

Wear Resistant Tubing

TUZ/TIUZB Series

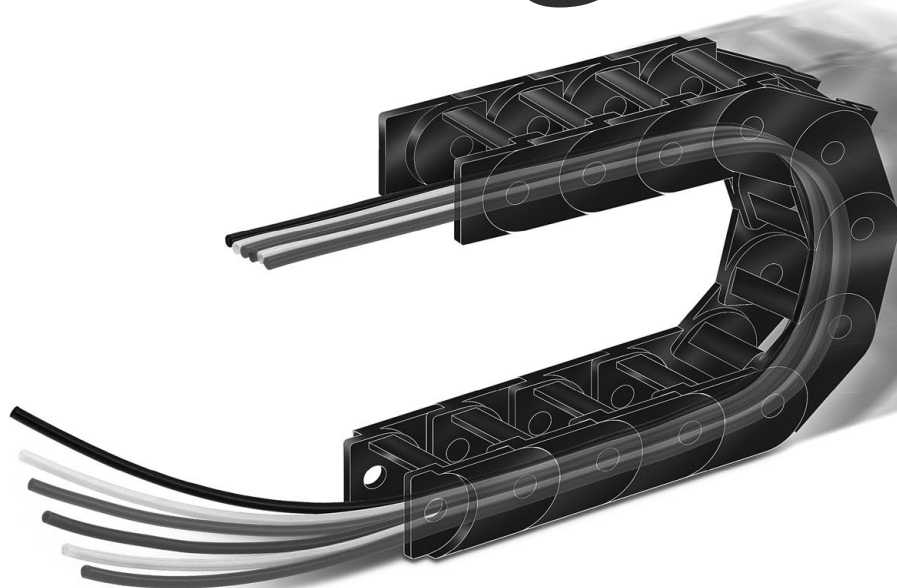
RoHS

Abrasion: Approx. $\frac{1}{3}$

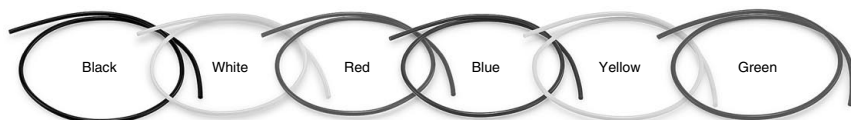
(Compared with SMC polyurethane tubing TU series)

Description	Maximum abrasion (mm) After 10 million cycles
Wear resistant tubing TUZ/TIUZB series	0.16
Polyurethane tubing TU series	0.46

Note) Comparison based on the SMC's specific testing condition



6-color variations



Metric: 8-size variations



Tubing O.D.: $\phi 2$ $\phi 3.2$ $\phi 4$ $\phi 6$ $\phi 8$ $\phi 10$ $\phi 12$ $\phi 16$

Inch: 3-size variations



Tubing O.D.: $\phi 1/4$ ($\phi 6.35$) $\phi 3/8$ $\phi 1/2$ ($\phi 12.7$)



KQ2
KQB2
KS
KX
KM
KF
M
H/DL
L/LL
KC
KK
KK130
DM
KDM
KB
KR
KA
KQG2
KG
KFG2
MS
KKA
KP
LQ
MQR
T
IDK

Wear Resistant Tubing

TUZ/TIUZB Series

RoHS



Model

Model	Tubing size										
	Metric size (TUZ series)								Inch size (TIUZB series)		
	TUZ0212	TUZ3220	TUZ0425	TUZ0604	TUZ0805	TUZ1065	TUZ1208	TUZ1610	TIUZB07	TIUZB11	TIUZB13
Tubing O.D. (mm)	2	3.2	4	6	8	10	12	16	6.35	9.53	12.7
Tubing I.D. (mm)	1.2	2	2.5	4	5	6.5	8	10	4.23	6.35	8.46

Black (B)	□	●	●	●	●	●	●	□	●	●	●
White (W)		●	●	●	●	●	●		●	●	●
Red (R)			●	●	●	●	●		●	●	●
Blue (BU)		●	●	●	●	●	●		●	●	●
Yellow (Y)			●	●	●	●	●		●	●	●
Green (G)			●	●	●	●	●		●	●	●

