

Grippers for Collaborative Robots

KAWADA ROBOTICS CORPORATION

Compliant with the
humanoid dual-arm
robot NEXTAGE

RoHS



More information
can be viewed here.

Cups with Flange
ZXP7-PFL1-□-X1



Air Gripper
JMHZ2-X7500-KR



CAT.ES160-8A

Grippers for Collaborative Robots

KAWADA ROBOTICS CORPORATION

Compliant with the humanoid dual-arm robot NEXTAGE

For Adsorption

Cups with Flange

ZXP7-PFL1-□-X1

- Standards: Conforming to ISO9409-1-50-4-M6
- Tube-less piping
Individual piping to suction cups is unnecessary and there is no interference with workpieces or operators
- Features a rounded appearance without corners
- A wide variety of cup variations are available to support a wide range of workpieces.
- Possible to change the number of suction cups and mounting pitches



Standards	Conforming to ISO9409-1-50-4-M6
Fluid	Air
Operating temperature range [°C]	5 to 50
Weight [g]*1	228
Max. work load [kg]*2	7
Vacuum pressure supply (PV) port	M5 x 0.8, Rc1/8
Number of suction cups	4 pcs. (Included in the same package) Possible to mount between 1 and 5 pcs.

*1 The weight does not include a cup with adapter. For the total product weight, add the weight of a cup with adapter to this value. (Refer to the "Suction Cup Part Numbers and Weight" on page 6.)

*2 May be restricted depending on the cup diameter, mounting orientation, or workpiece. Please use within the max. work load. Suction and transfer exceeding the max. work load may result in reduced vacuum pressure due to air leakage.

* Included parts: Parallel pin, Mounting bolt, Cups with adapter, Plug*3

*3 M5 x 0.8 For vacuum pressure supply port: 1 pc., M3 x 0.5 For cup with adapter: 4 pcs.



For Gripping

Air Gripper

JMHZ2-X7500-KR

- Compact, lightweight product with high gripping force due to air operation
- With high-precision linear guide, Repeatability: ± 0.01 mm
- Integrated speed adjustment mechanism
- Selectable attachment, protective cover, and auto switch
- Standards: ISO9409-1-50-4-M6

Gripping force Effective value per finger [N]	External	32.7
	Internal	43.5
Opening/Closing stroke (Both sides) [mm]	10	
Weight [g]	350*1	

*1 Includes 2 attachments (30 g) and 2 protective covers (20 g)



CONTENTS

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For Adsorption

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ZXP7-PFL1-□-X1

p. 4

Features	p. 4
Cup Variations	p. 5
Specifications	p. 5
How to Order	p. 6
Dimensions	p. 7
Specific Product Precautions	p. 8



For Gripping

Air Gripper
JMZH2-X7500-KR

p. 9

Features	p. 9
Component Parts	p. 9
Specifications	p. 10
How to Order	p. 10
Characteristics	p. 11
Dimensions	p. 12
Specific Product Precautions	p. 13

Cups with Flange for Collaborative Robots

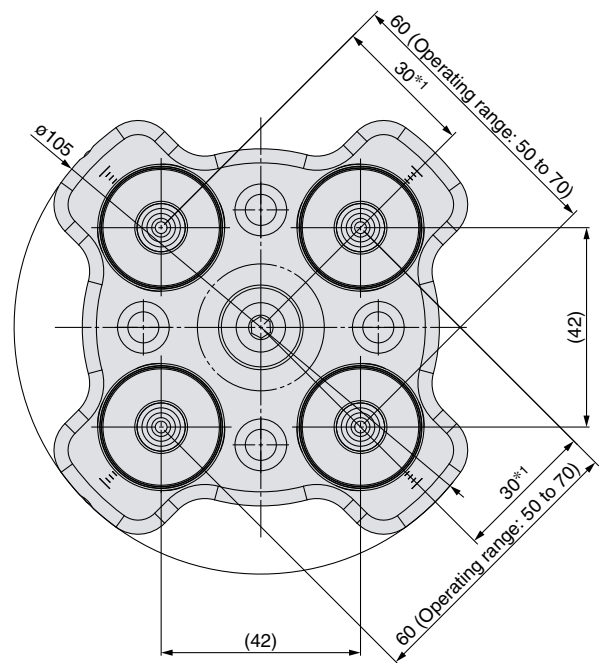
KAWADA ROBOTICS CORPORATION
Humanoid dual-arm robot

