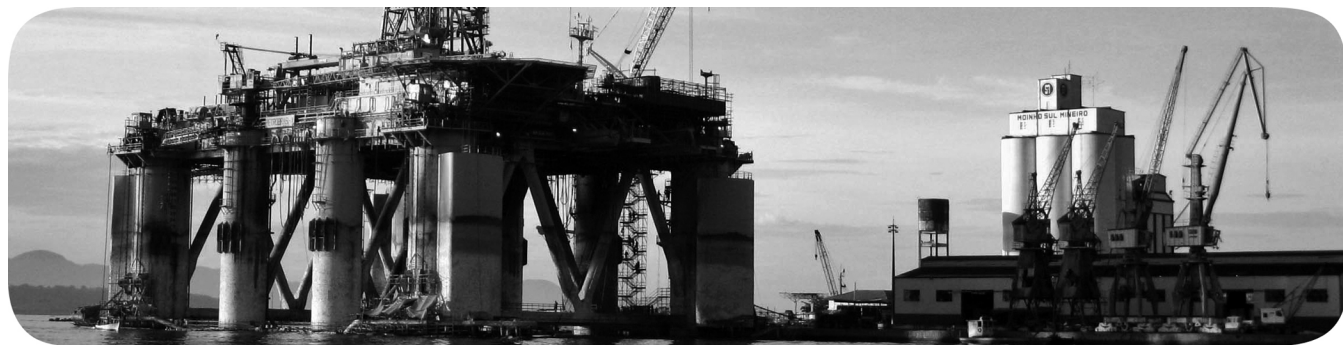


EtherNet/IP QuickConnect



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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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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).

This manual contains new and updated information. Changes throughout this revision are marked by change bars, as shown to the right of this paragraph.

New and Updated Information

This table contains the changes made to this revision.

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Studio 5000™ Logix Designer application is the rebranding of RSLogix™ 5000 software	7
Added new modules 1732E-16CFGM12P5QCR, 1732E-16CFGM12P5QCWR, 1732E-12X4M12P5QCDR	13, 25, 27, 52
Added data definition table for instance 106	26
Added status indicator descriptions for new modules	54

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Studio 5000 Environment

The Studio 5000 Engineering and Design Environment combines engineering and design elements into a common environment. The first element in the Studio 5000 environment is the Logix Designer application. The Logix Designer application is the rebranding of RSLogix 5000 software and continues to be the product to program Logix5000™ controllers for discrete, process, batch, motion, safety, and drive-based solutions.



The Studio 5000 environment is the foundation for the future of Rockwell Automation® engineering design tools and capabilities. This environment is the one place for design engineers to develop all of the elements of their control system

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/literature/>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Notes:

EtherNet/IP QuickConnect Overview

Topic	Page
Architecture	9
Requirements	12
QuickConnect Sequence	15
Application Considerations	15

EtherNet/IP QuickConnect technology enables EtherNet/IP devices to quickly power up and join an EtherNet/IP network. Typical implementations include the following:

- A robotic application where a robot arm quickly exchanges tools to switch tasks
- A pallet application where a large frame consisting of many I/O modules moves down an assembly line and connects to different controllers at different locations on the line

Architecture

A QuickConnect system consists of two sides: a controller side and a tool side.

The controller side can include some of these components:

- Robot with a tool-changing coupler
- Robot controller
- Managed EtherNet/IP switch
- EtherNet/IP communication modules
- EtherNet/IP network
- EtherNet/IP-based I/O modules

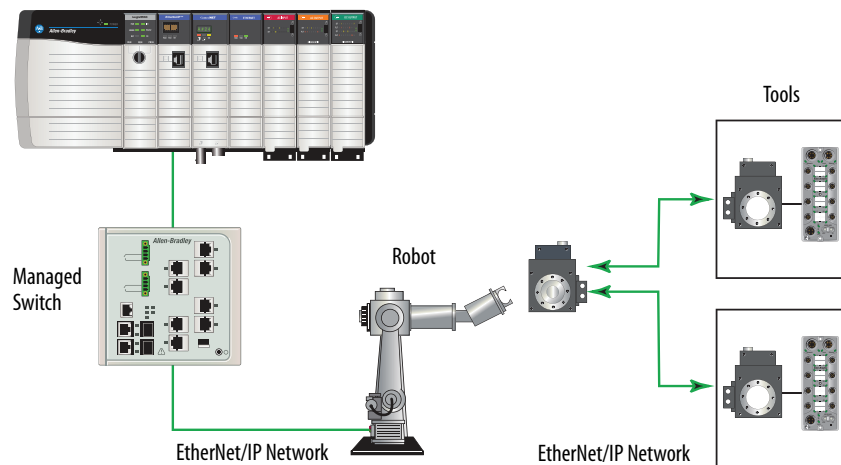
The tool side typically consists of multiple tools that include these components:

- A tool-changing coupler
- EtherNet/IP network
- EtherNet/IP-based I/O modules with QuickConnect capability

For supported Rockwell Automation products and system guidelines, refer to [Table 1 on page 13](#).

Figure 1 shows a typical QuickConnect configuration for a robotic application. There are many other devices required for robot operation not shown in the figure.

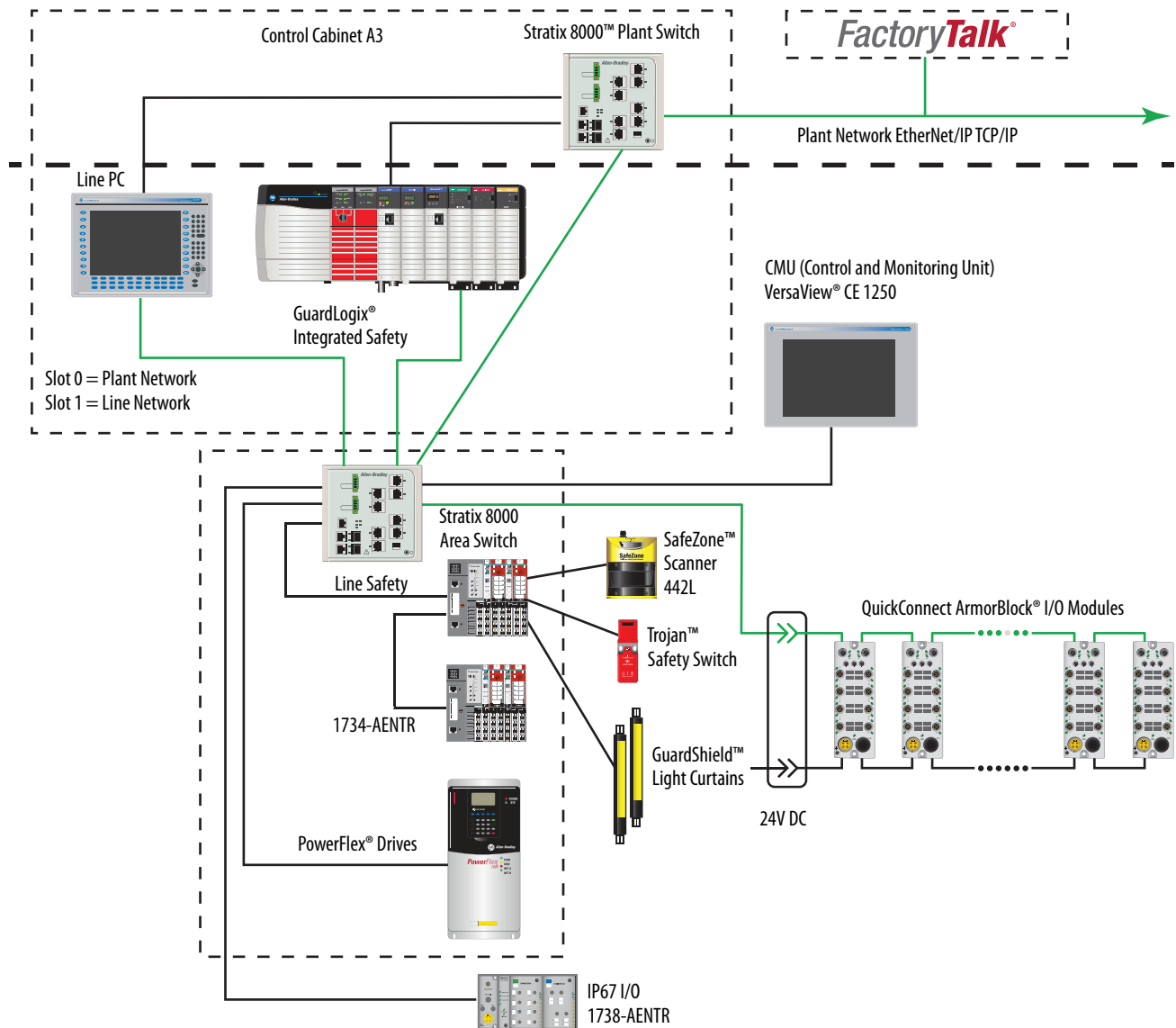
Figure 1 - Configuration for a Robotic Application



32157-MC

Figure 2 shows a typical QuickConnect configuration for use in a body shop.

Figure 2 - Configuration for a Pallet Application

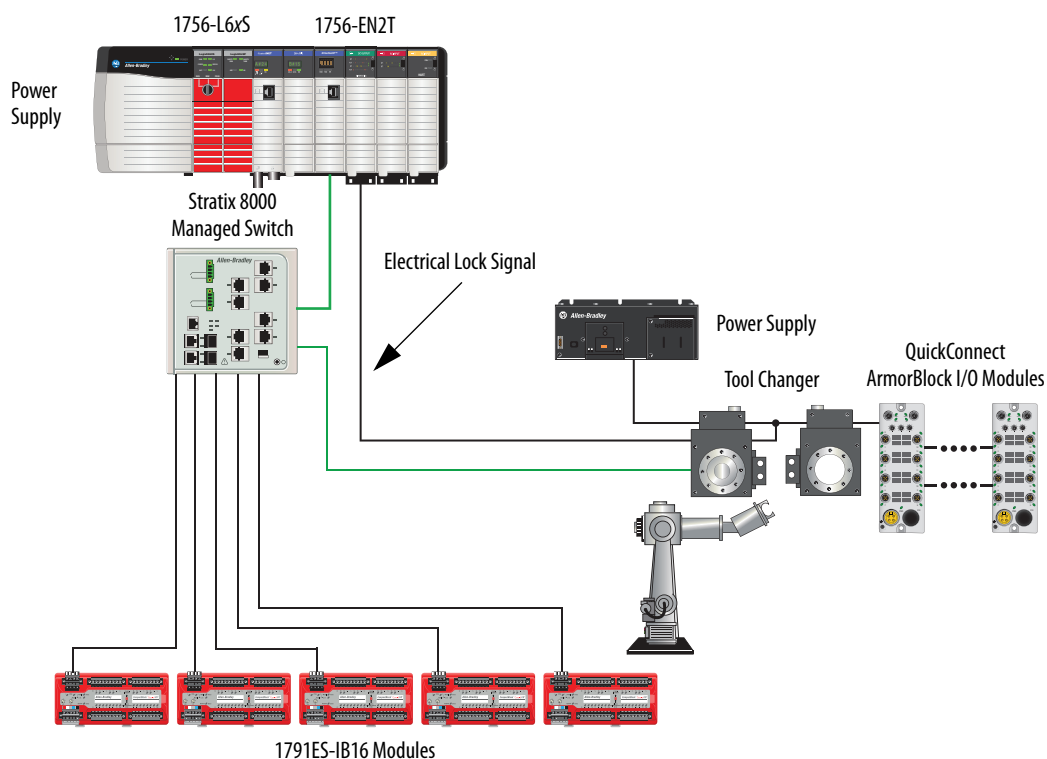


32158-MC

Requirements

An EtherNet/IP QuickConnect system requires an electrical lock signal. The electrical lock signal indicates that the tool changer has applied power to the tool. This is a hard-wired signal that must be implemented by the system builder. This signal must run from the tool changer back to the control system and must be connected to a digital input module. This signal is the event that starts the QuickConnect sequence.

Figure 3 - Example System Components



32156-MC

In addition to an electrical lock signal, a QuickConnect system requires the system components in the table below.

