35MPa

Double Acting

New

Swing Clamp / Link Clamp with Action Confirmation

ONLY ONE AIR PORT required to check both clamp and unclamp states

Model TLV
Swing Clamp

Model TMV
Link Clamp

KOSMEK
Harmony in Innovation

Air Sensing Swing Clamp

High Pressure : 7~35MPa

Swing Clamp with Action Confirmation

Hydraulic Double Action

Model TLV-2

ONLY ONE AIR PORT
required to check both clamp and unclamp states

Compact Clamp with Action Confirmation System

NEW

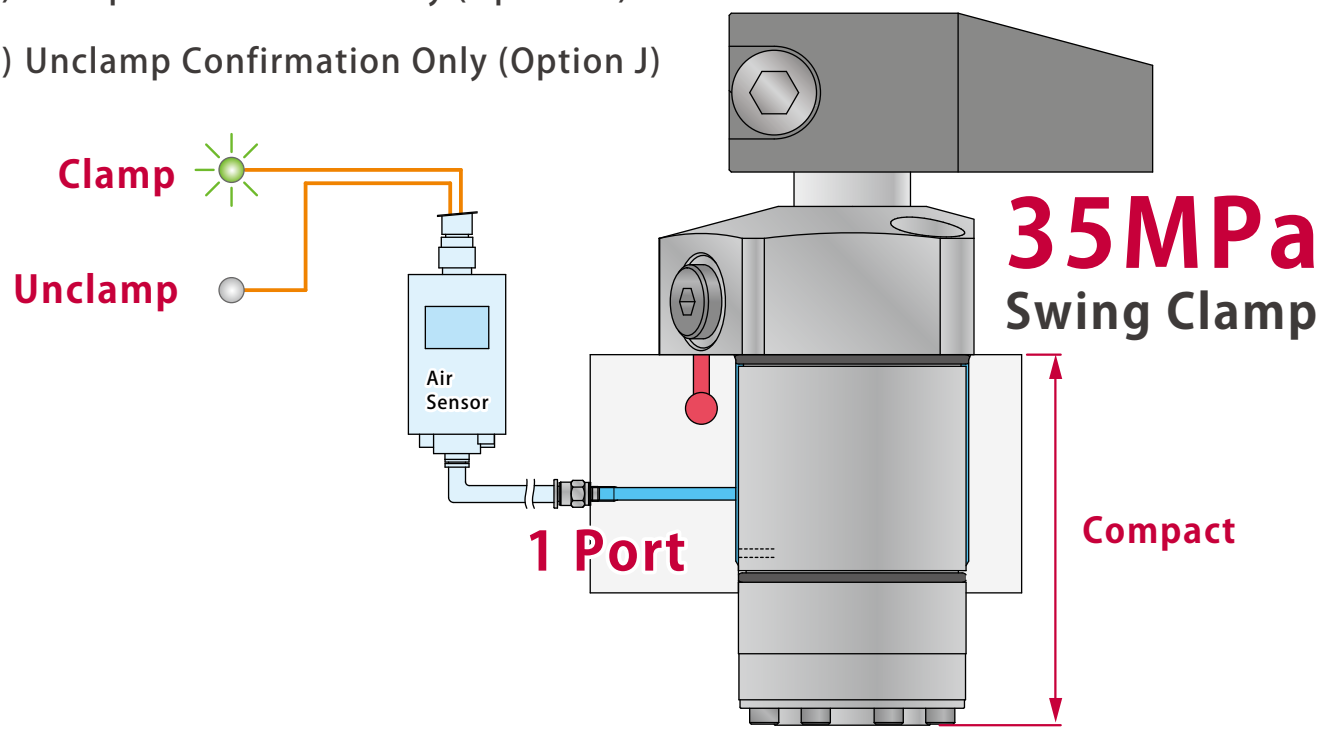
35MPa High-Pressure Swing Clamp with Action Confirmation

3 Options Available

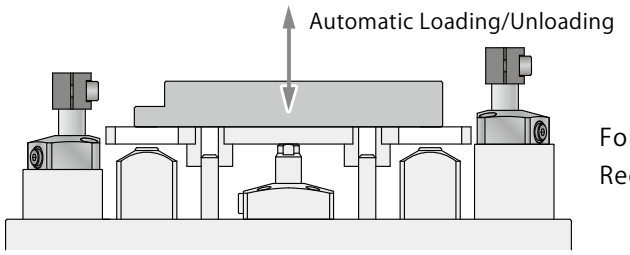
(1) Clamp • Unclamp Confirmation with One Air Port (Option E)

(2) Clamp Confirmation Only (Option H)

(3) Unclamp Confirmation Only (Option J)



Application Example



For Automation Line
Requiring Action Confirmation

Features

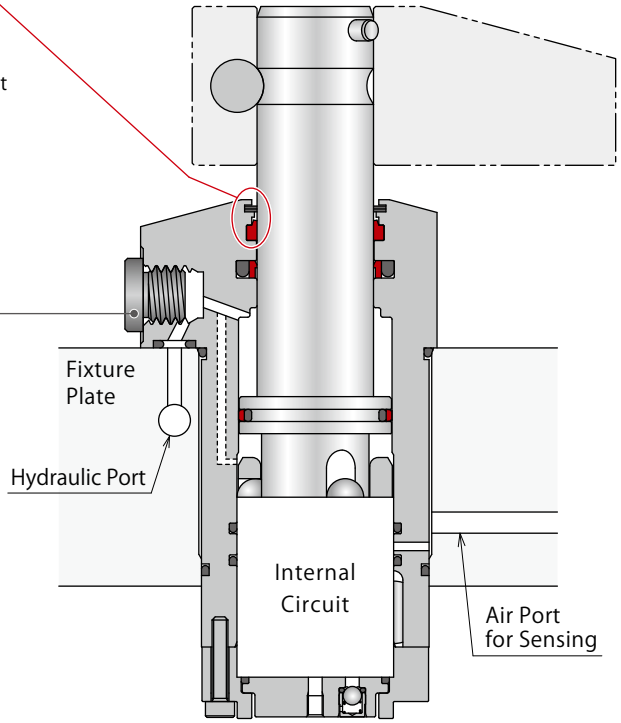
Metal Wiper Prevents Damage to the Dust Seal

Equipped with Metal Coil Scraper to prevent damage to the internal dust seal and maintain high sealing durability for a long period of time. The internal dust seal has high durability against chlorine-based coolant by using a sealing material with excellent chemical resistance.

Direct Mount Speed Control Valve

Speed control valve with air bleeding function can be directly mounted to the product. (Speed control valve is sold separately.)

model BZT

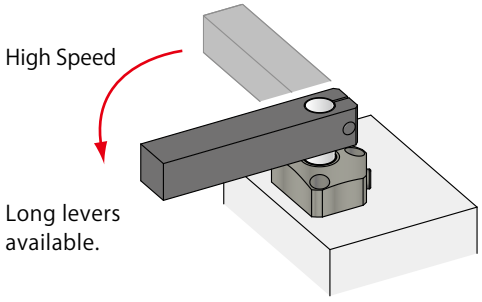


The Same Dimensions for All Confirmation Options

Fixture designing can be simple, and replacing a clamp with a different action confirmation option is possible because the external dimensions and the mounting hole machining dimensions are the same for all of three action confirmation options.

Optimum Design with High Performance

Designed with the most effective long guide ratio, steel ball size and rod diameter to achieve high clamping force and high rigidity. This design enables to maximize the usable range of a long lever with high durability and high-speed operations.

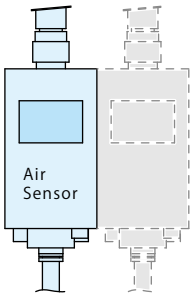


Minimized Number of Sensors

※ In case of option E : Clamp • Unclamp Detection

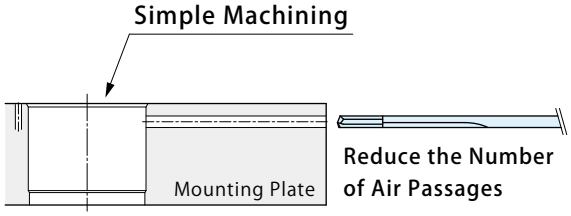
Only one air sensor is required to check both clamping and unclamping actions. (Required to use a two-output air sensor.)

Reduce the Number of Air Sensors



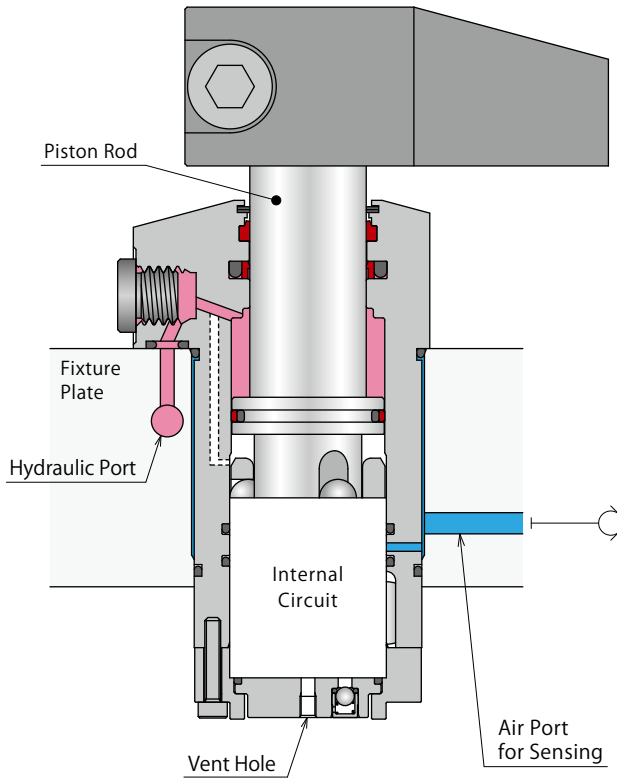
Minimized Number of Ports • Simple Machining

Integrating ports for the sensor allows for reducing the number of both ports of a rotary joint and air passages of a fixture plate. Plus, they can simplify the machining of a mounting hole.



Action Description (Internal Structure)

The figure shows clamp with option 5 E (Clamp - Unclamp Confirmation)



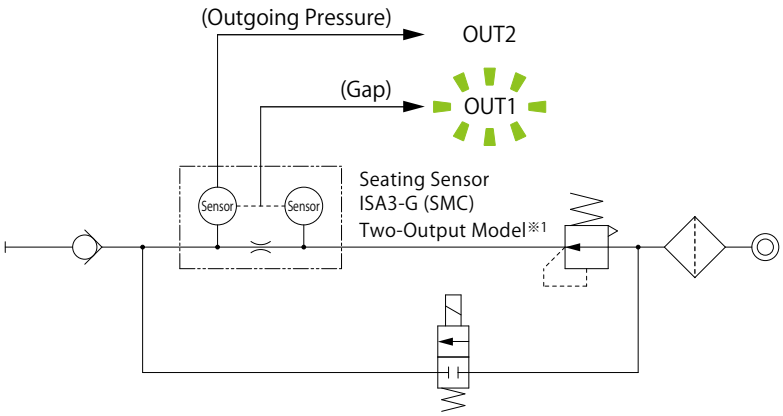
Clamping Action

The piston rod descends as it swings.

↓

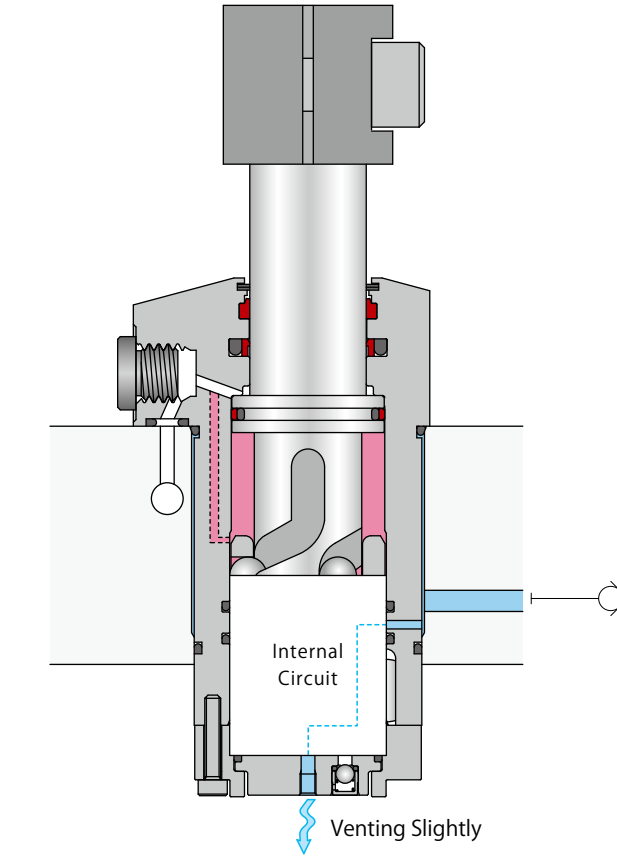
After swing action is completed, the piston rod descends vertically and clamps the workpiece.

Hydraulic Pressure		Air Sensor	
Clamp Side	Unclamp Side	Clamp Check Output 1 (OUT 1)	Unclamp Check Output 2 (OUT 2)
ON	OFF	ON	OFF



Note :

※1. It is able to use a one-output seating sensor for the action confirmation symbol 5 H/J (one-side action confirmation).



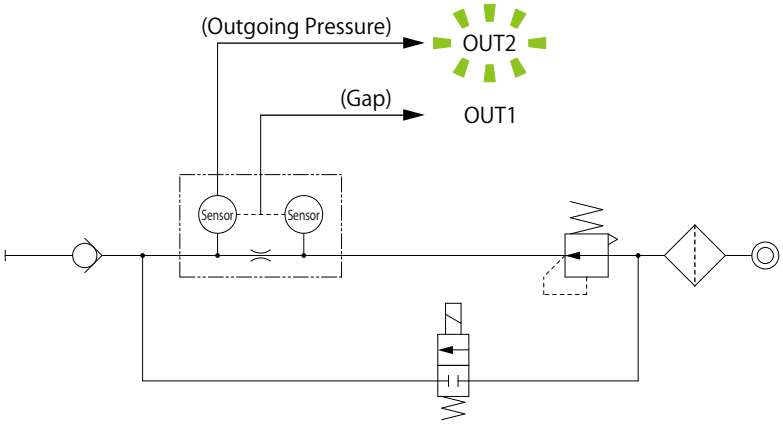
Unclamping Action

The piston rod ascends vertically (Clamp Stroke Range).

↓

After vertical action is completed, the piston rod ascends as it swings.

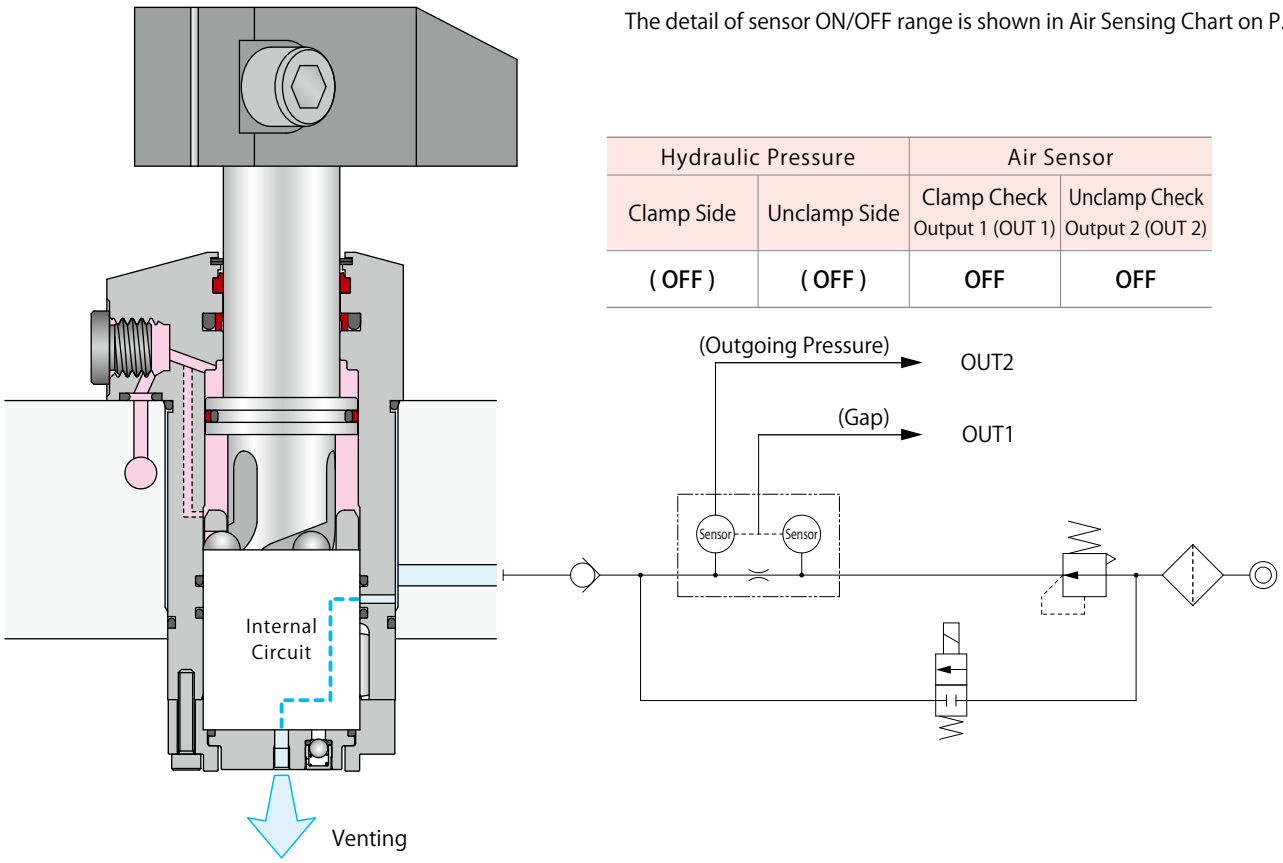
Hydraulic Pressure		Air Sensor	
Clamp Side	Unclamp Side	Clamp Check Output 1 (OUT 1)	Unclamp Check Output 2 (OUT 2)
OFF	ON	OFF	ON



During Swing Action

The air sensor turns OFF during swing action.

The detail of sensor ON/OFF range is shown in Air Sensing Chart on P. 6.



Hydraulic Pressure		Air Sensor	
Clamp Side	Unclamp Side	Clamp Check Output 1 (OUT 1)	Unclamp Check Output 2 (OUT 2)
(OFF)	(OFF)	OFF	OFF

The following shows the actions and the air sensor outputs for the action confirmation symbol **5 H/J**.

