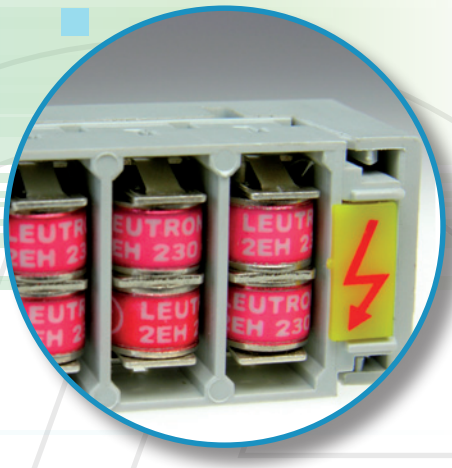
LEUTRON®



GAS DISCHARGE TUBES
SURGE PROTECTION / LSA TECHNOLOGY

WWW.LEUTRON.DE

Table of Contents

Surge arresters

Introduction

Gas-filled discharge tubes (GDT)

Atmospheric discharges, inductive interferences, frictional electricity or direct contact with high-voltage conductors can provoke short-term voltage surges which are coupled into telecommunications lines or any kind of process measuring and control lines and which, as a result, disturb or destroy the electric or electronic installations connected to them.

Voltage surges occurring in AC current systems are caused by the ever increasing strain on power supply units, our growing use of phase-control systems, by connecting operations carried out in networks interlinking power generating plants as well as by unbalanced loading of the network structures.

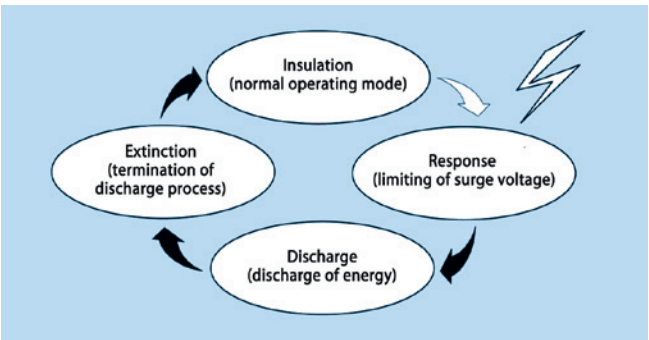
Such voltage surges must be limited as efficiently as possible to safe levels in order to protect both people and electronic equipment.

The **advantages** of gas discharge tubes are plain to see:

- Small dimensions yet high impulse current resistivity
- Sealed hermetically
- Fast response time due to gas discharge principle,
- Serves as primary protection element against voltage surges
- In combination with MOV resp. suppressor diodes or transzorb diodes it can be used for secondary and fine protection, complete protection system for telecommunications and data lines
- Separates the MOV from the network (in the case of C and D arresters), thus avoiding leakage current, helps to extend the service life of SPDs

Protection principle

Rare gas filled surge protective devices (surge arresters resp GDT – gas discharge tubes) function on the arc discharge principle. In pure electrical terms, a surge arrester is nothing else but a voltage-dependent electronic switch.



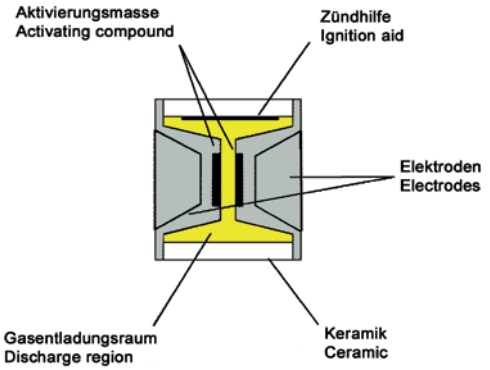
As soon as the voltage fed to the surge arrester exceeds its ignition voltage (usually between 70 V up to several kilovolt depending on the type and the voltage rise date), an arc is formed inside the hermetically sealed gas-filled discharge space (ceramic cylinder). The ignition speed of a surge arrester depends on the voltage rise rate dt/dv and can be as short as a few nanoseconds as, for example, in the case of a lightning pulse LEMP (Lightning ElectroMagnetic Pulse) or of an NEMP (Nuclear ElectroMagnetic Pulse). A current passage similar to a lightning strike with a very low internal resistance of just a few mΩ is led through the gas-plasma-path hence created, converting only a small amount of energy to heat.

The arc's high pulse current handling capacity (up to 40 kA lightning pulse current, depending on the type) and its almost completely current-independent arc discharge voltage (from 10 to 25 V) practically short-circuit the voltage surge.

Once the disturbance is over, the surge arrester extinguishes as soon as the arc discharge voltage has gone below a certain level whilst at the same time the internal resistance jumps back to the initial level of about 1 GΩ ~10 GΩ.

Construction

The construction is in principle identical to an isolating spark gap. The difference, however, lies both in dis-charge



capability and their residual voltage level. Surge arresters can discharge 8/20 type current pulses up to 25 kA without any damages and with a residual voltage level of 600 up to 1000 V.

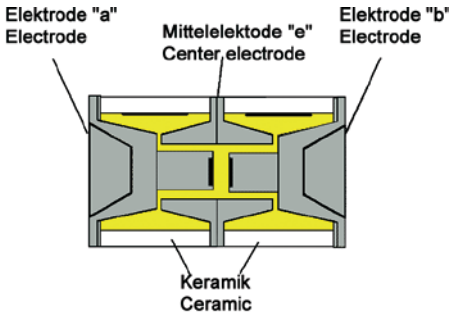
2-Electrode arresters

Usually, surge arresters consist of 2 metallic electrodes which are mostly coated with spark-resistant electron-emission surfaces (activating compound). They are fixed to the front ends of ceramic tubes at a short distance to each other and hard-soldered onto the tube at

high temperatures. The metallic/ceramic bodies thus hermetically sealed are then filled with a special rare gas blend (Argon, Neon etc.) at a precisely calculated pressure. These rare gases and their blending ratio ensure optimum electrical characteristics throughout their service life.

3-electrode arresters

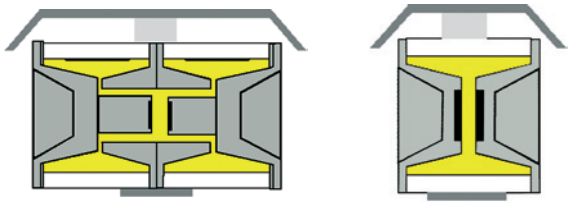
This type of arrester can be used instead of two 2-electrode arresters. It consists of a slightly longer ceramic cylinder with two metallic electrodes and a ring electrode situated



in the center of a single discharge space. The advantage of this construction type lies in the fact that equipotential bonding between all cable leads happens simultaneously and the energy is conducted faster and more steadily to the ground. No potential differences can happen!

Fail-safe (short-circuit spring)

When mounted on DC telecommunications line influenced by an AC line, the arrester cannot self-extinguish and there is a risk of an incalculable temperature rise within the arrester because of overload.
Therefore, a simple but efficient measure must be taken to protect the system.



A spring plugged or welded onto the arrester and connected with a special solder pill with specific temperature characteristics prompts an outside short-circuit of the electrodes once the permitted temperature level is exceeded - the arrester extinguishes.

Construction types

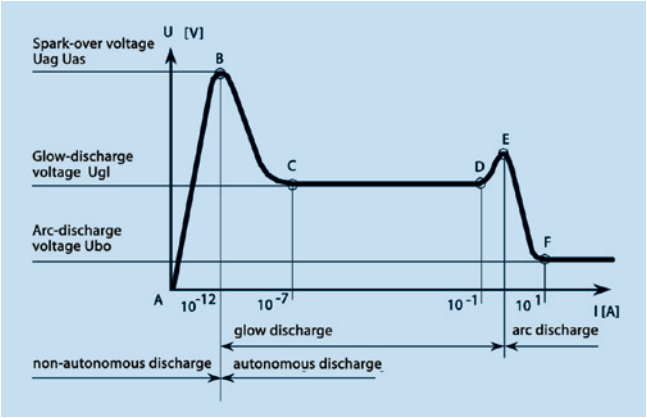
Depending on the final application, different construction types are available.

- Two-electrode button arresters sized 5x5 mm, 8x6 mm, 8x8 mm and so on which fit in so-called surge voltage protection magazines offered by various manufacturers
- pluggable 3-electrode button arresters with plugg- and solderable pins, ditto
- with solderable lead wire connector for elec-tronic print
- with special adapters for special magazines and holders such as used for military, railway or telecommunications purposes.

Functioning principle

The conducting properties of a gas do not follow Ohm's law, they are defined by the voltage-current (U/I) characteristic.

Virtually no current flows during the time that the voltage rises until spark-over voltage V_s is reached. After ignition of the arrester, the voltage drops to the glow voltage level V_{gl} (70 to 150V depending on the type, with a current of several 10 mA up to about 1,5 A).
Transition to arc discharge range occurs whilst current continues to increase inside the arrester. The typical low arc voltage V_a between 10 and 25 V is largely independent from the current.
At decreasing over-voltage (i.e. the second half of the wave) the arc current decreases further until it drops to the current level necessary to maintain the arc mode (some 10 up to 100 mA depending on the type).



Clear extinction features

DC-operated arrester: this condition prevails almost without exception in practice. If continuously operated with DC voltage, the arrester must be able to extinguish also at DC operating voltage after the surge has subsided.

The following conditions must be met:

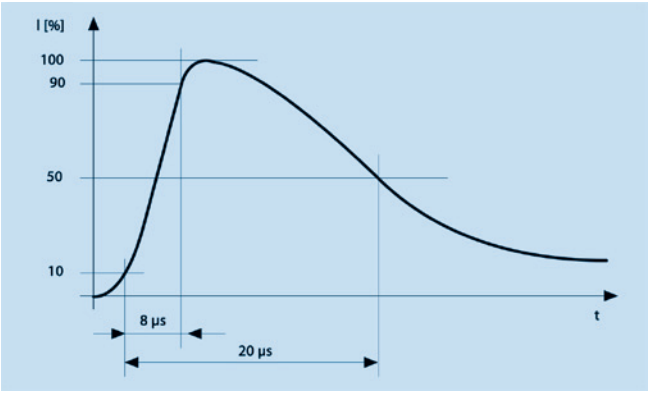
- DC operating voltage is either below the minimum arc voltage or below the glow voltage level.
- In the latter case make sure that the maximum current drawn from the operating voltage source is incapable to maintain the arc discharge mode after the surge has subsided.

Note

In AC current systems, the arrester usually does not extinguish after discharge of the voltage source, as the duration of the zero-crossing of the AC voltage is not long enough to effect a complete de-ionizing of the discharge path, potentially leading to inadmissibly high short-circuit follow-on current.
In order to limit this follow-on current and to extinguish the arrester, a fail-safe device must be installed at the power supply end. The single use of arresters in AC current systems therefore is only ever a compromise and not sufficient in most of the cases.
In order to safely and reliably extinguish an arrester in AC current systems, a metal oxide varistor (MOV) is usually installed upstream. This MOV makes sure that the voltage fed to the arrester drops below arc voltage level. This combination is also called „valve arrester".
The most recent development in this area are highperfor-mance arresters, also called "Multi-Arc" spark gaps, which are self-extinguishing thanks to integrated extinguishing chambers and no longer require an MOV as extinction aid.

Time to half-value of a voltage surge

Time to half-value of a voltage surge indicates the width of a voltage surge impulse at exactly half-value of the peak. It determines the type and performance range of a surge protective device.

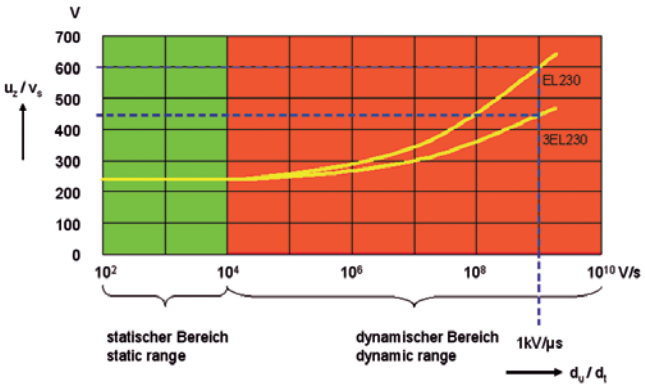


The values obtained are used to define the impedance of the test impulse which will determine the current handling capability of a protection element.

Impulse discharge current

If a voltage surge occurs at any point of a system or if it is arrested by a protection element, a high current will flow from the voltage surge. We call this current impulse discharge current.
The parameters to apply for a standardized impulse discharge current are defined in the same way as those specified for a standardized voltage pulse.

