New

Pneumatic Swing Clamp

One of the World's Smallest Pneumatic Swing Clamp

Model WHC
Pneumatic Swing Clamp

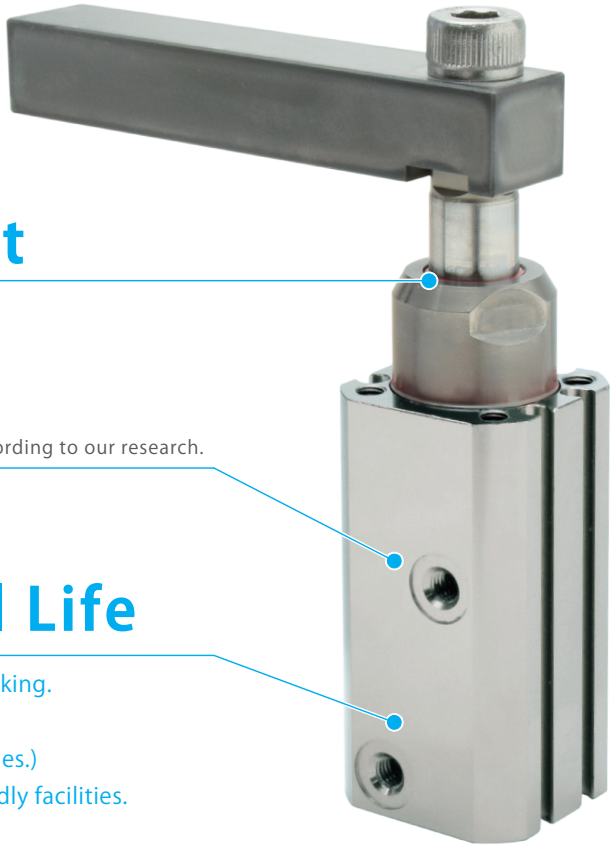
KOSMEK
Harmony in Innovation

Pneumatic Swing Clamp

Model WHC

High Rigidity, Long Operational Life and High Accuracy with Powerful Swing Mechanism

High Speed・High Rigidity・ ±0.5° Swing Angle Position Repeatability



Coolant Resistant

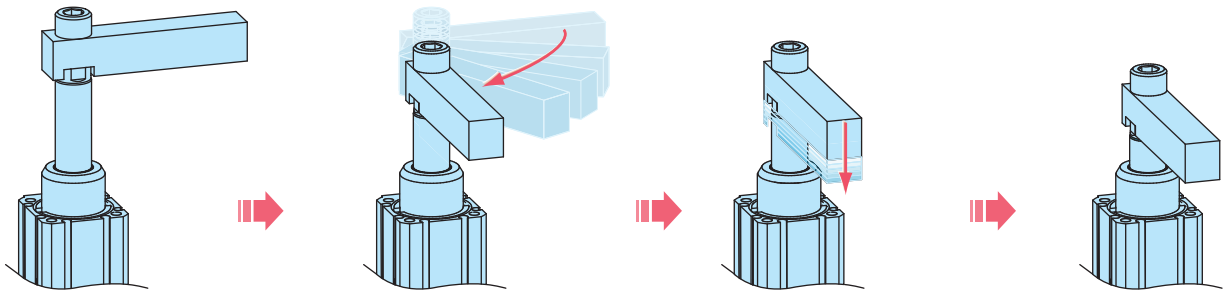
Compact Body

The World's Smallest Class ※According to our research.

High Accuracy・ Long Operational Life

Strong swing mechanism with 3 steel balls tracking.
Allows for high-speed and long operational life.
(Conducted in-house operation test 2 million times.)
For creating high-lifespan, environmentally friendly facilities.
Swing Complete Position Repeatability : ±0.5°
Swing Angle Accuracy 90° ±3°

Action Description



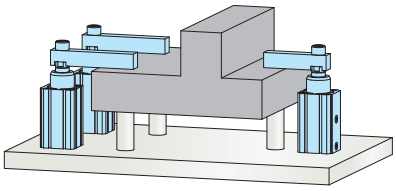
Before Swing (Released State)

The lever descends as it swings.

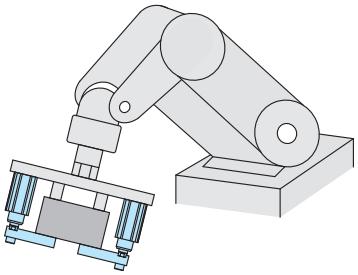
After swing completion, it descends vertically.

Action Completed (Clamped State)

