

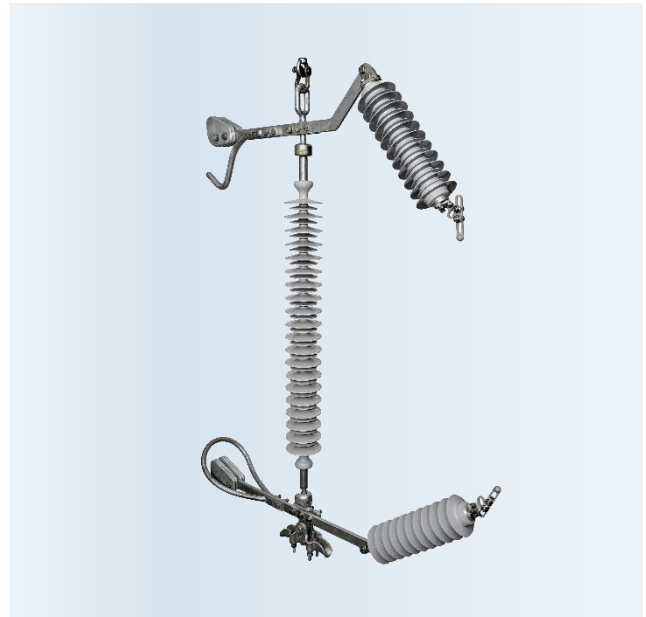
# Line surge arresters for increased system reliability



## Overvoltage protection by line surge arresters

Line surge arresters (LSA) are designed to prevent ground faults and short circuits in power lines caused by lightning or switching overvoltages. Insulator flashovers, voltage dips and interruptions are prevented by eliminating all lightning and switching overvoltages above the insulator insulation level (the lightning-impulse withstand level, or LIWL for short).

Installation of line surge arresters at recommended locations along the line in accordance with our line simulation ensures enhanced overvoltage protection. Selecting the optimum line surge arresters, especially in terms of their quantity and installation locations, significantly improves the reliability of the overall line system and the quality of power that it supplies. We offer line surge arresters with system voltages up to 800 kV and an energy discharge capability of 3.6 C.



Externally gapped line arrester (EGLA)

Non-gapped line arrester (NGLA)



## Beneficial applications of line surge arresters

- Improve lightning protection performance
- Reduce outages caused by poor grounding and high lightning activity
- Reduce double-circuit outage rates / protect underbuild distribution lines
- Provide switching surge control – structural optimization and lower clearances
- Improve safety – prevents personal injuries and damage to equipment
- For line upgrading and compaction – reduced insulation levels
- For live work on the line – temporarily reduce minimum approach distance
- Achieve lower installation costs and losses in line system (outages)

Siemens Energy offers unique line surge arresters and insulators in complete, end-to-end, technically clarified packages, providing compact, reliable and cost-optimized solutions.

## Two different LSA designs are available

### Non-Gapped Line Arresters (NGLA)

→ Directly connected to the overhead line

Non-gapped line surge arresters (NGLA) offer a high degree of mounting flexibility and operational reliability. Depending on the tower design and the arrangement of insulators and lines, these arresters can either be installed directly on the insulators or on the tower. NGLAs limit overvoltages to value levels below the insulator withstand voltage.

#### Benefits:

- Most flexible solution (installation at conductor, tower, insulator etc.)
- Offer a very high level of protection against lightning and switching overvoltages thanks to their high energy absorption capacity
- A disconnecter is installed in series that disconnects the arrester in case of thermal overload  
This ensures further operation of the overhead line until a replacement can be scheduled
- Designed and tested to comply with the latest IEC 60099-4 standard

