

Product Description

Nexto Series is a powerful and complete Programmable Logic Controller (PLC) with unique and innovative features. Due to its flexibility, smart design, enhanced diagnostics capabilities and modular architecture, Nexto is suitable for control systems ranging from medium to high-end large applications. Finally, its compact size, high density of points per module and superior performance, allow Nexto Series to be applied in small automation systems with high performance requirements, such as manufacturing applications and industrial machines.

The Series has a wide variety of CPUs, I/O and communication modules with features to fit requirements in different kinds of applications. The options available cover from standard automation systems, high-availability applications where redundancy is a major requirement, distributed applications to functional safety systems.

The NX2001 is a 24 Vdc transistor output module. NX2001 offers 16 protected source type outputs for general purpose use and uses only one slot of the Nexto Series Backplane Rack. Finally, Nexto Series has some innovative features for diagnosis and maintenance, such as Electronic Tag on Display, Easy Plug System and One Touch Diag.



Its main features are:

- High density, with 16 outputs in single width module
- Two isolated output groups
- Diagnostics and short-circuit protection for outputs
- Protection against external power supply polarity inversion
- External power supply low voltage diagnostic
- Display for module diagnostics and output state indication
- Easy Plug System
- One Touch Diag
- Electronic Tag on Display

Ordering Information

Included Items

The product package contains the following items:

- NX2001 module
- 20-terminals connector with wire holder
- Installation guide

Product Code

The following code should be used to purchase the product:

| Code | Description |
|--------|--------------------------------|
| NX2001 | 24 Vdc 16 DO Transistor Module |

Related Products

The following product must be purchased separately when necessary:

| Code | Description |
|--------|--|
| NX9403 | 20-terminal connector with cable guide |

Innovative Features

Nexto Series brings to the user several innovations in utilization, supervision and system maintenance. These features were developed focusing a new experience in industrial automation. The list below shows some new features that the user will find in NX2001 module:



Easy Plug System: Nexto Series has an exclusive method to plug and unplug I/O connectors. The entire connector can be easily removed with a single movement and with no special tools or huge effort. In order to plug the connector back to the module, close the frontal cover and the connector will be fit, ready to be used.



One Touch Diag: One Touch Diag is an exclusive feature that Nexto Series brings to PLCs. With this new concept, the user can check diagnostic information of any module present in the system directly on CPU's graphic display with one single press in the diagnostic switch of the respective module. OTD is a powerful diagnostic tool that can be used offline (without supervisor or programmer), reducing maintenance and commissioning times.

ETD – Electronic Tag on Display: Another exclusive feature that Nexto Series brings to PLCs is the Electronic Tag on Display. This new functionality makes the process of checking the tag names of any I/O terminal or module used in the system directly on the CPU's graphic display. Along with this information, the user can check the description, as well. This feature is extremely useful during maintenance and troubleshooting procedures.



iF Product Design Award 2012: Nexto Series was the winner of iF Product Design Award 2012 in industry + skilled trades group. This award is recognized internationally as a seal of quality and excellence, considered the Oscars of the design in Europe.

