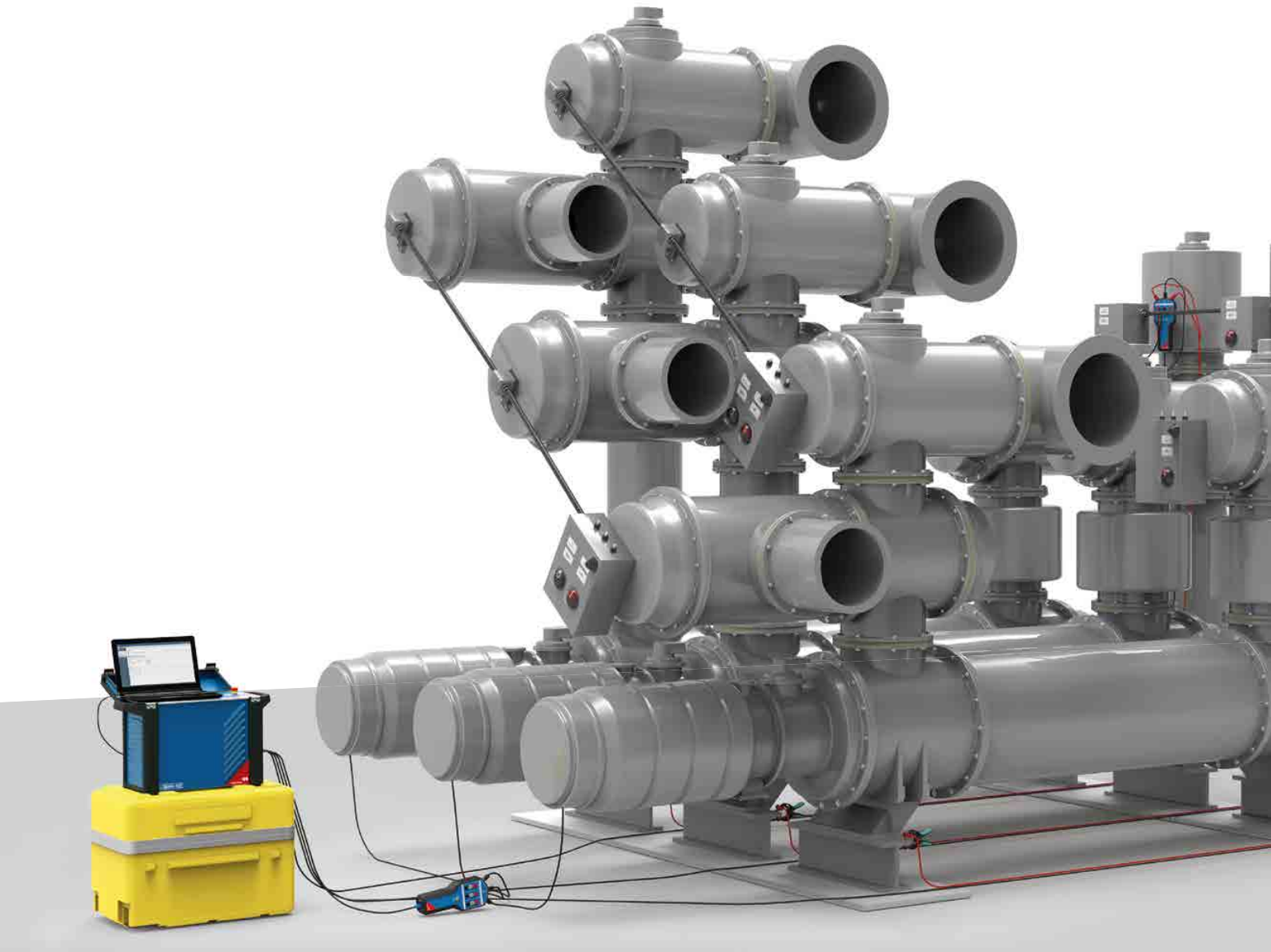
Safely Grounded!

Timing measurements on gas-insulated switchgear (GIS) with grounding on both sides

When measuring operating times on GIS with grounding on both sides, testing methods such as dynamic resistance measurement (DRM) don't deliver reliable results due to the low-ohm ground connections that run parallel to the circuit breaker. CIBANO 500 provides a new and simple solution to this problem, which allows the operating times to be determined accurately despite the fact that the GIS is grounded on both sides.



Circuit breaker testing in GIS – why don't conventional methods work?

