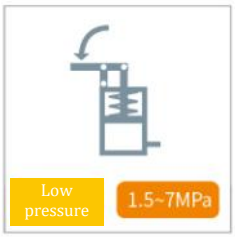
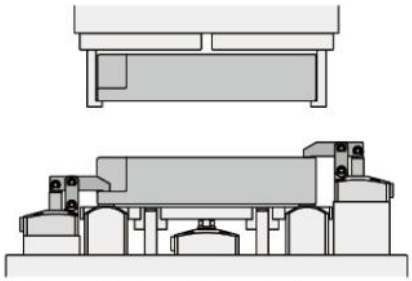


Action confirmation mechanism is built in the action end, which is the most suitable for realizing equipment automation

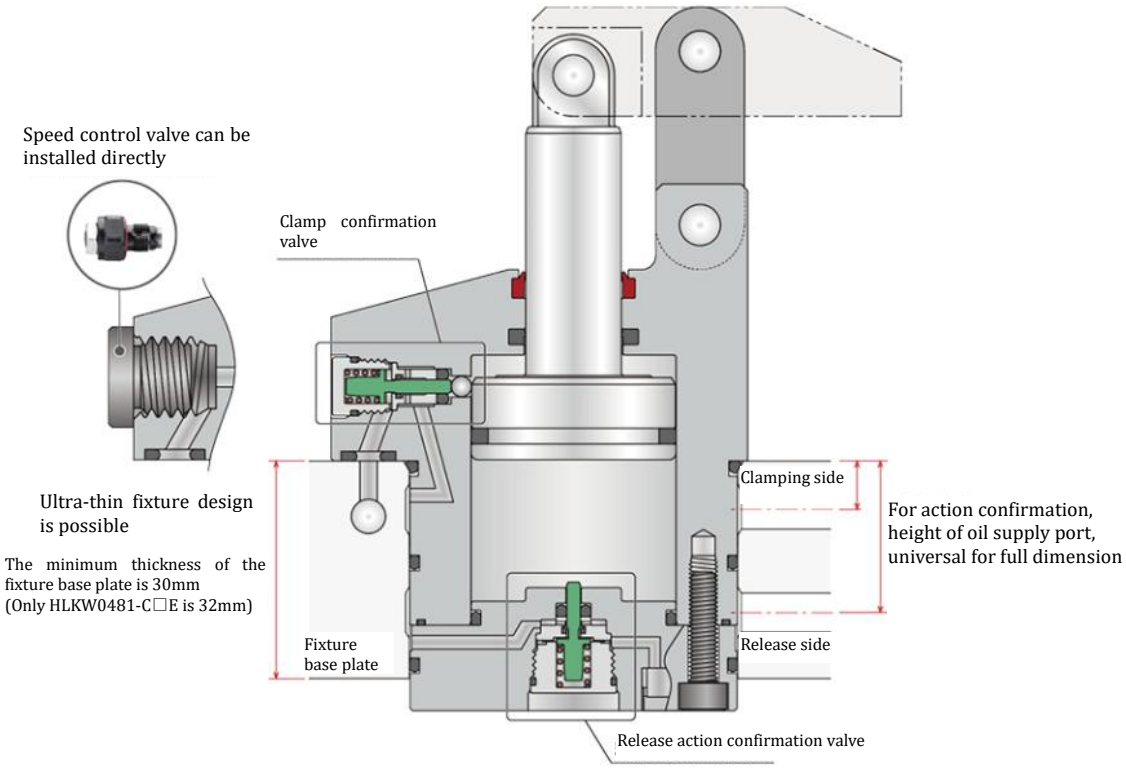
Application Example



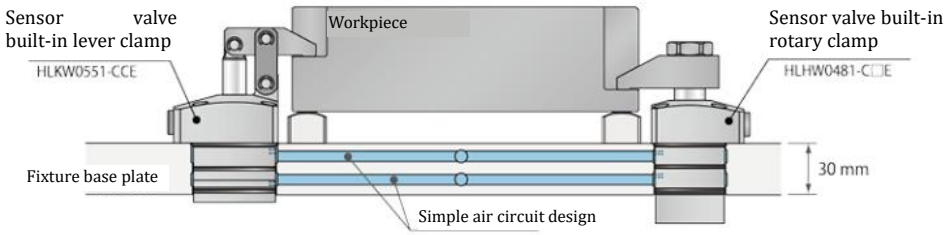
It is used for automated assembly line where release confirmation is required

Section Structure

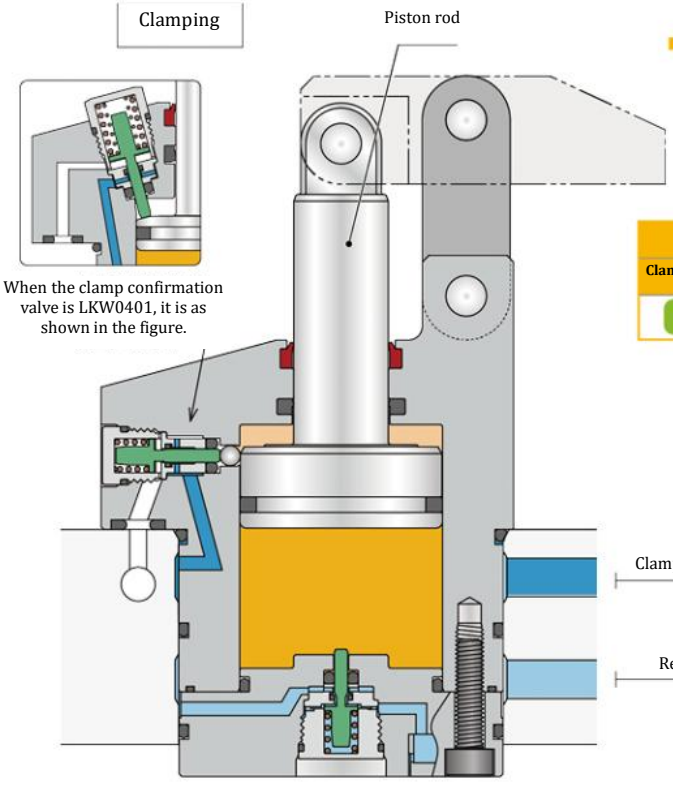
※ This figure shows the clamping and release confirmation type (HLKW-C□E)



