

# CompactLogix 5480 Controllers

Catalog Numbers 5069-L430ERMW, 5069-L450ERMW, 5069-4100ERMW, 5069-L4200ERMW, 5069-L46ERMW



## 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.

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

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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 explains how to use the CompactLogix™ 5480 controllers.

Make sure that you are familiar with the following:

- Use of a controller in a Logix 5000™ control system
- Use of an EtherNet/IP™ network
- Use of Rockwell Automation® software, for example:
  - Studio 5000 Logix Designer®
  - RSLinx® Classic
  - ControlFLASH™
  - FactoryTalk® Linx
- Use of **Windows 10 Internet of Things Enterprise (IoT) LTSB 64-bit operating system**; referred to as the COS (commercial operating system) throughout the rest of this publication

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**IMPORTANT** You are **not required** to use the COS on the controller.  
You **must install controller firmware before you can use the COS**. The COS does not start until working firmware is installed.

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If you use the COS, we recommend that you use the following resources to become more familiar with how to use a COS:

- *Windows 10 IoT platform powers the intelligent edge* from Microsoft® Corporation, available at: <https://www.microsoft.com/en-us/windowsforbusiness/windows-iot>
- Rockwell Automation Knowledgebase articles that describe how to use the Windows 10 operating system with Rockwell Automation products. The Knowledgebase is available at:

<https://rockwellautomation.custhelp.com/>

For more information about the COS, see Chapter 10, [Commercial Operating System on page 215](#)

## Summary of Changes

This revision of this publication includes the addition of the following new CompactLogix 5480 controller catalog numbers:

- 5069-L430ERMW
- 5069-L450ERMW
- 5069-L4100ERMW
- 5069-L4200ERMW

Information specific to these controllers is in the appropriate locations throughout the publication.

## Additional Resources

The following documents contain additional information concerning related products from Rockwell Automation.

**Table 1 - Additional Resources**

Resource	Description
CompactLogix 5480 Controller Specifications Technical Data, publication <a href="#">5069-TD002</a>	Provides specifications for CompactLogix 5480 controllers.
CompactLogix 5480 Controllers Installation Instructions, publication <a href="#">5069-IN019</a>	Describes how to install a CompactLogix 5480 controller.
CompactLogix System Selection Guide, publication <a href="#">1769-SG001</a>	Provides information about how to design and select components for a CompactLogix system.
Compact 5000 I/O Modules and EtherNet/IP Adapters Specifications Technical Data, publication <a href="#">5069-TD001</a>	Provides specifications, wiring diagrams, and functional block diagrams for Compact 5000™ I/O modules and EtherNet/IP adapters.
Replacement Guidelines: Logix 5000 Controllers Reference Manual, publication <a href="#">1756-RM100</a>	Provides guidelines on how to replace the following: <ul style="list-style-type: none"> <li>• ControlLogix® 5560/5570 controller with a ControlLogix® 5580 controller</li> <li>• CompactLogix 5370 L3 controllers with a CompactLogix 5480 controller</li> </ul>
Compact 5000 Digital I/O Modules, publication <a href="#">5069-UM004</a>	Provides information on how to configure, operate, and troubleshoot Compact 5000 I/O digital modules.
Compact 5000 Analog I/O Modules User Manual, publication <a href="#">5069-UM005</a>	Provides information on how to configure, operate, and troubleshoot Compact 5000 I/O analog modules.
Compact 5000 High-speed Counter Module User Manual, publication <a href="#">5069-UM006</a>	Provides information on how to configure, operate, and troubleshoot a Compact 5000 I/O high-speed counter module.
Compact 5000 EtherNet/IP Adapters User Manual, publication <a href="#">5069-UM007</a>	Provides information on how to configure, operate, and troubleshoot a Compact 5000 EtherNet/IP adapters.
Ethernet Design Considerations Reference Manual, publication <a href="#">ENET-RM002</a>	Describes the following Ethernet concepts: <ul style="list-style-type: none"> <li>• Overview</li> <li>• Network layout and components</li> <li>• Network infrastructure devices</li> <li>• Network infrastructure features</li> <li>• Protocol</li> </ul>
EtherNet/IP Socket Interface Application Technique, publication <a href="#">ENET-AT002</a>	Describes the socket interface that you can use to program MSG instructions to communicate between a Logix 5000™ controller and Ethernet devices that do not support the EtherNet/IP application protocol.
EtherNet/IP Embedded Switch Technology Application Guide, publication <a href="#">ENET-AP005</a>	Describes how to install, configure, and maintain linear and Device Level Ring (DLR) networks by using Rockwell Automation® EtherNet/IP devices that are equipped with embedded switch technology.

**Table 1 - Additional Resources**

Resource	Description
Integrated Architecture® and CIP Sync Configuration Application Technique, publication <a href="#">IA-AT003</a>	Provides information on CIP Sync™ and the IEEE 1588-2008 Precision Time Protocol.
Integrated Motion on the EtherNet/IP Network Reference Manual, publication <a href="#">MOTION-RM003</a>	Reference descriptions of the AXIS_CIP_DRIVE attributes and the Logix Designer application Control Modes and Methods
Electronic Keying in Logix5000 Control Systems Application Technique, publication <a href="#">LOGIX-AT001</a>	Describes how to use electronic keying in Logix5000™ control systems.
Logix5000 Controllers Design Considerations Reference Manual, publication <a href="#">1756-RM094</a>	Provides information to help design and plan Logix5000 control systems.
Logix5000 Controllers Instructions Reference Manual, publication <a href="#">1756-RM009</a>	Describes the programming instructions available to use in Logix Designer application projects.
Motion Coordinate System User Manual, publication <a href="#">MOTION-UM002</a>	Details how to create and configure a coordinated motion application system.
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <a href="http://www.rockwellautomation.com/global/certification/overview.page">http://www.rockwellautomation.com/global/certification/overview.page</a>	Provides declarations of conformity, certificates, and other certification details.

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

**Notes:**

## CompactLogix 5480 System

Topic	Page
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This chapter describes a CompactLogix™ 5480 system.

The CompactLogix 5480 controllers support functionality that is common to Logix 5000™ controllers and offer a pre-installed, licensed COS that runs in parallel with the Logix control engine.

### Minimum Requirements

The CompactLogix 5480 controllers have minimum programming software and firmware revision requirements. The controller firmware revision must be compatible with the software version that you use.

For more information on controller firmware revision and programming software version compatibility, and other minimum software requirements, see [page 14](#).

## Software Application Requirements

In addition to the Logix Designer application requirement, there are other minimum software version requirements in a CompactLogix 5480 system. If a CompactLogix 5480 system does not meet the minimum requirements, it does not work.

For more information on the software application requirements, see:

- [Table 3 - Components in a CompactLogix 5480 System on page 18](#)
- Product Compatibility and Download Center (PCDC) available at: <http://compatibility.rockwellautomation.com/Pages/home.aspx>

## Controller Firmware and Logix Designer Application Compatibility

In Logix 5000 control systems, the controller firmware and the Logix Designer application must be compatible. To be compatible, the firmware and software must be of the same major revision level.

For more information on controller firmware revisions and software application minimum requirements, go to the [PCDC](#).

- The Download section has the firmware for your controller.
- The Compare section has software compatibility information for software applications that are used in a CompactLogix 5480 control system.

## Real-time Control and Windows Environment in the Same Controller

The CompactLogix 5480 controller uses a high-performance architecture to support the functionality that is common to Logix 5000 controllers.

The controller goes beyond other Logix 5000 controllers, in that a COS runs in parallel with the Logix control engine. The pre-installed, licensed COS lets you perform tasks on the controller that must be performed on an external workstation in other Logix 5000 control systems.

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**IMPORTANT** You must **install working controller firmware** before you can use the COS. The COS does not start until working controller firmware is installed. For more information on how update controller the firmware revision, see [page 71](#).

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For more information about the COS, see Chapter 10, [Commercial Operating System on page 215](#)

## Controller Features

[Table 2](#) describes features available on CompactLogix 5480 controllers.

**Table 2 - CompactLogix 5480 Controller Features**

Feature	5069-L430ERMW	5069-L450ERMW	5069-L4100ERMW	5069-L4200ERMW	5069-L46ERMW
Onboard memory					
Windows 10 (COS on controller)	RAM - 6 GB SSD - 64 GB				
Logix control engine	3 MB	5 MB	10 MB	20 MB	20 MB
Controller tasks	32 tasks 1000 programs/task Event tasks; all event triggers				
Communication ports	Three USB ports – One device port for Logix control engine – Two host ports for COS Four Ethernet ports – Three for Logix control engine – One for COS				
EtherNet/IP™ network topologies supported	Device Level Ring (DLR) Star Linear				
EtherNet/IP nodes supported, max	60	120	180	250	250
EtherNet/IP modes	Linear/DLR mode Dual-IP mode				
Integrated motion					
Number of axes supported, max <sup>(1)</sup>	512				
Number of CIP™ Drive axes (Position loop-configured) supported, max <sup>(2)</sup>	16	24	32	150	150
Local I/O modules, max	31				
Programming languages	Ladder Diagram (LD) Structured Text (ST) Function Block Diagram (FBD) Sequential Function Chart (SFC)				

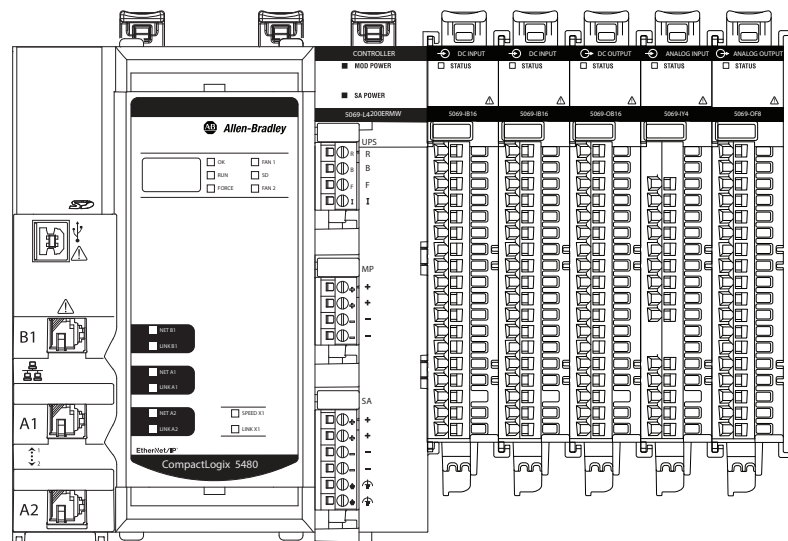
(1) Any combination of CIP Drive, Virtual, Consumed, Regenerative AC/DC Converter and Non-Regenerative AC/DC Converter axis types.

(2) The maximum number of CIP Drive axes (configured for Position Loop) that can be included in the total integrated motion axes count for a controller.

**CompactLogix 5480 System** The CompactLogix 5480 system is a DIN rail-mounted system that is part of the Logix 5000 family of controllers.

The controllers can operate in various applications, for example, standalone systems that include local Compact 5000™ I/O modules, as shown in [Figure 1](#).

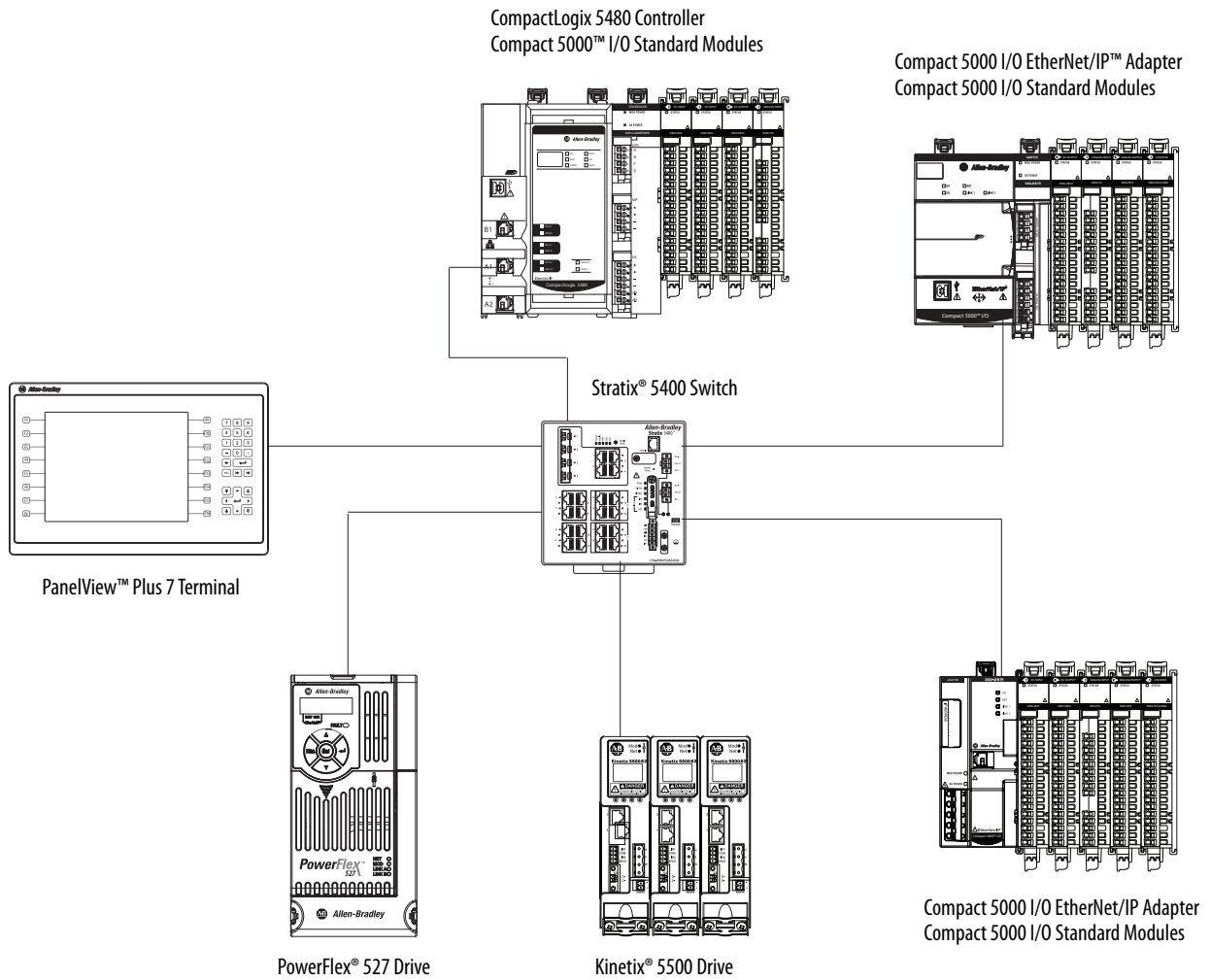
**Figure 1 - CompactLogix 5480 Controller in a Standalone System**





The controller can also operate in more complex systems with devices that are connected to the controller via an EtherNet/IP network, as shown in [Figure 2](#).

**Figure 2 - CompactLogix 5480 Controller in a More Complex System**



This example shows a CompactLogix 5480 controller in an EtherNet/IP network star topology. For more information on other topologies and network designs within which the controller fits, see the following:

- Chapter 5, [EtherNet/IP Network on page 117](#)
- Chapter 6, [Connect to Different EtherNet/IP Network Levels on page 131](#)

## Design a CompactLogix 5480 System

[Table 3](#) describes components that are used when you design a CompactLogix 5480 control system.

**Table 3 - Components in a CompactLogix 5480 System**

Component	Purpose	Required	For More Information
DIN rail	Mounting system	Yes	CompactLogix 5480 Controllers Installation Instructions, publication <a href="#">5069-IN019</a>
End cap (5069-ECR)	Covers the exposed interconnections on the last module in the system to help prevent equipment damage or injury from electric shock when the system is powered. Ships with the controller.	Yes	
Removable terminal blocks (RTBs)	Connect the following to the controller: <ul style="list-style-type: none"> <li>• MOD power</li> <li>• SA power</li> <li>• UPS control signal</li> </ul>	Yes	
Replaceable fans	Help maintain lower operating temperatures.	Yes	Replaceable Fans on <a href="#">page 35</a>
External power supply <sup>(1)</sup>	Provides Module (MOD) Power to the system	Yes	Power the System on <a href="#">page 20</a>
External power supply <sup>(1)</sup>	Provides Sensor/Actuator (SA) Power to the system	Yes - Only if the system requires SA power. If the system does not require SA power, the external power supply is not needed.	
Uninterruptible power supply (UPS)	Provides control signals that let the controller experience a controlled shutdown if the source of MOD power is lost	No <b>IMPORTANT:</b> CompactLogix 5480 controller systems typically use a UPS.	
Logix Designer application	Configures the project that defines Logix control engine activity.	Yes	Software online help Chapter 3, <a href="#">Start to Use the Controller on page 81</a> Chapter 7, <a href="#">Use I/O Modules on page 161</a> Chapter 11, <a href="#">Troubleshoot the Controller on page 245</a>
Linux-based software	Logix control engine Used as follows: <ul style="list-style-type: none"> <li>• Perform configuration tasks, for example, to assign IP addresses to the Ethernet ports or to troubleshoot issues.</li> <li>• Maintain communication over the EtherNet/IP network in a real-time control system.</li> </ul>	Yes	Software online help Chapter 2, <a href="#">Connect to the Controller on page 43</a> Chapter 5, <a href="#">EtherNet/IP Network on page 117</a> Chapter 6, <a href="#">Connect to Different EtherNet/IP Network Levels on page 131</a> Chapter 11, <a href="#">Troubleshoot the Controller on page 245</a>
	COS Used to communicate information between the COS and the Logix control engine.	Yes - If you use the COS.	Software online help Chapter 10, <a href="#">Commercial Operating System on page 215</a>
ControlFLASH™ software	Update controller firmware.	Yes	Use ControlFLASH or ControlFLASH Plus Software to Update Controller Firmware Only on <a href="#">page 73</a> .
Controller USB programming port	Complete tasks that only require a temporary connection to the controller, for example, when you download a project or update firmware	—	Connect a USB Cable on <a href="#">page 54</a>
Two COS USB 3.0 ports	Connect peripherals to be used with the COS	—	

**Table 3 - Components in a CompactLogix 5480 System**

Component	Purpose	Required	For More Information
Ethernet ports A1 and A2	Connect to device-level networks	—	Chapter 6, Connect to Different EtherNet/IP Network Levels on <a href="#">page 131</a>
Ethernet port B1	Connects to the following networks: <ul style="list-style-type: none"> <li>Enterprise-level network</li> <li>Device-level network</li> </ul>	—	
Ethernet port X1	Function as Windows 10 network interface, for example, connect the COS to an enterprise-level network	—	<ul style="list-style-type: none"> <li>Chapter 6, Connect to Different EtherNet/IP Network Levels on <a href="#">page 131</a></li> <li>Chapter 10, Commercial Operating System on <a href="#">page 215</a></li> </ul>
DisplayPort	Connect to a monitor to use with the COS	—	Chapter 10, Commercial Operating System on <a href="#">page 215</a>
Secure Digital (SD) card <b>IMPORTANT:</b> The 1784-SD2 card ships with the controller.	Store data, such as the controller project and diagnostics	No	<ul style="list-style-type: none"> <li>Secure Digital (SD) Card on <a href="#">page 34</a></li> <li>Chapter 4, Use the Secure Digital Card on <a href="#">page 103</a></li> </ul>
Ethernet cables	Used as follows: <ul style="list-style-type: none"> <li>Access the Logix control engine from the workstation over an EtherNet/IP network</li> <li>Connect the COS to an EtherNet/IP network</li> </ul>	Yes	Connect an Ethernet Cable on <a href="#">page 53</a> .
USB cables	Used as follows: <ul style="list-style-type: none"> <li>Access the Logix control engine directly from the workstation</li> <li>Connect peripherals to use with the COS</li> </ul>	Yes	<ul style="list-style-type: none"> <li>Connect a USB Cable on <a href="#">page 54</a></li> <li>Chapter 10, Commercial Operating System on <a href="#">page 215</a></li> </ul>
Compact 5000 I/O modules	Used as follows: <ul style="list-style-type: none"> <li>Local I/O modules that are installed in the CompactLogix 5480 system</li> <li>Remote I/O modules accessible via the EtherNet/IP network</li> </ul>	<ul style="list-style-type: none"> <li>Yes - If your application uses local I/O modules.</li> <li>No - It is common for CompactLogix 5480 controller systems to use remote Compact 5000 I/O modules. But it is not required. That is, the system can use other remote I/O module types.</li> </ul>	Chapter 7, <a href="#">Use I/O Modules on page 161</a> .
Devices that are installed on an EtherNet/IP network	Dependent upon device type. Examples include: <ul style="list-style-type: none"> <li>Remote I/O modules</li> <li>Ethernet switches</li> <li>Motion control devices, such as drives</li> <li>HMI devices</li> </ul>	No	Varies by product type and catalog number

(1) We strongly recommend that you use separate external power supplies for MOD power and SA power, respectively.

## Power the System

The CompactLogix 5480 controller provides power to the system as follows:

- MOD Power - System-side power that powers the CompactLogix 5480 system and lets modules transfer data and execute logic.

System-side power is provided through the MOD Power RTB and is passed to each module as it is added to the system.

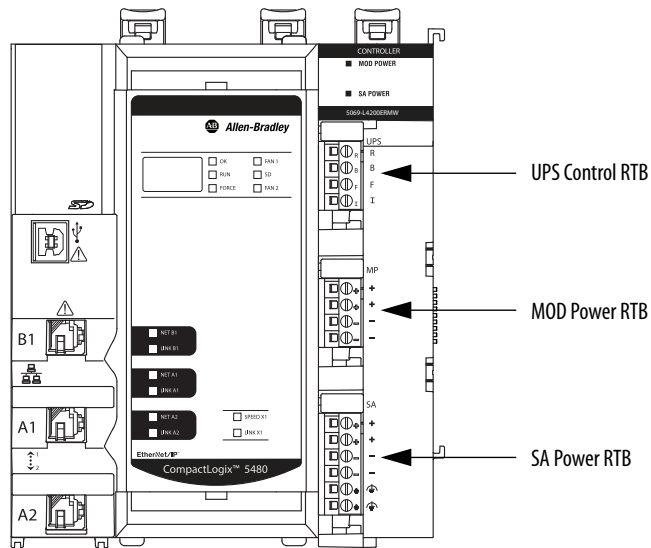
- SA Power - Field-side power that powers devices that are connected to some Compact 5000 I/O modules.

Field-side power is provided through the SA Power RTB and is passed to each module as it is added to the system.

- UPS Control Signals - Control signals that let the controller execute a controlled shutdown and save the current state of the project, if the source of MOD power is unexpectedly lost.

UPS control signals are connected via the UPS control RTB.

**Figure 3 - CompactLogix 5480 Controller Power Connectors**



Power begins at the controller and passes across the Compact 5000 I/O module internal circuitry via power buses.

MOD power passes across a MOD power bus, and SA power passes across an SA power bus. The MOD power bus and SA power bus are isolated from each other.

---

**IMPORTANT** We **recommend** that you use separate external power supplies for MOD power and SA power, respectively. This practice can help prevent unintended consequences that can result if you use one supply.

If you use separate external power supplies, the loss of power from one external power supply does not affect the availability of power from the other supply. For example, if separate external power supplies are used and SA power is lost, MOD power remains available for the CompactLogix 5480 controller and Compact 5000 I/O modules.

---

For more information on how to connect MOD power and SA power, see the CompactLogix 5480 Controllers Installation Instructions, publication [5069-IN019](#).

## MOD Power

MOD power is a DC power source that is required to operate the CompactLogix 5480 system.

---

**IMPORTANT** You can only use DC power on the MOD power bus. Do not connect AC power to the MOD power bus.

---

Remember the following:

- A CompactLogix 5480 system uses only one MOD power bus.
- Every module in the CompactLogix 5480 system draws current from the MOD power bus and passes the remaining current to the next module.
- MOD power lets Compact 5000 I/O modules transfer data and the CompactLogix 5480 controller execute logic.

- The total continuous current draw across the MOD power bus must not be more than 10 A, max, at 18...32V DC.

---

**IMPORTANT** The controller itself draws 4 A at 18...32V DC and passes 6 A at 18...32V DC to the local I/O modules. This is the case if an external power supply is connected to one set of MOD power RTB terminals as shown in [Figure 4](#).

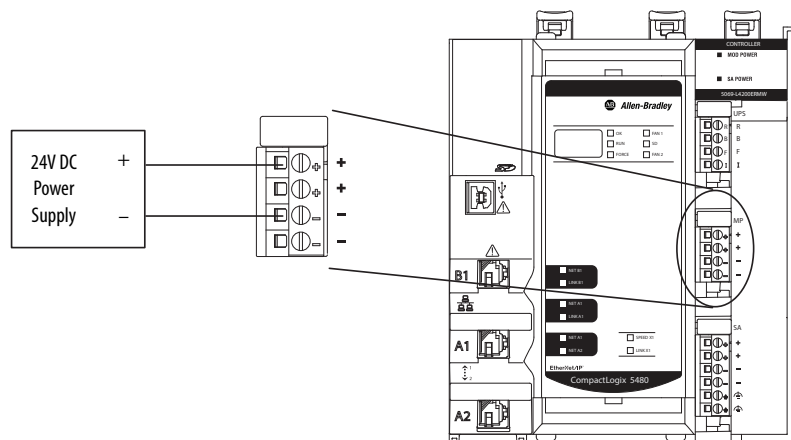
Remember, MOD power usage includes the total power that the controller and local Compact 5000 I/O modules use. If you connect external power to both sets of MOD power RTB terminals, however, the local Compact 5000 I/O modules can draw a maximum of 10 A in addition to the current that the controller draws.

---

- We recommend that you use an external power supply that is adequately sized for the total MOD power bus current draw in the system.

You must consider **inrush current requirements** when you calculate the total MOD power bus current draw in the system.

**Figure 4 - External Power Supply Provides MOD Power**



### *MOD Power Bus*

When the MOD power source is turned on, the following occurs.

1. The CompactLogix 5480 controller draws current from the MOD power bus and passes the remaining current through to the next module.
2. The next module draws MOD power bus current and passes the remaining current through to the next module.
3. The process continues until MOD power bus current needs are met for all modules in the system.

For more information on the current that the Compact 5000 I/O modules draw from the MOD power bus, see the Compact 5000 I/O Modules and EtherNet/IP Adapters Specifications Technical Data, publication [5069-TD001](#).

### **SA Power**

SA power can power devices that are connected to some Compact 5000 I/O modules in the CompactLogix 5480 system. Other Compact 5000 I/O modules require SA power to operate, regardless of what devices are connected to them.

Remember the following:

- Some Compact 5000 I/O modules draw current from the SA power bus and pass the remaining current to the next module.
- Some Compact 5000 I/O modules only pass current along the SA power bus to the next module.
- A CompactLogix 5480 system can have multiple SA power buses. The first SA power bus starts at the controller and passes across the I/O modules that are installed to the right of the controller.

You use a 5069-FPD field potential distributor to establish a new SA power bus. The new SA power bus is isolated from the SA power bus to its left in the system.

For more information on how to use a 5069-FPD field potential distributor in a CompactLogix 5480 system, see [page 29](#).

- If the SA power source uses DC voltage, the total continuous current draw across the SA power bus must not be more than 10 A, max at 18...32V DC.
- If the SA power source uses AC voltage, the total continuous current draw across the SA power bus must not be more than 10 A, max at 18...240V AC.

---

**IMPORTANT** If your system includes AC and DC modules that require SA power, you must use a 5069-FPD field potential distributor to establish a new SA power bus.

You install one set of module types, for example, DC modules, on the first SA power bus. Then, you install the other set, for example, AC modules on the second SA power bus. That is, the SA power bus to the right of the 5069-FPD field potential distributor.

The SA power source limitations described previously apply to each isolated SA power bus separately.

For more information on 5069-FPD field potential distributors, see [page 29](#).

---

- We recommend that you use an external power supply that is adequately sized for the total SA power bus current draw on the bus to which the supply provides power.

You must consider **current inrush requirements** when you calculate the total SA power bus current draw in the system.

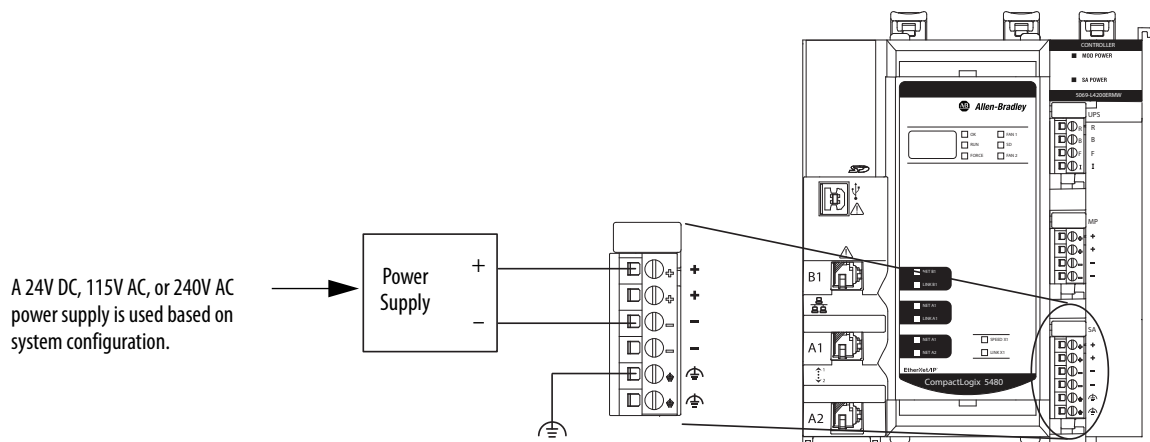
If a system contains multiple SA power buses, make sure that the external power supply that is used for each SA power bus is adequately-sized.



- Connections to an SA power bus use a **shared common**. All inputs that draw current from an SA power bus to power field-side devices have a return through circuitry to the SA - terminal on the SA power connector.

**IMPORTANT** Each SA power bus has a shared common unique to that bus because SA power buses are isolated from each other. That is, the SA power bus that the controller establishes has a shared common. If you use a 5069-FPD field potential distributor to establish a new SA power bus, the second bus has its own shared common for modules that draw current from it.

**Figure 5 - External Power Supply Provides SA Power**



### SA Power Bus

When the SA power source is turned on, the following occurs.

1. The CompactLogix 5480 controller draws current from the SA power bus and passes the remaining current through to the next module.

---

**IMPORTANT** The level of current that the controller draws from the SA power bus is negligible. It draws 10 mA when DC power is used and 25 mA when AC power is used.

---

2. The next module completes one of the following tasks.
  - If the module uses SA power, the module draws current from the SA power bus and passes the remaining current through to the next module.
  - If the module does not use SA power bus current, the module passes the remaining current through to the next module.
3. The process continues until all SA power bus current needs are met for the modules on the SA power bus.

Remember, if your system includes AC and DC modules that require SA power, you must complete the following:

- Use a 5069-FPD field potential distributor to establish a separate SA power bus.
- Separate the module types on the isolated SA power buses.

For more information on the current that the Compact 5000 I/O modules draw from the SA power bus, see the Compact 5000 I/O Modules and EtherNet/IP Adapters Specifications Technical Data, publication [5069-TD001](#).

### *Track SA Power Bus Current Draw*

We recommend that you track the SA power bus current draw, max, per module, and collectively for the CompactLogix 5480 system.

You must make sure that the Compact 5000 I/O modules that are installed on an SA power bus do not consume more than 10 A. If so, you must establish another SA power bus.

Consider the following with this example:

- The values in this example represent a worst-case calculation. That is, all modules that draw SA power bus current, draw the maximum available on the module.
- Not all modules that are shown in [Figure 6](#) use SA power bus current. For example, the 5069-OW4I module only passes SA power bus current to the next module.

For more information, see the following:

- Compact 5000 I/O Modules and EtherNet/IP Adapters Specifications Technical Data, publication [5069-TD001](#)
- Rockwell Automation® technical support center Knowledgebase article, *5069 I/O Modules that Require Sensor/Actuator (SA) Power*, #751748.

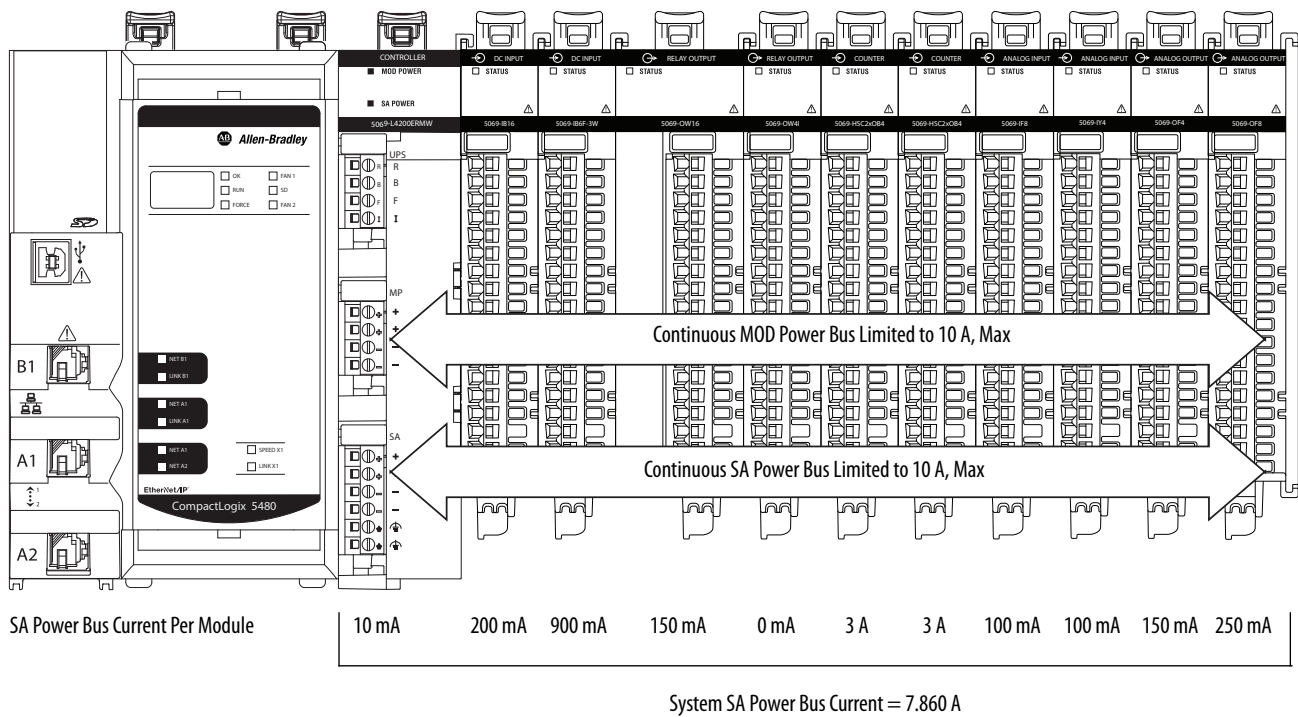
The technical support center is available at: <https://rockwellautomation.custhelp.com/>

- SA power bus current is calculated as each module draws SA power bus current. The calculation begins with the controller. The controller SA power bus current draw used for the calculation is 10 mA for DC power.

In [Figure 6](#), after the 5069-IB16 module in slot 1 draws SA power bus current, the system SA power bus current is 210 mA.

After the 5069-IB6F-3W module in slot 2 draws SA power bus current, the system SA power bus current draw is 1.110 A. This process continues until the system SA power bus current is 7.860 A.

**Figure 6 - Calculate SA Power Bus Current Draw**



### Use a 5069-FFPD Field Potential Distributor to Create a New SA Power Bus

You can use a 5069-FFPD field potential distributor to add an SA power bus to a CompactLogix 5480 system.

A 5069-FFPD field potential distributor lets you change the field-side power distribution source for Compact 5000 I/O modules to the right of the field potential distributor. The field potential distributor passes MOD power bus signals through to the next module in the system.

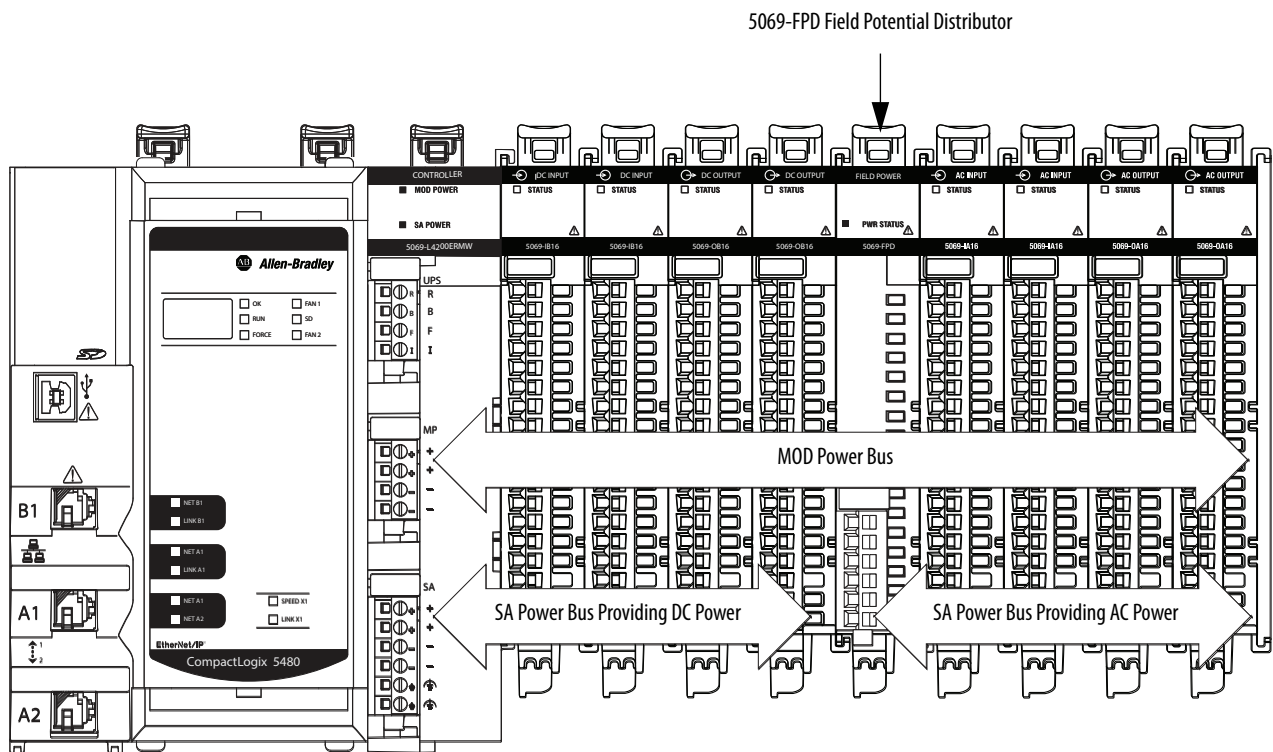
The field potential distributor blocks the current that passes across the SA power bus to the left of the field potential distributor. Then the field potential distributor establishes a new SA power bus for modules to the right.

The new SA power bus extends to the last module in the system or until another field potential distributor establishes another SA power bus.

The SA power bus that a field potential distributor establishes functions in the same way as the SA power bus that a controller or adapter establishes.

[Figure 7](#) shows a CompactLogix 5480 system that uses a 5069-FFPD field potential distributor that isolates DC-type modules from AC-type modules.

**Figure 7 - CompactLogix 5480 System - Create a New SA Power Bus**



---

**IMPORTANT** You must install DC-type modules and AC-type modules on separate SA Power bus.

You use 5069-FPD field potential distributors to establish SA Power buses that are separate from the SA Power bus that the controller or adapter establishes.

To install modules on separate SA Power buses, complete the following steps.

1. Install the controller or adapter.

The controller or adapter establishes the first SA Power bus.

2. Install one type of modules to the right of the controller or adapter, for example, DC-type modules.
3. Install a 5069-FPD field potential distributor.

The field potential distributor establishes a new SA Power bus that is isolated from the first one.

4. Install the other type of modules to the right of the field potential distributor, for example, AC-type modules.
- 

### *SA Power - Additional Notes*

Remember the following:

- Examples of system configurations that use multiple SA power buses include:
  - The modules in the system collectively draw more than 10 A of SA power. That is, the maximum current that one SA power bus can provide.
  - The modules in the system must be isolated according to module type. For example, you must install AC modules and DC modules on separate SA power buses.

- The actual current in a Compact 5000 I/O system changes based on the operating conditions at a given time.

For example, the SA power bus current draw on some modules is different if all channels power field devices or half of the channels power field devices.

- Some Compact 5000 I/O modules use field-side power but do not draw it from an SA power bus. The modules receive field-side power from an external power supply that is connected directly to the I/O module.

For example, the 5069-OB16 and 5069-OB16F modules use Local Actuator (LA) terminals on the module RTB, that is, LA+ and LA– terminals for all module channels.

In this case, you can use the same external power supply that is connected to the SA power RTB on the controller to the LA+ and LA– terminals.

---

**IMPORTANT** You must consider the current limit of an external power supply if it provides power to the SA power RTB on the controller and the LA+ and LA– terminals on a 5069-OB16 or 5069-OB16F module.

---

For more information on which modules use field-side power but do not draw it from an SA power bus, see the following:

- Compact 5000 I/O Modules and EtherNet/IP Adapters Specifications Technical Data, publication [5069-TD001](#)
- Rockwell Automation technical support center Knowledgebase article, *5069 Output Cards that Require LA+ and LA- Power Connections*, #746135.

The technical support center is available at: <https://rockwellautomation.custhelp.com/>

## Uninterruptible Power Supply

Other Logix 5000 controllers have an internal energy storage module that lets them save the current state of the project to internal memory when they lose power. As a result, when power is restored, the controllers resume operation from the state that was saved.

The CompactLogix 5480 controller **does not** have an internal energy storage module. You must connect an external uninterruptible power supply (UPS) to the UPS control RTB, as shown in [Figure 8 on page 33](#), to save the state of the project if the source of MOD power is lost.

Additionally, the COS functions differently based on whether a UPS is connected to the controller or not. You must connect a UPS to the controller for the COS to perform an orderly shutdown when MOD power is lost.

When a UPS signals that external power has been lost (UPS buffering), the controller waits 1 minute for power to be restored. If power is not restored within 1 minute, the controller saves the project and performs an orderly shutdown.

We recommend that you use 1606 power supplies from Rockwell Automation with the UPS control RTB, for example, the 1606-XLS240-UPS power supply.

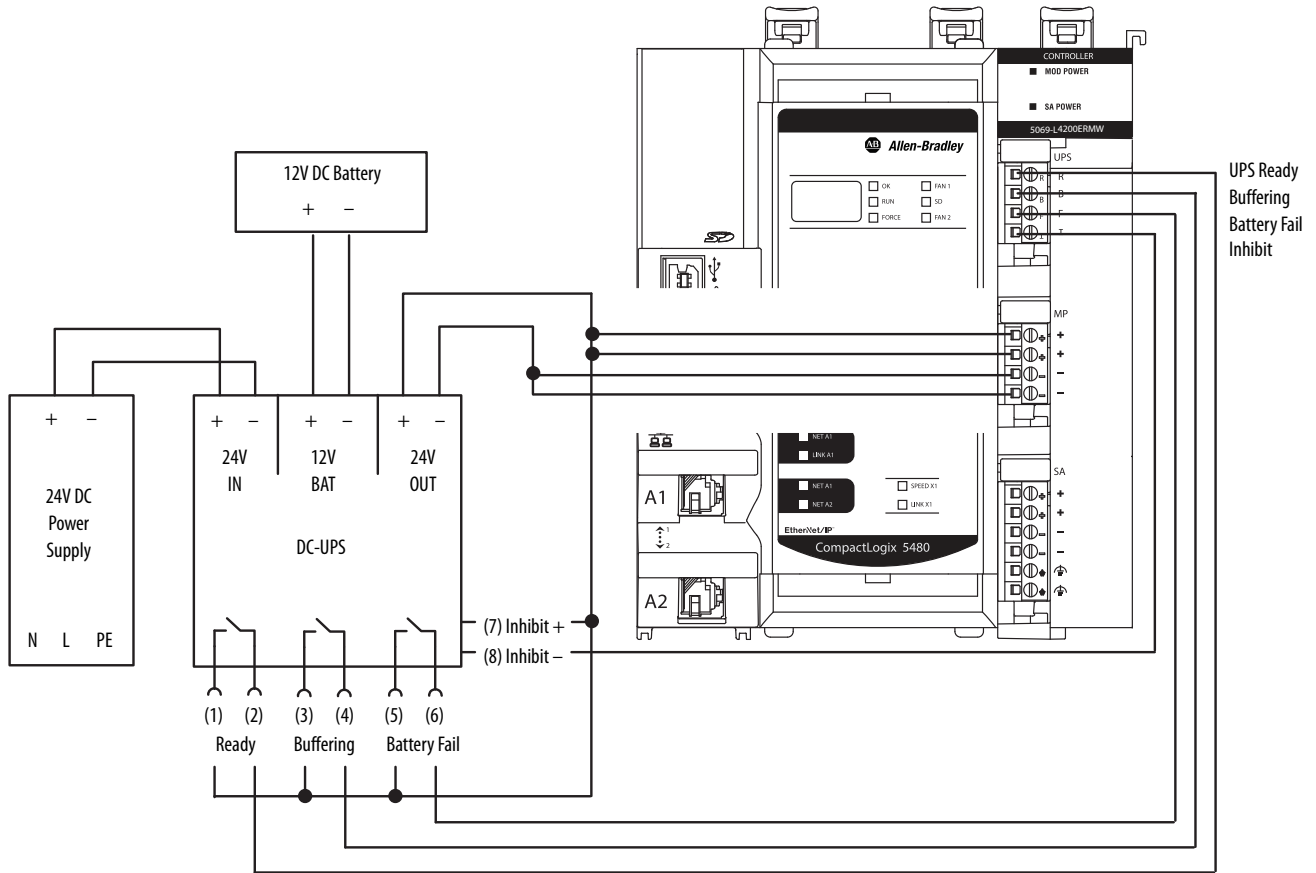
**Table 4 - UPS Control Signals**

Signal	Description
UPS Ready (R)	An input signal from the UPS to the controller that indicates the UPS is working and can buffer during a power failure. The charge level for a UPS to be ready to buffer during a power failure varies. For example, the 1606-XLS240-UPS power supply must be greater than 85% charged to be ready. The letter R indicates the RTB terminal for this signal.
Buffering (B)	An input signal from the UPS to the controller that indicates the UPS battery is providing power because the external power has failed. If the buffering signal is present for a minute, the controller performs an orderly shutdown by stopping execution and saving the state of the controller. The letter B indicates the RTB terminal for this signal.
Battery Fail (F)	An input from the UPS to the controller that indicates the UPS battery has failed, and the controller cannot operate from stored energy. In this case, the controller does not attempt to save the state of the program when the external power fails. The controller issues an alarm if a UPS was previously attached and ready to buffer. The letter F indicates the RTB terminal for this signal.
Inhibit (I)	This signal commands the UPS to remove power from the system. The INHIBIT signal is triggered after data is backed up and the system is ready to shut down. The letter I indicates the RTB terminal for this signal.



Figure 8 shows a 1606-XLS240-UPS power supply that is connected to a CompactLogix 5480 controller.

**Figure 8 - Power Connected to UPS RTB**



### *Differences in Controller Operation with UPS Connected or Not Connected*

The CompactLogix 5480 controller operates differently whether a UPS is connected or not.

- If a **UPS is connected** to the controller and the source of MOD power is lost, the following occur:
  - The current state of the project is saved.
  - An orderly shutdown occurs on the controller and on the COS.
- If a **UPS is not connected** to the controller and the source of MOD power is lost, the following occur:
  - The current state of the project is lost.

---

**IMPORTANT** You can use an SD card to store a back-up of a Logix Designer application project. The state of the project on an SD card represents the project state when it was stored on the SD card.

The project on the SD card **does not** represent the state of the project when MOD power was lost.

The project on the SD card is older than the state of the project when MOD power was lost.

---

- Neither the controller nor the COS is shut down in an orderly manner.

## **Secure Digital (SD) Card**

An SD card ships with the CompactLogix 5480 controller. It is installed in the controller behind the door on the front of the controller.

You can use an SD card in a CompactLogix 5480 controller to store Logix Designer application projects and load projects on to the controller.

For information on how to use SD cards with a CompactLogix 5480 controller, see Chapter 4, [Use the Secure Digital Card on page 103](#).

## Replaceable Fans

The CompactLogix 5480 controller uses fans at the top and bottom of the controller to help maintain lower operating temperatures when the controller is operating.

**TIP** In your Logix Designer application project, you can use the HardwareStatus object with GSV instructions to obtain status information about the fan speed and temperatures at runtime.

This object is supported in Ladder Diagram and Structured Text routines and in Add-On Instructions.

For more information, see the following:

- Logix Designer application online help
- Logix 5000 Controller General instructions Reference Manual, publication [1756-RM003](#)

Fan use includes speed control and monitoring. Faults indicate fan operating conditions as follows:

- Minor fault - Triggered when one or both fans are not operating at the requested speed or at all. The failure to operate at the requested speed or at all can be due to a failure or that the fan is removed.

The following events cause a failure:

- One or both fans fail and the controller internal temperature is 90...98 °C (194...208 °F).
- The fan or airflow channel is clogged, for example, with debris.
- The fan runs in consistently high temperature conditions.
- The fan experiences component corrosion.

The fault cause and length of time that the fan has been operating affects the recommended user action.

- If the fan has been operating for a relatively short time and the fan or airflow channel are clogged, we recommend that you clean the debris and continue to use the fan.
- If the fan has been operating in consistently high temperature conditions or component corrosion has occurred, we recommend that you replace both fans.

You can use the Minor Faults tab on the Controller Properties dialog box in your Logix Designer application project to monitor for the faults. The fault code is T17:C36.

- Major fault - Triggered if both fans fail and the controller exceeds the maximum operating temperature. There are two levels of temperature faults:
  - Major Recoverable Fault - This occurs when the controller internal temperature is 90...98 °C (194...208 °F).  
The fault code is T17:C34.
  - Major Non-recoverable Fault - This occurs when the controller internal temperature exceeds 100 °C (212 °F).

In this case, the controller stops operating and powers down to preserve hardware integrity, that is, capability to run properly in the future. When the controller shuts down, the COS shuts down as well.

Before the shutdown, however, any Compact 5000 I/O modules in the system receive a power shutdown indication.

You must replace both fans and restart the controller. As a result, the COS starts again. The fans resume operation at full speed to cool the controller temperature. The controller does not resume normal operation until it reaches an acceptable operating temperature.

The fault code is T17:C37. The code appears only after the controller powers back up.

In your Logix Designer application project, you can use the Major Faults tab on the Controller Properties dialog box to monitor for a fault.

You can order replacement fans. Replacement fans come in pairs. The fans are unique by position and keyed to help make sure that you install the correct fan in each position.

Replacement fans are available from your local Allen-Bradley distributor or Rockwell Automation sales representative via catalog number 5069-FANKIT.

The fans are labeled **Fan 1 - Top** and **Fan 2 - Bottom**.

Consider the following:

- We recommend that you replace the fans in pairs. That is, if you must replace one fan, we recommend that you replace the other fan too.
- You can replace fans during controller operation. The fans support removal and insertion under power.

---

**IMPORTANT** If you replace fans while the controller is operating, do not touch live voltage components.

---

- Do not remove both fans at once if the controller is operating.

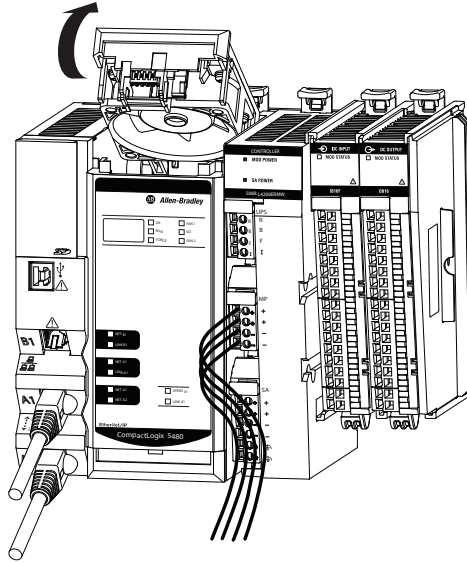
As indicated previously, the removal of both fans simultaneously when the controller is operating can cause the controller to exceed the maximum operating temperature. When the maximum operating temperature is exceeded, the controller experiences a major fault and stops operating.

## Remove the Top Fan

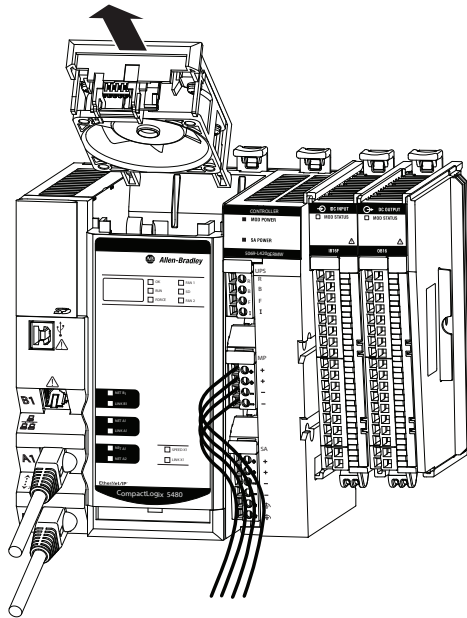
1. Push up on the front of the fan.

**TIP** If the hinges do not disengage when you push up on the front of the fan, then use a screwdriver as a pry tool.

Make sure that the fan is fully disengaged before you try to pull it out.



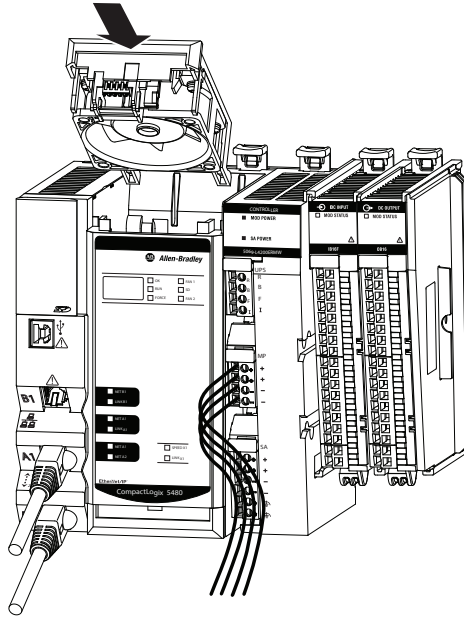
2. Pull the fan out of the slot at the top of the controller.



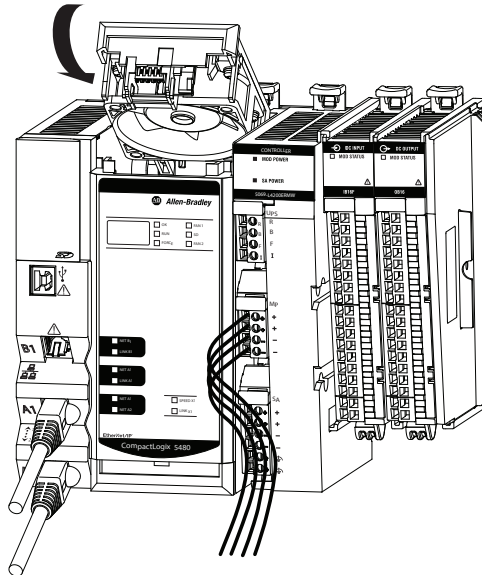
## Install the Top Replacement Fan

1. Insert the top replacement fan into the slot at the top of the controller.

Make sure the tabs at the back of the fan are inserted in the holes at the back of the slot.



2. Push down on the top replacement fan until it clicks in place.

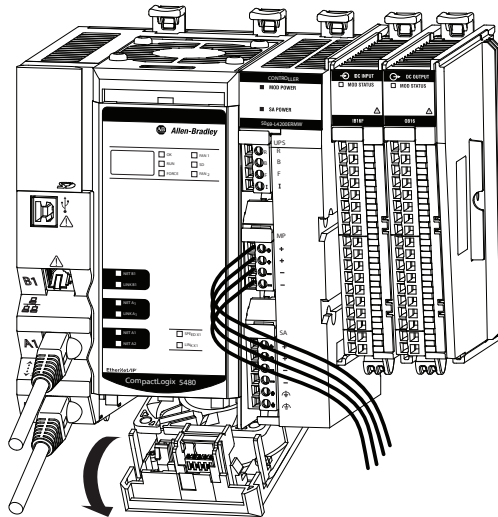


## Remove the Bottom Fan

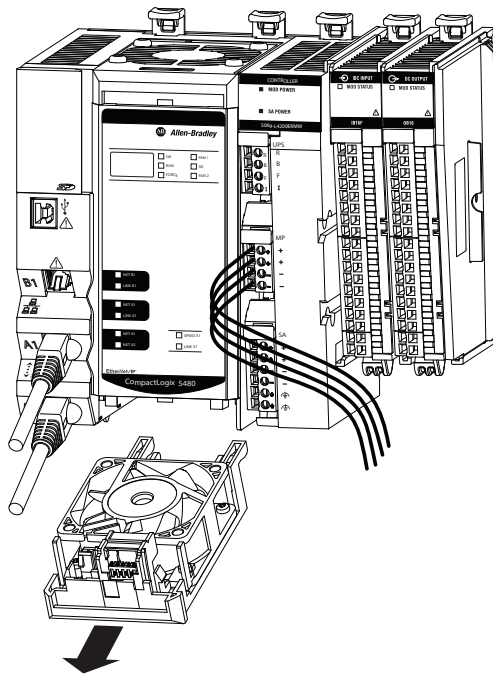
1. Push down on the front of the fan.

**TIP** If the hinges do not disengage when you push down on the front of the fan, then use a screwdriver as a pry tool.

Make sure that the fan is fully disengaged before you try to pull it out.



2. Pull the fan out of the slot at the bottom of the controller.

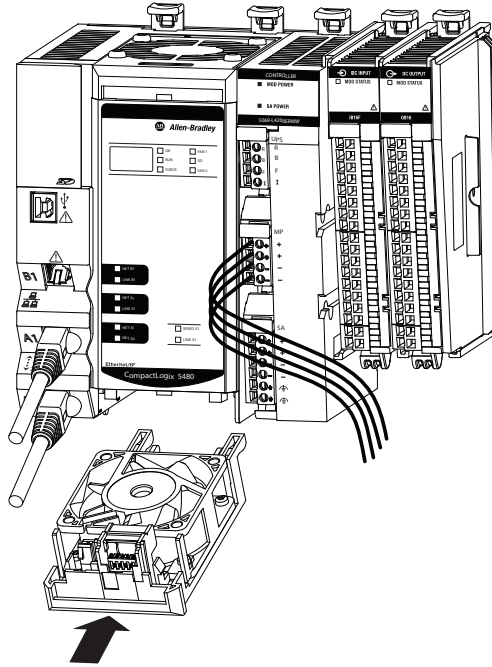




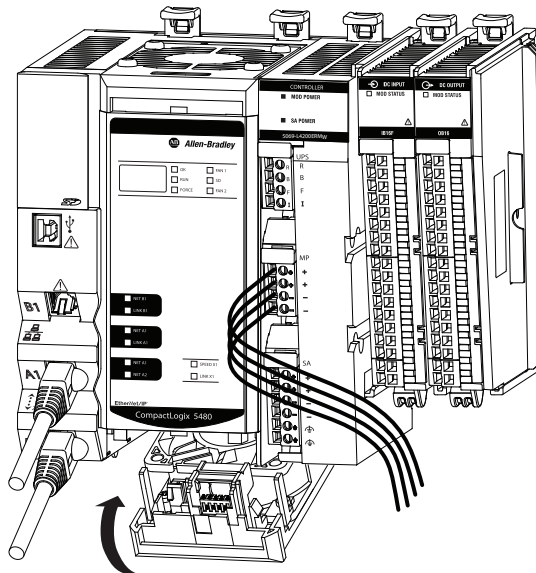
## Install the Bottom Replacement Fan

1. Insert the bottom replacement fan into the slot at the bottom of the controller.

Make sure the tabs at the back of the fan are inserted in the holes at the back of the slot.



2. Push up on the bottom replacement fan until it clicks in place.



## Notes:

## Connect to the Controller

Topic	Page
Out-of-box State	44
Configure EtherNet/IP and USB Drivers on Your Workstation	45
Connection Options	53
Set the Controller IP Address	55
Update Controller Firmware	71

This chapter describes how to connect to the CompactLogix™ 5480 controller before you use it.

---

**IMPORTANT** The content in this chapter describes how to connect to the controller to use the Logix control engine. For example, how to set the IP address on Ethernet ports A1, A2, or B1.

For more information on how to use the COS, including how to connect to it, see Chapter 10, [Commercial Operating System on page 215](#).

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## Out-of-box State

The following conditions apply when the CompactLogix 5480 controller is in the out-of-box state:

- EtherNet/IP™ mode is Dual-IP mode.

For more information on the EtherNet/IP mode options, see Chapter 6, [Connect to Different EtherNet/IP Network Levels on page 131](#).

- Ethernet ports are DHCP-enabled but do not have unique IP addresses assigned to them.

If the controller is connected to a DHCP server at power-up, IP addresses are assigned automatically. If the controller is not connected to a DHCP server at power-up, you must assign unique IP addresses to the ports.

To assign IP addresses, complete the steps that are described in [Set the Controller IP Address on page 55](#).

- Uses firmware revision 1.xxx.

---

**IMPORTANT** You must install working firmware on the controller before you can use it in a Logix Designer application project.

For more information on how update controller the firmware revision, see [page 71](#).

---

- Does not contain a Logix Designer application project.

For more information on how to create a project, see [page 81](#).

- A licensed COS is pre-installed on the controller and ready for initial set-up after you install firmware on the controller.

---

**IMPORTANT** You **must install firmware** revision before you can use it in a Logix Designer application project and **before you can use the COS**.

The COS does not start until a working controller firmware revision is installed on the controller.

For more information on how update controller the firmware revision, see [page 71](#).

---

## Configure EtherNet/IP and USB Drivers on Your Workstation

Before you can connect to the controller through the Ethernet or USB port, you must configure the EtherNet/IP or USB driver in Linux-based software on your workstation.

A workstation that is running the Studio 5000 Logix Designer® application can use these communication drivers:

- EtherNet/IP driver:
  - Supports runtime communications
  - Requires that the workstation and the controller are configured
  - Supports communications over longer distances when compared to the USB driver
- Ethernet devices driver:
  - Lets you download a Logix Designer application project to a controller that is on an Ethernet network when your controller is not directly connected to that network
  - Requires that you configure the IP addresses to which the software browses and, therefore, the devices with which the controller communicates
- USB driver:
  - Convenient method to connect to an unconfigured controller and configure the Ethernet port
  - Convenient method to connect to a controller when the Ethernet port configuration is unknown
  - Convenient method to update the controller firmware
  - Not intended for runtime connections; it is a temporary-use only connection with a limited cabling distance

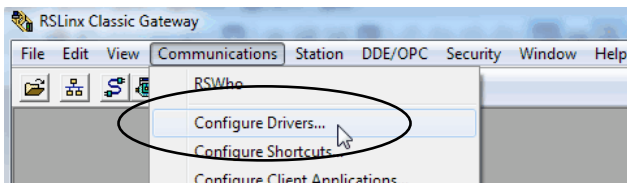
## Configure the EtherNet/IP Communication Driver in RSLinx Classic Software

Before you add an Ethernet driver, confirm that the following conditions exist:

- The workstation is properly connected to the EtherNet/IP network.
- The workstation IP address and other network parameters are configured correctly.

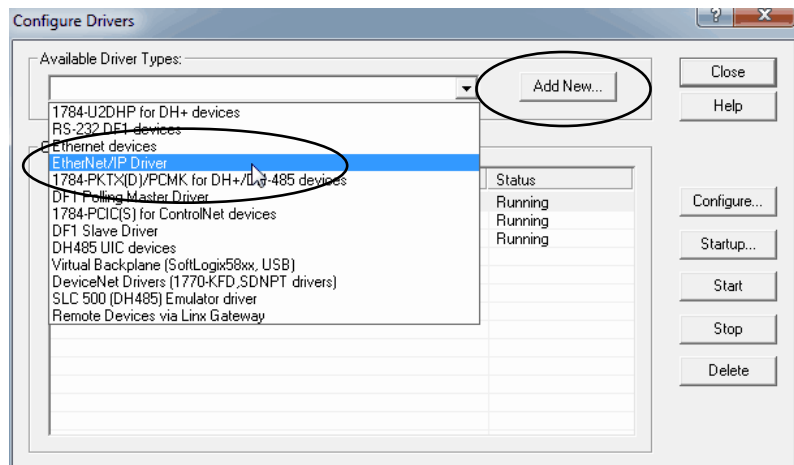
To configure the EtherNet/IP driver, complete the following steps.

1. From the Communications pull-down menu, choose Configure Drivers.



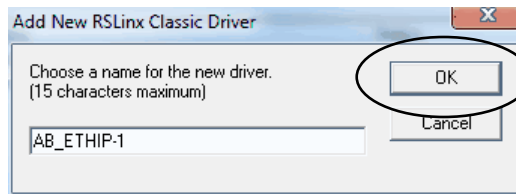
The Configure Drivers dialog box appears.

2. From the Available Driver Types pull-down menu, choose EtherNet/IP Driver.
3. Click Add New.



The Add New RSLinx Driver dialog box appears.

4. You can use the default name for the new drive or type a new name, and click OK.

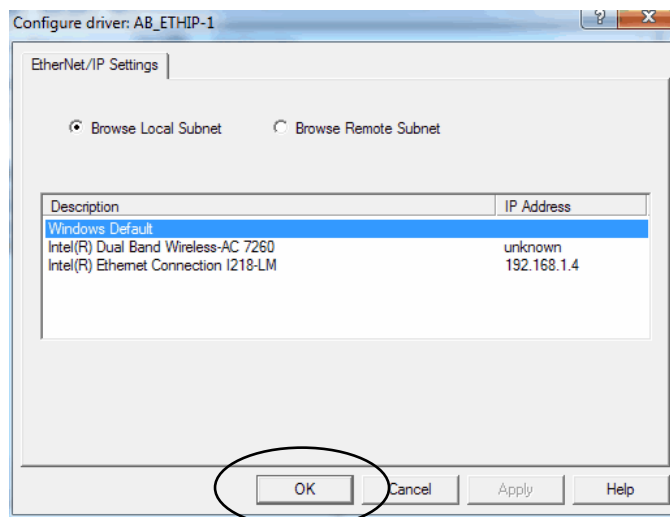


The Configure driver dialog box appears.

