

Varistors (MOVs) with disconnection system



VARSI - solution provider with a personal touch

How it started?

The beginnings of the company date back to the early seventies – the company used to be a part of the former world-wide known ISKRA Group - TOZD Keramika in DO ISKRA IEZE Ljubljana, reputed producer of technical and high frequency ceramics.

General company data and its strategy

Varsi, d.o.o. decided to carry on with the program of varistors, couplings and temperature probes, which had been a part of the production program also in the former Iskra TOZD Keramika since 1983. Varsi, d.o.o. therefore continues the tradition and on the base of its own knowledge and research upgrades the past experiences in the production of high technology ceramics.

The company has dedicated itself to total customer satisfaction. Market research - product development - purchase - production - testing & control - sales - environmental protection - these are all the activities incorporated into the company managing.

Varsi, d.o.o. strives for perfection in all levels of its activity. The company is present in all major world markets, daily facing the strong competition. It is therefore important to offer high quality products at reasonable costs.

The company has been successful, because:

- It has been able to satisfy and respect customers' expectations and requirements
- It has been balancing the internal costs properly in correlation with the care for good realization of processes
- It has been able to evaluate its efficiency
- It constantly monitors its performance and eliminates the reasons for any possible mistakes
- It creates sufficient new value (added value)
- It takes care for qualifications of the employees, stressing the importance of each single employee being a relevant part of the chain
- It confirms its accomplishments by international standards: UL (3rd Edition), ISO 9001:2000 (process adopted already to the new standard ISO 9001:2008), RoHS Certificate, REACH Compliance.

Company research and development activities

VARSI, d.o.o. works on the base of its own knowledge and research. Its R&D activity is regulated within the company R&D Department.

In May 1999 Varsi, d.o.o. established its own, independent research & development group named ISVAR all with the purpose to upgrade the link between the existing production and research spheres. The research group ISVAR was registered at Slovenian Research Agency (ARRS), Reg. No. 6464-001.

The activity well generates the link between the basic and application research, which enables the optimization of the single technological parameters in the varistor manufacturing process.

The group works closely together with the Institute Jožef Stefan, Technological Centre SEMTO, National Institute of Chemistry, all located in Ljubljana, Slovenia, Laboratory Centre Iskraemeco, Kranj, Slovenia, University Paul Sabatier, Toulouse, France, and with other research centres worldwide.

Why varsi?

- top quality products
- custom tailored solutions
- flexibility
- fast response time
- attractive lead times
- challenging prices
- short design-in period (from samples to the serial production)
- top skilled engineering & application specialists
- manufacturing facility in Europe

***We're small, but not fragile,
we're flexible and simple, but highly skilled and experienced,
we offer fast and efficient customer service with a personal touch.
Choosing Varsi means being one step ahead of the general development.
Together we're winners! Give us a chance!***



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Wind turbines convert wind energy to electrical energy for distribution and represent an important alternative source of energy. Today more than 120 GW (gigawatts) of wind-powered generators are installed worldwide, which represents about 1,5% of worldwide electricity use. While smaller wind turbines being used to provide electricity to isolated locations, the large scale wind farms are typically connected to the local electric power transmission networks. It means that any fault in wind turbines can reflect to the power transmission system and vice versa.

Due to the increased numbers of wind turbines in exploitation more and more information about damages due to the lightning strikes is available. It becomes clearly evident that surge protection is an important fact and shall be carefully investigated and respected during design and construction of wind turbines.

A simplified configuration of a typical wind turbine and lightning protection zones (LPZ) are presented in the *Figure 1*.

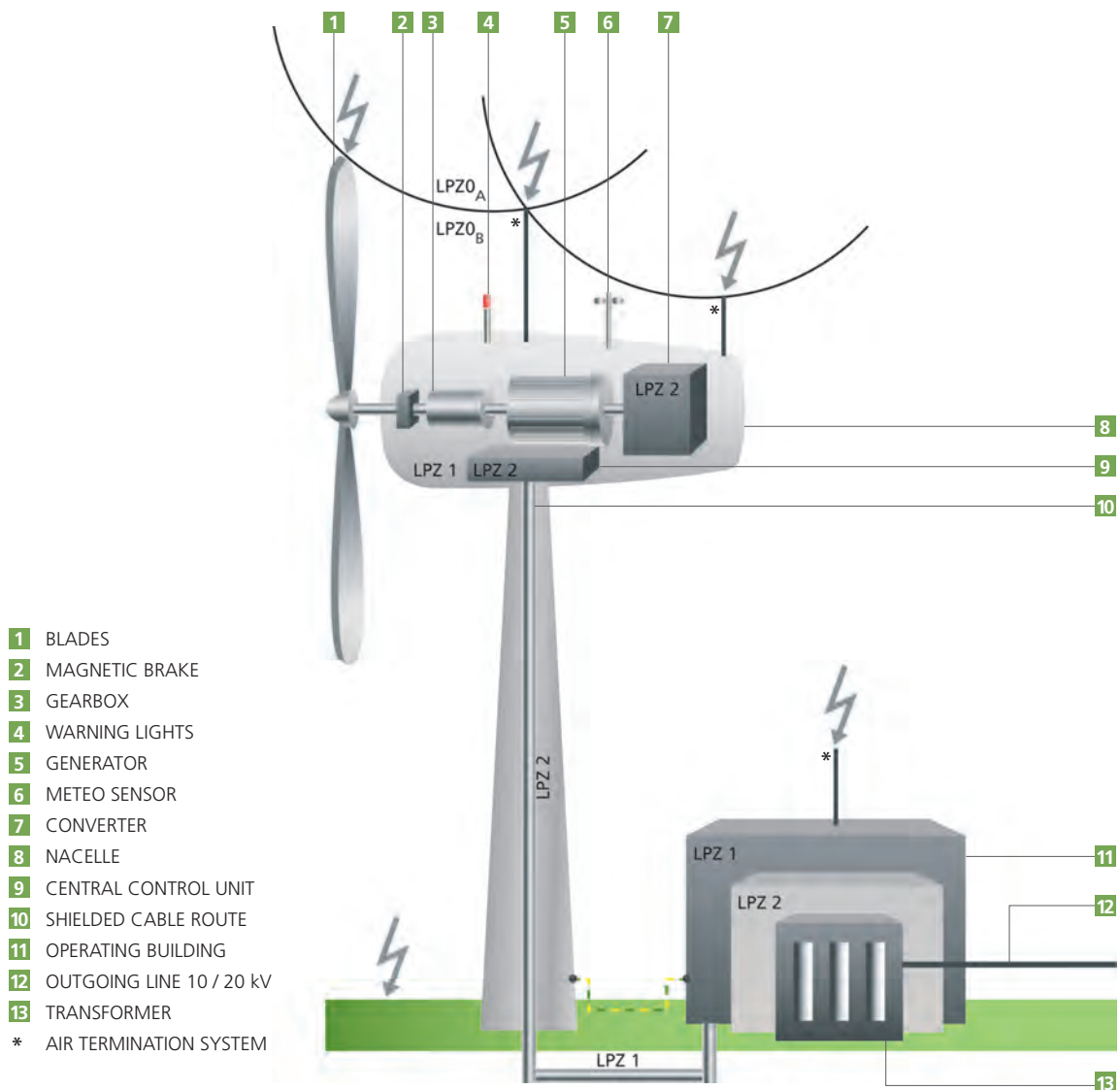


Figure 1 | Simplified configuration of a typical wind turbine

Equipment to be protected

The main electrical equipment that should be protected in a wind turbine is the following:

