



## Varistors (ZNR Surge Absorber) Type: E

Varistors (ZNR Surge Absorber) Type E is capable of handling larger surge energy than Type D in applications to protect electronic equipment or semiconductor devices from switching and induced lightning surges.

### Features

- UL and CSA recognized components
- Very large surge withstanding capability with a compact size
- Direct mounting on boards like a power distribution board available
- Fast response to steep impulse voltage
- Low clamping voltage for better surge protection
- RoHS compliant

### Recommended Applications

- Transistor, diode, IC, thyristor or triac semiconductor protection
- Surge protection in industrial power plant operations
- Relay or electromagnetic valve surge absorption
- Surge absorption applications in broadcasting, communications devices, traffic/railroad, agricultural facilities, waterworks
- Surge protection of automatic control devices for power distribution line

### Related Standards

| Standard No. | UL1449                   | CSA C22.2 No.269.5  |
|--------------|--------------------------|---|
| Title        | Surge Protective Devices | Accessories and Parts for Electronic Products (Varistor for Across-The-Line use as transient protection on 120 V ac nominal system) |

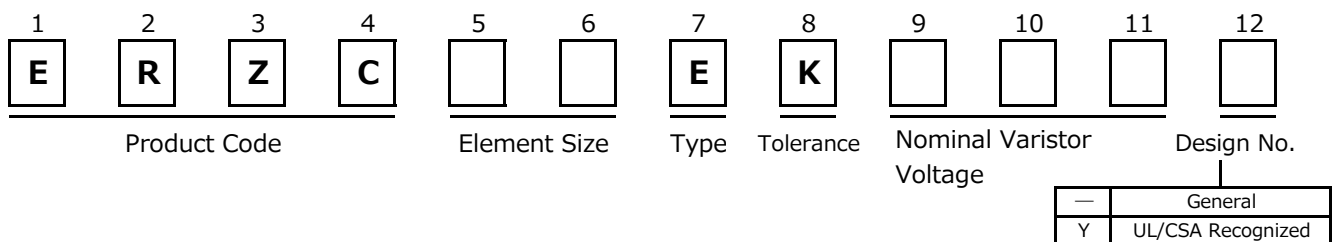
- Each type designation is not registered by Part Number.

Note : Ask our factory for Product Specification before use.

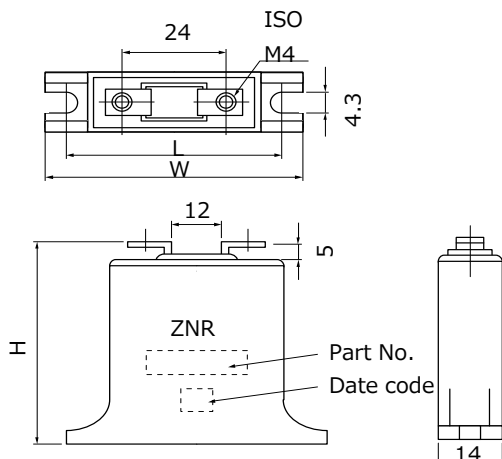
### As for Handling Precautions and Minimum Quantity / Packing Unit

Please see Related Information

### Explanation of Part Numbers



### Dimensions in mm (not to scale)



| Part No.       | W    | H    | L    |
|----------------|------|------|------|
| ERZC20EK□□□(Y) | 48±1 | 42±1 | 39±1 |
| ERZC32EK□□□(Y) | 60±1 | 55±1 | 51±1 |

## Series 20 (UL and CSA Recognized)

## Ratings and Characteristics(ERZC20EK)

- Operating Temperature Range : -40 to 85 °C
- Storage Temperature Range : -40 to 110 °C

| Part No.<br>(UL/CSA<br>Recognized) | Type<br>Designation | Varistor<br>Voltage | Maximum<br>Allowable<br>Voltage |       | Maximum<br>Clamping<br>Voltage<br><br>$V_{100A}$ (V) | Maximum<br>Energy<br>(2ms) | Maximum<br>Peak<br>Current<br>(8/20 $\mu$ s) | Rated<br>Voltage<br>(UL/CSA) |
|------------------------------------|---------------------|---------------------|---------------------------------|-------|--|----------------------------|--|------------------------------|
|                                    |                     |                     | ACrms(V)                        | DC(V) |  | 1 time                     | 1 time                                       |                              |
|                                    |                     |                     |                                 |       |  | (J)                        | (A)  |                              |
|                                    |                     | $V_{1mA}$ (V)       |                                 |       |  |                            |  |                              |
| ERZC20EK201Y                       | 20EK201U            | 200 (185 to 225)    | 130                             | 170   | 340  | 80                         | 8000   | 118                          |
| ERZC20EK241Y                       | 20EK241U            | 240 (216 to 264)    | 150                             | 200   | 395  | 95                         | 8000   | 136                          |
| ERZC20EK271Y                       | 20EK271U            | 270 (247 to 303)    | 175                             | 225   | 455  | 100                        | 8000   | 159                          |
| ERZC20EK361Y                       | 20EK361U            | 360 (324 to 396)    | 230                             | 300   | 595  | 120                        | 8000   | 209                          |
| ERZC20EK391Y                       | 20EK391U            | 390 (351 to 429)    | 250                             | 320   | 650  | 130                        | 8000   | 227                          |
| ERZC20EK431Y                       | 20EK431U            | 430 (387 to 473)    | 275                             | 350   | 710  | 140                        | 8000   | 250                          |
| ERZC20EK471Y                       | 20EK471U            | 470 (423 to 517)    | 300                             | 385   | 775  | 150                        | 8000   | 272                          |
| ERZC20EK511Y                       | 20EK511U            | 510 (459 to 561)    | 320                             | 415   | 845  | 150                        | 8000   | 291                          |
| ERZC20EK621Y                       | 20EK621U            | 620 (558 to 682)    | 385                             | 505   | 1025   | 160                        | 8000   | 350                          |
| ERZC20EK681Y                       | 20EK681U            | 680 (612 to 748)    | 420                             | 560   | 1120   | 175                        | 8000   | 381                          |
| ERZC20EK751Y                       | 20EK751U            | 750 (675 to 825)    | 460                             | 615   | 1240   | 190                        | 8000   | 418                          |
| ERZC20EK781Y                       | 20EK781U            | 780 (702 to 858)    | 485                             | 640   | 1290   | 200                        | 8000   | 440                          |
| ERZC20EK821Y                       | 20EK821U            | 820 (738 to 902)    | 510                             | 670   | 1355   | 215                        | 8000   | 463                          |
| ERZC20EK911Y                       | 20EK911U            | 910 (819 to 1001)   | 550                             | 745   | 1500   | 240                        | 8000   | 500                          |
| ERZC20EK102Y                       | 20EK102U            | 1000 (900 to 1100)  | 625                             | 825   | 1650   | 245                        | 8000   | 568                          |
| ERZC20EK112Y                       | 20EK112U            | 1100 (990 to 1210)  | 680                             | 895   | 1815   | 250                        | 8000   | 600                          |

