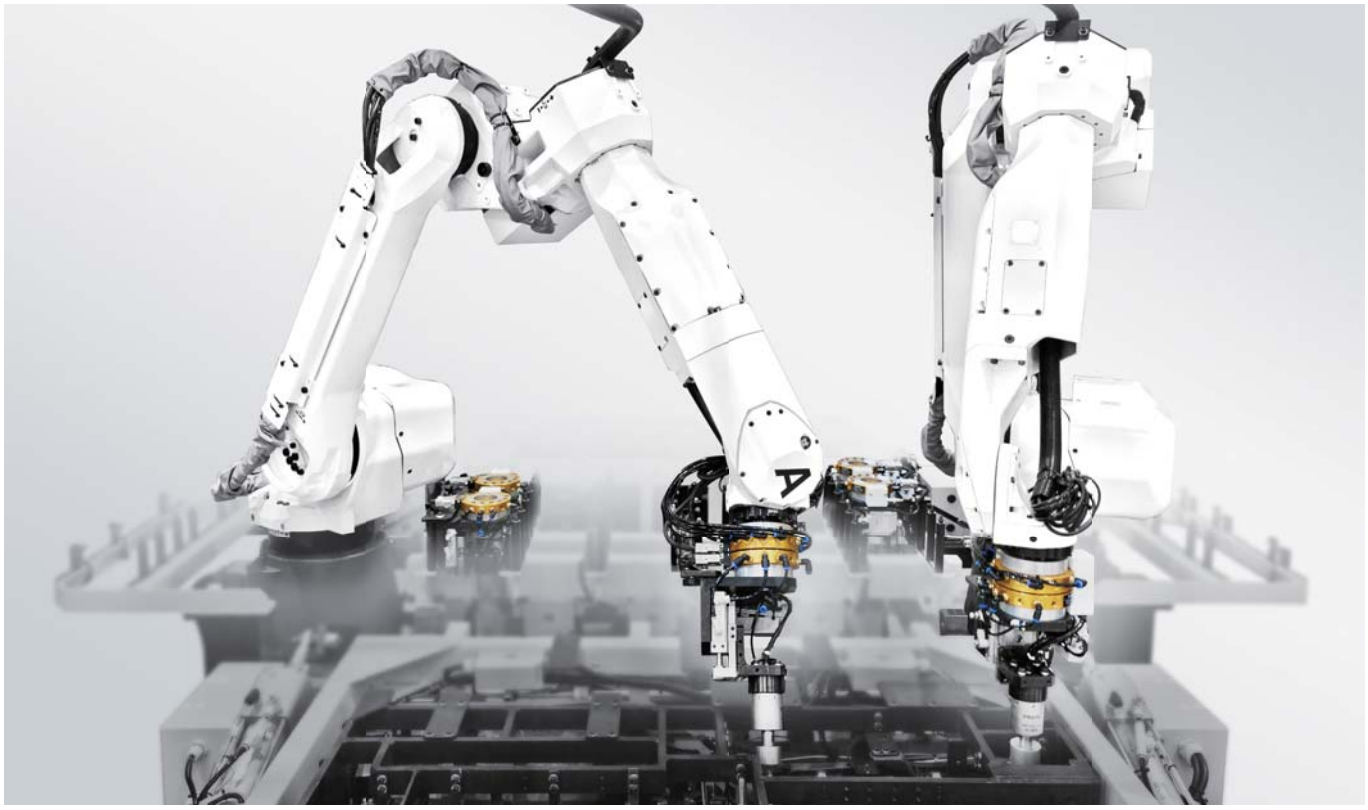
Robot tool changer

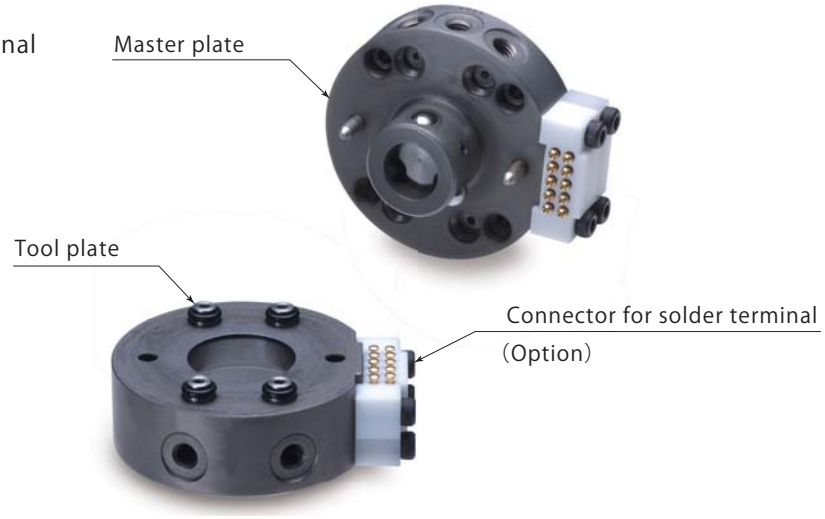
model **WVR**



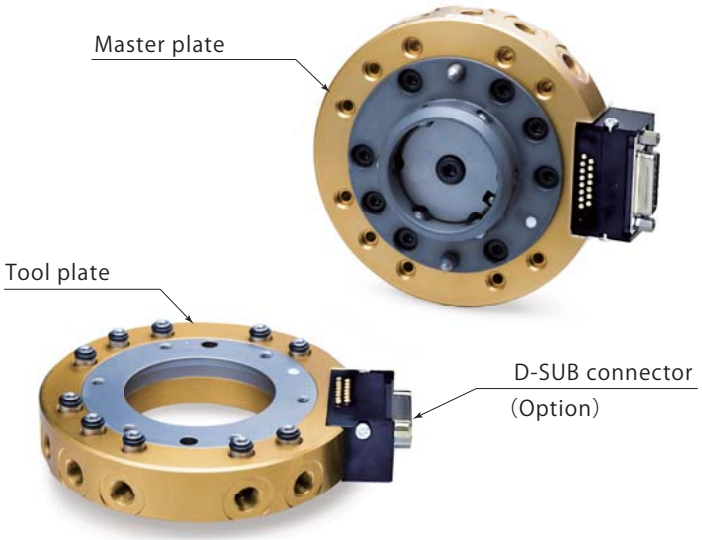
Pascal

www.pascaleng.co.jp

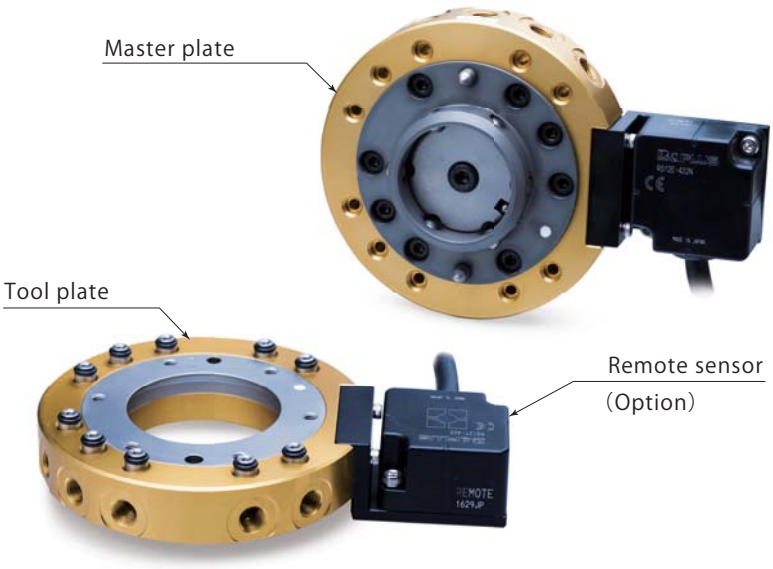
Connector for solder terminal



D-SUB connector



Remote sensor



Model designation

WVR 005 – M E (example) **WVR040 - ME**

1 Payload 005 : 5kg 010 : 10kg 020 : 20kg 040 : 40kg
060 : 60kg 100 : 100kg 150 : 150kg 200 : 200kg

2 M : Master plate
T : Tool plate

3 Option No symbol : No options
E : Connector for solder terminal → WVR005,010 ／ D-SUB connector → WVR020 ～ 200
EL : Connector for solder terminal (With cable 1m) → WVR005,010
RS12N : Master plate side remote sensor (NPN Output) → All models
RS12P : Master plate side remote sensor (PNP Output) → All models
RS12 : Tool plate side remote sensor → All models

＊ Refer to **page → 19** for model No. of connector for solder terminal and D-SUB connector. Refer to **page → 21** for model No. of remote sensor.

Specifications

Model			WVR005	WVR010	WVR020	WVR040	WVR060	WVR100	WVR150	WVR200
Payload ＊1		kg	5	10	20	40	60	100	150	200
Allowable torque ＊2		N·m	77	77	156	428	548	2015	2383	2908
Allowable moment ＊2、＊3		N·m	38	38	116	335	593	1424	2012	2985
Repeatability		mm	±0.010	±0.010	±0.015	±0.015	±0.015	±0.015	±0.015	±0.025
Cylinder capacity	Lock	cm^3	3.1	3.1	12.5	26.1	40.0	85.9	106.0	140.2
	Unlock	cm^3	2.5	2.5	10.8	24.0	36.6	79.4	96.6	123.4
Mass	Master plate	g	260	260	710	1170	1740	3575	5505	6205
	Tool plate	g	195	195	400	560	915	1850	2955	3335
Connection/Disconnection structure			Ball lock system							
Air pressure for connecting/disconnecting operation		MPa	0.4 ～ 0.7							
Connector for air	Number of ports (Size)		4 (M5)	4 (M5)	10 (Rc1/8)	10 (Rc1/8)	10 (Rc1/8)	10 (Rc3/8)	10 (Rc3/8)	10 (Rc3/8)
	Working pressure	MPa	-0.05 ～ 0.7 (Available under negative pressure)							
Operating temperature range		℃	0 ～ 60 (0 ～ 50 with remote sensor)							

Option (Electric contact)

Model			WVR005	WVR010	WVR020	WVR040	WVR060	WVR100	WVR150	WVR200
Connector for solder terminal	Number of contact points and Volume		10 points volume 3A/1pc		–					
	Connecting system		Solder							
	Mass	Master plate g	10							
		Tool plate g	10							
D-SUB connector	Number of contact points and Volume		–		15 points volume2.5A/1pc					
	Connecting system				D-SUB connector (Socket pin) ＊4					
	Mass	Master plate g			30					
		Tool plate g			30					
Remote sensor ＊5	Number of contact points		12 points							
	Mass (Except cable)	Master plate g	115		130					
		Tool plate g	110		125					

＊1 : Select a model number not to exceed the allowable torque and moment.
Refer to →**page 9** for calculation example of torque and moment.

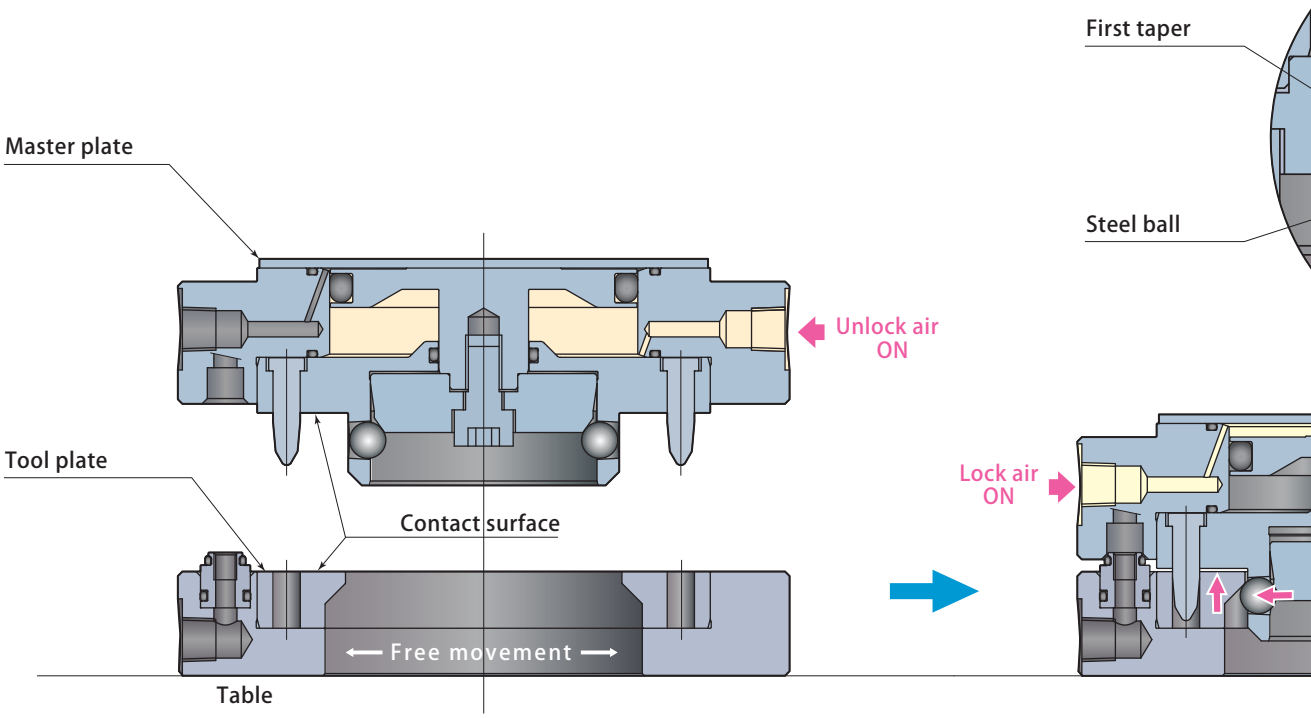
＊2 : The value indicates maximum. Select the right model not to exceed these values even for an instant case. Select right model considering two or three times of these value as an extra in case constant moment acts.

＊3 : It is the value for air pressure 0.5MPa. Refer to capacity diagrams on →**page 7** for other pressure.

