Doc.No.MH*-OMZ0009

Operation Manual

PRODUCT NAME

Air Gripper for Collaborative Robots

MODEL / Series / Product Number

RMHS Series

SMC Corporation

Contents

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)[*1)], and other safety regulations.

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Safety Instructions

⚠ Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not allowed.
Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.[*2)]
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

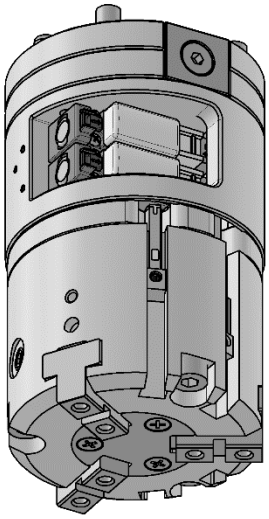
Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

1. List of included items

1-1.Common included items

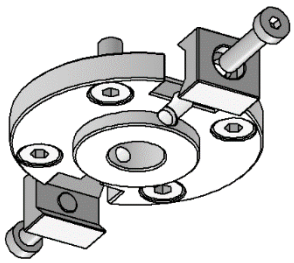
Manual type



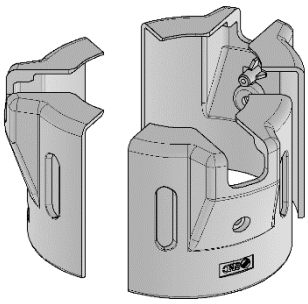
Air gripper x1

・Component configuration
- Solenoid valve x2
- Auto switch x2
-Fingers with opening/closing speed adjustment mechanism
- Tube fitting for air supply (applicable tube outer diameter 4)
- M8 Connector (Plug)

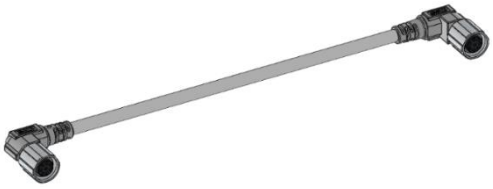
Optional parts



Main plate ASSY x1
This is an assembly necessary for installing the air gripper to the robot.

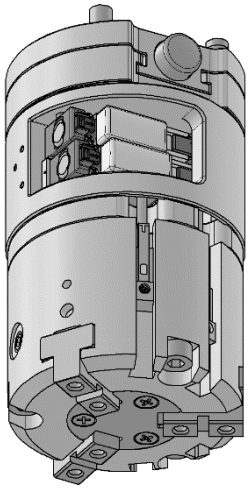


Protection cover x3 (diameter)
Attachment of a protective cover prevents exposure of the gripper corners.



Connector cable dedicated to robot x1
This is a cable equipped with a dedicated connector compatible with the robot.

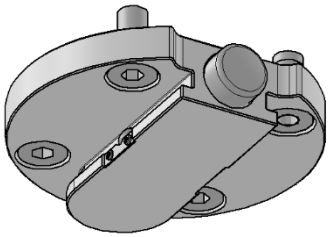
One push type



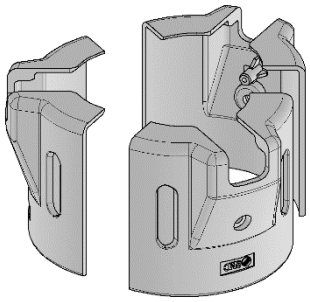
Air gripper x1

・Component configuration
- Solenoid valve x2
- Auto switch x2
-Fingers with opening/closing speed adjustment mechanism
- Tube fitting for air supply
(applicable tube outer diameter 4)
- M8 Connector (Plug)

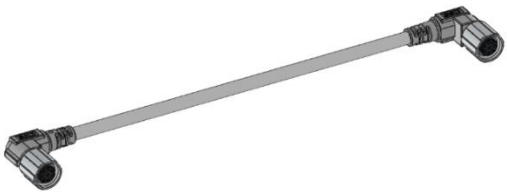
Optional parts



Main plate ASSY x1
This is an assembly necessary for installing the air gripper to the robot.



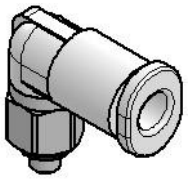
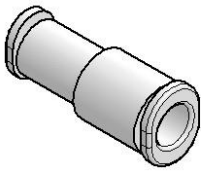
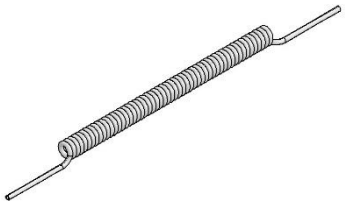
Protection cover x3 (diameter)
Attachment of a protective cover prevents exposure of the gripper corners.



Connector cable dedicated to robot x1
This is a cable equipped with a dedicated connector compatible with the robot.

1-2. Parts exclusive for each robot manufacturer included in the package

■ Parts exclusive for Mitsubishi Electric (identification symbol: 031N, 031P) included in the package.

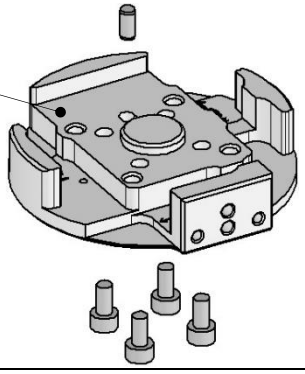
		
One touch fittings x1 (KQ2L04-M5A1)	**One touch fittings x1 (KQ2L06-08A)**	**Coil tube x1 (TCU0425B-1)**

* Please use the included one-touch fittings for piping work.

Optional parts

* This is included when you select either E or E1 for the mounting interface.

Connector storage flange

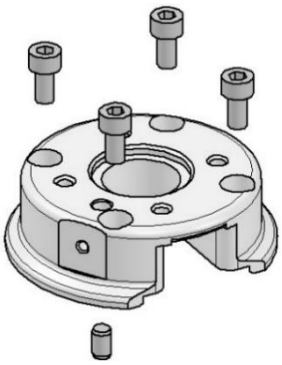


Bracket ASSY x1
・Equipment Configuration
- Connector storage flangex1
-Mounting Bolt x4
-Positioning pin x1

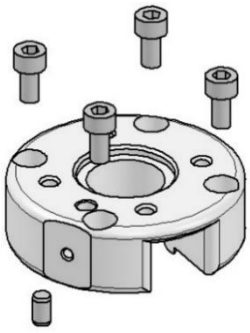
■ Parts exclusive for Yaskawa Electric (identification symbol: 041N, 041P, 042N, 042P) included in the package.

Optional parts

* This is included when you select either E or E1 for the mounting interface.

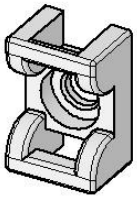


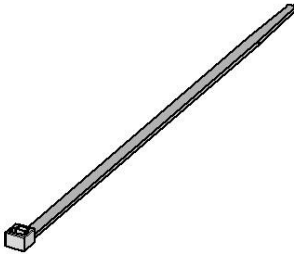
MOTOMAN-HC10



MOTOMAN-HC10DT

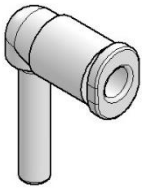
Bracket ASSY x1
・Equipment Configuration
-Flange x1
-Mounting bolt x4
-Positioning pin x1





Cable Fixture-INSULOK® tie x2
-INSULOK® tie mount x2
-Fixing bolt x2
-Bolt for plug x2

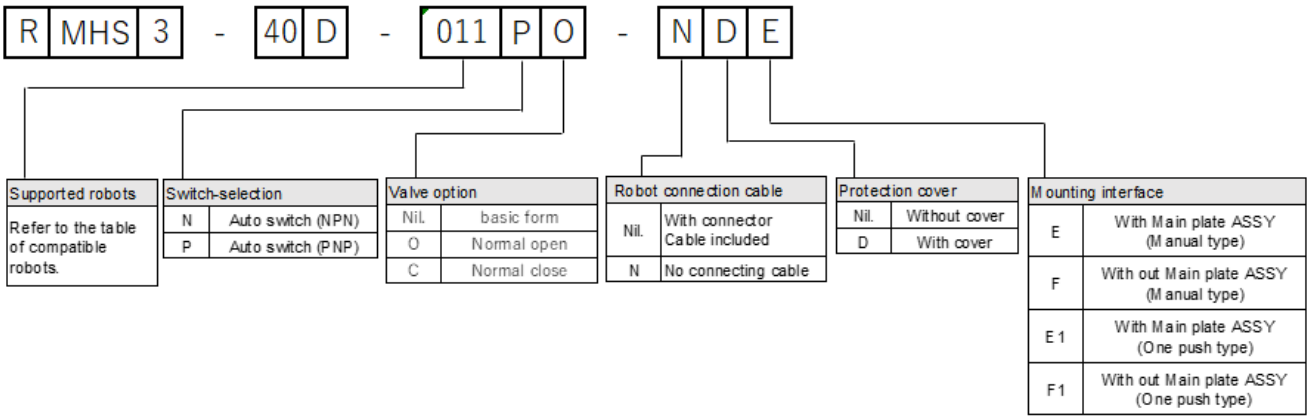
■ Parts exclusive parts for KUKA (Identification symbol: 061P) included in the package.



One touch fittings x2
(KQ2L04-99A1)

* Please use the included one-touch fittings for piping work.

2. How to order



○Table of compatible robot list

Symbol	Switch	Robot manufacturer	Suppoted models	Switch output	Valve polarity
011	P	UNIVERSAL ROBOTS	UR3e	PNP	-COM
			UR5e		
			UR10e		
			UR16e		
021	N	OMRON TECHMAN ROBOT	TM*	NPN	+COM
			TM*S		
031	N	Mitsubishi Electric	MELFA ASSISTA (RV-5AS-D)	NPN	+COM
	P			PNP	-COM
041	N	YASKAWA Electric	MOTOMAN -HC10	NPN	+COM
	P			PNP	-COM
042	N		MOTOMAN -HC10DT	NPN	+COM
	P			PNP	-COM
043	N		MOTOMAN -HC10(S)DTP	NPN	+COM
			MOTOMAN -HC20(S)DTP		
	P		MOTOMAN -HC10(S)DTP	PNP	-COM
			MOTOMAN -HC20(S)DTP		
051	P	FANUC	CRX-5iA	PNP	-COM
			CRX-10iA(L)		
			CRX-20iA		
			CRX-25iA		
061	P	KUKA	LBR-iiwa (Media flange ：I/O Pneumatic)	PNP	-COM

Symbol	Switch	Robot manufacturer	Suppoted models	Switch output	Valve polarity
071	P	Doosan Robotics	H2017	PNP	-COM
			H2515		
			M0609		
			M0617		
			M1013		
			M1509		
081	P	SIASUN	SCR3	PNP	-COM
			SCR5		
			GCR3-620		
			GCR5-910		
			GCR10-1300		
			GCR14-1400		
			GCR20-1100		
091	N	JAKA	JAKA Zu3	NPN	+COM
			JAKA Zu5		
			JAKA Zu7		
			JAKA Zu12		
	P		JAKA Zu3	PNP	-COM
			JAKA Zu5		
			JAKA Zu7		
			JAKA Zu12		
101	N	AUBO	AUBO-i3	NPN	+COM
			AUBO-i5		
			AUBO-i10		
111	P	HAN'S ROBOT	E03	PNP	-COM
			E05		
			E10		
121	P	ABB	Gofa	PNP	-COM

*Please contact our nearest sales office for the compatibility with robots not kisted in the compatible robot list

3. Product Specifications

3-1. Product Specifications

	Item		Specification
Common	Installation standard		Compliant with ISO9409-1-50-4-M6 *1)
	Fluid		Air
	Operating pressure		0.1 to 0.6 MPa
	Ambient and operating fluid temperature		-10 to 50 ℃ *2)
	Repeatability		±0.01 mm
	Maximum operating frequency		60 C.P.M.
	Lubrication		Non-lube
	Operating method		Double acting
	Gripping force Actual value per finger (N) **3)**	External gripping force	118 N
		Internal Gripping force	130 N
	Opening/ closing stroke (Both sides)		8 mm
	Weight **4)**	Manual type	776 g*4)
		One push type	783 g*4)
	Connector shape		M8/8 Pin (Plug)
	Air supply (P) port		One touch fittings (φ4)
	Supply voltage		DC24V±10%*2)
solenoid valve	Model		V114
Auto switch	Model		D-M9N/D-M9P
Exhaust throttle valve	Model		ASN2-M5-X937

*1) Robots whose end effector mounting standard differs are equipped with a dedicated mounting flange. (See P5.)
*2) Only when the compatible robot is KUKA's LBR-iiwa, the power supply voltage is DC24V (-15%/+20%) and the maximum operating temperature is 40°C.
*3) These are values at the stroke center when the pressure is 0.5 MPa and the gripping point distance L is 30 mm.
*4) This is the value excluding the weights of the protection cover and connector cable.

3-2. Valve Specifications

Items	Specifications
Ambient and fluid temperatures	-10 to 5°C (4°C *1) No freezing
Manual override	Non-locking push, Locking slotted
Mounting position	Unrestricted
Enclosure	Dustproof

*In case of robot identification code 061

3-3. Solenoid Specifications

Items	Specifications
Coil rated voltage	DC24V
Allowable voltage fluctuation	-10 to +10% (-15 to +20%[*1])
Power consumption	0.4W (0.55W)
Surge voltage suppressor	varistor

*In case of robot identification code 061

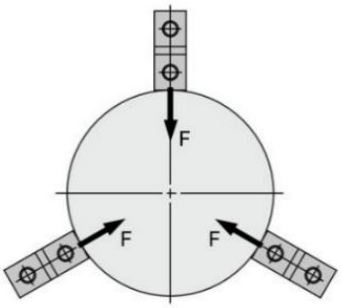
3-4. Auto Switch Specifications

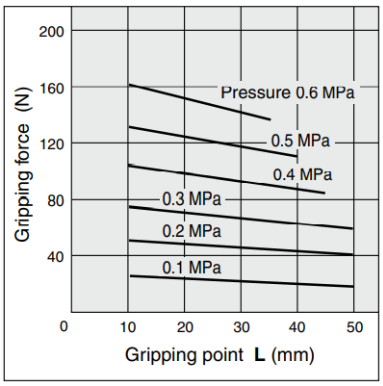
Items	Specifications
Output type	NPN / PNP (Depends on the robots.)
Power supply voltage	DC24V
Current consumption	10 mA or less
Load voltage	28 VDC or less (NPN)
Load current	40 mA or less
Internal voltage drop	0.8 V or less at 10 mA (2 V or less at 40 mA)
Leakage current	100 μA or less at 24 VDC

3-5. Gripping force

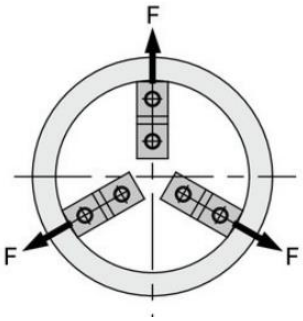
Indication of effective gripping force The effective gripping force shown in the graphs to the right is expressed as F, which is the thrust of one finger when all 3 of the fingers and attachments are in full contact with the workpiece as shown in the figure below.

