

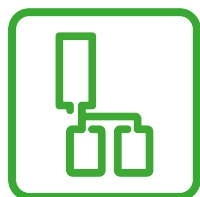
Modicon Edge I/O NTS

Field Device Master Modules

User Guide

Original instructions

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02/2025



Legal Information

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Safety Information

Important Information




Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

 DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check are made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995:

(In case of divergence or contradiction between any translation and the English original, the original text in the English language will prevail.)

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

Document Scope

This guide describes the implementation of Modicon Edge I/O NTS Field Device Master modules. It provides the description, characteristics, wiring diagrams and configuration details for Modicon Edge I/O NTS Field Device Master modules.

Validity Note

This document has been updated for the release of Modicon Edge I/O NTS Field Device Master modules firmware V1.0.0.

This document has been updated for the release of the Modicon Edge I/O Configurator V1.0.0.

The characteristics of the products described in this document are intended to match the characteristics that are available on www.se.com. As part of our corporate strategy for constant improvement, we may revise the content over time to enhance clarity and accuracy. If you see a difference between the characteristics in this document and the characteristics on www.se.com, consider www.se.com to contain the latest information.

Environmental Data

For product compliance and environmental information, refer to the Schneider Electric Environmental Data Program.

Related Documents

Title of documentation	Reference number
Modicon Edge I/O - System Planning and Installation Guide	EIO0000004786 (ENG)
Modicon Edge I/O - Configurator and Web Interface - User Guide	EIO0000004810 (ENG)
Modicon Edge I/O - Software Integration and Compatibility - User Guide	EIO0000004818 (ENG)
Modicon Edge I/O - Diagnostic Data - User Guide	EIO0000004826 (ENG)
Modicon Edge I/O NTS - Network Interface Modules - User Guide	EIO0000004794 (ENG)
Modicon Edge I/O NTS - Discrete Modules - User Guide	EIO0000005238 (ENG)
Modicon Edge I/O NTS - Analog Modules - User Guide	EIO0000005246 (ENG)
Modicon Edge I/O NTS - Counting Modules - User Guide	EIO0000005262 (ENG)

To find documents online, visit the Schneider Electric download center (www.se.com/ww/en/download/).

Product Related Information

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the equipment.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system for proper operation before placing it into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

¹ For additional information, refer to NEMA ICS 1.1 (latest edition), *Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control* and to NEMA ICS 7.1 (latest edition), *Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems* or their equivalent governing your particular location.

WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in the information contained herein, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2023	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2020	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2021	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2021	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive (2006/42/EC)* and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

IO-Link Field Device Master Module

What’s in This Part

NTSFIO0400 Field Device Master Module, IO-Link Master, 4 Channels..... 11

IO-Link Field Device Master Module Appendices30

NTSFIO0400 Field Device Master Module, IO-Link Master, 4 Channels

What's in This Chapter

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NTSFIO0400 Presentation

Overview

This section provides a presentation of the NTSFIO0400 module.

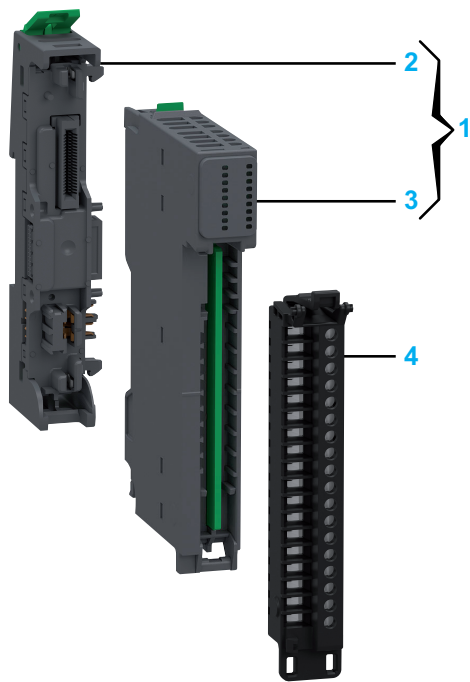
Main Characteristics

The following table describes the main characteristics of the NTSFIO0400 module:

Main Characteristics	Value
Product or component type	IO-Link master module with 4 channels: <ul style="list-style-type: none">Compliant with IO-Link standard V1.1Without data consistency between channels
Number of channels	<ul style="list-style-type: none">Up to 4 IO-Link devices (3 /4 wire - Class A) NOTE: IO-Link devices Class B (M12 connector) can be connected with an external power supply, see wiring diagram NTSFIO0400 Wiring diagram IO-Link Class B with external power supply, page 20 <ul style="list-style-type: none">Up to 4 (C/Q) discrete channels (configurable as input or output)Up to 4 additional discrete input (DI) channels
Input and output rated voltage	24 Vdc
Input signal type	Sink
Input current	2.5 mA / input channel
Output signal type	Push-Pull
Output current	200 mA / channel for C/Q output
Operating mode	Asynchronous

