

TEST SHOT NEWS

WORLD LEADER IN INNOVATIVE POWER SYSTEM TESTING SOLUTIONS

VOLUME 13 / ISSUE 1

A PUBLICATION OF OMICRON 2008



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Challenges of Commissioning Protection Devices

As a result of shortened scheduled revision and commissioning times, the test engineer works under increased time pressure. Furthermore, a much wider knowledge base is required in the field of protection engineering due to the greater number of multi-functional relays which become consistently more complex. Lack of attention or experience may lead to errors in the test sequence and subsequently during operation.

Testing of multi-functional protection relays

Theoretically, all setting parameters can be quite easily tested despite the multi-functional properties of a protection device. However, in some applications certain functions are influenced by other functions or superimposed by other protection settings. Sometimes the resulting undesired effects during testing can only be avoided by blocking the relay software in some way or even by deactivating certain protection functions. Therefore, there is the danger that not all functions are reactivated once the commissioning has been completed. The latter, of course, has to be avoided at all costs. This can be ensured by careful consideration and understanding of the protection functions before commencement of the test. By undertaking an exact analysis of the protection functions it should be possible to clarify exactly which test quantities are required to trigger the different protection functions. Often this detailed analysis combined with a versatile test software enables the commissioning engineer to find solutions for a test of overlapping functions without blocking or deactivating functions.

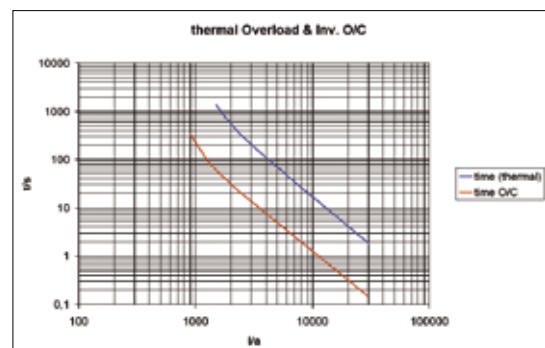
However, if no other solution is possible, the commissioning engineer can assure that all functions are active after the test by first deactivating the superimposed functions to the test subordinated functions. Then the superimposed function is activated again and tested. As shown in the example for an overcurrent relay (picture), first the inverse time function has to be deactivated in order to be able to test the thermal characteristic. Subsequently the deactivated

function has to be reactivated and tested. Both functions are therefore tested and reactivated as specified in the setting sheet.

The daily work of the commissioning engineer can be enhanced significantly through the use of adequate test equipment. By using software-supported test equipment it is possible to take advantage of reusable pre-defined tests. Default test processes also allow test engineers with less experience to follow a clear test strategy. As these test processes can be re-used for later routine testing, time-effective work is guaranteed and quality is further improved. Powerful, multi-phase test systems, ensure that set-up times can be greatly minimized. The test engineer is certainly well prepared if test equipment, in addition to the basic protection testing, can provide optimum support for commissioning tasks including testing the measurement functions, wiring and message tests.

New technologies require new knowledge and new tools

Due to the merging of protection and control devices, it is becoming increasingly more important for the test engineer to have multi-disciplinary knowledge in both systems. Messages and control commands are more and more often realized according to the IEC 61850 standard. Thus, the test engineer has also to work as a network technician which requires suitable test and analysis tools. To be engaged in this field also means that lifelong learning is essential because new technologies in the next years and decades also influence the protection and control technology. This can only be achieved by continuing education and training.



OMICRON – Continuous Innovation in the Field of Protection Testing

With the introduction of numerical protection relays, OMICRON began to emerge as the world market leader in the field of protection test equipment. An unconventional yet innovative approach, a team of excellent hardware and software developers, the fast growth of expertise in the field of protection testing and especially the close co-operation with pioneering customers led to revolutionary new solutions in the field of testing technology. For example, it is impossible to imagine today's state of technology without the following OMICRON innovations:

- PC-controlled small and light-weight protection test equipment with a Digital Signal Processor (DSP) technology and high-accuracy linear amplifiers
- Graphic-supported test software with:
 - Phasor diagram
 - Impedance plane
 - Z/t diagram
 - Differential protection stabilization characteristic
 - Synchronoscope
- RIO - Relay Interface by OMICRON
- Test sets with integrated transient recorder
- Using the integrated test set sources as reference for meter testing
- Protection, transducer and meter test all within one device

OMICRON's latest Test Universe Version 2.x software impressively demonstrates that the innovative power is continued. Test automation with XRIO and LinkToXRIO, a clever approach to create automatic test plans which does not require any programming skills, shows that OMICRON's technology advancement is an ongoing process. In addition, OMICRON's leading position in the introduction of UCA and IEC 61850 functionality strengthens the claim for being the technological leader and further emphasizes its willingness to tackle new approaches and solutions.

