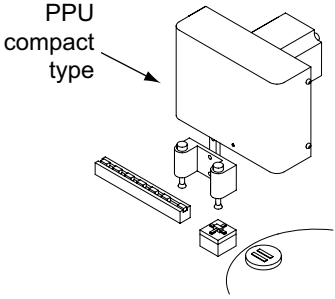
C-12




The compact type allows the user to adjust the stoke of the Z-axis, which is convenient when there are level differences or changes in the height of workpieces.

## Feeding to an index table

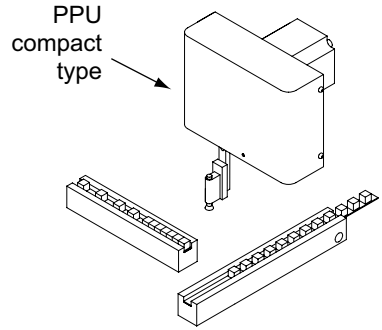
C-12




Stable conveyance is achieved in a compact space by moving workpieces with the double heads, positioning them at the middle station, and transporting them to the next process.

## From a parts feeder to hoop materials

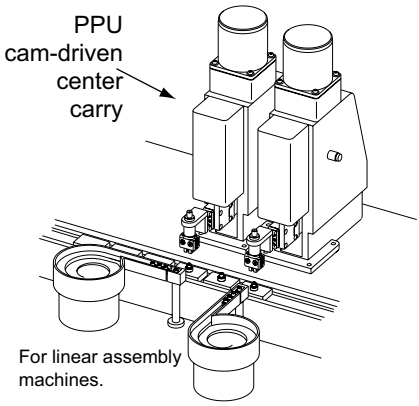
C-12




The cycle time can be as short as 0.3 seconds. Moreover, the mechanism that moves X- and Z-axis with a single motor allows high-speed conveyance with easy control.

## For linear assembly machines

From C-38



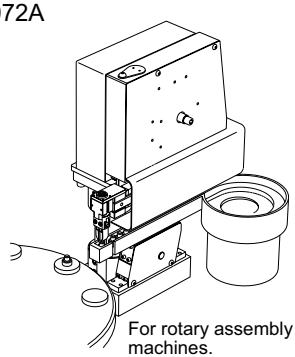

For linear assembly machines.

The shock-free motion of the cam ensures stable feeding of workpieces. The unit is equipped with a motor and mecha-controller (photo & dog) to allow easy setup.

### For rotary assembly machines

From C-38

PPU X6072A



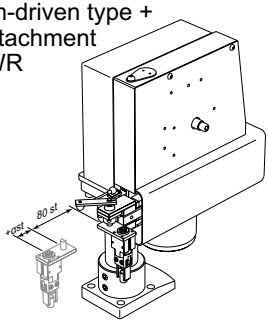
For rotary assembly machines.

The side carry type allows a feeder or chute to be placed under the arm to achieve a compact configuration of equipment around the workpiece.

### Changing the orientation of workpieces/extending the stroke

C-106

PPU cam-driven type + swivel attachment CWL/CWR



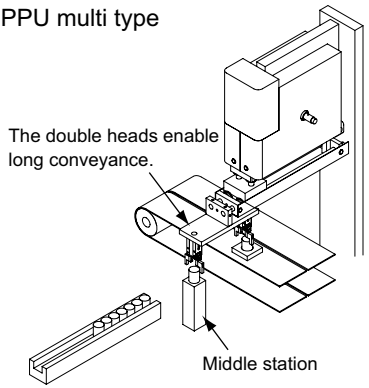

Stroke extension

This unit changes the orientation of a workpiece by 90°. It is convenient when a workpiece does not match the feeder exit orientation or when a layout of equipment needs to be compact.

### Feeding (unloading) workpieces on a line

C-30

PPU multi type

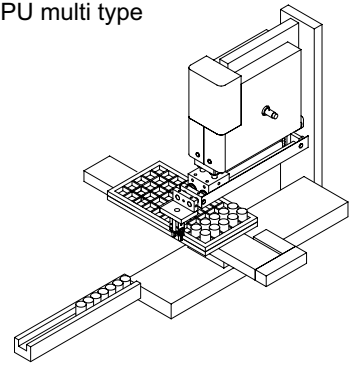



There is an open space under the PPU. By placing a conveyor, etc., the feeding process fits to save space.

### Transfer of workpieces between feeder and pallet

C-30

PPU multi type



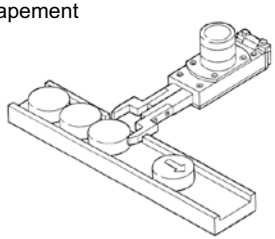
Place a pallet under the arm to achieve compact transfer of workpieces from the pallet to the feeder, or from the pallet to another pallet.

# *Escapement*

## Separation of workpieces on a conveyor

B-2

Escapement

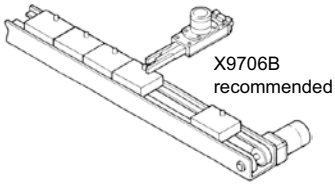


It performs accurate separation in a single action.

## Pallet separation

B-2

Escapement

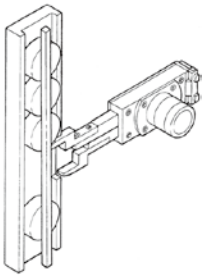



The X9706B is a high rigidity model with the guides incorporated in the front and back ends of the main body.

## Separation of workpieces in a chute

B-2

Escapement

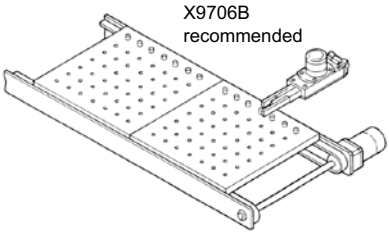


It has a handle that allows manual adjustment when the air is off.

## Tray pitch feed

B-2

Escapement




It allows feeding a pallet one pitch at a time. With your imagination, it can be used in a variety of applications.

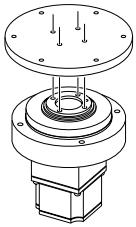
# FA equipment

## Application examples Index/Flexible actuator

### Index table

D-4

Thin-type index unit
X3016

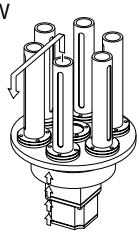


An all-in-one unit with an origin sensor, limiter, and speed adjustment.

### Magazine stocker

D-4

Thin-type index unit
X3016W

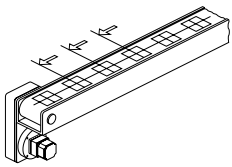


The unit is kept compact with no projections around the indexes.

### Pitch feed conveyor

D-4

Thin-type index unit

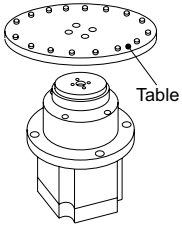


The unit has a manual adjustment axis so that it can be operated even when the power is off, which is convenient for maintenance.

### Multi indexing

E-4

Flexible actuator
X3101

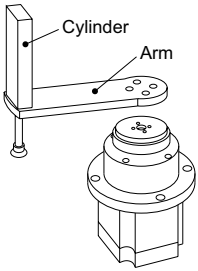



Feeding in increments of 0.1° per pulse enables integer indexing.

### Swivel-type pick & place

E-4

Flexible actuator

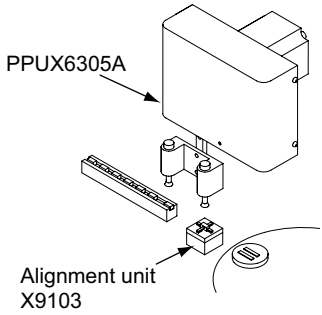



The backlash-free mechanism ensures high accuracy.

# *Alignment/Turn over unit*

## Positioning at the middle station

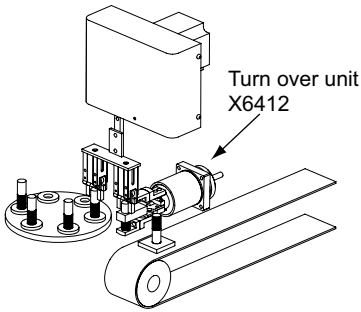
From F-2




☐ With the body being 30 mm, the unit can be mounted in a small space.

## Flip and feed (unloading)

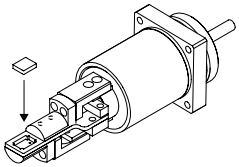
From G-2




The unit is compact but capable of accurate flipping. Easy to control.

## Turning over one workpiece

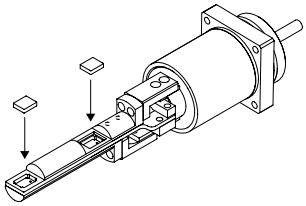
From G-2



It can easily turn over small objects like electronic components to something as large as a mobile phone.

