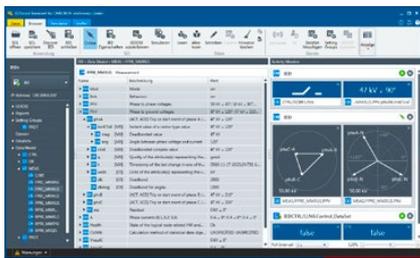
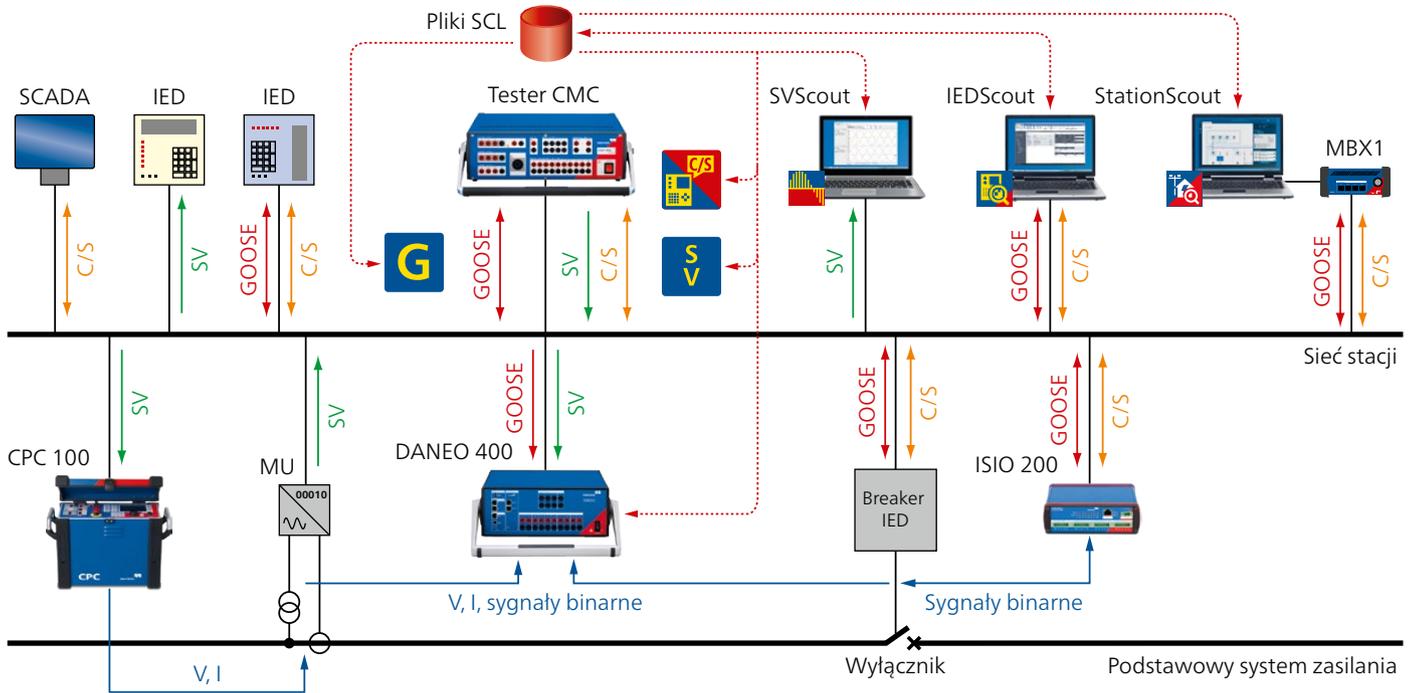


IEC 61850 has become the international standard for the communication in power supply systems. It is a core standard for smart grids and lays down the prerequisites for a future-proof design and the frictionless interoperability of products from different manufacturers.

OMICRON offers protection and SCADA engineers a set of advanced solutions for testing in IEC 61850 environments. The individual tools complement one another and cover a wide range of requirements: while Test Universe and RelaySimTest are used specifically for protection testing, further products mentioned in this section, such as StationScout, IEDScout and DANEO 400, focus on communication. They allow users to observe, track and analyze the behavior of data packets in the communication network and the data flow for protection, automation and control.



IEDScout

| | Essential | Standard | Enhanced | Complete | IEC 61850 Basic | IEC 61850 Advanced |
|----------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| IEDScout | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

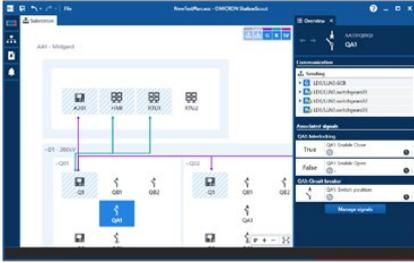
IEDScout (VESC1500) is the perfect tool for looking into IEC 61850 devices, such as IEDs, as it contains numerous useful functions for this purpose. Its user interface simplifies finding relevant information. While StationScout (see page 36) is used for getting an overview of the substation automation system and testing its logic and communication functions, IEDScout allows testing the IEC 61850 functionality of a single IED. Its application area ranges from IED development, factory acceptance testing, and commissioning to troubleshooting.

