Circular P&P drive **Discontinue**

PPIM/PPIOH/PPIOX

CONTENTS

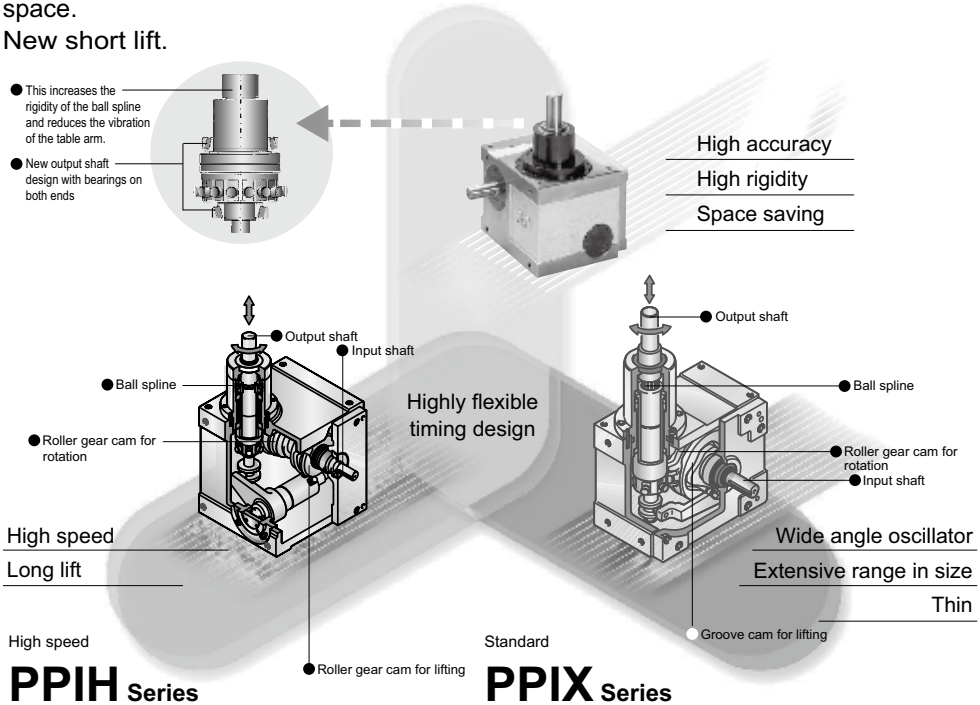
Discontinue

In addition to the transport of various small parts by the P&P drive, the launch of the PPIM Series with a compact, high speed and high accuracy brings enhancement to the lineup.

Compact, high speed, high accuracy

PPIM Series

Achieving high accuracy (indexing accuracy of ±30") and high rigidity in compact space.
New short lift.



High speed

PPIH Series
PPOH Series

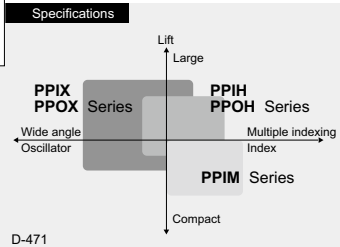
High speed rotation (Max 600 rpm).
Long lift.

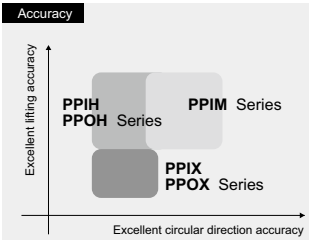
Standard

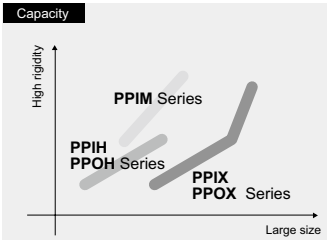
PPIX Series
PPOX Series

Wide angle oscillator offered in an extensive size range.
Thin with max. oscillating angle of 180 degrees.

Circular P&P drive selection guide







Discontinue

Compact, high speed, high accuracy PPIM Series featuring a newly developed output shaft design.

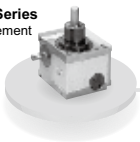
Optimized for conveying compact parts, semiconductor chips and electronic parts at high speed with high accuracy, New Circular Pick & Place drive 3 Series.

Compact, high speed, high accuracy

PPIM Series

Indexing movement

New



- Shaft interval / 63, 80, 110 mm
- Lift / 4 to 15 mm
- Application examples/ Tester and taping machine for semiconductor chips and electronic parts.

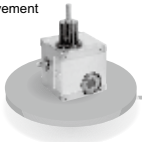
High speed

PPIH Series

Indexing movement

PPOH Series

Oscillator movement



- Shaft interval / 40, 50, 63, 80 mm
- Lift / 5 to 40 mm
- Application examples/ Tester and taping machine for semiconductor chips and electronic parts.

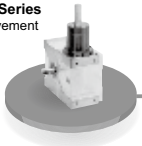
Standard

PPIX Series

Indexing movement

PPOX Series

Oscillator movement



- Shaft interval / 50, 63, 110, 140, 180 mm
- Lift / 5 to 70 mm
- Application examples / transporting small parts such as discs and batteries.

High accuracy (rotation)

Thanks to the new output shaft construction, the circular accuracy is improved and the indexing accuracy of ±30" (seconds) is achieved.

High rigidity

Rigidity of the ball spline is increased and torsion rigidity is doubled. (compared with our previous products)

Space saving

The volume is reduced by half. (compared with our previous models)

High speed rotation

Roller gear cam is adopted for circular motion and lifting, and the input shaft speed allows the max. of 600 rpm (tact 0.1 sec.).

High accuracy lift

Employing the roller gear cam for lifting increases the accuracy in lifting direction.

Multiple index

Standard up to 16 divisions. (single dwell)

High speed, long lift

High speed rotation and long lifting compatible.

Large lift

PPIH and PPOH support the motion up to 40 mm, while PPIX and PPOX support it up to 70 mm.

Wide angle oscillator

Max. oscillating angle of 180 degrees.

Extensive range in size

Shaft interval: Available in 6 sizes of 50, 63, 80, 110, 140 and 180 mm.

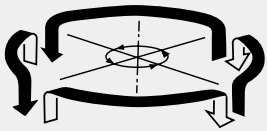
Highly flexible timing design

Flexible timing design since a small index angle can be chosen.

Basic movement

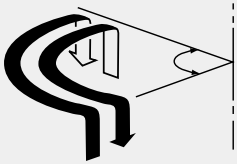
PPIM/PPIH/PPIX

Index P&P movement



PPOH/PPOX

Oscillator P&P movement

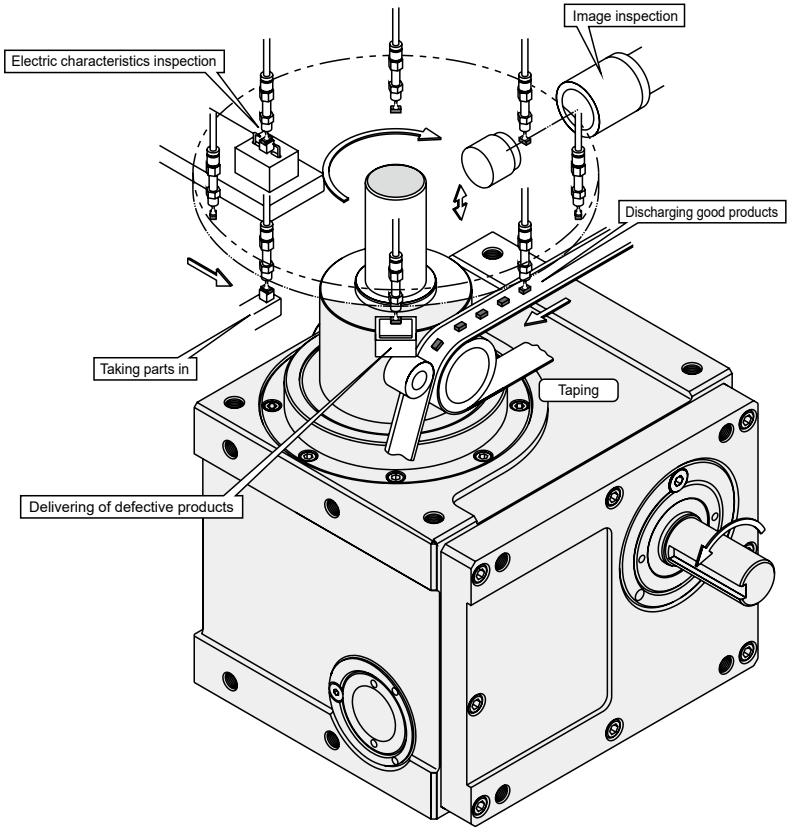


Major applications

- Tester and taping machine for semiconductor chips and electronic parts.
- Conveying small parts and electronic parts at high speed with high accuracy.
- Conveying small parts such as discs and batteries.

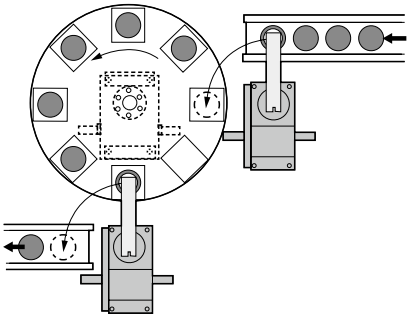
Applications

● Inspection and taping of electronic parts

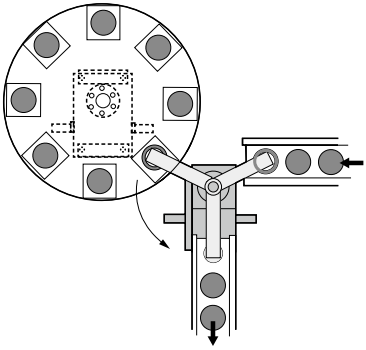


Discontinue

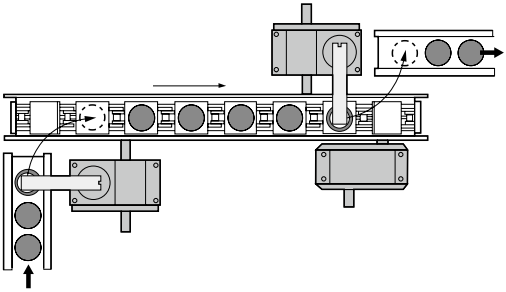
● Pick and place to and from the index table.



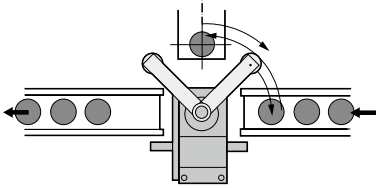
● Pick and place with a single PPIH and PPIX (Index P&P motion).



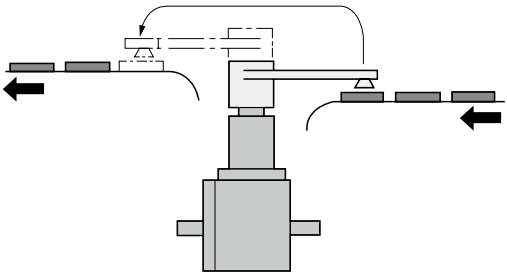
● Supply and transfer from the conveyor.



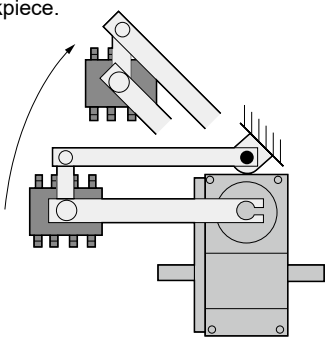
● Supply and transfer with a single PPOH and PPOX (Oscillator P&P motion).



● Lift and transfer to a position in a different path level.



● Lift while maintaining the direction of the workpiece.



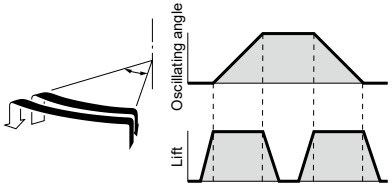
Motion and explanation

Timing chart

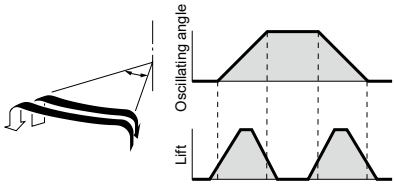
- The timing chart is essential when determining the specifications of a cam P&P drive as well as the model number. (Create the timing chart referring to the examples below.)
- When you drive the input shaft intermittently, set up dwell angle as a standby point as in examples (3) and (4), and determine the timing so that the cycle can be stopped within the dwell interval.
- Use overlap effectively so that load is reduced and work time (dwell interval) is ensured.
- Calculate overlap referring to "Index drive Catalog (Cam curve characteristics table)." (Note that displacement varies depending on the cam curve.)

Motion and timing chart example

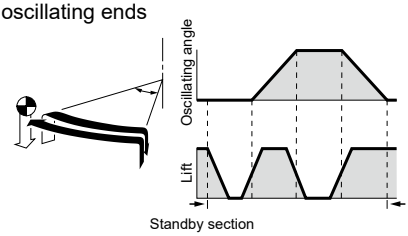
(1) Motion in which rotation and lifting do not overlap in timing



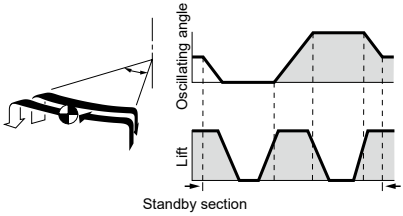
(2) Overlapping motions



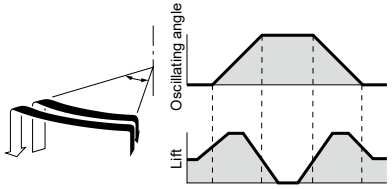
(3) Motion with a standby point (dwell angle) at the oscillating ends



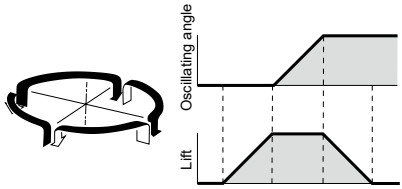
(4) Motion with a standby point (dwell angle) in oscillation



(5) Motion with a different path level (different amount of lift)



(6) Motion as Index P&P



MEMO

Size selection method

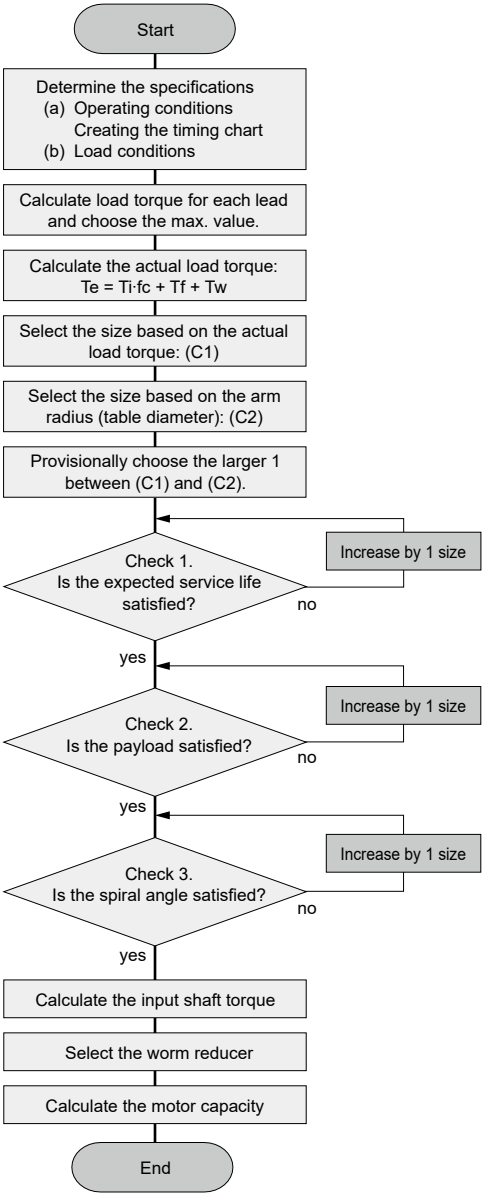
When you select specifications and model of a P&P drive, first determine the following primary specifications.

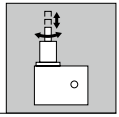
[Operating conditions]
- Oscillating angle (Index number)
- Lift
- Index angle
- Cam curve
- Input shaft rotational speed
- Driving method

[Load conditions]
- Payload
- Arm diameter (Table diameter)
- External load

First, provisionally determine a size comparing the actual load torque applied to the output shaft when the P&P system is run under these conditions with the rated dynamic output torque of the P&P drive and the arm radius (table diameter) with the allowable arm radius (allowable table diameter).
Then, finalize the selection considering the service life, payload and spiral angle.
When you select a P&P drive, you should design the arm diameter to be as small as possible and as light as possible from the beginning. When you create the timing chart, set the index angle large taking advantage of the overlap. Taking all these factors into consideration in designing may help you reduce the size of a P&P drive, which can contribute to saving space and costs.

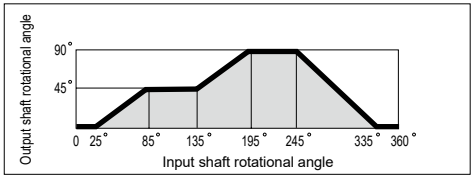
Size selection flow chart





1. Calculating the load torque

Create a timing chart and calculate load torque Tt for each lead range. Choose the max. value.



