

1. Product Description

Nexto Series is a powerful and complete Programmable Logic Controller (PLC) Series 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.

In this context, Nexto Jet is a selection of I/O modules that uses the existing CPUs and modules from Nexto Series to provide the best solution for applications in verticals like infrastructure, building, water, wastewater, food, machines and several OEM projects. Nexto Jet is ideal for systems with no hot-swapping and conformal coating requirements.

Finally, the module NJ2001 is a module that offers 16 isolated outputs for general use and it is a module that uses one rack position.



Its main features are:

- High density, with 16 outputs in single width module
- Two isolated output groups
- External power supply low voltage diagnostic
- Display for module diagnostics and output state indication
- Support of 1.5 A per channel
- Support of 6 A per group
- Easy Plug System

ATTENTION

Starting from product revision AI, it was included the connector frontal cover (which was previously exclusive of NX models), thus adding the Easy Plug System feature to this product.

2. Ordering Information

2.1. Included Items

The product package contains the following items:

- NJ2001 module
- 20-terminals connector with wire holder

2.2. Product Code

The following code should be used to purchase the product:

Code	Description
NJ2001	24 Vdc 16 DO Transistor Module

Table 1: Product Code

3. Related Products

The following product must be purchased separately when necessary:

Code	Description
NX9403	20-terminal connector with cable guides

Table 2: Related Products

4. Innovative Features

Nexto Series brings to the user many innovations regarding utilization, supervision and system maintenance. These features were developed focusing a new concept in industrial automation.



Easy Plug System: Nexto Series has an exclusive method to plug and unplug I/O terminal blocks. The terminal blocks can be easily removed with a single movement and with no special tools. In order to plug the terminal block back to the module, the frontal cover assists the installation procedure, fitting the terminal block to the module.

5. Product Features

5.1. General Features

	NJ2001
Backplane rack occupation	1 slot
Output type	Isolated transistor source type output
Number of outputs	16
Maximum output current	1.5 A @ 30 Vdc per output 6 A @ 30 Vdc per group
Leakage current	35 μ A
On state resistance	105 m Ω
External power supply	19.2 to 30 Vdc
Switching time	200 μ s – off-to-on transition @ 30 Vdc 500 μ s – on-to-off transition @ 30 Vdc
Maximum switching frequency	250 Hz
Output update time	1 ms
Output state indication	Yes
One Touch Diag (OTD)	No
Electronic Tag on Display (ETD)	No
Easy Plug System (EPS)	Yes
Status and diagnostic indication	Display, web pages and CPU's internal memory
Hot swap capability	No
Module protections	Protection against surge voltages Protection against short circuit must be provided externally
Wire gauge	0,5 mm ² (20 AWG)
Minimum wire temperature rating	75 °C
Wire material	Copper only
Isolation	
Outputs to logic	1500 Vac / 1 minute
Outputs to protective earth \oplus	1500 Vac / 1 minute
Logic to protective earth \oplus	1500 Vac / 1 minute
Output group to other output group	1500 Vac / 1 minute
Current consumption from rack PSU	165 mA
Maximum power dissipation	3.8 W
IP level	IP 20
Operating temperature	0 to 60 °C
Storage temperature	-25 to 75 °C
Operating and storage relative humidity	5% to 96%, non-condensing
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

Table 3: General Features

Notes:

Maximum output current – parallel outputs: 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 8 outputs can be used together. For example: It's possible to drive a given load with 4.5 A using 3 outputs. All outputs used on a given load must be enabled/disabled at the same time.

Maximum output current – group current: When the group current is higher than 4 A, the maximum operation temperature is reduced according to the following table:

Wire gauge: Crimp terminals for 0.5 mm² wire in each way respecting as described at Nexto Series User Manual - MU214600.

Group Current	Maximum Operation Temperature
6 A	40 °C
5 A	50 °C
4 A	60 °C

Table 4: Temperature for Current

External power supply: The terminals 9, 10, 19 and 20 are used to supply voltage only to the outputs. NJ2001 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.

