

## HV Circuit Breaker Analyzer and Microhmmeter

- Built-in 200 A microhmmeter
- Up to 18 main and 18 resistive contact inputs
- 12 auxiliary timing inputs
- Up to 4 trip/close coils control
- Motion and speed analyzer
- Static and dynamic contact resistance measurement
- Circuit Breaker test with both sides connected to ground (BSG option).
- Digital transducer option for motion analysis
- Minimum trip coil test
- Stand alone functionality - no PC connection is required
- Large graphical high brightness sunlight display
- Analysis and result evaluation directly on the display
- Internal memory for up to 500 test results and 64 pre-defined test plans

## A P P L I C A T I O N

The CBA 2000 is a unique test set for the complete test of all circuit breakers. It is a powerful timing and motion analyzer equipment with built-in 200 A pure DC microhmmeter for static and dynamic contact resistance tests. CBA 2000 is a stand alone unit with a large graphical display. The unit is supplied with TDMS analysis software. TDMS performs test results analysis and creates test reports; it allows also to pre-define test plans. TDMS is also a powerful Test and Data Management software compatible with all ISA Test Sets.

All CBA 2000 circuits have been designed to ensure safe and reliable operations in the noisy environment of EHV and HV substations.

## CHARACTERISTICS

### Coil operation

- . Number of circuits: 2 (1 Open and 1 Close coils); optional 4 (3 Open and 1 Close coils).
- . Type of driver: electronic; it ensures superior timing control.
- . Driver characteristic: 300 V DC max; 25 A DC max.
- . Operating time accuracy: 50  $\mu$ s.
- . Measurement of the coil current: one per channel; the waveform is displayed on the dedicated channels.
- . Coil current ranges: 2.5; 10; 25 A full scale, user selectable.
- . The 4 coils option permits selection of single or multiple phase opening.



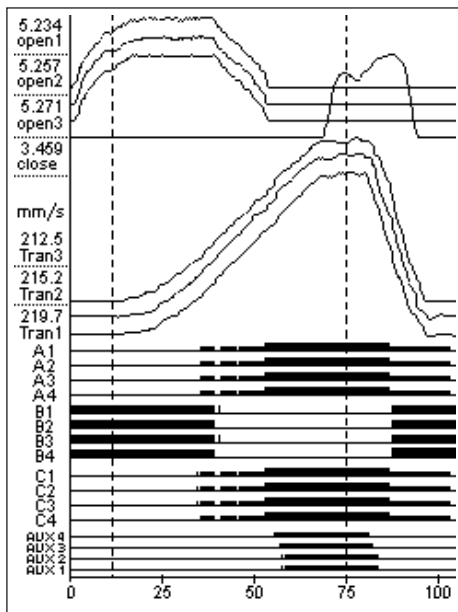
- Coil current measurement accuracy: 0.5% of the reading  $\pm$  0.1% of the selected range.
- Outputs are isolated between them.

## Main contact inputs

- Number of contact inputs: 18 Main contacts (6 breaks per phase) plus 18 Resistor contacts (6 breaks per phase).
- Resistor contact ranges: from 25 Ohm to 10 kOhm.
- Contact test voltage: 24 V. Main contact test current: 50 mA.
- Each input group is isolated with respect to the others.

## Event inputs

- Number of auxiliary event inputs: 4, divided in 2 groups of 2 each.
- Optionally: 8 or 12 divided in 4 or 6 groups of 2 each.
- Capability of testing dry or wet contacts: 24 V; 20 to 300 V. Test current: 2 mA.



CBA 2000 test result display

## Sample rates:

20 kHz - 10 kHz - 2kHz - 200Hz - 100Hz, user selectable.

## Timing accuracy:

100  $\mu$ s  $\pm$  0.025% of the time range.

## Maximum record length:

200 s.

