

Technical specification SAT Series

Power Output	
Coils output DC voltage	10 V DC - 300 V DC
Coils output AC voltage	10 V AC - 250 V AC
Motor output DC voltage	10 V DC - 250 V DC
Coil resistance measurement	
Measuring range	Resolution
0.5 Ω - 99,9 Ω	0.1 Ω
100 Ω - 999 Ω	1 Ω
Minimum trip voltage - fully automatic test	
Start voltage	10 V - 299 V DC 10 V - 249 V AC
Stop voltage	11 V - 300 V DC 11 V - 250 V AC
Step voltage	1 V - 20 V DC 1 V - 20 V AC
Typical accuracy	\pm (0.25 % rdg + 0.25 % FS)
Operating temperature	-10° C – + 50 °C

Highlights

- Lightweight – only 9.20 kg / 20 lbs
- Coil current measurement
- Coil resistance measurement
- Minimum trip voltage test of the circuit breaker's coils
- Undervoltage release test
- Supplying spring-charging motors
- Providing a power supply for breaker analyzers from different vendors

CAT series - Circuit Breaker Analyzers and Timers

These devices are either standalone or PC controlled digital instruments for circuit breakers' condition assessment. The robust design incorporates cutting edge technology with latest enhancements for safe and fast testing of medium or high-voltage circuit breakers with live or dead tank design.

The user can select any desired operational mode: Close (C), Open (O), Close-Open (C-O), Open-Close (O-C), Open-Close-Open (O-C-O). Test results can be stored in the instrument's internal memory, an USB memory stick or printed on a thermal printer (optional accessory) in both tabular and graphical form.

Circuit Breaker Analyzer & Timer CAT64

- Safe and fast testing with BSG (Both Sides Grounded)
- Simple & easy to operate
- Timing and motion measurement
- 6 timing channels (3x2) for main and resistive contacts
- 3 timing channels for auxiliary inputs
- Resistance measurement of pre-insertion resistors
- 4 Analog inputs + 1 Transducer input
- Supports both digital and analog transducers
- Detailed analysis of test results using DV-Win software



Circuit Breaker Analyzer & Timer CAT126

- Safe and fast testing with BSG (Both Sides Grounded)
- Timing and motion measurement
- 12 timing channels (3x4) for main and resistive contacts
- 6 timing channels for auxiliary inputs
- 3 transducer input channels
- 4 additional analog input channels
- Built-in Micro Ohmmeter 500 A
- Dynamic resistance measurement
- Detailed analysis of test results using DV-Win software



CAT Series

CAT03	CAT61	CAT125
CAT31	CAT64	CAT126
CAT34	CAT65	
	CAT66	
	CAT66D	

Essential part of circuit breaker condition assessment is ability to compare the latest test results with results obtained in previous tests. Measured values are compared with limits specified by the manufacturer. Obtained fingerprint can be used at later stage as a reference for subsequent measurements. In order to provide accurate comparison, tests need to be performed using identical test parameters. Any deviation and change in test results may indicate the circuit breaker condition deterioration. This ability is supported with DV-Win test plans and graph overlay feature. As a final result of circuit breaker maintenance process, DV-Win enables analytical tools and customized report creation.

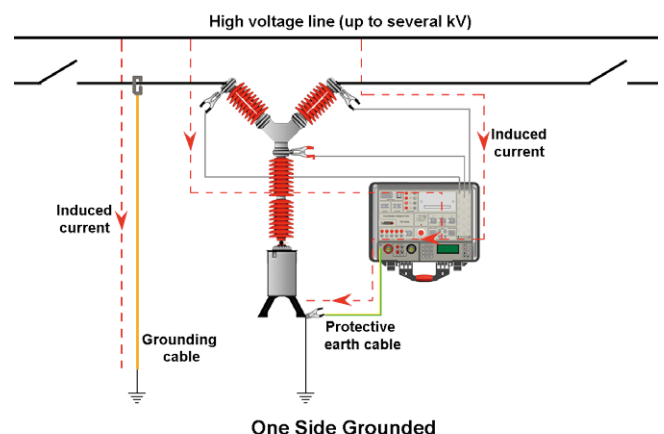
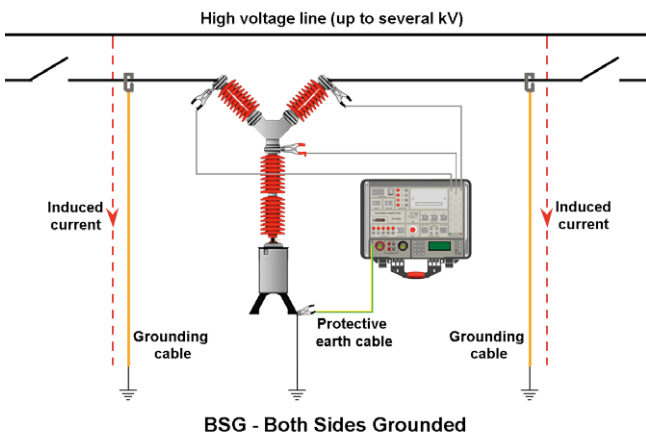
Applications

