Air Grippers for Collaborative Robots

Unitization of the peripheral devices required for gripper driving

Operation is possible simply by connecting 1 air supply tube and 1 electrical wire.

Built-in

- Solenoid valve
- Exhaust throttle valve with silencer
- Auto switch
- Fitting

＊ The attachment should be ordered separately by the customer.

3 types of grippers available for use with a variety of workpieces

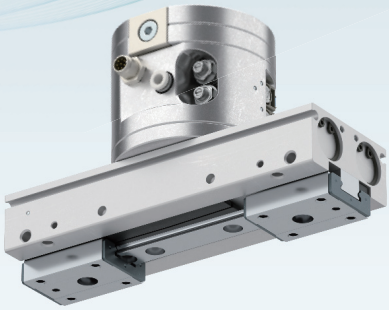
Standard Type

RMHZ2 Series

3-Finger Type

RMHS3 Series

Long Stroke Type



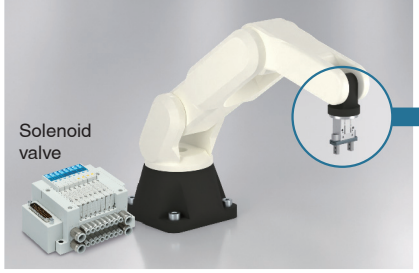
RMHF2 Series

Can be used with the collaborative robots of 12 companies

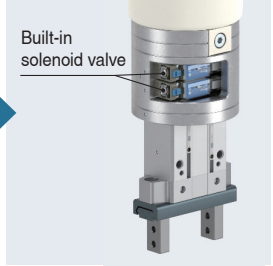
UNIVERSAL ROBOTS,
OMRON/TECHMAN ROBOT, FANUC,
YASKAWA Electric, Mitsubishi Electric,
HAN'S ROBOT, KUKA, DOOSAN ROBOTICS,
SIASUN, JAKA, AUBO, ABB

Air consumption reduced by up to 80 %

Product with a separate solenoid valve

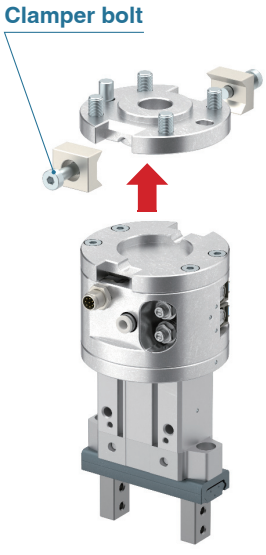


Unitized product



Manual changer built in as standard

- Allows for easy tool changing and labour saving
- Tools can be secured by simply tightening the 2 clamper bolts.



RMH□ Series

SMC

CAT.EUS160-7A-UK

Air Grippers for Collaborative Robots *RMH□*

Standard Type p. 13

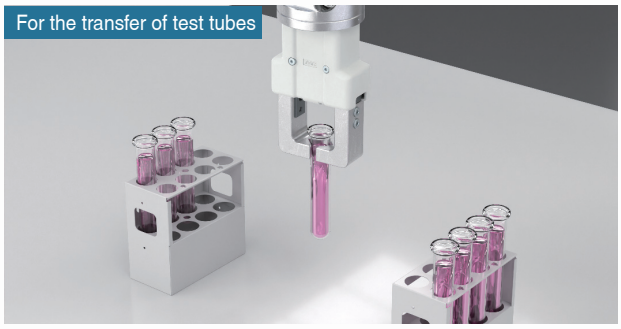
RMHZ2 Series

- High rigidity and precision are achieved by integrating the guide and finger.
- With high-precision linear guide

Specifications

Gripping force*1 Effective value per finger	External	54.2 N
	Internal	72.2 N
Opening/Closing stroke (Both sides)		14 mm
Weight		638 g*2

*1 Gripping force is measured at a pressure of 0.5 MPa.
*2 This is the value excluding the weights of the protective cover and connector cable.



3-Finger Type p. 19

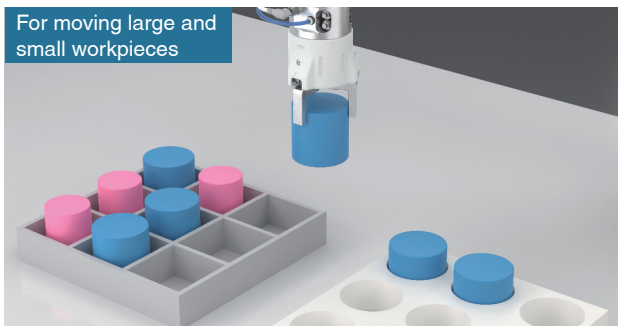
RMHS3 Series

- Suitable for axial gripping of cylindrical workpieces

Specifications

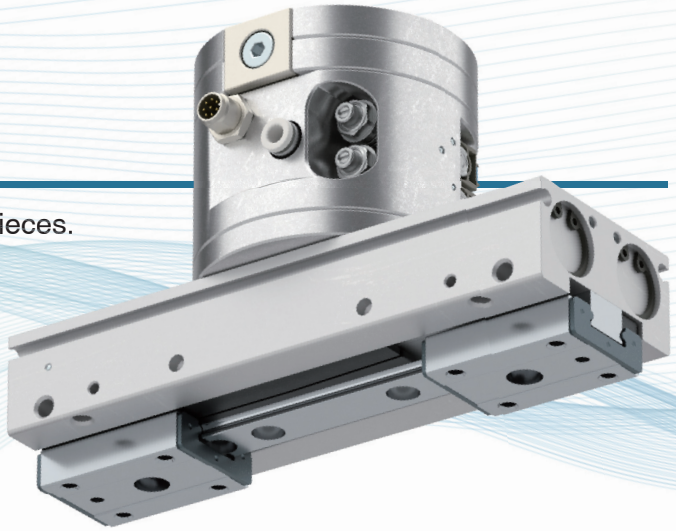
Gripping force*1 Effective value per finger	External	118 N
	Internal	130 N
Opening/Closing stroke (Both sides)		8 mm
Weight		776 g*2

*1 Gripping force is measured at a pressure of 0.5 MPa.
*2 This is the value excluding the weights of the protective cover and connector cable.



Long Stroke Type p. 25

RMHF2 Series

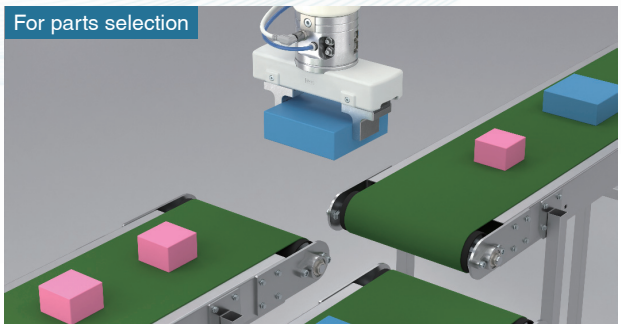


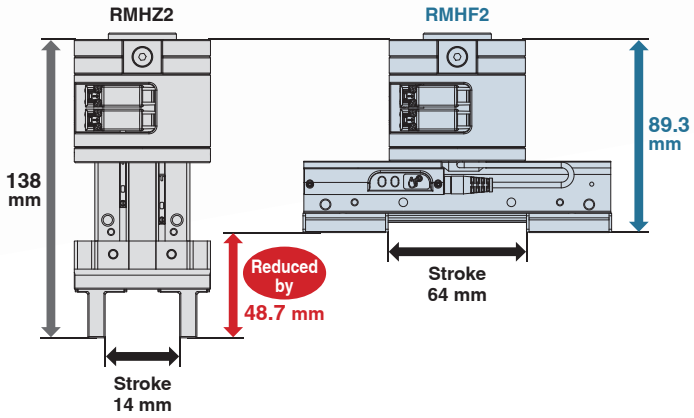
- The 64 mm long stroke is ideal for a variety of workpieces.
- Height reduced by approx. 35 %
  (Compared with the standard type)
- Actuator position sensor mountable

Specifications

Gripping force*1 Effective value per finger	90 N
Opening/Closing stroke (Both sides)	64 mm
Weight	945 g*2

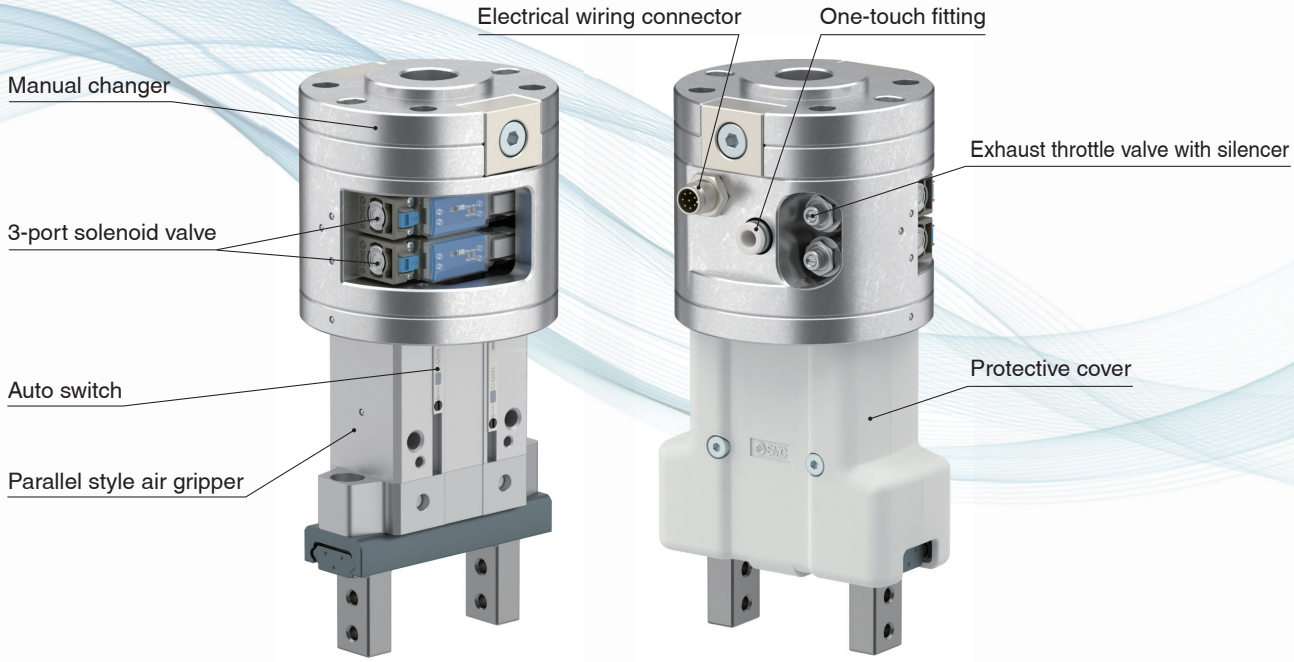
*1 Gripping force is measured at a pressure of 0.5 MPa.
*2 This is the value excluding the weights of the protective cover and connector cable.



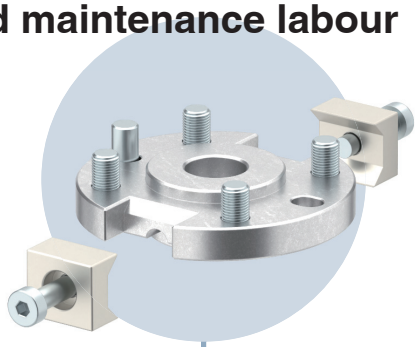


Easier mounting and maintenance

- A split protective cover for easy air gripper maintenance
- Standards: ISO 9409-1-50-4-M6

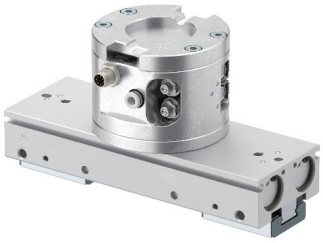


Easy tool changing via the manual changer
Reduced mounting and maintenance labour



Standard Type
p. 13

3-Finger Type
p. 19

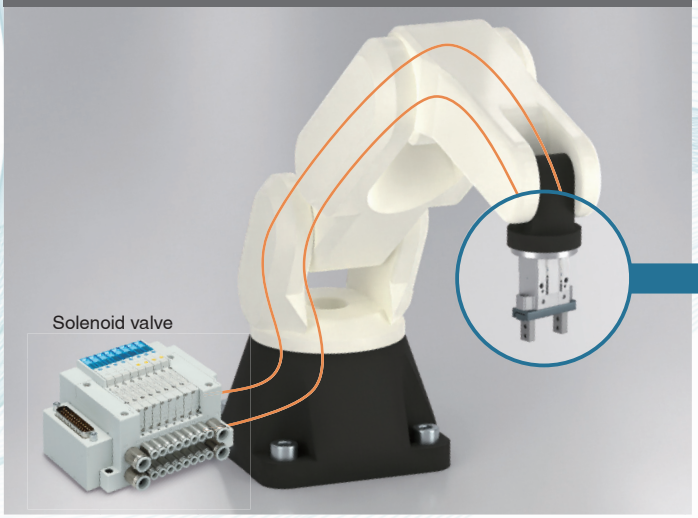


Long Stroke Type
p. 25

Air consumption reduced by up to 80 %

· Air consumption is significantly reduced compared to when the solenoid valve is installed separately for the same type of model.

