1. Product Description

Nexto Series is a powerful and complete series of Programmable Logic Controllers (PLCs) with exclusive and innovative features, targeted for covering control systems requirements from medium to large applications or high performance industrial machines.

NX5001 PROFIBUS-DP Master is an advanced PROFIBUS master interface designed to be used together with Nexto Series CPUs. This module allows the access of up to 3584 input bytes and 3584 output bytes. NX5001 also supports redundancy use for application where high availability is expected.

Its main features are:

- PROFIBUS-DP Master communication protocol compatible with any PROFIBUS-DP/ DPV1 slave equipment, according to EN 50170, IEC 61158 and IEC 61784 standards
- Supports up to 125 slaves (using network repeaters)
- Redundant architecture support
- Global Control Commands support (Sync, Unsync, Freeze, Unfreeze)
- Hot swap support
- Enhanced diagnostics services
- All configuration and parameterization through Master-Tool IEC XE
- One Touch Diag
- Electronic Tag on Display
- LCD and LED for diagnostic indication
- Baud rate up to 12 Mbits/s

2. Ordering Information

2.1. Included Items

The product package contains the following items:

- One NX5001 module
- Installation guide

2.2. Product Code

The following code shall be used for product purchase:

Code	Denomination
NX5001	PROFIBUS-DP Master Module

Table 1: Product Code

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3. Related Products

The following products must be acquired separately whenever necessary:

Code	Denomination
NX5110	PROFIBUS-DP Head
NX5210	PROFIBUS-DP Redundant Head
PO5063V1	PROFIBUS-DP Fieldbus Head
PO5063V5	Redundant PROFIBUS-DP Fieldbus Head
PO5064	PROFIBUS-DPV1 Head
PO5065	Redundant PROFIBUS-DPV1 Head
AL-2601	PROFIBUS Connector
AL-2602	PROFIBUS Terminator Connector
AL-2605	Terminator with Power Supply Diagnostic
AL-2303	PROFIBUS cable
AL-2431	FOCUS/ PROFIBUS Optical Repeater
AL-2432	FOCUS/ PROFIBUS Optical Repeater with Two Ports
AL-2433	PROFISwitch – Coupler for Redundant Profibus Network

Table 2: Related Products

Notes:

NX5110: PROFIBUS-DP network head enables the connection of Nexto Series' modules to PROFIBUS networks, expanding the CPU's I/O system.

NX5210: PROFIBUS-DP redundant network head enables the connection of Nexto Series' modules to redundant PROFIBUS networks.

PO5063V1: PROFIBUS-DP network head enables the connection of Ponto Series' modules to PROFIBUS networks, expanding the CPU's I/O system.

PO5063V5: PROFIBUS-DP redundant network head enables the connection of Ponto Series' modules to redundant PROFIBUS networks.

PO5064: PROFIBUS-DP network head enables the connection of Ponto Series' modules to PROFIBUS networks, expanding the CPU's I/O system. Additionally, PO5064 module supports DPV1 communication between Ponto Series' modules and any other PROFIBUS network node.

PO5065: PROFIBUS-DP redundant network head enables the connection of Ponto Series' modules to PROFIBUS networks, expanding the CPU's I/O system. Additionally, PO5065 module supports DPV1 communication between Ponto Series' modules and any other PROFIBUS network node.

AL-2601: DB9 connector with standard PROFIBUS pinout. It's suitable for connections between PROFIBUS networks and devices placed on intermediate positions in the network (not in the ends). This connector has a connection either for PROFIBUS network input and output, allowing module exchange without interrupting network activity.

AL-2602: DB9 connector and terminator with standard PROFIBUS pinout. It has inner components for network termination. It's suitable for connections between PROFIBUS networks and devices placed on the network ends.

AL-2605: This device is mounted at the ends of a PROFIBUS network and it eliminates the necessity for AL-2602 connectors. The AL-2605 module was developed for securing the PROFIBUS fieldbus operation even if the modules placed at the network ends are shut down or removed. The product also verifies the fieldbus' power supply, diagnosing failures. It's suitable for any PROFIBUS fieldbus where the reliability and availability are main requirements.