Three different types of torque, i.e., inertial torque, frictional torque and work torque, apply to the output shaft of a P&P drive. The total of these 3 is called the load torque.

Tt = Ti + Tf + Tw (N·m)

Here, Tt = load torque (N·m)

Ti: Inertial torque (N·m)

Tf: Frictional torque (N·m)

Tw: Work torque (N·m)

(1) Inertial torque: Ti

The inertial torque is the torque required to accelerate/decelerate the arm (table), the jigs and the workpieces mounted on the output shaft during indexing.

The inertia torque can be obtained by multiplying the moment of inertia with the output shaft max. angular acceleration.

Ti = I·α (N·m)

Here, I is the total moment of inertia (kg·m^2).

α: Max. angular acceleration of the output shaft (rad / s^2)

(1) - 1 Total moment of inertia: I

This indicates the total moment of inertia for various objects with an identical center of rotation. Refer to the moment of inertia formulas.

$$I = I\,1 + I\,2 + \cdots\cdots + I\,n \ (kg \cdot m^2)$$

(1) - 2 Max. angular acceleration of the output shaft: α

The max. output shaft angular acceleration can be obtained with a formula which consists of the non-dimensional max. acceleration Am of the cam curve, index number n, index angle θh and input shaft rotational speed N.

■ Index

$$\alpha = Am \cdot \frac{2\pi}{n} \cdot \left(\frac{360}{\theta h} \cdot \frac{N}{60} \right)^2 (rad/s^2)$$

Here, Am = non-dimensional max. acceleration of cam curve.

	MS Modified sine curve	MC Modified constant velocity curve	MT Modified trapezoidal curve	TR trapecloid
Am	± 5.53	± 8.01	± 4.89	± 6.17

n : Index number

θh : Index angle (°)

N : Input shaft rotational speed (rpm)

■ Oscillator

$$\alpha = Am \cdot \frac{\pi \cdot \psi}{180} \cdot \left(\frac{360}{\theta h} \cdot \frac{N}{60} \right)^2 (rad/s^2)$$

Here, ψ is the oscillating angle (°).

(2) Frictional torque: Tf

The friction torque is a torque applying to the output shaft due to friction of the bearing and the sliding surfaces. Frictional torque can be obtained using the following formula.

Tf = μ·Ff·Rf (N·m)

Ff = mg

Here, μ = coefficient of friction

Rolling friction	Sliding friction
μ = 0.03 to 0.05	μ = 0.1 to 0.3

Ff : Force applying to a sliding surface and a bearing (N)

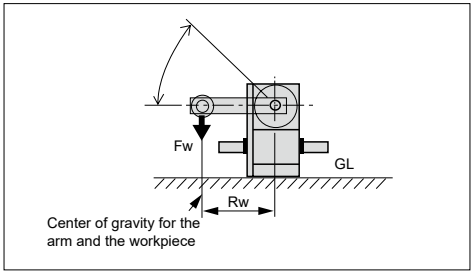
Rf : Average frictional radius (m)

m : Weight (kg)

g : Gravitational acceleration (m/s^2)

(3) Work torque: Tw

When the output shaft does a job while operating or when an external load acts on the output shaft as a load, the total of these is the work torque. For example, when the output shaft is set up to be horizontal, the forces caused by the arm (table), the jigs and the workpieces as eccentric load are to be considered as work torque.



Work torque can be obtained using the following formula.

Tw = Fw·Rw (N·m)

Here, Fw : Force required for work (N)

Rw : Radius for work (m)

(CAUTION)

Compare a torque which applies when the input shaft stops to the rated static output torque.

Size selection method

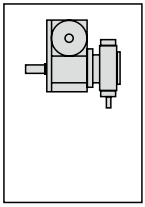
2. Calculating the actual load torque: Te

The load torque mentioned above is the theoretical torque. The actual load torque applying to the output shaft of a P&P drive is greater than this because of the rigidity of the driving system, presence of backlash and the coupling method. Furthermore, how the unit is used critically affects it. Hence, you should calculate the actual load torque taking the usage factor for your operational conditions which you have obtained through experience into consideration.

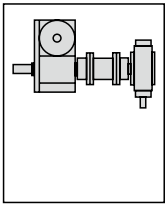
Te = Ti·fc + Tf + Tw (N·m)
Here, fc = Usage factor

(Table 1) Usage factors for various driving methods

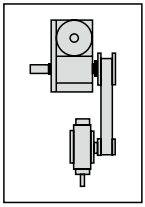
Input system driving method	Reduction ratio of the reducer	
	≤ 1/20 1/10, 1/20	Exceeding 1/20 1/30, 1/40 1/50, 1/60
Direct worm (1)	1.6	1.5
Direct worm (2)	1.7	1.6
Indirect worm	2.1	1.9
Geared motor	3.7	3.7



Direct worm (1)
Worm reducer is directly mounted on the housing.



Direct worm (2)
Connected with a coupler.

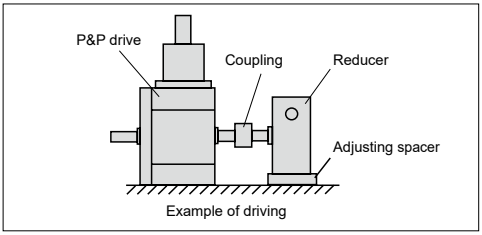


Indirect worm

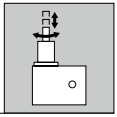
(CAUTION)
When you design a system, be sure to give sufficient rigidity for the drive system from the motor to the input shaft of a P&P drive minimizing backlash. This allows you to reduce the usage factors and helps you select the suitable unit size. Backlash in the system may cause vibration while the arm is rotating, shortening the service life of the unit, and damaging the components.

(1) Avoid inserting a camshaft in series between the motor and the input shaft of a P&P drive. If not avoidable, design the system taking the following factors into consideration.
(1) Increase the rigidity of the cam shaft.
(2) Select the connecting method of min. backlash.
(3) Select the motor capacity with a sufficient margin.
(4) Use a timing belt of high rigidity.

(2) When you connect the input shaft of a P&P drive directly to the output shaft of a reducer with a coupling, be sure to use a coupling of high rigidity which does not have backlash. You also have to consider that the center height should be adjustable.



Example of driving



3. Size selection

First, provisionally select a size which satisfies the actual load Te from the output torque table. (C1)

Tr ≥ Te

Next, provisionally select a size which satisfies the max. arm radius Rm (max. table diameter Dm). (C2)

Rm ≥ Ra

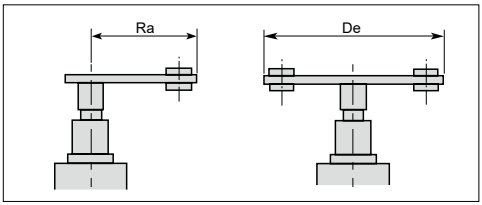
Rm : Allowable arm radius (mm)

Ra : Allowable arm radius (mm)

Dm ≥ De

Dm : Allowable table diameter (mm)

De : Max. table diameter (mm)



SizeC (Shaft interval)		Allowable arm radius Rm (mm)	Allowable table diameter Dm (mm)
PP I H PPOH	040	120	200
PP I H,PP I X PPOH PPOX	050	150	250
PPIM· PP I H,PP I X PPOH PPOX	063	190	320
PPIM· PP I H,PP I X PPOH PPOX	080	240	400
PP I M PP I X PPOX	110	330	550
PP I X PPOX	140	420	700
PP I X PPOX	180	540	900

Provisionally select the larger size comparing C1 and C2.

(Check. 1) Service life: Lh

We design our products to have the service life of 10,000 hours based on the service life for rolling fatigue of the race surface of the cam follower at the input shaft rotational speed at the rated torque.

When you need a service life longer than 10,000 hours, determine the required torque using the following formula taking the service life coefficient into consideration.

$$fh = \frac{Tr}{Te}$$

$$Lh = 10000 \cdot fh^{(10/3)}$$

Here, Tr = dynamic rated output torque (N·m)

fh: Service life coefficient

Lh: Service life hours (h)

Verify the service life is above the expected service life. If it is not, the size of the P&P drive should be increased.

(Table 2) Service life and the coefficient of service life

Lh (h)	fh	Lh (h)	fh
10,000	1.000	40,000	1.516
15,000	1.129	50,000	1.621
20,000	1.231	70,000	1.793
25,000	1.316	100,000	1.995
30,000	1.390		

If you choose a service life longer than necessary when you select a model, the size of the P&P drive will become large, which is uneconomical. Considering the actual time when the input shaft of the P&P drive is operating, choose the economical service life when you design the system.

(Check. 2) Allowable payload: Mm

Allowable payload may vary depending on the vertical lift, index angle and input shaft speed. Confirm that it satisfies the following formula referring to the allowable payload table. If work load applies while lifting, calculate the converted weight and add this to the load torque.

Mm ≥ me

Here, Mm : Allowable payload (kg)

me: Max. payload (kg)

If the above formula is not satisfied, increase the size.

(Check. 3) Spiral angle: βe

Since ball spline is used for the output shaft of the P&P drive the torsion rigidity is small compared to the regular index drive because of its mechanism. If the spiral angle becomes too large, faults such as residual vibration may occur.

To safely use a P&P drive against residual vibration, we recommend calculating the amplitude at the location where the workpiece is mounted based on the rotational torque (actual load torque).

$$\beta e = \frac{180}{\pi} \cdot \frac{Te}{K} (^\circ) \text{ - (Formula - 1)}$$

Here, βe : Spiral angle (°)

K: Torsion rigidity (N·m/rad)

Torsion rigidity: K (N·m/rad)

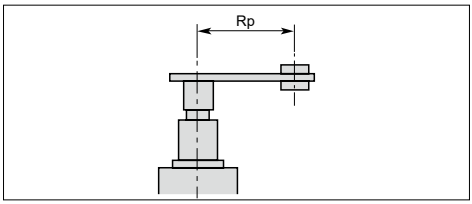
Series	040	050	063	080	110	140	180
PPIM	-	-	15000	40000	60000	-	-
PPIH/PPOH	1200	4200	10000	20000	-	-	-
PPIX/PPOX	-	1200	4200	10000	20000	30000	70000

Size selection method

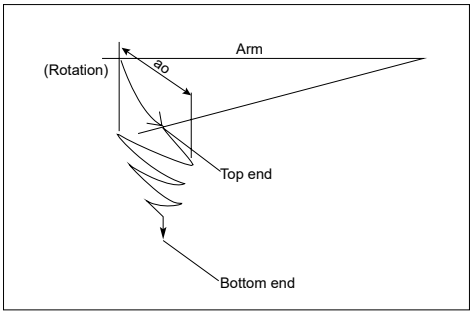
a0 = ±Rp·sin βe - (Formula - 2)

Here, a0 = amplitude (mm)

Rp: Workpiece mounting radius (mm)



Our standard is that a0 should be ±0.1 or less.
The a0 obtained through the above calculation is the value when the actual converted load torque Te applies to the output shaft. Vibration attenuates while it moves from top to bottom. However, if a0 is too large, vibration remains at the bottom dead center.



* The rigidity calculated here is only for the P&P drive, and the rigidity of the arm is not included in the calculation. When the output shaft is stopped and an external force such as torque which includes gravity is to be applied, the 1 and 2 formulae can be used to estimate the actual stopping position which includes torsion.

4. Calculating the input shaft torque: Tc

For general P&P motions, calculate the cam shaft torque for the rotating section and the lifting section, and choose the larger value.
If rotation and lifting motions overlap, choose the sum of these 2 values.

(1) Input shaft torque at the rotating section: Tc1

$$Tc1 = \frac{\psi}{\theta h} \cdot \{Qm \cdot Ti + Vm \cdot (Tf + Tw)\} + Tin$$

Here, ψ = Oscillating angle $\psi = \frac{360}{n}$ (°)

θh : Index angle (°)
Qm: Torque coefficient
Vm: Non-dimensional max. speed
Tin: Internal frictional torque (N·m)

List of Qm, Vm and Am

	MS Modified sine curve	MC Modified constant velocity curve	MT Modified trapezoidal curve	TR trapecloid
Qm	± 0.99	± 0.72	± 1.65	± 1.76
Vm	1.76	1.28	2.00	2.18
Am	± 5.53	± 8.01	± 4.89	± 6.17

(2) Input shaft torque at the lifting section: Tc2

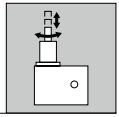
$$Tc2 = \frac{2.06 \times 10^{-3} \cdot Am \cdot Qm \cdot (me+mo) \cdot Lo^2 \cdot N^2}{\theta h^3} + \frac{0.057 \cdot Vm \cdot \{(me + mo) \times 9.81 + Ffl + Fwl\} \cdot Lo}{\theta h} + Tin$$

Here, Lo : Lift (mm)
N : Input shaft rotational speed (rpm)
θh : Index angle (°)
me : payload (kg)
mo : Output shaft inner weight (kg)
Ffl : Force applying to sliding surfaces for lifting (N)
Fwl : Force required for lifting (N)

(3) Input shaft torque when overlapping: Tc

Tc = Tc1 + Tc2 - Tin

(CAUTION)
The input torque obtained here is a torque required to drive the P&P drive. You also have to consider a torque externally applied as load to the input shaft.



5. Selecting the worm reducer

Calculate a torque Ter of the output shaft of the reducer (HO series) using the following formula.

$$Ter = Tc \times fr \ (N \cdot m)$$

Here, Ter = load torque (N·m) of the reducer
Tc : P&P drive input shaft torque
fr : Reducer usage factor
(Refer to Table 3.)

Compare Ter obtained here in the worm reducer (HO series) rated output torque table to verify that the reducer can be used combined with the P&P drive. If Ter is greater than the worm reducer rated output torque in the standard combination, the size of the reducer should be increased. For details, contact CKD.

(Table 3) Reducer usage factor: fr

	Operational hours per day		
	2 time	10 time	24 time
Continuous operation	0.90	1.25	1.50
Intermittent operation	1.25	1.5	1.75

6. Calculating the motor capacity

Calculating the motor capacity: P
You can obtain the motor capacity for the P&P drive itself from the input shaft torque and input shaft rotational speed of the P&P drive.

$$P = \frac{Tc \cdot N}{9550 \cdot \eta} (KW)$$

Here, P = motor capacity (kW)
Tc : Input shaft torque (N·m)
N : Input shaft rotational speed (rpm)
η : Efficiency of the reducer ($\eta < 1$)

* Pr when a worm reducer is used.
Add the motor capacity of the worm reducer itself to the above formula.

$$Pr = \frac{Tinr \cdot Nr}{9550} (KW)$$

Here, Tinr = Internal frictional torque of the reducer (N·m).
Nr : Worm shaft rotational speed (rpm)

The table indicates the relationship between the oil temperature of the HO reducer and its internal friction torque for each size. When we make calculations, we assume the oil temperature to be 10 degrees C unless otherwise stated.

(Table 4) Internal frictional torque of the HO reducer: Tinr (N·m)

HO reducer size	Oil temperature ( ) is viscosity (ISO viscosity grade VG320).			
	5°C (5500 mm^2/s)	10°C (3200 mm^2/s)	15°C (2000 mm^2/s)	20°C (1400 mm^2/s)
HO32	0.30	0.24	0.19	0.16
HO40	0.53	0.42	0.34	0.29
HO50	0.92	0.72	0.59	0.50
HO60	1.5	1.1	0.93	0.79
HO80	2.9	2.2	1.8	1.4
HO100	4.0	3.1	2.5	2.0
HO135	5.7	4.5	3.6	2.9

When you use a worm reducer other than the HO series, add to Pr the value obtained by converting the internal frictional torque given in the technical data into the motor capacity.
In addition, since the viscosity of lubricating oil in the reducer becomes high in the cold climate region or during cold winter mornings, a higher motor capacity will become necessary. As a result, the motor capacity may become insufficient failing to obtain the expected speed. In the worst case, the motor may become stuck.
Therefore, select a motor with sufficient margin for the calculation.

Discontinue

Specification check sheet for selecting a P&P drive

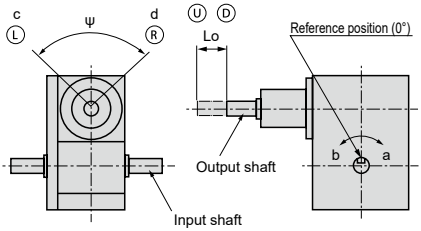
CKD
TO: ( )

Company name		Name	
Department/Section			
TEL		FAX	

Model to be selected: ☐ PPIM ☐ PPIH/PPOH ☐ PPIX/PPOX

Operating conditions

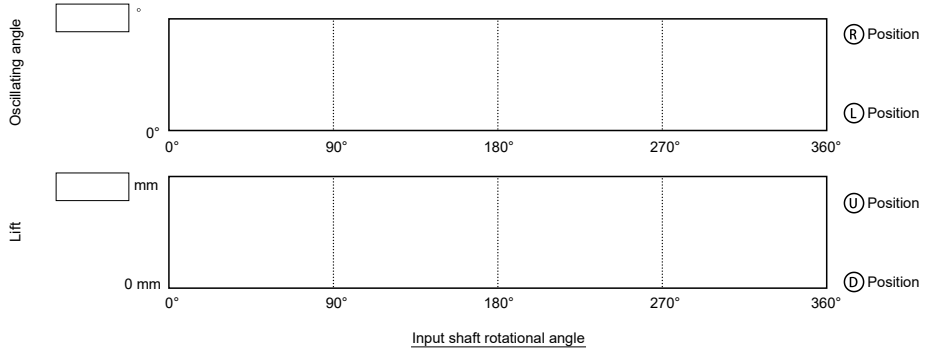
1. Oscillating angle: ψ = [ ] ° or index number: n = [ ]
2. Lift: Lo = [ ] mm
3. Input shaft rotating direction: ☐ Direction a ☐ Direction b
4. Output shaft rotating direction (PPIM/PPIH/PPIX): ☐ Direction c ☐ Direction d
5. Input shaft rotational speed: N = [ ] rpm
6. Cam curve: ☐ MS (standard) ☐ Other [ ]
7. Input shaft driving method
   - ☐ Direct worm (1) [mounting HO, etc.]
   - ☐ Direct worm (2) [worm reducer connected via coupling]
   - ☐ Indirect worm [chain & belt drive]
   - ☐ Geared motor
8. Expected service life [ ] hrs.
   Unless otherwise specified, this will be calculated as 10,000 hours.
9. Timing chart



* Create the timing chart referring to the following points.