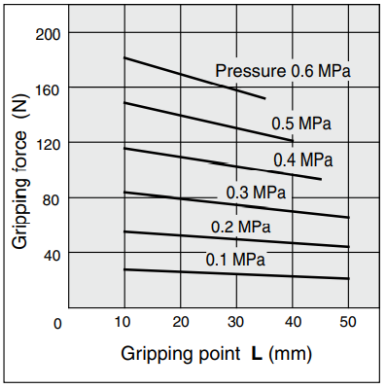
External grip





Internal grip

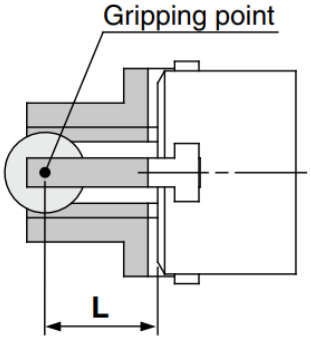




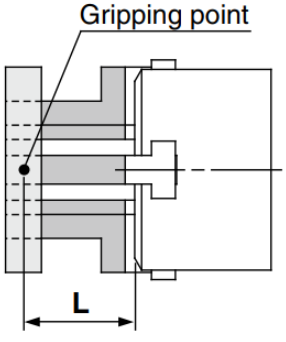
3-6. Gripping Point

The workpiece gripping point distance should be within the gripping force ranges given for each pressure in the effective gripping force graphs below. • If operated with the workpiece gripping point beyond the indicated ranges, an excessive offset load will be applied to the sliding section of the fingers, which can have an adverse effect on the service life of the product.

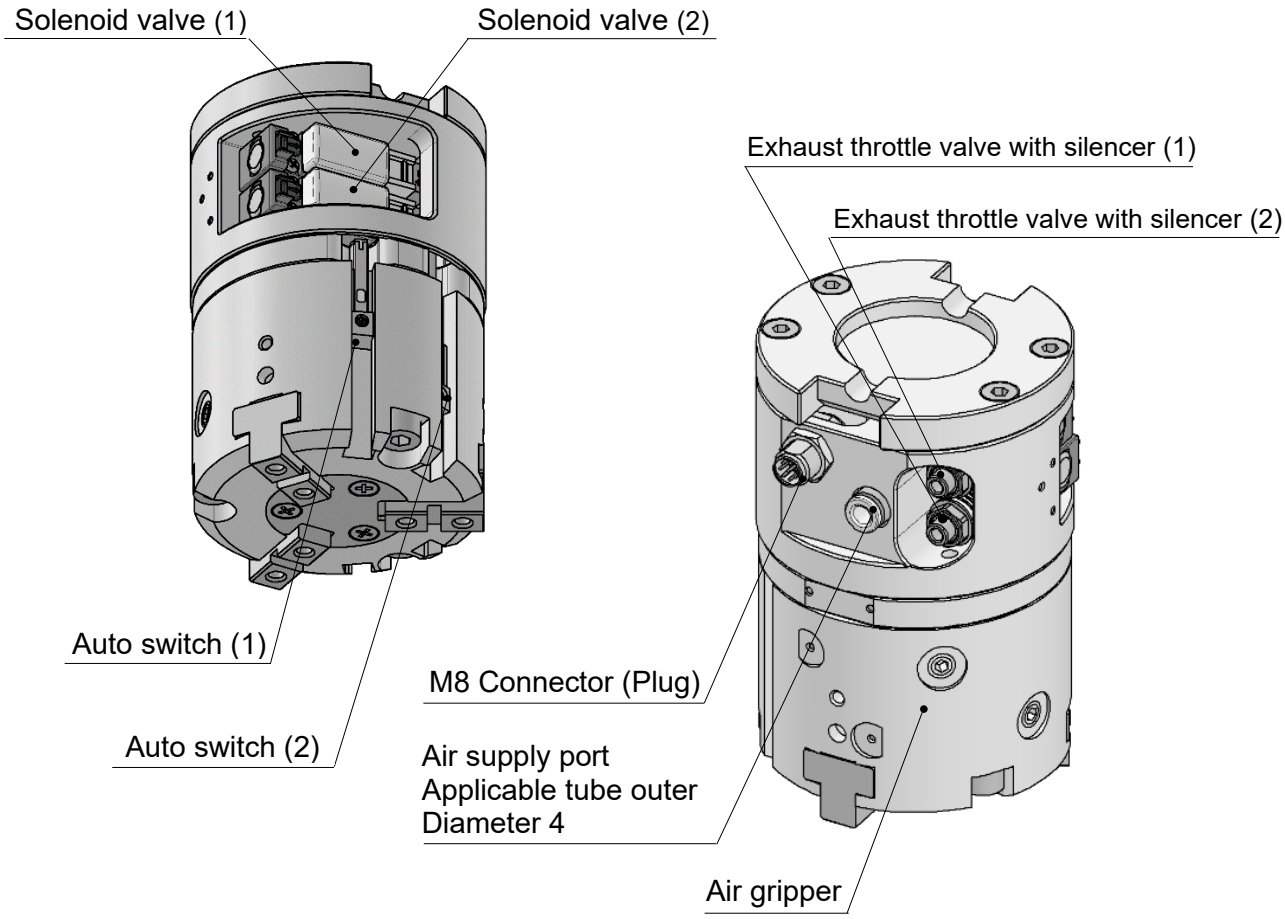
External grip



Internal grip



3-7. Names and function of product parts



Name	Function
Solenoid valve (1)	Control of opening/closing actions of finger
Solenoid valve (2)	Control of opening/closing actions of finger
Auto switch (1)	Detection of closing action of finger
Auto switch (2)	Detection of opening action of finger
Exhaust throttle valve with silencer (1)	Speed control of opening action of finger
Exhaust throttle valve with silencer (2)	Speed control of closing action of finger

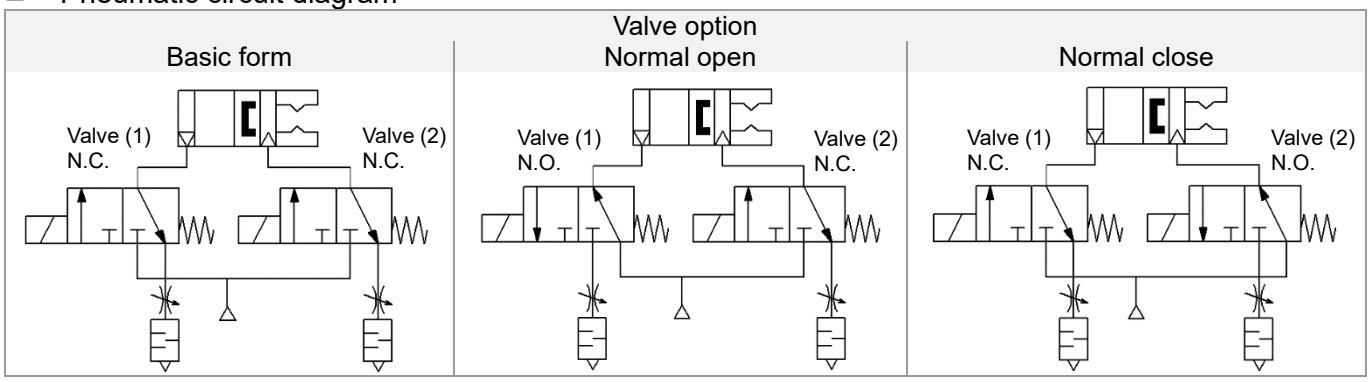
■ Valve ON / OFF state and gripper action

Energization state of valve		Gripper action		
Solenoid valve (1)	Solenoid valve (2)	Basic type	Normal open	Normal close
OFF	OFF	No pressure applied*1	Finger opening	Finger closing
ON	OFF	Finger opening	No pressure applied*1	Pressure applied to both sides*2
OFF	ON	Finger closing	Pressure applied to both sides*2	No pressure applied*1
ON	ON	Pressure applied to both sides*2	Finger closing	Finger opening

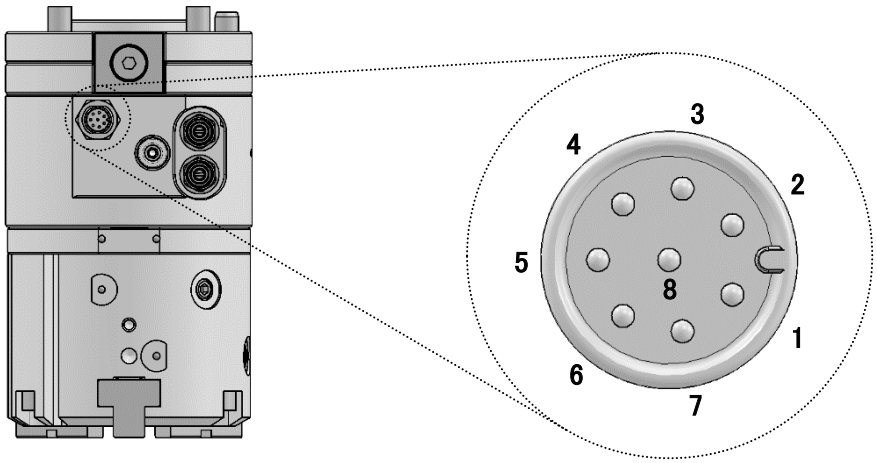
*1 When no pressure is applied, air is not supplied to the cylinders on both the open and close sides. The gripping force becomes zero, and the fingers can be moved by hand.

*2 When pressure is applied to both sides, air is supplied to the cylinders on both the open and close sides. Due to the characteristics of the construction of internal parts, a small force is generated in the opening direction.

■ Pneumatic circuit diagram



3-8.Connector and pin layout



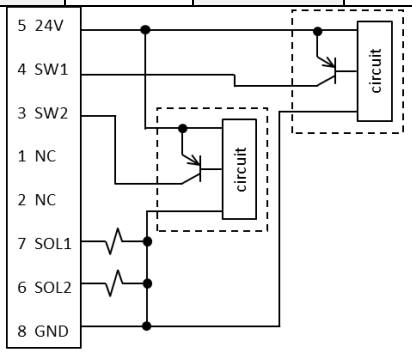
■ Pin layout

Symbol	Company name	PIN No.	Function
011P **043N** **043P** **051P** **081P** **121P**	UNIVERSAL ROBOTS YASKAWA Electric DTP" Series FANUC SIASUN ABB	1	-
		2	-
		3	Auto switch (Finger closing direction)
		4	Auto switch (Finger opening direction)
		5	+24V
		6	Valve (2) ON/OFF
		7	Valve (1) ON/OFF
		8	GND
021N	OMRON TECHMAN ROBOT	1	+24V
		2	Auto switch (Finger opening direction)
		3	Auto switch (Finger closing direction)
		4	-
		5	Valve (1) ON/OFF
		6	Valve (2) ON/OFF
		7	-
		8	GND

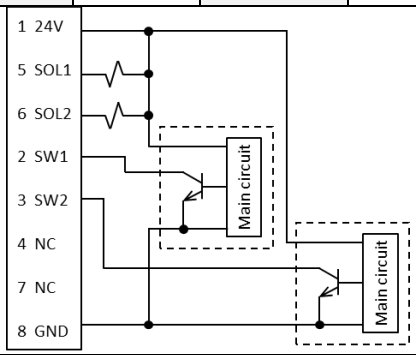
Symbol	Company name	PIN No.	Function
031N **031P**	Mitsubishi Electric	1	GND
		2	+24V
		3	Valve (1) ON/OFF
		4	Valve (2) ON/OFF
		5	-
		6	-
		7	Auto switch (Finger closing direction)
		8	Auto switch (Finger opening direction)
041N **041P** **042N** **042P** **111P**	YASKAWA Electric HAN'S ROBOT	1	+24V
		2	GND
		3	Valve (1) ON/OFF
		4	Valve (2) ON/OFF
		5	Auto switch (Finger opening direction)
		6	Auto switch (Finger closing direction)
		7	-
		8	-
061P	KUKA	1	+24V
		2	-
		3	Auto switch (Finger opening direction)
		4	Auto switch (Finger closing direction)
		5	Valve (1) ON/OFF
		6	Valve (2) ON/OFF
		7	-
		8	GND
071P	Doosan Robotics	1	Auto switch (Finger opening direction)
		2	Valve (1) ON/OFF
		3	Valve (2) ON/OFF
		4	-
		5	+24V
		6	-
		7	Auto switch (Finger closing direction)
		8	GND
091N **091P**	JAKA	1	+24V
		2	Auto switch (Finger opening direction)
		3	Auto switch (Finger closing direction)
		4	Valve (1) ON/OFF
		5	Valve (2) ON/OFF
		6	-
		7	-
		8	GND
101N	AUBO	1	GND
		2	+24V
		3	Auto switch (Finger opening direction)
		4	Auto switch (Finger closing direction)
		5	Valve (1) ON/OFF
		6	-
		7	Valve (2) ON/OFF
		8	-

