1. Product Description

NX-ERA 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, NX-ERA 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 NX-ERA 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.

NX1006 has 8 monitored sink type input and this module use only one NX-ERA Series Backplane Rack slot. The modules are used in fire detection and property security systems and are indicated for applications where the broken loop/line situation requires detection, That is, continuous monitoring of the connection between the module and the field sensor.Finally, NX-ERA 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:

- 08 inputs in a single width module
- Self-test for damaged inputs
- Detection of line break
- Diagnosis of failure causes
- Galvanic isolation between outputs and internal logic
- Protection against surge voltage
- Display for module diagnostics and output state indication
- Easy Plug System One
- Touch Diag Electronic
- Tag on Display

2. Ordering information

2.1. Included Items

The product package contains the following items:

- NX1006 module
- 20-terminals conector with wire holder

2.2. Product Code

The following code should be used to purchase the product:

Code	Description
NX1006	24Vdc 8 DI Monitored 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

NX-ERA 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: NX-ERA 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.

One Touch Diag: One Touch Diag is an exclusive feature that NX-ERA 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), re- ducing maintenance and commissioning times.

ETD – Electronic Tag on Display: Another exclusive feature that NX-ERA Series brings to PLCs is the Electronic Tag on Display. This new functionality brings the process of checking the tag names of any I/O pin or module used in the system directly to 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.

5. Product Features

5.1. General Features

	NX1006
Backplane rack occupation	1 slot
Input Type	Sink
Number of inputs	8 monitored digital inputs
Input voltage	24 Vdc 0.0 to 2.3 Vdc for logic level 0 (line break failure) 5.0 to 11.9 Vdc for logic level 0 (normal) 16.0 to 30.0 Vdc for logic level 1 (alarm)
Input Impedance	2.36 kΩ
Input Current	10 mA @ 24 Vdc
External loop termination resistor	4.7 kΩ (± 10 %) / 1W
Input filter	150 µs – per hardware
Input update time	1.2 ms
Input 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
Wire gauge	0.5 mm^2 (20 AWG)
Minimum wire temperature rating	75 °C
Wire material	Copper only
Module protections	Protection against surge voltages Resettable fuse for sensor power supply Inverted polarization in the external power supply
Isolation Input to logic Input to protective earth ⏚ Logic to protective earth ⏚	 1500 Vdc / 1 minute 1500 Vdc / 1 minute 1500 Vdc / 1 minute
Current consumption from rack	200 mA
External power supply (V1)	18 to 30 Vdc
Nominal sensor supply output current (V2)	10m A @24Vdc per channel
Nominal external power supply current (V1)	80mA @ 24Vdc with all the sensors closed (in Alarm)
Maximum sensor supply output current (V2)	15mA per channel
Maximum external power supply current (V1)	120mA@24Vdc with all V2 outputs consuming 15mA
Maximum power dissipation	3 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
Conformal coating	Yes
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

	NX1006
Weight with package	250 g

Table 3: General Features

Notes:

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

External power supply: Terminals 17 to 20 are used to supply the inputs only. The NX1006's internal logic is supplied by the Power Supply Module located in the NX-ERA Rack.

Wire gauge: Crimp terminals for 0.5 mm^2 wire in each way respecting as described at NX-ERA Series User Manual - MU214600.

5.2. Compatibility with Other Products

The following table provides information regarding the compatibility of the module NX1006 and NX-ERA Series program- ming tool MasterTool IEC XE.

NX1006		Software Version Compatible	
Version	Revision	MasterTool IEC XE	NX-ERA PROFIBUS-DP Head
1.0.6.0 or higher	AA or higher	3.75 or higher	1.14.51.0 or higher

Table 4: 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.

5.3. Physical Dimensions

Dimensions in mm.

