OMICRON

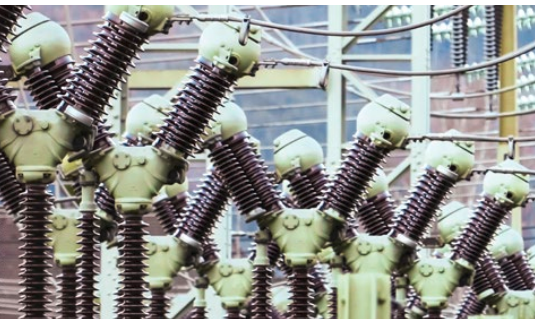
CIBANO 500

3-in-1 test system for medium- and high-voltage circuit breakers



Medium- and high-voltage circuit breaker testing







The 3-in-1 solution for your convenience

OMICRON's CIBANO 500 is the world's first circuit breaker test system to combine

- a multi-channel timing and travel analyzer
- a high-accuracy digital low-resistance ohmmeter, and
- a powerful and adjustable coil and motor supply (AC/DC).

The lightweight test system is optimized for on-site testing of

- medium-voltage circuit breakers and
- high-voltage circuit breakers.

This innovative 3-in-1 concept makes wiring faster and safer, speeds up the whole test process, and delivers one combined test report for all tests carried out.

The possibility to extend the number of measuring channels via the digital bus system EtherCAT® makes CIBANO 500 a futureproof and expandable device.

Active power for your circuit breakers

Due to CIBANO 500's integrated AC/DC power supply there is no longer any need for risky and time-consuming connections to live DC circuits. You can completely disconnect and isolate e.g. a medium-voltage breaker from the substation. This drastically increases your safety during measurements.

Additionally, you can operate independently from an external power supply. Thus you can easily carry out commissioning tests on circuit breakers even if there is no station battery installed.

With its active power electronics, the power supply provides you with a constant output power during all tests resulting in stable and reproducible testing conditions.



Only 1 apparatus for the 5 standard tests

1 Static contact resistance test

CIBANO 500 checks for a low transmission resistance on the closed breaker to ensure that the load current flows with low losses.

2 Minimum pick-up test

CIBANO 500 determines the minimum voltage necessary to trip and close a circuit breaker. This test is to make sure that your equipment can also be reliably operated in case of a low DC supply.

You can set the pass/fail level to a certain percentage of the nominal value. By applying short pulses with increasing amplitudes and breaks in-between CIBANO 500 makes sure that the trip coils don't heat up during testing. As a result, the test becomes safer and easier for you.

3 Timing tests

CIBANO 500 assesses the main contact timing and the delta timing. It can detect incorrect mechanical adjustments or wear phenomena of your circuit breakers by measuring differences between the fastest and slowest phase.

By analyzing their opening and closing time it can detect aging-related phenomena of the circuit breakers.

Possible sequences: O, C, CO, OC, O-CO, CO-CO, O-CO-CO. You can carry out all sequence tests with completely flexible timing.

4 Coil/motor current analysis

CIBANO 500 records the current signature curve of the coils and motors during the circuit breaker operation. Deviations from the expected signature show possible electrical or mechanical defects of the trip or close coils as well as of the release latch.

The trend of motor currents shows you the power needed by the motor. Elevated current levels indicate a potential electrical fault in the motor.

5 Undervoltage condition test

To date, measuring the impact of an undervoltage supply on a close and trip operation was only a rough simulation, because the simulated supply voltage could not be adjusted accurately and continuously.

Using CIBANO 500's adjustable power supply, you simply set an exact undervoltage of the nominal value and measure the respective behavior of the circuit breaker's coils.

Your benefits

- Easy-to-learn 3-in-1 system: digital low-resistance ohmmeter, AC/DC supply, and timing and travel analyzer
- Versatile system which serves medium- and high-voltage circuit breakers
- Futureproof and expandable by EtherCAT®
- Fast operation due to low wiring effort
- Safe due to integrated power supply: isolation from substation supply
- Easy transportation to test site with light-weight test system (20 kg / 44 lbs)

High-voltage live-tank circuit breaker and GIS testing

CB MC2: making the difference

When connected to CIBANO 500 the main contact module CB MC2 makes testing even more convenient for you. Especially on live-tank circuit breakers and GIS with larger dimensions. Its 2 high-current outputs and 2 sensitive voltage measurement channels offer you the following advantages:

- Same wiring set-up for all circuit breaker tests: no time-consuming rewiring necessary
- Overall wiring minimized and clearly arranged
- Short high-current cables: easier and faster measuring set-up
- Light-weight digital connection cables between the CB MC2 modules and CIBANO 500: transmission of measuring results without interference
- Only one connection cable to the main unit: fast set-up and reduced risk of wiring errors

CB MC2: easier, faster, and safer testing

While using CB MC2, all 5 standard tests can be carried out in a row without any change in measuring set-up.