Purchasing Information

The following figure presents the elements of the Modicon Edge I/O NTS NTSFIO0400 module:

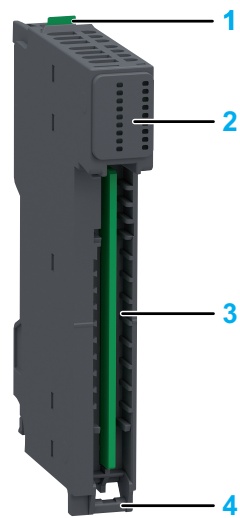


Number	Reference	Description
1	NTSFIO0400K	Base + Module (kit) NOTE: The module and its corresponding base can be purchased as a kit.
2	NTSXBA0100H	Spare Base, 1 Slot, for Input/Output Common or Expert Module, Hardened
3	NTSFIO0400	Field Device Master Module, IO-Link Master, 4 Channels
4	NTSXTB18200H NTSXTB18201H NTSXTB18000H NTSXTB18001H	Spring Terminal Block, 18 Points, 3.81 mm Pitch, Without Cover, use on Low Height Module, Hardened Spring Terminal Block, 18 Points, 3.81 mm Pitch, With Cover, use on Low Height Module, Hardened Screw Terminal Block, 18 Points, 3.81 mm Pitch, Without Cover, use on Low Height Module, Hardened Screw Terminal Block, 18 Points, 3.81 mm Pitch, With Cover, use on Low Height Module, Hardened NOTE: The terminal blocks are purchased separately.

NOTE: For more information on accessories and spare parts, refer to Modicon Edge I/O - System Planning and Installation Guide.

Physical Description

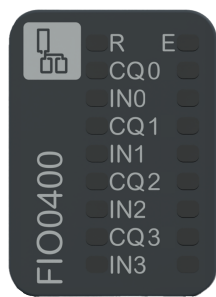
The following figure presents the elements of the module:



- 1: Release button for disengaging the module from the base
- 2: Status LEDs
- 3: Slot for the terminal block
- 4: Hinge for the terminal block installation

Status LEDs

The following figure presents the NTSFIO0400 status LEDs:

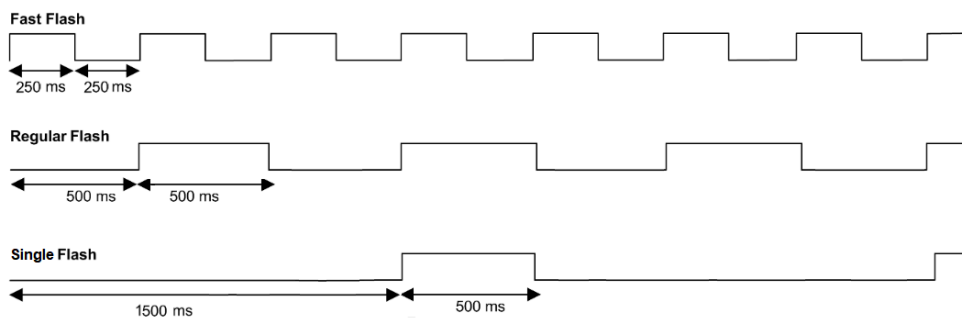


The following table describes the status of LEDs:

R (Green)	E (Red)	CQ (Green / Red / Yellow) IN (Green)	Description
Initialization and non-operational states			
OFF	OFF	OFF	Indicates that the module is not energized.
OFF	Fast Flash	-	Indicates that the module has detected a system error.
Regular Flash	OFF	-	Indicates that the firmware is being updated.
Single Flash	OFF	-	Indicates that the module is energized and not configured.
Operational state			
ON	OFF	OFF	Indicates that the discrete input or output is deactivated, or the channel is disabled.
ON	OFF	Green ON	Indicates that the discrete input or output is activated.
ON	OFF	Yellow ON	Indicates an active IO-Link communication.
ON	Regular Flash	OFF	Indicates that no device is connected in Autostart Mode .
ON	Regular Flash	Red Regular Flash	Indicates that a configured device is not connected.
ON	Regular Flash	Red ON	Indicates that a channel-related error is detected, for instance: <ul style="list-style-type: none">Indicates an undervoltage detection.Indicates an overload detection.Indicates an internal error detection.
ON	ON	-	Indicates that a module-related error is detected.

