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 500A
- Dynamic resistance measurement
- Detailed analysis of test results using DV-Win software

Description

Circuit Breaker Analyzer & Timer CAT126 is a standalone or a PC-controlled digital instrument for condition assessment of the circuit breakers. The timing channels record closing and opening of the main, resistor, and auxiliary contacts. CAT126 records graphs of both the open and close coil currents and displacements of the HV and MV circuit breaker moving parts. The main contact channels can also measure the resistance value of the pre-insertion resistors (if present in the circuit breaker). Both sides grounded feature enables safe and fast testing in high voltage substations. Test results are printed on the 112 mm thermal printer (optional accessory) in tabulated and graphical form.

CAT126 provides an easy selection of different operational modes: Open (O), Close (C), Open-Close (O-C), Close-Open (C-O), and Open-Close-Open (O-C-O). Multiple operations, such as Open-Close and Open-Close-Open, can be initiated by using a predefined delay time or by sensing a breaker's contact position.

The circuit breaker operation can be initiated in different ways (for instance from a control room, by a local switch or externally by a testing device) depending on a testing condition. The several time measurement triggers are available to record a measurement in a various testing condition: an external trigger, analog channels, auxiliary channels and coil currents.

The auxiliary inputs are used to monitor dry and wet auxiliary contacts. The external trigger input can be used as the sixth auxiliary input.

The four analog channels measure and record the coil currents simultaneously (OPEN and CLOSE), up to 35 A DC.

The four additional analog channels have four selectable voltage ranges available (±0,5 V, ±2,5 V, ±60 V and ±300 V AC/DC). They are used for monitoring of:

- circuit-breaker substation battery voltage,
- connection of the current clamps for "The first trip" monitoring test,
- other types of analog signals that may be relevant.

The three transducer channels are intended for measuring displacement of the circuit breaker moving parts, contact wipe, over-travel, rebound, damping time and an average velocity. Either an analog or a digital transducer can be connected to these universal channels.

DV-Win software provides acquisition and analysis of the test results, as well as control of all the CAT126 functions from a PC. Graphical presentation of a variety of measurements and timing test results uses cursors and powerful zoom functions for detailed analysis. Colors, grids, scales and positioning of the test data are all controlled by the user. DV-Win supports an automatic unit conversion. (e.g.: cycles to seconds or mm to inches). The test records can be exported in .dwc file format for further analysis.

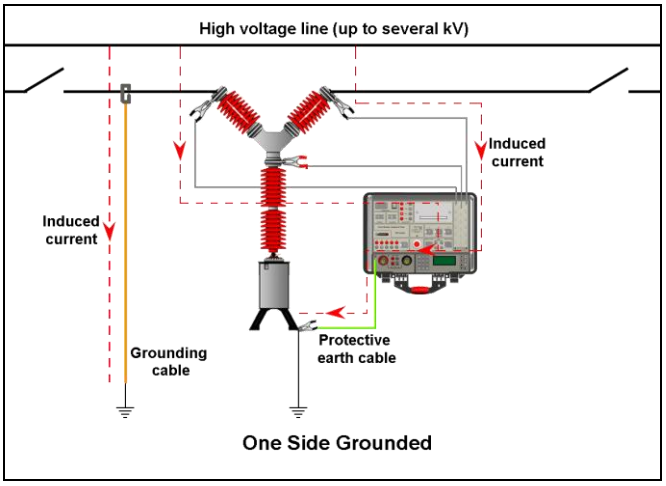
Application

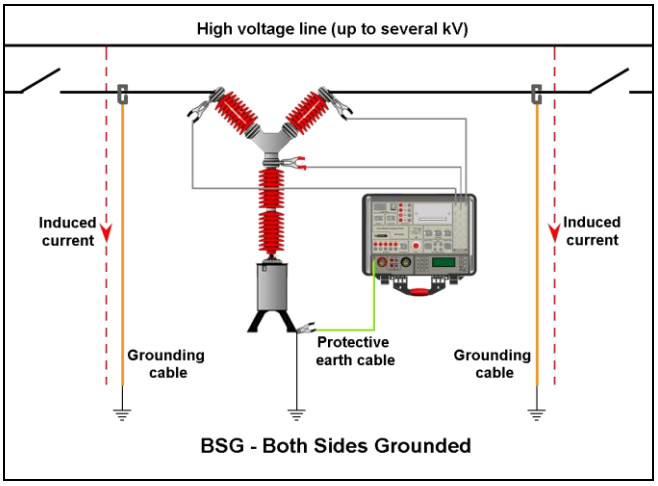
The list of the instrument application includes:

