# 24Vdc 8 DO Monitored Module          NX2025

## Nexto Series

## Product Description

Nexto Series is a powerful and complete Programmable Logic Controller (PLC) Series with unique and innovative features. Due to irs 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 syze, 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 feature to fit requirements in diferente kinds of applications. The options available cover from standard automation systems, high-availability applications where redundancy is major requirement, distributed applications to functional safety systems.

The NX2025 module offers 8 monitored digital outputs, occupying only one position in the rack. Finally, the Nexto Series has some innovative features for diagnostics and maintenance such as Electronic Tag on Display, Easy Plug System and One Touch Diag.



Its main features are:
- 08 outputs in a single width module
- Drive device redundancy, ensuring the safe state of the outputs in case of failure
- Possibility to use two outputs in parallel to drive the same field device, increasing availability, with integrated diodes
- Diagnosis of failure causes
- Galvanic isolation between outputs and internal logic
- Short circuit and overload protection
- Protection against surge voltage
- Open loop diagnostics
- Display for module diagnostics and output state indication
- Easy Plug System
- One Touch Diag
- Electronic Tag on Display

## Ordering information

### Included Items

The product package contains the following items:
- NX2025 module
- 20-terminals conector with wire holder
- Installation guide

### Product Code

The following code should be used to purchase the product:

| Code | Description |
|------|-------------|
| NX2025 | 24Vdc 8 DO Monitored Module |

### Related Products

The following product must be purchased separately when necessary:

| Code | Description |
|---|---|
| **NX9403** | 20-terminals conector with cable guides |

## 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. The list below shows some of these features that you will find in the NX2025 module:



**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.



**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.



**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

| | NX2025 |
|---|---|
| **Backplane rack occupation** | 1 slot |
| **Number of outputs** | 8 monitored digital outputs |
| **Maximum current** | 1,25 A per point @ 40 ºC<br>1 A per point @ 60 ºC<br>6 A total @ 40 ºC |
| **Maximum current limit** | 1,5 A (± 10 %) |
| **Minimum current limit** | 1 mA (± 25 %) |
| **Switching time** | Maximum 50 us |
| **Output 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 voltage surges per output |
| **Operation modes** | Safe Mode, with all protections enabled<br>Normal Mode, with protections disabled or partially enabled |
| **Isolation (@1 minuto)**<br>   **Output to logic**<br>   **Output to protective earth** ⏚<br>   **Logic to protective earth** ⏚ | <br>1500 Vdc<br>1500 Vdc<br>1500 Vdc |
| **Current consumption from backplane rack power supply** | 200 mA |
| **External power supply** | 19,2 to 30 Vdc |
| **External power supply current** | 50 mA @ 24 Vdc |
| **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 |
| **Coating of electronic circuits** | Yes |
| **Standards** | IEC 61131-2<br>CE – 2011/65/EU (RoHS), 2014/35/EU (LVD) and 2014/30/EU (EMC)<br>✔<br>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 |
| **Conformal coating** | Yes |

**Note:**

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

**External Power Supply:** The terminals 17 to 20 are used to supply power to the outputs only. NX2025 internal logic is supplied by the Power Supply Module placed on the Nexto Backplane Rack.

**Maximum Limit Current:** The maximum limit current is the current above which overcurrent protection takes effect. This protection shuts down the point with overcurrent to prevent damage to the module. Continuous operation with currents between the rated current and the maximum limit current is not recommended. Using the module under these conditions can cause irreversible damage.