Action Confirmation	In case of **5 H** Clamp Confirmation	In case of **5 J** Unclamp Confirmation
Clamping Action	Air Sensor Output **ON**	Air Sensor Output OFF
Unclamping Action	Air Sensor Output OFF	Air Sensor Output **ON**
During Swing Action	Air Sensor Output OFF	Air Sensor Output OFF

※ When air sensor is ON：No air leakage from the vent hole. When air sensor is OFF：Air releasing from the vent hole.

Action Confirmation and Air Sensing Chart

Action confirmation can be conducted by detecting differential pressure with an air sensor.

Applicable Model

TLV 080 0 - 2 C [R L] [E H J]

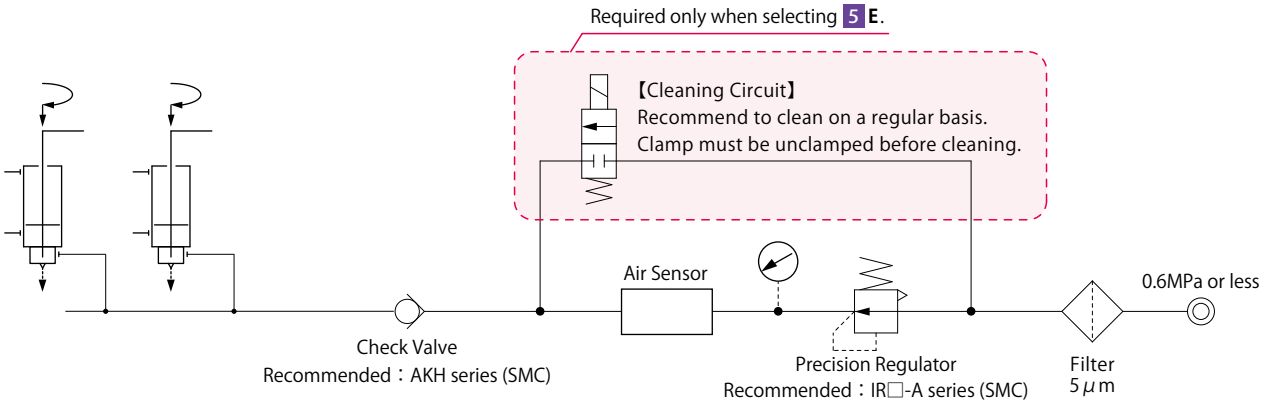
5 **Action Confirmation Symbol**
E : Clamp - Unclamp Confirmation
H : Clamp Confirmation
J : Unclamp Confirmation

Air Sensor

Recommended Air Sensor

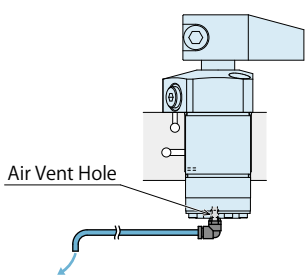
Action Confirmation Symbol	In case of 5 **E**	In case of 5 **H, J**	
Manufacturer	SMC	SMC	CKD
Name	Digital Seating Switch	Digital Seating Switch	Digital Gap Switch
Model No.	ISA3-G□A, ISA3-G□B	ISA3-G□N, ISA3-G□P	GPS3-E
Air Sensor Requirement	**Required to use the two-output air sensor shown above.**	**Able to use a general one-output air sensor.**	
Recommended Air Pressure	0.1 ~ 0.2MPa (0.15 ~ 0.2MPa when using 4 clamps.)	0.1 ~ 0.2MPa	

- **In case of 5 E, the number of clamps connected per air sensor : 2 ~ 4 pcs.**
  ※Please contact us when using an air sensor for one clamp.
- Please refer to manufacturer's catalog or other documents for the details about the air sensor.
- Please keep supplying air pressure when in use.
- Refer to the drawing below for the air circuit structure.

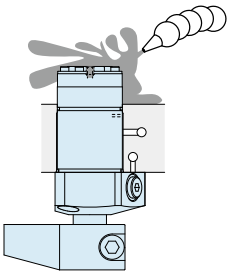


Notes for Design・Installation・Use

- Please keep clear condition at the air vent hole, and prevent coolant and chips from entering the hole.
  The air sensor can malfunction if the air vent hole is blocked.

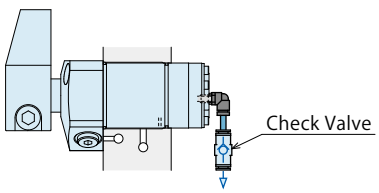


O Keep clear condition at the air vent hole.



✕ Coolant and chips enter from the air vent hole.

【Prevention of Contaminants to the Air Vent Hole】
Coolant and chips can be prevented by setting a check valve with low cracking pressure. (Recommended Check Valve: SMC-made AKH series, cracking pressure: 0.005MPa)

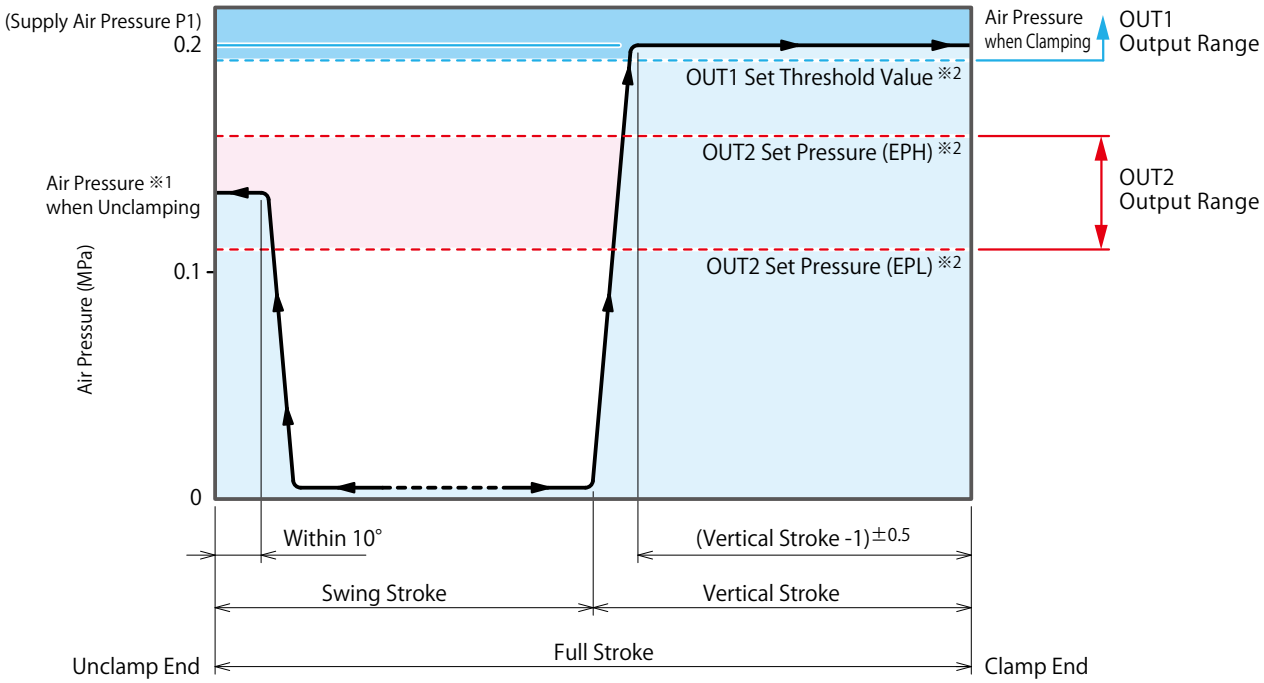


- Keep supplying air pressure to the air port for sensing when in use.
- Set a check valve with low cracking pressure to the detection port of the air sensor. (Recommended Check Valve: SMC-made AKH series, cracking pressure: 0.005MPa)

Air Sensing Chart

5 E : Clamp - Unclamp Confirmation

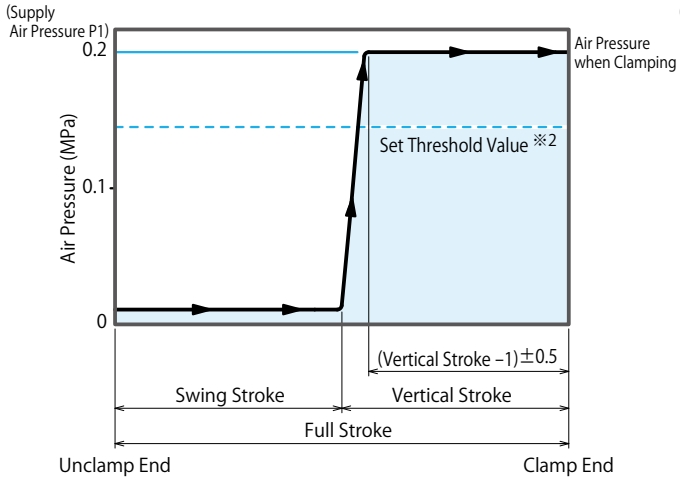
When Connected to 3 Clamps, Supply 0.2MPa Air Pressure



Sensor Setting should be as follows: Detect with OUT1 (Threshold Value) for clamp action confirmation, OUT2 (Pressure Set Value) for unclamp action confirmation. Hysteresis for both OUT1 and OUT2 should be set as 0. Please make sure to use the recommended air sensor.

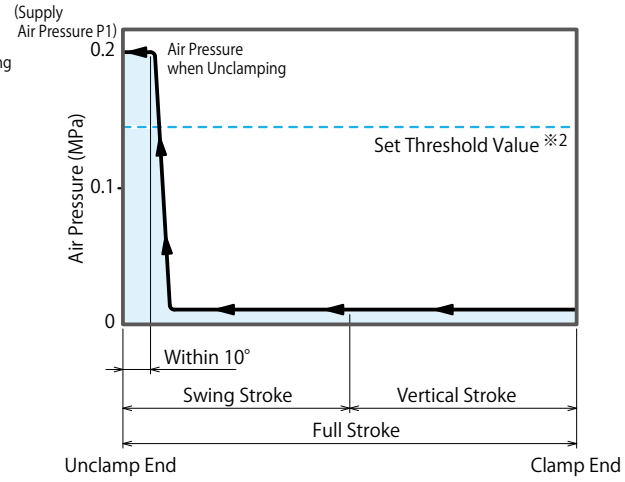
5 H : Clamp Confirmation

When Connected to 3 Clamps, Supply 0.2MPa Air Pressure



5 J : Unclamp Confirmation

When Connected to 3 Clamps, Supply 0.2MPa Air Pressure

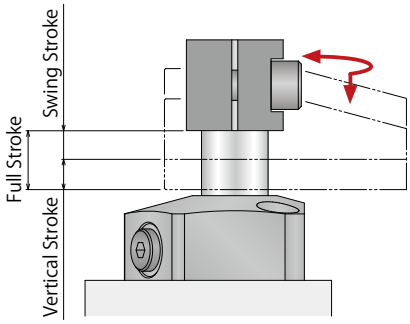


Notes :

1. The sensing chart shows the relationship between the stroke and detection circuit air pressure.
2. The specifications may vary depending on the air circuit. The length of hose should be as short as possible. (Suggest shorter than 5m)

※1. Pressure when unclamping may vary depending on the condition of air circuit.

※2. The location of a signal from air sensor output varies depending on the sensor setting. Set according to using systems. Please refer to manufacturer's instruction manual or other documents for the details about the air sensor.



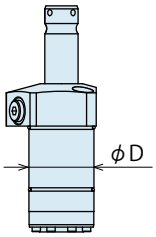
Model No. Indication

TLV 080 0 - 2 C R E
1 2 3 4 5

1 Body Size

080 : ϕD=36mm
100 : ϕD=43mm
160 : ϕD=46mm
200 : ϕD=56mm

※ Indicates the cylinder outer diameter (ϕD).



2 Design No.

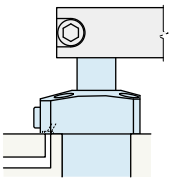
0 : Revision Number

3 Piping Method

C : Gasket Option (With G Thread Plug)

※ Speed control valve (BZT) is sold separately.
Please refer to P. 37.

C



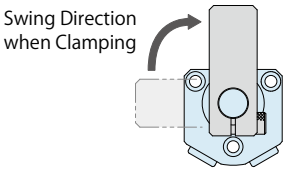
Gasket Option

With G Thread Plug
Able to Attach BZT Speed Control Valve

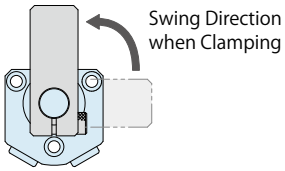
4 Swing Direction when Clamping

R : Clockwise
L : Counter-Clockwise

R



L



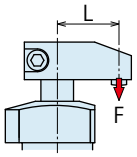
5 Action Confirmation Symbol

E : Clamp - Unclamp Confirmation (Both)
H : Clamp Confirmation Only
J : Unclamp Confirmation Only

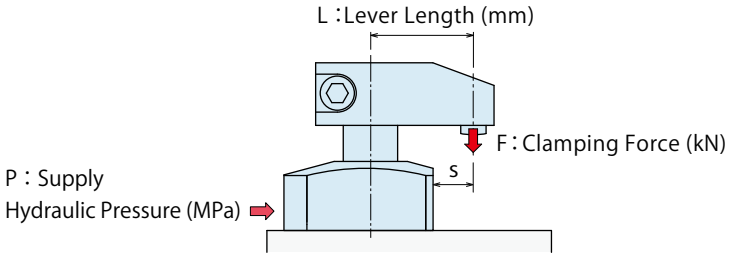
Specifications

Model No.			TLV0800-2C□□	TLV1000-2C□□	TLV1600-2C□□	TLV2000-2C□□
Cylinder Area for Clamping		cm^2	1.979	2.804	4.17	6.134
Cylinder Inner Diameter ※1		mm	24	29	34	41
Rod Diameter ※1		mm	18	22	25	30
Clamping Force ※2 (Calculation Formula)		kN	$F=\frac{P}{5.053+0.028\times L}$	$F=\frac{P}{3.566+0.0181\times L}$	$F=\frac{P}{2.398+0.0095\times L}$	$F=\frac{P}{1.63+0.0055\times L}$
Cylinder Capacity	Clamp	cm^3	3.6	5.5	10	16.3
	Unclamp	cm^3	4.1	6.6	10.5	17.5
Full Stroke		mm	18	19.5	24	26.5
Swing Stroke (90°)		mm	8	9.5	11	13.5
Vertical Stroke		mm	10	10	13	13
Swing Angle Accuracy			90° ±3°			
Swing Complete Position Repeatability			±0.5°			
Hydraulic Pressure	Max. Operating Pressure	MPa	35			
	Min. Operating Pressure ※3	MPa	7			
	Withstanding Pressure	MPa	42			
Recommended Operating Air Pressure		MPa	0.1 ~ 0.2			
Recommended Air Sensor	5 E ※4		ISA3-G□A, ISA3-G□B (Two-Output Model)：Made by SMC ※4			
	5 H/J		ISA3-G□N, ISA3-G□P (One-Output Model)：Made by SMC / GPS3-E：Made by CKD			
Operating Temperature		℃	0 ~ 70			
Usable Fluid			General Hydraulic Oil Equivalent to ISO-VG-32			
Weight ※5		kg	0.9	1.5	1.9	3.2

Notes：※1. Clamping force cannot be calculated from the cylinder inner diameter and rod diameter.
Please refer to the clamping force calculation formula and the clamping force curve.
※2. F：Clamping Force (kN) , P：Supply Hydraulic Pressure (MPa),
L：Distance between the piston center and the clamping point (mm).
※3. Minimum pressure to operate the clamp without load.
※4. The number of clamps connected per air sensor is 2 ~ 4 pcs. Please contact us when using an air sensor for one clamp.
※5. It shows the weight of single swing clamp without swing lever.



Clamping Force Curve



Applicable Model

TLV □ 0 - 2 C [R L] [E H J]

1 Body Size

(Ex.)
In case of TLV1000-2 : When supply hydraulic pressure P is 25MPa and lever length L is 50mm, clamping force becomes about 5.6kN.

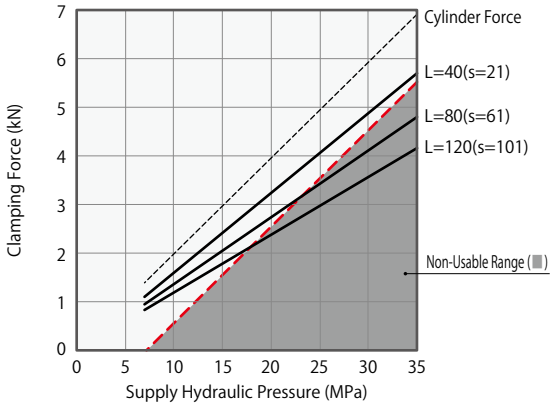
Notes :

1. Tables and graphs show the relationship between the clamping force (kN) and supply hydraulic pressure (MPa).
2. Cylinder force (when L=0) cannot be calculated from the formula of clamping force.
3. Lever with a large inertia sometimes does not work depending on supply hydraulic pressure, lever mounting position, etc.
4. Values in below charts indicate clamping force when the lever locks a workpiece in horizontal position.
5. The clamping force varies depending on the lever length. Set the suitable supply hydraulic pressure based on the lever length.
6. Clamping force in the non-usable range may cause damage and fluid leakage.
7. The tables and graphs are only for reference. The exact results should be calculated based on the clamping force calculation formula.

※1. F：Clamping Force (kN), P：Supply Hydraulic Pressure (MPa), L：Lever Length (mm).