NOTE: For an extended diagnostic, refer to the Modicon Edge I/O - Diagnostic Data - User Guide

The following graphic shows the system status of LEDs during module operation:



NTSFIO0400 Characteristics

Overview

This section provides a general description of the characteristics of the module.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

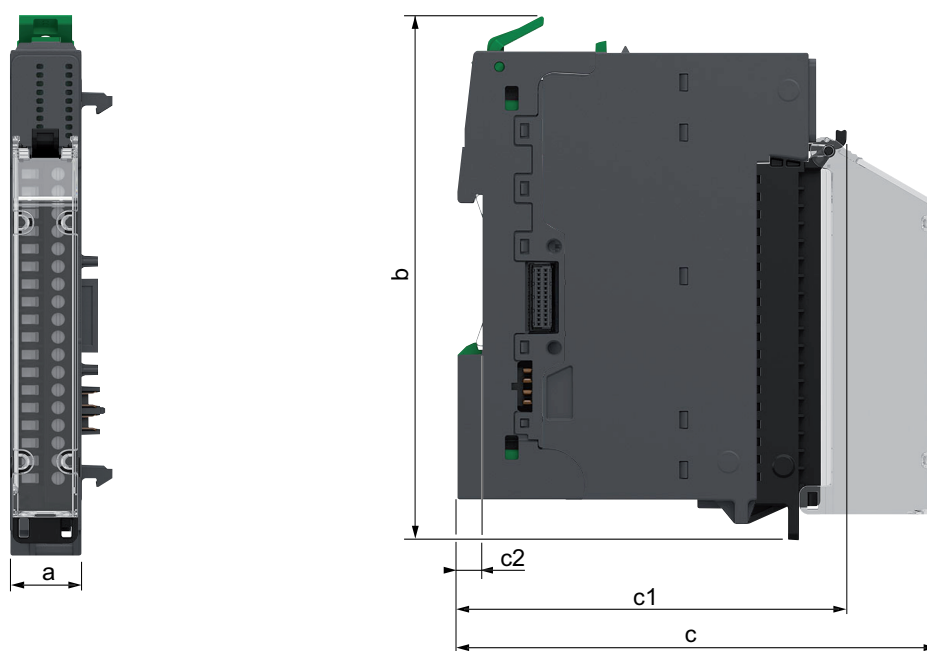
Do not exceed any of the rated values specified in the environmental and electrical characteristics tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For more information on environmental characteristics, refer to Modicon Edge I/O - System Planning and Installation Guide.

Dimensions

The following figure presents the external dimensions of the assembled module:



- a:** 15 mm (0.59 in)
- b:** 116.6 mm (4.57 in)
- c:** 107.5 mm (4.21 in)
- c1:** 88.2 mm (3.46 in)
- c2:** 5.6 mm (0.2 in)

Weight

- NTSFIO0400: 49 g (1.73 oz)
- NTSFIO0400K: 76 g (2.68 oz)

General Characteristics

The following table describes the general characteristics of the NTSFIO0400 module:

Characteristics	Value
Rated supplied voltage	24 Vdc
Power supply source	Connected to the 24 Vdc field power segment
Power supplied voltage range	20.4...28.8 Vdc
24 Vdc I/O segment current draw	1,709.6 mA
Power dissipation	1.40 W
Maximum cable length	20 m (65.6 ft)
Isolation between field power and I/O segment busses	1,000 Vac
Isolation between IO-Link channels	No Isolation
Derating	55 °C...60 °C (130 °F...140 °F): 4 signals are allowed. A signal can be DI, C/Q as input, C/Q as output or IO-Link.

Characteristics of L+ Supply

The following table describes the characteristics of L+ supply of the NTSFIO0400 module:

Characteristics	Value
Maximum current	<ul style="list-style-type: none"> Channel 0 : 250 mA Channel 1 : 250 mA Channel 2 : 200 mA Channel 3 : 200 mA
Voltage	Depending on the power supply
Short circuit protection	Yes

NOTE: L+ and L- form the 24 Vdc power supply for the IO-Link device.

Characteristics of the C/Q Signal in IO-Link Master Mode

The following table describes the characteristics of the C/Q signal in IO-Link master mode of the NTSFIO0400 module:

Characteristics	Value
Transfer rates	<ul style="list-style-type: none"> COM1: 4.8 kbaud COM2: 38.4 kbaud COM3: 230.4 kbaud
Data format	1 start bit, 8 data bits, 1 parity bit (even), 1 stop bit
Data storage	2048 bytes

NOTE: C/Q is the IO-Link communication line.