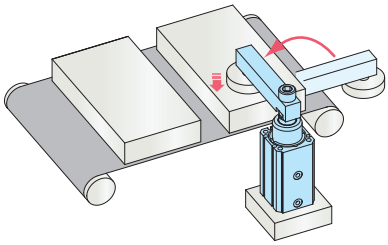
Application Examples



For Clamping a Workpiece during Assembly, Machining and Testing



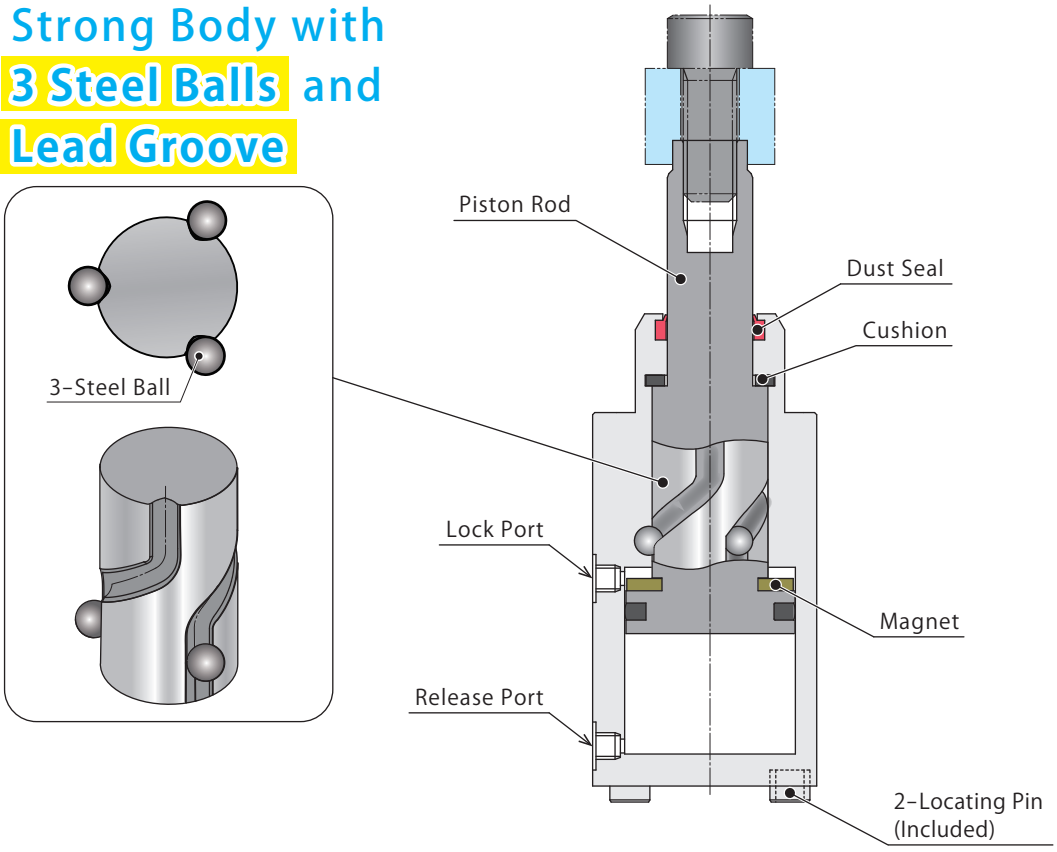
As a Robotic Hand



For Clamping a Workpiece on a Device

Cross Section

Strong Body with 3 Steel Balls and Lead Groove

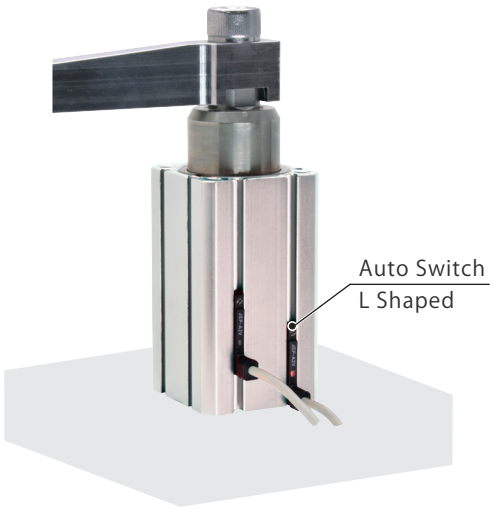


Auto Switch

Locking position and releasing position of the clamp can be detected by an auto switch (prepared by customer).

Installation Sample 1

Installation Sample 2



【Applicable Auto Switch / High-Accuracy Sensor for Air Cylinder】

Switch Type	Model No.	Output Method	Wiring Method	Cable Length	Shape	Protection Grade
Auto Switch※3	**JEP0000-A2**	Contact	2-Wire	1m	Straight 	IP67
	JEP0000-A2L			3m		
	JEP0000-B2	Non-Contact : NPN Output	3-Wire	1m		
	JEP0000-B2L			3m		
	JEP0000-A2V	Contact	2-Wire	1m	L Shaped 	
	JEP0000-A2VL			3m		
	JEP0000-B3	Non-Contact : NPN Output	3-Wire	1m		
	JEP0000-B3L			3m		
High-Accuracy Sensor for Air Cylinder※1※3	**JES0000-02GN**	Non-Contact : NPN Output N-Pole Sensor※2	3-Wire	1m	Straight 	IP67
	JES0000-02GS	Non-Contact : NPN Output S-Pole Sensor※2				
	JES0000-02GPN	Non-Contact : PNP Output N-Pole Sensor※2				
	JES0000-02GPS	Non-Contact : PNP Output S-Pole Sensor※2				
	JES0000-02LGN	Non-Contact : NPN Output N-Pole Sensor※2			L Shaped 	
	JES0000-02LGS	Non-Contact : NPN Output S-Pole Sensor※2				
	JES0000-02LGPN	Non-Contact : PNP Output N-Pole Sensor※2				
	JES0000-02LGPS	Non-Contact : PNP Output S-Pole Sensor※2				

Notes :

1. For further information, refer to the product catalogs of Auto Switch (JEP) and High-Accuracy Sensor for Air Cylinder (JES) on our website.
2. Depending on the installation position and the direction of the auto switch, it may be stuck out of the clamp.

※1. The detection range of High-Accuracy Sensor for Air Cylinder (JES) is different from Auto Switch (JEP), and even small stroke can be securely detected by JES. Refer to "Performance Curve" on the JES catalog for further information.

※2. When detecting both lock and release actions with High-Accuracy Sensor for Air Cylinder (JES), both N-pole sensor and S-pole sensor are required.

※3. JEP/JES series cannot be used in an environment which generates a magnetic field disturbance. For the use in such environments, please use D-P3DWA (manufactured by SMC).

Model No. Indication

WHC 032 1 - R - □

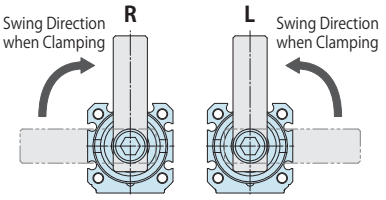
1 2 3 4

1 Cylinder Inner Diameter

020 : Cylinder Inner Diameter = ϕ20mm
032 : Cylinder Inner Diameter = ϕ32mm
040 : Cylinder Inner Diameter = ϕ40mm

3 Swing Direction when Clamping

R : Clockwise
L : Counter-Clockwise



2 Design No.

1 : Revision Number

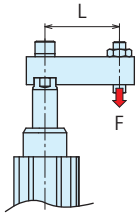
4 Option

Blank : Standard (Vertical Stroke 10mm)
Q20 : Long Stroke Option (Vertical Stroke 20mm)

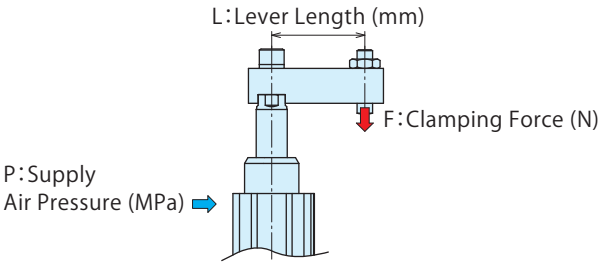
Specifications

Model No.				WHC0201-□-□	WHC0321-□-□	WHC0401-□-□
Cylinder Area for Locking			cm²	2.01	6.03	10.56
Cylinder Inner Diameter ※1			mm	20	32	40
Rod Diameter ※1			mm	12	16	16
Clamping Force (Calculation Formula) ※2			N	F = (187.56 - 0.855×L)×P	F = (527.39 - 1.620×L)×P	F = (860.52 - 2.441×L)×P
4 Option **Blank**	Full Stroke		mm	20	25	25
	Swing Stroke (90°)		mm	10	15	15
	Vertical Stroke		mm	10	10	10
	Cylinder Capacity cm³	Lock		4.02	15.08	26.39
		Release		6.28	20.11	31.42
	Weight		kg	0.19	0.47	0.78
4 Option **Q20**	Full Stroke		mm	30	35	35
	Swing Stroke (90°)		mm	10	15	15
	Vertical Stroke		mm	20	20	20
	Cylinder Capacity cm³	Lock		6.03	21.11	36.95
		Release		9.42	28.15	43.98
	Weight		kg	0.25	0.55	0.90
Max. Operating Pressure			MPa	1.0		
Min. Operating Pressure ※3			MPa	0.1		
Withstanding Pressure			MPa	1.5		
Operating Temperature			℃	0 ~ 70		
Usable Fluid				Dry Air		
90° Swing Angle Accuracy				90° ±3°		
Swing Completion Position Repeatability ※4				±0.5°		

Notes :
※ 1. Clamping force cannot be calculated from the cylinder inner diameter and rod diameter. Please refer to the clamping force curve.
※ 2. F : Clamping Force (N), P : Supply Air Pressure (MPa), L : Distance between the piston center and the clamping point (mm)
※ 3. Minimum pressure to operate the clamp without load. The clamp may stop in the middle of swing action depending on the lever shape. (Refer to "Notes on Lever Design" on P.15.)
※ 4. It shows the value within the vertical stroke range.



Clamping Force Curve



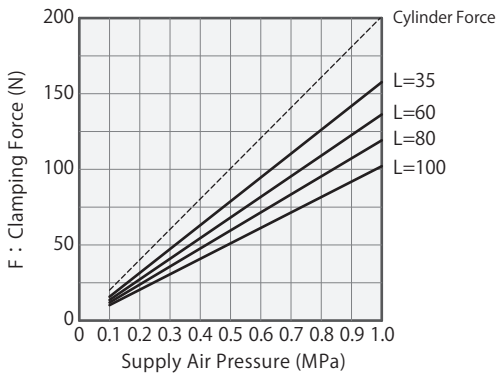
(How to Read the Clamping Force Curve)
In case of WHC0321:
When supply air pressure is 0.6MPa and lever length L is 60mm, clamping force becomes about 258N.