Static contact resistance test

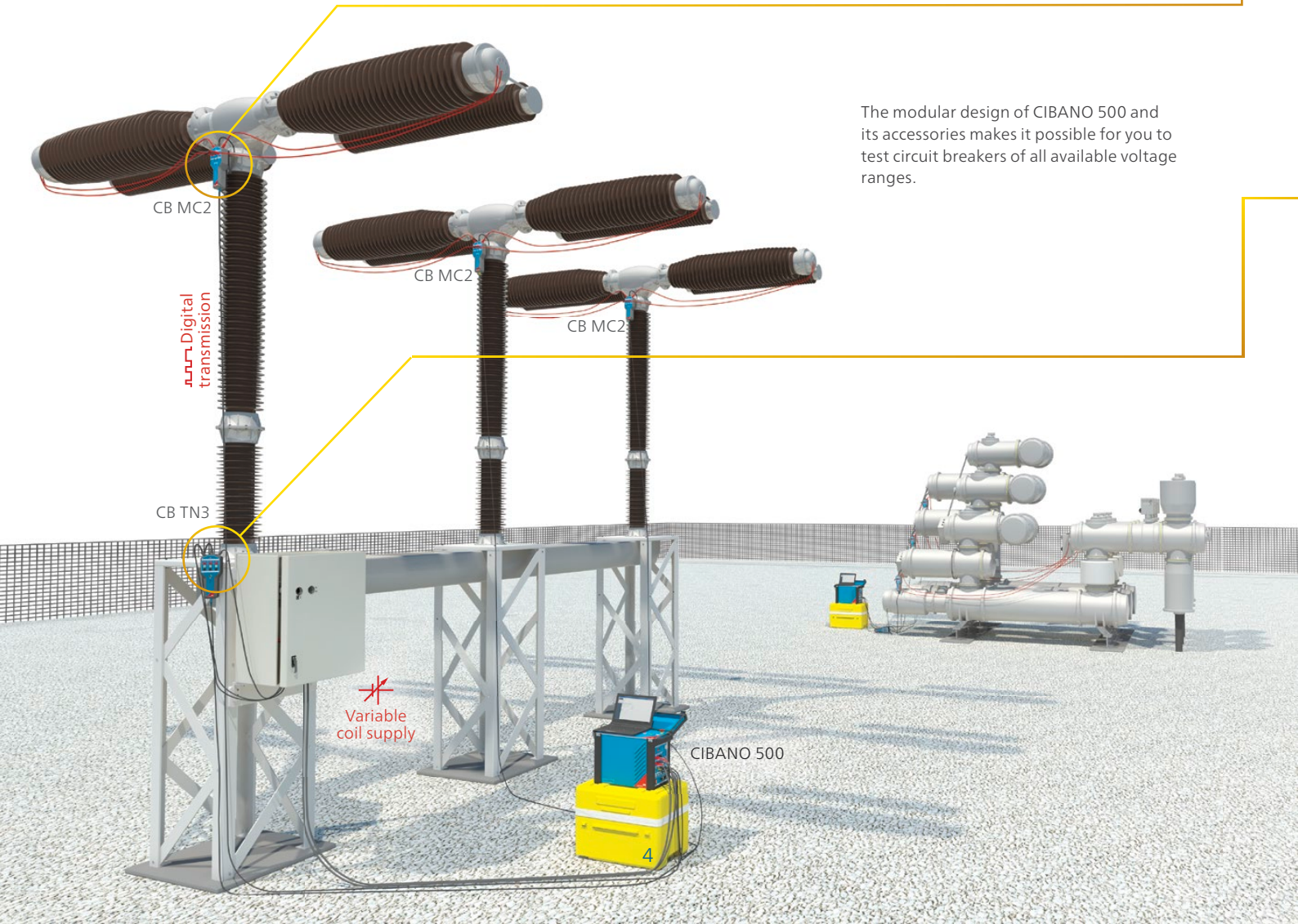
With the press of the start button, the contact resistance measurements are performed simultaneously on all main contacts without any rewiring necessary.

Timing tests

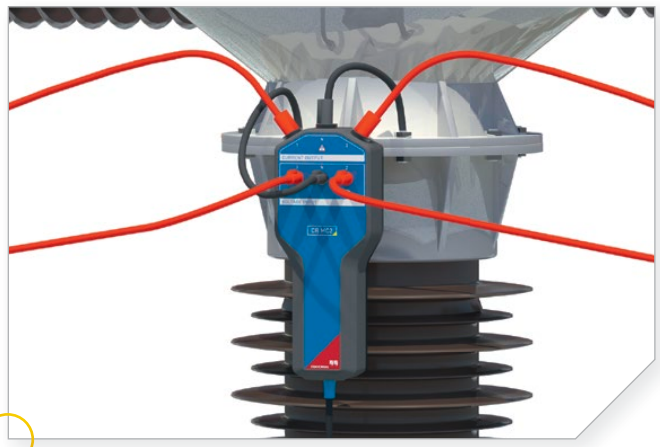
Using CB MC2 you can easily measure the timing of the main contacts, the auxiliary contacts and the pre-insertion resistors.

Both sides grounded

It goes without saying that all of the tests mentioned above on HV live-tank breakers can be done while the circuit breaker is grounded on both sides. This results in increased security levels for operating personnel.



The modular design of CIBANO 500 and its accessories makes it possible for you to test circuit breakers of all available voltage ranges.

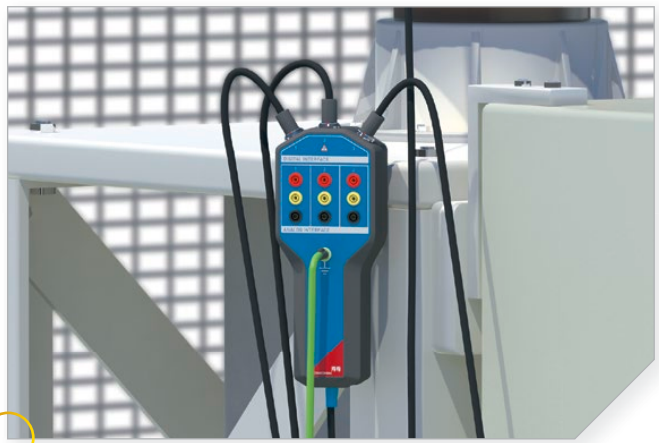


CB MC2: enhanced functionality

Dynamic contact resistance test

This test records the contact resistance value during circuit breaker operation and delivers information to you about wear-related problems with main and arcing contacts.

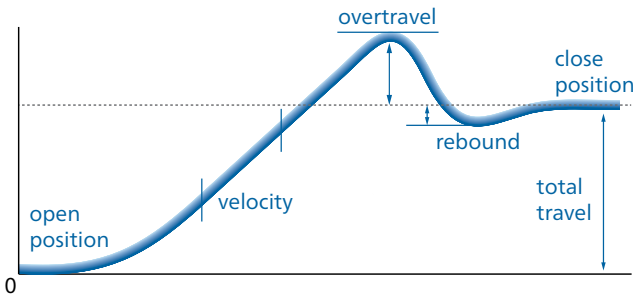
The test can also be carried out without rewiring. When combined with the motion/contact travel test you can additionally determine the length and condition of the arcing contacts.



Transducer node CB TN3: acquisition unit for motion data

CB TN3 evaluates the travel of the circuit breaker's main contacts during operation. It consists of 3 analog and 3 digital channels for acquiring data from 3 linear or rotary motion transducers.