## Analog inputs

- Number of analog inputs: 8 (10 Optional).
- 2 (4 optional) dedicated to Open and Close coil currents.
- 1 dedicated to Dynamic and Static Resistance Measurement.
- 3 dedicated to travel, transducers.
- Input voltage range:  $\pm$  10 V.
- 2 general purpose analog input.
- Input voltage range:  $\pm$  5 V;  $\pm$  50 V;  $\pm$  500 V user selectable.
- The analog inputs are isolated with respect to all other circuits.
- Analog input measurement resolution: 16 bit.

## Programmable sequences

The user can select the following Open and Close sequences: Open; Close; Open-Close; Close-Open; Open-Close-Open.

**Microohmmeter --> static**

Nominal test current			Resistance range	
<input checked="" type="radio"/> 200A	<input type="radio"/> 100A	<input type="radio"/> 20A	<input type="radio"/> 200 $\mu\Omega$	<input checked="" type="radio"/> 1 m $\Omega$

Test mode

Single test  
 Test on breaker phase

Test number  I dc  A  
V dc  mV  
Label  Res.  m $\Omega$

Microhmmeter display

## Static and Dynamic resistance measurement (Option)

- DC Test current: 200 A, 100A, 20 A.
- Contact resistance range: 200  $\mu$ Ohm; 1.000 mOhm; 10.00 mOhm; 100.0 mOhm, user selectable.
- Resistance measurement accuracy (range 100 mOhm):  $\pm$  1% of the reading  $\pm$  0.2% of the range.

## Minimum trip coil test (Option):

The minimum trip coil test allows the user to verify the minimum trip voltage threshold and the voltage drop off of a trip coil.

- Maximum current: 4 A.
- Maximum voltage adjustment: up to 50% of nominal DC Voltage.

## Digital transducer input (Option)

This option is made of a special card installed inside the CBA 2000 allowing to perform the motion analysis of circuit breaker using digital transducers.

This option has the following characteristics:

- Up to three digital transducer inputs.
- Input type: RS 422 - Single ended for incremental encoders with quadrature signal.
- Pulse rate: up to 35 kHz.
- Power supply: 5 V and 12 V supplied by the CBA 2000.
- Possibility to use an external power supply up to 24 V.
- Connections: 3 multiple connectors on the CBA 2000 front panel.

## Internal or external Printer (Option)

- Optional internal thermal printer 58 mm wide.
- Optional external thermal printer SEIKO DPV-414 112 mm wide.

## Test set control

- The control is local, via graphical display, keypad and pushbutton for menu selection: no PC control is necessary.

## Display

Large graphical high brightness sunlight display (viewing area 115 x 88 mm).

Test results are displayed graphically and in table format.

Zoom functions and cursors for test data analysis are directly available on the CBA 2000 display.

## Interfaces to PC:

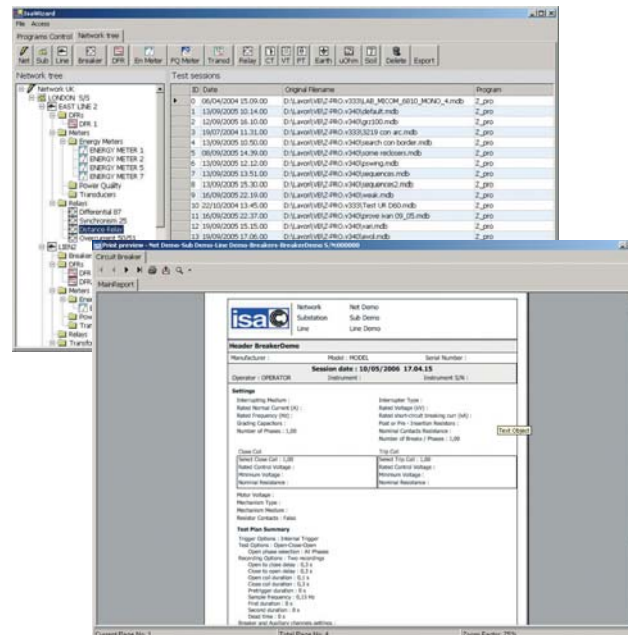
2 available interface: USB and RS232;

## Flash drive interface:

It allows to download test results and settings to a commercial flash drive memory - USB 2.0 compliant.