AL-2303: Cable for PROFIBUS network.

AL-2431 and AL-2432: Optical repeaters for PROFIBUS device interconnection through optical fiber. The AL-2432 module has redundancy in optical media, increasing system availability.

AL-2433: The AL-2433 adapter enables the interconnection between non-redundant PROFIBUS-DP slave devices in a redundant PROFIBUS-DP network with NX5001 master.

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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.

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.

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.

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. General Features

	NX5001
Space use in Backplane	2 sequential slots
Maximum amount of PROFIBUS Slaves	125
Maximum amount of cyclic input bytes per slave	244
Maximum amount of cyclic output bytes per slave	244
Maximum amount of input bytes	3584
Maximum amount of output bytes	3584
PROFIBUS-DP	Yes
Baud rate	9.6 to 12000 kBits/s, configurable
Redundancy support	Yes
Global Control Command support	Yes
Hot Swap support	Yes
Indication of status and diagnostics	Display, LEDs, web server and CPU internal memory
One Touch Diag (OTD)	Yes

Isolation
     Interface PROFIBUS to logic
     Interface PROFIBUS to protection grounding ⏚
     Logic to protection grounding ⏚
	
	 1000 Vac / 1 minute
	 1000 Vac / 1 minute
	 1250 Vac / 1 minute

Current consumption from bus power source	400 mA
Dissipated power	2 W
IP level	IP 20
Operating temperature	0 to 60 °C
Storage temperature	-25 to 75 °C
Relative humidity	5% to 96%, without condensation
Electronic Circuits' Conformal Coating	Yes
Module dimensions (W x H x D)	36.00 x 114.63 x 117.07 mm
Package dimensions (W x H x D)	42.00 x 122.00 x 147.00 mm
Net weight	200 g
Gross weight (with package)	250 g

Table 3: General Characteristics

Notes:

Baud Rate: Transmission rate can be configured with the following communication speeds: 9.6 kBits/s, 19.2 kBits/s, 45.45 kBits/s, 93.75 kBits/s, 187.5 kBits/s, 500 kBits/s, 1500 kBits/s, 3000 kBits/s, 6000 kBits/s and 12000 kBits/s.

Redundancy Support: It is possible to assemble a PROFIBUS redundant network using two NX5001. This implementation is described in section System Configurations. Needs software version 1.1.0.0 or above/ product revision AE or above.

Global Control Command: This service synchronizes inputs and/or outputs of a given PROFIBUS slave group through Sync, Unsync, Freeze and Unfreeze commands. These commands are available at the NX5001 PROFIBUS-DP master through User Commands. The description of this service is found at Appendix C – Global Control Commands. For further details on the availability of this service and its associated products (NX5001 and MasterTool IEC XE programmer), consult section Compatibility with Other Products. Needs software version 1.2.0.6 or above/ product revision AP or above.

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Maximum Number of PROFIBUS Slaves: NX5001 can address up to 31 slaves without needing repeaters or converters. For more than 31 slaves, repeaters and converters must be used.

Logic: Logic is the name given to inner interfaces such as memories, processor and rack interfaces.

Electronic Circuits' Conformal Coating: The electronic circuits' conformal coating protects the product's inner parts against humidity, dust and other harmful elements to electronic circuits.

ATTENTION

The Global Control Commands are incompatible with support for network redundancy. So they are invalid for architectures such as those described in the next section:
- Configuration B: Redundant PROFIBUS Fieldbus
- Configuration D: Two Independent Redundant PROFIBUS Fieldbuses
This and other information can be found in MU214601, Appendix C - Global Control Commands.

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 Type Approved Product	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)
c(UL)us 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

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5.3. System Configurations

This section presents the possible configurations for the PROFIBUS network using the NX5001 interface.

