

# CAT Advanced series

## Circuit Breaker Analyzers & Timers



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**amperis**

# CAT Advanced series

## Circuit Breaker Analyzers & Timers

- Robust design for field use
- Accurate measurement in high voltage environment
- Both Sides Grounded feature (optional)
- Built-in micro ohmmeter (up to 500 A)
- Dynamic resistance measurement
- Detailed analysis of test results using Amperis software
- Database of circuit breakers test plans



## Description

The CAT Advanced series circuit breaker analyzers & timers are stand-alone or a PCcontrolled digital instruments for circuit breakers condition assessments. The timing channels record closing and opening of the arcing, resistor and auxiliary contacts. The main contact channels can also measure the resistance value of the preinsertion resistors (if present in the circuit breaker). CAT Advanced series records graphs of both, open and close coil currents and displacements of the HV and MV circuit breaker moving parts. Test results are printed on the 112 mm (4.4 inch) thermal printer (optional accessory) in tabular and graphical form.

CAT Advanced series provides an easy selection of different operational modes:

- Open (O)
- Close (C)
- Reclose (O-0,3s-C)
- Trip free (CO)
- O-0, 3s-CO
- Open-Close (O-C)
- Close-Open (C-O)
- Open-Close-Open (O-C-O)
- First trip (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:

- external trigger
- analog channels
- auxiliary channels
- coil control channel

The auxiliary inputs are used to monitor dry and wet auxiliary contacts. The six coil control analog channels can measure and record coil currents simultaneously (OPEN and CLOSE), up to 35 A AC/DC.

The additional six voltage analog channels have four selectable voltage ranges available ( $\pm 1$  V,  $\pm 5$  V,  $\pm 60$  V and  $\pm 300$  V AC/DC). They are used to monitor:

- Measurement of coil resistance (simultaneously for 3 coils – during open or close sequence)
- Circuit-breaker substation battery voltage,

- DC and AC currents during the “First trip” test,
- Other types of analog signals that may be relevant.

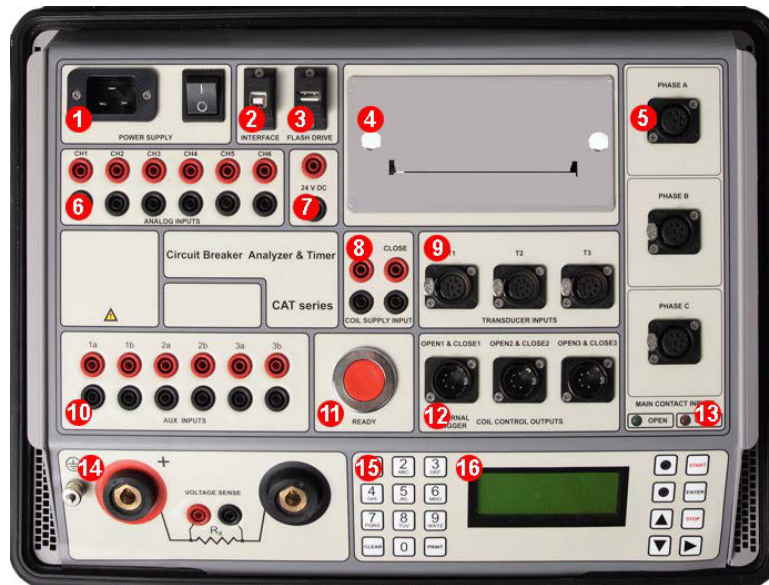
Three transducer channels provide measuring displacement of the circuit breaker moving parts, contact wipe, over-travel, rebound, damping time and an average velocity. Either an analog or a digital transducer can be connected to these universal channels.

## Application

The list of the instrument applications includes::

- Simultaneous timing measurement of up to 12 main contacts (4 breaks per 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
- Measurement of the coil currents, voltages and resistance simultaneously for 6 coils
- Evaluating the state of 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 resistance measurement
- Dynamic resistance measurementa

## Features



**1 - Mains power supply input**

90 - 264 V CA; 50 Hz - 60 Hz

**2 - PC communication**

USB interface

**3 - Flash drive**

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

**4 - Thermal printer (optional)**

Built-in 112 mm (4.4 inch) wide)  
Graphic and numeric printout of contact and travel wave forme.

**5 - Main contacts inputs**

Used for timing of the main and preinsertion resistor contacts, and for the resistance measurement of the preinsertion resistors.

**6 - Analog channels inputs**

Used for a voltage measurement of an analog signal that may be relevant.

**7 - Current clamps voltage supply**

24 V voltage output for current clamps

**8 - Coil supply input**

Voltage supply input for coil control

**9 - Motion transducer inputs**

Intended for measuring displacement of circuit breaker's moving parts.

**10 - Auxiliary inputs**

Used for timing measurement of dry or wet auxiliary contacts.

**11 - READY button**

Prepares the instrument for the start of the test.

**12 - Coil control outputs & external trigger input**

Used for operating the circuit breaker OPEN and CLOSE coil or external trigger feature

**13 - Breaker state indicator**

Indicates CLOSE or OPEN breaker position

**14 - Micro Ohmmeter**

built-in micro ohmmeter – up to 500 A DC) for static and dynamic contact resistance measurement (not available with CAT64A and CAT124A).

**15 - Alphanumeric keypad**

sed for entering breaker data, test data and control functions

**16 - LCD display**

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

## Medición del tiempo

Timing measurement of the mechanical operations is one of the most important tests to determine real condition of the circuit breaker. Timing measurement tests fulfill all the requirements defined by IEC 62271-100 and IEEE C37.09.

In three-phase systems, not only the contacts in a single pole have to operate simultaneously, but all poles must also operate at the same time. All contacts must be synchronized, within a certain tolerance limit.

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 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).

Simultaneous measurements within a single phase are important in situations where a number of contacts are connected in series.

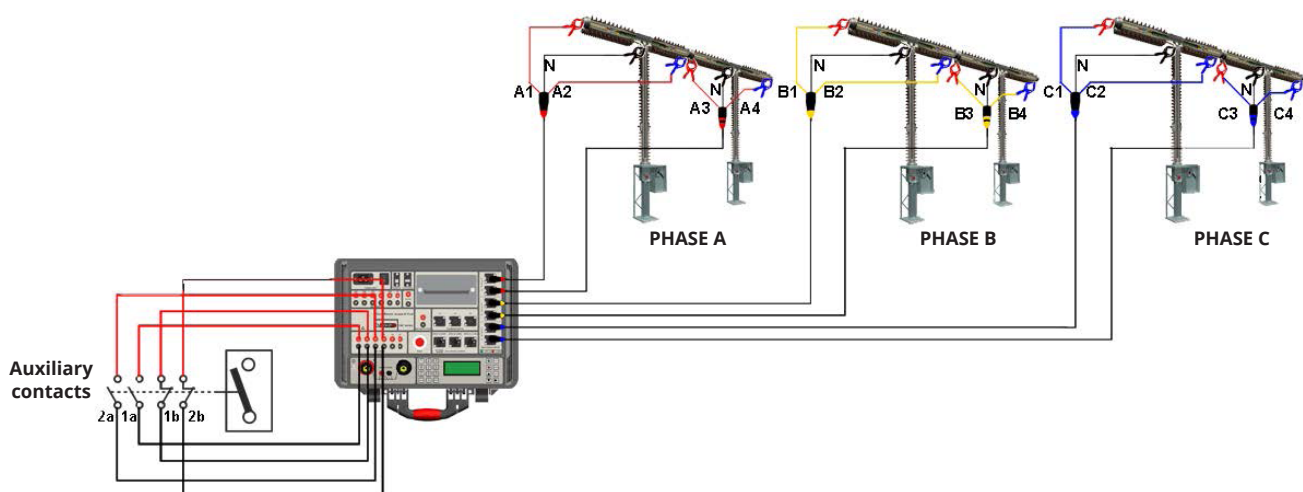
The maximum difference between the instants of contact separation within series connected interrupter units shall not exceed 1/8 of a cycle of rated frequency (2,50 ms at 50 Hz; 2,08 ms at 60 Hz). Maximum difference

between the instants of contacts touching within series connected interrupter units shall not exceed a 1/6 of a cycle of rated frequency (3,33 ms at 50 Hz; 2,78 ms at 60 Hz).

