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.

NX6020 module allows the reading of the temperature sensors of RTD type (Resistance Temperature Detectors), supporting a wide variety of sensors and resistance bands as well. The module has eight inputs which are individually configurable, allowing the use of temperature scales either in Celsius or Fahrenheit and configurable filters which help in the implementation of industrial automation systems and processes control. 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 RTD and resistance analog inputs in a single width module
- Support for different types of RTD sensors: Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni200, Ni500, Ni1000 and Cu10
- Support for multiple resistance range: 0 to 400 Ω, 0 to 4000 Ω and 0 to 10000 Ω
- Individual configuration per input
- Software configurable filters
- Galvanic isolation between inputs and internal logic
- Protection against surge voltage
- Support for hot swap
- Under and over range diagnostics
- Display for module diagnostics and input 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:

- NX6020 module
- 20-terminal connector with wire holder

2.2. Product Code

The following code should be used to purchase the product:

Code	Description
NX6020	8 AI RTD 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), reducing 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.

iF Product Design Award 2012: NX-ERA 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..

5. Product Characteristics

5.1. General Characteristics

	NX6020
Backplane rack occupation	1 slot
Number of inputs	8 analog inputs
Input type	Individually configurable inputs Resistances: 0 to 400 Ω, 0 to 4000 Ω and 0 to 10000 Ω Sensors RTD: Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni200, Ni500, Ni1000 and Cu10
Data format	16 bits in two's complement, justified to the left
Converter resolution	24 bits monotonicity guaranteed, no missing codes
Input state indication	Yes
One Touch Diag (OTD)	Yes
Electronic Tag on Display (ETD)	Yes
Status and diagnostic indication	Display Web pages CPU's internal memory
Hot swap support	Yes
Module protection	Yes, protection against surge voltages
Wire gauge	0,5 mm^2 (20 AWG)
Minimum wire temperature rating	75 °C
Wire material	Copper only
Isolation Inputs to logic Inputs to protective earth ⏚ Logic to protective earth ⏚	 1500 Vac / 1 minute 1500 Vac / 1 minute 1500 Vac / 1 minute
Current consumption from backplane rack	300 mA
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
Net weight	200 g
Gross weight	250 g

Table 3: General Characteristics

Notes:

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

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. Standards and Certifications

Standards and Certifications	
IEC	61131-2: Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests
DNV	DNV Type Approval – DNV-CG-0339 (TAA000013D)
CE	2014/30/EU (EMC) 2014/35/EU (LVD) 2011/65/EU and 2015/863/EU (ROHS)
UKCA	S.I. 2016 No. 1091 (EMC) S.I. 2016 No. 1101 (Safety) S.I. 2012 No. 3032 (ROHS)
cULus LISTED	UL/cUL Listed – UL 61010-1 UL 61010-2-201 (file E473496)
EAC	TR 004/2011 (LVD) CU TR 020/2011 (EMC)

Table 4: Standards and Certifications

5.3. Temperature Mode Characteristics (RTD)

	NX6020
Precision (25 °C)	
0..400 Ω	± 0.1% of full scale rating
0..4000 Ω	± 0.1% of full scale rating
0..10000 Ω	± 0.1% of full scale rating
Pt(100, 200, 500, 1000)	± 1 °C
Ni(100, 120, 200, 500, 1000)	± 1 °C
Cu10	± 1.5 °C
Precision (0 to 60 °C)	
0..400 Ω	± 0.3% of full scale rating
0..4000 Ω	± 0.3% of full scale rating
0..10000 Ω	± 0.5% of full scale rating
Pt(100, 200, 500, 1000)	± 3 °C
Ni(100, 120, 200, 500, 1000)	± 2 °C

