# OTCO
Organic Thermal-Link

RS Series $I_r$ : 10 A



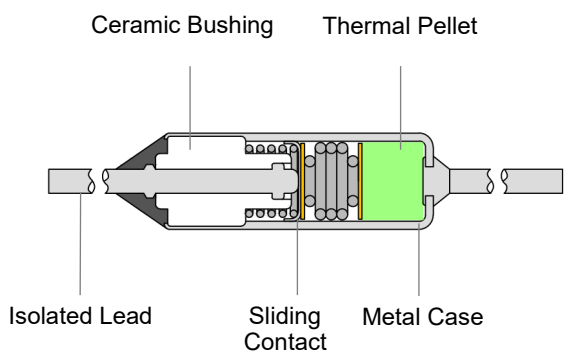
## Description

SETsafe | SETfuse Organic Thermal-Link (OTCO) RS series are non-resettable protective device, functioning one time only. It mainly consists of metal case, spring, sliding contact and thermal pellet. When the Thermal-Link senses abnormal heat and temp. reaches the predetermined fusing temp., thermal pellet melts and the sliding contact separates from the isolated lead with the assistance of the trip spring, thereby the circuit is disconnected. OTCO RS series are widely used in electrical equipment to provide over temp. protection, comply with RoHS and REACH.

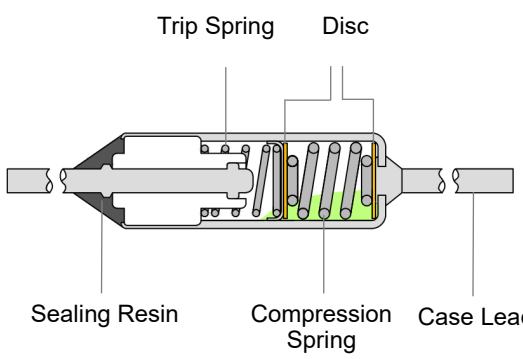
OTCO

## Construction

**Before Functioning**




**After Functioning**




### Functioning Principle:

Under normal operating temp., the solid thermal pellet keeps the isolated lead connected to the sliding contact. When the Thermal-Link senses abnormal heat and temp. reaches the predetermined fusing temp., thermal pellet melts and the sliding contact separates from the isolated lead with the assistance of the trip spring, thereby the circuit is disconnected.

## Features

- Compact Size
- Metal Case
- Organic Thermal Pellet
- Non-Resettable
- High Accuracy of Functioning Temp.
- Low Resistance
- RoHS & REACH

## Applications

- Small Home Appliances (Such as Electric Cooker, Bread Maker, Coffee Machine, Soymilk Machine, etc. )
- Comfort Home Appliances (Such as Washing Machine, Refrigerator, Air Conditioner, etc. )
- Personal Care Appliances (Such as Hair Dryer, Hair Straightener, Electric Iron, etc. )
- Commercial Appliances (Such as Printer, Scanner, Fax Machine etc.)
- Automobile Field (Such as Air Conditioner, Heated Seat, etc.)

## Customization

- Other Temp.
- The Length of Lead
- Lead Cutting
- Lead Forming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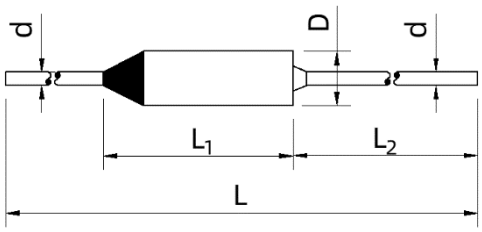
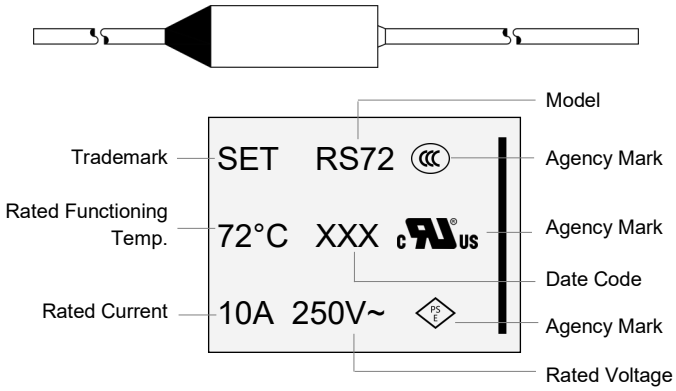
## Dimensions (mm)




| Lead Length | L | $L_1$ | $L_2$ | D | d |
|---|---|---|---|---|---|
| Standard | 65 ± 3 | 15 Max. | 35 ± 2 | Φ 4 ± 0.2 | Φ 1 ± 0.1 |
| Long | 81 ± 3 | 15 Max. | 35 ± 2 | Φ 4 ± 0.2 | Φ 1 ± 0.1 |
| Option | Customi-zation | 15 Max. | Customi-zation | Φ 4 ± 0.2 | Φ 1 ± 0.1 |

## Marking




**Note:**

The first letter of date code represents the year, letter A represents 2000, letter B represents 2001, and so on. The last two digits represent the quarter, the quarter code is represented by 01, 02, 03 and 04, representing the four quarters of the year.

