

## 1. Product Description

Nexto Series programmable controllers are the ultimate solution for industrial automation and system control. With high technology embedded, the products of the family are able to control, in a distributed and redundant way, complex industrial systems, machines, high performance production lines and the most advanced processes of Industry 4.0. Modern and high-speed, the Nexto series uses cutting-edge technology to provide reliability and connectivity, helping to increase the productivity of different businesses.

Compact, robust and with high availability, the series products have excellent processing performance and rack expansion possibilities. Its architecture allows easy integration with supervision, control and field networks, in addition to PLC redundancy. The series equipment also offers advanced diagnostics and hot swapping, minimizing or eliminating maintenance downtime and ensuring a continuous production process.



Its main features are:

- Up to 32 Kbytes of %I points and 32 Kbytes of %Q points
- Large memory capacity for user application and user data
- Up to 7.5 Kbytes of retain or persistent memory
- High-speed 32-bit processing
- Floating point unit
- 1 serial ports
- 1 Ethernet interfaces at front panel
- Enhanced diagnostics services
- System messages log
- OPC DA/UA, PROFINET, SNMP and EtherNet/IP protocols
- Support clock synchronization via SNTP
- Web server features
- Integrated power supply
- One Touch Diag
- IEC 61131-3 compliant
- Real-time clock (RTC)
- Compact and modern design
- Free of moving parts (fans, active cooling, etc.)

## 2. Ordering Information

### 2.1. Included Items

The product package contains the following items:

- NX3004 module
- 6-terminal connector with fixing

### 2.2. Product Code

The following code should be used to purchase the product:

Code	Description
NX3004	CPU, 1 Ethernet port, 1 serial channel, remote rack expansion support and power supply integrated

Table 1: Product Code

## 3. Related Products

The following products must be purchased separately when necessary:

Code	Description
MT8500	MasterTool IEC XE
AL-2600	RS-485 network branch and terminator
AL-2306	RS-485 cable for MODBUS or CAN network
AL-1763	CMDB9-Terminal Block Cable
NX9202	RJ45-RJ45 2 m Cable
NX9205	RJ45-RJ45 5 m Cable
NX9210	RJ45-RJ45 10 m Cable
NX9404	6-terminal connector with fixing
NX9020	2-Slot base for panel assembly
NX9000	8-Slot Backplane Rack
NX9001	12-Slot Backplane Rack
NX9002	16-Slot Backplane Rack
NX9003	24-Slot Backplane Rack
NX9010	8-Slot Backplane Rack (No Hot Swap)

Table 2: Related Products

#### Notes:

**MT8500:** MasterTool IEC XE is available in four different versions: LITE, BASIC, PROFESSIONAL and ADVANCED. For more details, please check MasterTool IEC XE User Manual - MU299609.

**AL-2600:** This module is used for branch and termination of RS-422/485 networks. For each network node, an AL-2600 is required. The AL-2600 that is at the ends of network must be configured with termination, except when there is a device with active internal termination, the rest must be configured without termination.

**AL-2306:** Two shielded twisted pairs cable without connectors, used for networks based on RS-485 or CAN.

**AL-1763:** Cable with one DB9 male connector and terminal block for communication between CPUs of the Nexto Series and products with RS-485/RS-422 standard terminal block.

**NX9202/NX9205/NX9210:** Cables used for Ethernet communication and to interconnect the bus expansion modules.  
**NX9404:** 6 terminal connector.  
**NX9020:** 2 slot base for panel assembly.

## 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.



**Battery Free Operation:** Nexto Series does not require any kind of battery for memory maintenance and real time clock operation. This feature is extremely important because it reduces the system maintenance needs and allows the use in remote locations where maintenance can be difficult to be performed. Besides, this feature is environmentally friendly.