3-9. Internal circuit diagram

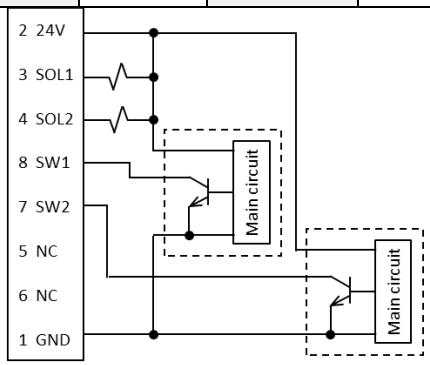
Symbol	011P	Company name	UNIVERSAL ROBOTS
Switch output	PNP	Valve	-COM



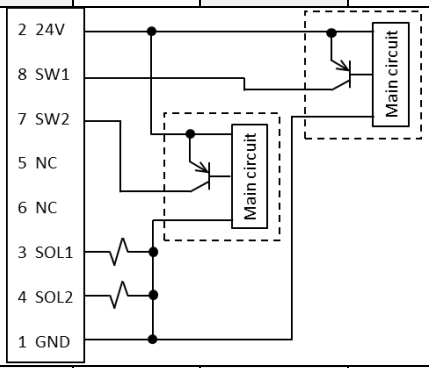
Symbol	021N	Company name	OMRON TECHMAN ROBOT
Switch output	NPN	Valve	+COM



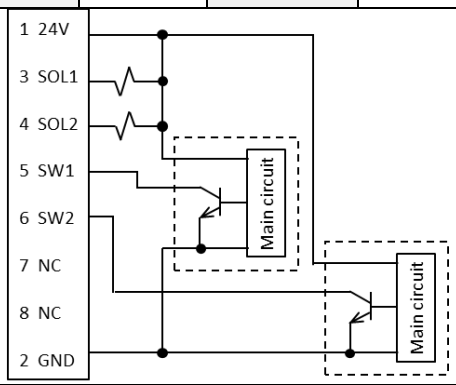
Symbol	031N	Company name	Mitsubishi Electric
Switch output	NPN	Valve	+COM



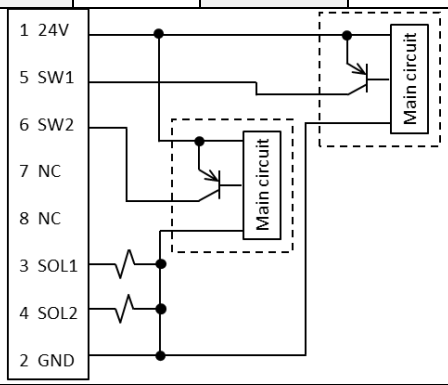
Symbol	031P	Company name	Mitsubishi Electric
Switch output	PNP	Valve	-COM



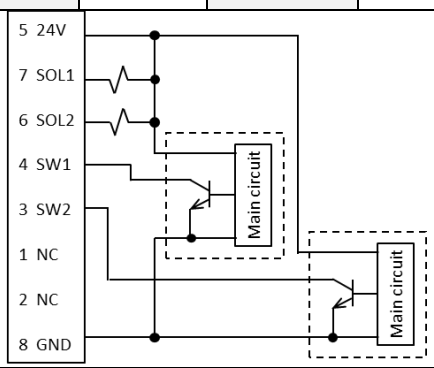
Symbol	041N,042N	Company name	YASKAWA Electric
Switch output	NPN	Valve	+COM



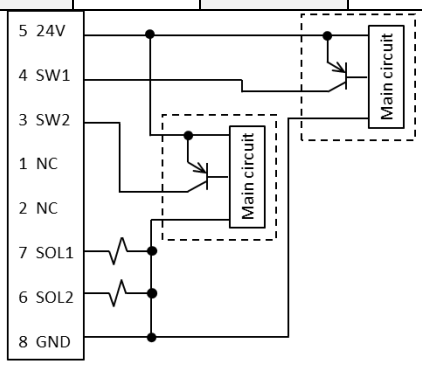
Symbol	041P,042P	Company name	YASKAWA Electric
Switch output	PNP	Valve	-COM



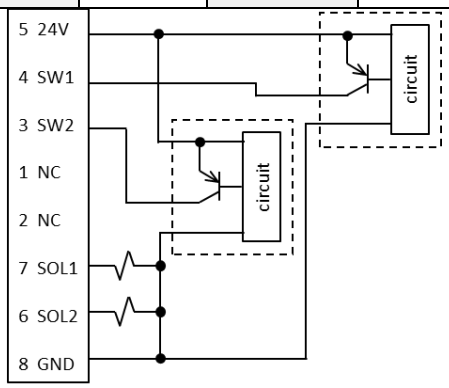
Symbol	043N	Company name	YASKAWA Electric
Switch output	NPN	Valve	+COM



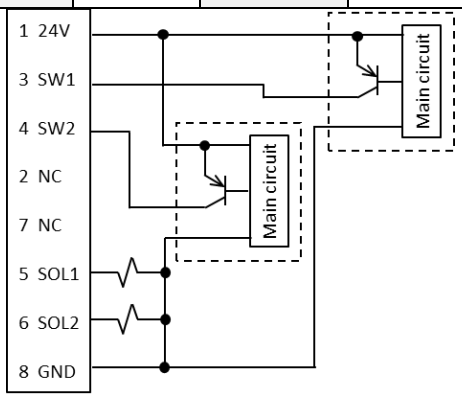
Symbol	043P	Company name	YASKAWA Electric
Switch output	PNP	Valve	-COM



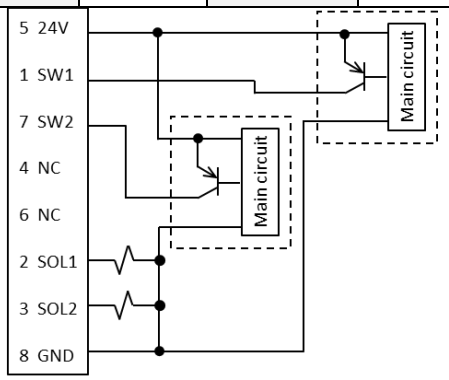
Symbol	051P	Company name	FANUC
Switch output	PNP	Valve	-COM



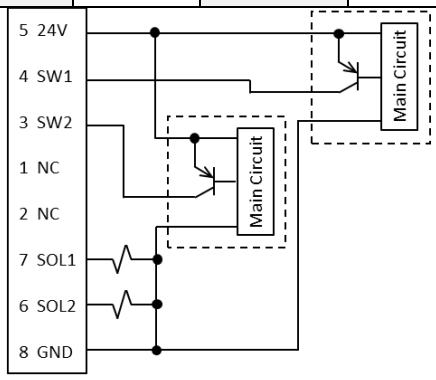
Symbol	061P	Company name	KUKA
Switch output	PNP	Valve	-COM



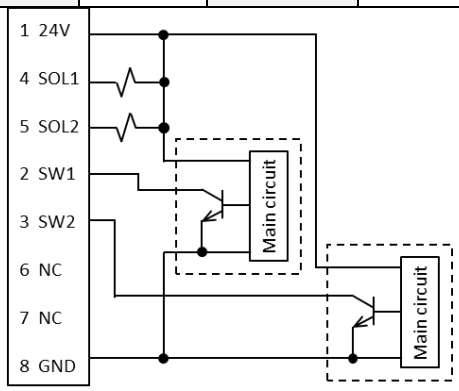
Symbol	071P	Company name	Doosan Robotics
Switch output	PNP	Valve	-COM



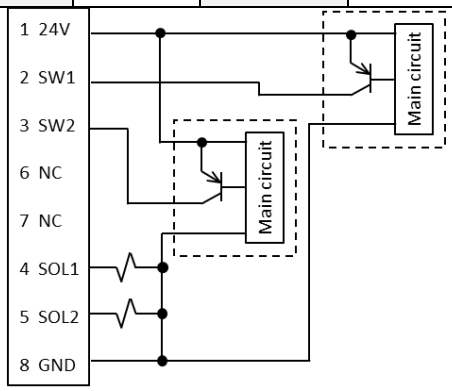
Symbol	081P	Company name	SIASUN
Switch output	PNP	Valve	-COM



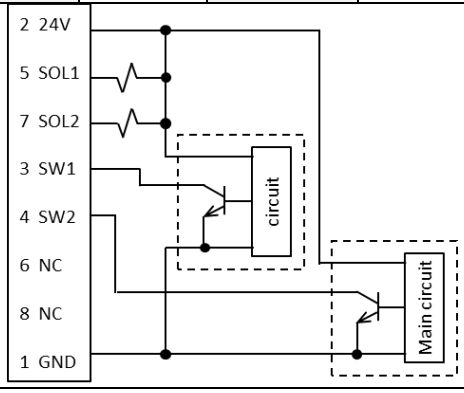
Symbol	091N	Company name	JAKA
Switch output	NPN	Valve	+COM



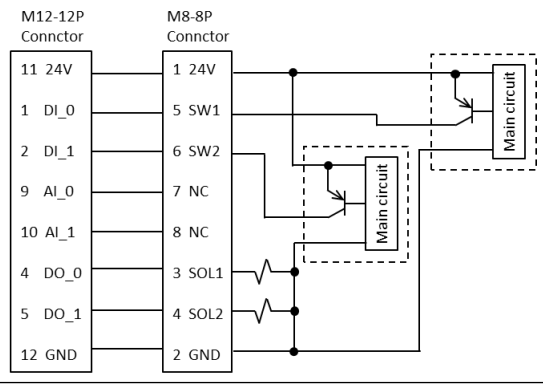
Symbol	091P	Company name	JAKA
Switch output	PNP	Valve	-COM



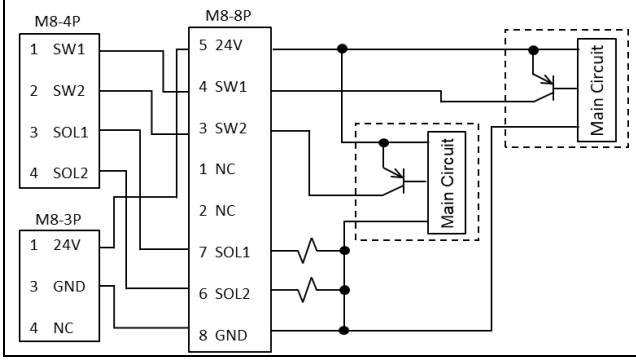
Symbol	101N	Company name	AUBO
Switch output	NPN	Valve	+COM



Symbol	111P	Company name	HAN'S ROBOT
Switch output	PNP	Valve	-COM



Symbol	121P	Company name	ABB
Switch output	PNP	Valve	-COM



4. Installation

⚠ Warning

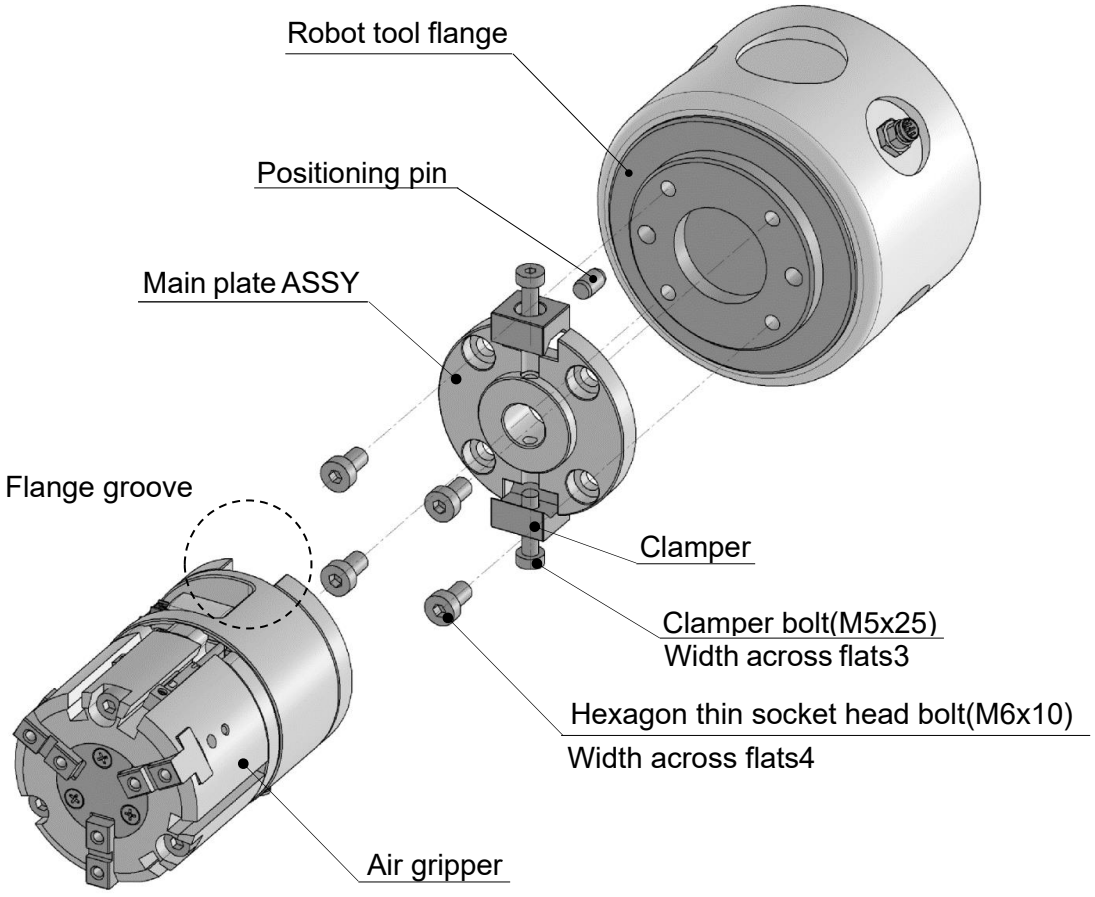
1. Install and operate the product only after reading the Operation Manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.
2. When installing the products, allow access for maintenance.
3. Do not scratch or dent the air gripper by dropping or bumping it when mounting. Slight deformation can cause inaccuracies or a malfunction.
4. Tighten the screw within the specified torque range when mounting the attachment. Tightening with a torque above the limit can cause malfunction, while insufficient tightening can cause slippage and dropping.
5. When mounting the gripper, tighten the screws to the appropriate torque within the limiting range. Tightening with a torque above the range may cause malfunction, while insufficient tightening may cause slippage and dropping.

