

## EPCOS Product Brief 2018

# Energy Varistors

## For the Protection of Power Distribution Systems

SIOV metal oxide varistors in the E series are designed to be used as active elements in gapless surge arresters for protection of medium and high voltage AC power utility distribution systems against overvoltages. Glass collar passivation makes this series suitable for a broad range of arrester designs such as porcelain housed arresters, or polymer housed arresters with a hollow insulator as well as for molded polymer arresters. The broad range of diameters supports the different class requirements according IEC and ANSI.

### Construction

- Glass passivated collar
- Aluminum termination for pressure contact

### Features

- Disk diameter of 32 to 99 mm
- Disk height up to 44 mm
- Stackable for higher voltage ratings
- Based on IEC 60099-4 and ANSI/IEEE C62.11
- Arrester blocks for distribution class
- Arrester blocks for station class



# Energy Varistors: Distribution Class



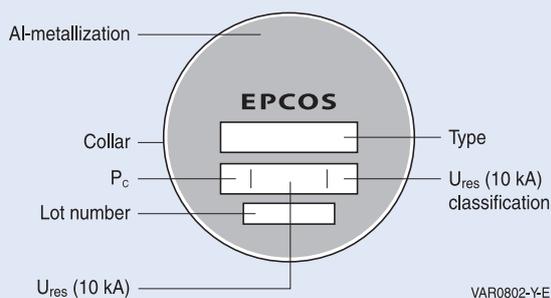
## Technical data



Type	E32NR302S	E32NR502S	E32NR602S	E36NR302E	E36NR502E	E36NR602E		
Ordering code	B72232 E0302R074	B72232 E0502R074	B72232 E0602R074	B72236 E0302R074	B72236 E0502R074	B72236 E0602R074	Unit	
<b>Dimensions</b>								
Diameter	Ø	32.0±1.0	32.0±1.0	32.0±1.0	36.6±1.0	36.6±1.0	36.6±1.0	mm
Height	h	17.7±0.6	29.6±0.6	39.5±0.6	18.5±0.6	30.8±0.6	37.0±0.6	mm
<b>Arrester classification</b>								
Suggested usage in gapless arrester constructions based on IEC 60099-4, Ed. 3	DM	DM	DM	DH	DH	DH	-	
Nominal discharge current	5	5	5	10	10	10	kA	
<b>Characteristics</b>								
Suggested rated voltage (max.)	$U_r$	3	5	6	3	5	6	kV
Continuous operating voltage (max.)	$U_c$	$U_{res}/3.25$	$U_{res}/3.25$	$U_{res}/3.25$	$U_{res}/3.25$	$U_{res}/3.25$	$U_{res}/3.25$	kV
Reference current	$I_{ref}$	1	1	1	2	2	2	mA
Reference voltage (min.)	$U_{ref}$	3	5	6	2.95	5	6	kV
Residual voltage at $I_n$	$U_{res}$	7.55 ... 8.55	12.55 ... 14.25	15.05 ... 17.05	7.55 ... 8.55	12.55 ... 14.15	15.05 ... 17.05	kV
Nominal discharge current (8/20 µs)	$I_n$	5	5	5	10	10	10	kA
High current impulse (4/10 µs) <sup>1)</sup>		2 x 65	2 x 65	2 x 65	2 x 100	2 x 100	2 x 100	kA
Repetitive charge transfer rating (8/20 µs)	$Q_{rs}$	0.2	0.2	0.2	0.4	0.4	0.4	C
Max. resistive power dissipation at $U_c$	$P_c$	0.18	0.39	0.46	0.27	0.45	0.54	W
Approx. weight/pcs.		80	130	175	110	180	215	g
Packing unit		50	25	25	20	20	20	pcs.

<sup>1)</sup> Secondary insulation required for E32/E36 types.