Characteristics of C/Q Signal in Discrete Input Mode and DI Signal

The following table describes the characteristics of the C/Q signal in discrete input mode and DI signal of the NTSFIO0400 module:

Characteristics	Value
Input compatibility	Type 3 conforming to IEC 61131-2
Rated input voltage	24 Vdc
Rated input current at 24 Vdc	2.5 mA (minimum 2 mA, maximum 3 mA)
Logic state 0	< 5 Vdc
Logic state 1	> 15 Vdc
Input logic type	Sink
Input filter	Software filter: 1.6 ms, not configurable

Characteristics of the C/Q Signal in Discrete Output Mode

The following table describes the characteristics of the C/Q signal in discrete output mode of the NTSFIO0400 module:

Characteristics	Value
Output type	Push-pull
Output voltage	24 Vdc
Maximum continuous output current	0.2 A per output
Total output current	0.8 A maximum
Maximum over-current threshold	Minimum 0.28 A, maximum 0.41 A per output
Output protection	<ul style="list-style-type: none">Thermal protectionShort circuit protectionOvercurrent protection NOTE: To restart the channel after an over-current event, it is necessary to disconnect the load.

NTSFIO0400 Wiring

Overview

This section provides the wiring diagram of the NTSFIO0400 module.

Wiring Rules

For more information on the wiring, refer to Modicon Edge I/O - System Planning and Installation Guide.

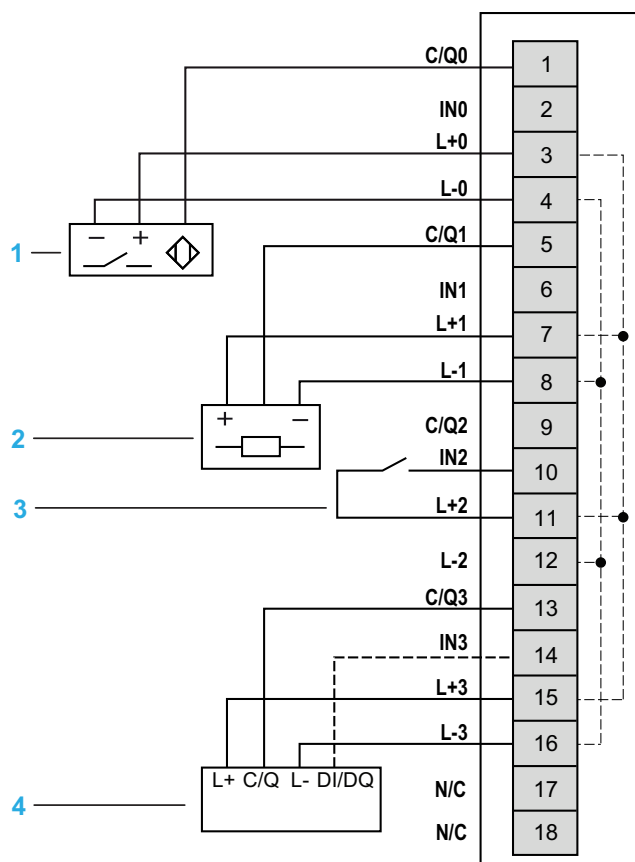
Wiring Diagrams

This module allows the use of an external power supply to energize the sensors.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION Use the sensor and actuator power supply only for supplying power to sensors or actuators connected to the module. Failure to follow these instructions can result in death, serious injury, or equipment damage.

NTSFIO0400 Wiring diagram IO-Link Class A

The following figure illustrates the connections of the IO-Link device (Class A):



- 1: 3-wire sensor
- 2: 3-wire actuator
- 3: Discrete input
- 4: IO-Link device (Class A) (4 wires)
- N/C: No Connection

⚠ WARNING

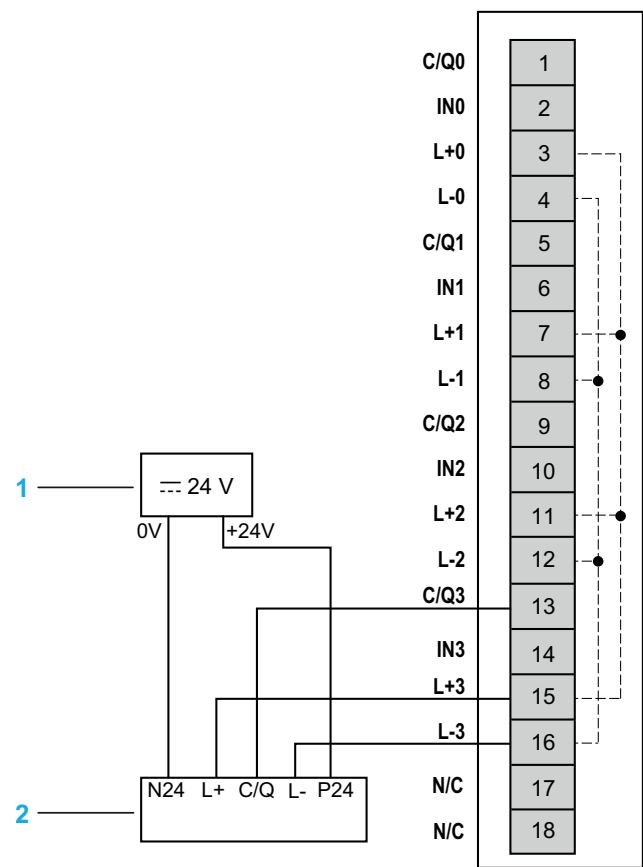
UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as "No Connection (N/C)".