**Minimum Limit Current:** The minimum limit current is the current below which the module indicates open load.

## Connector Pinout

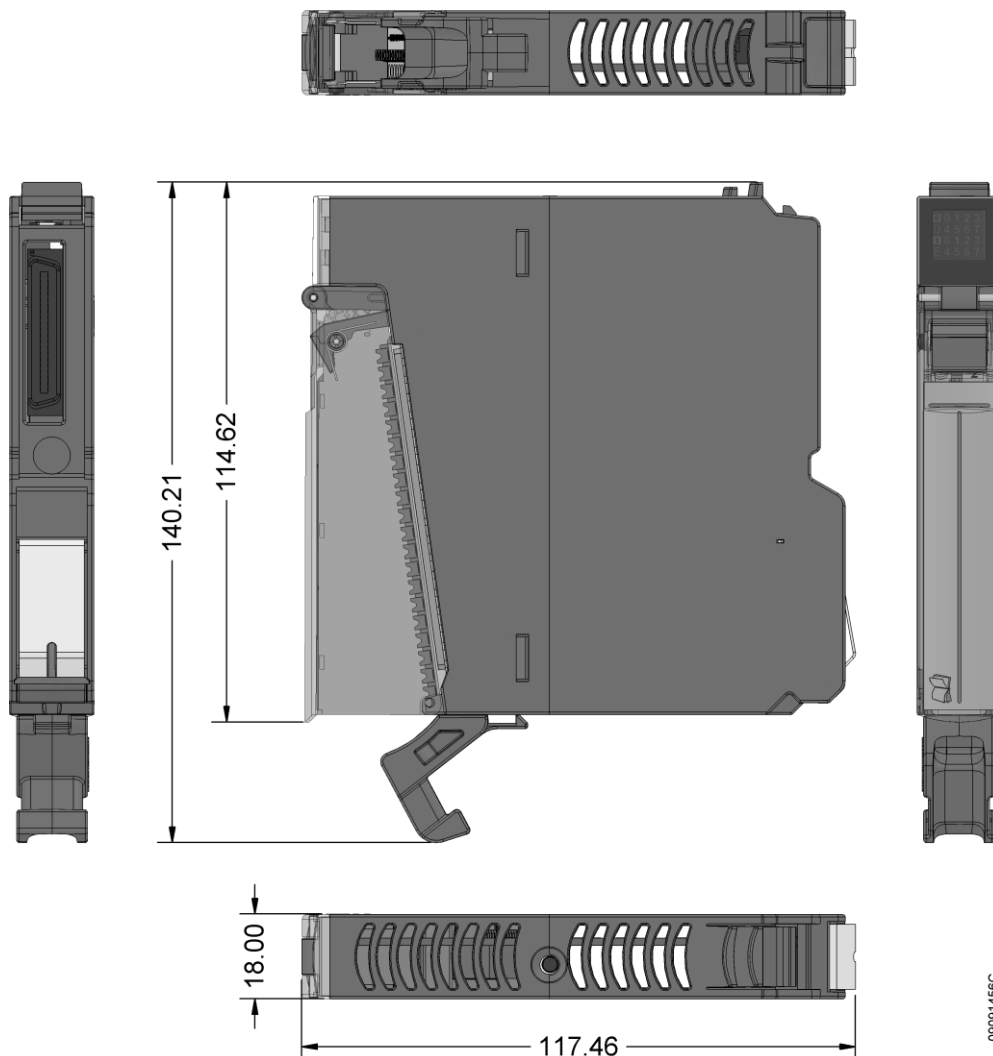The following table shows the description of each conector terminal:

| Terminal Number | Description |
|---|---|
| 1 | Positive 00 output |
| 2 | Negative 00 output |
| 3 | Positive 01 output |
| 4 | Negative 01 output |
| 5 | Positive 02 output |
| 6 | Negative 02 output |
| 7 | Positive 03 output |
| 8 | Negative 03 output |
| 9 | Positive 04 output |
| 10 | Negative 04 output |
| 11 | Positive 05 output |
| 12 | Negative 05 output |
| 13 | Positive 06 output |
| 14 | Negative 06 output |
| 15 | Positive 07 output |
| 16 | Negative 07 output |
| 17 | 0 Vdc |
| 18 | 24 Vdc |
| 19 | 0 Vdc |
| 20 | 24 Vdc |

## 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.

## Physical Dimensions

Nexto Series User Manual - MU214600 should be consulted for general measurement of installation panel.
Dimensions in mm.

## Configuration

The NX2025 was developed for use with the Nexto Series products. All Nexto Series products are configured in MasterTool IEC XE. All configuration data of a given module can be accessed through a double click in it on the Graphical Editor.

## Process Data

Process Data, when available, are the variables that are used to access and control the module. The list below describes all variables delivered by NX2025.

The table below shows the organization structure of the variables in the memory of the CPU.

Besides this data, NX2025 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 |
|---|---|---|---|---|---|
| %QB(n) | BYTE | Digital Outputs | Channel 00 to 07 output value | Output (Read/Write) | Always |

**Note:**

**Update:** The field "Update" indicates if the respective process data is updated by CPU and NX2025 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 NX2025 through the bus, to improve CPU performance, it's recommended to update only the process data that will be used in the application.