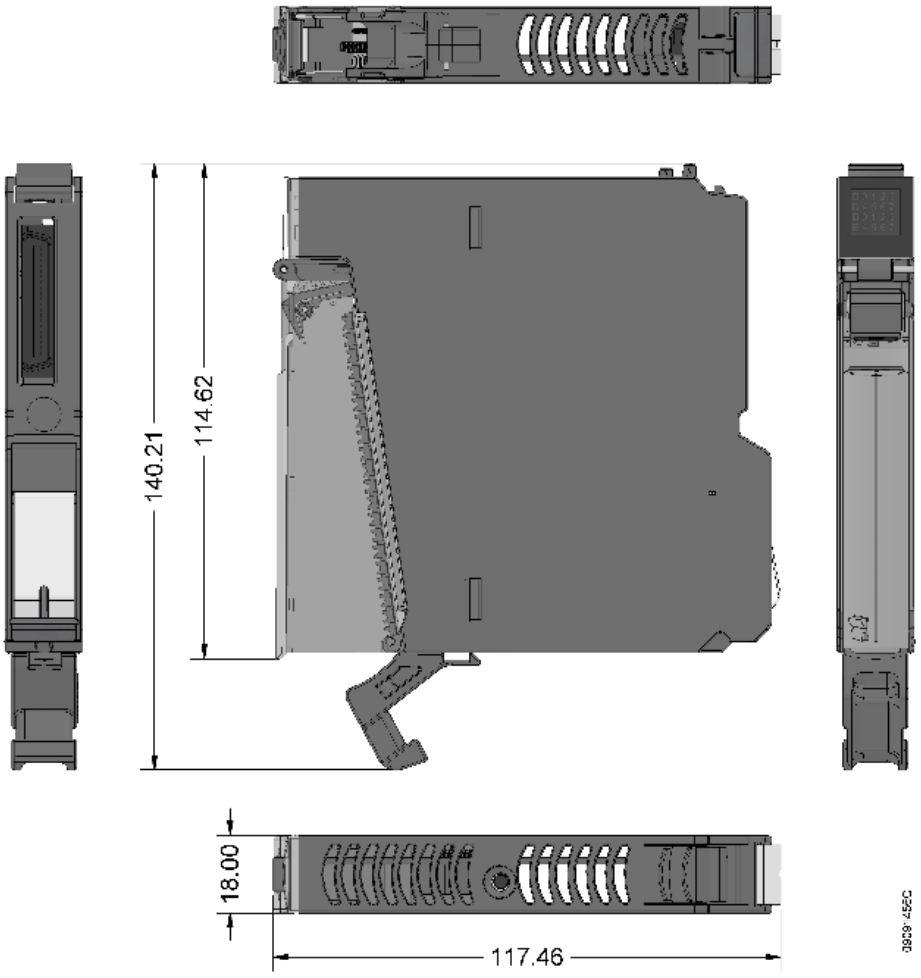

Figure 1: Physical Dimensions

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.

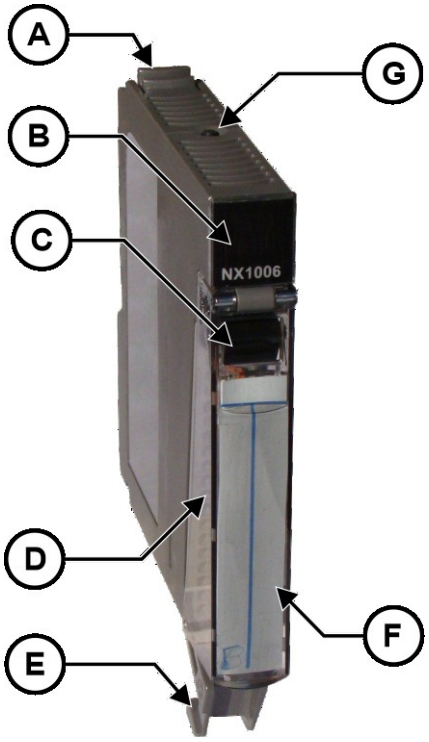

Figure 2: NX1006

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

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 of how to use the NX1006 alarm sensor inputs.