Specifications

Fluid ^{Note 1, 2)}		Air/Water										
Applicable fittings		One-touch fittings KQ2 series, Insert fittings KF series, Stainless steel 316 insert fittings KFG2 series, Miniature fittings M/MS series (hose nipple type)										
Max. operating pressure (MPa)	20°C	0.8										
	40°C	0.6										
	60°C	0.4										
Operating vacuum pressure ^{Note 3)} (kPa)		-101.3										
Min. bending radius ^{Note 4)} (mm)		4	10	10	15	20	27	35	45	23	27	35
Operating temperature		-20 to +60°C (Water: 0 to 40°C) (No freezing)										
Material		Special polyurethane										

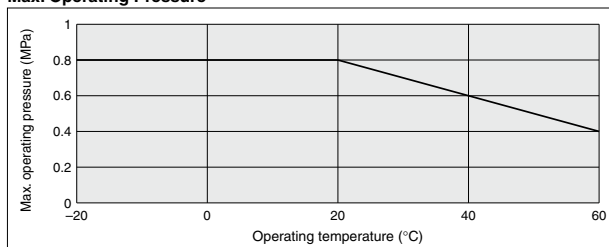
Note 1) Applicable for general industrial water. Please consult with SMC if using other kinds of fluid. Surge pressure must be under the max. operating pressure. If the surge pressure exceeds the maximum operating pressure, it will result in damage to fittings and tubes.

Note 2) Abnormal temperature rise caused by adiabatic compression may result in the tube bursting.

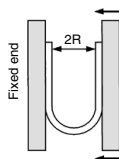
Note 3) As the operating vacuum pressure varies depending on the applicable fittings, be sure to check the fitting specifications beforehand.

Note 4) The minimum bending radius means the value measured by the method shown in the figure at the temperature of 20°C when the tube is bent. The minimum bending radius assumes static piping. If the tube is used in a moving part, provide extra length to the tube. Check the bending radius recommended by the flexible protection tube manufacturer for sure if the tube is used in the flexible protection tube.

Max. Operating Pressure



How to Calculate Minimum Bending Radius



Bend the tube into U-form at the temperature of 20°C. Fix one end and close loop gradually. Measure 2R when the tube breaks or is crushed.

How to Order

TUZ0425 BU - 20

Tubing model

Color

Length per roll

Symbol	Color
B	Black
W	White
R	Red
BU	Blue
Y	Yellow
G	Green

Symbol	Length
20	20 m roll
100	100 m roll

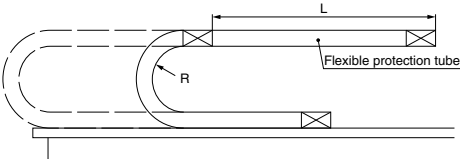
Note) Not clear, but translucent due to material.



Reference Data: Abrasion due to Flexible Protection Tube

Test Conditions

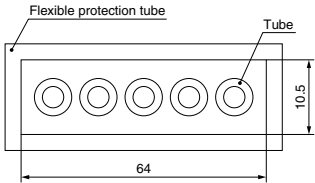
Test tube	TUZ0604, TU0604
Quantity of tube tested	5 pcs. for each
Operating speed	1500 mm/sec
Operating frequency	90 c.p.m
Stroke L	500 mm
Bending radius R	28 mm
Material of flexible protection tube	Special engineering plastic
Tube tie	Not used



Test Results

Model	Maximum abrasion after 10 million cycles (mm)
TUZ0604	0.16
TU0604	0.46

As this test was an acceleration test, the tube bending radius was out of the flexible protection tube manufacturer's allowable range.
When the flexible protection tube is used in the actual application, check the manufacturer's catalog specifications.
The values in the table above are representative values, and not guaranteed.



Tube dimensions inside the flexible protection tube

Made to Order

Multi-core, same color specification TFU-X73

Flat type of the TUZ series

Number of cores: 2 to 12 cores

Specification: Same color

Multi-core, multi-color specification TUZ-X169 to X172, -X204

Number of cores: 2 to 12 cores

Specification: Multi-color

Refer to page 478 for details.

