# 1. Product Description

NJ Line 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, NJ Line 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 NJ Line to be applied in small automation systems with high performance requirements, such as manufacturing applications and industrial machines.

In this context, NJ Line is a selection of I/O modules that uses the existing CPUs and modules from NJ Line to provide the best solution for applications in verticals like infrastructure, building, water, wastewater, food, machines and several OEM projects. NJ Line is ideal for systems with no hot-swapping requirements.

Finally, the module NJ6101 is a module that offers 4 individually configurable voltage or current analog outputs and it is a module that uses one rack position.




Its main features are:

- 4 voltage or current outputs in a single width module
- Voltage scale support: 0 to 10 Vdc
- Current scale support: 0 to 20 mA and 4 to 20 mA
- Individual configuration per output
- Galvanic isolation between outputs and internal logic
- Protection against surge voltage and polarity inversion
- Short circuit protection
- Open loop diagnostics
- External power supply fault diagnostic
- Individual diagnostic per channel
- Display for module diagnostics and output state indication
- Easy Plug System

**ATTENTION**

Starting from product revision AG, it was included the connector frontal cover (which was previously exclusive of NX models), thus adding the Easy Plug System feature to this product.

# 2. Ordering Information

## 2.1. Included Items

The product package contains the following items:

- NJ6101 module
- 20-terminal connector with wire holder

## 2.2. Product Code

The following code should be used to purchase the product:

| Code | Description |
|---|---|
| **NJ6101** | 4 AO Voltage/Current Module 12 Bits |
| **NJ6101-C** | 4 AO Voltage/Current Module 12 Bits with Conformal Coating |

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

This product 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:** This product 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.

# 5. Product Features

## 5.1. General Features

| | **NJ6101** |
|---|---|
| **Backplane rack occupation** | 1 slot |
| **Number of outputs** | 4 analog outputs |
| **Output type** | Voltage or current output, individually configured |
| **Data format** | 12 bits in two's complement, justified to the left |
| **Converter resolution** | 12 bits monotonicity guaranteed, no missing codes |
| **Scanning time** | 1 ms with one channel enabled<br>2 ms with all channels enabled |
| **Output state indication** | Yes |
| **One Touch Diag (OTD)** | No |
| **Electronic Tag on Display (ETD)** | No |
| **Status and diagnostic indication** | Display, web pages and CPU's internal memory |
| **Hot swap capability** | No |
| **Module protections** | Yes, protection against surge voltages and polarity inversion |
| **Wire gauge** | 0,5 $mm^2$ (20 AWG) |
| **Minimum wire temperature rating** | 75 °C |
| **Wire material** | Copper only |
| **Isolation**<br>**Analog to logic**<br>**Analog to protective earth** ⏚<br>**Logic to protective earth** ⏚ | <br>1500 Vac / 1 minute<br>1000 Vac / 1 minute<br>1500 Vac / 1 minute |
| **Current consumption from backplane rack power supply** | 200 mA |
| **External Power Supply** | 19.2 to 30 Vdc |
| **Maximum power dissipation** | 6 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** | Optional, ordering code NJ6101-C |
| **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 |

Table 3: General Features

**Notes:**

**External power supply:** The terminals 19 and 20 are used to supply power to the analog outputs. NJ6101 internal logic is supplied by the Power Supply Module placed on the Nexto Backplane Rack.

**Conformal coating:** The conformal coating protects the electronics inside the product from moisture, dust and other harsh elements in electronic circuits.

**ATTENTION**

If the external power supply is below the 19.2 V limit, the outputs go to a safe state. However, since the display only shows the outputs' logical state, its indication may not match the physical state of outputs.

## 5.2. Standards and Certifications

| Standards and Certifications | |
|---|---|
| **IEC** | 61131-2: Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests |
| CE | 2014/30/EU (EMC)<br>2014/35/EU (LVD)<br>2011/65/EU and 2015/863/EU (ROHS) |
| UKCA | S.I. 2016 No. 1091 (EMC)<br>S.I. 2016 No. 1101 (Safety)<br>S.I. 2012 No. 3032 (ROHS) |
| c UL us LISTED | UL/cUL Listed – UL 61010-1<br>UL 61010-2-201 (file E473496) |

Table 4: Standards and Certifications

## 5.3. Voltage Mode Features

| | NJ6101 – Voltage Output Mode | | |
|---|---|---|---|
| | Range | Engineering Scale | Resolution |
| **Scale** | 0 to 10 Vdc | 0 to 30,000 | 2.5 mV |
| **Precision** | ±0.3% of full scale rating @ 25 °C<br>±0.025% of full scale rating / °C | | |
| **Stabilization time** | 4 ms | | |
| **Maximum output value** | +10.3 Vdc | | |
| **Load impedance** | > 1 kΩ | | |
| **Configurable parameters** | Output Type | | |

Table 5: Voltage Output Mode Features

## 5.4. Current Mode Features

| | NJ6101 – Current Output Mode | | |
|---|---|---|---|
| **Scale** | Range | Engineering Scale | Resolution |
| | 0 to 20 mA | 0 to 30,000 | 5.18 $\mu$A |
| | 4 to 20 mA | 0 to 30,000 | 5.18 $\mu$A |
| **Precision** | ±0.3% of full scale rating @ 25 °C<br>±0.02% of full scale rating / °C | | |
| **Stabilization time** | 4 ms | | |
| **Maximum output value** | +20.6 mA | | |
| **Load impedance** | < 600 Ω | | |
| **Configurable parameters** | Output Type | | |