5.3.1. Configuration A: Simple PROFIBUS Fieldbus

This is the basic configuration. As it can be seen in the figure below, the NX5001 interface is connected to a Nexto Series CPU on the same bus and to the PROFIBUS slaves through a PROFIBUS network.
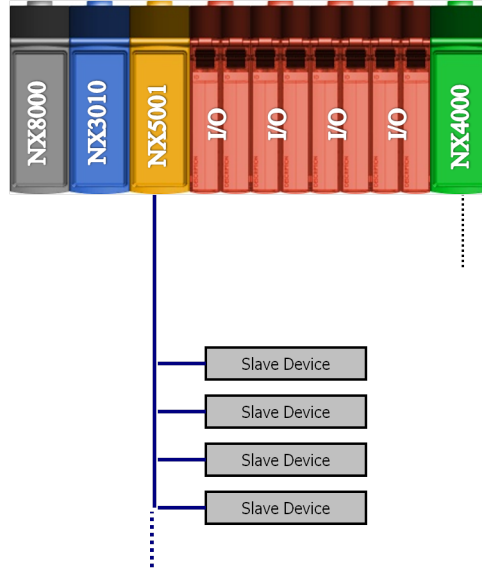
Figure 1: Configuration of a simple PROFIBUS network

5.3.2. Configuration B: Redundant PROFIBUS Fieldbus

As shown on the figure below, the PROFIBUS network is redundant. In this case, two NX5001 are connected to a Nexto Series CPU in the same bus.

The redundant PROFIBUS network allows normal operation during a failure in one of the redundant networks, offering higher availability, which is required in critical applications.
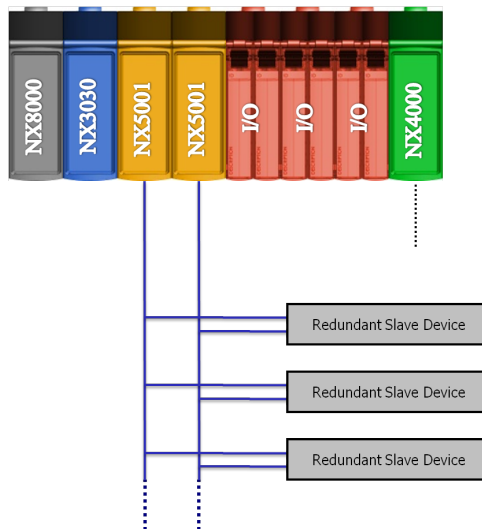
Figure 2: Configuration of a redundant PROFIBUS network

5.3.3. Configuration C: Two Independent Simple PROFIBUS Fieldbuses

In this configuration, two NX5001 modules are connected to a Nexto CPU in the same bus. Each NX5001 is connected to an independent PROFIBUS network. In this case there's no redundancy. The architecture is seen in the figure below.
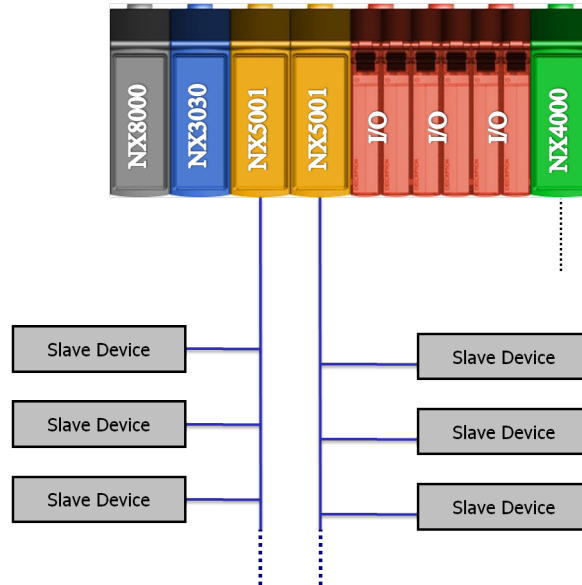
Figure 3: Configuration of two independent simple PROFIBUS networks

