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## 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.

NX6000 brings the two most used analog interfaces in a single product, delivering to the end user an extremely versatile option. NX6000 has eight analog inputs which can be individually configured as voltage input or current input. Also, this module provides different scales for both voltage and current inputs. Due to a high speed conversion and resolution, NX6000 can reach fast I/O requirements commonly seen in machinery automation. Besides, due to its configurable filters, it also can be used in process automation where both low pass filter and notch filter are normally required. Finally, it has some innovative features brought by Nexto Series such as Electronic Tag on Display, Easy Plug System and One Touch Diag.



Its main features are:

- Eight inputs in a single width module
- Galvanic isolation between inputs and internal logic
- Protection against surge voltage
- Under range, over range and open loop diagnostics
- Display for module diagnostics and input state indication
- Under range and over range diagnostics
- Easy Plug System
- One Touch Diag
- Electronic Tag on Display

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## Ordering Information

### Included Items

The product package contains the following items:

- NX6000 module
- 20-terminal connector with wire holder
- Installation guide

### Product Code

The following code should be used to purchase the product:

Code	Description
NX6000	8 AI Voltage/Current Module

### Related Products

The following product must be purchased separately when necessary:

Code	Description
NX9403	20-terminal connector with wire holder

### 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 NX6000 module:



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



**One Touch Diag:** One Touch Diag is a 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 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

	NX6000
Backplane rack occupation	1 slot
Number of inputs	8 analog inputs
Input type	Voltage or current input, single ended, individually configured
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 and CPU's internal memory
Hot swap capability	Yes
Module protections	Yes, protection against surge voltages
Isolation	
Input to logic	1500 Vac / 1 minute
Input to protective earth 	1500 Vac / 1 minute
Logic to protective earth 	1250 Vac / 1 minute
Current consumption from backplane rack power supply	270 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
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

**Note:**

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

**Voltage Mode Features**

NX6000 – Voltage Mode		
Input ranges	Range	Resolution
	0 to 10 Vdc	159.80 $\mu$ V
	-5 a 5 Vdc	159,80 $\mu$ V
	-10 to 10 Vdc	319.60 $\mu$ V
Precision	$\pm 0.1$ % of full scale rating @ 25 °C $\pm 0.005$ % of full scale rating / °C	
Over scale	$\pm 4.8$ % of full scale rating for all voltage ranges	
Maximum input voltage	30 Vdc	
Scanning time	1 ms with one channel enabled 6 ms with all channels enabled	
Input impedance	> 1 M $\Omega$	
Configurable parameters	Signal type per input Measurement range per input Filters Alarms	
Noise suppression filter	60 Hz, 50 Hz, 16.6 Hz, 10 Hz or disabled	
Low pass filter	1 <sup>st</sup> order digital filter	
Low pass filter time constant	100 ms, 1 s, 10 s or disabled	

**Current Mode Features**

NX6000 – Current Mode		
Input ranges	Range	Resolution
	0 to 20 mA	322.18 nA
	4 to 20 mA	322.18 nA
	-20mA to 20 mA	644.36 nA
Precision	$\pm 0.1$ % of full scale rating @ 25 °C $\pm 0.005$ % of full scale rating / °C	
Over scale	$\pm 4.8$ % of full scale rating for all current ranges	
Maximum input voltage	30 Vdc	
Scanning time	1 ms with one channel enabled 6 ms with all channels enabled	
Input impedance	135 $\Omega$ , when in current input or non-configured mode	
Configurable parameters	Signal type per input Measurement range per input Filters Alarms	
Noise suppression filter	60 Hz, 50 Hz, 16.6 Hz, 10 Hz or disabled	
Low pass filter	1st order digital filter	
Low pass filter time constant	100 ms, 1 s, 10 s or disabled	