＊4 : Prepare D-SUB connector (Plug pin) at the customer side. [Model number 17JE-23150 (M2.6 screw): Equivalent product of DDK Ltd.]

＊5 : Refer to web site of the company named B & Plus for details of the remote sensor.

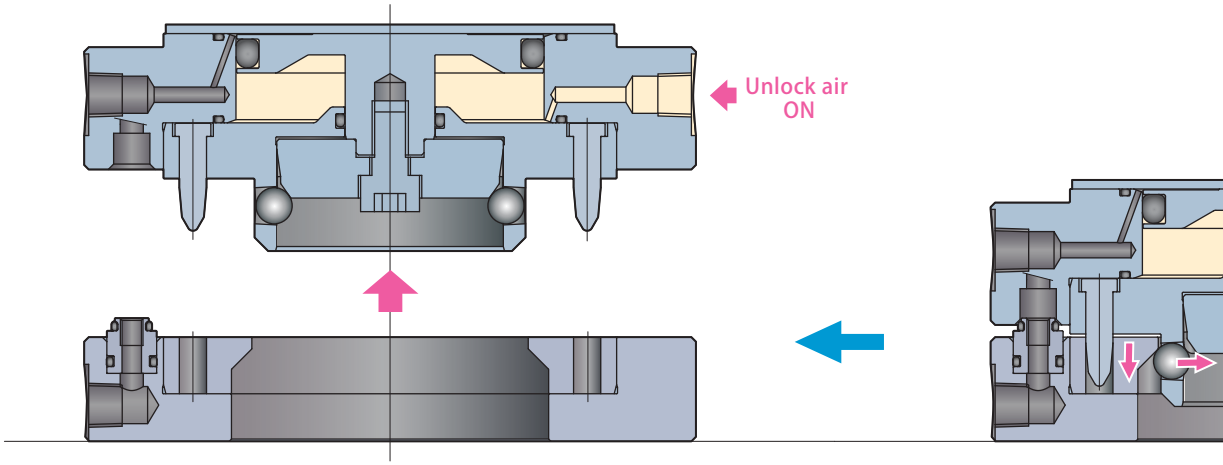
Fastened



① Place the tool plate in parallel with the table without restraint and unlock the master plate. Align the position of master plate to parallelize the contact surface between mater plate and tool plate.

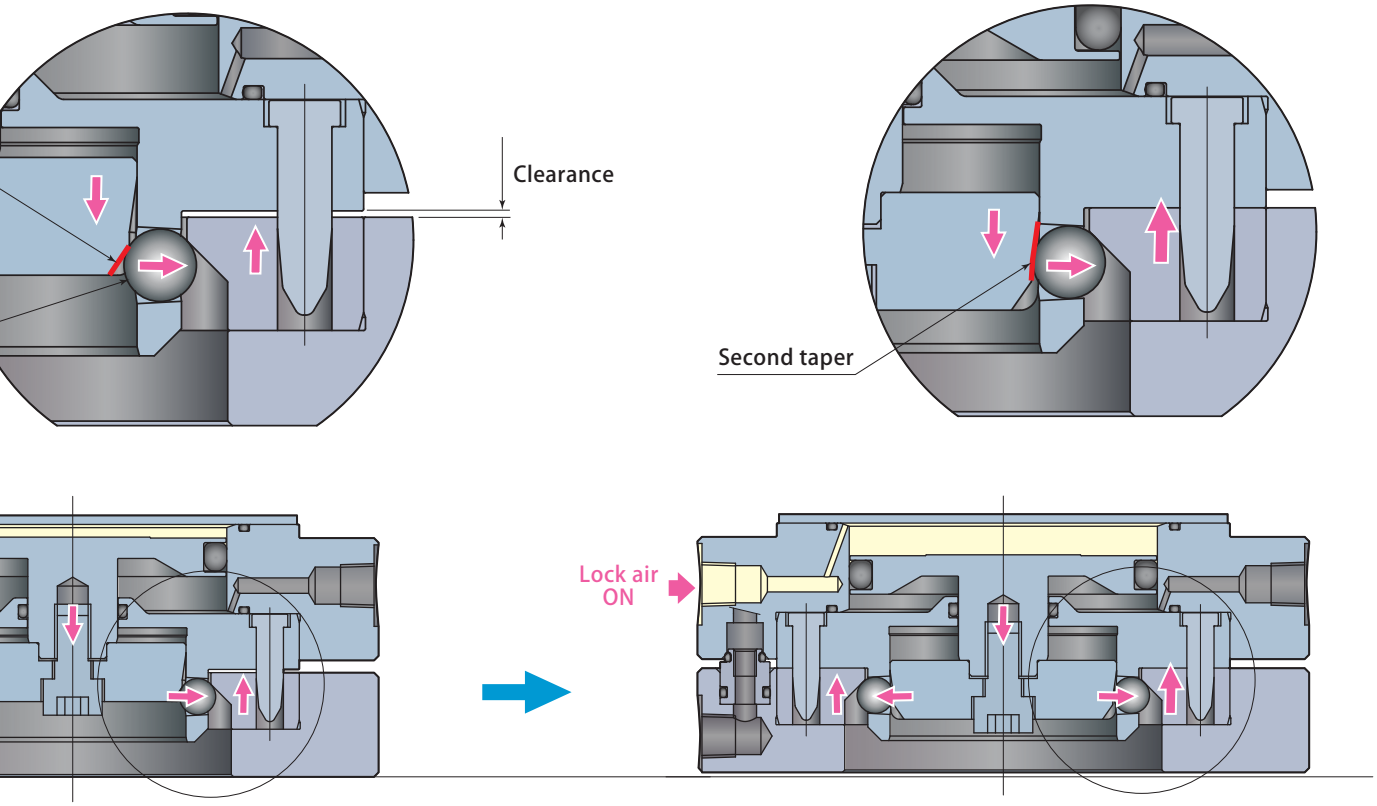
② Move the plate within turning ON first taper the tool Adjust the possible

Separated



⑥ Separating operation has been completed by lifting the master plate.

⑤ When unlocking, and the tool



master plate closer to the tool
allowable clearance. When
the air pressure for locking, the
pushes the steel ball and pulls up
plate.
allowable clearance as less as

③ Continuously the second taper pushes the steel ball, the master plate and tool plate stick fast to each other and fastening operation has been completed.

turning ON the air pressure for
fastening operation is released
plate lands on the table.

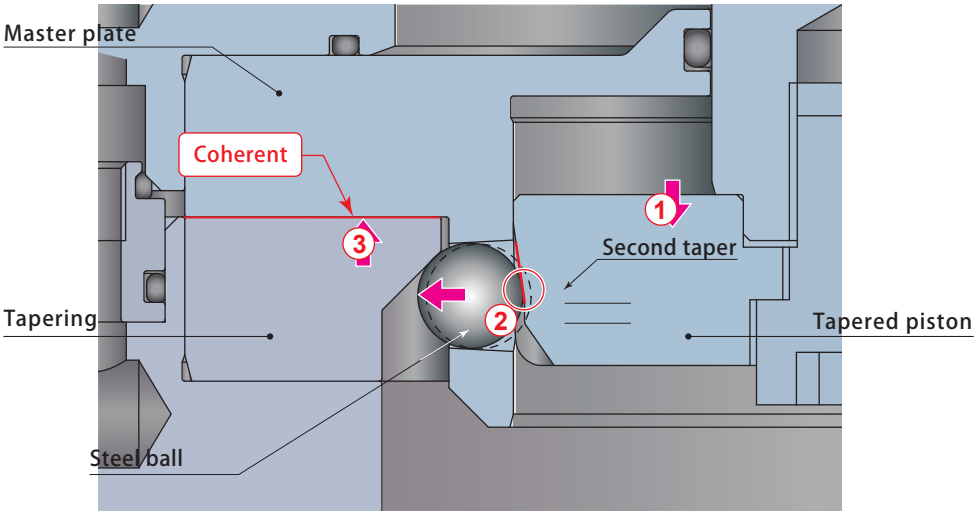
④ Place the tool plate very closer to the table.

- There is straight part on the tapered piston of master plate, therefore even when the air pressure for locking is not supplied, the tool plate does not fall.

＊ Do not use robot tool changer without supplying air pressure for locking. The protection fall mechanism is a temporary safety system.

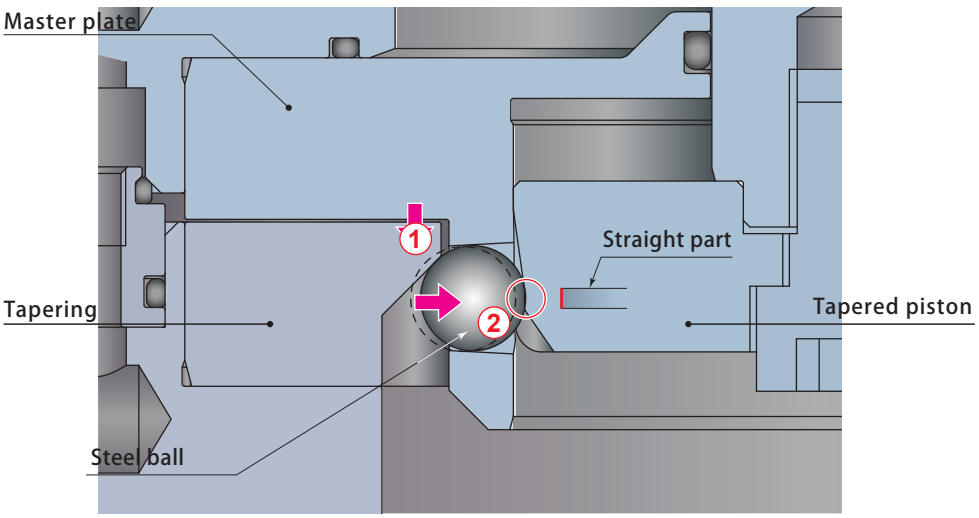
Lock state

The steel ball contacts with the second taper of tapered piston.

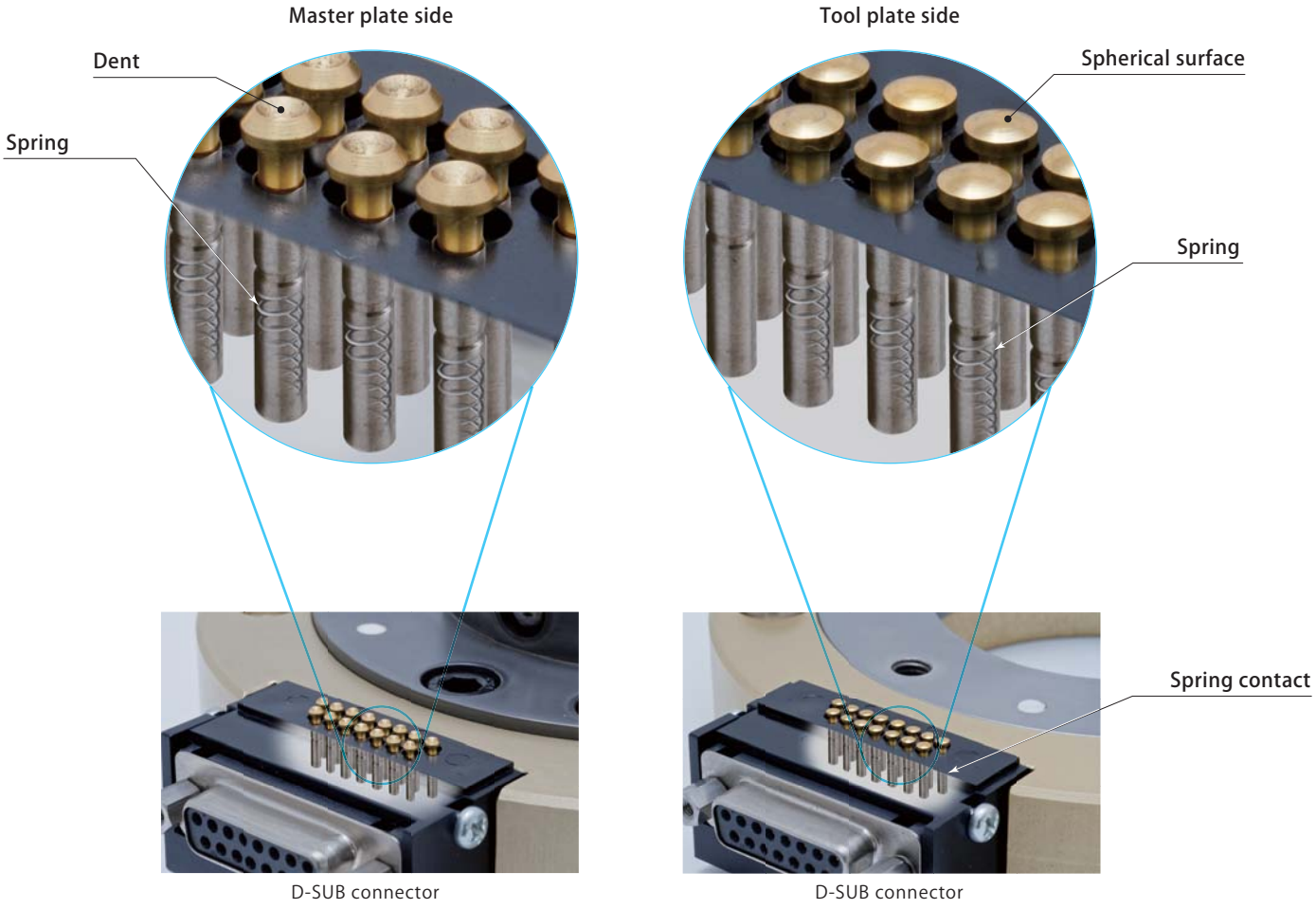


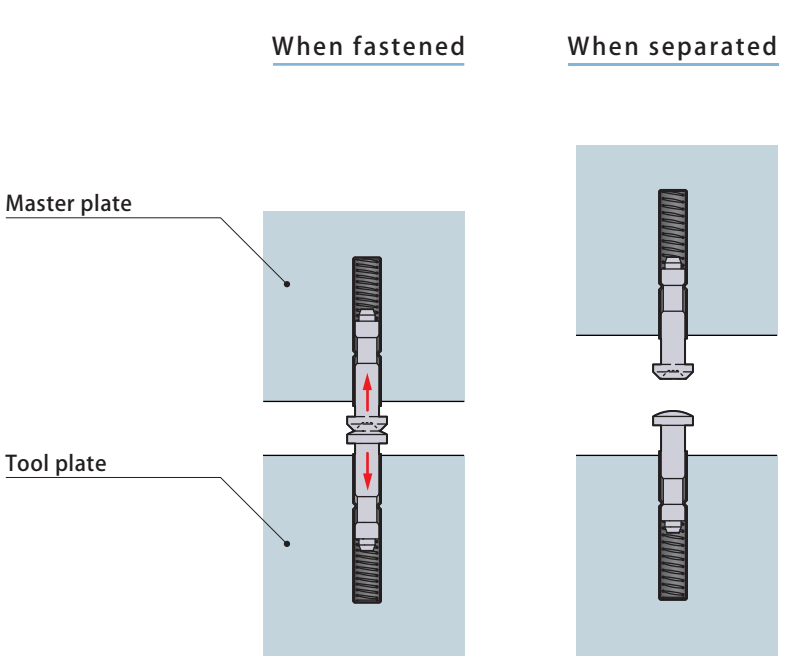
"No" air state

The steel ball contacts with the straight part of tapered piston.