• Input shaft reference point (keyway position) • Input shaft rotational direction

• Relationship between the positions of output shaft (L), (R), (D) and (U) and the input shaft rotational angle
(However, for Index P&P motion PPIM/PPIH/PPIX, ignore the positions of (L) and (R).)



Load conditions and others

MEMO

Discontinue

Circular P&P drive Compact, high speed and high accuracy

PPIM Series

● Shaft interval: 63, 80 and 110 mm

Specifications

CAD

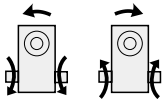
Descriptions		PPIM063					PPIM080					PPIM110				
Swing direction Note 1. Index specifications	Index number Note 2	4	6	8	12	16	4	6	8	12	16	4	6	8	12	16
	Min. index angle °	140	105	75	60	90	160	120	80	60	90	150	100	75	60	90
	Indexing accuracy " (sec.)	±30														
	Repeatability " (sec.)	20														
	Dwell accuracy " (sec.)	30 (dwell angle 90 degrees or less), 60 (dwell angle exceeding 90 degrees) Note 3.														
	Cam curve	MS curve (standard), MC curve, MT curve, Trapecloid curve														
Lift direction	Lift range (mm)	4 to 10										4 to 15				
	Standard lift mm	4	6	8	10		4	6	8	10		4	6	8	10	12	15
	Min. index angle °	32	39	45	50		31	37	43	47		22	27	31	34	37	41
	Stroke accuracy mm	±0.1														
	Repeatability mm	±0.02														
	Cam curve	MS curve														
Input shaft rotational speed rpm		max.600														
Product weight kg		18					32					68				
Oil level ℓ		1.0					1.8					4.0				
Paint color		Silver														

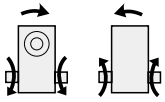
Note 1. For oscillation specifications, contact CKD.
Note 2. For specifications whose index number exceeds 16, contact CKD.
Note 3. When you prefer the specification exceeding dwell angle of 90 degrees with dwell accuracy of 60", contact CKD.
Note 4. For details of accuracy, refer to the page B-30.

How to order

RPIM (A) 063 (B) - 016 (C) 010 (D) S (E) L (F) S (G) 1 (H) - X012345 (I)

(A) Model No.	(B) Shaft interval		(C) Index number (n) and oscillating angle (ψ)		(D) Lift (Lo)		(E) Cam curve		(F) Spiral direction of the cam	
PPIM Index P&P Motion	063	63 mm	PPIM Index number (n)		004 to 015	4 mm to 15 mm	S	MS curve (standard)	PPIM (spiral direction of the cam)	
	080	80 mm							L	Left helix (standard)
	110	110 mm	004	4			C	MC curve (MCV50)		
			006	6						
			008	8			T	MT curve		
			012	12						
			016	16			P	Trapecloid curve		
							*	This indicates the cam curve for the swing direction. When there are more than 1 cam curve, this will be "x".	R	Right helix





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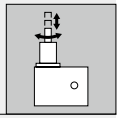
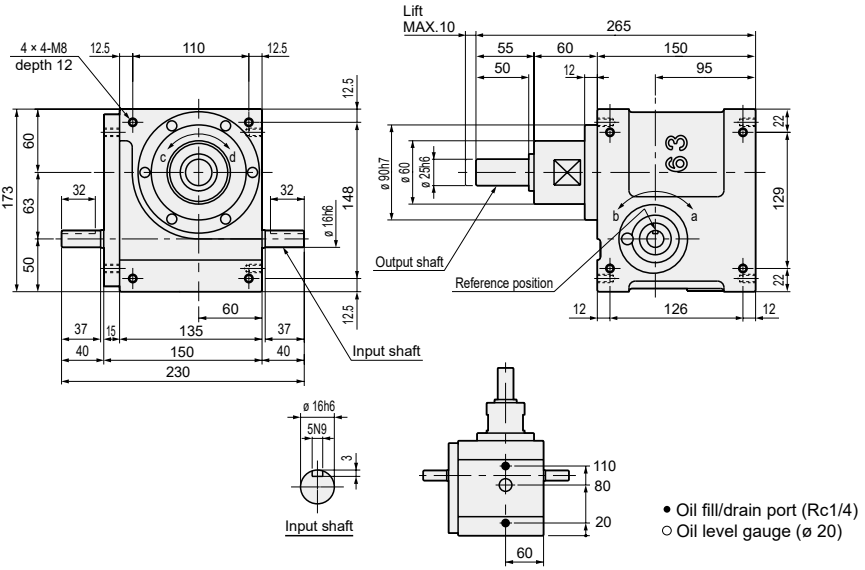


	Ⓖ Shape of the output shaft		Ⓗ Installation position		Ⓘ Special specification No.
	S	Straight (without keyway) * For the following specifications, contact CKD. • With Torque saver	1	Position 1 Output shaft facing upward * For the position other than #1, contact CKD.	* To place an order for a P&P drive, "Special specification number" is required. The special specification model number shall be determined after the consultation with the customer. Mounting options are available upon request. Please provide CKD with the specifications.

Dimensions

CAD

Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	850
Allowable radial force	N	200	1200
Allowable bending moment	N·m	30	-
Torsion rigidity (K)	N·m/rad	15000	-
Moment of inertia	kg·m²	1.49×10^{-3}	2.09×10^{-3}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	5
Output shaft inner weight (mo)	kg	0.8
Product weight	kg	18
Oil level	ℓ	1.0
Paint color		Silver

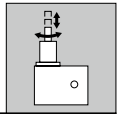
* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Accuracy

Descriptions		Swing direction	Descriptions		Lift direction
		Index			
Indexing accuracy	" (sec.)	±30	Stroke accuracy	mm	±0.1
Repeatability	" (sec.)	20	Repeatability	mm	±0.02
Dwell accuracy	" (sec.)	30 (60)			

Value in parentheses ( ) is when the dwell angle exceeds 90 degrees.

Discontinue



Index P&P

Output torque table

PPIM063 Cam curve/MS												
Index number *n*	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)									
			60	90	120	150	200	250	300	400	500	600
4	140	48.1	21.7	18.4	16.3	14.7	12.6	11.0	9.5	6.6		
	180	67.4	35.5	30.2	26.9	24.5	21.6	19.5	17.7	14.7	12.0	9.3
6	105	17.1	10.6	10.1	9.7	9.3	8.5	7.1	5.7			
	120	17.1	11.6	11.1	10.6	10.2	9.6	8.3	7.0			
	150	17.1	13.0	12.5	12.1	11.7	11.2	9.9	8.8	6.8		
	180	48.1	30.4	25.9	23.1	21.0	18.6	16.8	15.4	13.0	10.9	8.9
8	75	67.4	30.4	25.8	22.8	20.5	17.5	14.9	12.6	8.0		
	90	67.4	34.3	29.2	25.9	23.4	20.4	17.9	15.8	11.8	7.9	
	120	87.7	53.4	45.5	40.5	37.0	32.8	29.6	27.1	22.9	19.3	15.9
	150	87.7	58.6	50.0	44.6	40.8	36.2	32.9	30.4	26.3	23.0	20.1
	180	87.7	62.2	53.1	47.4	43.4	38.6	35.2	32.6	28.6	25.4	22.8
12	60	17.1	11.1	10.5	10.0	9.4	8.4	6.6				
	90	48.1	29.4	25.0	22.2	20.2	17.7	15.7	14.0	11.0	8.1	5.1
	120	48.1	32.3	27.6	24.6	22.4	19.8	17.9	16.3	13.7	11.5	9.3
	150	67.4	48.8	41.6	37.1	34.0	30.2	27.5	25.4	22.2	19.6	17.4
	180	67.4	50.0	43.3	38.6	35.4	31.5	28.8	26.6	23.4	21.0	18.9
16	90	17.1	14.8	14.2	13.7	13.4	12.8	11.4	10.1	7.9	5.8	
	120	17.1	15.9	15.3	14.8	14.5	14.0	12.6	11.5	9.7	8.0	6.4
	150	17.1	16.4	16.0	15.5	15.2	14.7	13.4	12.3	10.6	9.2	7.9
	180	17.1	16.6	16.4	16.0	15.6	15.2	13.9	12.8	11.2	9.9	8.7

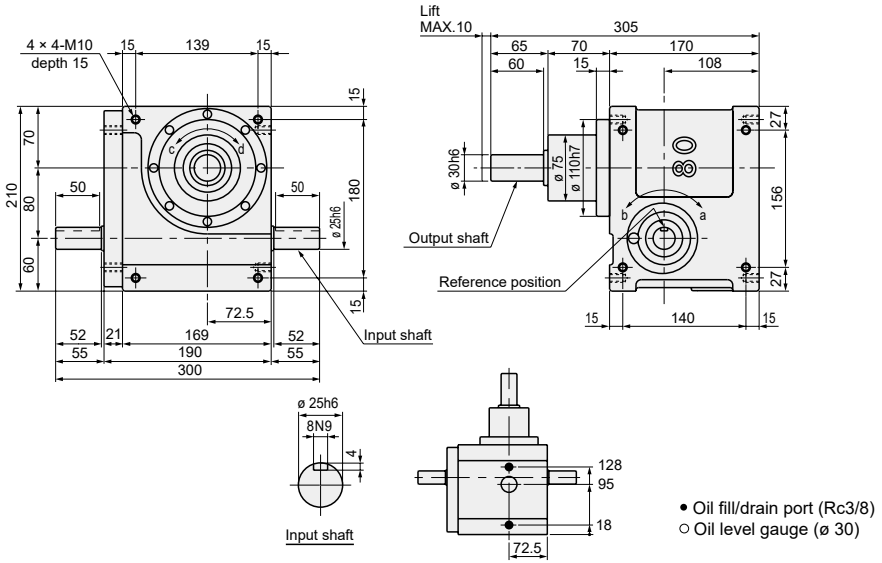
Payload table

PPIM063 Cam curve/MS											
Lift *Lo* (mm)	Index angle *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm)									
		60	90	120	150	200	250	300	400	500	600
4	32	12.0	12.0	12.0	12.0	7.6	5.1	3.5	1.7	0.8	0.3
	50	12.0	12.0	12.0	12.0	12.0	11.7	8.8	5.2	3.2	2.1
	70	12.0	12.0	12.0	12.0	12.0	12.0	12.0	9.9	6.7	4.7
	90	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	10.7	7.9
	120	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
6	39	12.0	12.0	12.0	11.8	7.5	4.9	3.4	1.7	0.8	0.3
	50	12.0	12.0	12.0	12.0	11.7	8.2	5.9	3.3	1.9	1.1
	70	12.0	12.0	12.0	12.0	12.0	12.0	11.1	6.8	4.4	3.0
	90	12.0	12.0	12.0	12.0	12.0	12.0	12.0	10.8	7.4	5.2
	120	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	9.2
8	45	12.0	12.0	12.0	11.7	7.4	4.9	3.3	1.6	0.8	0.3
	60	12.0	12.0	12.0	12.0	12.0	8.7	6.3	3.6	2.1	1.2
	80	12.0	12.0	12.0	12.0	12.0	12.0	10.9	6.6	4.3	2.9
	100	12.0	12.0	12.0	12.0	12.0	12.0	12.0	10.1	6.9	4.8
	120	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	9.7	7.0
10	50	12.0	12.0	12.0	11.4	7.2	4.7	3.2	1.6	0.7	0.3
	70	12.0	12.0	12.0	12.0	12.0	9.4	6.9	3.9	2.3	1.4
	90	12.0	12.0	12.0	12.0	12.0	12.0	10.9	6.7	4.3	2.9
	120	12.0	12.0	12.0	12.0	12.0	12.0	12.0	11.4	7.9	5.6

Dimensions

CAD

● Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	1300
Allowable radial force	N	270	1700
Allowable bending moment	N·m	40	-
Torsion rigidity (K)	N·m/rad	40000	-
Moment of inertia	kg·m²	5.31 × 10^{-3}	5.01 × 10^{-3}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	10
Output shaft inner weight (mo)	kg	1.6
Product weight	kg	32
Oil level	ℓ	1.8
Paint color		Silver

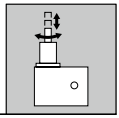
* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Accuracy

Descriptions		Swing direction	Descriptions		Lift direction
		Index			
Indexing accuracy	" (sec.)	±30	Stroke accuracy	mm	±0.1
Repeatability	" (sec.)	20	Repeatability	mm	±0.02
Dwell accuracy	" (sec.)	30 (60)			

Value in parentheses ( ) is when the dwell angle exceeds 90 degrees.

Discontinue



Output torque table

Index P&P

PPIM080 Cam curve/MS											
Index number *n*	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m)								
			Input shaft rotational speed *N* (rpm)								
			60	90	120	150	200	250	300	400	500	600
4	160	163.0	62.5	53.0	46.9	42.4	36.6	31.9	27.6	19.5		
	180	163.0	67.7	57.6	51.1	46.4	40.4	35.7	31.6	24.2	16.9	
6	120	64.8	31.3	26.3	23.0	20.4	16.7					
	150	85.8	50.0	42.5	37.6	34.0	29.4	25.7	22.4	16.1		
	180	85.8	54.7	46.5	41.3	37.6	32.9	29.3	26.2	20.7	15.4	
8	80	116.0	52.8	44.4	38.8	34.3	28.1	22.4	16.8			
	90	163.0	65.5	55.4	48.8	43.7	37.1	31.3	25.9	15.0		
	120	163.0	77.6	65.9	58.5	53.1	46.3	41.0	36.3	27.9	19.6	
	150	176.0	143	130	116	106	94.2	85.4	78.4	67.1	57.7	49.1
	180	256.0	188	161	143	131	117	106	98.2	85.8	76.0	67.5
12	60	64.8	30.1	24.9	21.1	18.0						
	90	85.8	52.9	44.8	39.6	35.6	30.5	26.2	22.2			
	120	116.0	79.1	67.4	59.9	54.6	48.0	43.0	38.9	31.7	25.1	18.5
	150	116.0	84.6	72.1	64.2	58.7	51.9	47.0	43.0	36.5	30.9	25.6
	180	163.0	99.3	85.9	76.7	70.1	62.4	56.7	52.3	45.4	39.8	34.9
16	90	68.4	42.7	36.2	32.0	28.8	24.8	21.4	18.3			
	120	90.6	65.4	55.7	49.6	45.2	39.8	35.8	32.4	26.7	21.5	16.3
	150	90.6	68.3	58.9	52.5	48.0	42.5	38.5	35.3	30.1	25.6	21.5
	180	90.6	69.7	61.1	54.5	49.9	44.3	40.3	37.1	32.2	28.2	24.6