## Agency Approvals

| Agency | Standards | File No. |
|---|---|---|
| | UL60691 | E214712 |
| | CAN-CSA-E60691 | E214712 |
| | EN60691 | 40052266 |
| | J60691 | JET2121-32001-2001<br>JET2121-32001-2002<br>JET2121-32001-2003<br>JET2121-32001-2004<br>JET2121-32001-2005<br>JET2121-32001-2006<br>JET2121-32001-2007<br>JET2121-32001-2008<br>JET2121-32001-2009<br>JET2121-32001-2010 |
| | KC60691 | SU05023-19001A<br>SU05023-19002A<br>SU05023-19003B<br>SU05023-19004B<br>SU05023-19005B |
| | GB/T 9816 | 2020980205000192 |

## Part Numbering System

OTCO - RS72 - L S A B - 001

**Other Options**

**Packaging**
B: Bulk
R: Tape and Reel

**Leads Forming**
A: Straight Lead
B: Single Lead Bending
C: Leads Bending

**Lead Length**
S: Standard
L: Long
O: Option

**Process of Mark**
L: Laser

**Rated Functioning Temp.**
refer to specifications

**Series**
RS

**Product Category**



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## Glossary

| Item | Description |
|---|---|
| TCO | **Thermal-Link**<br>A non-resettable device incorporating a THERMAL ELEMENT which will open a circuit once only when exposed for a sufficient length of time to a temp. in excess of that for which it has been designed. |
| OTCO | **Organic Thermal-Link**<br>Organic type Thermal-Link, organic is the THERMAL ELEMENT. |
| $T_f$ | **Rated Functioning Temp.**<br>The temp. of the Thermal-Link which causes it to change its state of conductivity with a detection current up to 10 mA as the only load.<br>Tolerance: $T_f$ + 0 / - 10 K (GB/T 9816, EN60691, UL60691, KC60691).<br>Tolerance: $T_f$ ± 7 K (J60691). |
| **Fusing Temp.** | The temp. of the Thermal-Link which causes it to change its state of conductivity is measured with silicone oil bath in which the temp. is increased at the rate of 0.5 K/min to 1 K/min, with a detection current up to 10 mA as the only load. |
| $T_h$ | **Holding Temp.**<br>The max. temp. of the Thermal-Link at which it will not change its state of conductivity during 168 hours at the rated current. |
| $T_m$ | **Max. Temp. Limit**<br>The temp. of the Thermal-Link stated by the manufacturer, up to which the mechanical and electrical properties of the Thermal-Link, having changed its state of conductivity, will not be impaired for a given time. |
| $I_r$ | **Rated Current**<br>The current used to classify a Thermal-Link. |
| $U_r$ | **Rated Voltage**<br>The voltage used to classify a Thermal-Link. |
| $I_n$ | **Nominal Discharge Current**<br>Being able to withstand 15 peak currents of waveform 8/20 μs to test the product's durability of withstanding pulse current. |
| $I_{max}$ | **Max. Discharge Current**<br>Being able to withstand 1 peak current of waveform 8/20 μs to test max. pulse current that the product can withstand. |


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# OTCO
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RS Series $I_r$ : 10 A