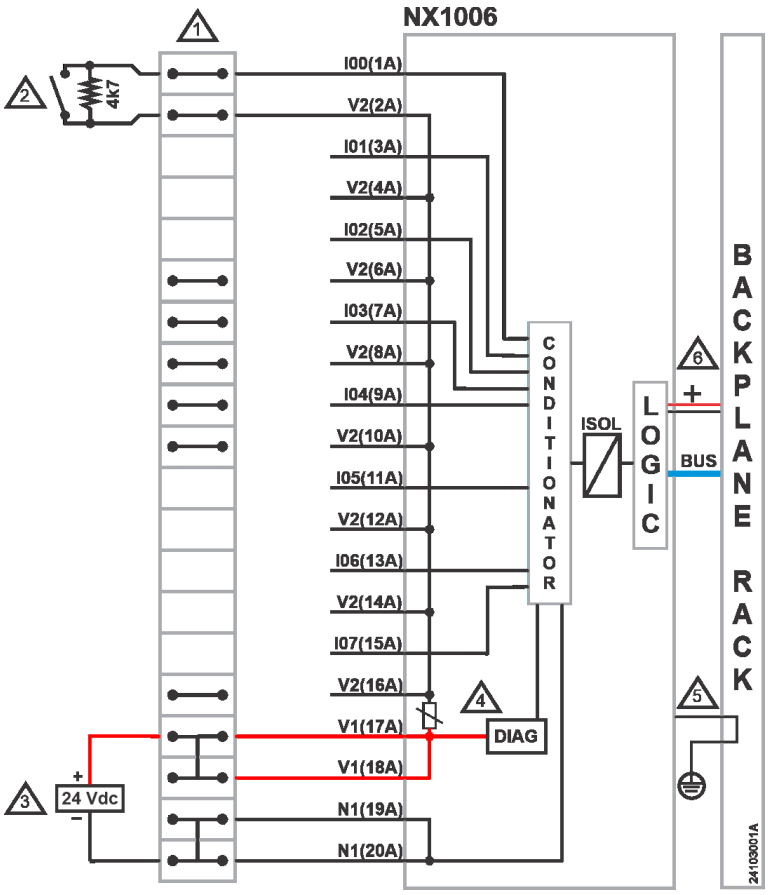

Figure 3: Electric Diagram

Diagram Notes:

1. The diagram above shows a set of terminal blocks where each symbol represents a different kind of terminal block: ⊷ represents a standard feed-through terminal block.
2. The inputs use the I0x pin for signal input and the V2 output for sensor power.
3. The external power supply is connected to pins 17A to 20A. With 17A and 18A connected to +24 Vdc and 19A and 20A connected to 0 Vdc.
4. Resettable fuse used for the V2 outputs and self-test systems.
5. The NX1006 is connected to protective earth ⏚ through the backplane rack.
6. 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	Input 00
2	Sensor power supply output (+24 Vdc)
3	Input 01
4	Sensor power supply output (+24 Vdc)
5	Input 02
6	Sensor power supply output (+24 Vdc)
7	Input 03
8	Sensor power supply output (+24 Vdc)
9	Input 04
10	Sensor power supply output (+24 Vdc)
11	Input 05
12	Sensor power supply output (+24 Vdc)
13	Input 06
14	Sensor power supply output (+24 Vdc)
15	Input 07
16	Sensor power supply output (+24 Vdc)
17	External power supply input (+24 Vdc)
18	External power supply input (+24 Vdc)
19	External power supply input (0 Vdc)
20	External power supply input (0 Vdc)

Table 5: Connector Pinout

6.4. 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 NX-ERA 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

NX-ERA 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 NX-ERA Series products. All NX-ERA 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 NX1006.

The process data of the module, when it is inserted in a PROFIBUS network, can be accessed via variables. The table below shows the organization structure of the variables in the CPU's memory.

Besides this data, NX1006 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
%IB(n)	BYTE	Digital Inputs	Input value of channel 00 to 07	Input (Read)	Always

Table 6: Process Data

Note:

Update: The field Update indicates if the respective process data is updated by CPU and NX1006. 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 NX1006 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	Options	Configuration
Self-Test	Enables internal short-circuit self-tests for all of the channels.	Disabled	Disabled Enabled	Per Module
Diagnostics Enable	Enables the diagnostics for each channel.	Enabled	Disabled Enabled	Per Input
%Q Start Address of Module Diagnostics Area	Defines the starting address of the module diagnostics area.	-	-	Per Module

Table 7: Module Parameters

Notes:

Configuration: Configuration indicates if the parameter is related to the entire module (per module) or if the parameter is related to a single input (per input). In case of input wise parameters, all parameters will be repeated for each available input

Self-Test: This is done by periodically activating (approximately once every 6.6 seconds) all the points in the module for a period of 6.4 milliseconds. The enabling allows the operation of each input point to be checked. The value of each point doesn't change during the test period (12.8 milliseconds). During this test, one cycle is used to check whether the input detects the alarm state and another cycle is used to check whether the input detects the line break failure state.