## Turning over two workpieces

From G-2

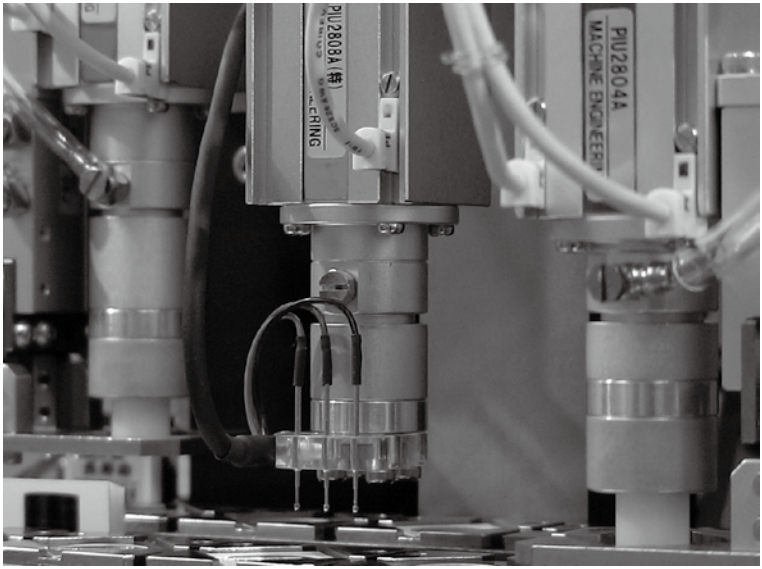


Creative use of tooling enables the unit to handle two workpieces.

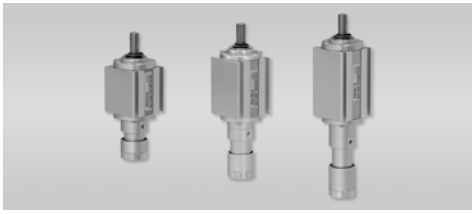
# PIU
## (Pick up unit)

***This "Pick up unit" is an outcome of our pursuit of accuracy in the operation of approaching a workpiece; its performance is marked by low levels of shock in the high-speed range.***

When the input shaft is turned, the head starts moving smoothly, and it stops quietly at the full-forward position. With easy control, it delivers high-speed and high-precision operations including picking up and pushing workpieces as well as various inspections.




Hold a workpiece and pick it up. This seemingly simple motion involves advanced technology. In the case of accurately lowering a vacuum head to the top surface of a workpiece, for example, it is important to minimize the deflection when the head stops and to gently come in contact with the workpiece in order to avoid applying excessive load to the workpiece and the machine, as well as to prevent mispositioning of the workpiece. Normally an air cylinder is used to move the head vertically, but considering the variation in air pressure and sliding friction, it is not possible to deliver a soft stop with the same accuracy every time. At MEG, we have combined the advance cam mechanism and reliable air device technology we accumulated over the years to create a unit that gently picks up minute and fragile workpieces at ultra high speed. Our unique mechanism improves the transferring of minute workpieces, which was previously considered unstable by definition. We recommend MEG's pick up unit for your labor-saving machinery projects.



PIU28

PIU42

Auxiliary guide

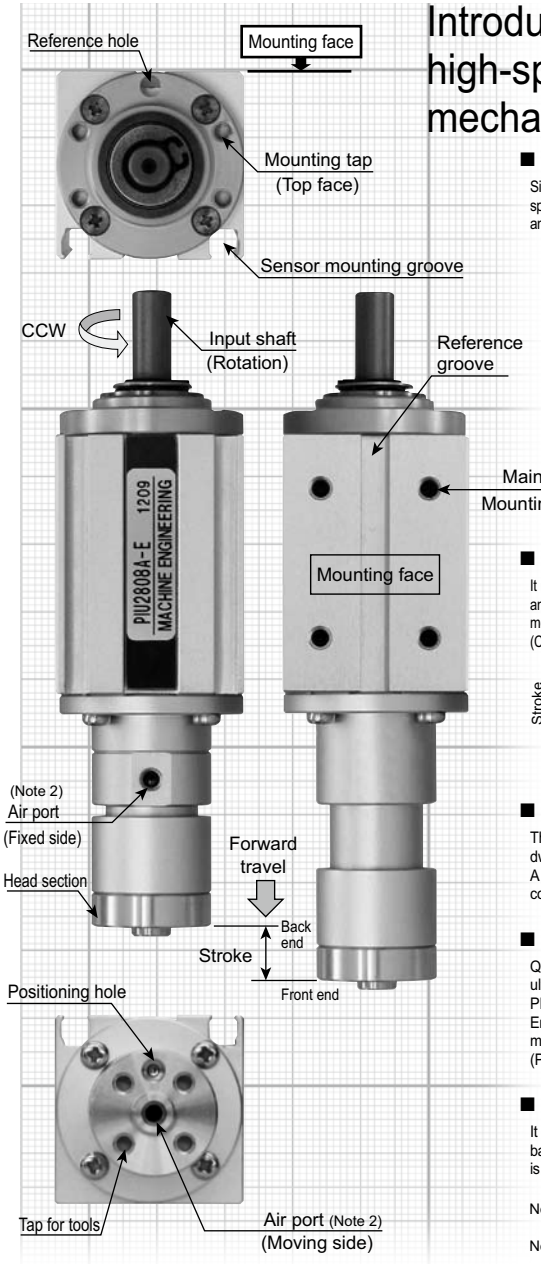
Stepping motor & motion controller with origin sensor

## Pick up unit

Index

# Maximum speed of 0.03 seconds per cycle

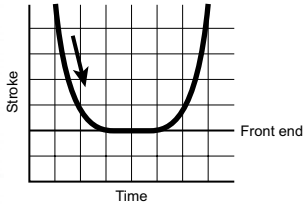





## Introducing a remarkably high-speed, shock-free mechanism!!

### ■ Ultra high-speed motion

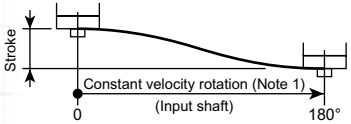
Simply by rotating the input shaft continuously at a constant speed, the cam mechanism accurately controls the acceleration and deceleration in the ultra high speed range. (Note 1)




Not affected by the motor's overshoot.

### ■ Soft stop at the end of travel

It moves smoothly even at high speed. Unlike air cylinder and screw-operated types, this is a shock-free mechanism with reduced deflection at the end of travel.
(Cam curve section)




### ■ Easy control

The internal mechanism performs a return-dwell-rise-dwell motion in a single rotation. (Note 1)
A position sensor can also be attached to enable easy control.

### ■ Low noise & energy saving

Quiet operation. It is 45 dB even when running at an ultra high speed of 30 ms/cycle. (When the PIU2804A-E is measured one meter away from it.)
Energy-saving: Even for a continuous operation at 30 ms/cycle, it can be driven by a 15 W brushless motor. (PIU28)

### ■ Anti-drop

It is mechanically designed with a dwell section at the back end so that the head will not drop when the power is lost during an up and down operation.

Note 1: In the case of the operational specification "E," continuous rotation.
Note 2: Only the air port type is designed with air ports.

## Variations in the series

| Model | Unit dimension (mm) | Standard stroke (mm) |
|---|---|---|
| PIU28 | □28 | 4 8 12 20 |
| PIU42 | □42 | 4 8 12 20 |

| Shaft specification | Operational specification | Position sensor | Motor/origin sensor |
|---|---|---|---|
| With air ports | Continuous rotation | Non-contact two-wire | Stepping motor |
| Ball bushing | Free stroke | Non-contact three-wire | Special specification |
| | Full-forward position adjustment | | |

## Shaft specification

### A With air ports

**Worry-free with the fixed piping**

With the air port type, air pipes are connected to the fixed part of the main body so that they cause no resistance during a travel and raise no concerns about pipes falling out or breaking.

Slide guide

### B Ball bushing

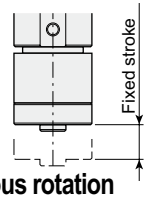
**High rigidity of the shaft**

The ball bushing type is suitable for applications in which offset load is applied or the unit overhangs sideways.

Ball bushing guide

## Operational specification

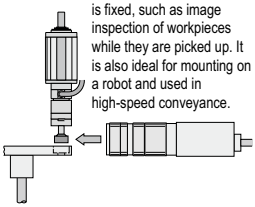
### E



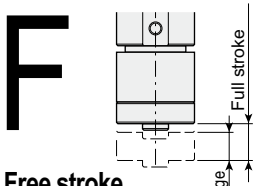

**Continuous rotation**

This is an easy-to-control mechanism designed to ensure high speed and shock-free motion.

The continuous rotation type is suitable for operations to be performed while the unit is fixed, such as image inspection of workpieces while they are picked up. It is also ideal for mounting on a robot and used in high-speed conveyance.

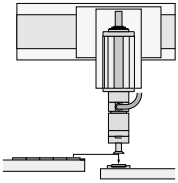


### F



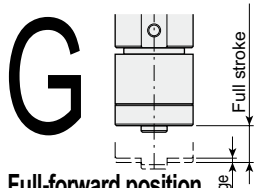

**Free stroke**

The fixed pitch feed range is designed wide in order to give the stroke an extra degree of freedom. It is a mechanism using sliding stem control with enhanced versatility.



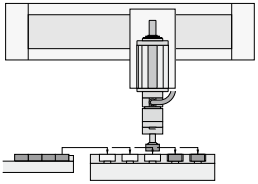
Specification F ensures accurate feeding even when transferring workpieces to a surface at a different height.

