Circuit Breaker Analyzer & Timer CAT-P

- Simple and easy to operate
- Lightweight
- On-line measurement (First trip test)
- Off-line measurement
- 3 timing channels (3 x 1) for main contacts
- DC voltage measurement
- DC current measurement
- Touch screen color display 145 mm (5.7 in)
- On-site analysis of test results
- Test results analysis using DV-Win software
- External and internal power supply

Description

Handheld Circuit Breaker Analyzer & Timer CAT-P is a digital instrument for circuit breakers condition assessment. CAT-P records timing graphs of main arcing contacts, DC substation battery voltage, Trip and Close coil currents. Main contacts operating time in on-line mode is calculated based on AC secondary CT's currents. The timing channels record closing and opening of the main contacts.

CAT-P provides an easy selection of different operating modes:

- Trip (O)
- Close (C)
- Tripfree (CO)
- Trip-Close (O-C)
- Close-Trip (C-O)
- Trip-Close-Trip (O-C-O)
- First trip (O)

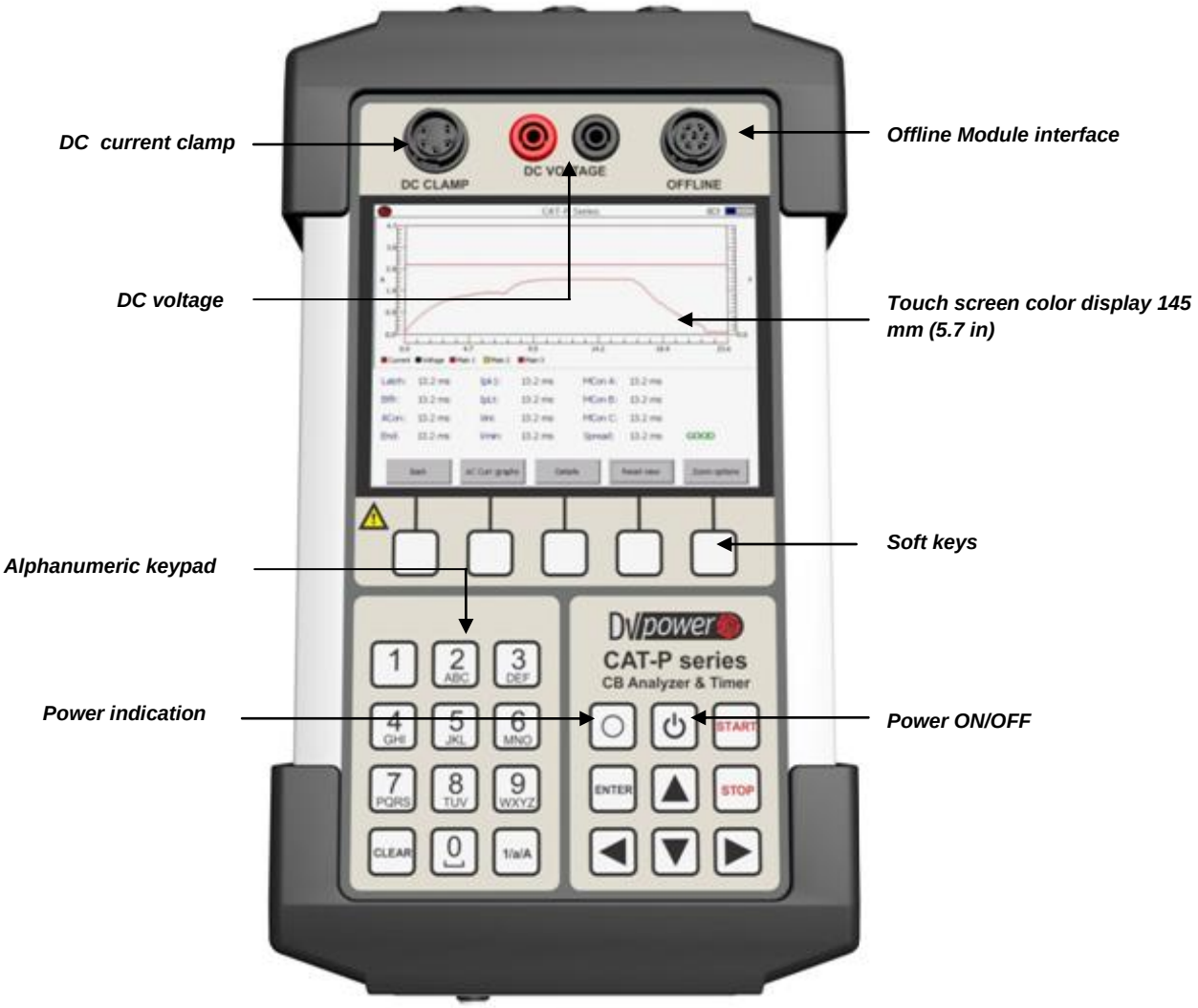
Before the start of the test, the current clamp needs to be connected to the auxiliary circuitry of the circuit breaker. The measurement starts when the connected current clamp senses the current flow through the auxiliary circuit, Trip or Close coil, depending on the initiated operation.