## Series 32 (UL and CSA Recognized)

## Ratings and Characteristics(ERZC32EK)

- Operating Temperature Range : -40 to 85 °C
- Storage Temperature Range : -40 to 110 °C

| Part No.<br>(UL/CSA<br>Recognized) | Type<br>Designation | Varistor<br>Voltage | Maximum<br>Allowable<br>Voltage |       | Maximum<br>Clamping<br>Voltage<br><br>$V_{100A}$ (V) | Maximum<br>Energy<br>(2ms) | Maximum<br>Peak<br>Current<br>(8/20 $\mu$ s) | Rated<br>Voltage<br>(UL/CSA) |
|------------------------------------|---------------------|---------------------|---------------------------------|-------|--|----------------------------|--|------------------------------|
|                                    |                     |                     | ACrms(V)                        | DC(V) |  | 1 Time                     | 1 Time                                       |                              |
|                                    |                     |                     |                                 |       |  | (J)                        | (A)  |                              |
|                                    |                     | $V_{1mA}$ (V)       |                                 |       |  |                            |  |                              |
| ERZC32EK201Y                       | 32EK201U            | 200 (185 to 225)    | 130                             | 170   | 340  | 210                        | 25000  | 118                          |
| ERZC32EK241Y                       | 32EK241U            | 240 (216 to 264)    | 150                             | 200   | 395  | 240                        | 25000  | 136                          |
| ERZC32EK271Y                       | 32EK271U            | 270 (247 to 303)    | 175                             | 225   | 455  | 255                        | 25000  | 159                          |
| ERZC32EK361Y                       | 32EK361U            | 360 (324 to 396)    | 230                             | 300   | 595  | 325                        | 25000  | 209                          |
| ERZC32EK391Y                       | 32EK391U            | 390 (351 to 429)    | 250                             | 320   | 650  | 350                        | 25000  | 227                          |
| ERZC32EK431Y                       | 32EK431U            | 430 (387 to 473)    | 275                             | 350   | 710  | 400                        | 25000  | 250                          |
| ERZC32EK471Y                       | 32EK471U            | 470 (423 to 517)    | 300                             | 385   | 775  | 405                        | 25000  | 272                          |
| ERZC32EK511Y                       | 32EK511U            | 510 (459 to 561)    | 320                             | 415   | 845  | 405                        | 25000  | 291                          |
| ERZC32EK621Y                       | 32EK621U            | 620 (558 to 682)    | 385                             | 505   | 1025   | 415                        | 25000  | 350                          |
| ERZC32EK681Y                       | 32EK681U            | 680 (612 to 748)    | 420                             | 560   | 1120   | 450                        | 25000  | 381                          |
| ERZC32EK751Y                       | 32EK751U            | 750 (675 to 825)    | 460                             | 615   | 1240   | 500                        | 25000  | 418                          |
| ERZC32EK781Y                       | 32EK781U            | 780 (702 to 858)    | 485                             | 640   | 1290   | 520                        | 25000  | 440                          |
| ERZC32EK821Y                       | 32EK821U            | 820 (738 to 902)    | 510                             | 670   | 1355   | 545                        | 25000  | 463                          |
| ERZC32EK911Y                       | 32EK911U            | 910 (819 to 1001)   | 550                             | 745   | 1500   | 600                        | 25000  | 500                          |
| ERZC32EK102Y                       | 32EK102U            | 1000 (900 to 1100)  | 625                             | 825   | 1650   | 620                        | 25000  | 568                          |
| ERZC32EK112Y                       | 32EK112U            | 1100 (990 to 1210)  | 680                             | 895   | 1815   | 640                        | 25000  | 600                          |

## Series 20

## Ratings and Characteristics(ERZC20EK)

- Operating Temperature Range : -40 to 85 °C
- Storage Temperature Range : -40 to 110 °C