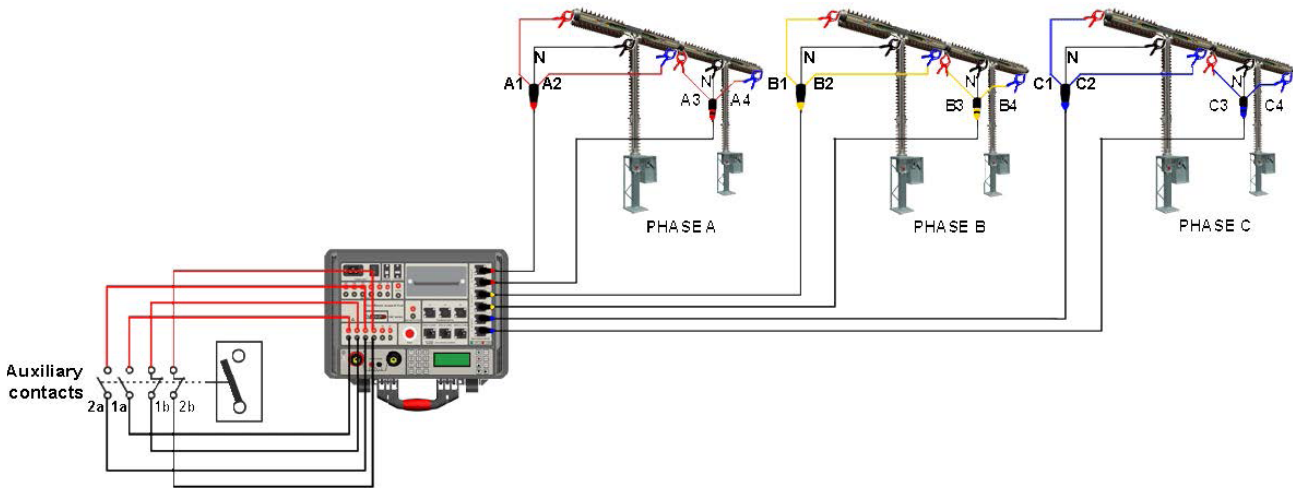
Auxiliary contacts are mechanically driven by the operating mechanism and are used for control and indication of main contacts state. There are no general requirements, related to timing measurement of auxiliary contacts, described in IEC® and IEEE® standards. Anyway, in order to assess condition of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

Type "a" contact follows circuit breaker main contact position and must close/open ahead of the closing/opening of the main contact. Type "a" contact is connected in series with the open coil and interrupts the open coil circuit when the circuit breaker opens

The "b" contact must open/close when the operating mechanism has released its stored energy in order to close/open the breaker. Type "b" contact is connected in series with the closing coil, interrupting the closing coil circuit when the circuit breaker closes.



Connecting the main contact timing cables and auxiliary timing cables to a test object



Connecting the main contact timing cables and auxiliary timing cables to a test object

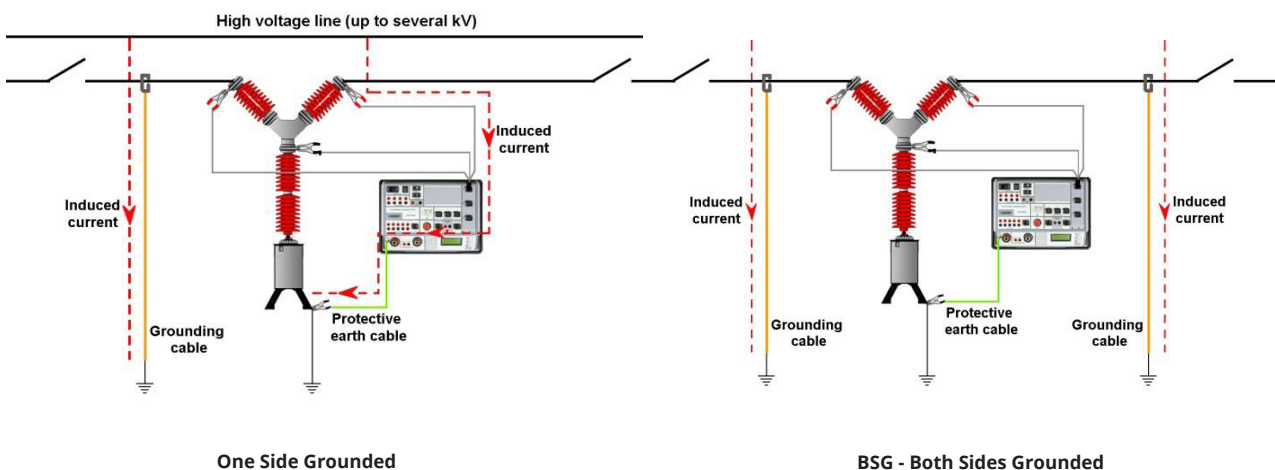
## Both Sides Grounded

Utilities and service companies increase their emphasis and demands on the safety regulations. In all substations grounding on both sides of the circuit breaker contacts is the best way to provide safety. These safety grounds eliminate any static discharge in the circuit breaker contact and conduct any line power close to the circuit breaker while the personnel are working.

These earth grounds present a short-circuit condition to the traditional test equipment, and therefore the circuit breaker always looks to be in the closed state. In practice, it is necessary to remove at least one of the safety grounds from the circuit breaker prior to testing, and

to reinstall the ground(s) after testing is complete. This procedure is not desirable as it introduces a possibility that the ground may not be reconnected after the test, presenting a safety hazard.

**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 case when both terminals are grounded.



## Motion measurement

Motion measurement of the high voltage circuit breakers' contact system is of crucial importance for assessing a condition of the test object. The three motion transducer channels can acquire data from 3 linear or rotary motion transducers. Each channel can be configured for either an analog or a digital transducer.

Due to universal transducer channels design, a user is able to connect a variety of motion transducers available on the market.

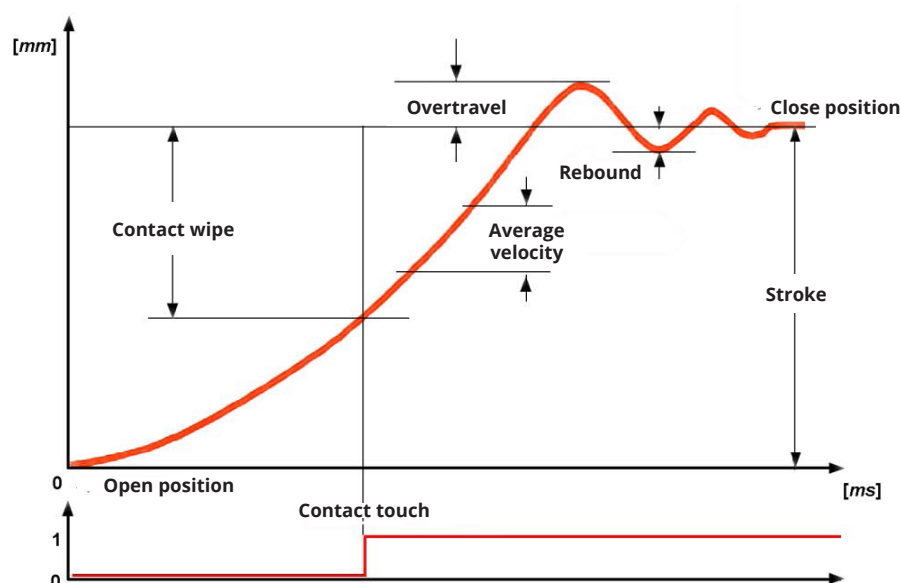
Performance values such as stroke, over-travel, rebound, contact wipe are obtained as a result of the measurement. These values can be compared to the manufacturer's reference data and data acquired from previous measurements. This provides indications about potential wear of the breaker.