**Notes:**

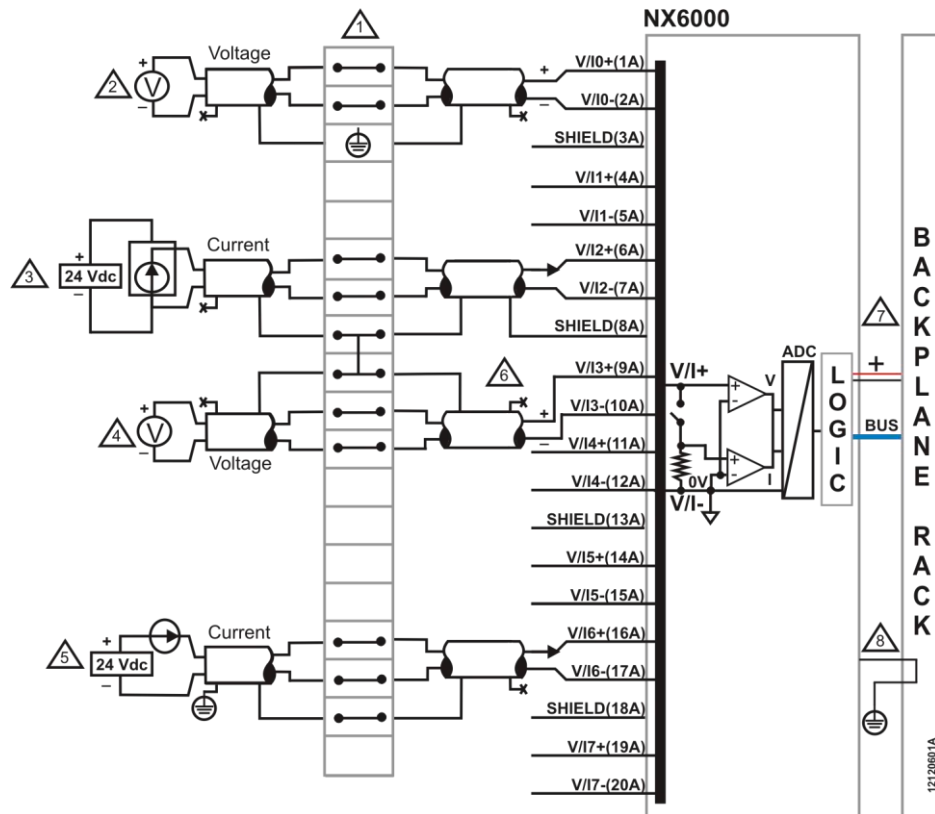
**Input ranges:** The presented resolutions are the optimal delivered by the hardware.

**Noise Suppression Filter:** When this parameter is configured, the filter value is applied to all analog inputs.

## Installation

### Electrical Installation

The figure below shows an example where four inputs are used: input 00, input 02, input 03 and input 06. Each input presents a different connection, explained below.



#### 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, represents a feed-through terminal block with connection to other terminal block and represents a fuse terminal block.

2 - Input 00 is connected to a standard voltage output module, normally a transducer placed on the field.

3 - Input 02 is connected to a current output module, normally a transducer. This kind of transducer has different pins for power supply and for current output.

4 - Input 03 is connected to a standard voltage output module, normally a transducer placed on the field.

5 - Input 06 is connected to a current output module, normally a transducer. This kind of transducer, different than the example above, uses the same pins for power supply and current output. In this case, only 4 to 20 mA scale is possible to be used.

2, 3, 4, 5 – The examples show 3 different ways to connect the cable shielding.

2 - The cable shielding of the input 00 is connected to the grounding terminal block.

3, 4 - The cable shielding of the input 02 and input 03 is connected to the SHIELD pin which is shared between these two inputs.

5 - The cable shielding of the input 06 is connected to the earth close to the device on the field

2,3,4,5 – In all examples the cable shielding is connected only in one point.

6 - There is one SHIELD pin for each pair of analog inputs.

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

8 - NX6000 is connected to the protective earth through the backplane rack.

### Connector Pinout

The following table shows the description of each connector terminal:

Terminal Number	Description
1	Current / Voltage input 00
2	Reference input 00
3	Shield
4	Current / Voltage input 01
5	Reference input 01
6	Current / Voltage input 02
7	Reference input 02
8	Shield
9	Current / Voltage input 03
10	Reference input 03
11	Current / Voltage input 04
12	Reference input 04
13	Shield
14	Current / Voltage input 05
15	Reference input 05
16	Current / Voltage input 06
17	Reference input 06
18	Shield
19	Current / Voltage input 07
20	Reference input 07

### Mechanical Assembly

The mechanical and electrical mounting and the connector pin 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 NX6000 and other Nexto Series products.