Table 6: Current Output Mode Features

## 5.5. Compatibility with Other Products

The following table provides information regarding the compatibility of the module and programming tool Mastertool.

| NJ6101 | | Compatible Software Version | | | |
|---|---|---|---|---|---|
| **Version** | **Revision** | **NX3004** | **NX3005** | **NX30x0** | **Mastertool** |
| 1.0.0.9 or higher | AA | 1.6.1.0 or higher | 1.6.1.0 or higher | 1.6.1.0 or higher | 3.02 or higher |
| 1.1.0.0 or higher | AF | - | - | - | 3.14 or higher to use the 4 to 20 mA scale |

Table 7: Compatibility with Other Products

**Note:**

**Revision:** If the software is upgraded in the field the product revision indicated on the label will no longer match the actual revision of the product.

**ATTENTION**

The CPUs and racks of NX Line support the use of Nexto Jet Modules. The Nexto Jet is formed by I/Os modules and when used in configuration with CPUs of NX Line, no other I/O type of NX Line can be used in the same bus.

## 5.6. Physical Dimensions

Dimensions in mm.

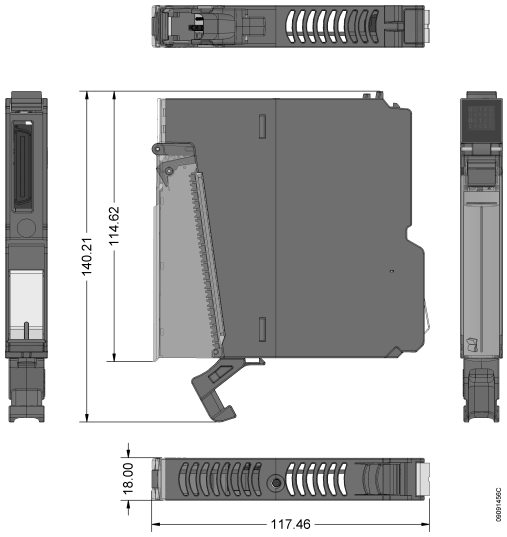



Figure 1: 18 mm I/O Module

# 6. Installation

For the correct installation of this product, it is necessary to use a 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.

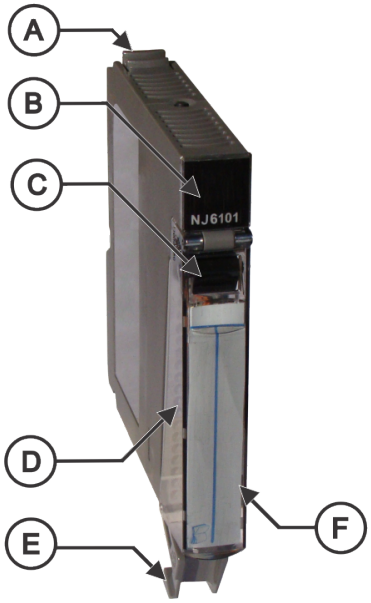



Figure 2: NJ6101

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

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 outputs of NJ6101 are used: output 10 and output 12. Each output presents a different connection, explained below.