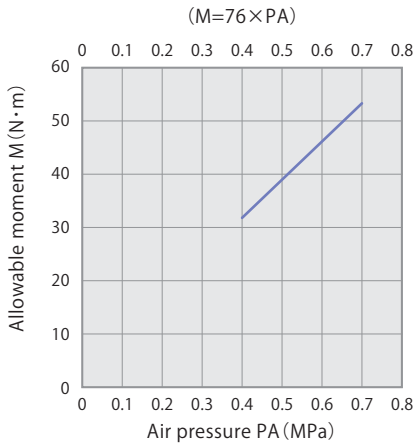
● The spring contact is adopted on both sides of master plate and tool plate and prevents contact failure.



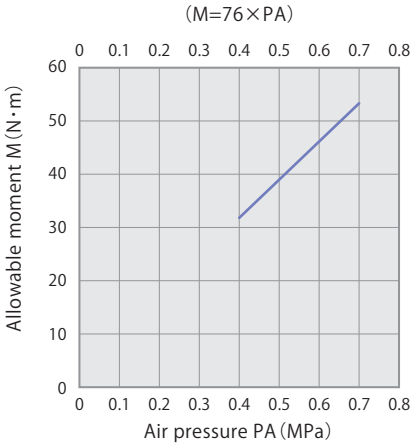


Allowable moment and air pressure

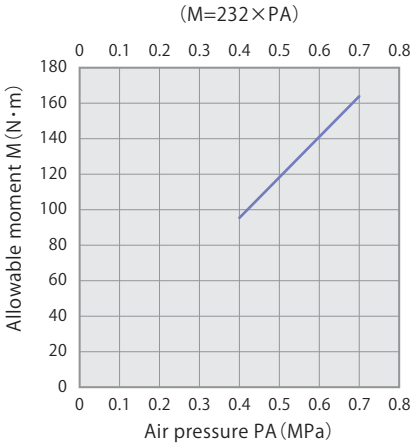
model WVR005



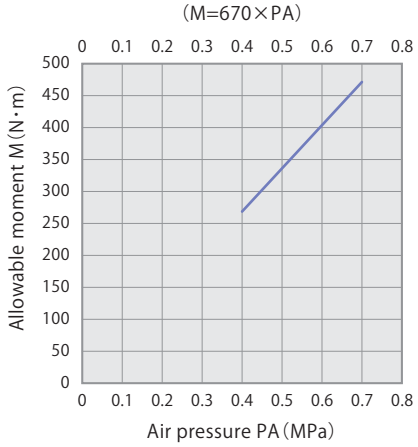
model WVR010



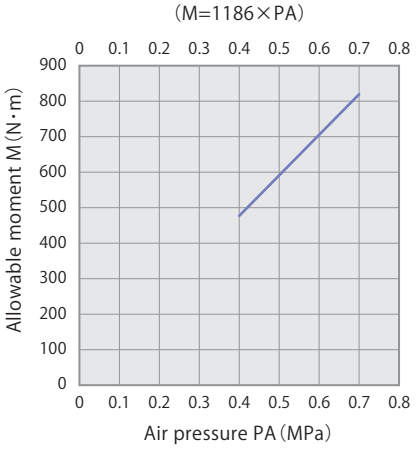
model WVR020



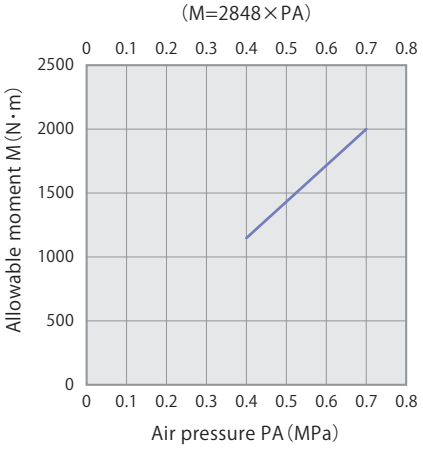
model WVR040



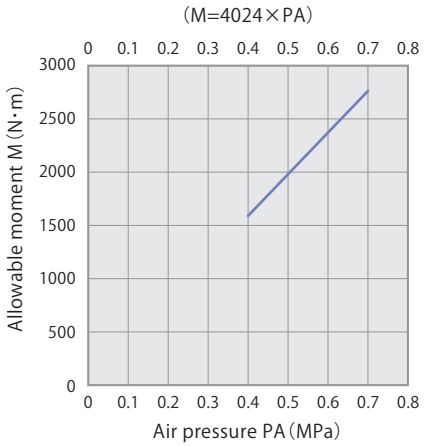
model WVR060



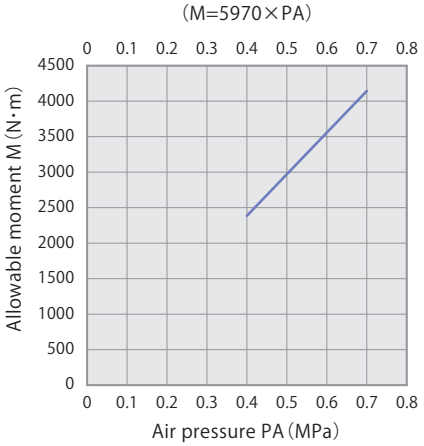
model WVR100



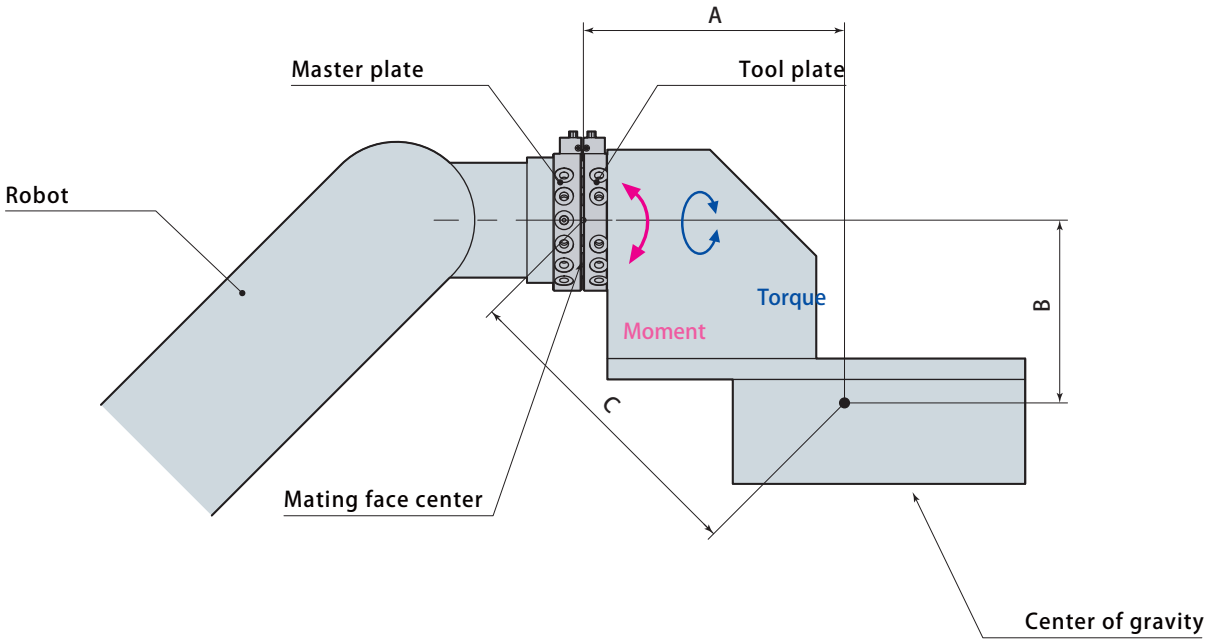
model WVR150



model WVR200



Select right models referring to the following calculation formula.



● Allowable torque (T)

T = Tool weight (m) x dimension B x robot max. acceleration speed

● Allowable moment (M)

M = Tool weight (m) x dimension C x robot max. acceleration speed

・Calculation example

A=0.3m B=0.4m C=$\sqrt{0.3^2+0.4^2}$=0.5m

Tool weight m=50kg T=50×0.4×(2×9.80665)=392 N・m

Robot max. acceleration speed =2G(2×9.80665m/s^2) M=50×0.5×(2×9.80665)=490 N・m

⇒ **WVR060** can be selected from the table shown below.

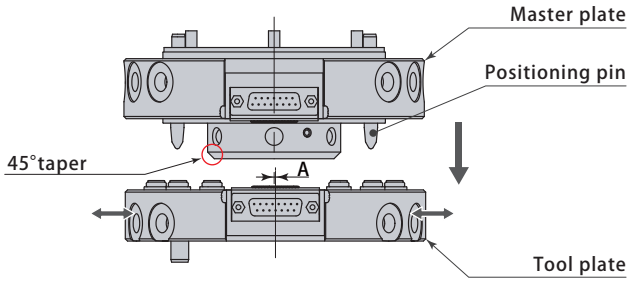
Model		WVR005	WVR010	WVR020	WVR040	WVR060	WVR100	WVR150	WVR200
Payload	kg	5	10	20	40	60	100	150	200
Allowable torque	N・m	77	77	156	428	548	2015	2383	2908
Allowable moment＊	N・m	38	38	116	335	593	1424	2012	2985

＊：Value when air pressure at 0.5MPa. Refer to →**page 7** page for the details of other air pressure.

Tool plate must be located in the following allowable range.

＊ The figure in the table indicate an independent positional displacement, not for simultaneous occurance.

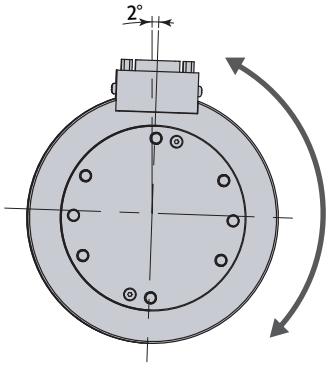
Allowable eccentricity (A)



Model		WVR							
		005	010	020	040	060	100	150	200
Allowable eccentricity A	mm	± 0.3		± 0.6			± 1		
Use of 45° taper ＊	mm	± 0.5		± 3			± 5		

＊ In case that rough positioning is performed with 45° taper, dents may occur on the connecting part, therefore make sure not to give impact on it. When positioning, pushing force to move the tool plate is required for the master plate.

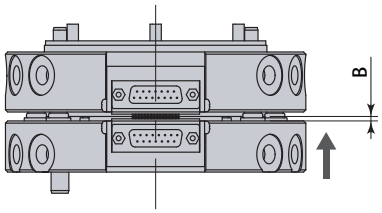
Allowable turning angle



Model	WVR							
	005	010	020	040	060	100	150	200
Allowable turning angle	± 2°							

When mating, final positioning is performed with positioning pins.
Place the tool plate on the table with slack to have it followed by positioning pin of master plate.

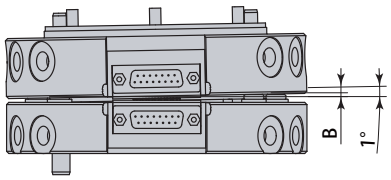
Allowable clearance (B)



Model		WVR							
		005	010	020	040	060	100	150	200
Allowable clearance B	mm	1					2		

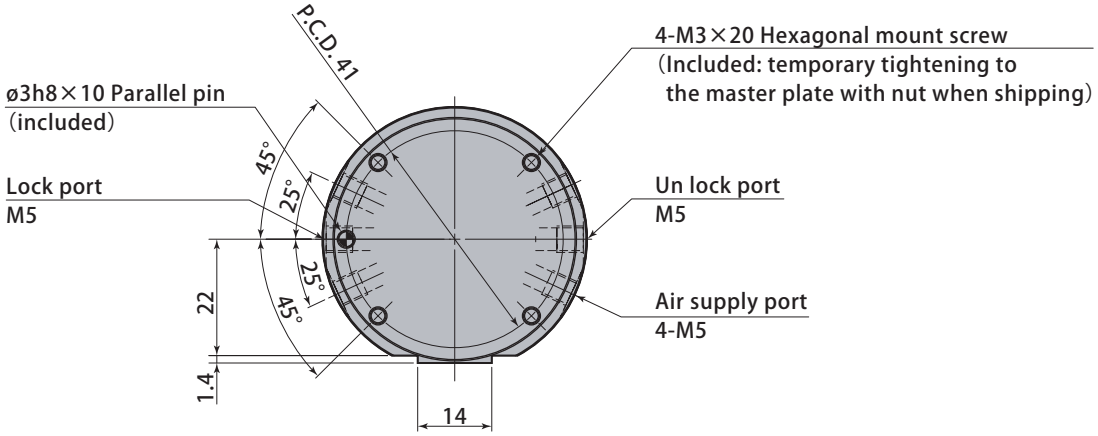
The master plate pulls upward to lock the tool plate as long as the clearance B is less than the distance shown in the above table. No teaching is required for a robot to have both plates coherent each other but the clearance should be as less as possible.