## Module Parameters

| Name | Description | Standard Value | Options | Configuration |
|---|---|---|---|---|
| Mode | How to use the output | Normal | Normal<br>Safe | Per Output |
| Test | Test to be performed when in safe mode | Disabled | Disabled<br>Light<br>Dark | Per Output |
| Light Time | Value to be used in Light test time (ms) | 25,5 | Unit in the hundredths of microseconds. | Per Output |
| Dark Time | Value to be used in Dark test time (ms) | 25,5 | Unit in the hundredths of microseconds. | Per Output |
| Minimum current | Minimum Load Verification at Output | FALSE | FALSE<br>TRUE | Per Output |
| Behavior of the Outputs with the CPU in Stop Mode | This parameter is individually defined for each output and defines the behavior of each output when the CPU is in STOP mode | FALSE | FALSE ou TRUE | Per Output |
| %Q Start Address of Module Diagnostics Area | Defines the start address of the module diagnostics area | - | - | Per module |

**Notes:**

**Configuration:** Configuration indicates if the parameter is related to the entire module (per module) or if the parameter is related to a single output (per output). In case of output wise parameters, all parameters will be repeated for each available output.

**Normal Mode:** It is possible to individually enable each protection and test via bits 1 to 4.

**Safe Mode:** All protections and tests will be automatically enabled, and the parameters set by the other enable bits will be disregarded.

**Light Test:** The "Light" test generates a trigger pulse on the off outputs for a user-specified maximum time. Its purpose is to diagnose faults in the module output circuits and short circuits in the field wiring. The Light Time, which defines the maximum time of the pulse, is specified in units of 0.1 ms, and can take values from 0.4 ms to 25.5 ms (numbers smaller than 4 will be considered as 0.4 ms). The time between tests of a point is fixed at 32 s.

**Dark" Test:** The "Dark" test generates a shutdown pulse on the connected outputs for a maximum user-specified time. Its purpose is to diagnose faults in the module output circuits and short circuits in the field wiring. The "Dark" Time, which

defines the maximum time of the pulse, is specified in units of 0.1 ms, and can take values from 0.4 ms to 25.5 ms (numbers smaller than 4 will be considered as 0.4 ms). The time between single point tests is fixed at 32 s.

**Open Load Test (Minimum Current):** This test checks if a minimum current flows through the load when it is triggered.

# Module Usage

## General Purpose Output Write

The NX2025 has two variables to control its outputs (Digital Outputs - Byte 0). The variable has 8 bits where each bit represents the logic state of each output channel. The relationship between each bit and its respective output can be found on the Bus: I/O Mapping tab.

# Maintenance

Altus recommends that all module connections be checked and that dust or any type of dirt on the outside of the module be removed every 6 months.

The NX2025 module 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 List of Status and Diagnostics, and Diagnostics via Variables.

## Electronic Tag on Display e One Touch Diag

Electronic Tag on Display and One Touch Diag are important features that provide to the user the option to check the tag, description and diagnostics related to a given module directly on the CPU display.

Electronic Tag on Display and One Touch Diag are easy-to-use features. To check the tag and diagnostics of a given module, it's required only one short press (shorter than 1 s) on its diagnostic switch. After pressing once, CPU will start to scroll tag information and diagnostic information of the module. To access the respective module description just long press (longer than 1 s) the diagnostics switch of the respective module.

More information about Electronic Tag on Display and One Touch Diag can be found at User Manual of each respective CPU (listed at manual of Nexto Series - MU214600).

## Status and Diagnostics Indicators

Nexto 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, 1 are common for all Nexto Series I/O modules. These states can be consulted in the table below.