You can configure each channel for either an analog or a digital transducer at any given time. CB TN3 can be connected to most analog and digital (EIA-422 standard) motion transducers. By using digital transmission, the measurement results are sent interference-free to the main unit via one connection cable.

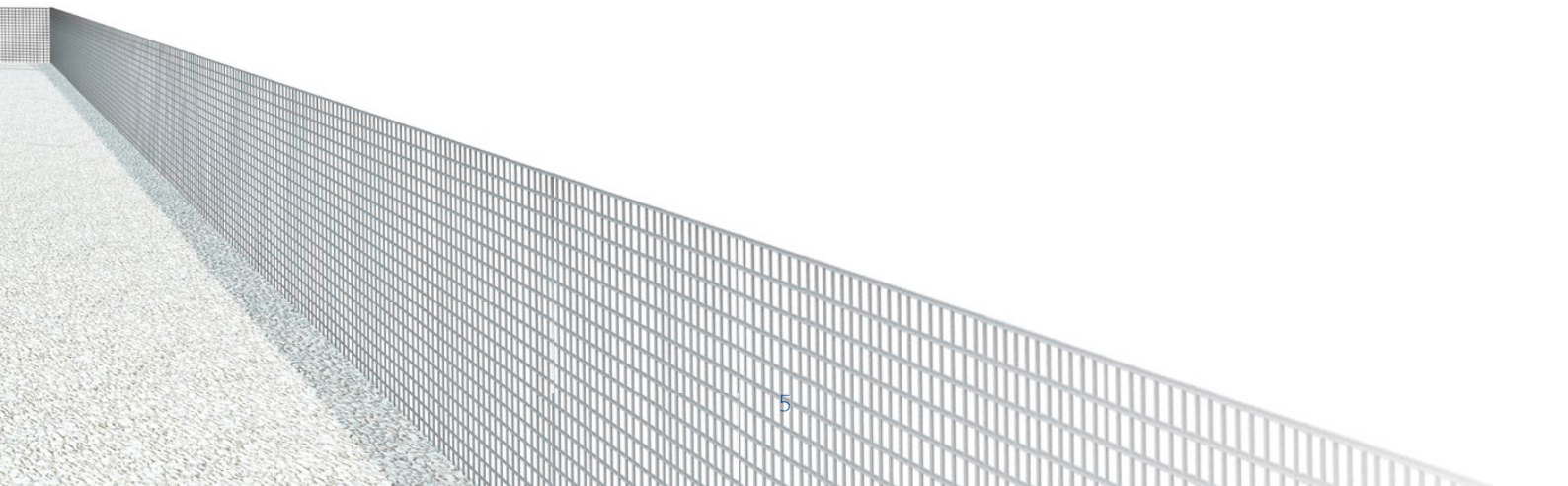


Performance values tested with CIBANO 500 and CB TN3

Motion/contact travel test

The configuration of CIBANO 500, CB TN3, and a motion transducer checks the circuit breaker's complete operating mechanism and mechanical linkage.

As a result you get the performance values (see graphics) which can be compared to the manufacturer's reference data and data acquired from previous measurements. Deviations may indicate potential wear of the breaker.



High-voltage dead-tank circuit breaker testing

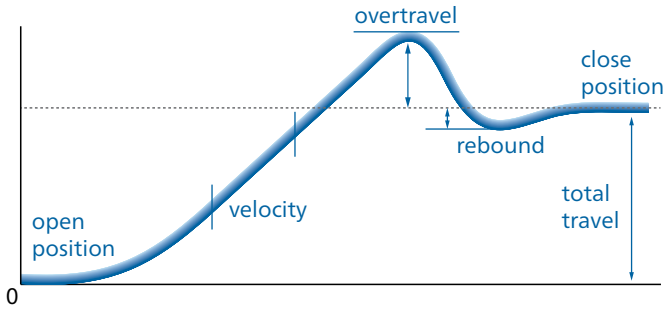
CB TN3: flexibility with open design

Motion/contact travel test

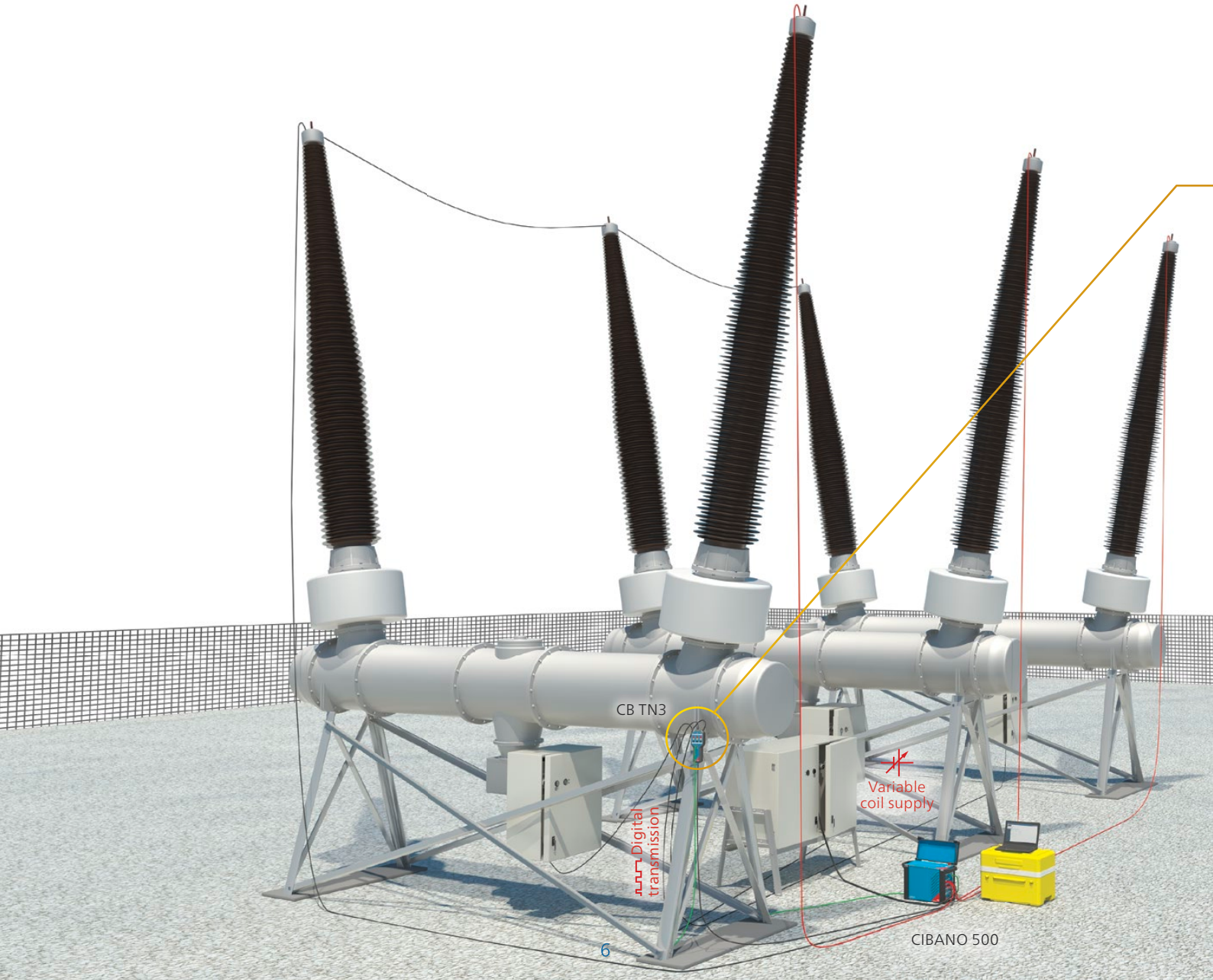
The configuration of CIBANO 500, CB TN3, and a motion transducer checks the circuit breaker's complete operating mechanism and mechanical linkage.