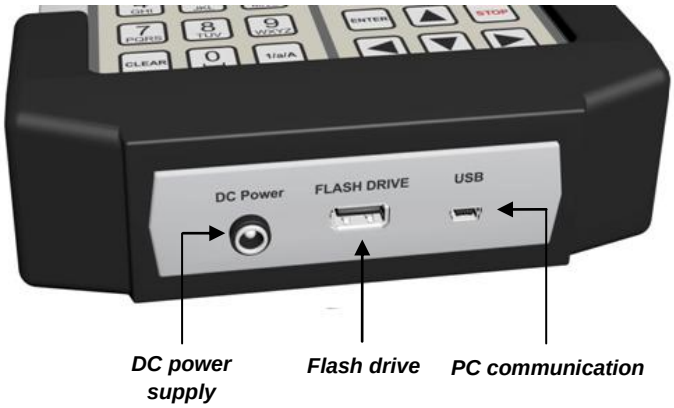
CAT-P is a powerful diagnostic tool for recording and analyzing:

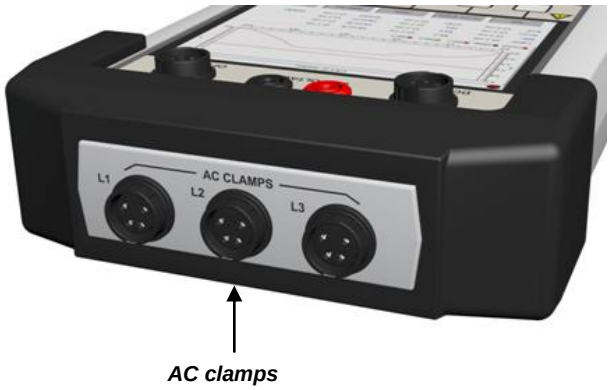
- Trip/Close coils condition
- Main contacts operating time
- Auxiliary contacts condition and operating time
- Circuit-breaker substation battery condition

CAT-P displays numerical and graphical results (it can overlay up to 4 records in graphical form). This enables quick onsite analysis of potential defects by comparing the obtained test results.

Features


DC current clamp
DC voltage
Alphanumeric keypad
Power indication
Offline Module interface
Touch screen color display 145 mm (5.7 in)
Soft keys
Power ON/OFF
DC CLAMP
DC VOLTAGE
OFFLINE
CAT-P series
CB Analyzer & Timer


DC Power
FLASH DRIVE
USB
DC power supply
Flash drive
PC communication


AC CLAMPS
L1
L2
L3
AC clamps

Application

The list of the instrument applications includes:

- Off-line and on-line testing of circuit breakers
- Timing measurement of up to 3 main contacts (1 break per phase) and auxiliary contacts
- A measurement of the coil currents
- Evaluating the state of the substation's battery by presenting the voltage value graphically
- Online measurement (First Trip monitoring test)

Timing Measurement (Off-line Test)

