Manual

10/09 MN01219003Z-EN
replaces 10/09 AWB1230-1459GB

NZM-XPC-Soft
NZM Diagnostics
DMI Configuration

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Original Operating Instructions
The German-language edition of this document is the original operating manual.

Translation of the original operating manual
All editions of this document other than those in German language are translations of the original German manual.

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See revision protocol in the "About this manual" chapter

Production: Thomas Kracht
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Contents

About This Manual

This manual describes how the NZM-XPC-Soft software functions. This software is used for:

- The display of operating data and diagnosis of the operating and release response of circuit-breakers in the NZM 2, NZM 3 and NZM 4 series, → chapter 4.
- The display and parameter assignment of the data for the Data Management Interface (DMI), → chapter 5.

A general overview of the user interface and the functions of the software can be found in chapter 3.

Additional manuals

Hardware and engineering:
Circuit-Breaker Communication System Manual
(MN01219002Z-EN, previously AWB1230-1441GB)

Writing Conventions

For clarity of layout, we adhere to the following conventions in this manual: at the top of left-hand pages you will find the Chapter heading, at the top of right-hand pages the current Section heading; exceptions are the first pages of Chapters and empty pages at the end of Chapters.

The symbols used in this manual have the following meanings:

▶ Indicates instructions to be followed.

Draws your attention to interesting tips and supplementary information.

Caution!
warns of the risk of material damage.

List of revisions

From the 10/09 edition the manual AWB1230-1459GB has been renamed to MN01219003Z-EN.
The following significant amendments have been introduced since the previous issue:

Edition date	Page	Keyword	new	Modification
09/05	11	"System requirements"		✓
	13	Note for "Start program"	✓	
	23	"Language setting"		✓
	32	"Key to type references for UL/CSA approved devices"		✓
	42	"Tripping characteristic"	✓	
	48	"Trends"	✓	
	58	"Protocolling"	✓	
	76	"Demo mode NZM"	✓	
	98	Note under the table	✓	
	104	Note: DMI parametric programming "Hardware val. active"	✓	
	105	"Tripping characteristic"	✓	
	110	Note extended		✓
	117	Note for warning or trip signals	✓	
	129	"DMI demo mode"	✓	
10/09	21	Setting the COM port"		✓
	43	Note about file "CurveSelect" added	✓	
	88	"Possibilities for signal assignment of the DMI outputs"		✓
	92	"Parameters"		✓
	96	"Identification and DMI settings"		✓
	106	"Tripping characteristic", note added		✓
	118	"Firmware update"		✓
	131	Explanation in glossary	✓	
	133	Addition to glossary		✓

1 About NZM-XPC-Soft

Features and functions

NZM-XPC-Soft is the PC user interface for the display of operating data and diagnosis of the operating and release response of circuit-breakers in the NZM 2, NZM 3 and NZM 4 series. Depending on the frame sizes and area of application, different electronic control units in addition to thermomagnetic releases are used for these circuit-breakers.

With this tool, the communication link between the PC software and an electronic trip unit in the NZM is implemented via a serial point-to-point connection. A special data transmission cable (→ section "Establishing communication link to NZM" on page 27) is used for the interface converter, so that the supply voltage for the trip unit can be taken from the mouse or keyboard port on the PC.

NZM-XPC-Soft is also used for the display and parametric programming of data in the data management interface (DMI). The DMI parameters can be predefined in a simple manner via software before they are connected to the circuit-breaker. The NZM parameters loaded into the DMI via the software, are transferred to the circuit-breaker when the DMI to NZM communication link is established. Communication of the PC software with the DMI is effected via a serial point-to-point connection. The DMI-PC cable serves as the special data transmission cable (→ section "Establishing communication link with DMI" on page 85).

NZM-XPC-Soft consists of two program sections: NZM and DMI.

The program section for the NZM circuit-breaker offers the following functions for commissioning as well as for service routines and diagnosis:

- Reading the identification data of the circuit-breaker and the electronic trip unit, such as type, function, serial number, rated current, additional module, etc. at the machine.
- Display of the up-to-date status data and currents of the onsite circuit-breaker.
- Onsite reading, evaluation and storage of diagnostic and status data.
- Tripping the circuit-breaker by means of a command signal.
- Evaluation and analysis of diagnostics and status data which was saved previously
- Display of the tripping characteristic of the circuit-breaker
- Export of the tripping characteristic into the "CurveSelect" characteristics program
- Recording of current trends for the phase currents, the neutral current conductor and the earth fault current
- Protocolling of events and currents in a text file
- Demo mode with NZM simulation.

The program section for the data management interface DMI provides the following functions:

- Reading of the DMI parameters, such as language, standard displays and conditions for setting outputs.
- Reading the circuit-breaker parameters stored in the DMI.
- Setting of DMI parameters and downloading into the DMI.
- Setting of the circuit-breaker parameters and download in the DMI.
- Deleting and loading of the DMI firmware.
- Switch-on and selection of the motor-starter function, selection of the switching device, entry of changeover time for star/delta switching.
- Switching on the "Remote operator" option
- Configuration of circuit-breaker signals and alarm messages in the DMI outputs
- Display and print out of the assignment of the DMI inputs and outputs

- Parametric programming of the input I0 as an acknowledgement input.
- Display of the tripping characteristic for the set circuit-breaker parameter
- Export of the tripping characteristic into the "CurveSelect" characteristics program
- Demo mode.

Product structure

NZM-XPC-Soft is a PC software that is installed via its own setup program, and can run autonomously.

To get a printout or a page preview, you will need Microsoft® Internet Explorer, Version 5.5 or above. If necessary, this can be installed from the installation CD.

In order to process XML files the Microsoft® XML-Parser MSXML, Version 3.0, is still required. If this parser is not present it is also installed with the setup of the NZM-XPC-Soft.

Microsoft® Excel is required for export of the tripping parameters in the "CurveSelect" characteristics program. "CurveSelect" can be installed by the setup of the NZM-XPC-Soft in the program folder under "\CurveSelect".

2 Installation

System requirements

The following are prerequisite for the installation of NZM-XPC-Soft:

- PC with Pentium IV processor or comparable type
- 512 MByte main memory (1 GByte recommended)
- XGA graphic card (1024 × 768)
- Hard drive with about 100 MByte available memory
- CD drive (for installation from product CD)
- Windows 2000 SP4/XP SP2/Vista SP1/Windows 7
- Internet Explorer® from V5.5
  (IE 6.0 is included on the product CD)
- Adobe Reader® from V7.0
  (AR is included on the product CD)
- Microsoft Excel® from 2000 (for "CurveSelect").

How to install NZM-XPC-Soft

Requirements:

- You require administrator rights in order to undertake the installation under Windows.
- If you have not yet installed Microsoft® Internet Explorer Version 5.5 or above on your PC, please install it from the CD first.

Procedure:

▶ Close all programs.

▶ Insert the installation CD into your CD ROM disk drive.

The start-up image of the installation program will appear.

→ If the start page is not automatically displayed after the CD has been inserted, please use one of the following alternatives: Select ‹Control panel → Software "Add new programs"› or select the "Run" command in the Windows Start menu and start the program "setup.exe" on the CD-ROM.

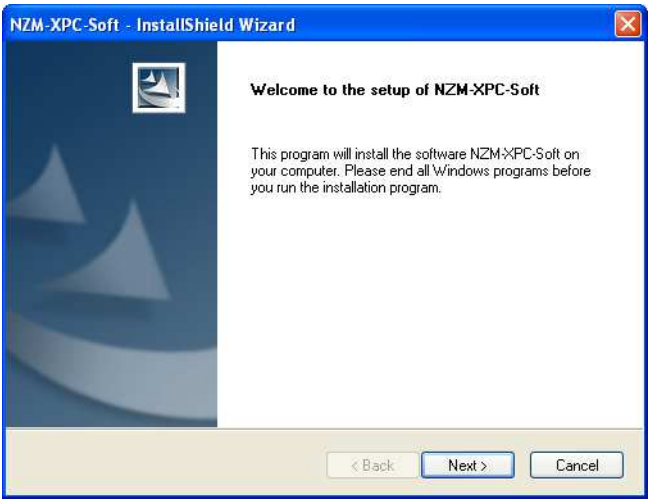


Figure 1: Start-up screen for installation

▶ Follow the instructions of the installation program and answer each question with "Yes" or "Next".

A message will appear as soon as the installation is successfully completed. The "setup.exe" program will then be closed.

3 General program functions

Start program

▶ Start the program either with the program icon on the desktop or with ‹Start r Programs›.

Figure 2: Program symbol for NZM-XPC-Soft

▶ Select the desired program mode (NZM or DMI) from the start-up dialog.

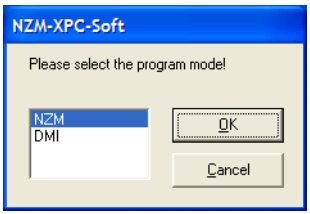


Figure 3: Start-up dialog

▶ Select the device here and confirm with "OK".

The program is ended with "Cancel".

→ Do not start multiple instances of the NZM-XPC-Soft simultaneously! Otherwise you will receive error messages:

Surface

Figure 4: User interface with start-up screen in NZM mode

The operator interface of NZM-XPC-Soft comprises the screen title ①, the menu bar ②, the main window ③ and the split status bar ④ for the link status and the status text.

The **screen title** displays the program name and mode (NZM or DMI). Once you have stored NZM or DMI data, the screen title also shows file name and path.

The **menu bar** of the software is divided into the main menu options "File", "Target system", "Settings" and "?". Further submenu options can be accessed via these main menu options. Depending on the selected program mode, the menu option "Target system" has different submenu options. The "Settings" menu option is inhibited during the communication connection to the NZM with the exception of "Protocolling".

The **main window** is divided into to two sub-windows. The left-hand sub-window contains the navigation tree. This allows navigation to the individual display or parameter allocation pages. Clicking one of the options in the navigation tree causes the corresponding page to be displayed in the right-hand sub-window. Depending on the selected program mode, the navigation tree offers different options.

The **status bar** is split into several parts. A plug symbol in the left-hand section indicates the link status. The plug symbols have the following meaning:

Table 1: Meaning of the plug symbols in the status bar

Plug symbol	Meaning
 (yellow)	The connection to NZM or DMI is in the process of being established, however, no data are available as yet.
 (green)	The connection to NZM or DMI is active, i. e. data are being transmitted.
 (gray)	The connection to NZM or DMI has been cleared.
 (red)	An error has occurred during connection.

Table 2: Output in the status line

Output on the status line from left to right	Explanation
Plug symbol (→ table 1)	Connection state symbolised
"No connection with NZM" "Try to connect NZM" "Active connection with NZM" "Connection fault"	Connection to NZM is disconnected Connection is being established Connection to NZM is active No connection possible
"" (empty) "Demo mode"	Demo mode is switched off Demo mode is active
"" (empty) "Trends on"	Trend recording not active Trend recording is active
"" (empty) "Evt log wait" "Event log on"	Protocolling events not active Protocolling events is activated but not yet started Protocolling events runs
"" (empty) "Curr log wait" "Current log on"	Protocolling currents not active Protocolling currents is activated but not yet started Protocolling currents runs
<F1> Help	Note for access to context-sensitive Help via button <F1>

Functions

File – Open, Save, Save as

▶ Select the menu command ‹File → Open› to open a file containing saved circuit-breaker or DMI data.

The standard Windows dialog "Open file" is shown. The default file type is "XML files (*.xml)". Search for the file in the directory tree and highlight the selected file. By pressing the "Open" button the selected file is opened and the data is read.

▶ Select the menu command ‹File → Save as› to save the current circuit-breaker or DMI data to a new file.

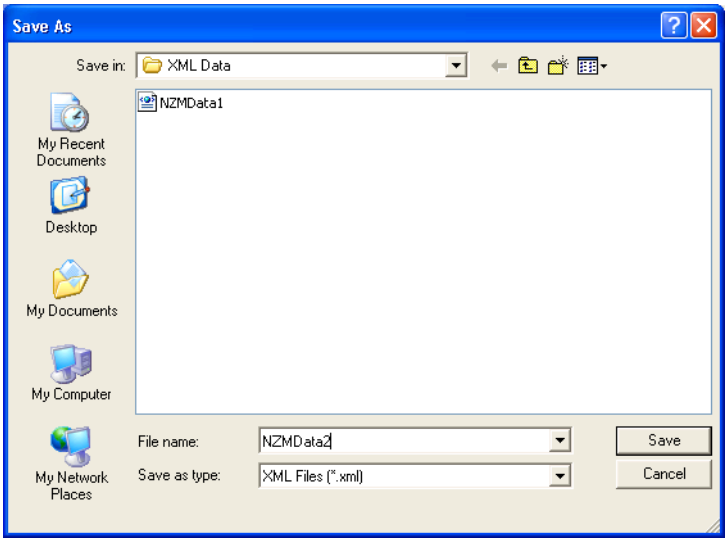


Figure 5: Standard dialog "Save as"

The standard Windows dialog "Save file as" will be opened. Select the desired disk-drive and directory here, and enter the file name under which you want to save the NZM or DMI data. The program suggests a file name, but you can change this if you wish. If 'XML files (*.xml)' is set as file type, there is no need to enter a file extension.

▶ Select the menu commands ‹File → Save› to save the current circuit-breaker or DMI data to the open file. The path and file name for the target file (where the are data being saved) are shown in the NZM-XPC-Soft screen title.

→ The "Save" option is only enabled as soon as either a file has been opened or a file has been generated via the menu command ‹File → Save as›.

File – Print preview, Print

▶ Select the menu command ‹File → Print preview›, if you wish to view the current data in the print view.

The current circuit-breaker or DMI data will be converted into in the predefined print format (⟶ section "Printing NZM data" on page 74 or section "Printing DMI data" on page 127) and shown in the "Print preview" window. You can print out the view immediately by pressing the "Print" button. You return to the program via the "Close" button.

▶ Select the menu command ‹File → Print› to print out the current data without first changing over to the page preview.

The standard Windows "Print" dialog will be opened. Here you can select the desired printer, the range of pages and the number of copies to be printed, and make other settings before printing out the circuit-breaker or DMI data.

The circuit-breaker or DMI data will be printed out in portrait view if you accept the predefined print format.

Selecting or changing the program mode

The program has the two program modes "NZM" and "DMI".

When you start the program, the required program mode can be set via a start-up dialog.

▶ To change the program mode, use the mouse to open out the submenu ‹Settings → Device› and click on the required device with the left mouse button.

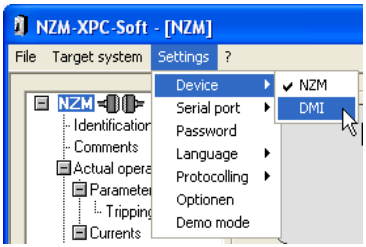


Figure 6: Program mode change

After changing the program mode, the altered navigation tree and the two permanently visible buttons with all the functions and parameter pages for the specific device are available in the altered menu bar.

→ The program settings described below can only be changed offline!

Setting the COM Port

The menu option ‹Settings → Serial port› enables you to set the COM port for serial point-to-point connection.

At program start, the COM ports available on the PC are automatically detected and displayed in the drop-down submenu when the menu option "Serial Port" is called up. Up to 32 different COM ports in the range COM1 to COM256 can be displayed and set up for a communications connection to the NZM or DMI.

Virtual COM ports exist only when the USB cable or the USB2-to-COM adapter has been connected with the PC or laptop. Once connected, close and reopen the Settings menu.

▶ To set the interface, use the mouse to drop-down the "Serial Port" submenu and click with the left mouse button on the desired COM port.

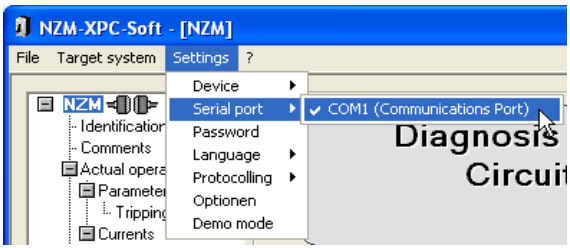


Figure 7: Setting the interface

The interface setting is saved. A different COM port can be set up for connection from PC to NZM and to DMI.

Activate password protection

You can activate password protection in DMI, to protect the switch tripping parameter settings from unauthorized changes. This password will be saved on your PC and checked on each occasion before the command is issued to the NZM to write data into DMI.

The password is identical for both program modes, but can be defined and changed in both the NZM and DMI modes.

- ▶ To activate password protection, click on the menu option ‹Settings → Password›. Enter a valid password in the following input dialog and confirm it once more. A valid password contains at least 4, and at most 10 letters or numbers. Then click on "OK".
- ▶ Change the password by selecting menu option ‹Settings → Password›. In the input dialog, enter you old password and click "OK". In the "New Password" dialog enter a new valid password and reenter it for confirmation. Then click "OK".
- ▶ To deactivate the password, click on the menu option ‹Settings → Password›. In the input dialog, enter you old password and click "OK". In the New Password dialog leave input fields "Input" and "Verification" blank and click "OK".

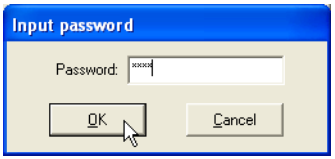


Figure 8: Inputting a password

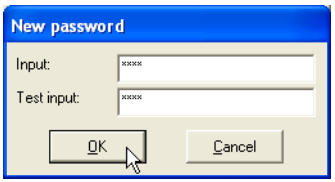


Figure 9: Changing passwords

Language setting

Thus the runtime language can be switched over.

→ The software NZM-XPC-Soft does not support unicode. You must therefore change the language setting in the Windows "Control Panel" when you change the character set (e.g. from a western European to a Cyrillic character set:

- ▶ Start the "Regional and Language Options" in the Windows Control Panel and set the language version for the programs which do not support Unicode under "Advanced" (Windows XP).
- ▶ Then click on "Ok" and restart your computer.

The NZM-XPC-Soft V1.2.0 program user interface currently supports the following languages:

- German
- English
- French
- Italian
- Spanish
- Czech
- Hungarian
- Russian

Other languages can be installed later.

Procedure

▶ The menu option ‹Setting → Language› enables you to set the required language for the parameterization environment. The language changes over as soon as the selection is made.

▶ To change the language setting, use the mouse to drop down the submenu "Language" and click on the required language with the left mouse button.

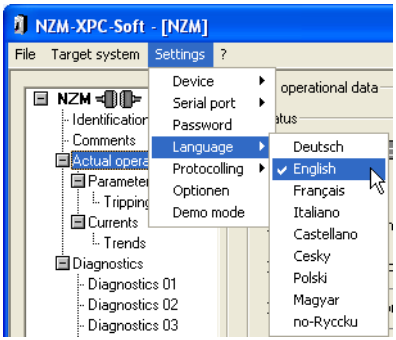


Figure 10: Language setting

→ This setting must not be confused with the DMI parameter "Language" → page 92.

Help

The program includes an extensive program-help file, with the Help functions "Contents", "Index", Search" and "Favourites".

- ▶ To start the program help, click on the required entry in the navigation tree and then click on the ‹? → Help›.
- ▶ Start the context-sensitive program help by pressing the required entry in the navigation tree and then pressing the ‹F1› key, or by using the right mouse button to open the context menu for the navigation tree and clicking on the "Help" entry.

→ After a language change, the context-sensitive help will be called in the language in which it was first started. To avoid this, call up the Help via ‹? → Help› or restart the program.

Display of Tooltips

The Tooltip texts are short explanations to the programming elements of the user interface. If you require more extensive help, call up the program help → section "Help" on page 25.

- ▶ Place the mouse over an element on the program user interface if you wish to view a Tooltip.

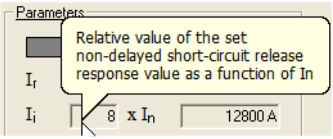


Figure 11: Tooltip

→ Click with the left mouse button to close the Tooltip window; otherwise it will close automatically after 10 seconds.

Program Info

- ▶ The program has an Info window with information about the program version, manufacturer as well as the firmware versions required. You can also find here the build number. You will need to quote these details in any contact with our Product Support team.
- ▶ Select the menu command ‹? → Info› to open the information window.
- ▶ Click on the E-mail address if you want to send a message to Product Support.
- ▶ Close the Info window with the "OK" button.