Benefits

- > Support of IEC 61850 Ed. 1, IEC 61850 Ed. 2, and IEC 61400-25
- > Works with IEC 61850-compatible IEDs from any vendor
- > Support of improvised testing situations, especially during commissioning and troubleshooting
- > Fast analysis of SCL files and large data models
- > Sniffer for investigating network traffic in depth – even between other clients and servers
- > Working with IEC 61850 Setting Groups via a smart user interface
- > Downloading files, for example COMTRADE disturbance recordings, over IEC 61850 file transfer
- > Simulation of IEDs including GOOSE and Reports

Try out the software 30 days for free: www.omicronenergy.com/iedscout

IEC 61850 Testing Tools



StationScout

Testing automation, control, and SCADA communication in an IEC 61850 substation automation system (SAS) is as time consuming as testing the protection – or often even more. StationScout simplifies the testing and reduces the required effort significantly. Running on the new digital substation test set MBX1, StationScout visualizes and analyzes the communication in an SAS in an unprecedented way. The topology is determined from the engineering data in SCL (Substation Configuration Language) and displayed intuitively for the SCADA engineer. StationScout supports designers and testing engineers throughout the entire life cycle of an SAS with a combination of simulation and testing functions.

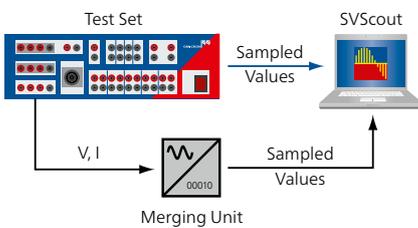
Benefits

- > "Live Overview" displaying the current status of IED functions and switchgear positions
- > Easy navigation in the SAS using clearly understandable and editable signal names
- > Cyber secure connection to the substation network through MBX1
- > Troubleshooting and monitoring of communication systems
- > GOOSE verification on sender, network and receiver side using LGOS
- > Automatic asset visualization, sorted by voltage level and feeder
- > Signal tracing through the whole SAS
- > Simulation of missing IEDs and equipment for testing logic functions and gateways
- > Automated testing using test plans and binary inputs and outputs (Commissioning Package)¹

Ordering information

| Order No. | Delivery contents |
|-----------|--|
| VEESC1750 | StationScout Smart Overview Package StationScout software for manual testing of substation automation systems (SAS) with hardware MBX1 |
| VEESC1751 | StationScout Commissioning Package¹ StationScout software for automated testing of substation automation systems (SAS) with hardware MBX1 |

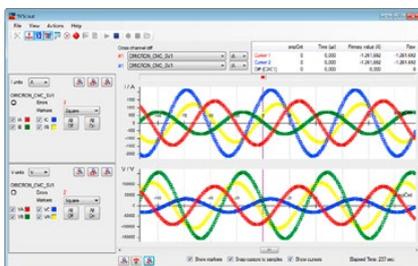
For more detailed information, please visit www.omiconenergy.com/stationscout or refer to the StationScout product brochure.



SVScout

VEESC1510

SVScout makes Sampled Values (SV) visible for the substation engineer and IED developer. One important application of SVScout is testing merging units by comparing two SV streams. The accurate measurement of the merging unit's time synchronization is especially useful for developers. SVScout subscribes to Sampled Values streams from merging units and displays the waveforms of the primary voltages and currents in an oscilloscope view. The data is displayed with electrical units. Detailed values on the traces can be looked up and compared with each other utilizing the cursor functions. The RMS values and phase angles are calculated from the Sampled Values and displayed in a phasor diagram and a measurement table.

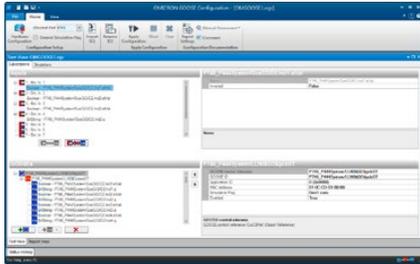


Captured Sampled Values can be saved in COMTRADE files for further in-depth analysis. Expert functions provide even more details on the received data, such as detailed decoding of the quality codes. Network traffic saved in PCAP² files can be opened in SVScout and analyzed as if it was being received online.

¹ Available from mid-2019

² PCAP – Packet Capture (file format used in network analysis)

IEC 61850 tools for CMC test sets



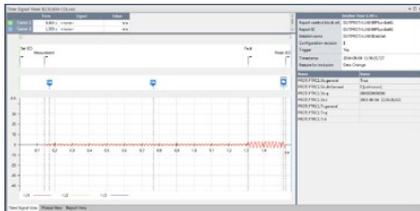
GOOSE Configuration

| Essential | Standard | Enhanced | Complete | IEC 61850 Basic | IEC 61850 Advanced |
|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

GOOSE Configuration (VESM1181) configures the mappings and sets up the CMC test set for communicating with the GOOSE messages on the substation network. As with any OMICRON test module, it can be inserted multiple times into test plans to automatically configure the “wiring”. To facilitate parameter entry and to avoid typing errors, the parameters can be imported from configuration files into the standardized SCL format.

