

User Manual

Original Instructions



ArmorBlock 16-Channel Configurable Digital Module

Catalog Numbers 1732E-16CFGM12M12LDR, 1732E-16CFGM12P5DR



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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This manual describes how to use the ArmorBlock® I/O 16-channel configurable digital module.

Make sure that you are familiar with the following:

- Use of a controller in a Logix 5000™ control system
- Studio 5000 Logix Designer® environment

IMPORTANT You must use the RSLogix 5000® and Studio 5000®, version 20.00.00 or later, to configure the ArmorBlock I/O module.

Who Should Use This Manual

This manual is intended for trained and qualified personnel who are responsible for mounting, installation, commissioning, operation, maintenance, and disassembly of the ArmorBlock I/O 16-channel configurable digital module.

Purpose of This Manual

This manual provides information and describes the procedures that are used to install, wire, troubleshoot, and operate the ArmorBlock I/O 16-channel configurable digital module.

Additional Resources

These resources contain information about related products from Rockwell Automation.

Resource	Description
ArmorBlock I/O 16-Channel Configurable Digital Module Installation Instructions, publication 1732E-IN008	Describes how to install and wire the ArmorBlock I/O module.
ArmorBlock I/O Selection Guide, publication 1732-SG001	Provides specifications, wiring diagrams, and module block diagrams for ArmorBlock I/O modules.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system
Product Certifications website, https://www.rockwellautomation.com/rockwellautomation/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <https://www.rockwellautomation.com/literature/>. For publications specific to your module, search the catalog number of the module. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

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Module Information

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About the Module

The ArmorBlock 16-channel configurable digital module offers easy handling of I/O data in a higher-level bus system. It is suitable for use in machines and installations with moderate I/O concentration.

A compact, fully sealed housing made of die-cast zinc helps to protect electronic components from environmental factors. This makes the module ideal for direct field service in tough industrial environments.

For connecting the network and I/O, the module uses the widely adopted M12 connector system; A-coded connectors for I/O signals and D-coded connectors for network communication. For connecting power, the 1732E-16CFGM12M12LDR uses M12, L-coded connectors, while the 1732E-16CFGM12P5DR uses 7/8-inch connectors.

Module Features

The ArmorBlock 16-channel configurable digital module provides the following features:

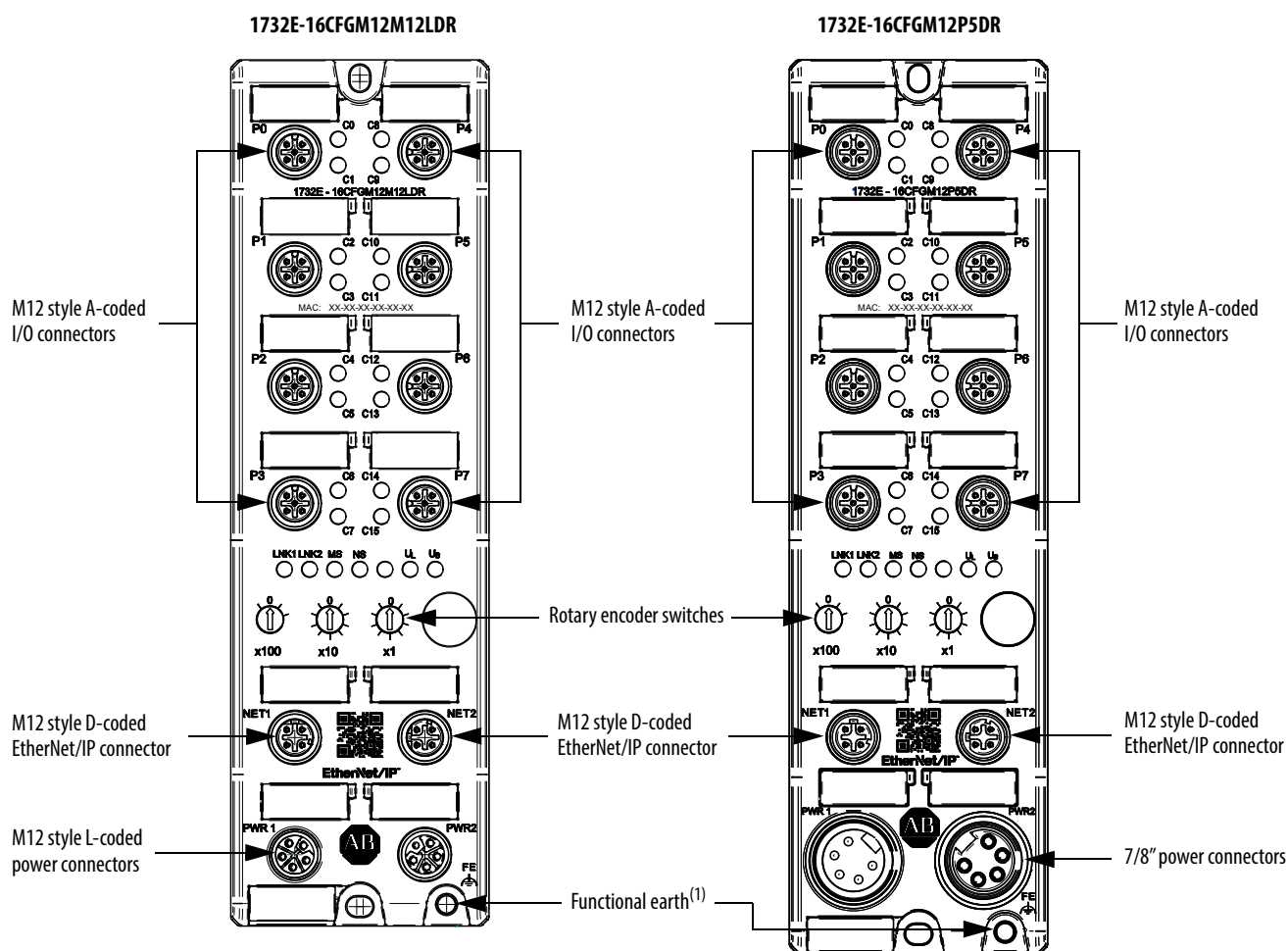
- **Integrated switch**
An integrated 2-port Ethernet switch enables the use of bus or star network topologies. The implemented device level ring (DLR) protocol enables the design of a highly accessible network infrastructure.
- **Redundancy function**
The module supports the device level ring (DLR) protocol for ring topologies. If the connection is interrupted, the module immediately switches to an alternative ring segment to ensure interruption-free operation.
- **Output Fault Values function**
This function enables you to define the behavior of each output channel in the event of interruption or loss of communication.

- QuickConnect
QuickConnect enables the module to start communicating quickly in an EtherNet/IP network through an accelerated startup process.

Module Overview

The ArmorBlock I/O 16-channel configurable digital module has 16 universal inputs/output. You can set individual channels as input only, output only, or input and output through the data direction setting in the Add-on Profile (AOP).

Figure 1 - ArmorBlock I/O 16-channel Configurable Digital Module



(1) Functional Earth grounds the I/O block EtherNet/IP communication circuitry, which is designed to mitigate the effect of noise on the network. The device requires a solid earth ground connection, either through a metal screw to a grounded metal panel or through a wire.