Product with a separate solenoid valve



Unitized product

Consumption air can be reduced because long piping is not required.

Air Consumption Reduction by Model (Per stroke)

	Air consumption reduction
RMHZ2	80 %
RMHS3	60 %
RMHF2	20 %

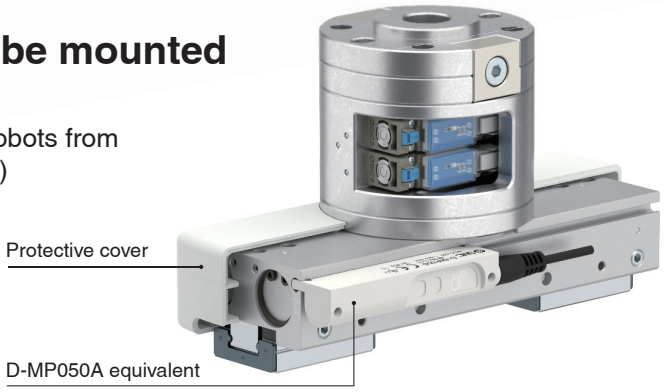
∗ Conditions
· Piping I.D.: Ø 2.5 mm
· Piping length: 2 m
· Number of pipes: 2
· Supply pressure: 0.5 MPa

An actuator position sensor can be mounted on the RMHF2. (Option)

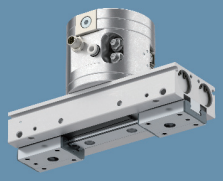
(Collaborative robot manufacturer: Compatible with robots from UNIVERSAL ROBOTS and FANUC CORPORATION)

Workpiece length measurement and discrimination can be performed.

- The stroke position is output with an analogue signal.
- Repeatability: 0.1 mm



Series Variations

		Standard Type **RMHZ2** Series	3-Finger Type **RMHS3** Series	Long Stroke Type **RMHF2** Series
				
Number of fingers		2	3	2
Gripping force	External gripping force [N]	54.2	118	90
	Internal gripping force [N]	72.2	130	90
Opening/Closing stroke (Both sides) [mm]		14	8	64
Piping diameter [mm]		4	4	4
Weight [g]		638	776	945
Options	Protective cover	●	●	●
	Connector cable	●	●	●
	Actuator position sensor	—	—	●
	Built-in valve	●	●	●
	Manual changer	●	●	●
	Plug-in software	●	●	●
Compatible robot manufacturer		12 companies	12 companies	12 companies

Options

Protective covers

For RMHZ2

For RMHS3

For RMHF2

Connector cable

For applicable robots, refer to page 32.

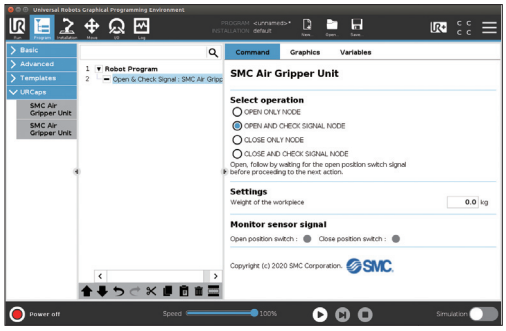
Plug-in Software

Compatible with robots from UNIVERSAL ROBOTS, OMRON Corporation/TECHMAN ROBOT, FANUC CORPORATION, and YASKAWA Electric Corporation

UNIVERSAL ROBOTS

URCap

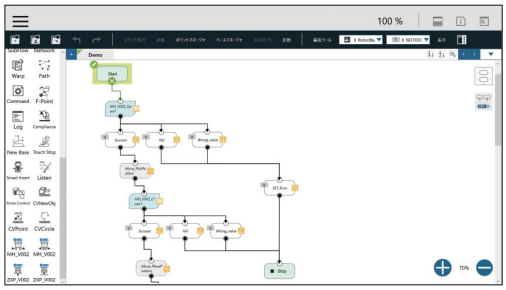
Air Gripper Program Screen



OMRON/TECHMAN ROBOT

TMComponent

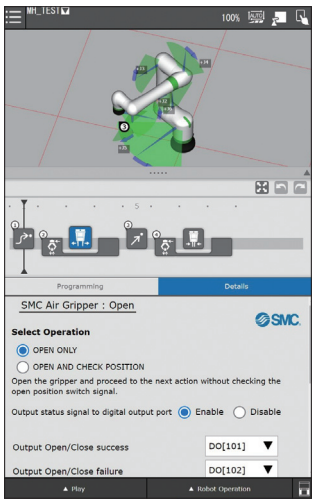
Air Gripper Program Screen



FANUC

CRX Plug-in

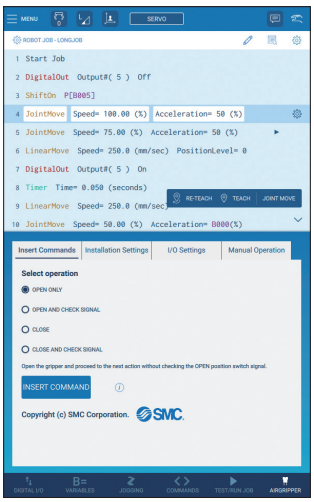
Tablet TP Editor Screen



YASKAWA Electric

YASKAWA Plug and Play Kit

Smart Pendant Program Screen



Compatible with the robots of 12 robot manufacturers

UNIVERSAL ROBOTS, OMRON/TECHMAN ROBOT, FANUC, YASKAWA Electric, Mitsubishi Electric, HAN'S ROBOT, KUKA, DOOSAN ROBOTICS, SIASUN, JAKA, AUBO, ABB

CONTENTS

Air Grippers for Collaborative Robots

RMH□ Series

RMH□ Series
Model Selection

Checking whether a workpiece can be transferred

Selection Procedure

Step 1 Check the effective gripping force. → **Step 2** Check the gripping point. → **Step 3** Check the external force on fingers.

Step 1 Check the gripping force.

Check the conditions. → Check the required gripping force. → Check whether it can be transferred or not from the gripping force graph.

Example

Workpiece mass: 0.2 kg →

Guidelines for gripping force with respect to workpiece mass

- Although conditions vary depending on the coefficient of friction between the attachment and the workpiece as well as the shape, adjust so that the gripping force is at least 5 to 10 times(∗1) greater than the workpiece weight.
  ∗1 Refer to the gripping force calculation explanatory drawing for more information.
- Further allowance should be provided when great acceleration or impact is expected during workpiece transfer.

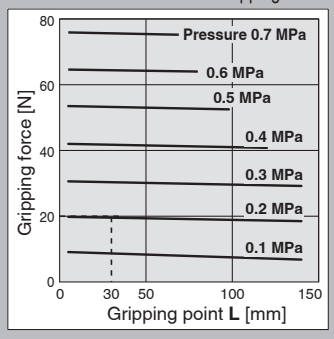
Example) For setting the gripping force to be at least 10 times greater than the workpiece weight:
Required gripping force = 0.2 kg x 10 x 9.8 m/s² ≈ 19.6 N or more

Gripping method: External gripping →

Gripping point: 30 mm →

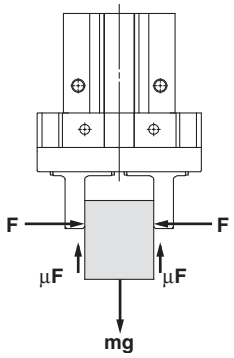
Operating pressure: 0.2 MPa →

RMHZ2-20D External Gripping Force



- When the **RMHZ2-20D** is used
  A gripping force of 20 N is obtained from the intersection point of gripping point L = 30 mm and a pressure of 0.2 MPa.
- Since a gripping force of 20 N satisfies the required gripping force of 19.6 N or more, the workpiece can be transferred by the RMHZ2-20D.

Gripping force calculation explanatory drawing



When gripping a workpiece as in the figure to the left, and with the following definitions,

F : Gripping force [N]
μ : Coefficient of friction between the attachments and the workpiece
m : Workpiece mass [kg]
g : Gravitational acceleration (= 9.8 m/s²)
mg : Workpiece weight [N]

the conditions under which the workpiece will not drop are

$$\underline{2} \times \mu F > mg$$

(2: Number of fingers)

and therefore,

$$F > \frac{mg}{2 \times \mu}$$

With "**a**" representing the margin, "**F**" is determined by the following formula:

$$F = \frac{mg}{2 \times \mu} \times a$$

"Gripping force at least 5 to 10 times greater than the workpiece weight"

· The "at least 5 to 10 times greater than the workpiece weight" recommended by SMC is calculated with a margin of "a" = 2, which allows for impacts that occur during transfer by collaborative robots, etc.

When μ = 0.2	When μ = 0.1
$F = \frac{mg}{2 \times 0.2} \times 2$	$F = \frac{mg}{2 \times 0.1} \times 2$
$= 5 \times mg$	$= 10 \times mg$
5 x Workpiece weight	10 x Workpiece weight

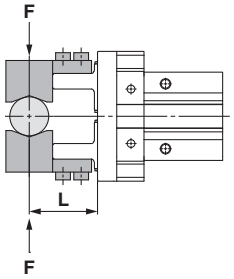
(∗) · Even in cases where the coefficient of friction is greater than μ = 0.2, or the number of fingers is 3, for safety reasons, select a gripping force which is at least 5 to 10 times greater than the workpiece weight, as recommended by SMC.
· This product has a smaller margin than our standard grippers as it is designed for use with a collaborative robot (acceleration 1000 mm/s², speed 250 mm/s). However, the gripping force margin should be increased in the following cases.
· For large accelerations or impacts exceeding the above, a larger margin should be considered.
· If the finger and workpiece contact surfaces are small, even if the gripping force is 5 to 10 times the workpiece weight, there is a risk of the workpiece falling. A material with a high coefficient of friction such as rubber is recommended for the end of the finger.
· To check whether a workpiece can be transferred under the actual conditions (such as the finger shape, material, grip method, amount of acceleration, and ambient environment), the customer must conduct a workpiece transfer test.

Checking whether a workpiece can be transferred/RMHZ2

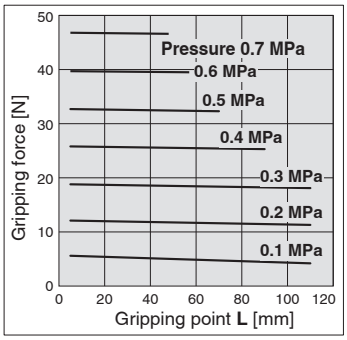
Step 1 Check the effective gripping force.

The gripping force shown in the graphs represents the gripping force of one finger when all fingers and attachments are in contact with the workpiece.
F = One finger thrust

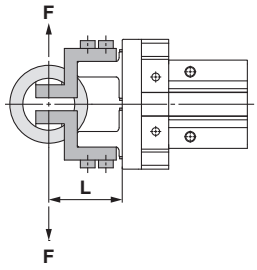
External gripping state



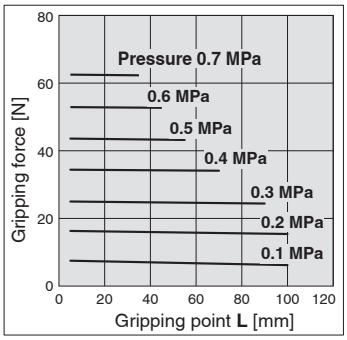
External Gripping Force



Internal gripping state



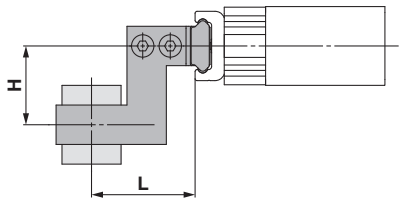
Internal Gripping Force



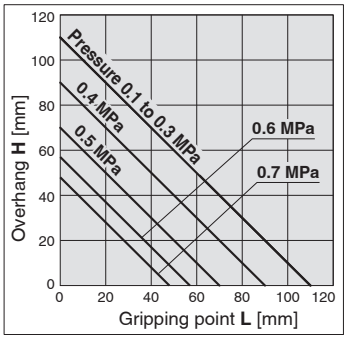
Step 2 Check the gripping point.