- Through the clamping confirmation, the workpiece can be moved in and out safely and reliably.
- Built-in sensing valve can realize ultra-thin fixture design.
  The air leakage is zero when the sensing valve is closed. Air sensors with low air consumption can be selected.
- Simple air circuit design
  Even in the case shown below, the height of air supply port for action confirmation can be universal, and simple air circuit design can be realized.
  - When lever clamp (HLKW-C□E) of different sizes are used in combination
  - When lever clamp (HLKW-C□E) and rotary clamp (HLKW-C□E) are used in combination



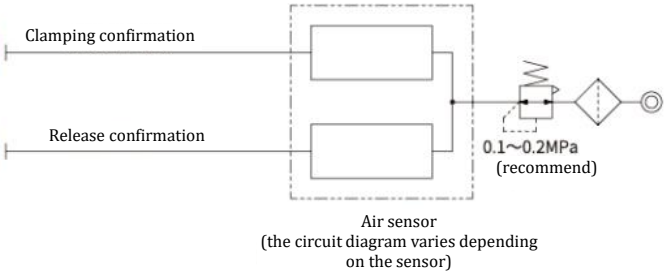
Action principle (section structure)

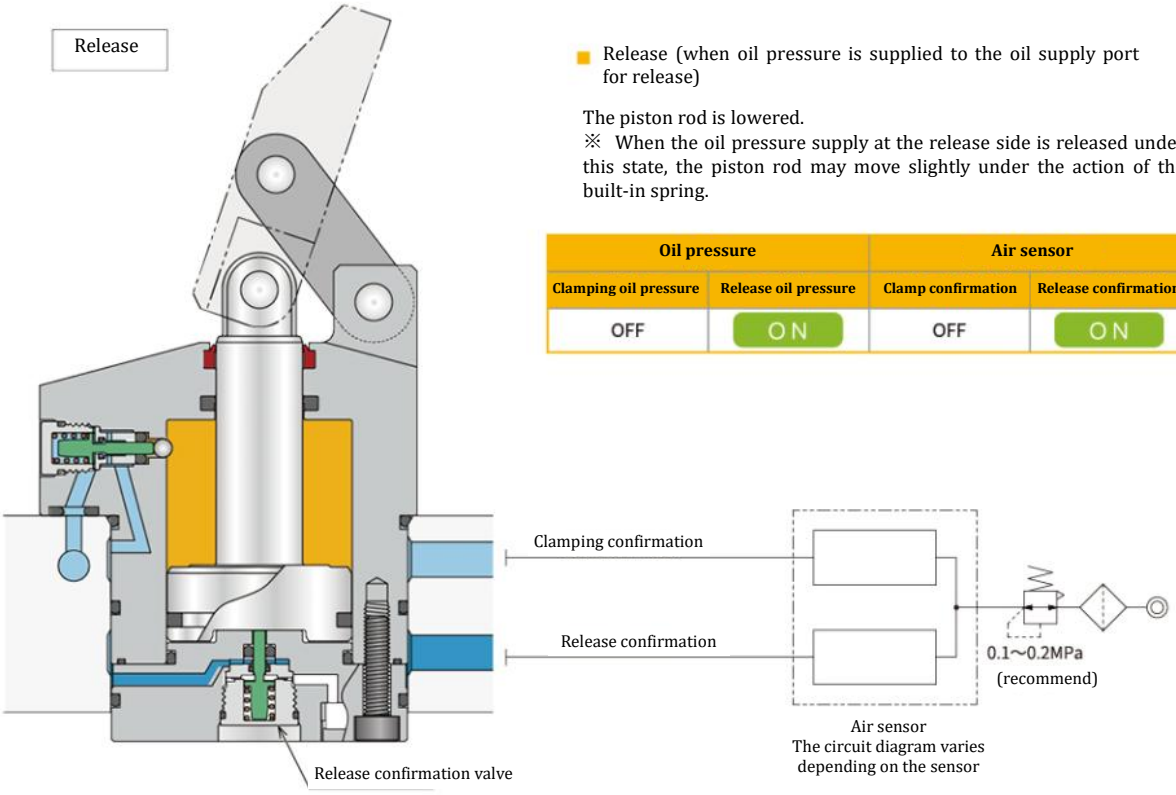


- Clamping (when oil pressure is supplied to the oil supply port for clamping)

The piston rod rises to clamp the workpiece.
※ Only when HLKW0401 releases the oil pressure supply at the clamping side under this state, the piston rod may move slightly under the action of the built-in spring.

Oil pressure		Air sensing element	
Clamping oil pressure	Release oil pressure	Clamp confirmation	Release confirmation
ON	OFF	ON	OFF





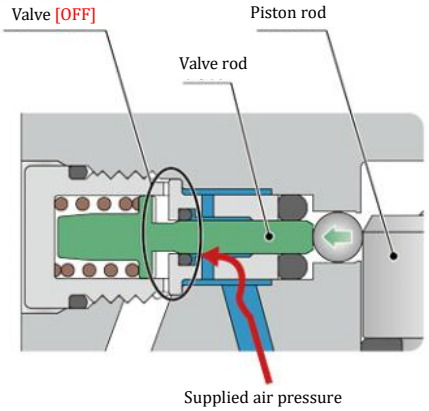
■ Release (when oil pressure is supplied to the oil supply port for release)

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

Oil pressure		Air sensor	
Clamping oil pressure	Release oil pressure	Clamp confirmation	Release confirmation
OFF	ON	OFF	ON