- Generator (DFIG - doubly fed induction generator is most common)
- Frequency converter (consists of AC/DC and DC/AC inverters)
- Motor drives (yaw motion, pitch motion, ...)
- Wind turbine control panel
- LV side of transformer including LV switchgear
- Auxiliary circuits (meteo sensors, warning lights, ...)

The basic concept of protected equipment with MOVs Type 1 and Type 2 is presented in the *Figure 2*

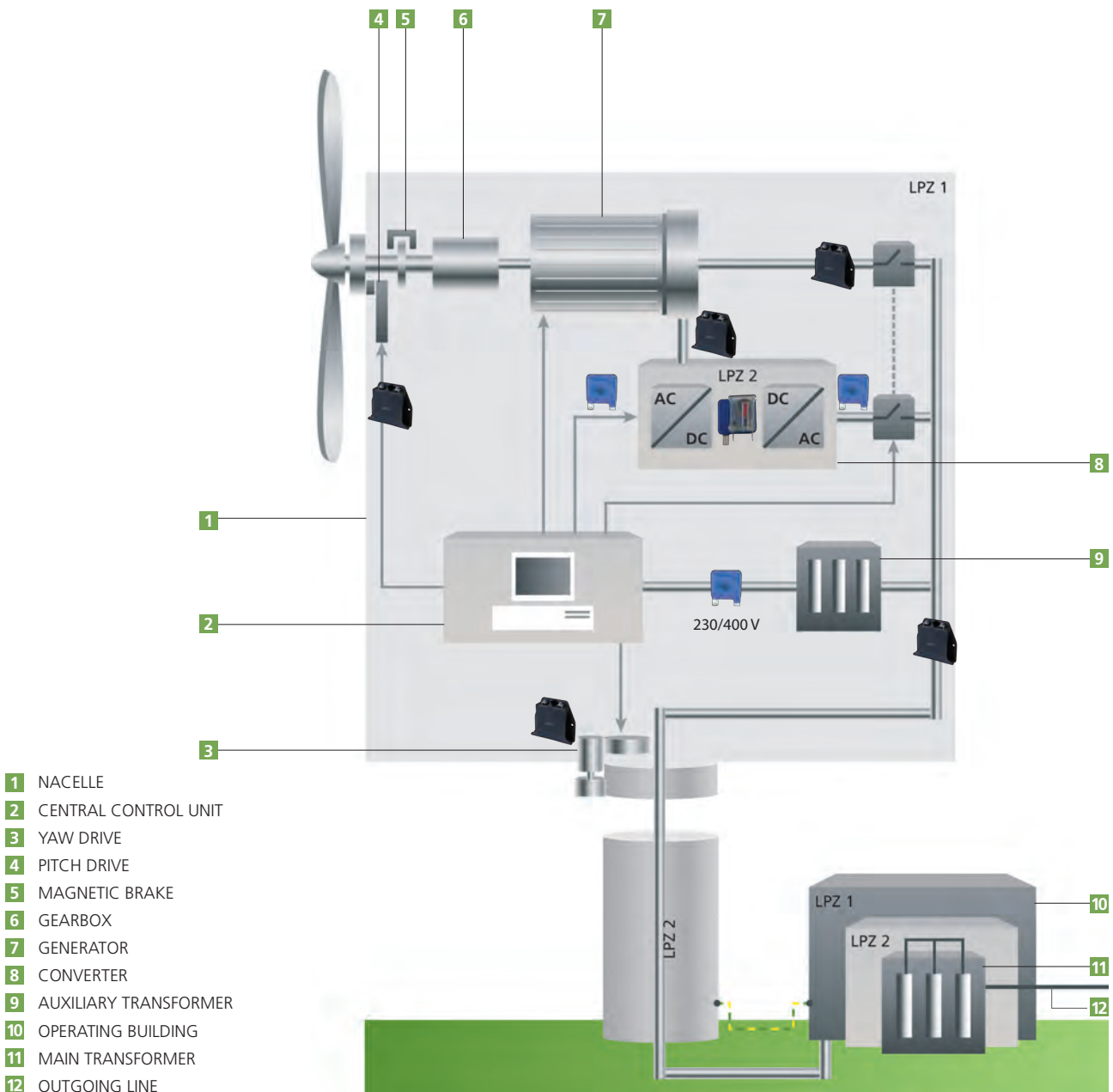


Figure 2 | Concept of equipment protection in wind turbines according to LPZ (IEC 62305-1)

Selection of appropriate MOVs according to the proposed connection

1. Typical values of the impulse current I_{imp} for Type 1 varistors

	I_{imp} [kA]; (10/350 μ s)	Location (LPZ 0 - LPZ 1) ¹	Equipment
Type 1 / Class I	12,5 kA \div 25 per pole	Nacelle	Generator ²
			Motor drives
			LV side of transformer
			Auxiliary circuits

Type 1 - MOV according to EN 61643-11/ Class I - MOV according to IEC 61643-1

- ¹ LPZ - lightning protection zone according to IEC 62305-1
² One of typical maximum continuous operating voltage U_c of generator rotor's excitation circuit is 690 V_{RMS}

2. Typical values of the maximum discharge current capability I_{max} for Type 2 varistors

	I_{max} [kA]; (8/20 μ s)	Location (LPZ 1 - LPZ 2)	Equipment
Type 2 / Class II	100	Protection zone LPZ 2 inside the nacelle	Frequency converter
			Wind turbine control panel

Type 2 - MOV according to EN 61643-11/ Class II - MOV according to IEC 61643-1

Note: converter (AC/DC and DC/AC inverter) in LPZ 2 should be protected with SPDs (MOVs) Type 2 according to the risk level in IEC IEC 62305-1. Certain information from the exploitation however indicate that SPDs are electrically overstressed because of switching nature of inverters and are more overloaded with transients of switching frequency of 2 kHz that are superimposed onto the main operating voltage of 690 V_{RMS} of rotor excitation. Amplitudes of such transients are up to 1,7 kV between line and earth and up to 3 kV between line to line voltage with the voltage rise of approx. 1,4 kV/ μ s.