4 NZM Mode

Establishing communication link to NZM

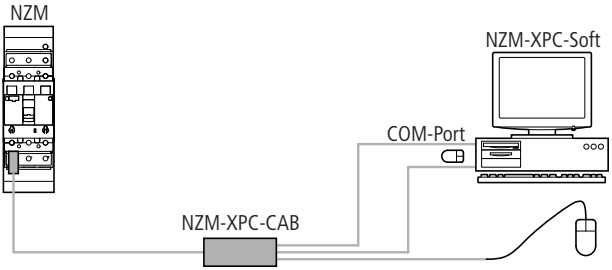


Figure 12: Connection schematic

Connecting the data transmission cable

Caution!
Switch off the PC before connecting the data transmission cable.

- ▶ Connect the data transmission cable (NZM-XPC-CAB) for PC-NZM communication to the electronic control unit (special connector) and the 9-pole connector to a free serial interface of the PC (e.g. COM1).
- ▶ Pull the PS/2 mouse or keyboard plug out of the PC and connect this plug with the coupling to the data transmission cable. Connect the PS/2 plug of the data transmission cable to the free socket on the PC.
- ▶ Start up NZM-XPC-Soft in program mode NZM.
- ▶ To establish the communication link with NZM, activate "Connect" or use the menu command ‹Target system → Connect›.

While the connection is being established, the plug symbol in the status bar and in the root of the navigation tree is yellow.

 (yellow) Trying to connect

Once the connection is successfully established, this plug symbol turns green.

 (green) Active connection

When a connection has been established with circuit-breaker, the actual operating data, parameters and circuit-breaker identification will be cyclically updated. Consequently, the data displayed are always current.

The diagnostic data of the circuit-breaker that are stored in the electronic trip unit are only called up and displayed if you request this.

The electronic trip unit is in diagnostics mode while the diagnostic data is being called up. This means that the operating data and parameters will not be updated while this is taking place.

→ If a connection is not established, this may be due to the following.

- The plug of the data transfer cable on the electronic trip unit and at the PC is not correct.
- The interface setting in NZM-XPC-Soft is not correct (menu option ‹Settings → Serial Port›).
- Another program is using the COM interface. In this case close the other program.

→ On connection establishment NZM-XPC-Soft checks the version of the NZM firmware and the type of NZM connected. If NZM-XPC-Soft detects a type or version that cannot be supported, the connection is removed and an appropriate message is output.

Identification

All the important device data for the circuit-breaker are displayed on the "Identification" page: (NZM) type, function, standard, rated current, N-conductor protection, serial number and firmware version.

If an optional expansion module (e.g. earth-fault release) is fitted, its data will also be shown here: type, hardware and firmware versions.

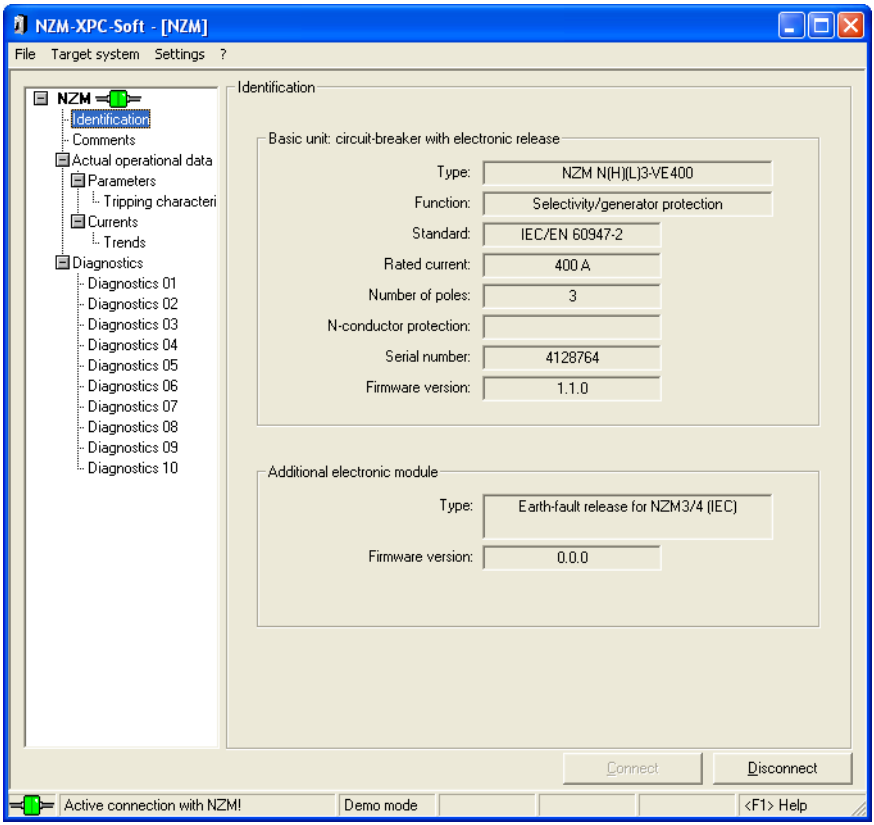
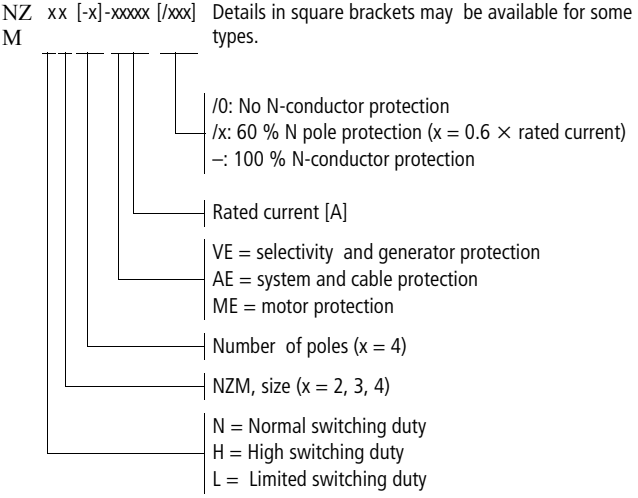


Figure 13: Identification using data

The identification data for the circuit-breaker and module are displayed for the first time when a communication link has been established, or after an XML file containing saved circuit-breaker data is opened. The display is maintained, even after the communication link has been disconnected again.

The type designation for the circuit-breaker includes various coded details that are shown in plain text on the "Identification" page.

Type code for IEC devices



Examples:

- NZMx2-4-VE250 (x = N, H, L)
  - NZM size 2
  - No. of poles 4
  - Selectivity and generator protection
  - Rated current 250 A
  - 100 % N-conductor protection

- NZMx2-4-VE250/160 (x = N, H, L)
  (as above, additionally: /160 = 60 % N pole protection)

- NZMx2-4-VE250/0 (x = N, H, L)
  (as above, additionally: /0 = no N pole protection)

- NZMx3-4-AE400 (x = N, H, L)
  - NZM size 3
  - No. of poles 4
  - System and cable protection
  - Rated current 400 A
  - 100 % N-conductor protection

- NZMx4-ME1400 (x = N, H)
  - NZM size 4
  - No. of poles 3
  - Motor protection
  - Rated current 1400 A

Key to type references for UL/CSA approved devices

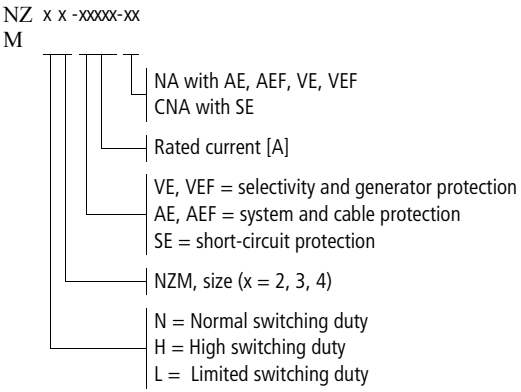


Table 3: Code letters according to area of application

Range of applications	IEC	UL/CSA
Systems/Cable protection	-AE	-AE, -AEF
Selectivity and generator protection	-VE	-VE, -VEF
Motor protection	-ME	
Short-circuit protective device		-SE

Examples:

- NZMx2-VE250-NA (x = N, H)
  - NZM size 2
  - No. of poles 3
  - Selectivity and generator protection
  - Rated current 250 A
  - Switch for North America

- NZMx3-SE220-CNA (x = N, H, L)
  - NZM size 3
  - No. of poles 3
  - Short-circuit protective device
  - Rated current 220 A
  - Switch for North America, C = Component[1)]
    (I_r=permanently set value)

[1)] The circuit-breaker as a component of the overall system is only responsible for short-circuit protection. Further additional devices are necessary for overload protection and ground-fault protection.

- NZMx4-AEF1000-NA (x = N, H)
  - NZM size 4
  - No. of poles 3
  - System and cable protection, fixed device
    (I_r= fixed value)
  - Rated current 1000 A

Comment

The "Comments" page allows you to enter additional data about the circuit-breaker. These data will also be saved when you create a file for circuit-breaker data. Individual details that can be entered and saved are: a name, the distribution circuit ID, the author, and other user information. Date and time of the last modification are also stored.

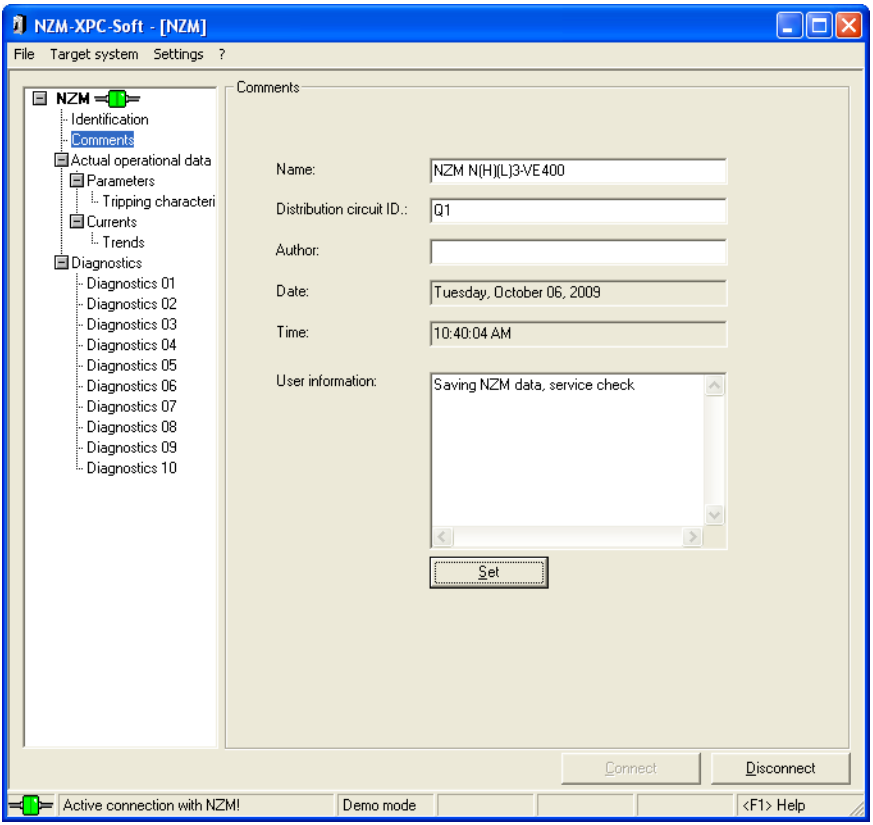


Figure 14: Comments and information entries

▶ Here you can enter the name, circuit ID, author, and other user information. Complete your input with "Set".

Comment

- Date and time are entered or updated when you press the "Set" button.
- You can enter up to 30 characters each for the name, distribution circuit ID and author. In the user information text, manually insert line returns as appropriate.
- The comments entered are only changed if you complete the entry with "Set". If you connect a new NZM and you also want to save its data, then you should update the entries on the information page.

Actual operational data

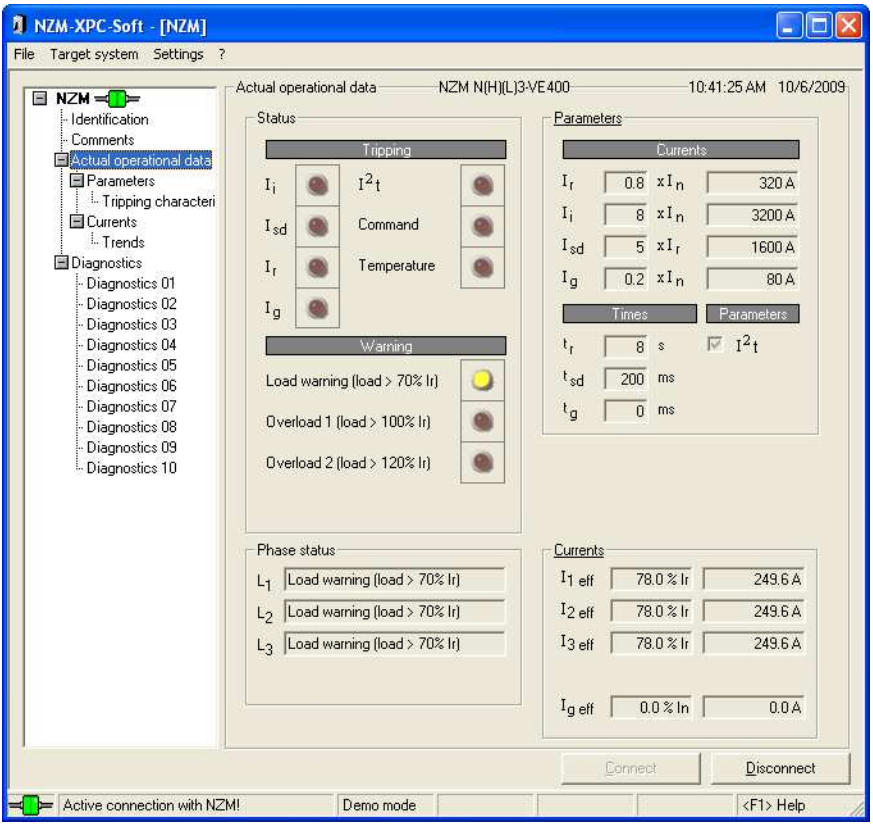


Figure 15: Actual operational data

Status

The status display indicates the cause of a trip and the "motor protection" alarm with a bright red LED symbol. Load, overload or load unbalance warnings are indicated by a yellow LED symbol.

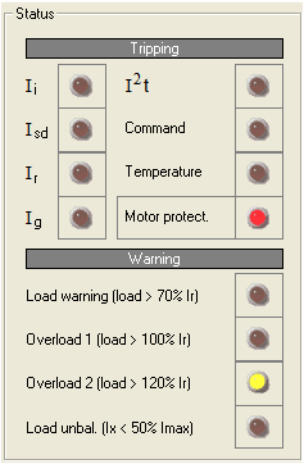


Figure 16: Status display

At every change of status, the electronic trip unit writes the status data, the parameter settings and the phase status into the diagnostics buffer (→ section "Diagnostics" on page 55).

Phase status

The status of phase 1 to phase 4 is displayed in plain text. The following status indications can be used:

- OK
- Load warning (load > 70 % I_r)
- Overload 1 (load > 100 % I_r)
- Overload 2 (load > 120 % I_r)
- Trip

→ If the phase status during a short-circuit release I_i cant be correctly determined "--" is displayed.

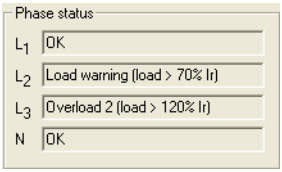


Figure 17: Phase status for overload in L1

Parameters

The parameters being used at present by the circuit-breaker are displayed under "Parameters".

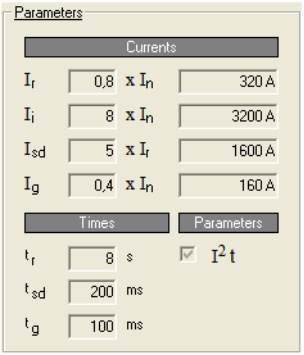


Figure 18: Parameter display on the "Current operating data" page

The response values (current parameters) for overload release (I_r), short-circuit release (I_i), short-time delayed short-circuit release (I_{sd}) and earth-fault release (I_g) are displayed as relative values in n × I_x format. The respective reference current I_x depends on the current parameters and on the NZM type and can be the rated current In or as the case with I_{sd} the parameter value for the overload release I_r.

When an earth-fault release module is built in, the threshold and delay time for this earth-fault release module (I_g, t_g) are also shown.

All currents are also shown as absolute values in Amps. The delay times with the response of the overload release (tr) are shown in seconds (s) and the short-time delayed short-circuit release (t_{sd}) in milliseconds (ms).

The parameter I^2t is only available with electronic releases for sizes 3 and 4 for selective and generator protection. If the parameter is set, this is indicated by a tick in the check box.

On the "Parameters" page the active connection to the NZM is current circuit-breaker parameter is also graphically represented.

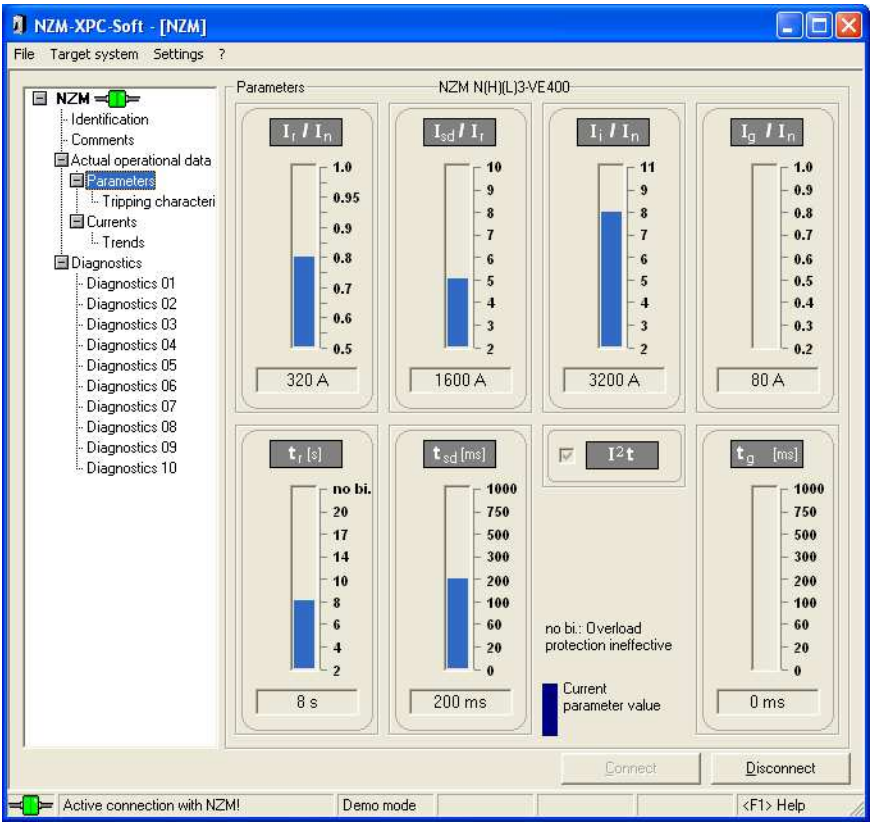


Figure 19: Actual parameters for the connected NZM

The individual graphical symbols and control elements have the following meaning:

Blue bar	The actual value of the parameter used by the circuit-breaker
Text box below bar	Shows the actual value of the circuit-breaker parameter as an absolute value, in [A], [s], or [ms].
I^2t	Shows the parameter I^2t

→ Which parameters are available (and which are fixed or adjustable) varies according to the type of electronic trip unit. Only parameters that are actually available will be shown.

Trip threshold and delay time for the earth-fault release module (I_g, t_g) will only be shown if this optional earth-fault release module is actually present.

→ The parameters of the NZM can be set in three ways:

- Setting directly on the electronic control unit
- Setting of the parameters on the DMI (Input menu → Parameters)
- Setting of the parameters via the fieldbus (PROFIBUS-DP)

If there is more than one value, the power circuit-breaker will always use the lower value in each case!