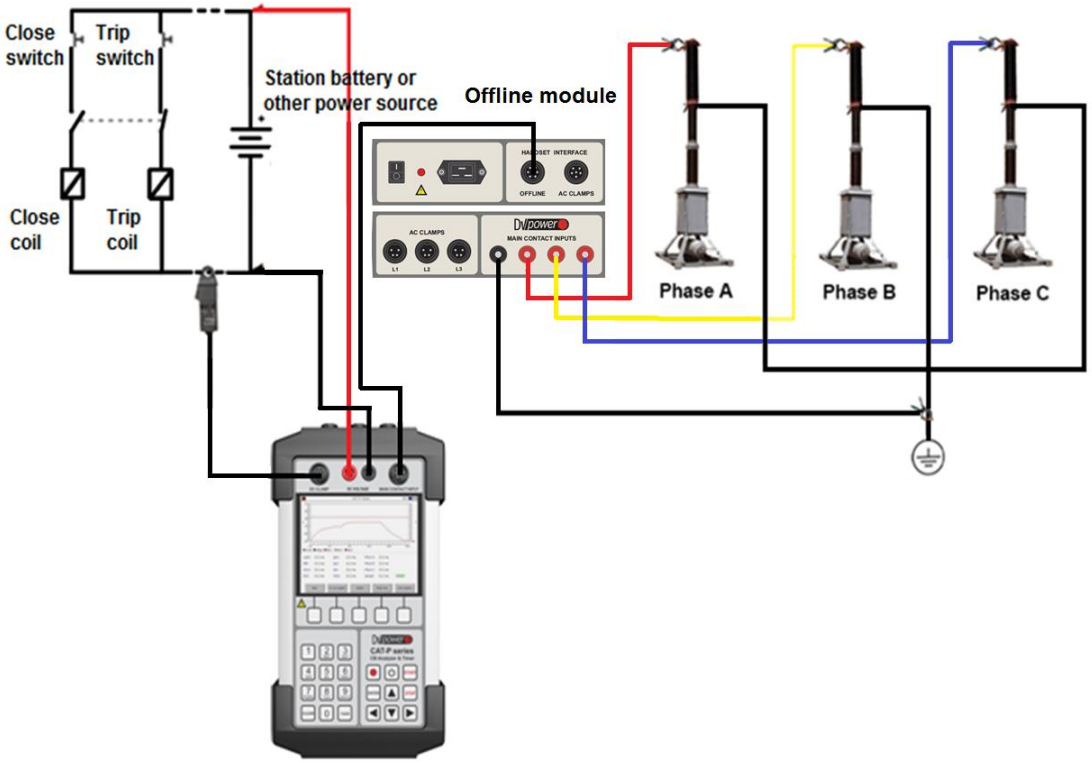
Timing measurement tests fulfill all the requirements stipulated in IEC 62271-100 and ANSI C37.04-1999.

Synchronization between the circuit breaker poles during opening shall not exceed 1/6 of the rated frequency cycle (3,33 ms at 50 Hz; 2,78 ms at 60 Hz) and during the closing shall not exceed 1/4 of the rated frequency cycle as well (5,0 ms at 50 Hz; 4,17 ms at 60 Hz).

Auxiliary contacts are mechanically driven by the operating mechanism and are used for control and indication of the main contacts state. There are no general requirements related to timing measurement of auxiliary contacts, described in IEC® and ANSI® standards. However, in order to assess conditions of high-voltage circuit breakers, it is important to check their operation.

Type "a" contact is opened/closed when the circuit breaker main contacts are opened/closed, while type "b" contact is opened/closed when the circuit breaker main contacts are closed/opened.