## Specifications

| Model | $T_f$ | Fusing Temp. | $T_h$ | $T_h$ (UL/cUL) | $T_m$ | $I_r$ | $U_r$ | $I_n$ | $I_{max}$ | UL | cUL | VDE | PSE | KC | CCC | RoHS & REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (°C) | (°C) | (°C) | (°C) | (°C) | (A) | (VAC) | (kA) | (kA) | | | | | | | |
| RS72 | 72 | 69 ± 2 | 42 | 57 | 180 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | N / A | ● | ● |
| RS77 | 77 | 74 ± 2 | 50 | 62 | 300 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | N / A | ● | ● |
| RS84 | 84 | 82 ± 2 | 54 | 69 | 200 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS94 | 94 | 89 ± 2 | 64 | 79 | 300 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS99 | 99 | 95 ± 2 | 69 | 84 | 200 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS104 | 104 | 102 ± 2 | 74 | 89 | 250 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS110 | 110 | 108 ± 2 | 82 | 95 | 240 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS117 | 117 | 114 ± 2 | 88 | 102 | 200 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS121 | 121 | 118 ± 2 | 93 | 106 | 300 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS128 | 128 | 124 ± 2 | 98 | 113 | 200 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS134 | 134 | 131 ± 2 | 104 | 119 | 250 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS144 | 144 | 141 ± 2 | 114 | 129 | 300 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS152 | 152 | 149 ± 2 | 122 | 137 | 205 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS167 | 167 | 164 ± 2 | 137 | 152 | 220 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS172 | 172 | 170 ± 2 | 143 | 157 | 260 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS184 | 184 | 181 ± 2 | 154 | 169 | 250 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS192 | 192 | 190 ± 2 | 162 | 177 | 300 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS216 | 216 | 213 ± 2 | 186 | 200 | 450 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS229 | 229 | 227 ± 2 | 200 | 200 | 450 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS240 | 240 | 236 ± 2 | 200 | 205 | 450 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS257 | 257 | 254 ± 2 | 200 | 220 | 480 | 10 | 250 | 1.5 | 3 | ● | ● | ● | ● | ● | ● | ● |
| RS263 | 263 | 261 +2 / -4 | N / A | 220 | 480 | 10 | 250 | 1.5 | 3 | ● | ● | ○ | ○ | ○ | ○ | ◑ |

Note:

1. ″●″ Means OTCO has gained the certification.

   ″○″ Means OTCO hasn't gained the certification.

2. For $T_h$ test, UL / cUL standard recommends the thermocouples to monitor the temp. of OTCO body, while other standards recommend the thermocouples to monitor the environment temp. in the oven.
3. OTCO RS series with a $T_f$ rating 175°C and above comply with UL conductive heat aging (CHAT) requirements.
4. RS263 comply with RoHS but does not comply with REACH.