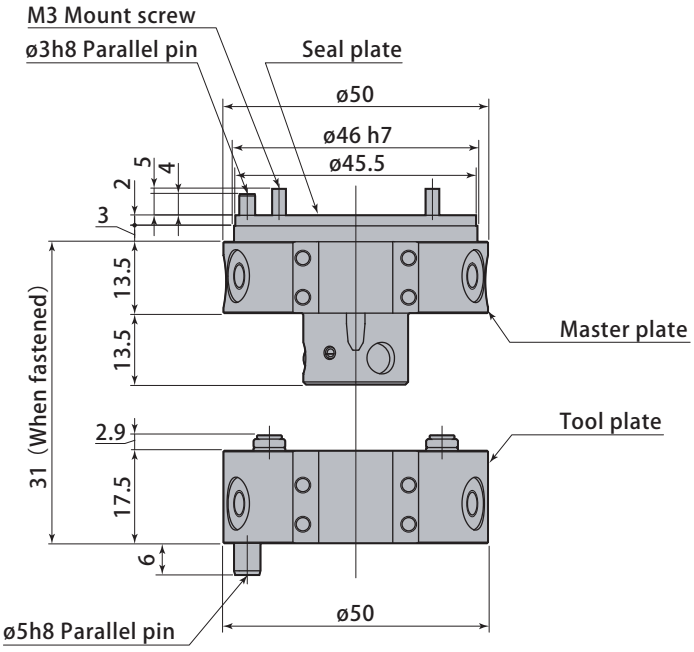
Allowable slant angle

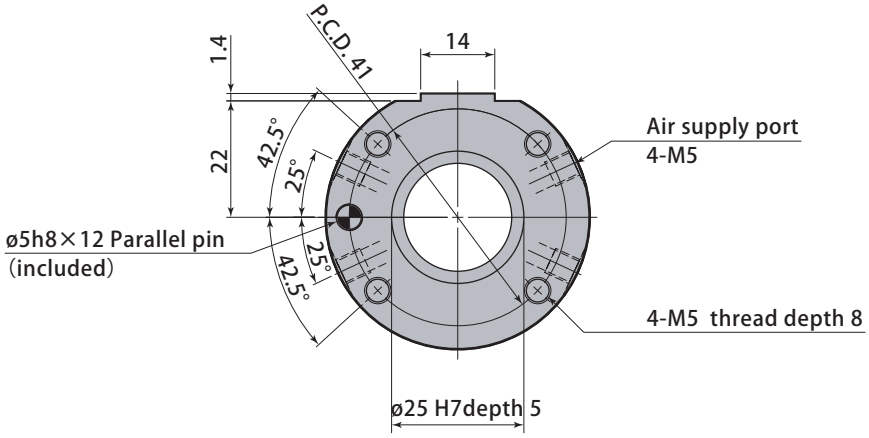


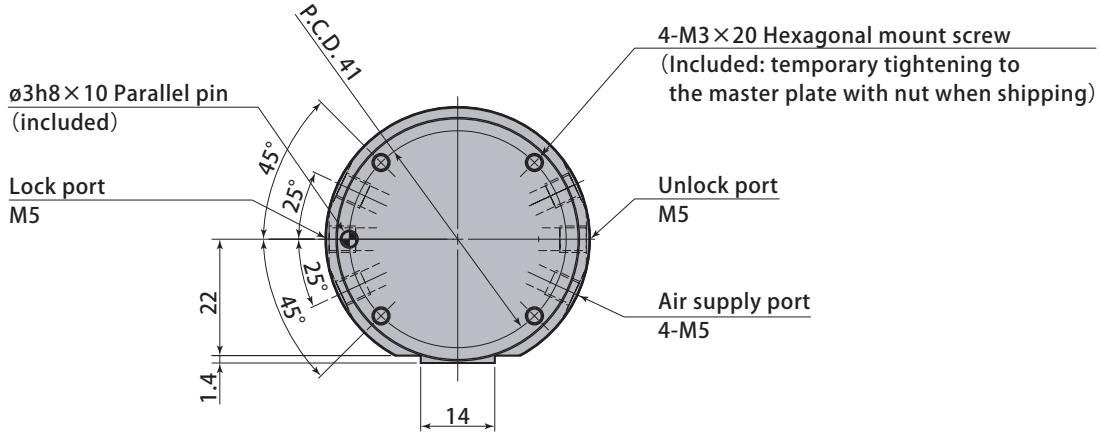
Model		WVR							
		005	010	020	040	060	100	150	200
Allowable slant angle	mm	1.2		0.9	0.7	0.6	0.9	0.8	0.7

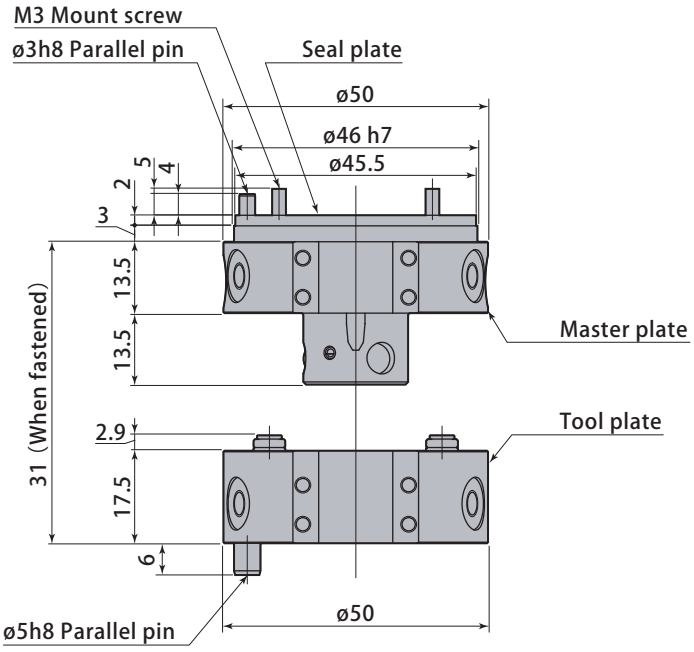
Teaching is required to have robot correct the slant angle and the clearance B to be less than the above value.

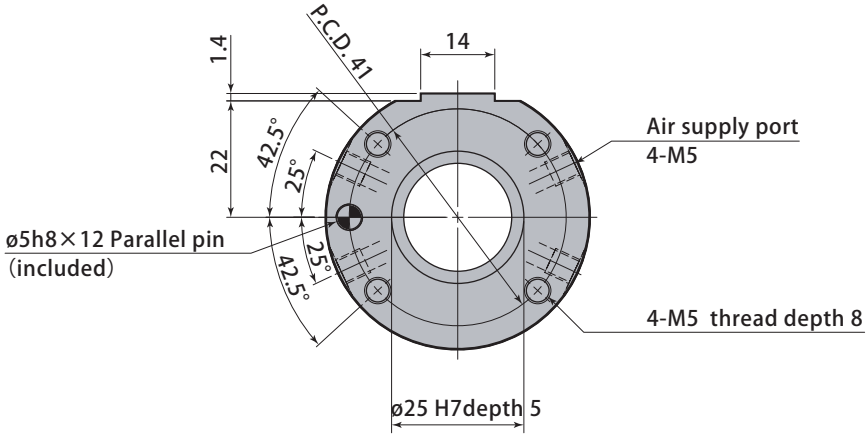

P.C.D.41
4-M3×20 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
ø3h8×10 Parallel pin
(included)
Lock port
M5
Un lock port
M5
Air supply port
4-M5
45°
25°
25°
45°
22
1.4
14

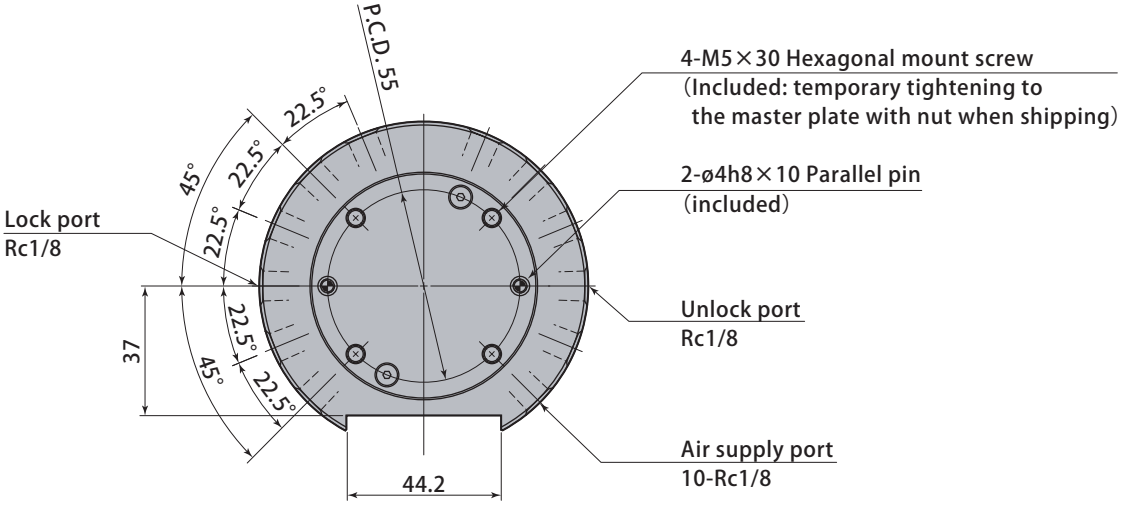

M3 Mount screw
ø3h8 Parallel pin
Seal plate
ø50
ø46 h7
ø45.5
5
4
2
3
13.5
13.5
31 (When fastened)
Master plate
Tool plate
2.9
17.5
6
ø5h8 Parallel pin
ø50

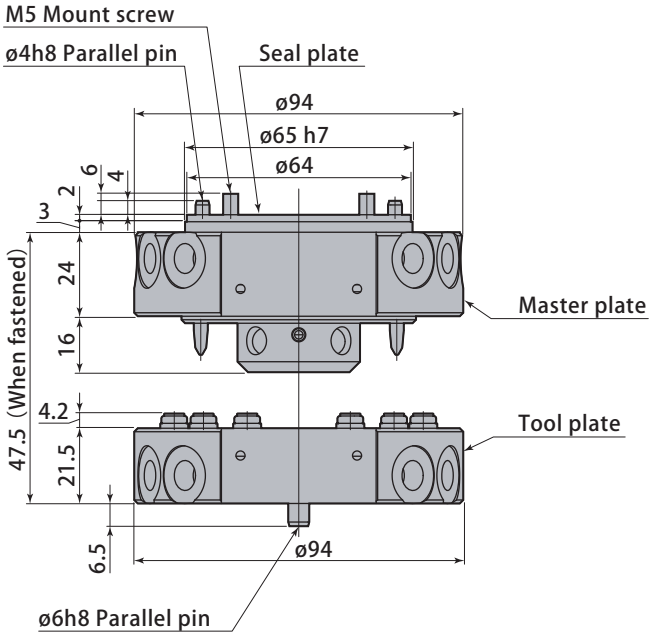

P.C.D.41
14
1.4
22
42.5°
25°
25°
42.5°
Air supply port
4-M5
ø5h8×12 Parallel pin
(included)
4-M5 thread depth 8
ø25 H7depth 5

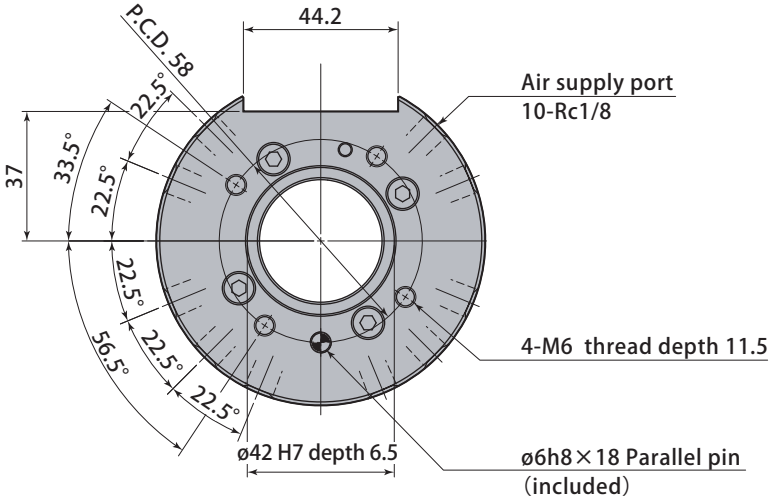

P.C.D.41
4-M3×20 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
ø3h8×10 Parallel pin
(included)
Lock port
M5
Unlock port
M5
Air supply port
4-M5
45°
25°
25°
45°
22
1.4
14