Note:
1. Cylinder force cannot be calculated with the formula of clamping force shown at ※1.

WHC0201

Clamping Force Calculation Formula※1 (N) $F = P\,(187.56 - 0.855 \times L)$

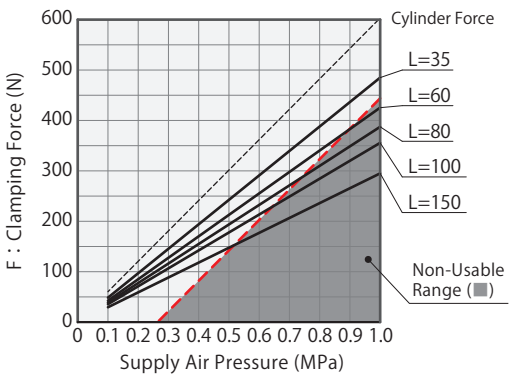
Air Pressure (MPa)	Cylinder Force (N)	Clamping Force (N) Non-Usable Range (■) Lever Length L (mm) 35	60	80	100	Max. Lever Length (L) (mm)
1.0	201	158	136	119	102	100
0.9	181	142	123	107	92	100
0.8	161	126	109	95	82	100
0.7	141	110	95	83	71	100
0.6	121	95	82	71	61	100
0.5	101	79	68	60	51	100
0.4	80	63	55	48	41	100
0.3	60	47	41	36	31	100
0.2	40	32	27	24	20	100
0.1	20	16	14	12	10	100
Max. Operating Pressure (MPa)		1.0	1.0	1.0	1.0	



WHC0321

Clamping Force Calculation Formula※1 (N) $F = P\,(527.39 - 1.620 \times L)$

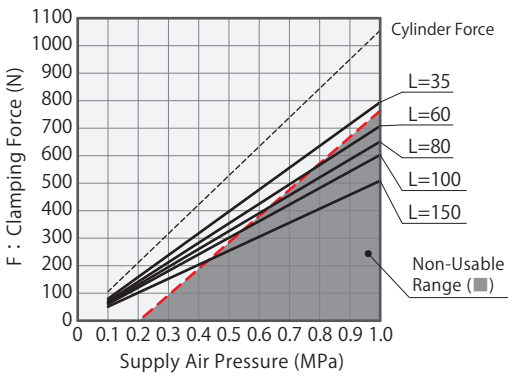
Air Pressure (MPa)	Cylinder Force (N)	Clamping Force (N) Non-Usable Range (■) Lever Length L (mm) 35	60	80	100	150	Max. Lever Length (L) (mm)
1.0	603	471					50
0.9	543	424					55
0.8	483	377					65
0.7	422	329	301				80
0.6	362	282	258	239			105
0.5	302	235	215	199	183		125
0.4	241	188	172	159	146	114	150
0.3	181	141	129	119	110	85	150
0.2	121	94	86	80	73	57	150
0.1	60	47	43	40	37	28	150
Max. Operating Pressure (MPa)		1.0	0.7	0.6	0.5	0.4	



WHC0401

Clamping Force Calculation Formula※1 (N) $F = P\,(860.52 - 2.441 \times L)$

Air Pressure (MPa)	Cylinder Force (N)	Clamping Force (N) Non-Usable Range (■) Lever Length L (mm) 35	60	80	100	150	Max. Lever Length (L) (mm)
1.0	1056	775					40
0.9	950	698					45
0.8	844	620					55
0.7	739	543	500				65
0.6	633	465	428				80
0.5	528	388	357	333			110
0.4	422	310	286	266	247		120
0.3	317	233	214	200	185	148	150
0.2	211	155	143	133	123	99	150
0.1	106	78	71	67	62	49	150
Max. Operating Pressure (MPa)		1.0	0.7	0.5	0.4	0.3	



Notes:
※1. F : Clamping Force (N), P : Supply Air Pressure (MPa), L : Lever Length (mm).
1. Lever with a large inertia sometimes does not work depending on supply air pressure, air flow rate and lever mounting position.
2. The tables and graphs show the relationship between the clamping force (N) and supply air pressure (MPa).
3. Values in above charts indicate clamping force when the lever locks a workpiece in horizontal position.
4. The clamping force varies depending on the lever length. Provide the suitable air pressure based on the lever length.
5. Clamping force in the non-usable range may cause damage, seizure and fluid leakage.

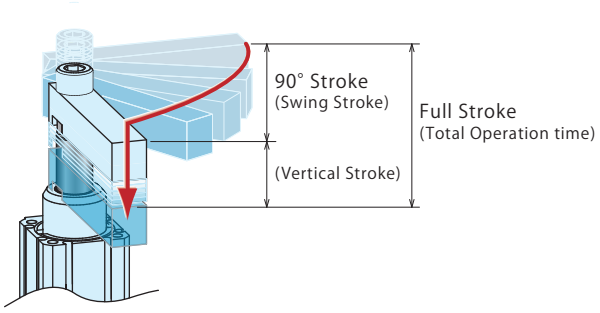
MEMO

Allowable Swing Time Graph

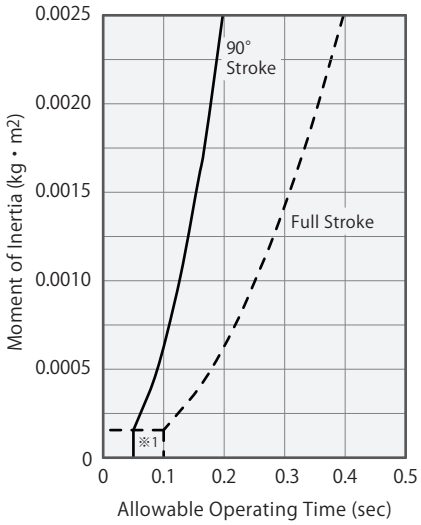
Adjustment of Swing Time

The graph shows allowable swing time against the moment of inertia of a lever.
An operation time should be longer than the operation time shown in the graph.

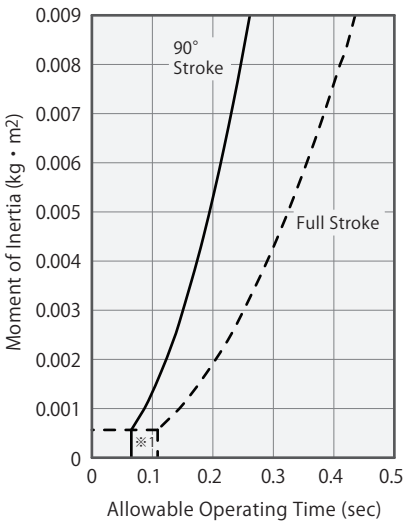
Excessive action speed can reduce stopping accuracy and damage internal components.



WHC0201



WHC0321/0401



Note :

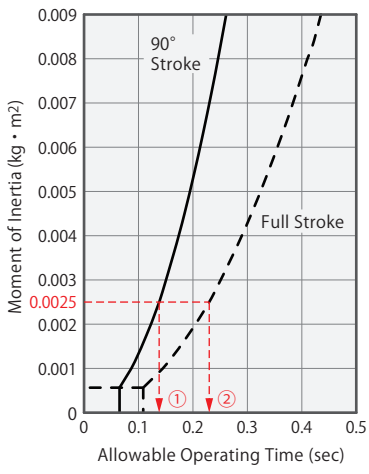
※1. For any moment of inertia of a lever,
90° swing time should be WHC0201：About 0.05 sec or more WHC0321/0401：About 0.075 sec or more
Total Operation Time should be WHC0201：About 0.1 sec or more WHC0321/0401：About 0.125 sec or more

1. For WHC-Q：Long Stroke Model, the total operation time is different from what is shown in the graph. It should be calculated with the calculation formula. (90° swing time is as shown in the graph.)

