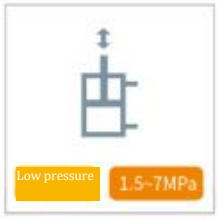
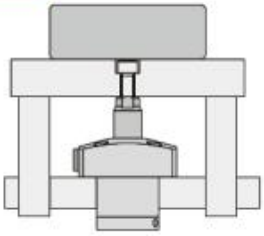
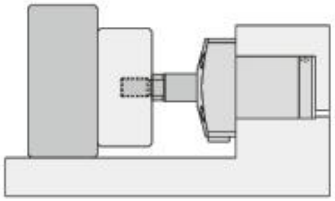


Built-in action confirmation mechanism is the most suitable for automatic equipment, which can use 5mm as the unit for specified stroke

Application Example

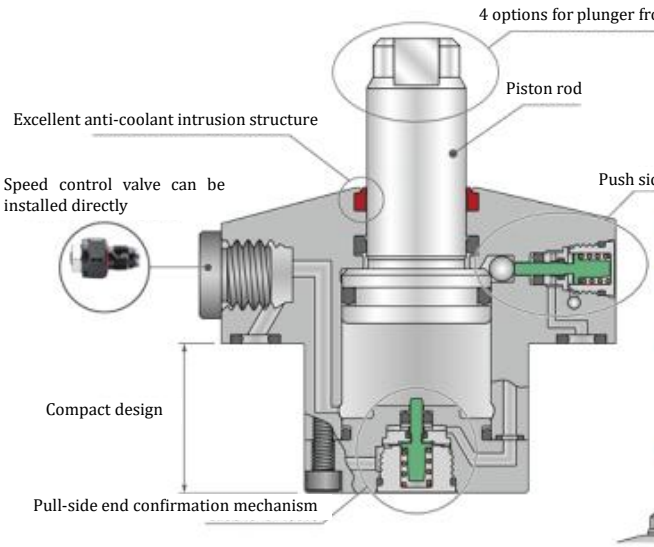


For lifting device

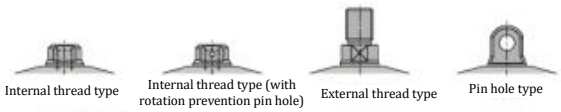


For moving device

Section Structure

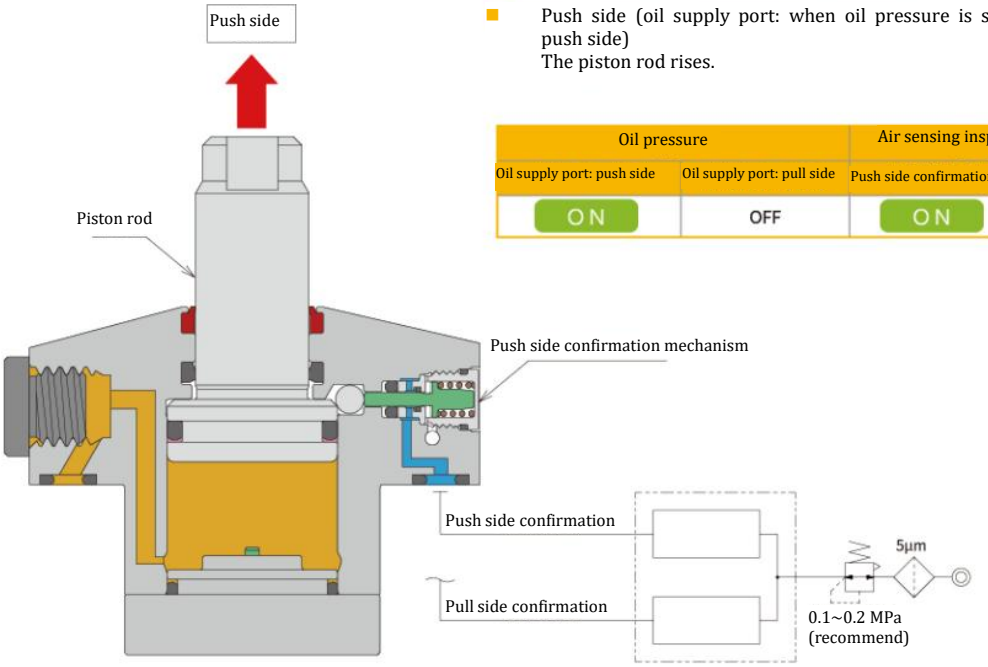


- There are 3 specifications for main dimensions of space saving clamps for lifting devices
- Built-in sensing mechanism. Ultra-thin fixture can be designed The air leakage is zero when the sensing valve is closed. Air sensing and detecting element with low air consumption can be selected.
- Stroke 10 to 50mm (75mm)※1 can be specified in 5mm.
  ※1 HLLW0361/HLLW0401: stroke within 50mm, HLW0481: stroke within 75mm.
- There are 4 options for plunger front end shape



- Speed control valve can be installed directly
- The speed control valve with built-in exhaust function can be directly installed (to be purchased separately).