NEXTAGE compliant

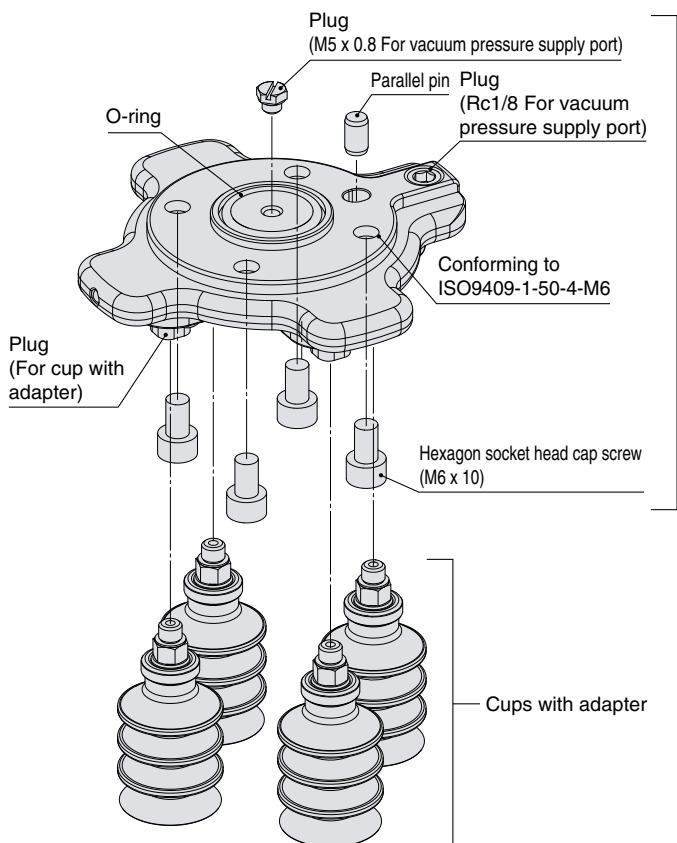


- **Standards: Conforming to ISO9409-1-50-4-M6**
- **Tube-less piping**
Individual piping to suction cups is unnecessary and there is no interference with workpieces or operators
- **Features a rounded appearance without corners**
- **A wide variety of cup variations are available to support a wide range of workpieces.**
- **Possible to change the number of suction cups and mounting pitches**

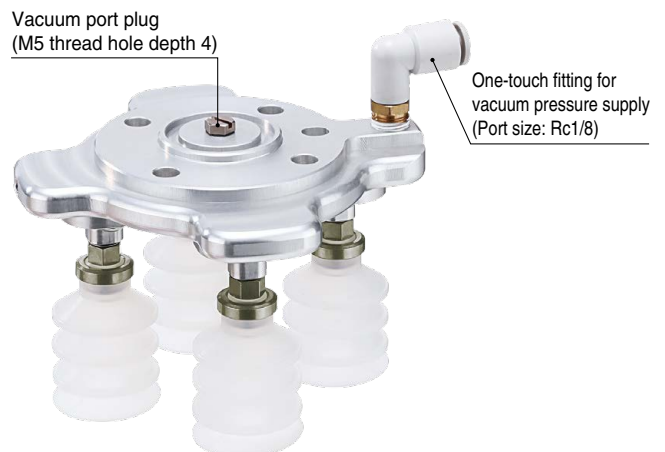
- **The cup pitch can be changed.**



*1 Operating range: 25 to 35 (When a cup is mounted in the center)
As interference between cups may occur depending on the cup diameter, select the cup diameter according to the pitch to be used.



Cup mounting flange
ZXP7-PFL1-A-X1



When using the Rc1/8 port as a vacuum pressure supply port, mount the supplied plug (product number: M-5P) to the M5 x 0.8 vacuum pressure supply (PV) port. Please order the One-touch fitting and tube to mount on the Rc1/8 port separately. (Recommended One-touch fitting: KQ2(S/L)08-01NS, recommended tube: TU0805)

Cups with Flange

Air Gripper

Cup Variations

The number of cups can be changed. (Refer to the operation manual for details on changing the quantity.)



1 cup



2 cups



4 cups

The cup type can be changed. (For details on selectable cups, refer to "How to Order.")



Flat (ø8), Silicone rubber



Bellows (ø20), NBR



Thin flat (ø16), NBR



Flat (ø32), Silicone rubber



Flat (ø32), Urethane rubber



ø32, 2.5-stage,
Silicone rubber



ø25, 5.5-stage,
Silicone rubber



ø25, 5.5-stage, Silicone rubber
With vacuum saving valve



Vacuum saving valve
ZP2V Series
(To be ordered separately)
Applicable part no.: **ZP2V-B6-05**

* The silicone material is compliant with the FDA (U.S. Food and Drug Administration) regulation 21CFR§177.

Specifications

Standards	Conforming to ISO9409-1-50-4-M6
Fluid	Air
Operating temperature range [°C]	5 to 50
Weight [g] ^{*1}	228
Max. work load [kg] ^{*2}	7
Vacuum pressure supply (PV) port	M5 x 0.8, Rc1/8
Number of suction cups	4 pcs. (Included in the same package) Possible to mount between 1 and 5 pcs.

*1 The weight does not include a cup with adapter. For the total product weight, add the weight of a cup with adapter to this value. (Refer to the "Suction Cup Part Numbers and Weight" on page 6.)

*2 May be restricted depending on the cup diameter, mounting orientation, or workpiece. Please use within the max. work load. Suction and transfer exceeding the max. work load may result in reduced vacuum pressure due to air leakage.

* Included parts: Parallel pin, Mounting bolt, Cups with adapter, Plug^{*3}

*3 M5 x 0.8 For vacuum pressure supply port: 1 pc., M3 x 0.5 For cup with adapter: 4 pcs.

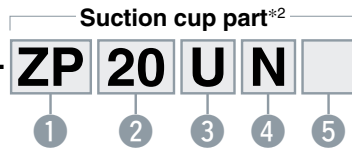
Flange only

ZXP7-PFL1-A-X1*1



Cups with Flange

ZXP7-PFL1-ZP 20 U N -X1



*1 For details, refer to page 4.
*2 Refer to the table below for the applicable cups. 4 cups with adapters are included in the package.

