

Smart-Grid Applicati**kries**ON

Fault isolation before distribution network failure with FLISR_xf

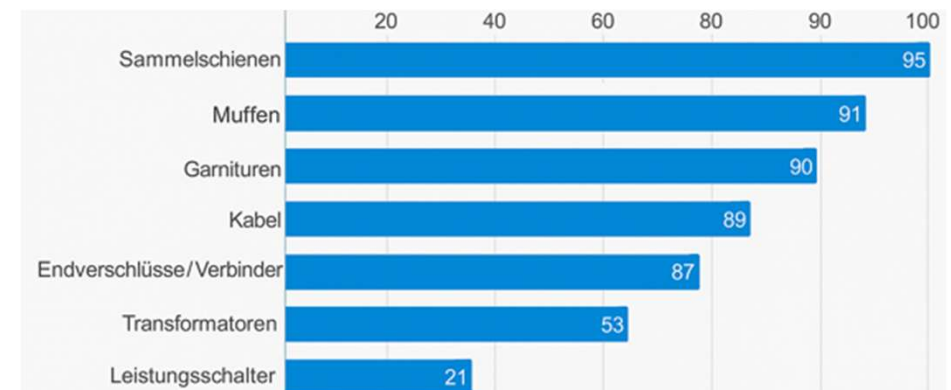
06.2025; gk

80% of all faults in the distribution network begin with a loss of insulation, which leads to a network failure if it is not detected.

The **FLISR_xf** system, consisting of the **IKI-5x** feeder controller device and the **CAPDIS R5** combined voltage and TE testing system, covers all aspects of early fault detection, load monitoring, fault detection, and isolation.

The FLISR_xf system

- protects operating personnel
- minimizes downtime (SAIDI)
- reduces maintenance costs and **pays for itself within a few cable testing intervals**



Source: IEEE Goldbook Table 36; Failure frequency of distribution network components due to insulation loss (TE)

FLISR_xf system: IKI-55 and CAPDIS R5

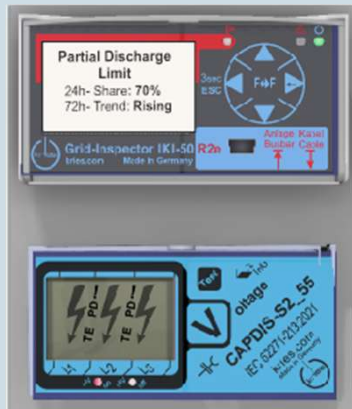


for highly available distribution networks



Months before failure

Stage 1: Partial Discharge PD



Installation errors

Defective sleeve



FLISR_xf offers

- Fault prediction through PD detection
- **Arc fault protection for personnel**
- PD trend analysis

Weeks before failure

Stage 2: Transient errors



FLISR_xf offers

- transient detection with direction
- detection before permanent fault

Failure, to be avoided!

Stage 3: Earth fault



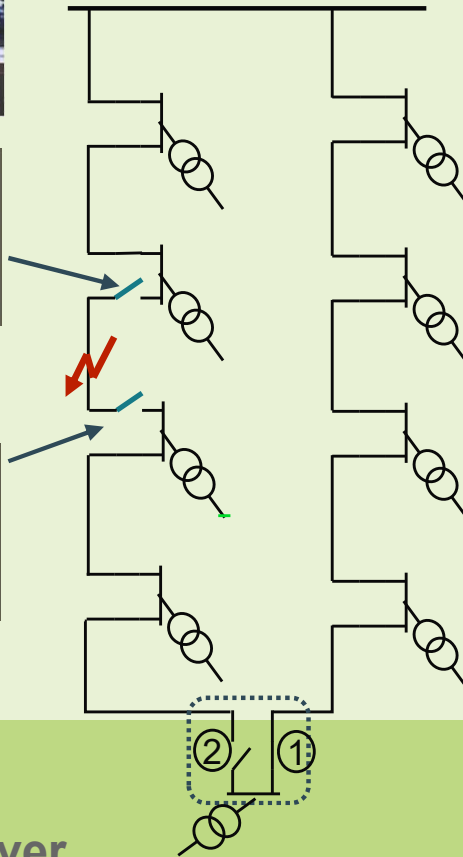
FLISR_xf offers

- Remote-controlled disconnection
- Fault recording on site and remotely
- Optional automatic switchover

