



SIOV Metal Oxide Varistors

Energy varistors – block arresters

Series/Type: B722**E
Ordering code: B722**E0***R074
Date: Aug 2021
Version:

Applications

- Gapless arresters for distribution class medium and high

Features

- Wide operating voltage range
- High energy absorption capability
- High current impulse up to 100 kA
- Long-term stability

Construction

- Based on IEC 60099-4, Ed. 3

Delivery mode

- Bulk



Picture for reference only.

General technical data

Nominal discharge current 8/20 μ s	5.0 ... 10.0	kA
Suggested rated voltage (max)	3.0 ... 6.0	kV
Normal service temperature	-40 ... +40	$^{\circ}$ C
Response time	< 25	ns

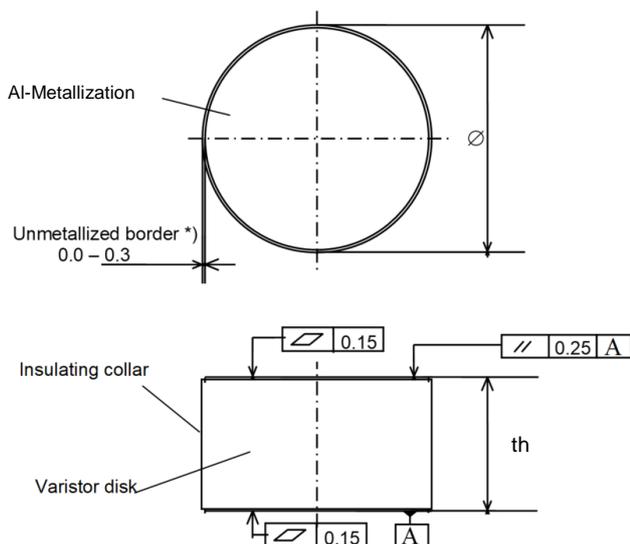
Electrical specification and ordering codes

The peak value of voltage that appears between the terminals of an arrester during the passage of discharge current is defined as residual voltage at nominal discharge current (8/20 μ s) or U_{res} according to IEC 60099-4 Edition 3.0 2014-06, Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems.

Ordering code	Type	Nominal discharge current 8/20 μ s	Suggested rated voltage max	Residual voltage at nominal discharge current 8/20 μ s or U_{res}	Continuous operating voltage (max)	Max. resistive power dissipation at continuous operating voltage (max)	Reference current	Reference voltage (min)	High impulse current 4/10 μ s	Repetitive charge transfer rating 8/20 μ s
		kA	kV	kV	kV	W	mA	kV	kA	C
B72232E0302R074	E32NR302S	5	3	7.55 ... 8.55	$U_{res} \div 3.25$	0.18	1	3	65	0.2
B72232E0502R074	E32NR502S	5	5	12.55 ... 14.25	$U_{res} \div 3.25$	0.39	1	5	65	0.2
B72232E0602R074	E32NR602S	5	6	15.05 ... 17.05	$U_{res} \div 3.25$	0.46	1	6	65	0.2
B72236E0302R074	E36NR302E	10	3	7.55 ... 8.55	$U_{res} \div 3.25$	0.27	2	3	100	0.4
B72236E0502R074	E36NR502E	10	5	12.55 ... 14.15	$U_{res} \div 3.25$	0.45	2	5	100	0.4
B72236E0602R074	E36NR602E	10	6	15.05 ... 17.05	$U_{res} \div 3.25$	0.54	2	6	100	0.4
B72241E0302R074	E41NR302E	10	3	7.35 ... 8.25	$U_{res} \div 3.25$	0.27	2	3	100	0.5
B72241E0502R074	E41NR502E	10	5	12.25 ... 13.75	$U_{res} \div 3.25$	0.45	2	5	100	0.5
B72241E0602R074	E41NR602E	10	6	14.65 ... 16.65	$U_{res} \div 3.25$	0.60	2	6	100	0.5

