

Vacuum Gripper for Collaborative Robots



Kawasaki Heavy Industries, Ltd.

Dual-Arm SCARA Robot

[duAro 1, 2] compliant

A K-AddOn registered product



ZXP7□-X1□-KA



EMC-ZXP-X1-KA-01A-UK

Vacuum Gripper

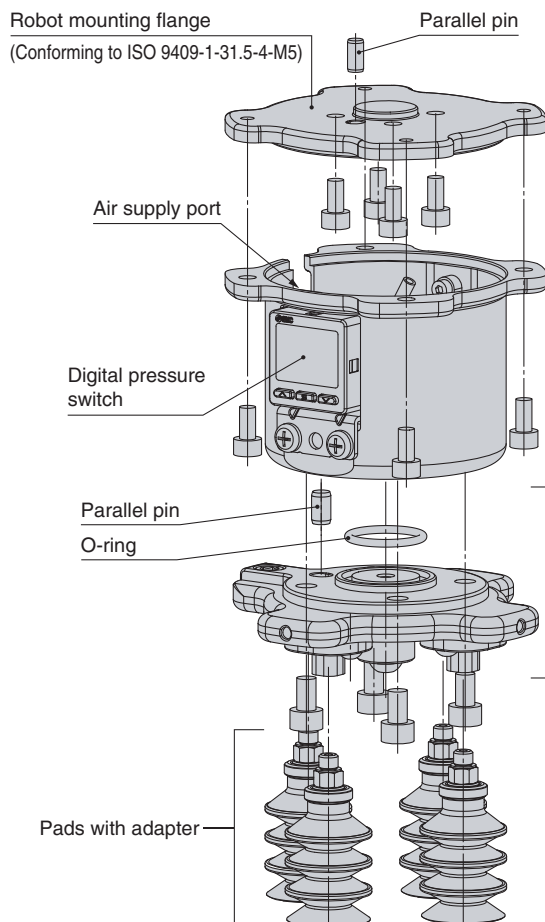
for Collaborative Robots

Kawasaki Heavy Industries, Ltd.
Dual-Arm SCARA Robot

[duAro 1, 2] compliant

A compact, lightweight all-in-one vacuum gripper

- Integrated vacuum ejector, pressure switch, and pads
- Standards: Conforming to ISO 9409-1-31.5-4-M5
- A wide variety of pad variations are available to support a wide range of workpieces.



Specifications

Common	Standards	Conforming to ISO 9409-1-31.5-4-M5
	Applicable fluid	Air
	Operating temperature range [°C]	5 to 50
	Weight [g]*4	659 (427)
	Max. work load [kg]*5	7
	Air pressure supply (P) port	One-touch fitting (Ø 4)
Vacuum ejector	Max. vacuum pressure [kPa]*6	-84
	Suction flow rate [L/min (ANR)]*6	17
	Air consumption [L/min (ANR)]*6	57
	Supply pressure range [MPa]	0.3 to 0.55
	Standard supply pressure [MPa]*7	0.5
Pressure switch	Rated pressure range [kPa]	0 to -101
	Power supply voltage [V]	12 to 24 VDC ±10 %, Ripple (p-p) 10 % or less
	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 conversion)

■ Included parts: Robot mounting flange, Parallel pin, Mounting bolt, Pads with adapter*1, Plug*2, Binding band*3

- *1 Included only with pads
- *2 Included only for the ZXP7A
- *3 When release pressure is to be supplied, it is used to bind and secure the switch cable and the Ø 4 tube to be connected to the release pressure supply (PD) port.
- *4 The weight in brackets refers to the weight of the product without a pad mounting flange. Add the weight of the suction pads with adapter for the weight with pads. (Refer to the "Suction Pad Part Numbers and Weight" on page 3.)
- *5 May be restricted depending on the pad 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.
- *6 Values are at the standard supply pressure and based on SMC's measurement standards. They depend on atmospheric pressure (weather, altitude, etc.) and the measurement method.
- *7 This value indicates the pressure right before the air pressure supply (P) port when vacuum is generated. The pressure right before the P port of the vacuum gripper when vacuum is generated may fall below 0.5 MPa due to the air supply capacity, piping size, and the amount of air being consumed by other devices being operated simultaneously.