Calculation Formula of Total Operation Time

$$\text{Total Operation Time (sec)} = 90°\text{Swing Time when Locking (sec)} \times \frac{\text{Full Stroke (mm)}}{\text{Swing Stroke (mm)}}$$

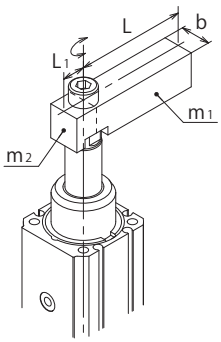
(How to read the allowable swing time graph)
In case of WHC0321
The moment of inertia of a lever : 0.0025kg・m²
① 90° Swing Time ：About 0.14 sec or more
②Total Operation Time ：About 0.23 sec or more
1. The total operation time on the graph shows the allowable operation time when fully stroked.



How to Calculate the Moment of Inertia (Estimated)

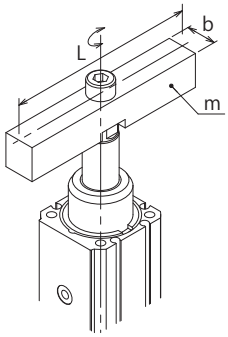
I : Moment of Inertia (kg·m²) L, L_1, L_2, K, b : Length (m) m, m_1, m_2, m_3 : Weight (kg)

① For a rectangular plate (cuboid), the rotating shaft is vertically on one side of the plate.



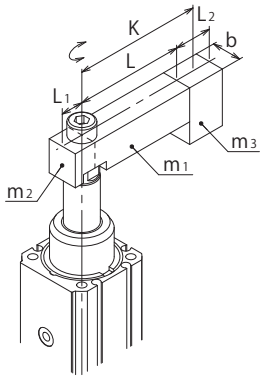
$$I = m_1 \frac{4L^2+b^2}{12} + m_2 \frac{4L_1^2+b^2}{12}$$

② For a rectangular plate (cuboid), the rotating shaft is vertically on the gravity center of the plate.



$$I = m \frac{L^2+b^2}{12}$$

③ Load is applied on the lever front end.



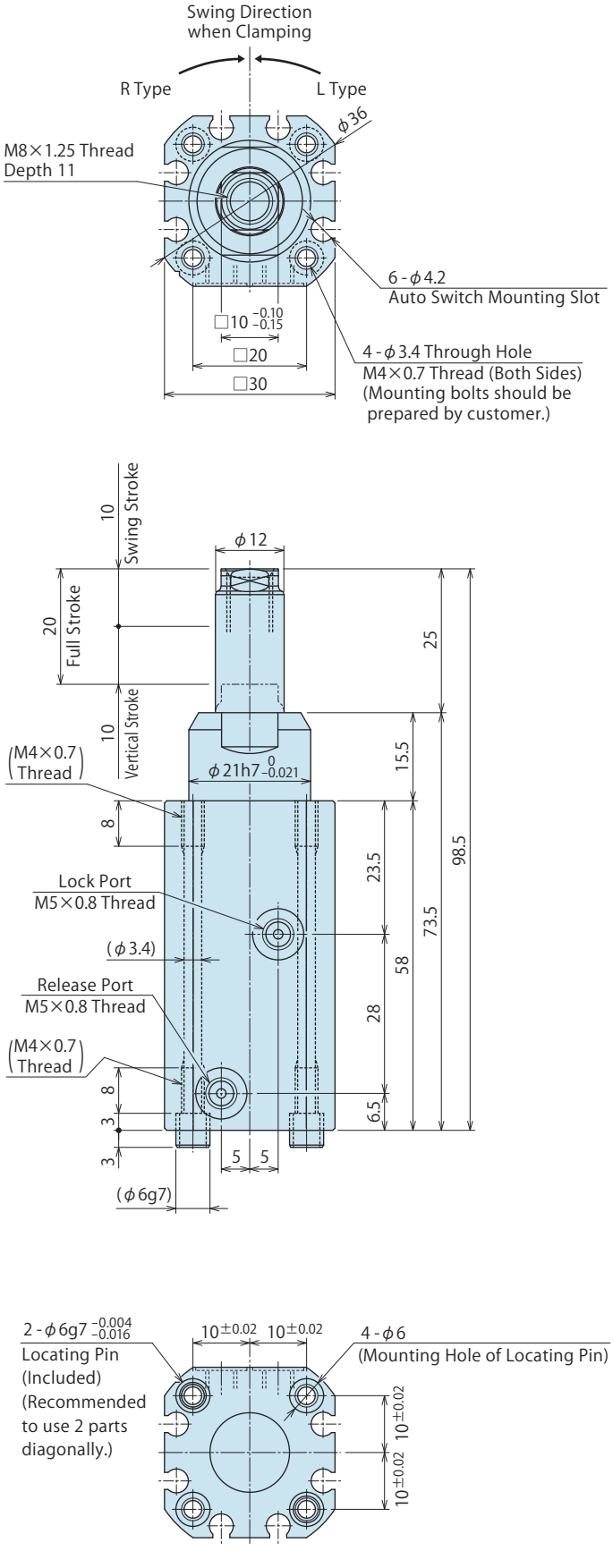
$$I = m_1 \frac{4L^2+b^2}{12} + m_2 \frac{4L_1^2+b^2}{12} + m_3K^2 + m_3 \frac{L_2^2+b^2}{12}$$

Notes :

1. The graph shows the allowable action time with respect to the moment of inertia of lever when the piston rod operates at constant speed.
2. Lever with a large inertia sometimes does not work depending on supply air pressure, air flow rate and lever mounting position.
3. For speed adjustment, please use meter-out flow control valve. In case of meter-in control, a clamp lever may be accelerated by its own weight during swinging motion (clamp mounted horizontally) or the piston rod may be moving too fast.
4. Excessive swing speed can reduce stopping accuracy and damage internal components.

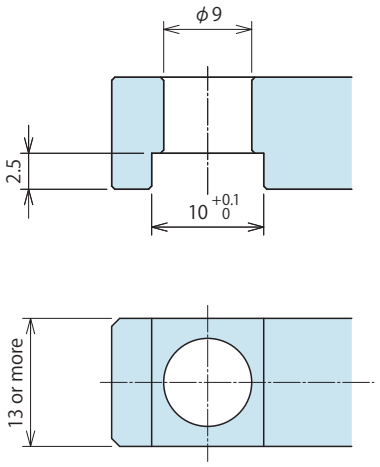
External Dimensions : WHC0201-□ (Standard)

※The drawing shows the released state of WHC0201-□.



Lever Design Dimensions for WHC0201

※Reference for designing swing lever for WHC0201.