### G



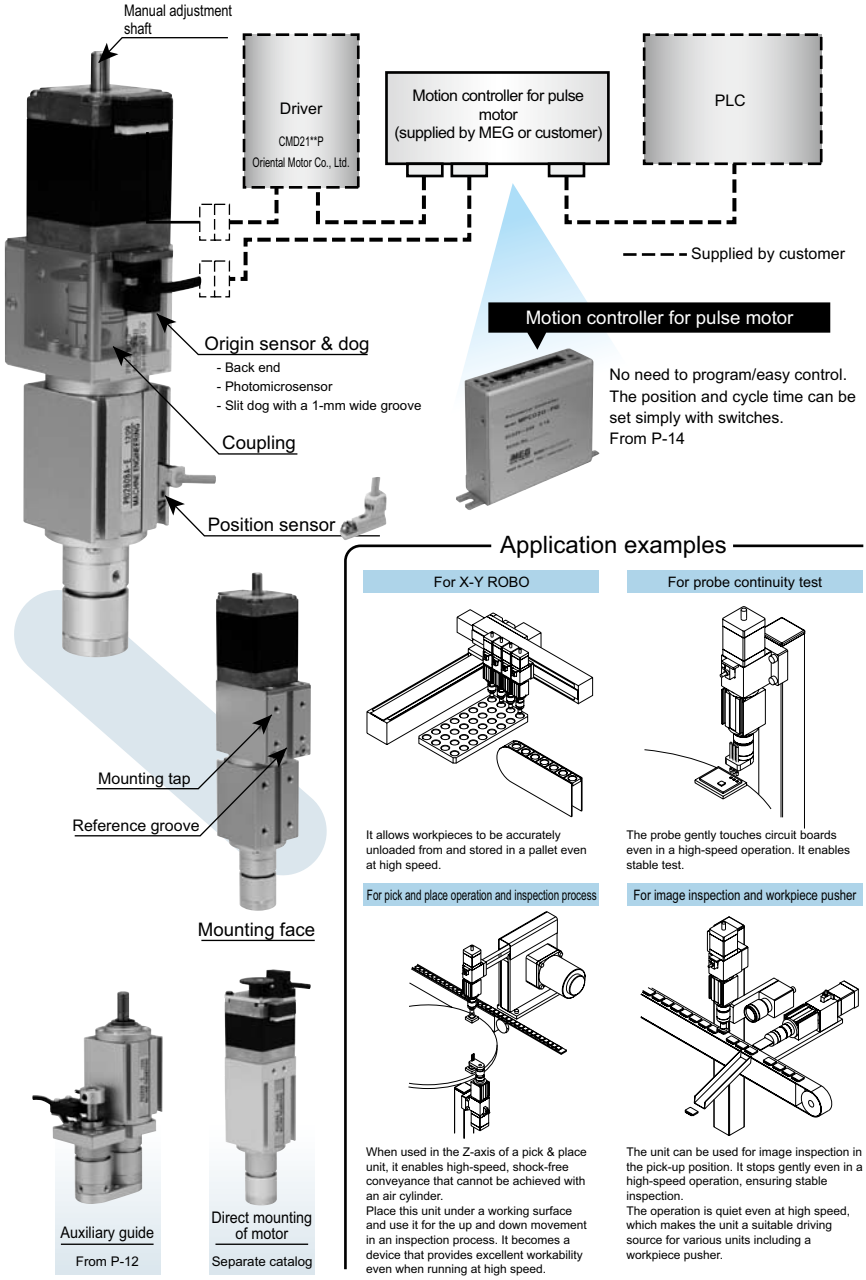

**Full-forward position adjustment**

Designed with a focus on low impact and fine-tuning of the stroke. It is a mechanism using simple sliding stem control.



Proper calibration in the transferring of minute workpieces can be achieved by fine-tuning the full-forward position.

# PIU (Pick up unit)
# *Optional parts, peripheral equipment/ application examples*




## Motion controller for pulse motor



No need to program/easy control.
The position and cycle time can be set simply with switches.
From P-14

## Application examples

### For X-Y ROBO



It allows workpieces to be accurately unloaded from and stored in a pallet even at high speed.

### For probe continuity test



The probe gently touches circuit boards even in a high-speed operation. It enables stable test.

### For pick and place operation and inspection process



When used in the Z-axis of a pick & place unit, it enables high-speed, shock-free conveyance that cannot be achieved with an air cylinder.
Place this unit under a working surface and use it for the up and down movement in an inspection process. It becomes a device that provides excellent workability even when running at high speed.

### For image inspection and workpiece pusher

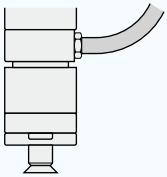
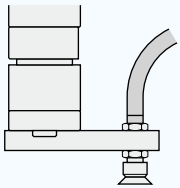


The unit can be used for image inspection in the pick-up position. It stops gently even in a high-speed operation, ensuring stable inspection.
The operation is quiet even at high speed, which makes the unit a suitable driving source for various units including a workpiece pusher.

# Model selection



## ■ Shaft specification

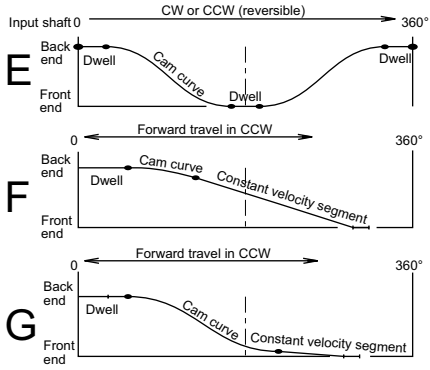
| Shaft specification | Code | Application example | Stability of air tube | Shaft rigidity |
|---|---|---|---|---|
| With air ports | A |  | Excellent stability<br>Built-in air pipe lines | Fair rigidity, not as good as ball bushing<br>Used almost right on the shaft core. |
| Ball bushing | B |  | No air pipes to be set up. | Excellent rigidity<br>- Operates off the head.<br>- Offset load is applied. |

* For enhanced rigidity, an optional auxiliary guide is available for the ball bushing type.

## ■ Operational specification

| Operational specification | Code | Driving | | Operational characteristics | | | Pressing range |
|---|---|---|---|---|---|---|---|
| | | Continuous rotation | Reversible rotation | Soft touch | Stroke freedom | Stroke fine-tuning | |
| Continuous rotation | E | Possible | Possible | ◎ | | | 1 mm to the front end |
| Free stroke | F | | Possible | △ | ◎ | △ | Constant velocity segment |
| Full-forward position adjustment | G | | Possible | ○ | △ | ◎ | Constant velocity segment |
| Remarks | | Note 1 | Notes 2 & 3 | Note 4 | Note 5 | Note 6 | Note 7 |

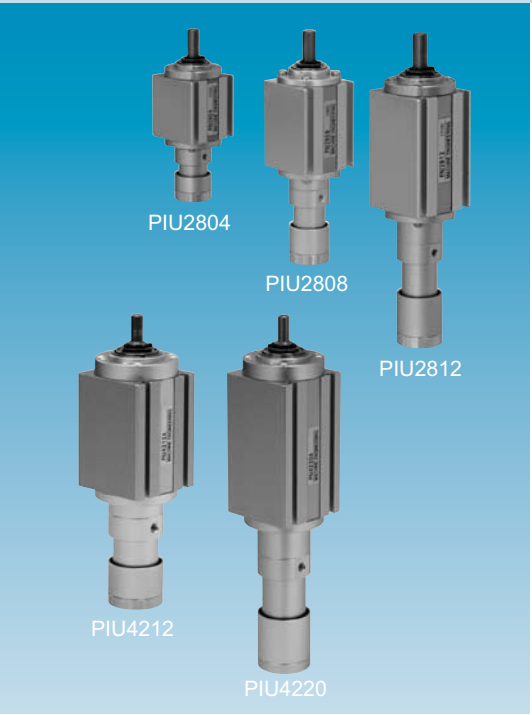
* ◎: Best performance, ○: High performance, △: Low performance




Note 1: With E, the unit can stop at the dwell position.
Note 2: With E, the rotation is reversible in increments of 180°.
Note 3: With F and G, the head travels to the constant velocity segment, and reverses the direction of rotation to return to the back end.
Note 4: Soft touch refers to the ability to handle workpieces with low levels of shock in the high-speed range.
Note 5: F and G can be changed in the constant velocity segment.
Note 6: G can be adjusted to the 1 mm range from the front end (constant velocity segment).
Note 7: The pressing range is where the buffer of the vacuum head and other types of load can be applied in the axial direction.

# PIU (Pick up unit)

## PIU28 PIU42




- When the input shaft is turned, the head starts moving smoothly. The cam curve ensures accurate operation with easy control.
- A wide variety of models are available. You can choose the most suitable model for your application.
- A wide variety of options are available. For the latest information, please visit our website.

### ■ Variations

| Model No. | Standard stroke (mm) | | | |
|---|---|---|---|---|
| | 4 | 8 | 12 | 20 |
| PIU2804 | × | | | |
| PIU2808 | | × | | |
| PIU2812 | | | × | |
| PIU4212 | | | × | |
| PIU4220 | | | | × |

* The stroke varies depending on the operational specification.

### Product number configuration

PIU2808 [A] - [E] - [SS] - [ ] - [MSO] [24B]

PIU model No.

**Shaft specification**
A: With air ports
B: Ball bushing

**Operational specification**
E: Continuous rotation
F: Free stroke
G: Full-forward position adjustment
T: Order

**Position sensor**
No code: None
S: One unit
SS: Two units

**Position sensor specification**
No code: E34L1
E33L1: E33L1
E34L3: E34L3
E33L3: E33L3

| Sensor type | Descriptions | Appearance |
|---|---|---|
| E34L1 | Right angle, 1 m non-contact two-wire lead |  |
| E33L1 | Right angle, 1 m non-contact three-wire lead | |
| E34L3 | Right angle, 3 m non-contact two-wire lead | |
| E33L3 | Right angle, 3 m non-contact three-wire lead | |

**Motor included or not**
No code: Not included
MSO: Motor and origin sensor included
MST: Special specification
* Please contact us for special specifications.

