



# Operation Manual

Product Name

*Residual Pressure Release Valve  
with One-touch Fitting*

Model/ Series/ Product Number

*KE series*

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# 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.

- \*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: Manipulating industrial robots -Safety.
- etc.



## 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.

## 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.



# Safety Instructions

## **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 regulation 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.

## 2. Specific Product Precautions (1)

### Design/Selection

#### Warning

##### (1) Check the specifications.

The product in this catalog is designed to be used in compressed air systems (including vacuum) only.

If the product is used in an environment where pressure or temperature is out of the specified range, damage and/or malfunction may result. (Refer to the specifications.)

Please consult with SMC when using a fluid other than compressed air (including vacuum). We do not guarantee against any damage if the product is used outside of the specification range.

##### (2) Do not disassemble the product or make any modifications, including additional machining.

It may cause human injury and/or an accident.

##### (3) When operating at a high temperature, the fittings and tubing will also become very hot.

Touching the product may result in burns, so be sure to take safety measures before coming into direct contact with the product.

#### Caution

##### (1) Keep the connection part of fittings and tubing from rotating or oscillating movement. Use Rotary One-touch Fittings (KS or KX Series) in these cases.

The fittings may be damaged if they are used in the above manner.

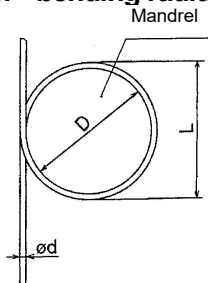
##### (2) The tubing bending radius in the vicinity of the fitting should be at least the minimum bending radius of the tubing.

If the bending radius is less than the minimum value, fittings may damage, or tubing may crack or be crushed. The minimum bending radius of the FR soft nylon tubing (TRS series), FR double layer tubing (TRB series), antistatic soft nylon tubing (TAS series), polyolefin tubing (TPH series), and soft polyolefin tubing (TPS series) is measured as following in accordance with JISB8381. Tubing deformation ratio at the minimum bending radius is obtained through the following formula, based on tubing diameter and mandrel diameter by winding the same radius mandrel tube.

**Tube deformation ratio at the minimum bending radius**

$$\eta = \left( 1 - \frac{L - D}{2d} \right) \times 100$$

Here,  $\eta$ : Deformation ratio (%)  
 d: Tubing diameter (mm)  
 L: Measured length (mm)  
 D: Mandrel diameter (mm)  
 (Twice against the minimum bending radius)  
 Test temperature: 20±5°C  
 Relative humidity: 65±5 (%)



### Design/Selection

##### (3) Do not use fluids other than listed on the specifications.

Applicable fluid is air. Please consult with SMC if using other fluids.

##### (4) Depending on the storage or operating environment and the period of storage or use, the surface of the brass (C3604) may blacken. If the discoloration of the brass is a problem, we recommend selecting electroless nickel-plated brass instead.

Example) KEC-02-X2

##### (5) The dimensions shown in the dimension drawings are merely reference dimensions. The actual dimensions will vary depending on the tolerance. Be sure to provide sufficient clearance around the fitting for piping. Please contact SMC if you are planning to mount the product in a narrow space

### Mounting/ Piping

#### Warning

##### (1) Operation Manual

Install the products and operate them only after reading the operation manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

##### (2) Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance.

##### (3) Adhere to the thread tightening method.

When installing the products, refer to "Connection Thread Tightening Method".

##### (4) There may be cases of the tubing detaching from the fitting and thrashing around uncontrollably due to tubing degradation or fitting breakage.

To prevent the situation from becoming uncontrollable, fit the tubing with a protective cover or fix it in place.

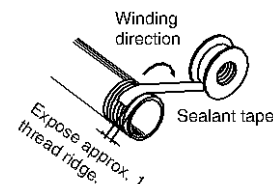
#### Caution

##### (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.

##### (2) Winding of sealant tape

When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealant does not get inside the pipe. Also, when the sealant tape is used, leave approximately 1 thread ridges exposed at the end of the threads.