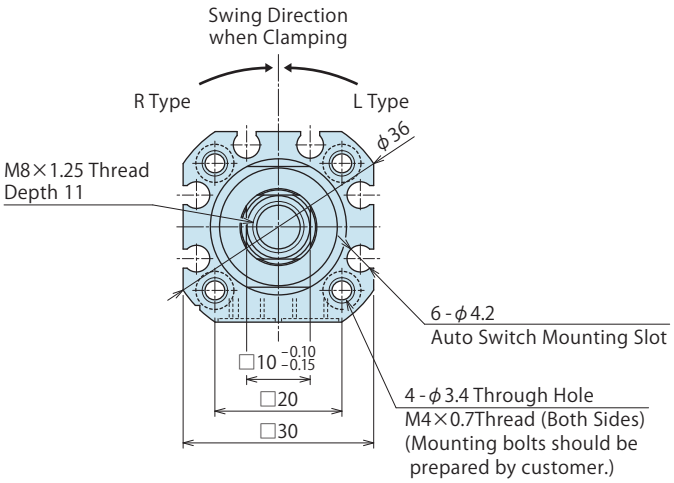


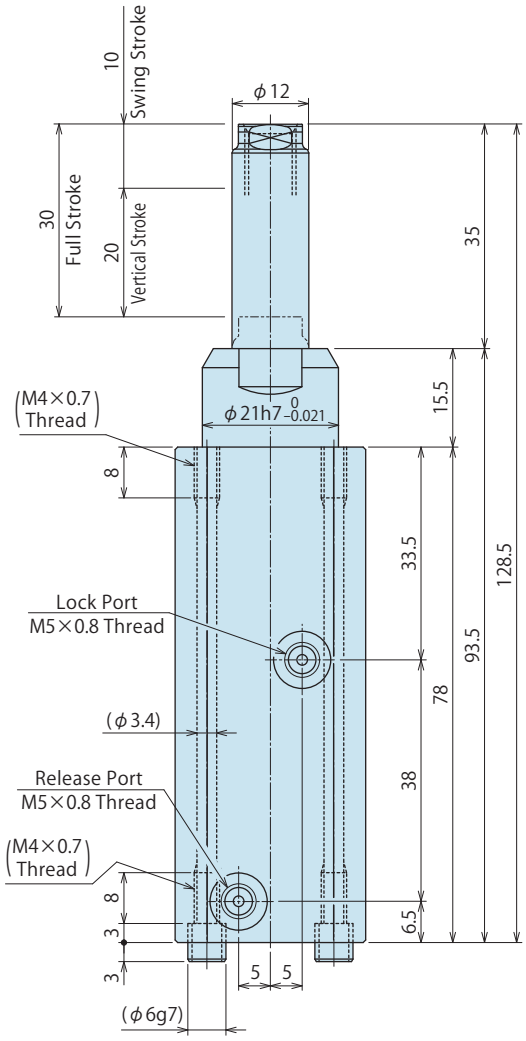
Note :

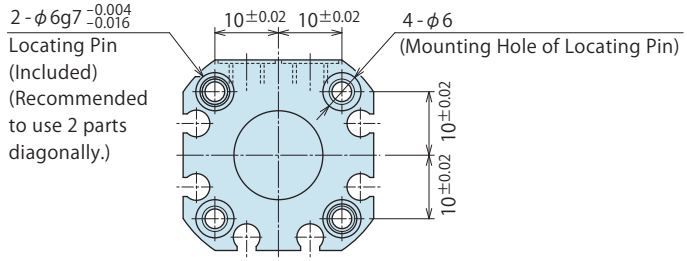
1. Swing lever should be designed with its length according to the allowable swing time graph and the clamping force curve.

External Dimensions : WHC0201-□-Q20 (Long Stroke)

※The drawing shows the released state of WHC0201-□-Q20

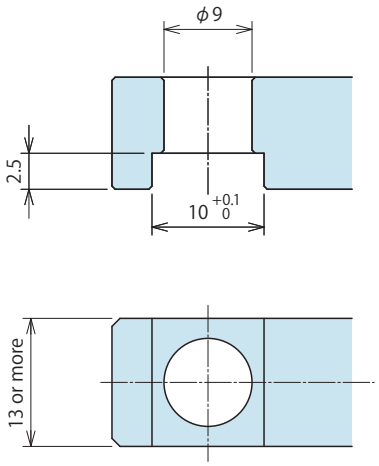






Lever Design Dimensions for WHC0201

※Reference for designing swing lever for WHC0201.

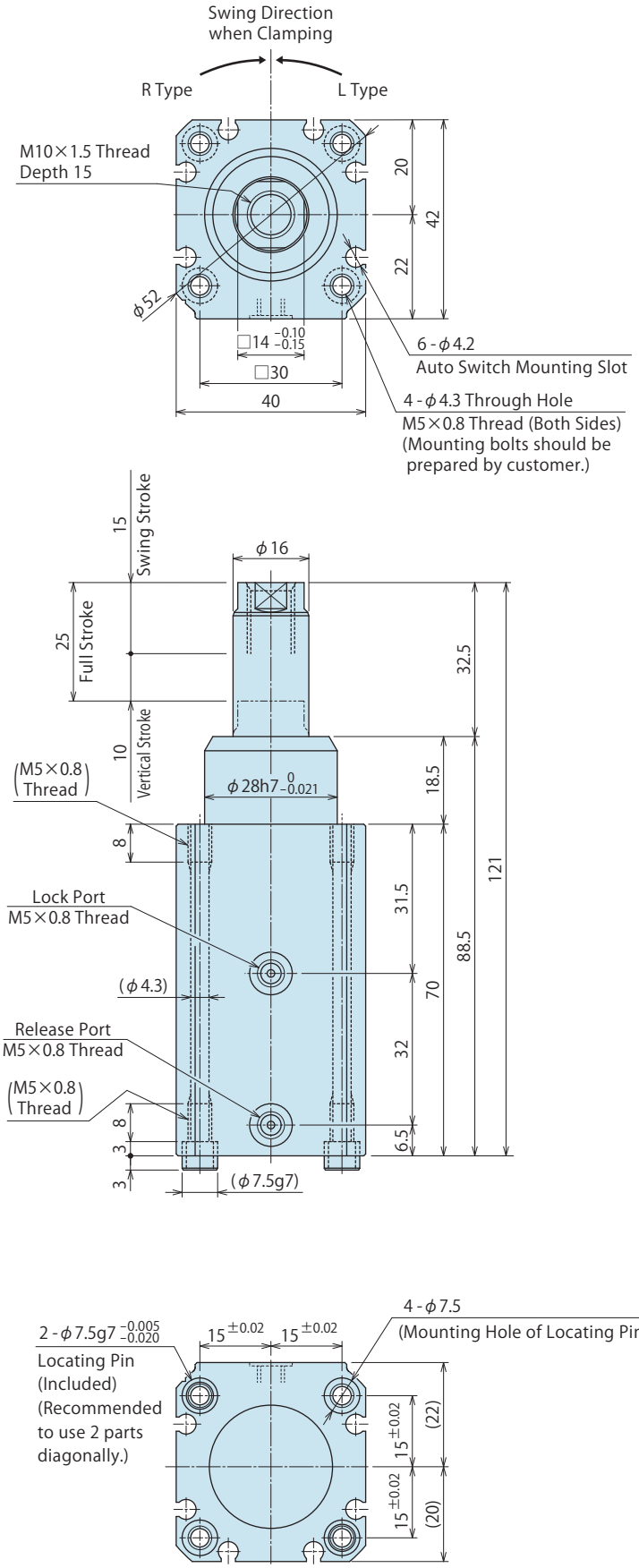


Note :

1. Swing lever should be designed with its length according to the allowable swing time graph and the clamping force curve.

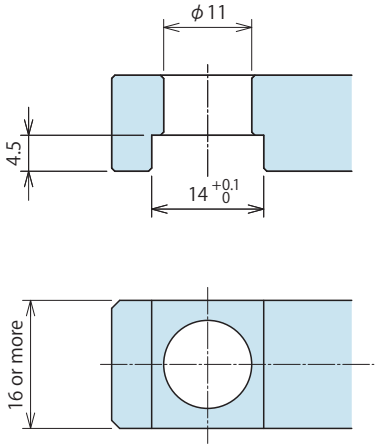
External Dimensions : WHC0321-□ (Standard)

※The drawing shows the released state of WHC0321-□.



Lever Design Dimensions for WHC0321

※Reference for designing swing lever for WHC0321.