4-1. Installation Manual type

Manual type

■ Mounting product

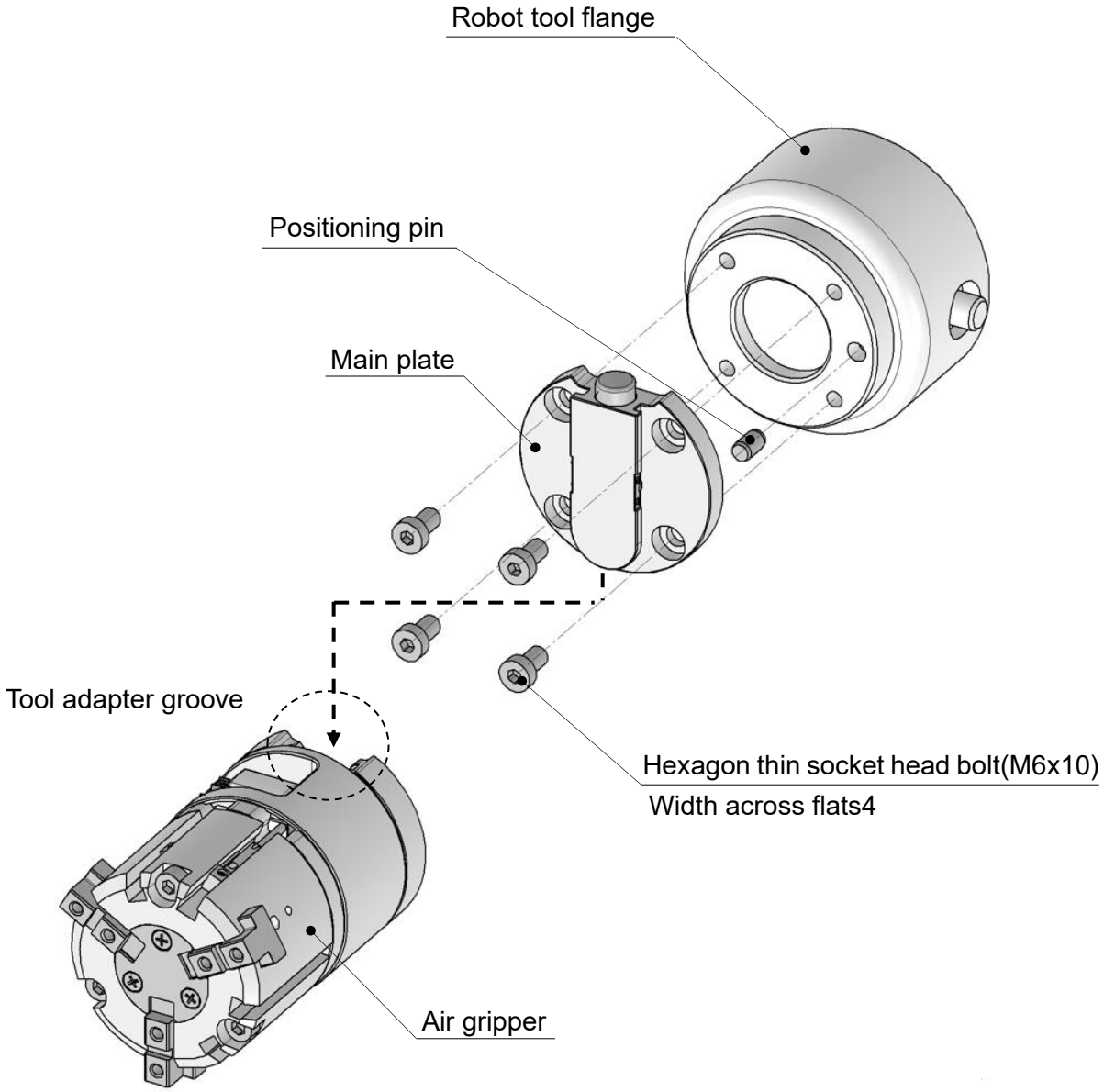
1) Insert parallel pins to the pin holes of the robot tool flange.
2) Insert the parallel pins by aligning them with the long holes of the main plate ASSY, and mount the main plate onto the robot with the supplied hexagon thin socket head bolts. (Tightening torque: 5.2 ±0.5 N·m)
3) Confirm that the clamper bolts on the main plate ASSY are loosened, and align the clampers with the flange grooves on the air gripper side.
4) Tighten the clamper bolts to mount the air gripper. (Tightening torque: 3.0 ±0.3 N·m)



One push type

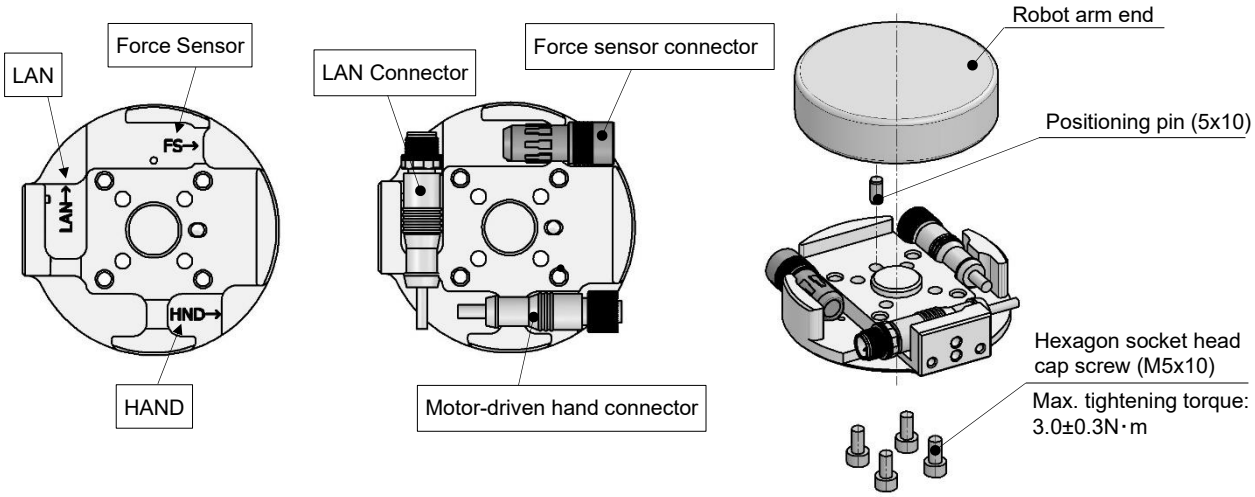
■ Mounting product

1) Insert parallel pins to the pin holes of the robot tool flange.
2) Insert the parallel pins by aligning them with the long holes of the main plate ASSY, and mount the main plate onto the robot with the supplied hexagon thin socket head bolts.
   (Tightening torque: 5.2 ±0.5 N·m)
3) While pressing the main plate's push button, attach it to the groove on the tool adapter.

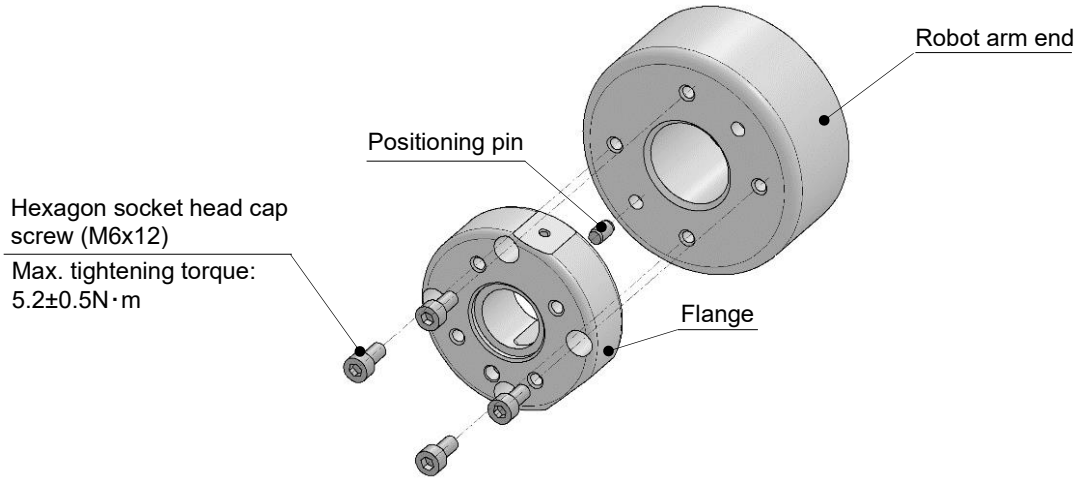


■ Installation of dedicated flange (identification symbol: 031N, 031P, 041N, 041P, 042N, 042P)
Before mounting the main plate ASSY, mount the dedicated flange.

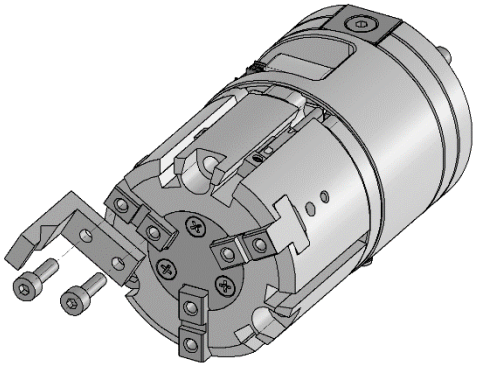
● Flange dedicated to Mitsubishi Electric



● Flange dedicated to YASKAWA Electric
*Figure by MOTOMAN-HC10DT

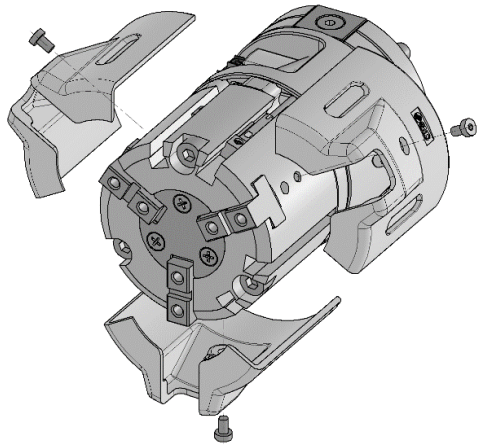


■ How to mount attachment
When attaching or detaching the finger attachment, use the tightening torque shown in the table below.



Bolt	Max. tightening torque
M4x0.7	1.5±0.15 N・m

■ How to mount protection cover
When attaching or detaching a protective cover, use the tightening torque shown in the table below.

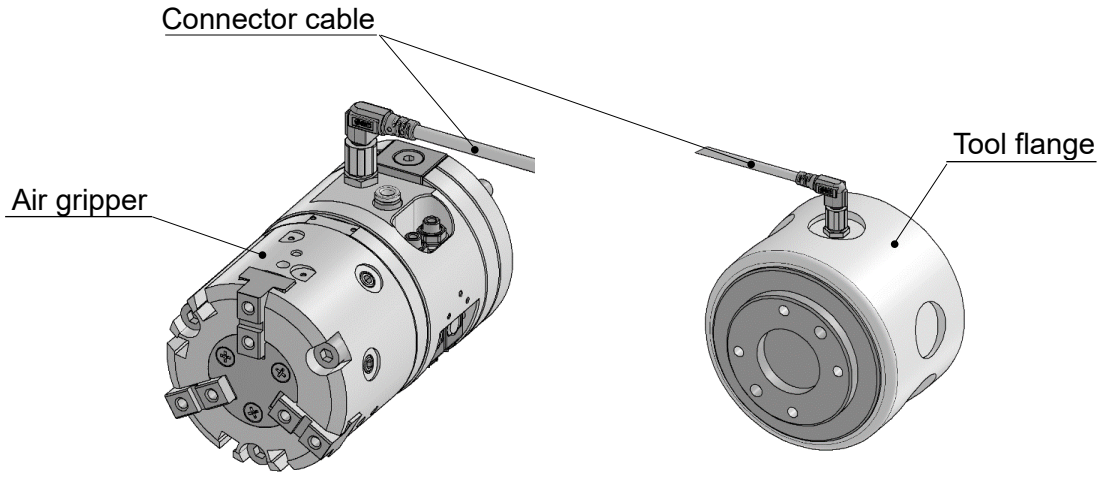


Bolt	Max. tightening torque
M3x0.5	0.63±0.06 N・m

4-2. Wiring

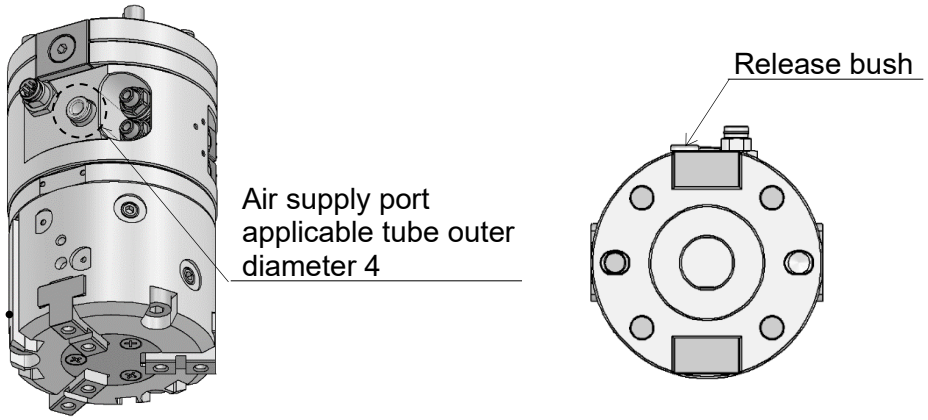
Connect a cable between the air gripper connector and the connector on the tool flange. For the connector pin layout and internal circuit, refer to “3-5 Connector pin layout” and “3-6 Internal circuit diagram.”

* Do not energize the product while securing the connector.
* Secure the connector so that it does not become loose.