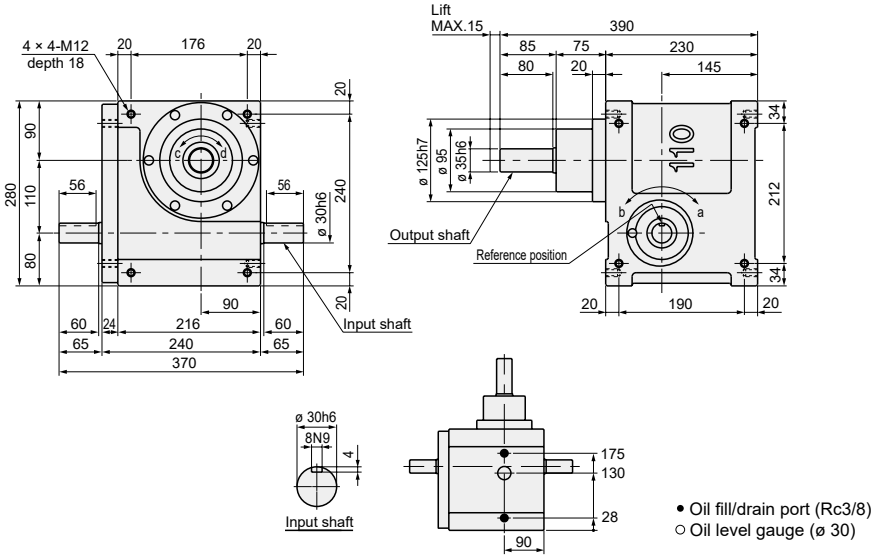
Payload table

PPIM080 Cam curve/MS											
Lift *Lo* (mm)	Index angle *θh* (°)	Rated dynamic payload *Mm* (kg)									
		Input shaft rotational speed *N* (rpm)									
		60	90	120	150	200	250	300	400	500	600
4	31	20.0	20.0	20.0	20.0	12.8	8.4	5.7	2.8	1.3	0.4
	50	20.0	20.0	20.0	20.0	20.0	20.0	15.4	9.1	5.7	3.6
	70	20.0	20.0	20.0	20.0	20.0	20.0	20.0	17.4	11.8	8.3
	90	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	18.7	13.7
	120	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
6	37	20.0	20.0	20.0	19.5	12.1	7.9	5.3	2.5	1.1	0.3
	50	20.0	20.0	20.0	20.0	20.0	14.5	10.4	5.8	3.3	1.9
	70	20.0	20.0	20.0	20.0	20.0	20.0	19.5	11.9	7.7	5.2
	90	20.0	20.0	20.0	20.0	20.0	20.0	20.0	18.9	13.0	9.2
	120	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	16.1
8	43	20.0	20.0	20.0	19.6	12.2	8.0	5.4	2.6	1.1	0.3
	60	20.0	20.0	20.0	20.0	20.0	15.5	11.3	6.3	3.7	2.2
	75	20.0	20.0	20.0	20.0	20.0	20.0	17.1	10.3	6.5	4.3
	90	20.0	20.0	20.0	20.0	20.0	20.0	20.0	14.6	9.7	6.7
	120	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	16.9	12.3
10	47	20.0	20.0	20.0	18.8	11.6	7.5	5.1	2.3	1.0	0.2
	60	20.0	20.0	20.0	20.0	18.2	12.6	8.9	4.8	2.6	1.4
	75	20.0	20.0	20.0	20.0	20.0	18.8	13.9	8.1	5.0	3.1
	90	20.0	20.0	20.0	20.0	20.0	20.0	19.3	11.8	7.6	5.1
	120	20.0	20.0	20.0	20.0	20.0	20.0	19.3	20.0	13.8	9.8

Dimensions

CAD

● Body



• Oil fill/drain port (Rc3/8)
○ Oil level gauge (ø 30)

Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	2800
Allowable radial force	N	300	3400
Allowable bending moment	N·m	50	-
Torsion rigidity (K)	N·m/rad	60000	-
Moment of inertia	kg·m^2	1.6 × 10^{-2}	1.2 × 10^{-2}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	15
Output shaft inner weight (mo)	kg	2.9
Product weight	kg	68
Oil level	ℓ	4.0
Paint color		Silver

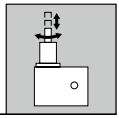
* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Accuracy

Descriptions		Swing direction	Descriptions		Lift direction
		Index			
Indexing accuracy	" (sec.)	±30	Stroke accuracy	mm	±0.1
Repeatability	" (sec.)	20	Repeatability	mm	±0.02
Dwell accuracy	" (sec.)	30 (60)			

Value in parentheses ( ) is when the dwell angle exceeds 90 degrees.

Discontinue



Index P&P

Output torque table

PPIM110 Cam curve/MS												
Index number *n*	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m)									
			Input shaft rotational speed *N* (rpm)									
			60	90	120	150	200	250	300	400	500	600
4	150	235	137.0	125.0	110.0	98.6	83.7	71.0	59.1	35.1		
	180	346	193.0	164.0	145.0	132.0	115.0	101.0	89.3	67.5	45.9	23.2
6	100	151	71.1	59.0	50.4	43.1	31.9	20.6				
	120	151	80.3	67.4	58.6	51.6	41.5	32.0	22.5			
	150	211	104.0	87.9	77.5	69.6	59.3	50.5	42.3	26.1		
	180	211	113.0	95.6	84.7	76.7	66.5	58.3	51.1	37.4	23.7	
8	75	235	132.0	119.0	103.0	90.4	72.0	54.5	36.6			
	90	374	237.0	201.0	177.0	160.0	137.0	117.0	99.4	64.3	27.0	
	120	374	278.0	237.0	210.0	191.0	167.0	149.0	133.0	105.0	78.5	51.0
	150	616	357.0	304.0	271.0	247.0	219.0	198.0	181.0	153.0	128.0	105.0
	180	616	380.0	324.0	289.0	264.0	235.0	213.0	196.0	169.0	147.0	127.0
12	60	211	88.1	72.9	61.8	52.4	37.6	22.5				
	90	211	109.0	91.8	80.6	72.0	60.2	49.9	39.9			
	120	235	203.0	185.0	165.0	150.0	132.0	118.0	106.0	85.4	66.3	47.0
	150	235	216.0	197.0	176.0	160.0	142.0	128.0	117.0	98.6	82.7	67.6
	180	346	274.0	237.0	212.0	194.0	172.0	156.0	144.0	125.0	109.0	95.0
16	90	151	104.0	88.0	77.5	69.6	59.2	50.3	41.9	25.2		
	120	151	112.0	95.2	84.4	76.6	66.7	58.9	52.1	39.7	27.4	
	150	211	132.0	114.0	101.0	92.3	81.4	73.2	66.4	54.9	44.6	34.5
	180	211	134.0	117.0	104.0	95.4	84.5	76.5	70.0	59.5	50.6	42.2

Payload table

PPIM110 Cam curve/MS											
Lift *Lo* (mm)	Index angle *θh* (°)	Rated dynamic payload *Mm* (kg)									
		Input shaft rotational speed *N* (rpm)									
		60	90	120	150	200	250	300	400	500	600
4	22	30.0	30.0	20.0	13.2	7.0	3.6	1.7			
	50	30.0	30.0	30.0	30.0	30.0	25.4	18.6	10.5	6.1	3.4
	70	30.0	30.0	30.0	30.0	30.0	30.0	30.0	21.1	13.9	9.3
	90	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	22.8	16.4
	120	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	27.9
6	27	30.0	30.0	20.0	13.3	7.0	3.6	1.7			
	50	30.0	30.0	30.0	30.0	25.6	17.6	12.3	6.2	3.1	1.2
	70	30.0	30.0	30.0	30.0	30.0	30.0	23.8	14.1	8.7	5.4
	90	30.0	30.0	30.0	30.0	30.0	30.0	30.0	23.1	15.4	10.5
	120	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	26.5	19.4
8	31	30.0	30.0	19.7	13.1	6.8	3.6	1.6			
	50	30.0	30.0	30.0	30.0	19.9	13.1	8.8	4.0	1.5	0.1
	70	30.0	30.0	30.0	30.0	30.0	25.0	18.3	10.3	5.9	3.3
	90	30.0	30.0	30.0	30.0	30.0	30.0	28.6	17.6	11.3	7.3
	120	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.5	20.5	14.5
10	34	30.0	29.6	18.9	12.5	6.5	3.3	1.4			
	60	30.0	30.0	30.0	30.0	22.6	15.2	10.4	5.0	2.2	0.6
	90	30.0	30.0	30.0	30.0	30.0	30.0	23.7	14.0	8.6	5.3
	120	30.0	30.0	30.0	30.0	30.0	30.0	30.0	24.5	16.5	11.3
12	37	30.0	29.2	18.6	12.2	6.3	3.2	1.3			
	60	30.0	30.0	30.0	30.0	19.1	12.5	8.3	3.7	1.3	
	90	30.0	30.0	30.0	30.0	30.0	27.1	20.1	11.5	6.8	3.9
	120	30.0	30.0	30.0	30.0	30.0	30.0	30.0	20.8	13.6	9.1
15	41	30.0	28.6	18.2	11.9	6.1	3.0	1.2			
	60	30.0	30.0	30.0	25.1	15.3	9.6	6.2	2.3	0.4	
	90	30.0	30.0	30.0	30.0	30.0	22.3	16.1	8.8	4.9	2.5
	120	30.0	30.0	30.0	30.0	30.0	30.0	27.4	16.7	10.6	6.8

Circular P&P drive high speed

Discontinue

PPIH/PPOH Series

● Shaft interval: 40, 50, 63 and 80 mm

Specifications

CAD

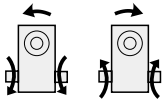
Descriptions		PPIH040/PPOH040						PPIH050/PPOH050						PPIH063/PPOH063							PPIH080/PPOH080						
Swing direction	Index specifications: Index number Note 1	2	3	4	6	8	12	2	3	4	6	8	12	2	3	4	6	8	12	16	2	3	4	6	8	12	16
	Index specifications: Min. index angle °	210	150	90	75	60	60	210	150	90	75	60	45	210	150	90	75	60	45	90	210	150	105	75	60	45	90
	Index specifications: Indexing accuracy " (sec.)	±120												±90													
	Index specifications: Repeatability " (sec.)	30																									
	Index specifications: Dwell accuracy " (sec.)	60																									
	Index specifications: Cam curve	MS curve (standard), MC curve, MT curve, Trapecloid curve																									
	Oscillator specifications: Oscillating angle °	30	45	60	90			30	45	60	90			30	45	60	90				30	45	60	90			
	Oscillator specifications: Min. index angle °	45	60	75	90			45	60	75	90			45	60	75	90				45	60	75	105			
	Oscillator specifications: Indexing accuracy " (sec.)	±120																									
	Oscillator specifications: Repeatability " (sec.)	30																									
	Oscillator specifications: Dwell accuracy " (sec.)	60																									
	Oscillator specifications: Cam curve	MS curve (standard), MC curve, MT curve, Trapecloid curve																									
Lift direction	Lift range (mm)	5 to 18						5 to 25						5 to 30							5 to 40						
	Standard lift mm	5	10	15	18			5	10	15	20	25		5	10	15	20	25	30		5	10	20	30	40		
	Min. index angle °	17	25	30	35			17	24	29	34	38		16	23	28	32	36	39		16	23	32	39	45		
	Stroke accuracy mm	±0.1	±0.2					±0.1	±0.2					±0.1	±0.2						±0.1	±0.2				±0.3	
	Repeatability mm	±0.02																									
	Cam curve	MS curve																									
Input shaft rotational speed rpm		max.600																									
Product weight kg		12						21						36							67						
Oil level ℓ		0.6						1.2						2.0							4.0						
Paint color		Silver																									

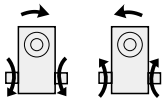
Note 1. For specifications whose index number exceeds 12 or 16, contact CKD.
Note 2. For details of accuracy, refer to the page B-30.

How to order

PPIH (A) 063 (B) - 006 (C) 010 (D) S (E) L (F) S (G) 1 (H) - X012345 (I)

(A) Model No.	(B) Shaft interval		(C) Index number (n) and oscillating angle (ψ)				(D) Lift (Lo)		(E) Cam curve		(F) Spiral direction of the cam and orbit pattern
PPIH Index P&P Motion	040	40 mm	PPIH Index number (n)		PPOH Oscillating angle (ψ)		005 to 040	5 mm to 40 mm	S	MS curve (standard)	PPIH (spiral direction of the cam)
PPOH Oscillator P & P Motion	050	50 mm	002	2	090	90°			C	MCcurve (MCV50)	L Left helix (standard)
	063	63 mm	003	3	060	60°			T	MT curve	
	080	80 mm	004	4	045	45°			P	Trapecloid curve	R Right helix
			006	6	030	30°			*	This indicates the cam curve for the swing direction. When there are more than 1 cam curve, this will be "x".	
			008	8							
			012	12							
			016	16							





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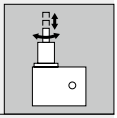
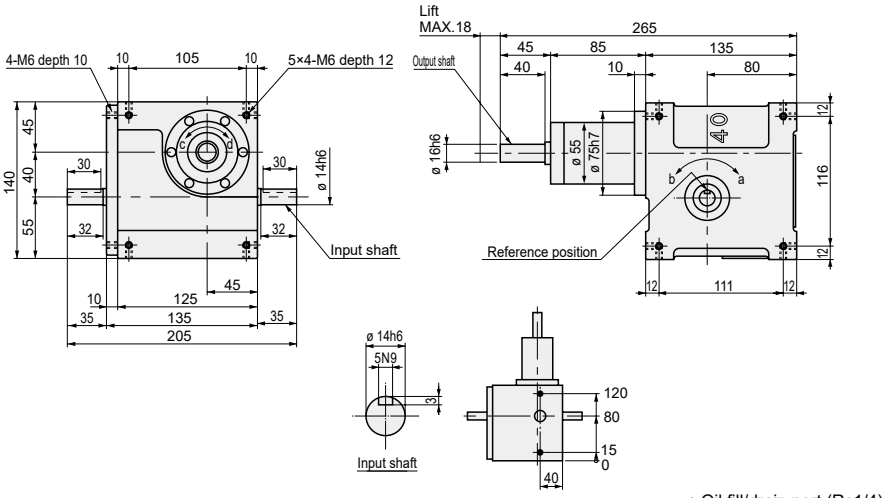


		Ⓖ Shape of the output shaft		Ⓗ Installation position		Ⓘ Special specification No.
PPOH (orbit pattern)		S	Straight (without keyway) * For the following specifications, contact CKD. • With Torque saver	1	Position 1 Output shaft facing upward * For the position other than #1, contact CKD.	* To place an order for a P&P drive, "Special specification number" is required. The special specification model number shall be determined after a consultation with the customer. Mounting options are available upon request. Please provide CKD with the specifications.
T	Standard	When the input shaft starts to rotate from the rotation reference point, the output shaft rotates in sequence from 1 and 2 as in the figure. Output shaft oscillation reference point Input shaft rotation Reference position (0°)				
S	Option	Output shaft oscillation reference point Input shaft rotation Reference position (0°)				

Dimensions

CAD

● Body



● Oil fill/drain port (Rc1/4)
○ Oil level gauge (ø 20)

Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	800
Allowable radial force	N	100	750
Allowable bending moment	N·m	8	-
Torsion rigidity (K)	N·m/rad	1200	-
Moment of inertia	kg·m²	1.32×10^{-4}	6.66×10^{-4}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	5
Output shaft inner weight (mo)	kg	0.4
Product weight	kg	12
Oil level	ℓ	0.6
Paint color		Silver

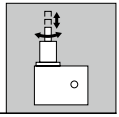
* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Accuracy

Descriptions		Swing direction		Descriptions		Lift direction
		Index	Oscillator			
Indexing accuracy	" (sec.)	±120	±120	Stroke accuracy	mm	*
Repeatability	" (sec.)	30	30	Repeatability	mm	±0.02
Dwell accuracy	" (sec.)	60	60			

* Lift value 6 or less: ±0.1
Over 6 to 18: ±0.2

Discontinue



Output torque table

Index P&P

PPIH040 Cam curve/MS												
Index number *n*	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m)									
			Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
2	210 240	14.7 14.7	7.1 7.6	6.4 6.9	5.5 5.9	4.9 5.2	4.4 4.8	3.9 4.3	3.3 3.6	2.8 3.1	2.3 2.7	2.0 2.3
3	150 180	14.7 14.7	7.3 8.0	6.5 7.2	5.6 6.1	5.0 5.5	4.5 5.0	4.0 4.4	3.3 3.7	2.7 3.2	2.3 2.7	2.3
4	90 120 180	5.8 5.8 14.7	3.6 4.3 8.7	3.2 3.8 8.0	2.7 3.2 6.8	2.4 2.9 6.1	2.1 2.6 5.5	2.3 4.9	4.1	3.6	3.2	2.8
6	75 120 180	14.7 14.7 14.7	7.1 8.7 9.4	6.3 7.8 8.8	5.4 6.7 7.5	4.8 5.9 6.7	4.3 5.4 6.1	3.8 4.8 5.4	2.9 4.0 4.6	2.2 3.4 4.0	2.9 3.6	2.5 3.3
8	60 90 150	5.8 14.7 14.7	4.1 8.7 9.5	3.7 7.7 8.8	3.1 6.6 7.5	2.7 5.9 6.7	2.4 5.3 6.2	2.1 4.7 5.5	3.9 4.6	3.3 4.1	2.7 3.6	2.2 3.3
12	60 90 150	4.0 5.8 5.8	3.4 5.3 5.6	3.0 4.8 5.3	2.5 4.1 4.5	2.2 3.7 4.0	2.0 3.3 3.7	2.9 3.3	2.4 2.8	2.0 2.4	2.2	

Output torque table

Oscillator P&P

PPOH040 Cam curve/MS												
Oscillating angle *ψ* (°)	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m)									
			Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
30	45 60 90	11.8 14.7 14.7	5.5 8.1 8.9	4.2 6.1 6.9	3.5 5.2 5.9	3.1 4.6 5.2	2.8 4.2 4.8	2.4 3.7 4.2	2.9 3.5	2.3 3.0	2.6	2.2
45	60 90 120	14.7 14.7 14.7	6.9 8.2 8.8	5.2 6.3 6.8	4.4 5.3 5.8	3.9 4.8 5.2	3.6 4.3 4.7	3.1 3.8 4.2	3.3 3.1 3.5	2.6 3.0	2.1 2.6	2.3
60	75 90 120	14.7 14.7 14.7	6.7 7.4 8.2	5.1 5.6 6.3	4.4 4.8 5.4	3.9 4.3 4.8	3.5 3.9 4.4	3.0 3.4 3.9	2.3 2.7 3.2	2.2 2.7	2.3	
90	90 120 150	14.7 14.7 14.7	6.0 7.1 7.8	4.6 5.4 6.0	3.9 4.6 5.1	3.4 4.1 4.6	3.1 3.7 4.2	2.7 3.3 3.7	2.0 2.6 3.1	2.1 2.6	2.2	