Clamping confirmation valve

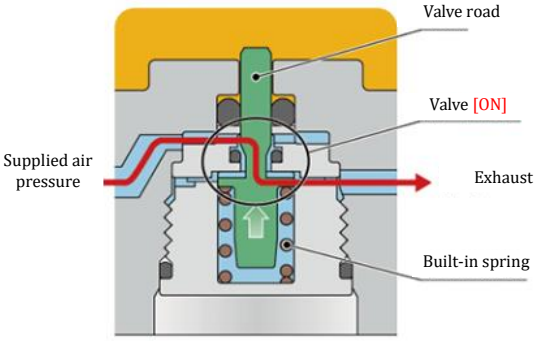
During clamping oil pressure | Air sensor | ON



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

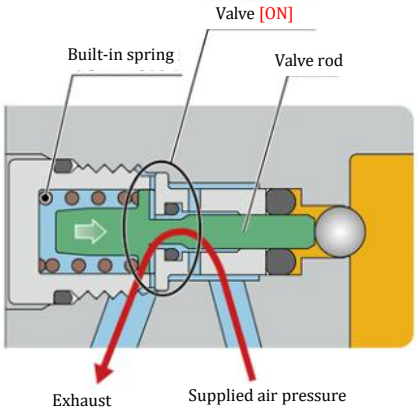
Release confirmation valve

During clamping oil pressure | Air sensor | OFF



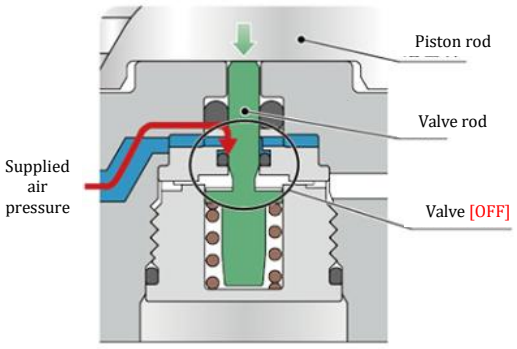
After the valve rod moves forward under the action of the built-in spring, the sensing valve is opened.

During clamping oil pressure | Air sensor | OFF



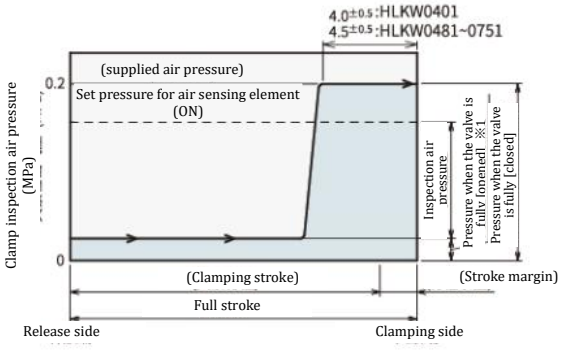
After the valve rod moves backward under the action of the built-in spring, the sensing valve is opened.

During clamping oil pressure | Air sensor | ON

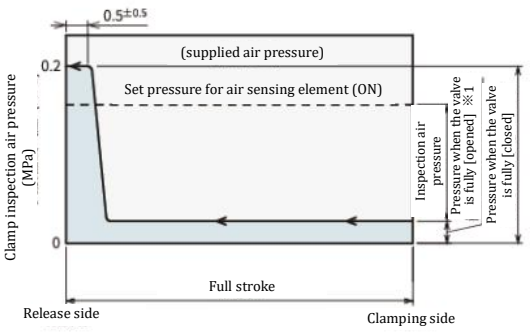


After the valve rod moves backward under the action of the piston rod, the sensing valve is closed.

Clamping confirmation Air sensing flow chart



Release confirmation 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 the air sensor with large air consumption will be higher when the sensing valve is [opened], making the inspection pressure difference smaller.

Operating principle

About sensing principle description and air sensing flow chart
The release can be confirmed by connecting the air sensing element and detecting its differential pressure.
(※ HLKW□-C□S-□ lever cylinder has no built-in sensor and cannot conduct release confirmation.)

Applicable model

HLKW 048 1 - C [L C R] [Unmarked] - [Unmarked: H K]

5 When the sensor symbol is unmarked

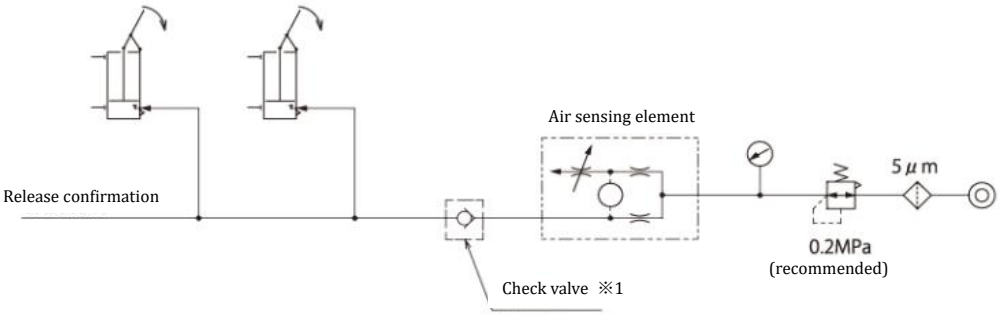
About air sensing element

- To confirm release, an air sensing element must be set.
  Please use the air sensing element with small air consumption (the recommended table is shown below).
  The recommended operating air pressure: 0.2 MPa

  Recommended air sensor

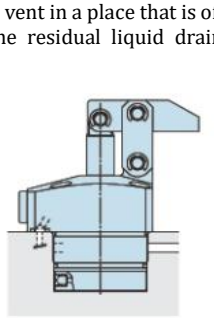
Manufacturer	SMC	SKD
Name	Air sensing element	Clearance switch
Model	ISA2-G	GPS2-05-15

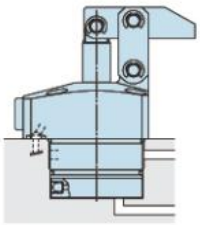
- For stable detection, the number of oil cylinders connected to each air sensing element shall be less than 4.
- The air pressure supplied to the air sensing element shall be 0.2MPa.
- Please keep normal air supply during use.
- Please refer to the following figure for the composition of air circuit.