Tripping characteristic

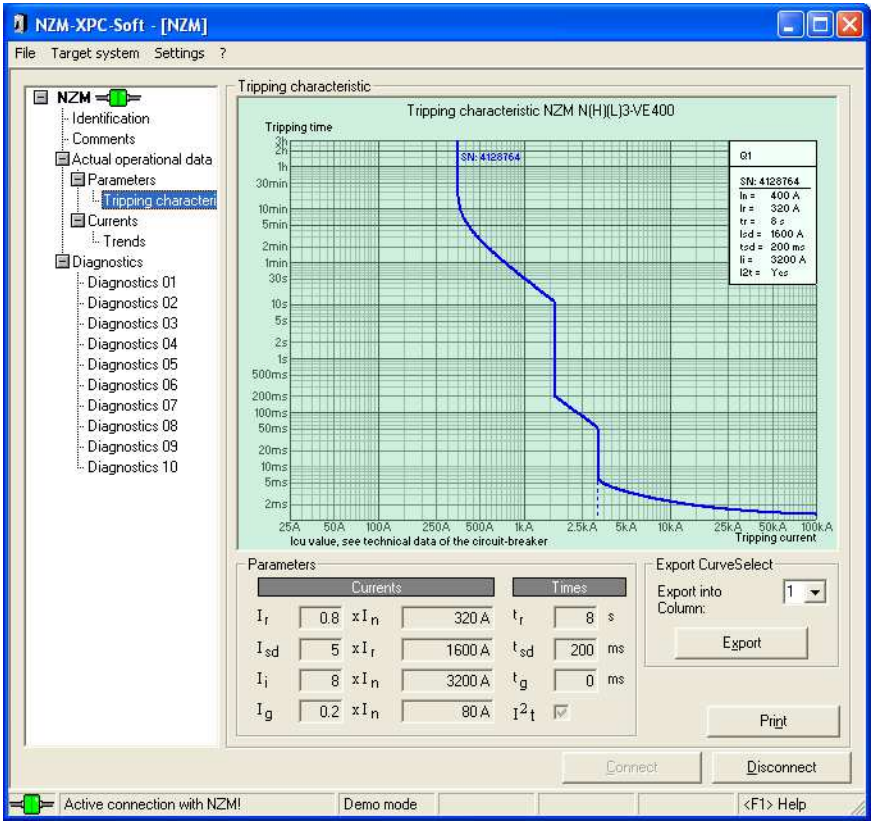


Figure 20: Tripping characteristics of the NZM

NZM-XPC-Soft V2.0 presents the tripping characteristic for the connected circuit-breaker with its specific parameter settings. The NZM parameters are represented as absolute values on the top right in the legend of the characteristic curve. Underneath the characteristic curve the tripping currents are displayed as absolute and relative values, and the delay times are displayed as absolute values.

For example, it is possible to export the tripping characteristic into the "CurveSelect" characteristics program to examine the selectivity (discrimination). This tool for Microsoft® Excel is installed by the NZM-XPC-Soft V2.0 setup in the "CurveSelect" subdirectory under the program folder.

→ You can change the path and the filename of file CurveSelect, to which the characteristics are to be exported, under ‹Settings → Options›. In addition an information window, which shows the path and filename of the CurveSelect file and which can be disabled, is displayed when you click the Export button. If the wrong file is set, you can still cancel the export at this point in time.

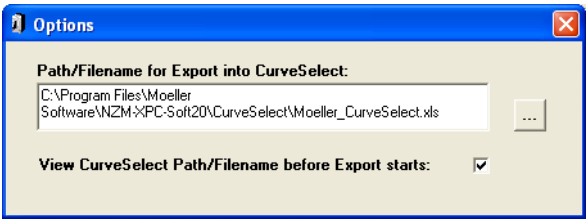


Figure 21: Setting option for the "CurveSelect" file for the export

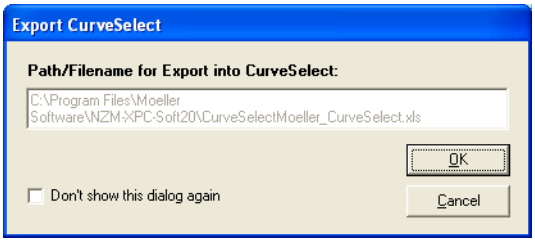


Figure 22: Display of "CurveSelect" file during export

For export into the characteristics program the tripping capacity is assumed to be "N". The setting in the "CurveSelect" should be adjusted to take account of the real switching capacity. Additionally, the mains voltage and the mains frequency should be entered in the characteristics

program. Both values as well as the resulting I_{cu} value are not available in the NZM-XPC-Soft because the NZM electronics do not transfer these values.

Further instructions for representation of the characteristic curve can be found in the "CurveSelect" on the "Read Me" worksheet.

▶ Select column 1, 2 or 3 (corresponds with the input fields 1 to 3 on the worksheet NZM2, NZM3 or NZM4 of the characteristic program) and press the "Export" button. The represented tripping characteristic is then exported to "CurveSelect".

The selection of the column is significant if multiple NZMs of the same size are available and if their characteristics are to be compared with one another in the "CurveSelect". Select the relevant column before every export.

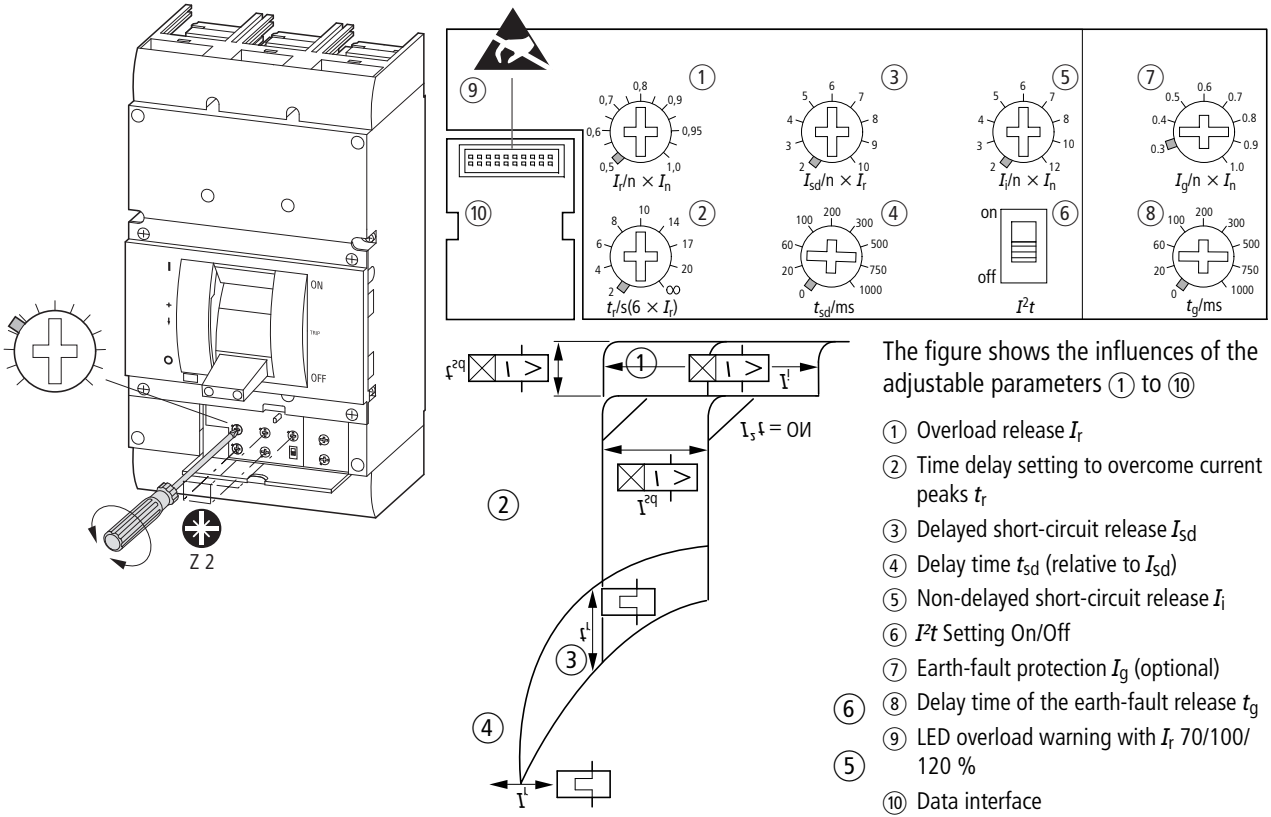
During export Microsoft® Excel is started and then the "CurveSelect" is loaded if it is not already open. Then the NZM type as well as the tripping parameters are entered in the worksheet of the NZM type (frame size). The respective trippingcharacteristic of the NZM is represented in the "Characteristic <> Curves" worksheet.

The tripping characteristic represented in the NZM-XPC-Soft can be printed on a printer.

The selected printer is set as the Windows® default printer as the characteristic curves can only be printed on a standard Windows® printer.

▶ Press the "Print" button on the "Tripping characteristics" page if you wish to print the characteristic on a printer.

Instructions for setting the circuit-breaker parameters via the tripping characteristic:



The figure shows the influences of the adjustable parameters ① to ⑩

① Overload release I_r
② Time delay setting to overcome current peaks t_r
③ Delayed short-circuit release I_{sd}
④ Delay time t_{sd} (relative to I_{sd})
⑤ Non-delayed short-circuit release I_i
⑥ I^2t Setting On/Off
⑦ Earth-fault protection I_g (optional)
⑧ Delay time of the earth-fault release t_g
⑨ LED overload warning with I_r 70/100/120 %
⑩ Data interface

Currents

The display of the effective currents (rms currents) of the three or four phases is implemented as a relative value in percent relative to the overload release current I_r. On the North American types (AEF, VEF, SE) with fixed I_r the relative current in percent is displayed relative to In.

The r.m.s. value of the residual current ($I_{g\,eff}$) is displayed (as a relative % value of the rated current I_n) if an earth-fault release module is fitted.

All currents are also shown as absolute values in Amps.

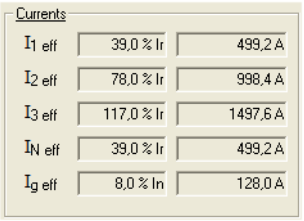


Figure 23: Currents

As well as being shown here as numerical values, the effective (rms) currents $I_{1\,eff}$, $I_{2\,eff}$, $I_{3\,eff}$, $I_{N\,eff}$ and $I_{g\,eff}$ are shown in graphical form on the "Currents" parameter page .

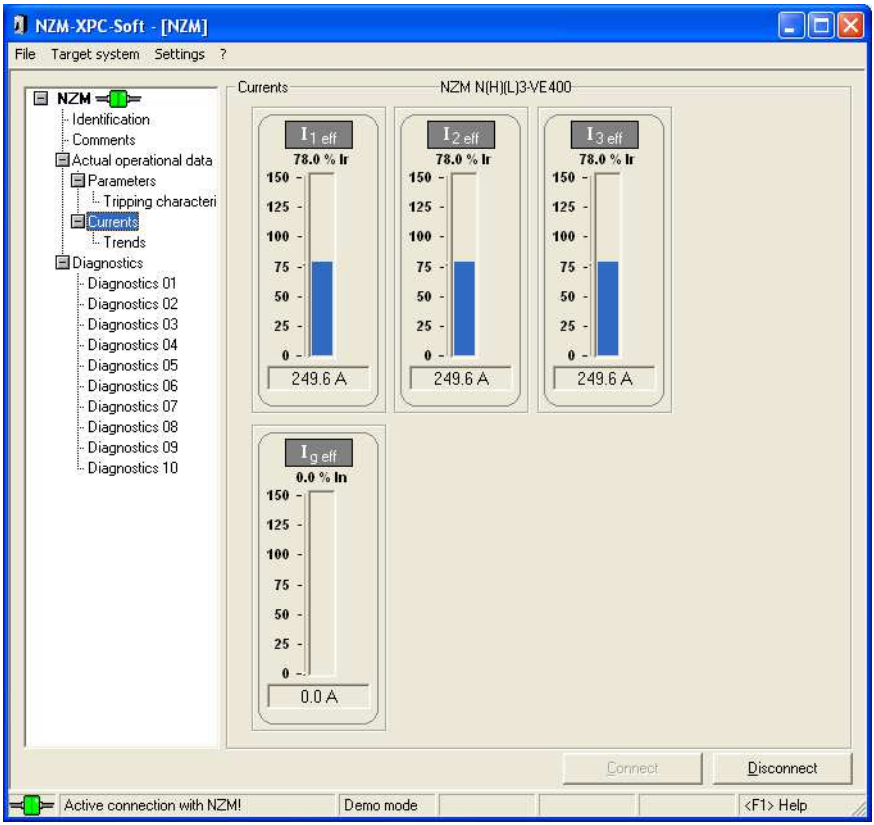


Figure 24: Currents

The bar graph display covers a range of values from 0 to 150 % I_r. Values exceeding 150 % I_r are displayed with a full bar and an arrow pointing upwards. The exact current value can be read as relative value in the text field above the bar. Below the bar graph are shown the absolute current values in Amps.

Trends

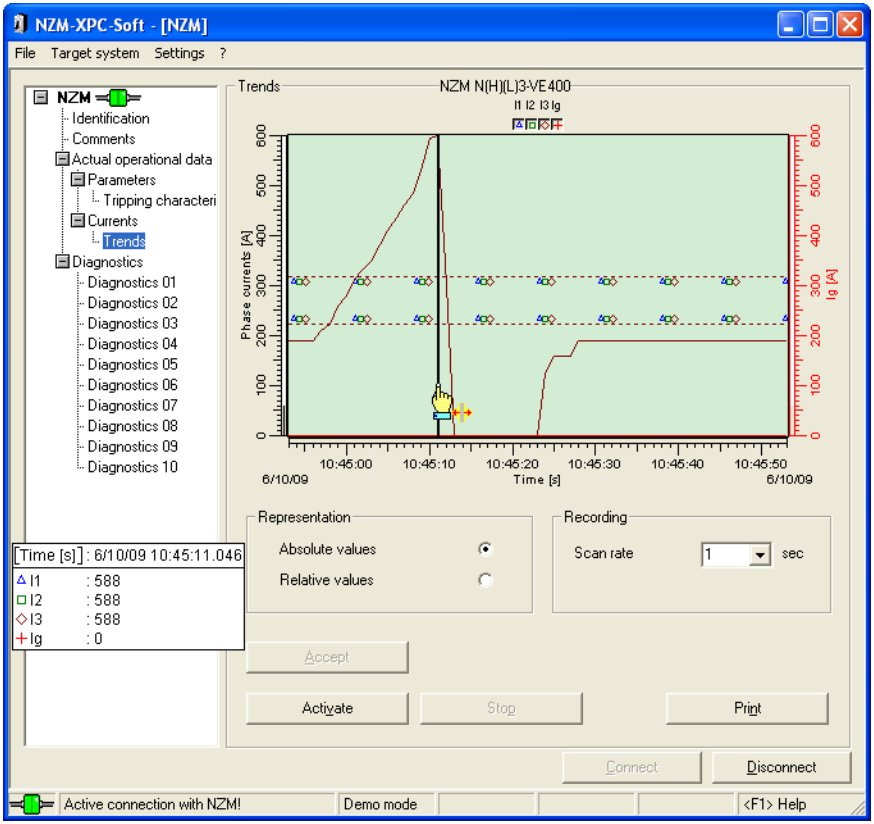


Figure 25: Trends

- "Recording trends" → page 49
- "Display and analysis of recorded trends" → page 50
- "Saving trends" → page 53.

Recording trends

NZM-XPC-Soft V2.0 can record the phase currents in the form of an ongoing trend. The three phase currents $I_{1\ eff}$, $I_{2\ eff}$, $I_{3\ eff}$, the neutral conductor current I_N as well as the earth-fault current can be recorded and represented. With 3-pole circuit-breakers I_N is automatically faded out. The earth fault current I_g will only be recorded and displayed if an earth-fault release is fitted.

Select the required method of representation of the current trend as absolute or as relative values as well as the scan rate before the trend recording starts. As soon as the recording has been activated, these settings can no longer be changed!

- ▶ Select the representation of the curves in the form of absolute or relative values by a click on the respective option.
- ▶ Select the scan rate for the recording of the current trend by entering a figure in the range from 1 to 3600 seconds or select a value from the drop-down list.
- ▶ Accept the settings by pressing the "Accept" button.

→ If you have changed the representation of values from relative to absolute (or vice versa), the trends recorded beforehand are deleted.

The trend recording can only be activated when they are associated with a circuit-breaker or if the NZM simulation is active in demo mode.

- ▶ Active the trend recording by pressing the "Activate" button.
- ▶ Stop the trend recording by pressing the "Stop" button.

At the start of the trend recording the X axis is set to the current time. The recording of the trend commences on the left of the trend window and proceeds to the right. As soon as the current curves have reached the edge of the window, the section of the window with the trend will continue to be moved to the right.

Display and analysis of recorded trends

Various tools in the trend display are available for evaluation of the recorded trend:

- Masking in and out of each individual curve,
- Setting of the interesting curve area by moving the scale,
- Display of the data interval on the Y axis (data scale) and the X axis (time scale),
- Display of the curve values by masking in a ruler,
- Zoom function.

Masking in and out each individual curve

The display of the current trend can be masked in and out individually for each current.

Current	Symbol	Color
I_1		Light blue
I_2		Green
I_3		Brown
I_N		Dark blue
I_g		Red

▶ Click on the curve symbol to mask in or out the individual trends.

Moving the scale

The scale for the interesting part of the curve can be set so that the display area of the curve can be expanded or compressed on the time or current axes.

Mouse button	Move	Reaction
Left	X axis to the left	The curves are stretched to the left, the right end remains stationary.
	X axis to the right	The curves are compressed to the right, the right end remains stationary.
	Y axis upwards	The curves are compressed to upwards, the upper end remains stationary.
	Y axis downwards	The curves are stretched to the bottom, the upper end remains stationary.
Middle	X axis to the left	The curves are moved 1 : 1 to the left.
	X axis to the right	The curves are moved 1 : 1 to the right.
	Y axis upwards	The curves are moved 1 : 1 to upwards.
	Y axis downwards	The curves are moved 1 : 1 downwards.
Right	X axis to the left	The curves are stretched to the right, the left end remains stationary.
	X axis to the right	The curves are compressed to the left, the right end remains stationary.
	Y axis upwards	The curves are stretched upwards, the lower end remains stationary.
	Y axis downwards	The curves are compressed downwards, the lower end remains stationary.

Display of the data interval on the Y axis (data scale) and the X axis (time scale)

Figure 26: Data scale

① Maximum representable data interval
② Data interval
③ Currently represented interval

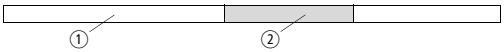


Figure 27: Time scale

① Data interval
② Currently represented interval

Display of the curve value by masking in a ruler

In the trend display window two interactive rulers can be masked-in for reading off the curves and they can be moved to the interesting locations on the curves. When the ruler is activated, a display window is simultaneously activated for curve values and can be moved with the mouse, and will continue to remain visible until the ruler is moved back to its original position.

- ▶ Mask-in the vertical ruler (time scale) by pressing the left mouse button just to the right of the Y axis and push to the right.
- ▶ Mask in the horizontal ruler (value scale) by pressing the left mouse button barely above the X axis and push upwards.

The time scale ruler indicates the time value at the current position as well as the corresponding current values of all active curves.

The value ruler supplies the current values of all active curves at the position where it is located.

By "moving along" the curves with the ruler you can determine the exact current values of each phase at any time.

→ You can mask-in either the value ruler or time ruler.

Zoom function
By marking a rectangular area when the left mouse button is kept pressed, the curve area is represented in enlarged form on the trend display window (zoom function). The represented section is expanded again by clicking with the right mouse button in the zoomed area.

Saving trends
The recorded current trends are retained until

- trend recording is reactivated.
- the active connection is discontinued and then re-established.
- the type or representation is converted from relative to absolute values or vice versa (after the "Accept" button has been pressed).
- the program is ended.

The recorded current trends are saved with the project. If you load a project with saved current trends, the trends recorded last are again available for evaluation.

▶ Select ‹File → Save as› if you want to save the recorded current trend together with the data of the current circuit-breaker!

Tripping NZM

The circuit-breaker NZM can be tripped by a software command provided that a sufficient supply of power is available. This command can be sent from the NZM-XPC-Soft or from the Data Management Interface (DMI) on the circuit-breaker.

▶ Select the menu command "Trip switch" in the "Target System" menu if you wish to trip a circuit-breaker by a software command.

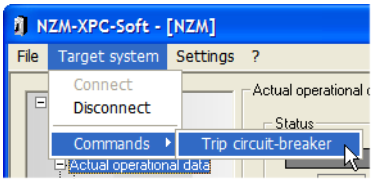


Figure 28: Menu command "Trip circuit breaker"

▶ Acknowledge the message with "OK" if a trip command is to be sent.

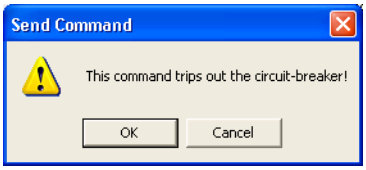


Figure 29: Alarm message before sending the trip command

→ For a safe trip of the circuit-breaker with the "Trip circuit breaker" software command, a load current of at least 40 % of the rated current should be flowing.