Average velocity is calculated between the two points on the motion curve. The upper point is defined as a distance in length or time elapsed from the breaker's closed position, or contact-separation point. The lower point is determined based on the upper point. It can either be a distance below the upper point or a time before the upper point. Up to 5 zones for average velocity calculation can be selected.

User is usually allowed to mount transducers on accessible parts of the circuit breaker's mechanical linkage. Beside this, instrument often records rotary motion, even it is known the main contacts motion is linear. As a result, motion results obtained do not represent real movement of the main contacts, but just linear or nonlinear interpretation of the main contacts moving parts displacement. Amperis software provides transfer function feature which allows user to define linear or non-linear parameters in order to obtain actual displacement values of the main contact moving parts.



*Digital rotary transducer mounted on ABB LTB 245 kV SF6 circuit breaker*





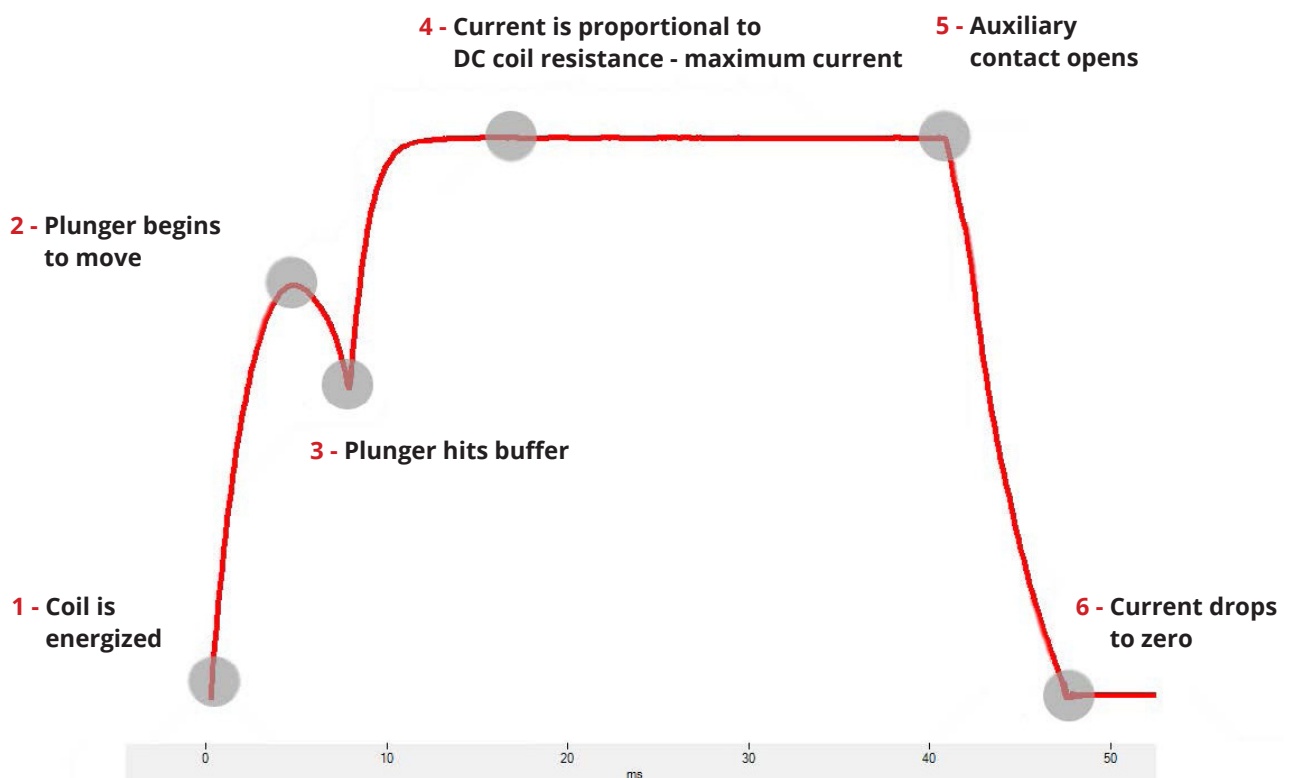
## Coil current measurement

The IEC 62271-100 standard states that it is desirable to record the coil currents waveform, since it provides information about coils' condition (e.g. increased friction of the plungers, burned insulation, short-circuited part of the winding), the latch for release of the operating mechanism (e.g. increased friction) and the operating mechanism (e.g. if there is reduced operating mechanism speed that can be seen based on the opening time of auxiliary contacts).

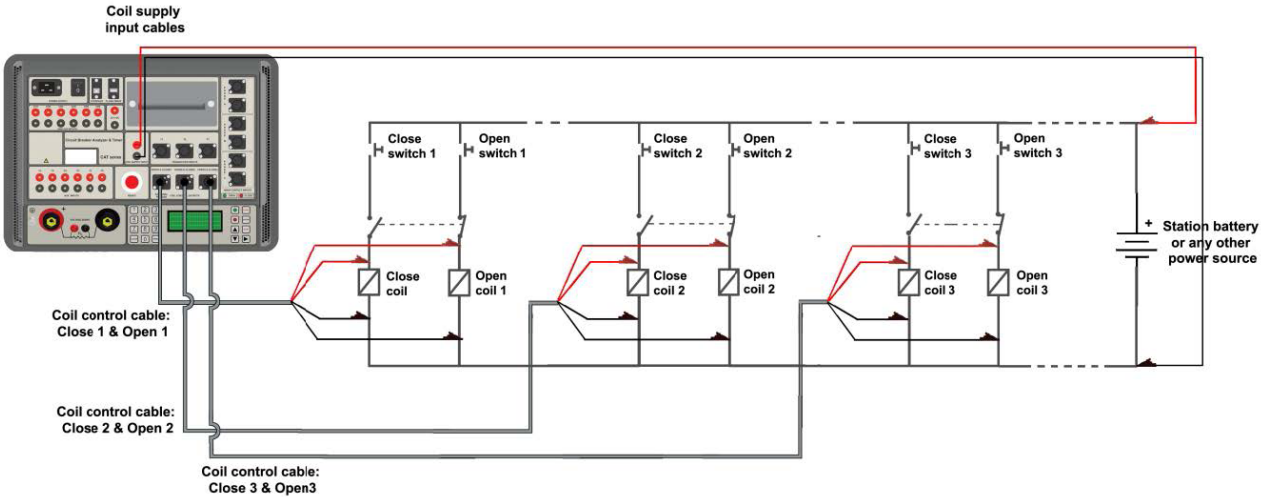
When the opening or closing command is initiated, the coil is energized (point 1) and the current rises causing a magnetic field to apply a force on the iron plunger. When the force on the plunger exceeds the retaining force the plunger begins to move (point 2). The motion of the iron plunger induces an *EMF* in the coil, effectively reducing the current.