Spark-over voltage:



Static or nominal DC spark-over voltage:

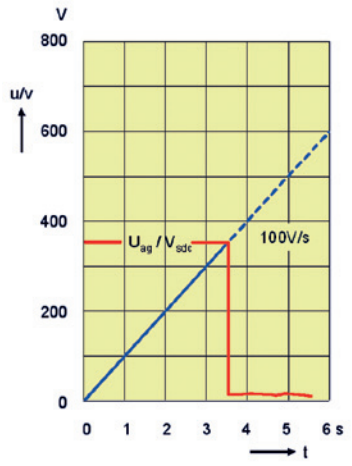
DC voltage is applied to the arrester and slowly increased (dv/dt=100 V/s). At a specific voltage level depending on the gas blend, the internal pressure, the distance bet-ween and the surface material of the electrodes, spark-over is triggered at high precision within a relatively low tolerance level of +/- 20%. The static area is at the beginning of the characteristic, as you can see in the illustration besides.
Dynamic or impulse spark-over voltage:

The voltage rate increases along with the rate of rise of the pulse edge, as clearly shown in the illustration besides. Dynamic spark-over voltage is usually measured with a pulse edge (dv/dt=1 kV/µs) acc. ITU-T K12, IEC 61643-311 or 100 V/µs and is located straight after the static range at the back end of the characteristic.

DC spark-over voltage V_{sdc}:

DC spark-over voltage, also called static spark-over voltage, is the value at which a gas-filled arrester ignites up to a specific voltage rise of for example dv/dt < 100 V/ms.
The voltage rise necessary to test the static spark-over voltage of an arrester can therefore be 100 V/ms or less.

A standard value for test purposes is 100 V/s. If an arrester ignites at 250 V, its static spark-over voltage will be 250 V.



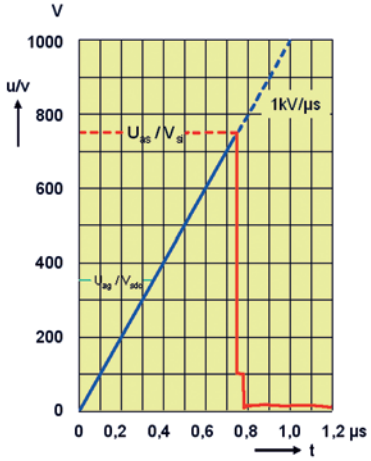
Alongside the discharge capability, the static spark-over voltage is the most important parameter of a gas-filled surge arrester.
Below this value, DC, AC and HF voltages can be applied without creating an influence or a current flow in the arrester.

Impulse spark-over voltage:

The impulse spark-over voltage, also referred to as dynamic spark-over voltage, is the voltage value at which an arrester responds if the voltage rises steeply, i.e. in case of a high dv/dt.

Usually, arresters are tested at voltage rise rates of 1, 2, 5 or 10 kV/µs. The peak value of the test voltage must be sufficiently above the response value of the arrester, in order to make sure that ignition takes place during the voltage rise (and not only during decay).

The value of the dynamic spark-over voltage must not increase after long-term storage and measurement in the dark. Good-quality arresters must not show an increase of this value after impulse current tests (bipolar test).



Definition and characteristics	Gas-filled surge arresters Terms according to VDE 0845 and test standard ITU-T K12 of International Telecom Union
DC spark-over voltage V_{sdc}	Measuring value for applied voltage rise rates of 100 V/s. Leutron-arresters offer low tolerances of ~15 % to 20%.
Impulse spark-over voltage v_{si}	Typical measuring value for applied voltage rise rates of 1 kV/µs. Leutron-arresters respond quickly and reliably. The indicated values are based on statistic assessments.
Nominal impulse discharge current i_{diN}	Peak value of the maximum admissible 8/20 current impulse (8µs time to rise and 20µs time to half-value). Leutron-arresters can be discharged with this current impulse for at least 10 times.
Maximum impulse discharge current	Maximum peak value of a 8/20 current impulse at which the arresters are not destroyed mechanically or interrupted. Leutron-arresters have a high discharge capability and therefore offer top safety.
Nominal alternating discharge current I_{daN}	Rated rms value of an AC current (15…62Hz) applied to an arrester several times for 1 s each time. Leutron-arresters excel by their high AC current discharge capability.
Glow-voltage v_{gl}	Voltage level at the ignited arrester at a current level of 10 mA
Arc discharge voltage v_a	Voltage level of arrester in the arc area. Ranges usually between 10 and 20 V.
Insulating resistance R_{is}	After 24 h storage in 95% relative air humidity, Leutron-arresters have an insulating resistance of $>10^{10}\Omega$. Leutron-arresters with higher insulating resistance are available on demand.
Capacitance C	Leutron-arresters have a self-capacitance of ca. 1 pF.
Arrester type name	Alongside the Leutron-logo, Leutron-arresters are labelled with a company-specific type name and various technical data.
Outstanding performance values	Thanks to Leutron GmbH's vast know-how and far-developed processing technology, we can guarantee narrow tolerances and remarkably constant electric parameters even after heavy current loads. In order to maintain our high quality requirements, not a single arrester leaves our premises without having previously passed successfully a highly demanding test program. Leutron arresters are good value-for-money and durable protection elements for telecommunications systems as well as for electric and electronic equipment. They serve as protective devices against volt-age surges which can be caused by lightning strikes, inductive, capacitive or galvanic influences or by frictional electricity.

Series 2EH

- 2-pole
- Ø8 x L6mm
- 10kA/10A
- Medium Duty Arrester

button type arrester

button type arrester with Fail-safe

with lead wires

- **High quality industrial ceramics**
- **Filled with inert gas, hermetically sealed**
- **No radioactivity!**
- **High impulse current resistance 10kA**
- **Highly reliable**
- **Stable functioning**
- **Long service life**

Description

LEUTRON gas tube surge arrester series 2EH are hermetically encapsulated medium duty high performance spark gaps, in metal/ceramics execution, filled with inert gas. With or without Fail-safe.

Application

Used as a classical primary medium protection for Telecom distribution frames (MDF), railways and other industrial applications where a medium lightning protection of 10kA (8/20µs) is required.
Pluggable in LSA arrester magazines and holders for 2-pole Ø8 x 6mm GDT, or with tin-plated wire for pc-boards.

Specification:

/ execution	Type code- Order No.					
Button type arrester, pluggable, surface Ni-plated	**2EH 90** **95 10 15**	**2EH 150** **95 10 20**	**2EH 230** **95 10 24**	**2EH 250** **95 10 31**	**2EH 350** **95 10 36**	**2EH 600** **95 10 44**
Button type arrester, pluggable, surface Ni-plated, + external Fail - safe			**2EH 230F** **95 10 26**			
With tin-plated lead wires	**2EH 90Q** **95 10 17**	**2EH 150Q** **95 10 22**	**2EH 230Q** **95 10 27**		**2EH 350Q** **95 10 38**	**2EH 600Q** **95 10 46**
Remark: - other voltages and executions on request						

Technical data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31									
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	90	150	230	250	350	600
Tolerance of V_{sdcN}		± [%]	20					
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs [V DC]	< 450 < 550	< 450 < 550	< 500 < 650	< 500 < 650	< 650 < 800	< 950 < 1100
Nominal impulse discharge surge current	(i_{dIN})	[kA]	10					
Single impulse discharge surge current	I_{max}	[kA]	12					
Nominal alternating discharge current	I_{wN} I_{daN}	[A]	10					
AC discharge current 9 cycles, 50cps	I_w	[A]	65 > 40…..(F)					
Impulse life	DI	10/700µs 10/1000µs	/ on request					
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 60	~ 60	~ 60	~ 60	~ 60	~ 60
Arc - voltage at 1A	U_{bo}	[V]	~ 15	~ 15	~ 15 < 20….(F)	~ 15	~ 15	~ 15
Glow-to arc transition current		[A]	~ 0,50	~ 0,50	~ 0,50	~ 0,50	~ 0,50	~ 0,50
Insulation resistance	Ris	[GΩ]	>10					
Capacitance at 1MHz	C	[pF]	< 1,5					
Climatic category, relative humidity DIN IEC 60068 - 1			40/90/21, 10%....95% rh					
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C					
Net weight / pc		[g]	ca. 1,5 g					
Measurements		[mm]	Ø8mm +0,1... –0,3 (8,7mm / with FS) x L6mm +0,25... -0,10 / length with Ø1mm wire : 60mm +4					

Marking

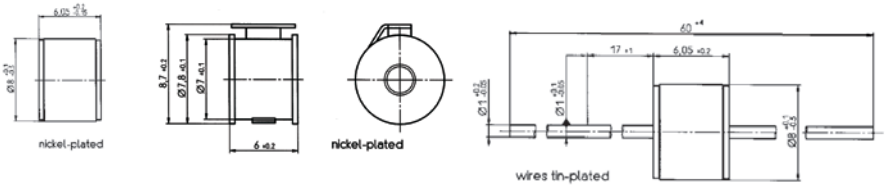
LEUTRON
2EH 230F Q YY

2 - / 2 electrodes
EH / type series
230 - nominal spark-over voltage
F - Fail - safe
Q - / lead wires
YY - / year of production

Marking / background: white / red

RoHS 2011/65/EU

Measurements in [mm] , Executions



Button type arrester | Button type arrester with Fail – safe | arrester with tin - plated lead wires

Series 2EJ

- 2-pole
- Ø8 x L8mm
- 20kA/20A
- Heavy Duty Arrester

button type arrester

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 20kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT series 2EJ are hermetically encapsulated high performance spark gaps in metal/ceramics execution, filled with inert gas.
Used as a classical primary protection for Telecom overhead lines, railways and applications where a higher lightning protection is required.
To be used in 8 x 8mm 2-pole arrester magazines and holders.

Specification:

Execution	Type code- Order No.				
Button type arrester, pluggable, surface Ni-plated	2EJ 90 95 10 70	2EJ 150 95 10 72	2EJ 230 95 10 74	2EJ 350 95 10 76	2EJ 500 95 10 80
Remark: - other voltages and executions on request					

Technical data

values according to: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31							
Nominal DC spark-over voltage at 100V/s	U_{agN} V_{sdcN}	[V DC]	90	150	230	350	500
Tolerance of V_{sdcN}		± [%]	20				

Impulse spark- over voltage, typical value	V_{si}	100V/µs [V GS] 1kV/µs [V DC]	< 450 < 550	< 450 < 550	< 450 < 550	< 650 < 700	< 900 < 1000
Nominal impulse discharge surge current	(i_{dIN})	[kA]	20				
Single impulse discharge surge current	I_{max}	[kA]	25				
Nominal alternating discharge current	I_{wN} I_{daN}	[A]	20				
AC discharge current 9 cycles, 50cps	I_w	[A]	>100				
Impulse life	DI	10/700µs 10/1000µs	on request				
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 60	~ 60	~ 60	~ 60	~ 60
Arc - voltage at 1A	U_{bo}	[V]	~ 10	~ 15	~ 10	~ 15	~ 10
Glow-to arc transition current		[A]	~ 0,5	< 0,5	~ 0,5	~ 0,5	~ 0,8
Insulation resistance	Ris	[GΩ]	>10				
Capacitance at 1MHz	C	[pF]	< 1,5				

Climatic category, relative humidity DIN IEC 60068 - 1		40/90/21, 10%....95% rh
Operating / storage temperature range	[°C]	- 40 °C…..+90 °C
Net weight / pc	[g]	ca. 2,5 g
Measurements	[mm]	Ø8mm +0,3... –0,2 x L 8mm +0,35.... -0,15

Marking

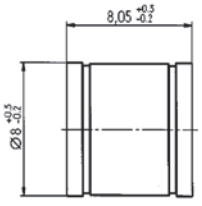
LEUTRON
2EJ 230 YY

2 - / 2 electrodes
EJ - / type series
230 - nominal spark-over voltage
YY - / year of production

Colour of marking: blue

RoHS 2011/65/EU

Measurements in [mm] , Executions

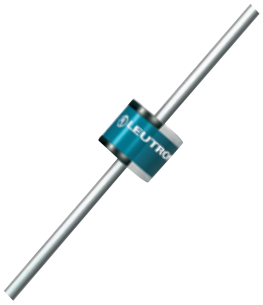


nickel-plated

Series 2EL..Q

- 2-pole
- Ø8 x L6mm
- 20kA/20A
- Heavy Duty Arrester

button type arrester



with lead wires

- **high quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 20 kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge arrester series 2EL are hermetically encapsulated heavy duty high performance spark gaps, in metal/ceramics execution, filled with inert gas.
Used as a primary protection for Telecom access networks, railways and industrial applications where a high lightning- and surge voltage protection is required.
To be used in 8 x 6mm 2-pole arrester magazines and holders, or with wires to solder in pc-boards.