Action principle

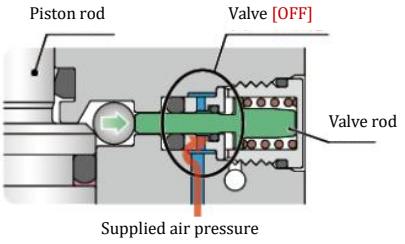


- Push side (oil supply port: when oil pressure is supplied to the push side)
  The piston rod rises.

Oil pressure		Air sensing inspection element	
Oil supply port: push side	Oil supply port: pull side	Push side confirmation	Pull side confirmation
ON	OFF	ON	OFF

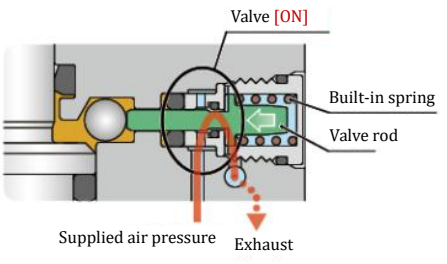
Push side confirmation mechanism

When pushing side oil pressure is supplied — Air sensing element ON



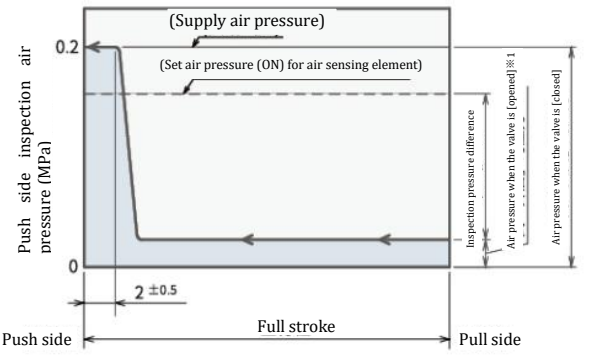
When the valve rod moves backward under the compression of the piston rod, the sensing valve is closed.

When pull side oil pressure is supplied — Air sensing element OFF

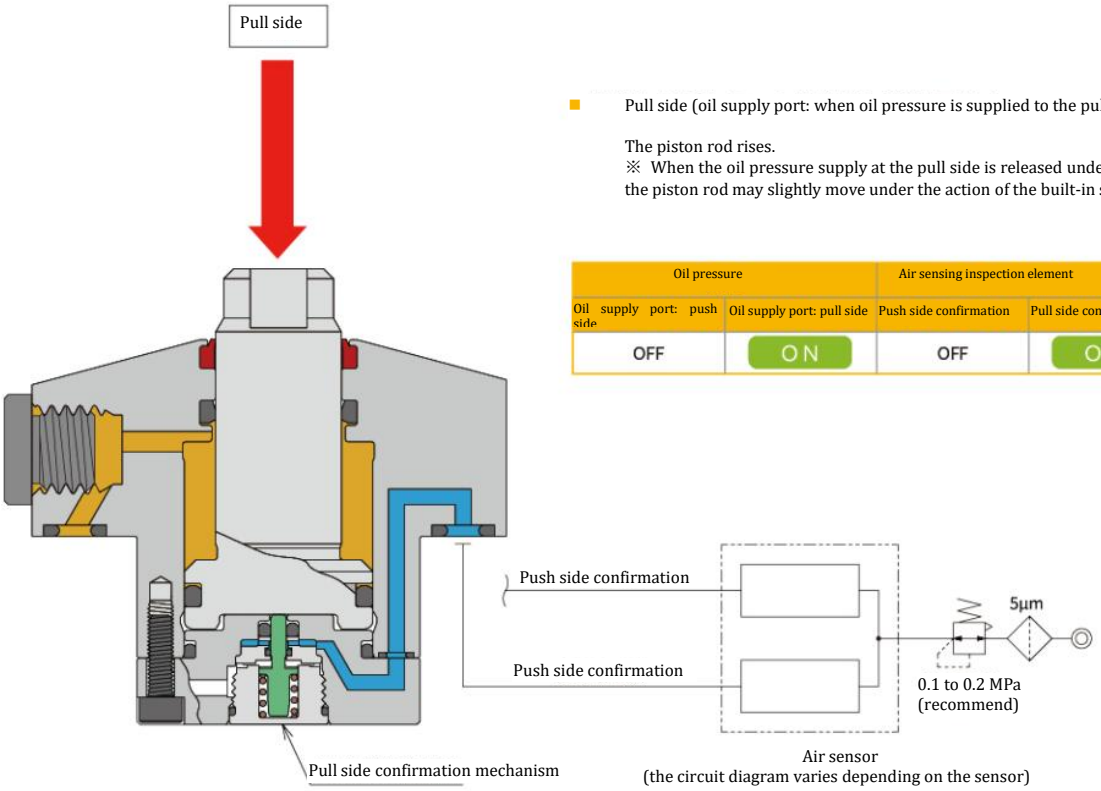


When the valve rod moves forward under the compression of the built-in spring, the sensing valve is ON.