Table 1 - QuickConnect System Components

Component	Supported Rockwell Automation Products
Controller	ControlLogix® controllers: <ul style="list-style-type: none"> • 1756-L6x • 1756-L7x GuardLogix controllers: <ul style="list-style-type: none"> • 1756-L6xS • 1756-L7xS All controllers require firmware revision 20.001 or later.
EtherNet/IP managed switch on the controller side	Stratix 6000 switches: <ul style="list-style-type: none"> • 1783-EMS04T • 1783-EMS08T Stratix 8000 switches: <ul style="list-style-type: none"> • 1783-MS06T or 1783-MS10T • 1783-RMS06T or 1783-RMS10T • 1783-MX08T or 1783-MX08F
EtherNet/IP communication modules	ControlLogix communication modules: <ul style="list-style-type: none"> • 1756-EN2T with firmware revision 4.003 • 1756-ENBT with firmware revision 6.002
A maximum of 20 EtherNet/IP-based I/O modules with QuickConnect capability on the tool side IMPORTANT: A connection time of 500 ms with 20 QuickConnect modules is supported with only a ControlLogix 1756-L7x controller and 1756-EN2T communication module. For average connection times per number of modules, see Average Timing with Rockwell Automation Products on page 50 . For network topology and architecture restrictions on the tool side, see Table 2 on page 14 .	ArmorBlock® I/O modules: <ul style="list-style-type: none"> • 1732E-16CFGM12QCR • 1732E-16CFGM12QCWR • 1732E-12x4M12QCDR • 1732E-16CFGM12P5QCR • 1732E-16CFGM12P5QCWR • 1732E-12X4M12P5QCDR
Application logic that uses generic CIP Messages to inhibit and uninhibit I/O modules	Studio 5000 Logix Designer application, version 21.00.00 or later or RSLogix 5000 software, version 20.01.02

[Table 2](#) lists additional system guidelines.

Table 2 - QuickConnect System Guidelines

System Component	Guideline
Tool side devices	<ul style="list-style-type: none"> • Use a preconfigured, static IP address for the devices. This removes DHCP/BOOTP cycle time. • Configure the devices for 100 Mbps, full-duplex operation in both the switch and the end-node device. • Configure the devices to not autonegotiate and to not use Auto-MDIX. • Use straight-through EtherNet/IP cables on the devices. • Connect the devices in a linear topology. Ring topology is not supported.
Switches	<ul style="list-style-type: none"> • Make sure an EtherNet/IP managed switch on the controller side remains powered on at all times. Only the tool side is subject to power cycling. This is important so that the switch does not block communication to and from devices. • If an EtherNet/IP switch on the tool side is required, use a device with an embedded switch because these power up more quickly.
Data	<ul style="list-style-type: none"> • I/O data sizes must remain the same when nodes on a new device use the same IP address. If the I/O sizes are different, then the nodes need unique IP addresses. • Configuration data sizes must remain the same when nodes on a new device use the same IP address. The configuration can change, but changes must be done by the application.
Communication	<ul style="list-style-type: none"> • A QuickConnect I/O module issues a gratuitous ARP message announcing its presence on the network. The module continues to issue the gratuitous ARP message every 25 ms for a maximum of 40 times (1 second) until an I/O connection is established. • The module issues a TCP close when it receives a forward close message. Otherwise, connections can stay open for several seconds before they time out.
Controllers	<ul style="list-style-type: none"> • Upon receiving the electrical lock signal, the controller waits for a module-specific delay period and then uninhibits the QuickConnect module to open an I/O connection. • The controller stores the device start-up time. You can use the power-up time in the device electronic data sheet (EDS) file to delay the connection establishment procedure by that amount of time. • In a GuardLogix safety system, connections being maintained by the controller have no effect on the QuickConnect time.

Performance Requirements

The time it takes to establish a connection depends on the end device:

- An EtherNet/IP QuickConnect module powers up in ≤ 300 ms.
- An EtherNet/IP controller and network infrastructure establishes connection in ≤ 200 ms. See [Table 11 on page 50](#) for sample ControlLogix, GuardLogix, and ArmorBlock QuickConnect performance.

QuickConnect Sequence

The sequence of operations in a QuickConnect application is as follows.

1. The controller inhibits current connections to QuickConnect modules, and the robot arm physically disengages the current tool.
2. The robot arm physically attaches to a new QuickConnect module.
3. The new QuickConnect module powers up.
4. The controller acknowledges a successful attachment to a new tool via an electrical lock signal.
5. Upon receiving the electrical lock signal, the controller waits for the devices to start up before uninhibiting a new set of I/O connections and then connects to the new QuickConnect module.
6. When all connections are established, the robot is ready for operation.

Application Considerations

The following applications affect QuickConnect performance. For additional troubleshooting and optimization considerations, refer to [Chapter 4](#).

Application	Consideration
QuickConnect I/O modules in a ControlLogix or GuardLogix control system with a firmware revision prior to 20.001	QuickConnect performance cannot be expected. System performance is better than a standard system with no QuickConnect I/O modules, but this configuration is not recommended for QuickConnect applications.
Standard I/O modules in a control system with firmware revision 20.001 that has QuickConnect disabled	
More than 20 QuickConnect modules in the system	QuickConnect performance cannot be expected. This is not recommended for QuickConnect applications faster than 500 ms.
QuickConnect modules in a ControlLogix enhanced redundancy system	QuickConnect performance cannot be expected. Enhanced redundancy systems do not support QuickConnect applications.
Replacing a failed QuickConnect module with another QuickConnect module	When replacing a failed module, make sure the QuickConnect feature is enabled. The default setting for QuickConnect varies depending on the module. See page 22 for instructions on enabling QuickConnect for an ArmorBlock I/O module.
Replacing a failed QuickConnect I/O module with a standard I/O module	Even if the electronic keying accepts the replacement module, QuickConnect performance cannot be expected.
Connecting to a QuickConnect module for the first time	QuickConnect performance cannot be guaranteed on the first connection of a QuickConnect module. QuickConnect performance is guaranteed only for second and subsequent connections.

Notes:

Enable QuickConnect with ArmorBlock I/O Modules

Topic	Page
Configure QuickConnect Modules with the Studio 5000 Environment	17
Configure QuickConnect Modules without the Studio 5000 Environment	25
Add Application Logic	29
Configure a Stratix 8000 Switch	33
Configure a Stratix 6000 Switch	37

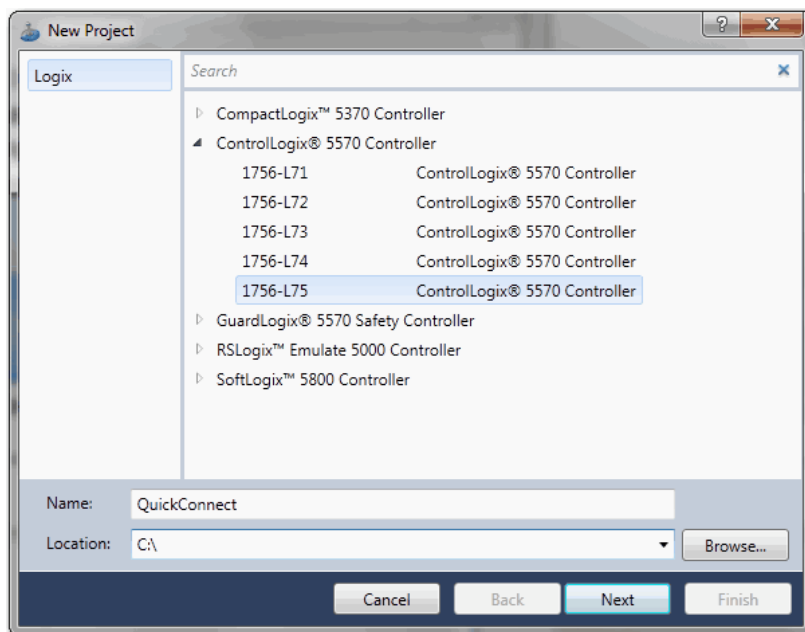
Configure QuickConnect Modules with the Studio 5000 Environment

To configure QuickConnect modules with the Studio 5000 environment, follow these steps.

1. In the Studio 5000 launcher, under Create, click New Project.

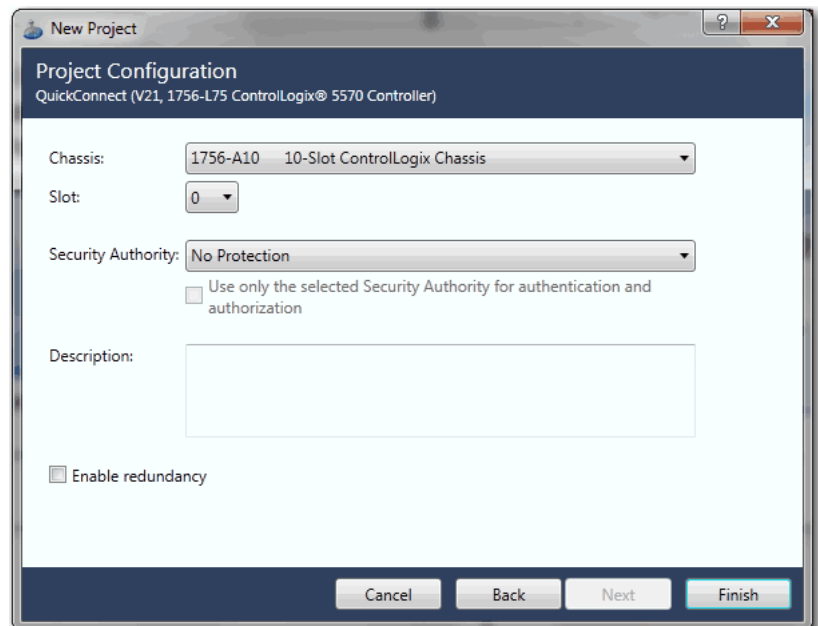


2. On the New Project dialog box, do the following.
 - a. Select a supported controller:
 - 1756-L6x ControlLogix
 - 1756-L7x ControlLogix
 - 1756-L6xS or 1756-L7xS GuardLogix
 - b. In the Name field, type a name for the project.
 - c. In the Location field, note the location for the project or to change the location, click Browse and select a location.
 - d. Click Next to configure the controller.

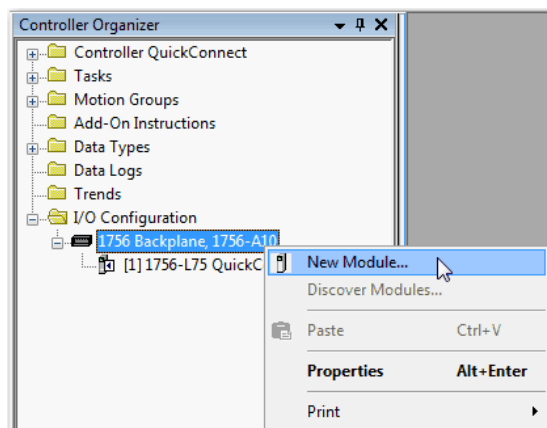


3. On the Project Configuration dialog box, complete the fields below and click Finish.

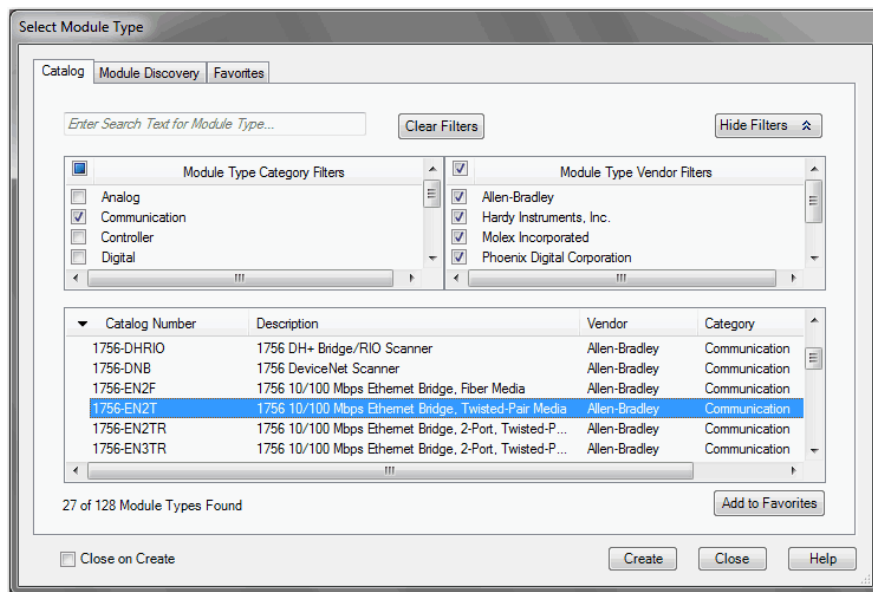
Field	Action
Chassis	Choose the type of chassis for the controller.
Slot	Enter the slot number for the controller: <ul style="list-style-type: none"> 1756 controllers occupy a numbered slot in the chassis and can be placed in any slot. GuardLogix controllers occupy two adjoining slots.
Security Authority	Choose No Protection or FactoryTalk® Security to establish the authority to authenticate all users of this controller. (Optional). Check the checkbox below the pull-down menu to use only the type of security you specified for authentication and authorization.
Description	Type a description of the controller project.
Redundancy Enabled	Leave the checkbox cleared. QuickConnect is not supported in enhanced redundancy systems.