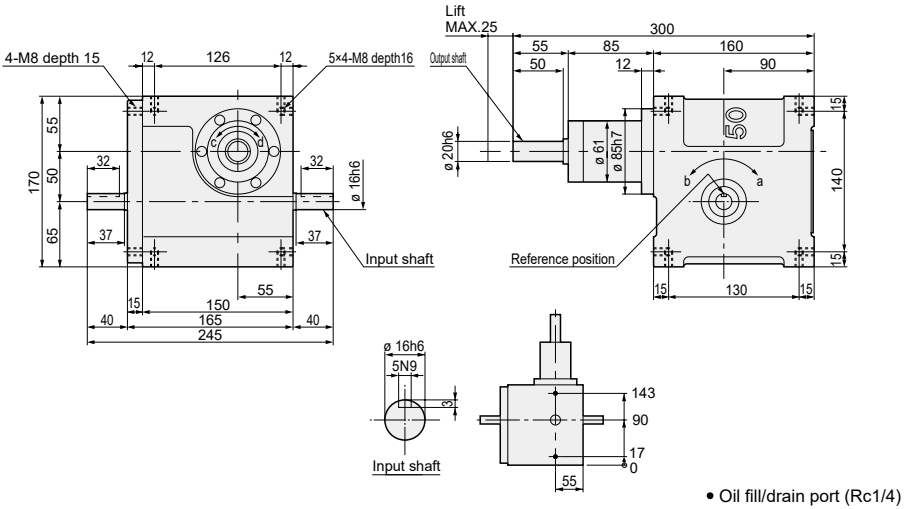
Payload table

PPIH/PPOH040 Cam curve/MS											
Lift *Lo* (mm)	Index angle *θh* (°)	Rated dynamic payload *Mm* (kg)									
		Input shaft rotational speed *N* (rpm)									
		30	60	90	120	150	200	300	400	500	600
5	17 60 120	3.3 5.0 5.0	1.2 5.0 5.0	0.4 4.3 5.0	0.1 3.4 5.0	2.6 5.0	1.7 4.3	0.7 2.8	0.2 1.8	1.2	0.8
10	25 65 120	3.2 5.0 5.0	1.1 4.4 5.0	0.4 3.2 5.0	0.1 2.3 4.6	1.6 3.9	0.9 2.9	0.2 1.6	0.8	0.4	0.2
15	30 70 120	2.8 5.0 5.0	0.9 3.9 5.0	0.3 2.7 4.6	1.8 3.8	1.2 3.0	0.6 2.1	0.1 1.0	0.4	0.1	
18	35 70 120	2.9 5.0 5.0	1.0 3.4 5.0	0.3 2.3 4.3	1.4 3.4	0.9 2.6	0.4 1.7	0.7	0.3		

Dimensions

CAD

● Body



● Oil fill/drain port (Rc1/4)
○ Oil level gauge (ø 20)

Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	1200
Allowable radial force	N	120	900
Allowable bending moment	N·m	10	-
Torsion rigidity (K)	N·m/rad	4200	-
Moment of inertia	kg·m²	5.14×10^{-4}	1.75×10^{-3}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	7
Output shaft inner weight (mo)	kg	0.8
Product weight	kg	21
Oil level	ℓ	1.2
Paint color		Silver

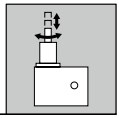
* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Accuracy

Descriptions		Swing direction		Descriptions		Lift direction
		Index	Oscillator			
Indexing accuracy	" (sec.)	±120	±120	Stroke accuracy	mm	*
Repeatability	" (sec.)	30	30	Repeatability	mm	±0.02
Dwell accuracy	" (sec.)	60	60			

* Lift value 6 or less: ±0.1
Over 6 to 25: ±0.2

Discontinue



Output torque table

Index P&P

PPIH050 Cam curve/MS												
Index number *n*	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
2	210 240	30.9 30.9	16.7 17.9	15.0 16.3	12.8 13.9	11.4 12.3	10.3 11.3	9.1 10.0	7.4 8.2	6.0 6.9	4.8 5.8	3.6 4.7
3	150 180	30.9 30.9	17.3 18.9	15.4 17.0	13.1 14.5	11.6 12.9	10.6 11.8	9.3 10.4	7.4 8.5	5.9 7.1	4.4 5.9	4.6
4	90 120 180	14.6 18.7 30.9	6.1 9.4 20.9	5.3 8.3 19.1	4.5 7.1 16.3	3.8 6.2 14.6	3.3 5.6 13.3	4.8 11.8	3.5 9.8	8.4	7.2	6.1
6	75 120 180	30.9 30.9 30.9	16.7 20.9 22.9	14.8 18.8 21.3	12.6 16.0 18.2	11.1 14.3 16.2	10.0 13.0 14.9	8.6 11.5 13.2	6.3 9.4 11.1	4.2 7.8 9.7	6.4 8.5	5.1 7.5
8	60 90 150	18.7 30.9 30.9	9.1 20.9 23.3	8.0 18.5 21.6	6.8 15.8 18.4	5.9 14.0 16.4	5.2 12.8 15.0	4.2 11.2 13.4	9.1 11.2	7.3 9.8	5.7 8.6	4.1 7.6
12	45 90 150	7.1 14.6 18.7	5.3 8.9 12.4	4.6 8.1 11.7	3.8 6.8 10.0	3.2 6.1 8.9	5.5 8.2	4.8 7.3	3.7 6.1	5.2	4.6	4.0

Output torque table

Oscillator P&P

PPOH050 Cam curve/MS												
Oscillating angle *ψ* (°)	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
30	45 60 90	18.7 30.9 30.9	9.0 19.4 21.7	6.8 14.8 16.8	5.7 12.5 14.3	4.9 11.1 12.7	4.2 10.0 11.6	3.3 8.7 10.3	6.6 8.4	4.8 7.0	5.8	4.5
45	60 90 120	18.7 30.9 30.9	8.6 19.8 21.3	6.5 15.0 16.6	5.5 12.8 14.1	4.7 11.4 12.6	4.1 10.3 11.5	3.3 9.1 10.2	7.2 8.4	5.7 7.1	4.2 5.9	4.8
60	75 90 120	30.9 30.9 30.9	15.9 17.6 19.8	12.0 13.4 15.3	10.2 11.4 13.0	9.0 10.1 11.6	8.1 9.1 10.5	6.8 7.9 9.3	4.8 6.0 7.5	4.4 6.1	4.9	3.6
90	90 120 150	18.7 30.9 30.9	7.5 16.8 18.7	5.6 12.8 14.4	4.7 10.9 12.2	4.1 9.6 10.9	3.6 8.7 9.9	7.6 8.7	5.9 7.1	4.4 5.8	4.6	3.4

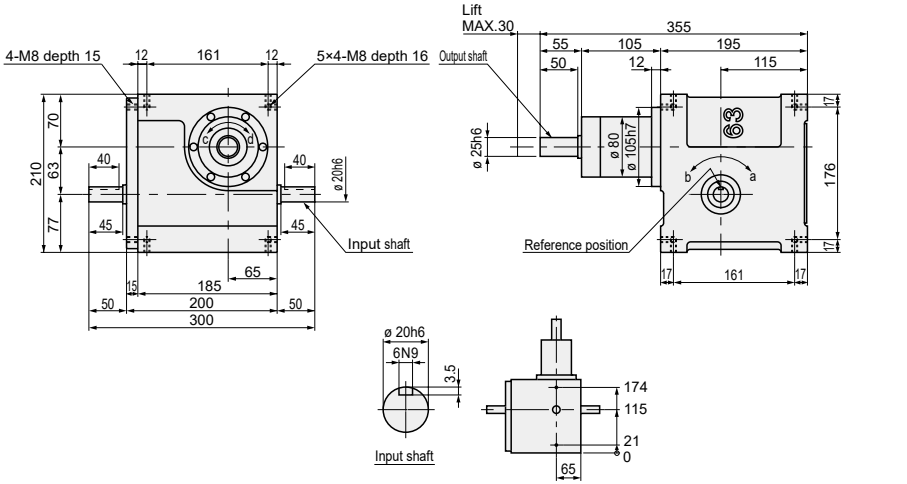
Payload table

PPIH/PPOH050 Cam curve/MS											
Lift *Lo* (mm)	Index angle *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm)									
		30	60	90	120	150	200	300	400	500	600
5	17 60 120	6.9 10.0 10.0	2.4 10.0 10.0	0.9 8.6 10.0	0.2 6.8 10.0	5.3 10.0	3.4 8.6	1.4 5.7	0.5 3.8	0.1 2.5	1.6
10	24 65 120	6.3 10.0 10.0	2.2 8.9 10.0	0.8 6.6 10.0	0.1 4.7 9.2	3.4 7.9	1.9 5.9	0.5 3.2	1.7	0.9	0.4
15	29 70 120	5.7 10.0 10.0	1.9 7.9 10.0	0.6 5.5 9.4	3.7 7.7	2.5 6.2	1.3 4.3	0.2 2.0	0.9	0.3	
20	34 70 120	5.4 10.0 10.0	1.8 6.7 10.0	0.5 4.3 8.3	2.7 6.5	1.7 5.0	0.7 3.2	1.3	0.5		
25	38 70 120	5.0 9.7 10.0	1.6 5.6 9.4	0.4 3.3 7.3	2.0 5.5	1.1 4.1	0.3 2.5	0.9	0.2		

Dimensions

CAD

● Body



● Oil fill/drain port (Rc1/4)
○ Oil level gauge (ø 20)

Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	2000
Allowable radial force	N	200	1600
Allowable bending moment	N·m	25	-
Torsion rigidity (K)	N·m/rad	10000	-
Moment of inertia	kg·m^2	9.41 × 10^{-4}	5.62 × 10^{-3}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	10
Output shaft inner weight (mo)	kg	1.6
Product weight	kg	36
Oil level	ℓ	2.0
Paint color		Silver

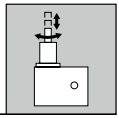
* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Accuracy

Descriptions		Swing direction		Descriptions		Lift direction
		Index	Oscillator			
Indexing accuracy	" (sec.)	±90	±120	Stroke accuracy	mm	*
Repeatability	" (sec.)	30	30	Repeatability	mm	±0.02
Dwell accuracy	" (sec.)	60	60			

* Lift value 6 or less: ±0.1
Over 6 to 30: ±0.2

Discontinue



Output torque table

Index P&P

PPIH063 Cam curve/MS

Index number *n*	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
2	210 240	51.5 51.5	29.3 31.3	26.3 28.4	22.4 24.2	19.9 21.6	18.1 19.7	15.9 17.4	12.9 14.3	10.4 12.0	8.2 9.9	5.9 7.9
3	150 180	51.5 51.5	30.3 32.9	26.9 29.7	22.9 25.3	20.3 22.5	18.5 20.5	16.2 18.1	12.8 14.8	10.1 12.3	7.4 10.0	7.8
4	90 120 180	23.3 37.9 51.5	9.9 22.2 36.3	8.7 19.7 33.2	7.3 16.7 28.3	6.2 14.8 25.2	5.4 13.4 23.0	11.6 20.4	8.7 16.9	6.2 14.4	12.3	10.3
6	75 120 180	51.5 51.5 51.5	29.3 36.3 39.5	26.0 32.6 36.7	22.0 27.7 31.3	19.4 24.7 28.0	17.5 22.5 25.6	14.9 19.8 22.7	10.8 16.2 19.1	6.9 13.4 16.6	10.9 14.6	8.4 12.8
8	60 90 150	37.9 51.5 51.5	21.5 36.2 40.0	19.0 32.1 37.1	16.0 27.3 31.7	14.0 24.3 28.3	12.5 22.1 25.8	10.4 19.4 23.0	6.6 15.5 19.2	12.5 16.7	9.5 14.6	6.6 12.8
12	45 90 150	18.7 23.3 37.9	9.1 14.8 29.7	8.0 13.3 28.1	6.6 11.3 23.9	5.5 10.0 21.4	9.1 19.5	7.9 17.4	6.1 14.6	12.7	11.2	9.9
16	90 120 180	18.7 18.7 18.7	11.7 12.0 12.1	10.7 11.2 11.5	9.1 9.5 10.0	8.1 8.5 9.0	7.3 7.7 8.2	6.4 6.8 7.3	5.5 6.1	5.3		

Output torque table

Oscillator P&P

PPOH063 Cam curve/MS

Oscillating angle *ψ* (°)	Index angle *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
30	45 90 120	37.9 51.5 51.5	21.3 37.4 38.6	16.1 28.9 30.7	13.5 24.6 26.1	11.7 21.9 23.3	10.3 20.0 21.3	8.2 17.6 18.9	14.4 15.8	11.9 13.6	9.6 11.7	7.4 10.1
45	60 90 120	51.5 51.5 51.5	28.4 34.2 36.7	21.6 26.1 28.6	18.2 22.2 24.3	16.0 19.7 21.7	14.3 17.9 19.8	12.0 15.6 17.5	7.9 12.3 14.4	9.6 12.0	6.9 10.0	8.0
60	75 90 120	51.5 51.5 51.5	27.8 30.7 34.4	21.1 23.3 26.4	17.8 19.8 22.5	15.7 17.5 20.0	14.1 15.8 18.2	11.9 13.7 16.0	8.2 10.3 12.9	7.3 10.5	8.2	5.9
90	90 120 150	51.5 51.5 51.5	24.5 29.4 32.5	18.6 22.3 25.0	15.7 19.0 21.3	13.8 16.8 18.9	12.3 15.2 17.2	10.3 13.2 15.1	6.7 10.1 12.2	7.4 9.9	7.7	5.5

Payload table

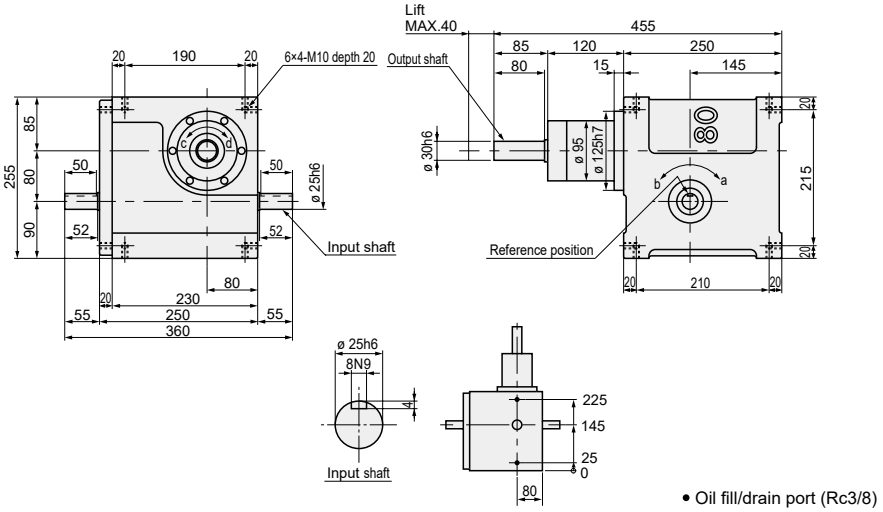
PPIH/PPOH063 Cam curve/MS

Lift *Lo* (mm)	Index angle *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm)									
		30	60	90	120	150	200	300	400	500	600
5	16 60 120	12.3 20.0 20.0	4.0 19.6 20.0	1.3 16.1 20.0	0.1 12.7 20.0	9.8 19.4	6.4 16.1	2.6 10.7	0.9 7.0	4.5	2.9
10	23 65 120	11.8 20.0 20.0	3.9 16.8 20.0	1.2 12.4 20.0	0.1 8.9 17.3	6.3 14.7	3.5 11.0	0.9 5.9	3.2	1.7	0.7
15	28 70 120	11.0 20.0 20.0	3.5 15.0 20.0	1.0 10.4 17.6	7.1 14.5	4.7 11.7	2.4 8.0	0.3 3.8	1.7	0.5	
20	32 70 120	10.3 20.0 20.0	3.2 12.9 19.2	0.8 8.3 15.7	5.2 12.3	3.3 9.5	1.4 6.1	2.5	0.8		
25	36 70 120	9.8 18.9 20.0	3.0 11.1 18.0	0.7 6.6 14.0	3.9 10.5	2.2 7.8	0.7 4.8	1.6	0.3		
30	39 70 120	9.0 17.5 20.0	2.6 9.5 16.7	0.5 5.3 12.5	2.9 9.1	1.5 6.5	0.2 3.7	1.0			

Dimensions

CAD

Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	2500
Allowable radial force	N	300	2700
Allowable bending moment	N·m	40	-
Torsion rigidity (K)	N·m/rad	20000	-
Moment of inertia	kg·m^2	3.59 × 10^{-3}	1.64 × 10^{-2}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	15
Output shaft inner weight (mo)	kg	2.9
Product weight	kg	67
Oil level	ℓ	4.0
Paint color		Silver

* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

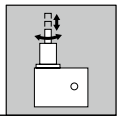
Accuracy

Descriptions		Swing direction	
		Index	Oscillator
Indexing accuracy	" (sec.)	±90	±120
Repeatability	" (sec.)	30	30
Dwell accuracy	" (sec.)	60	60

Descriptions		Lift direction
Stroke accuracy	mm	*
Repeatability	mm	±0.02

* Lift value 6 or less: ±0.1
more than 6 and 30 or less: ±0.2
more than 30 and 40 or less: ±0.3