## 2. Specific Product Precautions (2)

### Mounting/ Piping



#### Caution

- (3) **Check the model, type and size before installation.**  
Also, confirm that there are no scratches, gouges or cracks on the product.
- (4) **When connecting the tubing, take pressure or possible changes to the tubing length into account, and allow a sufficient margin.**  
Failure to do so may result in fitting breakage or detachment of the tubing. Refer to the recommended piping conditions.
- (5) **Do not apply unnecessary forces such as twisting, pulling, moment loads, vibration and impact, etc. on fittings or tubing.**  
This will cause damage to fittings and will crush, burst or release tubing.
- (6) **Tubing, with the exception of coiled tubing, requires stationary installation. Do not use standard tubing (non-coiled) in applications where tubing is required to travel inside the flexible protection tube. Tubing that travels may sustain abrasion, extension, or severance due to tensile force, or may result in removal of tubing from fitting. Use caution prior to use for proper application.**
- (7) **To install the fitting, screw the fitting into the hexagonal face of the body, and tighten with an appropriate wrench.**

Affix the wrench at the base of the thread. If the size of hexagonal face and wrench do not match, or tightening takes place near the tube side, it may cause collapse or deformation of the hexagonal face, or damage to the equipment. After installing, confirm that there is no damage to the fitting, etc.

### Air Supply



#### Warning

- (1) **Type of fluids**  
Please consult with SMC when using the product in applications other than compressed air. Regarding products for general fluids, please contact SMC concerning applicable fluids.
- (2) **When there is a large amount of drainage.**  
Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment. An air dryer or water droplet separator should be installed upstream from filters.
- (3) **Drain flushing**  
If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. It causes malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended.  
For details on the above compressed air quality, refer to SMC's Best Pneumatics catalog.

### Air Supply

- (4) **Use clean air.**

Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.



#### Caution

- (1) **Install an air filter.**  
Install an air filter at the upstream side of valve. Select an air filter with a filtration degree of 5µm or finer.
- (2) **Install an after cooler, air dryer or water droplet separator, etc.**  
Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer or water droplet separator.
- (3) **Ensure that the fluid and ambient temperature are within the specified range.**  
If the fluid temperature is 5°C or less, the moisture in the circuit could freeze, causing damage to the seals and leading to equipment malfunction. Therefore, take appropriate measures to prevent freezing.  
For details on the above compressed air quality, refer to SMC's Best Pneumatics catalog.

### Operating Environment



#### Warning

- (1) **Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.**  
Refer to each construction drawing on the Residual Pressure Release Valve with One-touch Fitting material.
- (2) **Do not expose the product to direct sunlight for an extended period of time.**
- (3) **Do not use in a place subject to heavy vibration and/or shock.**
- (4) **Do not mount the product in locations where it is exposed to radiant heat.**
- (5) **Do not use the ordinary fittings and tubing in locations where static electricity would be problematic.**  
It may result in the system failure and trouble.
- (6) **Do not use the ordinary fittings and tubing in locations where spatter is generated.**  
Spattering may result in a fire hazard.
- (7) **Do not use in an environment where the product is directly exposed to cutting oil, lubricant, coolant oil, etc.**  
Please contact SMC if using for an environment exposed to cutting oil, lubricant or coolant oil, etc.

## 2. Specific Product Precautions (3)

### Operating Environment



#### Warning

- (8) **Take note that if nylon tubing and soft nylon tubing are used in a clean room.**  
The antioxidant on the surface of the soft nylon tubing may come off, thereby lowering the cleanness level.
- (9) **Do not use in environments where foreign matter may stick to the product or get mixed in the product's interior.**  
This may cause leakage or disconnection of the tubing.

### Maintenance



#### Warning

- (1) **Perform maintenance inspection according to the procedures indicated in the operation manual.**  
If handled improperly, malfunction and damage of machinery or equipment may occur.
- (2) **Maintenance work**  
If handled improperly, compressed air can be dangerous. Assembly, handling, repair and element replacement of pneumatic systems should be performed by a knowledgeable and experienced person.
- (3) **Drain flushing**  
Remove drainage from air filters regularly.
- (4) **Removal of equipment, and supply/exhaust of compressed air**  
When components are removed, first confirm that measures are in place to prevent workpiece from dropping, run-away equipment, etc. Then, cut the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function. When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from sudden movement.