The list of applications that can be carried out on all circuit breakers includes:

- Simultaneous timing measurement of up to 12 main contacts (4 breaks per a phase) including pre-insertion resistors (if present in the circuit breaker) and 6 auxiliary contacts
- Resistance measurement of the pre-insertion resistors (if present in the circuit breaker)
- Evaluation of synchronization between the circuit breaker poles
- Coil current analysis, simultaneously for 4 coils (3 Open and 1 Closed coil)
- Evaluating the state of the substation's batteries by graphically showing the voltage value
- Measurement of displacement, contact wipe, over-travel, rebound, damping time and average velocity of the breaker's moving parts
- "First trip" test
- Static contact resistance measurement (with test current up to 500 A)
- Dynamic resistance measurement (with test current up to 500 A)
- Demagnetization of a CT core on the dead tank CB (available with CAT66D devices)

BSG (Both Sides Grounded)

BSG feature enables safe and fast circuit breakers testing in high voltage substations, without removing the safety ground connections on both sides of the circuit breaker. No additional modules or remote boxes are required. Each main contacts timing channel is able to detect main contacts state in case when both terminals are grounded.



First Trip Test

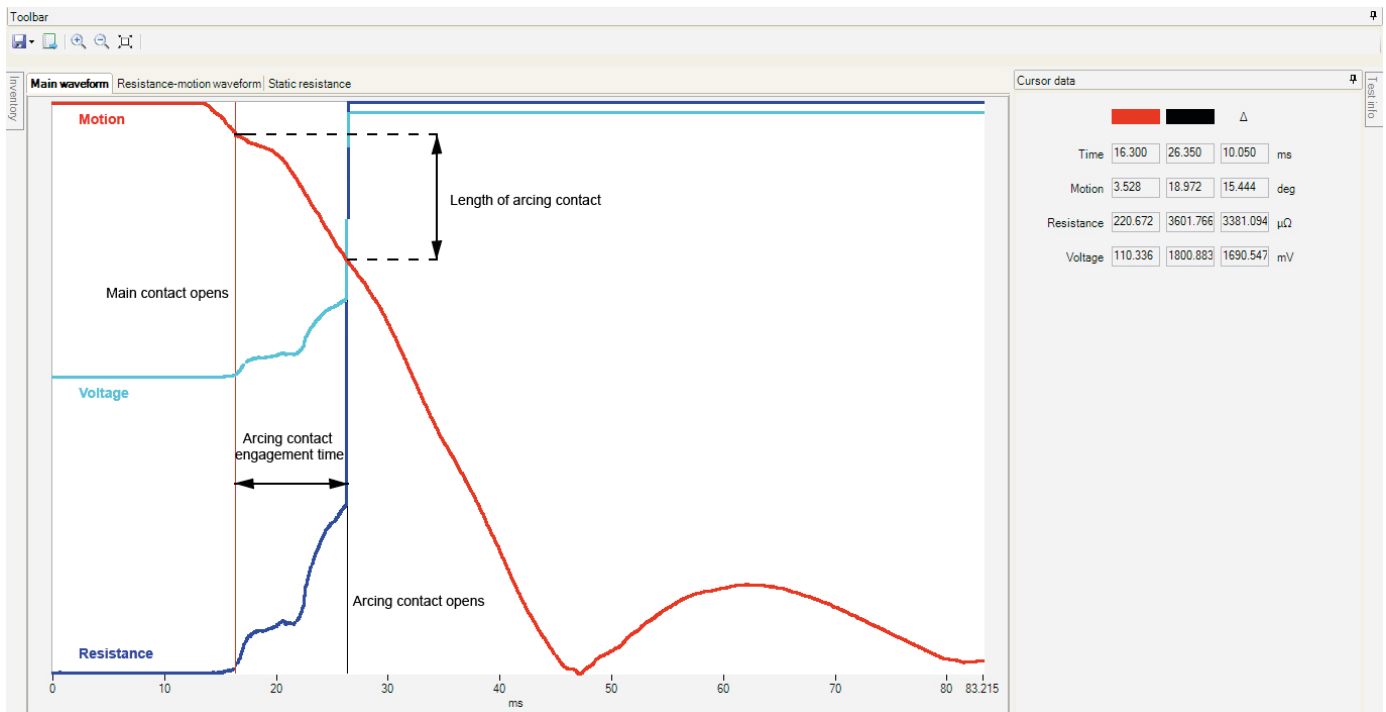
A “First trip” analysis is important to determine condition of the coil operating mechanism. A circuit breaker spends most of its lifetime conducting a current without any operation. Once the protective relay detects a problem, the circuit breaker, that was idle for maybe a year or longer, has to operate as fast as possible. However, if the circuit breaker has not been operated for a long time, the latch friction may increase. Information about the latch friction can be obtained from the coil current waveform recorded during the “First trip” test.