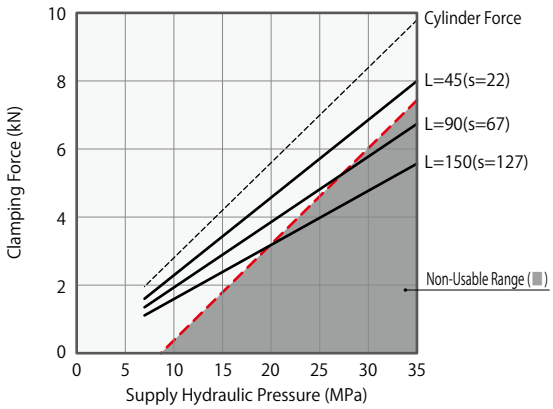
TLV0800-2 Clamping Force Calculation Formula※1 (kN) $F = P / (5.053 + 0.028 \times L)$

Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) Non-Usable Range (■)								Max. Lever Length (L) (mm)
		L=40	L=50	L=60	L=70	L=80	L=90	L=100	L=120	
35	6.9	5.7	■	■	■	■	■	■	■	46
32.5	6.4	5.3	5.0	■	■	■	■	■	■	51
30	5.9	4.9	4.7	■	■	■	■	■	■	56
27.5	5.4	4.5	4.3	4.1	■	■	■	■	■	63
25	5.0	4.1	3.9	3.7	3.6	■	■	■	■	72
22.5	4.5	3.6	3.5	3.3	3.2	3.1	■	■	■	83
20	4.0	3.2	3.1	3.0	2.9	2.7	2.6	2.6	■	100
17.5	3.5	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	123
15	3.0	2.4	2.3	2.2	2.1	2.1	2.0	1.9	1.8	163
12.5	2.5	2.0	1.9	1.9	1.8	1.7	1.7	1.6	1.5	230
10	2.0	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.2	230
7	1.4	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.8	230
Max. Operating Pressure (MPa)		35.0	32.8	28.5	25.4	23.1	21.4	19.9	17.8	



TLV1000-2 Clamping Force Calculation Formula※1 (kN) $F = P / (3.566 + 0.0181 \times L)$

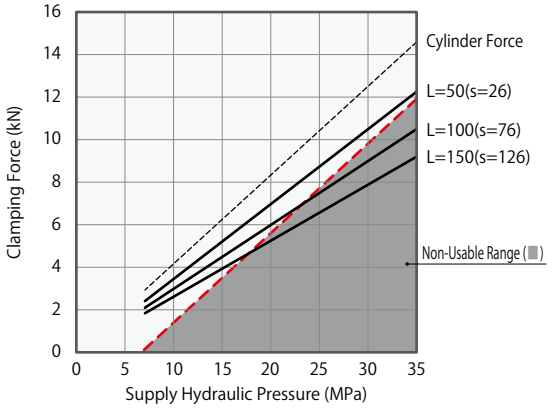
Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) Non-Usable Range (■)							Max. Lever Length (L) (mm)
		L=45	L=50	L=60	L=70	L=90	L=110	L=130	L=150	
35	9.8	8.0	7.8	7.5	■	■	■	■	■	63
32.5	9.1	7.4	7.3	7.0	6.7	■	■	■	■	70
30	8.4	6.9	6.7	6.5	6.2	■	■	■	■	78
27.5	7.7	6.3	6.2	5.9	5.7	■	■	■	■	88
25	7.0	5.7	5.6	5.4	5.2	4.8	■	■	■	101
22.5	6.3	5.1	5.0	4.8	4.7	4.3	4.1	■	■	119
20	5.6	4.6	4.5	4.3	4.1	3.9	3.6	3.4	■	145
17.5	4.9	4.0	3.9	3.8	3.6	3.4	3.2	3.0	2.8	185
15	4.2	3.4	3.4	3.2	3.1	2.9	2.7	2.5	2.4	250
12.5	3.5	2.9	2.8	2.7	2.6	2.4	2.3	2.1	2.0	250
10	2.8	2.3	2.2	2.2	2.1	1.9	1.8	1.7	1.6	250
7	2.0	1.6	1.6	1.5	1.5	1.4	1.3	1.2	1.1	250
Max. Operating Pressure (MPa)		35.0	35.0	35.0	32.3	27.0	23.7	21.3	19.6	



TLV1600-2

Clamping Force Calculation Formula※1 (kN) $F = P / (2.398 + 0.0095 \times L)$

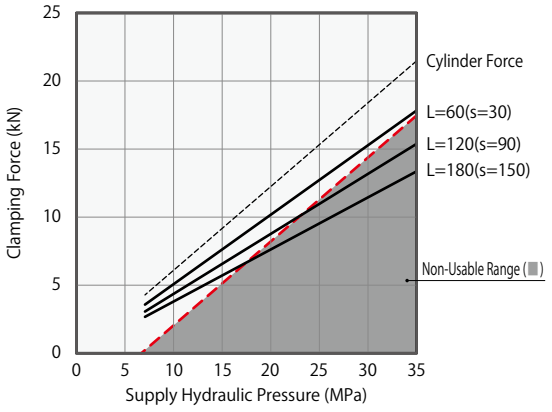
Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) Non-Usable Range (■)								Max. Lever Length (L) (mm)
		L=50	L=60	L=70	L=80	L=90	L=100	L=120	L=150	
35	14.6	12.2								58
32.5	13.6	11.3	11.0							64
30	12.5	10.4	10.1	9.8						70
27.5	11.5	9.6	9.3	9.0						79
25	10.4	8.7	8.4	8.2	7.9					89
22.5	9.4	7.8	7.6	7.4	7.1	6.9	6.7			103
20	8.3	7.0	6.7	6.5	6.3	6.2	6.0	5.7		123
17.5	7.3	6.1	5.9	5.7	5.5	5.4	5.2	5.0	4.6	151
15	6.3	5.2	5.1	4.9	4.8	4.6	4.5	4.2	3.9	195
12.5	5.2	4.4	4.2	4.1	4.0	3.8	3.7	3.5	3.3	250
10	4.2	3.5	3.4	3.3	3.2	3.1	3.0	2.8	2.6	250
7	2.9	2.4	2.4	2.3	2.2	2.2	2.1	2.0	1.8	250
Max. Operating Pressure (MPa)		35.0	34.1	30.1	27.2	24.9	23.0	20.3	17.5	



TLV2000-2

Clamping Force Calculation Formula※1 (kN) $F = P / (1.63 + 0.0055 \times L)$

Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) Non-Usable Range (■)								Max. Lever Length (L) (mm)
		L=60	L=70	L=80	L=100	L=120	L=140	L=160	L=180	
35	21.5	17.9								68
32.5	19.9	16.6	16.1							75
30	18.4	15.3	14.9	14.5						82
27.5	16.9	14.0	13.7	13.3						92
25	15.3	12.8	12.4	12.1	11.5					105
22.5	13.8	11.5	11.2	10.9	10.3	9.8				121
20	12.3	10.2	9.9	9.7	9.2	8.7	8.3			144
17.5	10.7	8.9	8.7	8.5	8.0	7.6	7.3	7.0		176
15	9.2	7.7	7.4	7.3	6.9	6.6	6.3	6.0	5.7	229
12.5	7.7	6.4	6.2	6.0	5.7	5.5	5.2	5.0	4.8	280
10	6.1	5.1	5.0	4.8	4.6	4.4	4.2	4.0	3.8	280
7	4.3	3.6	3.5	3.4	3.2	3.1	2.9	2.8	2.7	280
Max. Operating Pressure (MPa)		35.0	34.2	30.7	25.9	22.7	20.4	18.6	17.3	

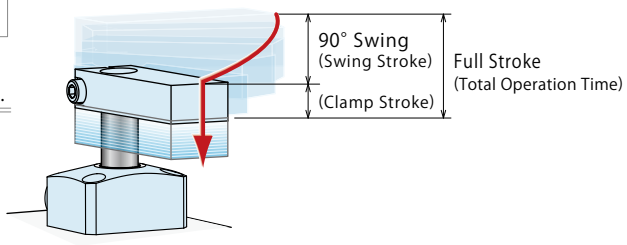


Allowable Swing Time Graph

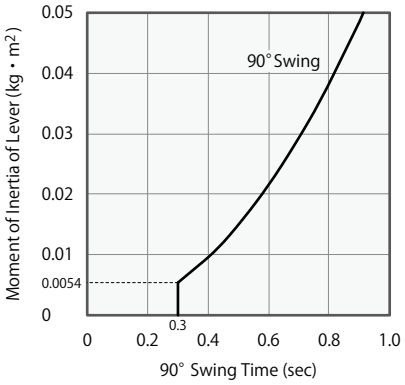
Adjustment of Swing Time

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.

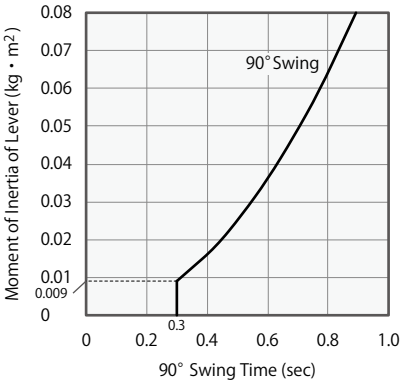
Excessive action speed can reduce stopping accuracy and damage internal components.



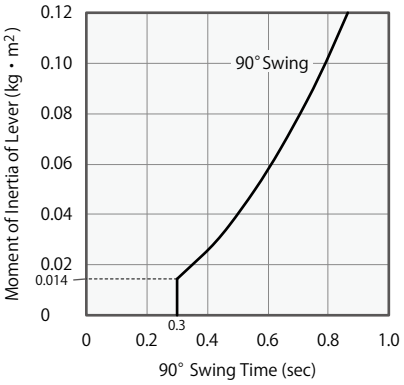
TLV0800-2



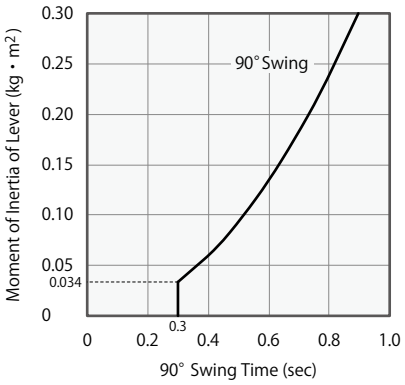
TLV1000-2



TLV1600-2



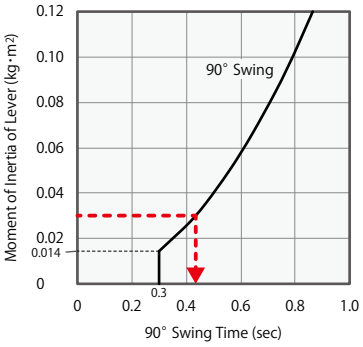
TLV2000-2



Notes :

1. The graph shows the 90° swing time in regard to the moment of inertia of lever.
2. Operation time is approximately twice the 90° swing time. Use the calculation formula of the total operation time on the next page to calculate the detailed time.
3. Lever with a large inertia sometimes does not work depending on supply hydraulic pressure, oil flow, lever mounting position, etc.
4. Please adjust the 90° swing time against the moment of inertia of lever to be longer than the indicated time in the above graphs.
5. Excessive swing speed can reduce stopping accuracy and damage the internal parts.
6. The clamping force varies depending on the lever length. Refer to the clamping force curve and set the suitable supply hydraulic pressure based on the lever length.
7. When a clamp is mounted horizontally, a lever may be accelerated by its own weight. The swing time may become faster than the allowable time shown above, and this results in a damage to the clamp. In this case, use meter-in flow control valve for speed adjustment.
8. For any moment of inertia of a lever, the minimum unclamping time should be 0.3 sec.
9. Please contact us if operational conditions differ from those shown on the graphs.

Model → **TLV1600-2**



(How to read the allowable operation time graph)

In case of TLV1600-2

The moment of inertia of a lever : 0.03kg·m²

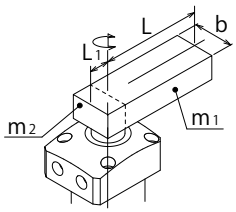
- 90° Swing Time : About 0.43 sec or more
- Total Operation Time : About 0.94 sec or more

1. The total operation time on the graph represents the allowable operation time when fully stroked. (Swing Stroke 11mm, Full Stroke 24mm)

How to Calculate the Moment of Inertia (Estimated)

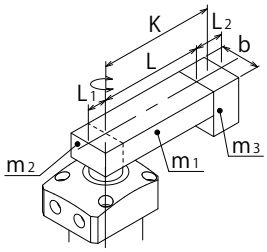
I : Moment of Inertia (kg·m²) L, L_1, L_2, K, b : Length (m) m, m_1, m_2, m_3 : Mass (kg)

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 Load is applied on the lever front end.



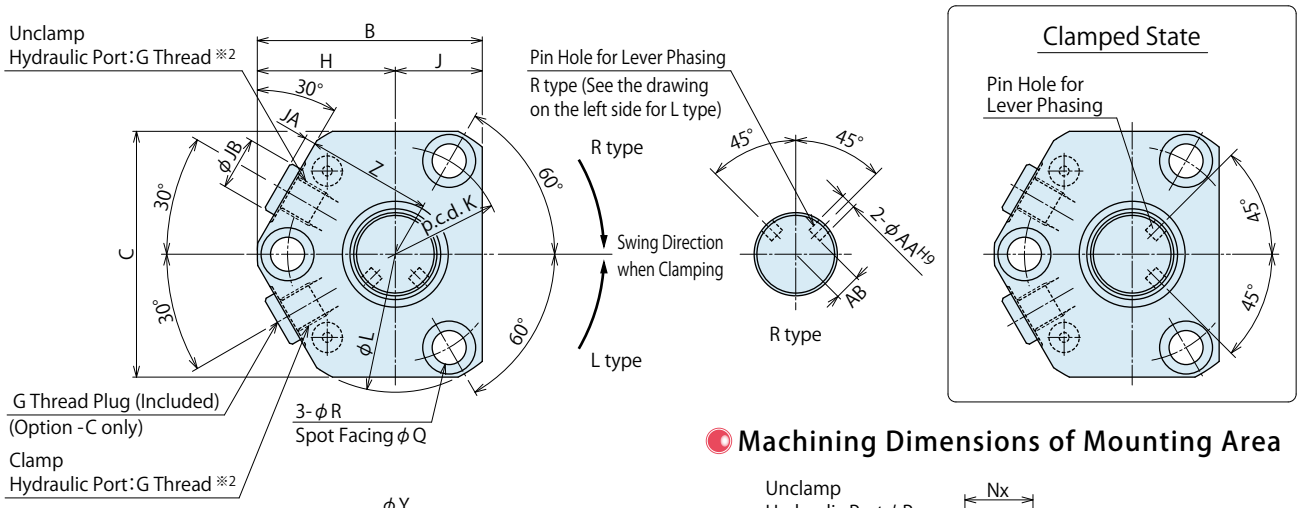
$$I = m_1 \frac{4L^2+b^2}{12} + m_2 \frac{4L_1^2+b^2}{12} + m_3K^2 + m_3 \frac{L_2^2+b^2}{12}$$

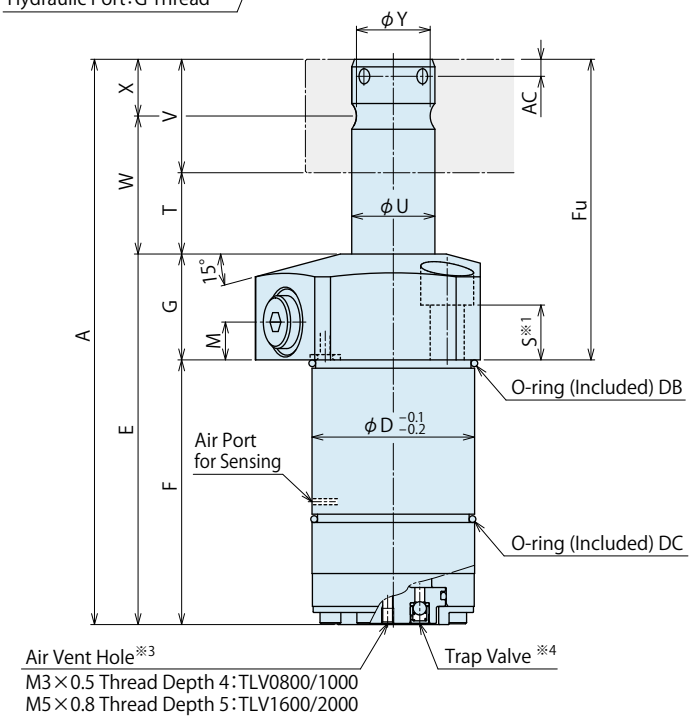
Calculation Formula of Total Operation Time

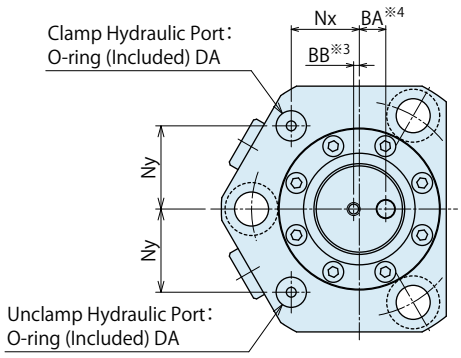
$$\text{Total Operation Time (sec)} = \text{90° Swing Time (sec)} \times \frac{\text{Full Stroke (mm)}}{\text{Swing Stroke (mm)}}$$

External Dimensions (The dimensions are the same for 5 Action Confirmation Symbol E / H / J.)

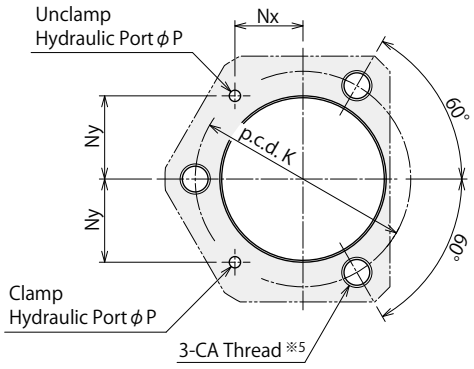
※The drawing shows the unclamped state of TLV-2CR□.

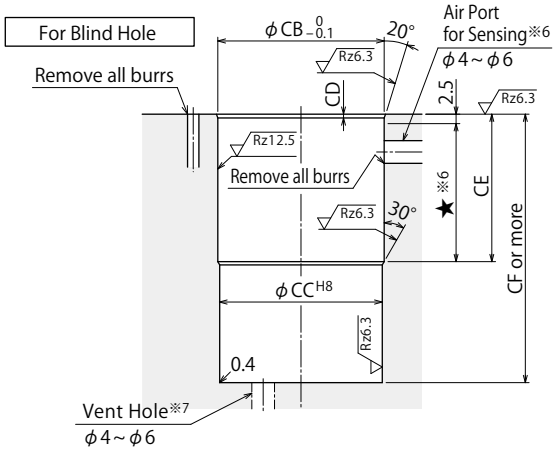


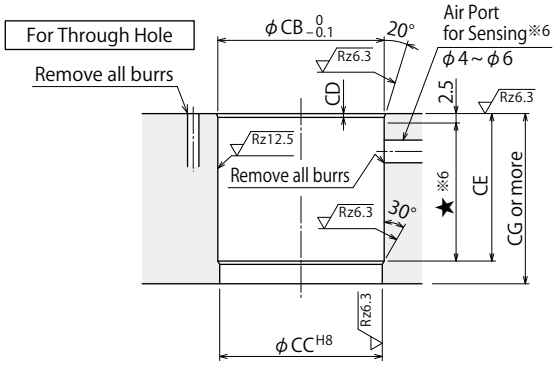




Machining Dimensions of Mounting Area







Notes:

※1. Mounting bolts are not provided. Please prepare them according to the mounting height referring to dimension 'S'.