- The air gripper should be operated so that the workpiece gripping point "L" and the amount of overhang "H" stay within the range shown for each operating pressure given in the graphs below.
- If the workpiece gripping point goes beyond the range limits, this will have an adverse effect on the life of the air gripper.

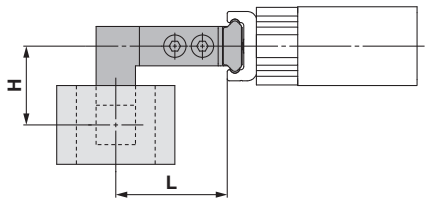
External gripping state



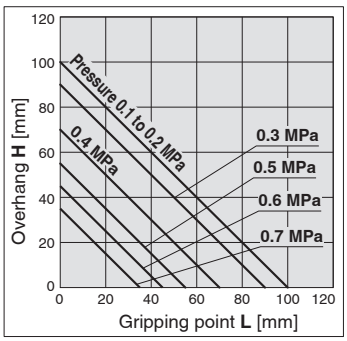
External Grip



Internal gripping state



Internal Grip

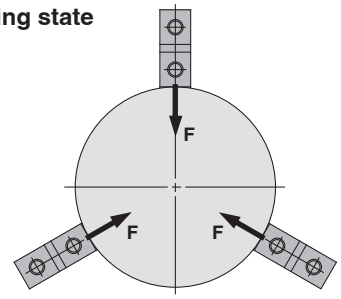


Checking whether a workpiece can be transferred/RMHS3

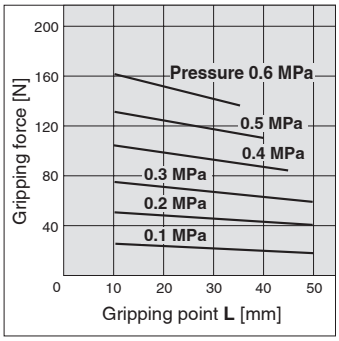
Step 1 Check the effective gripping force.

The gripping force shown in the graphs represents the gripping force of one finger when all fingers and attachments are in contact with the workpiece.
F = One finger thrust

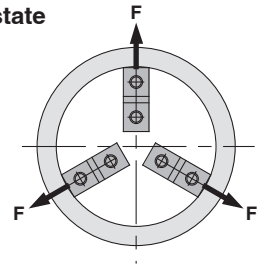
External gripping state



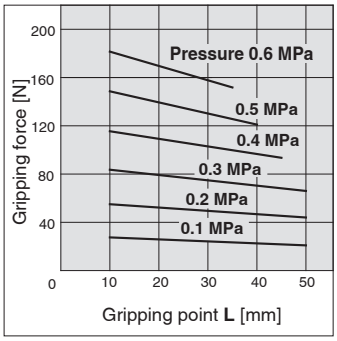
External Gripping Force



Internal gripping state



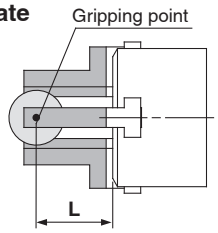
Internal Gripping Force



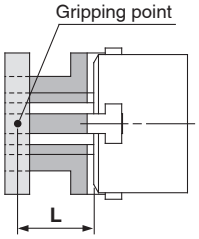
Step 2 Check the gripping point.

The workpiece gripping point distance should be within the gripping force ranges given for each pressure in the effective gripping force graphs (Step 1). 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 gripping state



Internal gripping state

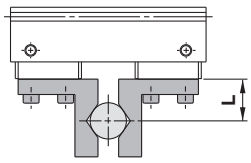


Checking whether a workpiece can be transferred/RMHF2

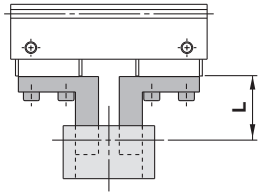
Step 1 Check the effective gripping force.

The gripping force shown in the graph represents the gripping force of one finger when all fingers and attachments are in contact with the workpiece.
F = One finger thrust

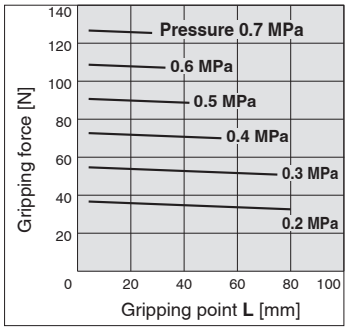
External gripping state



Internal gripping state



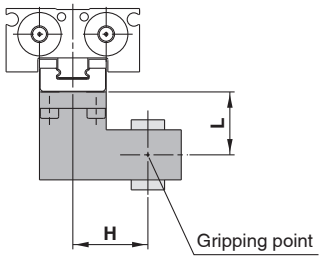
External/Internal Grip



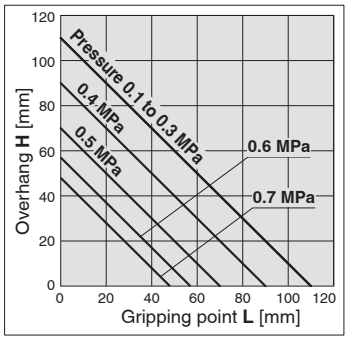
Step 2 Check the gripping point.

The air gripper should be operated so that the workpiece gripping point “L” and the amount of overhang “H” stay within the range shown for each operating pressure given in the graphs below.
If the workpiece gripping point goes beyond the range limits, this will have an adverse effect on the life of the air gripper.

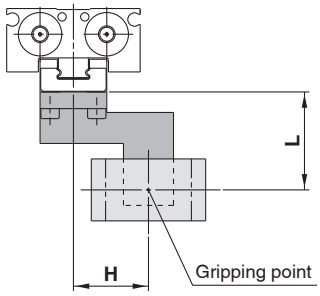
External gripping state



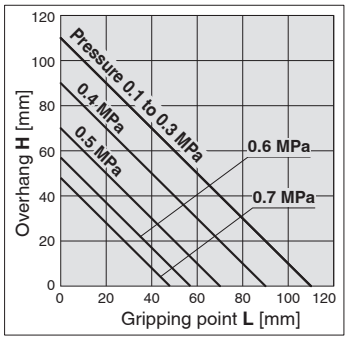
External Grip



Internal gripping state

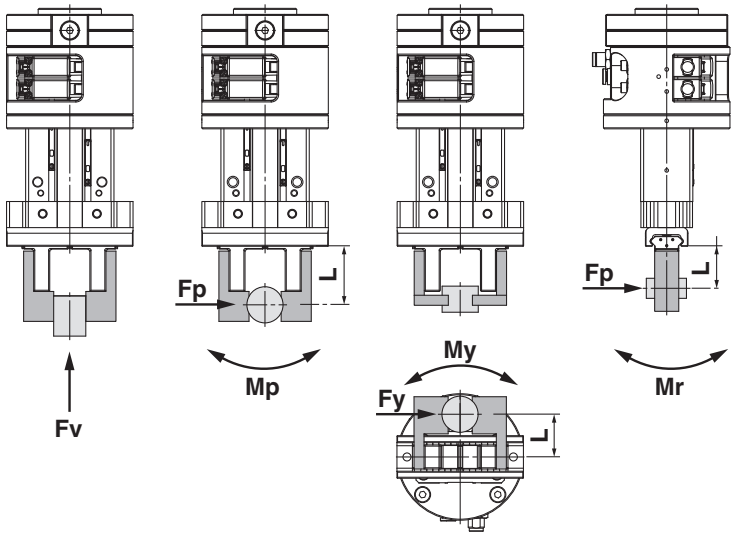


Internal Grip



Checking whether a workpiece can be transferred

Step 3 Check the external force on fingers.



Model	Max. allowable moment/load*1, *2			
	Vertical load **Fvmax** [N]	Pitch moment **Mpmax** [N·m]	Yaw moment **Mymax** [N·m]	Roll moment **Mrmax** [N·m]
RMHZ2-20	176	2.1	2.1	4.2
RMHF2-16	176	1.4	1.4	2.8

*1 Inertial loads will be generated at the stroke end when the product is used for transportation. Consider the rate of acceleration.
*2 Ensure moments and loads are the allowable values or less.
* When combining a vertical load and moment, make sure the load factor is 1 or less according to the equation below.

Fv/**Fvmax** + **Mp**/**Mpmax** + **My**/**Mymax** + **Mr**/**Mrmax** ≤ 1 (Load factor)

* For the RMHS, the above definition of moment does not apply. After confirming the workpiece weight and gripping force, check whether the workpiece can be transferred using the actual device.

For the RMHZ2 and RMHF2

* The allowable values in the table vary from those of the single unit air gripper. For more information on single unit air grippers, refer to the JMHZ2-20D and MHF2-16D2 standard product catalogs.

Air Gripper for Collaborative Robots
Standard Type
RMHZ2 Series

How to Order

RMHZ2-20D-□PO-NDE

❶ ❷ ❸ ❹ ❺ ❻

❶ Compatible robot

Refer to the “Table 1 Compatible Robot List.”

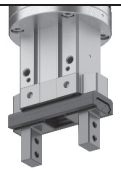
❷ Switch selection

N	Auto switch (NPN)
P	Auto switch (PNP)

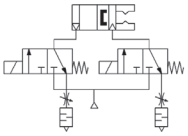
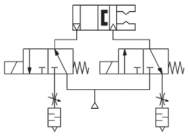
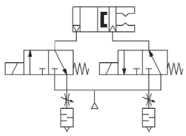
❹ Robot connection cable

—	With connector cable
N	Without connection cable

❺ Protective cover

—	Without protective cover	
D	With protective cover	

❸ Valve option

—	**O**	**C**
Basic type	Normally open	Normally closed
		

❻ Manual changer

E	With main plate assembly	
F	Without main plate assembly	

Refer to page 32 for how to mount the manual changer.

The main plate assembly is required to mount the gripper to the robot. In addition, when the main plate assembly is mounted to the robot, several different tool models can be used with the robot.
Customers who already have a main plate assembly can select option “F” (Without main plate assembly).

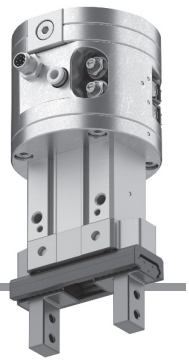


Table 1 Compatible Robot List

Identification symbol	Switch selection	Robot manufacturer	Supported model	Switch output	Valve polarity
011	P	UNIVERSAL ROBOTS	UR3e	PNP	–COM
			UR5e		
			UR10e		
			UR16e		
021	N	OMRON/ TECHMAN ROBOT	TM5	NPN	+COM
			TM12		
			TM14		
031	N	Mitsubishi Electric*1	MELFA ASSISTA (RV-5AS-D)	NPN	+COM
	P			PNP	–COM
041	N	YASKAWA Electric*1	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 only)	PNP	–COM
071	P	DOOSAN ROBOTICS	H2017	PNP	–COM
			H2515		
			M0609		
			M0617		
			M1013		
			M1509		

Identification symbol	Switch selection	Robot manufacturer	Supported model	Switch output	Valve polarity
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 Zu7		
			JAKA Zu12		
	P		JAKA Zu3	PNP	–COM
			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

*1 When a Mitsubishi Electric Corporation or YASKAWA Electric Corporation product is selected, a dedicated flange is included. Refer to page 33 for details.

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

Specifications

Item			Specification
Common	Standards		Compliant with ISO 9409-1-50-4-M6*1
	Fluid		Air
	Operating pressure		0.1 to 0.7 MPa
	Ambient and fluid temperatures		-10 to 50 °C*2
	Repeatability		±0.01 mm
	Max. operating frequency		120 C.P.M.
	Lubricant		Non-lube
	Action		Double acting
	Gripping force Effective value per finger	External	54.2 N*3
		Internal	72.2 N*3
	Opening/Closing stroke (Both sides)		14 mm
	Weight		638 g*4
	Connector type		M8, 8-pin (Plug)
	Air pressure supply (P) port		One-touch fitting (Ø 4)
	Power supply voltage		24 VDC ±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. (Refer to page 14.)
*2 Only when the compatible robot is KUKA's LBR-iiwa, the power supply voltage is 24 VDC (–15 %/+20 %) and the max. operating temperature is 40 °C.
*3 These are values at the stroke centre when the pressure is 0.5 MPa and the gripping point distance L is 20 mm.
*4 This is the value excluding the weights of the protective cover and connector cable.

