

TEST SHOT NEWS

WORLD LEADER IN INNOVATIVE POWER SYSTEM TESTING SOLUTIONS

VOLUME 9 / ISSUE 1

A PUBLICATION OF OMICRON 2004



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Innovative Test Methods Improve Transformer Diagnosis

Due to ever-increasing pressure to reduce costs, the power industry has been forced to keep old power transformers in operation as long as possible. A good percentage of power transformers are reaching the final stage of their lifespan with an increasing risk of failure. Better methods are required to assure the operation of the power transformers under safe operating conditions. Condition monitoring and improved electric testing techniques are playing major roles in assuring the 'well being' of power transformers.



In order to find out the reason for the high gas values, further tests have to be performed to find the root of the problem. Still we have to rely on the conventional testing techniques that have been in use for many years:

Dissolved gas analysis is a well-proven method, but must be complemented with electrical testing to locate any faults indicated by excess hydrocarbon gases in the oil. The introduction of digital and power amplifier technologies in the primary testing field allows a better assessment of the working condition of a power transformer, reducing the risk of a major failure.

There are many possible reasons for increased gas values in the oil, such as the existence of high contact resistances at the tap selector or decomposed oil leaking from the diverter switch into the transformer oil through a defective sealing. In order to find out the reason for high gas values, further electrical tests have to be performed on the transformer. Conventional testing techniques include:

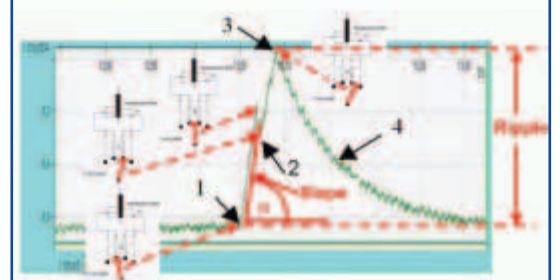
- Winding resistance measurement
- On-Load Tap Changer (OLTC) test
- Turns ratio measurement
- Excitation current measurement
- Measurement of leakage reactance/short circuit impedance
- Capacitance and Dissipation/Power factor measure

Thanks to new technologies in primary testing there are two major improvements:

- Dynamic Resistance test
- Frequency Scan ('fingerprint' or 'signature') test.

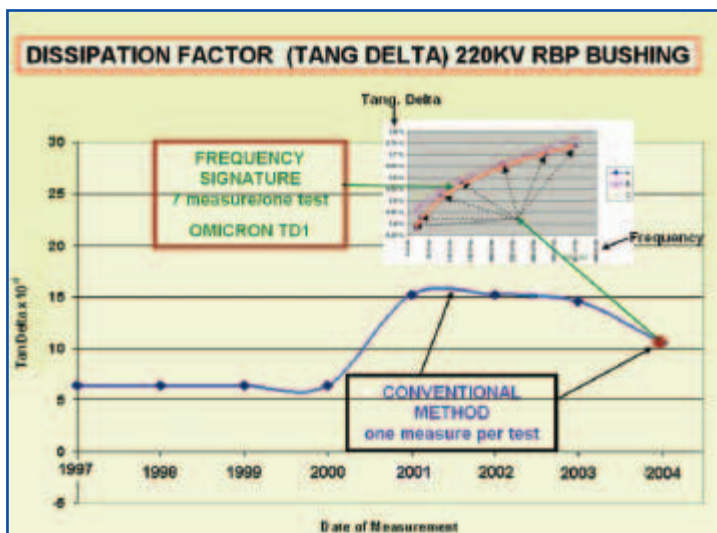
In the Dynamic Resistance test - two parameters are measured, the "slope" and the "ripple" (see figure). With conventional test sets, only the static measure of the contact resistance is possible.

Transient Signals on a Diverter Switch



(Continued from page 1)

The Frequency Scan involves the use of frequency scan from 15 to 400 Hz in some tests - Turns Ratio, Leakage Reactance, Dissipation/Power Factor (Tan Delta). The use of the Frequency Scan in the Dissipation/Power Factor test (Tan-Delta) allows the capture of the frequency "signature" of the device being tested, greatly improving the condition assessment of the insulation of the device (i.e. power transformer bushing, current transformer, lightning arrester, etc.). Instead of getting one measurement per test with conventional methods at nominal frequency, the Frequency Scan method allows several measurements per test performed under the same conditions (temperature, humidity, etc.), giving a better "picture" of the insulation condition.



Using OMICRON's revolutionary multifunctional test system, the CPC 100 + the new CP TD1, new tests such as those listed above are easily performed. Again, as 15 years ago in the secondary testing field, OMICRON is now changing the way things have been done for many years in the primary field. OMICRON is synonymous of innovation in the field of power system testing! Look for future issues of the TSN for more information on these topics.

CPC 100 + CP TD1 for Power Factor Testing (Tan-Delta)

The new CP TD1 in combination with the CPC 100 offers a unique portable test system for automatic testing of important transformer parameters. The CPC is the main control unit for the test system and the CP TD1 unit is used for testing of insulation conditions. The following can be tested:

- Winding resistance
- Turns ratio and excitation current
- On-load tap changer condition
- Leakage reactance/short circuit impedance
- Insulation condition (capacitance, tangent delta, power factor)

The CPC 100 + CP TD1 provides laboratory precision for capacitance and dissipation /power factor measurement in the field.

A fully automatic test sequence can be recorded to analyze tests at several voltages and different frequencies. The influence of line frequency interference is automatically suppressed with an innovative measurement technique. In addition the technology enables precise measurements even in the presence of strong electromagnetic interferences.