**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.



**Multiple Block Storage:** Several kinds of memories are available to the user in Nexto Series CPUs, offering the best option for any user needs. These memories are divided in volatile memories and non-volatile memories. For volatile memories, Nexto Series CPUs offer addressable input (%I), addressable output (%Q), addressable memory (%M), data memory and redundant data memory. For applications that require non-volatile functionality, Nexto Series CPUs bring retain addressable memory (%Q), retain data memory, persistent addressable memory (%Q), persistent data memory, program memory, source code memory, CPU file system (doc, PDF, data) and memory card interface.



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

**OFD – On Board Full Documentation:** Nexto Series CPUs are capable of storing the complete project documentation in its own memory. This feature can be very convenient for backup purposes and maintenance, since the complete information is stored in a single and reliable place.

**ETD – Electronic Tag on Display:** Another exclusive feature that Nexto 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.

**DHW – Double Hardware Width:** Nexto Series modules were designed to save space in user cabinets or machines. For this reason, Nexto Series delivers two different module widths: Double Width (two backplane rack slots are required) and Single Width (only one backplane rack slot is required). This concept allows the use of compact I/O modules with a high-density of I/O points along with complex modules, like CPUs, fieldbus masters and power supply modules.

**High-speed CPU:** All Nexto Series CPUs were designed to provide an outstanding performance to the user, allowing the coverage of a large range of applications requirements.



**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..

## 5. Product Features

### 5.1. Common General Features

	NX3004
<b>Backplane rack occupation</b>	2 sequential slots
<b>Power supply integrated</b>	Yes
<b>Ethernet TCP/IP local interface</b>	1
<b>Serial Interface</b>	1
<b>CAN Interface</b>	No
<b>USB Port Host</b>	No
<b>Memory Card Interface</b>	No
<b>Real time clock (RTC)</b>	Yes Resolution of 1 ms and maximum variance of 2 s per day.
<b>Watchdog</b>	Yes
<b>Status and diagnostic Indication</b>	Graphic display LEDs System Web Page CPU internal memory
<b>Programming languages</b>	Structured Text (ST) Ladder Diagram (LD) Sequential Function Chart (SFC) Function Block Diagram (FBD) Continuous Function Chart (CFC)
<b>Tasks</b>	Cyclic (periodic) Triggered by event (software interruption) Triggered by external event (hardware interruption) Continuous (freewheeling) Triggered by status (software interruption)
<b>Online changes</b>	Yes
<b>Maximum number of tasks</b>	16
<b>Maximum number of expansion bus</b>	1
<b>Bus expansion redundancy support</b>	Yes
<b>Maximum number of I/O modules on the bus</b>	32
<b>Maximum number of additional Ethernet TCP/IP interface modules</b>	0
<b>Ethernet TCP/IP interface redundancy support</b>	No
<b>Maximum number of PROFIBUS-DP network (using master modules PROFIBUS-DP)</b>	1
<b>PROFIBUS-DP network redundancy support</b>	No
<b>Redundancy support (half-clusters)</b>	No
<b>Hot Swap support</b>	Yes
<b>Event oriented data reporting (SOE)</b>	No
<b>Protocol</b>	-
<b>Maximum Event Queue Size</b>	-
<b>Web pages development (available through the HTTP protocol)</b>	No

NX3004	
One Touch Diag (OTD)	Yes
Electronic Tag on Display (ETD)	Yes

Table 3: Common Features

**Notes:**

**Real Time Clock (RTC):** The retention time, time that the real time clock will continue to update the date and time after a CPU power down, is 15 days for operation at 25 °C. At the maximum product temperature, the retention time is reduced to 10 days.

**Maximum number of I/O modules on bus:** The maximum number of I/O modules refers to the sum of all modules on the local bus and expansions.