Valve Specifications

Operating temperature	-10 to 50 °C (40 °C*1) No freezing
Manual override	Non-locking push type
Mounting orientation	Unrestricted (Based on gripper mounting orientation)
Enclosure	Dust-protected

*1 For robot identification symbol 061P

Solenoid Specifications

Coil rated voltage	24 VDC
Allowable voltage fluctuation	-10 to +10 % (-15 % to +20 %*1)
Power consumption	0.4 W (0.55 W*1)
Surge voltage suppressor	Varistor

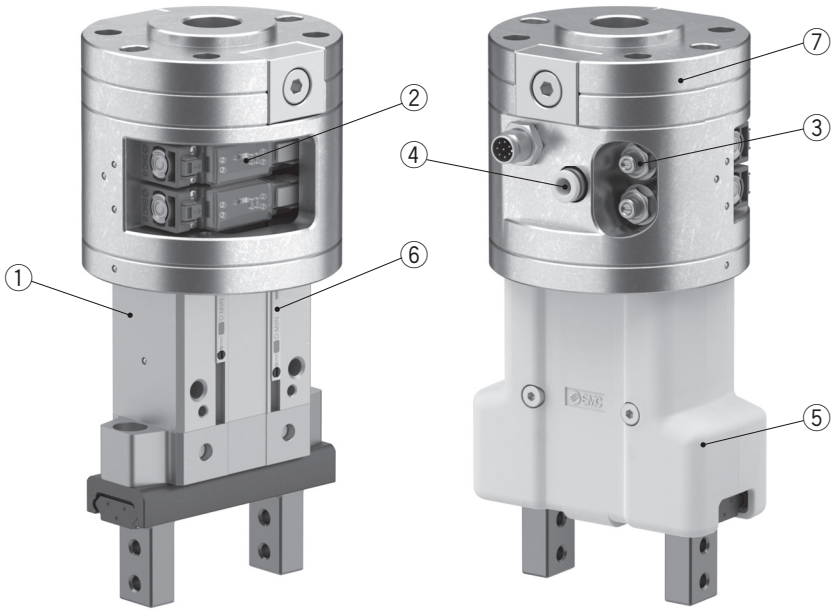
*1 For robot identification symbol 061P

Auto Switch Specifications

Output type	NPN/PNP (Depends on the robots)
Power supply voltage	24 VDC
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

Refer to page 8 for more information on model selection using the effective “gripping force” and “gripping point.”

Component Parts



No.	Description
1	**Gripper assembly**
2	**3-port solenoid valve**
3	**Exhaust throttle valve with silencer**
4	**One-touch fitting**
5	**Cover assembly**
6	**Auto switch assembly**
7	**Manual changer (Main plate assembly)**

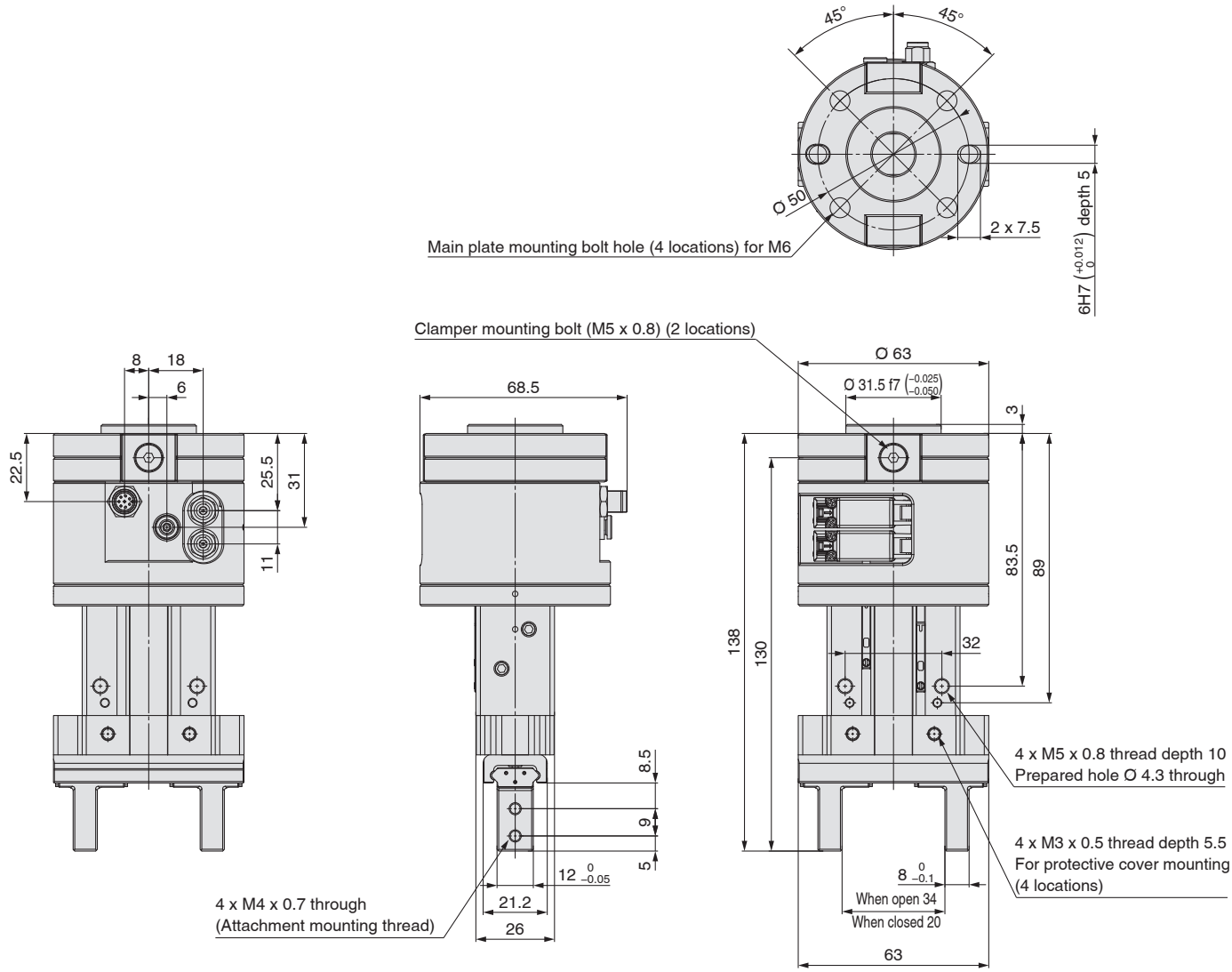
Replacement Parts

Description			Order number	Included parts
Gripper assembly			RMH-A13-01	①
Cover assembly			RMH-A13-08	⑤, Mounting screw
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
	YASKAWA Electric: 042N, 042P		JMHZ-A16-X7400-BRK-03	
Auto switch assembly∗1	**PNP**		RMH-A00-05-P	⑥
	NPN		RMH-A00-05-N	
3-port solenoid valve	**Normally open**∗2		V124-5MOU	②
	Normally closed		V114-5MOU	
	KUKA 061P	**Normally open**∗2, ∗3	V114-5MOU-X647	
		Normally closed∗3	V124-5MOU-X647	
Main plate assembly	**Other than the following**		RMH-A00-09-A	⑦
	Identification symbol 071P, 081P, 101N		RMH-A00-09-B	
	Identification symbol 091N, 091P, 121P		RMH-A00-09-C	
Connector cable			Refer to page 32.	
Piping plate assembly∗2			RMH-A00-06	Piping plate, Mounting bolt, O-ring
One-touch fitting			KQ2S04-M5N	④
Exhaust throttle valve with silencer			ASN2-M5-X937	③

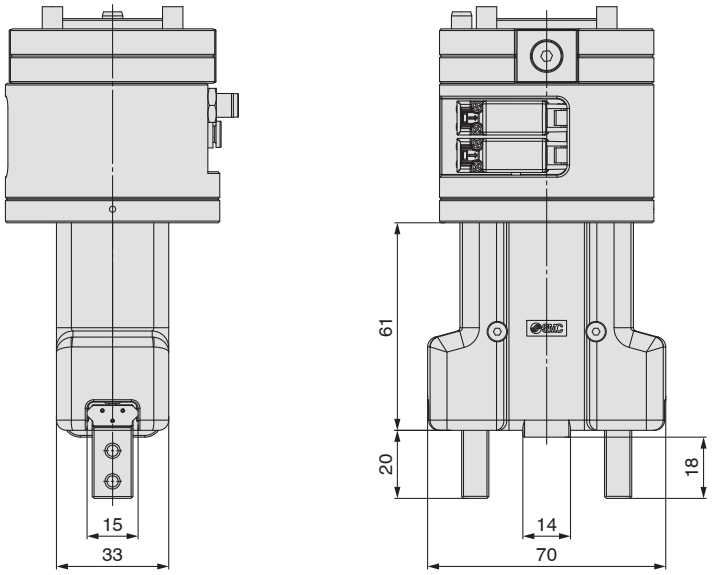
∗1 An auto switch assembly is an assembly part in which 2 auto switches are integrated into one part. When replacing an auto switch, replacement is conducted in units of auto switch assembly. An individual auto switch cannot be replaced.
∗2 When installing a normally-open valve, a piping plate assembly is necessary. For details, refer to the operation manual.
∗3 When KUKA is used, a 3-port solenoid valve is available as a special order.

Dimensions

* For Mitsubishi Electric Corporation and YASKAWA Electric Corporation collaborative robots, a dedicated flange is required for mounting. For details, refer to page 33.



With protective cover mounted



RMHZ2 Series
Specific Product Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For air gripper and auto switch precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smc.eu

Operating Environment

⚠Caution

Use caution for the anti-corrosiveness of the linear guide unit.

Martensitic stainless steel is used for the finger guide. However, the anti-corrosiveness of this steel is inferior to that of austenitic stainless steel. In particular, rust may be generated in environments where waterdrops are likely to adhere to the product due to condensation, etc.

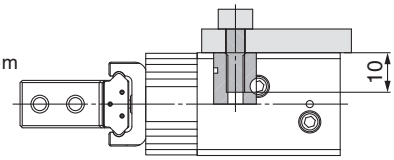
How to Use Body Tapped Holes

1. Do not scratch or dent the air gripper by dropping or bumping it when mounting.

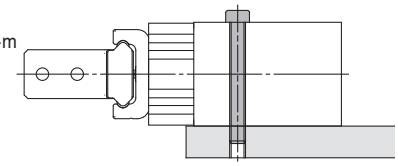
Even a slight deformation can cause inaccuracy or malfunction.

Body tapped hole

● **Body tapped**
Applicable bolt: M5 x 0.8
Tightening torque: 2.7 to 3.3 N·m
Max. screw-in depth: 10 mm



● **Body through-holes**
Applicable bolt: M4 x 0.7
Tightening torque: 1.35 to 1.65 N·m



Handling

⚠Caution

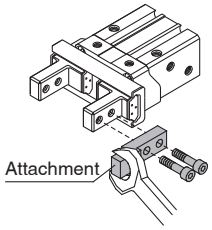
Finite orbit type guide is used in the actuator finger part. By using this, when there are inertial force which cause by movements or rotation to the actuator, steel ball will move to one side and this will cause a large resistance and degrade the accuracy. When there are inertial force which cause by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

How to Mount Attachments

1. 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.

Make sure to mount the attachments on fingers with the tightening torque in the table below by using bolts, etc., for the female threads on fingers.



Applicable bolt	Tightening torque [N·m]
M4 x 0.7	1.35 to 1.65

Air Gripper for Collaborative Robots
3-Finger Type
RMHS3 Series

How to Order

RMHS3 – 40D – ❶ ❷ ❸ ❹ ❺ ❻

❶ Compatible robot

Refer to the “Table 1 Compatible Robot List.”

❷ Switch selection

N	Auto switch (NPN)
P	Auto switch (PNP)

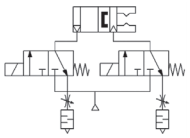
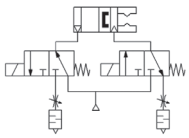
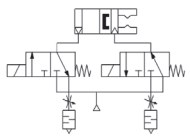
❹ Robot connection cable

—	With connector cable
N	Without connection cable

❺ Protective cover

—	Without protective cover	
D	With protective cover	

❸ Valve option

—	**O**	**C**
Basic type	Normally open	Normally closed
		

❻ Manual changer

E	With main plate assembly	
F	Without main plate assembly	

Refer to page 32 for how to mount the manual changer.

The main plate assembly is required to mount the gripper to the robot. In addition, when the main plate assembly is mounted to the robot, several different tool models can be used with the robot.
Customers who already have a main plate assembly can select option “F” (Without main plate assembly).

Table 1 Compatible Robot List

Identification symbol	Switch selection	Robot manufacturer	Supported model	Switch output	Valve polarity
011	P	UNIVERSAL ROBOTS	UR3e	PNP	–COM
			UR5e		
			UR10e		
			UR16e		
021	N	OMRON/ TECHMAN ROBOT	TM5	NPN	+COM
			TM12		
			TM14		
031	N	Mitsubishi Electric*1	MELFA ASSISTA (RV-5AS-D)	NPN	+COM
	P			PNP	–COM
041	N	YASKAWA Electric*1	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 only)	PNP	–COM
071	P	DOOSAN ROBOTICS	H2017	PNP	–COM
			H2515		
			M0609		
			M0617		
			M1013		
			M1509		

Identification symbol	Switch selection	Robot manufacturer	Supported model	Switch output	Valve polarity
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 Zu7		
			JAKA Zu12		
	P		JAKA Zu3	PNP	–COM
			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

*1 When a Mitsubishi Electric Corporation or YASKAWA Electric Corporation product is selected, a dedicated flange is included. Refer to page 33 for details.

