



Profile P3

Circuit Breaker Analyzer



A Trusted Partner on
your Journey to the
Grid of the Future



www.camlinenergy.com || mail@camlingroup.com





CONTENTS

CAMLIN GROUP

Overview 04

BREAKER

Guardians of the network 06

First trip profiling 08

PROFILE P3 10

P3 key features 12

DATA INTERPRETATION

The "Current Profile" 13

Connected Insights 14

REPLAYPRO 16

Product Options 18

CONTACTS 20

Optimizing Critical Infrastructures



With a history stretching back over 30 years, the foundations of the Camlin business are built on a core belief that innovation is key to driving improvements in the energy industry. We are at the forefront of key innovations that are changing the face of the industry – including digital fault recorders; digital circuit breaker analyzers; advanced protection systems and network automation technologies. Camlin continues this track record of innovation, developing innovative and intelligent monitoring products and services that help make electricity and rail networks safer, more efficient, resilient and sustainable.

We believe in leveraging our partners existing platforms and technology, partnering this with new developments to provide expert analysis into asset condition, translating diagnostic data into prescriptive actions. With headquarters in UK, the US and China, and facilities in 21 cities across 17 countries, we are set up to deliver globally, ultimately our goal is to ensure our customers see real value from monitoring technology.



Holistic Asset Monitoring

Transformer, circuit breakers and rotating machines



Digital Solutions

Advanced analytics providing prescriptive actions on asset health



Asset Condition Assessment

Building a full picture of asset health



Expert Services

Focused seminars and training aimed at driving knowledge sharing



Circuit Breakers: Guardians of the Network

A key requirement from electricity networks is to provide safe, efficient and reliable power to customers.

When faults occur due to weather, equipment failure or accidental damage, the circuit breaker must quickly disconnect the fault to protect the network upstream of the circuit breaker and maintain supply to the majority of customers.

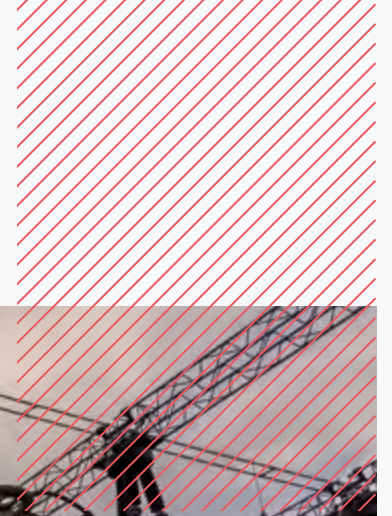
A Circuit Breaker can be considered as the guardian of the network.

An aged or poorly maintained circuit breaker may be slow to trip, leading to serious problems for the network, taking customers off supply and causing high current faults to 'cascade' across the network with:

- Widespread loss of supply
- Damage to plant
- Potential safety issues
- Financial penalties

Conventional testing requires a circuit breaker to be isolated but this first trip operation can often temporarily clear any slow tripping problem.

This means that capturing the 'first trip' operation is essential to effective circuit breaker condition monitoring.



