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Herausgeber: Eaton Industries GmbH
Hein-Moeller-Str. 7–11
D-53115 Bonn

© 2002 by Eaton Industries GmbH
Änderungen vorbehalten
11/04 MN01219002Z-EN xx/xx/Ki 0x/02
Printed in Germany (0x/02)
Artikel Nr.: xxxxxx

4 015082 613716

easy800

Manual

11/04 MN01219002Z-EN
replaces 11/04 AWB1230-1441GB

Circuit-Breaker Communication System



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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.

1st published 2002, edition date 02/02
2nd edition 11/02
3rd edition 04/03
4th edition 08/03
5th edition 08/04
6th edition 11/04
See revision protocol in the “About this manual“ chapter

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Production: Heidrun Riege
Translation: David Long

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Warning!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (IL/AWA) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.

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- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).

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1 User Notes

This manual describes the communication link between the NZM2, 3, and 4 circuit-breakers,

- a local **D**ata **M**anagement **I**nterface (DMI) and
- a fieldbus system.

The communication system allows the user to interrogate diagnostics and operating data, log current values, implement the parameter assignment and control of the circuit-breakers locally or via a network.

Target group

The DMI must only be installed and connected by qualified persons or persons familiar with the installation of electrical systems.

A knowledge of electrical engineering is required for commissioning to be properly executed. Incorrect connections may cause damage to sections of the system or danger to persons when active components such as motors or pressure cylinders are activated.

Proper use

The DMI is a communication component for the NZM compact circuit-breakers. Operation is only permissible after proper installation.

- The DMI is a rail-mounted device and must be installed in an enclosure, control panel or service distribution board. The power supply and signal terminals must be protected against accidental contact and must be covered.
- Installation must be carried out in compliance with the necessary EMC requirements.
- The switching on of the DMI must not cause any hazards due to the activation of devices, such as unforeseen motor start-ups or unexpected voltage connections.

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Improper use

The DMI must not be used as a replacement for components from safety controls such as safety controls for furnaces, cranes, Emergency-Stop or two-hand controls.

Modification index

From the 11/04 edition the manual AWB1230-1441GB has been renamed to MN01219002Z-EN.

Edition date	Page	Subject	New	Modi-fied	Omitted
11/04	10	Section "Compatability of DMI with field bus modules:"		✓	
	54	Section "COM"	✓		
	75ff.	In the entire chapter 3, "load warning" and "load prewarning" was changend to "load rejection prewarning"		✓	
	75ff.	In the entire chapter 3, enlarged data type description		✓	
08/04	33	Section "The standard display"		✓	
	41	Section "Q Assignment"		✓	
08/03	10	Compatibility with fieldbus modules	✓		
	14ff.	Main menu		✓	
	29ff.	Display menu		✓	
	31ff.	Parameters, motor starter, time		✓	
	35	„Password setting/changing"		✓	
	36ff.	Input menu overview		✓	
	41ff.	„Commands"		✓	
		„Remote operator"	✓		
		„Q Assignment"		✓	
	45ff.	Fieldbus interfacing function		✓	

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Edition date	Page	Subject	New	Modified	Omitted
08/03	54	„COM"		✓	
	60ff.	„Trip", „Alarm"		✓	
	62ff.	„Diagnostics"		✓	
	67	„Connection to bus systems"		✓	
		PROFIBUS-DP			✓
	75ff.	All of chapter 3„NZM-XDMI-DPV1 (PROFIBUS-DPV1 Interface for DMI)"	✓		
04/03	25, 68	Connecting an auxiliary switch to the NZM	✓		
	44	The circuit-breaker assumes the short-circuit and overload disconnection.	✓		
	47, 47	Switchover from star to delta operation	✓		
	67	Read data inputs, byte 2		✓	
	71ff.	Motor-starter functions via PROFIBUS DP	✓		
	80	Data content/address location		✓	
	81	Temperature data type			✓
	89	Table 11		✓	
	90	Table 12	✓		
	90	Table 13	✓		
	91	Table 14		✓	
	91	Table 15	✓		
	92	Table 16		✓	
	93	Table 17		✓	

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Edition date	Page	Subject	New	Modi-fied	Omitted
11/02	10, 11	Main menu		✓	
	24, 25	Display menu		✓	
	26	I/O status		✓	
		Motor starter	✓		
	31ff.	Input menu		✓	
	36	Reset			✓
	36, 37	Table		✓	
	37ff.	H select, Reset H-Sel			✓
		Motor start.	✓		
	39	Startup behaviour		✓	
	50	Diagnostics menu		✓	
	52	Commands		✓	
	64, 65	Input		✓	
	67, 68	Output		✓	
	74ff	Table 3		✓	
	78	Table 4		✓	
	79	Table 6	✓		

Writing conventions

In order to provide greater clarity, the header of the left-hand page shows the chapter title, whilst the header of the right-hand page shows the title of the current section. This does not apply to the first page of a chapter and empty pages at the end of a chapter.

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Abbreviations and symbols used in this manual have the following meanings:

DMI	**D**ata **M**anagement **I**nterface
NZM	Circuit-breaker in general
AE	**Distribution circuit protection e**lectronic (AE internal company abbreviation)
ME	**M**otor protection **e**lectronic
VE	**F**ull protection **e**lectronic (VE internal company abbreviation)

▶ indicates actions to be taken.



Indicates interesting tips and additional information



Note
Warns of a hazardous situation that could result in damage to the product or components.



Caution!
Warns of the possibility of a hazardous situation that could result in major damage and minor injury.



Warning
Warns of the possibility of a hazardous situation that could result in major damage and serious or fatal injury or even death.



Danger of electric shock!
Do not carry out any electrical work on the device with the power supply switched on.

Observe the safety rules:

- Isolate the system
- Secure against restarts
- Ensure de-energized state
- Cover adjacent energized parts

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Device designation

The following terms are used in the manual:

DMI for NZM-XDMI612.

System overview

The following communication components are the accessories that are used for establishing communication with the NZM2, 3 and 4 circuit-breakers.

- **DMI** for connecting the circuit-breaker; manages the NZM data and relays it to the fieldbus interface when necessary (→ chapter 2 Page 11).
- **Fieldbus coupling** enables data exchange with the circuit-breaker via the DMI. The NZM-XDMI-DPV1 PROFIBUS-DP interface from the easy product range is currently used (→ chapter 3 Page 75).
- **NZM-XPC-Soft** is a PC user interface for the DMI and NZM. It enables user-friendly parameter setting and firmware updating of the DMI, as well as the data scanning, parameter setting and diagnostics of the circuit-breaker
  (→ http://www.eaton.com/moeller → **Support**
  Search term: MN01219003Z).

Compatability of DMI with field bus modules:

NZM-XDMI612	easy-204-DP	NZM-XDMI-DPV1[1] V1.10
V1.1.x	✓	–
V1.2.1, V1.2.2	–	✓

1) PROFIBUS interface for DMI

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2 DMI

System concept

The DMI is the **D**ata **M**anagement **I**nterface for NZM circuit-breakers of frame sizes 2, 3 and 4. It supports user-friendly and local

- Parameter setting,
- Operation and
- Monitoring of the circuit-breakers,

as well as

- Interrogation and
- Control of other components in the vicinity such as auxiliary contacts or motor operators.

In combination with circuit-breaker types for motor-protection (NZMx-**ME**...) it can also be used for the user-friendly implementation of motor starter functions. Pluggable interface modules enable the DMI to access different fieldbus systems. All locally available data can be called to other locations (PLC, control room).

The design and operation of the DMI is based on that of the easy control relay, so you will become familiar with the DMI quickly and easily if you have a previous knowledge of this control relay. However, even without a knowledge of easy, operation is also simplified thanks to the clearly structured menu concept.

Unlike control relays or PLCs, logic operations or sequences cant be programmed in the DMI. It is primarily used for providing the communication connection to the NZM circuit-breakers. It is therefore not provided with a programming interface but simply a configurator.

The DMI also does not have Run and Stop operating states in the same way as control devices do. The DMI starts to operate as soon as the power supply is switched on.

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Device overview

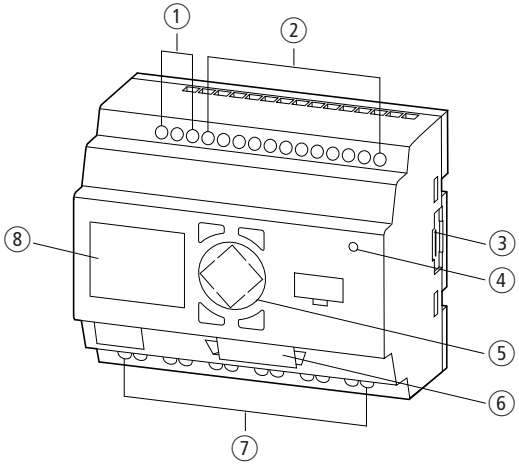


Figure 1: Setup of the DMI

① Power supply
② 6 digital inputs
③ Interface for the interface modules
④ Parameters LED
⑤ Keypad
⑥ Interface for connecting circuit-breaker or PC
⑦ 6 digital outputs
⑧ Display

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DMI system

Keypad



DEL + ALT: Change from any menu to the Special menu

DEL + ESC: Change from any submenu to the main menu

Cursor buttons:
íÚ Change menu item, change value
ú í change position

OK: Continue, confirm selection

ESC: Move back, cancel

Cursor display: The cursor flashes. Flashing menus and values are shown in this manual in grey.

Operating principle

The DMI is operated via the keypad and is menu-driven.

The **main menu** is the start of the menu system, from which all other submenus and the standard display can be accessed (→ section "Menu structure", Page 14).

The **standard display** appears automatically in the LCD display if the buttons on the DMI have remained in an non-actuated state for 30 seconds or longer. It can be configured as required. The standard display is overwritten by alarm screens automatically (→ section "The standard display", Page 33).

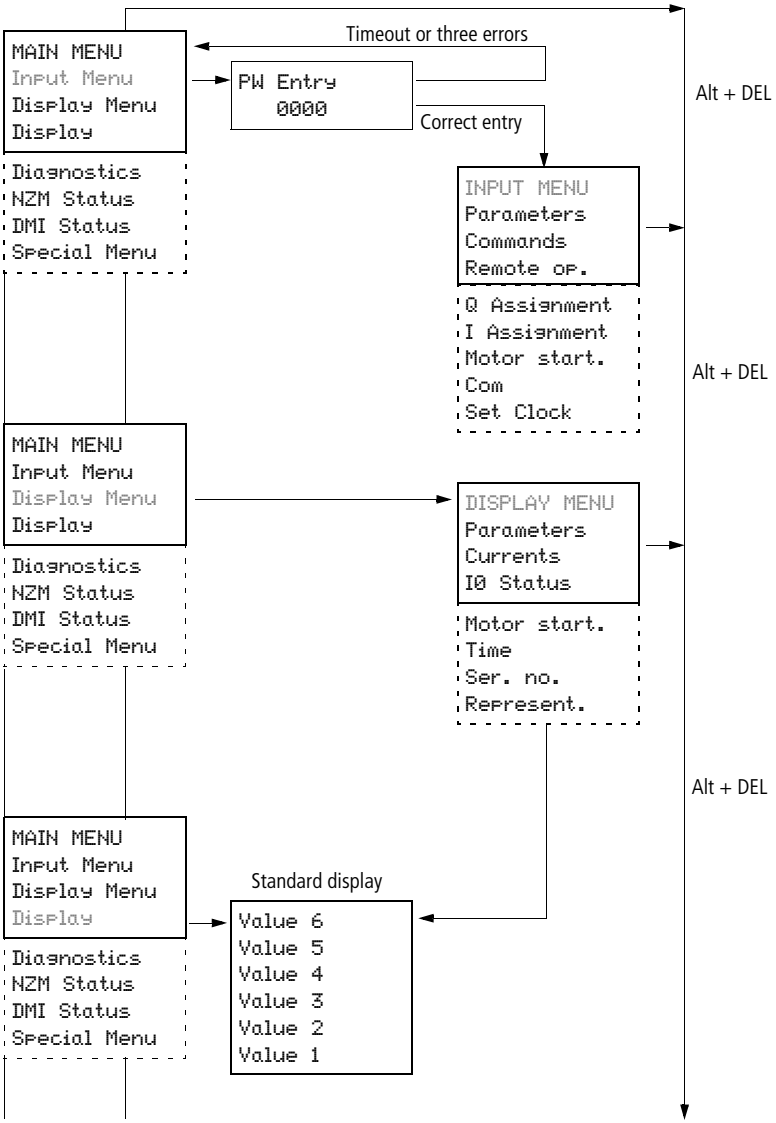
The **alarm screen** appears in the LCD display each time the circuit-breaker has detected an alarm state or a trip. The alarm screen is displayed until it has been acknowledged by the user (→ section "Alarm messages", Page 66).

The **display** only shows a maximum of four lines at a time. If a menu consists of more lines, these can be accessed by using the cursor buttons ∧ or ∨.

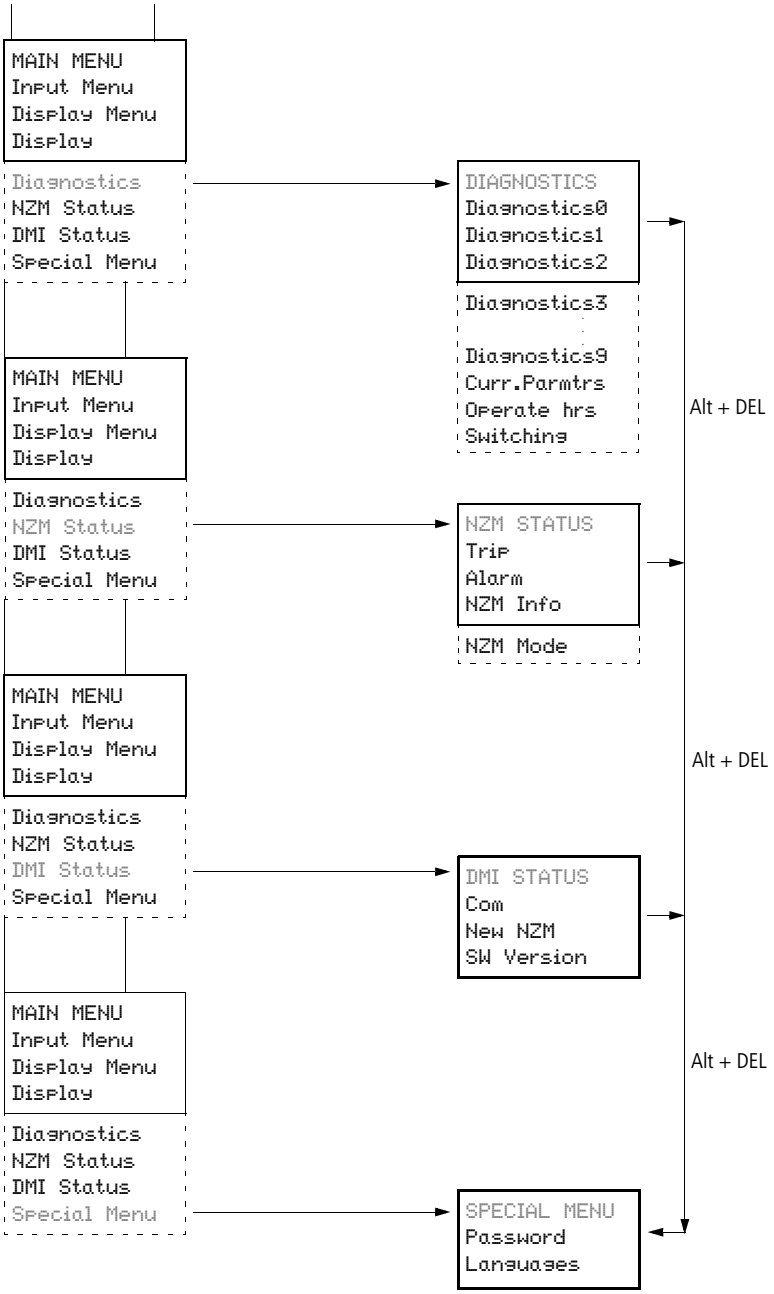
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Menu structure

Main menu

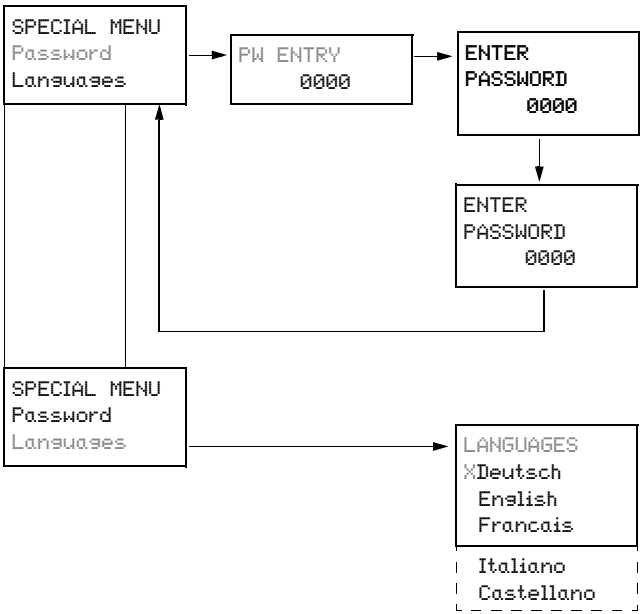


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Special menu



Engineering and installation

The DMI must only be installed and connected by qualified personnel or persons familiar with the installation of electrical systems.



Danger of electric shock!
Do not carry out any electrical work on the device with the power supply switched on.

Observe the safety rules:

- Isolate the system
- Secure against restarts
- Ensure de-energized state
- Cover adjacent energized parts

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Carry out the installation of the DMI in the following order:

- Mounting,
- Wire inputs,
- Wire outputs,
- Connect the power supply.

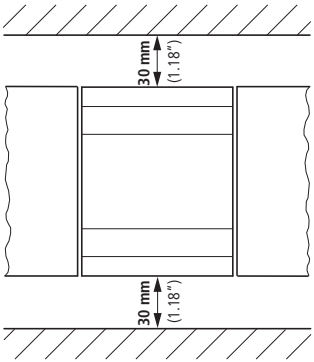
Mounting

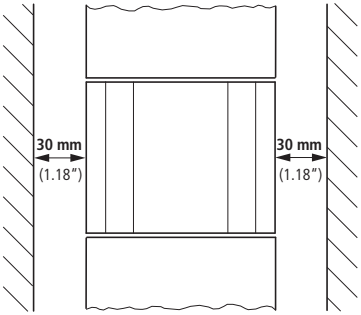
→ When using the DMI with expansion modules (e.g. fieldbus modules, PROFIBUS-DP) connect the expansion module before mounting.

Install the DMI in a control panel, service distribution board or enclosure so that during operation the power supply connections and the terminals are protected against direct contact.

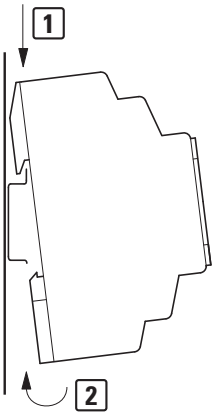
Snap fit the DMI onto a top-hat rail which is conform to IEC/EN 60715. The DMI can be mounted vertically or horizontally.

For problem-free wiring of the DMI, ensure a clearance on the terminal sides of at least 30 mm to the wall or to neighbouring devices.





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Mounting on a top-hat rail

▶ 1 Hook the DMI diagonally on the top edge of the top-hat rail. Slightly press the device down and onto the top-hat rail until it snaps over the bottom edge of the top-hat rail. The spring mechanism will cause the DMI to clip into place automatically.

▶ 2 Check that the device is seated securely.

Vertical mounting on a top-hat rail is carried out in the same way.

Connecting fieldbus modules

The fieldbus modules can be connected to the DMI easily using an EASY-LINK-DS jumper (→ fig. 2, Page 19).

A separate power supply is required for this. For further information on this refer to → chapter "NZM-XDMI-DPV1 (PROFIBUS-DPV1 Interface for DMI)", Page 75.

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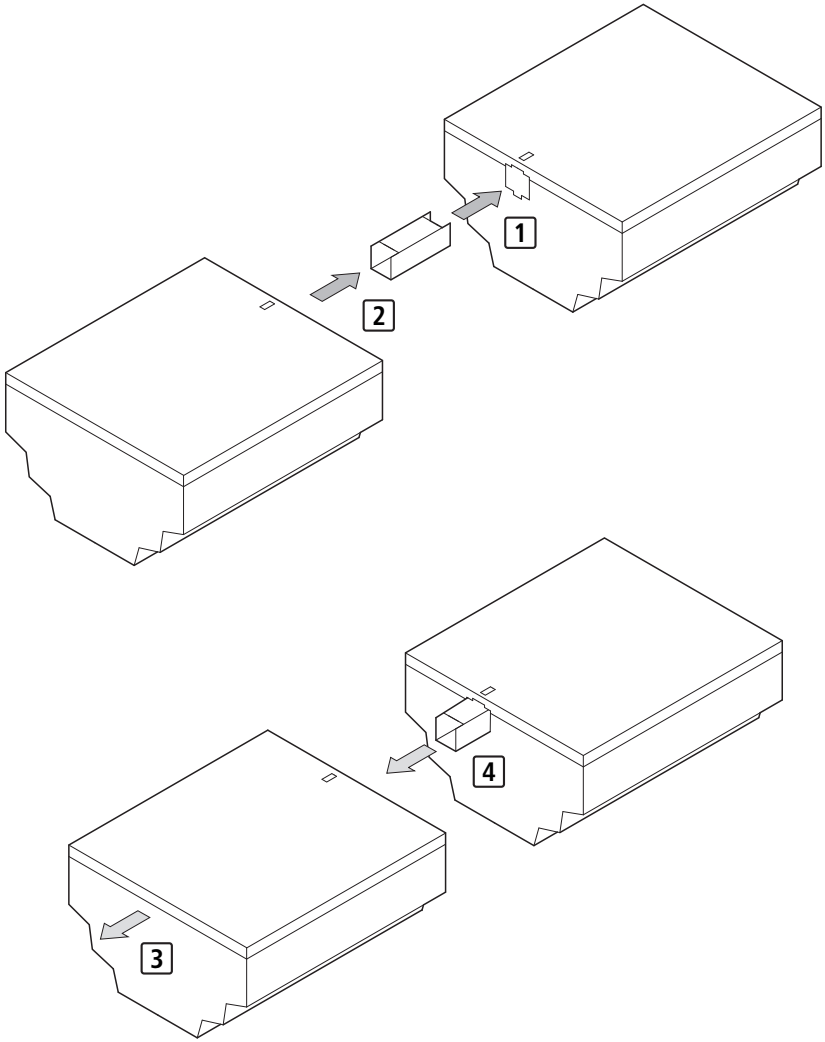


Figure 2: Connecting fieldbus modules

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Connection terminals

Tools

- Slot-headed screwdriver, slot width 3.5 mm, tightening torque 0.6 Nm.

Cable connection cross-sections

- Solid: 0.2 to 4 mm^2
- Flexible with ferrule: 0.2 to 2.5 mm^2

Installation regulations, EMC

Observe the following requirements when installing a DMI in a device or system:

- Always mount the DMI on an earthed top-hat rail.
- The clearance between the DMI and the circuit-breaker, as well as between the DMI and the main conductors must be at least 0.5 m.
- All cables and conductors connected to the DMI must not be laid parallel to the main conductors. Conductors may only be crossed on the shortest possible route and with a minimum clearance of 10 cm.
- The minimum bending radius of the communication cable between NZM and DMI is 130 mm.
- Fit the supplied ferrite ring on the cable (NZM-XDMI-CAB) to the circuit-breaker approximately 5 to 10 cm from the plug at the circuit-breaker end.

→ These measures must be observed in order to ensure the EMC characteristics specified in → section "Electromagnetic compatibility (EMC)", Page 70.

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Connecting the power supply

For the required connection data for the DMI refer to
→ section "Technical data", Page 68.

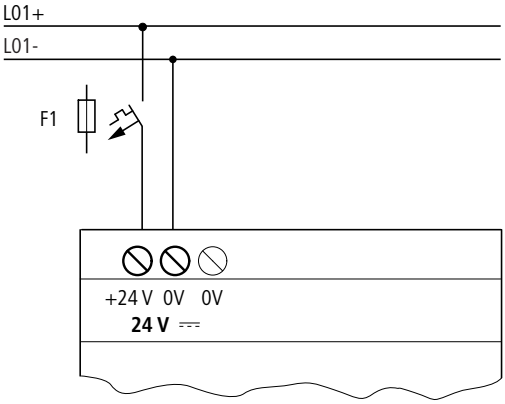


Figure 3: Connecting the power supply

→ The DMI is protected against reverse polarity. In order for the DMI to function properly, ensure that the connections have the correct polarity.

Cable protection

Connect a cable protection fuse (F1) of at least 1 A (slow).

→ The DMI power supply has capacitive properties the first time it is switched on. A suitable switching device for the power supply must therefore be used, i.e. no reed relay contacts, no proximity switches.

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Connecting inputs

The inputs of the DMI are switched electronically and are isolated from each other and from other electronic circuitry by means of optocouplers.

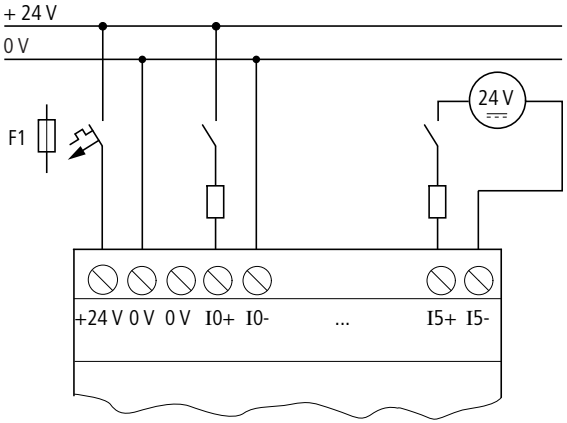


Figure 4: Connecting the inputs on the DMI

Connect the input terminals (I0+/I0– to I5+/I5–) to auxiliary contacts or other relevant contacts from the vicinity of the circuit-breaker.