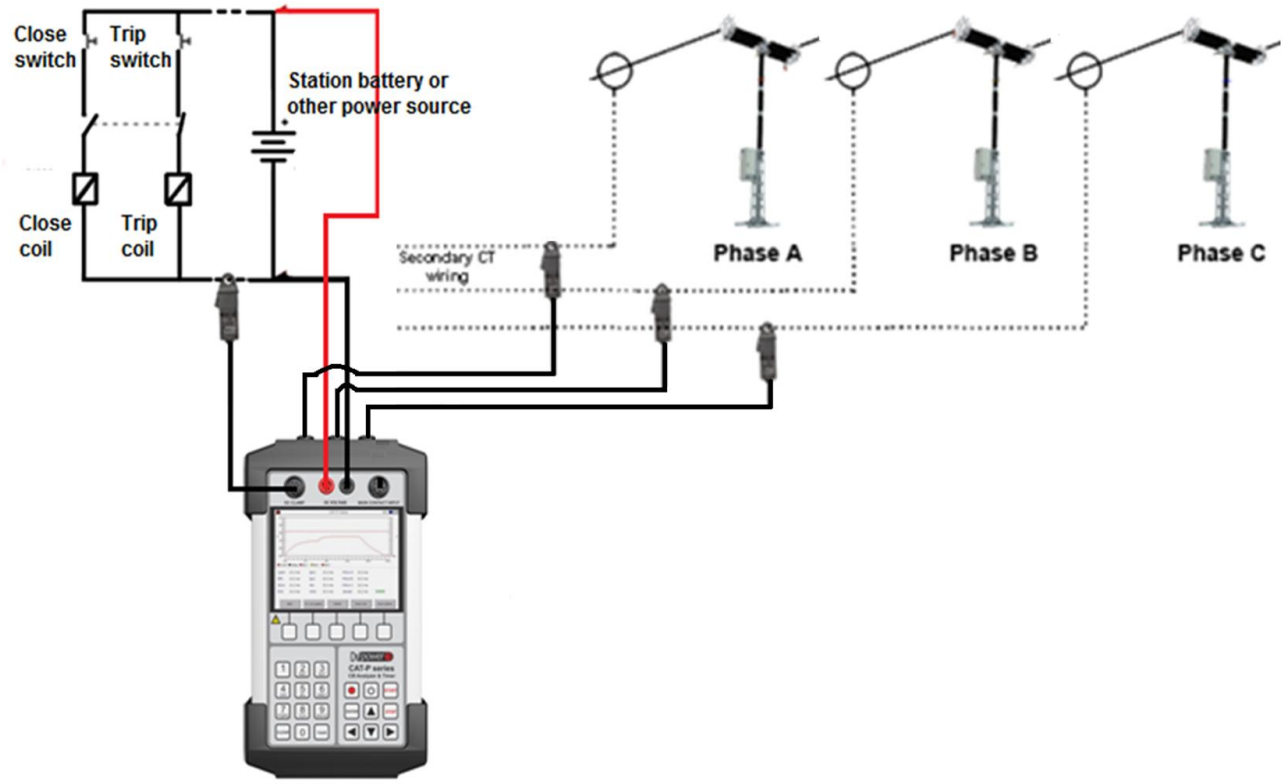
Type "a" contact is connected in series to the trip coil. It interrupts the trip coil circuit when the circuit breaker opens. Type "b" contact is connected in series to the closing coil, interrupting the closing coil circuit when the circuit breaker closes.



“First trip” test (Online test)

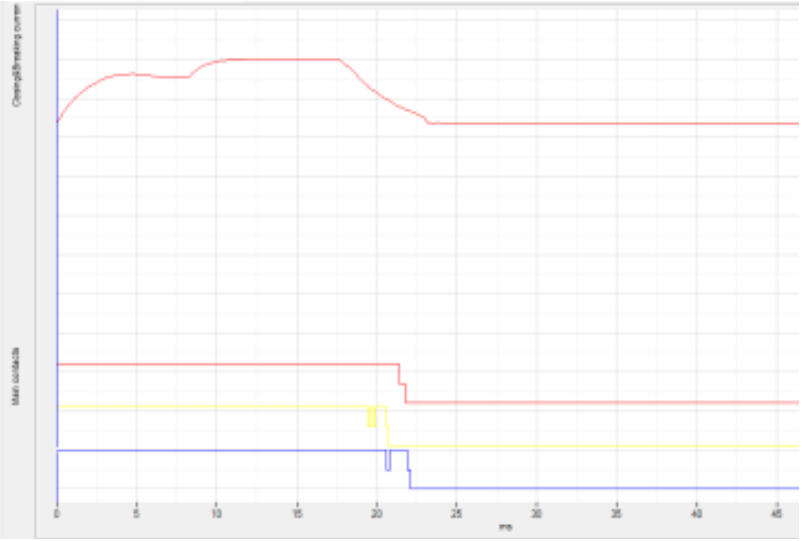
“First trip” analysis is important to determine a condition of the coil operating mechanism. A circuit breaker spends most of its lifetime conducting a current without any operation. Once the protective relay detects a problem, the circuit breaker, that was idle for maybe a year or longer, has to operate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

When the breaker is in service, the conventional way of offline timing measurement with timing cables across the interrupter cannot be used. Instead of the main contact timing cables, current clamps are used. These current clamps show current flowing through the secondary side of the current transformer in each phase. The instant when the current stops flowing reveals the breaker trip time.



DV-Win

DV-Win application software suite provides acquisition and analysis of the test results. 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.