5.3.4. Configuration D: Two Independent Redundant PROFIBUS Fieldbuses

This is the PROFIBUS master with the most complex configuration supported by the Nexto Series. It's the redundant version of configuration C. As shown on the figure below, there are two independent and redundant PROFIBUS networks.
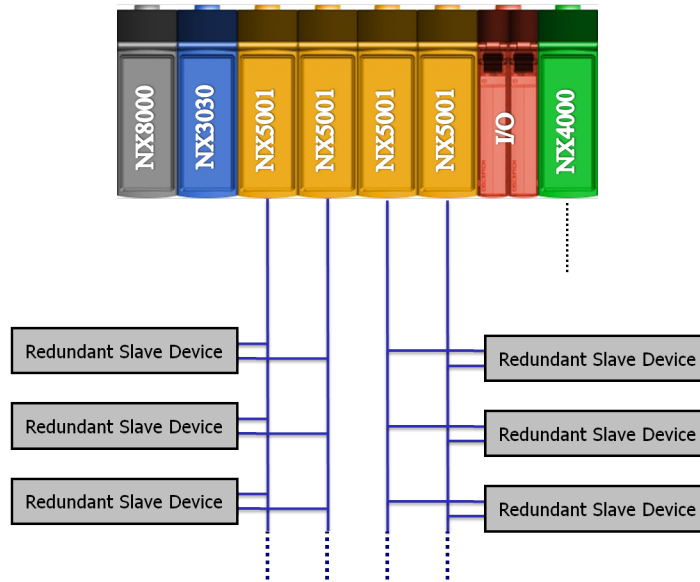
Figure 4: Configuration of two independent redundant PROFIBUS networks

5.3.5. Configuration E: Four Independent Simple PROFIBUS Fieldbuses

Configuration E has four NX5001 connected to a Nexto CPU on the same rack. Each NX5001 is connected to an independent PROFIBUS fieldbus. In this case there's no redundancy. The architecture is shown in figure below.
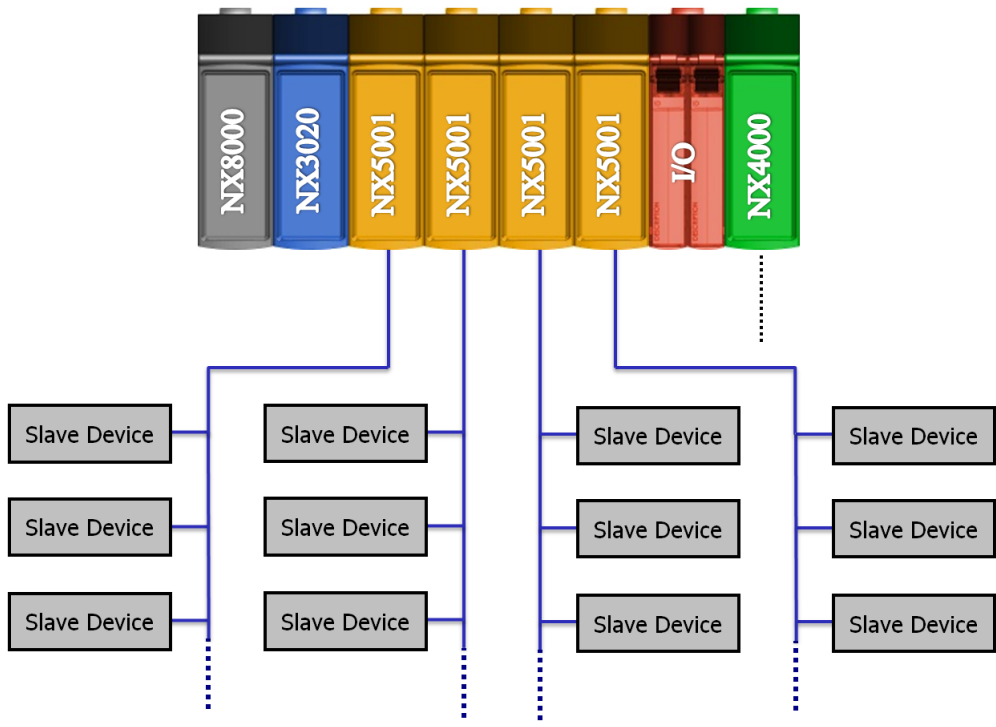
Figure 5: Configuration of four independent simple PROFIBUS networks