	NX6020
Cu10	± 4.5 °C
Additional error in case of open channel (interference between channels)	± 0.1% of full scale rating
Measurement unit	°C or °F
Input impedance	> 10 MΩ
Connection types	2 and 3 wires
Excitation current	1.02 mA
Continuous maximum voltage	± 15 Vdc
Noise Suppression Filter	Disabled, 50 Hz and 60 Hz
Conversion time for Ni, Pt, 400 Ω and 4000 Ω scales 50 Hz 60 Hz Disabled	 206 ms / channel 193 ms / channel 136 ms / channel
Conversion time for 10000Ω scale 50 Hz 60 Hz Disabled	 281 ms / channel 286 ms / channel 211 ms / channel
Conversion time for Cu10 scale 50 Hz 60 Hz Disabled	 806 ms / channel 793 ms / channel 736 ms / channel
Update time	It is the sum of conversion time of each channel enabled.
Low pass filter time constant	Disabled, 100 ms, 1 s and 10 s
Configurable parameters	Noise Suppression Filter Temperature Unit Input Type Wire Configuration Digital Filter
Open input detection	Yes, available in diagnostics
Over range indication	Yes
Under range indication	Yes
Sensor cable maximum impedance	20 Ω per wire

Table 5: Temperature Mode Characteristics (RTD)

Notes:

Noise suppression filter: The value of the selected filter in this parameter will be applied to all module reading inputs.

Conversion time: Time for conversion of one channel depending on the sensor type and filter configuration.

Update time: Time for updating the measured values (process data).

Open input detection: In this situation will be presented an over range indication and the read value presented will be the full scale rating selected.

Maximum impedance of the sensor cable: On a two-wire connection, the value read is the result of the sum of the sensor reading and resistance of each wire. In case of using this connection with large cables, the value read by the module will be affected by the effect of the resistance of the cable wires. On a three-wire connection, the error due to wire resistance is compensated by measuring the resistance value of one of the cable wires. Therefore, to enable a correct compensation is necessary for all the cable wires to have the same resistance.

Over range indication: When the input selected is RTD reading type and the sensor input value is greater than the maximum value of full scale for the range selected, the symbolic variable will be enabled. In this condition, besides enabling the diagnostic variable, the module will set the value read to the maximum value of full scale configured for this channel. In case of resistance reading, the diagnostic becomes active when the value read in the input is 1% greater than the maximum

value of full scale configured for this channel. If the value read exceeds 5% of the maximum value of full scale, the module will set the reading variable of this channel to this value.

Under range indication: This diagnostic becomes active when the input selected is RTD reading type and the value read in the channel is less than the minimum value of full scale for the selected range. E.g. for the Pt100E (-200 to +850 °C) scale, the diagnostics variable will be enabled when the measured value is less than -200 °C. In this condition, besides enabling the diagnostic variable, the module will set the value read to the minimum value of full scale configured for this channel. For resistance reading scale this diagnostic is not available.

The tables below show the functioning of over range and under range diagnostics according to the RTD sensor or applicable resistance scale.

Diagnostics	Sensors of Platinum type (Pt) α = 0.00385		Sensors of Platinum type (Pt) α = 0.003916	
	Temperature	Count	Temperature	Count
Over range	> 850 °C	8500	> 630 °C	6300
No diagnostics	-200 to 850 °C	-2000 to 8500	-200 to 630 °C	-2000 to 6300
Under range	< -200 °C	-2000	< -200 °C	-2000

Table 6: Over range and under range for sensors of Platinum type

Diagnostics	Sensors of Nickel type (Ni)		Sensors of Copper type (Cu)	
	Temperature	Count	Temperature	Count
Over range	> 250 °C	2500	> 260 °C	2600
No diagnostics	-60 to 250 °C	-600 to 2500	-200 to 260 °C	-2000 to 2600
Under range	< -60 °C	-600	< -200 °C	-2000

Table 7: Over range and under range for sensors of Nickel and Copper type

Diagnostics	0 to 400 Ω Scale		0 to 4000 Ω Scale		0 to 10000 Ω Scale	
	Resistance	Count	Resistance	Count	Resistance	Count
Over range	> 420 Ω	4200	> 4200 Ω	4200	> 10500 Ω	10500
	404.1 to 420 Ω	4041 to 4200	4041 to 4200 Ω	4041 to 4200	10101 to 10500 Ω	10101 to 10500
No diagnostics	0 to 404 Ω	0 to 4040	0 to 4040 Ω	0 to 4040	0 to 10100 Ω	0 to 10100

Table 8: Over range for Resistances

The table below presents the types of configurable inputs supported by NX6020 module.