The identification line is not shown.

Please contact SMC for detailed specifications, dimensions, and delivery.

How to Order

TFU0425 BU - 2 - 20 - X73

Color

Symbol	Color
B	Black
W	White
R	Red
BU	Blue
Y	Yellow
G	Green

(Note) Not clear, but translucent due to material.

Special polyurethane (Multi-core, same color specification)

Length per roll

Nil	10 m
n	n m (Note)

(Note) It is also available in lengths other than 10 m.
Enter the length you need (1, 2, 3, 4, 5, 20).

Example) TFU0425BU-2-20-X73

Number of cores
2 to 12

20 m

Tubing model

Model	O.D. x I.D. (mm)
TFU0425	4 x 2.5
TFU0604	6 x 4
TFU0805	8 x 5
TFU1065	10 x 6.5
TFU1208	12 x 8

Wear Resistant Flat Tubing

Multi-core, Multi-color Specification

TUZ Series

RoHS

Compact piping possible
6 color variations

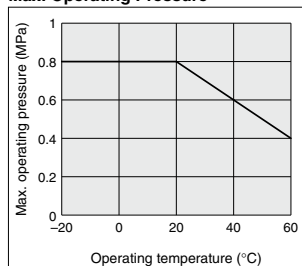
Abrasion: Approx. 1/3

* Compared with SMC polyurethane tubing TU series (Refer to the table below)

Description	Maximum abrasion (mm) After 10 million cycles
Wear resistant tubing TUZ series	0.16
Polyurethane tubing TU series	0.46

Note) Comparison based on the SMC's specific testing condition

Max. Operating Pressure



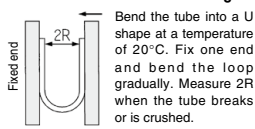
Precautions

Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions and pages 13 to 17 for Fittings and Tubing Precautions.

Caution

1. Please consult with SMC if using for any fluids other than air.
2. As a result of product design characteristics, there are cases of very slight leakage.

How to measure the minimum bending radius



Specifications

Model		TUZ0425	TUZ0604	TUZ0805	TUZ1065	TUZ1208
Tubing O.D. (mm)		4	6	8	10	12
Tubing I.D. (mm)		2.5	4	5	6.5	8
Black (B)		●	●	●	●	●
White (W)		●	●	●	●	●
Red (R)		●	●	●	●	●
Blue (BU)		●	●	●	●	●
Yellow (Y)		●	●	●	●	●
Green (G)		●	●	●	●	●
Number of cores	2 cores	X169 (Roll)				
	3 cores	X170 (Roll)				
	4 cores	X171 (Roll)				
	5 cores	X172 (Roll)				
	6 cores	X204 (Roll)				
Fluid ^{Note 1)}		Air				
Max. operating pressure MPa	20°C	0.8				
	40°C	0.6				
	60°C	0.4				
Applicable fittings		One-touch fitting, Insert fitting, Miniature fitting (Hose nipple type)				
Operating vacuum pressure ^{Note 2)} (kPa)		-101.3				
Min. bending radius ^{Note 3)} (mm)		10	15	20	27	35
Operating temperature		-20 to +60°C				
Material		Special polyurethane				

Note 1) Abnormal temperature rise caused by adiabatic compression may result in the tube bursting.

Note 2) As the operating vacuum pressure varies depending on the applicable fittings, be sure to check the fitting specifications beforehand.

Note 3) The minimum bending radius means the value measured by the method shown in the figure on the left below at the temperature of 20°C when the tube is bent. The minimum bending radius assumes static piping. If the tube is used in a moving part, provide extra length to the tube.

Check the bending radius recommended by the flexible protection tube manufacturer for sure if the tube is used in the flexible protection tube.

How to Order

Roll

Please contact SMC for delivery.

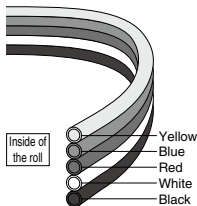
Tube length per roll: **1, 2, 3, 4, 5, 10, 20** m

TUZ 0425 - 12345 A - X172

Tubing model

Tubing size

Symbol	O.D. x I.D.
0425	ø4 x ø2.5
0604	ø6 x ø4
0805	ø8 x ø5
1065	ø10 x ø6.5
1208	ø12 x ø8



Color^{*1+2}

Symbol	Color	Symbol	Color
1	Black	4	Blue
2	White	5	Yellow
3	Red	6	Green

*1 Colors of the example (12345)
*2 Not clear, but translucent due to material.