**Motor code**
24B: PK224PB
25B: PK225PB
44B: PK244PB
* Please refer to the motor specifications.

Please also check the latest information on our website.

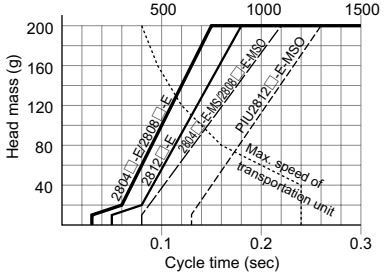


## ■ Basic specifications

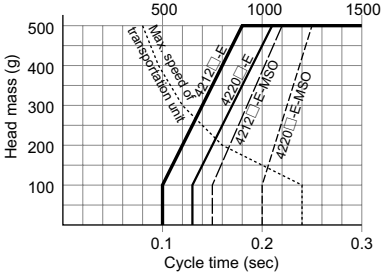
| Product code | PIU2804 | PIU2808 | PIU2812 | PIU4212 | PIU4220 |
|---|---|---|---|---|---|
| Operating method | Translation cam | | | | |
| Stroke (E) | 4 mm | 8 mm | 12 mm | 12 mm | 20 mm |
| Stroke (F/G) | 4.5 mm | 8.5 mm | 12.5 mm | 12.5 mm | 20.5 mm |
| Positioning accuracy (effective value) | ±0.01 mm/±0.03° (θ) or smaller | | | | |
| Clearance in the direction of movement/θ | 0.02 mm/0.7° | | | 0.03 mm/0.3° | |
| Ambient temperature | 10 to 40°C | | | | |
| Lubrication | Grease filled, non-lubrication use | | | | |
| Main body mass PIU****A /B | 90 g/97 g | 110 g/118 g | 127 g/137 g | 370 g/425 g | 463 g/518 g |

## ■ Cycle time and transportable mass

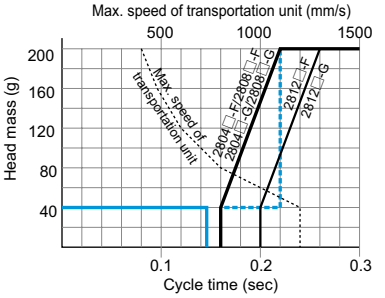
PIU28 Max. speed of transportation unit (mm/s)



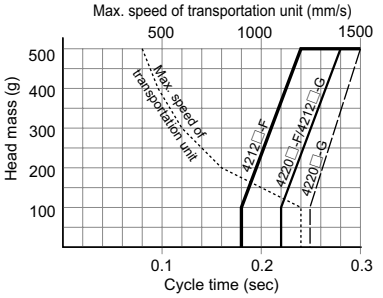

PIU42 Max. speed of transportation unit (mm/s)




Max. speed of transportation unit (mm/s)




Max. speed of transportation unit (mm/s)




How to select:

(1) The intersection of the lines representing the cycle time and the head mass falls in the range of use (on the right side of the line).
Example: PIU2804G with a 40-gram head with a cycle time of 0.15 seconds. ( ——— line)–Usable

(2) The intersection of the lines representing the maximum speed of the transportation unit and the head mass falls in the range of use (on the left side of the line).
Example: 40-gram head at a speed of 1100 mm/s ( - - - - line)–Usable

* The maximum speed of the transportation unit is the moving speed of a transportation robot when the unit is mounted on it.

Please also check the latest information on our website.

Note 1: F and G are the same line for both external input and motor-driven models.

Note 2: F and G stop at the front end for 20 ms.

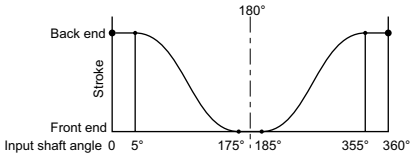
Note 3: The data for E with a motor is based on continuous 360° rotation.

# PIU28 PIU42

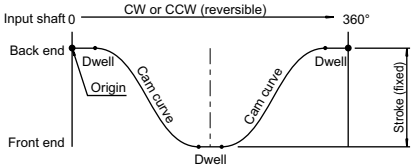


## ■ Operational specification

### E: Continuous rotation

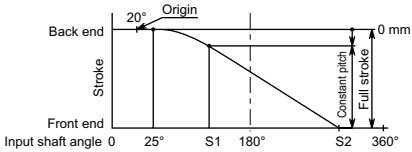



| Basic product code | 2804 | 2808 | 2812 | 4212 | 4220 |
|---|---|---|---|---|---|
| Stroke (mm) | 4 | 8 | 12 | 12 | 20 |
| Cam curve | Modified sine | | | | |
| Direction of input shaft rotation | Free | | | | |



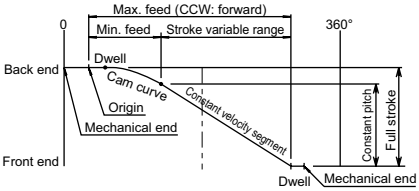

- By starting the rotation from the origin, the unit repeats the cycle of moving forward and returning to the back end.
- The input shaft can be operated in continuous rotation at a constant velocity or in a trapezoidal movement.
- The unit can be stopped in the dwell section.
- It can also be reversed 180°.
- The head will not move in the 10° dwell position at each end of travel even if the power is cut off. (Anti-drop)

### F: Free stroke



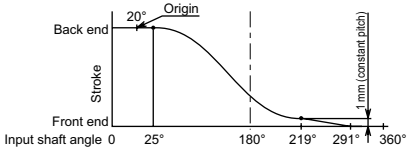

| Basic product code | 2804 | 2808 | 2812 | 4212 | 4220 |
|---|---|---|---|---|---|
| Full stroke (mm) | 4.5 | 8.5 | 12.5 | 12.5 | 20.5 |
| Constant pitch range (mm) | 1 to 4.5 | 2 to 8.5 | 3 to 12.5 | 3 to 12.5 | 5 to 20.5 |
| Pitch feed rate (mm/pulse) | 0.032 | 0.064 | 0.096 | 0.096 | 0.16 |
| Constant pitch start angle (S1) | 129° | 125° | 124° | 124° | 122° |
| Constant pitch end angle (S2) | 323° | 306° | 301° | 301° | 296° |
| Direction of input shaft rotation | Forward travel when rotating CCW | | | | |

1.8°/pulse

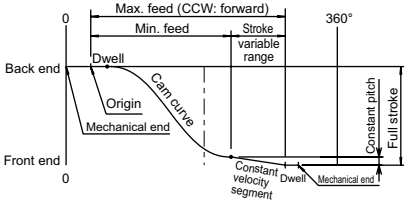



- The travel segment near the back end shows a cam curve, where the unit starts and stops smoothly.
- The input shaft can be operated in a trapezoidal movement.
- The constant pitch range ends at approximately 3/4 mm from the front end.
- Make sure the forward position is set within the constant pitch range.
- The head will not move in the back end dwell position even if the power is cut off. (Anti-drop)
- The front end is designed with a 5° dwell, but normally it cannot be used.
- The unit cannot be used against the mechanical ends.

### G: Full-forward position adjustment



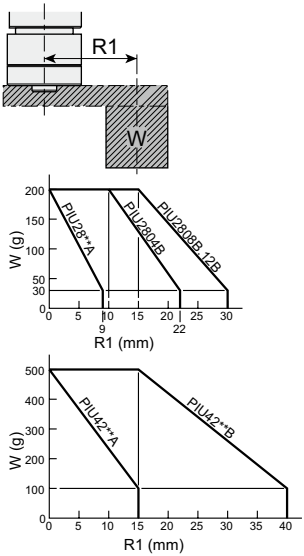

| Basic product code | 2804 | 2808 | 2812 | 4212 | 4220 |
|---|---|---|---|---|---|
| Full stroke (mm) | 4.5 | 8.5 | 12.5 | 12.5 | 20.5 |
| Constant pitch range (mm) | Up to 1 mm from the full-forward position | | | | |
| Pitch feed rate (mm/pulse) | 0.025 mm (at 1.8 step) | | | | |
| Direction of input shaft rotation | Forward travel when rotating CCW | | | | |



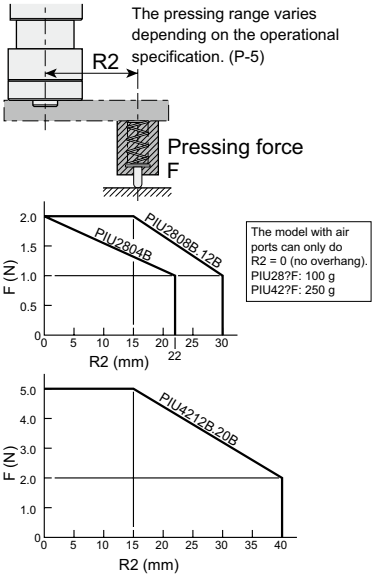

- The unit moves smoothly from the back end to where it enters the constant pitch range, following a cam curve.
- The input shaft can be operated in a trapezoidal movement.
- The head will not move in the back end dwell position even if the power is cut off. (Anti-drop)
- The front end is designed with a 5° dwell, but normally it cannot be used.
- The unit cannot be used against the mechanical ends.