※2. Speed control valve is sold separately. Please refer to P.37.

※3. Please keep clear condition at the air vent hole, and prevent coolant and chips from entering the hole. If exposed to coolant, use the thread and install piping, etc. to prevent contamination, but do not block the air vent hole. Phasing of the air vent hole of TLV0800 is not as shown in the drawing.

※4. Please keep clear condition at the trap valve. Phasing is not as shown in the drawing.

Notes:

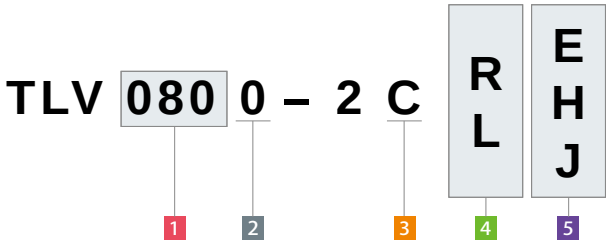
※5. CA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.

※6. Prepare the air port for sensing within the ★ area.

※7. Prepare the vent hole on the bottom within the range of φCC.

Model No. Indication

(Format Example：TLV0800-2CRE, TLV1600-2CLJ)



1 Body Size
2 Design No.
3 Piping Method
4 Swing Direction when Clamping
5 Action Confirmation Symbol

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		TLV0800-2C□□	TLV1000-2C□□	TLV1600-2C□□	TLV2000-2C□□
Full Stroke		18	19.5	24	26.5
Swing Stroke (90°)		8	9.5	11	13.5
Vertical Stroke		10	10	13	13
A		137.5	149.5	172	195.5
B		50.5	59.5	62	76.5
C		54	65	68	83
D		36	43	46	56
E		92.5	98	112	127
F		67.5	70	80	90
Fu		70	79.5	92	105.5
G		25	28	32	37
H		31.5	36.5	38	46.5
J		19	23	24	30
K		48	57	60	73.5
L		63	73	76	93
M		10	10	10	13
Nx		16	18	20	22
Ny		18.5	22	22	28
P		3	3	3	5
Q		11	14	14	17.5
R		6.8	9	9	11
S		14	14.5	18	19.5
T		20	21.5	26	28.5
U		18	22	25	30
V		25	30	34	40
W		32.5	36.5	43	48.5
X		12.5	15	17	20
Y		16	19.5	22	26
Z		30	33	35	44
AA		$4^{+0.030}_{0}$	$4^{+0.030}_{0}$	$4^{+0.030}_{0}$	$6^{+0.030}_{0}$
AB		5	7	8.5	9
AC		4.5	4.5	5	6.5
BA		5.5	7	9	9
BB		1.5	0	0	0
CA		M6×1	M8×1.25	M8×1.25	M10×1.5
CB		37	44	47	57
CC		$36^{+0.039}_{0}$	$43^{+0.039}_{0}$	$46^{+0.039}_{0}$	$56^{+0.046}_{0}$
CD		1	1	1	1.5
CE		34	39	46	49
CF		68	70.5	80.5	90.5
CG		40	45	55	55
JA		3	3	3	3.5
JB		14	14	14	19
Clamp Hyd. Port：G Thread		G1/8	G1/8	G1/8	G1/4
Unclamp Hyd. Port：G Thread		G1/8	G1/8	G1/8	G1/4
O-ring	DA	OR NBR-90 P5-N (1BP5)	OR NBR-90 P5-N (1BP5)	OR NBR-90 P5-N (1BP5)	OR NBR-90 P7-N (1BP7)
	DB	AS568-027(70°)	AS568-030(70°)	AS568-031(70°)	AS568-034(70°)
	DC	AS568-027(70°)	AS568-029(70°)	AS568-030(70°)	AS568-033(70°)
Lever Phasing Pin (Included)		ϕ4×8 (B type)	ϕ4×8 (B type)	ϕ4×8 (B type)	ϕ6×12 (B type)

Accessory：Material Swing Lever

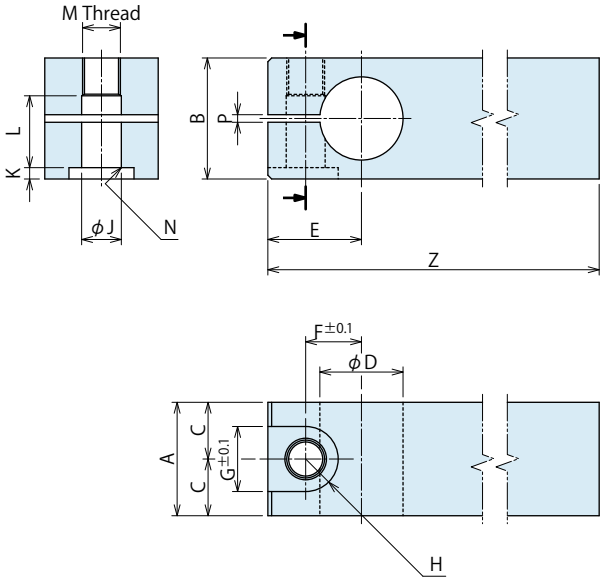
※ When designing a swing lever, please follow the mounting dimensions below. Designing with different dimensions from the following will cause malfunctions including insufficient clamping force, deformation, seizure, fluid leakage, and etc.

Model No. Indication

TLZ 080 0 – L2

080: Size (Refer to the table.)

0: Design No. (Revision Number)



(mm)

Model No.	TLZ0800-L2	TLZ1000-L2	TLZ1600-L2	TLZ2000-L2
Corresponding Model No.	TLV0800-2C□□	TLV1000-2C□□	TLV1600-2C□□	TLV2000-2C□□
A	25	30	34	40
B	26	32	36	45
C	12.5	15	17	20
D	$18^{0}_{-0.016}$	$22^{0}_{-0.020}$	$25^{0}_{-0.020}$	$30^{0}_{-0.020}$
E	19	23	26.5	31.5
F	12	14.75	17	20
G	14	17.5	20	23
H	7	8.75	10	11.5
J	8.5	10.5	12.5	14.5
K	3	4	4	5
L	16	18	22	26.5
M	M8×1	M10×1.25	M12×1.5	M14×1.5
N	C0.6	C0.6	C1	C1
P	2	2	2	2
Z	145	160	170	175

Notes :

1. Material : S50CH Surface Finishing : Alkaline Blackening
2. If necessary, the front end should be additionally machined and finished.
3. If lever phasing is required, refer to "Pin Hole for Lever Phasing Additional Machining Dimensions" for additional machining.
4. Lever tightening bolt is sold separately.

Accessory：Lever Tightening Bolt

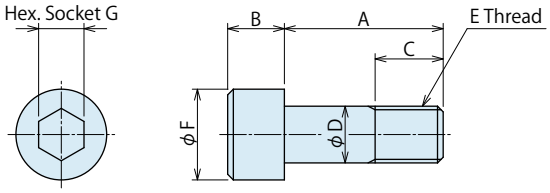
※ When designing the lever tightening bolt, follow the dimensions shown below. Strength Grade should be 12.9 or more.

Model No. Indication

TLZ 080 0 – LB

080: Size (Refer to the table.)

0: Design No. (Revision Number)

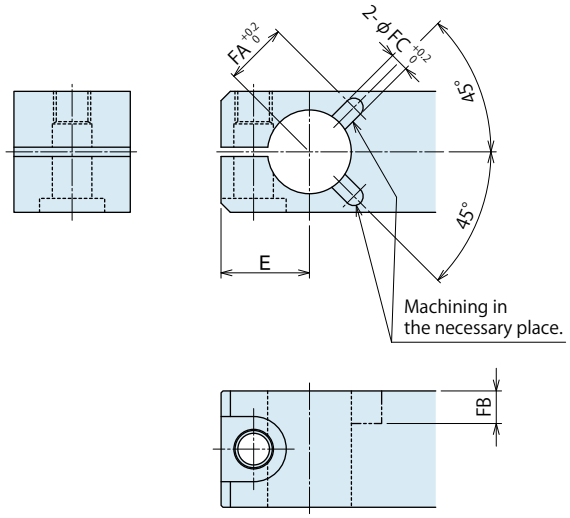


(mm)

Model No.	TLZ0800-LB	TLZ1000-LB	TLZ1600-LB	TLZ2000-LB
Corresponding Model No.	TLV0800-2C□□	TLV1000-2C□□	TLV1600-2C□□	TLV2000-2C□□
A	23	28	32	40
B	8	10	12	14
C	10	11	13	16
D	8	10	12	14
E	M8×1	M10×1.25	M12×1.5	M14×1.5
F	13	16	18	21
G	6	8	10	12

Pin Hole for Lever Phasing Additional Machining Dimensions (Reference)

※ This additional machining matches to TLV□0-2C□□.



(mm)

Corresponding Lever Model	TLZ0800-L2	TLZ1000-L2	TLZ1600-L2	TLZ2000-L2
E	19	23	26.5	31.5
FA	13.5	15.5	17	21.5
FB	7	7	7.5	10
FC	4	4	4	6

Notes :

1. Material : S50CH
2. Machine the pin hole for lever phasing in the necessary place by referring to the drawing.

Cautions

Notes for Design

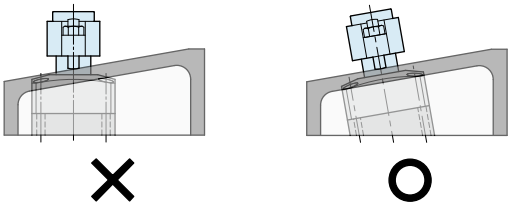
1) Check Specifications
- Please use each product according to the specifications.

2) Notes for Circuit Design
- Please read "Notes on Hydraulic Cylinder Speed Control Unit" for proper hydraulic circuit design. Improper circuit design may lead to malfunctions and damages. (Refer to P.40.)
- Ensure there is no possibility of supplying hydraulic pressure to the clamp port and the unclamp port simultaneously.

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 undue wear to the clamp.
  Additionally, the clamp may not function, depending on supplied hydraulic pressure and lever mounting position.
- Set the allowable operation time after the moment of inertia is calculated. Refer to "Allowable Swing Time Graph" and make sure to operate a clamp within the allowable operation time.

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 fluid 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) Vent Hole and Check Valve of Air Sensor
- When using an air sensor, make sure to check the Notes for Design・Installation・Use on P.5.

Installation Notes

1) Check the Usable Fluid

- Please use the appropriate fluid by referring to the Hydraulic Fluid List (P.39).

2) Swing Speed Adjustment

- Adjust the speed following "Allowable Swing Time Graph". If the clamp operates too fast, the parts will be worn out, leading to premature damage and ultimately complete equipment failure.
- Please make sure to release air from the circuit before adjusting speed. It will be difficult to adjust the speed accurately with air mixed in the circuit.
- Turn the speed control valve gradually from the low-speed side (small flow) to the high-speed side (large flow) to adjust the speed.

3) Installation of the Product

- When mounting the clamp, use hexagonal socket bolts as multiple bolt holes for mounting (with tensile strength of 12.9) and tighten them with the torque shown in the table below. Tightening with greater torque than recommended can dent the seating surface or break the bolt.

Model No.	Mounting Bolt Size	Tightening Torque (N·m)
TLV0800-2C□□	M6×1	11.8
TLV1000-2C□□	M8×1.25	25
TLV1600-2C□□	M8×1.25	25
TLV2000-2C□□	M10×1.5	58.8

4) Installation / Removal of the Swing Lever

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

Model No.	Tightening Bolt Size	Tightening Torque (N·m)
TLV0800-2C□□	M8×1	32
TLV1000-2C□□	M10×1.25	63
TLV1600-2C□□	M12×1.5	100
TLV2000-2C□□	M14×1.5	160

5) Checking Looseness and Retightening

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

※ Please refer to P.39 for common cautions.
・Installation Notes ・Hydraulic Fluid List ・Notes on Hydraulic Cylinder Speed Control Circuit
・Notes on Handling ・Maintenance/Inspection ・Warranty

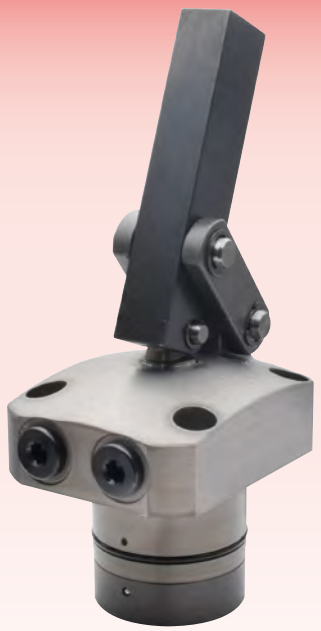
Air Sensing Link Clamp

High Pressure : 7~35MPa

Link Clamp with Action Confirmation

Hydraulic Double Action

Model TMV-2



ONLY ONE AIR PORT
required to check both clamp and unclamp states

Compact Clamp with Action Confirmation System

NEW

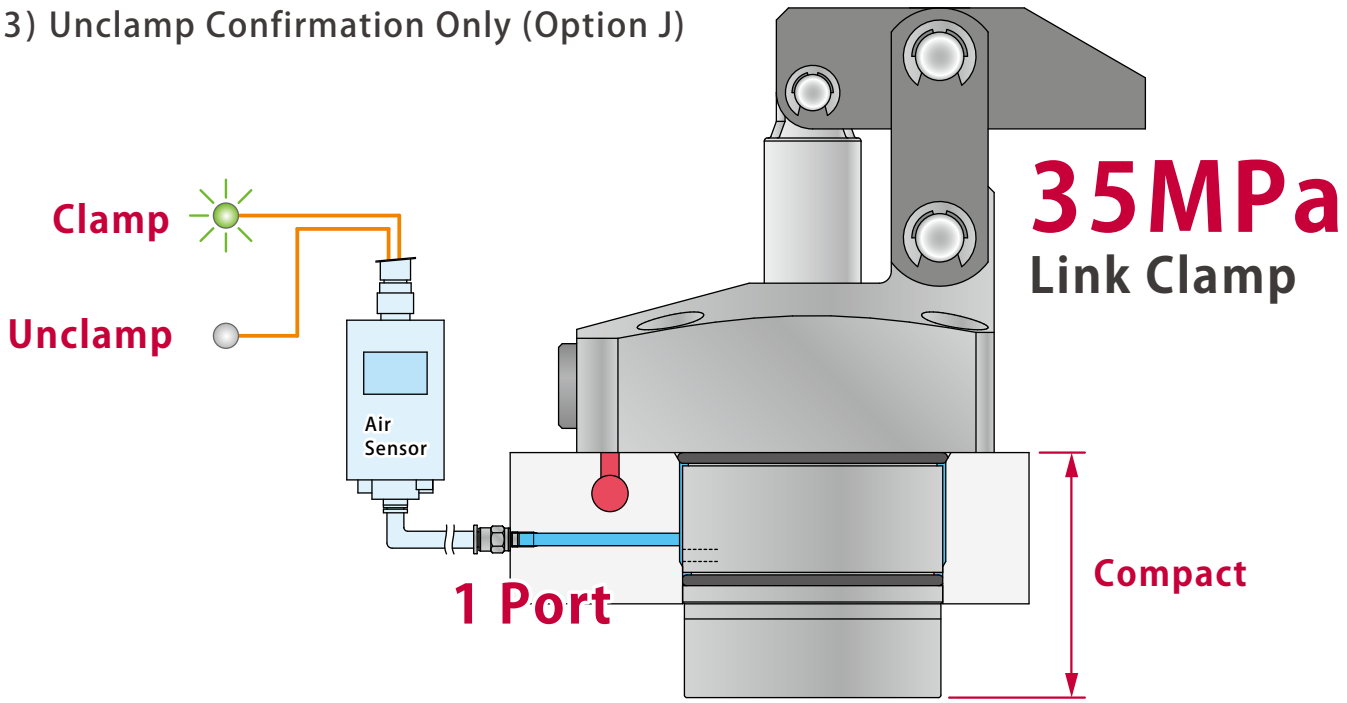
35MPa High-Pressure Link Clamp with Action Confirmation

3 Options Available

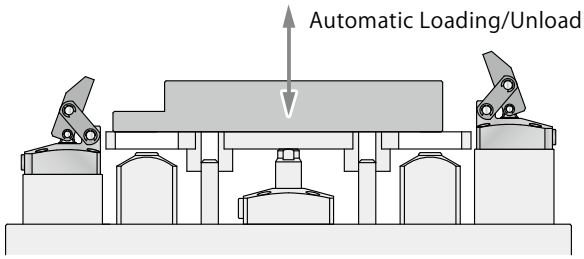
(1) Clamp • Unclamp Confirmation with One Air Port (Option E)

(2) Clamp Confirmation Only (Option H)

(3) Unclamp Confirmation Only (Option J)



Application Example



For Automation Line
Requiring Action Confirmation

Features

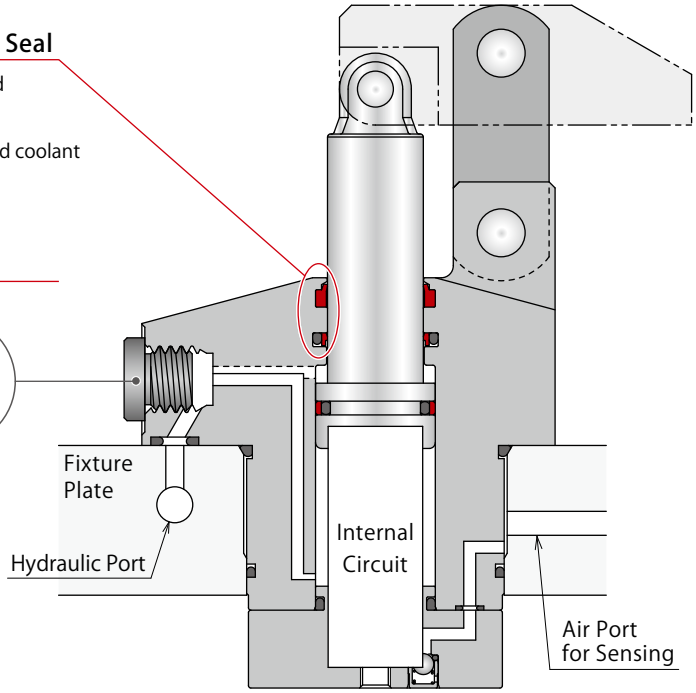
Protective Cover Prevents Damage to the Dust Seal

Protective Cover prevents damage to the internal dust seal and maintains high sealing durability for a long period of time.
The internal dust seal has high durability against chlorine-based coolant by using a sealing material with excellent chemical resistance.