Pad Variations

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



1 pad



2 pads



4 pads

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



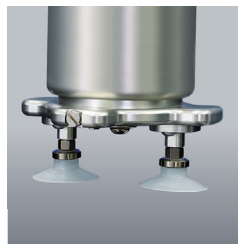
Flat (Ø 8), Silicone rubber



Bellows (Ø 20), NBR



Thin flat (Ø 16), NBR



Flat (Ø 32), Silicone rubber



Flat (Ø 32), Urethane rubber



Ø 32, 2.5-stage,
Silicone rubber



Ø 25, 5.5-stage,
Silicone rubber



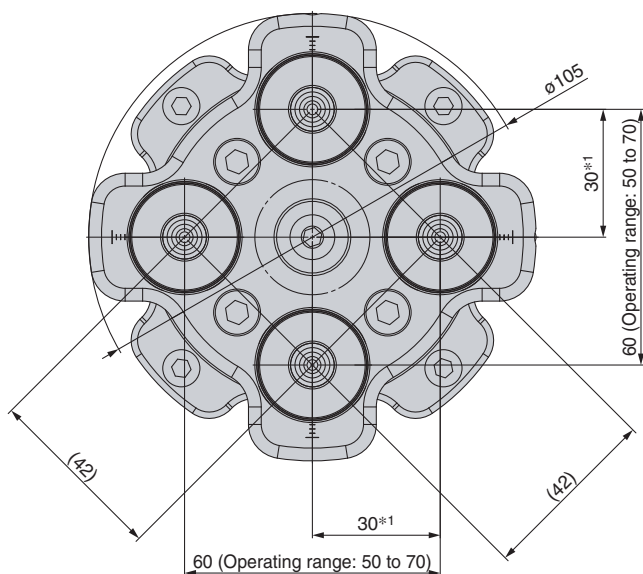
Ø 25, 5.5-stage,
Silicone rubber
With vacuum saving valve



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.

■ The cup pitch can be changed.



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

How to Order

CE RoHS

ZXP 7 A - ZP 20 U N - X1 - KA

Vacuum gripper

1 2 3 4 5 6 7 8

Suction pad part*1

For Kawasaki Heavy Industries, Ltd.

Dual-Arm SCARA Robot duAro 1 and 2 compatible

1 Body size

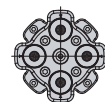
Symbol	Size
7	75 mm

2 Pad mounting flange shape

Symbol	Flange shape
A	With flange (42 mm x 42 mm)
N	Without flange*2



*2 Customers selecting the product without a pad mounting flange will be required to produce a flange that matches the mounting dimensions on their own.



3 Pad series

Symbol	Pad series
ZP	Basic
ZP3P	Bellows type for film packaging workpieces
—	Without pad

4 Pad diameter

Symbol	Pad diameter	Symbol	Pad diameter
08	Ø 8	25	Ø 25
10	Ø 10	B25	Ø 25
13	Ø 13	B30	Ø 30
16	Ø 16	32	Ø 32
20	Ø 20	—	Without pad

5 Pad form

Symbol	Pad 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
—	Without pad

6 Pad material

Symbol	Material
N	NBR
S	Silicone rubber (White)*3
U	Urethane rubber
F	FKM
SF	Silicone rubber (Blue)*3
—	Without pad

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

7 Attachment*⁴

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

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

8 Pressure switch output specifications/Unit

Symbol	Output/Unit
—	NPN/With unit switching function
A	NPN/SI unit only*5
B	NPN/With unit switching function (Initial value psi)
C	PNP/With unit switching function
D	PNP/SI unit only*5
E	PNP/With unit switching function (Initial value psi)