Specification

Executions	Type code- Order No.					
Button type arrester, pluggable, surface Ni - plated	**2EL 90 95 10 16**	**2EL 150 95 10 21**	**2EL 230 95 10 25**	**2EL 250 95 10 32**	**2EL 350 95 10 37**	**2EL 600 95 10 45**
With tin - plated lead wires	**2El 90Q 95 10 18**	**2EL 150Q 95 10 23**	**2EL 230Q 95 10 28**	**2EL 250Q 95 10 34**	**2EL 350Q 95 10 39**	**2EL 600Q 95 10 47**
					2EL 500Q 95 10 43	
Remark: - other voltages and executions on request						

Technical Data

Values according to: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31										
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	90	150	230	250	350	500	600
Tolerance of V_{sdcN}		± [%]	20						

Impulse spark- over voltage, typical value	U_{as} V_{si}	100V/µs 1kV/µs	[V GS] [V DC]	< 450 < 550	< 450 < 550	< 450 < 550	< 500 < 650	< 650 < 800	< 900 < 1000	< 950 < 1100
Nominal impulse discharge surge current	I_n (i_{sn}) (i_{diN})	[kA]		20						
Single impulse discharge surge current	I_{max}	[kA]		25						
Nominal alternating discharge current	I_{wN} I_{daN}	[A]		20						
AC discharge current 9 cycles, 50cps	I_w	[A]		100						
Impulse life	DI	10/700µs 10/1000µs		/ on request						
Glow voltage (average at 10mA)	U_{gl}	[V]		~ 60	~ 60	~ 60	~ 60	~ 60	~ 60	~ 60
Arc - voltage at 1A	U_{bo}	[V]		~ 15	~ 15	~ 15	~ 15	~ 15	~ 15	~15
Glow-to arc transition current		[A]		~ 0,5	< 0,5	~ 0,5	~ 0,5	~ 0,5	~ 0,5	0,5
Insulation resistance	Ris	[GΩ]		>10						
Capacitance at 1MHz	C	[pF]		< 1,5						

Climatic category, relative humidity DIN IEC 60068 - 1			40/90/21, 10%....95% rh
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C
Net weight / pc		[g]	ca. 1,5 g
Measurements		[mm]	Ø8mm +0,1... –0,3 x L6mm +0,25... -0,10 / length with Ø1mm wire : 60mm +4

Marking

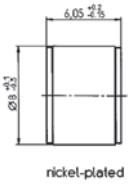
EUTRON
EL 230 Q YY

2 - / 2 electrodes
EL - / type series
230 - nominal spark-over voltage
Q - / lead wires
YY - / year of production

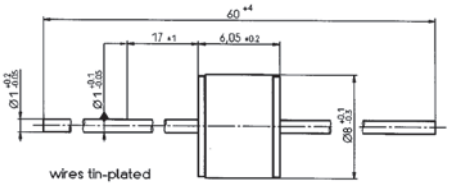
Colour of marking: blue

RoHS 2011/65/EU

Measurements mm / Executions



Button type arrester, Nickel plated



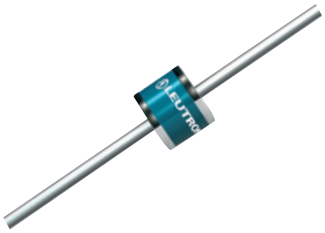
with tin - plated lead wires

Series 2EM

- 2-pole
- Ø5 x L5mm
- 5kA/5A
- Midget Size Arrester

button type arrester

with lead wires (and Fail-safe)



with SMD lead wires

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **impulse current resistance 5kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge arrester series 2EM are hermetically encapsulated medium duty high performance spark gaps, in metal/ceramics execution, filled with inert gas.

Used mainly for surge voltage protection for Telecom MDF and small distribution frames, electronic and sensor protection as well as other industrial applications, where high reliable midget size arresters are requested.
To be used in 5 x 5mm 2-pole arrester magazines or holders, with wire for pc-boards or for SMD.

Specification

Executions	Type code- Order No.			
Button type arrester, pluggable, surface Ni - plated	**2EM 90 95 10 00**	**2EM 230 95 10 04**	**2EM 350 95 10 08**	**2EM 600 95 10 10**
With tin - plated lead wires	**2EM 90 Q 95 10 01**	**2EM 230 Q 95 10 05**	**2EH 350 Q 95 10 09**	**2EH 600 Q 95 10 11**
With tin – plated lead wires + outside Fail-safe	**2EM 90F Q 95 10 03**	**2EM 230F Q 95 10 07**		
With tin - plated SMD lead wires (Measurements on request)	**2EM 90 QS 95 10 02**	**2EM 230 QS 95 10 06**		**2EH 600 QS 95 10 12**
Remark: - other voltages and executions on request				

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31						
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	90	230	350	600
Tolerance of V_{sdcN}		± [%]	20			

Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs [V DC]	< 350 < 550	< 500 < 600	< 750 < 800	< 1200 < 1350
Nominal impulse discharge surge current	(i_{dN})	[kA]	5			
Single impulse discharge surge current	I_{max}	[kA]	10			
Nominal alternating discharge current	I_{wN} I_{daN}	[A]	5			
AC discharge current 9 cycles, 50cps	I_w	[A]	10			
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 60	~ 60	~ 60	~ 60
Arc - voltage at 1A	U_{bo}	[V]	~ 15	~ 15	~ 15	~ 15
Glow-to arc transition current		[A]	~ 0,5	~ 0,5	~ 0,5	~ 0,5
Insulation resistance	Ris	[GΩ]	>1			
Capacitance at 1MHz	C	[pF]	< 1			

Climatic category, relative humidity DIN IEC 60068 - 1			40/90/21, 10%....95% rh
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C
Net weight / pc		[g]	ca. 1 g
Measurements		[mm]	Ø5mm ±0,15(6,6mm / with FS) x L5mm ±0,2 / length with Ø0,8mm wire :..60mm +4

Marking

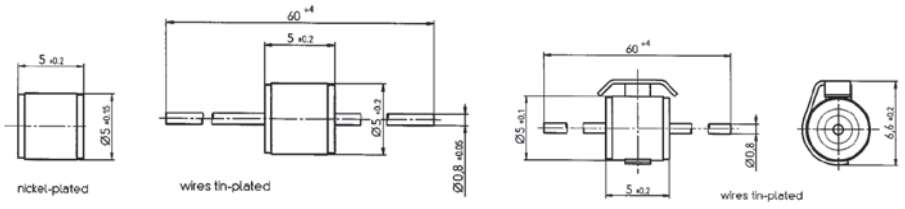
LEUTRON
2EM 230F Q YY

2 -/ 2 electrodes
EM - type series
230 - nominal spark-over voltage
F - Fail-safe
Q… (QS) - lead wires
YY - year of production

/ background: **white / blue**

RoHS 2011/65/EU

Measurements mm / Executions



Button type | with tin-plated lead wires | with tin-plated lead wires + Fail-safe

Series 2EU

- 2-pole
- Ø8 x L8mm with wire
- 10kA/10A
- High Voltage Arrester

Part 1

with lead wires

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 10kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge arrester series 2EU, are hermetically encapsulated high voltage spark gaps, in metal/ceramics execution, filled with inert gas. Mainly used as a classical primary protection for industrial electronics and power supplies, as well as for COAX HF antenna protection.

Specification

Executions	Type code- Order No.		
With tin - plated lead wires	**2EU 800 Q** **95 10 51**	**2EU 1000 Q** **95 10 53**	**2EU 1400 Q** **95 10 57**
Remark : - other voltages and executions on request			

Technical Data

Terms in accordance with: DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31					
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	800	1000	1400
Tolerance of V_{sdcN}		± [%]	15		20

Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs [V DC]	< 1000 < 1100	< 1200 < 1300	< 2000 < 2100
Nominal impulse discharge surge current	(i_{diN})	[kA]	10		
Single impulse discharge surge current	I_{max}	[kA]	10		
Nominal alternating discharge current	I_{daN}	[A]	10		
AC discharge current 9 cycles, 50cps	I_w	[A]	> 65	> 65	> 65
Impulse life	DI	10/700µs 10/1000µs	on request		
Glow voltage (average at 10mA)	U_{gl}	[V]		~ 180	
Arc - voltage at 1A	U_{bo}	[V]		~ 20	
Glow-to arc transition current		[A]		< 1	
Insulation resistance	R_{is}	[GΩ]	> 10		
Capacitance at 1MHz	C	[pF]	< 1		

Climatic category, relative humidity DIN IEC 60068 - 1		40/90/21, 10%....95% rh
Operating / storage temperature range	[°C]	- 40 °C…..+90 °C
Net weight / pc	[g]	ca. 1,5 g
Measurements	[mm]	Ø8mm +0,2... –0,4 x L 8mm +0,2.... -0,4 total length with Ø1mm wire: 60mm +4)

Marking

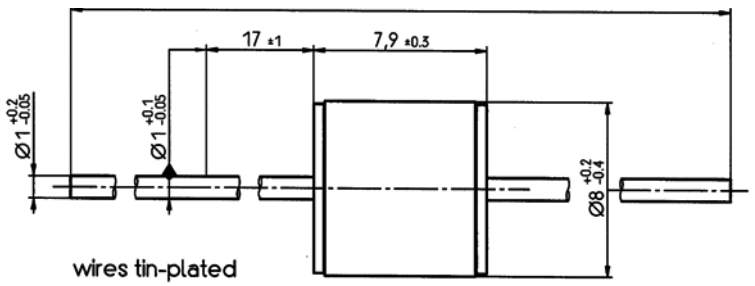
LEUTRON
2EU 1000 Q YY

2 - 2 electrodes
EU - / type series
1000 -nominal spark-over voltage
Q - / lead wires
YY - / year of production

Marking / background: **green / white**

RoHS 2011/65/EU

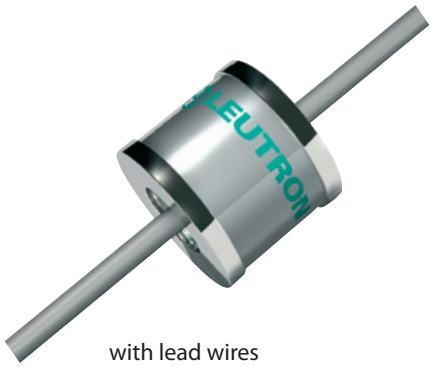
Measurements in [mm] / execution



Series 2EU

- 2-pole
- Ø8 x L8mm with wire
- 2,5kA/2,5A
- High Voltage Arrester

Part 2



with lead wires

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 2,5kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge arrester series 2EU, are hermetically encapsulated high voltage spark gaps, in metal/ceramics execution, filled with inert gas. Mainly used as a classical primary protection for industrial electronics and power supplies, as well as for COAX HF antenna protection.

Specification

Executions	**Type code- Order No.**			
With tin - plated lead wires	**2EU 1600 Q** **95 10 59**	**2EU 2500 Q** **95 10 60**	**2EU 3500 Q** **95 10 61**	**2EU 4500 Q** **95 10 62**
Remark : - other voltages and executions on request				

Technical Data

Terms in accordance with: DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31						
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	1600	2500	3500	4500
Tolerance of V_{sdcN}		± [%]	20			

Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs	[V DC]	< 2200 < 2300	< 3800 < 3900	< 4800 < 4900	< 5700 < 5800
Nominal impulse discharge surge current	I_n (i_{sn}) (i_{diN})	[kA]		2,5			
Single impulse discharge surge current	I_{max}	[kA]		2,5			
Nominal alternating discharge current	I_{wN} I_{daN}	[A]		2,5			
AC discharge current 9 cycles, 50cps	I_w	[A]		>	>	>	>
Impulse life	DI	10/700µs 10/1000µs		on request			
Glow voltage (average at 10mA)	U_{gl}	[V]		~	~	~	~
Arc - voltage at 1A	U_{bo}	[V]		~	~	~	~
Glow-to arc transition current		[A]		<	<	<	<
Insulation resistance	R_{is}	[GΩ]		> 10			
Capacitance at 1MHz	C	[pF]		< 1			

Climatic category, relative humidity DIN IEC 60068 - 1		40/90/21, 10%....95% rh
Operating / storage temperature range	[°C]	- 40 °C…..+90 °C
Net weight / pc	[g]	ca. 1,5 g
Measurements	[mm]	Ø8mm +0,2... –0,4 x L 8mm +0,2.... -0,4 / total length with Ø1mm wire: 60mm +4)

Marking

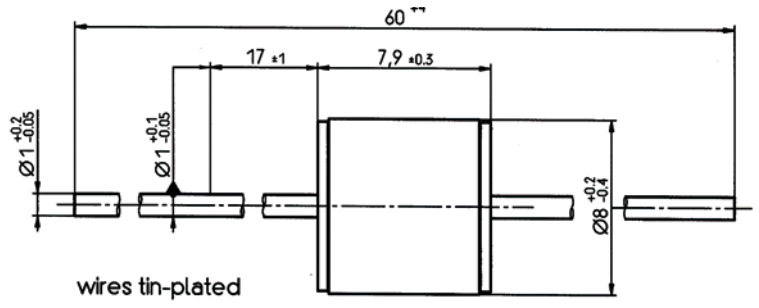
LEUTRON
2EU 1600 Q YY

2 / 2 electrodes
EU - / type series
1600 - nominal spark-over voltage
Q - / lead wires
YY - / year of production

Marking / background: **green / white**

RoHS 2011/65/EU

Measurements in [mm] executions



2EY

- 2-pole
- Ø8 x L20(41)mm
- 20kA/20A
- Heavy Duty Arrester

Execution „F“

Execution „E“

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 20kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Application

Used as LEMP and NEMP protection for applications in Telecom, industrial electronics, railway- and military systems, where particularly a special high protection against surge voltages and lightning influences is required.

For use in suitable arrester magazines and holders.

Description

LEUTRON GDT surge arrester series 2EY,
design “F” (TS No. 0089/96 / DTAG) with tube contacts, and design “E” with blade contacts, are hermetically encapsulated heavy duty spark gaps, in metal/ceramics execution, filled with inert gas.