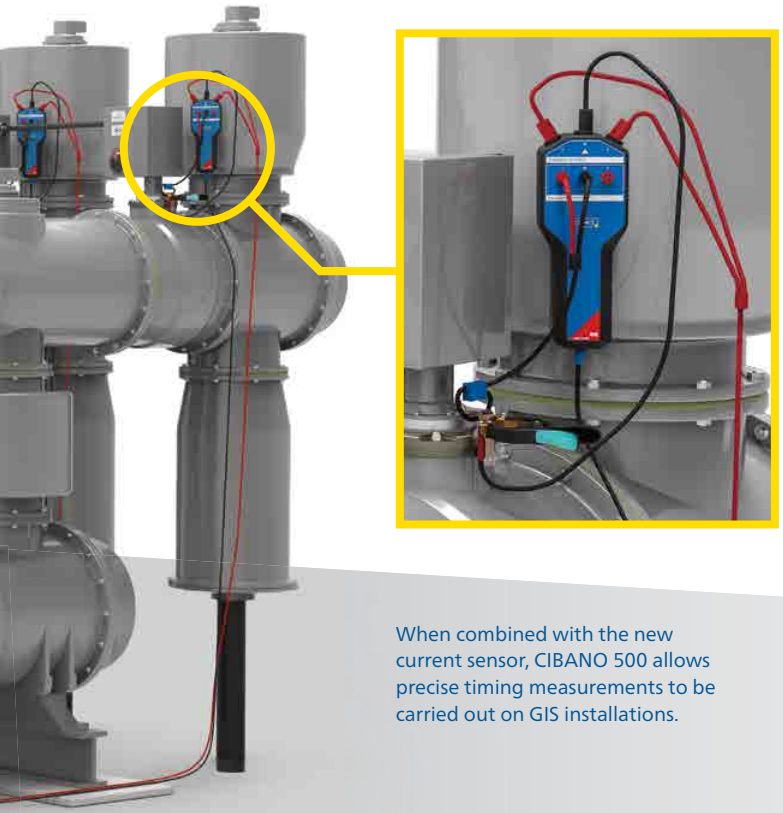
The operating times during C, O, CO, etc., are measured and compared with the manufacturer's reference values for circuit breakers in gas-insulated switchgears. This allows the condition of the interrupter unit and the operating system to be assessed.

Test sets and the circuit breaker are usually connected by tapping the grounding switches on the switchbay. Due to the low-ohm ground connection resulting from the metallic GIS enclosure that runs parallel to the circuit breaker where both sides are grounded, there is no significant increase in the measured voltage or the resulting resistance at the time of the contact separation. Measuring the operating times is thus rendered impossible, as a suitable resistance threshold value cannot be chosen. Therefore, testing methods such as the dynamic resistance measurement (DRM) cannot be used for measuring the operating times of GIS.

For this reason, timing measurements are often conducted with insulated grounding, or with grounding that is only on one side. Yet this carries the risk of capacitive coupling from adjacent components or switchbay sections on the non-grounded conductor. Therefore, on-site testing using these methods is often impossible or prohibited in many cases.

«We have seen the increasing demand for non-invasive test methods for evaluating the condition of GIS installations. Measuring the operating times on GIS with grounding on both sides has presented us with a significant technical challenge.»

Andreas Nenning
Product Manager, OMICRON



When combined with the new current sensor, CIBANO 500 allows precise timing measurements to be carried out on GIS installations.

CIBANO 500

- 3-in-1 system: micro-ohmmeter, timing analyzer, and AC/DC power supply (2.4 kW continuously)
- One system for medium- and high-voltage circuit breakers of all types (incl. GIS)
- Low wiring effort
- Safety assured thanks to a test setup with grounding on both sides
- One comprehensive report for all tests
- Lightweight test system (20 kg / 44 lbs)

www.omicronenergy.com/cibano500

Which alternative test methods have been used to date?

Test sets that are based on measuring the dynamic circuit breaker capacity (DCM) provide an alternative to the tests that are frequently prohibited when grounding is insulated or only done on one side. As a result of installing additional ferrite cores on the grounding switch, the parallel ground impedance can be increased when using the DCM test procedure. However, the assembly and setup is time-consuming. The feasibility of this process is also more restrictive and a variety of ferrite core types are needed, which increases the cost.

Current Sensor Measurement (CSM)