4. In the Controller Organizer, right-click the backplane and choose New Module.

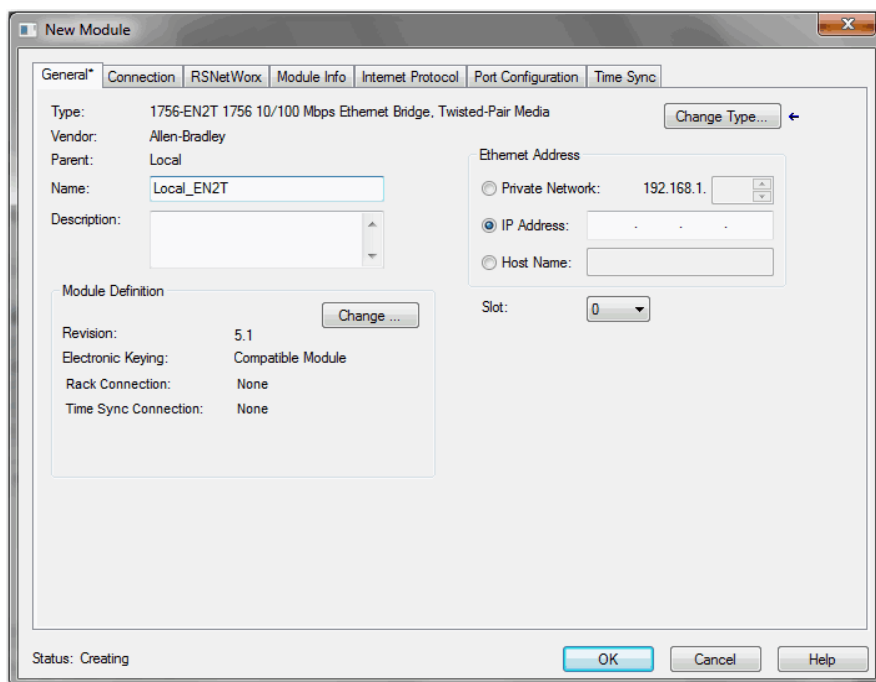


5. On the Select Module Type dialog box, select the 1756-ENBT or 1756-EN2T communication module and click Create.

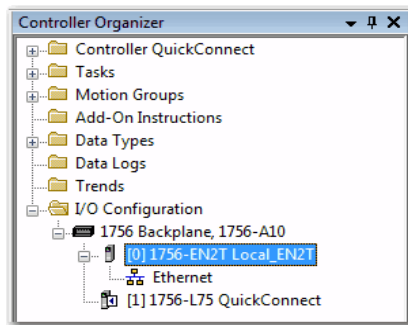


6. On the New Module dialog box, complete the fields below and click OK.

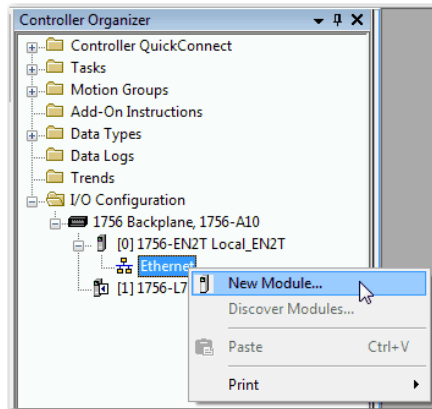
Field	Action
Name	Type a unique name for the local communication module.
Description	Type a description for the local communication module.
Ethernet Address	Click the method for setting a unique IP address to identify the communication module on the network. For more information about setting the IP address, refer to the online Help.
Slot	Enter the slot for the communication module.



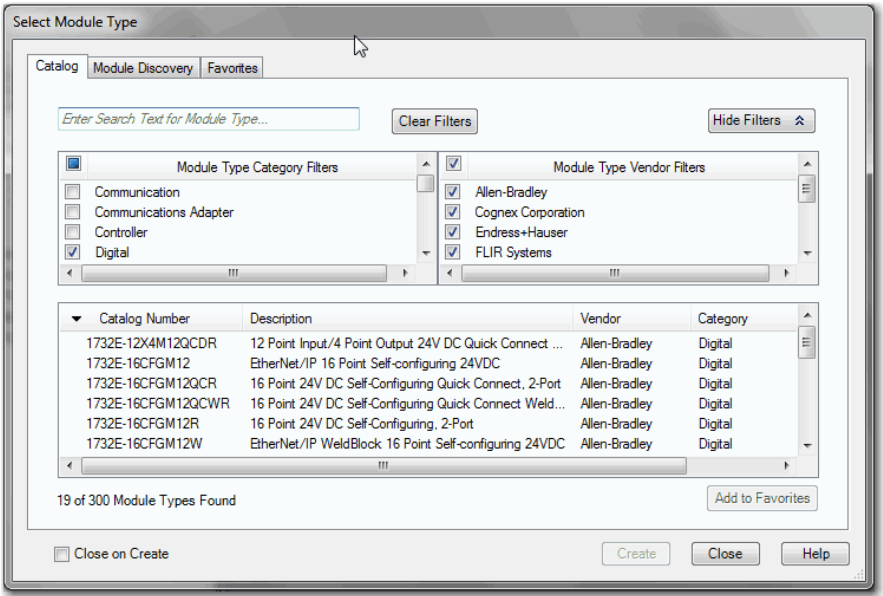
The communication module appears in the I/O configuration tree.



7. To add a QuickConnect ArmorBlock I/O module to the network, right-click Ethernet and choose New Module.

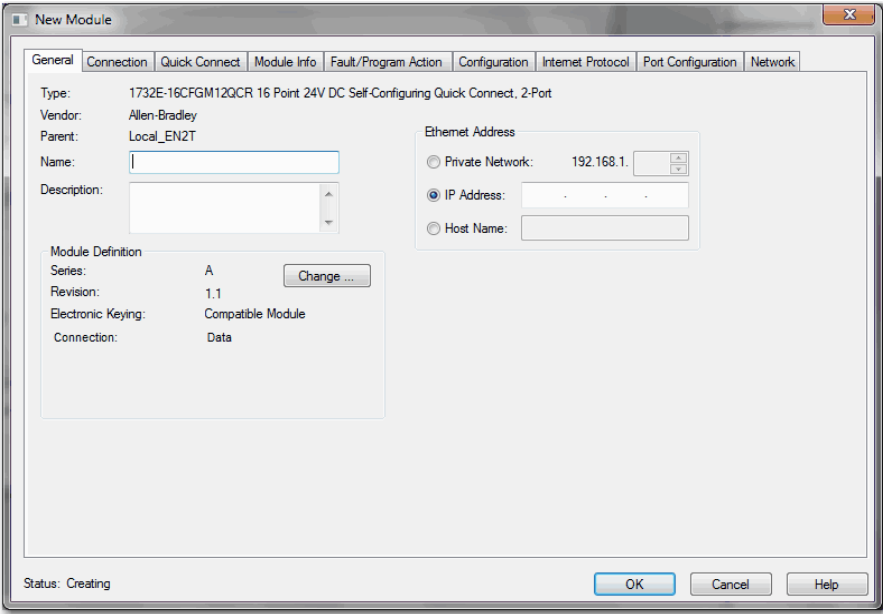


8. On the Select Module Type dialog box, expand Digital, select one of the these modules, and click Create:
- 1732E-12X4M12QCDR
 - 1732E-16CFGM12QCR
 - 1732E-16CFGM12QCWR
 - 1732E-16CFGM12P5QCR
 - 1732E-16CFGM12P5QCWR
 - 1732E-12X4M12P5QCDR



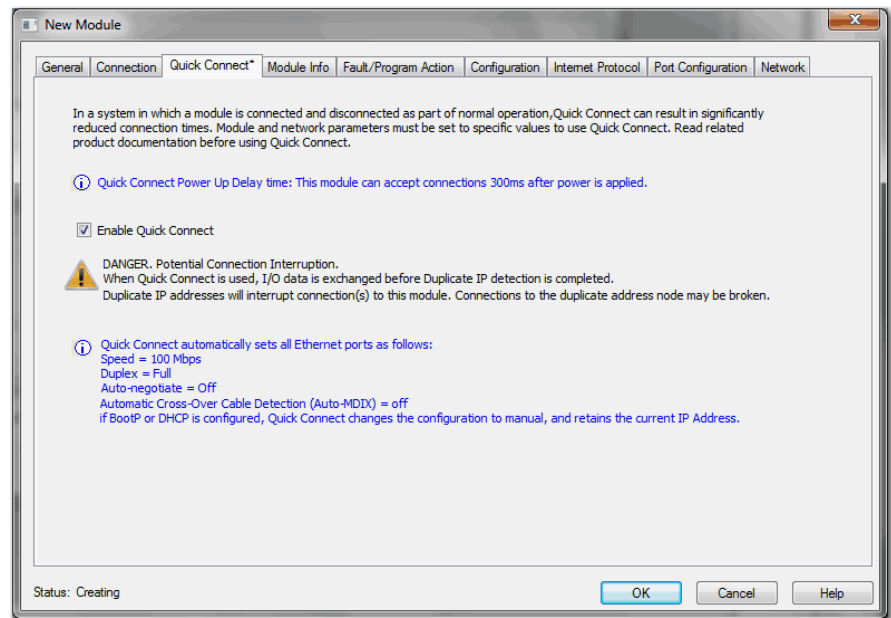
9. From the General tab of the New Module dialog box, complete the fields below.

Field	Action
Name	Type a unique name for the I/O module.
Description	Type a description for the I/O module.
Ethernet Address	Click the method for setting a unique IP address to identify the I/O module on the network. For more information about setting the IP address, refer to the online Help.

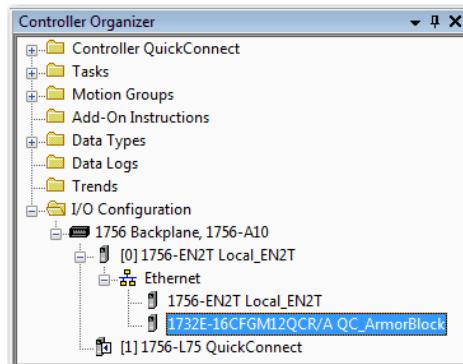


10. Click the QuickConnect tab.

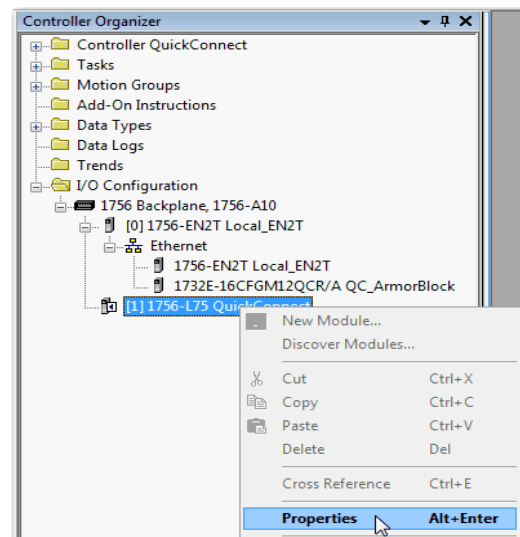
11. Check the Enable QuickConnect checkbox and click OK.