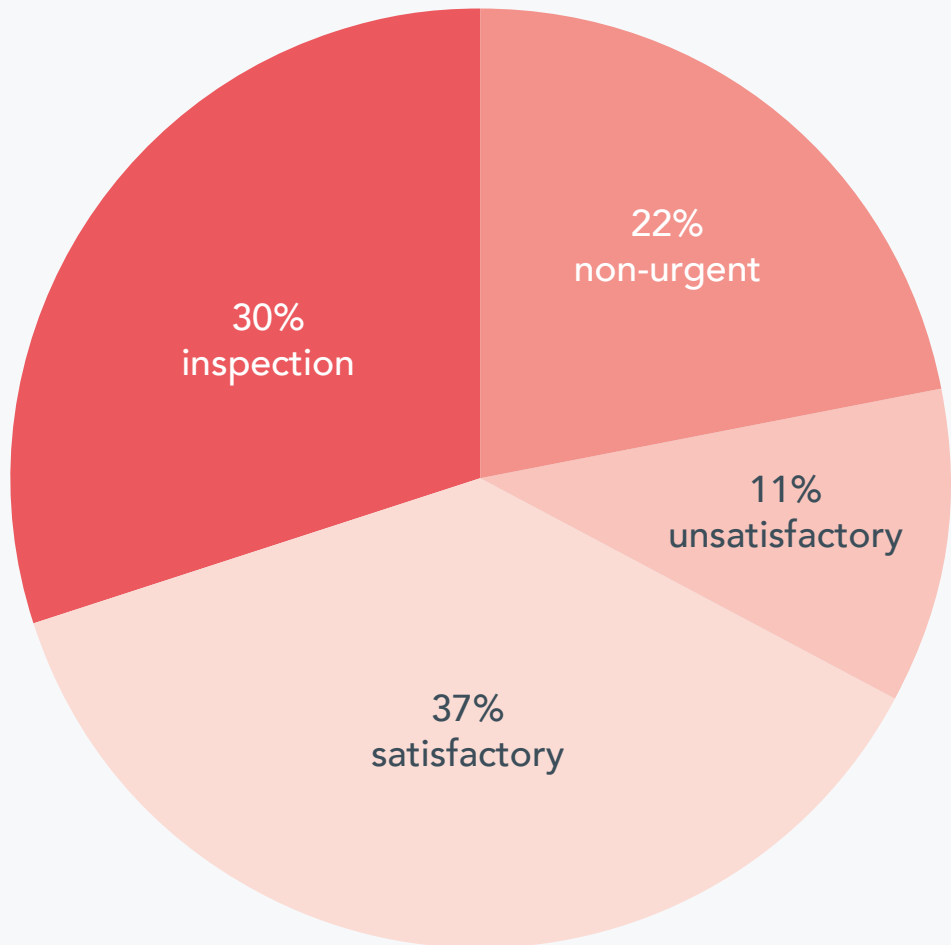
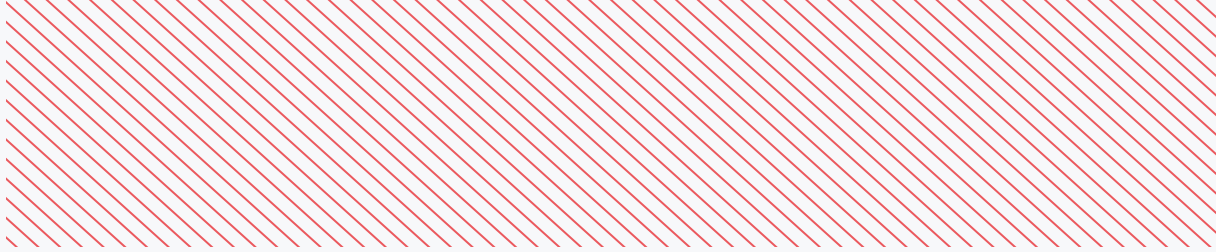
The importance of First Trip profiling

Although conventional timing tests control the operation, the current flowing through the trip coil is a powerful indicator of the circuit breaker readiness.

Capturing First Trip also provides the true condition of the circuit breaker. This leads to major benefits:

- Improves circuit breaker performance
- Minimizes damage to plant and personnel
- Enables a condition-based maintenance strategy
- Reduce operational costs
- Can be used on any circuit breaker





Analysis of First Trip Profiling VS Conventional Timing Tests

- 82% of the sample were assessed as performing satisfactorily using conventional timing tests.
- 37% of the sample were assessed as performing satisfactorily using trip coil profiling testing.
- 67% of faults on circuit breakers classified as slow tripping lay within the first stage tripping mechanism.
- Prior to trip coil profiling it was assumed that most defects lay within the main mechanism and therefore normal maintenance procedures were ineffective.
- For circuit breakers operating within time limits (<120 msec), around 50% had defects.