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NTSFIO0400 Wiring diagram IO-Link Class B with external power supply

The following figure illustrates the connections of the IO-Link device (Class B):



- 1: SELV External power supply isolated from field power
2: IO-Link device (Class B) (M12)
N/C: No Connection

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION
Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N/C)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NTSFIO0400 Parameters

Overview

This section presents the user parameters of the NTSFIO0400 module.

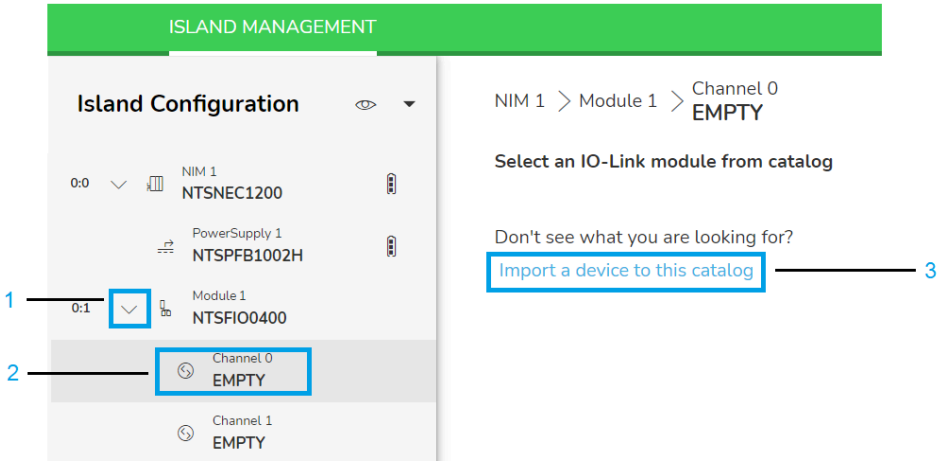
IO-Link Device IODD Import and Selection

Overview

The Modicon Edge I/O Configurator software and the embedded Modicon Edge I/O NTS Web Interface allow you to import the IO-Link device IODD description files for configuration creation or management.

IODD Description Files Import to the Catalog

This submenu allows you to import IO-Link device IODD description files:



In the Island Management

Step	Action
1	In the Island Configuration , expand the list to display the channels of the selected module.
2	Click on the Channel .
3	Click on the link Import a device to this catalog .
4	Select the IO-Link device IODD description file from your local PC or server.

Add an IO-Link Device

This submenu allows you to select the IO-Link device:

ISLAND MANAGEMENT

Island Configuration

0:0

NIM 1

NTSNEC1200

PowerSupply 1

NTSPFB1002H

0:1

Module 1

NTSFIO0400

Channel 0

EMPTY

Channel 1

EMPTY

NIM 1 > Module 1 > Channel 0

EMPTY

Select an IO-Link module from catalog

Search for an IO-Link module by commercial reference or a keyword...

Commercial Reference	Version	Description
<input checked="" type="checkbox"/> XUB5APYNM12	1	PHOTOELECTRIC SENSOR

Don't see what you are looking for?
[Import a device to this catalog](#)

Select XUB5APYNM12

1

2



3

4

Step	Action
1	In the Island Configuration , expand the list to display the channels of the selected module.
2	Click on the Channel to be configured.
3	With the checkbox, select the IO-Link device to be added to the Channel .
4	Confirm using the Select button.

Device Configuration

Once the IO-Link device is imported and selected, configure the device parameters of the channel with IO-Link device selected.