Push side: air sensing flow chart



※ 1. When the sensing valve is [opened], the sensing pressure will vary according to the air sensor used.
The sensing pressure of air sensors with high air consumption will be higher when the sensing valve is [opened], thus making the inspected differential pressure smaller.



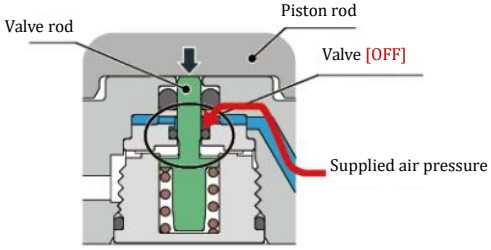
■ Pull side (oil supply port: when oil pressure is supplied to the pull side)

The piston rod rises.
※ When the oil pressure supply at the pull side is released under this state, the piston rod may slightly move under the action of the built-in spring.

Oil pressure		Air sensing inspection element	
Oil supply port: push side	Oil supply port: pull side	Push side confirmation	Pull side confirmation
OFF	ON	OFF	ON

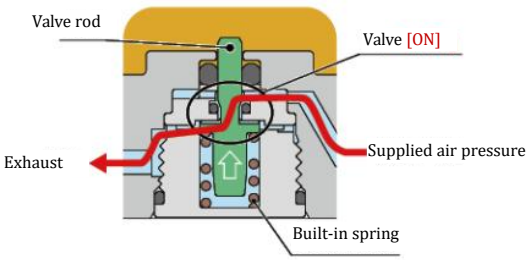
Pull side confirmation mechanism

When pushing side oil pressure is supplied — Air sensing element — ON



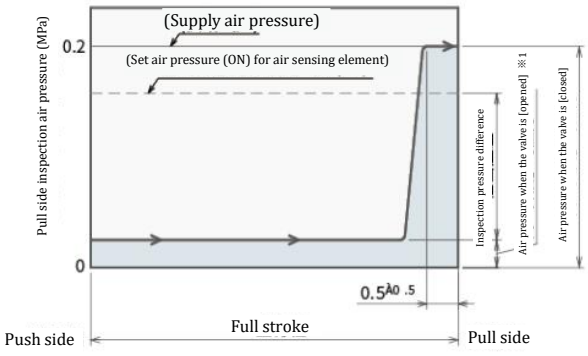
When the valve rod moves backward under the compression of the piston rod, the sensing valve is closed.

When pull side oil pressure is supplied — Air sensing element — OFF



When the valve rod moves forward under the compression of the built-in spring, the sensing valve is ON.

Pull side: air sensing flow chart



※ 1. When the sensing valve is [opened], the sensing pressure will vary according to the air sensor used.
The sensing pressure of air sensors with high air consumption will be higher when the sensing valve is [opened], thus making the inspected differential pressure smaller.

Action principle (description of sensing elements and air sensing flow chart)

Connect the air sensing inspection element to the air port for push side confirmation and air port for pull side confirmation, and check the pressure difference between the two to confirm the action of piston rod.

Model representation

HLLW 04 8 1- CA/CT/CP E/H/J 05 0

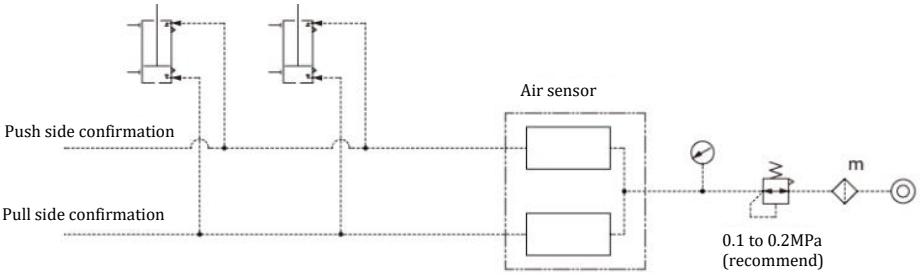
Sensor symbol
E: Built-in sensor at both ends
H: Built-in sensor at push side
J: Built-in sensor at pull side