The QuickConnect ArmorBlock I/O module appears in the I/O configuration tree.



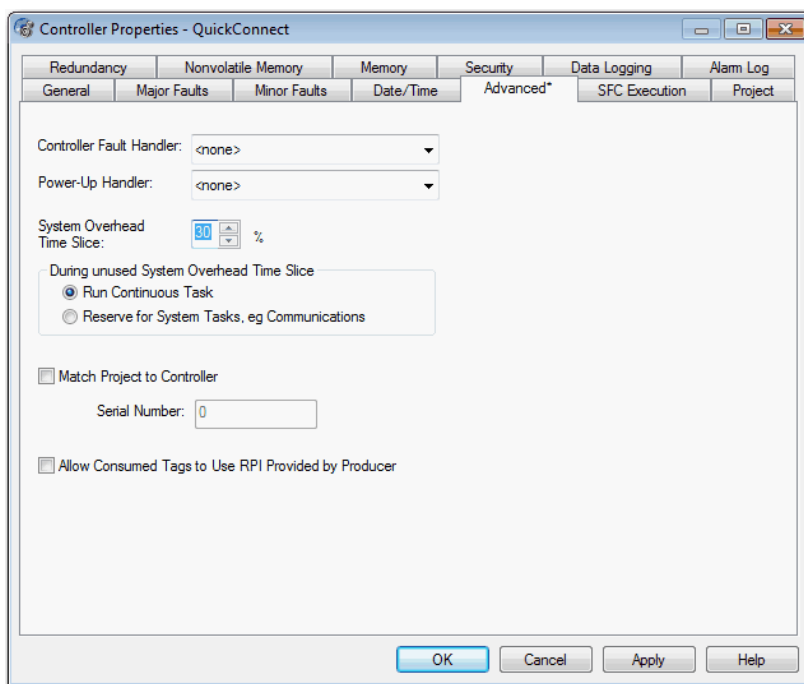
12. Right-click the controller and choose Properties.



13. Click the Advanced tab.
14. Set these properties:
 - In the System Overhead Time Slice field, enter a recommended starting value of 30%.
 - Click Run Continuous Task.

IMPORTANT These settings are recommended starting points. You can adjust the time slice percentage for your specific application, such as if you are running periodic or large, continuous tasks. However, increasing the time slice percentage beyond 30% has not been shown to improve connection time.

For more information about time slice settings, refer to the online Help for the controller's Add-on Profile (AOP).



Configure QuickConnect Modules without the Studio 5000 Environment

If you are using ArmorBlock I/O modules with a robot controller instead of a ControlLogix or GuardLogix controller, you can configure the modules for a QuickConnect I/O connection by using the procedures below.

Topic	Page
Configure a 1732E-16CFGM12QCR, 1732E-16CFGM12QCWR, 1732E-16CFGM12P5QCR, or 1732E-16CFGM12P5QCWR Module	25
Configure a 1732E-12x4M12QCDR or 1732E-12X4M12P5QCDR Module	27

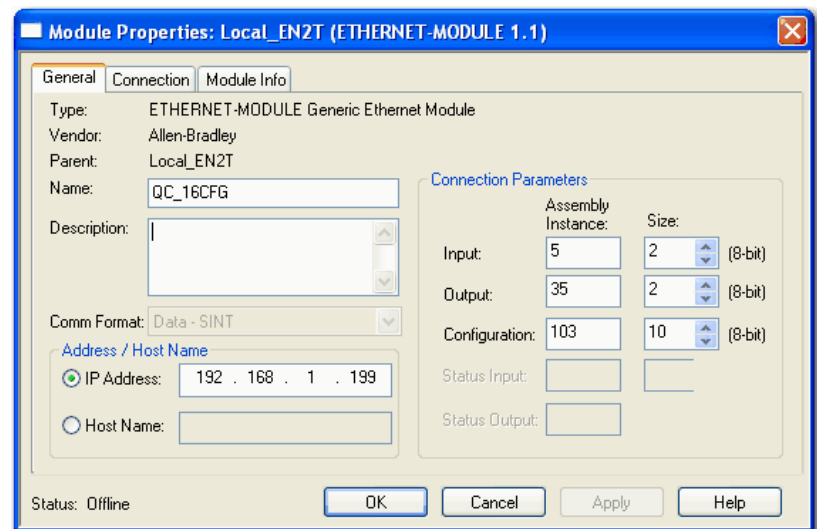
Configure a 1732E-16CFGM12QCR, 1732E-16CFGM12QCWR, 1732E-16CFGM12P5QCR, or 1732E-16CFGM12P5QCWR Module

To configure a 1732E-16CFGM12QCR, 1732E-16CFGM12QCWR, 1732E-16CFGM12P5QCR, or 1732E-16CFGM12P5QCWR module without the Studio 5000 environment, follow these steps.

1. Configure a generic Ethernet profile in a controller application with the following connection points.

Parameter	Assembly Instance (destination)	Connection Size in Bytes (input)
Input (T → O)	5	2
Output (O → T)	35	2
Configuration	103	10

Your profile can appear similar to the example below.



2. Refer to the data definition tables below to configure the module, and then cycle power to start the module in QuickConnect mode.

Table 3 - Instance 5—Produced

Produce Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	In7	In6	In5	In4	In3	In2	In1	In0
1	In15	In14	In13	In12	In11	In10	In9	In8

Table 4 - Instance 35—Consumed 16 Point Output

Consumed Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Out7	Out6	Out5	Out4	Out3	Out2	Out1	Out0
1	Out15	Out14	Out13	Out12	Out11	Out10	Out9	Out8

Table 5 - Instance 103—Configuration Input/Output

Produce Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved							CRN ⁽¹⁾
1	Reserved							
2	Reserved							
3	Reserved							
4	Group 0 Input OFF_ON Delay Filter (low byte)							
5	Group 0 Input OFF_ON Delay Filter (high byte)							
6	Group 0 Input ON_OFF Delay Filter (low byte)							
7	Group 0 Input ON_OFF Delay Filter (high byte)							
8	Reserved				IV_G0	IA_G0	FV_G0	FA_G0
9	Reserved							QuickConnect ⁽²⁾

(1) Configuration Revision Number. Set to 1 to configure the QuickConnect attribute.

FA_Gx = Fault Action Group. 0 = Apply Fault Value; 1 = Hold Last State.

IA_Gx = Idle Action Group. 0 = Apply Idle Value; 1 = Hold Last State.

FV_Gx = Fault Value Group. 0 = Off.

IV_Gx = Idle Value Group. 1 = On.

(2) QuickConnect: 1 = Enabled; 0 = Disabled.

Instance 106 in [Table 6](#) applies to only the 1732E-16CFGM12QCR, 1732E-16CFGM12QCWR, 1732E-16CFGM12P5QCR and 1732E-16CFGM12P5QCWR modules.

Table 6 - Instance 106—Produced

Produce Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved (must be 0)							
1	Reserved (must be 0)							
2	Reserved (must be 0)							
3	Reserved (must be 0)							
4	In7	In6	In5	In4	In3	In2	In1	In0
5	In15	In14	In13	In12	In11	In10	In9	In8
6	Reserved							Output power present
7	Reserved							

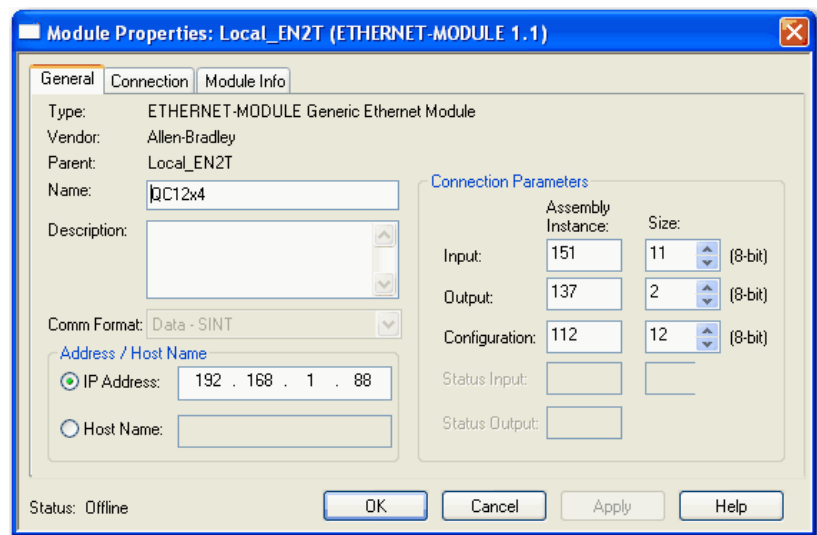
Configure a 1732E-12x4M12QCDR or 1732E-12X4M12P5QCDR Module

To configure a 1732E-12x4M12QCDR or 1732E-12X4M12P5QCDR module without the Studio 5000 environment, follow these steps.

1. Configure a generic Ethernet profile in a controller application with the following assembly instance numbers and connection points.

Parameter	Assembly Instance (destination)	Connection Size in Bytes (input)
Input (T → O)	151	11
Output (O → T)	137	2
Configuration	112	12

Your profile can appear similar to the example below.



2. Refer to the data definition tables on page 28 to configure the module, and then cycle power to start the module in QuickConnect mode.

Table 7 - Instance 151—Produced 12 Point Input/4 Point Output/Status

Produce Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved (must be 0)							
1	Reserved (must be 0)							
2	Reserved (must be 0)							
3	Reserved (must be 0)							
4	In7	In6	In5	In4	In3	In2	In1	In0
5	Reserved				In11	In10	In9	In8
6	Reserved		InOW5	InOW4	InOW3	InOW2	InOW1	InOW0
7	Reserved		InSC5	InSC4	InSC3	InSC2	InSC1	InSC0
8	Reserved				OutNL3	OutNL2	OutNL1	OutNL0
9	Reserved				OutSC3	OutSC2	OutSC1	OutSC0
10	OutPwr	Reserved						

InOW = Input Open Wire
 InSC = Input Short Circuit
 OutNL = Output No Load = Output Open Load
 OutSC = Output Short Circuit
 OutPwr = Auxiliary Output Power Present

Table 8 - Instance 137—Consumed 4 Point Output with Reset

Consumed Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved				Out3	Out2	Out1	Out0
1	Reserved				Reset3	Reset2	Reset1	Reset0

Table 9 - Instance 112—Configuration 12 Input/4 Output/Status

Produce Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved							CRN ⁽¹⁾
1	Reserved							
2	Reserved							
3	Reserved							
4	Group 0 Input OFF_ON Delay Filter (low byte)							
5	Group 0 Input OFF_ON Delay Filter (high byte)							
6	Group 0 Input ON_OFF Delay Filter (low byte)							
7	Group 0 Input ON_OFF Delay Filter (high byte)							
8	O_LTCH	Reserved			IV_G0	IA_G0	FV_G0	FA_G0
9	Reserved		Enabled In OW5	Enabled In OW4	Enabled In OW3	Enabled in OW2	Enabled In OW1	Enabled In OW0
10	Reserved				Enabled Out NL3	Enabled Out NL2	Enabled Out NL1	Enabled Out NL0
11	Reserved							QuickConnect ⁽²⁾

(1) Configuration Revision Number. Set to 1 to configure the QuickConnect attribute.

FA_Gx = Fault Action Group. 0 = Apply Fault Value; 1 = Hold Last State.

IA_Gx = Idle Action Group. 0 = Apply Idle Value; 1 = Hold Last State.

FV_Gx = Fault Value Group. 0 = Off.

IV_Gx = Idle Value Group. 1 = On.

O_LTCH = Output Diagnostic Latch. 0 = Auto Reset; 1 = Latch.

Enable In OW x = Enabled Output No (Open) Load x. 0 = Off; 1 = Enable.

En Out OL x = Enabled Output No (Open) Load x. 0 = Off; 1 = Enable.

