ZENSOL

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HIGH VOLTAGE
CIRCUIT BREAKER DIAGNOSIS

CBA-32P, CBV-32, CBV-19, OTM-X, CB14

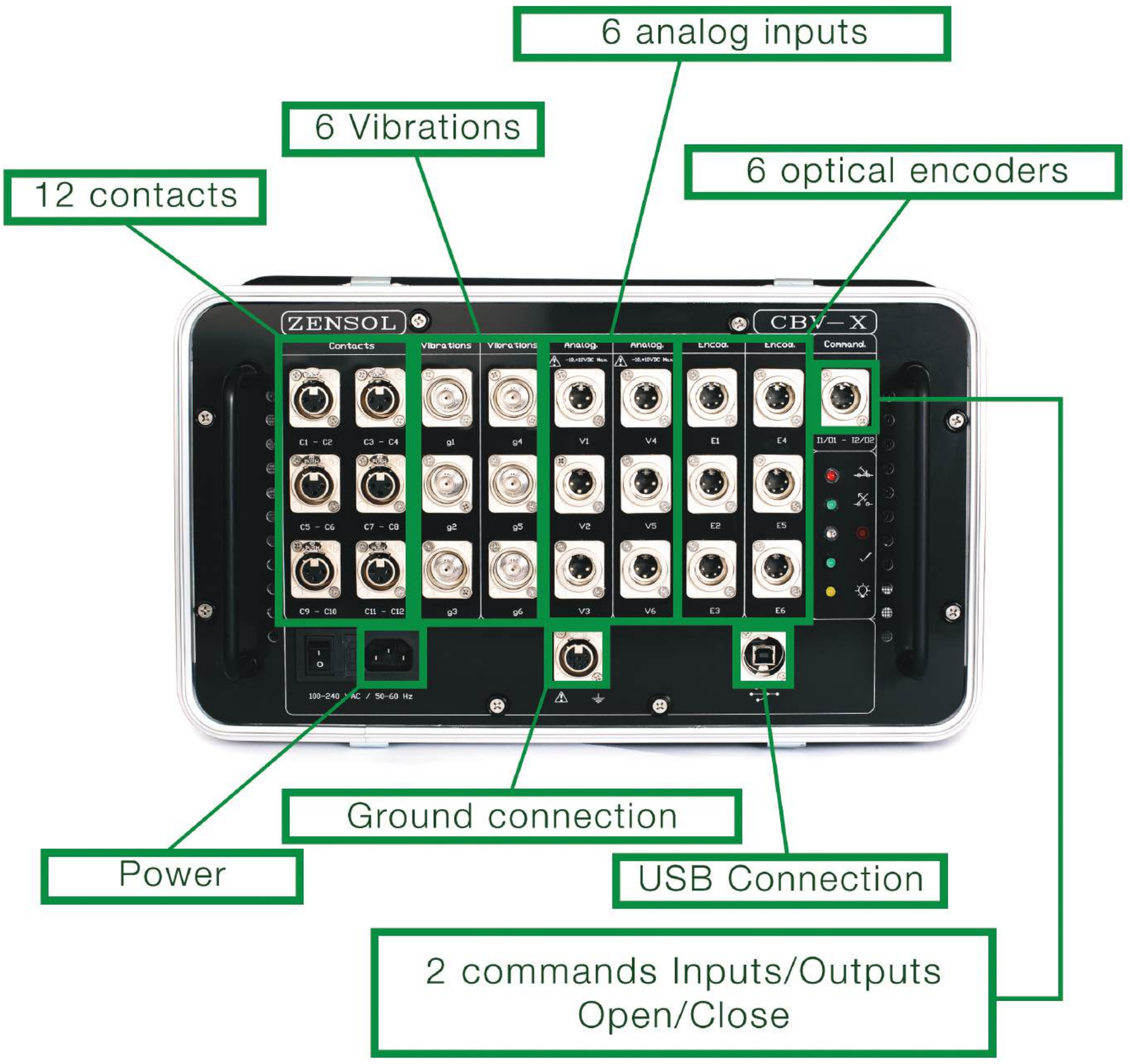
SHARING KNOWLEDGE

To learn more about circuit breaker diagnosis, visit our web site, you will find many articles

www.zensol.com/en/sharing-knowledge

WHAT IS THE CBV-32?

The CBV-32 is the only instrument able to perform in a SINGLE test timing, motion, vibration and dynamic resistance of contacts associated to different measurements of current and voltage.



