



ORIGINAL INSTRUCTIONS

**Instruction Manual**  
**Vacuum Gripper**  
**ZXP7\*-\*\*\*\*-X1\*-ASSISTA Series**



The intended use of the vacuum gripper is to mount on a collaborative robot and grip / release 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 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: Robots and robotic devices - Safety requirements for industrial robots - Part 1: 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>⚠ Caution</b> | Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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>⚠ Danger</b>  | Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious 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 Common Specifications**

|  |                                       |                         |
|--|---------------------------------------|-------------------------|
| Mechanical interface (Accessory bracket assembly)                    | Compliant with "ISO 9409-1-31.5-4-M5" |                         |
| Fluid  | Air                                   |                         |
| Operating temperature range [°C]                                     | 5 to 50                               |                         |
| Connector type   | M12 8 pin (Plug)                      |                         |
| Weight [g]   | ZXP7N-X1*-ASSISTA                     | 793                     |
|  | ZXP7A-X1*-ASSISTA                     | 1018                    |
|  | Example:<br>ZXP7A-ZPB25JS-X1*-ASSISTA | 1071 <sup>(Note1)</sup> |
| Max. workload [kg] <sup>(Note2)</sup>                                | 7                                     |                         |
| Impact / Vibration resistance [m/s <sup>2</sup> ] <sup>(Note3)</sup> | 150 / 30                              |                         |
| Air supply port(P)   | One touch fitting (Φ6) Internal       |                         |
| Power supply voltage [V]   | DC24 ± 10%                            |                         |

**Note 1)** The weight changes depending on the selected suction cup.  
**Note 2)** Limited by the cup diameter, mounting orientation or workpiece. The weight of the workpiece shall be maximum workload or less.

**2 Specifications- continued**

Gripping or transfer of workload exceeding the maximum workload leads to the decrease of vacuum due to air leakage.

**Note 3)** Impact resistance: The characteristics are satisfied after tested one time in each of the X, Y and Z directions without 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 without energization (Initial value).

**2.2 Ejector Specifications**

|   |             |
|---|-------------|
| Max. vacuum pressure [kPa] <sup>(note4)</sup>     | -84         |
| Max. suction flow [L/min(ANR)] <sup>(note4)</sup> | 17          |
| Air consumption [L/min(ANR)] <sup>(note4)</sup>   | 57          |
| Supply pressure range [MPa]                       | 0.3 to 0.55 |
| Standard supply pressure [MPa] <sup>(note5)</sup> | 0.5         |

**Note 4)** Values at the standard supply pressure. Values are based on standard of SMC measurements. They depend on atmospheric pressure (weather, altitude, etc.) and measurement method.

**Note 5)** This shows the pressure just before the supply (P) port.

The performance such as vacuum pressure may reduce, depending on supply air capacity, the piping volume (piping length and diameter) and affection of air consumption of other devices which operate at the same time.

**2.3 Valve Specifications**

|       |      |
|-------|------|
| Model | V114 |
|-------|------|

**2.4 Pressure Switch Specifications**

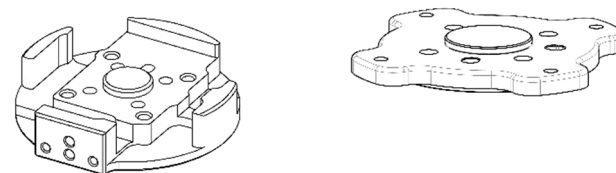
|                                 |   |
|---------------------------------|---|
| Model                           | ZSE20-**-M5-A1                                      |
| Rated pressure range [kPa]      | 0 to -101   |
| Display Accuracy [%]            | ±2 F.S. ±1 digit<br>(Ambient temperature of 25±3°C) |
| Repeatability [%]               | ±0.2 F.S. ±1 digit                                  |
| Temperature characteristics [%] | ±2 F.S. (25°C standard)                             |

**3 Installation**

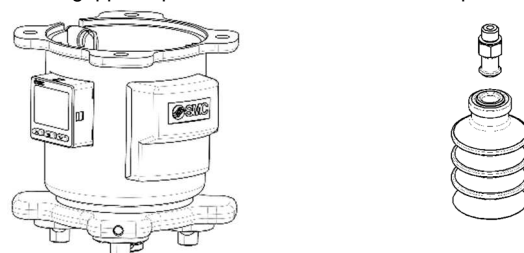
- Do not install the product unless the safety instructions have been read and understood.

**3.1 Parts included in the package**

- Connector storage flange: 1pc.
- Robot mounting flange: 1pc.