The combined mass of the plunger and the latch continue to move at a reduced velocity causing a further

reduction in the coil current (points 2 to 3) until it hits a buffer bringing it to a rest (point 3). If the current values at points 2 and 3 are higher than specified and the time at point 3 is longer than specified, it may indicate a friction of the plunger and latch. With the plunger at rest, the current increases to the saturation level (DC current which is proportional to the coil resistance, point 4). If the current value from point 4 to point 5 deviates from specific it may indicate a burned insulation or short-circuited part of the winding of coil. Meanwhile, the latch unlocks operating mechanism, releasing the stored energy to open the main breaker contacts. Typically, after a short delay the auxiliary contacts open, disconnecting the opening coil from the control voltage (point 5). As the coil is de-energized the current drops quickly to zero in accordance with the coil inductance (point 6). Longer time than specified at points 5 and 6 may indicate auxiliary contact malfunction or insufficient driving energy of the.





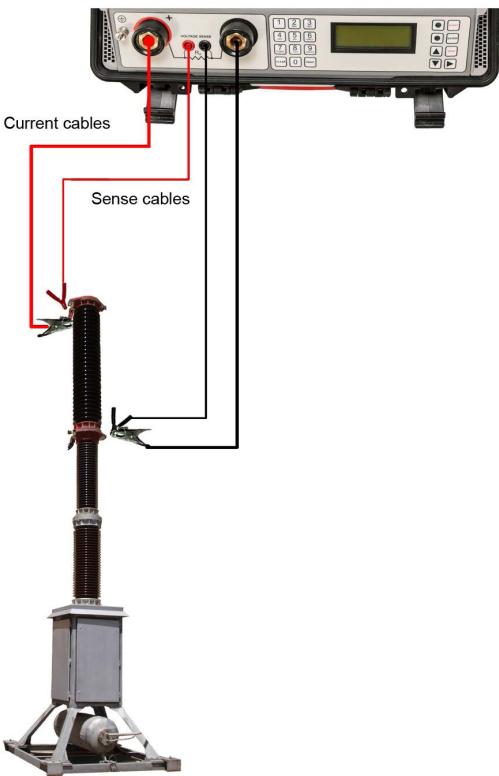


Connecting the coil control cables to 3 open and 3 close coils of the single pole controlled circuit breaker

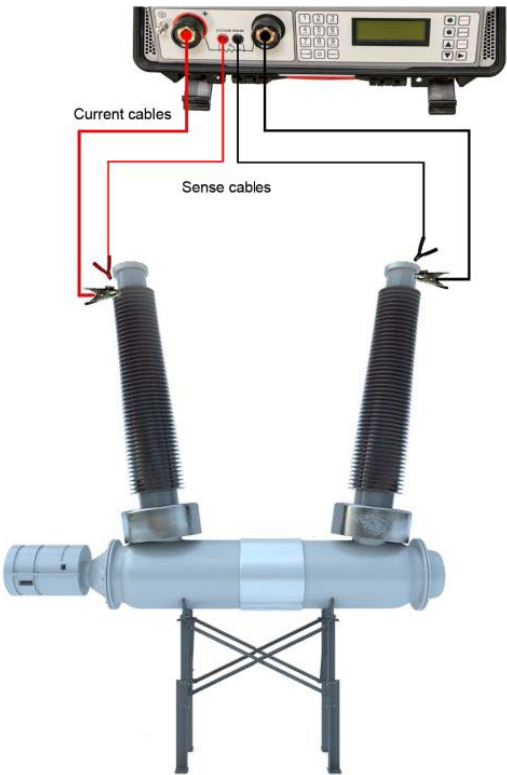
### Static resistance measurement

The built-in micro ohmmeter generates up to 500A 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. Voltage drop is measured between terminals of the circuit breakers. The resistance is calculated using the Ohm's law  $R=U/I$ .



Micro Ohmmeter cable connection on a live tank circuit breaker



Micro Ohmmeter cable connection on a dead tank circuit breaker

## High – Precision module (built-in)

The high-precision module is newly developed built-in addition to 500 A micro ohmmeter available in **CAT36 model**. It provides an increased precision and offers a highly accurate contact resistance measurement in the range from 1  $\mu\Omega$  to 30  $\mu\Omega$ , with 0,01  $\mu\Omega$  resolution.

CAT36 with the built-in High Precision Module may be used for applications on very small resistance measurements of non-inductive test objects. This requirement is usually met at resistance inspections of generator circuit breakers, welding joints, GIS testing, etc.

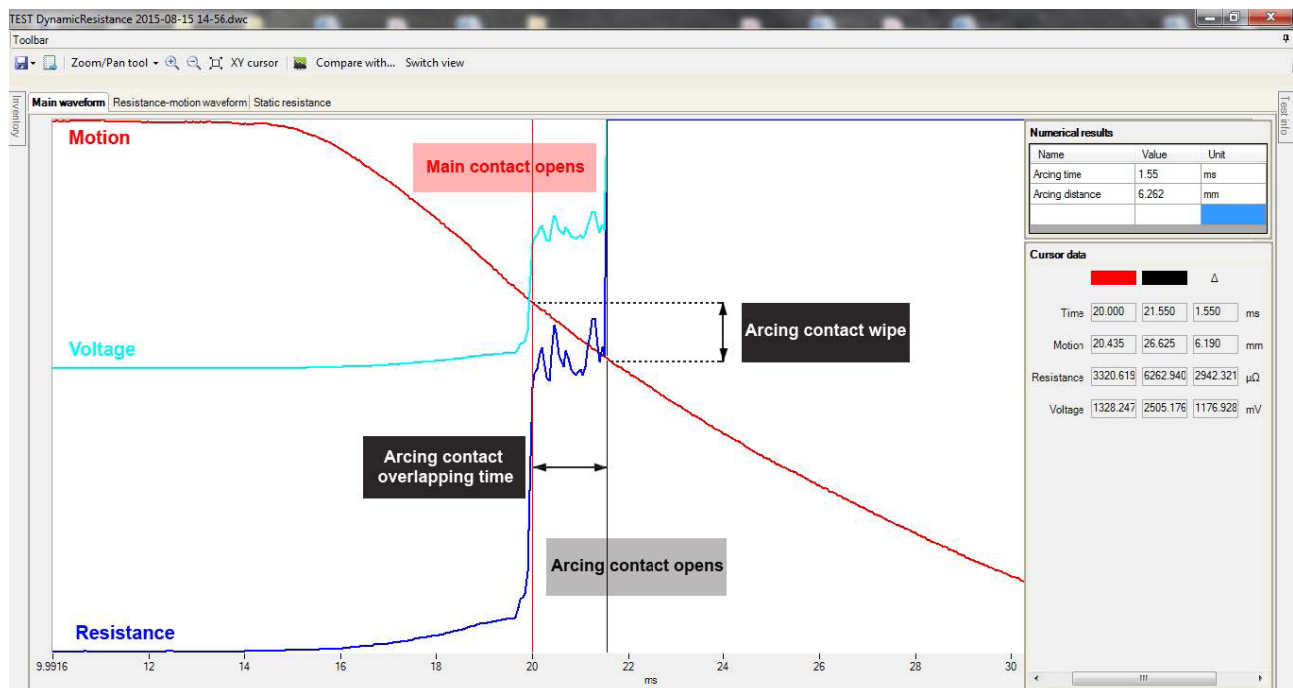
## DRM (Dynamic Resistance Measurement)

The built-in micro ohmmeter can also be used for the DRM. 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 breaker operation. The DRM test requires the circuit breaker analyzer with a high resolution measurement.

the arcing contact condition. The injected current value should be as high as possible but no less than 100 A, to provide a reliable voltage drop reading, thus allowing an easier detection of the arcing contact.