NX6000			Compatible Software Version	
Version	Revision	Feature	NX5110 e NX5210	MasterTool IEC XE
1.0.0.0	AA	-	-	1.26 or higher
1.0.1.2 or higher	AF or higher	-	-	1.29 or higher
1.3.0.0 or higher	AH or higher	±5 Vdc scale	1.1.1.0 or higher	2.03 or higher

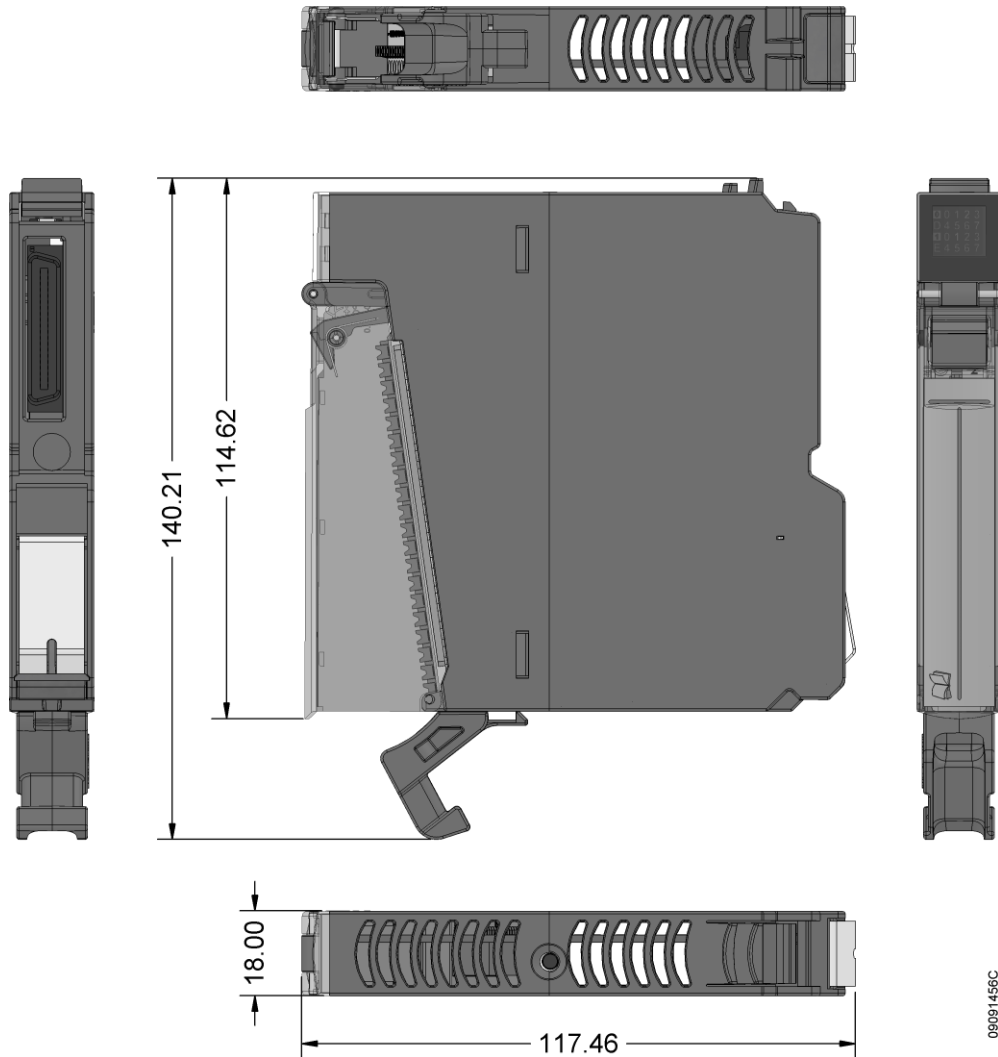
#### Note:

**Revision:** If the software 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

NX6000 was developed to be used with Nexto Series products. All Nexto Series products are configured in the MasterTool IEC XE. All configuration data of a given module can be accessed through a double click in it on the Graphical Editor.

## Process Data

Process Data are the variables that are used to access and control NX6000. The list below describes all variables delivered by NX6000.