Static/Contact Resistance Measurement

The built-in micro ohmmeter generates a true DC ripple-free current with automatically regulated test ramps. The resistance measurement is using well-known Kelvin’s four points method. The DC current is generated through closed circuit breaker contacts. The voltage drop is measured between the terminals of the circuit breakers. The resistance is calculated using Ohm’s law $R=U/I$.

DRM (Dynamic Resistance Measurement)

This built-in micro ohmmeter can also be used for the DRM. The DRM test is performed by injecting a current through the breaker contact and simultaneously monitoring the voltage drop across the breaker contact as well as the current flow during the operation of the breaker. Resistance curve as a function of contact travel can be used to reveal failures in relation to the arcing contact condition. The test current should be at least 100 A to provide a higher voltage drop to allow easier detection of the arcing contact. The DRM test requires the circuit breaker analyzer with a high resolution measurement.



Demagnetization of a Current Transformer Core after DC Contact Resistance Measurement

After testing a circuit breaker or a bus-bar with a DC current, the magnetic core of associated current transformers may remain magnetized (remanent magnetism). To eliminate this source of potential problems, demagnetization should be done using the feature this instrument provides as well.

The first series of CAT instruments was designed to meet requirements of an easy to use circuit breaker analyzer & timer with an attractive price. Their primary intention was timing and motion measurement of HV and MV circuit breakers.

Series 1	CAT03	CAT31	CAT34	CAT61	CAT64
Main contacts and preinsertion resistors contacts timing channels	3	3	3	6	6
Auxiliary contacts timing channels	NO	3	3	3	3
Coil control	NO	YES	YES	YES	YES
Coil current measurement channels	NO	2	2	2	2
External trigger channels	2	2	2	2	2
Analog input channels	NO	NO	2	NO	2
Transducer input channels	NO	NO	1	NO	1
Thermal printer (built-in)	Optional	Optional	Optional	Optional	Optional
“First trip” test	NO	YES	YES	YES	YES

The second series utilizes the latest enhancements for safe and fast testing, with unique technical capabilities for additional diagnostics of circuit breakers. Sophisticated design ensures efficient and reliable operations in high-voltage substations and industrial environments.

Series 2	CAT65	CAT66	CAT66D	CAT125	CAT126
Main contacts and preinsertion resistors contacts timing channels	6	6	6	12	12
Auxiliary contacts timing channels	6	6	6	6	6
Coil control	YES	YES	YES	YES	YES
Coil current measurement channels	4	4	4	4	4
Analog input channels	4	4	4	4	4
Transducer input channels	3	3	3	3	3
Thermal printer (built-in)	Optional	Optional	Optional	Optional	Optional
“First trip” test	YES	YES	YES	YES	YES
Both Sides Grounded	YES	YES	YES	YES	YES
Micro ohmmeter	NO	YES	YES	NO	YES
Dynamic resistance measurement	NO	500 A	200 A	NO	500 A
Demagnetization of CT	NO	NO	YES	NO	NO