PROFILE P3



By capturing the vital 'first trip', the PROFILE P3 shows how a circuit breaker would perform in a real-life fault situation and provides a unique insight into the true condition of circuit breakers at all voltages, pinpointing potential problems within either the trip coil or circuit breaker main operating mechanism.

This approach to testing helps utility Asset Managers to move from time-based maintenance towards condition-based maintenance which is more effective and efficient, based on the true condition of the circuit breaker.

Benefits:



Reduced Circuit Breaker maintenance costs

Drives cost effective maintenance strategies for asset managers based on condition-based circuit breaker assessment.



Intuitive visual profiling

Enables rapid onsite analysis of circuit breaker defects by comparing first trip or close profile with subsequent circuit breaker operations..



Avoid costly regulatory penalties

Pre-empt problems caused by slow circuit breaker trip operation causing supply loss, costly network equipment damage and potential penalties due to CI/CML.



Extended circuit breaker asset life

Quick, simple trending of key circuit breaker parameters allows operators to anticipate maintenance requirements and extended asset life.

The PROFILE P3 offers a cost-effective solution by enabling:

- Fast and simple online test
- Capture vital first trip operation
- Combined relay and circuit breaker test
- Onsite analysis of breaker defects
- Efficiently target critical resources





80% of defects can be detected by first trip profiling.

- * Detect if the circuit breaker operating time is outside limits due to the Trip/Close coil or main mechanism
- * The state of 'health' of Close and Trip coil mechanisms
- * The condition of the DC supply and associated wiring
- * The presence of 'sticky' or faulty circuit breaker auxiliary contacts
- * The Total Trip Time (relay + circuit breaker)



Key Features



Powerful Onsite Analysis

The possibility to graph up to 4 subsequent operations enables quick onsite analysis of the current profile.



Total Trip Time

An enhanced version of the software enables both the protection relay and circuit breaker trip times to be captured.



Multi-shot Mode

The PROFILE can rearm and capture multiple sequences of trip / close operations.



Automated Comparison

This function provides a clear indication of the breaker condition by determining if key parameters are outside user-set tolerances.



Connected Insights Enabler

This function provides a clear indication of the breaker condition by determining if key parameters are outside user-set tolerances.