About air sensing inspection elements

- In order to confirm the action of the piston rod, an air sensing inspection element must be set.
  The air sensing detection elements with small air consumption can be selected (see the table below for recommended consumption).
  Recommended air pressure: 0.1 to 0.2MPa
  Recommended air sensing inspection elements

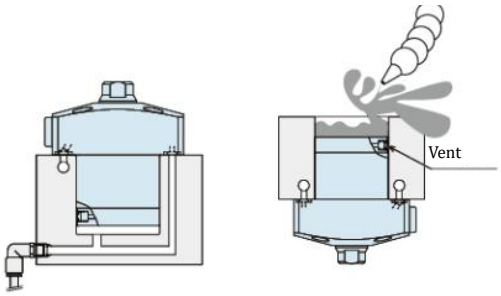
Manufacturer	SMC	CKD
Name	Air sensing element	Clearance switch
Model	ISA3-G	GPS3-E

- For details of the air sensor, please refer to the sample of the sensor manufacturer.
- The supply air pressure of the air sensor shall be 0.1 to 0.2MPa.
- Please keep normal air supply when using.
- Please refer to the following figure for the composition of air circuit.



Precautions for design, construction and use

- The vent must be open to the atmosphere and must be protected from coolant and chip intrusion. If the vent is blocked, it will cause malfunction of air sensor.

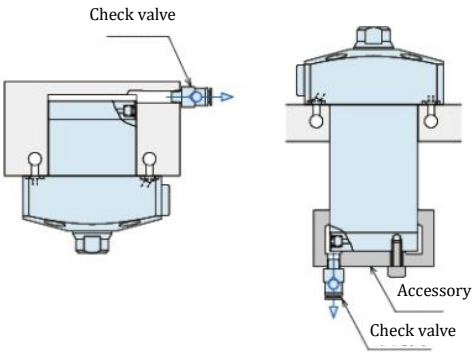


O The vent is open to the atmosphere.

✕ Coolant and chips intrude through the vent hole

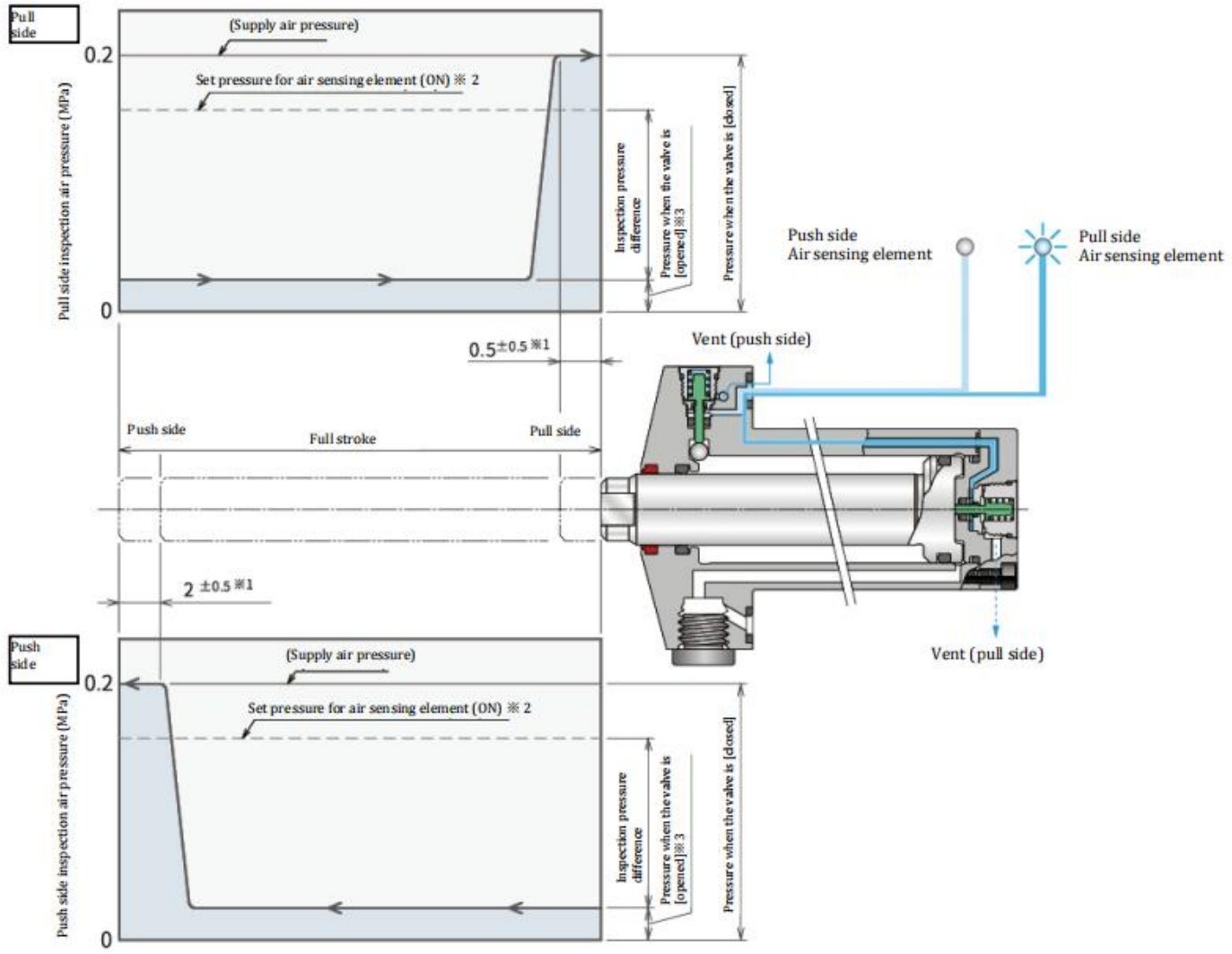
- Please keep the normal air supply to the air port during use.