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

Specifications

Item			Specification
Common	Standards		Compliant with ISO 9409-1-50-4-M6*1
	Fluid		Air
	Operating pressure		0.1 to 0.6 MPa
	Ambient and fluid temperatures		-10 to 50 °C*2
	Repeatability		±0.01 mm
	Max. operating frequency		60 C.P.M.
	Lubricant		Non-lube
	Action		Double acting
	Gripping force Effective value per finger	External	118 N*3
		Internal	130 N*3
	Opening/Closing stroke (Both sides)		8 mm
	Weight		776 g*4
	Connector type		M8, 8-pin (Plug)
	Air pressure supply (P) port		One-touch fitting (Ø 4)
	Power supply voltage		24 VDC ±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. (Refer to page 20.)
*2 Only when the compatible robot is KUKA's LBR-iiwa, the power supply voltage is 24 VDC (–15 %/+20 %) and the max. operating temperature is 40 °C.
*3 These are values at the stroke centre 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 protective cover and connector cable.

Valve Specifications

Operating temperature	-10 to 50 °C (40 °C*1) No freezing
Manual override	Non-locking push type
Mounting orientation	Unrestricted (Based on gripper mounting orientation)
Enclosure	Dust-protected

*1 For robot identification symbol 061P

Solenoid Specifications

Coil rated voltage	24 VDC
Allowable voltage fluctuation	-10 to +10 % (-15 % to +20 %*1)
Power consumption	0.4 W (0.55 W*1)
Surge voltage suppressor	Varistor

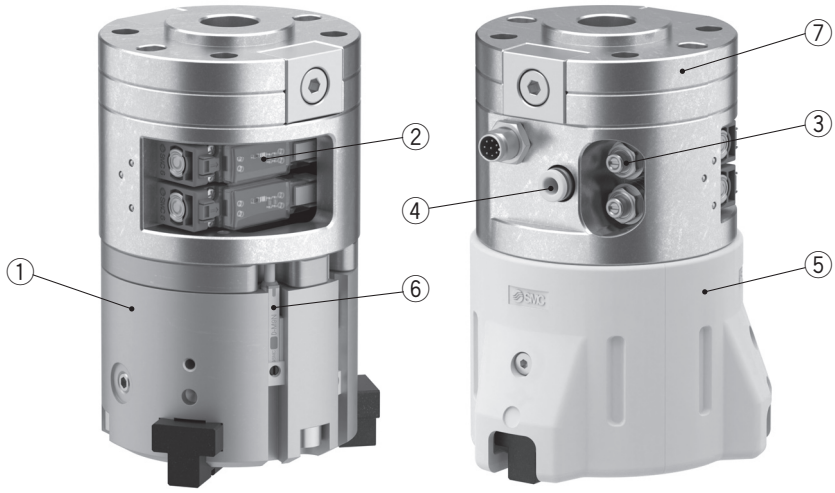
*1 For robot identification symbol 061P

Auto Switch Specifications

Output type	NPN/PNP (Depends on the robots)
Power supply voltage	24 VDC
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

Refer to page 9 for more information on model selection using the effective “gripping force” and “gripping point.”

Component Parts



No.	Description
1	**Gripper assembly**
2	**3-port solenoid valve**
3	**Exhaust throttle valve with silencer**
4	**One-touch fitting**
5	**Cover assembly**
6	**Auto switch assembly**
7	**Manual changer (Main plate assembly)**

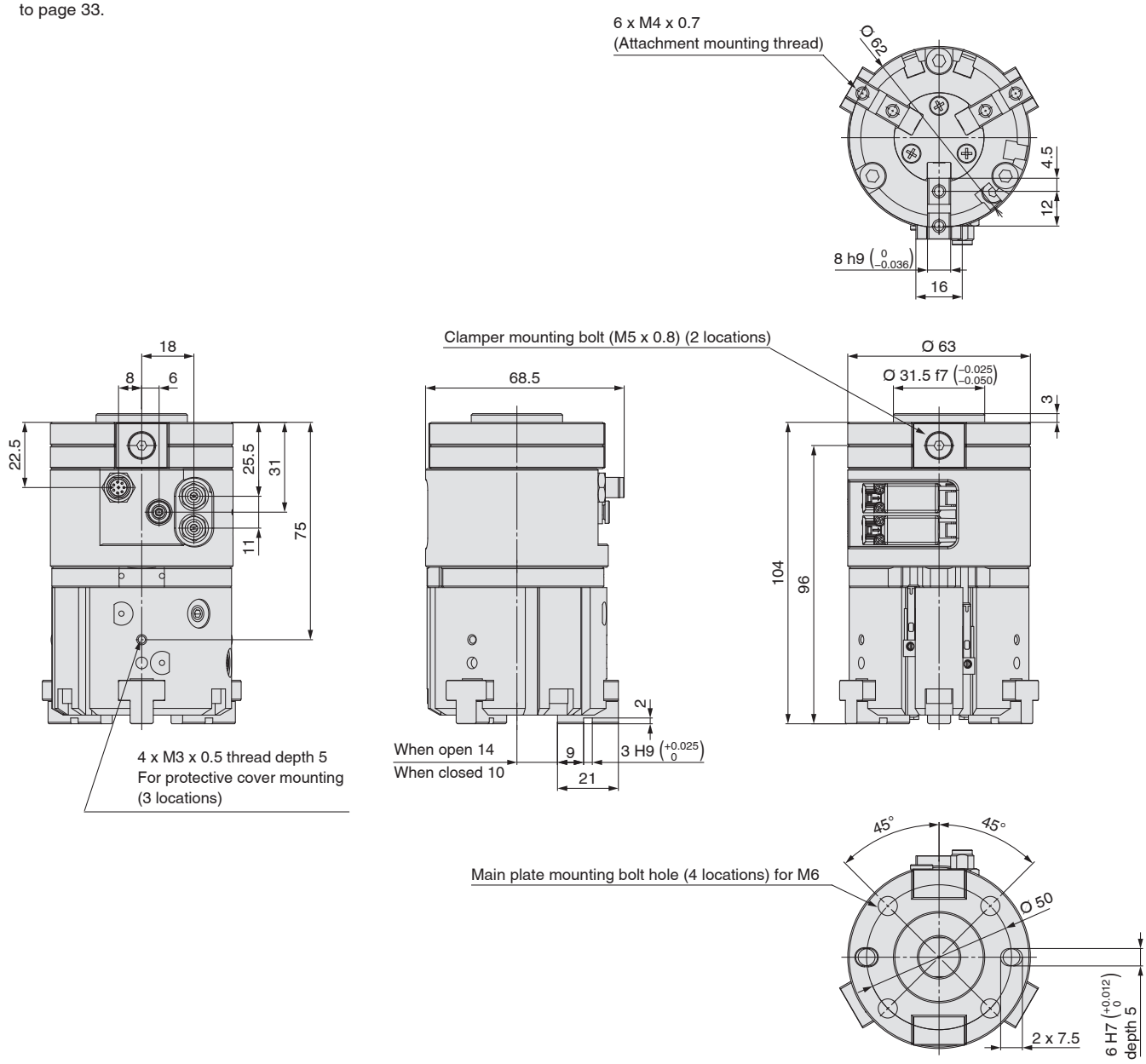
Replacement Parts

Description			Order number	Included parts
Gripper assembly			RMH-A26-01	①
Cover assembly			RMH-A26-08	⑤, Mounting screw
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
	YASKAWA Electric: 042N, 042P		JMHZ-A16-X7400-BRK-03	
Auto switch assembly∗1	**PNP**		RMH-A00-05-P	⑥
	NPN		RMH-A00-05-N	
3-port solenoid valve	**Normally open**∗2		V124-5MOU	②
	Normally closed		V114-5MOU	
	KUKA 061P	**Normally open**∗2, ∗3	V114-5MOU-X647	
		Normally closed∗3	V124-5MOU-X647	
Main plate assembly	**Other than the following**		RMH-A00-09-A	⑦
	Identification symbol 071P, 081P, 101N		RMH-A00-09-B	
	Identification symbol 091N, 091P, 121P		RMH-A00-09-C	
Connector cable			Refer to page 32.	
Piping plate assembly∗2			RMH-A00-06	Piping plate, Mounting bolt, O-ring
One-touch fitting			KQ2S04-M5N	④
Exhaust throttle valve			ASN2-M5-X937	③

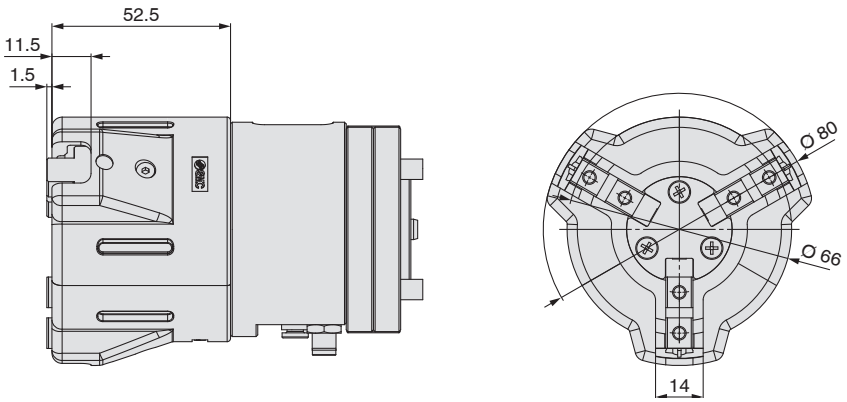
∗1 An auto switch assembly is an assembly part in which 2 auto switches are integrated into one part. When replacing an auto switch, replacement is conducted in units of auto switch assembly. An individual auto switch cannot be replaced.
∗2 When installing a normally-open valve, a piping plate assembly is necessary. For details, refer to the operation manual.
∗3 When KUKA is used, a 3-port solenoid valve is available as a special order.

Dimensions

* For Mitsubishi Electric Corporation and YASKAWA Electric Corporation collaborative robots, a dedicated flange is required for mounting. For details, refer to page 33.



With protective cover mounted



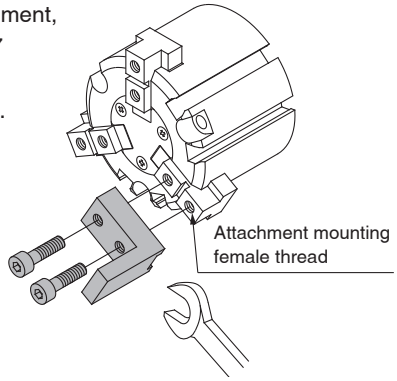
RMHS3 Series
Specific Product Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For air gripper and auto switch precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smc.eu

How to Mount Attachments

1. **Do not scratch or dent the air gripper by dropping or bumping it when mounting.**
   Even a slight deformation can cause inaccuracy or malfunction.
2. **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.

When mounting the attachment, make sure to use M4 x 0.7 screws and a tightening torque of 1.35 to 1.65 N·m.



Air Gripper for Collaborative Robots
Long Stroke Type
RMHF2 Series

CE UK CA RoHS

How to Order

RMHF2 – 16D2 – ❶ ❷ ❸ – ❹ ❺ ❻

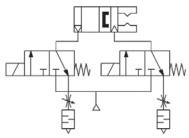
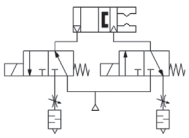
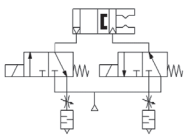
❶ Compatible robot

Refer to the “Table 1 Compatible Robot List.”

❷ Switch selection

N	Auto switch (NPN)
P	Auto switch (PNP)
A	Actuator position sensor (D-MP)

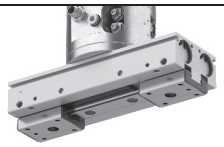
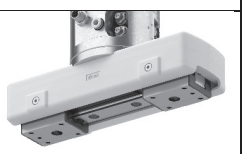
❸ Valve option

—	**O**	**C**
Basic type	Normally open	Normally closed
		

❹ Robot connection cable

—	With connector cable
N	Without connection cable

❺ Protective cover

—	Without protective cover	
D	With protective cover	

❻ Manual changer

E	With main plate assembly	
F	Without main plate assembly	

Refer to page 32 for how to mount the manual changer.