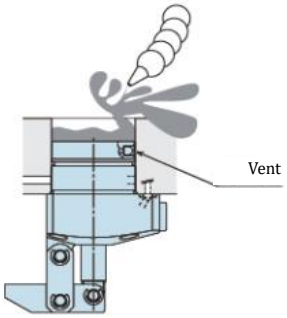


Precautions for design and construction

- The vent for disposal must be opened to the atmosphere.
  Once the vent is blocked, the air sensing element will malfunction.
  Spraying coolant into the exhaust port should be avoided as far as possible.
  Do not set the vent in a place that is often soaked with coolant.
  (please set the residual liquid drain hole to drain the internal residual liquid.)


✕
The vent cannot be opened to the atmosphere

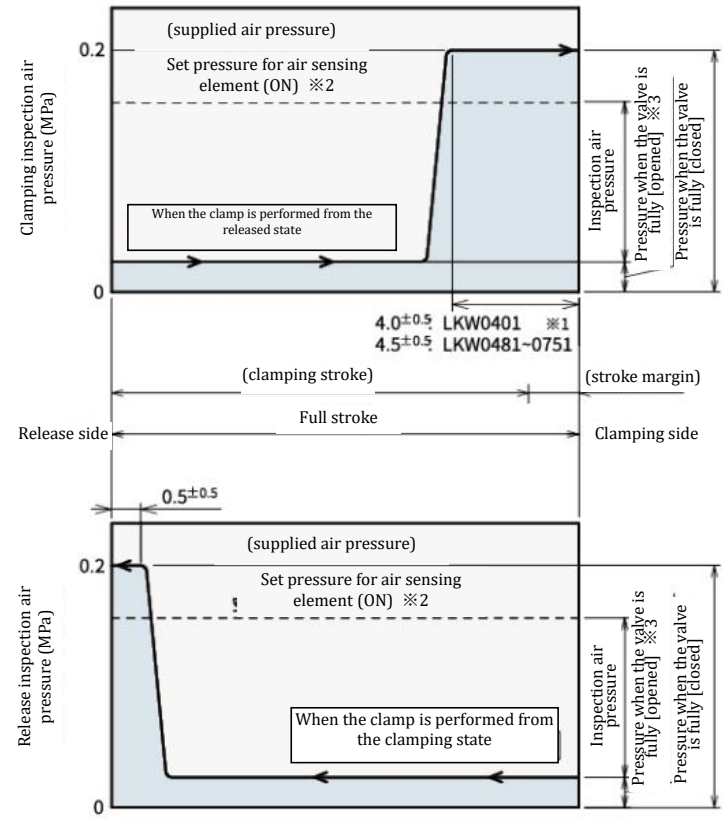

○
The vent can be opened to the atmosphere

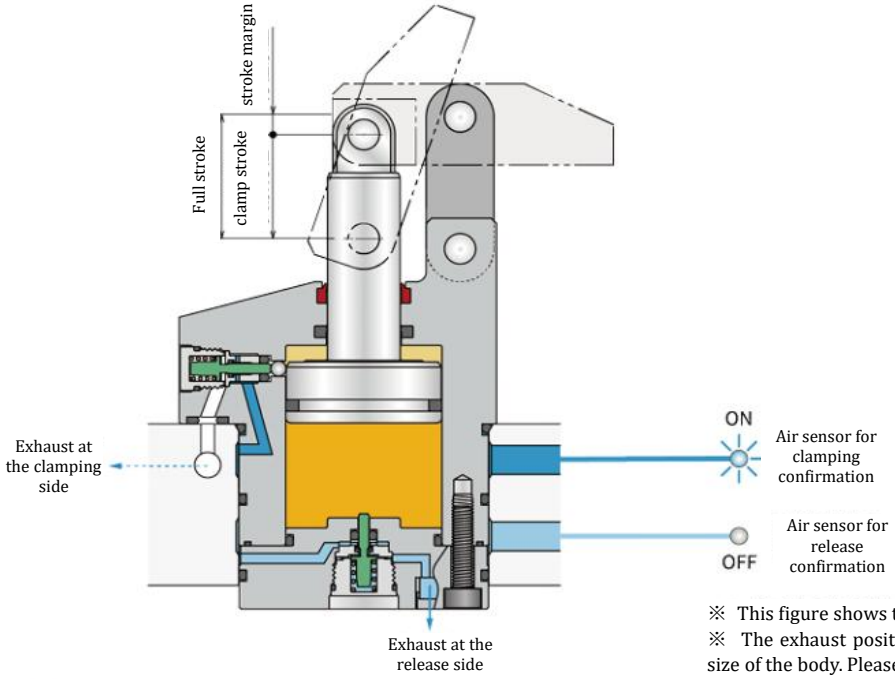


✕
The vent is immersed in coolant

- The air sensing element shall be set higher than the cylinder position.
  When the above setting requirements cannot be met, it is recommended to set a check valve (※ 1) with low opening pressure around the detection port of the sensing element.
  (recommended check valve: SMC opening pressure is 0.005MPa)

Air sensor flow chart





※ This figure shows the clamping state.
※ The exhaust position at the release side varies according to the size of the body. Please refer to the overall dimensions.

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 J, 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.