Product Features

General Features

| | NX2001 |
|--|--|
| Backplane rack occupation | 1 slot |
| Output type | Isolated transistor source type output |
| Number of outputs | 16 |
| Maximum output current | 1 A @ 30 Vdc per output 4 A @ 30 Vdc per group |
| Leakage current | 30 µA |
| On state resistance | 0.25 Ω |
| External power supply | 19.2 to 30 Vdc |
| Switching time | 100 us - off-to-on transition 400 us - on-to-off transition |
| Maximum switching frequency | 500 Hz |
| Output update time | 1 ms |
| Configurable parameters | Yes, output behavior with CPU in STOP mode |
| Output state indication | Yes |
| One Touch Diag (OTD) | Yes |
| Electronic Tag on Display (ETD) | Yes |
| Status and diagnostic indication | Display, web pages and CPU's internal memory |
| Hot swap capability | Yes |
| Module protections | Yes, power supply polarity inversion protection, protection against surge voltages and short circuit |
| Isolation | |
| Outputs to logic | 500 Vac / 1 minute |
| Outputs to protective earth  | 1250 Vac / 1 minute |
| Logic to protective earth  | 1250 Vac / 1 minute |
| Output group to output group | 500 Vac / 1 minute |
| Current consumption from rack PSU | 140 mA |
| Maximum power dissipation | 3 W |
| IP level | IP 20 |
| Operating temperature | 0 to 60 °C |
| Storage temperature | -25 to 70°C |
| Operating and storage relative humidity | 5 to 96 %, non-condensing |
| Conformal coating | Yes |
| Standards | IEC 61131-2 CE, Electromagnetic Compatibility (EMC) and Low-Voltage Directive (LVD)   RoHS |
| Module dimensions (W x H x D) | 18.00 x 114.62 x 117.46 mm |
| Package dimensions (W x H x D) | 25,00 x 122,00 x 147,00 mm |
| Weight | 200 g |
| Weight with package | 250 g |

Notes:

Maximum output current: When required higher current value, it's possible to use more than one output connected on the same load. In this case the maximum current is the sum of individual currents where up to 4 outputs can be used together. For example: It's possible to drive a given load with 1.5 A using 2 outputs. All outputs used on a given load must be enabled/disabled at the same time.

External power supply: The terminals 9, 10, 19 and 20 are used to supply voltage only to the outputs. NX2001 is supplied by the Power Supply Module placed on the Nexto Backplane Rack.

ATTENTION:
If the external power supply is below the 19.2 V limit, the outputs go to a safe state. However, since the display only shows the outputs' logical state, its indication may not match the physical state of outputs.

Switching time: It's the required time to turn off one specific output, but it depends on the output load. A lower resistance load results in a shorter time to disable the output. The given time refers to the maximum time to disable an output connected to a 12.5 kΩ resistive load, which is the maximum allowable resistance defined by IEC 61131 for digital input modules.

Conformal coating: Conformal coating protects the electronic components inside the product from moisture, dust and other harsh elements to electronic circuits.

Installation

Electrical Installation

The figure below shows an example where each NX2001's output is connected to a different load. The outputs 00 to 07 are supplied by one power supply and the outputs 10 to 17 are supplied by a different one.

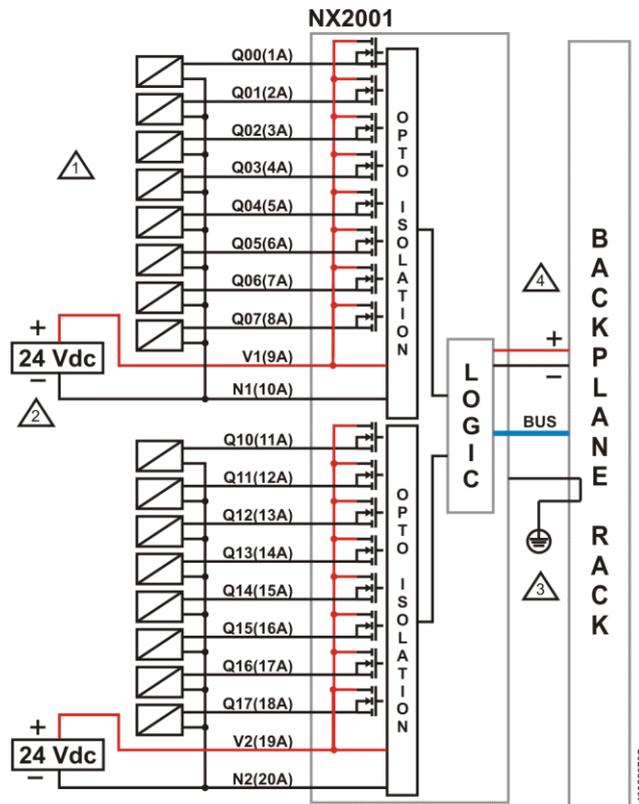


Diagram Notes:

- 1 – Typical usage of source digital outputs.
- 2 – External power supply to supply the outputs, V1 is connected to +24 Vdc and N1 is connected to 0 Vdc.
- 3 – The module is grounded through the Nexto Series backplane rack.
- 4 – The module power supply is derived from the connection to the backplane rack, not requiring external connections.