WHAT IS THE CBA-32P?

The CBA-32P is a universal analyzer with up to 24 contacts, for testing all types of circuit breakers. It can perform measurements of timing, motion and dynamic resistance of contacts, all in one single test.

Example of 24 contacts configuration CBA-32P-24C:

CBA-32P
16 CONTACTS

CBA-32P
8 CONTACTS

QUICK COMPARAISON BETWEEN CBA-32P AND CBV-32

CBA-32P

CBV-32

The CBA-32P and the CBV-32 share the same cables, same modules and the same accessories.

In red: The differences

In green: The commonalities

COMPARISON OF THE CHARACTERISTICS BETWEEN THE CBA-32P AND CBV-32

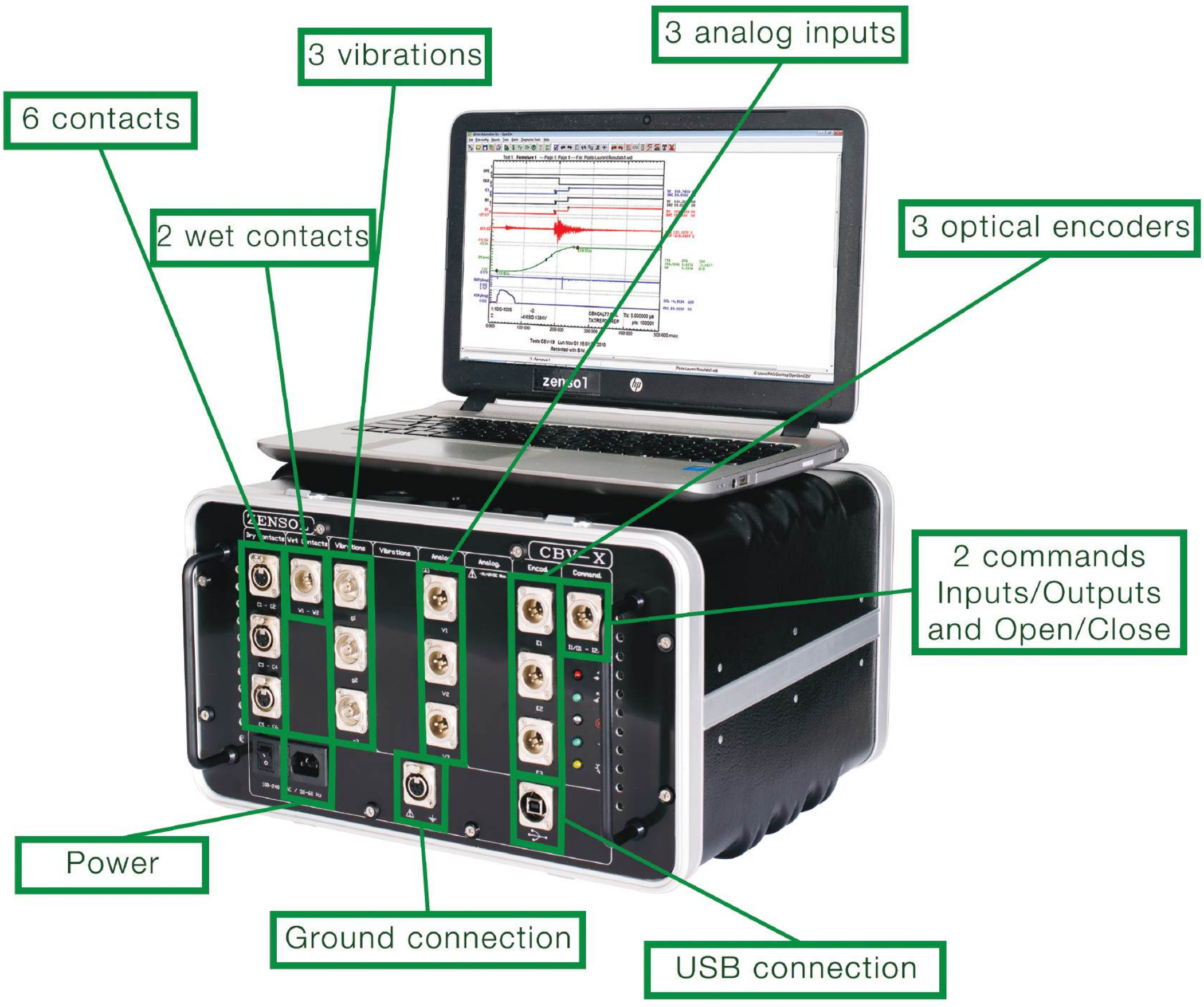
	CBA-32P characteristics	CBV-32 characteristics
Sampling frequency	10khz	200khz
Sampling time	100 microseconds (µs)	5 microseconds (µs)
Analog inputs	0-10 Volts	-10, +10 Volts
Analog/Digital Conversion	12 bits	16 bits
External trigger	—	Works on any analog input Rising of falling edge AC or DC Signals