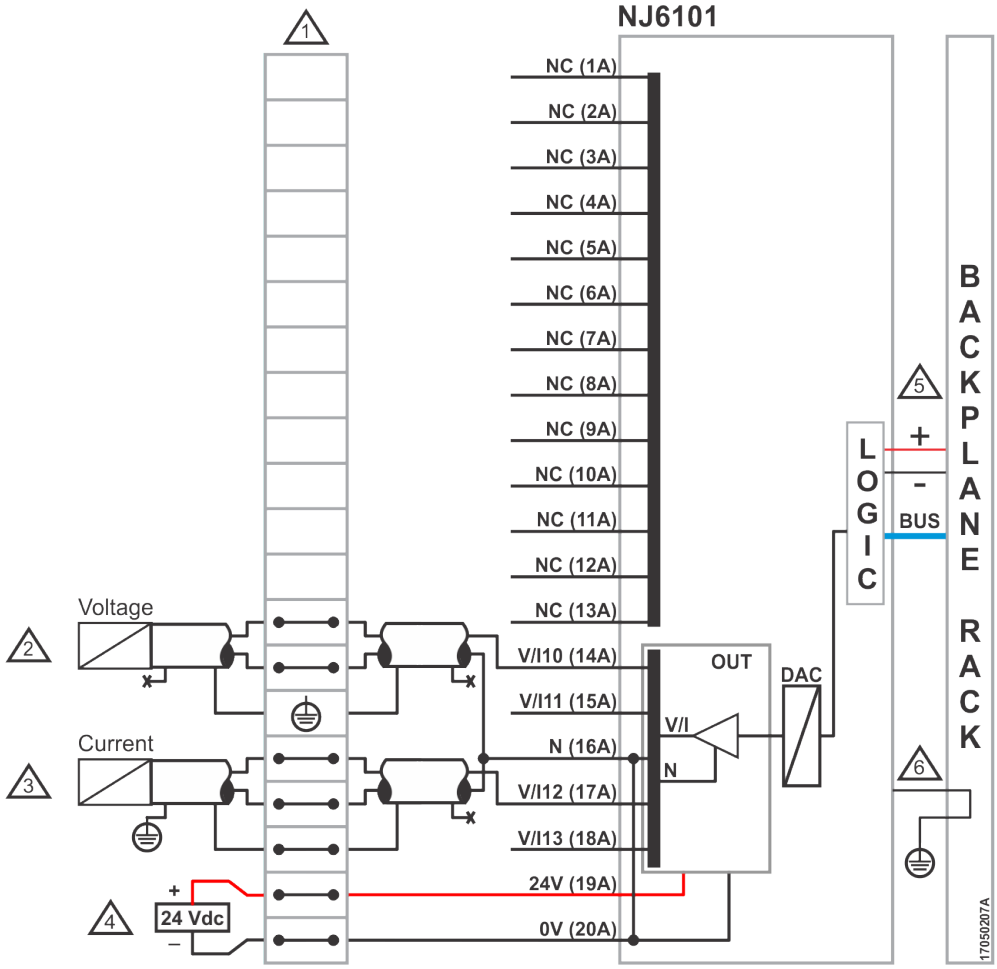



Figure 3: Electric Diagram

**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 and ⏚ represents a grounding terminal block.
2. The output 10 is connected in voltage mode. The cable shielding is connected to the grounding terminal block.
3. The output 12 is connected in current mode. The cable shielding is connected to the earth close to the device on the field.
4. The external power supply is connected to the pins 19A and 20A.
5. The power supply of the module internal logic is derived from the connection to the backplane rack, not requiring external connections.
6. NJ6101 module is connected to the protective earth ⏚ through the backplane rack.

⏚ Protective conductor terminal.

## 6.3. Connector Pinout

The following table shows the description of each connector terminal:

| Terminal | Description |
|---|---|
| **1A** | Not Connected |
| **2A** | Not Connected |
| **3A** | Not Connected |
| **4A** | Not Connected |
| **5A** | Not Connected |
| **6A** | Not Connected |
| **7A** | Not Connected |
| **8A** | Not Connected |
| **9A** | Not Connected |
| **10A** | Not Connected |
| **11A** | Not Connected |
| **12A** | Not Connected |
| **13A** | Not Connected |
| **14A** | Current / Voltage output 10 |
| **15A** | Current / Voltage output 11 |
| **16A** | Reference |
| **17A** | Current / Voltage output 12 |
| **18A** | Current / Voltage output 13 |
| **19A** | 24 Vdc |
| **20A** | 0 Vdc |

Table 8: Connector Pinout

**Note:**

NJ6101 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 Assembly

**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 System 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.

### 6.4.1. Module Insertion

The following example shows a generic module, this procedure must be followed for any module.

First the module lower part, which is used as a guide for the correct insertion, must be fit in the backplane rack, and then the guide pins are correctly placed in the right rack keyways for a specified position. Modules that use only one position in the rack has only one guide pin. The figure below shows how the module lower part must be positioned in relation to the rack for the correct insertion.

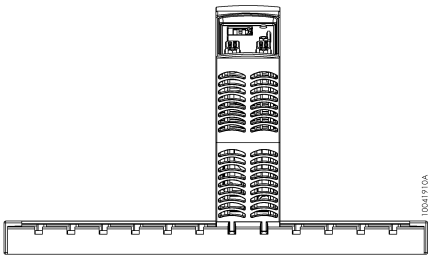


Figure 4: Module and Backplane Rack

After fitting the module lower part as described above, a rotation movement must be executed in order to fit the fixation lock in the rack upper part, as shown on figure below.

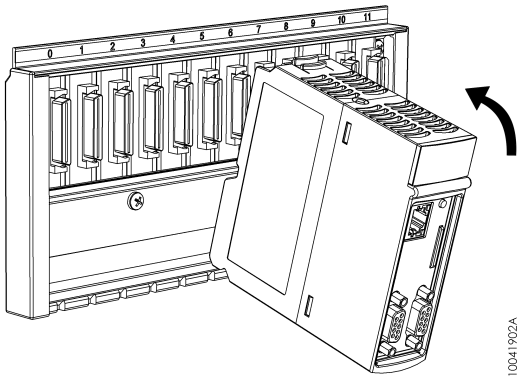


Figure 5: Backplane Rack Fitting Movement

If the user follows the described procedures correctly, the module will have been perfectly connected to the bus, as presented on figure below.

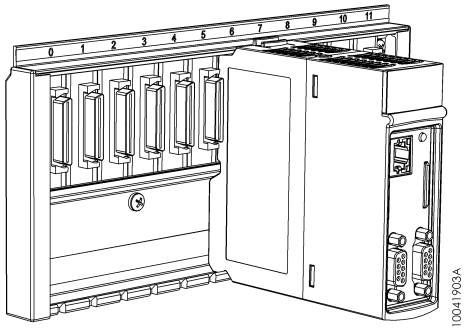


Figure 6: Module Correctly Placed in the Backplane Rack

The module mustn't be connected to the rack any other way. Wrong insertion of the module may cause irreversible damage to it. The figure below show how to NOT connect the modules to the rack.