The meaning of the numeric characters can be different for specific modules. For analog modules, the numeric characters show the respective state of each output. When the numeric character is connected, the respective output is configured and enabled; if it is disconnected, the respective output is disabled. The relationship between the output number and its respective numerical character can be found in the following figure.
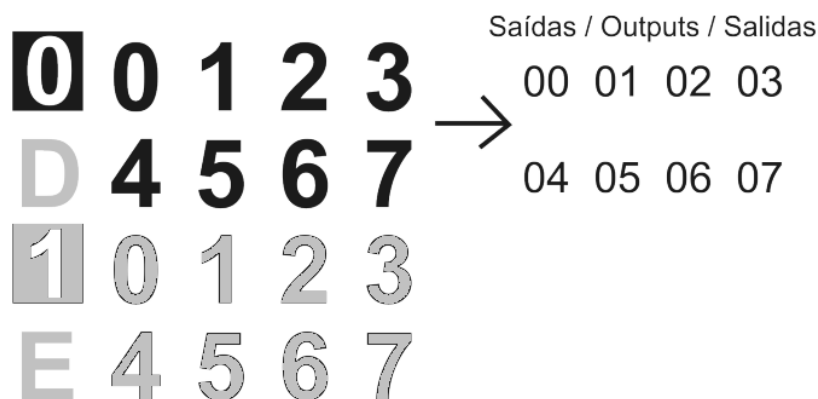
### D and E Symbols States

| D | E | Description | Cause | Solution | Priority |
|---|---|---|---|---|---|
| Off | Off | Display failure or module off | Module disconnected, external power missing, or hardware failure | Check if the module is completely connected to the rack, if the rack is powered by an external source, if the module has external power. | - |
| On | Off | Normal use | - | | 9 (Lower) |
| Blinking 1x | Off | Active Diagnostics | There is at least one active diagnostic related to the module | Check which diagnosis is active. More information can be found in the subsection Diagnostics via Variables. | 8 |
| Blinking 2x | Off | CPU in STOP mode | CPU in STOP mode. If the module is in a PROFIBUS Remote, the Master is in the Clear state | Check that the CPU is in RUN mode or that the PROFIBUS Master is in OPERATE mode. More information can be found in the documentation of the CPU or the PROFIBUS Master. | 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 1x | Parameterization error | The module is not parameterized or has not received the new parameterization | Verify that the module parameterization is correct | 4 |
| Off | Blinking 2x | Loss of bus master | Loss of communication between the module and the CPU. | Check if the module is completely connected to the rack and if the CPU is in RUN mode. | 3 |
| Off | Blinking 3x | Reserved | - | - | 2 |
| Off | Blinking 4x | Fatal hardware fault | Hardware fault | In this case the module must be returned 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 NX2025 only the character 0 is on. The figure below shows the relation between numerical characters and the respective output.

### Web Page with Complete Status and Diagnostics List

Another way to access diagnostics 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 diagnostics list can be found at User Manual of each respective CPU (listed at Nexto Series User Manual - MU214600).

### Diagnostics Through Variables

All diagnostics of the NX2025 module can be accessed through variables that can be manipulated by the user application or even forwarded to a supervisory 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 this module and their respective memory address, description, symbolic variable and string that will be shown on the CPU graphical display and web.

### General Diagnóstics

| Direct Representation Variable | | Diagnostic Message | Symbolic Variable DG_modulename.tGeneral. | Description |
|---|---|---|---|---|
| **Variable** | **Bit** | | | |
| **%QB(n)** | **0** | OUTPUT 00 W/ DIAG | bActiveDiagnosticsOutput00 | TRUE – Output 00 has active diagnostics |
| | | | | FALSE – Output 00 doesn't have active diagnostics |
| | **1** | OUTPUT 01 W/ DIAG | bActiveDiagnosticsOutput01 | TRUE – Output 01 has active diagnostics |
| | | | | FALSE – Output 01 doesn't have active diagnostics |
| | **2** | OUTPUT 02 W/ DIAG | bActiveDiagnosticsOutput02 | TRUE – Output 02 has active diagnostics |
| | | | | FALSE – Output 02 doesn't have active diagnostics |
| | **3** | OUTPUT 03 W/ DIAG | bActiveDiagnosticsOutput03 | TRUE – Output 03 has active diagnostics |
| | | | | FALSE – Output 03 doesn't have active diagnostics |
| | **4** | OUTPUT 04 W/ DIAG | bActiveDiagnosticsOutput04 | TRUE – Output 04 has active diagnostics |
| | | | | FALSE – Output 04 doesn't have active diagnostics |
| | **5** | OUTPUT 05 W/ DIAG | bActiveDiagnosticsOutput05 | TRUE – Output 05 has active diagnostics |
| | | | | FALSE – Output 05 doesn't have active diagnostics |
| | **6** | OUTPUT 06 W/ DIAG | bActiveDiagnosticsOutput06 | TRUE – Output 06 has active diagnostics |
| | | | | FALSE – Output 06 doesn't have active diagnostics |
| | **7** | OUTPUT 07 W/ DIAG | bActiveDiagnosticsOutput07 | TRUE – Output 07 has active diagnostics |
| | | | | FALSE – Output 07 doesn't have active diagnostics |
| **%QB(n+1)** | **0** | MODULE W/ DIAGNOSTICS | bActiveDiagnostics | TRUE – Module has active diagnostics |
| | | | | FALSE – Module doesn't have active diagnostics |
| | **1** | MODULE W/ FATAL ERROR | bFatalError | TRUE – Fatal error |
| | | | | FALSE – No fatal error |
| | **2** | CONFIG. MISMATCH | bConfigMismatch | TRUE – Parameterization error |
| | | | | FALSE – Parameterization ok |
| | **3** | WATCHDOG ERROR | bWatchdogError | TRUE – Watchdog has been detected |
| | | | | FALSE – No Watchdog |
| | **4** | OTD SWITCH ERROR | bOTDSwitchError | TRUE – Module has switch failure |
| | | | | FALSE – Diagnostics switch ok |
| | | | | FALSE – Calibrated module |
| | **5** | EXTERNAL SUPPLY | bExternalPowerSupply | TRUE – External supply with voltage below 19 Vdc |
| | | | | FALSE – External supply with voltage above 19 Vdc |
| | **6..7** | Reserved | | |