## ■ Transportable mass - Overhang




## ■ Pressing load - Overhang




## ■ Motor specification (MSO)

| Basic product code | PIU2804 | PIU2808 | PIU2812 | PIU4212 | PIU4220 |
|---|---|---|---|---|---|
| Name | Two-phase stepping motor | | | | |
| Manufacturer | Oriental Motor | | | | |
| Model | PK224PB | | PK225PB | PK244PB | |
| Basic step | 1.8° | | | | |
| Max. holding torque | 0.075 N•m | | 0.09 N•m | 0.39 N•m | |
| Rated current (A/phase) | 0.95 A | | | 1.2 A | |
| Frequency of use (max.) | 300 cpm | | 200 cpm | | |
| Product mass PIU****A | 312 g | 332 g | 410 g | 793 g | 886 g |
| Product mass PIU****B | 319 g | 340 g | 420 g | 848 g | 941 g |

Note 1: Continuous running of the above motors is restricted due to heat generation and other factors.
Note 2: The MSO type does not come with a motor driver. Please supply one yourself.

Driver
PIU28: CMD2109P
PIU42: CMD2112P (CMK series)
Set of connection cables: LCS01CMK2

Note 3: The connection cable for the motor (0.6 m) is included. PIU28: LC2U06A PIU42: LC2U06B
Note 4: For more information on the motor, please refer to the CMK series catalog published by Oriental Motor Co., Ltd.

## ■ Origin sensor specification NPN Type

| Sensor name | Photomicrosensor |
|---|---|
| Model (manufacturer) | PM-R24 (Panasonic SUNX) |
| Dog | Slit dog (Light enters at the back end dwell section.) |
| Power supply voltage | 5 to 24 VDC ±10% [Ripple (P-P) 10% or less] |
| Power consumption | 15 mA or less |

See D-15 for details.

## ■ Position sensor specification

| | Non contact sensor type | | | |
|---|---|---|---|---|
| | E33L1 | E33L3 | E34L1 | E34L3 |
| Power supply voltage | 5 to 28 VDC | | | |
| Load voltage | 28 VDC or less | | 10 to 28 VDC | |
| Load current | 0.1 to 40 mA | | 5 to 20 mA | |
| Operation time | 1 ms or less | | | |
| Wiring method | PVC 0.15 mm² 3-core | | PVC 0.2 mm² 2-core | |
| Protective construction | IP67 (IEC standard), JIS C0920 | | | |
| Output protection circuit/Indicator light | Yes/LED (lit when the sensor is on) | | | |
| Applications | For programmable controllers/small relays | | | |
| Cable length | 1 m | 3 m | 1 m | 3 m |
| Mass | 10 g | 31 g | 10 g | 31 g |

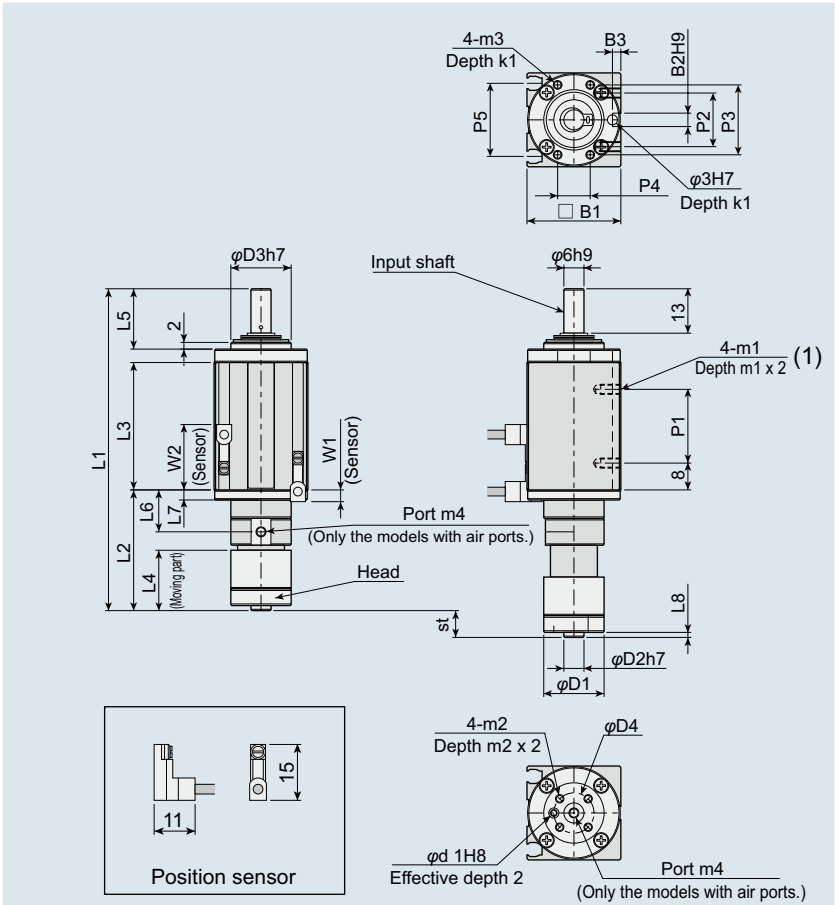
*E33 NPN Type

See A-90 for details.

# PIU28/PIU42



## ■ Dimensional drawing (mm)




| Model No. | Stroke | Length | | | | | | | | Pitch | | | | | Diameter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | st | L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | P1 | P2 | P3 | P4 | P5 | D1 | D2 | D3 | D4 |
| PIU2804 | 4 | 84 | 32 | 30 | 14 | 18 | 8.5 | 3 | 1.5 | 14 | 16 | 20.9 | 9.7 | 21.8 | 18 | 6 | 18 | 12 |
| PIU2808 | 8 | 104 | 44 | 38 | 18 | 18 | 12.5 | 3 | 1.5 | 22 | 16 | 20.9 | 9.7 | 21.8 | 18 | 6 | 18 | 12 |
| PIU2812 | 12 | 124 | 56 | 46 | 22 | 18 | 16.5 | 3 | 1.5 | 30 | 16 | 20.9 | 9.7 | 21.8 | 18 | 6 | 18 | 12 |
| PIU4212 | 12 | 150 | 63 | 58 | 22.3 | 21 | 19.2 | 5 | 2 | 42 | 30 | 32.2 | 15 | 27 | 28 | 10 | 28 | 20 |
| PIU4220 | 20 | 190 | 87 | 74 | 32.3 | 21 | 27.2 | 5 | 2 | 58 | 30 | 32.2 | 15 | 27 | 28 | 10 | 28 | 20 |

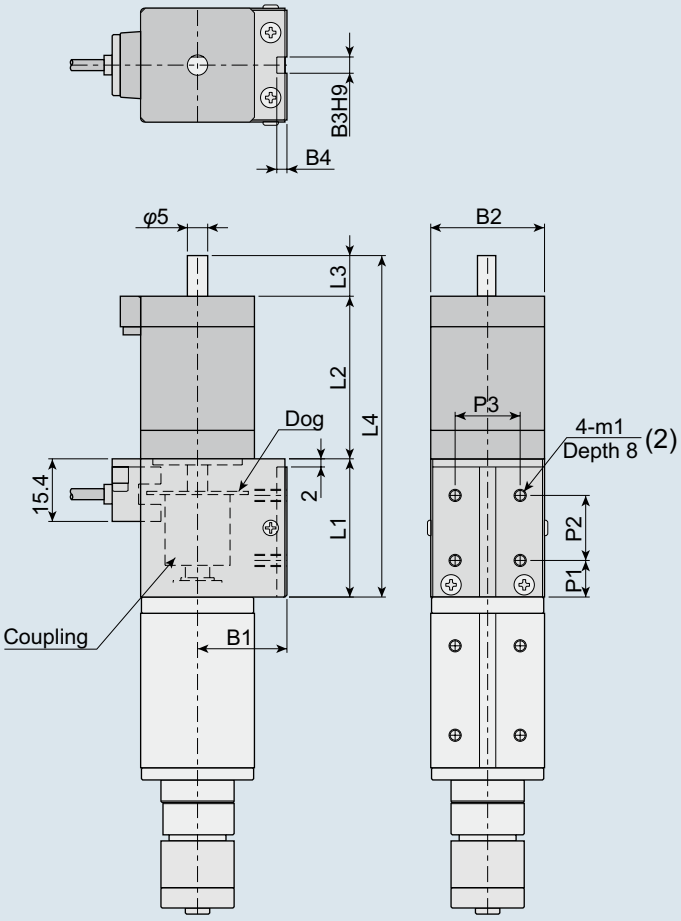
| Model No. | | | | Hole | Tap | | | | | Sensor | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | B1 | B2 | B3 | d1 | m1 | m2 | m3 | m4 | k1 | W1 | W2 |
| PIU2804 | 28 | 4 | 2.5 | 3 | 3 | M2.5 | M2.6 | M3 | 4 | 3.5 | 15.5 |
| PIU2808 | 28 | 4 | 2.5 | 3 | 3 | M2.5 | M2.6 | M3 | 4 | 3.5 | 19.5 |
| PIU2812 | 28 | 4 | 2.5 | 3 | 3 | M2.5 | M2.6 | M3 | 4 | 3.5 | 23.5 |
| PIU4212 | 42 | 6 | 3.5 | 4 | 4 | M3 | M3 | M5 | 8 | -1 | 26.5 |
| PIU4220 | 42 | 6 | 3.5 | 4 | 4 | M3 | M3 | M5 | 8 | -1 | 35 |

* st indicates the standard stroke.
See P-8 for more information.