5.4. Software Features

Nexto Series brings to the user the MasterTool IEC XE, a powerful tool that provides a complete interface for programming all Nexto Series' modules. This means that there is no additional software required to configure the PROFIBUS slaves. All settings are done in the same software used for programming Nexto CPUs.

Another important feature is that all PROFIBUS slaves parameterization are sent to NX5001 through Nexto CPU, so it doesn't require any special cable for its configuration.

5.5. Compatibility with Other Products

The table below brings information about compatibility between NX5001 module and MasterTool IEC XE programmer.

NX5001			Compatible Software Version
Version	**Revision**	**Functionality**	**MasterTool IEC XE**
1.2.0.6	AP	Support for Global Control Commands (Sync/Freeze) Support for DPV1 Command	2.01 or above

Table 5: Compatibility of Functionalities with MasterTool IEC XE

The table below indicates the compatibility of the main Altus' products with the NX5001 module.

Product	Software Version	Products Revision
NX5110	1.0.0.12 or above	AD or above
NX5210	1.0.0.12 or above	AD or above
PO5063	1.35 or above	DT or above
PO5063V1	2.07 or above	AV or above
PO5064	1.02 or above	AI or above

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Product	Software Version	Products Revision
PO5063V5	5.07 or above	AV or above
PO5065	1.02 or above	AI or above
PO5063V4	4.35 or above	AV or above
ALT_059A.GSD	1.30 or above	-
ALT_0BAF.GSD	1.30 or above	-
ALT_0BB0.GSD	1.30 or above	-