PROBLEMS DETECTED AND METHODS OF TESTING ON CIRCUIT BREAKERS

Detected problems	Test methods	CBA-32P		CBV-32	
		Online	Offline	Online	Offline
Contact timing	Timing test		X		X
Contact bounce	Timing/motion test		X		X
Bad damping	Motion test		X		X
Main contact wear	Micro-ohmmeter test		X		X
Arcing contact wear	Dynamic resistance test		X		X
Open and close coil assessment	Coil current test	X	X	X	X
Motor assessment	Current and voltage test	X	X	X	X
First trip	Measure current over 3 phases	X		X	X
Bad mechanical adjustment	Vibration test			X	X
Bad alignment	Vibration test			X	X
Bad contact timing	Vibration test			X	X

WHAT IS THE CBV-19?

The CBV-19 is the only instrument able to perform in a SINGLE test timing, motion, vibration and dynamic resistance of contacts associated to different measurements of current and voltage.



WHAT IS THE CB14?

The CB14 is a 6 contacts circuit breaker analyzer designed to measure timing, motion and static & dynamic contact resistance in a single test. It has also 3 multifonction analog inputs and one optical encoder input.

WHAT IS THE OTM-X?

STANDALONE SPORADIC EVENT RECORDER FOR CIRCUIT BREAKERS

TIMING

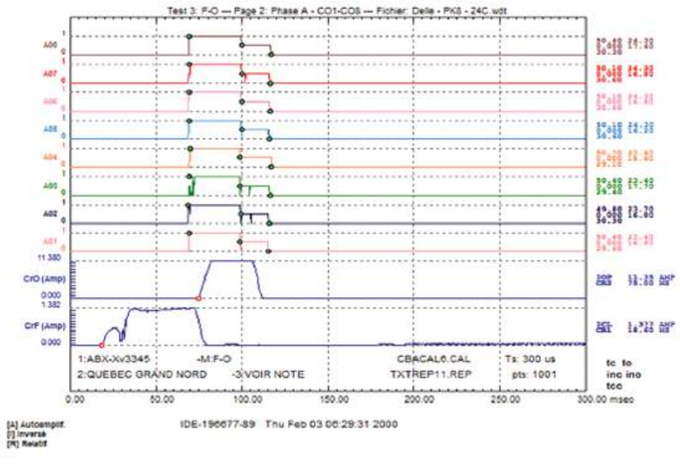
ARCTIC CABLES FOR CONTACTS

CABLE EXTENSION CONTACT/DISPLACEMENT

GROUND CABLE

COMMAND CABLE

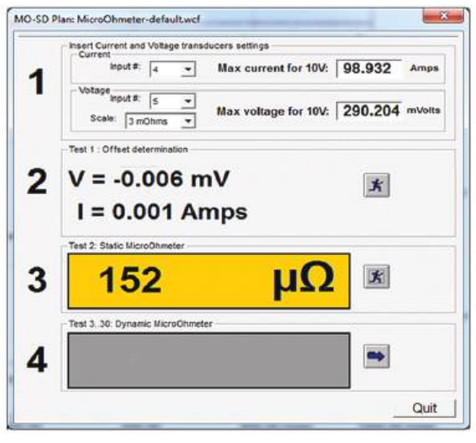
52 a/b CABLE

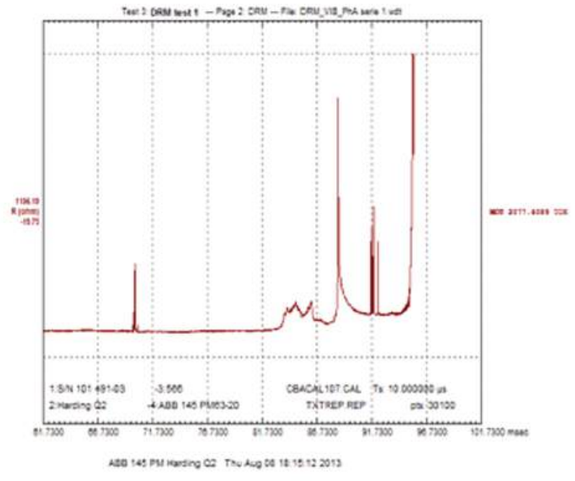


DYNAMIC RESISTANCE

DRM

The figure on the left shows the static resistance of a main contact (as given by a micro-ohmeter) while the figure on the right shows the dynamic resistance of an arc contact.