## Marking



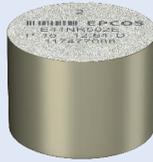
### Explanation example for type E36NR302E

$P_c$	Resistive power dissipation at maximum continuous operating voltage and 25 °C in $10^{-2}$ W e.g. $P_{09} = P_c = 9 \cdot 10^{-2}$ W = 0.09 W
$U_{res}(I_n)$	Measured residual voltage at nominal discharge current $I_n = 10$ kA in kV e.g. $7.62 = 7.62$ kV
$U_{res}(I_n)$ classification	Residual voltage is classified in 100 V steps and identified by a letter e.g. A

# Energy Varistors: Distribution Class



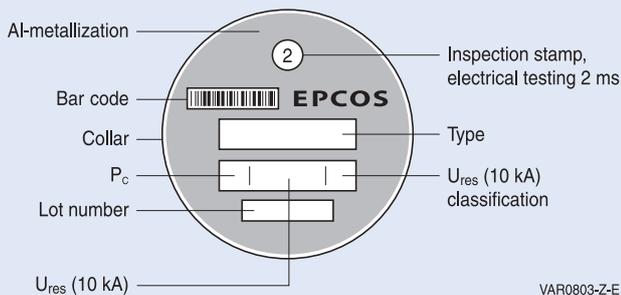
## Technical data



Type	E41NR302E		E41NR502E		E41NR602E		Unit
Ordering code	B72241E0302R074		B72241E0502R074		B72241E0602R074		
<b>Dimensions</b>							
Diameter	Ø	41.9±0.7	41.9±0.7	41.9±0.7	41.9±0.7		mm
Height	h	19.5±0.6	29.4±0.6	35.1±0.6	35.1±0.6		mm
<b>Arrester classification</b>							
Suggested usage in gapless arrester constructions based on IEC 60099-4, Ed. 3		DH	DH	DH	DH		–
Nominal discharge current		10	10	10	10		kA
<b>Characteristics</b>							
Suggested rated voltage (max.)	$U_r$	3	5	6	6		kV
Continuous operating voltage (max.)	$U_c$	$U_{res}/3.25$	$U_{res}/3.25$	$U_{res}/3.25$	$U_{res}/3.25$		kV
Reference current	$I_{ref}$	2	2	3	3		mA
Reference voltage (min.)	$U_{ref}$	3	5	6	6		kV
Residual voltage at $I_n$	$U_{res}$	7.35 ... 8.25	12.25 ... 13.75	14.65 ... 16.65	14.65 ... 16.65		kV
Nominal discharge current (8/20 µs)	$I_n$	10	10	10	10		kA
High current impulse (4/10 µs) <sup>1)</sup>		2 x 100	2 x 100	2 x 100	2 x 100		kA
Repetitive charge transfer rating (8/20 µs)	$Q_{rs}$	0.5	0.5	0.5	0.5		C
Max. resistive power dissipation at $U_c$	$P_c$	0.27	0.45	0.60	0.60		W
Approx. weight/pcs.		150	220	265	265		g
Packing unit		20	20	20	20		pcs.

<sup>1)</sup> Secondary insulation required for E41 types.

## Marking



### Explanation example for type E41NR302E

$P_c$	Resistive power dissipation at maximum continuous operating voltage and 25 °C in $10^{-2}$ W e.g. $P_{12} = P_c = 12 \cdot 10^{-2} \text{ W} = 0.12 \text{ W}$
$U_{res}$ ( $I_n$ )	Measured residual voltage at nominal discharge current $I_n = 10 \text{ kA}$ in kV e.g. $7.85 = 7.85 \text{ kV}$
$U_{res}$ ( $I_n$ ) classification	Residual voltage is classified in 100 V steps and identified by a letter e.g. A
Bar code format	One dimensional bar code 128, acc. to ISO/ IEC 15417:2000. Content of information: $U_{res}$ class