Multi-core, multi-color specification

Symbol	Number of cores
X169	2 cores
X170	3 cores
X171	4 cores
X172	5 cores
X204	6 cores

Tube length per roll [m]

Symbol	Length	Symbol	Length
A	1	E	5
B	2	F	10
C	3	G	20
D	4		

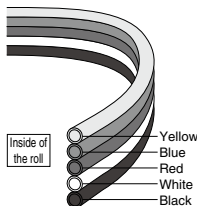
Tube length per roll: **50** m

TUZ 0425 - 12345 H - X172

Tubing model

Tubing size

Symbol	O.D. x I.D.
0425	ø4 x ø2.5
0604	ø6 x ø4
0805	ø8 x ø5
1065	ø10 x ø6.5
1208	ø12 x ø8



Color^{*1+2}

Symbol	Color	Symbol	Color
1	Black	4	Blue
2	White	5	Yellow
3	Red	6	Green

*1 Colors of the example (12345)
*2 Not clear, but translucent due to material.

Multi-core, multi-color specification

Symbol	Number of cores	Applicable tubing O.D.				
		ø4	ø6	ø8	ø10	ø12
X169	2 cores	●	●			
X170	3 cores	●	●	●		
X171	4 cores	●	●	●	●	
X172	5 cores	●	●	●	●	●
X204	6 cores	●	●	●	●	●

Tube length per roll [m]

Symbol	Length
H	50

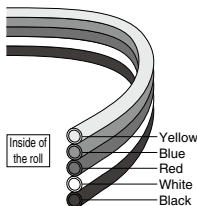
Tube length per roll: **100** m

TUZ 0425 - 12345 J - X172

Tubing model

Tubing size

Symbol	O.D. x I.D.
0425	ø4 x ø2.5
0604	ø6 x ø4
0805	ø8 x ø5



Color^{*1+2}

Symbol	Color	Symbol	Color
1	Black	4	Blue
2	White	5	Yellow
3	Red	6	Green

*1 Colors of the example (12345)
*2 Not clear, but translucent due to material.

Multi-core, multi-color specification

Symbol	Number of cores	Applicable tubing O.D.		
		ø4	ø6	ø8
X169	2 cores	●	●	
X170	3 cores	●	●	●
X171	4 cores	●	●	●
X172	5 cores	●	●	●
X204	6 cores	●	●	●

Tube length per roll [m]

Symbol	Length
J	100



TUZ/TIUZB Series

Specific Product Precautions

Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 13 to 17 for Fittings and Tubing Precautions.

Selection

Warning

1. Confirm the specifications.

Products represented in this catalog are designed only for use with compressed air system applications (including vacuum). Do not use at pressure or temperature beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)

2. In case of using the product for medical care

This product is designed for use with compressed air system applications for medical care purposes. Do not use in transfer applications to a human living body, or in contact with human bodily fluids, body tissues.

Caution

1. Do not use in locations where the connecting threads and tube connection will slide or rotate.

The connecting threads and tube connection will come apart under these conditions.

Use rotary type one-touch fittings (KS, KX series) in cases where sliding or rotation will occur.

2. Use the tube at or above the minimum bending radius. Using below the minimum bending radius can cause breakage or flattening of the tube.

3. Never use the tube for anything flammable, explosive or toxic such as gas, fuel gas, or cooling mediums, etc.

Because the contents may penetrate outward.

4. Use the suitable fittings for the tube size.

Mounting

Caution

1. Confirm model number, size, etc. before installing.

Check if there is damage, gouge, crack, etc. on the tube.

2. When the tube is connected, consider factors such as changes in the tubing length due to pressure, and allow sufficient leeway.

3. Do not apply unnecessary forces such as twisting, pulling, moment loads, etc. on fittings and tube.

This will cause damage to fittings or flattening, bursting or disconnection of tube, etc.