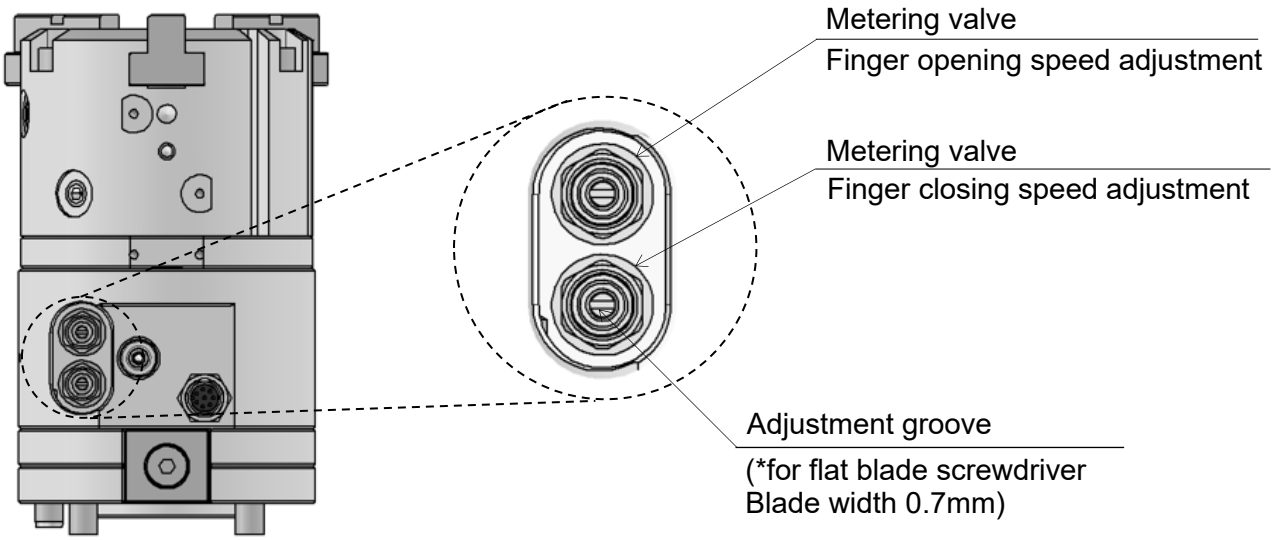
4-3. Piping

■ Tubing
Connect a tube (applicable tube O.D. φ4) to the air supply port. To remove the tube, pull out the tube while pushing the release button.



4-4. Finger open / close speed adjustment

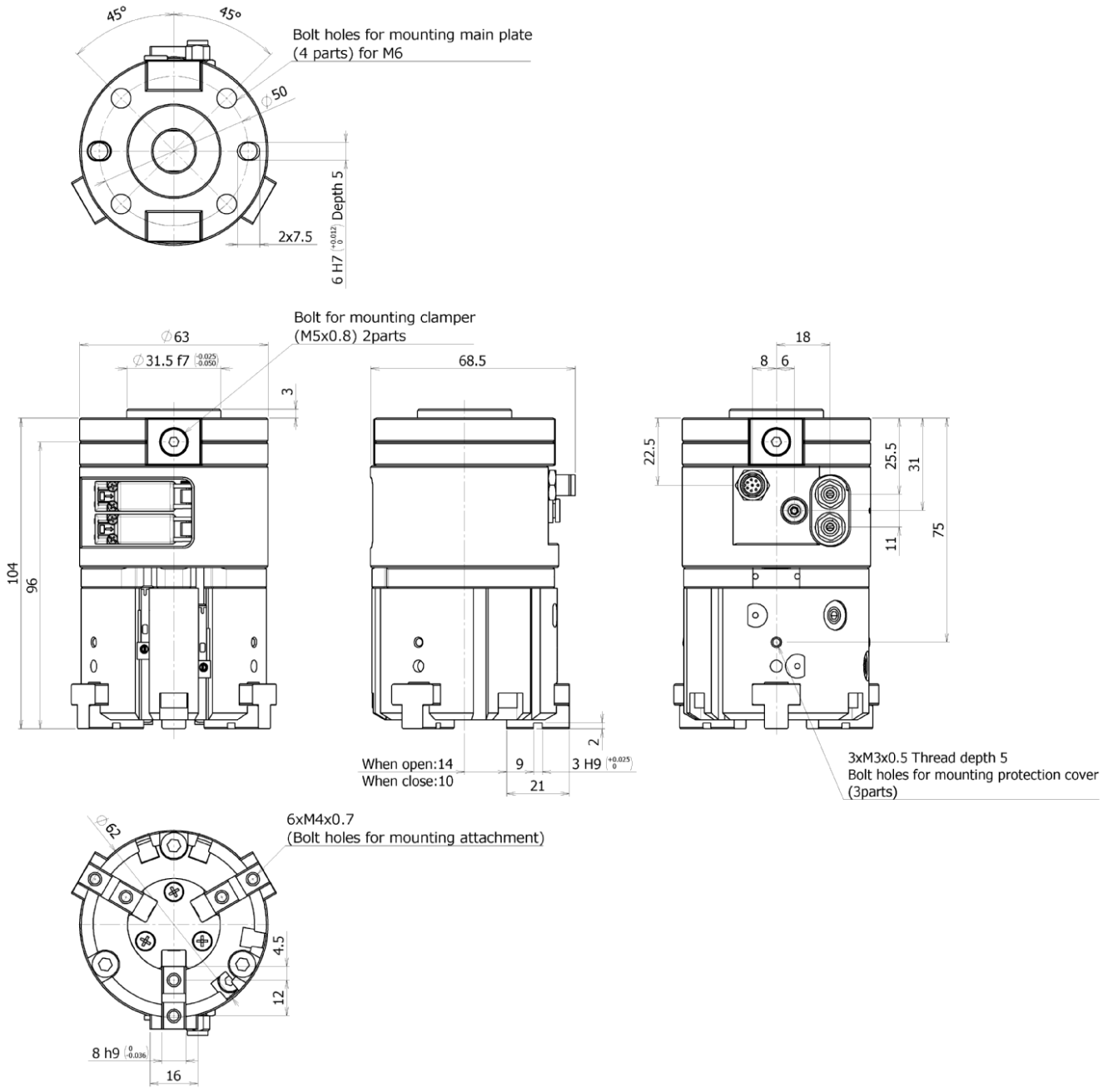
- *For adjustment of the opening of the exhaust restrictor, use a flat blade screwdriver.
  *Adjust the openings of two exhaust restrictors to approximately the same level. If they are extremely different from each other, the operation may become unstable.



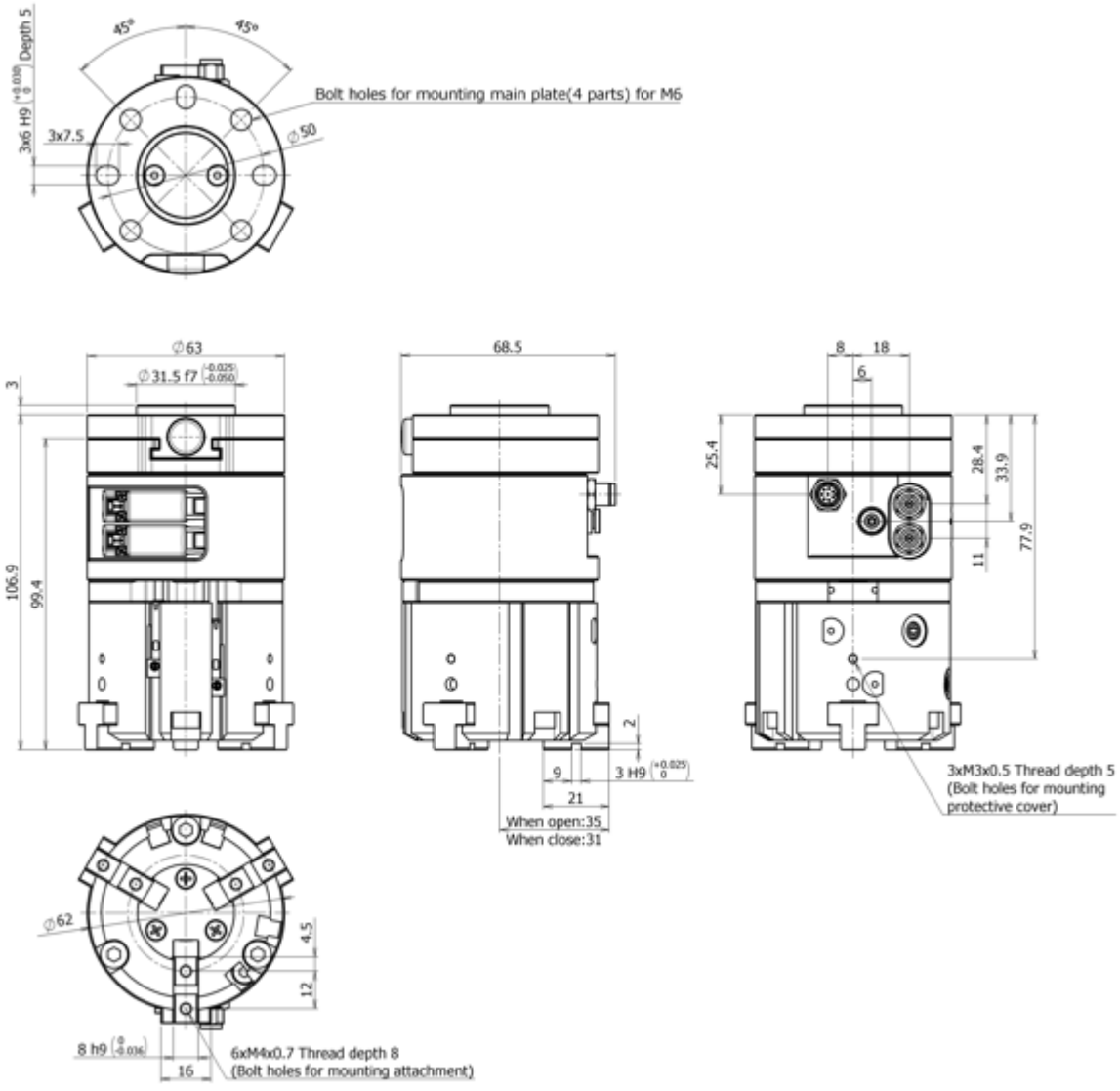
5. Dimensions

5-1. Air gripper

Manual type

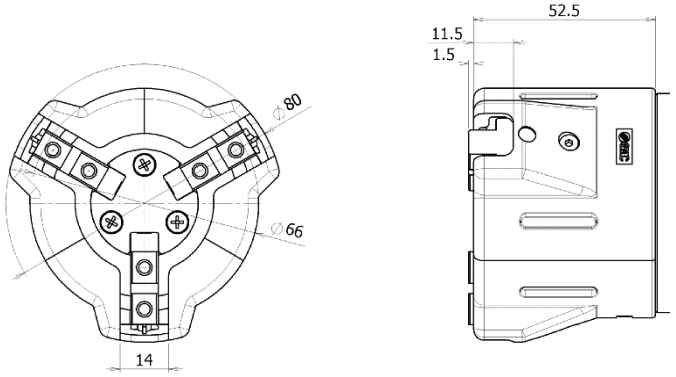


One push type



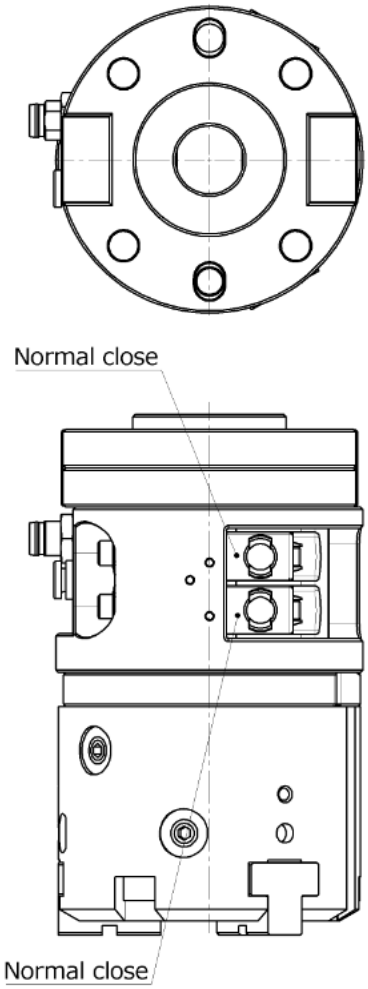
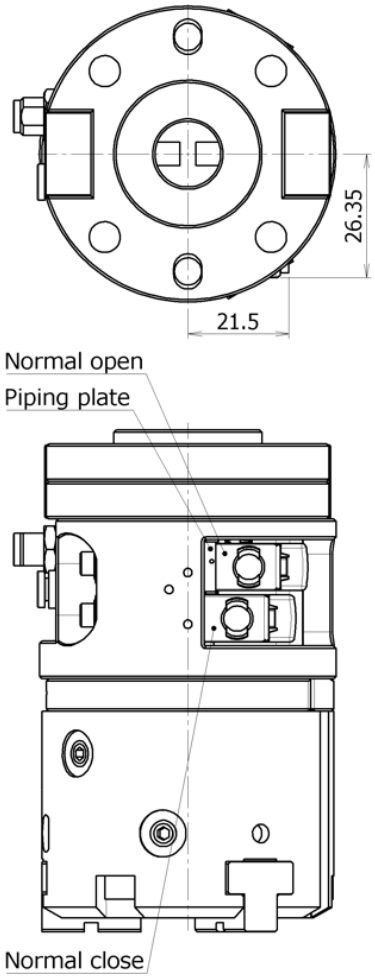
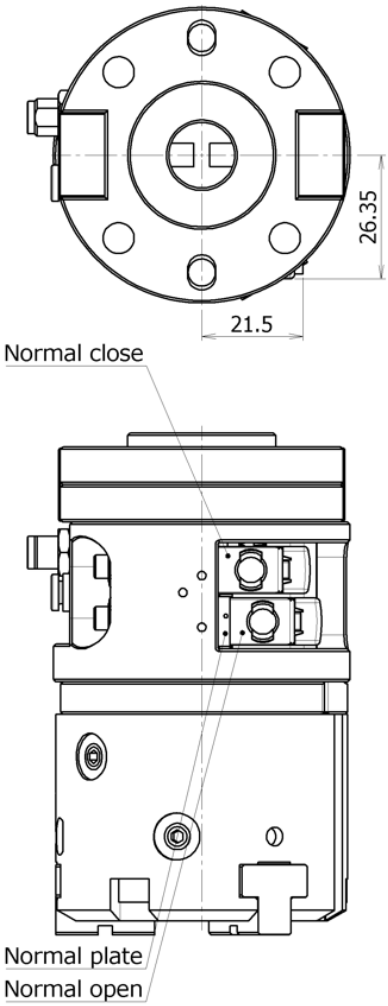
5-2. Protection cover

When the protective cover is mounted, the following dimensions change from when the cover is not mounted.