Recommendation: On the base of the facts indicated in Note above, a stronger MOV is highly recommended in all protected sides of a converter. We therefore suggest the usage of the MOVs Type 1 with $I_{imp} = 12,5$ kA or type 2 with $I_{max} \gg 70$ kA. You may therefore select among Varsi MOV range:

- MOVs for DIN-rail SPDs (according to the limitation of the DIN rail housing)
- Hard wired MOVs (E Series).

High Energy Varistors ED80 Series

■ Description



ED80 types are heavy-duty metal oxide varistors designed mainly for industrial applications. They are equipped with thermo decoupling device and remote signalization. They offer excellent surge protection for various electronic equipment: windmills, traffic and railway signal systems, communication equipment, waterworks, automatic control devices for power distribution, oil drilling and mining equipment (dredgers, cranes, etc.). ED80 housings offer an excellent protection also when they are exposed to different kinds of vibrations, dust, moisture, etc.

The advantages of the ED80 Series are: rigid terminals for good wire contact, a thermo decoupling device which protects ED80 from varistor failure in event of abnormal over voltage; ED80 has also a remote signalisation capability with remote terminals and galvanic separation from main line, solid plastic housing for secure mounting, higher insulation resistance (polyurethane filling and plastic housing).

■ Main Features

- Wide Operating Voltage Range V_{RMS} _____ **130 V – 1100 V**
- High Energy Absorption Capability W_{max} (2 ms) _____ **660 J – 6000 J**
- High Maximum Discharge Current Capability I_{max} (8/20 μ s) _____ **100000 A**
- Rigid Terminals for Secure Wire Contact
- Case Design Provides Complete Electrical Isolation of Disc Assembly
- Thermo Decoupling Device
- Remote Signalization With Micro switch and Remote Terminal
- Flame-retardant Housing (UL 94 V-0)
- Flame-retardant Filling (UL 94 V-0)

■ General Technical Data

Climatic Category	40 / 85 / 56	in accordance with IEC 68-1
LCT	- 40 °C	
UCT	+ 85 °C	in accordance with IEC 68-2-3
Damp Heat, Steady state (93% r.h., 40 °C)	56 days	
Operating temperature	- 40 ... + 85 °C	in accordance with CECC 42 000
Storage temperature	- 40 ... + 110 °C	
Electric strength	$\geq 2,5$ kV	in accordance with CECC 42 000
Insulation resistance	$\geq 1,0$ G Ω	in accordance with CECC 42 000
Response time	< 25 ns	
Max. torque	1.0 Nm	
Remote terminal torque	0.25 Nm	
Remote Terminal cross section	max. 1.5 mm ²	
Contacts ratings	AC: 250 V/0.5 A; 125 V/3 A	

■ Type designation

V 750 ED 80

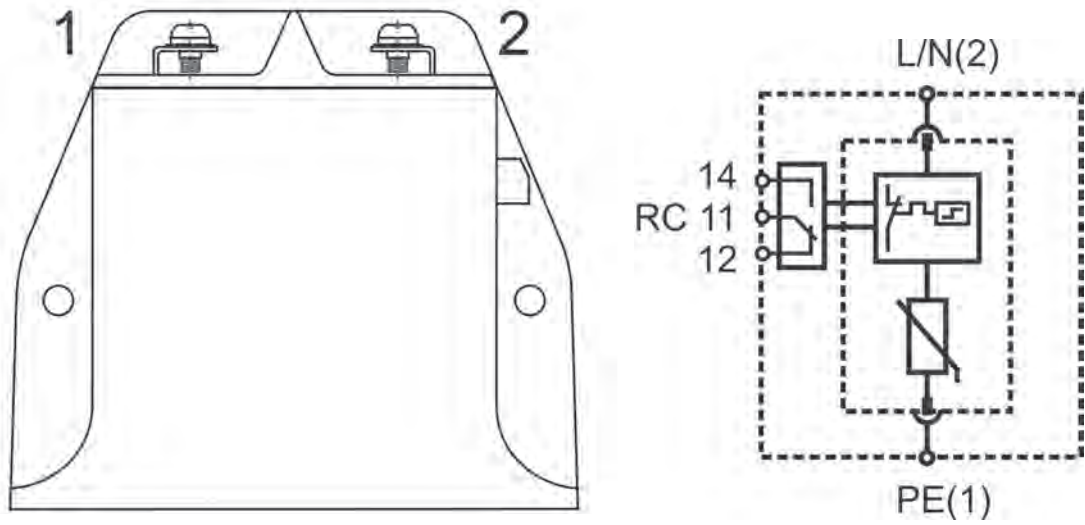
- V** | VARSI Metal Oxide Varistor
- 750** | Max. AC operating voltage
- ED** | E Varistor Design with Thermo **D**ecoupling Device
- 80** | Diameter of Varistor Disc