- Vacuum gripper: 1pc.
- Suction cup with adapter: 4pc.



**3 Installation - continued**

- Parallel pin (5x10) 1 pc.  
For mounting the connector storage flange.
- Hexagon socket head cap screw (M5x10) 4 pcs.  
For mounting the connector storage flange.



- Plug bolt (M6x6) 4 pcs. (with gasket (M-6G))
- Parallel pin (6x10) 1 pc.



- Male elbow (KQ2L04-M3G1) 1 pc.
- Different diameter straight (KQ2H04-06A1) 1 pc.



- Plug-in reducer (KQ2R06-04A1) 1 pc
- Hexagon socket head cap screw (M6x10) 8 pcs.



- Coil tube (TCU0604B-1) 1 pc.

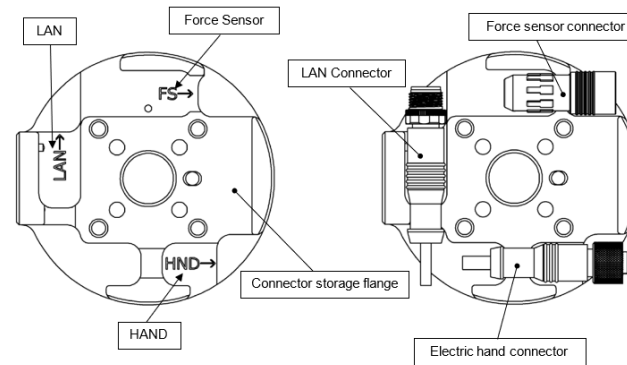


**3.2 Mounting**

**⚠ Warning**

Perform the mounting of the vacuum gripper and accessories by following these steps:

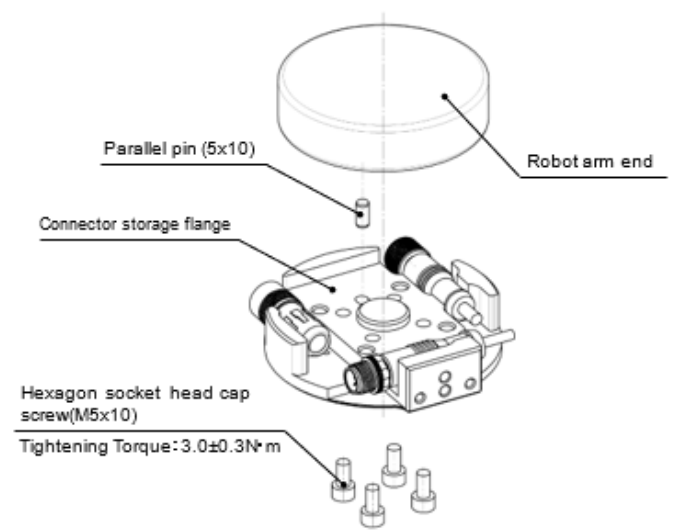
- Connector storage  
Set the three connectors at the end of the robot arm according to the characteristics printed on the flange. The connection part of the connectors is set in the direction of the arrows.



- Mounting the connector storage flange

Mounting a parallel pin to the end of the robot arm and mount the connector storage flange with the attached hexagon socket head cap screw (tightening torque: 3.0 ± 0.3 N · m).

**3 Installation - continued**

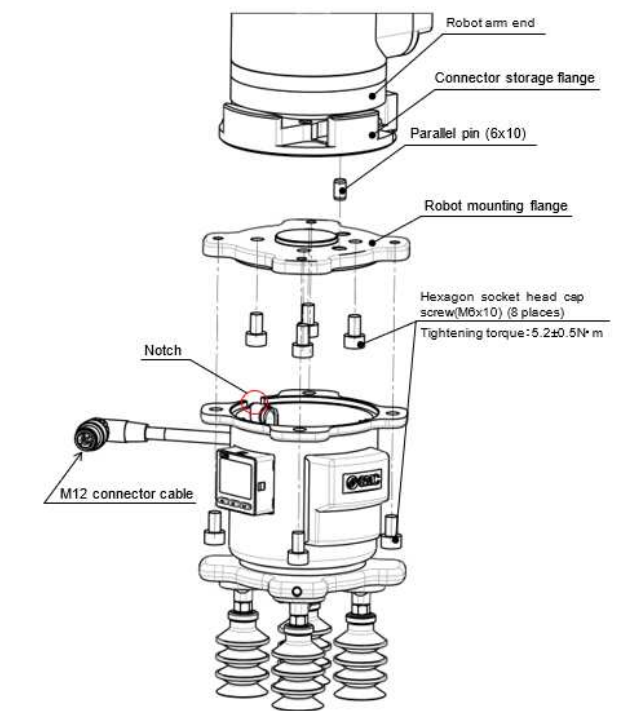


- Mounting the vacuum gripper

Before mounting the product, adjust the position of the robot arm so that it is easy to mount the product

Mount parallel pin (6x10) to connector storage flange mounted, and mount robot mounting flange with the attached hexagon socket head cap screw (M6x10) (tightening torque: 5.2±0.5N·m).