Input type	Temperature Coefficient (α)	Measurement Band	Count	Resolution
Pt100E, Pt200E, Pt500E, Pt1000E	0.00385	-200 to 850 °C -328 to 1562 °F	-2000 to 8500 -3280 to 15620	0.1 °C 0.2 °F
Pt100A, Pt200A, Pt500A, Pt1000A	0.003916	-200 to 630 °C -328 to 1166 °F	-2000 to 6300 -3280 to 11660	0.1 °C 0.2 °F
Ni100, Ni200, Ni500, Ni1000	0.00618	-60 to 250 °C -76 to 482 °F	-600 to 2500 -760 to 4820	0.1 °C 0.2 °F
Ni120	0.00672	-60 to 250 °C -76 to 482 °F	-600 to 2500 -760 to 4820	0.1 °C 0.2 °F
Cu10	0.00427	-200 to 260 °C -328 to 500 °F	-2000 to 2600 -3280 to 5000	0.1 °C 0.2 °F
400 Ω	-	0 to 400 Ω	0 to 4000	0.1 Ω
4000 Ω	-	0 to 4000 Ω	0 to 4000	1 Ω
10000 Ω	-	0 to 10000 Ω	0 to 10000	1 Ω

Table 9: Types of Inputs

Note:

Temperature Coefficient (α): For the Platinum type sensors (Pt100, Pt200, Pt500 and Pt1000) there are two supported coefficients. For other types of sensors there is only one associated temperature coefficient. In the Module Parameters the possible settings per channel can be found.

5.4. Compatibility with Other Products

The following table brings information regarding the compatibility between NX6020 module and other products of NX-ERA
Series.

NX6020			Compatible Software Version		
Version	Revision	Feature	NX30x0	NX5110 and NX5210	MasterTool IEC XE
1.0.0.0	AA	-	1.4.0.0 or higher	-	2.00 or higher
1.1.0.0 or higher	AC	0 to 10000 Ω scale		1.1.1.0 or higher	2.03 or higher

Table 10: Compatibility with Other Products

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.

5.5. Physical Dimensions

Dimensions in mm.

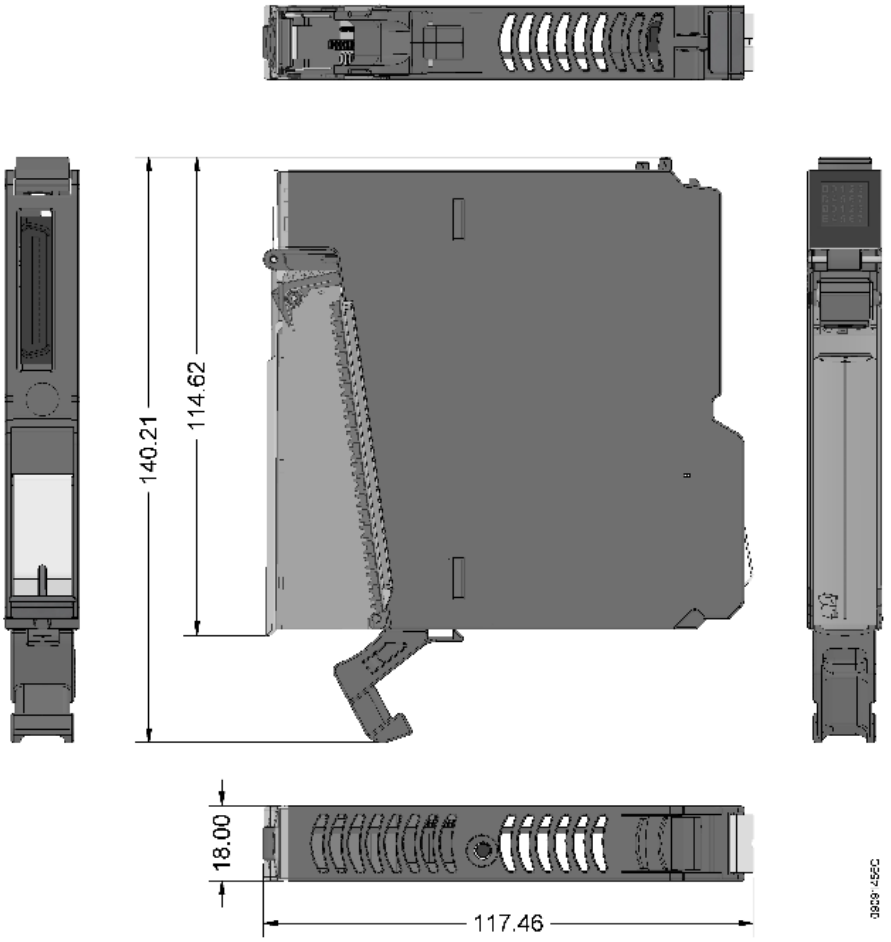

Figure 1: Physical Dimensions

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.