Discontinue



Output torque table

Index P&P

PPIH080 Cam curve/MS

Index number *n*	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
2	210 240	129.0 129.0	56.5 60.9	50.6 55.3	43.0 47.0	38.1 41.8	34.5 38.0	29.9 33.2	22.9 26.4	16.8 20.7	15.3	
3	150 180	129.0 140.0	58.7 101.0	52.0 96.6	44.1 88.2	39.0 78.6	35.2 71.6	30.2 63.2	22.4 51.6	15.1 42.7	34.8	27.0
4	105 120 180	67.4 67.4 129.0	36.4 39.7 72.5	32.1 35.1 66.2	27.0 29.6 56.3	23.4 26.0 50.1	20.6 23.1 45.7	16.6 19.2 40.2	32.5	26.5	21.0	15.5
6	75 120 180	129.0 140.0 140.0	56.8 114.0 126.0	50.2 108.0 124.0	42.2 98.5 114.0	36.9 87.7 101.0	32.7 80.0 92.7	26.8 70.5 82.4	16.0 57.5 69.2	47.6 60.1	38.7 52.9	30.0 46.6
8	60 90 150	91.5 129.0 140.0	51.2 72.2 129.0	45.1 64.0 126.0	37.8 54.3 115.0	32.8 48.1 103.0	28.7 43.5 94.0	22.8 37.6 83.5	28.6 70.0	20.5 60.8	53.3	46.8
12	45 90 150	26.8 67.4 67.4	18.7 52.3 55.4	17.1 47.0 52.3	15.7 40.0 44.6	35.4 39.8	32.1 36.3	27.8 32.1	21.4 26.6	15.7 22.6	19.1	15.8
16	90 120 180	26.8 26.8 26.8	25.4 26.0 26.4	24.4 25.7 26.4	23.4 24.7 26.1	22.6 23.9 25.4	21.9 23.3 24.9	20.7 22.4 24.1	18.3 20.7 22.8	18.0 20.7	18.2	15.9

Output torque table

Oscillator P&P

PPOH080 Cam curve/MS

Oscillating angle *ψ* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)									
			30	60	90	120	150	200	300	400	500	600
30	45 90 120	67.4 140.0 140.0	38.2 126.0 132.0	28.6 105.0 112.0	23.6 89.2 95.6	19.9 79.4 85.3	16.6 72.4 77.9	63.9 69.2	52.1 57.7	43.2 49.7	35.2 43.1	27.4 37.1
45	60 90 120	129.0 140.0 140.0	55.3 113.0 123.0	41.8 92.7 103.0	35.0 78.8 87.8	30.2 70.0 78.2	26.4 63.5 71.4	20.7 55.5 63.1	43.9 51.9	34.1 43.5	24.7 36.2	29.1
60	75 90 120	129.0 140.0 140.0	53.8 99.8 114.0	40.7 81.4 93.9	34.1 69.0 79.9	29.6 61.1 71.1	26.0 55.2 64.7	20.8 47.7 56.9	36.0 45.9	25.4 37.3	29.2	21.1
90	105 120 150	129.0 129.0 140.0	52.3 57.1 106.0	39.7 43.4 87.9	33.4 36.7 74.8	29.2 32.3 66.5	25.9 28.9 60.5	21.3 24.4 53.2	16.8 42.9	34.7	27.0	19.4

Payload table

PPIH/PPOH080 Cam curve/MS

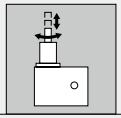
Lift *Lo* (mm)	Index angle: *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm)									
		30	60	90	120	150	200	300	400	500	600
5	16 60 120	25.9 30.0 30.0	9.6 30.0 30.0	3.6 30.0 30.0	0.9 28.3 30.0	22.1 30.0	14.6 30.0	6.5 24.0	2.7 15.9	0.8 10.6	7.1
10	23 65 120	25.2 30.0 30.0	9.4 30.0 30.0	3.5 27.8 30.0	0.9 20.1 30.0	14.5 30.0	8.4 24.6	2.7 13.7	0.4 7.7	4.3	2.3
20	32 70 120	22.7 30.0 30.0	8.1 29.3 30.0	2.8 19.1 30.0	0.5 12.3 27.8	8.0 21.6	3.8 14.2	0.2 6.2	2.6	0.7	
30	39 70 120	20.6 30.0 30.0	7.1 22.3 30.0	2.3 12.9 28.6	0.1 7.5 21.0	4.3 15.4	1.4 9.2	3.2	0.6		
40	45 75 120	18.8 30.0 30.0	6.3 19.0 30.0	1.8 10.4 23.4	5.6 16.2	2.9 11.2	0.5 6.1	1.5			

MEMO

Circular P&P drive standard

Discontinue

PPIX/PPOX Series



● Difference between shafts: 50, 63, 80, 110, 140, 180 mm

Specifications

CAD

Descriptions			PPIX050/PPOX050					PPIX063/PPOX063					PPIX080/PPOX080				
Swing direction	Index specifications	Index number	2	3	4	6	8	2	3	4	6	8	2	3	4	6	8
		Min. index angle °	120	90	60	45	35	120	90	60	45	35	120	90	60	45	35
		Indexing accuracy	±120														
		Repeatability " (sec.)	30														
		Dwell accuracy " (sec.)	60														
		Cam curve " (sec.)	MS curve (standard), MC curve, MT curve, Trapecloid curve														
	Oscillator specifications	Oscillating angle °	30	45	60	90	120	180	30	45	60	90	120	180	30	45	60	90	120	180
		Min. index angle °	30	35	45	60	90	120	30	35	45	60	90	120	30	35	45	60	90	120
		Indexing accuracy" (sec.)	±120														
		Repeatability " (sec.)	30														
		Dwell accuracy " (sec.)	60														
		Cam curve	MS curve (standard), MC curve, MT curve, Trapecloid curve														
Lift direction		Lift range mm	5 to 18					5 to 25					5 to 30				
		Standard lift mm	5	10	15	18		5	10	15	20	25	5	10	15	20	25	30
		Min. index angle °	24	33	40	44		20	28	35	40	45	19	26	32	38	42	46
		Stroke accuracy mm	±0.1	±0.2				±0.1	±0.2				±0.1	±0.2				
		Repeatability mm	±0.05														
		Cam curve	MS curve														
Input shaft rotational speed Note 1		rpm	max.120														
Product weight		kg	8					15					25				
Oil level		ℓ	0.3					0.5					1.0				
Paint color			Silver														

Descriptions			PPIX110/PPOX110					PPIX140/PPOX140					PPIX180/PPOX180				
Swing direction	Index specifications	Index number	2	3	4	6	8	2	3	4	6	8	2	3	4	6	8
		Min. index angle °	120	90	60	45	35	120	90	60	45	35	120	90	60	45	35
		Indexing accuracy" (sec.)	±120														
		Repeatability " (sec.)	30														
		Dwell accuracy " (sec.)	60														
		Cam curve	MS curve (standard), MC curve, MT curve, Trapecloid curve														
	Oscillator specifications	Oscillating angle °	30	45	60	90	120	180	30	45	60	90	120	180	30	45	60	90	120	180
		Min. index angle °	30	35	45	60	90	120	30	35	45	60	90	120	30	35	45	60	90	120
		Indexing accuracy" (sec.)	±120														
		Repeatability " (sec.)	30														
		Dwell accuracy " (sec.)	60														
		Cam curve	MS curve (standard), MC curve, MT curve, Trapecloid curve														
Lift direction		Lift range mm	10 to 40					10 to 50					10 to 70				
		Standard lift mm	10	20	30	40		10	20	30	40	50	10	20	30	40	50	60	70
		Min. index angle °	25	35	41	47		20	30	35	40	45	18	26	31	36	40	44	48
		Stroke accuracy mm	±0.2			±0.3		±0.2			±0.3		±0.2			±0.3			
		Repeatability mm	±0.05														
		Cam curve	MS curve														
Input shaft rotational speed Note 1		rpm	max.120					max.80					max.60				
Product weight		kg	50					90					185				
Oil level		ℓ	2.0					4.0					8.0				
Paint color			Silver														

Note 1. For speed exceeding the specifications, contact us.

Note 2. For details of accuracy, refer to the page B-30.

Discontinue

Circular P&P drive Standard

PPIX/PPOX Series

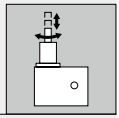
● Difference between shafts: 50, 63, 80, 110, 140, 180 mm

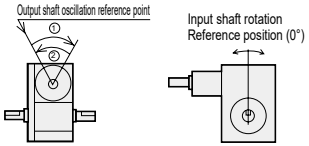
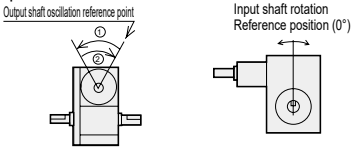
How to order

PPOX (A) 080 (B) - 060 (C) 030 (D) S (E) T (F) S (G) 1 (H) - X012345 (I)

(A) Model No.	(B) RO Shaft interval		(C) Index number (n) and oscillating angle (ψ)				(D) Lift (*Lo*)		(E) Cam curve		(F) Spiral direction of the cam and orbit pattern	
PPIX Index P&P Motion PPOX Oscillator P&P Motion	050 063 080 110 140 180	50 mm 63 mm 80 mm 110 mm 140 mm 180 mm	PPIX Index number (*n*)		PPOX Oscillating angle (ψ)		005 to 070	5 mm to 70 mm	S	MS curve (standard)	PPIX (spiral direction of the cam)	
			002	2	180	180°			C	MC curve (MCV50)	L	Left helix (standard)
			003	3	120	120°						
			004	4	090	90°			T	MT curve		
			006	6	060	60°			P	Trapecloid curve		
			008	8	045	45°			*	This indicates the cam curve for the swing direction. When there are more than 1 cam curve, this will be "x".	R	Right helix
					030	30°						

Discontinue



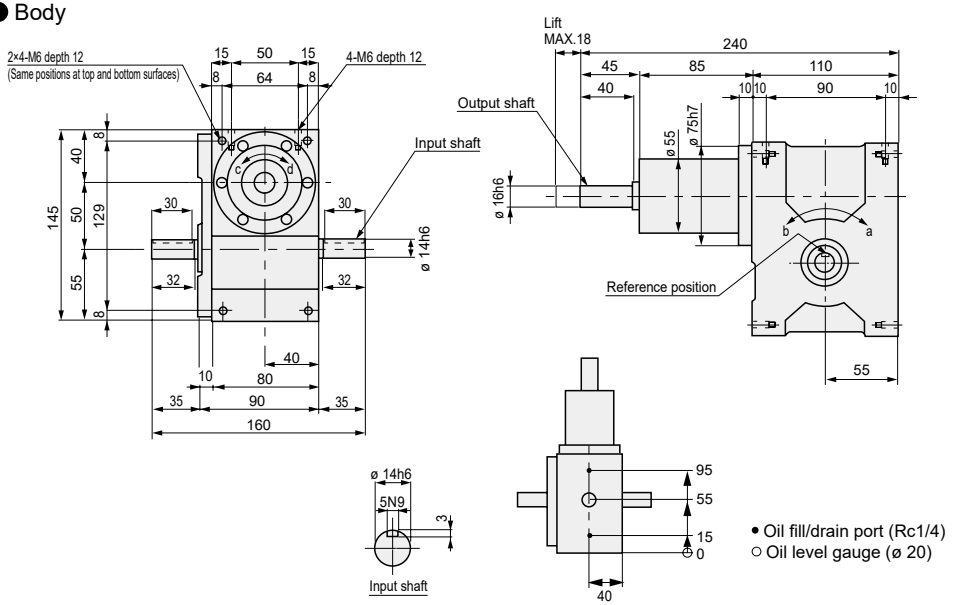
			Ⓖ Shape of the output shaft		Ⓗ Installation position		Ⓘ Special specification No.
	PPOX (orbit pattern)		S	Straight (without keyway) * For the following specifications, contact CKD. • Hollow hole specification • With Torque saver	1	Position 1 Output shaft facing upward * For the position other than #1, contact CKD.	* To place an order for a P&P drive, "Special specification number" is required. The special specification model number shall be determined after a consultation with the customer. Mounting options are available upon request. Please provide CKD with the specifications.
	T	Standard When the input shaft starts to rotate from the rotation reference point, the output shaft rotates in sequence from 1 and 2 as in the figure. 					
	S	Option 					

Discontinue

Dimensions

CAD

Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	1000
Allowable radial force	N	150	900
Allowable bending moment	N·m	10	-
Torsion rigidity (K)	N·m/rad	1200	-
Moment of inertia	kg·m^2	1.32 × 10^{-4}	6.86 × 10^{-4}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	5
Output shaft inner weight (mo)	kg	0.4
Product weight	kg	8
Oil level	ℓ	0.3
Paint color		Silver

* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

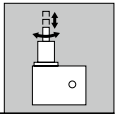
Accuracy

Descriptions		Index	
		Swing direction	Oscillator
Indexing accuracy	" (sec.)	±120	±120
Repeatability	" (sec.)	30	30
Dwell accuracy	" (sec.)	60	60

Descriptions		Lift direction
Stroke accuracy	mm	*
Repeatability	mm	±0.05

* Lift value 6 or less: ±0.1
Over 6 to 18: ±0.2

Discontinue



Output torque table

Index P&P

PPIX050 Cam curve/MS

Index number *n* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm) 20	30	40	50	60	80	100	120
2	120 150	11.8 14.7	4.8 7.2	4.7 7.0	4.5 6.8	4.4 6.7	4.1 6.2	3.7 5.6	3.4 5.1	3.1 4.7
3	90 120 150	14.7 14.7 14.7	6.7 7.8 8.4	6.5 7.6 8.4	6.3 7.4 8.2	6.2 7.3 8.0	5.7 6.8 7.5	5.1 6.0 6.7	4.6 5.5 6.1	4.3 5.1 5.7
4	60 75 90	4.0 5.8 11.8	2.4 4.0 6.0	2.3 3.8 5.8	2.3 3.8 5.6	2.2 3.7 5.5	2.0 3.4 5.1	1.8 3.0 4.6	1.6 2.7 4.2	1.4 2.5 3.8
6	45 60 75	14.7 14.7 14.7	6.5 7.6 8.4	6.2 7.4 8.1	6.1 7.2 7.9	5.9 7.0 7.8	5.5 6.5 7.2	4.9 5.8 6.4	4.4 5.3 5.9	4.1 4.9 5.5
8	35 45 60	5.8 11.8 11.8	3.7 5.8 6.6	3.6 5.6 6.3	3.5 5.4 6.2	3.4 5.3 6.0	3.1 4.9 5.6	2.8 4.4 5.0	2.5 4.0 4.6	2.2 3.7 4.2

Output torque table

Oscillator P&P

PPOX050 Cam curve/MS

Oscillating angle *ψ* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm) 20	30	40	50	60	80	100	120
30	30 45 60	11.8 14.7 14.7	5.7 8.7 9.3	5.2 8.0 8.6	4.6 7.1 7.7	4.2 6.5 7.1	3.9 6.1 6.6	3.5 5.4 5.9	3.1 4.9 5.4	2.8 4.6 5.0
45	35 45 60	11.8 14.7 14.7	5.0 7.5 8.5	4.6 6.9 7.8	4.1 6.1 7.0	3.7 5.6 6.4	3.5 5.2 5.9	3.0 4.6 5.3	2.7 4.2 4.8	2.4 3.9 4.5
60	45 60 75	14.7 14.7 14.7	6.5 7.6 8.4	5.9 7.0 7.7	5.3 6.2 6.9	4.8 5.7 6.3	4.5 5.3 5.9	4.0 4.7 5.2	3.6 4.3 4.8	3.3 4.0 4.4
90	60 75 90	11.8 14.7 14.7	4.7 7.1 7.8	4.3 6.4 7.1	3.8 5.7 6.4	3.5 5.3 5.8	3.2 4.9 5.4	2.9 4.4 4.8	2.6 4.0 4.4	2.3 3.7 4.1
120	90 120 150	14.7 14.7 14.7	6.7 7.8 8.4	6.1 7.2 7.9	5.5 6.4 7.1	5.0 5.9 6.5	4.6 5.5 6.1	4.1 4.9 5.4	3.8 4.5 5.0	3.5 4.1 4.6
180	120 150	11.8 14.7	4.8 7.2	4.4 6.6	3.9 5.9	3.6 5.4	3.4 5.1	3.0 4.5	2.7 4.1	2.5 3.8