Before You Begin

See the ArmorBlock I/O 16-channel Configurable Digital Module module installation instructions, publication [1732E-IN008](#), for instructions on how to install the modules.

Configure and Startup

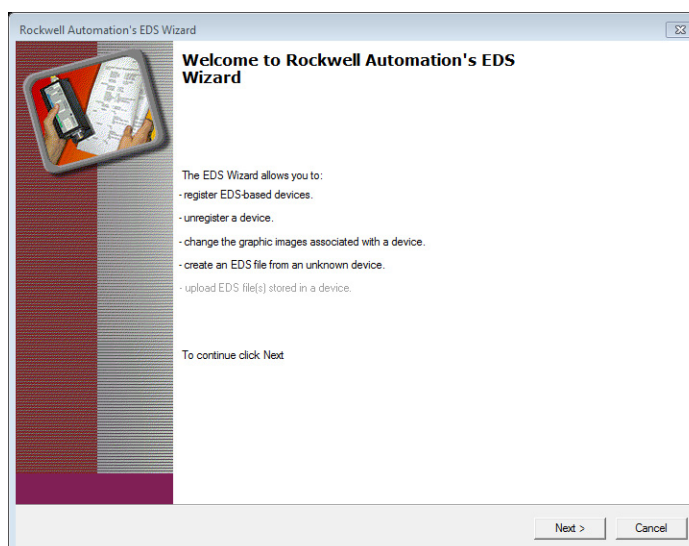
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Download and Register EDS File

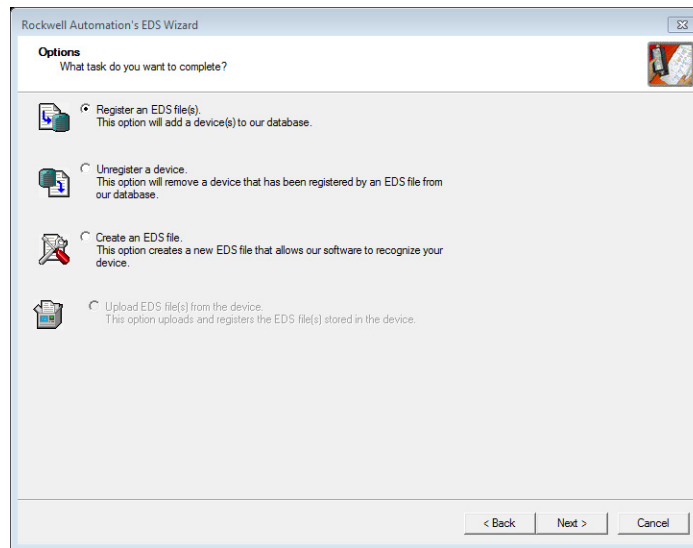
An electronic data sheet (EDS) file is required to configure the module in the controller. You can download the EDS file for the module from the Product Compatibility and Download Center (PCDC) website at <https://compatibility.rockwellautomation.com/Pages/home.aspx>.

After you have downloaded the EDS file, you must register it using the EDS hardware installation tool. To register the EDS file, do the following:

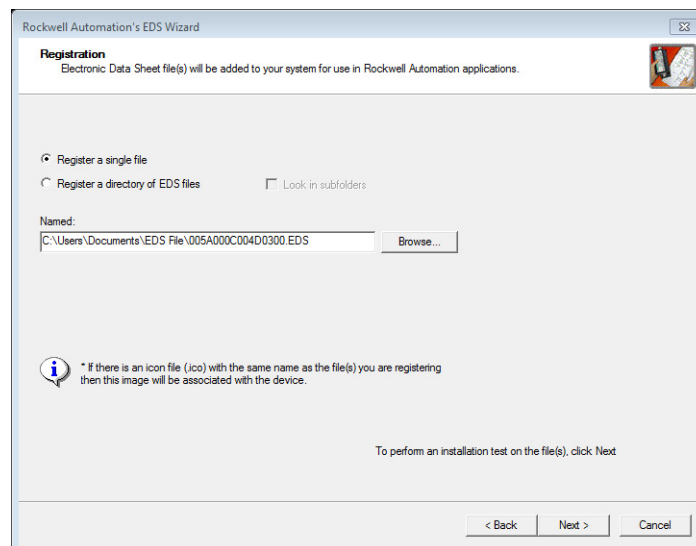
1. In Studio 5000 Logix Designer application, click Tools and select EDS Hardware Installation Tool.
The Rockwell Automation's EDS Wizard window appears.



2. Click Next.
3. Select “Register an EDS file(s)” and click Next.



4. Click Browse and select the EDS file that you have downloaded.



5. Click Next to begin the EDS file registration.
6. Verify that the EDS Wizard successfully completed the registration.
7. Click Finish.

Read the MAC Address

Each module has a unique media access control address (MAC address) that is assigned and cannot be changed. The MAC address is located on the front of the module.

Set the Network Parameters

Three rotary encoder switches on the front of the module enable you to set the operating mode for using or maintaining network parameters such as IP address, subnet mask, and gateway address. You can assign a static IP address to the module by using the rotary switches to set the last octet.

The module ships with the rotary switches set to 999 and DHCP enabled. To change the network address, you can do one of the following:

- adjust the rotary switches on the front of the module.
- use a Dynamic Host Configuration Protocol (DHCP) server, such as Rockwell Automation BootP/DHCP.
- retrieve the IP address from nonvolatile memory.

The module reads the rotary switches first to determine if the switches are set to a valid number. To set the network address:

1. Remove power.
2. Rotate the three switches on the front of the module using a small blade screwdriver.
3. Line up the small notch on the switch with the number setting you wish to use. Valid settings range from 001...254.
4. Reapply power.

Alternatively, you can reset the rotary switches and use BOOTP or DHCP to obtain the network parameters for the module. If you change the operating mode or network parameters during operation, you must cycle power to the module for the changes to take effect.

IMPORTANT A static IP address is required to use the QuickConnect feature.

The following table lists the possible rotary switch settings for the module:

Table 1 - Rotary Switch Settings

Value	Function
001...254	This value is used as the last octet of the IP address. For example, if the switches are set to 010, the IP address of the module is 192.168.1.10. The factory setting for the subnet mask is 255.255.255.000 and the gateway address is 192.168.1.1. If you set the switches to 001, the gateway address is changed to 0.0.0.0.
000 (Default), 255...999 (Except 888)	If the switches are set to an invalid number (for example, 000 or a value greater than 254, excluding 888), the module checks if DHCP is enabled. • If DHCP is enabled, the module asks for an IP address from the DHCP server. • If DHCP is not enabled, the module uses the IP address (along with other TCP configurable parameters) that is stored in nonvolatile memory.
888	The module performs a reset to factory settings. The network parameters are also reset to default values. Communication with the module is disabled.

Configure the Module

The module supports Implicit Messaging and Explicit Messaging for EtherNet/IP communication.

Use Implicit Messaging to transfer I/O process data cyclically through assembly objects and an existing connection.

Use Explicit Messaging to transfer data with low priority, non time-critical, and configuration and through acyclical messages.