| Part No.    | Varistor Voltage     | Maximum Allowable Voltage |       | Maximum Clamping Voltage | Rated Power | Maximum Energy (2ms) | Maximum Peak Current (8/20 μs) |         | Typical Capacitance (Reference) |
|-------------|----------------------|---------------------------|-------|--------------------------|-------------|----------------------|--------------------------------|---------|---------------------------------|
|             |                      | ACrms(V)                  | DC(V) |                          |             |                      | 1 time                         | 2 times |                                 |
|             | V <sub>1mA</sub> (V) | ACrms(V)                  | DC(V) | V <sub>100A</sub> (V)    | (W)         | (J)                  | (A)                            | (A)     | at 1 kHz (pF)                   |
| ERZC20EK201 | 200 (185 to 225)     | 130                       | 170   | 340                      | 0.8         | 80                   | 8000                           | 5000    | 2300                            |
| ERZC20EK241 | 240 (216 to 264)     | 150                       | 200   | 395                      | 0.8         | 95                   | 8000                           | 5000    | 1500                            |
| ERZC20EK271 | 270 (247 to 303)     | 175                       | 225   | 455                      | 0.8         | 100                  | 8000                           | 5000    | 1400                            |
| ERZC20EK361 | 360 (324 to 396)     | 230                       | 300   | 595                      | 0.8         | 120                  | 8000                           | 5000    | 1300                            |
| ERZC20EK391 | 390 (351 to 429)     | 250                       | 320   | 650                      | 0.8         | 130                  | 8000                           | 5000    | 1200                            |
| ERZC20EK431 | 430 (387 to 473)     | 275                       | 350   | 710                      | 0.8         | 140                  | 8000                           | 5000    | 1000                            |
| ERZC20EK471 | 470 (423 to 517)     | 300                       | 385   | 775                      | 0.8         | 150                  | 8000                           | 5000    | 950                             |
| ERZC20EK511 | 510 (459 to 561)     | 320                       | 415   | 845                      | 0.8         | 150                  | 8000                           | 5000    | 930                             |
| ERZC20EK621 | 620 (558 to 682)     | 385                       | 505   | 1025                     | 0.8         | 160                  | 8000                           | 5000    | 900                             |
| ERZC20EK681 | 680 (612 to 748)     | 420                       | 560   | 1120                     | 0.8         | 175                  | 8000                           | 5000    | 850                             |
| ERZC20EK751 | 750 (675 to 825)     | 460                       | 615   | 1240                     | 0.8         | 190                  | 8000                           | 5000    | 800                             |
| ERZC20EK781 | 780 (702 to 858)     | 485                       | 640   | 1290                     | 0.8         | 200                  | 8000                           | 5000    | 800                             |
| ERZC20EK821 | 820 (738 to 902)     | 510                       | 670   | 1355                     | 0.8         | 215                  | 8000                           | 5000    | 700                             |
| ERZC20EK911 | 910 (819 to 1001)    | 550                       | 745   | 1500                     | 0.8         | 240                  | 8000                           | 5000    | 700                             |
| ERZC20EK102 | 1000 (900 to 1100)   | 625                       | 825   | 1650                     | 0.8         | 245                  | 8000                           | 5000    | 400                             |
| ERZC20EK112 | 1100 (990 to 1210)   | 680                       | 895   | 1815                     | 0.8         | 250                  | 8000                           | 5000    | 350                             |

## Series 32

## Ratings and Characteristics(ERZC32EK)

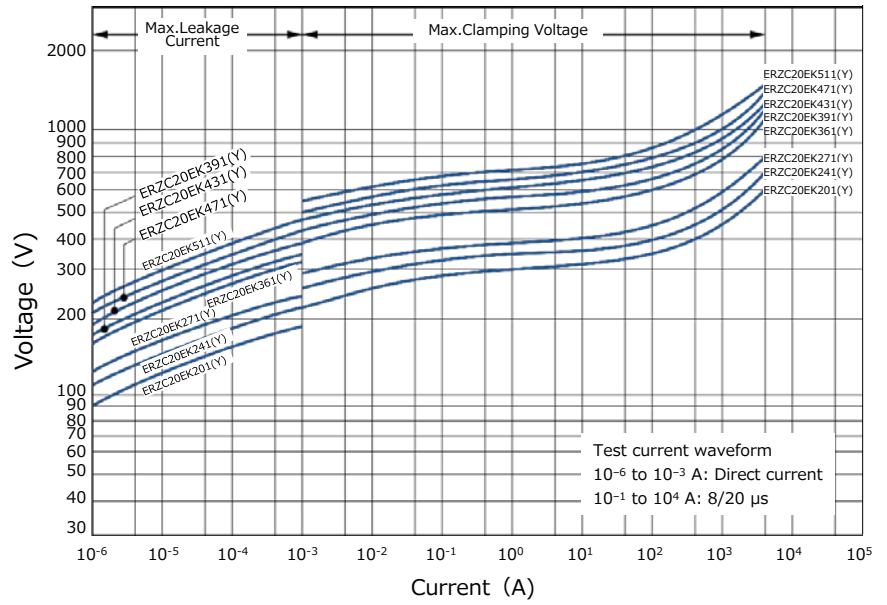
- Operating Temperature Range : -40 to 85 °C
- Storage Temperature Range : -40 to 110 °C

| Part No.    | Varistor Voltage     | Maximum Allowable Voltage |       | Maximum Clamping Voltage | Rated Power | Maximum Energy (2ms) | Maximum Peak Current (8/20 μs) |         | Typical Capacitance (Reference) |
|-------------|----------------------|---------------------------|-------|--------------------------|-------------|----------------------|--------------------------------|---------|---------------------------------|
|             |                      | ACrms(V)                  | DC(V) |                          |             |                      | 1 time                         | 2 times |                                 |
|             | V <sub>1mA</sub> (V) | ACrms(V)                  | DC(V) | V <sub>100A</sub> (V)    | (W)         | (J)                  | (A)                            | (A)     | at 1 kHz (pF)                   |
| ERZC32EK201 | 200 (185 to 225)     | 130                       | 170   | 340                      | 1.2         | 210                  | 25000                          | 20000   | 5500                            |
| ERZC32EK241 | 240 (216 to 264)     | 150                       | 200   | 395                      | 1.2         | 240                  | 25000                          | 20000   | 5000                            |
| ERZC32EK271 | 270 (247 to 303)     | 175                       | 225   | 455                      | 1.2         | 255                  | 25000                          | 20000   | 4200                            |
| ERZC32EK361 | 360 (324 to 396)     | 230                       | 300   | 595                      | 1.2         | 325                  | 25000                          | 20000   | 3500                            |
| ERZC32EK391 | 390 (351 to 429)     | 250                       | 320   | 650                      | 1.2         | 350                  | 25000                          | 20000   | 3000                            |
| ERZC32EK431 | 430 (387 to 473)     | 275                       | 350   | 710                      | 1.2         | 400                  | 25000                          | 20000   | 2500                            |
| ERZC32EK471 | 470 (423 to 517)     | 300                       | 385   | 775                      | 1.2         | 405                  | 25000                          | 20000   | 2500                            |
| ERZC32EK511 | 510 (459 to 561)     | 320                       | 415   | 845                      | 1.2         | 405                  | 25000                          | 20000   | 2400                            |
| ERZC32EK621 | 620 (558 to 682)     | 385                       | 505   | 1025                     | 1.2         | 415                  | 25000                          | 20000   | 2200                            |
| ERZC32EK681 | 680 (612 to 748)     | 420                       | 560   | 1120                     | 1.2         | 450                  | 25000                          | 20000   | 2100                            |
| ERZC32EK751 | 750 (675 to 825)     | 460                       | 615   | 1240                     | 1.2         | 500                  | 25000                          | 20000   | 2000                            |
| ERZC32EK781 | 780 (702 to 858)     | 485                       | 640   | 1290                     | 1.2         | 520                  | 25000                          | 20000   | 1900                            |
| ERZC32EK821 | 820 (738 to 902)     | 510                       | 670   | 1355                     | 1.2         | 545                  | 25000                          | 20000   | 1800                            |
| ERZC32EK911 | 910 (819 to 1001)    | 550                       | 745   | 1500                     | 1.2         | 600                  | 25000                          | 20000   | 1700                            |
| ERZC32EK102 | 1000 (900 to 1100)   | 625                       | 825   | 1650                     | 1.2         | 620                  | 25000                          | 20000   | 1000                            |
| ERZC32EK112 | 1100 (990 to 1210)   | 680                       | 895   | 1815                     | 1.2         | 640                  | 25000                          | 20000   | 800                             |