1 Cup series

Symbol	Series
ZP	Basic
ZP3P	Bellows type for film packaging workpieces

2 Cup diameter

Symbol	Cup diameter	Symbol	Cup diameter
08	ø8	25	ø25
10	ø10	B25	ø25
13	ø13	B30	ø30
16	ø16	32	ø32
20	ø20		

3 Cup form

Symbol	Form
U	Flat
C	Flat with rib
B	Bellows
UT	Thin flat
J	Multistage bellows
JT2	2.5-stage bellows
JT5	5.5-stage bellows

4 Cup material

Symbol	Material
N	NBR
S	Silicone rubber (White)*3
U	Urethane rubber
F	FKM
SF	Silicone rubber (Blue)*3

*3 The silicone material is compliant with the FDA (U.S. Food and Drug Administration) regulation 21CFR§177.

5 Attachment*4

Symbol	Attachment
Nil	With (guide) attachment
M	With mesh attachment

*4 Only applicable to the cup form "JT□." Note that "M" applies only to cup form: JT2.

*2

Suction Cup Part Numbers and Weight

Part No. ZXP7-PFL1 - -X1



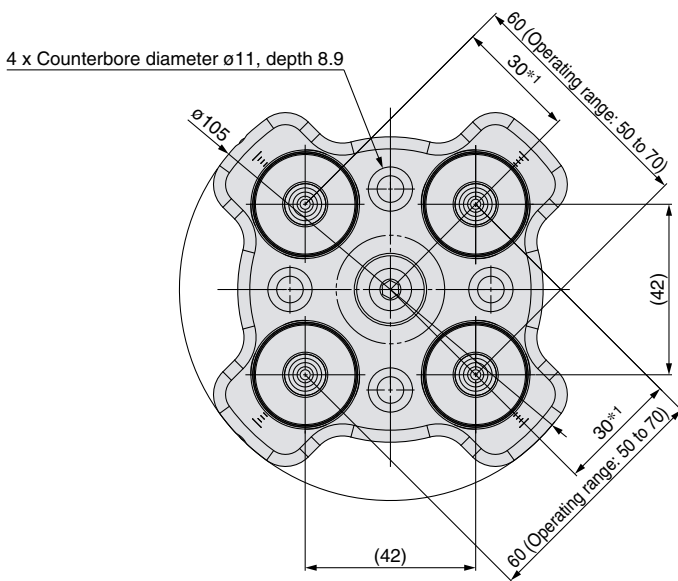
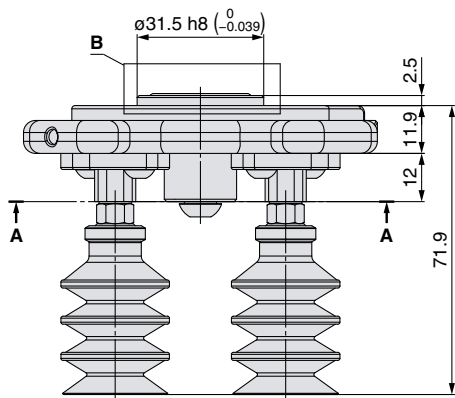
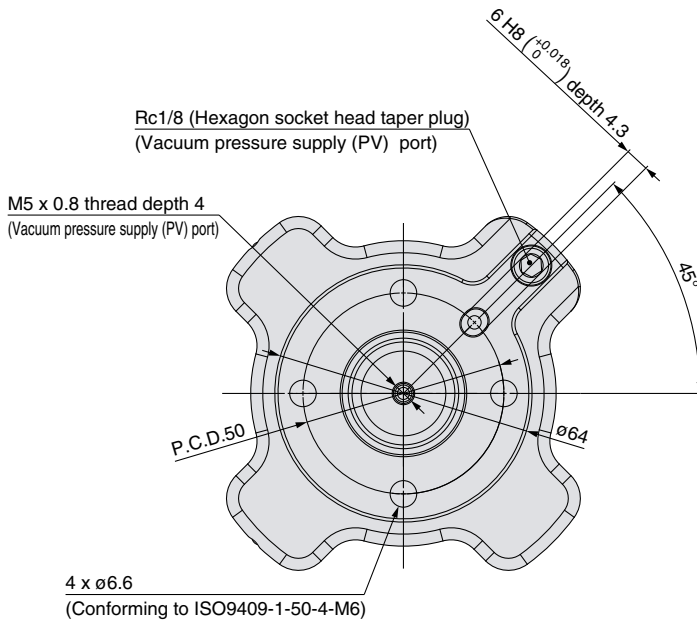
Cup part numbers

* Refer to the Web Catalog for details on suction cups.