As a result you get the performance values such as velocity, over-travel, rebound, etc., which can be compared to the manufacturer's reference data and data acquired from previous measurements. This provides you with indications about potential wear of the breaker.

Due to CIBANO 500's open design you can use most motion transducers available and only need to connect a CB TN3 unit between the transducer and CIBANO 500.



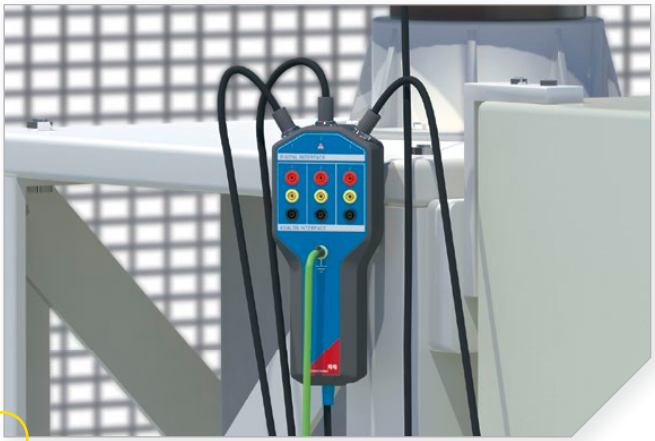
Performance values tested with CIBANO 500 and CB TN3



Transducer node CB TN3: acquisition unit for motion data

As an interface, CB TN3 evaluates the travel of the circuit breaker's main contacts during operation. It consists of 3 analog and 3 digital channels for acquiring data from 3 linear or rotary motion transducers.

You can configure each channel for either an analog or a digital transducer at any given time. CB TN3 can be connected to most analog and digital (EIA-422 standard) motion transducers (also available with most common transducer adapters). By using digital transmission, the measurement results are sent interference-free to the main unit via one connection cable.



Your benefits

- Fast parallel data transmission of several digital or analog motion transducers at a time
- Reliable measuring results due to light-weight digital connection cables between CB TN3 and CIBANO 500
- Universal usage with connections to most linear or rotary motion transducers
- One system checks the circuit breaker's complete operating mechanism and mechanical linkage

One system for measuring both linear and rotary motion

Linear motion measurement



A magnetic tape serves as an encoder for the transducer by simply affixing it to the circuit breaker's moving linear parts.



Easy and robust mounting of linear transducer to a static area of the circuit breaker's housing with a flexible arm fixture.

No CAD data necessary for test preparation. Setup and measurement completed within 30 minutes.

Only one system required for measuring both the linear and rotary motion of most breaker types.

Rotary motion measurement

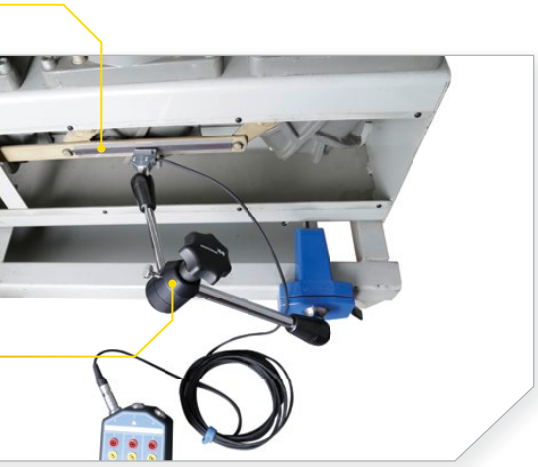


Easy connection of a rotary transducer to different rotating shaft sizes.



The drill chuck covers different shaft diameters.

The flexible coupling feature compensates for any misalignment between the shaft and transducer.





Accessories for rotary and linear transducers



All of our mounting kit components have a robust, heavy-duty design in order to guarantee immobilization and minimize vibrations on the transducers.

In the event that vibrations are still strong, you can mount an additional arm fixture that supports the first one and further reduces the vibrational effects on the transducers.



You can easily mount the flexible arm fixture on almost any type of circuit breaker by using a parallel vice with a globe joint and arm extensions (available in two different lengths).



OMICRON also develops customized mounting kits for individual circuit breakers. So just let us know what your special requirements are and we can design the kit that is right for you.

If you need a specific adapter cable for the connection between CIBANO 500 and your medium-voltage circuit breaker, we will deliver it on request.