Table 6: Compatibility with Other Products

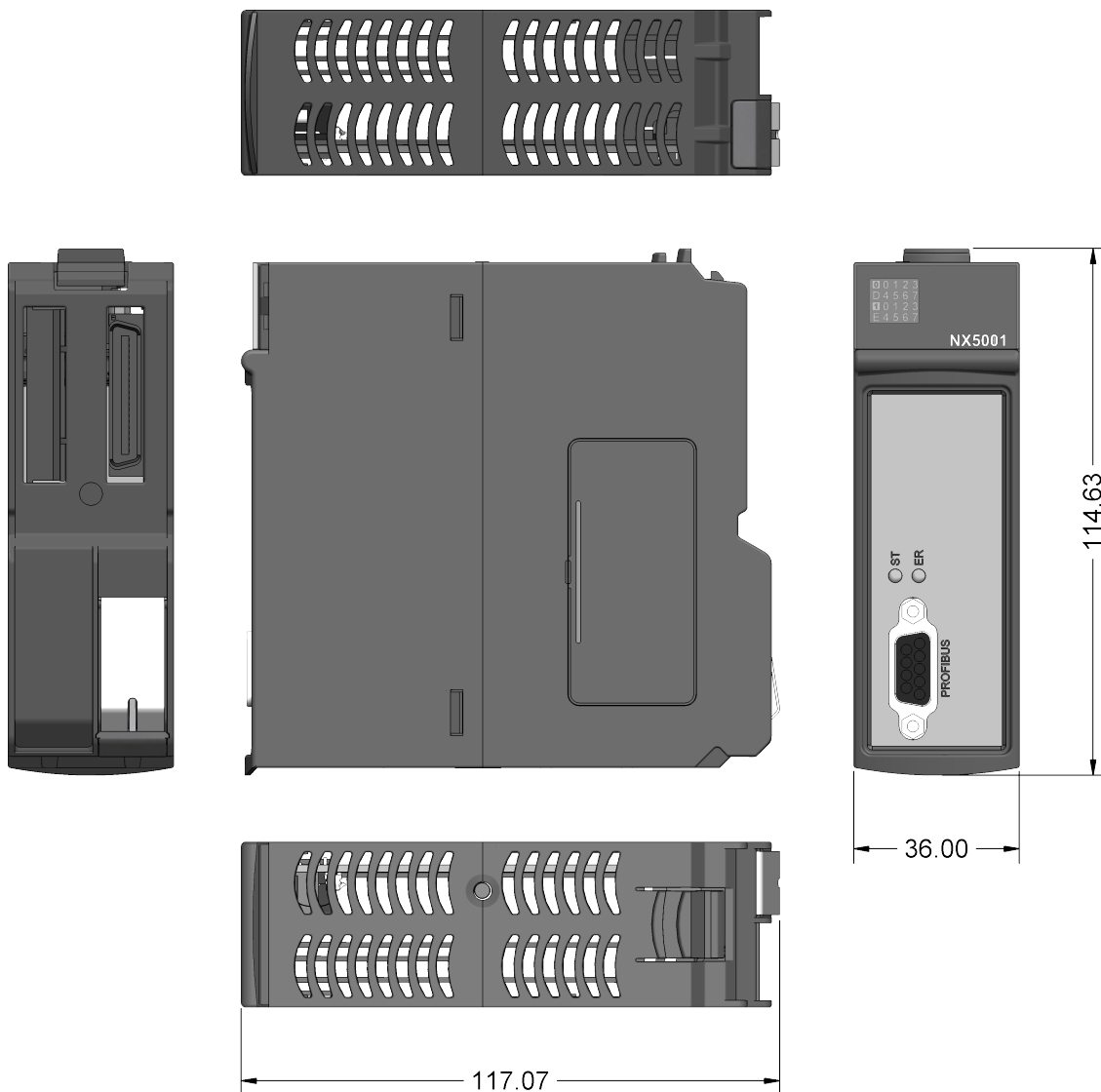## 5.6.   Physical Dimensions

Dimensions in mm.

Figure 6: Physical Dimensions from NX5001

6. Installation

6.1. Electrical Installation

> **DANGER**
>
> When performing any installation of an electrical panel, make sure that its power source is TURNED OFF.

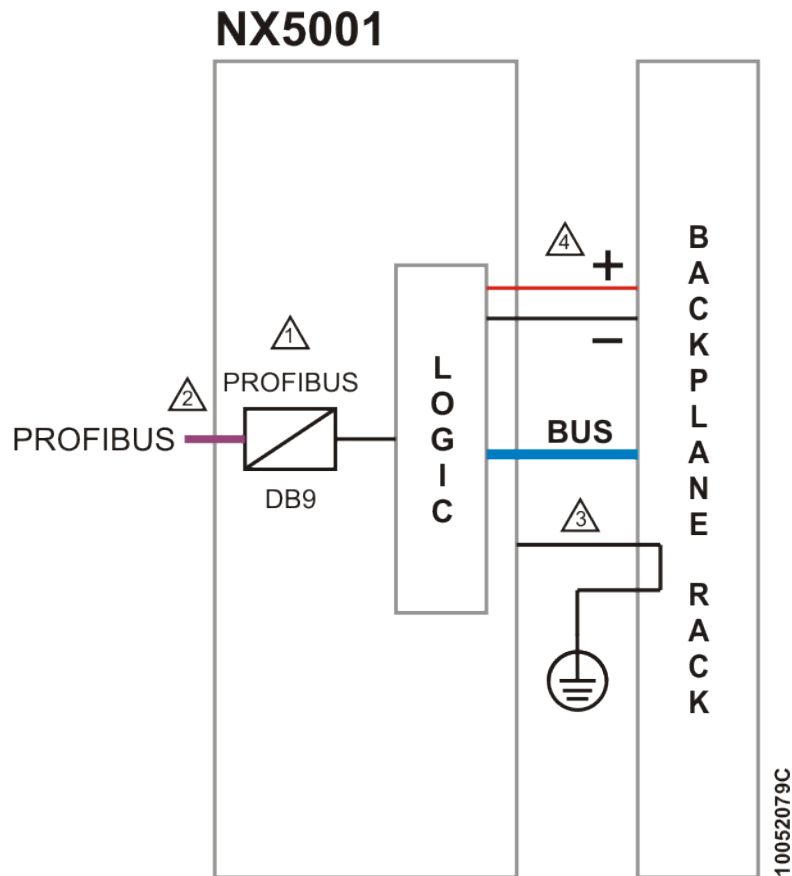The backplane rack installation can be seen on the figure below.