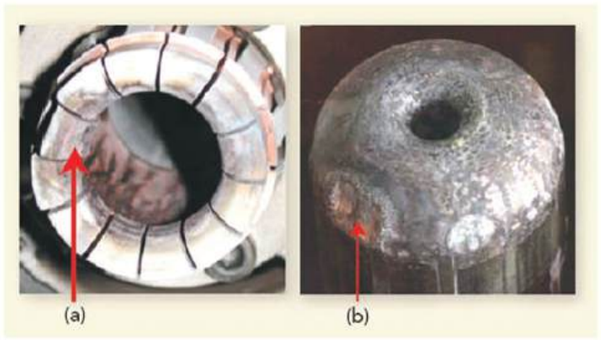
DYNAMIC RESISTANCE (DRM)

WHY?

Dynamic Contact Resistance Measurement (DRM) is a widely recognized method to determine the condition of a breaker's main and arcing contacts, without opening it. The DRM test (KIT MO-SD) is the ideal tool to observe the changes on the contacts as a function of time.

For circuit breakers, this resistance may be measured either at the rated speed or at slow speed, during an open operation.

Bad contact alignment



Arc pitting on fixed contacts

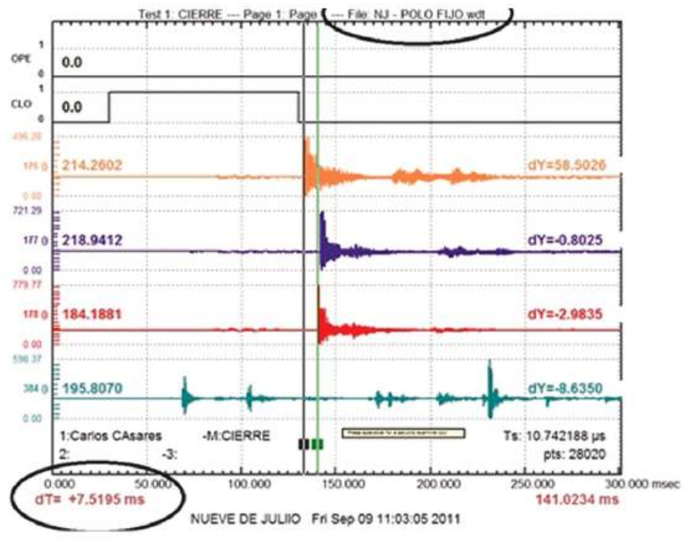
Detected problems	Static micro-ohmmeter	Dynamic micro-ohmmeter
Arcing contact wear		X
Arcing contact length		X
Main contact wear	X	X
Bad contact alignment		X
Bad contact adjustment		X
Hot spots (High joint resistance)	X	X
Contacts fingers		X
Contact surfaces		X
Blasting nozzles		X
Crossing joints		X

VIBRO-ACOUSTIC, WHY?

Accelerometer

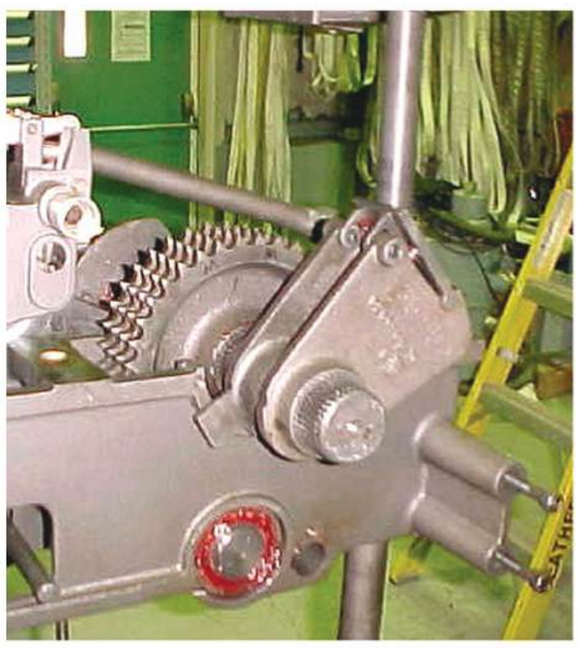
Mounting base

· Non-intrusive method
· Identify problems that classical tests cannot detect
·On-line/Off-line
·Timing test easily done on-line