Powerful control software for convenient testing

Primary Test Manager™ (PTM)

With PTM, which is the control software for CIBANO 500, you can run your circuit breaker tests quickly and tailor them to your specific demands as shown below.

Its easy-to-follow GUI intuitively guides you through the entire test procedure in no time at all.

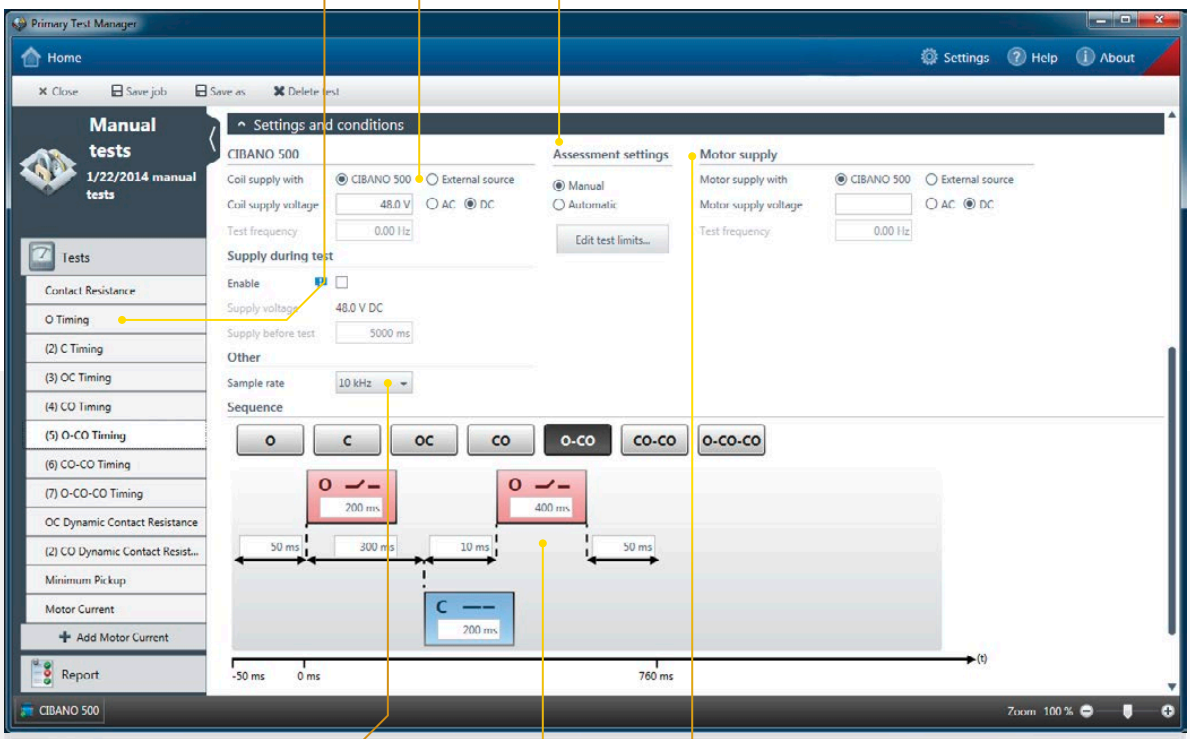
PTM's well-structured and comprehensive database enables you to manage all of your circuit breaker data with ease, including nameplate data, respective tests and reports.

Get instant "pass/fail" assessments of the results.

Coils can be supplied via CIBANO 500 or via the station battery.

Set up your individual test plans by selecting single tests.

Timing test



Flexible settings for different sample rates

A graphical overview of the testing sequence makes it easy to set the right timing.

The motor can be supplied via CIBANO 500 or via the station battery.

Easy testing supported by PTM

PTM delivers the testing structure to you. All you have to do is set up your test plan by selecting single tests.

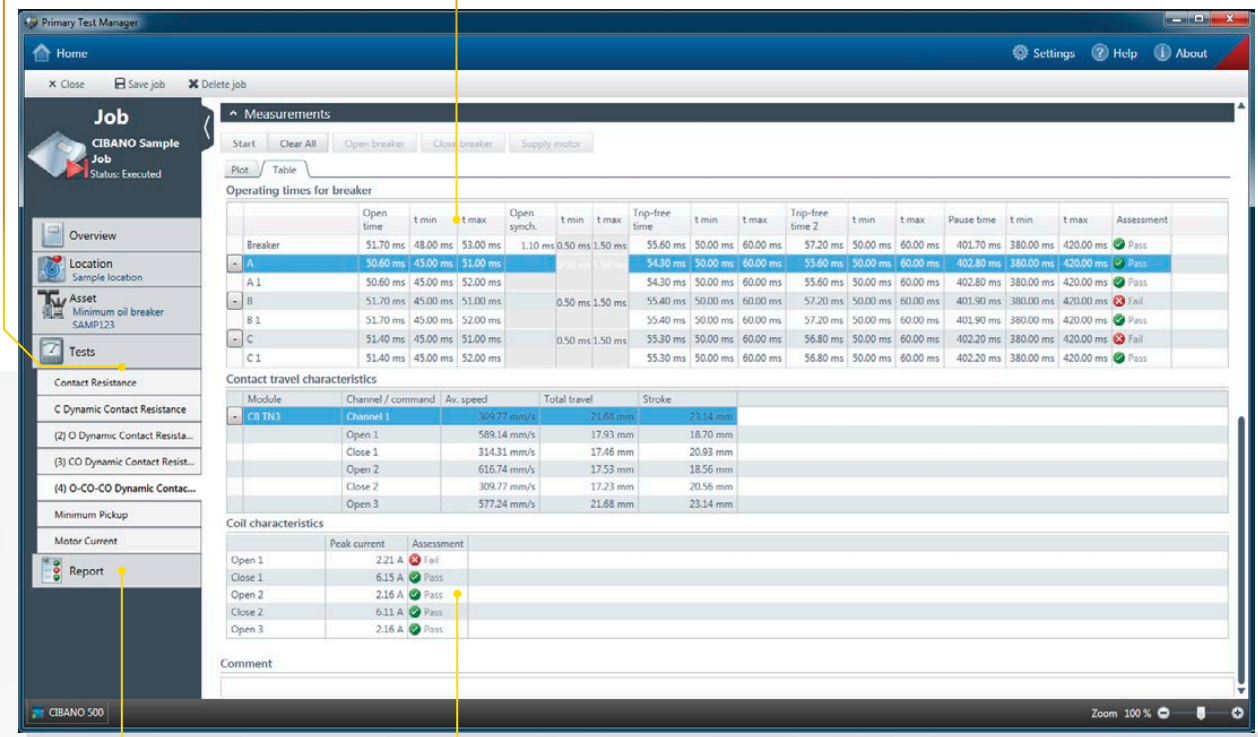
A graphical overview of the single test sequences makes it easy for you to enter the right test settings. You can choose between automatic or manual assessment and coils/motor supply via CIBANO 500 or the station battery.

