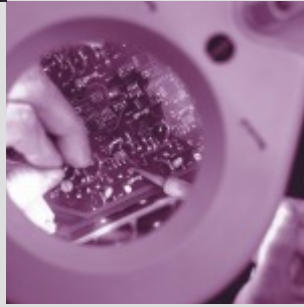


# SHERLOG



## SHERLOG Energy Network Monitors

## Energy Network Monitors of the SHERLOG Series

### System Description

The measuring instruments of the SHERLOG family combine the monitoring functions of a high-quality digital disturbance recorder with the manifold features of a power quality monitor in a single system. Not only the identification and recording of transient events, but also the continuous checking and logging of all quality parameters can be carried out on any number of bus bars and lines simultaneously. The wide variety of trigger functions even make it possible to trace faults by monitoring system unbalance, power quantities, individual harmonics or interharmonics.

SHERLOG provides you with an accurate and fail-safe means of directly monitoring your power system on site. As SHERLOG is an entirely digital system its functioning is fully software-controlled. All sequences and functions are freely programmable. New functional modules or algorithms in line with new standards can be added simply in the form of updates during manual or automatic software maintenance.

All data and parameters are stored in non-volatile flash RAM

modules which do not contain parts susceptible to mechanical wear and tear. This means that in the case of a power failure, recorded data can remain intact over a period of some months even without battery back-up. It goes without saying that SHERLOG systems restart independently and automatically on restoration of the power supply.

A distinctive feature shared by all the various models of the SHERLOG family is their compact and modular design. The systems of the C range are especially suitable for rack mounting. Their modular construction makes it possible to configure them for specific applications of any kind and to extend them in accordance with individual requirements. A simple 19" drawer with a height of 3HU can, for example, accommodate a system for measuring 32 analog and 192 binary signals. The systems of the SHERLOG P range have been especially developed as portable models. You can choose from a variety of models with 8 or 16 analog inputs.

All inputs and outputs, whether analog or binary, are galvanically separated from the measurement process. KoCoS linear opto-couplers (*LOC technology*) are used for the analog inputs guaranteeing high levels of accuracy and the very highest degree of linearity across the entire frequency range from DC to 10 kHz.



**In view of the growing number of factors with a disturbing influence on power systems and the ever increasing sensitivity of the devices and installations on the consumer side, simple monitoring criteria such as undervoltage or overcurrent are usually inadequate nowadays. Reliable logging of all the relevant events within the electrical power system calls for the constant observation of a wide variety of derived parameters such as harmonic content, system unbalance or interharmonics and the swift identification of the slightest deviation from the standard state.**

**In addition to providing pure monitoring functions, modern power system analysing equipment should be capable of logging in full the mode of operation and the interaction of all the component parts of a power supply system.**

**Only comprehensive and continuous monitoring of the entire power system enables all resources to be used purposively and effectively for the restoration of system operation should a disturbance occur.**

**In addition, the recorded data provides the planners of electrical installations and protection equipment with an invaluable basis for the extension and optimisation of primary and secondary equipment.**

**If you are not already convinced of the importance of using a modern power system monitor, you certainly will be as soon as you are confronted with the question of who is liable for system disturbances and who is responsible for meeting the costs involved.**





## SHERLOG

## The Energy Network Detective

### Functional principle

The energy network monitors of the SHERLOG family basically consist of two functional units working in parallel: a power quality analyser and a disturbance recorder.

#### ■ Power quality analyser

The power quality analyser measures all currents and voltages and continuously calculates their RMS values in real time, making them available per half-wave. On the basis of these values and the phase relationships recorded synchronously, the system calculates a multitude of further parameters for each bus bar or line monitored. Power values, harmonics and flicker are just a few of the parameters which can be calculated in this way.

All measured values are compressed and can be stored securely in freely configurable archives for almost any length of time. Adaptive and event-controlled storage algorithms ensure that values are only saved when the signals monitored violate at least one of the limit values configured by the user. Once an event such as a voltage dip occurs, the RMS values are recorded at an increased rate. The data acquired in this way serves as a basis for further statistical analyses in accord-

ance with current standards such as En50160 or IEC 61000-4-30.

#### ■ Disturbance recorder

All the quantities provided by the power quality analyser can also be used as start conditions (triggers) for recording transient system events. This means that it is possible to trigger a disturbance recording if, for example, the 5th harmonic or the reactive power transmitted by a line exceeds a defined level.

Depending on the specific configuration, disturbance records can include up to three time windows: the pre-fault period, the fault itself and the post-fault period. The duration of each time window can be freely configured. The recording of the fault itself can be carried out with either a static duration or with a variable duration which is dependent on the fault characteristic.

The number and duration of recordings are limited only by the size of the non-volatile memory. The standard memory enables storage of approximately 100 records with a duration of 4000 ms and a resolution of 2000 Hz. The sample rate can be selected to suit the specific application from within the range of 100 Hz to 30 kHz.

#### ■ Event recorder/logger

Independently of the disturbance recordings, the status changes of binary signals such as protection relay signals, breaker position indications and switching commands are continuously saved in a FIFO buffer. Depending on the configuration, SHERLOG can log 250,000 events or more with a time resolution of up to 0.1 ms. This means that all the systems of the SHERLOG system can additionally be used as fully functional event recording and signalling systems.