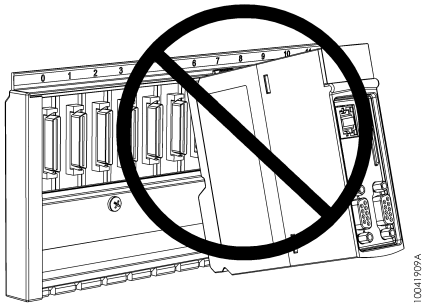


Figure 7: Wrong Insertion Way

### 6.4.2. Modules Removal

The following example shows a generic module, this procedure must be followed for any module.

First the fixation lock must be pressed (1), in order to unlock the module from the bus, then it must be rotate as shown on figure below(2).

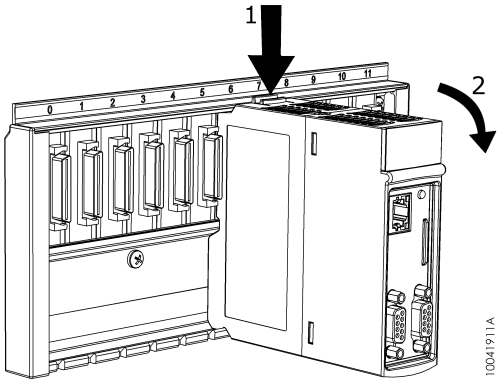



Figure 8: Bus Unlock

If the user follows the described procedures correctly, the module will have been perfectly disconnected from the bus and it can be taken off as presented on figure below.

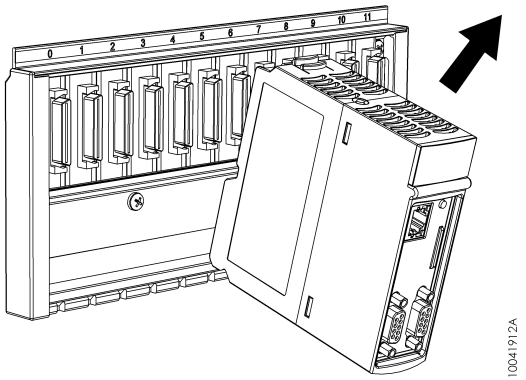



Figure 9: Module being Removed from the Backplane Rack

### 6.4.3. I/O Modules

#### 6.4.3.1. Frontal cover

I/O modules have a frontal cover which has as main objective to protect the I/O connectors. Besides, the frontal cover has other functions which are described throughout the I/O Modules item.

To access the I/O connector the frontal cover must be opened pulling its lower extremity. The figure below indicated how it must be done.

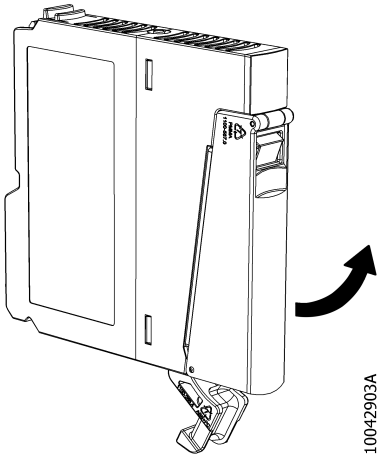



Figure 10: Opening the Frontal Cover

The figure below shows an I/O module with its frontal cover opened.

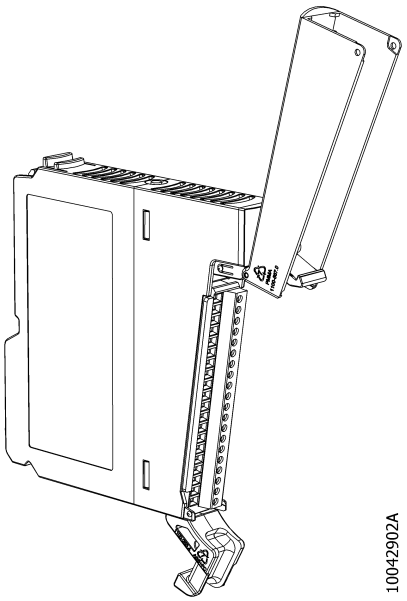



Figure 11: Frontal Cover Opened

#### 6.4.3.2. I/O Connector Insertion

The simple width modules have an extra feature which helps the I/O terminal block insertion, described below. In case of double width module the insertion must be executed manually.

With the frontal cover opened, the terminal block must be inserted partially in the module, taking care to insert it in the right position. Then the frontal cover must be closed as indicated on figure below. Observe the connector partially connected.

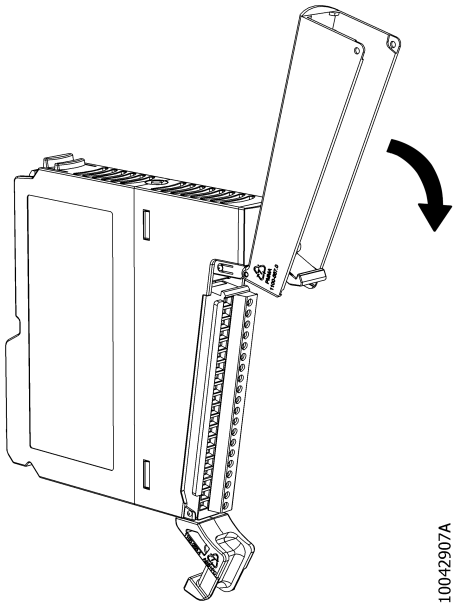



Figure 12: Closing the Frontal Cover

At closing the frontal cover the I/O connector block is inserted in the module. The movement must be done all the way down until the cover is in the final position, as presented on figure below.