5.2. Standards and Certifications

Standards and Certifications	
IEC	61131-2: Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests
CE	2014/30/EU (EMC) 2014/35/EU (LVD) 2011/65/EU and 2015/863/EU (ROHS)
UK CA	S.I. 2016 No. 1091 (EMC) S.I. 2016 No. 1101 (Safety) S.I. 2012 No. 3032 (ROHS)
UL LISTED	UL/cUL Listed – UL 61010-1 UL 61010-2-201 (file E473496)
EAC	TR 004/2011 (LVD) CU TR 020/2011 (EMC)

Table 5: Standards and Certifications

5.3. Compatibility with Other Products

The following table provides information regarding the compatibility of the module NJ2001 and other Nexto Series products.

NJ2001		Compatible Software Version			
Version	Revision	NX3004	NX30x0	NX5110	MasterTool IEC XE
1.2.0.5 or higher	AA	1.5.1.0 or higher	1.5.1.0 or higher	1.1.1.0 or higher	2.03 or higher

Table 6: Compatibility with Other Products

Note:

Revision: If the software is upgraded in the field the product revision indicated on the label will no longer match the actual revision of the product.

ATTENTION

The CPUs, racks and the PROFIBUS remote head of Nexto Series support the use of Nexto Jet Modules. The Nexto Jet is formed by I/Os modules and when used in configuration with CPUs or PROFIBUS remote head of Nexto Series, no other I/O type of Nexto Series can be used in the same bus.

5.4. Physical Dimensions

Dimensions in mm.

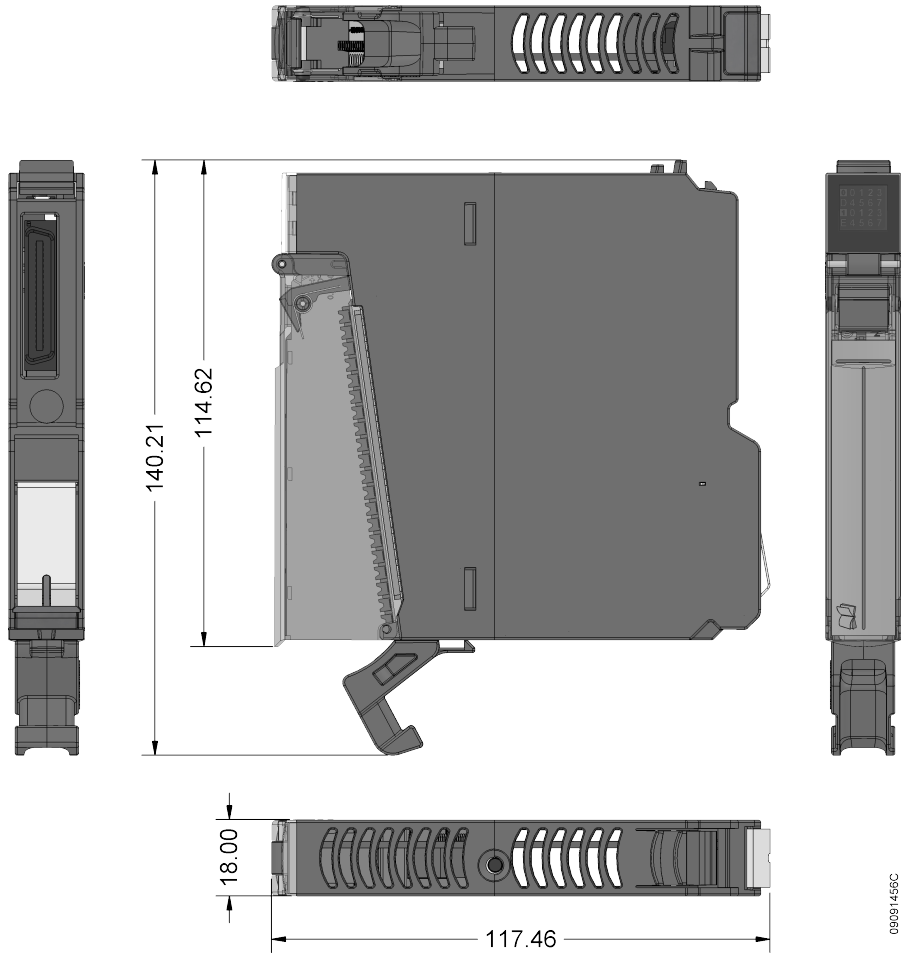


Figure 1: Physical Dimensions

6. Installation

For the correct installation of this product, it is necessary to use a rack (backplane rack) and it must be carried out according to the mechanical and electrical installation instructions that follow.

6.1. Product Identification

This product has some parts that must be observed before installation and use. The following figure identifies each of these parts.