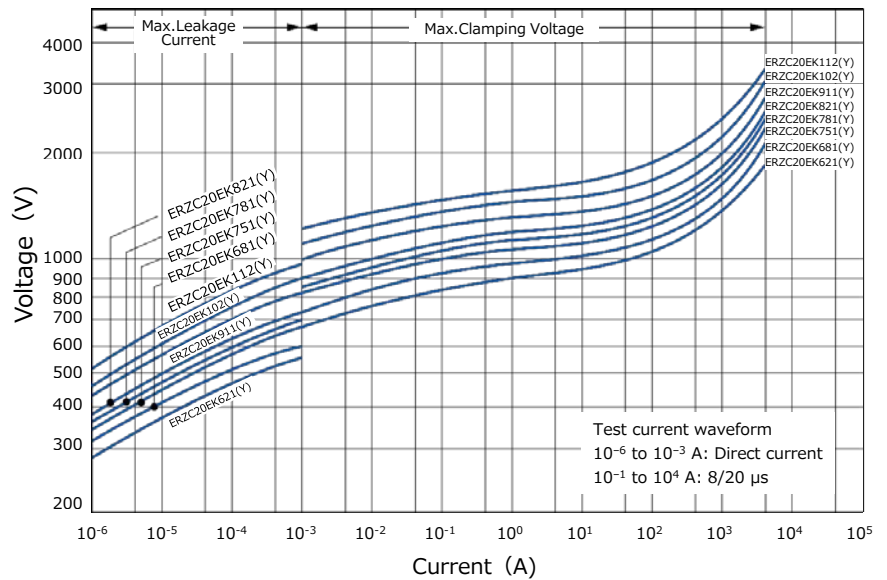
**Typical Characteristics(Type E)**

**Voltage vs. Current**

(ERZC20EK201(Y) to ERZC20EK511(Y))

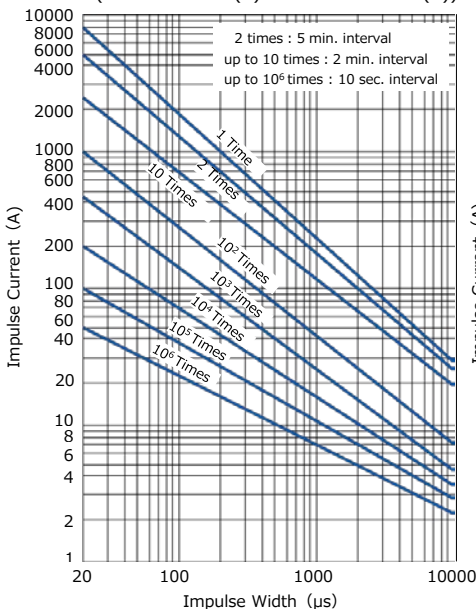


(ERZC20EK621(Y) to ERZC20EK112(Y))

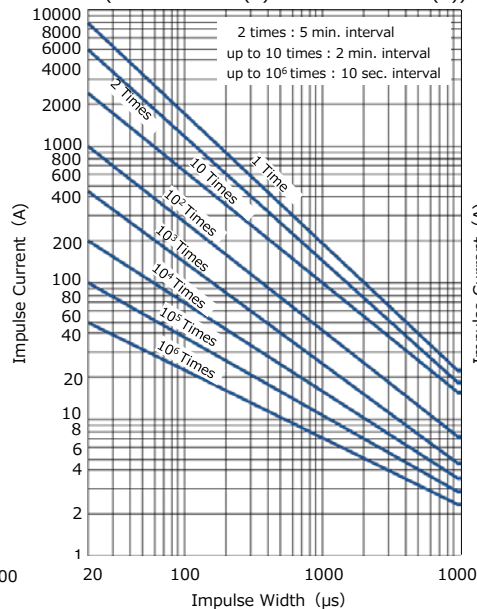


**Impulse Derating Curve (Relation between impulse width and surge, repetitively)**

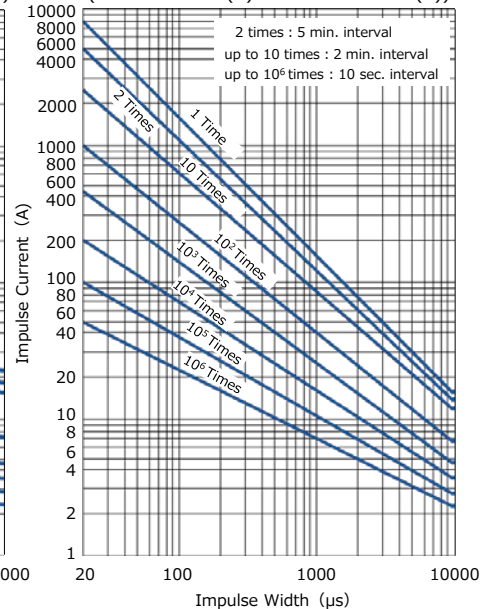
Series 20  
(ERZC20EK201(Y) to ERZC20EK271(Y))



Series 20  
(ERZC20EK361(Y) to ERZC20EK681(Y))