Connections and Assembly Objects

The module uses the connection types Data and Listen Only for exchanging I/O process data and communication through Implicit Messaging.

By selecting the corresponding instance ID of the assembly object, you can decide how many items of I/O process data the module makes available to the user.

The ArmorBlock I/O 16-channel configurable digital module provides the following connections and assembly IDs:

Table 2 - Profile for ArmorBlock I/O 16-channel Configurable Digital Module

Connection Type	Diagnostics	Assembly ID	Length
Data	Yes	Output: 100	2 bytes
		Input: 101	7 bytes
		Configuration: 110	130 bytes
Listen Only	Yes	Output: 192	0 bytes
		Input: 101	7 bytes
		Configuration: N/A	N/A

Configuration Parameters

To transfer the configuration parameters, the module uses different assembly objects depending on the module type. See [Connections and Assembly Objects on page 12](#) for more information.

Each module has a fixed number of configuration parameters. This variable is determined by the respective configuration assembly instance.

Length of the configuration parameters is 65 words (130 bytes).

Output Fault Delay Configuration

These parameters are used when the module is configured with digital outputs. The configuration can be used to set a delay time (Output Fault Delay) that defines the monitoring procedure for the individual digital output for each channel.

The delay time starts after a change to the output channel status. If an output is activated (rising edge) or deactivated (falling edge) the output monitoring does not start until the delay time expires. Any fault conditions that arise after this delay are reported as diagnostics.

The adjustable value range for the delay time is 0...255 ms. The default value is 80 ms.

Table 3 - Output Fault Delay Values

Bit	MSB								LSB							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 0	Output Fault Delay port P0, channel C0 (pin 4), value range 0...255, default value 80															
Word 1	Output Fault Delay port P0, channel C1 (pin 2), value range 0...255, default value 80															
⋮	⋮															
Word 14	Output Fault Delay port P7, channel C14 (pin 4), value range 0...255, default value 80															
Word 15	Output Fault Delay port P7, channel C15 (pin 2), value range 0...255, default value 80															

Configure QuickConnect

QuickConnect (QC) enables the module to perform the start-up process faster, especially the EtherNet/IP communication.

If you enable QC, the module accepts a TCP connection and the control system establishes a connection within 350 ms after being switched on. The module can achieve a total start-up time of 400...500 ms.

To use QC, the network must be in a star or linear topology, and the module must have a static IP address. Ring topologies and DHCP/BOOTP are not supported. No automatic check is performed for IP addresses that are assigned more than once in the same network.

If QC is enabled, the following parameters for the Ethernet interface of the module are fixed:

- 100 Mbit/s transmission speed
- Full duplex connection
- Auto-negotiation and auto-MDIX disabled.



ATTENTION: When QuickConnect is enabled, you must notify the module before you switch the module ON (inhibit instruction) or OFF (uninhibit instruction). A hard disconnect during operation is not permitted. See the EtherNet/IP QuickConnect Application Technique, publication [ENET-AT001](#), for more information.

Table 4 - QuickConnect Values

Bit	MSB								LSB							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 32	—								QuickConnect							
Where 0 = Disabled (default); 1 = Enabled																

Configure General Parameters

These are the general parameters available for the module.

Table 5 - General Parameters

Parameter	Description
WebServerDisable	Enables or disables the web server. 0 = Enable (default), 1 = Disable
OutputGroupPowerFaultEn	Enables or disables the output group power fault reporting. 0 = Disable (default), 1 = Enable
OutputGroupFaultEn	Enables or disables the output group fault when actuator power supply is unavailable. 0 = Disable (default), 1 = Enable
DOAutoRestartEn	Enables or disables the digital out auto restart. 0 = Disable (default), 1 = Enable
RES	Reserved. Default value is 0.

The following table shows the general parameters available for the module.

Table 6 - General Parameters

Bit	MSB								LSB							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 32	RES	DOAutoRestartEn	RES	RES	OutputGroupFaultEn	OutputGroupPowerFaultEn	WebServerDisable	RES	—							

Configure Process Data Direction

The data direction can be determined for each channel depending on the I/O mapping. Each of the 16 configurable channels can be configured as an input and output, as a pure input, or as a pure output.

The following table describes the different process data direction.

Table 7 - Process Data Direction

Bit	MSB								LSB							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word 33	Process data direction port P0, channel C0 (pin 4), value range 0...2, default value 0															
Word 34	Process data direction port P0, channel C1 (pin 2), value range 0...2, default value 0															
⋮	⋮															
Word 47	Process data direction port P7, channel C14 (pin 4), value range 0...2, default value 0															
Word 48	Process data direction port P7, channel C15 (pin 2), value range 0...2, default value 0															
	Where: 0 = Input and Output channel 1 = Input channel 2 = Output channel															

Configure in Logix Designer

This section describes how to configure the module in Logix Designer software.

1. Create a new project in Logix Designer.
2. Select the correct controller.
3. Under I/O Configuration, add the correct EtherNet/IP communication interface to your backplane.
4. Click Select Recent Communications Path and select a communications path with the controller.
5. Click Tools -> EDS Hardware Installation Tool to install the EDS files for the module.
6. Right-click on the EtherNet/IP communication interface and select New Module....
The Select Module Type dialog appears.
7. Select the EtherNet/IP module and click Create.
8. Enter a valid Name and IP address for the module.
9. Click Change....
The Module Definition dialog appears.
10. Confirm the entries for the module, then click OK.
11. Click the Connection tab and verify the entries for the Requested Packet Interval (RPI) time, and the Input Type (Unicast or Multicast).
12. Click OK.

13. Configure the module and download the parameters to the controller.

In the Controller Organizer, you can view the connection data (extension: C), the input data (extension: I), and the output data (extension: O) of the configuration for the module. See [Configuration Parameters on page 24](#) for a description of the configuration, and [Configure Module Using Generic Profile on page 29](#) for descriptions of the process data for input and output.

Initial Settings of the Connection Parameters

The following tables provide a list of useful parameters:

Table 8 - Connection Parameters

Parameter	Description
Transport type	Data
Requested packet interval (RPI), min	1 ms (Default is 20 ms)

Edit the Module Configuration Common Pages

Click a page name in the New Module dialog box to view and edit the parameters available for that page.

IMPORTANT This chapter shows how to edit configuration when you add the module to the Logix Designer application project.

If you access the module configuration after it is added to the project, the dialog box is named Module Properties. The same categories are displayed as the categories displayed on the New Module dialog box.

- [General Page](#)
- [Connection Page](#)
- [Quick Connect Page](#)
- [Module Info Page](#)
- [Fault/Program Action Page](#)
- [Configuration Page](#)
- [Internet Protocol Page](#)
- [Port Configuration Page](#)
- [Network Page](#)

General Page

The General page appears first when you create or add a new module to your Logix Designer project.

