Siemens A81-C90X Gas-Filled Surge Arrester Overview

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Siemens A81-C90X Gas-Filled Surge Arrester Overview

The **A81-C90X** is a **gas discharge tube (GDT)** surge arrester manufactured by Siemens (TDK Electronics AG) for industrial and professional electronics applications. It is a **2-electrode, hermetically sealed** device filled with noble gas, designed to protect sensitive circuits from voltage surges [A81-C90X TDK | Mouser] & [Surge arresters, A81-C90X-X1380] & [digchips.com]

A81 C90x X1380s102
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Key Specifications

- **Nominal DC sparkover voltage:** 90 V ± 20%

- **Impulse sparkover voltage:**
  - ≤ 500 V at 100 V/µs (typical at 1 kV/µs)

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- **Peak pulse current rating:** 25 kA
- **Service life:**
  - 300 operations at 10/1000 µs
  - 10 operations at 8/20 µs
- **Insulation resistance:** > 10 GΩ at 50 V DC
- **Capacitance:** < 1.5 pF at 1 MHz
- **Arc voltage at 1 A:** ~15 V
- **Glow to arc transition current:** < 0.5 A
- **Glow voltage:** ~60 V
- **Dimensions:** Ø 8 mm × 6.05 mm
- **Weight:** ~1.5 g
- **Operating temperature range:** −40 °C to +125 °C
- **Climatic category:** IEC 60068-1, 40/125/21
- **Certifications:** UL 497B, RoHS-compliant

Features

- **Fast response time** to voltage surges
- **Very low capacitance** for minimal circuit loading

- **High insulation resistance** for long-term stability
- **Stable performance** over its operational life
- **RoHS-compliant** for environmentally friendly manufacturing

Applications

- **Telecom systems** (tower-mounted amplifiers, alarm systems)
- **Consumer electronics**
- **Industrial electronics** requiring surge protection

Notes

- The A81-C90X is a **heavy-duty GDT** suitable for AC powerline class II/III protection in telecom and industrial contexts.
- It is **not** a failsafe-type device; it will conduct during a surge and must be replaced after operation.
- Always ensure the surge arrester's sparkover voltage is below the maximum operating voltage of the protected circuit to avoid unintended conduction.

If you need to source one, it is available from surplus/electronic component distributors such as **Radio741** and **Mouser** (availability may vary by region)

A81-C90X Siemens Surge Arrester 25kA 90V 8×6.05mm **— eBay**

A81-C90X Siemens Surge Arrester 25kA 90V 8×6.05mm — radio741

When was the gas filled surge arrester invented and by whom?

Invention of the Gas-Filled Surge Arrester

The modern gas-filled surge arrester concept evolved from earlier gas discharge devices, but a key advancement came in the **1970s** with patents that improved response time and reliability.

One of the earliest notable developments was the **1975 patent by General Instrument Corporation** (U.S. Patent No. 4,084,208), which described an improved gas-filled surge arrester with a faster response to rapidly rising voltages. This design used two electrodes with a small gap, filled with gas, to switch from high to low impedance when a preset breakdown voltage was reached, addressing the lag seen in earlier devices Justia Patents Search.

A significant refinement came in **1978** with a patent from **Reliable Electric Company** (U.S. Patent No. 4,104,693), which introduced a gas-filled surge arrester with high electron emission materials on the electrodes to facilitate faster arc initiation. This design was aimed at protecting communication circuits from lightning and power faults Google Patents.

Later, in **1983**, **Reliance Electric Company** (inventor **Toshiharu Toda**) filed a patent (U.S. Patent No. 4,491,893) that further optimized the device for extremely fast response to rapidly increasing surge voltages. This version used a discharge gap of 0.02–0.25 mm, high electron emission materials, and a gas mixture of noble gases ***with up to 20% hydrogen to improve performance***.

This should be a non-mild hint to suggest that the addition of hydrogen is what sets surge arresters apart from gas-filled indicator lamps. Hydrogen was used by Stanley Meyer to kickstart the ignition of his onsite production of ammonia and hydrazine, because ammonia is difficult to ignite while hydrogen lacks sufficient explosive force to accelerate a vehicle up a hill. He derived his ammonia from atmospheric nitrogen and decomposed water with hydrogen and oxygen left over to ignite the ammonia:

$$N_2 + 4(H_2O) = 2(NH_3) + H_2 + 2(O_2)$$

Summary:

- **1975** – General Instrument Corporation improved gas-filled surge arrester response time.
- **1978** – Reliable Electric Company introduced high electron emission electrode designs.
- **1983** – Reliance Electric Company (Toshiharu Toda) developed a high-speed gas-filled surge arrester with optimized gas composition and gap size.