As OMICRON introduces its next generation of test equipment and software utilities for the test technology used in electrical power engineering it is clear that the wheel of innovation continues to turn.

► NEW: Protection Test Sets

From valued customer feedback we can be proud of the fact that our customers consider the CMC 156 and the CMC 256-6 to be perfect test sets. However, OMICRON has continued to monitor the trends that affect the industry and, based on this, continued its extensive development activities. As a result, two new test sets are now being introduced:

CMC 356 – Protection Test Set and Commissioning Tool

“The workhorse”: The CMC 356 is designed to optimally cover the modern requirements for commissioning and maintaining substations and for testing protection devices. It opens up new possibilities especially for applications with 5A current transformers and for tests with increased power demand. The special feature of the CMC 356 is the powerful current sources with wide dynamic range (1mA up to, for instance, 6 x 32A, 3 x 64A, or 1 x 128A). Commissioning engineers will appreciate the possibility to perform wiring and plausibility checks of the current transformers by the primary injection of the high currents provided. Three-phase testing of high-burden, electromechanical relays and the latest IEC 6850 technology in one device is the answer to the wide variety of challenges in today's protection technology.

CMC 256plus – Protection Test Set and Universal Calibrator

“The reference”: The CMC 256plus is the right choice whenever high precision is required. This device is not only an excellent protection test set for all protection generations (also high-burden, electromechanical relays in single-phase mode), but also a universal calibrator. The high-accuracy current and voltage sources allow the user to calibrate a wide spectrum of measurement devices used in power engineering including meters of class 0.2, transducers and Power Quality measurement devices.

CMC 356	CMC 256plus
6 x 32A; 3 x 64A; 1 x 128A 6 x 430VA; 3 x 860VA; 1 x 1000VA	6 x 12.5A; 3 x 25A; 1 x 75A 6 x 80VA; 3 x 160VA; 1 x 460VA
Typical error: < 0.05% rd + 0.02% rg ¹	Typical error: < 0.015% rd + 0.005% rg ¹
4 x 300V; 1 x 600V	4 x 300V; 1 x 600V
Typical error: < 0.03% rd + 0.01% rg ¹	Typical error: < 0.015% rd + 0.005% rg ¹
6 + 6 (option) low level outputs 0 .. 10V	
10 multifunctional binary / measurement inputs (Enerlyzer™ option)	
4 + 4 binary outputs	
IEC 61850 GOOSE; simulation and reception	
IEC 61850 sampled values generation	
Synchronization: GPS/ IRIG-B/ external voltage	

¹ rd = reading, rg = range



► NEW: OMICRON Protection Testing Library - PTL

The PTL is based on a new concept that gives the protection engineer the possibility to benefit from OMICRON's modelling of multifunctional protection devices and building of test plans, and thus from the resulting testing know-how. This library provides OMICRON customers with free access to prepared test plans and relay models (XRIO converters) as well as parameter import filters for specific protection devices. Based on the protection parameters and technical details mentioned in the manual for the particular protection device, XRIO converters calculate the protection characteristics and tolerances. Users can easily extend or customize the test plans to the current testing purpose because the test plans are completely built up on the XRIO and LinkToXRIO concept of the Test Universe software. As a result, no scripting or programming is required.

Many relays, due to their complexity, can be very difficult to test and therefore make the testing process quite complex. This can be the cause for higher additional expenses affecting the test duration which are especially disturbing when the substation is due to be energized imminently. Now the PTL more effectively supports CMC users with relay-specific test templates!

The PTL is part of the Test Universe SW 2.2.0 and higher.

Find out more about PTL and the download possibility in our customer area: <http://www.omicron.at/en/support/customer/secondary/ptl/>

► NEW: Test Universe Version 2.2.0

Also for the CMC user software, the wheel of innovation continues to turn. The current version TU 2.2.0 (as of March 2008: 2.21) does not only additionally support the new test sets CMC 356 and CMC 256plus but also provides, amongst others, the following attractive new functions:

- Overcurrent Characteristics Grabber: Digitization of inverse-time characteristics from for example, the relay manual
- TestBase Standard CMC Personal Edition: Comfortable management of relay data and tests
- PQ Signal Generator: Universal function generator and test module for Power Quality devices (L)
- Sampled Values Configuration: Generation of IEC 61850 sampled values (L)
- LinkToXRIO for the test module selection boxes in the Control Center: Further simplifies test automation
- And many other functions