Dimensions, weight and packing units

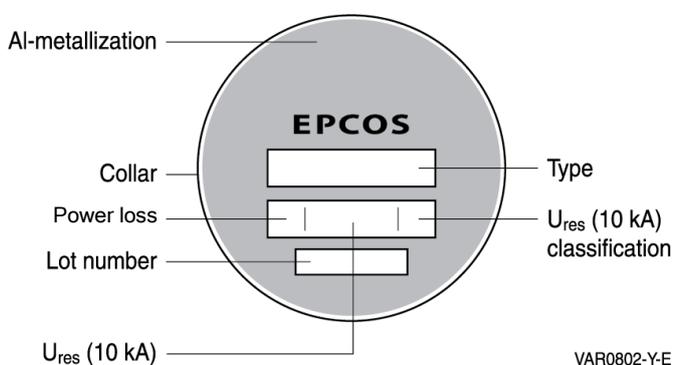
Ordering code	Type	Diameter Ø mm	Thickness th mm	Weight w g	Packing units pcs.
B72232E0302R074	E32NR302S	32.0 ±1.0	17.7 ±0.6	80	50
B72232E0502R074	E32NR502S	32.0 ±1.0	29.6 ±0.6	130	25
B72232E0602R074	E32NR602S	32.0 ±1.0	39.5 ±0.6	175	25
B72236E0302R074	E36NR302E	36.6 ±1.0	18.5 ±0.6	110	20
B72236E0502R074	E36NR502E	36.6 ±1.0	30.8 ±0.6	180	20
B72236E0602R074	E36NR602E	36.6 ±0.7	37.0 ±0.6	215	20
B72241E0302R074	E41NR302E	41.9 ±0.7	19.5 ±0.6	150	20
B72241E0502R074	E41NR502E	41.9 ±1.0	29.4 ±0.6	220	20
B72241E0602R074	E41NR602E	41.9 ±1.0	35.1 ±0.6	265	20

Dimensional drawings in mm


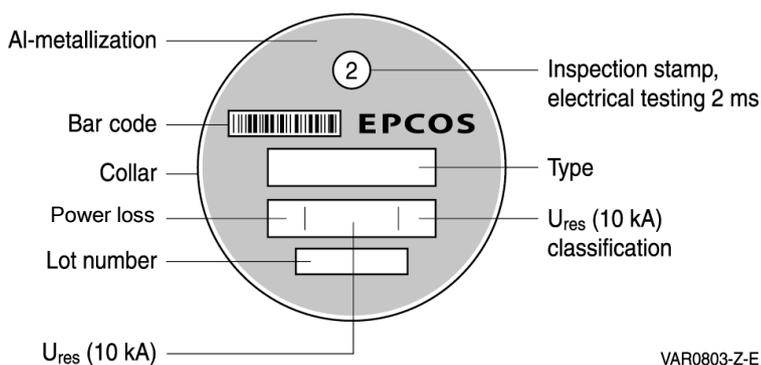
Diameter Ø	32.0 ... 41.9 ±0.7 mm
Thickness th	17.7 ... 35.1 ±0.6 mm
Al-Metallization	Al - electrodes
Unmetallized border	0.0 ... 0.3 mm
Flatness	0.15 mm
Parallelism	0.25 mm

Marking

- “2” stamp – not mandatory
- Product brand
- Type name
- Power dissipation
- Residual voltage
- Barcode for E41 series
- Lot number

E32 and E36 series marking layout


Power loss	Resistive power dissipation at max continuous operating voltage and 25 °C in 10^{-2} W. i.e.: P 22 ... Power loss = $22 \cdot 10^{-2}$ W = 0.22 W
U_{res} (10 kA)	Residual voltage at nominal discharge current 8/20 μ s in kV. i.e.: 16.15 = 16.15 kV
U_{res} (10 kA) classification	Residual voltage is classified in 100 V steps and identified by a letter. Only for E41 series. i.e.: A
Bar code	One dimensional bar code 128 acc. ISO/IEC 15417: 2000 for E41 series. E32 and E36 series has no bar code. Content of information: type, U_{res} , P_{cov} , U_{res} class, lot number (as above), running number (1 ... 99999)