These patents mark the progression from early gas discharge tubes to the modern, high-speed gas-filled surge arresters used today.

U.S. Patent for Gas filled surge arrester Patent (Patent # 4,491,893 issued January 1, 1985) - Justia Patents Search

US4491893A - Gas filled surge arrester - Google Patents - download/view

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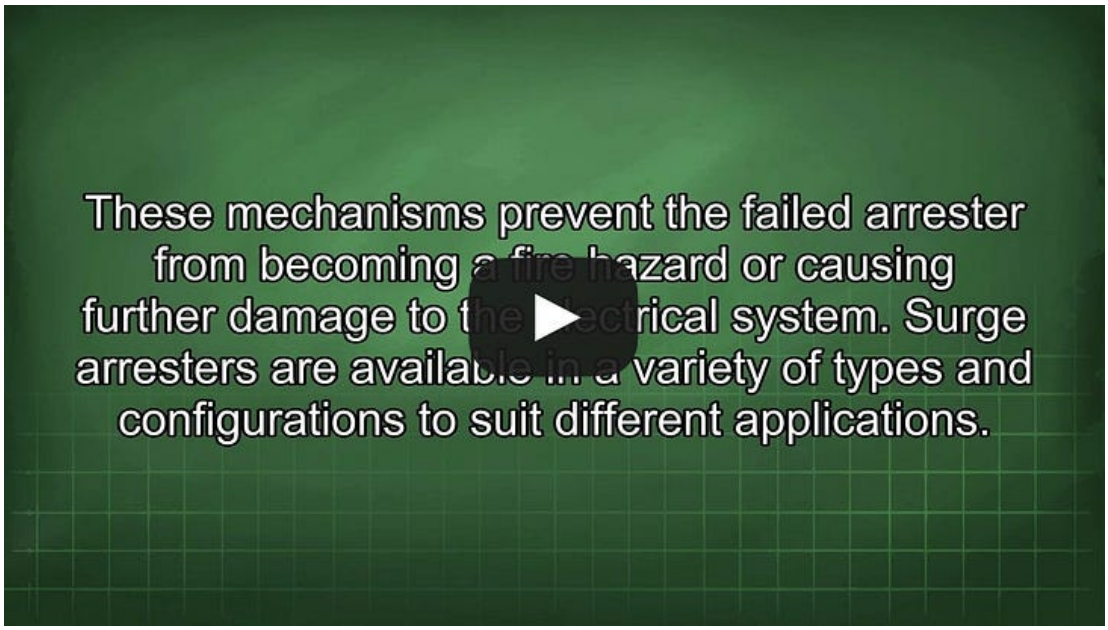


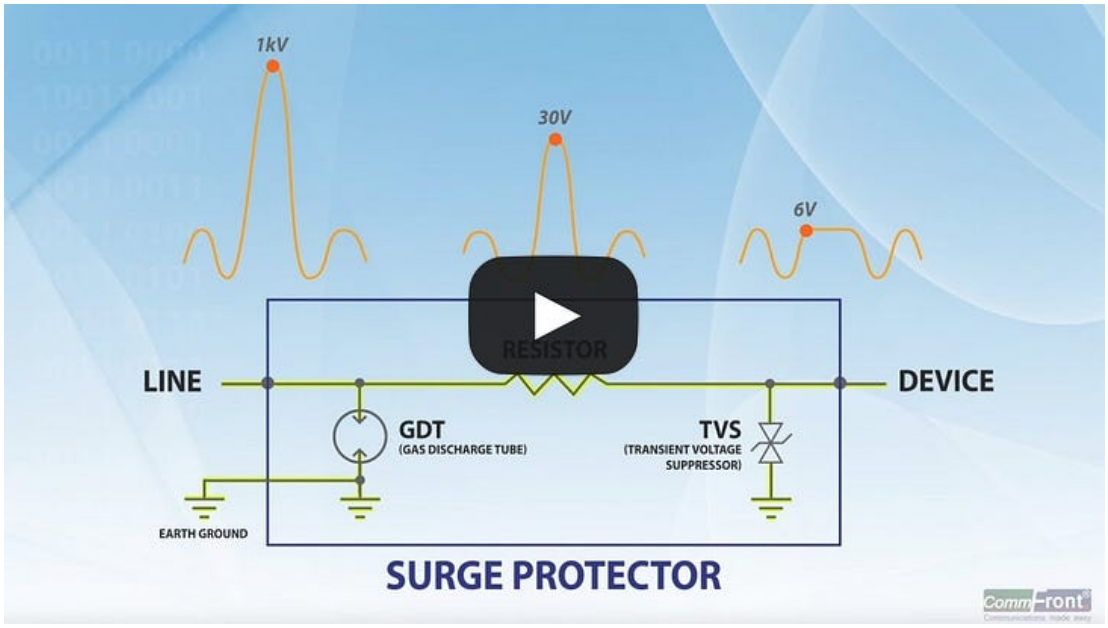
So, it's obvious from this YouTube discussion, that the whole point of a surge arrester is to carry a surge to ground as quickly as possible and away from the electrical equipment it is intended to protect.