inside the RMU
outside

FLISR_xf enables controlled and automated fault clearance

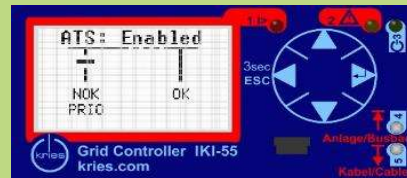
Stage 4: Fault isolation



Remote-controlled
fault clearance

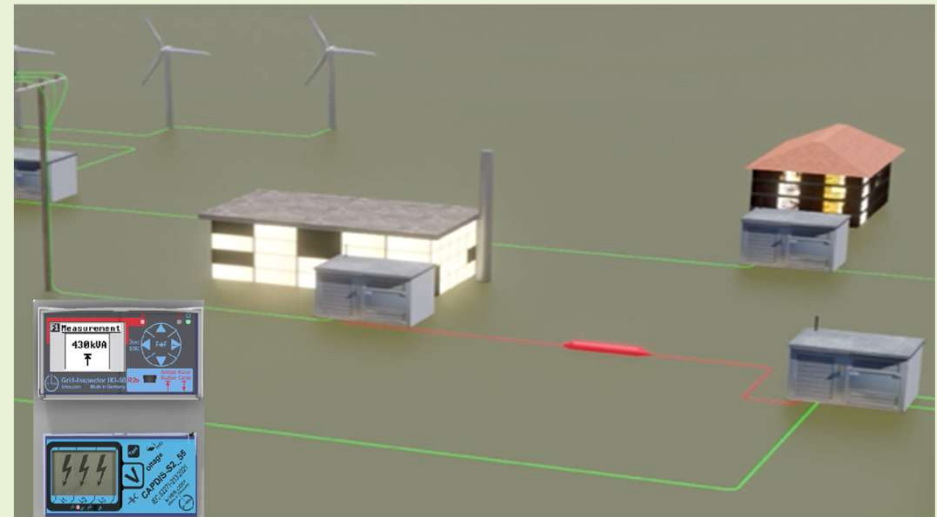
Automation via automatic switchover at the normally open point

The optional automatic
switchover restores the
supply at the normally
open point NOP within
seconds

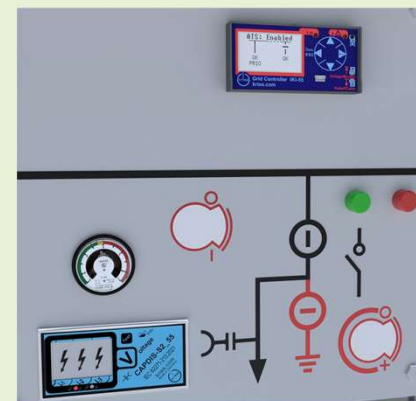


Stage 5: FLISR_xf complete

Fault location isolated, rest of network in
operation



FLISR_xf solutions for new systems
and retrofits: www.kries.com



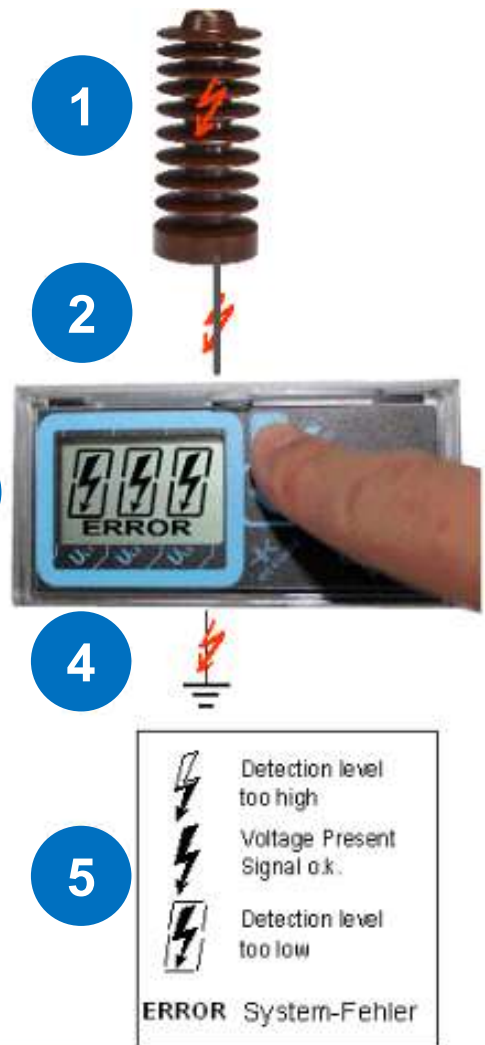
CAPDIS R5 increases the operational reliability of switchgear