#### Caution

- (1) **Be certain to wear safety glasses at all times during periodical inspections.**
- (2) **Replace fittings or tubing having the following problems.**
- Cracks, gouges, wearing, corrosion
  - Air leakage
  - Twists or crushing of tubing
  - Hardening, deterioration or softening of tubing
- (3) **When replacing tubes or fittings, do not try to mend or repair and then reuse them.**

### One-touch Fitting

### Mounting/Piping



#### Caution

- (1) **Installation and removal of tubing for One-touch fittings**
- a) **Installation of tubing**
- Cut the tubing perpendicularly, being careful not to damage the outside surface. Use an SMC tube cutter TK-1, 2, 3, 5 or 6. Do not cut the tubing with pliers, nippers, scissors, etc., otherwise, the tubing will be deformed and trouble may result.
  - The outside diameter of the polyurethane tubing swells when internal pressure is applied to it. Therefore, it may be possible that the tubing cannot be re-inserted into the One-touch fitting. Check the tubing outside diameter, and when the accuracy of the outside diameter is +0.07mm or larger for  $\phi 2$ , +0.15mm or larger for other sizes, insert into the One-touch fitting again, without cutting the tubing to use it. When the tubing is re-inserted into the One-touch fitting, confirm that the tubing goes through the release button smoothly.
  - Grasp the tubing, slowly push it straight (0 to 5° into the One-touch fitting until it comes to a stop. Refer to the table below for the length for inserting the tube.

Tubing size	Insertion length [mm]
$\phi 6$	17
$\phi 8$	18.5
$\phi 10$	21
$\phi 12$	22

4. Pull the tubing back gently to make sure it has a positive seal. Insufficient installation may cause air to leak or the tubing to release. As a guide for checking the tubing is not pulled out, refer to the following table.

Tubing size	Tensile force of tubing
$\phi 6$	12
$\phi 8$	20
$\phi 10$	30
$\phi 12$	35

## 2. Specific Product Precautions (4)

<b>One-touch Fitting</b>
<b>Mounting/Piping</b>

### **Caution**

#### b) Removal of tubing

1. Press the release button flange evenly and sufficiently to release the tube. Do not push in the tubing before pressing the release button.
2. Pull out the tubing while keeping the release button depressed. If the release button is not held down sufficiently, the tubing cannot be withdrawn.
3. To reuse the tubing, remove the previously lodged portion of the tubing. If the lodged portion is left on without being removed, it may result in air leakage and removal of the tubing difficult.

#### (2) Connecting products with metal rods

After attaching products with attached metal rods (KC series, old KQ series, KN series, and KM series) to the One-touch fitting, do not use tubes, resin plugs, or reducers, etc.

### Connection Thread Tightening Method

### **Caution**

#### (1) Fittings with sealant: R

- a) First, tighten the fitting by hand, then use a wrench appropriate for the hexagon flats of the body to tighten it a further two or three turns. For a tightening torque guide, see the table below.

Connection thread size	Tightening torque [N · m]
R1/4	8~12
R3/8	15~20

- b) If the fitting is tightened with excessive torque, a large amount of sealant will seep out. Remove the excess sealant.
- c) Insufficient tightening may cause seal failure, or loosen the threads.
- d) Reuse
  1. Normally, fittings with a sealant can be reused 2 to 3 times.
  2. To prevent air leakage through the sealant, remove any loose sealant stuck to the fitting by blowing air over the threaded portion.
  3. If the sealant no longer provides effective sealing, wind sealing tape over the sealant before reusing. Do not use the sealant in any form other than a tape type.
  4. Once the fitting has been tightened, backing it out to its original position often causes the sealant to become defective. Air leakage will occur.