5-3. Valve option

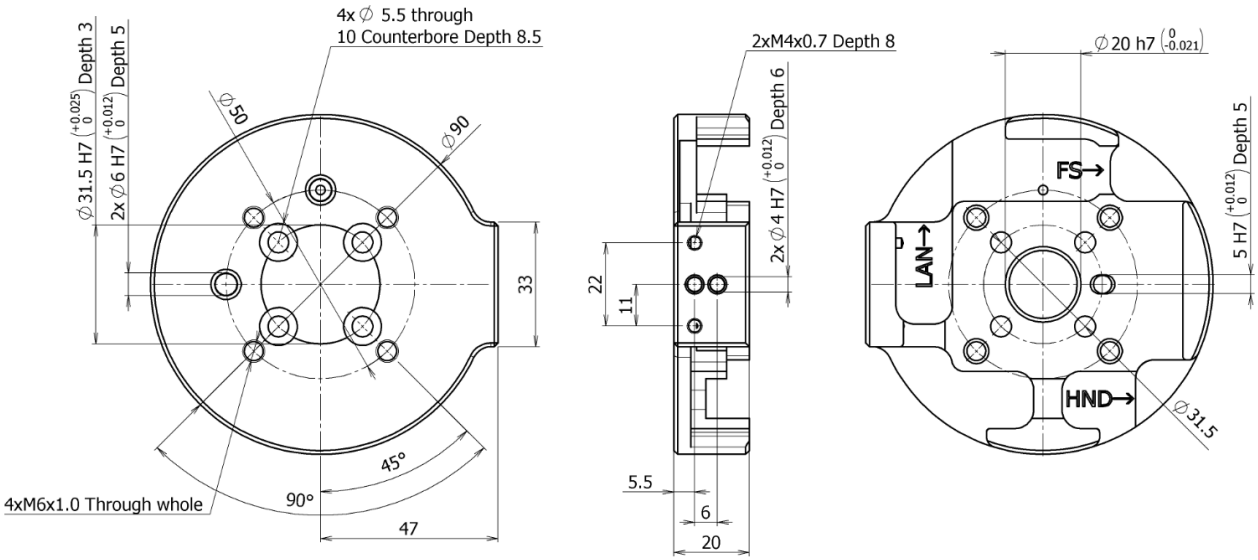
When a valve option (normally open or normally closed) is selected, a piping plate that switches the valve flow path is included with the valve.

Basic form	Normal open	Normal close
		

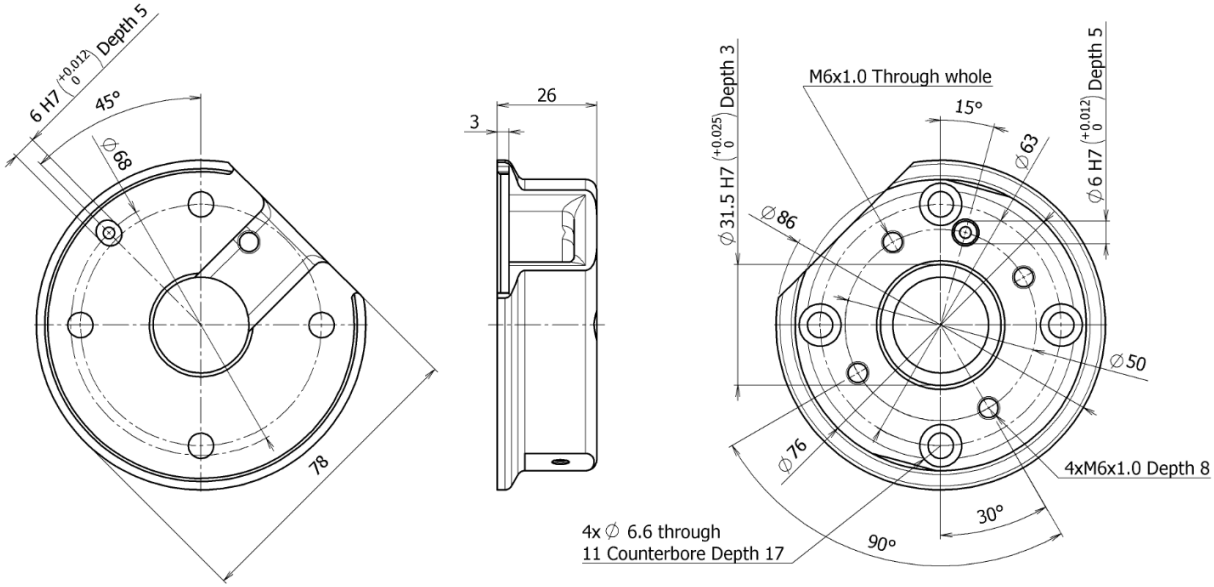
5-4. Dedicated flange

* The air grippers for Mitsubishi Electric and YASKAWA Electric (identification symbol: 031N, 031P, 041N, 041P, 042N, 042P) come with dedicated flanges (including mounting bolts).

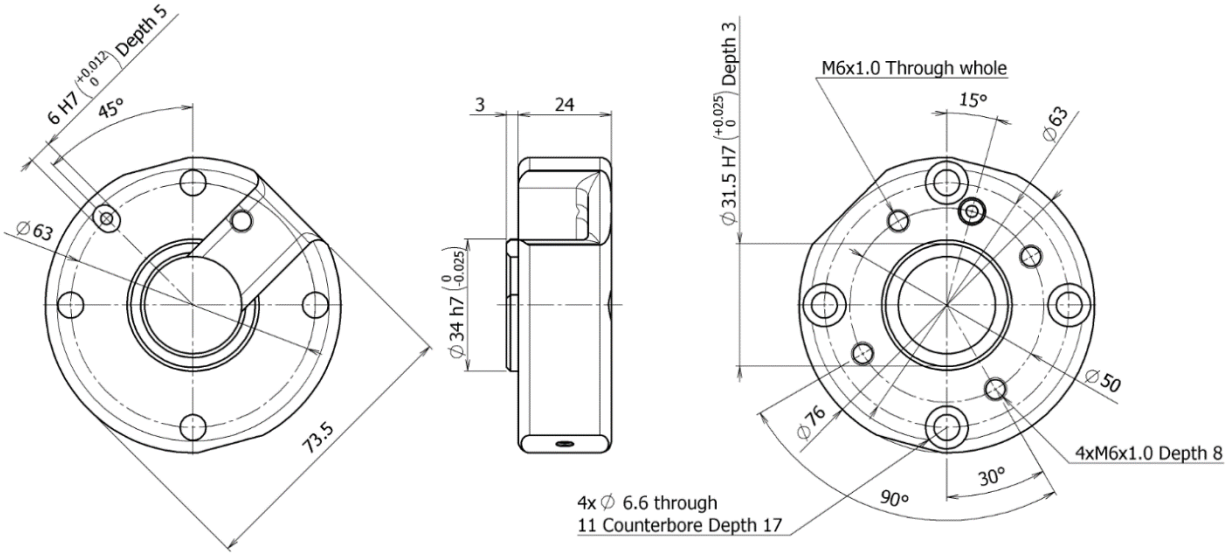
■ Flange for ASSISTA from Mitsubishi Electric



■ Flange for MOTOMAN-HC10 from YASKAWA Electric



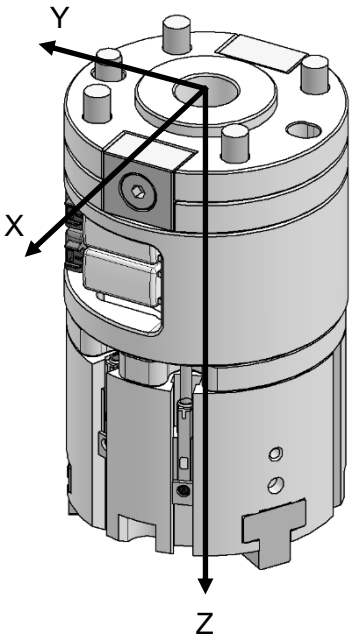
■ Flange for MOTOMAN-HC10DT from YASKAWA Electric

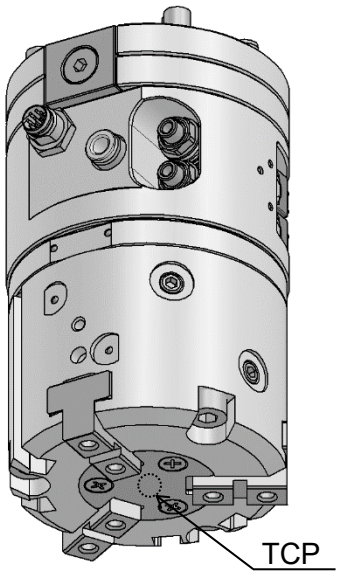


5-5. Position of the center of gravity and TCP

TCP (tool center point) indicates the coordinates of the tip of the finger. Change the value of TCP when a finger attachment is installed in accordance with the finger attachment in use.

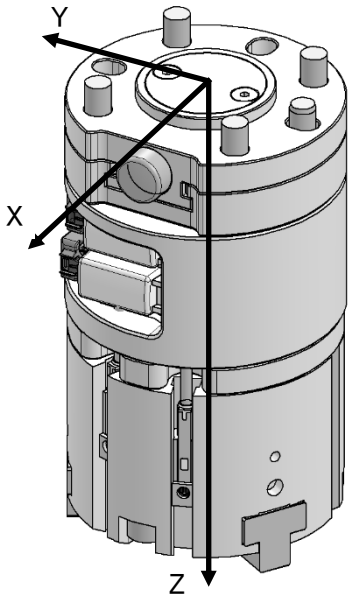
Manual type

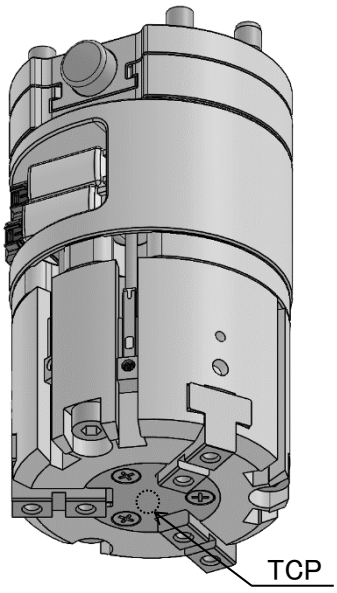




	X	Y	Z
Center of gravity[mm]	0.53	-1.26	53.17
TCP[mm]	0	0	104

One push type





	X	Y	Z
Center of gravity[mm]	−0.56	1.04	55.17
TCP[mm]	0	0	106.9

6. Maintenance

6-1. Precautions

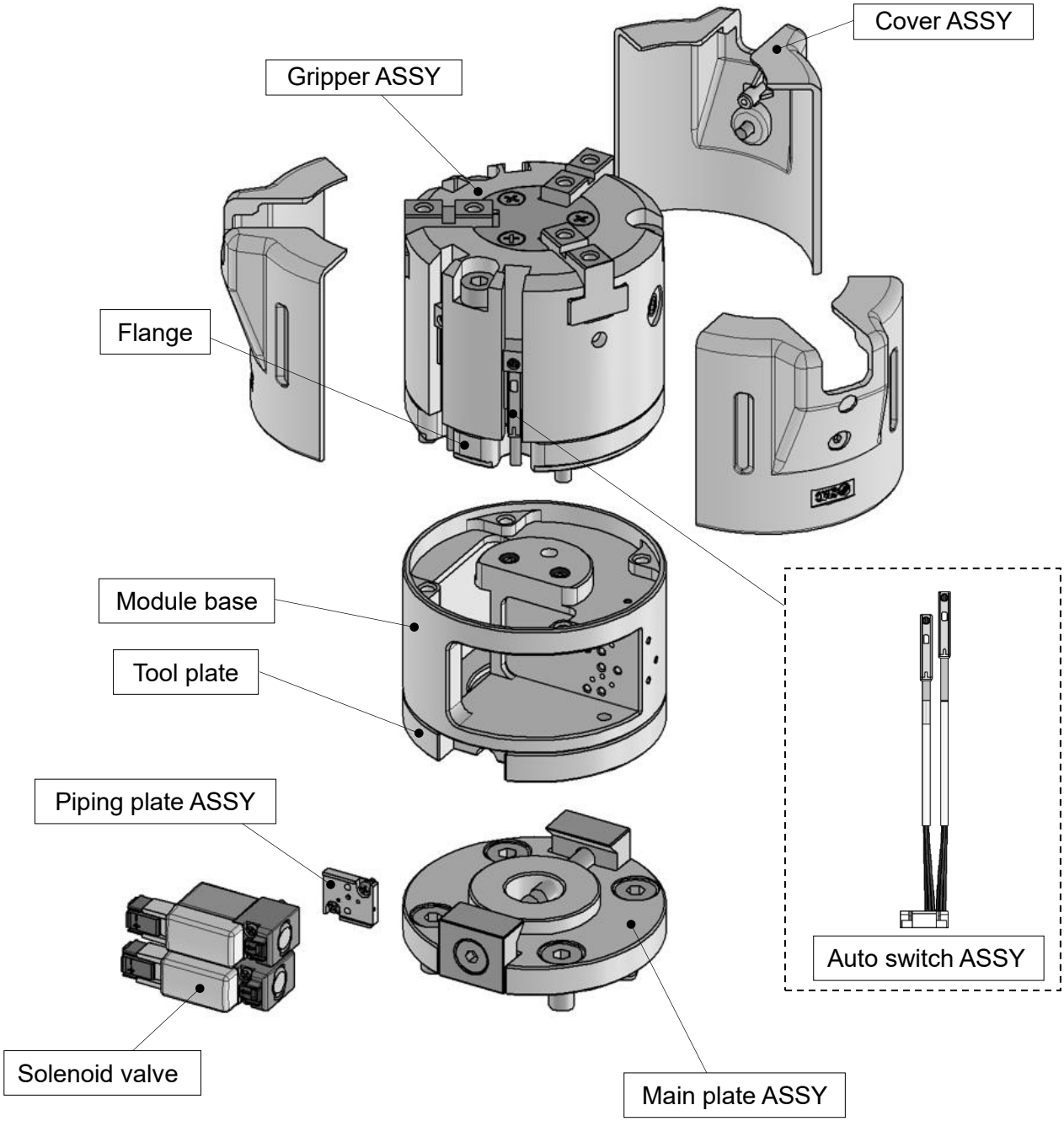
⚠ Warning

1. Perform maintenance or inspection in accordance with the procedures indicated in the operation manual.
If handled improperly, malfunction and damage of machinery or equipment may occur.
2. If handled improperly, compressed air can be dangerous. The assembly, handling, repair and element replacement of pneumatic systems should be performed by a knowledgeable and experienced person.
3. Drain air grippers, etc. on a regular basis.
4.When air grippers are removed, first confirm that measures are in place to prevent any workpieces from dropping, run-away of equipment, etc. Then cut off the supply pressure and electric power and exhaust all compressed air from the system using the residual pressure release function.
When the equipment is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from sudden movement.
5. Do not allow people to enter or place objects in the carrying path of the air gripper.
Otherwise, injury or an accident may occur.
6. Do not put hands, etc. in between the air gripper fingers or attachments.
Otherwise, injury or an accident may occur.
7. When removing the air gripper, first confirm that no workpieces are being held and then release the compressed air before removing the air gripper.
If a workpiece is still being held, there is a danger of it being dropped.