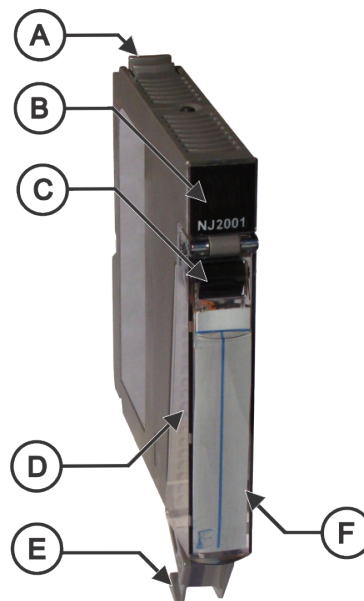


Figure 2: NJ2001

- Ⓐ Fixing lock.
- Ⓑ Status and diagnostic display.
- Ⓒ Terminal block extraction lever.
- Ⓓ Front cover.
- Ⓔ 20 pin terminal block with wire holder.
- Ⓕ Label for module identification.

The product has in its mechanics a label that identifies it and in it are presented some symbols whose meaning is described below:



Attention! Before using the equipment and installing, read the documentation.



Direct Current.

6.2. Electrical Installation

The figure below shows an example where each NJ2001'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.

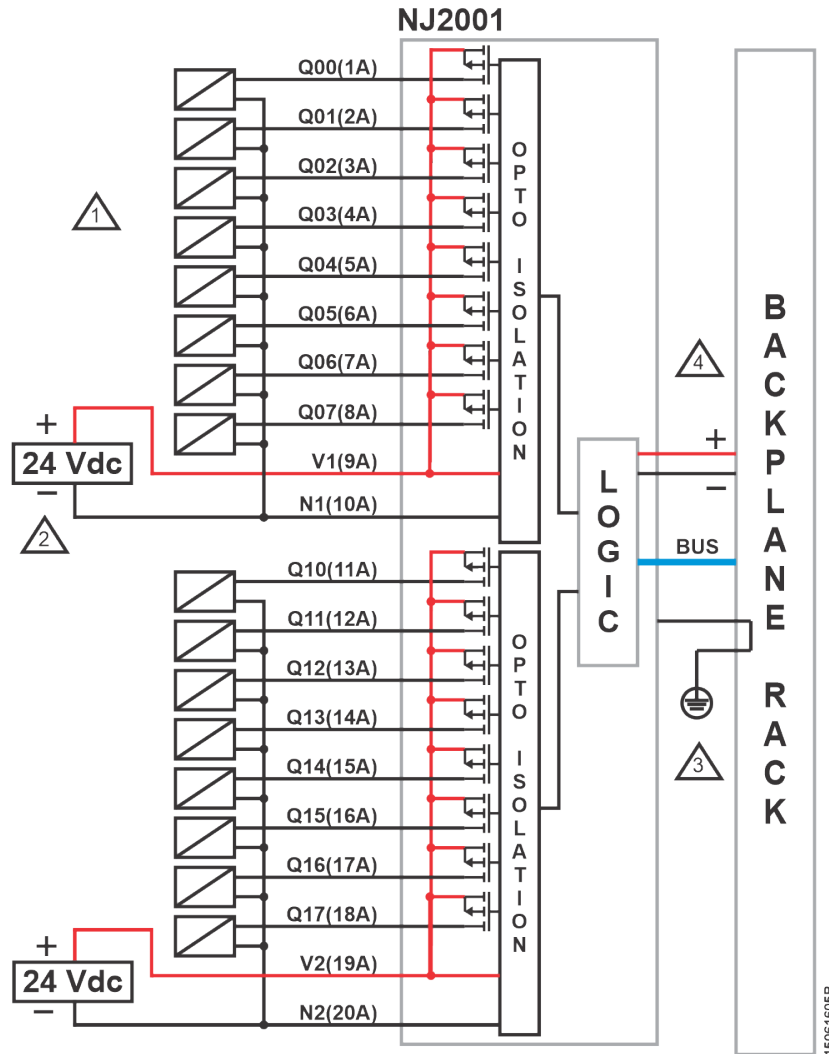


Figure 3: Electric Diagram

Diagram Notes:

- ① Typical usage of source digital outputs.
- ② External power supply to supply the outputs, V1 and V2 are connected to +24 Vdc, N1 and N2 are connected to 0 Vdc.
- ③ The module is grounded through the Nexto Series backplane racks.
- ④ The module power supply is derived from the connection to the backplane rack, not requiring external connections.
- ⊕ Protective conductor terminal.