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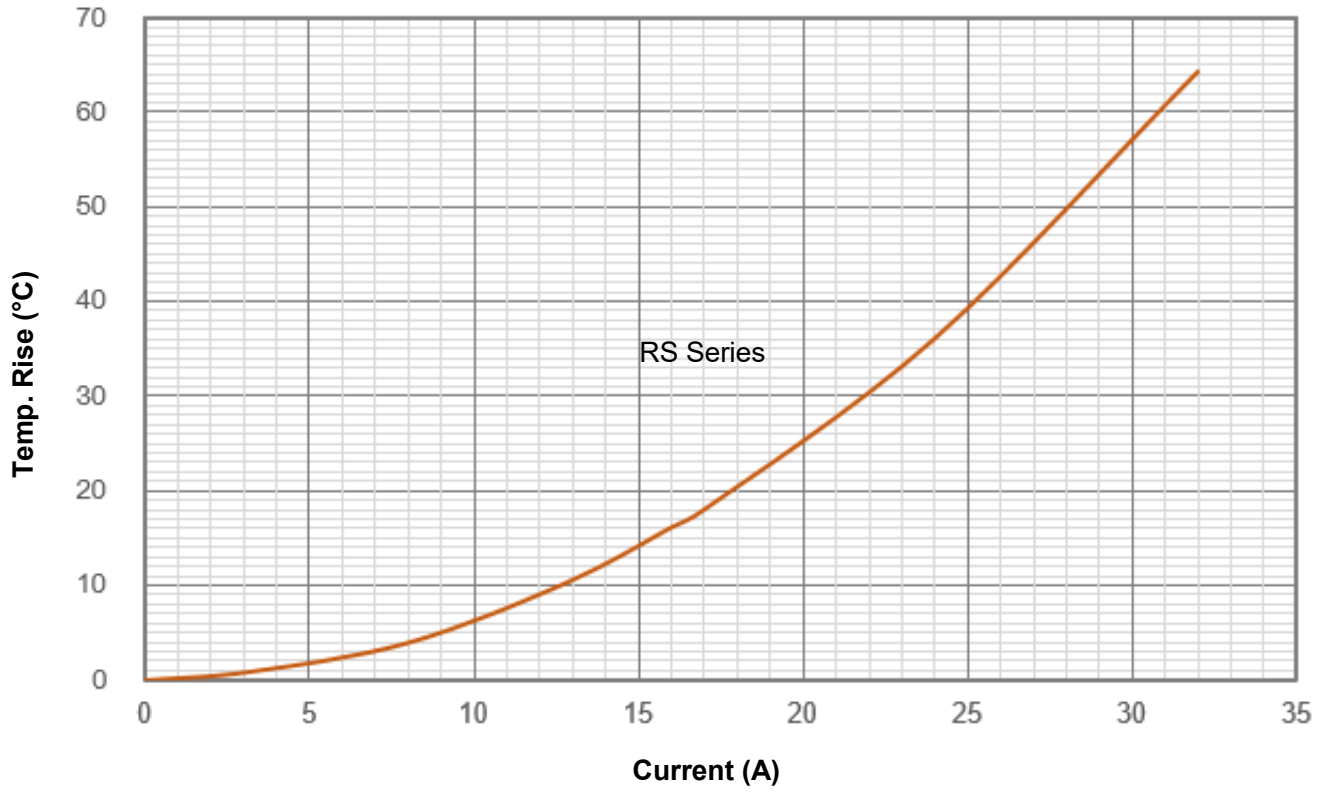
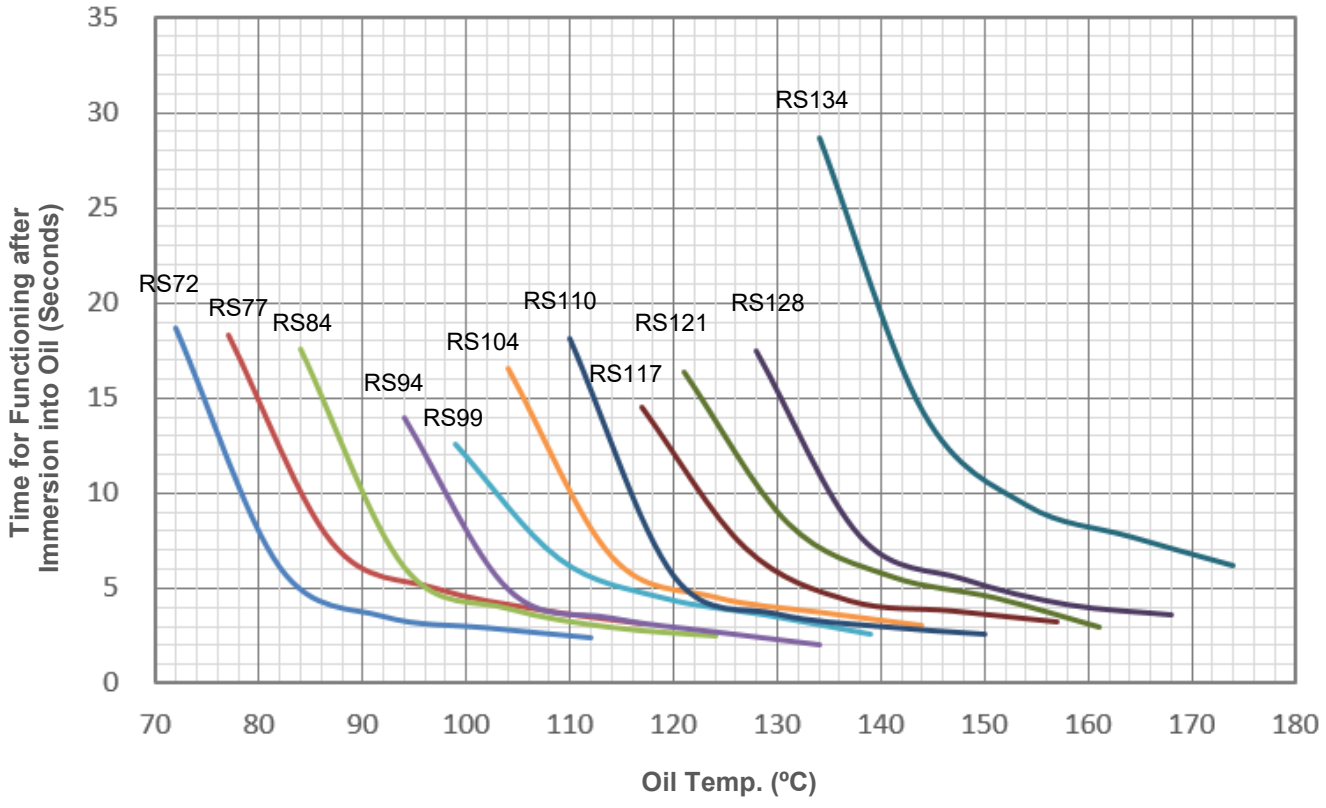
## Temp. Rise