CMC test sets interact with status data in GOOSE messages as if they were “wired” to the binary inputs and outputs of the CMC. Data attributes from received (subscribed) GOOSE messages actuate the binary inputs of the test set (for instance trip or start signals). Binary outputs actuate data attributes in simulated (published) GOOSE messages. By this generic approach, all test modules of the Test Universe software can be used with GOOSE.

Several IEC 61850 types and structures are supported in a GOOSE dataset. Mappings are provided for Boolean, Bit-String, Enum, Integer, and Unsigned. The timing performance of the message exchange is according to Type 1A; Class P2/3 (IEC 61850-5, “Trip” – “most important fast message”).



IEC 61850 Client/Server

| Essential | Standard | Enhanced | Complete | IEC 61850 Basic | IEC 61850 Advanced |
|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

IEC 61850 Client/Server (VESM1186) performs protection testing by utilizing IEC 61850 SCADA communications, in particular the reports. This verifies as well if the IED issues the correct reports to the SCADA system. The test module is a client that communicates directly with the IED (the server), largely extending the scope of testing. The module has access to the entire data model of the IED and may interrogate any data attribute during testing. The module also controls the IED’s operation mode (test, test/blocked, off, on, and on/blocked) to isolate the IED under test within a live installation.

IEC 61850 Client/Server contains the following functions, among others:

- > Retrieval, evaluation, and logging of IEC 61850 reports from the IED
- > Access to each attribute in the data model of the IED, e.g. pick-up of individual protection functions
- > Secure reset to normal operation after testing

Sampled Values Configuration

| Essential | Standard | Enhanced | Complete | IEC 61850 Basic | IEC 61850 Advanced |
|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Sampled Values Configuration (VESM1184) configures the output of Sampled Values (SV) by a CMC test set. The number of SV data streams depends on the type and configuration of the respective test set (see technical data, pages 40–54). The module is used to configure the communication parameters and activate/deactivate the output of SV. Parameters can be imported from configuration files in the standardized SCL format to simplify parameter input and prevent typing errors.

The available variants of SV correspond to the UCA implementation guideline (“9-2LE”) for IEC 61850-9-2 and IEC 61869-9. All relevant test modules of Test Universe can be used with SV.

IEC 61850 packages

Selected IEC 61850 tools can also be ordered as a package (add-on to Test Universe packages, see page 9):

- > IEC 61850 Basic (VESM1190)
- > IEC 61850 Advanced (VESM1191)

IEC 61850 Testing Tools



DANE0 400

DANE0 400 records and analyzes messages in the communication network of an IEC 61850 installation, along with conventional signals (voltages, currents, hardwired binary status signals). The hybrid measuring system measures both types of signals and provides information to assess their proper coordination. Information relating to operational status and communication helps operators to monitor the processes in the installation.

A measuring system containing multiple DANE0 400 devices will provide a time-coordinated picture of the signals from a distributed protection and automation system. All data acquisition devices are precisely time-synchronized. DANE0 400 devices are configured and controlled using the DANE0 Control PC software. The integrated web interface provides access to dedicated functions.

Further features

- > Verification of IEC 61850 communication based on SCL information
- > Real-time monitoring of measured values and IEC 61850 messages
- > Sophisticated analysis of signals and data traffic
- > Runtime measurement, for example, for GOOSE and Sampled Values
- > Autonomous operation in semi-permanent or permanent configurations
- > Insight into IEEE 1588 time sources
- > System monitoring (classic/hybrid fault recording) with notification in the case of events
- > Unsupervised operation, remote control and external storage possible
- > Assessment and documenting of results

Ordering information

| Order No. | Delivery contents |
|-----------|--|
| VESC1700 | DANE0 400 Basic Signal analyzer for power utility automation systems. Measuring and recording conventional (analog and binary) signals. |
| VESC1701 | DANE0 400 Standard Hybrid signal analyzer for power utility automation systems. Measuring and recording conventional (analog and binary) signals and traffic from power utility communication networks (IEC 61850 GOOSE and Sampled Values). |

For more detailed information, please visit www.omcronenergy.com/dane0400 or refer to the DANE0 400 product brochure.



CMC 850

The CMC 850 test set focuses specifically on IEC 61850 systems. It communicates with the test object using the real-time protocols GOOSE and Sampled Values. The CMC 850 is part of the CMC 850 package, which consists of optimized hardware and essential components of the Test Universe software.

For more information, see page 54.



ISIO 200

ISIO 200 is a simple, versatile binary input/output extension for substation automation systems (SAS). In the case of CMC test sets it extends the binary inputs and outputs, while as a standalone component in an SAS it receives or outputs additional binary signals.

For more information, see page 61.