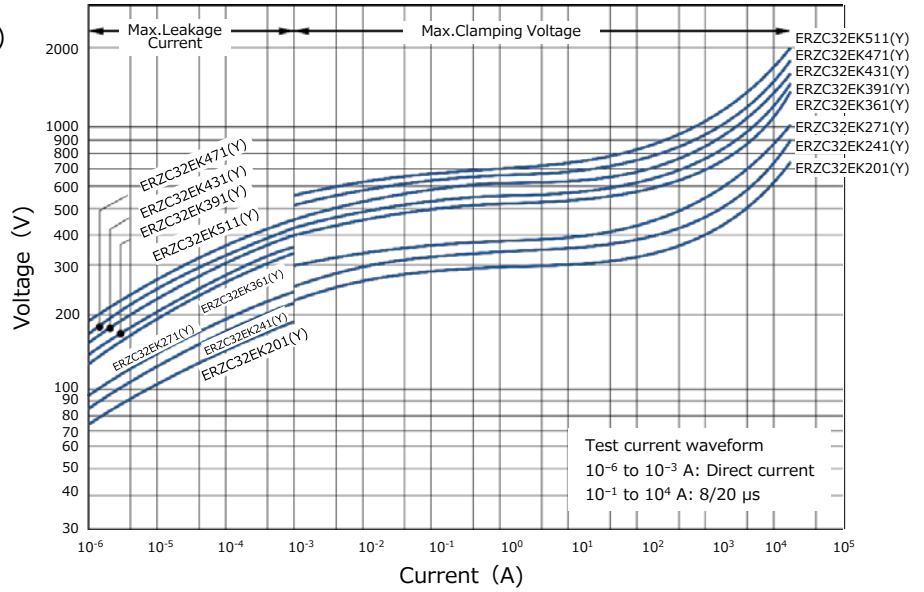
Series 20  
(ERZC20EK751(Y) to ERZC20EK112(Y))



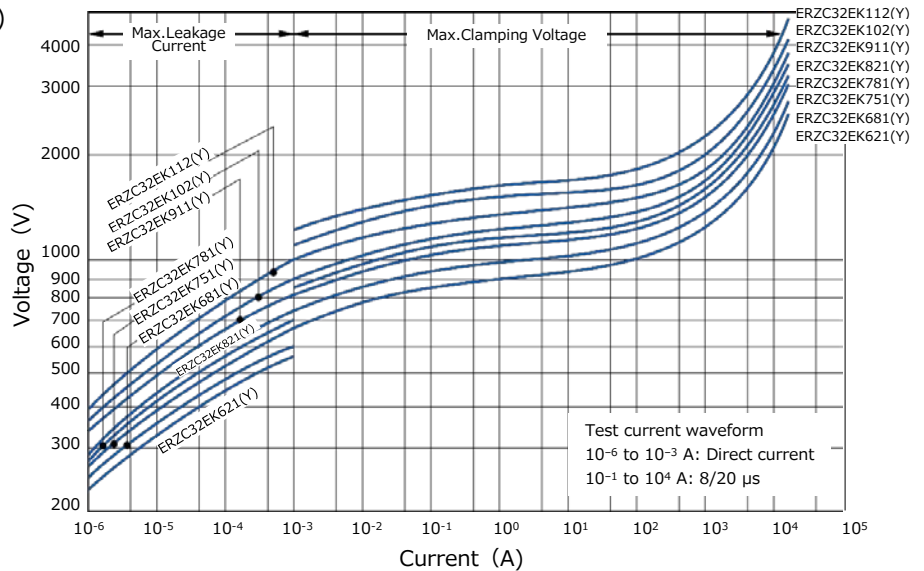
**Typical Characteristics(Type E)**

**Voltage vs. Current**

(ERZC32EK201(Y) to ERZC32EK511(Y))

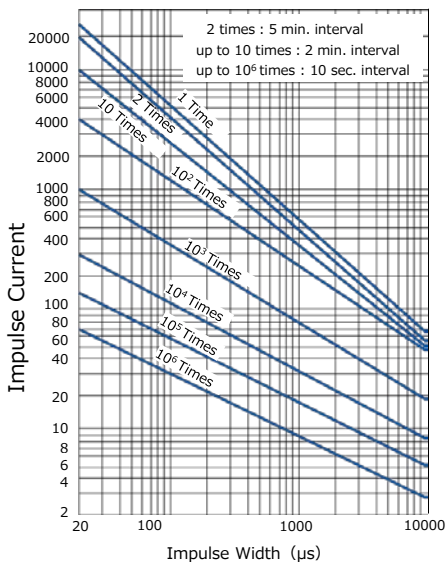


(ERZC32EK621(Y) to ERZC32EK112(Y))

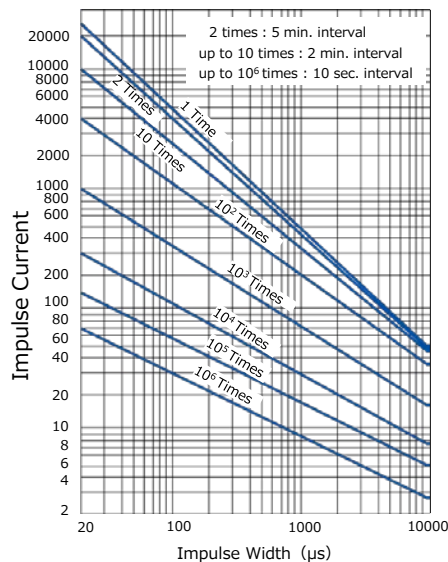


**Impulse Derating Curve (Relation between impulse width and surge, repetitively)**

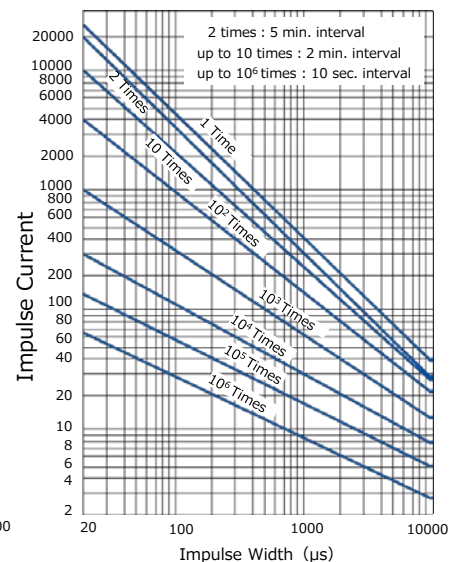
Series 32  
(ERZC32EK201(Y) to ERZC32EK271(Y))