## 5.2. Standards and Certifications

Standards and Certifications	
<b>IEC</b>	<p>61131-2: Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests</p> <p>61131-3: Programmable controllers - Part 3: Programming languages</p>
	DNV Type Approval – DNV-CG-0339 (TAA000013D)
<b>CE</b>	<p>2014/30/EU (EMC)</p> <p>2014/35/EU (LVD)</p> <p>2011/65/EU and 2015/863/EU (ROHS)</p>
<b>UK CA</b>	<p>S.I. 2016 No. 1091 (EMC)</p> <p>S.I. 2016 No. 1101 (Safety)</p> <p>S.I. 2012 No. 3032 (ROHS)</p>
	<p>UL/cUL Listed – UL 61010-1</p> <p>UL 61010-2-201 (file E473496)</p>
<b>EAC</b>	<p>TR 004/2011 (LVD)</p> <p>CU TR 020/2011 (EMC)</p>

Table 4: Standards and Certifications

### 5.3. Memory

	<b>NX3004</b>
<b>Addressable input variables memory (%I)</b>	32 Kbytes
<b>Addressable output variables memory (%Q)</b>	32 Kbytes
<b>Direct representation variable memory (%M)</b>	16 Kbytes
<b>Symbolic variable memory</b>	2 Mbytes
<b>Persistent or Retain symbolic variables memory</b>	7.5 Kbytes
<b>Full Redundant Data Memory</b>	-
<b>Direct representation input variable memory (%I)</b>	-
<b>Direct representation output variable memory (%Q)</b>	-
<b>Direct representation variable memory (%M)</b>	-
<b>Symbolic variable memory</b>	-
<b>Program memory</b>	3 Mbytes
<b>Source code memory (backup)</b>	32 Mbytes
<b>User files memory</b>	16 Mbytes

Table 5: Memory

### 5.4. Protocols

	<b>NX3004</b>	<b>Interface</b>
<b>Open Protocol</b>	Yes	COM1
<b>MODBUS RTU Master</b>	Yes	COM1
<b>MODBUS RTU Slave</b>	Yes	COM1
<b>MODBUS TCP Client</b>	Yes	NET1
<b>MODBUS TCP Server</b>	Yes	NET1
<b>MODBUS RTU over TCP Client</b>	Yes	NET1
<b>MODBUS RTU over TCP Server</b>	Yes	NET1
<b>CANopen Master</b>	No	-
<b>CANopen Slave</b>	No	-
<b>CAN low level</b>	No	-
<b>SAE J-1939</b>	No	-
<b>OPC DA Server</b>	Yes	NET1
<b>OPC UA Server</b>	Yes	NET1
<b>EtherCAT Master</b>	No	-
<b>SNMP Agent</b>	Yes	NET1
<b>SOE (Event-oriented data)</b>	No	-
<b>IEC 60870-5-104 Server</b>	No	-
<b>EtherNet/IP Scanner</b>	Yes	NET1
<b>EtherNet/IP Adapter</b>	Yes	NET1

	<b>NX3004</b>	<b>Interface</b>
<b>MQTT Client</b>	Yes	NET1
<b>SNTP Client (for clock synchronism)</b>	Yes	NET1
<b>PROFINET Controller</b>	Yes	NET1
<b>PROFINET Device</b>	No	-

Table 6: Protocols

**Note:**

**PROFINET Controller:** Enabled for use on a simple (not ring) network with up to 8 devices. For larger applications, consult technical support.

## 5.5. Serial Interface

### 5.5.1. COM 1


	<b>COM 1</b>
<b>Connector</b>	Shielded female DB9
<b>Physical interface</b>	RS-422 or RS-485 (depending on the selected cable)
<b>Communication direction</b>	RS-422: full duplex RS-485: half duplex
<b>RS-422 maximum transceivers</b>	11 (1 transmitter and 10 receivers)
<b>RS-485 maximum transceivers</b>	32
<b>Termination</b>	Yes (optional via cable selection)
<b>Baud rate</b>	200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
<b>Isolation</b>	
<b>Logic to Serial Port</b>	1000 Vac / 1 minute
<b>Serial Port to protection earth</b> 	1000 Vac / 1 minute

Table 7: COM 1 Serial Interface Features

**Notes:**

**Physical Interface:** Depending on configuration of the used cable, it is possible to choose the kind of physical interface: RS-422 or RS-485. The list of cables can be found at [Related Products](#) section.