## Response Time





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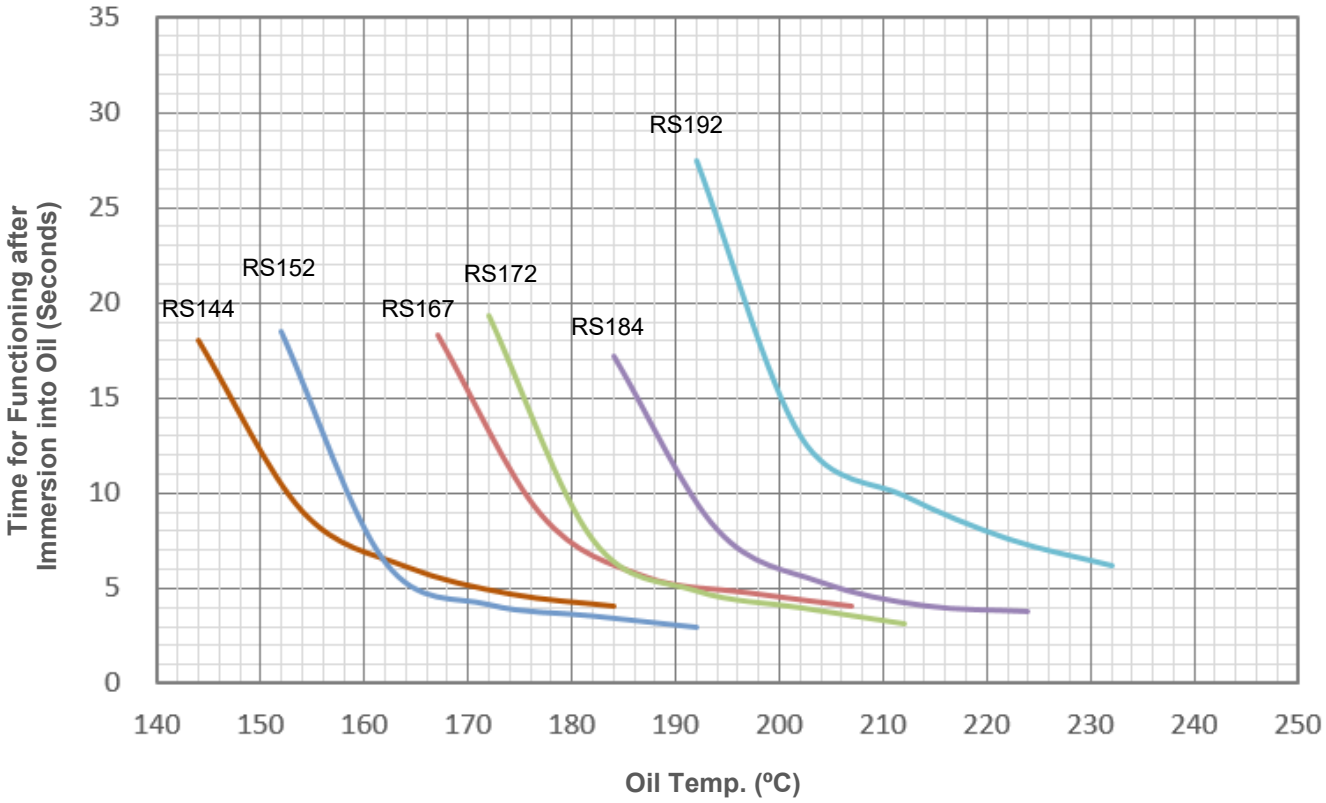


