SHERLOG

Fault Recorder Systems

User Manual

SHERLOG Operating Software

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1 SHERLOG operating software

The SHERLOG operating software consists of two parts: **Online** for the operation and management of SHERLOG devices and **Analysis** for the evaluation of records.

1.1 SHERLOG-Online for operation

The **Online** part of the software offers many possibilities, ranging from the operation of an individual fault recorder up to the administration of complex fault recorder groups.

The ergonomic graphical user interface, designed according to the Windows® Fluent concept, is geared to meet real-world requirements and provides a wide range of functions, including the following:

- Flexible configuration for optimum customisation to measurement tasks with due consideration of the network model
- Fully automatic measurement with
  - Remote data transmission
  - Determination of fault type and fault location
  - Printout or dispatch of fault reports or quality reports
  - Records are archived in a database
  - Online monitoring
  - Self-monitoring
- Easy-to-use manual functions for data evaluation and report creation
- Remote configuration
- Can be used with several screens (optimum overview, all information can be seen at a glance)

1.2 SHERLOG-Analysis for analysis

The **Analysis** part of the software is used for the evaluation of records made by SHERLOG CRX measuring systems.

The software includes a wide range of powerful analysis tools for assessing the recorded data:

- Useful zoom functions and variable scaling
- Simultaneous display, superimposition and synchronisation of more than one fault record
- Vector displays
- Harmonic analysis on the basis of full waves or to IEC 61000-4-7 with interharmonics
- Nyquist plot
- Determination of fault location
- Freely configurable absolute and delta measurement cursors
- Formulary and formula editor for the calculation of further power system quantities
- Individual report creation using the clipboard
- Automatic report creation

Fault location

The powerful fault locator can characterise faults quickly to support maintenance staff as well as calculating the fault loop and detailing the fault type, fault impedance and fault location.

Mathematical signal analysis

A formula editor can be used to make further mathematical calculations within fault records. The results are added to the fault record as an additional signal.

Data formats

Import and export functions enable data to be exchanged between different systems using standard COMTRADE, CSV and PQDIF file formats.

2 About this document

This user manual describes how to operate and control a SHERLOG CRX fault recorder system and how to evaluate records on a PC with the SHERLOG operating software.

Separate operating instructions describe how to commission, connect, operate and maintain the fault recorder systems.

This user manual is intended for:

- Persons who know how to switch on and off, enable, earth and identify electrical circuits and devices/systems in accordance with the applicable safety standards.
- Trained operating personnel in electrical installations

2.1 Other applicable documents

A number of other documents apply in conjunction with this user manual. The manufacturer is not liable for damages resulting from failure to comply with information contained in any of these documents.

All documentation pertaining to the commissioning, configuration of settings, operation and maintenance of a SHERLOG CRX fault recorder system also applies.

Other applicable documents for the user:

- SHERLOG CRX operating instructions

2.2 Validity of the present document

This user manual is valid only for the SHERLOG operating software in conjunction with a SHERLOG CRX fault recorder system.

2.3 Warning marks and symbols

2.3.1 Explanation of the symbols used in this document

Symbol	Explanation
	**DANGER** This symbol indicates the presence of an immediate risk associated with electric voltage. If this risk is not avoided, death or serious injury may result.
	**CAUTION** This symbol indicates the presence of a potential risk associated with improper use. If this risk is not avoided, personal injuries or material damage may result.
	**NOTE** This symbol highlights notes and information.

2.3.2 Typographical conventions

Symbol	Explanation
➢	This symbol highlights instructions which require action on the part of the user
1. 2.	Numbered lists are used for actions which must be carried out in the order given
■	This symbol marks the items of a list

3 Software

3.1 Recommended minimum PC requirements

To be able to use the SHERLOG operating software, the computer must fulfil the following minimum requirements:

- Windows XP professional, Windows 7 (32 or 64 bit) operating system
- Dual-core processor with at least 1.8 GHz
- At least 256 MB RAM main memory
- At least 500 MB HDD free hard drive space
- 10/100 Mbit Ethernet interface
- Graphics resolution 1024 x 768
- 19" TFT monitor (widescreen format)

3.2 Installation

The SHERLOG setup CD contains all the components required in order to install the software as well as this manual in PDF format. A PDF Reader (also included) is required in order to open the manual.

Before installing the SHERLOG operating software, it is important to ensure that the Windows operating system is up to date, i.e. that all updates have been installed and that the user is logged on to the PC with administrator rights.

The installation procedure for the SHERLOG operating software starts automatically as soon as the setup CD is inserted in the drive, providing this is permitted by the Windows® system settings.

If the existing installation is to be extended or reconfigured, the installation procedure can be repeated whenever necessary by running the SETUP.EXE file again.

Service packs and software updates included on the CD should only be installed if a message requiring this to be done is displayed during installation.

To install the SHERLOG operating software:

1. Close all Windows® applications.
2. Insert the SHERLOG setup CD in the drive.
3. Installation starts automatically.
4. Select the language of the installation programme.
5. Follow the instructions displayed on the screen for each installation step and carry out all the steps one after the other.
6. Once installation has been completed, restart the PC to activate the settings.

4 First steps

This chapter gives a brief description of how to put a fault recorder system into operation using the SHERLOG operating software. Detailed information on specific functions are given in separate chapters of this manual or in application notes.

The **Online** part of the software is used by way of example. However, it is also possible to use the **Analysis** part of the software instead and the procedure is similar to the one described here.

4.1 Start the software

➢ Click the appropriate entry in the **Programmes** folder of the Windows® start menu or the application icon on the desktop

4.2 User information

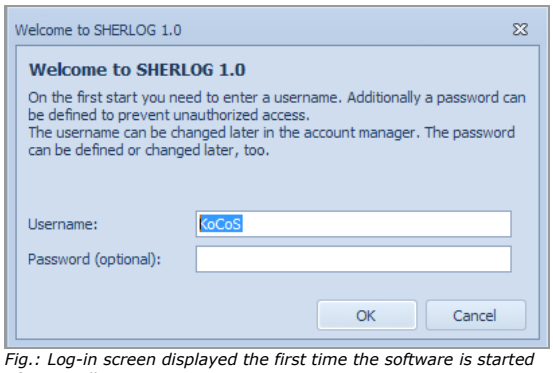


Fig.: Log-in screen displayed the first time the software is started after installation

Log-in

It is necessary to enter a user name when the software is started for the first time.

If no changes have yet been made in the User Manager, the user name entered during installation is displayed here.

A password may be entered for the user, but this is optional and not compulsory.

The user name and password can be changed at any time. For more information, see under **User manager**.

Fig.: Log-in screen displayed when the software is started subsequently

Every time the software is started subsequently, a user name is to be selected and, if defined, the password is to be entered.

4.3 Licensing

In order to use the software on a permanent basis, the software licence must be unlocked within 30 days of installation.

Within the 30 day trial period, it is possible to start the software for test purposes without a licence by clicking the **Start** button.

4.3.1 Request unlock code

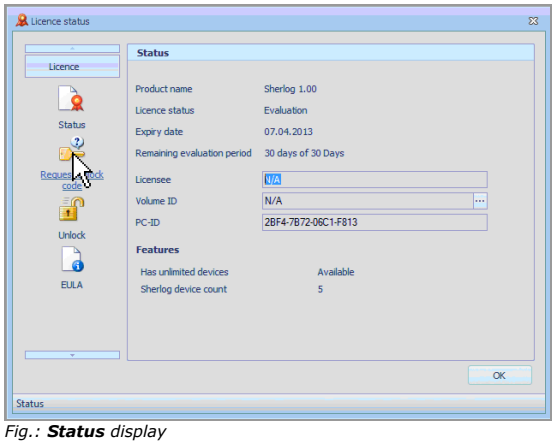


*Fig.: **Status** display*

When the programme is started for the first time and every time it is started within the 30 day trial period, the **Status** view is automatically called up, reminding the user to license the software.

In order to license the application, an unlock code must be obtained from the manufacturer.

➢ Click the **Request Unlock Code** button

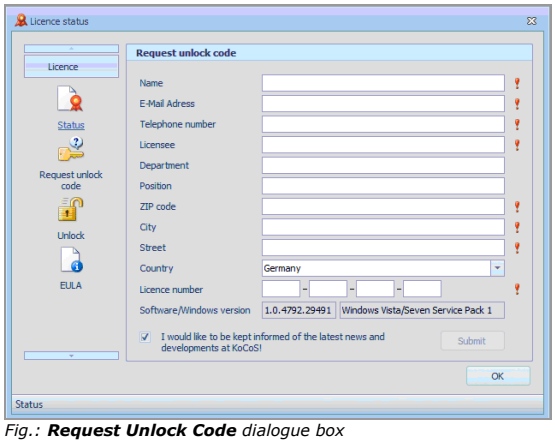


*Fig.: **Request Unlock Code** dialogue box*

The **Request Unlock Code** dialogue box is called up

➢ Enter data in the form

Licence number

➢ Enter the software licence number

The licence number can be found on the label of the installation CD.

Once all the required fields (!) have been filled in, the **Submit** button is displayed.

➢ Click the **Submit** button

➢ The request is sent by email

Software licences (licence numbers) always apply to a specific PC! Volume licences for 5 PCs, for example, therefore include 5 licence numbers.

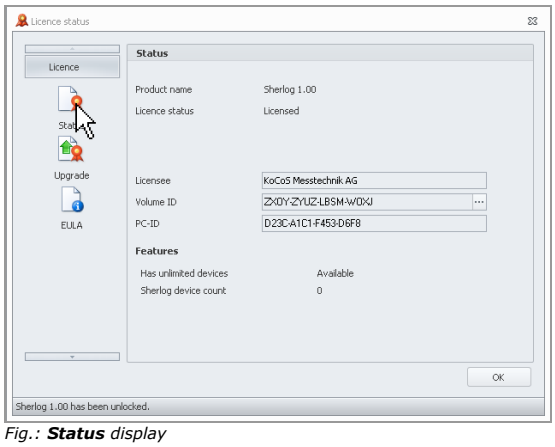


*Fig.: **Status** display*

PC-ID

The ID number of the computer on which the software has been installed is required for the generation of the unlock code. The PC-ID is retrieved automatically and entered in the application form.

If no internet connection is available, the request can also be made by telephone using the following number
+49(5631) 9596-0

When requesting an unlock code by telephone, the following information must be given: the PC-ID as listed in the **Status** window, the software licence number and other licensee data.

4.3.2 Unlock

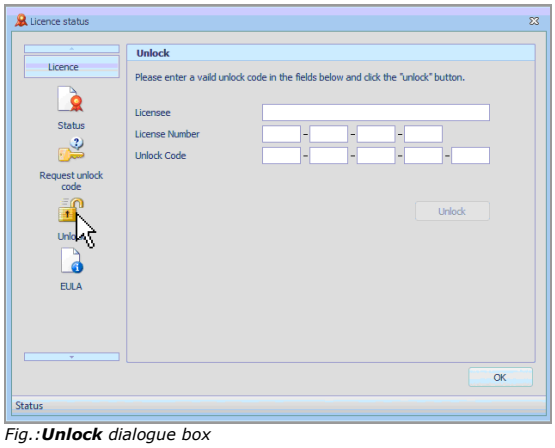


*Fig.:**Unlock** dialogue box*

KoCoS emails the unlock code to the address entered by the user under **Request Unlock Code**.

- Call up the **Unlock** view
- Enter the data received from KoCoS and click the **Unlock** button

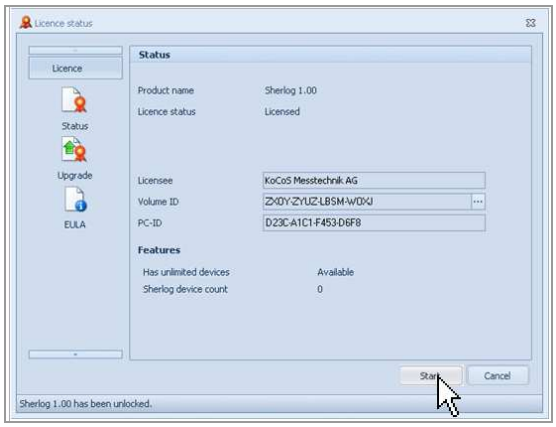


Fig.: Display after unlocking

Once the licensing procedure has been successfully completed, the status is displayed as **Licensed**.

- Click the Start button

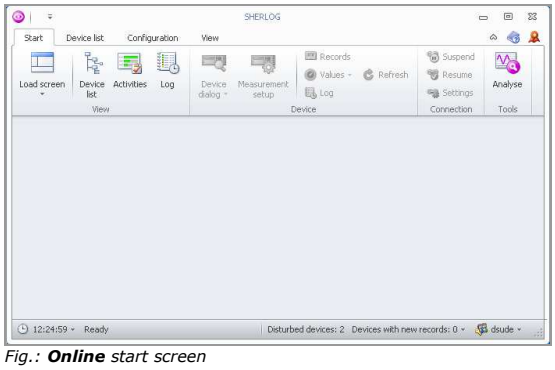


*Fig.: **Online** start screen*

The software is started.

4.4 Customize the user interface

*Fig.: **View** tab*

➢ Call up the **View** tab

Basic settings for the user interface, such as the layout, language and design, can be made here.

4.4.1 Change the screen design

Fig.: Set the screen design (skin)

Various colour schemes are available for the screen background.

➢ Open the Skin list and select a colour scheme

4.4.2 Change the language

Fig. Set the language for the user interface

Various languages are available for the user interface.

➢ Open the **Language** list and select a language

4.5 General settings

*Fig.: **Configuration** tab*

➢ Call up the **Configuration** tab

General settings for the configuration of the software can be made under **Settings**.

4.5.1 Signal names and colours for display

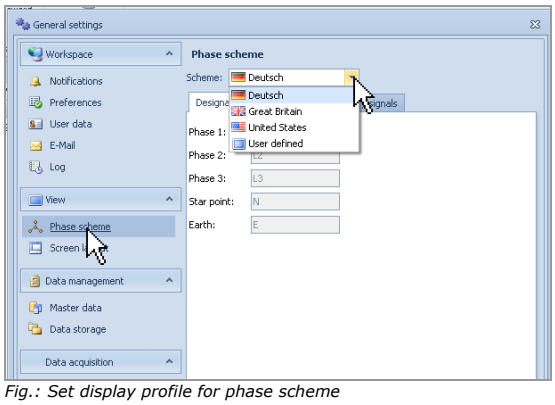


Fig.: Set display profile for phase scheme

The software contains a number of display profiles which can be selected via the phase scheme.

➢ Under **View**, open the **Phase scheme** window

➢ Open the **Scheme** list and select a display profile

The display profiles for German, English and American are already defined. Select **User defined** to define an individualized display profile.

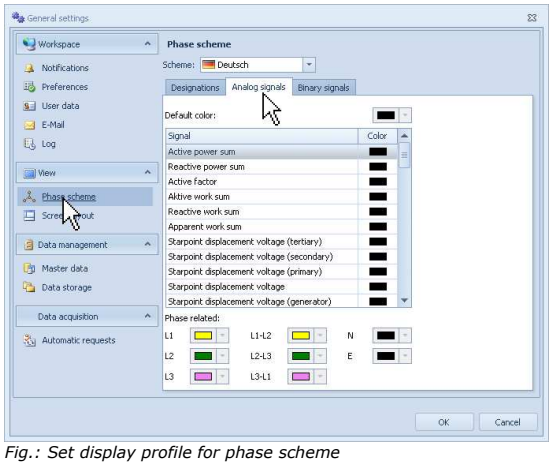


Fig.: Set display profile for phase scheme

Colours for analog and binary signals

As well as setting the signal names, it is also possible to set the colours for the display of analog and binary signals via the phase scheme.

4.5.2 Define voltage levels

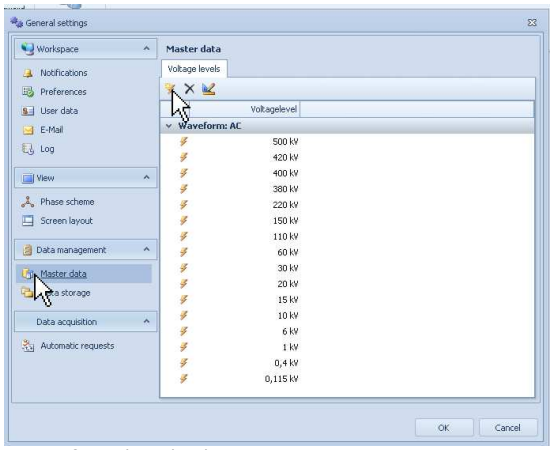


Fig.: Define voltage levels

In addition to the location, it is also possible to assign a voltage level to a SHERLOG device. For more information, see under **Set device name, location and connection parameters.**

The voltage levels must be defined beforehand:

- Under **Data management**, open the **Master data** window
- Add, delete or edit voltage levels with the aid of the tool bar

4.5.3 Data storage

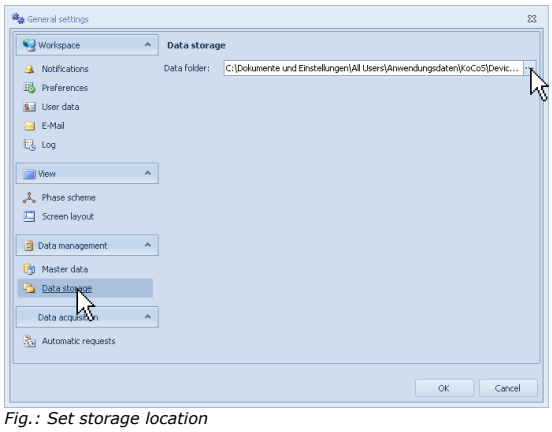


Fig.: Set storage location

The storage location for the SHERLOG database and all the measurement data can be specified here:

- Under **Data management**, open the **Data storage** window
- Click the ... button to open the **Browse for folder** dialogue box

Default data directory

Windows 7:
c:\ProgramData\KoCoS\DeviceController\Data

Windows XP:
c:\Documents and settings\All Users\Applications data\KoCoS\DeviceController\Data

If the data directory is edited, a new empty database is automatically created. Existing measurement data are not transferred.

4.6 Register SHERLOG devices in the software

4.6.1 Device list

All SHERLOG devices are managed centrally in the device list which is also used for the configuration of automatic tasks for controlling data transfer and report creation, for example.

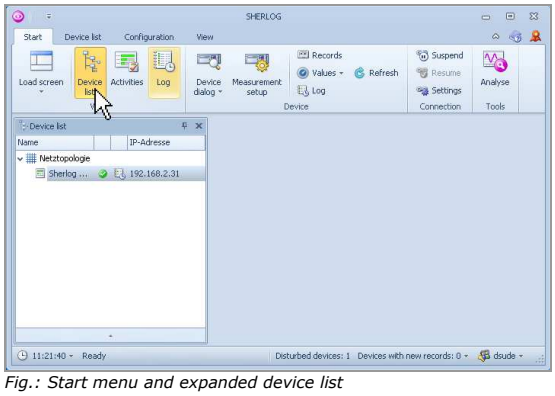


Fig.: Start menu and expanded device list

- Call up the **Start** tab
- Show/hide the device list by clicking the **Device list** button

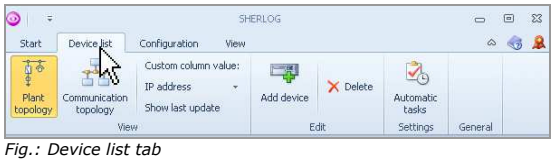


Fig.: Device list tab

- Call up the **Device list** tab

The **Device list** tab contains all the functions for customizing the view and integrating SHERLOG devices.

4.6.2 Add devices to the device list

- Click the **Add device** button

The wizard for the integration of new devices is started.

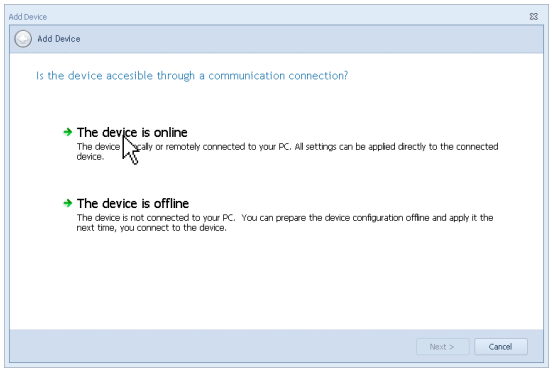
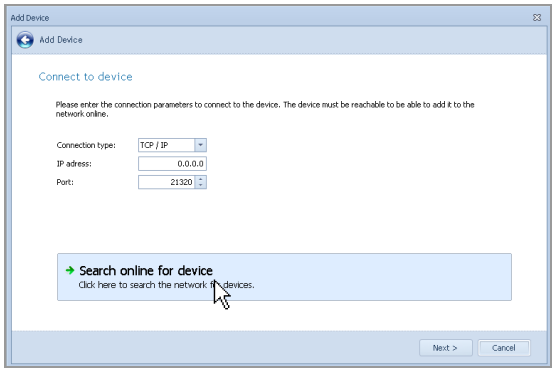


Fig.: Wizard for the integration of new devices

The integration of devices which are already connected to the network by means of the Ethernet interface is described below by way of example:

Further information on setting the IP address can be found in the **SHERLOG CRX operating instructions**.

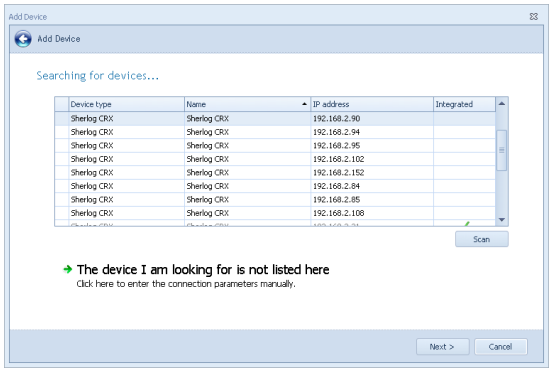
- Click the **The device is online** button



A dialogue box for entering the IP address is called up.

If the address is unknown, it is possible to search for a device:

- Click the **Search online for device** button

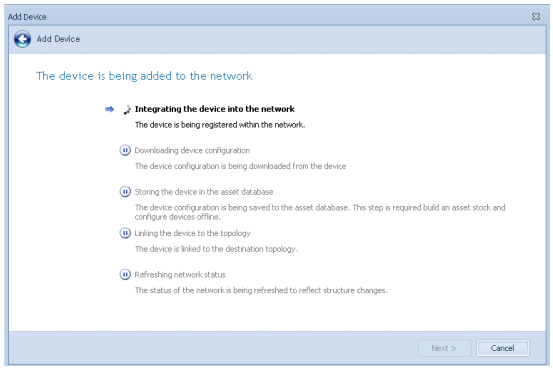


A list of all the devices in the network is displayed.