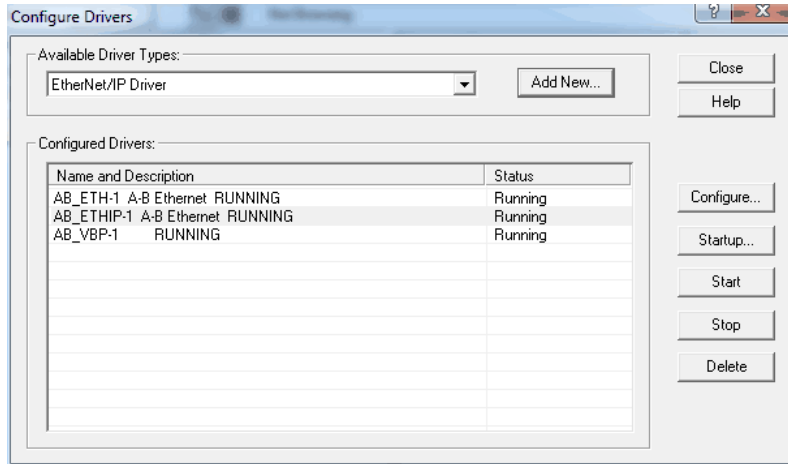
5. Click Browse Local Subnet.

**TIP** To view devices on another subnet or VLAN from the workstation running RSLinx® Classic software, click Browse Remote Subnet.

6. Select the desired driver, and click OK.



The new driver is available on the Configure Drivers dialog box.



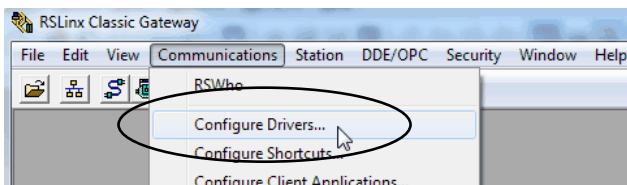
### Configure the Ethernet Devices Drivers in RSLinx Classic Software

The following conditions must exist to configure an Ethernet devices driver:

- The workstation is connected to another Ethernet network than the target controller.
- The IP address and other network parameters are correctly configured on the workstation.

To configure the Ethernet devices driver, complete these steps.

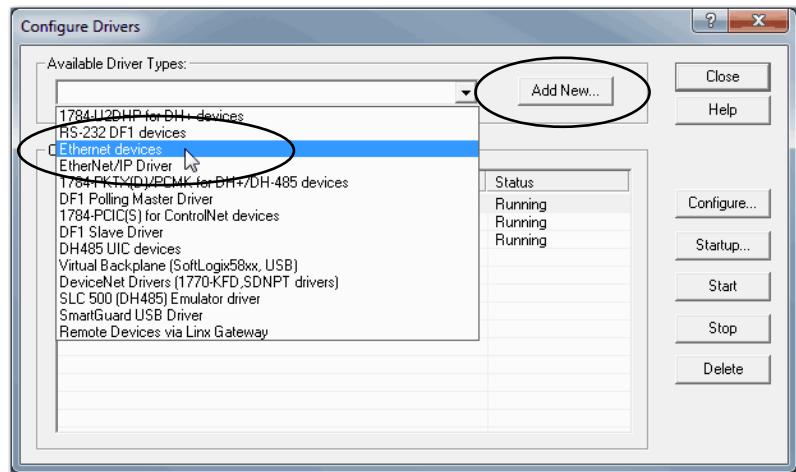
1. From the Communications pull-down menu, choose Configure Drivers.





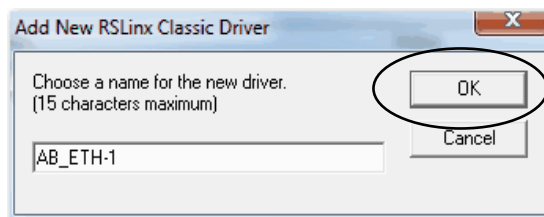
The Configure Drivers dialog box appears.

- From the Available Driver Types pull-down menu, choose Ethernet devices.
- Click Add New.



The Add New RSLinx Driver dialog box appears.

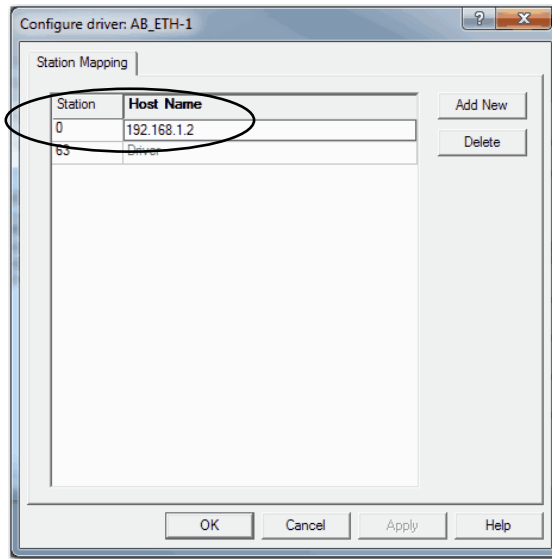
- You can use the default name for the new drive or type a new name, and click OK.



The Configure driver dialog box appears.

5. On the Configure driver dialog box, enter a host name for each station to which RSLinx Classic software browses.

The host name is the IP address for the device.



6. Click Add New to add stations and give each a host name.
7. When you are finished adding stations, click OK.
8. On the Configure Drivers dialog box, click Close.

## Configure the USB Communication Driver

You must use RSLinx Classic software, version 4.10.00 or later, or FactoryTalk® Linx software, version 6.10.00, with the CompactLogix 5480 controller.

A USB driver automatically appears in the software when you connect the USB cable from your workstation to the controller. Once the cable is disconnected, the driver disappears from the software.

If a USB driver does not appear automatically, you can complete the following steps.

1. Confirm that the USB cable is connected to the controller.

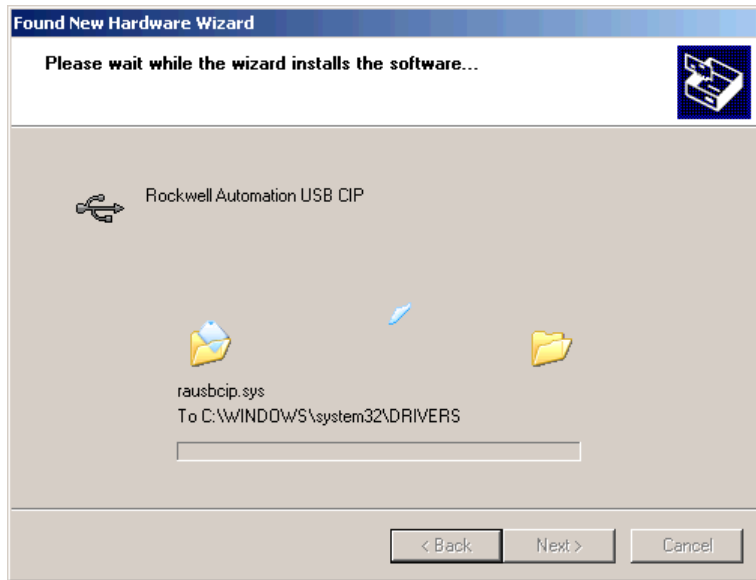
The Found New Hardware Wizard dialog box appears.

2. Click any of the Windows Update connection options and click Next.

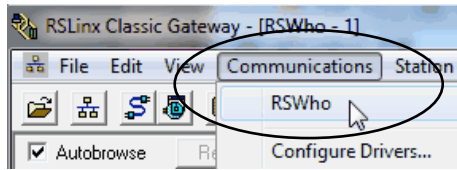


**TIP** If the software for the USB driver is not found and the installation is canceled, verify that you have installed correct software.

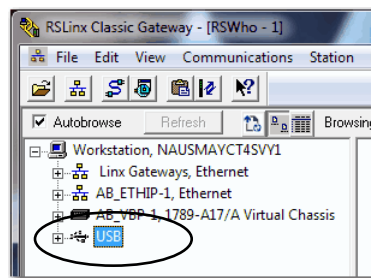
3. Click Install the software automatically (Recommended) and click Next. The software is installed.



4. Click Finish to configure your USB driver.
5. In RSLinx Classic software, from the Communications pull-down menu, choose RSWho.



The USB Port Driver appears.



## Connection Options

Before you can use the controller, you must connect one of the following:

- Ethernet cable to an Ethernet port - The controller Ethernet ports support communication rates of 10 Mbps, 100 Mbps, and 1 Gbps.
- USB cable to a USB port - The controller USB ports uses a Type B receptacle and is USB 2.0 compatible. The port runs at 480 Mbps.

You can order a USB cable from Rockwell Automation. For more information, see Rockwell Automation® Knowledgebase article, *Connecting to a Logix controller via its USB port, #121281*. The Knowledgebase is available at:

<https://rockwellautomation.custhelp.com/>

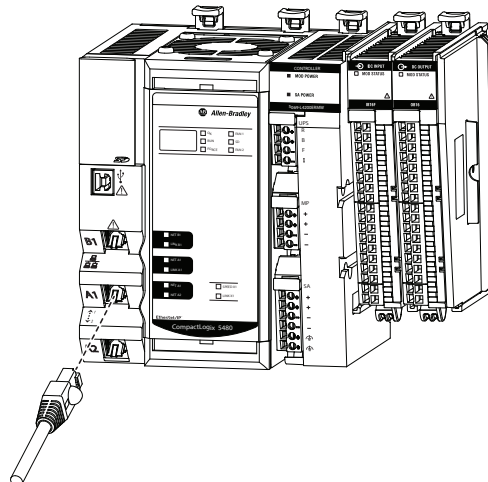
## Connect an Ethernet Cable



**WARNING:** If you connect or disconnect the communications cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

If you are connecting the controller directly to an EtherNet/IP network, connect a CAT 5e or CAT 6 Ethernet cable with an RJ45 connector to a controller Ethernet port.

**Figure 9 - Ethernet Cable Connection**



For information on how to select the proper cable, see *Guidance for Selecting Cables for EtherNet/IP Networks*, publication [ENET-WP007-EN-P](#).

## Connect a USB Cable

Use the USB connection to update firmware and download programs.

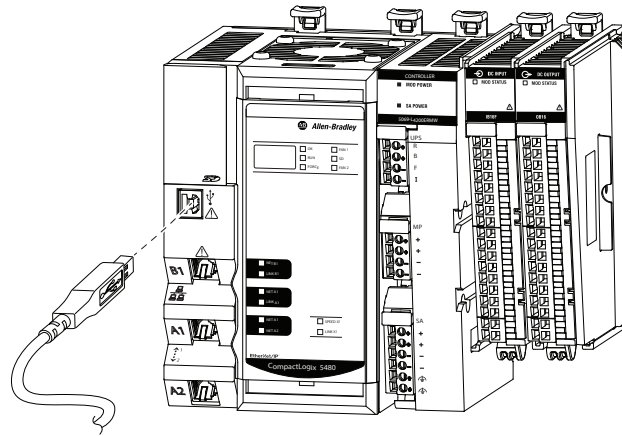


**ATTENTION:** The USB port is intended only for temporary local programming purposes and not intended for permanent connection. The USB cable is not to exceed 3.0 m (9.84 ft) and must not contain hubs.



**WARNING:** Do not use the USB port in hazardous locations.

Figure 10 - USB Connection



## Set the Controller IP Address

CompactLogix 5480 controller Ethernet ports require IP addresses to operate on an EtherNet/IP network. At initial power-up, the ports are DHCP-enabled but do not have unique IP addresses assigned to them.

- If the controller is connected to a DHCP server at power-up, IP addresses are assigned automatically.
- If the controller is not connected to a DHCP server at power-up, you must assign unique IP addresses to the ports.

This section provides a general description of how to set an IP address.

The EtherNet/IP mode in which a CompactLogix 5480 controller operates affects the setting and use of IP addresses on the controller.

For example, if the controller operates in Dual-IP mode, you must set an IP address for each controller Ethernet port. That is, you must complete the steps that are described in this section twice—once for each port.

For more information on how the EtherNet/IP modes affect the controller IP address, see [page 135](#).

## Multiple Ethernet Ports on Controller

The CompactLogix 5480 controller offers the following Ethernet ports to use the Logix control engine side of the controller:

- A1
- A2
- B1

---

**IMPORTANT** The controller also has Ethernet port X1. Port X1 is only used with the COS. Because this chapter focuses on how to use the Logix control engine in a CompactLogix 5480 controller, the descriptions do not apply to port X1 unless otherwise noted.

---

When the controller is in the out-of-the-box state, the following apply regarding IP addresses:

- The Ethernet ports are DHCP-enabled. That is, the Ethernet ports are configured to obtain an IP address via a DHCP server.

If there is no DHCP server or the DHCP server is not configured to set the IP address, you must set the IP address manually.

- The controller is configured so that you must set the IP address on every Ethernet port each time that power is cycled.

You can configure your controller so that you are not required to set an IP address each time that power is cycled.

- The controller is configured to use Dual-IP mode. As a result, you must set a unique IP address for port A1 and port A2.

You can use the following tools to set the IP address:

- BOOTP-DHCP tool
- DHCP server
- RSLinx Classic software
- Logix Designer application
- SD card

To operate on an EtherNet/IP network, you must define the following parameters.

EtherNet/IP Network Parameter	Description
IP address	<p>The IP address uniquely identifies the module. The IP address is in the form <i>xxx.xxx.xxx.xxx</i> where each <i>xxx</i> is a number from 000...255.</p> <p>There are some reserved values that you <b>cannot use as the first octet</b> in the address. The following numbers are <b>examples</b> of values <b>you cannot use</b>:</p> <ul style="list-style-type: none"> <li>• 001.<i>xxx.xxx.xxx</i></li> <li>• 127.<i>xxx.xxx.xxx</i></li> <li>• 223 to 255.<i>xxx.xxx.xxx</i></li> </ul> <p>The specific reserved values that cannot be used vary according to the conditions of each application. The previous values are only examples of reserved values.</p>
Subnet mask	<p>The subnet mask divides IP addresses into a network address and a host address. It defines whether the controller exchanges Ethernet packets directly with another device, or whether it routes packets through the Gateway. This field is set to 0.0.0.0 by default.</p>
Gateway	<p>A gateway connects individual physical networks into a system of networks. When a node communicates with a node on another network, a gateway transfers the data between the two networks. This field is set to 0.0.0.0 by default.</p>



If you use Domain Name System (DNS) addressing, or reference the controller via host name in MSG instructions, define the following parameters.

**Table 5 - EtherNet/IP Network Parameters for DNS Addressing**

EtherNet/IP Network Parameter	Description
Host name	A host name is part of a text address that identifies the host for a module. The full text address of a module is <i>host_name.domain_name</i> .
Domain name	A domain name is part of a text address that identifies the domain in which the module resides. The full text address of a module is <i>host_name.domain_name</i> . The domain name has a 48-character limit. If you specify a DNS server, you must type a domain name. Also, if you send email from the module, some mail relay servers require a domain name during the initial handshake of the SMTP session.
Primary DNS server address	An address that identifies any DNS servers that are used in the network. You must have a DNS server if you specified a domain name or a host name in the module configuration. The DNS server converts the domain name or host name to an IP address that is used by the network. For more information on DNS addressing, see <a href="#">page 65</a> .
Secondary DNS server address	

Check with your Ethernet network administrator to determine if you must specify the following parameters.

## Set the IP Address with the BOOTP-DHCP EtherNet/IP Commissioning Tool

The Ethernet ports on a CompactLogix 5480 controllers are DHCP-enabled by default.

The BOOTP-DHCP tool is a standalone tool that you can use to set an IP address. When used, the BOOTP-DHCP tool sets an IP address and other Transport Control Protocol (TCP) parameters.

The BOOTP-DHCP tool is installed automatically when you install RSLinx Classic software or the Logix Designer application on your computer.

Access the BOOTP-DHCP tool from one of the following locations:

- Programs > Rockwell Software® > BOOTP-DHCP Tool
- Tools directory on the Studio 5000® environment installation CD

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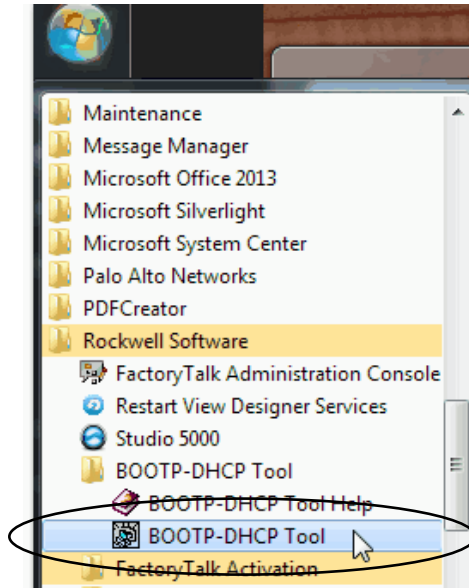
**IMPORTANT** Before you start the BOOTP-DHCP tool, make sure that you have the module hardware (MAC) address.

The MAC address scrolls across the controller status on the front of the controller. The address uses a format similar to the following:  
00-00-BC-14-55-35

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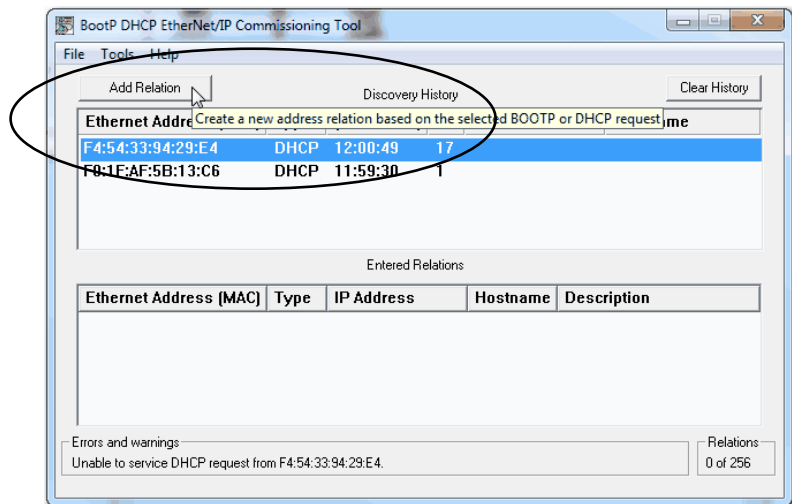
To set the IP address with a BOOTP-DHCP tool, complete the following steps.

1. Connect your workstation to the Ethernet network where the controller resides.
2. Start the BOOTP-DHCP tool.



The MAC address of the controller appears in the Request History window.

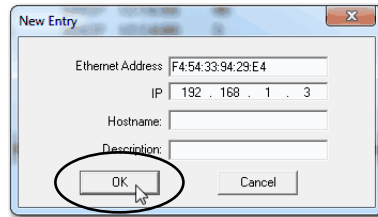
3. Select the appropriate controller and click Add to Relation List.



The New Entry dialog box appears.

4. Type an IP address, Hostname, and Description for the module.

Hostname and Description are optional.



5. Click OK.

---

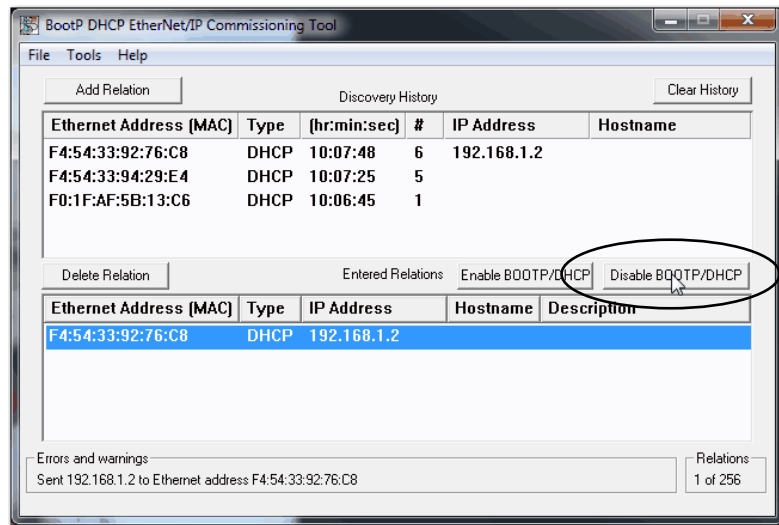
**IMPORTANT** If your controller is operating in Dual-IP mode, you must set an IP address for each controller Ethernet port. In this case, set the IP address for the other ports by repeating [step 3](#) . . . [step 5](#) for each port.

---

## Disable BOOTP/DHCP with the BOOTP-DHCP EtherNet/IP Commissioning Tool

After an IP address is assigned to the controller, we recommend that you disable BOOTP/DHCP.

Click Disable BOOTP/DHCP.



The module now uses the assigned configuration and does not issue a BOOTP or DHCP request.

**IMPORTANT** Remember the following:

- If you do not click Disable BOOTP/DHCP, on future power cycles, the current IP configuration is cleared and the controller sends DHCP requests again.
- If you click Disable BOOTP/DHCP and it does not disable BOOTP/DHCP, you can use RSLinx Classic software to disable BOOTP/DHCP.

For more information on how to use RSLinx Classic software to disable BOOTP/DHCP, see [page 61](#).

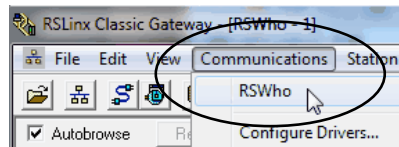
## Disable BOOTP/DHCP with RSLinx Classic Software

To disable BOOTP/DHCP from RSLinx Classic software, complete the following steps.

1. Start RSLinx Classic software.

After several seconds, an RSWho dialog box appears.

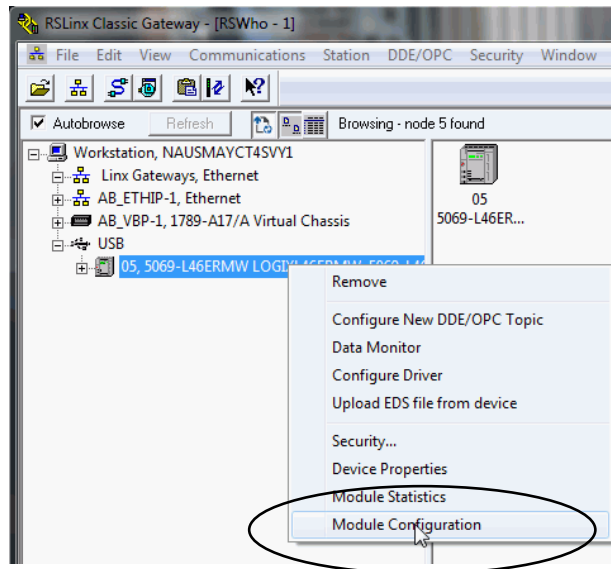
2. If no RSWho dialog box appears, from the Communications pull-down menu, choose RSWho.



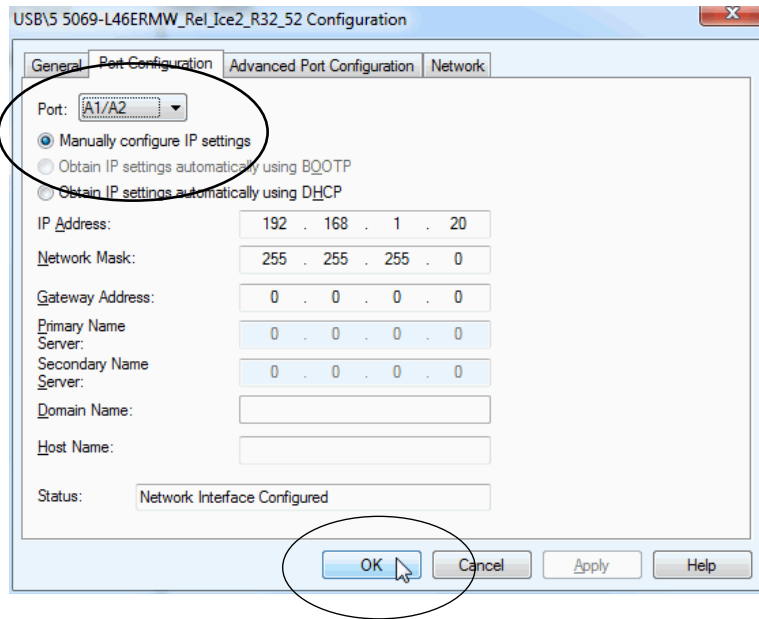
3. Navigate to the controller.

You can access the controller via the USB or an EtherNet/IP driver.

4. Right-click on the controller and choose Module Configuration.



5. On the Port Configuration tab, click Manually configure IP settings for the port, and click OK.



---

## Set the Controller IP Address with the DHCP Server

Because the CompactLogix 5480 controllers are DHCP-enabled when they are in the out-of-box condition, you can use a DHCP server to set the IP address.

The DHCP server automatically assigns IP addresses to client stations logging on to a TCP/IP network. DHCP is based on BOOTP and maintains some backward compatibility.



**ATTENTION:** You can use a DHCP server that is configured to always assign the same IP address to specific devices when they appear on the EtherNet/IP network and request an IP address.

If your system does not use a DHCP server that assigns the same IP address for specific devices, we **strongly recommend** that you assign the controller a fixed IP address. Do not set the IP address dynamically. That is, do not use the Obtain IP settings automatically by using DHCP.

When a controller uses Obtain IP settings automatically by using DHCP, the IP address for that controller is cleared with each power cycle. If the same IP address is not automatically assigned to the controller when it requests a new IP address, the controller can be assigned a new IP address.

The use of a new IP address can have unintended consequences. For example, a Duplicate IP Address condition can exist or the controller can experience configuration faults because the IP address differs from what is stored in the Logix Designer application project.

Failure to observe this precaution can result in unintended machine motion or loss of process control.

---

### Duplicate IP Address Detection

The controller verifies that its IP address does not match any other network device IP address when you perform either of the following tasks:

- Connect the controller to a EtherNet/IP network.
- Change the controller IP address.

If the controller IP address matches that of another device on the network, the controller Ethernet port transitions to Conflict mode. In Conflict mode, the following conditions exist:

- Network (NET) status indicator is solid red.
- The 4-character display indicates the conflict.

The display scrolls: *<IP\_address\_of\_this\_module> Duplicate IP  
<Mac\_address\_of\_duplicate\_node\_detected>*

For example: 192.168.1.1 Duplicate IP - 00:00:BC:02:34:B4

### Duplicate IP Address Resolution

When two devices on a network have IP addresses that conflict, the resolution depends on the conditions in which the duplication is detected. This table describes how duplicate IP addresses are resolved.

Duplicate IP Address Detection Conditions	Resolution Process
<ul style="list-style-type: none"> <li>• Both devices support duplicate IP address detection.</li> <li>• Second device is added to the network after the first device is operating on the network.</li> </ul>	<ol style="list-style-type: none"> <li>1. The device that began operation first uses the IP address and continues to operate without interruption.</li> <li>2. The device that begins operation second detects the duplication and enters Conflict mode.</li> </ol> <p>To assign a new IP address to the controller and leave Conflict mode, see <a href="#">Set the IP Address with the BOOTP-DHCP EtherNet/IP Commissioning Tool on page 57</a>.</p>
<ul style="list-style-type: none"> <li>• Both devices support duplicate IP address detection.</li> <li>• Both devices were powered up at approximately the same time.</li> </ul>	<p>Both EtherNet/IP devices enter Conflict mode.</p> <p>To resolve this conflict, follow the following steps:</p> <ol style="list-style-type: none"> <li>a. Assign a new IP address to the controller. For more information, see <a href="#">Set the IP Address with the BOOTP-DHCP EtherNet/IP Commissioning Tool on page 57</a>.</li> <li>b. Cycle power to the other device.</li> </ol>
<p>One device supports duplicate IP address detection and a second device does not.</p>	<ol style="list-style-type: none"> <li>1. Regardless of which device obtained the IP address first, the device that does not support IP address detection uses the IP address and continues to operate without interruption.</li> <li>2. The device that supports duplicate IP address detection detects the duplication and enters Conflict mode.</li> </ol> <p>To assign a new IP address to the controller and leave Conflict mode, see <a href="#">Set the IP Address with the BOOTP-DHCP EtherNet/IP Commissioning Tool on page 57</a>.</p>



### *DNS Addressing*

You can also use DNS addressing to specify a host name for a controller, a domain name, and DNS servers. DNS addressing makes it possible to configure similar network structures and IP address sequences under different domains.

DNS addressing is necessary only if you refer to the controller by host name, such as in path descriptions in MSG instructions.

To use DNS addressing, follow the following steps.

1. Assign a host name to the controller.

A network administrator can assign a host name. Valid host names must be IEC-1131-3 compliant.

2. Configure the controller parameters.
3. Configure the IP address, subnet mask, gateway address, a host name for the controller, domain name, and primary/secondary DNS server addresses.

In the DNS server, the host name must match the IP address of the controller.

4. In the Logix Designer application, add the controller to the I/O configuration tree in the Logix Designer application project for another controller.

---

**IMPORTANT** If a child module resides in the same domain as its parent module, type the host name. If the domain of the child module differs from the domain of its parent module, type the host name and the domain name (hostname.domainname)

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---

**IMPORTANT** You can also use DNS addressing in a module profile in the I/O controller tree or in a message path. If the domain name of the destination module differs from the domain name of the source module, use a fully qualified DNS name (hostname.domainname).

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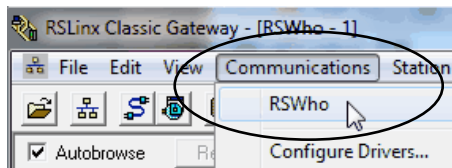
## Set the Controller IP Address with RSLinx Classic Software

Complete the following steps to use RSLinx Classic software to set the controller IP address when it is in the out-of-box state.

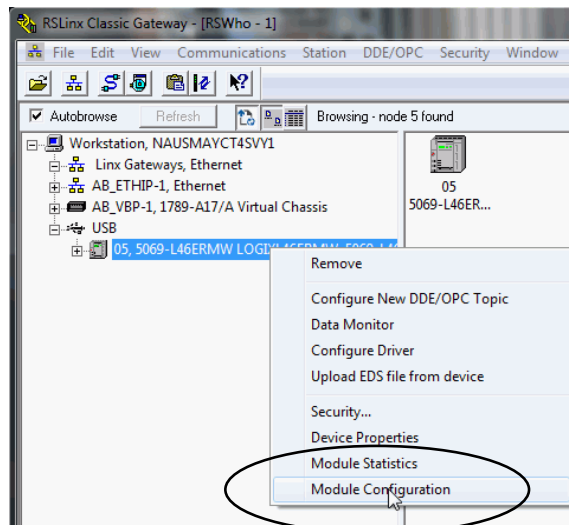
1. Confirm that your computer is connected to the controller via a USB cable.
2. Start the RSLinx Classic software.

After several seconds, an RSWho dialog box appears.

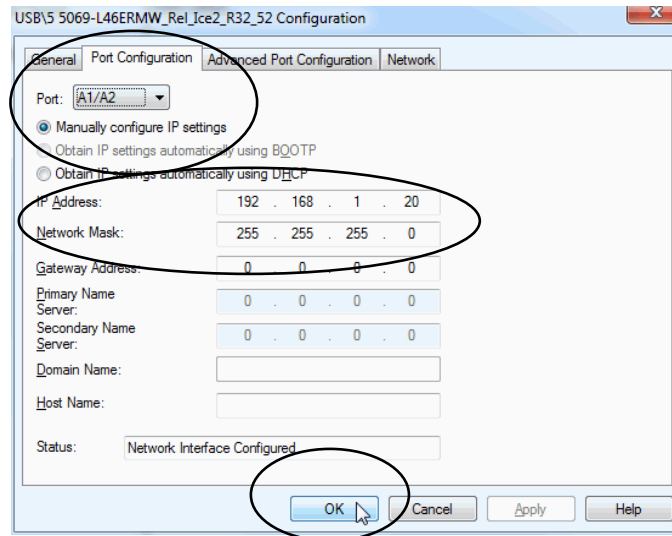
3. If the RSWho dialog box does not appear, from the Communications pull-down menu, choose RSWho.



4. Navigate to the controller via the USB driver.
5. Right-click on the controller and choose Module Configuration.



6. On the Port Configuration tab, click Manually configure IP settings for the port.
7. Assign the port configuration parameters and click OK.

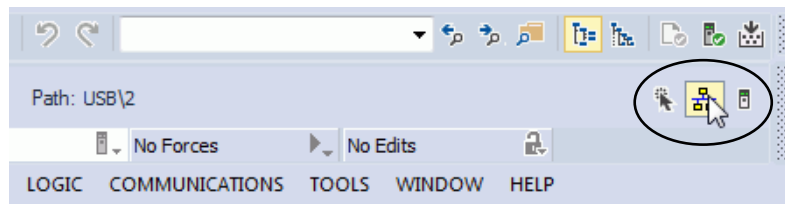


## Set the Controller IP Address with the Logix Designer Application

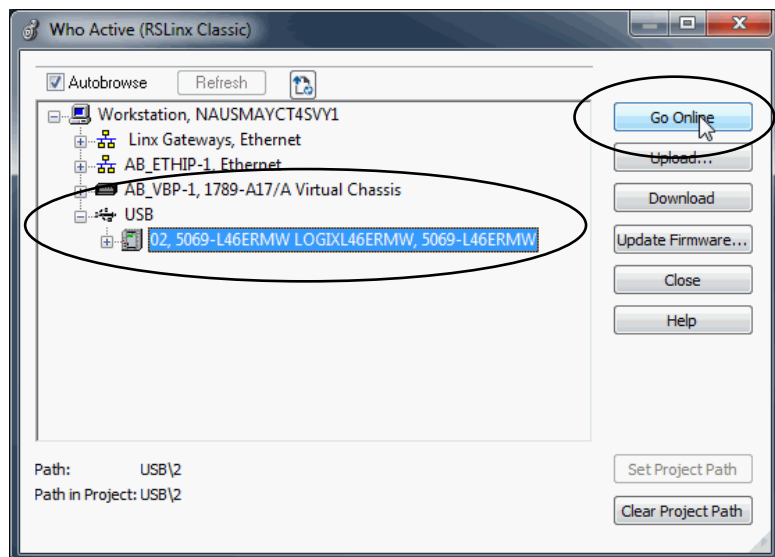
**IMPORTANT** You must install firmware on your controller before you can use the Logix Designer application to set the controller IP address.

Complete the following steps to use the Logix Designer application to set the controller IP address when it is in the out-of-box state.

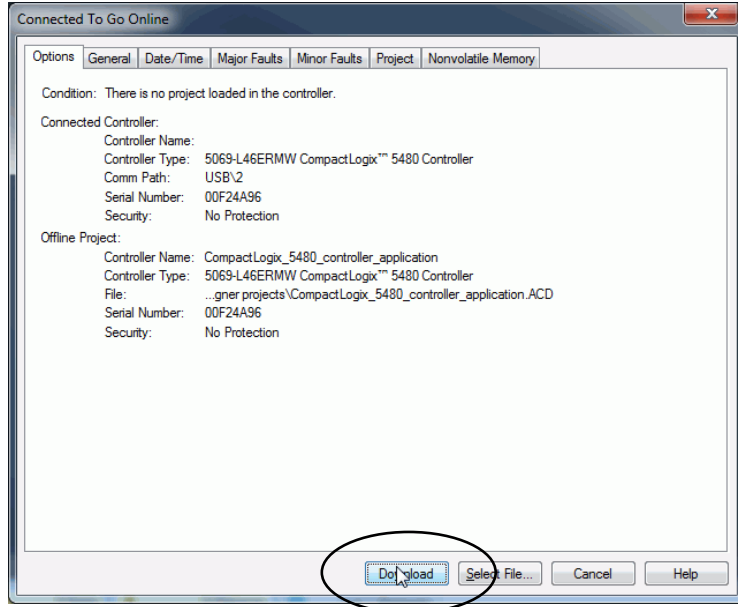
1. Confirm that your computer is connected to the controller via a USB cable.
2. Confirm that the controller is offline.
3. Start the Logix Designer application.
4. Create a project.
5. Use RSWho to browse to the controller.



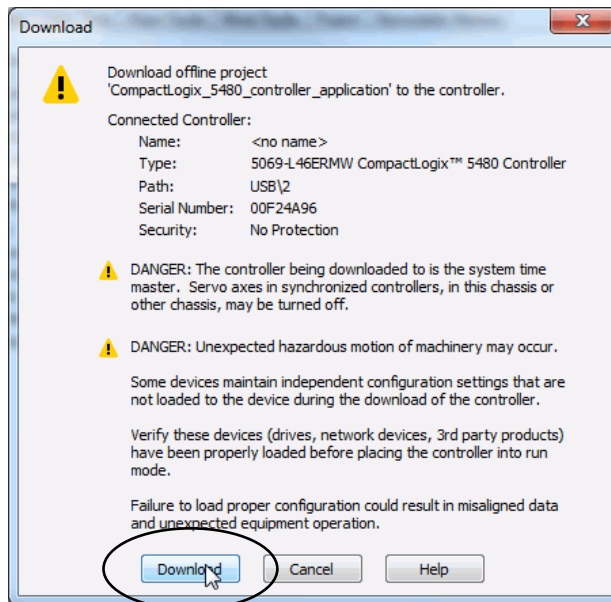
6. Select the controller and click Go Online.



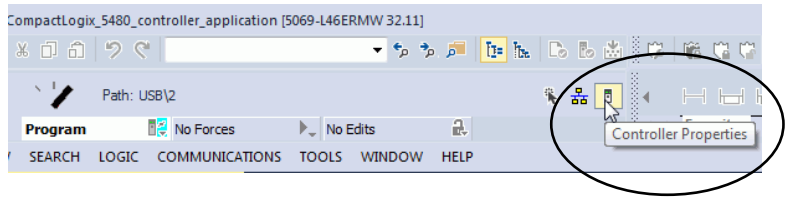
7. When the Connected To Go Online dialog box appears, click Download.



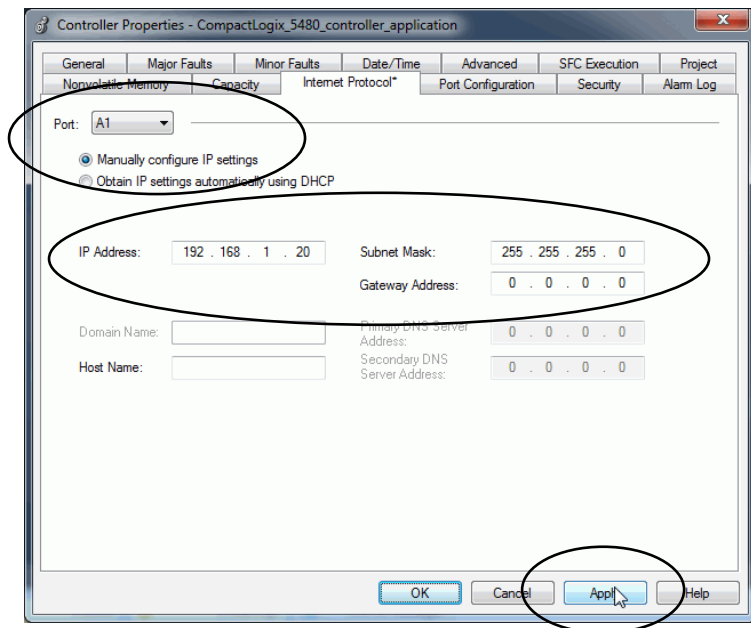
8. When the Download dialog box appears, click Download.



- 9. On the Online toolbar, click the Controller Properties icon.



- 10. On the Internet Protocol tab, choose the port from the Port pull-down menu.
- 11. Click Manually configure IP settings, enter the necessary values, and click Apply.



- 12. If a dialog box appears to confirm the change, click Yes.

### Use a Secure Digital Card to Set the Controller IP Address

You can use an SD card to set the controller IP address. The SD card can set the IP address when it loads a project onto the controller.

For more information on how to use an SD card, see Chapter 4, [Use the Secure Digital Card on page 103](#).

## Update Controller Firmware

In the out-of-box state, the controller uses firmware revision 1.xxx.

---

**IMPORTANT** You must install a working firmware revision before you can use it in a Logix Designer application project and before you can use the COS. The COS does not start until working firmware revision is installed. When you install a working firmware revision on a controller that has firmware revision 1.xxx, you must use the firmware file only option that is described below. You cannot use the Windows Kit file that is described below to install working firmware on a controller that has firmware revision 1.xxxx.

---

Future firmware updates do not impact COS use.

The following methods are available to update the firmware revision:

- Controller firmware file only - This method is the traditional method that is used with other Logix 5000™ controllers.
- Windows Kit file - This method includes not only firmware files but also files that install an Operating System (OS) Utilities tool that is used with the COS.

Remember, you cannot use the Windows Kit to update the firmware from revision 1.xxx to a compatible revision.

For more information on how to use the Windows kit, see [page 235](#).

### Download Only Controller Firmware Files

You can download only the controller firmware files and update the controller firmware revision. This method is the same as the traditional method used with other Logix 5000 controllers.

You can use the following tools to update the controller firmware:

- ControlFLASH™ or ControlFLASH Plus™ software

This publication describes how to use ControlFLASH software. For more information on how to use ControlFLASH Plus software, see the ControlFLASH Plus Quick Start Guide, publication [CFP-QS001](#).

- AutoFlash feature of the Logix Designer application

To update the controller firmware with this method, complete the following tasks:

1. [Determine Required Controller Firmware](#)
2. [Obtain Controller Firmware](#)
3. [Use ControlFLASH or ControlFLASH Plus Software to Update Controller Firmware Only](#)
4. [Use AutoFlash to Update Firmware](#)

## Determine Required Controller Firmware

---

**IMPORTANT** The controller must be in Remote Program or Program mode and all major recoverable faults must be cleared to accept updates.

---

The firmware major revision level must match the software major version level. For example, if the controller firmware revision is 32.011, you must use the Logix Designer application, major version 32.

## Obtain Controller Firmware

You can obtain controller firmware in the following ways:

- Firmware is packaged as part of the Studio 5000 Logix Designer® application installation.

---

**IMPORTANT** The firmware that is packaged with the software installation is the initial release of the controller firmware. Subsequent firmware revisions can be released.

We recommend that you check the Product Compatibility and Download Center (PCDC) to determine if later revisions of the controller firmware are available. For more information, see the next bullet.

---

- Download firmware, associated files, and access product release notes from the PCDC at:

<http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page>



## Use ControlFLASH or ControlFLASH Plus Software to Update Controller Firmware Only

**IMPORTANT** You must use ControlFLASH software, version 15.01.00 or later, or ControlFLASH Plus, version 1.01.00 or later, with CompactLogix 5480 controllers.

The software is available as follows:

- Part of Studio 5000 Logix Designer application installation process
- Standalone download from the Product Compatibility and Download Center at: <http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page>

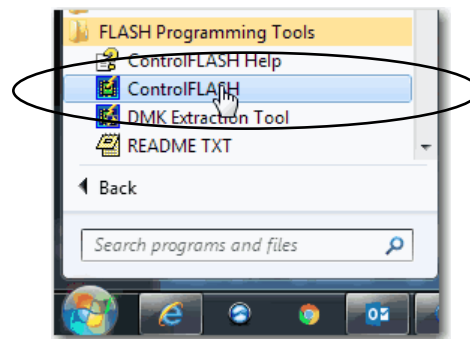
This section shows how to use ControlFLASH software.



**ATTENTION:** If the Secure Digital (SD) card is locked and set to load on power-up, this update can be overwritten by firmware on the SD card.

For more information on how to use an SD card, see Chapter 4, [Use the Secure Digital Card on page 103](#).

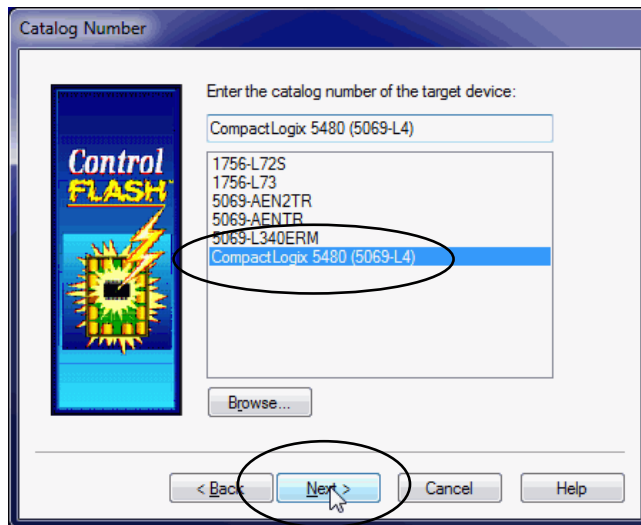
1. Verify the following:
  - The network connection is made.
  - The network driver has been configured in RSLinx Classic software.
  - The controller is in Remote Program or Program mode and all major recoverable faults are cleared.
2. Start the software.



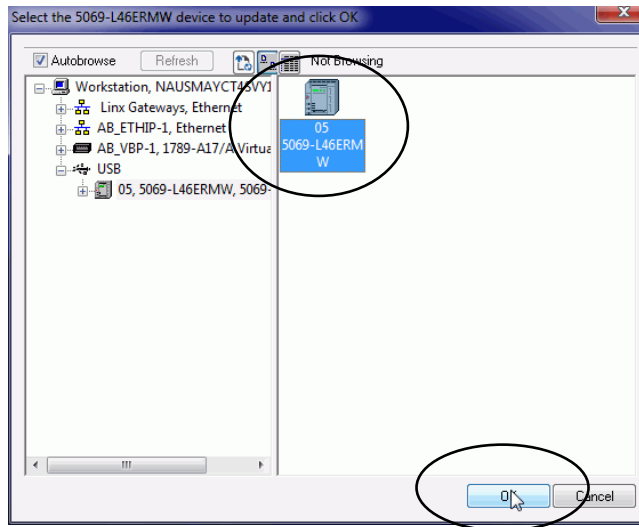
3. Click Next.



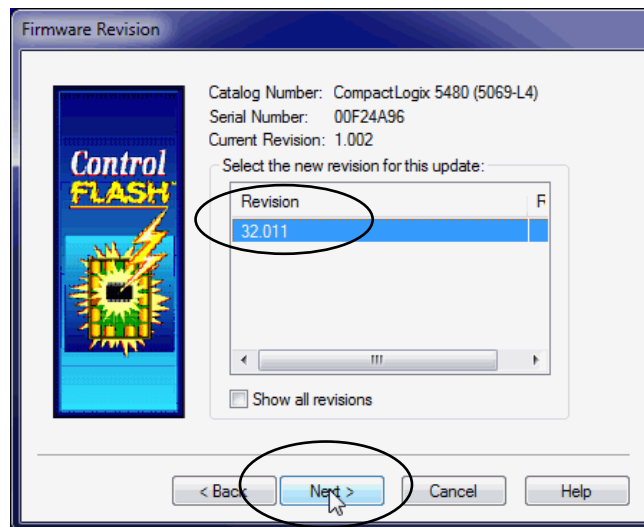
4. Select the controller, and click Next.



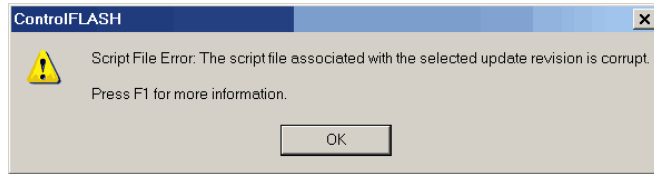
5. Expand the network driver to find the controller.
6. Select the controller and click OK.



7. Select the firmware revision and click Next.



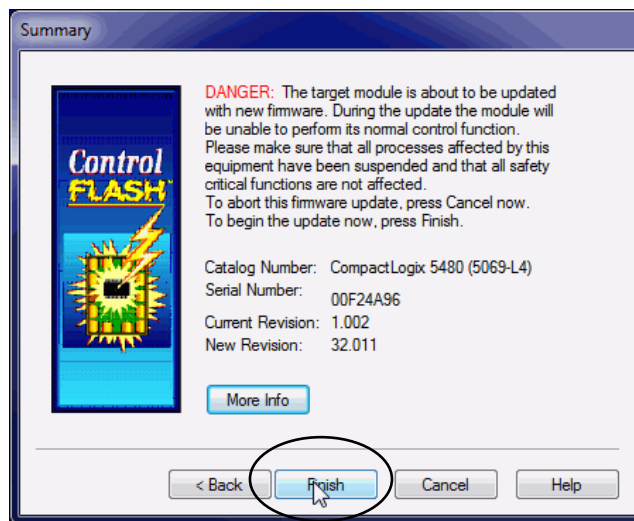
**TIP** If you experience a Script File Error after you select the firmware revision number, as shown, there can be a problem with your firmware files.



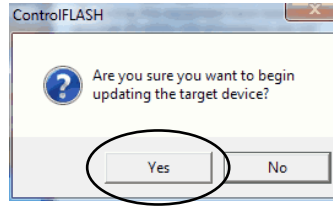
We recommend that you use the latest version of the ControlFLASH software. If you are not, first upgrade to the latest version.

If the issue persists, go to <http://www.rockwellautomation.com/support/> and download the firmware revision you are trying to update. Replace the firmware revision that you have previously installed with that posted on the Technical Support website.

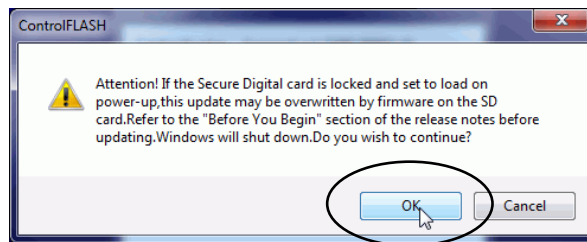
8. On the Summary dialog box, click Finish.



- When a confirmation dialog box appears, click Yes.



Before the firmware update begins, this dialog box appears. Take the required action for your application. In this example, the upgrade continues when OK is clicked.

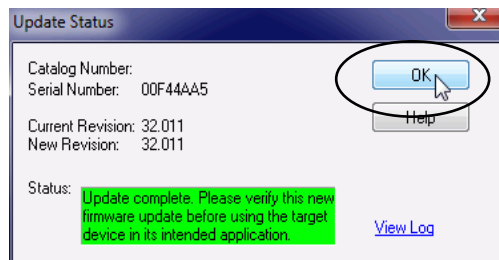


**WARNING:** Let the firmware update complete before you cycle power or otherwise interrupt the update.

**IMPORTANT** If the firmware update is interrupted, the CompactLogix 5480 controller reverts to boot firmware, that is, revision 1.xxx.

When the update is complete, the Update Status dialog box indicates that the update is complete.

- Click OK.



- Close the ControlFLASH software.

## Use AutoFlash to Update Firmware

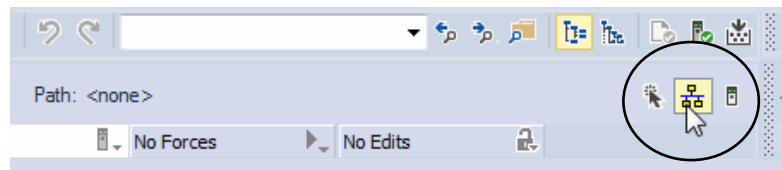


**ATTENTION:** If the Secure Digital Card is locked and set to load on power-up, this update can be overwritten by firmware on the SD card.

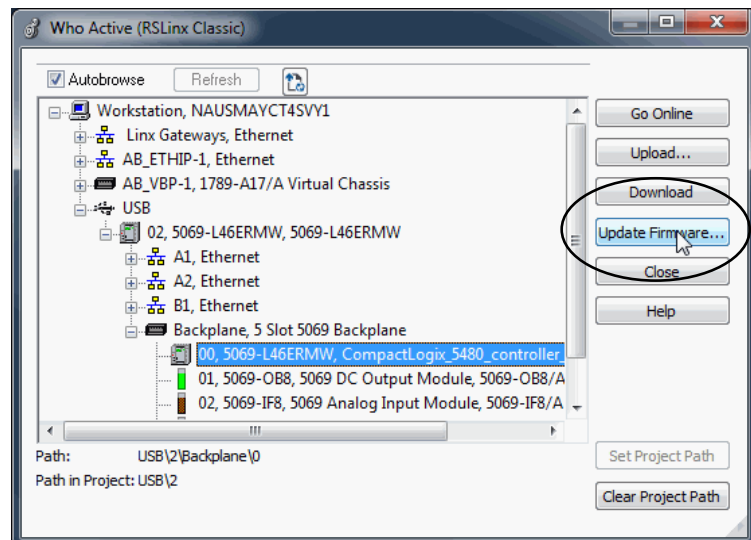
1. Verify the following:
  - The network connection is made.
  - The network driver has been configured in RSLinx Classic software.
  - The controller is in Remote Program or Program mode and all major recoverable faults are cleared.
2. Use the Logix Designer application to create a controller project.

For more information, see [Create a Logix Designer Application Project on page 81](#).

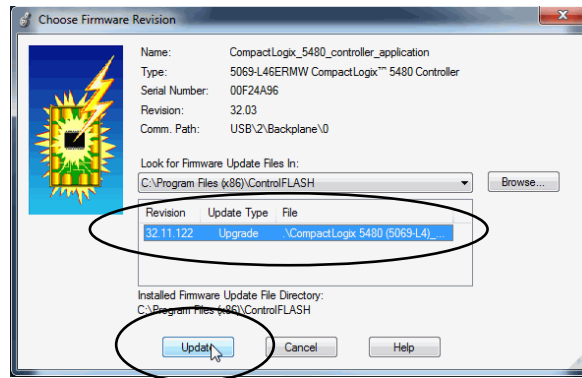
3. On the Logix Designer Path bar, click Who Active.



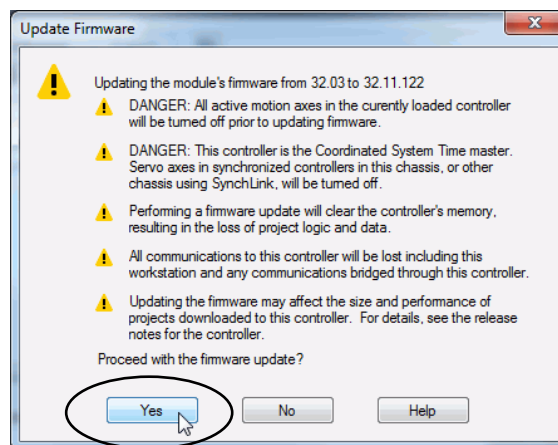
4. On the Who Active dialog box, select the controller under the communication driver you want to use, and click Update Firmware.



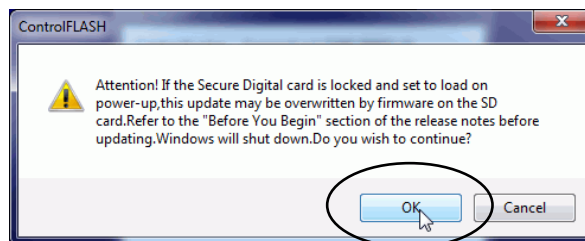
5. On the Choose Firmware Revision dialog, browse to the location of the firmware files.
6. Select the firmware revision, and click Update.



7. On the Confirmation dialog, click Yes.



8. On the ControlFLASH Attention dialog, click OK.



The firmware update begins. Let the update complete without interruption.

When the firmware update is complete, the progress dialog closes.

## Download Controller Firmware Files as Part of the Windows Kit

You can download controller firmware as part of the Windows kit. In addition to the latest controller firmware revision, the Windows kit also contains the Windows files necessary to install the latest Operating System installer on your controller.

The Windows image is already on the controller. You use the Operating System installer is used to install the COS.

You can download the Windows kit from the PCDC at:

<http://compatibility.rockwellautomation.com/Pages/home.aspx>

For more information on how to use the Windows kit, see [page 238](#).



## Start to Use the Controller

Topic	Page
Create a Logix Designer Application Project	81
Go Online with the Controller	84
Download a Project to the Controller	87
Upload from the Controller	89
Choose the Controller Operation Mode	92
Change Controller Configuration	95
Use the Reset Button	96
Disable the Ethernet Ports	102

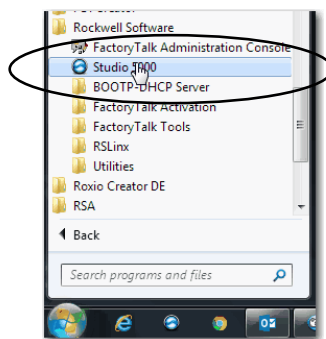
This chapter describes how to use the CompactLogix™ 5480 controller during its initial installation.

### Create a Logix Designer Application Project

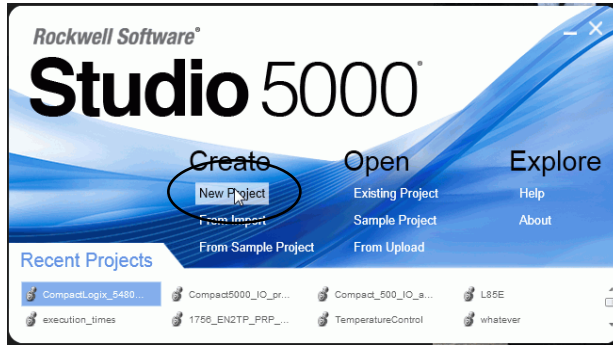
To create a Logix Designer application project, complete the following steps.

1. Start the application.

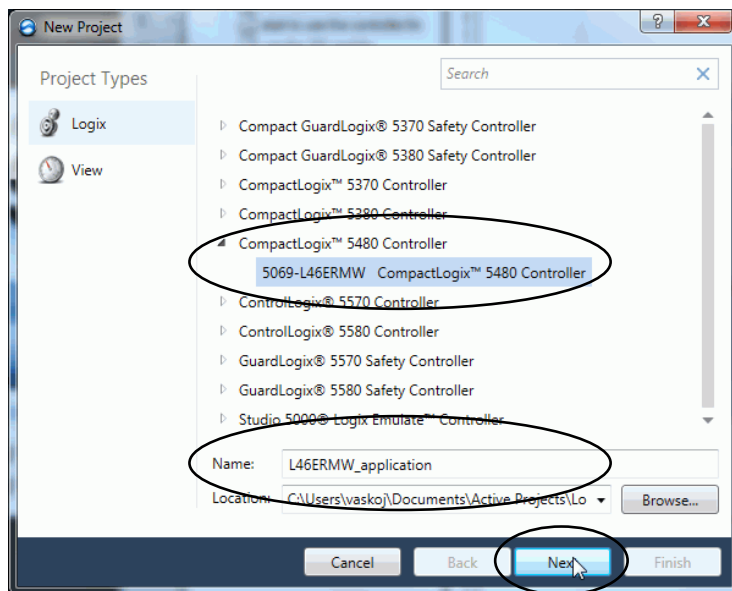
The Logix Designer application is part of the Studio 5000® environment.



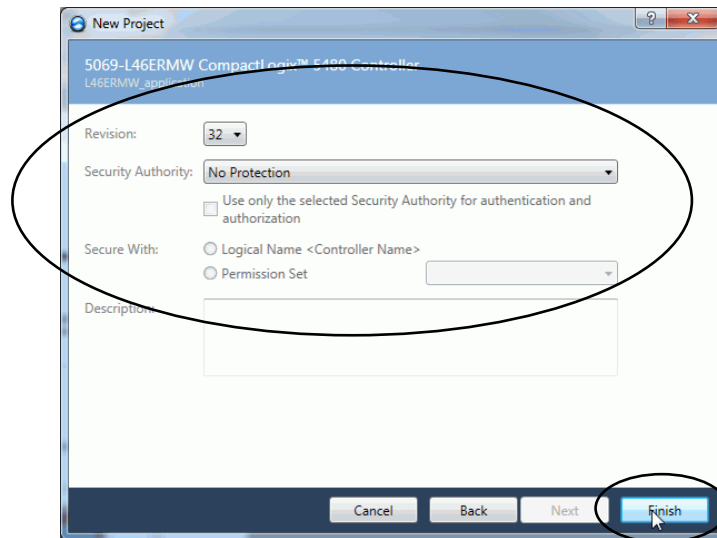
2. Click New Project.



3. On the New Project dialog box, complete the following steps:
  - a. Select the controller.
  - b. Name the project.
  - c. Browse to the location where the project file is created.
  - d. Click Next.



4. Select the following:
  - Revision
  - Security Authority (optional)
  - Secure With (only available if Security Authority is used)
5. Click Finish.



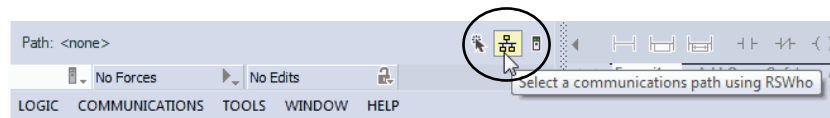
## Go Online with the Controller

To go online with the controller, you must first specify a communication path in the Logix Designer application.

**TIP** In this section, an Ethernet port is the communication path. You can also use the USB port.

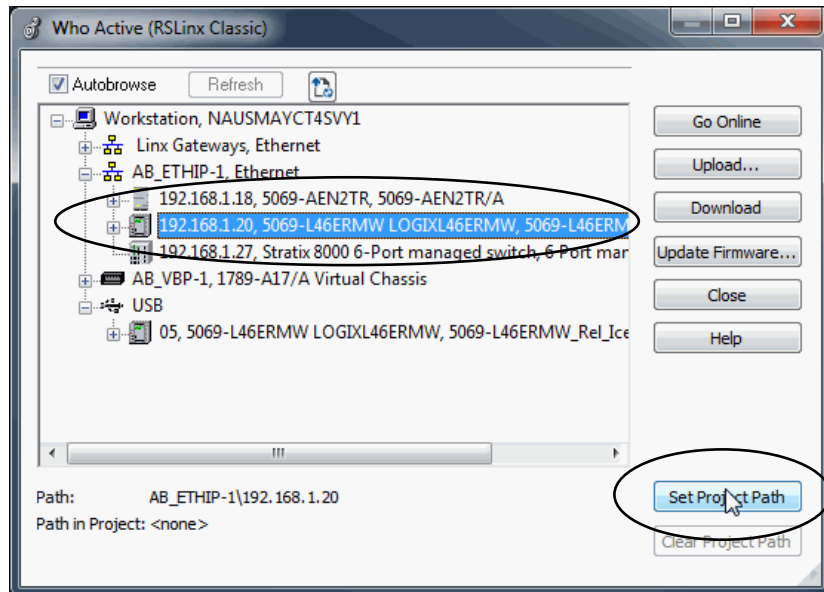
### Use RSWho to Specify a Communication Path to Go Online

1. Open or create a Logix Designer application project.
2. In Logix Designer application, click Who Active.

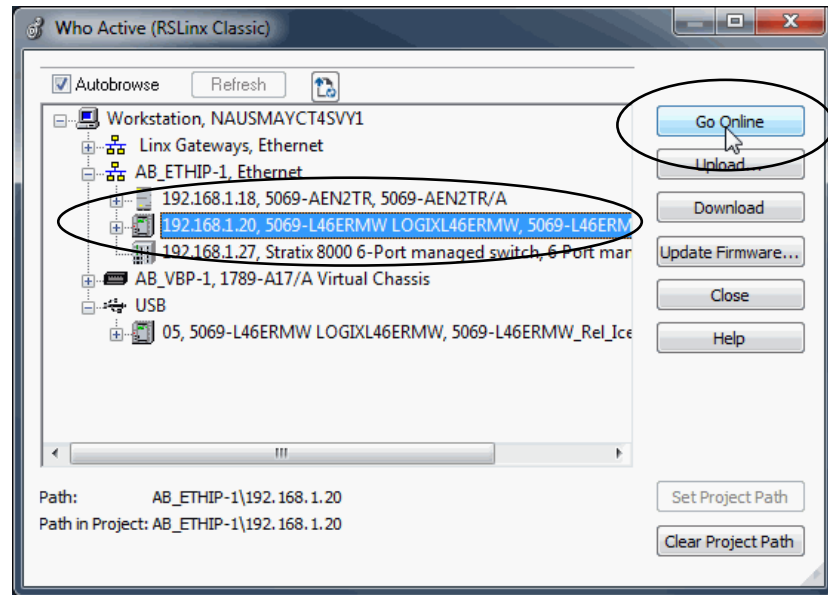


3. Expand the communication path and select the controller.
4. If you want to store the path in the project file, click Set Project Path.

If you store the project path in the project, you do not have to choose the path each time you go online.



5. After you choose the communication path, click Go Online in the Who Active dialog box.




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**IMPORTANT** If you are going online with the controller for the first time, you must download the project. Click Download on successive dialog boxes.

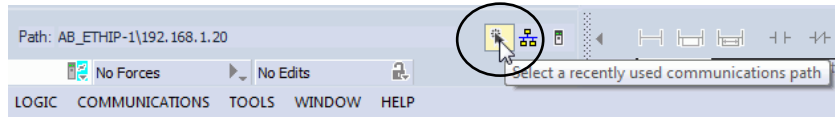
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Go Online uses the highlighted node in the Who Active tree, regardless of the setting for the Path in Project. For more information on the Who Active dialog box, see the Logix Designer application online help.

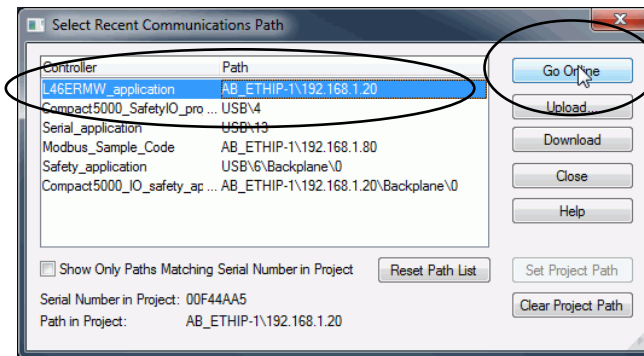
## Use a Recent Communications Path to Go Online

You can also select a recent communications path and go online or apply it to your project.

1. Click the Recent Communications Path icon next to the Path bar.

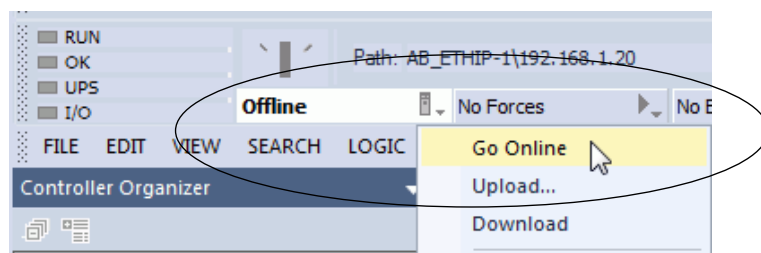


2. On the Select Recent Communications Path dialog box, choose the desired path and click Go Online.



## Use the Controller Status Menu to Go Online

From the Controller Status pull-down menu, click Go Online.