Diagnostics

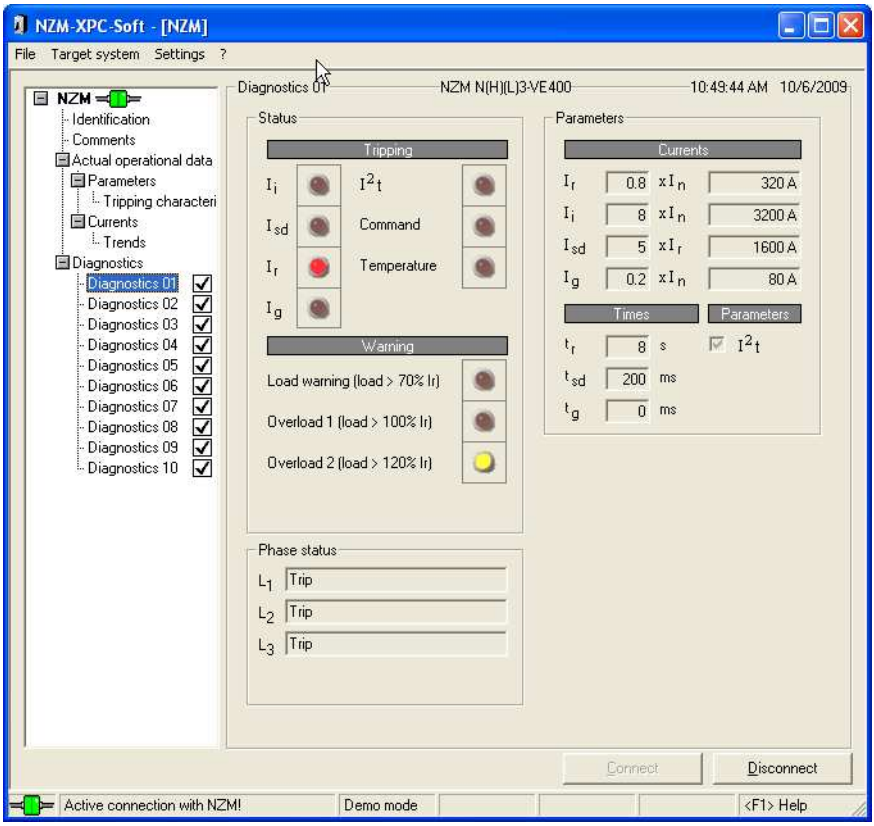


Figure 30: Diagnostics, detailed display

Every time the status in the circuit-breaker changes, the electronic trip unit saves the status data (trip, alarm), the parameter setting, the status of the phases, as well as date and time in a diagnostics memory. Up to ten diagnostic status messages can be stored here. The last diagnosis stored (the most recent) is always stored under number "01" in the diagnostics memory, the last but one diagnosis has number "02" and the oldest diagnosis has number "10".

The memory operates according to the principle of an open ring buffer, i.e. if a new diagnostic message is stored, all previously saved diagnoses move up one space, and the oldest diagnosis (under number 10) is deleted. This ensures that the buffer always contains the 10 latest diagnostic messages.

NZM-XPC-Soft allows you to read the stored diagnostic messages and to display them for analysis, as long as the connection with the circuit-breaker is active.

▶ If you want to call up and display the latest state of the diagnostics buffer, go to the "Diagnostics" page and press the "Read all diagnostics" button.

At every call-up, all the diagnostic messages available in the memory are read via the electronic trip unit. Available diagnoses are marked by a tick in the navigation tree and entered in the overview of diagnoses.

▶ To get a detailed display of a diagnosis, make a double-click on the appropriate line in the overview, or click on the corresponding entry in the navigation tree.

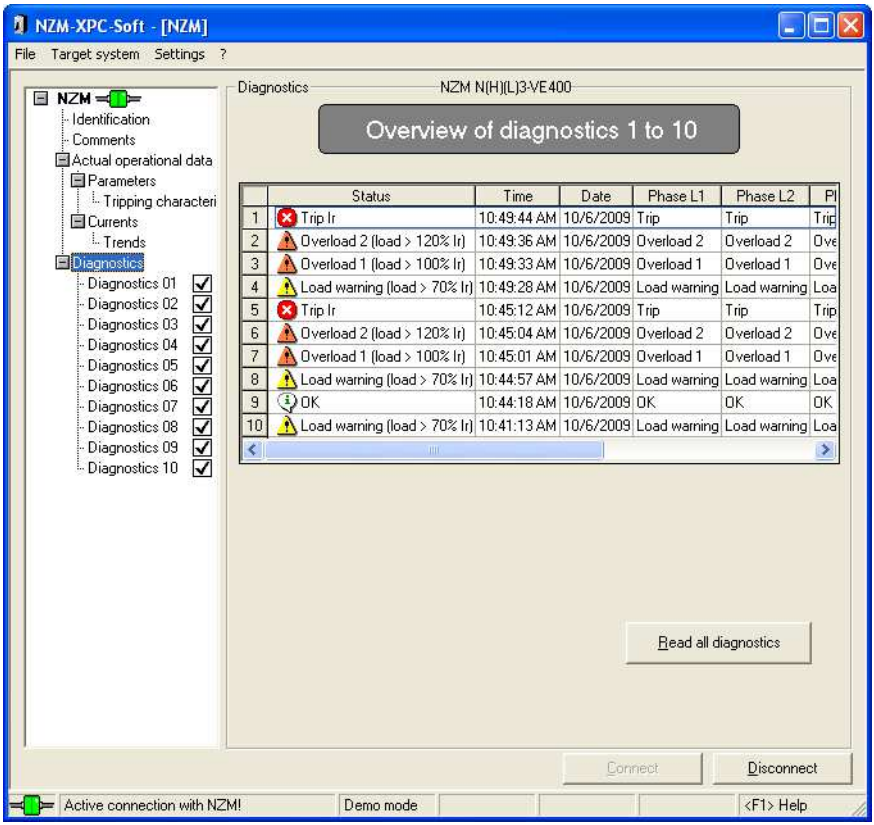


Figure 31: Overview of diagnoses 1 to 10

→ Since the electronic trip unit does not have its own timer element, the date and time are saved with the diagnostic data only if, at the moment of saving them to the diagnostics buffer, a DMI was connected or there was active connection with NZM-XPC-Soft.

Protocolling

Event protocolling

NZM with electronic releases signal trips, overload signals (load > 100 % I_r, load > 120 % I_r), load warnings (load > 70 % I_r), as well as motor specific messages such as unbalance and motor protection. Furthermore, the current phase state and the current circuit-breaker parameters are detected and transferred.

These results can be protocolled with the NZM-XPC-Soft V2.0 in an ASCII file. The date, time and a consecutive number are stored in the protocol data set.

- "Setting of the protocolling" → page 58
- "Starting and stopping protocolling" → page 65
- "Protocolling file" → page 65.

Setting of the protocolling

Various protocolling settings can be made which have an effect on the quantity of protocolled data, the storage location, the names and the sizes of the files. Furthermore, you can define how and when protocolling is to be started and stopped.

All settings on this page become valid after the "Accept" button is pressed!

The settings for protocolling are automatically saved when the NZM-XPC-Soft is closed. They are thus available again at the next start.

The following settings are available for event protocolling:

- Events for protocolling
- Protocol file(s)
- Recording

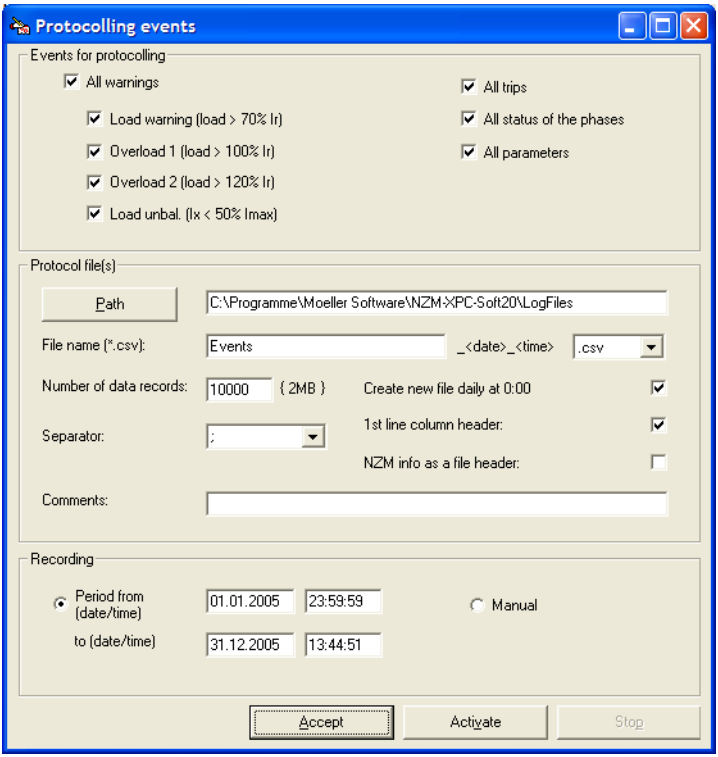


Figure 32: Protocolling events

Events for protocolling: With event protocolling, a data record is always written into the protocolling file if an event occurs or ceases to occur that is included in the selection of events to be protocolled. This means that the selection made has a direct effect on the events to be protocolled and has a direct effect on the number of data records in the protocol file.

▶ Select the events to be protocolled, status of the phases and parameters by clicking on the box beside the option. By clicking on "All warnings" all of the warnings are selected or deselected.

If the events occur faster than the data transfer can occur, all events for protocolling may be lost. For example, overload 1 can by passed over if overload 2 occurs quicker than the time the data record needs for transfer.

When warnings are protocolled, the highest warning level within the three phases is always recorded. When protocolling the status of the phases, every change of a warning stage within the three phases is recorded.

Event	A protocol data record is generated, if ...
Load warning (load > 70 % I_r)	the current in at least one phase must become greater than or become less than 70 % I_r
Overload 1 (load > 100 % I_r)	the current in at least one phase must become greater than or become less than 100 % I_r
Overload 2 (load > 120 % I_r)	the current in at least one phase must become greater than or become less than 120 % I_r
Load unbal.	the current in at least one phase must become greater than or less than 50 % of the maximum on the three phases
All trips	a trip of the circuit-breaker occurs independently of the trip cause.
All states of the phases	the phase state must change in at least one phase
All Parameters	at least one parameter must change

Protocol file(s): The settings which have an effect on the protocol file are made here.

- ▶ Select the path, the file name (prefix) and the file extension (*.txt or *.csv) for the protocol file.
- ▶ They are used for setting the target folder for the protocol files of the "Folder search" dialog. This dialog is accessed via the "Path" button.
- ▶ Enter a valid name for the file name. The following characters are not permitted: "\ / * ?: < > |". The date and time is automatically added to the file names when they are generated.

Microsoft® Excel automatically recognises that it is a text file with separator characters when a *.csv file is opened and arranges the values which are separated by the separator to individual columns! Microsoft® Excel uses the separator defined in the country setting here.

If you open csv files with a double click, Excel does not always open them correctly. In this case Excel appears to ignore the country settings and use the comma as a separator. It functions reliably if you first start Microsoft® Excel and then open the file from Microsoft® Excel.

- ▶ Enter the maximum number of data records per file!

The number of records must lie in the range of 100 to 999999999. From the number of records and the remaining data, an estimated file size is calculated. The value for the file size is only an approximate value! Normally the recorded file is not quiet so large.

The average quantity of data which results in a single day cannot be stated as a number of written data records as it depends on the events in the circuit-breaker.

- ▶ Select the option "create file daily at 00:00" if you wish to save the protocols strictly according to the days. In this case the current file is closed and a new protocol file commences before the maximum file size is achieved.

- ▶ Select the separator between the individual columns. Observe the list separator character set for your language which is set in the Windows® control panel under "Regional and Language Options". Microsoft® Excel uses the list separator character when opening a csv text file to detect the individual columns.
- ▶ Select the option "1st line column header" if you require column headers for the protocolled data. This option is particularly useful for evaluation of the protocols in Microsoft® Excel as the column content is not easy to assign without a header.
- ▶ Select the option "NZM info as a file header" if you wish to set the identification data of the circuit-breaker as a file header in the protocol file.

This adds a text before the actual data, which does not correspond to the CSV format. Some programs, such as Microsoft® Access, may not be able to import such data.

- ▶ Enter a comment here if you wish to save additional information in the file header.

In order to output the comment the option "NZM info as a file header" must be selected.

Recording: You can select if you want to manually start and stop protocolling, or if time control is required from a defined point in time to a defined end time. A time-control started recording can be stopped manually at any time.

▶ Click on the option "Period from (date/time)" and enter a valid date and a valid time in the input fields "from (date/time)" and "to (from date/time)" if you wish to start and stop the recording with time control. Recording starts automatically when the start point is reached and ends when the end point is reached.

Caution!
If the starting point is in the past, the recording will not commence!

If you click on the option "Period from (date/time)", the current date is entered automatically if the date and time are in the past. For the start time the current time + 5 minutes is entered and for the end time the current time + 10 minutes is entered.

▶ Click on the option "Manual" if you wish to start and stop protocolling manually.

Starting and stopping protocolling

A time controlled recording or a direct recording can be activated if an online connection to the circuit-breaker exists (online mode).

Protocolling runs with the old settings if you have not made changes to the protocolling settings!

Each recording is stopped directly with Stop. No protocolling can be activated in offline mode. If protocolling runs in online mode it is stopped when switched offline. You are asked beforehand if you wish to switch offline and interrupt protocolling. When switched online again it remains stopped until you have activated it. This also applies for time controlled recording. A new recording always commences with a new file. The status of a recording (time control active, recording operational or ended) is displayed in the status line.

Protocolling file

The protocolling files are created at the location which you have defined by your settings in the "Protocolling events" window. The file name has a fixed format:

```
<Name>_<Date>_<Time>.<File extension>
```

The name and file extension (*.txt or *.csv) have also been determined by input and selection.

The number of created files per protocolling depends on your settings and the duration of protocolling.

The protocolling file is assigned with a fixed format to ensure standardised evaluation. All columns are always created even if they are not filled out.

Table 4: Structure of the protocolling file

Column	Content
No	Consecutive number within a protocolling process (from start to stop). Commencing with the start value 1 it is incremented consecutively up to the end of protocolling (even when a new file is generated). Thus, this number can be used as a unique key for the evaluation of all protocolled data records in a database.
Date	Current date (see time)
Time	Point in time at which the event is recorded in the NZM-XPC-Soft and saved in the protocol data record
Trip	"True" when the circuit-breaker trips
Overload 2	• "True" when exceeding about 120 % I_r and status Overload 2 of the NZM • "False" if falls below about 120 % I_r and disappearance of the status "Overload 2"
Overload 1	• "True" when exceeding about 100 % I_r and status "Overload 1" of the NZM • "False" if falls below about 100 % I_r and disappearance of the status "Overload 1"
Load warning	• "True" when exceeding about 70 % I_r and status "Load warning" of the NZM • "False" if falls below about 70 % I_r and disappearance of the status "Load warning"
Load unbal.	• "True" if at least one phase current is less than about 50 % of the maximum current on all 3 phases and the status "Unbalance" of the NZM is active. • "False" if the phase current is again greater than about 75 % of the maximum current of all 3 phases and disappearance of the "Unbalance" status
Trip I_r	"True" with overload release
Trip I_i	"True" with short-circuit release
Trip I_{sd}	"True" with delayed short-circuit release
Trip I_g	"True" with earth-fault release
Temperature	"True" with a trip due to high operating temperature
Command	"True" with trip via software command
Motor protection	"True" with occurrence of the motor protection message

Column	Content
Phase 1 (L1)	Current phase state: "OK" "Load warning (load > 70 % I_r)" "Overload 1 (load > 100 % I_r)" "Overload 2 (load > 120 % I_r)" "Trip"
Phase 2 (L2)	→ Phase 1 (L1)
Phase 3 (L3)	→ Phase 1 (L1)
Neutral pole (N)	→ Phase 1 (L1)
I_r [x I_n]	Setting value (relative value) of the overload release
I_i [x I_n]	Setting value (relative value) of the short-circuit release
t_r [s]	Setting value (absolute value) of the delay time of the overload release
I_{sd} [x I_r]	Setting value (relative value) of the short-time delayed short-circuit release
t_{sd} [ms]	Setting value (absolute value) of the delay time of the short-time delayed overload release
I_g [x I_n]	Setting value (relative value) of the earth-fault release
t_g [ms]	Setting value (absolute value) of the delay time of the earth-fault release
I^2t	Setting value of the parameter I^2t
CommLS	Communication status to the circuit-breaker • "Connected" • "Disconnected" (this status can only occur in the protocol file if the cable is interrupted (open-circuit) or another communication problem has occurred)

The protocolling files can be evaluated in the most different ways. One possibility is to open or to import into standard software, such as Microsoft® Excel or Microsoft® Access. You can also open the protocolling file with a normal text editor.

Current protocolling

NZM with electronic releases detect and send the effective (rms) values of the phase currents $I_{1\,eff}$ to $I_{3\,eff}$ – and on 4-pole switches – the N-conductor current $I_{N\,eff}$ as well as the earth fault current for the optional earth-fault release $I_{g\,eff}$.

These currents can be protocolled with the NZM-XPC-Soft V2.0 in an ASCII file. Within the adjustable scan interval, the mathematical mean value of the received values per phase current are calculated and saved with a time stamp (date, time) and a validity flag in the protocol data record.

- "Setting of the protocolling" → page 58
- "Starting and stopping protocolling" → page 65
- "Protocolling file" → page 70.

Setting of the protocolling

Various protocolling settings can be made which have an effect on the quantity of protocolled data, the storage location, the names and the sizes of the files. Furthermore, you can define how and when protocolling is to be started and stopped.

→ All settings on this page become valid after the "Accept" button is pressed!

The settings for protocolling are automatically saved when the NZM-XPC-Soft is closed. They are thus available again at the next start.

The following settings are available for current protocolling:

– Currents to be protocolled
– Protocol file(s)
– Recording

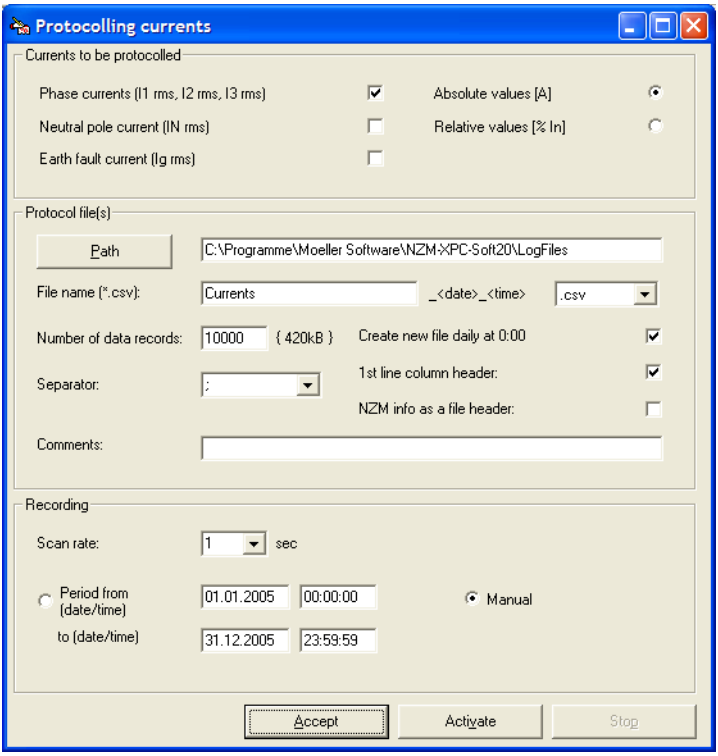


Figure 33: Protocolling currents

Currents to be protocolled: The choice of the currents to be protocolled influences the column in the protocol file. The neutral conductor current and the earth fault current are only protocolled with the selection, if the circuit-breaker is 4-pole or an earth-fault release module is available.

With current protocolling, a data record is always written into the protocol file after the scan interval has elapsed.

The selection made in the options "Absolute values [A]" or "Relative values [% I_n]" determines the way in which the method of representation of the currents is saved in the protocol file. Only absolute values or relative values are saved.

Protocol file(s): The settings for the protocol file(s) are identical to the settings for the event protocolling, → page 60.

Recording: The scan rate can be selected in steps: 1, 5, 15, 30, 60, 300, 900, 1800, 3600 seconds. Intermediate values can entered.

You can select if you want to manually start and stop protocolling, or if time control is required from a defined point in time to a defined end time.