Figure 2 - Example of General Page

The screenshot shows the 'General' configuration window for a module. The window has a title bar labeled 'General'. Inside, there are several sections:

- Type:** 1732E-16CFGM12M12LDR, 16 Point 24V DC Self-Configuring Quick Connect, ...
- Vendor:** Rockwell Automation/Allen-Bradley
- Parent:** Scanner
- Name:** [Empty text field]
- Description:** [Empty text area]
- Ethernet Address:**
 - ☒ Private Network: 192.168.1. [Spin box showing 9]
 - ☐ IP Address: [Empty text field]
 - ☐ Host Name: [Empty text field]
- Module Definition:**
 - Series:** A [Change ... button]
 - Revision:** 1.001
 - Electronic Keying:** Compatible Module
 - Connection:** Data

At the bottom right, there are four buttons: OK, Cancel, Apply, and Help.

Table 9 - General Parameters

Parameter	Definition
Type	Type of module
Vendor	Rockwell Automation/Allen-Bradley
Name	Enter a name for the module
Description	Enter an optional description for the module
Module Definition	Displays the module definition. For more information on how to configure the module definition, see Module Definition Dialog on page 18 .
Ethernet Address	Set the Ethernet address for the module

Module Definition Dialog

To configure the Module Definition parameters, click Change on the General page of the New Module/Module Properties window.

Figure 3 - Example of Module Definition Dialog

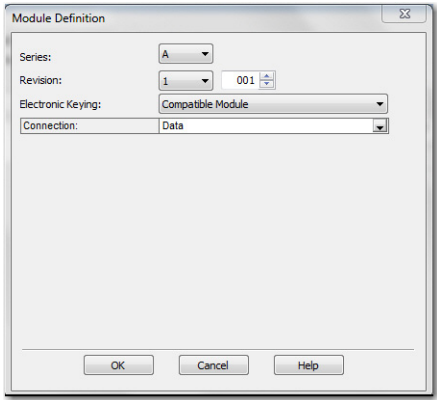


Table 10 - Module Definition Parameters

Parameter	Definition
Series	Module hardware series
Revision	Module firmware revision, including major and minor revision levels
Electronic Keying	Software method by which you reduce the possibility of using the wrong device in a control system. For more information, see Electronic Keying in Logix5000 Control Systems Application Technique, publication LOGIX-AT001 .
Connection	Determines the following for the module type you configure: • Available configuration parameters • Data type transferred between the module and the controller

Connection Page

Use the Connection page to configure the type of connection and behavior for the module.

Figure 4 - Example of Connection Page

Name	Requested Packet Interval (RPI) (ms)	Connection over EtherNet/IP
Data	20.0	Unicast

☐ Inhibit Module

☐ Major Fault On Controller If Connection Fails While in Run Mode

Module Fault

OK Cancel Apply Help

Table 11 - Connection Parameters

Parameter	Definition
Name	Displays the type of connection
Requested Packet Interval (RPI) (ms)	Set the RPI rate.
Connection over EtherNet/IP	Set the type of connection to use on the EtherNet/IP network
Inhibit Module	Select to inhibit the module. When the module is inhibited, the outputs follow the settings that are configured in the Fault/Program Action page. See Fault/Program Action Page on page 23 for more information.
Major Fault On Controller If Connection Fails While in Run Mode	Select to trigger a major fault on the controller if connection fails while the controller is in Run mode. If the checkbox is not selected, only a minor fault is triggered.
Module Fault	Displays details about a module fault to help in troubleshooting.

Requested Packet Interval

The Requested Packet Interval (RPI) is a configurable parameter that defines a specific rate at which data is exchanged between the owner-controller and the module.

You set the RPI value during initial module configuration and can adjust it as necessary after module operation has begun. Valid RPI values are 1...750 ms.

IMPORTANT If you change the RPI while the project is online, the connection to the module is closed and reopened in one of the following ways:

- You inhibit the connection to the module, change the RPI value, and uninhibit the connection.
 - You change the RPI value. In this case, the connection is closed and reopened immediately after you apply the change to the module configuration.
-

For more information on guidelines for specifying RPI rates, see the Logix5000 Controllers Design Considerations Reference Manual, publication [1756-RM094](#).

Inhibit Module

When you inhibit a module, you indefinitely suspend a connection between an owner-controller and the module without removing the module from the configuration. This process lets you temporarily disable a module, such as to perform maintenance.

You can use module inhibiting in the following ways:

- You write a configuration for an I/O module but inhibit the module to help prevent it from communicating with the owner-controller. The owner does not establish a connection and the configuration is not sent to the module until the connection is uninhibited.
- In your application, a controller already owns a module, has downloaded the configuration to the module, and is exchanging data over the connection between the devices.

In this case, you can inhibit the module and the connection to the module does not exist.

You can use module inhibiting in these instances:

- You want to update a module, for example, update the module firmware revision. Use the following procedure.
 - a. Inhibit the module.
 - b. Perform the update.
 - c. Uninhibit the module.
- You use a program that includes a module that you do not physically possess yet. You do not want the controller to look for a module that does not yet exist. In this case, you can inhibit the module in your program until it physically resides in the proper slot.

Quick Connect Page

Quick Connect can help to reduce connection times if the module is used in a system where it has to be connected and disconnected as part of normal operation.

Figure 5 - Example of Quick Connect Page

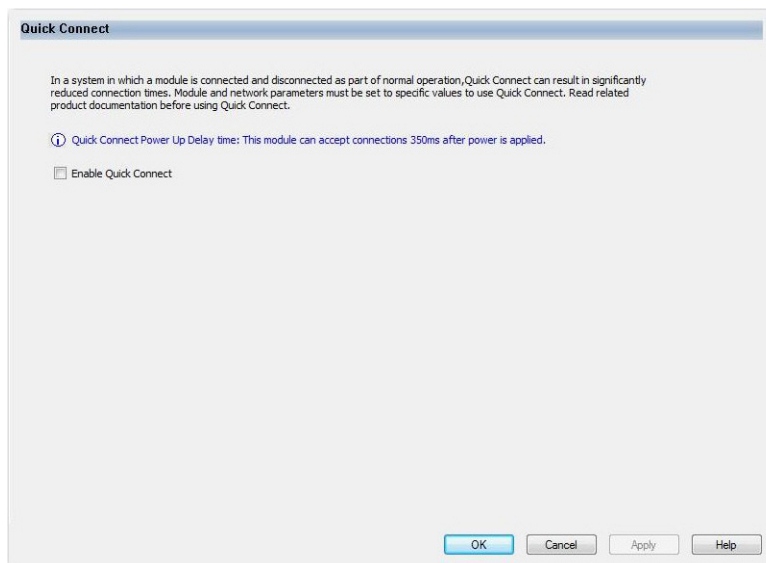


Table 12 - Quick Connect Parameters

Parameter	Definition
Enable Quick Connect	Select to enable Quick Connect for the module.

Module Info Page

This page displays information about the identity of your module and its fault status.