Immediately after the tests you get a “pass/fail” assessment of the test results. At the end you get one combined report for all tests.

Set up your individual test plans.

All settings at a glance.

Test list



Get instant “pass/fail” assessments of the results.

Get one combined report for all tests.

Technical specifications

CIBANO 500

Power supply – power output

Frequency	DC / 15 Hz ... 400 Hz		
Power	V_{mains}	P_{30s}	P_{2h}
	> 100 V	1500 W	1000 W
	> 190 V	3200 W	2400 W

Power supply - current / voltage output[1]

Source	Range	$I_{max, 30s}$ [1]	$I_{max,2 h}$ [1]
DC	0 ... ±300 V	27.5 A	12 A
DC	0 ... ±150 V	55 A	24 A
AC	0 ... 240 V	20 A	12 A
AC	0 ... 120 V	40 A	24 A

Command switches for control of trip or close coils

Current per channel[5]	Duty cycle
6 A_{RMS} AC or DC	continuous
15 A_{RMS} AC or DC	20 s on 80 s off
30 A_{RMS} AC or DC	10 s on 190 s off
40 A_{RMS} AC or 55 A DC	200 ms

Command switches for motor supply

Current per channel[5]	Duty cycle
24 A_{RMS} AC or DC	continuous
40 A_{RMS} AC or DC	20 s on 80 s off
55 A DC	10 s on 190 s off

Voltage input for station battery (CAT III[2])

Source	Range	Accuracy[3]
DC	0 ... 420 V	0.5 % rd + 0.5 % fs
AC	0 ... 300 V	0.5 % rd + 0.5 % fs

Voltage measurements (CAT III[4])

Source	Range	Accuracy[3]
DC	0 ... 300 V	0.1 % rd + 0.05 % fs
AC	0 ... 300 V	0.03 % rd + 0.01 % fs
DC	0 ... 3 V	0.1 % rd + 0.05 % fs
DC	0 ... 300 mV	0.1 % rd + 0.1 % fs
DC	0 ... 30 mV	0.1 % rd + 0.1 % fs

Current measurements

Source	Range	Accuracy[3]
DC	0 ... 55 A	0.1 % rd + 0.2 % fs
AC	0 ... 40 A	0.1 % rd + 0.1 % fs

Resistance measurements

Range name	Range value	Meas. current	Accuracy[3]
30 mV	0.1 µΩ ... 300 µΩ	100 A	0.2 % rd + 0.1 µΩ
300 mV	0.5 µΩ ... 3000 µΩ	100 A	0.2 % rd + 0.5 µΩ
3 V	5 µΩ ... 30 mΩ	100 A	0.2 % rd + 5 µΩ
3 V	50 µΩ ... 300 mΩ	10 A	0.2 % rd + 50 µΩ

Inputs for auxiliary contacts (CAT III[4])

Auxiliary input type	Toggling with potential-free (dry) contacts or voltages (wet) up to 300 V DC
Maximum sample rate	40 kHz
Minimum resolution	25 µs

Power specifications

Voltage	Nominal: 100 V ... 240 V AC Permitted: 85 V ... 264 V AC
Frequency	Nominal: 50 Hz / 60 Hz Permitted: 45 Hz ... 65 Hz
Power fuse	Automatic circuit breaker with magnetic overcurrent tripping at I > 16 A
Power consumption	Continuous: < 3.5 kW Peak: < 5.0 kW

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



Interfaces

Digital	4 × EtherCAT®[6], 1 × Ethernet, 1 × Serial, 2 × Safety
Analog	1 × analog input (V IN) 3 × analog input / analog output / binary input (A) 4 × analog input / analog output (B)

Environmental conditions

Temperature	Operating:	-10 °C ... +55 °C / +14 °F ... +131 °F
	Storage:	-30 °C ... +70 °C / -22 °F ... +158 °F
Relative humidity	5 % ... 95 %, non-condensing	
Maximum altitude	Operating:	2000 m / 6550 ft, up to 5000 m / 16400 ft (with limited specifications, according to footnotes [2] and [4])
	Storage:	12000 m / 40000 ft

Mechanical data

Dimensions (W × H × D)	580 × 386 × 229 mm / 22.9 × 15.2 × 9.0 inch (W = 464 mm / 18.3 inch without handles)
Weight	20 kg / 44.1 lbs

Equipment reliability

Shock	IEC / EN 60068-2-27, 15 g / 11 ms, half-sinusoid, each axis
Vibration	IEC / EN 60068-2-6, frequency range from 10 Hz to 150 Hz, continuous acceleration 2 g (20 m/s^2 / 65 ft/s^2), 10 cycles per axis

PC Requirements

Operating system	Windows 8™ 64-bit Windows 8.1 ™ 64-bit Windows 7™ SP1 32-bit and 64-bit
CPU	Single-core system with 2 GHz or faster
RAM	min. 2 GB
Hard disk	min. 4 GB of available space
Storage device	DVD drive
Graphics adapter	Super VGA (1280 × 768) or higher-resolution video adapter and monitor
Interface	Ethernet NIC
Necessary Microsoft® software	Microsoft Office® 2013, Office® 2010, or Office® 2007