6.3. 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

Table 7: Connector Pinout

6.4. Protection Circuit

For further information, consult the "*Lightning Protection*" section of the Nexto Series User Manual - MU214600.

ATTENTION

Atmospheric discharges (thunders) may cause damages to the product although its protections. Additional protections should be used if the product's power comes from a power supply located outside the panel where it 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.

6.5. 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.

ATTENTION

Products with broken warranty seal are not covered in warranty.

CAUTION



The device is sensitive to static electricity (ESD). Always touch in a metallic grounded object before handling it.

DANGER



Nexto Series can operate with voltage up to 250 Vac. Special care must be taken during the installation, which should only be done by qualified technical personnel. Do not touch on the wiring field when in operation.

7. Configuration

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

7.1. Process Data

Process Data, when available, are the variables that are used to access and control the module. The list below describes all variables delivered by NJ2001.

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 CPU memory.

Besides this data, NJ2001 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

Table 8: Process Data

Note:

Update: The field *Update* indicates if, by default, the respective process data is updated by CPU and NJ2001. When defined as *Always*, it means that the process data is always updated. When defined as *Selectable*, it 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 NJ2001 through the bus. To improve CPU performance, it's recommended to update only the process data that will be used in the application.

7.2. Module Parameters

Name	Description	Standard value
%Q Start Address of Module Diagnostics Area	Defines the start address of the module diagnostics	-

Table 9: Module Parameters

8. Usage

8.1. General Purpose Output Write





NJ2001 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.

9. Maintenance

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

This module offers important features to assist users during the maintenance: Status and Diagnostics Indicators, Web Page with Complete Status and Diagnostics List, and Diagnostics Mapped to Variables.

9.1. Status and Diagnostics Indicators

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

9.1.1. State of D and E Symbols

D	E	Description	Cause	Solution	Priority
Off	Off	Display failure or module off	<ul style="list-style-type: none"> - Module disconnected; - External power supply failure; - Hardware failure. 	Check: <ul style="list-style-type: none"> - If the module is completely connected to the rack; - If the rack is powered by an external source; - If the module has external power. 	-
On	Off	Normal use	-	-	9 (Lower)
Blinking 1x	Off	Active diagnostics	There is at least one active diagnostic related to the module.	Check what the active diagnostic is. More information can be found at section Diagnostics Through Variables .	8

D	E	Description	Cause	Solution	Priority
Blinking 2x	Off	No I/O data update	<ul style="list-style-type: none"> - CPU in STOP mode; - Head/Remote in non-ACTIVE state. 	Check: <ul style="list-style-type: none"> - If the CPU is in operation; - If the Fieldbus Master is in operation; - The integrity of the network between the MODBUS Client and the Head/Remote. 	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's diagnostic information. If it is a hardware failure, have the part replaced. If it's software, contact Technical Support.	5
Off	Blinking 2x	Loss of bus master	Loss of communication between: <ul style="list-style-type: none"> - The module and the CPU; - The module and the Head/Remote; - The Head/Remote and the Field Network Master. 	Check: <ul style="list-style-type: none"> - If the module is completely connected to the rack; - If the CPU is in RUN mode; - If the Fieldbus Master is in operation; - Network integrity between PROFIBUS Master and Head/Remote. 	4
Off	Blinking 3x	Module without calibration	<ul style="list-style-type: none"> - The module is not calibrated; - There was an error with the calibration value. 	The module must return to the manufacturer.	3
Off	Blinking 1x	Missing or parameterization error	The module isn't parameterized.	Check: <ul style="list-style-type: none"> - If the module parameterization is correct; - Network integrity between PROFIBUS Master and Head/Remote; - Network integrity between PROFINET Controller and Head/Remote. 	2
Off	Blinking 4x	Fatal hardware fault	Hardware fault.	The module must return to the manufacturer.	1 (Higher)

Table 10: Status of Symbols D and E

Notes:

Field net master: There are different field net solutions, using different nomenclatures to refer to the net master. Examples: Profibus Master, MODBUS Client, PROFINET Controller, etc.

Module without calibration: Only valid for modules that have calibration, typically analog modules. Modules that do not have calibration will never show such an indication through the symbols D and E.