Connector Pinout

The following table shows the description of each connector terminal.

| Terminal Number | Description |
|-----------------|-----------------------------------|
| 1 | Output 00 |
| 2 | Output 01 |
| 3 | Output 02 |
| 4 | Output 03 |
| 5 | Output 04 |
| 6 | Output 05 |
| 7 | Output 06 |
| 8 | Output 07 |
| 9 | (V1) +24 Vdc for outputs 00 to 07 |
| 10 | (N1) 0 Vdc for outputs 00 to 07 |
| 11 | Output 10 |
| 12 | Output 11 |
| 13 | Output 12 |
| 14 | Output 13 |
| 15 | Output 14 |
| 16 | Output 15 |
| 17 | Output 16 |
| 18 | Output 17 |
| 19 | (V2) +24 Vdc for outputs 10 to 17 |
| 20 | (N2) 0 Vdc for outputs 10 to 17 |

Suppressor Circuit

For further information about suppressor circuit, consult Nexto Series User Manual - MU214600.

ATTENTION:

Atmospheric discharges (thunders) may cause damages to the modules although its protections. Additional protections should be used if the module's power comes from a power supply located outside the cabinet where the module is installed because it could be vulnerable to this kind of discharges. If the field wiring of the output points is susceptible to this kind of discharge, surge suppressors should be used.

Mechanical and Electrical Assembly

The mechanical and electrical mounting and the connector insertion and removing for single hardware width I/O modules are described at Nexto Series User Manual – MU214600.

Compatibility with Other Products

The following table provides information regarding the compatibility of the module NX2001 and Nexto Series programming tool MasterTool IEC XE.

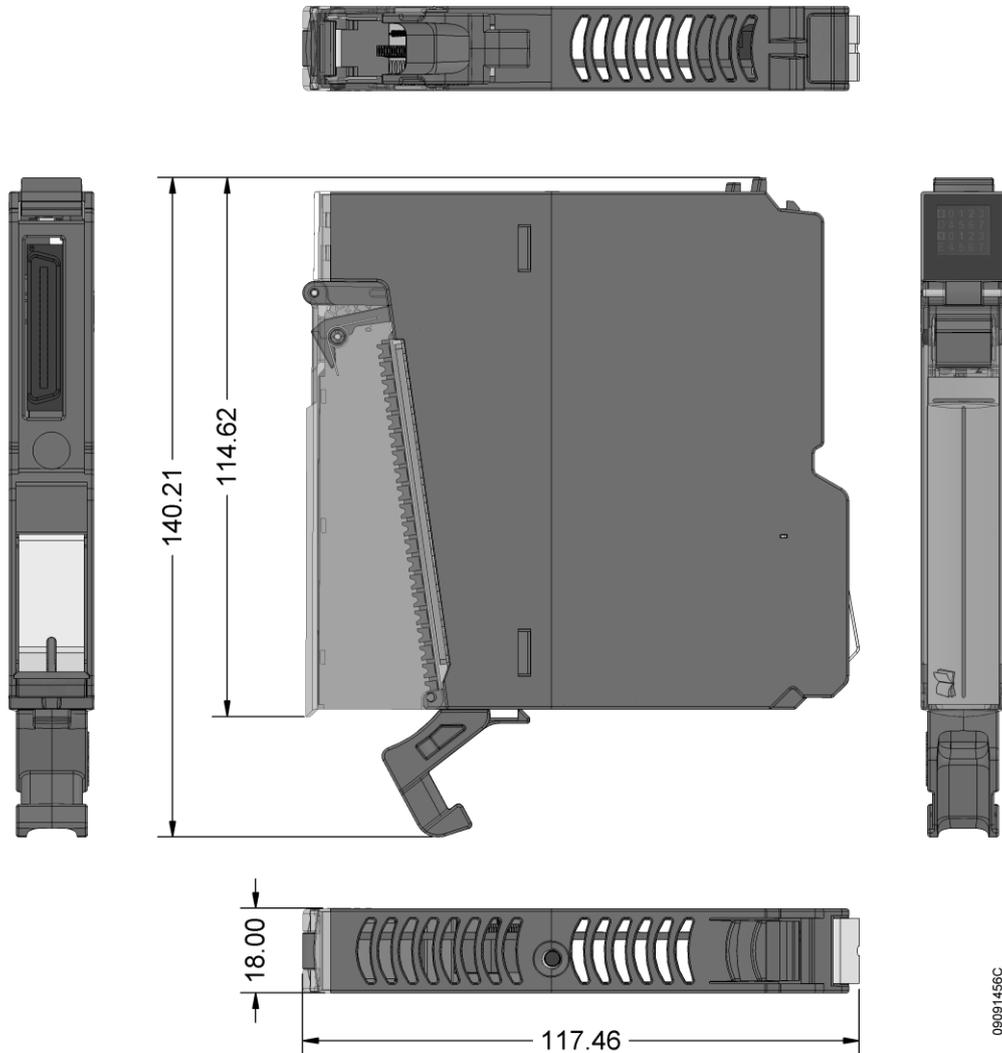
| NX2001 | | Software Version Compatible |
|-------------------|--------------|-----------------------------|
| Version | Revision | MasterTool IEC XE |
| 1.0.0.0 | AA | 1.22 or higher |
| 1.0.1.1 or higher | AB or higher | 1.29 or higher |