Two-wire proximity switches cant be used due to their high residual current.

The inputs are polarised, i.e. on I0+ the pole must be connected to the positive potential, and I0– must be connected with the corresponding reference point.

→ Polarity reversal will not damage the DMI, but will prevent the relevant switching states from being indicated and evaluated.

The current and voltage ranges for the digital inputs are stated in → section "Digital inputs (24 V DC)", Page 71.

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Connecting outputs

→ Prior to installation note the technical limit values and data of the outputs, → section "Digital outputs (relays)", Page 72.

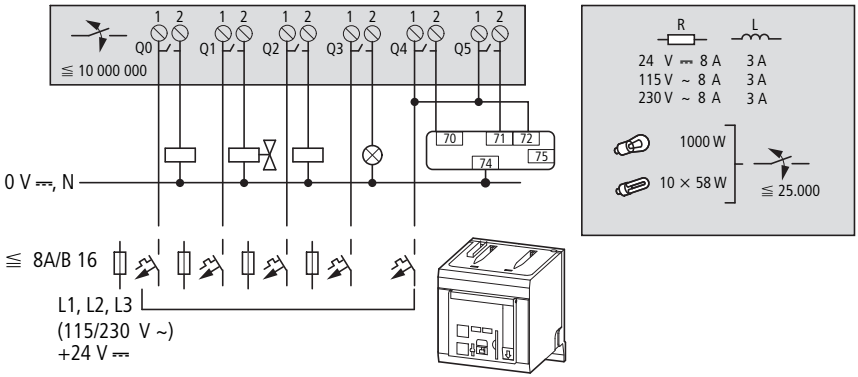


Figure 5: Connecting the outputs on the DMI

The outputs Q0 to Q5 are potentially isolated contacts (make). Their activation can be defined in the Input menu via Q Assignment (→ section "Q Assignment", Page 41). They can be used for switching loads such as fluorescent tubes, filament bulbs, contactors, relays or motors.

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Connecting circuit-breakers

Caution!
Before connecting the circuit-breaker to the DMI, ensure that no parameters are configured in the DMI that will impair the correct functioning of the circuit-breaker. For example, lower tripping values may have been configured in the DMI than in the circuit-breaker. These may be accepted as valid values when both devices are connected to each other, thus causing the circuit-breaker to trip prematurely. For detailed information on parameter setting and data transfer refer to → section "Parameter setting", Page 35.

The circuit-breaker is connected to the DMI using the NZM-XDMI-CAB cable. This ensures the correct adaption of signals in order to ensure interference-free data transfer, as well as providing the circuit-breaker with the required power supply.

It is then no longer dependent on the current in its contact system but can supply up-to-date process information at any time, even if it has just tripped and thus its own power supply is disconnected.

- ▶ Remove the cover of the DMI:
- ▶ Plug the cable into the interface for the circuit-breaker or PC connection ⑥ on the DMI (→ fig. 1, Page 12).

→ The cable has an anti-rotation feature and can only be plugged in the correct position.

- ▶ Open the front flap on the NZM.
- ▶ Remove the cover of the COM interface.
- ▶ Push in the plug under the front flap.
- ▶ Fit the plug onto the COM interface until it is flush.
- ▶ Close the front flap of the NZM.
- ▶ Fit the supplied ferrite ring on the cable to the circuit-breaker approximately 5 to 10 cm from the plug at the circuit-breaker end.

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- ▶ Fasten the cable also to one of the straps provided on the circuit-breaker.
- ▶ Connect both of the auxiliary switches to the NZM:
  - – Input 4 of the DMI is connected to the auxiliary switch for trip release recognition (tripped = L, not tripped = H),
  - – Input 5 of the DMI is connected to the auxiliary switch for ON/OFF detection (ON = H, OFF = L).



For further information refer to the relevant documentation for the individual NZM types as this varies according to the type and model concerned.

The circuit-breaker and DMI will exchange data within 5 s of connecting the cable at both ends. All the available parameters and data can then be interrogated as required.

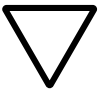
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Commissioning

Switching on

▶ Before switching on check that the terminals for the power supply and the inputs are connected correctly:

Terminal +24 V:	Power supply 24 V
Terminal 0 V:	Power supply 0 V
Terminal Ix+:	Positive input potential, Input x (x = 0 to 5)
Terminal Ix–:	Reference signal Input x (x = 0 to 5)



Note
Once both devices are connected to each other, the parameters will be transferred immediately after power up.
It must be ensured that the DMI does not contain any parameters that will impair the correct functioning of the circuit-breaker when transferred (→ section "Parameter setting", Page 35).

When the DMI is switched on, the firmware version and creation date will appear briefly on the display. The device will then try to connect to the circuit-breaker. If this is not successful or not successful immediately, the message "Starting Com" will appear. Otherwise the main menu will be displayed and then replaced by the standard display after 30 s. If a status display was not selected (→ section "The standard display", Page 33), only the main menu will appear, and the display will flicker briefly every 30 seconds in order to indicate this state.

All output relays are opened when the device is switched on and cant be set until the device has been fully initialised.

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When the DMI is switched off, all the parameters are permanently stored in the internal EEPROM so that they can be reloaded at the next start. The DMI also opens all the output relays.

Setting the menu language

The Special menu (→ section "Special menu", Page 16) allows you to set the user language required.

The Special menu can be opened:

- via the Main menu by selecting Special menu,
- or by using the button combination **ALT** + **DEL** from any other menu.



▶ In the Special menu use the cursor buttons Í or Ú to select Languages.

▶ Select the language you require using the cursor buttons Í or Ú.
German
English
French
Italian
Spanish

▶ Confirm your selection by pressing **OK**.

The language selected is indicated with an X.

After 30 s the display returns automatically to the standard display.

Press **ESC** to return to the Special menu.

The Language selection can also be changed later at any time.

For detailed information on operation and menu control refer to → section "DMI system", Page 13.

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Data interrogation

The following types of data can be called up in the DMI:

- Process data supplied by the circuit-breaker,
- Parameter settings,
- Identification data of the circuit-breaker and any fitted modules,
- Status messages from the circuit-breaker,
- Status messages from the DMI.

Data can be interrogated in two different ways:

- Constantly required data can be incorporated in the standard display and called there continuously,
- If necessary, less frequently required data can be called in the Display menu or in the status menus.

Display menu

You can also use the Display menu to include important data in the standard display (→ section "The standard display", Page 33).

If necessary, less frequently required data can be interrogated via the Display menu.

▶ In the main menu use cursor buttons Í or Ú to select Display menu.

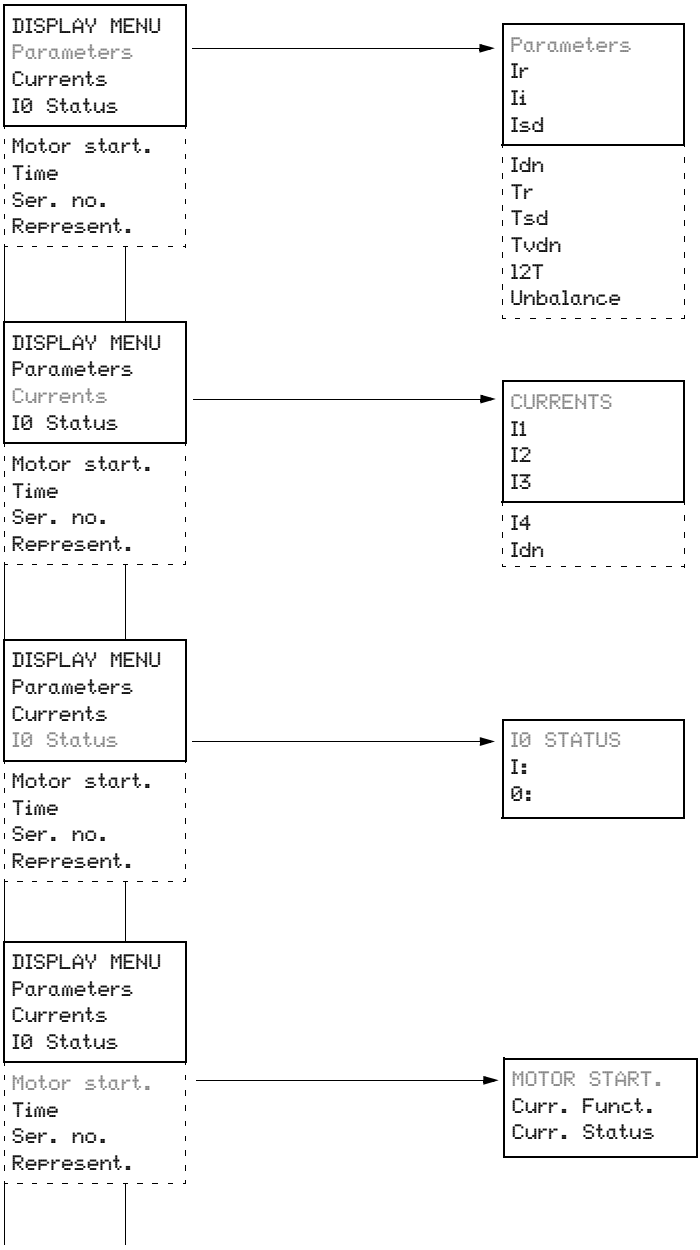
▶ Confirm your selection by pressing **OK**.

▶ Select the submenu you require using the cursor buttons Í or Ú.

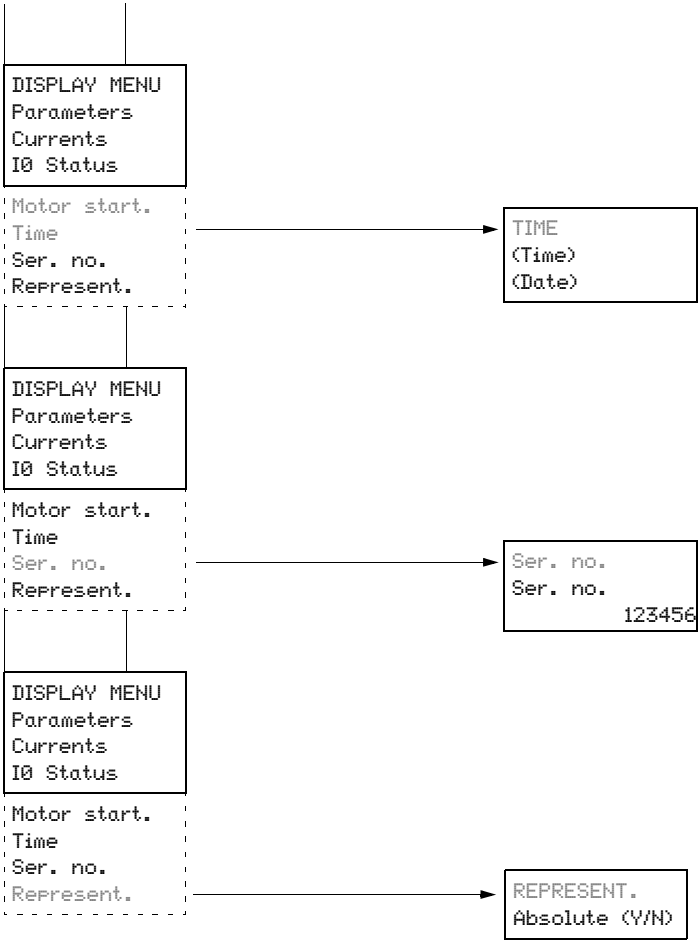
▶ Confirm your selection by pressing **OK**.

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Menu overview

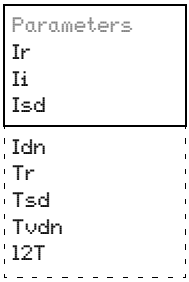


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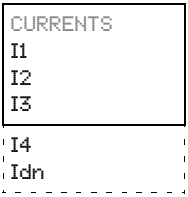
Parameters



Displays the parameters of the NZM. It must be remembered that the actual parameters used are displayed and not those values that are set directly on the switches of the NZM. This distinction is important if parameter settings were transferred to the NZM via the DMI or via a bus system. These can then differ from the device settings. A parameter deviation of this nature is indicated by flashing of parameter LED ④ (→ fig. 1, Page 12) on the DMI.

→ Only those parameters are displayed that the connected circuit-breaker actually supports. It is therefore not possible, for example, to display parameter I_{dn} on a circuit-breaker of frame size 2, as it is not available with this size.

Currents



The actual values of the individual currents can be called in this submenu. The individual phase and neutral pole currents (I_1 to I_4) and (if available) the differential current I_{dn}.

The display format depends on the setting selected. It is either displayed as a relative value, i.e. in relation to I_r [%], or as an absolute value in Amps.

I/O status



The status of the inputs and outputs on the DMI can be interrogated via this option. The inputs and outputs are displayed in separate lines with "0" for "OFF" and "1" for "ON".

When interpreting the display, remember that the inputs and outputs are displayed according to their spatial positioning in the device, i.e. I0 is on the far left and I5 is on the far right in the display.

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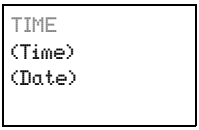
Motor start.

This allows you to access the motor starter function and the current status of the motor. The following options are available as a motor starter function:

- Off: no motor-starter function but rather a pure DMI-function, i.e. visualization, parameter setting and operating the circuit-breaker
- DOL starter: control of motor with one direction of rotation,
- Reversing starter: control of bi-directional motor,
- S/D starter: control of a one-directional motor with a star/delta starting circuit,
- S/D reversing starter: control of a bi-directional motor with a star/delta starting circuit,

For further information on motor protective functions refer to → chapter "Motor starter", Page 44.

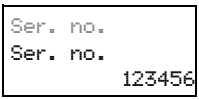
Time



This submenu allows you to interrogate the time and date or to transfer them to the standard display.

For setting of time and date → section "Set clock", Page 58.

Ser. no.



In this submenu, the serial number for the stop mode can be scanned. The serial number can only be set using the PC user interface or by accepting the transfer of the serial number from a connected circuit-breaker.

→ Transfer of the serial number to the standard display is not possible.

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Represent.

The DMI is factory set to display all currents as relative values, i.e. as % values of I_r. It is therefore factory set to correspond to the markings on the NZM. However, absolute values are also possible in Amps.

▶ Make the selection in the Represent. display menu.

The following screen shows Absolute and the setting Y (= Yes) or N (= No).

▶ Use the cursor buttons to select between Y and N.

▶ Confirm the setting with **OK**.

Incorporating values in the Standard display

For example, you can show important parameters, the status of the digital inputs and the current time in the display.

▶ Select a submenu, e.g. Currents in the Display menu.

▶ Use the cursor buttons ↑ or ↓ to select the required parameter, e.g. I_1.

▶ Confirm the selection by pressing **OK**.

The value for I_1 is incorporated in the Standard display (→ following Section "The standard display").

The standard display

▶ In the main menu use cursor buttons ↑ or ↓ to select Display.

▶ Confirm your selection by pressing **OK**.

→ The standard display appears automatically in the LCD display if buttons on the DMI have remained in a non-actuated state for 30 seconds or longer. It is only overwritten by alarm messages from the NZM (→ section "Alarm messages", Page 66).

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The Standard display can be assigned with data selected as required from the Display menu (→ section "Display menu", Page 28). In this way you can configure the Standard display for the requirements at hand.

The Standard display contains up to 6 lines. Lines that are not visible can be selected using the cursor buttons ↑ or ↓.

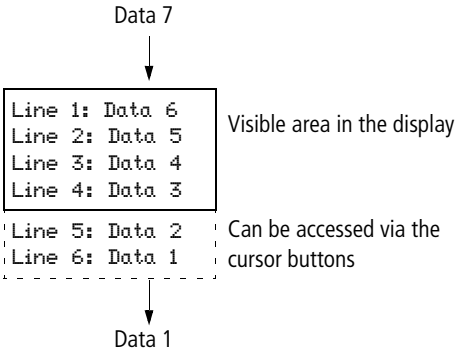


Figure 6: Operating principle of the Standard display

New Data 7 in the display is always added to line 1. Data 1 is deleted if there are more than 6 entries.

→ If the connection between DMI and NZM is interrupted, the DMI displays the last values for all circuit-breaker data (currents, parameters, status, type code) until a new connection is established.

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Parameter setting

Input menu

Parameters for the circuit-breaker and the DMI are assigned in the Input menu. This menu is the most complex one in the DMI on account of its wide range of setting and parameter assignment options.



Caution!
The Input menu is password protected since changes to the parameters can affect the entire system, and may in the event of a fault cause material damage and possibly serious injury to persons.

Password setting/changing
Entries cant be input unless the password has been entered correctly. A value between 0000 and 9999 must be entered as a password.

You can set or change a password via the Special menu (→ section "Special menu", Page 16).

- ▶ Call up the Special menu via **ALT** and **DEL**.
- ▶ Select Password using the cursor buttons Í or Ú.
- ▶ Confirm your selection by pressing **OK**.



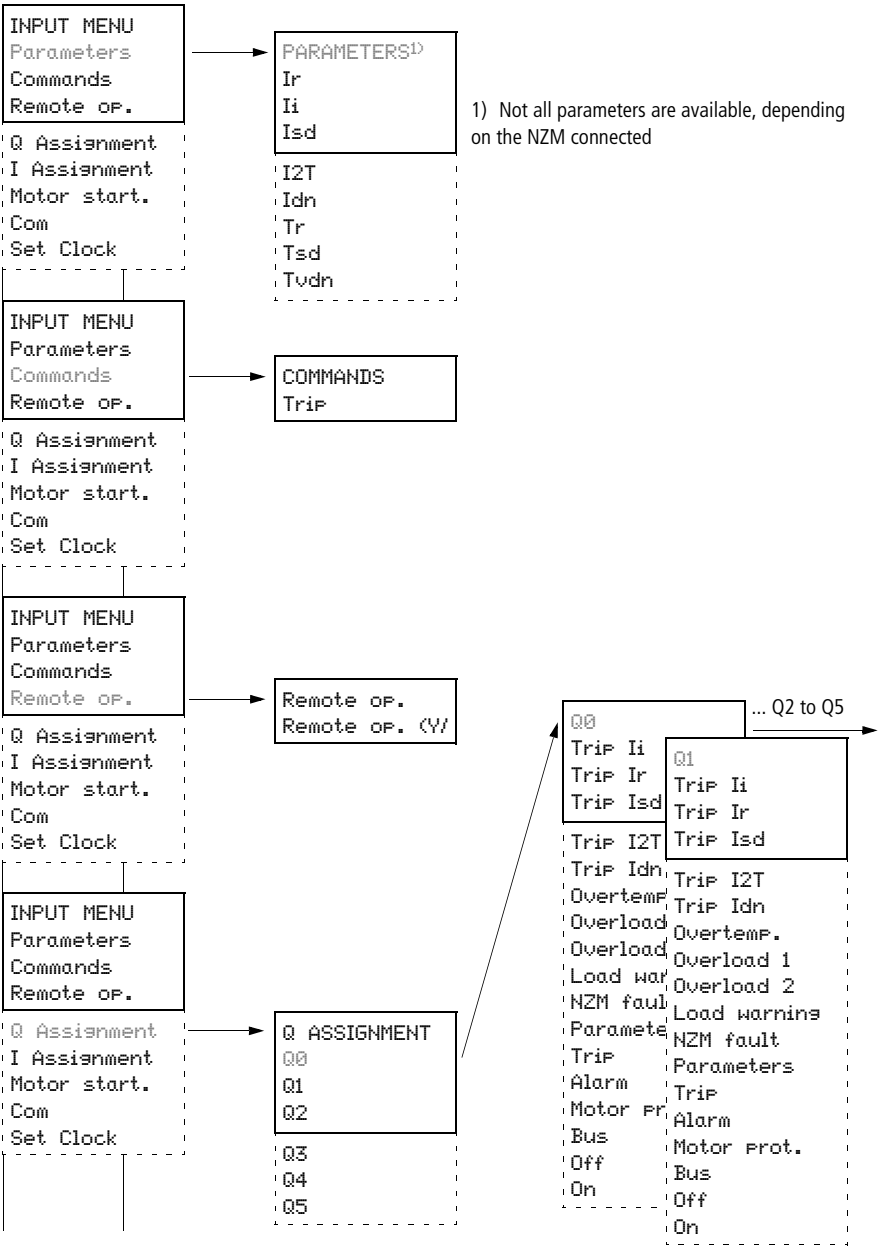
In order to prevent unauthorised modifications, the DMI switches to the main menu if correct password entry does not take place within 30 s. The entry level is then only accessible when the correct password is entered again.



Forgotten the password? You must now write a new parameter set with the required password into the DMI using the PC user interface. In order to retain the current configuration, transfer the current configuration to the PC interface with "DMI upload" and save it if necessary. The password can then be changed and the new setting can be transferred back to the DMI with "DMI download".

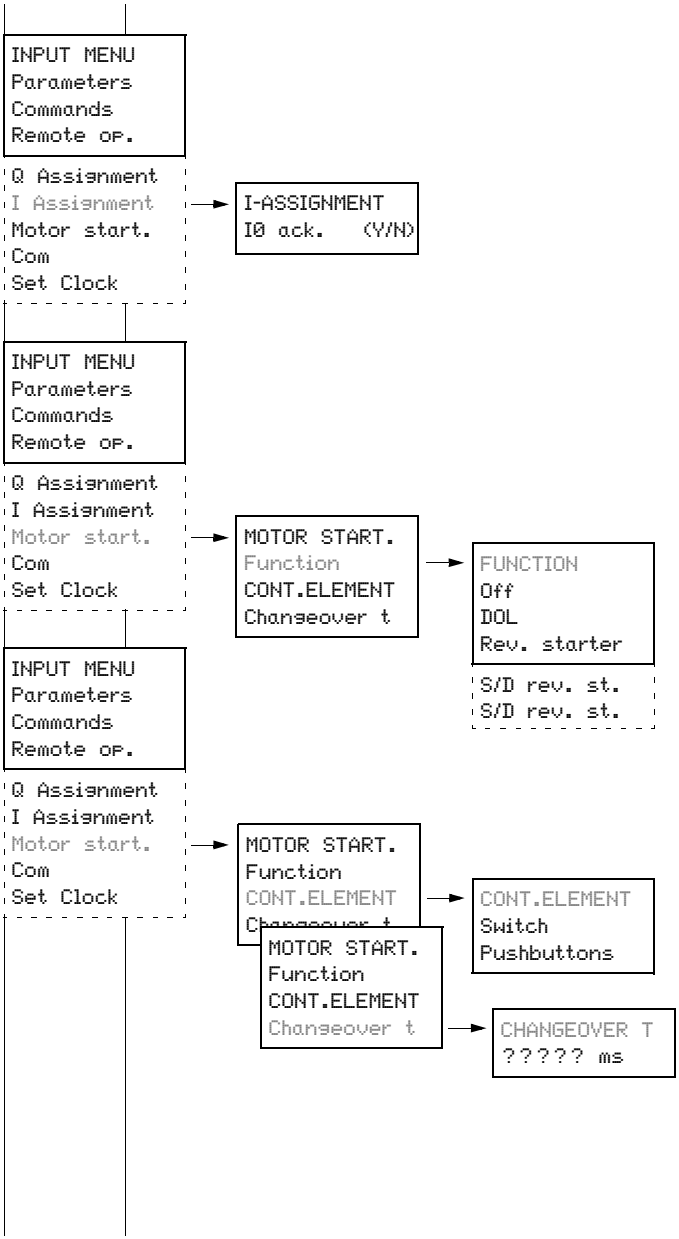
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Menu overview

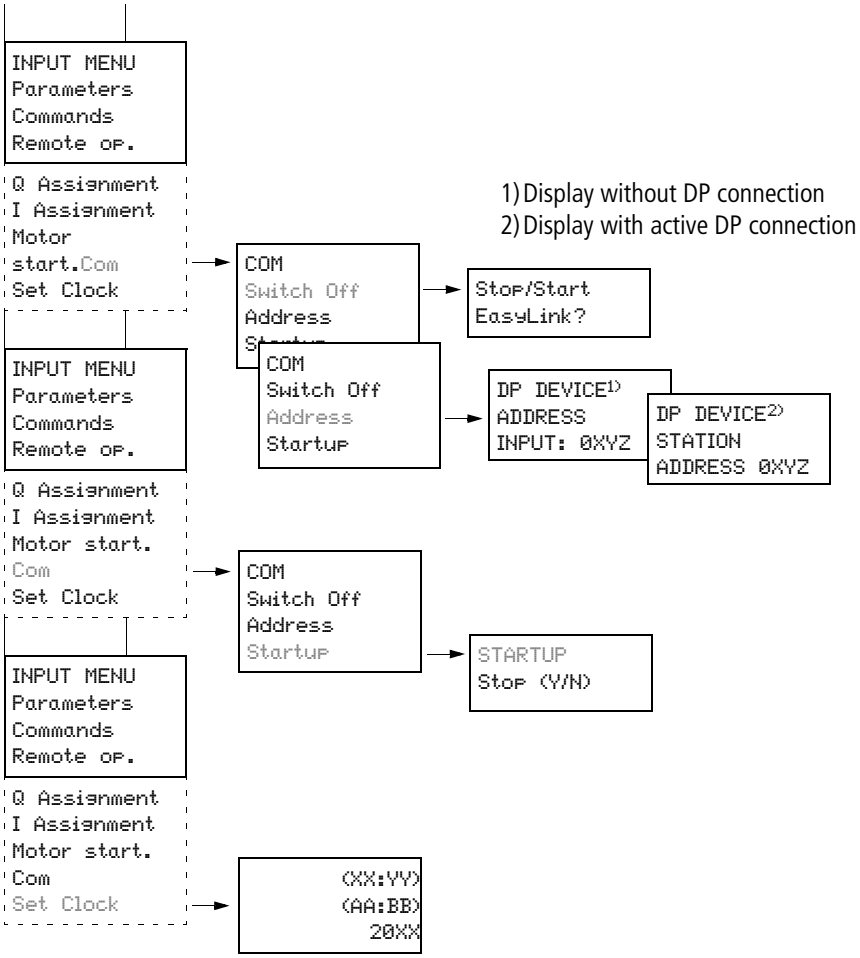


1) Not all parameters are available, depending on the NZM connected

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1) Display without DP connection
2) Display with active DP connection

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Parameters

You can modify the parameters of the circuit-breaker via "Parameters". It makes all the variables accessible that are supported by the connected NZM. Parameters that are not supported cant be modified. This also applies to parameters that are supported by the circuit-breaker but have fixed default values. For example, in some circuit-breaker versions this is the case with t_r.