DV-Win Main Features

- Downloading the test results from the instrument to PC
- 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

Technical Data

Main contact inputs

- Number of contact inputs: 3 (3 x 1), 1 per phase
- Each channel detects Main contacts
  - Closed ≤ 10 Ω
  - Resistor contacts range 10 Ω to 5 kΩ
  - Open ≥ 5 kΩ

  Open circuit voltage: 20 V DC

  Short circuit current 50 mA

Time measurement

Time measurement resolution:

- 0,05 ms for 1 s test duration (sampling rate 20 kHz)
- 0,1 ms for 2 s test duration (sampling rate 10 kHz)

Time accuracy: 0,05% of the reading ± resolution

Breaker operation

- Close (C)
- Trip (O)
- Close-Trip (C-O)
- Trip-Close (O-C)
- Trip-Close-Trip (O-C-O)
- First trip test

The user can select any desired test sequence

DC Current Clamps

- Nominal current: 300 A_{RMS} or 450 A DC_{PK}
- Measuring ranges: 30/300 A
- Frequency range: DC to 20 kHz (-3 dB)

AC Current Clamps

- Measuring Range: 0,05 A to 5 A_{RMS}
- Accuracy: ±3% ±1 mV (from 0,05 A to 0,5 A), ±1,5% ±1 mV (from 0,5 A to 1 A), ±1% (from 1 A to 5 A)

DC Voltage Measurement

- Range: ±300 V
- Typical accuracy: ±0,5% RDG ±0,5% FS
- Guaranteed accuracy: ±1% RDG ±1% FS

Handset Power Supply

- 12 V DC, 0,5 A

Inline Power Supply

- Input: 90 – 264 V AC, 50/60 Hz

Internal Battery Supply

- 2 x 3,7 V, 2900 mAh rechargeable Li-ion battery
- 8 hours under normal usage

Display

- Touch screen color display 145 mm (5.7 in)
- Graphic and numeric results

Warranty

- 3 years

Applicable standards

- Installation category: II
- Pollution degree: 2
- Safety: LVD 2006/95/EC (CE Conform)
  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 to + 55 ºC / 14 ºF to +131 ºF
- Storage & transportation:
  -40 ºC to + 70ºC / -40 ºF to +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.

Main Contact Cables 5 m (16.4 ft) with alligator clamps (A1)*

Main contact interface cable 5 m*

Voltage sense cable set 2 x 5 m (16.4 ft) 2,5 mm^2 (13 AWG) with banana plugs*

Dolphin clip (red, black)

Current clamp 30/300 A power supplied from the instrument with extension 5 m (16.4 ft)

AC Current clamp 1 A / 1 V with cable 5 m (16.4 ft)

Extension cable 5 m (16.4 ft) for AC Current clamp 1 A / 1 V

Offline Module

Plastic transport case - medium size

Cable bag

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

Order info

Instrument with included accessories	Article No
Handheld Circuit Breaker Analyzer & Timer CAT-P	CATP000-N-00
DV-Win PC software including USB stick and USB cable	
Mains power cable with adapter	

Recommended accessories	Article No
Main Contact Cables 5 m with alligator clamps (A1)	CMP-05-4BPA1
Main contact interface cable 5 m	E1P-05-7NMNM
Voltage sense cable set 2 x 5 m 2,5 mm^2 with banana plugs	C2-05-02BPBP
Dolphin clip (black)	DOLPIN-CL-B0
Dolphin clip (red)	DOLPIN-CL-R0
Current clamp 30/300 A power supplied from the instrument with extension 5 m	CACL-0300-06
AC Current clamp 1 A / 1 V with cable 5 m (x 3)	CACL-AC00-05
Extension cable 5 m for AC Current clamp 1 A / 1 V	CACL-ACE-N05
Offline Module	MC-MODULE-00
Plastic transport case - medium size	HARD-CASE-PM
Cable bag	CABLE-BAG-00

Optional accessories	Article No
Voltage sense cable set 2 x 2 m 2,5 mm^2 with banana plugs	C2-02-02BPBP
Voltage sense cable set 2 x 10 m 2,5 mm^2 with banana plugs	C2-10-02BPBP
Test probe with grip jaws (black)	TESTPR-GJ-B0
Test probe with grip jaws (red)	TESTPR-GJ-R0
Test probe with split test clamps (black)	TESTPR-SC-B0
Test probe with split test clamps (red)	TESTPR-SC-R0
Extension cable 10 m for AC Current clamp 1 A / 1 V	CACL-ACE-N10
Main Contact Cables 10 m with alligator clamps (A1)	CMP-10-4BPA1
Main Contact Cables 5 m with alligator clamps (A2)	CMP-05-4BPA2
Main Contact Cables 10 m with alligator clamps (A2)	CMP-10-4BPA2
Main contact interface cable 2 m	E1P-02-7NMNM
Main contact interface cable 10 m	E1P-10-7NMNM

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