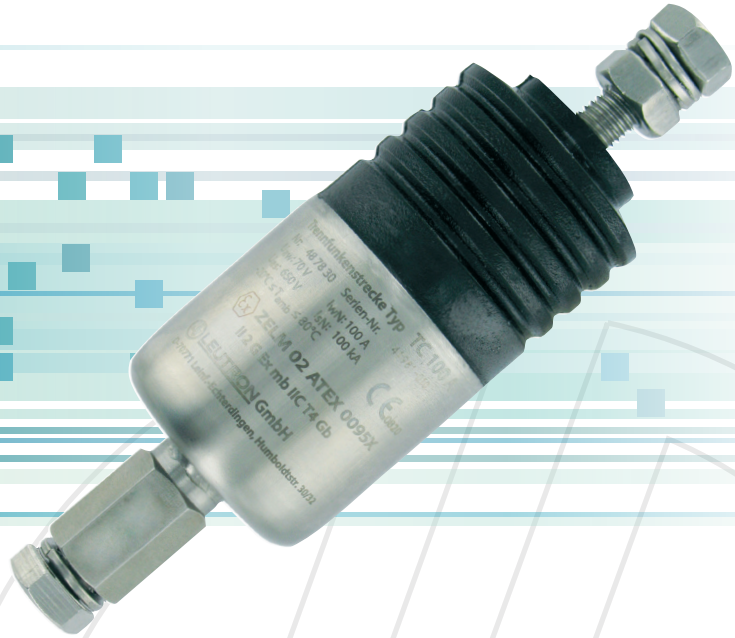
PRODUCT INFORMATION TC 100 A AND TC 500 A



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Leinfelden-Echterdingen, 21.04.2016

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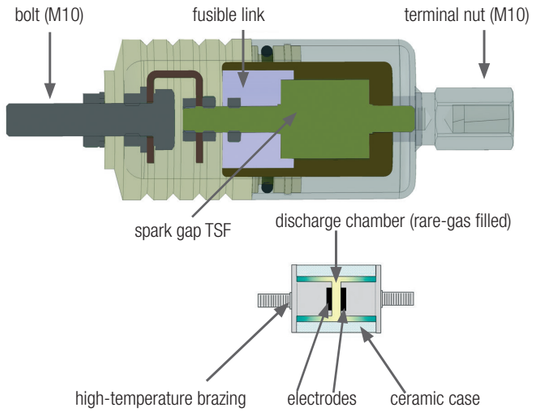
1. Design and function of isolating spark gaps

When an overvoltage occurs, e.g. caused by lightning stroke, isolating spark gaps form a connection between earthing installations and parts of the equipment, which normally are galvanically separated. This equipotential bonding (lightning equipotential bonding, IEC/DIN EN 62305-3) reduces the potential differences caused by the lightning current.

1.1 Design of isolating spark gap TC 100 A and TC 500 A



Leutron isolation spark gaps consist of intelligently designed components built from quality materials. They are manufactured with the help of vacuum technology and other special procedures. A thoroughly monitored compliance with the narrow tolerances of the metal and ceramic construction parts are essential for always stable characteristics of all Leutron products.

1.2 Function

An isolation spark gap is a gas- or air-filled room enabling a discharge between two conductors (electrodes). When the potential difference between the two electrodes increases, the tension finally reaches the break-through voltage where the resulting electrical field causes the ionization of the gas within the gap. The gas becomes electrically conductive and the gap is bridged by a spark for fractions of a microsecond due to collision ionization.

The optimal choice of the rare-gas filling for the discharge chamber and the use of a well-suited expansion alloy for the electrodes are other important factors for reliability and quality.

2. Special features of Leutron isolating spark gaps

Rare-gas filled isolation spark gaps have properties superior to spark gaps in air. Some of the advantages are:

- Low DC and AC voltage protection level
- Significant improvement of operator protection
- Very high ignition constancy, even after stress events with impulse and AC currents
- Sparkover voltage totally independent of atmospheric air pressure and ambient humidity
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- Low mounting space requirements because no security distance is required
- No influence of corrosion on discharge characteristics due to rare-gas filling and high-temperature brazing
- Extremely high impulse and AC current carrying capacity
- Long service life with stable characteristics
- Double fail-safe (short-circuit) at overload and therefore continuity of protection for the installation against subsequent lightning strikes

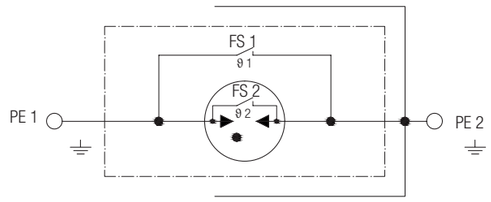


Fig.: Fail-safe 1 (FS 1) and Fail-safe 2 (FS 2) internal short-circuit

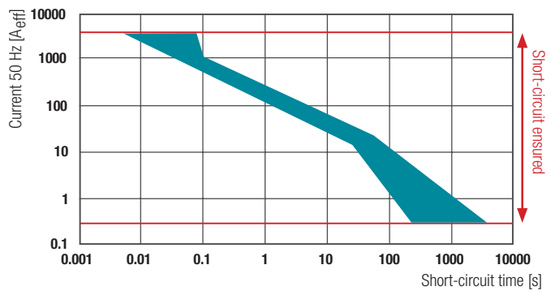


Fig.: Fail-safe temperature profile of the fusible element plotted over current/ time

After triggering of the fail-safe the isolation spark gap has to be replaced.