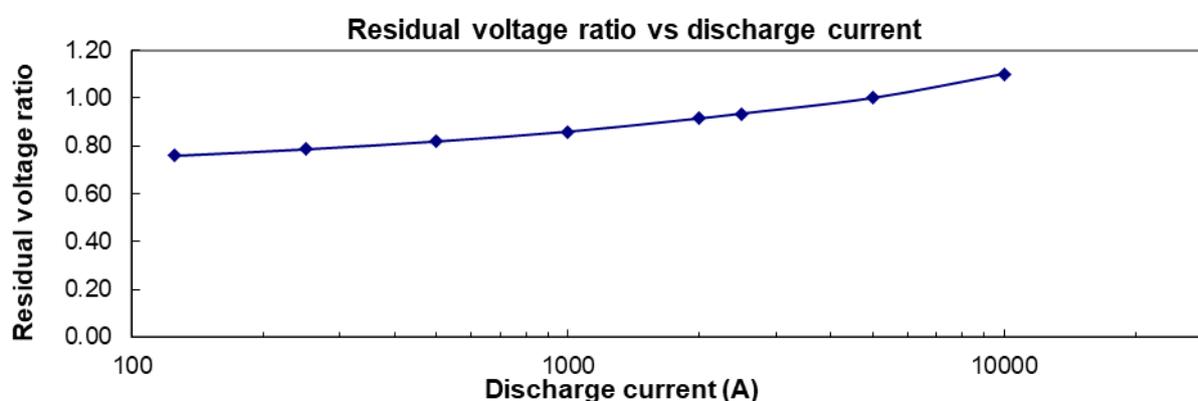
E41 series marking layout


Reliability data

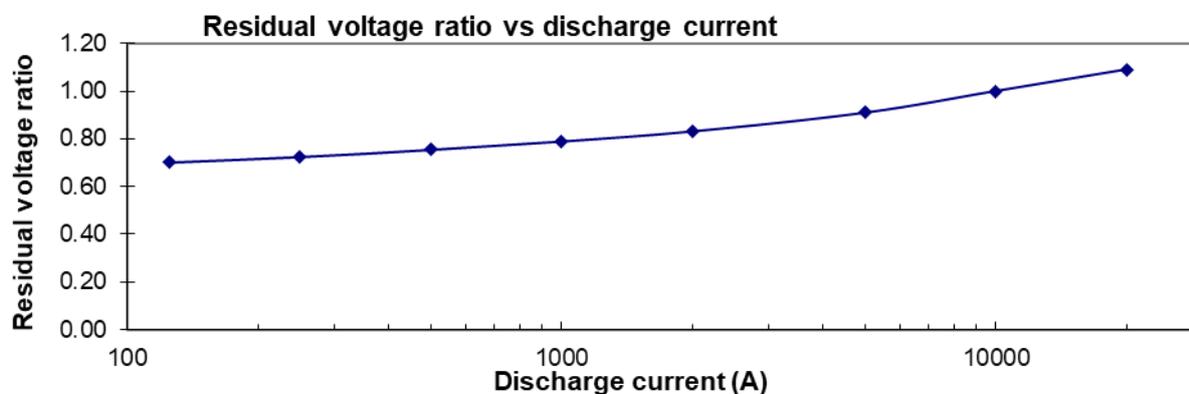
Test	Standard	Test conditions	Sample size	Requirements
Residual voltage at nominal discharge current (8/20 μ s)	IEC 60099-4, Ed. 3	Peak value of voltage that appears during the passage of nominal discharge current (8/20 μ s).	100%	To meet the specified value
Reference voltage (min)	IEC 60099-4, Ed. 3	Peak value of power-frequency voltage divided by $\sqrt{2}$, when the reference current is applied.	6 pcs	To meet the specified value
Repetitive charge transfer test	IEC 60099-4, Ed. 3	Wave shape of impulse: 8/20 μ s Test value: refer to data sheet Groups of impulses: 10 Number of impulses / group: 2 Impulse interval: 50 ... 60 s Group interval: cooling down to ambient temperature	5, 10, 20 parts/lot	Admissible number of rejects: 0/5, 1/10, 2/20 No flashover, puncture, crack Change of reference voltage (min) within 5%
Accelerated ageing type release	IEC 60099-4, Ed. 3	Temperature: 115 \pm 4 $^{\circ}$ C Surrounding medium: N ₂ Test voltage: continuous operating voltage (max) Frequency: 50 Hz Time: >1000 h	≥ 3	$P_{end} \leq 1.1 \cdot P_{start}$
Accelerated ageing lot release	IEC 60099-4, Ed. 3	Temperature: 115 \pm 4 $^{\circ}$ C Surrounding medium: N ₂ Test voltage: continuous operating voltage (max) Frequency: 50 Hz Time: 200 h	2	Decreasing resistive power dissipation
High current impulse test	IEC 60099-4, Ed. 3	Wave shape of impulse: 4/10 μ s Test value: refer to data sheet 2 impulses, cool down to ambient temperature between impulses	2	No indication of flashover, puncture, crack
Pull-off strength of metallization	-		8 pcs/lot	≥ 3 N/mm ²
Dimensions	-		10 pcs/lot	To meet the specified value