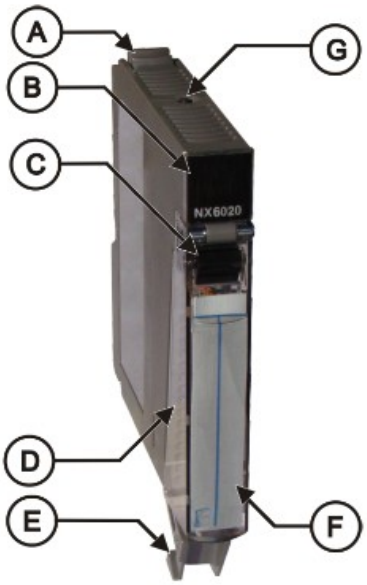

Figure 2: NX6020

Ⓐ 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 where some inputs of NX6020 module are used: input 00, input 02, input 03 and input 06. Each one of these inputs presents a different type of connection, according to the following.

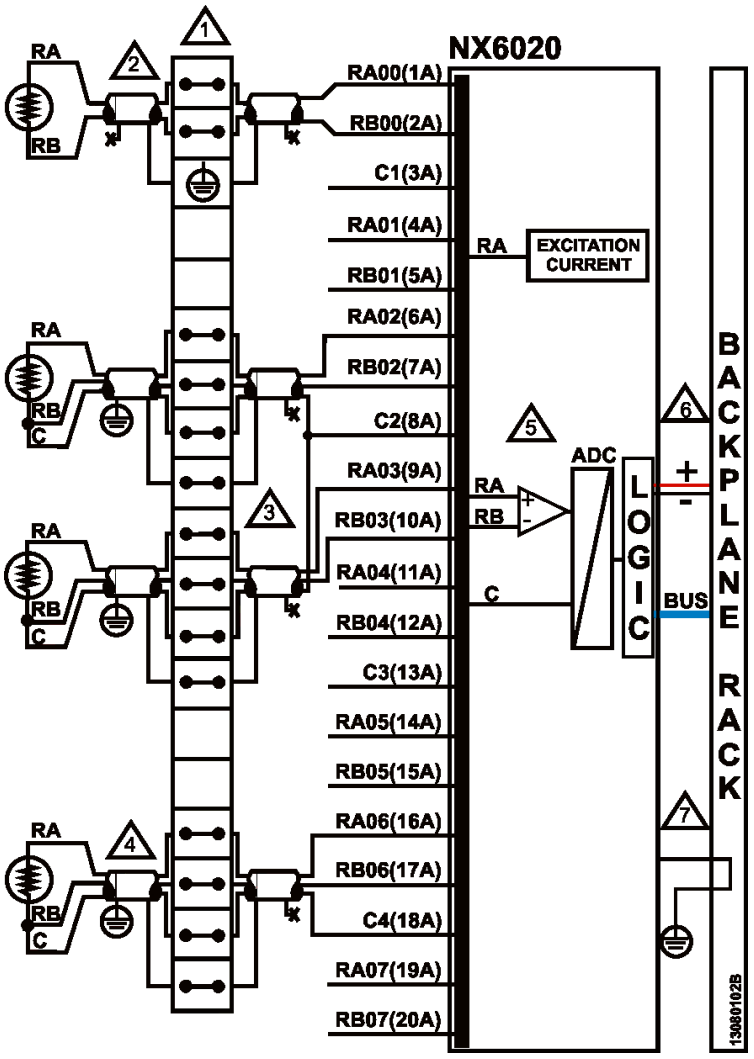

Figure 3: Electrical Installation

Diagram Notes:

1. The diagram above has the representation a set of terminal blocks where each symbol represents a different kind of terminal block: ⊷ represents a standard feed-through terminal block, ⏚ represents a grounding terminal block and ⊷ represents a feed-through terminal block with connection to other terminal block.