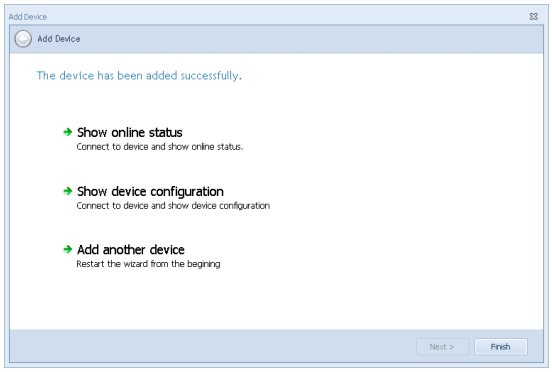
- Select a device in the list

Only one device can be selected at a time

- Confirm with **Next>**



The software introduces itself to the device and integrates it into the current database.



Once the device has been successfully added to the database, the **Add device** dialogue box is displayed.

- Click the **Finish** button

The wizard for the integration of new devices is closed. The newly added device or devices are now available in the device list.

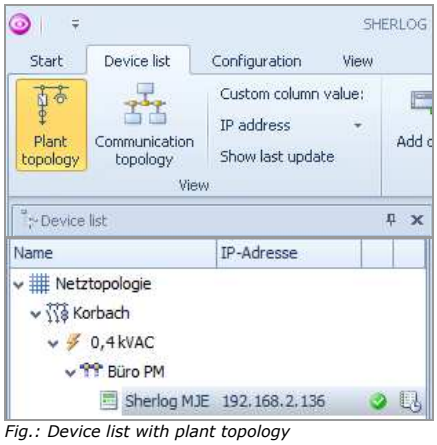


Fig.: Device list with plant topology

- Click the **Plant topology** button

Devices are displayed along with their location

- Click the **Communication topology** button

Devices are displayed without the location

Fig.: Save view

The size of the window and the widths of the columns of the device list can be adjusted as required. Click **Save** to save these settings which are then applied the next time the software is started.

4.6.3 Activate automatic queries

In order for the software always to be able to display the current status of a device, the data can be requested automatically.

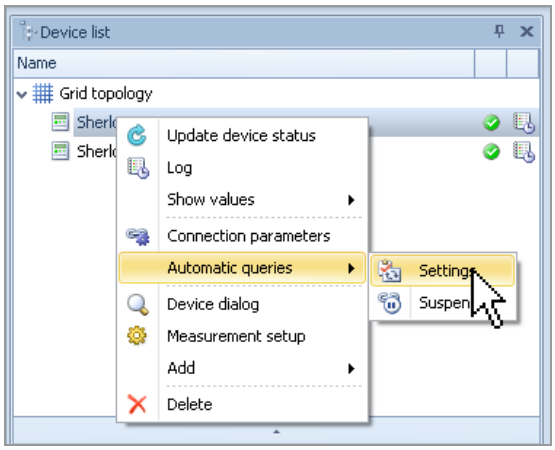


Fig.: Device context menu

- Right-click a device in the device list
- In the context menu, click the item **Automatic queries▶Settings**

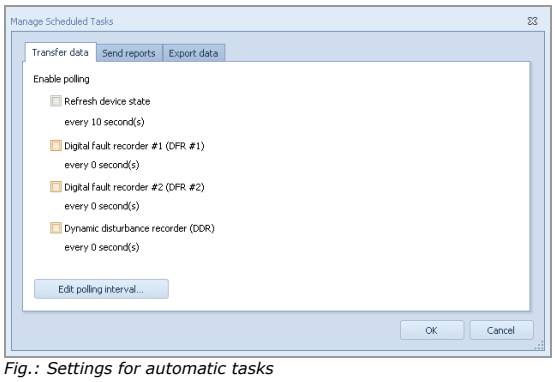


Fig.: Settings for automatic tasks

A dialogue box is called up in which all the automatic tasks for the device can be set

- Activate the **Refresh device state** task
- Click the **Edit polling interval** button and set the update interval to the required value

Interval times between 5 and 30 seconds are recommended if there is a fast network connection between the PC and the device.

5 Define device parameters

5.1 Device dialog window

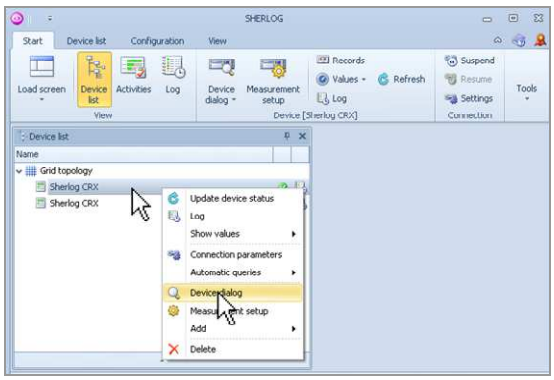


Fig.: Device context menu

SHERLOG devices are configured in the **Device dialog** window

- Right-click a device in the device list
- Click **Device dialog**

or:

- Double-click a device in the device list

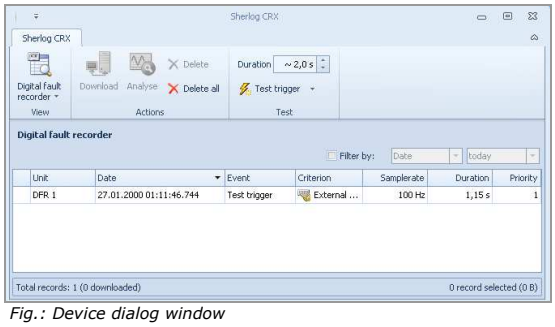


Fig.: Device dialog window

Initially, the device dialog window shows the table of contents of the fault recorder with all the records available in the device. In the case of devices which have not yet been configured it is usually empty.

5.2 Set device name, location and connection parameters

Fig.: Switch the view in the device dialog window

- Call up the **Settings** view

Fig.: Device dialog window for device settings

Under **General settings** it is possible to enter the device name and location and to edit the connection settings.

The device name and the location serve to identify the device in the device list and when opening records in the analysis software.
The structure of the databank is organised in accordance with these settings. Changes can be made at any time and are automatically copied to the database as well.

Only those voltage levels which have already been defined are available for selection. For more information, see under **Define voltage levels**.

5.3 Instrument functions

The instrument functions contain all the settings which are specific to the measurement locations, such as signal names, phase and power system allocations, recording settings, trigger criteria etc..

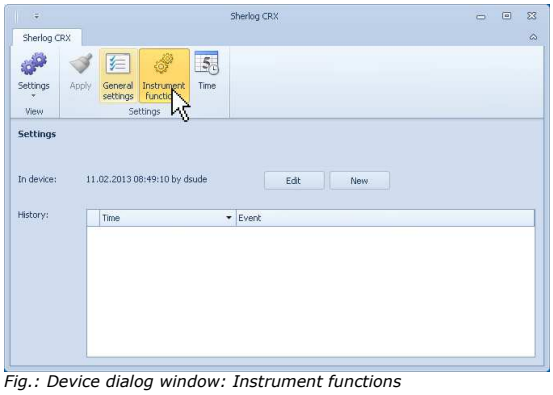


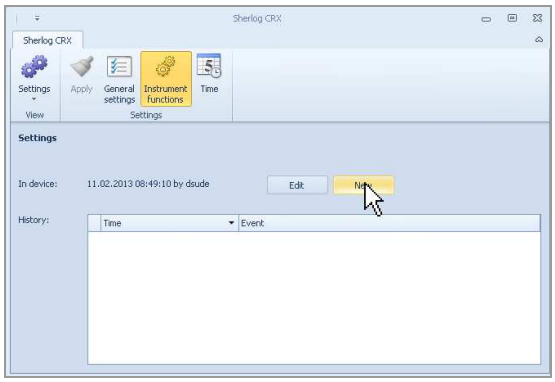
Fig.: Device dialog window: Instrument functions

Under **Instrument functions** it is possible to edit the current device configuration or create a new configuration.

The parameters saved in the device can be copied to the database of the PC to be used later.

The history in the parameters dialogue box displays the times of all the parameter changes in the device for information purposes.

5.3.1 Create instrument functions



➢ Click the **New** button

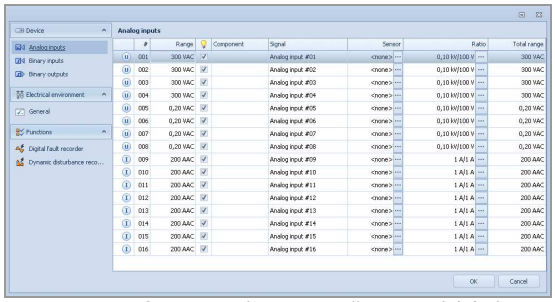


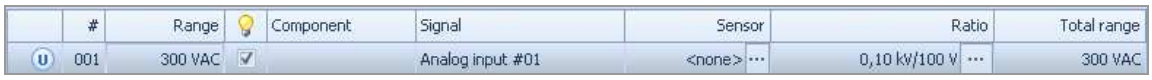
Fig.: Instrument functions with automatically assigned default channel names

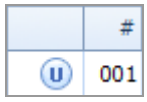
A set of instrument functions is created for the appropriate device and opened.

The set of instrument functions already contains all the settings which correspond to the equipment of the device, including the number of analog and binary inputs and outputs and the measuring ranges.

Default names are assigned to all the channels (e.g. analog input #001).

5.3.2 Analog inputs

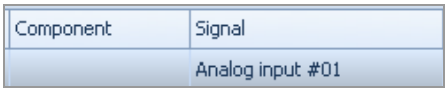




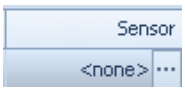
Information box for channel type (voltage or current) and for the physical channel number.

Maximum measuring range of the channel at the input terminal of the device

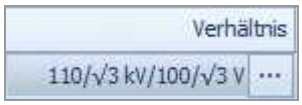
Check box for switching the channel on and off. Channels which are switched off are not recorded.



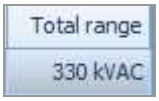
Signal group and signal name for clear identification.



Transmission parameters of a measuring transducer (e.g. temperature to voltage).



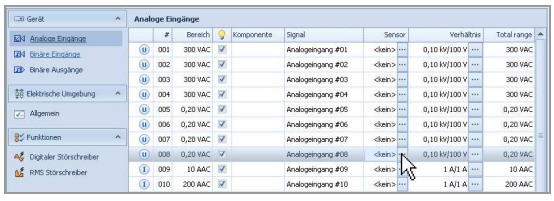
Transformation ratio of current and voltage transformers (CT / VT).



Information box with the maximum primary measuring range which results from the measuring range of the channel taking into consideration the sensor and transformer ratios.

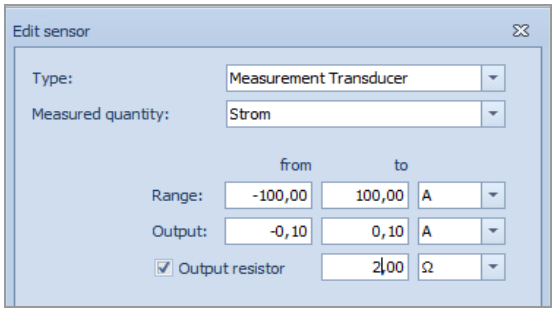
Example of configuration for an external current clamp

A current clamp with a transformation ratio of 100 A / 0.1 A is to be connected to a 200 mV input via a 2 Ohm shunt.



- Click the ··· button in the **Sensor** column

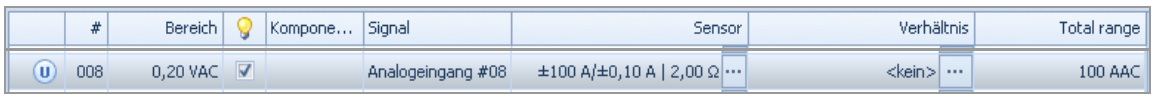
Enter sensor settings:



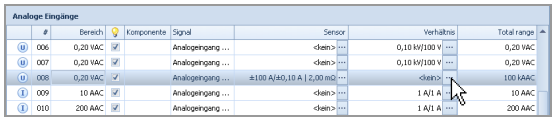
- The **Edit sensor** dialogue box is called up
- Enter sensor settings and confirm with **OK**

The settings are copied to the analog channel parameters.

Analog channel parameters:



The current clamp is to be connected to the secondary side of an upstream primary current transformer with a transmission ratio of 400 A/1 A.



In addition to the sensor parameters, the transmission ratio of the transformer must be specified here:

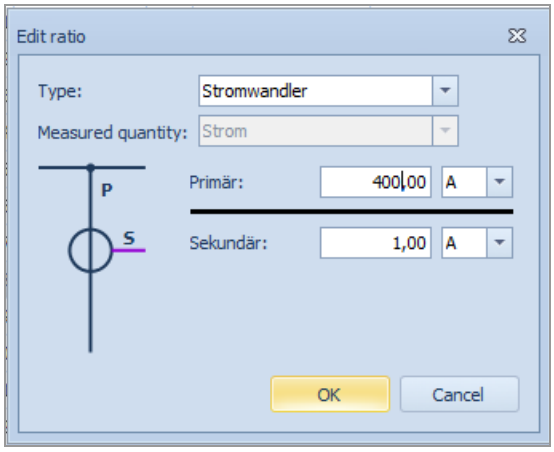
- Click the ··· button in the **Ratio** column
- The **Edit ratio** dialogue box is called up
- Select the transformer type

The transformer ratio is displayed

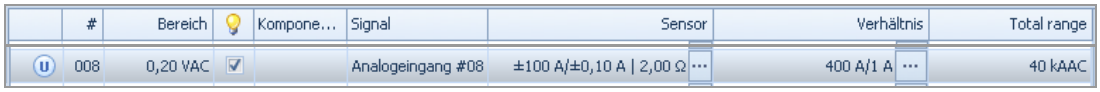
- Enter the transformer ratio and confirm with **OK**

The settings are copied to the analog channel parameters.

Enter transformer settings:

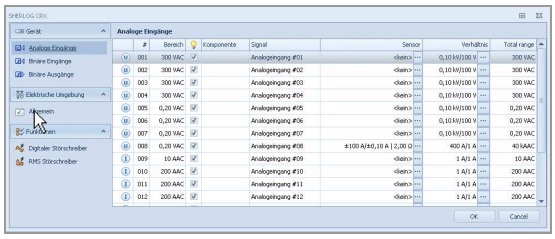


Analogue channel parameters:



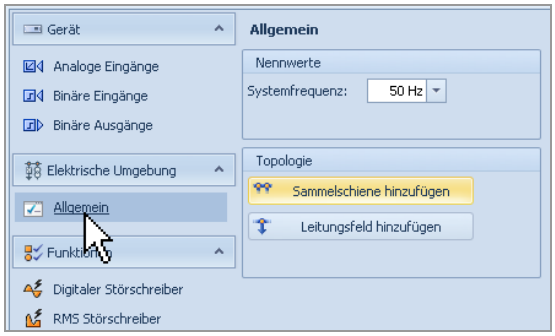
It is not possible to configure power systems or phase references such as lines or bus bars in the analog channel parameters. These are defined under **Electrical environment**, see below for more information. The transformation ratios of primary current and voltage transformers are entered there too.

5.3.3 Power systems



Phase references and/or power systems such as lines or bus bars can be defined and configured under **Electrical environment**.

- Call up the **General** view



- Set the rated frequency of the system
- Add bus bars and lines as described below

Add bus

Bus bars are also to be understood as a synonym for any power systems which contain only voltages. This means that they can also be used for voltage groups of generators or transformers, for example.

Add line

Lines are power systems which can contain both currents and voltages.
If both voltages and currents are assigned to a line, this power system is self-contained. However, if only currents are assigned to a line, then it can be coupled to a bus bar created previously. Several lines can be connected to one bus bar in this way. This means that SHERLOG is capable of carrying out power or fault location calculations on several lines, for example, although the corresponding voltages (bus bar) are only measured once. See the example of configuration below.

Example of configuration for power systems

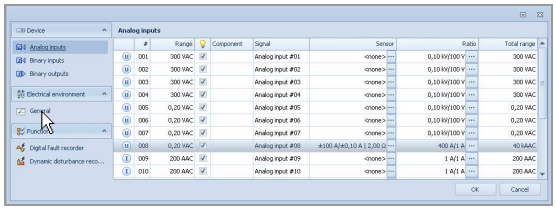
A parameterization is to be created for a 110 kV bus bar and 2 outgoing lines with the following configuration:

110 kV bus bar *with 3-phase voltage transformer with open delta winding for measuring the displacement voltage is to be connected to analog inputs 1 to 4.*
The transformation ratio of the transformer is 110 kV / 100 V

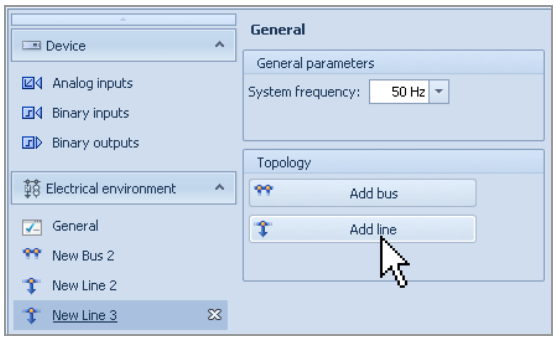
Line 1*: 3-phase current measurement on a current transformer with a transformation ratio of 400 A / 5 A which is to be connected to SHERLOG high-current inputs 9, 10 and 11 with a measuring range up to 200(200 A). The line is to be coupled to the 110 kV bus bar.*

Line 2*: 3-phase current measurement with star point current on a current transformer with a transformation ratio of 800 A / 1 A which is to be connected to 200 mV SHERLOG inputs 5, 6, 7 and 8 via an external AC/DC current sensor with 5 mOhm shunt. Line 2 is also to be coupled to the 110 kV bus bar.*

Create power systems

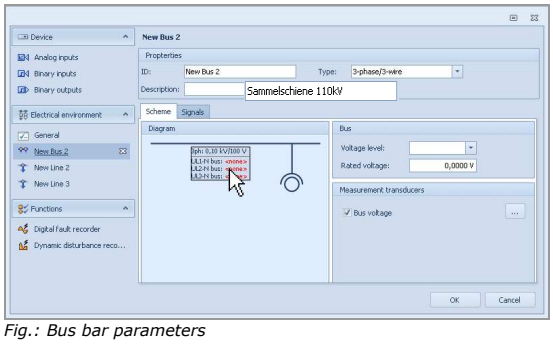


- Call up the **General** view



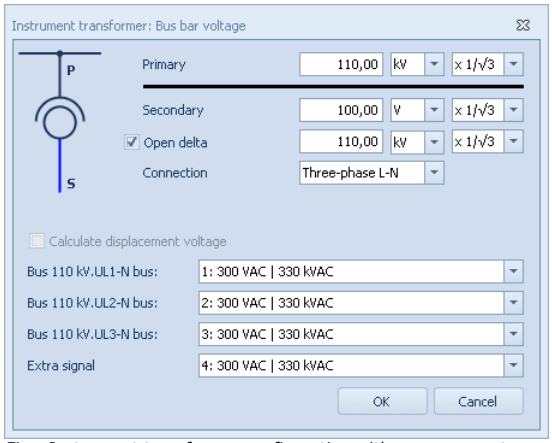
- Add power systems (one new bus bar and two new lines)

Define bus bar parameters



- Click the **New Bus 1** bus bar to open the properties window
- Enter an ID and, if required, a description for the bus bar
- Click the transformer box to open instrument transformer configuration and measurement channel allocation

Fig.: Bus bar parameters



- Configure the transformer ratio and measurement channel allocation
- Confirm with **OK**

Fig.: Instrument transformer configuration with measurement channel allocation

Define parameters for line 1 (direct current measurement)

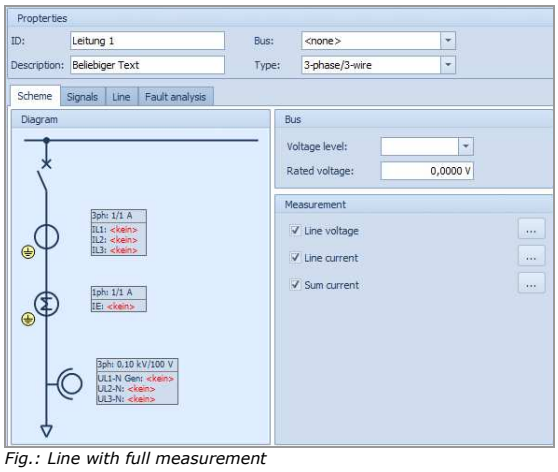


Fig.: Line with full measurement

- Click the **New Line 1** item to open the properties window
- Enter an ID and, if required, a description for line 1

Initially, all measurements are activated for the line.

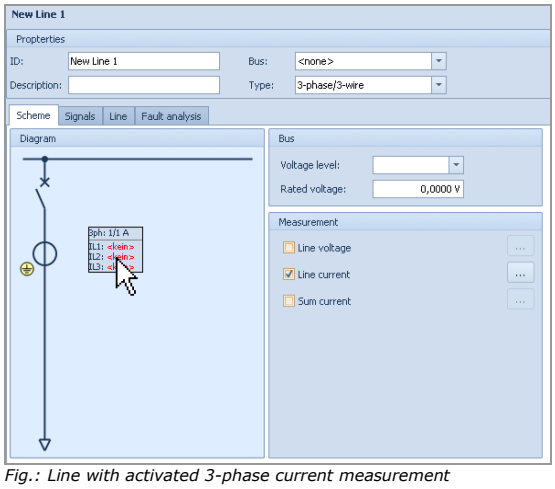


Fig.: Line with activated 3-phase current measurement

In this example no sum current measurement is to be carried out and the voltage is measured via the bus bar.