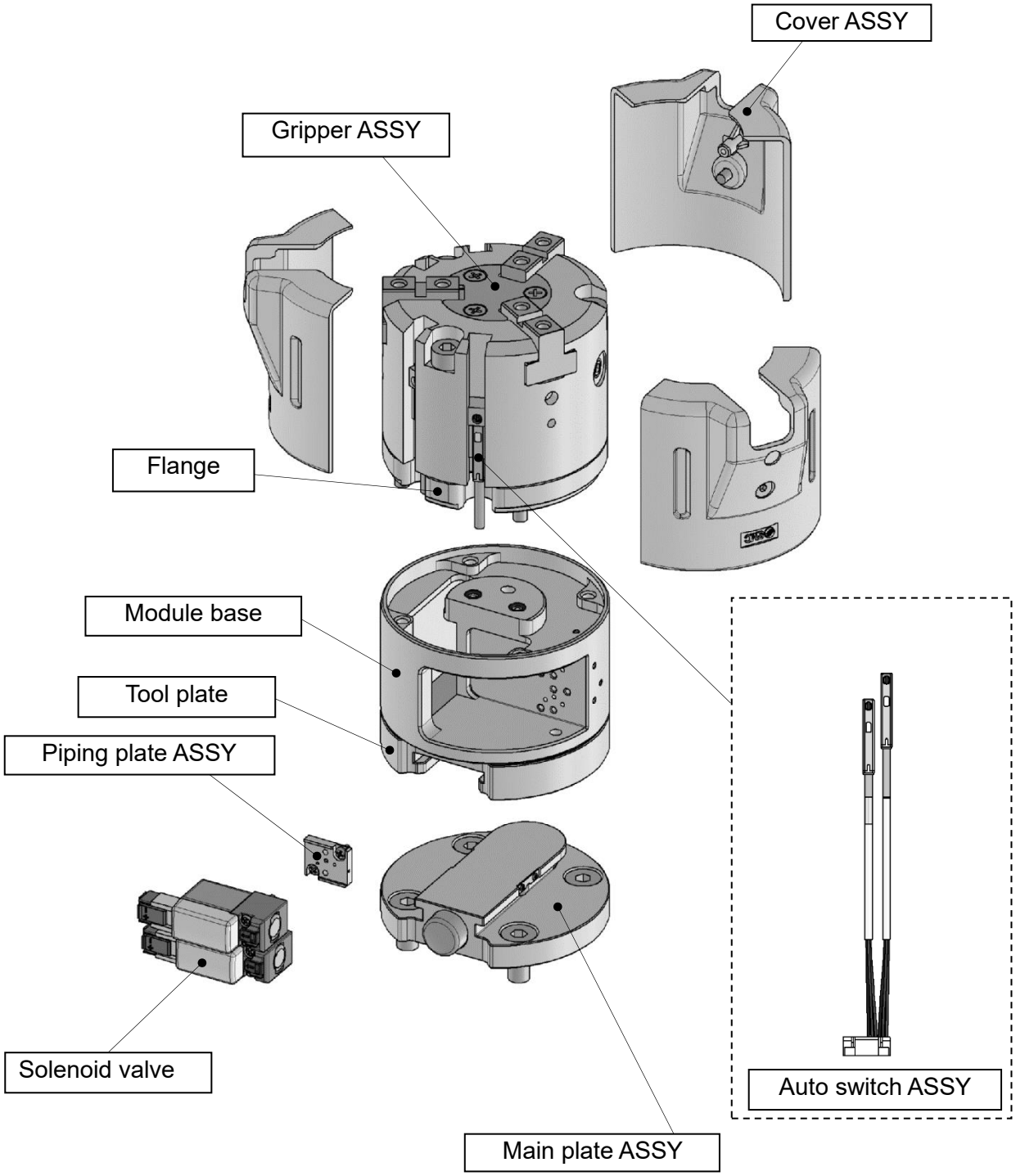
6-2. Exploded view

* Cables are omitted from the diagram.

Manual type



One push type



6-3. Replacement Parts

■ Table of product numbers of replacement parts

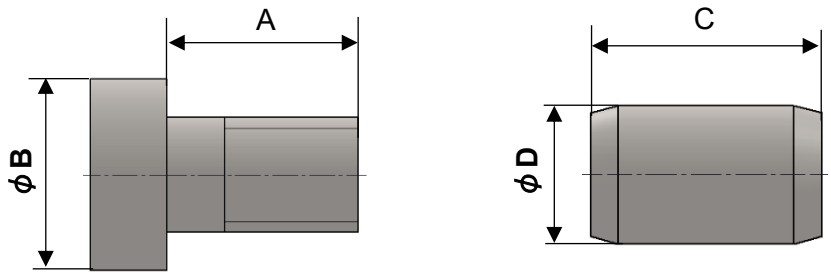
Part Name			Order number	Parts included
Gripper ASSY			RMH-A26-01	Air gripper
Protection cover ASSY			RMH-A26-08	Protection cover, Mounting Bolt
Dedicated flange	Mitsubishi Electric 031N,031P		JMHZ-A16-X7400-BRK-01	Dedicated flange Mounting Bolt
	YASKAWA Electric 041N,041P		JMHZ-A16-X7400-BRK-02	Dedicated flange Mounting Bolt Cable fixtures
	YASKAWA Electric 042N,042P		JMHZ-A16-X7400-BRK-03	
Auto switch ASSY*1	PNP		RMH-A00-05P	Auto switch ASSY
	NPN		RMH-A00-05P	
3 port solenoid valve	Normal open*2		V124-5MOU	3 port solenoid valve Mounting Bolt
	Normal close		V114-5MOU	
	KUKA 061P	Normal open*2,3	V114-5MOU-X647	
		Normal close*3	V124-5MOU-X647	
Main plate ASSY		Other than the following	RMH-A00-09-A	Main plate, Mounting Bolt Clamp, etc
		Symbol 071P,081P,101N	RMH-A00-09-B	
		Symbol 091N,091P,121P	RMH-A00-09-C	
Main plate		Other than the following	RMTM1-M1-X101	Main plate, Mounting Bolt
		Symbol 071P,081P,101N	RMTM1-M1-X101B	
		Symbol 091N,091P,121P	RMTM1-M1-X101C	
Piping plate ASSY*2			RMH-A00-06	Piping plate, Mounting Bolt, Gasket
One touch fittings			KQ2S04-M5N	
Exhaust throttle valve silencer			ASN2-M5-X937	

*1 An auto switch ASSY is an assembly part in which two auto switches are integrated into one part. When replacing an auto switch, replacement is conducted in units of auto switch ASSY. (An individual auto switch cannot be replaced.)

*2 When installing a normally-open valve, a piping plate ASSY is necessary.

*3 When KUKA is used, a 3-port solenoid valve is available as a special order.

■ Bolts and positioning pins for main plate ASSY mounting
Bolts and positioning pins for main plate ASSY are included with the main plate ASSY, but can be ordered in quantities of 1 or more by the part numbers listed below.



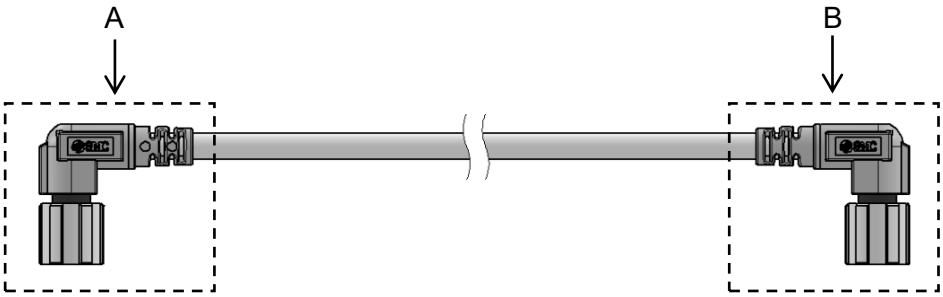
Dimensions

Part No.	Part name	A	φB	C	φD
RMH-A00-14	Hexagon thin socket head bolt	10	10	—	—
RMH-A00-15		8	10	—	—
RMH-A00-16	Positioning pin	—	—	10	6h8
RMH-A00-17		—	—	15	6h8

Main plate ASSY Compatible robot

Supported robots	Hexagon thin socket head bolt		Positioning pin	
	Part No.	pcs	Part No.	pcs
011	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
021	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
031	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
041	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
042	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
043	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
051	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
061	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
071	RMH-A00-15	Four／Unit	RMH-A00-16	One／Unit
081	RMH-A00-15	Four／Unit	RMH-A00-16	One／Unit
091	RMH-A00-14	Four／Unit	RMH-A00-17	One／Unit
101	RMH-A00-15	Four／Unit	RMH-A00-16	One／Unit
111	RMH-A00-14	Four／Unit	RMH-A00-16	One／Unit
121	RMH-A00-14	Four／Unit	RMH-A00-17	One／Unit

■ Connector cable



Symbol	Robot manufacturer	A Air gripper side	B Robot side	Part No.
011P	UNIVERSAL ROBOTS	M8 8 Pin connector (Socket)	M8 8 Pin connector (Socket)	RMH-A00-11-A
021N	OMRON TECHMAN ROBOT		M8 8 Pin connector (Plug)	RMH-A00-11-B
031N	Mitsubishi Electric		M12 8 Pin connector (Plug)	RMH-A00-11-C
031P				
041N	YASKAWA Electric		Made by MOLEX 51227-0800	MH-7400-ADP-D-01
041P				
042N				
042P				
043N			M8 8 Pin connector (Socket)	RMH-A00-11-A
043P				
051P	FANUC		M8 8 Pin connector (Socket)	RMH-A00-11-A
061P	KUKA		M8 8 Pin connector (Plug)	RMH-A00-11-B
071P	Doosan Robotics		M8 8 Pin connector (Socket)	RMH-A00-11-B
081P	SIASUN		M8 8 Pin connector (Socket)	RMH-A00-11-A
091N	JAKA		M8 8 Pin connector (Plug)	RMH-A00-11-B
091P				
101N	AUBO		M8 8 Pin connector (Socket)	RMH-A00-11-A
111P	HAN'S ROBOT		M12 12 Pin connector (Plug)	RMH-A00-11-D
121P	ABB		M8 3 Pin, M8 4 Pin connector (Plug)	RMH-A00-11-E

6-4. Procedures for replacing parts

■ Procedures for replacing gripper ASSY

1) Loosen the screws of the auto switch.
2) Loosen the hexagon socket head cap screws (M5x40) and remove the gripper assembly from the flange.
3) Replace the gripper and mount the dismounted parts by following the above steps in the reverse order.

* Precaution

① When disassembling the product, take care not to lose the positioning pin and O-ring.

② **<u>The lengths of the cables of two auto switches are different from each other.</u>** When installing the auto switches, fix them in the orientation shown in Step 2) of the figure below.

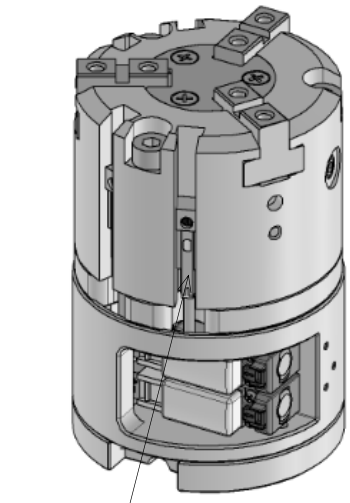
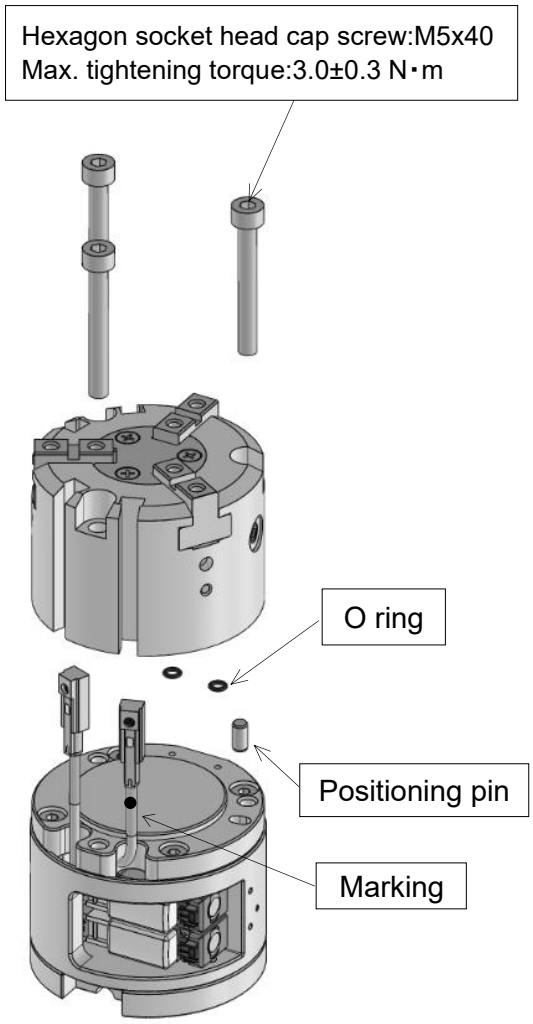
	Step1)	Step2)
Image		

***Figure shows the mounting interface, manual type.**

■ Procedures for replacing auto switch ASSY

1) Follow the same steps as Step 1) and Step 2) in “Procedures for replacing gripper ASSY.”
2) Loosen the hexagon socket head cap screws (M4x8) and remove the flange.
3) Loosen the hexagon socket head cap screws (M4x8) and remove the tool plate.
4) Take the auto switches out from the tool plate side to the extent that the connector of the substrate in the module base is visible.
5) Replace the auto switch ASSY by disconnecting the connector and mount the dismounted parts by following the above steps in the reverse order.