## Download a Project to the Controller

When you download a project to the controller, it copies the project from the Logix Designer application onto the controller. You can download a project in two ways:

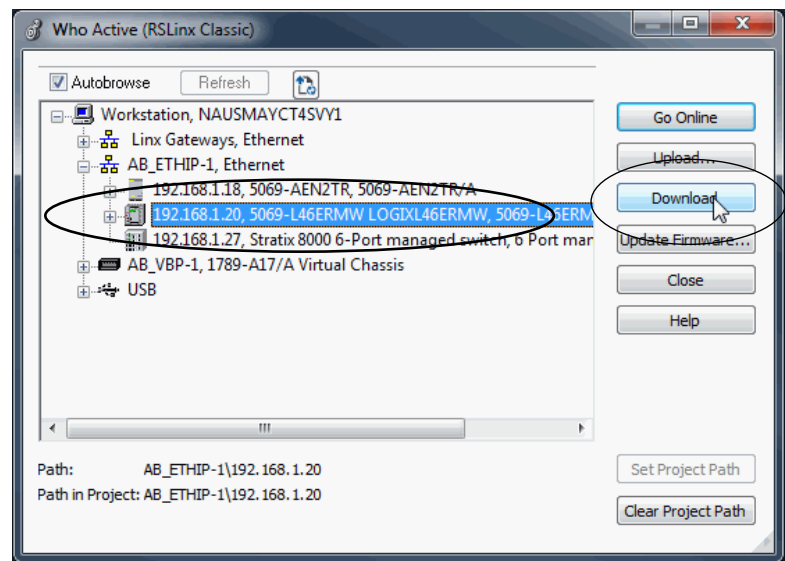
- [Use the Who Active Dialog Box to Download on page 87](#)
- [Use the Controller Status Menu to Download on page 88](#)

### Use the Who Active Dialog Box to Download

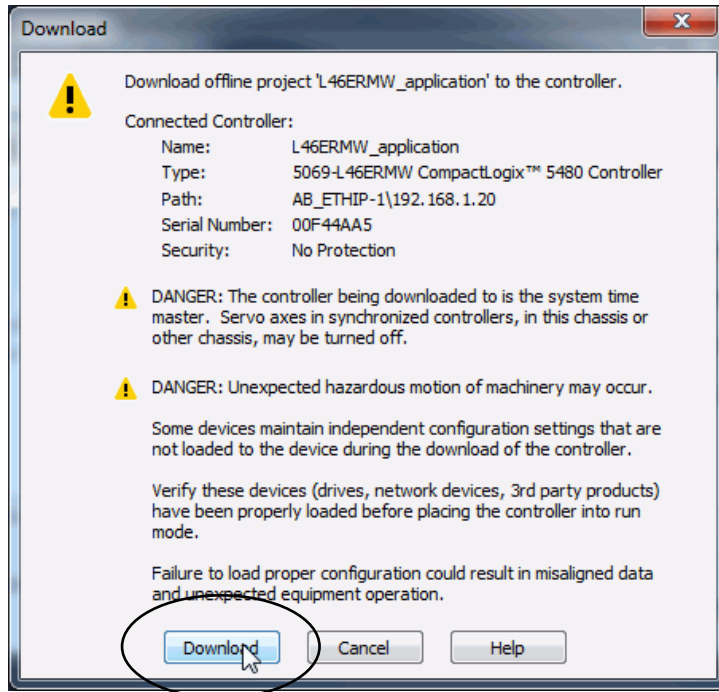
You can use the features of the Who Active dialog box to download to the controller after you have set the communication path. Complete the following steps to download to the controller.

**TIP** In this section, an Ethernet port is the communication path. You can also use the USB port.

1. In the Who Active dialog box, choose the communication path and click Download.



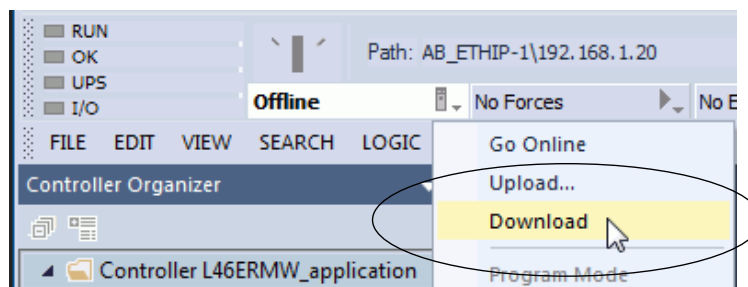
2. Read the warnings in the Download dialog box and click Download.



### Use the Controller Status Menu to Download

After you choose a communication path in the Logix Designer application, you can use the Controller Status menu to download to the controller.

From the Controller Status menu, choose Download.



**TIP** After the download completes, the project name appears on the scrolling status display of the controller.



## Upload from the Controller

When you upload a project from the controller, it copies the project from the controller to the Logix Designer application. To upload a project, use one of the following methods:

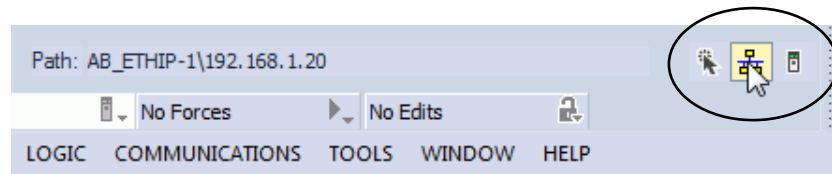
- [Use the Who Active Dialog Box to Upload, page 89](#)
- [Use the Controller Status Menu to Upload, page 91](#)

### Use the Who Active Dialog Box to Upload

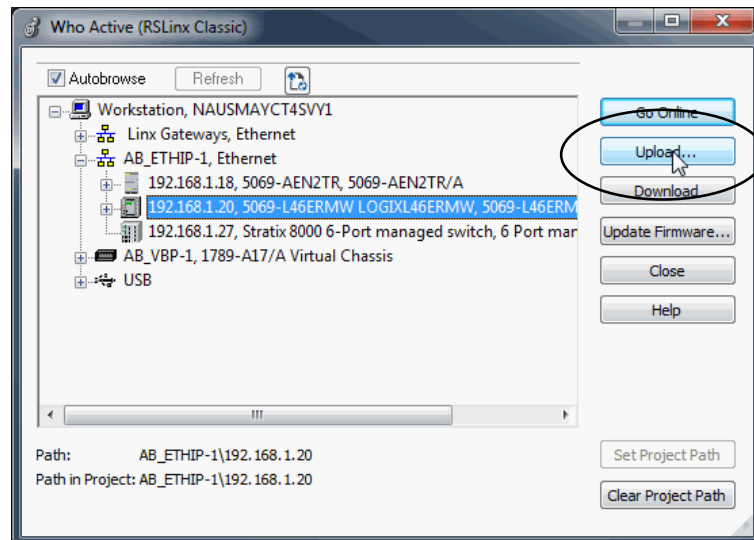
You can use the features of the Who Active dialog box to upload from your controller after you have set the communication path. Complete the following steps to upload from the controller.

**TIP** In this section, an Ethernet port is the communication path. You can also use the USB port.

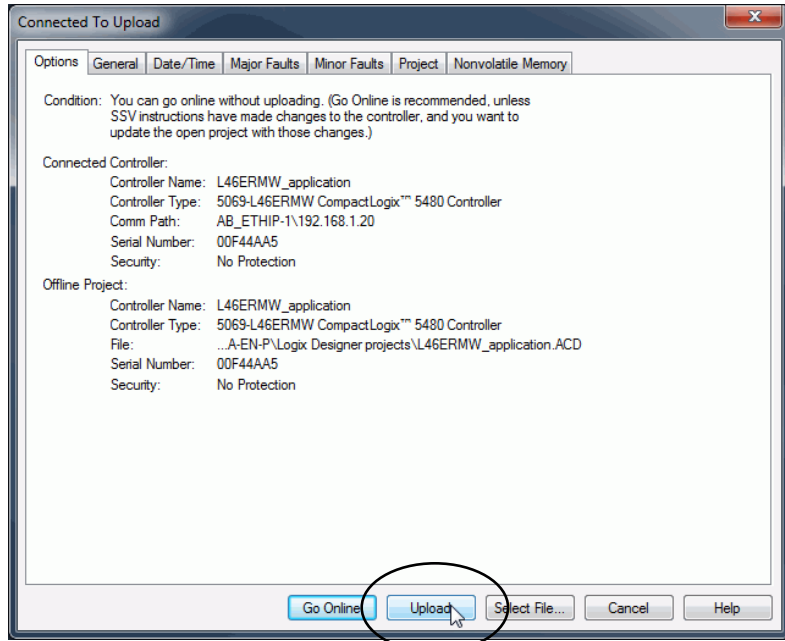
1. Click the Who Active icon.



2. Expand the communication path and select the controller.
3. Click Upload.



4. On the Connected to Upload dialog box, verify that the project is the one you want to upload.
5. Click Upload.

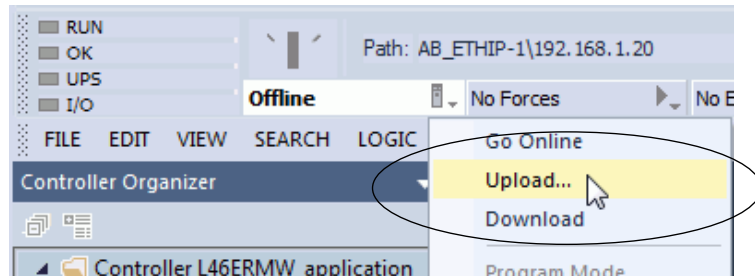


For more information on the Connected To upload dialog box, see the Logix Designer application online help.

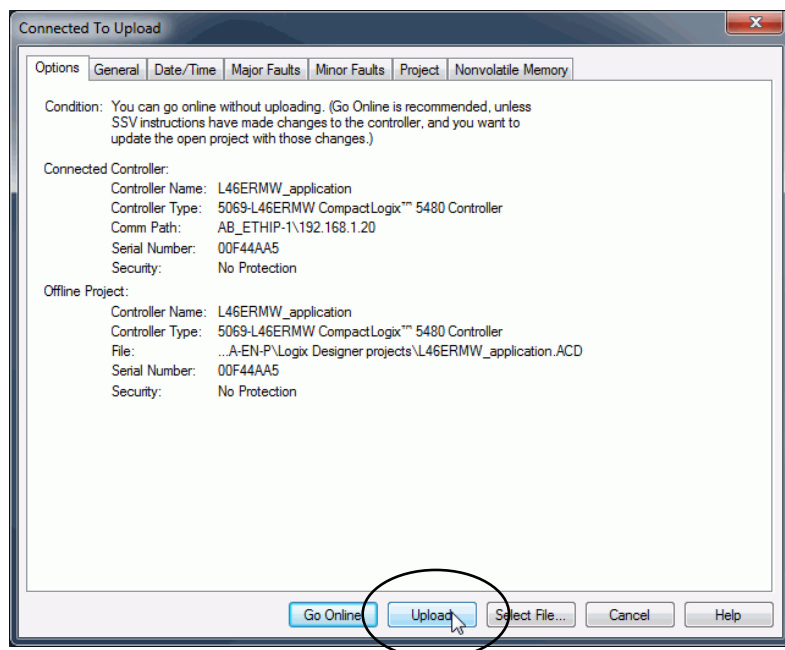
## Use the Controller Status Menu to Upload

After you establish a communication path in the Logix Designer application, you can use the Controller Status menu to upload from the controller.

1. From the Controller Status menu, choose Upload.




2. On the Connected to Upload dialog box, verify that the project is the one you want to upload.
3. Click Upload.



## Choose the Controller Operation Mode

Use [Table 6](#) as a reference when determining the controller operation mode.

**Table 6 - Controller Operation Mode Considerations**

Mode <sup>(1)</sup>	Available Controller Modes	In This Mode You Can:	In This Mode You Cannot:	ATTENTION: 
RUN	<b>Run mode</b> —The controller is actively controlling the process/machine. Projects cannot be edited in the Logix Designer application when in Run mode.	<ul style="list-style-type: none"> <li>• Turn outputs to the state commanded by the logic of the project.</li> <li>• Execute (scan) tasks</li> <li>• Send messages</li> <li>• Send and receive data in response to a message from another controller</li> <li>• Produce and consume tags</li> <li>• Initiate a soft or hard restart of the COS.<sup>(2)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Turn outputs to their configured state for Program mode</li> <li>• Change the mode of the controller via the Logix Designer application</li> <li>• Download a project</li> <li>• Schedule a ControlNet® network</li> <li>• While online, edit the project</li> </ul>	Run mode is used only when all conditions are safe.
REM	<b>Remote Run mode</b> —This mode is identical to Run mode except you can edit the project online, and change the controller mode through the Logix Designer application.	<ul style="list-style-type: none"> <li>• Turn outputs to the state commanded by the logic of the project.</li> <li>• Execute (scan) tasks</li> <li>• Change the mode of the controller via the Logix Designer application</li> <li>• While online, edit the project</li> <li>• Send messages</li> <li>• Send and receive data in response to a message from another controller</li> <li>• Produce and consume tags</li> <li>• Initiate a soft or hard restart of the COS.<sup>(2)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Turn outputs to their configured state for Program mode</li> <li>• Download a project</li> <li>• Schedule a ControlNet network</li> </ul>	<p>You are able to modify a project file online in Remote Run mode.</p> <p>Be sure to control outputs with care to avoid injury to personnel and damage to equipment.</p>
	<b>Remote Program mode</b> —This mode functions like Program mode, except you can change the controller mode through the Logix Designer application.	<ul style="list-style-type: none"> <li>• Turn outputs to their configured state for Program mode</li> <li>• Change the mode of the controller via the Logix Designer application</li> <li>• Download a project</li> <li>• Schedule a ControlNet network</li> <li>• While online, edit the project</li> <li>• Send and receive data in response to a message from another controller</li> <li>• Produce and consume tags</li> <li>• Initiate a soft or hard restart of the COS.<sup>(2)</sup></li> <li>• Restart the COS in UTIL mode.<sup>(2)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Turn outputs to the state commanded by the logic of the project.</li> <li>• Execute (scan) tasks</li> </ul>	Outputs are commanded to their Program mode state, which can cause a dangerous situation.
	<b>Remote Test mode</b> —This controller mode executes code, but I/O is not controlled. You can edit the project online, and change the controller mode through the Logix Designer application. Output modules are commanded to their Program mode state (on, off, or hold).	<ul style="list-style-type: none"> <li>• Turn outputs to their configured state for Program mode</li> <li>• Execute (scan) tasks</li> <li>• Change the mode of the controller via the Logix Designer application</li> <li>• While online, edit the project</li> <li>• Send messages</li> <li>• Send and receive data in response to a message from another controller</li> <li>• Produce and consume tags</li> <li>• Initiate a soft or hard restart of the COS.<sup>(2)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Turn outputs to the state commanded by the logic of the project.</li> <li>• Download a project</li> <li>• Schedule a ControlNet network</li> <li>• Send messages</li> </ul>	
<b>Program mode</b> —This controller mode does not execute code or control I/O, but editing operations are available. Output modules are commanded to their Program mode state (On, Off, or Hold). In this position, controller modes cannot be changed through the Logix Designer application.	<ul style="list-style-type: none"> <li>• Turn outputs to their configured state for Program mode</li> <li>• Download a project</li> <li>• Schedule a ControlNet network</li> <li>• While online, edit the project</li> <li>• Send and receive data in response to a message from another controller</li> <li>• Produce and consume tags</li> <li>• Initiate a soft or hard restart of the COS.<sup>(2)</sup></li> <li>• Restart the COS in UTIL mode.<sup>(2)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Turn outputs to the state commanded by the logic of the project.</li> <li>• Execute (scan) tasks</li> <li>• Change the mode of the controller via the Logix Designer application</li> <li>• Send messages</li> </ul>		
PROG	<b>Program mode</b> —This controller mode does not execute code or control I/O, but editing operations are available. Output modules are commanded to their Program mode state (On, Off, or Hold). In this position, controller modes cannot be changed through the Logix Designer application.	<ul style="list-style-type: none"> <li>• Turn outputs to their configured state for Program mode</li> <li>• Download a project</li> <li>• Schedule a ControlNet network</li> <li>• While online, edit the project</li> <li>• Send and receive data in response to a message from another controller</li> <li>• Produce and consume tags</li> <li>• Initiate a soft or hard restart of the COS.<sup>(2)</sup></li> <li>• Restart the COS in UTIL mode.<sup>(2)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Turn outputs to the state commanded by the logic of the project.</li> <li>• Execute (scan) tasks</li> <li>• Change the mode of the controller via the Logix Designer application</li> <li>• Send messages</li> </ul>	<p>Do not use Program mode as an emergency stop (E-stop). Program mode is not a safety device.</p> <p>Outputs are commanded to their Program mode state, which can cause a dangerous situation.</p>

(1) If you move the mode switch from RUN to REM, the controller changes to Remote Run mode. If you move the mode switch from PROG to REM, the controller changes to Remote Program mode. You cannot choose Remote Test mode by the mode switch alone, it is only available via the Logix Designer application.

(2) For more information on how to use the reset button to initiate state changes on the COS, see [Use the Reset Button with the COS on page 222](#).

## Use the Mode Switch to Change the Operating Mode

To change the operating mode, use the mode switch. The controller mode switch provides a mechanical means to enhance controller and control system security. You must physically move the mode switch on the controller to change its operating mode from RUN, to REM, or to PROG.

When the mode switch on the controller is set to RUN mode, features like online editing, program downloads, and firmware updates are prohibited. See [Table 6](#) for a complete list of prohibited features.

The mode switch can complement other authorization and authentication methods that similarly control user-access to the controller, such as the FactoryTalk® Security service.

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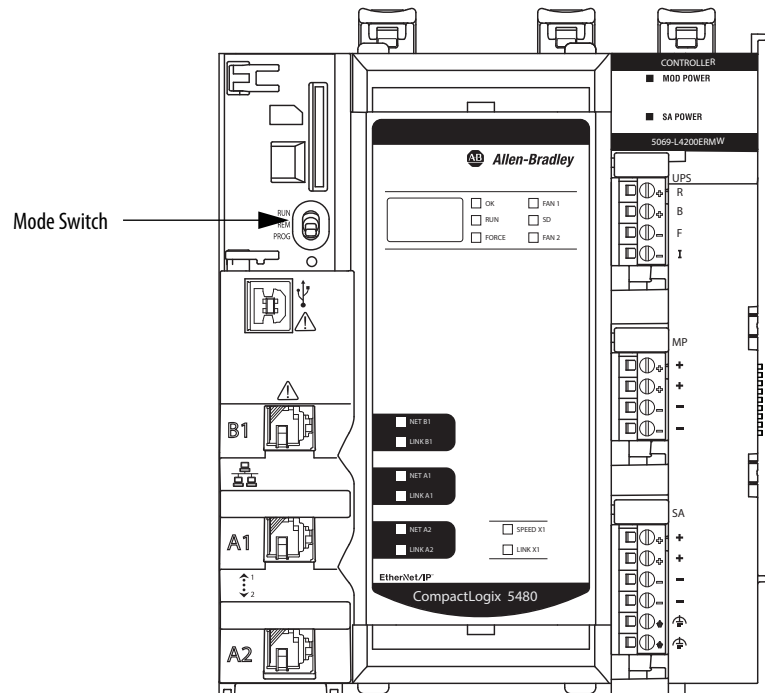
**IMPORTANT** During runtime, we recommend that you place the controller mode switch in RUN mode. This practice can discourage unauthorized access to the controller or potential tampering with the controller program, configuration, or device firmware.

Place the mode switch in REM or PROG mode during controller commissioning and maintenance and whenever temporary access is necessary to change the program, configuration, or firmware of the product.

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The mode switch on the front of the controller can be used to change the controller to one of the following modes:

- Run (RUN)
- Remote (REM)
- Program (PROG)

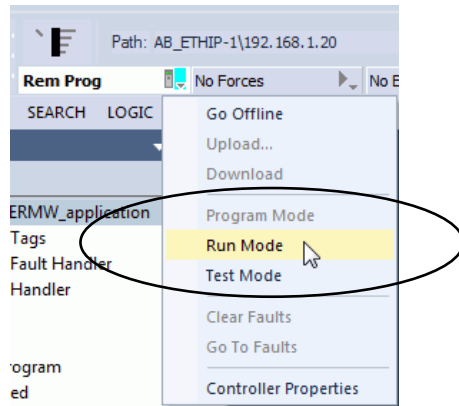


## Use the Logix Designer Application to Change the Operating Mode

To change the operating mode with the Logix Designer application, the controller is online and the mode switch is in the REM position. The following modes are available:

- Remote Program
- Remote Run
- Remote Test

Use the Controller Status menu to specify the operation mode.



**TIP** For this example, the controller mode switch is set to Remote mode. If the controller mode switch is set to Run or Program modes, the menu options change.

## Change Controller Configuration

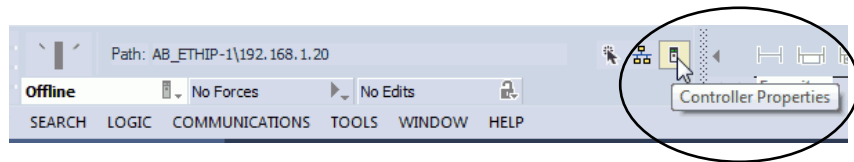
After the project is created, you can change some configuration parameters on the Controller Properties dialog box while the controller is offline.

Examples of configurable parameter that you can change offline include the following:

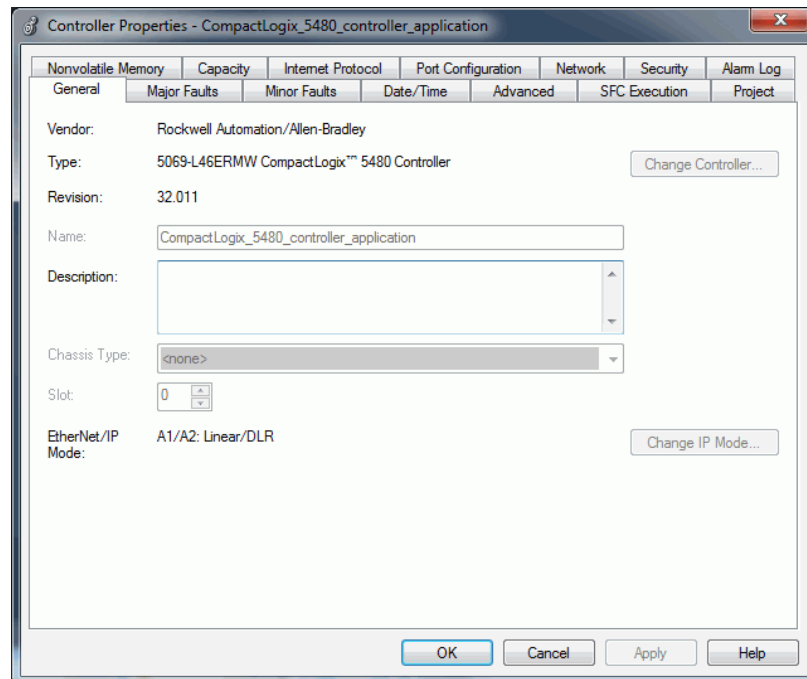
- EtherNet/IP™ Mode on the General tab
- Enable Time Synchronization on the Date/Time tab
- Execution Control on the SFC Execution tab

To change the controller configuration while the project is offline, complete the following steps:

1. On the Online toolbar, click the Controller Properties icon.



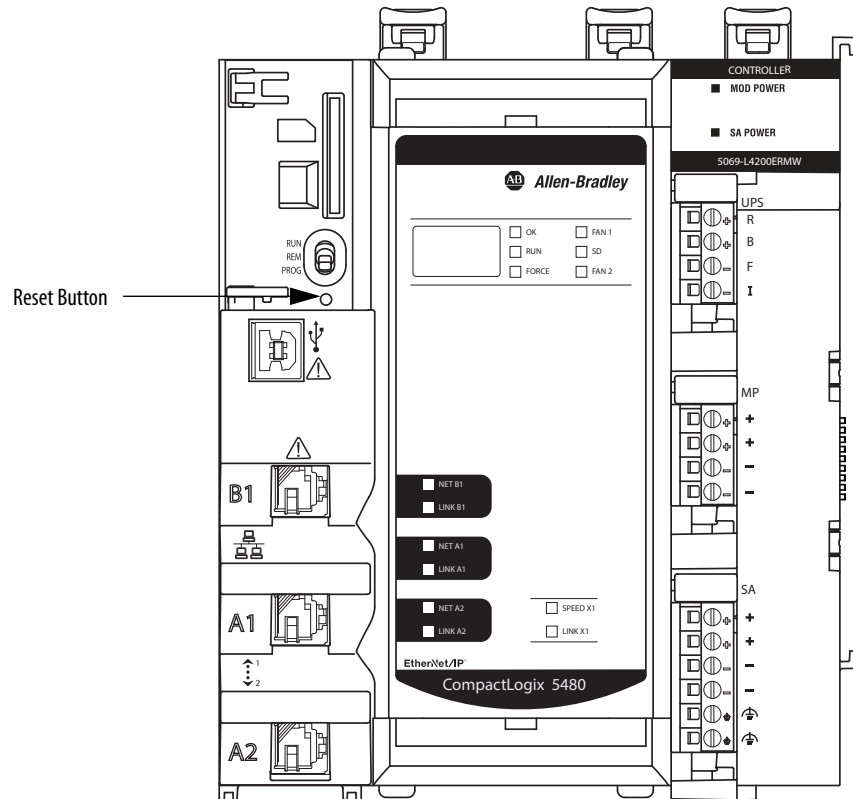
2. To change controller configuration, click the tabs to change the desired configurable parameters.



## Use the Reset Button

You can use the controller reset button to affect the Logix control engine or the COS. In both cases, you must press and hold the reset button. In this section, the word controller refers to events on the Logix control engine.

**Figure 11 - Reset Button on Controller**



The controller power state determines whether the Logix control engine or the COS is affected.

- To cause a controller reset, push in the reset button before turning on power and hold it in at power-up.

For more information, see [Controller Reset on page 97](#).

- To cause a COS restart or put the COS in Operating System Utilities mode, push the reset button in and hold it in when the controller is powered and operating.

For more information, see [Use the Reset Button with the COS on page 222](#)



## Controller Reset

You can use the reset button to perform one of the following controller resets:

- [Stage 1 Reset](#)
- [Stage 2 Reset](#)

---

**IMPORTANT** The processes to perform both controller reset types requires that you press the reset button and hold it in place during the controller power-up sequence.

- If you press the reset button when the controller is powered, neither the Stage 1 nor Stage 2 reset occurs.
- If you press the reset button when the controller is powered, the COS is affected. For example, if the controller is in Program or Remote Program mode and you press and hold the reset button for 10...15 seconds, the COS restarts in UTIL mode.

For more information on what happens to the COS when you press the reset button while the controller is powered, see [Use the Reset Button with the COS on page 222](#).

---

---

**IMPORTANT** Because port enable/disable status is associated with the application program, the Ethernet port becomes enabled after a Stage 1 or Stage 2 reset.

---

### *Stage 1 Reset*

---

**IMPORTANT** A stage 1 reset occurs only if the controller contains a user application.

---

The stage 1 reset completes the following:

- Clears the application program and memory.
- Retains the Ethernet port network settings, including the EtherNet/IP mode and all IP address settings.
- Retains APR (motion position info) information.
- Retains all PTP configuration (Time Synchronization) parameters.
- Retains WallClockTime within the energy retention capability of the module.
- Creates a timestamped entry in the Controller Log that a Stage 1 Reset event has occurred.
- Resets the controller to begin the controller startup process.

- Does not let the controller load firmware from the SD card on the initial startup after the reset.

The prevention occurs regardless of the SD card settings and without modifying the SD card contents, regardless of the write-protect setting.

If configured to do so, an SD card reloads on subsequent powerup situations.

- Enables any Ethernet port that were previously disabled.

To perform a Stage 1 reset, complete the following steps.

---

**IMPORTANT** If you have open applications that are running on the COS, we recommend that you save any opened files before you begin this process.

When you remove power from the controller, the COS shuts down and any unsaved data is lost. The lost data cannot be recovered.

---

1. Power down the controller.
2. Open the front door on the controller.
3. To press and hold the reset button. use a small tool with a diameter of a paper clip.
4. While holding in the reset button, power up the controller.
5. Continue to hold the reset button while the 4-character display cycles through CLR, 4, 3, 2, 1, Project Cleared.
6. After Project Cleared appears, release the reset button.

---

**IMPORTANT** If you release the reset button before Project Cleared scrolls across the display, the controller continues with powerup and does not reset.

---

After a Stage 1 reset is performed, load a Logix Designer application project to the controller in the following ways:

- Download the project from the Logix Designer application - For more information, see [Download a Project to the Controller on page 87](#).
- Cycle power on the controller to load a project from the SD card.

This option works only if the project stored on the SD card is configured to load the project on powerup.

After the power-up completes, the COS starts automatically.

### *Stage 2 Reset*

- 
- IMPORTANT** A stage 2 reset occurs only if the following conditions exist:
- The controller does not contain a user application.
  - The current controller firmware is not a 1.xxx revision.
- 

The stage 2 reset completes the following:

- Returns the module to firmware revision 1.xxx, that is, the out-of-box firmware revision.
- Clears all user settings, including network and time synchronization settings.
- The EtherNet/IP mode is reset to Dual-IP mode, if it was changed to Linear/DLR mode.
- Resets the controller to begin the controller startup process.
- There are no entries in the controller log after a Stage 2 reset, but saved logs on the SD card remain.
- Shuts down the COS, if it was running when the reset occurred.

You cannot restart the COS until after the firmware is updated to a working revision, that is, revision 32.011 or later.

To perform a Stage 2 reset, complete the following steps.

---

**IMPORTANT** If you have open applications that are running on the COS, we recommend that you save any opened files before you begin this process.  
When you remove power from the controller, the COS shuts down and any unsaved data is lost. The lost data cannot be recovered.

---

1. Confirm that the controller does not contain a user application.
2. Power down the controller.
3. Open the front door on the controller.
4. Remove the SD card.
5. Use a small tool with a diameter of a paper clip to press and hold the reset button.
6. While holding in the reset button, power up the controller.
7. Continue to hold the reset button while the 4-character display cycles through DFLT, 4, 3, 2, 1, Factory Default
8. After Factory Default appears, release the reset button.
9. On your workstation, delete the files on the SD card.
10. Power down the controller.
11. Reinstall the SD card.
12. Powerup the controller.
13. Verify that the controller is at firmware revision 1.xxx, and the controller is set to DHCP-enabled.

After a Stage 2 reset is performed, you must complete the following tasks to use the controller again:

- Configure the Ethernet ports, including setting the desired EtherNet/IP mode, and then setting the controller IP address configuration.

For more information, see [Set the Controller IP Address on page 55](#).

- Update the firmware revision - For more information, see [Update Controller Firmware on page 71](#).

Power is automatically cycled on the controller as part of the firmware update process. After the power-up completes, the COS starts automatically.

- Download a Logix Designer application project to the controller in one of the following ways:
  - Download the project from the Logix Designer application - For more information, see [Download a Project to the Controller on page 87](#).
  - Cycle power on the controller to load a project from the SD card.

This option works only if the project stored on the SD card is configured to load the project on powerup.

## **COS Reset**

You can press and hold the reset button to cause one of the following actions to occur on the COS:

- Soft reset
- Hard reset
- Restart in Operating System Utilities mode

The controller must be powered when you press and hold the reset button to change the COS state via a reset or restart.

---

**IMPORTANT** Some requirements apply when you use the reset button to cause an action on the COS. For example, you can only use the reset button to restart the COS in Operating System Utilities mode if the controller is in Program or Remote Program mode.

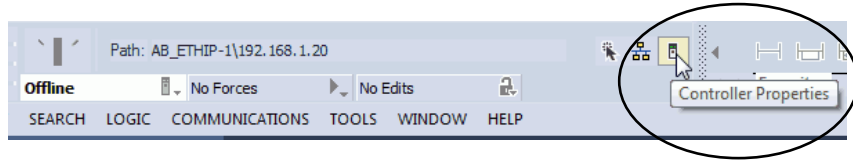
---

For more information on how to use the reset button with the COS, see [Use the Reset Button with the COS on page 222](#).

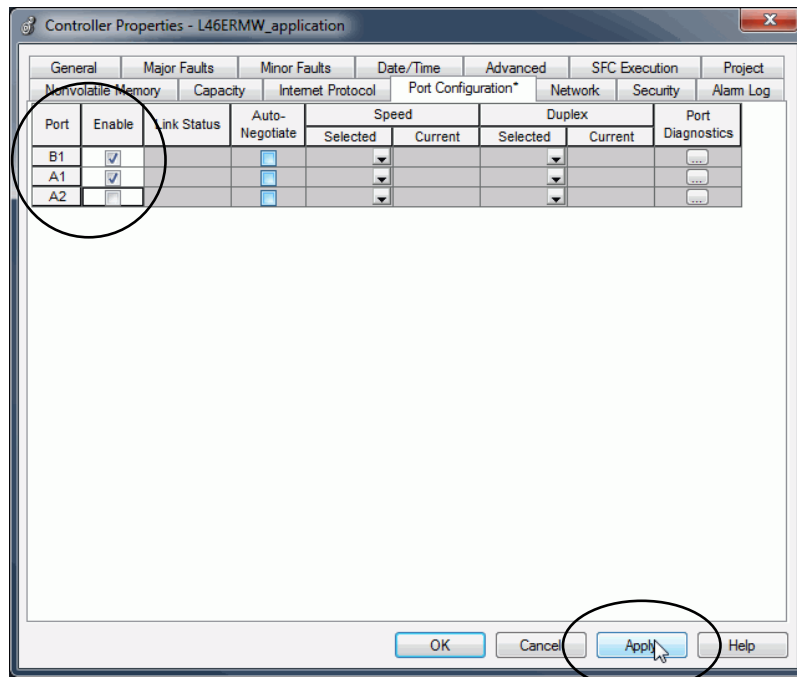
## Disable the Ethernet Ports

You can disable either of the embedded Ethernet ports on the controller.

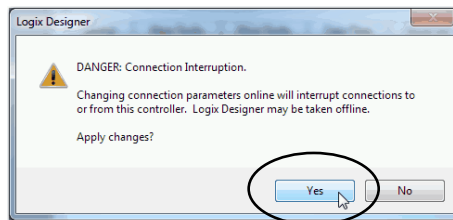
1. On the Online toolbar, click the Controller Properties icon.



2. On the Port Configuration tab, clear the Enable checkbox for the port that you want to disable and click Apply.



3. If you are online when you make this change, click Yes on the Alert dialog box.



- The change takes effect immediately.
  - If you are offline, the change takes effect when you download the program to the controller.
4. On the Port Configuration tab, click OK.

## Use the Secure Digital Card

Topic	Page
Store to the SD Card	106
Load from the SD Card	110

You use an SD card with your CompactLogix™ 5480 controller to store a copy of your project.

The controller ships with an SD card installed. We recommend that you leave the SD card installed, so if a fault occurs, diagnostic data is automatically written to the card. Rockwell Automation can then use the data to help investigate the cause of the fault.

We recommend that you use the SD cards available from Rockwell Automation.

**Table 7 - Secure Digital Cards**

Cat. No.	Description	Quantity
1784-SD1	1 GB SD card	1
1784-SD2	2 GB SD card (ships with the controller)	1
1784-SDHC8	8 GB SDHC card	1
1784-SDHC32	32 GB SDHC card	1
9509-CMSDCD4	4 GB CodeMeter CmCard card (when license-based source protection and execution protection features are enabled)	1

You can use other SD cards with the controller. However, Rockwell Automation has not tested the use of those cards with the controller and you can experience data corruption or loss with other cards.

SD cards that are not provided by Rockwell Automation can have different industrial, environmental, and certification ratings as those cards that are available from Rockwell Automation. The SD cards can have difficulty with survival in the same industrial environments as the industrially rated versions available from Rockwell Automation.

The memory card that is compatible with your controller is used to load or store the contents of user memory for the controller.

When you use the Store feature, the project that is stored on the SD card matches the project in the controller memory then. Changes that you make after you store the project are not reflected in the project on the SD card.

If you change the project in the controller memory but do not store the changes, the next time that you load the project from the SD card to the controller, you overwrite the changes.

---

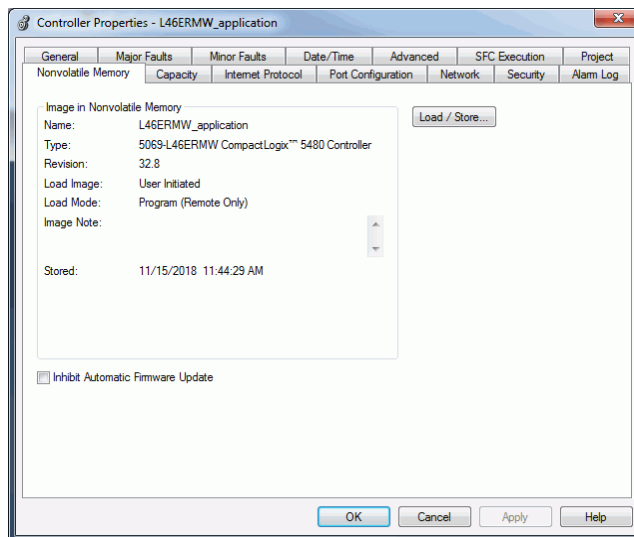
**IMPORTANT** Do not remove the SD card while the controller is reading from, or writing to, the card. If you remove the card during either activity, the data on the card or controller can become corrupt.

Additionally, the controller firmware at the time when the card is removed can become corrupted. Leave the card in the controller until the OK status indicator turns solid green.

---

If an SD card is installed, you can see the contents of the card on the Nonvolatile Memory tab of the Controller Properties dialog box.

**Figure 12 - Nonvolatile Memory Tab**

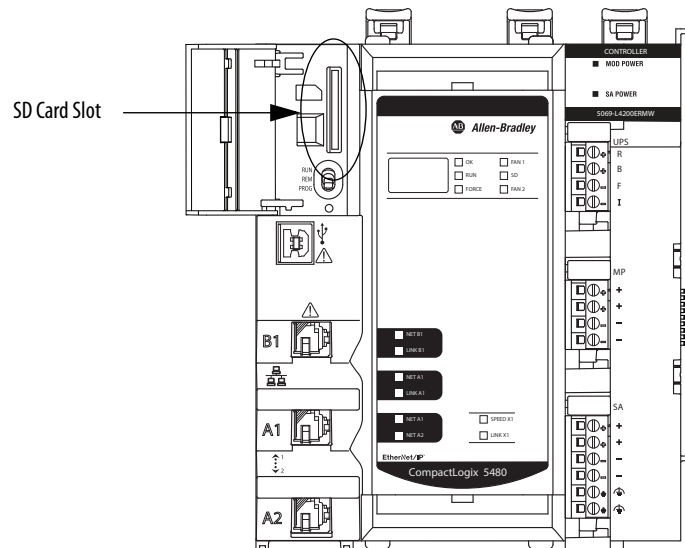


The project must be online to see the contents of the SD card.



Remember the following:

- An SD card slot is on the front of the controller behind the door.



- If the card is installed and a fault occurs, diagnostic data is automatically written to the card. Diagnostic data helps the investigation and correction of the fault cause.
- The controller detects the presence of an SD card at power-up or if a card is inserted during controller operation.
- The SD card can store all configuration data that is stored in nonvolatile memory, for example, the controller IP address.
- The SD card can store the back-up program.

---

**IMPORTANT** We recommend that you back up your Logix Designer application project to an SD card regularly.

If a major non-recoverable fault occurs that removes the project from the controller memory, the backup copy on the SD card can be automatically restored to the controller. Thus, normal control operation is quickly resumed.

---

For more information on how to back up the project to the SD card, see [Store to the SD Card on page 106](#).

- You can load the Logix Designer application project to the controller from the SD card.

For more information on how to load the project from the SD card, see [Load from the SD Card on page 110](#).

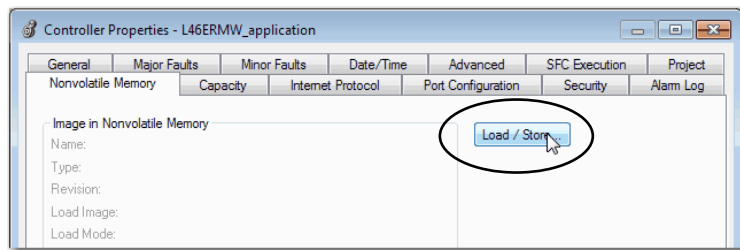
## Store to the SD Card

We recommend that you back up your Logix Designer application project to an SD card regularly.

If a major non-recoverable fault occurs that removes the project from the controller memory, the backup copy on the SD card can be automatically restored to the controller. Thus, normal control operation is quickly resumed.

To store a project to the SD card, complete the following steps.

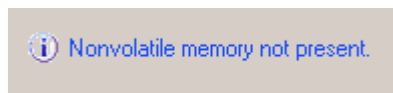
1. Make sure that the application is running as desired in the controller.
2. Make sure that the controller is online and in Program mode or Remote Program mode.
3. Access the Controller Properties.
4. On the Nonvolatile Memory tab, click Load/Store.



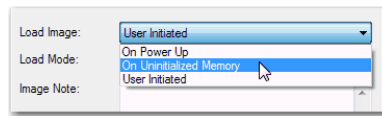
**TIP** If Load/Store is dimmed (unavailable), verify the following:

- You have specified the correct communication path.
- The SD card is installed.
- The SD card is unlocked. The locked status appears in the bottom-left corner of the Nonvolatile memory/Load Store dialog box.

If the SD card is not installed, a message in the lower-left corner of the Nonvolatile Memory tab indicates the missing card as shown here.



## 5. Change the Load Image properties as needed.



This table describes the available Load Image options.

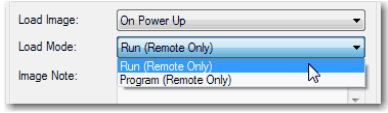
If You Want to Load the Project	Choose This Load Image Option	Notes
Whenever you turn on or cycle power	On Power Up	<ul style="list-style-type: none"> <li>During a power cycle, you lose any online changes, tag values, and network schedule that you have not stored in the nonvolatile memory.</li> <li>The controller loads the stored project and firmware at every power-up regardless of the firmware or application project on the controller.</li> <li>You can still use the Logix Designer application to load the project when the controller is operating and power is not cycled.</li> </ul>
Whenever there is no project in the controller and you turn on or cycle power	On Uninitialized Memory	<ul style="list-style-type: none"> <li>If the project has been cleared from memory, this option loads the project back into the controller on power-up.</li> <li>The controller updates the firmware on the controller, if necessary. The application project that is stored in nonvolatile memory is also loaded and the controller enters the selected mode, either Program or Run.</li> <li>You can still use the Logix Designer application to load the project when the controller is operating and power is not cycled.</li> </ul>
Only through the Logix Designer application	User Initiated	<p>This option is only available if the following match between the project that is stored on the SD card and the controller:</p> <ul style="list-style-type: none"> <li>Controller type</li> <li>Controller major and minor revision</li> </ul>

**IMPORTANT** If you update the firmware revision on a controller, and later install an SD card with an earlier firmware revision, the update process attempts to change the load option to User Initiated.

- If the SD card is unlocked, the load option is changed to User Initiated and the controller firmware revision is not updated to an earlier revision.
- If the SD card is locked, the load option does not change, and the firmware on the SD card can overwrite the newly updated firmware in the future.

The firmware update behavior helps to prevent the firmware revision on the SD card from overwriting the new firmware revision in the future.

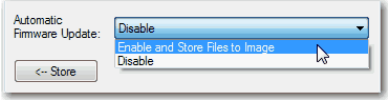
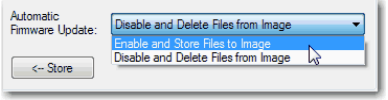
6. Set the Load Mode properties according to your application requirements.

If You Want the Controller to Go to This Mode after Loading	Choose	Menu Items
Program	Program (remote only)	
Run	Run (remote only)	

7. According to your application requirements, set the Automatic Firmware Update properties for I/O devices in the configuration tree of the controller.

The Automatic Firmware Update property is also referred to as the Firmware Supervisor feature.

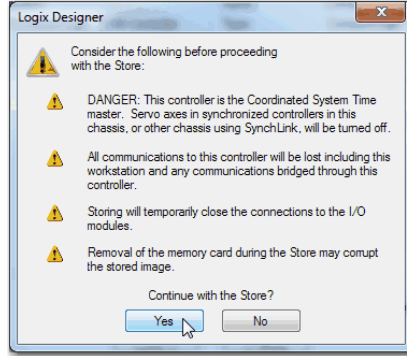
This table describes the Automatic Firmware Update options for I/O devices.

Setting	Description	Menu Items
Disable	Disables any automatic firmware updates. This item only appears in the menu when you initially save the image.	
Enable and Store Files to Image	Enables automatic firmware updates for I/O devices in the configuration tree of the controller. Saves I/O device firmware and controller firmware to the image. I/O devices must be configured to use Exact Match Keying. <sup>(1)</sup>	
Disable and Delete Files to Image	Disables automatic firmware updates for I/O devices in the configuration tree of the controller. Removes I/O device firmware from the image, but does not remove controller firmware from image. This item only appears in the menu on subsequent saves of the image.	

(1) The devices that are used with this option must support the firmware revision to which the device is being updated.

8. Click Store.

9. Click Yes in the confirmation dialog box that appears.



If you enabled Automatic Firmware Update, a dialog box informs you which modules are not included in the Automatic Firmware Update operation.

---

**IMPORTANT** Do not remove the SD card while the controller is reading from, or writing to, the card. If you remove the card during either activity, the data on the card or controller can become corrupt.

Additionally, the controller firmware at the time when the card is removed can become corrupted. Leave the card in the controller until the OK status indicator turns solid green.

---

10. On the Automatic Firmware Update dialog box, click Yes.

The project is saved to the SD card as indicated by the controller status indicators.

Store Status	This Following Occurs
In Progress	<ul style="list-style-type: none"> <li>• The OK indicator flashes green.</li> <li>• The SD indicator flashes green.</li> <li>• The following messages scroll across the 4-character display:               <ul style="list-style-type: none"> <li>– Saving... Do Not Remove SD Card</li> <li>– SAVE</li> </ul> </li> <li>• A dialog box in the Logix Designer application indicates that the store is in progress.</li> </ul>
Complete	Controller resets

---

**IMPORTANT** Let the store complete without interruption. If you interrupt the store, data corruption or loss can occur.

Your Logix Designer application project goes offline during the Store process. When the process is complete and the controller has completed the power-up sequence, you can go online again with the controller.

---

## Load from the SD Card

You can load a project to the controller from the SD card if the following conditions exist:

- You have set the communication path.
- The controller is online.
- The controller is in Program mode,

---

**IMPORTANT** With the SD card and brand new, out-of-box controllers:

- If you insert an SD card with an image into a brand new, out-of-box controller (firmware 1.x), at power-up the controller automatically updates the firmware up to the revision that is stored on the SD card. The update happens regardless of the Load Image setting in the image on the SD card (User Initiated, On Power Up, or On Uninitialized Memory).
  - If the image was created with either On Power Up or On Uninitialized Memory settings, then the controller both updates the firmware and loads in the controller application.
- 

You can load from an SD card to a controller in one of the following ways:

- [Controller Power-up](#)
- [User-initiated Action](#)

**TIP** You can always use the Logix Designer application to load the project.

The actions that are described in this section apply whether the SD card is unlocked or locked.

## Controller Power-up

This table describes what happens at power-up when an SD card that is installed in the controller contains an image.

Load Image Setting	Controller Is in Out-of-box Condition (v1.xxx Firmware)	Firmware > 1.xxx and Internal Nonvolatile Memory Is Not Valid <sup>(2)</sup>	Firmware > 1.xxx and Internal Nonvolatile Memory Is Valid <sup>(2)</sup>
User Initiated	Loads Firmware Only <sup>(1)</sup>	Does Nothing	Does Nothing
On Power Up	Loads both Firmware and Application	<ul style="list-style-type: none"> <li>Loads Firmware if there is a revision mismatch</li> <li>Loads Application</li> </ul>	<ul style="list-style-type: none"> <li>Loads Firmware if there is a revision mismatch</li> <li>Loads Application</li> </ul>
On Uninitialized Memory	Loads both Firmware and Application <sup>(1)</sup>	<ul style="list-style-type: none"> <li>Loads Firmware if there is a revision mismatch</li> <li>Loads Application</li> </ul>	Does Nothing

(1) Indicates change in behavior from CompactLogix 5370 or older controllers.

(2) "Valid" includes the No Project condition.

This table provides more information about each Load Image setting.

Setting	Notes
On Power Up	<ul style="list-style-type: none"> <li>During a power cycle, you lose any online changes, tag values, and network schedule that you have not stored in the nonvolatile memory.</li> <li>The controller loads the stored project and firmware at every power-up regardless of the firmware or application project on the controller.</li> <li>You can still use the Logix Designer application to load the project when the controller is operating and power is not cycled.</li> </ul>
On Uninitialized Memory	<ul style="list-style-type: none"> <li>In addition to loading the project that is on the SD card to the controller, the controller firmware is updated, if necessary.</li> <li>You can still use the Logix Designer application to load the project when the controller is operating and power is not cycled.</li> </ul>
User Initiated	This option is only available if the following match between the project that is stored on the SD card and controller: <ul style="list-style-type: none"> <li>Controller type</li> <li>Controller major and minor revision</li> </ul>

The COS starts at controller power-up unless the controller uses firmware revision 1.xxx. That is, if the controller is in the out-of-box state.

You must update the controller firmware revision to a working revision level, that is, firmware revision 32.011 or later, before the COS can start.

For more information on the COS, see Chapter 10, [Commercial Operating System on page 215](#).

## User-initiated Action

**IMPORTANT** You cannot load a project as described in this section if the controller currently uses firmware revision 1.xxx. That is, the firmware revision on an out-of-box controller.

This table shows what happens at power-up when the SD card in the controller contains an image.

Load Image Setting	Firmware > 1.xxx and Internal Nonvolatile Memory Is Not Valid <sup>(1)</sup>	Firmware > 1.xxx and Internal Nonvolatile Memory Is Valid <sup>(1)</sup>
User-initiated	Does nothing	Does nothing
On Power Up	<ul style="list-style-type: none"> <li>• Loads firmware if there is a revision mismatch</li> <li>• Loads application</li> </ul>	<ul style="list-style-type: none"> <li>• Loads firmware if there is a revision mismatch</li> <li>• Loads Application</li> </ul>
On Uninitialized Memory	<ul style="list-style-type: none"> <li>• Loads firmware if there is a revision mismatch</li> <li>• Loads application</li> </ul>	Does nothing

(1) "Valid" includes the No Project condition.

You must complete the following tasks before you can load a project to the controller from the SD card when the controller is already powered:

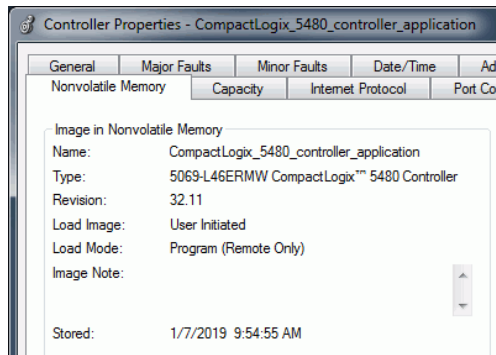
- Make sure that the controller has a working firmware revision.
- Establish the communication path.
- Go online with the controller.
- Make sure that the controller is in Program mode.

Complete the following steps to load a project from an SD card.

1. Access the Controller Properties.



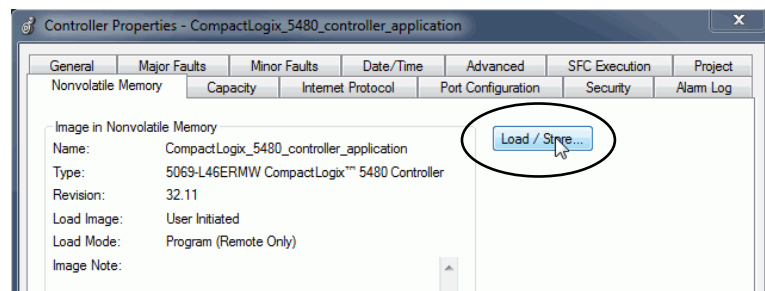
2. On the Nonvolatile Memory tab, verify that the project that is listed is the correct one.



**TIP** If no project is stored on the SD card, a message on the Nonvolatile Memory tab indicates that an image (or project) is not available.



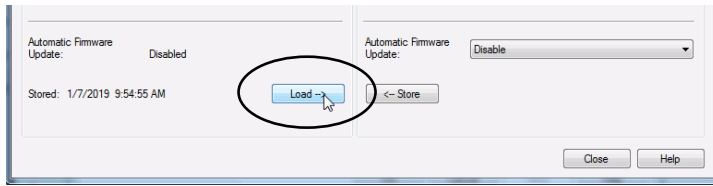
3. Click Load/Store.



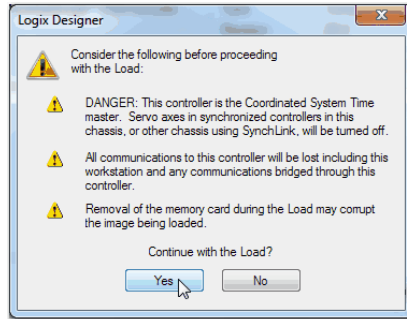
**TIP** If Load/Store is dimmed (unavailable), verify the following:

- You have specified the correct communication path and are online with the controller.
- The SD card is installed.
- Verify that the controller is not in Run Mode.

4. Click Load.



5. Click Yes in the confirmation dialog box that appears.



After you click Yes, the project is loaded to the controller as indicated by the controller status indicators.

Load Status	The Following Occurs
In Progress	<ul style="list-style-type: none"> <li>OK indicator is solid red</li> <li>SD indicator is flashing green</li> <li>The following messages scroll across the 4-character display:                             <ul style="list-style-type: none"> <li>Loading... Do Not Remove SD Card</li> <li>LOAD</li> <li>UPDT - Only if the firmware is also updating with the load.</li> </ul> </li> <li>A dialog box in the Logix Designer application indicates that the load is in progress.</li> </ul>
Complete	Controller resets

**IMPORTANT** Let the load complete without interruption. If you interrupt the load, data corruption or loss can occur.

After the controller reboots, not only can you use it for real-time control, but you can also use the COS.

## Other Secure Digital Card Tasks

You can use the SD cards to complete the following other tasks:

- Change the image that is loaded from the card
- Check for a load that was completed
- Clear an image from the SD card
- Store an empty image
- Change load parameters
- Read/write application data to the card
- Use the controller logging feature

For more information on the controller logging feature, see the Logix 5000™ Controllers Information and Status Programming Manual, publication [1756-PM015](#).

For information on how to use an SD card, see the Logix5000™ Controllers Nonvolatile Memory Card Programming Manual, publication [1756-PM017](#).

**Notes:**

## EtherNet/IP Network

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EtherNet/IP Network Topologies	123
EtherNet/IP Network Communication Rates	126
Socket Interface	129

The CompactLogix™ 5480 controller operates on EtherNet/IP™ networks.

Remember, before your controller can operate on EtherNet/IP network, you must configure a communication driver in RSLinx® Classic software. For more information on how to configure a driver, see [Configure EtherNet/IP and USB Drivers on Your Workstation on page 45](#).

This chapter describes how to use the Logix control engine of the CompactLogix 5480 controller on an EtherNet/IP network.

The content in this chapter does not apply to port X1 unless noted.

For more information on how to use the COS and port X1, see Chapter 10, [Commercial Operating System on page 215](#).

### Network Overview

The EtherNet/IP network offers a full suite of control, configuration, and data collection services by layering the Common Industrial Protocol (CIP™) over the standard internet protocols, such as TCP/IP and UDP. This combination of well-accepted standards provides the capability that is required to support information data exchange and control applications.

The CompactLogix 5480 controllers use socket interface transactions and conventional communication over the EtherNet/IP network to communicate with Ethernet devices that do not support the EtherNet/IP application protocol.

For more information on socket interface transactions, see [Socket Interface on page 129](#).

## EtherNet/IP Network Functionality

The CompactLogix 5480 controllers support this EtherNet/IP network functionality:

- Offers the following EtherNet/IP network ports
  - A1
  - A2
  - B1
- Support for the following EtherNet/IP modes:
  - Dual-IP mode
  - Linear/DLR mode
- Support for the following EtherNet/IP network topologies:
  - Device Level Ring (DLR)
  - Linear
  - Star
- Support for the following EtherNet/IP network communication rates:
  - 10 Mbps
  - 100 Mbps
  - 1 Gbps
- Support for only full-duplex operation

---

**IMPORTANT** If a device supports only half-duplex, you must connect it to a switch to communicate with a CompactLogix 5480 controller.

---

- Support for CIP Sync™ technology based on Time Synchronization using the IEEE-1588 Precision Time Protocol
- Duplicate IP address detection
- Socket interface to communicate with Ethernet devices that do not support the EtherNet/IP application protocol

- Compatible with industry-standard Ethernet switches - Managed switches are recommended, and CIP-protocol-aware switches can provide more predictable performance.
- Support for messaging, produced/consumed tags, HMI, and distributed I/O modules
- Support for Integrated Motion Over an EtherNet/IP network

For more information on how to use Integrated Motion over an EtherNet/IP network, see Chapter 9, [Develop Motion Applications on page 209](#).

For more information about network design, see the Ethernet Design Considerations Reference Manual, publication [ENET-RM002](#).

## Software for EtherNet/IP Networks

[Table 8](#) lists software that is used with the EtherNet/IP networks and modules.

**Table 8 - Software for Use with EtherNet/IP Networks**

Software	Use	Required or Optional
Logix Designer application	<ul style="list-style-type: none"> <li>• Configure CompactLogix projects.</li> <li>• Define EtherNet/IP communication.</li> </ul>	Required
RSLinx Classic or FactoryTalk® Linx	<ul style="list-style-type: none"> <li>• Configure communication devices.</li> <li>• Provide diagnostics.</li> <li>• Establish communication between devices.</li> </ul>	Required
BootP DHCP EtherNet/IP Commissioning tool	Assign IP addresses to the controller and devices on an EtherNet/IP network.	Optional
DHCP server	Assign IP addresses to the controller and devices on an EtherNet/IP network.	Optional

## Nodes on an EtherNet/IP Network

When you configure your CompactLogix 5480 controller system, you must account for the number of EtherNet/IP nodes that you include in the I/O configuration section of your project.

The CompactLogix 5480 controllers support the following maximum numbers of EtherNet/IP nodes:

- 5069-L430ERMW - 60
- 5069-L450ERMW - 120
- 5069-L4100ERMW - 180
- 5069-L4200ERMW - 250
- 5069-L46ERMW - 250

### Devices Included in the Node Count

Any EtherNet/IP devices that you add to the I/O configuration section are counted toward the controller node limit. The following are examples of devices that must be counted:

- Remote communication adapters
- Switches that are included in the I/O configuration section
- Devices with an embedded Ethernet port, such as drives, I/O modules, and linking devices
- Remote controllers when a produce/consume connection is established between the two controllers
- HMI and third-party devices that are included in the I/O configuration section



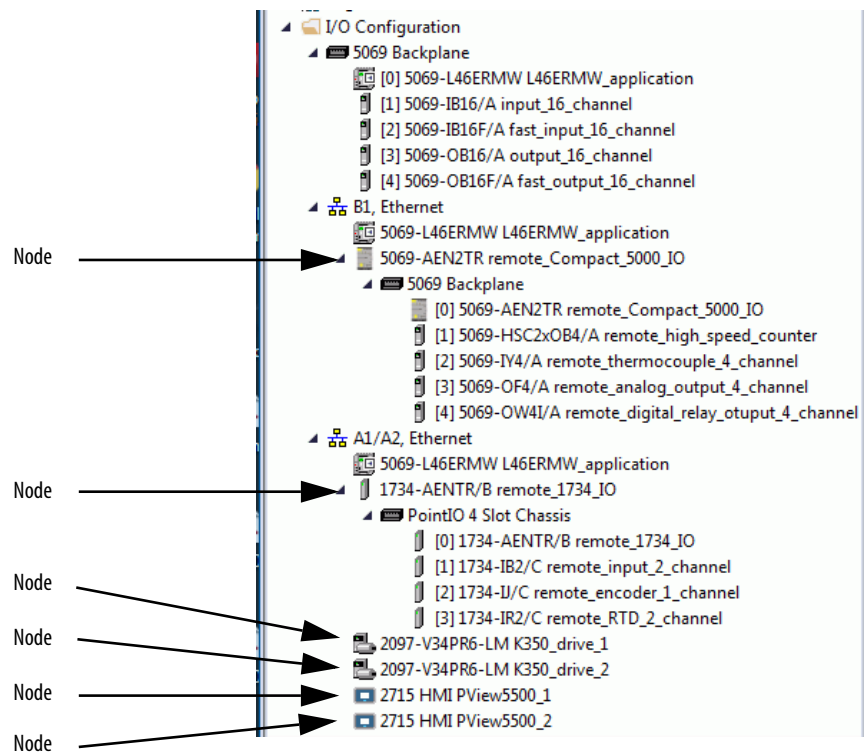
## Devices Excluded from the Node Count

When you calculate the EtherNet/IP node limitation of a controller, do not count devices that exist on the EtherNet/IP network but are not added to the I/O configuration section.

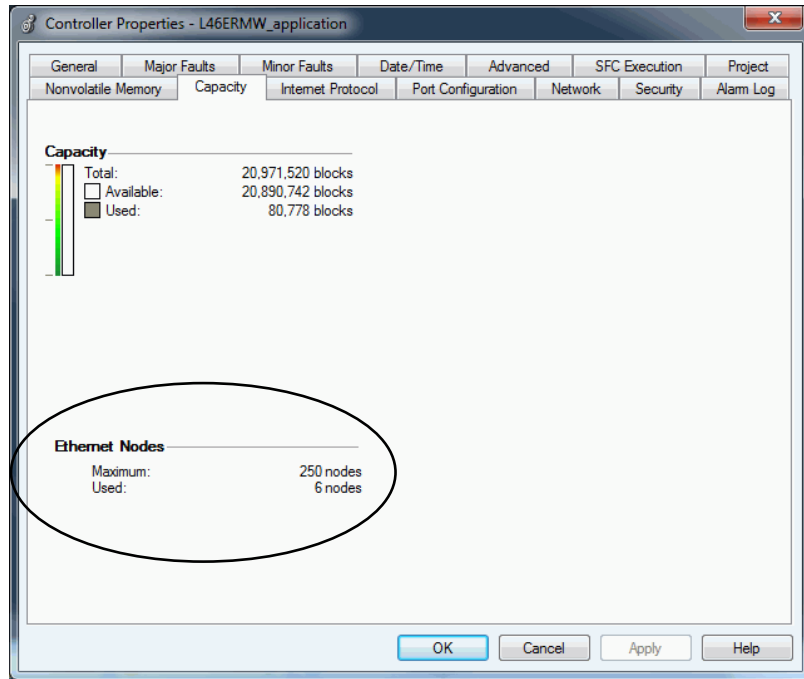
The following devices are **not added** to the I/O configuration section and are **not counted** among the number of nodes:

- Computer
- HMIs that are not added to the I/O configuration section
- Devices that are the target of MSG Instructions but were not added to the I/O configuration section
- Standard Ethernet devices with which the controller communicates via a socket interface

**Figure 13 - Example EtherNet/IP Nodes**



The Capacity tab in the Controller Properties dialog box tracks the number of Ethernet nodes that are used in a project. This graphic is representative of the project that is shown in [Figure 13](#).



## EtherNet/IP Network Topologies

CompactLogix 5480 controllers support these EtherNet/IP network types:

- [DLR Network Topology](#)
- [Linear Network Topology](#)
- [Star Network Topology](#)

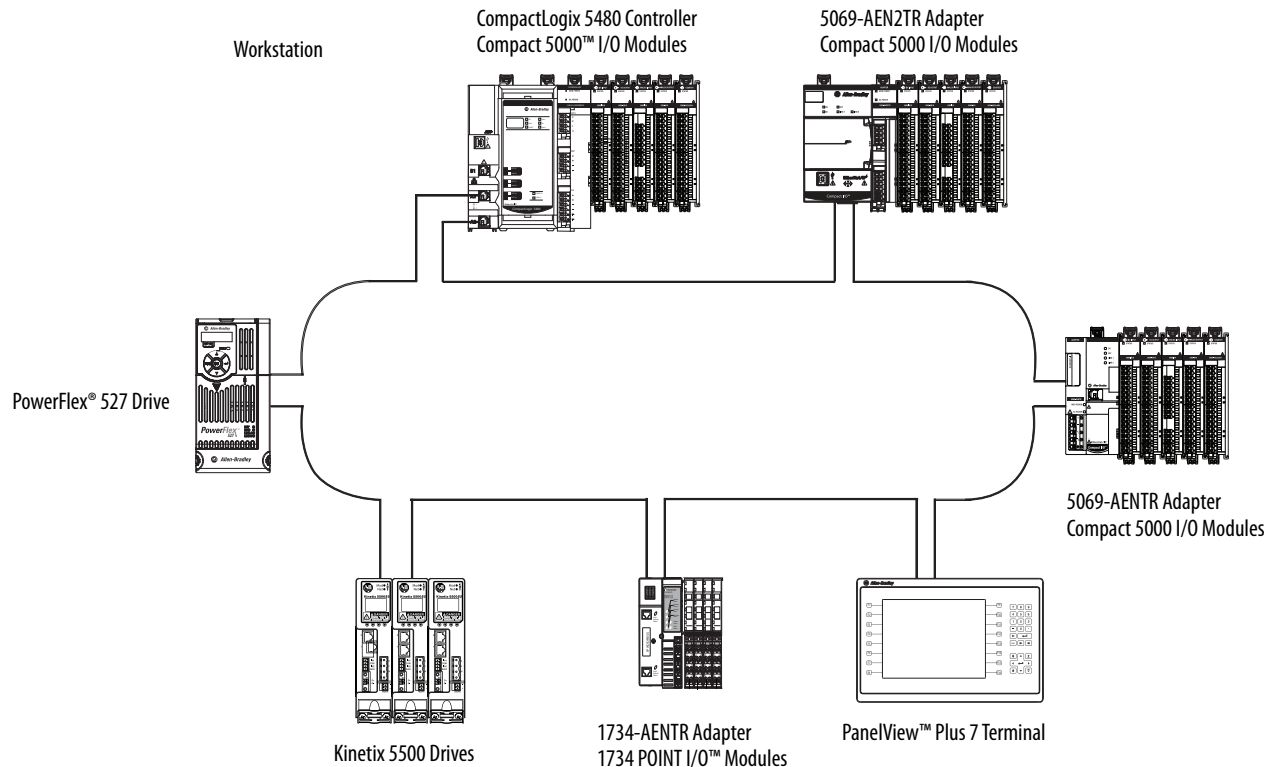
### DLR Network Topology

A DLR network topology is a single-fault tolerant ring network that is intended for the interconnection of automation devices. A DLR network uses Supervisor (Active and Backup) nodes and Ring nodes.

DLR network topologies automatically convert to linear network topologies when a fault is detected. The conversion to the new network topology maintains communication of data on the network. The fault condition is typically easily detected and corrected.

The controller is typically in Linear/DLR mode when it is used in a DLR topology. If the controller operates in Dual-IP mode, it must connect to a DLR topology via a 1783-ETAP that is connected to an Ethernet port on the controller.

