

Application

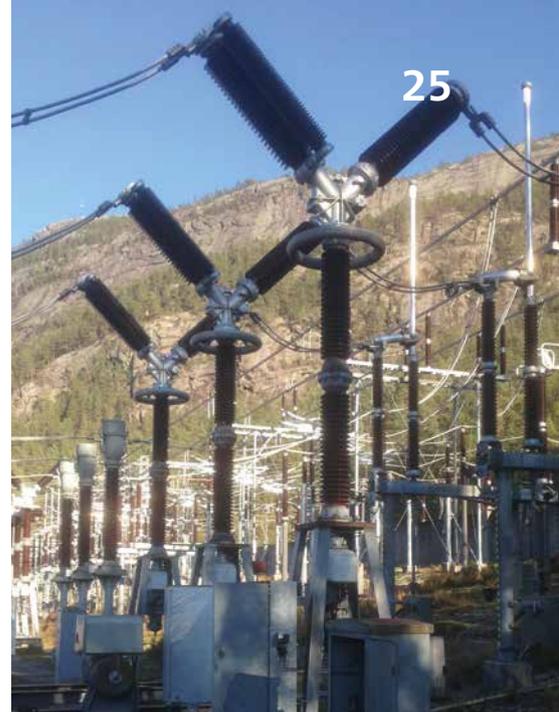
Nordic testing

Reliable and comprehensive troubleshooting
for circuit breakers

Since its market launch in 2013 customers all over the world have started to use CIBANO 500 to test their circuit breakers (CBs). So have EB Elektro AS in Hokksund, Norway. During a maintenance job for one of their customers they found a severe failure in a CB before any further damage could occur. For EB Elektro AS CIBANO 500 has once again proven its benefits.

EB Elektro AS is a leading Scandinavian company for developing, producing and installing high-voltage devices. Odd Tangen works as a service engineer in the service section of CB installation, commissioning and maintenance. In 2012 he saw the necessity for a new CB testing instrument. He started to research the market. "In 2013 I heard about

the new concept of CIBANO 500, I became curious and asked for a product demonstration," Odd Tangen remembers. "It turned out that the overall concept of CIBANO 500 did a good job of meeting my expectations." So he ordered the device. "This was a good decision on my part as CB testing became so much easier," Odd Tangen confirms.



Current condition as a first step

In September 2014 Odd Tangen and his team were asked by a Norwegian customer to suggest a maintenance plan for 11 of their 362 kV, live-tank SF₆ CBs. With almost 30 years of practical experience in the field, Odd Tangen didn't want to begin maintenance procedures with a cost-intensive major overhaul of the breakers that was only based on their long service life. "For me it was more cost-effective to assess their current condition first. So I recommended carrying out a condition monitoring," he explains his decision. "If we would find any failures, major overhaul actions could be taken afterwards."

Bad measurement results

As requested by the customer, condition monitoring was done based on visual inspections and measurements only. No cost-intensive disassembly should be undertaken. The visual inspections showed nothing unusual.

Measurements with CIBANO 500 were done next. Together with the main contact module CB MC2 for the dynamic contact resistance test and the transducer node CB TN3 for the motion/contact travel test all measurements were able to be executed without rewiring between the tests. ▶

EB Elektro AS

EB Elektro AS is a manufacturer of high-voltage devices such as disconnectors, earthing switches and motor operating devices. A part of their service portfolio is the installation/refurbishment, commissioning and maintenance of circuit breakers. The head office and production facilities are in Hokksund, Norway.

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► The timing measurement already showed abnormal timing in one phase of a CB during a close operation and Odd Tangen and his team became suspicious (Fig. 1). They received further unusual results during the static and dynamic resistance measurements (Fig. 2). The C, O, and CO operation showed closing times that changed in the same phase.

Gas analysis confirms measurements

After the measurements with CIBANO 500 an SF₆ gas analysis was done. Different parameters including dew point, gas volume, SO₂ level, and gas pressure were tested. The results of the gas analysis were really bad. Especially the SO₂ content was abnormally high. "The gas literally stank," remembers Odd Tangen. "This was additional proof that something was definitely wrong with one phase." The next step was to take the CB out of operation and replace it with a spare unit. "It took us four days." The defective CB was brought into a workshop where it was dismantled. Soon the reason for the failure was found. "A flashover in the main contact carrier due to loose parts was detected," Odd Tangen explains.



Flashover in the main contact carrier due to loose parts.

"The reference measurements after the repair confirmed that the CB worked properly," says Odd Tangen (Fig.3). And he continues: "With CIBANO 500 we can do cost-effective condition monitoring and begin comparably expensive overhauls only when necessary – that's exactly what our customers expect."

Valuable partner

Since his first practical experiences with CIBANO 500 in 2014 Odd Tangen has been in close cooperation with OMICRON's development team. He is always giving the team his valuable feedback for product enhancements. "What I personally like most about CIBANO 500 is the

fact that the instrument can measure contact timing, travel, static and dynamic contact resistance, coil current, minimum pick up and undervoltage condition with the same wiring setup," summarizes Odd Tangen. "This helps me to save a lot of time during my daily work, because I don't need to change the wiring several times as with other test systems," he adds. "Another great feature is the built-in power supply, because it gives me independence from a station battery."