2. Input 00 is connected to an RTD temperature sensor and shows an example of a 2-wire connection. In this case only one of the ends of the sensor grounding shield in the field and the cable used to connect the module NX6020 to the terminals of the electric panel are being connected to the earth terminal of the electric panel. In this type of connection, the other end of each cable must not be connected to other grounding point.

3. Inputs 02 and 03 show examples of 3-wire connection, where the compensation wire of the sensors are connected to the NX6020 module at one single point (C2), which refers to the ports 02 and 03.

4. Input 06 shows an example of a 3-wire connection, where the central point of grounding is done in the field. One end of the sensor grid in the field is connected to field grounding point and the other end is connected to the electric panel terminal board. The cable grid used to connect the electric panel terminal board to the NX6020 module terminals is connected in only one of its ends (which are connected to the electric panel terminal board).

5. The use of RA, RB and C signal depends on the number of wires used in the sensor connection.

6. The module power supply is derived from the connection to the backplane rack, not requiring external connections.

7. The NX6020 module is grounded ⏚ through the backplane rack.

Protective conductor terminal.

6.3. Connector Pinout

The following table shows the description of each connector terminal:

Terminal	Input	Description
1A	00	RTD positive signal (excitation current for sensor 2/3 wire)
2A		RTD negative signal
3A	Common	Compensation for 3-wire sensor
4A	01	RTD positive signal (excitation current for sensor 2/3 wire)
5A		RTD negative signal
6A	02	RTD positive signal (excitation current for sensor 2/3 wire)
7A		RTD negative signal
8A	Common	Compensation for 3-wire sensor
9A	03	RTD positive signal (excitation current for sensor 2/3 wire)
10A		RTD negative signal
11A	04	RTD positive signal (excitation current for sensor 2/3 wire)
12A		RTD negative signal
13A	Common	Compensation for 3-wire sensor
14A	05	RTD positive signal (excitation current for sensor 2/3 wire)
15A		RTD negative signal
16A	06	RTD positive signal (excitation current for sensor 2/3 wire)
17A		RTD negative signal
18A	Common	Compensation for 3-wire sensor
19A	07	RTD positive signal (excitation current for sensor 2/3 wire)
20A		RTD negative signal

Table 11: Connector Pinout

Note:

NX6020 module has no grounding terminals through the connector. The grounding is done through the terminal board or in the field sensor as described in the Electrical Installation.

6.4. Mechanical and Electrical Assembly

The mechanical and electrical mounting and the connector pin 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 are the variables used to access the module. The table below describes all the variables made available by this module when declared on the CPU or MODBUS Head bus.

In addition to the data in the table, this product 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
%IW(n)	WORD	AI 00	Analog Input 00	INT (Reading)	Always
%IW(n+2)	WORD	AI 01	Analog Input 01	INT (Reading)	Always
%IW(n+4)	WORD	AI 02	Analog Input 02	INT (Reading)	Always
%IW(n+6)	WORD	AI 03	Analog Input 03	INT (Reading)	Always
%IW(n+8)	WORD	AI 04	Analog Input 04	INT (Reading)	Always
%IW(n+10)	WORD	AI 05	Analog Input 05	INT (Reading)	Always
%IW(n+12)	WORD	AI 06	Analog Input 06	INT (Reading)	Always
%IW(n+14)	WORD	AI 07	Analog Input 07	INT (Reading)	Always

Table 12: Process Data

Note:

Update: The field “Update” indicates if the respective process data is updated by CPU and NX6020 module by default. 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 NX6020 module through the bus, to improve CPU performance. It is recommended to update only the process data that will be used in the application.

7.1.1. PROFIBUS Data

When the module is inserted on the bus of a PROFIBUS Head, the variable type will be WORD. In this case, we recommend using symbolic variables of type INT, declared with the AT directive at the same addresses as the direct variables. Example, considering the direct variable %IW(n) from the previous table:

```
iChannel_0 AT %IW(n): INT;
```

The values sent by PROFIBUS are of integer type. For example, on a channel configured as Pt100E (-200°C to 850°C), the temperature of -200°C will be converted to a value of -2000.