Specification

Executions	Type code- Order No.			
Button type arrester, pluggable, design „F", electrode surface Ni-plated	**2EY 90 95 10 86**	**2EY 230 95 10 89**	**2EY 350 95 10 90**	**2EY 600 95 10 91**
Button type arrester, pluggable, design „E", electrode surface Ni-plated	**2EY 90 E 95 10 94**	**2EY 230 E 95 10 97**	**2EY 350 E 95 10 98**	**2EY 600 E 95 10 99**
Remark : - other voltages (e.g. 150V, 170V) on request				

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31						
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	90	230	350	600
Tolerance of V_{sdcN}		± [%]	20			

Impulse spark- over voltage, typical value	U_{as} V_{si}	100V/µs 1kV/µs [V DC]	< 450 < 550	< 450 < 550	< 650 < 700	< 950 < 1100
Nominal impulse discharge surge current	(i_{diN})	[kA]	20			10
Single impulse discharge surge current	I_{max}	[kA]	25			20
Nominal alternating discharge current	I_{wN} I_{daN}	[A]	20			
AC discharge current 9 cycles, 50cps	I_w	[A]	> 100			
Impulse life	DI	10/700µs 10/1000µs	on request			
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 60	~ 60	~ 60	~ 60
Arc - voltage at 1A	U_{bo}	[V]	~ 15	~ 15	~ 15	~ 10
Glow-to arc transition current		[A]	~ 0,5	~ 0,5	~ 0,5	~ 0,5
Insulation resistance	Ris	[GΩ]	> 10			
Capacitance at 1MHz	C	[pF]	< 1,5			

Climatic category, relative humidity DIN IEC 60068 - 1		40/90/21, 10%....95% rh	
Operating / storage temperature range	[°C]	- 40 °C…..+90 °C	
Net weight / pc	[g]	/ design „F": ca. 2,5 g	/ design „E": ca 3g
Measurements	[mm]	Ø8mm +0,2... –0,4 x L 20mm ±0,5/ contact surface : 7,6 ± 0,2	Ø8mm +0,2... –0,4 x L 41mm ±1 / contact surface : / blade contacts 1,5 x 5

Marking

LEUTRON
2EY 230 E YY

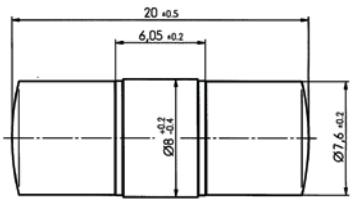
2 - / 2 electrodes
EY - / type series
230 - nominal spark over-voltage
E - Blade contacts German design "E"
YY - / year of production

Marking / background: **white**

RoHS 2011/65/EU

Measurements in [mm] / execu

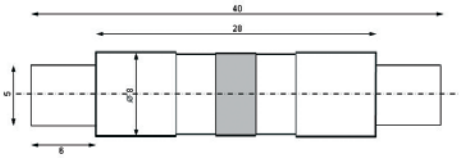
German design „F"
(TS Nr. 0089/96 / DTAG)



nickel-plated

surface Ni-plated

German design „E"



2ST 230 EK

- 2-pole
- Ø6 x L6mm
- 5kA/5A
- Mini-KOAX Medium Duty Arrester

button type KOAX arrester with pins

- **High quality industrial ceramics**
- **Filled with inert gas, hermetically sealed**
- **No radioactivity!**
- **Miniatur - KOAX construction**
- **impulse current resistance 5kA**
- **with axial pins**
- **highly reliable**
- **stable functioning, long service life**

Description

LEUTRON GDT surge arresters type 2ST 230 EK are hermetically encapsulated high performance Gas Discharge Tubes (GDT), in metal/ceramics execution, filled with inert gas, equipped with axial pins.
The outside tin plated metal cylinder is used to lead the surge energy to ground. He can therefore easily soldered into the protector housing.
The outside pins are precisely connected with the axial inside electrode.
Because of this special construction, excellent HF-data at simple construction of the connector housing becomes possible.

Applikation

Used mainly as a primary overvoltage protection in KOAX protectors for W-LAN antenna protection till 6 GHz, and in KOAX type surge protectors for KOAX data lines.
Solder able in many kinds of KOAX connector systems.

Specification

Executions	Type code- Order No.
KOAX Button type arrester, solder able, with tin plated surface and tin plated pins	2ST 230 EK 95 11 90
Remark: - other surface treatments on request	

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845				
Nominal DC spark-over voltage at 100V/s	U_{agN} V_{sdcN}	[V DC]		150 ....250 (at delivery AQL 0,65 level II, DIN ISO 2859)
Impulse spark- over voltage, typical value	U_{as} V_{si}	1kV/µs	[V DC]	< 700
Nominal impulse discharge surge current	I_n (i_{sn}) (i_{dIN})	[kA]		5
Single impulse discharge surge current	I_{max}	[kA]		5
Nominal alternating discharge current	I_{wN} I_{daN}	[A]		5
Impulse life at 100A wave form 10/1000µs				300 mal / 300 times
Insulation resistance at 100V DC	R_{is}	[MΩ]		>10.000
Capacitance at 1MHz	C	[pF]		< 1,5
Climatic category, relative humidity DIN IEC 60068 - 1				40/90/21, 10%....95% rh
Operating / storage temperature range	[°C]			- 40 °C…..+85 °C
Soldering acc. to IEC 68-2-20, Test Ta, Test methode 3				Reflow to 185°C in 240 sec, heating to 260°C max 10s and cooling down to 185°C in 70 sec
Net weight / pc	[g]			ca. 1 g
Measurements	[mm]			Ø6mm ±0,1 x L 6mm ±0,2, / with pins: 13mm ± 0,5

Type code

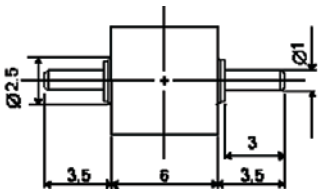
LEUTRON
2ST 230 EK YY

2 - / 2 electrodes
SS - / type series
230 - nominal spark-over voltage
E - pins
K - KOAX - execution

ATTENTION: no marking on arrester possible

RoHS 2011/65/EU

Measurements in [mm] , Executions



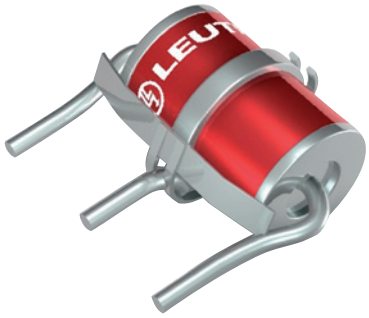
KOAX button type arrester with axial pins

Cylinder surface and pins; tin plated

Series 3EH..E

- 3-pole
- Ø8 x L10mm
- 10kA/10A
- Medium Duty Arrester

with pins



with pins and fail-safe

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **No radioactivity!**
- **high impulse current resistance 10kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge Arrester series 3EH..E are hermetically encapsulated medium duty high performance spark gaps with tin-plated pins. In metal/ ceramics execution, filled with inert gas.

The one-chamber system achieves:
a.) a faster potential equalisation between the two wires of a line.
b.) a faster response of the arrester.

Application

Used as a suitable primary medium protection for telecommunication systems, railways, etc. as well as for other Telecom- and industrial applications where a primary medium lightning and surge voltage protection is required.
To be used as a pluggable 8 x 10mm arrester with pins in 3-pole arrester magazines and holders of Telecom distribution frames (e.g. LSA-plus system and others). Or to be soldered to pc-boards as practised in conventional mounting technique (module 4,4 mm).

Specification

Executions	Type code- Order No.					
pluggable pins, distance 4,4mm, tin - plated,	**3EH 90 E 95 13 26**	**3EH 230 E 95 13 36**	**3EH 250 E 95 13 48**	**3EH 350 E 95 13 59**		**3EH 600 E 95 13 75**
+ upper Fail-safe, pluggable	**3EH 90F1 E 95 13 27**	**3EH 230F1 E 95 13 38**		**3EH 350F1 E 95 13 61**		
lower Fail-safe, pluggable pins, distance 4,4mm, tin-plated	**3EH 90F4 E 95 13 28**	**3EH 230F4 E 95 13 40**	**3EH 250F4 E 95 13 51**	**3EH 350F4 E 95 13 63**		
Remark: - other voltages and executions on request			pluggable pins, distance 6 mm, tin-plated,			**3EH 600 QE 95 13 74**

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31									
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]		90	230	250	350		420...700
Tolerance of V_{sdcN}		± [%]		20					- - -
Impulse spark-over voltage, typical value	V_{si}	100V/µs 1kV/µs	[V DC]	< 300 < 450	< 400 < 500	< 400 < 500	< 600 < 800		< 800 < 1000
Nominal impulse discharge surge current	(i_{diN})	[kA]		10	Total value through centre electrode, half value through side electrode				
Single impulse discharge surge current	I_{max}	[kA]		15					
Nominal alternating discharge current	I_{daN}	[A]		10	Total value through centre electrode, half value through side electrode				
AC discharge current 9 cycles, 50cps	I_w	[A]		40					
Impulse life	DI	10/700µs 10/1000µs		on request					
Glow voltage (average at 10mA)	U_{gl}	[V]		~ 60	~ 200				
Arc - voltage at 1A	U_{bo}	[V]		~ 10	~ 30				
Glow-to arc transition current		[A]		~ 1					
Insulation resistance	R	[GΩ]		> 10					
Capacitance at 1MHz	C	[pF]		< 1,5					
Climatic category, relative humidity DIN IEC 60068 - 1				40/90/21, 10%....95% rh					
Operating / storage temperature range		[°C]		- 40 °C…..+90 °C					
Net weight / pc		[g]		ca. 2 g; 2,2g with Fail-safe					
Measurements		[mm]		Ø8mm +0,2... –0,1 x L10mm ± 0,3 / Ø1mm pins, tin-plated					

Marking

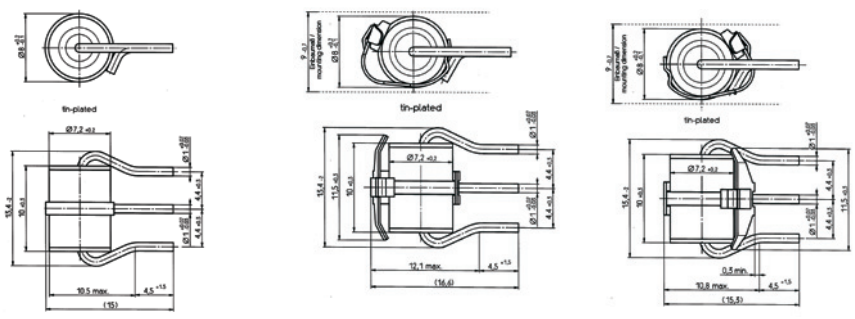
LEUTRON
3EH 230F1 E YY

3 - 2 electrodes
EH - / type series, 3 - pole 10kA,
230 - nominal DC spark-over voltage
F1 - upper fail – safe
F4 - lower Fail – safe
E - / connection pins
QE.....- pin module 6mm
YY - / year of production

Marking / background: white / red

RoHS 2011/65/EU

Measurements mm / Executions



Series 3EH..Q

- 3-pole
- Ø8 x L10mm
- 10kA/10A
- Medium Duty Arrester

button type arrester

button type arrester with Fail-safe

with lead wires and Fail-safe

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 10kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT Surge Arrester series 3EH are hermetically encapsulated medium duty high per-formance spark gaps, in metal/ceramics execution, filled with inert gas.

The one-chamber system achieves
a.) a fast potential equalisation also between the two wires of a line .
b.) a faster response of the arrester.

Application

Used as a suitable primary medium protection for, railway systems as well as for telephone exchanges and other Telecom- and industrial applications, where a primary medium lightning- or surge voltage protection is required.
Also suitable as 8 x 10mm button type arrester used in 3-pole arrester magazines and holders of Telecom distribution frames, e.g. System R&M / "VS-Standard" and others.
Or else with lead wires for classical pc-board mounting resp. for SMD.

Specification

Executions	Type code- Order No.					
Button type arrester, pluggable, surface Ni-plated	**3EH 90 95 13 23**	**3EH 230 95 13 29**	**3EH 250 95 13 43**	**3EH 350 95 13 53**		
Button type arrester, pluggable, Ni-plated,+ext. FS	**3EH 90F 95 13 24**	**3EH 230F 95 13 31**	**3EH 250F 95 13 45**	**3EH 350F 95 13 55**		
Tin-plated lead wires	**3EH 90 Q 95 13 25**	**3EH 230 Q 95 13 32**		**3EH 350 Q 95 13 57**		**3EH 600 Q 95 13 74**
Tin-plated lead wires + external. Fail-safe		**3EH 230F4 Q 95 13 34**				
Remark: - other voltages and executions on request; SMD - execution: 3EH 230 Q SMD.....Art. No. 95 13 42 (without illustr.)						