Series 32  
(ERZC32EK361(Y) to ERZC32EK681(Y))



Series 32  
(ERZC32EK751(Y) to ERZC32EK112(Y))



## Performance Characteristics ( Type E )

| Characteristics                             |   | Test Methods/Description  | Specifications                                     |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
|---|---|---|--|----------------------|------------------|----------------------|--|--|---|------------|--------|---|--|--|---|------------|--------|--|
| Standard Test Condition                     |   | Electrical measurements (initial/after tests) shall be conducted at temperature of 5 to 35 °C, relative humidity of maximum 85 %.   | —  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Varistor Voltage                            |   | The voltage between two terminals with the specified measuring current $I_{mA}$ DC applied is called $V_C$ or $V_{CmA}$ . The measurement shall be made as fast as possible to avoid heat affection.  | To meet the specified value.                       |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Maximum Allowable Voltage                   |   | The maximum sinusoidal wave voltage (rms) or the maximum DC voltage that can be applied continuously.   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Clamping Voltage                            |   | The maximum voltage between two terminals with the specified standard impulse current (8/20 $\mu$ s).   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Rated Power                                 |   | The maximum power that can be applied within the specified ambient temperature.   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Maximum Energy                              |   | The maximum energy within the varistor voltage change of $\pm 10$ % when one impulse of 2 ms is applied.  |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Maximum Peak Current                        | 2 times   | The maximum current within the varistor voltage change of $\pm 10$ % with the standard impulse current (8/20 $\mu$ s) applied two times with an interval of 5 minutes.  |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
|   | 1 time  | The maximum current within the varistor voltage change of $\pm 10$ % with the standard impulse current (8/20 $\mu$ s) applied one time.   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Temperature Coefficient of Varistor Voltage |   | $\frac{V_C \text{ at } 70 \text{ }^\circ\text{C} - V_C \text{ at } 20 \text{ }^\circ\text{C}}{V_C \text{ at } 20 \text{ }^\circ\text{C}} \times \frac{1}{50} \times 100(\%/^\circ\text{C})$   | 0 to -0.05 %/ °C max.                              |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Impulse Life                                |   | The change of $V_C$ shall be measured after the impulse current listed below is applied 10000 times continuously with the interval of 10 seconds at room temperature.<br><table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Series 20</td> <td>200 A (8/20 <math>\mu</math>s)</td> </tr> <tr> <td>Series 32</td> <td>300 A (8/20 <math>\mu</math>s)</td> </tr> </table>   | Series 20  | 200 A (8/20 $\mu$ s) | Series 32        | 300 A (8/20 $\mu$ s) | $\Delta V_{1 \text{ mA}}/V_{1 \text{ mA}} \leq \pm 10\%$ |  |   |            |        |   |  |  |   |            |        |  |
| Series 20                                   | 200 A (8/20 $\mu$ s)  |   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Series 32                                   | 300 A (8/20 $\mu$ s)  |   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Withstanding Voltage (Body Insulation)      |   | The commercial frequency voltage of AC 2.5 kV shall be applied between terminals and the bottom of the unit for one minute.   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Mechanical                                  | Robustness of Terminations (Tensile)  | After gradually applying the load of 49 N (5 kgf) and keeping the unit fixed for 10 seconds in an axial direction, the terminal shall be visually examined for any damage.  | No remarkable damage                               |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
|   | Vibration   | After repeatedly applying a single harmonic vibration (amplitude: 0.75 mm): double amplitude: 1.5 mm with 1 minute vibration frequency cycles (10 Hz to 55 Hz to 10 Hz) to each of three perpendicular directions for 2 hours. Thereafter, the damage of the terminals is visually examined.  |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Environmental                               | Dry Heat/ High Temperature Storage  | The specimen shall be subjected to $110 \pm 3$ °C for 500 hours in a thermostatic bath without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of $V_C$ shall be measured.<br><table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-25 \begin{smallmatrix} 0 \\ -3 \end{smallmatrix}</math></td> <td><math>30 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}</math></td> </tr> <tr> <td>2</td> <td>Room Temp.</td> <td>3 max.</td> </tr> <tr> <td>3</td> <td><math>85 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}</math></td> <td><math>30 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}</math></td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>3 max.</td> </tr> </tbody> </table> | Step   | Temperature (°C)     | Period (minutes) | 1                    | $-25 \begin{smallmatrix} 0 \\ -3 \end{smallmatrix}$      | $30 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$ | 2 | Room Temp. | 3 max. | 3 | $85 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$ | $30 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$ | 4 | Room Temp. | 3 max. | $\Delta V_{1 \text{ mA}}/V_{1 \text{ mA}} \leq \pm 5 \%$ |
|   | Step  | Temperature (°C)  | Period (minutes)                                   |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
|   | 1   | $-25 \begin{smallmatrix} 0 \\ -3 \end{smallmatrix}$   | $30 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$ |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
|   | 2   | Room Temp.  | 3 max.   |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
|   | 3   | $85 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$  | $30 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$ |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| 4   | Room Temp.  | 3 max.  |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Temperature Cycle                           | The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for one to two hours. The change of $V_C$ and mechanical damage shall be examined.                                    | $\Delta V_{1 \text{ mA}}/V_{1 \text{ mA}} \leq \pm 5 \%$  |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Dry Heat Load/ High Temperature Load        | After being continuously applied the Maximum Allowable Voltage at $85 \pm 5$ °C for 500 hours, the specimen shall be stored at room temperature and humidity for one to two hours. Thereafter, the change of $V_C$ shall be measured. | $\Delta V_{1 \text{ mA}}/V_{1 \text{ mA}} \leq \pm 10 \%$   |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |
| Damp Heat/Humidity (Steady State)           | The specimen shall be subjected to $40 \pm 2$ °C, 90 to 95 %RH for 1000 hours without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of $V_C$ shall be measured.                  | $\Delta V_{1 \text{ mA}}/V_{1 \text{ mA}} \leq \pm 5 \%$  |  |                      |                  |                      |  |  |   |            |        |   |  |  |   |            |        |  |

**Guidelines and precautions regarding the technical information and use of our products described in this online catalog.**

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

**<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>**

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

**We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.**

## Varistors (ZNR Surge Absorber) Type E, CK, SC

## Handling Precautions

**! Safety Precautions**

In case that a Varistors (ZNR Surge Absorber) (hereafter referred to as the ZNR, or product name) is used, if an abnormality takes place because of peripheral conditions of the ZNR(material, environments, power source conditions, circuit conditions, etc. in equipment design), fire, electric shock, burn, or product failure may occur. The precautions for this product are described below, understand the content thoroughly before usage. For more questions, contact us.