**Figure 14 - CompactLogix 5480 Controller in a DLR Network Topology**

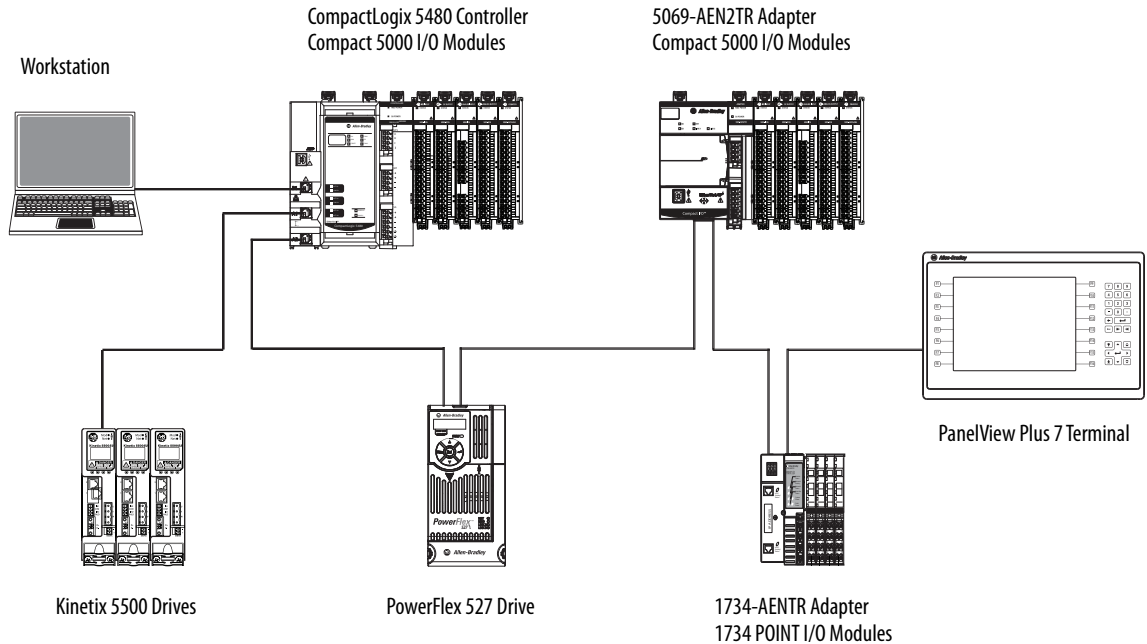


For more information on how to design a DLR network, see the EtherNet/IP Embedded Switch Technology Application Guide, publication [ENET-AP005](#).

## Linear Network Topology

A linear network topology is a collection of devices that are daisy chained together across an EtherNet/IP network. Devices that can connect to a linear network topology use embedded switch technology to eliminate the need for a separate switch, as required in Star network topologies.

**Figure 15 - CompactLogix 5480 Controller in a Linear Network Topology**

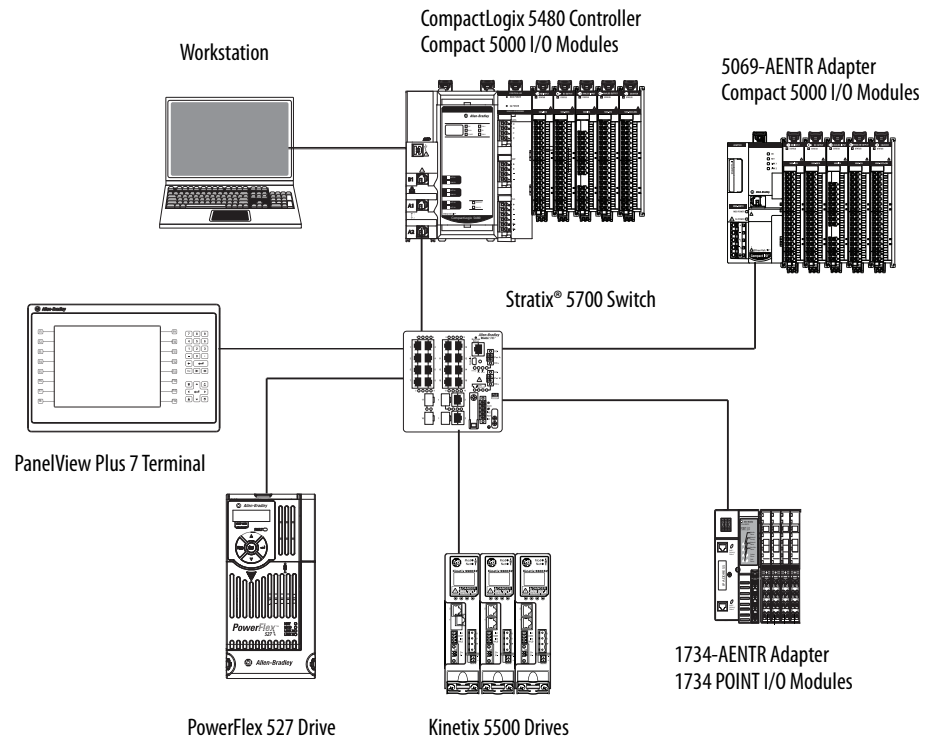


For more information on how to design a DLR network, see the EtherNet/IP Embedded Switch Technology Application Guide, publication [ENET-AP005](#).

## Star Network Topology

A star network topology is a traditional EtherNet/IP network that includes multiple devices that are connected to each other via an Ethernet switch.

**Figure 16 - CompactLogix 5480 Controllers in a Star Network Topology**



## Integrated Architecture Tools

For more information when you design your CompactLogix 5480 system, see the Integrated Architecture® Tools and Resources webpage. For example, you can access the Popular Configuration Drawings with different EtherNet/IP network topologies.

The tool and resources are available at: <http://www.rockwellautomation.com/global/products-technologies/integrated-architecture/tools/overview.page>

## EtherNet/IP Network Communication Rates

The CompactLogix 5480 controllers support the following EtherNet/IP network communication rates:

- 10 Mbps
- 100 Mbps
- 1 Gbps

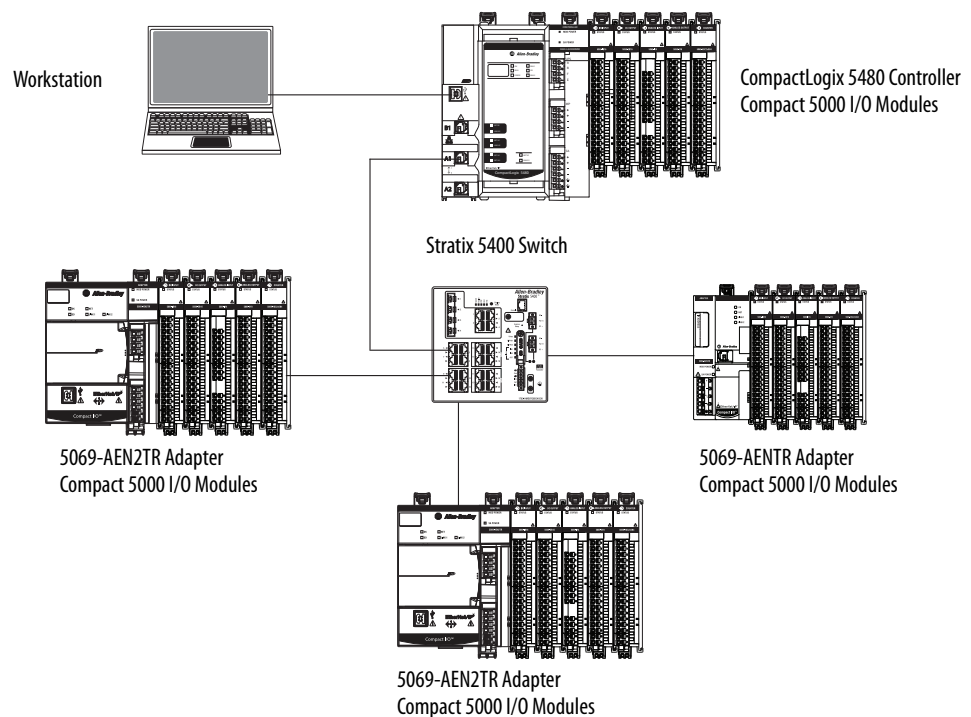
Network performance in a CompactLogix 5380 system is optimal if the 1-Gbps network communication rate is used. However, many Ethernet devices do not support the 1-Gbps network communication rate. Instead, they support a maximum rate of 100 Mbps.

The difference in maximum network communication rates impacts your CompactLogix 5480 system. In some applications, the difference restricts you from using the 1-Gbps network communication rate on a CompactLogix 5480 controller.

When you design a CompactLogix 5480 system and consider using the 1-Gbps network rate on the controller, remember the following:

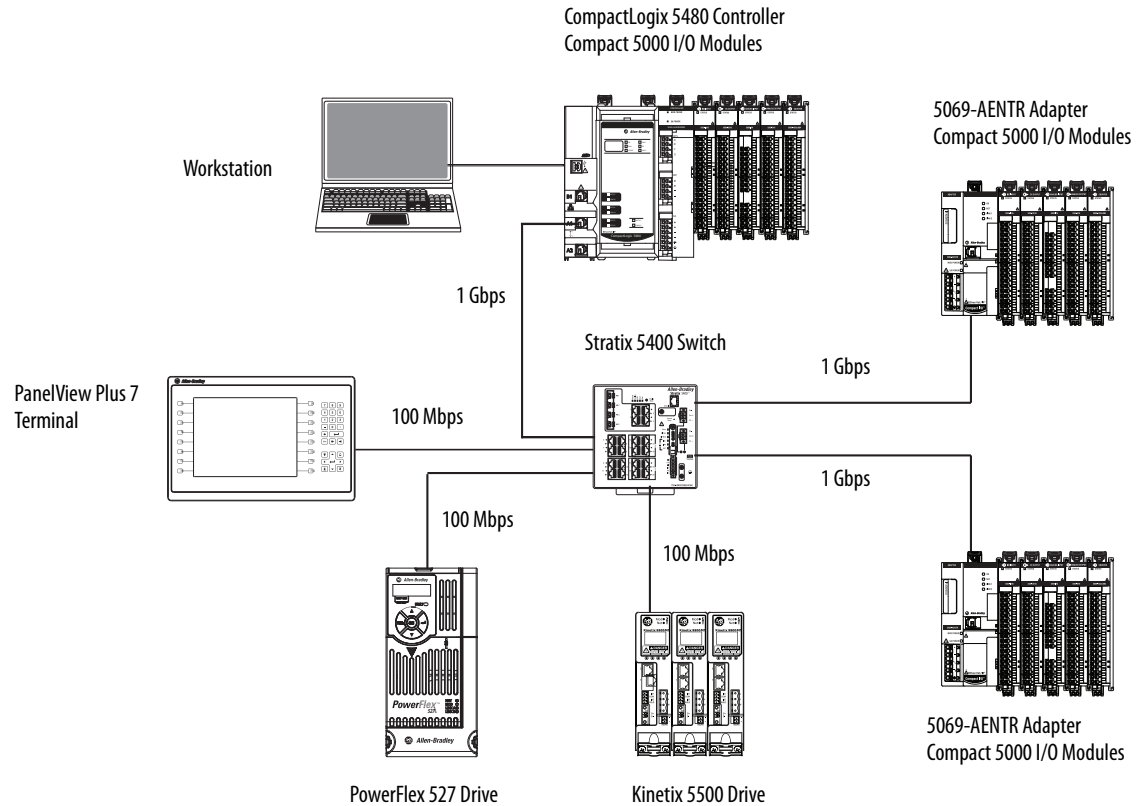
- You can use the 1-Gbps network communication rate on the controller ports when all network devices support the 1 Gbps, for example, 5069-AEN2TR adapters with Compact 5000™ I/O modules.

When you use the 1-Gbps network communication rate for all devices on the network, configure the controller ports to use Auto-Negotiate.



- You can use the 1-Gbps network communication rate on the controller ports when some network devices support a maximum network communication rate of 100 Mbps. However, in this case, the controller **must be connected** to those devices through a **managed switch**.

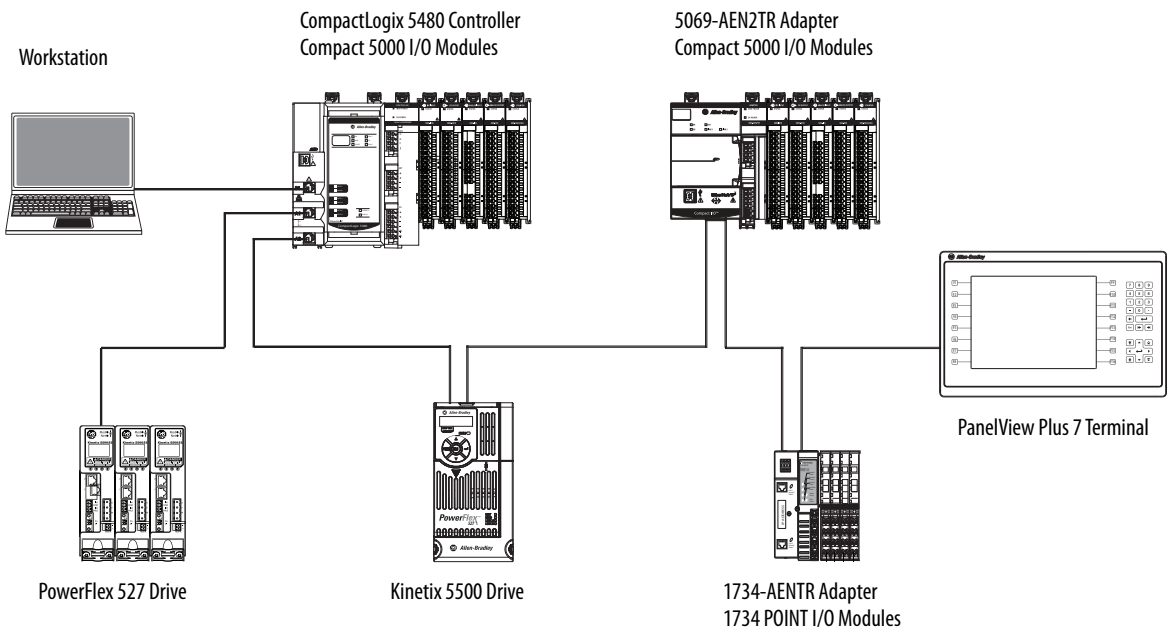
The port to which the controller is connected must be configured for Auto-Negotiate and support the 1-Gbps network communication rate.



We **strongly recommend** that you do not use the 1-Gbps network communication rate if the controller operates on a linear or DLR network and at least one device on the network has a 100-Mbps maximum network communication rate.

That is, do not use different network communication rates on device ports in the same EtherNet/IP network without a managed switch.

In this example, all network communication on this network uses the 100-Mbps rate. You must set each device to a fixed speed of 100 Mbps.

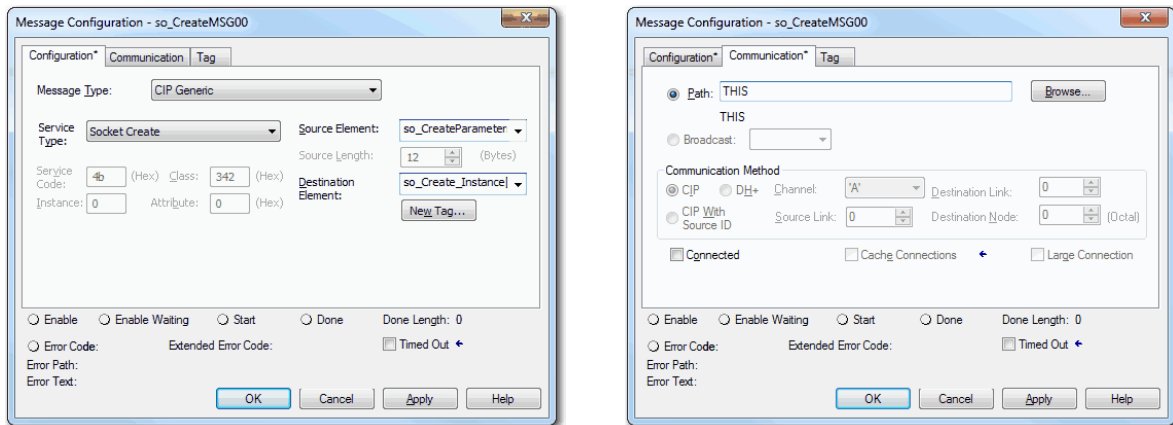




## Socket Interface

The controller can use socket interfaces to communicate with Ethernet devices that do not support the EtherNet/IP application protocol. The socket interface is implemented via the Socket Object. The controller communicates with the Socket Object via MSG instructions.

You must use MSG instructions that configure and operate the socket interface as Unconnected, and use the Message to Self path. To communicate with another device, you must understand the application protocol of the other device. The following are example screens of an MSG instruction that is used with a socket interface.



The CompactLogix 5480 controllers support up to 32 socket instances.

**IMPORTANT** Keep the following in mind when you use sockets with CompactLogix 5480 controllers:

- A significant difference between CompactLogix 5480 controllers and other Logix 5000™ controllers is the communication path. CompactLogix 5480 controllers do not require a separate EtherNet/IP network communication module, for example, a 1756-EN2TR communication module. With a CompactLogix 5480 controller, the MSG instruction is sent to the controller itself by using the path 'THIS'.
- All Logix 5000 controllers must use unconnected MSG instructions for socket servers. When you configure a message for a CompactLogix 5480 controller, make sure that the Connected checkbox on the Message Configuration dialog box is cleared.
- When the controller operates in Dual-IP mode and uses a Socket Object, you can use an IP address with a Socket\_Create service type.

For more information on the socket interface, see EtherNet/IP Socket Interface Application Technique, publication [ENET-AT002](#).

**Notes:**

## Connect to Different EtherNet/IP Network Levels

Topic	Page
Available Network Levels	131
Connect to an Enterprise-level Network	133
Connect to a Device-level Network	134
EtherNet/IP Modes with Ports A1 and A2	135
Overlapping IP Address Ranges	138
Configure the EtherNet/IP Modes	140
Change the EtherNet/IP Mode	148
Software Display Differences for EtherNet/IP Modes	158

This chapter describes the different EtherNet/IP™ network levels and how the CompactLogix™ 5480 controller can connect to them.

### Available Network Levels

The CompactLogix 5480 controller can connect to the following EtherNet/IP network levels:

- Enterprise-level network
- Device-level networks

The advantage of connecting to separate network levels is that you can segment the networks and isolate the communication on each. For example, communication that is required for the controller to execute a task is restricted to the device-level network.

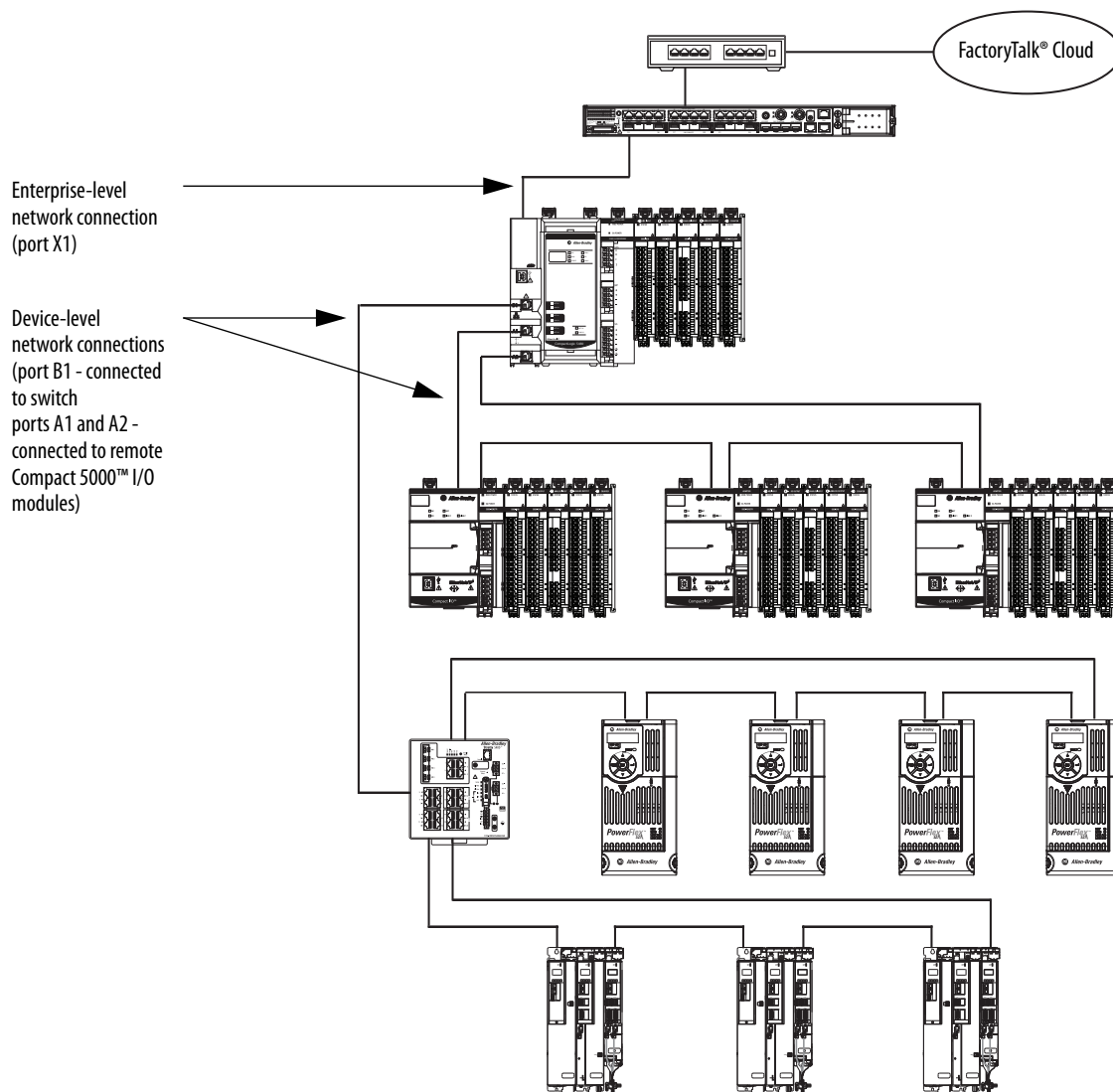
Network segmentation and the resulting communication isolation can help provide enhanced security in your application. Additionally, the option to connect to separate network levels helps you organize the networks in your application in a more logical manner.

The controller connects to the network levels via the Ethernet ports. The ports function as follows:

- **Port X1** - Connect to an enterprise-level network only. You can only use this port with the COS.
- **Port B1** - Connect to an enterprise-level or a device-level network.
- **Ports A1 and A2** - Connect to device-level networks only. In DLR/Linear mode, the ports can connect to the same EtherNet/IP network. In **Dual-IP mode**, ports A1 and A2 connect to separate EtherNet/IP networks, that is, **different subnets**.

Figure 17 shows an example application in which the controller is connected to an enterprise-level network and device-level networks.

Figure 17 - CompactLogix 5480 System Connected to Enterprise-level and Device-level Networks



## Connect to an Enterprise-level Network

The CompactLogix 5480 controller Ethernet **ports B1 and X1** can connect to an **enterprise-level network**. A port that is connected to an enterprise-level network is also known as an uplink port.

Remember the following when you connect to an enterprise-level network:

- You can connect only one port to an enterprise-level network at a time.
- When you set the IP address and subnet mask, you establish an IP address range for the port. Make sure that the IP address ranges that are established for each port on the controller do not overlap.

For more information on overlapping IP address ranges, see [page 138](#).

When you connect a port to an enterprise-level network, you configure the following parameters:

- IP address (Required)
- Subnet mask, also called the network mask (Required)
- Gateway address (Optional)
- Host name (Optional)
- Domain name (Optional)
- Primary DNS server address (Required if your controller makes DNS requests.)
- Secondary DNS server address (Required if your controller makes DNS requests.)

## Connect to a Device-level Network

The CompactLogix 5480 controller Ethernet ports A1, A2, and B1 can connect to device-level networks. Remember the following when you connect to device-level networks:

- You are not required to connect the controller to an enterprise-level network to connect to device-level networks.
- You can connect any combination of ports A1, A2, or B1 to device-level networks.
- When you set the IP address and subnet mask, you establish an IP address range for the port. Make sure that the IP address ranges that are established for each port on the controller do not overlap.

For more information on overlapping IP address ranges, see [page 138](#).

When you connect a port to a device-level network, you configure the following parameters:

- IP address (Required)
- Subnet mask, also called the network mask (Required)
- Gateway address (Optional)
- Host name (Optional)

### Ports A1 and A2

Ports A1 and A2 can connect to the same device-level network or separate device-level networks. The EtherNet/IP mode determines if the ports are connected to the same network or different ones.

- If the controller uses **Dual-IP mode**, ports A1 and A2 connect to separate device-level networks, that is, **different subnets**. You must configure the parameters that are listed earlier in this section for each port.
- If the controller uses **Linear/DLR mode**, ports A1 and A2 connect to the same device-level network. In the Logix Designer application project, the ports are port A1/A2 and use one sets of the parameters that are listed earlier in this section.

For more information on EtherNet/IP modes, see [page 135](#).

## Port B1

When you connect port B1 to a device-level network, you only configure the parameters that are listed earlier in this section. The EtherNet/IP mode choice does not impact port B1 use.

## EtherNet/IP Modes with Ports A1 and A2

The EtherNet/IP mode choice determines if you connect port A1 and port A2 to the same device-level network or different device-level networks. The following EtherNet/IP modes are available:

- [Dual-IP Mode](#)
- [Linear/DLR Mode](#)

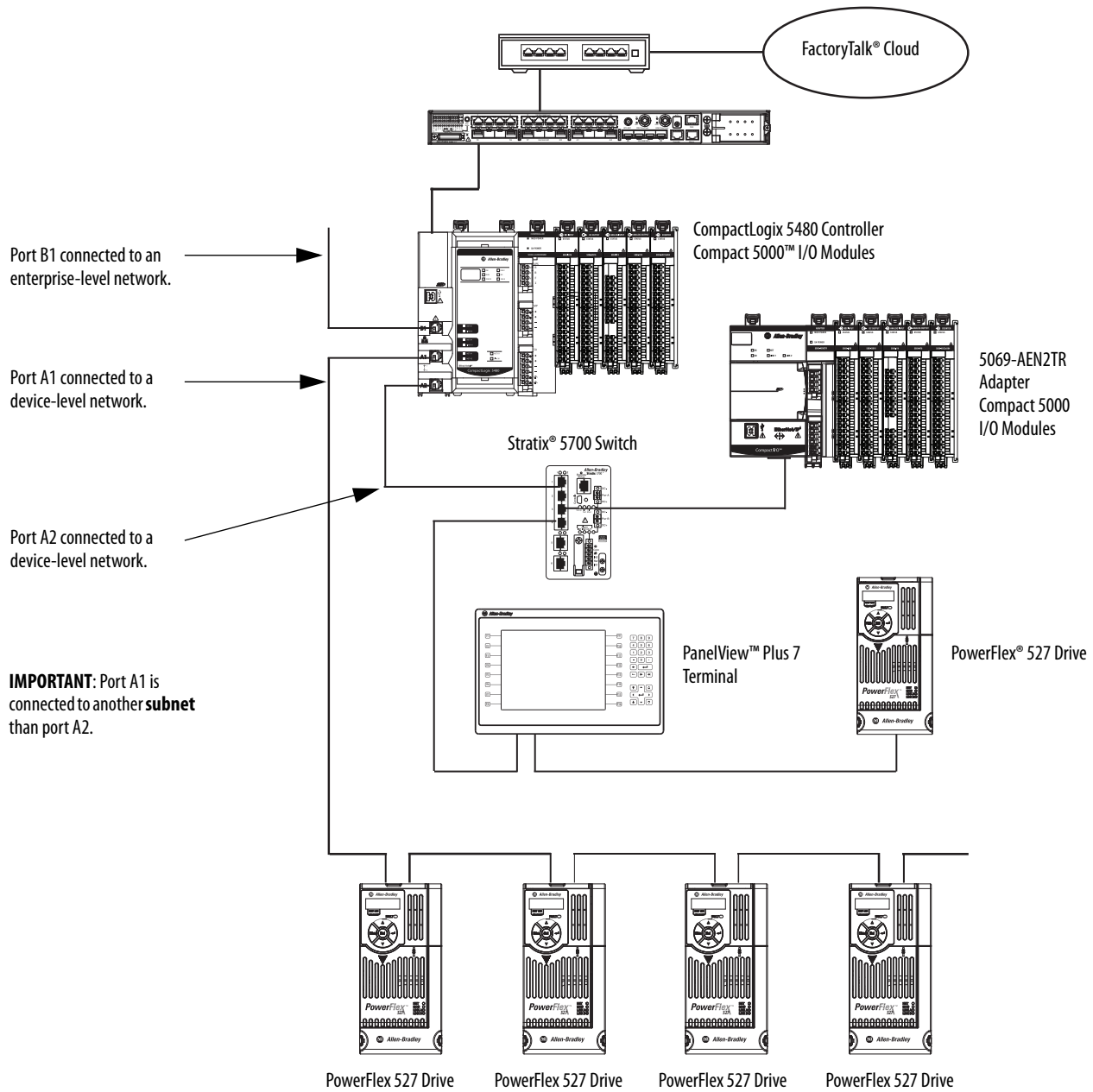
### Dual-IP Mode

Dual-IP mode lets you connect **port A1 and port A2** connect to separate device-level networks, that is, **different subnets**. The CompactLogix 5480 controller uses Dual-IP mode by default.

In this mode, each port requires its own network configuration. For more information on how to configure the Ethernet ports when the controller uses Dual-IP mode, see [Configure the EtherNet/IP Modes on page 140](#).

Figure 18 shows an example of a CompactLogix 5480 controller in Dual-IP mode with port B1 connected to an enterprise-level network.

Figure 18 - CompactLogix 5480 Controller in Dual-IP Mode





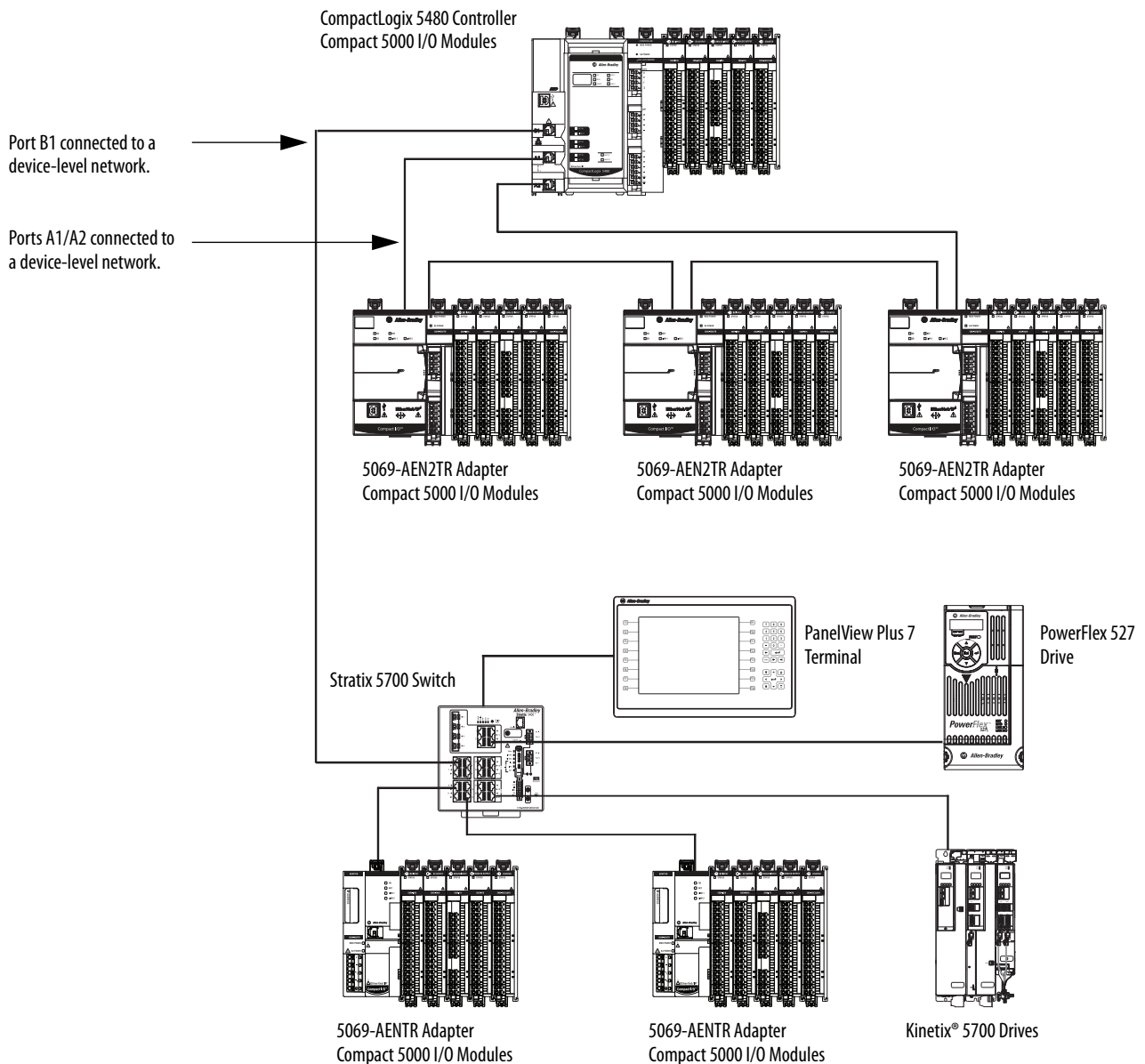
## Linear/DLR Mode

Linear/DLR mode lets you connect port A1 and port A2 to the same device-level network.

**IMPORTANT** The CompactLogix 5480 controller is set to Dual-IP mode by default. You must change the EtherNet/IP Mode to use Linear/DLR mode. For more information on how to change the controller EtherNet/IP mode, see [page 148](#).

[Figure 19](#) shows an example of a CompactLogix 5480 controller in Linear/DLR mode with a second device-level connection via port B1.

**Figure 19 - CompactLogix 5480 Controller in Linear/DLR Mode**



## Overlapping IP Address Ranges

The IP address and subnet mask values that you assign to an Ethernet port establish an IP address range for the port. The subnet mask value is used to establish the Network part of the IP address.

An IP address range is established whether the port is connected to an enterprise-level network or device-level network.

Overlapping IP address ranges occurs when any IP address from one range is also present in another IP address range. The Network parts **cannot** overlap across the Ethernet ports.

This example describes conditions in which IP address ranges do not overlap. The following conditions exist in the examples:

- Port X1 is connected to an enterprise-level network.
- Port B1 is connected to a device-level network.
- Ports A1/A2 are connected to a device-level network and use the same IP address.

---

**IMPORTANT** Ports A1/A2 use the same IP address because the EtherNet/IP mode is Linear/DLR mode. Only one IP address range is established for the ports. If the EtherNet/IP mode is Dual-IP, a separate IP address is required for each port to use on an EtherNet/IP network. Separate IP address ranges are established for each network. In this case, you must make sure that there is no IP overlapping across four IP address ranges.

---



---

### EXAMPLE IP Address Ranges Do Not Overlap

The table describes port X1, port B1, and port A1/A2 configurations that use IP address ranges that do not overlap.

None of the IP addresses in each port IP address range exists in the IP address ranges for any other ports.

Port Number	IP Address	Subnet Mask/ Network Mask	IP Address Range (Low to High)
X1	192.168.1.5	255.255.255.0	192.168.1.1...192.168.1.254
B1	192.168.2.1	255.255.255.0	192.168.2.1...192.168.2.254
A1/A2	192.168.3.1	255.255.255.0	192.168.3.1...192.168.3.254

---

This example describes conditions in which IP address ranges do overlap.

---

**EXAMPLE** IP Address Ranges **Do Overlap**

The table describes port B1 and port X1 configurations use IP address ranges that do overlap.

All IP addresses in the port B1 IP address range are in the port X1 IP address range.

Port Number	IP Address	Subnet Mask/ Network Mask	IP Address Range (Low to High)
X1	192.168.1.5	255.255.252.0	192.168.0.1...192.168.3.254
B1	192.168.2.1	255.255.255.0	192.168.2.1...192.168.2.254
A1/A2	192.168.4.1	255.255.255.0	192.168.4.1...192.168.4.254

---

The difference between the port configurations in the examples is the Subnet Mask/Network Mask value for port X1. That is, in the first example, the port X1 Subnet Mask/Network Mask value is 255.255.255.0. In the second example, the value 255.255.252.0.

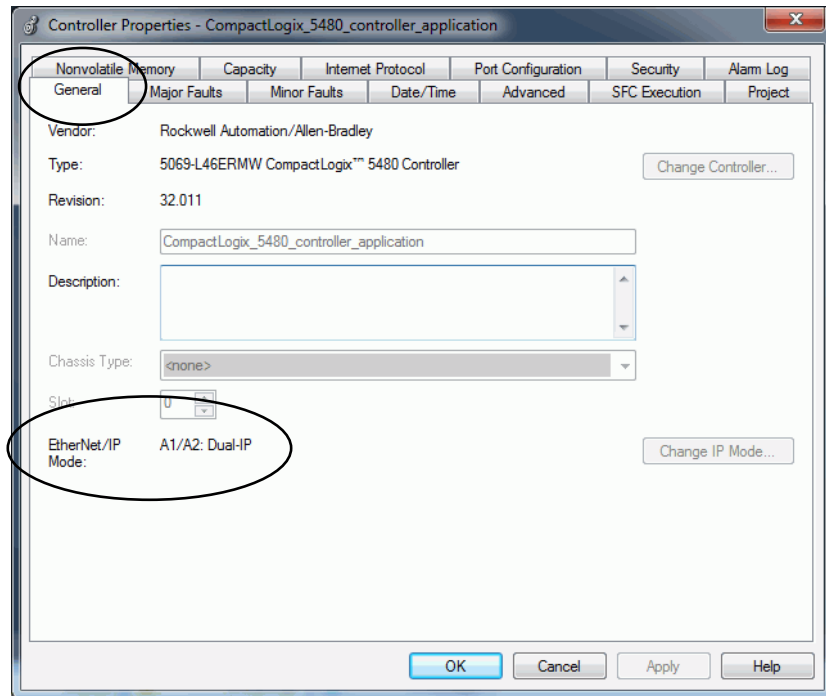
## Configure the EtherNet/IP Modes

You can configure the EtherNet/IP modes with the following:

- Logix Designer application
- RSLinx® Classic software

### Configure Dual-IP Mode in the Logix Designer Application

In the Logix Designer application, the EtherNet/IP Mode is Dual-IP by default and is displayed on the General tab in the Controller Properties dialog box.



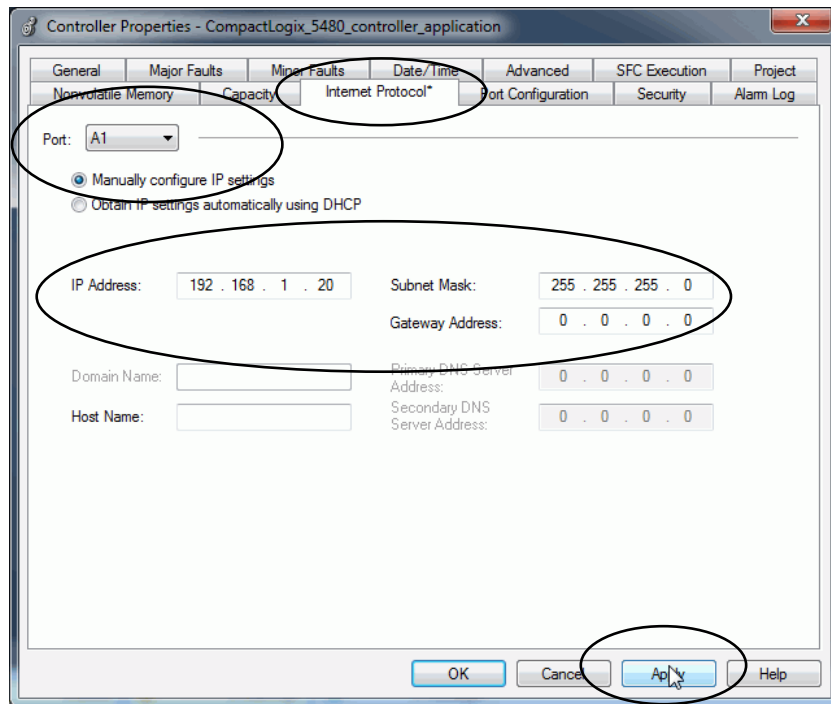
You set the IP address and Subnet Mask on the Internet Protocol tab.

**TIP** When you set the IP address and Subnet Mask, we recommend that you use a USB connection from the workstation to the controller.

1. Confirm that the project is online.
2. Confirm that the controller is in one of the following modes:
  - Program mode
  - Remote Program mode
  - Remote Run mode

You cannot change the IP Address or Subnet Mask if the controller is in Run mode.

3. Access the Controller Properties.
4. On the Internet Protocol tab, click Manually configure IP settings.
5. From the Port pull-down menu, choose A1.
6. Assign IP Address and Network Mask values, and click Apply.

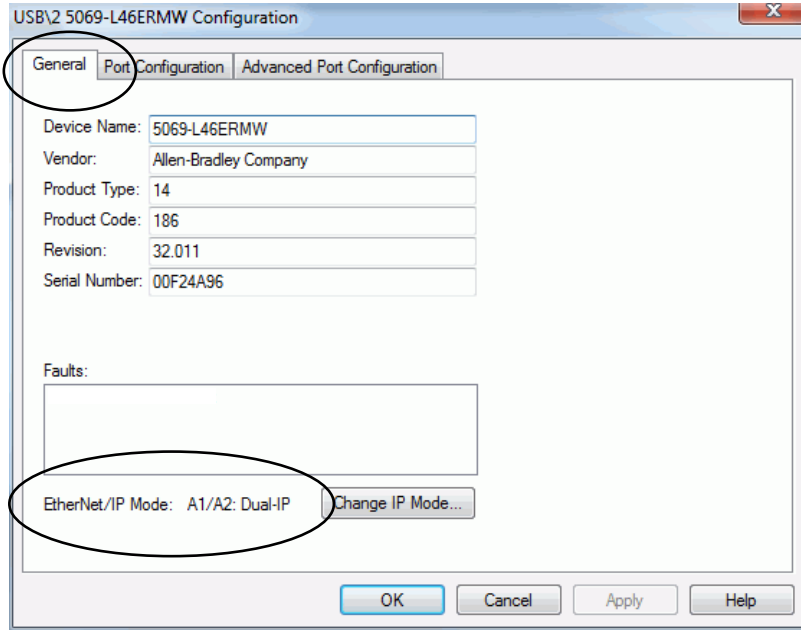


7. Repeat the previous steps, beginning at [step 5](#)

In [step 5](#), make sure that you choose A2 from the Port pull-down menu.

## Configure Dual-IP Mode in RSLinx Classic Software

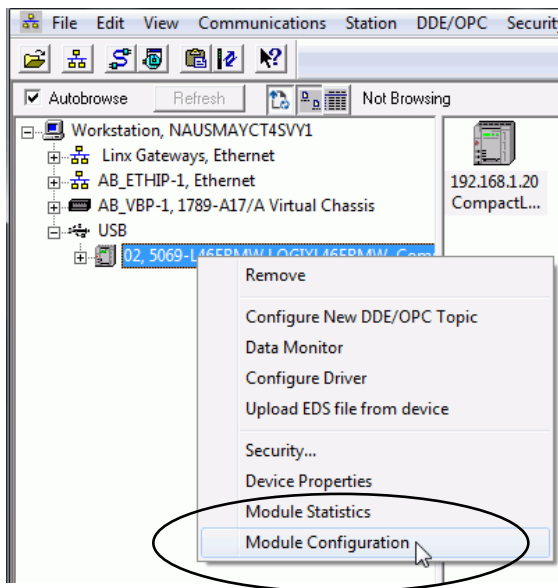
In RSLinx Classic software, the IP Mode for which the controller is configured is displayed on the General tab in the Configuration dialog box.



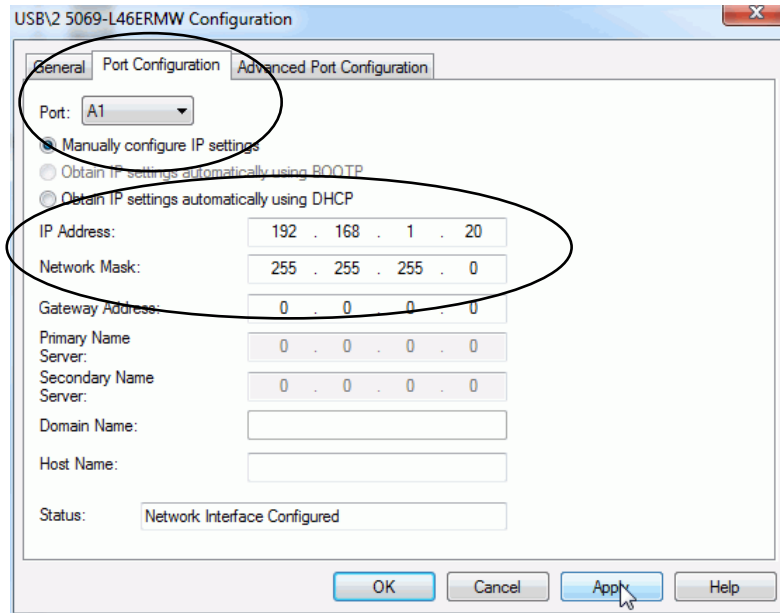
You set the IP Address and Network Mask on the Port Configuration tab.

**TIP** When you set the IP address and Subnet Mask, we recommend that you use a USB connection from the workstation to the controller.

1. Right-click the controller and choose Module Configuration.



2. On the Port Configuration tab, click Manually configure IP settings.
3. From the Port pull-down menu, choose A1.
4. Assign IP Address and Network Mask values, and click Apply.



5. Repeat the steps.

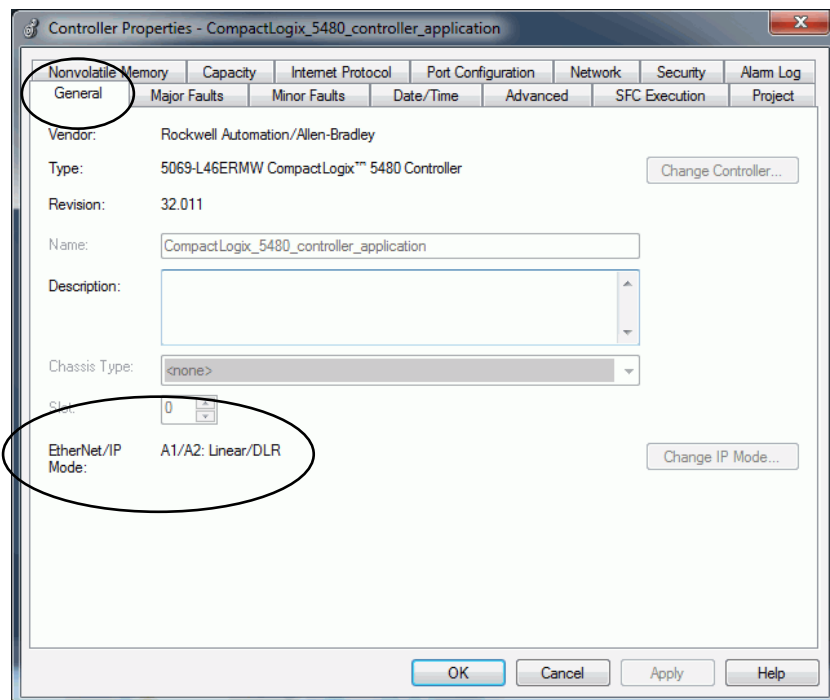
In [step 1](#), make sure that you choose A2 from the Port pull-down menu.

## Configure Linear/DLR Mode in the Logix Designer Application

The EtherNet/IP mode is Dual-IP by default. You must change the mode to use Linear/DLR mode.

For more information on how to change the controller EtherNet/IP mode, see [Change the EtherNet/IP Mode on page 148](#).

After you change the EtherNet/IP mode to Linear/DLR mode, the new mode choice is displayed on the General tab in the Controller Properties dialog box.



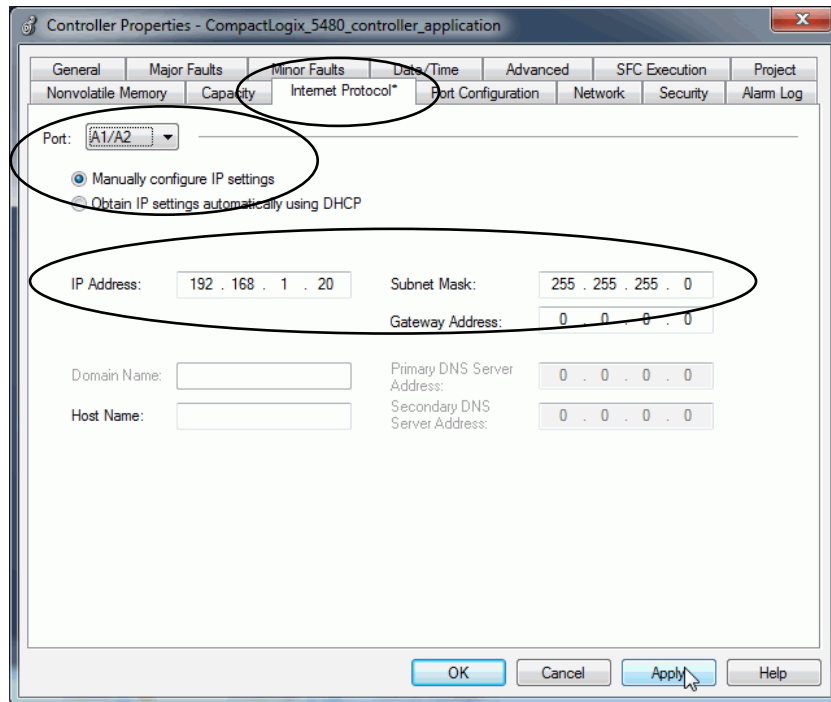


You set the IP Address and Subnet Mask on the Internet Protocol tab.

1. Confirm that the project is online.
2. Confirm that the controller is in one of the following modes:
  - Program mode
  - Remote Program mode
  - Remote Run mode

You cannot change the IP Address or Subnet Mask if the controller is in Run mode.

3. Access the Controller Properties dialog box.
4. On the Internet Protocol tab, click Manually configure IP settings.
5. From the Port pull-down menu, choose A1/A2.
6. Assign IP Address and Network Mask values, and click Apply.

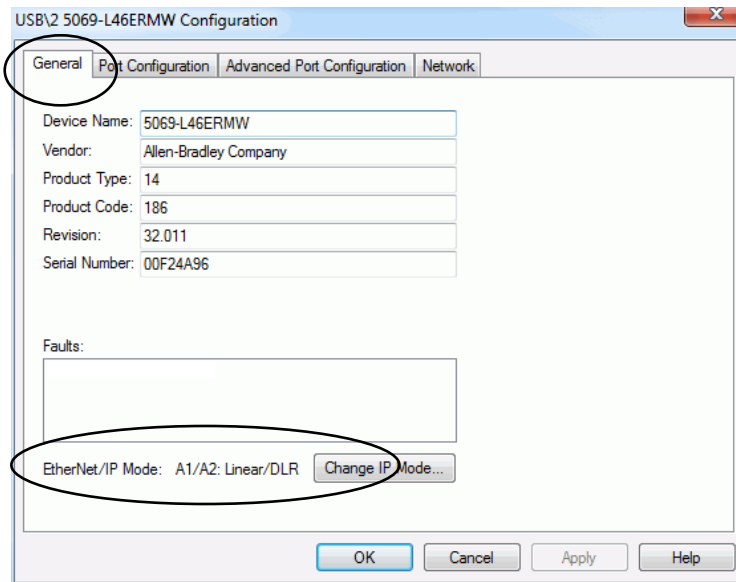


## Configure Linear/DLR Mode in RSLinx Classic Software

Remember, the EtherNet/IP Mode is Dual-IP by default. You must change the mode to use Linear/DLR mode.

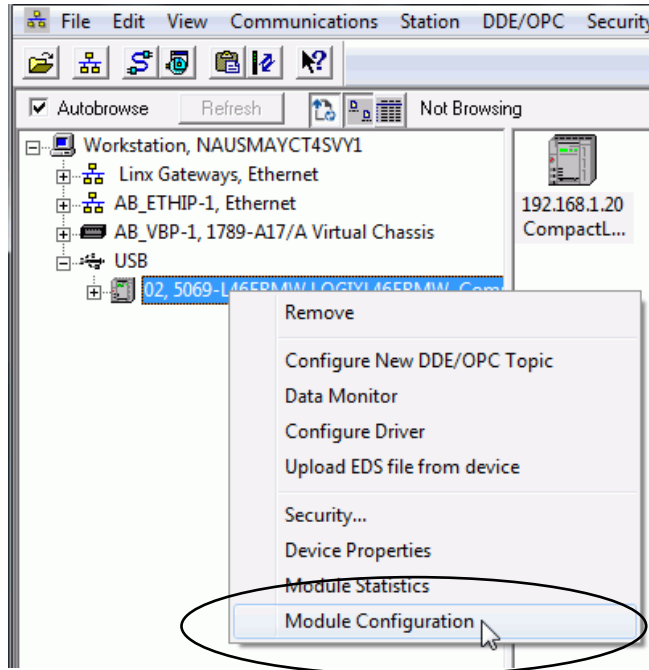
For more information on how to change the controller EtherNet/IP mode, see [Change the EtherNet/IP Mode on page 148](#).

The new mode choice is displayed on the General tab in the Controller Properties dialog box.

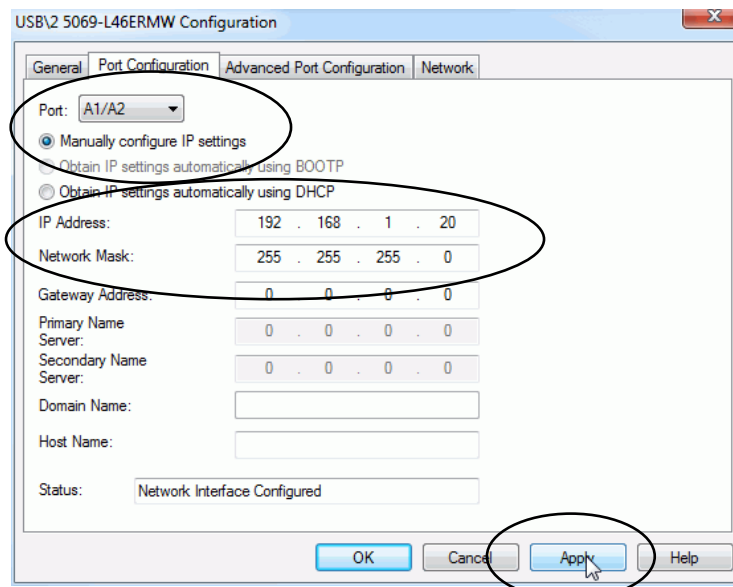


You set the IP Address and Subnet Mask on the Internet Protocol tab.

1. Confirm that the project is online.
2. Right-click the controller and choose Module Configuration.



3. On the Port Configuration tab, click Manually configure IP settings.
4. From the Port pull-down menu, choose A1/A2.
5. Assign IP Address and Network Mask values, and click Apply.



## Change the EtherNet/IP Mode

You can change the EtherNet/IP mode in the Logix Designer application or RSLinx Classic software.

**IMPORTANT** Remember the following:

- Exercise caution when you change the EtherNet/IP mode on your controller, and consider the possible effects of the change.
- You cannot change the controller EtherNet/IP mode from Dual-IP to Linear/DLR when you are connected through port A1 port. You must be connected to the controller via port A2 to change from Dual-IP mode to Linear/DLR mode.

The effects of changing the EtherNet/IP mode are different based on mode change. Make sure that you are aware of them before changing the EtherNet/IP mode.

**Table 9 - Effect of Changing the EtherNet/IP Mode**

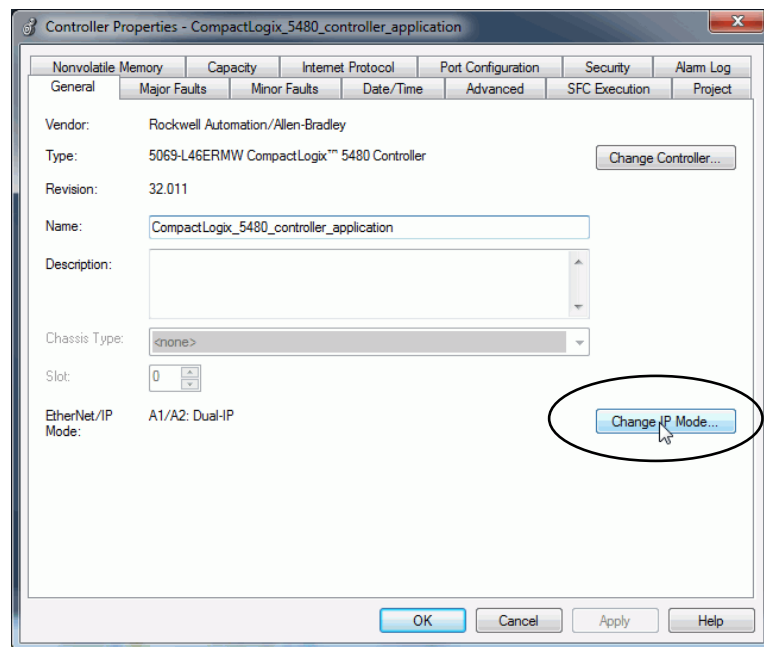
EtherNet/IP Mode Change	Effects
Dual-IP Mode to Linear/DLR Mode	<ul style="list-style-type: none"> <li>• The port A2 IP address, network mask, default gateway settings are applied to the A1/A2 port.</li> <li>• The MAC address of port A1 is applied to port A1/A2.</li> <li>• Attempts to change from Dual-IP mode to Linear/DLR mode are only successful if the I/O configuration section in at least one port does not contain modules.</li> </ul> <p>If the I/O configuration section for both ports includes modules, you cannot change the EtherNet/IP mode from Dual-IP mode to Linear/DLR mode.</p>
Linear/DLR Mode to Dual-IP Mode	<ul style="list-style-type: none"> <li>• The port A1/A2 IP address, network mask, default gateway settings are applied to port A2. Other port A1/A2 settings, for example, DNS servers and Domain Name, are lost.</li> <li>• The port A1/A2 MAC address is applied to port A1. A separate MAC address is applied to Port A2.</li> <li>• Port A1 is DHCP-enabled.</li> <li>• The I/O Configuration section in the Logix Designer application project is automatically assigned to port A1.</li> </ul> <p>You can change the I/O configuration in the Logix Designer application project to assign it to port A2.</p>

## Change the EtherNet/IP Mode in the Logix Designer Application

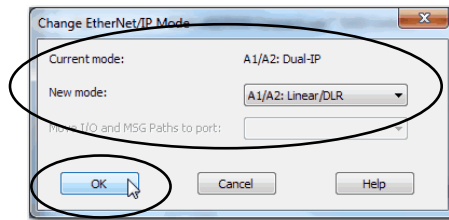
**IMPORTANT** This example shows the EtherNet/IP mode change from Dual-IP mode to Linear/DLR mode. The same tasks apply to change from Linear/DLR mode to Dual-IP mode.

To change the EtherNet/IP mode in the Logix Designer application, complete the following steps.

1. Confirm that the project is offline.
2. Access the Controller Properties dialog box.
3. On the General tab, click Change IP Mode.



- From the New mode pull-down menu, choose the new mode and click OK.



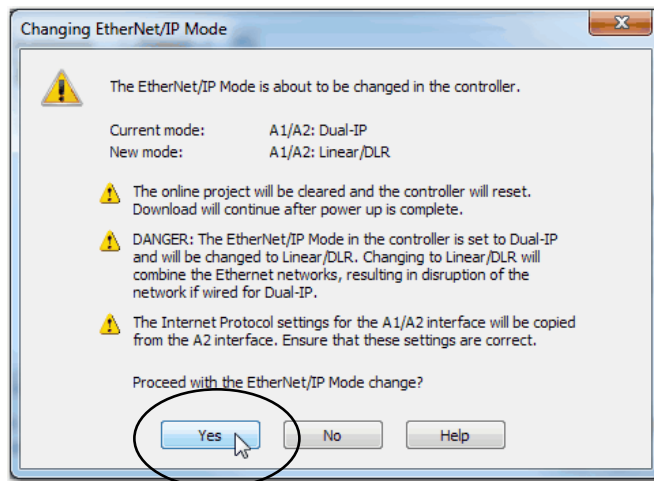
- Click OK on the Controller Properties dialog box.
- Save the project.
- Download the updated project to the controller.
- If the following warning appears, read it carefully and click Yes to continue.

---

**IMPORTANT** Before you change the EtherNet/IP mode, make sure that you understand the impact on your controller when you change the mode.

For more information on the impact of changing the EtherNet/IP mode, see [Table 9 on page 148](#).

---



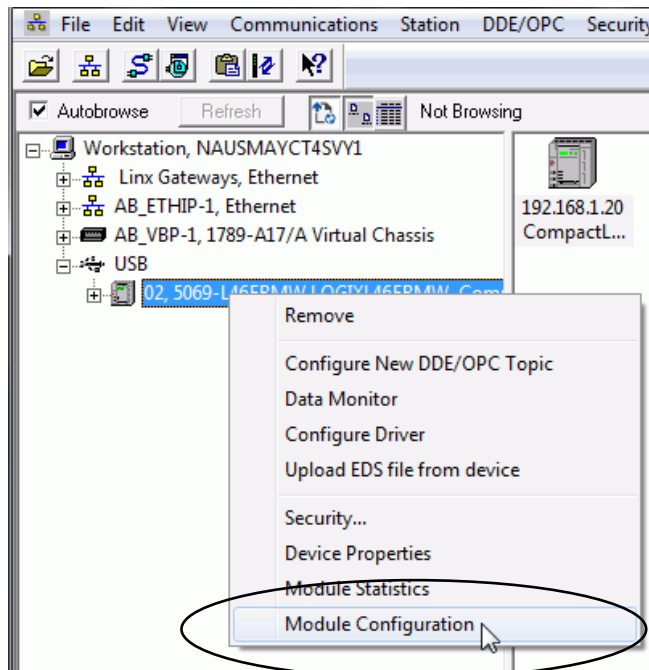
## Change the EtherNet/IP Mode in RSLinx Classic Software

To change the EtherNet/IP mode in RSLinx Classic software, complete the following steps.

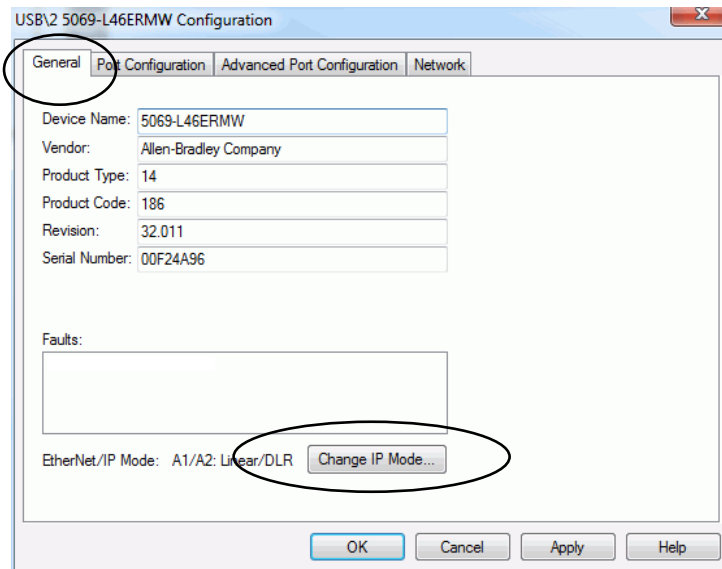
1. Confirm that the controller is online and there is no project in the controller.
2. Confirm that the controller is in one of the following modes:
  - Program mode
  - Remote Program mode
  - Remote Run mode

You cannot change the IP Address or Subnet Mask if the controller is in Run mode.

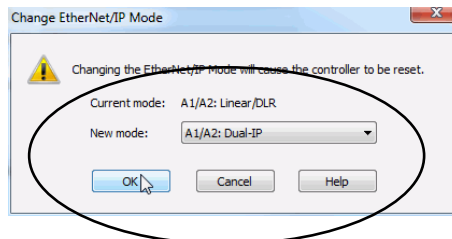
3. Right-click the controller and choose Module Configuration.



- On the General tab of the Configuration dialog box, click Change IP Mode.



- From the New mode pull-down menu, choose the new mode and click OK.

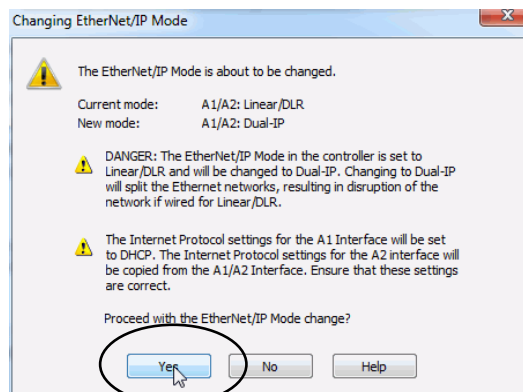


- If the following warning appears, read it carefully and click Yes to continue.

---

**IMPORTANT** Before you change the EtherNet/IP mode, make sure that you understand the impact of a mode change on your controller. For more information on the impact of changing the EtherNet/IP mode, see [Table 9 on page 148](#).

---



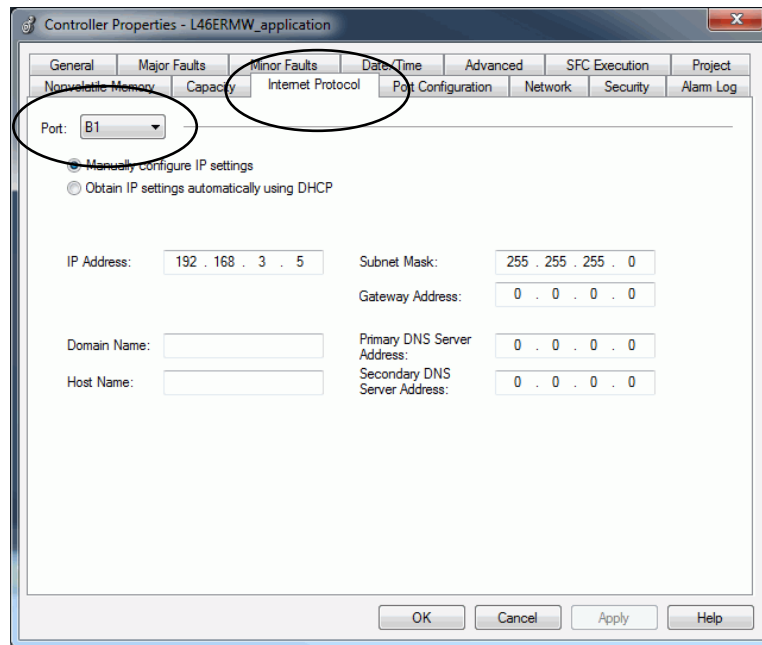


## Internet Protocol Configuration in Logix Designer Application

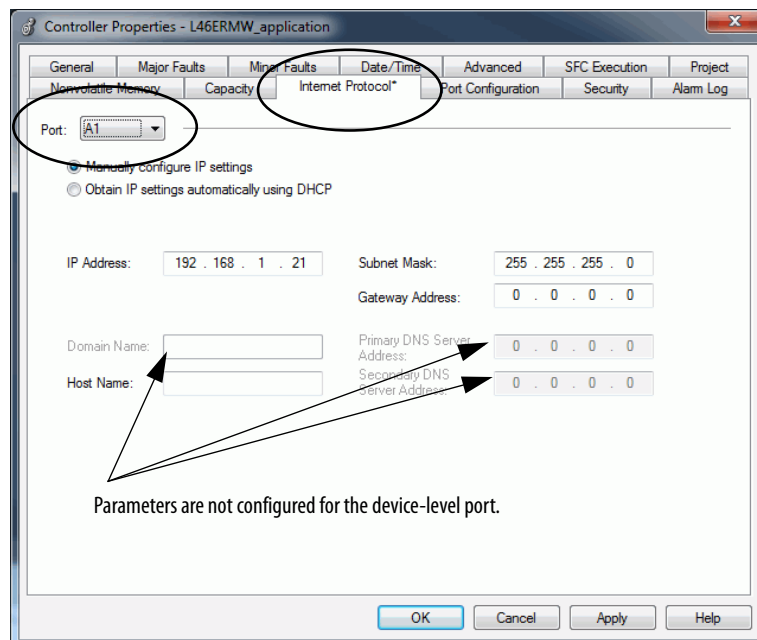
Figure 20 shows differences between Internet Protocol configurations on the controller in the Logix Designer application.