- A simultaneous measurement of 12 main contacts (4 breaks per a phase) including pre-insertion resistors (if present in the circuit breaker) and 6 auxiliary contacts,
- A resistance measurement of the pre-insertion resistors (if present in the circuit breaker),
- An evaluation of synchronization between the circuit breaker poles,
- A measurement of the coil currents, simultaneously for 4 coils,
- Evaluating the state of the substation's batteries by graphically showing the voltage value,
- A measurement of displacement, contact wipe, over-travel, rebound, damping time and average velocity of the breaker's moving parts,
- "First trip" test
- Static resistance measurement
- Dynamic resistance measurement

BSG (Both sides grounded)

BSG feature enables safe and fast 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 a case when both terminals are grounded.





First trip test

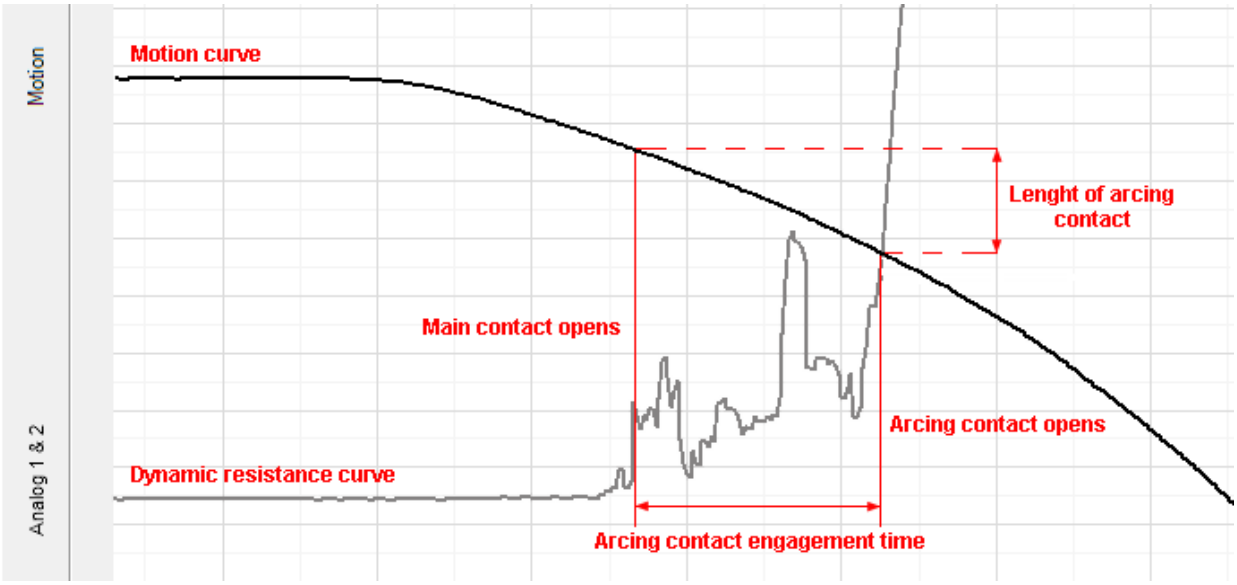
A "First trip" analysis is important to determine a condition of the coil operating mechanism. A circuit breaker spends most of its lifetime conducting a current without any operation. Once the protective relay detects a problem, the circuit breaker, that was idle for maybe a year or longer, has to operate 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 resistance measurement