The CAPDIS R5 voltage testing system in accordance with IEC-62271-213 contributes to early fault detection and increased personal and system safety with its integrated partial discharge detection. The device is maintenance-free and requires no auxiliary power for the local display of voltage and partial discharge.

Safe voltage detection, including:

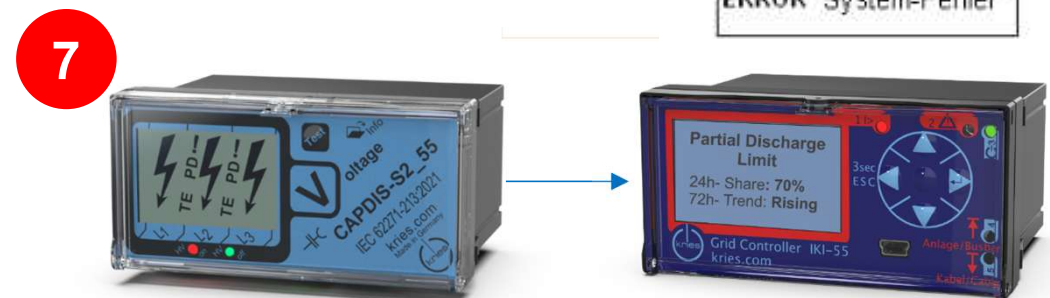
- 1 Isolation test of the decoupling
- 2 Connection cable test
- 3 Device test
- 4 Grounding test
- 5 Threshold value test
- 6 TE/PD detection with CAPDIS R5
- 7 TE/PD trend detection with IKI

● CAPDIS R4.5
● CAPDIS R5



PD indication

- Minimizes arc flash risk for operators
- Fault prediction



PD-trend analysis 24h / 72h

Monitored by the IKI and reported to the control center

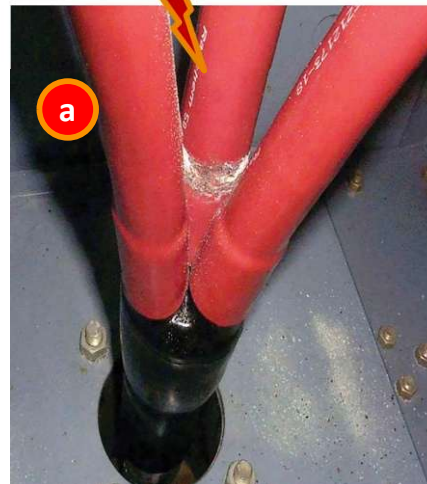
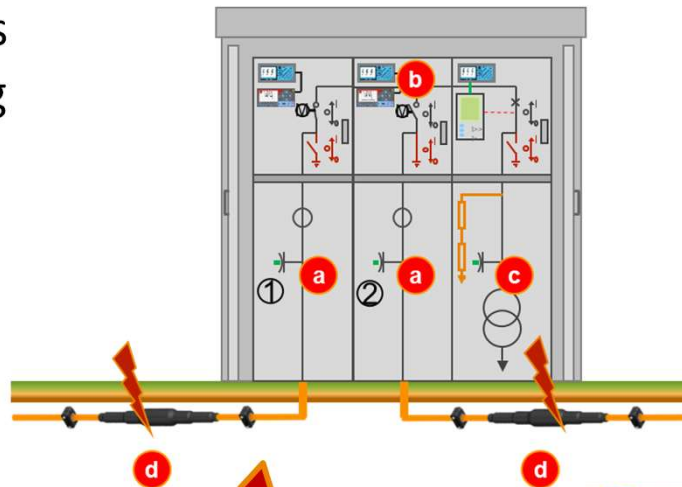
Insulation faults begin with partial discharges

PD detection in CAPDIS-R5 detects partial discharge in the switchgear, transformer, or cable and displays it as a warning message.