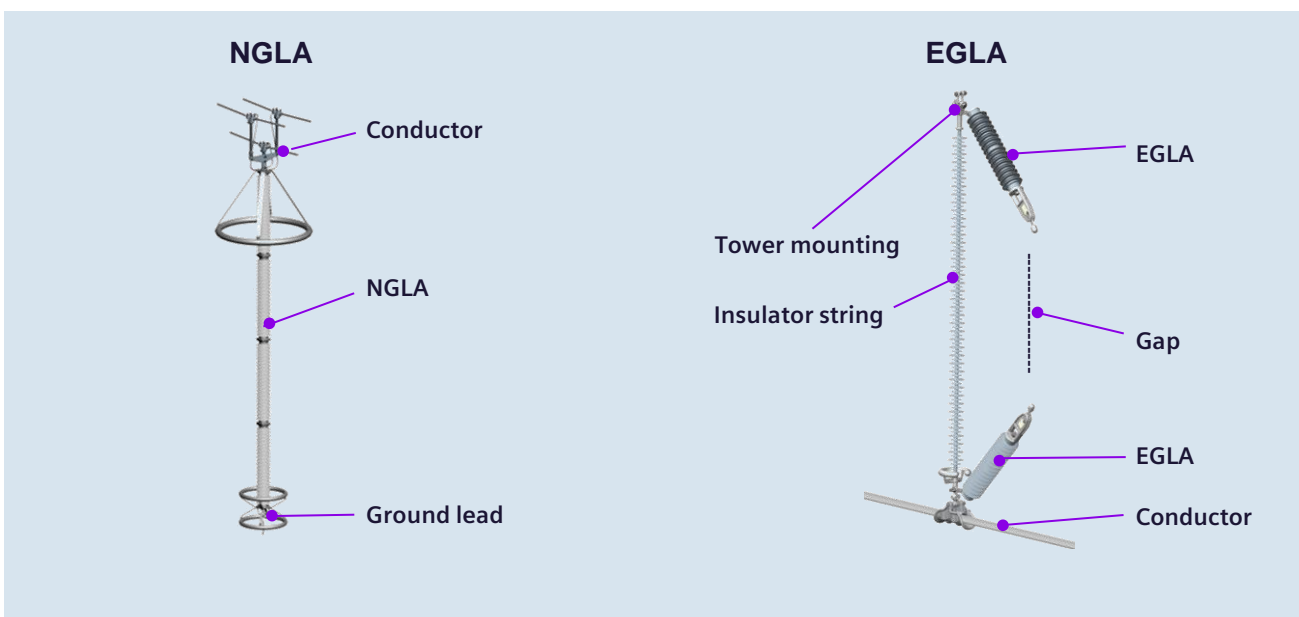
### Externally Gapped Line Arrester (EGLA)

→ Directly connected to the overhead line

Siemens Energy EGLA line surge arresters have an external series spark gap that galvanically isolates the active part of the line surge arrester from the line voltage under normal conditions. In case of lightning, the spark gap flashes over and the arrester limits the ground fault current from several kA to a few amperes, and extinguishes the arc within 10 ms such that no circuit breaker operation at both line ends is needed, i.e. no reclosing operation.

#### Benefits:

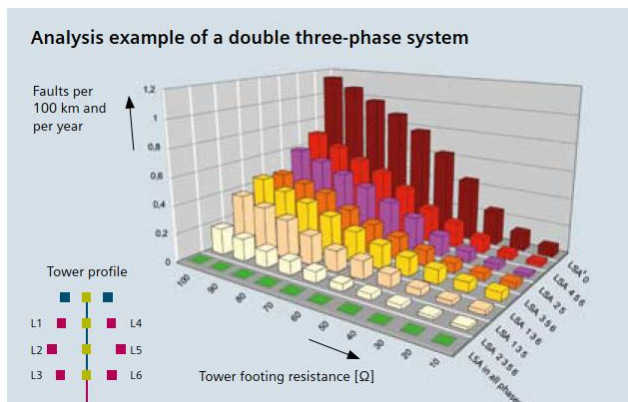
- No leakage current, since the series gap disconnects the arrester part of the EGLA – metal-oxide varistor (MOV) blocks - from the system voltage under normal service conditions
- Lower arrester rated voltage required (arrester is not energized all the time, i.e. it's insulated by the series GAP) → less material and fewer MOVs are needed
- No disconnecter and no ground lead are needed
- Suitable for multi-circuit towers with short clearances – the highly compact design of the EGLA and the absence of a ground lead allow installation and lightning protection even on towers with very small cross-arm clearances
- Better suited for live installation
- Complete EGLA solutions with polymer insulators also available
- Designed and tested to comply with the latest IEC 60099-8 standard



## Software analysis to define the optimum solution

Siemens Energy optionally offers software analysis using simulation based on Cigré studies to examine customer-specific applications and conduct preliminary testing as a way of determining the optimum, most cost-effective solution.

One particular benefit of this approach is that outstanding results can be achieved while investing only a fraction of the amount that would otherwise be required to install the maximum amount of equipment.



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