4. Mount so that tube is not damaged due to tangling.

This will cause flattening, bursting or disconnection of tube, etc.

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. Not allowing chips of the piping thread or the seal material to go in.

The minimum bending radius assumes static piping. If the tube is used in a moving part, provide extra length to the tube. Check the bending radius recommended by the flexible protection tube manufacturer for sure if the tube is used in the flexible protection tube.

Air Supply

Warning

1. Types of fluid

This product is designed for use with compressed air.

2. In case of excessive condensation

Excessive condensation in compressed air may cause malfunction of pneumatic devices. Installation of an air dryer, water separator before filter is recommended.

3. Drain flushing

If condensation in the drain bowl of an air filter is not emptied on a regular basis, the condensation will enter the outlet side, causing malfunction of pneumatic devices.

If the drain flushing is difficult, installation of a filter with an auto drain option is recommended.

For compressed air quality, refer to SMC's "Air Preparation Equipment Model Selection Guide."

Operating Environment

Warning

1. Do not use in locations having an explosive atmosphere.

2. Do not operate in locations where vibration or impact occurs.

3. In locations near heat sources, block off radiated heat.

Maintenance

Caution

1. Perform periodic inspections to check the following problems and replace the tube, if necessary.

- Cracks, gouges, wearing, corrosion
- Air leakage
- Twists or crushing of tube
- Hardening, deterioration, softening of tube

2. Do not repair or patch the replaced tube or fittings for reuse.

Wear Resistant Tubing / Clear Type

New

RoHS

Abrasion: Approx. 1/3

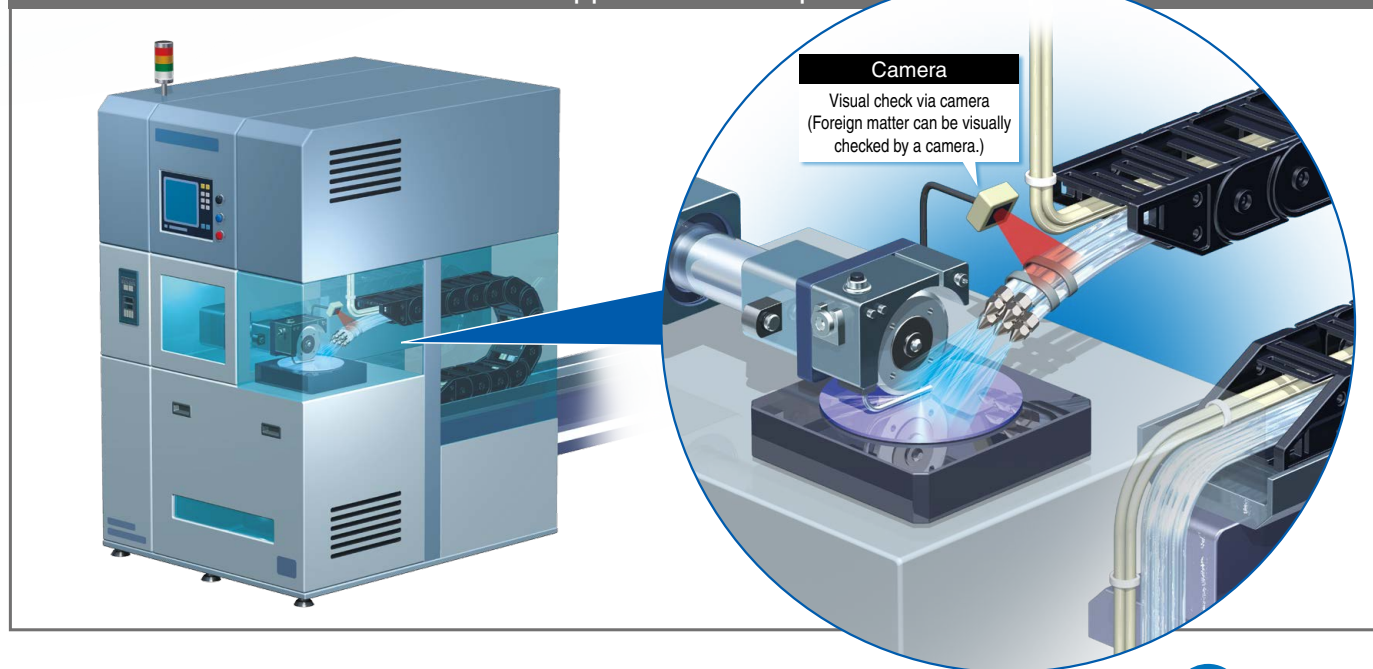
(Compared with SMC polyurethane tubing TU series)

Clear type

Transparency in which the inside contents of a tube can be seen.