Mount vacuum gripper to robot mounting flange with hexagon socket head cap screw (M6x10) so that the protrusion of robot mounting flange and the notch of vacuum gripper match.

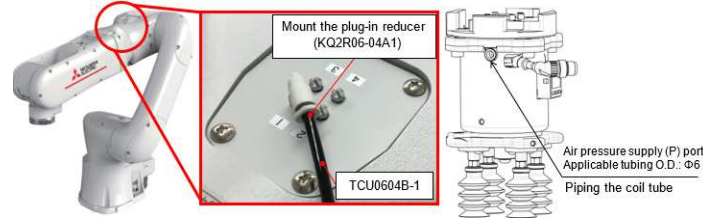


- Mounting of piping joints and coil tubes

Remove secondary piping plug in one place and mount the attached one-touch fitting (KQ2L04-M3G1).

### 3 Installation - continued

Mount the attached plug-in reducer (KQ2R06-04A1) to One-touch fitting (KQ2L04-M3G1) and piping the coil tube (TCU0604B-1) to both plug-in reducer and vacuum gripper.

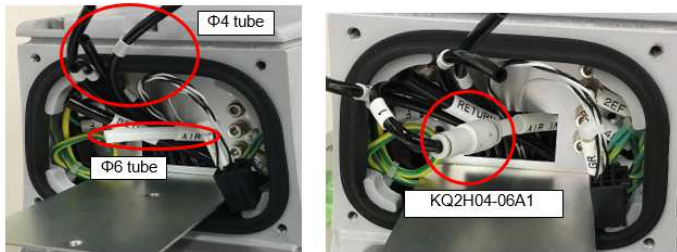


Remove truss screw (M4,4 places) on the base of the robot body and slowly remove the base cover. Depending on the posture of the robot body, it may be difficult to remove the base cover. Change the posture of the robot in advance to make it easier to work with.



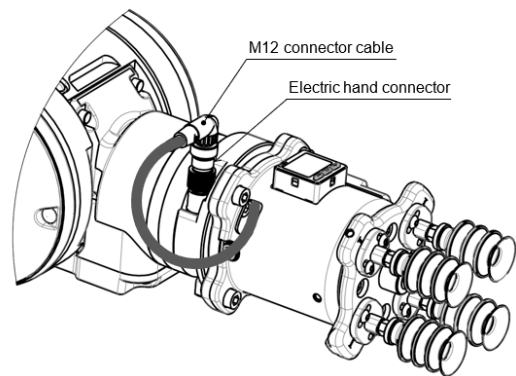
Take out the Φ4 tube and Φ6 tube (white) from the opening.

Connect the Φ4 tube tubing should be the same as the airport No. to which the one-touch fitting is connected in step 1 above and white Φ6 tubing with a one-touch fitting (KQ2H04-06A1).

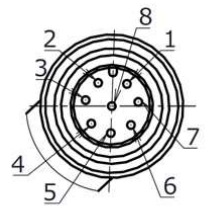


### 3.3 Wiring

Mount M12 connector cable to electric hand connector as below figure. Refer to the table below about M12 connector pin assign.



### 3 Installation - continued



| Pin no. | Wire color | Function                   |
|---------|------------|----------------------------|
| 1       | White      | Power supply voltage (GND) |
| 2       | Brown      | Power supply voltage (24V) |
| 3       | -          | N.C.(Non connection)       |
| 4       | Yellow     | Pilot valve for supply *   |
| 5       | -          | N.C.(Non connection)       |
| 6       | -          | N.C.(Non connection)       |
| 7       | Blue       | Pressure switch output     |
| 8       | -          | N.C.(Non connection)       |

\* Set the polarity of the robot output to the selected switch polarity (NPN/PNP).

### 3.4 Piping

#### Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

### 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.

### 4 How to Order

Refer to catalogue for 'How to Order'.

### 5 Outline Dimensions

Refer to catalogue for outline dimensions.