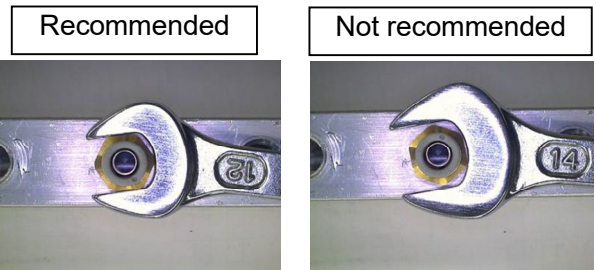
<b>Tightening tool</b>
------------------------

### **Caution**

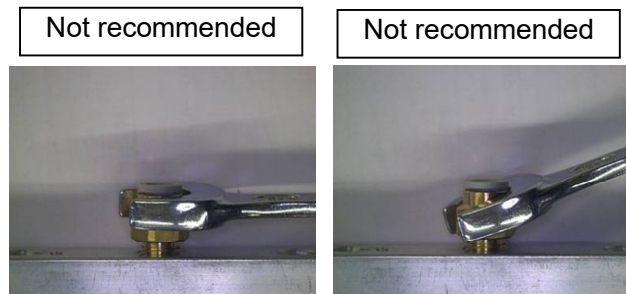
Use a wrench appropriate for the hexagon flats of the body to tighten the fitting.

Affix the wrench at the base of the thread. If the size of hexagonal face and wrench do not match, or tightening takes place near the tube side, it may cause collapse or deformation of the hexagonal face, or damage to the equipment.

After installing, confirm that there is no damage to the fitting, etc.



Recommended





## 2. Specific Product Precautions (5)

### Recommended Piping Conditions

#### Caution

(1) When connecting piping to the One-touch fitting, use pipe length with sufficient margin, in accordance with the piping conditions shown in Fig. 1.

Also, when using a tying band, etc., to bind the piping together, make sure that external force does not come to bear on the fitting (See Fig.2).

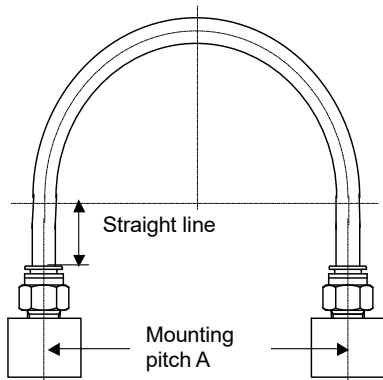
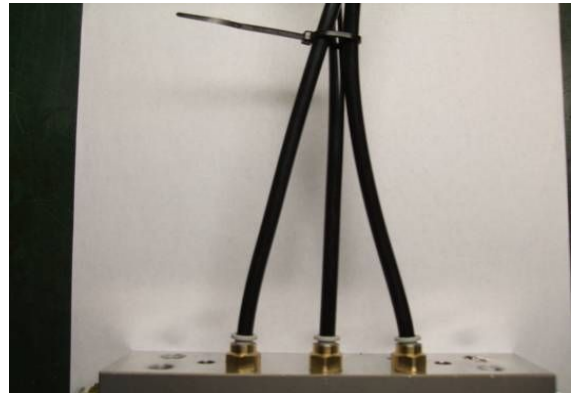


Fig.1 Recommended piping

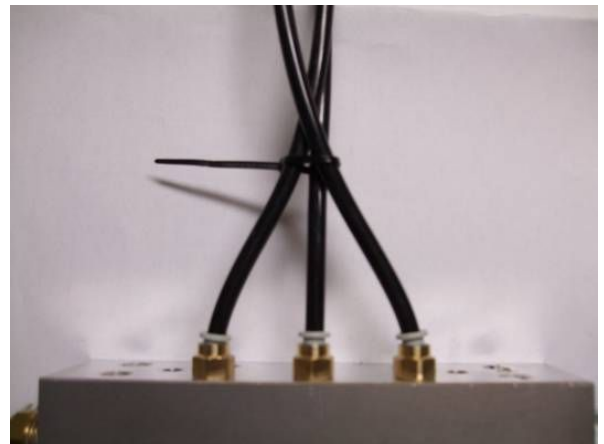
Unit: mm

Tubing size	Mounting pitch A			Straight line length
	Nylon tubing	Soft nylon tubing	Polyurethane tubing	
φ 6	84 or more	66 or more	39 or more	30 or more
φ 8	112 or more	88 or more	52 or more	40 or more
φ 10	140 or more	110 or more	69 or more	50 or more
φ 12	168 or more	132 or more	88 or more	60 or more

### Recommended piping conditions



Recommended



Not recommended

Fig. 2 When using a tying band to bind the piping together

## 2. Specific Product Precautions (6)

<b>Push Button Operation</b>
------------------------------

### **Caution**

- (1) Push button must be vertically operated by hand. Do not use tools or any other methods of operation. The product may be damaged otherwise.
- (2) Make sure that no lateral load is applied. Lateral loads may damage the product or cause an exhaust failure.
- (3) Make sure that no foreign matter enters the product to avoid leakages and exhaust failures.