A time controlled started recording can be stopped manually at any time.

▶ Click on the option "Period from (date/time)" and enter a valid date and a valid time in the input fields "from (date/time)" and "to (from date/time)" if you wish to start and stop the recording with time control. Recording starts automatically when the start point is reached and ends when the end point is reached.

Caution!
If the starting point is in the past, the recording will not commence!

If you click on the option "Period from (date/time)", the current date is entered automatically if the date and time are in the past. For the start time the current time + 5 minutes is entered and for the end time the current time + 10 minutes is entered.

▶ Click on the option "Manual" if you wish to start and stop protocolling manually.

Protocolling file
The protocolling files are created at the location which you have defined by your settings in the "Protocolling currents" window. The file name has a fixed format:

```
<Name>_<Date>_<Time>.<File extension>
```

The name and file extension (*.txt or *.csv) have also been determined by input and selection.

The number of created files per protocolling depends on your settings and the duration of protocolling.

Table 5: Structure of the protocolling file:

Column	Content	
No	Consecutive number within a protocolling process (from start to stop). Is (even when a new file is created) incremented consecutively. Thus, this number can be used as a unique key for the evaluation of all protocolled data records in a database.	
Date	Current date (see time)	
Time	Time at which the set scan rate expired and saving of the protocol data record.	
$I_{1\ eff}$ Abs [A] / $I_{1\ eff}$ Rel [% I_r]	Effective value (rms) of the phase current I_1	Depending on the setting either as an absolute value in A or as a relative value in % I_r
$I_{2\ eff}$ Abs [A] / $I_{2\ eff}$ Rel [% I_r]	Effective value (rms) of the phase current I_2	
$I_{3\ eff}$ Abs [A] / $I_{3\ eff}$ Rel [% I_r]	Effective value (rms) of the phase current I_3	
$I_{N\ eff}$ Abs [A] / $I_{N\ eff}$ Rel [% I_r]	Effective current on the N conductor I_N	
$I_{g\ eff}$ Abs [A] / Ig eff Rel [% In]	Effective current of the earth-fault current I_g. The earth-fault current is only protocolled if an earth-fault release is available.	Absolute value in A or as a relative value in % I_n
Valid	"Yes" – the protocolled values are valid, i.e. the connection to the circuit-breaker was not interrupted	

Securing NZM data

Saving to a file

All the important circuit-breaker data can be saved by storing them in a file. These are as follows:

- The identification data for the NZM and any optional add-on module,
- Own comments entered,
- Actual parameters,
- Status data and currents
- The last NZM diagnostic data to be called up
- The recorded current trends.

▶ Save the circuit-breaker data through the menu command ‹File → Save As› (→ section "File – Open, Save, Save as" on page 17.)

The file format is XML. An HTML file is also created, with the same name as the XML file, but with the *.htm extension. This gives you the additional option of viewing or printing the saved data through Microsoft® Internet Explorer.

The recorded trend file is also created, with the same name as the XML file, but with the *.trnd extension.

The NZM data can be saved "online", i.e. while there is an active communication connection to the power circuit-breaker, or "off-line". Please note that the latest operating data that are saved only represent a "snapshot" taken at the moment when they are saved, or when the online connection was broken.

▶ Use the menu command ‹File → Save› (→ section "File – Open, Save, Save as" on page 17) if you want to repeat the "online" save to the same file.

→ If you save repeatedly in a file, the data last saved is overwritten each time.

The last (i.e. latest) data called up from the circuit-breaker will be saved in each case. It is therefore a good idea to read out the diagnostic data again before saving.

This saved data can be loaded offline into the program at a later time, e.g. to analyse earlier diagnosis data (→ section "Loading a file").

Loading a file

Stored circuit-breaker data can be downloaded from an XML file into NZM-XPC-Soft, for analysis of previous diagnostic data for example.

▶ Load the XML file, using the menu command ‹File → Open› (→ section "File – Open, Save, Save as" on page 17).

Once the circuit-breaker file has been opened, all the data in the display are immediately available. Available diagnostic data are marked with a tick in the navigation tree.

▶ To display the stored data, click on the respective entries in the navigation tree.

→ As soon as a communication connection with the circuit-breaker has been established, the identification data of the NZM, the parameters, as well as the status data and currents are updated, i. e. the data downloaded from the file are overwritten in the display. The diagnosis data that were read from the file will disappear from the display.

Printing NZM data

All the saved data from the NZM can also be output to a printer or into a print file using the print function of the integrated Microsoft® Internet Explorer.

▶ To print out the NZM dat, use the menu command ‹File → Print› (⟶ section "File – Print preview, Print" on page 19).

The print format of the NZM and DMI data is determined by means of a predefined stylesheet file (XSL file) that is copied into the program directory at installation (NZM.XSL).

→ A separate print function can be found on the "Tripping characteristic" and "Trends" parameter pages which can be started via the "Print" buttons.

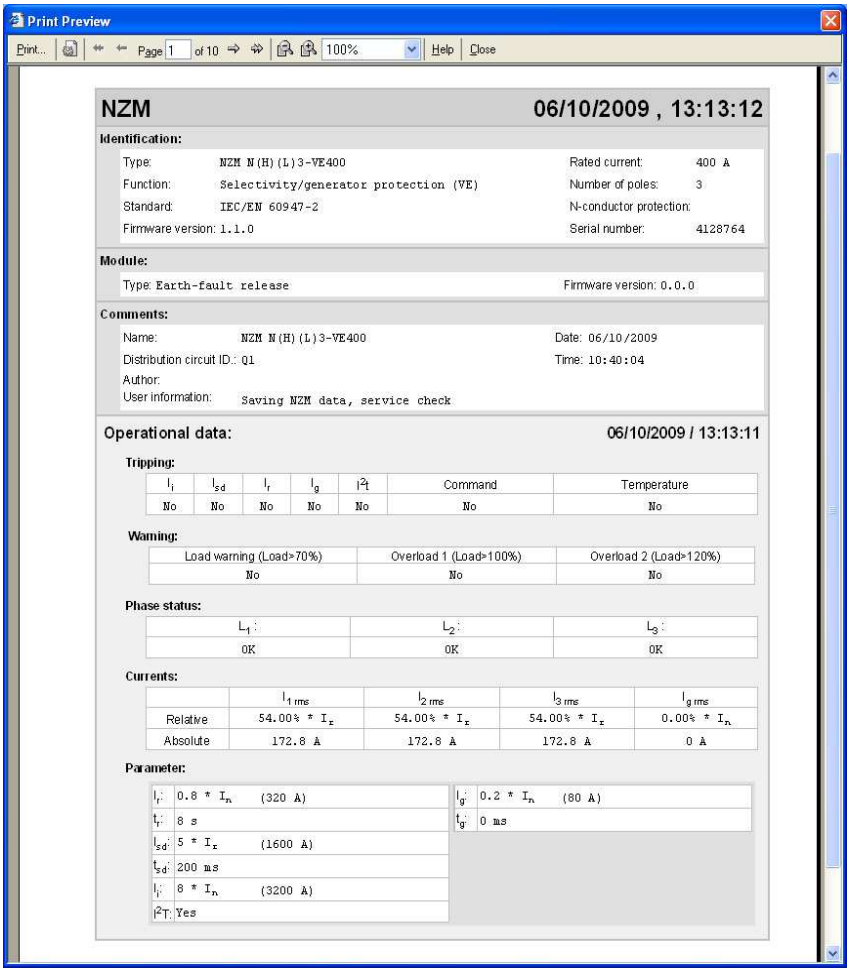


Figure 34: Print format

Demo mode NZM

The demonstration mode in the NZM-XPC-Soft V2.0 simulates all normal functions of the software without a real NZM-circuit-breaker being connected.

▶ Activate the demo mode for the software, by clicking on ‹Settings → Demo mode›.

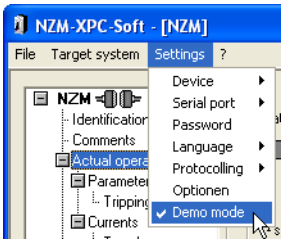


Figure 35: Activating demo mode

The demo mode is switched on if "Demomode" is displayed in the status line and the ‹Settings → Demo mode› is marked with a tick.

After clicking on the "Connect" button or the ‹Target system → Connect› a simple NZM simulation is opened, which can be used to simulate the phase currents and the reactions of the circuit-breakers.

By pressing the <Disconnect> button the active simulation windows "NZM-Simulation" and "Parameters" are closed and the connection to the simulated NZM is disconnected.

The NZM-XPC-Soft help is accessed by clicking on the "Help" button. The help is accessed in a sensitive context in section "Handling of the NZM simulation".

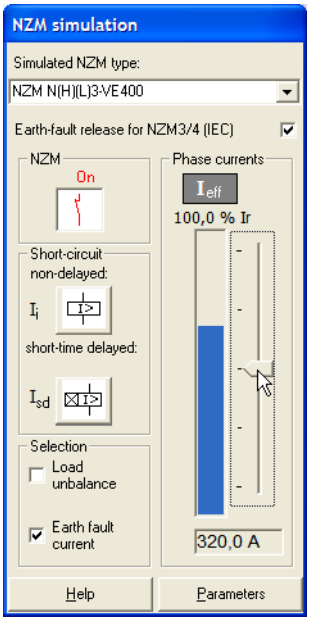


Figure 36: NZM simulation

With a click on the "Parameters" button you open a further window which simulates the NZM electronics with their setting buttons. The parameters of the circuit-breaker are set here and you can simultaneously observe the changes on the tripping characteristic on the NZM-XPC-Soft.

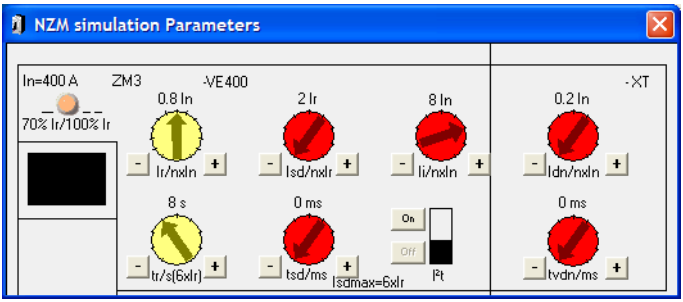


Figure 37: NZM simulation – parameters

The following functions can be simulated with the NZM simulation in demo mode:

- Simulated online connection to various circuit-breaker types
- Optional use of an earth fault release in the simulated NZM types of frame sizes 3 and 4
- Common adjustable current simulation for the phases L1 to L3
- Simulation of an unsymmetrical load by switch on of the "Unbalance" option
- Simulation of a current on the neutral conductor for a 4-pole circuit-breaker type (only with activated "Unbalance" option)
- Simulation of an earth fault current for a circuit-breaker with earth-fault release
- Simulation of a short-circuit release
- Simulation of a short-time delayed short-circuit release
- Simulation of an overload release from a simulated load of >110 % I_r
- Simulation of a trip by command
- Simulation of a motor protection signal for an ME type
- Reactivation of the circuit-breaker after a trip
- Simulation of the circuit-breaker states unbalance, load warning, overload 1, overload 2, trip
- Setting of all circuit-breaker parameters of a set simulated NZM type
- Simulation of the LED display for load warning and overload of the circuit-breaker electronics.

The following functions of a real circuit-breaker cannot be simulated with the simplified NZM simulation:

- Real simulation of load currents
- Real behaviour of the circuit-breaker corresponding to the adjust tripping characteristic
- Simulation of an earth-fault release
- Simulation of a release due to overtemperature.

Handling of the NZM simulation

With the help of the NZM simulation you can change the phase currents and the tripping parameters for various simulated NZM types. This may lead to a trip release. Furthermore, a non-delayed and a short-time delayed short-circuit can be simulated. The respective state of the simulated NZM (on = switched on, trip = released) is displayed. After a trip the simulated NZM can be switched back on via a button. A possible overload current is now again possible.

- "Setting of the simulated NZM type" → page 79
- "Display of the circuit-breaker state / Restart" → page 80
- "Short-circuit release" → page 80
- "Simulation of the phase currents" → page 81
- "Diagnostics memory" → page 83
- "Simulation of setting parameters" → page 84.

Setting of the simulated NZM type

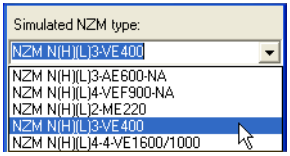


Figure 38: Selection of the NZM type for simulation

Selection of an entry from the drop-down list can be set for the simulation of another NZM type. The NZM-XPC-Soft user interface is immediately matched to the new type after selection. An optional earth-fault release can be selected for NZM types of frame size 3 and 4.

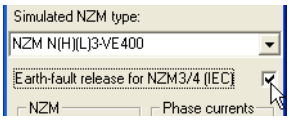


Figure 39: Selection of an optional earth-fault release for NZM simulation

By selection of the optional earth-fault release in the NZM-XPC-Soft user interface, both the parameters I_g and t_g as well as the earth-fault current $I_{g\,eff}$ appear. If you also select the "Earth-fault current" a constant earth-fault current is simulated with the current simulation.

Display of the circuit-breaker state / Restart

After the "Connect button" is pressed the simulated NZM is always in the "On" state (switch on). In this case a simulated current which can be set via a sliding regulator also flows in all three phases.

Figure 40: Display circuit-breaker state "On"

After a simulated overload or a short-circuit release and after the "Switch release" command has been issued, the simulated NZM is in the "Trip" (released) state. Switch the simulated NZM back on via the switch which is now visible.

Caution!
A current overload is again possible after switch on!

Figure 41: Display circuit-breaker state "Trip" and button "NZM on"

Short-circuit release

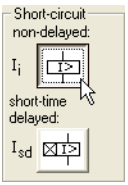


Figure 42: Buttons for non-delayed short-circuit (I_i) and short-time delayed short-circuit (I_{sd})

By actuation of the buttons you simulate a non-delayed or a short-time delayed short-circuit. The switch goes to the "Trip" state and can be switched back on if necessary.

Simulation of the phase currents

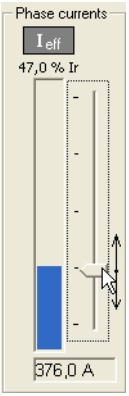


Figure 43: Setting and display of the phase currents (I_1, I_2, I_3)

All three phase currents (I_1, I_2, I_3) can be modified by moving the sliding regulator. The currents are displayed as relative values (in % I_r) and absolute values (in A). Furthermore, the current levels are represented by bar chart graphics. If the phase currents rise above 150 % I_r they will be symbolized by a full blue bar and an upward pointing red arrow. The entire adjustable value range ranges from 0 to 200 % I_r.

Caution!
If you push a slider, the simulated current will be adjusted as a relative value in % I_r. The simulated load current is calculated from the relative value in amps. This results in a divergence to the behaviour of a real circuit-breaker. When adjusting the parameter I_r the absolute value of the current changes in the simulation. With a real circuit-breaker the absolute load current remains constant when adjusting I_r and the displayed relative current changes.

If the phase currents are set to a value exceeding 110 % I_r an overload release will occur after a delay time (n × t_r). The time until a trip does not correspond with a real circuit-breaker NZM, as the values associated with a real NZM are determined using a characteristic curve.

If a short-circuit is caused, the phase currents are = 0 and can no longer be set with the sliding regulator until the circuit-breaker is switched back on.

If the connection to the NZM simulation is terminated by the "Disconnect" button after a short-circuit, no current will flow after a renewed "Connect" even though the switch is in the "On" state.

By selection of the "Unbalance" setting the 3 phase currents can be set to a constant deviation of ± 50 % (I_1 = approx. 50 % I_2 , I_2 = 100 %, I_3 = approx. 150 % I_2). The three phase currents are still set with the sliding regulator, however only the value of I2 will be displayed in the NZM simulation window.

By selection of the 4-pole NZM type and selection of the "Unbalance" setting a relative current is simulated on the N-conductor (I_N = approx. 50 % I_2).

By the selection of the "Earth fault current" option a constant earth fault current I_g can be simulated for the NZM types with earth-fault release.

→ The option "Earth-fault release for NZM3/4 (IEC)" must be switched on in the NZM simulation window to ensure that this option can be selected.

Diagnostics memory

As in the actual NZM, a diagnostics memory is incorporated in the NZM simulation. This means that an entry is made in the diagnostics memory with each status change (load warning, overload1, overload2, short-circuit, OK). The most recent status change is always entered as number 1. The oldest status information is cleared from memory as soon as a new entry is added and the remaining diagnostics entries are moved one place to the rear.

The diagnostics memory of the NZM simulation can accommodate a maximum of 10 entries and can be read out and displayed with the NZM-XPC-Soft demo mode.

→ The entries of the diagnostics memory of the NZM simulation are saved after ending of NZM-XPC-Soft in an XML file and are again available after a restart and pressing the "Connect" button.

If you set a new NZM type for the simulation the diagnostics memory of the NZM simulation is erased. New diagnostics entries must then be regenerated, e.g. by modification of the simulated current.

Simulation of setting parameters

In the "NZM simulation –parameters" you set or modify the circuit-breaker parameters of the simulated NZM type.

By a click on the plus (+) or minus (-) button the parameter is increased or reduced by a value. The parameter I^2t is switched on via the "ON" button and off via the "Off" button.

→ If you display the tripping characteristic in parallel in the NZM-XPC-Soft user interface, the influence of the parameters on these characteristics becomes apparent.

→ When adjusting the parameter I_r the absolute value of the current changes in the simulation. With a real circuit-breaker the absolute load current remains constant when adjusting I_r and the displayed relative current changes.

Figure 44: Setting of an NZM parameter

Figure 45: Setting I^2t

5 DMI Mode

Establishing communication link with DMI

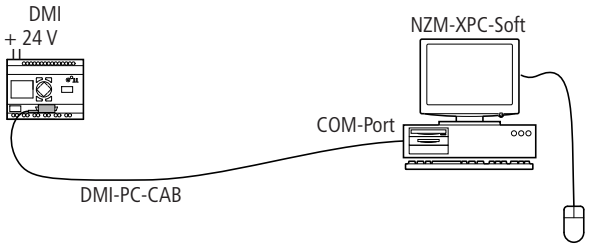


Figure 46: Connection schematic

Connecting the data transmission cable

Caution!
Switch off the PC before connecting the data transmission cable.

- ▶ Connect the data transmission cable (DMI-PC-CAB) for PC-DMI communication to the DMI (special connector) and the 9-pole connector to a free serial interface of the PC (e.g. COM1).
- ▶ Start up NZM-XPC-Soft in program mode DMI.
- ▶ Carry out the necessary actions: read out DMI, write to DMI, load firmware, or delete firmware.

The communication connection with the DMI is established only for the duration of a data transmission (e.g. reading data from the DMI). In contrast to communication with the NZM, there is no continuous communication link to the DMI.

DMI – short description of the functionality

The DMI (Data Management Interface) it an optional device for the NZM circuit-breaker of frame size 2, 3 and 4 equipped with an electronic release. It is used for displaying NZM

operational data (alarm status, trip status, phase status, currents, parameters), for querying the circuit-breaker diagnostics and for operation and parameter definition of the NZM circuit-breaker.

The DMI can be used for interfacing an NZM to a fieldbus system (e.g. PROFIBUS DPV1). An additional fieldbus module (e.g. NZM-XDMI-DPV1) is required for this purpose. The circuit-breaker can be operated remotely via the fieldbus, if a remote operator is available and the "Remote operator" option has been selected in the DMI.

The DMI enables simple implementation of the motor starter functionality's. The full range of protective functions is provided in combination with the circuit-breaker types for motor protection (NZMx-ME...) and additional contactors.

Possibilities for signal assignment of the DMI inputs
The six digital inputs of the DMI (I0 to I5) can be assigned with various signals to suit the functions to be implemented:

- Assignment of the I0 input with an acknowledgement signal
- Assignment of switch or button signals depending on the selected motor starter functions (I1 to I3)
- Assignment of the inputs I4 and I5 with the auxiliary switch signals "Tripped" and "On/Off" for signalling the circuit-breaker status via the fieldbus
- Assignment of the free inputs with further signals (e.g. position switch) for signalling signal states through field bus.