■ Table of Standard Values

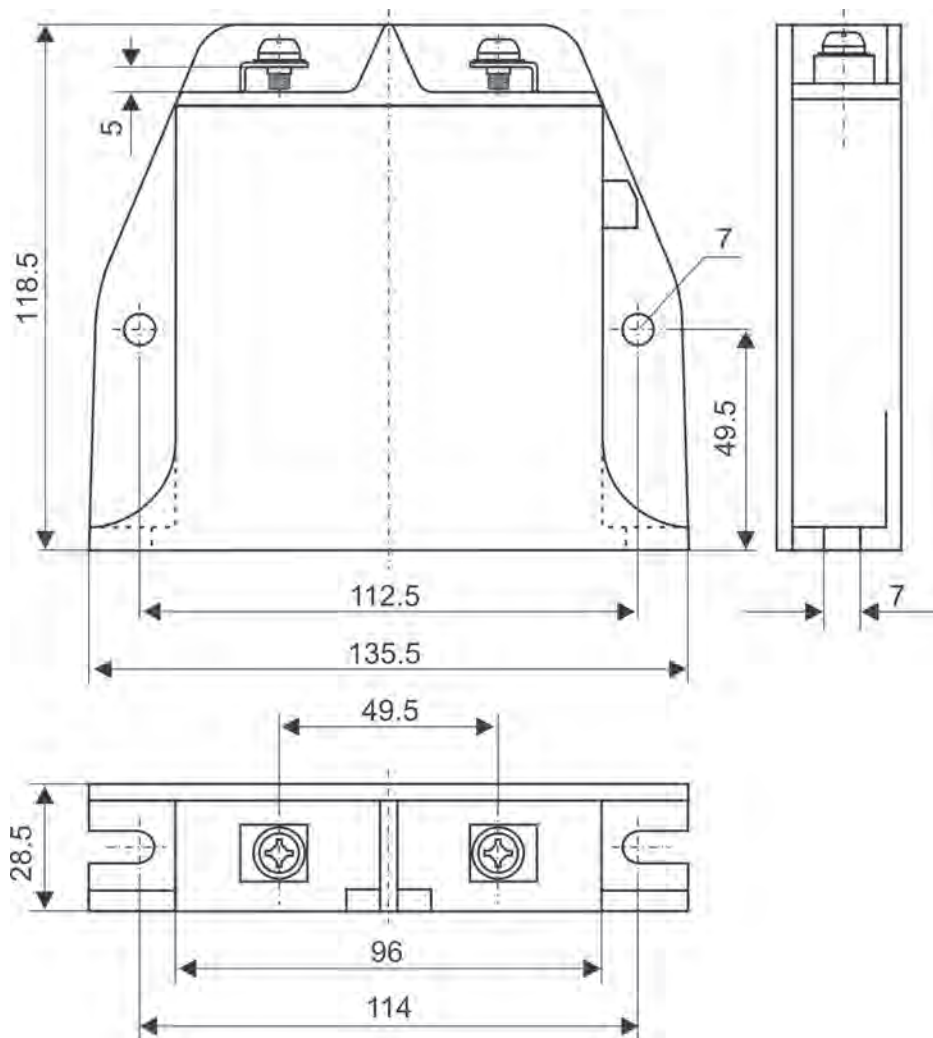
Model Number	Maximum Ratings TA = + 85 °C (+ 185 °F)					Characteristics TA = + 25 °C (+ 77 °F)					
	Operating Voltage		Average Power Dissipation	Permissible Peak Current (8/20 μ s)	Energy Absorption (2 ms)	Varistor Voltage (1 mA)			Maximum Clamping Voltage at Test Current (8/20 μ s)		Typical Capacitance f = 1kHz
	RMS Voltage	DC Voltage				V_{Nmin}	V_N	V_{Nmax}	V_C	I [A]	
	V_{RMS} [V]	V_{DC} [V]	P_{max} [W]	I_{max} [A]	W_{max} [J]						V_C [V]

V130ED80	130	170	2.0	100000	660	185	205	225	340	800	28000
V140ED80	140	180	2.0	100000	710	198	220	242	360	800	26000
V150ED80	150	200	2.0	100000	800	216	240	264	395	800	23000
V175ED80	175	225	2.0	100000	890	243	270	297	455	800	20000
V230ED80	230	300	2.0	100000	1200	342	360	396	595	800	16000
V250ED80	250	320	2.0	100000	1300	351	390	429	650	800	14100
V275ED80	275	350	2.0	100000	1400	387	430	473	710	800	13000
V300ED80	300	385	2.0	100000	1500	423	470	517	840	800	12000
V320ED80	320	420	2.0	100000	1600	459	510	561	840	800	11000
V385ED80	385	505	2.0	100000	2000	558	620	682	1025	800	9000
V420ED80	420	560	2.0	100000	2200	612	680	748	1120	800	8600
V440ED80	440	585	2.0	100000	2350	644	715	786	1180	800	8200
V460ED80	460	615	2.0	100000	2500	675	750	825	1240	800	7800
V510ED80	510	670	2.0	100000	2600	738	820	902	1355	800	7000
V550ED80	550	745	2.0	100000	3100	819	910	1001	1500	800	6600
V625ED80	625	825	2.0	100000	3300	900	1000	1100	1650	800	6000
V680ED80	680	895	2.0	100000	3600	990	1100	1210	1815	800	5200
V750ED80	750	970	2.0	100000	4000	1080	1200	1320	2000	800	4900
V1100ED80	1100	1465	2.0	100000	6000	1620	1800	1980	2970	800	3300

■ Connection diagram ED80



■ Dimensions



All dimensions are maximum except where noted. Dimensions are in millimeters.

High Energy Varistors ET 40 Series

■ Description



ET types are heavy-duty metal oxide varistors with thermal cutoff device. This device protects ET types from varistor failure in the event of abnormal overvoltage. They offer excellent surge protection with extra safety for various electronic equipment such as: traffic and railway protection, waterworks, communication equipment, automatic control devices for power distribution, oil drilling and mining equipment.

The advantages of the ET series are: terminals construction for PCB mounting, a thermal cut-off device which protects ET types from varistor failure in event of abnormal over voltage or varistor thermal runaway. Remote signalization can be achieved by external circuitry.

■ Main Features

Wide Operating Voltage Range V_{RMS} _____ **75 V – 440 V**
 High Energy Absorption Capability W_{max} (2 ms) _____ **180 J – 950 J**
 High Maximum Discharge Current Capability I_{max} (8/20 μ s) _____ **40000 A**
 Rigid Terminals for Secure Wire Contact
 Case Design Provides Complete Electrical Isolation of Disc Assembly
 Thermal Cut-off Device
 Flame-retardant Housing (UL 94 V-0)
 Flame-retardant Filling (UL 94 V-0)

■ General Technical Data

Climatic Category	40 / 85 / 56	in accordance with IEC 68-1
LCT	- 40 °C	
UCT	+ 85 °C	in accordance with IEC 68-2-3
Damp Heat, Steady state (93% r.h., 40 °C)	56 days	
Operating temperature	- 40 ... + 85 °C	in accordance with CECC 42 000
Storage temperature	- 40 ... + 110 °C	
Electric strength	\geq 2,5 kV	in accordance with CECC 42 000
Insulation resistance	\geq 1,0 G Ω	in accordance with CECC 42 000
Response time	< 25 ns	

■ Type designation

V 275 ET 40

V | VARSi Metal Oxide Varistor
275 | Max. AC operating voltage
ET | E Series with Thermal Cut-off Device
40 | Rated Diameter of Varistor Disc

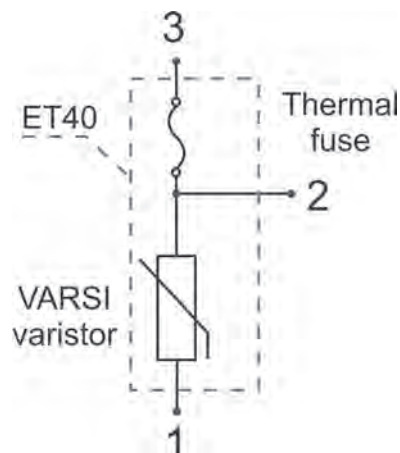
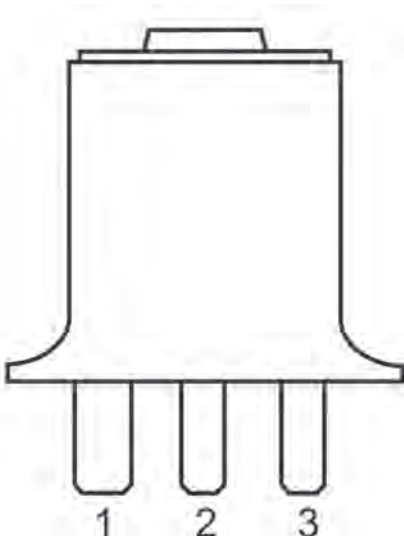
■ Table of Standard Values