Direct Mount Speed Control Valve

Speed control valve with air bleeding function can be directly mounted to the product.
(Speed control valve is sold separately.)


model BZT



Thin Fixture Plate

Fixture Plate Min. Thickness 25mm (In case of TMV0400/0600)

The Same Dimensions for All Confirmation Options

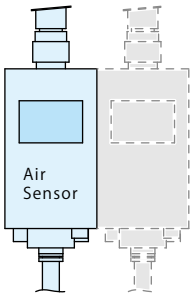
Fixture designing can be simple, and replacing a clamp with a different action confirmation option is possible because the external dimensions and the mounting hole machining dimensions are the same for all of three action confirmation options.

Minimized Number of Sensors

※ In case of option E : Clamp • Unclamp Detection

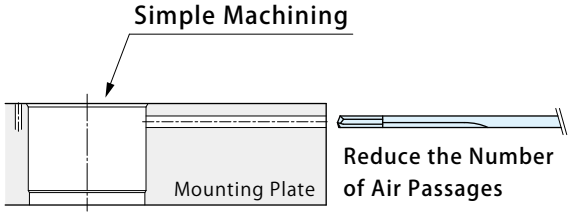
Only one air sensor is required to check both clamping and unclamping actions. (Required to use a two-output air sensor.)

Reduce the Number of Air Sensors



Minimized Number of Ports • Simple Machining

Integrating ports for the sensor allows for reducing the number of both ports of a rotary joint and air passages of a fixture plate. Plus, they can simplify the machining of a mounting hole.

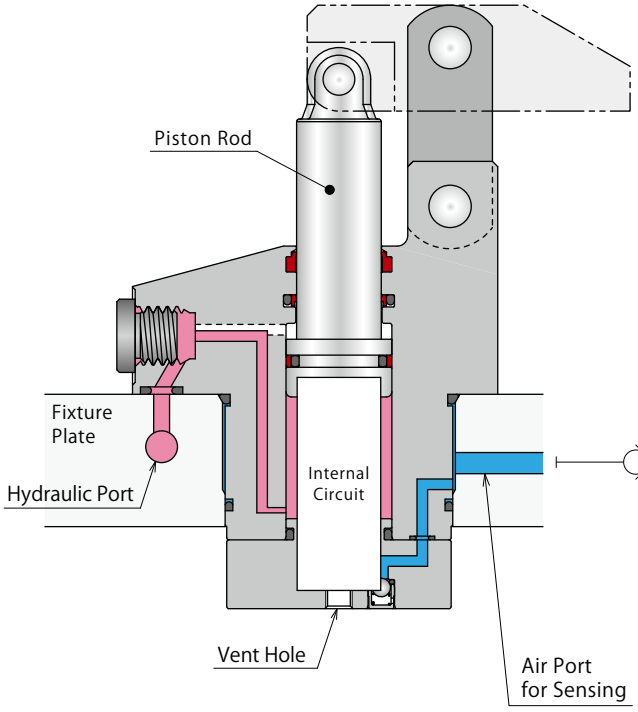


Action Description (Internal Structure)

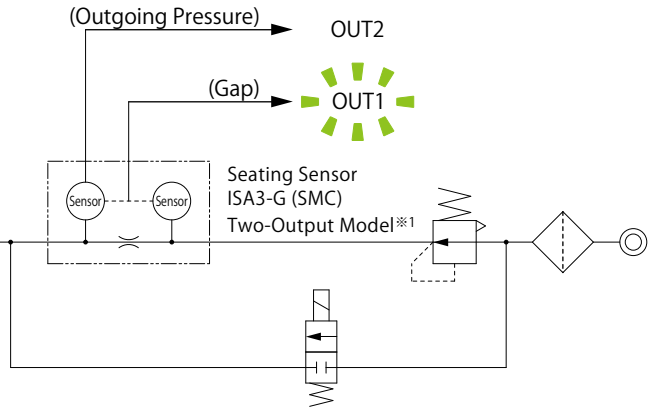
The figure shows clamp with option 5 **E** (Clamp - Unclamp Confirmation)

Clamping Action

The piston rod ascends and clamps the workpiece.



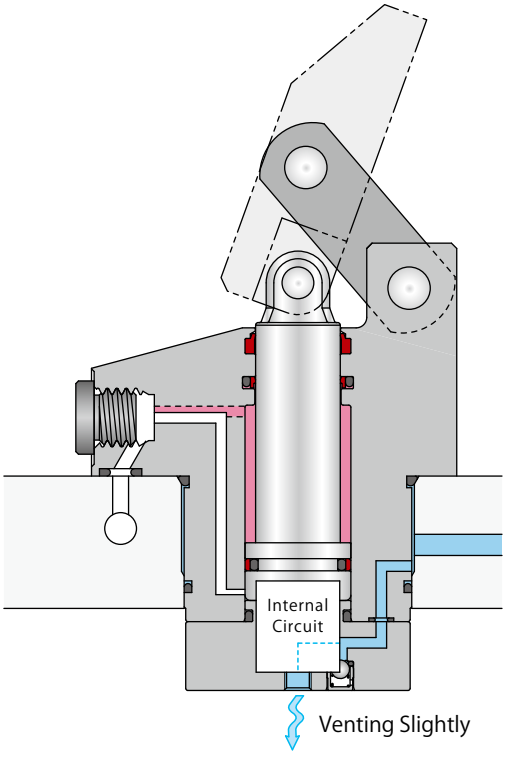
Hydraulic Pressure		Air Sensor	
Clamp Side	Unclamp Side	Clamp Check Output 1 (OUT 1)	Unclamp Check Output 2 (OUT 2)
ON	OFF	ON	OFF



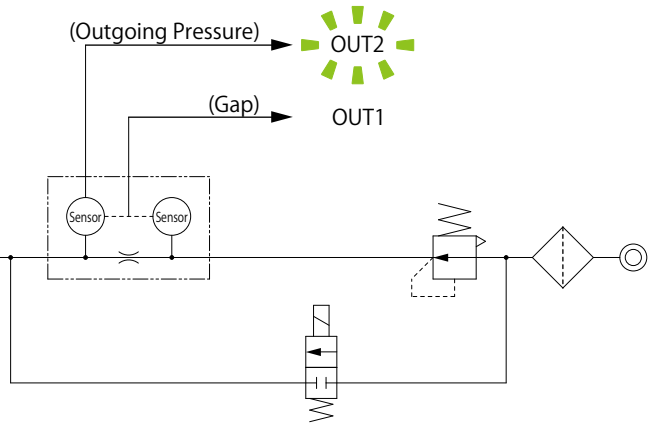
Note :
※1. It is able to use a one-output seating sensor for the action confirmation symbol 5 **H/J** (one-side action confirmation).

Unclamping Action

The piston rod descends.

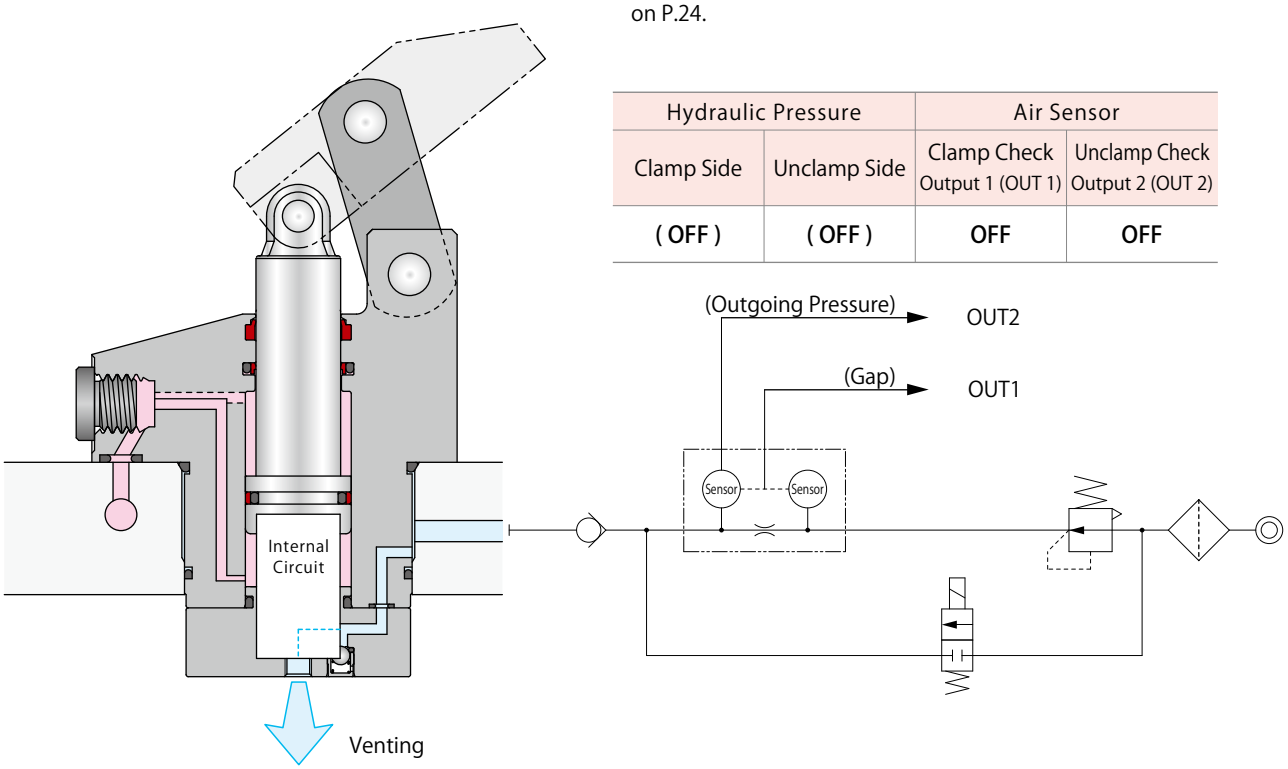


Hydraulic Pressure		Air Sensor	
Clamp Side	Unclamp Side	Clamp Check Output 1 (OUT 1)	Unclamp Check Output 2 (OUT 2)
OFF	ON	OFF	ON



During Clamp/Unclamp Action

The air sensor turns OFF during the stroke action.
The detail of sensor ON/OFF range is shown in Air Sensing Chart on P.24.



Hydraulic Pressure		Air Sensor	
Clamp Side	Unclamp Side	Clamp Check Output 1 (OUT 1)	Unclamp Check Output 2 (OUT 2)
(OFF)	(OFF)	OFF	OFF

The following shows the actions and the air sensor outputs for the action confirmation symbol **5 H/J**.

Action Confirmation	In case of **5 H** Clamp Confirmation	In case of **5 J** Unclamp Confirmation
Clamping Action	Air Sensor Output **ON**	Air Sensor Output OFF
Unclamping Action	Air Sensor Output OFF	Air Sensor Output **ON**
During Swing Action	Air Sensor Output OFF	Air Sensor Output OFF

※ When air sensor is ON：No air leakage from the vent hole. When air sensor is OFF：Air releasing from the vent hole.

Action Confirmation and Air Sensing Chart

Action confirmation can be conducted by detecting differential pressure with an air sensor.

Applicable Model

TMV 060 0 - 2 C L C R **E H J**

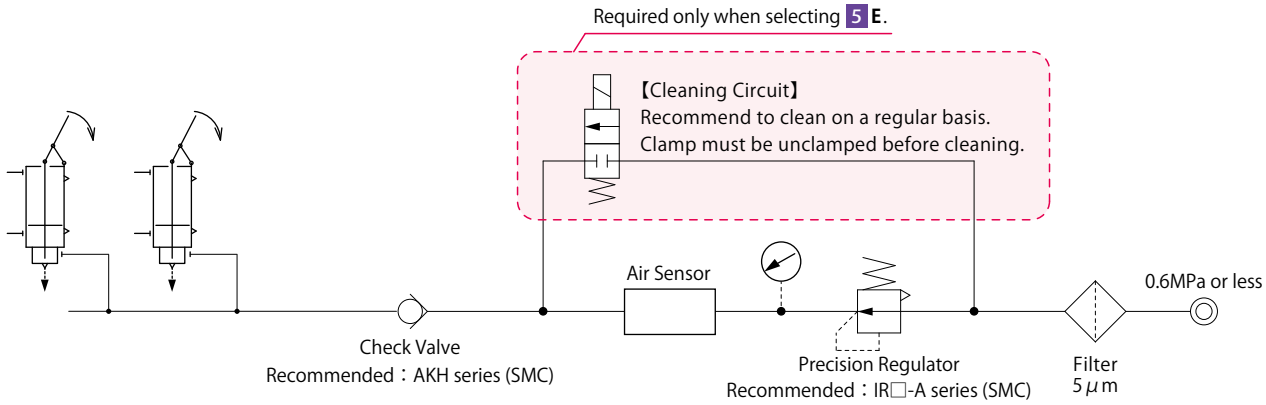
5 **Action Confirmation Symbol**
E : Clamp - Unclamp Confirmation
H : Clamp Confirmation
J : Unclamp Confirmation

Air Sensor

Recommended Air Sensor

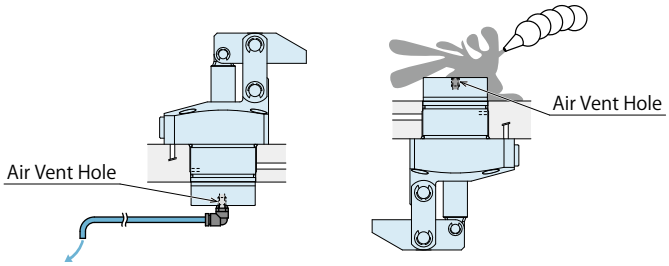
Action Confirmation Symbol	In case of 5 **E**	In case of 5 **H, J**	
Manufacturer	SMC	SMC	CKD
Name	Digital Seating Switch	Digital Seating Switch	Digital Gap Switch
Model No.	ISA3-G□A, ISA3-G□B	ISA3-G□N, ISA3-G□P	GPS3-E
Air Sensor Requirement	**Required to use the two-output air sensor shown above.**	**Able to use a general one-output air sensor.**	
Recommended Air Pressure	0.1 ~ 0.2MPa (0.15 ~ 0.2MPa when using 4 clamps.)	0.1 ~ 0.2MPa	

- **In case of 5 E, the number of clamps connected per air sensor : 2 ~ 4 pcs.**
  ※Please contact us when using an air sensor for one clamp.
- Please refer to manufacturer's catalog or other documents for the details about the air sensor.
- Please keep supplying air pressure when in use.
- Refer to the drawing below for the air circuit structure.



Notes for Design・Installation・Use

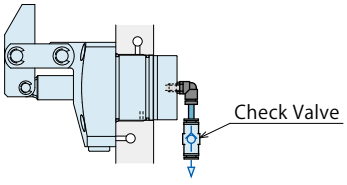
- Please keep clear condition at the air vent hole, and prevent coolant and chips from entering the hole.
  The air sensor can malfunction if the air vent hole is blocked.



O Keep clear condition at the air vent hole.

× Coolant and chips enter from the air vent hole.

【Prevention of Contaminants to the Air Vent Hole】
Coolant and chips can be prevented by setting a check valve with low cracking pressure. (Recommended Check Valve: SMC-made AKH series, cracking pressure: 0.005MPa)

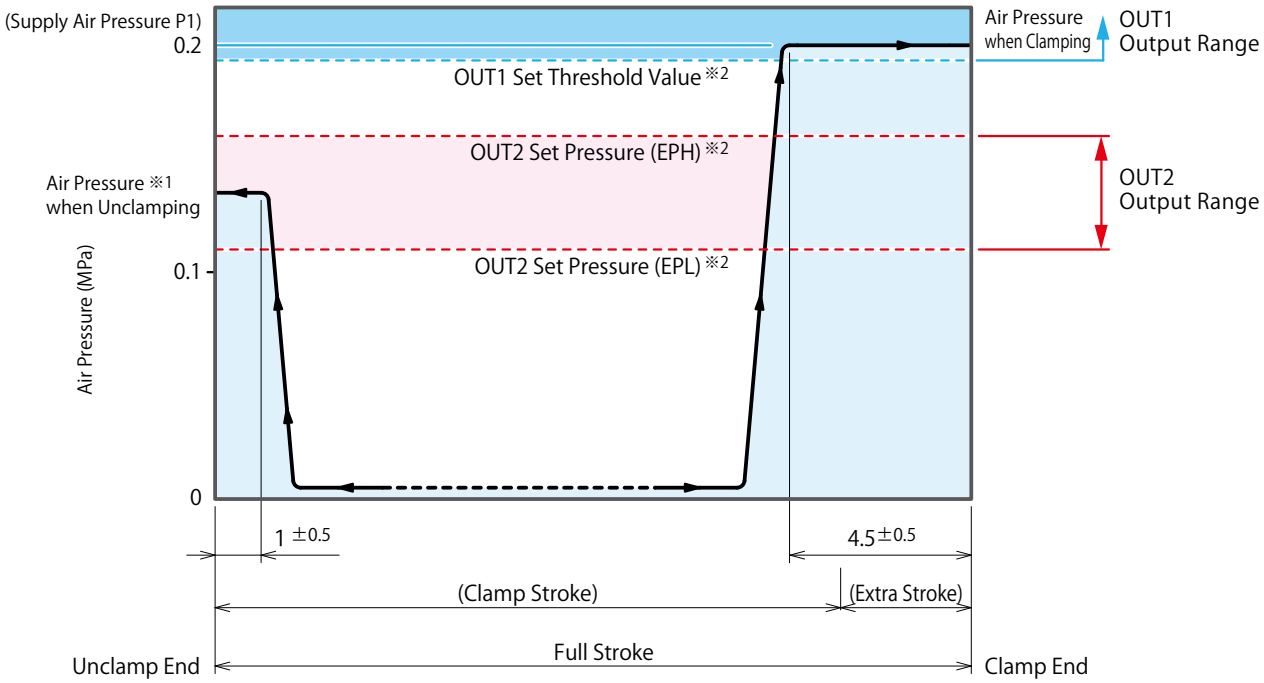


- Keep supplying air pressure to the air port for sensing when in use.
- Set a check valve with low cracking pressure to the detection port of the air sensor. (Recommended Check Valve: SMC-made AKH series, cracking pressure: 0.005MPa)

Air Sensing Chart

5 E : Clamp - Unclamp Confirmation

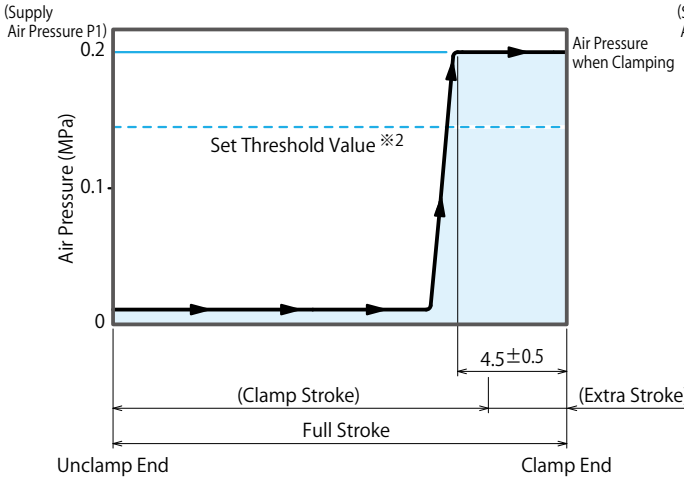
When Connected to 3 Clamps, Supply 0.2MPa Air Pressure



Sensor Setting should be as follows: Detect with OUT1 (Threshold Value) for clamp action confirmation, OUT2 (Pressure Set Value) for unclamp action confirmation. Hysteresis for both OUT1 and OUT2 should be set as 0. Please make sure to use the recommended air sensor.