1 Cup series	2 Cup diameter	3 Cup form	4 Cup material	5 Attachment	Cup with adapter				Adapter unit Vacuum inlet: (Male thread M6 x 1)	Cup unit		
					Part no.	Weight by cup material (g/cup)						
					N (NBR)	S/SF (Silicone)	U (Urethane)	F (FKM)				
ZP	08	U	<input type="checkbox"/>		ZPT08U□-A6	4	4	4	4	ZPT1-A6	ZP08U□	
ZP	08	B	<input type="checkbox"/>		ZPT08B□-A6	4	4	4	4		ZP08B□	
ZP	10	UT	<input type="checkbox"/>		ZPT10UT□-A6	4	4	4	4		ZP10UT□	
ZP	13	UT	<input type="checkbox"/>		ZPT13UT□-A6	4	4	4	4		ZP13UT□	
ZP	16	UT	<input type="checkbox"/>		ZPT16UT□-A6	4	4	4	4	ZP16UT□		
ZP	10	U	<input type="checkbox"/>		ZPT10U□-AS6	7	7	7	7	ZPT2-AS6	ZP10U□	
ZP	13	U	<input type="checkbox"/>		ZPT13U□-AS6	7	7	7	8		ZP13U□	
ZP	16	U	<input type="checkbox"/>		ZPT16U□-AS6	7	7	7	8		ZP16U□	
ZP	20	U	<input type="checkbox"/>		ZPT20U□-AS6	9	10	10	10		ZP20U□	
ZP	25	U	<input type="checkbox"/>		ZPT25U□-AS6	10	10	10	11	ZPT3-AS6	ZP25U□	
ZP	32	U	<input type="checkbox"/>		ZPT32U□-AS6	10	11	11	12		ZP32U□	
ZP	10	C	<input type="checkbox"/>		ZPT10C□-AS6	7	7	7	7		ZP10C□	
ZP	13	C	<input type="checkbox"/>		ZPT13C□-AS6	7	7	7	7		ZP13C□	
ZP	16	C	<input type="checkbox"/>		ZPT16C□-AS6	7	7	7	8	ZP16C□		
ZP	20	C	<input type="checkbox"/>		ZPT20C□-AS6	9	10	10	11	ZPT2-AS6	ZP20C□	
ZP	25	C	<input type="checkbox"/>		ZPT25C□-AS6	10	10	10	11		ZP25C□	
ZP	32	C	<input type="checkbox"/>		ZPT32C□-AS6	10	11	11	12		ZP32C□	
ZP	10	B	<input type="checkbox"/>		ZPT10B□-AS6	7	7	7	8		ZP10B□	
ZP	13	B	<input type="checkbox"/>		ZPT13B□-AS6	7	8	8	8	ZPT2-AS6	ZP13B□	
ZP	16	B	<input type="checkbox"/>		ZPT16B□-AS6	8	8	8	9		ZP16B□	
ZP	20	B	<input type="checkbox"/>		ZPT20B□-AS6	11	11	11	13		ZP20B□	
ZP	25	B	<input type="checkbox"/>		ZPT25B□-AS6	11	12	12	14		ZP25B□	
ZP	32	B	<input type="checkbox"/>		ZPT32B□-AS6	14	15	15	18	ZPT3-AS6	ZP32B□	
ZP	20	UT	<input type="checkbox"/>		ZPG20UT□-7A-X2	4	4	4	4		ZPT1-A6	ZP2-20UT□
ZP	16	J	<input type="checkbox"/>		ZPG16J□-7A-X2	8	8	8	9		ZPT2-AS6	ZP2-16J□
ZP	B25	J	<input type="checkbox"/>		ZPGB25J□-7A-X2	14	15	15	18		ZPT3-AS6	ZP2-B25J□
ZP	B30	J	<input type="checkbox"/>		ZPGB30J□-7A-X2	18	19	19	25	ZP2-B30J□		
ZP3P	20	JT2	SF		ZP3PG20JT2SF-7A-X2	—	21	—	—	ZP3PA-T1JT-7A-X2	ZP3P-20JT2SF-W	
ZP3P	20	JT2	SF	M	ZP3PG20JT2SF-M-7A-X2	—	21	—	—		ZP3P-20JT2SF-WM	
ZP3P	32	JT2	SF		ZP3PG32JT2SF-7A-X2	—	48	—	—	ZP3PA-T2JT-7A-X2	ZP3P-32JT2SF-W	
ZP3P	32	JT2	SF	M	ZP3PG32JT2SF-M-7A-X2	—	48	—	—		ZP3P-32JT2SF-WM	
ZP3P	20	JT5	SF		ZP3PG20JT5SF-7A-X2	—	23	—	—	ZP3PA-T1JT-7A-X2	ZP3P-20JT5SF-WG	
ZP3P	25	JT5	SF		ZP3PG25JT5SF-7A-X2	—	25	—	—		ZP3P-25JT5SF-WG	
ZP3P	32	JT5	SF		ZP3PG32JT5SF-7A-X2	—	54	—	—		ZP3P-32JT5SF-WG	

Input the material symbol ("N," "S," "U," or "F") into the □ in the part number.

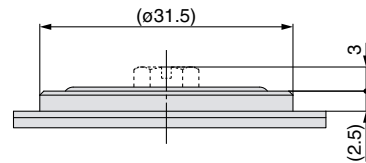
Dimensions



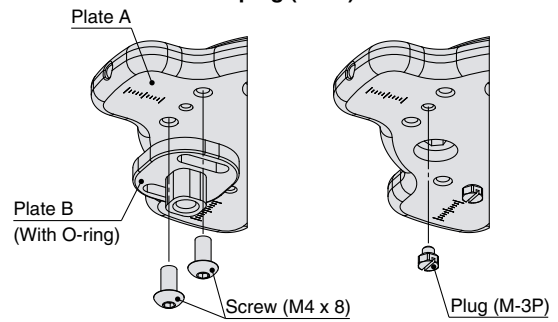
*1 Operating range: 25 to 35 (When a cup is mounted in the center)
As interference between cups may occur depending on the cup diameter, select the cup diameter according to the pitch to be used.



