



ORIGINAL INSTRUCTIONS

Instruction Manual  
Electric Vacuum Gripper for  
Collaborative Robots  
ZXPE5 Series



The intended use of the electric vacuum gripper is to mount on a collaborative robot and grip / release a workpiece.

1 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 <sup>1)</sup>), and other safety regulations.

<sup>1)</sup>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: Robotics — Safety requirements — Part 1: Industrial robots

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

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

**Warning**

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

2 Specifications

2.1 General specifications

Body specifications	Standards		ISO 9409-1-50-4-M6
	Operating temperature range [°C]		5 to 40
	Connector type		M8 8-pin connector (Plug)
	Weight	Gripper <sup>1)</sup>	722 (556)
		Connector cable	Refer to
		Cup with adapter	DOC1069701
	Max. workload [kg] <sup>2)</sup>		5
	Static allowable load $F_{max}$ [N] <sup>3)</sup>		150
	Static allowable moment $M_{max}$ [N.m] <sup>3)</sup>		1
	Max. vacuum pressure [kPa] <sup>4)</sup>		-74
	Suction flow rate [l/min] <sup>4)</sup>		4.5
	Impact / Vibration resistance [m/s <sup>2</sup> ] <sup>5)</sup>		150 / 30
	Noise level [dB(A)] <sup>6)</sup>		60
Power supply	Power supply voltage [V]		24VDC±10%
	Current consumption [mA] <sup>7)</sup>	Max. current <sup>8)</sup>	1,400
		Standby current <sup>9)</sup>	60

2 Specifications - continued

General specifications – continued

IO communication input	Input type	PNP/NPN
	Input ON voltage [V]	15 or more
	Input ON current [mA]	3 or more
	Input OFF voltage [V]	5 or less
IO communication output	Input OFF current [mA]	0.5 or less
	Output type	PNP/NPN
	Max. load current [mA]	200
	Protection	Short-circuit
Pressure monitor specifications	Rated pressure range [kPa]	0.0 to -101.0
	Display pressure range [kPa]	10.0 to -105.0
	Display/smallest adjustment increment[kPa]	0.1
	Display accuracy [%]	±2 F.S. ±1 digit (Ambient temperature of 25±3°C)
	Repeatability [%]	±0.2 F.S. ±1 digit
	Temperature characteristics [%]	±2 F.S. (25°C standard)
	Applicable suction cups	Refer to DOC1069701
Standard		CE / UKCA

Table 1.

- Note 1) The weight of the main plate assembly is included. The weights of the connector cable and cup with adapter are not included. The weight in brackets refers to the weight of the product without a cup mounting flange assembly.
- Note 2) The maximum workload is restricted by the cup diameter, mounting orientation, and workpieces. Use this product within its maximum workload. Suction and transfer exceeding the max. workload may result in product failure or dropping of the workpieces.
- Note 3) Limit values of the product itself. If there are other restrictions, such as a robot to be connected, use the ZXPE within these limits. When combining a load and moment, such as at the time of transportation, make sure the load factor is 1 or less according to:  $F/F_{max} + M/M_{max} \leq 1$  (load factor).
- Note 4) These are the values under SMC measurement conditions when the gripper is in continuous mode (the vacuum pump working continuously) and may vary depending on the atmospheric pressure (weather, altitude, etc.) and

- the measurement method.
- Note 5) Impact resistance: The characteristics are satisfied after tested one time in each of the X, Y and Z directions with energization. (Initial value)  
Vibration resistance: The characteristics are satisfied after tested a one sweep in each of the X, Y and Z directions at 10 to 500 Hz with energization. (Initial value)
- Note 6) Actual values under SMC's measurement conditions (not guaranteed values).
- Note 7) This represents the value when supply voltage of 24VDC is applied.
- Note 8) This represents the value including inrush current.
- Note 9) The standby current is an average current when the electric vacuum gripper is on standby.