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 these data, NX6000 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 (Read)	Always
%IW(n+2)	WORD	AI 01	Analog Input 01	INT (Read)	Always
%IW(n+4)	WORD	AI 02	Analog Input 02	INT (Read)	Always
%IW(n+6)	WORD	AI 03	Analog Input 03	INT (Read)	Always
%IW(n+8)	WORD	AI 04	Analog Input 04	INT (Read)	Always
%IW(n+10)	WORD	AI 05	Analog Input 05	INT (Read)	Always
%IW(n+12)	WORD	AI 06	Analog Input 06	INT (Read)	Always
%IW(n+14)	WORD	AI 07	Analog Input 07	INT (Read)	Always

### Note:

**Update:** The field "Update" indicates if the respective process data is updated by CPU and NX6000 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 NX6000 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	Options	Configuration
Noise Suppression Filter	Frequency of the noise filter	60 Hz	Disabled 10 Hz 16.6 Hz 50 Hz 60 Hz	Per module
Type	Type and scale of a given input	Voltage 0 - 10 Vdc	Voltage 0 - 10 Vdc Voltage $\pm$ 5 Vdc Voltage $\pm$ 10 Vdc Current 0 - 20 mA Current 4 - 20 mA Current -20 - 20 mA	Per input
Min Value	Minimum value for engineering scale	0	-	Per input
Max Value	Maximum value for engineering scale	30000	-	Per input
Digital Filter	First order digital filter time constant (ms)	Disabled	Disabled 100 ms 1 s 10 s	Per input
Open Loop Value	Value when in open loop condition (only valid for 4 - 20 mA scale)	Min Value	0 Min Value Max Value Keep last value	Per input
Alarms - Enabled	Enable or disable alarms triggering feature	FALSE	FALSE TRUE	Per input
Alarm - HH Setpoint	Alarm - High-High Setpoint	0	-	Per input
Alarm - H Setpoint	Alarm - High Setpoint	0	-	Per input



Alarm – L Setpoint	Alarm – Low Setpoint	0	-	Per input
Alarm – LL Setpoint	Alarm – Low-Low Setpoint	0	-	Per input
%Q Start Address of Module Diagnostics Area	Defines the start address of the module diagnostics area	-	-	Per module

**Notes:**

**Noise Suppression Filter:** For further information about this parameter, consult Noise Suppression Filter section. If a signal is present on a channel with filter enabled and a hot-swap is performed in the module, the channel will start with a value of zero to dynamically, according to the selected time constant, reach the present value at the input.

**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.

**Min and Max Value:** These parameters can be configured in any value from -30000 to 30000, as long as the Max Value is larger than the Min Value.

**Alarm Setpoints:** These parameters must be within the range configured in the Min and Max Value fields, described above.

**Noise Suppression Filter**

This parameter enables or disables a filter that rejects a particular frequency in the measurements, but this rejection includes a delay per enabled input for data acquisition, which depends on the selected frequency. It is important to consider the delays presented in the table below while developing an application.

Noise Suppression Frequency	Conversion Time (per Input)
Disabled	600 us
10 Hz	200 ms
16.6 Hz	120 ms
50 Hz	40 ms
60 Hz	35 ms

**Module Usage****General Purpose Input Read**

NX6000 has one variable for each input. The parameters Min Value and Max Value are used by the module to convert the analog input value to the corresponding engineering value.

**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.

NX6000 offers five important features to assist the user during maintenance: Electronic Tag on Display, One Touch Diag, Status and diagnostics indicators, web page with complete status and diagnostics list and status and diagnostics mapped to internal memory.



**Electronic Tag on Display and One Touch Diag**

Electronic Tag on Display and One Touch Diag are important features that provides for 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 diagnostics information of the module. To access the respective module description, just long press (longer than 1 s) 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 Diagnostic Indicators**

All 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.

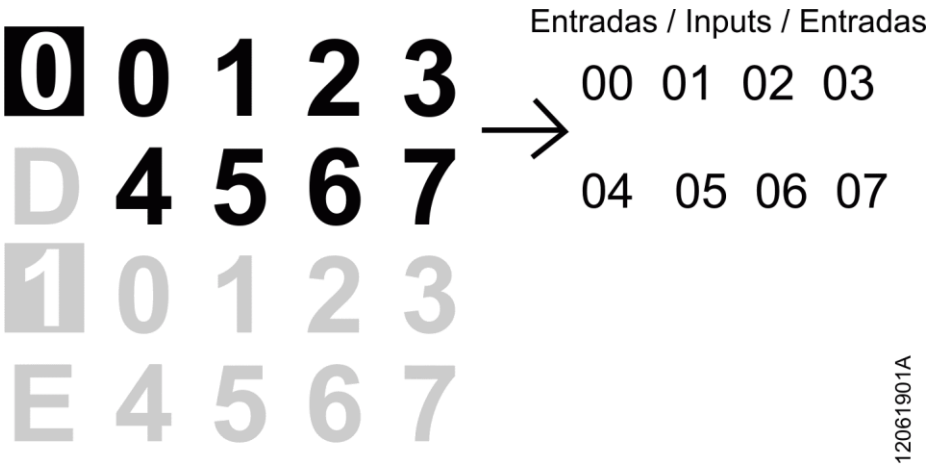
The meaning of the numerical characters can be different for specific modules. In case of analog modules, the numerical characters show the respective state of each input. When the numerical character is on, the respective input is configured and enabled, and if the numerical character is off, the respective input is disabled. The relationship between the input number and its respective numerical character can be found on the following figure.