CAT36, CAT66 and CAT126 models incorporate the most powerful micro ohmmeter generating up to 500 A.

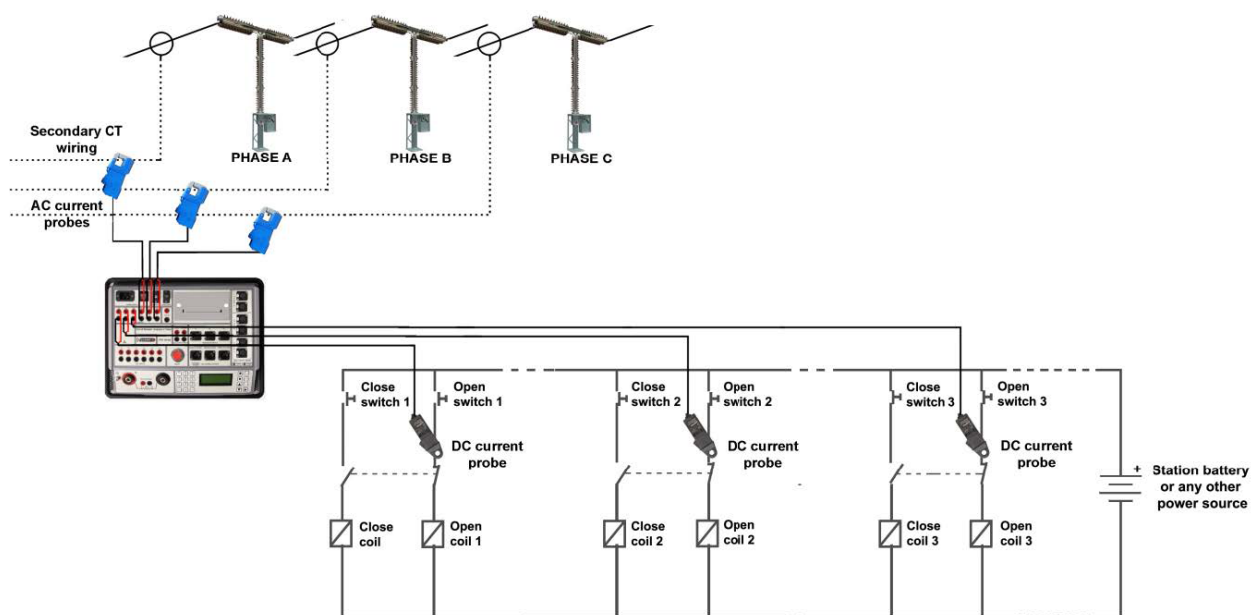
The resistance curve, as a function of a contact travel can be used to reveal potential problems related to



## First trip test

“First trip” analysis is important to determine a condition of the coil operating mechanism. 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 friction of the trip latch release mechanism may increase. Information about the latch friction, open circuit contacts, insufficient spring tension, can be learned from the coil current waveform recorded during the “First trip” test.

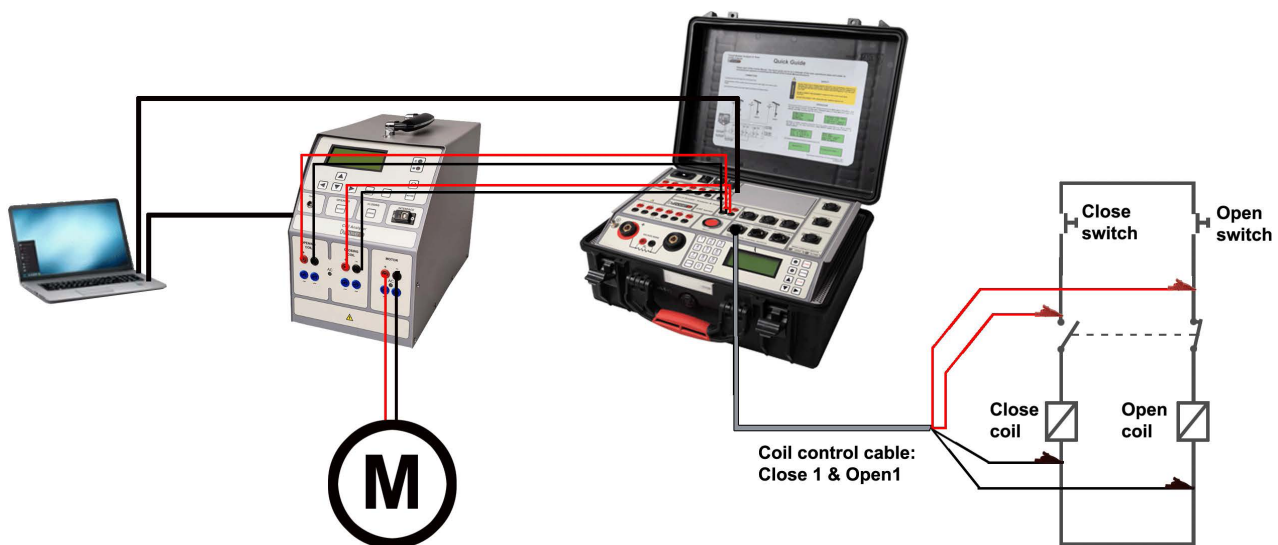
Since the breaker is in service, the conventional way of off-line timing measurement with timing cables across the interrupter cannot be used. Instead of main contact timing cables, three current probes are used. These current probes show current flowing through the secondary side of the current transformer for each phase. The instant when the current stops flowing, reveals the breaker open time..



*Connecting the DC current probes for measurement of the coil current and AC current probes to the line currents during the “First trip” test*

## CAT & SAT as Circuit Breaker Test System

CAT & SAT series devices - a circuit breaker test system. The CAT Advanced series circuit breaker analyzers and timers can be coupled with DV Power’s SATII series of coil analyzers. When connected to DV-Win software, these two instruments create a test system (monitoring and reporting done with the same software). The SAT40A II series can be used as a power supply to measure spring-loaded motor current and voltage, as well as to determine the minimum tripping voltage of circuit breaker coils.



## Software DV-Win

### Acquisition and Analysis

Amperis software provides acquisition and analysis of the test results, as well as control of all the CAT Advanced series functions from a PC. It supports measurements process and step by step guidance through the entire test procedure, providing faster, easier and safer testing.

### Graphical presentation

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. Amperis supports 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.

### Database

Results are automatically stored and organized in the database on your PC and are available for analysis and reporting. Each test can be automatically assessed according to manufacturer specifications or based on your individual limit values.