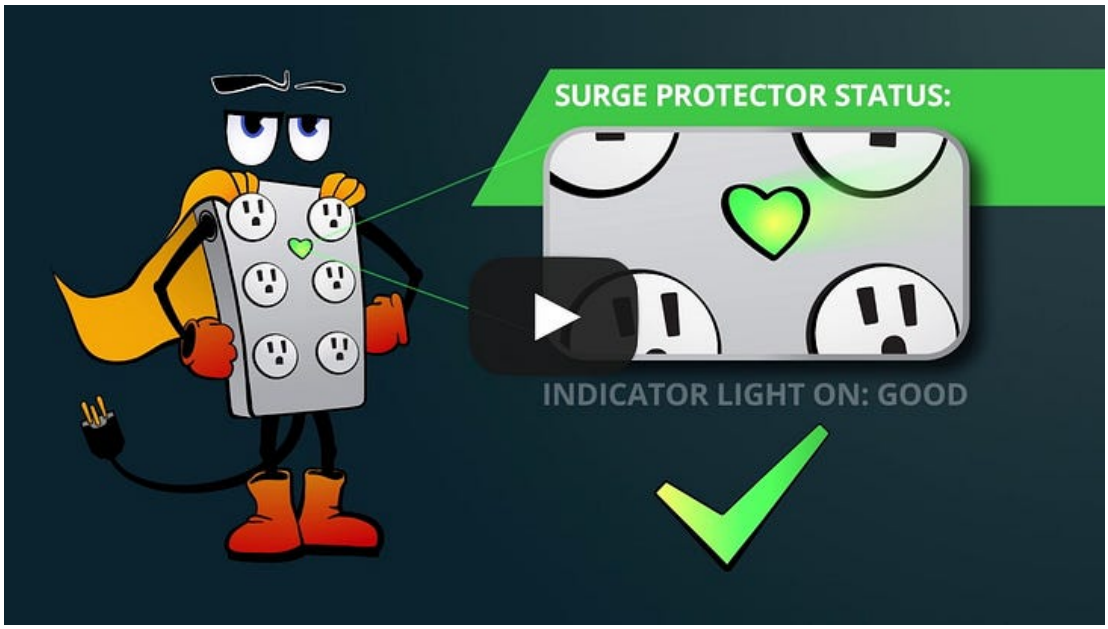
Yet, I don't connect my use of a surge arrester — within the context of my Konzen posts — to ground. Instead, I connect it back to itself which becomes a self-shorted, third coil on (what would otherwise have been) a 3-phase transformer core but without the core (in my case) since I'm simply lumping my three inductors together without any core material to slow down their oscillations.

This (mis)use of a surge arrester takes its salient feature, which is protection, and turns it on its head since I will be ***intensifying the surge rather than diminishing it*** due to the positive feedback of a self-shorted coil to connect the surge arrester through.

Since surge arresters are so commonplace (due to their popular demand), it is easy to find them "off-the-shelf" without having to "reinvent the wheel" so as to have to come up with our own custom-made arrester.

This is way, way cool and a big improvement over mere spark gaps and other gas-filled discharge tubes, because these lightning arresters are exactly what we need to escalate current on a low-resistance path back to itself for additional amplification.





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arrester versus arrestor - Search

The terms **“arrestor”** and **“arrester”** refer to different devices:

- **Arrestor**: This term is generally used for devices designed to stop or prevent something, often in law enforcement contexts.
- **Arrester**: This specifically refers to electrical devices that protect equipment from surge voltages, such as lightning arresters.
- In some contexts, “arrester” is used for fall arrest equipment, while “arrestor” is used for load arrest equipment.

In summary, the choice between “arrestor” and “arrester” depends on the context in which they are used.

Ask Difference