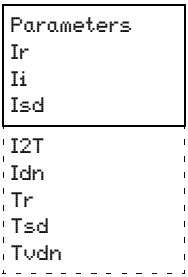


In all cases, the DMI restricts the value ranges of all parameters to those values that can be set with the operating elements on the front of the circuit-breaker.



Warning
The limit values on the circuit-breaker must be set according to the requirements of the system.

Proceed as follows in order to assign the parameters:



- ▶ In the Input menu use cursor buttons Í or Ú to select Parameters.
- ▶ Confirm your selection by pressing **OK**.
- ▶ Use the cursor buttons Í or Ú to select the parameter to be changed.
- ▶ Use the cursor buttons < or > to set the required value between the upper and lower setting limits.
  The setting limits are changed in the same graduations that are used on the circuit-breaker itself.
  Moving above or below the limit values is possible in order to reach particular values. The upper limit value is shown after the minimum value.
- ▶ Confirm your selection by pressing **OK**.
- ▶ Select a new parameter using the cursor buttons Í or Ú.

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Caution!
Selecting a new parameter without confirming the previous parameter entry with **OK** will cause the previous one to be lost.

Caution!
Selecting the Parameters submenu causes the DMI to store all the values currently set on the circuit-breaker. If the switch position of the circuit-breaker is changed whilst the Parameters menu is open, these modifications are **not** recognised during the parameter assignment process.

The set values are retentively stored by the DMI and are transferred during connection establishment every time the DMI is restarted and also cyclically in normal data exchange.

Warning
Parameters that are changed via the DMI or via a fieldbus are not retentively stored in the circuit-breaker. They are lost if the power supply to the circuit-breaker is not sufficient. A DMI is always required for retentive storage.

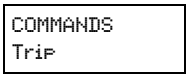
Parameter deviation

As it is possible to set parameters both on the circuit-breaker and on the DMI via a fieldbus, differences may occur between the two sets of parameters.

→ The ③ parameter LED flashes on the DMI if the parameter sets are different (→ fig. 1, Page 12).

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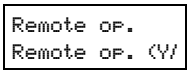
Commands



You can set the behaviour of the circuit-breaker directly via the Command submenu. The Trip command is currently available.

Trip causes the circuit-breaker to trip irrespective of the actual currents present and the set parameters. A current of ≧40 % I_r on at least one phase is necessary for the execution of this command.

Remote operator

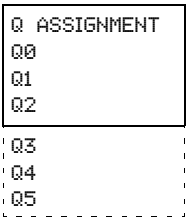


The assignment of the outputs Q4 and Q5 for the remote operator of the NZM can be selected using this submenu.

If the remote operator is activated, both of the outputs are mutually-exclusive, i.e. with Q4 "ON", Q5 is "OFF" and vice-versa. In the quiescent state Q4 is "ON" and Q5 is "OFF".

Both outputs are "OFF" after activation of the remote operator via the menu as well as after each time the DMI is switched on. As a result, the remote operator will retain its position until a control command is issued via the fieldbus.

Q Assignment



In the Q Assignment submenu you can assign specific functions to the six digital outputs Q0 to Q5 of the DMI.

- ▶ In the Q Assignment menu use the cursor buttons Í or Ú to select Q0 to Q5.
- ▶ Confirm your selection by pressing **OK**.
- ▶ Use the cursor buttons Í or Ú to select the required function (⟶ the following table)
- ▶ Confirm your selection by pressing **OK**.

All outputs can be assigned with the following functions separately (⟶ following Table 1):

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Table 1: Output functions

Function	Output switches, if ...
Trip I_i[1)]	a short-circuit trip has occurred
Trip I_r[1)]	an overload trip has occurred (long-delayed)
Trip I_{sd}[1)]	a short-time delayed trip has occurred (without I^2t monitoring activated)
Trip I^2t[1)]	a short-time delayed trip has occurred due to I^2t characteristics (with I^2t function activated)
Trip I_{dn}[1)]	the permissible residual current was exceeded and has caused a trip
Overtemp.[1)]	the permissible operating temperature of the NZM electronic circuitry was exceeded and has therefore caused a trip
Overload 1	the current in at least one pole has exceeded the permissible value of 100 % (hysteresis approx. 5 %)
Overload 2	the current in at least one pole has exceeded the permissible value of 120 % (hysteresis approx. 5 %)
Load warning	the current in at least one pole has exceeded the permissible value of 70 % (hysteresis approx. 5 %)
NZM fault	a motor protection circuit-breaker has detected an unsymmetry of > 50 % in the phase currents; the message is reset with an unsymmetry of 75 %.
Parameters	the parameter sets in the DMI and NZM are different
Trip[1)]	the circuit-breaker has tripped, regardless of the cause
Alarm	the circuit-breaker has reported an alarm, irrespective of the cause of the alarm
Motor prot.	the circuit-breaker (type -ME) detects an overload and asks the DMI to disconnect the motor. If the overload continues, the circuit-breaker will trip.
Bus	the output is to be controlled by the fieldbus (fieldbus module required)
OFF	the output is permanently deactivated
ON	if the output is permanently activated

1) The respective outputs are reset if they have been acknowledged after a trip (→ section "Alarm messages", Page 66).

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All outputs are separately isolated relay outputs and can therefore also be used to switch different circuits and loads. For technical data refer to → section "Technical data", Page 68.

→ Outputs Q4 and Q5 are used for switching the motor when using a motor operator for the circuit-breaker.

→ If a motor starter function has been selected for the DMI, some or all of the outputs Q0 to Q3 are used for controlling the contactors.

→ If any outputs of the DMI are configured for signalling circuit-breaker alarm conditions (trip, load warning, overload, etc.) and the connection to the NZM is interrupted while one of these outputs is set, the affected outputs remain set. This allows the use of an alternative circuit controlled by these outputs.

The diagnostic data can be read out from the NZM with a laptop and the NZM-XPC-Soft software, which requires the connection between DMI and NZM to be terminated.

Outputs that are not directly controlled by the NZM are not affected. This includes outputs that are permanently set to On or Off, that are controlled though the bus and a "parameter" output.

I Assignment

In this menu you determine if the I0 input is used for acknowledging trips or if the motor protection alarm is used.

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Motor starter

This menu is used to specify whether the DMI is to perform the functions of a motor starter with the relevant parameters or whether it is only to carry out the basic DMI functions (visualization, parameter assignment and operation of the circuit-breaker).

The DMI can perform different motor starter functions in conjunction with the NZM2/3/4-ME circuit-breakers, which are specially designed for motor protection:

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

The individual functions are (On/Off, Clockwise/ Anticlockwise) activated either via Pushbuttons or switches on the inputs I1 to I3 of the DMI or via the fieldbus (requirements: connected fieldbus module, e.g. NZM-XDMI-DPV1).

The outputs Q0 to Q3 are used by the DMI to control the contactors and implement the starter function required.

The principle motor protection assignment with the DMI is indicated on Fig. 7, Page 45.

With all motor starter variants, the circuit-breaker is connected in series upstream of the contactor(s).

The circuit-breaker takes over the short-circuit shut down task and controls the shutdown of the contactors via the DMI during an overload.

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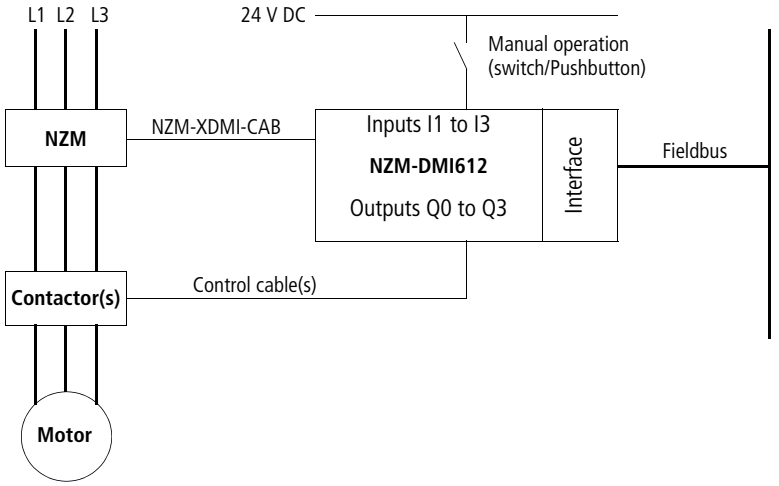


Figure 7: Operating principle for motor starter function with DMI

Function

```
FUNCTION
Off
DOL
Rev. starter
```

```
S/D rev. st.
S/D rev. st.
```

This specifies the function of the DMI. In other words, either the basic DMI functions or one of the following types of motor starter function:

- Direct-on-line starter

Selecting **DOL** causes the motor to start directly, without any additional changeover. Only one direction of rotation is possible.

The inputs are used according to the type of control circuit devices selected.

Inputs:	Switch	I1	ON/OFF
	Pushbuttons	I1	ON
		I2	OFF
Outputs:		Q0	Mains contactor

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In order to protect the system, the DMI implements a reclosing lockout that lasts for 100 ms after disconnection. Only after this time interval is a restart possible. Earlier start attempts are ignored.

- Reversing starter

Selecting **Rev. starter** allows the DOL starting of motor in one of two rotational directions. An additional changeover during startup does not occur.

The inputs are used according to the type of control circuit devices selected.

Inputs	Switch	I1	Anticlockwise rotation
		I3	Clockwise rotation
	Pushbuttons	I1	Anticlockwise rotation
		I2	OFF
		I3	Clockwise rotation
Outputs		Q0	Mains contactor, anticlockwise
		Q1	Mains contactor, clockwise

In order to protect the system, the DMI implements a reclosing lockout that lasts for 100 ms after disconnection or after a direction change. Only after this time interval is a restart or direction change possible. Earlier inputs are ignored. Actuating both switches or "ON" pushbuttons is ignored, i.e. the motor retains its state.

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- Star-delta starter

Selecting **S/D starter** enables the motor to be started in a star/delta circuit. Only one rotational direction is possible.

The inputs are used according to the type of control circuit devices selected.

Inputs	Switch	I1	ON/OFF
	Pushbuttons	I1	ON
		I2	OFF
Outputs		Q0	Mains contactor
		Q2	Star contactor
		Q3	Delta contactor

On startup, the mains contactor is not switched until 100 ms after the star contactor has switched in order to allow an optimum dimensioning of the star contactor. The changeover time from star to delta operation can be set between 100 and 99900 ms in 100 ms steps via the Changeover t parameter in the Motor st. menu.

With the switch-over from star to delta operation the delta contactor switches only approx. 100 ms after the star contactor control has been terminated.

In order to protect the system, the DMI implements a reclosing lockout that lasts for 100 ms after disconnection. Only after this time interval is a restart possible. Earlier start attempts are ignored.

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- Reversing star-delta starter

Selecting **S/D rev. st.** enables the motor to be started in either direction with a star/delta circuit.

The inputs are used according to the type of control circuit devices selected:

Inputs	Switch	I1	Anticlockwise rotation
		I3	Clockwise rotation
	Pushbuttons	I1	Anticlockwise rotation
		I2	OFF
		I3	Clockwise rotation
Outputs		Q0	Mains contactor, anticlockwise
		Q1	Mains contactor, clockwise
		Q2	Star contactor
		Q3	Delta contactor

On startup, the mains contactor is not switched until 100 ms after the star contactor has switched in order to allow an optimum dimensioning of the star contactor. The changeover time from star to delta operation can be set between 100 and 99900 ms in 100 ms steps via the Changeover t parameter in the Motor st. menu.

With the switch-over from star to delta operation the delta contactor switches only approx. 100 ms after the star contactor control has been terminated.

In order to protect the system, the DMI implements a reclosing lockout that lasts for 100 ms after disconnection or after a direction change. Only after this time interval is a restart or direction change possible. Earlier inputs are ignored. Actuating both switches or "ON" pushbuttons is ignored, i.e. the motor retains its state.

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For detailed motor starter wiring plans refer to the Eaton Wiring Manual, FB0200-004, chapter "All about motors".

- Fieldbus coupling

Like other parameters, the function of the DMI (DMI or motor starter, starter type), the control circuit devices used (switches or pushbuttons) and the changeover time can also be modified or read via a fieldbus such as PROFIBUS-DP. The motor starter can also be controlled via the fieldbus instead of via the switches or pushbuttons connected directly to the DMI.

For more precise information on the data for PROFIBUS-DP refer to → chapter 3, Page 75.

The control of the motor starter can be implemented by the DMI via switches or buttons, and from the fieldbus via command codes or level controlled using output data. The behaviour in all four possible combinations between the fieldbus and DMI control should be illustrated by the following diagrams:

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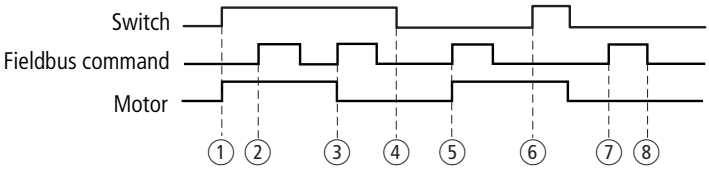


Figure 8: Switching element on the DMI: Switch fieldbus controlled via command codes

① The motor is switched on at location by the switch on the DMI.

② The switch on command on the fieldbus has no external effects as the motor is already switched on.

③ The fieldbus switches off the motor even though the switch is still positioned at "ON". The switch off command takes priority here for safety reasons.

④ The motor is already switched off, therefore the local switch off signal has no effect.

⑤ The fieldbus switches the motor back on via a command.

⑥ The switch is also set to "ON" on location. This step has no external influence as the motor is already switched on. The use of a switch (instead of a button) is necessary in order to be able to switch off the motor locally at ⑦.

⑦ The motor is switched off again locally by opening the switch. In this case, the switch off command will also take priority even though the motor was not originally switched on via the switch but rather via the fieldbus.

⑧ The switch off command via the bus does not have an effect as the motor is already switched off.

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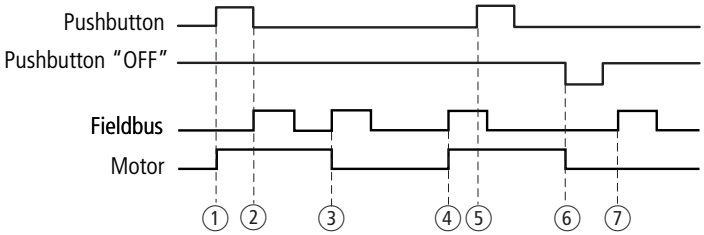


Figure 9: Switching element on the DMI: Pushbutton fieldbus controlled via command codes

① The pulse on the "ON" pushbutton on location switches the motor on.

② The switch on command via the fieldbus has no external effects as the motor is already switched on.

③ The switch-off command causes the motor to switch off via the fieldbus.

④ The switch-on command causes the motor to switch on via the fieldbus.

⑤ Pressing the "ON" pushbutton on location has no effect as the motor is already switched on.

⑥ Pressing the "OFF" pushbutton (L-active) switches the motor off again.

⑦ The switch-off command on the fieldbus has no effect.

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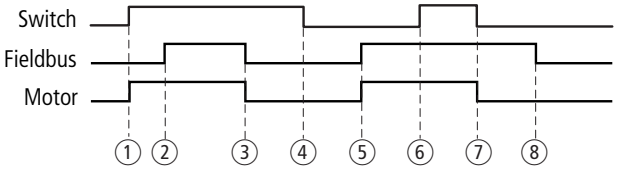


Figure 10: Switching element on the DMI: Switch fieldbus controlled via level of the output data

① The motor is switched on at location by the switch on the DMI.

② The switch on via the fieldbus has no external effects as the motor is already switched on.

③ The motor is switched off again by resetting the control bit on the fieldbus, even though the switch is still positioned to "ON". The switch off takes priority here for safety reasons.

④ The motor is already switched off, therefore local the switch off signal has no effect.

⑤ The fieldbus switches the motor back on.

⑥ The switch is also set to "ON" on location. This step has no external influence as the motor is already switched on. The use of a switch (instead of a button) is necessary in order to be able to switch off the motor locally on location at ⑦.

⑦ The motor is switched off again locally by opening the switch. In this case the switch off command also takes priority for safety reasons, even though the "ON" signal is still present on the fieldbus.

⑧ The switch off via the bus does not have an effect as the motor is already switched off.

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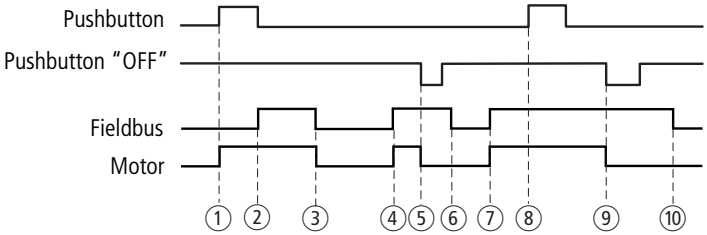


Figure 11: Switching element on the DMI: Pushbutton fieldbus controlled via level of the output data

① The pulse on the "ON" pushbutton on location switches the motor on.

② The switch on via the fieldbus has no externally visible effects as the motor is already switched on.

③ The switch-off via the fieldbus causes the motor to switch off.

④ The switch-on signal on the fieldbus causes the motor to switch on.

⑤ The switch off button has the effect of switching off the motor.

⑥ The switch off via the fieldbus does not have an effect as the motor is already switched off. It is however a precondition so that the motor can again be started via the fieldbus.

⑦ The motor is restarted via the fieldbus.

⑧ The "ON" pulse on the DMI has no effect as the motor is already switched on.

⑨ The pulse from the "OFF" pushbutton has the effect of switching off the motor even though a High level is still present on the fieldbus. The switch off takes priority here for safety reasons.

⑩ The switch off via the fieldbus does not have an effect as the motor is already switched off.

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Contact elements



These options allow you to select either switches or pushbuttons as the control circuit devices at the inputs. The inputs can be evaluated accordingly with either continuous signals or edges.

→ For safety reasons the "OFF" button operates as L-active.

Changeover time



With star/delta starters, this option specifies the changeover time from star to delta.

COM



The Com submenu is used to set the communication behaviour of the DMI when connected with the circuit-breaker and a fieldbus module.

You can control the behaviour of the DMI on the fieldbus in the following way:

- ▶ In the COM menu use the cursor buttons Í or Ú to select Switch Off.
- ▶ Confirm your selection by pressing OK.
  Switch off enables communication between the DMI and the fieldbus interface to be disconnected for commissioning tasks. Cutting the connection makes it possible to modify parameters locally without them being overwritten again from the bus master. It also means that the bus master does not have to be stopped for this step. The fieldbus can continue operating normally without having any influence on the DMI and NZM.



- ▶ In the COM menu use the cursor buttons Í or Ú to select the Address.
- ▶ Confirm your selection by pressing **OK**.
  Address is used for entering or checking the bus address.

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Three different methods are used depending on the versions of the DMI and communication modules involved:

DMI with any Firmware version and DP module with Firmware versions < V1.10

```
DP-DEVICE
STATION
ADDRESS 0XYZ
```

▶ Check that there is no bus communication.
Only then can the address be entered.

▶ Select 0XYZ using the cursor buttons < or >.

▶ Change the individual values using the cursor buttons Í or Ú.
An address change is no longer possible if the fieldbus is active. The address can only be displayed for verification purposes.

▶ Confirm your selection by pressing **OK**.



Caution!
If you check the address during communication, the outputs of the DMI cannot be controlled by the bus master for the duration of this process. Switched outputs turn to "OFF" and only change back to "ON" when 3 to 5 seconds have elapsed after exiting the address display. The input values are not updated during this time.

DMI Firmware version < V1.2.1 and DP module with Firmware version ≧ V1.10

```
Pls. Update
DMI Software
to V1.2.1
or higher
```

This message informs you that you have a DMI and communication module Firmware version which are incompatible with one another.

▶ Use the NZM-XPC-Soft to install a Firmware version ≧ V1.2.1 on the DMI.
The most up-to-date versions are available on the Internet → http://www.eaton.com/moeller → **Support,** Serarch term: DMI.

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DMI Firmware version ≧ V1.2.1 and DP module with Firmware version ≧ 1.10



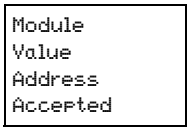
After you have selected the "Address" submenu the message indicated opposite will appear on the display. The display also appears if you connect a new (not yet addressed) communication module.

The fourth line contains a 4 digit numeric input/display field for the address. If the DMI has been assigned with the DP address beforehand, the current address will be displayed. If the devices are still in the default (ex-works) state the address 0126 will be displayed. The cursor will flash on the thousand digit in both cases.

Assignment of a valid address:

- ▶ Use the < or > cursor buttons on the individual positions.
- ▶ Change the individual values using the cursor buttons Í or Ú.
- ▶ Confirm your selection by pressing **OK**.
  The set value is transferred to the module.

If the address input has been successful, the following message appears:



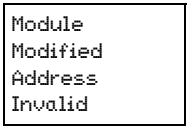
The message will be displayed for a maximum of 5 s or until the **ESC** or **OK** buttons are pressed. The previous selection menu will then be redisplayed.

The following faults can occur when entering the address:

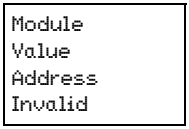


If a communication module or a module with the "Point-to-Point" type code is not connected to the DMI when the "Address" submenu is accessed, the fault message indicated opposite is shown on the display.

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You will receive this error message if you try to modify the address when network communication is active.



You will receive this error message if you attempt to enter an invalid address.

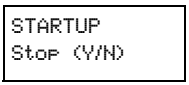
These fault messages will be displayed for a maximum of 5 s or until the **ESC** or **OK** buttons are pressed. The DMI will then return to the previous selection menu.

Startup behaviour

This is used to specify the startup behaviour of the DMI in communication with the circuit-breaker:

▶ In the Com menu use the cursor buttons ↑ or ↓ to select Startup.

▶ Confirm your selection by pressing **OK**.



During connection establishment, the DMI uses the serial number of the circuit-breaker to check whether it has previously communicated with it. If this is the case, communication will continue further. If the connection has been made to an "unknown" circuit-breaker, the further behaviour of the DMI will be determined by the Stop parameter.

▶ Use the cursor buttons < or > to select between Y and N.

- If N is selected, communication between the DMI and the NZM is continued unhindered.
- Selecting Y will activate Stop mode. The DMI will interrupt the connection being established to the circuit-breaker. It will ask whether the new serial number is to be accepted. There are two options for this:
  - Confirm the acceptance of the new serial number by pressing **OK**. At the same time, this will make the parameters stored in the DMI for the new connection

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valid. In future, the DMI will check for the serial number it has just accepted when establishing the connection.

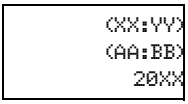
– Cut the connection to the DMI by removing the communication cable and the DMI as it clearly should not be installed at this location.

The prompt is deactivated by default.



Warning
If the DMI is to be connected to several circuit-breakers in succession, all parameters must be set beforehand to their respective maximum values. Only in this way can it be ensured that the parameters of the circuit-breaker are not overwritten by the DMI.

Set clock



This submenu is used to set the real-time clock in the DMI.

▶ In the Input menu use cursor buttons Í or Ú to select Set Clock.

▶ Confirm your selection by pressing **OK**.

▶ Use the cursor buttons < or > to set the parameter to be updated (time, date or year).

▶ Use the cursor buttons Í or Ú to set the required values between the upper and lower setting limits.

▶ Confirm your selection by pressing **OK**.

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Diagnostics

The diagnostics function includes both the display of the current status of the circuit-breaker and DMI, and the scanning of the last ten critical load conditions of the circuit-breaker (history memory).

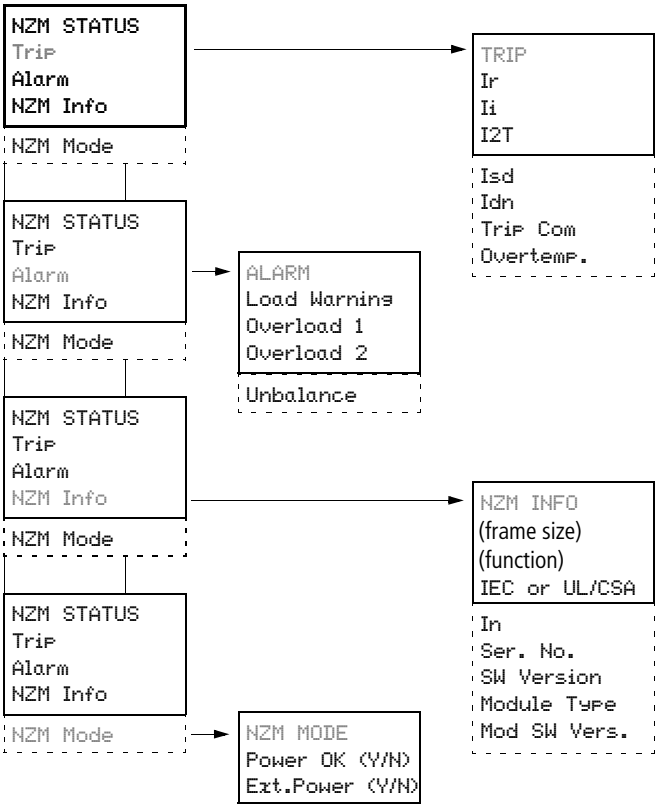
The diagnostics submenus can be accessed via the main menu (→ section "Main menu", Page 14).