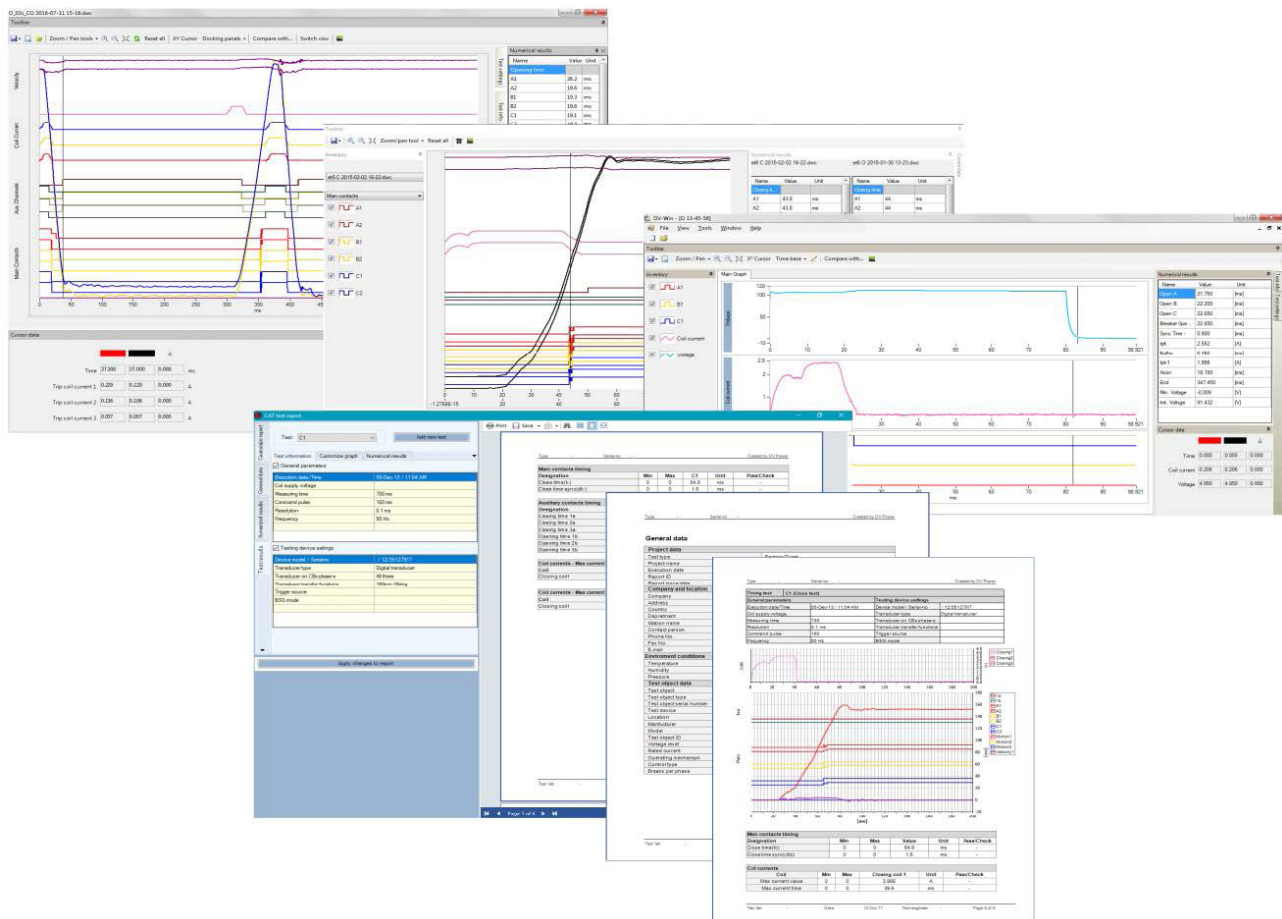
Amperis software database can be updated with over 500 test plans of different apparatus commonly used in most utilities and substations. This valuable benchmark data used for test results evaluation is provided upon request.

### Reports

Amperis automatically generates reports including all asset-related information and performed tests. This gives you a comprehensive overview of the test object, test results and assessment. You can easily adapt test reports, for example, by choosing from different types of result tables and diagrams and by providing comments on every test. Furthermore, you can incorporate your company logo, photos and other test results.

## DV-Win functions

- 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
- Creation of predefined test plans for an easy and quick field testing
- Customized configuration of the test result graphs



## Technical data

### Main contact inputs

- Number of contact inputs: up to 12 (3 x 4), 4 per phase, depending on the model.
- Each channel detects main and pre-insertion resistor contacts.
  - Closed  $\leq 10 \Omega$ ,
  - Resistor contacts range  $10 \Omega$  to  $5 \text{ k}\Omega$ ,
  - Open  $\geq 5 \text{ k}\Omega$
 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
- User selectable: dry or wet
- Contact sensing (dry):  
 Open circuit voltage 24 V DC,  
 Short circuit current 5 mA
- Voltage sensing (wet):  
 Working voltage 300 V DC, 250 V AC  
 Low activation mode  $\pm 5 \text{ V}$   
 High activation mode  $\pm 10 \text{ V}$
- Overcurrent and overvoltage protection

### Coil driver

- Number of channels: 6 (3 open and 3 close coil)
- 6 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
- Coil supply input: 300 V DC max, 35 A DC max

### Time measurement

Time measurement resolution:

- 0,025 ms for 1 s test duration (sampling rate 40 kHz)
- 0,1 ms for 2 s test duration (sampling rate 10 kHz)
- 1 ms for 20 s test duration (sampling rate 1 kHz)
- 10 ms for 200 s test duration (sampling rate 100 Hz)

Time accuracy  $\pm 0,05\%$  of the reading  $\pm$  resolution

### 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

### Current measurement

- Current measurement for Open and Close coil, 6 channels, Hall-Effect sensor
- Range  $\pm 35 \text{ A AC/DC}$  to 5 kHz
- Resolution: 25mA
- Accuracy  $\pm (0,5 \% \text{ rdg} + 0,1 \% \text{ FS})$
- Graphic presentation: currents waveform is displayed with resolution of 0,1ms

### Coil resistance measurement

- 3 coils simultaneously (Open or Close)
- Measuring range / Resolution  
 $1 \Omega - 99,9 \Omega / 0,1 \Omega$   
 $100 \Omega - 999 \Omega / 1 \Omega$
- Typical accuracy:  $\pm (0,5 \% \text{ rdg} + 0,5 \% \text{ FS})$

### 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

### Time measurement triggers

- External trigger: 2 channels (Open 1 & Close 1), input voltage: 10 V – 300 V AC/DC
- Coil currents: threshold level user selectable
- Auxiliary inputs
- Analog inputs: threshold level user selectable

### Analog inputs

- 6 channels – Coil current measurement
- 6 Voltage channels, each channel has four measurement ranges:  $\pm 1 \text{ V}$ ,  $\pm 5 \text{ V}$ ,  $\pm 60 \text{ V}$  and  $\pm 300 \text{ V AC/DC}$

The analog inputs are isolated with respect to all other circuits

## DC output

- 24 V voltage supply for current clamps

## Static resistance measurement

- Built-in Micro Ohmmeter with up to 500 A, depending on the model
- Current range 5 A - 500 A
- Max. load voltage 6,2 V
- Resistance range 0,1  $\mu\Omega$  - 999,9 m $\Omega$
- Resolution 0,1  $\mu\Omega$
- Accuracy  $\pm$  (0,1 % rdg + 0,1 % FS)

## Dynamic resistance measurement

- Voltage and current measuring channels
- DRM sampling rate 20 kHz (0,05 ms time resolution)
- Resolution 16 bit
- Breaker operations available for DRM test:
  - Open (O)
  - Close (C)
  - O - C (auto reclose)
  - C - O (make brake)

## Printer (optional)

- Thermal printer
- Graphic and numeric printout
- Paper width 112 mm / 4.4 in

The print density is guaranteed within range: 5°C to 40°C, 20 to 85% relative humidity, non-condensing

## Dimensions and weight

- Dimensions (W x H x D):  
480 mm x 197 mm x 395 mm  
18.89 in x 7.75 in x 15.55 in
- Weight:  
from 10,7 kg (23.5 lbs) up to 13.2 kg (29.1 lbs)  
depending on the model and built-in features

## 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 (without use of Micro Ohmmeter)
  - 3900 VA (with use of Micro Ohmmeter)

## Rechargeable battery (optional – excluding printer; available only with CAT64A)

- Type 4 x 3, 7 V, Cell – 2600 mAh Li-Ion

## Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Safety: LVD 2014/35/EU (CE Conform)  
Standard EN 61010-1
- EMC: Directive 2014/30/EU (CE Conform)  
Standard EN 61326-1:2006
- CAN/CSA-C22.2 No. 61010-1