If there's any uncertainty/doubt/products safety items, please contact us. When a dogma shall be occurred about safety for this products, be sure to inform us rapidly, operate your technical examination.

**1. ! Operating Conditions precautions to be strictly observed****1.1 Confirmation of performance ratings**

Use the ZNR within its rated range of performance such as the Max. allowable voltage, withstanding surge current, withstanding energy, impulse life(surge life), average pulse power, and operating temperature range. If used outside the range, the ZNR can be degrade and have element fracture, which may result in smoking and ignition.

**1.2 To avoid accidents due to unexpected phenomena, take the following measures**

## 1) Across-the-line use

When the ZNR is used across a line, put a current fuse in series with the ZNR (Refer to Table 1).

## 2) Use between line to ground

(1) If the case that the ZNR is used between a line to the ground, the short-circuit of the ZNR may not blow the current fuse because of grounding resistance, which may cause smoking and ignition of the ZNR's exterior resin.

As the measure against it, install an earth leakage breaker on the power supply side of the ZNR position. If no earth leakage breaker is installed, use a thermal fuse together with a current fuse in series. (Refer to Table 1.)

(2) If the case that the ZNR is used between a live part to metal case, an electric shock may develop at a shortcircuit of the ZNR ; hence, ground the metal case to the ground or keep it from the human body.

## 3) In the event of fracture of the ZNR, its pieces may scatter ; hence, put the case or cover of the set product in place.

## 4) Do not install the ZNR near combustible substances(polyvinyl chloride wires, resin moldings, etc.).

If it is difficult to do, install a nonflammable cover.

**1.3 The live part shall be equipped with a protective cover for preventing electric shock.****1.4 If ZNR is shorted out and happen smoke or ignition, please cut provided current to ZNR immediately.**

## ● Recommendation fuse

| Series                             | ERZC20EK□□□       | ERZC32EK□□□        | ERZVS34C□□□        | ERZC40CK□□□        |
|------------------------------------|-------------------|--------------------|--------------------|--------------------|
| Current Fuse<br>( Line - Line )    | 10 A max.         | 20 A max.          | 20 A max.          | 20 A max.          |
| Thermal. Fuse<br>( Line - Ground ) | 100 to 120 °C 5 A | 100 to 120 °C 10 A | 100 to 120 °C 10 A | 100 to 120 °C 10 A |

◆ Fuses shall use rated voltages appropriate for circuits.

◆ Finally, confirm that the secondary disaster does not occur even if the ZNR mounted on equipment breaks.

◆ Set a thermal fuse to get high thermal conductivity with ZNR.

**2. Application notes****2.1 Pay attention to the following items to avoid the shortened life and failure of the ZNR**

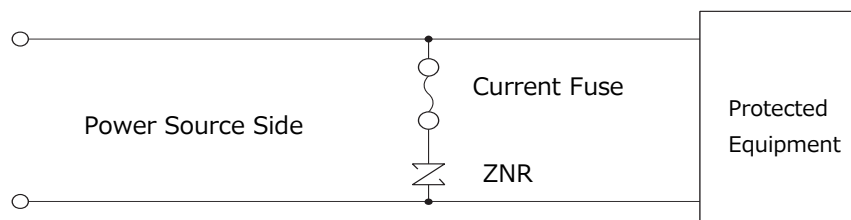
## 1) Circuit conditions

(1) Select a ZNR of which the maximum voltage including fluctuations in source voltage allows for the



- (2) In cases that surges are intermittently applied at short intervals (for example, in the case that the voltage of the noise simulator test is impressed), do not cause them to exceed the ZNR's rated pulse power.
- (3) Select a ZNR recommended in Table 1.
- ① Across-the-Line Use  
Because the primary line voltage temporarily rises due to load unbalance of separately wired loads, short circuit between the live line and the neutral line or LC resonance at switching for a capacitate load, ZNR with \* are recommended for AC100V or AC120V applications.
- ② Line to ground Use  
 • When DC500V insulation resistance test of the circuits employing ZNR is conducted, the ZNR shall be removed after getting approval from the customer, or the ZNR \*\* with the Maximum Allowable voltage exceeding to the test voltage shall be applied.  
 • When AC1000V dielectric with standing test is conducted, ZNR shall be removed after getting approval from the customer according to the relevant regulations, or the ZNR \*\*\* with the Maximum Allowable voltage exceeding to the test voltage shall be applied.
- 2) Operating environments
- (1) The ZNR is designed and manufactured for application in general purpose electronic devices.  
The ZNR shall not be exposed to the weather, except for usage inside unit.
- (2) Do not use the ZNR in places exposed to temperatures beyond the operating temperature range, such as places exposed to sunlight and vicinities of heating equipment.
- (3) Do not use the ZNR in places exposed to high temperatures and high humidity, such as places exposed directly to rain, wind, dew condensation, and vapor.
- (4) Do not use the ZNR in dusty and salinity environment and atmospheres polluted by corrosive gases, in liquids such as water, oil, chemical, organic solvent.
- 3) Processing conditions
- (1) Do not wash the ZNR by such solvents(thinner, acetone, etc.) as its exterior resin deteriorates.
- (2) Do not apply a strong vibration or shock (by falling, etc.) to the ZNR, cracking to its exterior resin and element may occur.
- (3) When coating the ZNR with resin(including molding), do not use such resin.
- (4) Do not bend the ZNR lead wires at the position close to its ZNR exterior resin, or apply external force to the position.
- (5) When soldering the ZNR lead wires, follow the recommended condition and do not melt the solder and insulating materials constituting the ZNR.
- (6) Keep the wiring of the ZNR as short and straight as possible.
- 4) Long-term storage
- (1) Do not store the ZNR under high temperature and high humidity. Store it indoor environment at a temperature up to 40 °C and at humidity below 75 %RH, and use it within two years.  
Before using the ZNR that has been stored for a long period(two years or longer), confirm the solderability.
- (2) Avoid atmospheres full of corrosive gases (hydrogen sulfide, sulfurous acid, chlorine, ammonia, etc.).
- (3) Avoid direct sunlight and dew condensation.