### 6 Maintenance

#### 6.1 General maintenance

#### Caution

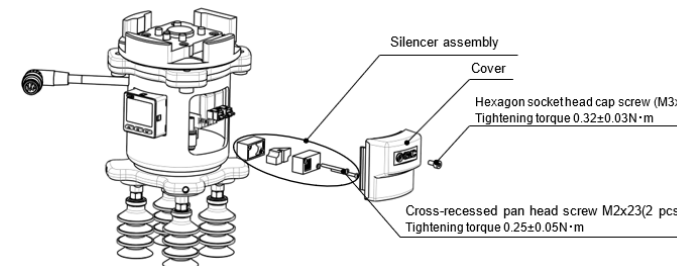
- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly, and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

### 6 Maintenance - continued

#### 6.2 Maintenance for vacuum gripper

#### Caution

- **Check before and after the maintenance work**  
When the product is to be removed, turn off the power supply, and be sure to cut off the supply pressure and exhaust the compressed air. Confirm that the air is released to atmosphere.  
When mounting the product after the maintenance work, supply compressed air, connect to the power, check if it functions properly and have a leakage inspection.
- Maintenance should be performed according to the procedure indicated in the operation manual  
Improper handling can cause damage and malfunction of equipment and machinery.
- **Draining**  
Remove condensate from air filters and mist separators regularly. If the collected drainage is drained to the downstream side, it can stick inside of the product, causing operation failure and failure to reach the specified vacuum pressure.
- **Replace the silencer built into the vacuum gripper regularly**  
It is recommended to replace the silencer when the pressure drop reaches 5kPa as a guideline. The replacement cycle varies depending on the operating conditions, operating environment, and supply air quality.  
However, if there is a vacuum pressure drop and/or delay in the vacuum (gripping) response time which causes problem with the settings during operation, stop the operation of the product and replace the silencer regardless of the above-mentioned replacement guideline.
- **Part number for the silencer assembly for replacement: ZX1-HS1**
- Silencer assembly replacement procedure
  - Remove the cover.
  - Loosen the 2 cross-recessed pan head screws to remove the silencer assembly.
  - Assemble the new silencer assembly.
  - Mount the cover.



- Do not disassemble or modify the product, other than the replacement parts specified in this manual.

#### 6.3 Maintenance for suction cup

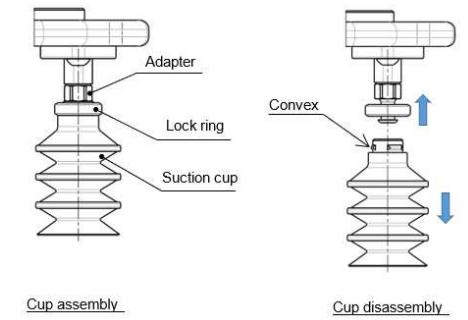
#### Caution

**Suction cups are disposable. 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 gradually get smaller and smaller. As the cups' diameter gets smaller, their lifting force will decrease, though gripping will remain possible.

It is extremely difficult to provide advice on the frequency of suction cup replacement. 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.). The weakening of bent parts or the wear or sticking of rubber parts may occur with the bellows type cup. Thus, the customer should decide when suction cups should be replaced, based on their condition at the time of initial use.

The adapter screw point may become loose depending on the operating conditions and environment. Be sure to perform regular maintenance.

### 6 Maintenance - continued



### 7 Limitations of Use

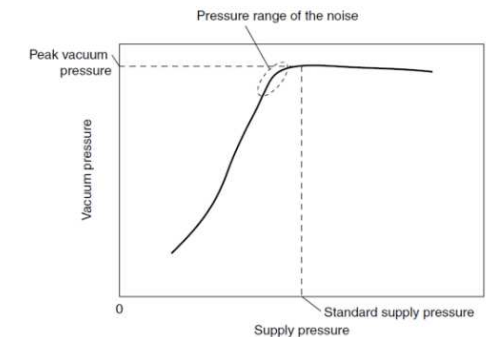
#### 7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

#### Caution

#### Exhaust Noise

When vacuum ejector generates vacuum, noise can be heard from the exhaust port when the standard supply pressure is close to the pressure that generates peak vacuum pressure making vacuum pressure unstable. If the vacuum pressure range is adequate for gripping, there should not be a problem. If the noise causes a problem or affects the setting of the pressure switch, change the supply pressure slightly to avoid the pressure range of the noise.



### 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> (Global) <https://www.smc.eu> (Europe)  
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