#### Distributed systems

Whether the measured data is to be processed on site or analysed centrally, the software module enables you to configure industrial PCs or even office computers as data collectors or central analysis systems.

Submasters carry out effective pre-analysis of the incoming data even on station or field control level, for example. Only really important information is then transmitted via communication channels which still often act as bottlenecks (modems). Measured data can even be compressed to such an extent that only fault analysis results still need to be transmitted as pure text information.

# SHERLOG Software

## Simple operation

The energy network monitors of the SHERLOG family are all configured and operated using the flexible SHERLOG software package. All the tools you need to successfully complete your specific measurement tasks are united in the NRGCenter (pronounced "energy centre") system software, starting from configuration and extending through to data management and automatic fault location.

All modules have an ergonomically designed graphical user interface developed with real-life practical requirements in mind. The standardized, intuitive operation and the templates included with all SHERLOG systems ensure that you will be able to familiarise yourself quickly and easily with the software.

## Online functions

For the purposes of further analysis, the recorded data is transferred to external PCs via various communication interfaces, such as RS 232/RS 485, ethernet and AT- or ISDN modems. In the automatic mode, data transfer can be carried out in the background, thus enabling you to work on your computer as usual while at the same time providing you with an optimum overview of the monitored system at all times. Depending on the communication channels at your disposal, you can select time- or event-controlled transfer or a combination of both. A special feature of the SHERLOG systems is the possibility of combining individual measured values to form display windows which are then shown on the screen online as in a SCADA system. For this purpose the



SHERLOG systems offer various graphical display options in addition to numerical display.

## Configuration

A wealth of practical experience went into the design of the configuration module which takes into account the actualities and the requirements of modern power supply systems in a very practical way. The entry of measurement range parameters via transformer ratios is fully supported as is the configuration of lines and bus bars via the corresponding network model.

In order to reduce the time and effort involved in configuration and to avoid incorrect entries, each SHERLOG has an individual hardware profile which is stored securely in the measuring instrument. These profiles contain the exact system con-

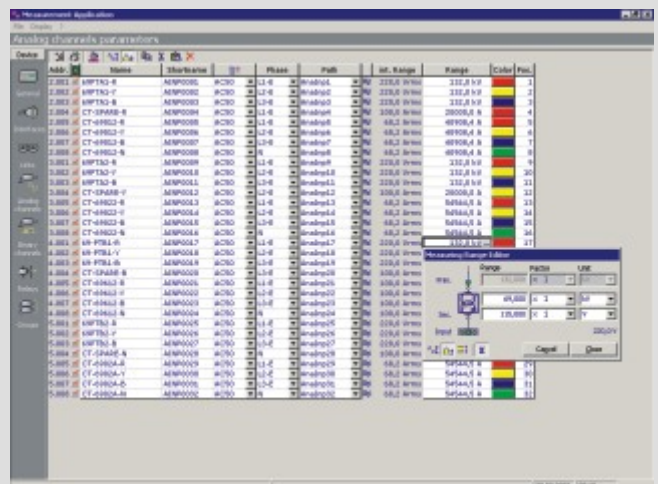
figuration including all measurement range parameters. If you wish to configure your SHERLOG system for a measurement task this is done on the basis of the hardware profile. To complete the configuration you need only indicate the specific installation and function parameters. Parameters can be managed separately for different measurement locations and can be assigned when the system is started up on site with just a few clicks of the mouse.

## Evaluation

A number of powerful analysis tools are at your disposal for the purposes of evaluating recorded transient and long-term data. These tools work both manually and automatically, for example, when new disturbance records come in.

The graphical display is remark-

*The energy network monitors of the SHERLOG family are all configured and operated using the flexible SHERLOG software package.*





able for the ease with which it can be operated and the short display building times. Zooming and scrolling are carried out in real time, controlled by our KoCoS *Smartbars* and with no need for any manual entries via the keyboard. Using the unlimited number of relative and absolute value cursors you can carry out exact measurements on signal characteristics. All graph parameters such as line styles, colours, signal arrangement etc. can of course be set in accordance with individual requirements. Signal characteristics can be moved and overlaid via "drag & drop". Entire records from various locations and system sections can also be compared in this way.

#### Power quality assessment

Long-term data which has been archived is displayed and

analysed using various analysis tools such as histograms and frequency distributions, for example. A graphical and numerical assessment of events makes it possible to classify all recorded events, such as long or short voltage sags and swells, in accordance with any international or user-defined standard (including ITIC and UNIPÉDE). In addition, the software offers you the option of comprehensive analysis and assessment of the power quality profile.