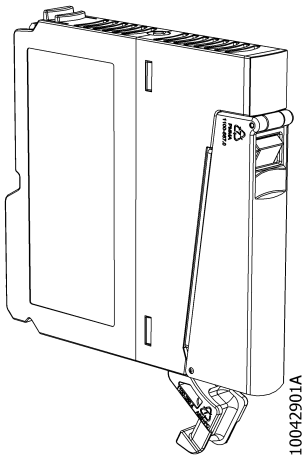



Figure 13: Module with the Frontal Cover Closed

#### 6.4.3.3. I/O Connector Removal

The I/O modules have a feature to help the connector block removal, which is described below.

As described previously, to open the frontal cover, it's necessary to pull it by its lower part. When the I/O connector block must be removed, it's necessary to execute the same opening movement besides pressing the connector block extraction lever as shown on figure below. It's important to keep the extraction lever pressed during the whole movement since the beginning.

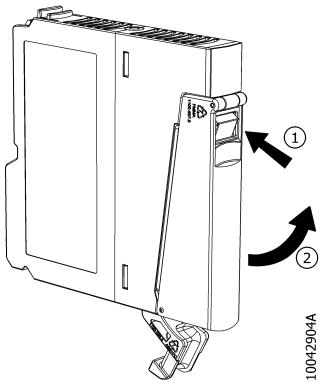



Figure 14: Movement to Remove the I/O Connector Block Modules

After the described movement, the I/O connector block is partially removed, simplifying the rest of its extraction. Such functionality is available both for the simple width modules as for the double width modules. In case of double width modules, each I/O connector has its own extraction lever. Therefore each connector must be removed individually.

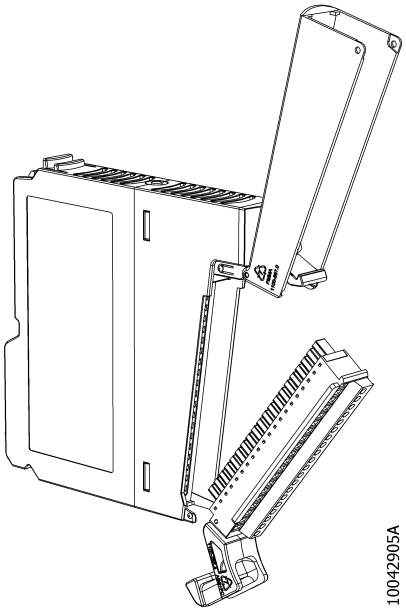



Figure 15: I/O Connector Block Removal Modules

#### 6.4.3.4. I/O connector block

The connectors block from the I/O modules use the spring-connection for cable fixation, not needing screws for cable holding.

##### *6.4.3.4.1. Identification*

All I/O connector block pins are numbered. The 10 pins connectors are numbered from 1 to 10 and the 20 pins connectors block are numbered from 1 to 20. The relation between the pin number and its function is defined in the Connector Pinout section.

#### 6.4.3.5. I/O module labels

##### *6.4.3.5.1. Identification number and description*

The modules have a frontal label, which has two functions: allow the user to identify and describe each module and indicate on a short way its installation diagram.

When the I/O modules frontal cover is closed, its identification number and description is visible, as shown on figure below. In this example the identification number is indicated by “XXXX” and the module description by “Description Altus S/A”.

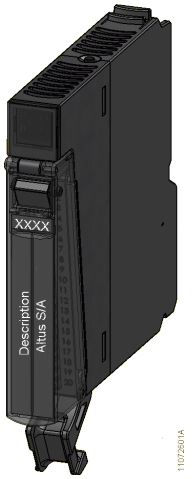



Figure 16: Module Identification

#### *6.4.3.5.2. Installation Diagram*

At opening the I/O frontal covers, the module installation diagram becomes visible, as presented on figure below.

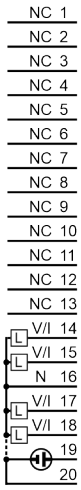
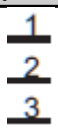



Figure 17: Installation Diagram

On table below are described all symbols used in the installation diagram.

| Symbol | Meaning |
|---|---|
|  | The numbers on the left indicate the connector block pin number, e.g. on the figure on the left the pins 1, 2 and 3 are indicated. |
|  | This symbol indicates a load which is being activated by a module output point. |
|  | This symbol indicates a direct current power supply source. On this symbol the power supply polarity is specified according to the inner circle bar. The bigger bar indicates the positive pole while the smaller bar indicates the negative pole. The voltage must be compatible with the module characteristics. |

| Symbol | Meaning |
|---|---|
| ----- | This symbol indicates that exist options to connect an input or output, according with the module characteristics. |

Table 9: Installation Diagram Symbols

*6.4.3.5.3. Label insertion and removal*

To add the identification number and module description it's necessary to remove the I/O module frontal label as shown on figure below. This figure shows an I/O module frontal cover which uses one slot in the rack. The same procedure must be executed for modules that use two slots.