Figure 6 - Example of Module Info Page

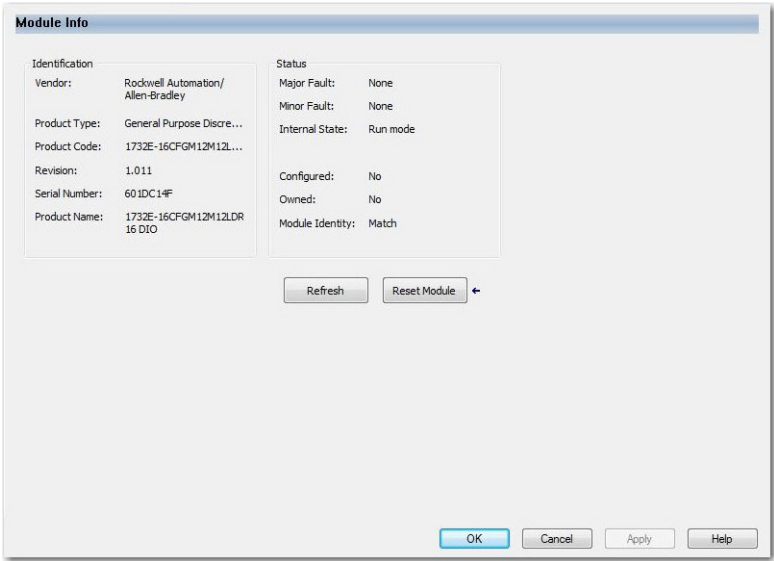


Table 13 - Module Info Parameters

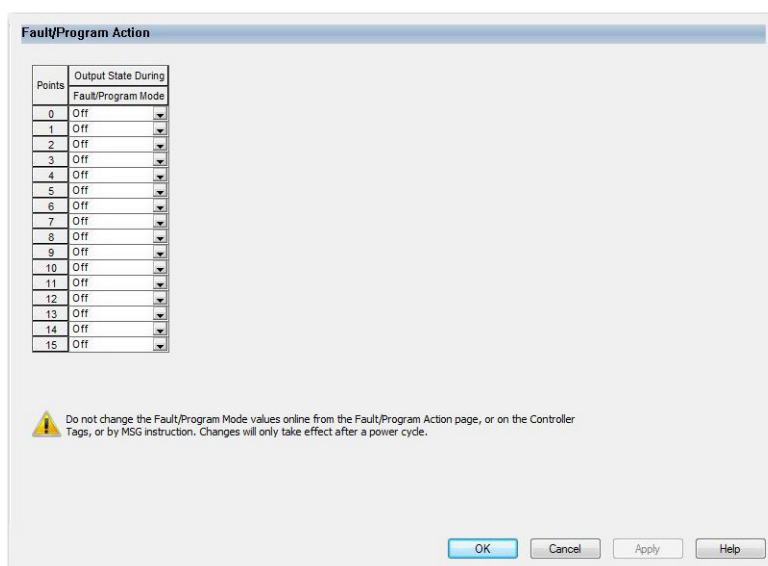
Parameter	Definition
Identification	
Vendor	Rockwell Automation/Allen-Bradley
Product Type	Module type
Product Code	Catalog number of the module
Revision	Firmware revision of module
Serial Number	CIP serial number
Product Name	Name of the module
Status	
Major Fault	Displays the fault code if a major fault occurs
Minor Fault	Displays the fault code if a minor fault occurs
Internal State	Displays the current operational state of the module:
Configured	For I/O modules only. Does not apply to adapters, scanners, bridges, or other communication modules
Owned	
Module Identity	Match - Agrees with what is specified on the General page. - For the Match condition to exist, the following must agree: - Vendor - Module Type (the combination of Product Type and Product Code for a particular Vendor) - Major Revision Mismatch - Does not agree with what is specified on the General Tab. The Module Identity field does not consider the Electronic Keying or Minor Revision selections for the module that were specified on the General page.

Table 13 - Module Info Parameters

Parameter	Definition
Controls	
Refresh	Refresh the data on the page
Reset Module	Reset the module to factory settings

Fault/Program Action Page

Configure the output state value for each individual channel of your module when the controller's mode changes to fault or program.

Figure 7 - Example of Fault/Program Action Page**Table 14 - Fault/Program Action Parameters**

Parameter	Definition
Output State During Fault/Program Mode	Off, On, Hold

IMPORTANT Do not change the Output State During Fault/Program Mode values while the module is online, regardless of whether it is through the Fault/Program Action page, through controller tags, or with message instructions. Changes take effect only after you cycle power to the module.

Configuration Page

Configure the Fault Delay and Data Direction for each individual channel of your module.

Figure 8 - Example of Configuration Page

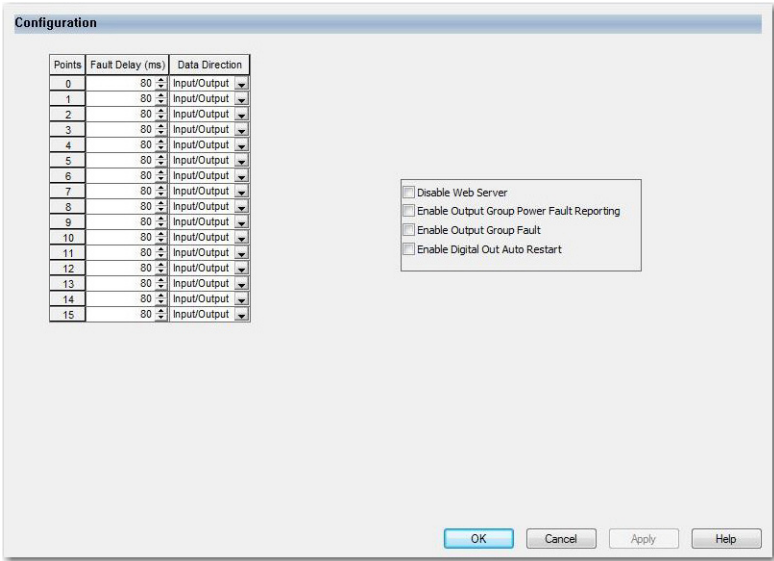


Table 15 - Configuration Parameters

Parameter	Definition
Fault Delay	Set the fault delay from 0 . . 255 ms. Default is 80 ms.
Data Direction	Set whether the direction of data is input only, output only, or both input and output. You cannot change the data direction when the module is online.
Disable Web Server	Select to disable the web server.
Enable Output Group Power Fault Reporting	Select to enable reporting of power faults.
Enable Output Group Fault	Select to enable output group fault when actuator power supply is unavailable.
Enable Digital Out Auto Restart	Select to enable the module to auto restart a digital output.

Internet Protocol Page

Configure the IP settings for your module. IP settings can be set manually, configured automatically by using a DHCP server, or set using the rotary address switches on the module. The following settings are used if you selected to configure the IP settings manually.

Figure 9 - Example of Internet Protocol Page

Table 16 - Internet Protocol Parameters

Parameter	Definition
Physical Module IP Address	Assign the addresses for the module's IP address, subnet mask and gateway address.
Subnet Mask	
Gateway Address	
Domain Name	Assign the module a domain name
Host Name	Assign the module a host name
Primary DNS Server Address	Set the address of the server to use as the primary DNS server
Secondary DNS Server Address	Set the address of the server to use as the secondary DNS server

Port Configuration Page

Configure settings for each individual port available on your module.