**Warning**

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Installation

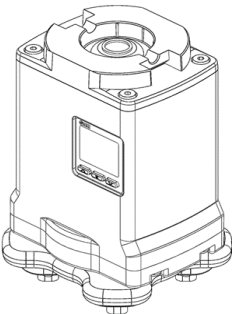
3.1 Installation

**Warning**

- Do not install the product unless the safety instructions have been read and understood.

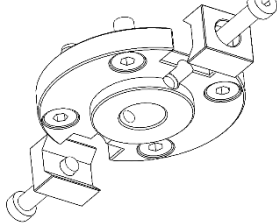
3.2 Parts included in the package

- Electric vacuum gripper: 1pc



3 Installation - continued

- Main plate assembly: 1pc  
Part No. RMTM2-4M1 Parallel pin (6x10) × 1, Parallel pin (6x15) × 1, Hexagon thin socket head bolt (M6 x 10) × 4, Hexagon thin socket head bolt (M6 x 8) × 4, and Hexagon thin socket head bolt (M5x25) x 2 (When “With main plate assembly” is selected.)



- Connector cable: 1 pc  
Part No. RMH-A00-11-(A,B) (When “With connector cable” is selected.) Specified connector cable for each compatible robot can be found in the Operation Manual DOC1069701.



- Suction cup with adapter: 4 pcs  
(When “Cup diameter” is selected).



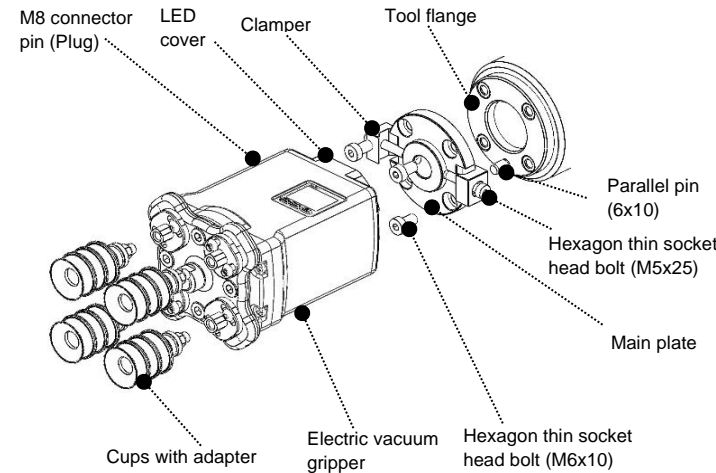
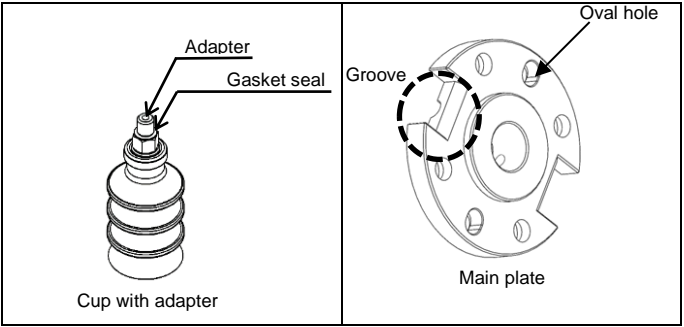
- Plug: 4 pcs  
Part No. M-3P (When “With flange assembly” is selected) (Used for decreasing the number of suction cups).



3.3 Mounting

- Mounting the gripper on the robot
  - Insert the parallel pin(6x10) into the robot tool flange pin hole.
  - Align the parallel pin with the oval hole of the main plate. Mount the main plate on the robot with the 4 hexagon thin socket head bolts(M6x10) provided. Tighten with a tightening torque of 5.2±0.5 Nm.
  - Align the grooves of the main plate and the LED cover. Insert the clammer into the grooves and mount the gripper by tightening the hexagon thin socket head bolts(M5x25) with a tightening torque of 1.5±0.1 Nm.
  - With the gasket seal in place on the adapter, mount 4 cups with adapter onto the electric vacuum gripper with a tightening torque of 1 Nm or tighten by 1/4 turn using a spanner after tightening by hand.
- To remove the gripper, follow the mounting procedure in reverse.