Application Example



TUZC Series



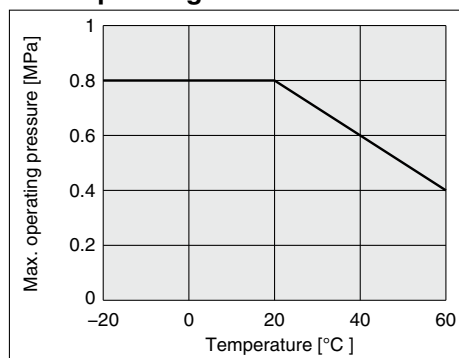
CAT.ES50-45A [Ⓐ]

Wear Resistant Tubing / Clear Type *TUZC Series*

RoHS



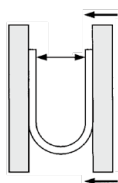
Max. Operating Pressure



Precautions

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

How to measure the minimum bending radius



Bend the tube into a U shape at a temperature of 20°C. Secure one end and bend the loop gradually. Measure 2R when the tube kinks or is flattened.

Model

● -20 m roll □ -100 m roll

Model	Tubing size				
	Metric sizes (TUZC series)				
Tubing O.D.	TUZC0425	TUZC0604	TUZC0805	TUZC1065	TUZC1208
Tubing I.D.	4	6	8	10	12
	2.5	4	5	6.5	8
Black (B)	●	●	●	●	●
White (W)	●	●	●	●	●
Red (R)	●	●	●	●	●
Blue (BU)	●	●	●	●	●
Yellow (Y)	●	●	●	●	●
Green (G)	●	●	●	●	●
Translucent (N)	●	●	●	●	●

Specifications

Fluid*1, *2		Air/Water				
Applicable fittings*1, *2		One-touch fittings KQ2 series, Insert fittings KF series, Stainless steel 316 insert fittings KFG2 series, Miniature fittings M/MS series (hose nipple type)				
Max. operating pressure	20°C or less	0.8				
	40°C	0.6				
	60°C	0.4				
Operating vacuum pressure [kPa]*3		-101.3				
Min. bending radius [mm]*4		10	15	20	27	35
Operating temperature		Air: -20 to 60°C Water: 0 to 40°C (No freezing)				
Material		Polyurethane				

- *1 Applicable for general industrial water. Please consult with SMC if using other kinds of fluid. Surge pressure must be under the max. operating pressure. If the surge pressure exceeds the maximum operating pressure, it will result in damage to fittings and tubes.
- *2 Abnormal temperature rise caused by adiabatic compression may result in the tube bursting.
- *3 As the operating vacuum pressure varies depending on the applicable fittings, be sure to check the fitting specifications beforehand.
- *4 The minimum bending radius means the value measured by the method shown in the figure at the left at the temperature of 20°C when the tube is bent. The minimum bending radius assumes static piping. If the tube is used in a moving part, provide extra length to the tube. Check the bending radius recommended by the flexible protection tube manufacturer for sure if the tube is used in the flexible protection tube.

How to Order

TUZC0604 N - 20

Tubing model ●

Color ●

Length per roll

Symbol	Color
B	Black (Opaque)
W	White (Opaque)
R	Red (Translucent)
BU	Blue (Translucent)
Y	Yellow (Opaque)
G	Green (Opaque)
N	Translucent (Material color)

Symbol	Length
20	20 m roll
100	100 m roll

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 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. 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 catalogs 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 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.

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

SMC Corporation

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Specifications are subject to change without prior notice
and any obligation on the part of the manufacturer.

D-G