(L) ... License required

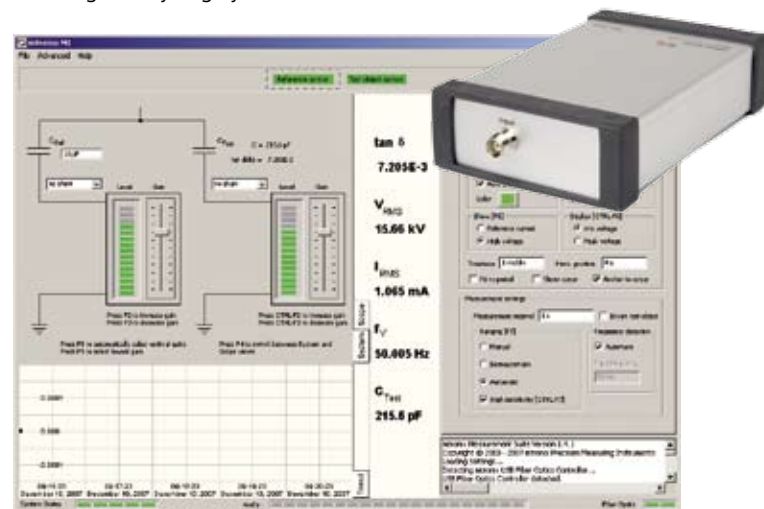
If a TU 2.x license is available, update to the latest TU version is free of charge.

Find more about the news in TU 2.2.0 and TU 2.2.1 in the customer area: <http://www.omicron.at/en/support/customer/secondary>

Dissipation Factor and Capacitance Measuring System MI 600

The MI 600 is a mobile high-precision acquisition and analysis system for dissipation factor and capacitance measurement of high voltage equipment. The MI 600 is targeted to replace Schering-type bridges in existing test bays or equip new test bays. The system can be used with any accurate reference capacitor to test any type of specimen, including cables, power transformers, instrument transformers, coils, windings, or entire rotating machines.

Complete electrical insulation between acquisition units and the control station provide superior safety in high-voltage setups. High-resolution digital processing enables exceptional measurement precision. The easy-to-use mtronix software features various real-time visualization and monitoring options, and integrates with the MPD 600 partial discharge analyzing system.



The MI 600 utilizes the same robust electrically isolated fiber optical bus system and the same fiber optic controller MCU 502 as the MPD 600. Due to the low power consumption, the MI 600 is operated preferably with the rechargeable battery (more than 12 hours' continuous operation).

The main features can be summarized as follows:

- Modular, compact design. The MI 600 consists of two acquisition units, a fiber optical controller and a PC / laptop running the operating software.
- Complete electrical insulation between the acquisition units and the control station is achieved by means of optical fibers. Each fiber optical cable can be up to 2 km in length. This guarantees unprecedented safety and flexibility.
- Low power consumption. Less than 4 W power consumption in measuring mode enables the use of a battery. In standby mode, each acquisition unit consumes less than 10 mW.
- Wide input range. The MI 600 features an 11-level input gain control, adjustable via the operating software. It reliably resolves currents from as low as 20 μ A up to 100 mA without the need for an external shunt. By use of the external shunts, currents up to 28 A can be measured.



UPCOMING EVENTS

World of Industry – Otomasyon '08
Tüyap Fair, Convention and
Congress Center, Booth No. E-270
Istanbul, Turkey
February 28 - March 02, 2008
www.win-fair.com

Electro
Palais des Expositions Pins
Maritimes, Pavillon "A", Stand 3.05
Algiers, Algeria
March 09 - 12, 2008
www.electro-automation.info

Washington State University
Hands-On Relay School
Pullman, Washington
United States
March 10 - 14, 2008
capps.wsu.edu/conferences/hrs/

IET DPSP
Crowne Plaza Hotel
Glasgow, United Kingdom
March 17 - 20, 2008
conferences.theiet.org/dpsp

NETA (Int'l Electrical Testing Assn)
Power Test: Electrical Maintenance
and Safety Conf.
Hilton Riverside, Booth No. 311-313
New Orleans, LA, US
March 17 - 20, 2008
www.netaworld.org

Texas A&M Protective Relay
Conference
Hilton Hotel
College Station, Texas, US
April 01 - 03, 2008
engineering.tamu.edu/prorelay/

International Conference on
Condition Monitoring and
Diagnosis - CMD 2008
North China Electric Power
University
Beijing, China
April 21 - 24, 2008
www.cmd2008.com