(2) QuickConnect: 1 = Enabled; 0 = Disabled.

Add Application Logic

Add ladder logic to inhibit and uninhibit QuickConnect I/O modules:

- Run this logic in a periodic task with a recommended 10 ms update rate.
- The logic examples shown configure two ArmorBlock I/O modules. Modify the code as needed to configure as many as 20 ArmorBlock I/O modules.

IMPORTANT A connection time of 500 ms with 20 QuickConnect modules is supported with only a ControlLogix 1756-L7x controller and 1756-EN2T communication module. For average connection times per number of modules, see [Average Timing with Rockwell Automation Products on page 50](#).

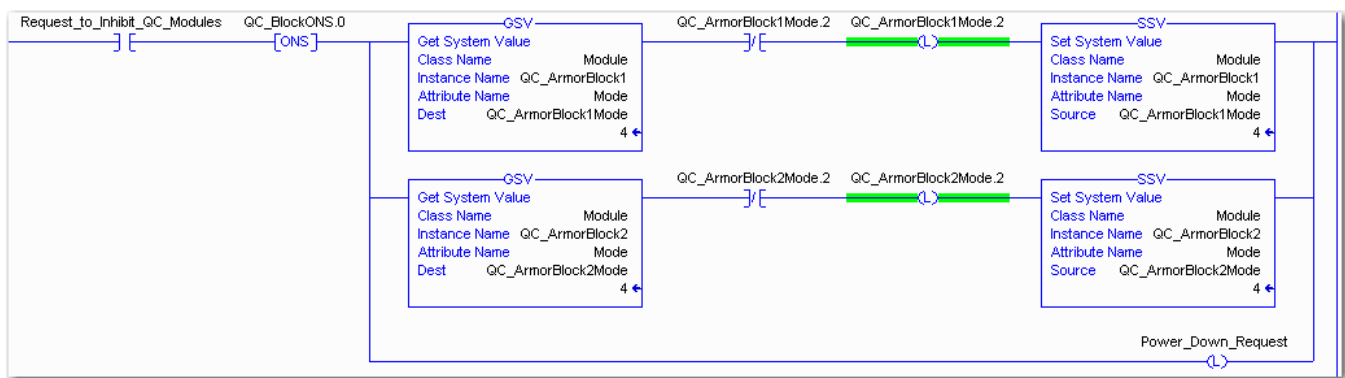
Inhibit and Power Down

Add this logic to inhibit and power down the QuickConnect modules.

1. Rung 0: Inhibit the modules.

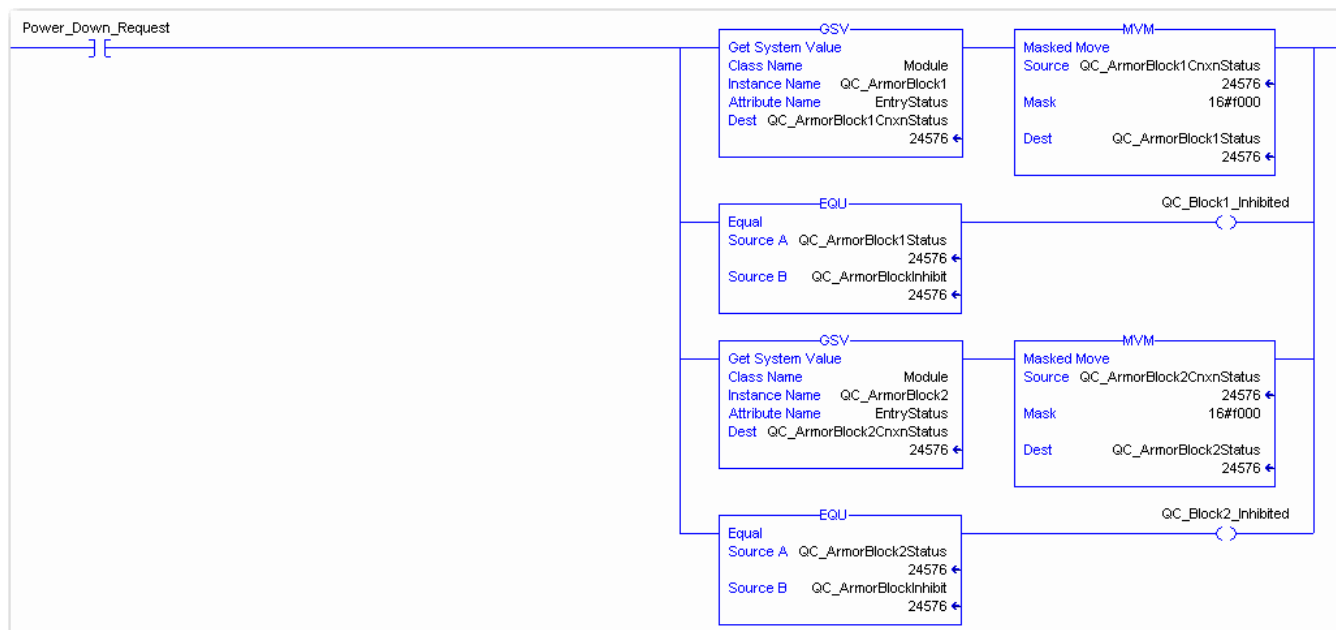
Before making a tool change, you must uninhibit the QuickConnect ArmorBlock I/O modules mounted to the tool before powering down. Use a GSV (Mode) instruction to monitor the present state of the modules and one SSV (Mode) instruction per module to inhibit the modules.

The input condition to start the inhibit process must come from an external input. For example, as the robot is traveling back to change out the tool, this input condition must be enabled. By the time the tool is being changed, the modules are inhibited and can proceed to powering down the tool and modules.



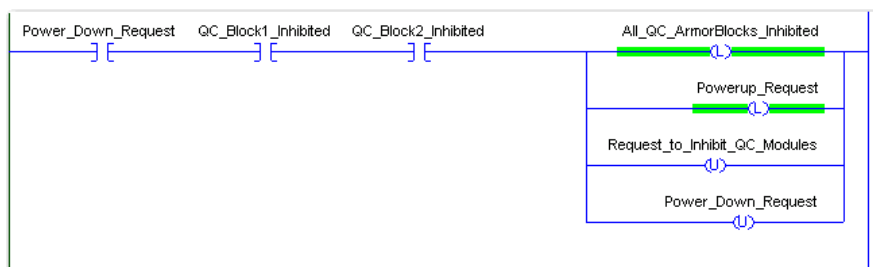
2. Rung 1: Verify the modules are inhibited.

After the modules have been inhibited, verify that the modules have indeed been inhibited. Use one GSV (Entry Status) instruction per module. When the Entry Status value equals a decimal value of 24576, the module can be disconnected from the robotic arm and powered down.



3. Rung 2: Power down the modules.

This rung verifies that all the modules have been inhibited and powered down. The tool and modules can be physically disconnected from the robotic arm.



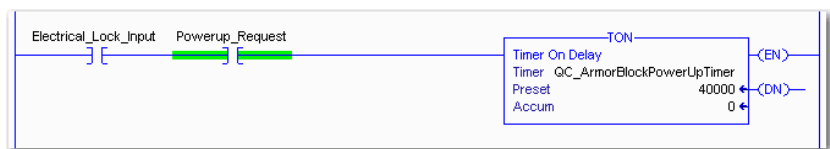
Uninhibit and Power Up

Add this logic to uninhibit and power up the QuickConnect I/O modules.

1. Rung 3: Power up the modules.

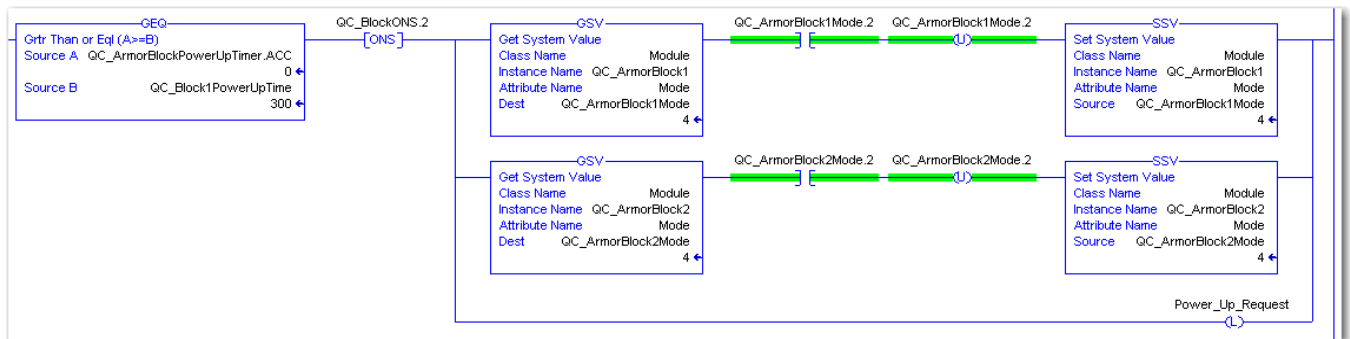
Once the tool and module is connected, an external input module sends an electrical lock input signal. On receipt of the signal, start a timer to keep track of how long the tool and modules have been connected.

Every QuickConnect ArmorBlock I/O module has a delay time embedded in its electronic data sheet (EDS) file. This delay time is the amount of time the module takes to power up. The module takes about 300 ms to fully power up before establishing a connection to the controller.



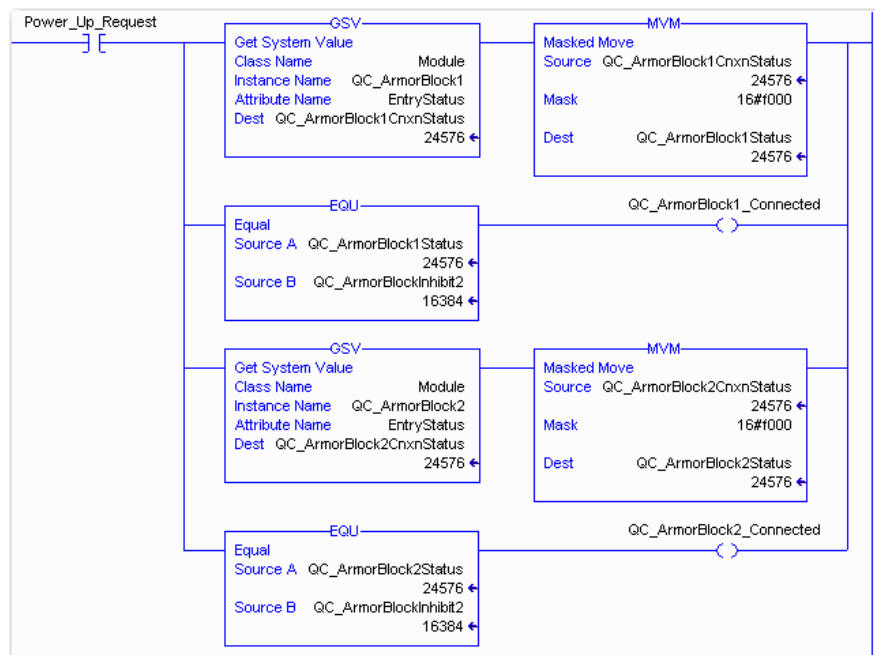
2. Rung 4: Uninhibit the modules.

When the Timer. Acc is greater than or equal to the module delay time (300 ms), use an SSV (Mode) instruction to uninhibit the module. Use a GSV (Mode) instruction to verify the mode of the module at powerup.



3. (Optional) Rung 5: Verify the modules are uninhibited.

After the modules have been uninhibited, verify that the modules have indeed been uninhibited. Use one GSV (Entry Status) instruction per module. When the Entry Status value equals a decimal value of 16384, the module has been uninhibited.



Configure a Stratix 8000 Switch

Configure the Stratix 8000 switch to optimize the performance of the connection between QuickConnect I/O modules and the controller:

- Run Express Setup to apply a static IP address to the switch and apply required global parameters, as described in [Run Express Setup on page 34](#).
- Apply the switch settings in [Table 10](#) for optimal performance. For more information about port configuration, refer to [Configure QuickConnect Ports on page 35](#).