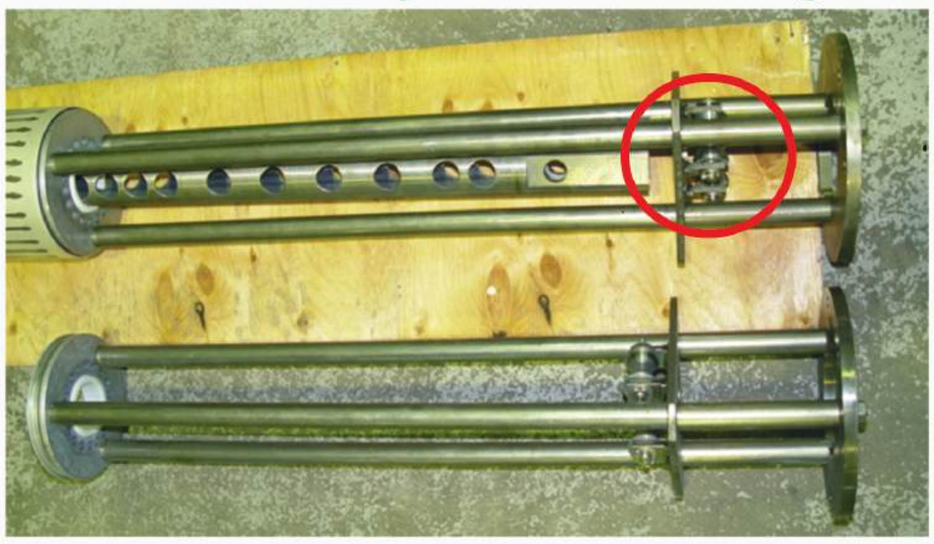
REAL CASES OF DETECTED PROBLEMS

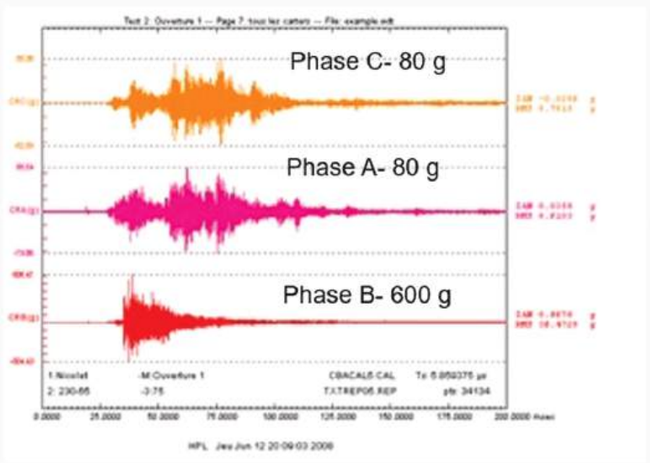
Similar to a stethoscope, our vibro-acoustic diagnostic technology enables us to assess the condition of breakers both ONLINE and OFFLINE.