**RS-422 Maximum Transceivers:** It is the maximum number of RS-422 transceivers that can be used on a same bus.

**RS-485 Maximum Transceivers:** It is the maximum number of RS-485 transceivers that can be used on a same bus.

## 5.6. Ethernet interface

### 5.6.1. NET 1

	NET 1
<b>Connector</b>	Shielded female RJ45
<b>Auto crossover</b>	Yes
<b>Maximum cable length</b>	100 m
<b>Cable type</b>	UTP or ScTP, category 5
<b>Baud rate</b>	10/100 Mbps
<b>Physical layer</b>	10/100 BASE-TX (Full Duplex)
<b>Data link layer</b>	LLC (Logical Link Control)
<b>Network layer</b>	IP (Internet Protocol)
<b>Transport layer</b>	TCP (Transmission Control Protocol) UDP (User Datagram Protocol)
<b>Diagnostic</b>	LEDs - green (speed), yellow (link/activity)
<b>Isolation</b> Ethernet interface to Se- rial Port	1500 Vac / 1 minute

Table 8: Ethernet NET 1 Interface Features

## 5.7. Environmental Characteristics

	NX3004
<b>Current consumption on the power supply rail</b>	-
<b>Dissipation</b>	4 W
<b>Operating temperature</b>	0 to 60 °C @ 15W 0 to 50 °C @ 20W
<b>Storage temperature</b>	-25 to 75 °C
<b>Relative humidity</b>	5% to 96%, non-condensing
<b>Conformal coating</b>	Yes
<b>IP Level</b>	IP 20
<b>Module dimensions (W x H x D)</b>	3.00 x 114.63 x 115.30 mm
<b>Package dimensions (W x H x D)</b>	44.00 x 122.00 x 147.00 mm
<b>Weight</b>	350 g
<b>Weight with package</b>	400 g

Table 9: Environmental Characteristics

**Notes:**

**Conformal coating of electronic circuits:** The covering of electronic circuits protects internal parts of the product against moisture, dust and other harsh elements to electronic circuits.



## 5.8. Power Supply



	<b>Power Supply</b>
<b>Nominal input voltage</b>	24 Vdc
<b>Maximum output power</b>	15W @ 60 °C 20W @ 50 °C
<b>Maximum output current</b>	3 A
<b>Input voltage</b>	19.2 to 30 Vdc
<b>Maximum input current (in-rush)</b>	30 A
<b>Maximum input current</b>	1.4 A
<b>Maximum input voltage interrupt time</b>	10 ms @ 24 Vdc
<b>Isolation</b>	
<b>Input to logic</b>	1000 Vac / 1 minute
<b>Input to protective earth</b> 	1500 Vac / 1 minute
<b>Input to functional earth</b> 	1000 Vac / 1 minute
<b>Cross section</b>	0.5 mm <sup>2</sup>
<b>Polarity inversion protection</b>	Yes
<b>Internal auto recovery fuse</b>	Yes
<b>Output short-circuit protection</b>	Yes
<b>Overcurrent protection</b>	Yes

Table 10: Power Supply Features

**Note:**

**Maximum output power:** To use the extended maximum output power, some conditions must be respected: use of Nexto Jet I/O modules only; reduction of maximum operating temperature; do not perform a hot swap of I/O modules, at the risk of affecting the system operation; modules NJ6000, NJ6010 and NJ6100 need to have revision AB or greater.

## 5.9. Performance

Instruction	Language	Variables	Instruction Times ( $\mu$ s)
<b>1000 Contacts</b>	LD	BOOL	6
<b>1000 Divisions</b>	ST	INT	43
		REAL	81
	LD	INT	43
		REAL	81
<b>1000 Multiplications</b>	ST	INT	15
		REAL	23
	LD	INT	15
		REAL	23
<b>1000 Sums</b>	ST	INT	15
		REAL	23
	LD	INT	15
		REAL	23
<b>1000 PID</b>	ST	REAL	< 5000