- Deactivate line voltage and sum current in the **Measurement** box

- Click the transformer box to open measurement channel allocation and entry of the transformer ratio

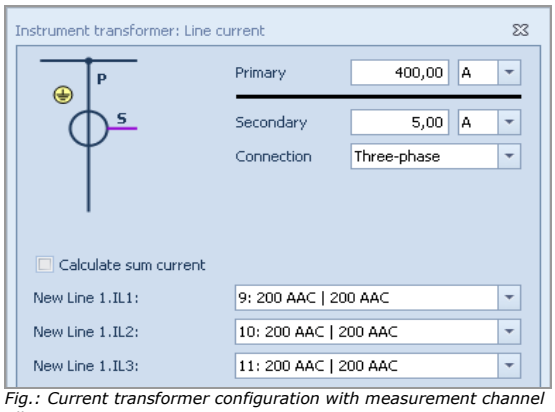


Fig.: Current transformer configuration with measurement channel allocation

- Configure the transformer ratio and measurement channel allocation
- Confirm with **OK**

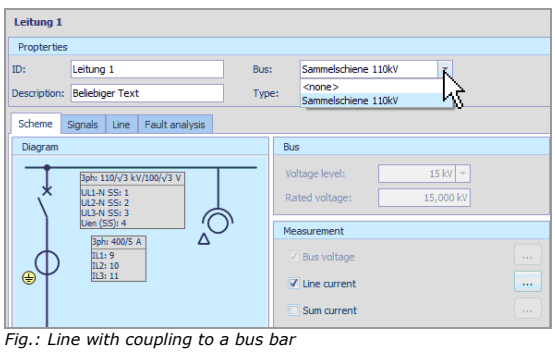


Fig.: Line with coupling to a bus bar

- Make the bus bar allocation in the properties box

The parameters of the bus bar are added to the diagram

Define parameters for line 2 (current measurement via external sensor)

For line 2, current measurement is to be carried out using an external sensor which converts the current signal to a voltage signal. For this reason it has to be connected to a voltage input of the SHERLOG device. First the sensor must be defined in the analog channel parameters.

When the analog channel parameters are opened, it can be seen that the power systems defined so far have been automatically updated.

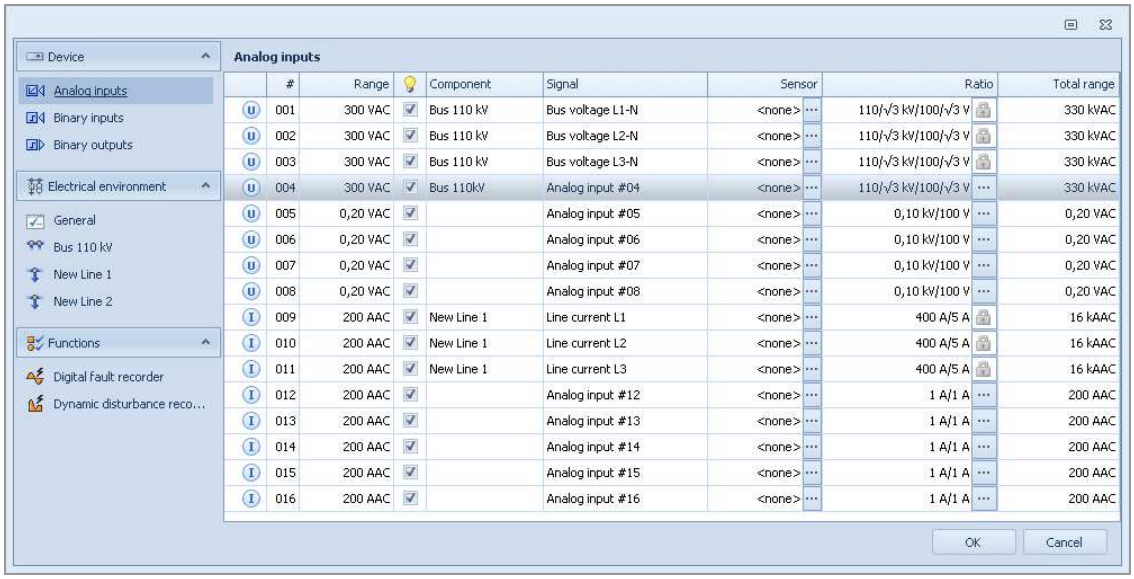


Fig.: Analog channel parameters with automatically assigned signal names

Define parameters for an external AC/DC current sensor with 5 mOhm shunts

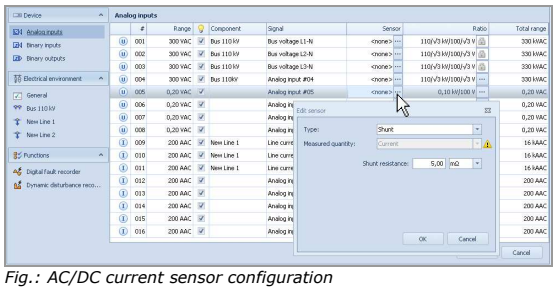
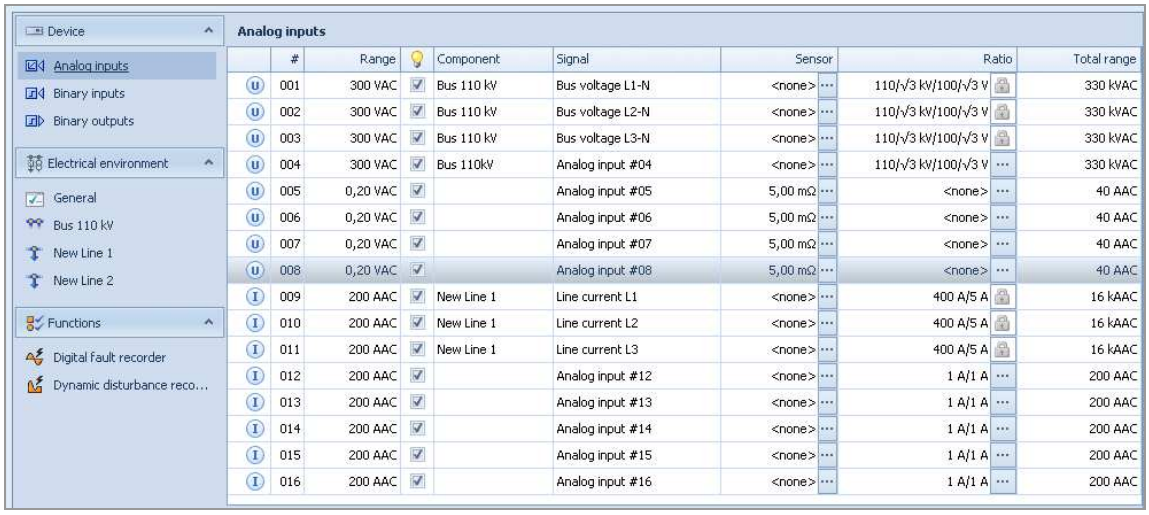


Fig.: AC/DC current sensor configuration

- Open the sensor parameters by clicking the sensor column of the analog channel required
- Enter the sensor type and resistance

Once the sensor configuration for analog inputs 5 to 8 has been completed successfully, the measuring range in the **Total range** column has changed to 40 A. These inputs are now available as current inputs and can be assigned in the signal allocation of the **Line 2** power system.



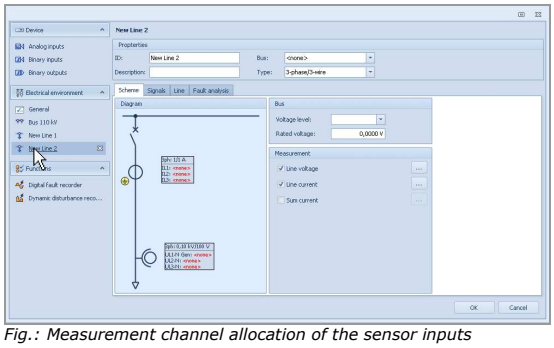


Fig.: Measurement channel allocation of the sensor inputs

- Click the **New Line 2** entry to open the properties window of the power system

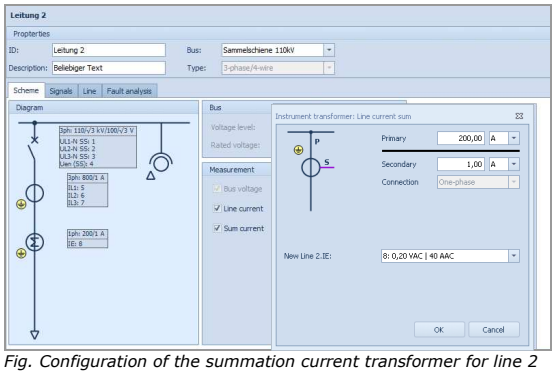


Fig. Configuration of the summation current transformer for line 2

- Configure the line

This completes the configuration. The names and measuring ranges of the analog channel parameters concerned are added automatically:

Analog inputs

	#	Range		Component	Signal	Sensor	Ratio	Total range
U	001	300 VAC	☑	Bus 110 kV	Bus voltage L1-N	<none>	110/√3 kV/100/√3 V	330 kVAC
U	002	300 VAC	☑	Bus 110 kV	Bus voltage L2-N	<none>	110/√3 kV/100/√3 V	330 kVAC
U	003	300 VAC	☑	Bus 110 kV	Bus voltage L3-N	<none>	110/√3 kV/100/√3 V	330 kVAC
U	004	300 VAC	☑	Bus 110kV	Analog input #04	<none>	110/√3 kV/100/√3 V	330 kVAC
U	005	0,20 VAC	☑		Analog input #05	5,00 mΩ	<none>	40 AAC
U	006	0,20 VAC	☑		Analog input #06	5,00 mΩ	<none>	40 AAC
U	007	0,20 VAC	☑		Analog input #07	5,00 mΩ	<none>	40 AAC
U	008	0,20 VAC	☑	New Line 2	Earth current	5,00 mΩ	200 A/1 A	8 kAAC
I	009	200 AAC	☑	New Line 1	Line current L1	<none>	400 A/5 A	16 kAAC
I	010	200 AAC	☑	New Line 1	Line current L2	<none>	400 A/5 A	16 kAAC
I	011	200 AAC	☑	New Line 1	Line current L3	<none>	400 A/5 A	16 kAAC
I	012	200 AAC	☑		Analog input #12	<none>	1 A/1 A	200 AAC
I	013	200 AAC	☑		Analog input #13	<none>	1 A/1 A	200 AAC
I	014	200 AAC	☑		Analog input #14	<none>	1 A/1 A	200 AAC
I	015	200 AAC	☑		Analog input #15	<none>	1 A/1 A	200 AAC
I	016	200 AAC	☑		Analog input #16	<none>	1 A/1 A	200 AAC

The signal names were entered automatically by the software in accordance with the configuration of the electrical environment and can be edited manually as required.

5.3.4 Binary inputs

Initially configuration of the binary inputs is limited to entering the desired names.
All binary inputs are recorded automatically and are available in every record.

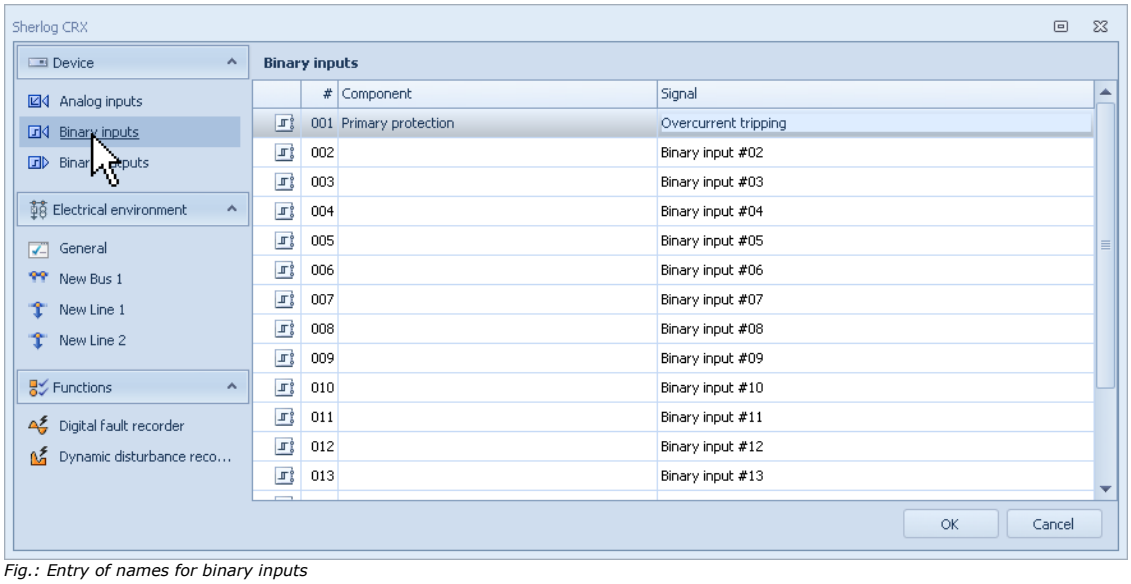


Fig.: Entry of names for binary inputs

5.3.5 Binary outputs

Fixed functions only can be allocated to the binary inputs using the picklist in the **Signal** column:

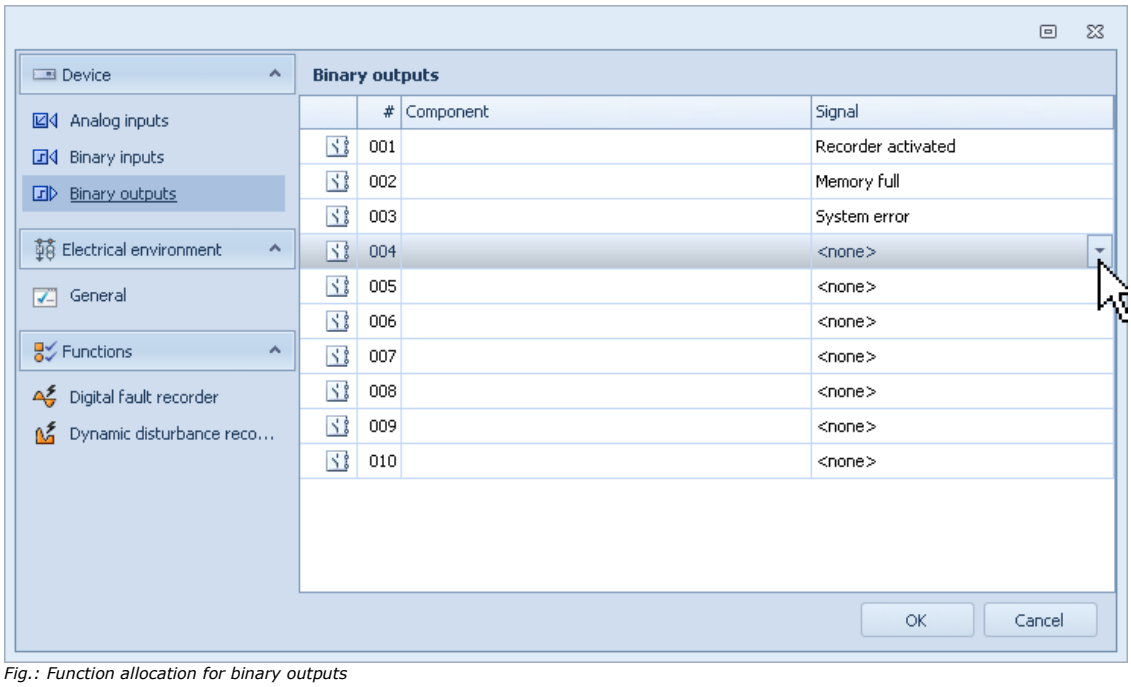


Fig.: Function allocation for binary outputs

5.3.6 Define digital fault recorder parameters

The digital fault recorder makes high-resolution recordings of power system faults.

The transient fault record generally contains all the signals which are connected to the analog and binary inputs and shows the fault characteristic with additional pre-fault and post-fault periods.

The time resolution of the analog inputs can be set between 100 Hz and 30 kHz. Binary inputs are always recorded with 10 kHz and therefore have a fixed time resolution of 100 microseconds (0.1 ms).

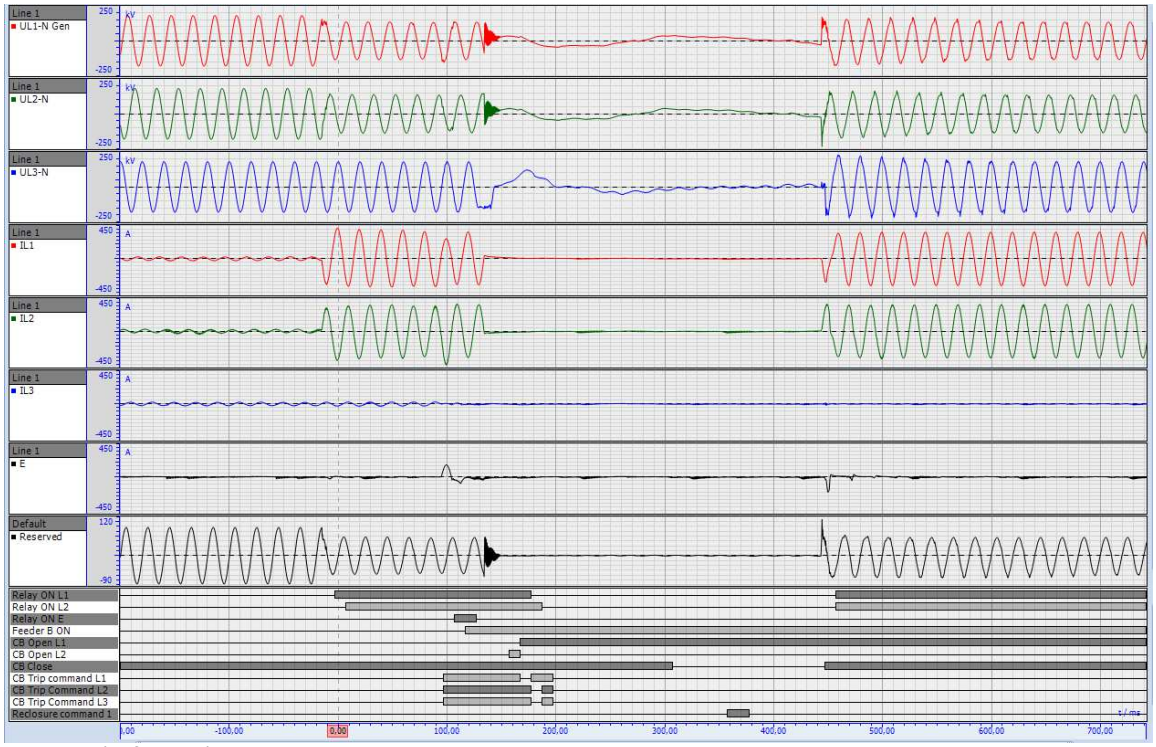


Fig.: Example of a record

SHERLOG contains two discrete digital fault recorder units.

Sampling rate, recording duration and trigger conditions can be assigned to each unit separately.

Both units can also generate simultaneous or overlapping recordings.

Sampling rate and recording duration

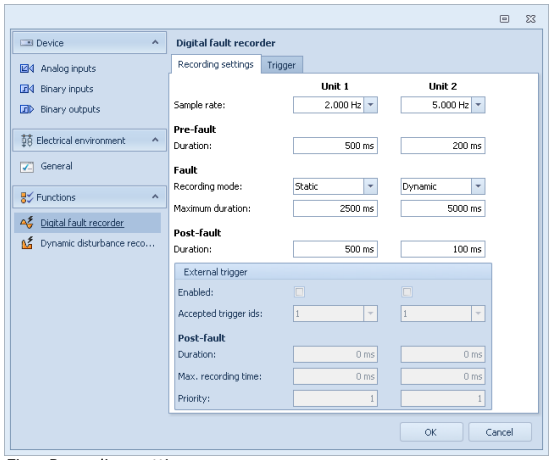


Fig.: Recording settings

- Call up the **Digital fault recorder** view
- Make the settings on the **Recording settings** tab

Sample rate:
The sampling frequency for analog inputs can be chosen between 100 Hz and 30 kHz.

Pre-fault/Duration:
Recording duration before fault occurrence

Fault/Recording mode static:
The recording duration is the defined **Maximum duration** whatever the actual fault duration. Subsequent faults which are detected during this time do not prolong recording.

Fault/Recording mode dynamic:
The recording duration is controlled by the actual length of the event which triggers recording but is limited by the **Maximum duration**. Subsequent faults which are detected during this time do not prolong recording.

Post-fault/Duration:
Recording duration which is added to the fault recording duration. Subsequent faults which are detected during this time prolong recording by provoking a restart of the fault recording duration. The maximum number of permissible subsequent triggers is set in the trigger parameters.

External trigger

The settings under **External trigger** are used to define the way this SHERLOG device is to behave in response to external cross-triggers which can be initiated by other SHERLOG devices. The cross-trigger information is exchanged between the participating SHERLOG devices via the KoCoS-Interlink interface.

Define trigger parameters

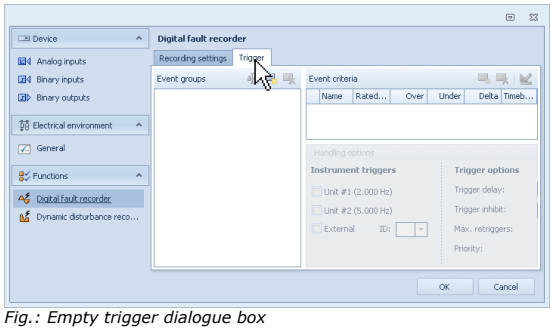


Fig.: Empty trigger dialogue box

Up to 14 trigger events can be defined on the **Trigger** tab for the purpose of triggering fault records automatically.

Up to 16 **Event criteria** can be assigned to any one trigger event.

In addition, certain **Handling options** are possible for each trigger event.

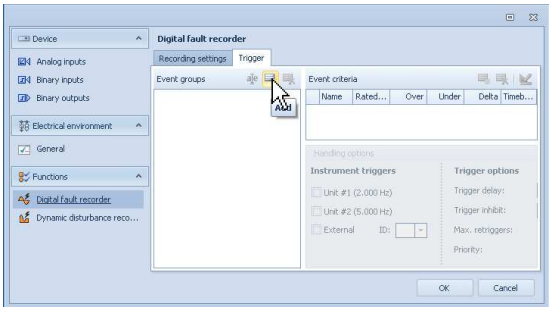


Fig.: Create trigger events

- Create a trigger event by clicking the **Add** button

Events can be renamed using the **F2** function key.