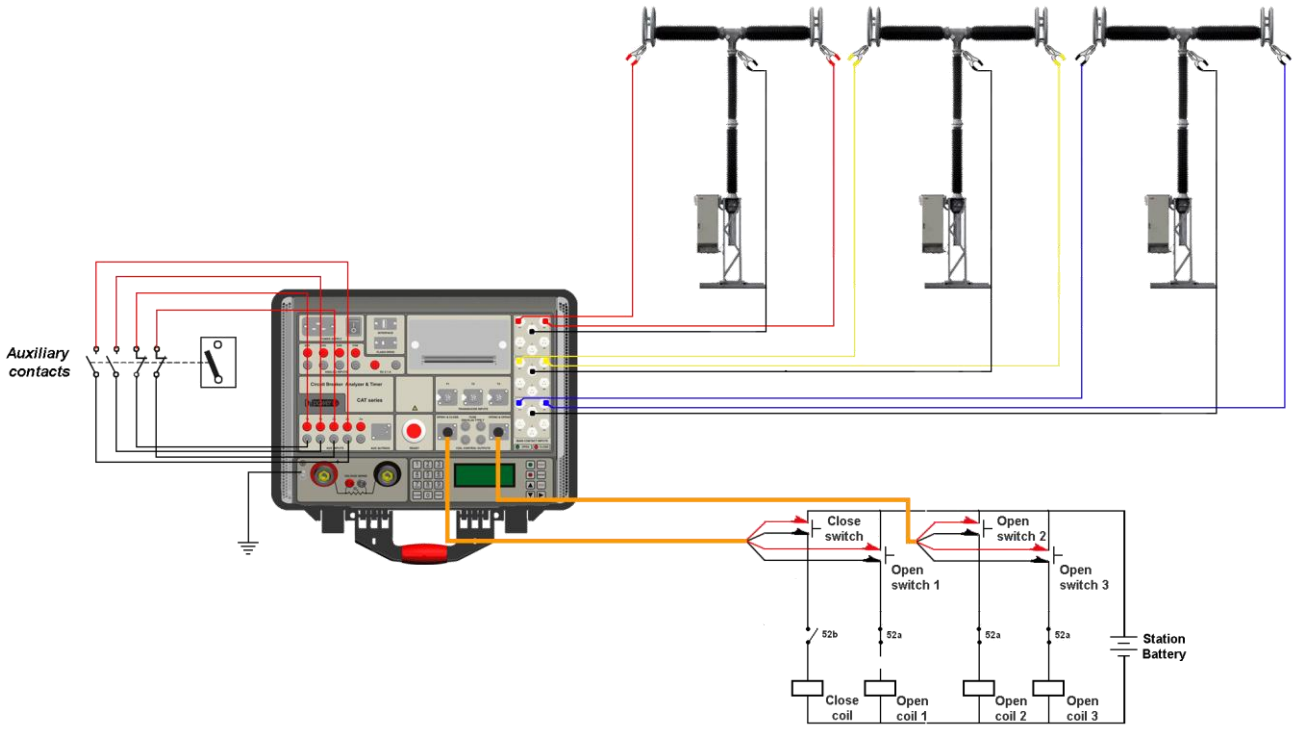
The built-in micro ohmmeter generates a true DC ripple free current with an automatically regulated test ramps. The resistance measurement is using the well known Kelvin's four point's method. The DC current is generated through the closed circuit breaker contacts. The voltage drop is measured between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

DRM (Dynamic Resistance Measurement)

The 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. The DRM test requires the circuit breaker analyzer with a high resolution measurement. The resistance curve, as a function of a contact travel can be used to reveal potential problems related to the arcing contact condition. The injected current value should be as high as possible but not less than 100A to provide a reliable voltage drop reading, thus allowing an easier detection of the arcing contact. This model provides up to 500A.



Connecting a test object to the CAT126



Features

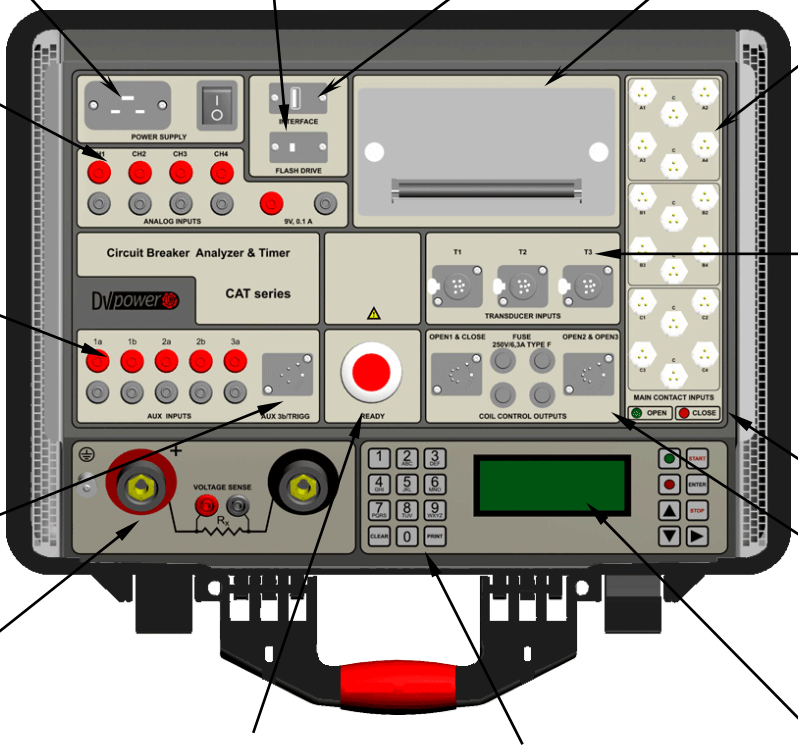
Mains power supply input
90 V – 264 V AC;
50 Hz – 60 Hz

Flash drive
Used for direct download of test results on a USB memory stick

PC communication
USB interface

Thermal printer *(built-in 112 mm wide) Graphic and numeric printout of test results*

Analog channels inputs
Used for measurement of any type of analog signal that may be relevant.