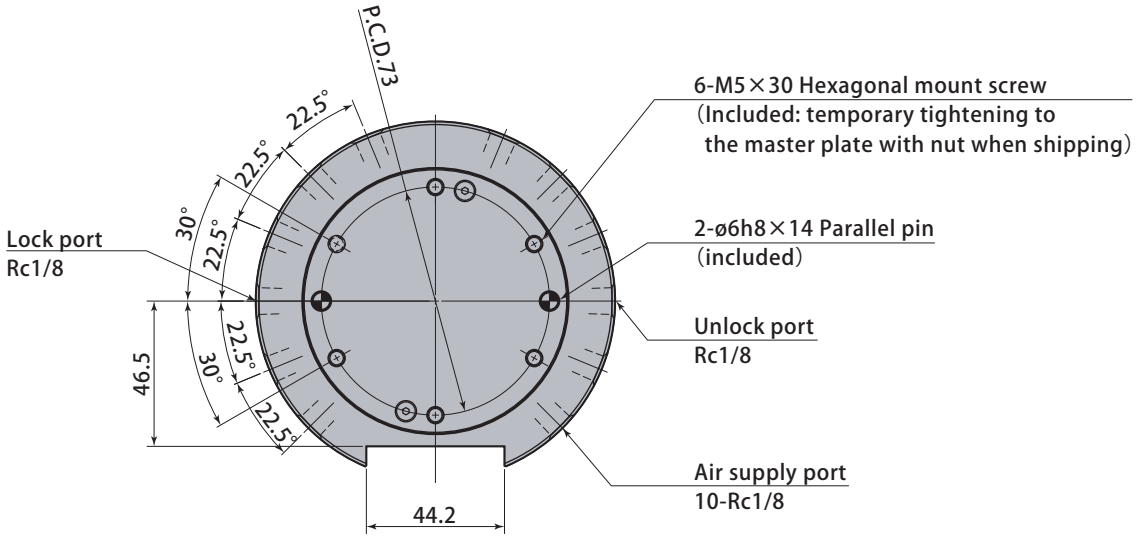

M3 Mount screw
ø3h8 Parallel pin
Seal plate
ø50
ø46 h7
ø45.5
5
4
2
3
13.5
13.5
31 (When fastened)
Master plate
Tool plate
2.9
17.5
6
ø5h8 Parallel pin
ø50

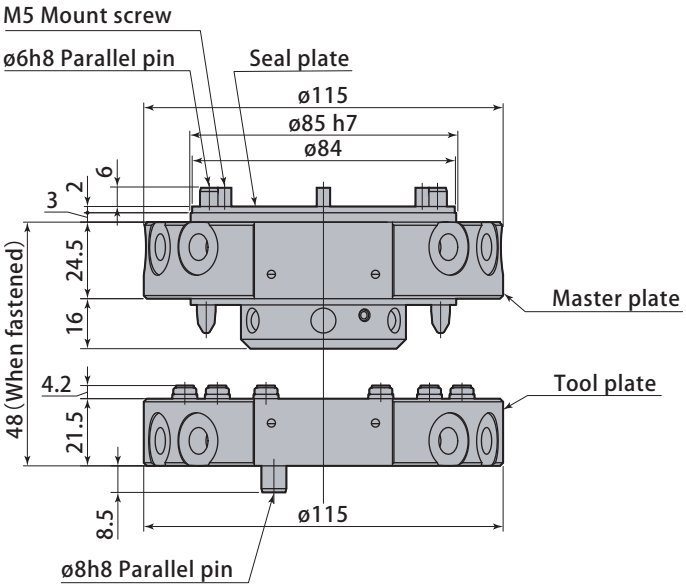

P.C.D.41
14
1.4
22
42.5°
25°
25°
42.5°
Air supply port
4-M5
ø5h8×12 Parallel pin
(included)
4-M5 thread depth 8
ø25 H7depth 5

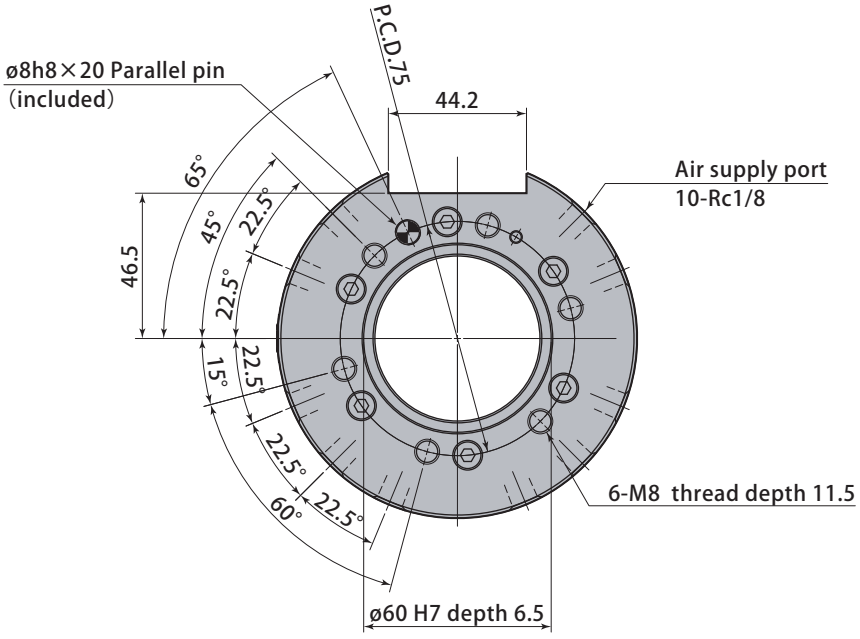

P.C.D. 55
4-M5×30 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
2-ø4h8×10 Parallel pin
(included)
Lock port
Rc1/8
Unlock port
Rc1/8
Air supply port
10-Rc1/8
22.5°
45°
37
44.2

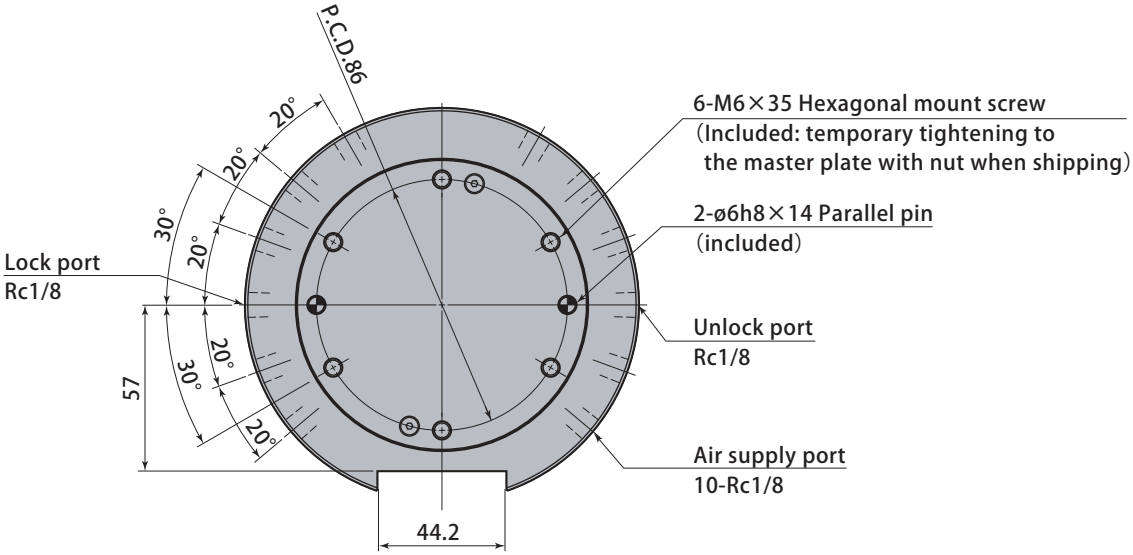

M5 Mount screw
ø4h8 Parallel pin
Seal plate
ø94
ø65 h7
ø64
Master plate
Tool plate
47.5 (When fastened)
24
16
4.2
21.5
6.5
ø94
ø6h8 Parallel pin

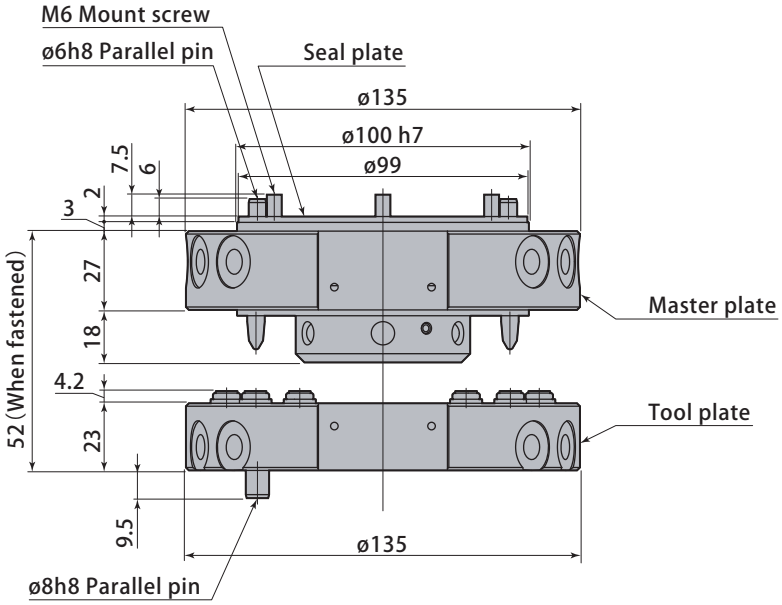

44.2
P.C.D. 58
Air supply port
10-Rc1/8
37
33.5°
22.5°
56.5°
4-M6 thread depth 11.5
ø42 H7 depth 6.5
ø6h8×18 Parallel pin
(included)

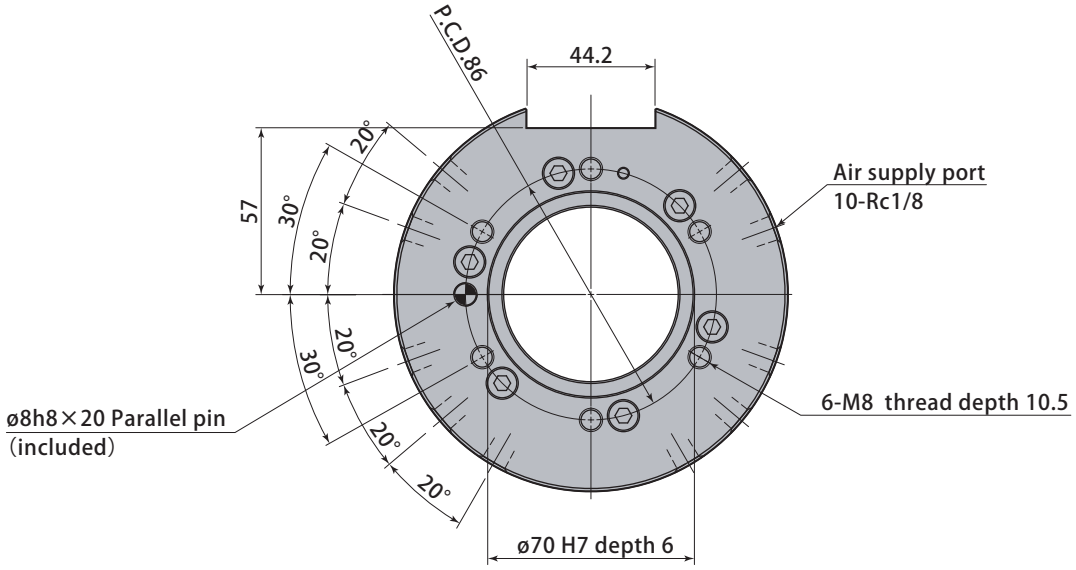

P.C.D.73
6-M5×30 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
2-ø6h8×14 Parallel pin
(included)
Unlock port
Rc1/8
Air supply port
10-Rc1/8
Lock port
Rc1/8
22.5°
22.5°
30°
22.5°
46.5
30°
22.5°
22.5°
44.2

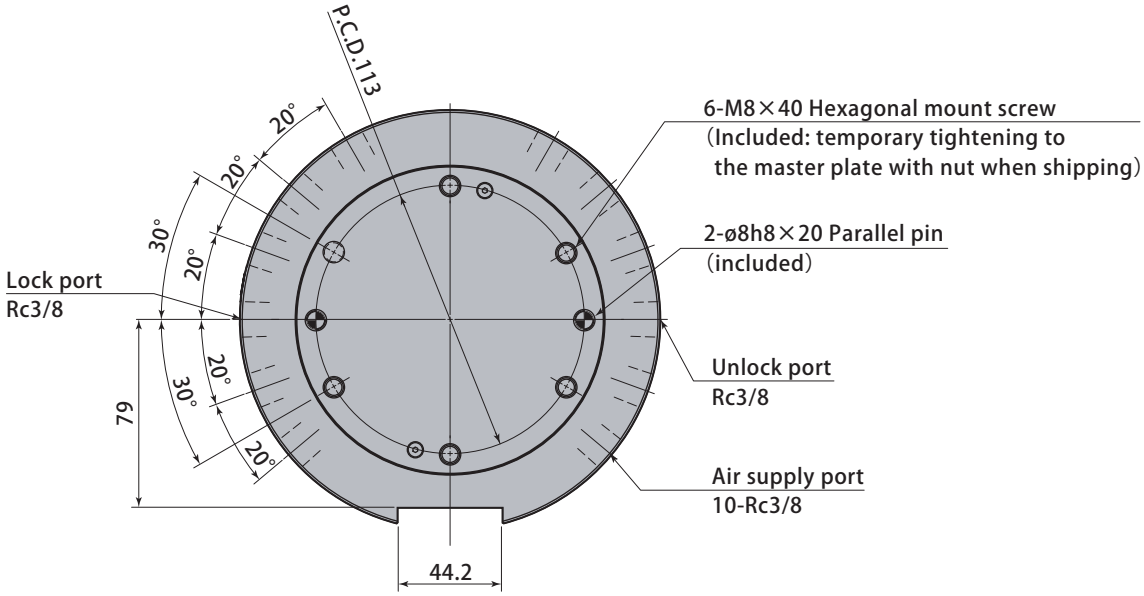

M5 Mount screw
ø6h8 Parallel pin
Seal plate
ø115
ø85 h7
ø84
3
2
6
24.5
16
48 (When fastened)
4.2
21.5
8.5
Master plate
Tool plate
ø115
ø8h8 Parallel pin