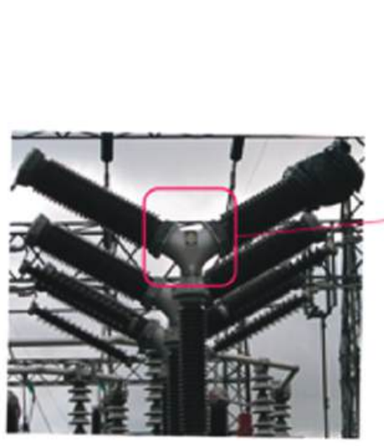
Transmission shaft distortion

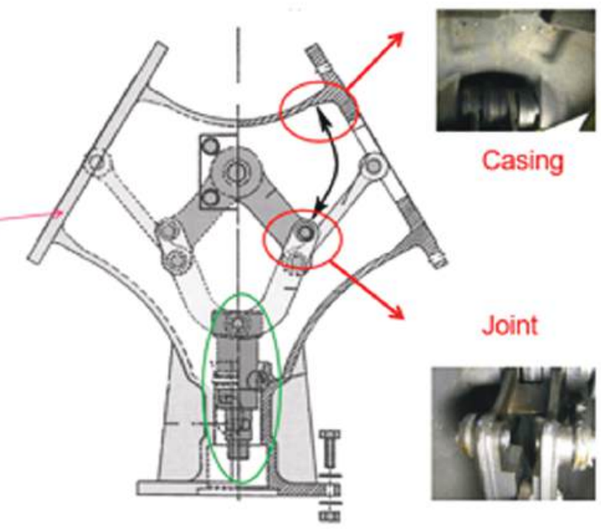
Bad Assembly: Reversed bearing

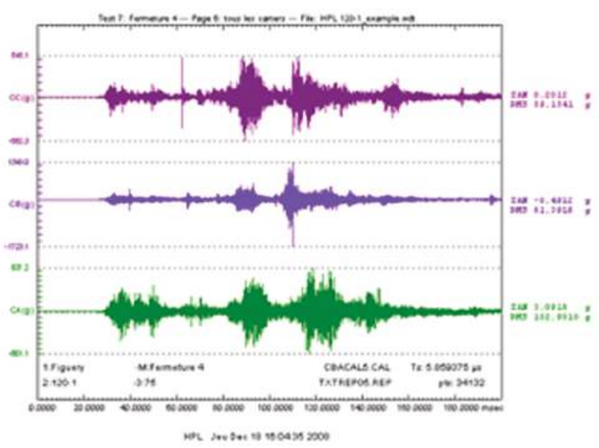




Adjustment problems on a HPL 120kV

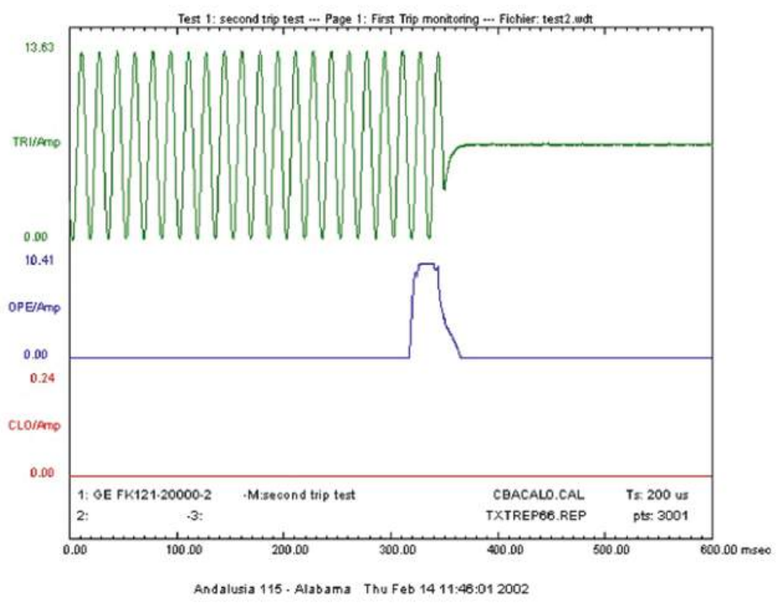


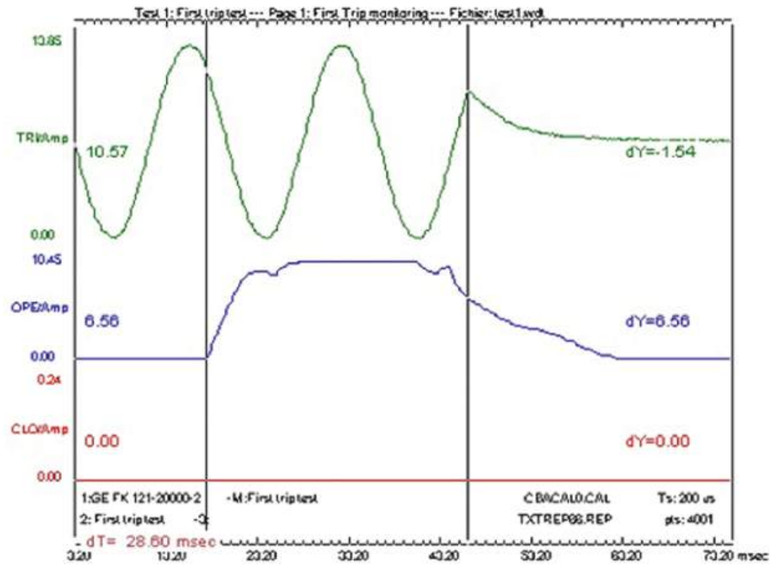




FIRST TRIP MONITORING
Z-FT

Example of high voltage line current tripping