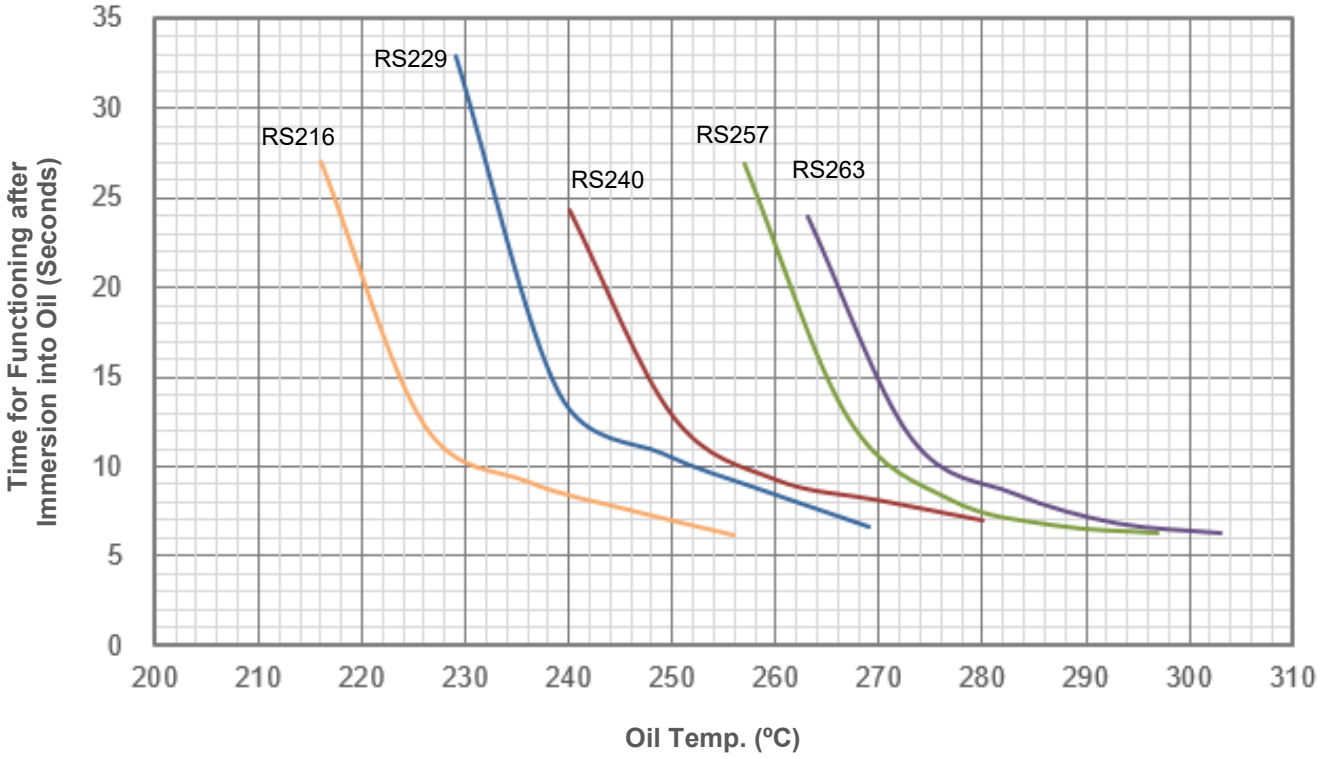



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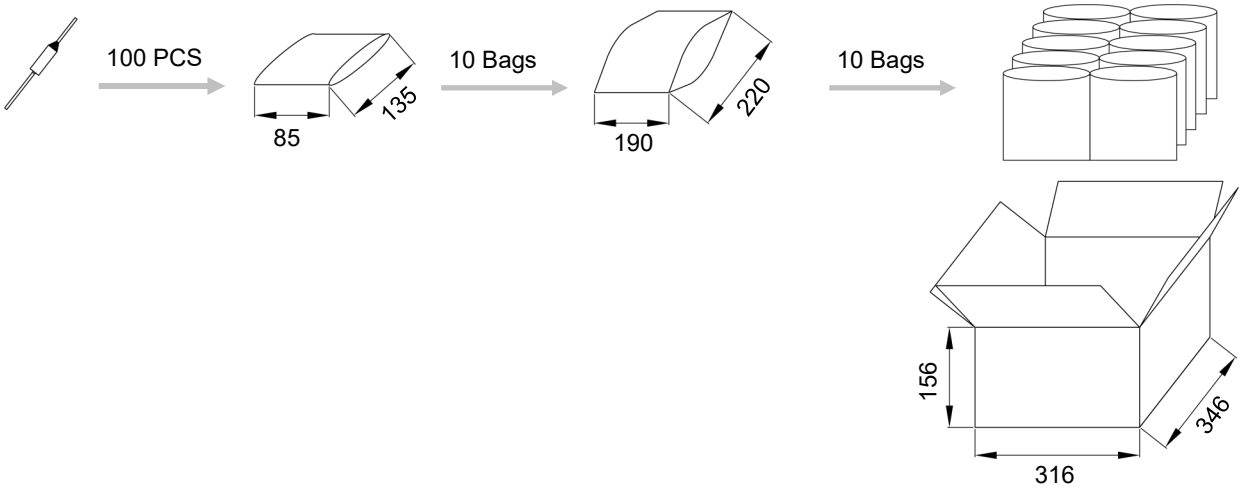
# Packaging Information (Take standard lead length for example)

