

GIS LPIT failure considerations

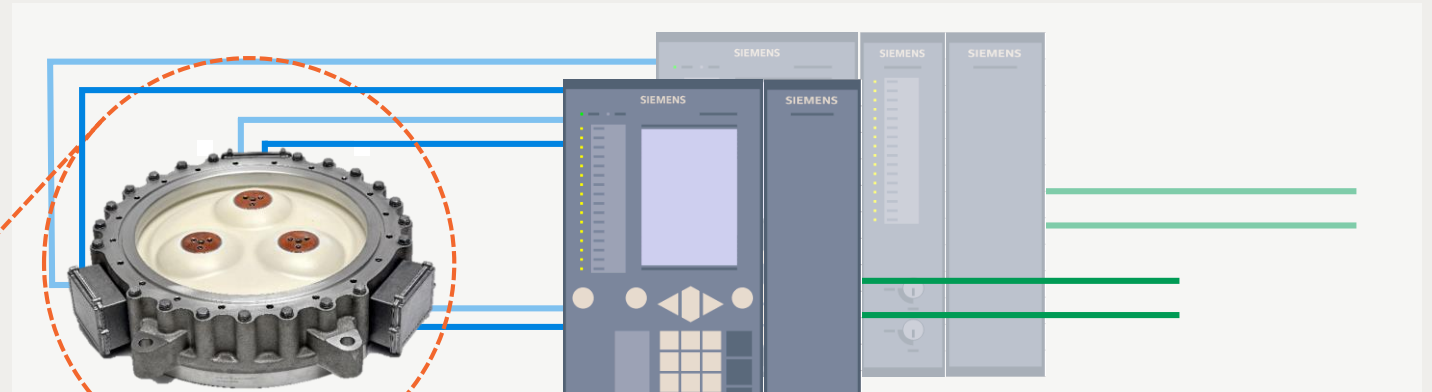
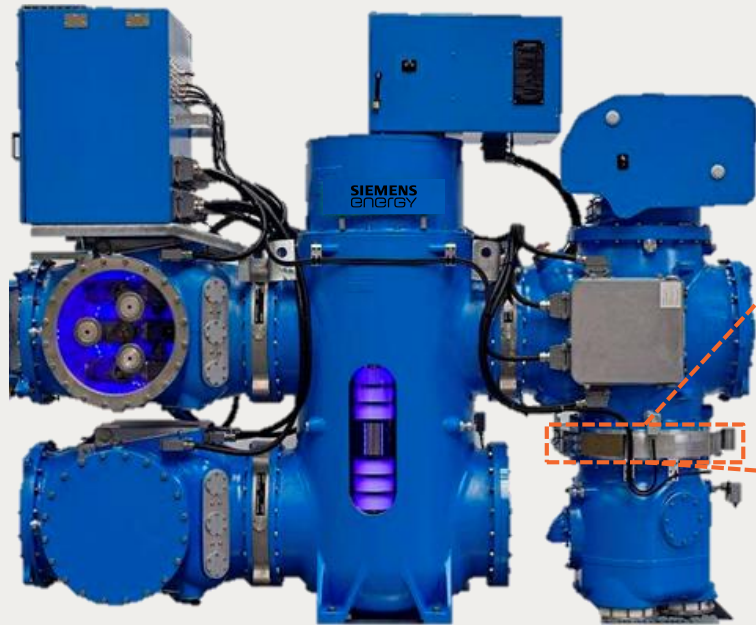
A3 PS3 Q20

A failure scenario of an instrument transformer depends on electrical and mechanical design parameters and varies between the manufactures. How do specialists see the complexity considering all manufacturers-dependent influences?