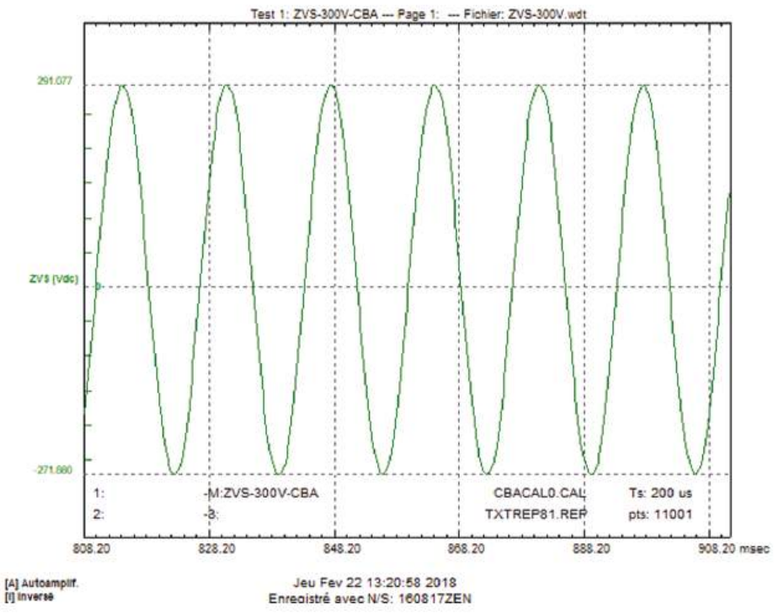
CURRENT CLAMP AC/DC 30A

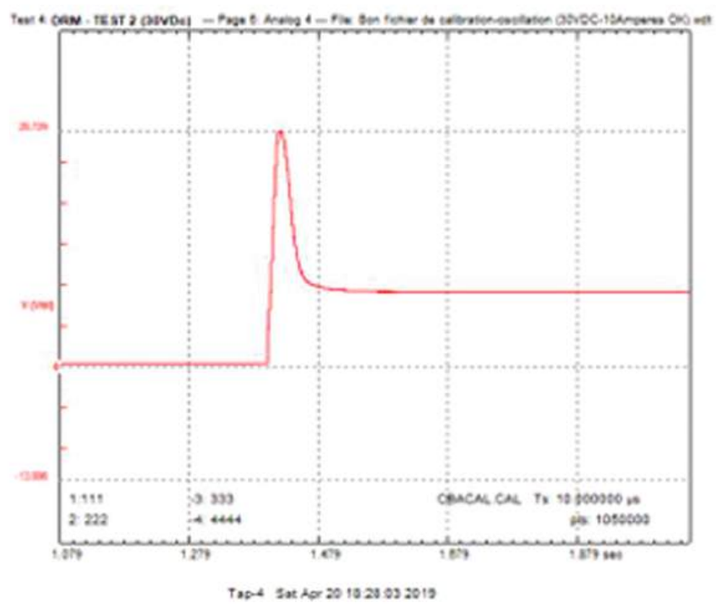
CT-CLAMP-AC/DC

For example, by using several of these current clamps, additional coil currents can be measured during closing/opening of contacts during timing tests.

HIGH VOLTAGE DIFFERENTIAL PROBE ZVS-300V-DP

Input Voltage (-300V to +300V)
Used to record transient voltage signals
See examples below