[1] Maximum power rating cannot be exceeded. Maximum voltage and current cannot be supplied at the same time
[2] From 2000 m to 5000 m altitude CAT III compliance only with half voltage
[3] Means "typical accuracy"; at typical temperatures of 25 °C, 98 % of all units have an accuracy which is better than specified
[4] From 2000 m to 5000 m altitude only CAT II compliance or CAT III compliance with half voltage
[5] Valid while using one channel. Thermal derating when 2 or 3 channels are used in parallel
[6] Advanced Packages only

Technical specifications

CB MC2



Current output

Channels	2
Current	0 ... 100 A DC

Static contact resistance measurement

Range	0.1 µΩ ... 1 000 µΩ
Accuracy[2]	0.2 % rd + 0.1 µΩ
Measuring current	100 A

Dynamic contact resistance measurement[1]

Range	10 µΩ ... 200 mΩ
Accuracy[2]	0.2 % rd + 10 µΩ
Maximum sample rate	40 kHz

Pre-insertion resistance (PIR) measurement

Range	0 ... 10 kΩ
Accuracy[2] (< 500 Ω)	0.5 % rd + 10 mΩ
Accuracy[2] (500 Ω ... 10 kΩ)	3 % rd

Timing measurement

Maximum sample rate	40 kHz
Minimum resolution	25 µs

Interface

EtherCAT® interface to CIBANO 500

Environmental conditions

Temperature	Operating: -30 °C ... +70 °C / -22 °F ... +158 °F Storage: -30 °C ... +70 °C / -22 °F ... +158 °F
Relative humidity	5 % ... 95 %, non-condensing
Maximum altitude	Operating: 5 000 m / 16 400 ft Storage: 12 000 m / 40 000 ft

Mechanical data

Dimensions (W × H × D)	109 × 272 × 63 mm / 4.3 × 10.7 × 2.5 inch
Weight	1.2 kg / 2.6 lbs

Equipment reliability

Please see CIBANO 500 parameters.

CB TN3



Analog interface

Output

Channels[3]	3
Voltage	5 ... 30 V DC
Current	10 ... 50 mA

Voltage Input

Channels	3
Range	30 V
Accuracy[2]	0.1 % rd + 20 mV
Maximum sample rate	40 kHz

Current input

Channels	3
Range	50 mA
Accuracy[2]	0.1 % rd + 20 µA
Maximum sample rate	40 kHz

Digital interface

Output

Channels[3]	3
Voltage	5 ... 30 V DC
Current	10 ... 200 mA
Maximum power	5 W per channel

Input

Signal type	2 square-wave signals according to EIA-422/485 standard
Max. input frequency	10 MHz

Interface

EtherCAT® interface to CIBANO 500

Environmental conditions

Please see CB MC2 parameters

Mechanical data

Dimensions (W × H × D)	109 × 272 × 63 mm / 4.3 × 10.7 × 2.5 inch
Weight	0.76 kg / 1.7 lbs

Equipment reliability

Please see CIBANO 500 parameters.

[1] Valid for test currents ≥10 A
[2] Means "typical accuracy"; at typical temperatures of 25 °C, 98 % of all units have an accuracy which is better than specified
[3] 3 channels of CB TN3 can be used at a time. They can be freely configured as digital or analog channel
[4] Valid while using one channel. Thermal derating when several channels are used in parallel

EHB1



Output

Channels	4
Devices per channel	optionally 1 × CB MC2, 1 × CB TN3 or 1 × IOB1
Max. cable length	100 m / 328 ft

Input

Channels	1

Interface

EtherCAT® interface to CIBANO 500 or to additional EHB1 modules

Power supply specifications

Voltage	Nominal: 100 V ... 240 V AC Permitted: 85 V ... 264 V AC
Maximum current	2.5 A
Frequency	Nominal: 50 Hz / 60 Hz Permitted: 45 Hz ... 65 Hz

Mechanical data

Dimensions (W × H × D)	265 × 80 × 180 mm / 10.4 × 3.1 × 7.1 inch
Weight	1.8 kg / 4.0 lbs

Environmental conditions and equipment reliability

Please see CIBANO 500 parameters.

IOB1



Voltage measurements

Source	Range	Accuracy[2]
DC	0 ... 300 V	0.05 % rd + 0.05 % fs
AC	0 ... 300 V	0.05 % rd + 0.02 % fs

Current measurements

Source	Range	Accuracy[2]
DC	0 ... 40 A	0.1 % rd + 0.2 % fs
AC	0 ... 40 A	0.1 % rd + 0.05 % fs

Command switches for control of trip/close coils or motors

Channels	6 (can alternatively be configured for measuring wet auxiliary contacts)
Voltage per channel[4]	**Duty cycle**
± 300 V DC or AC	continuous
Current per channel[4]	**Duty cycle**
24 A_{RMS} AC or DC	continuous
40 A_{RMS} AC or 55 A DC	200 ms on 5s off

Timing accuracy

Timing accurarcy[2]	± 1 sample interval ± 0.01 % rd

Inputs for auxiliary contacts

Channels	6
Auxiliary input type	Toggling with potential-free (dry) contacts or voltages (wet) up to 300 V DC
Maximum sample rate	40 kHz
Minimum resolution	25 µs

Mechanical data

Dimensions (W × H × D)	381 × 190 × 90 mm / 15 × 7.5 × 3.5 inch
Weight	3.0 kg / 6.6 lbs

Environmental conditions and equipment reliability

Please see CIBANO 500 parameters.