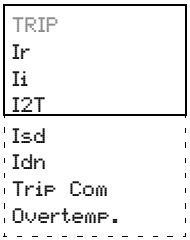
NZM status

This submenu is used to interrogate whether there is currently a trip or alarm condition on the circuit-breaker, the type of power supply and the type of circuit-breaker connected.

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Menu overview



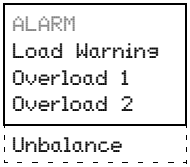


Trip

The Trip submenu uses the listed parameters (I_r, I_i, I_{sd}, ...) to show you the cause of a current trip of the circuit-breaker.

The meaning of the respective output functions can be found at → table 1, Page 42.

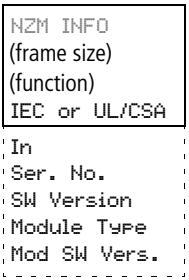
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Alarm

The Alarm submenu uses the listed parameters to show you the cause of a currently present alarm message of the circuit-breaker.

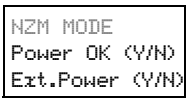
The meaning of the respective output functions can be found at → table 1, Page 42.



NZM Info

The NZM Info submenu provides information for the identification of the circuit-breaker.

Line 1:	Frame size (NZM2,3,4)
Line 2:	Function (AE, ME, VE etc.)
Line 3:	Rated current (stated in Amps)
Line 4/5:	Serial number
Line 6:	Software version
Line 7:	Module type (module ID if NZM4 module fitted)
Line 8:	Module software version



NZM Mode

The NZM Mode submenu shows you whether the circuit-breaker power supply is sufficient (Power OK [Y/N]) and whether it is being supplied from an external source or by itself. Ext.Power (Y/N)

The external power supply is normally provided by the DMI. The circuit-breaker uses its own power supply when working without a DMI or other communication partner.

When operating the circuit-breaker in conjunction with the DMI, "Power OK" and "Ext. Power" must be set to "Y".

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DMI Status



This submenu is used to interrogate the current status of the DMI.

COM
OK/Err indicates whether communication with the circuit-breaker is running or is faulty.

SW Version
This parameter shows the version of the DMI firmware.

The latest firmware versions can be installed using the PC software for the DMI. The latest versions are available on the Internet at:

http://www.eaton.com/moeller → **Support**

Diagnostics

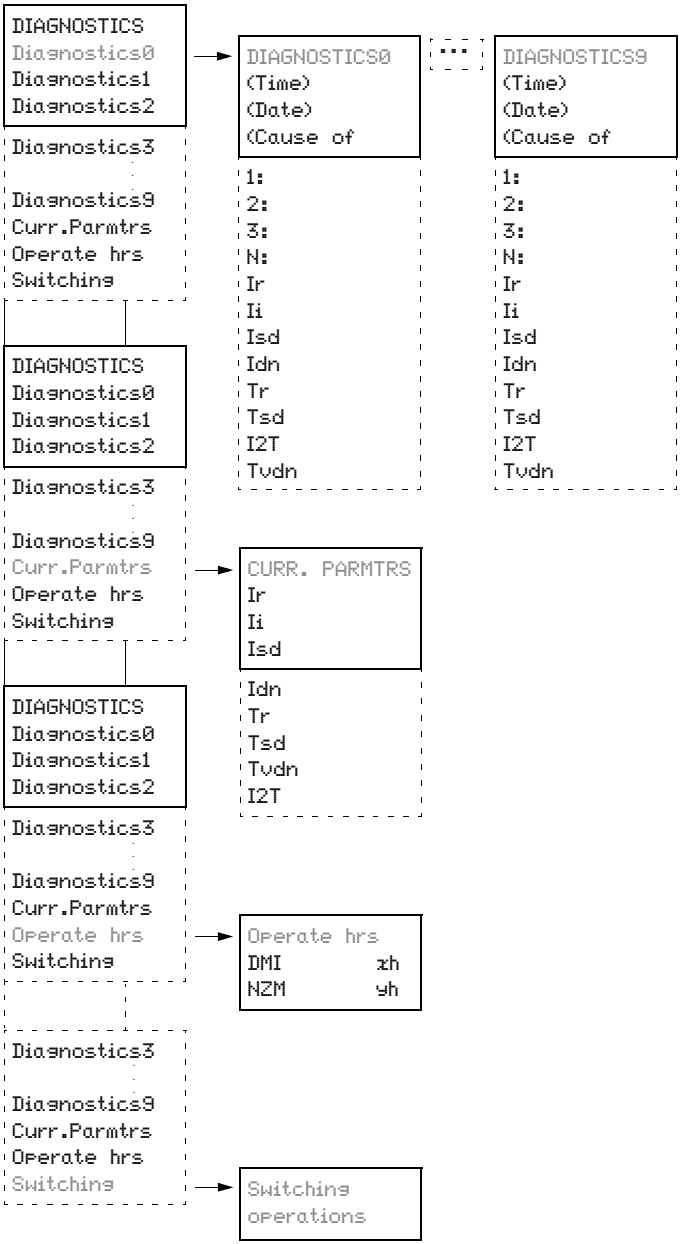
Selecting the Diagnostics submenu will switch the circuit-breaker to Diagnostics mode.

In this mode, current process data from the circuit-breaker is not available. However, you can interrogate the status of the circuit-breaker at previous events. Up to ten events can be stored. Furthermore, the currently set parameters can also be presented for the sake of comparison.

Statistical data can be called up in the "Operate hrs" and "Operations" submenus.

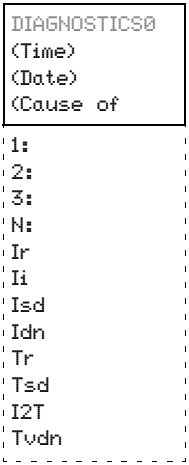
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Menu overview



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Diagnostics 0 to 9



Submenus Diagnostics0 to Diagnostics9 indicate the circuit-breaker status at a particular event.

By event is meant any change in circuit-breaker status with regard to alarm or tripping messages, such as exceeding or going below limit values or the tripping of the circuit-breaker.

The first three lines below the title show time, date and cause of alarm. The states of the individual phases are then shown (1 to 3) as well as the neutral conductor (OK/Load warning/Overload 1/Overload 2/Trip).

→ If in the case of a short-circuit (Trip I_i) the phase(s) which cause(d) the trip could not be determined with certainty, the status of the phases will be defined with "–".

This data can be used to diagnose the cause of the fault on the circuit-breaker. The valid parameter settings when the event occurred are then shown.

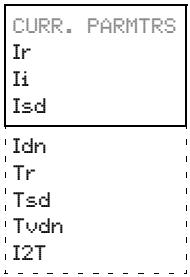
Event Diagnostics0 shows the last event that occurred. Diagnostics1 shows the one before that. By scanning and comparing a succession of events it is possible reconstruct the sequence of events up to tripping. The time stamp which is also stored also enables circuit-breaker events to be associated with events and states in the rest of the system. In this way, errors in the system can be localised more easily.

→ The information is only stored by the circuit-breaker if a DMI is connected. Otherwise the relevant data arrays are filled with the value 00.

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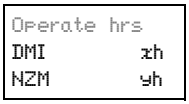
As early warning stages are stored as well as actual trips, the diagnostics data can help you to make preventative examinations of the system for weak points so that trips do not occur. For example, the diagnostics memory can help you determine regular overshoots of alarm thresholds.

Current parameters



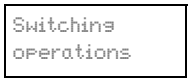
This submenu shows the parameters being used at present by the circuit-breaker. This makes it possible to make a quick comparison between the parameters used at the time of the event and the currently set parameters.

Operating hours



In the operating hours submenu the hours of operation of the DMI and NZM can be read off. The resolution is set to an hour. The entire operating time is indicated for the DMI. For the NZM, only the time with which it has been in communication with the respective DMI is displayed. The value is reset to 0 if there is an interruption in communication.

Switching operations



In this submenu the switching operations of the connected NZM are displayed whereby a switching operation is every change of state from "ON" → "OFF", "ON" → "Trip", "OFF" → "ON".

Similar to the operation time counter, this value is also lost when there is a loss of communication.

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Alarm messages

Each time that a load threshold is exceeded (Overload 1/ Overload 2) or each time the circuit-breaker trips, the alarm message appears automatically as an alarm screen in the DMI display (→ section "Operating principle", Page 13).

The standard display or older alarm messages are overwritten so that the display always shows the last alarm message output and indicates an exceptional circumstance.

Every alarm message is displayed until it is either overwritten by a new alarm or is acknowledged by the user by pressing ESC. This enables alarm states detected in the past to be indicated locally, even if they are currently no longer present.

Alarms which indicate opening of the current paths – all trip and motor protection messages – must be acknowledged by the user. Otherwise the status message remains active on the fieldbus and a respectively configured output remains set and the display indicates the respective alarm.

Four possibilities are available to the user to acknowledge the alarm:

- using the **ESC** pushbutton,
- using the input I0,
  (prerequisite: respective configuration, → section "I Assignment", Page 43),
- using the fieldbus through a command,
- by switching off the NZM.

All other alarms (overload1, overload2, unsymmetry) can be erased from the display with **ESC**. Outputs and status messages continue to remain active as long as the respective state continues.

The exact cause of the alarm message and possibly the sequence of faults can be viewed via the Diagnostics menu (→ section "Menu overview", Page 63).

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Connection to bus systems

The DMI and also the circuit-breaker are connected to bus systems using interface modules. At the moment the PROFIBUS-DP module NZM-XDMI-DPV1 which enables PROFIBUS-DP V1-communication is supported.

For information on installing, commissioning and operating the bus interface modules, refer to the relevant documentation.

For further information on connecting to PROFIBUS-DP systems refer to → chapter 3, Page 75.

What to do if ...?

It is possible that the DMI does not exactly behave as expected. If this is the case, refer to the following points. They are designed to help you in troubleshooting should faults arise.

Problem	Procedure and circumstance	Solution
No display	Observing the Parameters LED	LED dark, check power supply LED lit or flashing, change DMI
Start Com display	Connected to circuit-breaker	Remove NZM-XDMI-CAB cable between DMI and NZM and re-plug Change NZM-XDMI-CAB cable
	Connected to PC (→ Online Help of NZM-XPC-Soft)	The Start Com display only goes out if data exchange between the DMI and the PC is actually taking place. Start Com will reappear since the data transfer is completed in a few seconds

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Technical data

General

Dimensions W × H × D	
[mm]	107.5 × 90 × 53
[inches]	4.23 × 3.54 × 2.08
Space units (SU)	6 SU wide
Weight	
[g]	300
[lb]	0,661
Mounting	Top-hat rail IEC/EN 60715, 35 mm

Figure 12: Dimensions of DMI
(specified in inches → table 2)

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Table 2: Dimensions in inches

mm	inches	mm	inches
4,5	0.177	56,5	2.22
7,5	0.295	58	2.28
10,75	4.23	71,5	2.81
16,25	0.64	75	2.95
35,5	1.4	90	3.54
35,75	1.41	102	4.01
45	1.77	107,5	4.23
47,5	1.87	110	4.33
50	1.97		

Ambient conditions

Climatic ambient conditions (low temperatures to IEC 60068-2-1, high temperatures to IEC 60068-2-2)	
Ambient operating temperature Horizontal/vertical mounting	0 to 55 °C, –32 to 131 °F
Condensation	Prevent condensation with suitable measures
LCD display (reliably legible)	0 to 55 °C, 32 to 131 °F
Storage/transport temperature	–40 to +70 °C, –40 to 158 °F
Relative humidity (IEC 60 068-2-30)	5 to 95 %, non-condensing
Air pressure (operation)	795 to 1080 hPa
Corrosion resistance	
IEC 60068-2-42	SO_2 10 cm^3/m^3, 4 days
IEC 60068-2-43	H_2S 1 cm^3/m^3, 4 days
Ambient mechanical conditions	
Pollution degree	2
Degree of protection (EN 50178, IEC 60529, VBG4)	IP20

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Oscillations (IEC 60068-2-6)	10 to 57 Hz (constant amplitude 0.15 mm)
	57 to 150 Hz (constant acceleration 2 g)
Shock (IEC 60068-2-27)	18 shocks (semi-sinusoidal 15 g/11 ms)
Drop (IEC 60068-2-31)	Drop height 50 mm
Free fall, when packed (IEC 60068-2-32)	1 m
Electromagnetic compatibility (EMC)	
Electrostatic discharge (ESD), (IEC/EN 61000-4-2, severity level 3)	8 kV air discharge 6 kV contact discharge
Electromagnetic fields (RFI), (IEC/EN 61000-4-3)	Field strength 10 V/m
Radio interference suppression (EN 55011, EN 55022)	Limit class B
Burst (IEC/EN 61000-4-4, severity level 3)	2 kV power cables, 2 kV signal cables
Immunity to line-conducted interference (IEC/EN 61000-4-6)	10 V
Dielectric strength	
Measurement of air clearances and creepage distances	EN 50178, UL 508, CSA C22.2, No 142
Dielectric strength	EN 50178
Tool and cable cross-sections	
Solid	min. 0.2 mm^2, max. 4 mm^2/ AWG: 22 – 12
Flexible with ferrule	min. 0.2 mm^2, max. 2.5 mm^2/ AWG: 22 – 12 Factory wiring: to AWG 30
Width of slot-head screwdriver	3.5 × 0.8 mm; 0.14 × 0.03″
Tightening torque	0.6 Nm
Backup/accuracy of real-time clock	
Clock battery backup	
at 25 °C/77 °F	Normally 64 h
at 40 °C/104 °F	Normally 24 h
Accuracy of real-time clock	Normally ± 5 s/day, ~ ± 0.5 h/year

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Power supply

Rated voltage	
Nominal value	24 V DC, +20 %, –15 %
Permissible range	20.4 to 28.8 V DC
Residual ripple	≦ 5 %
Input current at 24 V DC	210 mA
Voltage dips	10 ms, IEC/EN 61131-2
Power loss at 24 V DC	Normally 5 W

Digital inputs (24 V DC)

Number	6
Status display	LCD, selectable via Display menu
Potential isolation	
From the power supply, CPU	Yes, test voltage 3.5 kV
Between each other	Yes, test voltage 3.5 kV
From the outputs	Yes, test voltage 3.5 kV
Rated voltage	
Nominal value	24 V DC
On 0 signal	< 5 V DC
On 1 signal	> 15 V DC
Input current on 1 signal	3.2 mA
Delay time from 0 to 1	20 ms
Delay time from 1 to 0	20 ms

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Digital outputs (relays)

Number	6
Type of outputs	Relays
In groups of	1
Parallel connection of outputs to increase the output	Not permissible
Protection for an output relay	Miniature circuit-breaker B16 or fuse 8 A (slow)
Potential isolation from mains supply, inputs	Yes 300 V AC (safe isolation) 600 V AC (basic isolation)
Mechanical lifespan (operations)	10×10^6
Relay contacts	
Conventional thermal current	8 A (10 A UL)
Recommended for load	. 500 mA, 12 V AC/DC
Protected against short-circuit cos φ = 1	16 A characteristic B (B16) at 600 A
Protected against short-circuit cos φ = 0.5 to 0.7	16 A characteristic B (B16) at 900 A
Rated impulse withstand voltage U_{imp} contact coil	6 kV
Rated insulation voltage U_i	
Rated operational voltage U_e	250 V AC
Safe isolation to EN 50178 between coil and contact	300 V AC
Safe isolation to EN 50178 between contacts	300 V AC
Making capacity	
AC-15 250 V AC, 3 A (600 Ops./h)	300000 operations
DC-13 L/R ≦ 150 ms 24 V DC, 1 A (500 Ops./h)	200000 operations
Breaking capacity	
AC-15 250 V AC, 3 A (600 Ops./h)	300000 operations
DC-13 L/R ≦ 150 ms 24 V DC, 1 A (500 Ops./h)	200000 operations

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Filament lamp load	1000 W at 230/240 V AC/ 25000 operations 500 W at 115/120 V AC/ 25000 operations
Fluorescent tube with ballast	10 × 58 W at 230/240 V AC/ 25000 operations
Conventional fluorescent tube, compensated	1 × 58 W at 230/240 V AC/ 25000 operations
Fluorescent, uncompensated	10 × 58 W at 230/240 V AC/ 25000 operations
Operating frequencies, relays	
Mechanical operations	10 million (10^7)
Mechanical switching frequency	10 Hz
Resistive/lamp load	2 Hz
Inductive load	0.5 Hz

UL/CSA

Uninterrupted current at 24 V DC		8 A
DC	Control circuit rating codes (utilization category)	R300 Light Pilot Duty
	Max. rated operational voltage	300 V DC
	Max. thermal uninterrupted current at R300	1 A
	Maximum make/break capacity at R300	28 VA

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3 NZM-XDMI-DPV1 (PROFIBUS-DPV1 Interface for DMI)

This chapter describes the transfer of data between the circuit-breaker, DMI and a higher-level master via PROFIBUS-DPV1. The NZM-XDMI-DPV1 is used as an interface here.

System overview

The NZM-XDMI-DPV1 communicates as a slave within a PROFIBUS-DPV1 system with the following higher-level masters:

- a class 1 DPV0 master or a class 1 DPV1 master, e.g. programmable logic controller (PLC) and/or
- up to two class 2 DPV1 masters, e.g. control system, PC with FDT (field device tool) based parameter setting software, visualisation.

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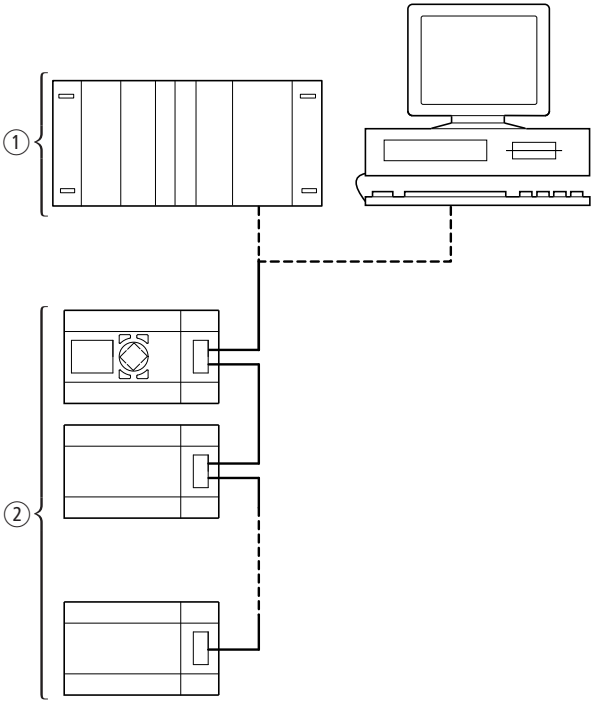


Figure 13: Integration of an NZM-XDMI-DPV1 in a DP network

① Master area: class 1 and/or class 2 DP master

② Slave area: DMI with DPV1 interfacing

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Layout of the device

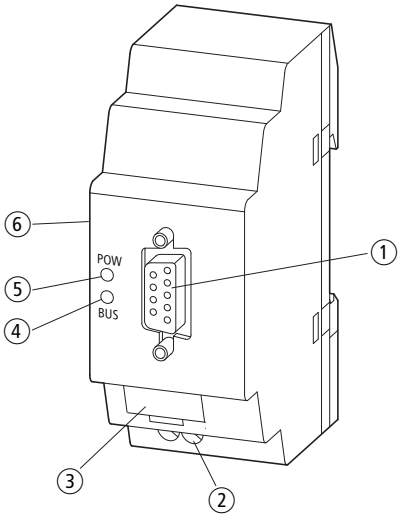


Figure 14: Device view

① PROFIBUS DP connection, 9-pole SUB-D socket
② Supply voltage 24 V DC
③ Device identification label
④ BUS communication LED
⑤ POW operation indicator LED
⑥ EASY-LINK socket

Operating system requirements

In order to operate the NZM-XDMI-DPV1 you will require a DMI with operating system version 1.2 or higher.

PROFIBUS certification

The NZM-XDMI-DPV1 has been certified by the PROFIBUS user organization (PNO) as a DPV1 slave. The NZM-XDMI-DPV1 includes the SPC3 PROFIBUS interfacing ASIC.

Scope of functions

With the NZM-XDMI-DPV1 interface, the connected DMI and the circuit-breaker which is connected to it, can be:

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- identified,
- parameterized
- controlled
- monitored,
- diagnosed,

via the PROFIBUS DP from a higher-level master.

Installation

Connect the power supply

The NZM-XDI-DPV1 is operated by a 24 V DC supply voltage (→ section "Technical data", Page 68).

Warning
With the 24 V power supply, ensure a safe electrical isolation of the low voltage (SELV).

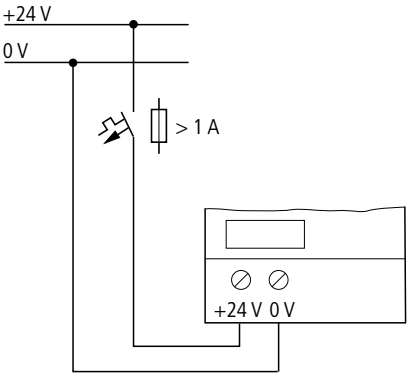


Figure 15: Standard connection

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Connecting the PROFIBUS-DP

A 9-pole SUB-D plug connects the PROFIBUS-DP connection to the PROFIBUS-DP bus.

Use the special PROFIBUS-DP plug for connection and the special PROFIBUS-DP cable from the range of accessories from Eaton.

PROFIBUS-DP connection assignment

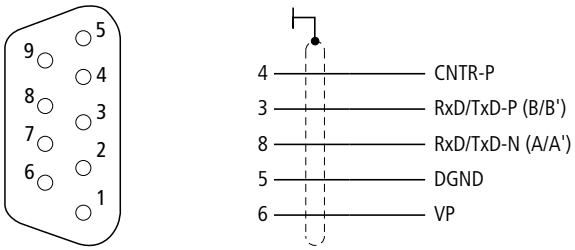


Figure 16: DP connection

Table 3: Connection assignment

Pin	Signal name
1	not assigned
2	not assigned
3	RxD/TxD-P (B/B')
(4)	Control-P (RTS), optional
(5)	Data Ground, optional
(6)	VP (plus voltage), optional
7	not assigned
8	RxD/TxD-N (A/A')
9	not assigned

Connections 3, 8 and shield are sufficient for data transfer.

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Bus terminator

The bus must be terminated with a bus terminator resistor at the first and last physical slaves in a bus segment.

The PROFIBUS-DP data plug from Eaton enables switch on and off of the bus terminator on the connector.

Potential isolation

The following potential isolation applies:

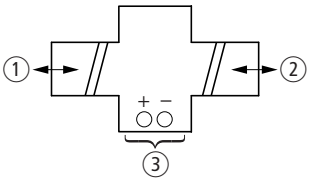


Figure 17: Potential isolation between the supply voltage and outputs

① Safe isolation EASY-LINK 240 V AC
② Simple isolation PROFIBUS-DP
③ Supply voltage 24 V DC

Baud rates

The NZM-XDMI-DPV1 automatically recognises the baud rate. The following baud rates are supported:

- 9.6 kBit/s,
- 19.2 kBit/s,
- 93.75 kBit/s,
- 187.5 kBit/s,
- 500 kBit/s,
- 1.5 MBit/s,
- 3 MBit/s,
- 6 MBit/s,
- 12 MBit/s.

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Maximum distances / Bus cable lengths
According to the IEC 61158-2 standard the maximum cable length of a bus segment with cable type "A" is as follows (→ following in Table 4):

Table 4: Cable lengths

Baud rate [kBit/s]	Max. cable length [m]
9.6	1200
19.2	1200
93.75	1200
187.5	1000
500	400
1500	200
3000	100
6000	100
12000	100

Operating the device

Putting the PROFIBUS-DPV1 interface into operation

The following steps are necessary to commission the interface:

- ▶ Connect the NZM-XDMI-DPV1 via the "EASY-Link" connector with the DMI (basic unit).
  You must slide up the cover flap on the right-hand side of the device in order to plug in the connector on the DMI.
- ▶ Connect the 24 V DC power supply for the interface (**Caution!** Do not switch on yet!).
- ▶ Connect the Profibus plug to the device and switch on the bus terminator if necessary.
- ▶ Switch on the supply voltage for the DMI and interface.

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- ▶ Set the required PROFIBUS address via the display and keypad on the DMI (→ section "COM", Page 54).
- ▶ Configure the PROFIBUS-DP line.
- ▶ Transfer the new configuration to the master (→ section "Configuration of the class 1 DP master", Page 84).
- ▶ Start the PROFIBUS-DP master.

After these steps, the communication between the DMI and Interface as well as between the PROFIBUS-DP master and interface must be established. Verify this fact using the LEDs installed in the NZM-XDMI-DPV1 (→ section "LED status displays", Page 82).

LED status displays

The NZM-XDMI-DPV1 has two display LEDs.