B (2: 1)
When the plug (M-5P) is mounted



When the plug (M-3P) is mounted

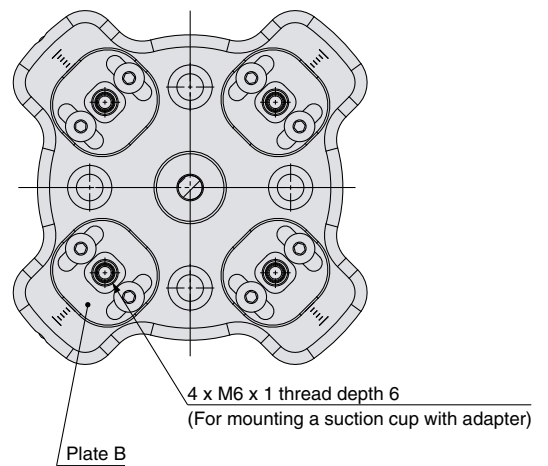


How to mount the plug

- 1) Loosen two bolts (M4 x 8) and remove plate B from plate A. Be careful not to lose the O-ring when removing the plate.
- 2) Confirm the gasket seal in the accessory plug, then mount the plugs to plate A.

A-A

Suction cup with adapter mounting parts





ZXP7-PFL1-□-X1

Specific Product Precautions

Be sure to read this before handling the products. For safety instructions and vacuum equipment precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

Handling

Caution

1. Strictly observe the precautions on vacuum equipment and safety when using the product. Additionally, select a cup size and material suitable to both the workpiece to be adsorbed and the atmosphere. Take safety measures so that any accident, such as the dropping of a workpiece, does not occur during adsorption transfer. For details, refer to the Web Catalog.
2. Use the product within the specification range. Use exceeding the compressed air pressure or voltage may result in serious damage due to reduced product performance.
3. Exhaust air is released from the opening in the product. Therefore, this exhaust air opening must not be blocked or restricted.

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.
4. Hold the body when handling the product.
5. The bolts may loosen due to the operating conditions and environment. Be sure to conduct maintenance such as tightening the bolts periodically.

Piping

Caution

1. **Flushing of the inside of the pipes**
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. **Tube attachment**
 - Take a tube having no flaws on its periphery and cut it off at a right angle. When cutting the tube, use tube cutters TK-1, 2, 3, 5, or 6. Do not use pliers, nippers, scissors, etc. If cutting is done with tools other than tube cutters, the tube may be cut diagonally or become flattened, etc., making a secure installation impossible, and causing problems such as the tube pulling out after installation or air leakage. Allow some extra length in the tube.
 - Grasp the tube and push it in slowly, inserting it securely all the way into the fitting.
 - After inserting the tube, pull on it lightly to confirm that it will not come out. If it is not installed securely all the way into the fitting, this can cause problems such as air leakage or the tube pulling out.
3. **Tube detachment**
 - Push in the release button sufficiently, pushing its collar equally around the circumference.
 - Pull out the tube while holding down the release button so that it does not come out. If the release button is not pressed down sufficiently, there will be increased bite on the tube and it will become more difficult to pull it out.
 - When the removed tube is to be used again, cut off the portion which has been chewed before reusing it. If the chewed portion of the tube is used as is, this can cause trouble such as air leakage or difficulty in removing the tube.
4. **Other Tube Brands**
When using other than SMC brand tube, confirm that the following specifications are satisfied with respect to the tube outside diameter tolerance.

· Nylon tube	within ± 0.1 mm
· Soft nylon tube	within ± 0.1 mm
· Polyurethane tube	within $+0.15$ mm, within -0.2 mm

Do not use tube which do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other trouble, such as air leakage or the tube pulling out after connection.
5. **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.smcworld.com>

Air Gripper

for Collaborative Robots

KAWADA ROBOTICS CORPORATION
Humanoid dual-arm robot

NEXTAGE compliant



■ Compact, lightweight product with high gripping force due to air operation

■ An air gripper that realizes high rigidity and high precision due to its guide-integrated construction