IMPORTANT For all QuickConnect applications, we recommend that you use unicast routing and not multicast routing.

Table 10 - Stratix 8000 Switch Settings

Configuration	Settings
Configuration per port	<p>Use the Port Settings page of the Device Manager Web interface to apply the following settings for each QuickConnect port:</p> <ul style="list-style-type: none"> • 100 Mbps speed • Full duplex • Auto-MDIX disabled <p>Use the Smartports page of the Device Manager Web interface to apply the Multiport Automation Device port role to each QuickConnect port. These recommended port settings are automatically applied via the Multiport Automation Device port role:</p> <ul style="list-style-type: none"> • Alarm profile ab-alarm • Service policy input CIP-PTP_Traffic • Spanning-tree PortFast • Cisco Discovery Protocol (CDP) disabled • Load interval 30
QoS	<p>These recommended QoS settings are automatically applied via the Multiport Automation Device port role:</p> <ul style="list-style-type: none"> • Srr-queue bandwidth share 1 19 40 40 • Priority—queue out • MLS QoS trust dscp
VLAN	<p>If you are not using the native VLAN (Default-1), configure the following by using the Device Manager Web interface:</p> <ul style="list-style-type: none"> • Switch port access VLAN • Switch port trunk native VLAN

Be aware that when you run Express Setup and apply the Multiport Automation Device port role, the following Stratix 8000 features are enabled by default. Depending on your environment, you can adjust the default settings for these features:

- Alarm profile ab-alarm
- Service-policy input CIP-PTP_Traffic
- Common Industrial Protocol (CIP)
- CIP Enable
- CIP Security
- Precision Time Protocol (PTP)
- Rapid Spanning Tree Protocol (RSTP)
- IGMP querier
- Quality of Service (QoS)
- Virtual Trunking Protocol VTP-Transparent mode
- Unidirectional Link Detection (UDLD)
- Logging
- Error Disable

For more information about Stratix 8000 parameters, see the Stratix 8000 and Stratix 8300 Ethernet Managed Switch User Manual, publication [1783-UM003](#).

Run Express Setup

Use Express Setup to apply these requirements to your switch:

- A static IP address and password
- Initial configuration, including required global parameters

IMPORTANT	If you are using an existing switch that has already been configured, you must still run Express Setup to make sure global parameters required for a QuickConnect application are properly applied to the switch.
------------------	---

Express Setup uses the Device Manager Web interface to enable you to configure initial network settings. For step-by-step instructions on running Express Setup, see the Stratix 8000 Ethernet Managed Switches Installation Instructions, publication [1783-IN005](#).

Configure QuickConnect Ports

Each Stratix 8000 switch port that connects to a QuickConnect I/O module must use these port settings:

- 100 Mbps speed
- Full duplex
- No Auto-MDIX
- Multiport Automation Device port role

To configure ports from the Device Manager Web interface, follow these steps.

1. Open a web browser.
2. Type the IP address of the Stratix 8000 switch.
3. Leave the user name blank and enter the password.
4. Expand the Configure folder and select Port Settings.
5. Configure the following port settings for each port that connects to a QuickConnect ArmorBlock I/O module and click Submit.

All other ports that do not connect to QuickConnect modules can use the default settings.

Field	Action
Speed	Choose 100.
Duplex	Choose Full.
Auto-MDIX	Clear the checkbox to disable Auto-MDIX.

In the figure below, port 1 is configured for a QuickConnect module.

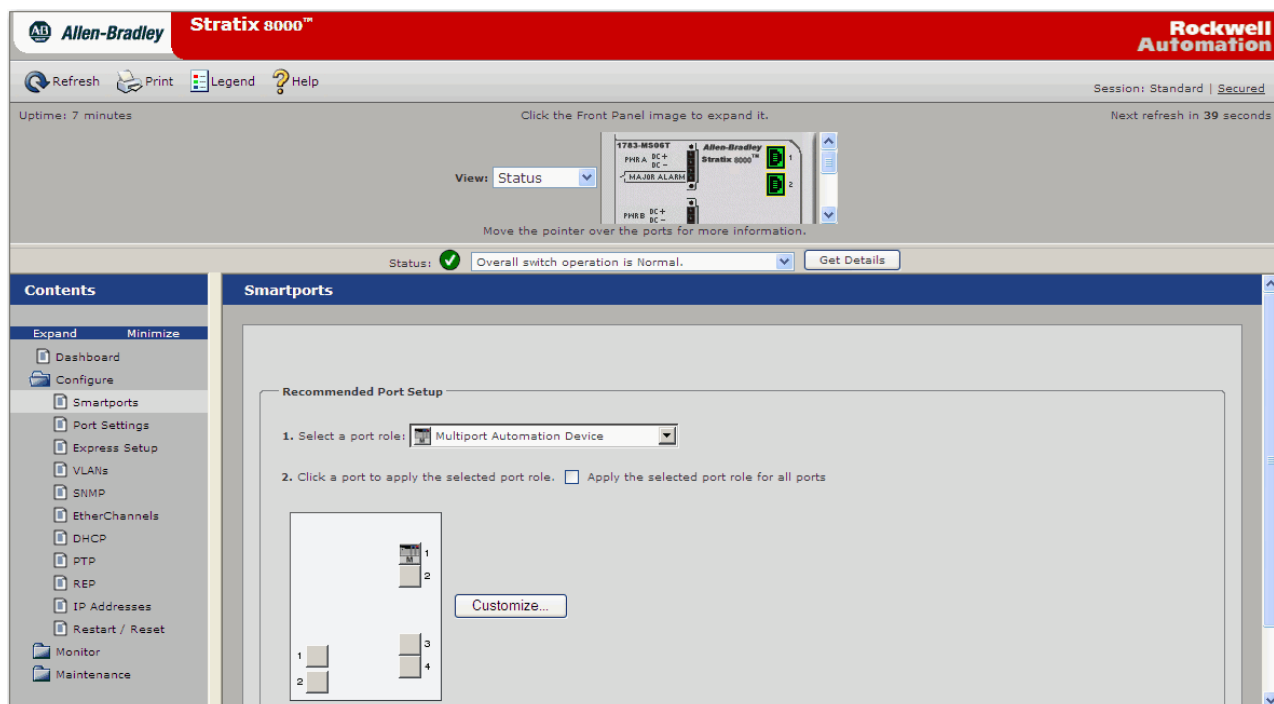
The screenshot shows the Allen-Bradley Stratix 8000 web interface. The top navigation bar includes the Allen-Bradley logo, the product name 'Stratix 8000', and the Rockwell Automation logo. Below the navigation bar is a status bar showing 'Uptime: 21 minutes' and 'Session: Standard | Secured'. The main content area is divided into a 'Contents' sidebar on the left and a 'Port Settings' main panel. The 'Port Settings' panel displays a table of ports with columns for Port, Description, Enable, Speed, Duplex, Auto-MDIX, and MediaType. Port Fa1/1 is configured for 'Quick Connect' with a speed of 100, duplex of Full, and Auto-MDIX disabled. Other ports (Fa1/2, Fa1/3, Fa1/4, Gi1/1, Gi1/2) are configured with default settings. The bottom of the interface includes a 'Submit' button and a 'Cancel' button.

Port	Description	Enable	Speed	Duplex	Auto-MDIX	MediaType
Fa1/1	Quick Connect	<input checked="" type="checkbox"/>	100	Full	<input type="checkbox"/>	N/A
Fa1/2		<input checked="" type="checkbox"/>	Auto	Auto	<input checked="" type="checkbox"/>	N/A
Fa1/3		<input checked="" type="checkbox"/>	Auto	Auto	<input checked="" type="checkbox"/>	N/A
Fa1/4		<input checked="" type="checkbox"/>	Auto	Auto	<input checked="" type="checkbox"/>	N/A
Gi1/1		<input checked="" type="checkbox"/>	Auto	Auto	N/A	Auto
Gi1/2		<input checked="" type="checkbox"/>	Auto	Auto	N/A	Auto

6. Under the Configure folder, select Smartports, apply the Multiport Automation Device role to each QuickConnect port, and click Submit.

TIP

If the Multiport Automation Device role is unavailable from the pull-down menu, make sure your switch is running firmware revision 12.2(58)SE2 or later.



Configure a Stratix 6000 Switch

Configure the Stratix 6000 switch to optimize the performance of the connection between ArmorBlock I/O modules and the controller.

IMPORTANT I/O devices do not support the QoS protocol in the Stratix 6000 switch.

Use these port settings for optimal performance:

- 100 Mbps speed
- Full Duplex mode
- No negotiation

These Stratix 6000 configuration parameters also aid in the QuickConnect connection time:

- IGMP snooping
- IGMP querier

For more information on the Stratix 6000 parameters, see the Stratix 6000 Ethernet Managed Switch User Guide, publication [1783-UM001](#).

Access the Stratix 6000 Web Interface

You can configure the Stratix 6000 switch for a QuickConnect application by using the Web interface. The instructions below provide the default IP address and password for accessing the Web interface. For information about how to set the switch's IP address and password, refer to the Stratix 6000 Ethernet Managed Switch User Manual, publication [1783-UM001](#).

To access the Web interface for the switch, follow these steps.

1. Connect the switch to your computer's LAN card.

This connection is required before you can access the home page. For information about how to establish this connection, see the Stratix 6000 Ethernet Managed Switch Installation Instructions, publication [1783-IN004](#).

2. Open your web browser once the connection is established.
3. In the address bar of your web browser, type your switch's IP address.

The default IP address is 192.168.1.1.

4. From the user name and password dialog box, leave the user name empty and type PASSWORD in the Password field, which is the default, case-sensitive password.

Apply an IP Address to a New Stratix 6000 Switch

To apply a static IP address to your managed switch, follow these steps.

1. Find an available IP address on your subnet.
2. Connect the switch to your computer's LAN card.

For additional information, refer to the Stratix 6000 Ethernet Managed Switch Installation Instructions, publication [1783-IN004](#).

3. Access the Web interface for the switch, as described in [Access the Stratix 6000 Web Interface on page 37](#).
4. From the navigation pane, expand the Basic Configuration folder and click Network Configuration to display the Network Configuration tab.
5. Complete the fields as described below.

Field	Action
IP Address	Type your new IP address.
Subnet Mask	Change the default subnet mask if needed.
Default Gateway	Change the default gateway if needed.
BOOTP Client	Choose Off to prevent dynamic IP address assignment.
Primary Name Server	If you are using host names on the network, type the DNS server address. A DNS server is typically required for the email function.
Name Resolution (DNS)	If you are using host names on the network, choose On.

The screenshot shows the web interface for the Allen-Bradley 1783-EMS08T/A switch. The left navigation pane is expanded to show the 'Basic Configuration' folder, with 'Network Configuration' selected. The main content area displays the 'Network Interface' configuration page. The fields are as follows:

Field	Value
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
BOOTP Client	Off
Primary Name Server	0.0.0.0
Secondary Name Server	0.0.0.0
Name Resolution (DNS)	Off

An 'Apply Changes' button is located at the bottom of the configuration area.

6. Click Apply Changes to change the IP and subnet addresses.

IMPORTANT	The switch does not load the new IP and subnet address until power is cycled.
------------------	---

7. Cycle power.

Once the IP and subnet addresses are changed, you must cycle power to load the new addresses. You can cycle power remotely through the management interface by expanding the Diagnostics folder and clicking Controller Restart. This restarts the switch and does not restart the controller. All communication through the switch is interrupted.

Configure QuickConnect Ports

For optimum performance, apply these settings to each port that connects to a QuickConnect ArmorBlock I/O module:

- 100 Mbps speed
- Full duplex
- No negotiation

If you are using a VLAN other than the default VLAN (Default - 1), refer to the Stratix 6000 Ethernet Managed Switch User Manual, publication [1783-UM001](#), for instructions on assigning ports to a custom VLAN.

To configure QuickConnect ports, follow these steps.

1. Access the switch's Web interface, as described in [Configure QuickConnect Ports on page 39](#).
2. In the navigation pane, expand the Switch Configuration folder and click Port Configuration.
3. Configure the following port settings for each port that connects to a QuickConnect ArmorBlock I/O module and click Apply Changes.

All other ports that do not connect to QuickConnect modules can use the default settings.