Figure 10 - Example of Port Configuration Page

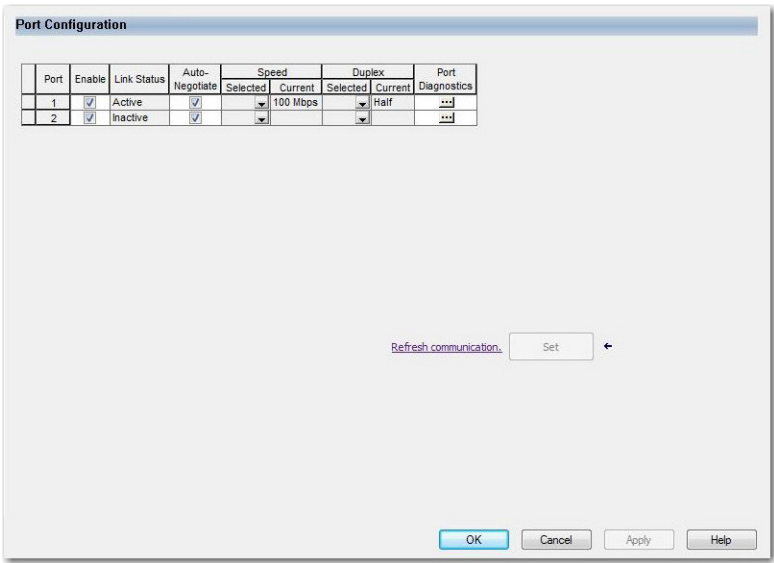


Table 17 - Port Configuration Parameters

Parameter		Definition
Enable		Select to enable the port.
Link Status		Displays the connection status of the port.
Auto-Negotiate		Select to enable auto-negotiate for the port.
Speed	Selected	Select the transfer rate for the port.
	Current	Displays the transfer rate for the port.
Duplex	Selected	Select the data transmission type for the port.
	Current	Displays the transmission type for the port.
Port Diagnostics		Displays diagnostic information for the port.

Network Page

View status information about the network that the module is connected to.

Figure 11 - Example of Network Page

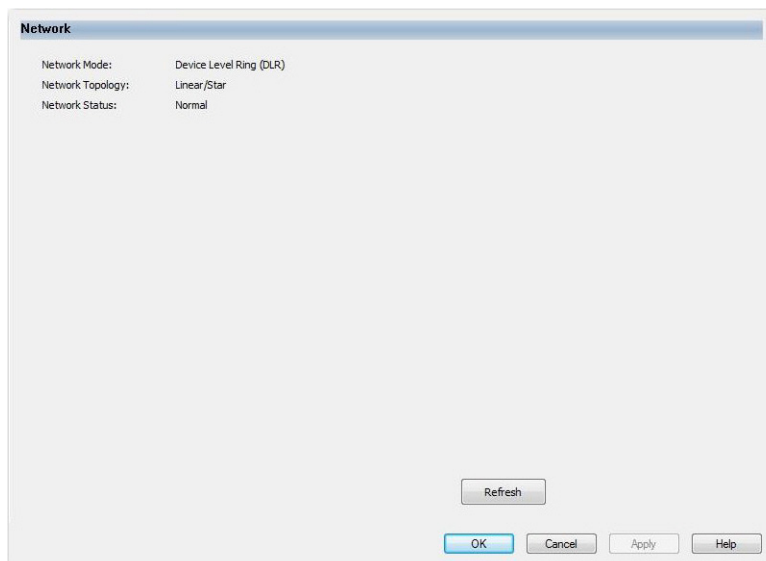


Table 18 - Network Parameters

Parameter	Definition
Network Mode	Displays the currently selected network redundancy protocol.
Network Topology	Displays the currently selected network redundancy protocol.
Network Status	Specifies whether the network is operating normally or otherwise.

Notes:

Configure Module Using Generic Profile

Topic	Page
Configure the Module as a Generic Device	30
Process Data for the Module	31
Description of Process Data Terms	32
Tag Name Conventions	33

This chapter describes how to assign process data from the controller to the I/O channels of your module. This also shows the process data length and the structure of the data.

You do not need to configure the module as a generic device if you register the EDS file for the module and use a specific device catalog number. To register the EDS files, see [Download and Register EDS File on page 9](#).

TIP You are not allowed to change the process data length.

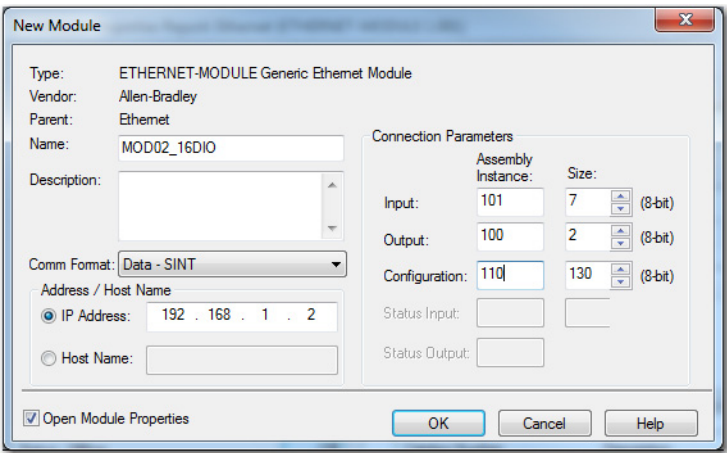
For EtherNet/IP modules, the input data are given as actual values and the output data as target values.

The amount of input data is variable and depends on whether the transfer of diagnostic data is selected. The module provides one byte for the slot or channel diagnostic, known as the module information byte. The diagnostic data is appended to the standard process input data.

Configure the Module as a Generic Device

To configure the module as a generic device, follow these steps.

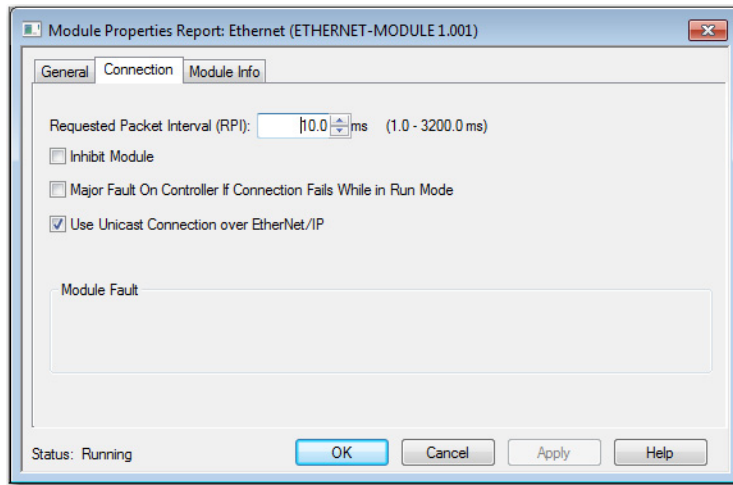
1. Add the module as a generic Ethernet module.