9.1.2. 0, 1 and Numerical Characters

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.

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.

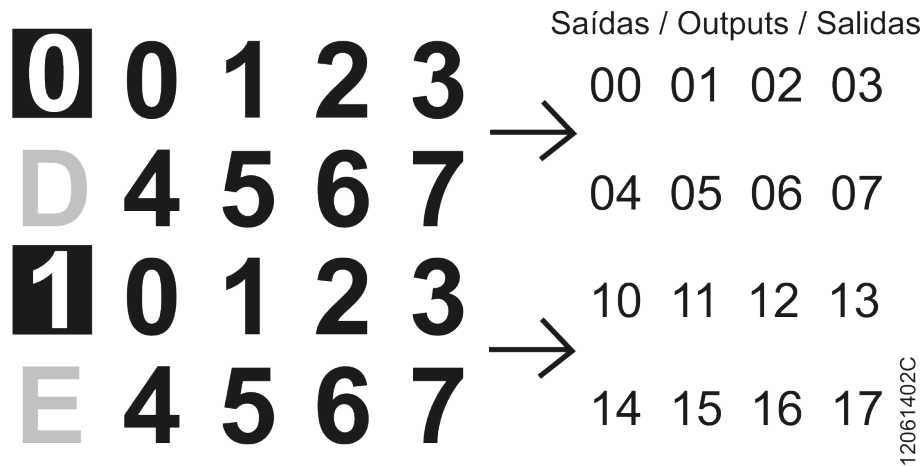


Figure 4: Display

9.2. 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 simple browser.

More information about web page with complete status and diagnostics list can be found at User Manual of each respective CPU (listed at Nexto Series User Manual - MU214600).

9.3. Diagnostics Through Variables

All diagnostics in this module 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 addressing memory. Altus recommends use symbolic variables for diagnostic accessing. The table below shows all available diagnostics for this module and their respective memory address, description, symbolic variable and string that will be shown on the CPU graphical display and web.

9.3.1. General Diagnostics

Direct Variable		Diagnostic Message	Symbolic Variable DG_NJ2001.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	-
		NO DIAG		FALSE – Module doesn't have active diagnostics	
	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..7	Reserved				

Table 11: General Diagnostics

9.3.2. Detailed Diagnostics

Direct Variable		Diagnostic Message	Symbolic Variable DG_NJ2001.tDetailed.*	Description	PROFIBUS Message Code
Variable	Bit				
%QB(n+2)	0..7	Reserved			
%QB(n+3)	0	NO EXTERNAL SUPPLY G0	bNoExternalSupplyGroup_0	TRUE – No external power supply at outputs 00 to 07 (terminal 9 and 10 of the connector).	24
		-		FALSE – Power supply ok for outputs 00 to 07.	
	1	NO EXTERNAL SUPPLY G1	bNoExternalSupplyGroup_1	TRUE – No external power supply at outputs 10 to 17 (terminal 19 and 20 of the connector).	25
		-		FALSE – Power supply ok for outputs 10 to 17.	
2..7	Reserved				

Table 12: Detailed Diagnostics

Notes:

Direct Representation Variable: "n" is the address defined in the field %Q Start Address of Module Diagnostics Area on the NJ2001 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 AT directive is a reserved word in the MasterTool IEC XE, that uses this directive to declare the diagnostics automatically on a symbolic variable. All symbolic variables declared automatically can be found in the diagnostics object.

9.4. Hot Swap

This product does not supports hot swap.

10. Manuals

For further technical details, configuration, installation and programming, 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 this product.

Code	Description	Language
CE114000	Nexto Series – Technical Characteristics	English
CT114000	Série Nexto – Características Técnicas	Portuguese
CS114000	Serie Nexto – Características Técnicas	Spanish
MU214600	Nexto Series User Manual	English
MU214000	Manual de Utilização Série Nexto	Portuguese
MU299609	MasterTool IEC XE User Manual	English
MU299048	Manual de Utilização MasterTool IEC XE	Portuguese
MP399609	MasterTool IEC XE Programming Manual	English
MP399048	Manual de Programação MasterTool IEC XE	Portuguese
MU214608	Nexto PROFIBUS-DP Head Utilization Manual	English
MU214108	Manual de Utilização da Cabeça PROFIBUS-DP Nexto	Portuguese

Table 13: Related Documents