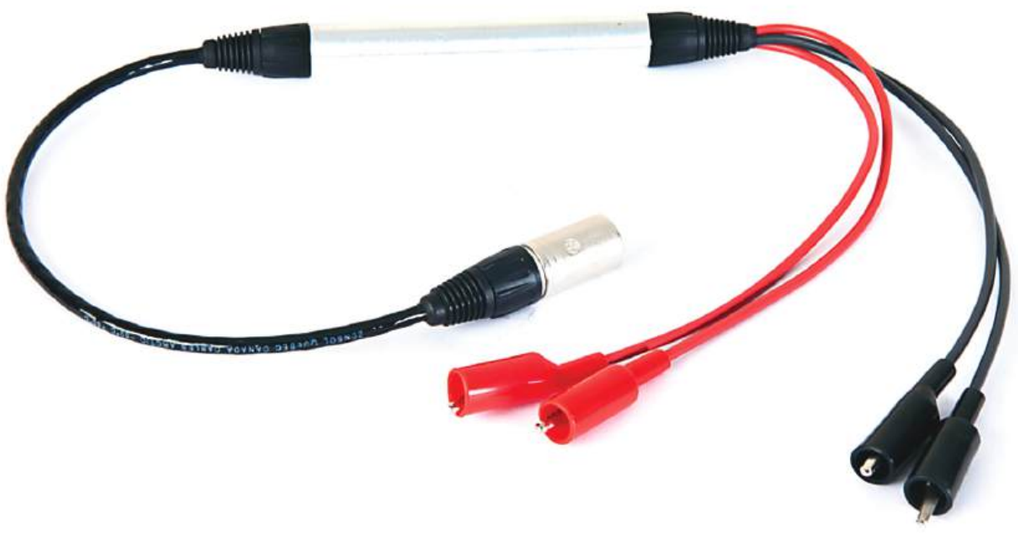


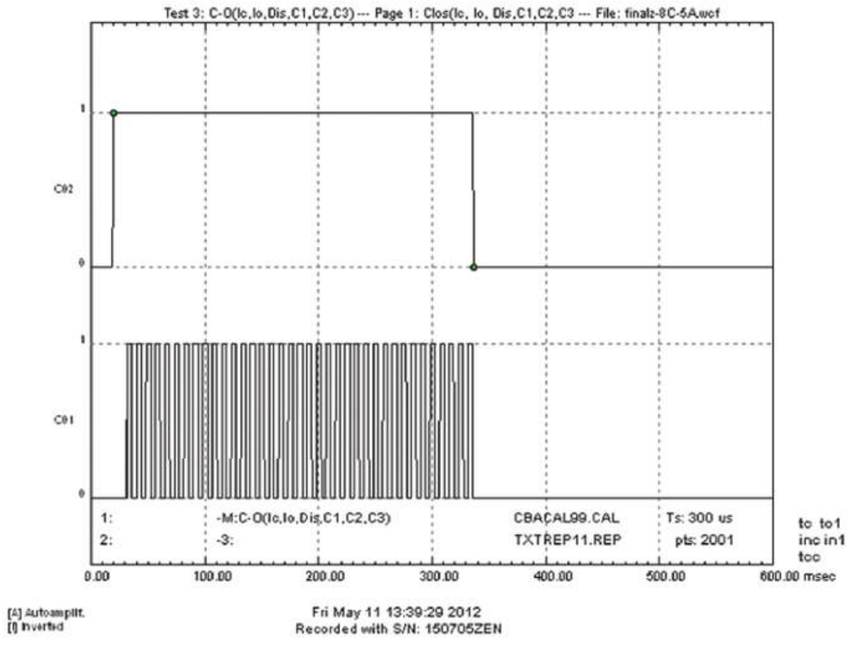


VOLTAGE TRANSDUCER

ZVD-AC-DC-300-CONTACT

Voltage transducer between 0 and +/- 300V with digital output 0 and 1.
For example, during a timing test, the ZVD-AC-DC-300-CONTACT allows you to observe the timing of a "live" contact of 129VDC. The digital output will be 0 if the input voltage is less than 60VDC and 1 if the input voltage is greater than 60VDC.





MOTION TEST
KIT ZLB

For linear measurements, use the resistive motion transducer ZLT or the digital ZLD-200.

MOTION TEST
KIT ZLR

Transform a linear motion into a rotary motion.

MOTION TEST
KIT ZMS

Allows you to fix any types of sensors (resistive or optical) on any circuit breakers.

MOTION TEST
KIT HPL

The HPL kit, specially designed for ABB power breakers, enables the easy and quick positioning of digital rotary transducers.

DUAL GROUNDING KIT
KIT DUAL-GR

The DUAL-GR kit allows breaker timing tests to be performed without disconnecting the ground cables on either side.

ANY TRANSDUCER

Compatible with an output range of -10 to +10 V

Examples of pressure, flow, and temperature transducers that can be used with analog inputs to detect breaker malfunctions.

Pressure

Flow

TRANSPORT CASES

Z-VAL / Z-VAL-5 / Z-VAL-7

Feature impact resistance (NK-7 resin), waterproofing (IP67), polyurethane wheels, PowerClaw Superior system, and a 2-stage retractable handle, designed for instrument cables and accessories.

TESTING SERVICES
ANALYSIS SERVICES

OUR EXPERIENCE AT YOUR SERVICE!

Our diagnostic team has performed a multitude of tests on every type of circuit breaker around the world!

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