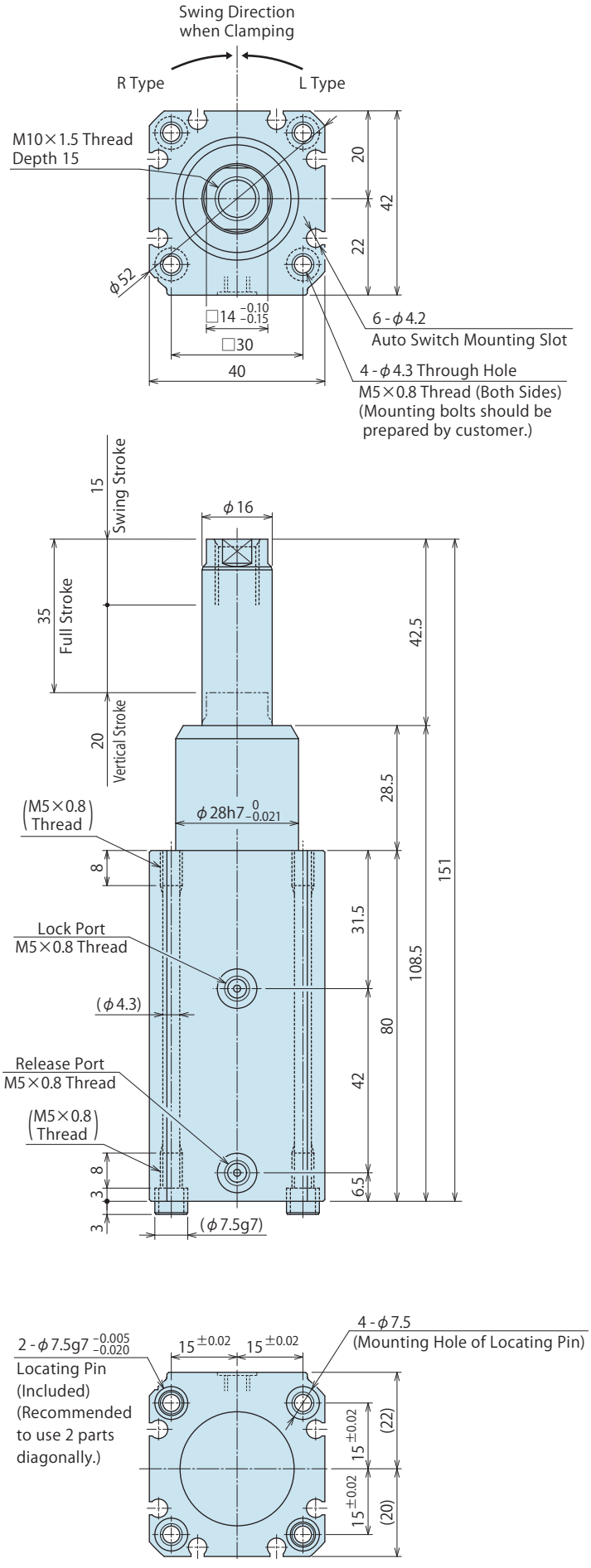


Note :

1. Swing lever should be designed with its length according to the allowable swing time graph and the clamping force curve.

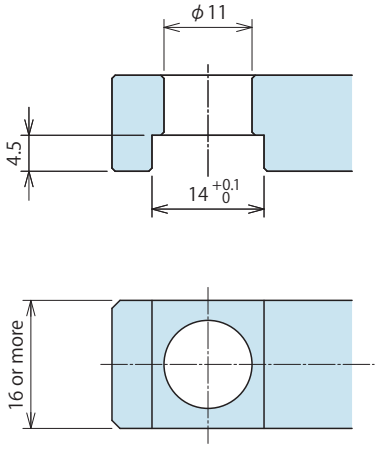
External Dimensions : WHC0321-□-Q20 (Long Stroke)

※The drawing shows the released state of WHC0321-□-Q20.



Lever Design Dimensions for WHC0321

※Reference for designing swing lever for WHC0321.

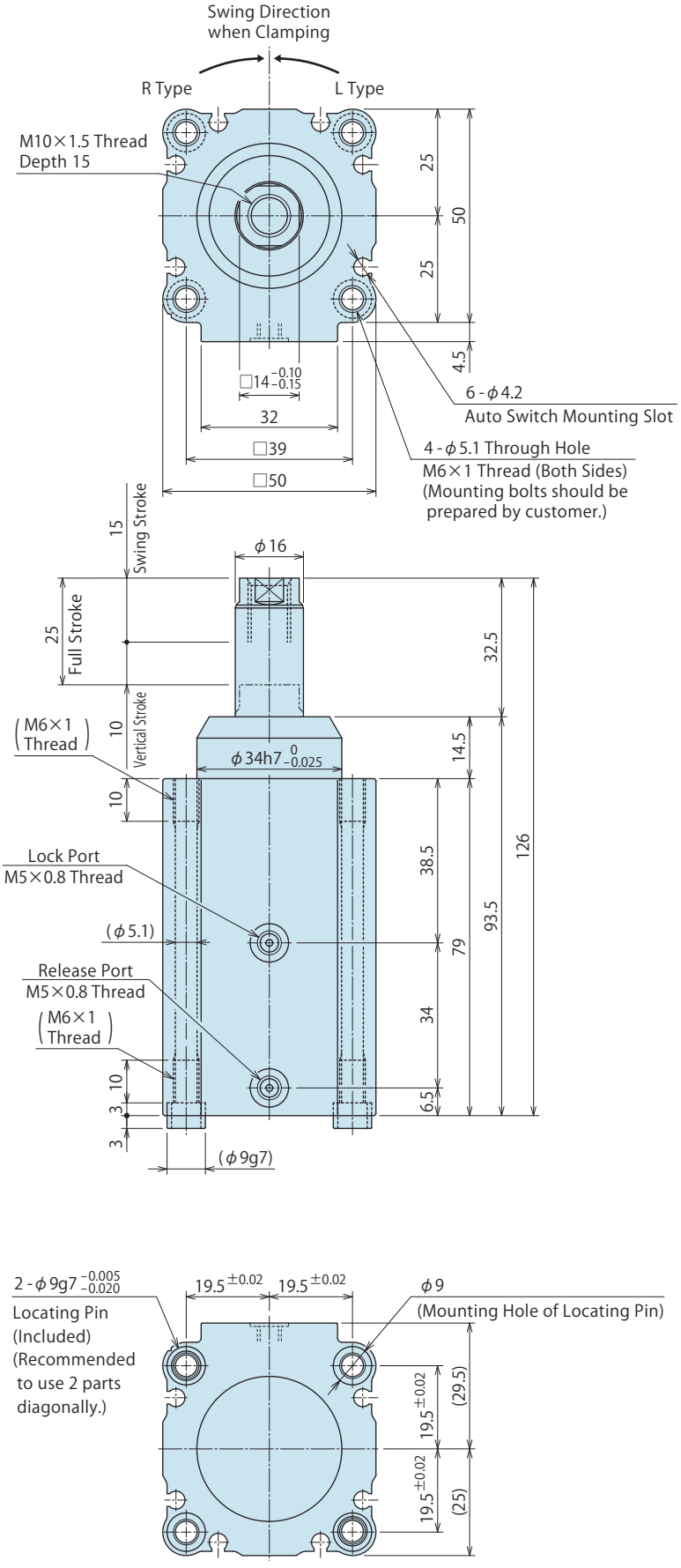


Note :

1. Swing lever should be designed with its length according to the allowable swing time graph and the clamping force curve.

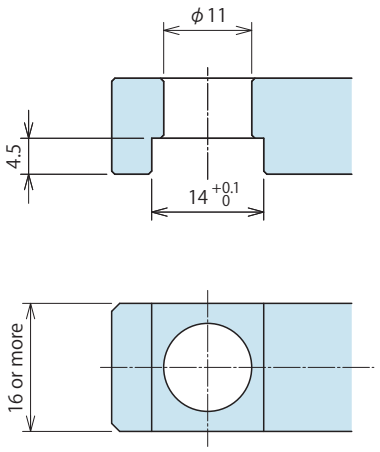
External Dimensions : WHC0401-□ (Standard)

※The drawing shows the released state of WHC0401-□.