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SIEMENS
energy

Failure scenarios for a GIS LPIT



GIS cast resin partition
with integrated current
and voltage sensors

Electronics I/O card as
part of a Merging Unit or
Protection Relay



**Failure scenarios “as usual”
for cast resin partitions**

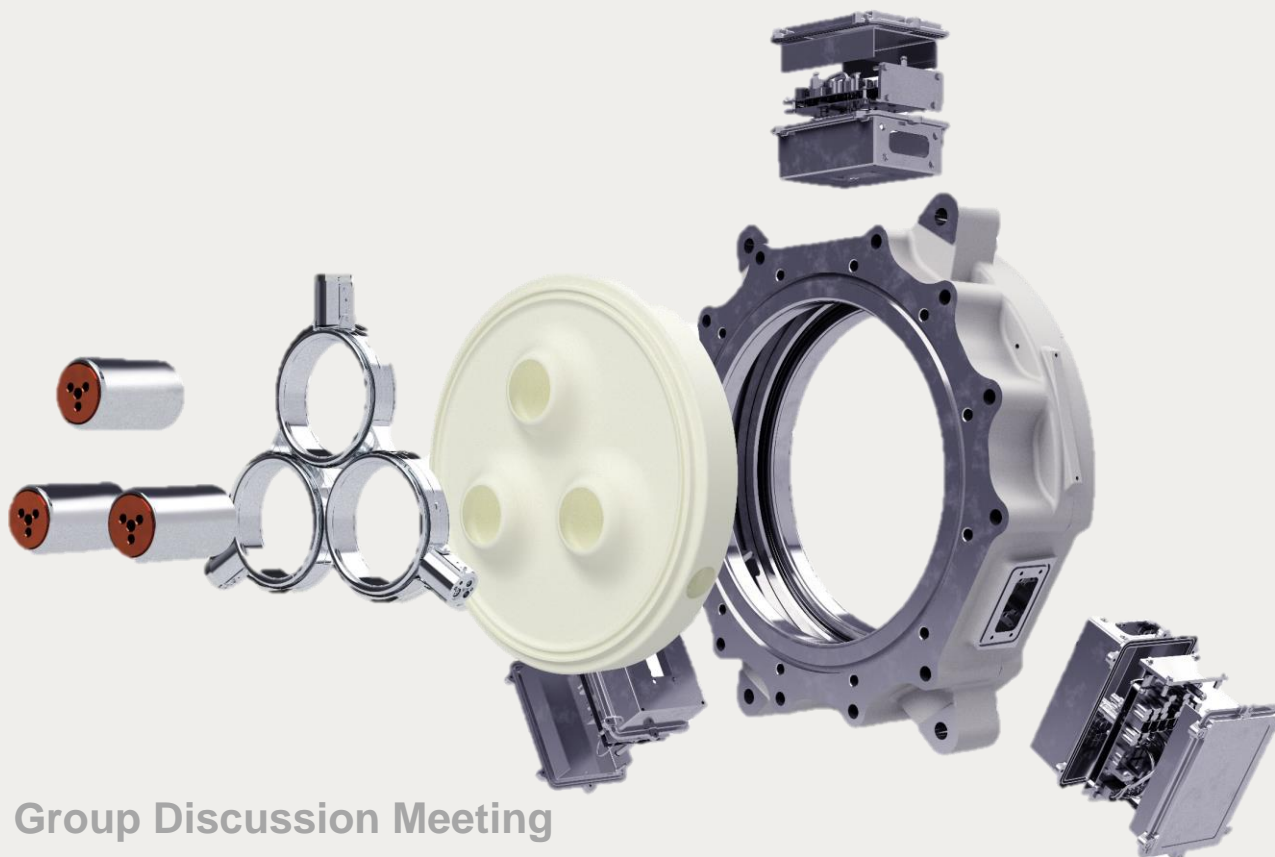


**Failure scenarios “as usual”
for protection relays and IED**

Group Discussion Meeting

Reliability consideration for GIS LPITs

LPIT partition



Group Discussion Meeting

- The LPIT partition on the left is designed similarly to conventional cast resin partitions. The embedded sensors are completely passive (only copper wire).
- Artificial aging test with 3 x rated voltage for >2000 h (equivalent to >50a life-time at rated voltage).
- The connection box PCB has a calculated MTBF@40°C of 397 years and a calculated MTBF@75°C of 86 years. Real life MTBFs are typically even higher than the calculated ones.
- Therefore we expect a very long lifetime at least similar to conventional Instrument Transformers with no impact on overall GIS lifetime.

Reliability consideration for GIS LPITs



Merging Unit with integrated IO240

Group Discussion Meeting

Electronic IO module

- The SIPROTEC5 IO240 module has a lifetime similar to the SIPROTEC5 IO modules for conventional instrument transformer
- Calculated MTBF@40°C = 25 years, calculated MTBF@75°C = 8 years. Real life MTBF are typically even higher than the calculated ones.

Replacements

- All components (except for the partition) can be replaced without need for recalibration (see CIGRE 2022 paper 1077).
- Availability of spare parts according to common practice for digital protection devices.