# PIU□-MSO



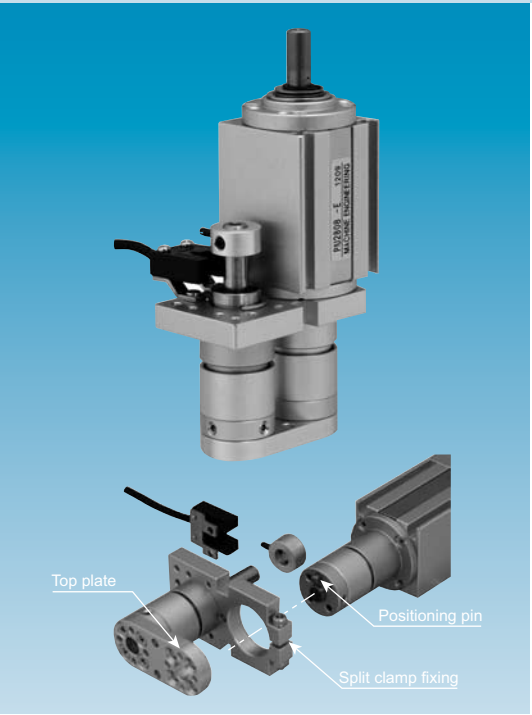
## ■ Dimensional drawing (mm)




| Model No. | Length | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L3 | L4 | B1 | B2 | B3 | B4 | P1 | P2 | P3 | m1 |
| PIU2804□-MSO<br>PIU2808□-MSO | 34 | 42 | 10 | 84 | 22 | 28 | 4 | 2.5 | 9 | 16 | 16 | M3 |
| PIU2812□-MSO | | 51.5 | | 95.5 | | | | | | | | |
| PIU4212□-MSO<br>PIU4220□-MSO | 42 | 39 | 15 | 96 | 31 | 42 | 6 | 3.5 | 11 | 20 | 30 | M4 |

# Auxiliary guide option

## Lateral load bearing/ high-precision support




- The double-axis guide structure offers lateral load bearing and high-precision support.
- It can be combined with the PIU ball bushing B type to endure high rigidity.
- The orientation can be changed freely by 90° when the piece is mounted to the PIU.
- The ball bushing guide enables smooth motion. It is also capable of high-speed operation.
- The setting position detection photomicrosensor enables high-precision detection.

| PIU model no. | Stroke (mm) | Auxiliary guide PSG |
|---|---|---|
| PIU2804B | 4 | × |
| PIU2808B | 8 | × |
| PIU2812B | 12 | × |
| PIU4212B | 12 | × |
| PIU4220B | 20 | × |

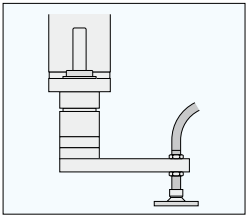
## Product number configuration

PSG2808B C - S

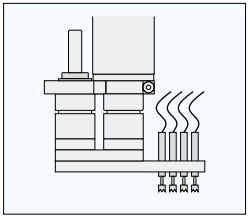
| Auxiliary guide | PIU basic model | Guide shaft specification | Setting position detection photo sensor |
|---|---|---|---|
| | 2804B<br>2808B<br>2812B<br>4212B<br>4220B | No code: Solid shaft<br>C : Hollow shaft | No code: Not included<br>S : Included |

* PIU is not included.
* Please also check the latest information on our website.

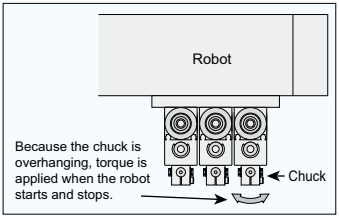
## Application examples



High-accuracy feeding of micro components



Inspection using multiple probes




Robotic transportation subject to a torque load



## ■ Mass (only the auxiliary guide)

(g)

| Product code | PSG | | | | |
|---|---|---|---|---|---|
| | 2804 | 2808 | 2812 | 4212 | 4220 |
| Without sensor | 50 | 56 | 70 | 180 | 240 |
| With sensor | 69 | 75 | 89 | 217 | 277 |
| Mass of moving part | 27 | 30 | 33 | 94 | 111 |

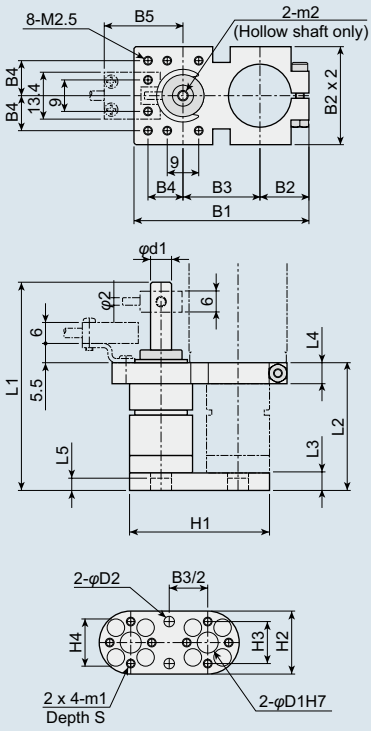
* Not including the mass of the pick up unit.
* The mass of the moving part includes that of the dog.

## ■ Sensor specifications

| | |
|---|---|
| Sensor name | Photomicrosensor |
| Model (manufacturer) | PM-U24 (Panasonic SUNX) |
| Dog | Light shielding dog |
| Power supply voltage | 5 to 24 VDC ±10% [Ripple (P-P) 10% or less] |
| Power consumption | 15 mA or less |

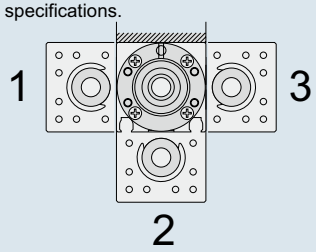
## ■ Dimensional drawing

(mm)




● All-direction assembly

The auxiliary guide can be mounted in any direction according to the equipment specifications.

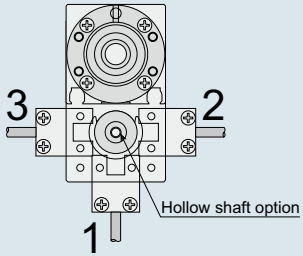



● All-direction sensor mounting

The sensor can also be mounted in any direction according to the equipment specifications.

● Hollow shaft is also available.

It can be used also as an air port.




| Model No. | Length | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L3 | L4 | L5 | H1 | H2 | H3 | H4 | B1 | B2 | B3 | B4 | B5 | D1 | D2 | d1 | m1 | m2 | S |
| PSG2804 | 47.5 | 28.5 | 5 | 6 | 3.5 | 40 | 18 | 12 | 12 | 50 | 14 | 22 | 10 | 22.5 | 6 | 3 | 6 | M2.5 | M3 | 3 |
| PSG2808 | 59.5 | 36.5 | 5 | 6 | 3.5 | 40 | 18 | 12 | 12 | 50 | 14 | 22 | 10 | 22.5 | 6 | 3 | 6 | M2.5 | M3 | 3 |
| PSG2812 | 71.5 | 44.5 | 5 | 6 | 3.5 | 40 | 18 | 12 | 12 | 50 | 14 | 22 | 10 | 22.5 | 6 | 3 | 6 | M2.5 | M3 | 3 |
| PSG4212 | 78 | 50 | 6 | 8 | 4 | 62 | 28 | 20 | 18 | 74 | 21 | 34 | 15 | 27.5 | 10 | 4 | 10 | M3 | M5 | 5 |
| PSG4220 | 102 | 66 | 6 | 8 | 4 | 62 | 28 | 20 | 18 | 74 | 21 | 34 | 15 | 27.5 | 10 | 4 | 10 | M3 | M5 | 5 |

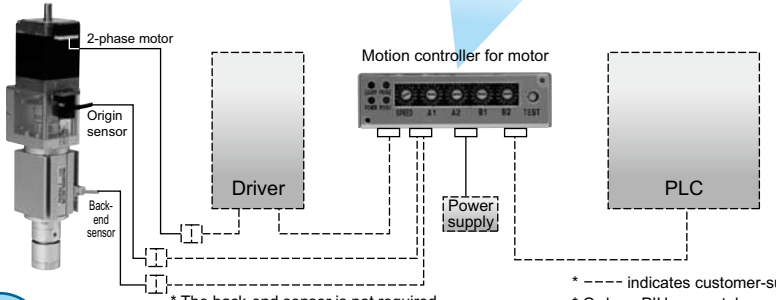
# Motion controller *Selectable motions! No need to program, easy setup.*



We have designed a special motion controller for our pick up unit (PIU) that uses an advance cam mechanism. It can control all three operational specifications of the PIU while maximizing the performance of each motion pattern. Moreover, it is designed with various features to ensure easy and convenient use. We recommend this controller along with our PIU for your labor-saving machinery projects.


NEW

MPC020-PIU




* The back-end sensor is not required in some control methods.

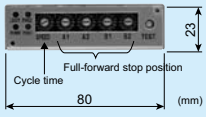
* ---- indicates customer-supplied cables.
* Order a PIU separately.

## Features

### Super easy setup using only switches!

No need to write motion programs!
The position and cycle time can be set simply with switches.