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31								
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]		90	230	250	350	420...700
Tolerance of V_{sdcN}		± [%]		20				---
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs	[V DC]	< 300 < 450	< 400 < 500	< 400 < 500	< 600 < 800	< 800 < 1000
Nominal impulse discharge surge current	(i_{diN})	[kA]		10	Total value through centre electrode, half value through side electrode			
Single impulse discharge surge current	I_{max}	[kA]		15				
Nominal alternating discharge current	I_{wN} I_{daN}	[A]		10	Total value through centre electrode, half value through side electrode			
AC discharge current 9 cycles, 50cps	I_w	[A]		40				
Impulse life	DI	10/700µs 10/1000µs		on request				
Glow voltage (average at 10mA)	U_{gl}	[V]		~ 60	~ 200			
Arc - voltage at 1A	U_{bo}	[V]		~ 10	~ 30			
Glow-to arc transition current		[A]		~ 1				
Insulation resistance	R_{is}	[GΩ]		>10				
Capacitance at 1MHz	C	[pF]		< 1,5				
Climatic category, relative humidity DIN IEC 60068 - 1				40/90/21, 10%....95% rh				
Operating / storage temperature range		[°C]		- 40 °C…..+90 °C				
Net weight / pc		[g]		ca. 2 g; 2,2g mit Fail-safe / with Fail-safe				
Measurements		[mm]		Ø8mm +0,2... –0,1 x L10mm ±0,3 / Ø1mm wires, tin-plated				

Marking

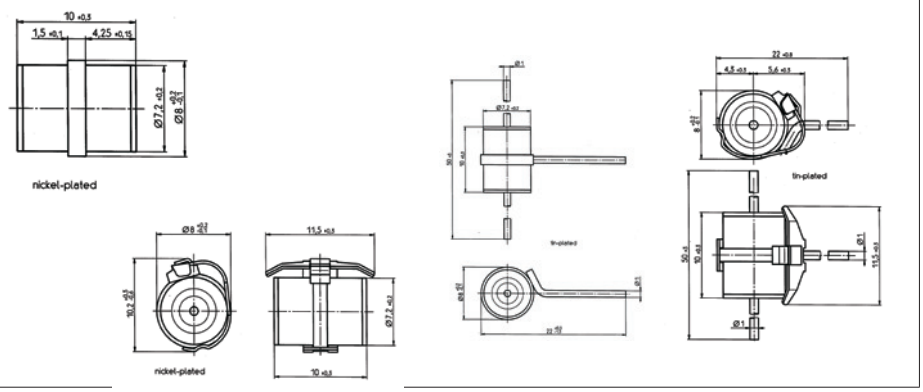
LEUTRON
3EH 230F. Q. YY

3 - / 3 electrodes
EH - / type series, 3-pole; 10kA
230 - nominal DC spark-over voltage
F… (**F4**) - Fail – safe
Q…(**QS**) - / lead wires
YY - / year of production

Marking / background: **white / red**

RoHS 2011/65/EU

Measurements mm / Executions



Series 3EHT..E

- 3-pole
- Ø8 x L10mm
- 10kA/10A
- Medium Duty Arrester

with pins

with pins and Fail-safe

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 10kA**
- **highly reliable**
- **stable functioning in dark conditions**
- **long service life**

Application

Used as a primary lightning and surge voltage protection especially for telecom MDF systems, as well as for other Telecom- and industrial applications, where a medium protection of 10kA acc. to ITU K.12 (CCITT K.12) is required. To be used as a pluggable 8 x 10mm arrester with pins in 3-pole arrester magazines and holders of Telecom distribution frames (e.g. LSA-plus system and others). Or for soldering to pc-board

Description

LEUTRON GDT surge Arrester series 3EHT..E are hermetically encapsulated medium duty high performance spark gaps with tin-plated pins. In metal/ ceramics execution, filled with inert gas.

The one-chamber system achieves
a.) a faster potential equalisation between the two wires of a line .
b.) a faster response of the arrester

Stable spark over even under dark conditions.

Specification

Executions	Type code- Order No.			
pluggable pins, distance 4,4mm, tin-plated,		**3EHT 230 E 95 14 02**		
+upper Fail-safe, pluggable		**3EHT 230F1 E 95 14 08**		
lower Fail-safe, pluggable pins, distance 4,4mm, tin-plated		**3EHT 230F4 E 95 14 03**		
Remark: - other voltages and executions on request				

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31						
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]			180 - 300	
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs	[V DC]		< 750	
Nominal impulse discharge surge current	(i_{diN})	[kA]	10	Total value through centre electrode, half value through side electrode		
Single impulse discharge surge current	I_{max}	[kA]	15			
Nominal alternating discharge current	I_{wN} I_{daN}	[A]	10	Total value through centre electrode, half value through side electrode		
AC discharge current 9 cycles, 50cps	I_w	[A]	40			
Impulse life	DI	10/700µs 10/1000µs	---------- 300 (+) or 300 (-)			
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 60			
Arc - voltage at 1A	U_{bo}	[V]	~ 10			
Glow-to arc transition current		[A]	~ 1			
Insulation resistance at 100V DC	R_{is}	[GΩ]	> 1			
Capacitance at 1MHz	C	[pF]	< 1,5			
Climatic category, relative humidity DIN IEC 60068 - 1			40/90/21, 10%....95% rh			
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C			
Net weight / pc		[g]	ca. 2 ; 2,2 with Fail-safe			
Measurements		[mm]	Ø8mm +0,2... –0,1 x L10mm ±0,3 / Ø1mm pins, tin-plated			

Marking

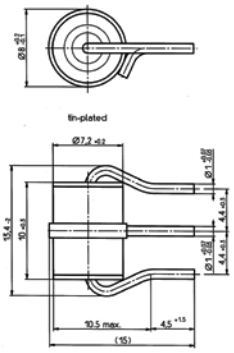
LEUTRON
3EHT 230F1 E YY

3 - 2 electrodes
EHT - type series, 3 - pole 10kA,
230 - nominal DC spark-over voltage
F4 - lower Fail – safe
E - connection pins
YY - year of production

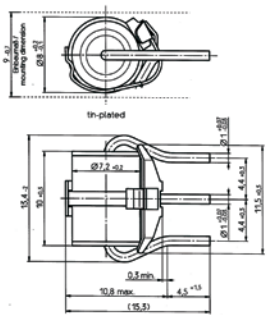
Marking / background: white / green

RoHS 2011/65/EU

Measurements mm / Executions



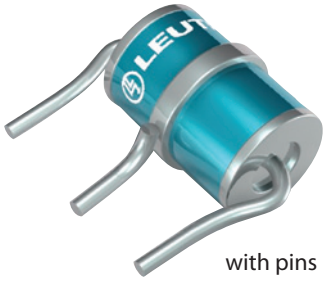
with tin-plated pins



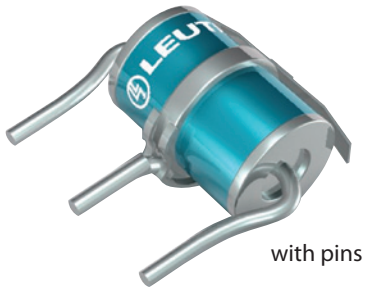
with tin-plated pins and lower Fail-safe

Series 3EL..E

- 3-pole
- Ø8 x L10mm
- 20kA/10A
- Heavy Duty Arrester



with pins



with pins and Fail-safe

- **High quality industrial ceramics**
- **Filled with inert gas, hermetically sealed**
- **No radioactivity!**
- **high impulse current resistance 20 kA**
- **highly reliable and stable function**
- **low DC spark over voltage (< 450 V)**
- **long service life**

Description

LEUTRON Gas Tube surge Arrester series 3EL.. E are hermetically encapsulated medium duty high performance spark gaps with tin-plated pins. In metal/ceramics execution, filled with inert gas.
The one-chamber system achieves:
a.) a faster potential equalisation between the two wires of a line
b.) a faster response of the arrester.

Fail-safe indicator included (execution F1).

Application

Used as a lightning- and surge voltage protection for Telephone systems, railways. As well as for other Telecom- and industrial applications where a high primary protection is required.
To be used at the transition point between Telecom overhead lines and underground cable or as a pluggable Ø8 x 10mm arrester with pins for 3-pole arrester magazines and holders of Telecom distribution frames (e.g. LSA-plus system and others).
Or to be soldered to pc-boards (module grid 4,4 mm).

Specification:

execution	Type code- Order No.				
Pins tin-plated, distance 4,4mm, pluggable	**3EL 230 E** **95 13 37**	**3EL 250 E** **95 13 49**	**3EL 350 E** **95 13 60**	**3EL 420 E** **95 13 71**	**3EL 500 E** **95 13 73**
upper Fail-safe, pluggable	**3EL 230F1 E** **95 13 39**	**3EL 250F1 E** **95 13 50**	**3EL 350F1 E** **95 13 62**		
lower Fail – safe, pluggable	**3EL 230F4 E** **95 13 41**	**3EL 250F4 E** **95 13 52**	**3EL 350F4 E** **95 13 64**		
Remark: - other voltages and executions on request					

Technical data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31							
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	230	250	350	420	420...700
Tolerance of V_{sdcN}		± [%]	20				- - -
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs [V DC]	< 350 < 450	< 400 < 500	< 600 < 800	< 700 < 800	< 800 < 950
Nominal impulse discharge surge current	(i_{dN})	[kA]	20	Total value through centre electrode, half value through side electrode			20
Single impulse discharge surge current	I_{max}	[kA]	25				20
Nominal alternating discharge current	I_{daN}	[A]	10	Total value through centre electrode, half value through side electrode			10
AC discharge current 9 cycles, 50cps	I_w	[A]	50				40
Impulse life	DI	10/700µs 10/1000µs	on request				
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 200				~ 200
Arc - voltage at 1A	U_{bo}	[V]	~ 30				~ 30
Glow-to arc transition current		[A]	~ 1				
Insulation resistance	R_{is}	[GΩ]	> 10				
Capacitance at 1MHz	C	[pF]	< 1,5				
Climatic category, relative humidity DIN IEC 60068 - 1			40/90/21, 10%....95% rh				
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C				
Net weight / pc		[g]	ca. 2 ; 2,2 with Fail - safe				
Measurements		[mm]	Ø8mm +0,2... –0,1 x L10mm ±0,3 / Ø1mm pins, tin plated				

Marking

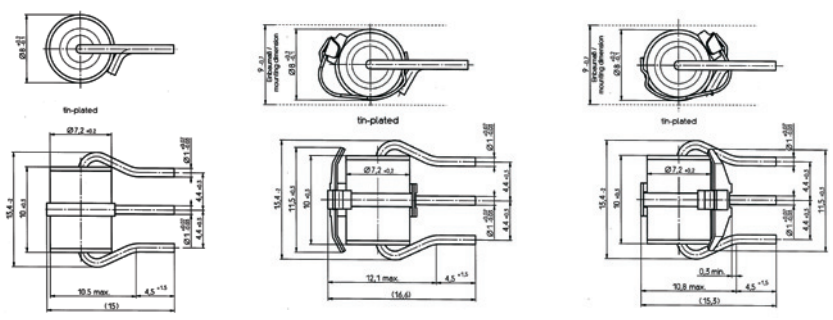
LEUTRON
3EL 230F1 E YY

3 -3 electrodes
EL -type series, 3 - pole 20kA,
230 - value nominal DC spark-over voltage
F1 upper fail – safe
F4 - lower Fail – safe
E - / connection pins
YY - / year of production

Marking / background: white / blue

RoHS 2011/65/EU

Measurements in [mm] , executions



Series 3EL..Q

- 3-pole
- Ø8 x L10mm
- 20kA/10A
- Heavy Duty Arrester

button type arrester

button type arrester with Fail-safe

with lead wires and Fail-safe

- **High quality industrial ceramics**
- **Filled with inert gas, hermetically sealed**
- **No radioactivity!**
- **high impulse current resistance 20 kA**
- **highly reliable and stable function**
- **low DC spark over voltage (< 450 V)**
- **long service life**

Description

The one-chamber system achieves:

a.) a fast potential equalisation also between the two wires of a line
b.) a faster response of the arrester

Application

Used as a lightning- and surge voltage protection for telecommunication systems, railways etc. as well as for other Telecom- and industrial applications where a high primary protection is required.
To be used at the transition point between Telecom overhead lines and underground cable. To be used as a pluggable Ø8 x 10mm arrester for 3-pole arrester magazines and holders of Telecom distribution frames (e.g. LSA-plus system etc.)
Or with lead wires for soldering to pc-boards.