V/I characteristics
E32 series

Impulse	Steep current	Switching impulse residual voltage ratio					Lightning impulse residual voltage ratio		
		125 A	250 A	500 A	1 kA	2 kA	5 kA	10 kA	20 kA
I	10 kA	125 A	250 A	500 A	1 kA	2 kA	5 kA	10 kA	20 kA
typ	-	0.759	0.786	0.819	0.86	0.915	0.935	1	1.1
max	1.15	0.781	-	0.844	-	-	0.95	1	1.13
min	-	0.697	-	0.752	-	-	-	-	-

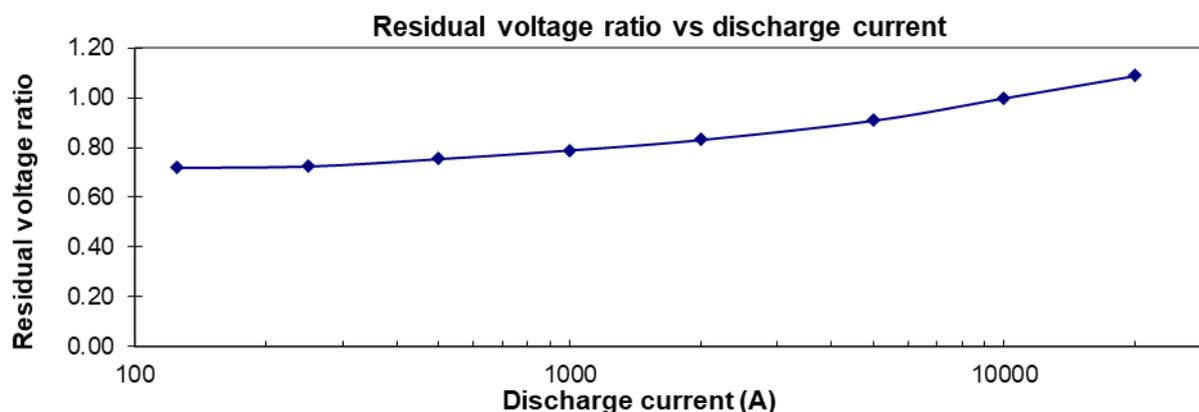

E36 series

	Steep current	Switching impulse residual voltage ratio					Lightning impulse residual voltage ratio		
		125 A	250 A	500 A	1 kA	2 kA	5 kA	10 kA	20 kA
	10 kA	125 A	250 A	500 A	1 kA	2 kA	5 kA	10 kA	20 kA
typ	-	0.702	0.725	0.755	0.790	0.832	0.91	1	1.09
max	1.15	-	-	-	-	-	0.94	-	1.15
min	-	0.66	-	0.71	-	-	-	-	-