The main plate assembly is required to mount the gripper to the robot. In addition, when the main plate assembly is mounted to the robot, several different tool models can be used with the robot.
Customers who already have a main plate assembly can select option “F” (Without main plate assembly).

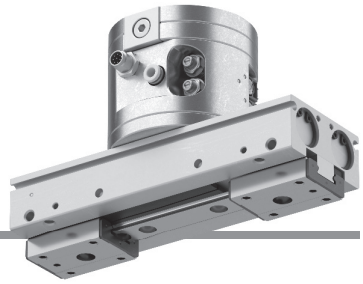


Table 1 Compatible Robot List

Identification symbol	Switch selection	Robot manufacturer	Supported model	Switch output	Valve polarity
011	A	UNIVERSAL ROBOTS	UR3e	Analogue	–COM
			UR5e		
			UR10e		
			UR16e		
	P		UR3e	PNP	–COM
			UR5e		
			UR10e		
			UR16e		
021	N	OMRON/ TECHMAN ROBOT	TM5	NPN	+COM
			TM12		
			TM14		
031	N	Mitsubishi Electric*1	MELFA ASSISTA (RV-5AS-D)	NPN	+COM
031	P			PNP	–COM
041	N	YASKAWA Electric*1	MOTOMAN-HC10	NPN	+COM
041	P			PNP	–COM
042	N		MOTOMAN-HC10DT	NPN	+COM
042	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	A	FANUC	CRX-5iA	Analogue	–COM
			CRX-10iA(L)		
			CRX-20iA		
			CRX-25iA		
	P		CRX-5iA	PNP	–COM
			CRX-10iA(L)		
			CRX-20iA		
			CRX-25iA		
061	P	KUKA	LBR-iiwa (Media flange: I/O Pneumatic only)	PNP	–COM

Identification symbol	Switch selection	Robot manufacturer	Supported model	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 Zu7		
			JAKA Zu12		
	P		JAKA Zu3	PNP	–COM
			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

*1 When a Mitsubishi Electric Corporation or YASKAWA Electric Corporation product is selected, a dedicated flange is included. Refer to page 33 for details.

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

Specifications

Item			Specification
Common	Standards		Compliant with ISO 9409-1-50-4-M6*1
	Fluid		Air
	Operating pressure		0.1 to 0.7 MPa
	Ambient and fluid temperatures		-10 to 50 °C*2
	Repeatability		±0.05 mm
	Max. operating frequency		60 C.P.M.
	Lubricant		Non-lube
	Action		Double acting
	Gripping force Effective value per finger	External	90 N*3
		Internal	90 N*3
	Opening/Closing stroke (Both sides)		64 mm
	Weight		945 g*4
	Connector type		M8, 8-pin (Plug)
	Air pressure supply (P) port		One-touch fitting (Ø 4)
	Power supply voltage		24 VDC ±10 %*2
Solenoid valve	Model		V114
Auto switch	Model		D-M9N/D-M9P
Position sensor	Model		D-MP
Exhaust throttle valve	Model		ASN2-M5-X937

*1 Robots whose end effector mounting standard differs are equipped with a dedicated mounting flange. (Refer to page 26.)
*2 Only when the compatible robot is KUKA's LBR-iiwa, the power supply voltage is 24 VDC (-15 %/+20 %) and the max. operating temperature is 40 °C.
*3 These are values at the stroke centre when the pressure is 0.5 MPa and the gripping point distance L is 20 mm.
*4 This is the value excluding the weights of the protective cover and connector cable.

Valve Specifications

Operating temperature	-10 to 50 °C (40 °C*1) No freezing
Manual override	Non-locking push type
Mounting orientation	Unrestricted (Based on gripper mounting orientation)
Enclosure	Dust-protected

*1 For robot identification symbol 061P

Solenoid Specifications

Coil rated voltage	24 VDC
Allowable voltage fluctuation	-10 to +10 % (-15 % to +20 %*1)
Power consumption	0.4 W (0.55 W*1)
Surge voltage suppressor	Varistor

*1 For robot identification symbol 061P

Auto Switch Specifications

Output type	NPN/PNP (Depends on the robots)
Power supply voltage	24 VDC
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

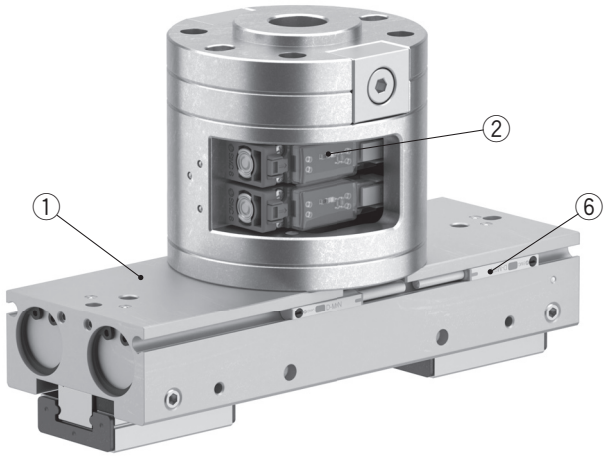
Refer to page 10 for more information on model selection using the effective “gripping force” and “gripping point.”

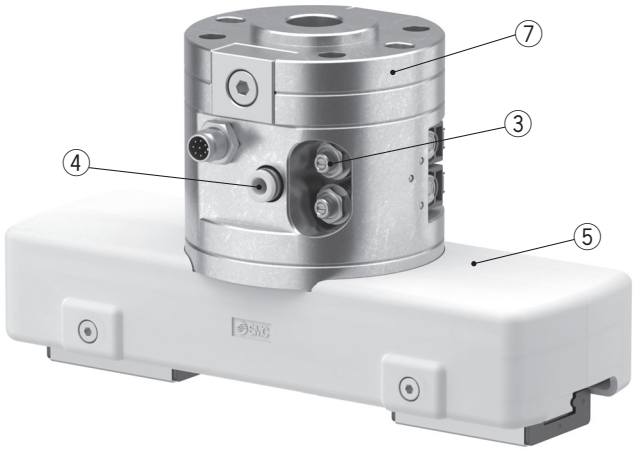
Actuator Position Sensor

Model		D-MP050□
Power supply voltage		15 to 30 VDC, Ripple (p-p) 10 % or less (with power supply polarity protection)
Current consumption		48 mA or less (when no load is applied)
Repeatability*1		0.1 mm (Ambient temperature: 25 °C)
Resolution		0.05 mm
Linearity		±0.3 mm (Ambient temperature: 25 °C)
Analogue voltage output	Output voltage	0 to 10 V
	Min. load resistance	2 kΩ

*1 Repeatability of magnetic movement in one direction
* For details on the actuator position sensor (D-MP series), refer to the operation manual on the SMC website.

Component Parts





No.	Description
1	**Gripper assembly**
2	**3-port solenoid valve**
3	**Exhaust throttle valve with silencer**
4	**One-touch fitting**

No.	Description
5	**Cover assembly**
6	**Auto switch assembly**
7	**Manual changer (Main plate assembly)**

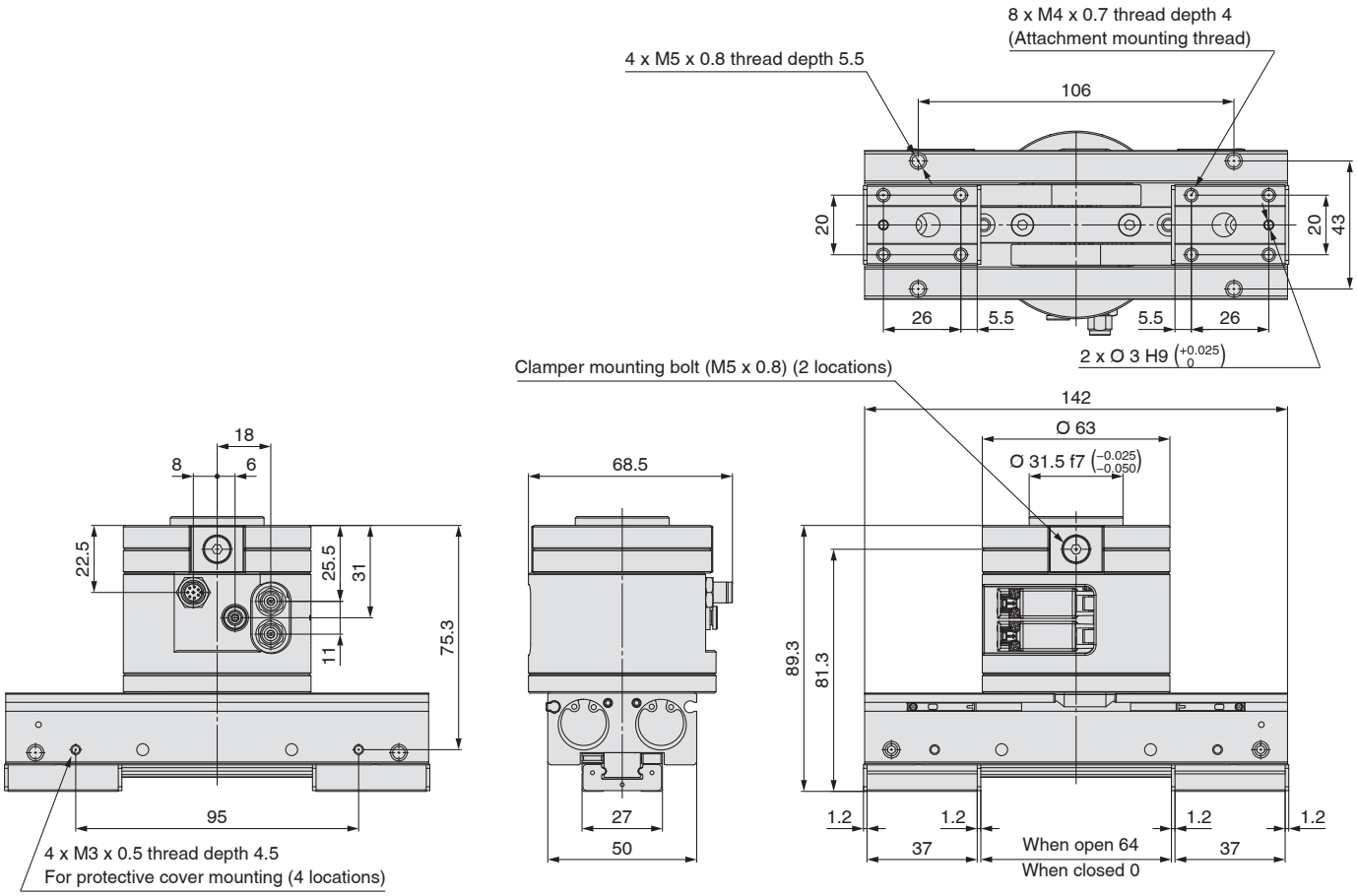
Replacement Parts

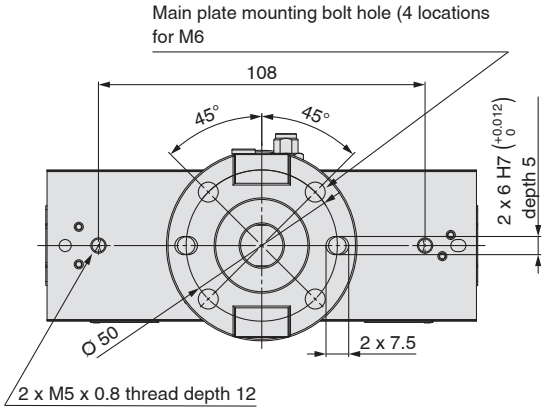
Description			Order number	Included parts
Gripper assembly			RMH-A32-01	①
Cover assembly	**Other than the following**		RMH-A32-08	⑤, Mounting screw
	Identification symbol: 011A, 051A		RMH-A32-08-B	
Dedicated flange	**Mitsubishi Electric: 031N, 031P**		JMHZ-A16-X7400-BRK-01	Dedicated flange, Mounting bolt
	YASKAWA Electric: 041N, 041P		JMHZ-A16-X7400-BRK-02	Dedicated flange, Mounting bolt
	YASKAWA Electric: 042N, 042P		JMHZ-A16-X7400-BRK-03	
Auto switch assembly∗1	**PNP**		RMH-A00-05-P	⑥
	NPN		RMH-A00-05-N	
3-port solenoid valve	**Normally open**∗2		V124-5MOU	②
	Normally closed		V114-5MOU	
	KUKA 061P	**Normally open**∗2, ∗3	V114-5MOU-X647	
		Normally closed∗3	V124-5MOU-X647	
Main plate assembly	**Other than the following**		RMH-A00-09-A	⑦
	Identification symbol: 071P, 081P, 101N		RMH-A00-09-B	
	Identification symbol: 091N, 091P, 121P		RMH-A00-09-C	
Connector cable			Refer to page 32.	
Piping plate assembly∗2			RMH-A00-06	Piping plate, Mounting bolt, O-ring
One-touch fitting			KQ2S04-M5N	④
Exhaust throttle valve			ASN2-M5-X937	③

∗1 An auto switch assembly is an assembly part in which 2 auto switches are integrated into one part. When replacing an auto switch, replacement is conducted in units of auto switch assembly. An individual auto switch cannot be replaced.
∗2 When installing a normally-open valve, a piping plate assembly is necessary. For details, refer to the operation manual.
∗3 When KUKA is used, a 3-port solenoid valve is available as a special order.