Note:

Revision: if the software/firmware is upgraded in the field the product reviewing indicated on the label will no longer match the actual review of the product.

Physical Dimensions

Nexto Series User Manual - MU214600 should be consulted for general measurement of installation panel.
Dimensions in mm.



Configuration

NX2001 was developed to be used with Nexto Series products. All Nexto Series products configurable in MasterTool IEC XE. All configuration data of a given module can be accessed through a double click in the desired module on the Graphical Editor.

Process Data

Process Data, when available, are the variables that are used to access and control NX2001. The list below describes all variables delivered by NX2001.

The process data of the module, when inserted in a PROFIBUS network, can be accessed through variables. The table below presents the variables organizational structure in the UCP memory.

Besides this data, NX2001 also provides a set of variables containing information related to diagnostics which are also described in this document.

| Variable | Size | Process Data | Description | Type | Update |
|----------|------|------------------------|---------------------------------|----------------------|--------|
| %QB(n) | BYTE | Digital Outputs Byte-0 | Output value of output 00 to 07 | Output (Read/ Write) | Always |
| %QB(n+1) | BYTE | Digital Outputs Byte-1 | Output value of output 10 to 17 | Output (Read/ Write) | Always |

Note:

Update: The field Update indicates if, by default, the respective process data is updated by CPU and NX2001. When defined as Always, it means that the process data is always updated. When defined as Selectable, means that the user can select if the respective process data will be updated or not. All these process data are exchanged between CPU and NX2001 through the bus, to improve CPU performance, it's recommended to update only the process data that will be used in the application.

Modules Parameters

| Name | Description | Standard value |
|--|---|----------------|
| Output Behavior on CPU STOP Mode – Group 0 | This parameter is individually defined for each output and defines the behavior of each output when CPU is in STOP mode | False |
| Output Behavior on CPU STOP Mode – Group 1 | This parameter is individually defined for each output and defines the behavior of each output when CPU is in STOP mode | False |
| User Defined Output Value – Group 0 | This parameter defines individually the logical level that each output must get when CPU is in STOP mode | False |
| User Defined Output Value – Group 1 | This parameter defines individually the logical level that each output must get when CPU is in STOP mode | False |
| %Q Start Address of Module Diagnostics | Defines the start address of the module diagnostics | - |

Note:

Output Behavior on CPU STOP Mode – Group 0 and 1: This is the behavior of the outputs when the CPU is in STOP mode. During procedures of CPU exception, Reset Warm, Reset Cold, Reset Origin or Power Failure this behavior may be in effect while CPU is changing through internal states. If module is hot-swapped with CPU in STOP mode, the output behavior will not be in effect. After downloading a project with different behavior settings, the new settings will only be updated only on CPU RUN state.