2. Set valid configuration data for the I/O mapping in byte[98]...byte[129].

+ MOD02_16DIO:C.Data[98]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[99]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[100]	16#01	Hex	SINT
+ MOD02_16DIO:C.Data[101]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[102]	16#02	Hex	SINT
+ MOD02_16DIO:C.Data[103]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[104]	16#03	Hex	SINT
+ MOD02_16DIO:C.Data[105]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[106]	16#04	Hex	SINT
+ MOD02_16DIO:C.Data[107]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[108]	16#05	Hex	SINT
+ MOD02_16DIO:C.Data[109]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[110]	16#06	Hex	SINT
+ MOD02_16DIO:C.Data[111]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[112]	16#07	Hex	SINT
+ MOD02_16DIO:C.Data[113]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[114]	16#08	Hex	SINT
+ MOD02_16DIO:C.Data[115]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[116]	16#09	Hex	SINT
+ MOD02_16DIO:C.Data[117]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[118]	16#0a	Hex	SINT
+ MOD02_16DIO:C.Data[119]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[120]	16#0b	Hex	SINT
+ MOD02_16DIO:C.Data[121]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[122]	16#0c	Hex	SINT
+ MOD02_16DIO:C.Data[123]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[124]	16#0d	Hex	SINT
+ MOD02_16DIO:C.Data[125]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[126]	16#0e	Hex	SINT
+ MOD02_16DIO:C.Data[127]	16#00	Hex	SINT
+ MOD02_16DIO:C.Data[128]	16#0f	Hex	SINT
+ MOD02_16DIO:C.Data[129]	16#00	Hex	SINT

- Download the configuration to the controller and go online.



Process Data for the Module

Output Data

16-bit output data, default I/O mapping, assembly Instance 100.

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	C7	C6	C5	C4	C3	C2	C1	C0
Byte 1	C15	C14	C13	C12	C11	C10	C9	C8

Input Data

16-bit input data with diagnostics, default I/O mapping, assembly Instance 101.

Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	C7	C6	C5	C4	C3	C2	C1	C0
Byte 1	C15	C14	C13	C12	C11	C10	C9	C8
Byte 2	InternalFault	0	0	0	OutputGroupFault	InputGroupFault	FieldPowerLow	PowerFault
Byte 3	Pt14_15InputShortCircuit	Pt12_13InputShortCircuit	Pt10_11InputShortCircuit	Pt08_09InputShortCircuit	Pt06_07InputShortCircuit	Pt04_05InputShortCircuit	Pt02_03InputShortCircuit	Pt00_01InputShortCircuit
Byte 4	0	0	0	0	0	0	0	0
Byte 5	Pt07OutputFault	Pt06OutputFault	Pt05OutputFault	Pt04OutputFault	Pt03OutputFault	Pt02OutputFault	Pt01OutputFault	Pt00OutputFault
Byte 6	Pt15OutputFault	Pt14OutputFault	Pt13OutputFault	Pt12OutputFault	Pt11OutputFault	Pt10OutputFault	Pt09OutputFault	Pt08OutputFault

Configuration Data

16-bit configuration data with diagnostics and padding byte, default I/O mapping, assembly Instance 110.

Parameter	Datatype
CfgSize	DINT
CfgIDNum	DINT
Pt00FaultDelay...Pt15FaultDelay	INT
Pt00Fault...Pt15Fault	INT
Pt00FaultValue...Pt15FaultValue	BIT
Pt00FaultMode...Pt15FaultMode	BIT
MiscSettings	INT
QuickConnectEn	BIT
WebServerDisable	BIT
OutputGroupPowerFaultEn	BIT
OutputGroupFaultEn	BIT
DOAutoRestartEn	Bit
Pt00DataDirection...Pt15DataDirection	INT
Pt00IOMapping...Pt15IOMapping	INT

Description of Process Data Terms

The following table lists the definition for terms that are used in the process data tables for the ArmorBlock 16-channel configurable digital module.

Table 19 - Description of Terms in Process Data Tables

Parameter	Description
C0...C15	Refers to the status of the channel.
PowerFault	Sensor power supply voltage is $< 18V \pm 1V$.
FieldPowerLow	Output power supply voltage is $< 18V \pm 1V$.
InputGroupFault	Sensor error
OutputGroupFault	Output error
InternalFault	Module error
Ptxx_xxInputShortCircuit	Sensor short-circuit on ports P0...P7
PtxxOutputFault	Output fault on channels C0...C15
PtxxFaultDelay	Fault delay on channels C0...C15
PtxxFaultValue	Fault value for channels C0...C15
PtxxDataDirection	Direction of data for channels C0...C15
QuickConnectEn	Enables or disables QuickConnect. 0 = Disable (default), 1 = Enable
WebServerDisable	Enables or disables the web server. 0 = Enable (default), 1 = Disable

Table 19 - Description of Terms in Process Data Tables

Parameter	Description
OutputGroupPowerFaultEn	Enables or disables the output group power fault reporting. 0 = Disable (default), 1 = Enable
OutputGroupFaultEn	Enables or disables the output group fault when actuator power supply is unavailable. 0 = Disable (default), 1 = Enable
DOAutoRestartEn	Enables or disables the digital out auto restart. 0 = Disable (default), 1 = Enable

Tag Name Conventions

The module tag names use defined naming conventions. The conventions are as follows:

Tag name examples = Module1:I.PowerFault

- Module1 = name of the module as assigned during module configuration
- I = tag type
The possible tag types are I (input) and O (output).
- PowerFault = tag function

In this case, PowerFault signifies that sensor power supply voltage is less than 18V. For a list of tag functions available for the module, see [Description of Terms in Process Data Tables on page 32](#).

Notes:

Diagnostic Properties

Topic	Page
Channel Error	35
Voltage Errors at M12 Slots (Sensor Short-circuit)	36
Overload of Output Drivers	36
Error in Actuator Power Supply	36
Error in System/Sensor Power Supply	36

The module provides advanced diagnostic messages to identify device errors during communication. The firmware of the module distinguishes between five different types of errors.

Channel Error

A channel error is determined by comparing the target value set by a controller and the actual value of an output channel.

Table 20 - Description of Channel Errors

Target Value	Actual Value	Description
Active	Active	OK, no diagnostic
Off	Off	OK, no diagnostic
Active	Off	Short-circuit - Channel indicator is red. - Channel error bit in the diagnostic is set. - Channel is locked after error is removed.
Off	Active	Voltage is fed back in - Red and yellow/white channel indicators are activated. - Channel error bit in the diagnostic is set. - Channel is not locked after error is removed.



ATTENTION: If both output channels of an M12 slot are activated when a channel error occurs, the controller locks both channels, even if only one channel is affected by the error. If only one channel is activated, the controller only locks this channel. Locked channels are deactivated and remain in the Off state if you do not reset them using the controller.

When an output channel is activated (rising edge) or deactivated (falling edge), the channel errors are filtered for the period of time set using the Fault Delay parameter during the configuration of the module. The value of this parameter ranges from 0...255 ms. The default value is 80 ms.

The filter is used to avoid premature error messages when a capacitive load is activated or an inductive load is deactivated, and during other voltage peaks when a status changes.

When a channel is in the static state (permanently activated or deactivated) the controller uses a fixed specified duration of 100 ms for filtering the error message.

Voltage Errors at M12 Slots (Sensor Short-circuit)

Pin 1 of every M12 input socket on the module supplies a monitored sensor voltage V_S .