<b>Tubing</b>
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<b>Design/Selection</b>
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### **Caution**

- (1) When using a tubing other than from SMC, be careful of the tolerance of the tubing O.D. and tubing material.
  - a) Nylon tubing                      Within +/-0.1 mm
  - b) Soft nylon tubing                Within +/-0.1 mm
  - c) Polyurethane tubing            Within +0.15 mm,  
  Within -0.2 mm

Do not use the tubing which does not satisfy the specified tubing O.D. accuracy, or if the tubing has a different I.D., material, hardness, or surface roughness from those of SMC's tubing. Please consult with SMC if there is anything unclear.

It may cause difficulty in connecting the tubing, leakage, disconnection of the tubing, or fitting damage.

- (2) When using fittings other than those from SMC, be certain to confirm that operating conditions are such that no problems will arise.

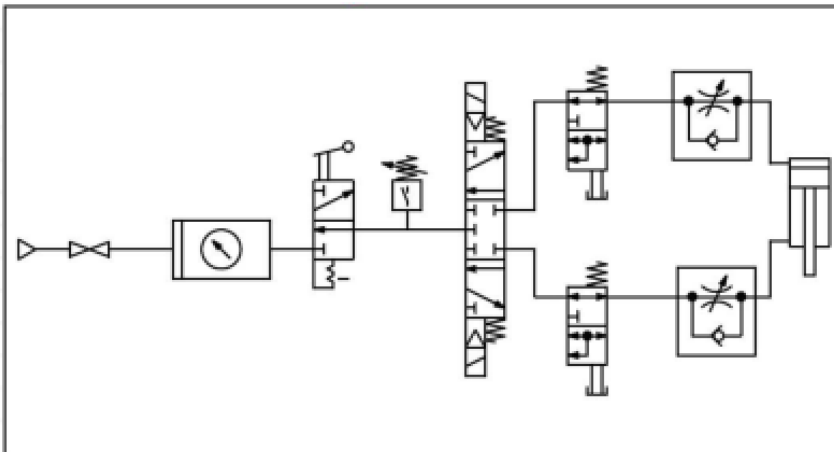
### 3. Specifications

Model	Without a push button guard	KEA06	KEA08	KEA10	KEA12
	With a push button guard	KEB06	KEB08	KEB10	KEB12
	Rc thread with a push button guard	—	KEC-02	—	KEC-03
Applicable tubing O.D. or connection thread		ø6	ø8, Rc 1/4	ø10	ø12, Rc 3/8
Applicable tubing material		Nylon, Soft nylon, Polyurethane, FEP, PFA			
Fluid		Air			
Operating pressure range		0 to 1 MPa			
Ambient and fluid temperature		-5 to 60°C (No freezing)			
Effective area A B	Nylon	13.1 mm <sup>2</sup>	26.1 mm <sup>2</sup>	41.5 mm <sup>2</sup>	58.3 mm <sup>2</sup>
	Polyurethane	13.1 mm <sup>2</sup>	18.0 mm <sup>2</sup>	29.5 mm <sup>2</sup>	46.1 mm <sup>2</sup>
Residual pressure release effective area		1.8 mm <sup>2</sup>			
Color	Body	Red			
	Push button				
	Release button (Tube connection part)	Blue			

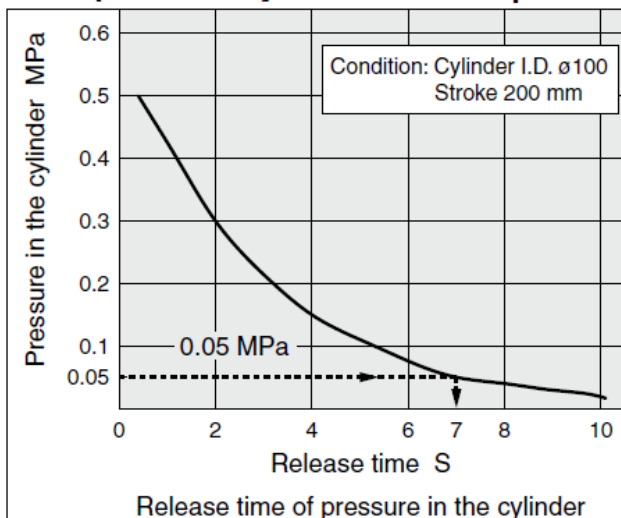
### 4. Product outline

Residual pressure in the cylinder can be easily released with one push of the push button.