*5 Fixed unit: kPa, MPa

*1

■ Suction Pad Part Numbers and Weight

Part No. **ZXP7(A,N)-** **-X1** **-KA**

3 4 5 6 7

Applicable pads

3 Pad series	4 Pad diameter	5 Pad form	6 Pad material	7 Attachment
ZP	08	U	□	
ZP	08	B	□	
ZP	10	UT	□	
ZP	13	UT	□	
ZP	16	UT	□	
ZP	10	U	□	
ZP	13	U	□	
ZP	16	U	□	
ZP	20	U	□	
ZP	25	U	□	
ZP	32	U	□	
ZP	10	C	□	
ZP	13	C	□	
ZP	16	C	□	
ZP	20	C	□	
ZP	25	C	□	
ZP	32	C	□	
ZP	10	B	□	
ZP	13	B	□	
ZP	16	B	□	
ZP	20	B	□	
ZP	25	B	□	
ZP	32	B	□	
ZP	20	UT	□	M
ZP	16	J	□	
ZP	B25	J	□	
ZP	B30	J	□	
ZP3P	20	JT2	SF	M
ZP3P	20	JT2	SF	
ZP3P	32	JT2	SF	M
ZP3P	32	JT2	SF	
ZP3P	20	JT5	SF	
ZP3P	25	JT5	SF	
ZP3P	32	JT5	SF	

Pad part numbers

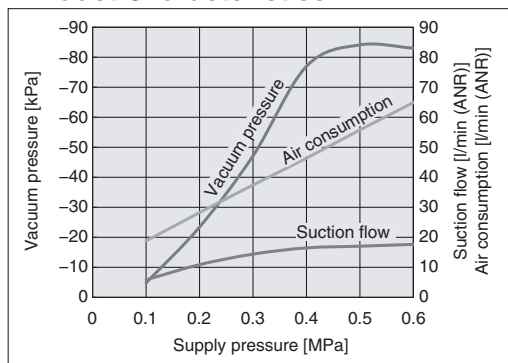
* Refer to the **Web Catalogue** for details on suction pads.

Part no.	Pad with adapter				Adapter unit Vacuum inlet: (Male thread M6 x 1)	Pad unit
	Weight by pad material (g/pad)					
	N (NBR)	S/SF (Silicone)	U (Urethane)	F (FKM)		
ZPT08U□-A6	4	4	4	4	ZPT1-A6	ZP08U□
ZPT08B□-A6	4	4	4	4		ZP08B□
ZPT10UT□-A6	4	4	4	4		ZP10UT□
ZPT13UT□-A6	4	4	4	4		ZP13UT□
ZPT16UT□-A6	4	4	4	4		ZP16UT□
ZPG10U□-7A-X2	7	7	7	7	ZPT2-7A-X2	ZP10U□
ZPG13U□-7A-X2	7	7	7	8		ZP13U□
ZPG16U□-7A-X2	7	7	7	8		ZP16U□
ZPG20U□-7A-X2	9	10	10	10	ZPT3-7A-X2	ZP20U□
ZPG25U□-7A-X2	10	10	10	11		ZP25U□
ZPG32U□-7A-X2	10	11	11	12		ZP32U□
ZPG10C□-7A-X2	7	7	7	7	ZPT2-7A-X2	ZP10C□
ZPG13C□-7A-X2	7	7	7	7		ZP13C□
ZPG16C□-7A-X2	7	7	7	8		ZP16C□
ZPG20C□-7A-X2	9	10	10	11	ZPT3-7A-X2	ZP20C□
ZPG25C□-7A-X2	10	10	10	11		ZP25C□
ZPG32C□-7A-X2	10	11	11	12		ZP32C□
ZPG10B□-7A-X2	7	7	7	8	ZPT2-7A-X2	ZP10B□
ZPG13B□-7A-X2	7	8	8	8		ZP13B□
ZPG16B□-7A-X2	8	8	8	9		ZP16B□
ZPG20B□-7A-X2	11	11	11	13	ZPT3-7A-X2	ZP20B□
ZPG25B□-7A-X2	11	12	12	14		ZP25B□
ZPG32B□-7A-X2	14	15	15	18		ZP32B□
ZPG20UT□-7A-X2	4	4	4	4	ZPT1-A6	ZP2-20UT□
ZPG16J□-7A-X2	8	8	8	9	ZPT2-7A-X2	ZP2-16J□
ZPGB25J□-7A-X2	14	15	15	18	ZPT3-7A-X2	ZP2-B25J□
ZPGB30J□-7A-X2	18	19	19	25		ZP2-B30J□
ZP3PG20JT2SF-7A-X2	—	21	—	—	ZP3PA-T1JT-7A-X2	ZP3P-20JT2SF-W
ZP3PG20JT2SF-M-7A-X2	—	21	—	—		ZP3P-20JT2SF-WM
ZP3PG32JT2SF-7A-X2	—	48	—	—	ZP3PA-T2JT-7A-X2	ZP3P-32JT2SF-W
ZP3PG32JT2SF-M-7A-X2	—	48	—	—		ZP3P-32JT2SF-WM
ZP3PG20JT5SF-7A-X2	—	23	—	—	ZP3PA-T1JT-7A-X2	ZP3P-20JT5SF-WG
ZP3PG25JT5SF-7A-X2	—	25	—	—		ZP3P-25JT5SF-WG
ZP3PG32JT5SF-7A-X2	—	54	—	—	ZP3PA-T2JT-7A-X2	ZP3P-32JT5SF-WG