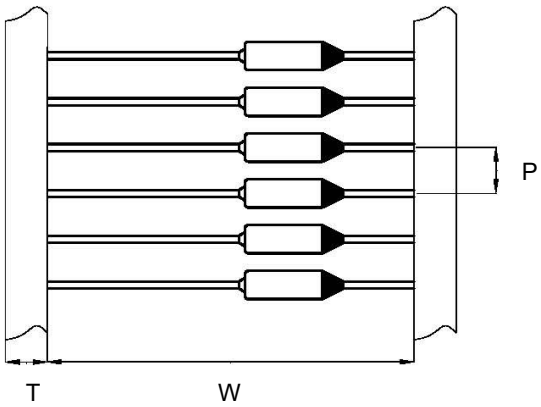
## Bulk Packaging

| Item | PE Bag | PE Bag | Carton |
|---|---|---|---|
| Dimensions (mm) | 135 x 85 | 220 x 190 | 346 x 316 x 156 |
| Quantity (PCS) | 100 | 1,000 | 10,000 |
| Gross Weight (kg) | | | 11 ± 10% |




## Tape Packaging

### Tape




| Item | Dimensions (mm) |
|---|---|
| W | 53 ± 2 |
| T | 6 ± 1 |
| P | 5 ± 0.5 |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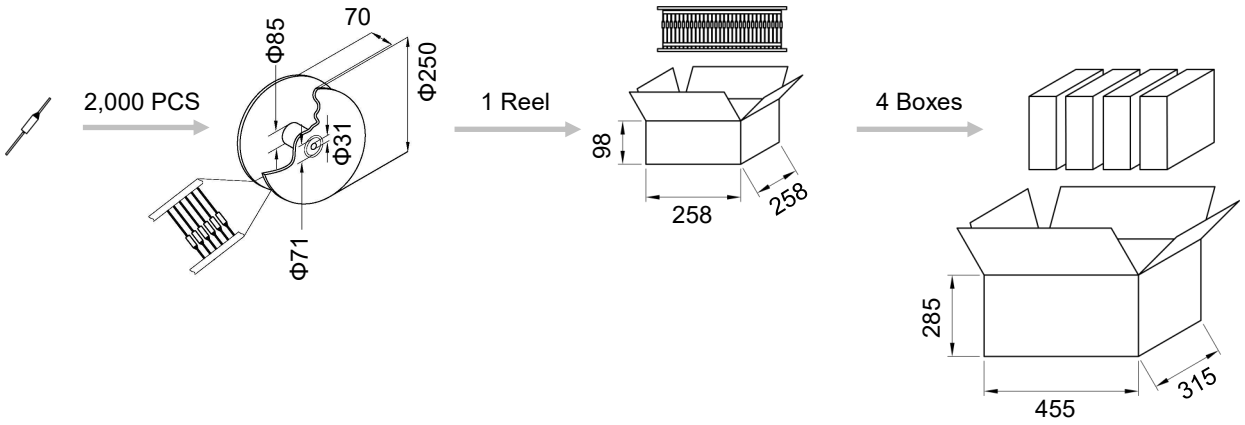
**Reel**

| Item | Reel | Box | Carton |
|---|---|---|---|
| Dimensions (mm) | Φ 250 x Φ 85 x 70 | 258 x 258 x 98 | 455 x 315 x 285 |
| Quantity (PCS) | 2,000 | 2,000 | 8,000 |
| Gross Weight (kg) | | | 10.3 ± 10% |





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# ATTENTION

## Usage

1. Please use OTCO without exceeding the rated current and voltage.
2. Do not use the OTCO in environments out of the standard specifications, such as those containing sulfur dioxide gas, nitrogen oxide gas, ammonia gas or formic acid. It is also not suitable for using in high humidity environment or immersed in liquid.

## Replace

OTCO is a non-repairable product. For safety aspect, it shall be replaced by an equivalent OTCO from the same manufacturer, and mounted in the same way.

## Storage

1. OTCO must be kept in a place with no sunshine or corrosive gas, the temperature shall be within -10 °C ~ 30 °C and humidity within 30 % ~ 75 %. The validity storage period of OTCO is 12 months after purchase.
2. The case and isolated lead of OTCO are silver-plated. Therefore, to avoid vulcanization, the OTCO shall not be kept around materials such as cardboard or rubber etc. which generate sulfurous acid gas.


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## Lead Process

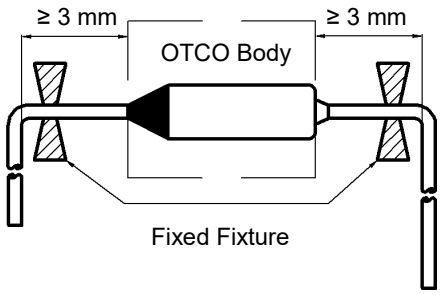


**FIGURE 1**

1. If lead wires has to be bent, it is important not to apply excessive pressure to the root of the lead wires. The tensile forces applied to the lead wires shall not exceed 15.7 N, and the thrust force applied to the lead wires shall not exceed 3.9 N.
2. The lead wires should be bent at a distance 3 mm or above from the body of OTCO (see Fig.1).
3. To avoid damaging the OTCO, when bending lead wires, please use pincher or similar tools to fix the OTCO.