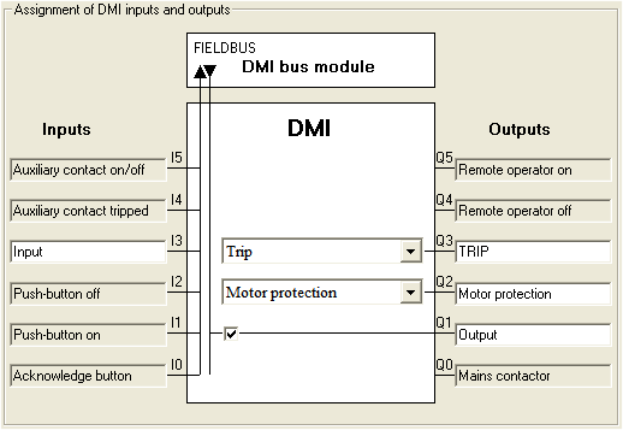


Figure 47: Example assignment of DMI inputs and outputs

Possibilities for signal assignment of the DMI outputs
The six digital outputs of the DMI (Q0 to Q5) can be assigned with various output signals to suit the functions to be implemented:

- Assignment with signals from circuit-breakers (alarms, trips), signals from the DMI (parameters) or fixed values (on, off)
- "No NZMCom": Sets the outputs when the connection to the circuit breaker is interrupted
- Assignment with signals for actuation of contactors by a selected motor starter function (Q0 to Q3)
- Assignment with the signals for remote operator on/off (Q4/Q5) via fieldbus (e.g. PROFIBUS DPV1)
- Assignment of the free outputs with further signals via fieldbus (e.g. PROFIBUS DPV1)

A complete description of the DMI functionality and operating instructions can be found in the MN01219002Z-EN (previously AWB1230-1441GB) operating manual. The PDF file is available for download on the Internet.

All settings and parameters of the DMI can be read out using the NZM-XPC-Soft, and also can be loaded to the DMI. This ensures a clearly defined and fast parameter definition of the DMI. DMI parameters can be simply transferred to other DMI´s. All parameters can be saved and printed out. Additionally, NZM-XPC-Soft offers the possibility of downloading a new firmware version to the DMI.

NZM type selection

On this page you can select an NZM type, and then connect it to the DMI and set the parameters at a later time. Using various filters, you can find the required NZM type faster in the list.

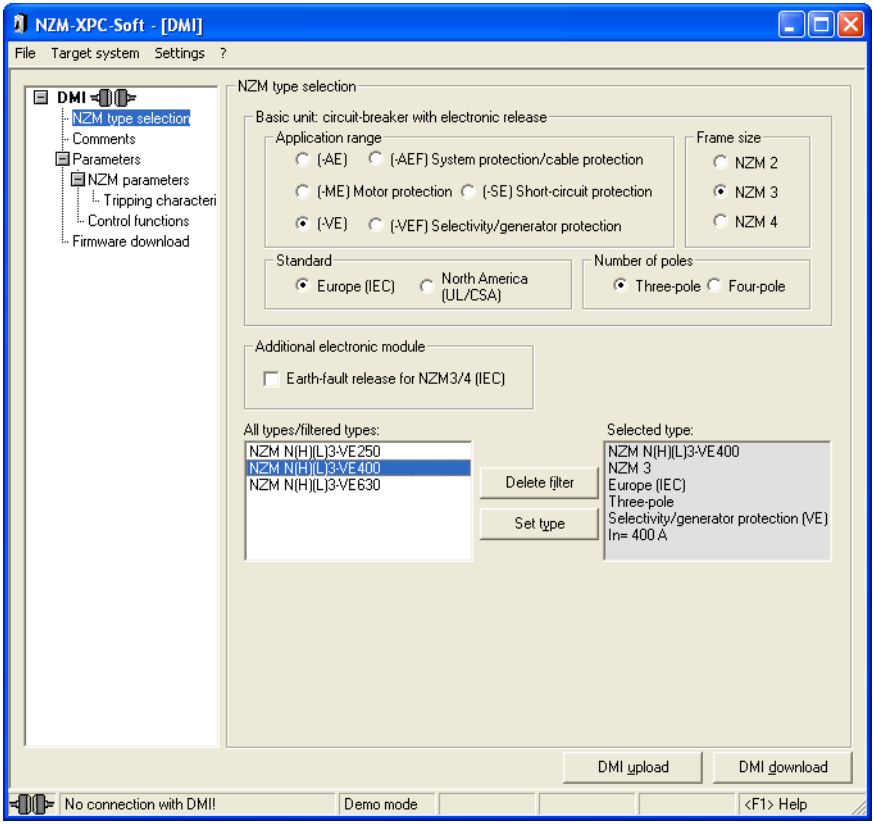


Figure 48: NZM type selection

As long as you have not yet set a type in the NZM type selection, the NZM parameters can only be set and displayed as index values. This is because the parameters have scales that differ according to the different NZM types. The for all known types are stored in the file "devicelist.xml", which is installed together with NZM-XPC-Soft and is read by the software.

You can only set the NZM parameters as relative or absolute values when an NZM type has been set. This makes the setting of the required values for I_r, I_i, I_{sd}, I_g, t_r, t_{sd} and t_g significantly easier and clearer. Some parameters may be fixed or unavailable, depending on the NZM type.

- ▶ You can filter the list of all the types, by clicking on one or more of the filter criteria.
- ▶ You can cancel the filter that was set by pressing the "Delete filter" button.
- ▶ Select an NZM type from the displayed list, and set the required type by activating the "Set type" button or by a double-click on the type in the list.

→

- The writing of NZM parameters to the DMI does not depend on setting an NZM type, since the parameters are transmitted to the DMI as index values.
- The set NZM type is not saved in the DMI. The type selection is simply a means to simplify the setting of the NZM parameters.
- Remember that the NZM parameters in the DMI are displayed as index values if the DMI is not connected with a NZM. If this connection is established, the DMI displays the parameters currently being used by the NZM.

Comment

On the "Information" page you can enter additional comments for the DMI. These data will be saved as well when you create a file with DMI data. Individual details that can be entered and saved are: a name, the distribution circuit ID, the author, and other user information. Date and time of the last modification are also stored.

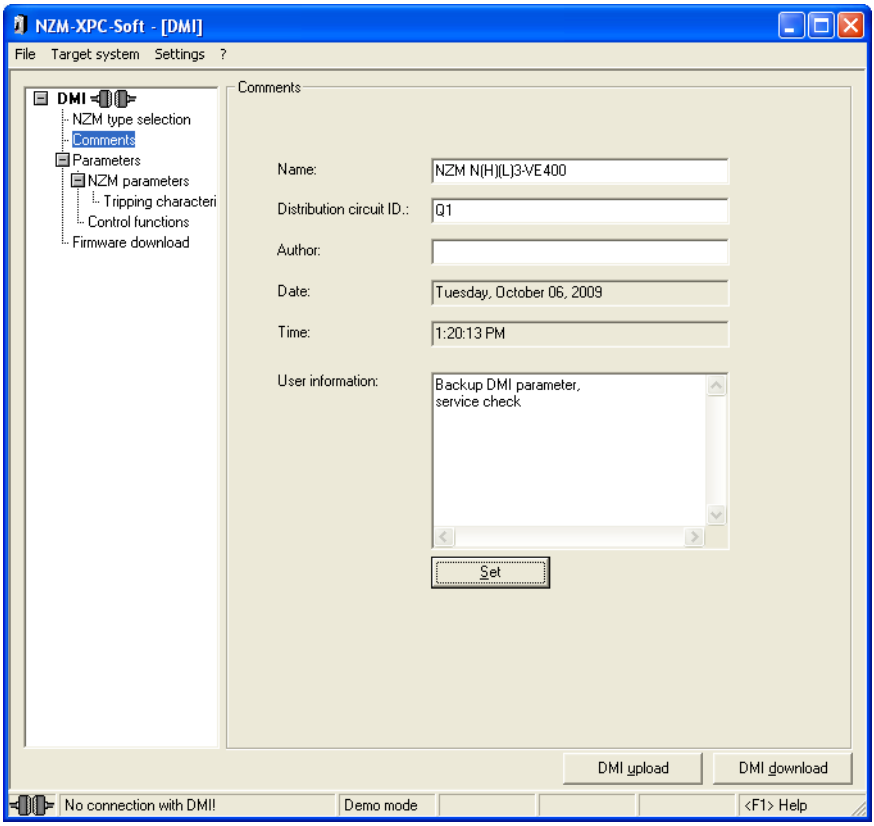


Figure 49: Comments and information entries

▶ Enter a name here, as well as the distribution circuit ID, author and any other user information. Complete your input with "Set".

→

- Date and time are entered or updated when you press the "Set" button.
- You can enter up to 30 characters each for the name, distribution circuit ID and author. In the user information text, manually insert line returns as appropriate.
- The comments entered are only changed if you complete the entry with "Set". If you connect a new DMI and you also want to save its data, then you should update the entries on the information page.

Parameters

After read out, all the important parameters of the DMI are displayed on this page and on the respective pages of the "NZM parameters" as well as the "Control functions".

On the Parameters page the current DMI firmware version is preset at the program start. Because the available and adjustable parameters depend the firmware version, you can select the firmware version of your device for programming in the software from the drop-down list. Alternatively the DMI can first be read out. The device's firmware version and parameterization are then written to the program and displayed.

You can set the standard display of the DMI display line-by-line, you can activate the "Stop" (discontinue) option and enter the serial number of the NZM which is to be connected later to the DMI. You can set the menu language of the DMI under "Representation" and convert the display of the parameters and currents from relative to absolute values.

The "Data for PROFIBUS DP V0" and "Summer time" are only available up to DMI Firmware V1.1.0.

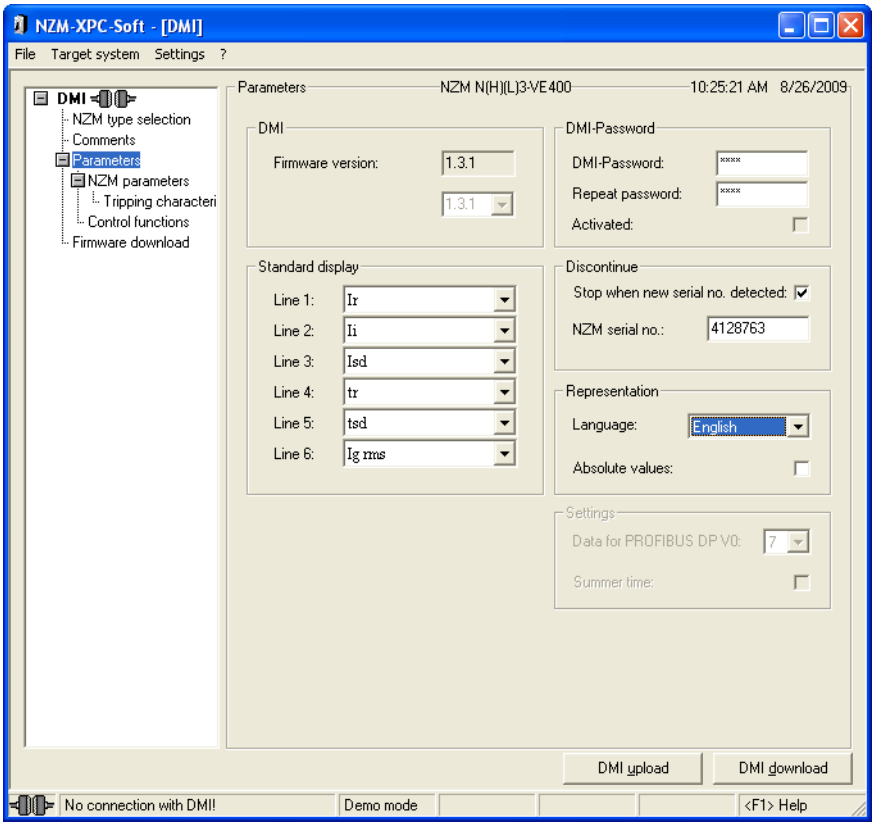


Figure 50: Parameters for the DMI

The display and setting of the DMI parameters are explained in more detail in the following sections:

- "Identification and DMI settings" → page 96
- "Standard display of the DMI" → page 97
- "NZM parameters" → page 100
- "Tripping characteristic" → page 105
- "Control functions" → page 109
- "Conditions for setting the outputs" → page 115.

But first of all, some general explanations of the display, parameter changes, and the status of the communication link:

Show parameters
If the "DMI upload" button is pressed, the current parameter settings that are stored in the DMI are read out and displayed. As an alternative, you can use the menu command ‹Target system → DMI upload›.

Changing parameters
You can alter the parameter settings through the text entry boxes or the list boxes.

→ The **Firmware Version** of the DMI can only be changed through a firmware download, → section "Firmware download" on page 118.

The "DMI download" button transfers the changes to the DMI. As an alternative, you can use the menu command ‹Target system → DMI download›.

→ If "DMI upload" or "DMI download" are activated, NZM-XPC-Soft checks the version/level of the DMI firmware. If a version or level is detected that is not supported by NZM-XPC-Soft, then the procedure is aborted and an error message is produced.

When a DMI read (DMI upload) is initiated, a DMI password which may have been set is also uploaded. This password can be changed and written back (downloaded) to the DMI. It enables you to replace a DMI password which you may have forgotten by a new password or to delete the password by entering "0000".

Connection status

While the connection is being established, the plug symbol in the status bar and in the root of the navigation tree is yellow.

 (yellow) Trying to connect

Once the connection is successfully established, this plug symbol briefly turns green.

 (green) Active connection

As soon as the connection has been cleared, the plug symbol returns to gray.

 (gray) No connection

 (red) Connection error

There is an error in the connection.

If the connection cannot be successfully established, please check that the plugs of the data transmission cable are correctly inserted at the DMI as well as at the PC . Also check whether the interface setting in NZM-XPC-Soft is correct (menu option ‹Settings → Serial Port›).

The connection to the DMI is established only for the duration of data transmission. The connection is discontinued immediately afterwards.

Sometimes it may appear that the connection to the DMI continues for a longer time (plug symbol remains green). This is due to problems closing the COM interface. After a brief wait of about 1-2 minutes the process is generally completed.

Identification and DMI settings

Firmware version:	The firmware version of the DMI – after upload, the current firmware version of the connected DMI is displayed. With the drop-down list you can set a DMI firmware version for parameterization. All parameters supported by this version are then available.
DMI password,	Password to protect the entry menu in the DMI; a value between 0001 and 9999 is acceptable as a password. 0000 deletes the DMI password.
Confirmation entry:	Repeating the password to exclude typing errors.
Language:	Language setting for the DMI menu; currently adjustable are: German, English, French, Italian, Spanish (Portuguese up to DMI Firmware version 1.1.0)
Data for PROFIBUS DP V0:	The selection of the data that is accessible via PROFIBUS-DP and is defined through an assignment to a Data Profile (1...7) only supported up to Firmware Version 1.1.0), See also: "Circuit-Breaker Communication System Manual" (MN01219002Z-EN, previously AWB1230-1441GB, 3rd edition 04/03)
Absolute value representation:	The display of the parameters and currents in the DMI display can be switched from relative values to absolute values and back again, using the "Absolute values" setting.
Summer time:	The summer time setting of the DMI can be set or reset (only up to DMI Firmware-Version 1.1.0) via the summer time setting.
Stop when new serial no. detected:	This setting is used to define the response when a connection is established with a circuit -breaker. See also: Circuit-Breaker Communication System Manual (MN01219002Z-EN).
NZM serial number:	Serial number of the most recently connected NZM (if the serial number has been accepted). When you enter an NZM serial number and download it to the DMI, the DMI checks whether this circuit breaker is connected when the connection is established; see line "Stop when new serial number detected:".

Standard display of the DMI

After downloading, the settings of the standard DMI display are also available to NZM-XPC-Soft. NZM-XPC-Soft shows these settings on the "Parameters" page.

The standard display appears automatically on the screen if you fail to operate a DMI button for more than 30 seconds. Four lines are permanently visible. A further two lines can be accessed using the cursor keys, refer to the Circuit-Breaker Communication System (MN01219002Z-EN, previously AWB1230-1441GB).

Using NZM-XPC-Soft, the standard contents of DMI display lines 1 to 6 can be set individually and loaded into the DMI:

▶ Open the list box and select the required value from the list:

Display	Description of the display
Empty	No entry from this line onwards
Ir	Current setting value for the overload release
Ii	Current setting value for the short-circuit release
Isd	Current setting for the short-time delayed trip release
Ig	Current setting value for the earth-fault release
tr	Time delay of overload release response
tsd	Delay time when the short-time delayed release responds
tg	Time delay of earth-fault release response
I2t	I^2t-characteristic on/off (changing over characteristic for the short-circuit protection for improved selectivity to the downstream fuses)
I1 eff	Effective current in phase 1
I2 eff	Effective current in phase 2
I3 eff	Effective current in phase 3
IN eff	Effective current in the neutral pole
Idn eff	Effective value of the fault current

Display	Description of the display
Motor function	Set motor starter function (only with motor protection (-ME) type circuit-breakers)
Motor state	Motor state or direction of rotation (only with motor protection (-ME) type circuit-breakers)
I:	State of the inputs in the "000000" format
Q:	State of the outputs in the "000000" format
Summer time[1)]	Summer time yes/no
Time	Time currently set in the DMI clock
Date	Date currently set as the DMI date

1) Only up to DMI Firmware V1.1.0

→ In DMI, parameters not available with an NZM type are faded out in the standard display, i.e. the following display lines move one position upwards. In NZM-XPC-Soft you can always parameterize all parameters for the standard display and load them to the DMI, even if an NZM type has been set. This means, that the parameterized assignment of a parameter to a display line via the NZM-XPC-Soft does not necessarily correspond to the real display on the DMI.

If you read out DMI parametric programming from a DMI with Firmware Version 1.1.0 and wish to transfer it to a DMI with a higher Firmware version, please note that other display options for the standard display which are dependant on the Firmware version may be available.

- ▶ Select the "Empty" entry if you wish the DMI to display nothing else from this line onwards in the standard display.
- ▶ Transfer the settings into the DMI by pressing the "DMI upload" button or by using the menu ‹Target system → DMI upload›.

NZM parameters

The circuit-breaker parameters that are stored in the DMI are shown on the "NZM parameters" page after uploading. All the parameters can be adjusted either via a sliding regulator or by clicking a control box, and finally transferred into the DMI.

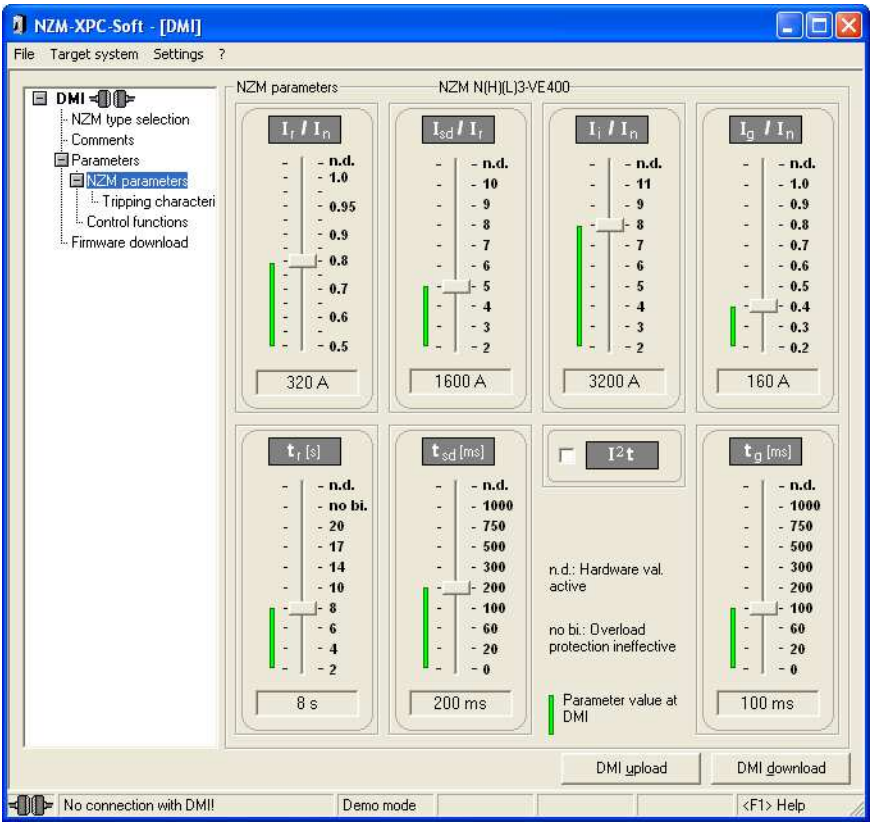


Figure 51: NZM parameters

The individual graphical symbols and control elements have the following meaning:

Green bar	The circuit-breaker parameter values (read/ write to DMI) saved in the DMI)
Sliding regulator	Adjustment of the set parameter; the parameter adjustments are made as index values if you have not yet set a type in the NZM type selection list. If an NZM type has been set, then the parameters will be adjusted as relative or absolute values.
Text field below the sliding regulator	The display always corresponds to the status of the sliding regulator. If an NZM type has been set, then the parameters will be shown as absolute values in Amps, seconds or milliseconds.