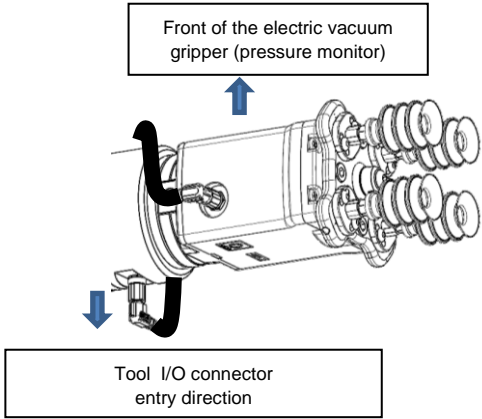
3 Installation - continued



**Caution**

- Mount the electric vacuum gripper on the robot in an orientation that minimizes slack in the connector cable. If the cable slack is large, the cable may cause an unexpected accident by pulling on the surrounding equipment, workpieces, or people while the robot is in operation.

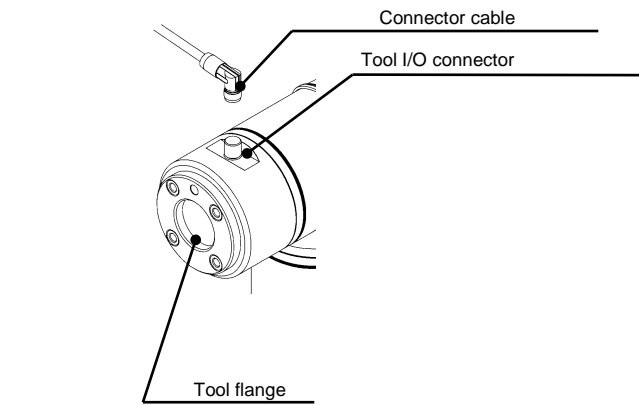
<Example of mounting>



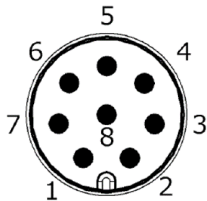
3.4 Wiring

- Connect the electric vacuum gripper's M8 connector pin (plug) and the tool flange's tool I/O connector together with the connector cable.
- Do not energize while securing the connector.
- Check that the connector is not loose.

3 Installation - continued



- M8 connector pin



Symbol	Robot	Pin no.	Function
011P	Universal Robots	1	RS485+
		2	RS485-
		3	Digital output 1
		4	Digital output 0
		5	Power supply voltage (24V)
		6	Digital input 1 *
		7	Digital input 0 *
		8	Power supply voltage (GND)
021N	Omron/ Techman Robot	1	Power supply voltage (24V)
		2	Digital output 0
		3	Digital output 1
		4	Non connection
		5	Digital input 0
		6	Digital input 1
		7	Non connection
		8	Power supply voltage (GND)
043N 043P 051P	Yaskawa Fanuc	1	Non connection
		2	Non connection
		3	Digital output 1
		4	Digital output 0
		5	Power supply voltage (24V)
		6	Digital input 1
		7	Digital input 0
		8	Power supply voltage (GND)

Table 2.

Make sure that the input/output type of electrical vacuum gripper matches the robot.

Caution

Do not connect the "non connection" pins in the table. Miswiring may cause product malfunction.

3 Installation - continued

- When supply voltage is applied to the electric vacuum gripper, the pressure monitor is turned on and performs zero-clear. The LED flashes green, indicating that the electric vacuum gripper is idling.

Caution

- Power on the electric vacuum gripper with the vacuum port released to atmosphere and unpressurized. This product clears the display value to zero upon power on. If it is powered on with pressure applied, the displayed pressure value may deviate. If this happens, power it on again after powering off and removing the pressure from the vacuum port to release to atmosphere.