Handling options

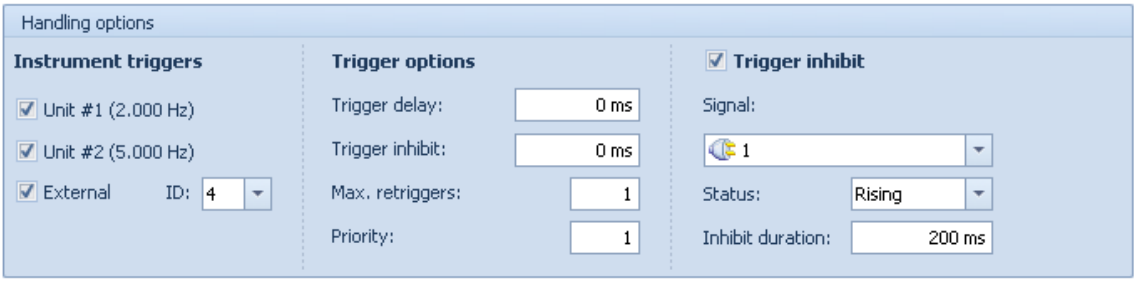


Fig.: Handling options

Instrument triggers

Unit #1 and Unit #2:

The check boxes are used to define which fault recorder units are to be started (triggered) by this event.

External:

The **External** check box is used to define whether this even is also to be passed on as a cross-trigger to other SHERLOG devices via the KoCoS-Interlink interface.

The ID is used to identify the cross-trigger information. In the external trigger configuration of the other SHERLOG devices it is possible to specify which IDs the devices react to. This allows the implementation of selective cross-triggers.

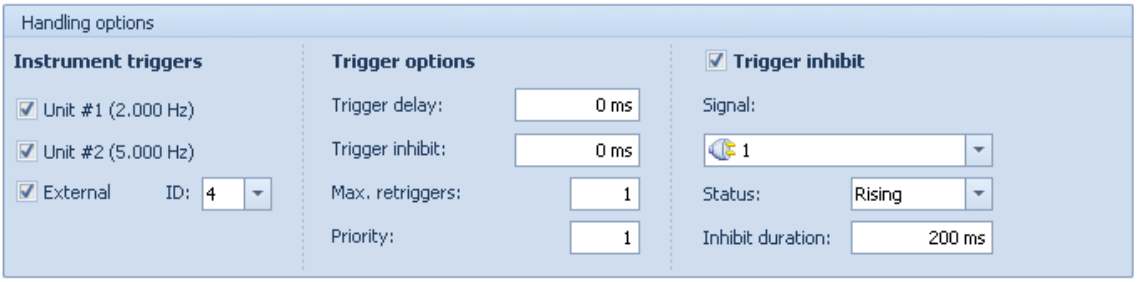


Fig.: Handling options

Trigger options

Trigger delay:

Defines the time period which must elapse before a limit value violation triggers a recording.

A delay can be useful for some measurement tasks, in order to suppress starting currents, for example. Usually no delay is entered for fault recorder applications (0 ms) as all limit violations are supposed to trigger a recording without delay in this case.

Trigger inhibit:

An inhibit time can be defined for a trigger if repeated recording is not required when the same events occur several times in succession.

Triggering is suppressed when the same limit value violation occurs repeatedly in succession within the inhibit tine. An inhibit time can be used to prevent intermitting triggers in this way.

Max. retriggers:

If a subsequent fault occurs within the post-fault period of a fault record, the record in progress is prolonged. The maximum number of triggers specifies how often recording may be prolonged. If the maximum number has been reached and another subsequent fault occurs, the record in progress is finished and a new record is started.

Priority:
It is possible to control the order in which data is transferred in automatic mode by entering a priority here to ensure that important records are transferred first.
The priority is also used for the automatic reporting functions. For example, reports on high-priority events can also be sent by email.

Priorities between 1 and 99 can be entered here, 1 having the top priority.

Trigger inhibit:

By configuring a trigger inhibit, it is possible to use a binary input to prevent a recording being triggered in response to this event.
An example of an application is the suppression of planned switch-ons or transitions.

The event is suppressed as long as the binary input concerned stays in the status set here. If the inhibit signal is only available as a pulse, a prolongation of the inhibit time can be achieved by means of the **Inhibit duration**.

Add event criteria

In order for trigger events to be able to become active, appropriate criteria must be assigned to them. All the criteria within an event are linked by the"or" operator. This means that events become active as soon as one or more criteria are violated.

Up to 16 criteria can be assigned to any one event.

- Click the **Add** button to add an event criterion.

Fig.: Add criteria to a selected event

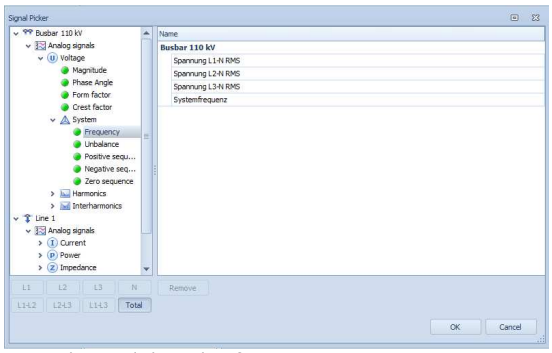


Fig.: Selection dialogue box for event criteria

The **Signal picker** is opened in which criteria can be selected from the list of available criteria.

Analog and binary channels which have been assigned to a power system during the configuration of the electrical environment are listed under the name of that power system. Analog and binary channels which have not been assigned to a power system are available for selection under **Analog signals** and **Binary signals**.

- Select a criterion and add it by clicking the button for the appropriate phase reference

Once the criteria have been selected, the limit values to be monitored can be selected and then set by clicking the **Edit criterion** button or by clicking the limit values and icons directly.

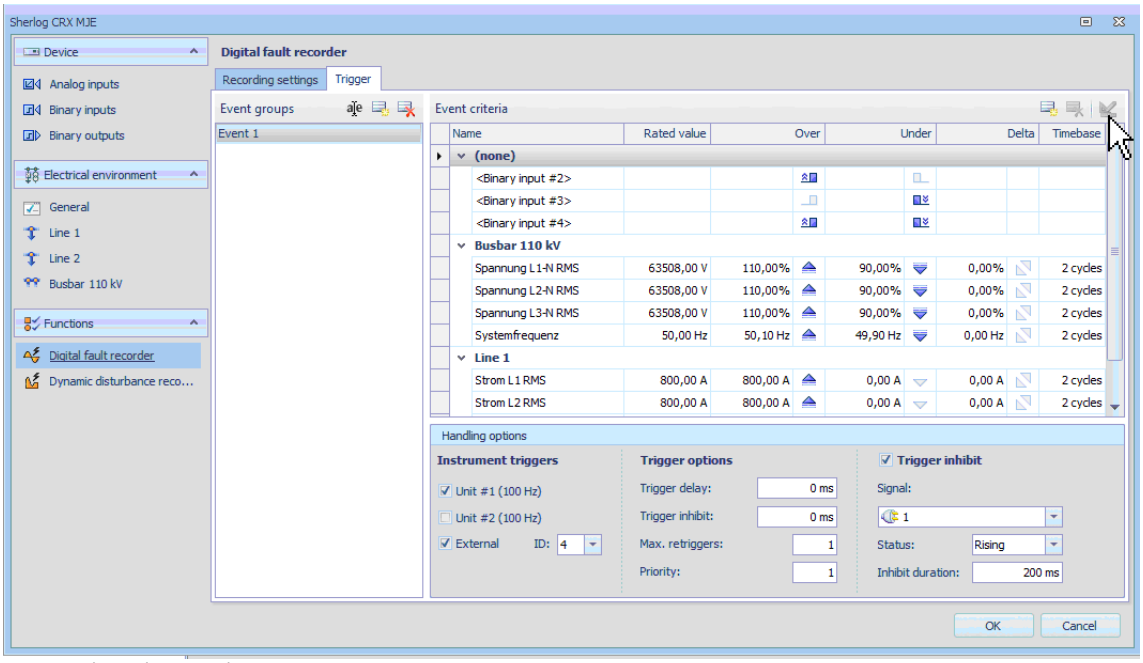


Fig. Event list with assigned criteria

Overtriggers, undertriggers or delta (change) triggers can be set either as absolute quantities or in percent in relation to the rated value.

It is important to note that all limit values refer to primary quantities.

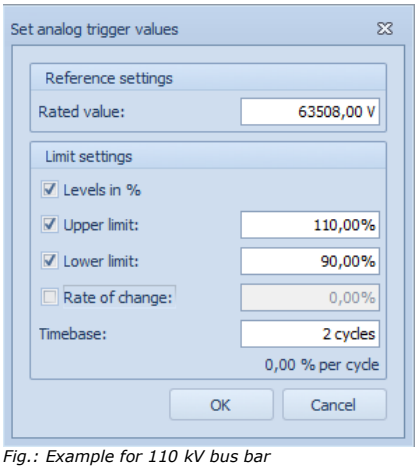


Fig.: Example for 110 kV bus bar

Example: Trigger on the phase-phase voltages of a 110 kV bus bar

Because the voltage levels given and the data of voltage transformers usually refer to phase-phase voltages, but the fault recorder usually measures the phase conductor against the star point or the earth, the factor √3 must be used when setting the trigger thresholds.

So the correct rated value of a 110 kV voltage level is 110 kV / 1.73 = 53508 V.

When setting the trigger threshold in percent it is important to note that 100% always refers to the rated value given. So an overvoltage of 10% should be entered as 110%.

5.3.7 Define dynamic disturbance recorder parameters

Unlike the, the dynamic disturbance recorder does not record the signal shape, but records values which are calculated from the signals, such as amplitude, phase angle, frequency, unbalance, etc..

The time resolution can be set anywhere between 1 Hz and 120 Hz. Binary inputs are always recorded with 10 kHz and therefore have a fixed time resolution of 100 microseconds (0.1 ms).

Dynamic (RMS) fault records consist of a pre-fault period and a post-fault period which is started with a trigger event.

Sampling rate and recording duration

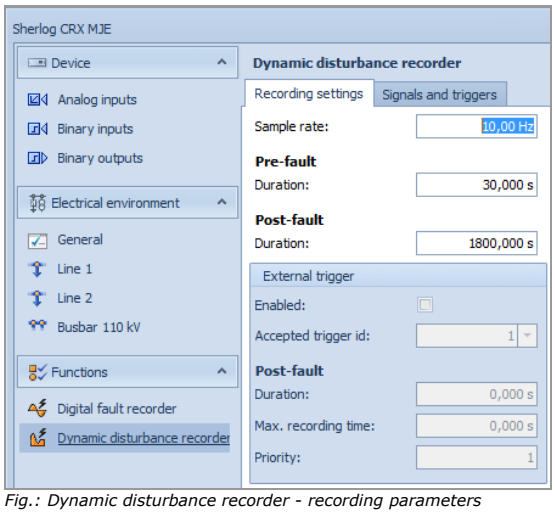


Fig.: Dynamic disturbance recorder - recording parameters

Sample rate:
The sampling rate (calculation interval) can be chosen between 1 Hz and 120 Hz.

Pre-fault:
Recording duration before fault occurrence. Duration of the pre-fault period max. 30 seconds.

Post-fault:
Recording duration starting with fault occurrence. Duration of the post-fault period max. 1800 seconds (30 minutes).

External trigger:

The settings under **External trigger** are used to define the way the SHERLOG device is to behave in response to external cross-triggers which can be initiated by other SHERLOG devices. The cross-trigger information is exchanged between the participating SHERLOG devices via the KoCoS-Interlink interface.

Select the signals to be recorded and define the trigger parameters

On the **Triggers and signals** tab the **Add** button can be used to select the measurement values which are to be recorded and enter the appropriate trigger criteria. For more information, see under the heading **Add event criteria** in the chapter titled **Define digital fault recorder parameters**.

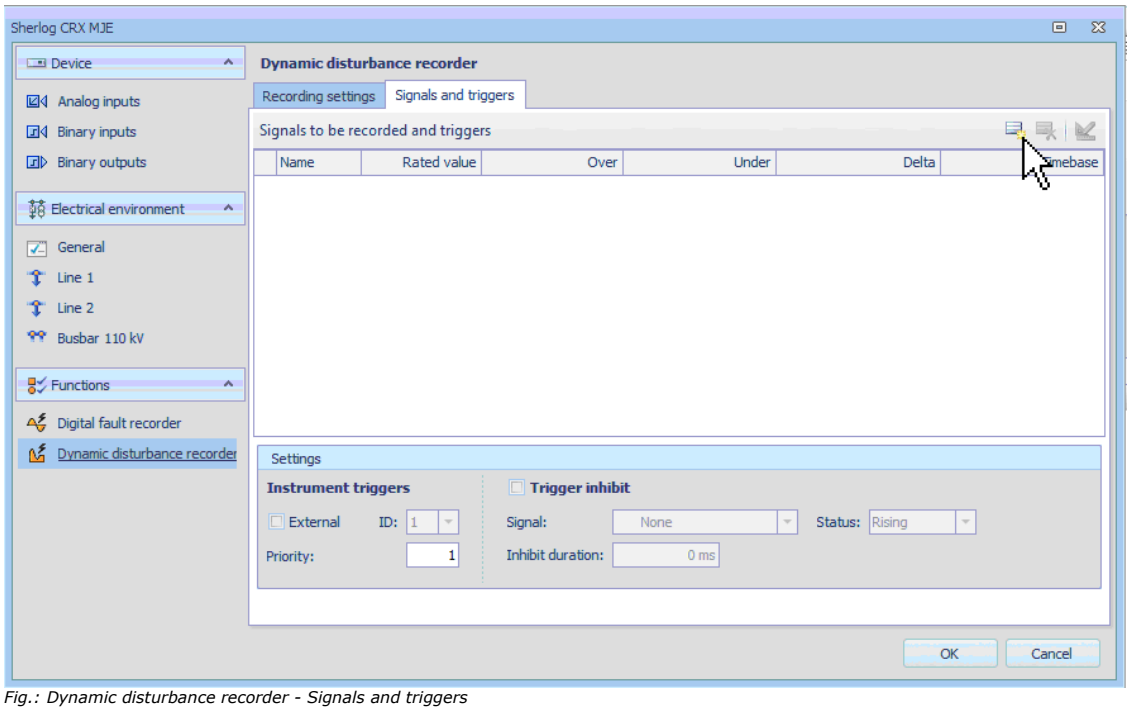


Fig.: Dynamic disturbance recorder - Signals and triggers

5.4 Set time synchronisation

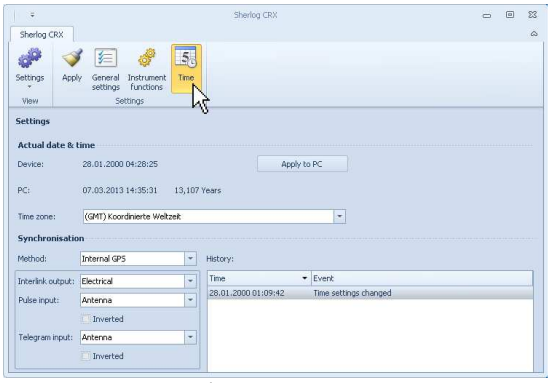


Fig.: SHERLOG time synchronisation

The time synchronisation can be set in the operating software or alternatively on the device display. For more information, see the **SHERLOG CRX Operating Instructions**.

At the moment the software only supports time synchronisation via the internal GPS receiver!

6 Functions of the device dialog window

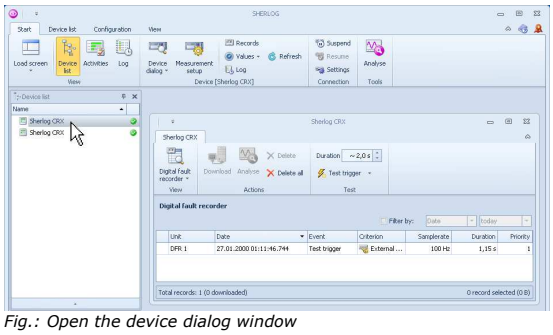


Fig.: Open the device dialog window

The device dialog window is the central control element for all actions which are directly related to the operation of the connected fault recorders.

To open the device dialog window, double-click the device concerned in the device list.

More than one device dialog window can be opened per device and the windows can be positioned, docked and grouped on the screen as required. For more information, see under **Customize the user interface** in the **Analysis** chapter.

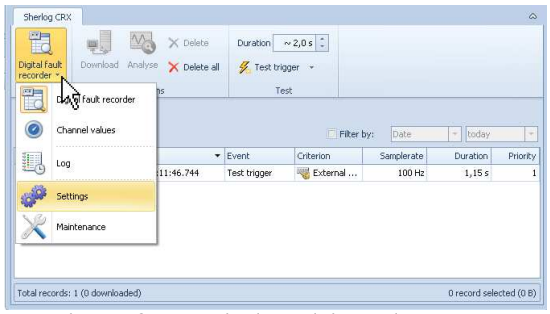


Fig.: Selection of views in the device dialog window

Various views for the device dialog window can be selected from the list under **View**. They are described below.

When a device dialog window is opened, the **Digital fault recorder** view is shown automatically.

6.1 Digital fault recorder

6.1.1 Table of contents

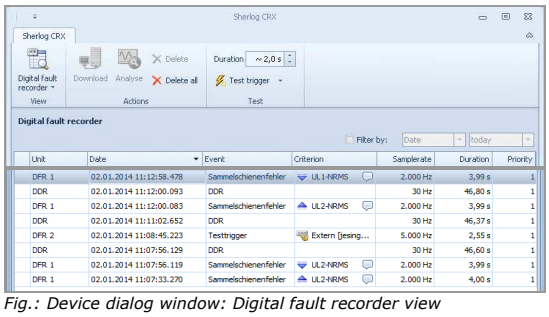


Fig.: Device dialog window: Digital fault recorder view

In the **Digital fault recorder** view, all the records currently saved in the memory of the fault recorder are displayed in a table of contents.

DFR1: Transient fault recorder 1

DFR2: Transient fault recorder 2

DDR: Dynamic disturbance recorder

Records can be displayed, transferred to the PC and deleted; test recordings can be generated.

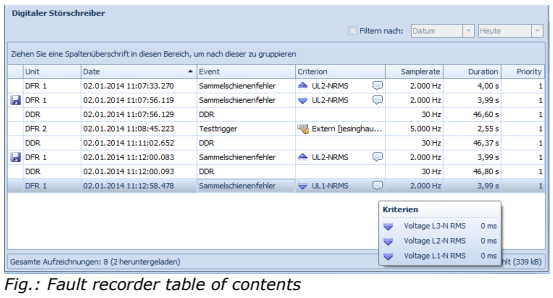


Fig.: Fault recorder table of contents

The disk symbol in the first column of the table of contents marks records which have already been transferred to the operating PC and have been saved in the record database.

Unit:	Recorder which generated the record (DFR1, DFR2 or DDR).
Date:	Trigger date and time of the record.
Event:	Name of the trigger event as defined under **Handling options**.
Criterion:	Trigger criterion with indication of type: over, under or change (d/dt). Further details can be shown by clicking the balloon.
Samplerate:	Sampling rate with which the record was generated.
Duration:	Duration of the whole record including the pre-fault, fault and post-fault periods.
Priority:	Priority of the record as defined under **Handling options**.

6.1.2 Filter records

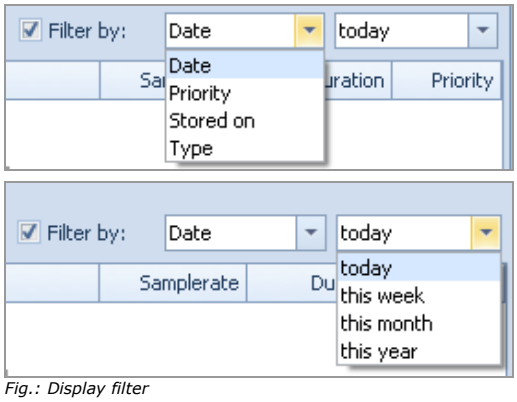


Fig.: Display filter

If there are a large number of records in the device, it can be helpful to filter display on the basis of specific criteria.

- Select the **Filter by** check box
- Select a filter criterion

6.1.3 Sort records

The default setting is for the latest records to be added at the top of the list (sorted by date in ascending order).

Click a column to change the sorting order. Each click switches the order between ascending and descending.

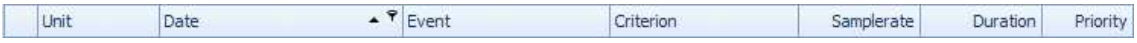


Fig.: Column heading indicates sort by date in ascending order

6.1.4 Group records

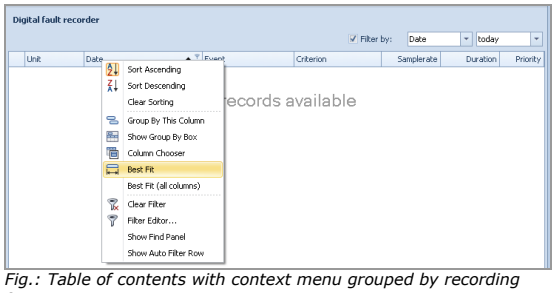
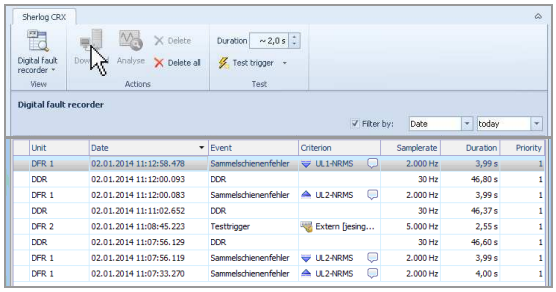


Fig.: Table of contents with context menu grouped by recording function

Right-click the column heading to open a context menu which lists further display functions for selection.

This makes it possible to group the display by different recording functions or events, for example.

6.1.5 Transfer fault records



Fault records can be transferred manually to the database on the operating PC.

- Select the records required (use the shift or CTRL key for multiple selection)
- Start transfer by clicking the **Download** button

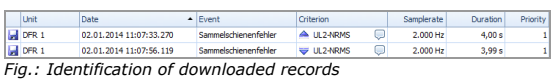
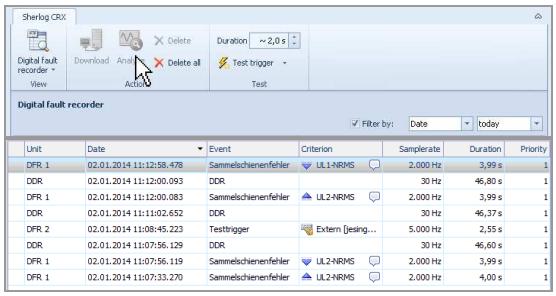


Fig.: Identification of downloaded records

Records which have been downloaded are added to the database and are marked with a disk icon.