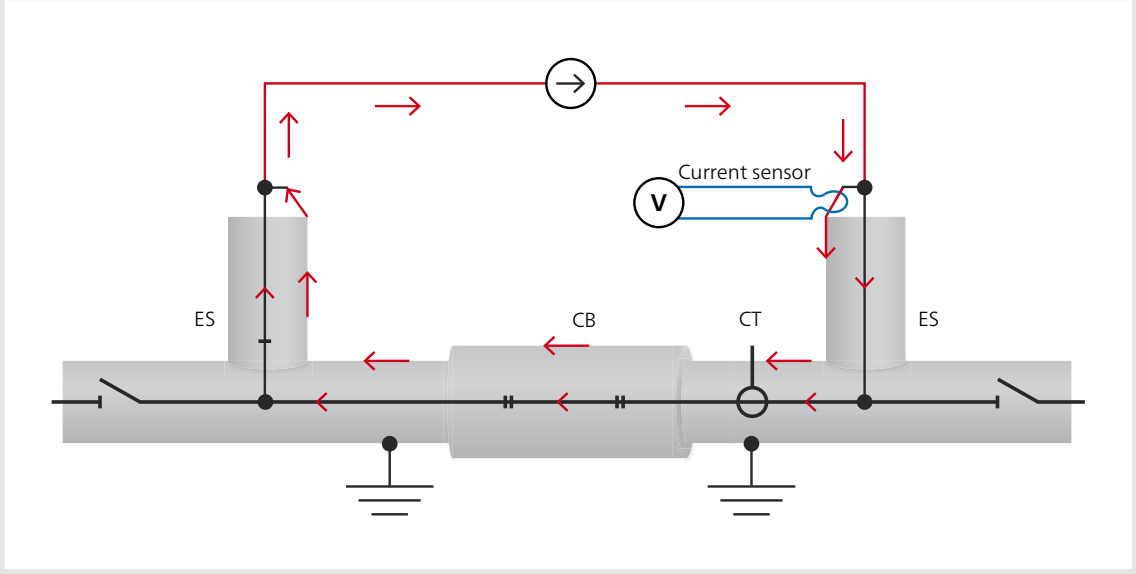
CIBANO 500 offers a new, alternative method for measuring operating times in GIS – called the Current Sensor Measurement method, or CSM method for short. The operating time is measured via an inductive current change measurement using the parallel ground connection or the circuit breaker, while the GIS remains grounded on both sides. In order to do this, the circuit breaker is connected to CIBANO 500 via the CB MC2 accessory. The CB MC2 has a constant current source (e.g., I_{DC} = 200 A) and a measurement channel for the current sensor. The sensor is laid around the ground connection of the grounding switch. The current change that is measured through the ground connection or the circuit breaker is then used to determine the switch response times. The circuit breaker remains grounded on both sides throughout the entire measurement.

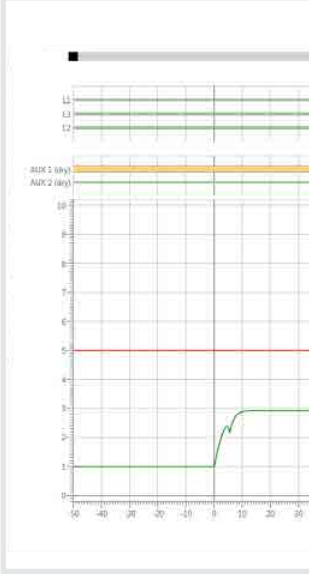
Advantages of the new CSM method

When using this new CSM method, the ground connections on the grounding switch don't need to be removed and additional components don't need to be installed. A current sensor just needs to be connected to the switchbay grounding switch. Since these sensors have a flexible design and can easily be installed on a multitude of different grounding switches, they are ideal for on-site applications in GIS installations. Therefore the CSM method is a faster and simpler alternative method for precisely measuring the operating times of a GIS that is grounded on both sides.

Did you know?

After timing measurements or high residual currents with transient DC components, there may be some residual magnetism left over in the GIS's current transformer. CIBANO 500 also features the "CT Demagnetization" function, which quickly and easily demagnetizes the current transformer after timing measurements.





Inductive measurement of the current change using the parallel ground connection for measuring the operating times of a GIS with grounding on both sides.

«I'm proud to be able to say that our experts have overcome this challenge. Circuit breaker testers can now rely on a safe and easy-to-use solution thanks to the new CSM method.»

Andreas Nenning
Product Manager, OMICRON

The Primary Test Manager™ software shows the results of the timing measurement using CIBANO 500 and the CSM method.

News

Stay Up To Date!

CT Analyzer software v4.51 – compliant with the latest standards

With its model-based approach to testing, the CT Analyzer has been providing a unique way of quickly and easily testing current transformers for years. With the simple push of a button the device is able to determine all of the relevant current transformer parameters automatically and assesses the current transformer in accordance with IEC or IEEE standard within seconds.

The new CT Analyzer software v4.51 brings you additional benefits when assessing current transformers according to the classes defined in the IEC and IEEE standards. You can now test current transformers in accordance with the recently updated IEEE standard C57.13 (published in 2016) by using the new version of the software. The new classes 0.15N and 0.3S, and the additional burdens B-0.1, B-0.2, and B-0.5 for protection transformers, have now been incorporated.

The CT Analyzer software is now even available in Portuguese and Korean.

Stay up to date – download the new CT Analyzer software v4.51 for free from our customer portal.

www.myomicronenergy.com/ctanalyzer