Model representation

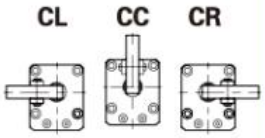
HLKW ①②–③ Example: HLKW0481-CRE

① Dimension (refer to specification sheet)

② Clamping arm installation direction

③ Sensing valve symbol

HLKW	0401 0481 0551 0651 0751	CL: left CC: forward CR: right	E: 2-point inspection lever clamp H: clamp inspection lever clamp J: release inspection lever clamp



Specification

Model		HLKW0401-C□□-□	HLKW0481- C□□-□	HLKW0551-C□□-□	HLKW0651-C□□-□	HLKW0751-C□□-□
Clamp area	cm^2	5.31	7.07	9.62	15.9	23.8
Clamp inner diameter※1	mm	26	30	35	45	55
Piston rod inner diameter※1	mm	12	14	16	20	22
Clamp output force※2 (calculation formula)	kN	$F=\frac{7.64\times P}{L-16}$	$F=\frac{11.76\times P}{L-18.5}$	$F=\frac{18.18\times P}{L-21}$	$F=\frac{35.06\times P}{L-24.5}$	$F=\frac{64.14\times P}{L-30}$
Clamp capacity cm^3	Clamping	10.9	16.6	25.0	46.9	83.2
	Release	8.6	13.0	19.8	37.7	69.8
Full stroke	mm	20.5	23.5	26	29.5	35
Clamping stroke	mm	17.5	20.5	23	26.5	32
Stroke margin	mm	3	3	3	3	3
Maximum operating pressure	MPa	7.0				
Minimum operating pressure※3	MPa	0.5				
Withstand pressure	MPa	10.5				
Recommended operating air pressure		0.1~0.2				
Recommended air sensing element		ISA3-G (SMC product)/GPS3-E (CKD product)				
Operating temperature	℃	0~70				
Weight※4 kg	③E and H	0.8	1.2	1.6	2.7	3.8
	③J	0.7	1.1	1.6	2.7	3.8

Precautions

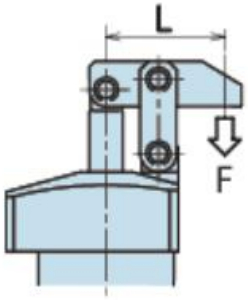
※ 1. In the clamping force calculation formula, F: clamping force (kN), P: supplied oil pressure (MPa), L: distance from the center of the piston to the clamping point (mm)

※2. It indicates the minimum pressure at which the rotary cylinder operates under no load.

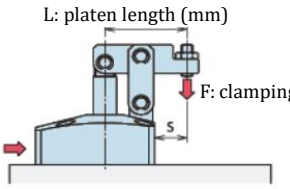
※3. HLKW□-C□-□: it indicates the specification of sensing valve.

※4. The number of oil cylinders connected to each air sensor should be less than 4.

※5. Weight refers to the weight of single cylinder except platen.



Clamping force curve



Applicable model

HLKW □ 1 - C L C R - Unmarked S - Unmarked H K

1 Main body dimension

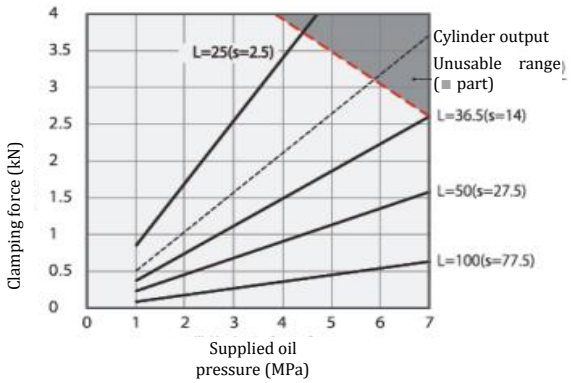
(example) In case of HLKW0480
The supplied oil pressure is 5.0MPa, the platen length is L=42mm and the clamping force is about 2.6kN.

Precautions:

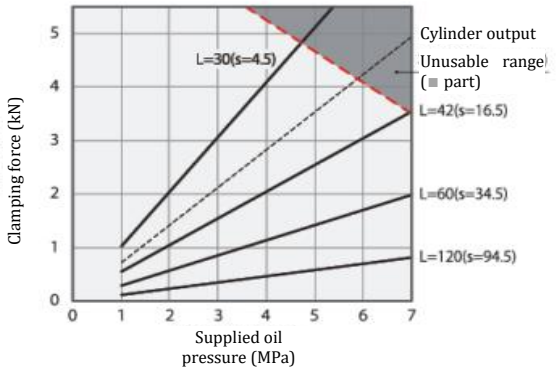
1. This figure is the relation curve between supplied oil pressure and clamping force.
2. The oil cylinder thrust (when L=0) cannot be calculated according to the calculation formula in each specification column.
3. Do not use the "unusable range" in the above table. Otherwise, deformation, cylinder sticking, oil leakage and other accidents will be caused.

※ 1. In the clamping force calculation formula, F: clamping force (kN), P: supplied oil pressure (MPa), L: platen length (mm).