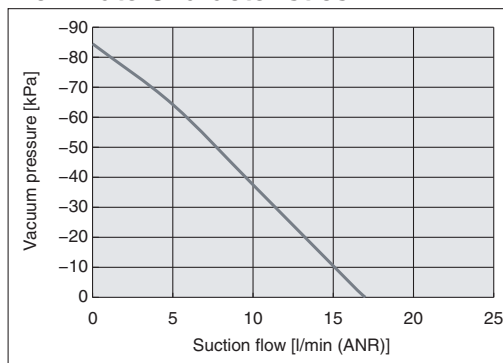
Input the material symbol ("N," "S," "U," or "F") into the ☐ in the part number.

Model Selection

Exhaust Characteristics*1

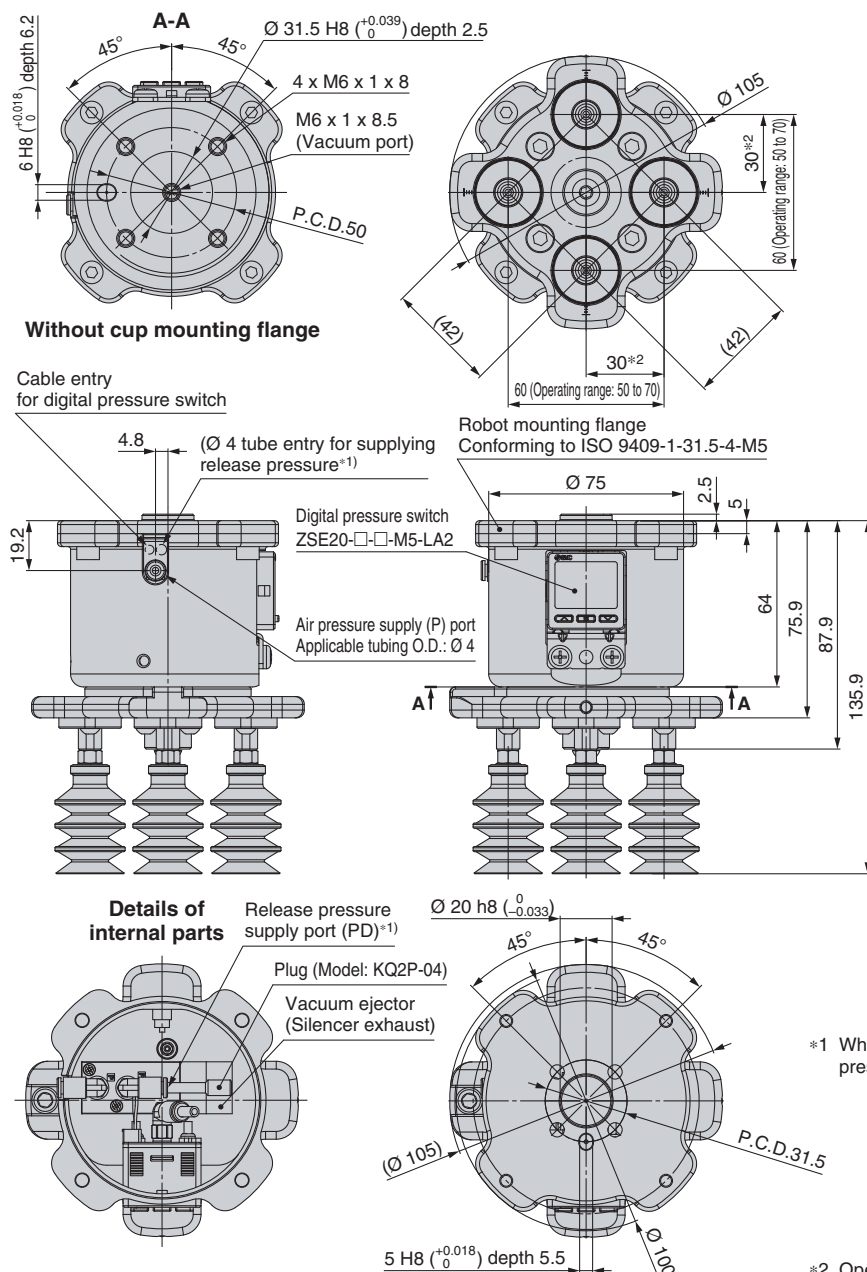


Flow Rate Characteristics

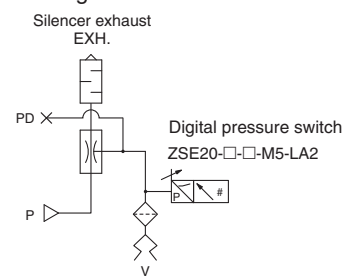


*1 The exhaust characteristics are different when the vacuum-saving valve (ZP2V-B6-05) is mounted.
For details, refer to "8.3 Suction pad precautions" in the operation manual.

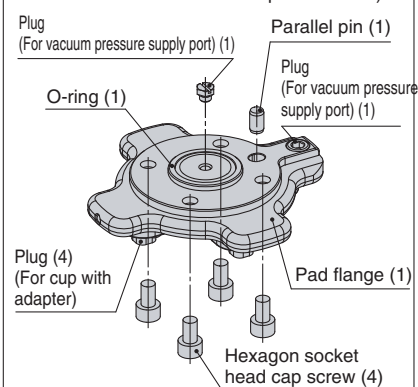
Dimensions



Circuit diagram



Pad mounting flange Replacement part number: ZXP7-PFL1-A-X1 (Refer to the figure below for items. Quantities are shown in the parentheses.)



*1 When a Ø 4 tube is connected to the release pressure supply (PD) port

* The dimensions and mounting method described in this drawing (example) are for the following part number: ZXP7A-ZPB25JS-X1-KA

*2 Operating range: 2.5 to 3.5 (When a pad is mounted in the centre)
As interference between pads may occur depending on the pad diameter, select the pad diameter according to the pitch to be used.



ZXP7□-X1□-KA

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.smc.eu>

Handling

Caution

1. Strictly observe the precautions on vacuum equipment and safety when using the product. Additionally, select a pad 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 Catalogue.
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.
Doing so may result in damage to the internal parts of the body or pressure 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 switch cable or pinch the cable when lifting the body. Failure to do so may result in damage to the pressure sensor. 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 switch 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 pressure switch. In some cases, this damage may result in a malfunction.
3. Do not disassemble the switch cable 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 tube 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.

-  **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 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. 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 catalogue.
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 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.

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 “Handling Precautions for SMC Products” (M-E03-3) before using.

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Croatia	+385 (0)13707288	www.smc.hr	office@smc.hr
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