Hannover Fair
Hannover, Germany
April 21 - 25, 2008
www.hannovermesse.de

Georgia Tech Protective Relay
Conference
Atlanta, Georgia, US
May 19 - 22, 2008

African Utility Week
Cape Town International
Convention Centre, Stand E14
Cape Town, South Africa
May 20 - 23, 2008
www.african-utility-week.com

FOR THE RECORD WITH COMICRON

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

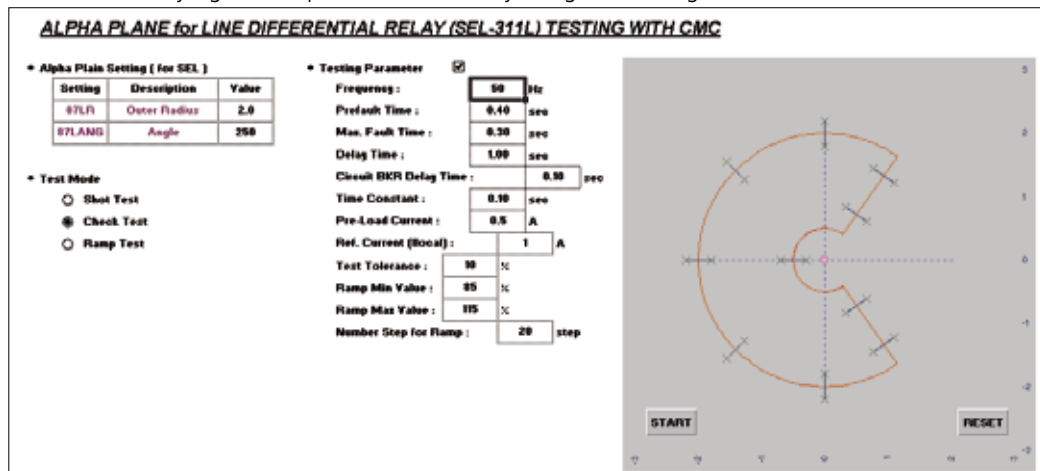
Q: I have to make Partial Discharge Measurements in surroundings where heavy noise may occur. Is there any possibility to deal with this noise and to still make a sensitive and reliable PD measurement?

A: The MPD600 Partial Discharge Analysis System will be the right choice for this application. It comes equipped with the latest and most flexible noise-suppression technologies. Via fully digital processing and the use of variable bandwidth filters (9 kHz - 3 MHz) the MPD 600 can be flexibly adjusted to the appropriate passband (frequency spectrum range) especially under changing on-site conditions to achieve the highest measuring sensitivity. These outstanding filtering options guarantee superior reliability and repeatability of all measured values and result in an extremely low system noise compared to measuring systems with fixed filtering frequencies. Apart from that a variety of various gating possibilities are supported to achieve maximum noise suppression:

- An unlimited number of phase-amplitude gates for gating noise with stable phase correlations
- Unit gating for gating external noise by means of a separate acquisition unit
- mtronix Dynamic Noise Gating technology for reliable suppression of external noise bursts
- 3PARD gating for 3-phase applications which allows reliable discrimination of different PD sources in clusters. This is very useful for gating of unwanted signals (noise, external discharges, etc.) and isolation of actual PD signal

Q: I have to test the Line Protection Relay SEL311L. How can I test the alpha plane characteristic?

A: Testing the alpha plane characteristic becomes possible using a customer specific solution. A special tool has been developed and is available from the OMICRON user area. This tool is based on the unique possibility to create self-designed testing solutions using Microsoft® EXCEL. Within EXCEL you can calculate any signal and power it out directly using the CMEngine interface.



OMICRON Training Classes

More Information on
www.omicron.at

Houston, TX, USA

Class 1 – CMC Protection Software (Sessions 1-4) Feb 11-13, 2008

Class 2 – CMC Advanced Protection Software (Sessions 4-8) Feb 13-14, 2008

Klaus, Austria

CMC Training March 3 - 5, 2008

CPC Basic Training & Measurements on CTs, VTs and Power Transformers March 6 - 7, 2008

Diagnostic Measurements on Power Transformers April 1 - 2, 2008

Line Impedance & k Factor Measurements with CPC 100 + CP CU1 April 9, 2008

Ground Impedance & Step and Touch Voltage Measurements with CPC 100 + CP CU1 April 9 - 10, 2008

Theory of FRAnalyzer for Power Transformers & Philosophy of FRAnalyzer May 6, 2008