Model Number	Maximum Ratings TA = + 85 °C (+ 185 °F)					Characteristics TA = + 25 °C (+ 77 °F)				
	Operating Voltage		Average Power Dissipation	Permissible Peak Current (8/20 μ s)	Energy Absorption (2 ms)	Varistor Voltage (1 mA)		Maximum Clamping Voltage at Test Current (8/20 μ s)		Typical Capacitance f=1kHz
	RMS Voltage	DC Voltage				V_N	ΔV_N	V_C	I	
	V_{RMS} [V]	V_{DC} [V]	P_{max} [W]	I_{max} [A]	W_{max} [J]	V_N [V]	ΔV_N [%]	V_C [V]	I [A]	C [pF]

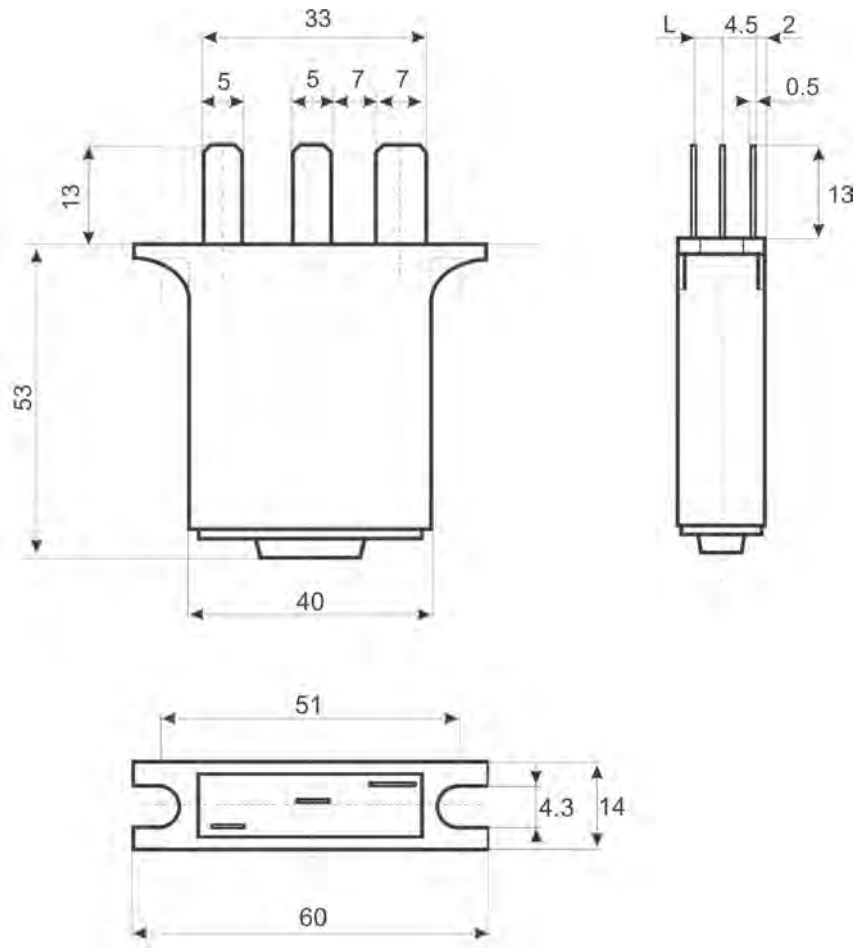
V75ET40	75	100	1.4	40000	180	120	± 10	200	300	13000
V95ET40	95	125	1.4	40000	220	150	± 10	250	300	11000
V115ET40	115	150	1.4	40000	280	180	± 10	300	300	8000
V130ET40	130	170	1.4	40000	320	205	± 10	340	300	5800
V140ET40	140	180	1.4	40000	340	220	± 10	360	300	5400
V150ET40	150	200	1.4	40000	370	240	± 10	395	300	5000
V175ET40	175	225	1.4	40000	410	270	± 10	455	300	4200
V230ET40	230	300	1.4	40000	470	360	± 10	595	300	3400
V250ET40	250	320	1.4	40000	505	390	± 10	650	300	3100
V275ET40	275	350	1.4	40000	565	430	± 10	710	300	2900
V300ET40	300	385	1.4	40000	600	470	± 10	775	300	2700
V320ET40	320	420	1.4	40000	655	510	± 10	840	300	2400
V385ET40	385	505	1.4	40000	815	620	± 10	1025	300	2000
V420ET40	420	560	1.4	40000	930	680	± 10	1120	300	1900
V440ET40	440	585	1.4	40000	950	715	± 10	1180	300	1800

All other voltages are available on request.

■ Connection diagram ET40



■ Dimensions



Part Number	Dimensions		
	$L \pm 1$ (mm)	$d \pm 0.05$ (mm)	l_{\min} (mm)
V75ET40	2.0	0.5	14
V95ET40	2.2	0.5	14
V115ET40	2.3	0.5	14
V130ET40	2.5	0.5	14
V140ET40	2.6	0.5	14
V150ET40	2.7	0.5	14
V175ET40	2.9	0.5	14
V230ET40	3.0	0.5	14
V250ET40	3.1	0.5	14
V275ET40	3.2	0.5	14
V300ET40	3.3	0.5	14
V320ET40	3.4	0.5	14
V385ET40	3.6	0.5	14
V420ET40	3.8	0.5	14
V440ET40	4.0	0.5	14

High Energy Varistors ET 80 Series

■ Description



ET80 types are heavy-duty metal oxide varistors designed mainly for industrial applications. They are equipped with thermal cut-off device and remote signalization. They offer excellent surge protection for various electronics equipment: windmills, traffic and railway signal systems, communication equipment, waterworks, automatic control devices for power distribution, oil drilling and mining equipment (dredgers, cranes, etc.). ET80 housings offer an excellent protection also when they are exposed to different kinds of vibrations, dust, moisture, etc.

The advantages of the ET80 Series are: solid plastic housing for secure mounting, remote terminals, higher insulation resistance (polyurethane filling and plastic housing), rigid terminals for good wire contact, a thermal cut-off device which protects ET types from varistor failure in event of abnormal overvoltage or varistor thermal runaway. Remote signalization can be achieved by external circuitry.