Main contacts inputs
Used for timing of main and pre-insertion resistor contacts, and for resistance measurement of pre-insertion resistors

Transducer inputs
Intended for measuring displacement of circuit breaker's moving parts

Auxiliary inputs
Used for timing of dry or wet auxiliary contacts

Breaker state indicator
The state of circuit breaker is indicated

External Trigger input
External trigger is used to start timing of the breaker when sensing a voltage.

Coil Control inputs
Used for operating of circuit breaker's OPEN and CLOSE coils

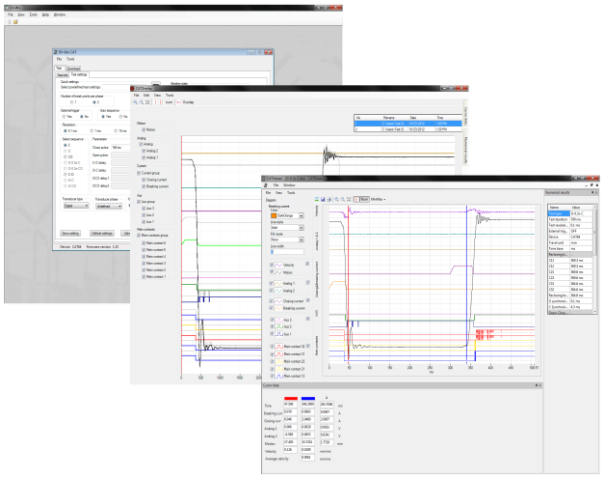
Micro Ohmmeter
(built-in 500 A DC micro ohmmeter) for static and dynamic contact resistance measurement

READY button
Prepares the instrument for start of the test

Alphanumeric keypad
Used for entering Breaker data, Test data and Control functions

LCD Screen
20 Characters by 4 Lines; LCD display with backlight, viewable in bright sunlight.

DV-Win software



DV-Win software provides the following features:

- *Full control of the CAT functions from a PC.*
- *Downloading the test results from the instrument.*
- *Acquisition and analysis of the test results.*
- *The test results can be viewed, edited, saved, printed and exported.*
- *Viewing and overlaying several graphs, for an easy test result comparison.*
- *Selecting the measurement points and intervals using the two cursors.*
- *Zoom and pan graph feature.*
- *Specific test sequence setup.*
- *Customized configuration of the test result graphs.*
- *Creation of the predefined test plans for an easy and quick field testing.*

Accessories

Included

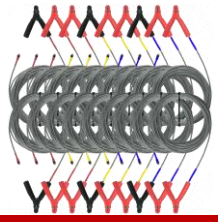
- DV-Win PC software
- Ground cable
- USB cable

Recommended

- Main contacts cable set 10 m with alligator clamps
- External trigger cable 5 m with banana plugs*
- Coil control cable set 5 m with banana plugs*
- Auxiliary contacts cable set 5 m with banana plugs*
- Analog channels cable set 8 x 5 m 2,5 mm2 with banana plugs
- Current cables 2 x 5 m 50 mm^2 with battery clips
- Sense cables 2 x 5 m with alligator clips
- Cable plastic case

Optional

- Thermal printer 112 mm (built-in)
- Thermal paper roll
- Digital rotary transducer with 5 m connection cable
- Linear analog transducer with 5 m connection cable
- Current clamp 30/300A + cable set 5 m
- Coil control cable set 10 m with banana plugs
- Auxiliary contact cable set 10 m with banana plugs
- External trigger cable 10 m with banana plugs
- Current cables 2 x 10 m 50 mm^2 with battery clips
- Sense cables 2 x 10 m with alligator clips
- Current cables 2 x 15 m 70 mm^2 with battery clips
- Sense cables 2 x 15 m with alligator clips
- Universal transducer mounting kit
- Test shunt 600 A / 60 mV



Main contacts cables set 10 m with alligator clamps*

External trigger cable 5 m with banana plugs*

Coil control cable set 5 m with banana plugs*

Auxiliary contacts cable set 5 m with banana plugs*

Analog channels cable set 8 x 5m 2,5 mm2 with banana plugs*

Linear analog transducer with 5 m connection cable*

Digital rotary transducer with 5 m connection cable

Current clamp 30/300A + 5 m cable set

Universal transducer mounting kit

Cable plastic case

Test shunt

Current & Sense cables

**The above cables are also available in several lengths and terminations.*
**The above linear analog transducers are available in several lengths.*
Please contact DV Power for more information