- ▶ To change the parameter settings, set the desired value using the sliding regulator or click on the control box.
- ▶ Set the correct NZM type when you upload to the DMI. Then the NZM parameters will be displayed in the NZM-XPC-Soft as they appear in the DMI when circuit-breaker is connected. Parameters which are not available will not be displayed, parameter values are displayed as relative and absolute values..
- ▶ Load your parameter alterations into the DMI by activating the "DMI download" button or the menu command ‹Target system → DMI download›.

If the parameter changes have been successfully uploaded into the DMI, the green bars match the values indicated by the sliding regulators. This matching is actuated by setting of an NZM type or by changing the language in the NZM-XPC-Soft.

There are two variants available for display and setting of the NZM parameters:

- Variant 1: An NZM type has not been preselected
  - all NZM parameters are visible and adjustable
  - the labelling of the sliding regulator indicates the index values of the NZM parameter scales (Index I_r: 0, 1, ... ,15, indices of all other NZM parameters: 0, 1, ... 9)
  - during DMI download the NZM parameters are written to the DMI in accordance with the settings of the sliding regulator

- Variant 2: A determined NZM type has been preselected (→ section "NZM type selection" on page 89)
  - only the NZM parameters which are supported by the preselected type are visible and adjustable. All other parameters are not visible
  - the labelling of the sliding regulator displays the parameter values as relative values (the relative values depend on the preselected NZM types), the absolute value is indicated underneath the sliding regulator
  - During the DMI download the visible NZM parameters are written to the DMI according to the slider settings. Invisible, i.e. non-existing parameters are set to their maximum values in the DMI as of version 1.2.x (index I_r: 12, indexes of all other parameters: 8)
  - the type setting of the preselected NZM is not loaded into the DMI!

Comparable to both these variants in the NZM-XPC-Soft, there are two states with the DMI:

- DMI without connection to the NZM
  - The NZM parameters stored in the DMI are displayed as index values under ‹Input menu → Parameters› (Index I_r: 0, 1, ... , 12, indices of all other NZM parameters: 0, 1, ... , 8) and can be set immediately.
  - Under ‹Display menu → Control elements› the parameters used by the last connected NZM are displayed (also as index values).

- DMI with connection to an NZM
  - The DMI transfers the parameter settings which are displayed under ‹Input menu → Parameters› to the NZM and reads the parameters which are actually used by the NZM (a type test is not performed before the NZM parameters are loaded). This is performed during the connection set-up and cyclically during normal data transfer operations.
  - Only the DMI parameter values will be displayed under ‹Input menu → Parameters›. In the standard display or under ‹Display menu → Parameters›, only those parameters with which the circuit-breaker actually operates are displayed.

The parameters of the NZM can be set in three different ways:

- Setting directly on the electronic control unit
- Setting of the parameters on the DMI via ‹Input menu → Parameters›
- Setting of the parameters via the fieldbus (PROFIBUS-DP).

The circuit-breaker always uses the lower (more critical) values in each case!

→ DMI parametric programming "Hardware val. active": If the NZM is to operate in all cases with the parameters set on the switch, you must set the NZM parameter in the DMI either to the value "n.def." (only possible with DMI Version 1.10) or set the largest scale values (max.).

If you parameterize the DMI per NZM-XPC-Soft, the setting "n. def." has the effect that the values set on the switch are active.

→ If the connection between the circuit-breaker and DMI is discontinued, the NZM will continue to operate with the parameters which have been transferred via the DMI, as long as the power supply of the electronic control unit is still established (current flow ≧ 30 % I_n).

Tripping characteristic

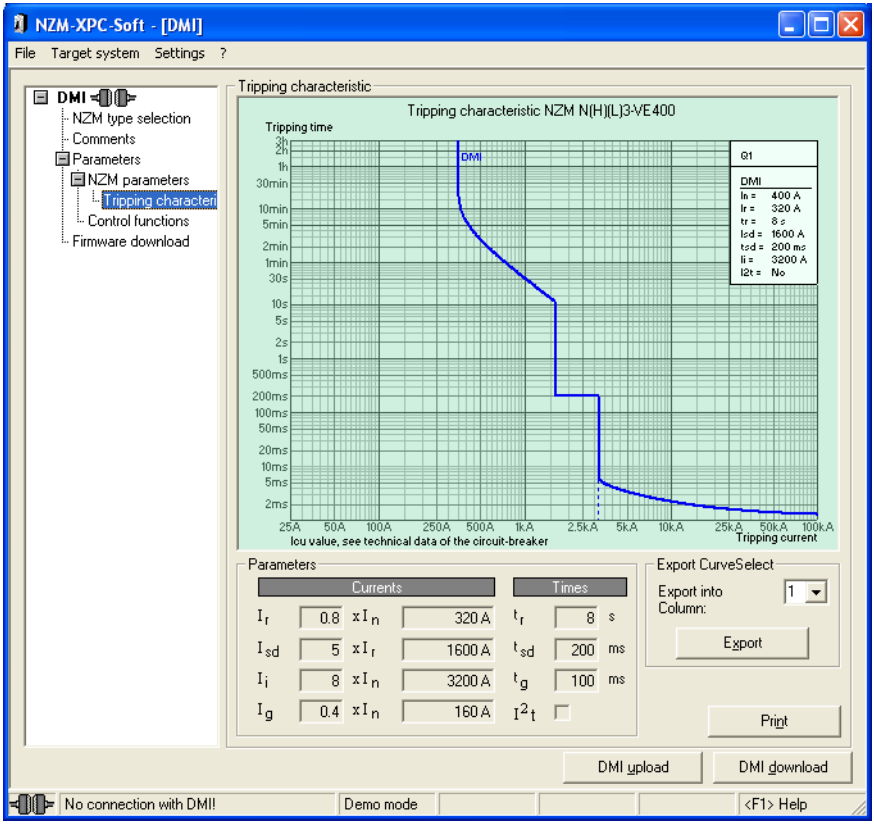


Figure 52: Tripping characteristic of the NZM in DMI mode

In DMI mode, the corresponding tripping characteristic of the NZM are represented graphically for the NZM type set under NZM type selection and the circuit-breaker parameters set under NZM parameters. The NZM parameters are represented as absolute values on the top right in the legend of the characteristic curve. Underneath the characteristic curve the tripping currents are displayed as absolute and relative values, and the delay times are displayed as absolute values.

→ Please note that the tripping characteristic is only effective in this form in the circuit-breaker if

- It is selected under NZM type selection and the correct NZM type is set
- The selected NZM parameters are transferred to the DMI and then connect the DMI with the NZM
- The NZM parameters parameterized in the DMI are less than or equal to the parameter settings (setting buttons) on the circuit-breaker.

It is possible to export the tripping characteristic into the "CurveSelect" characteristics program to examine the selectivity just like NZM mode.

This tool for Microsoft® Excel is installed by the NZM-XPC-Soft V2.0 setup in the "CurveSelect" subdirectory under the program folder.

→ You can change the path and filename of file CurveSelect, to which the characteristics are to be exported, under ‹Settings → Options›. In addition an information window, which shows the path and filename of the CurveSelect file and which can be disabled, is displayed when you click the Export button. If the wrong file is set, you can still cancel the export at this point in time.

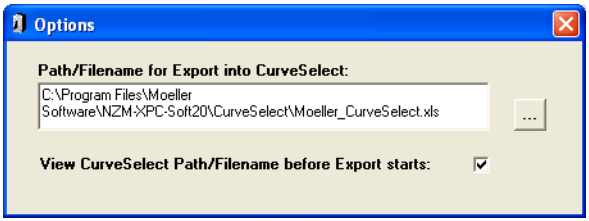


Figure 53: Setting option for the "CurveSelect" file for the export

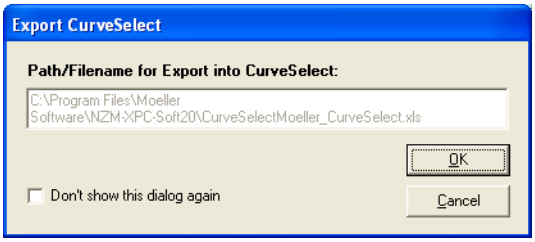


Figure 54: Display of "CurveSelect" file during export

For export into the characteristics program the tripping capacity is assumed to be "N". The setting in the "CurveSelect" should be adjusted to take account of the real switching capacity. Additionally, the mains voltage and the mains frequency should be entered in the characteristics program. Both values as well as the resulting I_{cu} value are not available in the NZM-XPC-Soft because the NZM electronics do not transfer these values.

→ Further instructions for representation of the characteristic curve can be found in the "CurveSelect" on the "Read Me" worksheet.

▶ Select column 1, 2 or 3 (corresponds with the input fields 1 to 3 on the worksheet NZM2, NZM3 or NZM4 of the characteristic program) and press the "Export" button. The represented tripping characteristic is then exported to "CurveSelect".

The selection of the column is significant if multiple NZMs of the same size are available and if their characteristics are to be compared with one another in the "CurveSelect". Select the relevant column before every export.

During export Microsoft® Excel is started and then the "CurveSelect" is loaded if it is not already open. Then the NZM type as well as the tripping parameters are entered in the worksheet of the NZM type (frame size). The respective tripping characteristic of the NZM is represented in the "Characteristic <> Curves" worksheet.

The tripping characteristic represented in the NZM-XPC-Soft can be printed on a printer.

→ The selected printer is set as the Windows® default printer as the characteristic curves can only be printed on a standard Windows® printer.

▶ Press the "Print" button on the "Tripping characteristics" page if you wish to print the characteristic on a printer.

→ Please note the "Instructions for setting the circuit-breaker parameters via the tripping characteristic:" on page 45.

Control functions

On the "Control functions" page, the DMI settings for a motor starter function, for a remote operator and for the acknowledgement input (I0) are displayed after read out.

These additional functions of the DMI can also be set in the NZM-XPC-Soft and uploaded to the DMI.

In addition, the required assignments for the respective functions of the inputs and outputs on the DMI are displayed. Optionally, texts for assignment of the free inputs or outputs can be entered.

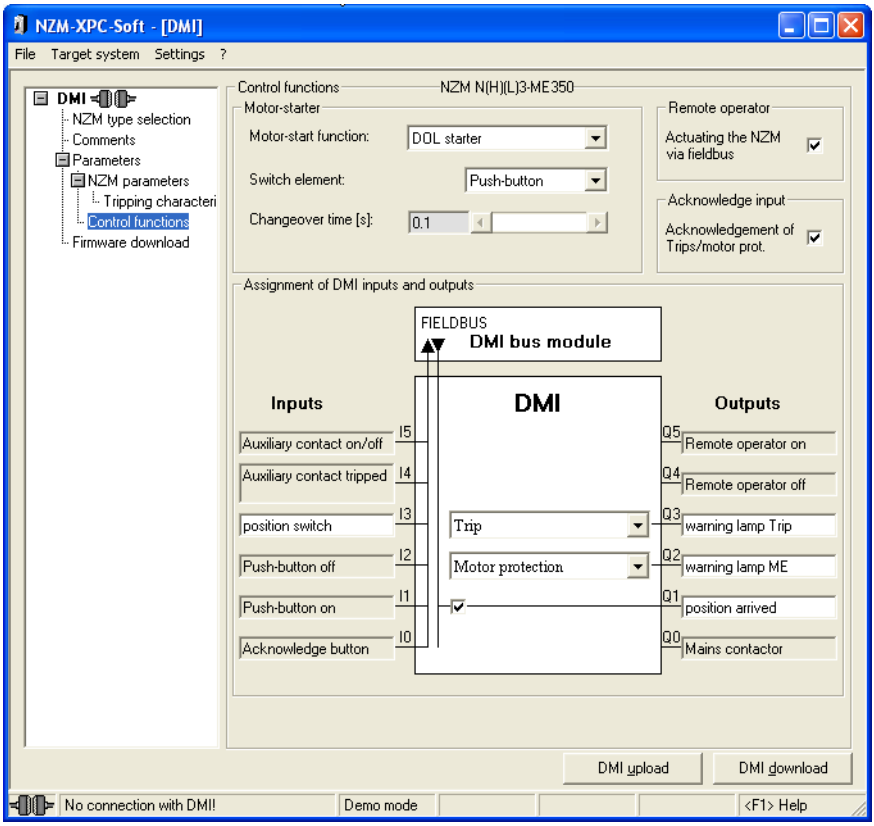


Figure 55: Motor starters

Motor starters
As an expansion of its standard function, the DMI in conjunction with the NZM circuit-breaker and additional contactors can take on motor protection tasks.

When the motor starter function is switched on, the DMI activates an overload shutdown through contactors. When the DMI receives an overload alarm from the NZM, it resets the outputs required for the corresponding function. This terminates control of the connected contactors and the motor is switched off. If the NZM still detects an overload condition after 100 ms, it trips itself.

▶ Switch on the motor-starter function by selecting the required function in the drop-down list box "Motor-start function".

A motor-starter function can only be set when you use a circuit-breaker for motor protection (-ME). If you have set a different type under "NZM type selection" the selection will be inhibited.

If a motor starter function is set in the DMI, you will receive a message when reading the DMI parameters with NZM-XPC-Soft if no ME type is set in the NZM-XPC-Soft. With "Yes" you accept the motor-starter function and set the type to "unknown". With "No" you retain the type setting and set the motor starter function to "Off".

The following motor-starter functions can be selected here, and effected via the DMI:

- Direct-on-line starter,
- Reversing starter,
- Star-delta starter,
- Reversing star-delta starter.

Actuation of the functions "Clockwise rotation", "Anticlockwise rotation" and "Stop" is effected either via PROFIBUS DP or via the external switching elements at input I1 to I3.

▶ Set the external switching elements for the motor-starter function by selecting the required switching elements in the list fields:
  – Switch (level control)
  – Push-button (edge triggering)

Depending on the function that is selected and the switching devices that are used, DMI will use inputs I1 to I3 and digital outputs Q0 to Q3 for the motor-starter functionality.

Two additional indications especially for the motor-starter function can be set in the standard display of the DMI display:

- Motor function (display of the motor-starter function)
- Motor status (shows the state or the direction of rotation)

The changeover time for star-delta switching can be set between 0.1 – 99.9 s in steps of 0.1 s, and uploaded into the DMI.

▶ Set the changeover time in 0.1 s steps by clicking on the ▸ or ◂ buttons on the scroll bar.
▶ Adjust the changeover time in 1 s steps by dragging the slider along the scroll bar, or by clicking in the white space to the left or right of the slider.
▶ Load your settings for the motor-starter function into the DMI, by using the "DMI download" button or the menu command ‹Target system → DMI download›.

When a motor starter function is set, the required assignment of the DMI inputs and outputs on the "Control functions" page are displayed.

Table 6: DOL Starters

Inputs		
Switches	I1	On/Off
Push-button	I1	On
	I2	off
Outputs	Q0	Mains contactor

Table 7: Reversing starters

Inputs		
Switches	I1	Anticlockwise operation
	I3	Clockwise
Push-button	I1	Anticlockwise operation
	I2	off
	I3	Clockwise
Outputs	Q0	Mains contactor, anticlockwise
	Q1	Mains contactor, clockwise

Table 8: Star/delta starter

Inputs		
Switches	I1	On/Off
Push-button	I1	On
	I2	off
Outputs	Q0	Mains contactor
	Q2	Star contactor
	Q3	Delta contactor

Table 9: Star/Delta-reversing starter

Inputs		
Switches	I1	Anticlockwise operation
	I3	Clockwise
Push-button	I1	Anticlockwise operation
	I2	off
	I3	Clockwise
Outputs:	Q0	Mains contactor, anticlockwise
	Q1	Mains contactor, clockwise
	Q2	Star contactor
	Q3	Delta contactor

Remote operator

If an optional remote operator is used the circuit-breaker can be remotely actuated via the PROFIBUS-DP fieldbus:

- ▶ In this case wire outputs Q4 and Q5 of the DMI with the remote operator.
- ▶ Select the "Remote operator" option.

If the option "remote operator" is selected, the required assignment of the DMI outputs on the "Control functions" page are displayed.

Table 10: Assignment of the outputs for remote operator

Outputs	Q4	Remote operator off
	Q5	Remote operator on

Indication of the circuit-breaker state

Proceed as follows for transfer of the circuit-breaker state via the PROFIBUS-DP fieldbus:

▶ Wire the auxiliary switch (standard auxiliary switch, tripped auxiliary switch) with the DMI inputs I4 and I5.

The DMI inputs I4 and I5 are reserved exclusively for this function.

Table 11: Auxiliary contacts

Inputs	I4	Auxiliary switch tripped
	I5	Auxiliary switch on/off

Acknowledge input

From DMI Firmware V1.2.0 it is possible to parameterize the I0 input as an acknowledgement input.

▶ For example, wire one of the pushbuttons for acknowledgement with DMI input I0.

If you have selected the "Acknowledgement of Trips/motor prot." option, an acknowledgement of the existing trip or motor protection signal is achieved with a "1" signal on input I0 of the DMI. An acknowledgement initiates a reset of the respective parameterized outputs and deletes the message on the DMI display.

→ All DMI inputs and outputs which are not assigned can be labelled as required. The assignment of the inputs and outputs of the DMI is also saved and printed out (→ section "Printing DMI data" on page 127).

The entry is limited to 50 characters. Scroll with the arrow keys if the entry protrudes beyond the visible range. If the input in the print out is too long, enter a space in order to commence a new line.

Conditions for setting the outputs

After uploading, the assignments for setting the outputs (Q assignment) are also available for NZM-XPC-Soft. NZM-XPC-Soft shows these settings on the "Control functions" page.

In the DMI, you can assign specific functions to the digital outputs Q0 to Q5.

You can use NZM-XPC-Soft to set the output conditions for the DMI outputs Q0 to Q5 individually, and load them into the DMI.

▶ Define the setting condition for a DMI output by opening the drop-down list box and selecting the required option from the list.

→ If you read out DMI parametric programming from a DMI with Firmware Version 1.1.0 and wish to transfer it to a DMI with a higher Firmware version, please note that other conditions for setting the outputs may be available.

Table 12: Conditions for setting the outputs

Function	Output switches if ...
Trip Ii	A short-circuit release has occurred
Trip Ir	An overload release has occurred (long-time delayed)
Trip Isd	A short-time delayed trip has occurred (without I^2t-monitoring activated)
Trip I^2t	A short-time delayed trip has occurred due to the I^2t-characteristic (with I^2t-function)
Trip Idn	The permissible fault current has been exceeded and a trip has occurred as a result (only with the earth-fault release)
Trip overtemperature	The permissible operating temperature has been exceeded and has caused a trip
Overload 1 (> 100% Ir)	The current in at least one phase has exceeded 100 % of the approved value
Overload 2 (> 120% Ir)	The current in at least one phase has exceeded 120 % of the approved value

Function	Output switches if ...
Load warning (> 70% Ir)	The current in at least one phase has exceeded 70 % of the approved value
HW fault NZM[1]	of the circuit-breaker which has tripped due to an internal fault.
Unbalence[2]	of a circuit-breaker for motor protection (-ME) detects an unbalance of the phase currents. (unbalance is detected by the NZM, when at least one phase has a current which is less than approx. 50 % of the r.m.s. value of the maximum current conducted on the three phases. The state is no longer true when approx. 75 % of the maximum current is again exceeded)
Different parameters[2]	The parameter set on the NZM which differs from the DMI parameter setting.
Trip	A trip has occurred, independent of the trip cause.
Alarm	The circuit-breaker signals an alarm state independent of the alarm cause.
Motor protection	The circuit-breaker (-ME- or -SE- type) recognises an overload and the DMI commands the motor to shutdown. If an overload continues to exist the circuit-breaker will trip.
Bus	The output can be actuated via the fieldbus. A fieldbus module is required for this purpose.
off	The output is shut off permanently.
On	The output is switched on permanently.
No NZMCom	Communications with the NZM are interrupted.

1) Available on DMI Firmware up to V1.1.0

2) Available from DMI Firmware V1.2.0

▶ Transfer the settings into the DMI by pressing the "DMI upload" button or by using the menu ‹Target system → DMI upload›.

The DMI outputs are set if the condition for the output is fulfilled, e.g. for "Trip", if a trip or release occurs, regardless of the reason. The settings for "Bus", "Off" and "On" have a different interpretation. Outputs which have been set when an alarm message occurred (load warning, overload 1, overload 2, unbalance, parameters, alarm), are reset when the alarm message is no longer present.