6.1.6 Open fault records



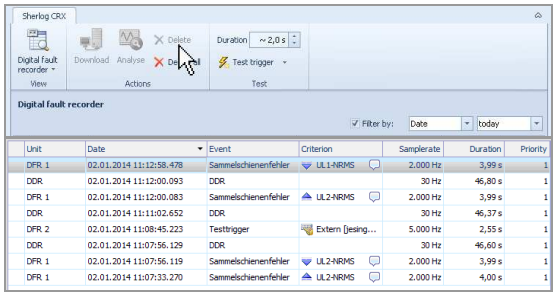
Only those records can be opened which have already been downloaded to the record database, i.e. only the records marked with a disk icon.

- Select the record required (use the shift or CTRL key for multiple selection)
- Click the **Analyse** button

SHERLOG-Analysis is opened and the selected records are displayed

Records which have been downloaded from any device can be opened directly from the analysis software. For more information, see **Open records** under **SHERLOG-Analysis.**

6.1.7 Delete fault records



Records can be deleted from the device dialog window either individually or all together.

- Click the **Delete** button

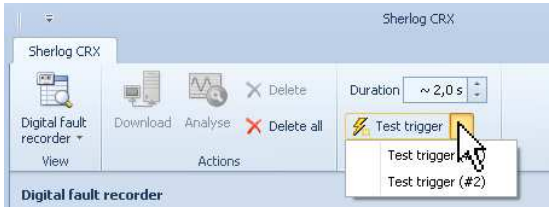
Only selected records are deleted

- Click the **Delete all** button

All the records displayed are deleted

In both cases, only the records in the internal data memory of the device are deleted. Records which have already been downloaded to the PC remain in the database.

6.1.8 Trigger test recordings via the software



For certain measurement tasks or for the purpose of testing functionality, the two transient fault recorders DFR1 or DFR2 can be triggered manually by the user.

- Set required recording duration
- Activate test trigger for DFR1 or DFR2

Alternatively test triggers can be activated directly using the display of the SHERLOG device. For more information, see the **SHERLOG CRX operating instructions**.

6.2 Channel values

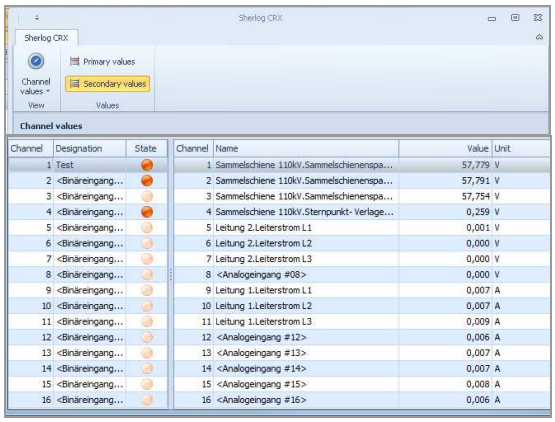


Fig.: Device dialog window: Channel values

The states of all the binary inputs and the measurement values of all the analog inputs are displayed in the **Channel values** view. The measurement values can be displayed as primary values or secondary values (measurement signal at the input terminal of the device).

6.3 Log

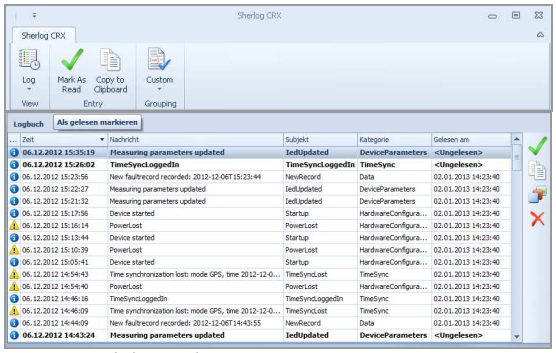


Fig.: Device dialog window: Log

The messages in the log provide information as to when the device was turned on or off, when records were made or when device parameters were changed, for example.

Using the ribbon or the tool bar located at the right-hand edge of the window, entries can be marked as read, deleted and copied to the Windows clipboard for documentation purposes.

Using the functions listed under **Grouping**, all messages can be grouped according to pre-defined criteria.

6.4 Settings

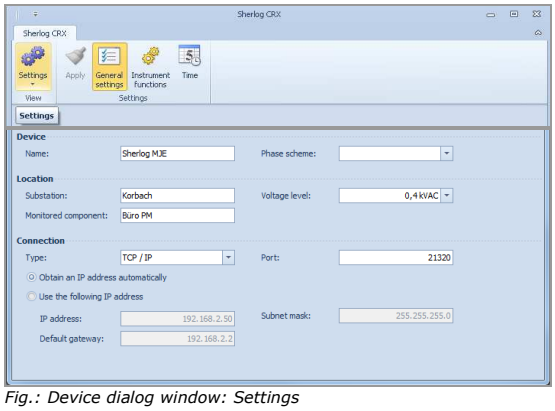


Fig.: Device dialog window: Settings

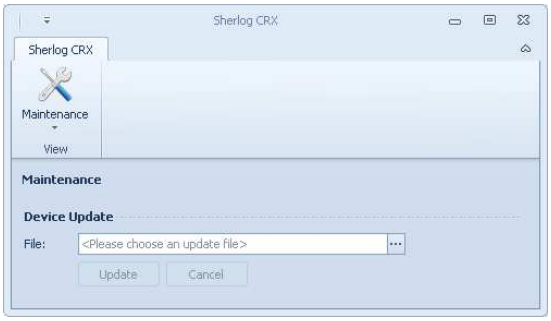
All the parameters for the fault recorder can be defined in the **Settings** view. The various different parameter areas **General settings**, **Instrument functions** and **Time synchronisation** are described in the chapter titled **Define device parameters**.

6.5 Maintenance

6.5.1 Device update

The device software can be updated using the **Device update** function.

The device update does not involve any changes to the device configuration. Once the update procedure has been completed successfully, the device puts itself back into operation.



- Specify the path of the appropriate device update file in the **File** text box
- Start the update by clicking the **Update** button.

Device updates can also be carried out directly on the device itself using a USB flash drive. For more information, see the **SHERLOG CRX operating instructions**.

7 Further functions of the operating software

7.1 Online data display

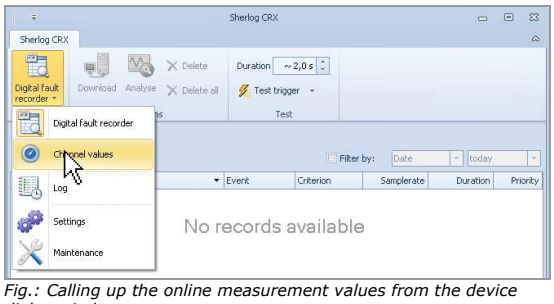


Fig.: Calling up the online measurement values from the device dialog window

In the SHERLOG device dialog window, the current measurement values of the analog and binary inputs can be displayed using the **Channel values** function.

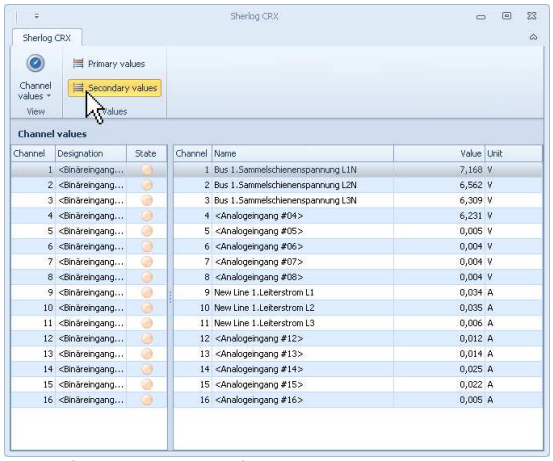


Fig.: Online measurement values

As the user can switch between primary and secondary values in this display, it is particularly suitable for checking the configured transformer ratios during commissioning.

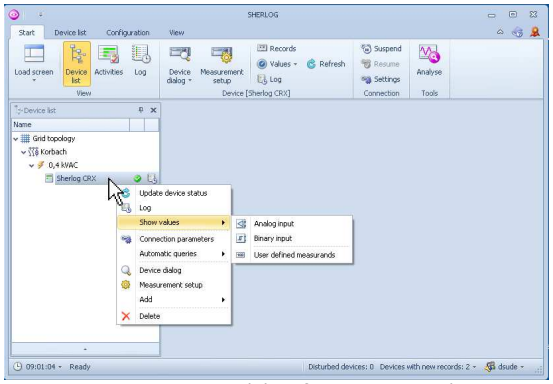


Fig.: Device context menu with list of measurement values

Another way of displaying online measurement values is to call them up from the context menu in the device list (right-click the device concerned).

Using the context menu, analog and binary inputs can be opened in separate windows. It is also possible to create views with user-defined measurement values.

7.2 Configure automatic tasks

A number of functions can be automated using automatic tasks, including the following:

- Data transfer from individual devices to the common record database
- Fault report creation
- Dispatch and print of fault reports and records
- Data export in various formats
- Signaling of system errors

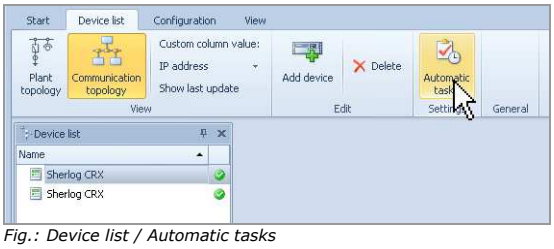


Fig.: Device list / Automatic tasks

- Switch to the **Device list** tab
- Select a device
- Click the **Automatic tasks** button

The settings for data transfer, for the dispatch of reports and for data export can be made separately for each individual SHERLOG device.

Only the interval times defined for data transfer are general settings which apply globally to all connected SHERLOG devices.

7.2.1 Automatic data transfer

In order to create reports and to analyse recorded data, the data must be transferred to the common record database. The transfer can be automated with time control.

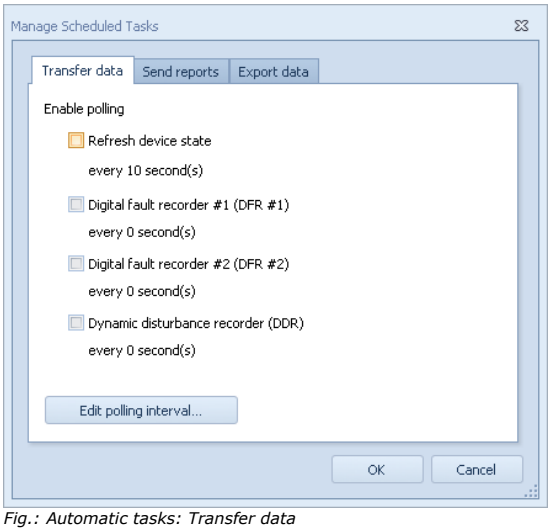


Fig.: Automatic tasks: Transfer data

- Call up the **Transfer data** tab

The **Refresh device state** function updates the device status in the device list as well as the record directory in the device dialog window. For more information, see the chapter titled **First steps** and consult the section **Activate automatic queries**.
This function should always be activated for every device.

Activation of automatic data transfer for the available recording functions (DFR1, DFR2 and DDR) is a pre-requisite for automatic report creation and data export.

If automatic data transfer is deactivated, no new data are transferred and so the data cannot be subjected to further processing.

Use the **Edit polling interval** button to set the interval time.

Automatic data transfer can be activated separately for all recording functions. The interval can only be edited globally as a general setting with the **Edit polling interval** button.

7.2.2 Create reports automatically

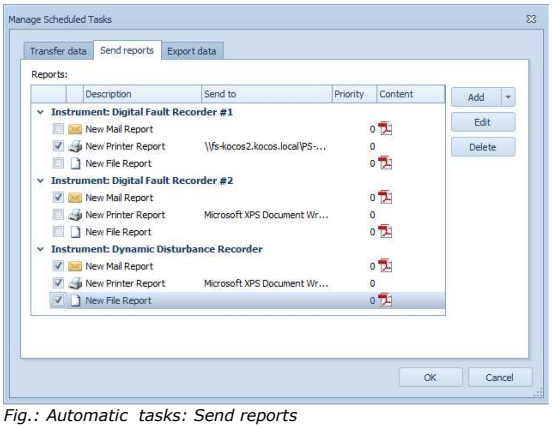


Fig.: Automatic tasks: Send reports

After automatic data transfer, the data can be compiled in a fault report.

- Switch to the **Send Reports** tab

Fault reports can be automatically sent by email, printed out or saved.

For each recording function (DFR1, DFR2 and DDR) 3 tasks are available as templates which can be activated and configured if required.

Tasks can be created, edited or deleted at any time, using the **Add**, **Edit** and **Delete** buttons.

Send fault reports by email

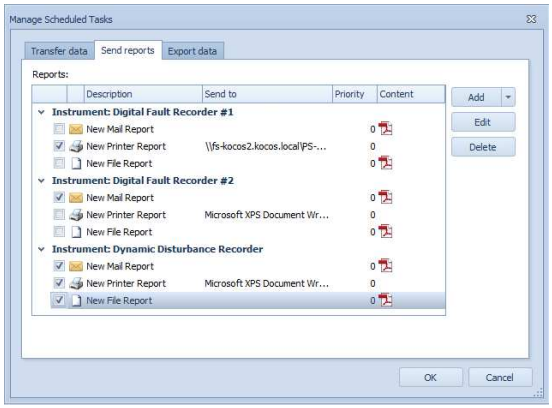


Fig.: Automatic tasks: Send reports

Fault reports can be sent automatically by email by selecting the task **New Mail Report**.

For this purpose, the task concerned must be configured by specifying email addresses, the required report format and any attachments that are needed.

- Select the **New Mail Report** task
- Click the **Edit** button

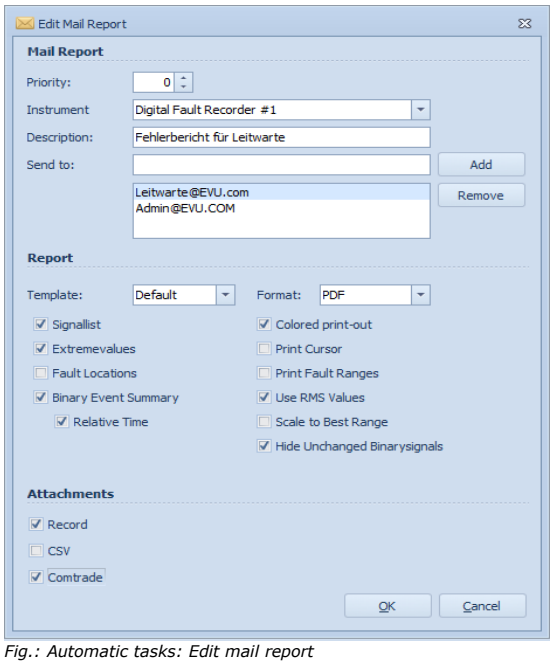


Fig.: Automatic tasks: Edit mail report

The **Edit Mail Report** dialogue box is called up

- Enter the settings for sending the email, for the report format and for any attachments required.

Priority

During configuration of the fault recorder, a priority between 1 and 99 can be assigned to each fault record under **Handling options**, 1 being the top priority.

- Select a priority in the **Priority** list box

Reports for fault records with the selected priority or with a higher priority are automatically sent by email.

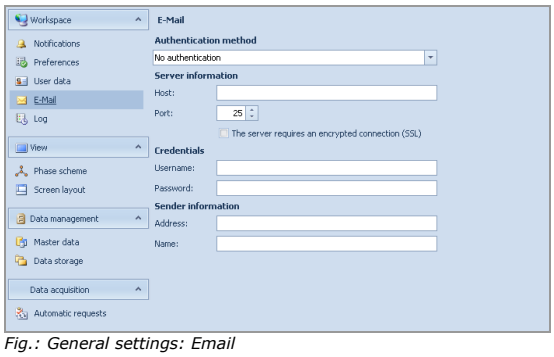


Fig.: General settings: Email

An email account is required for sending emails. The account details can be entered under **General settings**:

- On the **Configuration** tab, click the **Settings** button
- Under **Workspace**, call up **E-mail**.
- Enter the account details

Print report

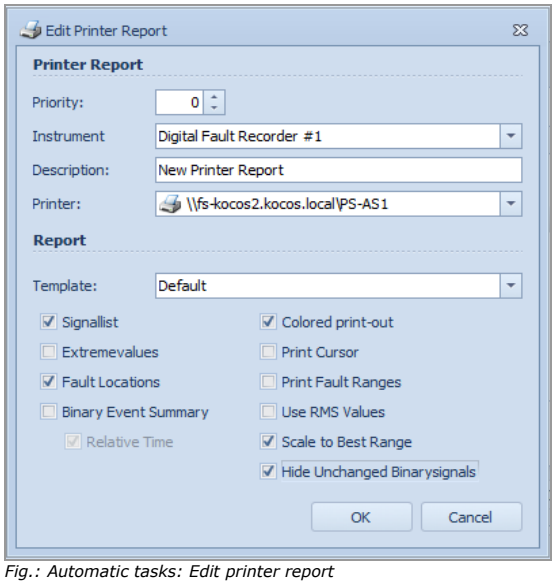


Fig.: Automatic tasks: Edit printer report

Fault reports can be printed out automatically by selecting the **New Printer Report** task.

For this purpose, the task concerned must be configured by specifying the printer and the report format.

Save report as file

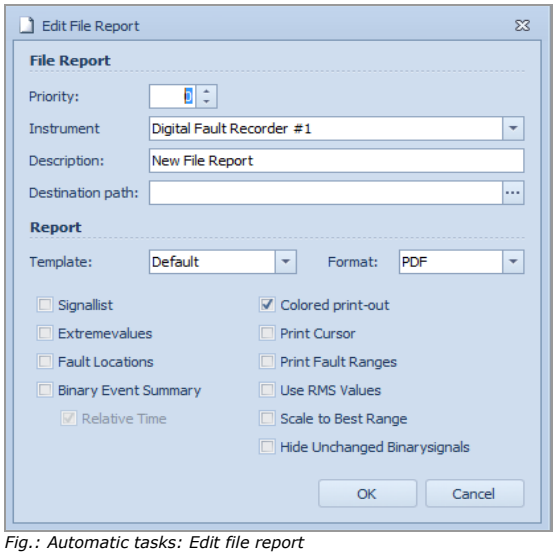


Fig.: Automatic tasks: Edit file report

Fault reports can be saved automatically as a file by selecting the task **New File Report**.

For this purpose, the task concerned must be configured by specifying the required file path and the report format.

7.2.3 Automatic data export

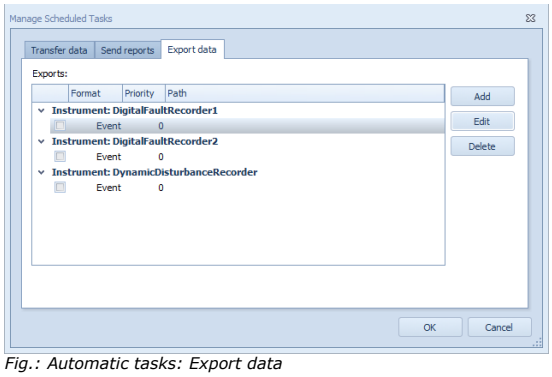


Fig.: Automatic tasks: Export data

After automatic data transfer, the data can be exported automatically in the following formats: Comtrade, Event or CSV.

- Switch to the **Export Data** tab
- Select a task
- Click the **Edit** button

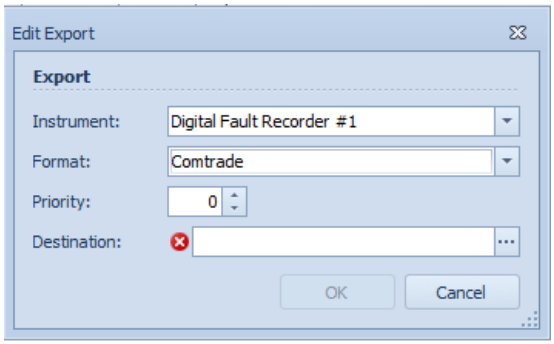


Fig.: Parameters for data export

The **Edit Export** dialogue box is called up

- Configure the task by specifying the required format and the destination

7.2.4 Activities

All the data transfer activities which are currently in progress between the PC and the connected measuring instruments are displayed Under **Activities**. Using this dialogue box, it is also possible to selectively switch on/off the automatic tasks configured for individual devices.

➢ On the **Start** tab, click the **Activities** button

The activities list is opened.

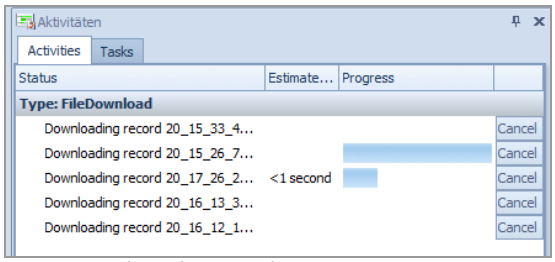


Fig.: Activities list with progress bar

Data transfer activities currently in progress between the PC and the connected measuring devices are displayed on the **Activities** tab.

Tasks list

All the automatic tasks already configured for all the devices in the device list are displayed on the **Tasks** tab.

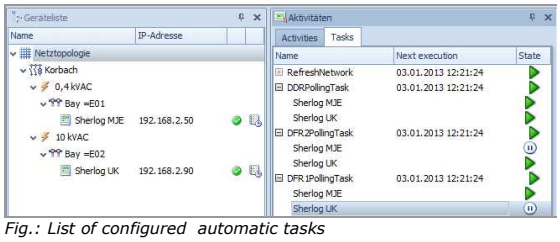


Fig.: List of configured automatic tasks

The **Next execution** column indicates when the task concerned will next be executed.

Tasks marked ▶ are active.

Tasks marked ⏸ are on hold.

Use the left-hand mouse button to click the icon in order to switch between active and on hold. Automatic tasks can be selectively stopped and restarted for specific devices in this way.

7.3 Log

The log contains status messages and data downloads of fault records of <u>all</u> the devices in the device list, for example.

In addition, the logs of individual devices can be displayed in the **Device dialog** window. For more information, see the under **Log** in the chapter titled **Functions of the device dialog window.**

➢ On the **Start** tab, click the **Log** button

The log is opened.

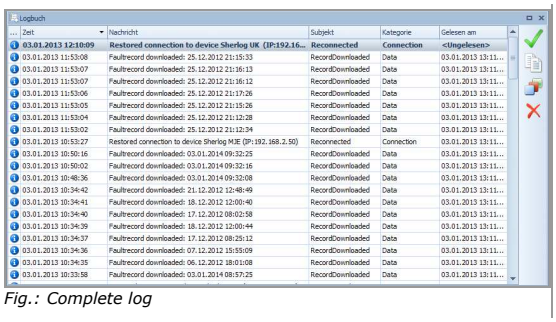


Fig.: Complete log

Using the ribbon or the tool bar located at the right-hand edge of the window, entries can be marked as read, can be deleted and can be copied to the Windows clipboard for documentation purposes.