Payload table

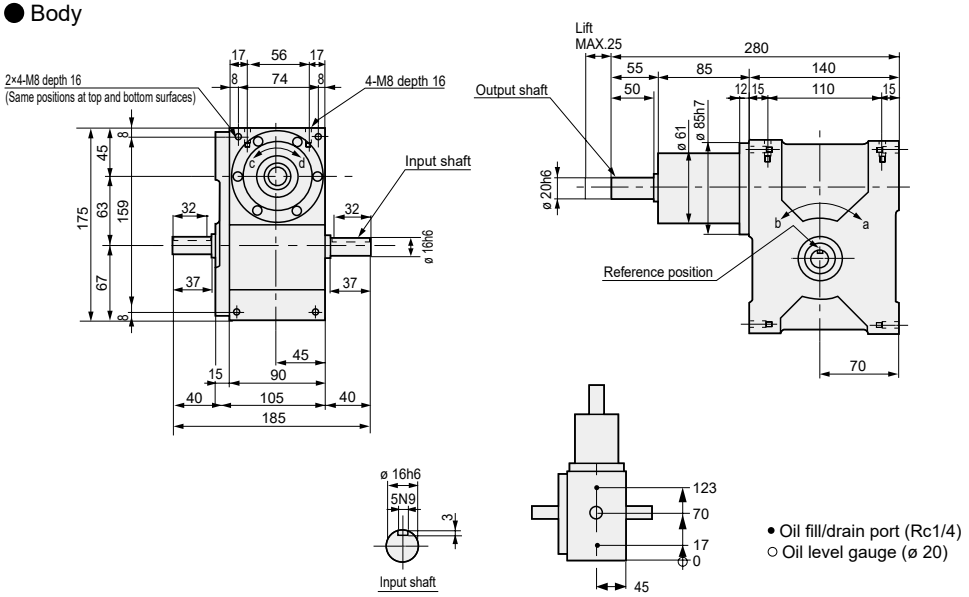
PPIX/PPOX050 Cam curve/MS

Lift *Lo* (mm)	Index angle: *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm) 20	30	40	50	60	80	100	120
5	24 30 40	3.4 3.5 3.7	2.7 2.9 3.1	2.2 2.4 2.7	1.7 2.0 2.3	1.4 1.7 2.1	0.9 1.2 1.6	0.5 0.8 1.2	0.3 0.5 0.9
10	33 40 50	3.2 3.4 3.5	2.5 2.7 2.9	2.0 2.3 2.5	1.6 1.9 2.2	1.2 1.5 1.9	0.7 1.0 1.4	0.4 0.7 1.0	0.2 0.4 0.7
15	40 50 60	3.0 3.2 3.4	2.3 2.7 2.8	1.9 2.2 2.4	1.5 1.8 2.1	1.1 1.5 1.8	0.7 1.0 1.3	0.4 0.7 0.9	0.2 0.4 0.6
18	44 50 60	2.9 3.1 3.3	2.3 2.5 2.7	1.8 2.0 2.3	1.4 1.6 1.9	1.1 1.3 1.6	0.7 0.8 1.1	0.4 0.5 0.8	0.2 0.3 0.5

Dimensions

CAD

● Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	1500
Allowable radial force	N	190	1100
Allowable bending moment	N·m	15	-
Torsion rigidity (K)	N·m/rad	4200	-
Moment of inertia	kg·m^2	5.14 × 10^{-4}	2.19 × 10^{-3}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	7
Output shaft inner weight (mo)	kg	0.8
Product weight	kg	15
Oil level	ℓ	0.5
Paint color		Silver

* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

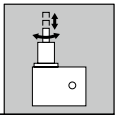
Accuracy

Descriptions		Swing direction	
		Index	Oscillator
Indexing accuracy	" (sec.)	±120	±120
Repeatability	" (sec.)	30	30
Dwell accuracy	" (sec.)	60	60

Descriptions		Lift direction
Stroke accuracy	mm	*
Repeatability	mm	±0.05

* Lift value 6 or less: ±0.1
Over 6 to 25: ±0.2

Discontinue



Output torque table

Index P&P

PPIX063 Cam curve/MS										
Index number *n* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m)							
			Input shaft rotational speed *N* (rpm)							
			20	30	40	50	60	80	100	120
2	120 150	18.7 30.9	7.9 17.0	7.6 16.7	7.4 16.2	7.3 15.9	6.7 14.8	6.0 13.2	5.4 12.0	4.9 11.1
3	90 120 150	30.9 30.9 30.9	15.9 18.6 20.3	15.3 18.2 20.3	14.9 17.7 19.7	14.6 17.4 19.3	13.5 16.2 18.0	12.0 14.4 16.1	10.9 13.1 14.7	10.0 12.2 13.6
4	60 75 90	14.6 14.6 18.7	5.9 6.8 9.8	5.7 6.5 9.5	5.5 6.3 9.2	5.3 6.2 9.0	4.9 5.7 8.4	4.3 5.0 7.4	3.7 4.5 6.7	3.2 4.1 6.2
6	45 60 75	30.9 30.9 30.9	15.4 18.3 20.3	14.8 17.6 19.6	14.4 17.2 19.1	14.0 16.8 18.7	13.0 15.6 17.4	11.5 13.9 15.5	10.3 12.6 14.1	9.3 11.6 13.1
8	35 45 60	14.6 18.7 18.7	6.3 9.5 10.8	6.0 9.2 10.4	5.8 8.9 10.1	5.7 8.7 9.9	5.2 8.0 9.2	4.4 7.1 8.1	3.8 6.3 7.4	3.2 5.7 6.8

Output torque table

Oscillator P&P

PPOX063 Cam curve/MS										
Oscillating angle *ψ* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m)							
			Input shaft rotational speed *N* (rpm)							
			20	30	40	50	60	80	100	120
30	30 45 60	18.7 30.9 30.9	9.3 21.2 22.8	8.5 19.3 21.1	7.5 17.3 18.9	6.9 15.8 17.3	6.3 14.7 16.1	5.5 13.0 14.3	4.8 11.9 13.1	4.1 10.9 12.1
45	35 45 60	18.7 30.9 30.9	8.3 18.1 20.7	7.5 16.5 18.8	6.7 14.7 16.8	6.0 13.4 15.4	5.5 12.5 14.3	4.7 11.0 12.7	4.1 9.9 11.6	3.5 9.1 10.7
60	45 60 75	30.9 30.9 30.9	15.4 18.3 20.3	14.0 16.7 18.6	12.5 14.9 16.6	11.4 13.6 15.2	10.5 12.7 14.1	9.3 11.2 12.6	8.3 10.2 11.5	7.4 9.3 10.6
90	60 75 90	30.9 30.9 30.9	14.4 16.8 18.6	13.1 15.3 17.0	11.7 13.6 15.2	10.7 12.5 13.9	9.9 11.6 12.9	8.7 10.3 11.5	7.8 9.3 10.5	7.0 8.5 9.6
120	90 120 150	30.9 30.9 30.9	15.9 18.6 20.3	14.5 17.2 19.2	12.9 15.4 17.1	11.8 14.1 15.7	11.0 13.1 14.6	9.7 11.7 13.0	8.8 10.6 11.9	8.1 9.8 11.0
180	120 150	18.7 30.9	7.9 17.0	7.2 15.8	6.5 14.1	5.9 12.9	5.5 12.0	4.8 10.7	4.3 9.7	3.9 9.0

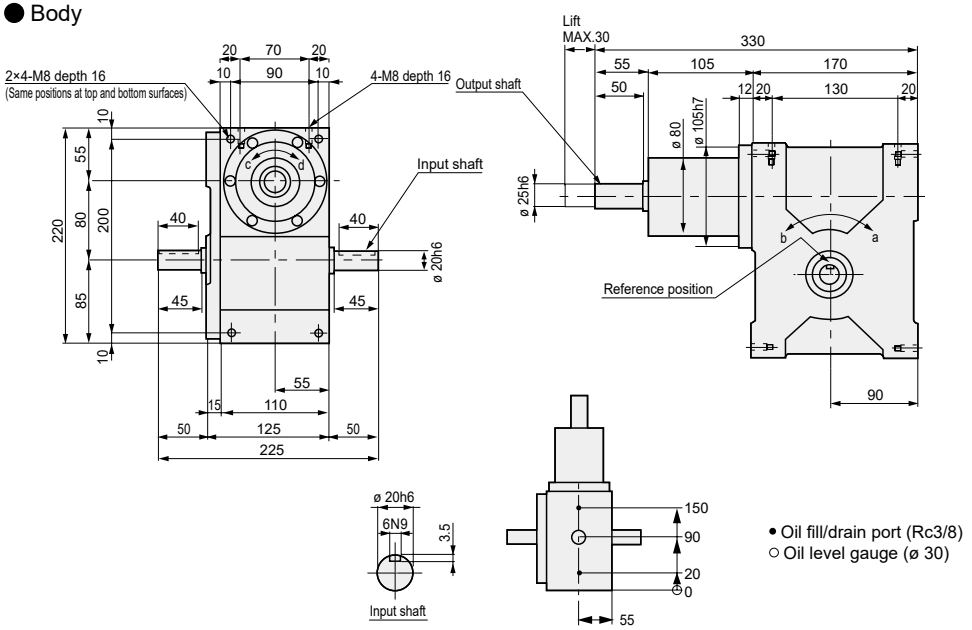
Payload table

PPIX/PPOX063 Cam curve/MS								
Lift *Lo* (mm)	Index angle: *θh* (°)	Rated dynamic payload *Mm* (kg)						
		Input shaft rotational speed *N* (rpm)						
		20	30	40	50	60	80	100	120
5	20 25 35	6.0 6.4 6.7	4.6 5.1 5.6	3.5 4.1 4.8	2.7 3.3 4.1	2.0 2.7 3.5	1.1 1.7 2.6	0.5 1.0 1.8	0.1 0.5 1.3
10	28 35 40	5.7 6.2 6.4	4.3 4.9 5.2	3.3 4.0 4.3	2.5 3.2 3.5	1.9 2.5 2.9	1.0 1.6 1.9	0.4 0.9 1.2	0.1 0.5 0.8
15	35 40 50	5.5 5.8 6.2	4.2 4.6 5.1	3.2 3.6 4.2	2.4 2.8 3.5	1.8 2.2 2.9	1.0 1.3 1.9	0.4 0.7 1.2	0.1 0.3 0.8
20	40 45 55	5.2 5.5 6.0	3.9 4.3 4.8	3.0 3.4 4.0	2.3 2.6 3.3	1.7 2.0 2.7	0.9 1.2 1.7	0.3 0.6 1.1	- 0.2 0.6
25	45 50 60	5.0 5.3 5.8	3.8 4.1 4.6	2.9 3.2 3.8	2.2 2.5 3.1	1.6 1.9 2.5	0.8 1.1 1.6	0.3 0.5 1.0	- 0.2 0.5

Dimensions

CAD

Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	2700
Allowable radial force	N	280	2200
Allowable bending moment	N·m	40	-
Torsion rigidity (K)	N·m/rad	10000	-
Moment of inertia	kg·m^2	9.41 × 10^{-4}	7.4 × 10^{-3}

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	10
Output shaft inner weight (mo)	kg	1.6
Product weight	kg	25
Oil level	ℓ	1.0
Paint color		Silver

* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

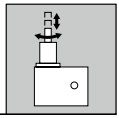
Accuracy

Descriptions		Swing direction	
		Index	Oscillator
Indexing accuracy	" (sec.)	±120	±120
Repeatability	" (sec.)	30	30
Dwell accuracy	" (sec.)	60	60

Descriptions		Lift direction
Stroke accuracy	mm	*
Repeatability	mm	±0.05

* Lift value 6 or less: ±0.1
Over 6 to 30: ±0.2

Discontinue



Output torque table

Index P&P

PPIX080 Cam curve/MS

Index number *n* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm) 20	30	40	50	60	80	100	120
2	120	51.5	26.3	25.3	24.7	24.1	22.4	19.9	18.1	16.7
	150	51.5	29.9	29.3	28.6	28.0	26.0	23.2	21.1	19.6
3	90	51.5	28.0	26.9	26.2	25.7	23.8	21.2	19.2	17.7
	120	51.5	32.6	31.8	31.0	30.4	28.3	25.2	23.0	21.3
	150	51.5	35.3	35.3	34.4	33.7	31.3	27.9	25.6	23.7
4	60	23.3	9.7	9.3	9.1	8.8	8.1	7.0	6.1	5.3
	75	37.9	21.1	20.3	19.8	19.3	18.0	15.9	14.4	13.1
	90	37.9	23.3	22.5	21.9	21.4	19.9	17.7	16.1	14.8
6	45	51.5	27.1	26.1	25.3	24.7	22.9	20.2	18.2	16.5
	60	51.5	32.0	30.8	30.0	29.4	27.3	24.2	22.0	20.2
	75	51.5	35.3	34.2	33.3	32.6	30.3	27.0	24.6	22.7
8	35	23.3	10.4	10.0	9.7	9.4	8.6	7.3	6.2	5.2
	45	37.9	22.6	21.8	21.2	20.7	19.2	16.9	15.3	13.9
	60	37.9	25.7	24.8	24.1	23.6	21.9	19.5	17.7	16.3

Output torque table

Oscillator P&P

PPOX080 Cam curve/MS

Oscillating angle *ψ* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm) 20	30	40	50	60	80	100	120
30	30	37.9	22.2	20.2	18.0	16.4	15.1	13.2	11.7	10.4
	45	51.5	36.7	33.5	29.9	27.4	25.4	22.6	20.5	18.9
	60	51.5	39.3	36.4	32.5	29.8	27.7	24.7	22.5	20.8
45	35	37.9	19.6	17.8	15.8	14.4	13.3	11.5	10.1	8.8
	45	51.5	31.6	28.8	25.7	23.5	21.8	19.3	17.4	15.8
	60	51.5	35.9	32.7	29.2	26.8	24.9	22.1	20.1	18.5
60	45	51.5	27.1	24.7	22.0	20.1	18.6	16.3	14.6	13.1
	60	51.5	32.0	29.2	26.1	23.8	22.1	19.6	17.8	16.3
	75	51.5	35.3	32.3	28.9	26.4	24.6	21.9	19.9	18.4
90	60	51.5	25.5	23.2	20.7	18.9	17.5	15.4	13.8	12.5
	75	51.5	29.5	26.9	24.0	21.9	20.4	18.1	16.4	15.0
	90	51.5	32.6	29.8	26.6	24.3	22.6	20.1	18.3	16.9
120	90	51.5	28.0	25.5	22.8	20.8	19.3	17.1	15.5	14.2
	120	51.5	32.6	30.2	26.9	24.7	22.9	20.4	18.6	17.2
	150	51.5	35.3	33.4	29.8	27.3	25.4	22.7	20.7	19.2
180	120	51.5	26.3	24.0	21.4	19.6	18.2	16.1	14.6	13.4
	150	51.5	29.9	27.8	24.8	22.7	21.1	18.8	17.1	15.8

Payload table

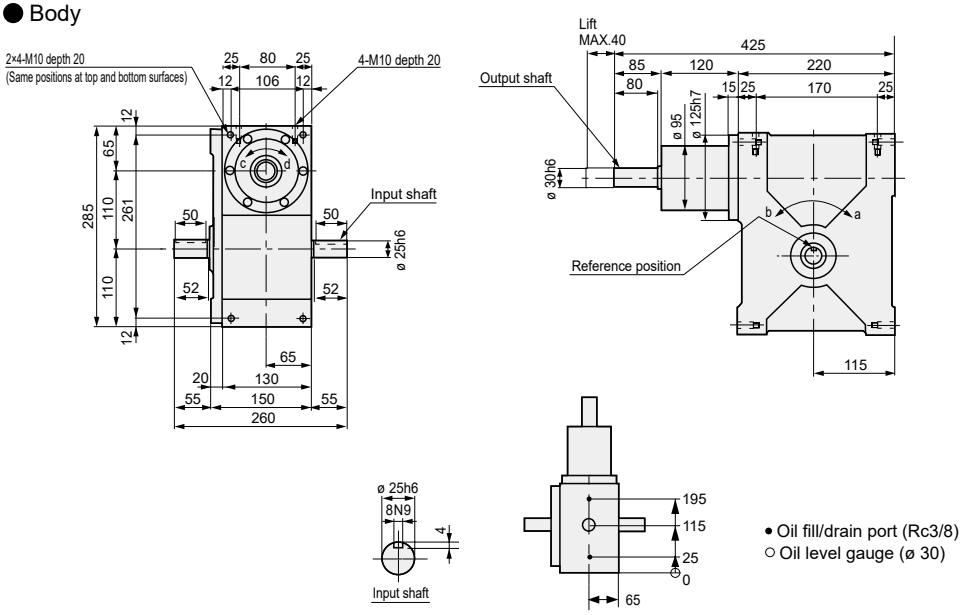
PPIX/PPOX080 Cam curve/MS

Lift *Lo* (mm)	Index angle: *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm) 20	30	40	50	60	80	100	120
5	19	11.1	8.4	6.3	4.7	3.5	1.7	0.7	-
	30	12.2	10.0	8.3	7.0	5.8	3.9	2.6	1.6
	40	12.6	10.6	9.1	7.9	6.9	5.2	3.9	2.8
10	26	10.6	7.9	5.9	4.3	3.1	1.5	0.5	-
	30	11.1	8.6	6.7	5.1	3.9	2.1	1.0	0.3
	40	11.9	9.7	8.0	6.6	5.4	3.6	2.3	1.3
15	32	10.2	7.6	5.7	4.2	3.0	1.4	0.5	-
	40	11.1	8.8	6.9	5.5	4.2	2.5	1.3	0.5
	50	11.8	9.6	7.9	6.6	5.4	3.6	2.3	1.4
20	38	10.0	7.5	5.6	4.2	3.0	1.4	0.5	-
	45	10.8	8.4	6.6	5.2	4.0	2.3	1.1	0.4
	55	11.5	9.3	7.6	6.2	5.1	3.3	2.0	1.1
25	42	9.6	7.2	5.4	3.9	2.8	1.3	0.4	-
	50	10.5	8.2	6.4	5.0	3.8	2.1	1.1	0.3
	60	11.2	9.0	7.3	6.0	4.8	3.1	1.9	1.0
30	46	9.4	7.0	5.2	3.8	2.7	1.2	0.3	-
	50	9.8	7.5	5.7	4.3	3.2	1.6	0.6	-
	60	10.6	8.4	6.8	5.4	4.2	2.5	1.4	0.6