#### Analysis of transient states

The powerful fault locator is used to locate and examine recorded transient states during and after the occurrence of a disturbance. It is just as suitable for use as a support tool for control-room personnel aiding them in the fast characterisation

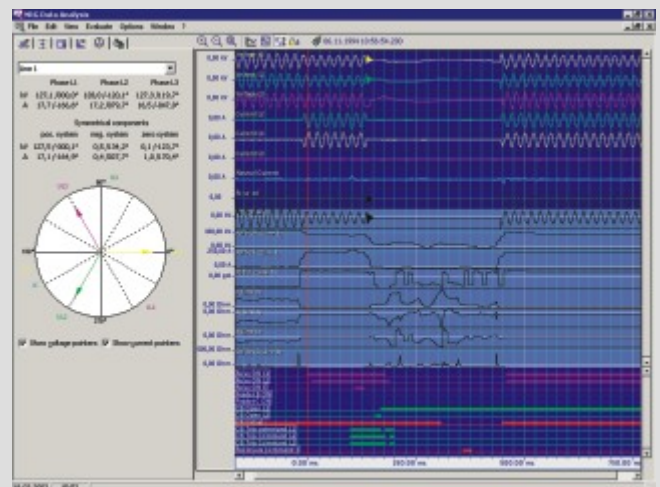
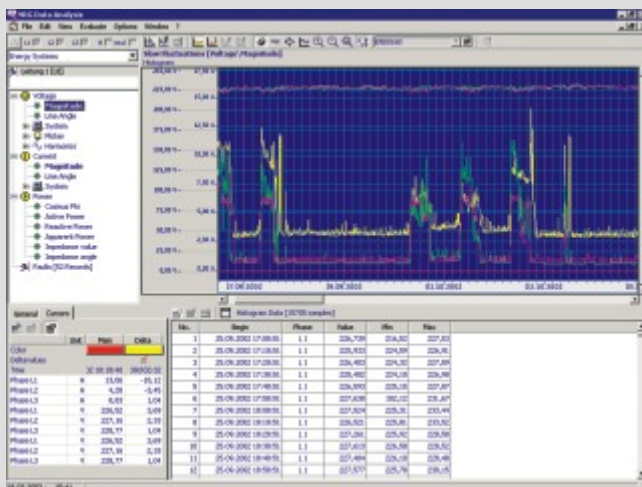
of disturbances as it is for installation and protection planners for the purpose of detailed retrospective analysis. The fault locator determines all relevant fault data automatically or manually on the basis of the network model which has been saved. By taking into account the binary signals of breakers and protection devices recorded in parallel, an automatic function check on all parts of the installation is possible. Breaker operating times and protective device response times which deviate from the specified values are automatically identified and indicated.

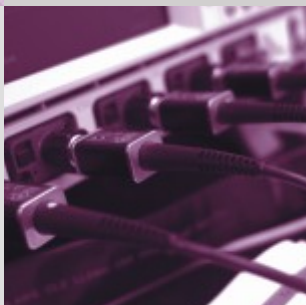
By taking advantage of the supplementary tools for harmonic analysis and the dynamic vector diagram you can be sure that even minor disturbances cannot escape your notice.

#### Event report

For documentation purposes, evaluation results can be presented in the form of a clear, well-structured event report with just a few clicks of the mouse. Reports are created automatically on the basis of a template included when you purchase a SHERLOG system and contain all relevant data, parameters and results.

Using our convenient *Report Generator* you can both edit existing report templates and create new ones. The contents and layout of reports can be adjusted flexibly in accordance with your individual requirements. Using the simple macro language integrated in the Report Generator you can even programme further automatic evaluations directly in the report.





## Product Specifications



SHERLOG P Series



SHERLOG C Series

	SHERLOG P8	SHERLOG P16	SHERLOG C8	SHERLOG C16	SHERLOG CRT	SHERLOG Cx
<b>Analog inputs</b>						
Total number per 3 HU	8	16	8	16	up to 16	up to 32
Current measurement	Int. CTs	Int. CTs	Int. CTs	Int. CTs	Int. Shunts or CTs	Ext. Shunts or CTs
<b>Binary inputs</b>						
Total number per 3 HU	12 <sup>2)</sup>	20 <sup>2)</sup>	12 <sup>2)</sup>	20 <sup>2)</sup>	up to 32 + 4 <sup>2)</sup>	up to 128 (192 <sup>1)</sup> ) + 4 <sup>2)</sup>
<b>Binary outputs</b>						
Total number per 3 HU	4	4	4	4	4	up to 36
<b>Internal UPS</b>	■	■	■	■		
<b>Display</b>						
Alphanumeric LCD	■	■	■	■	■	■
8 status LEDs	■	■	■	■	■	■
<b>Keyboard</b>	■	■	■	■	■	■
<b>Max. sample rate</b>	12.8 kHz	12.8 kHz	12.8 kHz	12.8 kHz	37.5 kHz	37.5 kHz
<b>Power Quality Analyser</b>	■	■	■	■	■	■
<b>Housing</b>	½ 19", 3 HU portable	½ 19", 3 HU portable	½ 19", 3 HU drawer	½ 19", 3 HU drawer	19", 3 HU drawer	19", 3 HU drawer
<b>Weight</b>	2.0 kg	2.2 kg	2.0 kg	2.2 kg	3 kg	3 kg

<sup>1)</sup> With galvanic isolation in groups of 8

<sup>2)</sup> With galvanic isolation in groups of 4

■ standard

■ optional



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