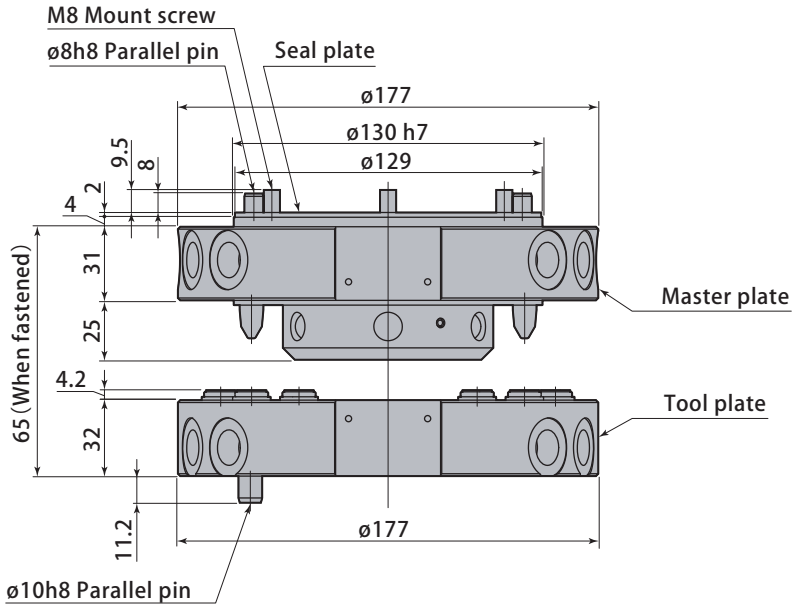

P.C.D.75
ø8h8×20 Parallel pin
(included)
44.2
Air supply port
10-Rc1/8
65°
45°
22.5°
46.5
22.5°
22.5°
15°
22.5°
22.5°
60°
22.5°
6-M8 thread depth 11.5
ø60 H7 depth 6.5

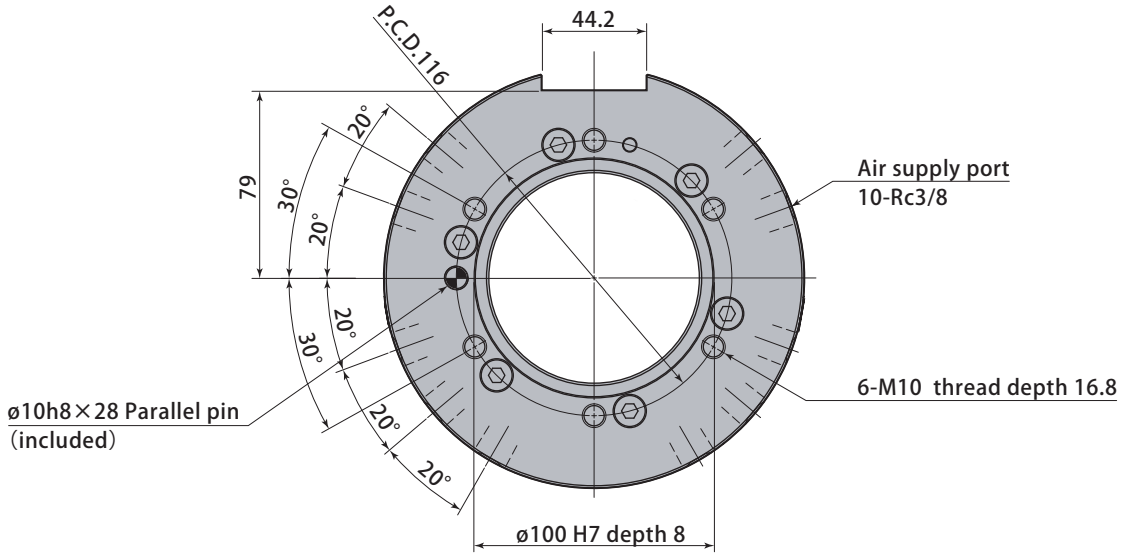

P.C.D.86
20°
20°
30°
20°
20°
30°
20°
20°
57
6-M6×35 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
2-ø6h8×14 Parallel pin
(included)
Lock port
Rc1/8
Unlock port
Rc1/8
Air supply port
10-Rc1/8
44.2

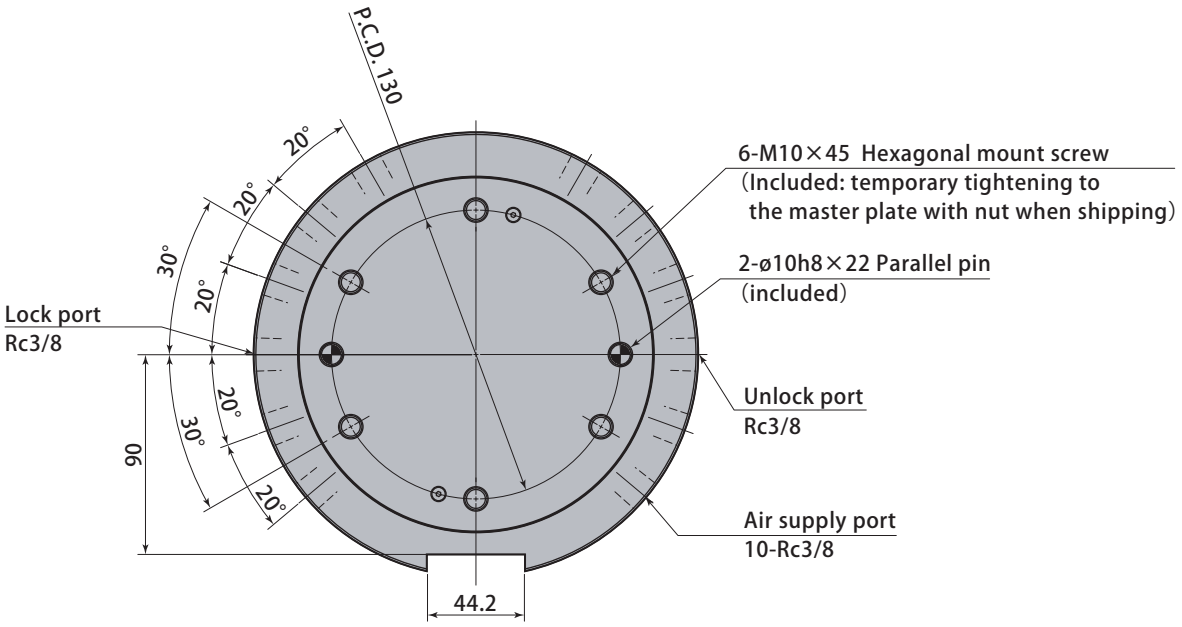

M6 Mount screw
ø6h8 Parallel pin
Seal plate
ø135
ø100 h7
ø99
7.5
6
2
3
27
18
4.2
23
52 (When fastened)
9.5
Master plate
Tool plate
ø135
ø8h8 Parallel pin

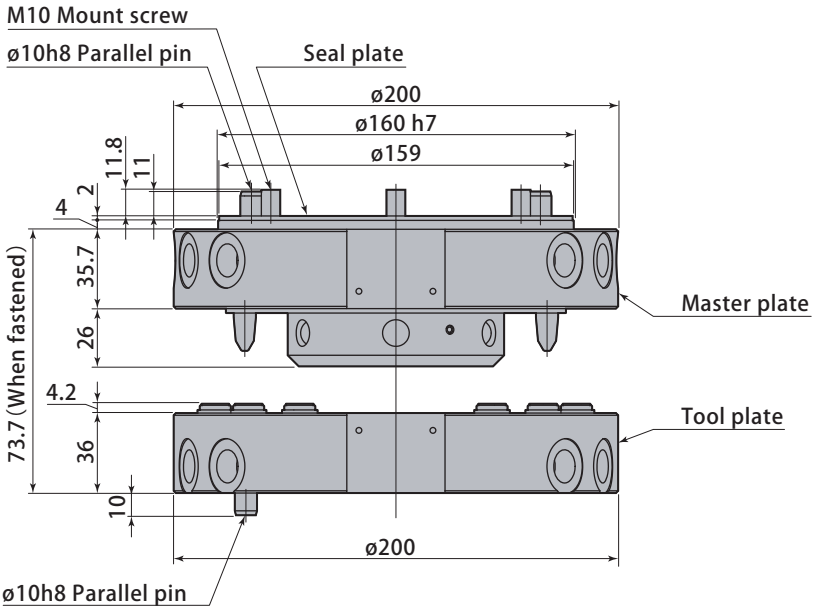

P.C.D.86
44.2
20°
30°
20°
20°
30°
20°
20°
57
Air supply port
10-Rc1/8
ø8h8×20 Parallel pin
(included)
6-M8 thread depth 10.5
ø70 H7 depth 6

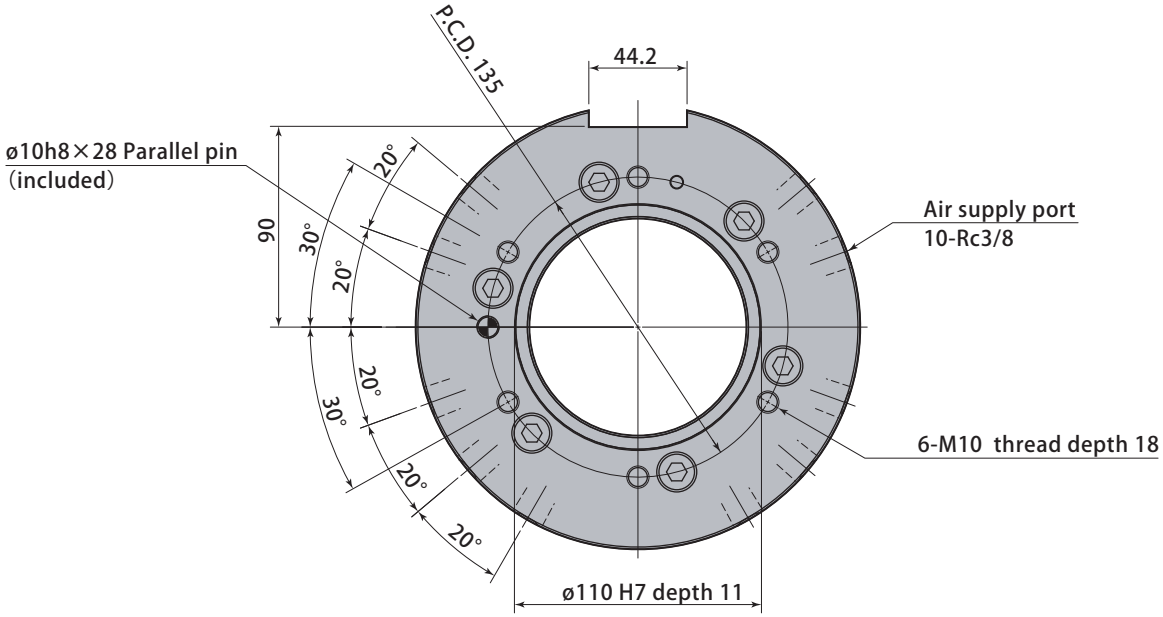

P.C.D.113
20°
20°
30°
20°
20°
30°
20°
79
6-M8×40 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
2-ø8h8×20 Parallel pin
(included)
Lock port
Rc3/8
Unlock port
Rc3/8
Air supply port
10-Rc3/8
44.2

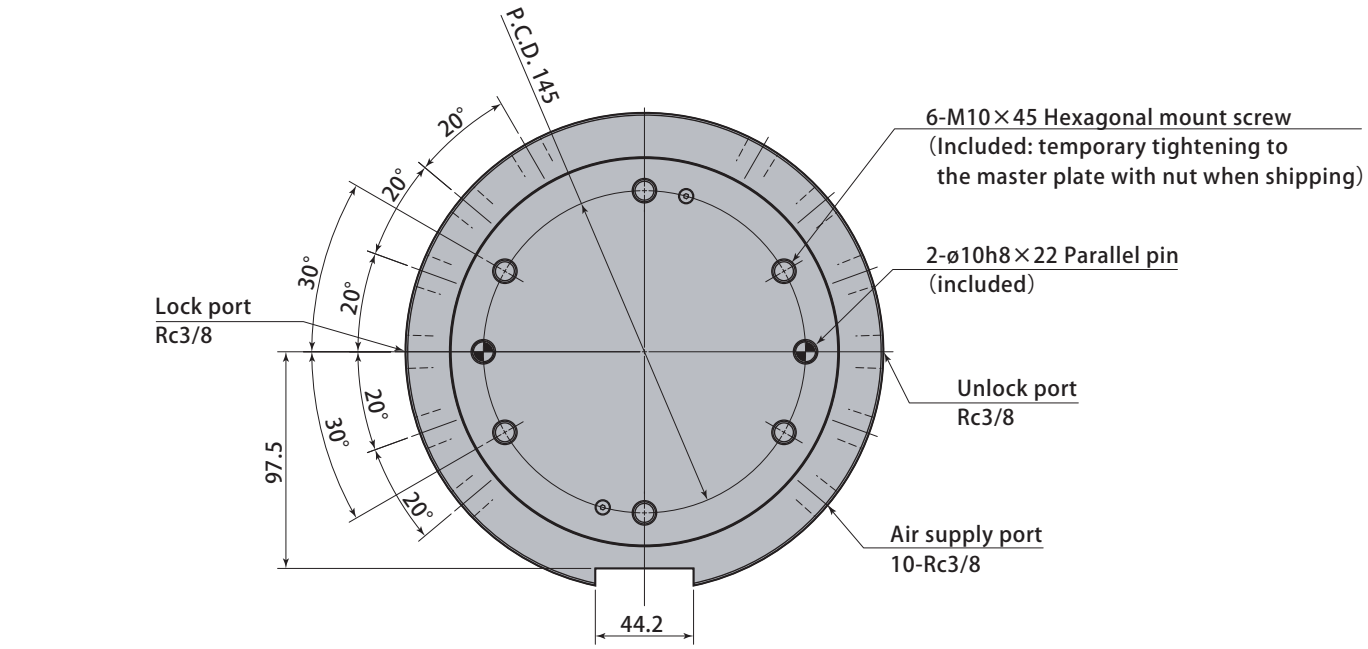

M8 Mount screw
ø8h8 Parallel pin
Seal plate
ø177
ø130 h7
ø129
9.5
8
2
4
65 (When fastened)
31
25
4.2
32
11.2
Master plate
Tool plate
ø177
ø10h8 Parallel pin