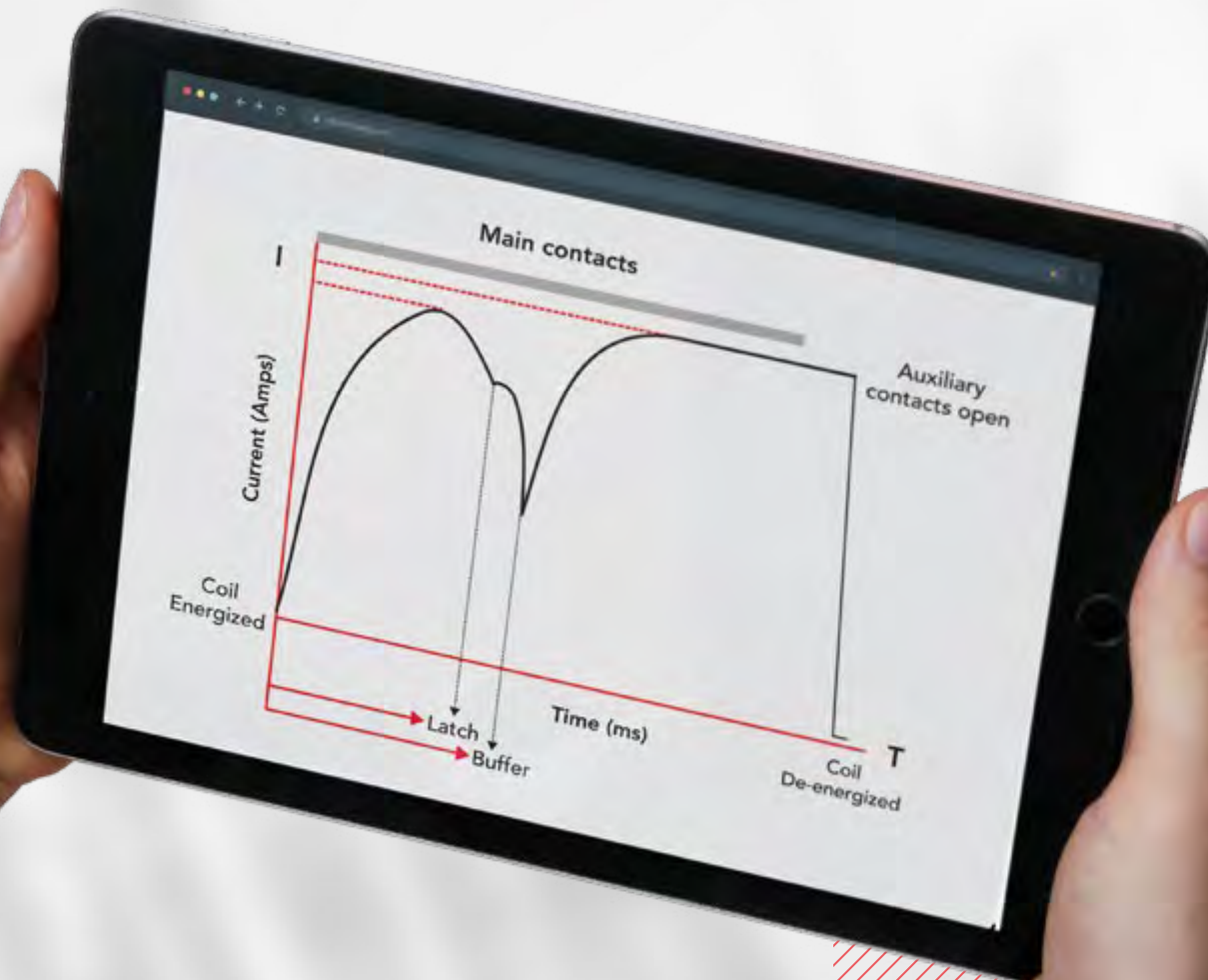
The “Current Profile”

The study of the trip coil current allows to detect deviations from the expected behavior, highlighting major problems in the breaker.

Trip coil current profile is specific to each breaker model. It depends on electrical and mechanical characteristics of the control circuit.

The current profile is strictly related to the effort necessary to the circuit breaker to clear the overcurrent.

Parameters such as Latch, Buffer and Acon are automatically identified and can be used to determine malfunctions, ageing and degradation of the breaker components.



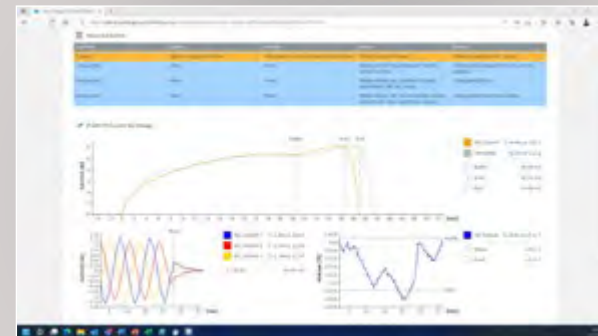
Connected Insights

- Connected Insights is a Cloud-based Software-as-a-Service Platform to provide expert and AI-generated insights to compliment in-house Subject Matter Experts.
- Connected Insights is data-driven and hardware agnostic.
- Connected Insights integrates with 3rd party customer IT systems and provides a Web portal for custom reports.
- Connected Insights provides insights on multiple assets like transformers, generators, circuit breakers and batteries.