POW LED, function

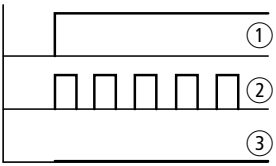


Figure 18: POW LED display function

① LED continuously lit:
- – supply voltage present
- – communication to DMI interrupted

② LED flashes:
- – supply voltage present
- – communication with DMI in order

③ LED not on:
- – no supply voltage present
- – communication with the DMI interrupted

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BUS LED, function

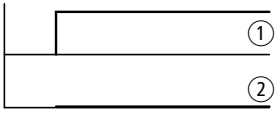


Figure 19: BUS LED function display

① LED continuously lit:
PROFIBUS-DP communication in order

② LED flashes:
No PROFIBUS-DP communication ongoing

Commissioning the PROFIBUS-DP line with NZM-XDMI-DPV1

GSD file

The "Moel4D11.gsd" GSD file is necessary for selection of the device with the configuration of the PROFIBUS-DP line and operation of the bus. You can download the most up-to-date version at the following Internet address:

http://www.eaton.com/moeller → **Support**

Follow the links on these pages.

The following modules are defined for the NZM-XDMI-DPV1 in the GSD for cyclic data exchange:

- Module 1: Circuit Breaker Profile 1: 3 Byte inputs/ 2 Byte outputs,
- Module 2: Circuit Breaker Profile 2: 11 Byte inputs/ 2 Byte outputs,
- Module 3: Circuit Breaker Profile 1 and motor starter: 4 Byte inputs/3 Byte outputs,
- Module 4: Circuit Breaker Profile 2 and motor starter: 12 Byte inputs/3 Byte outputs,

The meaning of the data of the respective format
→ section "PROFIBUS-DPV0 functions", Page 85.

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Configuration of the class 1 DP master

In principle you should perform the following steps for the configuration of the higher-level DP master:

- ▶ Add the "Moel4D11.gsd" GSD file to the GSD database of the configuration tool of your DP master.
- ▶ Insert a NZM-XDMI-DPV1 station in the topology of the bus segment to be configured.
- ▶ Assign the station with the intended station address.
- ▶ Select one of the four suggested modules for cyclic data exchange for this station.
  - – Module 1: Circuit Breaker Profile 1: if you wish to transfer data conform to profile 1 of the PROFIBUS circuit-breaker profile,
  - – Module 2: Circuit Breaker Profile 2: if you wish to transfer data conform to profile 2 of the PROFIBUS circuit-breaker profile,
  - – Module 3: Circuit Breaker Profile 1 and motor starter: if you wish to transfer data conform to profile 1 of the PROFIBUS circuit-breaker profile and additional data for a motor-starter function parameterized in the DMI,
  - – Module 4: Circuit Breaker Profile 2 and motor starter: if you wish to transfer data conform to profile 2 of the PROFIBUS circuit-breaker profile and additional data for a motor-starter function parameterized in the DMI,
- ▶ Repeat steps 2 to 4 for each NZM-XDMI-DPV1 station to be inserted into the topology.
- ▶ Save the configuration.
- ▶ Transfer the configuration to the DP master.

→ Observe the documentation of the DP master, when you perform the configuration.

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PROFIBUS-DPV0 functions

Cyclic data exchange with class 1 DP master

The NZM-XDMI-DPV1 offers four modules for cyclic data exchange which can be determined via the module selection in the configuration. The data content of all modules are described in the following section.

The following preconditions must be strictly observed to ensure that the modules provide the described information and control functions:

- The auxiliary switches which signal the switching state of the circuit-breaker must be connected to inputs 4 and 5:
  - Switch state "OFF": input 4 must have the "high" state, input 5 must have the "low" state.
  - Switch state "ON": input 4 and input 5 must have the "high" state.
  - Switch state "Tripped"": input 4 must have the "low" state.

→ Information for connection of the auxiliary switch → section "Connecting circuit-breakers", Page 24.

- The remote operator must be connected to outputs 4 and 5 which control the switch state of the circuit-breaker:
  - Switch state "OFF": output 4 has the "high" state, output 5 has the "low" state.
  - Switch state "ON": output 4 has the "low" state, output 5 has the "high" state.
  - The remote operator function must be selected in the configuration of the DMI.

→ Information concerning connection of the remote operator → section "Remote operator", Page 41.

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Module 1 conform to PROFIBUS circuit-breaker profile 1

The following information can be read out of the circuit-breaker and DMI with the selection of this module:

- Communication to the circuit-breaker (in order, not present),
- Switching state of the circuit-breaker ("ON", "OFF", "Tripped"),
- Load warning (current ≧ 70 %),
- Overload zone reached (current ≧ 100 %),
- Group warning,
- Trip cause (e.g. overload, short-circuit, fault current),
- State of the inputs of the DMI.

In addition, the following functions can be controlled:

- Switch state of the circuit-breaker via connected remote operator (switch on, switch off),
- State of the outputs of the DMI (for outputs whose switch signal has been parameterized on the "Bus").

The information read out are data inputs of the DP master, the controllable functions are picked up in the DP master as data outputs.

→ If a motor starter function is parameterized in the DMI (only possible in conjunction with the intended circuit-breaker type -ME), please use module 3 or module 4 if you control the motor via PROFIBUS-DP or if you wish to be informed concerning the state of the motor control.

Format of the data inputs

Reading of the data inputs is implemented directly via the DPV0 read commands or via the input bytes of the DP master defined by the PROFIBUS-DP configuration. Note the documentation of the master device for this purpose. Three Octets are read as data inputs which contain the following data:

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Table 5: Address assignment of the module 1 data inputs

Data position	Designation
Octet 1	
Bit 0 and Bit 1	Circuit-breaker position
Bit 2 and Bit 3	Circuit-breaker state
Bit 4	Ready to switch on
Bit 5 and Bit 6	Not used
Bit 7	Overload warning
Octet 2	
Bit 0	Not used
Bit 1	General warning
Bit 2	Not used
Bit 3	Input 0
Bit 4 to Bit 6	Trip cause (Release reason)
Bit 7	Load rejection prewarning
Octet 3	
Bit 0	Input 1
Bit 1	Input 2
Bit 2	Input 3
Bit 3	Input 4
Bit 4	Input 5
Bit 5 to Bit 7	Not used

The inputs 0 to 3 of the DMI can be assigned as required with 24 V signals. Input 4 and 5 are intended for connection of the auxiliary switch, in order to recognise the switching state of the circuit-breaker.

With parameterized motor-starter functions, defined inputs of the DMI are used for local control of the motor (→ section "Motor start.", Page 44). In this case, the data "Input 1" and if required "Input 3" (with parameterised reversing starters) do not contain the physical signal status

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of the respective DMI input, but rather the logical control of the motor:

Input 1:	"0" corresponds to motor "OFF",
	"1" corresponds to motor "ON" or anticlockwise,
Input 3:	"1" corresponds to motor clockwise.

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Meaning of the data inputs

The following data inputs have the following meaning.

Table 6: Data content of module 1 data inputs

Designation	Meaning
Circuit-breaker position	01 Normal operation of the circuit-breaker (communication in order) 11 Circuit-breaker faulty or not present (communication not present)
Circuit-breaker state	00 Initialisation running 01 Circuit-breaker is in the "OFF" state 10 Circuit-breaker is in the "ON" state 11 Circuit-breaker is in the "Tripped" state
Input 0 to 5	State of the digital inputs of the DMI.
Load rejection prewarning	At least one phase current has exceeded the load warning limit (I_r = 70 %)
Not used	No information for evaluation
Overload warning	At least one phase current has exceeded the overload 1 limit (I_r = 100 %)
Ready to switch on	1 The circuit-breaker is switched off (not tripped)
Trip cause (Release reason)	000 no trip 001 I_r 010 I_i 011 I_{sd} 100 I_{dn} 101 selectivity, communication fault, over-temperature hardware fault, 110 neutral pole overcurrent
General warning	Is set if a warning or a trip is present from the circuit-breaker

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Format of the data outputs

Writing of the data outputs is implemented directly via the DPV0 write commands or via the output bytes of the DP master defined by the PROFIBUS-DP configuration. Note the documentation of the master device for this purpose. Two octets are written as data outputs and contain the following control information:

Table 7: Address assignment of the module 1 data outputs

Data position	Designation
Octet 1	
Bit 0 and Bit 1	Operation circuit-breaker
Bit 2	Not used
Bit 3	Output 0
Bit 4	Output 1
Bit 5	Output 2
Bit 6	Output 3
Bit 7	Output 4
Octet 2	
Bit 0 to Bit 4	Not used
Bit 5	Output 5
Bit 6 and Bit 7	Not used

Outputs 0 to 5 of the DMI can only be controlled via the bus, if they have been parameterized for the bus access in the Q Assignment of the DMI. If outputs 4 and 5 are used for connection of a remote operator in order to control the switching state of the circuit breaker, outputs 4 and 5 are not available via the bus. Control of the remote operator is implemented in this case via the "Operation circuit-breaker" bits or acyclically with the aid of the "Circuit-breaker/DMI commands" object.

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→ Conformity to the PNO circuit-breaker profile assumes use of a remote operator with the respective parametric programming of outputs 4 and 5 in the DMI.

Meaning of the data outputs

The data outputs have the following meaning:

Table 8: Data content of the module 1 data outputs

Designation	Meaning	Precondition
Operation circuit-breaker	00 Do not change state 01 Switch off 10 Switch on 11 Do not change state	Outputs 4 and 5 have been parameterized in the DMI for "remote operator"
Output 0 to 5	State of the digital outputs of the DMI.	The respective output has been parameterized in the DMI for "bus access"
Not used	No information for evaluation	–

Module 2 conform to PROFIBUS circuit-breaker profile 2

When this module is selected, the following additional information can be read out from the circuit-breaker and the DMI in addition to the information of module 1:

- Phase currents I_1, I_2 and I_3,
- Maximum phase current I_{max}.

→ If a motor starter function is parameterized in the DMI (only possible in conjunction with the intended circuit-breaker type -ME), please use module 3 or module 4 if you control the motor via PROFIBUS-DP or if you wish to be informed concerning the state of the motor control.

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Format of the data inputs

Reading of the data inputs is implemented directly via the DPV0 read commands or via the input bytes of the DP master defined by the PROFIBUS-DP configuration. Note the documentation of the master device for this purpose. Eleven Octets are read as data inputs which contain the following data:

Table 9: Address assignment of the module 2 data inputs

Data position	Designation
Octet 1	
Bit 0 and Bit 1	Circuit-breaker position
Bit 2 and Bit 3	Circuit-breaker state
Bit 4	Ready to switch on
Bit 5 and Bit 6	Not used
Bit 7	Overload warning
Octet 2	
Bit 0	Not used
Bit 1	General warning
Bit 2	Not used
Bit 3	Input 0
Bit 4 to Bit 6	Trip cause (Release reason)
Bit 7	Load rejection prewarning
Octet 3 and 4	I_1
Octet 5 and 6	I_2
Octet 7 and 8	I_3
Octet 9 and 10	I_{max}
Octet 11	
Bit 0	Input 1
Bit 1	Input 2
Bit 2	Input 3

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Data position	Designation
Bit 3	Input 4
Bit 4	Input 5
Bit 5 to Bit 7	Not used

The inputs 0 to 3 of the DMI can be assigned as required with 24 V signals. Input 4 and 5 are intended for connection of the auxiliary switch, in order to recognise the switching state of the circuit-breaker.

With parameterized motor-starter functions, defined inputs of the DMI are used for local control of the motor (→ section "Motor start.", Page 44). In this case, the data "Input 1" and if required "Input 3" (with parameterised reversing starters) do not contain the physical signal status of the respective DMI input, but rather the logical control of the motor:

Input 1: "0" corresponds to motor "OFF",
"1" corresponds to motor "ON" or anticlockwise,
Input 3: "1" corresponds to motor clockwise.

→ When accessing the phase currents I_1 to I_3 and I_{max}, please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP for data in WORD format. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

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Meaning of the data inputs

The read data inputs have the following meaning:

Table 10: Data content of module 2 data inputs

Designation	Meaning
Circuit-breaker position	01 Normal operation of the circuit-breaker (communication in order) 11 Circuit-breaker faulty or not present (communication not present)
Circuit-breaker state	00 Initialisation running 01 Circuit-breaker is in the "OFF" state 10 Circuit-breaker is in the "ON" state 11 Circuit-breaker is in the "Tripped" state
General warning	Is set if a warning or a trip is present from the circuit-breaker
I_1 to I_3	Current of phases 1 to 3 in amps
I_{max}	Maximum phase current
Input 0 to 5	State of the digital inputs of the DMI.
Load rejection prewarning	At least one phase current has exceeded the load warning limit (I_r = 70 %)
Not used	No information for evaluation
Overload warning	At least one phase current has exceeded the overload 1 limit (I_r = 100 %)
Ready to switch on	1 The circuit-breaker is switched off (not tripped)
Trip cause (Release reason)	000 no trip 001 I_r 010 I_i 011 I_{sd} 100 I_{dn} 101 selectivity, communication fault, overtemperature hardware fault 110 neutral pole overcurrent

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Format and meaning of the data outputs

The format and meaning of the data outputs corresponds with module 1.

Module 3 conform to PROFIBUS circuit-breaker profile 1 and motor starter

When this module is selected, the following additional information can be read out from the circuit-breaker and the DMI in addition to the information of module 1:

- Motor switched on/off,
- Motor rotation left/right,
- Motor star connection,
- Motor delta connection.

Furthermore, the following functions can be controlled in addition to the functions of module 1:

- Switch motor on/off,
- Switch motor rotation to anticlockwise/clockwise.

The information read out are data inputs of the DP master, the controllable functions are picked up in the DP master as data outputs.



This information and these functions are only available if a motor starter function has been parameterized in the DMI.

Format of the data inputs

Reading of the data inputs is implemented directly via the DPV0 read commands or via the input bytes of the DP master defined by the PROFIBUS-DP configuration. Note the documentation of the master device for this purpose. Four Octets are read as data inputs which contain the following data:

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Table 11: Address assignment of the module 3 data inputs

Data position	Designation
Octet 1	
Bit 0 and Bit 1	Circuit-breaker position
Bit 2 and Bit 3	Circuit-breaker state
Bit 4	Ready to switch on
Bit 5 and Bit 6	Not used
Bit 7	Overload warning
Octet 2	
Bit 0	Not used
Bit 1	General warning
Bit 2	Not used
Bit 3	Input 0
Bit 4 to Bit 6	Trip cause (Release reason)
Bit 7	Load rejection prewarning
Octet 3	
Bit 0	Input 1
Bit 1	Input 2
Bit 2	Input 3
Bit 3	Input 4
Bit 4	Input 5
Bit 5 to Bit 7	Not used
Octet 4	
Bit 0	Not used
Bit 1	Motor state
Bit 2 and Bit 3	Not used
Bit 4	Motor "ON" **or** motor anticlockwise rotation
Bit 5	Motor clockwise rotation
Bit 6	Star configuration
Bit 7	Delta configuration

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The inputs 1 to 3 of the DMI can be connected with switches or pushbuttons to the local control of the motor to suit the selected motor-starter function (→ section "Motor starter", Page 44).

Input 4 and 5 are intended for connection of the auxiliary switch, in order to recognise the switching state of the circuit-breaker.

Meaning of the data inputs

The read data inputs have the following meaning:

Table 12: Data content of module 3 data inputs

Designation	Meaning		Precondition
Circuit-breaker position	01 11	Normal operation of the circuit-breaker (communication in order) Circuit-breaker faulty or not present (communication not present)	–
Circuit-breaker state	00 01 10 11	Initialisation running Circuit-breaker is in the "OFF" state Circuit-breaker is in the "ON" state Circuit-breaker is in the "Tripped" state	–
Delta configuration	0 1	The motor will not be operated in delta configuration The motor is operated in delta configuration	Outputs 0, 2, 3 have been parameterized for "star-delta starter" or the outputs 0, 1, 2 and 3 have been parameterized for "star-delta-reversing starter"
General warning	Is set if a warning or a trip is present from the circuit-breaker		–
Input 0 to 5	State of the digital inputs of the DMI.		–
Load rejection prewarning	At least one phase current has exceeded the load warning limit (I_r = 70 %)		–

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Designation	Meaning	Precondition
Motor clockwise rotation, Motor anticlockwise rotation	00 Motor is switched off 01 Motor is switched on for anticlockwise rotation 10 Motor is switched on for clockwise rotation	Outputs 0 and 1 have been parameterized for "reversing starter" or the outputs 0, 1, 2 and 3 have been parameterized for "star-delta-reversing starter"
Motor state	Is set if the Motor "ON" bit, motor anticlockwise rotation or motor clockwise rotation is set	Motor-starter function is parameterized in DMI
Motor "ON"	0 Motor is switched off 1 Motor is switched on	Output 0 has been parameterized to "direct-on-line starter" or outputs 0, 2 and 3 have been parameterized for "star-delta starter"
Not used	No information for evaluation	–
Overload warning	At least one phase current has exceeded the overload 1 limit (I_r = 100 %)	–
Ready to switch on	1 The circuit-breaker is switched off (not tripped)	–
Star configuration	0 The motor will not be operated in star configuration 1 The motor is operated in star configuration	Outputs 0, 2, 3 have been parameterized for "star-delta starter" or the outputs 0, 1, 2 and 3 have been parameterized for "star-delta-reversing starter"
Trip cause (release reason)	000 no trip 001 I_r 010 I_i 011 I_{sd} 100 I_{dn} 101 selectivity, communication fault, over-temperature, hardware fault 110 neutral pole overcurrent	–

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→ The delta mode, motor "ON", motor anticlockwise, motor clockwise, motor state and star mode data content are compiled from the control signals of the DMI outputs to which the contactor relays for motor control are connected (→ section "Motor starter", Page 44). They therefore only conditionally reflect the state of the motor control.

Format of the data outputs

Writing of the data outputs is implemented directly via the DPV0 write commands or via the output bytes of the DP master defined by the PROFIBUS-DP configuration. Note the documentation of the master device for this purpose. Three octets are written as data outputs and contain the following control information:

Table 13: Address assignment of the module 3 data outputs

Data position	Designation
Octet 1	
Bit 0 and Bit 1	Operation circuit-breaker
Bit 2	Not used
Bit 3	Output 0
Bit 4	Output 1
Bit 5	Output 2
Bit 6	Output 3
Bit 7	Output 4
Octet 2	
Bit 0 to Bit 4	Not used
Bit 5	Output 5
Bit 6 and Bit 7	Not used
Octet 3	
Bit 0	Motor "ON" **or** motor anticlockwise rotation
Bit 1	Motor clockwise rotation
Bit 2 to Bit 7	Not used

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Depending on the parameterized motor-starter function, outputs 1 to 3 are used for connection of the motor contactor (→ section "Motor starter", Page 44). The outputs not used here can only be controlled via the bus, if they have been parameterized for the bus access in the Q Assignment of the DMI. Control of the motor is implemented via the motor "ON", motor anticlockwise and motor clockwise bits or acyclically with the aid of the "circuit-breaker/DMI command" object. If outputs 4 and 5 are used for connection of a remote operator in order to control the switching state of the circuit breaker, outputs 4 and 5 are not available via the bus. Control of the remote operator is implemented in this case via the "Operation circuit-breaker" bits or acyclically with the aid of the "Circuit-breaker/DMI commands" object.

→ Conformity to the PNO circuit-breaker profile assumes use of a remote operator with the respective parametric programming of outputs 4 and 5 in the DMI.

Meaning of the data outputs

The data outputs have the following meaning:

Table 14: Data content of the module 3 data outputs

Designation	Meaning	Precondition
Operation circuit-breaker	00 Do not change state 01 Switch off 10 Switch on 11 Do not change state	Outputs 4 and 5 have been parameterized in the DMI for "remote operator"
Output 0 to 5	State of the digital outputs of the DMI.	The respective output has been parameterized in the DMI for "bus access"
Motor "ON"	0 Switch off motor 1 Switch on motor	Output 0 has been parameterized to "direct-on-line starter" or outputs 0, 2 and 3 have been parameterized for "star-delta starter"

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Designation	Meaning	Precondition
Motor clockwise Motor anticlockwise	00 Switch off motor 01 Switch on motor for anticlockwise rotation 10 Switch on motor for clockwise rotation 11 Not permissible	Outputs 0 and 1 have been parameterized for "reversing starter" or the outputs 0, 1, 2 and 3 have been parameterized for "star-delta-reversing starter"
Not used	No information for evaluation	–

Module 4 conform to PROFIBUS circuit-breaker profile 2 and motor starter

When this module is selected, the following additional information can be read out from the circuit-breaker and the DMI in addition to the information of module 2:

- Motor switched on/off,
- Motor rotation left/right,
- Motor star connection,
- Motor delta connection.

Furthermore, the following functions can be controlled in addition to the functions of module 2:

- Switch motor on/off,
- Switch motor rotation to anticlockwise/clockwise.

The information read out are data inputs of the DP master, the controllable functions are picked up in the DP master as data outputs.

→ This information and these functions are only available if a motor starter function has been parameterized in the DMI.

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Format of the data inputs

Reading of the data inputs is implemented directly via the DPV0 read commands or via the input bytes of the DP master defined by the PROFIBUS-DP configuration. Note the documentation of the master device for this purpose. Twelve Octets are read as data inputs which contain the following data:

Table 15: Address assignment of the module 4 data inputs

Data position	Designation
Octet 1	
Bit 0 and Bit 1	Circuit-breaker position
Bit 2 and Bit 3	Circuit-breaker state
Bit 4	Ready to switch on
Bit 5 and Bit 6	Not used
Bit 7	Overload warning
Octet 2	
Bit 0	Not used
Bit 1	General warning
Bit 2	Not used
Bit 3	Input 0
Bit 4 to Bit 6	Trip cause (Release reason)
Bit 7	Load rejection prewarning
Octet 3 and 4	I_1
Octet 5 and 6	I_2
Octet 7 and 8	I_3
Octet 9 and 10	I_{max}
Octet 11	
Bit 0	Input 1
Bit 1	Input 2
Bit 2	Input 3

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Data position	Designation
Bit 3	Input 4
Bit 4	Input 5
Bit 5 to Bit 7	Not used
Octet 12	
Bit 0	Not used
Bit 1	Motor state
Bit 2 and Bit 3	Not used
Bit 4	Motor "ON" **or** motor anticlockwise rotation
Bit 5	Motor clockwise rotation
Bit 6	Star configuration
Bit 7	Delta configuration

The inputs 1 to 3 of the DMI can be connected with switches or pushbuttons to the local control of the motor to suit the selected motor-starter function (→ section "Motor starter", Page 44). Input 4 and 5 are intended for connection of the auxiliary switch, in order to recognise the switching state of the circuit-breaker.

→ When accessing the phase currents I_1 to I_3 and I_{max}, please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP for data in WORD format. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

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Meaning of the data inputs

The read data inputs have the following meaning:

Table 16: Data content of module 4 data inputs

Designation	Meaning		Precondition
Circuit-breaker position	01 11	Normal operation of the circuit-breaker (communication in order) Circuit-breaker faulty or not present (communication not present)	–
Circuit-breaker state	00 01 10 11	Initialisation running Circuit-breaker is in the "OFF" state Circuit-breaker is in the "ON" state Circuit-breaker is in the "Tripped" state	–
Delta configuration	0 1	The motor will not be operated in delta configuration The motor is operated in delta configuration	Outputs 0, 2, 3 have been parameterized for "star-delta starter" or the outputs 0, 1, 2 and 3 have been parameterized for "star-delta-reversing starter"
General warning	Is set if a warning or a trip is present from the circuit-breaker		–
I_1 to I_3	Current of phases 1 to 3		–
I_{max}	Maximum phase current		–
Input 0 to 5	State of the digital inputs of the DMI.		–
Load rejection prewarning	At least one phase current has exceeded the load warning limit (I_r = 70 %)		–
Motor clockwise rotation, Motor anticlockwise rotation	00 01 10	Motor is switched off Motor is switched on for anticlockwise rotation Motor is switched on for clockwise rotation	Outputs 0 and 1 have been parameterized for "reversing starter" or the outputs 0, 1, 2 and 3 have been parameterized for "star-delta-reversing starter"

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Designation	Meaning	Precondition
Motor state	Is set if the Motor "ON" bit, motor anticlockwise rotation or motor clockwise rotation is set	Motor-starter function is parameterized in DMI
Motor "ON"	0 Motor is switched off 1 Motor is switched on	Output 0 has been parameterized to "direct-on-line starter" or outputs 0, 2 and 3 have been parameterized for "star-delta starter"
Not used	No information for evaluation	–
Overload warning	At least one phase current has exceeded the overload 1 limit (I_r = 100 %)	–
Ready to switch on	1 The circuit-breaker is switched off (not tripped)	–
Star configuration	0 The motor will not be operated in star configuration 1 The motor is operated in star configuration	Outputs 0, 2, 3 have been parameterized for "star-delta starter" or the outputs 0, 1, 2 and 3 have been parameterized for "star-delta-reversing starter"
Trip cause (Release reason)	000 no trip 001 I_r 010 I_i 011 I_{sd} 100 I_{dn} 101 selectivity, communication fault, over-temperature hardware fault 110 neutral pole overcurrent	–

→ The delta mode, motor "ON", motor anticlockwise, motor clockwise, motor state and star mode data content are compiled from the control signals of the DMI outputs to which the contactor relays for motor control are connected (→ section "Motor starter", Page 44). They therefore only conditionally reflect the state of the motor control.

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Format of the data outputs
The format of the data outputs corresponds to module 3.

Meaning of the data outputs
The meaning of the data outputs corresponds to module 3.

Synchronous reading and synchronous writing of the data
The NZM-XDMI-DPV1 supports synchronous reading (Sync) and writing (Freeze) at data to multiple stations conform to the DP standard.



Invoking this function can be referenced in the documentation of your DP master system.

Diagnosis with class 1 DP master

In addition to the standardised DP-standard diagnosis, the NZM-XDMI-DPV1 also provides additional diagnosis information which appear as "device related diagnosis" in a class 1 DPV0 master and as "status" in a class 1 DPV1 master.