Specification:

execution	Type code- Order No.		
Button type arrester, pluggable, surface Ni-plated	**3EL 230** **95 13 30**	**3EL 250** **95 13 44**	**3EL 350** **95 13 54**
Button type arrester, pluggable, Ni-plated,+ ext. FS	**3EL 230F** **95 13 78**	**3EL 250F** **95 13 46**	**3EL 350F** **95 13 56**
Tin-plated lead wires	**3EL 230 Q** **95 13 33**	**3EL 250 Q** **95 13 47**	**3EL 350 Q** **95 13 58**
Tin-plated lead wires + external. Fail – safe on lower side	**3EL 230F4 Q** **95 13 35**		
Remark: - other voltages and executions on request			

Technical data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31					
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	230	250	350
Tolerance of V_{sdcN}		± [%]	20		
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs [V DC]	< 350 < 450	< 400 < 500	< 600 < 800
Nominal impulse discharge surge current	I_n (i_{sn}) (i_{diN})	[kA]	20	Total value through centre electrode, half value through side electrode	
Single impulse discharge surge current	I_{max}	[kA]	25		
Nominal alternating discharge current	I_{wN} I_{daN}	[A]	10	Total value through centre electrode, half value through side electrode	
AC discharge current 9 cycles, 50cps	I_w	[A]	50		
Impulse life	DI	10/700µs 10/1000µs	on request		
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 200		
Arc - voltage at 1A	U_{bo}	[V]	~ 30		
Glow-to arc transition current		[A]	~ 1		
Insulation resistance	Ris	[GΩ]	>10		
Capacitance at 1MHz	C	[pF]	< 1,5		
Climatic category, relative humidity DIN IEC 60068 - 1			40/90/21, 10%....95% rh		
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C		
Net weight / pc		[g]	ca. 2 g; 2,2g mit Fail – safe / with Fail - safe		
Measurements		[mm]	Ø8mm +0,2... –0,1 x L10mm / Ø1mm wires, tin plated		

marking

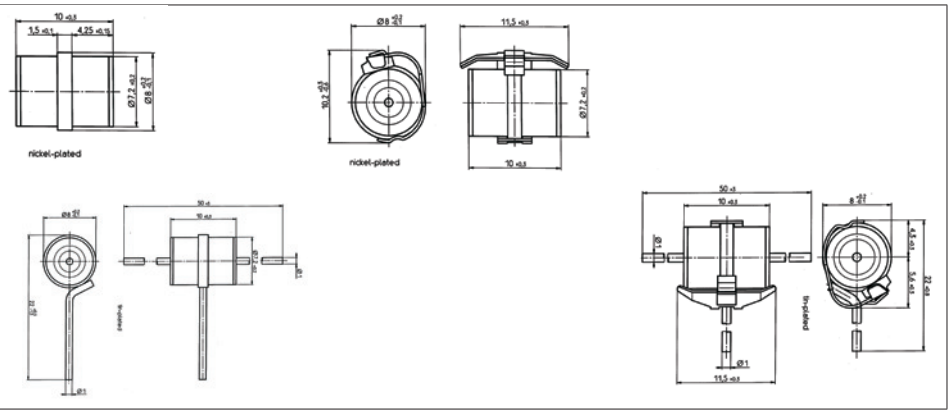
LEUTRON
3EL 230F... Q YY

3 3 electrodes
EL type series, 3-pole; 20kA
230 nominal DC spark-over voltage
F…(F4) - / Fail – safe
Q - / lead wires
YY - / year of production

Marking / background: white / blue

RoHS 2011/65/EU

Measurements in [mm] , Ausführungen / executions

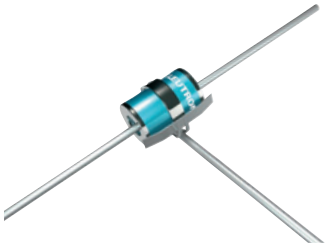


Series 3EM..Q

- 3-pole
- Ø5 x L7,5mm
- 5kA/5(10)A
- Light Duty Arrester

button type arrester

button type arrester and Fail-safe



with lead wires and Faill-safe

- **high quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **Miniatur size**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT Surge Arrester series 3EM are hermetically encapsulated light duty high performance spark gaps, in metal/ceramics execution, filled with inert gas.
The one-chamber system achieves:
a.) a fast equipotential bonding also between the two wires of a line .
b.) a faster response of the arrester.

Application

Used as a suitable protection against transient overvoltages for mini-telephone main- and subdistri-bution frames (MDF, SDF) and other Telecom- and industrial applications, where a surge voltage protection in smallest size is required.

Also suitable as 5 x 7,5mm button type arrester used in 3-pole arrester magazines and holders of Telecom distribution frames, and others.

Or else with lead wires for classical pc-board mounting resp. for SMD. With or without Fail-safe.

Specification:

Execution	Type code- Order No.		
Button type arrester, pluggable, surface Ni-plated	**3EM 90 95 13 14**	**3EM 230 95 13 16**	**3EM 350 95 13 20**
Button type arrester, pluggable, Ni-plated,+ext. FS	**3EM 90F on request**	**3EM 230F 95 13 18**	**3EM 350F on request**
Tin-plated lead wires	**3EM 90 Q on request**	**3EM 230 Q 95 13 21**	**3EM 350 Q on request**
Tin-plated lead wires + external. Fail - safe		**3EH 230F4 Q on request**	
Remark: - other voltages and executions on request; SMD - execution: 3EM _ _ _ SMD....(tin-plated) on request			

Technical data

terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31						
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]		90	230	350
Tolerance of V_{sdcN}		± [%]		± 20		
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs	[V DC]	< 400 < 500	< 450 < 600	< 700 < 800
Nominal impulse discharge surge current (8/20)	(i_{diN})	[kA]		5	Total value through centre electrode, half value through side electrode	
Single impulse discharge surge current	I_{max}	[kA]		5		
Nominal alternating discharge current	I_{wN} I_{daN}	[A]		10	Total value through centre electrode, half value through side electrode	
Impulse life	DI	10/700µs 10/1000µs		/ on request		
Glow voltage (average at 10mA)	U_{gl}	[V]		80		
Arc - voltage at 1A	U_{bo}	[V]		~ 10		
Glow-to arc transition current		[A]		~ 1		
Insulation resistance	R_{is}	[GΩ]		>1		
Capacitance at 1MHz	C	[pF]		< 1,5		
Climatic category, relative humidity DIN IEC 60068 - 1				40/90/21, 10%....95% rh		
Operating / storage temperature range		[°C]		- 40 °C…..+90 °C		
Net weight / pc		[g]		ca. 1g		
Measurements		[mm]		Ø5mm ± 0,1 x L7,5mm +0,3/-0,1 / Ø0,8mm wires, tin - plated		

Marking

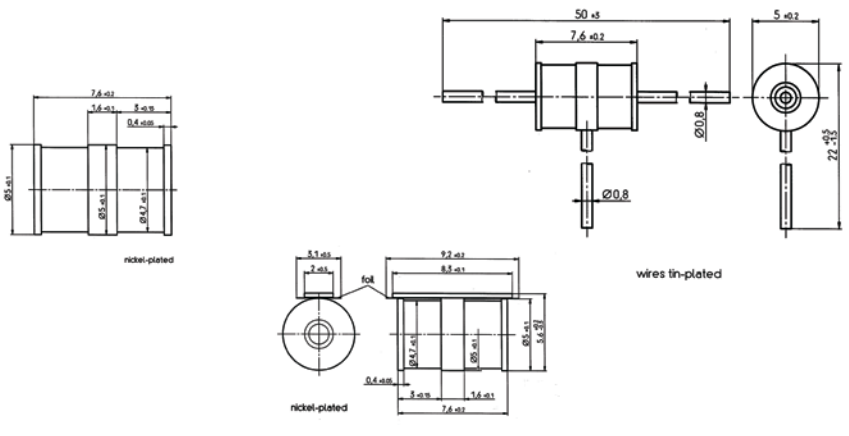
LEUTRON
3EM 230F. Q. YY

3 electrodes
EM - type series, 3-pole; 10kA
230 nominal DC spark-over voltage
F -(F4) - Fail – safe
Q - lead wires
YY - year of production

Marking / background: white / blue

RoHS 2011/65/EU

Measurements in [mm] , executions



Series 3ET

- 3-pole
- Ø6 x L8mm
- 10kA/10A
- Medium Duty Arrester

with pins

with pins and Fail-safe

with middle pin

with middle pin, Fs and TP

- **high quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 10kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge Arrester series 3ET..E are hermetically encapsulated medium duty high performance spark gaps. In metal/ceramics execution, filled with inert gas. With tin – plated pins. With or without Fail-safe (FS). Optional thermal FS indicator.
The one – chamber system achieves:
a.) a faster potential equalisation between the two wires of a line .
b.) a faster response of the arrester.

Application

For the medium lightning and surge voltage protection on smallest places, in miniature MDF of telecommunication systems, as well as for surge voltage protection of electronic pc-boards.
Used as a pluggable Ø6 x 8mm 3 pole arrester in 3-pins arrester magazines of Telecom distribution frames and holders (e.g. LSA system and others), resp. with middle pin for R&M system VS - Compact. More easy maintenance by optional thermal FS-indicator (thermo-indicator).

Specification:

Execution	Type code- Order No.		
pluggable pins, distance 4,4mm, tin-plated,	**3ET 90 E 95 13 02**	**3ET 230 E 95 13 05**	**3ET 350 E 95 13 08**
+ oberer Fail-safe / upper Fail-safe, pluggable	**3ET 90F1 E /on request**	**3ET 230F1 E 95 13 12**	**3ET 350F1 E /on request**
middle pin, tin-plated, l = 6mm, pluggable	**3ET 90 EM /on request**	**3ET230 EM 95 13 80**	**3ET 350 EM /on request**
middle pin, tin-plated, pluggable, upper FS	**3ET 90F1 EM /on request**	**3ET 230F1 EM 95 13 81**	**3ET 350F1 EM /on request**
middle pin, tin-plated, pluggable, upper FS + FS thermal indication	**3ET 90F1T EM /on request**	**3ET 230F1T EM 95 13 82**	**3ET 350F1T EM /on request**
Remark: - other voltages and executions on request			

Technical data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31					
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	90	230	350
Tolerance of V_{sdcN}		± [%]	20		
Impulse spark- over voltage, typical value	U_{as} V_{si}	100V/µs 1kV/µs [V DC]	< 300 < 380	< 350 < 420	< 650 < 700
Nominal impulse discharge surge current	(i_{diN})	[kA]	10	Total value through centre electrode, half value through side electrode	
Single impulse discharge surge current	I_{max}	[kA]	10		
Nominal alternating discharge current	I_{wN} I_{daN}	[A]	10	Total value through centre electrode, half value through side electrode	
AC discharge current 9 cycles, 50cps	I_w	[A]	30		
Impulse life	DI	10/700µs 10/1000µs	on request		
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 60	~ 200	
Arc - voltage at 1A	U_{bo}	[V]	~ 10	~ 30	
Glow-to arc transition current		[A]	~ 1		
Insulation resistance	R_{is}	[GΩ]	> 10		
Capacitance at 1MHz	C	[pF]	< 1,5		
Climatic category, relative humidity			40/90/21, 10%....95% rh (DIN IEC 60068 – 1)		
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C		
Net weight / pc		[g]	ca. 1,2 g; 1,6g mit Fail-safe / with Fail-safe		
Measurements		[mm]	Ø6mm ±0,1 x L8,1mm ±0,2, / Ø1mm pins, tin-plated		

marking

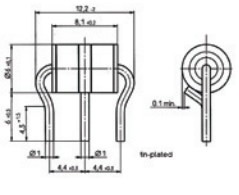
LEUTRON
3ET 230F4 E_ YY

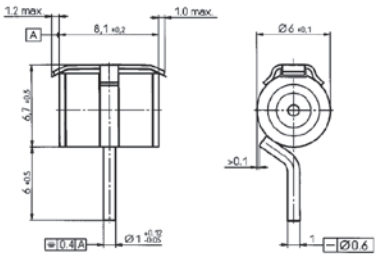
3 - / 3 electrodes
ET - / type series, 3-pole 10kA,
230 - nominal DC spark-over voltage
F1 - / upper Fail-safe
T - /FS indicator (thermo)
E - / 3 connection pins
M - / 1 middle pin
YY - Produktionsjahr / year of production

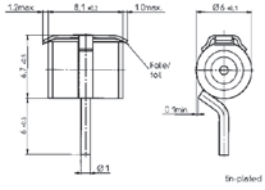
Marking / background: **white / blue**

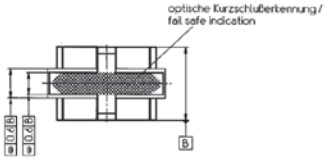
RoHS 2011/65/EU

Measurements in [mm] , / executions



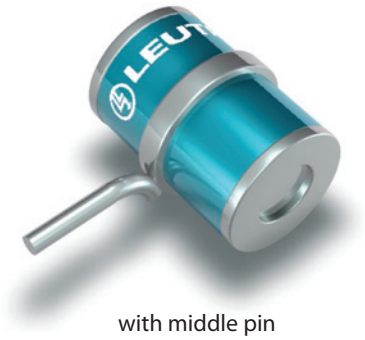






Series 3ET..EM

- 3-pole
- Ø 6 x L 8 mm
- 10 kA/10 A
- Medium Duty Arrester



with middle pin

with middle pin, FS and TP

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 10kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge arrester series 3ET..EM are hermetically encapsulated medium duty high performance spark gaps. In metal/ceramics execution, filled with inert gas. With tin-plated middle pin for PE. With or without Fail-safe (FS). Optional thermal FS-indicator.
The one-chamber system achieves:
a.) a faster potential equalisation between the two wires of a line .
b.) a faster response of the arrester.

Application

For the medium lightning and surge voltage protection on smallest places, in miniature MDF of telecommunication systems, as well as for surge voltage protection of electronic pc-boards.
Used as a pluggable Ø6 x 8mm 3-pole arrester in middle-pin arrester magazines of Telecom distribution frames and holders R&M system VS - Compact and others.
More easy maintenance by optional thermal FS-indicator (thermo-indicator).