With high-precision linear guide

Repeatability: ± 0.01 mm

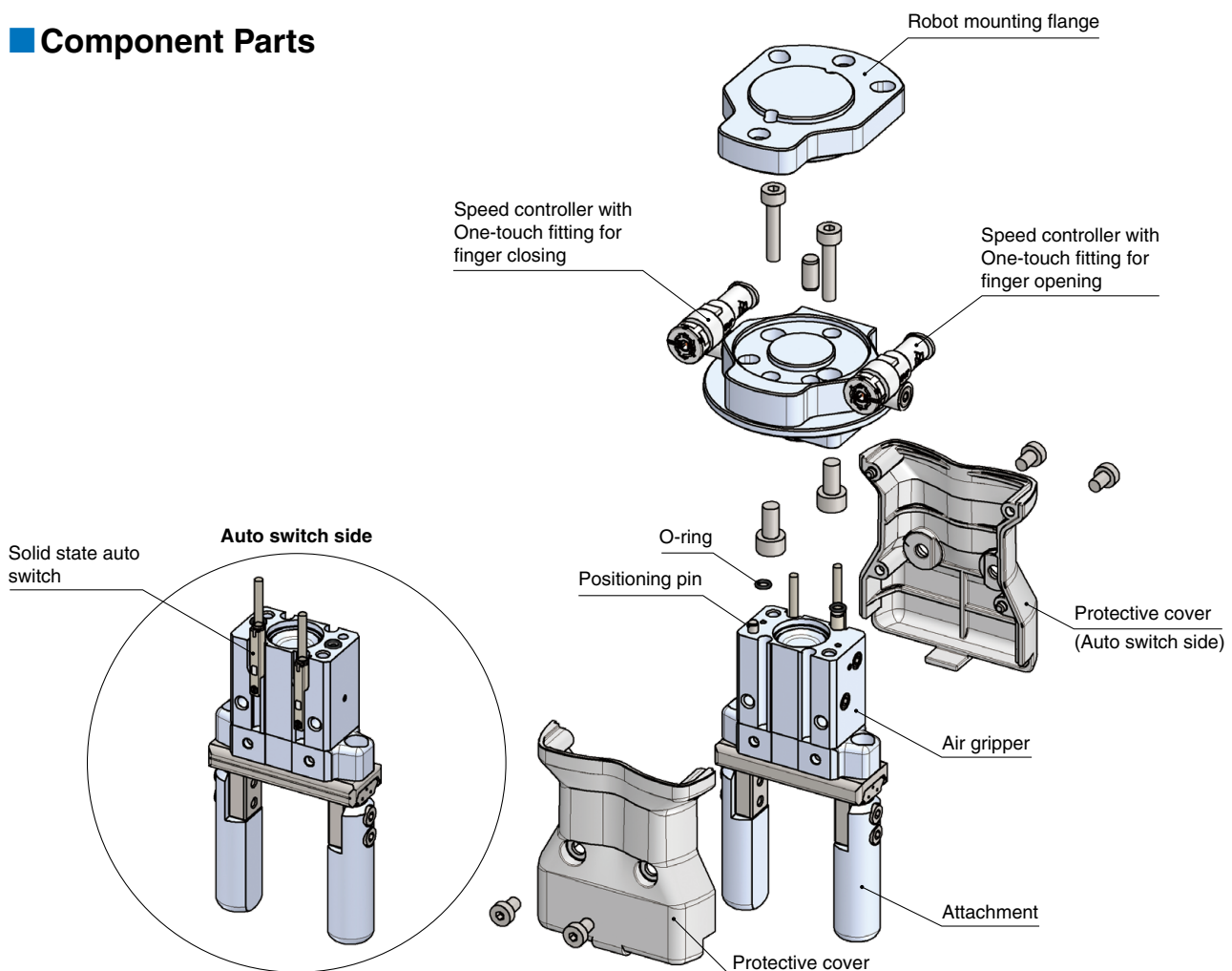
■ Integrated speed adjustment mechanism

■ A split protective cover for easy air gripper maintenance

■ Selectable attachment, protective cover, and number of auto switches

■ Standards: Conforming to ISO9409-1-50-4-M6

■ Component Parts



Specifications

Bore size [mm]	16
Fluid	Air
Operating pressure [MPa]	0.1 to 0.7
Ambient and fluid temperatures [°C]	-10 to 60
Repeatability [mm]	±0.01
Max. operating frequency [c.p.m]	120

Lubrication		Non-lube
Action		Double acting
Gripping force	External	32.7
Effective value per finger [N]	Internal	43.5
Opening/Closing stroke (Both sides) [mm]		10
Weight [g]		350*1

*1 Includes 2 attachments (30 g) and 2 protective covers (20 g)

How to Order

RoHS

JMHZ2-16D-M9NW **-X7500** **A** **C** -KR

1

2

3

4

5

6

7

For KAWADA ROBOTICS CORPORATION

1 Number of fingers

2	2
----------	---

2 Bore size

16	16 mm
-----------	-------

3 Action

D	Double acting
----------	---------------

4 Auto switch

Symbol	Specifications	Model
Nil	Without auto switch (Built-in magnet)	—
M9N	Solid state auto switch	D-M9N
M9NW	2-color indicator solid state auto switch	D-M9NW

5 Number of auto switches

Nil	2
S	1
N	n

6 Attachment

Nil	Without attachment
A	With attachment

7 Protective cover

Nil	Without protective cover
C	With protective cover

* Options "S" and "N" are shipped with the product.

Applicable Auto Switches/Refer to the Web Catalog for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model	Lead wire length [m]*1				Pre-wired connector	Applicable load		
					DC	AC		0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V			M9NW	●	●	●	○	○	

* Lead wire length symbols:

0.5 m..... Nil	(Example) M9NW
1 m..... M	(Example) M9NWM
3 m..... L	(Example) M9NWL
5 m..... Z	(Example) M9NWZ

*1 Auto switches marked with a "○" are produced upon receipt of order.

* When using the 2-color indicator type, please make the setting so that the indicator is lit in red to ensure the detection at the proper position of the air gripper.