Technical Data

Main contact inputs

- Number of contact inputs: 12 (3 x 4), 4 per phase.
- Each channel detects main and pre-insertion resistor contacts.
  Closed ≤ 10 Ω,
  Resistor contacts range 10 Ω to 10 kΩ,
  Open ≥ 10 kΩ
  Open circuit voltage: 20 V DC
  Short circuit current 50 mA
- Each channel measures resistance of pre-insertion resistors

Auxiliary inputs

- Number of channels: 6, galvanically isolated (external trigger input can be used as a sixth auxiliary input)
- User selectable: dry or wet

  - Contact sensing (dry):
  Open circuit voltage 24 V DC,
  Short circuit current 5 mA

  - Voltage sensing (wet):
  Working voltage 300V DC, 250V AC
  Low activation mode ± 5V
  High activation mode ±10V

- Overcurrent and overvoltage protection

BSG (Both Sides Grounded) feature

Each channel is able to detect Main contacts state in case when circuit breaker both terminals are grounded.

Time measurement

Time measurement resolution:

- 0,05 ms for 2 s test duration;
- 1 ms for 20 s test duration;
- 10 ms for 200 s test duration;

Time accuracy 0,05% of the reading ± resolution

Coil driver

- Number of channels: 4 (3 Open and 1 Close coil)
- Four separate outputs for coil triggering
- Driver characteristics: 300 V DC max, 35 A DC max
- Electronic drivers: it provides superior timing control
- Overcurrent and overvoltage protection

Current measurement

- Current measurement for Open and Close coil, 4 channels, Hall-Effect sensor
- Range ±35A DC to 5 kHz
- Accuracy ± (0,5 % rdg + 0,1 % FS)
- Graphic presentation: currents waveform is displayed with resolution of 0,1 ms

Breaker operation

- Close (C),
- Open (O),
- Close-Open (C-O),
- Open-Close (O-C),
- Open-Close-Open (O-C-O)
- First trip test

User can select any desired test sequence

Time measurement triggers

- External trigger: 2 channels, input voltage: 10 V – 300 V AC/DC
- Coil currents: threshold level user selectable
- Auxiliary inputs
- Analog inputs: threshold level user selectable, positive or negative

Analog inputs

- 4 channels – Coil current measurement
- 4 Voltage channels, each channel has four measurement ranges: ±0.5 V, ±2,5 V, ±60 V and ±300 V AC/DC

The analog inputs are isolated with respect to all other circuits

Universal transducer inputs

- 3 digital travel transducer channels
  Digital rotary transducers: 2500ppr
- 3 analog travel transducer channels
  Analog transducer input measurement resolution: 16 bit.
  Internal supply for linear transducer: 5 V DC

Static resistance measurement

- Built-in Micro Ohmmeter 500 A
- Current range 5-500 A
- Max. load voltage 6.2 V
- Resistance range 0,1 μΩ - 999,9 mΩ
- Resolution 0,1 μΩ
- Accuracy ± (0,1 % rdg + 0,1 % FS)

Dynamic resistance measurement

- Voltage and current measuring channels
- DRM sampling rate 40 kHz
- Resolution 16 bit
- Breaker operations available for DRM test:
  Close (C)
  Open (O)
  Close-Open (C-O)
  Open-Close (O-C)

Printer (optional)

- Thermal printer
- Graphic and numeric printout
- Paper width 112 mm

Dimensions and weight

- Dimensions: 480 mm x 197 mm x 395 mm (W x H x D)
  18,89 in x 7,75 in x 15,55 in
- Weight: 12,2 kg / 26 lbs

Mains power supply

- Connection according to IEC/EN60320-1; UL498, CSA 22.2
- Mains supply: 90 V - 264 V AC
- Frequency: 50/60 Hz
- Input power: 250 VA
- Fuse 2 A / 250 V, Fast blow, but not user replaceable

Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Safety: LVD 2006/95/EC (CE Conform)
  Standard EN 61010-1
- EMC: Directive 2004/108/EC (CE Conform)
  Standard EN 61326-1:2006
- CAN/CSA-C22.2 No. 61010-1, 2nd edition, including Amendment1

Environmental conditions

- Operating temperature: -10 ºC - + 55 ºC / 14 ºF - +131 ºF
- Storage & transportation: -40 ºC - + 70ºC / -40 ºF - +158 ºF
- Humidity 5 % - 95 % relative humidity, non condensing

All specifications herein are valid at ambient temperature of + 25 °C and recommended accessories.
Specifications are subject to change without notice.

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