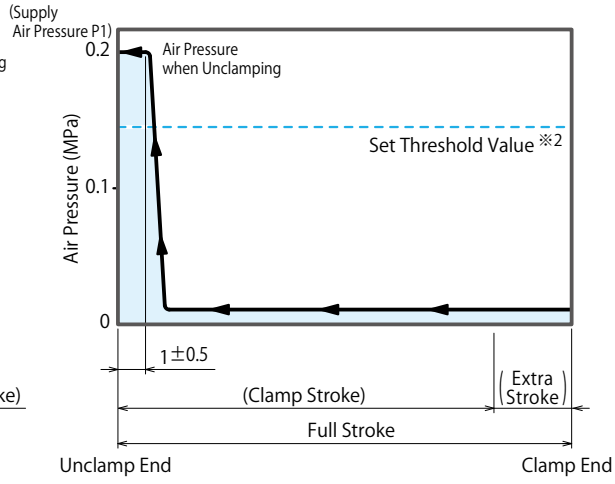
5 H : Clamp Confirmation

When Connected to 3 Clamps, Supply 0.2MPa Air Pressure



5 J : Unclamp Confirmation

When Connected to 3 Clamps, Supply 0.2MPa Air Pressure

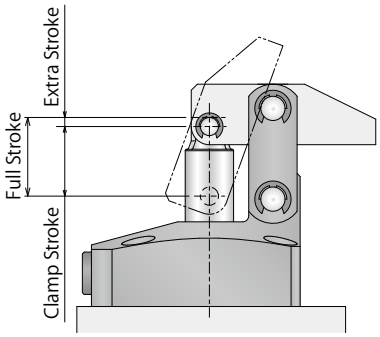


Notes :

1. The sensing chart shows the relationship between the stroke and detection circuit air pressure.
2. The specifications may vary depending on the air circuit. The length of hose should be as short as possible. (Suggest shorter than 5m)

※1 Pressure when unclamping may vary depending on the condition of air circuit.

※2. The location of a signal from air sensor output varies depending on the sensor setting. Set according to using systems. Please refer to manufacturer's instruction manual or other documents for the details about the air sensor.



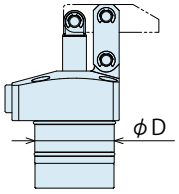
Model No. Indication

TMV 060 0 - 2 C C E
1 2 3 4 5

1 Body Size

040： ϕD=36mm
060： ϕD=43mm
100： ϕD=48mm
160： ϕD=60mm

※ Indicates the cylinder outer diameter (ϕD).



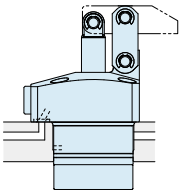
2 Design No.

0 ： Revision Number

3 Piping Method

C ： Gasket Option (With G Thread Plug)

※ Speed control valve (BZT) is sold separately.
Please refer to P. 37.

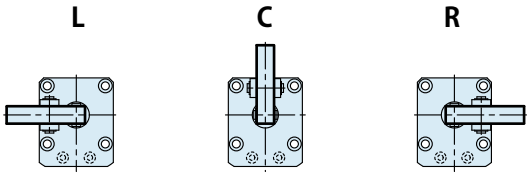


With G Thread Plug
Able to Attach BZT Speed Control Valve

4 Lever Direction

L ： Left
C ： Center
R ： Right

※ The images show the lever direction when the piping port is placed in front of you.

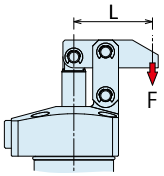


5 Action Confirmation Symbol

E ： Clamp - Unclamp Confirmation (Both)
H ： Clamp Confirmation Only
J ： Unclamp Confirmation Only

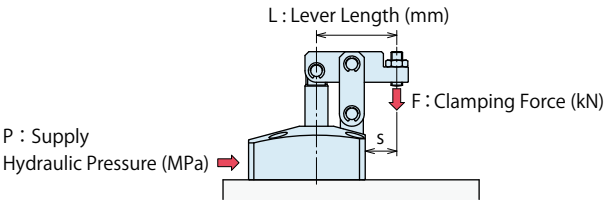
Specifications

Model No.			TMV0400-2C□□	TMV0600-2C□□	TMV1000-2C□□	TMV1600-2C□□
Cylinder Area for Clamping		cm^2	1.508	2.356	3.777	5.938
Cylinder Inner Diameter ※1		mm	16	20	25	30
Rod Diameter ※1		mm	14	16	18	22
Clamping Force ※2 (Calculation Formula)		kN	$F=\frac{2.51\times P}{L-18.5}$	$F=\frac{4.45\times P}{L-21}$	$F=\frac{8.33\times P}{L-24.5}$	$F=\frac{16.03\times P}{L-30}$
Cylinder Capacity	Clamp	cm^3	3.5	6.1	11.1	20.8
	Unclamp		1.1	2.9	7	11.4
Full Stroke		mm	23.5	26	29.5	35
Clamp Stroke		mm	20.5	23	26.5	32
Extra Stroke		mm	3	3	3	3
Hydraulic Pressure	Max. Operating Pressure	MPa	35			
	Min. Operating Pressure ※3	MPa	3.5			
	Withstanding Pressure	MPa	42			
Recommended Operating Air Pressure		MPa	0.1 ~ 0.2			
Recommended Air Sensor	5 E ※4		ISA3-G□A, ISA3-G□B (Two-Output Model)：Made by SMC ※4			
	5 H/J		ISA3-G□N, ISA3-G□P (One-Output Model)：Made by SMC / GPS3-E：Made by CKD			
Operating Temperature		℃	0 ~ 70			
Usable Fluid			General Hydraulic Oil Equivalent to ISO-VG-32			
Weight ※5		kg	0.9	1.3	1.9	3.2



Notes：※1. Clamping force cannot be calculated from the cylinder inner diameter and rod diameter.
Please refer to the clamping force calculation formula and the clamping force curve.
※2. F：Clamping Force (kN), P：Supply Hydraulic Pressure (MPa),
L：Distance between the piston center and the clamping point (mm).
※3. Minimum pressure to operate the clamp without load.
※4. The number of clamps connected per air sensor is 2 ~ 4 pcs. Please contact us when using an air sensor for one clamp.
※5. It shows the weight of single clamp without link lever.

Clamping Force Curve



Applicable Model

TMV [ ] 0 - C [L C R] [E H J]

1 Body Size

(Ex.)
In case of TMV1000-2 : When supply hydraulic pressure P is 30MPa and lever length L is 56.5mm, clamping force becomes about 7.8kN.

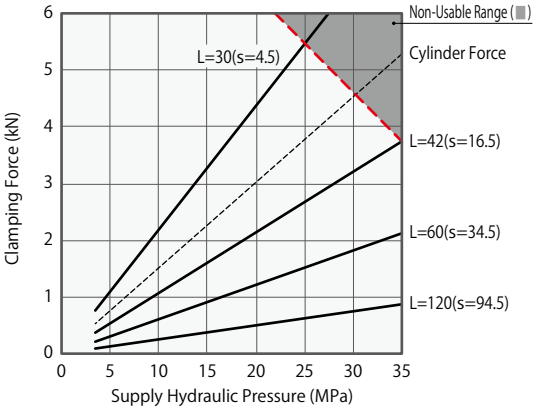
Notes :

1. Tables and graphs show the relationship between the clamping force (kN) and supply hydraulic pressure (MPa).
2. Cylinder output (when L=0) cannot be calculated from the calculation formula of clamping force.
3. Clamping force in the non-usable range may cause damage and fluid leakage.

※1. F : Clamping Force (kN), P : Supply Hydraulic Pressure (MPa), L : Lever Length (mm)

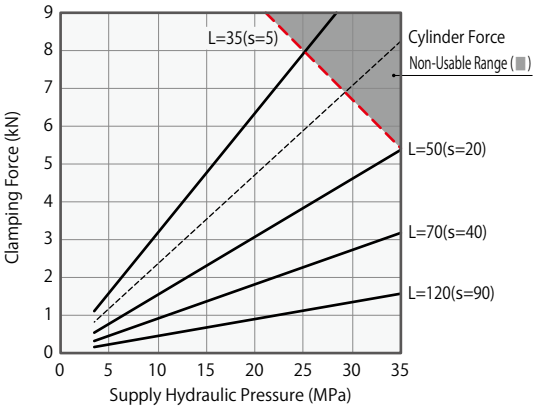
TMV0400-2 Clamping Force Calculation Formula※1 (kN) $F = (2.51 \times P) / (L - 18.5)$

Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) L=30	L=35	L=42	L=50	L=60	L=80	L=100	L=120	Min. Lever Length (L) (mm)
35.0	5.3			3.7	2.8	2.1	1.4	1.1	0.9	42
32.5	4.9			3.5	2.6	2.0	1.3	1.0	0.8	38
30.0	4.5		4.6	3.2	2.4	1.8	1.2	0.9	0.7	35
27.5	4.2		4.2	2.9	2.2	1.7	1.1	0.9	0.7	33
25.0	3.8	5.5	3.8	2.7	2.0	1.5	1.0	0.8	0.6	30
22.5	3.4	4.9	3.4	2.4	1.8	1.4	0.9	0.7	0.6	29
20.0	3.0	4.4	3.0	2.1	1.6	1.2	0.8	0.6	0.5	27
17.5	2.6	3.8	2.7	1.9	1.4	1.1	0.7	0.5	0.4	26
15.0	2.3	3.3	2.3	1.6	1.2	0.9	0.6	0.5	0.4	26
12.5	1.9	2.7	1.9	1.3	1.0	0.8	0.5	0.4	0.3	26
10.0	1.5	2.2	1.5	1.1	0.8	0.6	0.4	0.3	0.3	26
7.5	1.1	1.6	1.1	0.8	0.6	0.5	0.3	0.2	0.2	26
5.0	0.8	1.1	0.8	0.5	0.4	0.3	0.2	0.2	0.1	26
3.5	0.5	0.8	0.5	0.4	0.3	0.2	0.1	0.1	0.1	26
Max. Operating Pressure (MPa)		24.4	29.7	35.0	35.0	35.0	35.0	35.0	35.0	



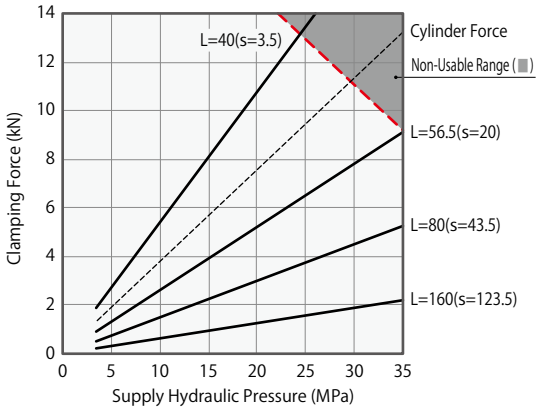
TMV0600-2 Clamping Force Calculation Formula※1 (kN) $F = (4.45 \times P) / (L - 21)$

Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) L=35	L=40	L=50	L=60	L=70	L=80	L=100	L=120	Min. Lever Length (L) (mm)
35.0	8.3			5.4	4.0	3.2	2.6	2.0	1.6	50
32.5	7.7			5.0	3.7	3.0	2.5	1.8	1.5	45
30.0	7.1			4.6	3.4	2.7	2.3	1.7	1.4	41
27.5	6.5		6.4	4.2	3.1	2.5	2.1	1.6	1.2	38
25.0	5.9	8.0	5.9	3.8	2.9	2.3	1.9	1.4	1.1	35
22.5	5.3	7.2	5.3	3.5	2.6	2.0	1.7	1.3	1.0	33
20.0	4.7	6.4	4.7	3.1	2.3	1.8	1.5	1.1	0.9	31
17.5	4.1	5.6	4.1	2.7	2.0	1.6	1.3	1.0	0.8	30
15.0	3.5	4.8	3.5	2.3	1.7	1.4	1.1	0.8	0.7	30
12.5	3.0	4.0	2.9	1.9	1.4	1.1	0.9	0.7	0.6	30
10.0	2.4	3.2	2.3	1.5	1.1	0.9	0.8	0.6	0.5	30
7.5	1.8	2.4	1.8	1.2	0.9	0.7	0.6	0.4	0.3	30
5.0	1.2	1.6	1.2	0.8	0.6	0.5	0.4	0.3	0.2	30
3.5	0.8	1.1	0.8	0.5	0.4	0.3	0.3	0.2	0.2	30
Max. Operating Pressure (MPa)		24.6	28.9	35.0	35.0	35.0	35.0	35.0	35.0	



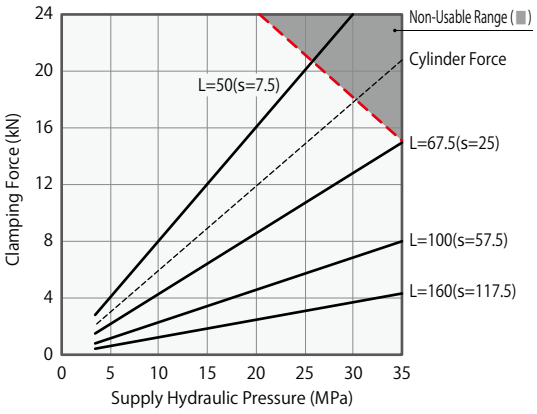
TMV1000-2 Clamping Force Calculation Formula※1 (kN) $F = (8.33 \times P) / (L - 24.5)$

Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) Non-Usable Range(■)								Min. Lever Length (L) (mm)
		L=40	L=50	L=56.5	L=80	L=100	L=120	L=140	L=160	
35.0	13.2			9.1	5.3	3.9	3.1	2.5	2.2	56.5
32.5	12.3			8.5	4.9	3.6	2.8	2.3	2.0	51.5
30.0	11.3		9.8	7.8	4.5	3.3	2.6	2.2	1.8	47
27.5	10.4		9.0	7.2	4.1	3.0	2.4	2.0	1.7	44
25.0	9.4		8.2	6.5	3.8	2.8	2.2	1.8	1.5	41
22.5	8.5	12.1	7.4	5.9	3.4	2.5	2.0	1.6	1.4	38
20.0	7.6	10.8	6.5	5.2	3.0	2.2	1.7	1.4	1.2	37
17.5	6.6	9.4	5.7	4.6	2.6	1.9	1.5	1.3	1.1	37
15.0	5.7	8.1	4.9	3.9	2.3	1.7	1.3	1.1	0.9	37
12.5	4.7	6.7	4.1	3.3	1.9	1.4	1.1	0.9	0.8	37
10.0	3.8	5.4	3.3	2.6	1.5	1.1	0.9	0.7	0.6	37
7.5	2.8	4.0	2.5	2.0	1.1	0.8	0.7	0.5	0.5	37
5.0	1.9	2.7	1.6	1.3	0.8	0.6	0.4	0.4	0.3	37
3.5	1.3	1.9	1.1	0.9	0.5	0.4	0.3	0.3	0.2	37
Max. Operating Pressure (MPa)		24.4	31.7	35.0	35.0	35.0	35.0	35.0	35.0	

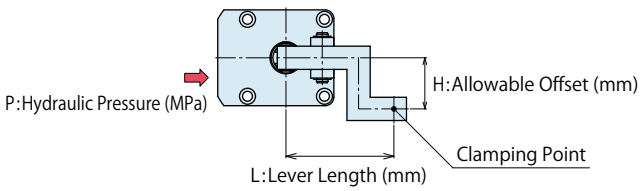


TMV1600-2 Clamping Force Calculation Formula※1 (kN) $F = (16.03 \times P) / (L - 30)$

Hydraulic Pressure (MPa)	Cylinder Force (kN)	Clamping Force (kN) Lever Length L (mm) Non-Usable Range(■)								Min. Lever Length (L) (mm)
		L=50	L=60	L=67.5	L=80	L=100	L=120	L=140	L=160	
35.0	20.8			15.0	11.2	8.0	6.2	5.1	4.3	67.5
32.5	19.3			13.9	10.4	7.4	5.8	4.7	4.0	62
30.0	17.8		16.0	12.8	9.6	6.9	5.3	4.4	3.7	57
27.5	16.3		14.7	11.8	8.8	6.3	4.9	4.0	3.4	53
25.0	14.8	20.0	13.4	10.7	8.0	5.7	4.5	3.6	3.1	49
22.5	13.4	18.0	12.0	9.6	7.2	5.2	4.0	3.3	2.8	46
20.0	11.9	16.0	10.7	8.6	6.4	4.6	3.6	2.9	2.5	43
17.5	10.4	14.0	9.4	7.5	5.6	4.0	3.1	2.6	2.2	43
15.0	8.9	12.0	8.0	6.4	4.8	3.4	2.7	2.2	1.9	43
12.5	7.4	10.0	6.7	5.3	4.0	2.9	2.2	1.8	1.5	43
10.0	5.9	8.0	5.3	4.3	3.2	2.3	1.8	1.5	1.2	43
7.5	4.5	6.0	4.0	3.2	2.4	1.7	1.3	1.1	0.9	43
5.0	3.0	4.0	2.7	2.1	1.6	1.2	0.9	0.7	0.6	43
3.5	2.1	2.8	1.9	1.5	1.1	0.8	0.6	0.5	0.4	43
Max. Operating Pressure (MPa)		25.6	31.7	35.0	35.0	35.0	35.0	35.0	35.0	



Allowable Offset Graph



Applicable Model

TMV □ 0 - C L C R E H J

1 Body Size

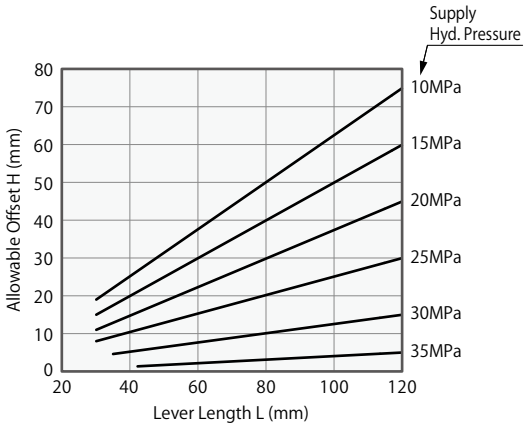
(Ex.) In case of TMV1600-2 :
When supply hydraulic pressure P is 30MPa and lever length L is 140mm, allowable offset becomes about 19mm.