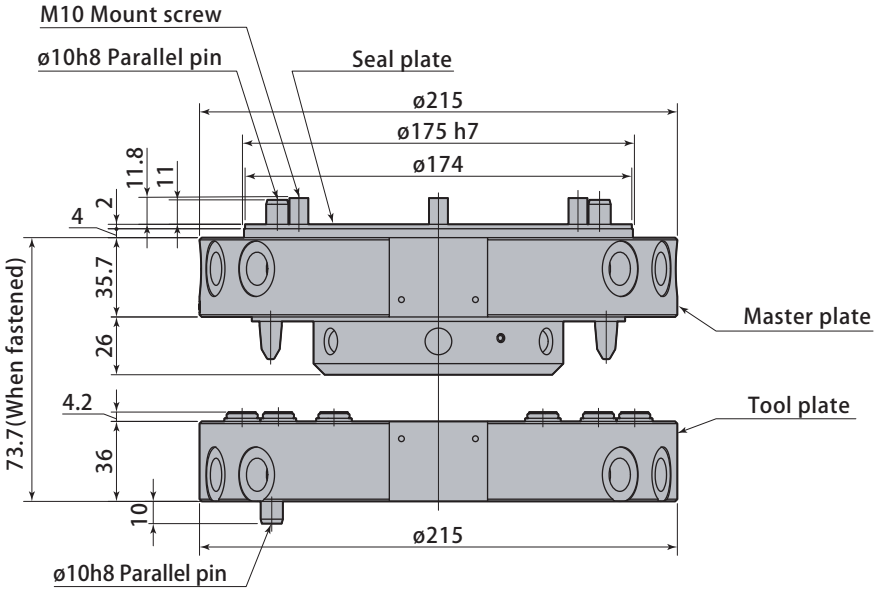

P.C.D.116
44.2
79
30°
20°
20°
20°
30°
20°
20°
Air supply port
10-Rc3/8
6-M10 thread depth 16.8
ø10h8×28 Parallel pin
(included)
ø100 H7 depth 8

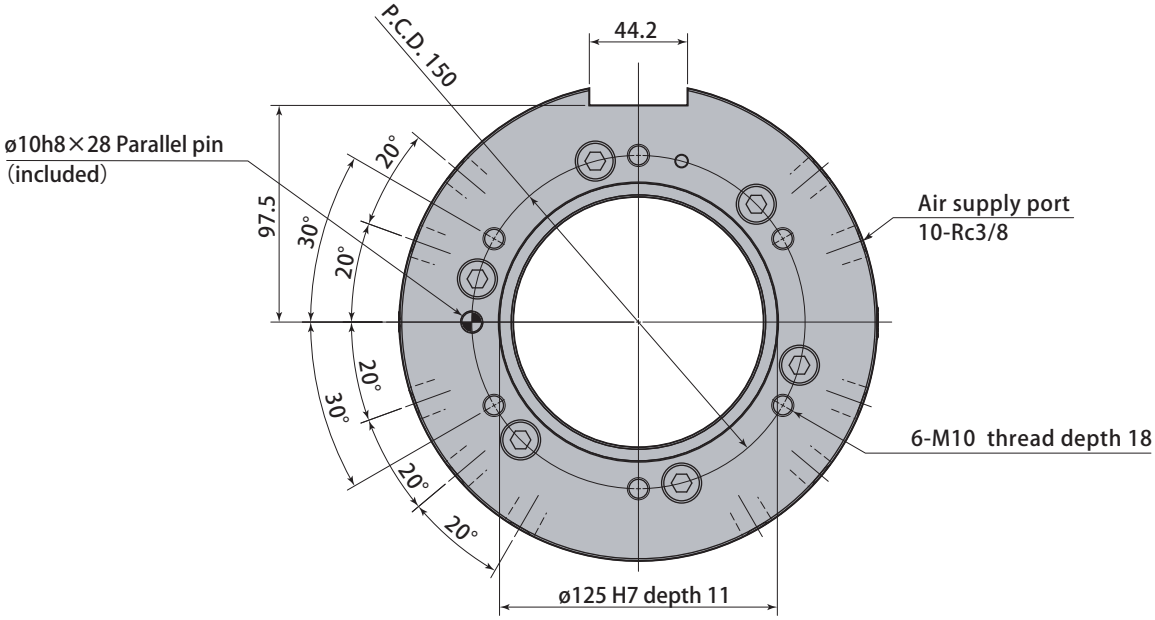

P.C.D. 130
20°
20°
30°
20°
20°
30°
20°
90
6-M10×45 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
2-ø10h8×22 Parallel pin
(included)
Lock port
Rc3/8
Unlock port
Rc3/8
Air supply port
10-Rc3/8
44.2


M10 Mount screw
ø10h8 Parallel pin
Seal plate
ø200
ø160 h7
ø159
11.8
11
2
4
35.7
26
73.7 (When fastened)
4.2
36
10
Master plate
Tool plate
ø200
ø10h8 Parallel pin


P.C.D. 135
44.2
ø10h8×28 Parallel pin
(included)
90
30°
20°
20°
20°
30°
20°
20°
Air supply port
10-Rc3/8
6-M10 thread depth 18
ø110 H7 depth 11


P.C.D.145
20°
20°
30°
20°
Lock port
Rc3/8
97.5
30°
20°
20°
6-M10×45 Hexagonal mount screw
(Included: temporary tightening to
the master plate with nut when shipping)
2-ø10h8×22 Parallel pin
(included)
Unlock port
Rc3/8
Air supply port
10-Rc3/8
44.2


M10 Mount screw
ø10h8 Parallel pin
Seal plate
ø215
ø175 h7
ø174
11.8
11
4
2
35.7
26
73.7(When fastened)
Master plate
4.2
36
10
Tool plate
ø215
ø10h8 Parallel pin


P.C.D.150
44.2
ø10h8×28 Parallel pin
(included)
97.5
30°
20°
20°
30°
20°
20°
Air supply port
10-Rc3/8
6-M10 thread depth 18
ø125 H7 depth 11

WVR005 • WVR010 Connector for solder terminal

Connector for solder terminal
Single model No.

E M 10 – L

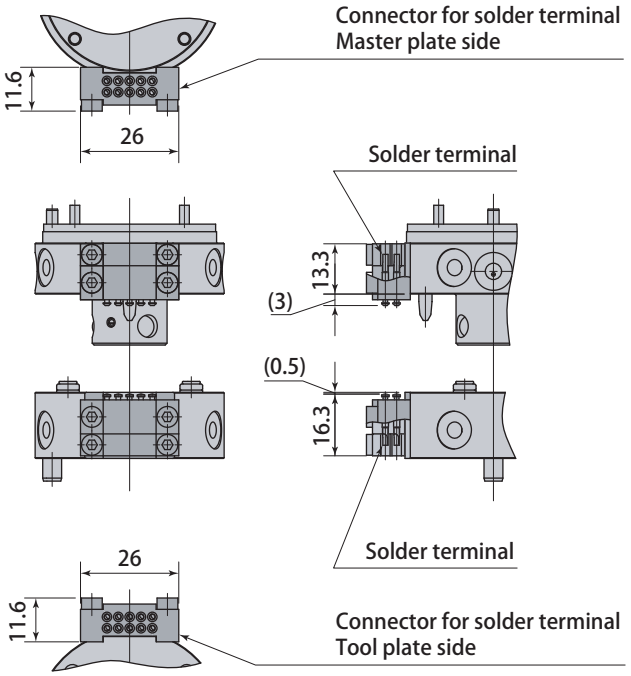
Option

No symbol : Without cable

L : With cable
ø7.7(1m) 0.2mm²×10pcs

M : Master plate side

T : Tool plate side



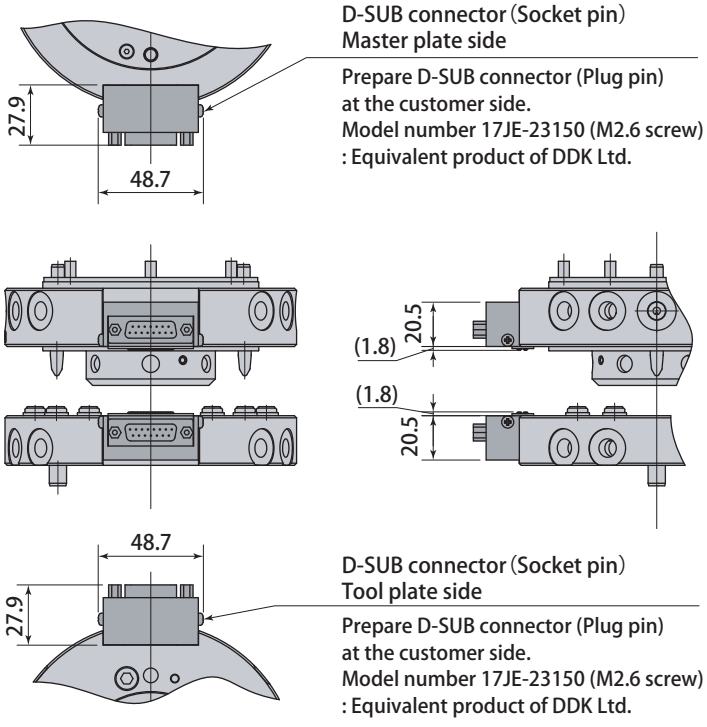
WVR020 ~ WVR200 D-SUB Connector

D-SUB connector Single model No.

E M 15

M : Master plate side

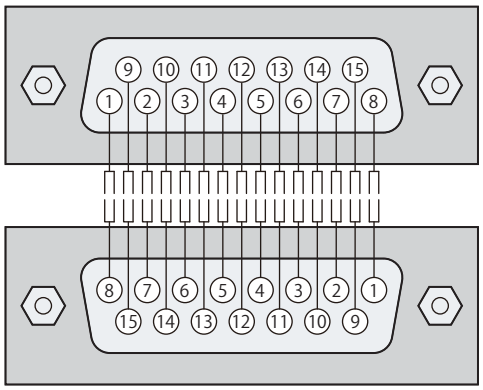
T : Tool plate side



Caution for wiring D-SUB connector

● The pin number of connector does not coincide with each other. Be careful when wiring.

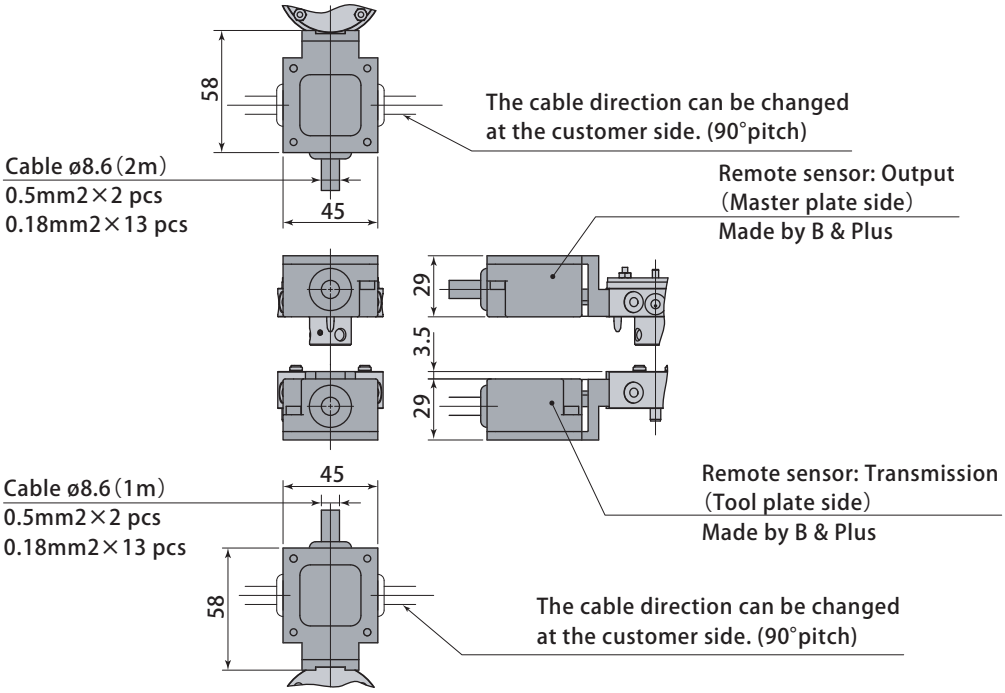
Master side(EM15)



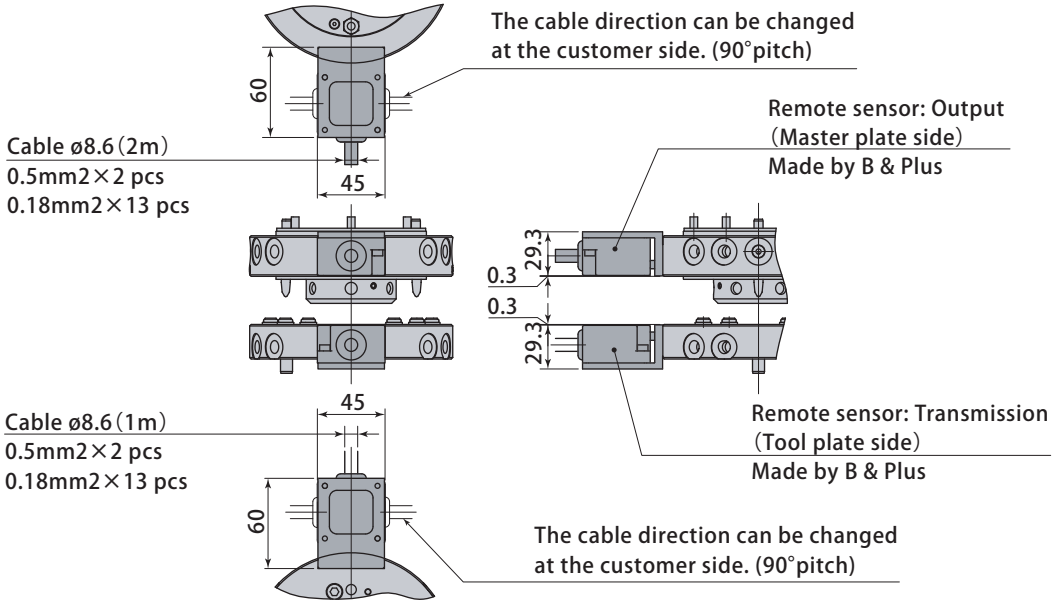
Tool side(ET15)

(example) Pin No.1 on master plate is wired to Pin No. 8 on tool plate.