## Installation

### Selection of Installation Location

1. Do not locate the OTCO in a place where severe vibration always occurs.
2. The infrared thermography or multiple thermocouples should be considered to detect the ambient temp. under normal and abnormal situation. The point that provides the biggest temp. rise between these two situations is the best installation location.

### Make Sure the Temp. of Installation Location

1. The body of OTCO will generate heat as current flows through it, resulting the body temp. higher than ambient temp. The influence of temp. rise shall be considered in the design to determine the appropriate OTCO model.
2. It shall be ensured that the body temp. of OTCO and the ambient temp. at the installation position do not exceed the corresponding holding temp. $T_h$.
3. The end product should be tested to ensure that potential abnormal conditions do not cause ambient temp. to exceed the $T_m$ of the OTCO.

### Mounting OTCO

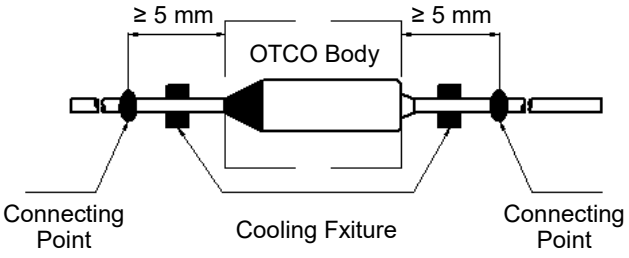


**FIGURE 2**

1. OTCO can be installed by soldering, welding, riveting or crimping. During and after installation, please do not pull, push or twist OTCO body or lead wires.
2. The connection point of the lead shall be no less than 5 mm away from the OTCO body (see Fig.2).
3. Try to ensure that the body of the OTCO is evenly heated. If the temp. difference is inevitable, make sure that the sealing resin side is connected close to the heat source.


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## Soldering

1. Soldering should be carried out according to below table. If secondary soldering is required, wait until the OTCO cools to room temp.
2. Soldering is not recommended for Thermal-Link with $T_f \leq 110°C$, while non heating processes such as crimping and riveting are recommended.
3. In the process of soldering, cooling fixture should be used between soldering point and OTCO body (see Fig.2).
4. It is recommended to take X-ray after soldering, to confirm that the thermal pellet has no shrinkage after soldering.

**TABLE 1:** Max. Allowable Soldering Time for Different Length of Soldering Point from OTCO Body

| Rated Functioning Temp. ($T_f$) | Length | Time | Length | Time | Length | Time | Max. Soldering Temp. |
|---|---|---|---|---|---|---|---|
| (°C) | (mm) | (s) | (mm) | (s) | (mm) | (s) | (°C) |
| ≤ 110 | 5 | N / A | 15 | N / A | 25 | N / A | 400 |
| 111 ~ 150 | 5 | N / A | 15 | 1 | 25 | 2 | |
| 151 ~ 190 | 5 | 1 | 15 | 2 | 25 | 3 | |
| ≥ 191 | 5 | 1 | 15 | 3 | 25 | 5 | |

## Welding

1. Avoid welding current flowing into the inside of the OTCO. The welding current will cause the internal parts to be welded together, resulting in the failure function of OTCO.
2. During the welding process, the lead wires of the OTCO must be supported to avoid the damage of the OTCO.
3. In the process of welding, cooling fixture should be used between welding point and OTCO body (See Fig.2).
4. It is recommended to take X-ray after welding, to confirm that the thermal pellet has no shrinkage after welding.

## Riveting or Crimping

1. Select materials with low resistance (such as copper) for riveting and crimping.
2. Contact resistance shall be as small as possible. Large contact resistance will cause high temp. to make OTCO open in advance.
3. It is better to crimp OTCO leads to stranded lead wires rather than solid wires as the stranded wire may be crimped tighter and maintain better electrical contact during temp. cycling.
4. During the riveting and crimping process, ensure that the lead wires shall not be reversed, sealing resin shall not be destroyed.
5. When the working temp. exceeds 150°C, soldering reinforcement is recommended after riveting and crimping.

**The isolated lead is forbidden to contact OTCO body directly to avoid short circuit (See Fig.3).**

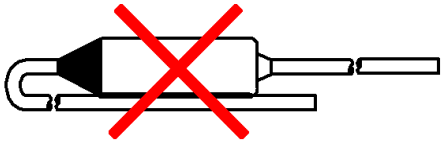

**FIGURE 3**


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