* Product mounting bolts are included in the package.

* Use M9N/M9NW when directly connecting the auto switch to the robot.

Cups with Flange

Air Gripper

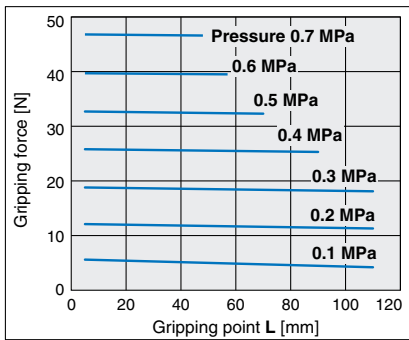
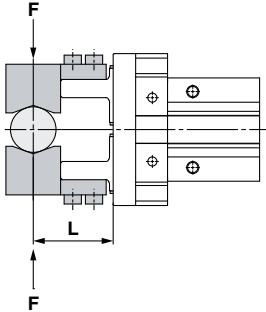
Characteristics

Gripping force

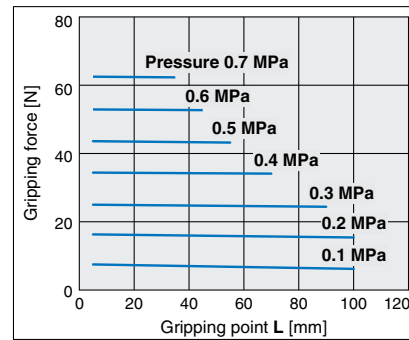
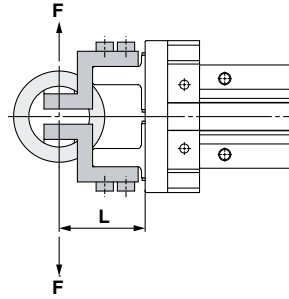
● Indication of effective gripping force

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

External gripping force



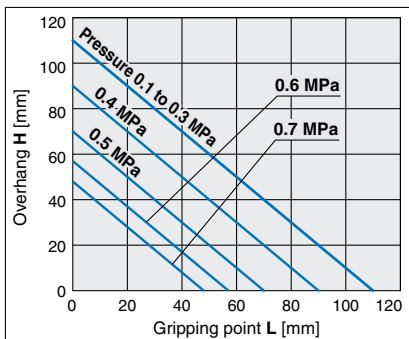
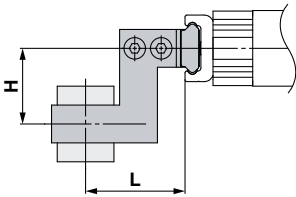
Internal gripping force



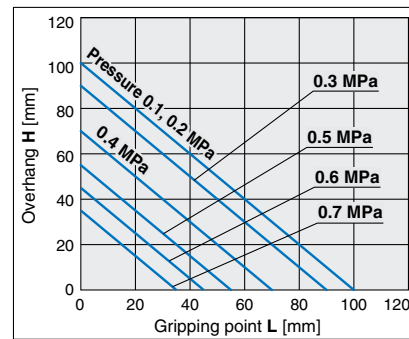
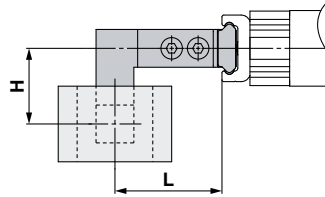
Gripping point

- 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 grip

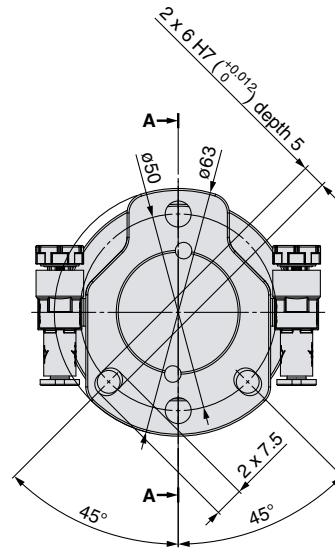
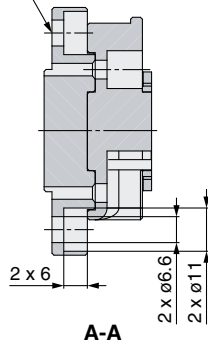