- Example of protection from coolant and chip intrusion through vent. Coolant can be effectively protected from chip intrusion by setting a check valve with a low opening pressure.
  (recommended check valve: opening pressure of SMC product, AKH series: 0.005MPa)



Air sensing flow chart

When connecting 1 linear clamp



Precautions

1. This air sensing flow chart shows the relationship curve of the stroke inspection circuit pressure
2. There may be changes due to the composition characteristics of the air circuit. It is recommended that the length of the connecting air pipe be as short as possible. (The standard is within 5m)
3. When the sensor valve symbol is H, only the clamping action is detected, and when the sensor valve symbol is], only the release action is detected.

※1 The pressure position in the [closed] state of the sensing valve may have a tolerance difference due to the structure of the clamp. (Please refer to the air sensing flow chart)

※2 The position of the air sensor output ON signal will change depending on the sensor setting.

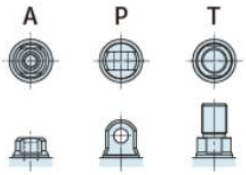
※3. The sensing pressure when the sensing valve is [open] varies depending on the air sensor used.
The sensing pressure of the air sensor with high air consumption will be higher when the sensing valve is [open], so that the detected pressure difference becomes smaller.

HLLW □ - □ Sensor Built-in Linear Clamp

Model representation

HLLW ①– ②③④ (Example: HLLW0361-CAE-025)

*3HLLW0361&0401: within 50mm, HLLW0481: within 75mm.

①Dimension (refer to specification sheet)		②Type	③ Clamping arm installation direction	④Sensing valve symbol	⑤Stroke
HLLW	0361 0401 0481	– C: pipe-plate connection type		E: Push-pull inspection clamp H: Push inspection clamp J: Pull inspection clamp	Stroke: (10~75mm)*3

Specification

Model			HLLW0361- □□	HLLW0401- □□	HLLW0481- □□
Full stroke		mm	10 to 50 (in 5mm)	10 to 50 (in 5mm)	10 to 75 (in 5mm)
Clamp area	cm^2	Push side	4.5	5.3	8.0
		Pull side	2.5	2.8	4.9
Clamping output force ※1 (calculation formula)	kN	Push side	P×0.45	P×0.53	P×0.80
		Pull side	P×0.25	P×0.28	P×0.49
Clamping capacity ※1 (calculation formula)	cm^3	Push side	Y×0.45	Y×0.53	Y×0.80
		Pull side	Y×0.25	Y×0.28	Y×0.49
Clamp inner diameter		mm	ϕ24	ϕ26	ϕ32
Piston rod inner diameter		mm	ϕ16	ϕ18	ϕ20
Oil pressure	Maximum operating pressure	MPa	7.0		
	Minimum operating pressure	MPa	0.5		
	Withstand voltage	MPa	10.5		
Recommended air operating pressure		MPa	0.1~0.2		
Recommended air sensing elements			ISA3-G (SMC product)/GPS3-E (CKD product)		
Operating temperature		℃	0~70		
Weight		kg	0.6~0.8	0.7~0.9	1.0~1.6

Precautions: ※ 1 in the output force (calculation formula) and capacity (calculation formula) of the clamp, P: supplied oil pressure (MPA), Y: full stroke mm).