### D and E States

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 NX6000	Check what the active diagnostic is. More information can be found at section Diagnostics Mapped to Variables 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 2x	Loss of master	Loss of communication between module and CPU or module and PROFIBUS head	Check if the module is completely connected to the backplane rack Check if CPU is in RUN mode or if PROFIBUS head is Active.	4
Off	Blinking 3x	Module without calibration	NX6000 isn't calibrated or there was an error with the calibration value	In this case, the module should return to the manufacturer	3
Off	Blinking 1x	Parameterization error	NX6000 isn't parameterized or didn't receive the new parameterization	-	2
Off	Blinking 4x	Fatal hardware fault	-	In this case, the module should return to the manufacturer	1 (Higher)

### 0, 1 and Numerical Characters

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 NX6000 only the character 0 is on. The figure below shows the relation between numerical characters and the respective input.



**Web Page with Complete Status and Diagnostic List**

Another way to access diagnostic 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 diagnostic list can be found at Nexto Series CPUs User Manual – MU214605.

**Diagnostics Mapped to Variables**

All NX6000'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 addressing memory. Altus recommends use symbolic variables for diagnostic accessing. The table below shows all available diagnostics for NX6000 and their respective memory address, description, symbolic variable and string 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	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	
%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 – Diagnostic switch failure	28
		-		FALSE – Diagnostic switch ok	
	5	CALIBRATION ERROR	bCalibrationError	TRUE – Module without calibration	29
		-		FALSE – Module calibrated	
	6..7	Reserved			

## Detailed Diagnostics

Direct Representation Variable		Diagnostic Message	Symbolic Variable DG_modulename.tDetailed.t AnalogInput_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 is over range	24
		-		FALSE – Input data is ok	
	1	UNDER RANGE	bUnderRange	TRUE – Input data is under range	25
		-		FALSE – Input data is ok	
	2	OPEN LOOP	bOpenLoop	TRUE – Input is open	26
		-		FALSE – Input is ok	
	3	-	bInputNotEnable	TRUE – Input is not enable	-
				FALSE – Input is enable	
	4	-	bHHiAlarm	TRUE – Hi Hi Alarm is active	-
				FALSE – Hi Hi Alarm is not active	
	5	-	bHAlarm	TRUE – Hi Alarm is active	-
				FALSE – Hi Alarm is not active	
	6	-	bLLAlarm	TRUE – Lo Lo Alarm is active	-
				FALSE – Lo Lo Alarm is not active	
	7	-	bLAlarm	TRUE – Lo Alarm is active	-
				FALSE – Lo Alarm is not active	

## Notes:

**Open Loop Diagnostic:** This diagnostics only applies to channels configured as 4 – 20 mA input current, and is set when the input current is lower than 3 mA.

**Under Range:** This diagnostics turns true when the input value is 1% of the full scale rating below the scale. E.g. for the 0 to 10 Vdc scale, under range diagnostics turns true for measurements below -0.1 Vdc.

**Over Range:** This diagnostics turns true when the input value is 1% of the full scale rating above the scale. E.g. for the 0 to 10 Vdc scale, over range diagnostics turns true for measurements above 10.1 Vdc.

**Direct Representation Variable:** “n” is the address defined in the field %Q Start Address of Diagnostic Area on the NX6000's 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 into the addressing memory, then the AT directive is used to map the symbolic variables in the addressing memory. 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 inside of Diagnostics object.

## 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 NX6000. The complete and updated table containing all documents of Nexto Series can be found at Nexto Series User Manual – MU214600.

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