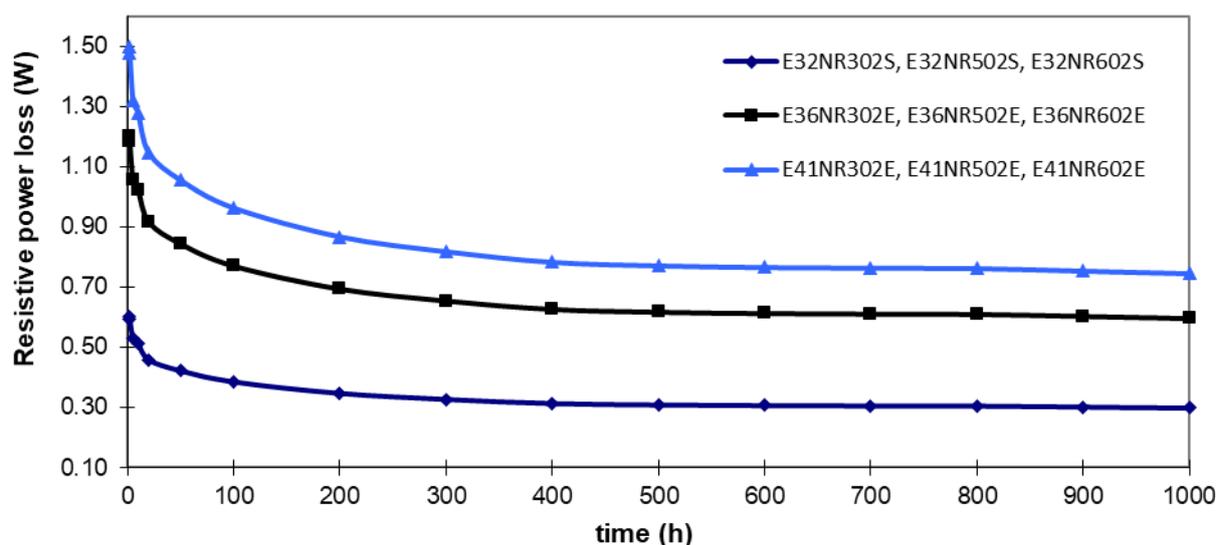
E41 series

Impulse	Steep current	Switching impulse residual voltage ratio					Lightning impulse residual voltage ratio		
		125 A	250 A	500 A	1 kA	2 kA	10 kA	20 kA	40 kA
I	20 kA	125 A	250 A	500 A	1 kA	2 kA	10 kA	20 kA	40 kA
typ	-	0.702	0.725	0.755	0.790	0.832	0.91	1	1.09
max	1.15	-	-	-	-	-	0.94	-	1.15
min	-	0.66	-	0.71	-	-	-	-	-



Accelerated aging test for E32, E36 and E41 series

Accelerated aging tests



Symbols and terms

Nominal discharge current (8/20 μ s)

Peak value of lightning current impulse.

Suggested rated voltage (max)

Maximum permissible 10 s power frequency root mean square overvoltage that can be applied between the arrester. Suggested rated voltage is used as a reference parameter for the specification of operating characteristics.

Residual voltage at nominal discharge current (8/20 μ s)

Peak value of voltage that appears between the terminals of an arrester during the passage of discharge current.

Continuous operating voltage (max)

Designated permissible root mean square value of power-frequency voltage that may be applied continuously between the arrester terminals in accordance with thermal equivalency between complete arrester and arrester section.

Power loss

Resistive power dissipation at continuous operating voltage (max).

Reference current

Peak value the resistive component of a power-frequency current used to determine the reference voltage of the arrester.

Reference voltage (min)

Peak value of power-frequency voltage divided by $\sqrt{2}$, which is obtained when the reference current flows through the arrester.

High impulse current of an arrester 4/10 μ s

Peak value of discharge current having a 4/10 impulse shape which is used to test the stability of the arrester on direct lightning strokes.

Repetitive charge transfer rating (8/20 μ s)

Maximum specified charge transfer capability of an arrester, in the form of a single event or group of surges that may be transferred through an arrester without causing mechanical failure or unacceptable electrical degradation to the metal oxide resistors.

Terms and definitions extracted from IEC 60099-4 Edition 3.0 2014-06, Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems.

Cautions and warnings

General

- Metal oxide varistors SIOVs from TDK are designed for specific applications and should not be used for purposes not identified in our specifications, application notes and data sheets unless otherwise agreed with TDK during the design-in-phase.
- Ensure suitability of SIOVs through reliability testing during the design-in phase. The SIOVs should be evaluated taking into consideration worst-case conditions.
- For applications of SIOVs in line-to ground circuits based on various international and local standards there are restrictions existing or additional safety measures required.

Storage

- Store SIOVs only in original packaging. Do not open the package before storage.
- Storage conditions in original packaging.
- Storage temperature: -25 °C ... +45 °C
- Relative humidity: <75% annual average, <95% on maximum 30 days a year.
- Dew precipitation: Is to be avoided.
- Avoid contamination of SIOVs surface during storage, handling and processing.
- Avoid storage of SIOVs in harmful environments which can affect the function during long-term operation examples given under operation precautions.

Handling

- SIOVs must not be dropped.
- Components must not be touched with bare hands. Gloves are recommended.
- Avoid contamination of the surface of SIOV electrodes during handling, be careful of the sharp edge of SIOV electrodes.

Mounting

- Potting, sealing or adhesive compounds can produce chemical reactions in the SIOV ceramic that will degrade the component's electrical characteristics.
- Overloading SIOVs may result in ruptured packages and expulsion of hot materials. For this reason the SIOVs should be physically shielded from adjacent components.

Operation

- Use SIOVs only within the specified temperature operating range.
- Use SIOVs only within the specified voltage and current ranges.
- Environmental conditions must not harm the SIOVs. Use SIOVs only in normal atmospheric conditions. Avoid use in the presence of deoxidizing gases chlorinegas, hydrogen sulfidegas, ammoniagas, sulfuricacidgas,etc., corrosive agents, humid or salty conditions. Avoid contact with any liquids and solvents.

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The ordering code for one and the same product can be represented differently in data sheets, data books, other **codes are due to different processes employed and do not affect the specifications of the respective products**. Detailed information can be found on the Internet under www.tdk-electronics.tdk.com/orderingcodes.

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The following applies to all products named in this publication:

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2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
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Important notes

8. The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, ExoCore, FilterCap, FormFit, LeaXield, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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