WVR005・WVR010 Remote sensor



WVR020 ～ WVR200 Remote sensor



Model designation of remote sensor (Including bracket)

Master plate side（Output）

RS12M- N - S

N ：NPN type
P ：PNP type

S ：WVR005・010
No symbol ：WVR020 ～ 200

Remote sensor only
(Made by B & Plus)
RS12E-422N-PU-02(NPN)
RS12E-422P-PU-02(PNP)

Tool plate side（Transmission）

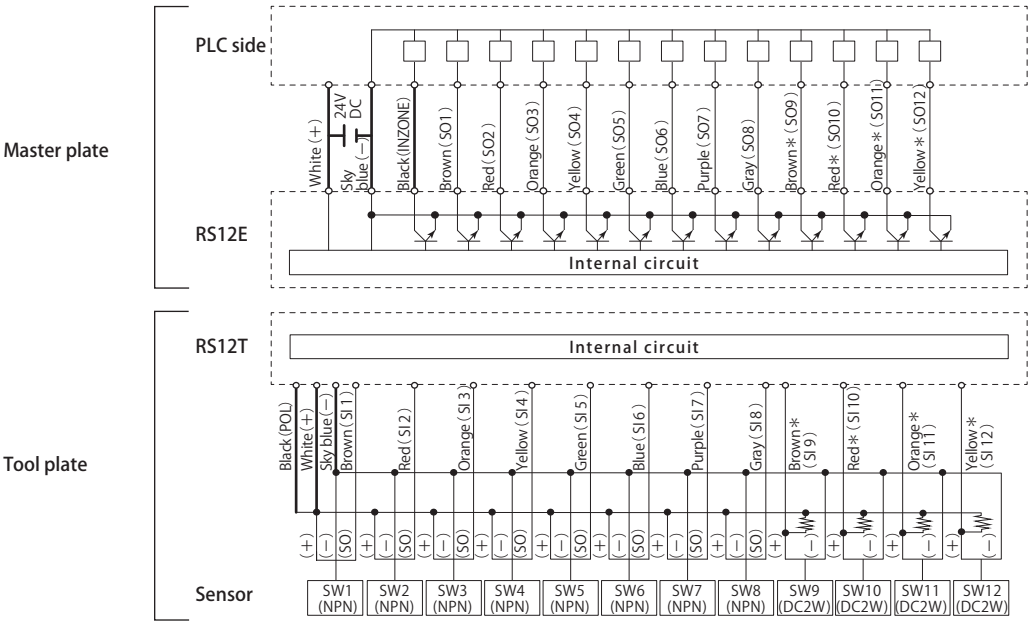
RS12T - S

S ：WVR005・010
No symbol ：WVR020 ～ 200

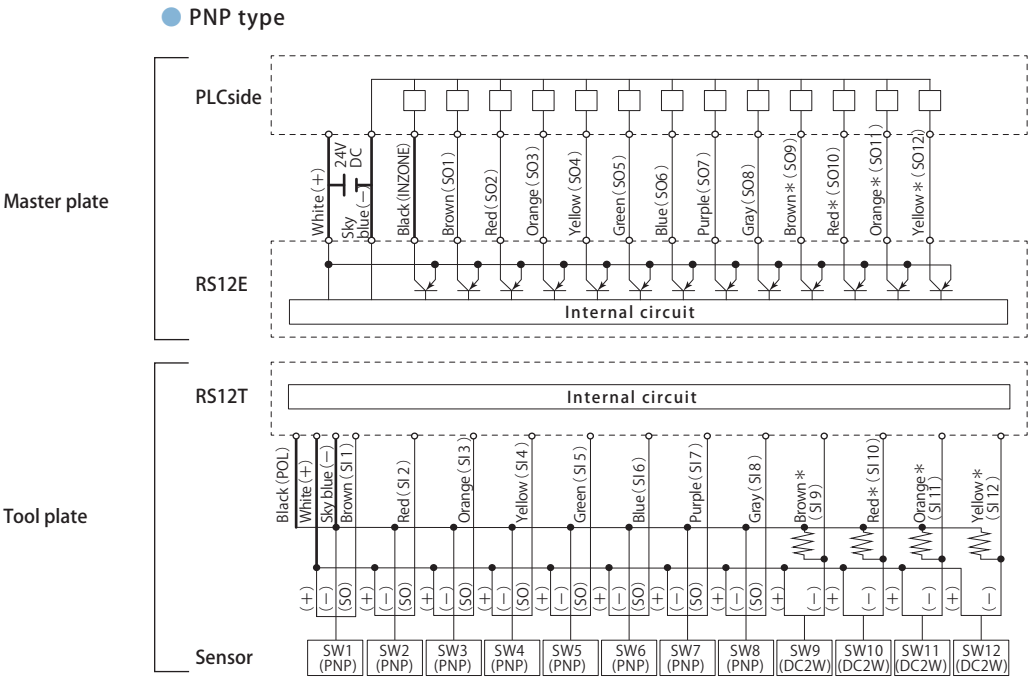
Remote sensor only
(Made by B & Plus)
RS12T-422-PU-01

Remote sensor wiring diagram

● NPN type



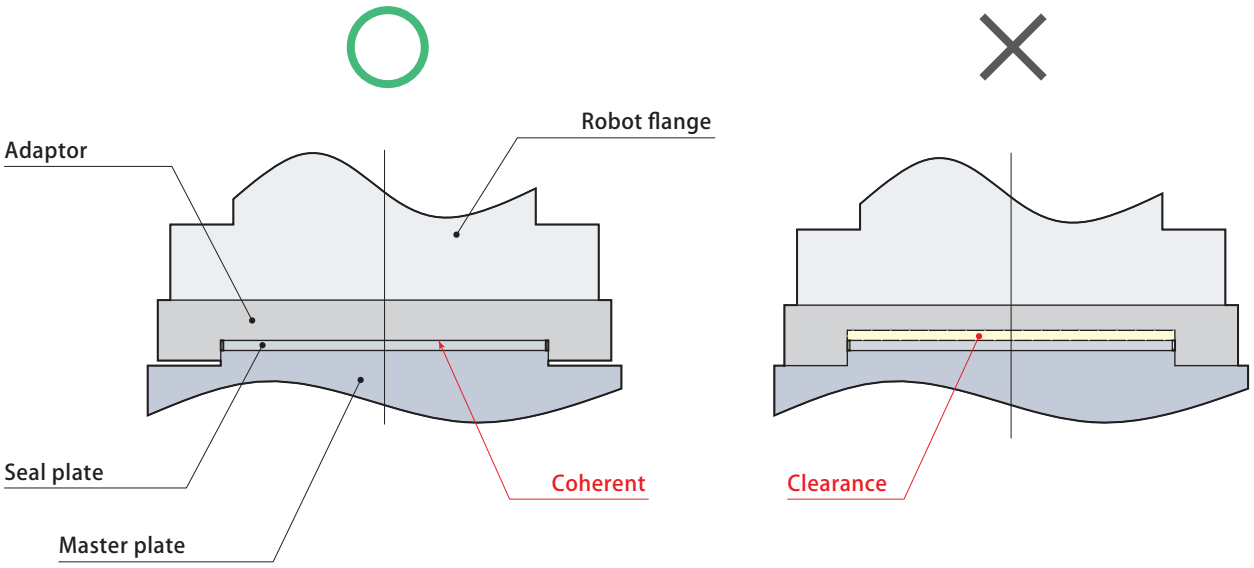
● PNP type

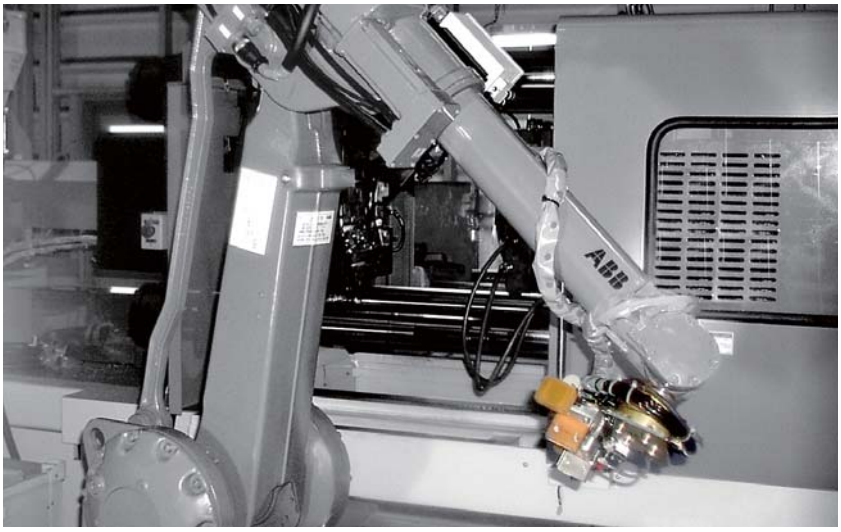


- The above diagram SW9-12 shows wiring for sensor of DC 2 lines.(Wire with the resistance value 1-2KΩ)
- The sensor for DC 3 lines is also available.
- Green, blue and purple cable of S12E and RS12T is not used.

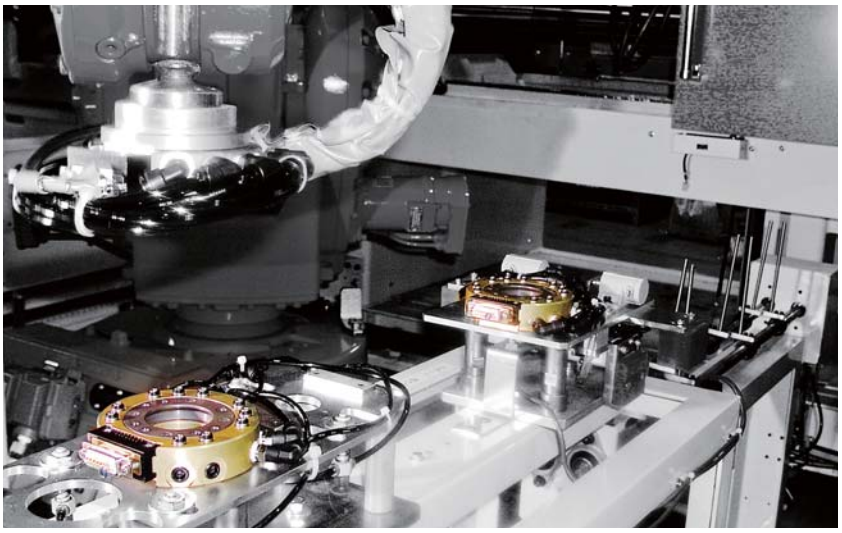
Caution for installation of master plate

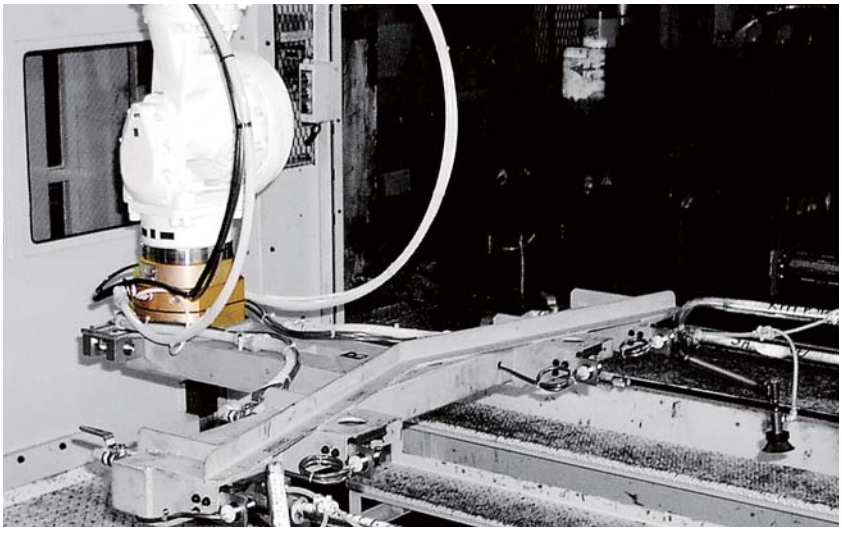
- Place a seal plate between robot mounting adapter (prepared by the customer) and master plate.
- Tighten the screws after master plate, adapter and seal plate are all coherent.

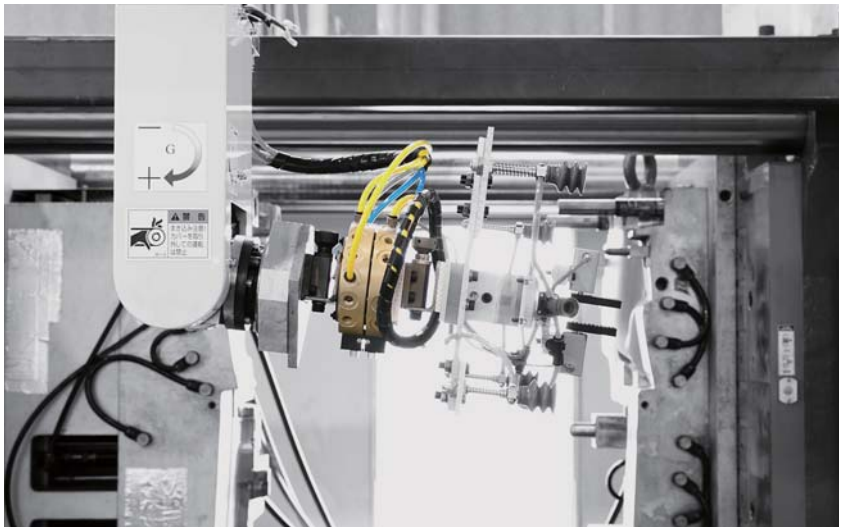




ABB







Pascal

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CERTIFICATE OF APPROVAL ISO9001

PA-162E-10
2018. 10