■ Main Features

- Wide Operating Voltage Range V_{RMS} _____ **130 V – 1100 V**
- High Energy Absorption Capability W_{max} (2 ms) _____ **660 J – 6000 J**
- High Maximum Discharge Current Capability I_{max} (8/20 μ s) _____ **100000 A**
- Rigid Terminals for Secure Wire Contact
- Case Design Provides Complete Electrical Isolation of Disc Assembly
- Thermal cut-off device
- Remote signalization and remote terminal
- Flame-retardant Housing (UL 94 V-0)
- Flame-retardant Filling (UL 94 V-0)

■ General Technical Data

Climatic Category	40 / 85 / 56	in accordance with IEC 68-1
LCT	- 40 °C	
UCT	+ 85 °C	in accordance with IEC 68-2-3
Damp Heat, Steady state (93% r.h., 40 °C)	56 days	
Operating temperature	- 40 ... + 85 °C	in accordance with CECC 42 000
Storage temperature	- 40 ... + 110 °C	
Electric strength	≥ 2,5 kV	in accordance with CECC 42 000
Insulation resistance	≥ 1,0 G Ω	in accordance with CECC 42 000
Response time	< 25 ns	
Max. torque	1.0 Nm	
Remote terminal torque	0.25 Nm	
Remote Terminal cross section	max. 1.5 mm ²	
Contacts ratings	AC: 250 V/0.5 A; 125 V/3 A	

■ Type designation

V 750 ET 80

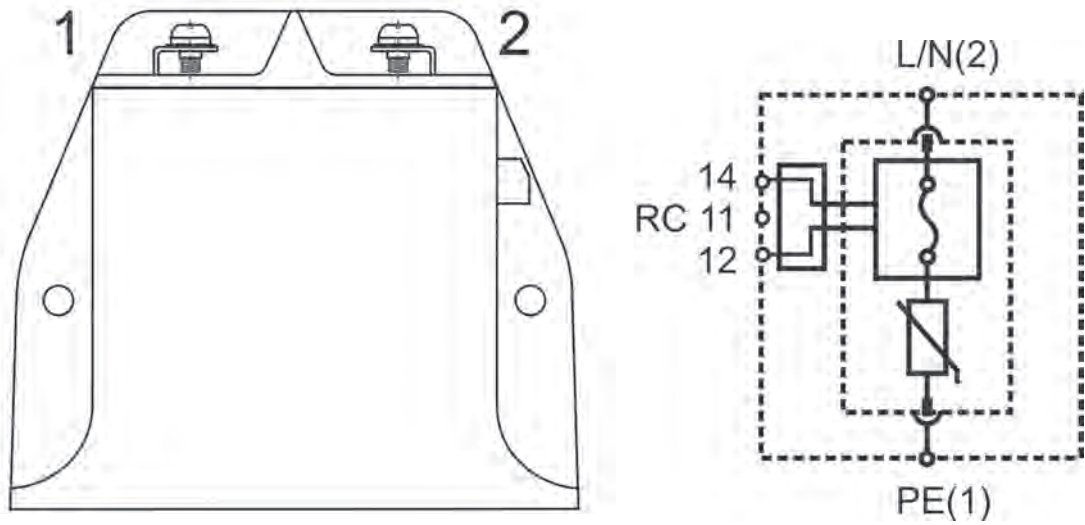
- V** | VARSI Metal Oxide Varistor
- 750** | Max. AC operating voltage
- ET** | E Varistor Design with Thermo Cut-off Device
- 80** | Diameter of Varistor Disc

■ Table of Standard Values

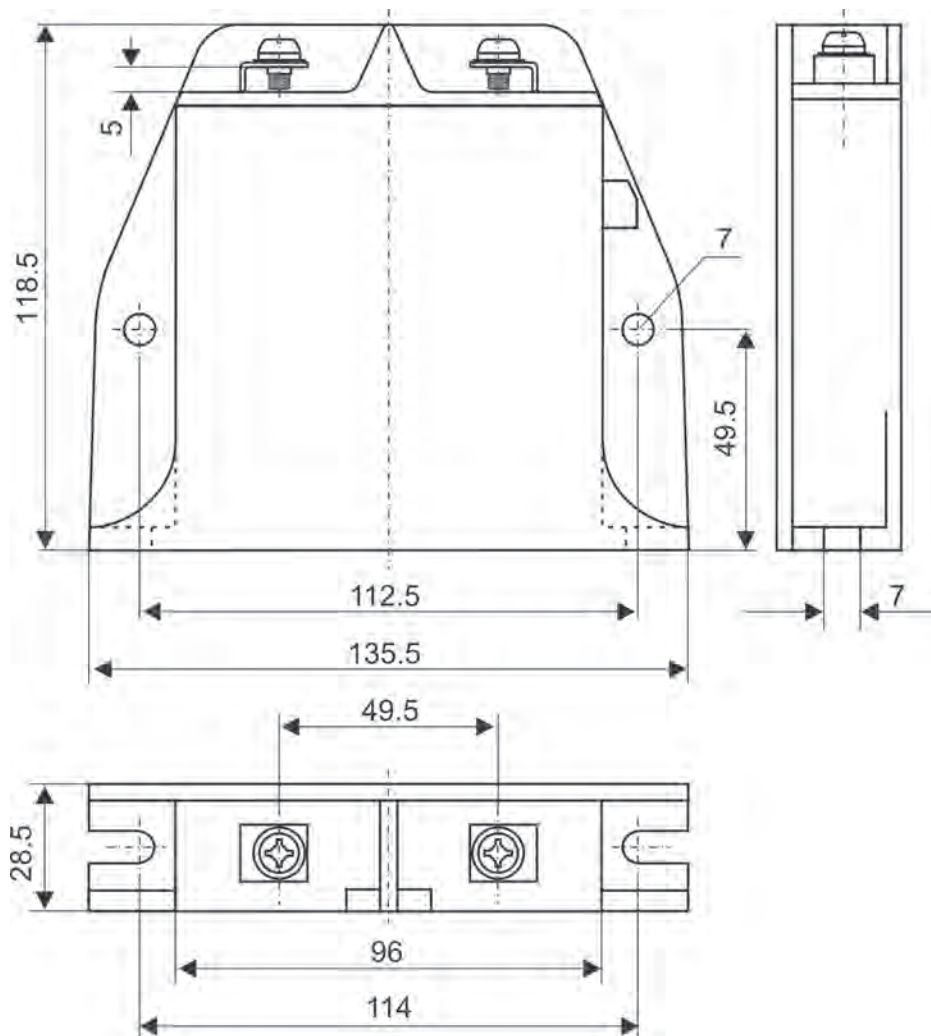
Model Number	Maximum Ratings TA = + 85 °C (+ 185 °F)					Characteristics TA = + 25 °C (+ 77 °F)					
	Operating Voltage		Average Power Dissipation	Permissible Peak Current (8/20 μs)	Energy Absorption (2 ms)	Varistor Voltage (1 mA)			Maximum Clamping Voltage at Test Current (8/20 μs)		Typical Capacitance f = 1kHz
	RMS Voltage	DC Voltage				V _{Nmin} [V]	V _N [V]	V _{Nmax} [V]	V _C [V]	I [A]	
	V _{RMS} [V]	V _{DC} [V]	P _{max} [W]	I _{max} [A]	W _{max} [J]						