Format of the diagnosis information
Reading of the diagnosis is implemented directly via the DPV0 diagnosis commands or via the diagnosis bytes of the DP master defined by the PROFIBUS-DP configuration. Note the documentation of the master device for this purpose. Thirteen Octets are read as diagnosis inputs which contain the following data:

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Table 17: Address assignment of the diagnosis information

Diagnosis position	Designation
Octet 1	
Bit 0	Station not existent
Bit 1	Station not ready
Bit 2	Configuration fault
Bit 3	Additional diagnostics information
Bit 4	Function not supported
Bit 5	Invalid response DP-slave
Bit 6	Parameterization fault
Bit 7	Master lock
Octet 2	
Bit 0	Parameterization query
Bit 1	Static diagnosis
Bit 2	Not used
Bit 3	Watchdog activated
Bit 4	Freeze mode active
Bit 5	Sync mode active
Bit 6	Not used
Bit 7	Slave deactivated
Octet 3	
Bit 0 to Bit 6	Not used
Bit 7	Overflow of additional diagnosis information
Octet 4	Stations address DP master
Octet 5 and 6	Ident-number of DP slave
Octet 7	Length of additional diagnosis information
Octet 8	Status type
Octet 9	Slot number
Octet 10	Status specifier

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Diagnosis position	Designation
Octet 11	
Bit 0	Initialization running
Bit 1	Easy Link: triple LRC fault
Bit 2	Easy Link: timeout
Bit 3	Power supply fault
Bit 4	DMI display fault
Bit 5	DMI clock module fault
Bit 6	Communication to circuit-breaker interrupted
Bit 7	Communication to DMI interrupted
Octet 12	
Bit 0	A/D convertor fault
Bit 1	Signal processing fault
Bit 2	Convertor block fault
Bit 3	EEPROM fault
Bit 4	Plug in module 1 fault
Bit 5	Plug in module 2 fault
Bit 6	Plug in module 3 fault
Bit 7	Plug in module 4 fault
Octet 13	
Bit 0	Remote operator not parameterized in DMI
Bit 1	Stop of DMI: CB with new serial number connected
Bit 2	Motor-starter function parameterized
Bit 3	Parameterized motor-starter function changed or deactivated
Bit 4 to Bit 7	Not used

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When accessing the diagnosis information "Ident-number" please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP for data in WORD format. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

Meaning of the diagnosis information

The read diagnosis information has the following meaning.

Table 18: Data content of the diagnosis information

Designation	Meaning	Clarification/Hint
Additional diagnosis information	The NZM-XDMI-DPV1 has sent additional diagnosis (status message) information	Target state: "FALSE"
Configuration fault	The DP master has sent an invalid configuration telegram to the NZM-XDMI-DPV1 (e.g. incorrect length of data inputs and/or data outputs)	Check the configuration of the DP master
Communication to circuit-breaker interrupted	The communication between DMI and circuit-breaker is interrupted	Inspect the connection between the DMI and circuit-breaker
Communication to DMI interrupted	Communication with the DMI via the Easy-Link is interrupted	Check the connection between the DMI and NZM-XDMI-DPV1
Easy Link: timeout	Communication with the DMI via the Easy-Link is interrupted	Check the connection between the DMI and NZM-XDMI-DPV1
Easy Link: triple LRC fault	The NZM-XDMI-DPV1 has received a faulty telegram via the Easy-Link from the DMI three-times in succession	Check the connection between the DMI and NZM-XDMI-DPV1 Check the noise immunity measures

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Designation	Meaning	Clarification/Hint
Fault	Fault in the hardware	Exchange the hardware
A/D convertor		
DMI display		
DMI clock module		
EEPROM		
Convertor block		
Signal processing		
Power supply		
Plug-in module 1		
Plug-in module 2		
Plug-in module 3		
Plug-in module 4		
Freeze mode active	The DP master has activated synchronous reading of data inputs from multiple stations	Intended user action
Function not supported	The DP master has demanded a non-supported function from the NZM-XDMI-DPV1	Check the configuration of the DP master
Ident-number of DP slave	Contains the identity number of the NZM-XDMI-DPV1: hexadecimal 4D11	–
Initialization running	The NZM-XDMI-DPV1 is in the initialization phase	Temporary state
Invalid response DP-slave	The NZM-XDMI-DPV1 has sent an invalid answer	Check the wiring and the noise immunity measures
Length of additional diagnosis information	Contains the length of additional diagnosis information: hexadecimal 07	–
Master lock	The NZM-XDMI-DPV1 is locked by another DP master	–
Not used	Contains no information for evaluation	–

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Designation	Meaning	Clarification/Hint
Overflow of additional diagnosis information	The additional diagnosis data (status) is larger than the memory reserved for it in the DP master	Check the configuration of the DP master
Parameterization fault	The DP master has sent an invalid parameterization telegram to the NZM-XDMI-DPV1	Check the configuration of the DP master
Parameterization query	The NZM-XDMI-DPV1 waits for the parameterization telegram of the DP master	Temporary state
Parameterized motor-starter function changed or deactivated	A motor starter function which has already been parameterized in the DMI is changed or deactivated	–
Remote operator not parameterized in DMI	The remote operator in the DMI is not parameterized, the switch state of the circuit-breaker can not be controlled via the PROFIBUS	Parameterize the remote operator in the DMI
Slave deactivated	The DP master has removed the NZM-XDMI-DPV1 from its cyclic process routine (deactivated)	Intended user action
Slot number	Contains the slot number from which the additional diagnosis information (status) originates: hexadecimal 00	–
Static diagnosis	The communication between the NZM-XDMI-DPV1 and DMI is interrupted	Check the connection between the DMI and NZM-XDMI-DPV1
Station not existent	A station does not answer at the station address used	Inspect the configuration of the DP master and the address setting on the DMI
Station not ready	The NZM-XDMI-DPV1 is not yet ready for communication (initialization phase)	Temporary state

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Designation	Meaning	Clarification/Hint
Stations address DP master	Contains the station address of the DP master	–
Status specifier	NZM-XDMI-DPV1 does not issue a "incoming/outgoing" message to the sent diagnosis information (status): hexadecimal 00	–
Status type	The NZM-XDMI-DPV1 uses the "Status message" type status: hexadecimal 81	–
Stop of DMI: CB with new serial number connected	A circuit-breaker with a new serial number has been connected to the DMI	Ensure that it is the desired type Acknowledge it via the DMI keypad or via the PROFIBUS with the aid of the circuit-breaker/DMI command object
Sync mode active	The DP master has activated the synchronous output of data outputs to multiple stations	Intended user action
Watchdog activated	The connection monitoring in the NZM-XDMI-DPV1 has been activated correctly	Desired state

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PROFIBUS-DPV1 functions

The NZM-XDMI-DPV1 provides various DPV1 process data objects (data records) containing logical data which belongs together for acyclic communication with a class 1 or a class 2 DPV1 master. The objects can be read and/or written. Some of these objects are only accessible for a class 2 DPV1 master as their data is available to class 1 DPV1 masters in the cyclic input/output data.

The access of all objects occurs via the DPV1 Read and Write service in your DP master system.

Function overview

The process data objects provided by the NZM-XDMI-DPV1 enable the functionality's listed in the following sections.

Acyclic data with class 1 and class 2 DPV1 masters
The following information can be read out:

- Status of the circuit-breaker (trip cause, load warning, overload zone reached, phase state, fault indication),
- Parameters used in the circuit-breaker (e.g., limitation values and delay times for overload, short circuit and fault current),
- Local parameters of the circuit-breaker (e.g., limitation values and delay times for overload, short circuit and fault current),
- Diagnosis sets 1 to 10 of the circuit-breaker (date, time, parameters used, status of the circuit-breaker),
- Circuit-breaker identification (e.g. serial number, NZM type, current transformer type, hardware version, software version),

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- Currents in the circuit-breaker (I_{rms} of the 3 phases and the neutral pole, maximum current, fault current),
- DMI functionality (motor-starter function, assignment of the DMI outputs with switching signals),
- DMI display (assignment of the individual display lines),
- DMI parameters (password, language selected, serial number, start configuration),
- DMI clock,
- State of the inputs of the DMI,
- State of the outputs of the DMI,
- DMI identification (software version),
- NZM-XDMI-DPV1 identification (software version),
- Communication status (circuit-breaker, DMI, start-up),
- Statistical values (circuit-breaker/DMI operating hours, circuit-breaker switching operations).

The following functions can be controlled or parameterized:

- Commands on the circuit-breaker (switch on, switch off, trip),
- Commands on the DMI (switch off motor, switch on motor, anticlockwise, clockwise, acknowledge stop mode, acknowledge alarms),
- Parameters to be used in the circuit-breaker (e.g, limitation values and delay times for overload, short circuit and fault current),
- DMI functionality (motor-starter function, assignment of the DMI outputs with switching signals),
- DMI display (assignment of the individual display lines),
- DMI parameters (password, language selected, serial number, start-up),
- DMI clock.

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Additional acyclic data only with class 2 DPV1 masters

The following functions can be controlled:

State of the DMI outputs (for outputs whose switching signal has been parameterized to "bus access", only possible for operation without class 1 DP master).

Object overview

In DPV1, the acyclic accessed data are compiled to so-called Process Data Objects. A Process Data Object contains consistent data contents (data records), which can be accessed via the DPV1 Read and/or Write services.

The following overview contains all the objects contained in the NZM-XDMI-DPV1.

Table 19: Process Data Objects in NZM-XDMI-DPV1

Object name	API	Slot number	Index	Data length (Octets)	Readable (R) Writable (W)	Page
Circuit-breaker						
Diagnosis set 1	0	0	1	27	R	→ 118
Diagnosis set 2	0	0	2	27	R	
Diagnosis set 3	0	0	3	27	R	
Diagnosis set 4	0	0	4	27	R	
Diagnosis set 5	0	0	5	27	R	
Diagnosis set 6	0	0	6	27	R	
Diagnosis set 7	0	0	7	27	R	
Diagnosis set 8	0	0	8	27	R	
Diagnosis set 9	0	0	9	27	R	
Diagnosis set 10	0	0	10	27	R	

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Object name	API	Slot number	Index	Data length (Octets)	Readable (R) Writable (W)	Page
Circuit-breaker						
Status	0	0	11	7	R	→ 129
Parameters used	0	0	12	9	R	→ 134
Locally set parameters	0	0	13	9	R	→ 136
New parameters	0	0	14	9	W	→ 139
Device identification	0	0	15	86	R	→ 142
Currents	0	0	17	12	R	→ 148
DMI						
Output assignment	0	0	21	9	R,W	→ 152
Standard display assignment	0	0	22	6	R,W	→ 158
Basic setting	0	0	23	9	R,W	→ 162
Clock	0	0	24	8	R,W	→ 166
Inputs	0	0	25	1	R	→ 169
Outputs	0	0	26	1	R	→ 170
Bus outputs	0	0	27	1	W	→ 172
Device identification	0	0	28	12	R	→ 174
Circuit-breaker/DMI						
Commands	0	0	16	1	W	→ 145
Communication status	0	0	20	2	R	→ 150
Statistic values	0	0	30	10	R	→ 177

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Object name	API	Slot number	Index	Data length (Octets)	Readable (R) Writable (W)	Page
NZM-XDMI-DPV1 device identification	0	0	29	8	R	→ 176
Object compilation A	0	0	50	31	R	→ 179
Object compilation B	0	0	51	19	R	→ 185

Access to objects

Access to the Process Data Objects in the NZM-XDMI-DPV1 using the DPV1 Read and Write services is implemented with the aid of the functions provided by the DP master system. Please refer to the manufacturers documentation. Usually, function blocks are provided for access. In IEC 61131-3 based systems, the "RDREC" (Read) and "WRREC" (Write) function blocks which are defined by the Profibus User Organization (PNO) in guideline 2.182 are often provided to also ensure optimum access to complex data structures.

You require the following details to address the objects:

- The address of the local DPV1 master interface,
- The station address of the NZM-XDMI-DPV1 to be contacted,
- The identifier of the application (API) in the NZM-XDMI-DPV1 (specification only required with class 2 DPV1 master),
- The module of the NZM-XDMI-DPV1 (slot number) to be addressed,

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- The address (Index) of the required Process Data Object in the addressed module of the NZM-XDMI-DPV1,
- The data length of the required Process Data Object,
- A defined variable (memory range) in the local application which should be assigned to the read data or the data to be written.

The address of the local DPV1 master interface can be taken from the topology of your master system. The station address of the NZM-XDMI-DPV1 to be contacted can be taken from the Profibus topology.

The API (specification only required with class 2 DPV1 master) and the Slot Number are to be defined with 0 for the NZM-XDMI-DPV1 for all Process Data Objects.

The index, the data length and a variable definition (declaration) example for an IEC 61131-3 based system and for every Process Data Object available in the NZM-XDMI-DPV1 can be found in the following sections.

Process Data Objects

Circuit-breaker diagnosis data records object 1 to 10
Diagnosis record 1 to diagnosis record 10 contain the last saved diagnosis data of the circuit-breaker. Diagnosis record 1 contains the current (last) diagnosis events and diagnosis set 10 the oldest saved data.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

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Intended usage

Use this object to receive information concerning a circuit-breaker event (e.g. trip) which has occurred relating to

- Alarms,
- Trip conditions,
- Status of the phases,
- Fault states.

By saving 10 diagnosis records, the time up to a trip can also be successfully diagnosed.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- Index is equal to the following:
  - 1 for diagnosis record 1,
  - 2 for diagnosis record 2,
  - 3 for diagnosis record 3 to
  - 10 for diagnosis record 10.



If no data exists in the circuit-breaker for an addressed diagnosis record, because the number of saved events is less than the selected number, the "resource unavailable" fault indication (fault code C3 hexadecimal) is generated as an answer.

The length of the data to be read is 27 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

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Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
CB_diagnosisset	STRUCT
Number	WORD or UINT
Time	DATE_AND_TIME
Options	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
I_r	BYTE or USINT
I_i	
Tr	
I_{sd}	
T_{sd}	
I_{dn}	
T_{vdn}	
Reserved	
Status	ARRAY [1..56] OF BOOL or ARRAY [1..7] OF BYTE

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 20: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
CB_diagnosisset.		
Number	Octet 1 and 2	Identity of the diagnosis set (Value: 1 to 10)
Time	Octet 3 to 10	Event time → table 21
	Octet 11	
Options[1]	Bit 0	Parameters used: I^2t 1) → table 26
	Bit 1 to Bit 7	Not used
	Octet 12	
	Bit 0 to Bit 7	Not used
I_r	Octet 13	Parameters used: I_r 1) → table 22
I_i	Octet 14	Parameters used: I_i 1) → table 23
T_r	Octet 15	Parameters used: T_r 1) → table 25
I_{sd}	Octet 16	Parameters used: I_{sd} 1) → table 24
T_{sd}	Octet 17	Parameters used: T_{sd} 1) → table 25
I_{dn}	Octet 18	Parameters used: I_{dn} 1) → table 22
T_{vdn}	Octet 19	Parameters used: T_{vdn} 1) → table 25
Reserved	Octet 20	Not used
	Octet 21 2)	Trip conditions
Status[1]	Bit 0	Trip I_i: short-circuit

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Variable access (example)	Data position	Meaning
Status[2]	Bit 1	Trip I^2t (if I^2t option selected): overload variable short-time delayed
		Trip I_{mv} (if I^2t option not selected): overload constant short-time delayed
Status[3]	Bit 2	Trip I_r: overload variable long-time delayed
Status[4]	Bit 3	Trip I_{dn}: fault current constant short-time delayed
Status[5]	Bit 4	Trip Select: time limit with H-selectivity exceeded (not yet supported)
Status[6]	Bit 5	Trip Com: trip has been initiated via PROFIBUS-DP
Status[7]	Bit 6	Trip Temp: trip due to device overtemperature (NZM)
Status[8]	Bit 7	Trip Error: trip due to device fault (NZM)
	Octet 22[2)]	Alarm conditions
Status[9]	Bit 0	Load rejection prewarning
Status[10]	Bit 1	Overload range 1
Status[11]	Bit 2	Overload range 2
Status[12]	Bit 3	Motor protection (only significant with -ME types, otherwise constant "0"): the circuit-breaker has detected an overload case and demands that the DMI switch off the motor. If the overload continues, the circuit-breaker will trip.
Status[13]	Bit 4	Unbalance
	Bit 5	Not used

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Variable access (example)	Data position	Meaning
Status[15]	Bit 6	Not used
Status[16]	Bit 7	Not used
	Octet 23[2)]	Status of the phases L1 and L2[3)]
Status[17]	Bit 0	Phase L1: Normal range
Status[18]	Bit 1	Phase L1: Load rejection prewarning
Status[19]	Bit 2	Phase L1: Overload range 1
Status[20]	Bit 3	Phase L1: Overload range 2
Status[21]	Bit 4	Phase L2: Normal range
Status[22]	Bit 5	Phase L2: Load rejection prewarning
Status[23]	Bit 6	Phase L2: Overload range 1
Status[24]	Bit 7	Phase L2: Overload range 2
	Octet 24[2)]	Status of the phases L3 and N conductor[3)]
Status[25]	Bit 0	Phase L3: Normal range
Status[26]	Bit 1	Phase L3: Load rejection prewarning
Status[27]	Bit 2	Phase L3: Overload range 1
Status[28]	Bit 3	Phase L3: Overload range 2
Status[29]	Bit 4	N-pole: Normal range
Status[30]	Bit 5	N-pole: Load rejection prewarning
Status[31]	Bit 6	N-pole: Overload range 1
Status[32]	Bit 7	N-pole: Overload range 2
	Octet 25[2)]	tripping phase[3)]
Status[33]	Bit 0	Trip via L1
Status[34]	Bit 1	Trip via L2
Status[35]	Bit 2	Trip via L3

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Variable access (example)	Data position	Meaning
Status[36]	Bit 3	Trip via N-pole
	Bit 4 to Bit 7	Not used
	Octet 26[2)]	Phase issuing alarm
	Bit 0 to Bit 3	Not used
Status[45]	Bit 4	Alarm from L1
Status[46]	Bit 5	Alarm from L2
Status[47]	Bit 6	Alarm from L3
Status[48]	Bit 7	Alarm from N-pole
	Octet 27[1)]	Fault states
Status[49]	Bit 0	NZM fault: A/D convertor
Status[50]	Bit 1	NZM fault: Signal processing
Status[51]	Bit 2	NZM fault: Convertor block
Status[52]	Bit 3	NZM fault: EEPROM
Status[53]	Bit 4	NZM plug in module 1 fault
Status[54]	Bit 5	NZM plug in module 2 fault
Status[55]	Bit 6	NZM plug in module 3 fault
Status[56]	Bit 7	NZM plug in module 4 fault

1) Prerequisite: Parameter is supported by the connected circuit-breaker, otherwise "Not used".

2) The meaning is relevant when the respective Bit is set.

3) With a short-circuit (Trip I_i) the tripping phase and the phase status cannot be identified with certainty.

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When accessing the "Number of the diagnosis record" data content, please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

Table 21: Format (BCD coding) of the event time data content

Data position	Meaning	Explanation
Octet 3		
Bit 4 to Bit 7	Year, 10 position digit	Value 90 conforms to 1990 Value 99 conforms to 1999 Value 00 conforms to 2000 Value 89 conforms to 2089
Bit 0 to Bit 3	Year, 1 position digit	
Octet 4		–
Bit 4 to Bit 7	Month, 10 position digit	
Bit 0 to Bit 3	Month, 1 position digit	
Octet 5		
Bit 4 to Bit 7	Day, 10 position digit	
Bit 0 to Bit 3	Day, 1 position digit	
Octet 6		
Bit 4 to Bit 7	Hour, 10 position digit	
Bit 0 to Bit 3	Hour, 1 position digit	
Octet 7		
Bit 4 to Bit 7	Minute, 10 position digit	
Bit 0 to Bit 3	Minute, 1 position digit	

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Data position	Meaning	Explanation
Octet 8		
Bit 4 to Bit 7	Second, 10 position digit	–
Bit 0 to Bit 3	Second, 1 position digit	
Octet 9		
Bit 4 to Bit 7	Millisecond, 100 position digit	
Bit 0 to Bit 3	Millisecond, 10 position digit	
Octet 10		
Bit 4 to Bit 7	Millisecond, 1 position digit	
Bit 0 to Bit 3	Day of the week	Value 0 complies with not used Value 1 complies with Sunday Value 2 complies with Monday Value 7 complies with Saturday

→ A diagnosis record can also be saved in the circuit-breaker without an event time. This is always the case when a DMI was not connected to the circuit-breaker at the time of the event. In this case, all 8 Octets of the data content event time are assigned with the value "0".

→ Octets 9 and 10 always have the value "0", as the internal clock of the DMI does not support millisecond and day of the week.

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Coding of the data content of the parameters used

Table 22: Parameter settings I_r and I_{dn}

Value	I_r [A]	I_{dn} [A]
0	$0.5 \times I_n$	$0.2 \times I_n$
1	$0.55 \times I_n$	$0.3 \times I_n$
2	$0.6 \times I_n$	$0.4 \times I_n$
3	$0.65 \times I_n$	$0.5 \times I_n$
4	$0.7 \times I_n$	$0.6 \times I_n$
5	$0.75 \times I_n$	$0.7 \times I_n$
6	$0.8 \times I_n$	$0.8 \times I_n$
7	$0.85 \times I_n$	$0.9 \times I_n$
8	$0.9 \times I_n$	$1.0 \times I_n$
9	$0.925 \times I_n$	$0.2 \times I_n$
10	$0.95 \times I_n$	–
11	$0.975 \times I_n$	–
12	$1.0 \times I_n$	–
13	$0.5 \times I_n$	–
14	$0.5 \times I_n$	–
15	$0.5 \times I_n$	–

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Table 23: Parameter settings I_i

Value	I_i [A]			
	NZM2-VE NZM4-AE NZM4-VE	NZM3-AE-250 NZM3-AE-400 NZM3-VE-250 NZM3-AE-400	NZM3-AE-630 NZM3-VE-630	NZM2-ME NZM3-ME-220 NZM3-ME-350 NZM4-ME
0	$2 \times I_n$	$2 \times I_n$	$2 \times I_n$	$2 \times I_r$
1	$3 \times I_n$	$3 \times I_n$	$2.5 \times I_n$	$3 \times I_r$
2	$4 \times I_n$	$4 \times I_n$	$3 \times I_n$	$4 \times I_r$
3	$5 \times I_n$	$5 \times I_n$	$3.5 \times I_n$	$5 \times I_r$
4	$6 \times I_n$	$6 \times I_n$	$4 \times I_n$	$6 \times I_r$
5	$7 \times I_n$	$7 \times I_n$	$5 \times I_n$	$8 \times I_r$
6	$8 \times I_n$	$8 \times I_n$	$6 \times I_n$	$10 \times I_r$
7	$10 \times I_n$	$9 \times I_n$	$7 \times I_n$	$12 \times I_r$
8	$12 \times I_n$	$11 \times I_n$	$8 \times I_n$	$14 \times I_r$
9	$2 \times I_n$	$2 \times I_n$	$2 \times I_n$	$2 \times I_r$

Table 24: Parameter settings I_{sd}

Value	I_{sd} [A]	
	NZM3-VE-630 NZM3-VE(F)-NA-...	All others
0	$1.5 \times I_r$	$2 \times I_r$
1	$2 \times I_r$	$3 \times I_r$
2	$2.5 \times I_r$	$4 \times I_r$
3	$3 \times I_r$	$5 \times I_r$
4	$3.5 \times I_r$	$6 \times I_r$
5	$4 \times I_r$	$7 \times I_r$
6	$5 \times I_r$	$8 \times I_r$
7	$6 \times I_r$	$9 \times I_r$
8	$7 \times I_r$	$10 \times I_r$
9	$1.5 \times I_r$	$2 \times I_r$

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Table 25: Parameter settings T_r, T_{sd}, T_{vdn}

Value	T_r [s]	T_{sd} [s]	T_{vdn} [s]
0	2	0.00	0.00
1	4	0.02	0.02
2	6	0.06	0.06
3	8	0.1	0.10
4	10	0.2	0.20
5	14	0.3	0.30
6	17	0.5	0.50
7	20	0.75	0.75
8	∞	1.00	1.00
9	2	0.0	0.00

Table 26: Parameter settings I^2t

Value	I^2t [A]
0	Function deactivated
1	Function activated

Circuit-breaker status object

This object contains the current state of the circuit-breaker.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to monitor the circuit-breaker with regard to

- Alarms,
- Trip conditions,
- Status of the phases,
- Fault states.

.

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→ After a circuit-breaker trip, the trip conditions are retained until they are acknowledged with the aid at the "circuit-breaker/DMI command" .

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 11.

The length of the data to be read is 7 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_Status	ARRAY [1..56] OF BOOL or ARRAY [1..7] OF BYTE

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 27: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
	Octet 1[1)]	Trip conditions
LS_Status[1]	Bit 0	Trip I_i: short-circuit
LS_Status[2]	Bit 1	Trip I^2t (when I^2t option selected): Overload variable short-time delay Trip I_{mv} (when I^2t option not selected): Overload constant short-time delayed
LS_Status[3]	Bit 2	Trip I_r: Overload variable long-time delayed
LS_Status[4]	Bit 3	Trip I_{dn}: Fault current, constant short-time delayed
LS_Status[5]	Bit 4	Trip Select: time limit with H-selectivity exceeded (not yet supported)
LS_Status[6]	Bit 5	Trip Com: trip has been initiated via PROFIBUS-DP
LS_Status[7]	Bit 6	Trip Temp: trip due to device overtemperature (NZM)
LS_Status[8]	Bit 7	Not used
	Octet 2[1)]	Alarm conditions
LS_Status[9]	Bit 0	Load rejection prewarning
LS_Status[10]	Bit 1	Overload range 1
LS_Status[11]	Bit 2	Overload range 2
LS_Status[12]	Bit 3	Motor protection (only significant with -ME types, otherwise constant "0"): the circuit-breaker has detected an overload case and demands that the DMI switch off the motor. If the overload continues, the circuit-breaker will trip.