Module Usage

General Purpose Output Write

NX2001 has two variables to control its outputs (Digital Outputs Byte-0 and Digital Outputs Byte-1). These variables have eight bits where each bit represents the logical state of each output channel. The relationship between each bit and its respective output can be found on the Bus I/O mapping tab.

Maintenance

Altus recommends that all modules' connections should be checked and any dust or any kind of dirt in the module's enclosure should be removed at least every 6 months.

NX2001 offers five important features to assist users during maintenance: Electronic Tag on Display, One Touch Diag, Status and Diagnostics Indicators, Web Page with complete Status and Diagnostics List and Diagnostics Mapped to Variables.

Electronic Tag on Display and One Touch Diag

Electronic Tag on Display and One Touch Diag are important features that provide to the user the option to check the tag, description and diagnostics related to a given module directly on the CPU display.

Electronic Tag on Display and One Touch Diag are easy-to-use features. To check the tag and diagnostics of a given module, it's required only one short press on its diagnostic switch. After pressing once, CPU will start to scroll tag information and diagnostics information of the module. To access the respective module description just long presses the diagnostic switch of the respective module.

More information about Electronic Tag on Display can be found at Nexto Series CPUs Utilization Manual – MU214605.

Status and Diagnostics Indicators

Nexto I/O modules have a display with the following symbols: D, E, ,  and numerical characters. The states of the symbols D, E, ,  are common for all Nexto Series modules. These states can be consulted in the table below.

The meaning of the numerical characters can be different for specific modules. In case of digital output modules, the numerical characters show the respective logic output state. When the numerical character is on the respective output is also on and if the numerical character is off the respective output is also off. The relationship between the output number and its respective numerical character can be found on the following figure.