Notes :

1. Tables and graphs show the relationship between the lever length and the allowable offset according to the supply hydraulic pressure.
2. Using the lever beyond allowable offset may cause deformation, seizure and fluid leakage etc.
3. The tables and graphs are only for reference. The design should be carried out with allowance fully taken into consideration.

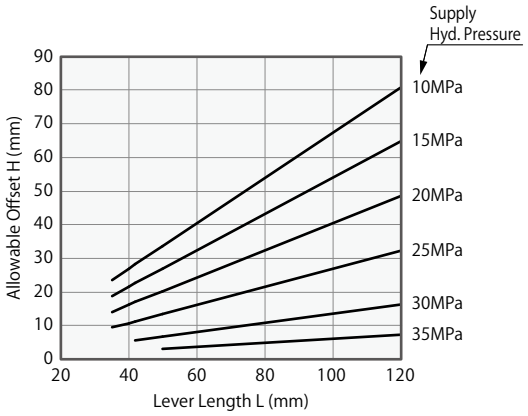
TMV0400-2

Hydraulic Pressure (MPa)	Allowable Offset H (mm) Non-Usable Range (■) Lever Length L (mm)							
	L=30	L=35	L=42	L=50	L=60	L=80	L=100	L=120
35	■	■	2	2	3	4	5	5
32.5	■	■	3	3	4	5	6	8
30	■	4	5	6	8	10	13	15
27.5	■	7	8	9	11	15	19	23
25	8	9	11	13	15	20	25	30
22.5	9	11	13	16	19	25	31	38
20	11	13	16	19	23	30	38	45
17.5	13	15	18	22	26	35	44	53
15	15	18	21	25	30	40	50	60
12.5	17	20	24	28	34	45	56	68
10	19	22	26	31	38	50	63	75



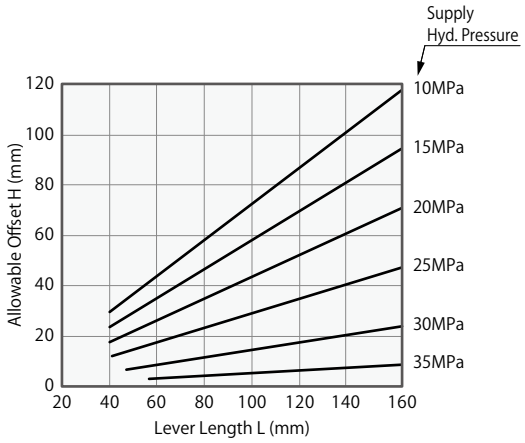
TMV0600-2

Hydraulic Pressure (MPa)	Allowable Offset H (mm) Non-Usable Range (■) Lever Length L (mm)							
	L=35	L=40	L=50	L=60	L=70	L=80	L=100	L=120
35	■	■	3	4	4	5	6	7
32.5	■	■	3	4	5	5	7	8
30	■	■	7	8	9	11	13	16
27.5	■	8	10	12	14	16	20	24
25	9	11	13	16	19	22	27	32
22.5	12	13	17	20	24	27	34	40
20	14	16	20	24	28	32	40	48
17.5	16	19	24	28	33	38	47	57
15	19	22	27	32	38	43	54	65
12.5	21	24	30	36	42	48	61	73
10	24	27	34	40	47	54	67	81



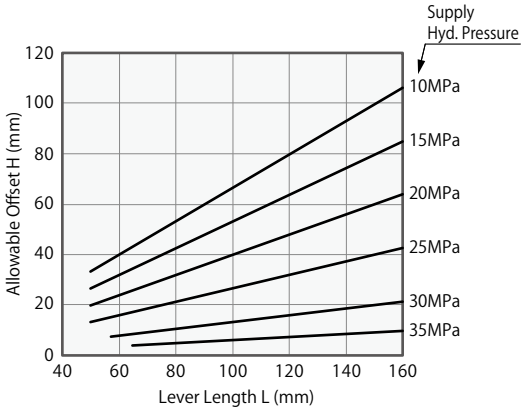
TMV1000-2

Hydraulic Pressure (MPa)	Allowable Offset H (mm) Non-Usable Range (■) Lever Length L (mm)							
	L=40	L=50	L=56.5	L=80	L=100	L=120	L=140	L=160
35			3	4	5	6	7	9
32.5			4	6	7	9	10	12
30		7	8	12	15	18	20	23
27.5		11	12	18	22	26	31	35
25		15	17	24	29	35	41	47
22.5	15	18	21	29	37	44	51	59
20	18	22	25	35	44	53	62	71
17.5	21	26	29	41	51	62	72	82
15	24	29	33	47	59	71	82	94
12.5	26	33	37	53	66	79	93	106
10	29	37	42	59	73	88	103	118



TMV1600-2

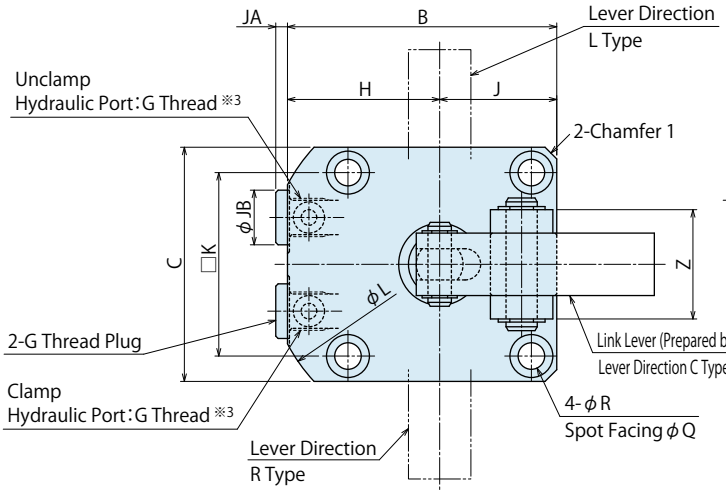
Hydraulic Pressure (MPa)	Allowable Offset H (mm) Non-Usable Range (■) Lever Length L (mm)							
	L=50	L=60	L=67.5	L=80	L=100	L=120	L=140	L=160
35			4	5	6	7	9	10
32.5			4	5	7	8	9	11
30		8	9	11	13	16	19	21
27.5		12	13	16	20	24	28	32
25	13	16	18	21	27	32	37	43
22.5	17	20	22	27	33	40	47	53
20	20	24	27	32	40	48	56	64
17.5	23	28	31	37	47	56	65	74
15	27	32	36	43	53	64	74	85
12.5	30	36	40	48	60	72	84	96
10	33	40	45	53	66	80	93	106



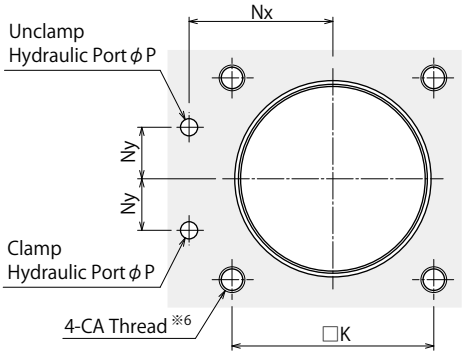
External Dimensions

(The dimensions are the same for 5 Action Confirmation Symbol E / H / J.)

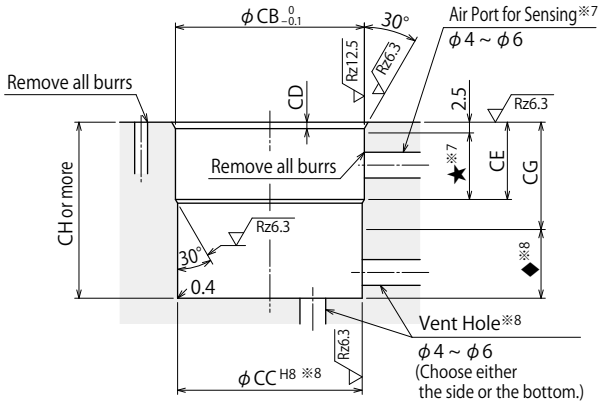
※ The drawing shows the clamped state of TMV-2CC□.

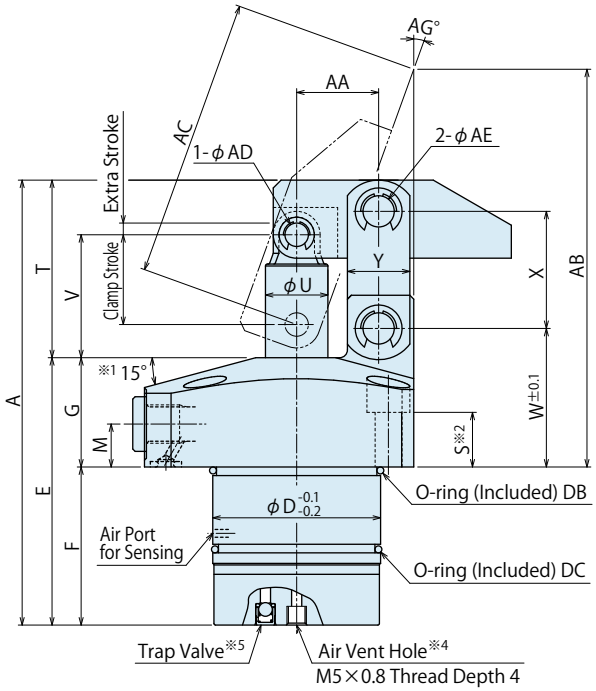


Machining Dimensions of Mounting Area

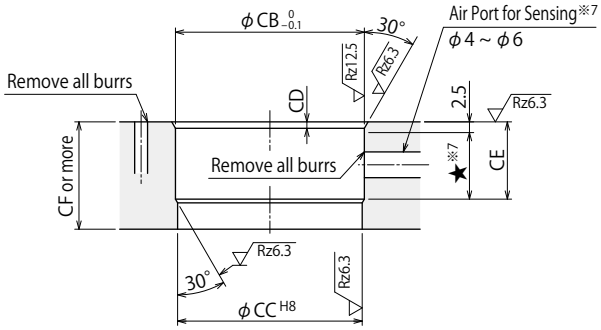


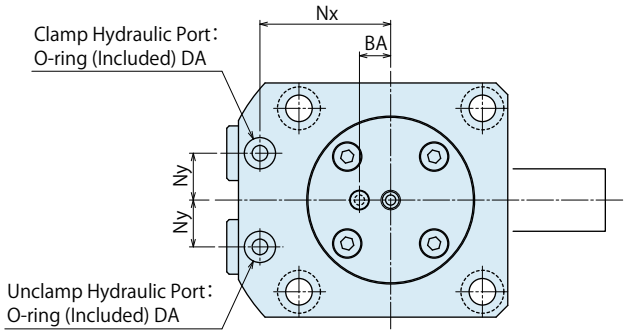
For Blind Hole





For Through Hole





Notes :

※6. CA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimensions 'S'.

※7. Prepare the air port for sensing within the ★ area.

※8. Prepare the vent hole on the side or the bottom.
When preparing on the side, it should be within the ◆ area.
When preparing on the bottom, it should be within ϕCC.

Notes:

※ 1. Flange inclination angle is 12° only for TMV1000-2.

※ 2. Mounting bolts are not provided with the product. Please prepare them according to the mounting height referring to dimension 'S'.

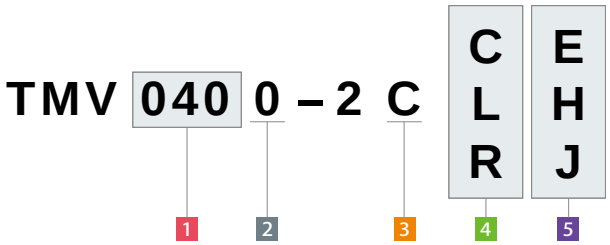
※ 3. Speed control valve is sold separately. Please refer to P.37 for detail.

※ 4. Please keep clear condition at the air vent hole, and prevent coolant and chips from entering the hole.
If exposed to coolant, use M5 thread and prepare piping to prevent coolant and chips, but do not block the air vent hole.

※ 5. Please keep clear condition at the trap valve.
1. Please use the provided pin (equivalent to ϕADf6, ϕAEf6, HRC60) as mounting pin for lever.

Model No. Indication

(Format Example：TMV0600-2CCE, TMV1600-2CLJ)



1 Body Size
2 Design No.
3 Piping Method
4 Lever Direction
5 Action Confirmation Symbol

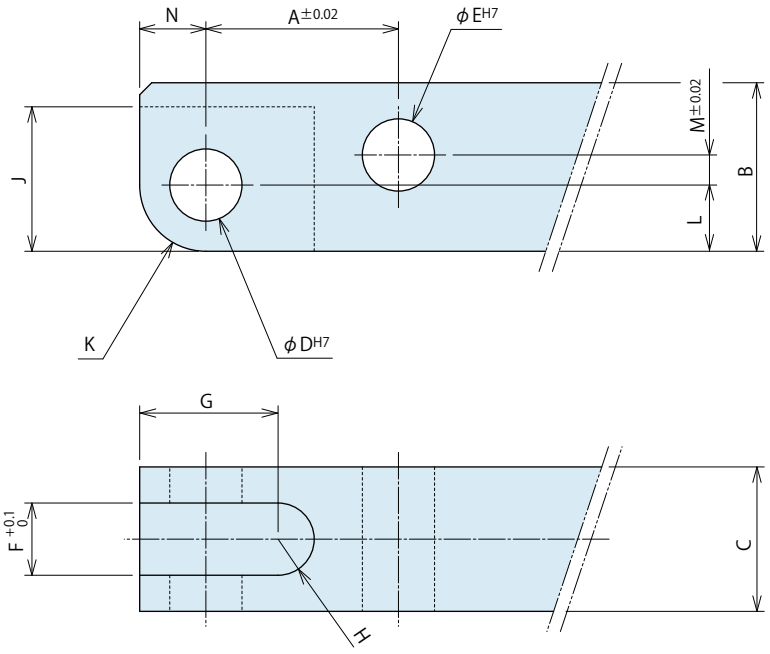
External Dimensions and Machining Dimensions of Mounting

(mm)

Model No.		TMV0400-2C□□	TMV0600-2C□□	TMV1000-2C□□	TMV1600-2C□□
Full Stroke		23.5	26	29.5	35
Clamp Stroke		20.5	23	26.5	32
Extra Stroke		3	3	3	3
A		105.5	114	127	152
B		61	69	82.5	94.5
C		51	60	73	85
D		36	43	48	60
E		66.5	68.5	73	85
F		38.5	40.5	43	48
G		28	28	30	37
H		35.5	39	46	52
J		25.5	30	36.5	42.5
K		40	47	57	65
L		81	88	103	116
M		12	11	13	15
Nx		30	33.5	40	45
Ny		10	12	15	16
P		3	3	3	5
Q		9	11	14	17.5
R		5.5	6.8	9	11
S		17	15	15	17
T		39	45.5	54	67
U		14	16	18	22
V		29	31.5	37	45
W		34.5	35.5	39	48
X		26	30	35.5	43.5
Y		13	16	19	25
Z		24	28	37	40
Chamfer		C3	C3	C4	C5
AA		18.5	21	24.5	30
AB		92.4	101.9	115.4	130.8
AC		61.2	71.7	83	90.8
AD		6	6	8	10
AE		6	8	10	12
AG		18.9	19.9	20.5	21.5
BA		8	8	8	10
CA (Nominal×Pitch)		M5×0.8	M6×1	M8×1.25	M10×1.5
CB		37	44	49	61
CC		$36^{+0.039}_{0}$	$43^{+0.039}_{0}$	$48^{+0.039}_{0}$	$60^{+0.046}_{0}$
CD		1.5	1.5	1.5	1.5
CE		19	18	24	29
CF		25	25	30	35
CG		25	25	30	35
CH		39	41	43.5	48.5
JA		3	3	3	3.5
JB		14	14	14	19
Clamp Port : G Thread		G1/8	G1/8	G1/8	G1/4
Unclamp Port : G Thread		G1/8	G1/8	G1/8	G1/4
O-ring	DA	OR NBR-90 P5-N (1BP5)	OR NBR-90 P5-N (1BP5)	OR NBR-90 P5-N (1BP5)	OR NBR-90 P7-N (1BP7)
	DB	AS568-027(70°)	AS568-030(70°)	AS568-031(70°)	AS568-035(70°)
	DC	AS568-027(70°)	AS568-029(70°)	AS568-031(70°)	AS568-035(70°)

Link Lever Design Dimensions

※ Reference for designing link lever.