**Figure 20 - Differences Between Enterprise-level Port Configuration and Device-level Configuration**

### Enterprise-level Port



### Device-level Port

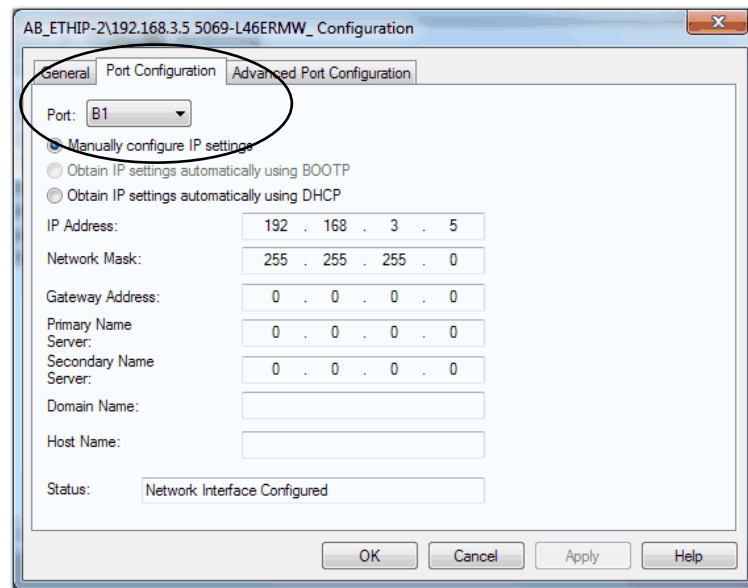


## Port Configuration in RSLinx Classic Software

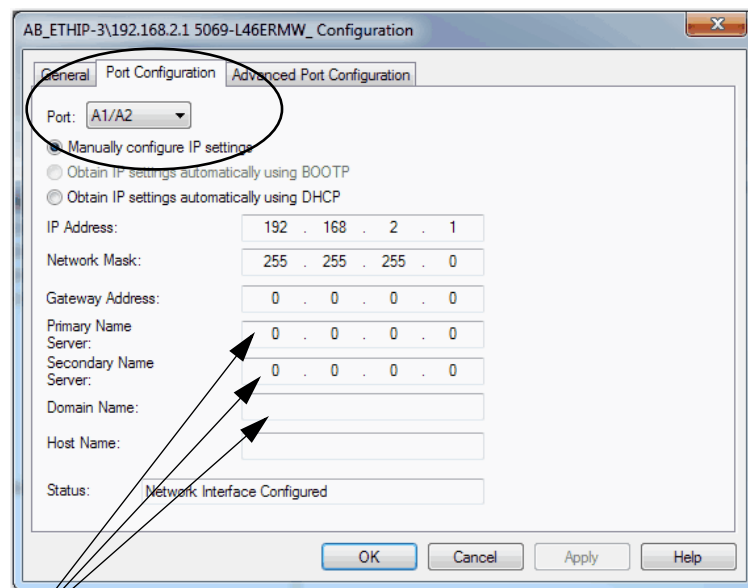
Figure 21 shows differences between port configurations on the controller in RSLinx Classic software.

Figure 21 - Differences Between Enterprise Port Configuration and Device-level Configuration

Enterprise-level port



Device-level port



Parameters are not configured for the device-level port.

## Controller Functionality Considerations

Remember the following controller functions when your controller is connected to an enterprise-level network and at least one device-level network:

- The controller does not support the following functions:
  - TCP routing or switching between the enterprise-level network and a device-level network.
  - CIP™ bridging of Class 0 packets between the enterprise-level network and a device-level network.
  - CIP bridging of Class 1 packets between the enterprise-level network and a device-level network.
- The controller supports the following functions:
  - CIP bridging for Class 3 CIP messages between the enterprise-level network and a device-level network.
  - CIP bridging for Unconnected CIP messages between the enterprise-level network and a device-level network.

## DNS Requests

Although you cannot configure the DNS servers or the domain name on a device-level port, it can use DNS requests. The device-level port uses the DNS servers and domain name from the enterprise port.

## DNS Request Routing

DNS requests can be generated from any port on the controller.

### *DNS Request Generated From Port B1*

- If the DNS server address is in the local subnet of port B1, DNS requests leave through B1 port.
- If port A1 and/or port A2 is enabled and the DNS server address is in the local subnet of either port, DNS requests leave through the respective port.

For example, if port A1 is enabled and the DNS server address is in the local subnet of port A1, DNS requests leave through port A1.

- If the DNS server address is outside of all local subnets, DNS requests leave through B1 port toward the port B1 default gateway.

### *DNS Request Generated From Port A1 or Port A2*

- If port B1 is enabled and the DNS server address is in local subnet of port B1, DNS requests leave through B1 port.
- If the DNS server address is in the local subnet of port A1 or A2, DNS requests leave through the respective port.

For example, if the DNS server address is in the local subnet of port A1, DNS requests leave through port A1.

- If port B1 is enabled and the DNS server address is outside of all local subnets, DNS requests leave through B1 port towards port B1 default gateway.
- If port B1 is disabled and the DNS server address is outside of all local subnets, DNS requests leave through port A1 towards port A1 default gateway.

### **SMTP Server**

The SMTP server is only available via the enterprise port. Therefore, emails can only be sent on the enterprise port.

For more information on how to send emails via an Ethernet port, see the EtherNet/IP Network Configuration User Manual, publication [ENET-UM001](#).

## Use Socket Object

When the controller operates in Dual-IP mode and uses a Socket Object, you can use an IP address with a Socket\_Create service type. By default this IP address is INADDR\_ANY.

Remember the following:

- If you use INADDR\_ANY, IP communication that the Socket Object instance initiates follows the same routing rules as DNS request routing rules described in [DNS Request Routing on page 155](#).
- If you use the IP address of port B1 instead of INADDR\_ANY, IP packets can only go to the port B1 subnet or via its default gateway.
- If you use the IP address of port A1 or port A2 instead of INADDR\_ANY, IP packets can go only to the port subnet or via its default gateway.
- If you use an IP address other than the port addresses of any controller Ethernet port or INADDR\_ANY, the Create\_Socket\_Service request is rejected.

## Send Message Instructions

You can send Message (MSG) instructions out the enterprise port or the device-level port. The only difference between the MSG instruction configurations is the path.

For more information on how to use MSG instructions, see the Logix5000™ Controllers General Instructions Reference Manual, publication [1756-RM003](#).

# Software Display Differences for EtherNet/IP Modes

Table 10 shows differences in the Logix Designer application when the controller uses Dual-IP mode or Linear/DLR mode.

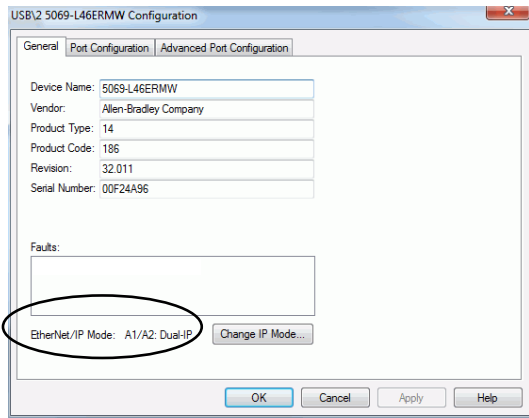
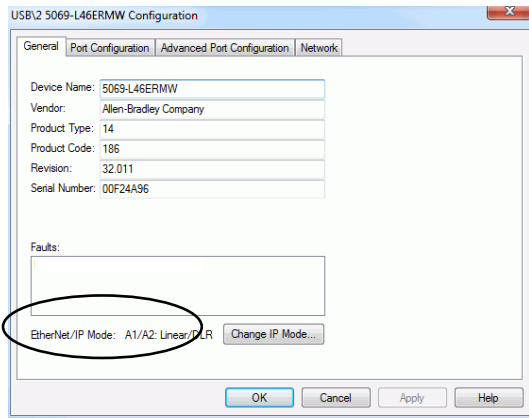
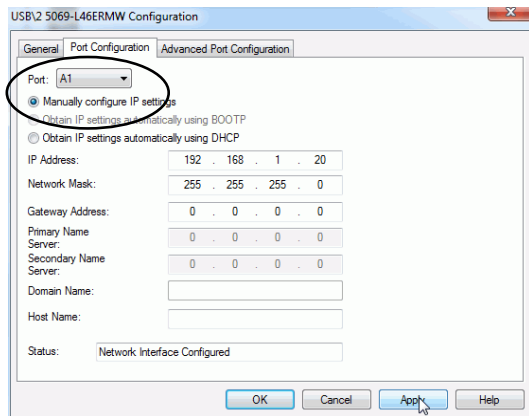
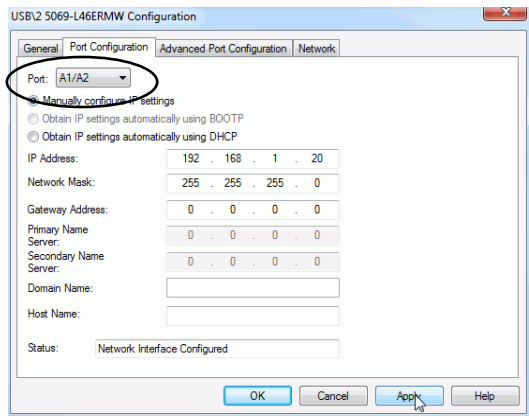
Table 10 - EtherNet/IP Mode Display Differences in the Logix Designer Application

EtherNet/IP Mode		
Section in Application	Dual-IP Mode	Linear/DLR Mode
I/O Configuration Tree in Controller Organizer		
General Tab on Controller Properties Dialog Box		
Internet Protocol on Controller Properties Dialog Box		

The Controller Properties dialog box also provides a Network tab in the Logix Designer application when the controller uses Linear/DLR mode. The Network tab is not available when the controller uses Dual-IP mode.

Table 11 shows differences in RSLinx Classic software when the controller uses Dual-IP mode or Linear/DLR mode.

**Table 11 - EtherNet/IP Mode Display Differences in the RSLinx Classic Software**

EtherNet/IP Mode		
Section in Software	Dual-IP Mode	Linear/DLR Mode
General Tab		
Port Configuration Tab		

**Notes:**



## Use I/O Modules

Topic	Page
Local I/O Modules	161
Remote I/O Modules	168
Add to the I/O Configuration While Online	179
Determine When Data Is Updated	181

CompactLogix™ 5480 systems support the following I/O module options:

- Local I/O modules
- Remote I/O modules

### Local I/O Modules

A CompactLogix 5480 system uses Compact 5000™ I/O modules as local I/O modules. The modules are installed to the right of the controller.

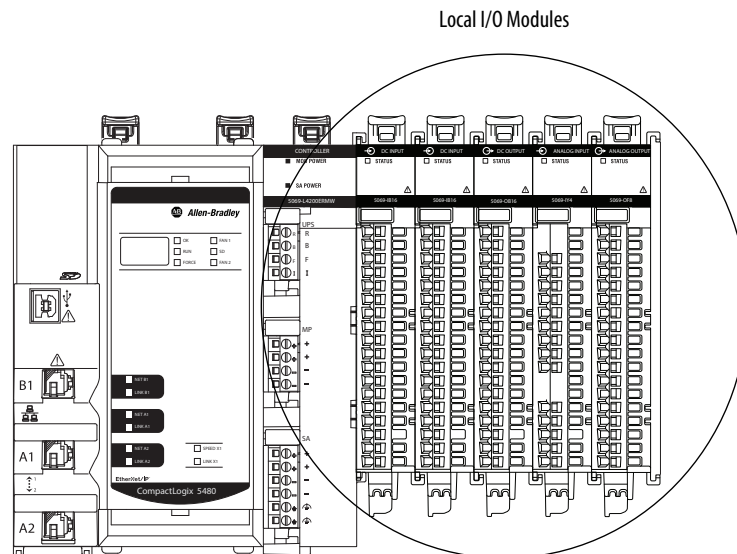
You can install as many as 31 local Compact 5000 I/O modules in a CompactLogix 5480 system.

The following are example factors that you must consider when you decide how to use local I/O modules in a CompactLogix 5480 system:

- Number of local I/O modules that the controller supports
- Features available on different modules, for example, sequence of events per point timestamping on only some Compact 5000 digital input modules
- I/O module power usage, including MOD power and SA power

For more information on Compact 5000 I/O modules, see [Additional Resources on page 10](#).

**Figure 22 - Local I/O Modules in a CompactLogix 5480 System**



## Add Local I/O Modules to a Project

Before you can add local I/O modules to a Logix Designer application project, you must open an existing project or create a project. For information on how to create a project, see [Create a Logix Designer Application Project on page 81](#).

There are two methods to add local I/O modules to the project:

- [Discover Modules](#)
- [New Module](#)

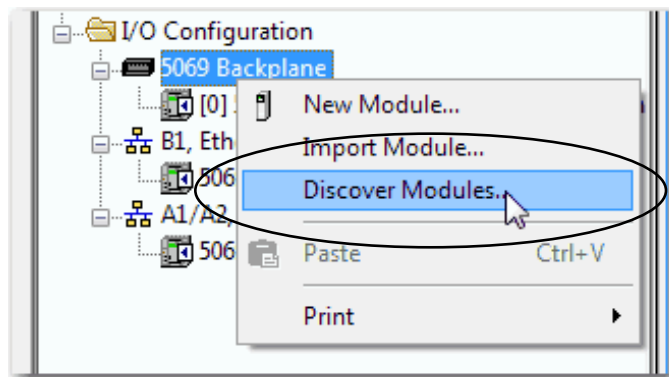
**TIP** The Discover Modules method is especially useful if the project can be online with the hardware.

The New Module is used if the project is created without access to the installed and powered hardware.

### Discover Modules

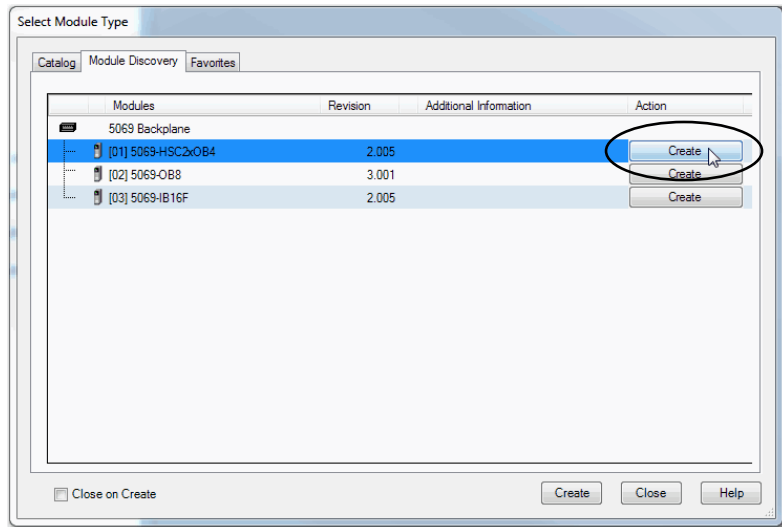
To use Discover Modules to add a local I/O module, complete the following steps.

1. Go online with your Logix Designer application.
2. Right-click 5069 Backplane and choose Discover Modules.

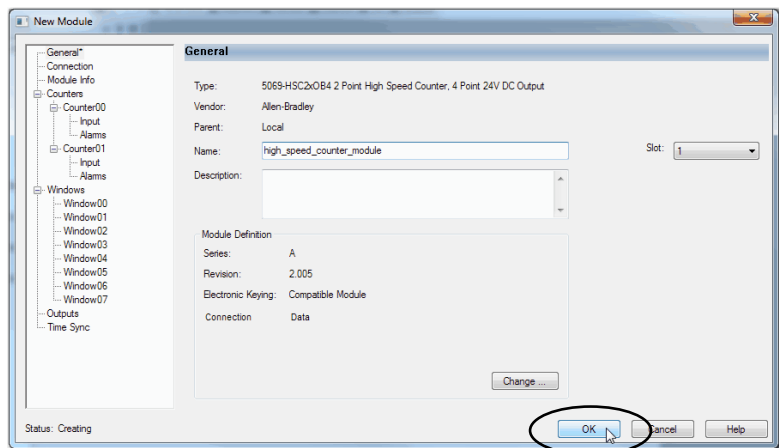


The Logix Designer application automatically detects available modules that are installed in the system.

- At the Select Module Type window, click Create to add a discovered module to your project.

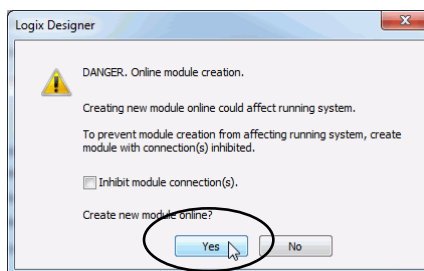


- At the New Module window, configure the module properties and click OK.



- At the warning dialog box, click Yes.

**TIP** If you inhibit the module connection, you must remember to uninhibit the connection later.



- Close the Select Module Type dialog box.

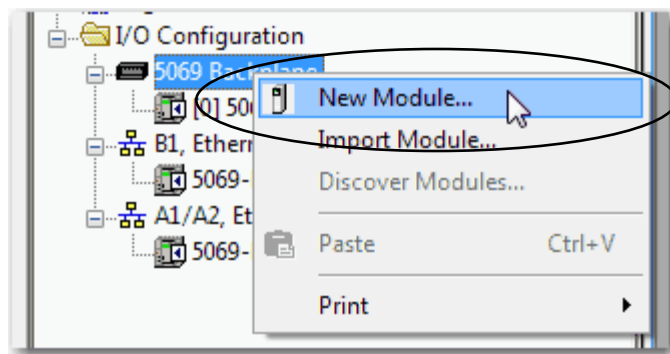
To add additional local I/O modules, complete one of the following:

- If you cleared the Close on Create checkbox when you created the first I/O module, repeat steps [3...6](#).
- If you did not clear the Close on Create checkbox when you created the first I/O module, repeat steps [2...6](#).

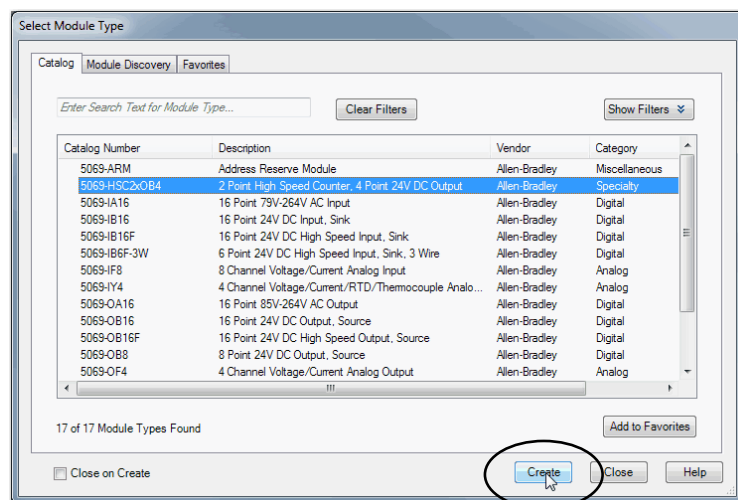
### *New Module*

To use New Module to add a module, complete the following steps.

1. Right-click 5069 Backplane and choose New Module.



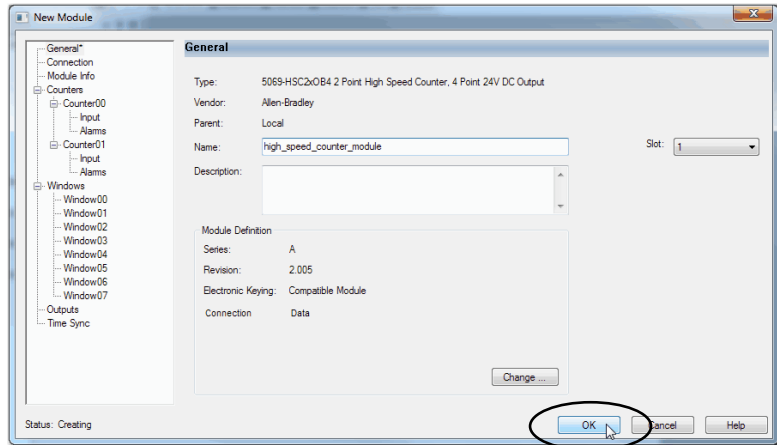
2. Select the module and click Create.



The New Module dialog box appears.

3. Configure the module and click OK.

**TIP** Remember, if the Series and Revision parameter values do not match the values of the module for which this configuration is intended, your project can experience module faults.



To add additional local I/O modules, complete one of the following:

- If you cleared the Close on Create checkbox when you created the first I/O module, repeat steps [2...3](#).
- If you did not clear the Close on Create checkbox when you created the first I/O module, repeat steps [1...3](#).

For more information on how to use local I/O modules in a CompactLogix 5480 system, see the resources that are listed in [Additional Resources on page 10](#).

## Electronic Keying

Electronic Keying reduces the possibility that you use the wrong device in a control system. It compares the device that is defined in your project to the installed device. If keying fails, a fault occurs. The following attributes are compared.

Attribute	Description
Vendor	The device manufacturer.
Device Type	The general type of the product, for example, digital I/O module.
Product Code	The specific type of the product. The Product Code maps to a catalog number.
Major Revision	A number that represents the functional capabilities of a device.
Minor Revision	A number that represents behavior changes in the device.

The following Electronic Keying options are available.

Keying Option	Description
Compatible Module	Lets the installed device accept the key of the device that is defined in the project when the installed device can emulate the defined device. With Compatible Module, you can typically replace a device with another device that has the following characteristics: <ul style="list-style-type: none"> <li>• Same catalog number</li> <li>• Same or higher Major Revision</li> <li>• Minor Revision as follows: <ul style="list-style-type: none"> <li>– If the Major Revision is the same, the Minor Revision must be the same or higher.</li> <li>– If the Major Revision is higher, the Minor Revision can be any number.</li> </ul> </li> </ul>
Disable Keying	Indicates that the keying attributes are not considered when attempting to communicate with a device. With Disable Keying, communication can occur with a device other than the type specified in the project. <b>ATTENTION:</b> Be cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We <b>strongly recommend</b> that you <b>do not use</b> Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Exact Match	Indicates that all keying attributes must match to establish communication. If any attribute does not match precisely, communication with the device does not occur.

Carefully consider the implications of each keying option when selecting one.

---

**IMPORTANT** When you change Electronic Keying parameters online, it interrupts connections to the device and any devices that are connected through the device. Connections from other controllers can also be broken.

If an I/O connection to a device is interrupted, the result can be a loss of data.

---

### *More Information*

For more detailed information on Electronic Keying, see Electronic Keying in Logix 5000™ Control Systems Application Technique, publication [LOGIX-AT001](#).

## Remote I/O Modules

Remote I/O modules do not reside in the local CompactLogix 5480 controller system. The controller connects to the I/O modules via an EtherNet/IP™ network. CompactLogix 5480 controllers support the use of a wide range of remote I/O modules. For maximum performance, we recommend that you use Compact 5000 I/O modules when you use remote I/O modules.

For example, CompactLogix 5480 controllers can connect to following:

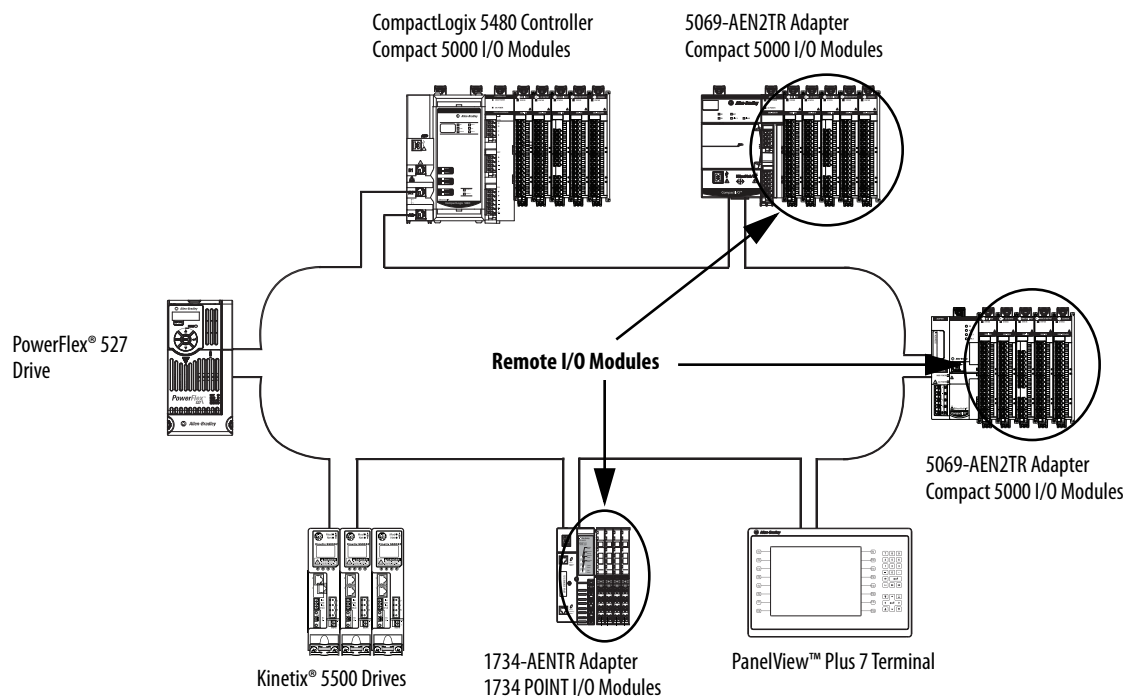
- Chassis-based I/O module families, such as Compact 5000 I/O, 1756 ControlLogix® I/O, 1769 Compact I/O™, or 1746 SLC™ I/O modules
- In-cabinet I/O module families, such as 1734 POINT I/O™ or 1794 FLEX™ I/O modules
- On-Machine™ I/O module families, such as 1732E ArmorBlock® I/O modules

**IMPORTANT** The following network examples are solely intended to show remote I/O modules in various network topologies. The examples do not address network communication rates between the CompactLogix 5480 controller and the I/O modules.

We recommend, however, that you consider network communication rates when you determine the best way to incorporate remote I/O modules in your CompactLogix 5480 system.

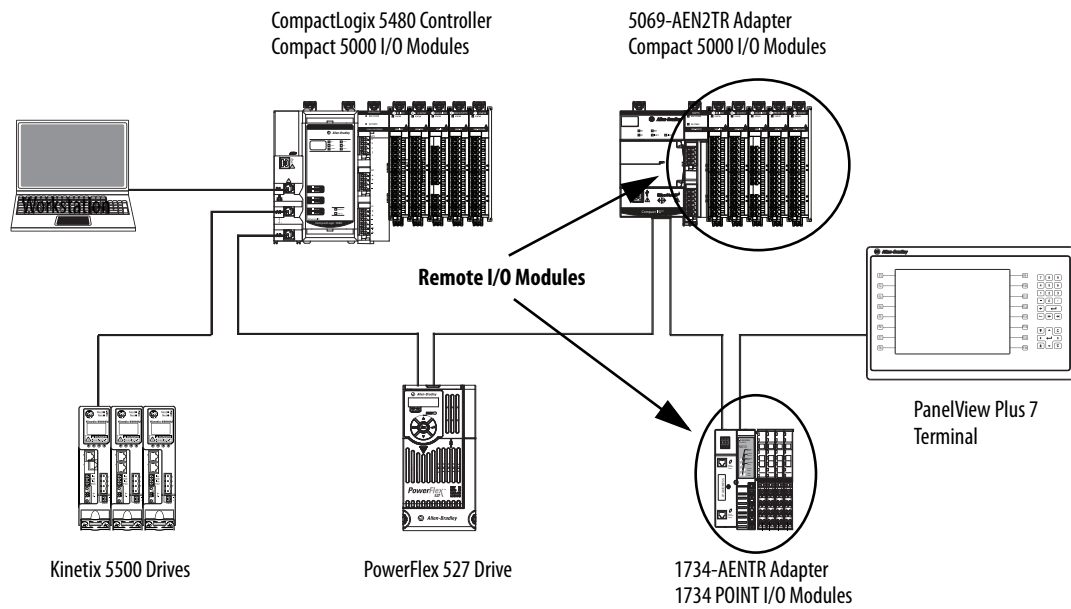
For more information, see [EtherNet/IP Network Communication Rates on page 126](#)

**Figure 23 - Remote I/O Modules in a CompactLogix 5480 System on a DLR Network Topology**

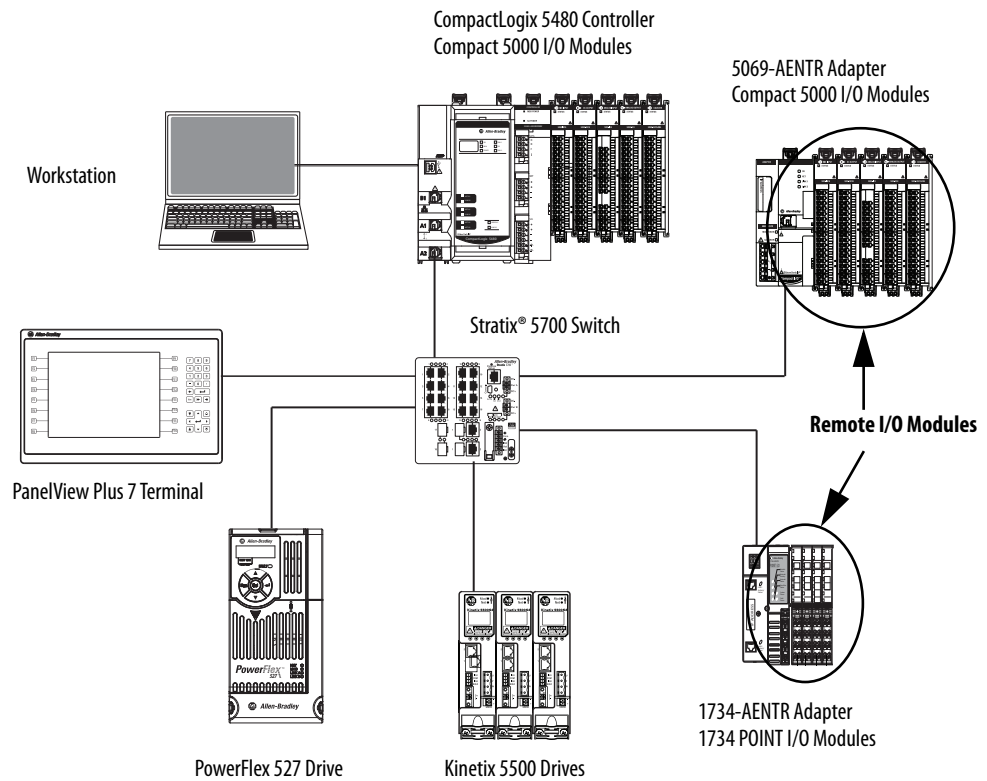




**Figure 24 - Remote I/O in a CompactLogix 5480 System on a Linear Network Topology**



**Figure 25 - Remote I/O in a CompactLogix 5480 System on a Star Network Topology**



## Add Remote I/O Modules to a Project

Before you can add remote I/O modules to a project, you must add the EtherNet/IP communication module that facilitates communication between the CompactLogix 5480 controller and the remote I/O modules.

There are two methods to add remote I/O modules to the project:

- [Discover Modules](#)
- [New Module](#)

---

**IMPORTANT** Consider the following:

- This section describes how to add remote I/O modules to a project on an EtherNet/IP network that is connected to controller port A1/A2. You complete the same tasks to add remote I/O modules to a project on an EtherNet/IP network that is connected to the other controller ports.
  - The EtherNet/IP mode that the controller uses determines which Ethernet ports that you can use with remote I/O modules. That is, if the controller uses Linear/DLR mode, you can only add remote I/O modules to the same EtherNet/IP network that is connected to ports A1/A2.  
If the controller uses Dual-IP mode, you can add remote I/O modules to separate EtherNet/IP networks that are connected to ports A1 and A2, respectively.
- 

### *Discover Modules*

When you use Discover Modules to find Ethernet devices, the Logix Designer application browses based on how Ethernet browsing is configured in RSLinx® Classic or FactoryTalk® Linx software.

---

**IMPORTANT** To use the Discover Modules method when you add remote I/O modules to a project, the controller and the remote I/O modules be powered and a physical connection be made between them, for example, over an EtherNet/IP network.

---

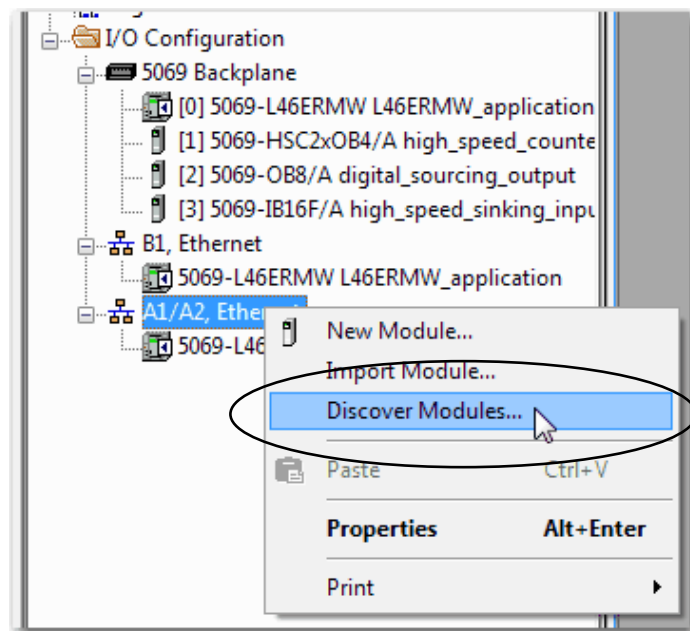
- If the EtherNet/IP driver is used in RSLinx Classic software, the Logix Designer application automatically detects remote I/O modules.

- If the Ethernet devices driver is used in RSLinx Classic software, you must configure the IP address for each Ethernet device that you want to display in the Select Module Type dialog box that is shown on [page 172](#).
- If the Ethernet bus is browsed via a CIP™ router, you must configure the IP address for each Ethernet device that you want to display in the Select Module Type dialog box that is shown on [page 172](#).

The tasks that are described in this section apply when you use the EtherNet/IP driver in RSWho to browse the network.

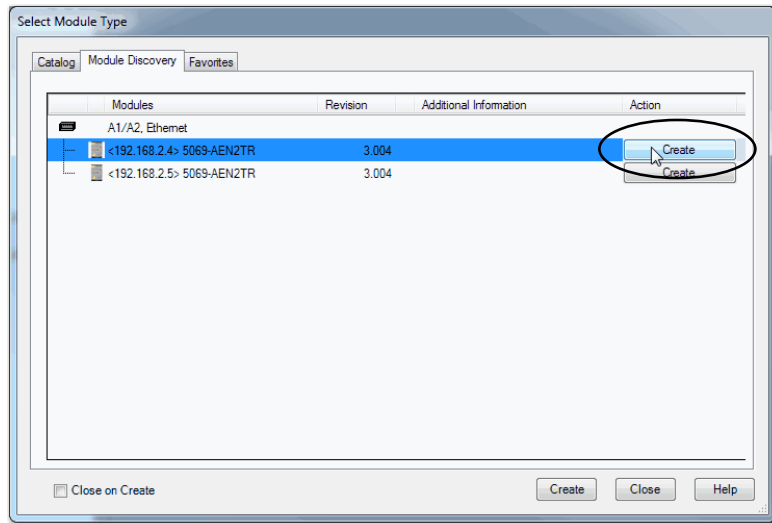
To use Discover Modules to add a remote I/O module, complete the following steps.

1. Go online with your Logix Designer application.
2. Right-click A1/A2, Ethernet and choose Discover Modules.

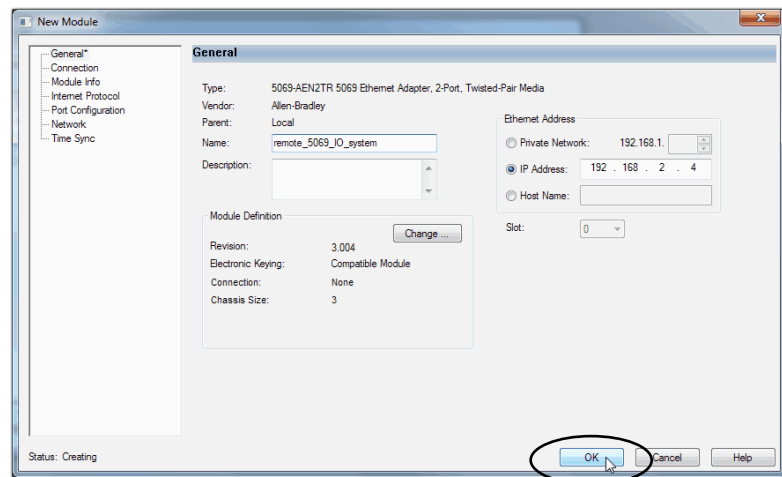


The Logix Designer application automatically detects available modules that are installed in the system.

3. At the Select Module Type window, click Create to add a discovered adapter to your project.

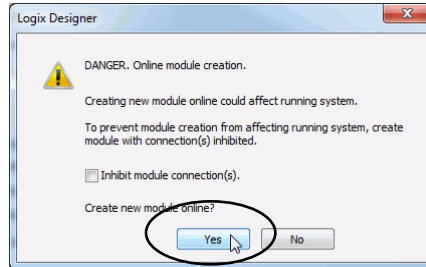


4. At the New Module window, configure the module properties and click OK.

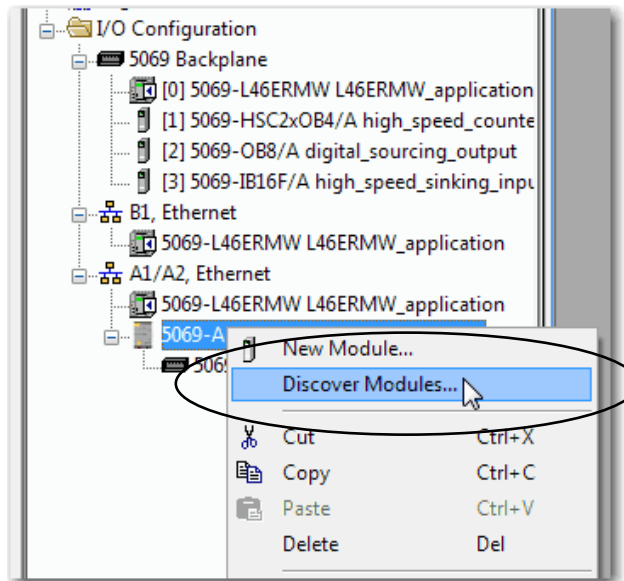


5. At the warning dialog box, click Yes.

**TIP** If you inhibit the module connection, you must remember to uninhibit the connection later.

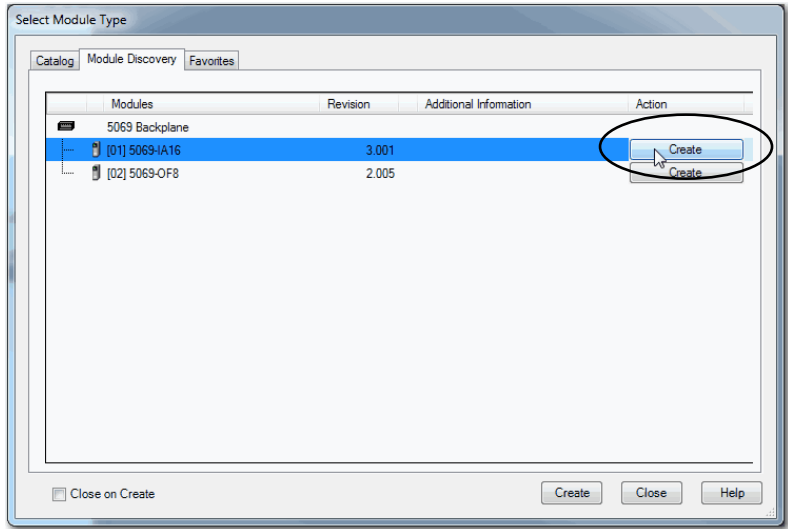


6. Close the Select Module Type dialog box.
7. Right-click 5069 Backplane and choose Discover Modules.

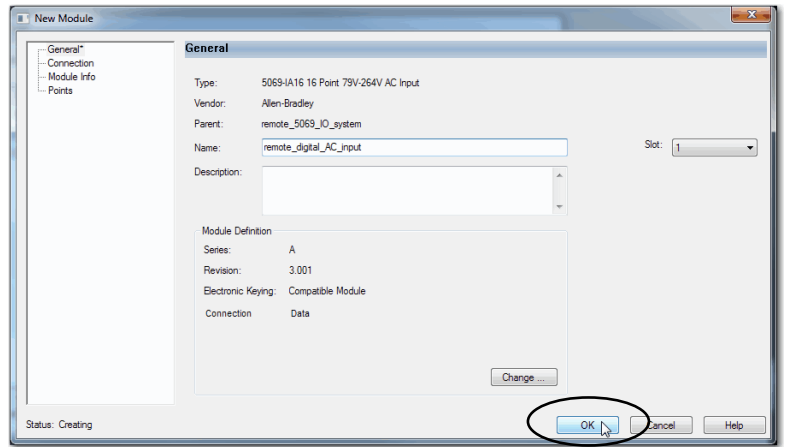


The Logix Designer application automatically detects available modules that are installed in the system.

- At the Select Module Type window, click Create to add a discovered module to your project.

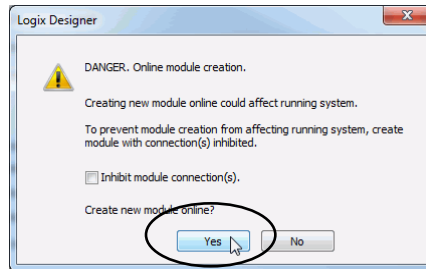


- At the New Module window, configure the module properties and click OK.



10. At the warning dialog box, click Yes.

**TIP** If you inhibit the module connection, you must remember to uninhibit the connection later.



11. Close the Select Module Type dialog box.

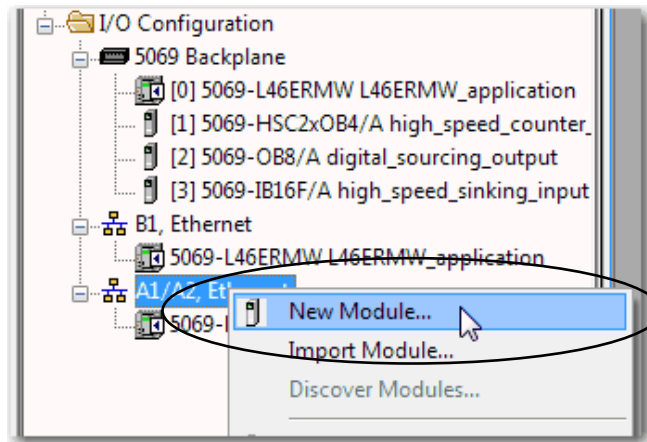
After you add the remote I/O module, consider the following:

- To add remote I/O modules in the same remote location, complete one of the following:
  - If you cleared the Close on Create checkbox when you created the first I/O module, repeat steps [8...11](#).
  - If you did not clear the Close on Create checkbox when you created the first I/O module, repeat steps [7...11](#).
- To add remote I/O modules in another new remote location, repeat steps [2...11](#).

### New Module

To use New Module to add a remote I/O module, complete the following steps.

1. Right-click Ethernet and choose New Module.

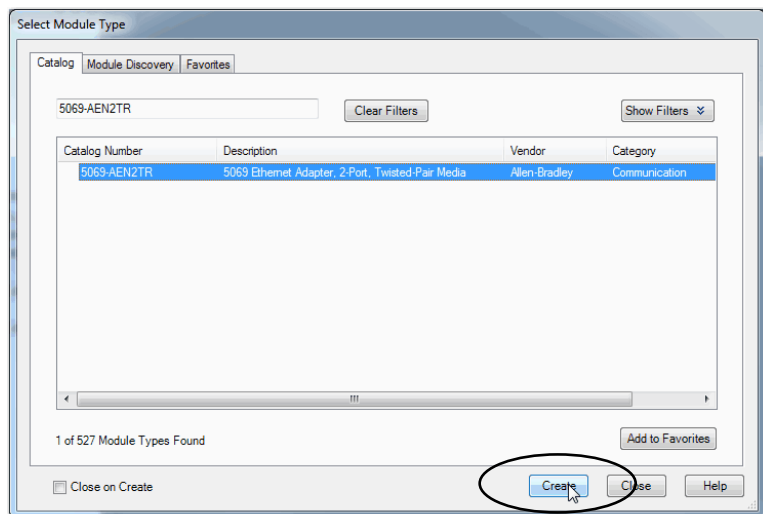


2. Select the EtherNet/IP adapter and click Create.

For some modules, the Select Major Revision dialog box can appear. If the dialog box appears, choose the major revision of the module and click OK.

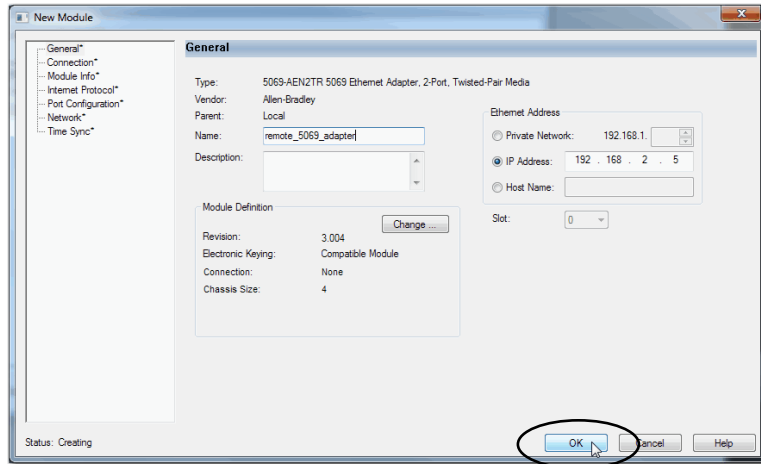
**TIP**

Remember, if the Series and Revision parameter values do not match the values of the module for which this configuration is intended, your project can experience module faults.

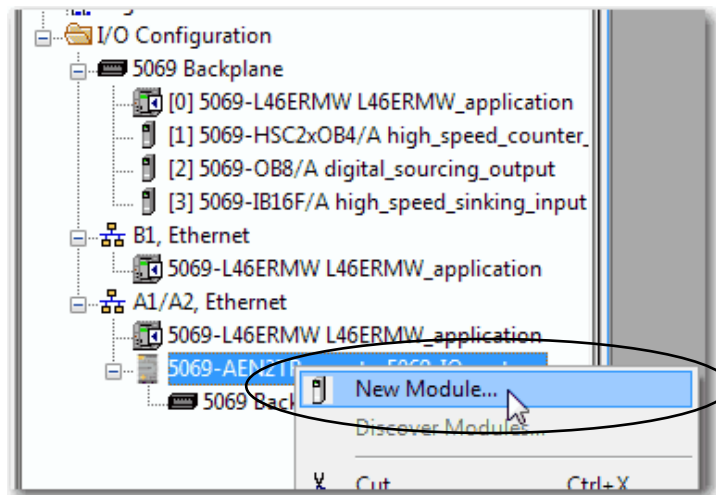




3. At the New Module window, configure the module properties and click OK.



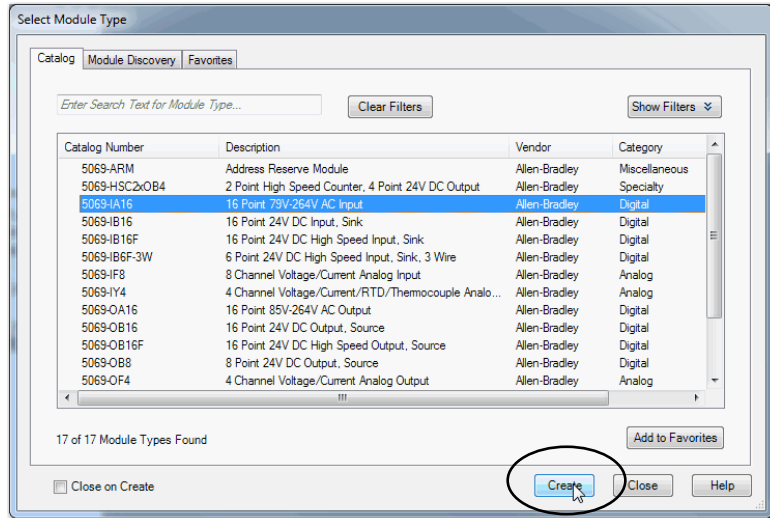
4. Close the Select Module Type dialog box.
5. Right-click the newly added EtherNet/IP communication module or the backplane and choose New Module.



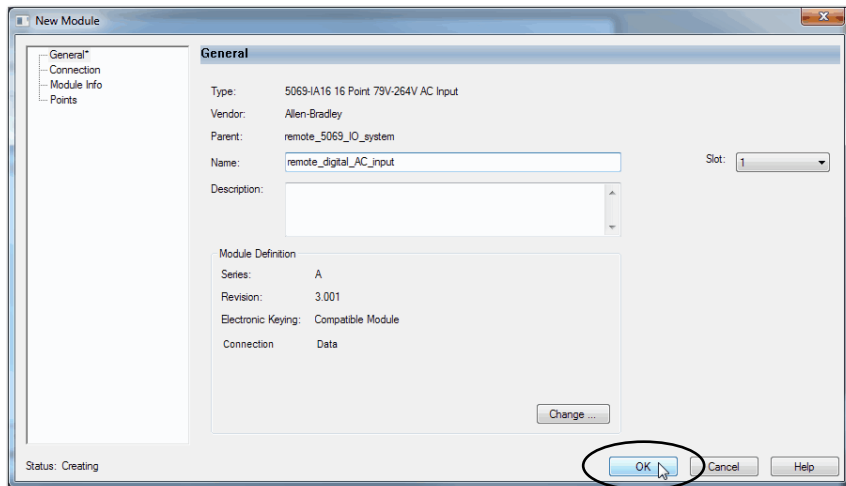
6. Select the I/O module that you want to add and click Create.

**TIP** If you must add multiple I/O modules to the same remote location, we recommend that you clear the Close on Create checkbox before you click Create.

If the Close on Create checkbox is cleared, when you complete configuration for an I/O module, the Select Module Type dialog box appears automatically and you can skip [step 5](#).



7. Configure the I/O module.
8. At the New Module window, configure the module properties and click OK.



9. If you want to add more remote I/O modules, complete one of the following tasks:
  - To add remote I/O modules in the same remote location, complete one of the following:
    - If you cleared the Close on Create checkbox when you created the first I/O module, repeat steps [6...7](#).
    - If you did not clear the Close on Create checkbox when you created the first I/O module, repeat steps [5...7](#).
  - To add remote I/O modules in another new remote location, repeat steps [1...10](#).
10. When you are finished adding remote I/O modules to the project, close the Select Module Type dialog box.

## Add to the I/O Configuration While Online

You can add local and remote I/O modules and other devices to the controller configuration while the project is online.

---

**IMPORTANT** To add I/O modules when the controller is online, the controller mode switch must be in the REM or PROG position.

Some I/O modules must be installed in the system before you turn on power to the system. For example, you cannot install Compact 5000 I/O modules when the system is powered.

Some I/O modules can be installed when the system is powered. For example, you can install ControlLogix I/O modules when the system is powered.

---

The modules and devices you can add while online depends on the software version that you use. Later versions have more modules and devices that can be added while online.

Add-on Profiles (AOP) for modules are made available between releases of different Logix Designer application versions. There are cases in which, after you download and install the AOP file for a module, you can add the module to a project while online.

To see a list of the available AOP files, go to:

<https://download.rockwellautomation.com/esd/download.aspx?downloadid=addonprofiles>

For more information about how to add to the I/O Configuration while online, see the Logix 5000 Controllers Design Considerations Reference Manual, publication [1756-RM094](#).

## Modules and Devices That Can Be Added While Online

You can add the following modules and devices to the CompactLogix 5480 controller I/O configuration while online with Logix Designer application, version 32.00.00 or later.

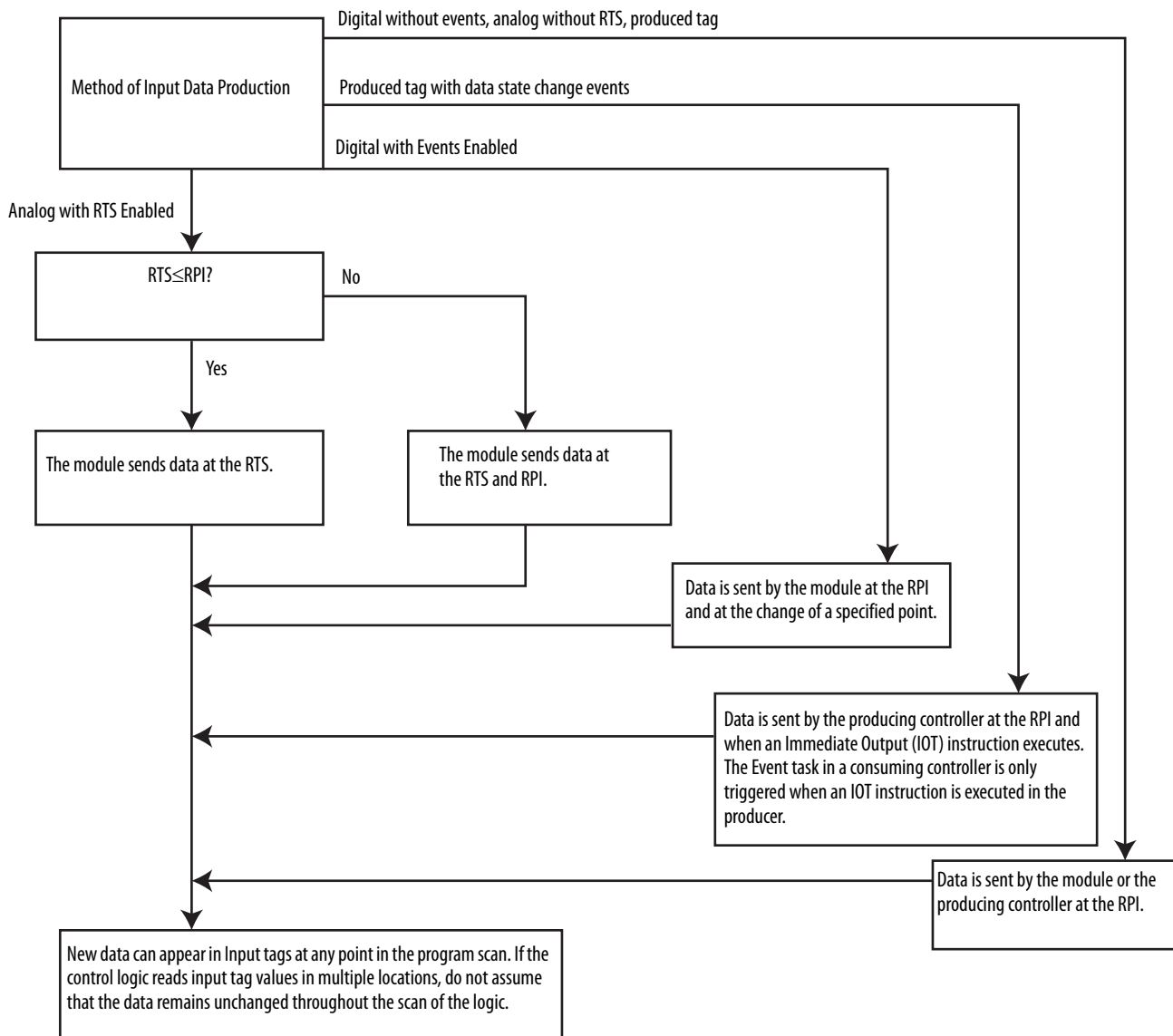
- Compact 5000 I/O modules - As local or remote I/O modules
- Compact 5000 I/O EtherNet/IP adapters
- 1756 ControlLogix EtherNet/IP modules
- 1756 ControlLogix I/O modules

## Determine When Data Is Updated

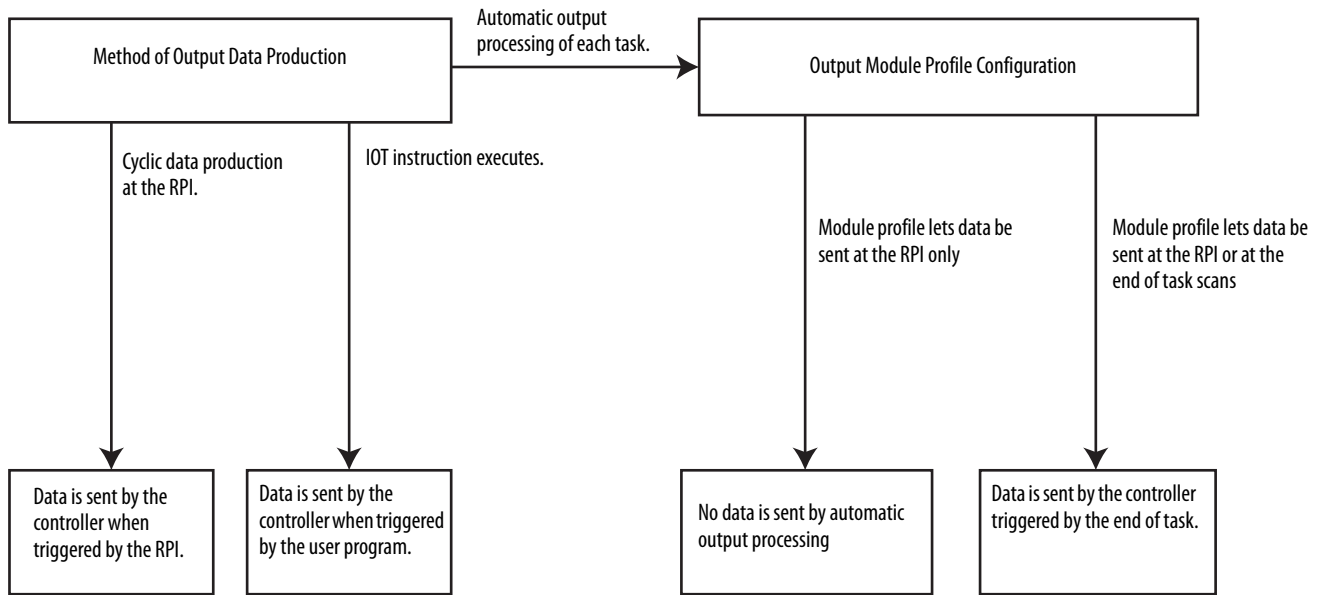
CompactLogix 5480 controllers update data asynchronously with the execution of logic. See the following flowcharts to determine when a controller, input module, or bridge sends data:

- [Input Data Update Flowchart](#)
- [Output Data Update Flowchart](#)

### Input Data Update Flowchart



### Output Data Update Flowchart



## Develop Control Applications

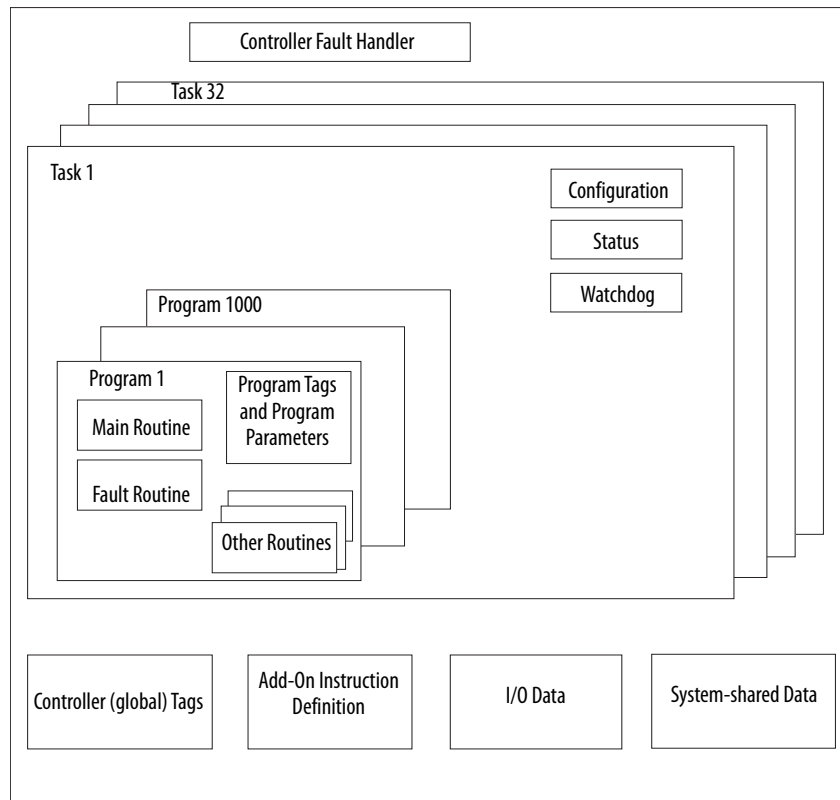
Topic	Page
Elements of a Control Application	183
Tasks	185
Programs	190
Routines	192
Parameters and Local Tags	193
Programming Languages	194
Add-on Instructions	195
Extended Properties	196
Access the Module Object from an Add-On Instruction	197
Monitor Controller Status	198
Connection Overview	199
Controller Communication Interaction with Control Data	199
Produce and Consume (Interlock) Data	201
Send and Receive Messages	203
Monitor I/O Connections	204

### Elements of a Control Application

A control application consists of several elements that require planning for efficient application execution. Application elements include the following:

- Tasks
- Programs
- Routines
- Parameters and Local Tags
- Add-On Instructions

Figure 26 - Elements of a Control Application





## Tasks

A Logix 5000™ controller lets you use multiple tasks to schedule and prioritize the execution of your programs based on criteria. This multitasking allocates the processing time of the controller among the operations in your application:

- The controller executes one task at a time.
- One task can interrupt the execution of another and take control based on its priority.
- In any given task, you can use multiple programs. One program executes at a time.
- You can display tasks in the Controller or Logical Organizer views, as necessary.

**Figure 27 - Task Within a Control Application**

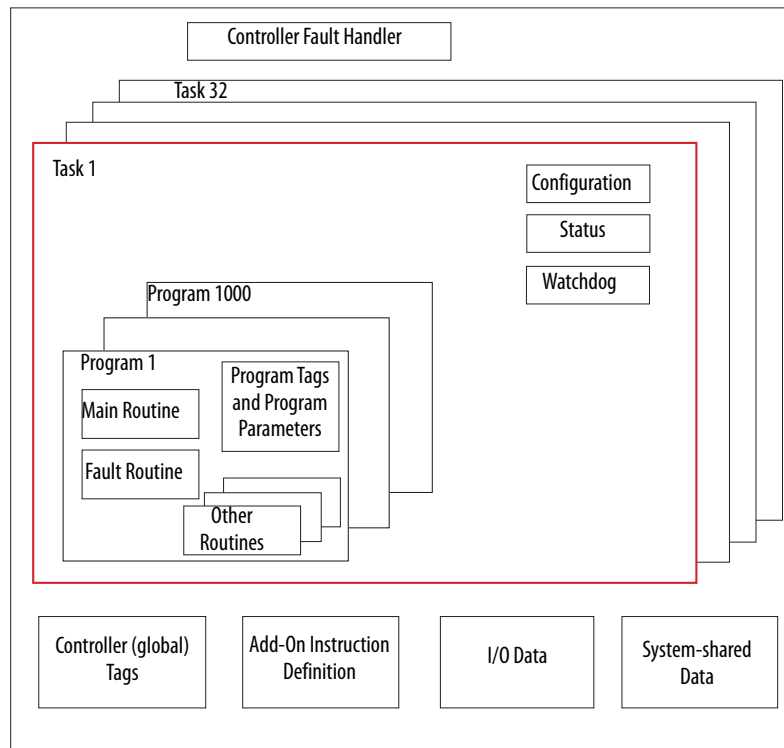
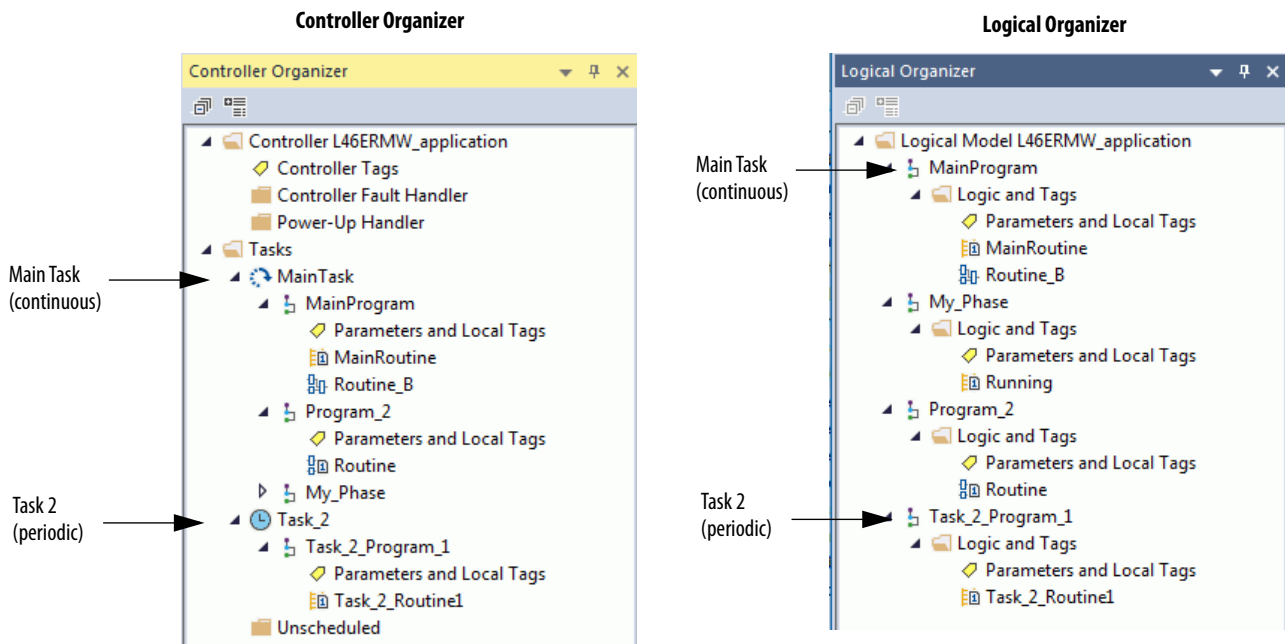
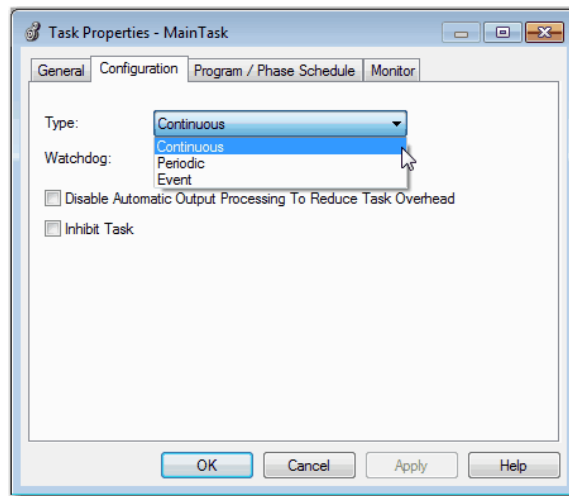


Figure 28 - Tasks



A task provides scheduling and priority information for a set of one or more programs. Use the Task Properties dialog box to configure tasks as continuous, periodic, or event.