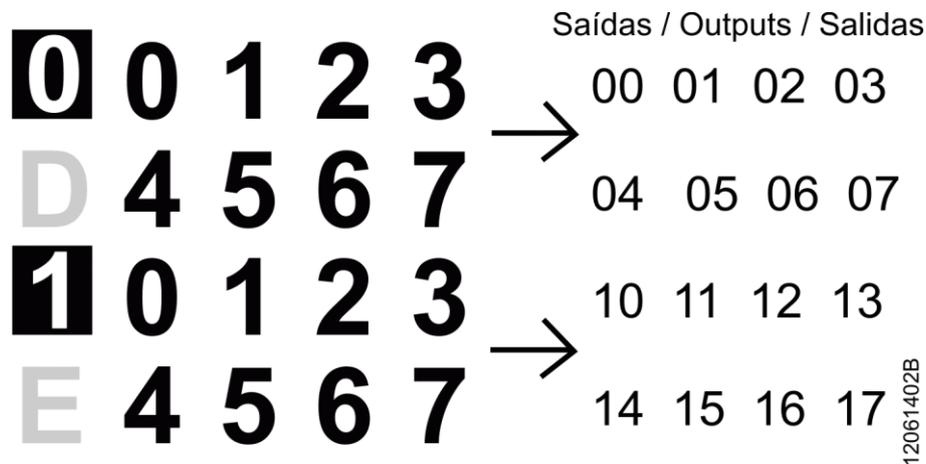
State of D and E Symbols

| D | E | Description | Causes | Solution | Priority |
|-------------|-------------|--|--|---|-----------|
| Off | Off | Display fail or module off | - | Check if the module is completely connected to the backplane rack and if the backplane rack is supplied by an external power supply | - |
| On | Off | Normal use | - | - | 9 (Lower) |
| Blinking 1x | Off | Active diagnostic | There is at least one active diagnostic related to the module NX2001 | Check what the active diagnostic is. More information can be found at Diagnostics Mapped to Variables section of this document | 8 |
| Blinking 2x | Off | CPU in STOP mode. If the module is in a Remote PROFIBUS, Master is in Clear state. | - | Check if CPU is in RUN mode or if PROFIBUS Master is in OPERATE mode. More information can be found on CPU's or PROFIBUS Master's documentation | 7 |
| Blinking 3x | Off | Reserved | - | - | 6 |
| Blinking 4x | Off | Non-fatal fault | Failure in some hardware or software component, which does not have impact on the basic functionality of the product | Check the module diagnostic information. If it is a hardware fault, provide the replacement of this part. If it is a software fault, please contact the Technical Support | 5 |
| Off | Blinking 1x | Parameterization error | NX2001 isn't parameterized or didn't receive the new parameterization | - | 4 |
| Off | Blinking 2x | Loss of master | Loss of communication between module and | Check if the module is completely connected to the backplane rack | 3 |

| | | | CPU or module and PROFIBUS head | Check if CPU is in RUN mode or if PROFIBUS head is Active. | |
|-----|-------------|----------------------|---------------------------------|--|------------|
| Off | Blinking 3x | Reserved | - | - | 2 |
| Off | Blinking 4x | Fatal hardware fault | - | - | 1 (Higher) |

0, 1 and Numerical Characters

The segments 0 and 1 are used to group the numerical characters used for the 16 outputs. The numerical characters that are placed at the right side of character 0 represent the outputs from 00 to 07 where character 0 is related to output 00 and character 7 is related to output 07. In the same way, the numerical characters that are placed at the right side of character 1 represent the outputs from 10 to 17 where character 0 is related to output 10 and character 7 is related to output 17. The figure below shows the relation between numerical characters and the respective outputs.



Web Page with Complete Status and Diagnostics List

Another way to access diagnostics information on Nexto Series is via web pages. Nexto Series CPU's has an embedded web page server that provides all Nexto status and diagnostics information, which can be accessed using a browser.

More information about web page with complete status and diagnostics list can be found at Nexto Series CPUs User Manual – MU214605.

Diagnostics Mapped to Variables

All NX2001's diagnostics can be accessed through variables that can be handled by the user application or even forwarded to a supervisory system using a communication channel. There are two different ways to access diagnostics in the user application: using symbolic variables with AT directive or direct representation variable. Altus recommends the use of symbolic variables.

The table below shows all available diagnostics for NX2001 and their respective memory addresses, descriptions, AT variables and strings that will be shown on the CPU graphical display and web.

General Diagnostics

| Direct Representation Variable | | Diagnostic Message | Symbolic Variable DG_modulename.tGeneral. | Description | PROFIBUS Message Code |
|--------------------------------|------|--------------------------|--|---|-----------------------|
| Variable | Bit | | | | |
| %QB(n) | 0..7 | Reserved | | | |
| %QB(n+1) | 0 | MODULE W/ DIAGNOSTIC | bActiveDiagnostics | TRUE – Module has active diagnostics | - |
| | | - | | FALSE – Module doesn't have active diagnostic | |
| | 1 | MODULE W/ FATAL ERROR | bFatalError | TRUE – Fatal error | 25 |
| | | - | | FALSE – No fatal error | |
| | 2 | CONFIG. MISMATCH | bConfigMismatch | TRUE – Parameterization error | 26 |
| | | - | | FALSE – Parameterization ok | |
| | 3 | WATCHDOG ERROR | bWatchdogError | TRUE – Watchdog has been detected | 27 |
| | | - | | FALSE – No watchdog | |
| | 4 | OTD SWITCH ERROR | bOTDSwitchError | TRUE – Module has switch failure | 28 |
| | | - | | FALSE – Diagnostics switch ok | |
| | 5..7 | Reserved | | | |