Using the functions listed under **Grouping**, all messages can be grouped according to predefined criteria as required by the user. For more detailed information, see under **Table of contents** in the chapter titled **Digital fault recorder**.

7.4 Change the SHERLOG CRX IP address

The IP connection parameters can either be set on-site using the display of the SHERLOG device or remotely via the software.

If the IP connection parameters of a SHERLOG which has already been registered in the software are changed via the device display, this change must also be made in the software, so that the device can be accessed again in the software.

7.4.1 Example: SHERLOG IP address has been changed on the device

Fig.: Device list displays communication fault

A SHERLOG CRX with the IP address 192.168.2.136 was added to the device list of the software. Later the SHERLOG IP address was changed on the display of the SHERLOG device. As a result, the device cannot be accessed via the software.

The icon for a communication fault is displayed in the device list.

Update connection parameters in the software

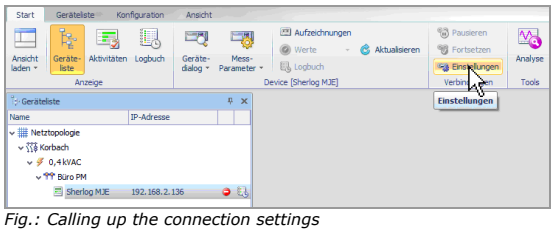


Fig.: Calling up the connection settings

- Select the device concerned in the device list
- On the **Start** tab, click the **Settings** button in the **Connection** group

The **Connection settings** dialogue box is called up.

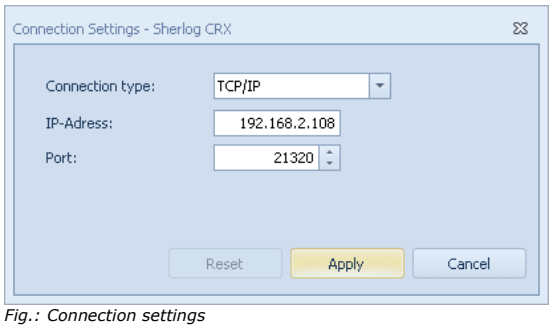


Fig.: Connection settings

- Enter the correct IP parameters for the device in the **Connection settings** dialogue box and click the **Apply** button

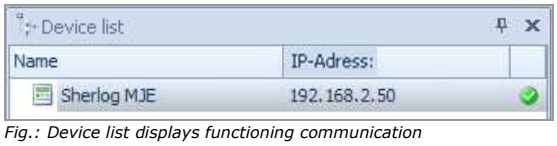


Fig.: Device list displays functioning communication

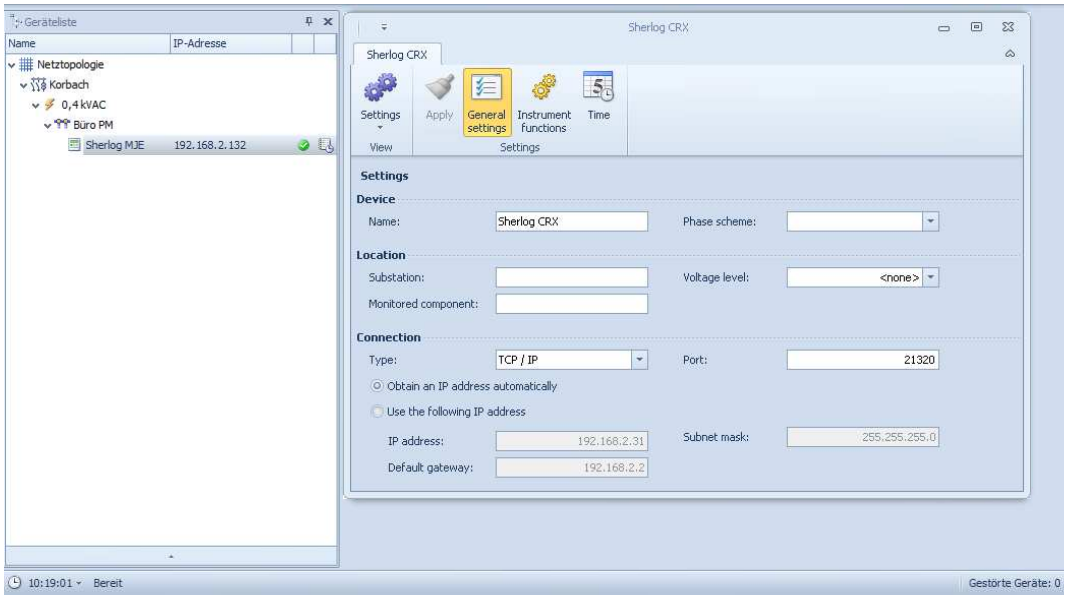
Once the new connection parameters have been entered, the device can be accessed again.

The icon is displayed in the device list.

7.4.2 Example: IP connection settings via remote access using the software

The IP connection settings of SHERLOG devices can be edited in the software via remote access if the data connection is functioning correctly.

- Double-click the device concerned to open the device dialog window
- Switch to the the **Settings** view



- Enter the changes
- Activate the changes by clicking the **Apply** button

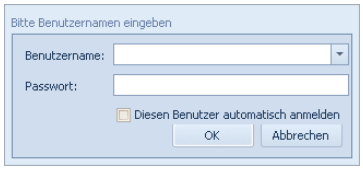
This method changes the IP connection settings of the SHERLOG devices as well as the corresponding settings in the software of the PC in use.

If the access to the changed SHERLOG device is to be configured for further PCs, the IP address must be changed manually on these PCs. For more information, see under **Editing connection parameters in the software**.

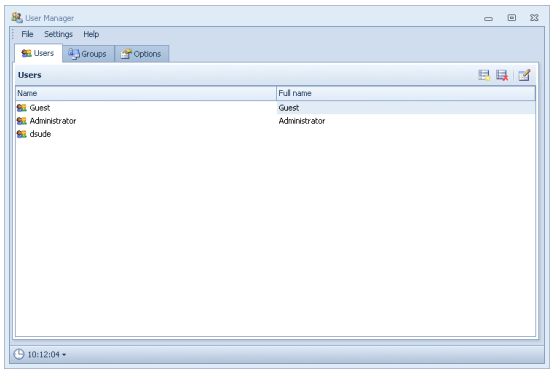
7.5 User Manager

With the **User Manager** new users can be added, existing users can be deleted and user passwords can be defined and changed.

➢ On the **Configuration** tab, click the **User Manager** button



➢ Enter the user name and, if required, the password



The **Account Manager** is called up.

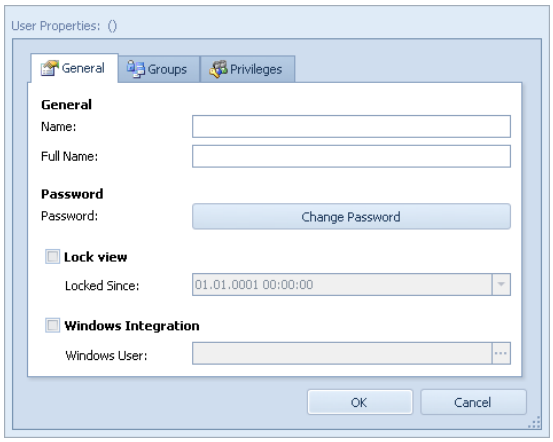
Using the tool bar the following actions can be carried out:

Add: Create a new user

Delete: Delete a user

Edit: Edit the user properties

7.5.1 Add/edit user



➢ Click the **Add** or **Edit** icon

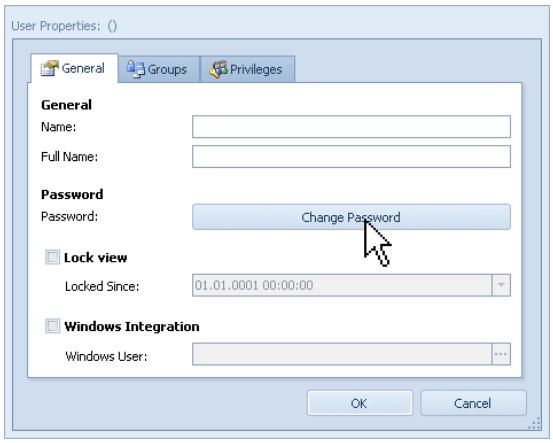
The **User Properties** dialogue box is called up.

➢ Enter/edit the user properties and confirm with **OK**

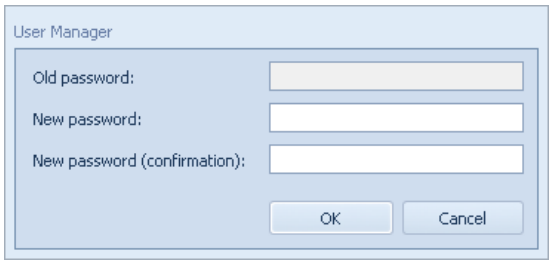
Change password, see below.

7.5.2 Define/change password

If the dialogue box for changing the password is called up in the **User Manager**, changes can be made for all the users.



- On the **Configuration** tab, click the **User Manager** button to open the Account Manager
- Select user
- Click the **Change Password** button



A dialogue box for changing the password is called up.

- Enter the old and new passwords and confirm with **OK**

Alternatively, the dialogue box for changing the password can be called up from the **Configuration** tab. However, in this case changes can only be made for the user who is currently logged in.

8 Support

8.1 Software version

The technical support department will need to know the version number of the **SHERLOG.EXE** programme file if technical support is required. A window displaying the licence and version numbers of the software is shown in the background when the programme is started and during log-in.

To call up the info window:

- Call up the **View** tab
- In the **Help** group, click the **About** button

The programme info window is called up.

8.2 System information

It may be necessary to provide detailed system information when requesting technical support.

- Click the **System info** button

Detailed system information is called up and can be saved as a file.

9 SHERLOG-Analysis

The SHERLOG analysis software is used for the evaluation of recordings made by SHERLOG CRX fault recorders.

The software contains a comprehensive range of powerful analysis tools for the assessment of recorded data:

- Useful zoom functions and variable scaling
- Simultaneous display, superimposition and synchronisation of more than one fault record
- Vector displays
- Harmonic analysis on the basis of full waves or to IEC 61000-4-7 with interharmonics
- Nyquist plot
- Determination of fault location
- Freely configurable absolute and delta measurement cursors
- Formulary and formula editor for the calculation of further power system quantities
- Individual report creation using the clipboard
- Automatic report creation

Fault location

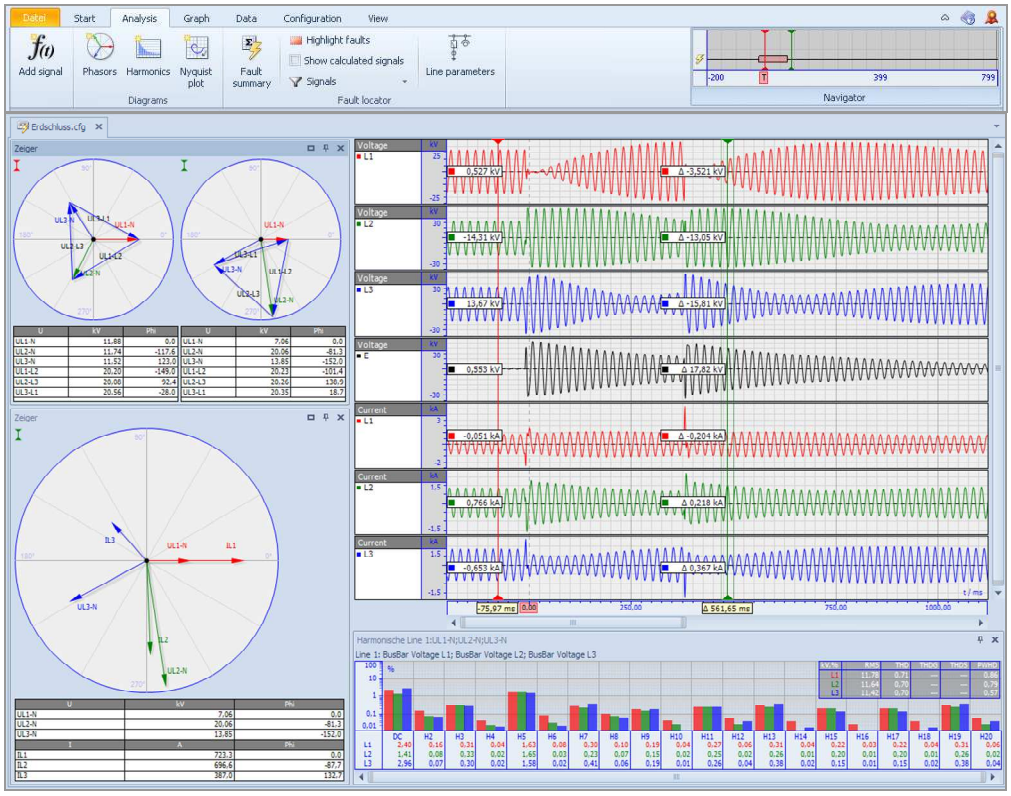
The fault locator can characterise faults quickly as well as calculating the fault loop and detailing the fault type, fault impedance and fault location.

Mathematical signal analysis

A formula editor can be used to make further mathematical calculations within fault records. The results are added to the fault record as an additional signal.

Data formats

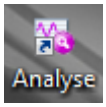
Import and export functions enable data to be exchanged between different systems using standard COMTRADE, CSV and PQDIF file formats.



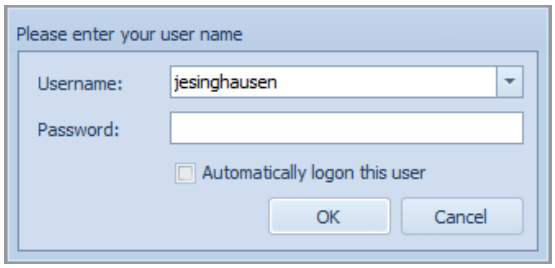
9.1 Start the programme

The analysis software can be started as a separate application via the Windows start menu or a link on the desktop as well as via the SHERLOG-Online application.

9.1.1 Start the programme as separate application



➢ Click the appropriate entry in the **Programmes** folder of the Windows® start menu or the application icon on the desktop



Log-in

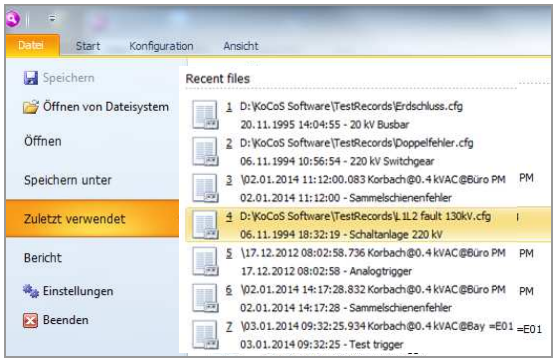
The software has been designed to give only selected people access to certain programme functions. If the software is started separately, it is necessary to enter the user name.

9.1.2 Start the programme from SHERLOG-Online

Use the **Analyse** button on the **Start** tab to call up SHERLOG-Analysis directly from SHERLOG-Online.

In this case no log-in is necessary because the user is already logged in for SHERLOG-Online.

9.1.3 File tab



When SHERLOG-Analysis is started, the **File** tab is called up.

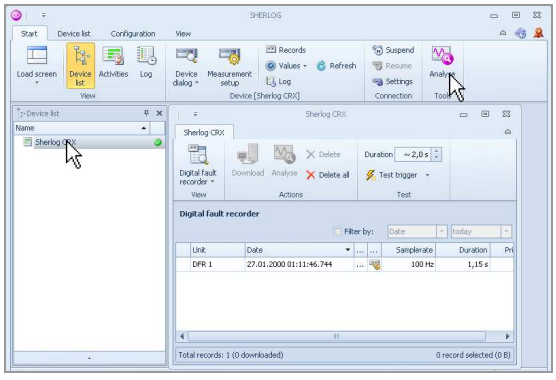
Open from file system

SHERLOG or COMTRADE records can be opened from any storage location.

Open

Open records from the SHERLOG database.

9.1.4 Open individual records from the Online device dialog window



To analyse a specific record, SHERLOG-Analysis can be started directly from the Online device dialog window

➢ Select the required record in the table of contents of the fault recorder

➢ Click the **Analyse** button

SHERLOG-Analysis is started and the fault record concerned is opened automatically.

10 User interface

The structure of the user interface is largely based on the Microsoft Fluent interface.
A ribbon with task-oriented tabs provides only those commands which are required for a specific task.
These features of the interface make for increased user-friendliness and intuitive operation; complex menu trees with multiple levels are avoided.
Basic knowledge of the Windows® operating system is a prerequisite for working with the software.
Typical Windows® functions are not dealt with in this user manual.

10.1 Elements of the user interface

① Ribbon

② Quick access toolbar

③ Title bar

④ Task bar

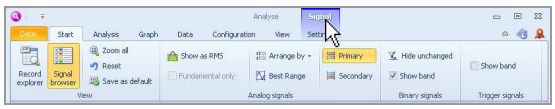
⑤ Analysis monitor

10.1.1 Ribbon

The ribbon is a multi-functional panel containing task-oriented tabs.

Tabs

The tabs are used to call up thematically organized groups of commands which are displayed on the ribbon.

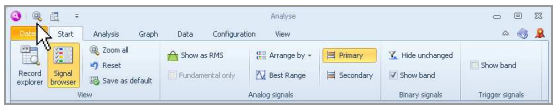


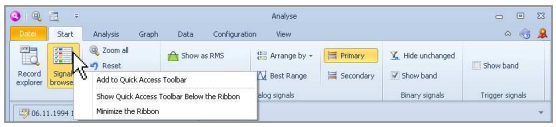
Contextual tabs

In addition to the core tabs which are always displayed, some tabs are only available when the user selects a function which requires special options for its execution.

The functions and commands of individual tabs are described in the context of their use in the following chapters of this user manual.

10.1.2 Quick access toolbar





The quick access toolbar is always in the foreground (active). Users can customize this tool bar by adding favourite commands for quick access.

Adding commands to the quick access toolbar

- Select the desired command by clicking it with the right-hand mouse button

A dialogue box for customizing the quick access toolbar is called up.

- Choose Add to Quick Access Toolbar

The command is displayed as an icon on the quick access toolbar and can be called up from there.

To remove commands from the quick access toolbar, use the right-hand mouse button to call up the remove command.

10.1.3 Task bar

List of administrator functions

Certain dialogue boxes and displays for managing users can be called up from here.

10.2 Customize the user interface

Settings for the screen design and the language are made on the **View** tab. For more information, see under **First steps**.

10.2.1 Position additional windows

Using the mouse, the position and size of tools such as signal lists or the windows of analysis functions can also be changed manually.

The position can also be changed automatically with the docker function:

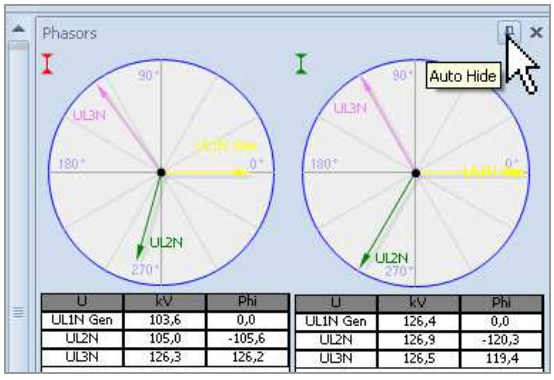
- Click the title bar of the docker window and drag it while keeping the left-hand mouse button pressed

A number of arrow icons are displayed for positioning.

- Drag the window to one of these arrow icons and then release the mouse button

The docker window is positioned automatically.

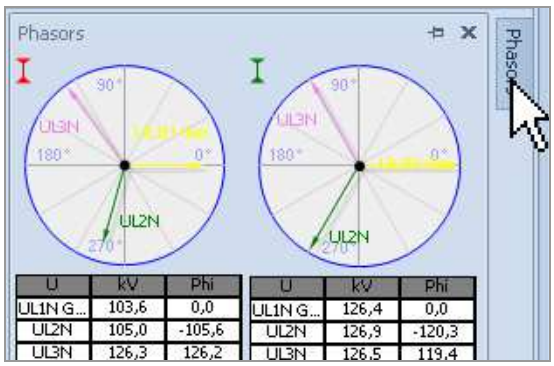
10.2.2 Automatically hide additional windows



Additional windows can be hidden and or shown using the buttons at the edge of the monitor:

- Click the **Auto hide** button

The window is hidden and a button for showing the window is automatically positioned at the edge of the monitor.

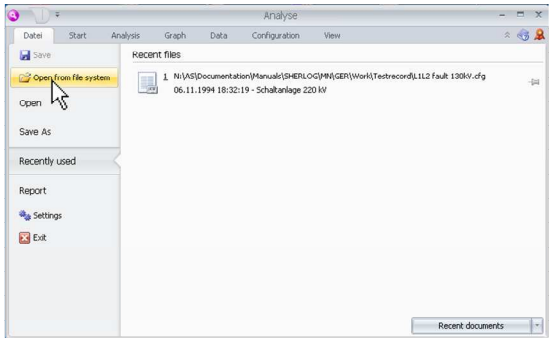


- Point to the button with the mouse pointer

The window is shown.

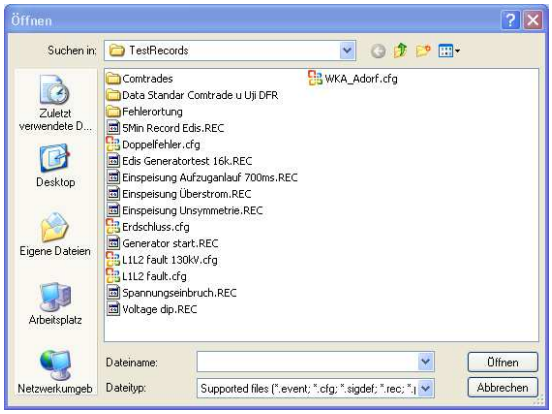
11 Open records

11.1 Open from file system



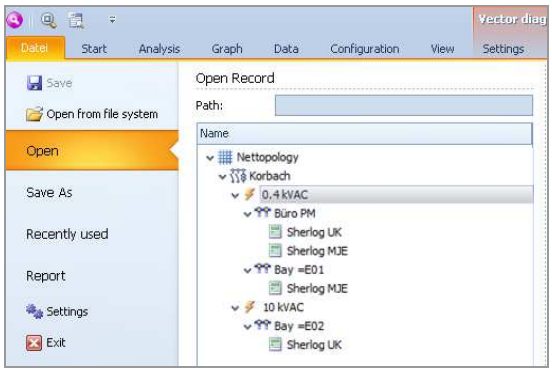
SHERLOG event records (*.Evt) or records available in COMTRADE format can be opened from any storage location.