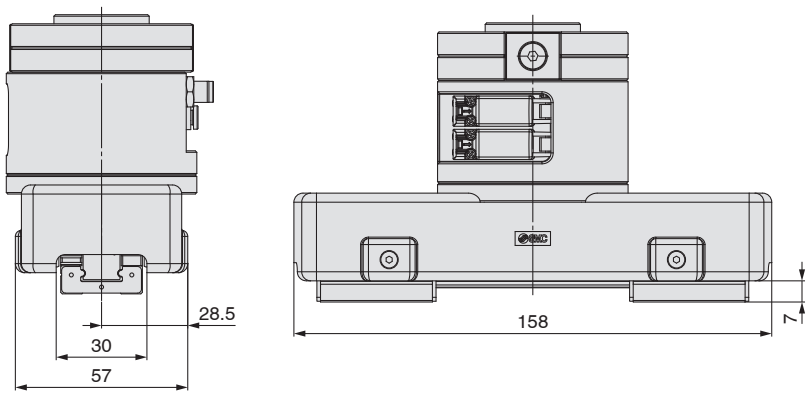
Dimensions

* For Mitsubishi Electric Corporation and YASKAWA Electric Corporation collaborative robots, a dedicated flange is required for mounting. For details, refer to page 33.



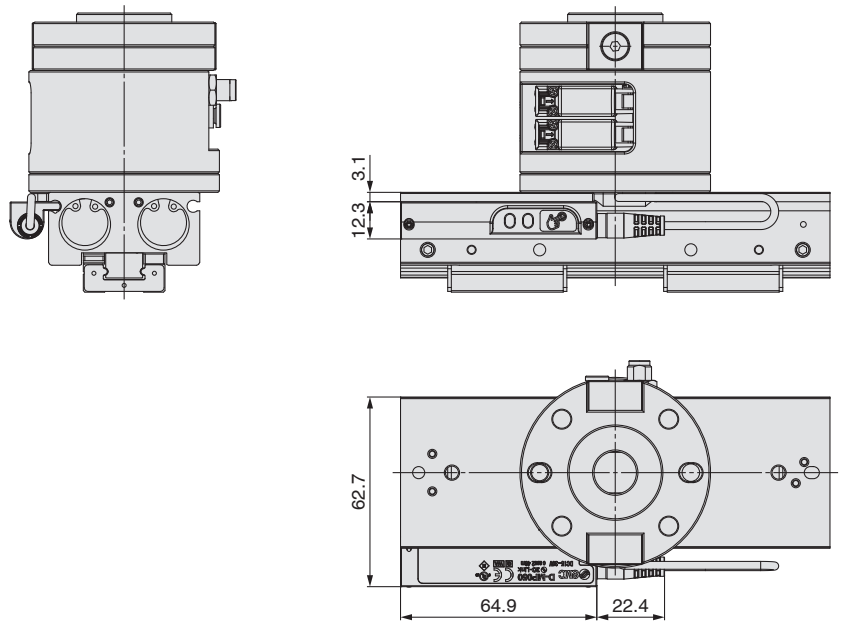


With protective cover mounted

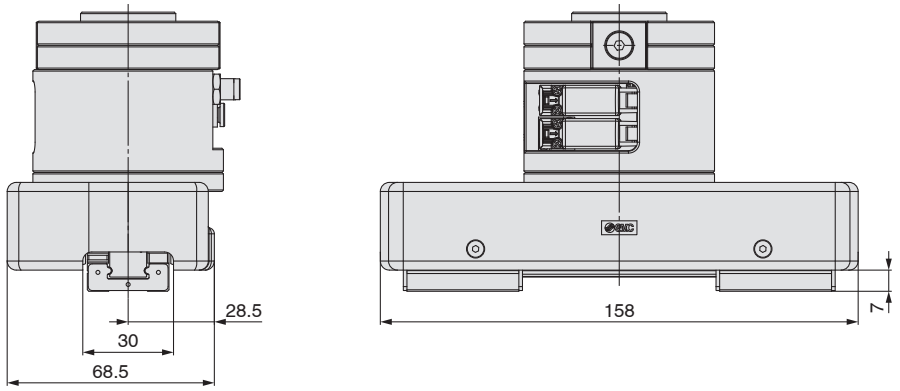


Dimensions: With Actuator Position Sensor

* Dimensions other than those shown below are the same as those shown on page 29.



With protective cover mounted



Specific Product Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For air gripper and auto switch precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smc.eu

How to Use Body Tapped Holes

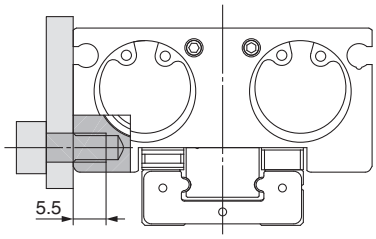
1. Do not scratch or dent the air gripper by dropping or bumping it when mounting.

Even a slight deformation can cause inaccuracy or malfunction.

Body tapped hole

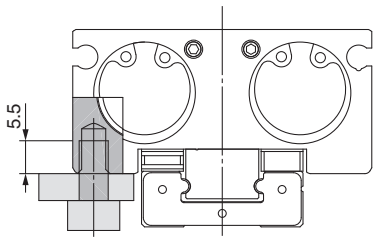
● Lateral mounting (Body tapped)

Applicable bolt: M5 x 0.8
Tightening torque: 2.7 to 3.3 N·m
Max. screw-in depth: 5.5 mm



● Bottom mounting (Body tapped)

Applicable bolt: M5 x 0.8
Tightening torque: 2.7 to 3.3 N·m
Max. screw-in depth: 5.5 mm



Handling

⚠ Caution

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 and degrade the accuracy. When there are inertial force which cause by movements or rotation to the actuator, operate the finger to full stroke.

How to Mount Attachments

1. 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.

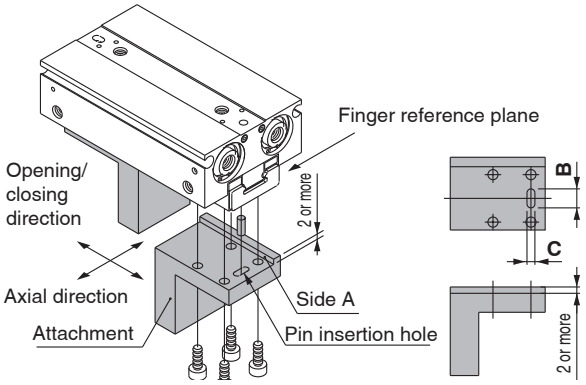
● Positioning in the finger's open/close direction

Position the finger and the attachment by inserting the finger's pin into the attachment's pin insertion hole.

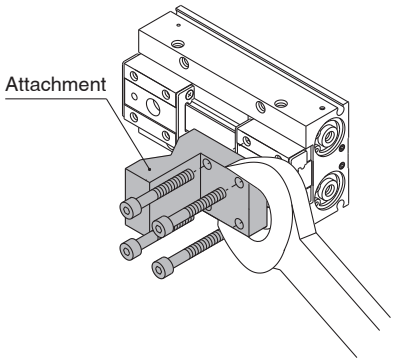
Provide the following pin insertion hole dimensions: shaft-basis fitting dimension **C** for the open/close direction; slotted hole with relief **B** for the axial direction.

● Positioning in the finger's axial direction

Perform the positioning from the reference plane of the finger and the side A of the attachment.

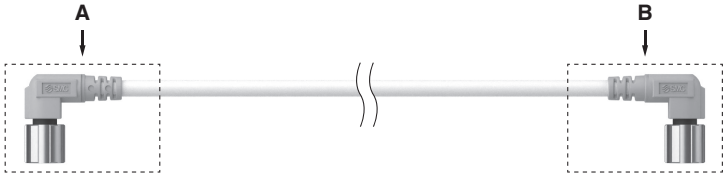


Make sure to mount the attachments on fingers with a tightening torque of 1.35 to 1.65 N·m by using M4 x 0.7 bolts, etc., for the female threads on fingers.



Options

Robot Compatible Connector Cable



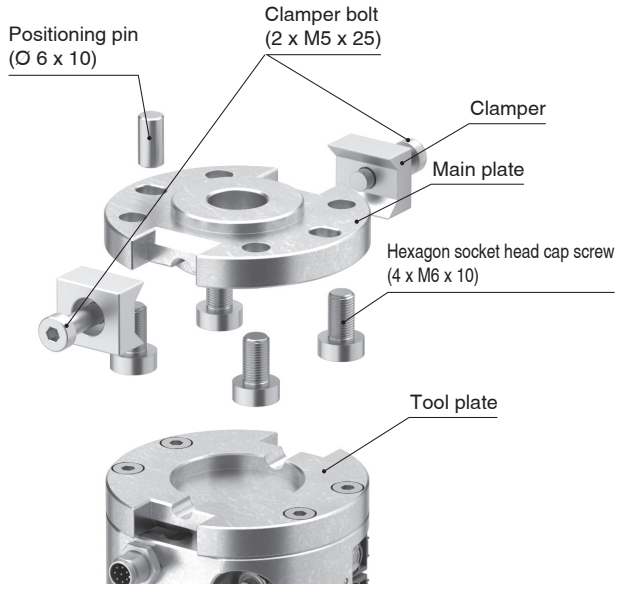
Identification symbol	Robot manufacturer	A Air gripper side	B Robot side	Part no.
011P, 011A	UNIVERSAL ROBOTS	M8 8-pin connector (Socket)	M8 8-pin connector (Socket)	RMH-A00-11-A
021N	OMRON/TECHMAN ROBOT		M8 8-pin connector (Plug)	RMH-A00-11-B
031N	Mitsubishi Electric		M12 8-pin connector (Plug)	RMH-A00-11-C
031P				
041N	YASKAWA Electric		51227-0800 made by MOLEX	MH-7400-ADP-D-01
041P				
042N				
042P				
043N			M8 8-pin connector (Socket)	RMH-A00-11-A
043P				
051P, 051A	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
101P				
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

How to Mount the Manual Changer

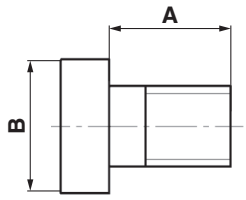
1. Insert the positioning pin into the robot arm, and tighten the main plate with the hexagon socket head cap screws. (Tightening torque: 4.7 to 5.7 N·m)

2. Loosen the clamper bolt, and align it with the tool plate groove on the air gripper.

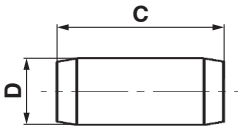
3. Tighten the clamper bolts. (Tightening torque: 2.7 to 3.3 N·m)



Replacement Parts



Main plate assembly mounting bolt



Positioning pin

Dimensions

Part no.	Description	A	B	C	D
RMH-A00-14	Hexagon socket head cap screw	10	10	—	—
RMH-A00-15		8	10	—	—
RMH-A00-16	Positioning pin	—	—	10	6h8
RMH-A00-17		—	—	15	6h8

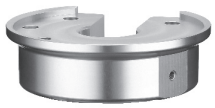
∗ Bolts and positioning pins for main plate assembly are included with the main plate assembly, but can be ordered in quantities of 1 or more by the part numbers listed below.

Compatible robot identification symbol	Hexagon socket thin head cap screw		Positioning pin	
	Part no.	Quantity	Part no.	Quantity
011	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
021	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
031	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
041	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
042	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
043	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
051	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
061	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
071	RMH-A00-15	4 pcs./unit	RMH-A00-16	1 pc./unit
081	RMH-A00-15	4 pcs./unit	RMH-A00-16	1 pc./unit
091	RMH-A00-14	4 pcs./unit	RMH-A00-17	1 pc./unit
101	RMH-A00-15	4 pcs./unit	RMH-A00-16	1 pc./unit
111	RMH-A00-14	4 pcs./unit	RMH-A00-16	1 pc./unit
121	RMH-A00-14	4 pcs./unit	RMH-A00-17	1 pc./unit

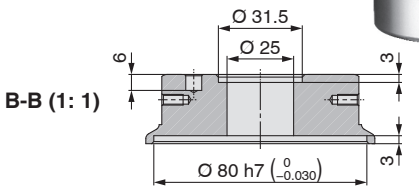
Robot Manufacturer Dedicated Flanges

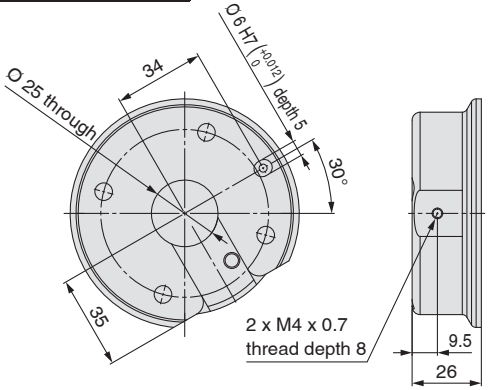
By selecting a robot identification symbol and the manual changer option "E" (With main plate assembly), a dedicated flange for the corresponding robot will be shipped with the product.