Table 11: Instruction Times

## 6. Compatibility with Other Products

To develop an application for Nexto Series CPUs, it is necessary to check the version of MasterTool IEC XE. The following table shows the minimum version required (where the controllers were introduced) and the respective firmware version at that time:

Nexto Series CPUs	MasterTool IEC XE	Firmware version
<b>NX3004</b>	2.01 to 2.09	1.5.0.18 to 1.7.17.0
<b>NX3004</b>	3.00 or above	1.8.11.0 or above

Table 12: Compatibility with other products

Additionally, along the development roadmap of MasterTool IEC XE some features may be included (like special Function Blocks, etc...), which can introduce a requirement of minimum firmware version. During the download of the application, MasterTool IEC XE checks the firmware version installed on the controller and, if it does not meet the minimum requirement, will show a message requesting to update. The latest firmware version can be downloaded from Altus website, and it is fully compatible with previous applications.

## 7. Physical Dimensions

Dimensions in mm.

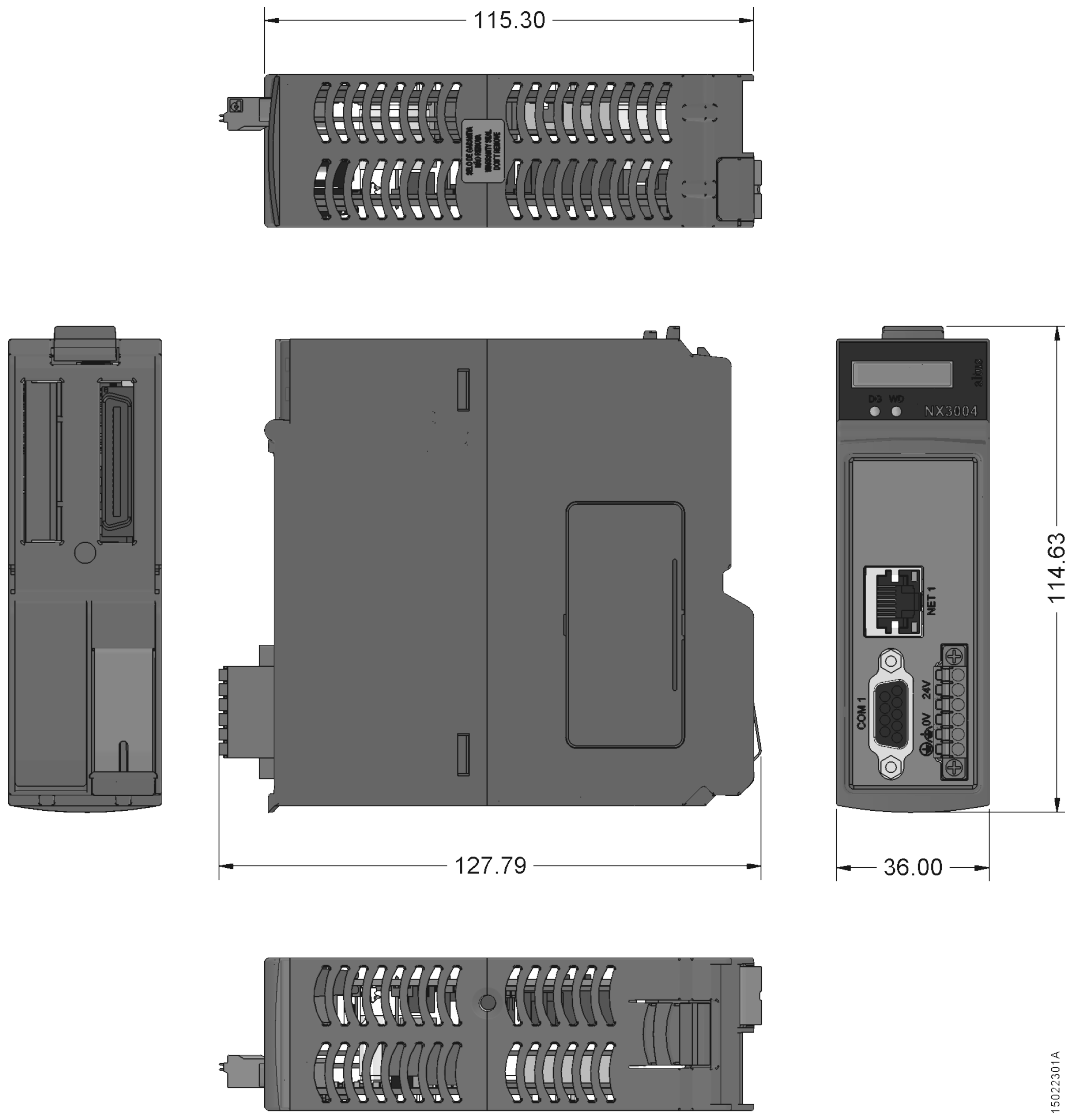


Figure 1: NX3004 and NX3005 CPU Physical Dimensions

## 8. 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.

### 8.1. Product Identification

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

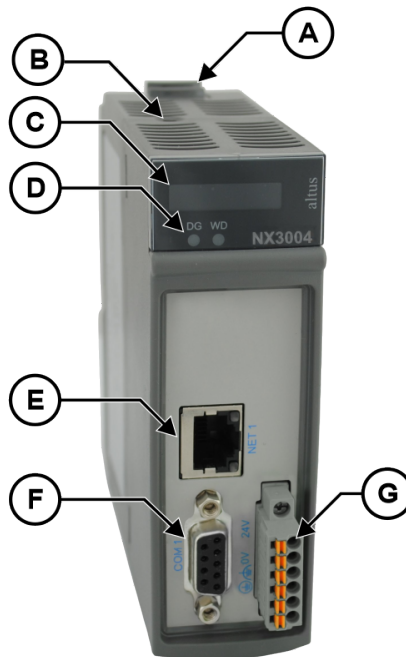


Figure 2: NX3004

- Ⓐ Fixing lock.
- Ⓑ Diagnostic switch.
- Ⓒ Status and diagnostic display.
- Ⓓ Diagnostic and watchdog LEDs.
- Ⓔ RJ45 connector for Ethernet communication.
- Ⓕ Female DB9 connector for RS-485/RS-422.
- Ⓖ Connector for power supply.

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.

## 8.2. Electrical Installation

The figure below illustrates the electrical diagram of the product installed in a Nexto Series rack. The arrangement of connectors and terminals in the figure is merely illustrative.