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Variable access (example)	Data position	Meaning
LS_Status[13]	Bit 4	Unbalance
	Bit 5	Not used
LS_Status[15]	Bit 6	External power supply of the NZM (via DMI or PC)
LS_Status[16]	Bit 7	Supply voltage in order
	Octet 3[1)]	Status of the phases L1 and L2[2)]
LS_Status[17]	Bit 0	Phase L1: Normal range
LS_Status[18]	Bit 1	Phase L1: Load rejection prewarning
LS_Status[19]	Bit 2	Phase L1: Overload range 1
LS_Status[20]	Bit 3	Phase L1: Overload range 2
LS_Status[21]	Bit 4	Phase L2: Normal range
LS_Status[22]	Bit 5	Phase L2: Load rejection prewarning
LS_Status[23]	Bit 6	Phase L2: Overload range 1
LS_Status[24]	Bit 7	Phase L2: Overload range 2
	Octet 4[1)]	Status of the phases L3 and N conductor[2)]
LS_Status[25]	Bit 0	Phase L3: Normal range
LS_Status[26]	Bit 1	Phase L3: Load rejection prewarning
LS_Status[27]	Bit 2	Phase L3: Overload range 1
LS_Status[28]	Bit 3	Phase L3: Overload range 2
LS_Status[29]	Bit 4	N-pole: Normal range
LS_Status[30]	Bit 5	N-pole: Load rejection prewarning
LS_Status[31]	Bit 6	N-pole: Overload range 1
LS_Status[32]	Bit 7	N-pole: Overload range 2
	Octet 5[1)]	Tripping phase[2)]
LS_Status[33]	Bit 0	Trip via L1
LS_Status[34]	Bit 1	Trip via L2
LS_Status[35]	Bit 2	Trip via L3

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Variable access (example)	Data position	Meaning
LS_Status[36]	Bit 3	Trip via N-pole
LS_Status[37]	Bit 4	Circuit-breaker is in the "ON" state
LS_Status[38]	Bit 5	Circuit-breaker is in the "OFF" state
LS_Status[39]	Bit 6	Circuit-breaker is in "tripped" state
LS_Status[40]	Bit 7	Normal operation of the circuit-breaker (communication in order)
	Octet 6[1)]	Phase issuing alarm
	Bit 0 to Bit 3	Not used
LS_Status[45]	Bit 4	Alarm from L1
LS_Status[46]	Bit 5	Alarm from L2
LS_Status[47]	Bit 6	Alarm from L3
LS_Status[48]	Bit 7	Alarm from N-pole
	Octet 7[1)]	Fault states
LS_Status[49]	Bit 0	NZM fault: A/D convertor
LS_Status[50]	Bit 1	NZM fault: Signal processing
LS_Status[51]	Bit 2	NZM fault: Convertor block
LS_Status[52]	Bit 3	NZM fault: EEPROM
LS_Status[53]	Bit 4	NZM plug in module 1 fault
LS_Status[54]	Bit 5	NZM plug in module 2 fault
LS_Status[55]	Bit 6	NZM plug in module 3 fault
LS_Status[56]	Bit 7	NZM plug in module 4 fault

1) The meaning is relevant when the respective Bit is set.

2) With a short-circuit (Trip I_i) the tripping phase and the phase status cannot be identified with certainty.

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Circuit-breaker Parameters used object

This object contains the parameters currently used by the circuit-breaker.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to get informed about the parameters currently in use

- Limitation value and delay time of the overload release,
- Limitation value and delay time of the short-time delayed short-circuit release,
- Limitation value of the non-delayed short-circuit release,
- Limitation value and delay time of the residual-current protection module,
- Characteristic curve used for the short-circuit protection (I^2t).



The parameters available depend on the type of electronic control unit used.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 12.

The length of the data to be read is 9 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

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Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_used parameters	STRUCT
Options	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
I_r	BYTE or USINT
I_i	
T_r	
I_{sd}	
T_{sd}	
I_{dn}	
T_{vdn}	

Table 28: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
LS_used parameters.		
	Octet 1	
Options[1]	Bit 0	Parameters used: I^2t[1)] → table 26
	Bit 1 to Bit 7	Not used
	Octet 2	
	Bit 0 to Bit 7	Not used
I_r	Octet 3	Parameters used: I_r[1)] → table 22
I_i	Octet 4	Parameters used: I_i[1)] → table 23
Tr	Octet 5	Parameters used: T_r[1)] → table 25

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Variable access (example)	Data position	Meaning
I_{sd}	Octet 6	Parameters used: I_{sd} 1) → table 24
T_{sd}	Octet 7	Parameters used: T_{sd} 1) → table 25
I_{dn}	Octet 8	Parameters used: I_{dn} 1) → table 22
T_{vdn}	Octet 9	Parameters used: T_{vdn} 1) → table 25

1) Prerequisite: Parameter is supported by the connected circuit-breaker, otherwise "Not used".

→ The Table 21 to Table 25 can be found with Section "Circuit-breaker diagnosis data records object 1 to 10", Page 118.

Circuit-breaker locally set parameters object
This object contains the parameters set locally in the electronic control unit.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage
Use this object in order to get informed about the locally set parameters

- Limitation value and delay time of the overload release,
- Limitation value and delay time of the short-time delayed short-circuit release,
- Limitation value of the non-delayed short-circuit release,

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- Limitation value and delay time of the residual-current protection module,
- Characteristic curve used for the short-circuit protection (I^2t).



The parameters available depend on the type of electronic control unit used.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 13.

The length of the data to be read is 9 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_local_parameters	STRUCT
Options	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
I_r	BYTE or USINT
I_i	
T_r	
I_{sd}	
T_{sd}	
I_{dn}	
T_{vdn}	

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Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 29: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
LS_local_parameters.		
	Octet 1	
Options[1]	Bit 0	Local parameter: I^2t[1)] → table 26
	Bit 1 to Bit 7	Not used
	Octet 2	
	Bit 0 to Bit 7	Not used
I_r	Octet 3	Local parameter: I_r[1)] → table 22
I_i	Octet 4	Local parameter: I_i[1)] → table 23
T_r	Octet 5	Local parameter: T_r[1)] → table 25
I_{sd}	Octet 6	Local parameter: I_{sd}[1)] → table 24
T_{sd}	Octet 7	Local parameter: T_{sd}[1)] → table 25
I_{dn}	Octet 8	Local parameter: I_{dn}[1)] → table 22
T_{vdn}	Octet 9	Local parameter: T_{vdn}[1)] → table 25

1) Prerequisite: Parameter is supported by the connected circuit-breaker, otherwise "Not used".

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The Table 22 to Table 25 can be found in Section "Circuit-breaker diagnosis data records object 1 to 10", from Page 118.

Circuit-breaker new parameters object

This object is used for accepting new parameters to be used by the circuit-breaker.

This object is a write only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to transfer new parameters with regard to

- Limitation value and delay time of the overload release,
- Limitation value and delay time of the short-time delayed short-circuit release,
- Limitation value of the non-delayed short-circuit release,
- Limitation value and delay time of the residual-current protection module,
- Characteristic curve used for the short-circuit protection (I^2t)

to the circuit-breaker.



The parameters available depend on the type of electronic control unit used. Settings for non-existent parameters are not effective.



Caution!

Writing to this object has the immediate effect of exchanging the parameters used up to this point with the new parameters which are transferred. This has the effect of modifying the trip characteristics of the circuit-breaker to correspond to the new parameter values. Please proceed carefully with the selection of the new parameter values and when calling the Write service for this object.

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→ Parameter values are only accepted from the electronic control unit when they are less than or equal to the locally set parameter values.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 14.

The length of the data to be written is 9 Octets. Please ensure that you do not enter other lengths when calling the Write service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_new_parameters	STRUCT
Options	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
I_r	BYTE or USINT
I_i	
T_r	
I_{sd}	
T_{sd}	
I_{dn}	
T_{vdn}	

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Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 30: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
LS_new_parameters.		
	Octet 1	
Options[1]	Bit 0	Local parameters: I^2t → table 26
	Bit 1 to Bit 7	Not used
	Octet 2	
	Bit 0 to Bit 7	Not used
I_r	Octet 3	Local parameters: I_r → table 22
I_i	Octet 4	Local parameters: I_i → table 23
T_r	Octet 5	Local parameters: T_r → table 25
I_{sd}	Octet 6	Local parameters: I_{sd} → table 24
T_{sd}	Octet 7	Local parameters: T_{sd} → table 25
I_{dn}	Octet 8	Local parameters: I_{dn} → table 22
T_{vdn}	Octet 9	Local parameters: T_{vdn} → table 25

→ The Table 22 to Table 26 can be found in Section "Circuit-breaker diagnosis data records object 1 to 10", from Page 118.

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Circuit-breaker device identification object

This object contains the device identification of the connected circuit-breaker (ASCII string).

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to get informed about the circuit-breaker device identification currently in use

- NZM frame size,
- NZM type,
- number of poles,
- rated current,
- neutral pole protection,
- serial number,
- current transformer type,
- Firmware version,
- type, hardware version and firmware version of a plug-in module.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 15.

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The length of the data to be read is 86 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_identification	STRUCT
Serial_number	DWORD or UDINT
Frame_size	ARRAY [1..4] OF CHAR or STRING [4]
NZM_type	ARRAY [1..8] OF CHAR or STRING [8]
I_n	ARRAY [1..6] OF CHAR or STRING [6]
Number_of_poles	ARRAY [1..8] OF CHAR or STRING [8]
Current_transformer	ARRAY [1..10] OF CHAR or STRING [10]
N_conductor_protection	ARRAY [1..22] OF CHAR or STRING [22]
SW_Version	ARRAY [1..6] OF CHAR or STRING [6]
Module_Version	ARRAY [1..12] OF CHAR or STRING [12]
Module_SW_Version	ARRAY [1..6] OF CHAR or STRING [6]

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Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 31: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
LS_identification.		
Serial_number	Octet 1 to 4	Serial number of the circuit-breaker
Frame_size	Octet 5 to 8	Frame size of the circuit-breaker
NZM_type	Octet 9 to 16	Circuit-breaker type
I_n	Octet 17 to 22	Rated current
Number_of_poles	Octet 23 to 30	Number of poles of the circuit-breaker
Current_transformer	Octet 31 to 40	Current transformer type
N_conductor_protection	Octet 41 to 62	Details about the neutral pole protection
SW_Version	Octet 63 to 68	Firmware version of the circuit-breaker
Module_Version	Octet 69 to 80	Type and hardware version of the plug-in module type 0: no plug-in module present
Module_SW_Version	Octet 81 to 86	Firmware version of the plug-in module

All data contents with the exception of the serial number are coded as ASCII strings.

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→ When accessing the "Serial_number" data content, please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

Circuit-breaker/DMI command object

This object serves for accepting commands which are directed to the circuit-breaker or to the DMI.

This object is a write only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to transfer the commands with regard to

- Tripping of the circuit-breaker,
- Switching state of the circuit-breaker,
- Motor control via the DMI,
- Group acknowledgement of alarms,
- Acknowledging a startup

to the circuit-breaker or the DMI.

→ For certain commands the preconditions in → table 32 are necessary.



Caution!
Writing to this object has the effect of immediately selecting execution of this command. Please proceed carefully with the selection of the command and when calling the Write service for this object.

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Note
Trip of the circuit-breaker by this command can only be achieved when current is flowing.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 16.

The length of the data to be written is 1 Octet. Please ensure that you do not enter other lengths when calling the Write service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_DMI_command	BYTE or USINT

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 32: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
LS_DMI_command.	Octet 1	Command to the circuit-breaker or the DMI → table 33

Table 33: Coding of the command

Command code (hexadecimal)	Effect	Precondition
00	NZM trips out	Current flows in the phases of the circuit-breaker
01	Acknowledge startup stop	–
02	Not used	
03	Not used	
04	NZM is switched on	The remote operator function is parameterized in DMI
05	NZM is switched off	
06	DMI switches off the connected motor	The motor-starter function is parameterized in the DMI
07	DMI switches on the connected motor or anticlockwise	
08	DMI switches the connect motor to clockwise	
09	All existing alarms (trips and motor protection trip) are acknowledged	–

If a command is issued for which the required preconditions do not exist, the Write service acknowledges negatively.

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Circuit-breaker currents object

This object contains the present current values of the connected circuit-breaker.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to get informed about the values currently in use

- Phase currents,
- Neutral pole current,
- Maximum phase current,
- Fault current.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 17.

The length of the data to be read is 12 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_currents	ARRAY [1..6] OF WORD or ARRAY [1..6] OF UINT

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Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 34: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
LS_currents[1]	Octet 1 and 2	Root mean square current phase 1
LS_currents[2]	Octet 3 and 4	Root mean square current phase 2
LS_currents[3]	Octet 5 and 6	Root mean square current phase 3
LS_currents[4]	Octet 7 and 8	Root mean square current N-pole
LS_currents[5]	Octet 9 and 10	Maximum phase current
LS_currents[6]	Octet 11 and 12	Fault current

→ When accessing all data content of the object, please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

→ It depends on the type of connected circuit-breaker if the root mean square current neutral pole and the fault current are available.

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Circuit-breaker/DMI communication status object

This object contains the current status of the communication between the NZM and DMI.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to get informed about the current communication status with regard to

- Startup behaviour,
- Parameter comparison,
- Initialization.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 20.

The length of the data to be read is 2 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_DMI_Com_Status	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE

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Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 35: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
	Octet 1	
LS_DMI_Com_Status[1]	Bit 0	NZM with new serial number recognised and stop mode active
LS_DMI_Com_Status[2]	Bit 1	Parameters in DMI (parameters used) and NZM (locally set parameters) differ
LS_DMI_Com_Status[3]	Bit 2	Motor-starter function in DMI parameterized, which are not supported by the connected NZM
	Bit 3 to Bit 4	Not used
LS_DMI_Com_Status[6]	Bit 5	After initialization of the interface until a CB-identity (circuit breaker identity) or PC identity have been recognised when a connection is being established.
LS_DMI_Com_Status[7]	Bit 6	After initialization of the interface until an identity block has been correctly received when a connection is being established
LS_DMI_Com_Status[8]	Bit 7	After initialization of the interface until the first transfer command has been correctly received when a connection is being established
	Octet 2	
	Bit 0 to 7	Not used

→ The meaning is relevant when the respective Bit is set.

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DMI output assignment object
This object contains the current output assignment of the DMI.

This object can be read and written (Read, Write). It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage
Use this object in order to get information about the current output assignment of the DMI relating to

- Switching signals,
- Remote operator function,
- Motor-starter function

and/or

use this object in order to transfer a new output assignment to the DMI relating to

- Switching signals,
- Remote operator function,
- Motor-starter function.



Caution!
Writing to the object has an immediate effect where the current output assignment is replaced by the new output assignment. Please proceed carefully with the selection of the output assignment and when calling the Write service for this object.

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Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 21.

The length of the data to be read or written is 9 Octets. Please ensure that no other lengths are entered when the Write service is called or shorter lengths are read when the Read service is called, as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_output assignment	STRUCT
Output_0	BYTE or USINT
Output_1	
Output_2	
Output_3	
Output_4	
Output_5	
Changeover_time	WORD or UINT
Switching_element	BYTE or USINT

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Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 36: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
DMI_output assignment.		
Output_0	Octet 1	Assignment of output Q0 → table 37 and Table 38
Output_1	Octet 2	Assignment of output Q1 → table 37 and Table 38
Output_2	Octet 3	Assignment of output Q2 → table 37 and Table 38
Output_3	Octet 4	Assignment of output Q3 → table 37
Output_4	Octet 5	Assignment of output Q4 → table 37
Output_5	Octet 6	Assignment of output Q5 → table 37
Changeover_time	Octet 7 and 8	Star-delta changeover time 1 corresponds to 100 ms (minimum value) 999 corresponds to 99 s (maximum value)
Switching_element	Octet 9	Switching element used: 0 corresponds with a switch 1 corresponds with a push-button

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When accessing the "Star-delta changeover time" data content, please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

An output can be assigned with either a switching signal (output Q0 to output Q5), a motor-starter function (output Q0 to Q3) or the remote operator function (output Q4 and output Q5).

Only outputs whose switching signal has been assigned with "Bus access" can be switched via the PROFIBUS-DP.

Assignment of the outputs with switching signals

The following table indicates the possible assignment of outputs Q0 to Q5 with switching signals and the corresponding value for the Octets 1 to 6 of the Object.

Table 37: Switching signals and their values

Value for output assignment (decimal)	Switching signal	Output switches, if
00	Trip I_i	a short-circuit trip has occurred
01	Trip I_r	an overload trip has occurred (long-delayed)
02	Trip I_{sd}	a short-time delayed trip has occurred (without activated I^2t monitoring)
03	Trip I^2t	a short-time delayed trip has occurred due to the I^2t characteristic (with activated I^2t monitoring)

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Value for output assignment (decimal)	Switching signal	Output switches, if
04	Trip I_{dn}	the permissible residual current was exceeded and has caused a trip
05	Overtemperature	the permissible operating temperature of the NZM electronic circuitry was exceeded and has therefore caused a trip
06	Overload range 1	the current in at least one phase has 100 % of the permissible value
07	Overload range 2	the current in at least one phase has reached 120 % of the permissible value
08	Loud prewarning	the current in at least one phase has exceeded 70 % of the permissible value
09	Unbalance	an unsymmetrical phase current load exists
10	Parameter comparison	the parameters in DMI (parameters used) and NZM (locally set parameters) differ
11	Trip	a trip has occurred (independent of the trip cause)
12	Alarm	an alarm state has occurred (independent of the alarm cause)
13	Motor prot.	the circuit-breaker (type -ME) detects an overload and asks the DMI to disconnect the motor. If the overload continues, the circuit-breaker will trip.
14	Bus access	the output is switched via the PROFIBUS-DP
15	Off	the output is permanently deactivated
16	On	if the output is permanently activated

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Assignment of the outputs with motor-starter functions

The following table indicates the possible assignment of outputs Q0 to Q3 with motor-starter functions and the corresponding value for the Octets 1 to 4 of the Object.

Table 38: Motor-starter function and its values

Value for output assignment (decimal)	Motor-starter function	Occupy outputs
17	Direct-on-line starter	Q0
18	Reversing starter	Q0, Q1
19	Star-delta starter	Q0, Q2, Q3
20	Reversing star-delta starter	Q0, Q1, Q2, Q3

→ Please note that the motor-starter function can only be parameterized in conjunction with the circuit-breaker type -ME which is intended for this purpose. If you do not observe this, you will receive a fault indication when writing to the object.

→ Please note that only the respective value may be parameterized on the stated outputs with the desired motor-starter function. All stated outputs are to be parameterized with the same intended value for the respective motor starter function. If you do not observe these conditions, you will receive a fault indication when writing to the object.

→ Information concerning the connection of motor contactors can be found in → section "Motor starter", Page 44.

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Assignment of the outputs with remote operator functions

The following table indicates the possible assignment of outputs Q4 to Q5 with remote-operator function and the corresponding value for the Octets 5 to 6 of the Object.

Table 39: Remote operator function and its value

Value for output assignment (decimal)	Function	Occupy outputs
21	Remote operator	Q4, Q5

→ Please note that only the respective value may be parameterized on the stated outputs with the desired remote operator function. All stated outputs are to be parameterized with the same intended value for the respective remote operator function. If you do not observe these conditions, you will receive a fault indication when writing to the object.

DMI standard display assignment object

This object contains the current standard display assignment of the DMI.

This object can be read and written (Read, Write). It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to obtain information concerning the current standard display assignment of the DMI or to transfer a new standard assignment to the DMI.

The standard display of the DMI appears automatically in the LCD display if the buttons on the DMI have remained in a non-actuated state for 30 seconds or longer. It is comprised of six lines where the first four lines are visible on the display. You can access the other two lines with the íú cursor keys.

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Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 22.

The length of the data to be read or written is 6 Octets. Please ensure that no other lengths are entered when the Write service is called or shorter lengths are read when the Read service is called, as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_Standard_Display	ARRAY [1..6] OF BYTE or ARRAY [1..6] OF USINT

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 40: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning → table 41
DMI_Standard_Display[1]	Octet 1	Assignment line 1
DMI_Standard_Display[2]	Octet 2	Assignment line 2
DMI_Standard_Display[3]	Octet 3	Assignment line 3
DMI_Standard_Display[4]	Octet 4	Assignment line 4
DMI_Standard_Display[5]	Octet 5	Assignment line 5
DMI_Standard_Display[6]	Octet 6	Assignment line 6

The following table indicates the possible assignment of lines 1 to 6 as the standard display of the DMI and the corresponding value for the Octets 1 to 6 of the Object.

Table 41: Display content and their values

Value for standard display assignment (decimal)	Meaning, displayed in the selected line:
00	No display
01	Parameter used: I_r
02	Parameter used: I_i
03	Parameter used: I_{sd}
04	Parameter used: I_{dn}
05	Parameter used: T_r
06	Parameter used: T_{sd}
07	Parameter used: T_{vdn}
08	Parameter used: I^2t
09	Current value: I_{1rms}
10	Current value: I_{2rms}
11	Current value: I_{3rms}

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Value for standard display assignment (decimal)	Meaning, displayed in the selected line:
12	Current value: I_{nrms}
13	Current value: I_{dnrms}
14	Selected motor-starter function
15	Motor state
16	Current state of the inputs I0 to I5
17	Current state of the outputs Q0 to Q5
18	Time
19	Date

Display of used parameters

The display of the parameters for currents which are used depends on the form of representation selected in the DMI, and is either an absolute value in Amps or relative to I_r or I_n. The representation form can be selected via the PROFIBUS-DP with the aid of the DMI object basic settings. In the default state, the relative representation option is preselected. The display of the used time parameters is always absolute.

→ Please note that you can only display used parameters and currents which the connected circuit-breaker actually provides. If you select a parameter or current which is not available, the selected line is not displayed.

→ Please note that the "No display" selection for a selected line also has the effect that all following lines are not represented on the DMI.

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Display of actual current values

The display of values for currents which are used depends on the form of representation selected in the DMI, and is either an absolute value in Amps or relative to I_r. The representation form can be selected via the PROFIBUS-DP with the aid of the DMI object basic settings. In the default state, the relative representation option is preselected.

→ Please note that you can only display values for currents which the connected circuit-breaker actually provides. If you select a non-available value of current for the display, the selected line is not displayed.

Display of selected motor-starter function and the motor state

→ Please note that only the value "OFF" will appear on the display for both selection possibilities with a non-parameterized motor-starter function.

Display of the current state of the inputs/outputs

The current state of the inputs or outputs is represented as 0/I, where 0 represents "OFF" and I represents "ON". The representation is made from left to right for I0 to I5 or Q0 to Q5.

DMI basic settings object

This object contains the current basic setting assignment of the DMI.

This object can be read and written (Read, Write). It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to get information about the current basic setting of the DMI relating to

- Password,
- Menu language,
- Representation form,

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- NZM serial number,
- Acknowledgement input

or to use this object in order to assign new DMI basic settings relating to

- Password,
- Menu language,
- Representation form,
- NZM serial number,
- Acknowledgement input.



Writing to the object has an immediate effect where the current basic settings are replaced by the new basic settings. Please proceed carefully with the selection of the settings and when calling the Write service for this object.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 23.

The length of the data to be read or written is 9 Octets. Please ensure that no other lengths are entered when the Write service is called or shorter lengths are read when the Read service is called, as otherwise you will receive a fault indication.

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Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_basic_setting	STRUCT
Password	WORD or UINT
Language_selected	WORD or UINT
CB_serial_number	DWORD or UDINT
Options	ARRAY [1..8] OF BOOL BYTE

1) You can use the UINT and UDINT data types in place of the WORD and DWORD data types.

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 42: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
DMI_basic_setting.		
Password	Octet 1 and 2	Password for access to the input menu of the DMI → table 43
Language_selected	Octet 3 and 4	Language selection for the DMI menu → table 44
CB_serial_number	Octet 5 to 8	Serial number of the connected circuit-breaker
	Octet 9[1)]	
Options[1]	Bit 0	Absolute value representation

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Variable access (example)	Data position	Meaning
Options[2]	Bit 1	Acknowledgement input I0
Options[3]	Bit 2	Stop mode with new NZM serial number
	Bit 3 to Bit 7	Not used

1) In Octet 9 an option is selected when the respective bit is set.



When accessing the "Serial number of the connected circuit-breaker", password and language selection data content, please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.

The following tables display the possible passwords for access to the input menu of the DMI and corresponding values in Octets 1 and 2 of the object.

Table 43: Passwords and their values

Value (decimal)	Meaning: Password has the value
0	No password
1	1
2	2
3	3
up to 9999	up to 9999

The following tables display the possible languages for the DMI menu and corresponding values in Octets 3 and 4 of the object.

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Table 44: Menu languages and their values

Value (decimal)	Meaning: Selected language is
0	Deutsch
1	English
2	French
3	Italian
4	Spanish

DMI clock object

This object contains the current time and current date of the DMI.

This object can be read and written (Read, Write). It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to obtain information concerning the current date and time of the DMI or to transfer a new time and/or date to the DMI.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 24.

The length of the data to be read or written is 8 Octets. Please ensure that no other lengths are entered when the Write service is called or shorter lengths are read when the Read service is called, as otherwise you will receive a fault indication.

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Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_clock	DATE_AND_TIME

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 45: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
DMI_clock	Octet 1 to 8	Time and date of the DMI → table 46

The following table indicates the BCD coding of the "Time and date of the DMI" data content.