## Memory size:

128 Mbytes: 500 results



Test & data management software

## TDMS software

TDMS is a powerful software package providing data management for commissioning and maintenance testing activities.

Circuit breaker data and test results are saved in TDMS database for historical results analysis.

TDMS software has the following main features.

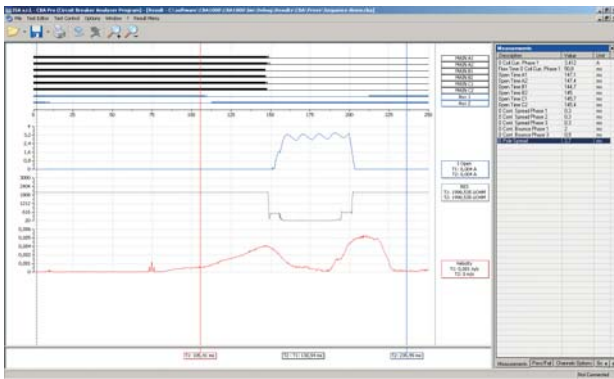
- Full control of CBA 2000 functions from PC.
- Download of test Plans.
- Download of test results.
- Test plans and test results can be viewed, edited in the missing descriptions, saved, printed, exported.
- Possibility of viewing and overlaying multiple results for easy test result comparison
- Possibility to pre-set test plans and to download them into the test set.
- Two cursors select measurement points and intervals.
- Zoom in and out feature.
- Enhanced measurement features for movement - speed - acceleration control.

ISA software updating policy allows all the users to update for free their software from ISA WEB site without any additional cost.

## Other characteristics

CBA 2000 can operate both from mains (AC or DC) and from internal rechargeable battery:

- . Mains supply:
  - . From 85 to 265 V AC; 50-60 Hz.
  - . From 100 to 350 V DC.
- . Internal battery. Battery characteristics: Type: NiMh.
- . Case: aluminium case, with hinged removable cover and handle.
- . Dimensions: 490(W) \* 370(D) \* 240(H) mm.
- . Weight: 13 kg basic unit; 15 kg with Microhmmeter module.



Test result analysis

## Standard accessories:

The following accessories are supplied with the unit:

- . Mains cable;
- . User's manual for hardware and software;
- . Serial cable;
- . USB cable;
- . Spare fuses;
- . Software TDMS.

## Options available:

The following options are available upon request:

- . **Test cable kit:** The connection cables set includes:
  - . Two - four - six cables with two conductors each for the connection to the Circuit Breaker coils. Cable length: 10 m;
  - . Three - six - nine cables with three conductors each for the connection to the Event inputs. Cable length: 6 m;
  - . Two - four - six cables with three conductors each for the connection to the main contacts. Cable length: 16 m;
  - . Transport Plastic bag.

- . **Additional 2 Open Driving Coils Module.** This module increases to 3 the number of Open Coils.
- . **Built-in 200 A Static / Dynamic resistance module** with 10 m long test cables, cross section 25 sq.mm, terminated with high current clamps.
- . **Minimum trip Voltage test.**
- . **Internal thermal printer:** CBA 2000 has an (optional) built-in thermal printer, 58 mm wide.
- . **External thermal printer** Seiko DPV-414.
- . **BSG** is an enhanced safety external module, that allows to test the circuit breaker with both sides connected to ground.
- . **CBA Heavy duty transport case with wheels.**
- . **CBA plastic soft bag.**
- . **Linear transducer:** TLH 150 - 150 mm length, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Linear transducer:** LWG 150 - 150 mm length, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Linear transducer:** TLH 225 - 225 mm length, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Linear transducer:** LWG 225 - 225 mm length, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Linear transducer:** TLH 300 - 300 mm length, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Linear transducer:** TLH 500 - 500 mm length, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Linear transducer:** LWG 500 - 500 mm length, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Rotary transducer:** IP 6501 - 355° rotation angle, supplied with connecting cable, 1 m long terminated on both sides with measuring connectors.
- . **Digital transducer:** model Hegstler RS - 58 - 0 / 5000 AS.41RB, supplied with 1 connecting cable, 10 m long terminated with multiple connectors. Other models are available upon request.
- . **Universal Transducer mounting kit** for TLH, LWG and IP travel transducers.