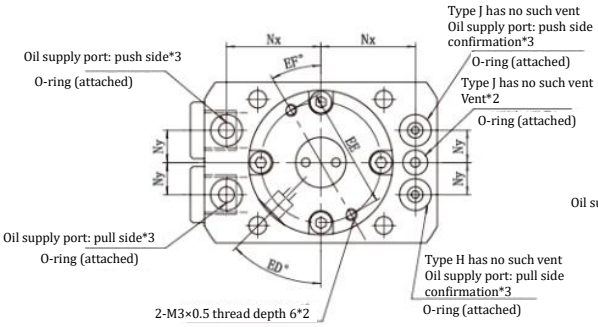
Capacity calculation table

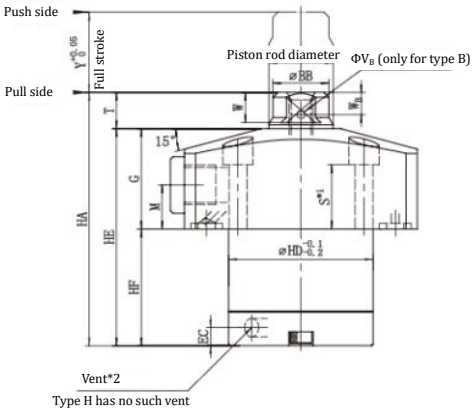
Model	Clamp push side output force (kN)							Clamp pull side output force (kN)						
	1MPa	2MPa	3MPa	4MPa	5MPa	6MPa	7MPa	1MPa	2MPa	3MPa	4MPa	5MPa	6MPa	7MPa
HLLW0361- □□	0.4	0.9	1.3	1.8	2.2	2.7	3.1	0.2	0.5	0.7	1.0	1.2	1.5	1.7
HLLW0401- □□	0.5	1.0	1.5	2.1	2.6	3.1	3.7	0.2	0.5	0.8	1.1	1.4	1.6	1.9
HLLW0481- □□	0.8	1.6	2.4	3.2	4.0	4.8	5.6	0.4	0.9	1.4	1.9	2.4	2.9	3.4

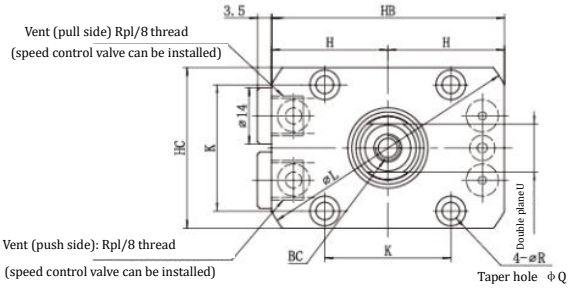
Precaution:
※ 1 This figure shows the relationship between the output force of the clamp and the supplied oil pressure
※ 2 The output force F (kN) of the clamp is the theoretical output value. The actual output force will be affected by the resistance of the sliding part of the clamp piston and the pressure loss of the oil pressure equipment and piping, and may be reduced by a part.

Overall dimension

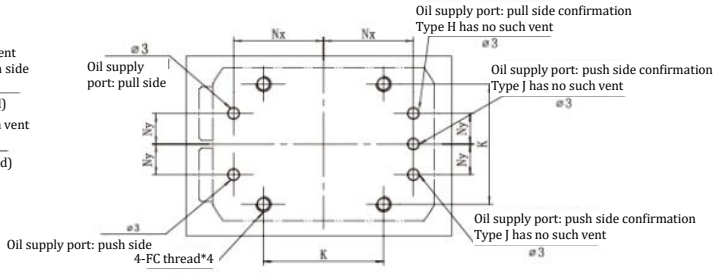
Shape A at piston front section: internal thread type
*This drawing shows HLLW-CAE

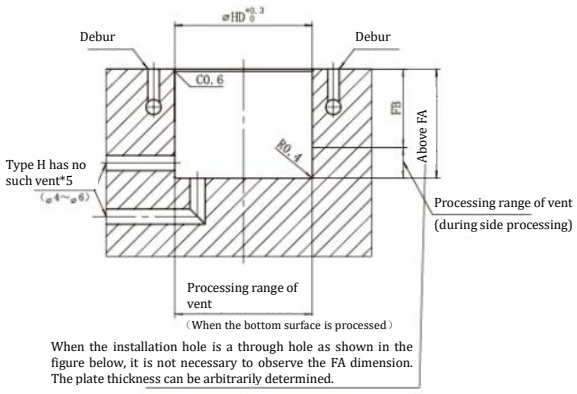




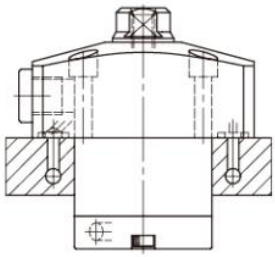


Installation hole processing drawing





When the installation hole is a through hole as shown in the figure below, it is not necessary to observe the FA dimension. The plate thickness can be arbitrarily determined.