### *Detailed Diagnostics*

| Direct Representation Variable | | Diagnostic message | Symbolic Variable DG_modulename.tDetailed. tDigitalOutput_XX | Description |
|---|---|---|---|---|
| **Variable** | **Bit** | | | |
| **%QB(n+2+XX*2)** | **0..7** | Reserved | | |
| **%QB(n+2+2*XX+1)** | **0** | OPEN LOOP | tDigitalOutput_XX bOpenLoop | TRUE – Output is in an open load situation (current less than the 1 mA Minimum Limit Current). |
| | | | | FALSE – Output with connected load |
| | **1** | OVER CURRENT | tDigitalOutput_XX bOverCurrent | TRUE – Output is in an overcurrent situation (I > 1.5 A). |
| | | | | FALSE – Output with current below 1.5 A. |
| | **2** | LIGHT | tDigitalOutput_XX bLightFail | TRUE – Failed Light test output. |
| | | | | FALSE – Output is working normally. |
| | **3** | DARK | tDigitalOutput_XX bDarkFail | TRUE – Output with a failed Dark test. |
| | | | | FALSE – Output is working normally. |
| | **4..7** | Reserved | | |

**Notes:**

**Open Loop Diagnostic:** This diagnostic is triggered when the output voltage of the channel is higher than 13.4 Vdc.

**Direct Representation Variable:** "n" is the address defined in the field %Q Start Address of Diagnostic Area on the module configuration screen – Modules Parameters tab in the MasterTool IEC XE, "XX" is the channel of digital output.

**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.

This table is only a guide to some relevant documents that may be useful when using, maintaining, and programming the NX2025. The complete and updated table containing all Nexto Series documents can be found in the Nexto Series User Manual - MU214600.

| Code | Description | Language |
|------|-------------|----------|
| **CE114000**<br>**CT114000**<br>**CS114000** | Nexto Series – Technical Characteristics<br>Série Nexto – Características Técnicas<br>Serie Nexto – Especificaciones y Configuraciones | English<br>Portuguese<br>Spanish |
| **MU214600**<br>**MU214000**<br>**MU214300** | Nexto Series User Manual<br>Manual de Utilização Série Nexto<br>Manual Del Usuario Serie Nexto | English<br>Portuguese<br>Spanish |
| **MU214605**<br>**MU214100**<br>**MU214305** | Nexto Series CPUs User Manual<br>Manual de Utilização UCPs Série Nexto<br>Manual del Usuario UCPs Serie Nexto | English<br>Portuguese<br>Spanish |
| **MU299609**<br>**MU299048**<br>**MU299800** | MasterTool IEC XE User Manual<br>Manual de Utilização MasterTool IEC XE<br>Manual Del Usuario MasterTool IEC XE | English<br>Portuguese<br>Spanish |
| **MU214603**<br>**MU214003** | Nexto Series HART Manual<br>Manual HART Série Nexto | English<br>Portuguese |