# Energy Varistors: Station Class

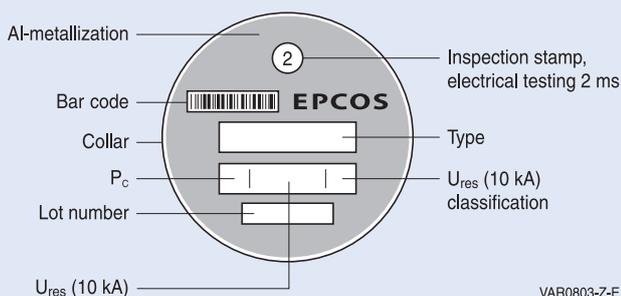


## Technical data



Type	E48NR113E	E48NR133E	E48NR153E	Unit	
Ordering code	B72248E0113S074	B72248E0133S074	B72248E0153S074		
<b>Dimensions</b>					
Diameter	Ø 48.0±1.0	48.0±1.0	48.0±1.0	mm	
Height	h 30.5±0.6	35.4±0.6	40.4±0.6	mm	
<b>Arrester classification</b>					
Suggested usage in gapless arrester constructions based on IEC 60099-4, Ed. 3	SL	SL	SL	-	
Nominal discharge current	10	10	10	kA	
<b>Characteristics</b>					
Suggested rated voltage (max.)	$U_r$	$0.385 \times U_{res}$	$0.385 \times U_{res}$	$0.385 \times U_{res}$	kV
Continuous operating voltage (max.)	$U_c$	$U_{res}/3.2$	$U_{res}/3.2$	$U_{res}/3.2$	kV
Reference current	$I_{ref}$	2	2	2	mA
Reference voltage (min.)	$U_{ref}$	$0.385 \times U_{res}$	$0.385 \times U_{res}$	$0.385 \times U_{res}$	kV
Residual voltage at $I_n$	$U_{res}$	10.65 ... 12.55	12.65 ... 14.25	14.05 ... 16.05	kV
Nominal discharge current (8/20 µs)	$I_n$	10	10	10	kA
High current impulse (4/10 µs)		2 x 100	2 x 100	2 x 100	kA
Repetitive charge transfer rating (2 ms)	$Q_{rs}$	1.2	1.2	1.2	C
Max. resistive power dissipation at $U_c$	$P_c$	0.26	0.30	0.34	W
Approx. weight/pcs.		305	350	400	g
Packing unit		12	12	12	pcs.

## Marking

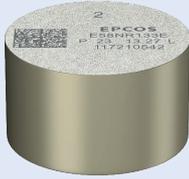


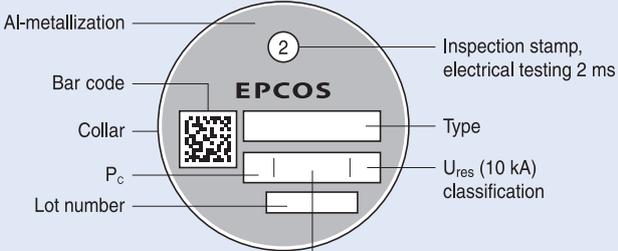
### Explanation example for type E48NR133E

$P_c$	Resistive power dissipation at maximum continuous operating voltage and 25 °C in $10^{-2}$ W e.g. $P_{20} = P_c = 20 \cdot 10^{-2} \text{ W} = 0.20 \text{ W}$
$U_{res}(I_n)$	Measured residual voltage at nominal discharge current $I_n = 10 \text{ kA}$ in kV e.g. $13.45 = 13.45 \text{ kV}$
$U_{res}(I_n)$ classification	Residual voltage is classified in 100 V steps and identified by a letter e.g. A
Bar code format	One dimensional bar code 128, acc. to ISO/ IEC 15417:2000. Content of information: $U_{res}$ class

# Energy Varistors: Station Class



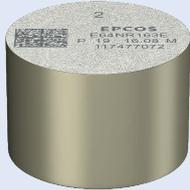
Technical data				
				
<b>Type</b>	<b>E58NR133E</b>		<b>E58NR163E</b>	
Ordering code	B72258E0133S074		B72258E0163S074	
<b>Dimensions</b>				
Diameter	Ø	59.7±1.0	59.7±1.0	mm
Height	h	35.4±0.6	44.0±0.6	mm
<b>Arrester classification</b>				
Suggested usage in gapless arrester constructions based on IEC 60099-4, Ed. 3	SM		SM	–
Nominal discharge current	10		10	kA
<b>Characteristics</b>				
Suggested rated voltage (max.)	$U_r$	$0.4 \times U_{res}$	$0.4 \times U_{res}$	kV
Continuous operating voltage (max.)	$U_c$	$U_{res}/3.0$	$U_{res}/3.0$	kV
Reference current	$I_{ref}$	3	3	mA
Reference voltage (min.)	$U_{ref}$	$0.4 \times U_{res}$	$0.4 \times U_{res}$	kV
Residual voltage at $I_n$	$U_{res}$	12.15 ... 13.75	15.15 ... 17.15	kV
Nominal discharge current (8/20 µs)	$I_n$	10	10	kA
High current impulse (4/10 µs)		2 x 100	2 x 100	kA
Repetitive charge transfer rating (2 ms)	$Q_{rs}$	2	2	C
Max. resistive power dissipation at $U_c$	$P_c$	0.4	0.5	W
Approx. weight/pcs.		545	675	g
Packing unit		8	8	pcs.