Specification

Executions	Type code- Order No.
middle pin, tin-plated, l = 6mm, pluggable	**3ET230 EM 95 13 80**
middle pin, tin-plated, pluggable, upper FS	**3ET 230F1 EM 95 13 81**
middle pin, tin-plated, pluggable, upper FS + FS thermal indication	**3ET 230F1T EM 95 13 82**
Remark: other voltages and executions on request	

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31				
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]	230	
Tolerance of V_{sdcN}		± [%]	20	
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs [V DC]	< 350 < 420	
Nominal impulse discharge surge current	(i_{diN})	[kA]	10	Total value through centre electrode, half value through side electrode
Single impulse discharge surge current	I_{max}	[kA]	10	
Nominal alternating discharge current	I_{daN}	[A]	10	Total value through centre electrode, half value through side electrode
AC discharge current 9 cycles, 50cps	I_w	[A]	30	
Impulse life	DI	10/700µs 10/1000µs	on request	
Glow voltage (average at 10mA)	U_{gl}	[V]	~ 60	~ 200
Arc - voltage at 1A	U_{bo}	[V]	~ 10	~ 30
Glow-to arc transition current		[A]	~ 1	
Insulation resistance	R_{is}	[GΩ]	> 10	
Capacitance at 1MHz	C	[pF]	< 1,5	
Climatic category, relative humidity			40/90/21, 10%....95% rh (DIN IEC 60068 – 1)	
Operating / storage temperature range		[°C]	- 40 °C…..+90 °C	
Net weight / pc		[g]	ca. 1,2 ; 1,6 with Fail - safe	
Measurements		[mm]	Ø6mm ±0,1 x L8,1mm ±0,2 / Ø1mm pins, tin-plated	

Marking

LEUTRON
3ET 230F4 EM YY

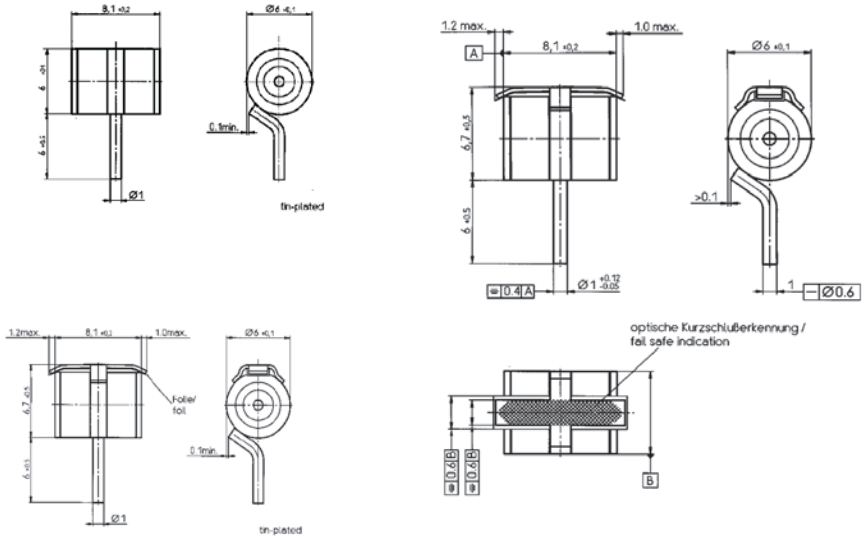
3 - / 3 electrodes
ET type series, 3 - pole 10kA,
230 - nominal DC spark-over voltage
F1 -upper Fail – safe
T -FS indicator (thermo)
EM - 1 middle pin

YY - year of production

Marking / background: white / blue

RoHS 2011/65/EU

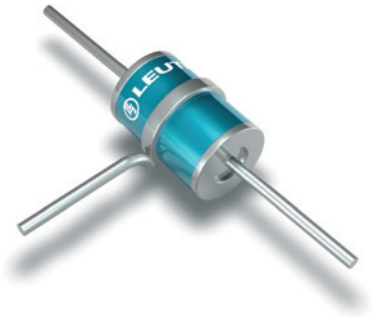
Measurements mm / Executions



Series 3ET..(Q)

- 3-pole
- Ø 6 x L 8 mm
- 10 kA/10 A
- Medium Duty Arrester

button type arrester



with lead wires (Q)

- **High quality industrial ceramics**
- **filled with inert gas, hermetically sealed**
- **no radioactivity!**
- **high impulse current resistance 10kA**
- **highly reliable**
- **stable functioning**
- **long service life**

Description

LEUTRON GDT surge Arrester series 3ET..(Q) are hermetically encapsulated medium duty high performance spark gaps in metal/ceramics execution, filled with inert gas.
The one-chamber system achieves:
a.) a faster potential equalisation between the two wires of a line .
b.) a faster response of the arrester.
With or without tin-plated lead wires (Q), with or without Fail-safe (FS). Optional thermal FS-indicator (Thermo Paint). Because of tinned surface, the button type arrester can be soldered directly to SMD board.

Application

For the medium lightning and surge protection on smallest place.
To be used as a universal solderable Ø6 x 8mm
3-pole arrester for medium duty protection of elec-tronic systems and equipments.
More easy maintenance by optional thermal FS indicator (Thermo-Paint).

Specification

Executions	Type code- Order No.		
Button type arrester, pluggable, surface tin-plated	**3ET 90** **95 13 00**	**3ET 230** **95 13 03**	**3ET 350** **95 13 06**
Button type arrester, pluggable, tin-plated,+external. FS	**3ET 90F** auf Anfrage	**3ET 230F** auf Anfrage	**3ET 350F** auf Anfrage
Tin-plated lead wires	**3ET 90 Q** **95 13 01**	**3ET230 Q** **95 13 04**	**3ET 350 Q** **95 13 07**
Tin-plated lead wires + external. Fail - safe	**3ET 90F1 Q** auf Anfrage	**3ET 230F1 Q** auf Anfrage	**3ET 350F1 Q** auf Anfrage
Remark: - other voltages and executions on request.	Option: F1T…..FS with thermal FS indicator (Thermo-Paint)		

Technical Data

Terms in accordance with: ITU – T K12. / DIN 57845 / VDE 0845 / CEI - IEC 61647 – 1 / IEEE C 62.31						
Nominal DC spark-over voltage at 100V/s	V_{sdcN}	[V DC]		90	230	350
Tolerance of V_{sdcN}		± [%]		20		
Impulse spark- over voltage, typical value	V_{si}	100V/µs 1kV/µs	[V GS] [V DC]	< 300 < 380	< 350 < 420	< 650 < 700
Nominal impulse discharge surge current	(i_{dIN})	[kA]		10	Total value through centre electrode, half value through side electrode	
Single impulse discharge surge current	I_{max}	[kA]		10		
Nominal alternating discharge current	I_{daN}	[A]		10	Total value through centre electrode, half value through side electrode	
AC discharge current 9 cycles, 50cps	I_w	[A]		30		
Impulse life	DI	10/700µs 10/1000µs		on request		
Glow voltage (average at 10mA)	U_{gl}	[V]		~ 60	~ 200	
Arc - voltage at 1A	U_{bo}	[V]		~ 10	~ 30	
Glow-to arc transition current		[A]		~ 1		
Insulation resistance	R_{is}	[GΩ]		> 10		
Capacitance at 1MHz	C	[pF]		< 1,5		
Climatic category, relative humidity				40/90/21, 10%....95% rh (DIN IEC 60068 – 1)		
Operating / storage temperature range		[°C]		- 40 °C…..+90 °C		
Net weight / pc		[g]		ca. 1,2 g; 1,6 with Fail - safe		
Measurements		[mm]		Ø6mm ±0,1 x L8,1mm ±0,2/ Ø1mm pins, tin-plated		

Marking

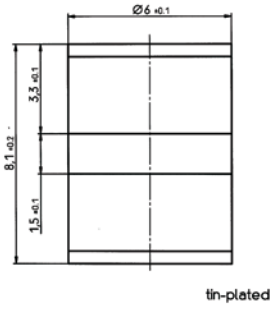
LEUTRON
3ET 230F1T Q YY

3 - / 3 electrodes
ET -type series, 3 - pole 10kA,
230 - nominal DC spark-over voltage
F(1) / (upper) Fail – safe
T /FS indicator (thermo paint)
Q - / lead wires
YY - / year of production

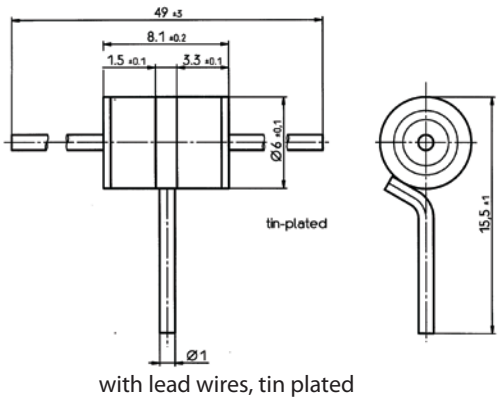
Marking / background: **white / blue**

RoHS 2011/65/EU

Measurements mm / Executions



button type arrester



with lead wires, tin plated

TelPro LSA 2/10

Lightning and surge voltage protection for telecommunications and data line systems Surge voltage protection for LSA (IDC) connector technology

for lightning protection equipotential bonding in telecommunications networks, data lines and process measuring and control equipment

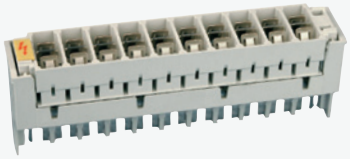
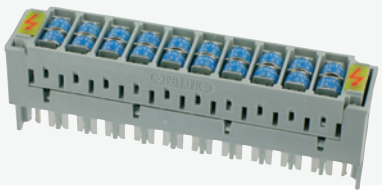
- Magazines for/with 2-electrode or 3-electrode arresters (GDT), with or without fail-safe device
- High contact safety due to silver-plated and passivated contact surfaces made of non-flameable PBT according to UL 94-V0
- Universally pluggable onto other LSA 2/10 systems (i.e. producer ADC-KRONE, 3M-Quante, RXS-CORNING, etc)
- Available as complete set with either 10kA or 20kA LEUTRON surge arresters
- Available as complete set with LSA connection modules including accessories
- Meets the specifications of Deutsche Telekom AG and other renowned telecommunications companies

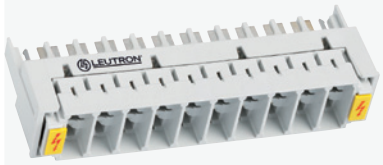
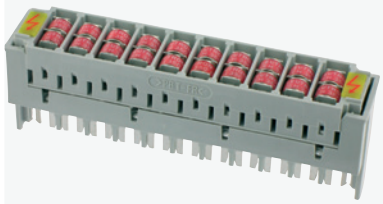
Product description

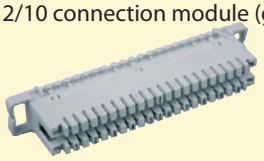
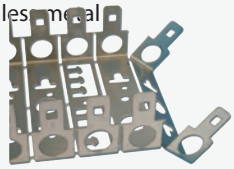
Complete surge voltage protection for telecommunications, data, signal and process measuring and control lines. Includes LSA connection modules, also called IDC / Insulation Displacement Connection (no soldering, no screws) as per IEC 352-4, part 4 and DIN 41 611-6-C-EL-CL. Low transition resistance due to secure gas-proof connection.

Application

LEUTRON's TelPro LSA 2/10 product line offers you a variety of protection possibilities against lightning strikes for telephone and data network systems as well as for main distribution frames (MDF) and secondary distribution units. This type of surge voltage protection including LSA technology has also proven to be very successful when used in process measuring and control systems.