Figure 29 - Configuring the Task Type



[Table 12](#) explains the types of tasks you can configure.

**Table 12 - Task Types and Execution Frequency**

Task Type	Task Execution	Description
Continuous	Constant	The continuous task runs in the background. Any CPU time that is not allocated to other operations (such as motion and other tasks) is used to execute the programs in the continuous task. <ul style="list-style-type: none"> <li>The continuous task runs constantly. When the continuous task completes a full scan, it restarts immediately.</li> <li>A project does not require a continuous task. If used, you use only one continuous task.</li> </ul>
Periodic	At a set interval, such as every 100 ms	A periodic task performs a function at an interval. <ul style="list-style-type: none"> <li>Whenever the time for the periodic task expires, the task interrupts any lower priority tasks, executes once, and returns control to where the previous task left off.</li> <li>You can configure the time period from 0.1...2,000,000.00 ms. The default is 10 ms. It is also controller and configuration dependent.</li> </ul>
Event	Immediately when an event occurs	An event task performs a function when an event (trigger) occurs. The trigger for the event task can be the following: <ul style="list-style-type: none"> <li>Module input data change of state</li> <li>A consumed tag trigger</li> <li>An EVENT instruction</li> <li>An axis trigger</li> <li>A motion event trigger</li> </ul> <p>You can configure an optional timeout interval for missed event triggers. The timeout interval causes the event tasks to execute even in the absence of the trigger. Set the Check the Execute Task If No Event Occurs Within &lt;timeout period&gt; checkbox for task.</p>

The CompactLogix™ 5480 controller supports up to 32 tasks. Only one of the tasks can be continuous.

A task can have up to 1000 programs, each with its own executable routines and program-scoped tags. Once a task is triggered (activated), the programs that are assigned to the task execute in the order in which they are grouped. Programs can appear only once in the Controller Organizer and multiple tasks cannot share them.

## Event Task with Compact 5000 I/O Modules

Some Compact 5000™ I/O modules can trigger an Event task. For example, complete the following steps to configure an Event task that is triggered by a state change on a 5069-IB16F module input.

1. Configure the 5069-IB16F input module to trigger the Event task. The following tasks are required.
  - a. Use the **Data with Events** connection type in the 5069-IB16F module definition.
  - b. Enable the Event.
  - c. To participate in the event, select at least one point on the module.
  - d. Define what constitutes an event, for example, a state change from Off to On.
  - e. Choose which edge of the event triggers the event. That is, the rising edge, falling edge, or both can trigger an event.

You can also latch an event and enable independent point triggers.

2. Create an Event task in your project.
3. Configure the Event task.
  - You must choose the event trigger. For example, you can choose Module Input Data State Change as the trigger.
  - Link the task to the appropriate Event Input tag on the module.

For more information on how to use event tasks with Compact 5000 I/O modules, see the Compact 5000 I/O Digital Module User Manual, publication [5000-UM004](#).

For more information on how to use event tasks in general, see the Logix 5000 Controllers Tasks, Programs, and Routines Programming Manual, publication [1756-PM005](#).

## Task Priority

Each task in the controller has a priority level. The operating system uses the priority level to determine which task to execute when multiple tasks are triggered. A higher priority task interrupts any lower priority task. The continuous task has the lowest priority and a periodic or event task interrupts it.

The continuous task runs whenever a periodic task is not running. Depending on the application, the continuous task could run more frequently than the periodic tasks, or much less frequently. There can also be large variability in the frequency that the task is called, and its scan time (due to the effect of the other periodic tasks).

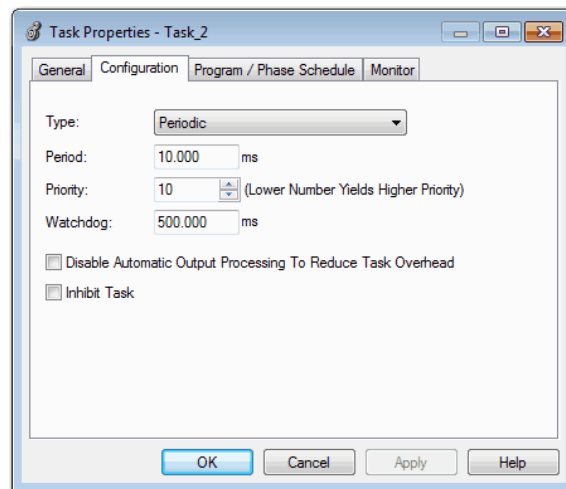
---

**IMPORTANT** If you configure multiple tasks with the same priority, the controller timeslices them, which de-optimizes their application. This is not recommended.

---

You can configure periodic and event tasks to execute from the lowest priority of 15 up to the highest priority of 1. Use the Task Properties dialog box to configure the task priority.

**Figure 30 - Configure Task Priority**



## Programs

The controller operating system is a preemptive multitasking system that is in compliance with IEC 61131-3. This system provides the following:

- Programs to group data and logic
- Routines to encapsulate executable code that is written in one programming language

Each program contains the following:

- Local Tags
- Parameters
- A main executable routine
- Other routines
- An optional fault routine

**Figure 31 - Program Within a Control Application**

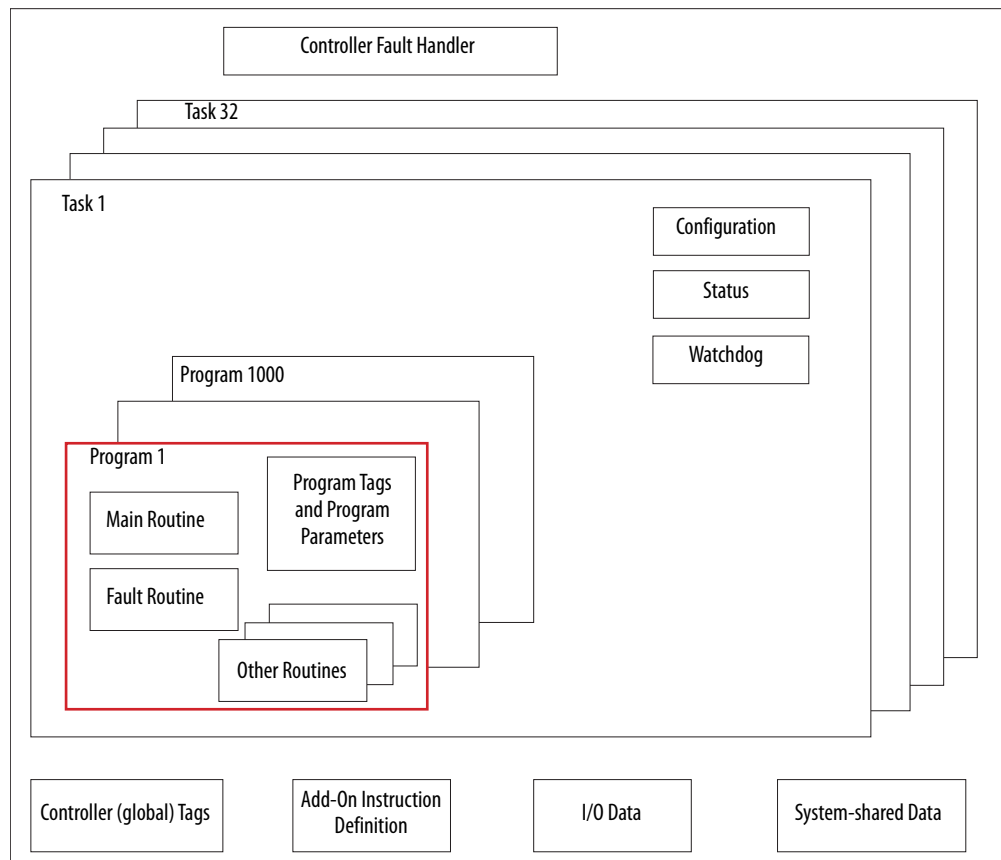
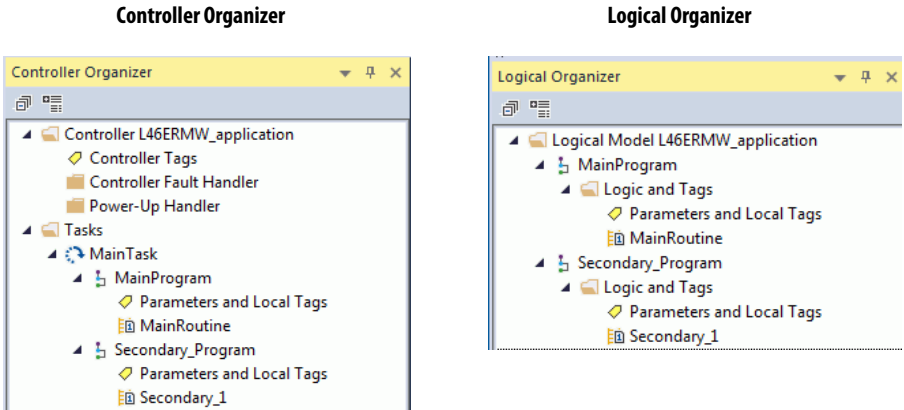


Figure 32 - Programs



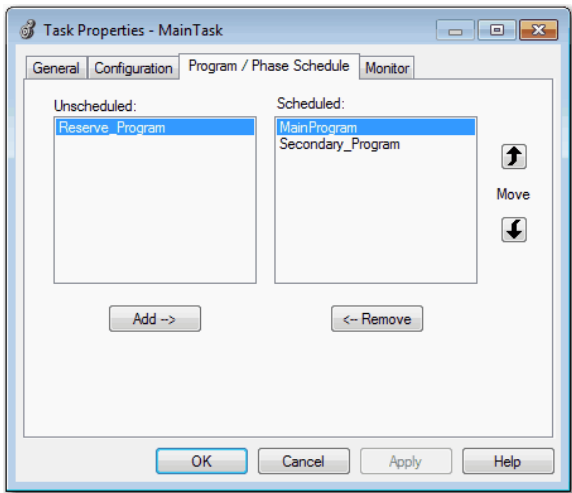
### Scheduled and Unscheduled Programs

The scheduled programs within a task execute to completion from first to last. Programs that are not attached to any task show up as unscheduled programs.

Unscheduled programs within a task are downloaded to the controller with the entire project. The controller verifies unscheduled programs but does not execute them.

You must schedule a program within a task before the controller can scan the program. To schedule an unscheduled program, use the Program/Phase Schedule tab of the Task Properties dialog box.

Figure 33 - Scheduling an Unscheduled Program



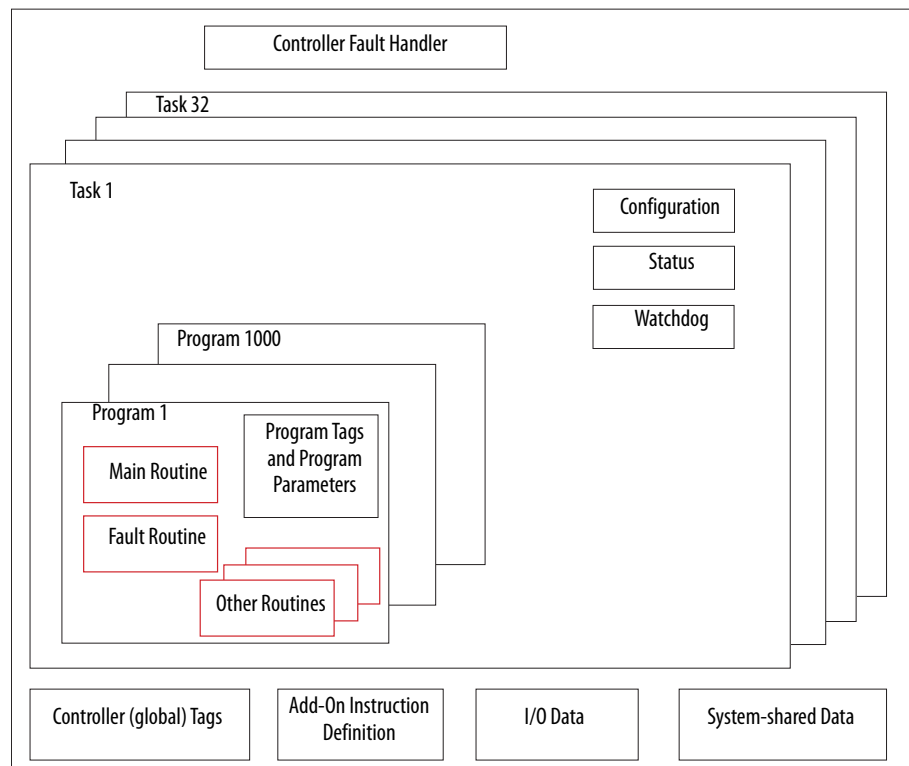
## Routines

A routine is a set of logic instructions in one programming language, such as Ladder Diagram (ladder logic). Routines provide the executable code for the project in a controller.

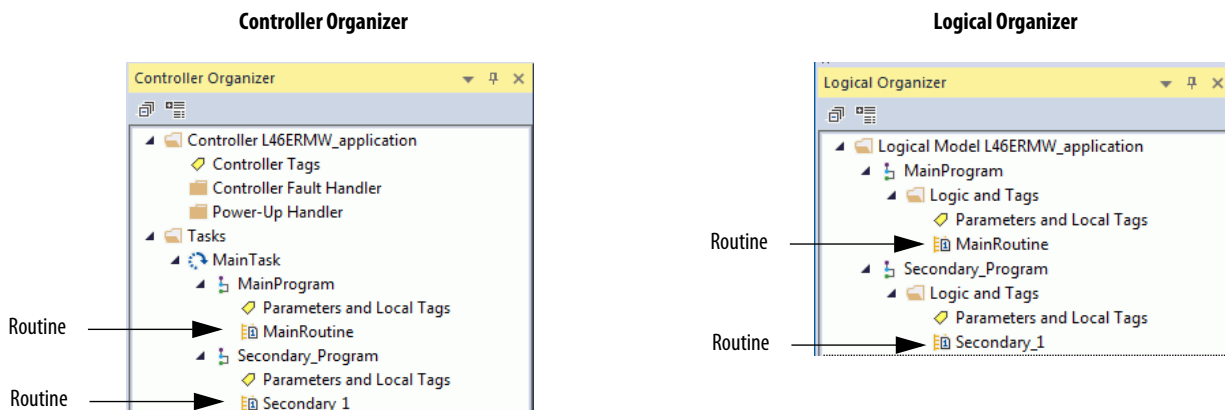
Each program has a main routine. The main is the first routine to execute when the controller triggers the associated task and calls the associated program. Use logic, such as the Jump to Subroutine (JSR) instruction, to call other routines.

You can also specify an optional program fault routine. The controller executes this routine if it encounters an instruction-execution fault within any of the routines in the associated program.

**Figure 34 - Routines in a Control Application**



**Figure 35 - Routine**





## Parameters and Local Tags

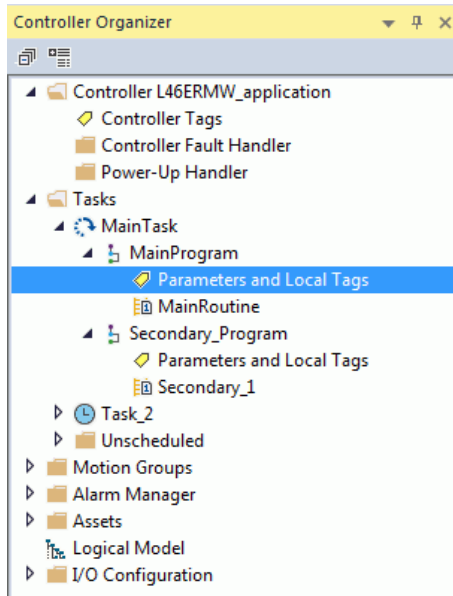
With a Logix 5000 controller, you use a tag (alphanumeric name) to address data (variables). In Logix 5000 controllers, there is no fixed, numeric format. The tag name identifies the data and lets you do the following:

- Organize your data to mirror your machinery.
- Document your application as you develop it.

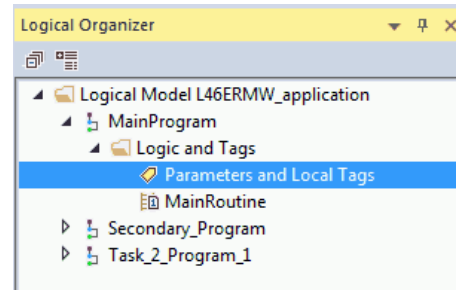
This example shows data tags that are created within the scope of the Main Program of the controller.

Figure 36 - Tags Example

Controller Organizer —Main Program Parameters and Local Tags



Logical Organizer —Main Program Parameters and Local Tags



Program Tags Window—Main Program Parameters and Local Tags

Scope: MainProgram		Show: All Tags		Y. Enter Name Filter...						
	Name	Usage	Alias For	Base Tag	Data Type	Description	External Access	Constant	Style	
Analog I/O Device	north_tank_mbx	Local			BOOL		Read/Write	<input type="checkbox"/>	Decimal	
	north_tank_pr...	Local			REAL		Read/Write	<input type="checkbox"/>	Float	
	north_tank_temp	Local			REAL		Read/Write	<input type="checkbox"/>	Float	
Integer Value	+ one_shots	Local			DINT		Read/Write	<input type="checkbox"/>	Decimal	
	+ recipe	Local			TANK		Read/Write	<input type="checkbox"/>		
	+ recipe_number	Local			DINT		Read/Write	<input type="checkbox"/>	Decimal	
Storage Bit	replace_bit	Local			BOOL		Read/Write	<input type="checkbox"/>	Decimal	
	+ running_hours	Local			COUNTER		Read/Write	<input type="checkbox"/>		
Counter	+ running_secon...	Local			TIMER		Read/Write	<input type="checkbox"/>		
	start	Local			BOOL		Read/Write	<input type="checkbox"/>	Decimal	
Timer	stop	Local			BOOL		Read/Write	<input type="checkbox"/>	Decimal	
								<input type="checkbox"/>		

There are several guidelines for how to create and configure parameters and local tags for optimal task and program execution. For more information, see the Logix 5000 Controllers and I/O Tag Data Programming Manual, publication [1756-PM004](#).

## Programming Languages

The Logix Designer application supports the following programming languages.

Language	Is Best Used in Programs with
Ladder Diagram (LD)	Continuous or parallel execution of multiple operations (not sequenced)
	Boolean or bit-based operations
	Complex logical operations
	Message and communication processing
	Machine interlocking
Function Block Diagram (FBD)	Operations that service or maintenance personnel have to interpret to troubleshoot the machine or process
	Continuous process and drive control
	Loop control
Sequential Function Chart (SFC)	Calculations in circuit flow
	High-level management of multiple operations
	Repetitive sequence of operations
	Batch process
	Motion control that uses structured text
Structured Text (ST)	State machine operations
	Complex mathematical operations
	Specialized array or table loop processing
	ASCII string handling or protocol processing

For information about programming in these languages, see the Logix 5000 Controllers Common Procedures Programming Manual, publication [1756-PM001](#).

## Add-on Instructions

With the Logix Designer application, you can design and configure sets of commonly used instructions to increase project consistency. Similar to the built-in instructions that are contained in Logix 5000 controllers, these instructions you create are called Add-On Instructions. Add-On Instructions reuse common control algorithms. With them, you can do the following:

- Ease maintenance by creating logic for one instance.
- Apply source protection to help protect intellectual property.
- Reduce documentation development time.

You can use Add-On Instructions across multiple projects. You can define your instructions, obtain them from somebody else, or copy them from another project.

[Table 13](#) explains some of the capabilities and advantages of use Add-On Instructions.

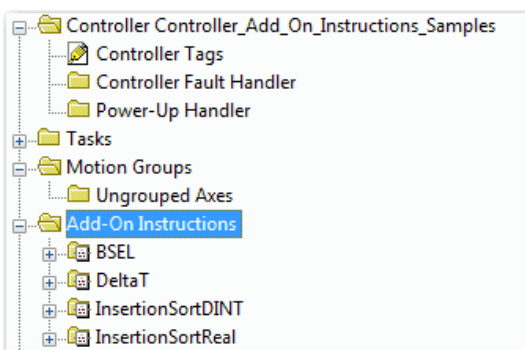
**Table 13 - Add-on Instruction Capabilities**

Capability	Description
Save Time	With Add-On Instructions, you can combine your most commonly used logic into sets of reusable instructions. You save time when you create instructions for your projects and share them with others. Add-On Instructions increase project consistency because commonly used algorithms all work in the same manner, regardless of who implements the project.
Use Standard Editors	You use one of the following editors to create Add-On Instructions: <ul style="list-style-type: none"> <li>• Ladder Diagram</li> <li>• Function Block Diagram</li> <li>• Structured Text</li> </ul>
Export Add-On Instructions	You can export Add-On Instructions to other projects and copy and paste them from one project to another. Give each instruction a unique, descriptive name to make it easier to manage and reuse your collection of Add-On Instructions.
Use Context Views	Context views let you visualize the logic of an instruction to perform instant and simple online troubleshooting of your Add-On Instructions.
Document the Instruction	When you create an instruction, you enter information for the description fields. Each instruction definition includes revision, change history, and description information. The description text also becomes the help topic for the instruction.
Apply Source Protection	When you create Add-On Instructions, you can limit users of your instructions to read-only access. You can also bar access to the internal logic or local parameters that the instructions use. This source protection lets you stop unwanted changes to your instructions and helps to protect your intellectual property.

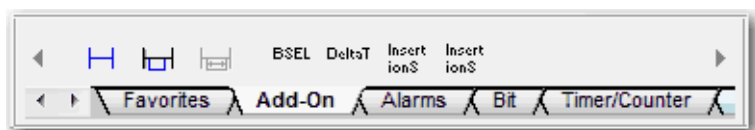
Once defined in a project, Add-On Instructions behave similarly to the built-in instructions in Logix 5000 controllers. They appear on the instruction toolbar for easy access along with internal instructions.

**Figure 37 - Add-on Instructions**

**Controller Organizer**



**Instruction Toolbar**



## Extended Properties

The Extended Properties feature lets you define more information, such as limits, engineering units, or state identifiers for various components within the controller project.

Component	Extended Properties
Tag	In the tag editor, add extended properties to a tag.
User-defined data type	In the data type editor, add extended properties to data types.
Add-On Instructions	In the properties that are associated with the Add-On Instruction definition, add extended properties to Add-On Instructions.

Pass-through behavior is the ability to assign extended properties at a higher level of a structure or Add-On Instruction and have that extended property automatically available for all members. Pass-through behavior is available for descriptions, state identifiers, and engineering units and you can configure it.

Configure pass-through behavior on the Project tab of the Controller Properties dialog box. If you choose not to show pass-through properties, only extended properties that are configured for a given component are displayed.

Pass-through behavior is **not** available for limits. When an instance of a tag is created, if limits are associated with the data type, the instance is copied.

Use the `.@Min` and `.@Max` syntax to define tags that have limits. There is no indication in the tag browser that limits extended properties are defined for a tag. If you try to use extended properties that have not been defined for a tag, the editors show a visual indication and the routine does not verify. Visual indicators include:

- A rung error in Ladder Logic.
- A verification error X in Function Block Diagrams.
- The error underlined in Structured Text.

You can access limit extended properties that the `.@Min` and `.@Max` syntax defines. However, you cannot write to extended properties values in logic.

For more information on Extended Properties, see the Logix 5000 Controllers I/O and Tag Data Programming Manual, publication [1756-PM004](#).

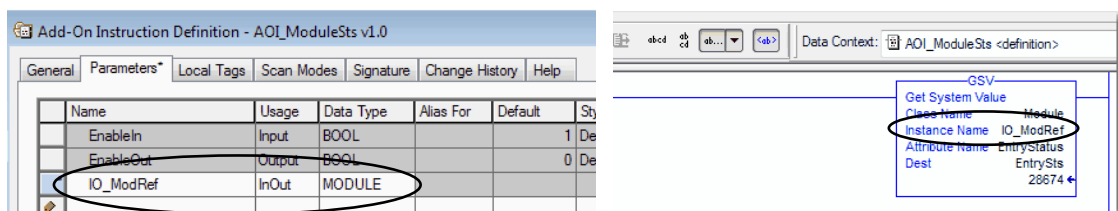
## Access the Module Object from an Add-On Instruction

The MODULE object provides status information about a module. To select a particular module object, set the Object Name operand of the GSV/SSV instruction to the module name. The specified module must be present in the I/O Configuration section of the controller organizer and must have a device name.

## Create the Add-On Instruction

You can access a MODULE object directly from an Add-On Instruction. Previously, you could access the MODULE object data but not from within an Add-On Instruction.

You must create a Module Reference parameter when you define the Add-On Instruction to access the MODULE object data. A Module Reference parameter is an InOut parameter of the MODULE data type that points to the MODULE Object of a hardware module. You can use module reference parameters in both Add-On Instruction logic and program logic.



For more information on the Module Reference parameter, see the Logix Designer application online help and the Logix 5000 Controllers Add-On Instructions Programming Manual, publication [1756-PM010](#).

The MODULE object uses the following attributes to provide status information:

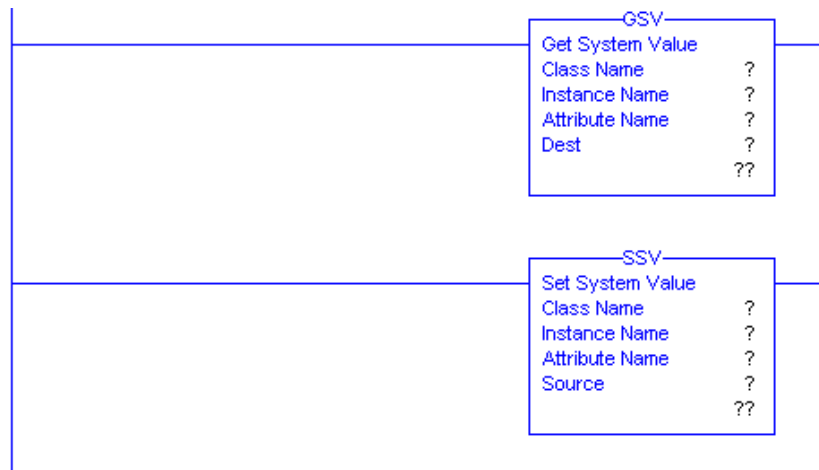
- EntryStatus
- FaultCode
- FaultInfo
- FWSupervisorStatus
- ForceStatus
- Instance
- LEDStatus
- Mode
- Path

## Monitor Controller Status

The CompactLogix 5480 controller uses Get System Value (GSV) and Set System Value (SSV) instructions to get and set (change) controller data. The controller stores system data in objects. There is no status file, as in the PLC-5® processor.

The GSV instruction retrieves the specified information and places it in the destination. The SSV instruction sets the specified attribute with data from the source. Both instructions are available from the Input/Output tab of the Instruction toolbar.

**Figure 38 - GSV and SSV Instructions for Monitoring and Setting Attributes**



When you add a GSV/SSV instruction to the program, the object classes, object names, and attribute names for the instruction are shown. For the GSV instruction, you can get values for the available attributes. For the SSV instruction, only the attributes that you can set are shown.

Some object types appear repeatedly, so you have to specify the object name. For example, there can be several tasks in your application. Each task has its own Task object that you access by the task name.

The GSV and SSV instructions monitor and set many objects and attributes. See the online help for the GSV and SSV instructions.

## Connection Overview

Logix 5000 controllers provide connection resources when communications are established between two devices.

Connections are used when the system contains the following conditions:

- I/O modules, communication modules, and adapters are present in the I/O configuration of the user project.
- Produced or Consumed tags are configured in the user project.
- Connected Messages are executed in the user application.
- External devices, programming terminals, or HMI terminals communicate with the controller.

## Controller Communication Interaction with Control Data

The CompactLogix 5480 controller runs the communications task separately from the application code. The controller runs communications asynchronously to the application.

Therefore, it is important to make sure communications that are delivered to the controller are complete before the application executes on the newly delivered data. This applies to data that is coming into the controller and data that is going out from the controller.

For example, if an HMI device writes a large block of recipe data to the controller, the application code can start to execute on that data before the data is written. This action results in half of the current recipe and half of the last recipe in the application space.

Traditionally, programmers have used the following to control the effects of asynchronous communications:

- UID/UIE pairs
- Periodic tasks
- Moving data with CPS instructions.

The following options rely on controlling when the main core can switch tasks. As a result, the communication task cannot change data when the control task is using it. Because the controller processes communications on an independent CPU core, these methods are no longer effective in all cases.

[Table 14](#) highlights the controller behavior.

**Table 14 - CompactLogix 5480 Controller Behavior**

Application Construct	Tag Access					
	HMI	MSG	I/O Update	Produce/Consume	Other User Tasks	Motion Planner
UID/UIE	Allows	Allows	Allows	Allows	Blocks	Allows
CPS	Blocks	Blocks	Blocks	Blocks	Allows	Allows
Periodic Tasks	Allows	Allows	Allows	Allows	Allows	Allows

Blocks - Helps prevent source data values from change by communications during application execution.

Allows - Communications can change source data values during application execution.

Because the controllers have 32-bit data integrity, this only applies to data structures larger than 32 bits. If word-level integrity is your primary concern, the 32-bit data integrity does not impact your data use.

Good programming practice dictates the use of two unique words at the beginning and the end of data. The controller validates the words to help ensure that the entire structure has data integrity.

We recommend that the handshake data is changed and the application code validates it every transaction before the controller application code or higher-level system reading controller data acts on it.



Table 15 shows two data elements that are added to a structure for data integrity checking. That is, Start Data and End Data are added. We recommend that the controller validates the Start Data value and the End Data value match before the controller acts on My\_Recipe1.

If the Start Data and End Data values do not match, it is likely communications is in the process of filling the structure. The same applies to higher-level systems that are receiving data from the controller.

**Table 15 - Data Elements**

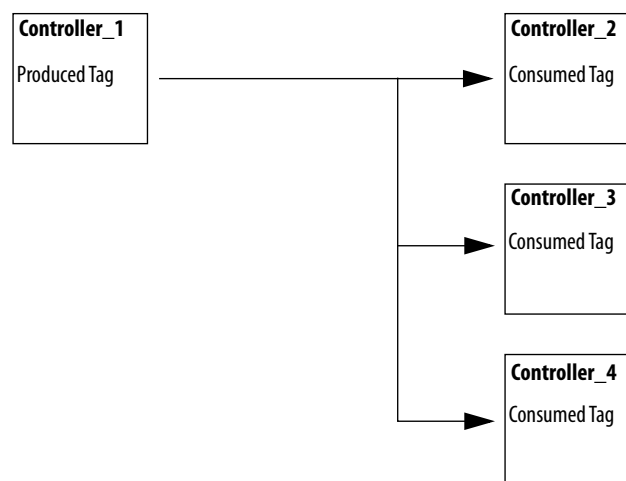
Structure	My_Recipe1	My_Recipe2	My_Recipe3
Start Data	101	102	103
Sugar	3	4	8
Flour	4	3	9
Chocolate	2	2	4
Oil	6	7	2
End Data	101	102	103

**TIP** We recommend that you perform this test on a buffered copy of the data and not the actual data element being written to by the communications core. If you use buffered data, you prevent the risk of the communication core changing data after you have passed the data valid test.

## Produce and Consume (Interlock) Data

CompactLogix 5480 controllers let you produce (transmit) and consume (receive) controller-scoped tags.

**Figure 39 - Example Produced and Consumed Tags**



[Table 16](#) describes the system-shared tags.

**Table 16 - Produced and Consumed Tag Descriptions**

Tag	Description
Produced tag	A tag that a controller makes available for use by other controllers. Multiple controllers can simultaneously consume (receive) the data. A produced tag sends its data to one or more consumed tags (consumers) without using logic.
Consumed tag	A tag that receives the data of a produced tag. The data type of the consumed tag must match the data type (including any array dimensions) of the produced tag. The RPI of the consumed tag determines the period at which the data updates.

For two controllers to share produced or consumed tags, the controllers must be attached to the same network. You cannot bridge produced and consumed tags over two networks.

Produced and consumed tags use connections of the controller and the communication modules being used.

### Requested Packet Interval (RPI) of Multicast Tags

The first consumer of a multicast produced tag on any given communications port establishes the RPI value for that port. All subsequent consumers that use the same port must request the same RPI value as the first consumer, otherwise they fail to connect. Controllers with backplane and Ethernet ports can produce data at an independent RPI value on each port.

For more information about produced/consumed tags, see the Logix 5000 Controllers Produced and Consumed Tags Programming Manual, publication [1756-PM011](#).

## Send and Receive Messages

Messages transfer data to other devices, such as other controllers or operator interfaces. The MSG instruction is a ladder logic output instruction that asynchronously reads or writes a block of data to or from another module over the backplane or a network. The size of the instruction depends on the data types and message command that you program.

Messages use connection resources to send or receive data. Messages can leave the connection open (cached) or can close the connection when the message is done transmitting.

Messages can be unconnected or connected. Unconnected messages depend on the availability of unconnected buffers in all devices through which the message passes. Connected messages begin with a request to allocate connection buffers in all of those devices, before sending the actual message. If you choose to cache a connected message, the controller keeps the connection open after the message is complete. Cached message improves efficiency if you intend to send the message repeatedly.

Connected messages use connection resources. If the connected message is uncached, the resources are used temporarily each time the message is triggered. As long as a cached connected message remains in the cache, the resources remain allocated and are not available for other messages. Cached messages can get pushed from the cache if the application exceeds the cache capacity of the controller.

Each message uses one connection out of the controller, regardless of how many devices are in the message path.

**Table 17 - Message Types**

Message Type	Communication Method	Connected Message	Message Can Be Cached
CIP™ data table read or write	Not applicable	Configurable	Yes <sup>(2)</sup>
PLC-2®, PLC-3®, PLC-5®, or SLC™ (all types)	CIP	No	No
	CIP with Source ID	No	No
	DH+™	Yes	Yes <sup>(2)</sup>
CIP generic	Not applicable	Optional <sup>(1)</sup>	Yes <sup>(2)</sup>
Block transfer read or write	Not applicable	Yes	Yes <sup>(2)</sup>

(1) You can connect CIP generic messages. However, for most applications we recommend that you leave CIP generic messages unconnected.

(2) We recommend that you cache connected messages that occur more frequently than once every 60 seconds, if possible.

For more information about how to use messages, see the Logix 5000 Controllers Messages Programming Manual, publication [1756-PM012](#).

## Determine Whether to Cache Message Connections

When you configure a message instruction, you can cache the connection. Use [Table 18](#) to decide to cache a connection.

**Table 18 - Options for Caching Connections**

If the Message Executes	Then
Repeatedly	Cache the connection. When you cache the connection, the connection remains open and execution time is optimized. If a connection is opened each time that the message executes, execution time is increased.
Infrequently	Do not cache the connection. When you do not cache the connection, the connection closes upon completion of the message. As a result, the connection is available for other uses. Unconnected messages are best used for infrequent cached message connections.

**TIP** Cached connections transfer data faster than uncached connections. The CompactLogix 5480 controller can cache as many as 256 connections.


## Monitor I/O Connections

If communication with a device in the I/O configuration of the controller does not occur in an application-specific period, the communication times out and the controller produces warnings.

The minimum timeout period that, once expired without communication, causes a timeout is 100 ms. The timeout period can be greater, depending on the RPI of the application. For example, if your application uses the default RPI = 20 ms, the timeout period is 160 ms.

For more information on how to determine the time for your application, search the Rockwell Automation® Knowledgebase for answer ID 38535. The document is available at <http://www.rockwellautomation.com/knowledgebase>.

When a timeout does occur, the controller produces the following warnings;

- I/O Fault status information scrolls across the 4-character status display of the controller.
- A  shows over the I/O configuration folder and over the devices that have timed out.
- A module fault code is produced. You can access the fault code via the following:
  - The Module Properties dialog box
  - A GSV instruction

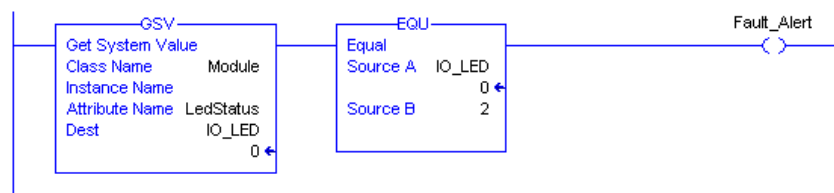
For more information about I/O faults, see the Logix 5000 Controllers Major, Minor, and I/O Faults Programming Manual, publication [1756-PM014](#).

## Determine If I/O Communication Has Timed Out

This example can be used with the CompactLogix 5480 controllers:

- The GSV instruction gets the status of the I/O status indicator (via the LEDStatus attribute of the Module object) and stores it in the IO\_LED tag.
- IO\_LED is a DINT tag that stores the status of the I/O status indicator or status display on the front of the controller.
- If IO\_LED equals 2, at least one I/O connection has been lost and the Fault\_Alert is set.

**Figure 40 - GSV Used to Identify I/O Timeout**



## Determine If I/O Communication to a Specific I/O Module Has Timed Out

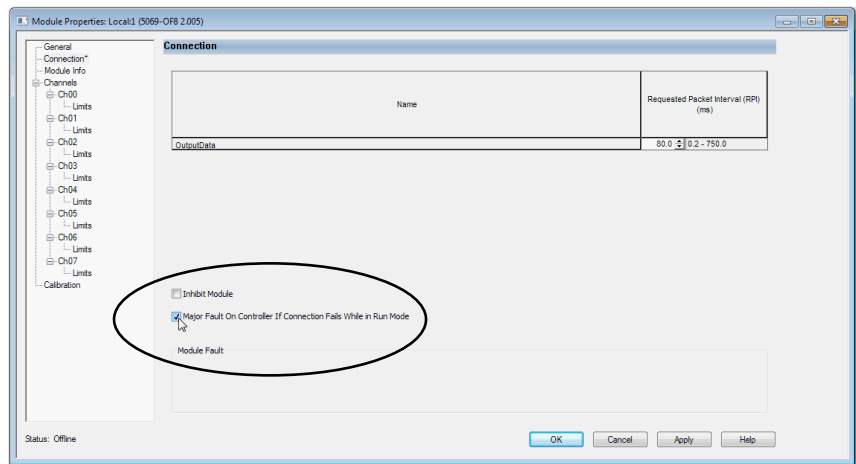
If communication times out with a device (module) in the I/O configuration of the controller, the controller produces a fault code and fault information for the module. You can use GSV instructions to get fault code and information via the FaultCode and FaultInfo attributes of the Module object.

## Automatic Handling of I/O Module Connection Faults

You can use an I/O connection error to cause the Controller Fault Handler to execute. To do so, set the module property that causes a major fault to result from an I/O connection error. The major fault causes the execution of the Controller Fault Handler.

It can be important to interrupt your normal program scan to handle an I/O connection fault. In this case, set the 'Major Fault On Controller If Connection Fails While In Run Mode' and put the logic in the Controller Fault Handler.

**Figure 41 - I/O Connection Fault Causes Major Fault**



You can configure the application so that a response to a failed I/O module connection can wait until the next program scan. In this case, put the logic in a normal routine and use the GSV technique that is described on [page 205](#) to call the logic.

First, develop a routine in the Controller Fault Handler that can respond to I/O connection faults. Then, in the Module Properties dialog box of the I/O module or parent communication module, check Major Fault On Controller If Connection Fails While in Run Mode.

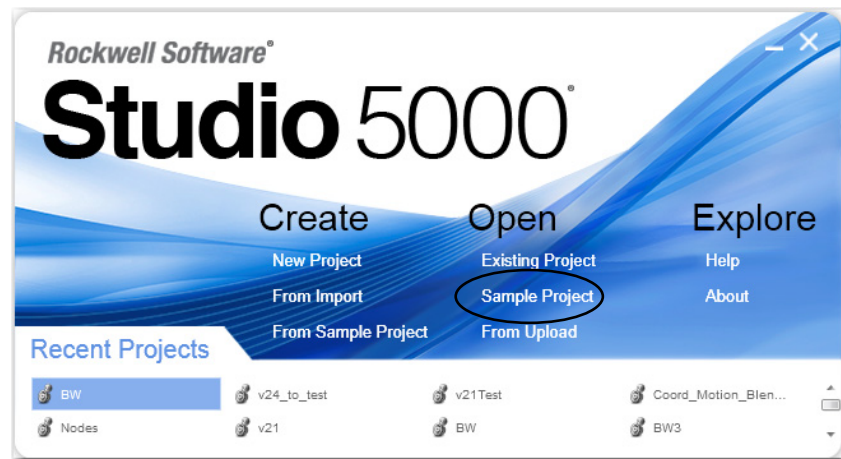
**TIP** It takes at least 100 milliseconds to detect an I/O connection loss, even if the Controller Fault Handler is used.

For more information about programming the Controller Fault Handler, see the Logix 5000 Major, Minor, and I/O Faults Programming Manual, publication [1756-PM014](#).

## Sample Controller Projects

Logix Designer application includes sample projects that you can copy and modify to fit your application. To access the sample projects, click Sample Project in the Studio 5000® environment interface as shown and navigate to Samples > ENU > v32 > Rockwell Automation.

**Figure 42 - Open Sample Projects**



**Notes:**



## Develop Motion Applications

Topic	Page
Motion Overview	209
Motion Applications	211
Program Motion Control	212
Obtain Axis Information	214

This chapter describes how to use motion with a CompactLogix™ 5480 controller.

### Motion Overview

CompactLogix 5480 controllers support Integrated Motion over an EtherNet/IP™ network on digital and integrated motion interfaces.

- [Table 19](#) lists the number of axes that the CompactLogix 5480 controllers support.

**Table 19 - CompactLogix 5480 Controller Integrated Motion**

	5069-L430ERMW	5069-L450ERMW	5069-L4100ERMW	5069-L4200ERMW	5069-L46ERMW
Number of axes supported, max <sup>(1)</sup>	512				
Number of CIP™ Drive axes (Position loop-configured) supported, max <sup>(2)</sup>	16	24	32	150	150

(1) Any combination of CIP Drive, Virtual, Consumed, Regenerative AC/DC Converter and Non-Regenerative AC/DC Converter axis types.

(2) The maximum number of CIP Drive axes (configured for Position Loop) that can be included in the total integrated motion axes count for a controller.

- Digital drive interfaces include EtherNet/IP connected drives.
- Integrated Motion over an EtherNet/IP network supports the following:
  - Kinetix® 350 drives
  - Kinetix 5500 drives
  - Kinetix 5700 drives
  - Kinetix 6500 drives
  - PowerFlex® 527 drives
  - PowerFlex 755 drives

- CompactLogix 5480 controllers support single-axis motor control with PowerFlex variable-frequency drives over an EtherNet/IP network.

For more information, see the following:

- Integrated Motion on the EtherNet/IP network Configuration and Startup User Manual, publication [MOTION-UM003](#).
- Integrated Motion on the EtherNet/IP network Reference Manual, Publication [MOTION-RM003](#).

---

**IMPORTANT** The CompactLogix 5480 controllers do not support Analog or SERCOS motion.

---

You can associate Integrated Motion axes to any appropriate drive.

## Motion Applications

The following are general steps to configure a motion application. The configuration process varies, based on your application and drive selection.

1. Create a controller project.
2. Add a drive to the I/O configuration of the project.
3. Create and configure logical axes, and associate them with physical drives or virtual axes.
4. Create and configure a Motion Group.
5. Assign Axes to the Motion Group.
6. Specify the motor data source.
7. Display the motor model information.
8. Assign Motor Feedback.
9. Configure the load feedback.
10. Configure the master feedback.
11. Commission an axis.
12. Home an axis.
13. Optionally create and configure Coordinate Systems.
14. Write user logic to control motion.
15. Optionally tune the physical drives for the attached loads.

For more information on how to configure a motion application, see the Integrated Motion on the EtherNet/IP Network Configuration and Startup User Manual, publication [MOTION-UM003](#).

## Program Motion Control

The controller provides a set of motion control instructions for your axes:

- The controller uses the instructions just like the rest of the Logix 5000™ instructions.
- Each motion instruction works on one or more axes.
- Each motion instruction needs a motion control tag. The tag uses a MOTION\_INSTRUCTION data type and stores the information status of the instruction.
- You can use motion control instructions in the following programming languages:
  - Ladder Diagram (LD)
  - Structured Text (ST)
  - Sequential Function Chart (SFC)

For more information, see the Logix 5000 Controller Motion Instructions Reference Manual, publication [MOTION-RM002](#).

**Figure 43 - Motion Control Instruction**



**ATTENTION:** Use each motion control tag in only one motion instruction. Unintended operation can result if you reuse the same motion control tag in other motion instructions, or if you write to any of the motion control tag elements.

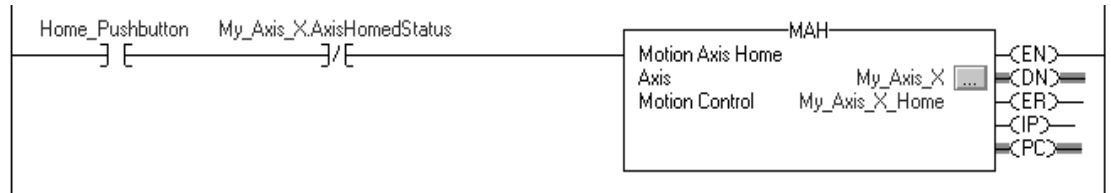
### Example

In this example, a simple ladder diagram that homes, jogs, and moves an axis.

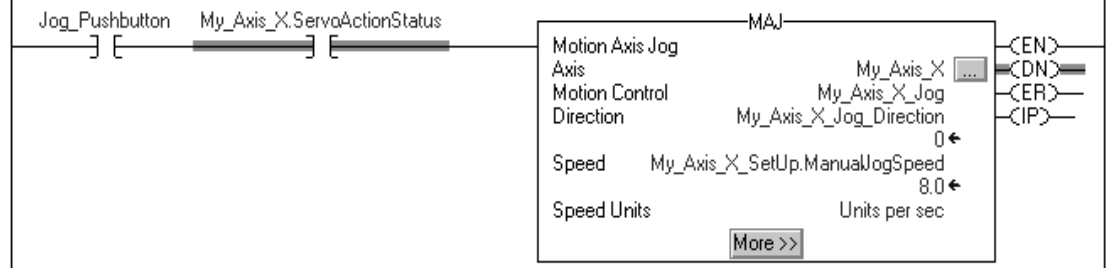
If Initialize\_Pushbutton = on and the axis = off (My\_Axis\_X.ServoActionStatus = off), the MSO instruction turns on the axis.



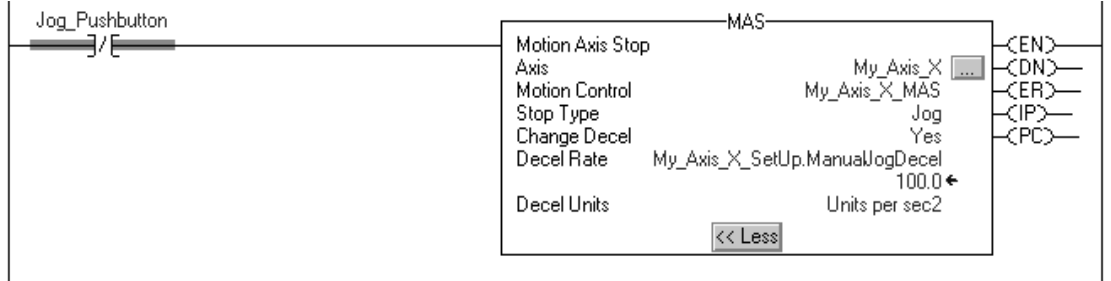
If Home\_Pushbutton = on and the axis hasn't been homed (My\_Axis\_X.AxisHomedStatus = off), the MAH instruction homes the axis.



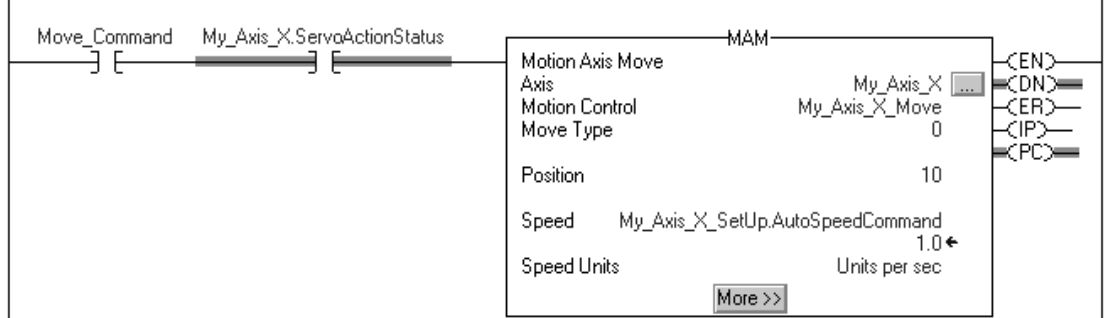
If Jog\_Pushbutton = on and the axis = on (My\_Axis\_X.ServoActionStatus = on), the MAJ instruction jogs the axis forward at 8 units/second.



If Jog\_Pushbutton = off, the MAS instruction stops the axis at 100 units/second<sup>2</sup>. Make sure that Change Decel is Yes. Otherwise, the axis decelerates at its maximum speed.



If Move\_Command = on and the axis = on (My\_Axis\_X.ServoActionStatus = on), the MAM instruction moves the axis. The axis moves to the position of 10 units at 1 unit/second.

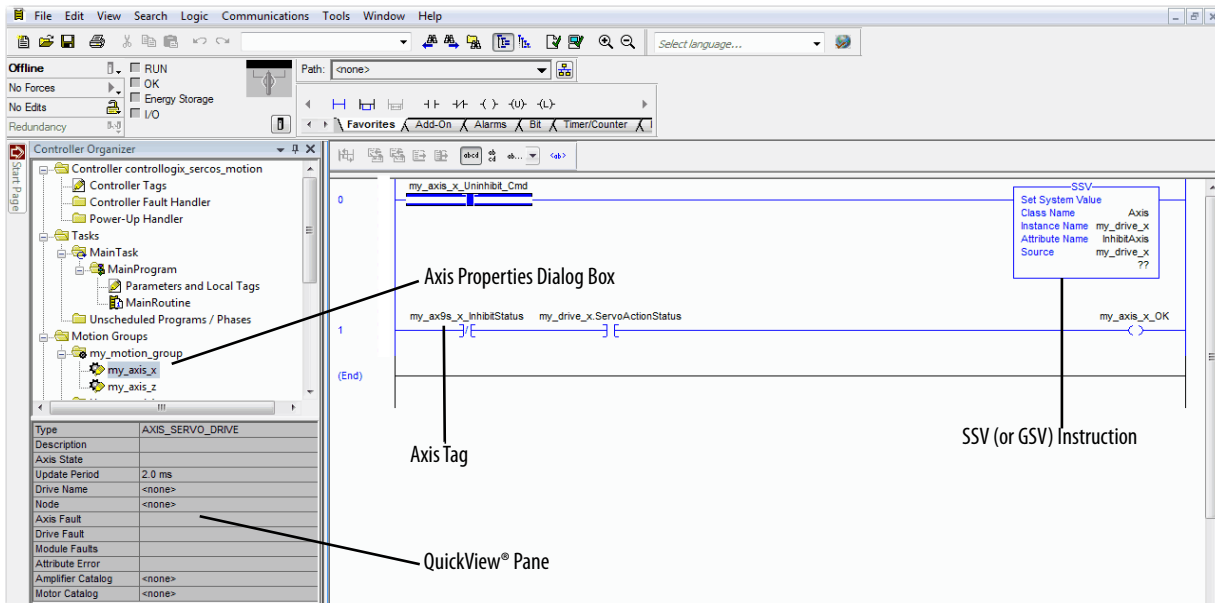


## Obtain Axis Information

You can obtain axis information via the following methods:

- Double-click the axis to open the Axis Properties dialog box.
- Use a Get System Value (GSV) or Set System Value (SSV) instruction to read or change the configuration at runtime.
- View the QuickView® pane to see the state and faults of an axis.
- Use an axis tag for status and faults.

Figure 44 - Obtain Axis Information



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## Commercial Operating System

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This chapter describes the COS on the CompactLogix™ 5480 controller.

The pre-installed, licensed COS lets you perform tasks on the controller that must be performed on an external workstation in other Logix 5000™ control systems.

### System Overview

The COS on a CompactLogix 5480 controller runs in parallel with the Logix control engine. Remember the following:

- The COS is licensed and pre-installed on the controller.
- You are not required to use the COS.
- You cannot extend CompactLogix 5480 controller real-time control to the COS.

## Controller Firmware Installation Required to Start the COS

You **must install working controller firmware** before you can use the COS. The COS does not start until working controller firmware is installed.

In the out-of-box state, the controller uses firmware revision 1.xxx. When you install firmware on a controller that has firmware revision 1.xxx, you must use the firmware file only option. You cannot use the firmware file with WIN file option.

For more information on the firmware file only and firmware file with WIN file options and how update controller the firmware revision, see [page 71](#).

Power is automatically cycled on the controller as part of the firmware update process. After the power-up completes, the COS starts automatically.

For more information on how to update the controller firmware, see [Update Controller Firmware on page 71](#).

**TIP** If you are not using the COS, consider shutting it down because there is no benefit to running the COS if it is not in use.  
There are benefits to shutting down the COS if you are not going to use it, though. For example, less power is consumed and there is a reduction in the heat that is generated.

## Clock Synchronization with Logix Control Engine

The wall clock time of the controller is copied to the COS at controller power-up. However, controller power-up is the only time that it is copied.

The Logix control engine and the COS clocks are independent. Over time there is drift between the clocks.

If you set it in the COS, it is not persistent across power cycle.

## Functions Like a Computer

The COS is an industrial computer that supports the following actions:

- The COS performs Windows-based computing and has the same reliability as other Windows-based products.
- The installation and use of third-party software applications.



- Installation and use of Rockwell Automation® applications that are used with a Logix 5000 control system.

For example, you can install and run the following applications from the COS:

- FactoryTalk® Linx software
- FactoryTalk View SE Station software

- You can transfer data between the COS and the Logix control engine.
- You can use ports on the bottom of the controller to make connections that are typically made with a computer. For example, you can connect a wireless mouse and keyboard to the controller instead of to a computer.

For more information on how to use the ports that are dedicated to the COS, see [Ports Dedicated to Windows-based Activities on page 218](#).

### *Initial Startup Procedure*

The first time that you start the COS, it is in the factory default state. You must complete the tasks during the startup procedure, for example, setting a password, the first time you turn on power to the controller.

### *Controller Reset Causes COS Reset*

The CompactLogix 5480 controller is an industrial controller that hosts the COS. When the controller resets, power is cycled to the controller, and the COS resets. For example, if you update the firmware revision, the controller resets.

You can change the state of the COS and not affect the state of the Logix control engine in the controller. You can reset or shut down the COS and the Logix control engine continues to operate as before the COS reset.

## Memory Dedicated to Windows-based Activities

We recommend that you consider the memory limits before you begin using the COS. For example, application code development can burden the COS memory resources in a manner that can impact COS performance.

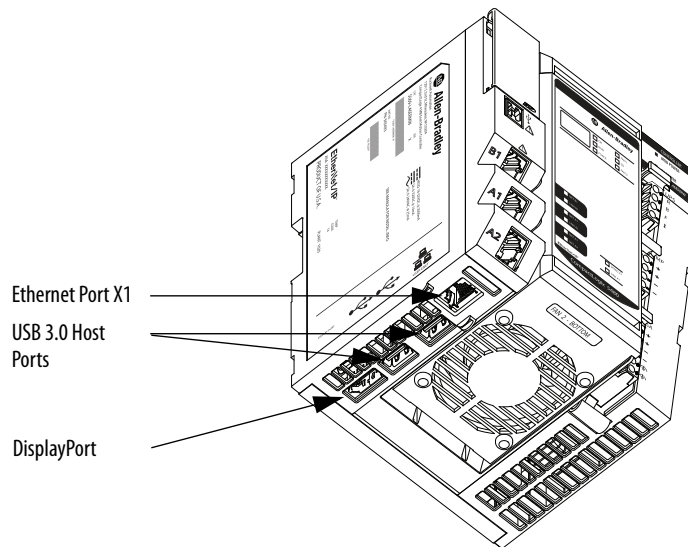
It can be more effective to develop code on an external workstation and perform maintenance or troubleshooting activities on the COS so available controller resources are best used.

## Ports Dedicated to Windows-based Activities

The following ports are available on the bottom of the controller to use with the COS:

- [Ethernet Port X1](#)
- [USB 3.0 Host Ports](#)
- [DisplayPort](#)

**Figure 45 - COS Ports on a CompactLogix 5480 Controller**



### Ethernet Port X1

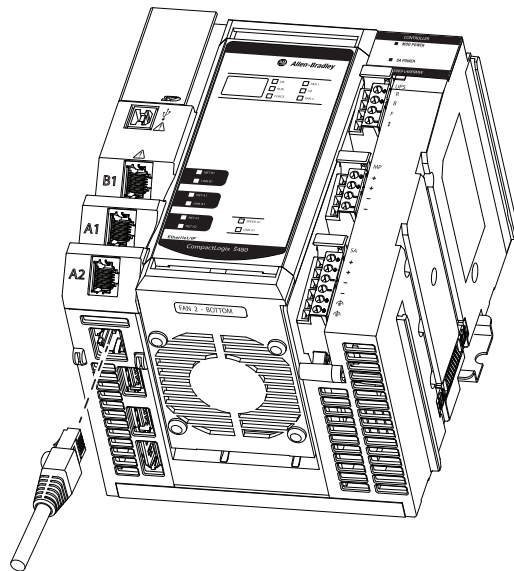
You can use port X1 to connect the COS to only enterprise-level EtherNet/IP™ networks. Port X1 communicates at the 10 Mbps, 100 Mbps, and 1-Gbps network communication rates.

Port X1 is isolated from ports A1, A2, and B1. You cannot use Port X1 with the Logix control engine for real-time control. The isolation between port X1 and ports A1, A2, and B1, lets you segment network communication. As a result, network communication is isolated.



**WARNING:** If you connect or disconnect the communications cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

If you are connecting the controller directly to an EtherNet/IP network, connect a CAT 5e or CAT 6 Ethernet cable with an RJ45 connector to a controller Ethernet port.



Port X1 requires an IP address for the COS to connect to an EtherNet/IP network.

When the controller is in the out-of-the-box state, port X1 is DHCP-enabled. That is, the port is configured to automatically obtain an IP address via a DHCP server as soon as it connects to an EtherNet/IP network. The port automatically obtains other EtherNet/IP network parameters, for example, a Subnet Mask, simultaneously.

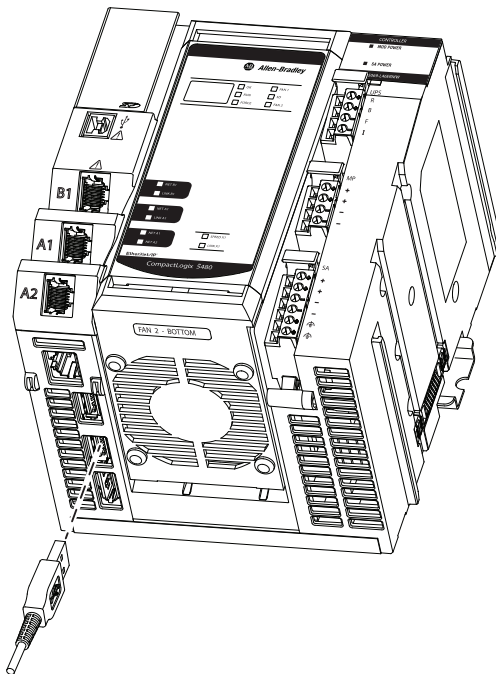
To change the network settings on port X1, you use any Microsoft® Windows 10 configuration method.

### *USB 3.0 Host Ports*

The USB 3.0 Host ports let you connect COS peripherals to the controller, including the following:

- USB 3.0 hard disk drive
- USB 3.0 flash drive
- USB hub
- Keyboard/mouse/point click interface

**Figure 46 - Connect USB Cables to the USB 3.0 Host Ports**

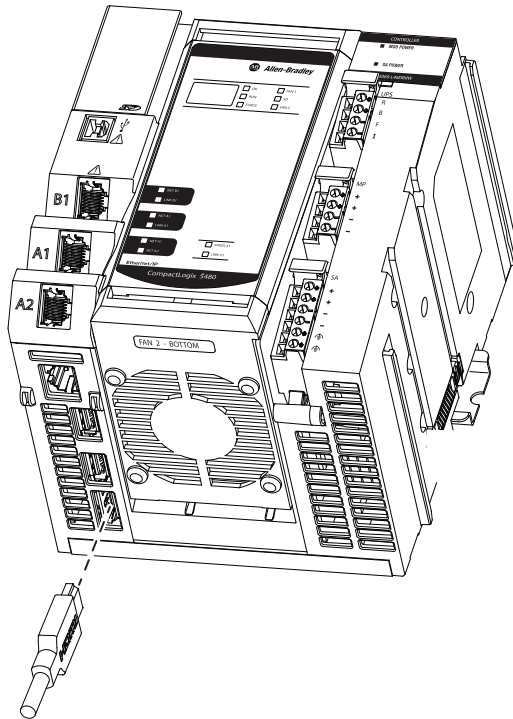


## DisplayPort

The DisplayPort interface lets you connect the controller to a display monitor that can be used with the COS.

If you want to connect to a monitor using another interface, you must use a VESA-certified adapter. Failure to use a VESA-certified adapter can cause damage or improper operation. For a list of certified adapters and cables, see [www.vesa.org](http://www.vesa.org).

**Figure 47 - Connect a Cable to the DisplayPort**

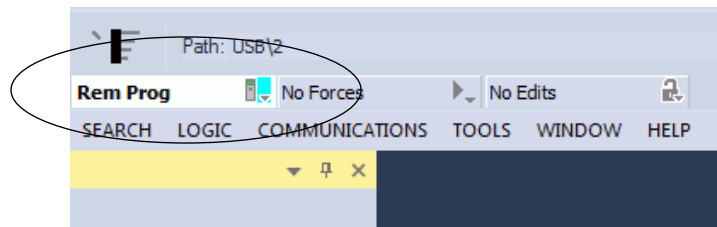


## Use the Reset Button with the COS

As long as the controller is powered, you can use the reset button to perform the following tasks on the COS:

- Execute a soft restart.
- Execute a hard restart.
- Enter Operating System Utilities mode - The controller must be in Program or Remote Program mode to perform this task.
  - If the controller mode switch is in the PROG position, the controller is in Program mode.
  - If the controller mode switch is in the REM position, the controller can be in Remote Run or Remote Program mode.

In addition to confirming that the mode switch is in the REM position, check the controller project in Logix Designer application to that the controller is in Remote Program mode.




---

**IMPORTANT** Pressing the reset button when the controller is in Remote Run or Run mode does not affect the Logix control engine.

---



**WARNING:** When you press the reset button while power is on, an Electric Arc can occur. This could cause an explosion in hazardous location installations. Be sure that the area is nonhazardous before proceeding.

---

**TIP** Before you use the reset button with the COS, we recommend that you save any unsaved data to the COS internal memory or removable media that is connected to one of the USB ports that are used with the COS.

Any unsaved data is lost when the COS is restarted or enters Operating System Utilities mode.

**IMPORTANT:** Removable media that is connected to the COS is read-only unless it is protected by Bit Locker.

When the button is pressed and held, 4-character words appear on the controller display. The mode switch position and length of time that you hold the reset button in determines what happens.

[Table 20](#) describes what occurs.

**Table 20 - Using the Reset Button with the COS**

Controller Mode Switch Position	If You Press and Hold the Reset Button For This Long	This Word Appears on the 4-character Display	This Happens on the COS	For More Information, See This Page
RUN, REM, or PROG	1...<5 seconds	SFTR <sup>(1)</sup>	Soft restart A soft reset is the same as using the Start menu on a computer.	227
	≥5...<10 seconds	HRDR	Hard restart A hard reset is the same as using the power button on a computer.	
PROG	≥10...<15 seconds	UTIL	COS restarts in Operating System Utilities mode, and the controller restarts.	235
RUN or REM		MODE	Nothing	
RUN, REM, or PROG	≥15 seconds	There is no change to the display.	Nothing	—

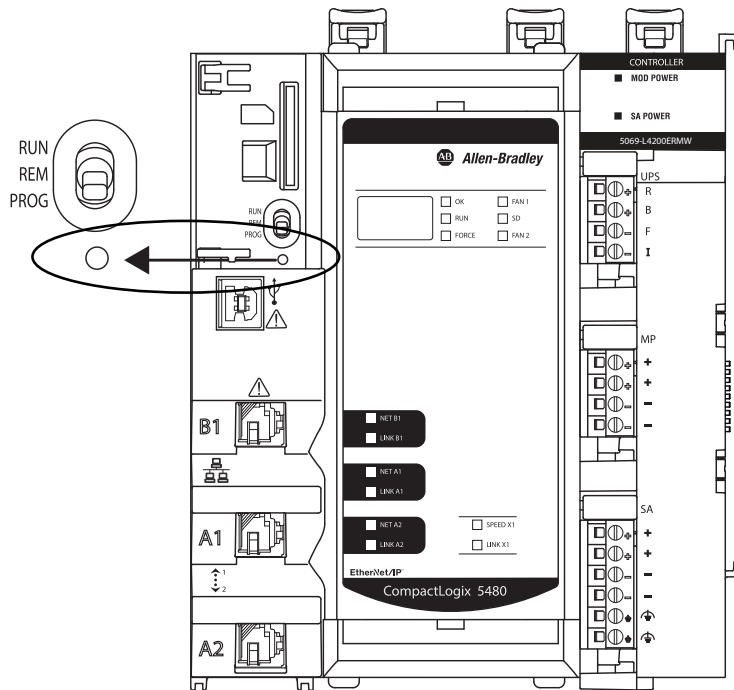
(1) The reset does not occur immediately so that an orderly shutdown can occur on the COS. If the soft reset fails to occur after approximately 5 minutes and a hard reset does not occur automatically after the time is elapsed, you can be required to press the reset button again for 1...5 seconds.