Internal grip



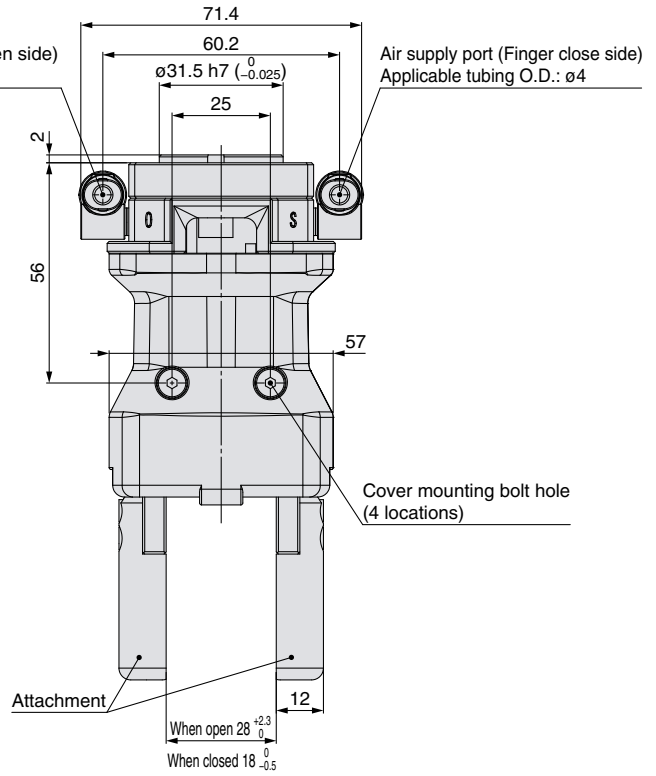
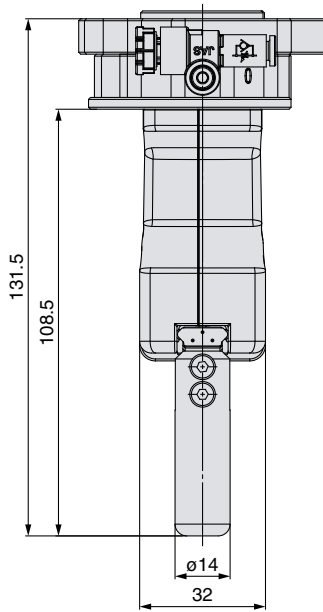
Dimensions

Air gripper mounting bolt hole
(2 locations)

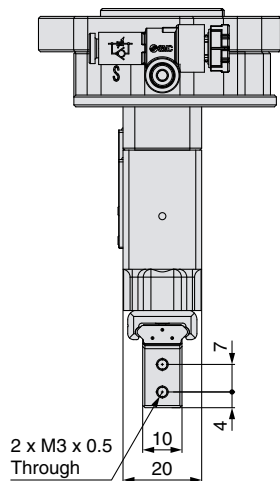
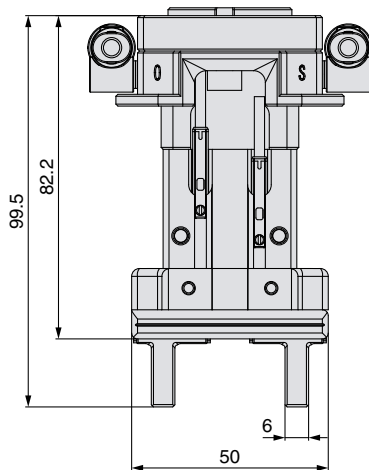


Air supply port (Finger open side)
Applicable tubing O.D.: ø4

Air supply port (Finger close side)
Applicable tubing O.D.: ø4



Without attachment and protective cover





JMHZ2-X7500-KR

Specific Product Precautions

Be sure to read this before handling the products. For safety instructions, air gripper precautions, air gripper specific product precautions, and auto switch precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

Handling

Caution

1. 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.
2. 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.
3. When mounting or removing the attachment, use the following tightening torque: 0.59 N. The weight of the attachment is generally about 70 g per side of a finger.

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 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 auto switch cable or pinch the cable when lifting the body. Failure to do so may result in damage to the 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 auto switch cable as well as applying force to it.
2. Do not wire while energizing the product. Doing so may result in damage to the internal parts of the auto switch. In some cases, this damage may result in a malfunction.
3. Do not disassemble the product or make any modifications, including additional machining. Doing so may cause human injury and/or an accident.

Piping

Caution


1. **Flushing of the inside of the pipes**
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. **Tube attachment**
 - Take a tube having no flaws on its periphery and cut it off at a right angle. When cutting the tube, use tube cutters TK-1, 2, 3, 5, or 6. Do not use pliers, nippers, scissors, etc. If cutting is done with tools other than tube cutters, the tube may be cut diagonally or become flattened, etc., making a secure installation impossible, and causing problems such as the tube pulling out after installation or air leakage. Allow some extra length in the tube.
 - Grasp the tube and push it in slowly, inserting it securely all the way into the fitting.
 - After inserting the tube, pull on it lightly to confirm that it will not come out. If it is not installed securely all the way into the fitting, this can cause problems such as air leakage or the tube pulling out.
3. **Tube detachment**
 - Push in the release button sufficiently, pushing its collar equally around the circumference.
 - Pull out the tube while holding down the release button so that it does not come out. If the release button is not pressed down sufficiently, there will be increased bite on the tube and it will become more difficult to pull it out.
 - When the removed tube is to be used again, cut off the portion which has been chewed before reusing it. If the chewed portion of the tube is used as is, this can cause trouble such as air leakage or difficulty in removing the tube.
4. **Other Tube Brands**
When using other than SMC brand tube, confirm that the following specifications are satisfied with respect to the tube outside diameter tolerance.


· Nylon tube	within ± 0.1 mm
· Soft nylon tube	within ± 0.1 mm
· Polyurethane tube	within $+0.15$ mm, within -0.2 mm


Do not use tube which do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other trouble, such as air leakage or the tube pulling out after connection.
5. **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.smcworld.com>

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.

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
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 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. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

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.

Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

 **Safety Instructions** Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.

SMC Corporation

Akihabara UDX 15F,
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: 03-5207-8249 Fax: 03-5298-5362
<https://www.smcworld.com>
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Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

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