Illustration	Description	Type	Article-No.
LSA surge voltage protection magazine for 2-electrode arresters, 8x6mm	Empty magazine, bare	TelPro LSA 2/10-2E 8x6	24 01 06
	fitted with 20 pcs. 8x6mm arresters, 230V 10kA, 10A	TelPro LSA-2EH230-10kA	24 01 13
	fitted with 20 pcs 8x6mm arresters, 230V 10kA, 10A, with integrated fail-safe	TelPro LSA-2EH230F-10kA	24 01 14
	fitted with 20 pcs 8x6mm arresters, 230V 20kA, 20A	TelPro LSA-2EL230-20kA	24 01 15
	fitted with 20 pcs 8x6mm arresters, 350V 10kA, 10A	TelPro LSA-2EH350-10kA	24 01 16
	fitted with 20 pcs 8x6mm arresters, 90V 10kA, 10A	TelPro LSA-2EH90-10kA	24 01 17

LSA surge voltage protection magazine for 3-electrode arresters, 8x13(10)mm	Empty magazine, bare	TelPro LSA 2/10-3E 8x13	24 01 18
	fitted with 10 pcs 8x13(10)mm arresters, 230V 10kA, 10A	TelPro LSA-3EH230E-10kA	24 01 19
	fitted with 10 pcs 8x13(10)mm arresters, 230V 10kA + FS	TelPro LSA-3EH230F1E-10kA	24 01 23
	fitted with 10 pcs 8x13(10)mm arresters, 230V 20kA, 20A	TelPro LSA-3EL230E-20kA	24 01 24
	fitted with 10 pcs 8x13(10)mm arresters, 230V 20kA +FS	TelPro LSA-3EL230F1E-20kA	24 01 25
	fitted with 10 pcs 8x13(10)mm arresters, 90V 10kA	TelPro LSA-3EH90E-10kA	24 01 26
	fitted with 10 pcs 8x13(10)mm arresters, 90V 10kA + FS	TelPro LSA-3EH90F1E-10kA	24 01 27
LSA surge voltage protection magazine for 2-electrode arresters, 8x20mm	Empty magazine, bare	TelPro LSA 2/10-2E 8x20	24 01 28
	fitted with 20 pcs 8x20mm arresters, 230V 20kA, 20A	TelPro LSA-2EY230-20kA	24 01 29
	fitted with 20 pcs 8x20mm arresters, 90V 20kA, 20A	TelPro LSA-2EY90-20kA	24 01 31
	fitted with 20 pcs 8x20mm arresters 350V 20kA, 20A	TelPro LSA-2EY350-20kA	24 01 32
LSA 2/10 magazine cover (transparent plastic) 	Magazine cover – For protection against dust and unwanted contact and visual inspection of the arrester	LSA 2/10 AD	24 01 09
LSA 2/10 hinged label holder (plastic) 	Label holder for LSA 2/10 connection modules and surge voltage protection magazines	LSA 2/10 KSR	24 01 08
LSA-1DA PTC surge current protection 	1DA single wire protection with PTC 145mA Installation: Plug into connection modules on the front. Installation height ca 20mm from top surface of connection module.	DPA-LSA-1DA-PTC	24 01 22

Combined LSA-1DA PTC-surge current and surge voltage protector with fail-safe 	1DA single wire protection with PTC 145mA and 3-electrode arrester + FS Max 180V DC/110V AC, PTC max 3A ÜsAg 10kA, 10A Installation: Plug directly into LSA connection modules, type series 2; grounding via grounding-rail LSA 2/10 –ES Installation height ca. 32mm from top surface of connection module	DPA-LSA-1DA-180FS-PTC	24 01 20
LSA 2/10 grounding rail 	pluggable grounding-rail For 10DA connection modules serving as connection between LSA backmount frame and 1 DA surge voltage (+surge current) – protection connector Installation: Plug into front connection modules, bonding to ground via LSA backmount frame		
LSA 10DA surge voltage fine protection 	10 DA Surge voltage protection with 3-electrode arrester + SID Supressor diode circuit. Can be plugged directly into LSA construction type series 2 connection modules (in place of surge arrester magazine); max. 180V DC/110V AC, Arresters: 10kA, 10A , bonding to ground via LSA backmount frame		24 01 40
Combined LSA 10DA surge current and surge voltage fine protection 	10 DA surge voltage and surge current protection with 3-electrode arrester + SID and PTC Suppressor diode circuit plus PTC 145mA surge current protection. Can be plugged directly into LSA connection modules con-struction type series 2 (in place of surge arrester magazine); max. 180V DC/110V AC, arrester: 10kA, 10A bonding to ground via backmount frame		24 01 42
LSA 2/10 connection module (grey) 	LSA connection module 10DA (max. 10kA) Circuit system: 1 solid wire 0.4-0.8mm, AWG 26-20 2 solid wire 0.4-0.65mm, WG 26-22 Multistrand conductor (one per slot) 7 x 0.12-0.32mm AWG 28-20		24 01 00
LSA 2/10 disconnection module (white) 	LSA disconnection module 10DA (max. 5kA) LSA backmount frame Connection wire options: Solid wire 1 solid wire 0.4 -0.8mm, AWG 26-20 2 solid wires 0.4-0.65mm, WG 26-22 Multistrand conductor (one per slot); 7 x 0.12-0.32mm, AWG 28-20		24 01 02
LSA 2/38 ground module (red) 	**LSA ground module for 38 wires** Ground wire rail with ring terminal for connection to PAS Ground wire 500mm, yellow/green Ground wire 500mm, red	**LSA 2/10–ER38-ge/gn** **LSA 2/10–ER38-rot**	24 01 34 24 01 04
LSA backmount frame 10x 10DA (modular) stainless metal 	**Plug space for 10 pcs of LSA 2/10 10DA connection modules (Σ 100DA)** (grounding of 1 DA protection modules via optional grounding rail…see accessories) 25mm grid / depth 22mm Easily detachable upon individual require-ments, available up to a size of 78 connection modules (780DA). Other grid and depth types upon request. **Grounding**: Whole backmount frame or single 10DA frame must be either grounded or connected to the electronic equipotential bonding bar via the ground module.		
LSA edge protection profile for backmount frame (plastic) 	Edge protection profile Made from plastic, used as cover for spare plug spaces, protection from injuries Length 120mm (can be cut in any length as required)	**LSA 2/10 KS-120**	24 01 36
LSA 2/10 Din rail adapter 	adapter metal line with M5 screw thread (without screw) Used to fix backmount frame or connection modules onto 35mm DIN rails	**LSA-DIN ADAPT**	24 01 37

Technical Data

Type LSA 2/10 surge voltage protection magazines for/with 2- and 3-electrode arresters and connection modules for single wire protection (1DA), including many accessories.

Application surge voltage protection of telecom-, data and signal lines (process measuring and control equipment), suitable for use according to the lightning-protection-zone conception at 01–1 zones and higher.

The following technical requirements either meet or exceed the standards of Deutsche Telekom AG.
These LSA-connection modules allow you to use unshielded or shielded twin wire or tetra wire cables.

General technical data:
Climatic conditions: either dry or wet without condensation:

- Storage temperature range -40°C up to +90°C (+40°F up to +194°F)
- Operational temperature range -20°C up to +80°C (+4°F up to +176°F)

Mechanical values:

- LSA connection modules, with LSA-contacts for plastic-insulated copper conductors with solid or stranded tin-plated copper wires
- (strand), for isolation displacement connections (IDC) according to IEC 352-4, part 4 and DIN 41 611-6-C-EL-CL

Conductor specifications (conductor diameter) for connection modules:

- Solid wire, 1-wire connection 0.40 up to 0.80mm*), AWG 26 up to 20
- Solid wire for 2-wire circuits of identical diameter and type 0.40 up to 0.65mm, AWG 26 up to 22
- Tin-plated strand for single circuit 7x0.12 bis 0.32mm, AWG

Further connectable strand types upon request!

- Outside diameter (PVC or PE insulation) unstranded da=0.70.up to 1.60mm
- Special connection module execution for da=1.60 up to max. 2.70mm**)
- Number of connectable identical wires per contact slot max.2

*) after connecting > 0,65mm no longer suitable for smaller conductor diameters!
**) Special types for data lines with thicker insulation sheathing available.

Repeatability of connections:

- When connected to strand or solid conductors of 0.40 up to 0.65mm: min. 200 times
- When connected to solid conductors of 0.80mm: min.= 50 times

Plug-in repeatability of 10DA magazines without contact failures.

- In case of pluggable magazines for 2-electrode resp 3-electrode-arresters: min. 25 times

- Plastic parts PBT
- Inflammability of plastic parts according to UL 94 V - 0
- Contact spring to connection modules and arrester magazines : high-strength brass, silver-plated in contact area > 0.5µm

Electrical values of connection modules (after four days' storage at constant climate at +40°C resp. 104°F and 93% rel. humidity

- Insulation resistivity > 5x 104MΩ
- AC voltage resistivity $2kV_{eff}$
- Impulse withstand voltage (1,2/50µs wave) 3.6kV
- permitted impulse current load to LSA-contact (8/20µs) equivalent to current handling capability of the connected wire
- permitted impulse current to connection module (8/20µs) 10kA (at conductor diameter > 0,60mm)
- permitted impulse current load to LSA disconnection module (8/20µs) 5kA

Contact resistance (wire connection)

- Typical 1 mΩ
- Guaranteed < 2.5mΩ
- Joint resistance including disconnection unit < 10mΩ

Electrical values for magazines fitted with LEUTRON surge arresters, when plugged in connection modules

- Permitted C2 nom. impulse discharge current load IdiN per wire for 2-electrode-arrester magazine***) max 20kA, 8/20µs wave, wireground
- Permitted C2 nom. impulse discharge current load IdiN per wire for 3-clectrode-arrester magazines***) max 10kA
- Lightning impulse discharge current resistivity, 10/350µs wave, at 2EL 230 (20kA 8/20µs) 5kA
- Lightning impulse discharge current resistivity, 10/350µs wave, at 3EL 230 3kA
- AC current resistivity acc. to DIN VDE 0845 part 5-1, pt 7.8 (2EH 230...F) 10A, 50Hz

AC current resistivity acc. to DIN VDE 0845 part 5-1, pt 7.8 (2EL 230, 3EL 230..F E)	20A, 50Hz
Contact resistance per contact acc. to IEC 60512-2-2-2a	< 5mΩ
Nominal voltage VN	110V
Max. continuous voltage DC...Vc	180V
Max. continuous voltage AC...Vc	127V
Protection level Ad-Ad at 1 kV/µs C3 Up for 3-electrode magazines with 3EL 230 arresters	< 450V
Protection level Ad-Ad at 1 kV/µs C3 Up for 2-electrode magazines with 2EH 230 (F) arresters	< 550V
Protection level Ad-Ad at 1 kV/µs C3 Up for 3-electrode magazines with 3EL 230 arresters	< 450V
Response time at voltage rise dV/dt 2kV/µs	< 50ns
Voltage resistivity acc. to DIN IEC 60512-2-4a	1kV, 50Hz, 1min
Impulse withstand voltage 10/700µs (wire-wire; wire-ground) EC EN 60950	4.000V
Insulation resistivity (50V; Ri) DIN VDE 0845 part 5-1	10.000 MΩ
Capacitance (wire-ground) DIN VDE 0845 part 5-1	< 1,5pF bei 1MHz
Contact reliability acc. to DIN IEC 60512-2-9a	> 25

You can find the available plug types and other data for our arresters on the separate product data sheet.

***) It is advantageous to equip the magazines with 20kA arresters per wire as this leads to a significantly longer service life of the arrester and to a reduction of electrical damages. The connector rails however are designed for max. 10kA, wave 8/20µs. per wire and might be damaged if exposed to 2x 20kA (40kA for 1 DA against ground).

Mechanical values of equipped and plugged surge voltage protection magazines

Vibration resistivity acc. to DIN EN 60068-2-6	vibration 5g, 10-500Hz; 1 octave/minute, 15 cycles/room axis 10-55Hz, amplitude 0.75mm;
Impulse resistivity acc. to DIN EN 60068-2-6	5g at 55-500Hz

Transmission values when using either shielded or unshielded cables:
The LSA-connection modules (incl. or excl. surge voltage arrester magazines) are suitable for the following communications applications:

Ethernet (10baseT) with 10Mbit/s
Token Ring with 4 or 16Mbit/s
TPDDI with 100Mbit/s
Analogous and digital telecommunications services
other data and communication services

Values acc. to EIA / TIA 568 standard test procedure

Isertion loss (IL) Return loss (RL)

frequency MHz	required values per KAT 5	LSA-connection module	frequency MHz	required values per KAT 5	LSA-connection module
20	< 0,2 dB	< 0,1 dB	20	< 54 dB	< 59 dB
100	< 0,4 dB	< 0,2 dB	100	< 40 dB	< 42 dB

Remark

Surge voltage arrester magazines, connection- and disconnection modules, backmount frame suitable for LSA 2/8 (8DA) are available on request. Please contact our Technical Service under +49 711 / 947 71 -82 DW.

LSA wire insertion tools and arrester test equipment: further documents available on request!

Functional test equipment for SPD and isolating spark-gaps based on spark gap technology

H35 is suitable for simple functional testing of surge voltage arresters based on gas-filled spark-gap technology.

Product description
SPD tester H35 is suitable for a quick functional test of lightning and Surge Protective Devices (SPD) such as Leutron PowerPro and IsoPro, Leutron isolating spark-gaps such as TSF-, TA- und TC-types and small gas discharge tubes (GDT).

Technical Data:

Mobile functional test device for lightning and surge protective pevices based on spark-gap technology

Type		**H35**
Article No.:		**87 00 10**
Measuring range	[V]	40-1000
Test current	[mA]	typ. 0,1
Resolution	[V]	1
Rate of voltage rise	[V/ms]	20
Battery	9V IEC 22 ()	
External power pack	81VDC / 300mA	
typ. current consumption in stand-by mode	[mA]	0.2
typ. current consumption during measuring	[mA]	35
Operating temperature range	[°C]	-20 … +80
Dimensions (L x B x H) / weight	[mm] / [g]	180 x 90 x 30 / ca. 400
Housing material	High performance plastic	

Accessories			
Type:	/dimensions L x B x H [mm]	weight	Articel-No.:
Ever-Ready case (s.b.)	300 x 100 x 110	ca. 350g	87 00 40
Test cable kit	-	-	87 00 50
Connector power pack	80 x 80 x 60	250g	87 00 80
/Calibration	-	-	87 00 30
Test adapter ADE/FGH	45 x 30 x 50	ca. 50g	87 00 60
Test adapter ADE/E	45 x 30 x 50	ca. 50g	87 00 70

Test adapter ADE/FG H
for 2-pole gas discharge tubes 8x8mm, 8x6mm and 8x20mm

Test adapter ADE/E for
type E gas discharge tubes

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SURGE PROTECTION

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