V130ET80	130	170	2.0	100000	660	185	205	226	340	800	28000
V140ET80	140	180	2.0	100000	710	198	220	242	360	800	26000
V150ET80	150	200	2.0	100000	800	216	240	264	395	800	23000
V175ET80	175	225	2.0	100000	890	243	270	297	455	800	20000
V230ET80	230	300	2.0	100000	1200	342	360	396	595	800	16000
V250ET80	250	320	2.0	100000	1300	351	390	429	650	800	14100
V275ET80	275	350	2.0	100000	1400	387	430	473	710	800	13000
V300ET80	300	385	2.0	100000	1500	423	470	517	840	800	12000
V320ET80	320	420	2.0	100000	1600	459	510	561	840	800	11000
V385ET80	385	505	2.0	100000	2000	558	620	682	1025	800	9000
V420ET80	420	560	2.0	100000	2200	612	680	748	1120	800	8600
V440ET80	440	585	2.0	100000	2350	644	715	786	1180	800	8200
V460ET80	460	615	2.0	100000	2500	675	750	825	1240	800	7800
V510ET80	510	670	2.0	100000	2600	738	820	902	1355	800	7000
V550ET80	550	745	2.0	100000	3100	819	910	1001	1500	800	6600
V625ET80	625	825	2.0	100000	3300	900	1000	1100	1650	800	6000
V680ET80	680	895	2.0	100000	3600	990	1100	1210	1815	800	5200
V750ET80	750	970	2.0	100000	4000	1080	1200	1320	2000	800	4900
V1100ET80	1100	1465	2.0	100000	6000	1620	1800	1980	2970	800	3300

■ Connection diagram ET80



■ Dimensions



All dimensions are maximum except where noted. Dimensions are in millimeters.

Surge Protective Device **VTD S40 Series**



■ Description

VTD(S) Surge Protective Devices use square-shape metal oxide varistors equipped with a thermo decoupling device. They can be widely used in TVSS products, AC/DC power supplies, AC panel protection modules, AC line power supplies, surge protected strip connectors, AC power meters, UPS (uninterruptable power supply), Inverters, White Goods, GFCI (ground fault current interrupters).

The advantages of the VTD(S) Surge Protective Devices are: terminals construction for PCB mounting, a thermal decoupling device which protects VTD(S) against varistor failure in the event of abnormal overvoltage, VTD(S) also has the remote signalization capability.

■ Main Features

- Wide Operating Voltage Range V_{RMS} _____ **75 V – 1100 V**
- Very Good Clamping Voltage at 300 A (8/20 μ s) _____ **200 V – 2970 V**
- High Maximum Discharge Current Capability I_{max} (8/20 μ s) _____ **40000 A**
- Terminals construction for PCB mounting
- Option With Decoupling Device with VTDS Signalization

■ General Technical Data

Tested in accordance with	IEC 61643-1 IEC 61051-1 and UL1449
Category IEC / VDE	II / C
Operating temperature	- 40 ... + 85 °C
Response time	< 25 ns
Mounting	on Printed Circuit Board

■ Type designation

VTD S 275 S 40

- VTD** | VARSi Metal Oxide Varistor with Thermal Decoupler
- S** | Option with remote Signalization
- 275** | Max. AC operating voltage
- S** | Varistor Design (Square Disc)
- 40** | Rated Diameter of Varistor Disc

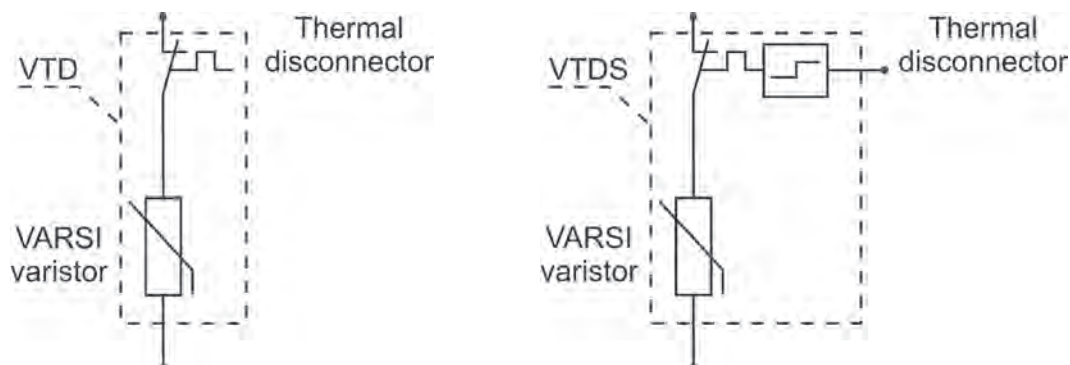
■ Table of Standard Values

Model Number	Maximum Ratings TA = + 85 °C (+ 185 °F)					Characteristics TA = + 25 °C (+ 77 °F)				
	Operating Voltage		Average Power Dissipation	Permissible Peak Current (8/20 μ s)	Energy Absorption (2 ms)	Varistor Voltage (1 mA)		Maximum Clamping Voltage at Test Current (8/20 μ s)		Typical Capacitance f=1kHz
	RMS Voltage	DC Voltage				V_N	ΔV_N	V_C	I	
	V_{RMS} [V]	V_{DC} [V]	P_{max} [W]	I_{max} [A]	W_{max} [J]	V_N [V]	ΔV_N [%]	V_C [V]	I [A]	C [pF]