3. Technical specification

3.1 Mechanical properties

- Degree of protection IP 67 (dust-proof, with defined immersion)
- Dimensions (Ø x L): approx. 49 x 127 (total 160) mm
- Terminal connection: M10 bolt/nut (NIROSTA stainless steel)
- Casting compound: ARATHANE® CW 5631

3.2 Electrical properties

- Lightning impulse current (10/350µs): 75 kA
- Lightning current carrying capacity class according to EN 62561-3:2013-02
- Nominal discharge current (8/20µs) In: 100 kA
- 100% lightning impulse sparkover voltage: < 950 V (TC 100 A) / < 1300 V (TC 500 A)
- AC sparkover voltage (50Hz) Uaw: < 70V (TC 100 A) / < 350V (TC 500 A)

3.3 Environment

- Operating temperature range: $-20°C \leq T_{amb} \leq 80°C$
- Relative humity: 10% …95% rh

3.4 Applied standards

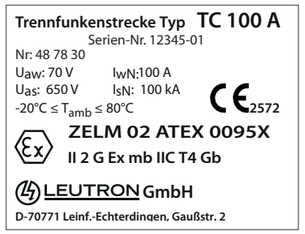
- DIN EN 60079-0:2012 + A11:2013 Explosionsgefährdete Bereiche: Betriebsmittel - Allgemeine Anforderungen
  Explosive atmospheres: equipment – general requirements
- DIN EN 60079-18:2015 Explosionsgefährdete Bereiche: Geräteschutz durch Vergusskapselung „m“
  Explosive atmospheres: equipment protection by encapsulation „m“
- DIN EN 62561-3: 2013-02; VDE 0185-561-3: 2013-02 Blitzschutzsystembauteile (LPSC): Anforderungen an Trennfunkenstrecken
  Lightning Protection System Components (LPSC): requirements concerning isolation spark gaps
- DIN EN 61643-11:2013-04; VDE 0675-6-11:2013-04 Überspannungsschutzgeräte für Niederspannung: Überspannungsschutzgeräte für den Einsatz in Niederspannungsanlagen - Anforderungen und Prüfungen
  Surge protective devices for low voltages: surge protective devices for application in low-voltage systems – requirements and testing

4. Routine tests

The isolation spark gaps TC 100 A und TC 500 A undergo a 100% electrical final testing. For the testing an automatic inspection and test unit E55B224 with a test adapter TC is used. The test unit is regularly calibrated and the calibration certifications are available.

5. Identification

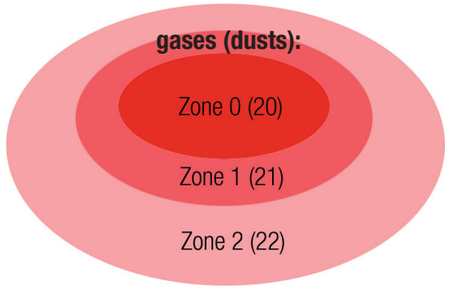
Nameplate TC 100 A and TC 500 A:



6. Protection against explosion

6.1 Zone categorization for gases and vapours (dusts):

Zone 0 (20): Constantly over long periods or often
Zone 1 (21): Occasional occurrence
Zone 2 (22): normally not; otherwise, for short periods only

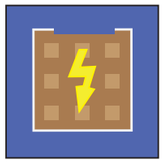


6.2 Ignition protection type (gas)

Degree of protection	Sign	Zone	Device category	EN-standard
increased safety	e	1 o. 2	2 o. 3	60079-7
intrinsic safety	ia, ib, ic	0*, 1** o. 3	1*, 2**, o. 3	60079-11
over-pressure encapsulation	p	1 o. 2	2 o. 3	60079-2
oil immersion	o	1 o. 2	2 o. 3	50015
powder filling	q	1 o. 2	2 o. 3	50017
explosion-proof enclosure	d	1 o. 2	2 o. 3	60079-1
casting encapsulation	**mb**	**1 o. 2**	**2 o. 3**	**60079-18**
protection against ignition	n	2	3	60079-15

* only ia, ** only ia and ib

6.3 Encapsulation „m“ (according to IEC) for TC 100 A and TC 500 A



Parts which could ignite an explosive atmosphere are encapsulated in a casting compound, which prevents an ignition of the explosive atmosphere. Electrical equipment can not ignite the surrounding explosive atmosphere (neither in normal operation nor under defined abnormal operation conditions).

Main application: mb = application in zone 1 or 2

6.4 Labelling according to ATEX directives of EN 60079: Gases

II	2	G	Ex	mb	IIC	T4	Gb
1	2	3	4	5	6	7	8

1 Product group: II, according to 94/9/EG (European ATEX directive)
2 Product category: 2, gases, mists, and vapours occur infrequently and for short periods only
3 Gas (G)
Part 2+3 (2 G): high protection level
4 Labelling for explosion proof equipment: Ex
5 Encapsulated (moulding) zone 1 or 2
6 Explosion group (gas)
7 Temperature class (= 135°C)
8 Equipment protection level Gb (EPL gas: high)

LEUTRON®

RARE-GAS-FILLED INSULATING SPARK GAPS

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