Lever Design Dimensions for WHC0401

※Reference for designing swing lever for WHC0401.

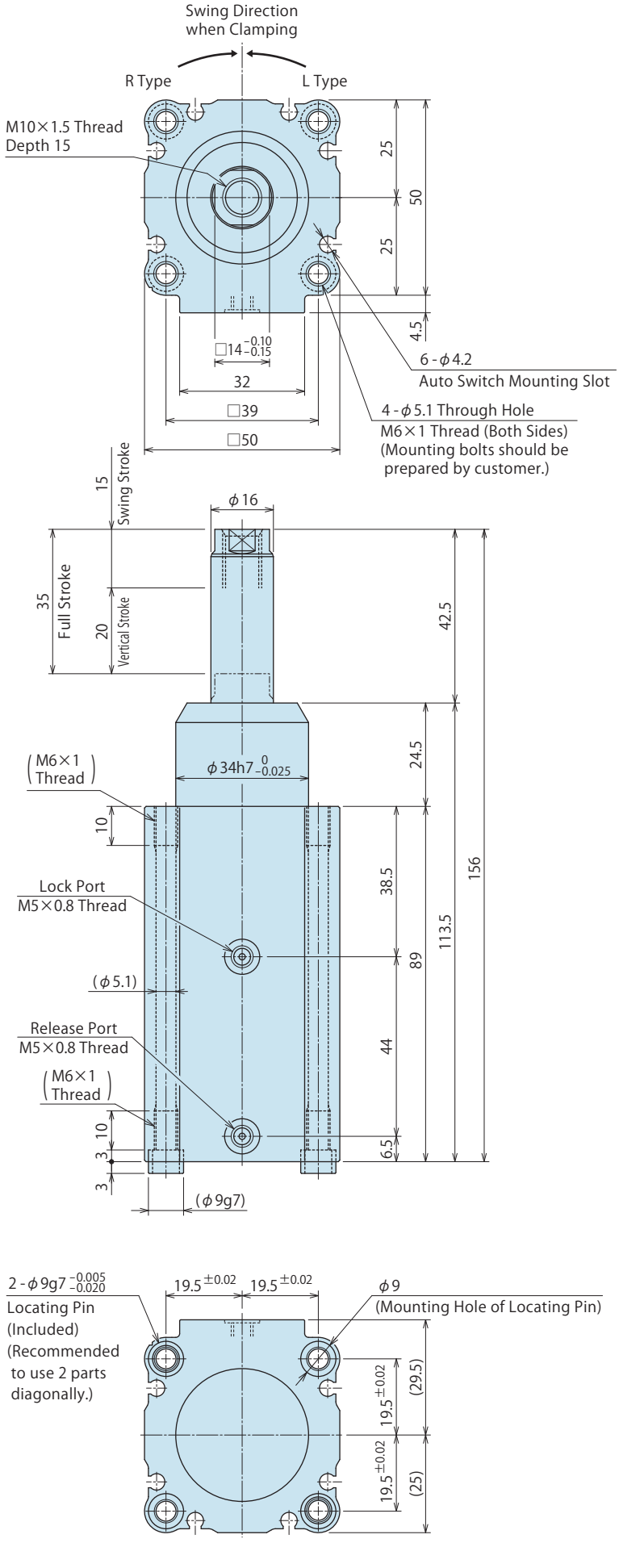


Note :

1. Swing lever should be designed with its length according to the allowable swing time graph and the clamping force curve.

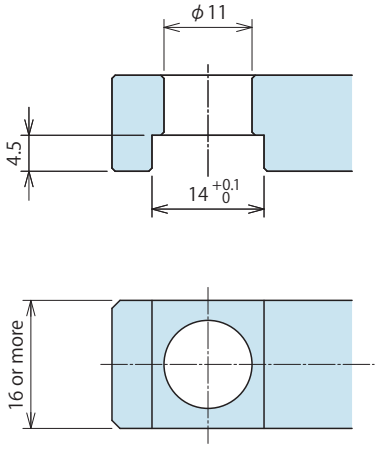
External Dimensions : WHC0401-□-Q20 (Long Stroke)

※The drawing shows the released state of WHC0401-□-Q20.



Lever Design Dimensions for WHC0401

※Reference for designing swing lever for WHC0401.



Note :

1. Swing lever should be designed with its length according to the allowable swing time graph and the clamping force curve.

Cautions

Notes for Design

1) Check Specifications

- Please use each product according to the specifications.

2) Notes for Circuit Design

- Ensure there is no possibility of providing air pressure to the lock port and the release port simultaneously. Improper circuit design may lead to malfunctions and damages.

3) Swing lever should be designed to make the moment of inertia small.

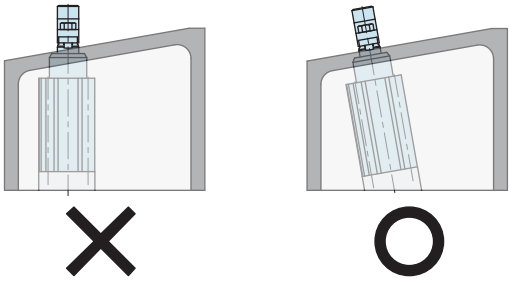
- Large moment of inertia will degrade the lever's stopping accuracy and cause damage to the clamp.
  Additionally, the clamp may not function, depending on supplied air pressure and lever mounting position.
- Set the swing time according to the moment of inertia.
  Refer to "Allowable Swing Time Graph" and make sure to operate clamps within the allowable operation time.
- If supplying a large amount of air right after installation, action time will be extremely fast leading to severe damage on a clamp.
  Install a speed controller (meter-in) near the air source and gradually supply air pressure.

4) Protect the exposed area of the piston rod when using on a welding fixture.

- If spatter attaches to the sliding surface it could lead to malfunction and air leakage.

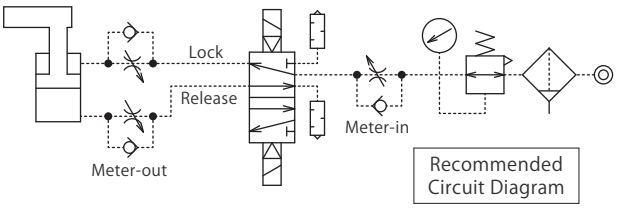
5) When clamping on a sloped surface of the workpiece.

- Make sure the clamping surface and the mounting surface of the clamp are parallel.



6) Adjustment of Swing Speed

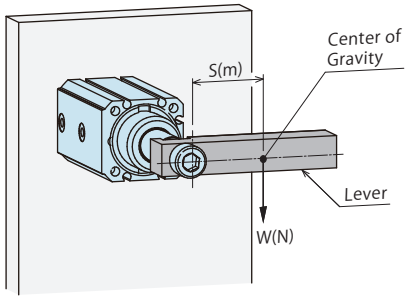
- If the clamp operates too fast, the components will be worn out leading to premature damage and ultimately complete failure.
  Adjust the swing speed following "Allowable Swing Time Graph".
- Install a speed control valve (meter-out) and gradually control the flow rate from the low-speed side (small flow) to the designated speed. Controlling from the high-speed side (large flow) causes excessive surge pressure or overload to the clamp leading to damage of a machine or device.



- When operating multiple clamps simultaneously, please install the speed controller (meter-out) to each clamp.