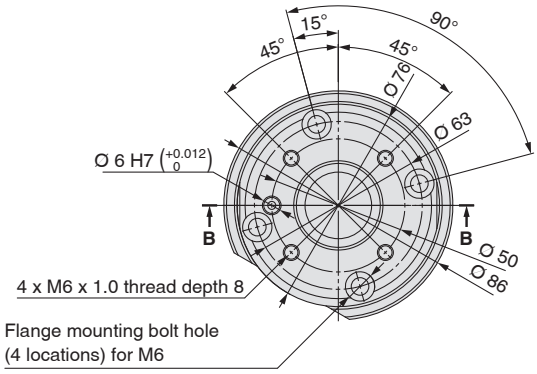
■ Flange for MOTOMAN-HC10 from YASKAWA Electric (Robot identification symbol: 041N, 041P)



Accessories	Quantity
Hexagon socket head cap screw (M4 x 8)	2 pcs.
Hexagon socket head cap screw (M6 x 12)	4 pcs.
Cross recessed resin round head screw (M4 x 6)	2 pcs.
Positioning pin (6 x 10)	1 pc.
Cable fixture	2 pcs.
Tie band	2 pcs.

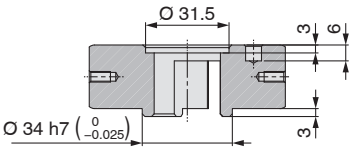


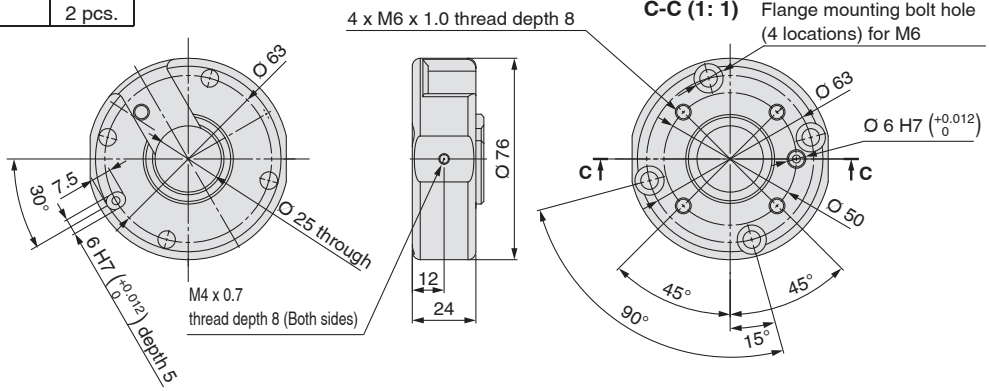




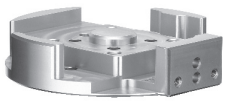
■ Flange for MOTOMAN-HC10DT from YASKAWA Electric (Robot identification symbol: 042N, 042P)

Accessories	Quantity
Hexagon socket head cap screw (M4 x 8)	2 pcs.
Hexagon socket head cap screw (M6 x 12)	4 pcs.
Cross recessed resin round head screw (M4 x 6)	2 pcs.
Positioning pin (6 x 10)	1 pc.
Cable fixture	2 pcs.
Tie band	2 pcs.

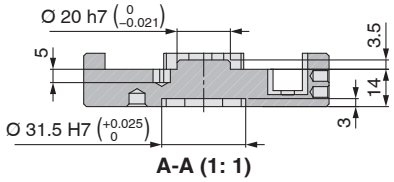


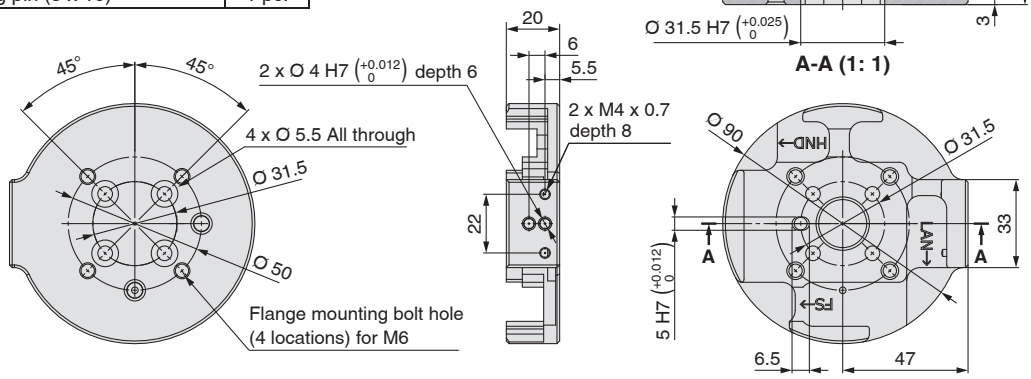


■ Flange for ASSISTA from Mitsubishi Electric (Robot identification symbol: 031N, 031P)



Accessories	Quantity
Hexagon socket head cap screw (M5 x 10)	4 pcs.
Positioning pin (5 x 10)	1 pc.





RMH□ Series
Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For air gripper and auto switch precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smc.eu

Mounting

⚠Caution

1. For details on the mounting method, refer to the Operation Manual.

2. Tighten to the specified tightening torque. If the tightening torque is exceeded, the body and the mounting screws may break. However, insufficient torque may cause displacement of the body and loosening of the mounting screws.

3. Do not drop, strike, or apply excessive impact to this product.
Doing so may result in damage to the internal parts of the body, solenoid valve, or auto switch. In some cases, this damage may result in a malfunction.

4. Hold the body when handling the product. Do not pull excessively on the connector cable or pinch the cable when lifting the body. Failure to do so may result in damage to the solenoid valve or auto switch. In some cases, this damage may result in a failure or malfunction.

5. The bolts may loosen due to the operating conditions and environment. Be sure to conduct maintenance such as tightening the bolts periodically.

Wiring

⚠Caution

1. Avoid repeatedly bending or stretching the connector cable as well as applying force to it.

2. Do not wire while energising the product. Doing so may result in damage to the internal parts of the solenoid valve or auto switch. In some cases, this damage may result in a malfunction.

3. Do not disassemble the connector cable or make any modifications, including additional machining. Doing so may cause human injury and/or an accident.

Piping

⚠Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil, and other debris from inside the pipe.

2. Installation and removal of tubing for One-touch fittings

1) Installation of tubing

(1) Cut the tubing perpendicularly, being careful not to damage the outside surface. Use an SMC tube cutter TK-1, 2, 3, 5 or 6. Do not cut the tubing with pliers, nippers, scissors, etc., otherwise, the tubing will be deformed and trouble may result.

(2) The outside diameter of the polyurethane tubing swells when internal pressure is applied to it. Therefore, it may be possible that the tubing cannot be re-inserted into the One-touch fitting. Check the tubing outside diameter, and when the accuracy of the outside diameter is +0.07 mm or larger for Ø 2, +0.15 mm or larger for other sizes, insert into the One-touch fitting again, without cutting the tubing to use it. When the tubing is re-inserted into the One-touch fitting, confirm that the tubing goes through the release button smoothly.

Piping

⚠Caution

(3) Grasp the tubing, slowly push it straight (0 to 5°) into the One-touch fitting until it comes to a stop.

(4) Pull the tubing back gently to make sure it has a positive seal. Insufficient installation may cause air to leak or the tubing to release.
As a guide for checking the tubing is not pulled out, refer to the following table.

Tubing size	Tensile force of tubing [N]
Ø 2, 3.2, 1/8"	5
Ø 4, 5/32", 3/16"	8
Ø 6, 1/4"	12
Ø 8, 5/16"	20
Ø 10, 3/8"	30
Ø 12, 1/2"	35
Ø 16	50

2) Removal of tubing

(1) Push the release button flange evenly and sufficiently to release the tube. Do not push in the tubing before pressing the release button.

(2) Pull out the tubing while keeping the release button depressed. If the release button is not held down sufficiently, the tubing cannot be withdrawn.

(3) To reuse the tubing, remove the previously lodged portion of the tubing. If the lodged portion is left on without being removed, it may result in air leakage and removal of the tubing difficult.

3. When using a tubing other than from SMC, be careful of the tolerance of the tubing O.D. and tubing material.

1) Nylon tubing Within ±0.1 mm
2) Soft nylon tubing Within ±0.1 mm
3) Polyurethane tubing Within +0.15 mm, Within –0.2 mm

Do not use the tubing which does not satisfy the specified tubing O.D. accuracy, or if the tubing has a different I.D., material, hardness, or surface roughness from those of SMC's tubing. Please consult SMC if there is anything unclear. It may cause difficulty in connecting the tubing, leakage, disconnection of the tubing, or fitting damage.
When used with tubing other than those from SMC, due to their properties, the products listed below are not subject to warranty.
KQG2, KQB2, KFG2, KF, Ø 2M

4. Piping

· Do not apply unnecessary forces, such as twisting, pulling, moment loads, vibration, impact, etc., on fittings or tubing. This will cause damage to fittings and will crush, burst, or release tubing.
· Do not lift the product by the piping after the tube is connected. Doing so may result in damage to the One-touch fitting.
For details, refer to the "Handling Precautions for SMC Products" on the SMC website: https://www.smc.eu

⚠ 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.

⚠ **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.

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.

⚠ 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 catalogue 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. Our products cannot be used beyond their specifications.
Our products are not developed, designed, and manufactured to be used under the following conditions or environments.
Use under such conditions or environments is not covered.
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, fuel 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 catalogues 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.

⚠ Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not covered.
Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.
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 catalogue 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.

SMC Corporation (Europe)

Austria	+43 (0)2262622800	www.smc.at	office@smc.at
Belgium	+32 (0)33551464	www.smc.be	info@smc.be
Bulgaria	+359 (0)2807670	www.smc.bg	office@smc.bg
Croatia	+385 (0)13707288	www.smc.hr	office@smc.hr
Czech Republic	+420 541424611	www.smc.cz	office@smc.cz
Denmark	+45 70252900	www.smcdk.com	smc@smcdk.com
Estonia	+372 651 0370	www.smcee.ee	info@smcee.ee
Finland	+358 207513513	www.smc.fi	smcfi@smc.fi
France	+33 (0)164761000	www.smc-france.fr	supportclient@smc-france.fr
Germany	+49 (0)61034020	www.smc.de	info@smc.de
Greece	+30 210 2717265	www.smchellas.gr	sales@smchellas.gr
Hungary	+36 23513000	www.smc.hu	office@smc.hu
Ireland	+353 (0)14039000	www.smcautomation.ie	sales@smcautomation.ie
Italy	+39 03990691	www.smcitalia.it	mailbox@smcitalia.it
Latvia	+371 67817700	www.smc.lv	info@smc.lv
Lithuania	+370 5 2308118	www.smclt.lt	info@smclt.lt
Netherlands	+31 (0)205318888	www.smc.nl	info@smc.nl
Norway	+47 67129020	www.smc-norge.no	post@smc-norge.no
Poland	+48 222119600	www.smc.pl	sales@smc.pl
Portugal	+351 214724500	www.smc.eu	apoioclientept@smc.smces.es
Romania	+40 213205111	www.smcromania.ro	smcromania@smcromania.ro
Russia	+7 (812)3036600	www.smc.eu	sales@smcru.com
Slovakia	+421 (0)413213212	www.smc.sk	office@smc.sk
Slovenia	+386 (0)73885412	www.smc.si	office@smc.si
Spain	+34 945184100	www.smc.eu	post@smc.smces.es
Sweden	+46 (0)86031240	www.smc.nu	smc@smc.nu
Switzerland	+41 (0)523963131	www.smc.ch	info@smc.ch
Turkey	+90 212 489 0 440	www.smcturkey.com.tr	info@smcturkey.com.tr
UK	+44 (0)845 121 5122	www.smc.uk	sales@smc.uk
South Africa	+27 10 900 1233	www.smcza.co.za	zasales@smcza.co.za

Printing BW 00 Printed in Spain