Step	Action
1	In the Island Configuration , expand the list to display the channels of the selected module.
2	Click on the Channel of the device to be configured. The device parameters are displayed, according to the IODD content.
3	<p>Configure the device parameters.</p> <p>NOTE: Parameters that are not modified are displayed with the value Unset.</p> <p>If you are configuring your device offline, continue to step 4.</p> <p>If you are configuring your device online, continue to step 5.</p>
4	<p>The following actions are possible while being offline:</p> <ul style="list-style-type: none"> Configure the device parameters by modifying the value. For more information on possible settings, refer to the device documentation. The Set to default drop-down list allows you to select one of the following actions: <ul style="list-style-type: none"> All parameters: All parameters are set to the default values defined in the IODD. Unset parameters: Parameters that are not modified are set to the default value defined in the IODD. Configured parameters are not modified. The Unset parameters button allows you to set the device parameters to Unset.
5	<p>The following actions are possible while being online:</p> <ul style="list-style-type: none"> The Read Values button allows you to read the values configured in the connected device. Two lists of parameters are displayed: <ul style="list-style-type: none"> PARAMETERS: Parameters that are accessible offline and online. ONLINE PARAMETERS: Parameters that are accessible only online. Configure the device parameters by entering or selecting the value. For parameters which type is ButtonT, you can send a command by clicking the corresponding button. For more information on possible settings, refer to the device documentation. <ul style="list-style-type: none"> To write a parameter value to the device, click  Write online value icon. To read a parameter value from the device, click  Read online value icon. <p>NOTE: Some IO-Link devices restart when a parameter has been written online. This may lead to an unsuccessful writing if another parameter is written before the restart of the device has completed as the IO-Link device is not accessible.</p> <p>NOTE: If Validation and Backup is set to 3 (Compatible with IO-Link V1.1, datastorage set as backup and restore), the parameters may not be updated as intended.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">⚠ WARNING</p> <p>UNINTENDED EQUIPMENT OPERATION</p> <p>Verify that the writing of parameters to the IO-Link devices is successfully completed, in case Validation and Backup is set to 3.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p> </div>

Parameters Description

Configurable Parameters

The following table presents the configurable parameters for the NTSFIO0400 module:

Displayed Name <i>Parameter Name</i>	Value	Data type	Description
Device Mode <i>DeviceMode</i>	0: Normal* 1: Optional 2: Virtual reserved	ENUM	Allows you to select the device mode: <ul style="list-style-type: none">• Normal: The module is part of the software configuration and is physically connected on the cluster.• Optional: The module is part of the software configuration. A dummy module or the configured module must be physically installed on the cluster. Whether either module is present does not cause a configuration error.• Virtual reserved: The module is part of the software configuration. A dummy module must be physically installed on the cluster. If the virtual module is physically installed on the cluster, a configuration error is detected.
* Parameter default value			

The following table presents the configurable parameters for the channels of the NTSFIO0400 module:

Displayed Name <i>Parameter Name</i>	Value	Data type	Description
Port Mode and CQ behavior <i>PortMode</i>	0*: Deactivated 1: Manual Mode 2: Autostart Mode 3: SIO input Mode 4: SIO output Mode	ENUM	Port mode and C/Q behavior Refer to Port Mode, Validation and Backup Parameters Description , page 31.
Validation and Backup <i>ValidationAndBackup</i>	0*: No device verification 1: Compatible with IO-Link V1.0 2: Compatible with IO-Link V1.1, without datastorage 3: Compatible with IO-Link V1.1, datastorage set as backup and restore 4: Compatible with IO-Link V1.1, datastorage set as restore only	ENUM	IO-Link version and device verification, and data storage configuration <ul style="list-style-type: none"> 1 and 2: Offline configuration is used. 3 and 4: Use the datastorage of the IO-Link specification. Refer to Port Mode, Validation and Backup Parameters Description , page 31.
IQ Behavior <i>IQBehavior</i>	0*: Not used 1: Digital input	ENUM	Enables or disables the IN input as a discrete input.
Master cycle time <i>PortCycleTime</i>	0*: Computed fastest master cycle time 1...255: Fixed cycle time	BYTE	Computed cycle time of the data transmission between IO-Link master and IO-Link device at the port. Refer to Master Cycle Time Description , page 31.
Device Id <i>ValidationDeviceId</i>	–	UINT32	Value set by the IODD file and used for validation. Read only parameter
Vendor Id <i>ValidationVendorId</i>	–	UINT16	Value set by the IODD file and used for validation. Read only parameter
Device name <i>DeviceName</i>	–	STRING	Value set by the IODD file. Read only parameter
Vendor name <i>VendorName</i>	–	STRING	Value set by the IODD file. Read only parameter
Input process data length <i>InputProcessDataLength</i>	<ul style="list-style-type: none"> Number of bytes defined by the IODD if Port Mode and CQ behavior is set to Manual Mode 32 bytes if Port Mode and CQ behavior is set to Autostart Mode 0 byte otherwise 	BYTE	Number of bytes used by <i>IPProcessData</i> .
Output process data length <i>OutputProcessDataLength</i>	<ul style="list-style-type: none"> Number of bytes defined by the IODD if Port Mode and CQ behavior is set to Manual Mode 32 bytes if Port Mode and CQ behavior is set to Autostart Mode 0 byte otherwise 	BYTE	Number of bytes used by <i>QProcessData</i> .
* Parameter default value			