Marking	
	
<b>Explanation example for type E58NR133E</b>	
$P_c$	Resistive power dissipation at maximum continuous operating voltage and 25 °C in $10^{-2}$ W e.g. P 32 = $P_c = 32 \cdot 10^{-2}$ W = 0.32 W
$U_{res} (I_n)$	Measured residual voltage at nominal discharge current $I_n = 10$ kA in kV e.g. 15.65 = 15.65 kV
$U_{res} (I_n)$ classification	Residual voltage is classified in 100 V steps and identified by a letter e.g. A
Bar code format	Data Matrix 2D, acc. to ISO/ IEC 16022:2006. Content of information: Type, $U_{res}$ , $P_c$ , $U_{res}$ class, lot number, running number (1 ... 99999)

# Energy Varistors: Station Class



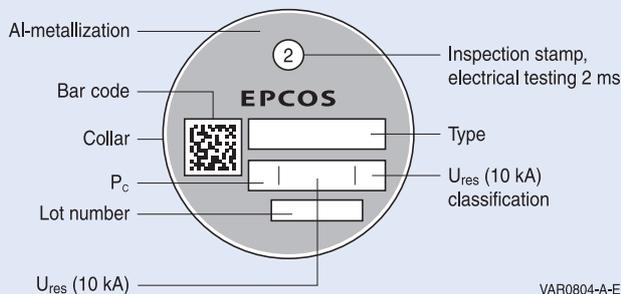
## Technical data



Type		E64NR133E	E64NR163E	E70NR133E	E78NR123E	E99NR702E	
Ordering code		B72264 E0133S074	B72264 E0163S074	B72270 E0133S074	B72278 E0123S074	B72299 E0702S074	Unit
<b>Dimensions</b>							
Diameter	Ø	64.5±0.7	64.5±0.7	70.0±1.0	78.0±1.0	99.0±1.0	mm
Height	h	35.4±0.6	44.0±0.6	35.4±0.6	35.4±0.6	21.4±0.6	mm
<b>Arrester classification</b>							
Suggested usage in gapless arrester constructions based on IEC 60099-4, Ed. 3		SH	SH	SH	SH	SH	–
Nominal discharge current <sup>1)</sup>		20	20	20	20	20	kA
<b>Characteristics</b>							
Suggested rated voltage (max.)	$U_r$	$0.425 \times U_{res}$	$0.425 \times U_{res}$	$0.425 \times U_{res}$	$0.431 \times U_{res}$	$0.45 \times U_{res}$	kV
Continuous operating voltage (max.)	$U_c$	$U_{res}/3.0$	$U_{res}/3.0$	$U_{res}/2.9$	$U_{res}/2.9$	$U_{res}/2.9$	kV
Reference current	$I_{ref}$	5	5	5	5	5	mA
Reference voltage (min.)	$U_{ref}$	$0.425 \times U_{res}$	$0.425 \times U_{res}$	$0.425 \times U_{res}$	$0.431 \times U_{res}$	$0.45 \times U_{res}$	kV
Residual voltage at 10 kA	$U_{res}$	12.15 ... 13.75	14.85 ... 16.95	11.85 ... 13.45	11.65 ... 13.25	6.85 ... 7.85	kV
Nominal discharge current (8/20 µs) <sup>1)</sup>	$I_n$	20	20	20	20	20	kA
High current impulse (4/10 µs) at 10 kA		2 x 100	2 x 100	2 x 100	2 x 100	2 x 100	kA
Repetitive charge transfer rating (2 ms)	$Q_{rs}$	2.4	2.4	2.8	3.6	6.0	C
Max. resistive power dissipation at $U_c$	$P_c$	0.45	0.56	0.50	0.60	0.65	W
Approx. weight/pcs.		635	790	750	930	905	g
Packing unit		8	8	5	5	8	pcs.

<sup>1)</sup>  $U_{res}$  measured at 10 kA.

## Marking



### Explanation example for type E99NR702E

$P_c$	Resistive power dissipation at maximum continuous operating voltage and 25 °C in $10^{-2}$ W e.g. $P_{45} = P_c = 45 \cdot 10^{-2} \text{ W} = 0.45 \text{ W}$
$U_{res} (I_n)$	Measured residual voltage at nominal discharge current $I = 10 \text{ kA}$ in kV e.g. 15.65 = 15.65 kV
$U_{res} (I_n)$ classification	Residual voltage is classified in 100 V steps and identified by a letter e.g. A
Bar code format	Data Matrix 2D, acc. to ISO/ IEC 16022:2006. Content of information: Type, $U_{res}$ , $P_c$ , $U_{res}$ class, lot number, running number (1 ... 99999)

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