Link Lever Design Dimension List

(mm)

Corresponding Model No.	TMV0400	TMV0600	TMV1000	TMV1600
A	18.5	21	24.5	30
B	16	20	25	32
C	$12^{\ 0}_{-0.3}$	$16^{\ 0}_{-0.3}$	$19^{\ 0}_{-0.3}$	$22^{\ 0}_{-0.3}$
D	$6^{\ +0.012}_{\ 0}$	$6^{\ +0.012}_{\ 0}$	$8^{\ +0.015}_{\ 0}$	$10^{\ +0.015}_{\ 0}$
E	$6^{\ +0.012}_{\ 0}$	$8^{\ +0.015}_{\ 0}$	$10^{\ +0.015}_{\ 0}$	$12^{\ +0.018}_{\ 0}$
F	6	8	10	11
G	13	12.5	16	20
H	R3	R4	R5	R5.5
J	13	13	17.5	22
K	R6	R6	R8	R10
L	6	6	8	10
M	3.5	6	7.5	9.5
N	6	6	8	10

Notes :

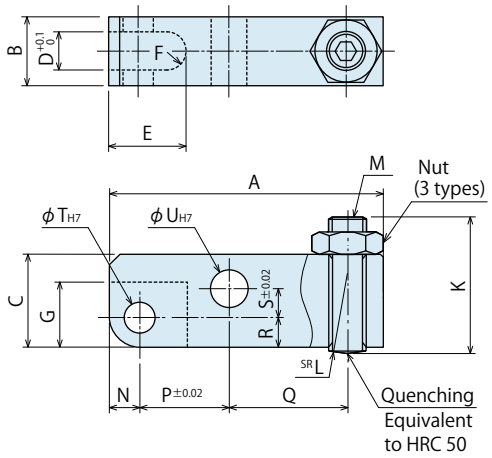
1. Please design the link lever length according to the performance curve.
2. If the link lever is not in accordance with the dimension shown above, performance may be degraded and damage can occur.
3. Please use the attached pin (equivalent to φADf6, φAEf6, HRC60) as the mounting pin for lever.
   (Please refer to each external dimension of TMV for the dimensions φAD and φAE.)

Accessory：Link Lever (LZ-LJ3)

Model No. Indication

LZ 048 0 – LJ3

- 048: Size (Refer to the table.)
- 0: Design No. (Revision Number)



(mm)

Model No.	LZ0480-LJ3	LZ0550-LJ3	LZ0650-LJ3	LZ0750-LJ3
Corresponding Model No.	TMV0400-2	TMV0600-2	TMV1000-2	TMV1600-2
A	54	64	74.5	88.5
B	$12^{0}_{-0.3}$	$16^{0}_{-0.3}$	$19^{0}_{-0.3}$	$22^{0}_{-0.3}$
C	16	20	25	32
D	6	8	10	11
E	16	16.5	21	25.5
F	R3	R4	R5	R5.5
G	13	13	17.5	22
K	26	32	39	47
L	10	15	20	30
M	M6×1	M8×1.25	M10×1.5	M12×1.75
N	6	6	8	10
P	18.5	21	24.5	30
Q	23.5	29	32	37.5
R	6	6	8	10
S	3.5	6	7.5	9.5
T	$6^{+0.012}_{0}$	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$
U	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$	$12^{+0.018}_{0}$

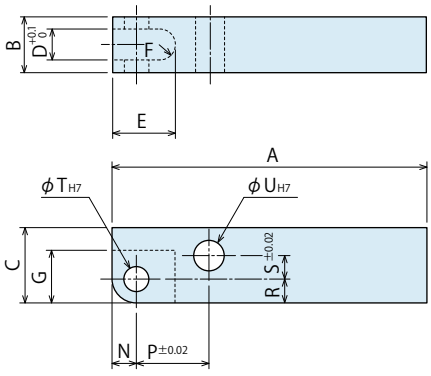
Notes：
1. Material : S45C　Surface Finishing：Alkaline Blackening
2. Please use the attached pin (equivalent to φADf6, φAEf6, HRC60) as the mounting pin for lever.

Accessory：Material Link Lever (LZ-LJ2)

Model No. Indication

LZ 048 0 – LJ2

- 048: Size (Refer to the table.)
- 0: Design No. (Revision Number)



(mm)

Model No.	LZ0480-LJ2	LZ0550-LJ2	LZ0650-LJ2	LZ0750-LJ2
Corresponding Model No.	TMV0400-2	TMV0600-2	TMV1000-2	TMV1600-2
A	85	90	105	110
B	$12^{0}_{-0.3}$	$16^{0}_{-0.3}$	$19^{0}_{-0.3}$	$22^{0}_{-0.3}$
C	16	20	25	32
D	6	8	10	11
E	16	16.5	21	25.5
F	R3	R4	R5	R5.5
G	13	13	17.5	22
N	6	6	8	10
P	18.5	21	24.5	30
R	6	6	8	10
S	3.5	6	7.5	9.5
T	$6^{+0.012}_{0}$	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$
U	$6^{+0.012}_{0}$	$8^{+0.015}_{0}$	$10^{+0.015}_{0}$	$12^{+0.018}_{0}$

Notes：
1. Material : S45C　Surface Finishing：Alkaline Blackening
2. If necessary, the front end should be additionally machined.
3. Please use the attached pin (equivalent to φADf6, φAEf6, HRC60) as the mounting pin for lever.

Cautions

Notes for Design

1) Check Specifications

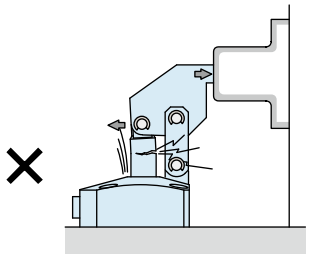
- Please use each product according to the specifications.

2) Notes for Circuit Design

- Please read "Notes on Hydraulic Cylinder Speed Control Unit" for proper hydraulic circuit design. Improper circuit design may lead to malfunctions and damages. (Refer to P.40.)
- Ensure there is no possibility of supplying hydraulic pressure to the clamp port and the unclamp port simultaneously.

3) Notes for Link Lever Design

- Make sure no force is applied to the piston rod except from the axial direction. The usage like the one shown in the drawing below will apply a large bending stress to the piston rod and must be avoided.



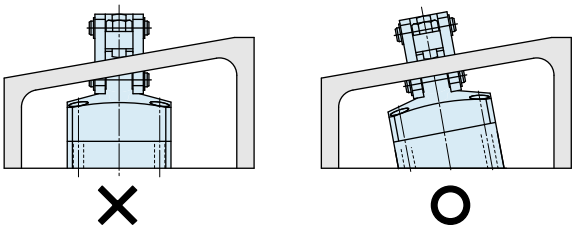
- If offset load is applied on the link part, use it within the allowable range of "Allowable Offset Graph".

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 fluid 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) When using in a dry environment.

- The link pin can be dried out. Grease it periodically or use a special pin. Contact us for the specifications for special pins.

7) Vent Hole and Check Valve of Air Sensor

- Make sure to check the notes for design, installation and use on P. 23 when using an air sensor.

Installation Notes

1) Check the Usable Fluid

- Please use the appropriate fluid by referring to the Hydraulic Fluid List (P.39).

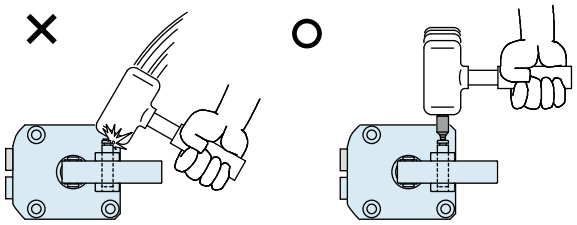
2) Installation of the Product

- When mounting the clamp, use hexagonal socket bolts as multiple bolt holes for mounting (with tensile strength of 12.9) and tighten them with the torque shown in the table below. Tightening with greater torque than recommended can dent the seating surface or break the bolt.

Model No.	Mounting Bolt Size	Tightening Torque (N·m)
TMV0400-C□□	M5×0.8	6.9
TMV0600-C□□	M6×1	11.8
TMV1000-C□□	M8×1.25	25
TMV1600-C□□	M10×1.5	58.8

3) Installation / Removal of the Link Lever

- When inserting the link pin, do not hit the pin directly with a hammer. When using a hammer to insert the pin, always use a cover plate with a smaller diameter than the snap ring groove on the pin.



4) Speed Adjustment

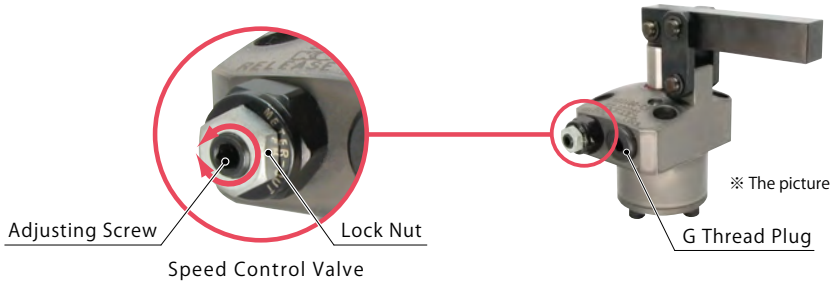
- Adjust the speed so that the total operating time is one second or more. If the clamp operates too fast, the parts will be worn out, leading to premature damage and ultimately complete equipment failure.
- Please make sure to release air from the circuit before adjusting speed. It will be difficult to adjust the speed accurately with air mixed in the circuit.
- Turn the speed control valve gradually from the low-speed side (small flow) to the high-speed side (large flow) to adjust the speed.

※ Please refer to P.39 for common cautions.
・Installation Notes ・Hydraulic Fluid List ・Notes on Hydraulic Cylinder Speed Control Circuit
・Notes on Handling ・Maintenance/Inspection ・Warranty

Speed Control Valve (For High Pressure)

Directly Mounted to Clamps

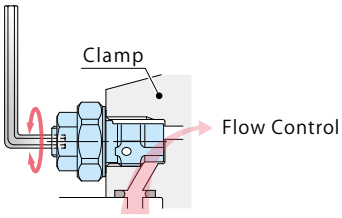
Speed Control Valve (model BZT) attaches directly to
KOSMEK hydraulic clamp with piping method: type C.



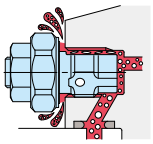
※ The picture shows a double-acting clamp (model LKA).

Action Description

Control the flow with a wrench.
Able to change the clamping action speed individually.



Able to release the air in the circuit
by loosening the Speed Control Valve.



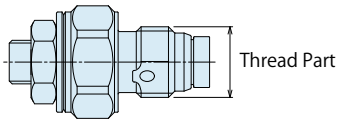
Model No. Indication (Speed Control Valve for High Pressure)

BZT 0 10 1 - A

1 2 3

1 G Thread Size

10 ：Thread Part G1/8A Thread
20 ：Thread Part G1/4A Thread



2 Design No.

1 ：Revision Number

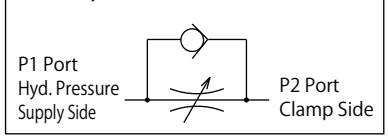
3 Control Method

A ：Meter-in

※ No meter-out method for model BZT.

A

Circuit Symbol：Meter-in



Specifications

Model No.		BZT0101-A	BZT0201-A
Max. Operating Pressure	MPa	35	
Min. Operating Pressure	MPa	10	
Control Method		Meter-in	
G Thread Size		G1/8A	G1/4A
Cracking Pressure	MPa	0.04	
Max. Passage Area	mm^2	2.6	5.0
Usable Fluid		General Hydraulic Oil Equivalent to ISO-VG-32	
Operating Temperature	℃	0 ~ 70	
Tightening Torque for Main Body	N·m	10	25
Weight	g	12	26

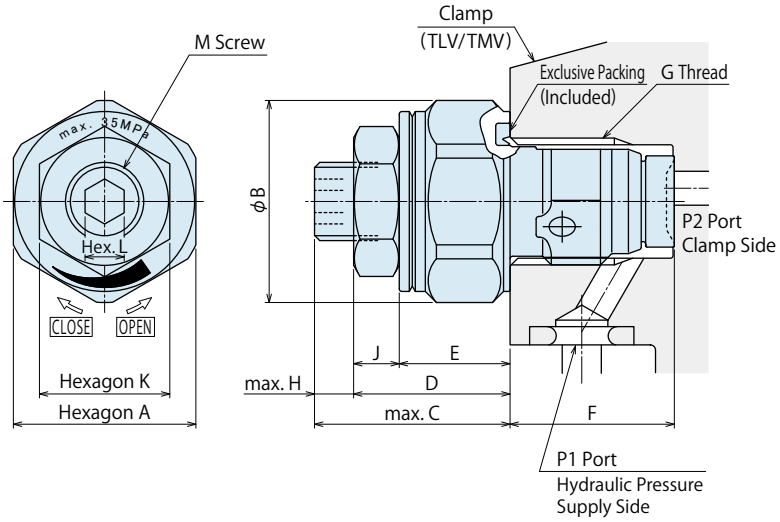
Notes : 1. It must be mounted with recommended torque. Because of the structure of the metal seal, if mounting torque is insufficient, it may not be able to control the flow rate.
2. Do not attach a used BZT to other clamps. Flow control may not be succeeded because the bottom depth difference of G thread makes metal sealing insufficient.

Applicable Products

Model No.	TLV-2 (Double Action) Swing Clamp	TMV-2 (Double Action) Link Clamp
BZT0101-A	TLV0800-2C□□	TMV0400-2C□□
	TLV1000-2C□□	TMV0600-2C□□
	TLV1600-2C□□	TMV1000-2C□□
BZT0201-A	TLV2000-2C□□	TMV1600-2C□□

Note : 1. In case of controlling TLV/TMV, both the clamp side and release side should have meter-in circuit. Meter-out circuit causes excessive high pressure leading to fluid leakage and product damage.

External Dimensions



(mm)

Model No.	BZT0101-A	BZT0201-A
A	14	18
B	15.5	20
C	15	16
D	12	13
E	8.5	9.5
F	(12.6)	(16.1)
G	G1/8	G1/4
H	3	3
J	3.5	3.5
K	10	10
L	3	3
M	M6×0.75	M6×0.75

Notes

1. Please read "Notes on Hydraulic Cylinder Speed Control Circuit" for proper hydraulic circuit design. Improper circuit design may lead to malfunctions and damages. (Refer to P.40.)
2. It is dangerous to release air under high pressure. It must be conducted under lower pressure. (For reference : the minimum operating range of the product within the circuit.)
3. If the cylinder capacity is small, the speed of flow may not be controlled properly. (Recommended Cylinder Capacity : $3cm^3$ or more)

Cautions

Installation Notes (for Hydraulic Series)

1) Check the Usable Fluid

- Please use the appropriate fluid by referring to the Hydraulic Fluid List.

2) Procedure 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 Kosmek's product except for a part of valves which prevent contamination in the circuit.

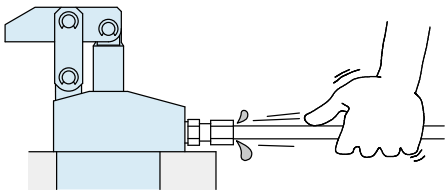
3) Applying Sealing Tape

- Wrap with tape 1 to 2 times following the screw direction.
- Pieces of the sealing tape can lead to oil leakage and malfunction.
- Please implement piping construction in a clear environment to prevent anything getting in products.

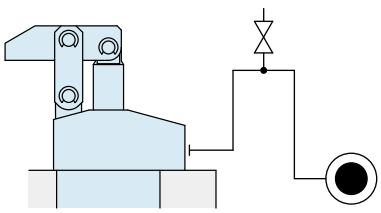
4) Air Bleeding of the Hydraulic Circuit

- If the hydraulic circuit has excessive air, the action time may become very long. If air enters the circuit after connecting the hydraulic port or under the condition of no air in the oil tank, please perform the following steps.

① Reduce hydraulic pressure to less than 2MPa.
② Loosen the cap nut of pipe fitting closest to the clamp, cylinder, work support, etc. by one full turn.
③ Shake the pipeline to loosen the outlet of pipe fitting. Hydraulic fluid mixed with air comes out.



④ Tighten the cap nut after air bleeding.
⑤ It is more effective to release air at the highest point inside the circuit or at the end of the circuit. (For the gasket option, set an air bleeding valve at the highest point inside the circuit.)



5) Checking Looseness and Retightening

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

Hydraulic Fluid List

ISO Viscosity Grade ISO-VG-32

Manufacturer	Anti-Wear Hydraulic Oil	Multi-Purpose Hydraulic Oil
Showa Shell Sekiyu	Tellus S2 M 32	Morlina S2 B 32
Idemitsu Kosan	Daphne Hydraulic Fluid 32	Daphne Super Multi Oil 32
JX Nippon Oil & Energy	Super Hyrando 32	Super Mulpus DX 32
Cosmo Oil	Cosmo Hydro AW32	Cosmo New Mighty Super 32
ExxonMobil	Mobil DTE 24	Mobil DTE 24 Light
Matsumura Oil	Hydol AW-32	
Castrol	Hyspin AWS 32	

Note : Please contact manufacturers when customers require products in the list above.

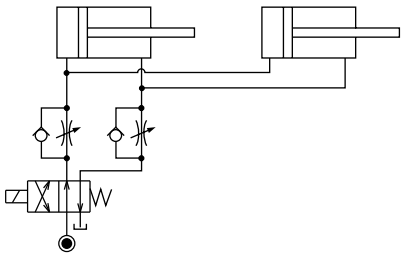
Notes on Hydraulic Cylinder Speed Control Unit

Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Speed Control Circuit

Speed control circuit for TLV and TMV should have meter-in circuits for both the clamp and unclamp sides.
In case of TLV/TMV, meter-out circuit causes excessive high pressure leading to fluid leakage and product damage.

【Meter-in Circuit】(Use Meter-in Circuit for TLV/TMV.)



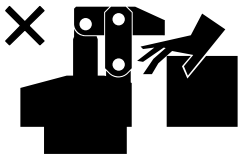
Cautions

Notes on Handling

1) It should be handled by qualified personnel.
- The hydraulic machine and air compressor should be operated and maintained by qualified personnel.

2) Do not operate or remove the product unless the safety protocols are ensured.
① The machine and equipment 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 abnormality in the bolts and respective parts before restarting the machine or equipment.

3) Do not touch the clamp (cylinder) while it is working. Otherwise, your hands may be injured due to clinching.

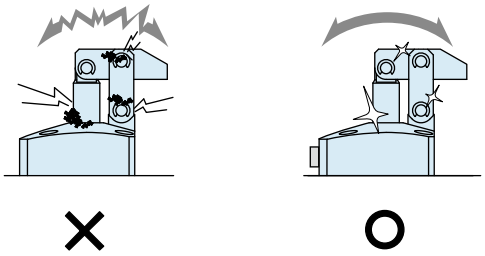


4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

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 abnormality 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) If disconnecting by couplers, air bleeding should be carried out on a regular basis to avoid air mixed in the circuit.

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

5) Make sure the hydraulic fluid has not deteriorated.

6) 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.

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

8) 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 If the product is used while it is not suitable for use based on the operator's judgment, resulting in defect.
③ If it is used or handled in 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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