Field	Action
Negotiation	Choose None.
Speed	Choose 100.
Duplex	Choose Full.

In the figure below, port 1 is configured for a QuickConnect module.

The screenshot shows the Allen-Bradley 1783-EMS08T/A configuration interface. The left sidebar contains a navigation tree with the following items: Home, Login, Basic Configuration, Network Services Setup, Diagnostics, Switch Configuration (expanded), RSTP Configuration, VLAN Configuration, Port Configuration (selected), Mirror Configuration, MAC ID Management, Port Segmenting, QoS Setup, and Send an Email. The main panel displays the Port Configuration settings for Port 1. The settings are as follows:

	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8	Port G
Transmit & Receive	Both	Both	Both	Both	Both	Both	Both	Both	Both
Negotiation	None	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
Rate	100	100	100	100	100	100	100	100	1000
Duplex Mode	Full	Half	Half	Half	Half	Half	Half	Half	Full
Flow Control	ON	ON	ON	ON	ON	ON	ON	ON	ON

An "Apply Changes" button is located at the bottom of the configuration panel.

QuickConnect Scenarios

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QuickConnect Modules Using DHCP

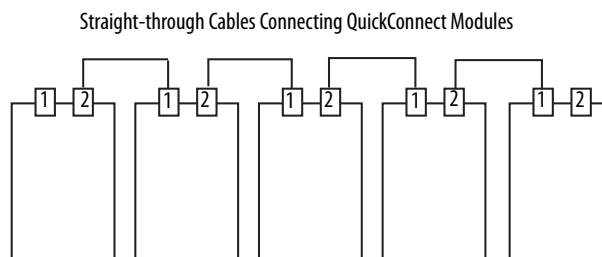
In this commissioning scenario, the QuickConnect modules are in a linear configuration connected to a managed switch. DHCP is used to allocate IP addresses to all QuickConnect modules during the initial power cycle. The modules then store the DHCP allocated IP address into nonvolatile memory and use this stored IP address for subsequent power cycles.

IMPORTANT	Modules configured to obtain an IP address by using DHCP cannot achieve 500 ms performance.
------------------	---

Scenario Sequence

1. Mount the QuickConnect modules.
2. Set the rotary switches on the QuickConnect modules to 999.
This is the default setting and configures the modules to use DHCP to obtain an IP address.
3. Wire power to the QuickConnect modules.
4. Connect a straight-through cable from the tool changer to a port on the managed switch.
5. Connect a straight-through cable from the tool changer to the first QuickConnect module.

6. For subsequent QuickConnect modules, connect a straight-through cable from port 2 on one module to port 1 on the next module, as shown below.



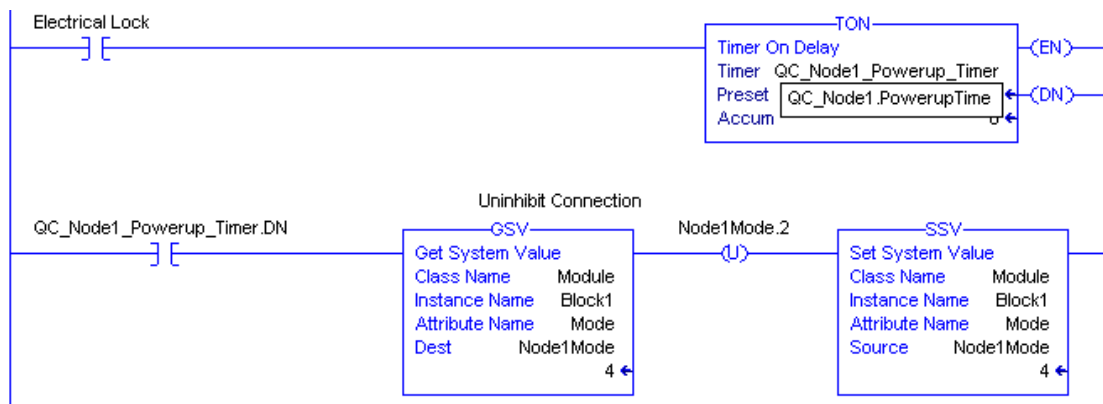
7. Configure the port on the managed switch as shown in the table.

Port Parameter	Setting
Negotiation	Off
Rate	100 Mbps
Duplex	Full
Auto-MDIX	Off

The first time a QuickConnect module powers up, it autonegotiates with the managed switch for 100 Mbps and full duplex and obtains its IP address from the DHCP server. The QuickConnect module is now ready for a standard connection to the controller.

The next time the QuickConnect module powers up with QuickConnect enabled, the control program starts the tool connection process. As soon as the controller recognizes the electrical lock signal, the controller starts a timer that has a preset value equal to or greater than the power-up time of the QuickConnect modules.

When the timer's done (.DN) bit is set, the controller uninhibits the connection to that QuickConnect module via an SSV ladder instruction. You need a unique timer and SSV instruction for each QuickConnect module, as shown in the figure below.



By uninhibiting the connection, a Forward Open service is sent to the QuickConnect module. This service includes a data segment with configuration data that instructs the QuickConnect module to turn off autonegotiation, use 100 Mbps speed, and use full duplex. The QuickConnect module also sets the Quick_Connect attribute of the TCP/IP object to 1 (enabled).

The QuickConnect module saves the new configuration and the DHCP allocated IP address to nonvolatile memory. On the next use of the tool, the QuickConnect module powers up in QuickConnect mode and uses the IP address in its nonvolatile memory.

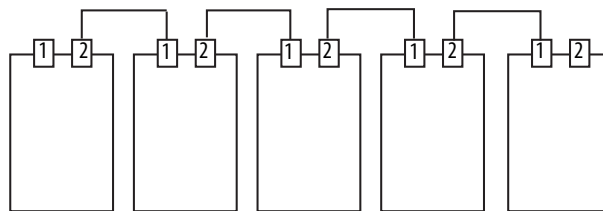
QuickConnect Modules Using Static IP Addresses

In this commissioning scenario, the QuickConnect modules are in a linear configuration connected to a managed switch. The QuickConnect modules use a static IP address.

Scenario Sequence

1. Mount the QuickConnect modules.
2. Set the rotary switches on the QuickConnect modules to a unique IP address.
3. Wire power to the QuickConnect modules.
4. Connect a straight-through cable from the tool changer to a port on the managed switch.
5. Connect a straight-through cable from the tool changer to the first QuickConnect module.
6. For subsequent QuickConnect modules, connect a straight-through cable from port 2 on one module to port 1 on the next module, as shown below.

Straight-through Cables Connecting QuickConnect Modules



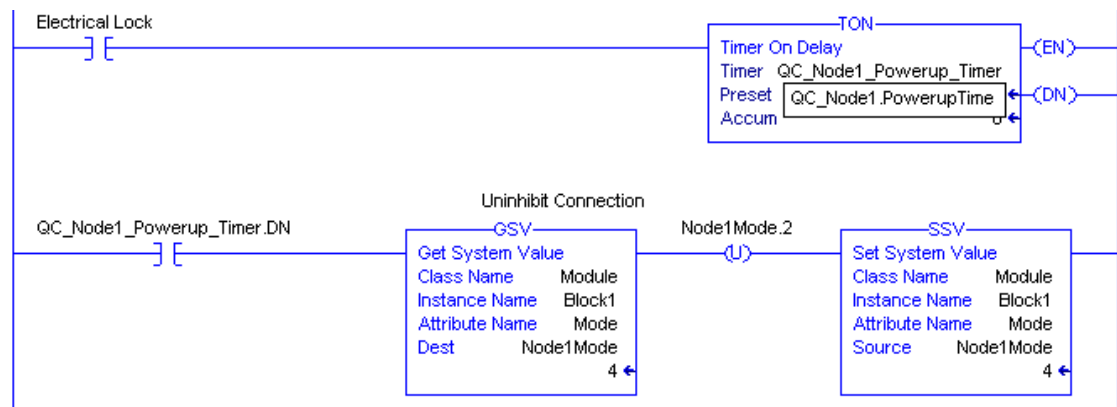
7. Configure the port on the managed switch as shown in the table.

Port Parameter	Setting
Negotiation	Off
Rate	100 Mbps
Duplex	Full
Auto-MDIX	Off

The first time a QuickConnect module powers up, it autonegotiates with the managed switch for 100 Mbps and full duplex and obtains a fixed IP address from the rotary switches. The QuickConnect module is now ready for a standard connection to the controller.

The next time the QuickConnect module powers up with QuickConnect enabled, the control program starts the tool connection process. As soon as the controller recognizes the electrical lock signal, the controller starts a timer that has a preset value equal to or greater than the power-up time of the QuickConnect modules.

When the timer's done (.DN) bit is set, the controller uninhibits the connection to that QuickConnect module via an SSV ladder instruction. You need a unique timer and SSV instruction for each QuickConnect module, as shown in the figure below.



By uninhibiting the connection, a Forward Open service is sent to the QuickConnect module. This service includes a data segment with configuration data that instructs the QuickConnect module to turn off autonegotiation, use 100 Mbps speed, and use full duplex. The QuickConnect module also sets the Quick_Connect attribute of the TCP/IP object to 1 (enabled).

The QuickConnect module saves the new configuration to nonvolatile memory. On the next use of the tool, the QuickConnect module powers up in QuickConnect mode.

QuickConnect Modules Using Duplicate IP Addresses

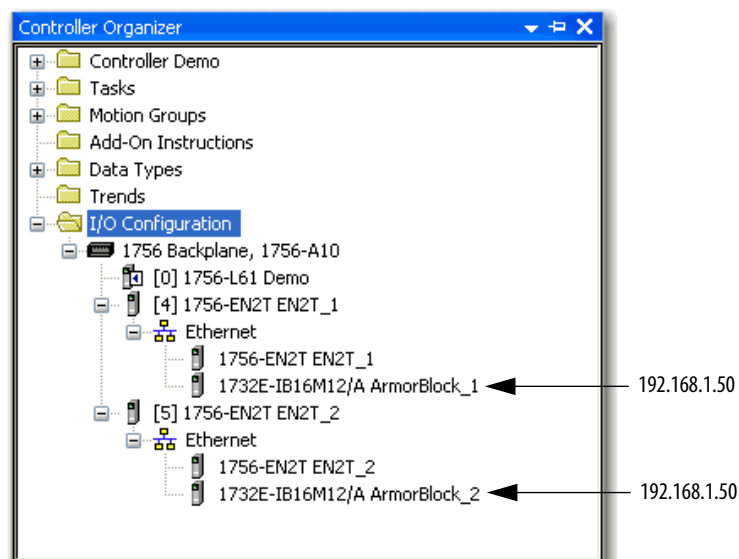
IP addresses for QuickConnect modules can be reused from one tool to the next. To reuse IP addresses, these requirements apply to the QuickConnect modules:

- Modules that share the same IP address must be all of the same type, and only one of them can be powered up and communicating with the controller at any time.
- Modules that are not powered up, but are in the I/O configuration tree must be inhibited. As a result, each tool's ID must be recognized before the tool is electrically connected, so that the application logic can make sure that all unused QuickConnect modules in the I/O configuration tree are kept inhibited.

In many cases, such as when all tools are using identical sets of QuickConnect modules, you need to add only one set of QuickConnect modules to the I/O configuration tree under a single EtherNet/IP communication module. Make sure that each module within a set connected to the same tool has a unique IP address.

In cases that require QuickConnect modules to be configured under different EtherNet/IP communication modules, duplicate IP addresses can exist in the I/O configuration tree under each communication module, as shown in [Figure 4](#).

Figure 4 - Duplicate IP Addresses in I/O Configuration Tree



Replacement of Faulty QuickConnect Modules

This scenario demonstrates how to replace a QuickConnect module in a system that is running.

Scenario Sequence

1. Prepare and mount the replacement module.
2. Set the rotary switches on the replacement module for DHCP (default) or for a fixed IP address.
3. Wire power to the replacement module.

The first time the replacement module powers up, it autonegotiates with the managed switch for 100 Mbps and full duplex. The module obtains its IP address based on the method you chose with the rotary switches. The QuickConnect module is now ready for a standard connection to the controller.