#### Example of circuit diagram (Residual exhaust of air cylinder)



#### Example of air cylinder residual pressure release time

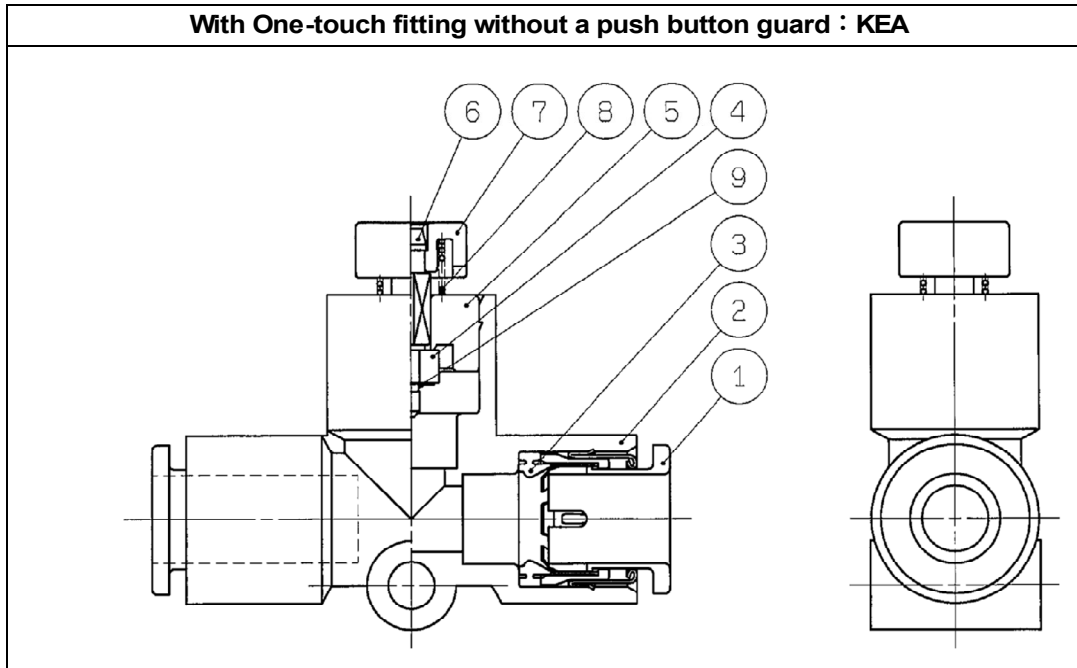


## 5. Troubleshooting

Residual Pressure Release Valve with One-touch Fitting / KE Series cannot be disassembled or repaired in order to quality maintenance.

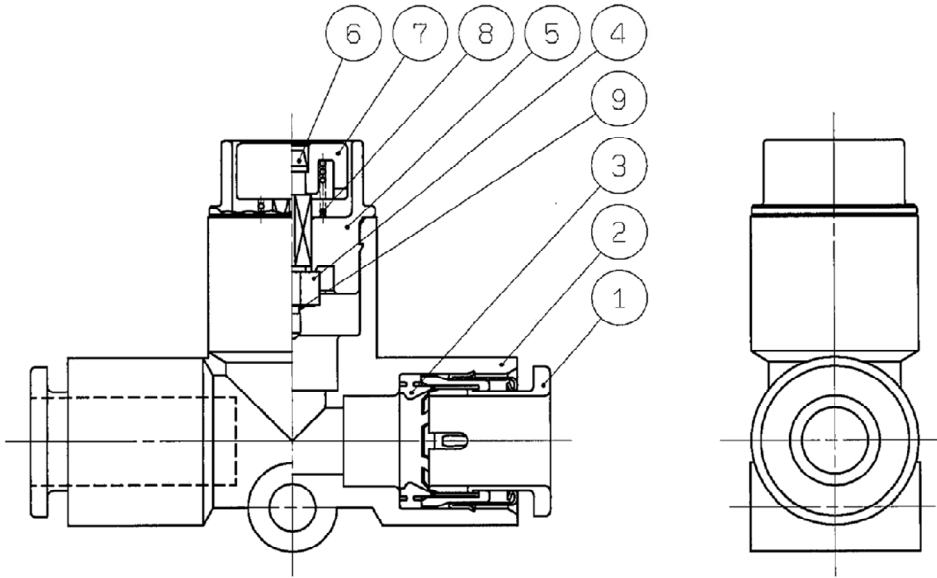
When failure such as "Non-removable tubing" " Air leakage " occurs, please replace the whole product.

