

“ZNR” Transient/Surge Absorbers, Type D, Series V

“ZNR” Transient/Surge Absorbers, Type SMD, Series HF, VF

Handling Precautions

Safety Precautions

In case that a 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.

1. 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) In the event of fracture of the ZNR, its pieces may scatter ; hence, put the case or cover of the set product in place.
- 2) Do not install the ZNR near combustible substances(polyvinyl chloride wires, resin moldings, etc.). If it is difficult to do, install a nonflammable cover.
- 3) Across-the-line use
When the ZNR is used across a line, put a current fuse in series with the ZNR(Refer to Item 2.1.1). (4) and Table 1.
- 4) 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.

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 maximum permissible circuit voltage. (Refer to Table 1.)
- (2) In cases that surges are intermittently applied at short intervals(for example, in case that the voltage of the noise simulator test is implemented etc.), do not let them exceed the ZNR's rated power.
- (3) Select a ZNR recommended in Table 1.

<1> Across-the-line use

If possible, use a Part No. marked with * in case of voltage temporarily rises load unbalance of separately-wired loads, short between hot and neutral-line, open of neutral line in single-phase-three-wired system, and due to resonance at switching for a capacitive, inductive load.

<2> Used between line to ground

Use a different Part No. from “Across-the-line use” as table 1, because of raising voltage in case of “Line to Ground Fault”.

Use a Part No. marked with ** in table 1, in case of the insulation resistance test(500 VDC) for equipment. When using a Part of the varistor voltage that the insulation efficiency examination can not be cleared, there is a case where the surge absorber can be done by removing it from the circuit depending on the circuit condition(Refer examination of Japan Domestic Safety Regulations).

Use a Part No. marked with *** in table 1, in case of the withstanding voltage test(1000 VAC or 1200 VAC) for equipment.

(4) Concerning current fuse

<1> We recommend selecting a ZNR and the rated current of a current fuse as follows.

Finally, please be sure that there is no danger if the ZNR mounted on the equipment breaks.

● Type D, Series V

Standard Part No.	ERZV05D□□□	ERZV07D□□□	ERZV09D□□□	ERZV10D□□□	ERZV14D□□□	ERZV20D□□□
Fuse rated current	3 A max.	5 A max.	7 A max.	7 A max.	10 A max.	10 A max.

* Fuses shall use rated voltages appropriate for circuits.

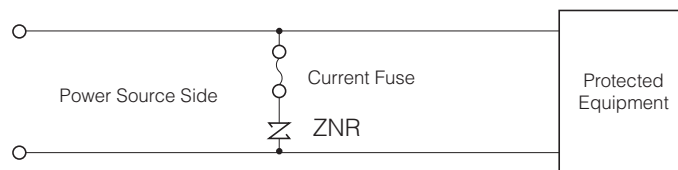
● Type SMD, Series VF

Standard Part No.	ERZVF□M□□□
Fuse rated current	5 A max.

* Fuses shall use rated voltages appropriate for circuits.

* Concerning HF series, please confirm adjusted to load dump surge and protection cooperation.

<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.



(5) Concerning thermal fuse

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

Table 1 Example of ZNR application

Connections example	Across-the-Line use		Use between Line to ground	
	DC/AC Single-phase		DC/AC Single-phase	
AC 3-phase		AC 3-phase		
Example of varistor voltage	ZNR	Source voltage	Nominal varistor voltage	
			Type D	SMD Mold Type
ZNR1 ZNR3	AC100 V	AC100 V	201 to 361*	201 to 361*
			241 to 431*	241 to 431*
	AC200 V	AC200 V	471 to 621*	471
			471 to 621*	471
	AC240 V	AC240 V	511, 621*	—
	AC380 V	AC380 V	821	—
ZNR2 ZNR4	AC100 V AC220 V	AC100 V AC220 V	471	471
			511	—
			621*	—
	AC230 V AC240 V	AC230 V AC240 V	821 and more**	—
			182***	—
			511	—
AC380 V	AC380 V	621*	—	
		821 and more**	—	
			182***	—
			112**	—
			182***	—

Note : Element size is selected by impulse Condition.

2) Operating environments

- (1) The ZNR is designed to be used indoors. Do not use it exposed outdoors.
- (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.

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 type D lead wires at the position close to its ZNR type D exterior resin, or apply external force to the position.
- (5) When soldering the ZNR lead wires, follow the recommended conditions and do not melt the solder and insulating materials constituting the ZNR.

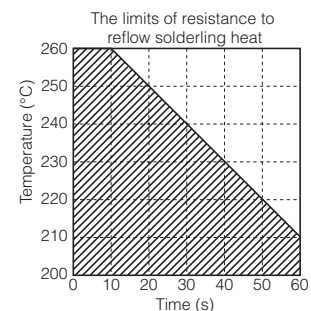
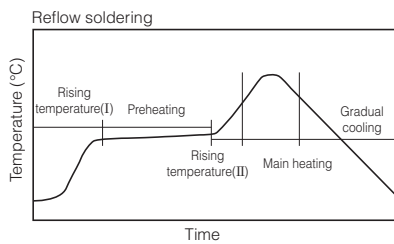
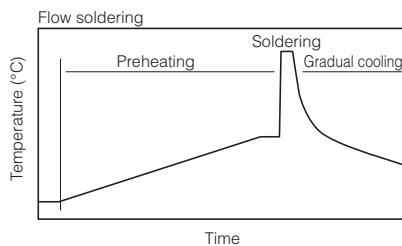
	Soldering Method	Recommended Condition	Attention Item
Type D	Flow soldering	260 °C, within 10 sec.	Type D is not Reflow soldering object part.
SMD Type	Flow soldering	260 °C, within 10 sec.	When the package density of the part is high pill out gas because the solderability sometimes becomes bad.
	Reflow soldering	Refer to Reflow soldering profile	When Land is too big compared with the size of the terminal surface of the part, be careful because the part sometimes upset when solder fuses.

*1 Soldering iron temperature should not exceed 400 °C and should not be applied for mor than 5 seconds.

*2 Profile be careful because there is a margin of error in the way of measuring.

*3 The temperature depend on the size and the package density of the substrate. Therefore, confirm every kind of the substrate.

● Soldering temperature-time profile to recommend



Preheating	The normal to 130 °C	max. 120s
Soldering	max. 260 °C	max. 10s
Gradual cooling	Gradual cooling	

Rising temperature I	The normal to preheating temperature	30 to 60 s
Preheating	150 to 180 °C	60 to 120 s
Rising temperature II	Preheating to 200 °C	2 to 6 °C/s
Main heating	(cf. The limit of resistance to reflow soldering heat)	
Gradual cooling	200 to 100 °C	1 to 4 °C/s

(Reflow soldering shall be within two times)

(6) Mounting (only for SMD Type)

In case of mounting ZNR on a Printed Circuit Board, be careful not to put excessive impact load, such as pressure from adsorption nozzle, and mechanical impact/stress of position-shifting or positioning. Also, we recommend you to fix a Printed Circuit Board to sheathing resin with an adhesive in case of position-shifting of ZNR when mounting.

4) Long-term storage

- (1) Do not store the ZNR under high temperature and high humidity. Store it 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.

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 a selection of Part No., and protection coordination, etc. in advance.
- 3.2 Note that we do not take any responsibility for faults and abnormalities resulting from the use not in conformity with the contents of entries in the delivery specification.
- 3.3 There is a possibility that the ZNR will unexpectedly cause smoke or ignite because of an 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 frame-retardant materials for housing parts and structural parts.