All outputs which have been set by a trip of the circuit-breaker or with motor protection will remain active until the message is acknowledged.

An acknowledgement is possible by:

- Pressing the "ESC" button on the DMI
- Switching off the circuit-breaker (from the "Trip" to the "Off" position) manually or by using the remote operator
- Setting of the acknowledgement input I0 (from DMI Firmware V1.2.0)
- Issuing the acknowledgement command via the fieldbus (from DMI Firmware V1.2.0).

When motor-start functionality has been set up, then the outputs Q0 to Q3 may have a fixed assignment, depending on the function that was set.

The outputs Q4 and Q5 are reserved when the "Remote operator" option is selected.

→ section "Control functions" on page 109.

Warning or trip messages for setting the outputs (Q0 – Q5) can be parameterized in the DMI, which may never occur in the NZM type which is connected later (e.g. motor protection or unbalance with non-ME-types). The outputs parameterized in this way always remain in the "Off" state.

Firmware download

The NZM-XPC-Soft software enables you to carry out a firmware download to the DMI. This can be necessary for example, where needed new functions are accessible only from a higher firmware version.

A firmware update resets the parameters in the DMI to their default values. To restore a previous parameterization, the following procedure is recommended:

- Reading out current parameters of the DMI:
  Connect DMI and transfer the parameters to the software with button Read DMI.
- Save DMI parameters to file:
  Select menu item ‹File → Save As...›, enter filename and select folder and save (→ section "Securing DMI data")
- Delete old DMI firmware: the firmware that is at present in the DMI is deleted, and the DMI is prepared for the loading of the new firmware (the bootloader is activated).
- Download new firmware: the new firmware is loaded into the DMI. To do this, you need a file that contains the latest firmware version.
- Open file with saved parameters: Select menu item ‹File → Open›, select the file with the saved DMI parameters and open it.
- Write parameters to the DMI: Click button Write DMI to write the parameters to the connected DMI.

Delete firmware

- ▶ Before starting, check that the DMI is linked to the PC via the interface that is set up in the software, and that you have got a file that contains the new firmware version (or level).
- ▶ If you want to load the new Firmware version into the DMI, press the "Delete Firmware" button first.

The following warning message will appear:

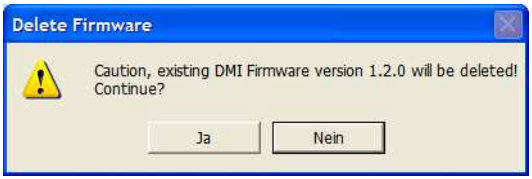


Figure 56: Warning message before the firmware is deleted

- ▶ Acknowledge this warning message with "Yes" if you are certain that you want to delete the Firmware version that is shown. Press "No" if you want to cancel the operation.

If you answer with ‹Yes›, the following window will appear:

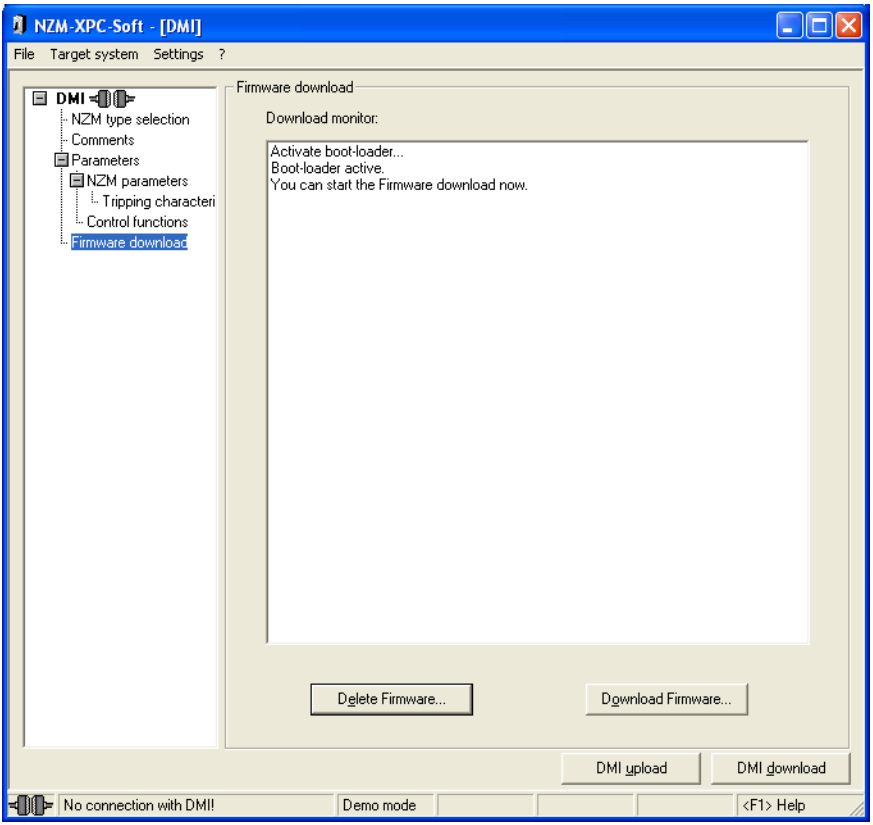


Figure 57: Download monitor

▶ Carry on to the next step when the information shown above has appeared in the download monitor.

Download firmware

→ Do NOT start "Download firmware" unless you have already carried out "Delete firmware"!

▶ Activate the "Download firmware" button, look for the firmware file in the standard dialog box, and then click on "Open".

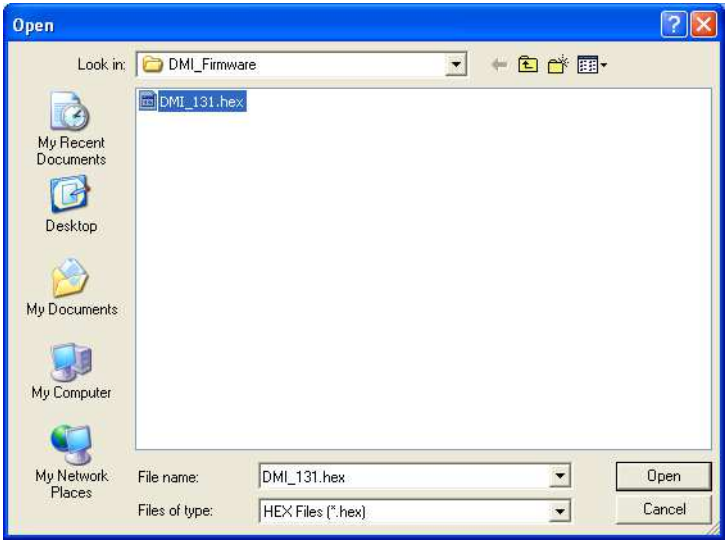


Figure 58: Disconnecting the DMI from the power supply

Figure 59: Open firmware file

→ The disconnection of the DMI from the power supply before a download is mainly required with notebooks, as the particular characteristics of the Com interface in this case will cause transfer errors. Only confirm the message with OK after you have reconnected the DMI to the power supply. The firmware download will then start immediately. The "Download firmware" function is ended with the "Cancel" button.

The following progress display will appear:

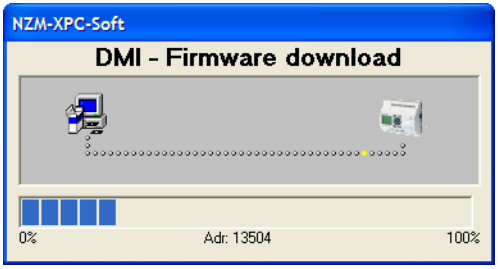


Figure 60: Progress display

While the firmware download is taking place, you can observe the momentary state of the download in the progress display. All the intermediate steps are shown in the download monitor. The program cannot undertake any other action until the download is finished.

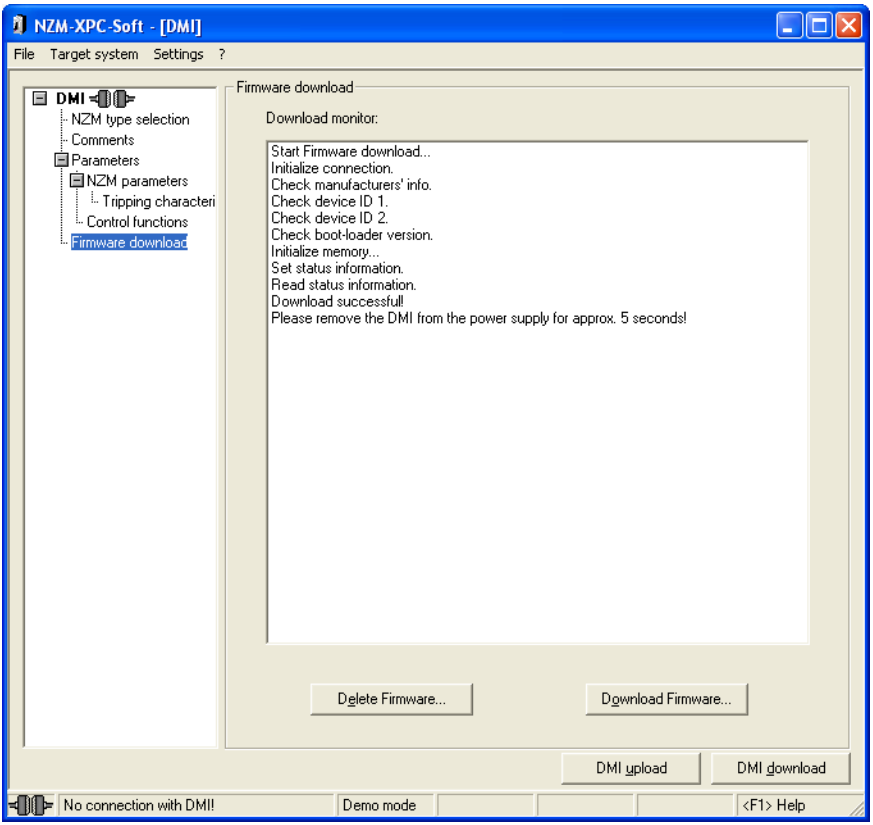


Figure 61: Download monitor

▶ Disconnect the DMI from the power supply after the download has been successfully concluded. After the power supply has been reconnected, verify that the DMI displays a new Firmware version on the display.

→ If the firmware download was not successfully concluded, because of an error, start the download procedure once more after you have cleared the fault.

Securing DMI data

Saving to a file

Any data of the DMI that are indicated, can be saved to a file. These are as follows:

- NZM type selection
- Comment entries
- Identification data and DMI settings
- NZM parameters
- Settings for the standard display and the conditions for setting the outputs
- Settings for the motor-starter function
- Settings for the remote operator
- Assignment of DMI inputs and outputs.

▶ Save the DMI data by using the menu command ‹File → Save As› (→ section "File – Open, Save, Save as" on page 17).

The file format is XML. An HTML file is also created, with the same name as the XML file, but with the *.htm extension. This gives you the additional option of viewing the saved data through Internet Explorer.

▶ Use the menu command ‹File → Save› (→ section "File – Open, Save, Save as" on page 17) if you want to repeat the save to the same file (for instance, after altering a comment entry).

→ If you save repeatedly in a file, the data last saved is overwritten each time.

The last data called up from the DMI (displayed data) will be saved. It is therefore a good idea to read the current DMI data again before saving.

The saved data can be reloaded in to the program (for instance, to apply the same parameter settings to more than one DMI) (→ section "Loading a file" on page 127).

Loading a file

Stored DMI data can be downloaded from an XML file into NZM-XPC-Soft, e.g. in order to load identical parameters into several DMI.

▶ Load the XML file, using the menu command ‹File → Open› (→ section "File – Open, Save, Save as" on page 17).

Immediately upon opening of the DMI file, all the displayed data are available and can be uploaded into the DMI.

▶ To display the general parameters for the DMI, or the NZM parameters, click on the corresponding entries in the navigation tree.

→ When you read out the DMI data, the parameters in the display will be updated, i.e. the data that were loaded from the file will be overwritten.

Printing DMI data

All the saved DMI data can also be output on a printer or into a print file using the print function of the integrated Web Browser.

▶ Print out the DMI data by using the menu command ‹File → Print› (→ section "File – Print preview, Print" on page 19)

The print format for the NZM and DMI data is determined by means of a predefined stylesheet file (XSL file) that is copied into the program directory during installation (NZM.XSL).

→ A separate print function can be found on the "Tripping characteristic" parameter pages which can be started via the "Print" buttons.

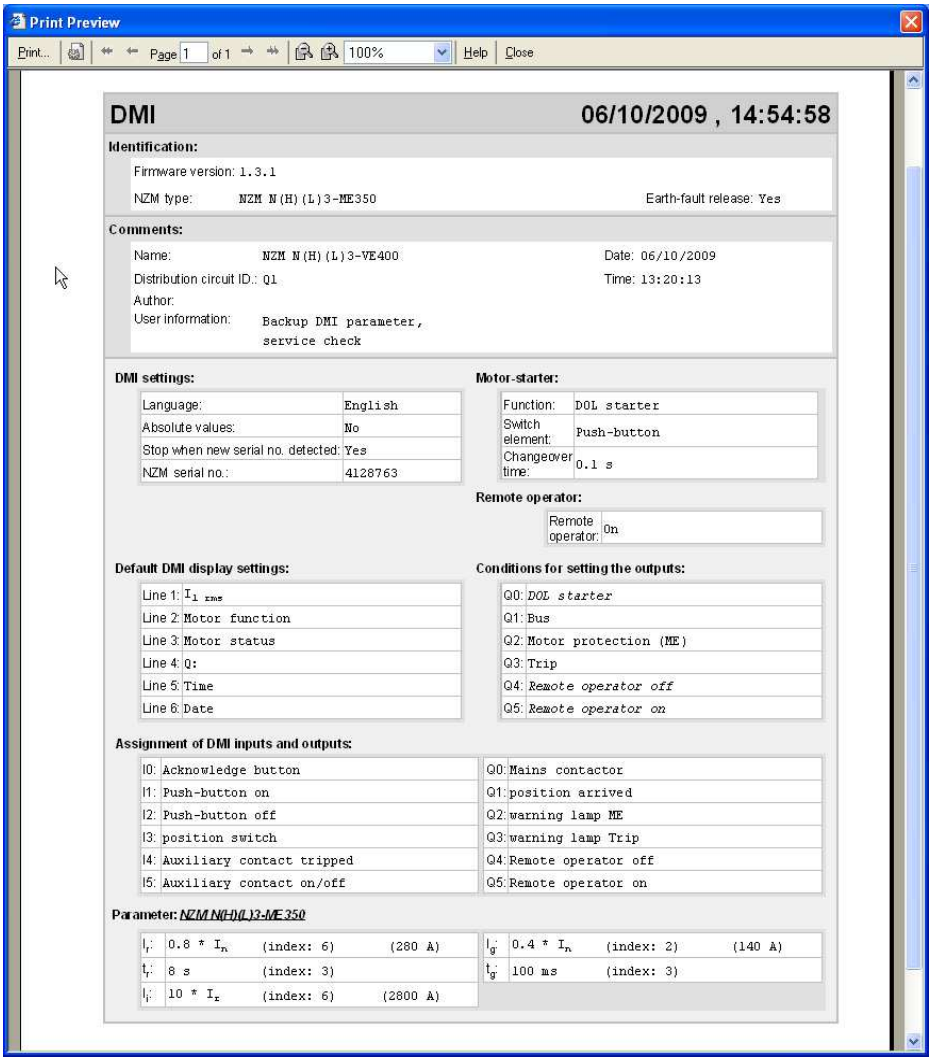


Figure 62: Print format

DMI demo mode

The demonstration mode in the NZM-XPC-Soft V2.0 simulates all the normal functions of the software without a real DMI being connected.

▶ Activate the demo mode for the software, by clicking on ‹Settings → Demo mode›.

The demo mode is switched on if "Demomode" is displayed in the status line and the ‹Settings → Demo mode› is marked with a tick.

By clicking on the "DMI upload" button a simulated connection with a DMI is established and DMI parameter data is read out.

By clicking on the "DMI download" button a simulated connection with a DMI is established and the set DMI parameter data is written. The data downloaded to the simulated DMI can be subsequently uploaded.

If you save the state after the first "DMI upload" into a file (→ page 125) you can restore the state at any time that the simulated DMI had after installation of NZM-XPC-Soft V2.0.

Firmware download simulation

With NZM-XPC-Soft V2.0 in demo mode you can simulate the steps and the monitor text reactions with a Firmware download.

Proceed with the software in the same manner as with → section "Firmware download" described on page 118.

The simulation of the Firmware download can be ended immediately if you click on the animation in the progress window.

Appendix

Glossary

Technical term or abbreviation	Explanation
General	
COM 1 to COM 256	Serial communication ports of the PC or virtual COM ports when using a USB cable or a USB-to-COM adapter
HTM (HTML)	Hypertext markup language, language for representation of data, pictures etc. as a web page in Web Browsers.
XML	Extensible markup language, language for the structured description of data in text format; can be interpreted by XML parsers.
XSL	Extensible stylesheet language, language for the transformation and formatted representation of XML files.
NZM	
Earth-fault release	Optional additional module for earth-fault protection, can be used for IEC circuit-breakers of frame size 3 and 4. Protective devices that operate in the milliamp range, are described as residual-current operated protective devices (personnel protection). Protective devices that operate in the amp range (1 to 1200 A), are described as earth-fault protective devices (system protection – fire barrier).
Firmware Version	Firmware version of the electronic trip unit or the add-on module
Hardware version	Hardware version (add-on electronics module)
$I_{1\text{eff}} - I_{3\text{eff}}$	Effective current phase 1 – 3, related to the set I_r
$I_{N\text{eff}}$	Neutral conductor current relative to set I_r
I_{cs}	Rated **operational** short-circuit breaking capacity
I_{cu}	Rated **limit** short-circuit breaking capacity
I_g	Response value of the earth-fault release
$I_{g\ \text{eff}}$	R.m.s. value of residual current

Technical term or abbreviation	Explanation
I_i	(i=instantaneous) Response value of the non-delayed short-circuit release
I_n	Rated current, nominal current
Ir	Set value for the overload trip
I *d*	(sd=short time delayed) Response value of the short-time delayed short-circuit release
I^2t	For conversion of the short-circuit protection characteristic to improved selectivity with downstream fuses.
Command	Tripping of circuit-breaker by means of command sent from software
Load warning	Alarm message at a load > 70 % I_r or I_n (with -AEF, -VEF)
Motor protection	Signal of a circuit-breaker for motor protection (-ME) to the DMI 100 ms before an overload release. The DMI reacts by switching off the contactors. If the NZM still recognizes an overload condition after 100 ms, the breaker automatically trips out.
N conductors	neutral poles
Phase 1 – 3, N	Load status in phases 1 to 3, neutral conductor
Temperature	Release based on temperature monitoring (NZM-internal)
t_r	Delay time when the overload release responds
Trip	Tripping
t_{sd}	Delay time when the short-time delayed short-circuit release responds
t_g	Time delay of earth-fault release response
Overload 1	Alarm message at a load > 100 % I_r or I_n (with -AEF, -VEF)
Overload 2	Alarm message at a load > 120 % I_r or I_n (with -AEF, -VEF)
Load unbal.	Alarm message when at least one phase has a current which is less than approx. 50 % of the r.m.s. value of the maximum current conducted on the three phases. The state is no longer true when approx. 75 % of the maximum current is again exceeded.

Technical term or abbreviation	Explanation
DMI	
n.def.	Parameters not defined, NZM uses local setting.
Data for PROFIBUS DP V0	For selection of the data which can be accessed via PROFIBUS-DP (only up to DMI Version 1.1.0, PROFIBUS DP V0), see also: "Circuit-Breaker Communication System Manual" (MN01219002Z-EN, previously AWB1230-1441GB, 3rd edition 04/03)
Q0 – Q5	Conditions for setting the outputs Q0 to Q5[1]
NZM serial number	Serial number of the NZM, for verification of the startup configuration with a new serial number
Lines 1 – 6	Display line 1 to 6 on the DMI display (standard display)[2]
No NZM Com	Optional setting for Q0 to Q5 in the DMI Outputs are set when communications to the NZM are interrupted.

Note:

1) If you have selected a motor starter function, 1 to 4 outputs (Q0, Q1, Q2, Q3) are no longer available for assignment with circuit-breaker alarms or trips. If a remote operator is connected the outputs Q4 and Q5 reserved.
2) Parameters which do not exist in the connected NZM type are not displayed in the DMI; i.e. the line is missing.

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