## Environmental conditions

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

## Warranty

- 3 years warranty

*All specifications herein are valid at ambient temperature of + 25 °C and recommended accessories.*

*Specifications are subject to change without notice.*



## Accessories



Main contact cables 5 m (16.4 ft)  
with SCT clamps  
(with 4 breaks per phase)  
(CM-05-12MXST)



Main contact cables 5 m (16.4 ft)  
with SCT clamps  
(with 2 breaks per phase)  
(CM-05-65MXST)



Main contact cables 5 m (16.4 ft)  
with SCT clamps  
(one break per phase)  
(CM-05-34MXST)



Main Contact Extension Cables  
10 m (32.8 ft)\*  
(E6-10-12MXFX)



Main Contact Extension Cables  
10 m (32.8 ft)\*  
(E6-10-65MXFX)



Coil control cable set, 5 m (16.4 ft.)  
with Control banana plugs\*  
(Single-pole unipolar - 6 coil  
channels)  
(CO-05-6BC5B1)



Coil control cable set, 5 m (16.4 ft.)  
with Control banana plugs\*  
(Single-pole unipolar - 2 coil  
channels)  
(CO-05-00C5B1)



Coil supply cable set  
4 x 5 m 2.5 mm<sup>2</sup> (16.4 ft, 13 AWG)  
with banana plugs  
(CS-05-02BPBP)



Sense cables 2 x 10 (32.8 ft) m  
with alligator clips A2  
(S2-10-02BPA2)



2 x 10 m power cables  
50 mm<sup>2</sup> (32.8 ft, 0 AWG)  
with battery clamps  
(C2-10-50VMB3)



2 x 10 m power cables  
25 mm<sup>2</sup> (32.8 ft, 3 AWG)  
with battery clamps  
(C2-10-25LMB1)



Cable set for auxiliary  
contacts 5 m with banana plugs\*  
(AX-05-02BPBP)



Analog channel cable set  
12 x 5 m with banana plugs\*  
(AN-05-02BPBP)



Shunt test  
600 A / 60 mV  
(SHUNT-600-MK)



Cable bag  
(CABLE-BAG-00)



Plastic box for cables  
- medium size  
(CABLE-CAS-02)



Plastic cable box  
with wheels - large size  
(CABLE-CAS-W3)



Carrying case  
(HARD-CASE-LC)



Carrying plastic case  
(HARD-CASE-PC)



Current clamp of 30/300 A fed  
from the instrument with the  
5 m (16.4 ft) adaptor  
(CACL-0300-07)



Current clamp of 30/300 A  
with internal battery and  
5 m extension  
(CACL-0300-08)



AC current clamp 1A / 1 V  
and 5 m cable with  
banana plugs  
(CACL-ACBP-05)



Analog linear transducer  
(TLH) 225 mm with  
5 m connection cable\*\*  
(LAT-225-C305)



Digital rotary transducer  
with a 5 m (16.4 ft)  
connection cable  
(DRT-250-C605)



Digital rotary transducer  
with 5 m connection cable  
with accessories  
(DRT-SET-0005)



Universal transducer  
mounting kit  
(extended version)  
(UTM-KIT-0001)



Rotary transducer kit  
digital three-phase  
(with 5 m connection cable)  
(TPH-DRTS-050)



Transducer adapter  
Double  
(DTA-BOX-C002)



First Trip In-Line Test Kit  
for the CAT Advanced series  
(ONFTT-KIT-00)

*\*The above cables are also available in various lengths and terminations.*

*\*\*Linear analog transducers are available in various lengths.*

*Please contact AMPERIS for more information.*

## CAT Advanced series – Models

### CAT35



**Main contact inputs**

Number of contact inputs:  
3 (3 x 1), 1 per phase

**Auxiliary contact inputs: 6**

**Analog contact inputs: 6**

**Coil control outputs: 6**

**Transducer inputs: 3**

**Static resistance measurement**  
Built-in Micro Ohmmeter 200 A

### CAT36



**Main contact inputs**

Number of contact inputs:  
3 (3 x 1), 1 per phase

**Auxiliary contact inputs: 6**

**Analog contact inputs: 6**

**Coil control outputs: 6**

**Transducer inputs: 3**

**Static resistance measurement**  
Built-in Micro Ohmmeter 500 A

**High precision module (built-in)**  
Optional

### CAT64A



**Main contact inputs**

Number of contact inputs:  
6 (3 x 2), 2 per phase

**Auxiliary contact inputs: 6**

**Analog contact inputs: 6**

**Coil control outputs: 6**

**Transducer inputs: 3**

**Static resistance measurement**  
Not available

**Battery power supply**  
Optional

### CAT65



**Main contact inputs**

Number of contact inputs:  
6 (3 x 2), 2 per phase

**Auxiliary contact inputs: 6**


**Analog contact inputs: 6**

**Coil control outputs: 6**


**Transducer inputs: 3**

**Static resistance measurement**  
Built-in Micro Ohmmeter 200 A


CAT66

	<p><b>Main contact inputs</b> Number of contact inputs: 6 (3 x 2), 2 per phase</p> <p><b>Auxiliary contact inputs: 6</b></p> <p><b>Analog contact inputs: 6</b></p> <p><b>Coil control outputs: 6</b></p>	<p><b>Transducer inputs: 3</b></p> <p><b>Static resistance measurement</b> Built-in Micro Ohmmeter 500 A</p>
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CAT124A

	<p><b>Main contact inputs</b> Number of contact inputs: 12 (3 x 4), 4 per phase</p> <p><b>Auxiliary contact inputs: 6</b></p> <p><b>Analog contact inputs: 6</b></p> <p><b>Coil control outputs: 6</b></p>	<p><b>Transducer inputs: 3</b></p> <p><b>Static resistance measurement</b> Not available</p>
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CAT125

	<p><b>Main contact inputs</b> Number of contact inputs: 12 (3 x 4), 4 per phase</p> <p><b>Auxiliary contact inputs: 6</b></p> <p><b>Analog contact inputs: 6</b></p> <p><b>Coil control outputs: 6</b></p>	<p><b>Transducer inputs: 3</b></p> <p><b>Static resistance measurement</b> Built-in Micro Ohmmeter 200 A</p>
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CAT126

	<p><b>Main contact inputs</b> Number of contact inputs: 12 (3 x 4), 4 per phase</p> <p><b>Auxiliary contact inputs: 6</b></p> <p><b>Analog contact inputs: 6</b></p> <p><b>Coil control outputs: 6</b></p>	<p><b>Transducer inputs: 3</b></p> <p><b>Static resistance measurement</b> Built-in Micro Ohmmeter 500 A</p>
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## Data for order

Instrument	Item No.
CAT35 Circuit Breaker Analyzer	CAT3500-N-01
CAT36 Circuit Breaker Analyzer	CAT3600-N-01
CAT64A Circuit Breaker Analyzer	CAT64A0-N-01
CAT65 Circuit Breaker Analyzer	CAT6500-N-01
CAT66 Circuit Breaker Analyzer	CAT6600-N-01
CAT124A Circuit Breaker Analyzer	CAT124A-N-01
CAT125 Circuit Breaker Analyzer	CAT1250-N-01
CAT126 Circuit Breaker Analyzer	CAT1260-N-01

Included accessories
DV-Win PC software including USB cable
Power cable
Earth cable (PE)
Transport case