## APPLICABLE STANDARD

The test set conforms to the EEC directives regarding Electromagnetic Compatibility and Low Voltage instruments.

A) Electromagnetic Compatibility:

Directive no. 2004/108/EC.

B) Low Voltage Directive:

Directive n. 2006/95/EC. Applicable standards, for a class I instrument, pollution degree 2, Installation category II:

- . CEI EN 61010-1. In particular:
- . Inputs/outputs protection: IP 2X - CEI 70-1.
- . Operating temperature: - 10° to + 55°C; storage: - 20°C to + 70°C.
- . Relative humidity: 10 - 95% without condensing

## Ordering information:

CODE	MODULE
10266	CBA 200 basic unit (2 Breaks per phase 4 Auxiliary inputs) supplied with
10015	TDMS - Test & Data Management Software
33266	CBA 200 basic unit (4 Breaks per phase 8 Auxiliary inputs) supplied with
10015	TDMS - Test & Data Management Software
30266	CBA 200 basic unit (6 Breaks per phase 12 Auxiliary inputs) supplied with
10015	TDMS - Test & Data Management Software

## Option for CBA 2000

CODE	MODULE
15266	CBA 2000 (2 Main - 4 Aux.) Test cables kit with transport case
35266	CBA 2000 (4 Main - 8 Aux.) Test cables kit with transport case
36266	CBA 2000 (6 Main - 12 Aux.) Test cables kit with transport case
11266	Additional 2 Open Coils Module*
13266	Additional 2 Breaks per phase expansion kit
40266	Additional 4 Breaks per phase expansion kit
14266	200 A Static / Dynamic Resistance Module (with test cables 10 m terminated with clamps)*
12266	Minimum Trip Voltage test module*; **
23266	Internal thermal printer*; **

CODE	MODULE
24266	Internal thermal printer 4.5"
96169	Digital transducer Inputs
18166	CBA 2000 Heavy Duty transport case
28266	CBA 2000 Plastics soft bag
11166	TLH 150 Linear Transducer 150 mm
12166	TLH 225 Linear Transducer 225 mm
36166	TLH 300 Linear Transducer 300 mm
13166	TLH 500 Linear Transducer 500 mm
14166	Rotary Transducer: IP 6501 - 355° rotation angle
26166	LWG 150 Linear Transducer 150 mm
27166	LWG 225 Linear Transducer 225 mm
28166	LWG 500 Linear Transducer 500 mm
11169	Digital transducer (model Hengstler) with 1 connecting cable, 10 m long terminated with multiple connectors
17169	Digital transducer mounting kit
29166	Current Clamp
16166	Transducers mounting kit
44166	Flexible coupling shaft

Options with \* have to be specified at order.

Options with \*\* are exclusive each other.

NOTE: code 23266 Internal thermal printer cannot be ordered together with code 12266 Minimum Trip Voltage Module.

## Both sides grounded option for CBA 2000

CODE	MODULE
22166	BSG 1000 One break per phase including: . Three BSG Remote Heads Type 1 . One BSG Main Unit . One Cables Kit
21166	BSG 1000 Two breaks per phase including: . Three BSG Remote Heads Type 2 . One BSG Main Unit . One Cables Kit
17166	Heavy Duty transport case for BSG1000
21266	BSG 2000 Four breaks per phase including: . Six BSG Remote Heads Type 2 . One BSG 2000 Main Unit . One Cables Kit
22266	BSG 2000 Six breaks per phase including: . Nine BSG Remote Heads Type 2 . One BSG 2000 Main Unit . One Cables Kit
17166	Q.ty 2 Heavy Duty transport case for BSG 2000



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