Dimensions

CAD

Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	3200
Allowable radial force	N	400	3300
Allowable bending moment	N·m	60	-
Torsion rigidity (K)	N·m/rad	20000	-
Moment of inertia	kg·m^2	3.59 × 10^{-3}	3.42 × 10^{-2}

* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	20
Output shaft inner weight (mo)	kg	2.9
Product weight	kg	50
Oil level	ℓ	2.0
Paint color		Silver

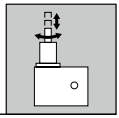
Accuracy

Descriptions		Swing direction	
		Index	Oscillator
Indexing accuracy	" (sec.)	±120	±120
Repeatability	" (sec.)	30	30
Dwell accuracy	" (sec.)	60	60

Descriptions		Lift direction
Stroke accuracy	mm	*
Repeatability	mm	±0.05

* Lift value 30 or less: ±0.2
more than 30 and 40 or less: ±0.3

Discontinue



Output torque table

Index P&P

PPIX110 Cam curve/MS

Index number n (°)	Index angle: θh (°)	Static rated output torque (N·m)	Dynamic rated output torque Tr (N·m) Input shaft rotational speed N (rpm) 20	30	40	50	60	80	100	120
2	120 150	129.0 140.0	54.8 98.0	52.8 96.0	51.3 93.5	50.2 91.6	46.5 90.0	41.2 85.9	37.1 78.4	33.9 72.6
3	90 120 150	129.0 140.0 140.0	58.3 107.0 116.0	56.1 104.0 115.0	54.6 102.0 112.0	53.3 99.4 110.0	49.4 97.7 108.0	43.6 93.3 104.0	39.3 85.2 94.7	35.7 78.8 87.9
4	60 75 90	67.4 67.4 91.5	34.9 40.3 59.4	33.5 38.7 57.3	32.4 37.6 55.7	31.5 36.7 54.5	29.0 33.9 50.6	25.0 29.8 44.8	21.7 26.5 40.6	18.8 23.8 37.1
6	45 60 75	140.0 140.0 140.0	88.7 105.0 116.0	85.3 101.0 112.0	82.9 98.3 109.0	81.0 96.1 107.0	79.3 94.4 105.0	74.9 89.9 100.0	67.3 81.6 91.2	60.9 75.0 84.3
8	35 45 60	67.4 91.5 129.0	37.3 57.6 74.7	35.8 55.4 71.9	34.6 53.8 70.0	33.5 52.5 68.5	30.7 48.6 63.6	26.1 42.6 56.4	22.2 38.0 51.1	18.5 34.1 46.9

Output torque table

Oscillator P&P

PPOX110 Cam curve/MS

Oscillating angle ψ (°)	Index angle: θh (°)	Static rated output torque (N·m)	Dynamic rated output torque Tr (N·m) Input shaft rotational speed N (rpm) 20	30	40	50	60	80	100	120
30	30 45 60	129 140 140	64.6 120.0 129.0	58.7 116.0 126.0	52.2 111.0 120.0	47.4 101.0 110.0	43.7 94.3 103.0	37.8 83.8 91.4	33.1 76.1 83.4	28.9 70.0 77.2
45	35 45 60	129 140 140	57.0 103.0 117.0	51.8 99.6 113.0	46.0 95.3 108.0	41.7 87.1 99.2	38.3 80.8 92.2	32.9 71.4 82.0	28.4 64.4 74.5	24.3 58.7 68.7
60	45 60 75	140 140 140	88.7 105.0 116.0	85.3 101.0 112.0	81.5 96.6 107.0	74.4 88.4 98.0	68.9 82.1 91.1	60.5 72.8 81.1	54.0 65.9 73.8	48.6 60.4 68.1
90	60 75 90	129 140 140	53.1 96.6 107.0	48.3 93.0 103.0	42.9 89.0 98.5	39.1 81.4 90.2	36.0 75.6 83.8	31.3 67.0 74.5	27.5 60.6 67.8	24.1 55.5 62.5
120	90 120 150	129 140 140	58.3 107.0 116.0	53.1 104.0 115.0	47.3 99.9 111.0	43.2 91.4 101.0	40.0 85.0 94.3	35.2 75.7 84.1	31.6 69.0 76.8	28.6 63.8 71.2
180	120 150	129 140	54.8 98.0	50.0 96.0	44.5 92.0	40.7 84.2	37.7 78.3	33.3 69.7	29.9 63.5	27.1 58.7

Payload table

PPIX/PPOX110 Cam curve/MS

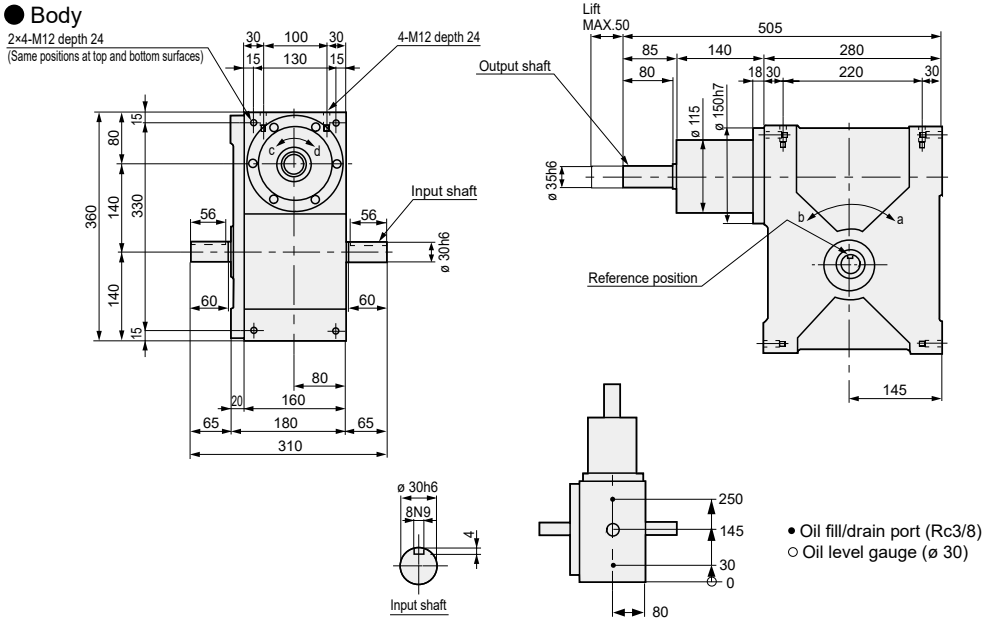
Lift Lo (mm)	Index angle: θh (°)	Rated dynamic payload Mm (kg) Input shaft rotational speed N (rpm) 20	30	40	50	60	80	100	120
10	25 30 40	22.4 23.7 25.1	16.7 18.4 20.5	12.4 14.4 17.0	9.1 11.2 14.1	6.6 8.6 11.6	3.2 4.9 7.8	1.3 2.6 5.1	- 1.1 3.2
20	35 45 55	21.3 23.3 24.5	15.8 18.3 19.9	11.6 14.5 16.4	8.5 11.4 13.5	6.1 8.9 11.1	2.9 5.3 7.3	1.0 2.9 4.7	- 1.4 2.8
30	41 50 60	19.8 21.8 23.3	14.5 16.8 18.5	10.5 13.0 14.9	7.5 9.9 12.0	5.2 7.5 9.6	2.3 4.1 5.9	0.6 2.0 3.5	- 0.6 1.8
40	47 50 60	18.9 19.6 21.5	13.7 14.5 16.7	9.9 10.7 13.0	7.0 7.7 10.0	4.8 5.5 7.6	2.0 2.5 4.3	0.4 0.8 2.1	- - 0.8

Discontinue

Dimensions

CAD

Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	4800
Allowable radial force	N	530	4900
Allowable bending moment	N·m	120	-
Torsion rigidity (K)	N·m/rad	30000	-
Moment of inertia	kg·m^2	7.3 × 10^{-3}	0.11

* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	35
Output shaft inner weight (mo)	kg	5.6
Product weight	kg	90
Oil level	ℓ	4.0
Paint color		Silver

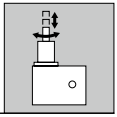
Accuracy

Descriptions		Swing direction	
		Index	Oscillator
Indexing accuracy	" (sec.)	±120	±120
Repeatability	" (sec.)	30	30
Dwell accuracy	" (sec.)	60	60

Descriptions		Lift direction
Stroke accuracy	mm	*
Repeatability	mm	±0.05

* Lift value 30 or less: ±0.2
more than 30 and 50 or less: ±0.3

Discontinue



Output torque table

Index P&P

PPIX140 Cam curve/MS

Index number *n* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)					
			20	30	40	50	60	80
2	120 150	169 272	109 197	105 193	102 188	100 184	98 178	93 159
3	90 120 150	248 272 272	151 213 229	145 208 229	141 203 223	138 198 218	128 193 212	114 172 189
4	60 75 90	148 148 169	66 76 133	64 73 128	62 71 125	60 69 122	55 64 120	47 56 114
6	45 60 75	272 272 272	178 209 229	172 201 222	167 196 216	163 192 211	158 186 205	139 165 183
8	35 45 60	148 169 248	70 129 190	68 124 183	65 120 178	63 117 174	58 115 162	49 109 144

Output torque table

Oscillator P&P

PPOX140 Cam curve/MS

Oscillating angle *ψ* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm)					
			20	30	40	50	60	80
30	30 45 60	248 272 272	165 237 253	151 226 244	134 202 218	122 185 200	113 172 186	98 152 166
45	35 45 60	248 272 272	147 206 233	134 197 222	119 175 198	108 160 181	100 149 168	87 131 150
60	45 60 75	272 272 272	178 209 229	170 199 219	151 178 196	138 163 179	128 151 167	112 134 148
90	60 75 90	248 272 272	138 194 213	126 184 203	112 165 181	102 150 166	94 140 154	82 124 137
120	90 120 150	248 272 272	151 213 229	138 206 226	123 184 202	112 168 185	104 156 172	92 139 154
180	120 150	169 272	109 197	105 190	100 170	92 156	85 145	75 129

Payload table

PPIX/PPOX140 Cam curve/MS

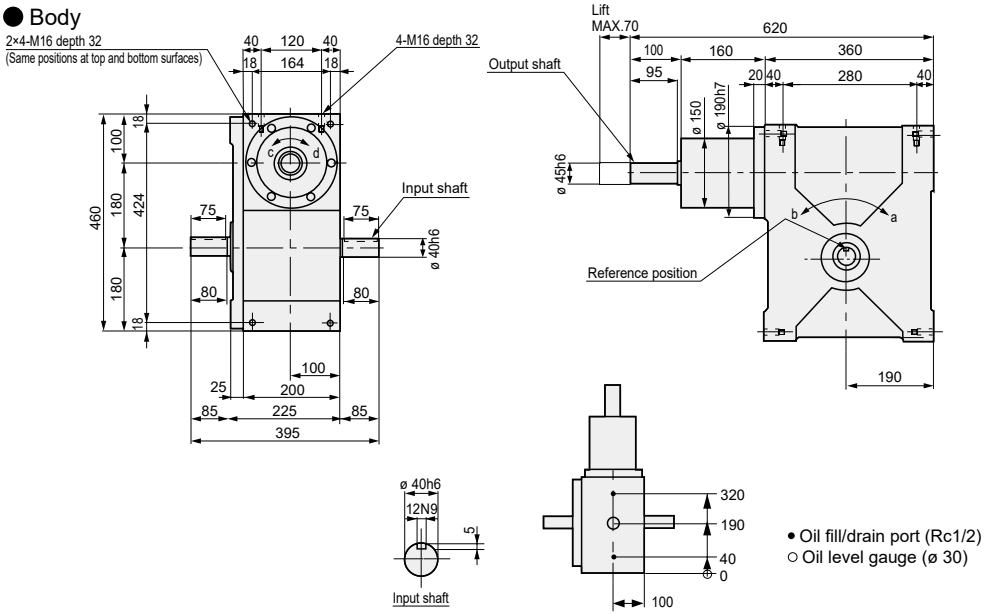
Lift *Lo* (mm)	Index angle: *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm)					
		20	30	40	50	60	80
10	20 25 35	29.8 32.6 35.5	20.3 24.0 28.2	13.5 17.5 22.5	8.6 12.5 17.9	5.2 8.7 14.1	1.0 3.7 8.4
20	30 35 45	29.3 31.5 34.2	20.4 23.1 26.6	13.8 16.7 20.8	9.1 11.9 16.1	5.7 8.2 12.3	1.4 3.3 6.8
30	35 45 55	27.3 31.2 33.5	18.5 23.1 26.0	12.2 17.0 20.3	7.8 12.3 15.7	4.6 8.6 12.0	0.6 3.7 6.6
40	40 50 60	26.0 29.8 32.2	17.5 21.8 24.7	11.4 15.8 19.0	7.1 11.2 14.4	4.1 7.7 10.8	0.3 3.0 5.5
50	45 50 60	25.1 27.1 30.1	16.9 19.1 22.4	11.1 13.1 16.6	6.8 8.7 12.1	3.9 5.5 8.6	0.2 1.4 3.7

Discontinue

Dimensions

CAD

Body



Characteristics

Descriptions		Characteristics	
		Output shaft	Input shaft
Allowable thrust force	N	*	7000
Allowable radial force	N	700	6200
Allowable bending moment	N·m	170	-
Torsion rigidity (K)	N·m/rad	70000	-
Moment of inertia	kg·m^2	2.3 × 10^{-2}	0.39

Descriptions		Characteristics
Internal frictional torque (Tin)	N·m	50
Output shaft inner weight (mo)	kg	11
Product weight	kg	185
Oil level	ℓ	8.0
Paint color		Silver

* Allowable output shaft thrust force is defined in the following formula.
Output shaft allowable thrust force = (allowable payload - max. payload) × 9.81 (N)

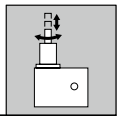
Accuracy

Descriptions		Swing direction	
		Index	Oscillator
Indexing accuracy	" (sec.)	±120	±120
Repeatability	" (sec.)	30	30
Dwell accuracy	" (sec.)	60	60

Descriptions		Lift direction
Stroke accuracy	mm	*
Repeatability	mm	±0.05

* Lift value 30 or less: ±0.2
more than 30 and 70 or less: ±0.3

Discontinue



Output torque table

Index P&P

PPIX180 Cam curve/MS

Index number *n* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm) 20	30	40	50	60
2	120 150	568 568	271 306	261 300	254 292	248 285	230 265
3	90 120 150	568 710 710	287 432 465	276 422 464	269 411 451	262 402 442	243 374 411
4	60 75 90	216 318 345	135 203 272	129 195 262	125 190 255	121 185 249	117 171 241
6	45 60 75	568 710 710	278 424 464	267 409 449	259 397 437	251 388 428	232 360 397
8	35 45 60	318 345 568	189 263 361	181 253 347	174 246 338	168 239 330	153 231 306

Output torque table

Oscillator P&P

PPOX180 Cam curve/MS

Oscillating angle *ψ* (°)	Index angle: *θh* (°)	Static rated output torque (N·m)	Dynamic rated output torque *Tr* (N·m) Input shaft rotational speed *N* (rpm) 20	30	40	50	60
30	30 45 60	568 710 710	315 480 510	286 438 472	254 390 422	230 357 386	211 331 359
45	35 45 60	568 710 710	280 419 471	254 381 429	225 340 383	204 310 350	187 286 325
60	45 60 75	568 710 710	278 424 464	253 387 425	224 345 379	203 315 347	187 292 322
90	60 75 90	568 568 710	263 302 432	239 275 394	212 245 352	193 223 322	177 206 299
120	90 120 150	568 710 710	287 432 465	262 400 439	233 357 392	213 326 359	197 303 334
180	120 150	568 568	271 306	247 284	220 253	201 232	186 215

Payload table

PPIX/PPOX180 Cam curve/MS

Lift *Lo* (mm)	Index angle: *θh* (°)	Rated dynamic payload *Mm* (kg) Input shaft rotational speed *N* (rpm) 20	30	40	50	60
10	18 25 35	41.5 48.0 52.1	26.1 34.6 40.8	15.5 24.5 32.1	8.3 16.8 25.0	3.3 11.0 19.2
20	26 30 40	40.4 43.8 49.0	25.6 29.7 36.6	15.3 19.4 27.1	8.2 12.0 19.6	3.4 6.6 13.7
30	31 35 45	38.3 41.5 46.8	23.8 27.4 34.1	13.8 17.4 24.4	7.0 10.2 17.0	2.4 5.1 11.2
40	36 40 50	37.1 40.1 45.2	23.0 26.3 32.5	13.3 16.4 22.9	6.7 9.4 15.5	2.1 4.5 9.9
50	40 50 60	35.7 41.8 45.8	21.9 28.8 33.6	12.5 19.2 24.3	6.1 12.0 17.1	1.7 6.8 11.4
60	44 50 60	34.7 38.5 43.1	21.2 25.3 30.6	12.0 15.9 21.3	5.7 9.1 14.2	1.4 4.3 8.8
70	48 50 60	33.9 35.2 40.4	20.8 22.2 27.8	11.8 13.0 18.5	5.6 6.7 11.6	1.4 2.2 6.5