PD detection warns and protects the network operator from dangerous arc faults during operation and enables installation errors and insulation aging to be detected at an early stage.

Typical sources of partial discharge:

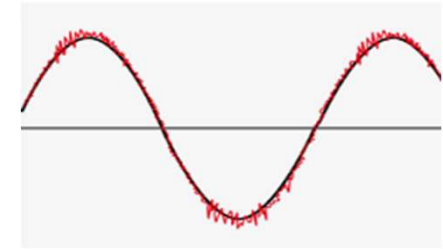
- a) Defective terminations**
- b) Defective busbars**
- c) Defective transformers**
- d) Defective joints**



Partial discharges are the most common fault scenario and occur in almost all equipment.

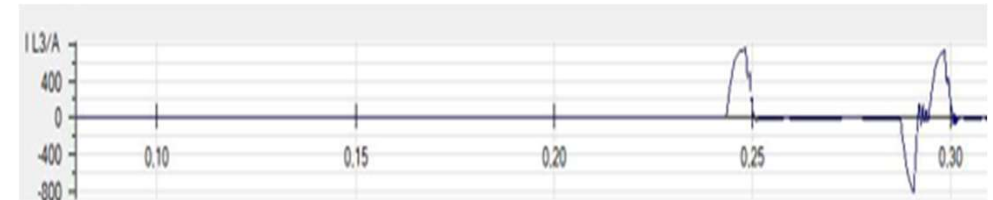
Insurance companies for critical infrastructure (CRITIS) now require **online partial discharge detection to reduce risk.**

This is directly incorporated into the risk assessment (MFL calculation).

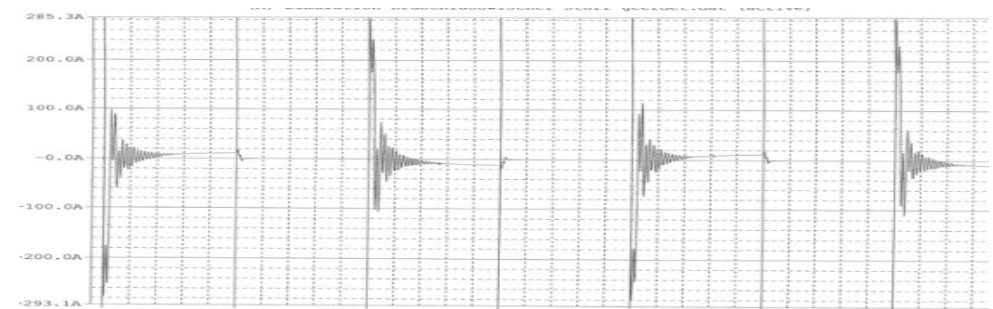


Transient faults can occur as arc faults or intermittent earth faults, depending on the equipment. They significantly increase the fire load in the distribution network and represent an **ultimate failure warning.**

Arc faults often do not clear or do not clear completely. A failure is usually imminent.



Intermittent earth faults occur more frequently and can also disappear completely for a time. They spread in both directions and must therefore be detected in a targeted manner in order to locate the fault.



If partial discharges or transient faults are detected, these faults can be isolated at an early stage by switching measures, thus preventing a power failure.

IKI-5x feeder controllers: for network analysis, control, and brownout prevention

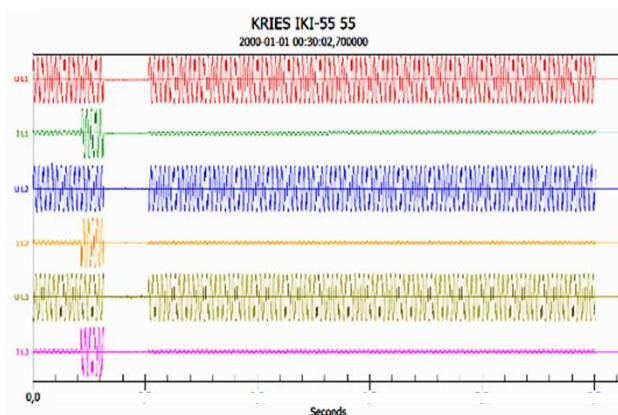
If faults occur with power disconnection, the defective section must be quickly isolated in order to restore the rest of the network.