7) Notes for Lever Design

- Please design a lever as light as possible, and it should be no larger than necessary.
  The clamp may not function depending on supplying air pressure, mounting position and shape of the lever. If using a large lever in the mounting position as shown below, it may stop in the middle of swing action. Please use a lever with (Lever Weight W)× (Distance to the Center of Gravity S) lighter than shown in the following table.



Model No.	(Lever Weight W) × (Distance S) (N·m)
WHC0201	0.035
WHC0321	0.10
WHC0401	0.18

Installation Notes

1) Check the Usable Fluid

- Please provide filtered clean dry air.
- Oil supply with a lubricator, etc. is not necessary.
  Oil supply with a lubricator may cause loss of the initial lubricant, and the operation under low pressure/speed may be unstable.
  (When using secondary lubricant, please supply lubricant continuously. Otherwise, the initial grease applied from KOSMEK will be removed from the secondary lubricant.)

2) Preparation before Piping

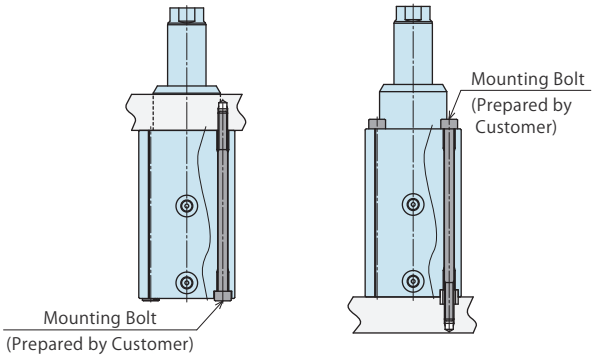
- The pipeline, piping connector and fixture circuits should be cleaned by thorough flushing. The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
- There is no filter provided with this product which prevents contamination in the circuit.

3) Installation of the Product

- When installing the product, use 4 hexagonal socket bolts (with tensile strength of 12.9) and tighten them with the torque shown in the list below. Tightening with greater torque than recommended can damage the thread, dent the seating surface or break the bolt. When tapping both ends, make sure the thread engaging length is longer than the minimum engaging length shown below. If the engaging length is too short, it may cause damage to the threads.

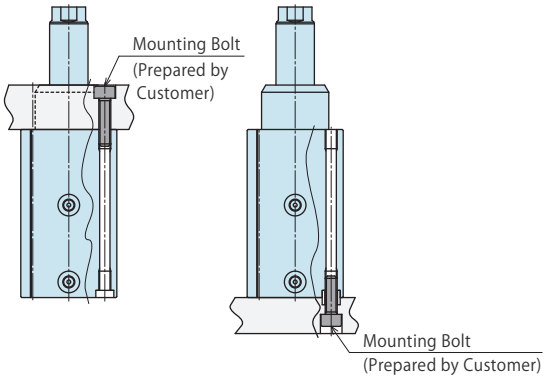
Installation Using the Through Holes

Model No.	Mounting Bolt Size	Tightening Torque (N·m)
WHC0201	M3×0.5	1.3
WHC0321	M4×0.7	3.2
WHC0401	M5×0.8	6.3



Installation Using Taps on Both Ends (Flange)

Model No.	Mounting Bolt Size	Min. Engagement Length (mm)	Tightening Torque (N·m)
WHC0201	M4×0.7	5	2.8
WHC0321	M5×0.8	6	4.8
WHC0401	M6×1	8	7.0



4) Installation and Removal of the Swing Lever

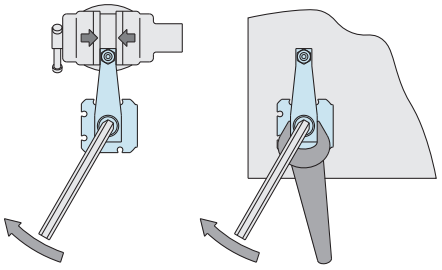
- Oil or debris adhered on the tightened parts of the lever and piston rod may cause the lever to loosen. Please clean them thoroughly before installation.
- Tighten the swing lever with the torque shown below. Tightening with greater torque than recommended can damage the bolts and lever tightening function.

Model No.	Mounting Bolt Size	Tightening Torque (N·m)
WHC0201	M8×1.25	25
WHC0321	M10×1.5	50
WHC0401	M10×1.5	50

- If the piston rod is subjected to excessive torque or shock, the internal rotation mechanism may be damaged. Observe the following points to prevent these kinds of shocks.

At Installation

① Fix the swing lever with a vise or spanner, etc. and tighten the lever fixing bolt.



At Removal

① Fix the swing lever with a vise or spanner, etc. and loosen the lever fixing bolt 2 or 3 turns.

5) Adjustment of Swing Speed

- Adjust the speed following “Allowable Swing Time Graph”. If the clamp operates too fast, the components will be worn out leading to premature damage and ultimately complete failure.
- Turn the speed control valve gradually from the low-speed side (small flow) to the high-speed side (large flow) to adjust the speed.

6) Checking Looseness and Retightening

- At the beginning of the product installation, the lever fixing bolt may be tightened lightly. Check the looseness and re-tighten as required.

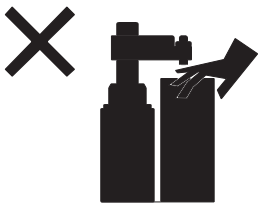
Cautions

Notes on Handling

1) It should be operated by qualified personnel.
- Machines and devices with hydraulic and pneumatic products should be operated and maintained by qualified personnel.

2) Do not operate or remove the product unless the safety protocols are ensured.
① Machines and devices can only be inspected or prepared when it is confirmed that the safety devices are in place.
② Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
③ After stopping the product, do not remove until the temperature drops.
④ Make sure there is no trouble/issue in the bolts and respective parts before restarting a machine or device.

3) Do not touch a clamp while it is working.
Otherwise, your hands may be injured.

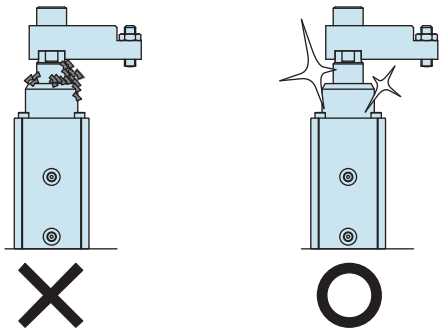


4) Do not disassemble or modify.
- If the product is taken apart or modified, the warranty will be voided even within the warranty period.

Maintenance and Inspection

1) Removal of the Product and Shut-off of Pressure Source
- Before the product is removed, make sure that safety devices and preventive devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
- Make sure there is no trouble/issue in the bolts and respective parts before restarting.

2) Regularly clean the area around the piston rod.
- If it is used when the surface is contaminated with dirt, it may lead to packing seal damage, malfunctioning and fluid leakage.



3) Regularly tighten pipe, mounting bolt, nut, snap ring, cylinder and others to ensure proper use.

4) Make sure there is a smooth action without an irregular noise.
- Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.

5) The product should be stored in the cool and dark place without direct sunshine or moisture.

6) Please contact us for overhaul and repair.

Warranty

1) Warranty Period

- The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.

2) Warranty Scope

- If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense.
  Defects or failures caused by the following are not covered.

① If the stipulated maintenance and inspection are not carried out.
② Failure caused by the use of the non-confirming state at the user's discretion.
③ If it is used or operated in an inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
④ If the defect is caused by reasons other than our responsibility.
⑤ If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
⑥ Other caused by natural disasters or calamities not attributable to our company.
⑦ Parts or replacement expenses due to parts consumption and deterioration.
(Such as rubber, plastic, seal material and some electric components.)

Damages excluding from direct result of a product defect shall be excluded from the warranty.

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■ For Further Information on Unlisted Specifications and Sizes, Please call us.
■ Specifications in this Leaflet are Subject to Change without Notice.

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