## 6. Construction



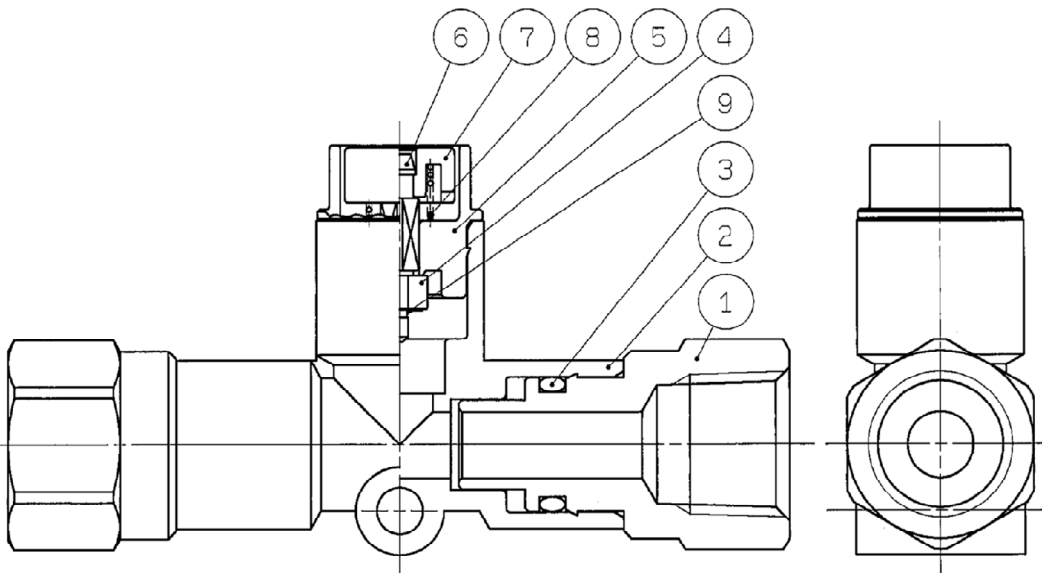
No.	Part name	Material	Qty	Remarks
1	Cassette	POM,Stainless steel304	2	Blue
2	Body	PBT	1	Red
3	Seal	NBR	2	
4	Valve	HNBR	1	
5	Valve guide	Brass	1	
6	Rod	Brass	1	
7	Push Button	POM	1	Red
8	Spring	Stainless steel304-WPB	1	
9	Push nut	Stainless steel304	1	

**With One-touch fitting with a push button guard : KEB**



No.	Part name	Material	Qty	Remarks
1	Cassette	POM,Stainless steel304	2	Blue
2	Body	PBT	1	Red
3	Seal	NBR	2	
4	Valve	HNBR	1	
5	Valve guide	Brass	1	
6	Rod	Brass	1	
7	Push Button	POM	1	Red
8	Spring	Stainless steel304-WPB	1	
9	Push nut	Stainless steel304	1	

**Rc thread with a push button guard : KEC**



No.	Part name	Material	Qty	Remarks
1	Stud	Brass	2	
2	Body	PBT	1	Red
3	O-Ring	NBR	2	
4	Valve	HNBR	1	
5	Valve guide	Brass	1	
6	Rod	Brass	1	
7	Push Button	POM	1	Red
8	Spring	Stainless steel304-WPB	1	
9	Push nut	Stainless steel304	1	

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