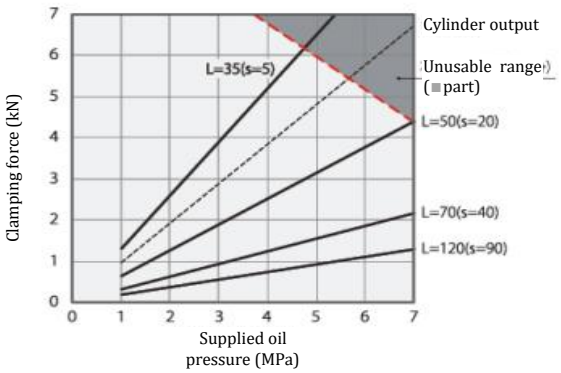
HLHW0401		Clamping force calculation formula※1 (kN)		F=(7.64×P)/(L-16)						
Supplied oil pressure (MPa)	Clamp output (kN)	Clamping force (kN) / Platen length (mm)				Unusable range within ■				Minimum platen length (L) (mm)
		L=25	L=30	L=36.5	L=40	L=50	L=60	L=80	L=100	
7	3.8			2.7	2.3	1.6	1.3	0.9	0.7	36.5
6.5	3.5			2.5	2.1	1.5	1.2	0.8	0.6	34
6	3.2			2.3	2.0	1.4	1.1	0.8	0.6	32
5.5	3.0		3.1	2.2	1.8	1.3	1.0	0.7	0.6	29
5	2.7		2.8	2.0	1.6	1.2	0.9	0.6	0.5	27
4.5	2.4	3.9	2.5	1.8	1.5	1.1	0.8	0.6	0.5	26
4	2.2	3.4	2.2	1.6	1.3	0.9	0.7	0.5	0.4	24
3.5	1.9	3.0	2.0	1.4	1.2	0.8	0.7	0.5	0.4	23
3	1.6	2.6	1.7	1.2	1.0	0.7	0.6	0.4	0.3	23
2.5	1.4	2.2	1.4	1.0	0.8	0.6	0.5	0.3	0.3	23
2	1.1	1.7	1.1	0.8	0.7	0.5	0.4	0.3	0.2	23
1.5	0.8	13	0.9	0.6	0.5	0.4	0.3	0.2	0.2	23
1	0.6	0.9	0.6	0.4	0.4	0.3	0.2	0.2	0.1	23
Maximum operating pressure (MPa)		4.5	5.8	7.0	7.0	7.0	7.0	7.0	7.0	



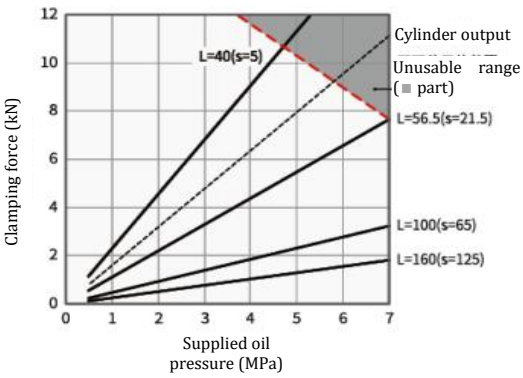
HLKW0481		Clamping force calculation formula※1 (kN)		F=(11.76× P)/(L-18.5)						
Supplied oil pressure (MPa)	Clamp output (kN)	Clamping force (kN) / Platen length (mm)				Unusable range within ■				Minimum platen length (L) (mm)
		L=30	L=35	L=42	L=50	L=60	L=80	L=100	L=120	
7	5.0			3.6	2.7	20	1.4	1.1	0.9	42
6.5	4.6			3.3	2.5	1.9	1.3	1.0	0.8	39
6	4.3			3.1	2.3	1.8	1.2	0.9	0.7	36
5.5	3.9		4.0	2.8	2.1	1.6	1.1	0.8	0.7	34
5	3.6		3.6	2.6	1.9	1.5	1.0	0.8	0.6	32
4.5	3.2	4.7	3.3	2.3	1.7	1.3	0.9	0.7	0.6	30
4	2.9	4.1	2.9	2.1	1.5	1.2	0.8	0.6	0.5	28
3.5	2.5	3.6	2.5	1.8	1.4	1.0	0.7	0.6	0.5	26
3	2.2	3.1	2.2	1.6	1.2	0.9	0.6	0.5	0.4	26
2.5	1.8	2.6	1.8	1.3	1.0	0.8	0.5	0.4	0.3	26
2	1.5	2.1	1.5	1.1	0.8	0.6	0.4	0.3	0.3	26
1.5	1.1	1.6	1.1	0.8	0.6	0.5	0.3	0.3	0.2	26
1	0.8	1.1	0.8	0.6	0.4	0.3	0.2	0.2	0.2	26
Maximum operating pressure (MPa)		4.8	5.9	7.0	7.0	7.0	7.0	7.0	7.0	



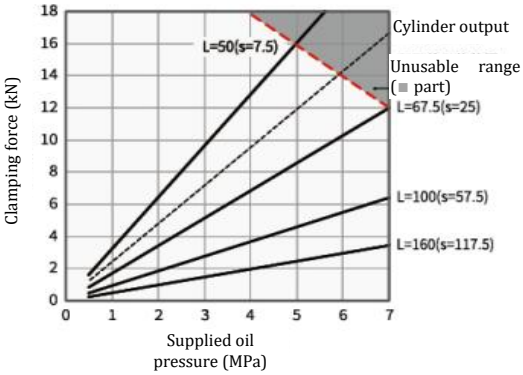
HLKW0551		Clamping force calculation formula※1 (kN)		F=(18.18× P)/(L-21)						
Supplied oil pressure (MPa)	Clamp output (kN)	Clamping force (kN) / Platen length (mm)				Unusable range within ■				Minimum platen length (L) (mm)
		L=34	L=40	L=50	L=60	L=70	L=80	L=100	L=120	
7	6.8			4.4	3.3	2.6	2.2	1.7	1.3	50
6.5	6.3			4.1	3.1	2.5	2.1	1.5	1.2	46
6	5.8			3.8	2.8	2.3	1.9	1.4	1.2	43
5.5	5.3		5.3	3.5	2.6	2.1	1.7	1.3	1.1	39
5	4.9		4.8	3.2	2.4	1.9	1.6	1.2	1.0	37
4.5	4.4	5.9	4.4	2.9	2.1	1.7	1.4	1.1	0.9	34
4	3.9	5.2	3.9	2.6	1.9	1.5	1.3	1.0	0.8	32
3.5	3.4	4.6	3.4	2.2	1.7	1.3	1.1	0.9	0.7	30
3	2.9	3.9	2.9	1.9	1.4	1.2	1.0	0.7	0.6	30
2.5	2.5	3.3	2.4	1.6	1.2	1.0	0.8	0.6	0.5	30
2	2.0	2.6	2.0	1.3	1.0	0.8	0.7	0.5	0.4	30
1.5	1.5	2.0	1.5	1.0	0.7	0.6	0.5	0.4	0.3	30
1	1.0	1.3	1.0	0.7	0.5	0.4	0.4	0.3	0.2	30
Maximum operating pressure (MPa)		4.8	5.7	7.0	7.0	7.0	7.0	7.0	7.0	