Recommended accessories	Item No.
<b>Main contact cables</b>	
Main contact cables 5 m with SCT clamps (for CAT35, CAT36)	CM-05-34MXST
Main contact cables 5 m with SCT clamps (for CAT64A, CAT65, CAT66)	CM-05-65MXST
Main contact cables 5 m with SCT clamps (for CAT124A, CAT125, CAT126)	CM-05-12MXST
<b>Main contact cable extensions</b>	
Main contact cable extensions 10 m (for CAT35, CAT36, CAT64A, CAT65, CAT66)	E3-10-65MXFX
Main contact cable extensions 10 m (for CAT124A, CAT125, CAT126)	E6-10-12MXFX
<b>Control cabinet cables</b>	
Set of coil control cables 5 m with banana plugs (Unipolar control - 6 coil channels)	CO-05-6BC5B1
4 x 5 m 2.5 mm <sup>2</sup> (16.4 ft., 13 AWG) coil supply cable set with banana plugs	CS-05-02BPBP
Auxiliary contact cable set 12 x 5 m with banana plugs	AX-05-02BPBP
Analogue channel cable set 12 x 5 m with banana plugs	AN-05-02BPBP

**Power cables**

Power cables 2 x 10 m 50 mm <sup>2</sup> with battery clamps (for CAT36, CAT66 and CAT126)	C2-10-50VMB3
Power cables 2 x 10 m 25 mm <sup>2</sup> with battery clamps (for CAT35, CAT65 and CAT125)	C2-10-25LMB1

**Voltage sensing cables**

Sensor cables 2 x 10 m with alligator clips (for CAT35, CAT36, CAT65, CAT66, CAT125 and CAT126)	S2-10-02BPA1
Plastic cable boxes - large (x2)	CABLE-CAS-03

Optional accessories	Item No.
BSG characteristic for CAT35 and CAT36 (single-phase breaking)	BSG-CATII-00
BSG feature for CAT6x and CAT12x II series (two breaks per phase)	BSG-CATII-01
High precision module (available for CAT36)	RMO-HPMM-DG0
30/300 A current clamp powered by the instrument with 5 m adapter (16,4 ft.)	CACL-0300-07
30/300 A current clamp with battery power and 5 m extension	CACL-0300-08
112 mm (4.4 inch) thermal printer (integrated)	PRINT-112-00
Thermal paper roll	PRINT-112-RO
Plastic cable boxes with wheels - large	CABLE-CAS-W3
Coil control cable set 10 m with banana plugs (single pole control - 6 coil channels)	CO-10-6BC5B1
Coil control cable set 15 m with banana plugs (single pole control - 6 coil channels)	CO-15-6BC5B1
5 m coil control cable set with banana plugs (3-pole control - 2 coil channels)	CO-05-00C5B1
10 m coil control cable set with banana plugs (3-pole control - 2 coil channels)	CO-10-00C5B1
15 m coil control cable set with banana plugs (3-pole control - 2 coil channels)	CO-15-00C5B1
Auxiliary contact cable set 12 x 5 m with banana plugs	AX-05-02BPBP
Auxiliary contact cable set 12 x 10 m with banana plugs	AX-10-02BPBP
Auxiliary contact cable set 12 x 15 m with banana plugs	AX-15-02BPBP
Analogue channel cable set 12 x 5 m with banana plugs	AN-05-02BPBP
Analogue channel cable set 12 x 10 m with banana plugs	AN-10-02BPBP
Analogue channel cable set 12 x 15 m with banana plugs	AN-15-02BPBP

**Main contact cables**

Main contact cables 3 m with SCT clamps (for CAT35, CAT36)	CM-03-34MXST
Main contact cables 3 m with SCT clamps (for CAT64A, CAT65, CAT66)	CM-03-65MXST
Main contact cables 3 m with SCT clamps (for CAT124A, CAT125, CAT126)	CM-03-12MXST
Main contact cables 3 m with alligator clips (for CAT35, CAT36)	CM-03-34MXA2
Main contact cables 5 m with alligator clips (for CAT35, CAT36)	CM-05-34MXA2
Main contact cables 3 m with alligator clips (for CAT64A, CAT65, CAT66)	CM-03-65MXA2
Main contact cables 5 m with alligator clips (for CAT64A, CAT65, CAT66)	CM-05-65MXA2
Main contact cables 3 m with alligator clips (for CAT124A, CAT125, CAT126)	CM-03-12MXA2
Main contact cables 5 m with alligator clips (for CAT124A, CAT125, CAT126)	CM-05-12MXA2

**Extension of the main contact wires**

Main contact cable extensions 5 m (for CAT35, CAT36, CAT64A, CAT65, CAT66)	E3-05-65MXFX
Main contact cable extensions 5 m (16,4 ft.) (for CAT124A, CAT125, CAT126)	E6-05-12MXFX
Main contact cable extensions 15 m (49,2 ft.) (for CAT35, CAT64A, CAT65, CAT66)	E3-15-65MXFX
Main contact cable extensions 15 m (49,2 ft.) (for CAT124A, CAT125, CAT126)	E6-15-12MXFX

**Power cables**

Power cables 2 x 5 m 50 mm <sup>2</sup> (32.8 ft., 0 AWG) with battery clamps (for CAT36, CAT66 and CAT126)	C2-05-50VMB3
Power cables 2 x 15 m 70 mm <sup>2</sup> (49,2 ft., 0 AWG) with battery clamps (for CAT36, CAT66 and CAT126)	C2-15-70VMB3
Power cables 2 x 5 m 25 mm <sup>2</sup> (32.8 ft., 3 AWG) with battery clamps (for CAT35, CAT65 and CAT125)	C2-05-25LMB1
Power cables 2 x 5 m 35 mm <sup>2</sup> (49.2 ft., 2 AWG) with battery clamps (for CAT35, CAT65 and CAT125)	C2-15-35LMB1



**Voltage sensing cables**

Sensor cables 2 x 5 m with alligator clips (for CAT35, CAT36, CAT65 , CAT66, CAT125 and CAT126)	S2-05-02BPA1
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Sensor cables 2 x 15 m with alligator clips (for CAT35, CAT36, CAT65 , CAT66, CAT125 and CAT126)	S2-15-02BPA1
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**Sensors**

Digital rotary encoder with 5 m connection cable	DRT-250-C605
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Digital rotary encoder with 10 m connection cable	DRT-250-C610
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Digital rotary encoder with 5 m connection cable and accessories	DRT-SET-0005
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Digital rotary encoder with 10 m connection cable and accessories	DRT-SET-0010
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Analogue Linear Sensor 150 mm with 5 m connection cable	LAT-150-C305
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Analogue Linear Sensor 225 mm with 5 m connection cable	LAT-225-C305
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Analogue Linear Sensor 300 mm with 5 m connection cable	LAT-300-C305
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Analogue Linear Sensor 500 mm with 5 m connection cable	LAT-500-C305
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30/300 A current clamp powered from the instrument with 5 m adapter	CACL-0300-07
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1A / 1 V AC power clamp and 5 m cable with banana plugs	CACL-ACBP-05
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First Trip In-Line Test Kit for CAT Advanced series	ONFTT-KIT-00
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**Sensor mounting kits**

Universal sensor mounting kit	UTM-KIT-0000
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Universal sensor mounting kit - extended version	UTM-KIT-0001
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Three-phase digital rotary transducer kit (with 5 m connection cable)	TPH-DRTS-050
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Doble sensor adapter	DTA-BOX-C002
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Linear to rotary motion converter	LTR-CON-0000
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PROYECTO COFINANCIADO POR EL IGAPE, XUNTA DE GALICIA Y FONDO EUROPEO DE DESARROLLO REGIONAL DEL PROGRAMA OPERATIVO 2014-2020



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