**2.2 The recommended fuse position is shown in Table.1, "Example of ZNR application", however, if the load current of protected equipment is larger than that of the above recommended fuse rated current, install a current fuse at the position shown below.**



### 3. Notices

- 3.1 In cases that the ZNR is used in equipment (aerospace equipment, medical equipment, etc.) requiring extremely high reliability, ask us for selection of part No., and protection coordination, etc. in advance.
- 3.2 There is possibility that the ZNR will unexpectedly smoke or ignite because of abnormal rise of the circuit voltage and invasion of excessive surge. To prevent that accident from spreading over the equipment and not to expand the damage, use multiplex protection such as the adoption of flame-retardant materials for housing parts and structural parts.
- 3.3. We don't bear any responsibility for product malfunction or abnormal conditions which caused by using beyond the descriptions in this product specification.
- 3.4 Package marking includes the product number, quantity, and country of origin. As a rule, country of origin should be indicated in English.

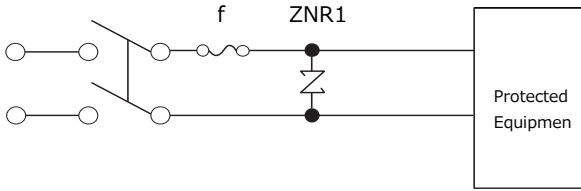
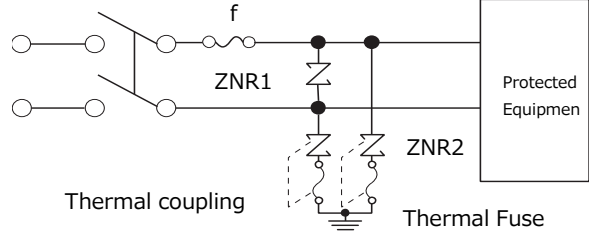
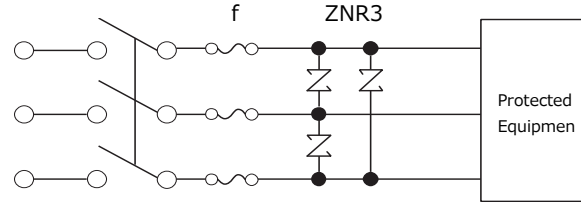
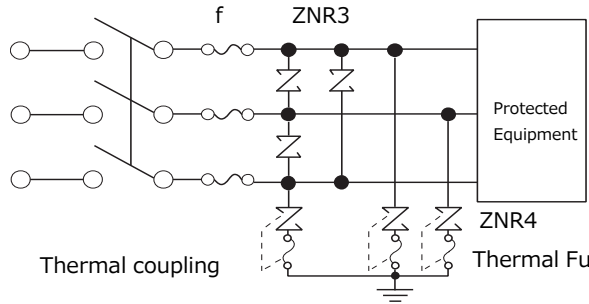
### 4. Applicable laws and regulations , others

- 4.1 This product not been manufactured with any ozone depleting chemical controlled under the Montreal Protocol.
- 4.1 Specified brominated flame retardants (including PBB (polybromobiphenyl) and PBDE (polybromodiphenyl ether)) are not intentionally used in the components of this product.
- 4.3 This product comply with RoHS(Restriction of the use of certain Hazardous Substance in electrical and electronic equipment) (DIRECTIVE 2011/65/EU and 2015/863/EU).
- 4.4 All the materials used in this part are registered material under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substance.
- 4.5 If you need the notice by letter of "A preliminary judgement on the Laws of Japan foreign exchange and Foreign Trade Control", be sure to let us know.
- 4.6 These products are not dangerous goods on the transportation as identified by UN(United nations) numbers or UN classification.

### 5. Others

- 5.1 As to the disposal of ZNR, check the method of disposal in each country or origin where the ZNR are incorporated in your products to be used.
- 5.2 The technical information in this specification provides example of our products' typical operations and application circuit. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right or interest in our intellectual property.

Table 1 Example of ZNR application

|  | Across-the-Line/Line to Line Protection |                      |   | Line to Line and Line to Ground Protection |                      |                                      |                               |
|--|---|----------------------|---|--|----------------------|--------------------------------------|-------------------------------|
|  | <b>Connections example</b>              | DC/AC Single-phase   |   |  | DC/AC Single-phase   |                                      |                               |
|   |   |                      |   |  |                      |                                      |                               |
| f : fuse   |   |                      | f : fuse  |  |                      |                                      |                               |
| AC 3-phase   |   |                      | AC 3-phase  |  |                      |                                      |                               |
|  |   |                      |  |  |                      |                                      |                               |
| f : fuse   |   |                      | f : fuse  |  |                      |                                      |                               |
| <b>Selection Examples</b>  | Across the Line Use/Line to Line        |                      |   | Line to Ground Use                         |                      |                                      |                               |
|  | ZNR                                     | Nominal Line Voltage | Part Number of ZNR<br>Type E, CK, SC  | ZNR  | Nominal Line Voltage | Part Number of ZNR<br>Type E, CK, SC |                               |
|  | ZNR 1<br>ZNR 3                          | AC 100 V             | ERZC□□EK<br>ERZC□□CK<br>ERZVS34C  | 201<br>241<br>271                          | ZNR 2<br>ZNR 4       | AC 100 V<br>~ AC 220 V               | 471<br>511<br>821 and more ** |
|  |   | AC 120 V             |   | 241<br>271*                                |                      |                                      |                               |
|  | AC 200 V<br>~ AC 220 V                  |                      | 471   |  | AC 240 V             | 511<br>821 and more **               |                               |
|  | AC 240 V                                |                      | 511   |  |                      |                                      |                               |