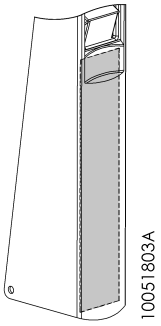



Figure 18: Label (1)

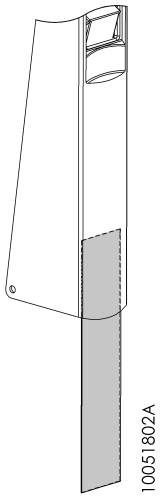



Figure 19: Label (2)

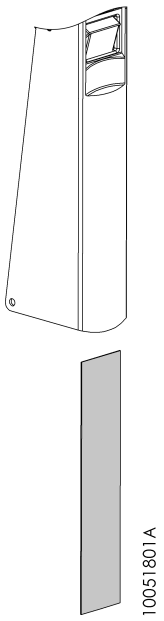



Figure 20: Label (3)

Care must be taken for a little lock existent in the frontal cover inner part. The label removal is only possible when it is directed over the lock. Besides, at inserting it again, the label must be placed over the frontal cover side locks in order to remain fixed. The figure below indicates the side lock position where 3 locks can be observed on each side.

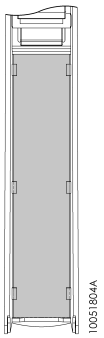



Figure 21: Label Fixation Locks

### 6.4.4. Spring-Connectors

This type of connector has a fixation system based on a high reliability spring even under vibration subjected environment. For its assembly it's recommended the use of a 3.5 mm wide screwdriver with isolated handle. The advantage of using this connector is the quick and easy electric cable assembly.

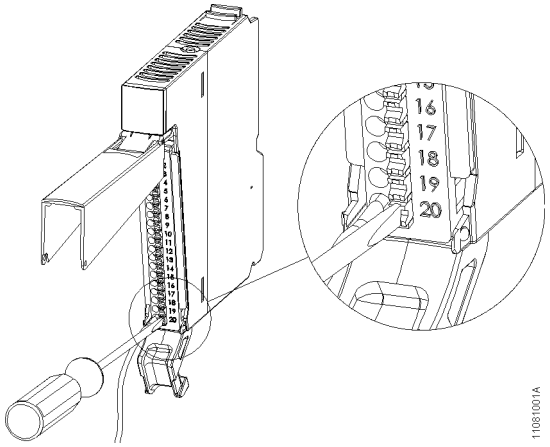



Figure 22: Spring Connection I/O Module

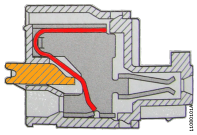


Figure 23: Spring Terminal Block

To assembly the cable in the connector:
- Insert the screwdriver in the terminal lever to open the spring
- Insert the cable terminal in the connector
- Remove the screwdriver to close the connector

#### 6.4.4.1. Cable Insertion

In order to obtain an equal length in all cables connected to a same I/O connector block, it's recommended the following definition regarding the length difference which each cable beside another must obey before installation. It's important to stress that the biggest cable must be always the cable connected to the I/O connector pin 1.

#### 6.4.4.2. 20-Pin Connector Block - NX9403

It's recommended the use of 0.5 $mm^2$ cables. Each cable must be cut with a difference of 4 mm as indicated on Figure 24. Each pin must have 0.5 $mm^2$ terminals crimped.

**ATTENTION**

Use single terminal with length A = 8 mm to guarantee the effective contact (see Figure 25).

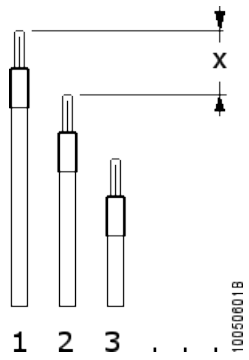



Figure 24: Wire Cutting

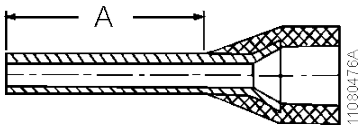



Figure 25: Terminal

#### 6.4.4.3. Cable assembly

Insert the terminals in the connector block starting by pin 10, for the 10-pin connector block, or by pin 20, for 20-pin connector block. Certify that the terminals are completely inserted in the connector and correctly connected.

#### 6.4.4.4. Cable fixation and Identification

It is recommended to use numbered wiring or cables with numbered conductors for wiring identification and Conexel identifier WKM 8/30 (PN: 1631910000) for cable identification. Turn the cables to place then under the I/O module frontal cover. Then, tie them together using plastic tie fixing in the wire holder placed on the connector lower part (see figure below).