Detailed Diagnostics

| Direct Representation Variable | | Diagnostic Message | Symbolic Variable DG_modulename.tDetailed. | Description | PROFIBUS Message Code |
|--------------------------------|----------|----------------------------|---|---|-----------------------|
| Variable | Bit | | | | |
| %QB(n+2) | 0 | Output short circuit g0 | bOutputShortCircuitGroup_0 | TRUE – Short circuit at outputs 00 to 07. Short circuit in any output with diagnostic enabled | 16 |
| | | - | | FALSE – No short circuit at outputs 00 to 7 | |
| | 1 | Output short circuit g1 | bOutputShortCircuitGroup_1 | TRUE – Short circuit at outputs 10 to 17. Short circuit in any output with diagnostic enabled | 17 |
| | | - | | FALSE – No short circuit at outputs 10 to 17. | |
| 2..7 | Reserved | | | | |
| %QB(n+3) | 0 | NO EXTERNAL SUPPLY G0 | bNoExternalSupplyGroup_0 | TRUE – No external power supply at output 00 to 07 (terminal 9 and 10 of the connector) | 24 |
| | | - | | FALSE – Power supply ok for output 00 to 07 | |
| | 1 | NO EXTERNAL SUPPLY G1 | bNoExternalSupplyGroup_1 | TRUE – No external power supply at output 10 to 17 (terminal 19 and 20 of the connector) | 25 |
| | | - | | FALSE – Power supply ok for output 10 to 17 | |
| 2..7 | Reserved | | | | |

Notes

Direct Representation Variable: "n" is the address defined in the field Module Diagnostic Address in %Q on the NX2001 configuration screen – Module Parameters tab in MasterTool IEC XE.

Symbolic Variable: Some symbolic variables serve to access diagnostics. These diagnostics are stored in the direct representation variable, then the AT directive is used to map the symbolic variables in the direct representation variable. The directive AT is a reserved word in the MasterTool IEC XE, that uses this directive to declares the diagnostics automatically on a symbolic variables. All symbolic variables declared automatically can be found in the Diagnostics object.

Hot Swap

This product supports hot swap. For further information about how to correctly perform a hot swap, consult Nexto Series User Manual - MU214600.

Manuals

For further technical details, configuration, installation and programming of Nexto Series the table below should be consulted.

The table below is only a guide of some relevant documents that can be useful during the use, maintenance, and programming of NX2001. The complete and updated table containing all documents of Nexto Series can be found at Nexto Series User Manual – MU214600.

| Document Code | Description | Language |
|-----------------|--|------------|
| CE114000 | Nexto Series – Technical Characteristics | English |
| CT114000 | Série Nexto – Características Técnicas | Portuguese |
| CS114000 | Serie Nexto – Especificaciones y Configuraciones | Spanish |
| MU214600 | Nexto Series User Manual | English |
| MU214000 | Manual de Utilização Série Nexto | Portuguese |
| MU214300 | Manual Del Usuario Serie Nexto | Spanish |
| MU214605 | Nexto Series CPUs User Manual | English |
| MU214100 | Manual de Utilização UCPs Série Nexto | Portuguese |
| MU214305 | Manual del Usuario UCPs Serie Nexto | Spanish |
| MU299609 | MasterTool IEC XE User Manual | English |
| MU299048 | Manual de Utilização MasterTool IEC XE | Portuguese |
| MU299800 | Manual Del Usuario MasterTool IEC XE | Spanish |
| MP399609 | MasterTool IEC XE Programming Manual | English |
| MP399048 | Manual de Programação MasterTool IEC XE | Portuguese |
| MP399800 | Manual de Programación MasterTool IEC XE | Spanish |
| MU214608 | Nexto PROFIBUS-DP Head Utilization Manual | English |
| MU214108 | Manual de Utilização da Cabeça PROFIBUS-DP Nexto | Portuguese |
| MU214308 | Manual de Utilización Cabeça PROFIBUS Nexto | Spanish |