### Compact but full of features with easy setup

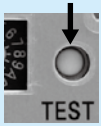



PIU models and operational patterns can be selected with the built-in switch.

### Quick check using the TEST switch!

Operation can be checked with the "TEST" switch even when no signal is input from the PLC.

(1) Return to origin
(2) Step feed





## ■ Compatible with all PIUs

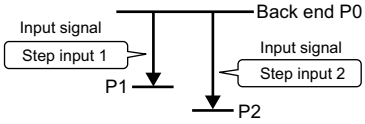
| Model No. | Standard stroke (mm) | Operational specification | | |
|---|---|---|---|---|
| | | E | F | G |
| PIU2804□ | 4 | × | × | × |
| PIU2808□ | 8 | × | × | × |
| PIU2812□ | 12 | × | × | × |
| PIU4212□ | 12 | × | × | × |
| PIU4220□ | 20 | × | × | × |

The model can be switched with the built-in switch.

## ■ The front end can be specified at two different points.

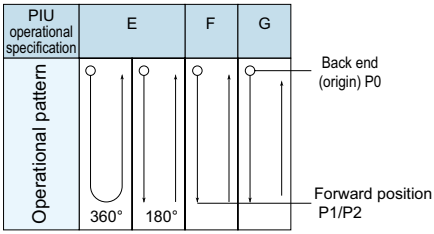
PIU operational specifications F/G

- The input signal enables the head to be sent to two different points.




Switches A1/A2 ..... Position P1 setting
Switches B1/B2 ..... Position P2 setting

## ■ A variety of operational patterns





The operational patterns can be changed with the built-in switch. The operation patterns change in sequence every time the unit receives a step signal.

Operational pattern

| No. | Operation | Operational specification | Return-to-origin method |
|---|---|---|---|
| 1 | 180° feed (P0→P1) | E | 1 |
| 2 | 180° feed (P0→P1) | E | 2 |
| 3 | 360° feed (P0→P0) | E | 1 |
| 4 | 360° feed (P0→P0) | E | 2 |
| 5 | P0→P1 (P2) | F | 1 |
| 6 | P0→P1 (P2) | G | 1 |
| 7 | P0→P1 (P2) | F | 2 |
| 8 | P0→P1 (P2) | G | 2 |

* For the position numbers (P*), please refer to the diagram on the left.
For the operational specifications F and G, both P1 and P2 positions can be specified.
* The unit moves in the sequence indicated by the arrow (→).
* The unit operates in sequence every time a step feed signal is input (every time the TEST switch is pressed).
* Use the upper controller to set the dwell period at the bottom end. (Except for No. 3 and 4)
* For information on P1 (P2) in No. 5 through 8, please refer to the I/O specifications.
* The unit cannot move from P1 to P2.
* For more information on the methods of returning to the origin, please refer to the “Return to origin” section.

## ■ Both the cycle time and stoke can be finely adjusted.

From 0.08 seconds

0.1 mm increments
When the operation specification “F” is selected.

**Operational specifications F/G**


**Example**
Setting the stop position for “F”

**5.0 mm**

1 mm increments
0.1 mm increments

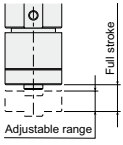
Separate two point setting

Use the TEST switch to actually check the operation!!

Stroke adjustable range

(mm)

| PIU product code | Operational specification | Adjustable range | Adjustment unit |
|---|---|---|---|
| PIU2804 | F | 3.5 | 0.1 |
| PIU2808 | | 6.5 | |
| PIU2812 | | 9.5 | |
| PIU4212 | | 9.5 | |
| PIU4220 | | 15.5 | |
| All models | G | 1 | 0.01 |



# PIU (Pick up unit)

## Motion controller *Selectable motions! No need to program, easy setup.*


- Compatible with all models of PIU
- Operational pattern, position, and cycle time can be set with a switch.
- Two points can be specified for the PIU operational specifications of F and G.

### ■ Specifications

| | |
|---|---|
| Product code | MPC020-PIU |
| Power supply | 22 to 24 VDC 0.1 A |
| Power consumption | Max. 2.4 W |
| Number of control shaft | One shaft |
| Control method | Open loop |
| Operational program | Not required (operational patterns are pre-installed) |
| Operational pattern | Eight patterns (switched with built-in switch) |
| Points to specify | One or two points (depends on operational pattern) Note 1 |
| PPU model selection | Five models (switched with built-in switch) |
| Speed setting | From 0.08 seconds (cycle time) Notes 2 & 3 |
| Return to origin | With “Return-to-origin” signal input |
| Main body mass | 93 g |

Note 1: The position can be changed with the stroke adjustment switch (only for the operational specifications F and G).
Note 2: The unit cannot be operated at higher speed than the basic specification of PIU.
Note 3: The value is applicable when PIU2804□-E/PIU2808□-E are selected.

Product number configuration

MPC020-PIU

Pulse motor controller for the PIU series

### ■ Input/output specifications

| Name | Function |
|---|---|
| Position output 1 | Return the travel points (P1/P2) to the upper controller. |
| Position output 2 | |
| Ready output | Position output, position error output |
| Return-to-origin input | Return to origin. |
| Step feed input 1 | Perform step feed (P0<->P1). |
| Step feed input 2 | Perform step feed (P0<->P2). |

| Position | P0 | P1 | P2 |
|---|---|---|---|
| Ready origin output | × | | |
| Position output 1 | × | × | |
| Position output 2 | × | | × |

Please also check the latest information on our website.



## ■ Cycle time table

Please visit our website.

| PIU product code | PIU2804E | PIU2808E | PIU2812E | PIU4212E | PIU4220E |
|---|---|---|---|---|---|
| Cycle time (sec) | From 0.08 | From 0.08 | From 0.13 | From 0.15 | From 0.2 |

* When No. 3 is selected.

| PIU product code | PIU2804F | PIU2808F | PIU2812F | PIU4212F | PIU4220F |
|---|---|---|---|---|---|
| Cycle time (sec) | From 0.16 | From 0.16 | From 0.2 | From 0.18 | From 0.22 |

| PIU product code | PIU2804G | PIU2808G | PIU2812G | PIU4212G | PIU4220G |
|---|---|---|---|---|---|
| Cycle time (sec) | From 0.16 | From 0.16 | From 0.2 | From 0.22 | From 0.25 |

## ■ Return to origin

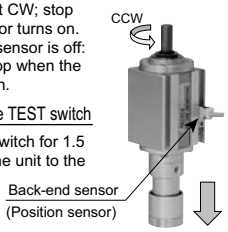
Return-to-origin method No. 1: Using only the origin sensor

- Turn the unit CW, and stop when the origin sensor turns on.
- If the sensor does not turn on after a certain period of time, reverse the direction to CCW. After sending a certain number of pulses, turn the unit CW, and stop when the sensor turns on. (This is to return to origin from near the mechanical back end when using the operational specifications F and G.)

* With the operational specification “E,” the unit may travel to the full-forward position. Make sure there will be no interference with the equipment.

Return-to-origin method No. 2: Using the position sensor in addition

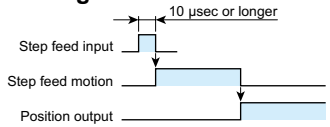
- When the back-end sensor is on: Turn the unit CCW, and once the back-end sensor turns off, turn the unit CW; stop when the origin sensor turns on.
- When the back-end sensor is off: Turn the unit CW; stop when the origin sensor turns on.




Return to origin using the TEST switch

- Pressing the TEST switch for 1.5 seconds will return the unit to the origin.

## ■ Timing chart



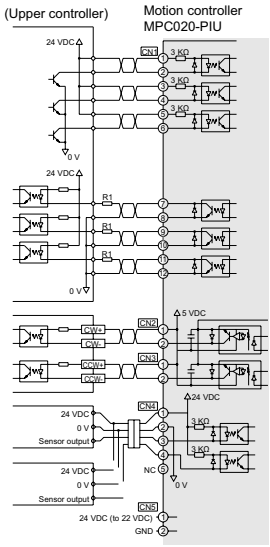

Once the unit returns to the origin, it becomes ready for operation.

## ■ Error display

| Error LED indication | Description |
|---|---|
| Origin sensor error | Sensor not responding |
| Back-end sensor error | Sensor not responding |
| Origin position error (mispositioning detected) | Sensor turns off at origin position |

* To release the origin position error, return the unit to the origin.

## ■ Input/output circuit




| Code | I/O | Pin no. | Signal name |
|---|---|---|---|
| CN1 | Input | 1 | Return-to-origin input |
| | | 2 | |
| | | 3 | Step feed input 1 |
| | | 4 | |
| | | 5 | Step feed input 2 |
| | | 6 | |
| | Output | 7 | Position output 1 |
| | | 8 | |
| | | 9 | Position output 2 |
| | | 10 | |
| | | 11 | Ready output |
| | | 12 | |

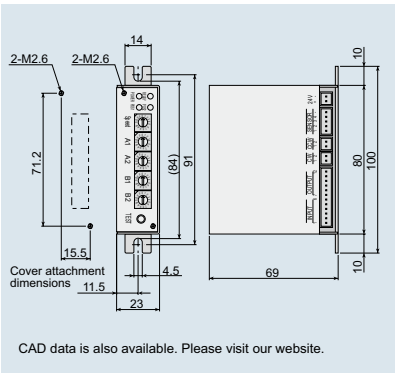
Connect the external resistance R1 if the current value is 10 mA or higher.

| Code | I/O | Pin no. | Signal name |
|---|---|---|---|
| CN2 | Output | 1 | CW+ |
| | | 2 | CW- |
| CN3 | Output | 1 | CCW+ |
| | | 2 | CCW- |

| Code | Pin no. | Signal name |
|---|---|---|
| CN4 | 1 | +V |
| | 2 | 0 V |
| | 3 | Origin input |
| | 4 | Back end input |
| | 5 | Not used |

- Use twisted-pair wires for signals and keep them as short as possible (no longer than two meters).
- Arrange the I/O signal lines at least 100 mm away from power lines (power supply lines, motor lines, etc).