- Click the **Open from file system** button



A file browser is opened for selecting the record.

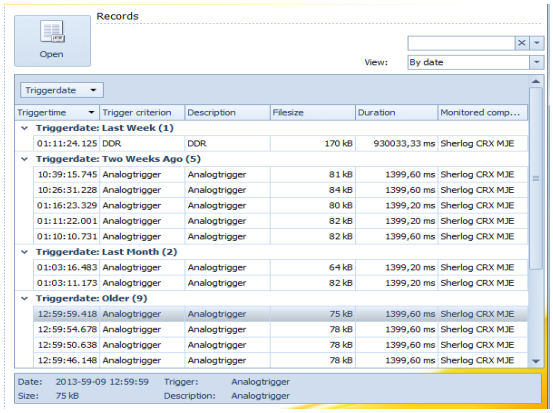
11.2 Open from database



Click **Open** to open records from the SHERLOG database.

The software displays the entire grid topology of the database in the form of a tree structure with all the measurement locations and all the connected measuring systems.

In the grid topology, the range of records to be displayed can be limited by clicking on the branch required.



All the records available for the selected branch are listed alongside the grid topology.

Open record:

- Select the required record and click the **Open** button or double-click the record itself.

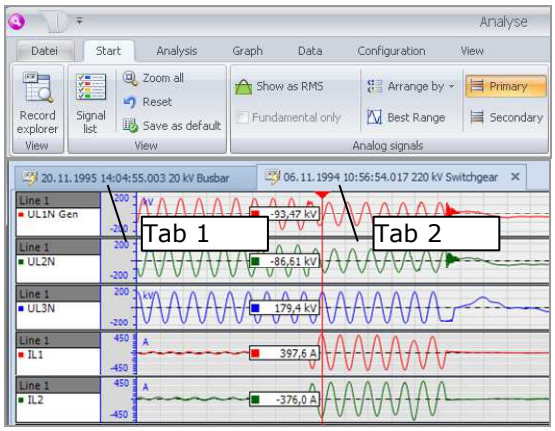
11.3 Open several records

The analysis software allows the user to open several separate records at once and to superimpose or consolidate a number of records.

11.3.1 In a separate analysis window

If a record is already open when another record is opened, the user can choose whether the records are to be displayed separately or whether they are to be superimposed.

The **Create a new window** function opens the record in a separate analysis window.



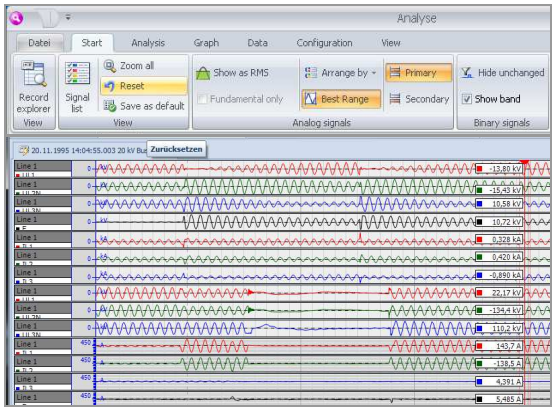
The newly opened record is added as a further tab in the analysis window.

Click the tabs to switch between records.

Each record can be grabbed with the mouse, removed from the current view and dragged to another screen, for example, once it has been accessed via the corresponding tab.

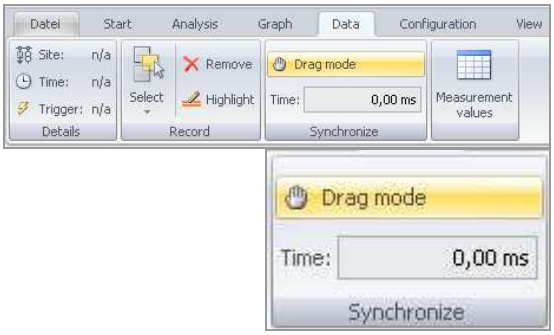
11.3.2 Superimpose records

The **Add to active window** function superimposes the record to be opened on the currently displayed record.



Superimposition causes the individual records to be consolidated to form a new record which can be saved as a new event by clicking **Save as** on the **File** tab.

11.3.3 Synchronize superimposed records



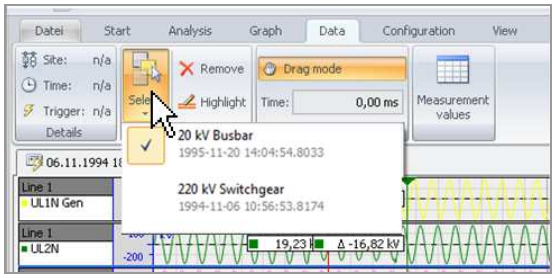
Records which overlap in time are synchronized automatically on the basis of the trigger time points.

Manual synchronization

When the **Drag mode** button is activated, the records can be moved in relation to one another with the mouse.

Alternatively, a time correction can be entered. The records are displaced by the amount of time entered here.

11.3.4 Highlight or remove superimposed records



Especially if individual signals have been moved around in consolidated records, it can be useful to highlight all the channels of a specific record for identification purposes.

In order to do so, a record can be selected by clicking the **Select** button on the **Data** tab. The **Highlight** and **Remove** buttons affect the selected record only.

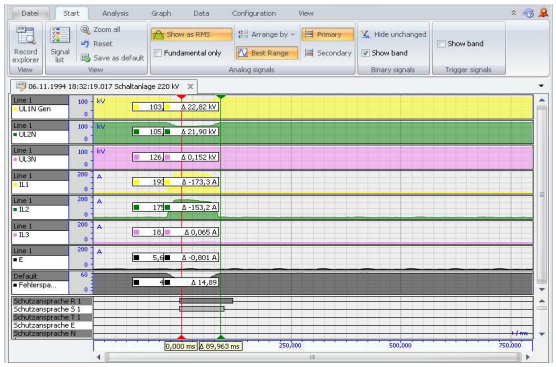
12 Display options for fault records

12.1 Best range display

➢ Click the **Best range** button

The scaling factor for the display of signal characteristics is automatically set to achieve an optimised display with maximum resolution.

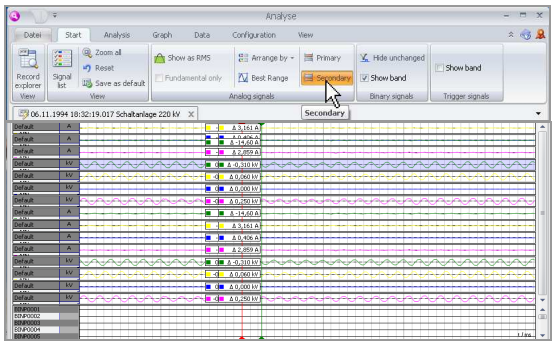
12.2 RMS display



➢ Click the **Show as RMS** button

The signal characteristics are displayed as RMS values with optimised scaling.

12.3 Display primary or secondary values



➢ Click the **Primary** button

The primary values are displayed at the measurement cursors.
Primary values allow for the transformer ratios configured for sensors and transformers.

➢ Click the **Secondary** button

The secondary values are displayed at the measurement cursors.
Secondary values refer to the measurement signal at the input terminals of SHERLOG.

12.4 Show and hide binary channels

The display of the binary channel signals can be shown or hidden.

➢ In the **Binary signals** group, select the **Show band** check box

The binary signals are displayed.

Activate the **Hide unchanged** button to display only those binary channels for which at least one change of state is registered during recording.

12.5 Show and hide trigger information

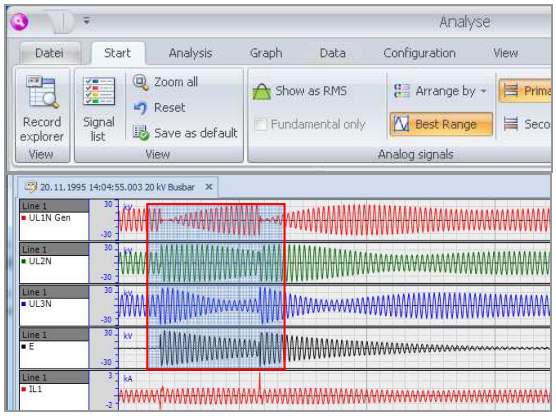
In the **Trigger signals** band, the type and duration of all the limit value violations which occurred during recording are displayed. This shows when and for how long which limit value was violated within the record.

The display of the extended trigger information by means of binary signal display can be shown or hidden.

- In the **Trigger signals** group, select the **Show band** check box

12.6 Zoom functions

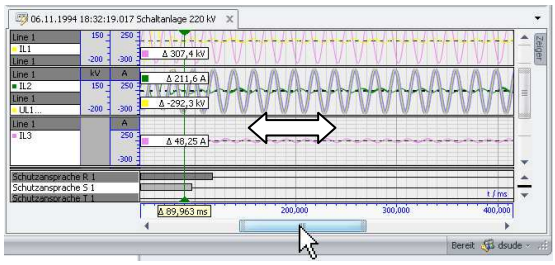
12.6.1 Window zoom



- Use SHIFT + left-hand mouse button to drag open a zoom window around the area to be displayed

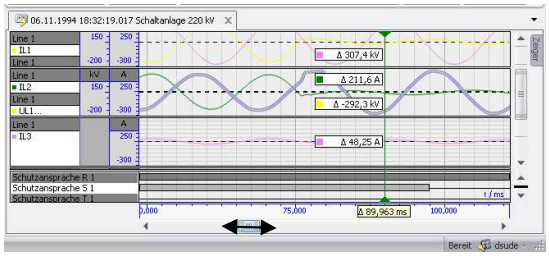
The selected area is zoomed to the maximum display size.

12.6.2 Smart bars



- Use the left-hand mouse button to move the sliders on the horizontal and vertical scroll bar

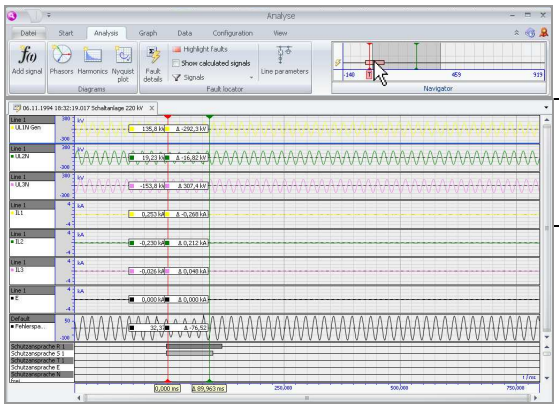
The zoomed area of the image is moved.



- Position the mouse pointer on the ends of the slider which are marked in grey

The mouse pointer takes on the form of a double-headed arrow and the left-hand mouse button can be used to operate the zoom.

12.6.3 Bird view (navigator)



The ribbon features a navigation window which provides an overview of the entire length of the record and the current cursor positions.

The navigation window is hidden if the window is not wide enough to display the groups of commands and the navigation window!

The (zoomed) time range currently visible in the analysis window is shown with a grey background in the navigation window. Via the grey area, the view can be moved and its size modified (zoomed) with the left-hand mouse button.
The navigator can also be used to move the position of the measurement cursors.

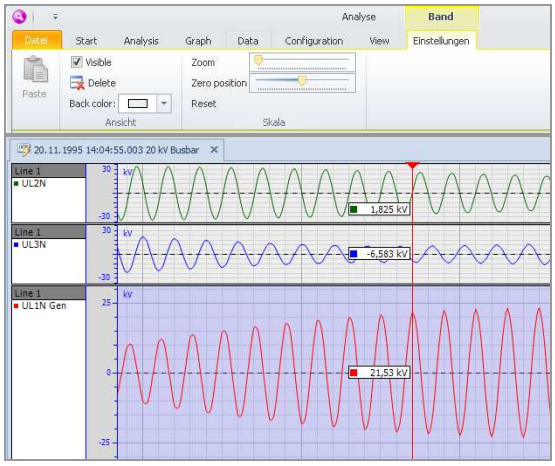
12.6.4 Amplitude zoom of individual signal bands

Using the mouse, the individual signal bands can be selected or moved and their amplitude magnified.

- Position the mouse pointer at the bottom edge of a band.

The mouse pointer takes on the form of a double-headed arrow and the signal band can be zoomed as required.

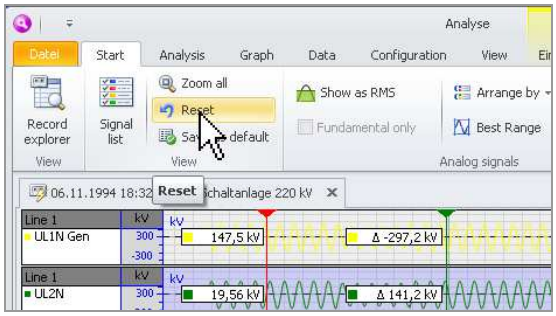
12.6.5 Edit the scaling factor and the offset of individual signals



Individual signals can be zoomed in on and moved within the band.

- Select a band
- The **Band** tab is displayed in the quick access toolbar
- Click the **Band** tab
- The tab for editing bands is displayed
- Use the **Zoom** slider to set the scale of the amplitude within the band
- Use the **Zero position** slider to set the offset of the signal within the band

12.6.6 Undo zoom functions



➢ On the **Start** tab, click the **Reset** button

The zoom functions carried out since the last time the view was saved are undone.

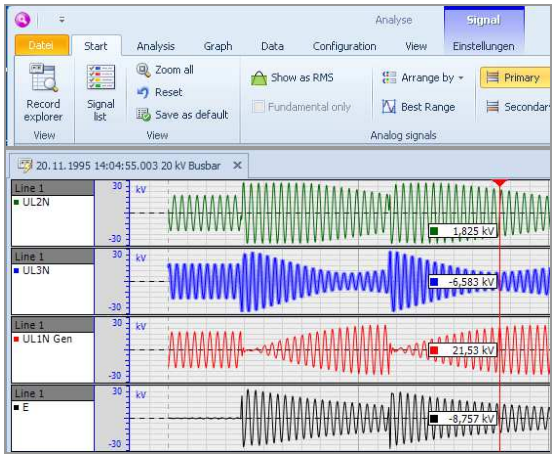
12.6.7 Move signals with the mouse

Change the order of the signals

➢ Select a band

➢ Keep the left-hand mouse button pressed and move the band to the required position

When the band is moved, the insertion location is shown in blue.



Superimpose signals

To superimpose signals, several signals can be displayed in one band.

➢ Select a signal

➢ Keep the left-hand mouse button pressed and move the signal into another band

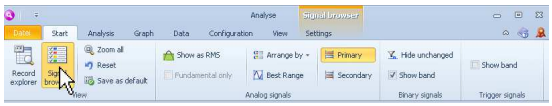
The target band is highlighted during the movement.

Separate superimposed signals

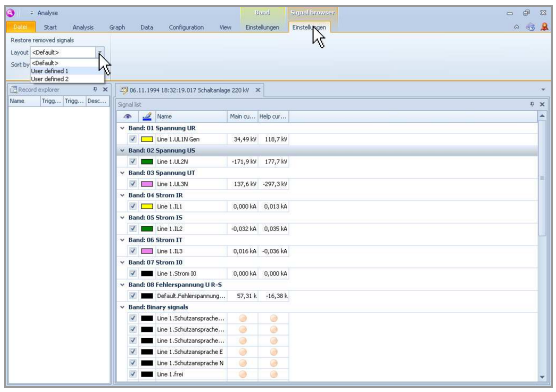
➢ During the movement, position the mouse pointer between two bands so that neither of the bands is highlighted.

The selected signal is added as a new band.

13 Signal browser



➢ On the **Start** tab, click the **Signal browser** button.

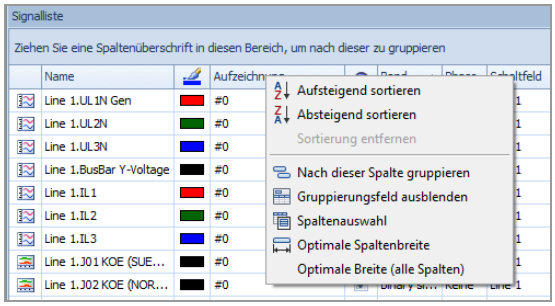


The signal browser is called up.

The signal browser shows all the analog and binary channels of the record as well as their measuring ranges or states at the cursor positions.

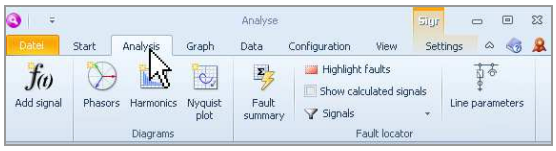
User-defined views

Two user-defined views can be saved and called up in the **View** group.



When one of these user-defined views is called up, a right-click on the column heading opens a context menu in which the view can be defined.

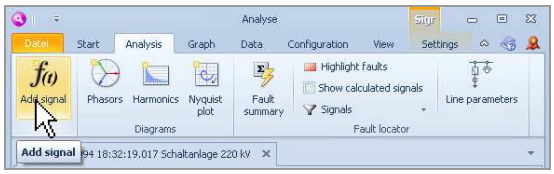
14 Analysis functions



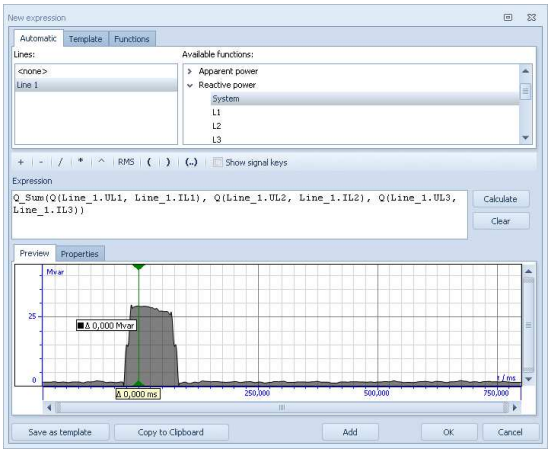
All the analysis functions can be called up from the **Analysis** tab

14.1 Use mathematical calculations to add signals to fault records

A formula editor can be used to make further mathematical calculations within fault records. The results can be added to the fault record as an additional signal.



➢ On the **Analysis** tab, click the **Add signal** button



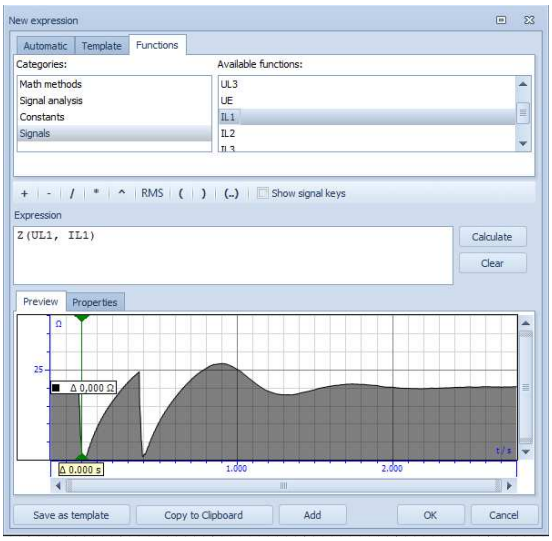
The **New expression** window is called up

Automatic

This tab makes available those calculations which automatically result from the signal types and phase allocations of the channels in the record which is open at the time. For example, if the phase reference between current and voltage channels is defined in the record, the calculation formulae for power which can be derived from the phase reference are offered directly.

Template

Using the **Save as template** button, individual formulae can be saved in the template for later use.

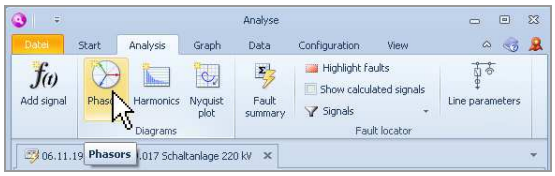


Functions

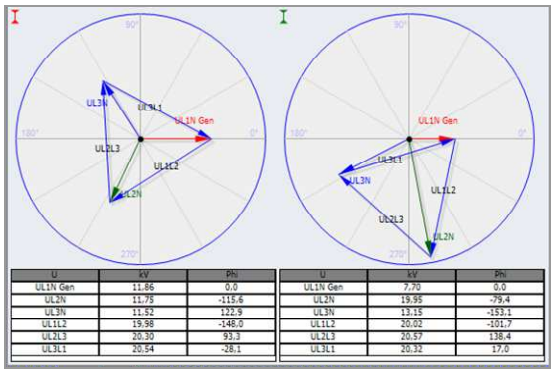
Users themselves can define all kinds of virtual channels with the aid of the functions provided. Access is given to mathematical functions, formulae for signal analysis (unbalance, frequency, harmonics etc), constants and all the channels in the record which is currently open.

14.2 Vector analysis

Power systems which exist in the record (e.g. a line or a bus bar) can be displayed with their value and phase angle in the form of a vector diagram. Any number of vector diagrams can be opened; the view can be set individually for each one.



➢ On the **Analysis** tab, click the **Phasor** button.

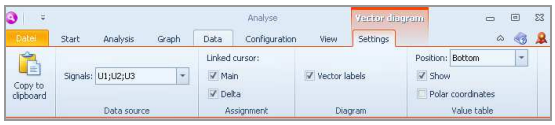


The vector diagram is called up.

In addition to the graphical display, the signals displayed in the vector diagram can also be displayed numerically in table form.

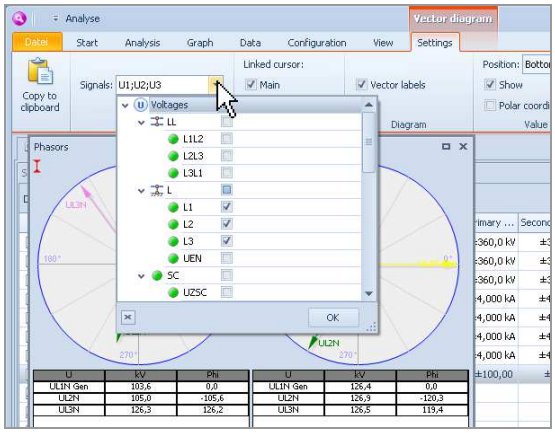
The vector diagram displays the values corresponding to the current position of the main and/or help cursor.