3.5 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- Do not use the product in an area where surges are generated. When there are machines or equipment that generate a large surge near the product (magnetic type lifter, high frequency inductive furnace, motor, etc.), this can result in deterioration and damage of the internal elements. Take measures against the surge sources and prevent the lines from coming into close contact.
- Do not use the product in an area where a strong magnetic field or strong electric field is generated; this can result in damage to internal parts and product malfunction.
- Do not allow oil, moisture, particles, dust, cutting chips, spatter, or other foreign objects to enter inside the product; this can result in deterioration in product performance or malfunction. Provide appropriate protection when using the product in an environment

where contamination may occur.

- Do not apply vibration or impact to the product. Handle the product with care as vibration and impact may cause deterioration in product performance or malfunction.

3.6 Software

Refer to the following Operation Manuals for each software:

- URCap: DOC1075117
- TMComponent: DOC1086932
- YASKAWA Plug & Play Kit: DOC1086941
- FANUC CRX: DOC1086961

4 How to Order

Refer to catalogue for 'How to Order'.

5 Outline Dimensions

Refer to catalogue for outline dimensions.

6 Maintenance

6.1 Maintenance of electric vacuum gripper

Caution

- Inspection before and after maintenance. When removing the product from the robot, ensure that the power supply is turned off and the vacuum pressure inside the product is released. When returning the product on the robot after maintenance, connect to the power and check if it functions properly.
- Perform diagnostic function of product regularly. For details of diagnostic function, refer to Operation Manual DOC 1069701.
- Regularly tighten connections which may be loosened by the use for a long period. The parts connections may be loosened by vibration or impact when the gripper is operated for a long time. Tighten the following connections regularly to ensure that parts do not fall off and the gripper is properly installed on the robot:

6 Maintenance - continued

**Clamper:** Tighten the clamper in the same manner as initial installation.  
**Cup mounting flange:** Refer to Operation Manual DOC 1069701 for the tightening method.

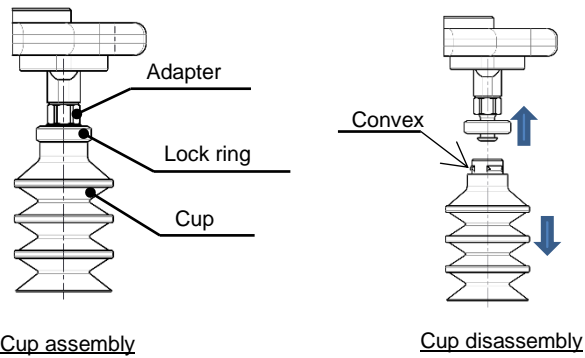
- Maintenance should be performed according to the procedure stated in the Operation Manual. Improper handling can cause damage and malfunction of equipment and machinery.
- Do not disassemble or modify the product, other than replacement of the parts specified in this manual.

6.2 Maintenance for suction cups

Caution

- Suction cups are consumables. Replace them on a regular basis. Continued use of suction cups will cause wear and tear on the gripping surface, and the exterior dimensions will be gradually reduced, which can lead to a reduction in lifting force, whilst gripping will remain possible. It is extremely difficult to predict when a suction cup should be replaced. This is because there are numerous factors at work, including surface roughness, operating environment (temperature, humidity, ozone, solvents, etc.), and operating conditions (vacuum pressure, workpiece weight, pressing force of the suction cups on the workpieces, presence, or absence of a buffer, etc.). (With the bellow type cup, weakened bents, wear, or sticking of rubber parts may occur.) The customer is required to decide when suction cups should be replaced, based on their operating condition at the time of initial use. The bolts may become loose depending on the operating conditions and environment. Be sure to perform regular maintenance.
- How to replace the suction cup:
  - Pull the lock ring upward and after lifting it up to the adapter, remove the old cup by pulling it downward.
  - While holding the lock ring in the raised position place a new cup onto the adapter.
  - Confirm that the cup is securely in place and then return the lock ring to its original position.

Note) The cup without lock ring should be inserted to the end of the adapter.



7 Limitations of Use

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

Caution

8 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

9 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for your local distributor/importer.

SMC Corporation

URL : [https:// www.smcworld.com](https://www.smcworld.com) (Global) [https:// www.smc.eu](https://www.smc.eu) (Europe)  
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