To use the reset button with the COS, complete the following steps.

1. If you want the controller to enter Operating System Utilities mode, make sure that the mode switch is in the PROG position.

For more information, see [Table 20 on page 223](#)

2. Use a small tool with a diameter of a paper clip to press and hold the reset button.



3. Release the button when necessary, see the times that are listed in [Table 20 on page 223](#), to execute the desired task.



## Data Exchange Between the COS and Logix Control Engine

You can exchange data between the COS and the Logix control engine on the CompactLogix 5480 controller.

### FactoryTalk Linx Software

FactoryTalk Linx software, formerly known as RSLinx® Enterprise software, facilitates the communication of data between the Logix control engine on the CompactLogix 5480 controller and devices on an EtherNet/IP network.

Previous to the release of the CompactLogix 5480 controller, you were required to install FactoryTalk Linx browser software on a workstation to use it with a Logix 5000 controller.

The COS on a CompactLogix 5480 controller lets you install FactoryTalk Linx software on the controller itself without the need for a workstation.

FactoryTalk Linx software is launched through FactoryTalk Administration Console software that is included with the installation of FactoryTalk Services Platform.

### FactoryTalk Linx Gateway Software

FactoryTalk Linx software can be used as a standalone tool. It can also be used as part of the FactoryTalk Linx Gateway software.

FactoryTalk Linx Gateway is an OPC Unified Architecture (UA) and Classic Data Access (DA) data server. FactoryTalk Linx Gateway lets OPC clients to connect to, and access tag data from, FactoryTalk applications that contain FactoryTalk Linx and FactoryTalk View SE servers.

FactoryTalk Linx Gateway can send data to, and retrieve data from, any FactoryTalk Live Data server or OPC server that is defined within a FactoryTalk system.

FactoryTalk Linx Gateway consists of:

- A service that provides tag data to OPC DA clients.
- A service that provides tag data to OPC UA clients.
- A configuration tool that configures the runtime operation of the service. The configuration tool enables the selection of the area or application, from which you want to access data (called the scope) and to start and stop the service.

You can purchase FactoryTalk Linx Gateway software through the Product Compatibility and Download Center (PCDC) available at:

<http://compatibility.rockwellautomation.com/Pages/home.aspx>

For more information on how to use FactoryTalk Linx Gateway software, see the following:

- FactoryTalk Linx Gateway Getting Results Guide, publication [FTLG-GR001](#)
- FactoryTalk Administration Console online help

## Restrictions With the COS

The following restrictions apply when you use the COS on your CompactLogix 5480 controller:

- You cannot access the controller SD card on the front of the controller from the COS.
- You cannot start the COS if the controller firmware revision is 1.xxx.

The controller firmware revision must be a working revision, that is, 32.011 or later, for you to start the COS.

## State Changes on the COS

The following state changes can have negligible effect on real-time control:

- Restarting the COS.
- Shutting down the COS.
- An unexpected termination of the COS.

## Methods of Changing the COS State

You can use the following methods to change the COS state:

**TIP** Before you use the reset button with the COS, we recommend that you save any unsaved data to the COS internal memory or removable media that is connected to one of the USB ports that are used with the COS.

Any unsaved data is lost when the COS is restarted or enters Operating System Utilities mode.

**IMPORTANT:** Removable media that is connected to the COS is read-only unless it is protected by Bit Locker.

- You can **restart or shut down** the COS in the same ways that you can a computer, for example, **via the Start menu**.

---

**IMPORTANT** If the COS is shut down, you are **not required to cycle power** to the controller to restart the COS.

You can restart the COS in either of the following ways:

- Via the controller reset button by performing a soft or hard reset when the controller is powered.
- Cycling power to the controller. However, you are not required to cycle power.

For more information on how to use the controller reset button to perform a soft or hard reset, see [Use the Reset Button with the COS on page 222](#).

- 
- You can also perform a soft or hard **reset** of the COS **via the controller reset button**, as described on [page 222](#).

### *Soft Reset of COS*

A soft reset of the COS is the same as restarting a computer via the Start menu. The difference is that to execute a soft reset of the COS, you use the controller reset button as described in [Use the Reset Button with the COS on page 222](#).

Before you execute a soft reset, we recommend that you save unsaved data and close all open applications on the COS.

### *Hard Reset of COS*

A hard reset of the COS is the same as performing a hard restart of a computer by holding the power button down. The difference is that to execute a hard reset of the COS, you use the controller reset button as described in [Use the Reset Button with the COS on page 222](#).

If possible, before you execute a hard reset, we recommend that you save unsaved data and close all open applications on the COS.

## **Security Settings on the COS**

The COS on the CompactLogix 5480 controller is configured per the Microsoft Security Baseline for Windows 10 v1607 with three exceptions that are described at [Inactivity Lock and Screen Saver Settings on page 230](#).

For detailed information on Microsoft Security Baseline for Windows 10 v1607, see: <https://docs.microsoft.com/en-us/windows/device-security/windows-security-baselines>.

Remember the following as you read this section:

- The security setting descriptions provide information that is considered to be of particular importance regarding how you use the COS.

The descriptions are not exhaustive descriptions. For complete descriptions, see the Microsoft Security Baseline referenced previously.

- If you change the COS default security settings from the out-of-box conditions, you assume responsibility for any potential issues that arise as a result of the changes.

## COS Updates

The COS is enabled for automatic critical updates only.

If necessary, you can change the COS update settings. We recommend that you update the COS according to your organizational IT policies.

## Install Software Application from External Network

If you must install software on the COS from an external network, you can experience an issue during the installation process. That is, a dialog box can unexpectedly disappear.

This is an example of how the issue can occur.

1. Access the remote network via the X1 port.
2. Browse to an executable file and double-click it.

The Open File - Security Warning dialog box appears.

3. Click Run.

The User Account Control dialog box appears.

4. Click Yes.

The Windows Security dialog box appears that requires you to enter your network credentials. When you click the dialog box, it disappears.

5. Click ALT + tab and the Windows Security dialog box reappears.

**TIP** This step is one method to get the dialog box to reappear. It is a potential workaround.

6. Enter your credentials and the installation process proceeds as expected.

## Inactivity Lock and Screen Saver Settings

The Inactivity Lock and Screen Saver policies settings are the exceptions regarding the COS design compared to the Microsoft Security Baseline for Windows 10 v1607.

- In the Baseline, the policies are set so that a screen saver launches if no activity occurs for a specified time. Once the screen saver launches, you enter the password to access the module.
- In the COS, a screen saver does not launch and the account is not locked, regardless of the length of time that no activity occurs on the COS.

The following changes were made to disable the inactivity lock and screen saver policies.

Policy Path	Policy Name	Value in COS
Computer Configuration\Windows Settings\Security Settings\Local Policies\Security Options	Interactive logon: Machine inactivity limit	0
User Configuration\Administrative Templates\Control Panel\Personalization	Password protect the screen saver	Not Configured
User Configuration\Administrative Templates\Control Panel\Personalization	Enable screen saver	Not Configured

For more information on the policies in the Microsoft Security Baseline for Windows 10 v1607, see the following:

- Interactive logon: Machine inactivity limit policy:
  - = <https://docs.microsoft.com/en-us/windows/device-security/security-policy-settings/interactive-logon-machine-inactivity-limit>
  - = <https://www.microsoft.com/en-us/download/details.aspx?id=25250>
- Password protect the screen saver policy and Enable screen saver policy:
  - = <https://www.microsoft.com/en-us/download/details.aspx?id=25250>

## Password Settings

Password and account lockout settings are tied together because, if an account is locked, a password is required to unlock it. A password can help to establish and maintain a degree of security.

---

**IMPORTANT** The first time you power up a CompactLogix 5480 controller after the initial controller firmware update, there is no enabled account on the COS. You must configure a login ID and password. The COS guides you through the process to create them.

After you implement a password, you can change it. However, you cannot recover the password if you forget or lose it.

If you cannot log in to COS because you do not know the password, you must reinstall the COS. That is, you must return it to its factory default state.

When the COS is returned to the out-of-box condition, all data that was previously on the COS is lost.

---

[Table 21](#) describes some of the password policies.

**Table 21 - COS Password Policies**

Policy	Description
Password change	The following apply: <ul style="list-style-type: none"> <li>You must change the password every 60 days. When 60 days have expired, you are prompted to change the password the next time that you log in.</li> <li>After you change the password, you cannot change it again for at least 1 day.</li> </ul>
Minimum password length	The password must be a minimum of 14 characters in length.
Password complexity	The password must include at least one of <b>each of the following</b> : <ul style="list-style-type: none"> <li>Lower case letter</li> <li>Upper case letter</li> <li>Number</li> <li>Special character</li> </ul>
Password reuse	The password cannot be the same as the previous 24 passwords that were used on the module.

For more information on the Password Policy in the Microsoft Security Baseline for Windows 10 v1607, see <https://docs.microsoft.com/en-us/windows/device-security/security-policy-settings/password-policy>

## Account Lockout Settings

To help maintain a degree of security, an account on the COS can be locked. [Table 22](#) describes some of the account lockout policies.

**Table 22 - COS Account Lockout Policies**

Policy	Description
Password use to unlock account	An account is locked after 10 failed attempts to log in.
Access to a locked account	The following apply: <ul style="list-style-type: none"> <li>Once an account is locked, you can attempt to log in to the account after 15 minutes.</li> <li>A system administrator can manually unlock the account for a general user before 15 minutes expire.</li> </ul>

For more information on the Account Lockout Policy in the Microsoft Security Baseline for Windows 10 v1607, see <https://docs.microsoft.com/en-us/windows/device-security/security-policy-settings/account-lockout-policy>.

## Network Settings

The X1 port lets the COS connect to an EtherNet/IP network. [Table 23](#) describes some of the Network policies.

**Table 23 - COS Network Policies**

Policy	Description
Local account access over network	Local accounts are denied permission to log on to the module over the network.
Windows Firewall	Windows Firewall policy that the local policy manages.

For more information on the Microsoft Security Baseline for Windows 10 v1607 policies, see the following:

- Local account access over network policy - <https://docs.microsoft.com/en-us/windows/device-security/security-policy-settings/deny-access-to-this-computer-from-the-network>
- Windows Firewall policy - <https://docs.microsoft.com/en-us/windows/access-protection/windows-firewall/windows-firewall-with-advanced-security-design-guide>



## Internet Explorer Settings

You can use Internet Explorer (IE) on the COS. [Table 24](#) describes some of the IE policies.

**Table 24 - COS IE Policies**

Policy	Description
Restrictions on using IE	Restrictions exist to account for unsafe ActiveX controls. The restrictions include: <ul style="list-style-type: none"> <li>You cannot use IE to run outdated controls.</li> <li>You cannot use IE to run some controls that are not outdated.</li> </ul>
Java configuration	Java is configured on the module to run with High Safety settings on the following: <ul style="list-style-type: none"> <li>Trusted<sup>®</sup> Sites Zone</li> <li>Intranet Zone</li> </ul>

For more information on the IE policies, see <https://www.microsoft.com/en-us/download/details.aspx?id=25250>.

## Removable Media Settings

You can use removable media with the COS. [Table 25](#) lists removable media policies.

**Table 25 - COS Removable Media Policies**

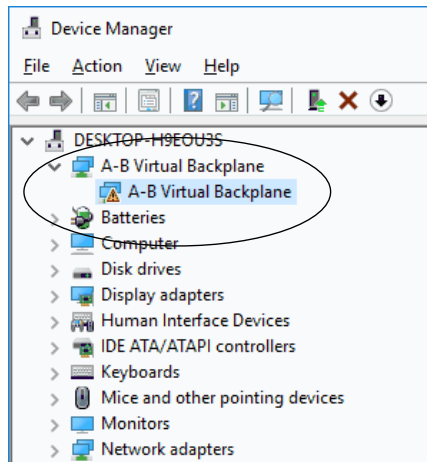
Policy	Description
Removable media use	Removable media that is connected to the COS is read-only unless it is protected by Bit Locker.
Autoplay	Autoplay is disabled.

For more information on the Removable Media Policy in the Microsoft Security Baseline for Windows 10 v1607, see <https://www.microsoft.com/en-us/download/details.aspx?id=25250>.

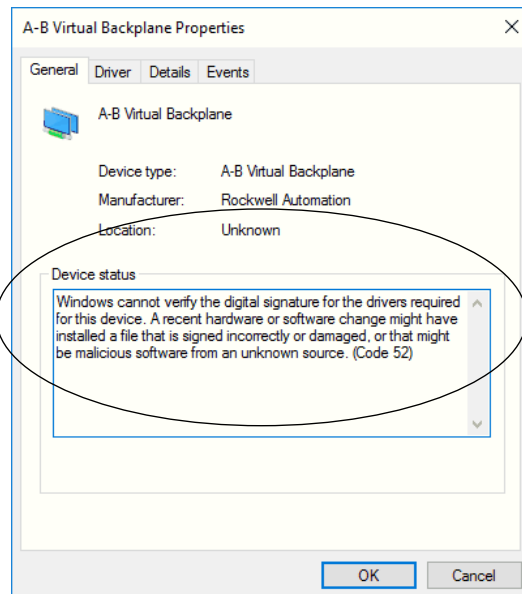
## Driver Signature Enforcement

The COS is designed with the **driver signature enforcement** feature enabled. Therefore, you can only use signed drivers that are installed correctly.

If you install an unsigned driver or incorrectly install a signed driver, it does not work. The error is indicated in the Device Manager dialog box under A-B Virtual Backplane folder.



If you double-click the A-B Virtual Backplane folder, the Device status section of the A-B Virtual Backplane Properties dialog box describes the presence of error code 52.



---

**IMPORTANT** To avoid this error, install signed drivers correctly. If you must use a driver but only have an unsigned version of it, you must first obtain a signed version of that driver.

---

## Use the Operating System Utilities Tool to Reinstall the COS

The CompactLogix 5480 controller ships with a licensed COS already installed. If necessary, you can use the Operating System Utilities tool to reinstall the COS.

---

**IMPORTANT** Before you begin to reinstall the COS, consider the following:

- When you reinstall the COS on a CompactLogix 5480 controller, you return it to its factory default state, also known as the Out-of-Box Experience (OOBE) state.

Any data files, programs, or Windows configuration settings that exist on the COS before it is reinstalled are lost and cannot be recovered after the reinstallation process is complete.

We recommend that you save all data, user installed programs, and Windows settings before reinstalling the COS. You can save the data, programs, and settings to removable media that is connected to one of the COS USB ports.

**IMPORTANT:** Removable media that is connected to the COS is read-only unless it is protected by Bit Locker.

- Make sure that all peripherals, for example, monitor, mouse and keyboard, are connected to the controller.
- In rare cases, the COS does not enter Operating System Utilities mode and a new Operating System installer must be installed before you can complete the steps that are described in this section.

For more information on how to use the Windows Kit to reinstall the Operating System installer, see [page 238](#).

---

To reinstall the COS, complete the following steps.

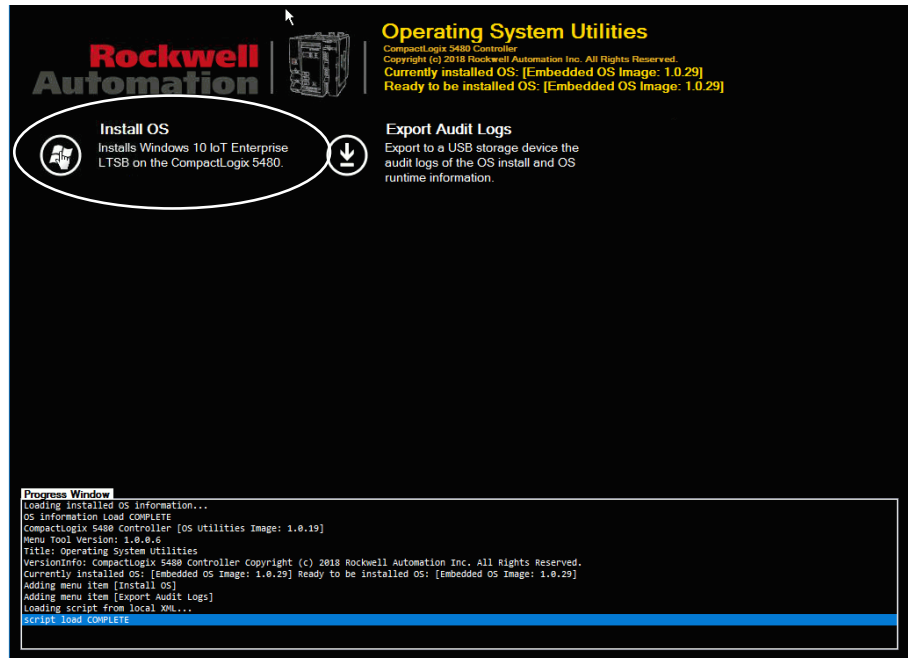
1. Confirm that the controller is powered and in Program or Remote Program mode.
2. Press the reset button and hold it until UTIL appears on the 4-character display.

UTIL appears after the reset button has been held in for at least 10 seconds but less than 15 seconds.

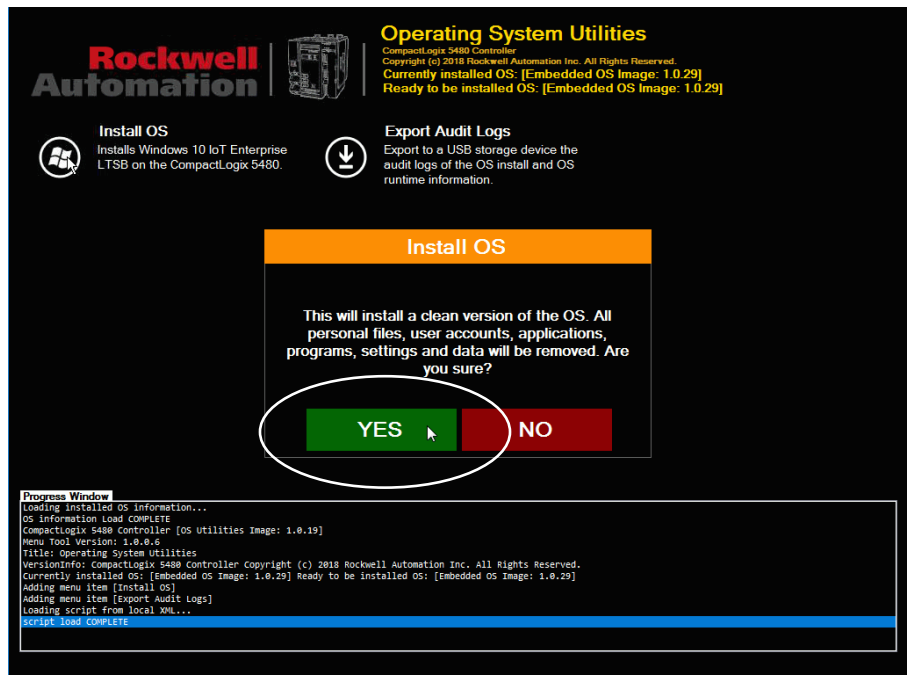
If you hold the reset button in for 15 seconds or more, there is no change to the display. The COS continues to operate as it did before you pressed the reset button in.

For more information on using the reset button with the COS, see [page 222](#).

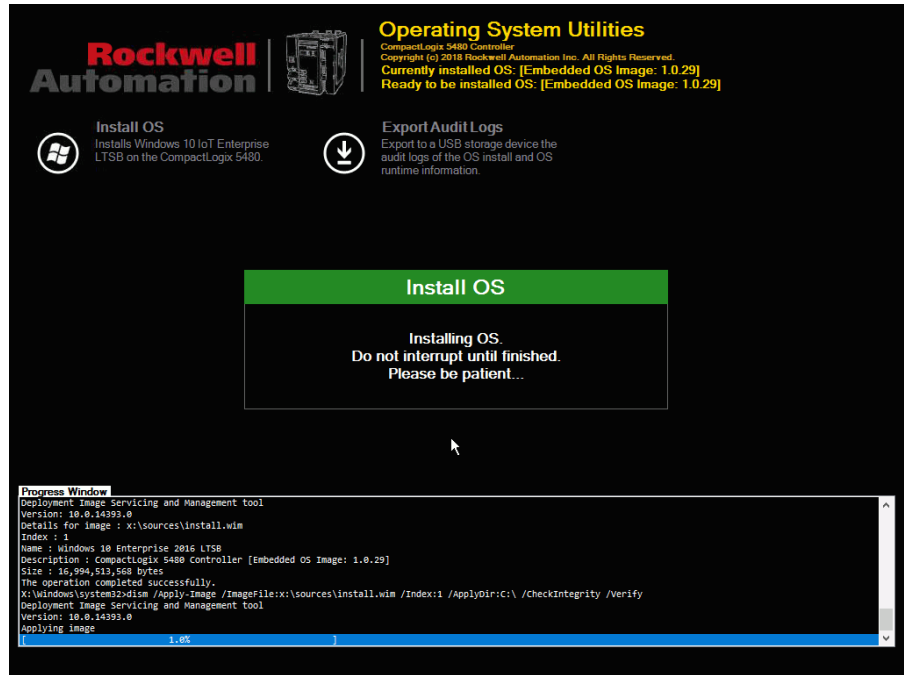
3. Once the controller enters Operating System Utilities mode, click Install OS.



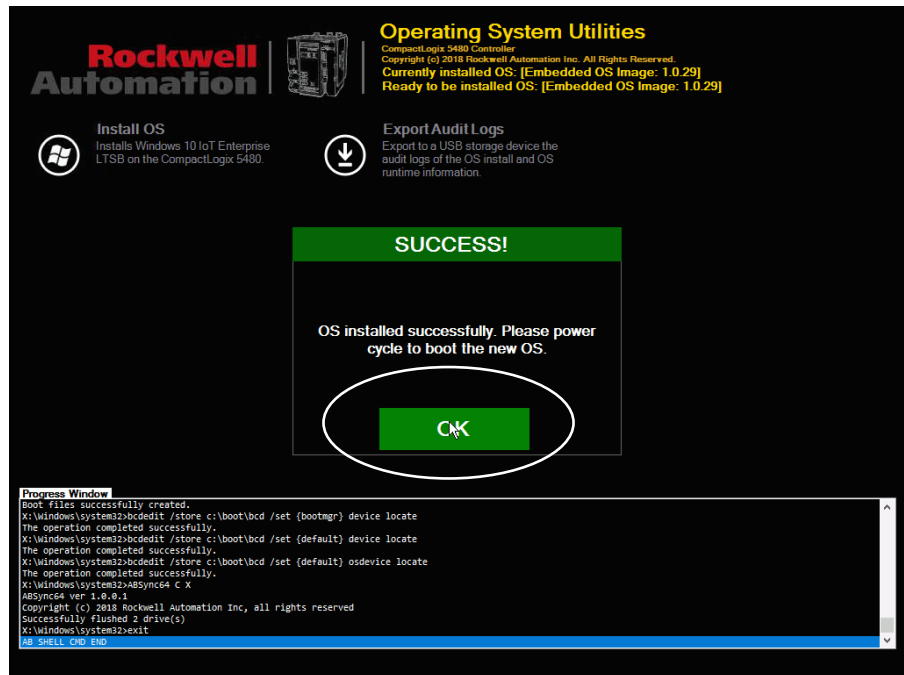
4. Click Yes to confirm the OS installation.



The screen indicates the progress of the OS installation.



5. After the OS is installed successfully, click OK.



6. Restart the controller.

The COS starts in the factory default state.

## Maintain Power to Controller After Successful COS Installation

After the CompactLogix 5480 controller restarts, do not interrupt power before the Windows image completes its ‘first boot’ procedures. The procedures include user tasks, for example, completing forms and checklists.

The ‘first boot’ procedures require at least 7 minutes to complete. The procedures are complete when you see the Windows 10 login screen.

If power is interrupted before the procedures are complete, the COS can fail to start successfully. In this case, you must repeat the process, starting at [step 1](#) on [page 235](#).

---

**IMPORTANT** Remember, the monitor must remain connected to the DisplayPort during this process or you cannot see the COS.

---

## Use the Windows Kit

As described beginning on [page 235](#), you use the Operating System Utilities tool to reinstall the COS.

In rare circumstances, however, you must reinstall the Operating System installer before you can reinstall the COS.

You reinstall the Operating System installer via a Windows Kit that is available at the PCDC. The Windows Kit is available as a .DMK file and contains files necessary to reinstall the COS and a controller firmware file.

## Considerations Before You Use the Windows Kit

The following table describes considerations that you must be aware of before you use the Windows Kit.

Topic	Description
Available computer memory	The computer that runs ControlFLASH™ or ControlFLASH Plus™ must have sufficient disk space available. At a minimum, approximately 15 Gb must be free. The DMK file uses 5 Gb and the temporary files that are created during the updating process use 10 Gb. The 10 GB free must be on the C: drive, even if the DMK file is placed on another drive.
Download times	The time required to download the Windows Kit DMK file varies based on download method and speed. <ul style="list-style-type: none"> <li>• If you download the package via a USB port or over an EtherNet/IP network at the 1-Gbps communication rate, the download takes over 2 hours.</li> <li>• If you download the package over an EtherNet/IP network at the 100-Mbps communication rate, the download takes an additional 30 minutes.</li> </ul>
Installation process	The ControlFLASH software first installs controller firmware and then installs the Operating System Utilities tool. The Operating System Utilities tool is then used to install the COS on the CompactLogix 5480. Once the Operating System Utilities tool installation update portion of the ControlFLASH procedure starts, do not interrupt the process. Otherwise, the Operating System Utilities is corrupted and you must begin the process again at the beginning.

After the ControlFLASH procedure is completed and the CompactLogix 5480 reboots, you must enter Operating System Utilities mode to reinstall the Operating System.

For information on how to enter Operating System Utilities mode, see [Use the Operating System Utilities Tool to Reinstall the COS on page 235](#).

## **Obtain Windows Kit**

Download the Windows kit from the PCDC at:

<http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page>

## **Install the Windows Kit**

You can install the Windows Kit with ControlFLASH™ or ControlFLASH Plus software. This publication describes how to use ControlFLASH software.

The installation process includes the following parts.

- Controller firmware is installed on the controller.

This controller firmware installation occurs regardless of whether your controller already has working firmware on it or not.

- The Operating System installer is installed on the controller.

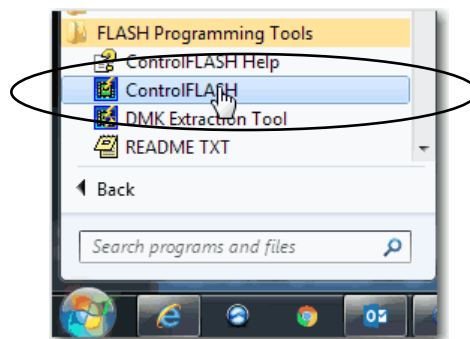
To install the Windows Kit, complete the following steps:

**IMPORTANT** At different points in the process, there can be delays that are typically not experienced when you install controller firmware in the tradition manner, that is, as is used with other Logix 5000 controllers.

During the delays, the software dialog boxes can appear as if no activity is occurring.

This is normal operation. Do not take action, such as closing the software. Rather, patiently wait and take the next action when possible.

1. Verify the following:
  - The network connection is made.
  - The network driver has been configured in RSLinx Classic software.
  - The controller is in Remote Program or Program mode and all major recoverable faults are cleared.
2. Start the ControlFLASH software.

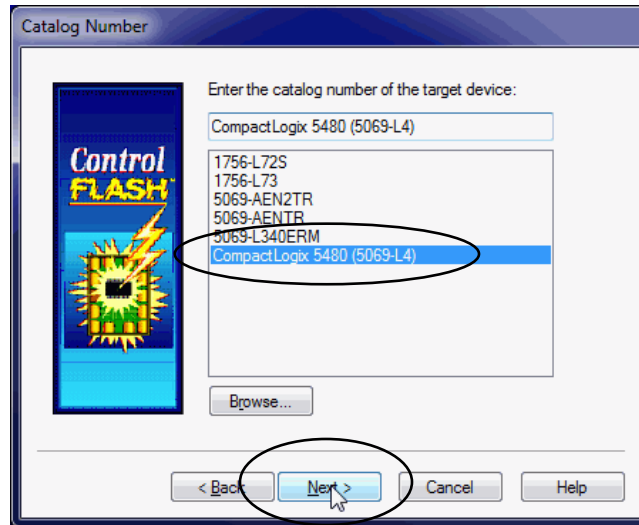


3. Click Next.

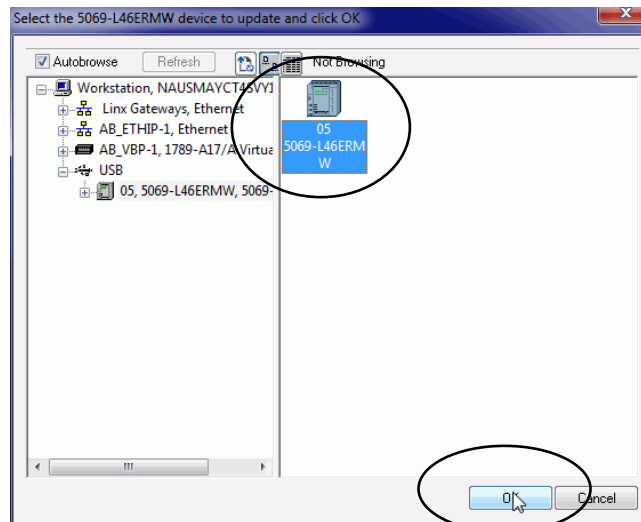




4. Select the controller, and click Next.

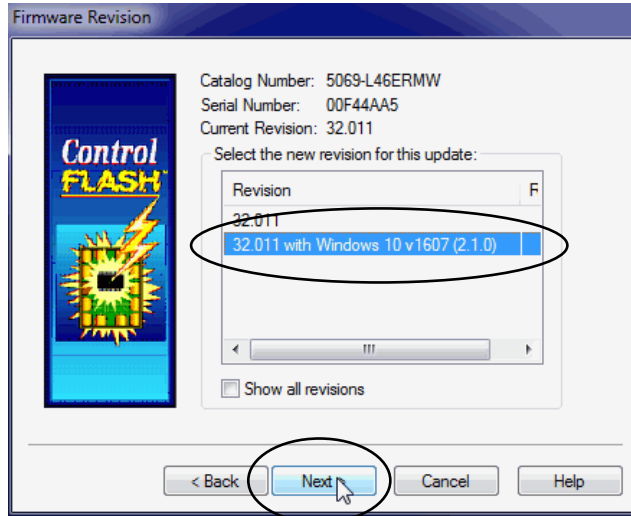


5. Expand the network driver to find the controller.
6. Select the controller and click OK.



- 7. Select the revision and click Next.

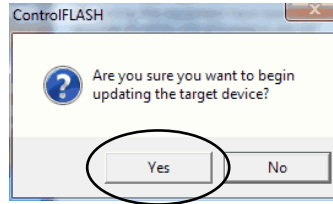
In this case, you select the revision number that includes Windows in the title.



- 8. On the Summary dialog box, click Finish.



9. When a confirmation dialog box appears, click Yes.

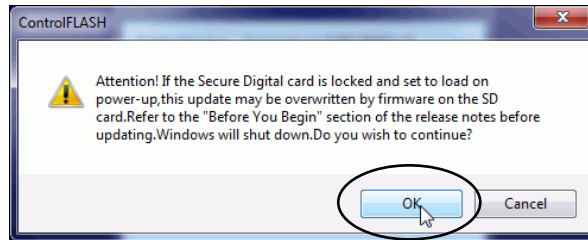



---

**IMPORTANT** A Progress dialog box appears that does not indicate that any activity is occurring. This is normal operation. Do not take action. The next dialog box appears approximately a minute later.

---

10. Before the firmware update begins, this dialog box appears. Take the required action for your application. In this example, the upgrade continues when OK is clicked.



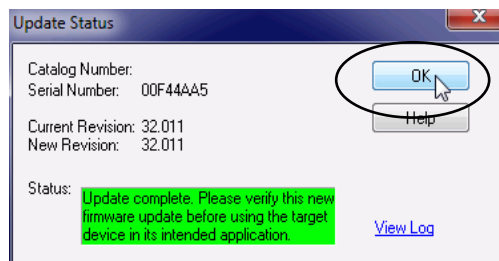

---

**IMPORTANT** Do not interrupt the update process until it is complete. If the process is interrupted, you must repeat the entire process, starting at [step 2 on page 240](#).

---

The final part of the process is an automatic power cycle on the controller.

11. When the Update Status dialog box indicates that the update is complete, click OK.



12. Close the ControlFLASH software.
13. Complete the steps described in [Use the Operating System Utilities Tool to Reinstall the COS on page 235](#).

**Notes:**

## Troubleshoot the Controller

Topic	Page
Controller Diagnostics with Logix Designer Application	245
Controller Diagnostics with RSLinx Classic Software	260
Controller Webpages	265
Other Potential Issues to Troubleshoot	276

This chapter describes how to troubleshoot the CompactLogix™ 5480 controller if issues occur during normal operation. The chapter does not describe how to use the 4-character display or status indicators. For more information, see Appendix A, [Status Indicators on page 279](#).

### Controller Diagnostics with Logix Designer Application

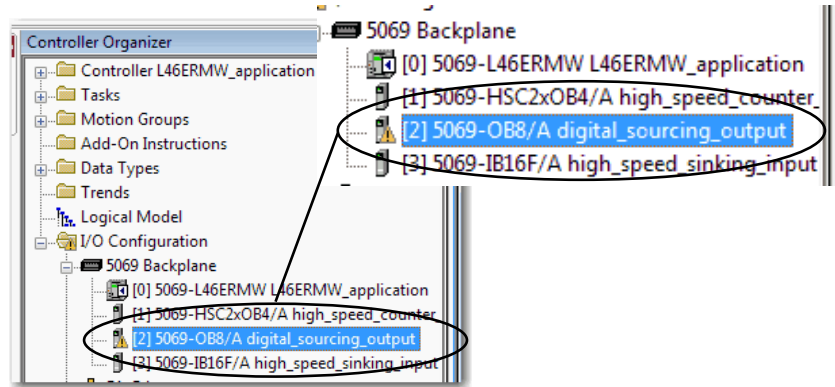
You can use the Controller Properties dialog box in the Logix Designer application to view fault conditions in the following ways:

- [Warning Symbol in the I/O Configuration Tree](#)
- [Categories on I/O Module Properties Dialog Box](#)
- [Notification in the Tag Editor](#)
- [Fault Information in Controller Properties Dialog Box](#)
- [Port Diagnostics](#)
- [Advanced Time Sync](#)

## Warning Symbol in the I/O Configuration Tree

A warning symbol appears in the I/O Configuration tree when a module fault occurs.

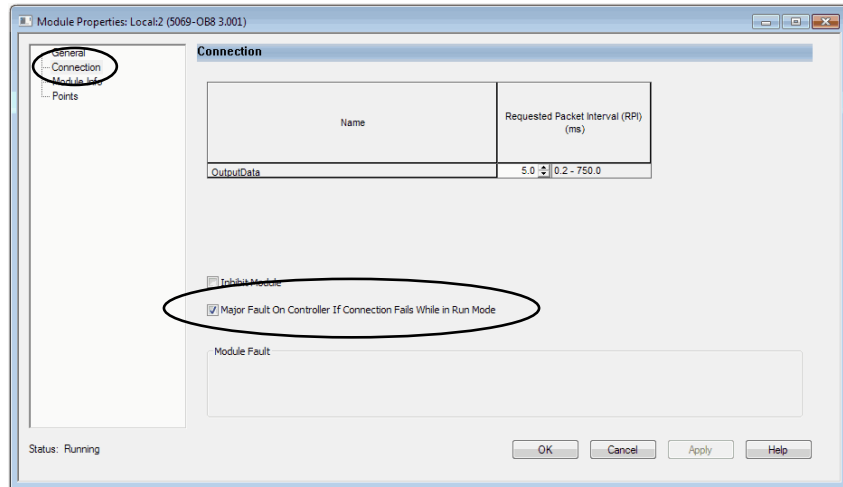
Figure 48 - Warning Symbol on I/O Module



## Controller Status after a Module Fault

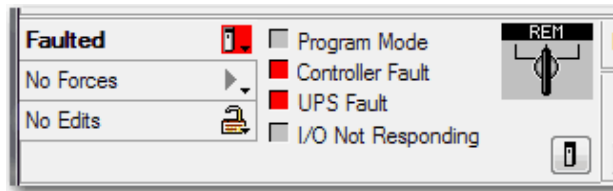
Your project configuration determines if an I/O module fault causes a controller fault. You enable the option on the Connection category of the Module Properties dialog box.

Figure 49 - Enable Major Fault on Controller



The following conditions are possible:

- When the I/O module is configured to cause a major fault on the controller and an I/O module fault occurs, the following can occur **in the Logix Designer application**:
  - Controller state displays the current state, for example, *Faulted*.
  - Controller status displays *Controller Fault* and blinks red.
  - I/O module status displays *I/O Not Responding* and blinks green at alternate times that the Controller Fault blinks red. When the *Controller Fault* field blinks red, the *I/O Not Responding* is gray.

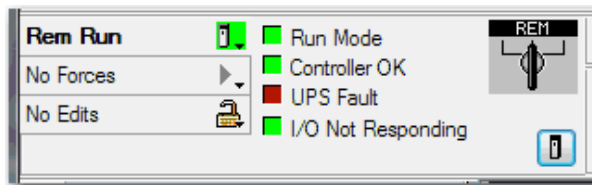



---

**IMPORTANT** The descriptions in the Logix Designer application can change based on the controller mode and status.

---

- When the I/O module is not configured to cause a major fault on the controller and an I/O module fault occurs, the following occur **in the Logix Designer application**:
  - Controller state displays the current state, for example, *Rem Run*.
  - Controller status displays *Controller OK* and is steady green.
  - I/O module status displays *I/O Not Responding* and blinks green.



## Categories on I/O Module Properties Dialog Box

The Module Properties dialog box for I/O modules includes a series of categories. You can use some of the categories to troubleshoot the controller.

---

**IMPORTANT** The number and type of categories varies by I/O module type.

---

The following are examples of ways to use categories on the Module Properties dialog box when you troubleshoot a controller:

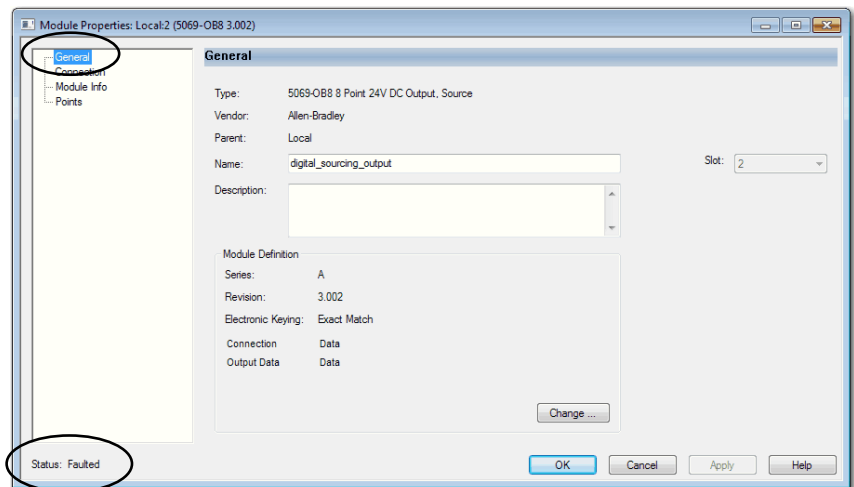
- [Module Status on General Category](#)
- [Module Fault Descriptions on Connection Category](#)
- [Module Fault Descriptions on Module Info Category](#)
- [Diagnostics Option on Module Info Category](#)

The categories that are described in this section display the module status. When a fault exists, the text is **Status: Faulted** in the module status line as shown in [Figure 50](#).

### *Module Status on General Category*

The General category displays the module status.

**Figure 50 - Module Status in Fault Message Line**

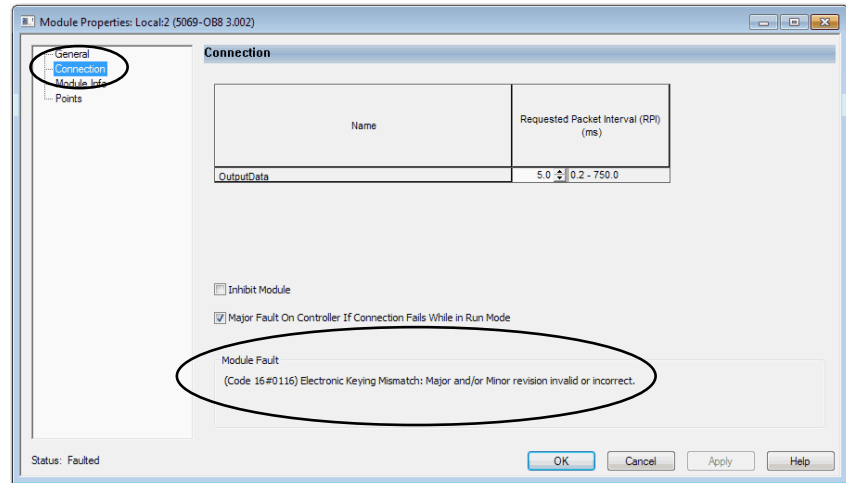




### Module Fault Descriptions on Connection Category

The Connection category displays the module fault description that includes an error code that is associated with the specific fault type.

**Figure 51 - Fault Description with Error Code**



### Module Fault Descriptions on Module Info Category

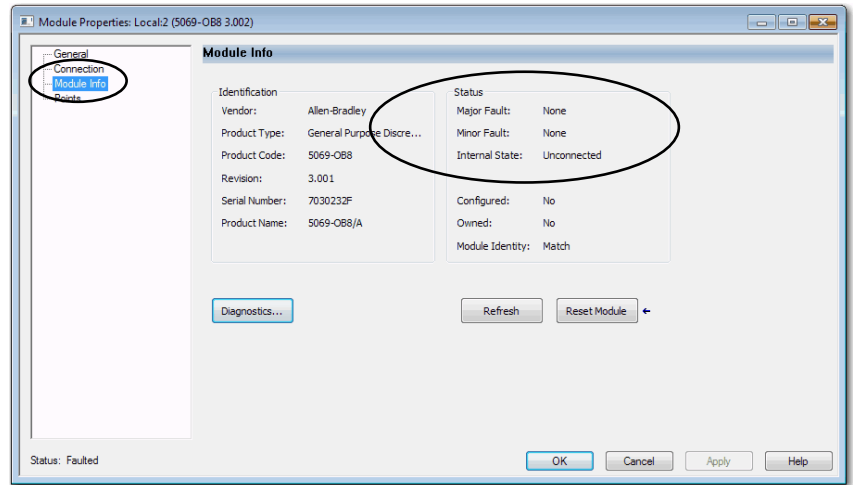
When you click the Module Info category, a dialog box displays the module fault description and the corresponding fault code. Click OK to access the Module Info category.

- TIP** The Module Info tab requires successful communications to help you troubleshoot the fault effectively. Consider the following:
- If communication to the I/O module is OK, but the module is faulted, we recommend that you use the Module Info category to troubleshoot the fault.
  - If communication to the I/O module is faulted, we recommend that you use the Connection category to troubleshoot the fault.

On the Module Info category, the Status section displays the following about the I/O module:

- Major and Minor Faults
- Internal State

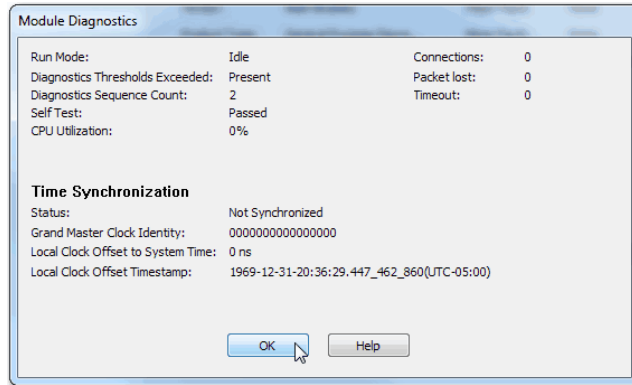
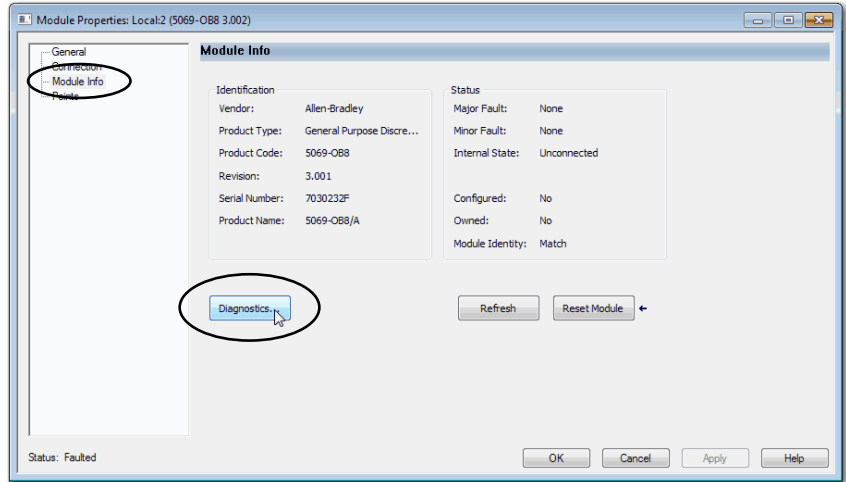
**Figure 52 - Major and Minor Fault Information**



### Diagnostics Option on Module Info Category

You can access the diagnostics for a module from the Module Info category. Click Diagnostics, to access the Module Diagnostics dialog box.

**Figure 53 - Module Diagnostics**



## Notification in the Tag Editor

General and diagnostic module faults are reported on the Monitor Tags tab of the Logix Designer application tag editor.

The Value field indicates a fault with the number 1.

Name	Value	Force Mask
+ Local:1:C	{...}	{...}
+ Local:1:I	{...}	{...}
+ Local:1:O	{...}	{...}
+ Local:2:C	{...}	{...}
- Local:2:I	{...}	{...}
- Local:2:I.RunMode	0	
- Local:2:I.ConnectionFaulted	1	
- Local:2:I.DiagnosticActive	1	
+ Local:2:I.DiagnosticSequenceCount	2	
- Local:2:I.Pt00	{...}	{...}
- Local:2:I.Pt00.Data	0	
- Local:2:I.Pt00.Fault	1	

## Fault Information in Controller Properties Dialog Box

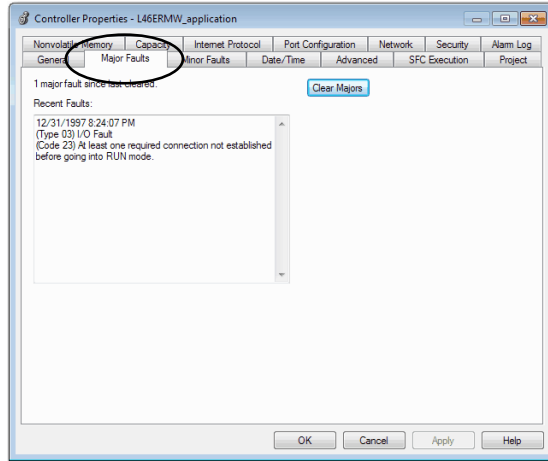
You can use the following tabs on the Controller Properties dialog box to troubleshooting the controller:

- [Major Faults](#)
- [Minor Faults](#)
- [Network](#)

### Major Faults

You can monitor information about recent major faults and also clear major faults on the Major Faults tab.

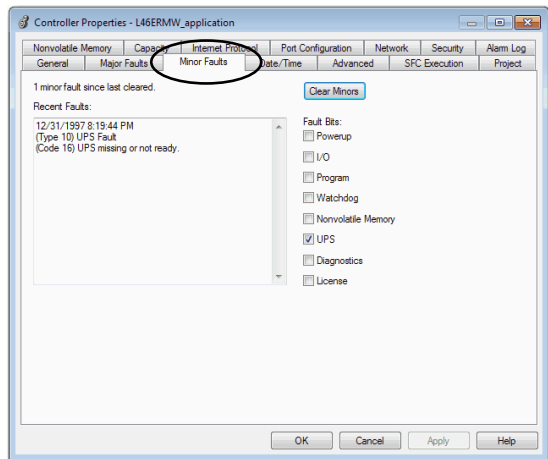
**Figure 54 - Major Faults Tab in Controller Properties Dialog Box**



### Minor Faults

You can monitor information about recent minor faults and also clear minor faults on the Minor Faults tab.

**Figure 55 - Minor Faults Tab in Controller Properties Dialog Box**



### Network

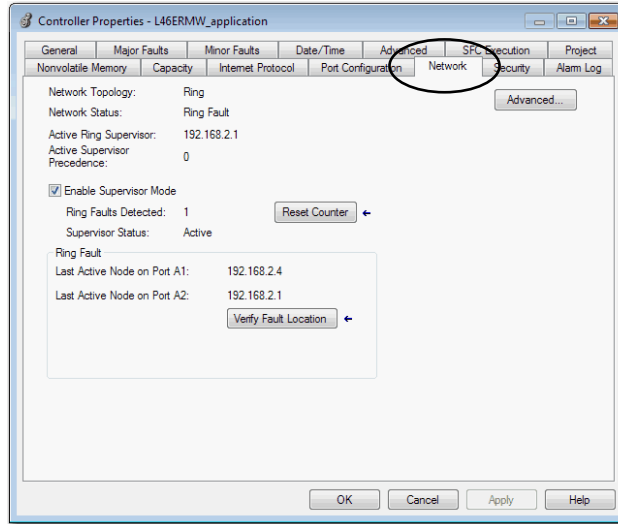
The Network tab is used to monitor for faults that occur when the controller is used in a DLR network.

---

**IMPORTANT** The Network tab is not available when the controller operates in Dual-IP mode.

---

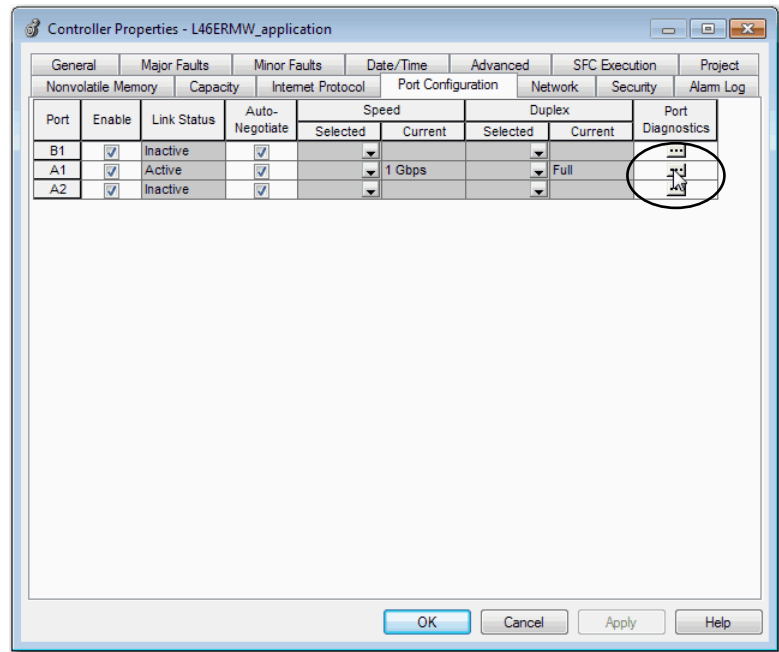
**Figure 56 - Network Tab in Controller Properties Dialog Box**



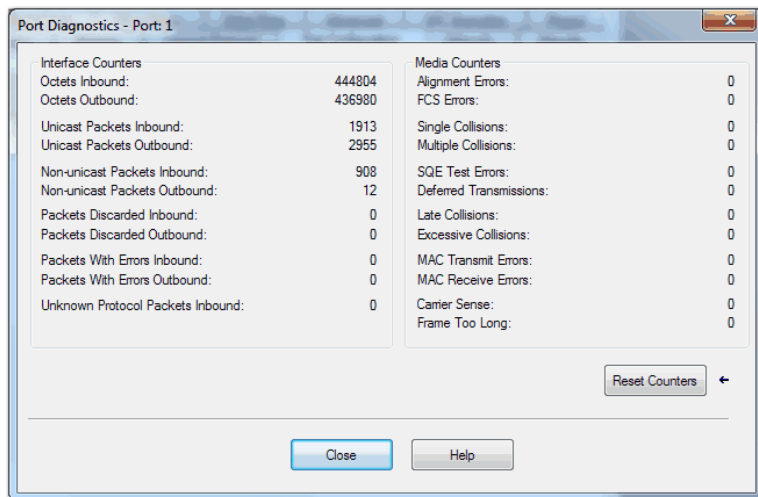
## Port Diagnostics

When your project is online, you can view the status of the embedded Ethernet ports on the controller.

1. Access the Controller Properties.
2. On the Port Configuration tab, click the Port Diagnostics button for an active port.



The Port Diagnostics page, displays information for the port. See [Table 26 on page 256](#) for parameter descriptions.



**Table 26 - Port Diagnostics Parameters - Logix Designer**

Parameter	Description
<b>Interface Counters</b>	The Interface Counters values have no value when you are offline or online and there is a communication error.
Octets Inbound	Displays the number of octets that are received on the interface.
Octets Outbound	Displays the number of octets that are transmitted to the interface.
Unicast Packets Inbound	Displays the number of unicast packets that are received on the interface.
Unicast Packets Outbound	Displays the number of unicast packets that are transmitted on the interface.
Non-unicast Packets Inbound	Displays the number of non-unicast packets that are received on the interface.
Non-unicast Packets Outbound	Displays the number of non-unicast packets that are transmitted on the interface.
Packets Discarded Inbound	Displays the number of inbound packets that are received on the interface but discarded.
Packets Discarded Outbound	Displays the number of outbound packets that are transmitted on the interface but discarded.
Packets With Errors Inbound	Displays the number of inbound packets that contain errors (excludes discarded inbound packets).
Packets With Errors Outbound	Displays the number of outbound packets that contain errors (excludes discarded outbound packets).
Unknown Protocol Packets Inbound	Displays the number of inbound packets with unknown protocol.
<b>Media Counters</b>	The Media Counters values have no value when you are offline or online and there is a communication error.
Alignment Errors	Displays the number of frames received that are not an integral number of octets in length.
FCS Errors	Displays the number of frames received that do not pass the FCS check.
Single Collisions	Displays the number of successfully transmitted frames that experienced exactly one collision.
Multiple Collisions	Displays the number of successfully transmitted frames that experienced multiple collisions.
SQE Test Errors	Displays the number of times an SQE test error message was generated.
Deferred Transmissions	Displays the number of frames for which the first transmission attempt is delayed because the medium is busy.
Late Collisions	Displays the number of times a collision is detected later than 512 bit-times into the transmission of a packet.
Excessive Collisions	Displays the number of frames for which transmission fails due to excessive collisions.
MAC Transmit Errors	Displays the number of frames for which transmission fails due to an internal MAC sub layer transmit error.
MAC Receive Errors	Displays the number of frames for which reception on an interface fails due to an internal MAC sub layer receive error.
Carrier Sense	Displays the number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame.
Frame Too Long	Displays the number of frames received that exceed the maximum permitted frame size.
Reset Counters	Click Reset Counter to cause the interface and media counter values on the module to set to zero, and the values in the dialog to update. Reset Counter appears dimmed when either of the following conditions exist: <ul style="list-style-type: none"> <li>The project is offline.</li> <li>The project is online and a communication error has occurred.</li> </ul>

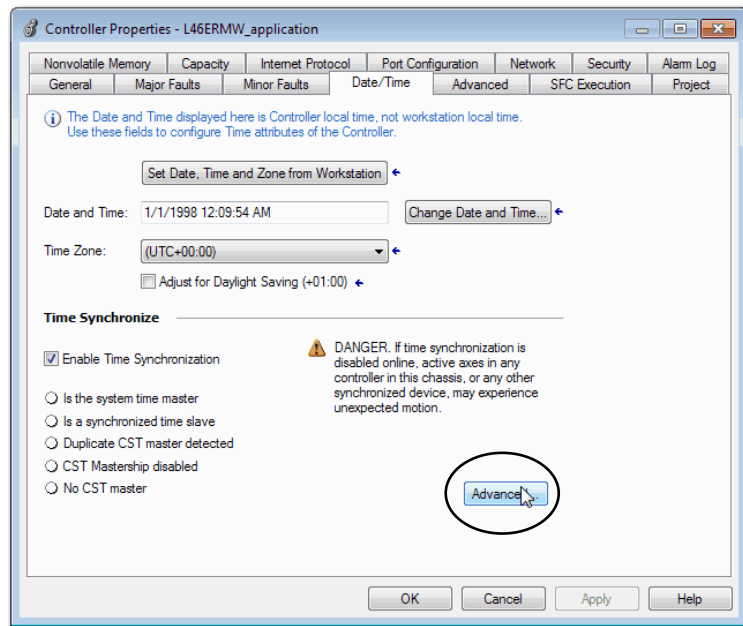


## Advanced Time Sync

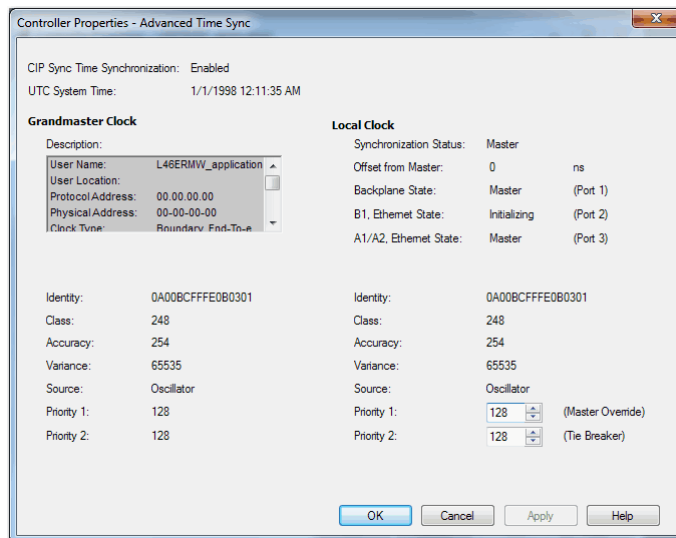
The Advanced Time Sync dialog displays information that is related to CIP Sync™ time synchronization.

**IMPORTANT** The information appears only if the project is online and Time Synchronization is enabled on the Date/Time tab. Also, when the controller operates in Dual-IP mode, the Advanced Time Sync tab that is shown provides data for each port.

1. On the Date/Time tab, click the Advanced button.



The Advanced Time Sync dialog box opens. See [Table 27 on page 258](#) for parameter descriptions.



**Table 27 - Time Sync Parameters**

<b>Grandmaster Clock</b>	
Description	<p>Displays information about the Grandmaster clock. The vendor of the Grandmaster device controls this information. This information is specified:</p> <ul style="list-style-type: none"> <li>• User Name</li> <li>• User Location</li> <li>• Protocol Address</li> <li>• Physical Address</li> <li>• Clock Type</li> <li>• Manufacturer Name</li> <li>• Model</li> <li>• Serial Number</li> <li>• Hardware Revision</li> <li>• Firmware Revision</li> <li>• Software Version</li> <li>• Profile Identity</li> <li>• Physical Protocol</li> <li>• Network Protocol</li> <li>• Port Number</li> </ul> <p>Use the vertical scroll bar to view the data.</p>
Identity	Displays the unique identifier for the Grandmaster clock. The format depends on the network protocol. Ethernet network encodes the MAC address into the identifier.
Class	Displays a measure of the quality of the Grandmaster clock. Values are defined from 0...255 with zero as the best clock.
Accuracy	Indicates the expected absolute accuracy of the Grandmaster clock relative to the PTP epoch. The accuracy is specified as a graduated scale that starts at 25 nsec and ends at greater than 10 seconds or unknown. The lower the accuracy value, the better the clock.
Variance	Displays the measure of inherent stability properties of the Grandmaster clock. The value is represented in offset scaled log units. The lower the variance, the better the clock.
Source	<p>Displays the time source of the Grandmaster clock. The available values are:</p> <ul style="list-style-type: none"> <li>• Atomic Clock</li> <li>• GPS</li> <li>• Radio</li> <li>• PTP</li> <li>• NTP</li> <li>• HAND set</li> <li>• Other</li> <li>• Oscillator</li> </ul>
Priority 1 / Priority 2	Displays the relative priority of the Grandmaster clock to other clocks in the system. The priority values range from 0...255. The highest priority is zero. The default value for both settings is 128.

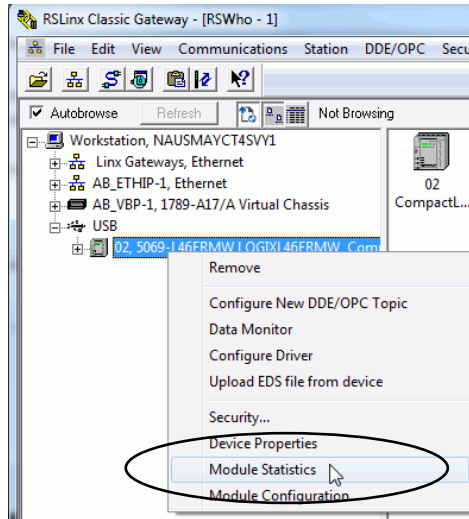
**Table 27 - Time Sync Parameters (continued)**

<b>Local Clock</b>	
Synchronization Status	Displays whether the local clock is synchronized or not synchronized with the Grandmaster reference clock. A clock is synchronized if it has one port in the slave state and is receiving updates from the time master.
Offset to Master	Displays the amount of deviation between the local clock and the Grandmaster clock in nanoseconds.
Backplane State	Displays the current state of the backplane. The available values are as follows: <ul style="list-style-type: none"> <li>• Initializing</li> <li>• Faulty</li> <li>• Disabled</li> <li>• Listening</li> <li>• PreMaster</li> <li>• Master</li> <li>• Passive</li> <li>• Uncalibrating</li> <li>• Slave</li> <li>• None</li> </ul>
Ethernet State	Displays the state of the Ethernet port. The available values are as follows: <ul style="list-style-type: none"> <li>• Initializing</li> <li>• Faulty</li> <li>• Disabled</li> <li>• Listening</li> <li>• PreMaster</li> <li>• Master</li> <li>• Passive</li> <li>• Uncalibrating</li> <li>• Slave</li> <li>• None</li> </ul> <p><b>IMPORTANT:</b> When the controller operates in Dual-IP mode, this attribute provides data for each controller port. The fields appear as follows:</p> <ul style="list-style-type: none"> <li>• A1, Ethernet State</li> <li>• A2, Ethernet State</li> </ul>

## Controller Diagnostics with RSLinx Classic Software

You can also view diagnostic information in RSLinx® Classic software.

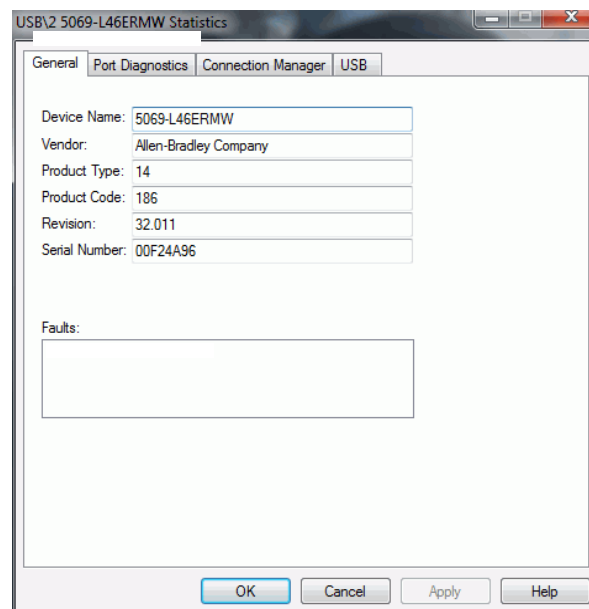
1. Use the RSWho button to browse.
2. Right-click the controller and choose Module Statistics.



In this example, the USB connection is used to access the Module Statistics. The dialog boxes that follow in this section show a USB tab. If the controller is connected via an Ethernet port instead of the USB port, the USB tab does not appear on the dialog boxes.

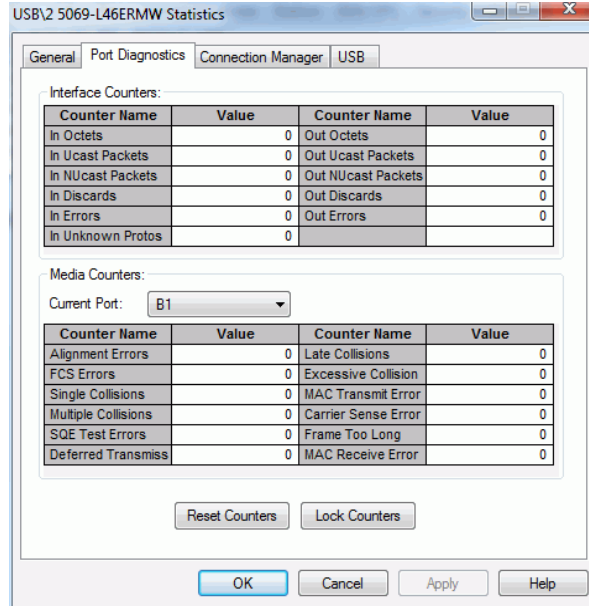
### General Tab

The General tab shows device information, and any faults on the controller.



## Port Diagnostics Tab

The Port Diagnostics tab shows information for the port. See [Table 28 on page 261](#) for parameter descriptions.



**Table 28 - Port Diagnostics Parameters - RSLinx Classic Software**

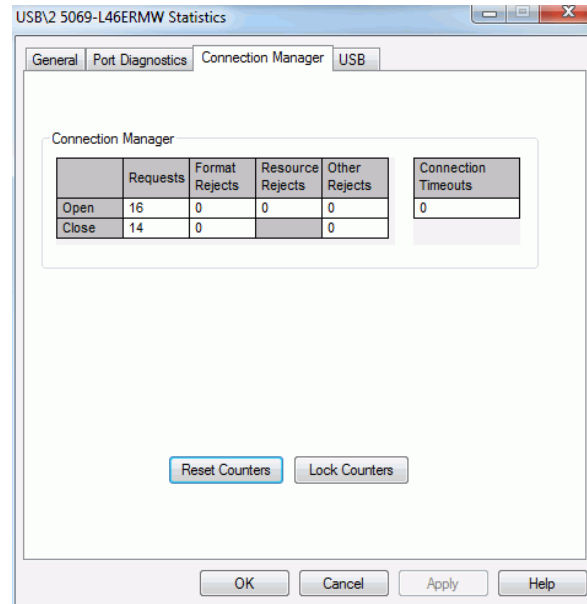
Parameter	Description
<b>Interface Counters</b>	Provides information relevant to receipt of packets on the interface
In Octets	Octets received on the interface.
Out Octets	Octets sent out from the interface.
In Ucast Packets	Unicast packets that are received on the interface.
Out Ucast Packets	Unicast packet sent out from the interface.
In NUcast Packets	Non-unicast packets that are received on the interface.
Out NUcast Packets	Non-unicast packets sent out from the interface.
In Discards	Inbound packets that were received on the interface but discarded.
Out Discards	Outbound packets that were sent out from the interface but were discarded.
In Errors	Inbound packets that contain errors (excludes In Discards).
Out Errors	Outbound packets that contain errors.
In Unknown Protos	Inbound packets with unknown protocol.