Ordering information

CIBANO 500 Packages

	Description	Ordering No.
CIBANO 500 Standard Package incl. cables and accessories	Package for standard tests on MV and HV CBs (static contact resistance test, timing test, undervoltage condition test). Rewiring between tests is necessary. No EtherCAT®port included.	VE000900
CIBANO 500 Advanced Package incl. cables and accessories	Package for enhanced testing of MV and HV CBs without any rewiring (additionally possible tests: dynamic contact resistance test, minimum pick-up test, coil/motor current analysis). Four EtherCAT®ports included.	VE000901
CIBANO 500 Dead Tank Package incl. cables and accessories	Specially adapted package for testing of MV and HV dead-tank design CBs. It comes with one digital rotary sensor allowing motion/contact travel tests to be done.	VE000902

CIBANO 500 Advanced Package



CIBANO 500 Hardware Upgrade Options

	Description	Ordering No.
EtherCAT® Hardware Upgrade Option incl. mounting accessories	Hardware module with 4 EtherCAT® lead outs which can additionally be mounted into the external module slot of CIBANO 500	VEHO0900
Auxiliary Module Hardware Upgrade Option incl. mounting accessories	Hardware module with 1 EtherCAT® lead out and 3 measuring inputs for auxiliary contacts. It can be additionally mounted into the external module slot of CIBANO 500	VEHO0903

CIBANO 500 Upgrade Options

	Description	Ordering No.
EHB1 Upgrade Option incl. cables and accessories	External module offering 4 additional EtherCAT® output connections for tests of large circuit breakers where several EtherCAT® accessories (CB MC2, CB TN3, IOB1) are needed	VEHZ0932
IOB1 Upgrade Option incl. cables and accessories	External module offering > 6 additional input channels for timing measurements of more than six auxiliary contacts simultaneously and > 6 additional output channels for controlling up to six trip or close coils or motors simultaneously	VEHZ0949
CIBANO 500 Standard to Advanced Package Upgrade Option	Upgrade option for the Standard Package to the Advanced Package	VEHZ0904
CB MC2 Upgrade Option incl. cables and accessories	Upgrade option for all CIBANO 500 Packages. It comes with one CB MC2 module and facilitates measurements of large HV breakers	VEHZ0900
Motion Linear Basic Upgrade Option incl. CB TN3, cables and accessories	Upgrade option for all CIBANO 500 Packages. It comes with one digital linear transducer allowing linear motion measurements to be done on CBs with ganged pole operation.	VEHZ0902
Motion Rotary Basic Upgrade Option incl. CB TN3, cables and accessories	Upgrade option for all CIBANO 500 Packages. It comes with one digital rotary transducer allowing rotary motion measurements to be done on CBs with ganged pole operation.	VEHZ0901
Motion Linear Standard Upgrade Option incl. CB TN3, cables and accessories	Upgrade option for all CIBANO 500 Packages. It comes with 3 digital linear transducers allowing linear motion measurements to be done on CBs with independent pole operation.	VEHZ0905
Motion Rotary Standard Upgrade Option incl. CB TN3, cables and accessories	Upgrade option for all CIBANO 500 Packages. It comes with 3 digital rotary transducers allowing rotary motion measurements to be done on CBs with independent pole operation.	VEHZ0906
Motion Universal Upgrade Option incl. CB TN3, cables and accessories	Upgrade option for all CIBANO 500 Packages. It comes with 3 digital linear and 3 digital rotary transducers allowing linear and rotary motion measurements to be done on CBs with independent pole operation.	VEHZ0907

Motion Universal Upgrade Option



CIBANO 500 Main Use Cases

Assets and tests	Packages			Upgrade Options								
	Standard	Advanced	Dead Tank	EtherCAT® Hardware	Aux. Module Hardware	EHB1	IOB1	CB MC2	Motion Linear Basic	Motion Rotary Basic	Motion Linear Standard	Motion Rotary Standard
Medium-voltage CBs												
> timing test of all three interrupters; no aux. timing test; single-phase static contact resistance test; rewiring necessary between timing and resistance test	■											
> additional timing test for up to three auxiliary contacts					■							
> additional timing test for up to nine auxiliary contacts					■	□	■					
> additional linear motion test					■	□			■			
> additional rotary motion test					■	□				■		
High-voltage live-tank CBs with ganged pole operation												
> timing test of up to six interrupters (two per phase); timing tests for three auxiliary contacts; static and dynamic contact resistance test; minimum pick-up test; coil/motor current analysis; no rewiring necessary between tests; tests can be done with both sides grounded		■										
> additional timing test for up to nine auxiliary contacts						□	■					
> additional linear motion test						□			■			
> additional rotary motion test						□				■		
> additional timing test, static, and dynamic contact resistance test for two additional interrupters						□		■				
High-voltage live-tank CBs with independent pole operation												
> timing test of up to six interrupters (two per phase); tests of up to six pre-insertion resistors; timing test for three auxiliary contacts static and dynamic contact resistance test; minimum pick-up test; coil/motor current analysis; no rewiring necessary between tests; tests can be done with both sides grounded		■										
> additional timing test for up to nine aux. contacts						□	■					
> additional linear motion test						□					■	
> additional rotary motion test						□						■
> additional timing test, static, and dynamic contact resistance test and pre-insertion resistor test for two additional interrupters						□		■				

Assets and tests	Packages			Upgrade Options								
	Standard	Advanced	Dead Tank	EtherCAT® Hardware	Aux. Module Hardware	EHB1	IOB1	CB MC2	Motion Linear Basic	Motion Rotary Basic	Motion Linear Standard	Motion Rotary Standard
High-voltage dead-tank CBs												
> timing test of all three phases; timing test for up to three auxiliary contacts; single-phase static contact resistance test; rotary motion test; rewiring necessary between timing and resistance test			■									
> additional timing test for up to nine aux. contacts						■	■					
> additional linear motion test						■			■			
> additional timing test, static, and dynamic contact resistance test and pre-insertion resistor test for one additional phase						■		■				
High-voltage gas-insulated switchgear (GIS)												
> timing test of all three phases; pre-insertion resistor test; static and dynamic contact resistance test; minimum pick-up test; coil/motor current analysis; no rewiring necessary between tests		■										
> additional timing test for up to nine auxiliary contacts						□	■					
> additional linear motion test						□			■			
> additional rotary motion test						□				■		

■ necessary □ optional (number depending on necessary EtherCAT® -ports)

OMICRON is an international company serving the electrical power industry with innovative testing and diagnostic solutions. The application of OMICRON products allows users to assess the condition of the primary and secondary equipment on their systems with complete confidence. Services offered in the area of consulting, commissioning, testing, diagnosis and training make the product range complete.

Customers in more than 140 countries rely on the company's ability to supply leading-edge technology of excellent quality. Service centers on all continents provide a broad base of knowledge and extraordinary customer support. All of this together with our strong network of sales partners is what has made our company a market leader in the electrical power industry.

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.

www.omicron.at | www.omicronusa.com

© OMICRON L2494, August 2015
Subject to change without notice.