Implicit Data

The following table presents the input implicit data for the NTSFIO0400 module:

<i>Parameter Name</i>	<i>Value</i>	<i>Data type</i> <i>Size in bytes</i>	<i>Description</i>
GCS	0...255	BYTE 1	Group Cyclic Status Bit 0: Data quality Bit 1: General module status Bit 2: I/O status Bit 3: N/A Bit 4: N/A Bit 5: Advisory status Bit 6: N/A Bit 7: Data freshness
ChannelHealth0_7 ⁽¹⁾	0...255	BYTE 1	Bit 0...7 = Status of channel 0...7 <ul style="list-style-type: none"> Bit = FALSE: Channel is invalid or not present. Bit = TRUE: Channel is valid or disabled.
⁽¹⁾ This parameter is not part of the implicit data in case of the optimized IO profile is selected.			

The following table presents the input implicit data for the channels of the NTSFIO0400 module:

<i>Parameter Name</i>	<i>Value</i>	<i>Data type</i> <i>Size in bytes</i>	<i>Description</i>
C/Q_Level	FALSE TRUE	BOOL 1	C/Q input level, valid if C/Q is configured as input
DI_Level	FALSE TRUE	BOOL 1	DI level, valid if DI is configured as input
IFifoDiag	Result of the FIFO diagnostic command on 32 bits in High word / Low word format <ul style="list-style-type: none"> First byte: Administrative information: <ul style="list-style-type: none"> bit 0: command mirror bit 1: other diagnostics available in the FIFO Second byte: value qualifier or 0 if no value Second word: event code or 0 if no value 	UINT32 4	Result of the FIFO diagnostic command, valid if C/Q is configured as IO-Link
IProcessData	-	BYTE 0...32	IO-Link input process data, valid if C/Q is configured as IO-Link
PortQualifier	-	BYTE 1	Port Qualifier, valid if C/Q is configured as IO-Link

The following table presents the output implicit data for the channels of the NTSFIO0400 module:

Parameter Name	Value	Data type Size in bytes	Description
<i>C/Q_Level</i>	FALSE TRUE	BOOL 1	C/Q output level, valid if C/Q is configured as output
<i>OutputEnabled</i>	FALSE TRUE	BOOL 1	IO-Link output valid from the controller, valid if C/Q is configured as IO-Link
<i>QFifoDiag</i>	FALSE TRUE	BOOL 1	On rising edge, gets the next entry in the FIFO diagnostic queue, valid if C/Q is configured as IO-Link
<i>QProcessData</i>	-	BYTE 0...32	IO-Link output process data, valid if C/Q is configured as IO-Link

Explicit Data

The following table presents the explicit data for the channels of the NTSFIO0400 module:

<i>Parameter Name</i>	<i>Value</i>	Data type Size in bytes	Description
<i>ApplicationSpecificTag</i>	-	STRING 0...32	Application specific tag of the connected IO-Link device
<i>DeviceId</i>	0...FFFFFF hex	UINT32 4	Device ID of the connected IO-Link device
<i>DiagStatus</i>	-	STRING 0...192	Diagnostic status of the connected IO-Link device This parameter provides the list of the IO-Link events. Each event entry is a set of 3 bytes: <ul style="list-style-type: none"> Byte 1: Event qualifier Byte 2, 3: Event code Up to 64 array elements are available. Refer to Event Qualifier description, page 30.
<i>InputDataLength</i>	-	BYTE 1	Input data length of the connected IO-Link device
<i>MasterCycle</i>	0*: No device connected 1...255: Fixed cycle time	BYTE 1	Computed cycle time of the data transmission between IO-Link master and IO-Link device at the port All bits at 0: No device connected Bits 0...5: Multiplier (0...63) Bits 6...7: Time base <ul style="list-style-type: none"> 00: 0.1 ms, with a minimum cycle time of 0.4 ms 01: 0.4 ms, with a minimum cycle time of 6.4 ms 10: 1.6 ms, with a minimum cycle time of 32 ms 11: Reserved
<i>OutputDataLength</i>	-	BYTE 1	Output data length of the connected IO-Link device
<i>PortQualityInfo</i>	Bit 0: Input process data status <ul style="list-style-type: none"> 0: Valid 1: Invalid Bit 1: Output process data status <ul style="list-style-type: none"> 0: Valid 1: Invalid 	BYTE 1	Port status of the connected IO-Link device