Table 46: Format of the time and date data content

Data position	Meaning	Explanation
Octet 1		
Bit 4 to 7	Year, 10 position digit	Value 90 conforms to 1990 Value 99 conforms to 1999 Value 00 conforms to 2000 Value 89 conforms to 2089
Bit 0 to 3	Year, 1 position digit	
Octet 2		
Bit 4 to 7	Month, 10 position digit	–
Bit 0 to 3	Month, 1 position digit	

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Data position	Meaning	Explanation
Octet 3		
Bit 4 to Bit 7	Day, 10 position digit	–
Bit 0 to Bit 3	Day, 1 position digit	
Octet 4		
Bit 4 to Bit 7	Hour, 10 position digit	–
Bit 0 to Bit 3	Hour, 1 position digit	
Octet 5		
Bit 4 to Bit 7	Minute, 10 position digit	–
Bit 0 to Bit 3	Minute, 1 position digit	
Octet 6		
Bit 4 to Bit 7	Second, 10 position digit	–
Bit 0 to Bit 3	Second, 1 position digit	
Octet 7		
Bit 4 to Bit 7	Millisecond, 100 position digit	–
Bit 0 to Bit 3	Millisecond, 10 position digit	
Octet 8		
Bit 4 to Bit 7	Millisecond, 1 position digit	–
Bit 0 to Bit 3	Day of the week	Value 0 complies with not used Value 1 corresponds to Sunday Value 2 corresponds to Monday Value 7 corresponds to Saturday

→ The clock in the DMI does not use milliseconds and weekday internally. For this reason the respective data fields are assigned with "0" when reading the object. When writing the object, the values in the these data fields are ignored.

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DMI inputs object

This object contains the current states of the inputs I0 to I5 of the DMI.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to obtain information concerning the state of the inputs of the DMI.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 25.

The length of the data to be read is 1 Octet. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_inputs	ARRAY [1..8] OF BOOL or BYTE

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 47: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
	Octet 1	
DMI_Inputs[1]	Bit 0	State I0
DMI_Inputs[2]	Bit 1	State I1
DMI_Inputs[3]	Bit 2	State I2
DMI_Inputs[4]	Bit 3	State I3
DMI_Inputs[5]	Bit 4	State I4
DMI_Inputs[6]	Bit 5	State I5
	Bit 6 and Bit 7	Not used

→ A set bit corresponds to the "ON" state and a bit which is not set corresponds to the "OFF" state.

→ With a parameterized motor-starter function, inputs I1 and I3 indicate the current state of the motor control (→ section "Format of the data inputs", Page 86.

DMI outputs object

This object contains the current states of the outputs Q0 to Q5 of the DMI.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to obtain information concerning the state of the outputs of the DMI.

→ You can read the state of all outputs of the DMI with this object, regardless of if they have been parameterized for "bus access".

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Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 26.

The length of the data to be read is 1 Octet. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_outputs	ARRAY [1..8] OF BOOL or BYTE

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 48: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
	Octet 1	
DMI_outputs[1]	Bit 0	State Q0
DMI_outputs[2]	Bit 1	State Q1
DMI_outputs[3]	Bit 2	State Q2

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Variable access (example)	Data position	Meaning
DMI_outputs[4]	Bit 3	State Q3
DMI_outputs[5]	Bit 4	State Q4
DMI_outputs[6]	Bit 5	State Q5
	Bit 6 and Bit 7	Not used

→ A set bit corresponds to the "ON" state and a bit which is not set corresponds to the "OFF" state.

DMI bus outputs object

This object enables control of the state of the outputs of the DMI.

This object is a write only object. It can only be accessed by a class 2 DPV1 master.

Intended usage

Use this object in order to control the state of the outputs of the DMI.

→ You can only set the state of outputs of the DMI with this object, if they have been parameterized for the "bus access" switching signal. Control signals for outputs, whose switching signal has not been parameterized for "bus access" will be ignored.

You can only access this object if no class 1 DP master cyclically transfers data with the NZM-XDMI-DPV1 module.

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Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 27.

The length of the data to be written is 1 Octet. Please ensure that you do not enter other lengths when calling the Write service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_Bus_outputs	ARRAY [1..8] OF BOOL or BYTE

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 49: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
	Octet 1	
DMI_Bus_outputs[1]	Bit 0	New state Q0 (only if switching signal has been parameterized for bus access and there is no cyclic data transfer)
DMI_Bus_outputs[2]	Bit 1	New state Q1 (only if switching signal has been parameterized for bus access and there is no cyclic data transfer)
DMI_Bus_outputs[3]	Bit 2	New state Q2 (only if switching signal has been parameterized for bus access and there is no cyclic data transfer)
DMI_Bus_outputs[4]	Bit 3	New state Q3 (only if switching signal has been parameterized for bus access and there is no cyclic data transfer)
DMI_Bus_outputs[5]	Bit 4	New state Q4 (only if switching signal has been parameterized for bus access and there is no cyclic data transfer)
DMI_Bus_outputs[6]	Bit 5	New state Q5 (only if switching signal has been parameterized for bus access and there is no cyclic data transfer)
	Bit 6 and Bit 7	Not used

→ A set bit corresponds to the "ON" state and a bit which is not set corresponds to the "OFF" state.

DMI device identification object
This object contains the device identification of the connected DMI (ASCII string).

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

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Intended usage

Use this object in order to obtain information concerning device identification relating to the firmware version.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 28.

The length of the data to be read is 12 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
DMI_SW_Version	ARRAY [1..12] OF CHAR or STRING [12]

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 50: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
DMI_SW_Version	Octet 1 to 12	Firmware version of the DMI

The data content is coded as an ASCII string.

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NZM-XDMI-DPV1 device identification object

This object contains the device identification of the NZM-XDMI-DPV1 (ASCII string).

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object in order to obtain information concerning device identification relating to the Firmware version of the NZM-XDMI-DPV1.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 29.

The length of the data to be read is 8 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
NZM_XDMI_DPV1_SW_Version	ARRAY [1..8] OF CHAR or STRING [8]

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 51: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
NZM_XDMI_DPV1_SW_Version	Octet 1 to 8	Firmware version of the NZM-XDMI-DPV1

The data content is coded as an ASCII string.

Circuit-breaker/DMI statistic values object

This object contains statistical values from the circuit-breaker and DMI.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object to obtain information about the

- Hours of operation of the circuit-breaker,
- Hours of operation of the DMI,
- Number of trips of the circuit-breaker.

Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 30.

The length of the data to be read is 10 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

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Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
LS_DMI_Statistics	STRUCT
LS_Operating_hours	DWORD or UDINT
DMI_Operating_Hours	DWORD or UDINT
LS_Number_Trip	WORD or UINT

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 52: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
LS_DMI_Statistics.		
LS_Operating_hours	Octet 1 to 4	Number of operating hours of the connected circuit-breaker
DMI_Operating_Hours	Octet 5 to 8	Number of the hours of operation of the DMI
LS_Number_Trip	Octet 9 and 10	Number of trips of the connected circuit-breaker

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When accessing the "LS_Operating_hours", "DMI_Operating_Hours" and "LS_Number_Trip", please note the Motorola coding format (Octet N: High-Byte, Octet N+1: Low-Byte) used in PROFIBUS-DP. If the data processing format in your DP master system deviates from this standard, and the DP access commands do not automatically include a conversion, it will be necessary to implement and perform the conversion in your application program. Please refer to the documentation of your DP master system.



The "Number of operating hours of the connected circuit-breaker" and the "Number of trips of the connected circuit-breaker " are reset to 0 when the circuit-breaker is disconnected from the DMI.

Object compilation A

This object contain a ready-made compilation of the data content of the following individual objects:

- Circuit-breaker/DMI communication status,
- DMI inputs,
- DMI outputs,
- Circuit-breaker currents,
- DMI clock,
- Circuit-breaker status.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object if you want to obtain information about the data content of the contained objects with a read operation.



Note all the information contained in the descriptions of the individual objects which are included.

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Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 50.

The length of the data to be read is 31 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
Object_A	STRUCT
LS_DMI_Com_Status	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
DMI_Input_outputs	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
LS_Currents	ARRAY [1..6] OF WORD or ARRAY [1..6] OF UINT
DMI_clock	DATE_AND_TIME
LS_Status	ARRAY [1..56] OF BOOL or ARRAY [1..7] OF BYTE

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

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Table 53: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
Object_A.	Octet 1	
LS_DMI_Com_Status[1]	Bit 0	Circuit-breaker with new serial number recognized and stop mode active
LS_DMI_Com_Status[2]	Bit 1	Parameters differ in the DMI and circuit-breaker
	Bit 2 to Bit 4	Not used
LS_DMI_Com_Status[6]	Bit 5	After initialization of the interface until a CB-identity (circuit breaker identity) or PC identity have been recognized when a connection is being established.
LS_DMI_Com_Status[7]	Bit 6	After initialization of the interface until an identity block has been correctly received when a connection is being established
LS_DMI_Com_Status[8]	Bit 7	After initialization of the interface until the first transfer command has been correctly received when a connection is being established
	Octet 2	
	Bit 0 to Bit 7	Not used
	Octet 3	
DMI_Input_outputs[1]	Bit 0	State I0
DMI_Input_outputs[2]	Bit 1	State I1
DMI_Input_outputs[3]	Bit 2	State I2
DMI_Input_outputs[4]	Bit 3	State I3
DMI_Input_outputs[5]	Bit 4	State I4
DMI_Input_outputs[6]	Bit 5	State I5
	Bit 6 and Bit 7	Not used

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Variable access (example)	Data position	Meaning
	Octet 4	
DMI_Input_outputs[9]	Bit 0	State Q0
DMI_Input_outputs[10]	Bit 1	State Q1
DMI_Input_outputs[11]	Bit 2	State Q2
DMI_Input_outputs[12]	Bit 3	State Q3
DMI_Input_outputs[13]	Bit 4	State Q4
DMI_Input_outputs[14]	Bit 5	State Q5
	Bit 6 and Bit 7	Not used
LS_currents[1]	Octet 5 and 6	Root mean square current phase 1
LS_currents[2]	Octet 7 and 8	Root mean square current phase 2
LS_currents[3]	Octet 9 and 10	Root mean square current phase 3
LS_currents[4]	Octet 11 and 12	Root mean square current N-pole
LS_currents[5]	Octet 13 and 14	Maximum phase current
LS_currents[6]	Octet 15 and 16	Fault current
DMI_clock	Octet 17 to 24	Time and date of the DMI → table 46
	Octet 25	Trip conditions
LS_Status[1]	Bit 0	Trip I_i: short-circuit
LS_Status[2]	Bit 1	Trip I^2t (when I^2t option selected): Overload variable short-time delay Trip I_{mv} (when I^2t option not selected): Overload constant short-time delayed
LS_Status[3]	Bit 2	Trip I_r: Overload variable long-time delayed
LS_Status[4]	Bit 3	Trip I_{dn}: Fault current, constant short-time delayed
LS_Status[5]	Bit 4	Trip Select: time limit with H-selectivity exceeded (not yet supported)

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Variable access (example)	Data position	Meaning
LS_Status[6]	Bit 5	Trip Com: trip has been initiated via PROFIBUS-DP
LS_Status[7]	Bit 6	Trip Temp: trip due to device overtemperature (NZM)
LS_Status[8]	Bit 7	Not used
	Octet 26[1)]	Alarm conditions
LS_Status[9]	Bit 0	Load rejection prewarning
LS_Status[10]	Bit 1	Overload range 1
LS_Status[11]	Bit 2	Overload range 2
LS_Status[12]	Bit 3	Motor protection (only significant with -ME types, otherwise constant "1"): the circuit-breaker has detected an overload case and demands that the DMI switch off the motor. If the overload continues, the circuit-breaker will trip.
LS_Status[13]	Bit 4	Unbalance
	Bit 5	Not used
LS_Status[15]	Bit 6	External power supply of the NZM (via DMI or PC)
LS_Status[16]	Bit 7	Supply voltage in order
	Octet 27[1)]	Status of the phases L1 and L2
LS_Status[17]	Bit 0	Phase L1: Normal range
LS_Status[18]	Bit 1	Phase L1: Load rejection prewarning
LS_Status[19]	Bit 2	Phase L1: Overload range 1
LS_Status[20]	Bit 3	Phase L1: Overload range 2
LS_Status[21]	Bit 4	Phase L2: Normal range
LS_Status[22]	Bit 5	Phase L2: Load rejection prewarning
LS_Status[23]	Bit 6	Phase L2: Overload range 1
LS_Status[24]	Bit 7	Phase L2: Overload range 2

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Variable access (example)	Data position	Meaning
	Octet 28[1)]	Status of the phases L3 and neutral pole
LS_Status[25]	Bit 0	Phase L3: Normal range
LS_Status[26]	Bit 1	Phase L3: Load rejection prewarning
LS_Status[27]	Bit 2	Phase L3: Overload range 1
LS_Status[28]	Bit 3	Phase L3: Overload range 2
LS_Status[29]	Bit 4	N-pole: Normal range
LS_Status[30]	Bit 5	N-pole: Load rejection prewarning
LS_Status[31]	Bit 6	N-pole: Overload range 1
LS_Status[32]	Bit 7	N-pole: Overload range 2
	Octet 29[1)]	Tripping phase
LS_Status[33]	Bit 0	Trip via L1
LS_Status[34]	Bit 1	Trip via L2
LS_Status[35]	Bit 2	Trip via L3
LS_Status[36]	Bit 3	Trip via N-pole
LS_Status[37]	Bit 4	Circuit-breaker is in the "ON" state
LS_Status[38]	Bit 5	Circuit-breaker is in the "OFF" state
LS_Status[39]	Bit 6	Circuit-breaker is in the "Tripped" state
LS_Status[40]	Bit 7	Normal operation of the circuit-breaker (communication in order)
	Octet 30[1)]	Phase issuing alarm
	Bit 0 to Bit 3	Not used
LS_Status[45]	Bit 4	Alarm from L1
LS_Status[46]	Bit 5	Alarm from L2
LS_Status[47]	Bit 6	Alarm from L3
LS_Status[48]	Bit 7	Alarm from N-pole

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Variable access (example)	Data position	Meaning
	Octet 31[1)]	Fault states
LS_Status[49]	Bit 0	NZM fault: A/D convertor
LS_Status[50]	Bit 1	NZM fault: Signal processing
LS_Status[51]	Bit 2	NZM fault: Convertor block
LS_Status[52]	Bit 3	NZM fault: EEPROM
LS_Status[53]	Bit 4	NZM plug in module 1 fault
LS_Status[54]	Bit 5	NZM plug in module 2 fault
LS_Status[55]	Bit 6	NZM plug in module 3 fault
LS_Status[56]	Bit 7	NZM plug in module 4 fault

1) The meaning is relevant when the respective Bit is set.

Object compilation B

This object contain a ready-made compilation of the data content of the following objects:

- Parameters used by circuit-breaker,
- Circuit-breaker locally set parameters.

This object is a read only object. It can be accessed by class 1 and/or a class 2 DPV1 master.

Intended usage

Use this object if you want to obtain information about the data content of the contained objects with a read operation.

Note all the information contained in the descriptions of the individual objects which are included.

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Addressing and length of the object

Please use the following information for addressing of the object:

- API is equal to 0 (only required for class 2 DPV1 master),
- Slot number is equal to 0,
- The index is equal to 51.

The length of the data to be read is 19 Octets. Please ensure that you do not enter smaller lengths when calling the Read service as otherwise you will receive a fault indication.

Variable definitions (example) for the object

According to IEC 61131-3, you define the following variable (data module):

Name	Data type
Object_B	STRUCT
Options_used	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
I_r_used	BYTE or USINT
I_i_used	
T_r_used	
I_{sd}_used	
T_{sd}_used	
I_{dn}_used	
T_{vdn}_used	
Reserved	

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Name	Data type
Options_local	ARRAY [1..16] OF BOOL or ARRAY [1..2] OF BYTE
I_r_local	BYTE or USINT
I_i_local	
T_r_local	
I_{sd}_local	
T_{sd}_local	
I_{dn}_local	
T_{vdn}_local	

Format and meaning of the object data content

The following table displays the address location and the meaning of the data content of the object. Furthermore, it provides an example of how the data content can be accessed by the application with the aid of the example variable.

Table 54: Address location and meaning of the object data content

Variable access (example)	Data position	Meaning
Object_B.	Octet 1	
Options_used[1]	Bit 0	Parameter used: I^2t → table 26
	Bit 1 to Bit 7	Not used
	Octet 2	
	Bit 0 to Bit 7	Not used

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Variable access (example)	Data position	Meaning
I_r_used	Octet 3	Parameters used:I_r → table 22
I_i_used	Octet 4	Parameters used: I_i → table 23
T_r_used	Octet 5	Parameters used: T_r → table 25
I_{sd}_used	Octet 6	Parameters used: I_{sd} → table 24
T_{sd}_used	Octet 7	Parameters used: T_{sd} → table 25
I_{dn}_used	Octet 8	Parameters used: I_{dn} → table 22
T_{vdn}_used	Octet 9	Parameters used: T_{vdn} → table 25
	Octet 10	Not used
	Octet 11	
Options_local[1]	Bit 0	Local parameters: I^2t → table 26
	Bit 1 to Bit 7	Not used
	Octet 12	
	Bit 0 to Bit 7	Not used
I_r_local	Octet 13	Local parameters: I_r → table 22
I_i_local	Octet 14	Local parameters: I_i → table 23
T_r_local	Octet 15	Local parameters: T_r → table 25
I_{sd}_local	Octet 16	Local parameters: I_{sd} → table 24

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Variable access (example)	Data position	Meaning
T_{sd}_local	Octet 17	Local parameters: T_{sd} → table 25
I_{dn}_local	Octet 18	Local parameters: I_{dn} → table 22
T_{vdn}_local	Octet 19	Local parameters: T_{vdn} → table 25

→ The Table 22 to Table 26 can be found in Section "Circuit-breaker diagnosis data records object 1 to 10", Page 118.

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DPV1 error messages

The NZM-XDMI-DPV1 generates the DPV1 error messages contained in the following table.

Table 55: DPV1 error messages

Error message	Meaning	Clarification/Hint
Access denied (Code B6 hexadecimal)	The accessed object is inhibited for the type of the DP master	You have accessed an object with a class 1 DP master which can only be accessed by a class 2 DPV1 master. Please note the object description.
	The accessed object is inhibited for the selected service	You have either attempted to access an object with a Write service which is read-only, or have attempted to access an object with a Read service which is write-only. Please note the object description.
Feature not supported (Code A9 hexadecimal)	During writing of the "DMI output assignment" you have selected a parameterization for the motor-starter function even though the connected circuit-breaker does not support it	Please note the object description.
	You have issued a command when writing the "circuit-breaker/DMI commands" object which requires a remote operator or motor-starter function, even though this is not parameterized	Please note the object description.
Invalid index (Code B0 hexadecimal)	The index defined in the Read or Write service is invalid for the NZM-XDMI-DPV1	Use the Index defined in the object description

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Error message	Meaning	Clarification/Hint
Invalid parameter (Code B8 hexadecimal)	The data length used with the Read service is smaller than the data length of the accessed object	Use the data length defined in the object description
	The parameters used with connection set-up of the class 2 DPV1 master do not correspond with those of the NZM-XDMI-DPV1	The Features Supported parameter must be set to "1" and the Ident Number profile to "0" on the class 2 DPV1 master with connection set-up.
	You have selected an inconsistent parameterization for the motor starter or remote operator function when writing the "DMI output assignment " object	Please note the object description
Invalid range (Code B7 hexadecimal)	An invalid value has been used for the data content with a Write service	Please observe the value range of the data content as described in the object description
Invalid slot (Code B2 hexadecimal)	The slot defined in the Read or Write service is invalid for the NZM-XDMI-DPV1	Use the slot defined in the object description
Resource unavailable (Code C3 hexadecimal)	The accessed object can currently not be contacted as either communication between NZM-XDMI-DPV1 and DMI or between the DMI and circuit-breaker has malfunctioned	Check the connection between the devices
	You have selected a record number when reading the "Circuit-breaker diagnostics record" for which there is currently no entry	Select a lower record number

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Error message	Meaning	Clarification/Hint
State conflict (Code B5 hexadecimal)	You have written with a class 2 master to a "DMI bus outputs" object even though a class 1 master is active	Please note the object description
Write length error (Code B1 hexadecimal)	The data lengths used with the Write service do not correspond with the data lengths of the polled object	Use the data length defined in the object description

What Happens If ...?

Event	Explanation	Remedy
POW LED not lit	No power supply	Connect and switch on power supply
POW LED flashing	Data transfer via EASY-LINK OK	
BUS LED not lit	No PROFIBUS-DP data communication	Connect and start PROFIBUS-DP
BUS LED lit	Data transfer via PROFIBUS-DP OK	
Slave not signalling	– No slave address set – No bus terminating resistor present – Cable, plug faulty – No power supply	– Set slave address – Set bus terminating resistors – Check connection – Provide power supply to device

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Technical Data

General

Standards and regulations	EN 55011, EN 55022, IEC/EN 61-4, IEC 60068-2-27, IEC 61158
Dimensions (W × H × D)	35.5 × 90 × 56.5
Weight	150 g
Mounting	Top-hat rail to IEC/EN 60715, 35 mm Screw fixing with fixing brackets ZB4-101-GF1 (accessories)

Ambient temperatures

Ambient temperature Installed horizontally/vertically	Cold to IEC 60068-2-1 Heat to IEC 60068-2-2	–25 to 55 °C
Condensation		Prevent condensation with suitable measures
Storage/transport temperature		–40 to +70 °C
Relative air humidity	IEC 60068-2-30	5 to 95 %, non-condensing
Air pressure (operation)		795 to 1080 hPa
Corrosion resistance	IEC 60068-2-42 IEC 60068-2-43	SO_2 10 cm^3/m^3, 4 days H_2S 1 cm^3/m^3, 4 days

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Ambient mechanical conditions

Pollution degree		2
Degree of protection	EN 50178 IEC 60529 VBG4	IP20
Oscillations	IEC 60068-2-6	10 to 57 Hz (constant amplitude 0.15 mm) 57 to 150 Hz (constant acceleration 2 g)
Shocks	IEC 60068-2-27	18 shocks (semi-sinusoidal 15 g/11 ms)
Drop	IEC 60068-2-31	Drop height 50 mm
Free fall, packaged	IEC 60068-2-32	1 m

Electromagnetic compatibility (EMC)

Electrostatic discharge	IEC/EN 61000-4-2, degree of severity 3	8 kV air discharge, 6 kV contact discharge
Electromagnetic fields	IEC/EN 61000-4-3	Field strength 10 V/m
Radio interference suppression	EN 55011, EN 55022	Limit class A
Burst	IEC/EN 61000-4-4, degree of severity 3	2 kV supply lines, 1 kV signal lines
High-energy pulses (surge)		
DMI	IEC/EN 61000-4-5, degree of severity 2	0.5 kV power cable symmetrical
Line-conducted interference	IEC/EN 61000-4-6	10 V

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Dielectric strength

Measurement of the air clearance and creepage distance	EN 50178, UL 508, CSC C22.2 No 142
Dielectric strength	EN 50178

Tools and cable cross-sections

Solid	
min.	0.2 mm^2 , AWG 22
max.	4 mm^2, AWG 12
Flexible with ferrule	
min.	0.2 mm^2, AWG 22
max.	2.5 mm^2, AWG 12
Slot-head screwdriver, width	3.5 × 0.8 mm
Tightening torque max.	0.5 Nm

Power supply

Rated voltage	
Rated value	24 V DC, –15 %, +20 %
Permissible range	20.4 to 28.8 V DC
Residual ripple	< 5 %
Input current at 24 V DC	Normally 200 mA
Voltage dips (IEC/EN 61131-2)	10 ms
Power dissipation at 24 V DC	Normally 4.8 W

Status LEDs

Power LED (POW)	green
PROFIBUS-DP LED (BUS)	green

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PROFIBUS-DP

Device connection	SUB-D 9-pole, socket
Electrical isolation	Bus to power supply (simple) Bus and power supply to DMI
Function	PROFIBUS-DP slave
Interface	RS 485
Bus protocol	PROFIBUS-DP
Baud rates	Automatic search up to 12 MBd
Bus terminating resistors	Connectable via plug
Bus addresses	1 to 126 addressable via DMI

Dimensions

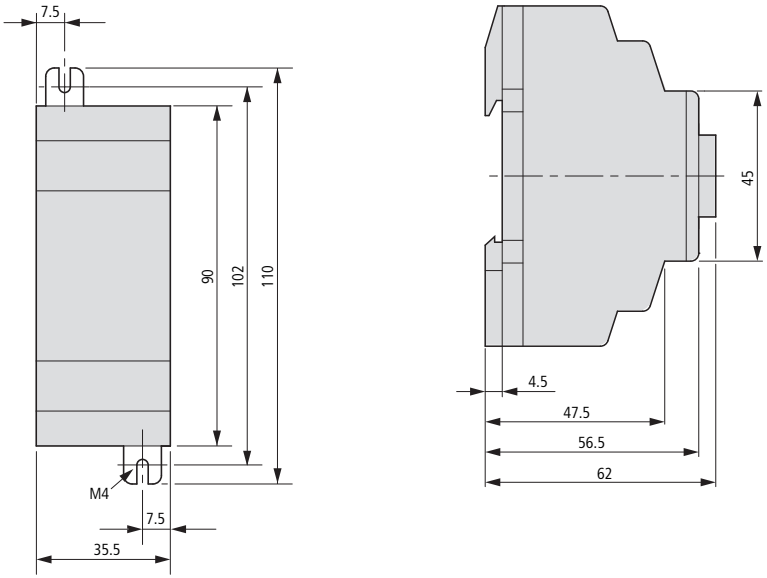


Figure 20: Dimensions NZM-XDMI-DPV1

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