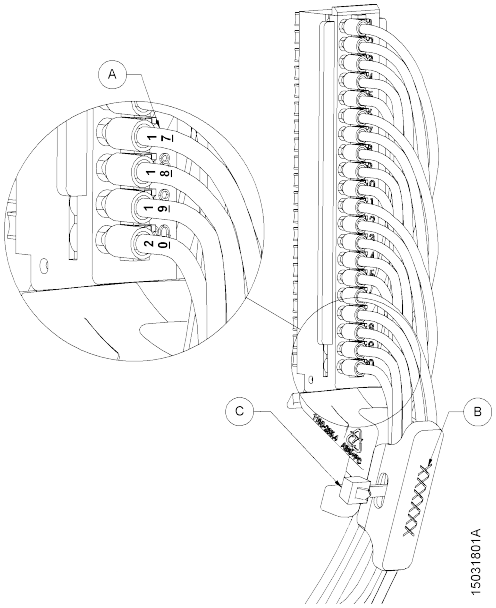



Figure 26: Cabling ID and Fixation

To identify the wiring:

- (A) Use numbered wiring or cables with numbered conductors
- (B) Use Conexel identifier WKM 8/30 (PN: 1631910000) for cable identification
- (C) Fix with plastic tie the identifier of the wires on the support (wire holder) located at the bottom of the connector

#### 6.4.4.5. Cable removal

To remove the cables from the connector block it's recommended the use of a 3.5 mm wide screwdriver with isolated handle. It must be inserted in the lever beside the cable while the cable is pulled off.

# 7. Configuration

This module was developed to be used with NJ Line products. All Nexto System products are configured in Mastertool. 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 that are used to access and control the module. The list below describes all variables delivered by NJ6101.

The table below presents the variables organizational structure in the CPU memory.

Besides these data, NJ6101 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 |
|---|---|---|---|---|---|
| %QW(n) | WORD | AO 00 | Analog Output 10 | INT (Read/Write) | Always |
| %QW(n+2) | WORD | AO 01 | Analog Output 11 | INT (Read/Write) | Always |
| %QW(n+4) | WORD | AO 02 | Analog Output 12 | INT (Read/Write) | Always |
| %QW(n+6) | WORD | AO 03 | Analog Output 13 | INT (Read/Write) | Always |

Table 10: Process Data

**Note:**

**Update:** The field "Update" indicates if the respective process data is updated by CPU and NJ6101 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 NJ6101 through the bus, to improve CPU performance, it's recommended to update only the process data that will be used in the application.

## 7.2. Module Parameters

| Name | Description | Standard Value | Options | Configuration |
|---|---|---|---|---|
| Output Type | Set the Analog Output Type | Not Configured | Not Configured<br>Voltage 0 - 10 Vdc<br>Current 0 - 20 mA<br>Current 4 - 20 mA | Per output |
| %Q Start Address of Module Diagnostics Area | Defines the start address of the module diagnostics area | - | - | Per module |

Table 11: Module Parameters

**Notes:**

**Configuration:** Indicates if the parameter is related to the entire module (per module) or if the parameter is related to a single output (per channel).

**Output Type:** Current 4 – 20 mA configuration is only available for firmware version 1.1.0.0 or higher.

# 8. Usage

## 8.1. General Purpose Analog Read and Write

NJ6101 has one variable for each output.

# 9. Maintenance

Altus recommends that all modules' connections should be checked and any dust or any kind of dirt located in the module's enclosure should be removed at least every 6 months.

This module offers important features to assist users during the maintenance: Status and Diagnostics Indicators, Web Page with Complete Status and Diagnostics List, and Diagnostics Mapped to Variables.

## 9.1. Status and Diagnostics Indicators

All 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 this line of I/O modules. These states can be consulted in the table below.

### 9.1.1. D and E States

| D | E | Description | Cause | Solution | Priority |
|---|---|---|---|---|---|
| Off | Off | Display failure or module off | - Module disconnected;<br>- External power supply failure;<br>- Hardware failure. | Check:<br>- If the module is completely connected to the rack;<br>- If the rack is powered by an external source;<br>- 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;<br>- Head/Remote in non-ACTIVE state. | Check:<br>- If the CPU is in operation;<br>- If the Fieldbus Master is in operation;<br>- 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:<br>- The module and the CPU;<br>- The module and the Head/Remote;<br>- The Head/Remote and the Field Network Master. | Check:<br>- If the module is completely connected to the rack;<br>- If the CPU is in RUN mode;<br>- If the Fieldbus Master is in operation;<br>- Network integrity between PROFIBUS Master and Head/Remote. | 4 |
| Off | Blinking 3x | Module without calibration | - The module is not calibrated;<br>- There was an error with the calibration value. | The module must return to the manufacturer. | 3 |
| Off | Blinking 1x | Missing or parameterization error | The module isn't parameterized. | Check:<br>- If the module parameterization is correct;<br>- Network integrity between PROFIBUS Master and Head/Remote;<br>- Network integrity between PROFINET Controller and Head/Remote. | 2 |
| Off | Blinking 4x | Fatal hardware fault | Hardware fault. | The module must return to the manufacturer. | 1 (Higher) |

Table 12: 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.

### 9.1.2. 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 output. When the numerical character is on the respective output is configured and enabled and if the numerical character is off the respective output is disabled. The relationship between the output 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 outputs. In NJ6101 module's case, only the character 1 is used. The characters that are placed at the right side of character 1 and the segment 1 itself represent the outputs from 10 to 13, where the character 0 represents the output 10 and the character 3 represents the output 13. The figure below shows the relationship between the numerical characters and the respective outputs.