Parameter Name	Value	Data type Size in bytes	Description
<i>PortStatusInfo</i>	0: No active communication (COMLOST state) 1: Port configuration is in DEACTIVATED state. 2: The device is in PREOPERATE state, <i>DiagStatus</i> contains the diagnosis cause. 3: The device is in PREOPERATE state and will go to OPERATE or PORT_DIAG state. 4: The device is in OPERATE state. 5: C/Q is configured as input. 6: C/Q is configured as output. 254: L+ is de-energized. 255: <i>PortStatusInfo</i> is not available.	ENUM 1	Port status information
<i>RevisionId</i>	0: No active communication at that port 1...255	BYTE 1	Revision ID of the connected IO-Link device <ul style="list-style-type: none"> • 00 hex: No device connected • 10 hex: V1.0 • 11 hex: V1.1
<i>SerialNumber</i>	-	STRING 0...32	Serial number of the connected IO-Link device
<i>TransmissionRate</i>	0: No communication at that port 1: COM1 (4.8 kbit/s) 2: COM2 (38.4 kbit/s) 3: COM3 (230.4 kbit/s)	ENUM 1	Transmission rate of the connected device
<i>VendorId</i>	0...FFFF hex	UINT16 2	Vendor ID of the connected IO-Link device

IO-Link Field Device Master Module Appendices

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EventQualifier Description

The following table presents the structure of the EventQualifier bitfield:

Bits	Value	Description
Bits 0...2 INSTANCE	<ul style="list-style-type: none">0: Indeterminable1...3: Reserved4: Application5...7: Reserved	These bits indicate the instance of an event.
Bit 3 SOURCE	<ul style="list-style-type: none">0: Device (remote)1: Master/Port (local)	This bit indicates the source of the event.
Bits 4...5 TYPE	<ul style="list-style-type: none">0: Reserved1: Notification2: Advisory3: Error	These bits indicate the type of the event.
Bits 6...7 MODE	<ul style="list-style-type: none">0: Reserved1: Event single shot2: Event disappears3: Event appears	These bits indicate the mode of the event.

Port Mode, Validation and Backup Parameters Description

The following table presents the **Validation and Backup** parameter when the **Port Mode and CQ behavior** is set to **Manual Mode**:

NOTE: **Port Mode and CQ behavior** parameter can only be set to **Manual Mode** when an IODD is selected for the channel, see **IO-Link Device IODD Import and Selection**, page 21.

Value	Validation	Offline Configuration	Datastorage
0* : No device verification	None	No	No
1 : Compatible with IO-Link V1.0	Vendor ID, Device ID and IO-Link revision V1.0	Yes. Always write into device during startup.	No
2 : Compatible with IO-Link V1.1, without datastorage	Vendor ID, Device ID and IO-Link revision V1.1	Yes. Always write into device during startup.	No
3 : Compatible with IO-Link V1.1, datastorage set as backup and restore	Vendor ID, Device ID and IO-Link revision V1.1	No	Yes (Backup parameters modifications in Master (e.g. Teaching, Upload-Request). Restore parameters of new device with previously backed up parameters)
4 : Compatible with IO-Link V1.1, datastorage set as restore only	Vendor ID, Device ID and IO-Link revision V1.1	No	Yes (Restore modified parameters of the device with previously backed up parameters)

NOTE: Selecting an incorrect IO-Link version may lead to an invalid communication state. Restart the connected device to initialize the communication.

Master Cycle Time Description

The **Master cycle time** bit field defines the cycle time of the data transmission between the IO-Link master and the IO-Link device at the port.

All bits at 0: The IO-Link master uses the computed fastest master cycle time.

Master cycle time selection:

- Bits 0...5: These bits contain a six bits multiplier for the calculation of the cycle time (0...63).
- Bits 6...7: These bits specify the time base for the calculation of the cycle time.

The following table presents the permissible time base encoding and the corresponding cycle time ranges:

Time base encoding	Time base value	Calculation	Cycle time range
00	0.1 ms	Multitplier x Time base	0.4 ⁽¹⁾ ...6.3 ms
01	0.4 ms	6.4 ms + Multitplier x Time base	6.4...31.6 ms
10	1.6 ms	32.0 ms + Multitplier x Time base	32.0...132.8 ms
11	Reserved	Reserved	Reserved
⁽¹⁾ The value 0.4 ms is the minimum cycle time at a transmission rate of 230.4 kbit/s.			

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