HLKW0651		Clamping force calculation formula※1 (kN)				F=(35.06×P)/(L-24.5)				
Supplied oil pressure (MPa)	Clamp output (kN)	Clamping force (kN)				Unusable range within ■				Minimum platen length (L)
		Platen length (mm)								
		L=40	L=50	L=56.5	L=80	L=100	L=120	L=140	L=160	(mm)
7	11.2			7.7	4.5	3.3	2.6	2.2	1.9	56.5
6.5	10.4			7.2	4.2	3.1	2.4	2.0	1.7	52
6	9.6		8.3	6.6	3.8	2.8	2.3	1.9	1.6	48
5.5	8.8		7.6	6.1	3.5	2.6	2.1	1.7	1.5	45
5	8.0		6.9	5.5	3.2	2.4	1.9	1.6	1.3	42
4.5	7.2	10.2	6.2	5.0	2.9	2.1	1.7	1.4	1.2	39
4	6.4	9.1	5.5	4.4	2.6	1.9	1.5	1.3	1.1	37
3.5	5.6	8.0	4.9	3.9	2.3	1.7	1.3	1.1	1.0	35
3	4.8	6.8	4.2	3.3	1.9	1.4	1.2	1.0	0.8	35
2.5	4.0	5.7	3.5	2.8	1.6	1.2	1.0	0.8	0.7	35
2	3.2	4.6	2.8	2.2	1.3	1.0	0.8	0.7	0.6	35
1.5	2.4	3.4	2.1	1.7	1.0	0.7	0.6	0.5	0.4	35
1	1.6	2.3	1.4	1.1	0.7	0.5	0.4	0.4	0.3	35
0.5	0.8	1.2	0.7	0.6	0.4	0.3	0.2	0.2	0.2	35
Maximum operating pressure (MPa)		4.8	63	7.0	7.0	7.0	7.0	7.0	7.0	

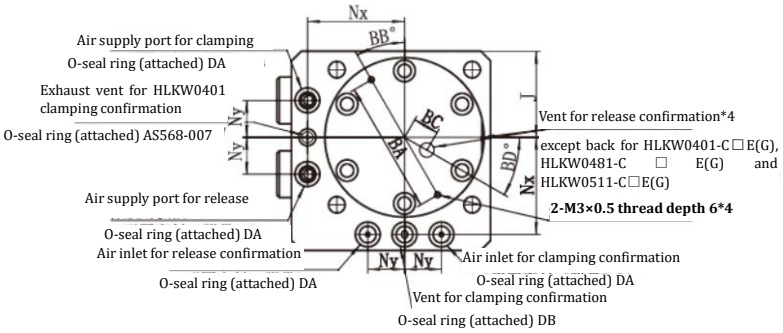


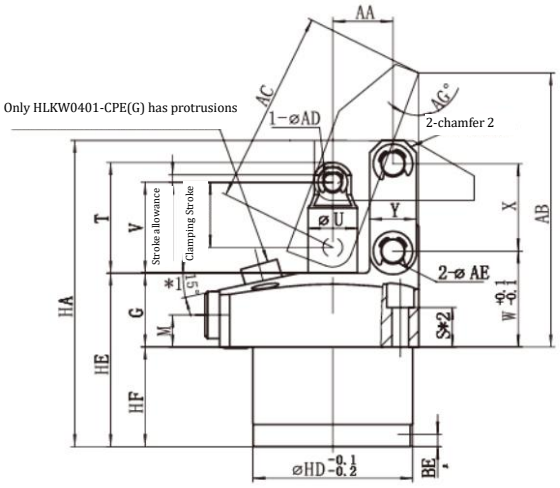
HLKW0651		Clamping force calculation formula※1 (kN)				F=(64.14×P)/(L-30)				
Supplied oil pressure (MPa)	Clamp output (kN)	Clamping force (kN)				Unusable range within ■				Minimum platen length (L)
		Platen length (mm)								
		L=50	L=60	L=67.5	L=80	L=100	L=120	L=140	L=160	(mm)
7	16.7			12.0	9.0	6.5	5.0	4.1	3.5	67.5
6.5	15.5			11.2	8.4	6.0	4.7	3.8	3.3	63
6	14.3		12.9	10.3	7.7	5.5	4.3	3.5	3.0	58
5.5	13.1		11.8	95	7.1	5.1	4.0	3.3	2.8	54
5	11.9	16.1	10.7	8.6	6.5	4.6	3.6	3.0	2.5	51
4.5	10.7	14.5	9.7	7.7	5.8	4.2	3.3	2.7	2.3	48
4	9.6	12.9	8.6	6.9	5.2	3.7	2.9	2.4	2.0	45
3.5	8.4	11.3	7.5	6.0	4.5	3.3	2.5	2.1	1.8	43
3	7.2	9.7	6.5	5.2	3.9	2.8	2.2	1.8	1.5	43
2.5	6.0	8.1	4.9	4.3	3.3	2.3	1.8	1.5	1.3	43
2	4.8	6.5	3.3	3.5	2.6	1.9	1.5	1.2	1.0	43
1.5	3.6	4.9	2.2	2.6	2.0	1.4	1.1	0.9	0.8	43
1	24	3.3	1.1	1.8	1.3	1.0	0.8	0.6	0.5	43
0.5	1.2	1.7	6.3	0.9	0.7	0.5	0.4	0.3	0.3	43
Maximum operating pressure (MPa)		5.0	6.3	7.0	7.0	7.0	7.0	7.0	7.0	