The IKI-5x feeder controllers have all the necessary fault analysis functions on board, with interfaces to SCADA, analytics, and asset management systems. The built-in control logic enables reliable 1.5-pole load switch control.

High-availability customers can also be automatically switched to emergency power supply or reserve feeds using the FLISR_xf system with integrated automatic switchover. The network operator determines with the customer whether the switchover should take place at the first sign of a brownout (e.g., under/over frequency), during transients, or only in the event of a complete failure. The automatic switchover also allows automatic switchback to the main network with optional synchronization check and without network interruption.



FLISR_xf system: IKI-55 and CAPDIS R5



T= -2 sec



**T= 0 sec:
Failure**

Blackout

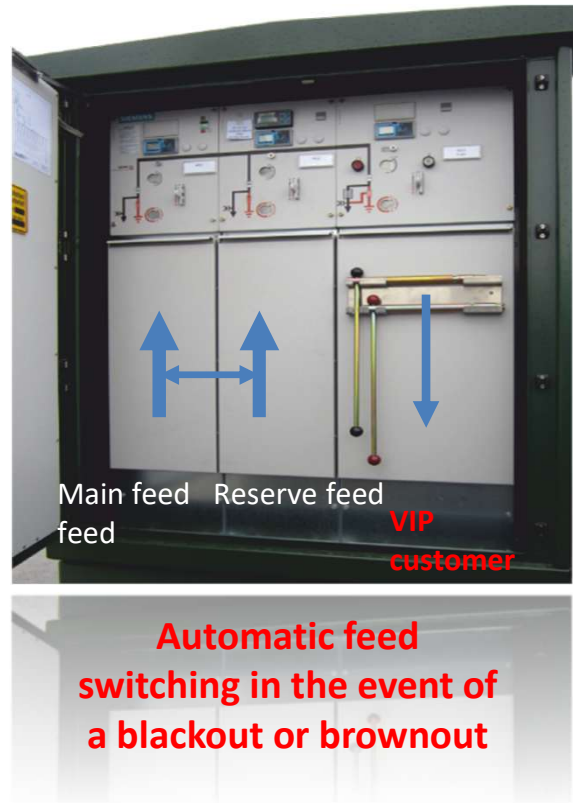
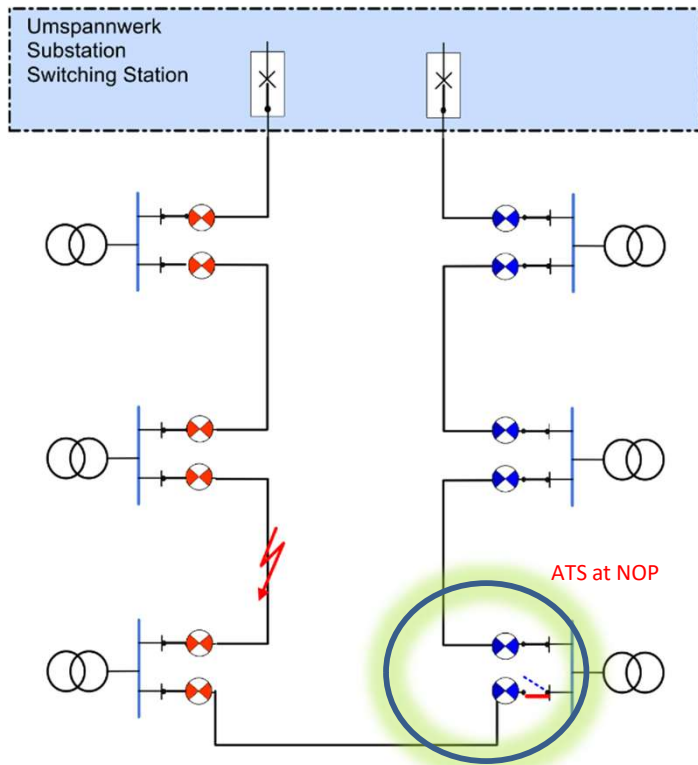


**Network
restoration T=
+3 sec:**

The automatic switchover in the FLISR_xf system automatically switches high availability customers to the backup feed.

Example:

Customers connected to a separation point (NOP) with automatic switchover enjoy maximum availability.



Example:

High-availability customers with their own reserve feed and automatic switchover