## ■ Dimensional drawing (mm)




CAD data is also available. Please visit our website.

# Precautions

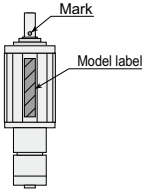


## ■ Precautions for selection

- The main body of the product has a magnet inside. Use caution when installing the product in an environment with materials that are susceptible to a magnetic body (accumulated iron dust, cylinder sensors nearby, workpieces, etc.)
- The input shaft of motor-less models has no origin sensor. Install it yourself as necessary.
- The motor driver of the models with a motor is to be supplied by customer.
- We ask customers to design and manufacturer chucks and vacuum pads.
  Please contact us for the installation of the air chuck.
- The head moves as shown in the “operation timing diagram.” When E (continuous) is in use, the unit can turn both CW and CCW; with F and G, it moves back and forth.
- The unit can be used both vertically and horizontally. When using horizontally, be sure to apply the model number label facing up.
- When using the models with air ports, do not let air out for the purposes including vacuum break. Doing so may cause the grease inside to splash.
- For more information on the position sensor, please refer to A-90.
- In a travel range of about 2 mm from the stroke end, the position sensor turns on even if it is set to the front and back ends.
- The direction of mounting the position sensor on the PIU28□□B (back end/front end) is as indicated in the dimensional drawing.
- A strong thrust is generated near the ends of cam curve travel. If the height of approach to workpieces varies, attach a buffer or other components to the head.
- The unit cannot be stopped outside of the dwell sections or the constant pitch range.
- Do not apply an external rotational load to the head. Install the auxiliary guide (an optional part) if a load is applied in the rotational direction.

## ■ Notes on returning to origin

- The models with a motor sensor have a 1-mm wide slit dog for the detection of the origin. Configure the control so that the unit stops at the position where this dog turns on.
- Do not over-loosen the coupling screws of the models with a motor. It may displace the origin dog and result in interference, failure, or malfunction.
- The input shaft has a mark indicating the origin position. The origin position is shown in the diagram on the right.



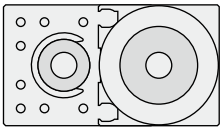

## ■ Precautions for use

- Before use, read and understand the instruction manual for safe and proper operation.
- Wire this product correctly while checking against the “instruction manual.”
- Read also the instruction manual for the motor driver to ensure proper wiring.
- When using the position sensor in the presence of a strong magnetic field, provide a magnetic shield using a steel plate or similar.
- Keep the position sensor away from ferromagnetic objects (such as iron). In general, keep a distance of at least 10 mm between them.
- Attach a safety cover to the driving part (input shaft).
- For the installation of the main body, use the tap shown in dimensional drawing (1). The tapped surface has a key groove. Use the groove as a repetition reference. For the MSO (models with a motor and origin sensor), we recommend using the tap shown in dimensional drawing (2).
- When inserting a key or pin into the key groove, do not hit it or twist it.
- Use a coupling or similar in the connection between a motor and an input shaft to prevent radial and thrust loads from being applied to the input shaft.
- When using the operational specification E, set the dwell section at each end of travel to be the stop position. Starting the unit from the middle of a travel causes an overload, which may result in a malfunction or premature failure of the unit.
- When using the operational specifications F and G, do not stop the unit outside of the dwell section at the back end or the constant pitch range.
- Do not operate the unit in the acceleration/deceleration range while transportation is performed by a robot or similar. This causes unexpected inertia and may result in an operation error or premature failure of the unit.
- Keep the motor's surface temperature at or below 70°C.
- When using a model with a motor, the unit should be stopped at the origin for at least 100 ms.
- When using a model with a motor in an ambient temperature of 15°C or less at the maximum speed range (cycle time and transportable mass table), be sure to give it a warm-up (low-speed run) before starting the operation.
- Make sure the sensor cable is not repeatedly bent or pulled. Use particular caution to avoid a load to the base of the sensor cord by securing it or by other means.



## ■ Auxiliary guide

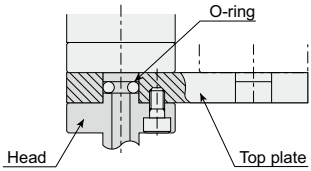
- Make sure that the top plate and base plate are straight when they are mounted to the main body of PIU. Failure to do so will increase the sliding friction and may cause a malfunction.
- When the auxiliary guide is mounted on the front side of the PIU, the position sensor cannot be installed afterward.



- Do not use the sensor dog as an end stopper.
- Do not over-tighten the fixing screws of the base plate attached to the main body of PIU. Doing so will increase the sliding friction of the built-in guide and may cause a malfunction.

| | Recommended tightening torque (N•m) |
|---|---|
| PSG28 | 0.5 |
| PSG42 | 1.0 |

- When attaching an air pipe to a hollow shaft, use an O-ring in the top plate to seal it.




## ■ Controller

Precautions for selection

- Select one of the eight operation motions.
- Use the driver for the micro step settings (1/16). Other drivers may cause a malfunction and other problems depending on their performance. Use the recommended driver.
- Use the upper controller to control the solenoid valve of chucks and vacuum pads.
- The PIU origin sensor is used with this product.
- Only the power supply cable is included. Please provide other connectors and cables yourself. You can use commercially-available cables. Please contact us for detailed information.

| Name | Pin no. | Connector | Terminal |
|---|---|---|---|
| I/O | 12 | 51103-1200 | 50351-8100 |
| CW | 2 | 51103-0200 | |
| CCW | 2 | 51103-0200 | |
| SENSOR | 5 | 51103/-0500 | |
| 24 VDC (power supply) | 2 | 51103-0200 (300 mm cable included) | |

Manufacturer: Molex

- Set up the model and pattern selection switches before you install the body.

## ■ Precautions for use

- Before use, read and understand the instruction manual for safe and proper operation.
- Wire this product correctly while checking against the “instruction manual.”
- Read the instruction manuals for the motor driver and PIU as well to ensure proper wiring.
- Set the stroke and cycle time switch properly by repeating test runs.
- If necessary, create and attach a lid using the two taps (M2.6) to prevent accidental turning of switches after completing the settings. The CAD data is available.
- The unit does not receive input signals for about two seconds after the power is turned on.
- If an origin error occurs, stop the operation and check for any interference or damage. You can reset an error by pressing and holding the TEST switch (for at least 1.5 seconds) or by the external input of return-to-origin signal. (Either way the unit returns to the origin.)

# Applications



## 1. Safety precautions

**⚠ DANGER**

- Do not use the product for the following applications.
  1. Medical devices related to the support and maintenance of human life and body
  2. Mechanisms and machinery used for the purpose of moving and transporting people
  3. Important security components of machinery
     This product is not developed or designed for applications that require a high degree of safety. Use of this product for such applications may cause death.
- Do not use the product in a place where hazardous substances such as combustible or flammable substances exist.
  There is a possibility of the product catching fire.
- Never modify the product. Doing so may cause injury due to abnormal operation, electric shock, fire, etc.
- Do not perform improper disassembly/ assembly that affects the product's basic structure, performance, or functions.
- Do not pour water on the product.
  Pouring water on the product, washing it or using it immersed in water may cause injury due to abnormal operation, electric shock, fire, etc.

**⚠ WARNING**

- Be sure to confirm the safety of the operating range of devices before supplying power to and operating the product. If the power is supplied improperly, there is a risk of electric shock and injury caused by contact with a movable part.
- Keep away from the operating range of machinery when a product is in operation or ready to operate. Failure to do so may result in injury due to unexpected operation of the product.
- Do not touch the terminal blocks or switches while the power is turned on. There is a risk of abnormal operation and electric shock.
- Do not damage any of the cables. Damaging, forcibly bending, pulling, winding or pinching cables, or placing heavy objects on them may cause current leakage, fire and/or electric shock due to poor conduction, abnormal operation, etc.
- Do not throw the product into the fire. The product may explode or poisonous gases may be discharged.
- Be sure to completely remove the supply of electricity before performing various tasks such as maintenance, inspection, service, or replacement.

**⚠ CAUTION**

- Do not apply sudden shocks from outside. Doing so may cause unexpected force to be applied and result in failure of the product or personal injury.
- Do not use this product in places subjected to direct sunlight (ultraviolet light) or dust, iron, iron powder, or in an atmosphere containing organic solvent, phosphate-ester hydraulic oil, sulphurous acid gas, chlorine gas, acids, etc. The product may stop functioning in a short period of time, or the performance may be deteriorated and the lifetime of the product may be significantly reduced.

- Use protective covers to prevent the moving parts of machinery from coming in direct contact with human body.

- As you incorporate the products into your system, add all safety information to the instruction manual of your system and make sure the operators of the system follow the instructions.
  Be sure to add to the instruction manual all new safety information that needs to be provided as a result of the incorporation.