Diagnostics Enable: This parameter allows the input's diagnostics to be enabled or disabled. It is especially useful in cases where the input isn't in use and it isn't necessary to put the 4k7 resistor in parallel with the input. In the case of Profibus remotes, when disabled, no diagnostic data will be generated for the disabled channel.

8. Module Usage

8.1. General Purpose Input Read

The NX1006 has a variable to access its inputs (Digital Inputs). The variable has 8 bits where each bit represents the logical state of each input channel. The relation between each bit and its respective input can be found in the Bus: I/O Mapping tab.

9. Maintenance

Messung recommends that all module's 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.

This module 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 through Variables.

9.1. 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 (shorter than 1 s) on its diagnostic switch. After pressing once, CPU will start to scroll tag information and diagnostic information of the module. To access the respective module description just long press (longer than 1 s) the diagnostics switch of the respective module.

More information about Electronic Tag on Display and One Touch Diag can be found at User Manual of each respective CPU (listed at manual of NX-ERA Series - MU214600).

9.2. Status and Diagnostics Indicators

NX-ERA I/O modules have a display with the following symbols: D, E, 0, 1 and numerical characters. The states of the symbols D, E, 0 and 1 are common for all NX-ERA Series I/O modules. These states can be consulted in the table below.

9.2.1. D and E States

D	E	Description	Cause	Solution	Priority
Off	Off	Display failure or module off	- Module disconnected; - External power supply failure; - Hardware failure.	Check: - 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
Blinking 2x	Off	No I/O data update	- CPU in STOP mode; - Head/Remote in non-ACTIVE state.	Check: - 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: - The module and the CPU; - The module and the Head/Remote; - The Head/Remote and the Field Network Master.	Check: - 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	- The module is not calibrated; - There was an error with the calibration value.	The module must return to the manufacturer.	3

D	E	Description	Cause	Solution	Priority
Off	Blinking 1x	Missing or parameterization error	The module isn't parameterized.	Check: - If the module parameterization is correct; - Network integrity between PROFIBUS Master and Head/Remote; - Network integrity between PROFINET Controller and	2
Off	Blinking 4x	Fatal hardware fault	Hardware fault.	The module must return to the manufacturer.	1 (Higher)

Table 8: 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.

9.2.2. 0, 1 and Numerical Characters

The meaning of the numerical characters can be different for specific modules. In case of digital input modules, the numerical characters represent its physical state as well. When the numerical character is on, the respective input is also on, and if the numerical character is off, the respective input is also off. The relationship between the input 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 first 8 I/O and the numerical characters used for the last 8 I/O. In case of NX1006 only the character 0 is on. The figure below shows the relation between numerical characters and the respective inputs.

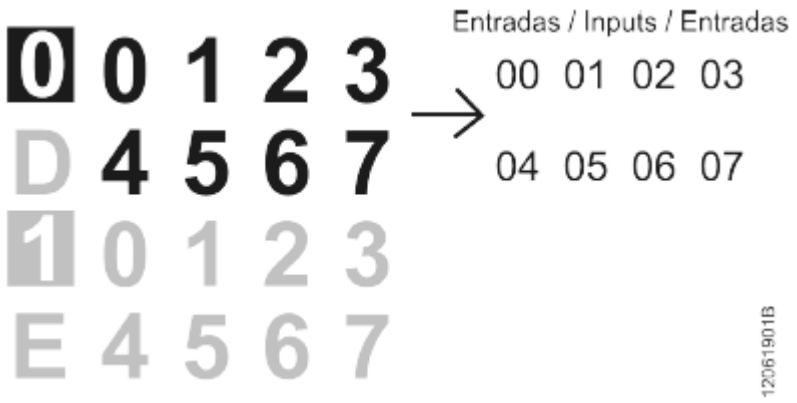

Figure 4: Display

9.3. Web Page with Complete Status and Diagnostics List

Another way to access diagnostics information on NX-ERA Series is via web pages. NX-ERA Series CPU's has an embedded web page server that provides all NX-ERA 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 NX-ERA Series User Manual - MU214600).

9.4. 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. Messung 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.