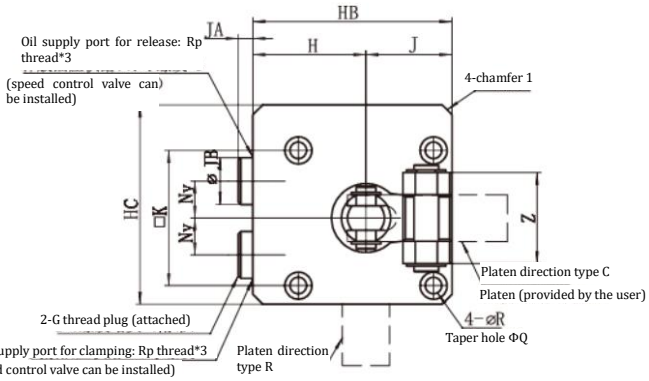


Overall dimension

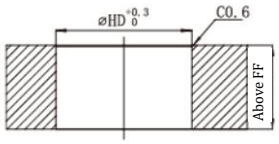
*This figure shows the released state of HLKW-CCE(G)



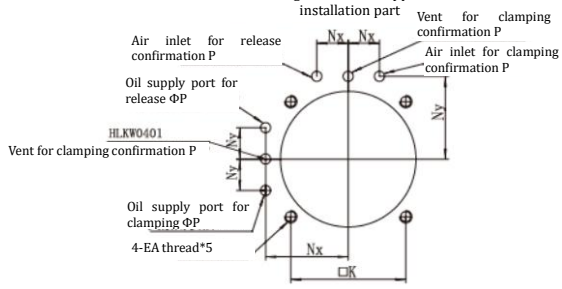


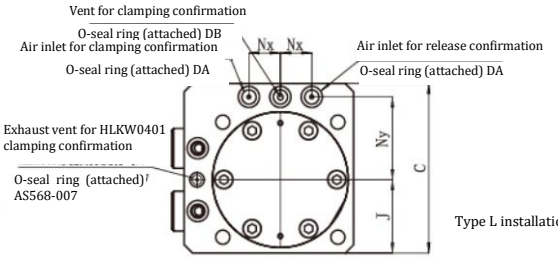


Installation hole processing drawing

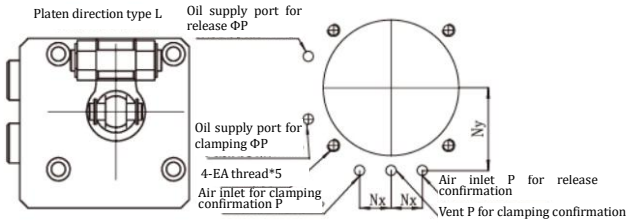


Processing dimension of type C and R installation part





Type L installation part processing dimension



Precautions

※1. Only the inclination angle of HLKW0651 flange is 12°

※2 This product does not include installation bolts, so please refer to the S dimension and install it by yourself.

※3. This product does not include a speed control valve.

※4 The vent must be open to the atmosphere, and the intrusion of coolant and cutting fluid must be prevented. When the coolant will splash directly, please set a spacer on the M3 thread to effectively prevent the intrusion of the coolant and make sure that the vent holes are not blocked. Use the attached pin for the clamp installation pin (φADf6, AEf6 and HRC60 related products)

※5 Please refer to the S dimension and determine the depth of the EA threaded hole for the installation bolt according to the installation height.

Overall Dimension

mm

Model	HLKW0401-C □ E(G)	HLKW0481-C □ E(G)	HLKW0551-C □ E(G)	HLKW0651-C □ E(G)	HLKW0751-C □ E(G)
Full stroke	20.5	23.5	26	29.5	35
Rotation stroke (90°)	17.5	20.5	23	26.5	32
Clamping stroke	3	3	3	3	3
HA	92.5	103.5	110.5	124.5	145.5
HB	54	61	69	81	94.5
HC	54	61	69	81	94.5
HD	40	48	55	65	75
HE	59	64.5	65	70.5	78.5
HF	34	36.5	37	40.5	41.5
G	25	28	28	30	37
H	31.5	35.5	39	46	52
J	22.5	25.5	30	35	42.5
K	34	40	47	55	63
M	11	12	12	13	16
Nx	26	30	33.5	39.5	45
Ny	9	11	12	15	16
P	3	3	3	5	5
Q	9	9	11	11	14
R	5.5	5.5	6.8	6.8	9
S	15	16	13.5	16	17.5
T	30.5	35	37.5	45	55
U	12	14	16	20	22
V	25	29	31.5	37	45
W	30.5	34.5	35.5	39	48
X	22	26	30	35.5	43.5
Y	13	13	16	19	25
Z	21	24	28	37	40
Chamfer 1	C3	C3	C3	C4	C10
Chamfer 2	C3	C3	C3	C5	C5
AA	16	18.5	21	24.5	30
AB	77.7	92.4	101.9	111.4	130.8
AC	50.2	61.2	71.7	78.7	90.8
AD	6	6	6	8	10
AE	6	6	8	10	12
AG	20.2	18.9	19.9	20.5	21.4
BA	31.6	38	43	54	64
BB	0°	0°	0°	0°	30°
BC	R10.5	R10.5	R10.5	-	-
BD	30°	30°	30°	30°	22.5°
BE	-	-	-	5	5
EA	M5×0.8	M5×0.8	M6	M6	M8
FF	34.5	37	37.5	41	42
JA	3.5	3.5	3.5	4.5	4.5
JB	14	14	14	19	19
Oil supply port for clamping Rp thread Oil supply port for release Rp thread	Rp1/8	Rp1/8	Rp1/8	Rp1/4	Rp1/4
O-seal ring DA	1BP5	1BP5	1BP5	1BP7	1BP7
O-seal ring DB	s568-007(90°)	1BP5	1BP5	1BP7	1BP7