7.2. Module Parameters

Name	Description	Standard Value	Options	Configuration
Noise Suppression Filter	Noise suppression filter frequencies	60 Hz	Disabled 50 Hz 60 Hz	Per module
Temperature Unit	Selects the temperature unit	Degree Celsius	Degree Celsius Degree Fahrenheit	Per module
Input Type	Configuration of the input type	Not Configured	Not configured 400 Ω 4000 Ω 10000 Ω Pt100A Pt100E Pt200A Pt200E Pt500A Pt500E Pt1000A Pt1000E Ni100 Ni120 Ni200 Ni500 Ni1000 Cu10	Per channel
Wire Configuration	Configures the wire connection type	Two Wires	Two wires Three wires	Per channel
Digital Filter	Configures the time or disables the low pass filter	Disabled	Disabled 100 ms 1 s 10 s	Per channel
%Q Start Address of Module Diagnostics	Defines the start address of the module diagnostics	-	-	Per module

Table 13: Module Parameters

Notes:

Configuration: Indicates whether certain functionality of the module is related to an entire module configuration (per module), or if the functionality is related to a single input (per channel).

Noise Suppression Filter: This parameter is used to select the frequency of the noise suppression filter which is applied to all NX6020 module inputs. This filter rejects a particular frequency in the analog signal measurements. For each frequency configured there is an associated conversion time which must be regarded during the development of an application in the channels reading. For further information on the conversion time according to the selected filter, see the Temperature Mode Characteristics (RTD).

Input Type: Exclusively for the RTD sensors of Platinum type (Pt100, Pt200, Pt500 and Pt1000), this module supports two temperature coefficients (α), which are different from each other by its last character. For the option which ends with A the α is 0.003916 and for the option with E α is 0.00385. For information on the values of the temperature coefficients used for each type of RTD sensor, see the Temperature Mode Characteristics (RTD).

Digital Filter: This parameter enables or disables, per channel, a first order low pass digital filter with time constant of 100 ms, 1 s or 10 s. If there is a signal in a channel with the digital filter enabled and a hot swap is performed in the module, the channel will start with zero until it reaches the input value, according to the selected time constant, in a dynamic way.

8. Usage

8.1. RTD Analog Input Read

NX6020 module has one variable for each input. The parameters of minimum value and maximum value are automatically configured according to the selected RTD type.

NX6020 module has one variable for each input, which will be presented in the temperature scale defined in the Temperature Unit, where the value is multiplied for 10. Thus, a 25 °C temperature, for example, is read as 250.

9. Maintenance

Messung 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.

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 mapped to internal memory.

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 14: 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 analog modules, the numerical characters show the respective state of each input. When the numerical character is on, the respective input is configured and enabled, and if the numerical character is off, the respective input is disabled. 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 inputs and outputs. In NX6020 module's case, the characters that are placed at the right side of character 0 represent the inputs from 00 to 07, where character 0 represents the input 00 and character 7 represents the input 07. The characters that are placed at the right side of character 1 and the segment 1 itself are not used in NX6020 module. The figure below shows the relationship between the numerical characters and the respective inputs.