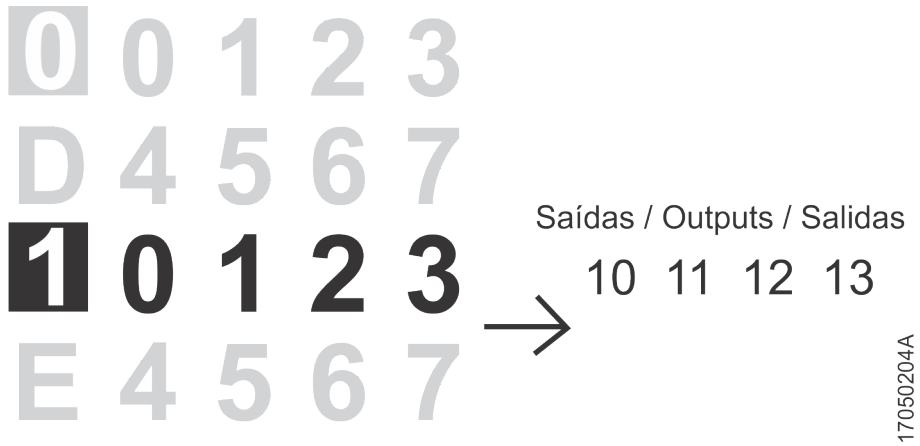



Figure 27: Display

## 9.2. Web Page with Complete Status and Diagnostics List

Another way to access diagnostics information is via web pages. The CPU's has an embedded web page server that provides all 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.

## 9.3. Diagnostics Through Variables

All diagnostics can be accessed through symbolic variables that can be handled by the user application or even forwarded to a supervisory system using a communication channel. The tables below show all available diagnostics and their respective symbolic variables, description and string that will be shown on the CPU graphical display and web.

### 9.3.1. General Diagnostics

| Diagnostic Message | Symbolic Variable DG_NJ6101.tGeneral.* | Description |
|---|---|---|
| MODULE W/ DIAGNOSTIC | bActiveDiagnostics | TRUE – Module has active diagnostics |
| NO DIAG | | FALSE – Module doesn't have active diagnostic |
| MODULE W/ FATAL ERROR | bFatalError | TRUE – Fatal error |
| - | | FALSE – No fatal error |
| CONFIG. MISMATCH | bConfigMismatch | TRUE – Parameterization error |
| - | | FALSE – Parameterization ok |
| WATCHDOG ERROR | bWatchdogError | TRUE – Watchdog has been detected |
| - | | FALSE – No watchdog |
| NO EXTERNAL SUPPLY | bNoExternalSupply | TRUE – No external voltage |
| - | | FALSE – Power supply ok |

Table 13: General Diagnostics

### 9.3.2. Specific Diagnostics

| Diagnostic Message | Symbolic Variable DG_NJ6101.tSpecific.* | Description |
|---|---|---|
| OUTPUT 10 W/ DIAG | bActiveDiagnosticsOutput10 | TRUE – Output 10 has active diagnostics |
| - | | FALSE – Output 10 doesn't have active diagnostics |
| OUTPUT 11 W/ DIAG | bActiveDiagnosticsOutput11 | TRUE – Output 11 has active diagnostics |
| - | | FALSE – Output 11 doesn't have active diagnostics |
| OUTPUT 12 W/ DIAG | bActiveDiagnosticsOutput12 | TRUE – Output 12 has active diagnostics |
| - | | FALSE – Output 12 doesn't have active diagnostics |
| OUTPUT 13 W/ DIAG | bActiveDiagnosticsOutput13 | TRUE – Output 13 has active diagnostics |
| - | | FALSE – Output 13 doesn't have active diagnostics |

Table 14: Specific Diagnostics

### 9.3.3. Detailed Diagnostics

| Diagnostic Message | Symbolic Variable DG_NJ6101.tDetailed.* | Description |
|---|---|---|
| - | tAnalogOutput_XX. | TRUE – Output is not enabled |
| - | bOutputNotEnable | FALSE – Output is enabled |
| OPEN LOOP | tAnalogOutput_XX. | TRUE – Output is in open loop condition |
| - | bOpenLoop | FALSE – Output is not in open loop condition |
| OUTPUT SHORT CIRCUIT | tAnalogOutput_XX. | TRUE – There is a short-circuit in the Output |
| - | bShortCircuit | FALSE – There is no short-circuit in the Output |

Table 15: Detailed Diagnostics

**Note:**

**Symbolic Variable:** Diagnostics are accessed through the symbolic variables listed in the tables above. Mastertool declares them automatically, and all of them can be found in the diagnostics object.

# 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** | Technical Characteristics of the NX and NJ Lines | English |
| **CT114000** | Características Técnicas das Linhas NX e NJ | Portuguese |
| **MU299611** | Mastertool X User Manual | English |
| **MU299049** | Manual de Utilização Mastertool X | Portuguese |
| **MU299609** | MasterTool IEC XE User Manual | English |
| **MU299048** | Manual de Utilização MasterTool IEC XE | Portuguese |
| **MP399609** | IEC 61131 Programming Manual | English |
| **MP399048** | Manual de Programação IEC 61131 | Portuguese |
| **MU214608** | Nexto NX NX5110, NX5210 User Manual | English |
| **MU214108** | Manual de Utilização Nexto NX NX5110, NX5210 | Portuguese |

Table 16: Related Documents