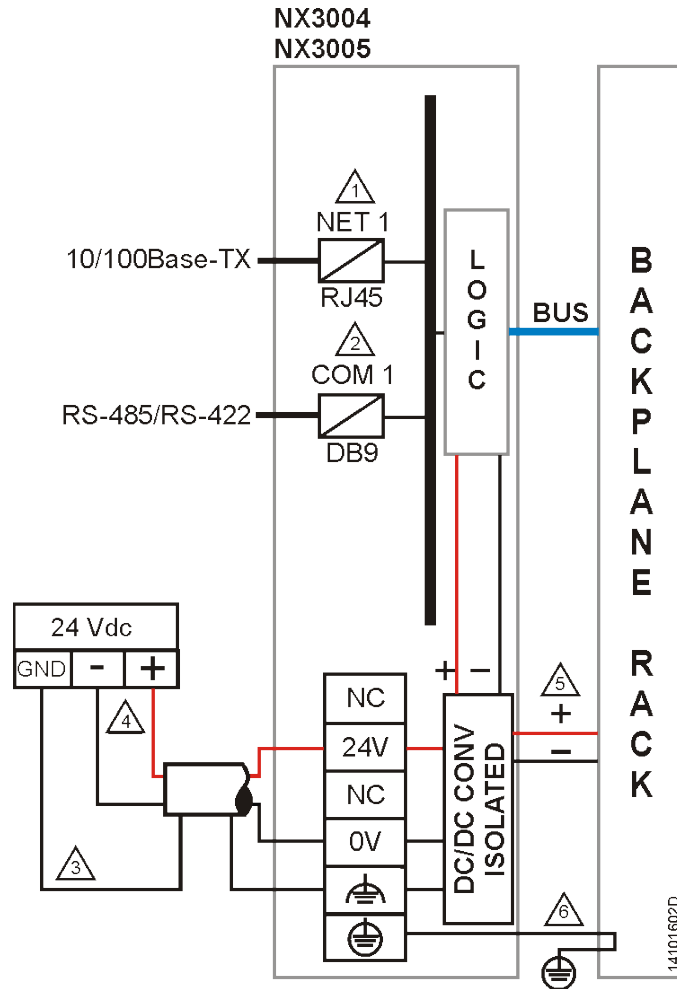




Figure 3: NX3004 and NX3005 CPU Electric Diagram

**Diagram Notes:**

- ① Ethernet interface 10/100Base-TX standard for programming, debugging and MODBUS TCP network connection or other protocols.
  - ② Serial interface RS-485/RS-422 standard for MODBUS RTU network connection or other protocols. The physical interface choice depends on the cable used.
  - ③ The grounding from the external power source is connected to the terminal . Use 0.5 mm<sup>2</sup> cables.
  - ④ The power supply is connected to the terminals 24 V and 0 V. Use 0.5 mm<sup>2</sup> cables.
  - ⑤ The module feeds the other modules of the Nexto Series through rack connection.
-  Functional earth terminal.

### 8.3. Mechanical Assembly

This product must be inserted in the backplane rack position 0. It requires two sequential positions, this means that it uses positions 0 and 1 of the rack.

The mechanical assembly of this module is described in the NX3004 CPU User Manual – MU214616.

**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.

## 9. Manuals

For the correct application and use, the Nexto Series CPUs NX3004 User Manual - MU214605 should be consulted.

For more technical details, configuration, installation and programming of the Nexto Series, see the table below. This table is just a guide to some relevant documents that may be useful when using, maintaining and programming Nexto Series controllers. The complete and updated table containing all Nexto Series documents can be found in the Nexto Series User Manual - MU214600.

Code	Description	Language
CE114000	Nexto Series – Technical Characteristics	English
CT114000	Série Nexto – Características Técnicas	Portuguese
CE114103	NX3004 Technical Characteristics	English
CT114103	Características Técnicas NX3004	Portuguese
CE114700	Nexto Series Backplane Racks Technical Characteristic	English
CT114700	Características Técnicas dos Bastidores da Série Nexto	Portuguese
CE114810	Nexto Series Accessories for Backplane Rack Technical Characteristics	English
CT114810	Características Técnicas Acessórios para Bastidor Série Nexto	Portuguese
CE114902	Nexto Series PROFIBUS-DP Master Technical Characteristics	English
CT114902	Características Técnicas do Mestre PROFIBUS-DP da Série Nexto	Portuguese
CE114908	NX5110 and NX5210 PROFIBUS-DP Heads Technical Characteristics	English
CT114908	Características Técnicas Interfaces Cabeça PROFIBUSDP NX5110 e NX5210	Portuguese
MU214600	Nexto Series User Manual	English
MU214000	Manual de Utilização Série Nexto	Portuguese
MU214616	NX3004 CPU User Manual	English
MU214104	Manual de Utilização UCP NX3004	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
MU214601	NX5001 PROFIBUS DP Master User Manual	English
MU214001	Manual de Utilização Mestre PROFIBUS-DP NX5001	Portuguese
MU214608	Nexto PROFIBUS-DP Head Utilization Manual	English
MU214108	Manual de Utilização da Cabeça PROFIBUS-DP Nexto	Portuguese
MU214603	Nexto Series HART Manual	English
MU214606	MQTT User Manual	English
MU214609	OPC UA Server for Altus Controllers User Manual	English
MU214610	Advanced Control Functions User Manual	English
MU214621	Nexto Series PROFINET Manual	English
NAP151	Utilização do Tunneller OPC	Portuguese

Table 13: Related Documents