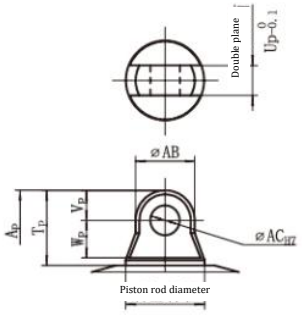
Precautions

※1. This product does not include installation bolts. Please refer to the S dimension and configure it according to the installation height.
※2. The vent must be opened to the atmosphere, and the intrusion of coolant and cutting debris must be prevented. When coolant splashes directly, please set a cushion block on the M3 thread to effectively prevent the intrusion of coolant and make sure that the exhaust hole is not blocked.
※3. The name of each port is engraved on the body. (PLSH HYD: push side of oil supply port, PULL HYD: pull side of oil supply port, PUSH CHECK: push side of oil supply port, PULL CHECK: pull side of oil supply port, VENT: vent).
※4. Refer to S dimension and according to FC thread depth of installation bolt.
※5. The installation hole is a through hole, and no vent is required.

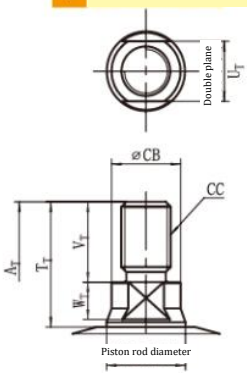
Shape at the plunger front

For unmarked dimensions, please refer to A: internal thread type

P Pin hole connection type



T External thread type



Overall Dimension

A: internal thread type (mm)

Model	HLLW0361-C A□		HLLW0401-C A□		HLLW0481-C A□	
Full stroke Y	10,15	20 to 50 (in 5mm)	10,15	20 to 50 (in 5mm)	10,15	20 to 50 (in 5mm)
HA	58	Y+43	59	Y+44	62	Y+47
HB	58		63		71	
HC	40		45		51	
HD	36		40		48	
HE	49	Y+34	49	Y+34	51	Y+36
HF	24	Y+9	24	Y+9	23	Y+8
G	25		25		28	
H	29		31.5		35.5	
K	31.4		34		40	
L	66		73		83	
M	11		11		12	
Nx	23.5		26		30	
Ny	8		9		11	
Q	7.5		9.5		9.5	
R	4.5		5.5		5.5	
S	16		14		15.5	
T	9		10		11	
U	12		13		14	
W	7.5		7.5		8.5	
BB	14		15		17	
BC	M6×12		M8×16		M8×16	
VB (only for Type B)	2		2.5		2.5	
WB (only for Type B)	5.5		5		6	
EC	4.5		4.5		4.5	
ED	45°		60°		60°	
EE	30		31.6		39	
EF	30°		0°		0°	
FA	24.5	Y+9.5	24.5	Y+9.5	23.5	Y+8.5
FB	15.5	Y+0.5	15.5	Y+0.5	14.5	Y+0.5
FC	M4×0.7		M5×0.8		M5×0.8	
O-seal ring DA	AS568-006(90°)		AS568-007(90°)		P5	

(Example: in case of HLLW0361-CA□-010, [Y=10, A=58, E=49, F=24]; in case of HLLW0361-CA□-030 [Y=30, A=73, E=64, F=39]

P: pin hole connection type For dimensions not marked, please refer to Type A. (mm)

Model	HLLW0361-CP□		HLLW0401-CP□		HLLW0481-CP□	
Full stroke Y	10,15	20 to 50 (in 5mm)	10,15	20 to 50 (in 5mm)	10,15	20 to 75 (in 5mm)
Ap	64	Y+49	68	Y+53	72	Y+57
AB	12		15		17	
AC	$6^{+0.012}_{0}$		$8^{+0.015}_{0}$		$8^{+0.015}_{0}$	
AD	6		8		9	
Tp	15		19		21	
Up	6		8		10	
Vp	6		8		9	
Wp	7.5		9.5		10.5	

T: External thread type For dimensions not marked, please refer to Type A. (mm)

Model	HLLW0361-CT□		HLLW0401-CT□		HLLW0481-CT□	
Full stroke Y	10,15	20 to 50 (in 5mm)	10,15	20 to 50 (in 5mm)	10,15	20 to 75 (in 5mm)
AT	74	Y+59	79	Y+64	86	Y+71
TT	25		30		35	
UT	12		14		17	
VT	16		20		24	
WT	7.5		7.5		8.5	
CB	14		17		19	
CC	M10×1.25		M12×1.25		M14×1.5	

Precautions

Design precautions

1) Confirm specifications
- Please confirm the specifications of each product before use.