The next time the replacement module powers up with QuickConnect enabled, the control program starts the tool connection process. As soon as the controller recognizes the electrical lock signal, the controller starts a timer that has a preset value equal to or greater than the power-up time of the QuickConnect modules.

When the timer done bit(.DN) is set, the controller uninhibits the connection to that QuickConnect module via an SSV ladder instruction. You need a unique timer and SSV instruction for each QuickConnect module.

At this point, the replacement module is still powering up in standard mode. Eventually, the QuickConnect module accepts a connection when the controller attempts to establish connection. On the next use of the tool, the QuickConnect module powers up in QuickConnect mode.

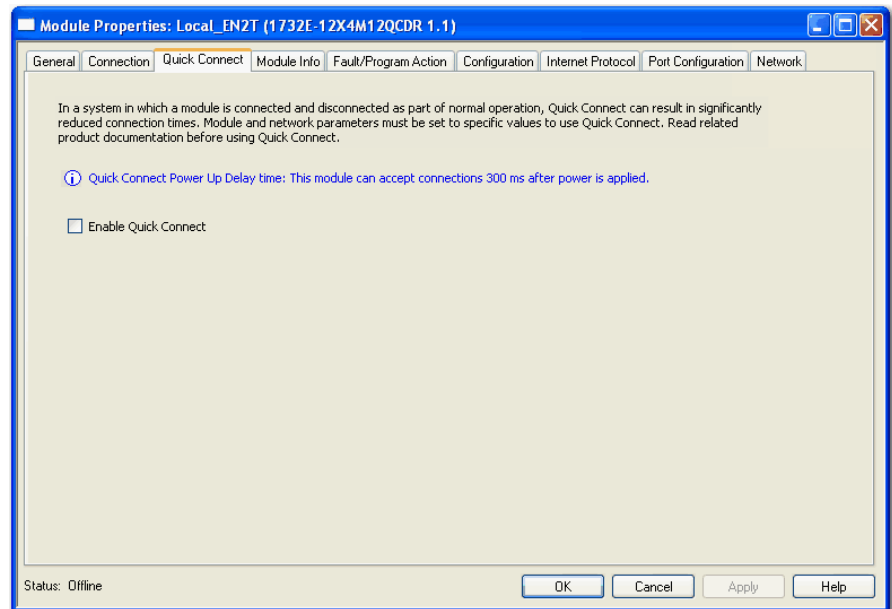
QuickConnect Modules in Standard Systems

This scenario shows how to use a module initially configured for a QuickConnect system in a standard system with no QuickConnect functionality.

IMPORTANT Once QuickConnect functionality has been disabled in a module, the module still retains its current port settings. When moving the module to a standard system, make sure its port settings match its link partner to avoid invalid I/O control.

Scenario Sequence

1. Open the Module Properties dialog box for the QuickConnect module.
2. Click the QuickConnect tab.
3. Clear the Enable QuickConnect checkbox and click Apply.



Upon the next connection to the module, the module reconfigures these parameters:

- Sets the QuickConnect attribute to 0
- Enables Auto-MDIX

The module retains its current IP address and port settings:

- Auto-negotiate remains disabled
- Speed remains at 100 bps
- Duplex remains set to Full

Modify the above settings as needed to adapt the module to a standard system. For more information, refer to the QuickConnect AOP online Help.

Notes:

Troubleshooting and Optimization

Topic	Page
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Average Timing with Rockwell Automation Products

Refer to [Table 11](#) for average connection times with supported Rockwell Automation controllers and communication modules. Connection times are based on testing using these parameters:

- Time slice percentage = 30%
- RPI = 20 ms
- Unicast routing

Keep in mind that the QuickConnect feature must always have a managed switch in the circuit with specific port settings. For required port settings, see [Configure a Stratix 8000 Switch](#) or [Configure a Stratix 6000 Switch on page 37](#).

IMPORTANT All connection times in the table are preceded by a 300 ms power-up delay.

Table 11 - Average Connection Time per Number of QuickConnect I/O Modules

Network	Controller	Load %	Messages	Connection Time (ms) per Number of QuickConnect Modules				
				1 Module	5 Modules	10 Modules	15 Modules	20 Modules
ControlLogix 1756-EN2T communication module, firmware revision 4.003	ControlLogix 1756-L75	25	5000	355	370	388	434	462
		50	10000	368	385	400	451	486
	ControlLogix 1756-L73	25	5000	380	399	417	479	503
		50	10000	380	413	438	485	524
	ControlLogix 1756-L63	25	5000	403	454	553	593	676
		50	10000	437	548	634	734	921
	GuardLogix 1756-L6xS	25	5000	410	465	565	620	698
		50	10000	428	545	681	838	961
ControlLogix 1756-ENBT communication module, firmware revision 6.002	ControlLogix 1756-L75	25	5000	395	492	679	924	1251
		50	10000	400	497	685	923	1258
	ControlLogix 1756-L73	25	5000	396	498	699	941	1205
		50	10000	403	505	702	943	1223
	ControlLogix 1756-L63	25	5000	431	524	742	1010	1354
		50	10000	447	574	773	1033	1362
	GuardLogix 1756-L6xS	25	5000	435	542	757	1023	1307
		50	10000	442	577	781	1113	1346

Delayed Connection Time

There are many factors that can cause the connection time to be greater than 500 ms. These factors include the following:

- RPI
- Time slice percentage
- Timer set in the application logic
- EtherNet/IP traffic
- Controller task load

These core settings are recommended based on testing a variety of configurations:

- RPI = 20 ms
- Time slice percentage = 30%
- Timer set for 300 ms

If the optimum connection time cannot be achieved with the recommended settings, you can evaluate alternate EtherNet/IP configurations or controller requirements.

IMPORTANT A connection time of 500 ms with 20 QuickConnect modules is supported only with a ControlLogix 1756-L7x controller and 1756-EN2T communication module. For average connection times per number of modules, see [page 50](#).

Timing Errors

Once your initial system is configured, we recommend that you test whether the connection timing is within your required time frame. A QuickConnect I/O module issues a gratuitous ARP message on the network every 25 ms for a maximum of 40 times (1 second) until an I/O connection is established. If you experience periodic missed connections, we recommend the following:

- Analyze network traffic for the root cause.
- Extend the timer in your application logic to a value greater than 300 ms.

Power Limitations

To determine whether an alternate power source is required for your application, refer to the table below.

Table 12 - QuickConnect Power Specifications

Attribute	Description	1732E-12X4M12QCDR, 1732E-12X4M12P5QCDR	1732E-16CFG12QCR, 1732E-16CFG12QCWR, 1732E-16CFG12P5QCR, 1732E-16CFG12P5QCWR
Continuous output current per point/module, max	The maximum rated current of each output channel or maximum combined current of all available output channels	0.5 A per channel 2 A (4 channels)	0.5 A per channel 8 A (16 channels)
Auxiliary power connector per module, max	The maximum current carrying capacity of each auxiliary power connector	10 A	

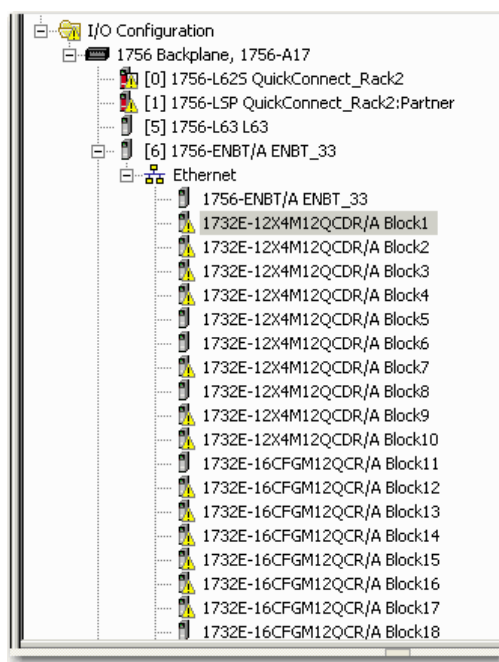
For a daisy chain application, the combined auxiliary output current of all modules connected in the daisy chain must not exceed 10 A.

EXAMPLE If the first 1732E-16CFG12QCR module in a daisy chain is operating on maximum output current of 8 A (0.5 A per channel x 16 channels), then the maximum current supported from the auxiliary output connector of the first module to the auxiliary input connector of the second module is only 2 A.

Out of Communication Bandwidth Errors and RPI

An Out of Communication Bandwidth error (code 16#0302) can occur while you are online if the RPI value is too low for your application. This connection error appears when the controller is attempting to set up a connection with an I/O module that has exceeded its communication bandwidth capacity. The error is indicated by an Attention icon in the I/O configuration tree.

Figure 5 - Out of Communication Bandwidth Errors



While the default RPI value for QuickConnect I/O modules is 20 ms, some applications require a higher RPI value to enable connections to complete.

Duplicate IP Addresses

If another device is using the same IP address assigned to an EtherNet/IP communication module in your network, the status indicators on the communication module show the conditions in the following table.

Table 13 - EtherNet/IP Status Indicator Conditions for Duplicate IP Address

Indicator	Status
OK	Flashing red
Network (NET)	Solid red

If a duplicate IP address is detected on your network, communication between devices stop. To recover the fault, follow these steps.

1. Change the IP address of the module.
2. Cycle power to the module, or reset the modules by disconnecting and reconnecting the EtherNet/IP cable.

For more information about duplicate IP address detection, refer to these resources:

- EtherNet/IP Network Configuration User Manual, publication [ENET-UM001](#).
- Volume 2: EtherNet/IP Adaptation of CIP, Appendix F: Address Conflict Detection of the CIP Networks Library available at <http://www.odva.org>.

AOP Help File

Within the Logix Designer application, you can access online Help for each module's Add-on Profile (AOP). To access online Help, press F1 from the New Module or Module Properties dialog box. The online Help for each module provides this information:

- Descriptions of configuration parameters
- Detailed description of the Enable Quick Connect checkbox

ArmorBlock Status Indicators

ArmorBlock I/O modules have the status indicators described below.

Module Status Indicator

Status	Description
Off	The module has no power.
Solid green	The module is operating normally.
Flashing green	The module needs commissioning. The configuration is missing, incomplete, or incorrect.
Solid red	The module has a critical, unrecoverable fault. Replace the module.
Flashing red	The module has a minor, recoverable fault. Possible causes include the following: <ul style="list-style-type: none"> • The IP address of the switch changed since the last powerup. • An update is in process. • There is a duplicate IP address. • Nonvolatile memory is being reset to factory defaults by the rotary switch.

Network Status Indicator

Status	Description
Off	The device is not online. Possible causes include the following: <ul style="list-style-type: none"> • The device does not have an IP address or has not resolved an IP address conflict. • The device has no power.
Solid green	The module is online with established connections and operating normally.
Flashing green	The device is offline with no connections.
Solid red	The device has a critical connection failure due to a duplicate IP address on the network.
Flashing red	An I/O connection has timed out.

Ethernet Activity Indicator

Status	Description
Off	There is no EtherNet/IP connection.
Solid green	A connection is established on the indicated port at 100 Mbps.
Flashing green	There is connection activity on the indicated port at 100 Mbps.
Solid yellow	A connection is established on the indicated port at 10 Mbps.
Flashing yellow	There is connection activity on the indicated port at 10 Mbps.

Input Status Indicators

Status	Description
Off	There is no input, or the input is inactive.
Solid yellow	A valid, active input is present.
Solid red	(Diagnostic feature only). A short circuit is detected.
Flashing red	(Diagnostic feature only). An open wire is detected.

Output Status Indicators

Status	Description
Off	There is no output, or the output is inactive.
Solid yellow	The output is energized, and auxiliary output power is present.
Flashing yellow	The output is energized, but auxiliary output power is not present.
Solid red	(Diagnostic feature only). A short circuit is detected.
Flashing red	(Diagnostic feature only). An open load is detected.

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Rockwell Automation provides technical information on the Web to assist you in using its products.

At <http://www.rockwellautomation.com/support> you can find technical and application notes, sample code, and links to software service packs. You can also visit our Support Center at <https://rockwellautomation.custhelp.com/> for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://www.rockwellautomation.com/services/online-phone>.

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If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

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