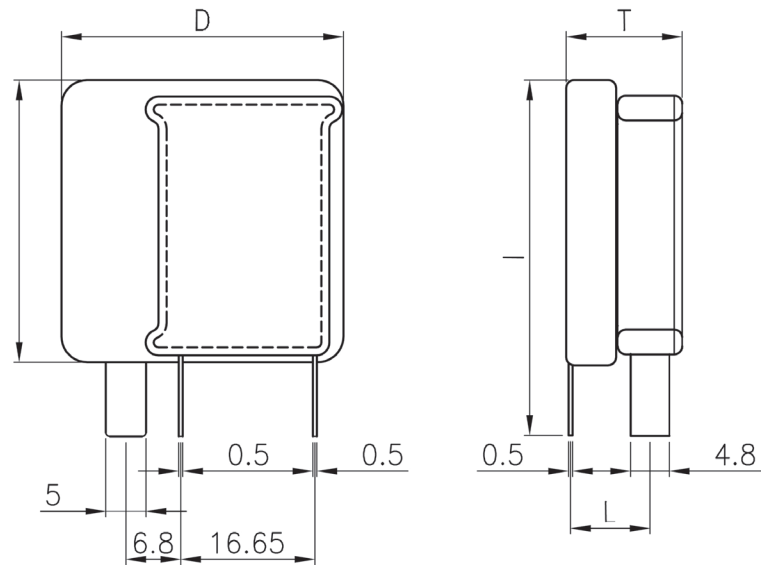
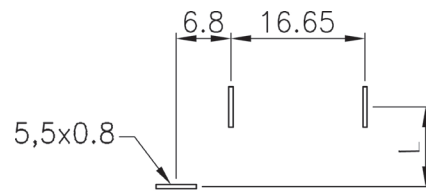
VTD75S40	75	100	1.4	40000	180	120	± 10	200	300	13000
VTD95S40	95	125	1.4	40000	220	150	± 10	250	300	11000
VTD115S40	115	150	1.4	40000	280	180	± 10	300	300	8000
VTD130S40	130	170	1.4	40000	320	205	± 10	340	300	5800
VTD140S40	140	180	1.4	40000	340	220	± 10	360	300	5400
VTD150S40	150	200	1.4	40000	370	240	± 10	395	300	5000
VTD175S40	175	225	1.4	40000	410	270	± 10	455	300	4200
VTDV230S4	230	300	1.4	40000	470	360	± 10	595	300	3400
VTD250S40	250	320	1.4	40000	505	390	± 10	650	300	3100
VTD275S40	275	350	1.4	40000	565	430	± 10	710	300	2900
VTD300S40	300	385	1.4	40000	600	470	± 10	775	300	2700
VTD320S40	320	420	1.4	40000	655	510	± 10	840	300	2400
VTD385S40	385	505	1.4	40000	815	620	± 10	1025	300	2000
VTD420S40	420	560	1.4	40000	930	680	± 10	1120	300	1900
VTD440S40	440	585	1.4	40000	950	715	± 10	1180	300	1800
VTD440S40	460	615	1.4	40000	1010	750	± 10	1240	300	1700
VTD510S40	510	670	1.4	40000	1040	820	± 10	1355	300	1600
VTD550S40	550	745	1.4	40000	1080	910	± 10	1500	300	1500
VTD625S40	625	825	1.4	40000	1100	1000	± 10	1650	300	1400
VTD680S40	680	895	1.4	40000	1130	110	± 10	1815	300	1200
VTD750S40	750	970	1.4	40000	1230	1200	± 10	1980	300	1100
VTD1100S40	1100	1465	1.4	40000	1850	1800	± 10	2970	300	800

All other voltages are available on request.

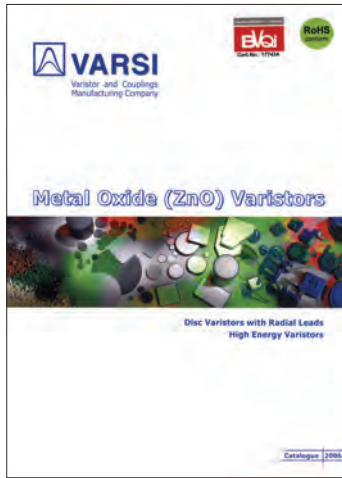
■ VTD / VTDS



■ Dimensions



Part Number	Dimensions				
	D_{max} (mm)	H_{max} (mm)	T_{max} (mm)	$L \pm 1$ (mm)	l_{min} (mm)
VTD75S40	37.5	39.0	13.0	6.9	44
VTD95S40	37.5	39.0	13.3	7.2	44
VTD115S40	37.5	39.0	13.6	7.5	44
VTD130S40	37.5	39.0	14.0	7.9	44
VTD140S40	37.5	39.0	14.1	7.95	44
VTD150S40	37.5	39.0	15.0	8.0	44
VTD175S40	37.5	39.0	15.4	8.4	44
VTD230S40	37.5	39.0	15.9	8.9	44
VTD250S40	37.5	39.0	16.1	9.1	44
VTD275S40	37.5	39.0	16.3	9.3	44
VTD300S40	37.5	39.0	16.6	9.6	44
VTD320S40	37.5	39.0	16.8	9.9	44
VTD385S40	37.5	39.0	17.6	10.7	44
VTD420S40	37.5	39.0	18.0	11.1	44
VTD440S40	37.5	39.0	19.2	11.3	44
VTD460S40	37.5	39.0	19.4	11.5	44
VTD510S40	37.5	39.0	20.0	12.2	44
VTD550S40	37.5	39.0	20.4	12.4	44
VTD625S40	37.5	39.0	21.0	12.9	44
VTD680S40	37.5	39.0	21.5	13.5	44
VTD750S40	37.5	39.0	22.1	14.1	44
VTD1100S40	37.5	39.0	25.0	17.1	44



General Catalogue

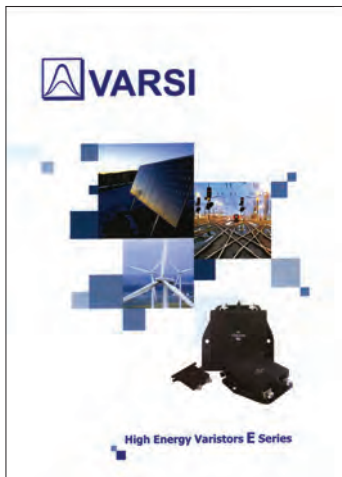
Standard leaded varistors: K5 - K20, K5 - K20P, K5 - K20E, KS20, K25 K25P;

High energy varistors: bare discs (D, S Series), epoxy coated varistors D32, S40, D60, D80 LE (ME, FE, IE, JE), hard-wired varistors E25, E32, E40, High energy blocks (D40HEB)



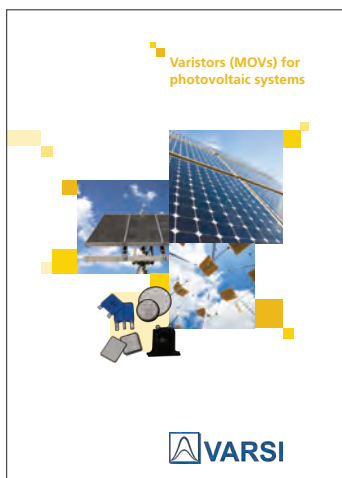
Short-form Catalogue

overview of Varsi product range



High energy varistors E Series

(E25, E32, E40, E60, E80) for wind, solar and transportation applications



Varistors (MOVs) for photovoltaic systems (PV1, PV2)



VARSI, d.o.o.
Varistor and Couplings Manufacturing Company
Stegne 35, SI - 1521 Ljubljana, Slovenia, Europe
T + 386 1 500 31 80 | F + 386 1 500 32 37
E commercial@varsi.si; technical@varsi.si
W www.varsi.si

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