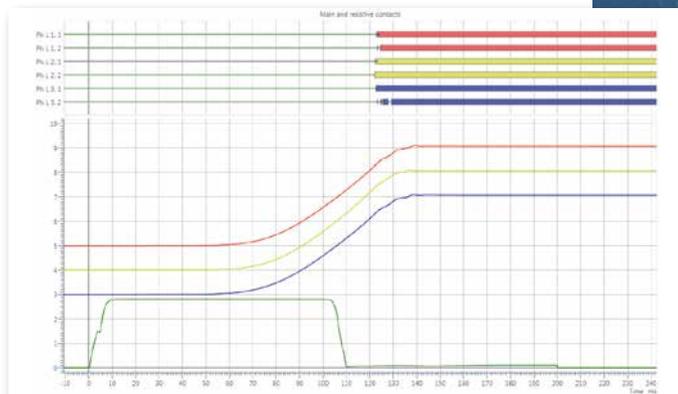


Fig. 1: Timing measurement during a close operation shows failure in blue phase.

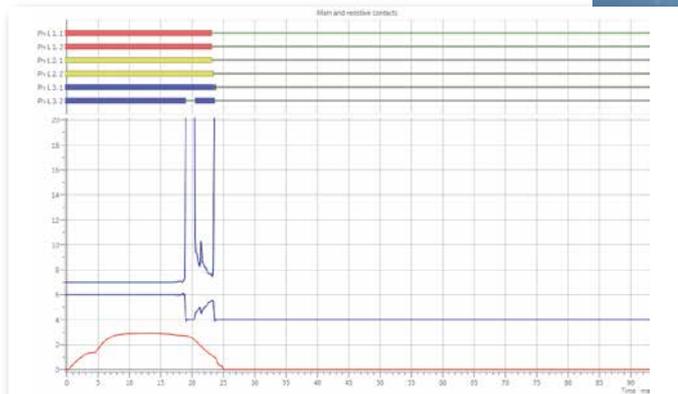


Fig. 2: Dynamic resistance measurement shows failure in blue phase.

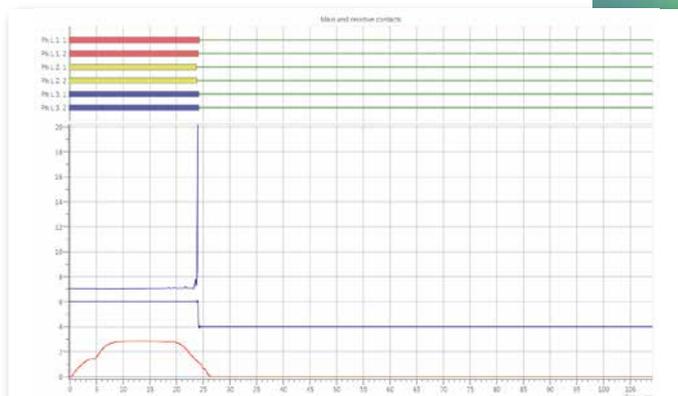


Fig. 3: Dynamic resistance measurement after repair.



Odd Tangen
Service engineer for EB Elektro AS, Norway

OM: What was your first impression of CIBANO 500 during the product presentation you saw in 2013?

Odd Tangen: Right from the start I saw the advantages of its general design and features which offer several benefits compared with other instruments.

Can you give me a rough estimate of the number of tests you have already carried out with CIBANO 500?

So far I have tested about 150 customer CBs in total on site ranging from 12 to 420 kV. In addition I have done quite a lot of tests in the EB Elektro workshop and with customers during the development of different transducer applications. These were also several hundred measurements.

What would you say is the best thing for you about using CIBANO 500?

One big inconvenience while testing with other CB test systems are the time-consuming and failure-prone wiring setups which sometimes need to be changed several times between the different measurements. So with CIBANO 500 OMICRON's developers made sure to cut down the wiring effort to a minimum, which greatly reduces the testing time and probability of measuring errors. I especially like this aspect of it very much, because it pays off every day of my working life.

Can you somehow quantify the time-saving you have achieved by using CIBANO 500?

In order to respond to this correctly, I need to split up the answer. For the smaller breakers from 12 to 24 kV you can save 20 to 30 % of time. Normally these breakers are easily accessible and the wiring is no problem. In general you have a CB with ganged pole operation

«Thanks to CIBANO 500, the wiring effort is cut down to a minimum, which greatly reduces the testing time and probability of measuring errors.»

and only need to measure one motion. When you have three phases with one interrupter per phase you can do all your measurements in one turn: timing, travel, DRM, static contact resistance, coil current and motor current.

However, when you start testing bigger CBs you really save a lot of time. If you have a CB type with independent pole operation, for example, you need to measure two interrupters per phase, three motions and three dampings in the drive mechanism. This means six travel parameters, three trip plus three close coil currents, three motors of driving mechanisms and DRM in six interrupters. For such a use case you need to use a mobile personnel lift in order to connect your hardware and cables. This is really time consuming. With CIBANO 500 you only need to do the wiring once. You connect to all three phases, you do all your tests and you remove the wiring again. With other equipment you need to do the wiring twice or even three times. I would say you save 50 % of your time when you use CIBANO 500 in such a case.

Are there any general trends you see in circuit breaker testing?

Looking into the future I am sure that we will see more and more cost-effective maintenance based on condition monitoring as customers become more and more critical of time-based maintenance. ▀