An automatic assessment is possible at the test location if the reference values of each device (consisting of capacitance and the dissipation factor) are known.

All measurement results and test object data are saved at the test location in XML format allowing easy transfer to database applications or automatic reports. Software utilities are included to convert the test results into spreadsheet (MS-EXCEL) format.



New Test Universe Software Version 2.0

The New Dimension in Testing

One of the biggest projects in OMICRON's recent past is now finished: OMICRON's Test Universe Software Version 2.0 (TU 2.0). Many new improvements have been made to existing software modules as well as significant changes to the overall structure. Along with many additional new features, the most significant include:

Improved automated testing

- New **XRIO** (extending the current RIO standard) to allow all functions of a modern relay to be modeled
- **LinkToXRIO** to allow the use of relative settings, the test automatically adapts to changed relay settings
- Improved **Test Wizard** to allow customized build and distribution of automated test plans using the OMICRON Control Center

Improved QuickCMC for manual testing - completely reworked

- **New fault calculator** automatically computes fault values and allows the user to choose between different operating modes (i.e. symmetrical components, power, fault values, etc.)
- **New impedance plane** and vector views

New Annunciation Checker software module - helps the commissioning engineer verify that the allocation of each annunciation signal to its location (marshalling) and that the wiring has been done correctly. A test specification can be created prior to the test and can be flexibly adapted while a test runs.

New GSSE Protocol software - for testing with GSSE (Generic Substation Event Status) messages according to IEC 61850 (replaces the former UCA GOOSE used with UCA 2.0), requires the NET-1 hardware option



New "Power Quality" Scheme Testing Tool

PQPro is our latest Scheme Testing Tool specifically designed for testing power quality event detection logic schemes. It contains 13 of the most common schemes and gives the user the ability to understand and test these power quality monitoring functions that are based on fundamental frequency.

Voltage variation events that may result in service or process interruptions are of major concern to sensitive industrial facilities and utilities, since they can result in significant losses. **PQPro** offers a convenient and fast way to evaluate many of these potentially costly events.



New "NET-1" Hardware Option for the CMC 256

The NET-1 option replaces the parallel interface on the CMC 256 and provides a new way of controlling the test set via Ethernet. In addition to replacing the parallel interface, it offers many additional opportunities such as controlling the test set over a network and support for substation communication protocols according to IEC 61850 and UCA 2.0 (also based on Ethernet). The NET-1 option requires our new TU V2.0 software running on MS Windows 2000 or XP operating systems. The NET-1 option can be ordered with a new test set or as an upgrade to your existing CMC 256.



FOR THE RECORD WITH **COMICRON**

A series of questions most commonly asked, and responses from OMICRON's renowned electronic test Guru...

UPCOMING EVENTS

RTND

Savoy Place
London, UK
February 15-17, 2005

Midwestern Protective Relay School

Iowa State University, Ames, IA
February 22-24, 2005

Elenex Thailand

Queen Sirikit National Convention Centre, Bangkok, Thailand
March 2 - 5, 2005

Middle East Electricity

Dubai, United Arab Emirates
March 6-9, 2005

Washington State University Hands-On Relay School

Pullman, WA
March 14-18, 2005

NETA - InterNational Electrical Testing Association, Inc.

New Orleans, LA
March 21-23, 2005

Texas A&M Protective Relay Conference

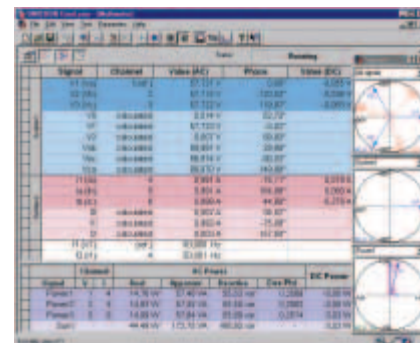
College Station, TX
April 5-7, 2005

Hanover Fair

Hanover, Germany
April 11-15, 2005

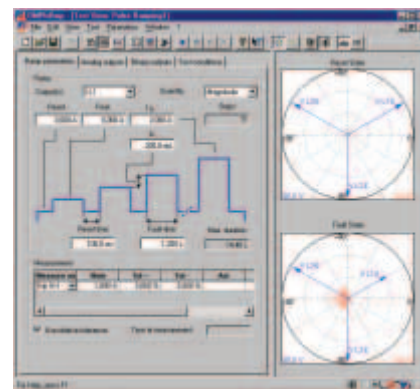
Q: Can I measure voltages and currents with the CMC 256?

A: Yes, the software option EnerLyzer provides many powerful measuring functions. All 10 binary/analog inputs can be used for measuring binary, voltage and current signals simultaneously. In addition, the EnerLyzer software option allows the CMC 256 to be used as a transient recorder. Even without an EnerLyzer license all CMC 256 users can perform analog measurements of 3 signals, any mix of currents and voltages. It is very handy!



Q: Are there any tips to testing the df/dt function of frequency relays when using frequency ramps?

A: In the Pulse Ramping module of our new TU software 2.0 you can define a df/dt ramp allowing the test of this function with a continuous signal. We generate a true linear frequency ramp (no steps).



"WHAT'S NEW"

Test Universe software Version 2.0, the NET-1 hardware option, Annunciation Checker module and PQPro Scheme Testing Tool software - specifically designed for testing power quality event detection logic schemes - are the newest additions to the OMICRON CMC test system. Please visit our web site for additional information or contact your local OMICRON office.