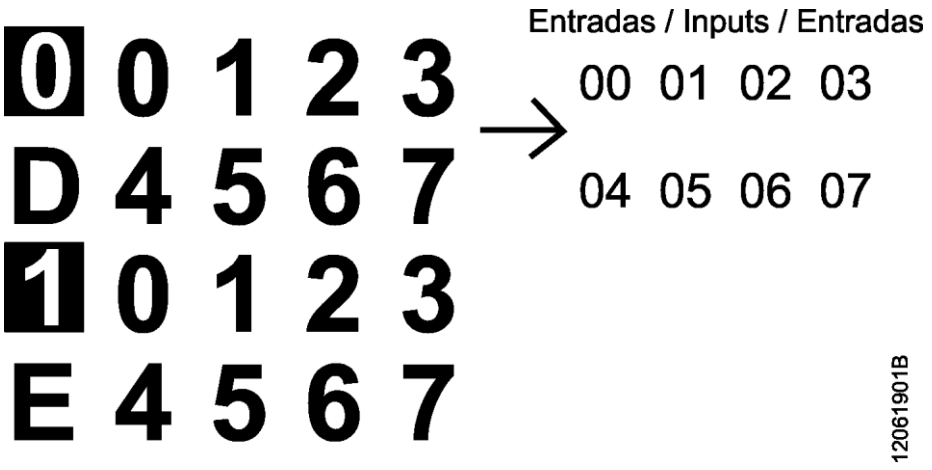

Figure 4: Numerical Characters

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_NX6020.tGeneral.*	Description	PROFIBUS Message Code
Variable	Bit				
%QB(n)	0	INPUT 00 W/ DIAG	bActiveDiagnosticsInput00	TRUE – Input 00 has active diagnostics	-
		-		FALSE – Input 00 has no active diagnostics	
	1	INPUT 01 W/ DIAG	bActiveDiagnosticsInput01	TRUE – Input 01 has active diagnostics	-
		-		FALSE – Input 01 has no active diagnostics	
	2	INPUT 02 W/ DIAG	bActiveDiagnosticsInput02	TRUE – Input 02 has active diagnostics	-
		-		FALSE – Input 02 has no active diagnostics	
	3	INPUT 03 W/ DIAG	bActiveDiagnosticsInput03	TRUE – Input 03 has active diagnostics	-
		-		FALSE – Input 03 has no active diagnostics	
	4	INPUT 04 W/ DIAG	bActiveDiagnosticsInput04	TRUE – Input 04 has active diagnostics	-
		-		FALSE – Input 04 has no active diagnostics	
	5	INPUT 05 W/ DIAG	bActiveDiagnosticsInput05	TRUE – Input 05 has active diagnostics	-
		-		FALSE – Input 05 has no active diagnostics	
	6	INPUT 06 W/ DIAG	bActiveDiagnosticsInput06	TRUE – Input 06 has active diagnostics	-
		-		FALSE – Input 06 has no active diagnostics	
	7	INPUT 07 W/ DIAG	bActiveDiagnosticsInput07	TRUE – Input 07 has active diagnostics	-
		-		FALSE – Input 07 has no active diagnostics	
	0	MODULE W/ DIAGNOSTICS	bActiveDiagnostics	TRUE – Module has active diagnostics	-

Direct Variable		Diagnostic Message	Symbolic Variable DG_NX6020.tGeneral.*	Description	PROFIBUS Message Code
Variable	Bit				
%QB(n+1)		NO DIAG		FALSE – Module has no 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	OTD SWITCH ERROR	bOTDSwitchError	TRUE – Module has diagnostic switch failure	28
		-		FALSE – Diagnostic switch ok	
	5..7	Reserved			

Table 15: General Diagnostics

9.4.2. Detailed Diagnostics

Direct Variable		Diagnostic Message	Symbolic Variable DG_NX6020.tDetailed .tAnalogInput_XX.*	Description	PROFIBUS Message Code
Variable	Bit				
%QB(n+2 +XX*2)	0..7	Reserved			
%QB(n+2+ 2*XX+1)	0	OVER RANGE	bOverRange	TRUE – Input data are over range	24
		-		FALSE – Input data are ok	
	1	UNDER RANGE	bUnderRange	TRUE – Input data are under range	25
		-		FALSE – Input data are ok	
	2	Reserved			
	3	-	bInputNotEnable(1)	TRUE – Input is not enabled	-
		-		FALSE – Input is enabled	
	4..7	Reserved			

Table 16: Detailed Diagnostics

Notes:

(1): This diagnosis does not apply to the module when declared on the Profibus Heads or PROFINET Heads bus. It is valid only when the module is declared on the UCPs or MODBUS Heads bus.

Direct Representation Value: “n” is the address defined in the field %Q Start Address of Module Diagnostics Area on the NX6020 module’s configuration screen – Module 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 into the addressing memory, then the AT directive is used to map the symbolic variables in the addressing memory. 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.

9.5. 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	English
MU299609	MasterTool IEC XE User Manual	English
MP399609	MasterTool IEC XE Programming Manual Manual	English
MU214608	NX-ERA PROFIBUS-DP Head Utilization Manual	English

Table 17: Related Documents