* Precaution

- When disassembling the product, take care not to lose the positioning pin and O-ring.

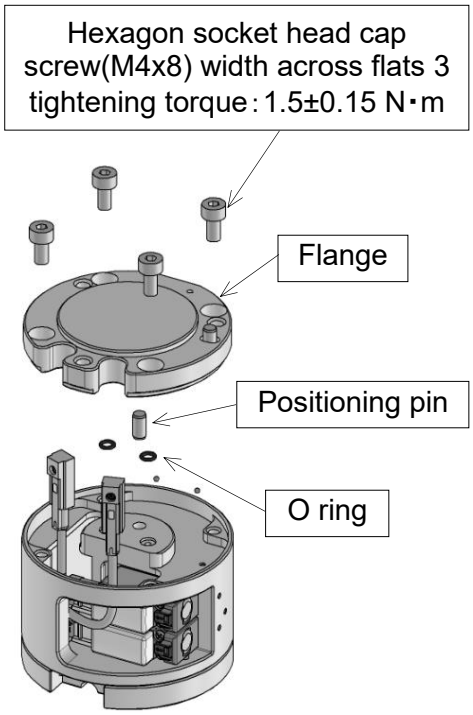
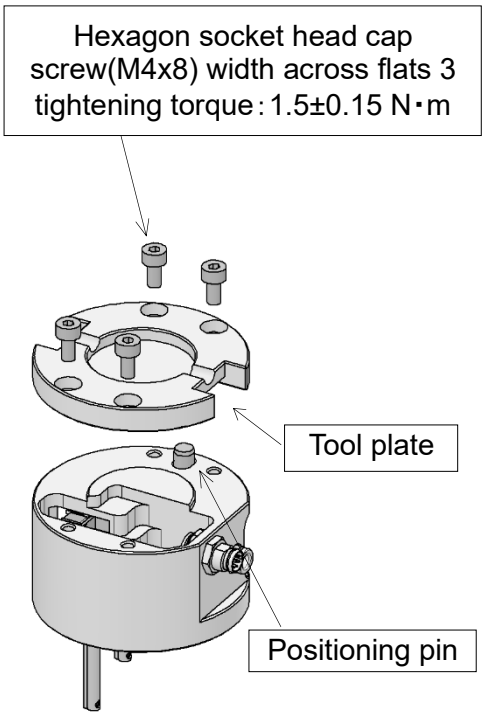
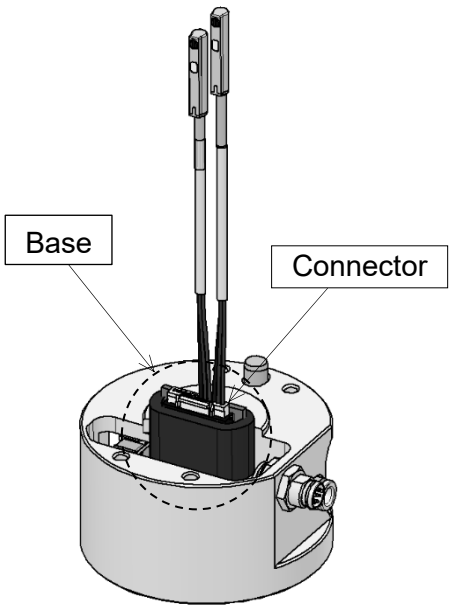
	Step2)	Step3)
Image		
	Step4)	
Image		

***Figure shows the mounting interface, manual type.**

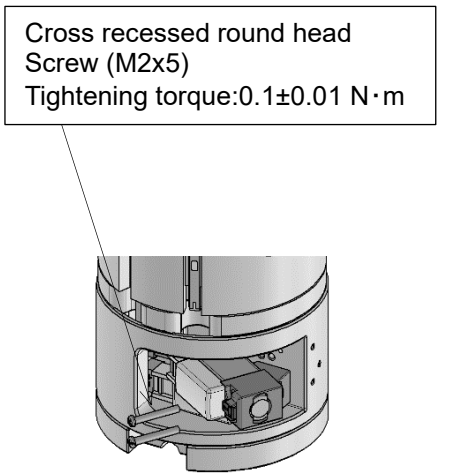
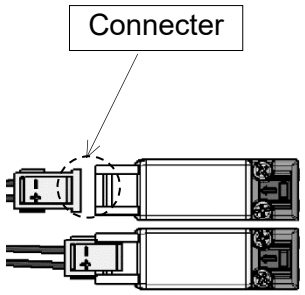
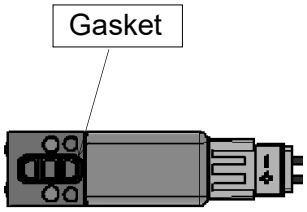
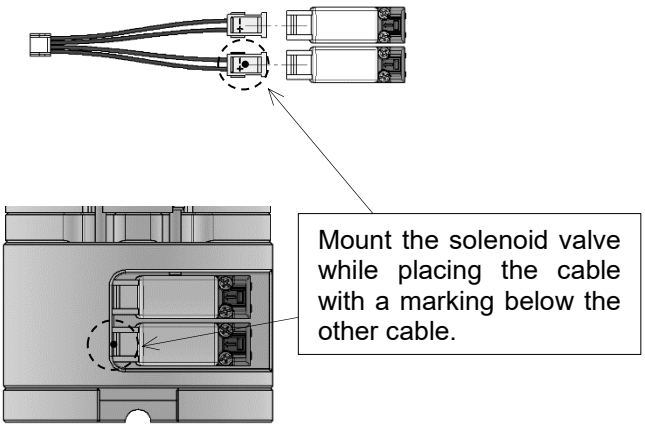
■ Procedures for replacing solenoid valve (valve option: basic type)

1) Loosen the cross recessed head machine screw (M2X5) and take the solenoid valve out.
2) Remove the connector and replace the valve. (The product number of the replacement valve is **V114-5MOU**)

* Precaution

① A gasket is mounted on the solenoid valve. Take care not to lose the gasket or have dirt attach on it at the time of replacement.

② Refer to Precaution 2 and mount the solenoid valve while placing the cable with a marking to be below the other cable.

	Step1)	**Step2)**
Image		
	Precaution ①	**Precaution ②**
Image		

■ Solenoid valve replacement procedure (valve option: normally open, normally closed)

In the normally open or normally closed version, a piping plate is assembled between the valve on one side and the module base. The valve on the side with the piping plate should be replaced with V124-5MOU and the valve on the other side with V114-5MOU. The replacement procedure is the same as for the basic type.

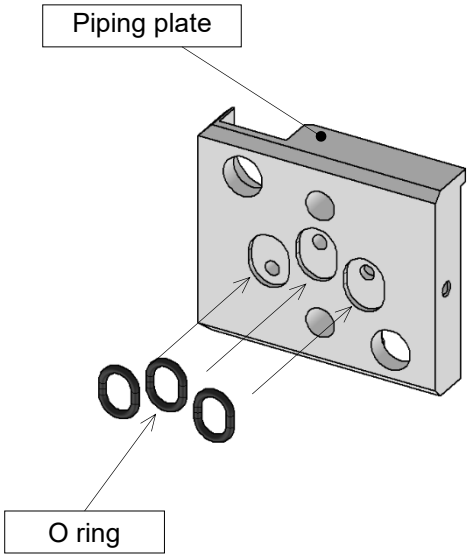
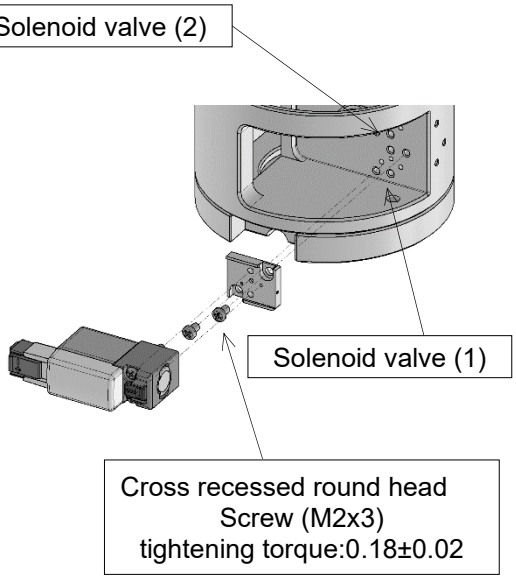
■ Procedures for replacing solenoid valve (valve option: when replacing basic type with normally open type or normally close type)

1) Remove the valve by following the same procedures as those for basic type.
2) Install the O-ring on the piping plate.
3) Mount the connector to the valve, and install the valve on top of the piping plate.

* Precaution

① When installing the gasket on the piping plate, pay attention not to have dirt attach to it.

② Refer to p. 32, (Precaution 2) and mount the solenoid valve while placing the cable with a marking be below the other cable.

	Step 2)	**Step 3) 4)**
Image		*Please refer to the below for valve and piping plate mounting positions according valve options. 

● Combination of valve option and valve product number

	Solenoid valve (1)	**Solenoid valve (2)**
Basic form	V114-5MOU	V114-5MOU
Normal open	V124-5MOU+Piping plate ASSY	V114-5MOU
Normal close	V114-5MOU	V124-5MOU+Piping plate ASSY

*In the case of identification code 061, the valve part numbers will be changed to V114-5MOU-X647 and V124-5MOU-X647, respectively.

7. Precautions for use

7-1. Precautions for Design

⚠ Warning

1.The product is designed for use only in compressed air systems. Do not operate at pressures or temperatures, etc., beyond the range of the specifications, as this can cause damage or malfunction of the cylinder and other equipment. (Refer to the specifications.)
Please contact SMC if using fluids other than compressed air. The product cannot be guaranteed if is used outside of the specification range.

2.Take safety measures (e.g. mounting protective covers) when there is a danger of fingers being caught in a gripper or workpieces causing damage, etc.

3.There is a danger of workpieces dropping if there is a decrease in gripping force due to a drop in circuit pressure caused by a power failure, etc. It is necessary to take measures such as drop prevention so that injury and damage to machinery or equipment can be prevented.

4. If the product is used for a purpose other than the transportation of a workpiece such as positioning or clamping, please consult SMC.

⚠ Caution

1. Finite orbit type guide is used in the actuator finger part. By using this, when there are inertial force which cause by movements or rotation to the actuator, steel ball will move to one side and this will cause a large resistance degrade the accuracy. When there are inertial force which cause by movements or rotation to the actuator, operate the finger to full stroke.

7-2. Air supply

⚠ Warning

1. Compressed air containing a large amount of drainage can cause the malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.
2. If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. This causes the malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, the installation of a drain bowl with an auto drain option is recommended.
3. Use clean air.
   Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction of equipment.
   For detailed information regarding the quality of the compressed air described above, refer to SMC's "Air Cleaning Systems".

⚠ Caution

1. When dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please consult with SMC.
2. Install air filters.
   Install an air filter at the upstream side of valve. Select an air filter with a filtration degree of 5μm or finer.
3. Install an aftercooler, air dryer or drain catch before the filter and take appropriate measures.
   Compressed air that contains excessive foreign material may cause malfunction of valves and other pneumatic equipment.
   Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer or water separator.
4. Use the product within the specified fluid and ambient temperature range.
   If the fluid temperature is 5°C or Cable at the bottom, the moisture in the circuit could freeze, causing damage to the seals and leading to equipment malfunction. Therefore, take appropriate measures to prevent freezing.

For detailed information regarding the quality of the compressed air described above, refer to SMC's "Air Cleaning Systems".

7-3. Piping

⚠ Caution

1. Refer to the Fittings and Tubing Precautions (Best Pneumatics) for handling one touch fittings.
2. Before piping

Before piping, blow air (flush) or clean the piping to remove any cutting chips, cutting oil, dust, etc.

7-4. Operating environment

⚠ Warning

1) Do not use in an atmosphere where corrosive gases, chemicals, sea water, water or water steam is present.
2. Do not expose the product to direct sunlight for an extended period of time.
3. Do not operate in a location subject to vibration or impact.
4. Do not mount the product in locations where it is exposed to radiant heat.
5. Do not use this product in an area that is dusty, or in an environment in which water or oil splashes on to the cylinder.

⚠ Caution

1. Martensitic stainless steel is used for the finger guide rail, so make sure that anti-corrosiveness is inferior to the austenitic stainless steel. Especially rust may be generated in environments that allow water drops from condensation to stay on the surface.

7-5. Lubrication

⚠ Caution

1. The non-lube type air gripper is lubricated at the factory, and can be used without any further lubrication.

If a lubricant is used in the system, use turbine oil Class 1 (with no additive) ISO VG32.
Furthermore, once lubrication is applied, it must be continued.
If lubrication is later stopped, malfunction can occur due to loss of the original lubricant.
Refer to the Material Safety Data Sheet (MSDS) of the hydraulic fluid when supplying the fluid.

Revision history
2: P3:Change the contents of Safety Instructions. P7: Corrected ABB's corresponding roboot. P34:Note change. 3: Add a one-push type to the interface. 4: Change the main plate part number

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