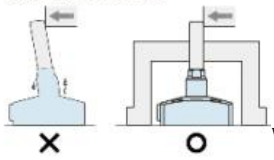
2) Precautions in circuit design
- When designing the hydraulic circuit, please carefully read "speed control circuit and precautions" and design appropriate hydraulic circuit.
  The wrong design of hydraulic circuit will lead to mechanical equipment action error, damage and other accidents.
- It is forbidden to supply oil pressure to push side and pull side at the same time when designing the circuit.

3) Precautions for piping design
- It is recommended to select large-diameter piping as much as possible. As the back pressure is affected by the pipe diameter, if the pipe diameter is too small, the release time and clamping time will be extended.

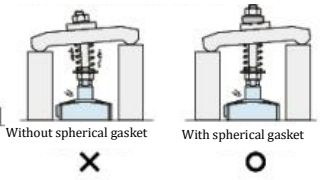
4) When used in the welding fixture, take care to protect the sliding surface of the piston rod.
- If the sliding surface is stained with welding slag, it will lead to abnormal operation, oil leakage and other faults.

5) Bearing direction of plunger
- Do not apply a non-axial force to the piston rod.
  The use method shown in the figure below will cause great torsional stress on the piston rod, so be sure to avoid.

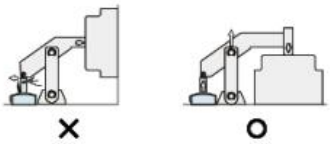
When non-axial force is applied



When clamping workpieces with different heights

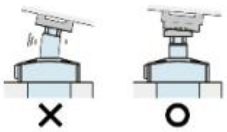


Combined with lever mechanism

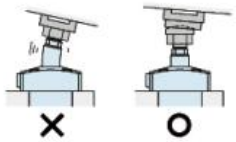


6) When clamping the inclined surface of the workpiece
- When clamping the inclined surface of the workpiece, keep the clamp level with the clamped surface.
  That is, the clamped surface shall be parallel to the installation surface of the fixture.
  Otherwise, the workpiece will deviate or the piston rod will slip.
  (if the workpiece is a cast part, it is recommended to use claw shaped accessories at the parts with large inclination for fixation.)

Internal thread type



External thread type



7) Precautions for air sensor
- Please be sure to confirm the precautions for design, construction and use on page 0000

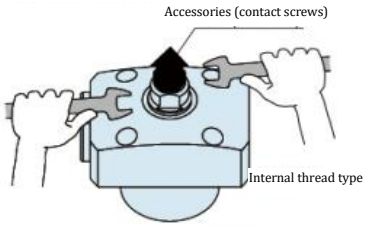
Precautions for installation and construction

1) Please confirm to use fluid
- Be sure to use proper hydraulic oil.

2) Body installation
- When installing the body, please use 4 hexagon socket bolts (strength grade of 12.9) and install them at the tightening torque specified in the following table.
  If the installation torque exceeds the recommended tightening torque, it will lead to the collapse of the foundation, the hot sticking of bolts and other faults.

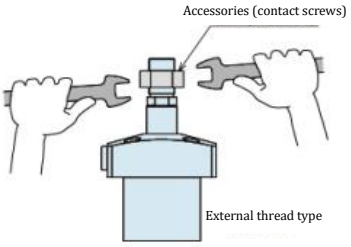
Model	Installation bolt name	Tightening torque (N · m)
HLLW0361	M4×0.7	3.2
HLLW0401	M5×0.8	6.3
HLLW0481	M5×0.8	6.3

3) Installation and removal of contact screw
- When installing and removing the contact screw, be sure to use a wrench to fix the double planes at the front end of the piston rod and prevent the piston rod from rotating.
  Tighten the contact screws to the torque specified in the following table.



HLLW□-CA□/HLLW□-CB□: internal thread type

Model	Installation bolt name	Tightening torque (N · m)
HLLW0361-CA/B □	M6	10
HLLW0401-CA/B □	M8	16
HLLW0481-CA/B □	M8	16



HLLW□-CT□: internal thread type

Model	Installation bolt name	Tightening torque (N · m)
HLLW0361-CT □	M10×1.25	40
HLLW0401-CT □	M12×1.25	63
HLLW0481-CT □	M14×1.5	80

4) Adjust speed
- Please adjust the speed according to the standard that the push side and pull side move less than 100mm per second.
  If the clamp is too fast, it will accelerate the wear or damage of various components, resulting in mechanical equipment fault.
- The air in the circuit must be drained before speed adjustment.
  If air is mixed in the circuit, the speed cannot be adjusted correctly.
- When adjusting the speed, please slowly move the speed control valve from the low-speed side (small flow) to the high-speed side for (large flow) direction rotation and adjustment.