**Table 28 - Port Diagnostics Parameters - RSLinx Classic Software**

Parameter	Description
<b>Media Counters</b>	Provides information specific to Ethernet media you are using
Alignment Errors	Frames received that are not an integral number of octets in length.
FCS Errors	Frames received that do not pass the FCS (Frame Check Sequence) check.
Single Collisions	Successfully transmitted frames that experienced exactly one collision.
Multiple Collisions	Successfully transmitted frames that experienced multiple collisions.
SQE Test Errors	Number of times an SQE test error message was generated.
Deferred Transmissions	Frames for which the first transmission attempt is delayed because the medium is busy.
Late Collisions	Number of times a collision is detected later than 512 bit-times into the transmission of a packet.
Excessive Collisions	Frames for which transmission fails due to excessive collisions.
MAC Transmit Errors	Frames for which transmission fails due to an internal MAC sub layer transmit error.
MAC Receive Errors	Frames for which reception on an interface fails due to an internal MAC sub layer receive error.
Carrier Sense	Times that the carrier sense condition was lost or never asserted when attempting to transmit a frame.
Frame Too Long	Frames received that exceed the maximum permitted frame size.
Reset Counters	Click Reset Counter to cause the interface and media counter values on the module to set to zero, and the values in the dialog to update. Reset Counter appears dimmed when either of the following conditions exist: <ul style="list-style-type: none"> <li>• The project is offline.</li> <li>• The project is online and a communication error has occurred.</li> </ul>

## Connection Manager Tab

See [Table 29](#) for a description of the Connection Manager properties.

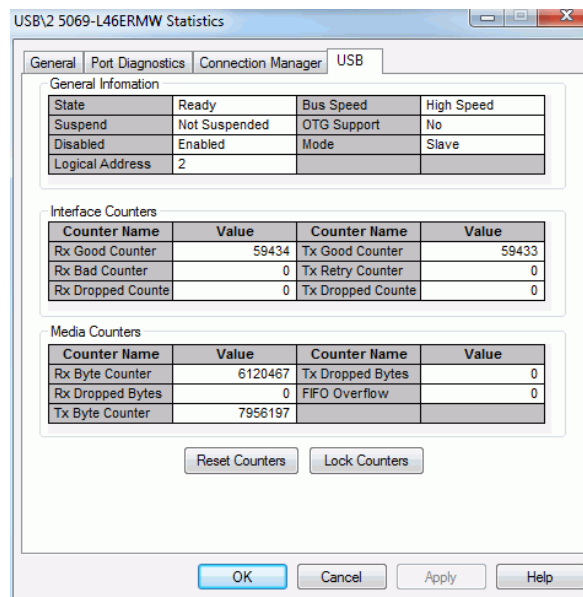


**Table 29 - Connection Manager Properties**

Field	Description
Requests	Number of open/close connection requests that this module has received.
Format Rejects	Number of open/close connection requests that this module has rejected because the request was not formatted correctly or because some parameter value was not within a supported range of values.
Resource Rejects	Number of open connection requests that this module has rejected because the module did not have enough resources (buffers, link bandwidth, or CPU utilization) to honor the request.
Other Rejects	Number of open/close connection requests that a module rejects.
Timeouts	Number of connections that the connection originator has not explicitly closed but this module closed because they were not being used.

## USB Tab

The USB tab provides this information about the controller USB port.



**Table 30 - General Information**

Attribute Name	Description
State	State (Initializing, Fault, Initialized, Configured, Ready, and Reserved) of the USB interface.
Suspend	The USB interface was suspended by the host.
Disabled	The USB interface was disabled by the host.
Logical Address	Logical address of the USB interface (slot number in the virtual backplane).
Bus Speed	The highest USB bus speed the USB interface supports.
OTG Support	USB On The Go (OTG) capability support.
Mode	The operating mode (slave/host) of the USB interface, if the interface supports OTG.

**Table 31 - Interface Counters<sup>(1)</sup>**

Counter Name	Description
Rx Good Counter	Total number of good USB-CIP transfers received.
Rx Bad Counter	Total number of bad USB-CIP transfers received.
Rx Dropped Counter	Total number of dropped USB-CIP transfers.
Tx Good Counter	Total number of USB-CIP transfers sent.
Tx Retry Counter	Total number of USB-CIP transfers retried.
Tx Dropped Counter	Total number of USB-CIP transfers dropped.

(1) The counters provide diagnostic information in the USB-CIP layer.



**Table 32 - Media Counters<sup>(1)</sup>**

Counter Name	Description
Rx Byte Counter	Total number of bytes received.
Rx Dropped Counter	Total number of received bytes dropped.
Tx Byte Counter	Total number of bytes sent.
Tx Dropped Bytes	Total number of transmit bytes dropped.
FIFO Overflow	Total number of FIFO (First in First Out) overflows.

(1) The counters provide diagnostic information in the USB driver layer.

## Controller Webpages

The controller provides diagnostic webpages that track controller performance, network performance, and backplane performance.

To access the diagnostic webpages, follow the following steps.

1. Open your web browser.
2. In the Address field, type the IP address of the controller and press Enter.
3. To access the information that you need, use the links in the left-side navigation bar.

---

**IMPORTANT** The controller webpages are slightly different based on the EtherNet/IP™ mode that is used. The webpages look different and provide different information.

For example, consider the following:

- When the controller operates in Linear/DLR mode, the left-side navigation bar displays an Ethernet Port A1/A2 folder with three tabs. There is one Ethernet Port webpage for both ports, and the controller webpages provide one set of Ethernet data.
- When the controller operates in Dual-IP mode, the left-side navigation bar displays an Ethernet Port A1 folder and an Ethernet Port A2 folder. Each folder has three tabs.

There is an Ethernet Port webpage for each port. The controller webpages provide one set of Ethernet data for port A1 and another set of Ethernet data for port A2.

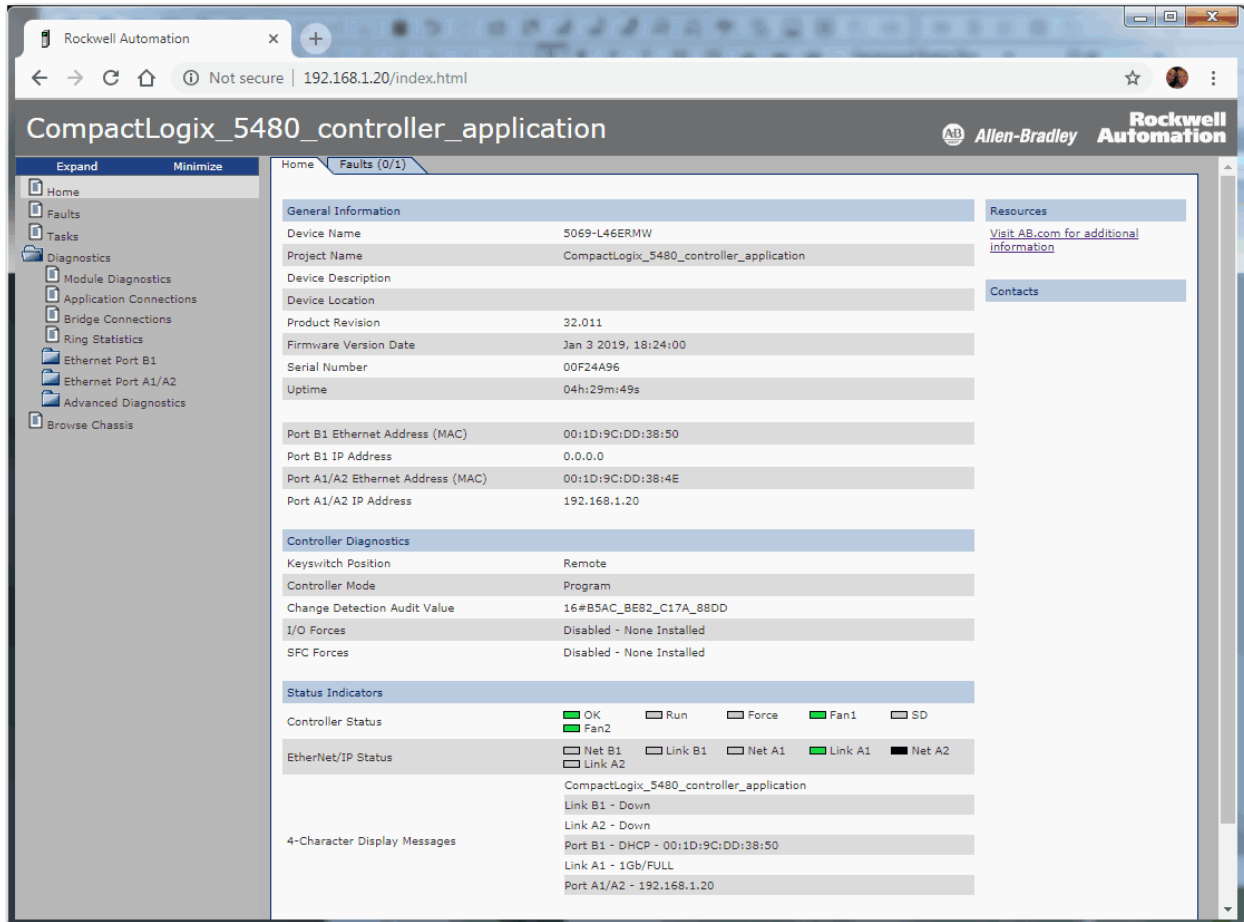
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## Home Webpage

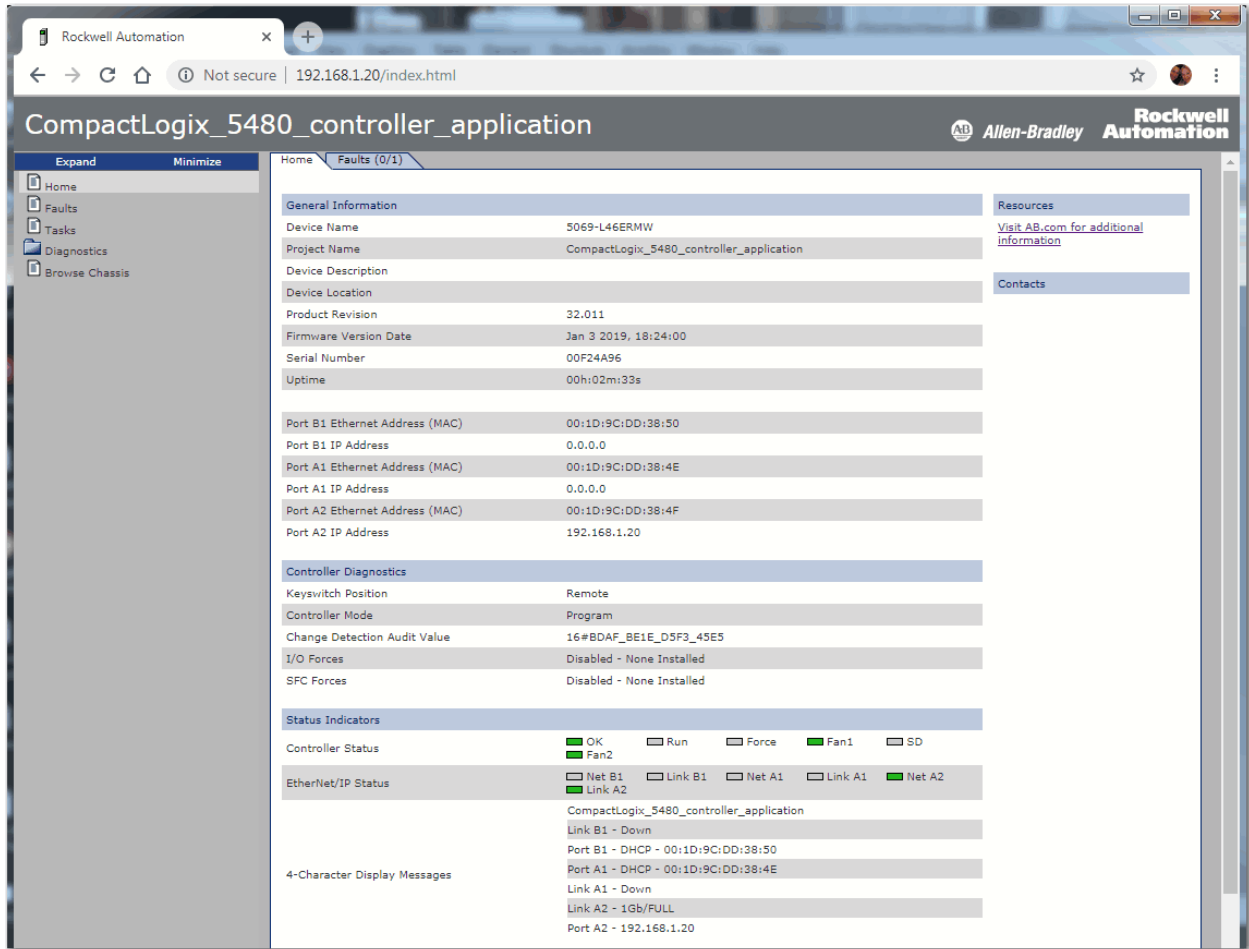
The Home webpage provides general project and controller information.

- [Figure 57](#) shows the Home webpage when the controller is in Linear/DLR mode.
- [Figure 58](#) shows the Home webpage when the controller is in Dual-IP mode.

**Figure 57 - Home Webpage - Linear/DLR Mode**

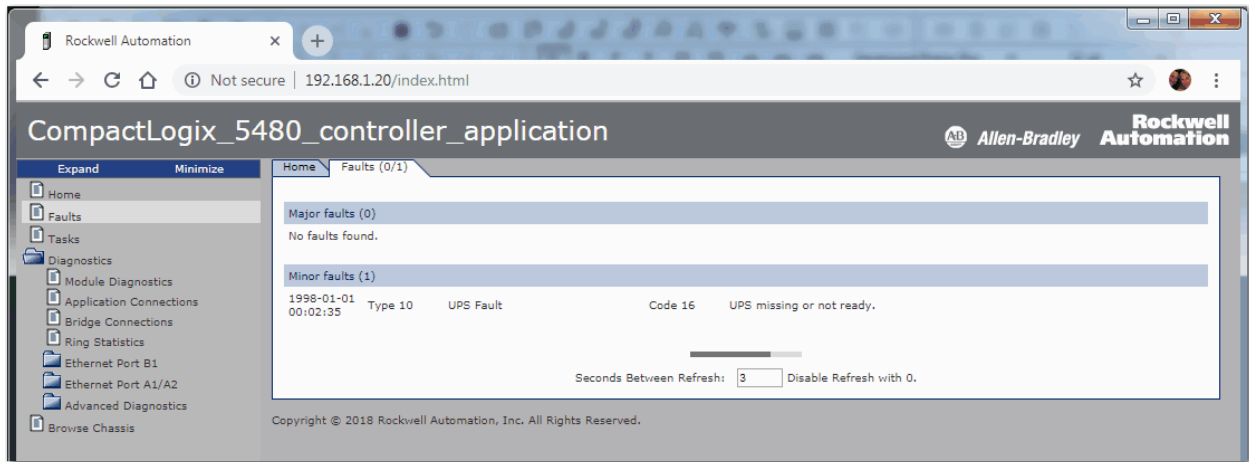


**Figure 58 - Home Webpage - Dual-IP Mode**



## Faults Webpage

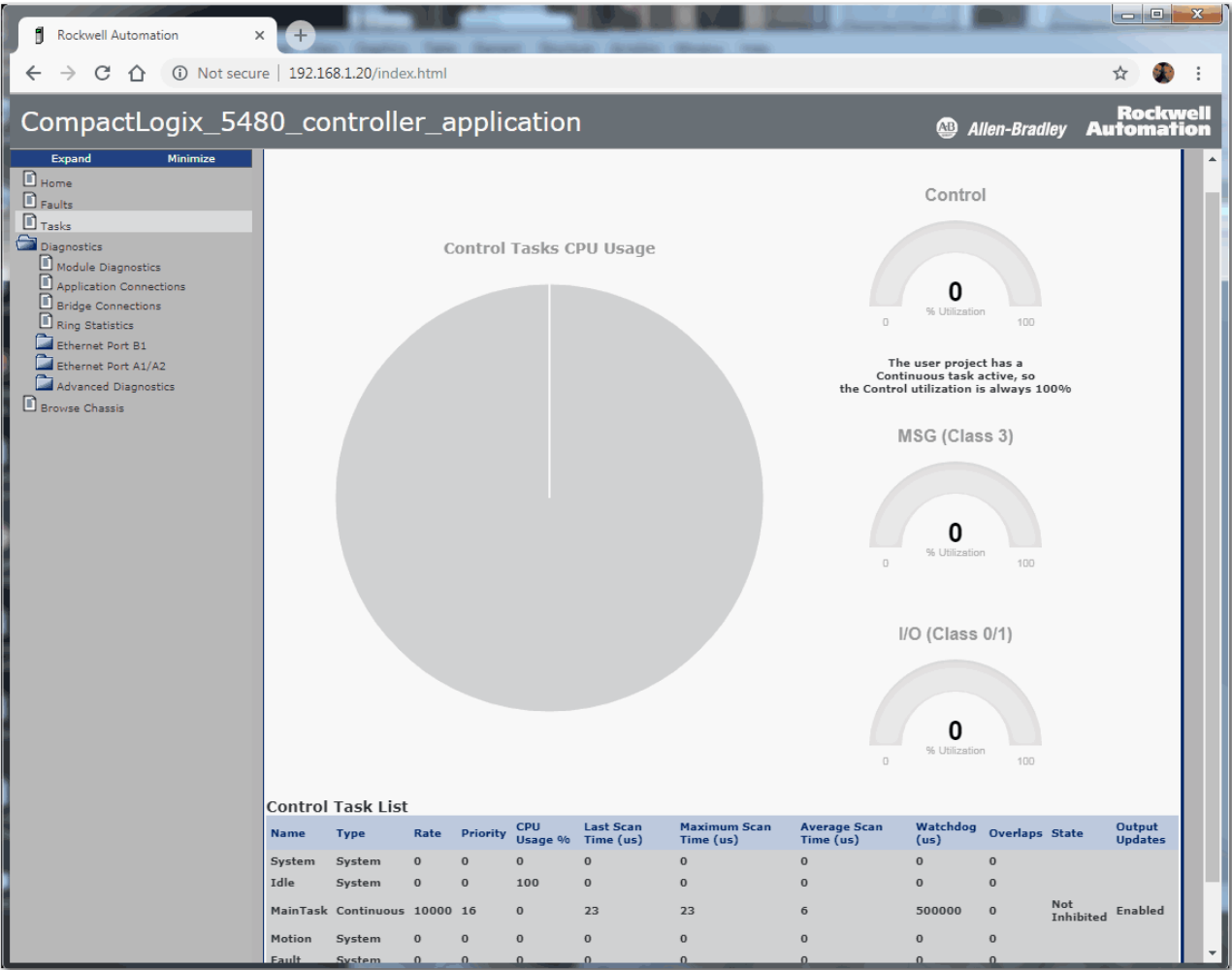
The Faults webpage provides major and minor fault information.



# Tasks Webpage

On the Tasks webpage, the pie chart shows the percentage of the control core CPU consumed by the tasks that are on that core. The gauges show the CPU utilization of the control and communications cores.

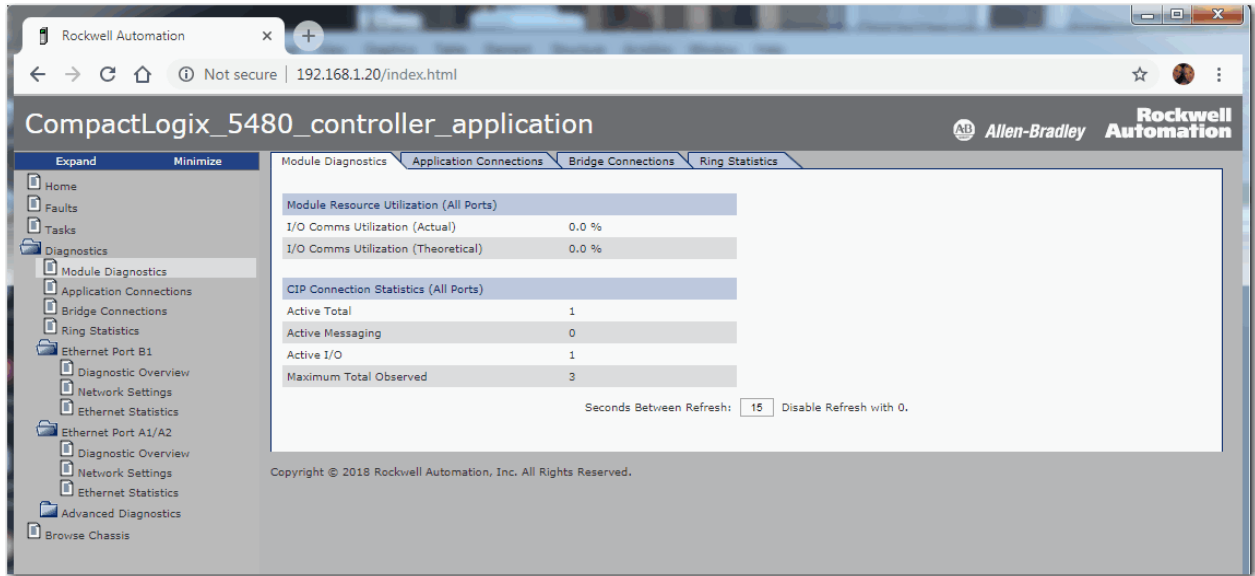
The table shows the tasks that are running on the Control core (all system tasks are summarized as one task).



## Diagnostics Webpages

The Diagnostics webpages use a series of tabs to provide information about the following:

- Module Diagnostics
- Application Connections
- Bridge Connections
- Ring Statistics



## Ethernet Port Webpages

The Ethernet Port webpages use a series of tabs to provide information about the following:

- Diagnostic Overview
- Network Settings
- Ethernet Statistics

When the controller is in Linear/DLR mode, the Network Settings and Ethernet Statistics tabs provide more information for ports A1 and A2 than port B1.

The Ethernet port webpages are shown as follows:

- [Figure 59](#) shows the Ethernet Port webpage when the controller is in Linear/DLR mode.
- [Figure 60](#) shows the Ethernet Port webpage when the controller is in Dual-IP mode.

**Figure 59 - Ethernet Port Webpage - Linear/DLR Mode**

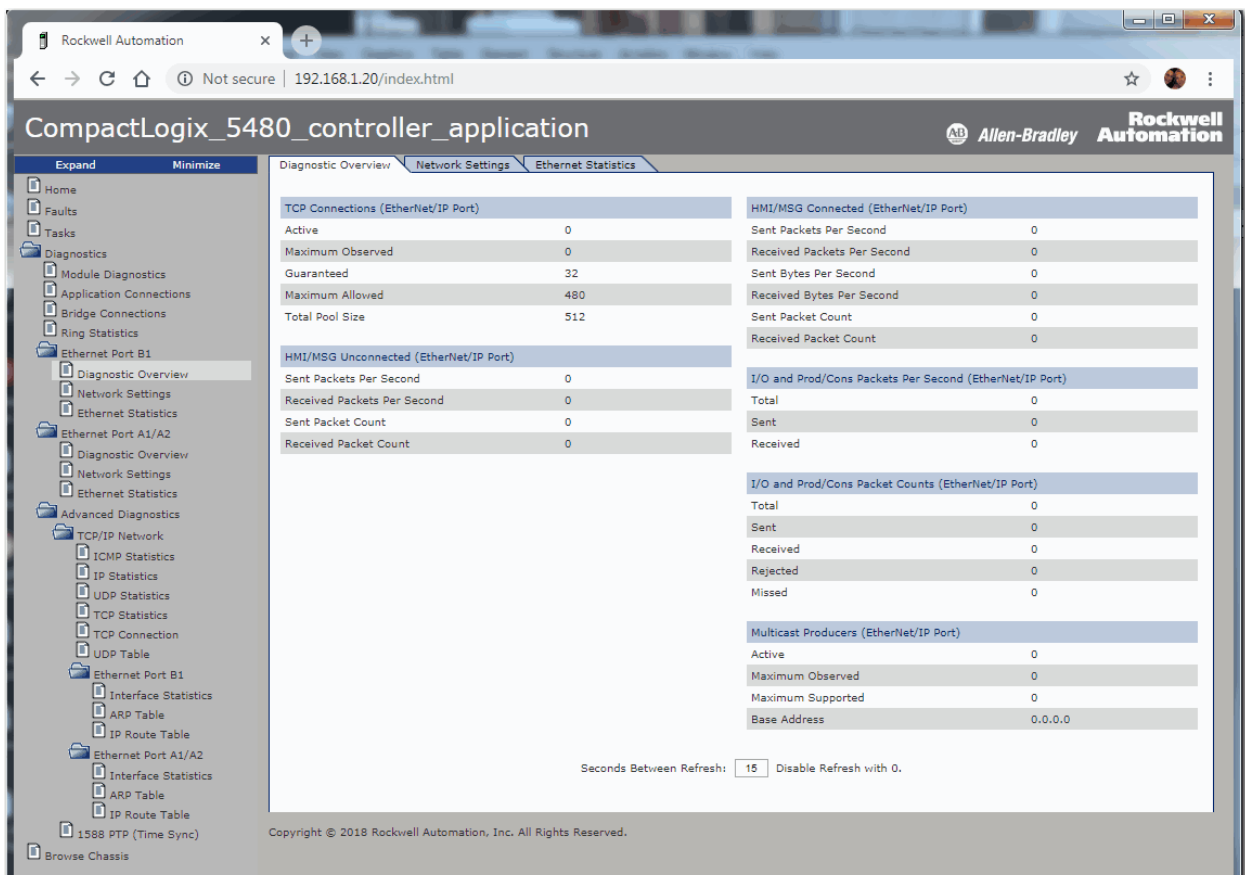


Figure 60 - Ethernet Port Webpage - Dual-IP Mode

The screenshot shows a web browser window displaying the 'CompactLogix\_5480\_controller\_application' interface. The browser address bar shows '192.168.1.20/index.html'. The page title is 'CompactLogix\_5480\_controller\_application'. The interface includes a navigation menu on the left with options like Home, Faults, Tasks, Diagnostics, and Ethernet Port B1. The main content area is titled 'Ethernet Statistics' and contains several data tables.

TCP Connections (EtherNet/IP Port)	
Active	0
Maximum Observed	0
Guaranteed	32
Maximum Allowed	448
Total Pool Size	512

HMI/MSG Connected (EtherNet/IP Port)	
Sent Packets Per Second	0
Received Packets Per Second	0
Sent Bytes Per Second	0
Received Bytes Per Second	0
Sent Packet Count	0
Received Packet Count	0

HMI/MSG Unconnected (EtherNet/IP Port)	
Sent Packets Per Second	0
Received Packets Per Second	0
Sent Packet Count	0
Received Packet Count	0

I/O and Prod/Cons Packets Per Second (EtherNet/IP Port)	
Total	0
Sent	0
Received	0
Rejected	0
Missed	0

I/O and Prod/Cons Packet Counts (EtherNet/IP Port)	
Total	0
Sent	0
Received	0
Rejected	0
Missed	0

Multicast Producers (EtherNet/IP Port)	
Active	0
Maximum Observed	0
Maximum Supported	0
Base Address	0.0.0.0

Seconds Between Refresh:  Disable Refresh with 0.



## Advanced Diagnostics Webpages

The Advanced Diagnostics webpages provide information about the following:

- TCP/IP Network - Provide information about the following:
  - ICMP Statistics
  - IP Statistics
  - UDP Statistics
  - TCP Statistics
  - TCP Connection
  - UDP Table
  
- Ethernet Port A1, A2, and B1 - Provide information about the following:
  - Interface Statistics
  - ARP Table
  - IP Route Table

---

**IMPORTANT** This information is listed separately for, and is unique to, each port when the controller operates in Dual-IP mode.

---

- 1588 PTP (Time Sync)

The Ethernet port webpages are shown as follows:

- [Figure 61](#) shows the Advanced Diagnostics webpage when the controller is in Linear/DLR mode.
- [Figure 62](#) shows the Advanced Diagnostics webpage when the controller is in Dual-IP mode.

Figure 61 - Advanced Diagnostics Webpage - Linear/DLR Mode

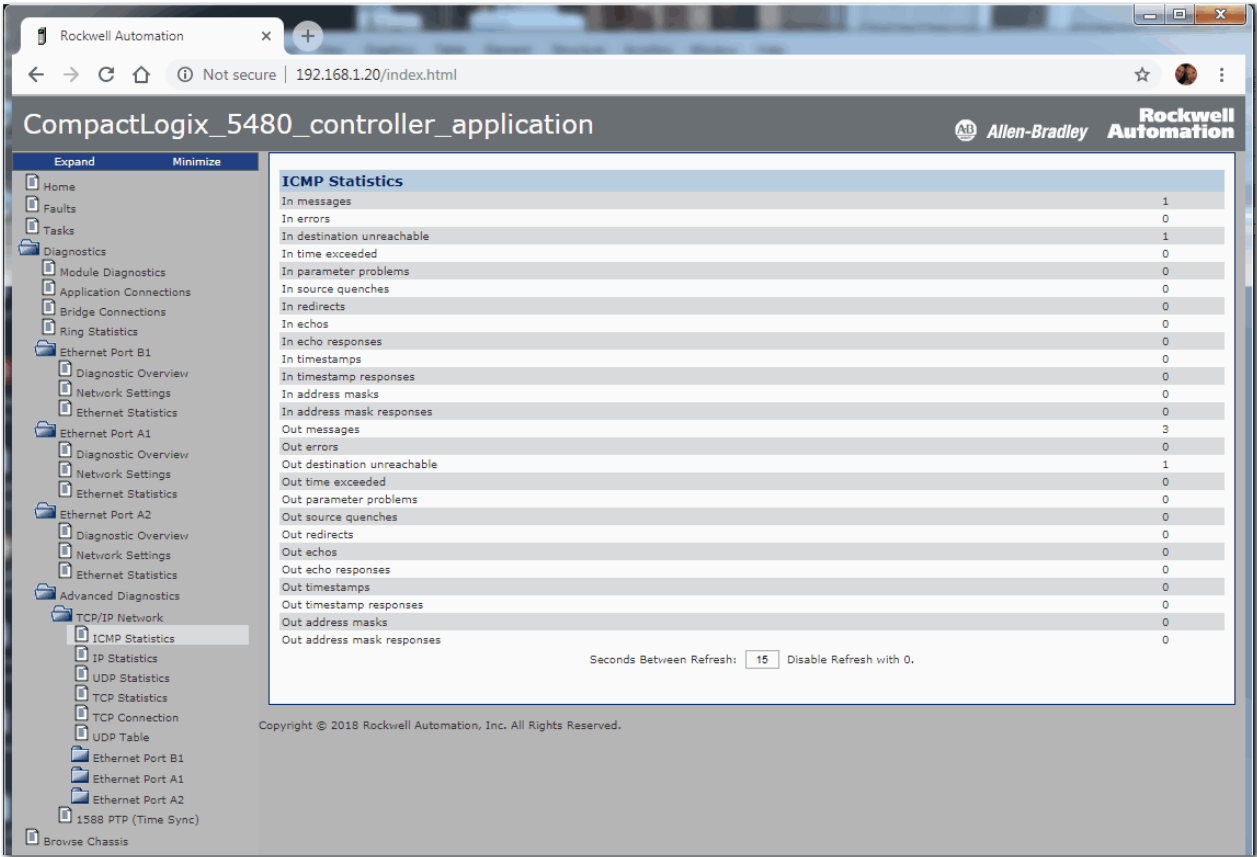
The screenshot shows a web browser window displaying the 'CompactLogix\_5480\_controller\_application' interface. The browser address bar shows '192.168.1.20/index.html'. The page title is 'CompactLogix\_5480\_controller\_application' and it features the Rockwell Automation logo. A left-hand navigation menu is visible, with 'Advanced Diagnostics' expanded to show 'TCP/IP Network' and 'ICMP Statistics' selected. The main content area displays the 'ICMP Statistics' table.

ICMP Statistics	
In messages	1
In errors	0
In destination unreachable	1
In time exceeded	0
In parameter problems	0
In source quenches	0
In redirects	0
In echos	0
In echo responses	0
In timestamps	0
In timestamp responses	0
In address masks	0
In address mask responses	0
Out messages	3
Out errors	0
Out destination unreachable	1
Out time exceeded	0
Out parameter problems	0
Out source quenches	0
Out redirects	0
Out echos	0
Out echo responses	0
Out timestamps	0
Out timestamp responses	0
Out address masks	0
Out address mask responses	0

Seconds Between Refresh:  Disable Refresh with 0.

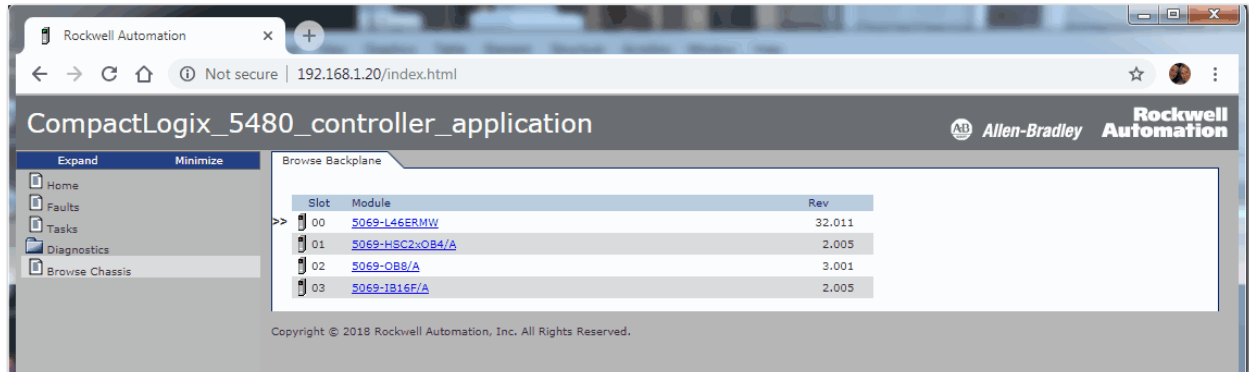
Copyright © 2018 Rockwell Automation, Inc. All Rights Reserved.

Figure 62 - Advanced Diagnostics Webpage - Dual-IP Mode



## Browse Chassis Webpage

The Browse Chassis provides information about the devices in the system. You can click the link for each catalog number to access more information about that device.



## Other Potential Issues to Troubleshoot

The CompactLogix 5480 controller can experience other issues that you must troubleshoot.

### Continuous Task Sends Output Data at High Rate

A free-running Continuous Task can keep sending outputs at a high rate. If the Continuous Task executes repetitively with a short task execution time, and local output or produced data is changing, the controller can produce data faster than the receiving modules can react.

We recommend that you program appropriately to avoid this condition. For example, monitor interval times between continuous task execution.

## **Immediate Output Instructions Issued at High Rate**

CompactLogix 5480 controllers can issue Immediate Output (IOT) instructions faster than I/O modules can react to them. We recommend that you program IOT instructions so that they are sent at a rate appropriate for the I/O module and the corresponding physical devices.

## **Integrated Motion On an EtherNet/IP Network Traffic Priority Status**

When you use a Stratix® managed switch to change the network communication rate from 1 Gbps to 100 Mbps, the system can fail to prioritize the Integrated Motion On an EtherNet/IP network communication higher than standard I/O communication.

For more information on managed switches in general, see the EtherNet/IP Network section of the product directory accessible at this address:  
<http://ab.rockwellautomation.com/networks-and-communications/ethernet-ip-network>.

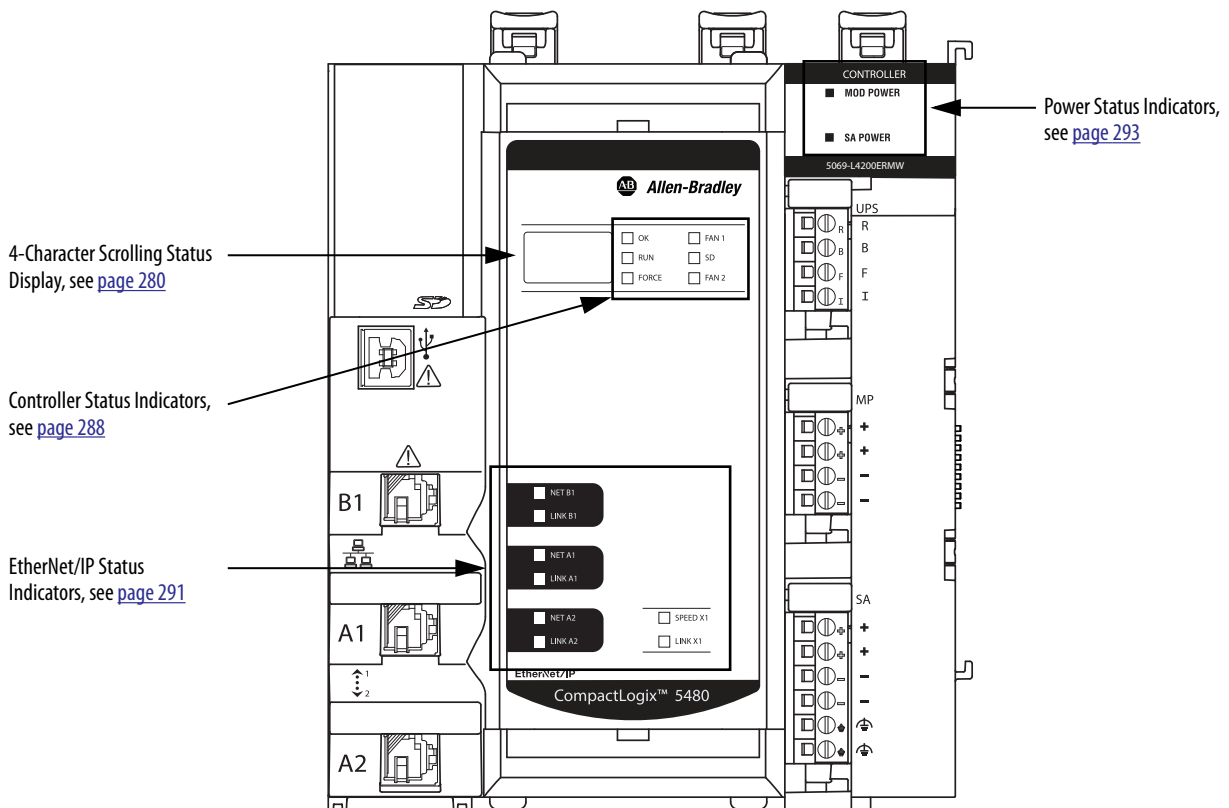
**Notes:**

## Status Indicators

Topic	Page
4-Character Status Display	280
Controller Status Indicators	288
EtherNet/IP Status Indicators	291
Power Status Indicators	293
Thermal Monitoring and Thermal Fault Behavior	294

The CompactLogix™ 5480 controllers have a four-character scrolling status display, controller status indicators, EtherNet/IP™ network status indicators, and power indicators.

**Figure 63 - Status Display and Indicators**



## 4-Character Status Display

The CompactLogix 5480 controller 4-character status display scrolls messages that provide information about the following:

- Firmware revision
- Energy storage status
- Project status
- Ethernet port status
- Major faults of the controller
- Local I/O faults information

## General Status Messages

[Table 33](#) describes the messages.

**Table 33 - General Status Messages**

Message	Interpretation
No message is indicated	The controller is Off. Check the MOD POWER status indicator to see if power is applied to the system. Check the OK indicator to determine if the controller is powered and to determine the state of the controller.
TEST	The controller is conducting power-up tests.
CHRG	The embedded energy storage circuit is charging.
PASS	Power-up tests have completed successfully.
One of the following: • SAVE • Saving...Do Not Remove SD Card	The following occurs. 1. First, the controller is about to save an image to the SD card. 2. A project is being saved to the SD card. For more information, see <a href="#">SD Indicator on page 290</a> . Let the save operation complete before you take the following actions: • Remove the SD card. • Disconnect the power. <b>IMPORTANT:</b> Do not remove the SD card while the controller is saving to the SD card. Let the save complete without interruption. If you interrupt the save, data corruption or loss can occur.
One of the following: • LOAD • Loading . . . Do Not Remove SD Card	A project is being loaded from the SD card. For more information, see <a href="#">SD Indicator on page 290</a> . Let the load operation complete before doing the following: • Remove the SD card • Disconnect the power <b>IMPORTANT:</b> Do not remove the SD card while the controller is loading from the SD card. Let the load complete without interruption. If you interrupt the load, data corruption or loss can occur.
UPDT	A firmware update is being conducted from the SD card upon powerup. For more information, see <a href="#">SD Indicator on page 290</a> . If you do not want the firmware to update upon powerup, change the Load Image property of the controller.
Rev XX.xxx	The firmware major and minor revision of the controller.
5069-L4xxx	The controller catalog number and series.
Link Down	Message appears when an Ethernet port does not have a network connection. Message scrolls continuously during operation. <b>IMPORTANT:</b> When the controller operates in Dual-IP mode, this information is provided for each link, that is, Link A1 and Link A2. The link name appears before the information.



**Table 33 - General Status Messages (continued)**

Message	Interpretation
Link Disabled	Message appears when you have disabled an EtherNet/IP port. Message scrolls continuously during operation. <b>IMPORTANT:</b> When the controller operates in Dual-IP mode, this information is provided for each link, that is, Link A1 and Link A2. The link name appears before the information.
DHCP-00:00:XX:XX:XX:XX	Message appears when the controller is set for DHCP, but not configured on a network. The message shows the MAC address for each Ethernet port. The message scrolls continuously during operation if no IP address is set.
Ethernet Port Rate/ Duplex State	The current port rate and duplex state for each EtherNet/IP port that has a connection. Message scrolls continuously during operation.
IP Address	The IP address of each Ethernet port. Appears on powerup and scrolls continuously during operation. If the IP address is not yet set, the MAC address appears.
Duplicate IP - 00:00:XX:XX:XX:XX	Message appears when the controller detects a device on the network with the same IP Address as an Ethernet connected to the same network. The message shows the MAC address of the device with the duplicate IP Address. Message scrolls continuously during operation.
DHCP-Address Lost	The controller communicated with the DHCP server to renew the IP addresses on the Ethernet ports. The server either did not reply or did not renew the IP address. The controller continues to operate, but with no Ethernet connectivity out of this port.
IP Address/Mask/ Gateway/DNS Invalid	The DHCP server responded with an unusable combination.
IP Address Invalid	The IP Address that is used in an Ethernet port configuration is not valid.
Mask Invalid	The Subnet/Network Mask used in an Ethernet port configuration is not valid.
Gateway Invalid	The Gateway Address that is used in an Ethernet port IP configuration is not valid.
DNS Invalid	The DNS used in an Ethernet port IP configuration is not valid.
No Project	No project is loaded on the controller. To load a project, complete one of the following tasks: <ul style="list-style-type: none"> <li>• Use the Logix Designer application to download the project to the controller</li> <li>• Use an SD card to load a project to the controller</li> </ul>
Project Name	The name of the project that is loaded on the controller.
BUSY	The I/O modules that are associated with the controller are not yet fully powered. Let powerup and I/O module self-testing complete.
Corrupt Certificate Received	The security certificate that is associated with the firmware is corrupted. Go to <a href="http://www.rockwellautomation.com/support/">http://www.rockwellautomation.com/support/</a> and download the firmware revision to which you are trying to update. Replace the firmware revision that you have previously installed with that posted on the Technical Support website.
Corrupt Image Received	The firmware file is corrupted. Go to <a href="http://www.rockwellautomation.com/support/">http://www.rockwellautomation.com/support/</a> and download the firmware revision to which you are trying to update. Replace the firmware revision that you have previously installed with that posted on the Technical Support website.
Backup Energy HW Failure - Save Project	A failure with the embedded storage circuit has occurred, and the controller is incapable of saving the program if there is a powerdown. If you see this message, save your program to the SD card before you remove power and replace the controller.
Backup Energy Low - Save Project	The embedded storage circuit does not have sufficient energy to enable the controller to save the program if there is a powerdown. If you see this message, save your program to the SD card before you remove power and replace the controller.
Flash in Progress	A firmware update that is initiated via ControlFLASH™ or AutoFlash utilities is in progress. Let the firmware update complete without interruption.
XX %	The percentage of the Windows Kit update that is complete.
Firmware Installation Required	The controller is using boot firmware, that is, revision 1.xxx, and requires a firmware update.
SD Card Locked	An SD card that is locked is installed.

**Table 33 - General Status Messages (continued)**

Message	Interpretation
UTIL	The COS is restarting in Operating System Utilities mode.
MODE	The reset button was pressed and held while the controller was powered but the controller is working as normal.
SFTR	The COS is performing a soft reset.
HRDER	The COS is performing a hard reset.
Operating System Utilities Mode	The COS reinstallation is beginning.
Flashing in Progress - Installing Operating System (%)	The percentage of progress that has been made when the COS is being reinstalled.

## Fault Messages

If the controller displays a fault, the following messages can be indicated on the status display.

**Table 34 - Fault Messages**

Message	Interpretation
Major Fault TXX:CXX <i>message</i>	A major fault of Type <i>XX</i> and Code <i>XX</i> has been detected. For example, if the status display indicates Major Fault T04:C42 Invalid JMP Target, a JMP instruction is programmed to jump to an invalid LBL instruction. For details about major recoverable faults, see the Logix 5000™ Major, Minor, and I/O Fault Codes Programming Manual, publication <a href="#">1756-PM014</a> .
I/O Fault Local:X #XXXX <i>message</i>	An I/O fault has occurred on a module in the local chassis. The slot number and fault code are indicated along with a brief description. For example, I/O Fault Local:3 #0107 Connection Not Found indicates that a connection to the local I/O module in slot three is not open. Take corrective action specific to the type of fault indicated. For details about each I/O fault code, see the Logix 5000 Major, Minor, and I/O Fault Codes Programming Manual, publication <a href="#">1756-PM014</a> .
I/O Fault <i>ModuleName</i> #XXXX <i>message</i>	An I/O fault has occurred on a module in a remote chassis. The name of the faulted module is indicated with the fault code and brief description of the fault. For example, I/O Fault My_Module #0107 Connection Not Found indicates that a connection to the module named My_Module is not open. Take corrective action specific to the type of fault indicated. For details about each I/O fault code, see the Logix 5000 Major, Minor, and I/O Fault Codes Programming Manual, publication <a href="#">1756-PM014</a> .
I/O Fault <i>ModuleParent</i> :X #XXXX <i>message</i>	An I/O fault has occurred on a module in a remote chassis. The parent name of the module is indicated because no module name is configured in the I/O Configuration tree of Logix Designer application. In addition, the fault code is indicated with a brief description of the fault. Take corrective action specific to the type of fault indicated. For details about each I/O fault code, see the Logix 5000 Major, Minor, and I/O Fault Codes Programming Manual, publication <a href="#">1756-PM014</a> .
X I/O Faults	I/O faults are present and <i>X</i> = the number of I/O faults present. If there are multiple I/O faults, the controller indicates that the first fault reported. As each I/O fault is resolved, the number of indicated faults decreases and the I/O Fault message indicates the next reported fault. Take corrective action specific to the type of fault indicated. For details about each I/O fault code, see the Logix 5000 Major, Minor, and I/O Fault Codes Programming Manual, publication <a href="#">1756-PM014</a> .

## Major Fault Messages

The Major Fault TXX:CXX *message* on the controller status display indicates major faults. [Table 35](#) lists fault types, codes, and the associated messages as they are shown on the status display.

For detailed descriptions and suggested recovery methods for major faults, see the Logix 5000 Major, Minor, and I/O Fault Codes Programming Manual, publication [1756-PM014](#).

**Table 35 - Major Fault Status Messages**

Type	Code	Message
1	1	Run Mode Powerup
1	60	Nonrecoverable
1	61	Nonrecoverable – Diagnostics Saved on SD Card
3	16	I/O Connection Failure
3	20	Chassis Failure
3	21	
3	23	Connection Failure
4	16	Unknown Instruction
4	20	Invalid Array Subscript
4	21	Control Structure LEN or POS < 0
4	31	Invalid JSR Parameter
4	34	Timer Failure
4	42	Invalid JMP Target
4	82	SFC Jump Back Failure
4	83	Value Out of Range
4	84	Stack Overflow
4	89	Invalid Target Step
4	90	Invalid Instruction
4	91	Invalid Context
4	92	Invalid Action
4	990	User-defined
4	991	
4	992	
4	993	
4	994	
4	995	
4	996	
4	997	
4	998	
4	999	

**Table 35 - Major Fault Status Messages (continued)**

Type	Code	Message
6	1	Task Watchdog Expired
7	40	Save Failure
7	41	Bad Restore Type
7	42	Bad Restore Revision
7	43	Bad Restore Checksum
7	44	Failed to Restore Processor Memory
8	1	Mode switch Change Ignored
10	14	Energy Storage Fault
10	15	
11	1	Positive Overtravel Limit Exceeded
11	2	Negative Overtravel Limit Exceeded
11	3	Position Error Tolerance Exceeded
11	4	Encoder Channel Connection Fault
11	5	Encoder Noise Event Detected
11	7	Synchronous Connection Fault
11	8	Servo Module Fault
11	9	Asynchronous Connection Fault
11	32	Motion Task Overlap Fault
11	33	CST Reference Loss Detected
17	34	Temperature Fault or Preservation Fault
18	1	CIP Motion Initialization Fault
18	2	CIP Motion Initialization Fault Mfg
18	3	CIP Motion Axis Fault
18	4	CIP Motion Axis Fault Mfg
18	5	CIP Motion Fault
18	6	CIP™ Module Fault
18	7	Motion Group Fault
18	8	CIP Motion Configuration Fault
18	9	CIP Motion APR Fault
18	10	CIP Motion APR Fault Mfg
18	128	CIP Motion Guard Fault

## I/O Fault Codes

The controller indicates I/O faults on the status display in one of the following formats:

- I/O Fault Local:*X* #XXXX *message*
- I/O Fault *ModuleName* #XXXX *message*
- I/O Fault *ModuleParent:X* #XXXX *message*

The first part of the format is used to indicate the location of the module with a fault. How the location is indicated depends on your I/O configuration and the properties of the module that are specified in Logix Designer application.

The latter part of the format, #XXXX message, can be used to diagnose the type of I/O fault and potential corrective actions. For details about each I/O fault code, see the Logix 5000 Major, Minor, and I/O Fault Codes Programming Manual, publication [1756-PM014](#).

**Table 36 - I/O Fault Messages**

Code	Message
#0001	Connection Failure
#0002	Insufficient Resource
#0003	Invalid Value
#0004	IOI Syntax
#0005	Destination Unknown
#0006	Partial Data Transferred
#0007	Connection Lost
#0008	Service Unsupported
#0009	Invalid Attribute Value
#000A	Attribute List Error
#000B	State Already Exists
#000C	Object Mode Conflict
#000D	Object Already Exists
#000E	Attribute Not Settable
#000F	Permission Denied
#0010	Device State Conflict
#0011	Reply Too Large
#0012	Fragment Primitive
#0013	Insufficient Command Data
#0014	Attribute Not Supported
#0015	Data Too Large
#0100	Connection In Use
#0103	Transport Not Supported
#0106	Ownership Conflict
#0107	Connection Not Found
#0108	Invalid Connection Type

**Table 36 - I/O Fault Messages (continued)**

<b>Code</b>	<b>Message</b>
#0109	Invalid Connection Size
#0110	Module Not Configured
#0111	RPI Out of Range
#0113	Out of Connections
#0114	Wrong Module
#0115	Wrong Device Type
#0116	Wrong Revision
#0117	Invalid Connection Point
#0118	Invalid Configuration Format
#0119	Module Not Owned
#011A	Out of Connection Resources
#0203	Connection Timeout
#0204	Unconnected Message Timeout
#0205	Invalid Parameter
#0206	Message Too Large
#0301	No Buffer Memory
#0302	Bandwidth Not Available
#0303	No Bridge Available
#0305	Signature Mismatch
#0306	CCM Not Available
#0311	Invalid Port
#0312	Invalid Link Address
#0315	Invalid Segment Type
#0317	Connection Not Scheduled
#0318	Invalid Link Address
#0319	No Secondary Resources Available
#031E	No Available Resources
#031F	No Available Resources
#0800	Network Link Offline
#0801	Incompatible Multicast RPI
#0814	Data Type Mismatch
#FD01	Bad Backplane EEPROM
#FD02	No Error Code
#FD03	Missing Required Connection
#FD04	No CST Master
#FD05	Axis or GRP Not Assigned
#FD0A	Axis Attribute Reject
#FD1F	Safety I/O
#FD20	No Safety Task
#FE01	Invalid Connection Type

**Table 36 - I/O Fault Messages (continued)**

<b>Code</b>	<b>Message</b>
#FE02	Invalid Update Rate
#FE03	Invalid Input Connection
#FE04	Invalid Input Data Pointer
#FE05	Invalid Input Data Size
#FE06	Invalid Input Force Pointer
#FE07	Invalid Output Connection
#FE08	Invalid Output Data Pointer
#FE09	Invalid Output Data Size
#FE0A	Invalid Output Force Pointer
#FE0B	Invalid Symbol String
#FE0C	Invalid Scheduled Personal Computer Instance
#FE0D	Invalid Symbol Instance
#FE0E	Module Firmware Updating
#FE0F	Invalid Firmware File Revision
#FE10	Firmware File Not Found
#FE11	Firmware File Invalid
#FE12	Automatic Firmware Update Failed
#FE13	Update Failed - Active Connection
#FE14	Searching Firmware File
#FE22	Invalid Connection Type
#FE23	Invalid Unicast Allowed
#FF00	No Connection Instance
#FF01	Path Too Long
#FF04	Invalid State
#FF08	Invalid Path
#FF0B	Invalid Config
#FF0E	No Connection Allowed

## Controller Status Indicators

The controller status indicators display the state of the controller.

### OK Indicator

The OK indicator shows the state of the controller.

**Table 37 - OK Indicator**

State	Description
Off	No power is applied.
Flashing red	<p>One of the following exists:</p> <ul style="list-style-type: none"> <li>The controller requires a firmware update. Typically, the controller is in its out-of-box state when a firmware update is required. If a firmware update is required, the 4-character display indicates Firmware Installation Required. For more information on how to update firmware, see <a href="#">Upload from the Controller on page 89</a>.</li> <li>A firmware update is in progress. If a firmware update is in progress, the 4-character display indicates Flash in Progress. For more information on how to update firmware, see <a href="#">Upload from the Controller on page 89</a>.</li> <li>The controller has a major fault. The fault can be recoverable or nonrecoverable. If the fault is nonrecoverable, the program has been cleared from the controller memory. If a fault has occurred, the 4-character display shows information about the fault, for example, the Type and Code. For details about major faults, see the following: <ul style="list-style-type: none"> <li>The fault descriptions in the <a href="#">4-Character Status Display</a> starting on <a href="#">page 280</a>.</li> <li>Logix 5000 Major, Minor, and I/O Fault Codes Programming Manual, publication <a href="#">1756-PM014</a>.</li> </ul> </li> </ul>
Solid red	<p>One of the following:</p> <ul style="list-style-type: none"> <li>The controller is completing power-up diagnostics.</li> <li>The controller is depleting its residual stored energy upon power-down.</li> <li>The controller is powered, but is inoperable.</li> <li>The controller is loading a project to nonvolatile memory.</li> <li>The controller is experiencing a Hardware Preservation Fault due to a high internal module temperature. In this condition, only the status indicator receives power. Once the controller cools down to an acceptable temperature, full power is applied.</li> </ul>
Solid green	The controller is operating normally.



## RUN Indicator

The RUN indicator shows the current mode of the controller.

To change the controller mode, you can use the mode switch on the front of the controller or the Controller Status menu in the Logix Designer application.

**Table 38 - RUN Indicator**

State	Description
Off	The controller is in Program or Test mode.
Steady green	The controller is in Run mode.

## FORCE Indicator

The Force indicator shows if I/O forces are enabled on the controller.

**Table 39 - FORCE Indicator**

State	Description
Off	No tags contain I/O force values.
Solid amber	I/O forces enabled. If any I/O force values exist, they are active. <b>IMPORTANT:</b> Use caution if you enable I/O forces. All existing I/O force values take effect immediately.
Flashing yellow	I/O forces exist in the application, but are not active because I/O forces are not enabled. <b>IMPORTANT:</b> Use caution if you enable I/O forces. All existing I/O force values take effect immediately.

## FAN 1/2 Indicator

The Fan 1/2 indicators show the operating state of the controller fans.

**Table 40 - FAN Indicator**

State	Description
Solid green	The fan is operating as normal.
Solid red	<p>One of the following:</p> <ul style="list-style-type: none"> <li>• The fan is off. We recommend that you troubleshoot the application to determine why the fan is off and correct the issue.</li> <li>• The fan is running at a slower pace than needed. We recommend that you troubleshoot the application to determine why the fan is running slower than needed and correct the issue.</li> <li>• The fan has failed. We recommend that you replace a fan if it fails.</li> </ul>

## SD Indicator

The SD indicator shows if the SD card is in use.

**Table 41 - SD Indicator**

State	Description
Off	No activity is occurring with the SD card. You can safely remove the card, if necessary.
Flashing green	The controller is reading from or writing to the SD card.
Solid green	<b>IMPORTANT:</b> Do not remove the SD card while the controller is reading or writing. Let the read/write complete without interruption. If you interrupt the read/write, data corruption or loss can occur.
Flashing red	<p>One of the following exists:</p> <ul style="list-style-type: none"> <li>• The SD card does not have a valid file system.</li> <li>• The SD card drew excessive current and power has been removed from the card.</li> </ul>
Solid red	The controller does not recognize the SD card.

## EtherNet/IP Status Indicators

The EtherNet/IP indicators show the state of the controller Ethernet ports and network communication activity.

### NET A1, A2, and B1 Indicators

The NET A1, A2, and B1 indicators show the state of the EtherNet/IP ports that are used for Logix control network connections.

**Table 42 - NET A1, A2, and B1 Indicators**

State	Description
Off	One of the following: <ul style="list-style-type: none"> <li>The controller is not configured or does not have an IP address.</li> <li>The port is administratively disabled.</li> <li>The EtherNet/IP mode is Linear/DLR mode. The NET A1 indicator is on. The NET A2 indicator is off.</li> </ul> <b>IMPORTANT:</b> The third bullet applies to only ports A1 and A2.
Flashing green	The port has an IP address, but no active connections are established.
Steady green	The port has an IP address and at least one established active connection.
Steady red	Duplicate IP Address or invalid configuration.

### LINK A1, A2, and B1 Indicators

The LINK A1, A2, and B1 indicators show the state of the EtherNet/IP links with Logix control network connections.

**Table 43 - LINK A1, A2, and B1 Indicators**

State	Description
Off	The link is down. One or more of the following conditions exists: <ul style="list-style-type: none"> <li>Ethernet cables are not properly connected at both ends. That is, the cables are not properly connected the controller Ethernet port and to the connected device.</li> <li>No link exists on the port. For example, the connected device is not powered.</li> <li>The port is administratively disabled.</li> <li>LINK A2 only:               <ul style="list-style-type: none"> <li>The controller is the active ring supervisor in a DLR network, and the ring is not broken. This is normal operation.</li> <li>The controller is the active ring supervisor in a DLR network and has detected a rapid ring fault.</li> </ul> </li> </ul>
Flashing green	The following conditions exist: <ul style="list-style-type: none"> <li>The port is enabled.</li> <li>A link exists. That is, the cable is properly connected to an enabled controller Ethernet port on to another device.</li> <li>There is <b>activity</b> on the port.</li> </ul>
Steady green	The following conditions exist: <ul style="list-style-type: none"> <li>The port is enabled.</li> <li>A link exists. That is, the cable is properly connected to an enabled controller Ethernet port on to another device.</li> <li>There is <b>no activity</b> on the port.</li> </ul>

### SPEED X1 Indicator

The SPEED X1 indicator shows the state of the COS network port connection.

State	Description
Steady amber	The port is connected to a network operating at a communication rate of 1 Gbps.
Steady green	The port is connected to a network operating at a communication rate of 100 Mbps.
Off	The port is connected to a network operating at a communication rate of 10 Mbps.

### LINK X1 Indicator

The LINK X1 indicator shows the state of the EtherNet/IP link to which the COS network port is connected.

State	Description
Flashing green	A link exists and there is activity on the port.
Steady green	A link exists but there is no activity on the port.
Off	No link exists.

## Power Status Indicators

The power status indicators show the status of MOD power and SA Power.

### MOD Power Indicator

[Table 44](#) describes the MOD Power indicator on a CompactLogix 5480 controller.

**Table 44 - MOD Power Indicator**

State	Description
Off	No power is applied.
Steady green	A valid power level, that is, 18...32V DC, is applied to the RTB. <sup>(1)</sup>
Steady red	An invalid power level, that is, <18V DC or >32V DC, is applied to the RTB.

(1) Although unlikely, it is possible that there is enough Module power present for the indicator to turn steady green but the power is not valid because the supply current or inrush current is undersized.

### SA Power Indicator

[Table 45](#) describes the SA Power indicator on a CompactLogix 5480 controller.

**Table 45 - SA Power Indicator**

State	Description
Off	One of the following: <ul style="list-style-type: none"> <li>SA power is not present</li> <li>Status of SA power is unknown</li> </ul>
Steady green	SA Power is present <sup>(1)</sup>

(1) Although unlikely, it is possible that there is enough SA Power present for the indicator to turn steady green but the power is not valid. Valid power is 18...32V DC in applications that require DC voltage and 18...240V AC in applications that require AC voltage.

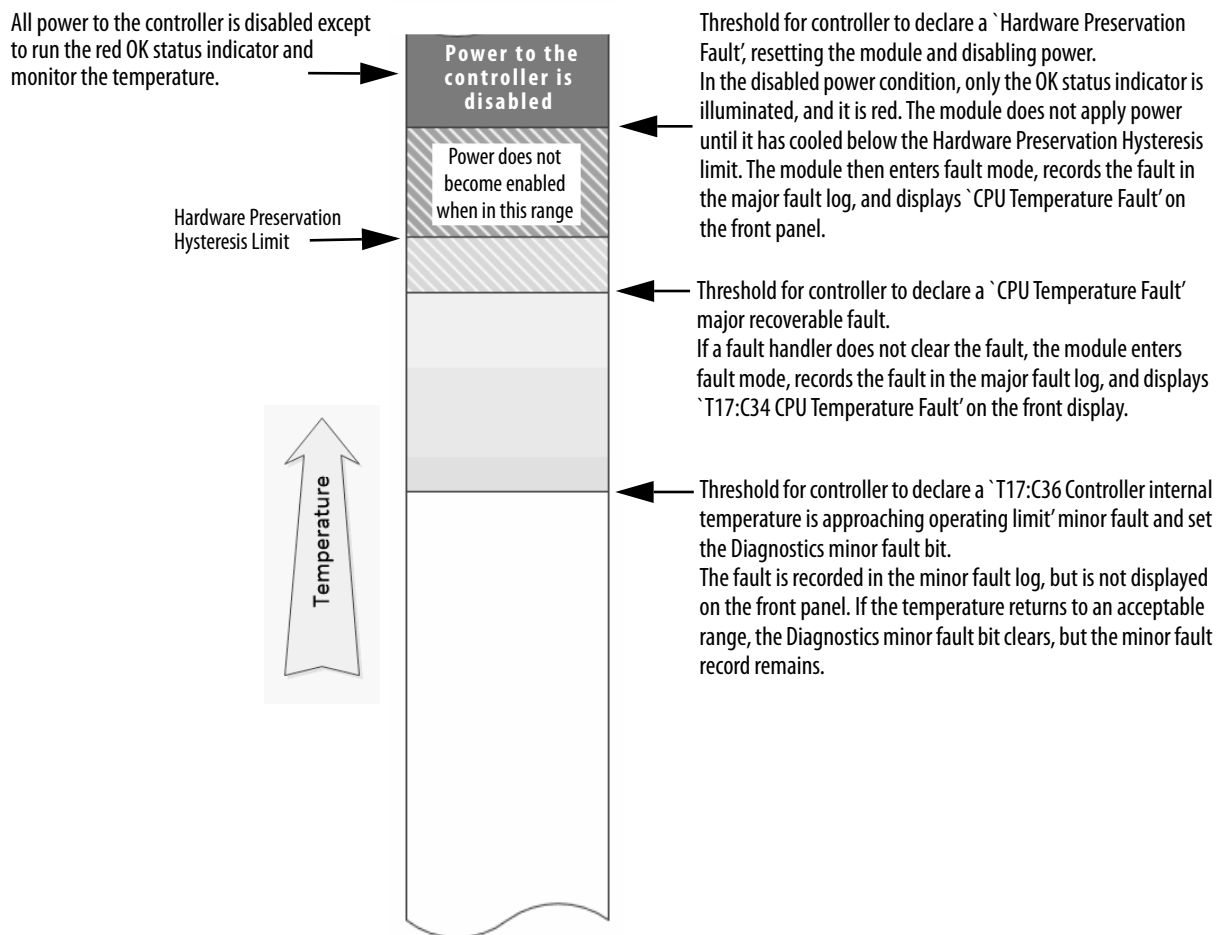
If SA Power is invalid, we recommend that you make sure that the external power supply is working correctly, properly sized for your application and that all wiring is correct.

## Thermal Monitoring and Thermal Fault Behavior

The CompactLogix 5480 controllers monitor internal module temperatures. As shown in [Figure 64](#), the controller takes actions as the temperature increases.

- IMPORTANT**
- Faults that occur as a result of changing internal module temperature reporting, are declared when the module is in Run mode or transitions to Run mode.
  - The COS is not aware of increasing internal module temperature and operates as expected until the controller declares a Hardware Preservation Fault and power is disabled.
- When power is disabled on the controller, the COS shuts down.

**Figure 64 - CompactLogix 5480 Controller Thermal Fault Behavior**



- IMPORTANT** If you follow the recommended limits for ambient (inlet) temperature and apply the required clearances around the system, the controller is unlikely to reach the initial warning (minor fault) temperature.
- For more information on CompactLogix 5480 controller specifications, see CompactLogix 5480 Controller Specifications Technical Data, publication [5069-TD002](#).

**IMPORTANT** The presence of any temperature warning indicates that measures must be taken to reduce the ambient temperature of the module.

Instructions for how to use relay ladder logic to check for a minor fault can be found in the Logix 5000 Controllers Major, Minor, and I/O Faults Programming Manual, publication [1756-PM014](#).

You can use a GSV instruction to read the MinorFaultBits attribute of the FaultLog class name. If the Diagnostics minor fault bit (Bit 17) is set, a temperature minor fault can be present. Check the Minor Faults tab of the Controller Properties dialog box in Logix Designer application to see if the minor fault is a temperature warning.

---

**Notes:**



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