How Connected Insights Adds Value


Developed from more than 30 years of experience in high voltage asset condition assessment, Connected Insights delivers actionable information, translating electric utilities' diagnostic data, from both offline and online results, into prescriptive actions.

Data are translated into valuable information and prescriptive actions by applying insights from Camlin alongside your own in-house knowledge and expertise.




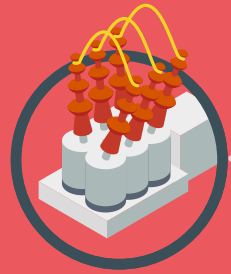
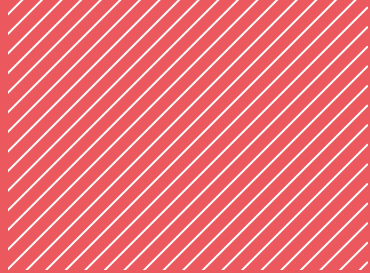
Reports are automatically generated by AI

 Bringing all relevant asset data together into one place and freeing up more decision-making time for your teams.

 Connecting your data to the right decisions: Camlin technical depth augments the skillsets of your team.

 Knowledge gathered from monitoring increases worker availability in the field and reduces time to complete jobs.

 Working together to create specific solutions for specific needs.



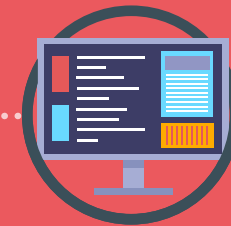
Transformers
Generators
Circuit breakers
Batteries
Other assets



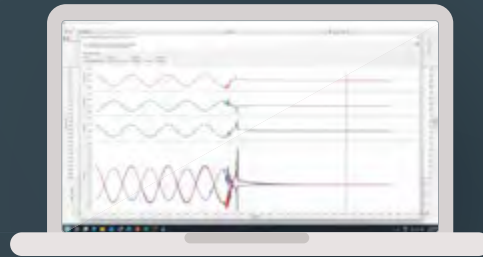
Data adaptors /
consolidation
ML/AI insights generation
SME insights validation



Data generates value via Sapien
Connected Insights
Actionable insights integrated
with enterprise systems



Asset reports
Data visualizations
Insight visualizations
Maintenance actions



REPLAY PRO

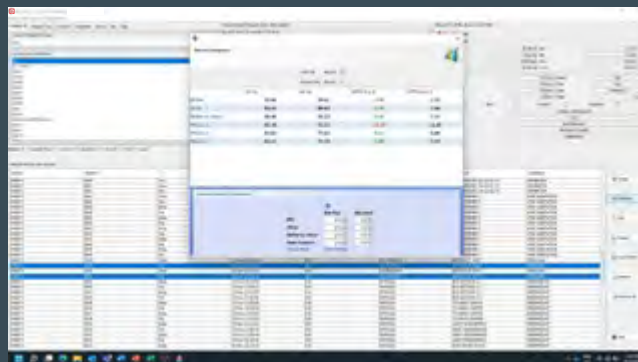
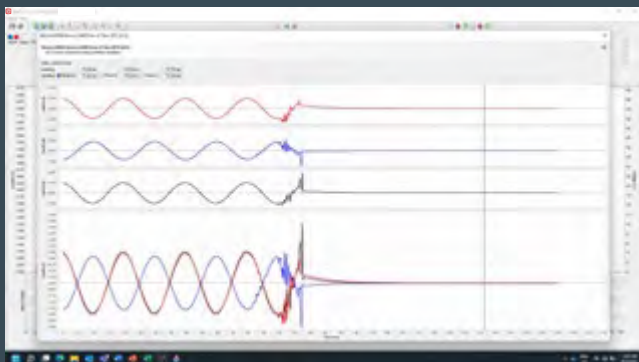
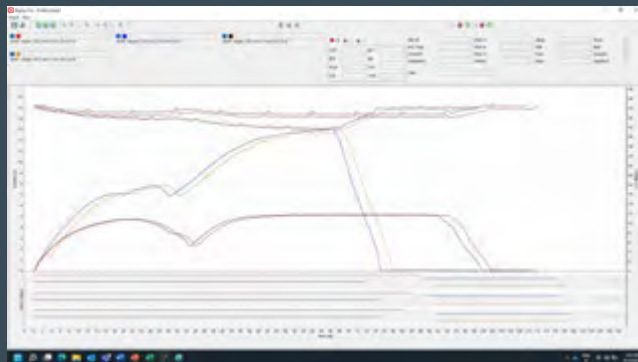
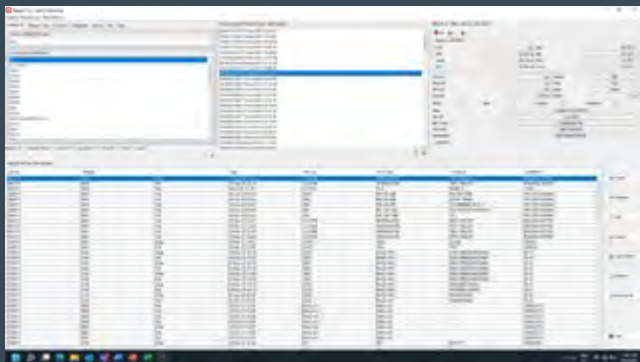
REPLAY PRO software is an integral part of the PROFILE system enabling efficient profile record storage, retrieval and analysis.