Figure 7: Electrical Diagram from NX5001

Diagram Notes:

- **1** – Standard interface for connection to PROFIBUS networks. Pin 1 of DB9 connector is connected to the protection ground of the Nexto Series rack.
- **2** – Use the supplied AL-2303 cable for PROFIBUS network and one of the following connectors:
  - AL-2601 is a connector for PROFIBUS network without internal termination. It can be used to connect any PROFIBUS equipment in a position in which the termination is not required.
  - AL-2602 is a connector for PROFIBUS network with internal termination. It must be used in equipment located at the ends of the PROFIBUS network. Altus also offers a second option for networks where reliability and availability are the main requirements. For these cases, module AL-2605 should be used in each end of the network and all PROFIBUS modules should use unterminated connectors (AL-2601). More information about AL-2605 module can be found in the document CE104705. It is mandatory the use of two PROFIBUS network terminations. Each termination should be placed at each end of the network.
- **3** – Module is grounded through the rack of Nexto Series.
- **4** – The NX5001 module is powered by the power supply connected to the same Nexto series rack not requiring external power source.

6.2. Mechanical Assembly

Mechanical assembly of this module is described in Nexto Series User Manual - MU214600.

The module can be installed anywhere in the bus, after the CPU. If a pair of modules is redundant, they must be placed side by side.

Module(s) NX5001 must be declared at the CPU bus through the MasterTool IEC XE, in the desired positions.

7. Configuration

NX5001 PROFIBUS-DP Master User Manual - MU214601 must be consulted for information about module configuration.

8. Maintenance

NX5001 PROFIBUS-DP Master User Manual - MU214601 must be consulted for information about module maintenance.

9. Manuals

For correct application and utilization NX5001 PROFIBUS-DP Master User Manual - MU214601 must be consulted.

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 NX5001. The complete and updated table containing all documents of Nexto Series can be found at Nexto Series User Manual – MU214600.

Code	Description	Language
CE114000	Nexto Series – Technical Characteristics	English
CT114000	Série Nexto – Características Técnicas	Portuguese
CS114000	Serie Nexto – Características Técnicas	Spanish
MU214600	Nexto Series User Manual	English
MU214000	Manual de Utilização Série Nexto	Portuguese
MU214605	Nexto Series CPUs User Manual	English
MU214100	Manual de Utilização UCPs Série Nexto	Portuguese
MU299026	Manual de Utilização da Rede PROFIBUS	Portuguese
MU209010	Configuração da Remota PROFIBUS – Série Ponto	Portuguese
MU214608	Nexto PROFIBUS-DP Head Utilization Manual	English
MU214108	Manual de Utilização da Cabeça PROFIBUS-DP Nexto	Portuguese
MU209508	Manual de Utilização Cabeça PROFIBUS PO5063V1 e Cabeça Redundante PROFIBUS PO5063V5	Portuguese
MU219511	PO5064 PROFIBUS Head and PO5065 Redundant PROFIBUS Head Utilization Manual	English
MU209511	Manual de Utilização Cabeça PROFIBUS PO5064 e Cabeça Redundante PROFIBUS PO5065	Portuguese
MU209020	Manual de Utilização Rede HART sobre PROFIBUS	Portuguese
MU204631	Manual de Utilização do Repetidor Ótico / FOCUS PROFIBUS	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

Table 7: Related Documents

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