9.4.1. General Diagnostics

Direct Variable		Diagnostic Message	Symbolic Variable DG_modulename.tGeneral.	Description	PROFIBUS Message Code
Variable	Bit				
%QB(n)	0	INPUT 00 W/ DIAG	bActiveDiagnosticsInput00	TRUE – Input 00 has active diagnostics	-
		-		FALSE – Input 00 doesn't have active diagnostics	
	1	INPUT 01 W/ DIAG	bActiveDiagnosticsInput01	TRUE – Input 01 has active diagnostics	-
		-		FALSE – Input 01 doesn't have active diagnostics	
	2	INPUT 02 W/ DIAG	bActiveDiagnosticsInput02	TRUE – Input 02 has active diagnostics	-
		-		FALSE – Input 02 doesn't have active diagnostics	
	3	INPUT 03 W/ DIAG	bActiveDiagnosticsInput03	TRUE – Input 03 has active diagnostics	-
		-		FALSE – Input 03 doesn't have active diagnostics	
	4	INPUT 04 W/ DIAG	bActiveDiagnosticsInput04	TRUE – Input 04 has active diagnostics	-
		-		FALSE – Input 04 doesn't have active diagnostics	
	5	INPUT 05 W/ DIAG	bActiveDiagnosticsInput05	TRUE – Input 05 has active diagnostics	-
		-		FALSE – Input 05 doesn't have active diagnostics	
	6	INPUT 06 W/ DIAG	bActiveDiagnosticsInput06	TRUE – Input 06 has active diagnostics	-
		-		FALSE – Input 06 doesn't have active diagnostics	
	7	INPUT 07 W/ DIAG	bActiveDiagnosticsInput07	TRUE – Input 07 has active diagnostics	-
		-		FALSE – Input 07 doesn't have active diagnostics	
	0	MODULE W/ DIAGNOSTIC	bActiveDiagnostics	TRUE – Module has active diagnostics	-
		-		FALSE – Module doesn't have active diagnostics	
	1	MODULE W/ FATAL ERROR	bFatalError	TRUE – Fatal error	25

Direct Variable		Diagnostic Message	Symbolic Variable DG_modulename.tGeneral.	Description	PROFIBUS Message Code
Variable	Bit				
%QB(n+1)		-		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	Reserved			
	6	EXTERNAL SUPPLY	bNoExternalSupply	TRUE – External supply below minimum voltage limit	30
		-		FALSE – External supply above minimum voltage limit	
	7	SENSORS POWER SUPPLY	bNoSensorsPowerSupply	TRUE – Sensors power supply below minimum voltage limit	31
		-		FALSE – Sensors power supply above minimum voltage limit	

Table 9: General Diagnostics

9.4.2. Detailed Diagnostics

Direct Representation Variable		Diagnostic Message	Symbolic Variable DG_modulename.tDetailed.tDigitalInput_XX.	Description	PROFIBUS Message Code
Variable	Bit				
%QB(n+2+XX*2)	0..7	Reserved			
%QB(n+2+2*XX+1)	0	LINE BREAK	bLineBreak	TRUE – Sensor line is open (break)	6
		-		FALSE – Sensor line is normal (break)	
	1	SHORT-CIRCUIT	bShortCircuit	TRUE – Defective input (shorted)	1
		-		FALSE – Faultless input	
	2..7	Reserved			

Table 10: Detailed Diagnostics

Notes:

Direct Representation Variable: "n" is the address defined in the field (%Q) Start Address of Diagnostic Area on the module configuration screen – Modules Parameters tab in the MasterTool IEC XE, “XX” is the channel of analog input.

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 declare the diagnostics automatically on a symbolic variables. All symbolic variables declared automatically can be found in the Diagnostics object

Line Break: In the event of a failure, it should be checked whether the field wiring has been interrupted, whether the sensor’s supply is above the minimum voltage limit and whether the resistor in parallel, with some types of sensor, is correctly connected and set to the correct value.

Short-Circuit: In the event of a self-test failure, the module must be sent for maintenance, as the error is internal to the module.

9.5. Hot Swap

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

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	NX-ERA Series – Technical Characteristics	English
MU214600	NX-ERA Series User Manual Manual de Utilização Série NX-ERA	English
MU299609	MasterTool IEC XE User Manual	English
MP399609	MasterTool IEC XE Programming Manual	English
MU214608	NX-ERA PROFIBUS-DP Head Utilization Manual	English

Table 11: Related Documents