REPLAY PRO software for PC is a powerful analysis tool that combines detection of circuit breaker defects with trending of performance against key parameters from profile records imported from the system.

REPLAY PRO can be hosted on a central server, allowing circuit breaker profiling data to be shared with other users across your organization.

Key Features

- Efficient storage of PROFILE P3 records
- Multiple search criteria for record retrieval
- Display and overlay (up to 9) Profile records for analysis
- Automated analysis function to determine if key parameters are outside preset tolerances
- Export records in CSV format for trending in graph format
- View AC data during trip and close operation

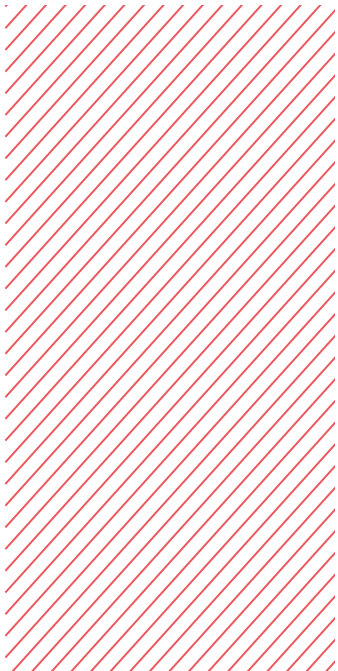


Product Options

PROFILE IP3 Independent Pole

PROFILE IP3 is designed specifically for circuit breakers with an independent pole per phase and provides a unique insight into their true condition.

Capturing the vital 'first trip' on all three poles simultaneously, along with powerful analysis, shows how the breaker would perform in a real-life fault situation.



PROFILE P3 Offline Tool

The PROFILE P3 can be used in an offline mode to measure the main contact times when the circuit breaker is isolated from the network.

PROFILE P3 to an Interface Unit which provides a constant current source from a 24V DC supply across the circuit breaker main contacts.



Group Headquarters

Camlin Energy

31 Ferguson Drive
Knockmore Hill Industrial Park
Lisburn BT28 2EX
Northern Ireland



+44 (0)28 9262 6989



mail@camlingroup.com



camlinenergy.com

Camlin Energy (US)

1765 North Elston Avenue
Unit 105,
Chicago,
IL 60642,
USA



(+1) 773-598-4126



Whilst every effort has been made to ensure that the information given is accurate, Camlin Energy reserve the right to change any of the details or specifications in this document without prior notice and disclaims liability for any editorial, pictorial or typographical errors.