The reference quantity in the diagram is always the voltage of phase 1 with the phase angle 0°. The direction of rotation is to the left (mathematically positive) so that a phasor at 90° has a 90° lead on voltage UL1.



The functions available for the vector diagram are displayed in the ribbon.

If more than one vector diagram is open, the functions are applied to the diagram which is currently selected.



The signals to be displayed can be selected in the **Data source** group.

The cursor for which a vector diagram is to be shown can be specified in the **Assignment** group.

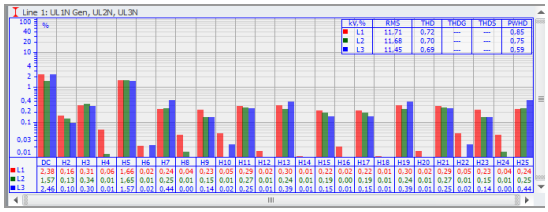
The vector labels can be shown/hidden in the **Diagram** group.

The table view can be edited in the **Vector table** group.

14.3 Harmonic analysis

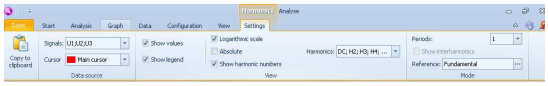
Harmonics can be displayed in a bar chart for analysis. Any number of bar charts can be opened; the view can be set individually for each one.

➢ On the **Analysis** tab, click the **Harmonics** button



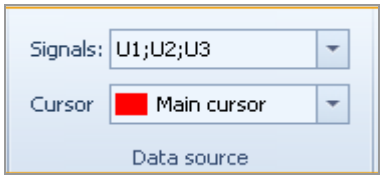
The bar chart for the analysis of harmonics is displayed.

The measurement value of each of the harmonics can be displayed numerically beneath the chart.

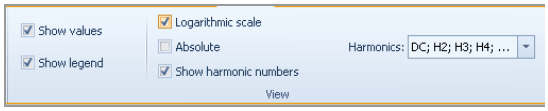


The functions available for harmonic analysis are displayed in the ribbon.

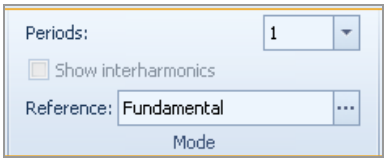
If more than one bar chart is open, the functions are applied to the chart which is currently selected.

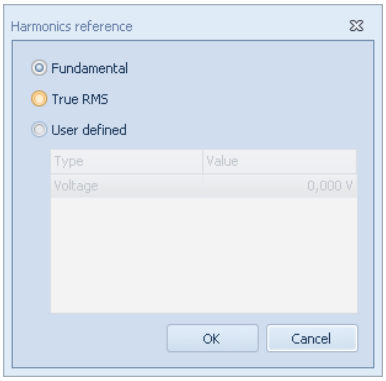


The signals to be displayed can be selected in the **Data source** group.
It is also possible to specify which of the cursors is to be used for the analysis.



The chart view can be edited in the **View** group and the user can select the harmonics to be displayed. Which harmonics are available depends on the sampling rate of the record which is to be analysed.





Mode

Periods:
It is possible to define the number of periods used for the calculation of the harmonics. The calculation window is arranged symmetrically around the selected measurement cursor.

If the calculation is carried out across a number of periods, it is possible to show the resulting interharmonic signals.

Reference:
The following options can be chosen as the reference for the calculation of harmonics.

Fundamental:
RMS value of the system frequency component

Whole signal:
RMS value of the whole signal: TrueRMS

User-defined value:
Freely configurable value, e.g. for the calculation of harmonics with reference to defined rated values (Total Demand Distortion).

kV,%		RMS	THD	THDG	THDS	PWHD
	L1	103,5	1,04	---	---	1,67
	L2	104,9	1,17	---	---	2,50
	L3	126,3	1,26	---	---	1,02

In addition to the RMS value of the whole signal (**RMS**) and the total harmonic distortion (**THD**), the **Legend** displays the following quantities in accordance with IEC 61000-4-7.

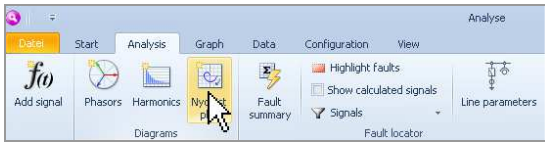
THDG --> Group distortion

THDS --> Subgroup distortion

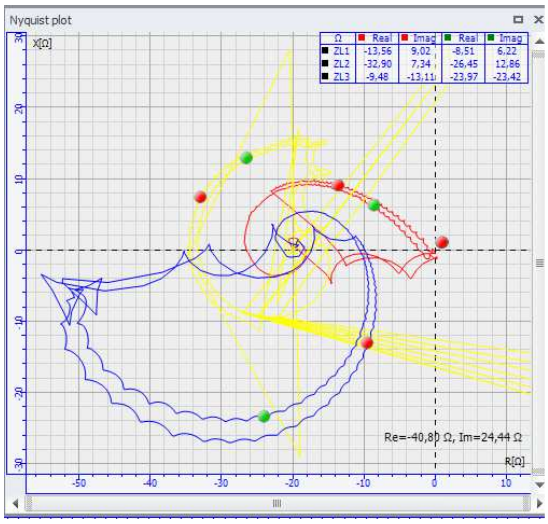
PWHD --> Partially weighted distortion

14.4 Nyquist plots

Recorded signals can be displayed in a Nyquist plot.

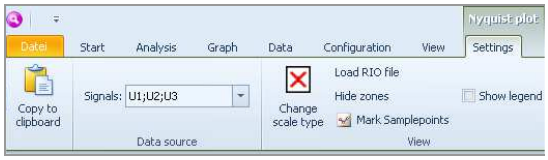


➢ On the **Analysis** tab, click the **Nyquist plot** button



The Nyquist plot is displayed.

The current cursor positions are shown as coloured points in the Nyquist plot.



The functions available for the Nyquist plot are displayed in the ribbon.

If more than one Nyquist plot is open, the functions are applied to the diagram which is currently selected.

The signals to be displayed can be selected in the **Data source** group.

The plot view can be edited in the **View** group.

It is also possible to import the operating characteristic of protection devices using the RIO format. This allows the actual relay characteristic to be superimposed on and compared with the fault impedance.

14.5 Fault location

The method implemented for fault location is based on the fact that the imaginary part of the impedance (reactance) of an electrical high-voltage line is proportional to the length of the line and independent of the arc resistance and the arc base resistance. This means that if the abovementioned line parameters are known, the fault location can be inferred from the characteristic of the fault current and voltage (conductance method).

To ensure that sudden, large variations in the load are not identified as faults, the starting threshold for the fault locator can be defined individually for the phase and neutral currents using overcurrent factors.

14.5.1 Set line parameters

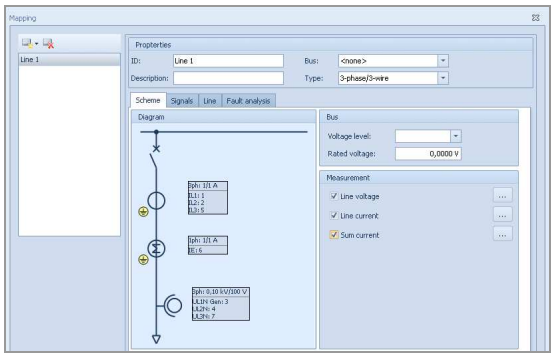
For SHERLOG CRX measuring systems

The parameters which are required for fault location, such as line impedances, capacities, coupling to parallel lines, starting thresholds etc are set in the device configuration (Electrical environment) of SHERLOG CRX and automatically belong to every fault record. However, the analysis software also offers the options of entering or editing line parameters subsequently during analysis. This is necessary when, for example, fault location is to be carried out for consolidated fault records made by various different SHERLOG CRX devices.

For individual records

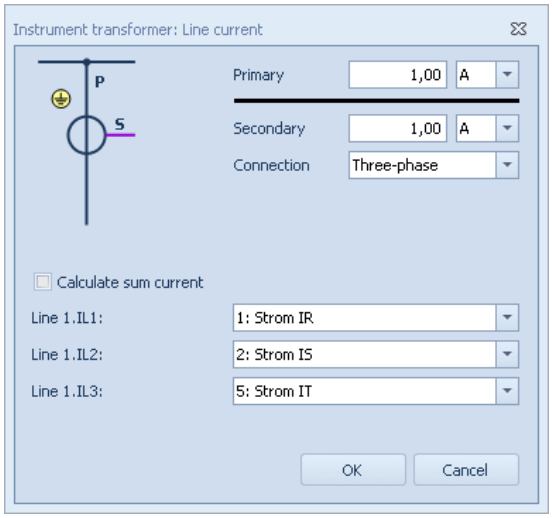
If a record from an external device such as a protection relay is available as a COMTRADE file and is to be analysed, the line parameters can be entered in the analysis software.

➢ On the **Analysis** tab, click the **Line parameters** button

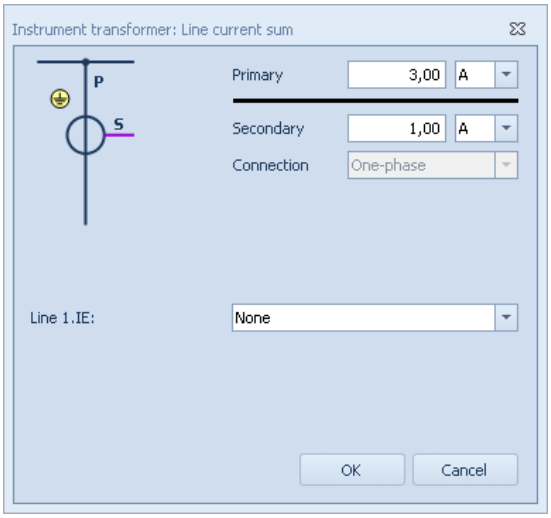


A window is opened with the line diagram identified from the record.
In the case of imported COMTRADE records, automatic assignment is not always possible, depending on the execution, and bus bars and/or lines must be added manually using the buttons.

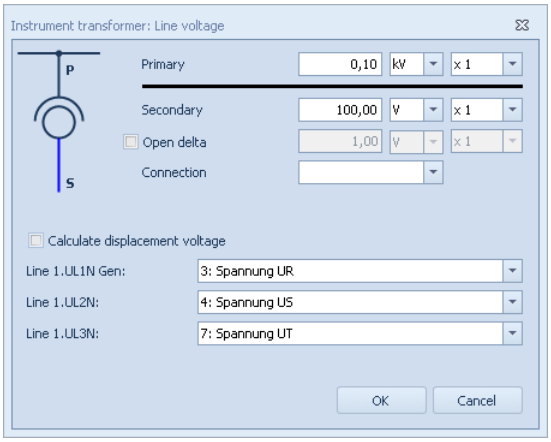
Click the info boxes next to the icons for current and voltage transformers to open the window for setting the channel allocation and the transformer ratios



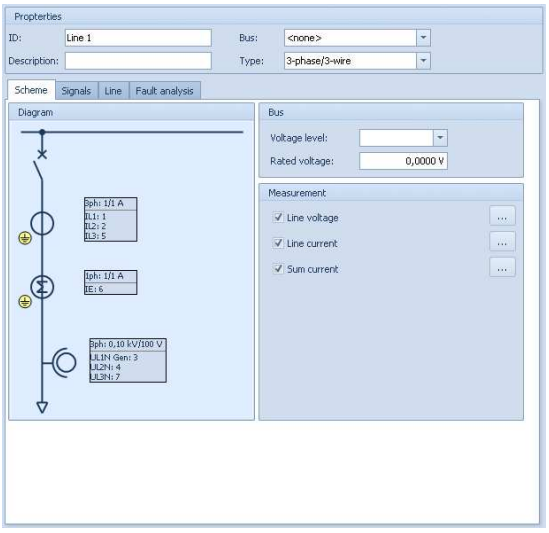
Setting for a current transformer with channel allocation



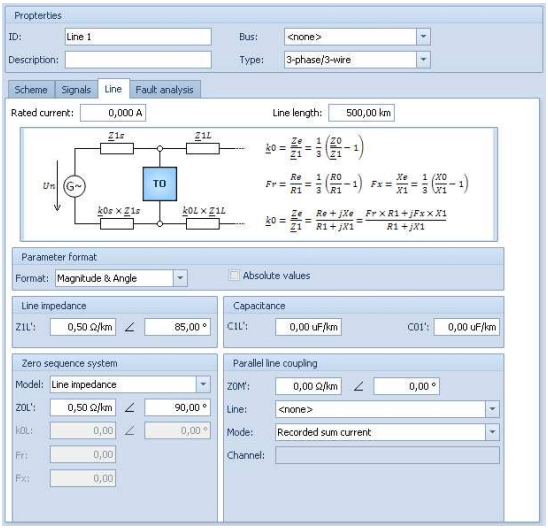
Setting for a summation current transformer with channel allocation



Setting for a voltage transformer with channel allocation



Once the line diagram has been fully configured, the appropriate line parameters can be assigned on the **Line** tab.



Set line parameters for a power system

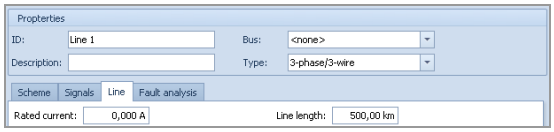
- Switch to the **Line** tab
- Enter the rated current and the line length
- Choose the entry format

Z1L: positive-sequence impedance, essential.

Z0L: zero-sequence impedance, essential.

C1L: line capacity, optional.

Z0M: Required for parallel lines.



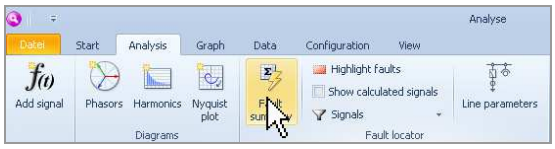
Enter starting threshold for fault location

- Switch to the **Fault analysis** tab

The starting thresholds for the phase-phase and neutral currents are set as factors in relation to the rated current entered in the line parameters. If the resulting overcurrent is reached within a fault record, fault location is automatically carried out for the time range concerned.

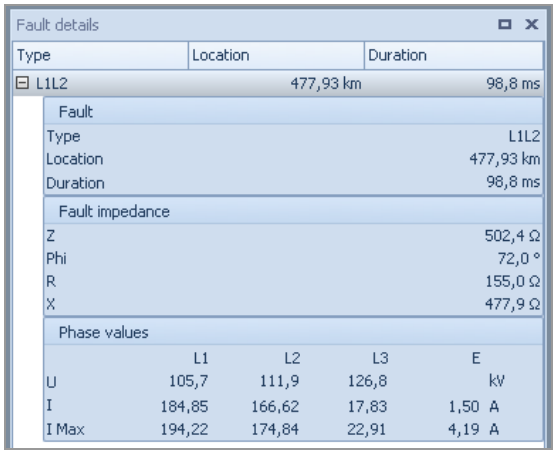
14.5.2 Carry out fault location

Fault location is automatically carried out for every record which is open using the configured line parameters. Different display functions are available for the graphical and numerical evaluation. These are described in detail below:

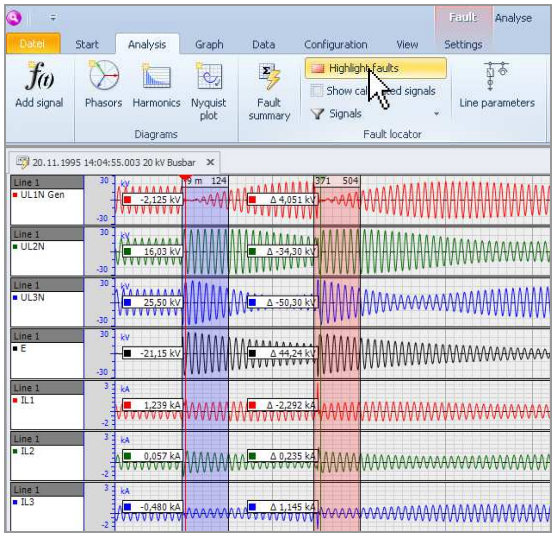


Fault details

- On the **Analysis** tab, click the **Fault details** button.



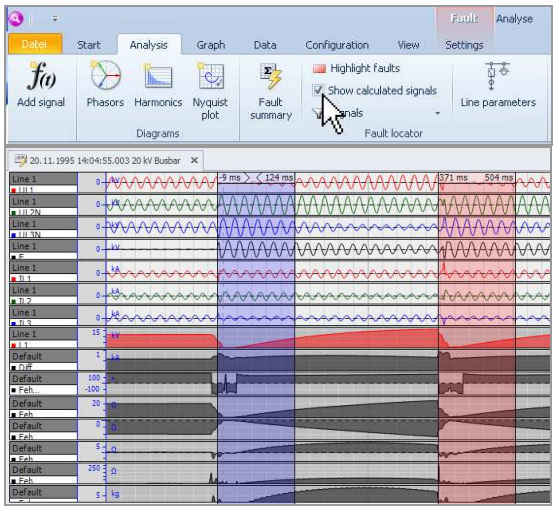
A window is displayed with detailed information on every fault identified in the record, including the fault type, fault impedance and distance-to-fault.



Highlight faults

- Click the **Highlight faults** button

Colour is used to highlight those areas in which faults have been identified and for which the data for the **Fault details** has been calculated.



Show calculated signals

- Select the **Show calculated signals** check box

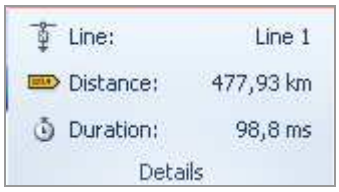
This function supplements the fault record with mathematical signals calculated automatically within the scope of fault analysis.

The values to be displayed can be selected on the **Fault/Settings** tab. See below for more information.

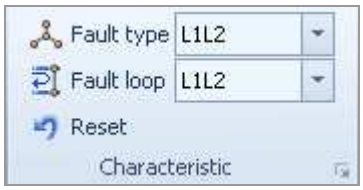
Fault/Settings tab

- Click the **Fault** button

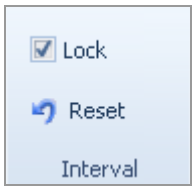
The functions for fault analysis are displayed in the ribbon.

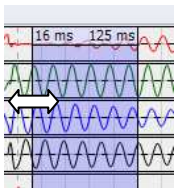


The distance-to-fault and the fault duration of the fault area selected in the record are displayed in the **Details** group.

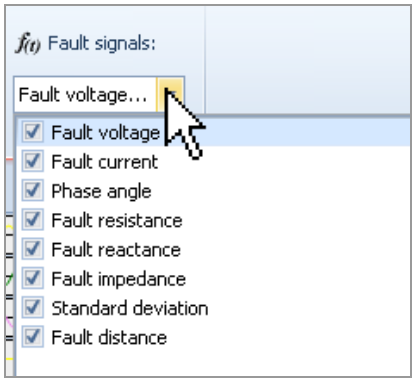


The **Fault type** and **Fault loop** parameters used for fault location are displayed in the **Characteristic** group. They can be edited manually if required.





When the **Lock** check box in the **Interval** group is cleared, the time range for the calculation of the fault location can be edited manually.
To do so, use the mouse to move the left-hand or right-hand edge of the time range which is marked in colour. Afterwards the fault data is automatically recalculated and displayed.

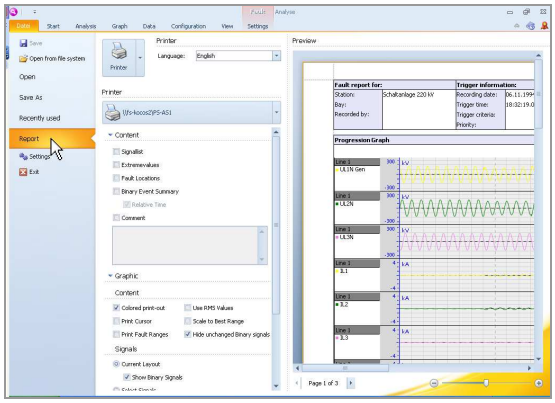


In the **View** group, the user can select which mathematical channels of the record are to be displayed when the **Show calculated signals** button is clicked.

15 Create fault reports

15.1 SHERLOG report function

The SHERLOG report function can be used to create fault reports and print them out directly or save them as a file.



➢ On the **File** tab, click **Report**

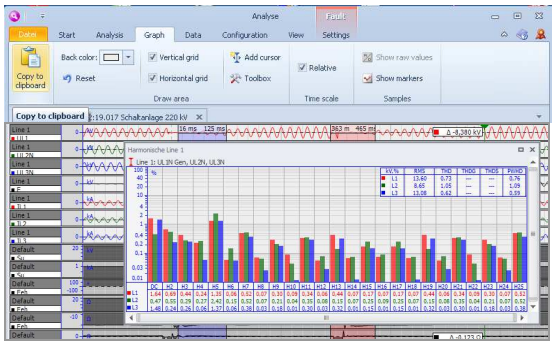
A window for setting the report parameters, such as language, output (printer or file), content, formatting etc. is called up.

The preview window is automatically updated after every change.

➢ Start report output by clicking the **Printer**/**File** button

15.2 Create customized reports

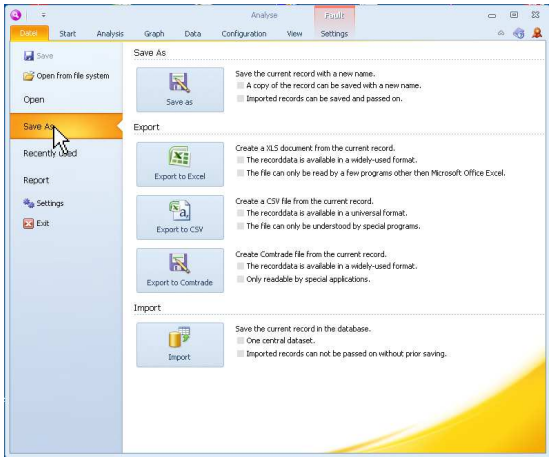
For the creation of customized reports, all graphs and tables of results can be copied to other Windows applications as vector graphics using the Windows clipboard.



Copy graphs with the Windows clipboard:

➢ Switch to the **Graph** tab
➢ Click the window which is to be copied
➢ Click the **Copy to clipboard** button

16 Data export and import



All export and import functions can be accessed in the **File** menu under **Save as**.