When a sensor short-circuit occurs, a voltage error is reported. Both channel indicators of the M12 input socket light up red, and the relevant error bit for the sensor short-circuit is set in the diagnostic bytes.

The error message is filtered by the Fault Delay parameter.

Overload of Output Drivers

The output drivers of the module with output functions report an error when they detect an overload. This error is reported by setting the relevant channel error bits in the diagnostic bytes.



ATTENTION: If both output channels of an M12 slot are activated when a channel error occurs, the controller locks both channels, even if only one channel is affected by the error. If only one channel is activated, the controller only locks this channel. Locked channels are deactivated and remain in the Off state if you do not reset them using the controller.

If there is an overload, the status indicator of the active output channel lights up red. If both output channels of an M12 slot are active during an overload, both status indicators light up red.

The error message is filtered by the Fault Delay parameter.

Error in Actuator Power Supply

The voltage value at the connections for the power supply of the actuator is monitored globally and at the module level.

If the actuator power supply U_L goes outside the voltage range of 18...30V, an error is reported. The U_L indicator lights up red, and the actuator undervoltage bit is set in the module information byte.

When output channels are activated, the voltage error is also displayed by setting the relevant error bits of the M12 slots.



ATTENTION: Every output channel that is active at the same time as the error occurs in supply voltage U_L is locked. This means that for correct operation, the output channel must be reset by the controller when the status of the supply voltage U_L has normalized again.

We recommend to deactivate all output channels with the controller as soon as the undervoltage is detected. Otherwise, because the channels are locked, every active output channel will report a diagnostic when the voltage value has normalized again.

The error message is filtered by means of a fixed filter period of 300 ms.

Error in System/Sensor Power Supply

The voltage value for the system/sensor power supply is also monitored globally. If the value goes outside the voltage range of 18...30V, an error message is created.

The U_S indicator lights up red and the sensor undervoltage bit is set in the module information byte.

The error message has no effect on the outputs and is not filtered, but is reported immediately.



WARNING: The supply voltage measured at the device furthest away from the system/sensor power supply must not drop below 18V DC.

Notes:

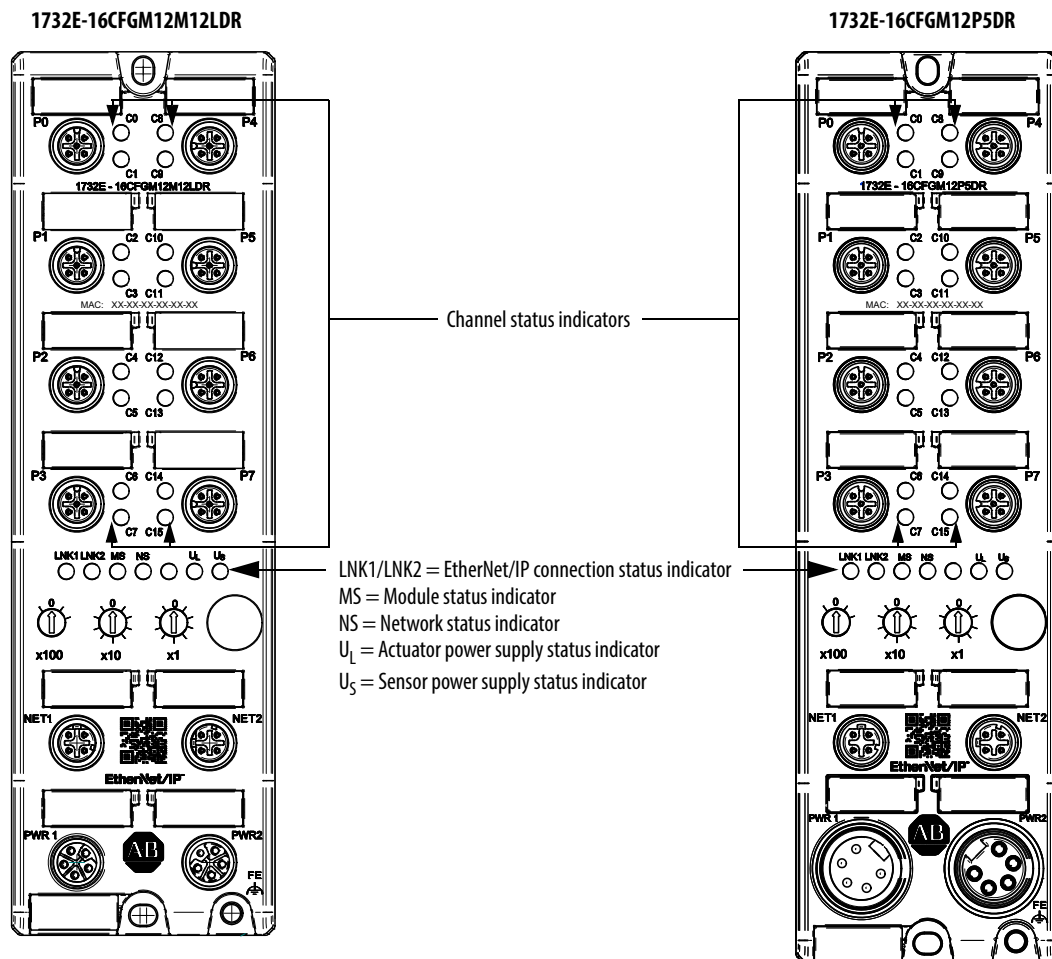
Interpret Status Indicators

Topic	Page
Status Indicator Overview	39
Status Indicator Descriptions	40

Status Indicator Overview

See the following figure to identify the location of the status indicators.

Figure 12 - Status Indicators



Status Indicator Descriptions

The following table describes the meaning of colors and flashes produced by the status indicators.

Table 21 - Status Indicators and Descriptions

Status Indicator	Color	Description
C0...C15	Off	The channel is in the off state.
	Yellow for even channels; White for odd channels	The channel is in the on state.
	Red	Sensor or actuator fault (overload/short-circuit)
LNK1/LNK2	Off	No connection to the controller.
	Green	Communicating with the controller.
Module status	Off	Module is switched off.
	Flashing green	Module ready but not configured.
	Green	Module ready for operation.
	Flashing red	Recoverable fault. An incorrect or contradictory configuration is classified as a recoverable fault.
	Red	Non-recoverable fault.
	Flashing red/green	Module is performing a self-test.
Network status	Off	Module is switched off or does not have an IP address.
	Flashing green	No connection: module has no connections. IP address exists.
	Green	Connected: Module has at least one connection.
	Flashing red	Connection has exceeded limit or connection interrupted.
	Red	Duplicate IP address. Module has determined that the assigned IP address already exists.
	Flashing red/green	Module is performing a self-test.
Actuator power supply status	Off	Power supply is off.
	Green	Power supply is operating normally.
	Red	Power supply is $< 18V \pm 1V$.
Sensor power supply status	Off	Power supply is off.
	Green	Power supply is operating normally.
	Red	Power supply is $< 18V \pm 1V$.

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	https://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	https://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	https://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	https://www.rockwellautomation.com/global/support/pcdc.page

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